

**Fishery Management Report No. 23-21**

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# **Kodiak Management Area Herring Fisheries Annual Management Report, 2022**

by

**Brad A. Fuerst**

December 2023

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Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



## Symbols and Abbreviations

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| Weights and measures (metric)           |                    | General  |                               | Mathematics, statistics                                    |                         |
|---|--------------------|--|-------------------------------|--|-------------------------|
| centimeter                              | cm                 | Alaska Administrative Code                       |                               | all standard mathematical signs, symbols and abbreviations |                         |
| deciliter                               | dL                 |  | AAC                           |  |                         |
| gram                                    | g                  | all commonly accepted abbreviations              | e.g., Mr., Mrs., AM, PM, etc. | alternate hypothesis                                       | H <sub>A</sub>          |
| hectare                                 | ha                 |  |                               | base of natural logarithm                                  | e                       |
| kilogram                                | kg                 |  |                               | catch per unit effort                                      | CPUE                    |
| kilometer                               | km                 | all commonly accepted professional titles        | e.g., Dr., Ph.D., R.N., etc.  | coefficient of variation                                   | CV                      |
| liter                                   | L                  |  |                               | common test statistics                                     | (F, t, $\chi^2$ , etc.) |
| meter                                   | m                  | at   | @                             | confidence interval  | CI                      |
| milliliter                              | mL                 | compass directions:                              |                               | correlation coefficient (multiple)                         | R                       |
| millimeter                              | mm                 | east   | E                             | correlation coefficient (simple)                           | r                       |
| <b>Weights and measures (English)</b>   |                    | north  | N                             | covariance   | cov                     |
| cubic feet per second                   | ft <sup>3</sup> /s | south  | S                             | degree (angular)   | °                       |
| foot                                    | ft                 | west   | W                             | degrees of freedom   | df                      |
| gallon                                  | gal                | copyright  | ©                             | expected value   | E                       |
| inch                                    | in                 | corporate suffixes:                              |                               | greater than   | >                       |
| mile                                    | mi                 | Company  | Co.                           | greater than or equal to                                   | ≥                       |
| nautical mile                           | nmi                | Corporation                                      | Corp.                         | harvest per unit effort                                    | HPUE                    |
| ounce                                   | oz                 | Incorporated                                     | Inc.                          | less than  | <                       |
| pound                                   | lb                 | Limited  | Ltd.                          | less than or equal to                                      | ≤                       |
| quart                                   | qt                 | District of Columbia                             | D.C.                          | logarithm (natural)  | ln                      |
| yard                                    | yd                 | et alii (and others)                             | et al.                        | logarithm (base 10)  | log                     |
| <b>Time and temperature</b>             |                    | et cetera (and so forth)                         | etc.                          | logarithm (specify base)                                   | log <sub>2</sub> , etc. |
| day                                     | d                  | exempli gratia                                   |                               | minute (angular)   | '                       |
| degrees Celsius                         | °C                 | (for example)                                    | e.g.                          | not significant  | NS                      |
| degrees Fahrenheit                      | °F                 | Federal Information Code                         | FIC                           | null hypothesis  | H <sub>0</sub>          |
| degrees kelvin                          | K                  | id est (that is)                                 | i.e.                          | percent  | %                       |
| hour                                    | h                  | latitude or longitude                            | lat or long                   | probability  | P                       |
| minute                                  | min                | monetary symbols                                 |                               | probability of a type I error                              |                         |
| second                                  | s                  | (U.S.)   | \$, ¢                         | (rejection of the null hypothesis when true)               | α                       |
| <b>Physics and chemistry</b>            |                    | months (tables and figures): first three letters | Jan,...,Dec                   | probability of a type II error                             |                         |
| all atomic symbols                      |                    | registered trademark                             | ®                             | (acceptance of the null hypothesis when false)             | β                       |
| alternating current                     | AC                 | trademark  | ™                             | second (angular)   | "                       |
| ampere                                  | A                  | United States                                    |                               | standard deviation   | SD                      |
| calorie                                 | cal                | (adjective)                                      | U.S.                          | standard error   | SE                      |
| direct current                          | DC                 | United States of America (noun)                  | USA                           | variance   |                         |
| hertz                                   | Hz                 | U.S.C.   | United States Code            | population sample  | Var var                 |
| horsepower                              | hp                 |  |                               |  |                         |
| hydrogen ion activity (negative log of) | pH                 |  |                               |  |                         |
| parts per million                       | ppm                | U.S. state                                       | use two-letter abbreviations  |  |                         |
| parts per thousand                      | ppt, ‰             |  | (e.g., AK, WA)                |  |                         |
| volts                                   | V                  |  |                               |  |                         |
| watts                                   | W                  |  |                               |  |                         |

***FISHERY MANAGEMENT REPORT NO. 23-21***

**KODIAK MANAGEMENT AREA HERRING FISHERIES  
ANNUAL MANAGEMENT REPORT, 2022**

by

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# ABSTRACT

This report presents information concerning the commercial Pacific herring *Clupea pallasii* sac roe, food and bait, and subsistence fisheries in the Kodiak Management Area (KMA) in 2022.

Several significant regulation changes to the sac roe fishery occurred at the January 2020 Board of Fisheries meeting in Kodiak. The season start date was changed from April 15 to April 1. The allocative management plan that assigned GHLS and sections by gear type was removed, and both gear types can now fish the same sections. Fishing periods were changed so that purse seine permit holders and gillnet permit holders fish on alternating days. Purse seine fishing periods remained the same, but gillnet fishing periods were changed from 12:00 noon on even-numbered days to 12:00 noon on odd-numbered days.

The 2022 preseason GHL was established at 8,075 tons. There was no effort by gillnetters, and 11 purse seine permit holders participated in the fishery harvesting 8,913 tons.

A combine fishery was conducted for the 2022–2023 food and bait fishery due to small GHLS and overharvest concerns. The total GHL was 760 tons, and 912 tons were harvested during the food and bait fishery.

Subsistence herring harvests were reported from 15 subsistence permits. The total KMA subsistence harvest for 2022 was 3,266 pounds.

Keywords: Kodiak, herring, *Clupea pallasii*, sac roe commercial fishery, food and bait commercial fishery, subsistence fishery, stock status, GHL, KMA, AMR

# INTRODUCTION

This report presents information on the commercial Pacific herring *Clupea pallasii* sac roe, food and bait, and subsistence fisheries in the Kodiak Management Area (KMA) in 2022. This includes harvest data by fishery, age and weight data collected from the commercial harvest, stock status, and a summary of fishery management activity.

The KMA consists of the waters of the Kodiak Archipelago and that portion of the Alaska Peninsula extending from Cape Douglas southwest to Kilokak Rocks (Figure 1). The archipelago is approximately 250 kilometers (150 miles) long, extending from Shuyak Island in the north, to the Trinity Islands in the south. The Alaska Peninsula portion of the KMA is about 267 kilometers (160 miles) long and is separated from the archipelago by Shelikof Strait (Figure 1).

The KMA is divided into 13 districts that define geographical areas used to manage both the herring sac roe and the food and bait fisheries (Figures 2–10). For the sac roe fishery, each district is divided into sections that define the spawning area used by specific herring stocks or a geographical area.

# HERRING SAC ROE FISHERY

## FISHERY CHARACTERISTICS

The KMA herring sac roe fishery began in 1964 (Table 1; Figure 11) and occurs in approximately 30 bays and coastal locations. Since 1964, harvests have averaged 2,229 tons (Table 1). Prior to 1974 the fishery was unregulated regarding guideline harvest levels (GHLs), gear types, seasons, and fishing periods (Gretsch 2001). Between 1974 to 1978 season dates were from March 1 through June 30 with an areawide quota of 3,400 tons. Legal gear included purse seine, beach seine, gillnet, and trawl. In 1979 the season length was shortened to May 1 through June 30 and the areawide quota was reduced to 2,400 tons. Trawl and beach seine were eliminated as legal gear types during the 1981 season. In 1982 the starting date for the season was changed to April 15 and GHLs were set annually on a stock-by-stock basis (Gretsch 2001). The April 15 opening, prior to

any major buildup of herring, was intended to distribute effort and harvest; however, in recent years, purse seiners have concentrated in areas known to have early-spawning herring and the largest GHLS. The fishery ends on June 30 (5 AAC 27.510(a)). In 2020 the season start date was moved to April 1 to accommodate early spawn timing observed in recent seasons.

The harvest strategy was allocative from 2000 to 2019 and required that 20% to 30% of the GHL be assigned to gillnet permit holders and 70% to 80% of the GHL be assigned to purse seine permit holders for each district with more than one section open to fishing (5 AAC 27.535(e)(2)(D)). This was accomplished by designating one gear type for each section with a GHL. In districts where assigning one gear type for each section would not achieve the required allocation, the department established GHLS for both gear types within a section, and fishing is separated by time or area. From May 1 through June 30, the department could open any area with a remaining GHL to any gear group if the fishery was not likely to result in overharvest (5 AAC 27.535(e)(1)(C)). In 2020, the allocation was eliminated and both gear types were allowed to fish the same sections on alternating days.

## **Gear**

Purse seines and gillnets are the only gear types allowed in the commercial sac roe fishery. Purse seines may not exceed 18 fathoms stretch measure in depth or 100 fathoms in length (5 AAC 27.525(a)). Gillnets may not exceed an aggregate length of 150 fathoms (5 AAC 27.520(a)).

## **Harvest Strategy**

The herring sac roe fishery harvest strategy requires the Alaska Department of Fish and Game (ADF&G) to establish GHLS by section based on historical harvest data, current and past fishery performance, age composition of commercial catch samples, aerial surveys, and hydroacoustic biomass assessments.

Adjacent sections may be combined and managed as a single section if the same stock is present or moves between sections (5 AAC 27.535(e)(1)(A)). ADF&G may also use emergency order (EO) authority to restrict fishing time in any section if overharvest concerns exist or to open additional areas during the season.

After April 30, permit holders must be registered with ADF&G before participating in the fishery (5 AAC 27.510(a)(4)). To better keep track of active participants, the department has required by EO that sac roe fishers register with the Kodiak office since 2016.

## **Fishing Periods**

From April 1 through May 7, fishing periods for purse seiners are from 12:00 noon until 9:00 p.m. on odd-numbered days and from 9:00 a.m. to 12:00 noon on even-numbered days. From May 8 through June 30, fishing periods for purse seiners are from 12:00 noon until 10:00 p.m. on odd-numbered days and from 9:00 a.m. to 12:00 noon on even-numbered days (5 AAC 27.510(a)(1)). Gillnet fishing periods are from 12:00 noon on even-numbered days until 12:00 noon on odd-numbered days (5 AAC 27.510(a)(2)).

### ***2020 Regulation Changes***

During the January 2020 Board of Fisheries (BOF) meeting in Kodiak, there were major changes to the management plan of the Kodiak herring sac roe fishery; they included the following items:



- The season start date was changed to April 1.
- The allocative management plan that provides opportunities for gillnet permit holders to harvest approximately 25% and purse seine permit holders to harvest approximately 75% of the GHL was removed.
- Both gear types will be allowed to fish the same sections on alternating days. Purse seine fishing periods will remain 12:00 noon to 9:00 p.m. on odd-numbered days and 9:00 a.m. to 12:00 noon on even-numbered days. Gillnet fishing periods are from 12:00 noon on even-numbered days to 12:00 noon on odd-numbered days.

## **FISHERY MANAGEMENT**

### **Establishing GHLs**

Preseason GHLs are established for all sections that have produced consistent herring harvests in previous seasons. These GHLs reflect the status of a particular herring stock by section but are conservative in nature due to the uncertainty in assessing biomass in the KMA. In 2022, section GHLs ranged from 10 to 1,200 tons (short; Table 2). Establishing the 2022 GHLs involved evaluation of a variety of information to determine stock status trends and conservative adjustment of GHLs, including the following:

1. fishery performance during preceding season or seasons (i.e., harvest timing, harvest duration, average school size);
2. trends in age composition (i.e., level of recruitment of age-3 herring, the proportion of age-5 and younger herring, and the proportion of age-2 herring as an indicator of future recruit strength);
3. observations of spawn and juvenile herring;
4. ADF&G and industry aerial surveys;
5. hydroacoustic surveys; and
6. test fishery data including age composition and biomass estimates.

Preseason GHLs have generally reflected the actual harvests and have aided fishers and processors in planning prior to the start of each season (Figure 12).

### **Inseason Fishery Management**

Inseason, processors and independent tender operators are required to provide daily tallies of herring tonnage and deliveries by section, as well as accurate estimates of herring tonnage onboard tenders that have not yet delivered to the processor. Reports from field personnel, processors, permit holders, spotter pilots, and tenders are tallied by ADF&G to assess herring harvests. Generally, once the harvest estimate draws near, meets, or exceeds the GHL, a section is closed for the season by EO. Due to the rapid pace at which some harvests occur, inperiod closures are frequent. In sections that have field personnel present on the grounds, inperiod closures may occur with only a few minutes of advance notice. Industry cooperation has greatly aided managers.

ADF&G has historically relied on the fishing industry to establish roe recovery and minimum size standards. The quality of Kodiak herring has generally been high and met industry standards due to selective harvest of mature herring by fishers and the inseason processing of relatively small amounts of herring over long time periods by local processors (Figure 13). In the 1990s, competition in the purse seine fishery intensified, and fishers were less selective in harvesting

high-quality herring. In 2003 and 2004, ADF&G took a more active role in some sections to manage for roe quality, which resulted in delayed openings of sections and an increase in roe quality. During the 2005 BOF meeting, the harvest strategy was changed to direct ADF&G to strive for the highest-quality product (5 AAC 27.535(e)(6)).

## **2022 SEASON SUMMARY**

The 2022 sac roe season opened at 12:00 noon April 1. The last harvest occurred on April 24, and 19 EOs were issued during the season (Appendix A1). The total 2022 KMA GHF was established at 8,075 tons, and 8,912 tons were harvested (Table 3; Figures 11 and 12).

In 2022, 11 purse seine permit holders made 133 landings and harvested all 8,075 tons. No gillnet permit holders participated (Table 3; Figure 14).

The new earlier opening date caused fishers to target herring in areas of the Eastside District where the first herring are known to appear and spawn. Harvests occurred early in the season, with Shearwater Bay closing on April 1 (Appendix A1). Fishers continued to concentrate effort in the southern portion of the Eastside District, closing many areas on April 4 (Appendix A1). These early harvests totaled 883 tons in Barling Bay, Southwest Sitkalidak, West Sitkalidak, Geese-Twoheaded, and Outer Kiliuda Bay Sections.

Fishers turned their attention to open sections on the northern end of the Eastside District and Northeast District, closing the Kalsin Bay Section on April 6 and the Inner and Outer Kiliuda Sections and the East Sitkalidak and Tanganak Anchorage Sections on April 8 (Appendix A1). Harvest in these areas totaled 574 tons.

Tonki Bay of the North Afognak District closed on April 10 with a harvest of 72 tons (Table 1; Appendix A1).

Harvests in the Uganik District began on April 10, with 1,108 tons taken by April 12. Open sections closed in rapid succession, with the combined Village Islands and Uganik Bay Sections closing on April 12 (Appendix A1).

The combined areas of Delphin Bay and Perenosa Bay of the North Afognak District closed on April 13 with a harvest of 71 tons (Appendix A1).

Fishers then began to target Uyak Bay District herring, and closures occurred of the combined sections of the Zachar Bay and Spiridon Bay Sections on April 16 with a harvest of 749 tons (Appendix A1). Closure of the combined Inner Uyak and Browns Lagoon Sections occurred the next day with a harvest of 97 tons (Appendix A1). The Kizhuyak Bay Section of the Inner Marmot District also closed on April 17 with a harvest of 201 tons (Appendix A1).

The Danger Bay Section of the South Afognak District closed on April 18 with a harvest of 395 tons (Appendix A1). The West Afognak District areas closed on April 19 with harvests in the combined Paramanof Bay and Foul Bay Sections as well as the Malina Bay Section totaling 885 tons (Appendix A1). The South Afognak District areas of Izhut Bay, Kitoi Bay, and MacDonalds Lagoon Sections closed April 20 with a harvest of 52 tons (Appendix A1).

The combined areas of Inner Ugak Bay and Outer Ugak Bay Sections closed on April 22 with a harvest of 459 tons (Appendix A1). The season wrapped up with the closure of combined Inner Alitak, Inner Deadman Bay, Outer Deadman Bay, and Sulua Bay Sections on April 24 with a harvest of 144 tons (Appendix A1).

The fishery was monitored by 2 ADF&G vessels that traveled to anticipated herring harvest locations. Vessels monitored the fishery to gather effort and harvest data used to manage the fishery and collected commercial catch samples to obtain age, weight, and length (AWL) data. A field crew was also stationed in the Outer Ugak Bay Section to monitor the fishery there, as well as collect AWL data.

There were a total of 48 sections open to fishing; however, 6 sections were exploratory and had little or no historic harvests. Harvest occurred within 41 sections. There were 19 EOs issued concerning the fishery (Appendix A1).

### **Exvessel Value of the Fishery**

In 2022 the exvessel price paid for 10% roe recovery herring was approximately \$158 per ton at the dock, which was similar to recent seasons (Table 3). The estimated average exvessel earnings per purse seine permit holder was \$128,009 (Figure 16). The total exvessel value of the 2022 fishery was worth an estimated \$1,408,096 (Table 3; Figure 17), which does not include any adjustments in value for roe recovery above or below 10% recovery, herring that are sold as bait, or herring that were discarded. Roe recovery averaged 10.4% (Figure 13). As is usually the case, seine gear accounted for the majority of the harvest (Figure 15).

### **STOCK ASSESSMENT**

ADF&G evaluates fishery performance and survey information to assess trends in stock status. Hydroacoustic and aerial surveys are conducted by ADF&G to assess herring abundance prior to, during, and after the commercial fishery and to survey closed sections. Herring samples come from commercial harvests and from research vessels (using a midwater trawl). Age composition information from these samples provides insight into recruitment and aids managers in making GHL adjustments. For example, areas with strong percentages of age-4 and younger herring (recruitment) will not be aggressively fished and will have conservative GHLs established, whereas areas with older age classes (9 or more years old) will be more aggressively fished with higher GHLs.

Industry aerial observers and permit holders have aided managers by providing biomass estimates, spawn observations, fleet movements, and harvest estimates. Although aerial and hydroacoustic assessments provide an evaluation of the biomass, there are problems associated with herring assessment in the KMA. These problems include the following:

1. Herring tend to be deeper in the water column during the day and rise toward the surface in the evening and early morning hours, limiting the time fish are observable from the air.
2. Most fishing sections have several distinct aggregations of herring that spawn from April through June, making complete biomass estimates difficult.
3. Herring may stay within an area for the duration of the sac roe season or may move to another district, which may lead to duplicated or incomplete biomass estimates, or incorrect assignment to a spawning stock location.
4. The KMA encompasses a large geographical area.
5. Adverse weather conditions limit the extent of surveys.
6. Hydroacoustic surveys are limited to shallower waters, and vessel avoidance by herring is known to occur (Hjellvik et al. 2008).

