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ALASKA PENINSULA AND ALEUTIAN ISLANDS MANAGEMENT AREAS SAC ROE HERRING REPORT AND THE ALEUTIAN ISLANDS MANAGEMENT AREA FOOD AND BAIT HERRING REPORT, 1994

By

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and

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ABSTRACT

The 1994 commercial sac roe Pacific herring *Clupea pallasi*, season extended from April 15 through July 15 in the Alaska Peninsula and Aleutian Islands waters. However, 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 Port Moller District was opened from May 21 through June 30. In 1994, the Port Heiden District was not open to commercial herring fishing. The Aleutian Islands Management Area "Dutch Harbor" food and bait herring fishery was open during July 16-19.

In 1994, commercial sac roe herring catches occurred in North Peninsula waters from May 21 through June 7 and in South Peninsula waters from June 2 to June 3. No sac roe herring harvest occurred in the Aleutian Islands Management Area. The North Peninsula catch was 89.8 tons and the South Peninsula catch was 8.2 tons, producing a total Alaska Peninsula catch of 98.1 tons. The 1994 Alaska Peninsula sac roe herring catch was the lowest harvest since the fishery began in 1979 and was substantially lower than the 1989-93 average of 1,575.4 tons. During the sac roe herring fishery, 6 purse seine permit holders made 11 deliveries to three companies that purchased herring. The average roe recovery during the sac roe season was 9.16% for the North Peninsula, 8.0% for the South Peninsula, and overall 9.08%. The average price per ton was $300 for 10% roe recovery and $\pm$ $50 for each percentage point above or below 10% and $50 for bait herring, giving a sac roe herring exvessel value of about $24,500 for the Alaska Peninsula fishery.

Aerial biomass survey estimates documented for the North Peninsula: 381 tons for Herendeen Bay and 274 tons for Moller Bay. No herring were observed in the Port Heiden District nor were any observed along the coast. Fishermen and commercial pilots reported herring in several locations where ADF&G personnel were unable to survey.

In 1994, commercial food and bait catches occurred in the Aleutian Islands Management Area during July 16-19. The Aleutian Islands "Dutch Harbor" commercial food and bait herring harvest was 3,348.6 tons (308.4 food and 3,040.2 bait), with an allocation of 2,215 tons, and a test fishery harvest of 45.1 tons. The average price per ton was $300, giving a food and bait exvessel value of about $1,004,580 for the Aleutian Islands Management Area commercial food and bait herring fishery. During the fishery, 14 purse seine permit holders made 65 deliveries to seven 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 South Peninsula, consisting of Pacific Ocean coastal waters extending west of Kupreanof Point to $163^{0}30'$ W. long. (the south side of Unimak Island near Cape Lazaref); (2) 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; and (3) the North Peninsula, consisting of Bering Sea waters extending west from Cape Menshikof to Cape Sarichef (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. Commercial Pacific sac roe herring *Clupea pallasi*, fishing normally begins in the latter part of May in both North and South Peninsula waters. 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) and address problems with wastage. Management plans (McCullough and Campbell 1994a, McCullough and Campbell 1994b) and other directives from the BOF set policies by which these fisheries are prosecuted (ADF&G 1993).

Herring have been reported throughout the South Peninsula, most areas in the North 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 1994, the Alaska Department of Fish and Game (ADF&G) has 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, 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 were harvested (Table

1). From 1989-93, an average of 1,363.9 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 stocks. In order to shift fishing pressure from the earlier arriving stocks to the later more abundant stocks, the Port Moller District opening was initially 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.

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 1, 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 (McCullough and Campbell 1994a).

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 bays quota makes fishing halibut or North Peninsula herring more attractive (Table 4). Most South Peninsula herring also appear to spawn later than North Peninsula herring, this prevents many halibut and 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 (Table 6). Although the entire Aleutian Islands Management Area is usually open during this season, fishing effort has 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 2-5). Two management plans: (1) the Bering Sea herring fishery management plan (Appendix B), and (2) Aleutian Islands Management Area food and bait herring management plan, 1994 (McCullough and Campbell 1994b) and various regulations (ADF&G 1993) 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.

Recently, the "Dutch Harbor" food and bait herring fishery occurred from 1981 through 1994 (Tables 5, 6). Currently, fishing gear consists of purse seine vessels, which use large seines up to 250 fathoms in length and 25 to 35 fathoms in depth. The entire 1981-86 and 1990-93 harvest was caught with purse seine gear. One gillnet permit holder participated in the 1987 and 1988 seasons, and two gillnet permit holders fished in 1989. Gillnet vessels used in the fishery are typically 32 feet in length, and there is no restriction on gear length. Purse seine vessels used in the fishery average about 50 feet in keel length and the majority also participate in Management Area "M" salmon fisheries. Prior to 1992, fishing occurred at night and sonar aboard the vessels was critical to the fishing operation, much as the airplane is critical to sac roe herring fisheries. Since 1991, the fishery has mainly occurred during day light hours and airplane use is becoming more common.

Generally, permit holders freely exchange information concerning the location of herring schools. When herring concentrations leave traditional fishing areas, fishers will conduct organized "sonar searches" over fairly large areas until concentrations of herring are located. 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. 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 1990-93, some herring were tendered to the King Cove shore plant, in 1989 and 1990-92 to the Sand Point shore plant, and in 1988-93 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 herring fishery to be comprised of the Eastern Aleutian herring biomass (Rogers and Schnepf 1985). The extensive sac roe fisheries occurring on these stocks 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).

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. In 1992, 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 1992-93, 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.

The objectives of this report are: (1) to present the numbers of herring in the commercial catch for each statistical day in the Alaska Peninsula and Aleutian Islands Management Areas during 1994; (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 provide a data base for developing brood tables, forecasting runs, and evaluating management goals. 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 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.

Catches were sampled throughout the season from harvests in the fishing areas. Catch sampling occurred in Port Moller and Canoe Bay for Alaska Peninsula harvests, and in Dutch Harbor for herring harvested in the Aleutian Islands. In the Alaska Peninsula and Aleutian Islands, 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 (Anonymous 1986). 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 of herring schools occurred during aerial surveys. The methodology of these surveys is described in an ADF&G manual (Anonymous 1986). Observers fly at a recommended altitude of 1,500 feet and count the number of schools of herring and measure 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^2; medium-sized schools with a surface area >50 m^2 and $\leq$450 m^2; and large schools with a surface area >450 m^2. 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 tonnages 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 (Anonymous 1986). Some schools of fish, especially in South Peninsula waters, may have been capelin or other finfish.

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 1994, eleven landings were made in the Alaska Peninsula Management Area by six purse seine permit holders (Table 7). The 1994 catch of 98.1 tons of herring was more than six times below the 1993 catch of 632.9 tons and about sixteen times less than the 1989-93 average of 1,575.4 tons (Table 1).

In 1994, 31 purse seine permit holders, 12 tenders, and 6 companies indicated an interest in fishing or purchasing fish in the Alaska Peninsula during the sac roe herring season. However, only six purse seine permit holders made at least one landing and three companies purchased herring. This was a decrease of 11 purse seine permit holders making deliveries and a decrease of two companies buying herring from the 1993 level.

The total 1994 commercial sac roe, food, and bait herring catch during the sac roe season for the Alaska Peninsula and Aleutian Islands Management Areas was 98.1 tons (96.6 tons of sac roe and 1.5 tons of bait product), with an exvessel value of about $24,500.

Fishing Effort

In 1994, the number of permit holders making at least one delivery in the Alaska Peninsula was nearly a third that of 1993, with decreased effort occurring in all districts. The decreased effort was in part due to the extended fishing periods in the Togiak fishery which kept fishers interested in Togiak stocks and the June 6 halibut fishing period in area 3B.

In 1994, the Port Moller District opened on May 21; herring were observed in the district by a local pilot on May 10, well before industry arrived. The first spotter pilot arrived on the grounds on May 19, the first fishing vessels were not on the grounds until May 20; the first tender arrived on the grounds on May 20; the first buyer was ready on May 21, and the first commercial harvest occurred on May 21. Only two companies, both floating, processed herring in North Peninsula waters while one company, shore based, processed herring in South Peninsula waters. All herring were processed locally.

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, the Port Heiden and Amak Districts, 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. Neither industry or ADF&G had timely surveys of the Port Heiden District, herring may have been present during May. All exploration areas were unproductive (Tables 2, 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 schools of fish, (reported as herring), were observed by a commercial spotter pilot. In all districts herring may be taken with purse seines and gillnets, both gear types share common time and area openings.

The 1994 projected guideline herring harvest for North Peninsula commercial herring fisheries of 1,200 tons (Table 4) included herring harvested only in the Port Moller District and did not include harvests in sections open to exploration (McCullough and Campbell 1994a). 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 11. Commercial quantities of herring were first observed on May 20, the first day that commercial spotter pilots surveyed the area. The first commercial fishing vessels and tenders arrived on May 20. The presence of herring was confirmed by ADF&G on May 21 with the arrival of the state pilot and aircraft. The Port Moller District opened to commercial herring fishing on May 21, because of the lack of quality herring (most were spawned out fish), few herring were harvested. By May 27, ADF&G had documented an estimated biomass of only 274 tons of herring in Port Moller and 381 tons in Herendeen Bay, and only 19 tons of herring had been harvested. Although industry waited for additional biomass to enter the fishery, it was becoming apparent that either the herring had arrived and departed before ADF&G or industry arrived in the district or they were not coming.

Herring continued to enter the Port Moller District and due to the decreased effort, the district was opened to continuous herring fishing from May 29 until June 30. During this time period the bulk of the harvest (70.8 tons) occurred (Table 9).

Table 8 lists ADF&G aerial surveys of North Peninsula waters. In past years, biomass estimates have been difficult due to poor survey conditions and the rapid arrival and departure of fish, 1994 was no exception. In 1994, herring were visible in substantial numbers on 2 different surveys. The 1994 aerial survey estimates resulted in a much lower biomass estimate as compared to the 1992 and 1993 estimates. In 1994, the documented biomass for the North Peninsula was 655 tons: 381 tons for Herendeen Bay and 274 tons for Moller Bay (Table 8). Intensive aerial surveys by ADF&G to document spawning biomass and locations were not possible prior to May 22 or after May 28 due to budget constraints.

In the Port Moller District, most herring spawned in the Inner and Outer Port Moller Bay Sections, although limited spawning was observed in all sections except for the Western Section. ADF&G did not document any herring or spawning in the Port Heiden District although a few herring were reported in the area.

A total of 89.8 tons of herring were harvested in North Peninsula waters from the Port Moller District (Table 2). About 21% of the harvest (19.0 tons) occurred prior to June 6. The entire North Peninsula harvest was sold as sac roe product. The exploitation rate in individual districts ranged from no harvest in the Amak and Port Heiden Districts to a maximum of 14.0% in the Port Moller District. The three companies that bought herring from North Peninsula waters paid about $300 per ton for 10% roe recovery $\pm$ $50 for each percentage point above or below 10%. The average roe recovery was 9.2%. The total exvessel value of the North Peninsula herring sac roe catch is estimated to be $23,100.

Commercial catches of herring from the Port Moller District from 1982 to 1994 were landed from May 8 to July 4 (Figure 6, Table 1). Historically, most catches were taken during a time period

of 20 days or less from mid-May to mid-June. In 1994, the commercial catch occurred mostly in the Inner Port Moller Bay Section (80.3 tons; Table 9).

A total of 134 herring were sampled from the commercial catch in Inner Port Moller Bay. In the Inner Port Moller Bay catch the most abundant age classes were estimated as 11.9% age 5, 18.7% age 6, 46.3% age 7, and 9.7% age 10+ (Tables 10, 11; Figure 10). The male to female ratio was 1:0.52. The average herring length in the catch was 325 mm, and the average weight was 281 g (Table 12).

Age class data from the 1994 harvest indicates that in 1995 age 8 herring should dominate Port Moller Bay catches. Since the abundance of newly recruited year classes (ages 3 and 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 1995 North Peninsula forecast is only fair (Appendix D).

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 1994, North Peninsula capelin stocks appeared to be depressed.

South Peninsula

The 1994 projected guideline harvest for South Peninsula herring fisheries was 200 tons (Table 4), which did not include herring harvested in sections open to exploration (McCullough and Campbell 1994a). The General Sections of the Sand Point and King Cove Districts and the Seal Cape-Wosnesenski Section of the Pavlof District were open for exploration. South Peninsula herring fisheries were open seven days a week beginning April 15 through the closure of the sac roe season (July 15).

South Peninsula commercial herring catches from 1980 to 1993 were landed from May 9 to June 23 and in 1994 were landed from June 2-3 (Table 1). Most catches have been taken during a time period of 20 days or less. In 1994, the only commercial catches occurred in Canoe Bay. During June 2-3, 8.2 tons were harvested by two purse seine permit holders making 4 deliveries (Tables 7 and 13). The average roe recovery of 6.7 tons was 8%, 1.5 tons were purchased as bait herring. Prices paid by the single company that purchased herring from South Peninsula waters was about $300 per ton for 10% roe recovery $\pm$ $50 for each percentage point above or below 10%. The South Peninsula sac roe herring fishery exvessel estimated value was $1,400.

The first fishing vessel arrived in Canoe Bay on May 31 and harvests occurred from June 2 through June 3. The market for South Peninsula herring closed on June 6, no additional South Peninsula sac roe harvests occurred after June 3. Poor survey conditions and budget constraints limited ADF&G aerial survey effort to North Peninsula waters and commercial fishing effort (early June is the beginning of salmon and halibut fisheries and ADF&G personnel are occupied with salmon concerns). Commercial spotter pilots and several fishing vessels reported herring through mid-July in other locations, but ADF&G was not able to document their presence.

A total of 101 herring were sampled from the commercial catch in Canoe Bay. In Canoe Bay, the most abundant age classes in the commercial harvest were estimated as 70.3% age 3, 14.9% age 4, and 8.9% age 6 (Table 14; Figure 11). The male to female ratio was 1:0.4. The average herring length in the catch was 222 mm, and the average weight was 160 g (Table 12).

No spawning was observed in South Peninsula waters. Other finfish (capelin and juvenile pollock, cod, and salmon) were abundant in Stepovak and Canoe Bays.

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 1994, the fishery was restricted to the Unalaska District. The fishery had ten periods between July 16 and July 19 for a total fishing time of 17 hours and 20 minutes. The fleet consisted of 16 purse seine vessels, 14 tenders representing 7 processing companies, and 3 aircraft.

On July 16, there were two fishing periods, the initial period was for one hour from 8:00 a.m. until 9:00 a.m., and the second period was two hours from 3:00 p.m. until 5:00 p.m. During the initial opening, 9 of 16 permit holders made successful sets and harvested an estimated 173 tons. The catch came from the inner portion of Unalaska Bay bounded by Eider Point and Constantine Bay; approximately 2,042 tons remained on the quota. Because of the small catch during the first opening, fishing time and the area open to fishing were expanded to include the entire Unalaska Bay Section (Cape Wislow to Priest Rock). During the second period, 11 of 16 purse seiners reported successful sets and harvested an estimated 147 tons.

Due to the 1,895 tons remaining on the allocation; the fishery was reopened on July 17. During the third fishing period in the Unalaska Bay Section (July 17; 3:00 p.m. until 5:00 p.m.) only 1 of 16 purse seiners reported a successful set and the harvest was an estimated 5 tons. Because of the remaining quota (1,890 tons), and the lack of any sizeable reported biomass in Unalaska Bay, the fleet was moved to the Makushin Bay Section, where pilot reports indicated a large biomass of herring. One spotter pilot reported an estimated 400-500 tons of herring in the Volcano Bay-Makushin Bay area. Since the fleet was operating in a new area the next fishing period was limited to 20 minutes (4:00 p.m. until 4:20 p.m.).

The fifth, sixth, seventh, and eighth fishing periods, for a total of 10 hours, all occurred within the Makushin Bay Section. During the four fishing periods an estimated 1,446 tons of herring were harvested and approximately 410 tons remained on the quota. Because of the relatively small (410 tons) remaining quota the fleet was moved back to the Unalaska Bay area in an attempt to limit the potential harvest. One permit holder stopped fishing after the fifth period, and two more permit holders left after the eighth fishing period, reducing the number of participating permit holders to 13.

During the ninth fishing period (July 19; 8:00 a.m. until 10:00 a.m.), 5 of 13 permit holders reported successful sets and an estimated 180 tons were harvested. The entire harvest was taken

from the Unalaska Bay area. Because of the low harvest and lack of any reported increase in biomass, another fishing period was allowed in the Unalaska Bay area during July 19 from 6:00 p.m. until 7:00 p.m.. Since only 260 tons remained on the quota the length of the fishing period was reduced to one hour. From the time of the announcement of the final period (3:00 p.m.), until the fishing period opened, (6:00 p.m.), an unanticipated large volume of herring moved into the Unalaska Bay area. During the final (tenth) fishing period, 11 of 13 permit holders reported successful sets and an estimated 1,265 tons were harvested.

