Fishery Management Report No. 16-04

Kodiak Management Area Herring Fisheries Annual Management Report, 2014

by

Geoff Spalinger

February 2016

Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Measures (fisheries)

fork length	FL
mid eye to fork	MEF
mid eye to tail fork	METF
standard length	SL
total length	TL

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

FISHERY MANAGEMENT REPORT NO. 16-04

KODIAK MANAGEMENT AREA HERRING FISHERIES ANNUAL MANAGEMENT REPORT, 2014

by

Geoff Spalinger

Alaska Department of Fish and Game
Division of Sport Fish, Research and Technical Services
333 Raspberry Road, Anchorage, Alaska, 99518-1565

February 2016

The Fishery Management Reports series was established in 1989 by the Division of Sport Fish for the publication of an overview of management activities and goals in a specific geographic area, and became a joint divisional series in 2004 with the Division of Commercial Fisheries. Fishery Management Reports are intended for fishery and other technical professionals, as well as lay persons. Fishery Management Reports are available through the Alaska State Library and on the Internet: http://www.sf.adfg.state.ak.us/statewide/divreports/html/intersearch.cfm. This publication has undergone regional peer review.

Geoff Spalinger
Alaska Department of Fish and Game, Division of Commercial Fisheries,
351 Research Court, Kodiak, AK 99615, USA

This document should be cited as follows:
Spalinger, G. 2016. Kodiak Management Area herring fisheries annual management report, 2014. Alaska Department of Fish and Game, Fishery Management Report No. 16-04, Anchorage.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

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 2014.

The KMA 2014 herring sac roe fishery was open from April 15 through June 30. Fishermen harvested 2,463 tons, compared to the preseason guideline harvest level (GHL) of 5,830 tons. Prior to May 1, the herring sac roe fishery is managed under an allocative harvest strategy that provides approximately 75% of the total Kodiak GHL to seine gear and approximately 25% to gillnet gear. From May 1 through June 30, the Alaska Department of Fish and Game (ADF&G) may open any area with a remaining GHL to any gear group if the fishery is unlikely to result in overharvest. There was no effort by gillnetters in 2014 and purse seine fishermen harvested all 2,463 tons. Roe recovery percentages averaged 12.3% for the fishery. The total exvessel value of the fishery was an estimated $246,300. The harvest was composed primarily of age-9 herring.

A combine fishery was conducted for the KMA herring food and bait fishery due to the small GHLs. Food and bait harvests totaled 124 tons with the entire harvest taken from the South Afognak District (117-ton GHL). The Eastside District (193-ton GHL) was opened; however, no herring were caught.

Subsistence herring harvests were reported from a total of 18 subsistence permits. The total subsistence herring harvest for the KMA in 2014 was 2,264 pounds.

Key words: 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 2014. 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 comprises 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. The fishery currently opens at noon on April 15, with most of the management area opening concurrently. This opening, prior to any major buildup of herring, was historically intended to distribute effort and harvest; however, in recent years, purse seine fishermen have concentrated in areas known to have early spawning herring and the largest guideline harvest levels (GHLs). The fishery ends on June 30 (5 AAC 27.510(a)).

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)).

Fishing Periods

From April 15 through May 7, fishing periods for purse seiners are from noon until 9:00 PM on odd-numbered days and from 9:00 AM to noon on even-numbered days. From May 8 through June 30, fishing periods for purse seiners are from noon until 10:00 PM on odd-numbered days and from 9:00 PM to noon on even-numbered days (5 AAC 27.510(a)(1)). For gillnets, fishing periods are from noon on odd-numbered days until noon on even-numbered days (5 AAC 27.510(a)(2)); however, in recent years the Alaska Department of Fish and Game (ADF&G) has allowed continuous fishing by gillnet gear due to low effort.

Harvest Strategy

The herring sac roe fishery is managed under an allocative harvest strategy that has been in effect since 2000 with some modifications in 2008 and 2009. The harvest strategy requires the 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. For each district that has more than one section open to fishing, ADF&G is required to assign 20% to 30% of the GHL to gillnet permit holders and 70% to 80% of the GHL to purse seine permit holders (5 AAC 27.535(e)(2)(D)). This is 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, ADF&G establishes GHLs for both gear types, within a section, and fishing is separated by time or area. 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.

Regulation changes made by the Alaska Board of Fisheries (BOF) in 2009 allow ADF&G, from May 1 through June 30, to open any area with a remaining GHL to any gear group if the fishery is not likely to result in overharvest (5 AAC 27.535(e)(1)(C)). Also, after April 30, permit holders must be registered with ADF&G before participating in the fishery (5 AAC 27.510(a)(4)).

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 2014, section GHLs ranged from 10 to 1,700 tons (short; Table 2). Establishing the 2014 GHLs involved evaluation of a variety of information to determine stock status trends and conservative adjustment of GHLs, including

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 fishermen and processors in planning prior to the start of each season.

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 due to selective harvest of mature herring by fishermen and the inseason processing of relatively small amounts of herring over long time periods by local processors. In the 1990s, competition in the purse seine fishery intensified and fishermen 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 so that ADF&G is directed to strive for the highest quality product (5 AAC 27.535(e)(6)).

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 approaches, 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.

2014 SEASON SUMMARY

The 2014 sac roe season opened at noon April 15. The last harvest occurred on May 12 and 24 EOs were issued during the season (Figure 12; Appendix A1). The total 2014 KMA GHL was established at 5,830 tons and 2,463 tons were harvested (Table 3; Figure 13).

In 2014, 21 purse seine permit holders made 99 landings harvesting 2,463 tons. No gillnet permit holder made a landing in 2014, resulting in purse seine fishermen harvesting 100% of the total catch. (Table 3; Figures 14 and 15). The 2014 average individual harvest was 117 tons for purse seiners (Table 3). Five processing facilities bought and processed herring.