7. A substantial amount of subtidal spawning may occur in water 10 to 20 fathoms in depth, which is not detectable from aerial surveys.

## **Catch Sampling**

A total of 5,750 herring were collected and analyzed for AWL data from harvests and ADF&G trawl samples during the 2022 sac roe season. Samples were taken from 21 sections, all of which had commercial harvests. Age-6 herring were the dominant age class, representing approximately 73% of the sampled herring (Table 4). The samples consisted of 73% age-6, 21% age-3, 3% age-4, 1% age-5, 1% age-7, and 1% age-8 herring (Table 4). Herring sizes from the Eastside were generally larger at age than samples taken throughout the rest of the KMA (Table 5).

## **Stock Status by District**

Herring can generally be found seasonally in all bays of the KMA (Figure 2). ADF&G monitors approximately 70 sections that are known to have spawning populations of herring, with the majority of effort spent on larger herring stocks. Generally, there is less information available for the smaller stocks of herring, so the evaluation of these stocks is more tenuous. In some areas, such as in the Mainland Districts, several years may elapse before new information becomes available. ADF&G also considers information provided by commercial herring fishers, spotter pilots, air taxi operators, and remote area residents concerning herring distribution, biomass estimates, and spawn sightings.

### ***North Afognak District***

Five sections compose the North Afognak District. Spawning stocks of herring occur in all 5 sections, although these stocks tend to be small (Figure 3). The Tonki Bay Section had a GHL of 75 tons and the combined Delphin and Perenos Bay Sections had a 50-ton GHL. On April 15, 72 tons were harvested from the Tonki Bay Section and 71 tons in Delphin/Perenos Sections (Table 2). The harvest was composed of 93% age-6 herring for Tonki Bay and 91% age-6 for Delphin/Perenos Sections (Table 4).

### ***West Afognak District***

The West Afognak District has 6 sections, 5 of which are known to have spawning stocks of herring (Figure 3). These stocks have been at low levels since 2005 but have improved in recent years. The combined Paramanof/Foul Bay Sections had a GHL of 500 tons. The Malina Bay Section and the Raspberry Strait Section each had a GHL of 250 tons. Harvest from the Malina Bay Section was 138 tons, and 825 tons were harvested from the combined Paramanof/Foul Bay. There was no harvest from Raspberry Strait (Table 2). Harvest from both areas were composed of 72% age-6 and 20% age-3 herring (Table 4).

### ***South Afognak District***

The South Afognak District contains six sections, and the Danger Bay Section currently has the largest stock of herring in this district (Figure 3). A 400-ton GHL was established (Table 2). Approximately 3,000 tons were observed during hydroacoustic surveys, and 395 tons were harvested (Table 2). Samples collected were composed of 81% age-6, 11% age-3, and 3% age-4 (Table 4).

The MacDonalds Lagoon, Kitoi Bay, and Izhut Bay Sections were combined and managed as one unit with a 100-ton GHL; approximately 52 tons were harvested (Table 2).

### ***Uganik District***

The Uganik District consists of 9 sections on the northwest side of Kodiak Island (Figure 4). Recently this district had the largest harvests in the KMA. The 2022 GHL for the combined Village Islands/Uganik Bay Sections was set at 1,000 tons. Purse seine permit holders harvested 1,107 tons (Table 2). Samples from the fishery were composed of 86% age-6 and 13% age-3 herring (Table 4).

The Viekoda Bay, Terror Bay, and West Uganik Passage Sections were combined and managed as one area with a GHL of 1,200 tons. Hydroacoustic and aerial surveys estimated approximately 12,000 tons of herring in these areas. Purse seine permit holders harvested 1,335 tons (Table 2). Samples from the harvest were composed of 51% age-6, 43% age-3, and 5% age-4 herring (Table 4).

### ***Uyak District***

The Uyak District is made of 7 sections located on the west side of Kodiak Island (Figure 5). Through the 1980s, the Uyak District was the largest herring-producing district in the KMA. In the early 1990s, these stocks began declining and were at low levels for several years. In 2002, aerial surveys indicated that these stocks were improving, and by 2004, several sections were reopened for the first time since 1994.

The combined Inner Uyak Bay and Brown's Lagoon Sections were opened with a 400-ton GHL, and 486 tons were harvested (Table 2). The harvest was composed of 72% age-6, 21% age-3, and 5% age-4 herring. Approximately 5,300 tons were observed during aerial surveys.

The combined Zachar Bay and Spiridon Bay Sections had a 400-ton GHL. Purse seiners harvested approximately 749 tons, and the harvest was made up of 83% age-6, 11% age-3, and 4% age-4 herring (Tables 2 and 4).

### ***Alitak District***

All sections in the Alitak District, except the Outer Alitak Section, are known to have herring stocks (Figure 6). These stocks began to decline in the early 1990s, and by 1998, most sections were closed. In 2002, aerial survey reports indicated an increase in herring abundance. In 2003 and 2004, some sections were opened to gillnet gear to act as test fisheries. By 2005, several sections that had been closed were reopened.

The Inner Alitak, Inner Deadman Bay, Outer Deadman Bay, and Sulua Bay Sections currently have the largest biomass and were combined and managed as one section in 2022. These combined sections had a GHL of 150 tons (Table 2). The harvest of 144 tons was made up of 94% age-6 herring (Table 4).

The East Upper Olga Bay and West Upper Olga Bay Sections were combined with the Lower Olga-Moser Section and managed as one area with a GHL of 100 tons, although no harvest occurred.

The Geese-Twoheaded Section was open in 2022 with a GHL of 150 tons (Table 2). Purse seiners observed a large biomass and harvested 253 tons from this section (Table 2).

### ***Eastside District***

The Eastside District is composed of 4 bay complexes: Ugak Bay, Kiliuda Bay, East Sitkalidak Strait, and West Sitkalidak Strait (Figure 7). Sixteen sections have been established, and only one,

the Outer Sitkalidak Section, has no history of herring sac roe harvests. Hydroacoustic surveys in this district are conducted less frequently than other portions of the KMA.

Generally, the East and West Sitkalidak Sections have the earliest spawning herring in the KMA, with initial spawns sometimes occurring in March. In 2022, the East Sitkalidak and Tanginak Anchorage Sections were combined with a 1,000-ton GHL. Fishers harvested 1,022 tons with the harvest composed of 71% age-6, 24% age-3, 2% age-8, and 1% age-5 herring (Tables 2 and 4). Hydroacoustic surveys estimated nearly 12,000 tons in these sections.

The West Sitkalidak, Three Saints Bay, Barling Bay, and Newman Bay Sections were combined and managed as one area with a GHL of 400 tons. The harvest of 271 tons was composed of 88% age-6, 7% age-3, and 3% age-8 herring (Table 4). Surveys estimated approximately 1,000 tons in the West Sitkalidak Section.

The Inner Kiliuda Bay and Outer Kiliuda Bay Sections also have some of the earliest spawning herring in the KMA. These sections were combined and managed as a single section with a 600-ton GHL (Table 2). Aerial and hydroacoustic surveys indicated a substantial biomass of around 12,000 tons. Purse seiners harvested 517 tons here, composed of 80% age-6, 17% age-3, and 2% age-8 herring (Table 4).

The Shearwater Bay Section was opened with a 200-ton GHL, and 506 tons were harvested by purse seine gear (Table 2). The harvest was composed of 90% age-6; 5% age-3; 2% age-7; and 1% each of age-7, age-9, and age-10 herring (Table 4). Aerial and hydroacoustic surveys documented approximately 8,200 tons of herring.

The Inner Ugak Bay and Outer Ugak Bay Sections have recently been strong herring producers. The Inner Ugak Bay and Outer Ugak Bay Sections were combined and managed as one area with a 500-ton GHL (Table 2). The harvest of 459 tons was composed of 72% age-6, 23% age-3, 2% age-8, and 1% age-4 herring (Table 4).

### ***Northeast District***

The Northeast District is composed of 5 sections, 4 of which have known spawning stocks of herring (Figure 8). The Womens Bay and Kalsin Bay Sections currently have the largest stocks of herring in this district. The Kalsin Bay Section opened with a 100-ton GHL, and 104 tons were harvested (Table 2). The harvest was composed of 93% age-6 and 4% age-3 herring (Table 4).

### ***Inner Marmot District***

There are 5 sections within the Inner Marmot District. All have known spawning stocks of herring, although most stocks are small (Figure 9). The Kizhuyak Bay Section has the largest stock of herring in the district. This section was opened with a 250-ton GHL, and 202 tons were harvested (Table 2). The harvest was composed of 60% age-6, 30% age-3, 8% age-4, and 1% each of age-5 and age-8 herring (Table 4).

### ***Mainland District***

There are 3 Mainland Districts containing 12 sections (Figure 10). The last commercial herring harvest from the Mainland Districts occurred in 1997. In 2022, 6 sections were open as exploratory; however, no effort occurred. The Inner Kukak Bay Section has the largest known biomass in the Mainland Districts, and between 20,000 and 30,000 tons have recently been estimated based on hydroacoustic surveys.

# **HERRING FOOD AND BAIT FISHERY**

## **FISHERY CHARACTERISTICS**

### **Harvest Strategy**

The herring food and bait season currently opens September 1 and lasts until February 28 (5 AAC 27.510(b)). GHLS for the fishery are established by district and are based upon 10% of the GHLS established for the preceding sac roe fishery by section (5 AAC 27.535(b)).

### **Combine Fisheries**

The KMA herring food and bait fishery was closed for the 1999 and 2000 seasons because of low potential GHLS and ADF&G's concern for manageability of a competitive fishery on a highly aggregated stock. In 2001, the Commercial Fisheries Entry Commission (CFEC) designated the KMA herring food and bait fishery a limited entry fishery and issued 13 interim use permits to those fishers who made landings between 1994 and 1998 (Gretsch 2001). Because of the relatively low GHLS available (60 tons in the Uganik District and 47 tons in the Eastside District), ADF&G did not allow a competitive fishery in 2001. As an alternative, the interim permit holders formed a combine, and ADF&G and CFEC agreed to allow a combine fishery to occur. The 13 interim permit holders determined which vessel would conduct the harvest, all marketing aspects, and all costs associated with harvesting and tendering the herring. In July 2002, the CFEC made a final determination on these limited entry permits. Nine permanent limited entry permits were issued consisting of 5 purse seine/gillnet permits and 4 trawl permits.

Combine fisheries have been conducted under similar conditions each season since 2002. Generally, 1 purse seine vessel is used to harvest herring that are then loaded onto a tender for transport. Fishing efforts have been focused mainly in the Uganik, West Afognak, and South Afognak Districts in recent years. Only purse seine vessels have been used to harvest herring for the combine.

### **Kamishak Stock**

During the fall and winter months of the early 1980s, large concentrations of herring were observed in eastern Shelikof Strait and adjacent bays along the west side of the Kodiak Archipelago. The biomass exceeded that of known KMA spawning stocks. Herring food and bait fishers targeted these herring, but the stock composition was unknown. In 1986 a stock identification study, based on scale pattern analysis, was conducted on herring harvested from a large biomass located in the northeastern part of the Shelikof Strait (unpublished ADF&G report by B. A. Johnson, C. Burkey, and D. Gaudet, 1988, Kodiak, Alaska). Results of the study indicated that at least 80% of the Shelikof herring catch sampled were Kamishak Bay stocks, which spawn within the Lower Cook Inlet (LCI) Management Area. Ten percent of the allowable harvest of Kamishak Bay herring were allocated to the Shelikof food and bait fishery. To alleviate the problem of identifying the spawning stock of a harvest in areas where intermixing may occur, the harvest strategy combined the Kamishak stock GHL with the Kodiak stock GHL for food and bait management units along the Shelikof Strait. When this combined GHL was achieved the Shelikof Strait food and bait management units were closed collectively (5 AAC 27.535(a)). The harvest strategy also closed the food and bait fishery north of the latitude of Miners Point (Uganik Bay) when the Kamishak spawning biomass fell below 6,000 tons (5 AAC 27.535(d)). Surveys of Kamishak Bay were suspended in 2016 and the current spawning biomass is unknown.

During the January 2020 BOF meeting in Kodiak, the Kamishak allocation was removed from the management plan. Food and bait GHs are now based solely on Kodiak stocks and cannot exceed 10% of the GH during the previous sac roe season. To ease concerns over Kamishak herring being harvested, the offshore sections along the Shelikof Strait may not open during the food and bait fishery (5 AAC 27.535 (b)).

## **2022/2023 SEASON**

The biggest obstacle to manage a competitive fishery is how to determine an equitable fishing period for the 2 gear types. For the 2022/2023 season, permit holders again requested a combine fishery. ADF&G accommodated the permit holders' request, and the West Afognak District (100-ton GH), the Eastside District (280-ton GH), the South Afognak District (40-ton GH), the Uganik District (220-ton GH), the Uyak District (80-ton GH), and the Alitak District (40-ton GH) opened on October 1, 2022 (Table 6). The Uganik and Uyak Districts closed on November 10 with a harvest of 375 tons. The West Afognak District closed on November 11 with a harvest of 186 tons. The South Afognak District closed on November 12 with no harvest. The Eastside District closed on November 17 with a harvest of 351 tons. The overall food and bait herring harvest for the season was 912 tons (Table 7).

## **HERRING SUBSISTENCE FISHERY**

### **FISHERY CHARACTERISTICS**

Prior to 1999, the herring subsistence fishery was referred to as a Personal Use/Subsistence Fishery and had occurred for at least 20 years. The majority of the harvest occurred near the Port of Kodiak in Womens Bay and was caught by gillnets. The herring were used primarily for bait in commercial longline and pot fisheries. Also prior to 1999, this fishery was only regulated during the herring sac roe season, from April 15 to June 30, under the conditions of the subsistence permit issued in Kodiak. Gear was limited to a 25-fathom gillnet, but there was no harvest limit. The remainder of the year, there were no permit requirements, gear restrictions, or harvest limits.

In 1999, more restrictive regulations were approved by the BOF. These regulations allowed for a harvest of up to 500 pounds of herring with no permit requirements except during the sac roe fishing season (April 15 to June 30; Gretsche 2001). A subsistence permit was required for those individuals that wished to fish during the sac roe season or intended to harvest more than 500 pounds of herring annually. The maximum annual harvest was limited to 2,000 pounds per permit.

In 2000, herring subsistence harvests increased due to bait needs created with the reopening of the commercial Tanner crab fishery in the KMA. ADF&G was concerned about the increased herring subsistence harvest and the appropriateness of taking subsistence herring for use as bait in a commercial fishery. ADF&G proposed regulation changes to the BOF in 2001, which were approved to allow for both types of historic harvests. The current subsistence regulation allows for the harvest of up to a total of 500 pounds of herring annually and requires that fishers obtain a permit prior to fishing (5 AAC 01.530 (d)). Herring were included on the existing KMA salmon and crab subsistence permit. A permit that allows for the harvest of up to 1,000 pounds of herring to be used bait by commercial permit holders in commercial fisheries was also created (5 AAC 27.545).



## **2022 SEASON SUMMARY**

In 2022, a total of 15 KMA subsistence permits were returned to ADF&G with herring subsistence harvest data, as required for reporting purposes. The reported subsistence herring harvests totaled 3,266 pounds (Table 8). The majority of the harvest was from the Eastside District with smaller harvests occurring throughout the KMA.

## **REFERENCES CITED**

- Gretsch, D. 2001. Kodiak management area annual herring management report, 1999. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K01-28.
- Hjellvik, V., N. O. Handegard, and E. Ona. 2008. Correcting for vessel avoidance in acoustic-abundance estimates for herring. ICES Journal of Marine Science 65(6):1036-1045.



## **TABLES AND FIGURES**

Table 1.—Annual harvests by weight and percent in the KMA commercial herring sac roe and food and bait fisheries, from 1964 through 2022.

| Year | Sac roe<br>harvest<br>(tons) | Food/bait<br>harvest<br>(tons) | Total herring<br>harvest<br>(tons) | Sac roe<br>% of total<br>harvest | Food/bait<br>% of total<br>harvest |
|------|------------------------------|--------------------------------|------------------------------------|----------------------------------|------------------------------------|
| 1964 | 568                          | 310                            | 878                                | 65%                              | 35%                                |
| 1965 | 657                          | 35                             | 692                                | 95%                              | 5%                                 |
| 1966 | 2,769                        | 198                            | 2,967                              | 93%                              | 7%                                 |
| 1967 | 1,662                        | 300                            | 1,962                              | 85%                              | 15%                                |
| 1968 | 2,001                        | 15                             | 2,016                              | 99%                              | 1%                                 |
| 1969 | 1,130                        | 11                             | 1,141                              | 99%                              | 1%                                 |
| 1970 | 342                          | 8                              | 350                                | 98%                              | 2%                                 |
| 1971 | 284                          | 44                             | 328                                | 87%                              | 13%                                |
| 1972 | 215                          | 50                             | 265                                | 81%                              | 19%                                |
| 1973 | 831                          | 178                            | 1,009                              | 82%                              | 18%                                |
| 1974 | 868                          | 40                             | 908                                | 96%                              | 4%                                 |
| 1975 | 8                            | 5                              | 13                                 | 62%                              | 38%                                |
| 1976 | 5                            | 0                              | 5                                  | 100%                             | 0%                                 |
| 1977 | 338                          | 0                              | 338                                | 100%                             | 0%                                 |
| 1978 | 904                          | 399                            | 1,303                              | 69%                              | 31%                                |
| 1979 | 1,735                        | 125                            | 1,860                              | 93%                              | 7%                                 |
| 1980 | 2,383                        | 381                            | 2,764                              | 86%                              | 14%                                |
| 1981 | 2,065                        | 18                             | 2,083                              | 99%                              | 1%                                 |
| 1982 | 1,771                        | 326                            | 2,097                              | 84%                              | 16%                                |
| 1983 | 2,318                        | 33                             | 2,351                              | 99%                              | 1%                                 |
| 1984 | 2,163                        | 123                            | 2,286                              | 95%                              | 5%                                 |
| 1985 | 1,968                        | 102                            | 2,070                              | 95%                              | 5%                                 |
| 1986 | 1,558                        | 213                            | 1,771                              | 88%                              | 12%                                |
| 1987 | 2,146                        | 217                            | 2,363                              | 91%                              | 9%                                 |
| 1988 | 2,171                        | 340                            | 2,511                              | 86%                              | 14%                                |
| 1989 | 2,249                        | 345                            | 2,594                              | 87%                              | 13%                                |
| 1990 | 2,347                        | 313                            | 2,660                              | 88%                              | 12%                                |
| 1991 | 2,432                        | 215                            | 2,647                              | 92%                              | 8%                                 |
| 1992 | 4,283                        | 312                            | 4,595                              | 93%                              | 7%                                 |
| 1993 | 4,929                        | 837                            | 5,766                              | 85%                              | 15%                                |
| 1994 | 5,893                        | 677                            | 6,570                              | 90%                              | 10%                                |
| 1995 | 4,604                        | 507                            | 5,111                              | 90%                              | 10%                                |
| 1996 | 3,386                        | 651                            | 4,037                              | 84%                              | 16%                                |
| 1997 | 3,235                        | 756                            | 3,991                              | 81%                              | 19%                                |
| 1998 | 2,057                        | 151                            | 2,208                              | 93%                              | 7%                                 |
| 1999 | 1,651                        | 0                              | 1,651                              | 100%                             | 0%                                 |
| 2000 | 1,370                        | 0                              | 1,370                              | 100%                             | 0%                                 |
| 2001 | 1,694                        | 115                            | 1,809                              | 94%                              | 6%                                 |
| 2002 | 1,677                        | 135                            | 1,812                              | 93%                              | 7%                                 |
| 2003 | 1,992                        | 199                            | 2,191                              | 91%                              | 9%                                 |
| 2004 | 3,167                        | 190                            | 3,357                              | 94%                              | 6%                                 |
| 2005 | 3,463                        | 168                            | 3,631                              | 95%                              | 5%                                 |
| 2006 | 2,643                        | 169                            | 2,812                              | 94%                              | 6%                                 |