Fourteen permit holders made a total of 65 landings for a harvest of 3,348.6 tons (1,133.6 tons over the allocation). The exvessel value of the fishery was an estimated $1,004,580. 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 45.1 tons of herring.

A total of 581 herring from the commercial catch 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 36.7% age 7, 24.3% age 6, and 13.3% age 10 (Table 16; Figures 2-4). The male to female ratio was 0.8:1.0. The average herring length in the sample was 287 mm, and the average weight was 320 g (Table 16).

The strength of age 6 and age 7 herring coincides with the age class strength of herring from the Togiak fishery, although some variation is apparent in the presence of older herring in Dutch Harbor samples by location and date (personnel communication, Kathy Rowell, Alaska Department of Fish and Game, Anchorage).

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Table 1. Alaska Peninsula Management Area commercial sac roe herring catch by time period and area, 1979-94.

	South Peninsula		North Peninsula		
Year	Harvest (Tons)	Time Period	Harvest (Tons)	Time Period	Total
1979	10.1	July 4-July 4	0.0		10.1
1980	453.8	May 18-July 14	0.0		453.8
1981	797.4	May 9-June 23	0.0		797.4
1982	138.3	May 31-June 14	505.5	May 31-June 12	643.8
1983	0.0		627.0	May 9-May 29	627.0
1984	210.4	May 13-June 1	431.2	May 24-June 8	641.6
1985	287.8	June 1-June 11	710.2	May 24-June 4	998.0
1986	281.9	June 7-June 14	894.4	May 18-May 30	1,176.3
1987	319.0	June 8-June 19	513.8	May 9-June 5	832.8
1988	376.7	May 31-June 20	294.3	May 17-June 15	671.0
1989	310.3	May 13-June 19	729.0	May 28-June 23	1,039.3
1990	312.2	May 14-June 14	272.8	June 4-June 19	585.0
1991	157.4	May 16-June 11	1,313.0	May 17-July 4	1,470.5
1992	180.4	June 4-June 7	3,969.0	May 23-June 17	4,149.4
1993	97.0	May 27-June 9	535.9	May 8-June 9	632.9
1994	8.2	June 2-June 3	89.8	May 21-June 7	98.1
1989-93 Average	211.5		1,363.9		1,575.4

Table 2. North Peninsula commercial sac roe herring catch by geographic area, 1982-94.

	Port Moller District				Port Heiden District	
Year	Deer Island	Herendeen Bay	Moller Bay	Bear River Bering Sea Coast	Port Heiden Bay	Total
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[a]	349.8	7.3	0.0	513.8
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
1994 District Total		89.9			0.0	89.9
1989-93 Average	34.9	99.3	755.0	154.7	320.0	1,363.9

[a] At least 11 tons were caught in the Deer Island-Mud Bay Section.

Table 3. South Peninsula commercial sac roe herring catch by geographic area, 1980-94.

Year	Stepovak Bay[a]	Balboa Bay	Pavlof Bay	Canoe Bay	Volcano-Dolgoi	Belkofski Bay	Lenard Harbor	Dolgoi Harbor	Shumagin Islands	Total
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[b]	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[c]	0.0	0.0	61.0	140.5	13.0	8.0	59.0	0.0	0.0	281.5
1987[c]	0.0	0.0	92.0	118.0	0.0	38.0	59.0	12.0	0.0	319.0
1988[d]	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
1989-93 Average	26.9	11.4	10.6	123.7	0.0	0.6	3.0	1.0	34.2	211.4

[a] The 1984-88 catches came from Ramsey Bay, the 1989 and 1993 catch came from Granville

[b] 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.

[c] 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.

[d] In Stepovak Bay seven tons of green herring were dumped on May 7, and an additional two tons were dumped on May 11.

Table 4. Alaska Peninsula and Aleutian Islands Management Areas sac roe herring harvest guideline levels, by management area, 1994.[a]

Management Area	Sac Roe Guideline Harvest In Short Tons
South Peninsula	
Sand Point District	
Stepovak Bay Section	100
Swedania Point-Balboa Bay Section	b
Point Aliaksin-Beaver Bay Section	b
General Section	b
Pavlof District	
Canoe Bay Section	100
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
South Peninsula Total	*200*
North Peninsula	
Amak District	b
Port Moller District[c]	
Western Section	b
Deer Island Section[d]	
Herendeen Bay Section	200
Inner Moller Bay Section	200
Outer Moller Bay	750
Bear River Section[e]	50
Port Heiden District[f]	b
North Peninsula Total	*1,200*
Aleutian Islands	
Unimak District	b
Akutan District	b
Unalaska District	b
Umnak District	b
Adak District	b
Guideline Harvest Total[g]	*1,400*

-Footnotes Continued On Next Page-

Table 4. (page 2 of 2)

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[a] 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.

[b] 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.

[c] Herring abundance in the Port Moller District is difficult to document. The 1994 herring abundance may justify a larger catch than 1,200 tons, however to increase the guideline harvest level a larger than expected spawning biomass must be documented by ADF&G.

[d] Herring harvested in the Deer Island Section of Herendeen Bay will be counted against the Herendeen Bay guideline harvest level.

[e] 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.

[f] In 1992, commercial quantities of herring were harvested for the first time in the Port Heiden District. The 1994 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 traveling in to Port Heiden Bay.

[g] Total does not include harvests that may occur in areas open for exploration.

Table 5. Aleutian Islands "Dutch Harbor" area food and bait herring fisheries historical industry summary, 1929-94.

Year	Harvest In Short Tons	Number Processors	Number Permits	Number Landings	Tons Per Boat	Tons Per Landing	Price Per Ton	Exvessel Value (Thousands)	Exvessel Value Per Vessel (Thousands)
1929	1,259	*	*	*	*	*	*	*	*
1930	1,916	*	*	*	*	*	*	*	*
1931	1,056	12	26	*	*	*	*	*	*
1932	2,510	12	30	*	*	*	*	*	*
1933	1,585	12	38	*	*	*	*	*	*
1934	1,533	9	*	*	*	*	*	*	*
1935	2,412	10	*	*	*	*	*	*	*
1936	1,379	8	*	*	*	*	*	*	*
1937	579	*	*	*	*	*	*	*	*
1938	513	*	*	*	*	*	*	*	*
1939-44					No Fishery				
1945	75	*	*	*	*	*	*	*	*
1946-80					No Fishery				
1981	704	a	a	16	352	44	300	211	a
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	3	6	78	560	45	162	564	94
1986	2,394	4	7	53	342	45	254	600	86
1987	2,503	4	8[b]	45	373	56	300	751	94
1988	2,004	6	8[b]	59	251	34	252	505	63
1989	3,081	5	9[b]	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
1929-38 Average	1,474	11	31	*	*	*	*	*	*
1984-93 Average	2,392	5	9	45	294	62	271	614	72

-Continued-

Table 5. (page 2 of 2)

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[a] The number of processors, fishing vessels, and catch by gear type can not be released due to state confidentiality requirements.

[b] The catch by gear type can not be released due to state confidentiality requirements or is not available.

Table 6. Aleutian Islands "Dutch Harbor" commercial food and bait herring catch, 1981-94.

Year	Landing Date First	Landing Date Last	Days Fished	Preseason Togiak Spawning Biomass Short Tons	Harvest Quota Short Tons	Food & Bait Harvest Short Tons	% Togiak Spawning Biomass Harvested	Number Permit Holders Fishing
1981	8/03	8/23	21	159,000	None	704	0.4	-[a]
1982	8/05	9/12	39	98,000	None	3,565	3.6	6
1983	7/23	9/06	46	142,000	3,525[b]	3,567	2.5	5
1984	7/17	7/27	11	115,000	3,525[b]	3,578	3.1	5
1985	7/17	8/11	26	132,000	3,525[b]	3,480	2.6	3
1986	7/16	7/28	13	96,000	2,453[c]	2,394	2.5	4
1987	7/16	7/23	4[d]	88,000	2,332[c]	2,503	2.8	9
1988	7/16	9/18	21	132,000	3,100[e]	2,004	1.6	8
1989	7/16	8/05	19[f]	100,108	3,100[e]	3,081	3.2	9
1990	8/15	8/15	<1	72,000	903[e]	820	1.1	7
1991	7/17[g]	7/17	<1	83,229	931[e]	1,325	1.6	8
1992	7/16	7/28[h]	5	60,214[i]	1,940[i]	1,949	1.3	11
1993	7/16	7/16	<1	164,135	2,193	2,790	1.7	13
1994	7/16	7/19	4	165,747[j]	2,215[j]	3,349	2.0	14
1984-93 Average			10	104,269	2,400	2,392	2.2	8

[a] Number may not be released due to State of Alaska confidentiality requirements.
[b] Harvest ceiling of 3,525 established by Alaska Board of Fisheries.
[c] Harvest quota set by ADF&G. Reduced proportionate with the drop from the 1985 Togiak spawning biomass level.
[d] Closed 7/19, reopened for 14 hours on 7/23.
[e] Harvest quota set under provisions of the Bering Sea Herring Fisheries Management Plan.
[f] Closed 7/26, reopened 7/27 through 8/5.
[g] Fishery opened for six hours on 7/16; weather prevented any fishing effort.
[h] Fishery co-op after 7/16.
[i] 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.
[j] The preseason forecasted biomass was adjusted by ADF&G (Kathy Rowell, personal communication, May 25, 1994).

Table 7. Alaska Peninsula sac roe herring catch and number of landings and permits by year, 1979-94.

	North Peninsula				South Peninsula				Total			
Year	Pounds	Tons	Landings	Permits	Pounds	Tons	Landings	Permits	Pounds	Tons	Landings	Permits
1979					20,213	10.1	1	1	20,213	10.1	1	1
1980					907,649	453.8	15	6	907,649	453.8	15	6
1981					1,594,884	797.4	93	56	1,594,884	797.4	93	56
1982	1,011,000	505.5	6	3	276,655	138.3	13	4	1,287,655	643.8	19	7
1983	1,253,922	627.0	47	23	0	0	0	0	1,253,922	627.0	47	23
1984	862,345	431.2	20	11	420,755	210.4	20	5	1,283,100	641.6	40	15
1985	1,420,394	710.2	31	17	575,561	287.8	8	5	1,995,955	998.0	39	20
1986	1,788,775	894.4	116	50	563,816	281.9	14	6	2,352,591	1,176.3	130	51
1987	1,027,617	513.8	46	27	637,960	319.0	8	2	1,665,577	832.8	54	27
1988	588,599	294.3	21	9	753,322	376.7	22	10	1,341,921	671.0	43	19
1989	1,457,925	729.0	24	10	620,549	310.3	31	13	2,078,474	1,039.2	55	19
1990	545,685	272.8	23	5	624,420	312.2	31	6	1,170,105	585.1	54	9
1991	2,626,080	1,313.0	59	11	314,828	157.4	26	10	2,940,908	1,470.5	85	18
1992	7,938,010	3,969.0	100	24	360,600	180.3	11	7	8,302,710	4,151.4	112	29
1993	1,071,740	535.9	44	16	193,600	96.8	17	3	1,265,780	632.9	61	17
1994	179,600	89.8	7	5	16,400	8.2	2	4	196,000	98.1	11	6
1984-93 Average												
	1,932,717	966.4	48	18	506,541	253.3	19	7	2,439,712	1,219.9	67	22

Table 8. North Peninsula aerial herring biomass surveys, 1994.

Date	Port Moller District						Bear River to Strogonof Point		
	Herendeen Bay			Moller Bay					
	RAI[a]	Tons[b]	Rating[c]	RAI[a]	Tons[b]	Rating[c]	RAI[a]	Tons[b]	Rating[c]
May 21[d]	230	350	2	86	131[e]	2	0	0	2
May 22	3	5	2	15	23[e]	2	0	0	2
May 23[f]	0	0	3	0	0	3	0	0	2
May 24	9	22	2	57	111[e]	2	0	0	2
May 25	6	9	2	3	5[e]	2	0	0	2
May 26	0	0	2	0	0	2	0	0	2
May 27	0	0	2	3	5[e]	2	0	0	2
May 28	0	0	2	0	0	2			
Total Biomass Observed[g]	245	381		164	274		0	0	

Herendeen Bay includes both the Herendeen Bay and Deer Island-Mud Bay Sections.
Moller Bay includes both the Inner and Outer Port Moller Bay Sections.

RAI units express the surface area of herring schools in terms of small schools (surface area equal to 538 square feet). For example, 10 RAI units are equivalent to 10 small herring schools, each with a surface area of 538 square feet.

[a] Relative Abundance Index (RAI): small school (less than 538 square feet) = 1 RAI unit
medium school (538 square feet to 4,841 square feet) = 5 RAI units
large school (total surface area in square feet/538 square feet) = RAI

[b] Tons: RAI units are multiplied by 1.52 (schools in water less than 16 feet of depth)
RAI units are multiplied by 2.58 (schools in water 16 to 26 feet of depth)

[c] Rating of survey: (1) Excellent, (2) Good, (3) Fair, (4) Poor, (5) Unsatisfactory

[d] An additional 125 tons of juvenile herring were observed in Herendeen Bay.

[e] Used in calculating biomass estimate

[f] An additional 60 tons of juvenile herring were observed in Herendeen Bay.

[g] A minimum of 70 additonal tons of new herring moved into the district and were harvested after May 28.

Table 9. North Peninsula commercial sac roe herring catch by area, day, and percent roe, 1994.

Area	Date	Catch in Short Tons		Percent Roe	Total
		Food/Bait	Sac Roe		
Deer Island	May 22	0.0	7.2	9.7	
Total		0.0	7.2	9.7	7.2
Inner Moller Bay	May 21	0.0	9.5	9.6	
	June 6	0.0	55.0	8.7	
	June 7	0.0	15.8	10.1	
Total		0.0	80.3	9.1	80.3
Outer Moller Bay	May 21	0.0	2.3	11.5	
Total		0.0	2.3	11.5	2.3
Total		0.0	89.8	9.2	89.8

Table 10. Estimated age composition of North Peninsula commercial purse seine sac roe herring catches by area and percent, 1985-94.

	Ages									
Year	2	3	4	5	6	7	8	9	10	11+
Herendeen Bay										
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
1992-94	No catch in this section									
Deer Island-Mud Bay										
1991	0	1	65	7	3	18	5	0	1	1
1992	0	0	17	64	5	2	6	3	2	2
1993-94	No samples from this section									
Inner Moller Bay										
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
Outer Moller-Bering Sea Coast										
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 catch in this section									
1989	0	0	0	6	26	6	24	7	10	21
1991[a]	90	10	0	0	0	0	0	0	0	0
1991[b]	0	3	74	6	1	11	2	1	1	0
1992[b]	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
Bering Sea Coast										
Bear River area										
1991	0	2	86	8	0	4	1	0	0	1
1992	No catch in this section									
1993	No samples from this section									
1994	No catch in this section									

-Continued-

Table 10. (page 2 of 2)

	Ages									
Year	2	3	4	5	6	7	8	9	10	11+
Cape Kutuzof area										
1991	0	0	37	10	0	40	9	2	2	2
1992-94	No catch in this section									
Port Heiden										
1992	0	0	9	64	5	1	13	2	1	4
1993-94	No catch in this section									

[a] Juvenile herring sample.

[b] Outer Port Moller Bay Section samples only.

Table 11. Estimated age composition of Alaska Peninsula commercial purse seine sac roe herring catches by area and day, in percent, 1994.

Date	Sample Size	Ages									
		2	3	4	5	6	7	8	9	10	11+
North Peninsula											
Outer Moller Bay											
May 21	13	0.0	0.0	7.7	7.7	0.0	53.8	0.0	0.0	23.1	7.7
Total	13	0.0	0.0	7.7	7.7	0.0	53.8	0.0	0.0	23.1	7.7
Inner Moller Bay											
May 7	134	0.0	0.0	3.0	11.9	18.7	46.3	3.7	0.7	9.7	6.0
Total	134	0.0	0.0	3.0	11.9	18.7	46.3	3.7	0.7	9.7	6.0
South Peninsula											
Canoe Bay											
June 1	37	0.0	56.8	21.6	0.0	16.2	0.0	0.0	5.4	0.0	0.0
June 3	64	0.0	78.1	10.9	1.6	4.7	3.1	1.6	0.0	0.0	0.0
Total	101	0.0	70.3	14.9	1.0	8.9	2.0	1.0	2.0	0.0	0.0

Table 12. Alaska Peninsula Management Area commercial purse seine sac roe herring harvest summary of average weights (g) and lengths (mm) by age, 1994.