ADF&G monitored the fishery with 1 shore-based field crew and 2 research vessels, all of which were stationed in anticipated herring harvest locations. Vessels and the field crew gathered effort and harvest data used to manage the fishery, and collected commercial catch samples to obtain age, weight, length (AWL), and maturity data.

There were a total of 46 sections open to fishing; however, 13 sections were designated exploratory having little or no historic harvests. Harvests occurred within 8 sections and the remaining sections were not fished. There were 24 EOs issued concerning the fishery (Appendix A1).

Purse Seine Fishery

The 2014 herring harvest by purse seine gear occurred in 2 areas. Herring were only harvested in sections of the Eastside and South Afognak districts. The West Sitkalidak, East Sitkalidak, Shearwater, Outer Kiliuda, Inner Ugak, and Outer Ugak sections of the Eastside District had a combined harvest of 1,428 tons. The Danger Bay and the combined Kitoi, Izhut, MacDonalds Lagoon sections had a combined harvest of 1,036 tons (Table 2). Roe recovery from purse seine harvests averaged 12.3% (Figure 16).

The combined Village Islands/Uganik Bay sections had the largest GHL in the KMA and these sections had been the most consistent herring producers for the last 10 years. The observed biomass in 2014 was far less than expected and these sections remained closed. The Kizhuyak Bay and the combined Kitoi, Izhut, MacDonalds Lagoon sections were closed earlier than anticipated due to the large presence of juvenile herring.

Gillnet Fishery

Gillnet effort was expected to be minimal in 2014. As a result, ADF&G opened areas initially allocated to the gillnet fleet by EO to continuous fishing beginning at noon on April 15 (Appendix A1). Normally gillnet areas follow a fishing schedule that allows them to fish from noon on even-numbered days until noon on odd-numbered days (24-hour open periods followed by 24-hour closed periods).

No gillnet permit holders participated in the 2014 fishery.

Inseason Gear Changes

After April 30, ADF&G has the authority to allow any gear group access to a section with a remaining GHL, if the fishery is unlikely to result in overharvest (5 AAC 27.535(e)(1)(C)). Beginning noon May 1, the following sections were opened to both gear types: the Inner Alitak Bay, Inner/Outer Deadman bays, East Upper Olga Bay, West Upper Olga Bay, Sulua Bay, Lower Olga Bay, Three Saints Bay, West Sitkalidak, Barling Bay, Outer Ugak Bay, Inner Ugak Bay, Viekoda Bay, Terror Bay, West Uganik Passage, Tonki Bay, and the Izhut/Kitoi/MacDonalds Lagoon sections. The Shearwater Bay and Inner Kiliuda Bay sections were opened on May 7 when the R/V *K-Hi-C* became available to monitor those fisheries. Purse seine gear was also allowed back into the Danger Bay Section as a result of remaining GHL by the gillnet fleet.

Purse seine vessels were able to harvest an additional 790 tons from areas where the gillnet GHL was unharvested. The majority of the 790 tons were taken from the Danger Bay Section. Herring were also taken from the Inner Ugak and Inner Kiliuda sections.

Exvessel Value of the Fishery

In 2014 the dock delivered exvessel price paid for 10% roe recovery herring was the lowest on record at approximately $100 per ton (Table 3). The estimated average exvessel earnings per purse seine permit holder was $11,729 (Figure 17). The total exvessel value of the 2014 fishery

was worth an estimated $246,300 (Table 3; Figure 18), 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 12.3% (Figure 16).

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 mid-water trawl). Age composition information from these samples provide insight into recruitment and aid 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 during the day and rise toward the surface during 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 in 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 3,682 herring were collected and analyzed for AWL data from harvests and ADF&G trawl samples during the 2014 sac roe season. Samples were taken from 9 sections, 7 of which had commercial harvests. Age-9 herring were the dominant age class harvested, representing approximately 52.3% of the total commercial harvest (Table 4). The complete commercial harvest consisted of 2.2% age-2, 1.7% age-3, 10.5% age-4, 4.9% age-5, 2.5% age-6, 11.1% age-7, 6.8% age-8, 52.3% age-9, 5.9% age-10, and 2.1% age-11 and older herring (Table 4). To simplify reporting hereafter, age composition estimates will be rounded to the nearest percent. Herring size at age was fairly consistent throughout KMA (Table 5).

Stock Status by District

Herring can generally be found seasonally in all bays of the KMA (Figure 2). ADF&G attempts to monitor 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 fishermen, 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 (less than 20 tons; Figure 2). The Tonki Bay Section currently has the largest biomass and had a GHL of 40 tons in 2014. The Perenosa Bay Section was open to gillnet gear in 2014 with a 10-ton GHL, and the Delphin Bay Section was open as exploratory. No harvest has occurred in the North Afognak District since 2010.

West Afognak District

The West Afognak District has six sections, 5 of which are known to have spawning stocks of herring (Figure 3). Paramanof Bay has the largest spawning stock within this district; however, this stock has been at low levels since 2005 and no herring were observed in 2014.

South Afognak District

The South Afognak District comprises 6 sections, and the Danger Bay Section currently has the largest stock of herring in this district (Figure 3). This section opened with a 1,000-ton GHL for both purse seine (800-ton GHL) and gillnet (200-ton GHL) permit holders (Table 2). Purse seine fishermen harvested 1,033 tons (Table 2). Commercial catch samples from the Danger Bay Section consisted of 1% age-2, 1% age-3, 10% age-4, 7% age-5, 5% age-6, 19% age-7, 10% age-8, 38% age-9, 8% age-10, and 1% age-11 and older herring (Table 4). Hydroacoustic surveys conducted by ADF&G estimated approximately 8,500 tons of herring.

In 2014, the MacDonalds Lagoon, Kitoi Bay, and Izhut Bay sections were combined and managed as 1 unit allocated to purse seine gear with a 100-ton GHL (Table 2). Only 3 tons were harvested and these sections were closed due to the large presence of juvenile herring (Table 4).