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Table 1.–Page 2 of 2.

| Year            | Sac roe<br>harvest<br>(tons) | Food/bait<br>harvest<br>(tons) | Total herring<br>harvest<br>(tons) | Sac roe<br>% of total<br>harvest | Food/bait<br>% of total<br>harvest |
|-----------------|------------------------------|--------------------------------|------------------------------------|----------------------------------|------------------------------------|
| 2007            | 2,546                        | 154                            | 2,700                              | 94%                              | 6%                                 |
| 2008            | 3,099                        | 202                            | 3,301                              | 94%                              | 6%                                 |
| 2009            | 4,759                        | 263                            | 5,022                              | 95%                              | 5%                                 |
| 2010            | 5,701                        | 191                            | 5,892                              | 97%                              | 3%                                 |
| 2011            | 2,957                        | 212                            | 3,169                              | 93%                              | 7%                                 |
| 2012            | 4,260                        | 299                            | 4,559                              | 93%                              | 7%                                 |
| 2013            | 4,447                        | 291                            | 4,738                              | 94%                              | 6%                                 |
| 2014            | 2,463                        | 124                            | 2,587                              | 95%                              | 5%                                 |
| 2015            | 357                          | 106                            | 463                                | 77%                              | 23%                                |
| 2016            | 365                          | 0                              | 365                                | 100%                             | 0%                                 |
| 2017            | 125                          | 77                             | 202                                | 62%                              | 38%                                |
| 2018            | 226                          | 59                             | 285                                | 79%                              | 21%                                |
| 2019            | <sup>a</sup>                 | 121                            | <sup>a</sup>                       | <sup>a</sup>                     | <sup>a</sup>                       |
| 2020            | 4,127                        | 339                            | 4,466                              | 92%                              | 8%                                 |
| 2021            | 7,903                        | 685                            | 8,588                              | 92%                              | 8%                                 |
| 2022            | 8,912                        | 912                            | 9,825                              | 90%                              | 10%                                |
| Average         |                              |                                |                                    |                                  |                                    |
| 1964–2021       | 2,229                        | 213                            | 2,442                              | 89%                              | 11%                                |
| 10-year average |                              |                                |                                    |                                  |                                    |
| 2012–2021       | 2,429                        | 210                            | 2,639                              | 80%                              | 20%                                |
| 5-year average  |                              |                                |                                    |                                  |                                    |
| 2017–2021       | 2,479                        | 256                            | 2,735                              | 67%                              | 33%                                |

<sup>a</sup> Confidential.

Table 2.—Herring sac roe fishery GHLS by section and gear type, harvest by section and gear type, and date sections were closed, KMA, 2022.

| Statistical<br>area    | Management<br>section | GHL    | Harvest     |         | Date closed |
|------------------------|-----------------------|--------|-------------|---------|-------------|
|                        |                       |        | Purse seine | Gillnet |             |
| NORTH AFOGNAK DISTRICT |                       |        |             |         |             |
| NA10                   | Shuyak Island         | Closed | —           | —       | —           |
| NA20 <sup>a</sup>      | Delphin Bay           | a      | a           | a       | a           |
| NA30 <sup>a</sup>      | Perenos Bay           | 50     | 71          | 0       | 4/13        |
| NA40                   | Seal Bay              | Closed | —           | —       | —           |
| NA50                   | Tonki Bay             | 75     | 72          | 0       | 4/10        |
| DISTRICT TOTAL         |                       | 125    | 143         |         |             |
| WEST AFOGNAK DISTRICT  |                       |        |             |         |             |
| WA10                   | Raspberry Strait      | 250    | 0           | 0       | 6/30        |
| WA20                   | Malina Bay            | 250    | 138         | 0       | 4/19        |
| WA31 <sup>b</sup>      | Paramanof Bay         | 500    | 825         | 0       | 4/19        |
| WA32 <sup>b</sup>      | Foul Bay              | b      | b           | b       | b           |
| WA40                   | Bluefox Bay           | Closed | —           | —       | —           |
| WA50                   | Offshore W. Afognak   | Closed | —           | —       | —           |
| DISTRICT TOTAL         |                       | 1,000  | 963         |         |             |
| SOUTH AFOGNAK DISTRICT |                       |        |             |         |             |
| SA10 <sup>c</sup>      | Izhut Bay             | 100    | 52          | 0       | 4/20        |
| SA20 <sup>c</sup>      | Kitoy Bay             | c      | c           | c       | c           |
| SA30 <sup>c</sup>      | MacDonald Lagoon      | c      | c           | c       | c           |
| SA40                   | Danger Bay            | 300    | 395         | —       | 4/18        |
| SA50                   | Litnik                | Closed | —           | —       | —           |
| SA60                   | Duck Bay              | Closed | —           | —       | —           |
| DISTRICT TOTAL         |                       | 400    | 447         | 0       |             |
| UGANIK DISTRICT        |                       |        |             |         |             |
| UG10                   | Kupreanof             | Closed | —           | —       | —           |
| UG20 <sup>d</sup>      | Viekoda Bay           | 1,200  | 1,335       | 0       | 4/15        |
| UG21 <sup>d</sup>      | Terror Bay            | d      | d           | d       | d           |
| UG30 <sup>e</sup>      | Village Islands       | 1,000  | 1,107       | 0       | 4/12        |
| UG31 <sup>d</sup>      | West Uganik Passage   | d      | d           | d       | d           |
| UG32 <sup>e</sup>      | NE Arm Uganik Bay     | e      | e           | e       | e           |
| UG33 <sup>e</sup>      | East Arm Uganik Bay   | e      | e           | e       | e           |
| UG34 <sup>e</sup>      | South Arm Uganik Bay  | e      | e           | e       | e           |
| UG40                   | Offshore Uganik       | Closed | —           | —       | —           |
| DISTRICT TOTAL         |                       | 2,200  | 2,442       | 0       |             |
| UYAK DISTRICT          |                       |        |             |         |             |
| UY10                   | Offshore Uyak         | Closed | —           | —       | —           |
| UY20                   | Harvester Island      | Closed | —           | —       | —           |
| UY30 <sup>f</sup>      | Inner Uyak            | 400    | 486         | -       | 4/17        |
| UY32 <sup>f</sup>      | Browns Lagoon         | f      | f           | f       | f           |
| UY31                   | Larsen Bay            | Closed | —           | —       | —           |
| UY40 <sup>g</sup>      | Zachar Bay            | 400    | 749         | —       | 4/16        |
| UY50 <sup>g</sup>      | Spiridon Bay          | g      | g           | g       | g           |
| DISTRICT TOTAL         |                       | 800    | 1,235       |         |             |

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Table 2.—Page 2 of 3.

| Statistical<br>area       | Management<br>section | GHL    | Harvest     |         | Date Closed |
|---------------------------|-----------------------|--------|-------------|---------|-------------|
|                           |                       |        | Purse seine | Gillnet | Purse seine |
| ALITAK DISTRICT           |                       |        |             |         |             |
| AL10                      | Outer Alitak          | Closed | —           | —       | —           |
| AL20 <sup>h</sup>         | Inner Alitak          | 150    | 144         | 0       | 4/24        |
| AL21 <sup>h</sup>         | Inner Deadman Bay     | h      | h           | h       | h           |
| AL22 <sup>h</sup>         | Outer Deadman Bay     | h      | h           | h       | h           |
| AL30 <sup>h</sup>         | Sulua Bay             | h      | h           | h       | h           |
| AL40 <sup>i</sup>         | Lower Olga-Moser      | 100    | 0           | 0       | 6/30        |
| AL41 <sup>i</sup>         | East Upper Olga Bay   | i      | i           | i       | i           |
| AL50 <sup>i</sup>         | West Upper Olga Bay   | i      | i           | i       | i           |
| AL60                      | Geese/Twoheaded       | 150    | 253         | 0       | 4/4         |
| DISTRICT TOTAL            |                       | 400    | 397         | 0       |             |
| STURGEON/HALIBUT DISTRICT |                       |        |             |         |             |
| SH10                      | Sturgeon/Halibut      | CLOSED | CLOSED      |         |             |
| EASTSIDE DISTRICT         |                       |        |             |         |             |
| EA10 <sup>j</sup>         | Kaiugnak              | 100    | 204         | 0       | 4/3         |
| EA20 <sup>j</sup>         | SW. Sitkalidak        | j      | j           | j       | j           |
| EA21 <sup>k</sup>         | Three Saints Bay      | 400    | 271         | 0       | 4/3         |
| EA22 <sup>k</sup>         | Newman Bay            | k      | k           | k       | k           |
| EA23 <sup>k</sup>         | W. Sitkalidak Strait  | k      | k           | k       | k           |
| EA24 <sup>k</sup>         | Barling Bay           | k      | k           | k       | k           |
| EA30 <sup>l</sup>         | E. Sitkalidak Strait  | 1,000  | 1,022       | 0       | 4/8         |
| EA31 <sup>l</sup>         | Tanginak Anchorage    | l      | l           | l       | l           |
| EA40                      | Outer Sitkalidak      | Closed | —           | —       | —           |
| EA41                      | Boulder Bay           | Closed | —           | —       | —           |
| EA42                      | Shearwater Bay        | 200    | 506         | 0       | 4/1         |
| EA43 <sup>m</sup>         | Outer Kiliuda Bay     | 600    | 517         | 0       | 4/8         |
| EA44 <sup>m</sup>         | Inner Kiliuda Bay     | m      | m           | m       | m           |
| EA50 <sup>n</sup>         | Outer Ugak Bay        | 500    | 459         | —       | 4/22        |
| EA51 <sup>n</sup>         | Inner Ugak Bay        | n      | n           | n       | n           |
| EA52                      | Pasagshak Bay         | Closed | —           | —       | —           |
| DISTRICT TOTAL            |                       | 2,800  | 2,979       | 0       |             |
| NORTHEAST DISTRICT        |                       |        |             |         |             |
| NE10                      | Womens Bay            | Closed | —           | —       | —           |
| NE20                      | Kalsin Bay            | 100    | 104         | 0       | 4/6         |
| NE30                      | Middle Bay            | Closed | —           | —       | —           |
| NE40                      | Inshore Chiniak       | Closed | —           | —       | —           |
| NE50                      | Offshore Chiniak      | Closed | —           | —       | —           |
| DISTRICT TOTAL            |                       | 100    | 104         | 0       |             |

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Table 2.–Page 3 of 3.

| Statistical<br>area      | Management<br>section | GHL         | Harvest     |         | Date closed |
|--------------------------|-----------------------|-------------|-------------|---------|-------------|
|                          |                       |             | Purse seine | gillnet | Purse seine |
| INNER MARMOT DISTRICT    |                       |             |             |         |             |
| IM10                     | Monashka Bay          | Closed      | —           | —       | —           |
| IM20                     | Anton Larsen Bay      | Closed      | —           | —       | —           |
| IM30                     | Sharatin Bay          | Closed      | —           | —       | —           |
| IM40                     | Kizhuyak Bay          | 250         | 202         | 0       | 4/17        |
| IM50                     | Spruce Island         | Closed      | —           | —       | —           |
| NE AND IM DISTRICT TOTAL |                       | 250         | 202         | 0       |             |
| NORTH MAINLAND DISTRICT  |                       |             |             |         |             |
| NM10                     | Hallo Bay             | Closed      | —           | —       | —           |
| NM20                     | Inner Kukak           | Exploratory | 0           | 0       | 6/30        |
| NM30                     | Outer Kukak           | Closed      | —           | —       | —           |
| NM40                     | Missak Bay            | Closed      | —           | —       | —           |
| MID MAINLAND DISTRICT    |                       |             |             |         |             |
| MM10                     | Inner Katmai          | Exploratory | 0           | 0       | 6/30        |
| MM20                     | Outer Katmai          | Closed      | —           | —       | —           |
| MM30                     | Alinchak              | Exploratory | 0           | 0       | 6/30        |
| MM40                     | Puale Bay             | Exploratory | 0           | 0       | 6/30        |
| MM50                     | Portage Bay           | Exploratory | 0           | 0       | 6/30        |
| MM60                     | Outer Portage         | Closed      | —           | —       | —           |
| SOUTH MAINLAND DISTRICT  |                       |             |             |         |             |
| SM10                     | Wide Bay              | Exploratory | 0           | 0       | 6/30        |
| SM20                     | Lower Shelikof        | Closed      | —           | —       | —           |
| MAINLAND DISTRICTS TOTAL |                       |             | 0           | 0       |             |
| GRAND TOTAL              |                       | 8,075       | 8,912       | 0       |             |

<sup>a</sup> NA20 and NA30 were combined and managed as one section.

<sup>b</sup> WA31 and WA32 were combined and managed as one section.

<sup>c</sup> SA10, SA20, and SA30 were combined and managed as one section.

<sup>d</sup> UG20, UG21, and UG31 were combined and managed as one section.

<sup>e</sup> UG30, UG32, UG33, and UG34 were combined and managed as one section.

<sup>f</sup> UY30 and UY32 were combined and managed as one section.

<sup>g</sup> UY40 and UY50 were combined and managed as one section.

<sup>h</sup> AL20, AL21, AL22, and AL30 were combined and managed as one section.

<sup>i</sup> AL40, AL41, and AL50 were combined and managed as one section.

<sup>j</sup> EA10 and EA20 were combined and managed as one section.

<sup>m</sup> EA43 and EA 44 were combined and managed as one section.

<sup>n</sup> EA50 and EA51 were combined and managed as one section.



Table 3.—Summary of GHL, harvest by gear type, percentage of harvest by gear type, number of landings, and estimated exvessel earnings for the herring sac roe fishery in the KMA, 1979–2022.

| Year              | GHL<br>(tons) | Total<br>harvest<br>(tons) | Harvest<br>(tons)<br>by gear type |         | Percent<br>harvest by<br>gear type |         | Number of<br>landings by<br>gear type |         | Units of gear<br>fished |         | Average catch<br>(tons) by gear |         | Estimated<br>average<br>earnings <sup>a</sup> |          | Price<br>per<br>ton <sup>a</sup> | Estimated<br>exvessel<br>total value <sup>a</sup> |
|-------------------|---------------|----------------------------|-----------------------------------|---------|------------------------------------|---------|---------------------------------------|---------|-------------------------|---------|---------------------------------|---------|---|----------|----------------------------------|---|
|                   |               |                            | Seine                             | Gillnet | Seine                              | Gillnet | Seine                                 | Gillnet | Seine                   | Gillnet | Seine                           | Gillnet | Seine   | Gillnet  |                                  |   |
| 1979              | 2,400         | 1,735                      | 1,457                             | 278     | 84%                                | 16%     | —                                     | —       | 57                      | 125     | 26                              | 2       | \$38,342                                      | \$3,336  | \$1,500                          | \$2,602,500                                       |
| 1980              | 2,400         | 2,383                      | 2,009                             | 374     | 84%                                | 16%     | —                                     | —       | 92                      | 109     | 22                              | 3       | \$15,068                                      | \$2,368  | \$690                            | \$1,644,270                                       |
| 1981              | 2,400         | 2,065                      | 1,596                             | 469     | 77%                                | 23%     | 207                                   | 406     | 79                      | 114     | 20                              | 4       | \$14,647                                      | \$2,983  | \$725                            | \$1,497,125                                       |
| 1982              | 2,400         | 1,771                      | 1,447                             | 324     | 82%                                | 18%     | 138                                   | 191     | 45                      | 67      | 32                              | 5       | \$17,686                                      | \$2,660  | \$550                            | \$974,050   |
| 1983              | 2,400         | 2,319                      | 1,797                             | 522     | 77%                                | 23%     | 164                                   | 284     | 41                      | 64      | 44                              | 8       | \$35,063                                      | \$6,525  | \$800                            | \$1,855,200                                       |
| 1984              | 2,400         | 2,163                      | 1,691                             | 472     | 78%                                | 22%     | 138                                   | 212     | 39                      | 69      | 43                              | 7       | \$34,687                                      | \$5,472  | \$800                            | \$1,730,400                                       |
| 1985              | 2,000         | 1,968                      | 1,244                             | 724     | 63%                                | 37%     | 118                                   | 348     | 34                      | 81      | 37                              | 9       | \$32,929                                      | \$8,044  | \$900                            | \$1,771,200                                       |
| 1986              | 1,690         | 1,558                      | 1,110                             | 448     | 71%                                | 29%     | 132                                   | 385     | 31                      | 71      | 36                              | 6       | \$34,016                                      | \$5,994  | \$950                            | \$1,480,100                                       |
| 1987              | 1,640         | 2,146                      | 1,591                             | 554     | 74%                                | 26%     | 122                                   | 411     | 29                      | 62      | 55                              | 9       | \$54,862                                      | \$8,935  | \$1,000                          | \$2,146,000                                       |
| 1988              | 2,065         | 2,171                      | 1,304                             | 867     | 60%                                | 40%     | 169                                   | 555     | 33                      | 76      | 40                              | 11      | \$51,370                                      | \$14,830 | \$1,300                          | \$2,822,300                                       |
| 1989              | 2,415         | 2,249                      | 1,513                             | 736     | 67%                                | 33%     | 171                                   | 627     | 37                      | 83      | 41                              | 9       | \$34,758                                      | \$7,537  | \$850                            | \$1,911,650                                       |
| 1990              | 2,375         | 2,347                      | 1,644                             | 703     | 70%                                | 30%     | 156                                   | 544     | 27                      | 63      | 61                              | 11      | \$51,756                                      | \$9,485  | \$850                            | \$1,994,950                                       |
| 1991              | 2,510         | 2,432                      | 1,697                             | 735     | 70%                                | 30%     | 169                                   | 587     | 32                      | 64      | 53                              | 11      | \$45,077                                      | \$9,762  | \$850                            | \$2,067,200                                       |
| 1992              | 2,720         | 4,283                      | 3,260                             | 1,023   | 76%                                | 24%     | 185                                   | 706     | 40                      | 74      | 82                              | 14      | \$40,750                                      | \$6,912  | \$500                            | \$2,141,500                                       |
| 1993              | 3,525         | 4,929                      | 4,203                             | 726     | 85%                                | 15%     | 237                                   | 294     | 41                      | 86      | 103                             | 8       | \$56,382                                      | \$4,643  | \$550                            | \$2,710,950                                       |
| 1994              | 4,550         | 5,893                      | 4,976                             | 917     | 84%                                | 16%     | 285                                   | 485     | 66                      | 57      | 75                              | 16      | \$60,315                                      | \$12,870 | \$800                            | \$4,714,400                                       |
| 1995              | 4,480         | 4,604                      | 3,837                             | 768     | 83%                                | 17%     | 280                                   | 642     | 73                      | 71      | 53                              | 11      | \$66,858                                      | \$13,759 | \$1,272                          | \$5,856,288                                       |
| 1996              | 4,180         | 3,386                      | 2,322                             | 1,064   | 69%                                | 31%     | 202                                   | 890     | 57                      | 74      | 41                              | 14      | \$81,474                                      | \$28,757 | \$2,000                          | \$6,772,000                                       |
| 1997              | 3,435         | 3,235                      | 2,629                             | 606     | 81%                                | 19%     | 183                                   | 418     | 64                      | 59      | 41                              | 10      | \$20,539                                      | \$5,136  | \$500                            | \$1,617,500                                       |
| 1998              | 2,030         | 2,057                      | 1,954                             | 103     | 95%                                | 5%      | 110                                   | 26      | 35                      | 7       | 56                              | 15      | \$27,914                                      | \$7,357  | \$500                            | \$1,028,500                                       |
| 1999              | 1,495         | 1,651                      | 1,589                             | 62      | 96%                                | 4%      | 94                                    | 16      | 31                      | 5       | 51                              | 12      | \$33,984                                      | \$8,221  | \$663                            | \$1,094,613                                       |
| 2000 <sup>b</sup> | 1,735         | 1,370                      | 1,290                             | 80      | 94%                                | 6%      | 57                                    | 23      | 31                      | 10      | 42                              | 8       | \$29,129                                      | \$5,600  | \$700                            | \$959,000   |
| 2001              | 1,540         | 1,694                      | 1,412                             | 282     | 83%                                | 17%     | 67                                    | 37      | 33                      | 9       | 43                              | 31      | \$21,394                                      | \$15,667 | \$500                            | \$847,000   |
| 2002              | 1,860         | 1,677                      | 1,274                             | 403     | 76%                                | 24%     | 37                                    | 50      | 30                      | 14      | 42                              | 29      | \$21,233                                      | \$14,393 | \$500                            | \$838,500   |
| 2003              | 2,600         | 1,992                      | 1,738                             | 254     | 87%                                | 13%     | 59                                    | 45      | 31                      | 11      | 56                              | 23      | \$28,032                                      | \$11,545 | \$500                            | \$996,000   |

