

ALASKA PENINSULA AND ALEUTIAN ISLANDS MANAGEMENT  
AREAS SAC ROE HERRING REPORT AND THE ALEUTIAN ISLANDS  
MANAGEMENT AREA FOOD AND BAIT HERRING REPORT, 1996

By

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## ABSTRACT

The 1996 season extended from April 15 through July 15 in the Alaska Peninsula and Aleutian Islands waters. However, the Port Moller District had several openings beginning June 10 and ending June 30, the Port Heiden District had no openings; the opening of the Sand Point, Pavlof, and King Cove Districts was from April 15 through July 15; the opening of the Unimak, Akutan, Unalaska, Umnak, and Adak Districts was from April 15 through June 15; the Amak District was open from April 15 through June 30; and the Aleutian Islands Management Area "Dutch Harbor" food and bait herring fishery was open during July 16.

In 1996, commercial sac roe herring harvests occurred in North Peninsula waters from June 12 through June 18 and in South Peninsula waters from May 10 to June 27. No sac roe herring harvest occurred in the Aleutian Islands Management Area. The North Peninsula catch was 95.8 tons and the South Peninsula catch was 124.4 tons, producing a total Alaska Peninsula harvest of 220.2 tons. The 1996 Alaska Peninsula sac roe herring harvest was approximately half the 1995 harvest of 400.0 tons and was one fifth the ten year average (1987-96) harvest of 1,009.9 tons. During the sac roe herring fishery, 5 purse seine permit holders made 17 deliveries to two companies that purchased herring. The average roe recovery during the sac roe season was 8.0% for the North Peninsula, 11.4% for the South Peninsula, and both areas combined was 9.9%. The average price per ton was \$500 for 10% roe recovery and  $\pm$  \$50 for each percentage point above or below 10%, giving a sac roe herring exvessel value of approximately \$105,000 for the Alaska Peninsula fishery.

Aerial biomass survey estimates were documented for the North Peninsula : Herendeen Bay (390 tons), Moller Bay (986 tons), Bering Sea Coast (309), and Port Heiden Bay (65 tons). Fishermen and commercial pilots reported herring in several locations where ADF&G personnel were unable to survey. Industry conducted aerial surveys were included in the biomass estimates beginning in June due to lack of state funded surveys being available.

In 1996, commercial food and bait catches occurred in the Aleutian Islands Management Area. The Aleutian Islands "Dutch Harbor" commercial food and bait herring harvest was 2,239.2 tons ( bait only), with an allocation of 1,793 tons, and a test fishery harvest of 39.3 tons. The average price per ton was \$300, giving a food and bait exvessel value of approximately \$671,760 for the Aleutian Islands Management Area commercial food and bait herring fishery. During the fishery, 26 purse seine permit holders (24 vessels) made 29 deliveries to six companies that purchased herring.

**KEY WORDS:** Alaska Peninsula, Aleutian Islands, herring, catch, age, length, weight, sex, sac roe, food

## INTRODUCTION

### *Alaska Peninsula*

The Alaska Peninsula and Aleutian Islands Management Areas (Figures 1-2) are described as Management Area "M" and are divided into three subareas; (1) the North Peninsula, consisting of Bering Sea waters extending west from Cape Menshikof to Cape Sarichef; (2) the South Peninsula, consisting of Pacific Ocean coastal waters extending west of Kupreanof Point to 163°30' W. long. (the south side of Unimak Island near Cape Lazaref); and (3) the Aleutian Islands, consisting of Bering Sea waters extending west of Unimak Pass and Pacific Ocean waters extending west from 163°30' W. long. (the south side of Unimak Island near Cape Lazaref) to the International Date Line (Figures 3-9).

The North Peninsula is comprised of three districts and 23 statistical areas, the South Peninsula includes three districts and 45 statistical areas, and the Aleutian Islands includes five districts and 41 statistical areas. Fishing normally begins in the latter part of May in both North and South Peninsula waters and ends in mid to late June. The Aleutian Islands has not had a sac roe herring harvest since at least 1979. The fishery for food and bait herring in the Aleutian Islands Management Area begins by regulation on July 16.

Commercial herring fisheries have been regulated by emergency order to achieve exploitation mandates by the Alaska Board of Fisheries (BOF), these regulations also address problems with wastage. Management plans and other BOF directives set policies by which these fisheries are prosecuted (ADF&G 1996; Campbell and Murphy 1996; Campbell 1996).

Herring have been reported throughout most areas in the North Peninsula, South Peninsula, and in Unalaska Island waters of the Aleutian Islands Management Area. Major concentrations of herring and fishing effort have occurred in North Peninsula waters in Port Heiden, Port Moller, and Herendeen Bays, and along the Bering Sea coast in near shore waters from Entrance Point to Cape Seniavin. Known herring stocks and most fishing effort occurs in South Peninsula waters in the Shumagin Islands, and Stepovak, Pavlof, and Canoe Bays. Fishing effort in the Aleutian Islands Management Area has been limited to Unalaska and Akutan Islands waters.

From 1981 through 1995, the Alaska Department of Fish and Game (ADF&G) deployed field crews in the Alaska Peninsula for the purpose of collecting data and to monitor the fishery. Crews have collected herring samples and documented spawning areas and substrate. Aerial surveys have been used with limited success to monitor the fishery, primarily due to the large area involved, poor weather, turbidity of the water, and the sporadic and unpredictable appearance of the herring. ADF&G has been conducting aerial surveys in the Alaska Peninsula since 1981, however, only surveys flown in 1989, 1991, and 1992 are considered to have provided an accurate assessment of the total spawning biomass in North Peninsula waters.

Aerial surveys of the Port Moller area by ADF&G personnel in 1976 reported numerous schools of herring in Herendeen Bay (Warner and Shafford 1979). The first commercial catches of sac roe herring in North Peninsula waters occurred in 1982 when 505.5 tons in the North Peninsula and 138.3 tons in the South Peninsula were harvested (Table 1). From 1987-96, an average of 815.1

tons have been harvested during the North Peninsula sac roe herring fishery. Until 1992, the majority of the harvest was taken from Herendeen and Moller Bays and the balance of the catch was taken off the Bering Sea coast between Entrance Point and the Seal Islands (Table 2). In 1992, more than 40% of the North Peninsula harvest came from Port Heiden Bay.

Prior to 1982, fishing vessels destined to or returning from the Togiak herring fishery, frequently looked for herring in the Port Moller and Port Heiden Districts but made no deliveries. In the Port Moller District, during the 1986-88 seasons, there was an average of 52 vessels present, although only a few permit holders actually made landings. In 1986, fishing effort increased on the earlier arriving biomass. In order to shift fishing pressure from the earlier arriving herring to the later more abundant fish, the Port Moller District opening was delayed until May 30 from 1989 to 1992. However, the fishery could open prior to May 30 by emergency order if a large biomass of herring was documented in the area. The later opening date in the 1989-91 seasons started a trend of decreasing effort. Fishers returning from Togiak tended to pursue halibut or salmon fisheries rather than wait for the Port Moller herring fishery to open. The Port Moller District opened prior to May 30 in 1991-93 due to a herring biomass sufficient to warrant commercial harvests. The run timing of the North Peninsula stocks appears to be two to three days after the biomass peaks in the Togiak fishery. Since 1993, the Togiak sac roe herring harvest strategy has extended the harvest well after the peak biomass. This along with lower biomass levels has likely caused less than expected harvests in the North Peninsula due to the late arrival of industry, well past the expected North Peninsula peak biomass.

The South Peninsula sac roe herring harvest and effort continues to fluctuate since it began in 1979. During years in which commercial sac roe herring harvests occurred, landings have been reported from 18 geographical locations; of these, only Canoe Bay produced an annual harvest (Tables 3; Figure 8).

In South Peninsula waters, significant landings occurred in 1980 (453.8 tons), and peaked in 1981 (797.4 tons; Table 1). The BOF closed the South Peninsula sac roe herring fishery in 1983, allocating all catches to a food and bait herring fishery that failed to develop. From 1984 through 1991, the BOF allocated the catch between the sac roe fishery (75% of the allowable harvest) and the food and bait fishery (25% of the allowable harvest). In 1992, the BOF allocated the entire harvest to the sac roe herring fishery (Campbell and Murphy 1996).

In South Peninsula waters, effort and harvests have generally decreased since 1981. Most bays have small harvestable quantities of herring but the cost of having fishing vessels, tenders, and airplanes on call for the harvesting of each section's quota makes fishing North Peninsula herring more attractive (Table 4). Most South Peninsula herring also appear to spawn later than North Peninsula herring, this prevents many salmon fishers from participating in the South Peninsula herring fishery.

### *Aleutian Islands*

The Aleutian Islands Management Area food and bait herring season as established by regulation is from July 16 through February 28, actual fishing time of the food and bait fishery is based on inseason evaluation of the harvest (Tables 5 and 6). Although the entire Aleutian Islands Management Area may open by regulation, openings have been limited to the vicinity of Unalaska and Akutan Islands due to processing capabilities and herring concentrations. The Unimak,

Akutan, and Unalaska Districts and that portion of the Umnak District located east of Samalga Pass are commonly referred to as the "Dutch Harbor" food and bait herring fishery (Figures 2-4). Two management plans: (1) the Bering Sea Herring Fishery Management Plan (Appendix B; 5AAC 27.060), and (2) Aleutian Islands Management Area food and bait herring management plan, 1996 (Campbell 1996) and various regulations (ADF&G 1996) are used to manage the fishery.

Historically, the "Dutch Harbor" food and bait fishery occurred from 1929 through 1938 and in 1945 (Table 5). This fishery was a mixture of gillnet and purse seine catches, holding pounds, and numerous small, shorebased hand packing operations. A large portion of the catch was brined for either food or bait purposes while some product was frozen. Purse seine gear provided the bulk of the harvest.

The "Dutch Harbor" food and bait herring fishery has occurred annually since 1981 (Tables 5 and 6). Harvests during 1981-86 and 1990-96 were achieved with purse seine gear only. During the 1987-88 herring seasons, one gillnet permit holder participated while in 1989 two gillnetters made landings. Currently, purse seine vessels average approximately 50 feet in keel length and deploy seines up to 250 fathoms in length and 25 to 35 fathoms in depth.

Prior to 1992 and after 1994, fishing occurred at night with the use of sonar. In the past when herring concentrations left traditional fishing areas, fishers conducted organized "sonar searches" over fairly large areas until concentrations of herring were located. Between 1992 and 1994 the fishery occurred during daylight hours using aircraft to spot herring schools. During the past two seasons, aircraft have also been used to spot concentrations of herring. When catcher vessels leave the immediate area of shorebased processing facilities, industry follows with floating processors and tenders. Processing efficiency and product quality may decline when this occurs. Harvest locations have extended over approximately 90 miles, from Tigalda Island to Makushin Bay on Unalaska Island. However, the majority of the harvest occurred within a five mile radius of shorebased processing facilities in Unalaska and Akutan Bays.

A similarity between the recent and historical fisheries is the quality problem associated with feeding herring. Feed problems were overcome in the historical fishery by the use of holding pounds, where seine caught herring were held until their stomachs became empty. Gillnet caught herring required special handling to prevent spoilage. In the current fishery, the use of ice and chilled seawater in conjunction with rapid processing alleviates most of the feed related problems. When feeding conditions are severe, processors will suspend buying.

One difference between the current and historical (1929-38 and 1945) fisheries is the availability of herring. Historically, herring were categorized into an early summer run (late June to late July) and a late summer run (late August to early September). This pattern does not seem to apply to the current (post 1980) fishery. Herring now appear in the Dutch Harbor area about July 1 and are available through mid-September.

Shorebased processors purchase the majority of the herring harvested. Floating processors have been used most years; however, they are limited by daily handling capacities. In 1988, and from 1990 to the present, some herring were tendered to the King Cove shore plant; in 1989, 1990-92, and 1994 to the Sand Point shore plant, and in 1988 to the present to the Akutan shore plant.

Generally, the exvessel value for bait herring has exceeded that for food herring, although during the past few seasons the same price has been paid for both food and bait herring. While Aleutian food herring are a suitable and desirable product, an ample and more reliable supply of food herring from other countries currently dominates the market. Food herring must be processed quickly from fresh herring; when the allocation is harvested quickly (less than a day) processors can only produce a limited amount of food herring before the flesh is no longer fit for human consumption. The bait product from this fishery has a more stable market. Bait is used locally and in other Alaskan fishing ports for the longline and pot groundfish and pot crab fisheries. Bait demands have been increasing in recent years, and a premium price is placed on quality bait which is fresh and has high oil content. Overall, the market for bait herring has remained more stable than that for food.

The harvest strategy of the "Dutch Harbor" food and bait herring fishery has evolved since it was re-established in 1981. During the 1981 and 1982 seasons, there were no harvest restrictions. From 1983 to 1985, the BOF implemented a harvest ceiling of 3,527 tons per year due to biological concern over multiple exploitation on Eastern Bering Sea spawning stocks, specifically the Bristol Bay, Nelson Island, and Port Moller stocks. Scale pattern analysis studies identified herring harvested during the Aleutian Islands Food and Bait herring fishery to be comprised of the Eastern Aleutian herring biomass (Rogers and Schnepf 1985). The extensive sac roe fisheries occurring on these stocks in their spawning areas coupled with the "Dutch Harbor" food and bait fishery which may harvest some of these stocks, may create biological concern due to possible exploitation above the board's guideline harvest policy. In 1986, a modification of the harvest ceiling was implemented by ADF&G in response to the BOF concern for the possible lack of recruitment in the contributing stocks (primarily Togiak, to which the bulk of the Aleutian catch is estimated to be comprised). The 1986 harvest allocation in the Aleutians was reduced by 30% (2,453 ton harvest allocation). This reduction corresponded with the percent reduction of the observed Togiak spawning biomass between the springs of 1985 and 1986. The 1987 harvest allocation was 2,332 tons, which was proportional to the 1985 to 1987 reduction of observed Togiak spawning biomass.

In 1988, the BOF implemented the Bering Sea Herring Fisheries Management Plan, which established criteria for calculating the "Dutch Harbor" food and bait quota. To ensure conservation of herring stocks, the BOF adopted a requirement that the overall exploitation of a herring stock should not exceed 20% of the spawning biomass. In the case of the Togiak spawning stock, an allocation between the sac roe fishery, spawn on kelp fishery, and the "Dutch Harbor" food and bait fishery was established so that the catch did not exceed 20% of the observed spawning biomass. The number of fishers involved and the value of the fishery were factors considered by the BOF when allocations were determined. The Bering Sea Herring Fishery Management Plan defines the biological criteria and the quota for the "Dutch Harbor" food and bait fishery (Appendix B; 5AAC 27.060).

In 1991, the BOF changed the "Dutch Harbor" food and bait herring fishery opening date from August 15 to July 16. This change was implemented to lessen the chance of catching herring stocks other than Togiak and North Alaska Peninsula in the "Dutch Harbor" fishery. From 1992 to 1994, ADF&G action changed the fishery from night to a day time fishery; prior to 1992 the fishery located and set on herring schools at night using sonar. In 1992-94, as an aid in monitoring the fishery, ADF&G initially made day time fishing periods of two hours or less. Although sonar was still used to locate schools, spotter pilots and fishers visually detected feeding birds and sea

mammals which directed them to herring schools. In 1995, the fishery was once again conducted at night in an attempt to slow down the rate of harvest.

The objectives of this report are: (1) to present the biomass harvested in the commercial catch for each statistical day in the Alaska Peninsula and Aleutian Islands Management Areas during 1996; (2) to estimate the age and sex composition of harvests; (3) to estimate the mean length and weight of herring harvested in commercial fisheries; and (4) to estimate the biomass of herring within each area. This information will add to a database allowing for evaluation of harvest rates, recruitment events, and to refine management of these fisheries. This report is intended as a reference document; interpretation and discussion of the data are therefore limited.

## METHODS

Commercial catch data were compiled by the Commercial Fisheries Management and Development Division (CFMD) of ADF&G. Data were based on computer tabulations originating from individual sale receipts (fish tickets) given to fishers at the time of delivery. Fish tickets and the computer generated summaries were edited by ADF&G Alaska Peninsula staff for errors and omissions. Because extensive fish ticket editing is usually required to finalize the data for any given year, later reports may contain minor differences in the catch information listed in this report.

### *Catch Sampling*

Catches were sampled when available throughout the season from harvests in the fishing areas. Catch sampling occurred in Port Moller Bay, Herendeen Bay, Canoe Bay and Shumagin Islands for Alaska Peninsula harvests, and in Dutch Harbor for herring harvested in the Aleutian Islands. In the Alaska Peninsula, bags of herring were collected by fishermen and voluntarily given to ADF&G personnel. However, during the "Dutch Harbor" food and bait fishery, herring were randomly sampled, usually collected from the holds of tender vessels but occasionally directly from the fishers net to minimize scale loss. The harvest area of each tender and fishing vessel sampled was determined through vessel operator interviews and fish ticket information.

Generally, tender operators purchase herring from fishers who sell their catch to a specific company. Since all Alaska Peninsula and Aleutian Islands catch sampling occurred before sorting within the cannery, there was no preselection of herring other than from delivery areas; although not tested, each sample was assumed to be representative of the harvest within a sample area. While this insured that samples were randomly selected from the fishery, the samples may not be characteristic of the population structure because the distribution of the population is unknown in the fishery.

Age compositions were computed for the catch for each area sampled. Age was determined by examining scales (Warner and Shafford 1979). Scales were taken from the preferred area, located on the left side of the herring three rows below the lateral line and three scales posterior to the center of the operculum plate. One scale was taken from each herring. Ages were recorded in actual fish age in years. The accuracy of age determination was not tested.

Standard length measurements were taken to within 1 mm from the anterior most portion of the fish, including the lower jaw with the mouth closed, to the end of the vertebra (hypural plate) using a meter stick with 1 mm gradations. Accuracy of a length measurement was within  $\pm 5$  mm. Mean lengths were calculated from an unweighted composite of the data collected from each area sampled.

Weight measurements of fish were taken using a digital scale with 2.0 g gradations and reading the scale device to within 2.0 g. Accuracy of a weight measurement was within  $\pm 2.0$  g. Mean weights were calculated from an unweighted composite of the data collected from each area sampled.

### ***Biomass Estimates***

Biomass estimates of herring schools occurred during aerial surveys. Observers fly at a recommended altitude of 1,500 feet and count the number of schools of herring and estimate the length and width of each school. Each school is classified into one of three size classes based on its surface area: small schools with an area  $\leq 50$  m<sup>2</sup>; medium-sized schools with a surface area  $>50$  m<sup>2</sup> and  $\leq 450$  m<sup>2</sup>; and large schools with a surface area  $>450$  m<sup>2</sup>. The number of schools in each size-class are converted to Relative Abundance Indices (RAI) by assuming that one small school equals one RAI, one medium-sized school equals five RAI, and the RAI's of a large school equals the schools total surface area in square feet divided by 538 square feet. Aerial observers also classify the conditions on each survey with a rating system: one equals excellent, two equals good, three equals fair, four equals poor, five equals unsatisfactory. A conversion factor of 1.52 short tons/RAI is used for schools observed in water depths of 16 feet or less and 2.58 short tons/RAI is used for schools observed in water depths of 16 to 26 feet. In deep water, no attempt was made to convert RAI units into tonnage's due to the lack of data. Conversion factors were calculated from surveys of schools of known biomass and surface area in known water depths that were conducted with commercial fishing vessels in Bristol Bay in 1983. If more than one survey of an area was conducted in a single day, then the largest number of RAI's recorded in each area was chosen as the most accurate index of biomass, because observers were more likely to underestimate the biomass than they were to overestimate the biomass. Aerial surveys conducted by industry were also used to assist in estimating biomass when state aerial surveys could not be conducted primarily during the month of June.

Harvest guidelines were established preseason and were based on past fishery performance, age class data, and biomass estimates from ADF&G and industry aerial surveys (Table 4). Areas with little or no data on stock biomass were open for exploratory fishing.

## **SAC ROE FISHERY**

### ***Results***

In 1996, 5 purse seine permit holders made 17 landings in the Alaska Peninsula Management Area (Table 7). The 1996 herring harvest of 220.2 tons was approximately half the 1995 harvest of 400.0 tons and was one fifth the ten year average (1987-96) harvest of 1,009.9 tons (Table 1).