Uganik District

The Uganik District consists of 9 sections on the northwest side of Kodiak Island (Figure 4). During the last 10 years this district had the largest harvests in the KMA. The 2014 GHL for the combined Village Islands/Uganik Bay sections was 1,700 tons (1,350 purse seine and 350 gillnet; Table 2). The R/V *K-Hi-C* arrived in Uganik on April 12 to conduct hydroacoustic surveys prior to the fishery. Lower than expected biomass was observed and these sections were not opened (Table 2). Hydroacoustic surveys estimated approximately 6,000 tons of herring; normally, 10,000 to 30,000 tons are observed. A cost recovery was allowed to occur that harvested 27 tons. Catch samples from the cost recovery were composed of 3% age-4, 6% age-5, 3% age-6, 13% age-7, 6% age-8, 48% age-9, 19% age-10, and 4% age-11 and older herring (Table 4).

The West Uganik Passage, Terror Bay, and Viekoda sections all had established GHLs but no herring were harvested (Table 2).

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. Since 2012, there has not been adequate herring observed to warrant any openings in this district. Hydroacoustic surveys in 2014 estimated 345 tons in the Inner Uyak Bay Section, 218 tons in the Browns Lagoon Section, 40 tons in the Zachar Bay Section, and 54 tons in the Spiridon Bay Section.

Alitak District

All sections in the Alitak District (Figure 6), except the Outer Alitak Section, are known to have herring stocks. Herring 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. Surveys and fishing effort in the Alitak District are often limited due to the late timing of these stocks which often are not present until June.

The Inner and Outer Deadman Bay sections currently have the largest biomass and were combined and managed as one section in 2014. These combined sections had a GHL of 300 tons, but no fish were harvested (Table 2). Based on hydroacoustic surveys, 460 tons of herring were estimated, plus several schools of what were likely juvenile herring were also seen.

The East Upper Olga Bay and West Upper Olga Bay sections were each open in 2014 with a 50-ton GHL, but no harvest occurred. The Inner Alitak and Sulua Bay sections each had a 75-ton GHL, and no harvest occurred (Table 2). Hydroacoustic surveys documented 335 tons of herring.

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 1, 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. Sections in the Eastside District have historically been areas where purse seiners concentrate for the initial April 15 opening.

Generally, the East and West Sitkalidak sections have the earliest spawning herring in the KMA, with initial spawns sometimes occurring in March. In 2014, the GHL for the East Sitkalidak Section was established at 300 tons, and 352 tons were harvested by purse seine gear (Table 2). The commercial harvest from the East Sitkalidak Section was composed of 6% age-2, 1% age-3, 11% age-4, 3% age-5, 1% age-6, 5% age-7, 3% age-8, 57% age-9, 7% age-10, and 6% age-11 and older herring (Table 4).

The West Sitkalidak Section GHL was established at 300 tons and 111 tons were harvested by purse seine gear (Table 2). No commercial catch samples were collected.

The Barling Bay Section, adjacent to the West Sitkalidak Section, had a 125-ton GHL initially open to gillnet gear (Table 2). On May 1 this section was opened to purse seine gear as well but no herring were harvested (Table 2).

The Inner and Outer Kiliuda Bay sections also have some of the earliest spawning herring in the KMA. Several spawns occurred in 2014, which were documented before, during, and after the fishery. The GHL for the Outer Kiliuda Bay Section was set at 225 tons, and 199 tons were harvested by purse seine fishermen (Table 2). Age composition of the harvest was 1% age-2, 2% age-3, 11% age-4, 4% age-5, 1% age-6, 4% age-7, 5% age-8, 63% age-9, 6% age-10, and 4% age-11 and older herring (Table 4). The Inner Kiliuda Bay Section was opened as a gillnet section with a 100-ton GHL and later opened to purse seine gear; however, no herring were harvested (Table 2).

The Inner and Outer Ugak Bay sections have recently been strong herring producers. The GHL for the Outer Ugak Bay Section was 450 tons and allocated to purse seiners; 472 tons were harvested (Table 2). Samples from the harvest consisted of 3% age-2, 4% age-3, 14% age-4, 5% age-5, 1% age-6, 9% age-7, 5% age-8, 56% age-9, and 2% age-10 herring (Table 4). The Inner Ugak Bay Section was initially allocated to the gillnet fleet then opened to the purse seine fleet as well on May 1. The GHL was set at 200 tons and 174 tons were harvested (Table 2). The harvest was composed of 2% age-2, 2% age-4, 2% age-5, 3% age-7, 4% age-8, 85% age-9, 2 % age-10, and 1% age-11 and older herring (Table 4).

The Shearwater Bay Section was initially allocated to the gillnet fleet with a 125-ton GHL and on May 7 this section was also opened to purse seine gear (Table 2). The purse seine fleet harvested 120 tons (Table 2). Age composition of the harvest consisted of 2% age-2, 1% age-3, 11% age-4, 2% age-5, 1% age-6, 2% age-7, 2% age-8, 69% age-9, 7% age-10, and 4% age-11 and older herring (Table 4).

Northeast District

The Northeast District is composed of 5 sections, four 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. Each section was allocated to the gillnet fleet with a 25-ton GHL; however, no herring were harvested (Table 2).

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 to purse seine gear with a 225-ton GHL (Table 2). This section was closed before any harvest occurred due to the large presence of juvenile herring.

Mainland District

There are 3 Mainland districts comprising 12 sections (Figure 10). The last commercial herring harvest from the Mainland districts occurred in 1997. In 2014, seven sections were open as exploratory; however, no effort occurred. The Inner Kukak Bay Section currently has the largest known biomass in the Mainland districts. Between 20,000 and 30,000 tons were estimated in this section based on hydroacoustic surveys. Samples taken by trawl net were composed of 1% age-2, 2% age-3, 35% age-4, 26% age-5, 13% age-6, 18% age-7, 3% age-8, 1% age-9, 1% age-10, and 1% age-11 and older herring (Table 4).