Fishery/Area	Harvest (tons)	Sample Date	Weight Length	Age 2	3	4	5	6	7	8	9	10	11+	Average	Sample Size
North Peninsula															
Outer Port Moller Bay	2.3	21 May	Weight	-	-	177	233	-	299	-	-	360	407	307	13
			Length	-	-	285	305	-	327	-	-	345	360	329	13
Inner Port Moller Bay	80.3	21 May - 7 June	Weight	-	-	171	211	240	290	328	322	358	381	281	134
			Length	-	-	283	301	313	329	340	345	347	355	325	134
South Peninsula															
Canoe Bay	8.2	2 June - 3 June	Weight	-	138	181	246	233	264	292	214	-	-	160	99
			Length	-	213	228	253	260	257	277	233	-	-	222	97

No samples were collected from the 7.2 ton harvest in Herendeen Bay, Deer Island-Mud Bay Section.

Table 13. South Peninsula commercial sac roe herring catch by area, day, and percent roe, 1994.

Area	Date	Catch Tons	Roe Percent
Canoe Bay	June 2	3.8	8.0
	June 3	4.5	8.0
Total		8.2[a]	8.0

[a] 1.5 tons were sold as bait and 6.7 tons were sold as sac roe herring.

Table 14. Estimated age composition of South Peninsula commercial purse seine sac roe herring catches by area and percent, 1985-94.

Year	Ages 2	3	4	5	6	7	8	9	10	11
Stepovak Bay										
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[a]	0	4	13	6	23	42	13	0	0	0
1992	No catch									
1993[a]	No samples									
1994	No catch									
Balboa										
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									
Shumagin Islands										
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
1992-94	No catch									
Canoe Bay										
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
Pavlof Bay										
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									
1990-94	No catch									
Lenard Harbor										
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
1991-94	No catch									

[a] The 1991 and 1993 Stepovak Bay catch was in the northeastern portion of the bay.

Table 15. Aleutian Islands Management Area "Dutch Harbor" commercial purse seine food and bait herring catch by day, 1994.

Area	Date	Catch in Short Tons Bait	Food	Total
Unalaska Bay[a]	July 16	365.7	8.5	374.2
	July 19	1,298.0	87.7	1,385.7
Total		1,663.7	96.2	1,759.9
Makushin Bay Section[b]	July 17	740.9	14.5	755.4
	July 18	635.7	197.7	833.4
Total		1,376.6	212.2	1,588.8
Total	July 16	365.7	8.5	374.2
	July 17	740.9	14.5	755.4
	July 18	635.7	197.7	833.4
	July 19	1,298.0	87.7	1,385.7
Total		3,040.3	308.4	3,348.7

Note: There was an additional 45.1 tons harvested during test fisheries

[a] Unalaska Bay harvest was from statistical area 302-31 and 302-35.

[b] Makushin Bay harvest was from statistical area 302-40.

Table 16. Estimated age, sex, weight, and length of herring harvested in the Aleutian Islands "Dutch Harbor" commercial food and bait herring fishery, July 16-19, 1994.

Age Years	Sample Size			Catch (%)			Weight			Length		
	Male	Female	Total	Male	Female	(%) of Total	N	Mean (g)	STD (g)	N	Mean (mm)	STD (mm)
4	0	1	1	0.0	100.0	0.2	1	216	0.0	1	265	0.0
5	2	8	10	20.0	80.0	1.7	10	249	20.9	10	265	6.9
6	66	75	141	46.8	53.2	24.3	140	272	35.4	141	273	7.7
7	99	113[a]	213	46.5	53.1	36.7	213	302	38.4	213	281	8.3
8	13	9	22	59.1	40.9	3.8	22	300	51.5	22	282	10.3
9	12	11	23	52.2	47.8	4.0	23	330	64.2	23	295	15.2
10	31	46	77	40.3	59.7	13.3	75	357	53.3	77	298	11.9
11	16	22	38	42.1	57.9	6.5	37	407	59.3	38	309	11.6
12	5	16	21	23.8	76.2	3.6	21	402	59.4	21	311	12.3
13	7	12	19	36.8	63.2	3.3	19	429	41.9	19	319	8.3
14	2	4	6	33.3	66.7	1.0	6	429	61.1	6	319	3.8
15	2	3	5	66.7	33.3	0.9	5	445	27.6	5	323	12.8
16	3	2	5	60.0	40.0	0.9	5	432	58.5	5	328	6.0
Total	258	322	581	44.5	55.5	100.0	577	320	66.4	581	287	17.4

[a] Unable to determine the sex of one of the herring sampled.

Table 17. Estimated age, sex, weight, and length of juvenile herring harvested in Herendeen Bay during the commercial sac roe herring fishery, May 21, 1994.

Age Years	Sample Size			Catch			Weight			Length		
	Male	Female	Total	(%) Male	(%) Female	(%) of Total	N	Mean (g)	STD (g)	N	Mean (mm)	STD (mm)
1	-	-	7	-	-	100.0	7	6.0	2.1	7	103	12.0
Total	-	-	7	-	-	100.0	7	6.0	2.1	7	103	12.0

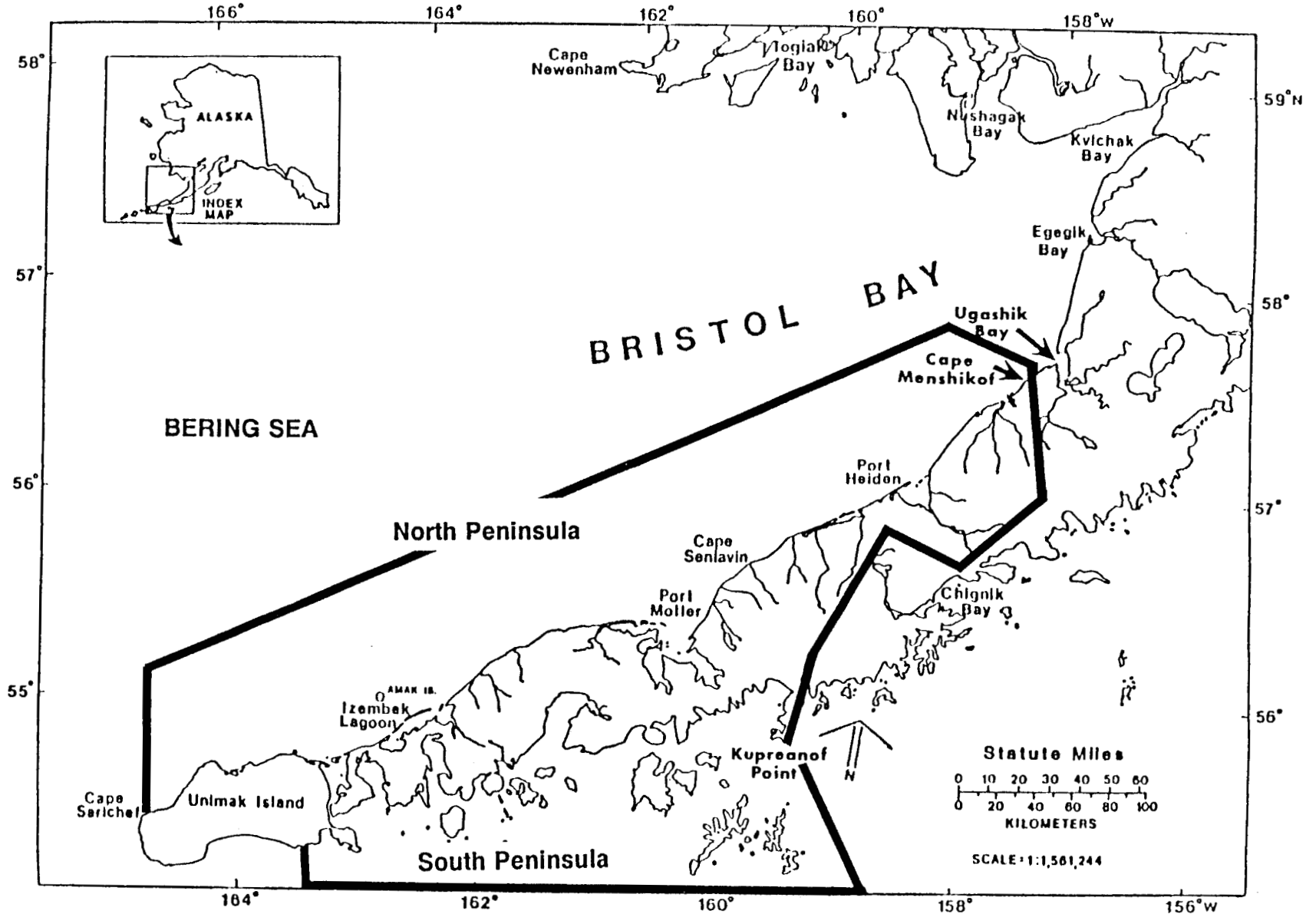

Figure 1. Map of the Alaska Peninsula Management Area, the study area on the Pacific Ocean portion of map is from Kupreanof Point to Unimak Island and on the Bering Sea from Cape Sarichef to Cape Menshikof.

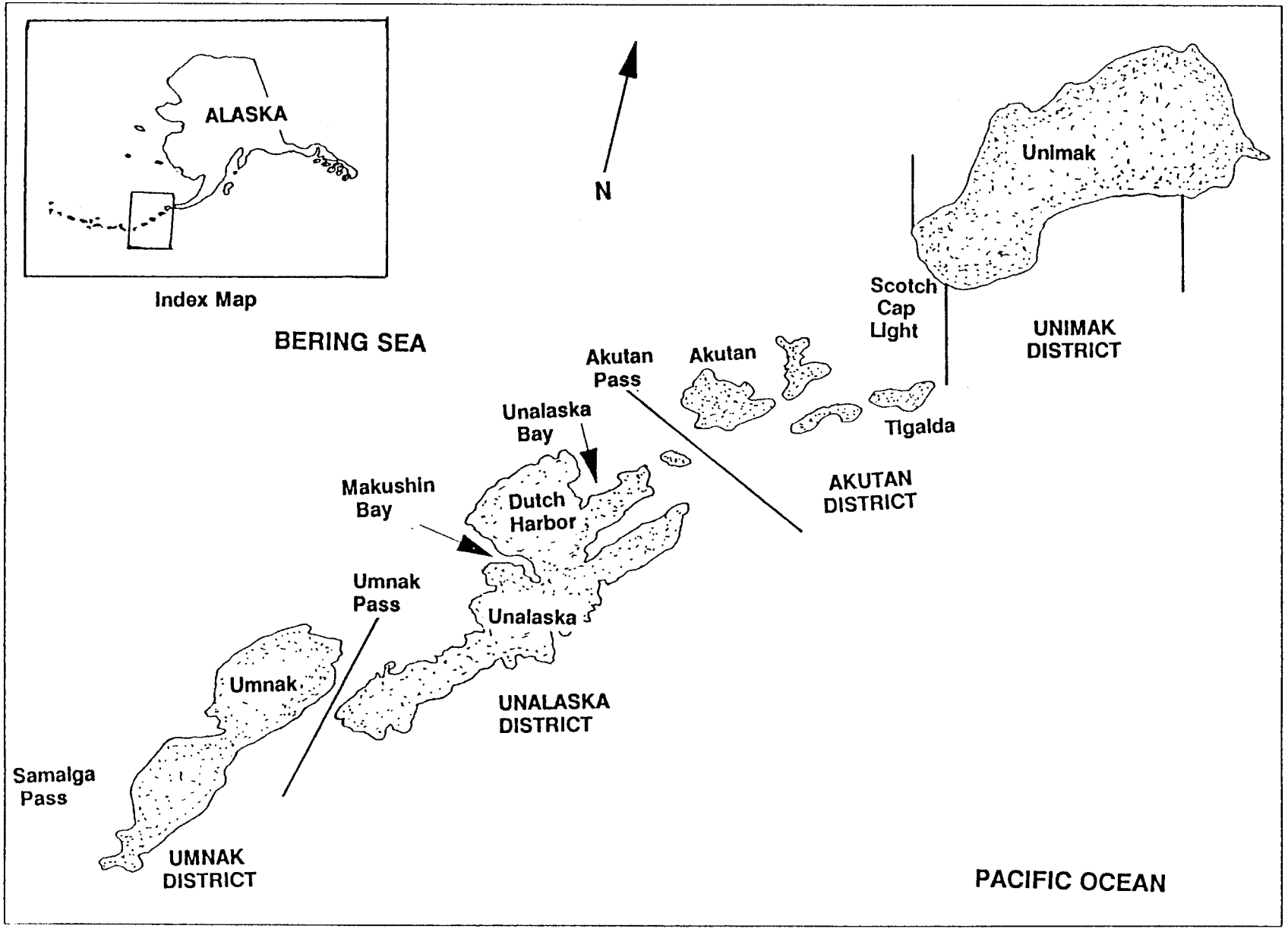

Figure 2. Map of the Aleutian Islands "Dutch Harbor" Management Area, the study area is from the Unimak District to Samalga Pass.

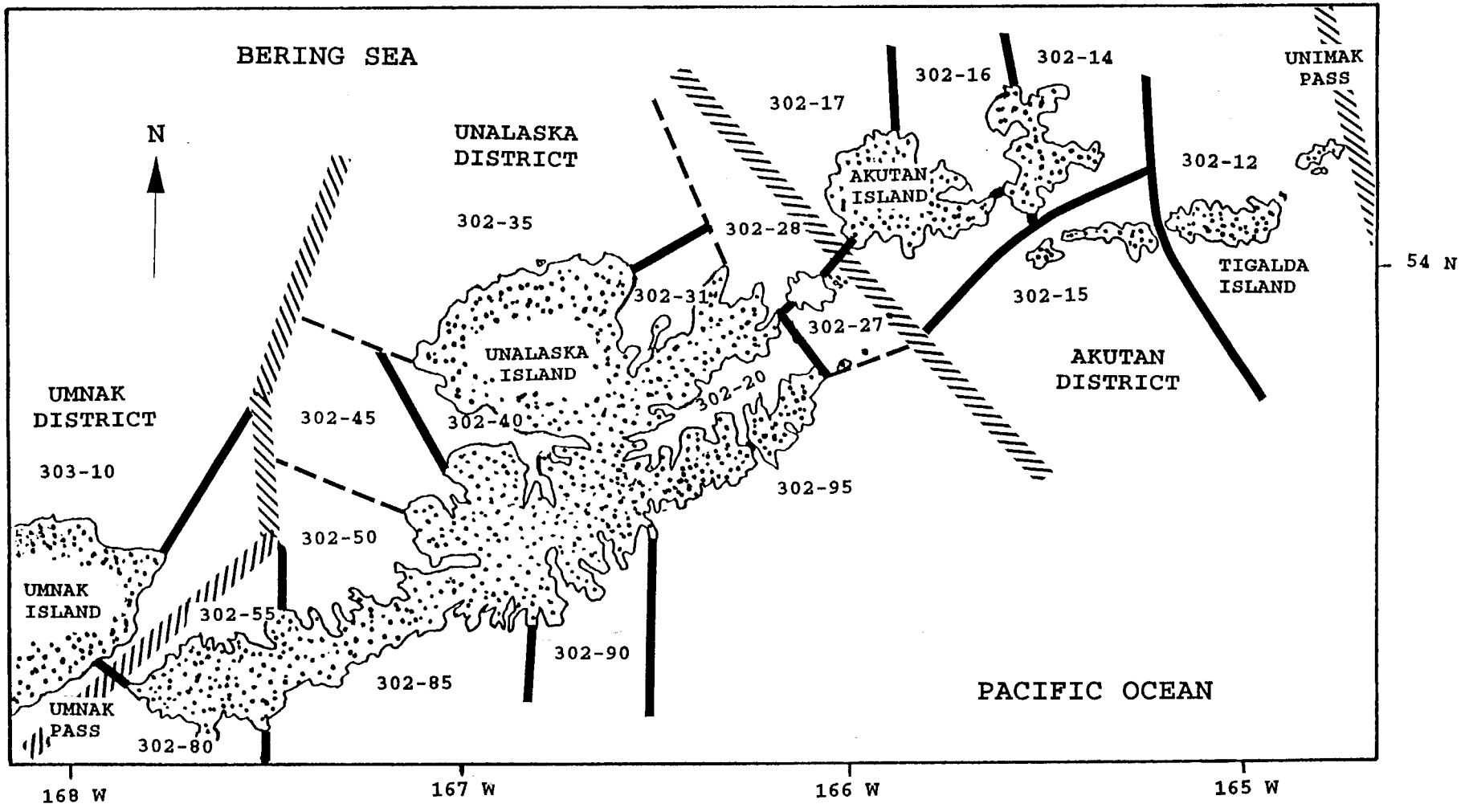

Figure 3. Map of the Aleutian Islands Area from Unmak Pass to Unimak Pass with the statistical herring fishing areas shown.