In 1996, 24 purse seine and 27 gillnet permit holders, 16 tenders, and 5 companies indicated an interest in fishing or purchasing fish in the Alaska Peninsula during the sac roe herring season. However, only 5 purse seine permit holders made at least one landing to two companies that purchased herring. This was a decrease of eight purse seine permit holders making deliveries in 1995.

The total 1996 commercial herring harvest during the sac roe season for the Alaska Peninsula and Aleutian Islands Management Areas was 220.2 tons (7 tons of discard included), with an exvessel value of approximately \$105,000.

### *Fishing Effort*

In 1996, the number of permit holders making at least one delivery in the Alaska Peninsula was less than half that of 1995. The decreased effort was due to a low abundance of herring being available in May. Unfortunately, by the time enough biomass became available to conduct a fishery most vessels had left the fishing grounds to prepare for the salmon season.

In 1996, the first herring in the Port Moller District were observed on May 17 (15 tons). However, the first commercial fishing period ( June 10) did not occur until Fish and Game staff felt confident that the Port Moller District threshold of 1000 tons, established in the Bering Sea Herring Management Plan, would be obtained (ADF&G 1996). Purse seine vessels started arriving in the Port Moller District as well as a gillnet fleet in the Port Heiden District in early May. The first tender registered with the department on May 9. The first of three commercial fishing periods was conducted on June 10, while the first harvest did not occur until June 12. In the South Peninsula, fishing vessels arrived in the Sand Point area by early May and made deliveries from May 10 through June 27. Only one company processed herring in the North Peninsula while two companies processed herring in the South Peninsula.

In areas with guideline harvest levels, inseason fishing time was based on ADF&G biomass surveys and fishery performance. In areas open for exploration, (Aleutian Islands Management Area, Amak District, the Western Section of the Port Moller District, the Seal Cape-Wosnesenski Section of the Pavlof District and General Sections of the King Cove and Sand Point Districts), liberal fishing time was allowed to give fishers the opportunity to locate and exploit unknown herring stocks. Several surveys were conducted in the Port Heiden District with a very low amount of biomass observed and therefore, no commercial fishery was prosecuted. All exploratory areas in the North Peninsula and most areas in the South Peninsula were unproductive. However, small harvests occurred in the Stepovak, Balboa, and Canoe Bays and the general section (Shumagin Islands) of the South Peninsula (Tables 2 and 3).

### *North Peninsula*

There are three commercial herring fishing districts in North Peninsula waters: Port Heiden, Port Moller, and Amak Districts. No catches were reported nor were herring observed in the Amak District. No catches occurred in the Port Heiden District, although a few small herring schools

were observed by the Fish and Game pilot. In all districts herring may be taken with purse seines and gillnets. Both gear types share common time and area openings.

The entire 1996 North Peninsula guideline harvest (750 tons) was within the Port Moller District (Table 4; Campbell and Murphy 1996). All fishing periods in the Port Moller District were by emergency order when herring biomass and tender and processor capacity warranted an opening. The Amak District was open for exploration continuously from April 15 through June 30. All North Peninsula waters closed to herring fishing on June 30. A minimum of six hours advanced notice for commercial fishing periods in the Port Moller and Port Heiden Districts was initiated prior to the fishing season.

ADF&G herring staff arrived in the Port Moller area on May 6. The first aerial survey was conducted on May 9 with no fish being spotted. Even though aerial surveys were flown almost daily, the first school of herring was not spotted until May 17. Purse seine vessels started arriving in Port Moller on May 9. By May 11, 22 purse seine vessels were anchored in Port Moller and approximately 27 gillnet vessels were anchored in Port Heiden Bay. Although the Port Moller and Port Heiden fleets waited for substantial biomass to arrive it became apparent that a large biomass of herring would not materialize (Tables 8 and 9). The bulk of the gillnet vessels and four tenders that were in Port Heiden decided to depart on May 13 due to low herring availability. By June 7, participation by the purse seine fleet in Port Moller had decreased to less than 4 vessels and one processing company. Due to a low biomass of herring arriving to the area, the first commercial opening did not occur until June 10. Three commercial openings between June 10 - June 30, were established by emergency order in which 9 landings were made for a total harvest of 95.8 tons (Table 10). The number of vessels that participated could not be released due to state confidentiality requirements.

A list of ADF&G aerial surveys of North Peninsula waters are presented in Tables 8 and 9. In past years, biomass estimates have been difficult due to poor survey conditions and the rapid arrival and departure of fish, 1996 was no exception. In 1996, schools of fish were visible in substantial numbers beginning on May 31 along the outside Bering Sea coast. However, it was difficult to make positive identification between herring and capelin schools on the Bering Sea coast. Herring were seen in Port Moller Bay on June 4. The 1996 aerial survey estimates resulted in a higher biomass estimate as compared to the 1995 estimates. However, in 1996 not only did the department increase aerial survey efforts but industry conducted surveys were included in the biomass estimates beginning June 6 due to lack of availability of state funded aerial surveys. In 1996, the documented biomass for the North Peninsula was 1750 tons: Herendeen Bay (390 tons), Moller Bay (986 tons), Bering Sea Coast (309 tons), and Port Heiden Bay (65 tons; Table 8). Intensive aerial surveys by ADF&G to document spawning biomass and locations were not possible prior to May 9 or after June 4 due to budget constraints.

In 1996, ADF&G documented some spawning in the North Peninsula. On June 1, a one hundred yard spawn was observed in Port Moller Bay located northeast of Mud Bay. Also, on June 4 a one mile patch of spawn was located one half mile south of Harbor Point (Port Moller Bay).

The exploitation rate in individual districts ranged from no harvest in the Amak and Port Heiden Districts to an estimated maximum rate of 7% in the Port Moller District. The one company that purchased herring from North Peninsula fishers paid approximately \$500 per ton for 10% roe

recovery  $\pm$  \$50 for each percentage point above or below 10%. The average roe recovery was 8.0% with an estimated exvessel value of \$38,000.

From 1982 to 1996, commercial harvests of herring from the Port Moller District were landed from May 8 to July 4 (Figure 6, Table 1). Historically, most harvests were taken during a time period of 20 days or less from mid-May to mid-June. In 1996, 23 percent of the commercial harvest occurred in the Outer Moller Bay Section and 77 percent in the Herendeen Bay Section (Table 10).

A total of 211 herring were sampled from the commercial catch in Outer Port Moller and Herendeen Bays. In Outer Moller Bay (sample only; no catch retained due to low abundance of sexually mature fish) the most abundant age classes were estimated as age-3 50%, age-4 28%, and age-5 14% (Table 11; Figure 9). The male to female ratio was 0.59:1.0. The average herring length in the sample was 210 mm (Table 12). In Herendeen Bay the most abundant age classes were estimated as age-3 60%, age-4 20%, and for age-5 and age-6 7% (Table 11; Figure 9). The male to female ratio was 1.4:1.0. The average herring length in the harvest was 213 mm, and the average weight was 127 g (Table 12).

Historically, from mid-May through early-June, commercial spotter pilots and ADF&G observers have also reported on the biomass of capelin in North Peninsula waters. In 1996, North Peninsula capelin stocks appeared to have improved over the last several years. Large schools were spotted along the Bering Sea coast between Port Moller and Cape Seniavin. No harvest occurred in 1996.

### **1997 Outlook**

Age class data from the 1996 harvest indicates that in 1997 age-4, age-5, and age-6 herring should dominate Port Moller Bay harvests, while age-4 and age-5 herring may dominate Herendeen Bay harvests. Since the abundance of newly recruited year classes (age-3 and age-4) cannot be reliably determined until the herring are nearly fully recruited into the fishery at age-5, no attempt has been made to estimate the potential contribution of younger age herring to the fishery. Confidence in the 1997 North Peninsula forecast is only fair (Appendix D). Because of a small sample size, low number of purse seine sets sampled and little control over sample distribution, the age class information may not be representative of the population and will reduce accuracy of the 1997 forecast. The 1997 forecasted harvest is 150 tons. This forecast is based on the 1996 biomass estimate and applying a sliding scale exploitation rate to the estimate (Appendix D). Adjustments may be made inseason once herring biomass is quantified.

### ***South Peninsula***

The 1996 projected guideline harvest for South Peninsula herring fisheries was 100 tons (Table 4), which did not include herring harvested in sections open to exploration (Campbell and Murphy 1996). The Swedania Point-Balboa Bay, Point Aliaksin-Beaver Bay, and General Sections of the Sand Point District, the Pavlof Bay, Seal Cape-Wosnesenski and General Sections of the Pavlof District, and the King Cove District were open for exploration.

South Peninsula sac roe herring fisheries were open from April 15 through July 15. Fishing periods opened at 12:00 noon on odd number days of the month and closed at 12:00 noon on even number days of the month, followed by 24 hour closed periods.

From 1980 through 1996, South Peninsula commercial herring harvests were landed from May 9 through July 14. In 1996, fishing vessels arrived in the Sand Point area in early May and herring were landed from May 10 through June 27 (Table 1). In 1996, commercial harvests occurred in Balboa, Stepovak, and Canoe Bays and in the General Section of the Sand Point District (Table 3). The total South Peninsula sac roe herring harvest was 124.4 tons, which included an estimated 7 tons wastage (Table 13).

The average roe recovery was 11.4%. The average price paid to fishermen was approximately \$500 per ton for 10% roe recovery  $\pm$  \$50 for each percentage point above or below 10%. The estimated exvessel value of the South Peninsula sac roe herring was \$67,000.

Due to poor survey conditions and budget constraints ADF&G only made three partial aerial surveys of the South Peninsula area on May 13, May 14, and June 3. However, only 10 tons of herring were observed in Balboa Bay. Commercial spotter pilots and several fishing vessels reported herring through mid July in other locations in the South Peninsula area, but ADF&G was not able to verify their presence. One commercial spotter pilot reported seeing a large biomass (1000 tons) of eulachon in the Sand Point District.

In 1996, ADF&G did not document any herring spawning in the South Peninsula.

In 1996, 114 herring were sampled from the Pavlof and Canoe Bay section of the Pavlof District (samples were mixed) and the General Section (Shumagin Islands) of the Sand Point District.

In the Pavlof / Canoe Bay sample, the most abundant age classes were age-5 29%, age 6-26%, and age-11+ 20% (Table 14; Figure 12). The male to female ratio was 0.65 to 1.0. The average length of the herring sampled was 275 mm, and the average weight was 361 g (Table 15).

In Shumagin Islands the most abundant age classes were age-4 16% and age-5 74% (Table 14; Figure 12). The male to female ratio was 2.2 to 1.0. The average length of the herring sampled was 253 mm, and the average weight was 247 g (Table 15).

### **1997 Outlook**

Age class data from the 1996 harvest indicates that in 1997 age-6, age-7, and age-11+ herring should dominate the Pavlof/ Canoe Bay harvest. In the Shumagin Islands, age class data indicates age-6 herring should dominate the harvest. However, because of a small sample size, these predictions may not accurately represent the population. The 1997 forecasted harvest is 100 tons (Appendix D) . This forecast is based on the five year (1992-96) South Peninsula average harvest of 94.5 tons.

## **ALEUTIAN ISLANDS FOOD AND BAIT FISHERY**

The Aleutian Islands (Unimak, Akutan, and Unalaska Districts and that portion of the Umnak District located east of Samalga Pass) "Dutch Harbor" commercial food and bait herring fishery may open to commercial herring fishing on July 16. In 1996, the fishery was restricted to the Unalaska District. The fishery had one period on July 16 for a total fishing time of 20 minutes. The fleet consisted of 25 purse seine vessels, 15 tenders representing 6 processing companies, and 7 aircraft.

On July 16, there was one 20 minute commercial fishing period from 12:15 a.m. until 12:35 a.m.. During this opening, 24 of the 25 registered vessels made successful sets and harvested 2,239.2 tons (Tables 6 and 16). The harvest came from the inner portion of Unalaska Bay bounded by a line from Eider Point to the northern tip of Hog Island and west from the southern tip of Hog Island to the point of land at the west entrance of Captains Bay.

Twenty- six permit holders made a total of 29 landings (Table 5). All herring were sold as bait. The harvest exceeded the guideline harvest of 1,793 by 25 percent. The exvessel value of the fishery was an estimated \$671,760. ADF&G also conducted a test fishery to obtain biological data and to finance management of the fishery. ADF&G contracted a commercial permit holder who harvested an additional 39.3 tons of herring.

A total of 558 herring from the commercial fishery were analyzed for age, length, weight, and sex data. In the Unalaska District, the most abundant age classes in the commercial harvest were estimated as age-7 16.1%, age 8-35.8%, and age-9 25.8% (Tables 17, 18; Figures 2-4). The male to female ratio was 0.90:1.0. The average herring length in the sample was 282 mm, and the average weight was 312 g (Table 17).

### ***1997 Outlook***

Age class data from the 1996 harvest indicates that in 1997 age-9 and age-10 herring should dominate the "Dutch Harbor" food and bait fishery. The 1997 forecasted harvest is 1,645 tons (K.A. Rowell, ADF&G, Anchorage, personal communication). This GHF was established by using the Bering Sea Herring Management Plan allocation formula given the 20% exploitation rate and the 1997 Togiak District forecasted biomass of 125,000 tons (Appendix E).

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Table 1. Alaska Peninsula Management Area commercial sac roe herring harvest by time period and area, 1979-96.

Year	North Peninsula		South Peninsula		Total
	Harvest (Tons)	Harvest Time Period	Harvest (Tons)	Harvest Time Period	
1979	0.0		10.1	July 4-July 4	10.1
1980	0.0		453.8	May 18-July 14	453.8
1981	0.0		797.4	May 9-June 23	797.4
1982	505.5	May 31-June 12	138.3	May 31-June 14	643.8
1983	627.0	May 9-May 29	0.0		627.0
1984	431.2	May 24-June 8	210.4	May 13-June 1	641.6
1985	710.2	May 24-June 4	287.8	June 1-June 11	998.0
1986	894.4	May 18-May 30	281.9	June 7-June 14	1,176.3
1987	513.7	May 9-June 5	319.0	June 8-June 19	832.7
1988	294.3	May 17-June 15	376.7	May 31-June 20	671.0
1989	729.0	May 28-June 23	310.3	May 13-June 19	1,039.3
1990	272.8	June 4-June 19	312.2	May 14-June 14	585.0
1991	1,313.0	May 17-July 4	157.4	May 16-June 11	1,470.4
1992	3,969.0	May 23-June 17	180.3	June 4-June 7	4,149.3
1993	535.9	May 8-June 9	97.0	May 27-June 9	632.9
1994	89.8	May 21-June 7	8.2	June 2-June 3	98.0
1995	337.3	May 29-June 20	62.7	June 6-June 17	400.0
1996 <sup>a</sup>	95.8	June 12-June 18	124.4	May 10-June 27	220.2
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1987-96 Average	815.1		194.8		1,009.9

<sup>a</sup> In the South Peninsula 7 tons were included in the harvest figure, but were not sold due to low roe percentage.

Table 2. North Peninsula commercial sac roe herring harvest by section, 1982-96.

Year	Port Moller District			Bear River Bering Sea Coast	Port Heiden District	Total
	Deer Island Mud Bay Section	Herendeen Bay Section	Moller Bay Section		Port Heiden Bay Section	
1982	0.0	279.5	180.0	46.0	0.0	505.5
1983	0.0	509.3	36.5	81.3	0.0	627.0
1984	0.0	180.8	250.4	0.0	0.0	431.2
1985	0.0	173.3	255.5	281.4	0.0	710.2
1986	0.0	156.1	254.8	483.5	0.0	894.4
1987	0.0	156.6 <sup>a</sup>	349.8	7.3	0.0	513.7
1988	0.0	8.2	286.1	0.0	0.0	294.3
1989	0.0	67.0	246.5	415.6	0.0	729.0
1990	0.0	155.8	117.1	0.0	0.0	272.8
1991	156.3	167.0	689.6	300.2	0.0	1,313.0
1992	18.3	0.0	2,350.7	0.0	1,600.0	3,969.0
1993	0.0	106.6	371.0	57.9	0.0	535.9
1994	7.2	0.0	82.6	0.0	0.0	89.8
1995	3.2	145.7	188.4	0.0	0.0	337.3
1996	0.0	73.8	22.0	0.0	0.0	95.8
1987-96 Average	18.5	72.4	470.4	78.1	160.0	815.1

<sup>a</sup> At least 11 tons were caught in the Deer Island-Mud Bay Section.

Table 3. South Peninsula commercial sac roe herring harvest by geographic area, 1980-96.

Year	Area									Total
	Stepovak Bay <sup>a</sup>	Balboa Bay	Pavlof Bay	Canoe Bay	Volcano-Dolgoi	Belkofski Bay	Lenard Harbor	Dolgoi Harbor	Shumagin Islands	
1980	195.0	132.0	114.0	12.0	0.0	0.0	0.0	0.0	0.0	453.0
1981	122.0	36.0	225.0	206.0	65.0	23.0	110.0	0.0	0.0	787.0
1982	0.0	5.0	0.0	171.2	0.0	0.0	0.0	0.0	0.0	176.2
1983 <sup>b</sup>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1984	30.0	25.0	0.0	155.4	0.0	0.0	0.0	0.0	0.0	210.4
1985	11.0	0.0	95.0	239.0	0.0	0.0	0.0	0.0	0.0	345.0
1986 <sup>c</sup>	0.0	0.0	61.0	140.5	13.0	8.0	59.0	0.0	0.0	281.5
1987 <sup>c</sup>	0.0	0.0	92.0	118.0	0.0	38.0	59.0	12.0	0.0	319.0
1988 <sup>d</sup>	0.3	11.0	69.0	236.5	17.0	12.0	31.0	0.0	0.0	376.8
1989	39.0	17.0	53.0	148.0	0.0	0.0	9.0	5.0	39.0	310.0
1990	71.7	20.8	0.0	120.4	0.0	3.2	5.9	0.0	90.4	312.2
1991	19.3	19.3	0.0	77.5	0.0	0.0	0.0	0.0	41.4	157.4
1992	0.0	0.0	0.0	180.4	0.0	0.0	0.0	0.0	0.0	180.4
1993	4.6	0.0	0.0	92.2	0.0	0.0	0.0	0.0	0.0	96.8
1994	0.0	0.0	0.0	8.2	0.0	0.0	0.0	0.0	0.0	8.2
1995	0.0	9.8	0.0	52.9	0.0	0.0	0.0	0.0	0.0	62.7
1996 <sup>e</sup>	27.8	3.9	0.0	77.1	0.0	0.0	0.0	0.0	15.6	124.4
1987-96 Average										
	16.3	8.2	21.4	111.1	1.7	5.3	10.5	1.7	18.6	194.8

<sup>a</sup> The 1984-88 catches came from Ramsey Bay, the 1989 and 1993 catch came from Granville Bay.

<sup>b</sup> In 1983 the South Peninsula sac roe fishery was closed, all herring catches were allocated to a food and bait fishery that did not develop.

<sup>c</sup> Stepovak Bay (Kupreanof Point to Swedania Point) was closed during 1986-87 due to the herring biomass being below the threshold required for a commercial fishery.

<sup>d</sup> In Stepovak Bay seven tons of immature (green) herring were dumped on May 7, and an additional two tons were dumped on May 11.

<sup>e</sup> In Stepovak Bay seven tons of immature (green) herring were dumped on May 15.

Table 4. Alaska Peninsula and Aleutian Islands Management Areas sac roe herring harvest guideline levels, by management area, 1996<sup>a</sup>.

Management Area	Sac Roe Guideline Harvest In Short Tons
<i>North Peninsula</i>	
Amak District	b
Port Moller District <sup>c</sup>	
Western Section	b
Deer Island Section <sup>d</sup>	
Herendeen Bay Section	150
Inner Moller Bay Section	150
Outer Moller Bay Section	400
Bear River Section <sup>e</sup>	50
Port Heiden District <sup>f</sup>	b
<i>North Peninsula Total</i>	750
<i>South Peninsula</i>	
Sand Point District	
Stepovak Bay Section	25
Swedania Point-Balboa Bay Section	b
Point Aliaksin-Beaver Bay Section	b
General Section (Shumagin Islands)	b
Pavlof District	
Canoe Bay Section	75
Pavlof Bay Section	b
Seal Cape-Wosnesenski Section	b
General Section (Volcano Bay)	b
King Cove District	
Belkofski Section	b
Deer Passage Section	b
Cold Bay Section	b
General Section	b
<i>South Peninsula Total</i>	100

-Continued-

Table 4. (page 2 of 2)

Management Area	Sac Roe Guideline Harvest In Short Tons
<i>Aleutian Islands</i>	
Unimak District	b
Akutan District	b
Unalaska District	b
Umnak District	b
Adak District	b
<hr/>	
<i>Guideline Harvest Total<sup>g</sup></i>	850
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<sup>a</sup> The Aleutian Islands Management Area is open for exploration; no deliveries have ever been made from the Aleutian Islands. Portions of a section, district, or area may be closed if it is suspected that additional harvests in a given location will exceed 20% of the spawning biomass.