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 fishermen 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 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 District, the area with the largest GHL, and the South Afognak District in recent years. Areas with smaller GHLs, such as the Eastside, Alitak, and Uyak districts, have generally had less effort. 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 fishermen 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 Johnson et al., 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. The current harvest strategy alleviates the problem of identifying the spawning stock of a harvest in areas where intermixing may occur by closing the food and bait fishery north of the latitude of Miners Point (Uganik Bay) when the Kamishak spawning biomass falls below 6,000 tons (5 AAC 27.535(d)). The 2014, projected biomass was above minimum threshold and no restrictions were placed the food and bait fishery north of Miners Point. Despite biomass levels being above threshold in Kamishak Bay, areas along the Shelikof Strait remained closed due to low abundance of Kodiak stocks.

2014/2015 SEASON

The biggest obstacle to a competitive fishery is how to determine an equitable fishing period between the differing gear types. Permit holders again requested a combine fishery for the 2014/2015 season. ADF&G accommodated the permit holders' request, and the South Afognak District (117-ton GHL) and the Eastside District (193-ton GHL) opened on November 5 (Table 6). Approximately 124 tons were harvested from the South Afognak District on December 13 and December 14. The South Afognak District was closed December 15. No herring were harvested from the Eastside District. The harvest of 124 tons was below the recent 10-year average harvest of 224 tons (Table 7). The harvest was composed of 5% age-2, 4% age-4, 6% age-5, 3% age-6, 20% age-7, 14% age-8, 40% age-9, 6% age-10, and 1% age-11 and older herring.

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; Gretsch 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 escalated 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 fishermen obtain a permit prior to fishing (5 AAC 01.530(d)). Herring were included on the existing KMA salmon and crab subsistence permit. Another permit was also created which allows for the harvest of up to 1,000 pounds of herring by commercial permit holders to be used as bait in commercial fisheries (5 AAC 27.545).

2014 SEASON SUMMARY

A total of 18 KMA subsistence permits were returned to ADF&G, as required for reporting purposes, with herring subsistence harvest data. The reported subsistence herring harvests totaled 2,264 pounds (Table 8). The majority of the harvest occurred in the Northeast, Eastside, and Alitak districts.

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, 65:1036–1045.

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 2014.

Year	Sac roe harvest (tons)	Food/bait harvest (tons)	Total herring harvest (tons)	Sac roe % of total harvest	Food/bait % of total 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%

-continued-

Table 1.–Page 2 of 2.

Year	Sac roe harvest (tons)	Food/bait harvest (tons)	Total herring harvest (tons)	Sac roe % of total harvest	Food/bait % of total 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%
Average 1964 to 2013	2,274	216	2,490	91%	9%
10-Year Average 2004 to 2013	3,704	214	3,918	94%	6%
5-Year Average 2009 to 2013	4,425	251	4,676	94%	6%

Table 2.–Herring sac roe fishery GHLs by section and gear type, harvest by section and gear type, and date sections were closed, KMA, 2014.

Statistical area	Management section	GHL	Initial gear type [a]	Harvest		Date closed	
				Purse seine	Gillnet	Purse seine	Gillnet
North Afognak District							
NA10	Shuyak Island	Closed	-	-	-	-	-
NA20	Delphin Bay	Exploratory	Both	0	0	6/30	6/30
NA30	Perenosa Bay	10	Gillnet	-	0	-	6/30
NA40	Seal Bay	Closed	-	-	-	-	-
NA50	Tonki Bay	40	Gillnet	0	0	6/30	6/30
West Afognak District							
WA10	Raspberry Strait	10	Gillnet	-	0	-	6/30
WA20	Malina Bay	10	Gillnet	-	0	-	6/30
WA31 [b]	Paramanof Bay	Closed	-	-	-	-	-
WA32 [b]	Foul Bay		-	[b]	[b]	[b]	[b]
WA40	Bluefox Bay	Exploratory	Both	0	0	6/30	6/30
WA50	Offshore W. Afognak	Closed	-	-	-	-	-
South Afognak District							
SA10 [c]	Izhut Bay	100	Purse Seine	3	0	5/2	5/2
SA20 [c]	Kitoi Bay	[c]	[c]	[c]	[c]	[c]	[c]
SA30 [c]	MacDonald Lagoon	[c]	[c]	[c]	[c]	[c]	[c]
SA40	Danger Bay	1,000	800PS/200GN	1,033	0	5/2	5/2
SA50	Litnik	Closed	-	-	-	-	-
SA60	Duck Bay	Closed	-	-	-	-	-
Total all Afognak Districts		1,170		1,036	0		
Uganik District							
UG10	Kupreanof	Closed	-	-	-	-	-
UG20	Viekoda Bay	25	Gillnet	0	0	6/30	6/30
UG21	Terror Bay	30	Gillnet	0	0	6/30	6/30
UG30 [d]	Village Islands	1,700	1,350PS/350GN	-	-	-	-
UG31	West Uganik Passage	50	Gillnet	0	0	6/30	6/30
UG32 [d]	NE Arm Uganik Bay	[d]	[d]	[d]	[d]	[d]	[d]
UG33 [d]	East Arm Uganik Bay	[d]	[d]	[d]	[d]	[d]	[d]
UG34 [d]	South Arm Uganik Bay	[d]	[d]	[d]	[d]	[d]	[d]
UG40	Offshore Uganik	Closed	-	-	-	-	-
District total		1,805		0	0		
Uyak District							
UY10	Offshore Uyak	Closed	-	-	-	-	-
UY20	Harvester Island	Closed	-	-	-	-	-
UY30	Inner Uyak	Closed	-	-	-	-	-
UY32	Browns Lagoon	Closed	-	-	-	-	-
UY31	Larsen Bay	Closed	-	-	-	-	-
UY40	Zachar Bay	Closed	-	-	-	-	-
UY50	Spiridon Bay	Closed	-	-	-	-	-
District total							

-continued-

Table 2.–Page 2 of 3.