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Table 3.—Page 2 of 3.

| Year         | GHL<br>(tons) | Total<br>harvest<br>(tons) | Harvest<br>(tons)<br>by gear type |         | Percent<br>harvest by<br>gear type |         | Number of<br>landings by<br>gear type |         | Units of gear<br>fished |         | Average catch<br>(tons) by gear |         | Estimated<br>average<br>earnings <sup>a</sup> |          | Price<br>per<br>ton <sup>a</sup> | Estimated<br>exvessel<br>total value <sup>a</sup> |
|--------------|---------------|----------------------------|-----------------------------------|---------|------------------------------------|---------|---------------------------------------|---------|-------------------------|---------|---------------------------------|---------|---|----------|----------------------------------|---|
|              |               |                            | Seine                             | Gillnet | Seine                              | Gillnet | Seine                                 | Gillnet | Seine                   | Gillnet | Seine                           | Gillnet | Seine   | Gillnet  |                                  |   |
| 2004         | 2,850         | 3,167                      | 2,894                             | 273     | 91%                                | 9%      | 95                                    | 36      | 27                      | 11      | 107                             | 25      | \$53,593                                      | \$12,409 | \$500                            | \$1,583,500                                       |
| 2005         | 3,475         | 3,463                      | 2,932                             | 531     | 85%                                | 15%     | 134                                   | 61      | 32                      | 12      | 92                              | 44      | \$45,813                                      | \$22,125 | \$500                            | \$1,731,500                                       |
| 2006         | 3,705         | 2,643                      | 2,617                             | c       | 99%                                | 0%      | 86                                    | c       | 21                      | c       | 125                             | c       | \$34,270                                      | c        | \$275                            | \$726,825   |
| 2007         | 4,000         | 2,546                      | 2,510                             | 36      | 99%                                | 1%      | 105                                   | 8       | 21                      | 3       | 120                             | 12      | \$47,810                                      | \$4,800  | \$400                            | \$1,018,400                                       |
| 2008         | 4,290         | 3,099                      | 3,086                             | c       | 100%                               | 0%      | 108                                   | c       | 22                      | c       | 140                             | c       | \$73,643                                      | c        | \$525                            | \$1,626,975                                       |
| 2009         | 4,765         | 4,759                      | 4,549                             | 210     | 96%                                | 4%      | 218                                   | 19      | 31                      | 6       | 147                             | 35      | \$77,040                                      | \$18,375 | \$525                            | \$2,498,475                                       |
| 2010         | 6,075         | 5,701                      | 5,538                             | 163     | 97%                                | 3%      | 277                                   | 14      | 36                      | 7       | 154                             | 23      | \$61,533                                      | \$9,314  | \$400                            | \$2,280,400                                       |
| 2011         | 6,135         | 2,957                      | 2,937                             | 20      | 99%                                | 1%      | 95                                    | 6       | 14                      | 3       | 210                             | 7       | \$41,957                                      | \$1,333  | \$200                            | \$591,400   |
| 2012         | 5,355         | 4,260                      | 4,253                             | c       | 100%                               | 0%      | 164                                   | c       | 23                      | c       | 185                             | c       | \$55,474                                      | c        | \$300                            | \$1,278,000                                       |
| 2013         | 5,410         | 4,447                      | 4,298                             | 149     | 97%                                | 3%      | 189                                   | 18      | 33                      | 5       | 130                             | 30      | \$29,956                                      | \$6,854  | \$230                            | \$1,022,810                                       |
| 2014         | 5,830         | 2,463                      | 2,463                             | 0       | 100%                               | 0%      | 99                                    | 0       | 21                      | 0       | 117                             | 0       | \$11,729                                      | \$0      | \$100                            | \$246,300   |
| 2015         | 3,190         | 357                        | 357                               | 0       | 100%                               | 0%      | 19                                    | 0       | 9                       | 0       | 40                              | 0       | \$4,363                                       | \$0      | \$110                            | \$39,270  |
| 2016         | 1,670         | 365                        | 365                               | 0       | 100%                               | 0%      | 15                                    | 0       | 3                       | 0       | 122                             | 0       | \$15,817                                      | \$0      | \$130                            | \$47,450  |
| 2017         | 1,645         | 125                        | 124                               | c       | 99%                                | 0%      | 6                                     | c       | 3                       | c       | 41                              | c       | \$6,613                                       | c        | \$160                            | \$20,000  |
| 2018         | 1,185         | 226                        | 226                               | 0       | 100%                               | 0%      | 8                                     | 0       | 3                       | 0       | 75                              | 0       | \$15,067                                      | \$0      | \$200                            | \$45,200  |
| 2019         | 1,405         | c                          | c                                 | 0       | 100%                               | 0%      | c                                     | 0       | c                       | 0       | c                               | 0       | \$0   | \$0      | \$0                              | \$0   |
| 2020         | 3,150         | 4,127                      | 4,127                             | 0       | 100%                               | 0%      | 91                                    | 0       | 9                       | 0       | 459                             | 0       | \$66,491                                      | \$0      | \$145                            | \$598,415   |
| 2021         | 7,895         | 7,903                      | 7,903                             | 0       | 100%                               | 0%      | 136                                   | 0       | 13                      | 0       | 608                             | 0       | \$100,307                                     | \$0      | \$165                            | \$1,303,995                                       |
| 2022         | 8,075         | 8,912                      | 8,912                             | 0       | 100%                               | 0%      | 133                                   | 0       | 11                      | 0       | 810                             | -       | \$128,009                                     | \$0      | \$158                            | \$1,408,096                                       |
| Average      |               |                            |                                   |         |                                    |         |                                       |         |                         |         |                                 |         |   |          |                                  |   |
| 1979 to 2021 | 3,146         | 2,714                      | 2,367                             | 347     | 87%                                | 13%     | 130                                   | 204     | 33                      | 37      | 95                              | 14      | \$39,296                                      | \$7,225  | \$596                            | \$1,644,933                                       |
| 10-Year      |               |                            |                                   |         |                                    |         |                                       |         |                         |         |                                 |         |   |          |                                  |   |
| 2012 to 2021 | 3,674         | 2,429                      | 2,413                             | 16      | 100%                               | 0%      | 73                                    | 2       | 12                      | 1       | 179                             | 13      | \$30,582                                      | \$911    | \$154                            | \$460,144   |
| 5-Year       |               |                            |                                   |         |                                    |         |                                       |         |                         |         |                                 |         |   |          |                                  |   |
| 2017 to 2021 | 3,056         | 2,479                      | 2,479                             | 0       | 100%                               | 0%      | 48                                    | 0       | 6                       | 0       | 239                             | -       | \$37,696                                      | \$32     | \$134                            | \$393,522   |

<sup>a</sup> Exvessel values are based on dock delivered herring and inseason data.<sup>b</sup> From 2000 to 2019, an allocative harvest strategy was in effect.<sup>c</sup> Confidential.

Table 4.–Age composition of herring samples from the commercial sac roe fishery, by section in the KMA, 2022.

| Section                 | <i>n</i> | Percent at age |       |       |       |       |       |       |       |       |        |         |
|-------------------------|----------|----------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|---------|
|                         |          | age-1          | age-2 | age-3 | age-4 | age-5 | age-6 | age-7 | age-8 | age-9 | age-10 | age-11+ |
| Danger Bay              | 490      | 0%             | 0%    | 11%   | 3%    | 1%    | 81%   | 1%    | 2%    | 1%    | 1%     | 0%      |
| Raspberry Strait        | 322      | 0%             | 5%    | 77%   | 12%   | 2%    | 4%    | 0%    | 0%    | 0%    | 0%     | 0%      |
| Paramanof/Foul Bay      | 528      | 0%             | 0%    | 20%   | 5%    | 2%    | 72%   | 1%    | 0%    | 0%    | 0%     | 0%      |
| Perenosa                | 161      | 0%             | 0%    | 6%    | 1%    | 2%    | 91%   | 1%    | 0%    | 0%    | 0%     | 0%      |
| Tonki                   | 168      | 0%             | 0%    | 4%    | 1%    | 1%    | 93%   | 1%    | 0%    | 0%    | 0%     | 0%      |
| Kizhuyak                | 384      | 0%             | 0%    | 30%   | 8%    | 1%    | 60%   | 0%    | 1%    | 0%    | 0%     | 0%      |
| Kalsin                  | 146      | 0%             | 0%    | 4%    | 1%    | 1%    | 93%   | 1%    | 0%    | 0%    | 0%     | 0%      |
| Inner and Outer Ugak    | 450      | 0%             | 0%    | 23%   | 1%    | 0%    | 72%   | 1%    | 2%    | 0%    | 0%     | 0%      |
| Shearwater              | 310      | 0%             | 0%    | 5%    | 0%    | 1%    | 90%   | 2%    | 1%    | 0%    | 1%     | 0%      |
| Inner and Outer Kiliuda | 654      | 0%             | 0%    | 17%   | 1%    | 0%    | 80%   | 0%    | 2%    | 0%    | 0%     | 0%      |
| Tanginak Anchorage      | 474      | 0%             | 0%    | 24%   | 0%    | 1%    | 71%   | 1%    | 2%    | 0%    | 0%     | 0%      |
| Barling                 | 233      | 0%             | 0%    | 7%    | 0%    | 0%    | 88%   | 0%    | 3%    | 0%    | 0%     | 0%      |
| SW Sitkalidak           | 210      | 0%             | 0%    | 24%   | 0%    | 1%    | 70%   | 0%    | 4%    | 0%    | 0%     | 0%      |
| Inner Alitak            | 144      | 0%             | 0%    | 2%    | 1%    | 0%    | 94%   | 1%    | 3%    | 0%    | 0%     | 0%      |
| Inner Uyak              | 114      | 0%             | 0%    | 21%   | 5%    | 1%    | 72%   | 1%    | 0%    | 0%    | 0%     | 0%      |
| Zachar                  | 446      | 0%             | 0%    | 11%   | 4%    | 1%    | 83%   | 1%    | 0%    | 0%    | 0%     | 0%      |
| Village Islands         | 181      | 0%             | 0%    | 13%   | 0%    | 0%    | 86%   | 0%    | 1%    | 1%    | 0%     | 0%      |
| Viekoda                 | 335      | 0%             | 0%    | 43%   | 5%    | 0%    | 51%   | 0%    | 0%    | 0%    | 0%     | 0%      |
| All samples combined    | 5,750    | 0%             | 0%    | 21%   | 3%    | 1%    | 73%   | 1%    | 1%    | 0%    | 0%     | 0%      |

Table 5.—Average weight of herring samples from the commercial sac roe fishery, by age and section in the KMA, 2022.

| Section                 | n     | Weight at age (g) |       |       |       |       |       |       |       |       |        |         |
|-------------------------|-------|-------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|---------|
|                         |       | age-1             | age-2 | age-3 | age-4 | age-5 | age-6 | age-7 | age-8 | age-9 | age-10 | age-11+ |
| Danger Bay              | 490   | 0                 | 0     | 86    | 111   | 154   | 169   | 175   | 221   | 210   | 238    | 0       |
| Raspberry Strait        | 322   | 0                 | 33    | 51    | 74    | 90    | 108   | 0     | 0     | 0     | 0      | 0       |
| Paramanof/Foul Bay      | 528   | 0                 | 0     | 83    | 108   | 123   | 152   | 176   | 272   | 0     | 269    | 0       |
| Perenosa                | 161   | 0                 | 0     | 91    | 131   | 138   | 155   | 155   | 0     | 0     | 0      | 0       |
| Tonki                   | 168   | 0                 | 0     | 90    | 115   | 131   | 166   | 157   | 0     | 0     | 0      | 0       |
| Kizhuyak                | 384   | 0                 | 0     | 83    | 119   | 122   | 159   | 148   | 193   | 0     | 280    | 0       |
| Kalsin                  | 146   | 0                 | 0     | 85    | 122   | 142   | 179   | 184   | 0     | 0     | 0      | 0       |
| Inner and Outer Ugak    | 450   | 0                 | 32    | 80    | 123   | 112   | 171   | 195   | 218   | 207   | 223    | 0       |
| Shearwater              | 310   | 0                 | 0     | 90    | 0     | 137   | 174   | 187   | 229   | 0     | 244    | 0       |
| Inner and Outer Kiliuda | 654   | 0                 | 0     | 81    | 99    | 128   | 171   | 200   | 214   | 0     | 242    | 0       |
| Tanginak Anchorage      | 474   | 0                 | 0     | 81    | 0     | 133   | 175   | 199   | 224   | 0     | 0      | 0       |
| Barling                 | 233   | 0                 | 0     | 85    | 0     | 122   | 175   | 180   | 236   | 253   | 0      | 0       |
| Newman                  | 210   | 0                 | 0     | 86    | 120   | 165   | 174   | 170   | 238   | 0     | 0      | 0       |
| Inner Alitak            | 144   | 0                 | 0     | 90    | 103   | 0     | 171   | 205   | 220   | 0     | 0      | 0       |
| Inner Uyak              | 114   | 0                 | 0     | 89    | 102   | 132   | 154   | 155   | 0     | 0     | 0      | 0       |
| Zachar                  | 446   | 0                 | 0     | 81    | 114   | 128   | 156   | 160   | 216   | 0     | 260    | 219     |
| Village Islands         | 181   | 0                 | 0     | 80    | 0     | 0     | 149   | 0     | 225   | 275   | 0      | 0       |
| Veikoda                 | 335   | 0                 | 0     | 78    | 99    | 163   | 144   | 0     | 177   | 211   | 0      | 0       |
| All samples combined    | 5,750 | 0                 | 33    | 76    | 103   | 128   | 165   | 181   | 223   | 223   | 246    | 219     |

Table 6.–KMA herring food and bait commercial fishery GHLS and harvest (tons) by district, 2022.

| Management district   | GHL | Harvest |
|-----------------------|-----|---------|
| F/B 1 – West Afognak  | 100 | 186     |
| F/B 3 – South Afognak | 40  | 0       |
| F/B 4 – Uganik        | 220 | 375     |
| F/B 5 – Uyak          | 80  | 0       |
| F/B 7 – Alitak        | 40  | 0       |
| F/B 8 – Eastside      | 280 | 351     |
| Total                 | 760 | 912     |

Table 7.–KMA herring food and bait commercial fishery GHLS and harvest (tons), 2001–2022.

| Year                 | GHL | Harvest |
|----------------------|-----|---------|
| 2001                 | 107 | 114     |
| 2002                 | 134 | 135     |
| 2003                 | 197 | 199     |
| 2004                 | 225 | 190     |
| 2005                 | 302 | 168     |
| 2006                 | 342 | 169     |
| 2007                 | 370 | 154     |
| 2008                 | 351 | 202     |
| 2009                 | 420 | 263     |
| 2010                 | 555 | 191     |
| 2011                 | 405 | 212     |
| 2012                 | 404 | 299     |
| 2013                 | 454 | 291     |
| 2014                 | 310 | 124     |
| 2015                 | 113 | 106     |
| 2016                 | 101 | 0       |
| 2017                 | 129 | 77      |
| 2018                 | 91  | 59      |
| 2019                 | 111 | 121     |
| 2020                 | 319 | 339     |
| 2021                 | 720 | 685     |
| 2022                 | 760 | 912     |
| Average<br>2012–2021 | 275 | 210     |

Table 8.—Subsistence herring harvest summary for the KMA, 1993 through 2022.