<sup>b</sup> All areas without guideline harvest levels are open for exploration. Harvests in these areas will be kept small until ADF&G is able to document the spawning biomass. For the General Section of the Sand Point District (Shumagin Islands), Seal Cape-Wosnesenski Section, The General Section of the King Cove District, Amak District, Western Section of the Port Moller District, and the Aleutian Islands, no more than 50 tons of herring will be allowed to be harvested from the waters near any single island or bay in exploratory areas unless ADF&G documents a herring biomass that would allow a larger harvest.

<sup>c</sup> Herring Abundance in the Port Moller District is difficult to document. The 1996 herring abundance may justify a larger catch than 750 tons, however to increase the guideline harvest level a larger than expected spawning biomass must be documented by ADF&G.

<sup>d</sup> Herring harvested in the Deer Island Section of Herendeen Bay will be counted against the Herendeen Bay guideline harvest level.

<sup>e</sup> Herring harvested along the Bering Sea Coast will be counted against the Port Moller and Herendeen Bays guideline harvest level if it is suspected that these herring were traveling into Port Moller or Herendeen Bays.

<sup>f</sup> In 1992, commercial quantities of herring were harvested for the first time in the Port Heiden District. The 1996 herring abundance may justify a catch larger than 50 tons, however to increase the guideline harvest level a larger than expected spawning biomass must be documented by ADF&G. The commercial herring fishery will be managed conservatively until adequate data is obtained to warrant a liberal management approach. Herring harvested along the Bering Sea coast will be counted against the Port Heiden guideline harvest level if it is suspected that these herring were travelling in to Port Heiden Bay.

<sup>g</sup> Total does not include harvests that may occur in areas open to exploration.

Table 5. Aleutian Islands area "Dutch Harbor" food and bait herring fisheries historical summary, 1929-96.

Year	Harvest in Short Tons	Number of Processors	Number of Vessels		Tons Per Boat	Tons Per Landing	Price Per Ton	Exvessel Value (Thousands)	Exvessel Value Per Vessel (Thousands)
			Making Landings	Number Landings					
1929	1,259								Information not Available
1930	1,916								Information not Available
1931	1,056	12	26						Information not Available
1932	2,510	12	30						Information not Available
1933	1,585	12	38						Information not Available
1934	1,533	9							Information not Available
1935	2,412	10							Information not Available
1936	1,379	8							Information not Available
1937	579								Information not Available
1938	513								Information not Available
1939-44	No Fishery								
1945	75								Information not Available
1946-80	No Fishery								
1981	704	<sup>a</sup>	<sup>a</sup>	16	352	44	300	211	<sup>a</sup>
1982	3,565	6	7	95	509	38	300	1,020	146
1983	3,567	5	8	96	446	37	232	828	104
1984	3,578	5	9	61	398	59	210	751	83
1985	3,480	<sup>a</sup>	6	78	560	45	162	564	94
1986	2,394	4	7	53	342	45	254	600	86
1987	2,503	4	8	45	373	56	300	751	94
1988	2,004	6	8	59	251	34	252	505	63
1989	3,081	5	9	69	342	45	283	873	97
1990	820	5	7	8	117	103	350	287	41
1991	1,325	5	8	18	166	74	300	398	50
1992	1,949	5	11	26	177	75	300	573	52
1993	2,790	4	13	32	215	87	300	837	64
1994	3,349	7	14	65	239	52	300	1,005	72
1995	1,748	6	14	24	125	73	300	524	37
1996	2,239	6	24	29	93	77	300	672	28
1929-38									
Average	1,474	11	31						Information not Available
1987-1996									
Average	2,181	5	12	38	210	68	299	642	60

<sup>a</sup> This information can not be released due to state confidentiality requirements.

Table 6. Aleutian Islands area "Dutch Harbor" commercial food and bait herring fishery, including landing date, days fished, preseason Togiak spawning biomass, guideline harvest level, harvest, and number of vessels fishing, 1981-96.

Year	Landing Date		Days fished	Preseason Togiak Spawning Biomass	Harvest Quota Short Tons	Food & Bait Harvest Short Tons	% Togiak Spawning Biomass Harvested	Number Vessels Fishing
	First	Last		Short Tons		Short Tons	Harvested	
1981	Aug 3	Aug 23	21	159,000	None	704	0.4	<sup>a</sup>
1982	Aug 5	Sep 12	39	98,000	None	3,565	3.6	6
1983	Jul 23	Sep 6	46	142,000	3,525 <sup>b</sup>	3,567	2.5	5
1984	Jul 17	Jul 27	11	115,000	3,525 <sup>b</sup>	3,578	3.1	5
1985	Jul 17	Aug 11	26	132,000	3,525 <sup>b</sup>	3,480	2.6	3
1986	Jul 16	Jul 28	13	96,000	2,453 <sup>c</sup>	2,394	2.5	4
1987	Jul 16	Jul 23	4 <sup>d</sup>	88,000	2,332 <sup>c</sup>	2,503	2.8	9
1988	Jul 16	Sep 18	21	132,000	3,100 <sup>e</sup>	2,004	1.6	8
1989	Jul 16	Aug 5	19 <sup>f</sup>	100,108	3,100 <sup>e</sup>	3,081	3.2	9
1990	Aug 15	Aug 15	<1	72,000	903 <sup>e</sup>	820	1.1	7
1991	Jul 17 <sup>g</sup>	Jul 17	<1	83,229	931 <sup>e</sup>	1,325	1.6	8
1992	Jul 16	Jul 28 <sup>h</sup>	5	60,214 <sup>i</sup>	1,940 <sup>i</sup>	1,949	1.3	11
1993	Jul 16	Jul 16	<1	164,135	2,193	2,790	1.7	13 <sup>k</sup>
1994	Jul 16	Jul 19	4	165,747 <sup>i</sup>	2,215 <sup>j</sup>	3,349	2.0	14 <sup>k</sup>
1995	Jul 16	Jul 16	<1	149,093	1,982	1,748	1.2	18 <sup>k</sup>
1996	Jul 16	Jul 16	<1	135,585	1,793	2,239	1.7	25 <sup>k</sup>

<sup>a</sup> Number may not be released due to state confidentiality requirements.

<sup>b</sup> Harvest ceiling of 3,525 established by Alaska Board of Fisheries.

<sup>c</sup> Harvest quota set by ADF&G. Reduced proportionately with the drop from the 1985 Togiak spawning biomass level.

<sup>d</sup> Closed July 19 reopened for 14 hours on July 23.

<sup>e</sup> Harvest quota set under provisions of the Bering Sea Herring Fisheries Management Plan.

<sup>f</sup> Closed July 26, reopened July 27 through August 5.

<sup>g</sup> Fishery opened for six hours on July 16; weather prevented any fishing effort.

<sup>h</sup> Fishery co-op after July 16.

<sup>i</sup> The preseason forecasted biomass was adjusted by ADF&G, the final biomass estimate for Togiak was 146,037 tons and the harvest quota was adjusted to 1,940 tons.

<sup>j</sup> The preseason forecasted biomass was adjusted by ADF&G (Kathy Rowell, personal communication, May 25, 1994).

<sup>k</sup> Number of vessels registered to fish.

Table 7. Alaska Peninsula sac roe herring harvest and number of landings and permits by year, 1979-96.

Year	North Peninsula			South Peninsula			Total		
	Tons	Landings	Permits	Tons	Landings	Permits	Tons	Landings	Permits
1979		No Harvest		10.1	a	a	10.1	a	a
1980		No Harvest		453.8	15	6	453.8	15	6
1981		No Harvest		797.4	93	56	797.4	93	56
1982	505.5	6	a	138.3	13	4	643.8	19	7
1983	627.0	47	23	0.0	0	0	627.0	47	23
1984	431.2	20	11	210.4	20	5	641.6	40	15
1985	710.2	31	17	287.8	8	5	998.0	39	20
1986	894.4	116	50	281.9	14	6	1,176.3	130	51
1987	513.8	46	27	319.0	8	a	832.8	54	27
1988	294.3	21	9	376.7	22	10	671.0	43	19
1989	729.0	24	10	310.3	31	13	1,039.2	55	19
1990	272.8	23	5	312.2	31	6	585.1	54	9
1991	1,313.0	59	11	157.4	26	10	1,470.5	85	18
1992	3,969.0	100	24	180.3	11	7	4,149.3	112	29
1993	535.9	44	16	96.8	17	a	632.9	61	17
1994	89.8	7	5	8.2	4	a	98.1	11	6
1995	337.3	37	12	62.7	a	a	400.0	39	13
1996	95.8	9	a	124.4	8	4	220.2	17	5
1987-96 Average									
	815.1	37	12	194.8	16	6	1,009.9	53	16

<sup>a</sup> Number can not be released due to state confidentiality requirements.

Table 8. North Peninsula aerial herring biomass surveys, 1996.

Date	Port Moller District				Port Heiden District				Total (Tons)
	Herendeen Bay <sup>a</sup>		Moller Bay <sup>b</sup>		Bear River to Strogonof Point		Port Heiden Bay		
	Tons <sup>c</sup>	Rating <sup>d</sup>	Tons <sup>c</sup>	Rating <sup>d</sup>	Tons <sup>c</sup>	Rating <sup>d</sup>	Tons <sup>c</sup>	Rating <sup>d</sup>	
May 9	0	3	0	3					0
May 11							0	2	0
May 12			0	2					0
May 14	0	3							0
May 15	0	3	0	3					0
May 16			0	2	0	2			0
May 17	0	2	15 <sup>e</sup>	2					15
May 19	0	2	12 <sup>e</sup>	2	15 <sup>e</sup>	2	15 <sup>e</sup>	2	42
May 20	0	4	0	4	0	4			0
May 22	0	2	0	2	0	2			0
May 25					40 <sup>e</sup>	1	50 <sup>e</sup>	1	90
May 29	0	2	64 <sup>e</sup>	2					64
May 30	0	1	0	1	35 <sup>e</sup>	1			35
May 31	0	1	0	1	219 <sup>e</sup>	1			219
June 1	0	2	0	2	140	2			140
June 3	0	1	15 <sup>e</sup>	1	0 <sup>f</sup>	1			15
June 4	0	2	125 <sup>e</sup>	2					125
June 6 <sup>f</sup>	0	2	0						0
June 8 <sup>f</sup>	0	2	40 <sup>e</sup>						40
June 9 <sup>f</sup>	0	2	70 <sup>e</sup>						70
June 10			0	4					0
June 12			0	4					0
June 12 <sup>f</sup>	250 <sup>e</sup>	4	125 <sup>e</sup>	4					375
June 13	0	2	0	2					0
June 14 <sup>f</sup>	50 <sup>e</sup>		40 <sup>e</sup>						90
June 15 <sup>f</sup>			40						40
June 17 <sup>f</sup>			300						300
June 17			70	2					70
June 18 <sup>f</sup>	90 <sup>e</sup>		480 <sup>e</sup>						570
Total Biomass Observed									
	390		986		309		65		1750

<sup>a</sup> Herendeen Bay includes both the Herendeen Bay and Deer Island-Mud Bay Sections.

<sup>b</sup> Moller Bay includes both the Inner and Outer Port Moller Bay Sections.

<sup>c</sup> Tons observed; Method of biomass estimate varied based on experience of the observer.

<sup>d</sup> Rating of survey: (1) Excellent, (2) Good, (3) Fair, (4) Poor, (5) Unsatisfactory

<sup>e</sup> Used in calculating biomass estimate.

<sup>f</sup> Biomass estimates conducted by commercial spotter pilots.

Table 9. North Peninsula aerial herring biomass surveys, historical summary, 1980-1996.

Date	Port Moller District			Port Heiden District		Total Biomass Estimate Tons <sup>c</sup>	Aerial Survey Dates	
	Herendeen Bay <sup>a</sup> Section	Moller Bay <sup>b</sup> Sections	Additional Biomass Harvested Tons <sup>c</sup>	Bear River to Strogonof Point Tons <sup>c</sup>	Port Heiden Bay Section Tons <sup>c</sup>		Begin	End
	Tons <sup>c</sup>	Tons <sup>c</sup>	Tons <sup>c</sup>	Tons <sup>c</sup>	Tons <sup>c</sup>			
1980								
1981								
1982								
1983								
1984	2,000	1,500-1,900				3,500-3,900	May 9 - July 31	
1985	260	1,305		5,240		6,805	May 1 - June 13	
1986	1	28		0		29	May 16 - June 7	
1987	0	5,125		0		5,125	May 6 - June 3	
1988	1,737	442		8		2,187	May 17 - June 15	
1989	1,163	1,471				2,634	May 19 - June 16	
1990	155	387				542	May 21 - June 14	
1991	2,278 (250) <sup>d</sup>	4,651		1,471		8,400	May 17 - June 26	
1992	755	8,269		5,798	10,021	24,843	May 19 - June 18	
1993	775	2,878		33	0	3,686	May 4 - June 9	
1994	381	274	74	0		729	May 22 - May 28	
1995	60	477	200	0		737	May 13 - June 2	
1996	390 (390) <sup>d</sup>	986 (755) <sup>d</sup>		309	65	1,750	May 9 - June 18	
1987-96 Average	769	2,496		762	1,009	5,063		

<sup>a</sup> Herendeen Bay includes both the Herendeen Bay and Deer Island-Mud Bay Sections.

<sup>b</sup> Moller Bay includes both the Inner and Outer Port Moller Bay Sections.

<sup>c</sup> Tons observed; Method of biomass estimate varied based on experience of the observer.

<sup>d</sup> Biomass estimates conducted by commercial spotter pilots are enclosed in parenthesis ( ); these estimates are included in the total biomass estimate. They may not be comparable to ADF&G estimates.

Table 10. North Peninsula commercial sac roe herring harvest by area, day, and percent roe, 1996.

Area	Date	Harvest (Short Tons)	Roe Recovery (Percent)
<b>Herendeen Bay</b>	June 13	33.4	8.03
	June 17	10.8	7.90
	June 18	29.6	7.97
Total		73.8	7.99
<b>Outer Moller Bay</b>	June 12	22.0	8.05
Total		22.0	8.05
Total		95.8	8.00

Table 11. Estimated age composition of North Peninsula commercial purse seine sac roe herring harvests by area and percent, 1985-96.

Area	Year	Percent at age (Years)									
		2	3	4	5	6	7	8	9	10	11+
<b>Herendeen Bay Section</b>											
	1985	0	5	49	21	15	6	4	0	0	0
	1986	0	0	3	25	13	20	21	17	1	0
	1987	0	2	4	22	24	17	13	10	6	2
	1988	0	3	23	30	22	9	4	3	3	2
	1989	0	0	2	62	22	5	1	1	0	7
	1990	0	14	3	1	57	15	3	1	1	5
	1991	0	2	72	5	2	11	4	0	2	3
	1992	No harvest in this section									
	1993	No samples from this section									
	1994	No harvest in this section									
	1995	0	5	22	42	17	7	2	0	0	5
	1996	1	60	20	7	7	4	1	0	0	0
<b>Deer Island-Mud Bay Sections</b>											
	1991	0	1	65	7	3	18	5	0	1	1
	1992	0	0	17	64	5	2	6	3	2	2
	1993-96	No samples from this section									
<b>Inner Moller Bay Section</b>											
	1985	0	1	12	8	15	33	27	2	0	1
	1986	0	1	7	21	12	18	19	20	1	1
	1987	0	2	11	13	22	12	11	17	11	0
	1988	0	1	30	29	12	6	5	5	8	5
	1989	0	1	1	67	19	3	1	2	2	4
	1990	0	13	4	2	49	16	5	2	2	6
	1991	0	1	59	13	2	16	1	5	2	1
	1992	0	0	23	60	4	2	6	2	1	2
	1993	0	0	0	10	48	5	2	17	8	10
	1994	0	0	3	12	19	46	4	1	10	6
	1995	0	1	2	8	16	23	38	3	4	6
	1996	No harvest in this section									
<b>Outer Moller-Bering Sea Coast</b>											
	1985	0	1	26	16	20	17	17	1	1	0
	1986	0	0	2	22	13	21	23	18	1	0
	1987	0	2	48	9	14	5	11	8	3	0
	1988	No harvest in this section									
	1989	0	0	0	6	26	6	24	7	10	21
	1990 <sup>a</sup>	90	10	0	0	0	0	0	0	0	0

-Continued-

Table 11. (page 2 of 2)

Area	Year	Percent at age (Years)									
		2	3	4	5	6	7	8	9	10	11+
	1991 <sup>b</sup>	0	3	74	6	1	11	2	1	1	0
	1992 <sup>b</sup>	0	2	41	49	2	0	2	2	0	2
	1993	No samples from this section									
	1994	0	0	8	8	0	54	0	0	23	8
	1995	No samples from this section									
	1996 <sup>ab</sup>	0	50	28	14	5	0	3	0	0	0
<b>Bering Sea Coast</b>											
<b>Bear River area</b>											
	1991	0	2	86	8	0	4	1	0	0	1
	1992	No harvest in this section									
	1993	No samples from this section									
	1994-96	No harvest in this section									
<b>Cape Kutuzof area</b>											
	1991	0	0	37	10	0	40	9	2	2	2
	1992-96	No harvest in this section									
<b>Port Heiden Bay Section</b>											
	1992	0	0	9	64	5	1	13	2	1	4
	1993-96	No harvest in this section									

<sup>a</sup> Juvenile herring sample.

<sup>b</sup> Outer Port Moller Bay Section samples only.

Table 12. Age, sex, weight, and length of herring harvested in the Outer Port Moller (June 17) and Herendeen Bay (June 18) commercial sac roe herring fishery, 1996.

Age Years	Sample Size				Catch (Percent)				Weight			Length		
	Male	Female	Unk	Total	Male	Female	Unk	Total	N	Mean (g)	SD (g)	N	Mean (mm)	SD (mm)
<b>Outer Port Moller<sup>a</sup></b>														
2	0	0	0	0	0.0	0.0	0.0	0.0	0	0	0.0	0	0	0.0
3	14	22	4	40	17.7	27.8	5.1	50.6	0	0	0.0	40	198	7.3
4	6	15	1	22	7.6	19.0	1.2	27.8	0	0	0.0	22	212	10.4
5	4	6	1	11	5.1	7.6	1.2	13.9	0	0	0.0	11	223	10.5
6	2	2	0	4	2.5	2.6	0.0	5.1	0	0	0.0	4	238	11.4
7	0	0	0	0	0.0	0.0	0.0	0.0	0	0	0.0	0	0	0.0
8	1	1	0	2	1.3	1.3	0.0	2.6	0	0	0.0	2	275	6.3
Total	27	46	6	79	34.2	58.3	7.5	100.0	0	0	0.0	79	210	17.8
<b>Herendeen Bay</b>														
2	1	0	0	1	0.8	0.0	0.0	0.8	1	54	0.0	1	166	0.0
3	49	30	0	79	37.1	22.7	0.0	59.8	79	103	13.1	79	201	7.5
4	13	14	0	27	9.9	10.6	0.0	20.5	27	136	17.1	27	219	7.7
5	5	5	0	10	3.8	3.8	0.0	7.6	10	176	27.9	10	235	7.9
6	6	3	0	9	4.5	2.3	0.0	6.8	9	203	26.0	9	248	12.3
7	3	2	0	5	2.2	1.5	0.0	3.7	5	229	31.3	5	262	5.9
8	1	0	0	1	0.8	0.0	0.0	0.8	1	273	0.0	1	265	0.0
Total	78	54	0	132	59.1	40.9	0.0	100.0	132	127	42.9	132	213	20.2
<b>All Areas</b>														
2	1	0	0	1	0.5	0.0	0.0	0.5	1	54	0.0	1	166	0.0
3	63	52	4	119	29.9	24.6	1.9	56.4	79	103	13.1	119	200	7.5
4	19	29	1	49	9.0	13.7	0.5	23.2	27	136	17.1	49	216	9.4
5	9	11	1	21	4.3	5.2	0.5	10.0	10	176	27.9	21	229	11.1
6	8	5	0	13	3.8	2.4	0.0	6.2	9	203	26.0	13	245	12.5
7	3	2	0	5	1.4	0.9	0.0	2.3	5	229	31.3	5	262	5.9
8	2	1	0	3	0.9	0.5	0.0	1.4	1	273	0.0	3	271	7.0
Total	105	100	6	211	49.8	47.3	2.9	100.0	132	127	42.9	211	212	19.3

<sup>a</sup> Samples were obtained, however, no herring were harvested due to low abundance of sexual mature fish.