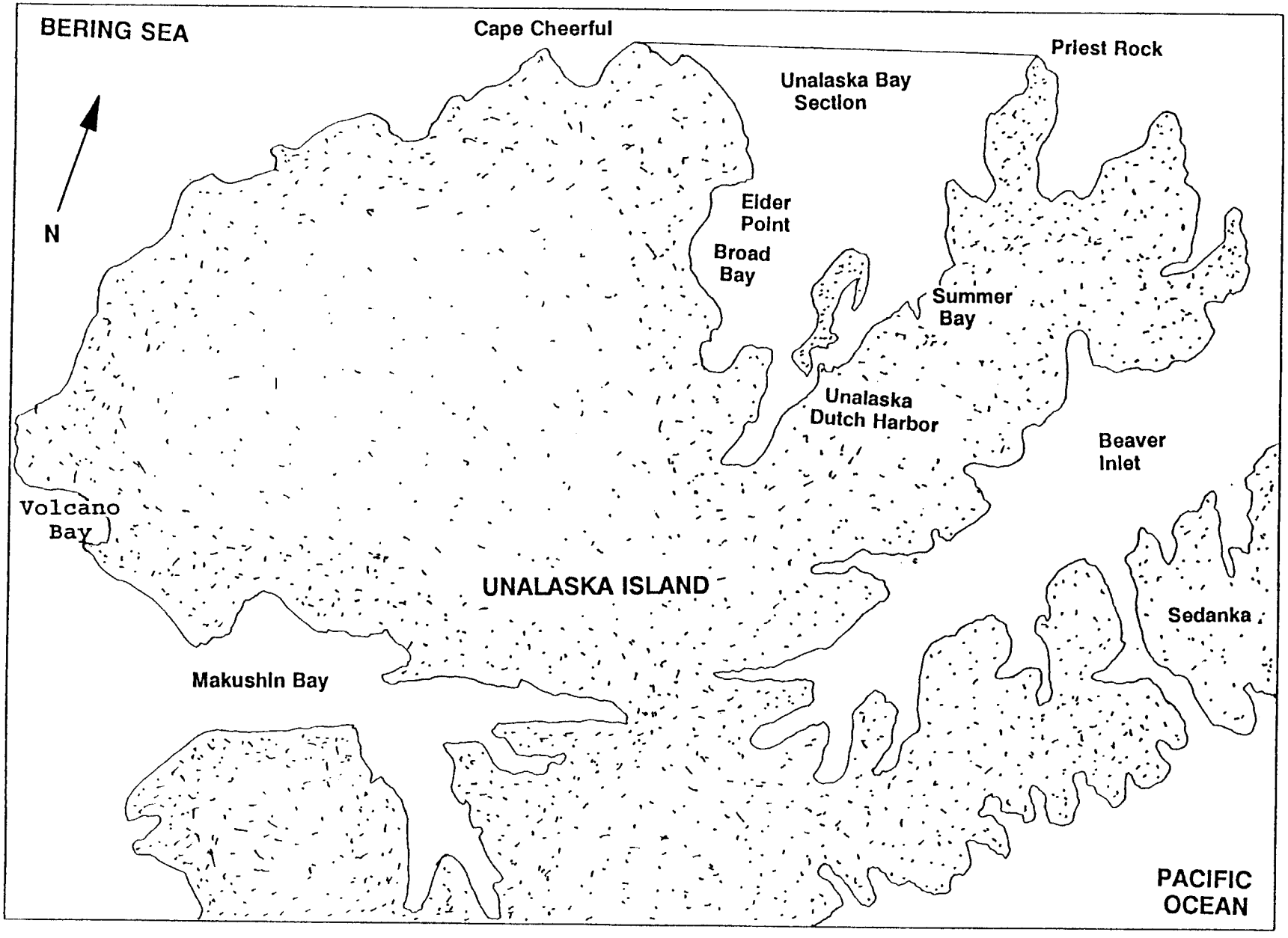

Figure 4. Map of Unalaska Island from Beaver Inlet to Volcano Bay.

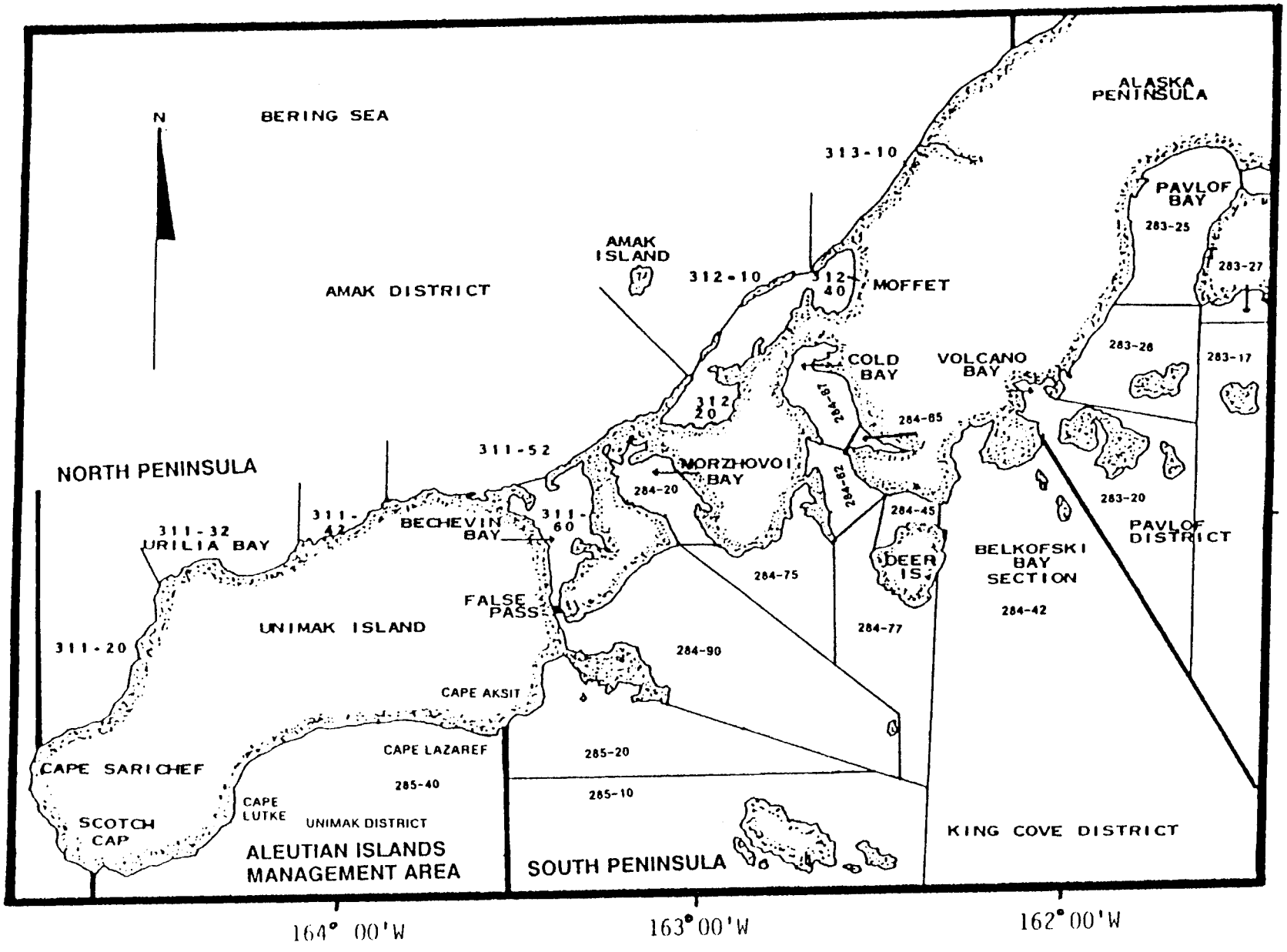

Figure 5. Map of the Alaska Peninsula Area from Cape Sarichef to Pavlof Bay with the statistical herring fishing areas shown.

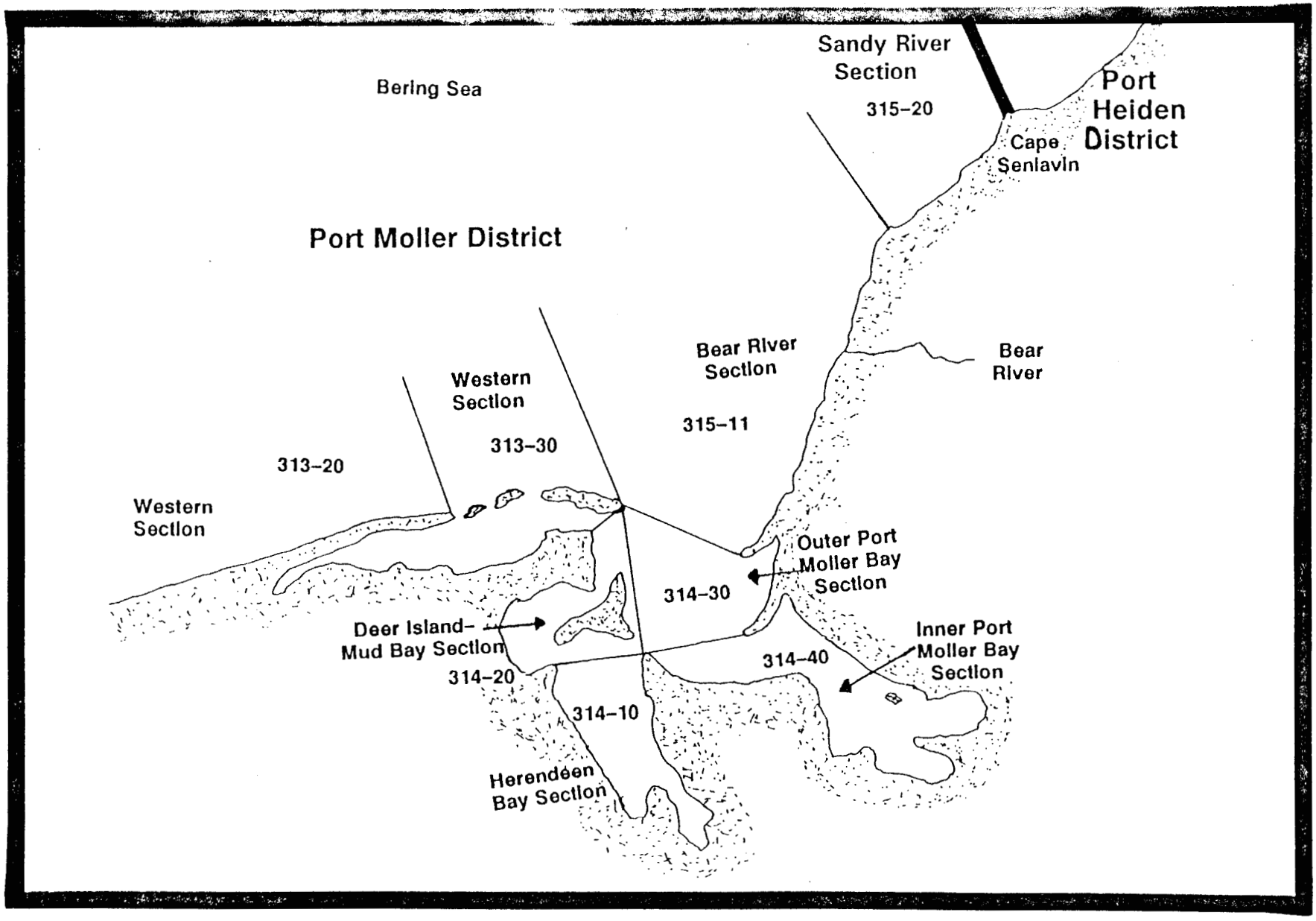

Figure 6. Map of the Port Moller District with the statistical herring fishing areas shown.

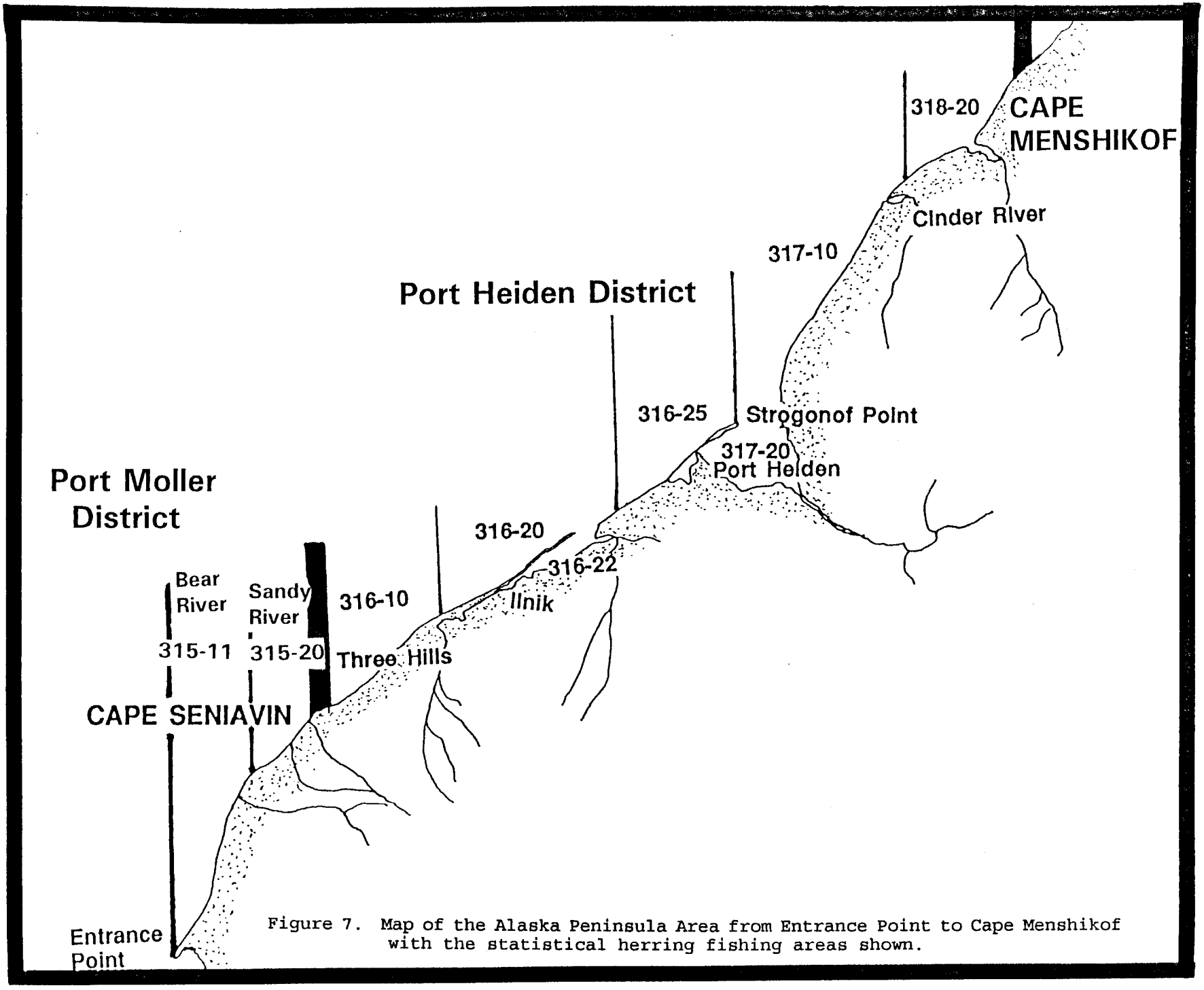

Figure 7. Map of the Alaska Peninsula Area from Entrance Point to Cape Menshikof with the statistical herring fishing areas shown.