| Year | Permits issued | Permits returned | Estimated harvest in pounds by district |           |              |        |       |          |        |       | Total  |
|------|----------------|------------------|---|-----------|--------------|--------|-------|----------|--------|-------|--------|
|      |                |                  | Afognak                                 | Northeast | Inner Marmot | Uganik | Uyak  | Eastside | Alitak | Other |        |
| 1993 | 50             | 16               | 90                                      | 3,000     | 3,910        | 550    | 50    | 0        | 0      | 0     | 7,600  |
| 1994 | 47             | 14               | 90                                      | 740       | 1,350        | 2,000  | 200   | 0        | 0      | 0     | 4,380  |
| 1995 | 20             | 6                | 75                                      | 0         | 500          | 0      | 340   | 0        | 175    | 0     | 1,090  |
| 1996 | 23             | 10               | 550                                     | 180       | 140          | 0      | 590   | 0        | 0      | 0     | 1,460  |
| 1997 | 16             | 7                | 0                                       | 200       | 350          | 50     | 1,325 | 0        | 0      | 0     | 1,925  |
| 1998 | 18             | 10               | 1,240                                   | 0         | 0            | 50     | 0     | 0        | 0      | 0     | 1,290  |
| 1999 | 15             | 9                | 0                                       | 200       | 350          | 0      | 425   | 0        | 0      | 0     | 975    |
| 2000 | 39             | 21               | 575                                     | 21,150    | 0            | 1,825  | 0     | 0        | 700    | 0     | 24,250 |
| 2001 | 48             | 19               | 3,000                                   | 0         | 875          | 0      | 1,015 | 10,500   | 0      | 0     | 15,390 |
| 2002 | <sup>a</sup>   | 23               | 1,170                                   | 1,150     | 420          | 0      | 200   | 903      | 0      | 0     | 3,843  |
| 2003 | <sup>a</sup>   | 16               | 0                                       | 220       | 300          | 0      | 420   | 1,210    | 30     | 0     | 2,180  |
| 2004 | <sup>a</sup>   | 24               | 200                                     | 580       | 465          | 206    | 1,580 | 1,142    | 0      | 0     | 4,173  |
| 2005 | <sup>a</sup>   | 37               | 300                                     | 850       | 1,070        | 160    | 550   | 2,300    | 155    | 0     | 5,385  |
| 2006 | <sup>a</sup>   | 33               | 600                                     | 1,109     | 1,175        | 250    | 415   | 1,650    | 0      | 0     | 5,199  |
| 2007 | <sup>a</sup>   | 37               | 200                                     | 912       | 1,430        | 5      | 1,470 | 850      | 300    | 0     | 5,167  |
| 2008 | <sup>a</sup>   | 21               | 100                                     | 1,134     | 1,110        | 50     | 1,020 | 610      | 0      | 0     | 4,024  |
| 2009 | <sup>a</sup>   | 36               | 625                                     | 660       | 520          | 400    | 451   | 980      | 0      | 330   | 3,966  |
| 2010 | <sup>a</sup>   | 26               | 401                                     | 527       | 650          | 200    | 250   | 595      | 150    | 0     | 2,773  |
| 2011 | <sup>a</sup>   | 27               | 10                                      | 425       | 355          | 550    | 310   | 505      | 200    | 30    | 2,385  |
| 2012 | <sup>a</sup>   | 24               | 262                                     | 1,508     | 25           | 0      | 330   | 920      | 200    | 15    | 3,260  |
| 2013 | <sup>a</sup>   | 24               | 615                                     | 668       | 50           | 75     | 200   | 585      | 200    | 0     | 2,393  |
| 2014 | <sup>a</sup>   | 17               | 232                                     | 682       | 0            | 0      | 150   | 500      | 500    | 100   | 2,164  |
| 2015 | <sup>a</sup>   | 13               | 0                                       | 100       | 20           | 150    | 150   | 745      | 350    | 0     | 1,515  |
| 2016 | <sup>a</sup>   | 15               | 500                                     | 195       | 500          | 140    | 30    | 135      | 300    | 0     | 1,800  |
| 2017 | <sup>a</sup>   | 11               | 0                                       | 140       | 900          | 89     | 200   | 510      | 424    | 0     | 2,263  |
| 2018 | <sup>a</sup>   | 8                | 0                                       | 245       | 17           | 365    | 350   | 325      | 0      | 0     | 1,302  |
| 2019 | <sup>a</sup>   | 8                | 0                                       | 10        | 230          | 5      | 490   | 570      | 0      | 0     | 1,305  |
| 2020 | <sup>a</sup>   | 17               | 480                                     | 155       | 120          | 290    | 175   | 1,755    | 100    | 0     | 3,075  |
| 2021 | <sup>a</sup>   | 21               | 479                                     | 140       | 0            | 4,040  | 200   | 1,340    | 100    | 0     | 6,299  |
| 2022 | <sup>a</sup>   | 15               | 200                                     | 81        | 0            | 640    | 270   | 2,025    | 50     | 0     | 3,266  |

<sup>a</sup> Beginning in 2002, herring was added to the Kodiak subsistence salmon and crab permit; no separate permit was required.

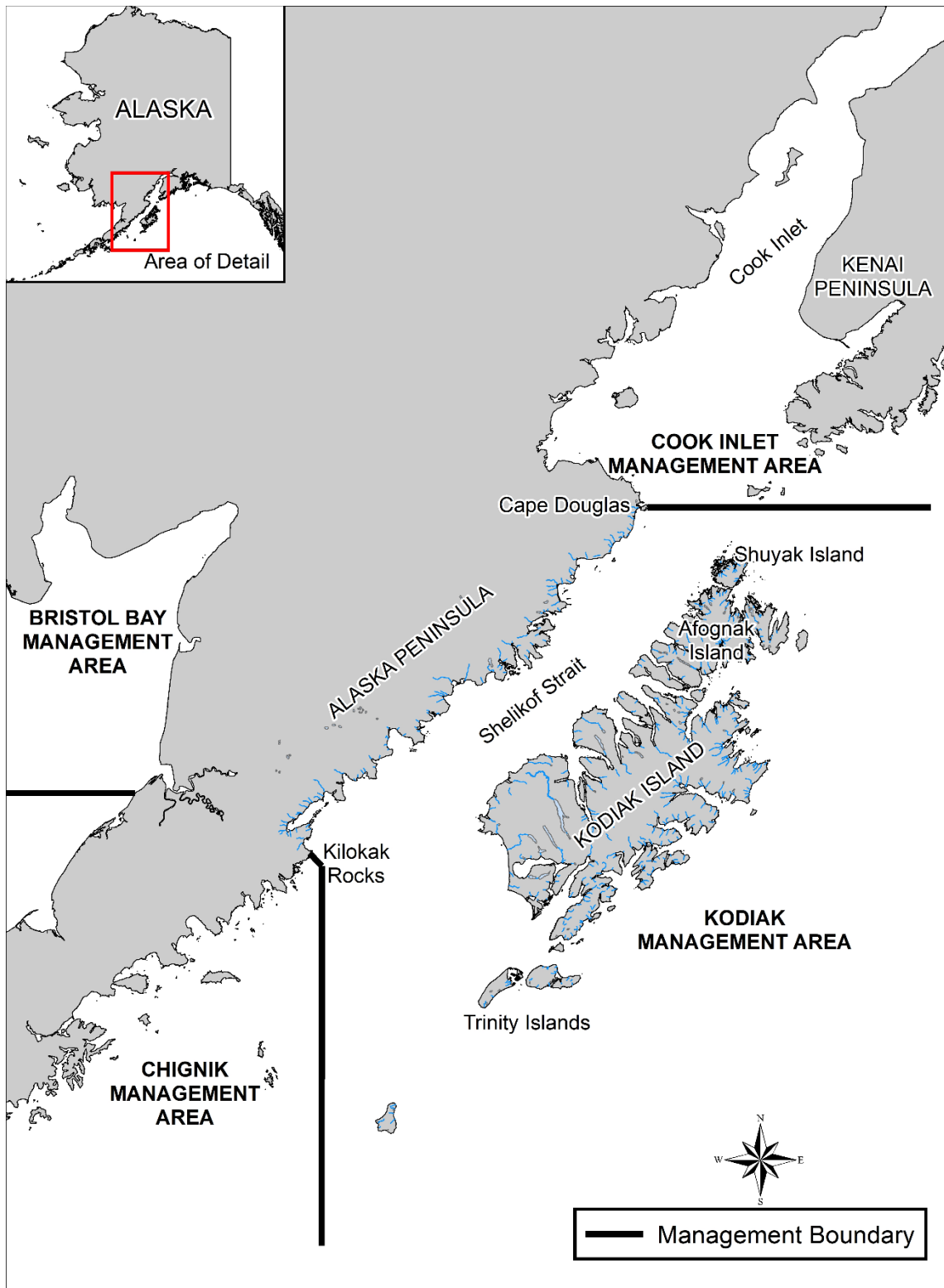


Figure 1.—Map of southwestern Alaska showing the KMA and surrounding management areas.

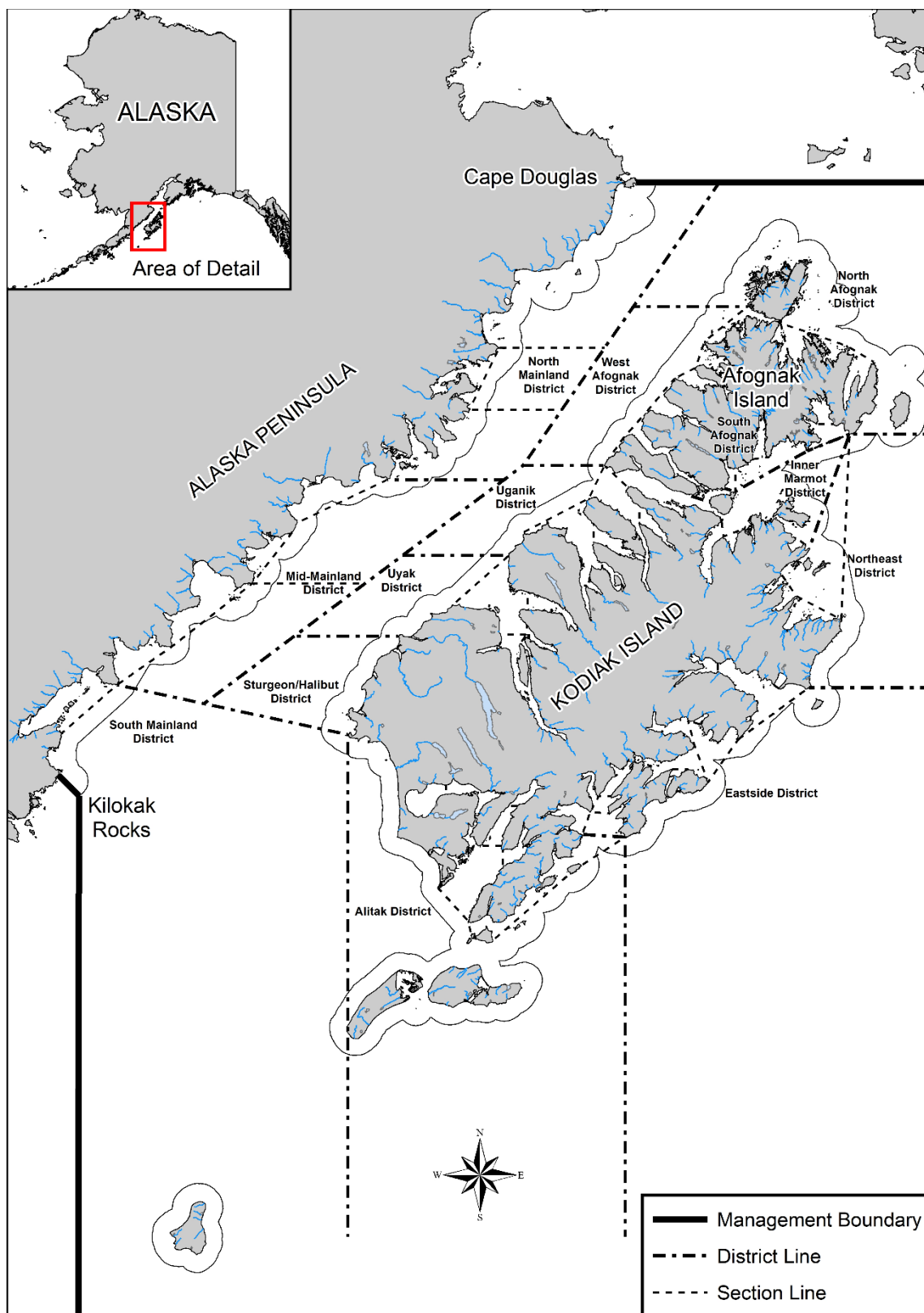


Figure 2.—Map of the KMA illustrating the herring commercial fishery districts.



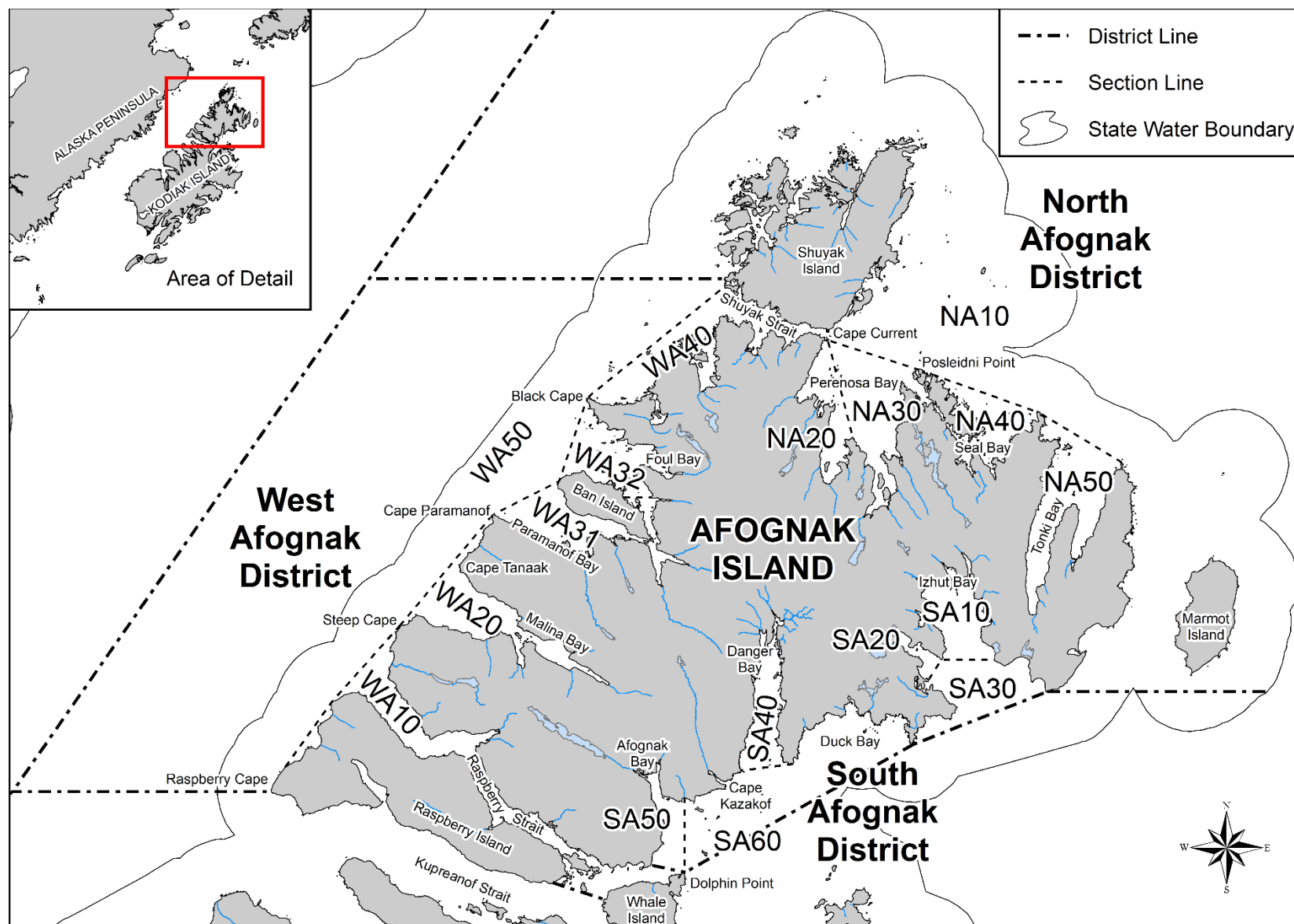


Figure 3.—Map showing the Afognak Districts.

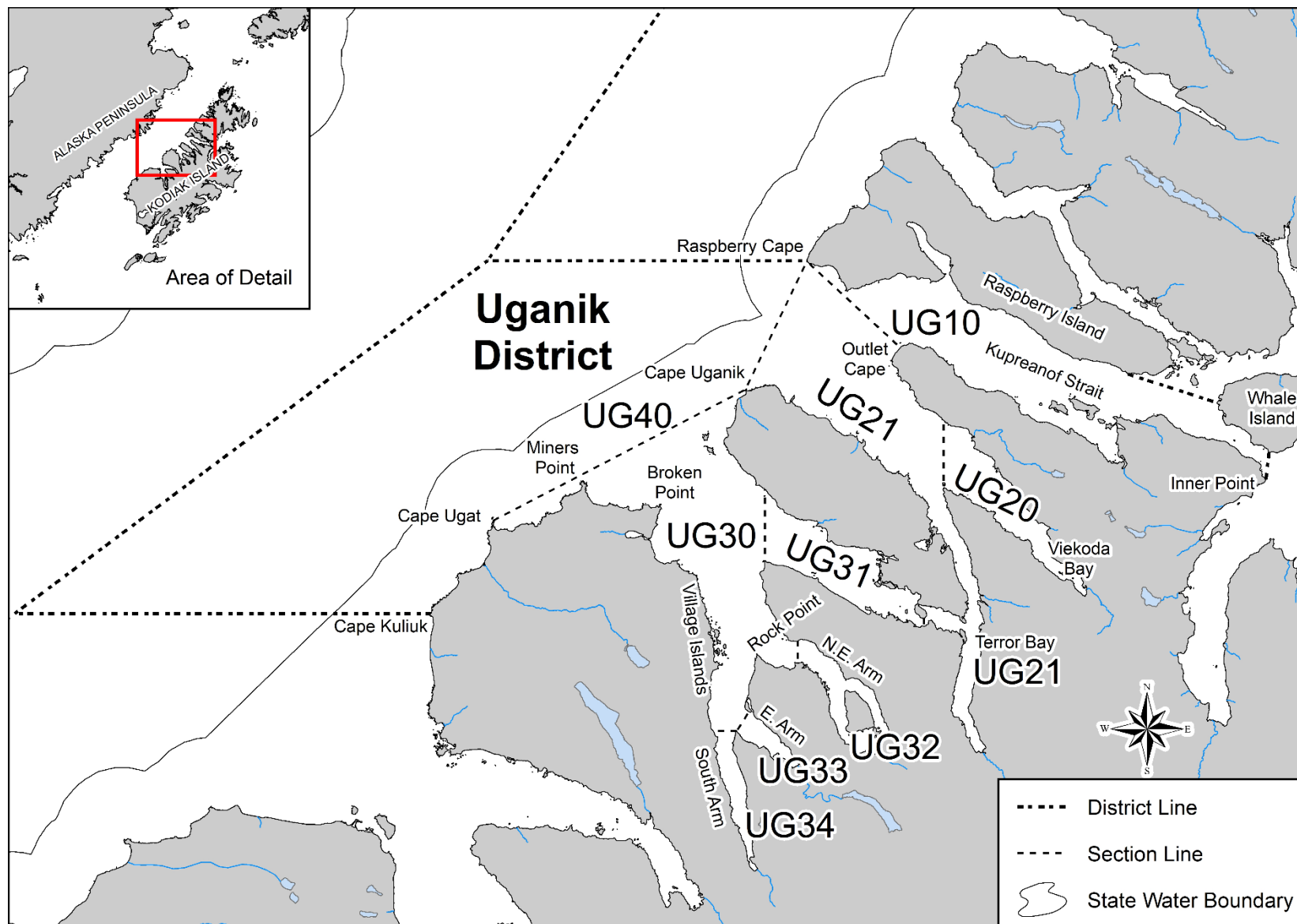


Figure 4.—Map showing the Uganik District.