Table 13. South Peninsula commercial sac roe herring harvest by area, day, and percent roe, 1996.

Area	Date	Harvest Tons	Roe Percent
Balboa Bay	May 30	3.9	12.8
Stepovak Bay	May 15	13.5 <sup>a</sup>	10.4
	June 03	5.1	9.1
	June 05	9.2	7.5
Canoe Bay	June 20	55.8	12.5
	June 27	21.3	12.5
General (Shumagin Islands)	May 10	15.6	9.5
Total		124.4	11.4

<sup>a</sup> Included are 7 tons that were not sold due to low roe content.

Table 14. Estimated age composition of South Peninsula commercial purse seine sac roe herring harvests by area and percent, 1985-96.

Year	Ages									
	2	3	4	5	6	7	8	9	10	11
<b>Stepovak Bay</b>										
1985	No samples									
1986-87	No catch									
1988	0	5	78	17	0	0	1	0	0	0
1989	0	3	31	50	13	0	0	0	2	0
1990	1	6	8	28	50	7	1	0	1	1
1991 <sup>a</sup>	0	4	13	6	23	42	13	0	0	0
1992	No catch									
1993 <sup>a</sup>	No samples									
1994-95	No catch									
1996	No samples									
<b>Balboa</b>										
1988	0	32	50	9	0	1	3	1	2	3
1989	No samples									
1990	0	4	7	22	59	4	0	4	0	0
1991	0	16	11	16	26	32	0	0	0	0
1992-94	No catch									
1995	No samples									
1996	No samples									
<b>Shumagin Islands</b>										
1989	0	1	15	79	1	0	0	3	0	2
1990	0	4	0	26	67	2	0	0	0	1
1991	0	0	17	2	30	48	2	0	0	0
1992-95	No catch									
1996	0	0	16	73	8	3	0	0	0	0
<b>Canoe Bay</b>										
1985	0	1	3	81	7	6	1	1	0	1
1986	0	6	0	3	82	6	2	0	1	0
1987	0	25	28	1	5	34	3	3	0	0
1988	0	24	31	20	0	1	16	4	2	1
1989	0	6	56	22	9	0	0	5	1	1
1990	0	23	5	49	17	5	0	0	1	0
1991	0	27	16	1	41	12	2	0	1	0
1992	0	0	6	9	1	55	23	4	0	2
1993	0	21	4	16	9	2	35	11	2	1
1994	0	71	15	1	9	2	1	2	0	0
1995	No samples									
1996 <sup>b</sup>	0	0	0	29	26	5	12	5	3	20

- Continued -

Table 14. (page 2 of 2)

Year	Percent at age (Years)									
	2	3	4	5	6	7	8	9	10	11
<b>Pavlof Bay</b>										
1985-86	No samples									
1987	0	6	18	5	11	48	9	2	1	0
1988	0	34	50	5	0	2	7	0	2	0
1989	No samples									
1990-95	No catch									
1996 <sup>b</sup>	0	0	0	29	26	5	12	5	3	20
<b>Lenard Harbor</b>										
1986	0	3	0	3	83	7	4	0	0	0
1987	0	67	5	0	3	25	0	0	0	0
1988-89	No samples									
1990	0	3	2	35	46	6	0	3	6	0
1991-96	No catch									

<sup>a</sup> The 1991 and 1993 Stepovak Bay catch was in the northeastern portion of the bay.

<sup>b</sup> The samples from Canoe Bay and Pavlof Bay were mixed.

Table 15. Age, sex, weight, and length of herring harvested in the Shumagin Islands (May 9) and Pavlof/Canoe Bays (June 20) commercial sac roe herring fishery, 1996.

Age Years	Sample Size			Catch (Percent)			Weight			Length		
	Male	Female	Total	Male	Female	Total	N	Mean (g)	SD (g)	N	Mean (mm)	SD (mm)
<b>Shumagin Islands</b>												
4	4	2	6	10.5	5.3	15.8	6	227	15.8	6	243	9.6
5	19	9	28	50.0	23.7	73.7	28	250	26.7	28	255	9.7
6	2	1	3	5.3	2.6	7.9	3	254	40.7	3	249	6.6
7	1	0	1	2.6	0.0	2.6	1	271	0.0	1	263	0.0
Total	26	12	38	68.4	31.6	100.0	38	247	27.1	38	253	10.3
<b>Pavlof / Canoe Bays</b>												
5	7	15	22	9.2	19.8	29.0	22	311	37.2	22	261	9.4
6	7	13	20	9.2	17.1	26.3	20	338	61.4	20	270	12.6
7	3	1	4	4.0	1.3	5.3	4	337	41.7	4	276	12.6
8	5	4	9	6.6	5.2	11.8	9	370	47.7	9	280	13.3
9	0	4	4	0.0	5.3	5.3	4	423	30.7	4	290	2.8
10	2	0	2	2.6	0.0	2.6	2	412	94.0	2	292	13.4
11+	6	9	15	7.9	11.8	19.7	15	442	57.0	15	291	13.3
Total	30	46	76	39.5	60.5	100.0	76	361	70.1	76	275	16.2
<b>All Areas</b>												
4	4	2	6	3.5	1.8	5.3	6	227	15.8	6	243	9.6
5	26	24	50	22.8	21.1	43.9	50	277	43.8	50	258	9.9
6	9	14	23	7.9	12.3	20.2	23	327	65.2	23	268	13.9
7	4	1	5	3.5	0.9	4.4	5	324	46.6	5	273	12.3
8	5	4	9	4.4	3.5	7.9	9	370	47.7	9	280	13.3
9	0	4	4	0.0	3.5	3.5	4	423	30.7	4	290	2.8
10	2	0	2	1.7	0.0	1.7	2	412	94.0	2	292	13.4
11+	6	9	15	5.2	7.9	13.1	15	442	57.0	15	291	13.3
Total	56	58	114	49.0	51.0	100.0	114	323	80	114	268	17.8

Table 16. Aleutian Islands Management Area "Dutch Harbor" commercial purse seine food and bait herring harvest by day, 1996.

Area	Date	Catch in Short Tons		
		Bait	Food	Total
Unalaska Bay <sup>a</sup>	July 16	2,239.2	0.0	2,239.2
Total		2,239.2	0.0	2,239.2

Note: There was an additional 39.3 tons harvested during test fisheries.

<sup>a</sup>Unalaska Bay harvest was from statistical area 302-31.

Table 17. Age, sex, weight, and length of herring harvested in the Aleutian Islands  
 "Dutch Harbor" commercial food and bait herring fishery, July 16, 1996.

Age Years	Sample Size			Catch (Percent)			Weight			Length		
	Male	Female	Total	Male	Female	Total	N	Mean (g)	SD (g)	N	Mean (mm)	SD (mm)
5	1	3	4	0.2	0.5	0.7	4	249	51.1	4	254	17.2
6	24	22	46	4.3	3.9	8.2	46	269	32.6	46	268	12.8
7	49	41	90	8.8	7.3	16.1	90	294	34.5	90	276	9.4
8	87	113	200	15.6	20.3	35.8	200	302	37.2	200	279	11.6
9	67	77	144	12.0	13.8	25.8	143	323	48.4	143	285	13.7
10	7	11	18	1.3	2.0	3.3	18	334	45.2	18	290	19.9
11	9	7	16	1.6	1.3	2.9	16	340	36.3	16	292	8.8
12	9	6	15	1.6	1.1	2.7	15	368	84.5	15	302	17.8
13	6	3	9	1.1	0.5	1.6	9	413	52.4	9	306	26.0
14	2	6	8	0.4	1.1	1.5	8	466	54.4	8	317	9.6
15	1	4	5	0.2	0.6	0.8	5	371	60.1	5	315	20.0
16	1	1	2	0.2	0.2	0.4	2	488	121.6	2	322	11.3
17	1	0	1	0.2	0.0	0.2	1	382	0.0	1	319	0.0
Total	264	294	558	47.3	52.7	100.0	557	312	53.6	557	282	15.9

Table 18. Estimated age composition of Aleutian Islands commercial purse seine food and bait herring harvests, in percent, 1991-96.

Year	Percent at age (Years)													
	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1991	0.2	0.2	0.2	8.7	11.0	5.7	13.4	11.2	22.1	17.2	8.9	1.0	0.0	0.2
1992	0.0	0.3	0.2	0.3	23.3	25.0	4.8	15.2	8.9	10.0	9.4	2.5	0.2	0.0
1993	0.3	9.5	51.8	5.1	5.9	13.2	6.2	2.5	1.6	1.7	1.3	0.8	0.0	0.0
1994	0.2	1.7	24.3	36.7	3.8	4.0	13.3	6.5	3.6	3.3	1.0	0.9	0.9	0.0
1995	0.2	3.2	5.6	30.4	27.5	4.5	4.3	10.4	5.0	1.9	4.8	1.4	0.6	0.2
1996	0.0	0.7	8.2	16.1	35.8	25.8	3.3	2.9	2.7	1.6	1.5	0.8	0.4	0.2

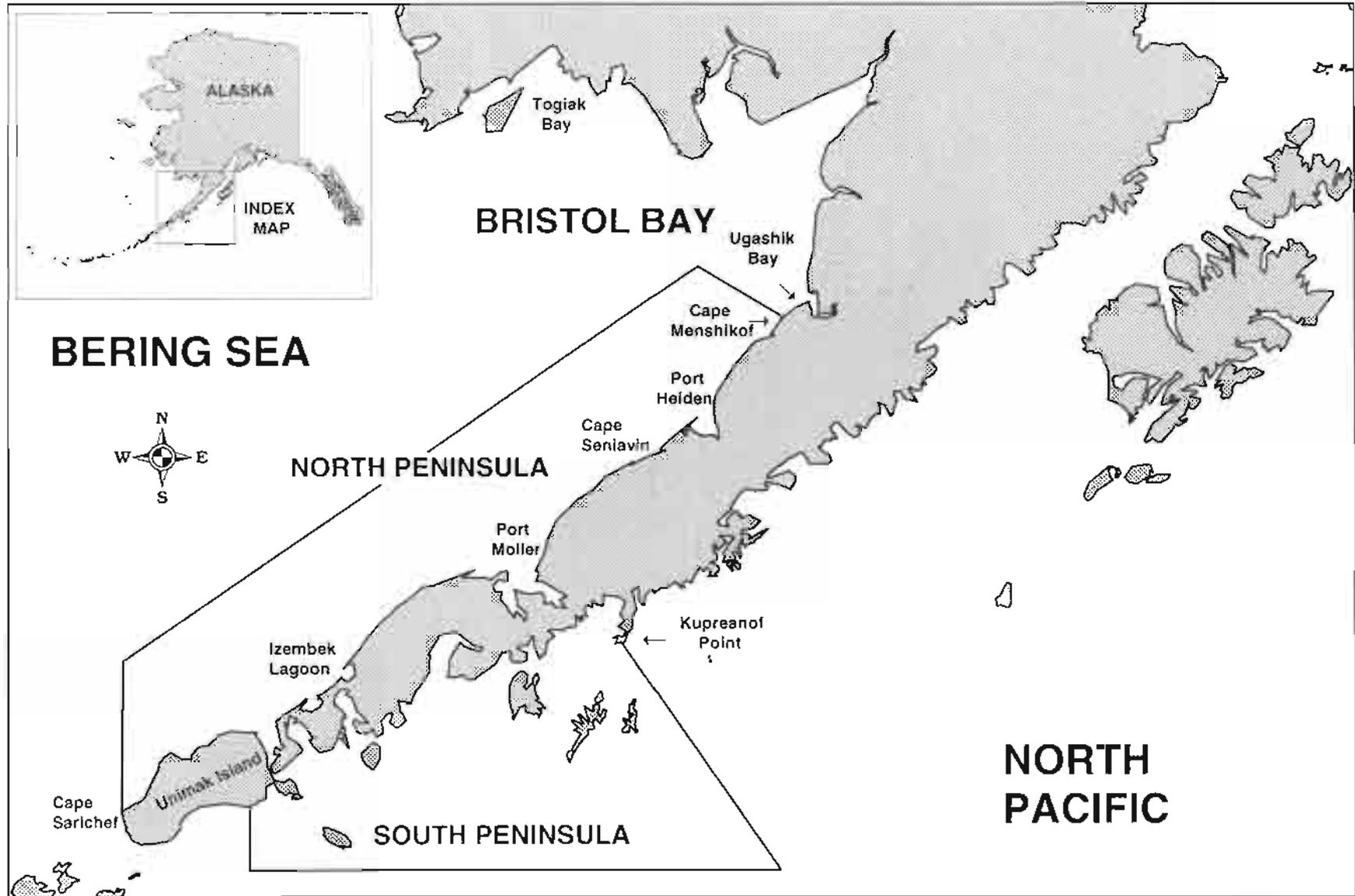


Figure 1. Map of the Alaska Peninsula Herring Management Area, the area on the Pacific Ocean portion of the map is from Kupreanof Point to Unimak Island and on the Bering Sea from Cape Sarichef to Cape Menshikof.

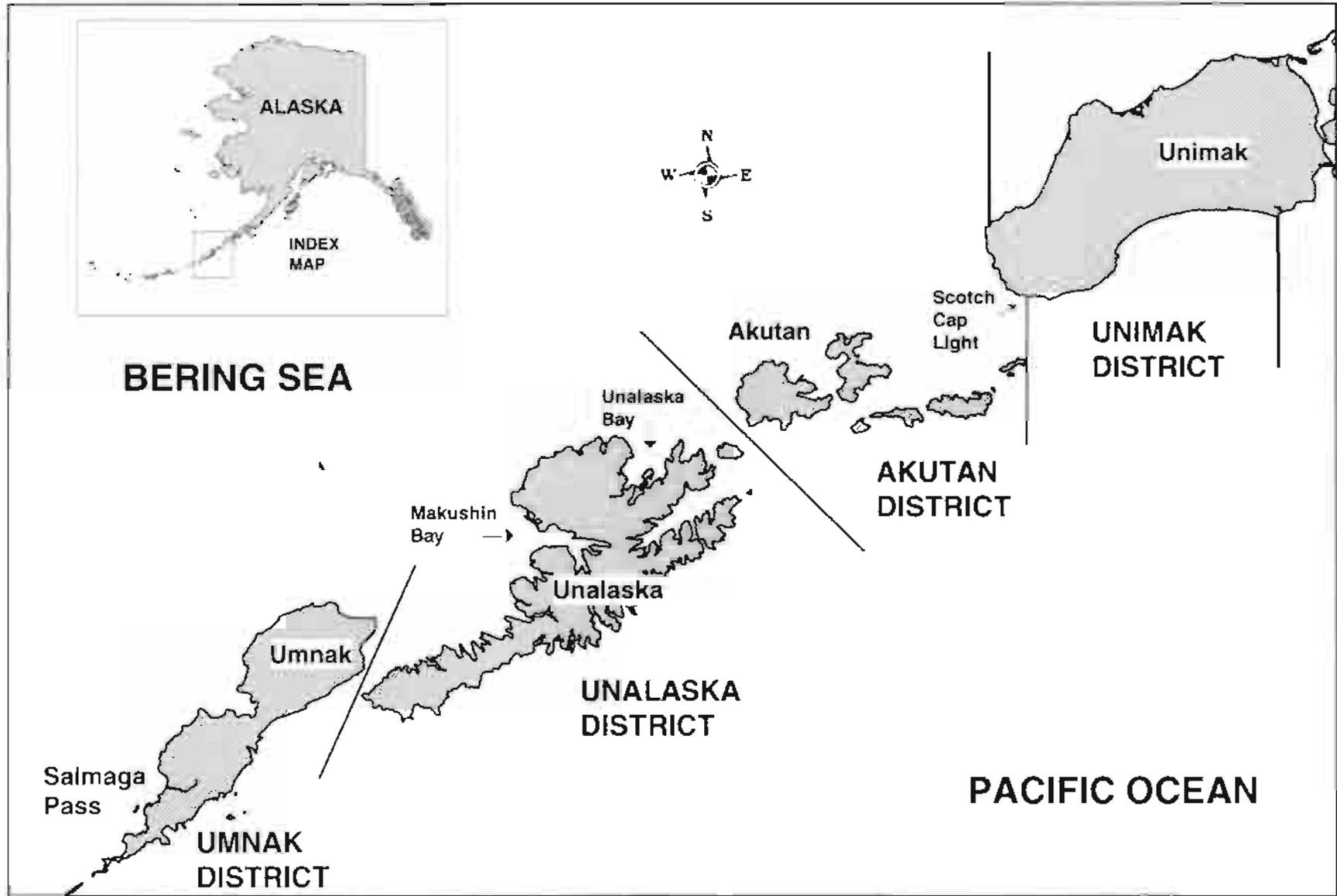


Figure 2. Map of the Aleutian Islands, "Dutch Harbor" Management Area, from Salmaga Pass to Unimak Island with the fishing districts shown.

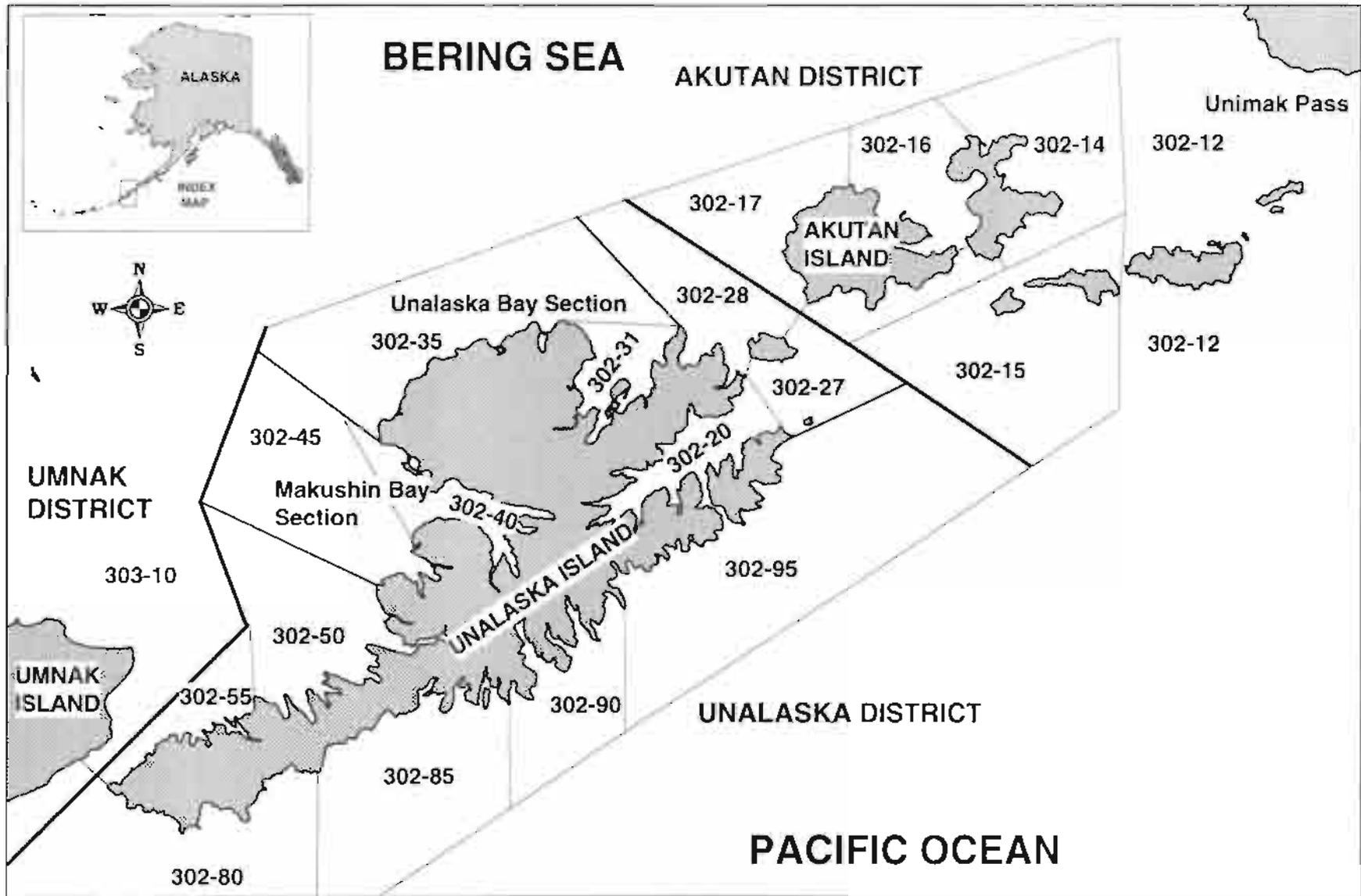


Figure 3. Map of Aleutian Islands Area from Umnak Pass to Unimak Pass with the statistical herring fishing areas shown.