Statistical area	Management section	GHL	Initial gear type[a]	Harvest		Date closed	
				Purse seine	Gillnet	Purse seine	Gillnet
Alitak District							
AL10	Outer Alitak	Closed	-	-	-	-	-
AL20	Inner Alitak	75	Purse seine	0	0	6/30	6/30
AL21 [e]	Inner Deadman Bay	300	Purse seine	0	0	6/30	6/30
AL22 [e]	Outer Deadman Bay	[e]	[e]	[e]	[e]	[e]	[e]
AL30	Sulua Bay	75	Gillnet	0	0	6/30	6/30
AL40	Lower Olga-Moser	50	Gillnet	0	0	6/30	6/30
AL41	East Upper Olga Bay	50	Purse seine	0	0	6/30	6/30
AL50	West Upper Olga Bay	50	Purse seine	0	0	6/30	6/30
AL60	Geese/Twoheaded	Exploratory	Both	0	0	6/30	6/30
District total		600		0	0		
Sturgeon/Halibut District							
SH10	Sturgeon/Halibut	Closed	Closed	Closed			
Eastside District							
EA10	Kaiugnak	Exploratory	Both	0	0	6/30	6/30
EA20	SW. Sitkalidak	Exploratory	Both	0	0	6/30	6/30
EA21	Three Saints Bay	100	Purse seine	0	0	6/30	6/30
EA22	Newman Bay	Exploratory	Both	0	0	6/30	6/30
EA23	W. Sitkalidak Strait	300	Purse seine	111	0	6/30	6/30
EA24	Barling Bay	125	Gillnet	0	0	6/30	6/30
EA30	E. Sitkalidak Strait	300	Purse seine	352	-	4/23	-
EA31	Tanginak Anchorage	Exploratory	Both	0	0	6/30	6/30
EA40	Outer Sitkalidak	Closed	-	-	-	-	-
EA41	Boulder Bay	Closed	-	-	-	-	-
EA42	Shearwater Bay	125	Gillnet	120	0	5/12	5/12
EA43	Outer Kiliuda Bay	225	Purse seine	199	-	4/16	-
EA44	Inner Kiliuda Bay	100	Gillnet	0	0	6/30	6/30
EA50	Outer Ugak Bay	450	Purse seine	472	0	5/6	5/6
EA51	Inner Ugak Bay	200	Gillnet	174	0	5/8	5/8
EA52	Pasagshak Bay	10	Gillnet	-	0	-	6/30
District total		1,935		1,428	0		
Northeast District							
NE10	Womens Bay	25	Gillnet	-	0	6/30	6/30
NE20	Kalsin Bay	25	Gillnet	-	0	6/30	6/30
NE30	Middle Bay	Closed	-	-	-	-	-
NE40	Inshore Chiniak	Closed	-	-	-	-	-
NE50	Offshore Chiniak	Closed	-	-	-	-	-
District total		50		0	0		
Inner Marmot District							
IM10	Monashka Bay	Closed	-	-	-	-	-
IM20	Anton Larsen Bay	15	Gillnet	-	0	-	6/30
IM30	Sharatin Bay	30	Gillnet	-	0	-	6/30
IM40	Kizhuyak Bay	225	Purse seine	0	-	5/2	-
IM50	Spruce Island	Closed	-	-	-	-	-
District total		270		0	0		

-continued-

Table 2.–Page 3 of 3.

Statistical area	Management section	GHL	Initial gear type[a]	Harvest		Date closed	
				Purse seine	Gillnet	Purse seine	Gillnet
North Mainland District							
NM10	Hallo Bay	Closed	-	-	-	-	-
NM20	Inner Kukak	Exploratory	Both	0	0	6/30	6/30
NM30	Outer Kukak	Closed	-	-	-	-	-
NM40	Missak Bay	Closed	-	-	-	-	-
Mid Mainland District							
MM10	Inner Katmai	Exploratory	Both	0	0	6/30	6/30
MM20	Outer Katmai	Closed	-	-	-	-	-
MM30	Alinchak	Exploratory	Both	0	0	6/30	6/30
MM40	Puale Bay	Exploratory	Both	0	0	6/30	6/30
MM50	Portage Bay	Exploratory	Both	0	0	6/30	6/30
MM60	Outer Portage	Closed	-	-	-	-	-
South Mainland District							
SM10	Wide Bay	Exploratory	Both	0	0	6/30	6/30
SM20	Lower Shelikof	Closed	-	-	-	-	-
Mainland districts total				0	0		
Grand total		5,830		2,463	0		

[a] Beginning May 1, ADF&G may open any area to any gear group.
[b] WA31 and WA32 were combined and managed as one section.
[c] SA10, SA20, and SA30 were combined and managed as one section.
[d] UG30, UG32, UG33, and UG34 were combined and managed as one section.
[e] AL21 and AL22 were combined and managed as one section.

Table 3.–Summary of season length, 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, from 1979 through 2014.