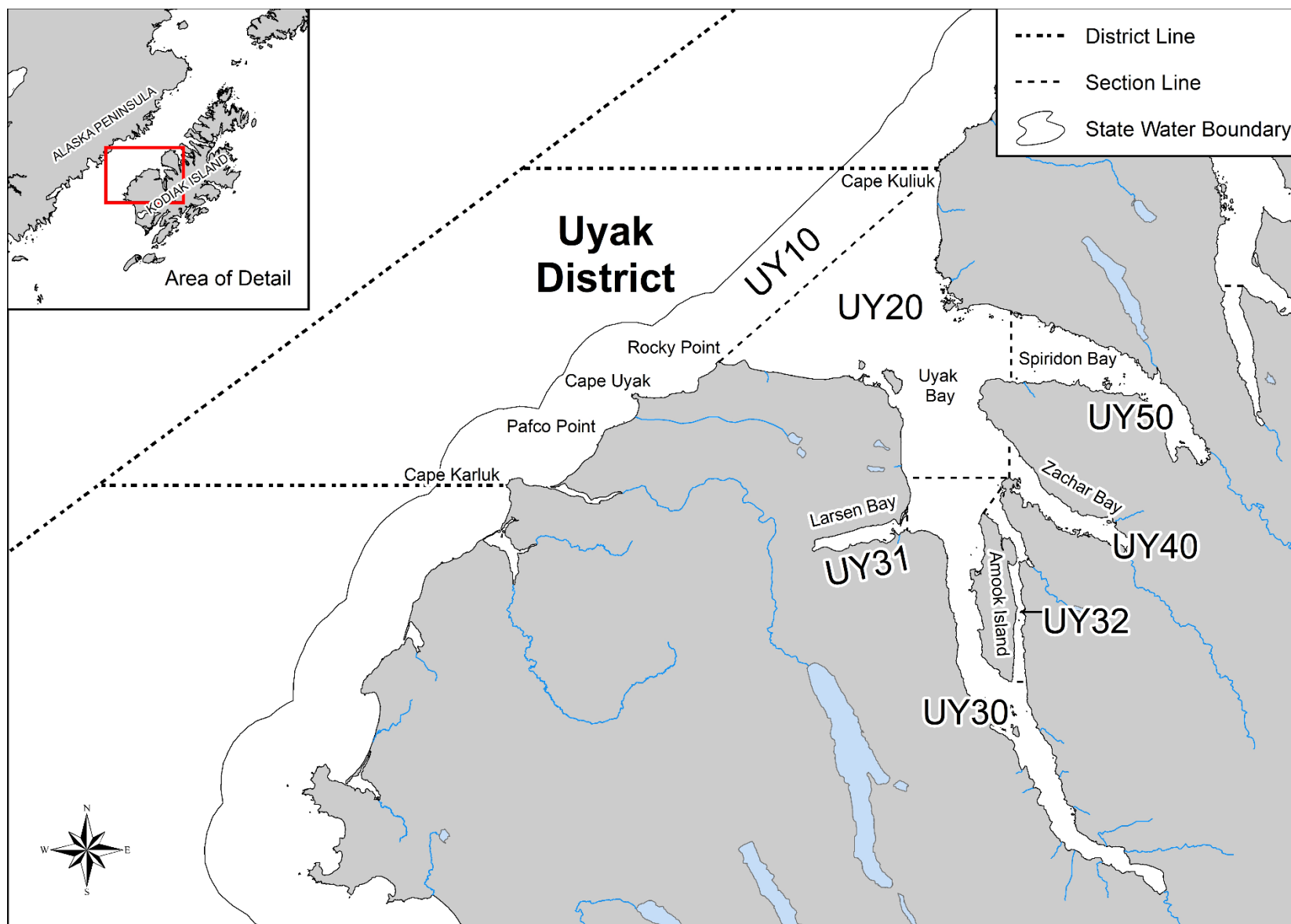


Figure 5.—Map showing the Uyak District.

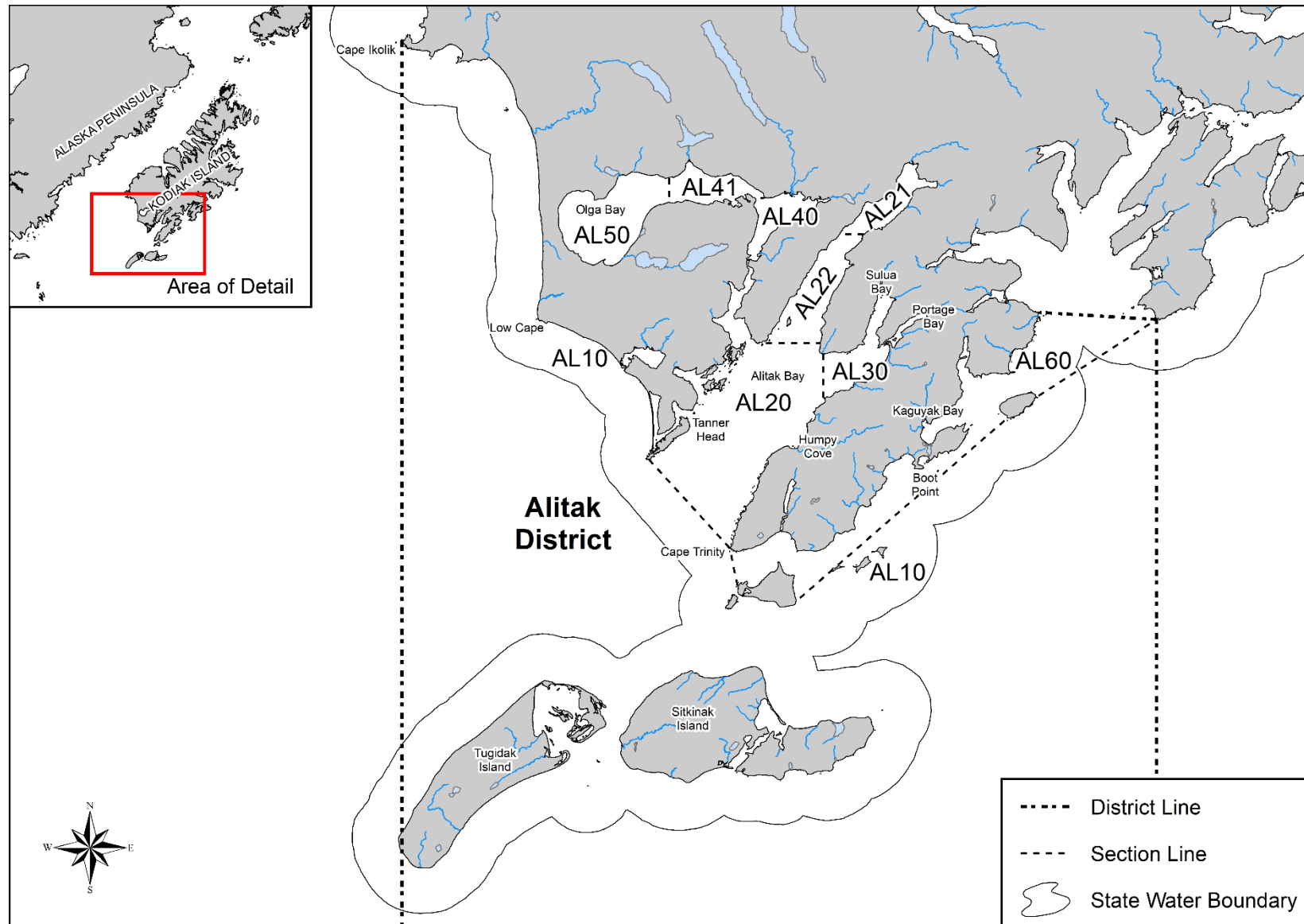


Figure 6.—Map showing the Alitak District.

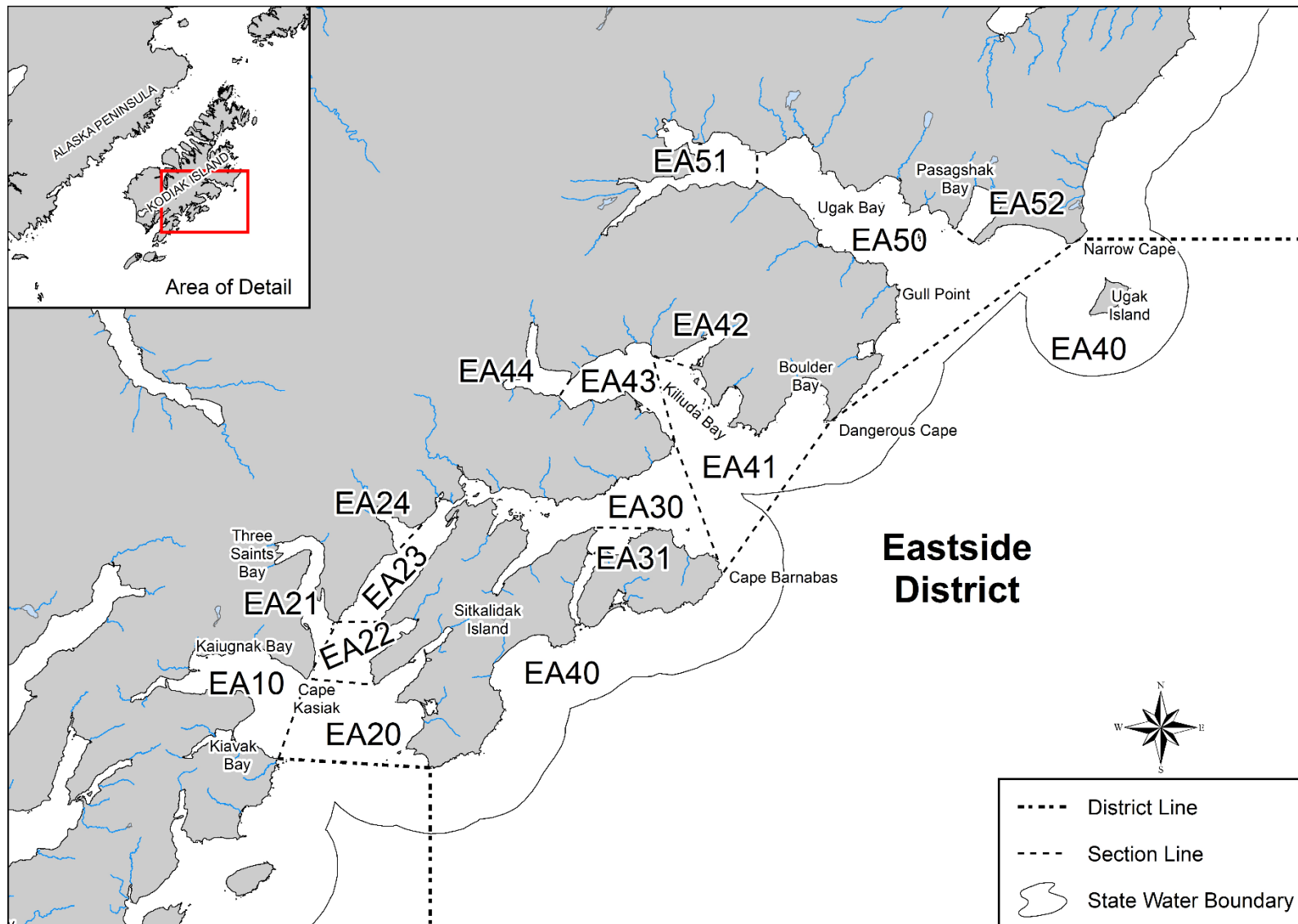


Figure 7.—Map showing the Eastside District.

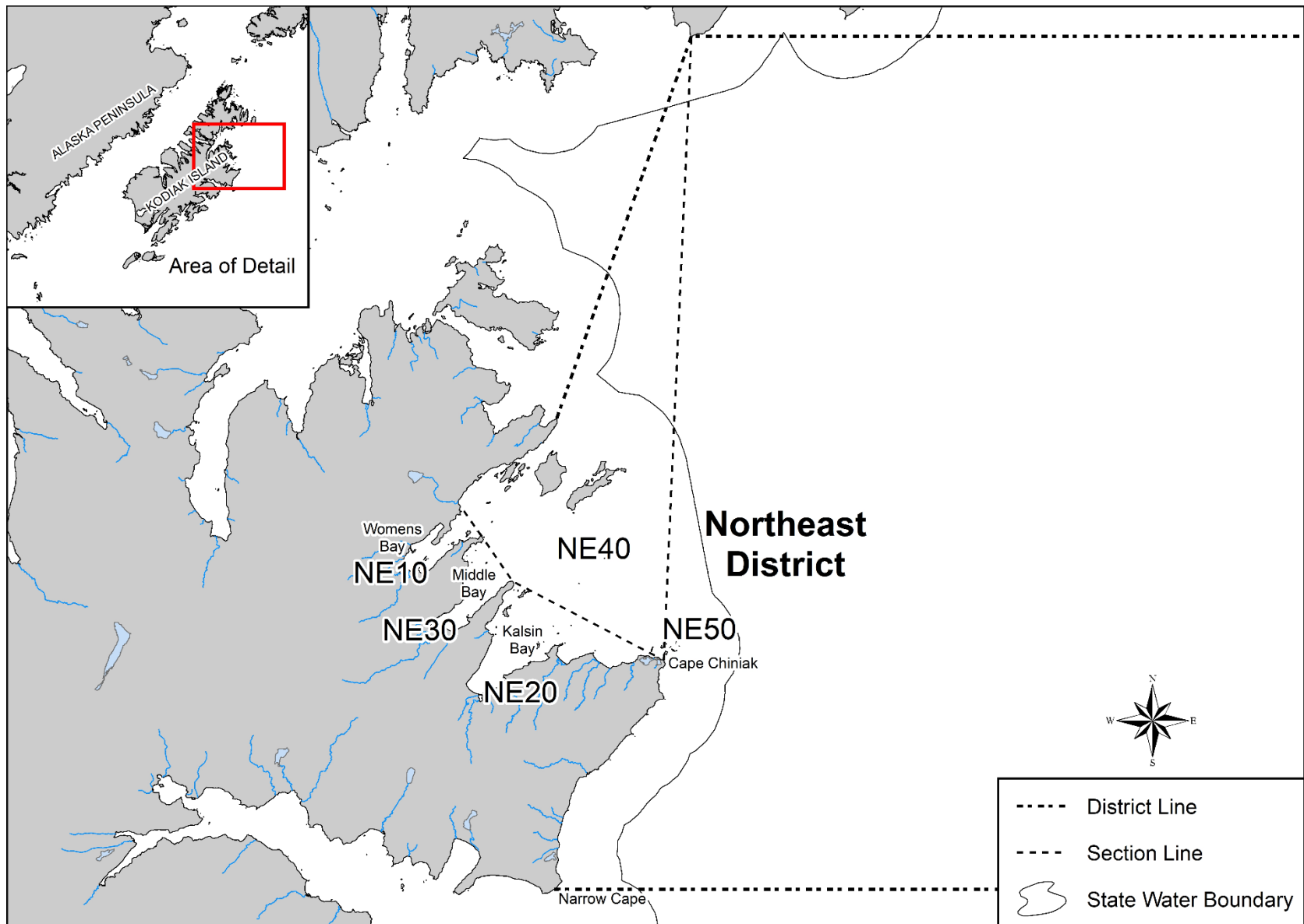


Figure 8.—Map showing the Northeast District.

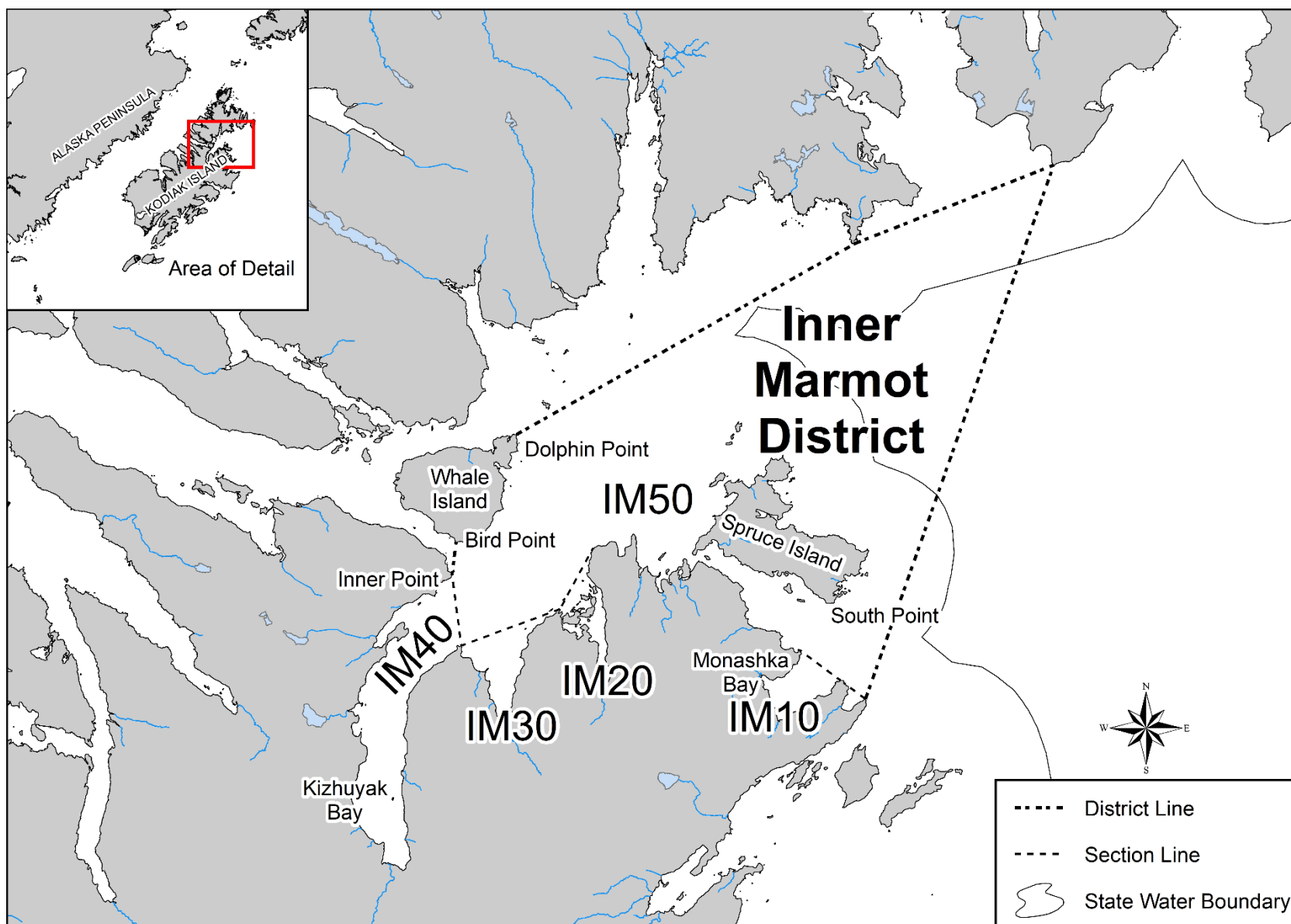


Figure 9.—Map showing the Inner Marmot District.