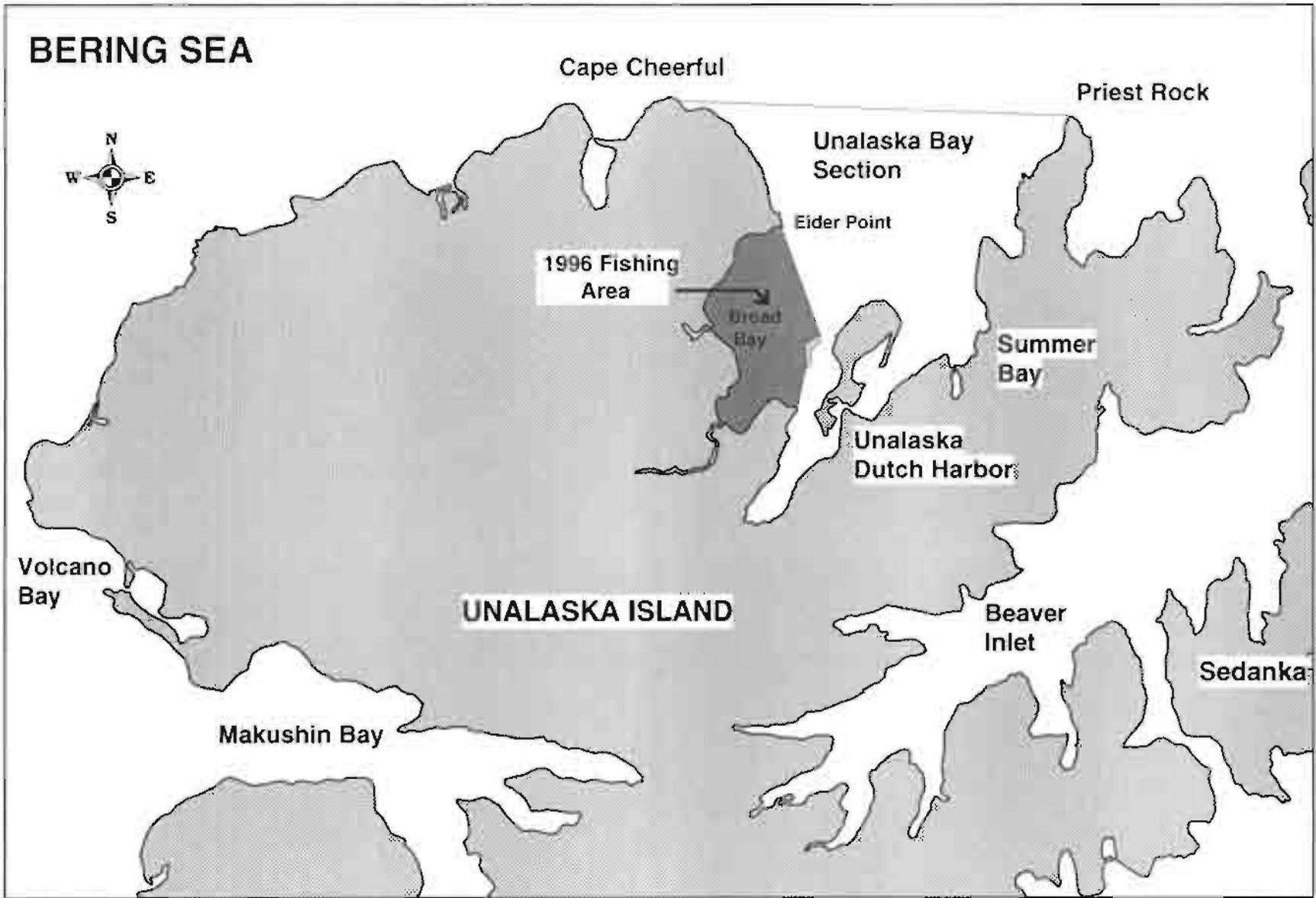


Figure 4. Map of Unalaska Island from Beaver Inlet to Volcano Bay.



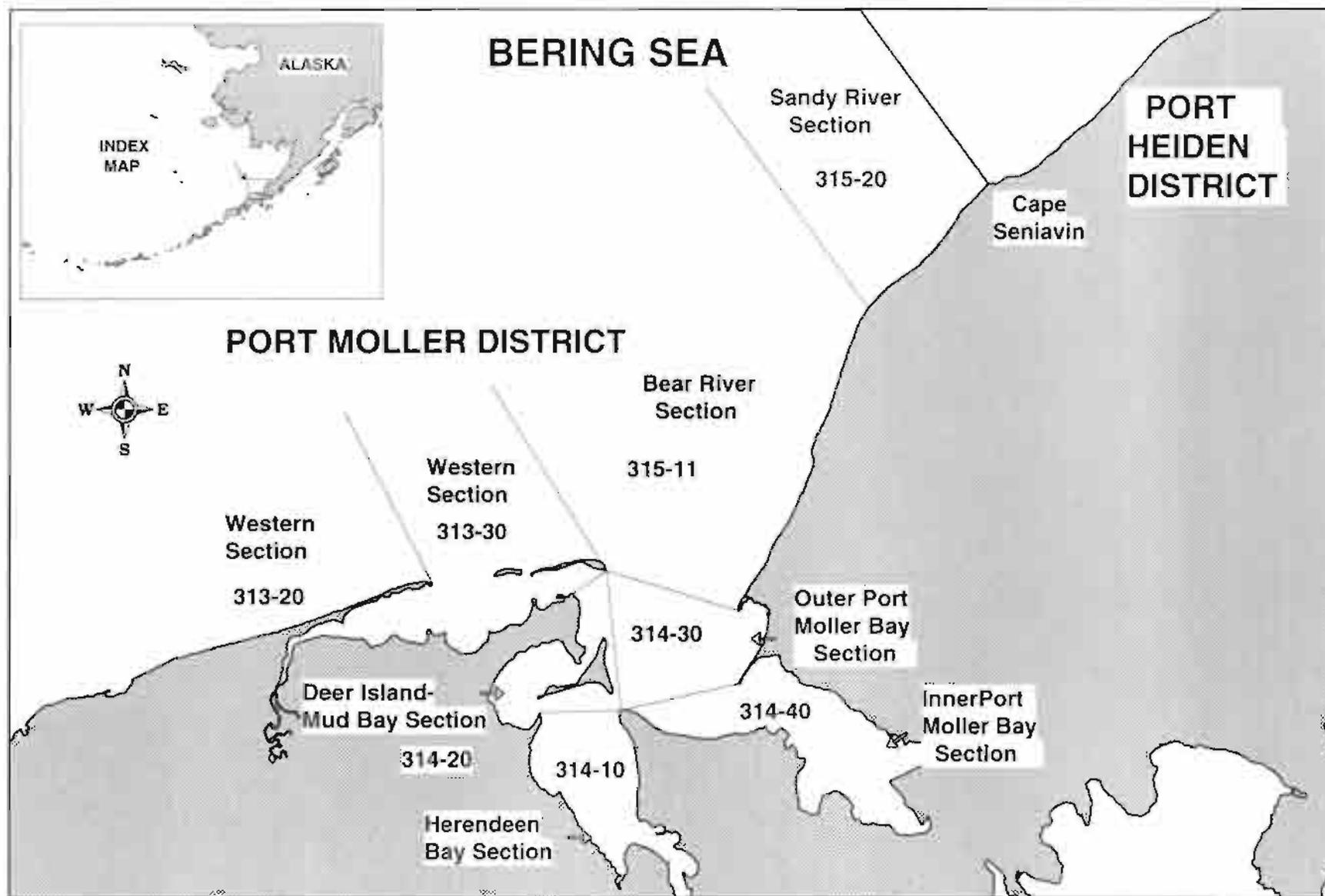


Figure 6. Map of the Port Moller District with the statistical herring fishing areas shown.

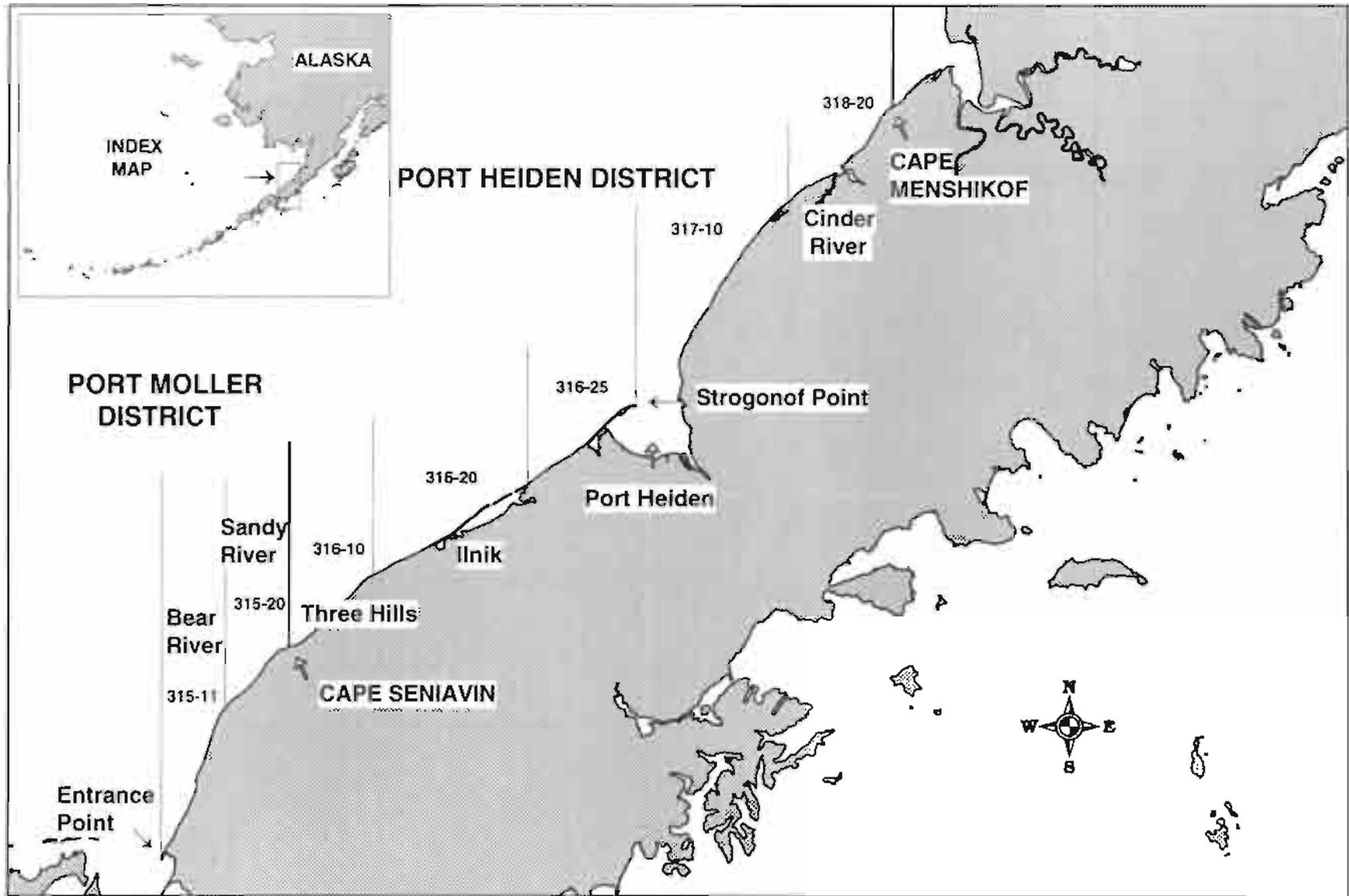


Figure 7. Map of the Alaska Peninsula Area from Entrance Point to Cape Menshikof with the statistical herring fishing areas shown.

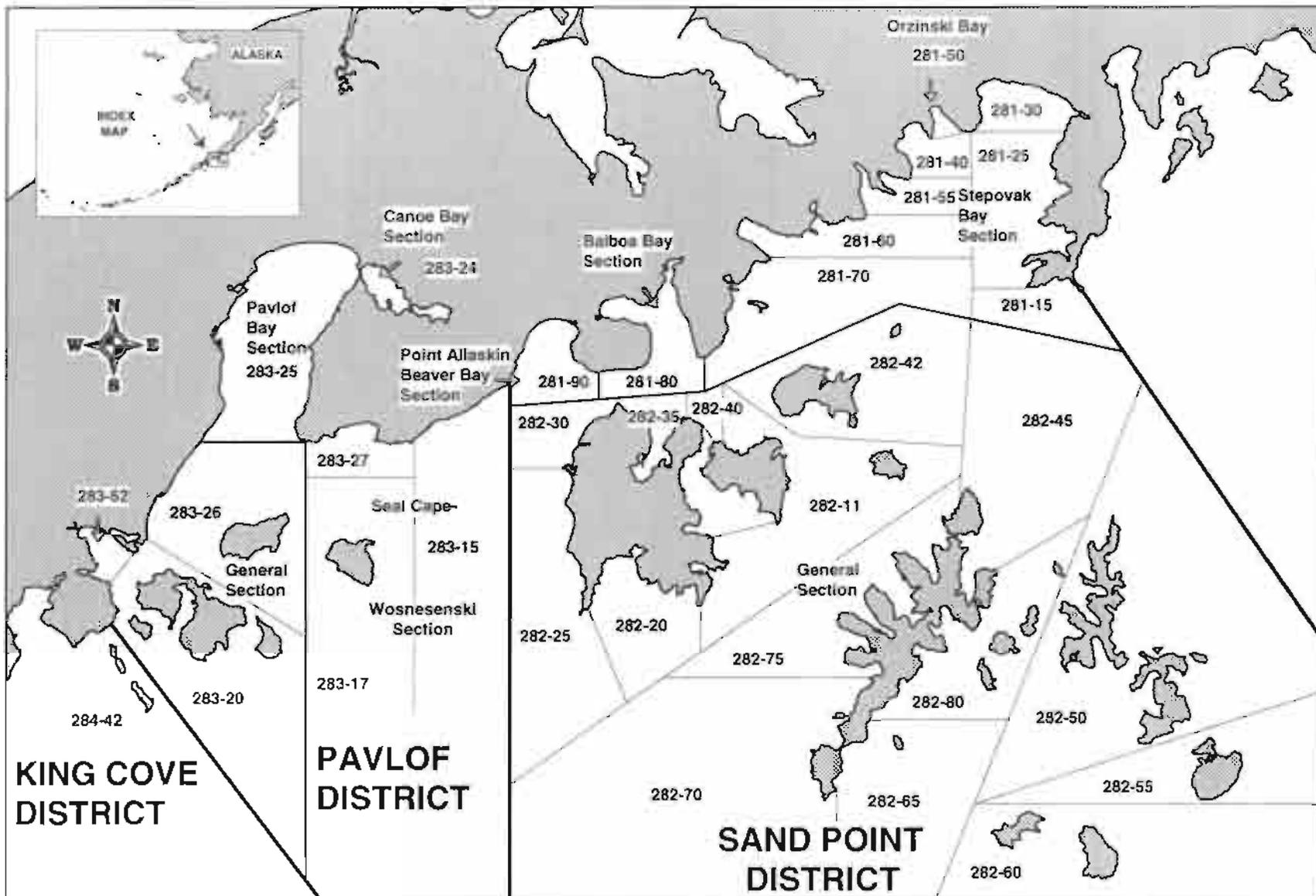


Figure 8. Map of the Alaska Peninsula Area from Belkofski Bay to Kupreanof Point with the statistical herring fishing areas shown.

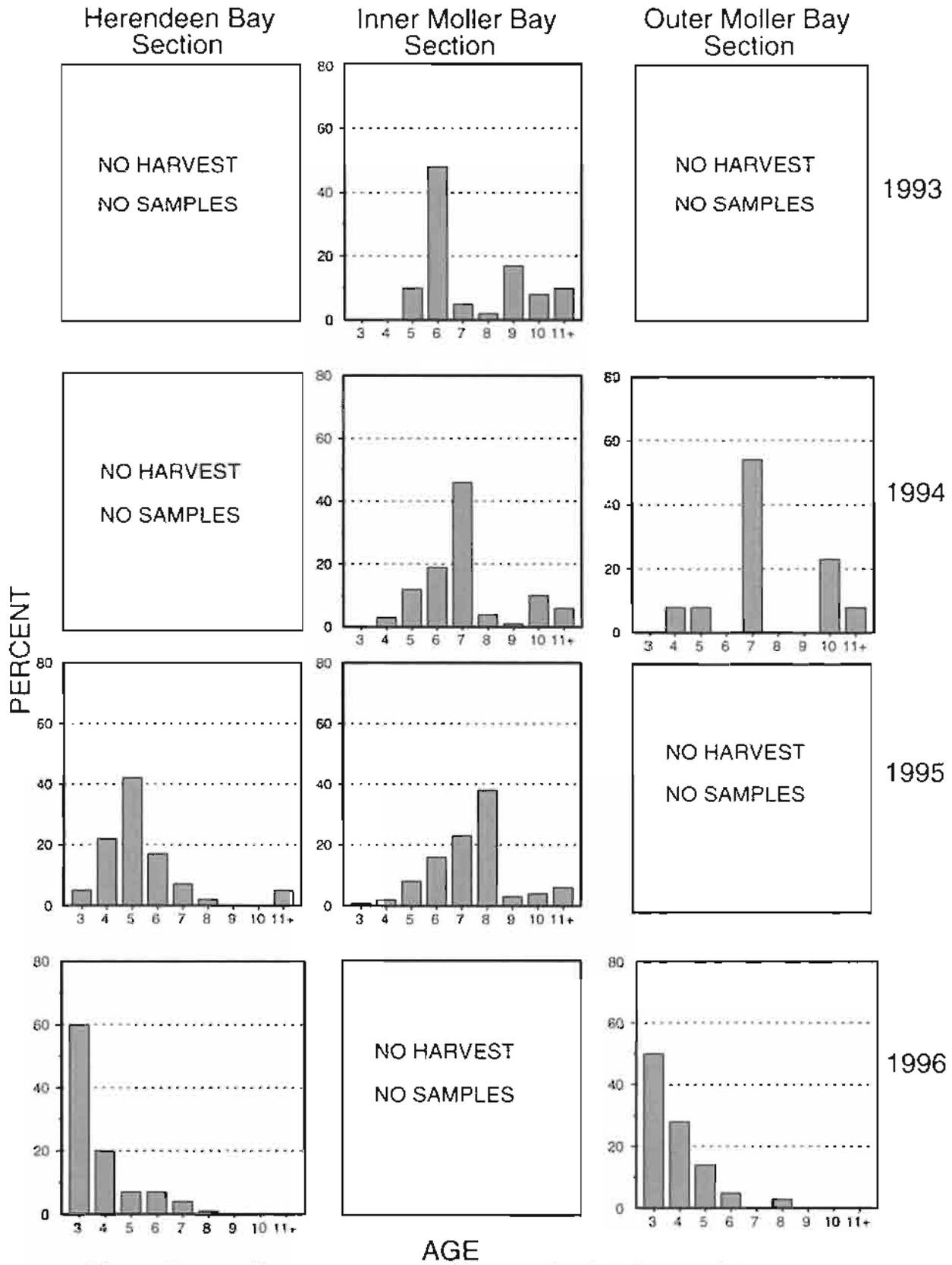


Figure 9. Age distribution of annual sac roe herring harvest from Herendeen, Inner Moller, and Outer Moller Bays Sections, 1993-96.