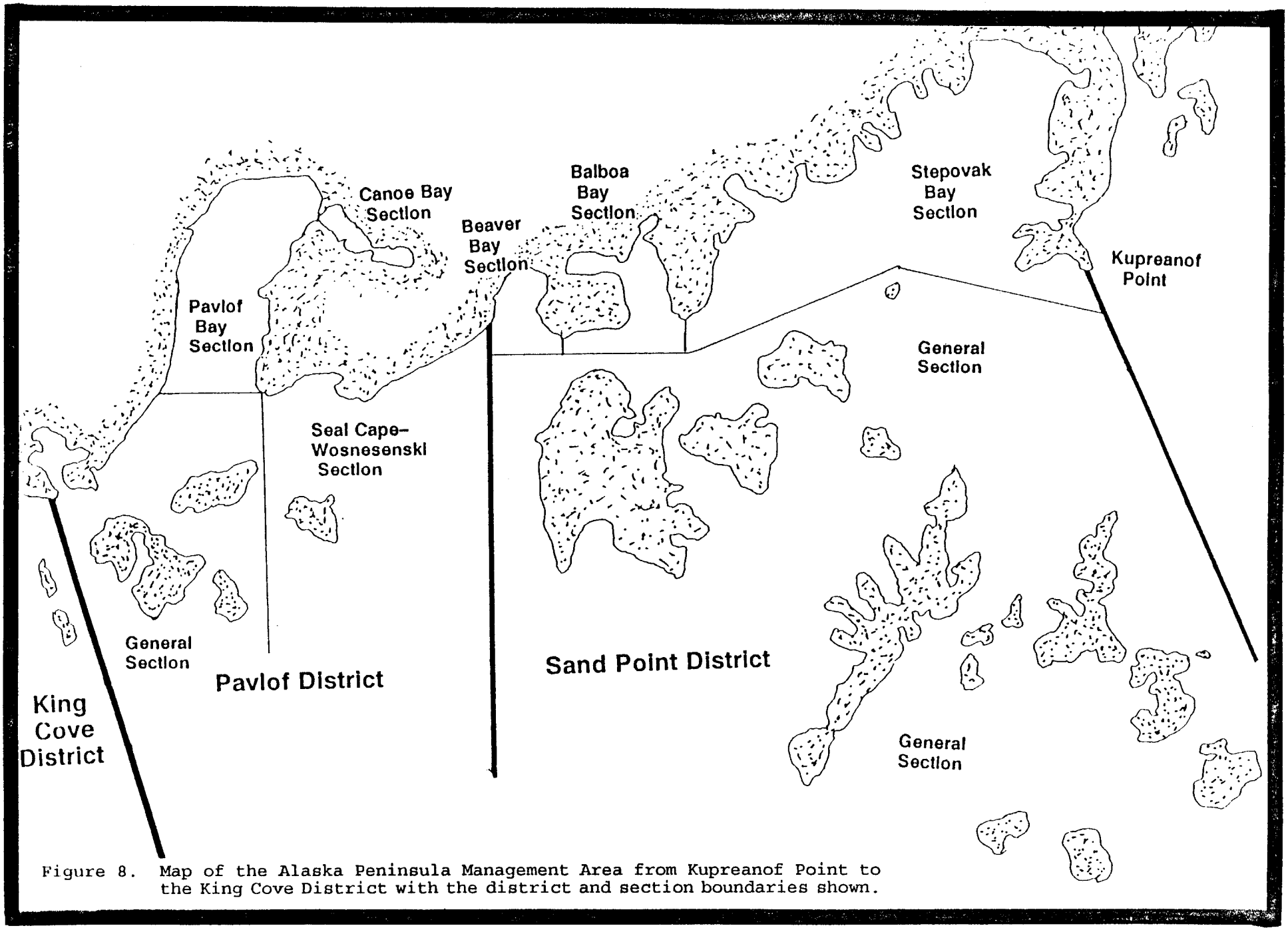

Figure 8. Map of the Alaska Peninsula Management Area from Kupreanof Point to the King Cove District with the district and section boundaries shown.

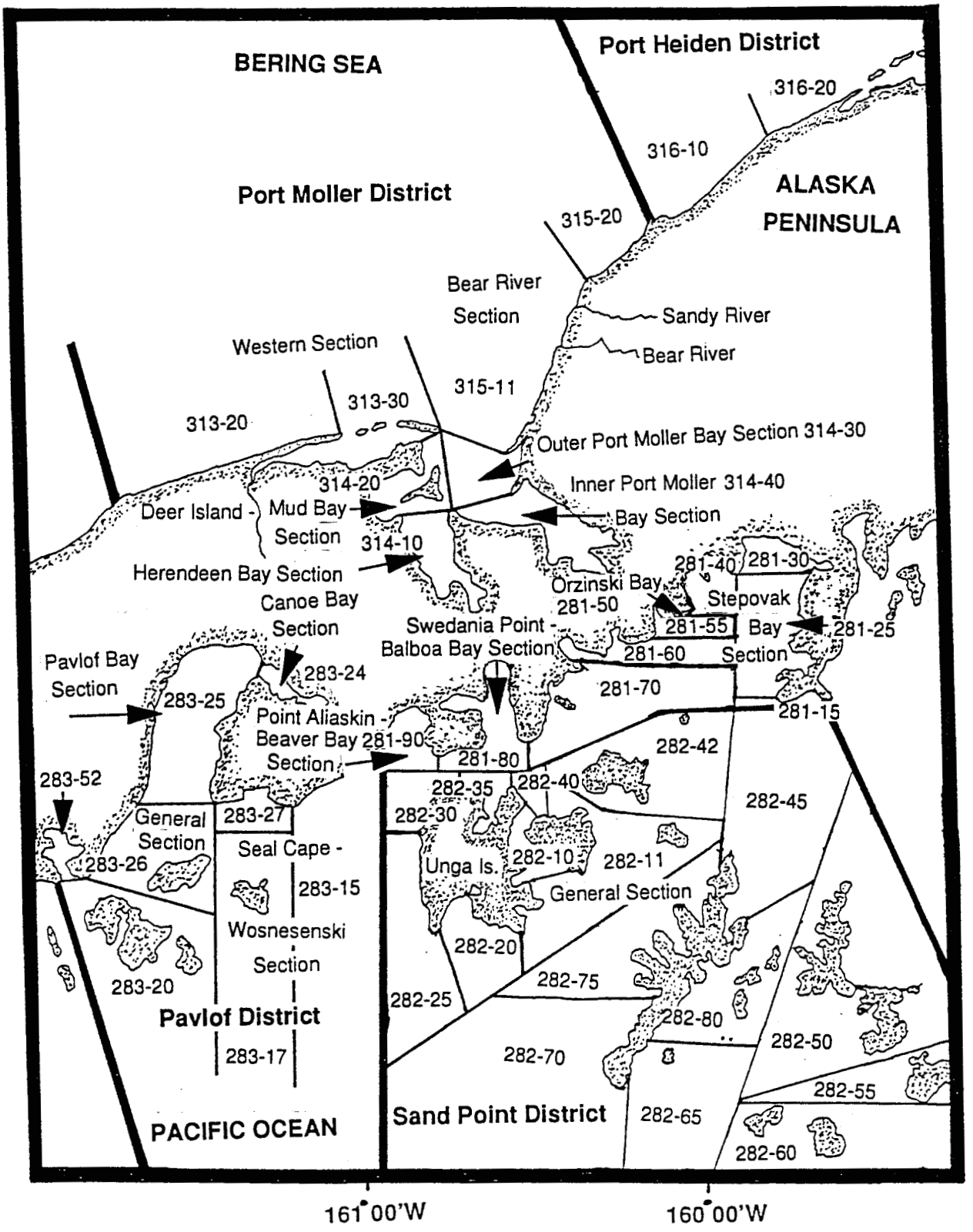

Figure 9. Map of the Alaska Peninsula Area from Bear Bay to Kupreanof Point with the statistical herring fishing areas shown.

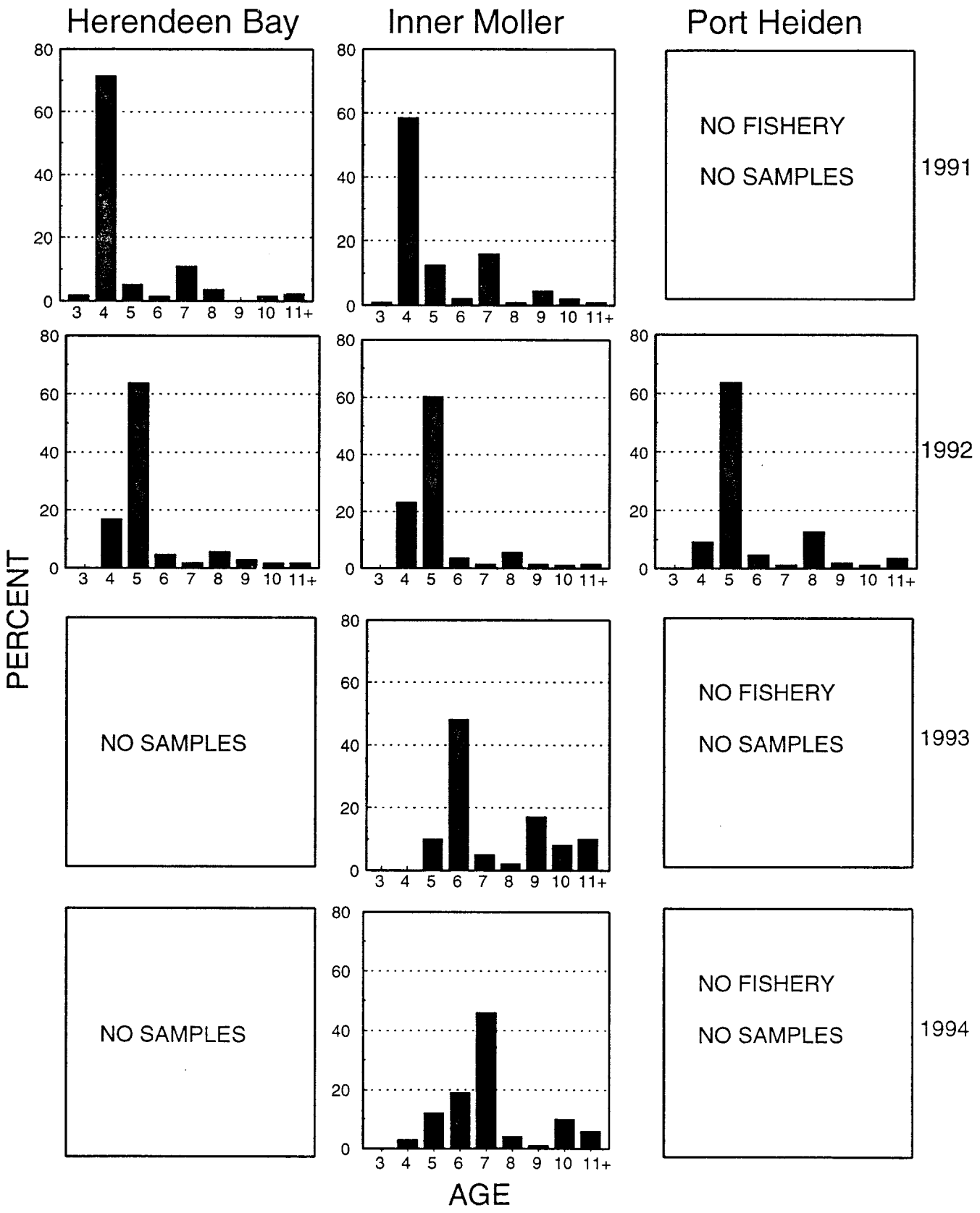

Figure 10. Age distribution of annual sac roe herring catches from Herendeen, Inner Moller, and Port Heiden Bays, 1991-94.

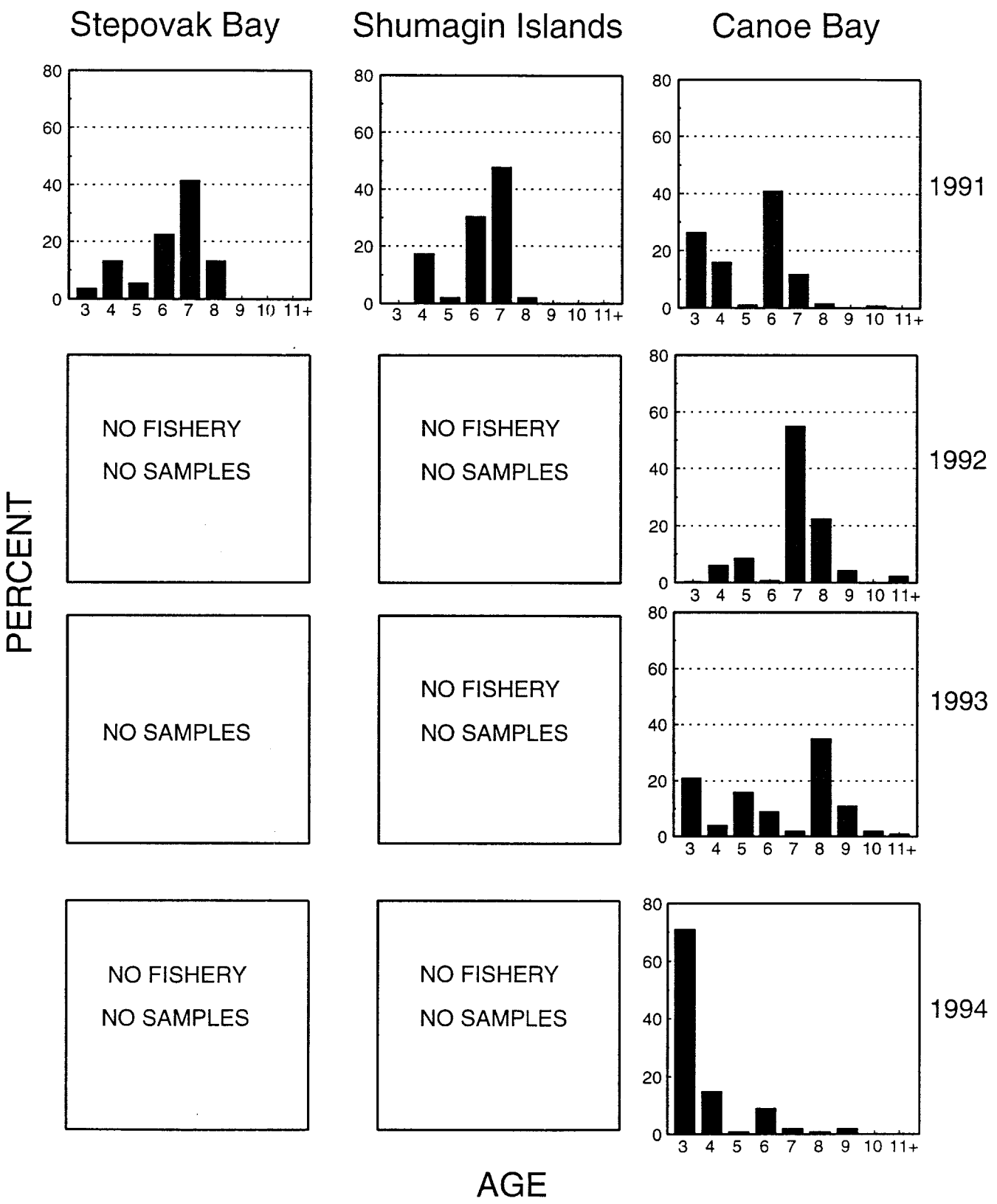

Figure 11. Age distribution of annual sac roe herring catches from Stepovak Bay, Shumagin Islands, and Canoe Bay, 1991-94.