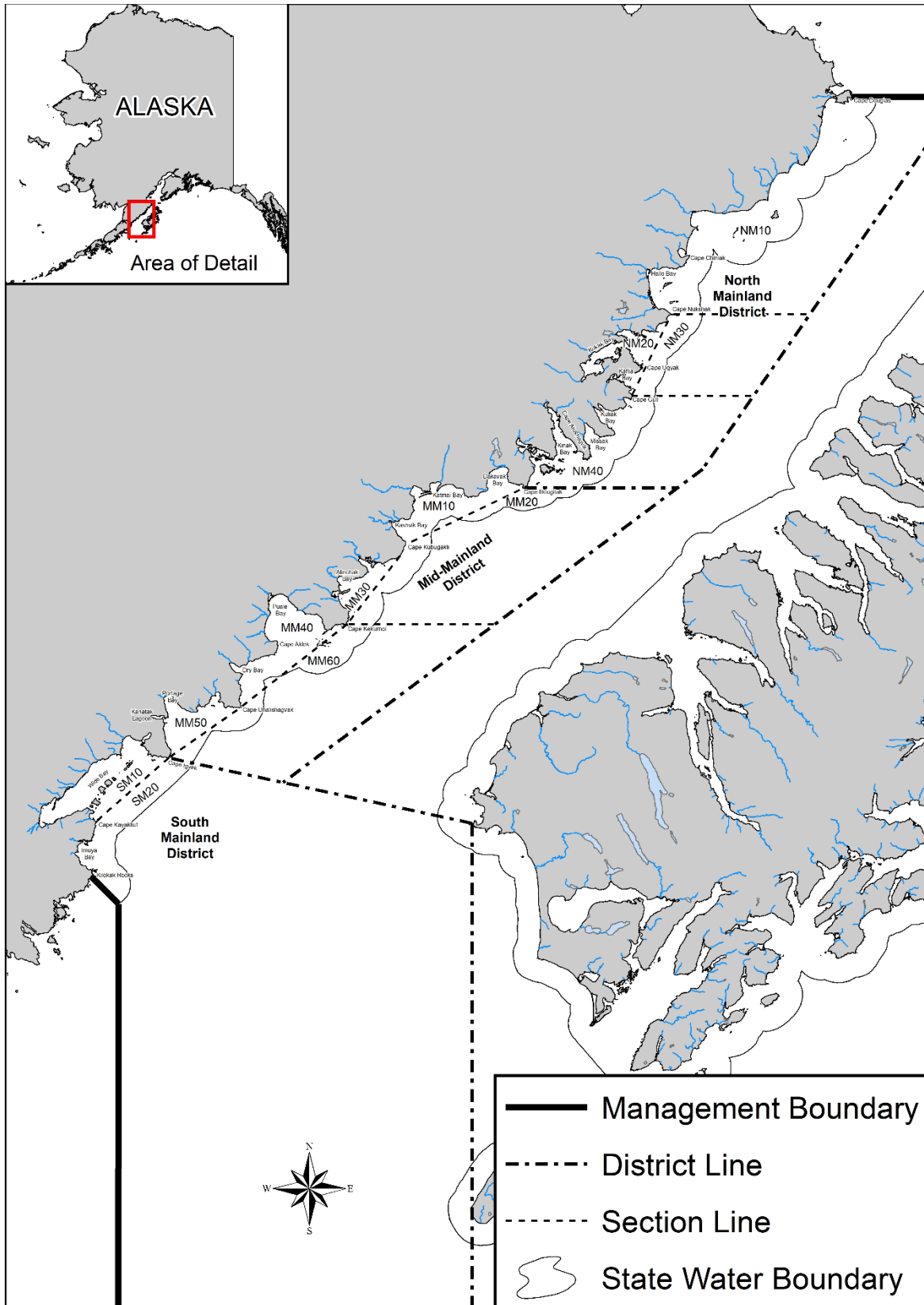


Figure 10.—Map showing the Mainland Districts.



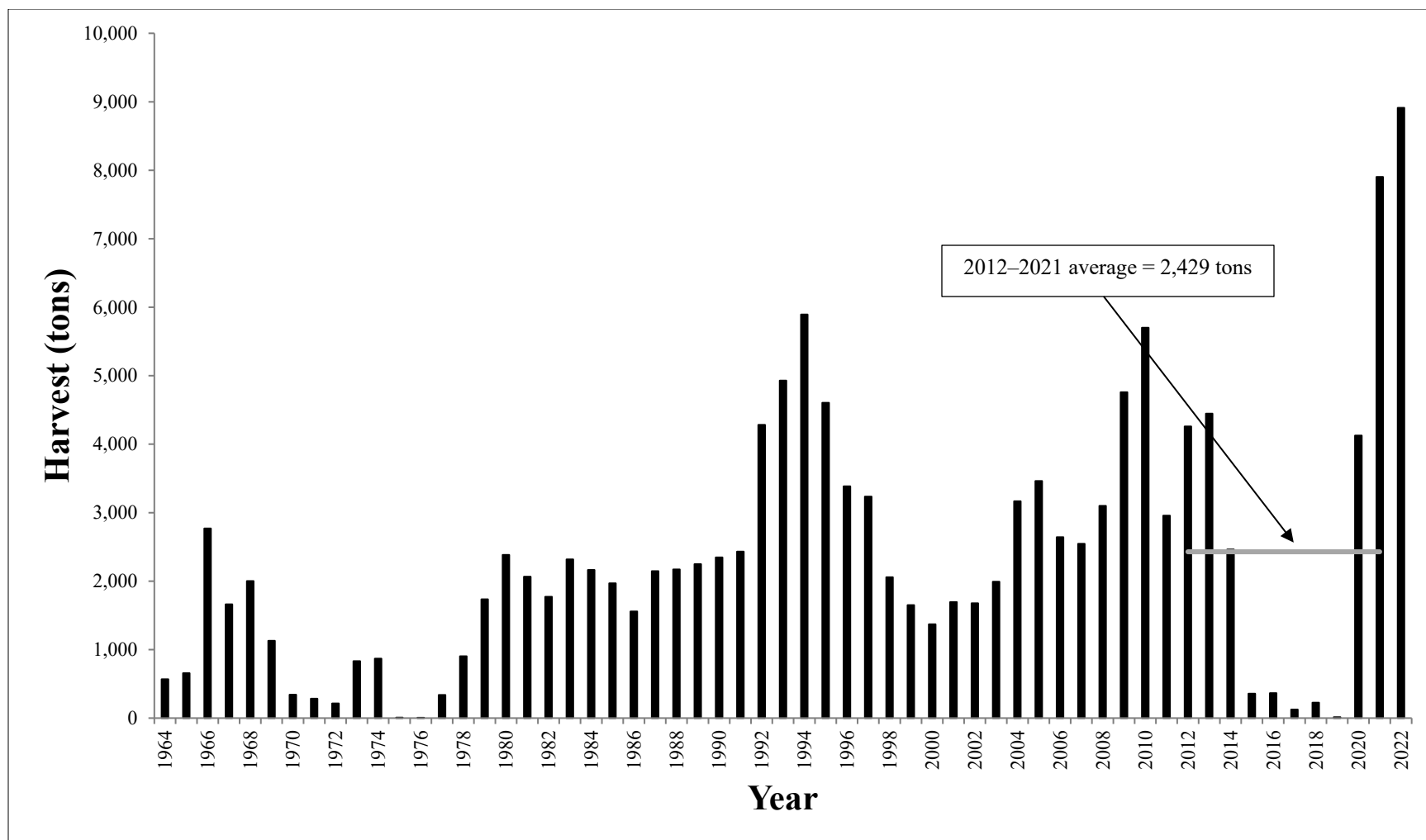


Figure 11.—KMA herring sac roe commercial fishery harvest, 1964–2022.

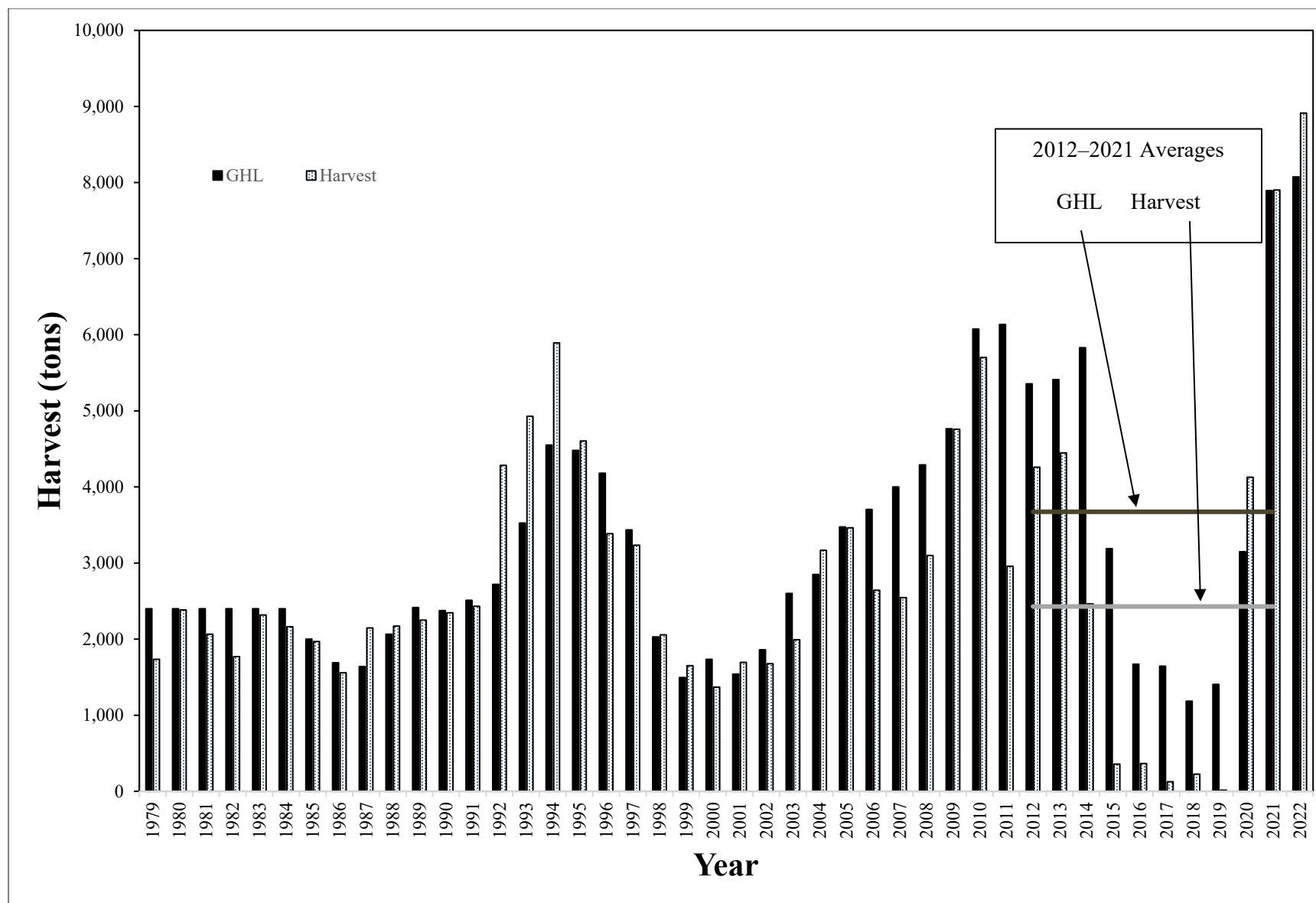


Figure 12.—Comparison of KMA herring sac roe GHLS to harvest, 1979–2022.

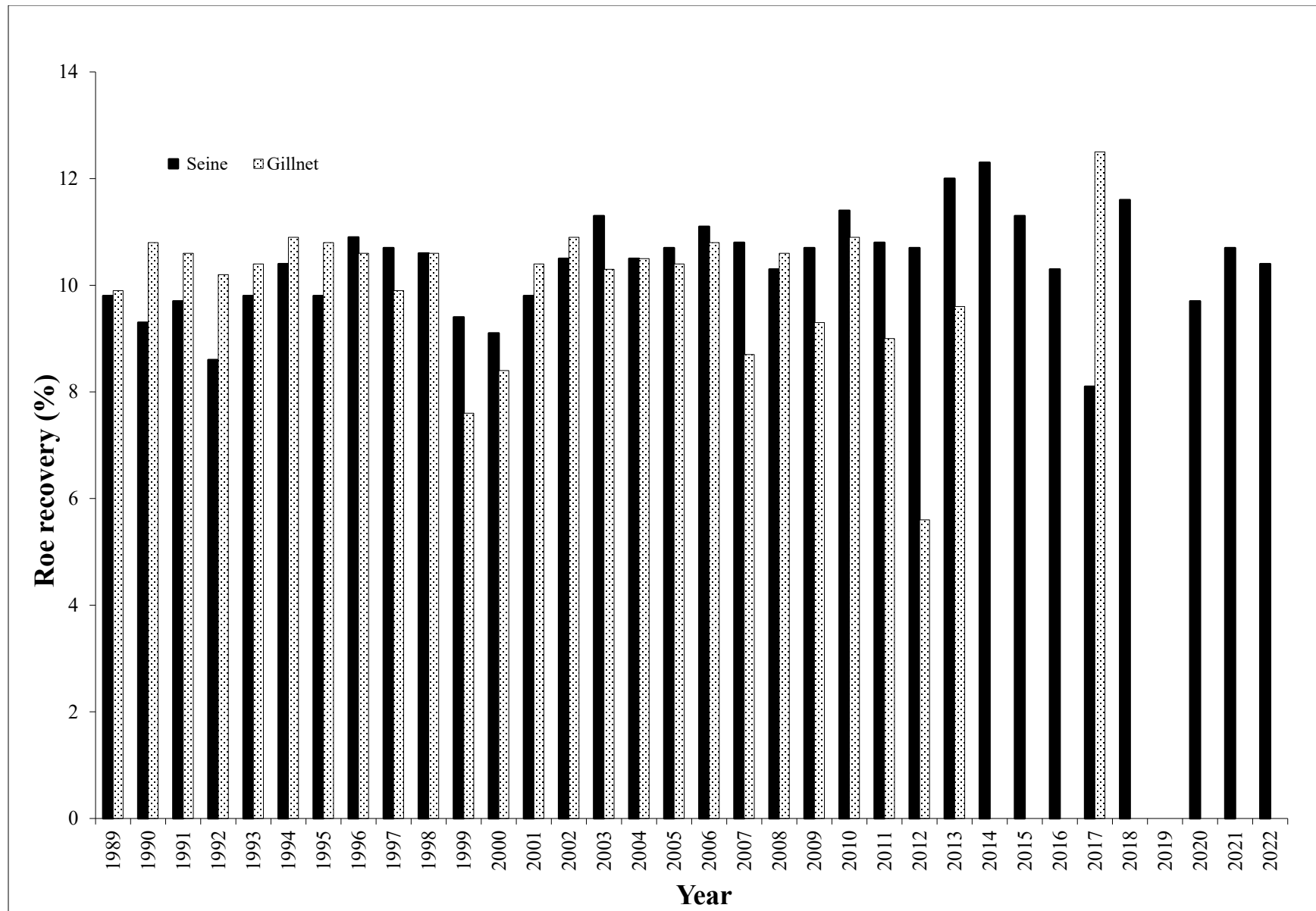


Figure 13.–KMA herring sac roe fishery roe recovery, 1989–2022.

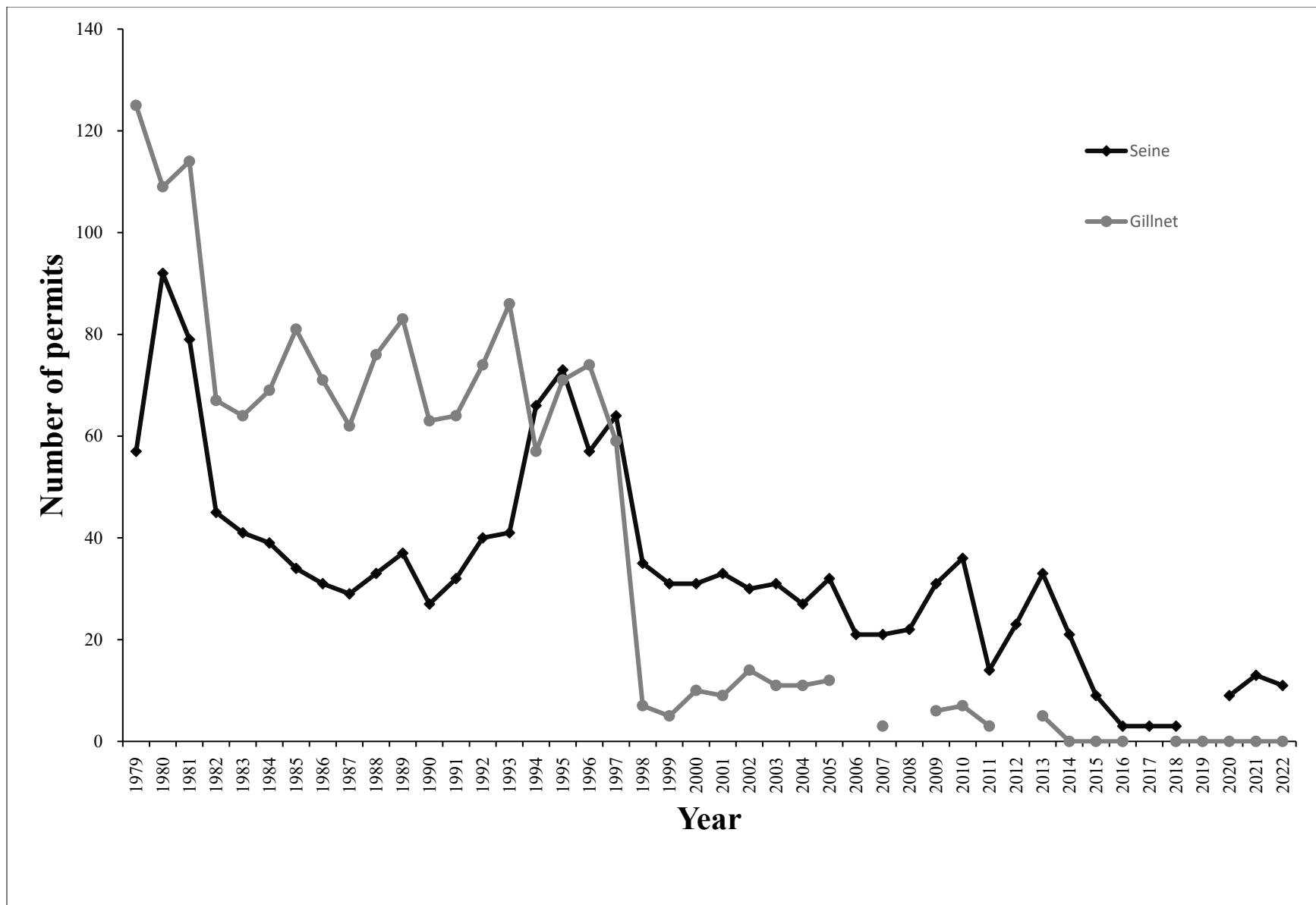


Figure 14.—KMA herring sac roe commercial fishery participation, by gear type, 1979–2022.