				Harvest (tons)		Percent harvest by		Number of landings by						Estimated average			
	Season length	GHL	Total harvest	by gear type		gear type		gear type		Units of Gear Fished		Average catch (tons) by gear		earnings [a]		Price per	Estimated exvessel
Year	(days)	(tons)	(tons)	Seine	Gillnet	Seine	Gillnet	Seine	Gillnet	Seine	Gillnet	Seine	Gillnet	Seine	Gillnet	ton [a]	total value [a]
1979	36	2,400	1,735	1,457	278	84%	16%	-	-	57	125	26	2	$38,342	$3,336	$1,500	$2,602,500
1980	35	2,400	2,383	2,009	374	84%	16%	-	-	92	109	22	3	$15,068	$2,368	$690	$1,644,270
1981	48	2,400	2,065	1,596	469	77%	23%	207	406	79	114	20	4	$14,647	$2,983	$725	$1,497,125
1982	59	2,400	1,771	1,447	324	82%	18%	138	191	45	67	32	5	$17,686	$2,660	$550	$974,050
1983	51	2,400	2,319	1,797	522	77%	23%	164	284	41	64	44	8	$35,063	$6,525	$800	$1,855,200
1984	54	2,400	2,163	1,691	472	78%	22%	138	212	39	69	43	7	$34,687	$5,472	$800	$1,730,400
1985	59	2,000	1,968	1,244	724	63%	37%	118	348	34	81	37	9	$32,929	$8,044	$900	$1,771,200
1986	61	1,690	1,558	1,110	448	71%	29%	132	385	31	71	36	6	$34,016	$5,994	$950	$1,480,100
1987	61	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	59	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	76	2,415	2,249	1,513	736	67%	33%	171	627	37	83	41	9	$34,758	$7,537	$850	$1,911,650
1990	75	2,375	2,347	1,644	703	70%	30%	156	544	27	63	61	11	$51,756	$9,485	$850	$1,994,950
1991	83	2,510	2,432	1,697	735	70%	30%	169	587	32	64	53	11	$45,077	$9,762	$850	$2,067,200
1992	77	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	77	3,525	4,929	4,203	726	85%	15%	237	294	41	86	103	8	$56,382	$4,643	$550	$2,710,950
1994	71	4,550	5,893	4,976	917	84%	16%	285	485	66	57	75	16	$60,315	$12,870	$800	$4,714,400
1995	73	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	69	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	49	3,435	3,235	2,629	606	81%	19%	183	418	64	59	41	10	$20,539	$5,136	$500	$1,617,500
1998	50	2,030	2,057	1,954	103	95%	5%	110	26	35	7	56	15	$27,914	$7,357	$500	$1,028,500
1999	38	1,495	1,651	1,589	62	96%	4%	94	16	31	5	51	12	$33,984	$8,221	$663	$1,094,613
2000 [b]	37	1,735	1,370	1,290	80	94%	6%	57	23	31	10	42	8	$29,129	$5,600	$700	$959,000
2001	47	1,540	1,694	1,412	282	83%	17%	67	37	33	9	43	31	$21,394	$15,667	$500	$847,000
2002	46	1,860	1,677	1,274	403	76%	24%	37	50	30	14	42	29	$21,233	$14,393	$500	$838,500
2003	42	2,600	1,992	1,738	254	87%	13%	59	45	31	11	56	23	$28,032	$11,545	$500	$996,000

-continued-

Table 3.–Page 2 of 2.

Year	Season length (days)	GHL (tons)	Total harvest (tons)	Harvest (tons) by gear type		Percent harvest by gear type		Number of landings by gear type		Units of Gear Fished		Average catch (tons) by gear		Estimated average earnings [a]		Price per ton [a]	Estimated exvessel total value [a]
				Seine	Gillnet	Seine	Gillnet	Seine	Gillnet	Seine	Gillnet	Seine	Gillnet	Seine	Gillnet		
2004	42	2,850	3,167	2,894	273	91%	9%	95	36	27	11	107	25	$53,593	$12,409	$500	$1,583,500
2005	37	3,475	3,463	2,932	531	85%	15%	134	61	32	12	92	44	$45,813	$22,125	$500	$1,731,500
2006	34	3,705	2,643	2,617	26	99%	1%	86	[c]	21	[c]	125	[c]	$34,270	[c]	$275	$726,825
2007	37	4,000	2,546	2,510	36	99%	1%	105	8	21	3	120	12	$47,810	$4,800	$400	$1,018,400
2008	38	4,290	3,099	3,086	13	99.6%	0.4%	108	[c]	22	[c]	140	[c]	$73,643	[c]	$525	$1,626,975
2009	54	4,765	4,759	4,549	210	96%	4%	218	19	31	6	147	35	$77,040	$18,375	$525	$2,498,475
2010	48	6,075	5,701	5,538	163	97%	3%	277	14	36	7	154	23	$61,533	$9,314	$400	$2,280,400
2011	48	6,135	2,957	2,937	20	99%	1%	95	6	14	3	210	7	$41,957	$1,333	$200	$591,400
2012	72	5,355	4,260	4,253	7	99.8%	0.2%	164	[c]	23	[c]	185	[c]	$55,474	[c]	$300	$1,278,000
2013	65	5,410	4,447	4,298	149	97%	3%	189	18	33	5	130	30	$29,956	$6,854	$230	$1,022,810
2014	28	5,830	2,463	2,463	0	100%	0%	99	0	21	0	117	0	$11,729	$0	$100	$246,300
Average 1979 to 2013	55	3,123	2,889	2,463	426	84%	16%	150	278	39	49	74	15	$41,982	$9,313	$703	$1,955,185
10-year avg. 2004 to 2013	48	4,606	3,704	3,561	143	96%	4%	147	23	26	7	141	25	$52,109	$10,744	$386	$1,435,829
5-year avg. 2009 to 2013	57	5,548	4,425	4,315	110	98%	2%	189	14	27	5	165	24	$53,192	$8,969	$331	$1,534,217

[a] Exvessel values are based on dock delivered herring and inseason data.
[b] Beginning in 2000, an allocative harvest strategy was in effect.
[c] Confidential.

Table 4.–Age composition of herring samples from the commercial sac roe fishery, by section in the KMA, 2014.