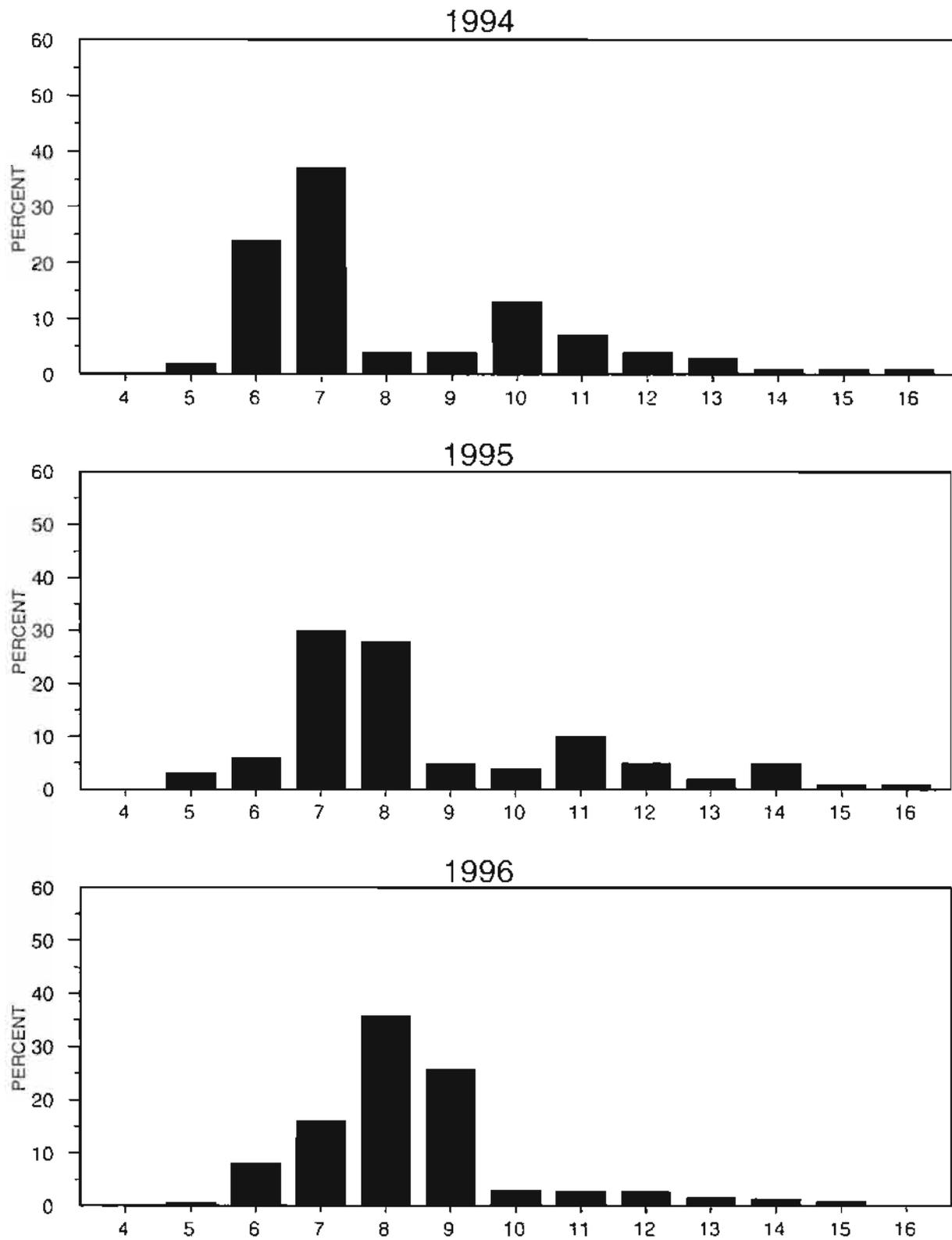


Figure 10. Age distribution of annual food and bait herring catches from the Aleutian Islands "Dutch Harbor" Management Area, 1994-96.

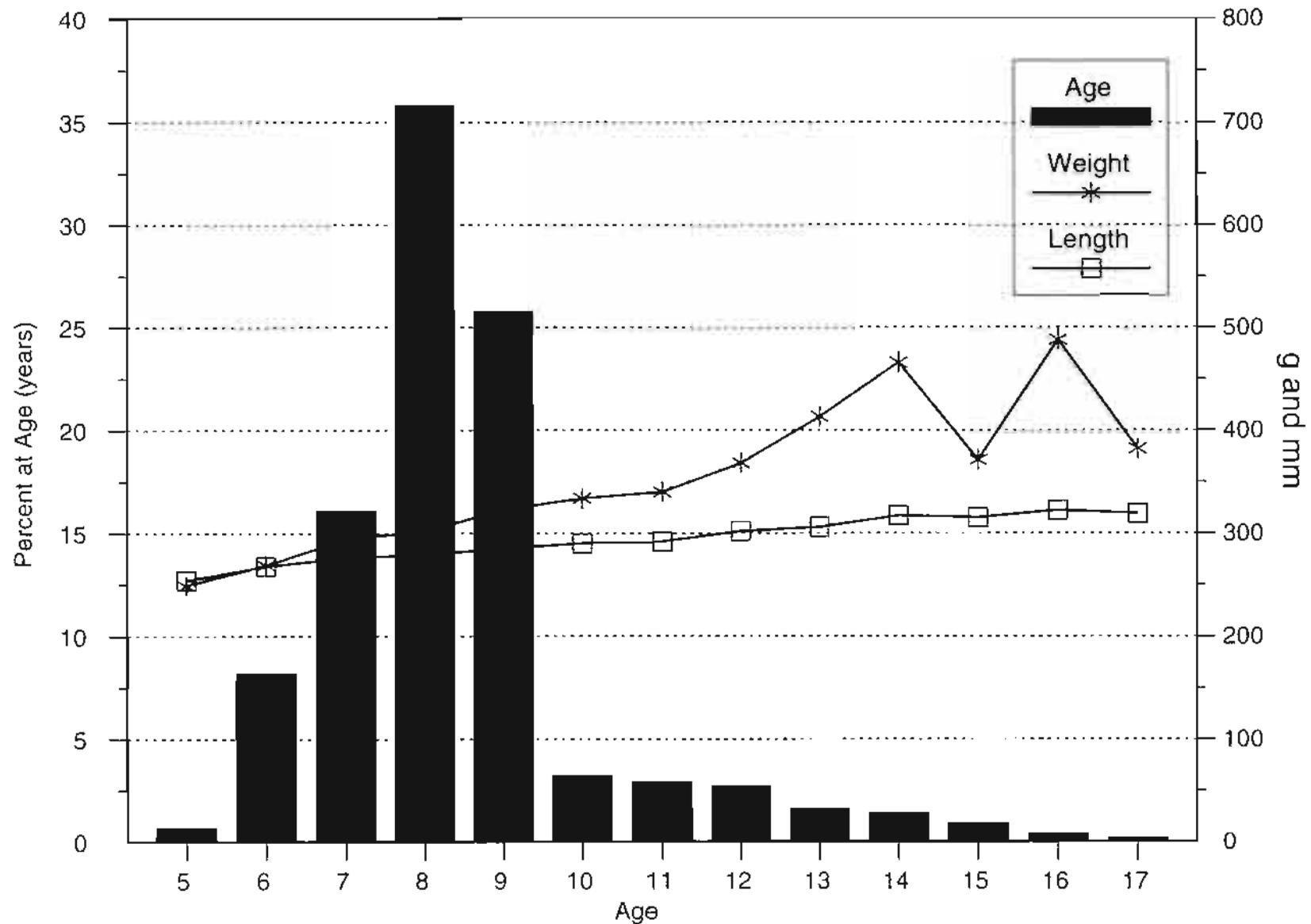


Figure 11. Average length at age(mm), average weight at age(g), and percent of each age class present in the "Dutch Harbor" management area, food and bait herring fishery, 1996.

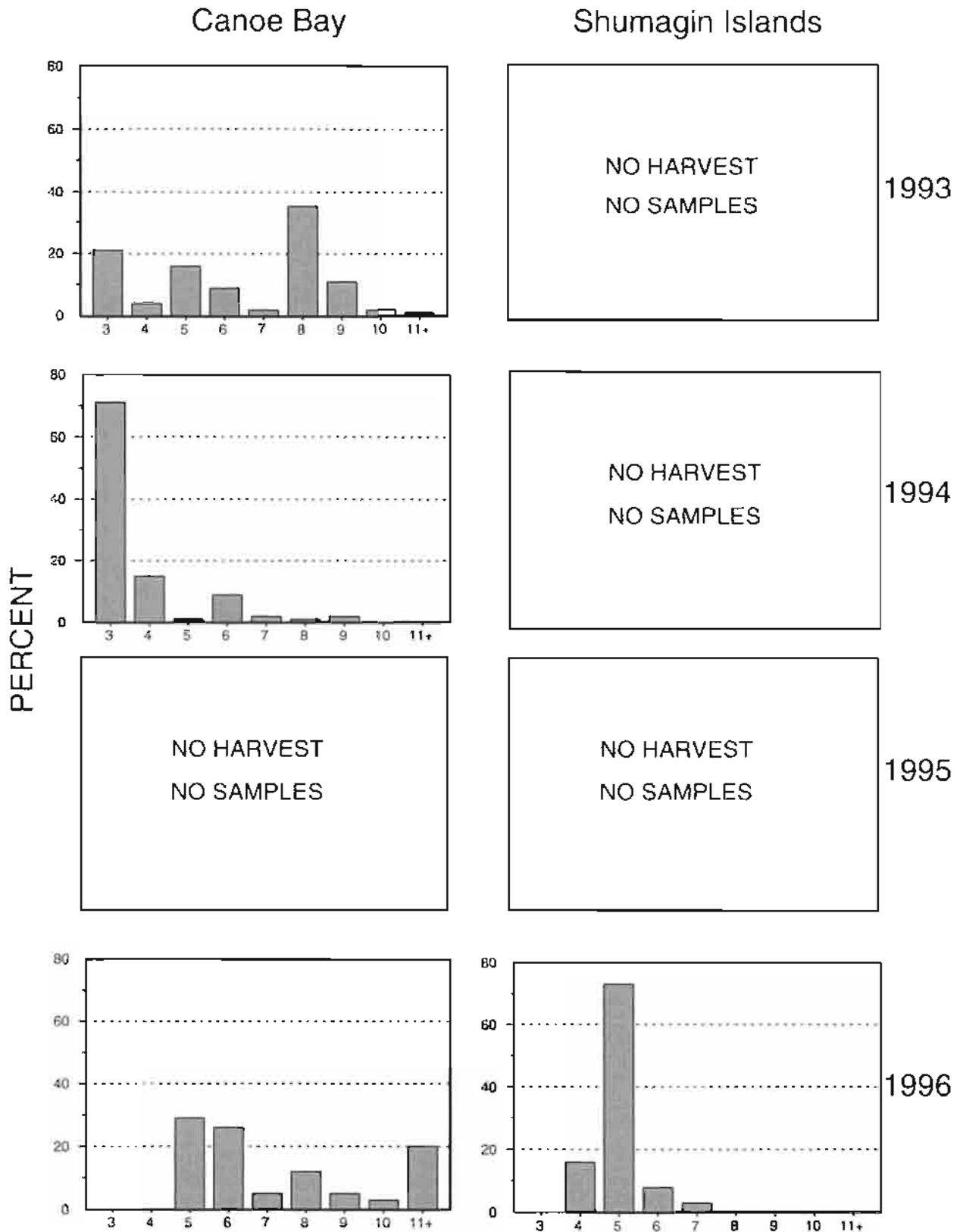


Figure 12. Age distribution of annual sac roe herring harvest from Canoe Bay and Shumagin Islands, 1993-96.

## **APPENDIX**

APPENDIX A: EMERGENCY ORDER SUMMARY

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**ALASKA PENINSULA MANAGEMENT AREA**

**EMERGENCY ORDER NO. 4-FH-M-SP-01-96**

EFFECTIVE DATE: April 15, 1996

EXPLANATION: This emergency order establishes commercial sac roe herring fishing periods as follows for the Alaska Peninsula and Aleutian Islands Management Areas:

(1) South Peninsula: Sand Point, Pavlof, and King Cove Districts.

From April 15 through July 15 herring may be taken during fishing periods starting at 12:00 noon on odd number days of the month and closing at 12:00 noon on even days of the month, followed by 24 hour closed periods.

(2) Aleutian Islands: Unimak, Akutan, Unalaska, Umnak, and Adak Districts.

Effective at 12:01 a.m. April 15 through 11:59 p.m. June 15 herring may be taken. The season is closed from June 16 through July 15.

(3) North Peninsula: Amak, Port Moller, and Port Heiden Districts.

(a) Amak District.

Effective at 12:01 a.m. April 15 through 11:59 p.m. June 30 herring may be taken. The season is closed from July 1 through July 15.

(b) Port Moller and Port Heiden Districts.

From April 15 through June 30 herring may be taken only during periods established by subsequent emergency order(s). The season is closed from July 1 through July 15.

JUSTIFICATION: Fishing time is needed to allow sac roe herring harvests in the Alaska Peninsula and Aleutian Islands Management Areas during the sac roe herring season. Effort is anticipated to be low in Aleutian waters and the Amak District of the North Peninsula. These areas are open for exploration because no commercial sac roe herring deliveries have been made in the Aleutian Islands and the Amak District of the North Peninsula has had no deliveries in

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recent years. Therefore, until harvests indicate more conservative measures are needed, seven fishing days per week can be allowed without causing stock conservation concerns in Aleutian waters and the Amak District of the North Peninsula.

The reason that portions of the area will remain closed during part of the sac roe herring season is as follows:

Unimak, Akutan, Unalaska, Umnak, and Adak Districts during June 16 through July 15:

These districts are managed on a food and bait herring fishery allocation during the food and bait season beginning July 16. The food and bait fishery is managed on the basis of 5 AAC 27.060 Bering Sea Herring Fishery Management Plan. During some years food and bait stocks (non local spawning stocks) are present in these areas by June 16. The closure from June 16 through July 15 will prevent food and bait herring from being harvested prior to the food and bait season. If sac roe stocks are discovered during the June 16 through July 15 time period, appropriate locations can be opened for a sac roe herring harvest by subsequent emergency order(s).

South Peninsula: Sand Point, Pavlof, and King Cove Districts during April 15 through July 15:

These districts are managed on local sac roe herring stocks. During recent years, fishing effort has increased and the department's ability to monitor the fishery has diminished. Therefore, to avoid overharvest these districts should be opened for 24 hour periods, followed by 24 hour closures.

Port Moller and Port Heiden Districts during April 15 through June 30.

These districts are managed on local sac roe herring stocks. Fishing effort has increased, in recent years, and the department must closely monitor these fisheries to prevent overharvest. Therefore, these districts should remain closed until a large biomass of herring is observed, fishing vessels are on the grounds and tender capacity sufficient to transport the harvest are on the grounds.

Port Heiden, Port Moller, and Amak District during July 1 through July 15:

These districts are managed on a local sac roe herring stocks. During some years non-local, spawned-out herring are present in coastal waters by July 1. The closure from July 1 through July 15 will prevent the harvest of any non-local, spawned-out herring. If sac roe stocks are discovered during the July 1 through July 15 time period, appropriate locations can be opened for a sac roe herring harvest by subsequent emergency order(s).

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**EMERGENCY ORDER NO. 4-FH-M-SP-02-96**

EFFECTIVE DATE: 12:00 noon June 7, 1996.

EXPLANATION: This emergency order closes the Stepovak Bay Section of the Sand Point District to commercial sac roe herring fishing effective at 12:00 noon Friday June 7, 1996. The balance of the Sand Point District will remain open.

JUSTIFICATION: The preseason guideline harvest level (GHL) for the Stepovak Bay Section was 25 tons. The GHL has been achieved although the harvest information is confidential. Aerial surveys conducted by the department have not documented sufficient biomass to justify additional harvest of Stepovak Bay stocks.

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**EMERGENCY ORDER NO. 4-FH-M-SP-03-96**

EFFECTIVE DATE: 1:00 p.m., Monday June 10, 1996

EXPLANATION: This emergency order allows a ten hour commercial herring fishing period from 1:00 p.m. Monday, June 10, 1996 until 11:00 p.m., Monday, June 10, 1996 in the Port Moller District.

JUSTIFICATION: The herring guideline harvest in the Port Moller District remains at 750 tons with no commercial fishery to date. Biomass estimate aerial surveys were first conducted on May 9, with a biomass estimate to date around 550 tons. Effort levels have fluctuated in the Port Moller District from 25 purse seine boats in mid May to only 3 vessels at the present.

A ten hour fishing period from 1:00 p.m. until 11:00 p.m. Monday, June 10 should give fishers the opportunity to catch herring, if they enter the district during this period, without exceeding the processing capacity of the one registered company on the grounds. On average, a minimum of 50 tons per day of herring have been entering the district the past two days. The department will continue to manage the fishery to assure a spawning biomass of 1,000 tons in the Port Moller District by the latter part of June.

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**EMERGENCY ORDER NO. 4-FH-M-SP-04-96**

EFFECTIVE DATE: 1:00 p.m., Tuesday, June 11, 1996

EXPLANATION: This emergency order allows a commercial herring fishing period from 1:00 p.m. Tuesday, June 11, 1996 until further notice in the Port Moller District.

JUSTIFICATION: The herring guideline harvest in the Port Moller District remains at 750 tons with no commercial harvest to date. Biomass estimate aerial surveys were first conducted on May 9, with a biomass estimate to date around 550 tons. Effort levels have fluctuated in the Port Moller District from 25 purse seine boats in mid May to only 3 vessels at the present.

Due to severe high winds, a ten hour fishing period from 1:00 p.m. until 11:00 p.m. Monday, June 10 did not provide opportunity for vessels to participate in the fishery. Reopening the herring fishery until further notice will provide opportunity for the three vessels to harvest herring if they enter the district. If a harvest does occur, the department does not expect the harvest to exceed 50 tons. When fish have entered the district, the biomass estimates have usually been small and much less than 50 tons. If a harvest does occur, the department will re-evaluate future management actions. The department will continue to manage the fishery to assure a spawning biomass of 1,000 tons in the Port Moller District by the latter part of June.

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**EMERGENCY ORDER NO. 4-FH-M-SP-05-96**

EFFECTIVE DATE: 9:00 a.m. Friday, June 14, 1996

EXPLANATION: This emergency order closes the commercial herring fishing period from 9:00 a.m. Friday, June 14, 1996 until further notice in the Port Moller District.

JUSTIFICATION: The commercial herring fishery harvest in the Port Moller District is 45 tons. The preseason guideline harvest level was 750 tons. Biomass estimate aerial surveys were first conducted on May 9, with a minimum season biomass estimate to date of 975 tons. Effort levels have fluctuated in the Port Moller District from 25 purse seine boats in mid May to only 3 vessels at the present.

The first herring fishery occurred on Monday, June 10 and poor weather conditions (high wind) did not provide opportunity for vessels to participate in the fishery. The commercial fishery was

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reopened on Tuesday, June 11 until further notice to provide opportunity for a harvest if herring entered the district. The harvest of herring during this period was 45 tons. The department will further document more biomass to assure 1,000 tons of spawning stock as identified in the Bering Sea Herring Fishery management Plan (5 AAC 27.060). The commercial herring fishery is closed until effective at 9:00 a.m. Friday, June 14 until significant quantities of herring enter the district and the 1,000 tons spawning biomass is assured.

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**EMERGENCY ORDER NO. 4-FH-M-SP-06-96**

EFFECTIVE DATE: 11:00 p.m. Friday, June 14, 1996

EXPLANATION: This emergency order reopens the commercial herring fishing period from 11:00 p.m. Friday June 14, 1996 until further notice in the Port Moller District.

JUSTIFICATION: The herring guideline harvest in the Port Moller District is 750 tons with a harvest of 45 tons. Biomass estimate aerial surveys were first conducted on May 9, with a minimum observed biomass estimate to date of 1,155 tons. The spawning threshold of 1,000 tons has been met and the department will continue to manage the Port Moller District commercial herring fishery to provide for a maximum harvest of 16% above the spawning threshold. Effort levels in the Port Moller District fluctuated from 25 purse seine boats in mid May to only 3 vessels at the present.