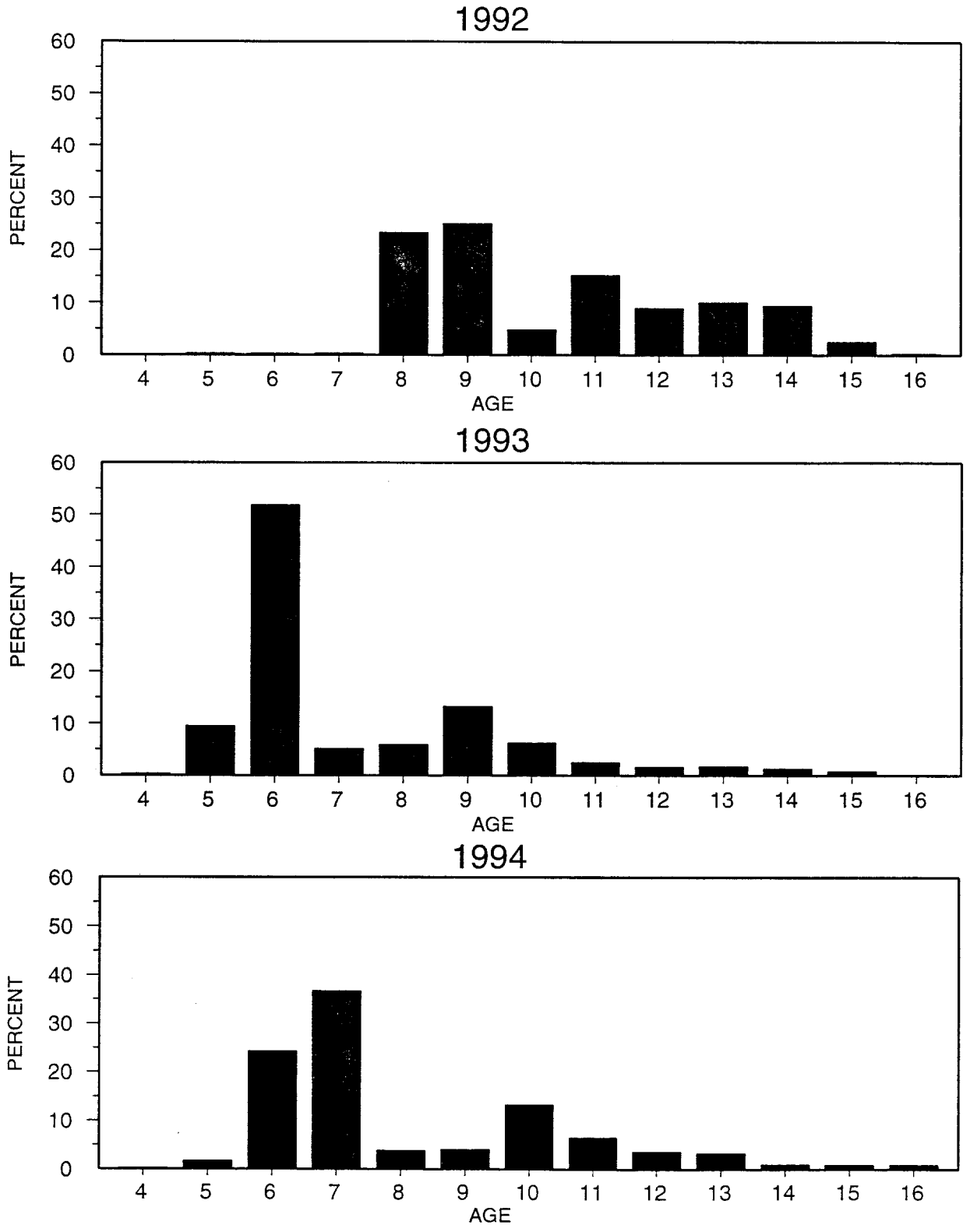

Figure 12. Age distribution of annual food and bait herring catches from the Aleutian Islands "Dutch Harbor" Management Area, 1992-94.

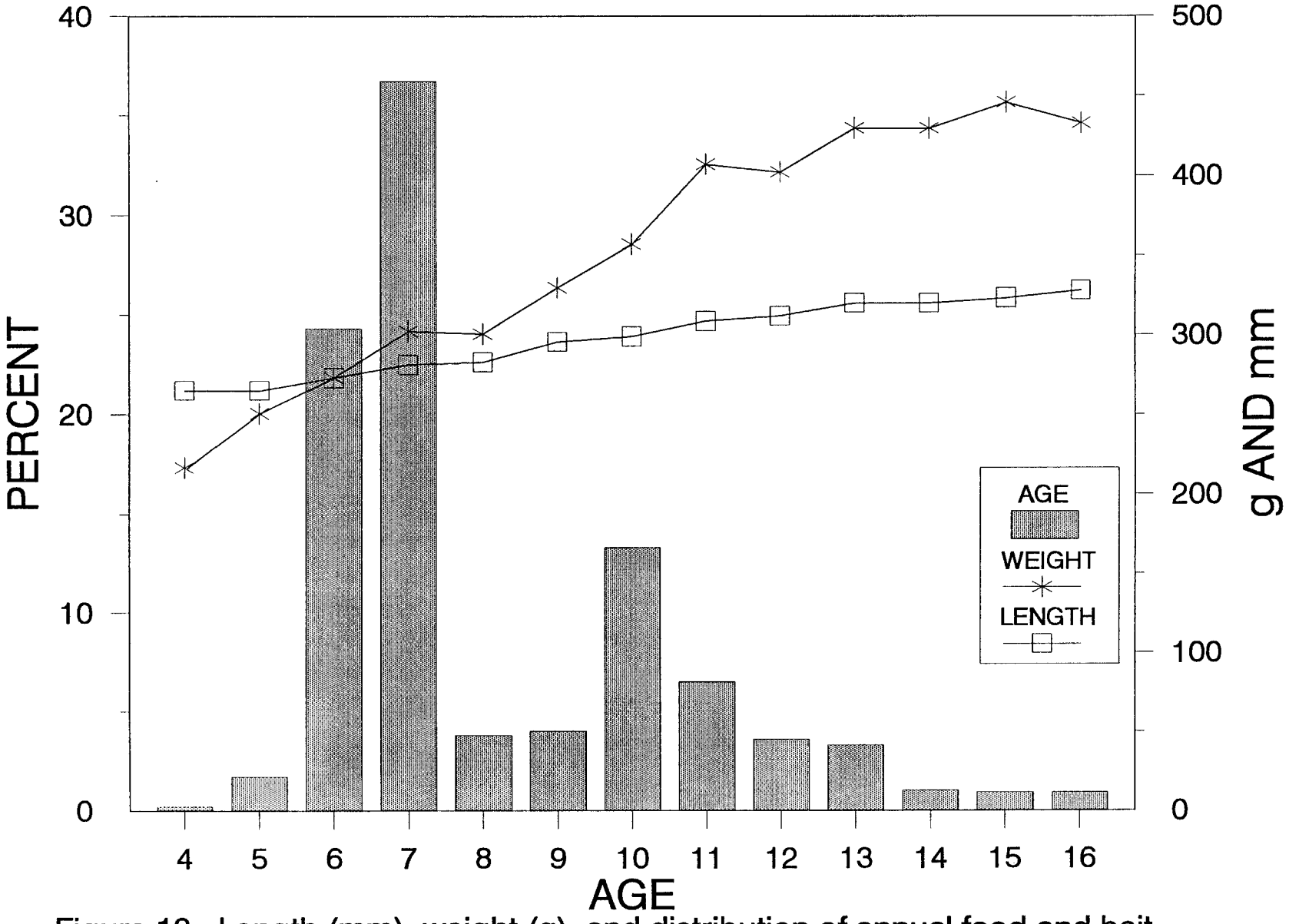

Figure 13. Length (mm), weight (g), and distribution of annual food and bait herring catches from the Aleutian Islands "Dutch Harbor" Management Area, 1994.

APPENDIX

APPENDIX A: EMERGENCY ORDER SUMMARY

ALASKA PENINSULA MANAGEMENT AREA

EMERGENCY ORDER NO. 4-F-M-SP-01-94

EFFECTIVE DATE: April 15, 1994

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

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

April 15 through July 15 herring may be taken during Sunday through Saturday.

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

April 15 through June 15 herring may be taken during Sunday through Saturday.

June 16 through July 15, no open fishing periods.

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

(a) Amak District.

April 15 through June 30 herring may be taken during Sunday through Saturday. July 1 through July 15, no open fishing period

(b) Port Moller and Port Heiden Districts.

April 15 through June 30 herring may be taken only during periods established by subsequent emergency order(s). July 1 through July 15, no open fishing period.

JUSTIFICATION: Fishing time is needed to allow sac roe herring harvests in the Alaska Peninsula and Aleutian Islands Management Areas during the sac roe season. Effort is anticipated to be light in Aleutian and South Peninsula waters and the Amak District of the North Peninsula. Effort is anticipated to be heavy in the Port Moller and Port Heiden Districts. Therefore, until harvests indicate more conservative measures are needed, seven fishing days per week can be allowed without causing stock conservation concerns in the Aleutian and South Peninsula waters and the Amak District while restricted fishing periods are needed in the Port Moller and Port Heiden Districts. The reason that portions of the area will remain closed during part of the sac roe season is as follows:

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

-Continued-

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 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 to herring sac roe fishing by subsequent emergency order(s).

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

These districts are managed on local sac roe herring stocks. During recent years fishing effort has increased to the point where most of the allowable harvest occurs during one to three 20 minute fishing periods. 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 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 harvested 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 to sac roe herring fishing by subsequent emergency order(s).

==========

EMERGENCY ORDER NO. 4-F-M-SP-03-94

EFFECTIVE DATE: 7:00 p.m., May 21, 1994

EXPLANATION: This emergency order allows a 2 hour herring fishing period from 7:00 p.m., Saturday, May 21, 1994 until 9:00 p.m., Saturday, May 21, 1994 in the Port Moller District.

JUSTIFICATION: Historically, herring have been observed in the Port Moller District within 2 to 4 days of the arrival of herring at Togiak. ADF&G is assuming that because of the late arrival of industry to the Port Moller District the peak of the herring run has been missed; therefore ADF&G will manage the fishery for the 1,200 ton preseason guideline harvest level.

An aerial survey this morning resulted in a biomass estimate of about 250 tons of herring in the Port Moller District.

Currently three companies have registered as being able to buy fish. Approximately 28 purse seine vessels, 6 tenders, and 2 floating processors are on-the-grounds. The industry capacity is about 750 tons.

A two hour fishing period from 7:00 p.m. to 9:00 p.m. should give fishers the opportunity to catch herring without exceeding the processing capacity of the registered companies.

-Continued-

EMERGENCY ORDER NO. 4-F-M-SP-04-94

EFFECTIVE DATE: 9:00 a.m., May 25, 1994

EXPLANATION: This emergency order allows a 2 hour herring fishing period from 9:00 a.m., Wednesday, May 25, 1994 until 11:00 a.m., Wednesday, May 25, 1994 in the Port Moller District.

JUSTIFICATION: Historically, herring have been observed in the Port Moller District within 2 to 4 days of the arrival of herring at Togiak. ADF&G is assuming that because of the late arrival of industry to the Port Moller District the peak of the herring run has been missed; therefore ADF&G will manage the fishery for the 1,200 ton preseason guideline harvest level. Currently, 20.5 tons have been harvested.

An aerial survey this afternoon resulted in a biomass estimate of about 125 tons of herring in the Port Moller District. The total observed biomass is 400 tons.

Currently five companies have registered as willing to buy fish. Approximately 28 purse seine vessels, 7 tenders, and 3 floating processors are on-the-grounds. The industry capacity is about 1,000 tons.

A two hour fishing period from 9:00 a.m. to 11:00 a.m. should give fishers the opportunity to catch herring without exceeding the processing capacity of the registered companies.

==========

EMERGENCY ORDER NO. 4-F-M-SP-05-94

EFFECTIVE DATE: 1:00 a.m., May 28, 1994

EXPLANATION: This emergency order changes the required 6 hour notice to no advanced notice given prior to commercial herring fishing periods in the Port Moller and Port Heiden Districts.

JUSTIFICATION: Historically, herring have been observed in the Port Moller District within 2 to 4 days of the arrival of herring at Togiak. ADF&G is assuming that because of the late arrival of industry to the Port Moller District the peak of the herring run has been missed; therefore ADF&G will manage the fishery for the 1,200 ton preseason guideline harvest level. Currently, 20.5 tons have been harvested.

Recent aerial surveys have not indicated herring moving into either Port Moller or Port Heiden Districts. A reduction in the required advanced notice time may aid fishers in harvesting the preseason guideline harvest level.

==========

EMERGENCY ORDER NO. 4-F-M-SP-05-B-94

EFFECTIVE DATE: 8:00 a.m., May 29, 1994

EXPLANATION: This emergency order allows a commercial herring fishing period from 8:00 a.m., Sunday, May 29, 1994 until 12:00 p.m., midnight, Thursday, June 30, 1994 in the Port Moller District.

-Continued-

JUSTIFICATION: Historically, herring have been observed and harvested in the Port Moller District through early July. ADF&G is assuming that because of the late arrival of industry to the Port Moller District the peak of the herring run has been missed; therefore ADF&G will manage the fishery for the 1,200 ton preseason guideline harvest level. Effort has been reduced to three fishing vessels and one processor with an estimated 75 ton daily capacity. A continuous fishing period will aid industry to harvest the preseason guideline harvest level.

==========

ALEUTIAN ISLANDS MANAGEMENT AREA

EMERGENCY ORDER NO. 4-F-M-SP-34-94

EFFECTIVE DATE: 8:00 a.m., July 16, 1994

EXPLANATION: This emergency order allows a one hour commercial food and bait herring fishing period in the Unalaska District of the Aleutian Islands Management Area, from 8:00 a.m., Saturday, July 16, 1994 until 9:00 a.m. Saturday, July 16, 1994 in all waters of Unalaska Bay south of a line from the aircraft beacon on Eider Point (53°57'40" N. lat., 166°35'30" W. long.) to Constantine Bay (53°57'14" N. lat., 166°26'19" W. long.).

JUSTIFICATION: Fishing time is needed to allow food and bait herring harvests in the "Dutch Harbor" fishery. The allocation for this fishery is 2,215 tons of herring. Effort consists of 16 permit holders- purse seine vessels, 12 tenders representing 5 processing companies, and 3 aircraft. The initial holding capacity for both tenders and purse seiners is an estimated 3,000 tons. Herring are present in the Unalaska Bay Section; a one hour opening should allow for a harvest while not exceeding the allocation.

==========

EMERGENCY ORDER NO. 4-F-M-SP-35-94

EFFECTIVE DATE: 3:00 p.m., July 16, 1994

EXPLANATION: This emergency order allows a two hour commercial food and bait herring fishing period in the Unalaska District of the Aleutian Islands Management Area, from 3:00 p.m., Saturday, July 16, 1994 until 5:00 p.m. Saturday, July 16, 1994 in all waters of Unalaska Bay enclosed by a line from Priest Rock (54°00'24" N. lat., 166°22'42" W. long.) to a point on the 166°45' W. long. line two nautical miles north of Cape Wislow and extending to Cape Wislow (54°00'48" N. lat., 166°45'00" W. long.).

JUSTIFICATION: Fishing time is needed to allow food and bait herring harvests in the "Dutch Harbor" fishery. The remaining allocation for this fishery is an estimated 2,040 tons of herring. Considering the relatively large amount remaining on the allocation the second opening will be for two hours. An additional processing company registered after the first opening, however their one tender will not be available for this opening. Therefore, effort is expected to be 16 permit holders - purse seine vessels, 12 tenders representing 6 processing companies, and 3 aircraft. The holding capacity for both tenders and purse seiners is an estimated 3,000 tons. Herring are present in the Unalaska Bay Section; a two hour opening should allow for a harvest while not exceeding the allocation.

-Continued-

EMERGENCY ORDER NO. 4-F-M-SP-36-94

EFFECTIVE DATE: 7:00 a.m., July 17, 1994

EXPLANATION: This emergency order allows a one hour commercial food and bait herring fishing period in the Unalaska District of the Aleutian Islands Management Area, from 7:00 a.m., Sunday, July 17, 1994 until 8:00 a.m. Sunday, July 17, 1994 in all waters of Unalaska Bay enclosed by a line from Priest Rock (54°00'24" N. lat., 166°22'42" W. long.) to a point on the 166°45' W. long. line two nautical miles north of Cape Wislow and extending to Cape Wislow (54°00'48" N. lat., 166°45'00" W. long.).

JUSTIFICATION: Fishing time is needed to allow food and bait herring harvests in the "Dutch Harbor" fishery. The remaining allocation for this fishery is an estimated 1,883 tons of herring. Considering the relatively large amount remaining on the allocation this opening will be for one hour. Effort is expected to be 16 permit holders- purse seine vessels, 12 tenders representing 6 processing companies, and 3 aircraft. The holding capacity for both tenders and purse seiners is an estimated 3,000 tons. Herring are present in the Unalaska Bay Section; a one hour opening should allow for a harvest while not exceeding the allocation.

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EMERGENCY ORDER NO. 4-F-M-SP-37-94

EFFECTIVE DATE: 4:00 p.m., July 17, 1994

EXPLANATION: This emergency order allows a twenty minute commercial food and bait herring fishing period in the Unalaska District of the Aleutian Islands Management Area, from 4:00 p.m., Sunday, July 17, 1994 until 4:20 p.m. Sunday, July 17, 1994 in all waters of Makushin Bay east of a line from Cape Kovrizhka (53°50'20" N. lat., 167°09'20" W. long.) to Spray Cape (53°36'57" N. lat., 167°09'40" W. long.).

JUSTIFICATION: Fishing time is needed to allow food and bait herring harvests in the "Dutch Harbor" fishery. The remaining allocation for this fishery is an estimated 1,865 tons of herring. Since this will be the first opening in Makushin Bay this season the opening will be for only twenty minutes. Effort is expected to be 16 permit holders- purse seine vessels, 12 tenders representing 6 processing companies, and 3 aircraft. The holding capacity for both tenders and purse seiners is an estimated 3,000 tons. Herring are present in the Makushin Bay Section; a twenty minute opening should allow for a harvest while not exceeding the allocation.