		Percent at age										
Section	n	Age-2	Age-3	Age-4	Age-5	Age-6	Age-7	Age-8	Age-9	Age-10	Age-11+	Harvest (tons)
Danger Bay	817	1.3%	1.2%	10.0%	6.6%	4.9%	18.6%	10.2%	38.1%	7.7%	1.3%	1036
East Sitkalidak	597	6.2%	1.0%	11.2%	3.4%	0.5%	5.0%	2.7%	57.3%	6.9%	5.9%	352
Inner Kukak	220	0.5%	1.8%	34.5%	26.4%	13.2%	17.7%	3.2%	1.4%	0.9%	0.5%	0
Inner Ugak	328	1.5%	0.0%	2.4%	2.1%	0.0%	3.0%	4.0%	84.8%	1.5%	0.6%	174
Outer Kiliuda	961	0.9%	1.7%	10.7%	4.0%	1.0%	4.3%	4.7%	62.9%	6.2%	3.6%	199
Outer Ugak	303	3.0%	4.3%	13.9%	5.0%	1.0%	8.6%	5.3%	56.4%	2.3%	0.3%	472
Shearwater	103	1.9%	1.0%	10.7%	1.9%	1.0%	1.9%	1.9%	68.9%	6.8%	3.9%	120
Village Islands/Uganik Bays	313	0.0%	0.0%	2.9%	5.8%	2.6%	12.5%	6.1%	47.6%	18.8%	3.8%	0
West Sitkalidak	40	0.0%	0.0%	10.0%	2.5%	0.0%	5.0%	7.5%	65.0%	7.5%	2.5%	111
All samples combined [a]	3,682	2.3%	1.7%	10.5%	4.9%	2.5%	11.1%	6.8%	52.3%	5.9%	2.1%	2,463

[a] For 'All samples combined' the percent of the harvest by section is weighted to the age class data to estimate overall age composition of the harvest.

Table 5.–Average weight of herring samples from the commercial sac roe fishery, by age and section in the KMA, 2014.

		Weight at age (g)									
Section	n	Age-2	Age-3	Age-4	Age-5	Age-6	Age-7	Age-8	Age-9	Age-10	Age-11+
Danger Bay	817	47	97	126	155	181	204	224	245	264	286
East Sitkalidak	597	48	87	124	162	185	210	225	259	279	317
Inner Kukak	220	15	61	97	122	133	165	178	216	211	187
Inner Ugak	328	48	-	140	170	-	231	241	261	291	307
Outer Kiliuda	961	46	98	133	163	185	198	218	254	289	304
Outer Ugak	303	53	101	135	173	217	219	234	260	305	318
Shearwater	103	54	114	130	172	190	206	234	274	280	280
Village Islands/Uganik Bays	313	-	-	140	171	198	215	236	254	269	281
West Sitkalidak	40	-	-	156	197	-	244	259	315	339	380

Table 6.–Herring food and bait commercial fishery GHLs and harvest (tons) by district, KMA, 2014.

Management district	GHL	Harvest
F/B 3 - South Afognak	117	124
F/B 8 - Eastside	193	0
Total	310	124

Table 7.–Herring food and bait commercial fishery GHLs and harvest (tons), KMA, 2001 through 2014.

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
Average 2004 to 2013	383	214

Table 8.–Subsistence herring harvest summary for the KMA, 1991 through 2014.

Year	Permits issued	Permits returned	Estimated harvest in pounds by district								
			Afognak	Northeast	Inner Marmot	Uganik	Uyak	Eastside	Alitak	Other	Total
1991	50	9	2,110	1,745	1,745	1,000	0	0	0	0	6,600
1992	45	10	120	250	250	1,000	0	0	320	0	1,940
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	[a]	23	1,170	1,150	420	0	200	903	0	0	3,843
2003	[a]	16	0	220	300	0	420	1,210	30	0	2,180
2004	[a]	24	200	580	465	206	1,580	1,142	0	0	4,173
2005	[a]	37	300	850	1,070	160	550	2,300	155	0	5,385
2006	[a]	33	600	1,109	1,175	250	415	1,650	0	0	5,199
2007	[a]	37	200	912	1,430	5	1,470	850	300	0	5,167
2008	[a]	21	100	1,134	1,110	50	1,020	610	0	0	4,024
2009	[a]	36	625	660	520	400	451	980	0	330	3,966
2010	[a]	26	401	527	650	200	250	595	150	0	2,773
2011	[a]	27	10	425	355	550	310	505	200	30	2,385
2012	[a]	24	262	1,508	25	0	330	920	200	15	3,260
2013	[a]	24	615	668	50	75	200	585	200	0	2,393
2014	[a]	18	332	682	0	0	150	500	500	100	2,264

[a] Beginning in 2002 herring was added to the Kodiak subsistence salmon and crab permit; no separate permit was required.