*Note:* 2006, 2008, 2012, and 2017 gillnet data and 2019 purse seine data are confidential.

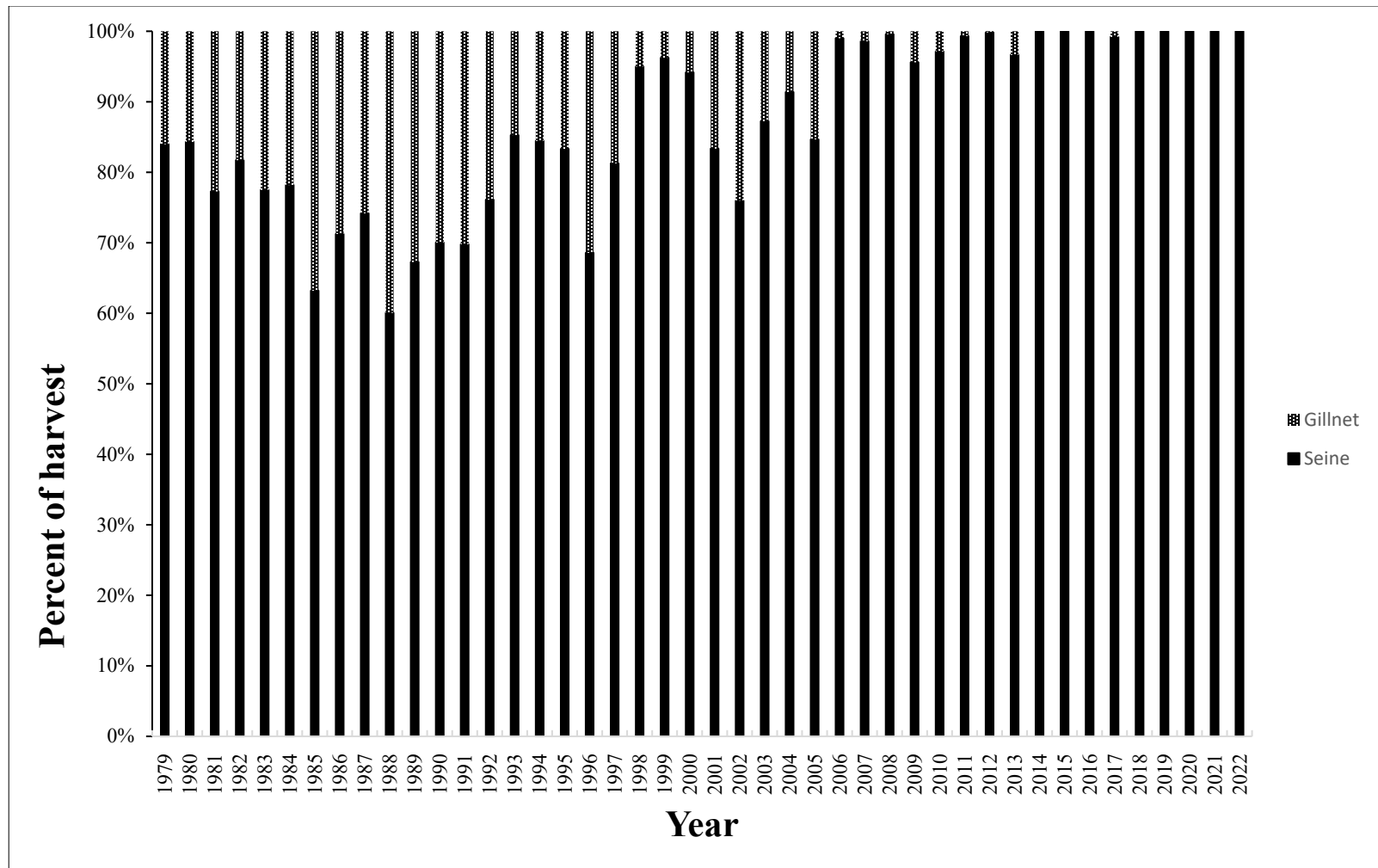


Figure 15.—Percent of the total harvest taken by gear type in the KMA herring sac roe commercial fishery, 1979–2022.

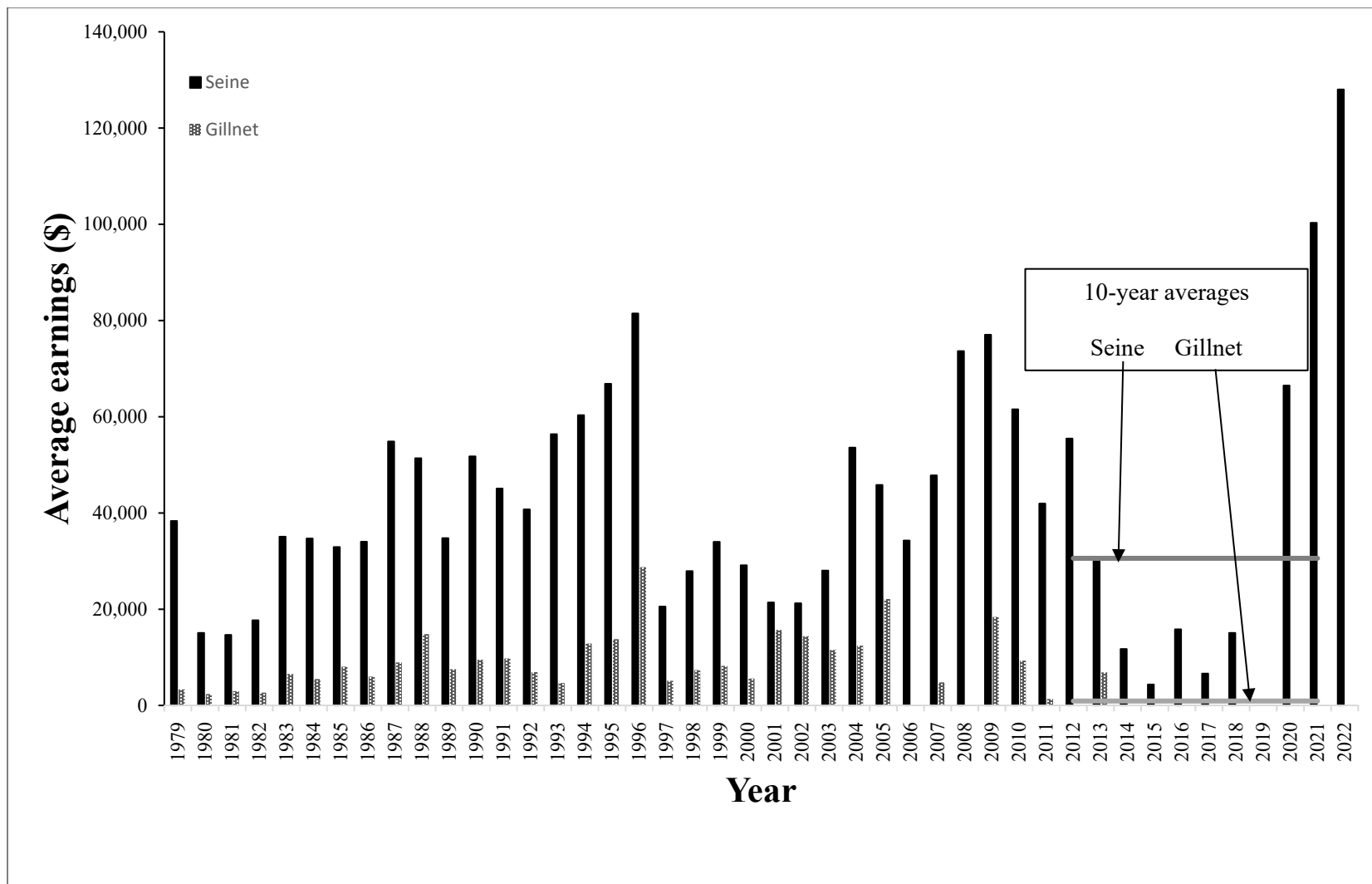


Figure 16.—Average earnings by gear type for KMA herring sac roe commercial fisheries 1979–2022.

Note: 2006, 2008, 2012, and 2017 gillnet data and 2019 purse seine data are confidential.

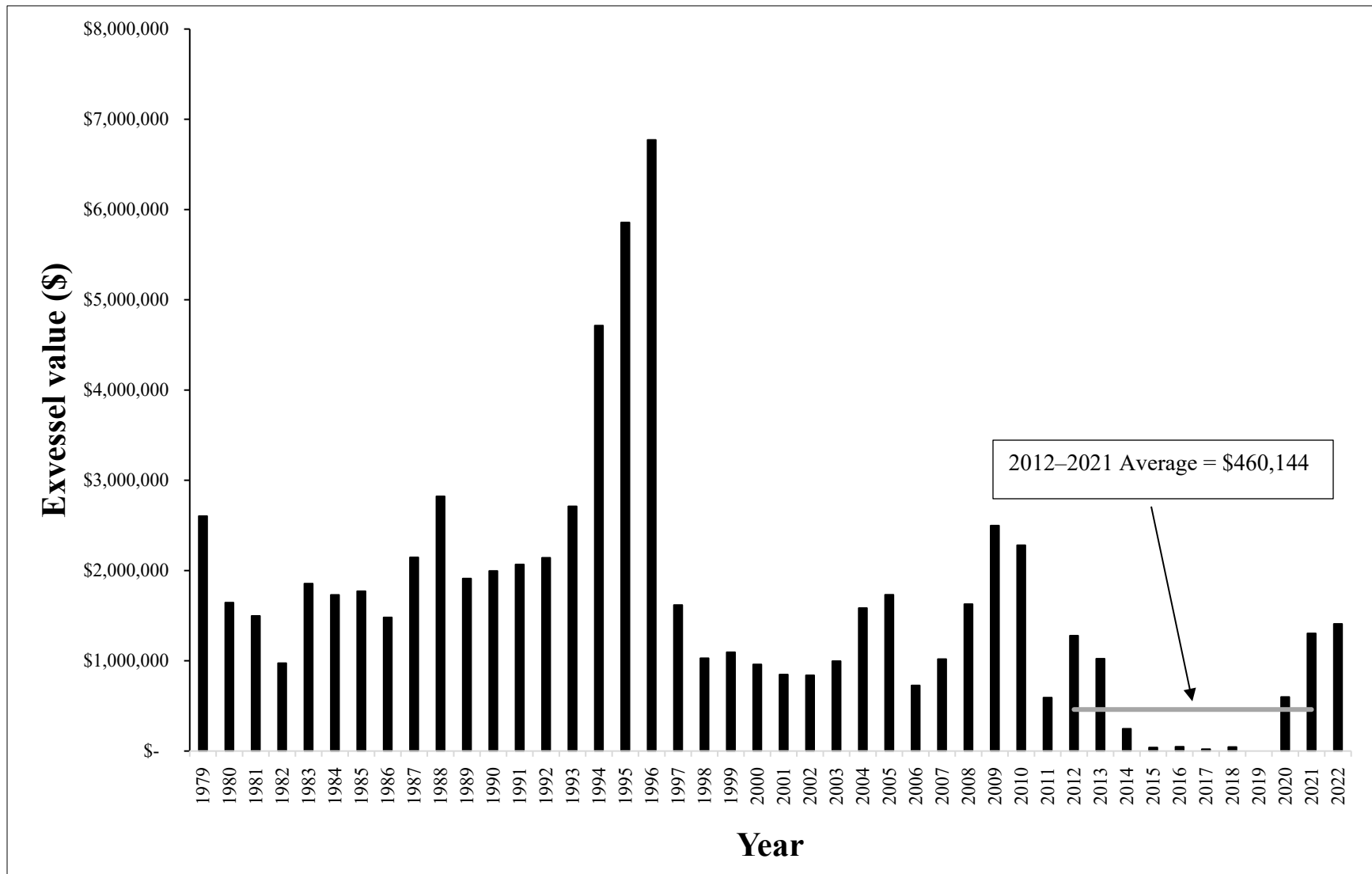


Figure 17.—Total exvessel value for KMA herring sac roe commercial fisheries, 1979–2022.





**APPENDIX A: SUMMARY OF EMERGENCY ORDERS  
ISSUED FOR THE HERRING COMMERCIAL FISHERIES  
IN THE KODIAK MANAGEMENT AREA, 2022**

Appendix A1.—Summary of emergency orders issued for the herring commercial fisheries in the Kodiak Management Area, 2022.

| Emergency Order # | Issued                 | Effective:             | Action Taken:   |
|-------------------|------------------------|------------------------|---|
| 1                 | 10:00 a.m.<br>March 11 | 12:00 noon<br>April 1  | <u>Open Sac Roe Fishery:</u> Initial fishing periods, GHFs, and open sections for sac roe herring fishery   |
| 2                 | 3:45 p.m.<br>April 1   | 2:40 p.m.<br>April 1   | <u>Closure:</u> The Shearwater Bay Section (EA42) at 2:40 p.m. April 1.   |
| 3                 | 4:10 p.m.<br>April 3   | 2:45 p.m.<br>April 3   | <u>Closure:</u> The combined Barling Bay (EA24), Three Saints Bay (EA21), Newman Bay (EA22), and West Sitkalidak Strait (EA23) Sections at 2:45 p.m. April 3 and the combined Kaiugnak (EA10) and SW Sitkalidak (EA20) Sections at 3:27 p.m. April 3. |
| 4                 | 10:30 a.m.<br>April 4  | 10:40 a.m.<br>April 4  | <u>Closure:</u> The Geese-Two Headed (AL60) Section at at 10:40 a.m. April 4.   |
| 5                 | 10:50 a.m.<br>April 6  | 11:00 a.m.<br>April 6  | <u>Closure:</u> The Kalsin Bay (NE20) Section at 11:00 a.m. April 6.  |
| 6                 | 12:30 p.m.<br>April 8  | 10:25 a.m.<br>April 8  | <u>Closure:</u> The combined Inner Kiliuda (EA44) and Outer Kiliuda (EA43) at 10:25 a.m. April 8 and the combined East Sitkalidak (EA30) and Tanginak Anchorage (EA31) Sections at 12:00 noon April 8.  |
| 7                 | 1:30 p.m.<br>April 10  | 12:00 noon<br>April 10 | <u>Closure:</u> The Tonki Bay (NA50) Section at 12:00 noon April 10.  |
| 8                 | 10:00 a.m.<br>April 12 | 10:46 a.m.<br>April 12 | <u>Closure:</u> The combined Village Islands/Uganik Bay Sections (UG30,32-34) at 10:46 a.m. April 12.   |
| 9                 | 12:00 noon<br>April 13 | 12:00 noon<br>April 15 | <u>Fishing Period:</u> The combined Outer Ugak (EA50) and Inner Ugak (EA51) Sections, the combined Inner Uyak (UY30) and Browns Lagoon (UY32) Sections, and the combined Zachar Bay (UY40) and Spiridon Bay (UY50) Sections at 12:00 noon April 15.   |
| 10                | 7:20 p.m.<br>April 13  | 7:30 p.m.<br>April 13  | <u>Closure:</u> The combined Delphin Bay (NA20) and Perenosa Bay (NA30) Sections at 7:30 p.m. April 13.   |

Appendix A1.–Page 2 of 3.

| Emergency Order # | Issued                    | Effective:                | Action Taken:  |
|-------------------|---------------------------|---------------------------|--|
| 11                | 1:00 p.m.<br>April 15     | 12:05 p.m.<br>April 15    | <u>Closure:</u> The combined Viekoda Bay (UG20), Terror Bay (UG21), and West Uganik Passage (UG31) Sections at 12:05 p.m. April 15.                                |
| 12                | 10:30 a.m.<br>April 16    | 9:35 a.m.<br>April 16     | <u>Closure:</u> The combined Zachar Bay (UY40) and Spiridon Bay (UY50) Sections at 9:35 a.m. April 16.   |
| 13                | 1:45 p.m.<br>April 17     | 1:00 p.m.<br>April 17     | <u>Closure:</u> The Kizhuyak Bay (IM40) Section at 1:00 p.m. April 17.   |
| 14                | 8:00 p.m.<br>April 17     | 7:00 p.m.<br>April 17     | <u>Closure:</u> The combined Inner Uyak (UY30) and Browns Lagoon (UY32) Sections at 7:00 p.m. April 17.  |
| 15                | 12:00 noon.<br>April 18   | 9:45 a.m.<br>April 18     | <u>Closure:</u> The Danger Bay (SA40) Section at 9:45 a.m. April 18.   |
| 16                | 3:00 p.m.<br>April 19     | 12:32 p.m.<br>April 19    | <u>Closure:</u> The combined Paramanof Bay (WA31) and Foul Bay (WA32) Sections at 12:32 p.m. and the Malina Bay (WA20) Section at 1:15 p.m. April 19.              |
| 17                | 3:00 p.m.<br>April 20     | 12:00 noon<br>April 20    | <u>Closure:</u> The combined Izhut Bay (SA10), Kitoi Bay (SA20), and MacDonalds Lagoon (SA30) Sections at 12:00 noon April 20.                                     |
| 18                | 2:00 p.m.<br>April 22     | 12:00 noon<br>April 22    | <u>Closure:</u> The combined Outer Ugak (EA50) and Inner Ugak (EA51) at 12:00 noon April 22.   |
| 19                | 6:15 p.m.<br>April 24     | 12:00 noon<br>April 24    | <u>Closure:</u> The combined Inner Alitak (AL20), Inner Deadman Bay (AL21), Outer Deadman Bay (AL22), and Sulua Bay (AL30) Sections at 12:00 noon April 24.        |
| 20                | 10:00 a.m.<br>November 1  | 12:00 noon<br>November 1  | <u>Open Food and Bait Fishery:</u> Initial opening of the food and bait fishery for the West Afognak, Eastside, South Afognak, Uganik, Alitak, and Uyak Districts. |
| 21                | 10:00 a.m.<br>November 10 | 12:00 noon<br>November 10 | <u>Closure:</u> The Uganik and Uyak Districts for food and bait at 12:00 noon November 10.   |

Appendix A1.–Page 3 of 3.

| Emergency Order # | Issued                    | Effective:                | Action Taken:  |
|-------------------|---------------------------|---------------------------|--|
| 22                | 5:30 p.m.<br>November 11  | 6:00 p.m.<br>November 11  | <u>Closure:</u> The West Afognak District for food and bait at 6:00 p.m. November 11.  |
| 23                | 4:45 p.m.<br>November 12  | 5:15 p.m.<br>November 12  | <u>Closure:</u> The South Afognak District for food and bait at 5:15 p.m. November 12. |
| 24                | 10:00 a.m.<br>November 17 | 12:00 noon<br>November 17 | <u>Closure:</u> The Eastside District for food and bait at 12:00 noon November 17.     |