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EMERGENCY ORDER NO. 4-F-M-SP-38-94

EFFECTIVE DATE: 7:00 p.m., July 17, 1994

EXPLANATION: This emergency order allows a three hour commercial food and bait herring fishing period in the Unalaska District of the Aleutian Islands Management Area, from 7:00 p.m., Sunday, July 17, 1994 until 10:00 p.m. Sunday, July 17, 1994 in all waters of Makushin Bay east of a line from Cape Kovrizhka (53°50'20" N. lat., 167°09'20" W. long.) to Spray Cape (53°36'57" N. lat., 167°09'40" W. long.).

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JUSTIFICATION: Fishing time is needed to allow food and bait herring harvests in the "Dutch Harbor" fishery. The remaining allocation for this fishery is an estimated 1,856 tons of herring. Considering the relatively large amount remaining on the allocation this opening will be for three hours. Effort is expected to be 16 permit holders- purse seine vessels, 13 tenders representing 6 processing companies, and 3 aircraft. The holding capacity for both tenders and purse seiners is an estimated 3,300 tons. Herring are present in the Makushin Bay Section; a three hour opening should allow for a harvest while not exceeding the allocation.

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EMERGENCY ORDER NO. 4-F-M-SP-39-94

EFFECTIVE DATE: 3:00 a.m., July 18, 1994

EXPLANATION: This emergency order allows a three hour commercial food and bait herring fishing period in the Unalaska District of the Aleutian Islands Management Area, from 3:00 a.m., Monday, July 18, 1994 until 6:00 a.m. Monday, July 18, 1994 in all waters of Makushin Bay east of a line from Cape Kovrizhka (53°50'20" N. lat., 167°09'20" W. long.) to Spray Cape (53°36'57" N. lat., 167°09'40" W. long.).

JUSTIFICATION: Fishing time is needed to allow food and bait herring harvests in the "Dutch Harbor" fishery. The remaining allocation for this fishery is an estimated 1,235 tons of herring. Considering the relatively large amount remaining on the allocation this opening will be for three hours. Effort is expected to be 15 permit holders - purse seine vessels, 13 tenders representing 6 processing companies, and 3 aircraft. The holding capacity for both tenders and purse seiners is an estimated 3,300 tons. Herring are present in the Makushin Bay Section; a three hour opening should allow for a harvest while not exceeding the allocation.

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EMERGENCY ORDER NO. 4-F-M-SP-40-94

EFFECTIVE DATE: 12:00 noon, July 18, 1994

EXPLANATION: This emergency order allows a three hour commercial food and bait herring fishing period in the Unalaska District of the Aleutian Islands Management Area, from 12:00 noon, Monday, July 18, 1994 until 3:00 p.m. Monday, July 18, 1994 in all waters of Makushin Bay east of a line from Cape Kovrizhka (53°50'20" N. lat., 167°09'20" W. long.) to Spray Cape (53°36'57" N. lat., 167°09'40" W. long.).

JUSTIFICATION: Fishing time is needed to allow food and bait herring harvests in the "Dutch Harbor" fishery. The remaining allocation for this fishery is an estimated 710 tons of herring. Effort is expected to be 15 permit holders - purse seine vessels, 12 tenders representing 6 processing companies, and 3 aircraft. The holding capacity for both tenders and purse seiners is an estimated 3,000 tons. Herring are present in the Makushin Bay Section; a three hour opening should allow for a harvest while not exceeding the allocation.

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EMERGENCY ORDER NO. 4-F-M-SP-41-94

EFFECTIVE DATE: 6:00 p.m., July 18, 1994

EXPLANATION: This emergency order allows a one hour commercial food and bait herring fishing period in the Unalaska District of the Aleutian Islands Management Area, from 6:00 p.m., Monday, July 18, 1994 until 7:00 p.m. Monday, July 18, 1994 in all waters of Makushin Bay east of a line from Cape Kovrizhka (53°50'20" N. lat., 167°09'20" W. long.) to Spray Cape (53°36'57" N. lat., 167°09'40" W. long.).

JUSTIFICATION: Fishing time is needed to allow food and bait herring harvests in the "Dutch Harbor" fishery. The remaining allocation for this fishery is an estimated 545 tons of herring. Effort is expected to be 15 permit holders - purse seine vessels, 12 tenders representing 6 processing companies, and 3 aircraft. The holding capacity for both tenders and purse seiners is an estimated 3,000 tons. Herring are present in the Makushin Bay Section; a one hour opening should allow for a harvest while not exceeding the allocation.

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EMERGENCY ORDER NO. 4-F-M-SP-42-94

EFFECTIVE DATE: 8:00 a.m., July 19, 1994

EXPLANATION: This emergency order allows a two hour commercial food and bait herring fishing period in the Unalaska District of the Aleutian Islands Management Area, from 8:00 a.m., Tuesday, July 19, 1994 until 10:00 a.m. Tuesday, July 19, 1994 in all waters of Unalaska Bay enclosed by a line from Priest Rock (54°00'24" N. lat., 166°22'42" W. long.) to a point on the 166°45' W. long. line two nautical miles north of Cape Wislow and extending to Cape Wislow (54°00'48" N. lat., 166°45'00" W. long.).

JUSTIFICATION: Fishing time is needed to allow food and bait herring harvests in the "Dutch Harbor" fishery. The remaining allocation for this fishery is an estimated 455 tons of herring. Effort is expected to be 12 permit holders - purse seine vessels, 8 tenders representing 5 processing companies, and 3 aircraft. The holding capacity for both tenders and purse seiners is an estimated 2,350 tons. Herring are present in the Unalaska Bay Section; a two hour opening should allow for a harvest while not exceeding the allocation.

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EMERGENCY ORDER NO. 4-F-M-SP-43-94

EFFECTIVE DATE: 6:00 p.m., July 19, 1994

EXPLANATION: This emergency order allows a one hour commercial food and bait herring fishing period in the Unalaska District of the Aleutian Islands Management Area, from 6:00 p.m., Tuesday, July 19, 1994 until 7:00 p.m. Tuesday, July 19, 1994 in all waters of Unalaska Bay enclosed by a line from Priest Rock (54°00'24" N. lat., 166°22'42" W. long.) to a point on the 166°45' W. long. line two nautical miles north of Cape Wislow and extending to Cape Wislow (54°00'48" N. lat., 166°45'00" W. long.).

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JUSTIFICATION: Fishing time is needed to allow food and bait herring harvests in the "Dutch Harbor" fishery. The remaining allocation for this fishery is an estimated 260 tons of herring. Effort is expected to be 12 permit holders - purse seine vessels, 8 tenders representing 5 processing companies, and 3 aircraft. The holding capacity for both tenders and purse seiners is an estimated 2,350 tons. Herring are present in the Unalaska Bay Section; a one hour opening should allow for a harvest while not exceeding the allocation.

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EMERGENCY ORDER NO. 4-F-M-SP-44-94

EFFECTIVE DATE: 7:00 p.m., July 19, 1994

EXPLANATION: This emergency order supersedes Emergency Order Number 4-F-M-SP-34-94 in regards to the Aleutian Islands Management Area. This emergency order closes the Aleutian Islands Management Area commercial food and bait herring fishery effective 7:00 p.m., Tuesday, July 19, 1994 until 12:00 midnight, February 28, 1995 (the end of the food and bait herring season).

JUSTIFICATION: On July 19, 1994 a news release was issued stating that 260 tons of herring remained to be harvested during the "Dutch Harbor" commercial food and bait fishery. The fishery was reopened an additional one hour from 6:00 p.m. until 7:00 p.m. Tuesday, July 19, 1994.

Catch estimates on July 19 indicated that the remainder of the allocation was harvested during that fishing period. Therefore, the "Dutch Harbor" commercial food and bait herring season will close effective 7:00 p.m., Tuesday, July 19, 1994.

APPENDIX B. PARTIAL LISTING OF HERRING REGULATIONS, 1994

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.

District	Thresholds (s.t.)
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.

(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.

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(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.

(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^{0}) 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.

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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.

(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.

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(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.

(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.

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.

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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.

APPENDIX C: ALASKA PENINSULA TIDES FOR 1994.

Appendix C.1. Port Moller tides, 1994.

Date		---HIGH TIDE--- Time	Feet	---HIGH TIDE--- Time	Feet	---LOW TIDE--- Time	Feet	----LOW TIDE--- Time	Feet
May	1	4:24 AM	12.9	4:24 PM	9.4	10:18 AM	2.5	10:13 PM	-1.3
	2	5:18 AM	12.5	5:28 PM	9.3	11:13 AM	2.1	11:11 PM	-0.1
	3	6:10 AM	12.0	6:32 PM	9.3	:		12:07 PM	1.7
	4	7:00 AM	11.4	7:35 PM	9.4	0:08 AM	1.3	12:58 PM	1.3
	5	7:48 AM	10.7	8:36 PM	9.5	1:06 AM	2.7	1:48 PM	1.1
	6	8:35 AM	10.0	9:33 PM	9.7	2:03 AM	4.0	2:35 PM	1.0
	7	9:19 AM	9.3	10:27 PM	9.9	2:59 AM	5.0	3:19 PM	0.9
	8	10:01 AM	8.7	11:17 PM	10.1	3:54 AM	5.8	4:02 PM	1.0
	9	10:42 AM	8.2	:		4:48 AM	6.4	4:43 PM	1.0
	10	0:03 AM	10.3	11:22 AM	7.8	5:39 AM	6.8	5:23 PM	1.2
	11	0:45 AM	10.5	12:01 PM	7.4	6:27 AM	6.9	6:03 PM	1.3
	12	1:25 AM	10.6	12:40 PM	7.2	7:14 AM	7.0	6:42 PM	1.4
	13	2:04 AM	10.7	1:20 PM	7.1	7:58 AM	6.9	7:22 PM	1.5
	14	2:41 AM	10.9	2:02 PM	7.1	8:41 AM	6.6	8:03 PM	1.6
	15	3:18 AM	10.9	2:47 PM	7.2	9:23 AM	6.2	8:45 PM	1.8
	16	3:54 AM	11.0	3:35 PM	7.4	10:03 AM	5.6	9:29 PM	2.1
	17	4:32 AM	11.1	4:28 PM	7.7	10:44 AM	4.7	10:17 PM	2.5
	18	5:10 AM	11.1	5:25 PM	8.2	11:25 AM	3.6	11:09 PM	2.9
	19	5:51 AM	11.0	6:24 PM	8.9	:		12:07 PM	2.3
	20	6:33 AM	10.9	7:24 PM	9.6	0:04 AM	3.5	12:52 PM	0.8
	21	7:19 AM	10.7	8:25 PM	10.4	1:03 AM	4.1	1:38 PM	-0.7
	22	8:08 AM	10.4	9:26 PM	11.3	2:04 AM	4.6	2:27 PM	-2.1
	23	9:00 AM	10.2	10:26 PM	12.0	3:06 AM	5.0	3:19 PM	-3.2
	24	9:55 AM	9.9	11:25 PM	12.6	4:08 AM	5.1	4:12 PM	-4.0
	25	10:53 AM	9.7	:		5:10 AM	5.0	5:07 PM	-4.4
	26	0:23 AM	13.0	11:54 AM	9.5	6:10 AM	4.6	6:02 PM	-4.2
	27	1:20 AM	13.2	12:56 PM	9.3	7:09 AM	4.1	6:59 PM	-3.7
	28	2:15 AM	13.2	2:00 PM	9.2	8:07 AM	3.5	7:56 PM	-2.7
	29	3:08 AM	13.1	3:04 PM	9.1	9:03 AM	2.8	8:52 PM	-1.4
	30	4:00 AM	12.7	4:09 PM	9.0	9:58 AM	2.2	9:49 PM	0.0
	31	4:49 AM	12.2	5:13 PM	9.0	10:50 AM	1.5	10:45 PM	1.5
June	1	5:37 AM	11.6	6:16 PM	9.1	11:41 AM	1.0	11:42 PM	3.1
	2	6:23 AM	11.0	7:17 PM	9.3	:		12:29 PM	0.6
	3	7:08 AM	10.3	8:16 PM	9.6	0:38 AM	4.4	1:15 PM	0.4
	4	7:50 AM	9.6	9:11 PM	9.8	1:34 AM	5.6	2:00 PM	0.2
	5	8:32 AM	9.0	10:02 PM	10.1	2:30 AM	6.5	2:43 PM	0.1
	6	9:13 AM	8.4	10:49 PM	10.3	3:24 AM	7.1	3:25 PM	0.2
	7	9:53 AM	8.0	11:34 PM	10.5	4:17 AM	7.5	4:06 PM	0.2
	8	:		:		:		4:47 PM	0.4
	9	0:15 AM	10.7	11:15 AM	7.4	5:57 AM	7.6	5:27 PM	0.5
	10	0:55 AM	10.9	11:58 AM	7.2	6:44 AM	7.4	6:08 PM	0.7
	11	1:33 AM	11.0	:		:		6:49 PM	1.0
	12	2:09 AM	11.1	1:30 PM	7.1	8:11 AM	6.5	7:31 PM	1.3
	13	2:45 AM	11.2	2:21 PM	7.3	8:52 AM	5.8	8:15 PM	1.8
	14	3:21 AM	11.2	3:15 PM	7.6	9:33 AM	4.8	9:03 PM	2.3
	15	3:58 AM	11.2	4:13 PM	8.1	1:13 AM	3.5	9:54 PM	3.0
	16	4:37 AM	11.1	5:12 PM	8.7	1:55 AM	2.0	1:49 PM	3.7
	17	5:18 AM	11.0	6:13 PM	9.5	1:39 AM	0.4	1:47 PM	4.5
	18	6:02 AM	10.9	7:14 PM	10.2	:		1:26 PM	-1.0
	19	6:50 AM	10.6	8:15 PM	11	0:47 AM	5.1	1:14 PM	-2.4
	20	7:42 AM	10.4	9:15 PM	11.7	1:48 AM	5.6	2:06 PM	-3.5

-Continued-

Date		---HIGH TIDE--- Time	Feet	---HIGH TIDE--- Time	Feet	---LOW TIDE--- Time	Feet	----LOW TIDE--- Time	Feet
June	21	8:36 AM	10.1	1:14 PM	12.3	2:50 AM	5.8	2:59 PM	-4.2
	22	9:34 AM	9.8	1:12 PM	12.6	3:52 AM	5.7	3:53 PM	-4.5
	23	1:35 AM	9.6	:		4:53 AM	5.4	4:48 PM	-4.3
	24	0:08 AM	12.9	1:37 AM	9.3	5:52 AM	4.9	5:44 PM	-3.7
	25	1:02 AM	12.9	1:40 PM	9.1	6:50 AM	4.3	6:40 PM	-2.7
	26	1:54 AM	12.8	1:44 PM	9.0	7:46 AM	3.5	7:35 PM	-1.4
	27	2:45 AM	12.5	2:48 PM	8.9	8:41 AM	2.8	8:30 PM	0.0
	28	3:33 AM	12.1	3:51 PM	8.9	9:32 AM	2.1	9:25 PM	1.5
	29	4:19 AM	11.5	4:53 PM	9.0	1:22 AM	1.4	1:20 PM	3.0
	30	5:03 AM	11.0	5:53 PM	9.1	1:09 AM	1.0	1:14 PM	4.4
July	1	5:45 AM	10.4	6:50 PM	9.3	11:54 AM	0.6	:	
	2	6:26 AM	9.8	7:44 PM	9.6	0:08 AM	5.5	12:38 PM	0.3
	3	7:07 AM	9.3	8:36 PM	9.8	1:02 AM	6.5	1:22 PM	0.1
	4	7:47 AM	8.8	9:25 PM	10.1	1:56 AM	7.1	2:04 PM	0.0
	5	8:27 AM	8.4	10:11 PM	10.3	2:48 AM	7.6	2:47 PM	-0.1
	6	9:09 AM	8.1	10:55 PM	10.5	3:40 AM	7.8	3:29 PM	-0.1
	7	:		11:38 PM	10.7	:		4:12 PM	0.0
	8	:		:		:		4:54 PM	0.2
	9	0:18 AM	10.8	11:24 AM	7.6	6:05 AM	7.3	5:37 PM	0.5
	10	0:56 AM	11.0	12:14 PM	7.6	6:50 AM	6.7	6:21 PM	0.8
	11	1:33 AM	11.0	1:07 PM	7.0	7:33 AM	5.9	7:06 PM	1.3
	12	2:10 AM	11.1	2:03 PM	8.0	8:15 AM	4.7	7:54 PM	2.0
	13	2:47 AM	11.1	3:01 PM	8.4	8:57 AM	3.4	8:46 PM	2.7
	14	3:27 AM	11.0	4:01 PM	9.0	9:41 AM	1.9	9:40 PM	3.5
	15	4:08 AM	11.0	5:01 PM	9.6	10:26 AM	0.3	10:36 PM	4.2
	16	4:53 AM	10.8	6:02 PM	10.3	11:13 AM	-1.0	11:35 PM	4.9
	17	5:40 AM	10.7	7:02 PM	10.9	:		12:03 PM	-2.3
	18	6:31 AM	10.5	8:02 PM	4.0	0:35 AM	5.4	12:54 PM	-3.3
	19	7:26 AM	10.2	9:01 PM	8.0	1:35 AM	5.7	1:48 PM	-3.8
	20	8:23 AM	10.0	9:59 PM	12.1	2:36 AM	5.7	2:43 PM	-4.0
	21	9:23 AM	9.7	10:55 PM	12.3	3:36 AM	5.5	3:38 PM	-3.7
	22	10:25 AM	9.5	11:49 PM	12.2	4:35 AM	5.1	4:34 PM	-3.0
	23	11:27 AM	9.3	:		5:33 AM	4.6	5:29 PM	-2.1
	24	0:41 AM	12.1	12:30 PM	9.1	6:28 AM	4.0	6:24 PM	-0.9
	25	1:31 AM	11.8	1:32 PM	9.0	7:22 AM	3.3	7:18 PM	0.3
	26	2:18 AM	11.5	2:33 PM	9.0	8:13 AM	2.7	8:11 PM	1.7
	27	3:03 AM	11.0	3:31 PM	9.0	9:01 AM	2.1	9:04 PM	3.0
	28	3:45 AM	10.5	4:27 PM	9.1	9:47 AM	1.7	9:56 PM	4.2
	29	4:26 AM	10.0	5:21 PM	9.3	10:31 AM	1.3	10:47 PM	5.2
	30	5:06 AM	9.6	6:13 PM	9.5	11:15 AM	1.0	11:38 PM	6.0
	31	5:45 AM	9.2	7:03 PM	9.6	11:58 AM	0.7	:	

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:

Time		Feet	
High	Low	High	Low
1:30	2:04	0.6	0.8

Appendix C.2. Kodiak tides, 1994.