Reopening the herring fishery until further notice will provide opportunity for the three vessels to harvest herring if they enter the district. If a harvest does occur, the department does not expect the harvest to exceed 25 tons since the daily volume of fish that have been entering the district recently has been small.

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**EMERGENCY ORDER NO. 4-FH-M-SP-07-96**

EFFECTIVE DATE: 12:00 noon Tuesday, June 18, 1996

EXPLANATION: This emergency order allows a 24 hour extension of the current commercial sac roe herring fishing period in the Canoe Bay Section of the Pavlof District from 12:00 noon Tuesday June 18, until 12:00 noon Wednesday June 19, 1996. The balance of the South Peninsula herring fishery will remain open as previously announced.

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**JUSTIFICATION:** The preseason guideline harvest level (GHL) for the Canoe Bay Section is 75 tons. Due to the late arrival of herring into Canoe Bay, ADF&G is currently unable to assess the biomass. Commercial herring spotter pilots have reported an estimated 240 tons herring in Canoe Bay.

A 24 hour extension of the current fishing period will give fishermen the additional opportunity to harvest herring toward the GHL. Fishing effort is expected to be limited to one fishing vessel and a single tender. To date, there has been no herring harvest in the Pavlof District.

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## **ALEUTIAN ISLANDS MANAGEMENT AREA**

### **EMERGENCY ORDER NO. 4-FH-M-SP-08-96**

**EFFECTIVE DATE:** 12:00 Midnight Monday, July 15, 1996

**EXPLANATION:** This emergency order establishes that the commercial food and bait herring fishing period will be announced by subsequent emergency order.

**JUSTIFICATION:** The "Dutch Harbor" food and bait fishery is managed on the basis of the Togiak herring biomass as described under 5 AAC 27.060, the Bering Sea Herring Management Plan. The department shall manage the Dutch Harbor fishery so that it is allocated seven percent of the allowable Togiak District herring sac roe harvest determined under the provisions of the Bristol Bay Herring Management Plan (5 AAC 27.865). Because of the expected high effort, large biomass and small guideline harvest of this fishery, only short openings in duration will be required to harvest the allocation.

Fishing periods for the Dutch Harbor food and bait herring fishery will be announced by emergency order to establish fishing time and area once stock assessment has occurred.

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**EMERGENCY ORDER NO. 4-FH-M-SP-09-96**

EFFECTIVE DATE: 12:15 a.m. Tuesday July 16, 1996

EXPLANATION: This emergency order allows a 20 minute commercial food and bait herring fishing period in the Unalaska District of the Aleutian Islands Management Area, from 12:15 a.m. to 12:35 a.m., Tuesday, July 16, 1996 in all waters of Unalaska Bay west of a line from Eider Point to the northern most tip of Hog Island and west of a line from the southern most tip of Hog Island to the point of land at the west entrance of Captains Bay at 53°52' 47" N. lat., 166°34'30" W. long.

JUSTIFICATION: The "Dutch Harbor" food and bait fishery is managed on the basis of the Togiak herring biomass as described under 5 AAC 27.060, the Bering Sea Herring Management Plan. The department shall manage the Dutch Harbor fishery so that it is allocated seven percent of the allowable Togiak District herring sac roe harvest determined under the provisions of the Bristol Bay Herring Management Plan (5 AAC 27.865).

The allocation for this herring fishery is 1,793 tons. Effort consists of 25 purse seine vessels, 15 tenders representing 6 processing companies, and 7 aircraft. The initial holding capacity for both tenders and purse seiners is an estimated 4,300 tons. Herring are present in the Unalaska Bay Section. Based on aerial surveys, a 20 minute opening in the described waters will allow the fleet to harvest herring to meet the food and bait allocation.

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**EMERGENCY ORDER NO. 4-FH-M-SP-10-96**

EFFECTIVE DATE: 4:00 p.m. Tuesday July 16, 1996

EXPLANATION: This emergency order closes the Aleutian Islands Management Area commercial food and bait herring fishing season effective 12:35 a.m. Tuesday, July 16, 1996 until 12:00 midnight, February 28, 1997 (the end of the food and bait herring season).

JUSTIFICATION: Catch estimates from July 16 indicate that approximately 2,048 tons were harvested during the 20 minute fishing period. An estimated 255 tons were caught above the 1793 ton allocation. Because the allocation has been exceeded, there will be no more fishing periods for the 1996 "Dutch Harbor" food and bait herring fishery.

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APPENDIX B. PARTIAL LISTING OF HERRING REGULATIONS, 1996.

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ARTICLE 2. - GENERAL SPECIFICATIONS.

5 AAC 27.060. BERING SEA HERRING FISHERY MANAGEMENT PLAN.

- (a) The department shall follow the directives of the Bering Sea Herring Management Plan, as well as the regulations that govern the individual herring fisheries, when managing the commercial herring fisheries that take place in the Bering Sea.
- (b) Unless otherwise specified in this chapter, the department shall manage the fisheries so that the exploitation rate on eastern Bering Sea herring stocks does not exceed 20 percent of the biomass of those stocks.
- (c) The following thresholds are minimum biomass levels for each herring fishing district. When the department estimates, in season, that the biomass in a district is below its threshold, the department may not allow a commercial harvest of herring in that district.

<u>District</u>	<u>Thresholds (s.t.)</u>
Port Moller	1,000
Togiak	35,000
Security Cove	1,200
Goodnews Bay	1,200
Cape Avinof	500
Nelson Island	3,000
Nunivak Island	1,500
Cape Romanzof	1,500
Norton Sound	7,000

- (d) The department shall manage the food and bait herring fishery that takes place in the Unimak, Akutan, and Unalaska Districts and that portion of the Umnak District east of Samalga Pass (Dutch Harbor fishery) so that it is allocated seven percent of the allowable Togiak District sac roe herring harvest determined under the provisions of the Bristol Bay Herring Management Plan (5 AAC 27.865).
- (g) When the Togiak District is below its threshold, the Dutch Harbor fishery will be closed for that season.

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- (h) When any of the southwest Alaska herring stocks, from Security Cove to Port Clarence, is below its threshold, identified in (c) of this section, the department shall close the Dutch Harbor food and bait herring fishery for that season. For the purpose of determining the need for this closure, the threshold level for the Nelson Island herring stock is 2,000 short tons. If the department determines it necessary to close the Dutch Harbor food and bait herring fishery under this subsection, the department shall not reallocate the herring harvest set for the Dutch Harbor food and bait herring fishery, under 5 AAC 27.865 (b)(7), to the Togiak sac roe herring fishery.

ARTICLE 12. - STATISTICAL AREA T; BRISTOL BAY AREA

5 AAC 27.865. BRISTOL BAY HERRING MANAGEMENT PLAN

- (a) When managing the Bristol Bay commercial herring fishery, the primary objectives of the department will be to prosecute an orderly and manageable fishery, while striving for the highest level of product quality with a minimum of waste.
- (b) To ensure that no gear group is totally disadvantaged, the Board of Fisheries directs the department to take the following actions given the specified circumstances.
  - (1) When circumstances preclude the department from adequately assessing the biomass, the fishery shall be managed for an exploitation based on the pre-season projected return.
  - (3) Whenever possible, openings for both gear types must begin during the hours of daylight, and special consideration will be given to afford the maximum amount of daylight.
  - (4) The department may allow only one gear type to operate in an area during any open period.
  - (7) The maximum exploitation rate for the Bristol Bay herring stock is 20 percent. Before opening the sac roe fishery, the department shall set aside approximately 1,500 short tons for the Togiak district herring spawn-on-kelp fishery, and seven percent of the remaining available harvest for the Dutch Harbor food and bait fishery.
  - (8) After the spawn-on-kelp harvest and the Dutch Harbor food and bait fishery have been subtracted, the remaining harvestable surplus is allocated to the sac roe fishery. The department shall manage for a removal of 25 percent of that surplus by the gillnet fleet and 75 percent by the purse seine fleet.

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- (9) If a manageable separation of the year classes occurs, an exploitation rate of up to 20 percent may be allowed on the younger age herring (4 years or less), and no fishery will be considered if this recruit population is less than 20,000 short tons.
- (10) Late season (post-peak) sac roe openings must be based on one or more of the following criteria:
- (A) a definable increase in the biomass of herring present on the fishing grounds;
  - (B) a major shift in the age composition of the herring in a definable biomass that is large enough to allow a harvest; and
  - (C) a major improvement in the roe maturity of fish sampled over a broad area, indicating the arrival of a quantity of new herring.

ARTICLE 10. - STATISTICAL AREA M; ALASKA PENINSULA-ALEUTIAN ISLANDS AREA.

5 AAC 27.600. DESCRIPTION OF AREA. Statistical area M includes all waters bound on the east by a line extending southeast (135°) from the southernmost tip of Kupreanof Point, on the west by the International Date Line, and on the north by a line extending west from the westernmost tip of Cape Menshikof.

5 AAC 27.605. DESCRIPTION OF DISTRICTS AND SECTIONS.

- (a) Sand Point District: all waters on the south (Pacific) side of the Alaska Peninsula west of a line extending from 135° from Kupreanof Point (55°34'N.lat, 159°36' W.long.), and east of 160°59' W.long. (longitude of McGinty Point). Sections are as follows:
- (1) Stepovak Bay Section: all waters of the Sand Point District located west of a line extending 135° from Kupreanof Point 55°34' N.lat., 159°36'W.long., north of a line from approximately two nautical miles south of 135° from Kupreanof Point, west to 55°32'12" N.lat., 160°02'36 W.long., (approximately one nautical mile north of Karpa Island), and west to 55°26' N.lat, 160°31'30" W.long., (approximately two nautical miles south of the longitude of Swedania Point 160°31'30" W.long.).
  - (2) Swedania Point-Balboa Bay Section: all waters of the Sand Point District located between 160°31'30" W.long. and 160°49' W.long., and north of 55°26' N.lat.

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- (3) Point Aliaksin-Beaver Bay Section: all waters of the Sand Point District located between 160°49' W.long. and 161°59' W.long., and north of 55°26' N.lat.
- (4) General section: all other waters of the Sand Point District.
- (b) Pavlof District: all waters on the south (Pacific) side of the Alaska Peninsula between 160°59' W.long. and a line extending 150° from 55°05'54" N.lat., 161°59' W.long. through Inner and Outer Iliasik Islands, including Bear and Volcano Bays.
  - (1) Canoe Bay Section: all waters of Canoe Bay east of 161°21'45" W.long.
  - (2) Pavlof Bay Section: all waters of Pavlof Bay north of 55°21'42" N.lat. (latitude of Cape Tolstoi), excluding the Canoe Bay and Seal Cape-Wosnesenski Sections.
  - (3) Seal Cape-Wosnesenski Section: all waters of the Pavlof District located between 160° 59' W.long. and 161°30" W.long. (longitude of Cape Tolstoi).
  - (4) General section: all other waters of the Pavlof District.
- (c) King Cove District: all waters of the south (Pacific) side of the Alaska Peninsula between a line extending 150° from 55°05'54" N.lat., 161°59' W.long. through Inner and Outer Iliasik Islands and 163°30' W.long., including waters of Isanotski Strait south of a line from Nichols Point to the False Pass dock.
  - (1) Belkofski Section: all waters of the King Cove District east of 162°15'W.long. (longitude of Bold Cape).
  - (2) Deer Passage Section: all waters of the King Cove District between 162°15' W.long. (longitude of Bold Cape) and 162°25' W.long. (longitude of Vodapoini Point), and north of 54°55' N.lat., excluding all waters of Lenard Harbor.
  - (3) Cold Bay Section: all waters of the King Cove District bounded by a line from Thin Point to Vodapoini Point.
  - (4) General section: all other waters of the King Cove District.
- (d) Unimak District: all waters on the southside of Unimak Island between 163°30' W.long. and the longitude of Scotch Cap Light.
- (e) Akutan District: all waters extending west of Unimak Island to and including Akutan Pass.

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- (f) Unalaska District: all waters west of Akutan Pass to and including Umnak Pass.
  - (1) Unalaska Bay Section: all waters of the Unalaska Bay District enclosed by a line from Priest Rock at 54°00'24" N.lat., 166°22'42" W.long. to Cape Cheerful at 54°00'33" N.lat., 166°37'45" W.long.
  - (2) General Section: all waters of the Unalaska District not included in the Unalaska Bay Section.
- (g) Umnak District: all waters west of Umnak Pass to and including Atka Pass.
- (h) Adak District: all waters west of Atka Pass to the terminus of the Aleutian Islands.
- (i) Amak District: all Bering Sea waters south and west of Cape Lieskof (55°47' N.lat., 162°04' W.long.) to the longitude of Cape Sarichef Light, including all waters of Bechevin Bay and Isanotski Strait north of a line from the False Pass Cannery dock to the tip of Nichols Point.
- (j) Port Moller District: all Bering Sea waters between the latitude of Cape Lieskof and the latitude of Cape Seniavin (56°24' N.lat.).
  - (1) Western Section: all waters of the Port Moller District west of the longitude of Wolf Point on Walrus Island, excluding the waters of Herendeen Bay and Deer Island - Mud Bay Sections.
  - (2) Deer Island - Mud Bay Section: all waters of the Port Moller District bounded by a line from the northernmost tip of Point Edward to the southernmost tip of Wolf Point on Walrus Island to Point Divide (55°53'10" N.lat., 160°47' W.long.) to the northernmost tip of Black Point.
  - (3) Herendeen Bay Section: all waters of Herendeen Bay south of a line from the northernmost tip of Black Point to Point Divide (55°53'10" N.lat., 160°47' W.long.).
  - (4) Inner Port Moller Section: all waters of Port Moller Bay enclosed by a line from Point Divide (55°53'10" N.lat., 160°47' W.long), to Harbor Point (55°55' N.lat., 160°34'30" W.long.).
  - (5) Outer Port Moller Bay Section: all waters of the Port Moller District south and east of a line from Point Divide (55°53'10" N.lat., 160°47' W.long.) to the southernmost tip of Wolf Point on Walrus Island to the southernmost tip of Entrance Point (55°59'30" N.lat., 160°34' W.long.).

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- (6) Bear River Section: all Bering Sea waters between the longitude of Wolf Point on Walrus Island and Cape Seniavin Light, excluding the waters of the Herendeen Bay, Deer Island - Mud Bay, Outer Port Moller Bay, and Inner Port Moller Bay Sections.
- (k) Port Heiden District: all waters between the latitude of Cape Seniavin (56°24' N.lat.) and the latitude of Cape Menshikof (57°31'20" N.lat.).

5 AAC 27.610. FISHING SEASONS AND PERIODS.

- (a) In the Sand Point, Pavlof, King Cove, Amak, Port Moller, and Port Heiden Districts, herring may be taken from April 15 through July 15 (sac roe season).
- (d) Herring may be taken only during periods established by emergency order.
- (e) In the Unimak, Akutan, Unalaska, Umnak, and Adak Districts, herring may be taken from April 15 through July 15 (sac roe season) and from July 16 through February 28 (food and bait season).

5 AAC 27.630. GEAR. Herring may be taken only by purse seines and gillnets.

5 AAC 27.631. GILLNET SPECIFICATIONS AND OPERATIONS.

- (a) During the herring sac roe season, the aggregate length of herring gillnets in use by a herring CFEC permit holder may not exceed 150 fathoms.
- (b) The interim-use or entry permit holder must be physically present while the gillnet is being fished.
- (c) Each drift gillnet in operation must have a buoy at one end and the opposite end must be attached to the fishing vessel. Each set gillnet in operation must be anchored and buoyed at both ends. Each buoy must be plainly and legibly marked with the permanent vessel license plate number (ADF&G number) of the vessel operating the gear. The buoy may bear only a single number and this number must be that of the vessel used in operating the gear. The numbers must be painted on the top one-third of the buoy in numerals at least four inches in height, one-half inch in width and in a color contrasting to that of the buoy. The buoy markings must be visible on the buoy above the water surface.

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5 AAC 27.632. SEINE SPECIFICATIONS AND OPERATIONS. During the sac roe herring season, no purse seine may be more than 1,000 meshes in depth and more than 100 fathoms in length. During the food and bait herring season, no purse seine may be more than 250 fathoms in length.

5 AAC 27.650. WATERS CLOSED TO HERRING FISHING.

- (a) Herring may not be taken from June 25 through September 30 in any waters closed to salmon fishing.

5 AAC 27.662. BUYER AND TENDER REPORTING REQUIREMENTS. In addition to the requirements of 5 AAC 39.130(f) each tender operator and each buyer or his agents shall report in person to and register with a local representative of the department upon arrival in the statistical area before commencing operations and before changing location of the operation. Each buyer shall:

- (1) identify all vessels to be employed in transporting or processing herring and shall register such vessels with a local representative of the department located in the statistical area before transporting or processing of herring;
  - (2) make daily reports of all herring purchased from fishermen, and other processing records as specified by a local representative of the department; and
  - (3) submit fish tickets before departure from the area and no later than 10 days after termination of buying operations in the area, or as otherwise specified by a local representative of the department.
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Appendix C.1. Port Moller tides, 1996.

Date	---HIGH TIDE---		---HIGH TIDE---		---LOW TIDE---		---LOW TIDE---		
	Time	Feet	Time	Feet	Time	Feet	Time	Feet	
May	1	9 : 35 AM	9.2	10 : 37 PM	9.9	3 : 29 AM	5.2	3 : 47 PM	1.5
	2	10 : 17 AM	9.0	11 : 27 PM	10.5	4 : 22 AM	5.4	4 : 29 PM	0.7
	3	11 : 01 AM	8.8	:		5 : 15 AM	5.6	5 : 13 PM	0.0
	4	0 : 17 AM	11.1	11 : 47 AM	8.7	6 : 08 AM	5.5	5 : 58 PM	-0.7
	5	1 : 06 AM	11.6	12 : 37 PM	8.7	7 : 00 AM	5.3	6 : 46 PM	-1.2
	6	1 : 57 AM	12.1	1 : 31 PM	8.7	7 : 53 AM	4.9	7 : 37 PM	-1.6
	7	2 : 47 AM	12.4	2 : 28 PM	8.8	8 : 45 AM	4.3	8 : 30 PM	-1.6
	8	3 : 38 AM	12.6	3 : 29 PM	9.0	9 : 38 PM	3.5	9 : 26 PM	-1.4
	9	4 : 29 AM	12.6	4 : 31 PM	9.2	10 : 31 AM	2.6	10 : 23 PM	-0.8
	10	5 : 21 AM	12.5	5 : 36 PM	9.5	11 : 24 AM	1.6	11 : 22 PM	0.0
	11	6 : 13 AM	12.2	6 : 42 PM	9.9	:		12 : 17 PM	0.6
	12	7 : 05 AM	11.8	7 : 48 PM	10.2	0 : 23 AM	1.0	1 : 11 PM	-0.2
	13	7 : 57 AM	11.3	8 : 52 PM	10.6	1 : 25 AM	2.1	2 : 03 PM	-0.9
	14	8 : 49 AM	10.8	9 : 55 PM	11.0	2 : 26 AM	3.1	2 : 55 PM	-1.4
	15	9 : 41 AM	10.1	10 : 54 PM	11.3	3 : 28 AM	3.9	3 : 46 PM	-1.5
	16	10 : 33 AM	9.5	11 : 50 PM	11.5	4 : 28 AM	4.5	4 : 35 PM	-1.4
	17	11 : 24 AM	8.9	:		5 : 27 AM	5.0	5 : 23 PM	-1.1
	18	0 : 42 AM	11.6	12 : 14 PM	8.4	6 : 23 AM	5.2	6 : 10 PM	-0.5
	19	1 : 31 AM	11.6	1 : 02 PM	8.0	7 : 15 AM	5.4	6 : 55 PM	0.1
	20	2 : 16 AM	11.5	1 : 49 PM	7.7	8 : 05 AM	5.4	7 : 39 PM	0.7
	21	2 : 58 AM	11.3	2 : 36 PM	7.5	8 : 52 AM	5.3	8 : 23 PM	1.4
	22	3 : 37 AM	11.2	3 : 23 PM	7.4	9 : 36 AM	5.1	9 : 07 PM	2.0
	23	4 : 15 AM	11.0	4 : 10 PM	7.4	10 : 18 AM	4.8	9 : 52 PM	2.7
	24	4 : 52 AM	10.8	4 : 59 PM	7.6	11 : 00 AM	4.3	10 : 38 PM	3.4
	25	5 : 29 AM	10.6	5 : 50 PM	7.8	11 : 41 AM	3.7	11 : 26 PM	4.1
	26	6 : 06 AM	10.3	6 : 42 PM	8.2	:		12 : 21 PM	3.0
	27	6 : 43 AM	10.1	7 : 34 PM	8.7	0 : 16 AM	4.7	1 : 02 PM	2.3
	28	7 : 21 AM	9.8	8 : 26 PM	9.2	1 : 07 AM	5.3	1 : 42 PM	1.4
	29	8 : 01 AM	9.5	9 : 18 PM	9.9	2 : 01 AM	5.8	2 : 24 PM	0.6
	30	8 : 43 AM	9.3	10 : 10 PM	10.6	2 : 55 AM	6.2	3 : 06 PM	-0.3
	31	9 : 29 AM	9.1	11 : 01 PM	11.2	3 : 51 AM	6.3	3 : 51 PM	-1.2
June	1	10 : 18 AM	9.0	11 : 52 PM	11.9	4 : 46 AM	6.2	4 : 38 PM	-1.9
	2	11 : 11 AM	8.9	:		5 : 41 AM	5.9	5 : 28 PM	-2.4
	3	0 : 43 AM	12.4	12 : 08 PM	8.9	6 : 35 AM	5.3	6 : 20 PM	-2.7
	4	1 : 34 AM	12.8	1 : 09 PM	9.0	7 : 29 AM	4.5	7 : 14 PM	-2.6
	5	2 : 25 AM	13.0	2 : 12 PM	9.1	8 : 24 AM	3.5	8 : 10 PM	-2.1
	6	3 : 17 AM	13.0	3 : 17 PM	9.3	9 : 18 AM	2.4	9 : 08 PM	-1.3
	7	4 : 08 AM	12.9	4 : 24 PM	9.5	10 : 12 AM	1.2	10 : 07 PM	-0.2
	8	4 : 59 AM	12.6	5 : 31 PM	9.8	11 : 05 AM	0.1	11 : 08 PM	1.0
	9	5 : 50 AM	12.2	6 : 38 PM	10.2	11 : 59 AM	-0.9	:	
	10	6 : 42 AM	11.7	7 : 44 PM	10.6	0 : 09 AM	2.3	12 : 52 PM	-1.7
	11	7 : 33 AM	11.0	8 : 47 PM	10.9	1 : 11 AM	3.5	1 : 43 PM	-2.1