Date		---HIGH TIDE--- Time	Feet	---HIGH TIDE--- Time	Feet	---LOW TIDE--- Time	Feet	----LOW TIDE--- Time	Feet
May	1	6 :34 AM	8.2	8 :07 PM	6.7	0 :26 AM	2.4	1 :25 PM	-0.2
	2	7 :41 AM	7.3	9 :14 PM	6.7	1 :36 AM	2.8	2 :27 PM	0.4
	3	8 :58 AM	6.7	10 :17 PM	6.9	2 :59 AM	2.8	3 :31 PM	1.0
	4	10 :18 AM	6.3	11 :10 PM	7.3	4 :21 AM	2.5	4 :32 PM	1.3
	5	11 :28 AM	6.3	11 :54 PM	7.7	5 :28 AM	1.8	5 :25 PM	1.5
	6	:		12 :26 PM	6.5	6 :20 AM	1.2	6 :10 PM	1.7
	7	0 :31 AM	8.1	1 :14 PM	6.6	7 :03 AM	0.5	6 :49 PM	1.7
	8	1 :06 AM	8.4	1 :56 PM	6.8	7 :40 AM	-0.1	7 :25 PM	1.8
	9	1 :38 AM	8.7	2 :34 PM	6.9	8 :15 AM	-0.4	7 :59 PM	1.9
	10	2 :10 AM	8.9	3 :11 PM	7.0	8 :49 AM	-0.7	8 :33 PM	2.0
	11	2 :41 AM	9.0	3 :47 PM	6.9	9 :23 AM	-0.9	9 :06 PM	2.1
	12	3 :13 AM	8.9	4 :24 PM	6.8	9 :58 AM	-0.9	9 :40 PM	2.3
	13	3 :45 AM	8.8	5 :01 PM	6.7	10 :33 AM	-0.8	10 :15 PM	2.5
	14	4 :18 AM	8.6	5 :41 PM	6.5	11 :10 AM	-0.6	10 :54 PM	2.7
	15	4 :55 AM	8.2	6 :24 PM	6.4	11 :49 AM	-0.3	11 :39 PM	2.9
	16	5 :37 AM	7.8	7 :12 PM	6.4	:		12 :32 PM	-0.1
	17	6 :29 AM	7.3	8 :06 PM	6.6	0 :35 AM	3.0	1 :20 PM	0.3
	18	7 :35 AM	6.8	9 :02 PM	7.0	1 :43 AM	2.9	2 :15 PM	0.7
	19	8 :55 AM	6.4	9 :57 PM	7.5	3 :01 AM	2.4	3 :14 PM	1.0
	20	10 :18 AM	6.3	10 :51 PM	8.2	4 :17 AM	1.6	4 :15 PM	1.2
	21	11 :34 AM	6.6	11 :41 PM	9.0	5 :24 AM	0.6	5 :14 PM	1.3
	22	:		12 :39 PM	6.9	6 :23 AM	-0.4	6 :09 PM	1.4
	23	0 :30 AM	9.7	1 :37 PM	7.3	7 :16 AM	-1.5	7 :02 PM	1.3
	24	1 :19 AM	10.3	2 :31 PM	7.6	8 :06 AM	-2.2	7 :53 PM	1.3
	25	2 :06 AM	10.6	3 :21 PM	7.7	8 :55 AM	-2.6	8 :43 PM	1.4
	26	2 :54 AM	10.6	4 :11 PM	7.8	9 :43 AM	-2.7	9 :32 PM	1.5
	27	3 :41 AM	10.3	5 :00 PM	7.7	10 :30 AM	-2.4	10 :23 PM	1.7
	28	4 :30 AM	9.8	5 :50 PM	7.5	11 :17 AM	-1.9	11 :16 PM	2.0
	29	5 :19 AM	8.9	6 :41 PM	7.4	:		12 :04 PM	-1.1
	30	6 :12 AM	8.0	7 :34 PM	7.3	0 :13 AM	2.3	12 :52 PM	-0.3
	31	7 :11 AM	7.1	8 :29 PM	7.2	1 :17 AM	2.5	1 :41 PM	0.4
June	1	8 :18 AM	6.3	9 :23 PM	7.3	2 :28 AM	2.5	2 :33 PM	1.1
	2	9 :34 AM	5.7	10 :15 PM	7.5	3 :43 AM	2.3	3 :27 PM	1.7
	3	10 :50 AM	5.5	11 :02 PM	7.8	4 :52 AM	1.8	4 :21 PM	2.2
	4	11 :56 AM	5.6	11 :45 PM	8.1	5 :49 AM	1.2	5 :13 PM	2.4
	5	:		12 :51 PM	5.8	6 :36 AM	0.5	6 :01 PM	2.5
	6	0 :25 AM	8.4	1 :38 PM	6.1	7 :17 AM	0.0	6 :45 PM	2.5
	7	1 :03 AM	8.7	2 :19 PM	6.3	7 :55 AM	-0.4	7 :26 PM	2.5
	8	1 :39 AM	8.9	2 :57 PM	6.6	8 :31 AM	-0.8	8 :05 PM	2.4
	9	2 :15 AM	9.1	3 :34 PM	6.7	9 :06 AM	-1.1	8 :44 PM	2.4
	10	2 :50 AM	9.1	4 :10 PM	6.9	9 :41 AM	-1.2	9 :22 PM	2.4
	11	3 :26 AM	9.0	4 :46 PM	6.9	10 :15 AM	-1.2	10 :01 PM	2.4
	12	4 :02 AM	8.8	5 :23 PM	7.0	10 :50 AM	-1.1	10 :43 PM	2.4
	13	4 :40 AM	8.5	6 :01 PM	7.1	11 :27 AM	-0.8	11 :30 PM	2.4
	14	5 :23 AM	8.0	6 :43 PM	7.3	:		12 :06 PM	-0.4
	15	6 :14 AM	7.4	7 :28 PM	7.5	0 :24 AM	2.3	12 :48 PM	0.0
	16	7 :15 AM	6.7	8 :19 PM	7.8	1 :27 AM	2.1	1 :35 PM	0.6
	17	8 :30 AM	6.1	9 :14 PM	8.2	2 :38 AM	1.8	2 :29 PM	1.2
	18	9 :56 AM	5.8	10 :12 PM	8.7	3 :54 AM	1.1	3 :30 PM	1.6
	19	11 :18 AM	5.9	11 :10 PM	9.2	5 :05 AM	0.2	4 :35 PM	1.9
	20	:		12 :30 PM	6.2	6 :09 AM	-0.6	5 :40 PM	2.0
	21	0 :06 AM	9.8	1 :30 PM	6.7	7 :05 AM	-1.4	6 :40 PM	2.0
	22	1 :00 AM	10.2	2 :23 PM	7.1	7 :57 AM	-2.1	7 :37 PM	1.8
	23	1 :51 AM	10.4	3 :12 PM	7.5	8 :45 AM	-2.4	8 :29 PM	1.6
	24	2 :41 AM	10.4	3 :58 PM	7.7	9 :30 AM	-2.4	9 :20 PM	1.5
	25	3 :28 AM	10.1	4 :42 PM	7.9	10 :13 AM	-2.2	10 :10 PM	1.5
	26	4 :14 AM	9.5	5 :25 PM	7.9	10 :55 AM	-1.7	11 :00 PM	1.7

-Continued-

Date		---HIGH TIDE--- Time	Feet	---HIGH TIDE--- Time	Feet	---LOW TIDE--- Time	Feet	----LOW TIDE--- Time	Feet
June	27	5 :00 AM	8.8	6 :08 PM	7.8	11 :35 AM	-1.0	11 :51 PM	1.8
	28	5 :47 AM	7.9	6 :51 PM	7.7	:		12 :14 PM	-0.2
	29	6 :37 AM	6.9	7 :36 PM	7.6	0 :45 AM	2.0	12 :54 PM	0.5
	30	7 :34 AM	6.0	8 :23 PM	7.5	1 :45 AM	2.1	1 :35 PM	1.3
July	1	8 :42 AM	5.4	9 :13 PM	7.5	2 :52 AM	2.1	2 :21 PM	2.0
	2	10 :03 AM	5.0	10 :06 PM	7.6	4 :04 AM	1.8	3 :14 PM	2.6
	3	11 :22 AM	5.0	10 :58 PM	7.8	5 :10 AM	1.4	4 :14 PM	2.9
	4	12 :27 PM	5.2	11 :47 PM	8.1	6 :06 AM	0.8	5 :15 PM	3.0
	5	:		1 :18 PM	5.6	6 :53 AM	0.2	6 :10 PM	2.9
	6	0 :33 AM	8.5	2 :00 PM	6.0	7 :33 AM	-0.3	6 :58 PM	2.7
	7	1 :15 AM	8.8	2 :37 PM	6.4	8 :10 AM	-0.7	7 :43 PM	2.5
	8	1 :54 AM	9.1	3 :12 PM	6.8	8 :45 AM	-1.1	8 :25 PM	2.2
	9	2 :32 AM	9.2	3 :46 PM	7.2	9 :19 AM	-1.3	9 :05 PM	2.0
	10	3 :10 AM	9.2	4 :20 PM	7.4	9 :53 AM	-1.4	9 :47 PM	1.8
	11	3 :48 AM	9.1	4 :54 PM	7.7	10 :27 AM	-1.3	10 :30 PM	1.6
	12	4 :29 AM	8.7	5 :30 PM	7.9	11 :01 AM	-1.0	11 :16 PM	1.5
	13	5 :13 AM	8.1	6 :08 PM	8.1	11 :38 AM	-0.5	:	
	14	6 :02 AM	7.4	6 :51 PM	8.3	0 :08 AM	1.3	12 :17 PM	0.1
	15	7 :01 AM	6.6	7 :40 PM	8.4	1 :07 AM	1.2	1 :01 PM	0.8
	16	8 :14 AM	5.8	8 :38 PM	8.5	2 :16 AM	1.1	1 :54 PM	1.5
	17	9 :42 AM	5.4	9 :43 PM	8.7	3 :33 AM	0.7	2 :57 PM	2.1
	18	11 :11 AM	5.5	10 :50 PM	9.0	4 :51 AM	0.1	4 :11 PM	2.5
	19	12 :25 PM	5.9	11 :53 PM	9.4	5 :59 AM	-0.5	5 :25 PM	2.5
	20	:		1 :23 PM	6.5	6 :57 AM	-1.1	6 :31 PM	2.2
	21	0 :51 AM	9.7	2 :12 PM	7.0	7 :47 AM	-1.6	7 :29 PM	1.8
	22	1 :43 AM	9.9	2 :56 PM	7.5	8 :31 AM	-1.9	8 :21 PM	1.5
	23	2 :31 AM	9.9	3 :36 PM	7.9	9 :12 AM	-2.0	9 :09 PM	1.2
	24	3 :16 AM	9.7	4 :14 PM	8.1	9 :50 AM	-1.7	9 :54 PM	1.0
	25	3 :58 AM	9.2	4 :51 PM	8.2	10 :26 AM	-1.2	10 :38 PM	1.1
	26	4 :40 AM	8.5	5 :27 PM	8.2	11 :01 AM	-0.6	11 :22 PM	1.2
	27	5 :21 AM	7.7	6 :03 PM	8.0	11 :34 AM	0.0	:	
	28	6 :04 AM	6.9	6 :40 PM	7.8	0 :07 AM	1.4	12 :07 PM	0.8
	29	6 :52 AM	6.0	7 :21 PM	7.6	0 :58 AM	1.6	12 :42 PM	1.6
	30	7 :51 AM	5.3	8 :09 PM	7.4	1 :56 AM	1.8	1 :22 PM	2.3
	31	9 :10 AM	4.8	9 :07 PM	7.3	3 :06 AM	1.8	2 :12 PM	2.8

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.

	Time		Feet	
Alaska Peninsula:	High	Low	High	Low
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

-Continued-

Appendix C.2. (page 3 of 3)

	Time		Feet	
Alaska Peninsula (Cont.)	High	Low	High	Low
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

APPENDIX D: ALASKA PENINSULA SAC ROE HERRING FORECAST, 1995

This forecast is for North and South 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 harvest only during 1992.

The 1995 North Peninsula forecasted catch is 1,100 tons. The forecast is based on the five year (1990-94) average catch of 1,236.1 tons. The forecast has been reduced by 136.1 tons to account for North Peninsula herring that are probably harvested during the Dutch Harbor food and bait herring fishery. Non-Togiak herring stocks comprise about 22% of the Dutch Harbor herring catch; due to the July 16 opening date of the food and bait fishery, North Peninsula herring stocks should comprise the majority of the non-Togiak herring component. Using a non-Togiak component mid point estimate of 11%, the North Peninsula guideline harvest level should be reduced during the sac roe fishery to insure than North Peninsula herring stocks are not harvested beyond a 20% exploitation rate. Age class data from the 1994 harvest indicates that in 1995 age 8 herring should dominate Port Moller Bay catches, no other adult samples were collected in North Peninsula waters. 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. The harvest of North Peninsula sac roe herring appears to be dependent upon industry moving into the area within 2-4 days after the peak herring biomass is observed in Togiak. During the 1993 and 1994 fisheries, industry moved into North Peninsula waters well after the Togiak biomass peak; this was likely the major cause of the total harvest being well below the forecast.

The 1994 South Peninsula forecasted sac roe catch is 150 tons. The forecast is based on the 1990-94 average sac roe herring catch of 151.0 tons. Age class data from the 1994 harvest indicates that in 1995 age 4 herring should dominate Canoe Bay catches, no other samples were collected in South Peninsula waters.

Confidence in the South Peninsula forecast is only fair.

APPENDIX E: ALEUTIAN ISLANDS "DUTCH HARBOR" FOOD AND BAIT HERRING FORECAST, 1995.

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.

A 1,982 ton quota was allocated for the "Dutch Harbor" food and bait herring fishery for 1995 using the Bering Sea Herring Management Plan allocation formula, as follows, given the maximum 20% exploitation rate of the projected biomass:

1994 Togiak Spawning Biomass	149,093 Tons
@ 20% Maximum Exploitation	
Total Allowable Catch	29,811 Tons
Togiak Spawn on Kelp Allocation	1,500 Tons
Remainder of Allowable Catch	28,311 Tons
Dutch Harbor Allocation	7.0%
Dutch Harbor Quota	1,982 Tons
Togiak District Sac Roe Harvest	26,329 Tons

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