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Appendix C.1. (page 2 of 2)

Date	---HIGH TIDE---		---HIGH TIDE---		---LOW TIDE---		---LOW TIDE---	
	Time	Feet	Time	Feet	Time	Feet	Time	Feet
12	8 : 25 AM	10.3	9 : 47 PM	11.2	2 : 13 AM	4.4	2 : 34 PM	-2.2
13	9 : 16 AM	9.7	10 : 44 PM	11.4	3 : 14 AM	5.2	3 : 24 PM	-1.9
14	10 : 07 AM	9.0	11 : 37 PM	11.4	4 : 13 AM	5.7	4 : 12 PM	-1.5
15	10 : 56 AM	8.4	:	:	5 : 10 AM	6.0	4 : 58 PM	-0.9
16	0 : 25 AM	11.4	11 : 44 AM	8.0	6 : 03 AM	6.2	5 : 43 PM	-0.2
17	1 : 10 AM	11.3	12 : 30 PM	7.6	6 : 53 AM	6.2	6 : 26 PM	0.5
18	1 : 51 AM	11.2	1 : 16 PM	7.3	7 : 40 AM	6.0	7 : 08 PM	1.2
19	2 : 29 AM	11.1	2 : 02 PM	7.2	8 : 24 AM	5.8	7 : 51 PM	1.9
20	3 : 04 AM	10.9	2 : 49 PM	7.2	9 : 05 AM	5.3	8 : 33 PM	2.6
21	3 : 38 AM	10.8	3 : 38 PM	7.3	9 : 46 AM	4.8	9 : 17 PM	3.3
22	4 : 12 AM	10.6	4 : 28 PM	7.6	10 : 25 AM	4.1	10 : 03 PM	4.0
23	4 : 46 AM	10.4	5 : 19 PM	7.9	11 : 04 AM	3.3	10 : 51 PM	4.7
24	5 : 21 AM	10.2	6 : 10 PM	8.4	11 : 43 AM	2.4	11 : 41 PM	5.4
25	5 : 57 AM	10.0	7 : 02 PM	9.0	:	:	12 : 22 PM	1.4
26	6 : 36 AM	9.8	7 : 55 PM	9.7	0 : 33 AM	6.0	1 : 03 PM	0.4
27	7 : 17 AM	9.7	8 : 47 PM	10.4	1 : 27 AM	6.4	1 : 46 PM	-0.7
28	8 : 03 AM	9.5	9 : 40 PM	11.0	2 : 23 AM	6.6	2 : 31 PM	-1.6
29	8 : 53 AM	9.4	10 : 32 PM	11.7	3 : 19 AM	6.5	3 : 19 PM	-2.4
30	9 : 47 AM	9.4	11 : 25 PM	12.2	4 : 15 AM	6.2	4 : 10 PM	-3.0

Tidal Station Location: Port Moller (Entrance Point) 55 59'N., 160 34'W.  
 Port Heiden 56 56'N., 158 44'W.

Note: To correct the time and height for high and low tides for Port Heiden add time and feet from the Port Moller tide table.

Port Heiden:	<u>Time</u>		<u>Feet</u>	
	High	Low	High	Low
	1:30	2:04	0.6	0.8

Appendix C.2. Kodiak tides, 1996.

Date	---HIGH TIDE---		---HIGH TIDE---		---LOW TIDE---		---LOW TIDE---	
	Time	Feet	Time	Feet	Time	Feet	Time	Feet
May 1	1 : 02 AM	8.4	1 : 40 PM	7.4	7 : 27 AM	0.1	7 : 25 PM	1.1
2	1 : 37 AM	9.1	2 : 23 PM	7.7	8 : 06 AM	-0.7	8 : 02 PM	1.0
3	2 : 13 AM	9.6	3 : 06 PM	7.9	8 : 45 AM	-1.3	8 : 41 PM	1.1
4	2 : 50 AM	10.0	3 : 49 PM	7.9	9 : 26 AM	-1.7	9 : 21 PM	1.2
5	3 : 30 AM	10.1	4 : 34 PM	7.7	10 : 09 AM	-1.9	10 : 03 PM	1.4
6	4 : 12 AM	10.0	5 : 23 PM	7.4	10 : 54 AM	-1.8	10 : 50 PM	1.7
7	4 : 58 AM	9.6	6 : 16 PM	7.1	11 : 43 AM	-1.4	11 : 42 PM	2.1
8	5 : 50 AM	8.9	7 : 16 PM	6.9	:	:	12 : 37 PM	-0.9
9	6 : 50 AM	8.1	8 : 23 PM	6.8	0 : 44 AM	2.4	1 : 36 PM	-0.3
10	8 : 01 AM	7.4	9 : 32 PM	7.0	1 : 59 AM	2.5	2 : 42 PM	0.2
11	9 : 24 AM	6.8	10 : 36 PM	7.5	3 : 26 AM	2.2	3 : 51 PM	0.6
12	10 : 49 AM	6.7	11 : 31 PM	8.0	4 : 49 AM	1.6	4 : 55 PM	0.8
13	:	:	12 : 02 PM	6.8	5 : 55 AM	0.8	5 : 51 PM	1.0
14	0 : 18 AM	8.6	1 : 03 PM	7.1	6 : 49 AM	0.0	6 : 40 PM	1.1
15	1 : 00 AM	9.0	1 : 54 PM	7.3	7 : 35 AM	-0.6	7 : 24 PM	1.3
16	1 : 38 AM	9.4	2 : 39 PM	7.4	8 : 15 AM	-1.0	8 : 04 PM	1.5
17	2 : 14 AM	9.5	3 : 20 PM	7.5	8 : 53 AM	-1.2	8 : 41 PM	1.7
18	2 : 48 AM	9.5	3 : 58 PM	7.4	9 : 29 AM	-1.2	9 : 18 PM	2.0
19	3 : 22 AM	9.4	4 : 35 PM	7.2	10 : 05 AM	-1.0	9 : 54 PM	2.2
20	3 : 57 AM	9.1	5 : 12 PM	7.0	10 : 40 AM	-0.7	10 : 31 PM	2.5
21	4 : 32 AM	8.6	5 : 50 PM	6.7	11 : 17 AM	-0.3	11 : 10 PM	2.8
22	5 : 10 AM	8.1	6 : 32 PM	6.5	11 : 55 AM	0.1	11 : 55 PM	3.0
23	5 : 52 AM	7.5	7 : 18 PM	6.4	:	:	12 : 37 PM	0.5
24	6 : 41 AM	6.9	8 : 09 PM	6.3	0 : 47 AM	3.2	1 : 23 PM	1.0
25	7 : 40 AM	6.3	9 : 04 PM	6.5	1 : 51 AM	3.2	2 : 15 PM	1.3
26	8 : 50 AM	5.9	9 : 57 PM	6.9	3 : 06 AM	3.0	3 : 12 PM	1.6
27	10 : 07 AM	5.8	10 : 46 PM	7.4	4 : 21 AM	2.4	4 : 10 PM	1.8
28	11 : 20 AM	5.9	11 : 32 PM	8.1	5 : 23 AM	1.6	5 : 05 PM	1.8
29	:	:	12 : 23 PM	6.3	6 : 14 AM	0.7	5 : 56 PM	1.8
30	0 : 16 AM	8.8	1 : 17 PM	6.7	7 : 00 AM	-0.3	6 : 44 PM	1.7
31	0 : 59 AM	9.4	2 : 07 PM	7.1	7 : 44 AM	-1.1	7 : 30 PM	1.6

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Appendix C.2. (page 2 of 3)

Date	---HIGH TIDE---		---HIGH TIDE---		---LOW TIDE---		---LOW TIDE---	
	Time	Feet	Time	Feet	Time	Feet	Time	Feet
June 1	1 : 42 AM	10.0	2 : 54 PM	7.5	8 : 28 AM	-1.8	8 : 16 PM	1.5
2	2 : 26 AM	10.3	3 : 40 PM	7.7	9 : 12 AM	-2.2	9 : 02 PM	1.4
3	3 : 11 AM	10.4	4 : 27 PM	7.8	9 : 56 AM	-2.4	9 : 50 PM	1.4
4	3 : 58 AM	10.2	5 : 15 PM	7.7	10 : 42 AM	-2.3	10 : 41 PM	1.5
5	4 : 47 AM	9.7	6 : 06 PM	7.7	11 : 30 AM	-1.9	11 : 36 PM	1.7
6	5 : 40 AM	8.9	6 : 59 PM	7.6	:		12 : 20 PM	-1.3
7	6 : 39 AM	8.0	7 : 56 PM	7.6	0 : 38 AM	1.8	1 : 12 PM	-0.6
8	7 : 46 AM	7.1	8 : 56 PM	7.7	1 : 50 AM	1.9	2 : 09 PM	0.2
9	9 : 04 AM	6.4	9 : 56 PM	8.0	3 : 11 AM	1.7	3 : 11 PM	0.9
10	10 : 30 AM	6.0	10 : 53 PM	8.3	4 : 31 AM	1.2	4 : 14 PM	1.4
11	11 : 50 AM	6.0	11 : 44 PM	8.6	5 : 39 AM	0.6	5 : 14 PM	1.8
12	:		12 : 55 PM	6.3	6 : 35 AM	0.0	6 : 09 PM	2.0
13	0 : 30 AM	8.9	1 : 47 PM	6.6	7 : 22 AM	-0.4	6 : 57 PM	2.1
14	1 : 12 AM	9.1	2 : 32 PM	6.8	8 : 03 AM	-0.8	7 : 40 PM	2.2
15	1 : 50 AM	9.2	3 : 11 PM	7.0	8 : 40 AM	-0.9	8 : 20 PM	2.3
16	2 : 26 AM	9.3	3 : 47 AM	7.1	9 : 14 AM	-1.0	8 : 58 PM	2.3
17	3 : 01 AM	9.2	4 : 20 PM	7.1	9 : 47 AM	-1.0	9 : 34 PM	2.4
18	3 : 35 AM	9.0	4 : 53 PM	7.1	10 : 20 AM	-0.8	10 : 11 PM	2.5
19	4 : 11 AM	8.7	5 : 26 PM	7.0	10 : 53 AM	-0.6	10 : 50 PM	2.5
20	4 : 47 AM	8.2	6 : 01 PM	7.0	11 : 27 AM	-0.2	11 : 31 PM	2.6
21	5 : 27 AM	7.7	6 : 38 PM	6.9	:		12 : 02 PM	0.1
22	6 : 10 AM	7.0	7 : 19 PM	7.0	0 : 18 AM	2.7	12 : 40 PM	0.6
23	7 : 01 AM	6.4	8 : 05 PM	7.1	1 : 12 AM	2.7	1 : 22 PM	1.1
24	8 : 02 AM	5.8	8 : 55 PM	7.4	2 : 16 AM	2.5	2 : 11 PM	1.5
25	9 : 17 AM	5.5	9 : 48 PM	7.7	3 : 27 AM	2.1	3 : 08 PM	1.9
26	10 : 38 AM	5.4	10 : 43 PM	8.3	4 : 38 AM	1.4	4 : 09 PM	2.2
27	11 : 54 AM	5.7	11 : 37 PM	8.9	5 : 41 AM	0.5	5 : 12 PM	2.2
28	:		12 : 58 PM	6.2	6 : 35 AM	-0.4	6 : 11 PM	2.1
29	0 : 29 AM	9.5	1 : 52 PM	6.8	7 : 25 AM	-1.3	7 : 05 PM	1.8
30	1 : 19 AM	10.1	2 : 40 PM	7.3	8 : 11 AM	-2.0	7 : 58 PM	1.5

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Appendix C.2. (page 3 of 3)

	Time		Feet	
	High	Low	High	Low
Alaska Peninsula:				
Fox Bay, Kupreanof Peninsula	+0:22	+0:36	X0.89	X0.89
Dent Point, Stepovak Bay	+0:21	+0:36	X0.89	X0.89
Albatross Anchorage, Balboa Bay	+0:32	+0:43	X0.91	X0.91
Beaver Bay	+0:37	+0:42	X0.87	X0.87
Seal Cape, Coal Bay	+0:34	+0:45	X0.84	X0.84
Ukolnoi Island	+0:41	+0:40	X0.83	X0.83
Dolgoi Harbor, Dolgoi Island	+0:44	+0:40	X0.79	X0.79
Settlement Point, Pavlof Bay	+0:43	+0:48	X0.84	X0.84
Canoe Bay, Pavlof Bay	+1:36	+1:30	X0.76	X0.76
King Cove	+0:40	+0:42	X0.80	X0.80
Lenard Harbor, Cold Bay	+0:46	+0:57	X0.85	X0.85
Cold Bay	+0:49	+1:03	X0.84	X0.84
Morzhovoi Bay	+0:50	+0:43	X0.80	X0.80
Shumagin Islands				
Korovin Island (east side)	+0:26	+0:52	X0.92	X0.92
Sanborn Harbor, Nagai Island	+0:37	+0:37	X0.86	X0.86
Mist Harbor, Nagai Island	+0:35	+0:38	X0.83	X0.83
Pirate Cove, Popof Island	+0:42	+0:43	X0.88	X0.88
Sand Point, Popof Island	+0:30	+0:42	X0.87	X0.87
Zachary Bay, Unga Island	+0:34	+0:49	X0.88	X0.88
Sanak Islands				
Peterson Bay	+0:29	+0:32	X0.73	X0.73
Sanak Harbor	+0:48	+0:43	X0.78	X0.78
Unimak Island				
Dora Harbor	+0:49	+0:55	X0.77	X0.77
Ikatan Bay	+0:43	+0:45	X0.78	X0.78

Note: To correct tables for local areas add or subtract time for high and low tides and feet for high and low tides.

Note: X Multiply height of district tide by ratio to result, add given correction for total height correction.

APPENDIX D: ALASKA PENINSULA SAC ROE HERRING FORECAST, 1997.

This forecast is for North and South Alaska Peninsula areas with guideline harvest levels, excluding those areas open for exploration such as the General Section of the Sand Point District, Seal Cape-Wosnesenski Section, the General Section of the King Cove District, Amak District, and the Western Section of the Port Moller District. This forecast does not include the Aleutian Islands Management Area, which has no history of sac roe herring harvests, nor the Port Heiden District which had a commercial harvest only during 1992.

The 1997 North Peninsula forecasted harvest is 150 tons which is expected to be taken in the Port Moller District. This forecast is based on the 1996 biomass estimate and applying a sliding scale exploitation rate to the estimate. However, adjustments to the guideline harvest level will be made inseason once herring biomass is quantified. The following table shows the sliding scale allowable harvest on the estimated mature biomass when it is assumed the threshold of 1,000 tons will be reached.

Stock Size (Short Tons)	Sliding Scale Exploitation Rate	Allowable Harvest
Less than 1,000	0%	0
1,001-1,500	10%	0-150
1,501-1,999	10%	150-200
2,000-2,500	15%	300-375
2,501-3,000	15%	375-450
> 3,000	20%	> 450

At low biomass levels a conservative approach will be taken to allow the local stocks to rebuild and to account for North Peninsula herring that may contribute to the Dutch Harbor food and bait fishery. Rowell et. al. (1990) estimated that up to 22% of the Dutch Harbor food and bait harvest may be non-Togiak herring. Based on estimated travel time of eastern Bering Sea herring stocks to Dutch Harbor and the fishery opening date of July 16, North Peninsula stocks may comprise a portion of the non-Togiak component. During periods when large biomass levels are observed a higher harvest rate will be allowed. Based on Alaska Board of Fisheries findings, exploitation rate may not exceed 20% of the mature biomass of those stocks. Age class data from the 1996 Herendeen Bay harvest indicate that in 1997 age-4 and age-5 should dominate the fishery, but age-6, age-7, and age-8 should equally contribute to the fishery. In Port Moller Bay age-4, age-5, and age-6 should dominate the fishery. The forecast does not include the Port Heiden District where commercial fishing occurred only during 1992.

Confidence in the North Peninsula forecast is only fair. In 1996, extensive aerial surveys indicated that a harvestable biomass of herring occurred in the Port Moller District later than expected. In the Port Moller District, a 1,000 ton threshold of mature herring is required before

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the department may allow a commercial harvest in that district. In prior years it was assumed that the threshold requirements were achieved before aerial surveys were conducted. However, in 1996 biomass surveys were conducted earlier than normal with no herring observed during the initial surveys. Due to the low biomass observed in 1996, a lower harvest forecast is warranted for 1997.

The 1997 South Peninsula forecasted sac roe is 100 tons. The forecast is based on the 1992-96 average sac roe harvest of 94.5 tons. Age class data indicate that age-6, age-7, and age-11+ will dominate the Canoe Bay Section harvest while age-6 will dominate the Shumagin Islands harvest; no other samples were collected in the South Peninsula.

Confidence in the South Peninsula forecast is only fair.

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APPENDIX E: ALEUTIAN ISLANDS "DUTCH HARBOR" FOOD AND BAIT  
HERRING FORCAST, 1997.

This forecast is for the "Dutch Harbor": Unimak, Akutan, and Unalaska Districts and that portion of the Umnak District located east of Samalga Pass, food and bait herring fishery (personal communication, Kathy Rowell, ADF&G, Anchorage, memo January 29, 1997).

A 1,645 ton quota was allocated for the "Dutch Harbor" food and bait herring fishery for 1997 using the Bering Sea Herring Management Plan allocation formula, as follows, given the maximum 20% exploitation rate of the projected biomass:

	Biomass (Short Tons)	Harvest (Short Tons)
1997 Forecasted Biomass	125,000	
Exploitation @ maximum 20% for Total Allowable Harvest		25,000
Togiak Spawn-on Kelp Fishery (Fixed Allocation)		1,500
Remaining Allowable Harvest		23,500
<b>Dutch Harbor Food/Bait Allocation (7.0% of the remaining allocation)</b>		<b>1,645</b>
Remaining Allowable Harvest for Togiak District Sac Roe Fishery:		21,855

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