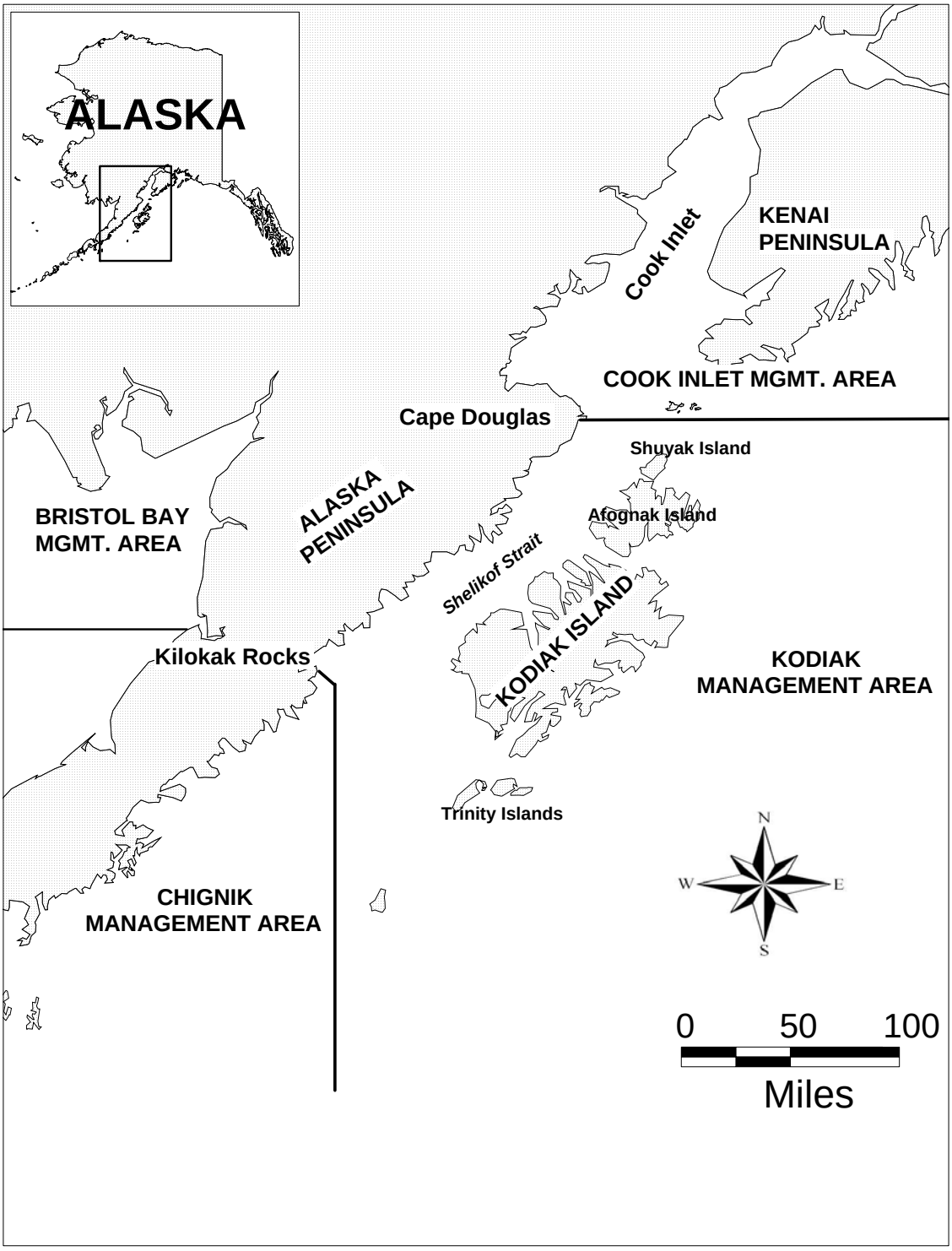


Figure 1.–Map of southwestern Alaska showing the KMA and surrounding management areas.

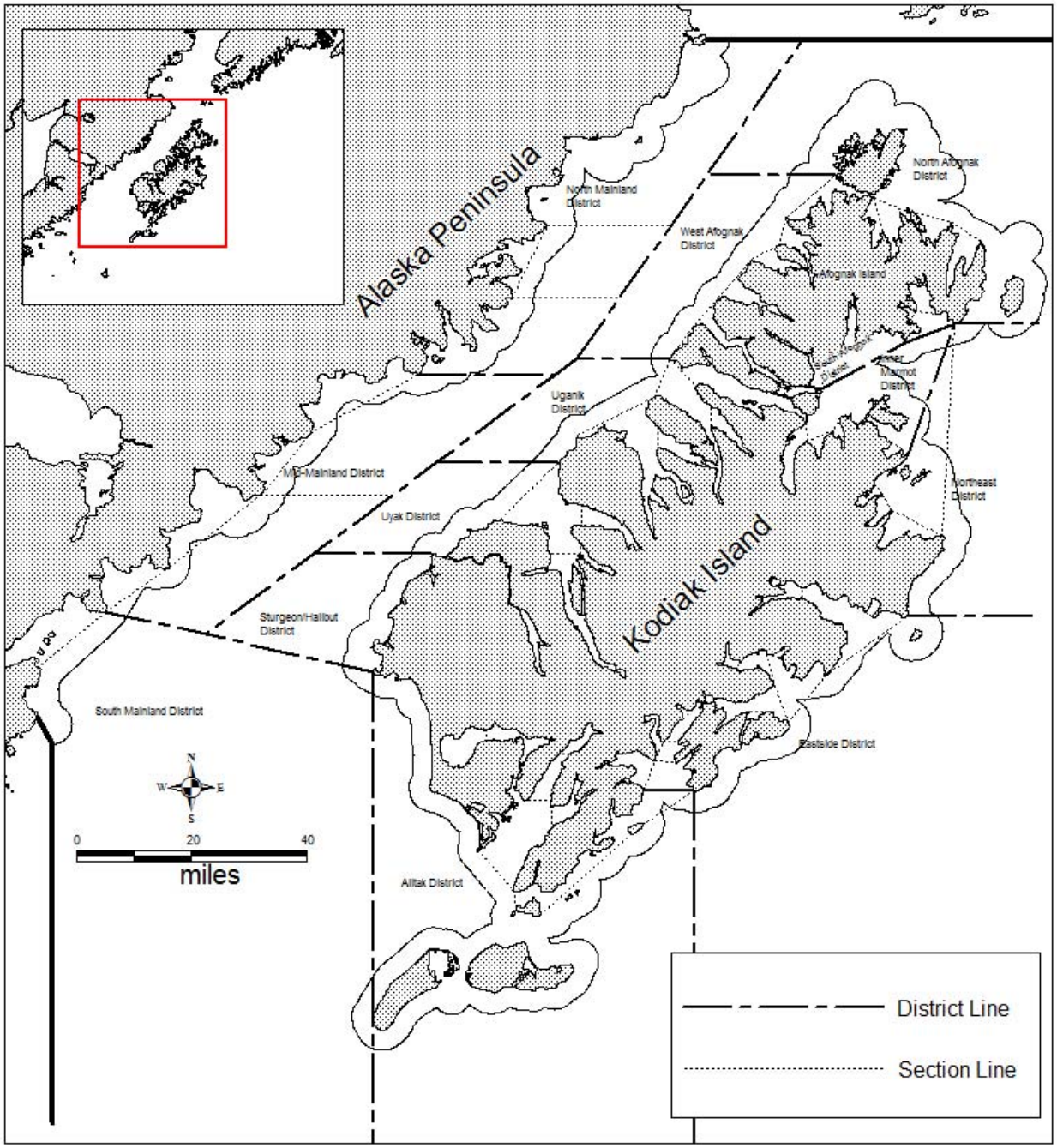


Figure 2.–Map of the KMA illustrating the herring commercial fishery districts.

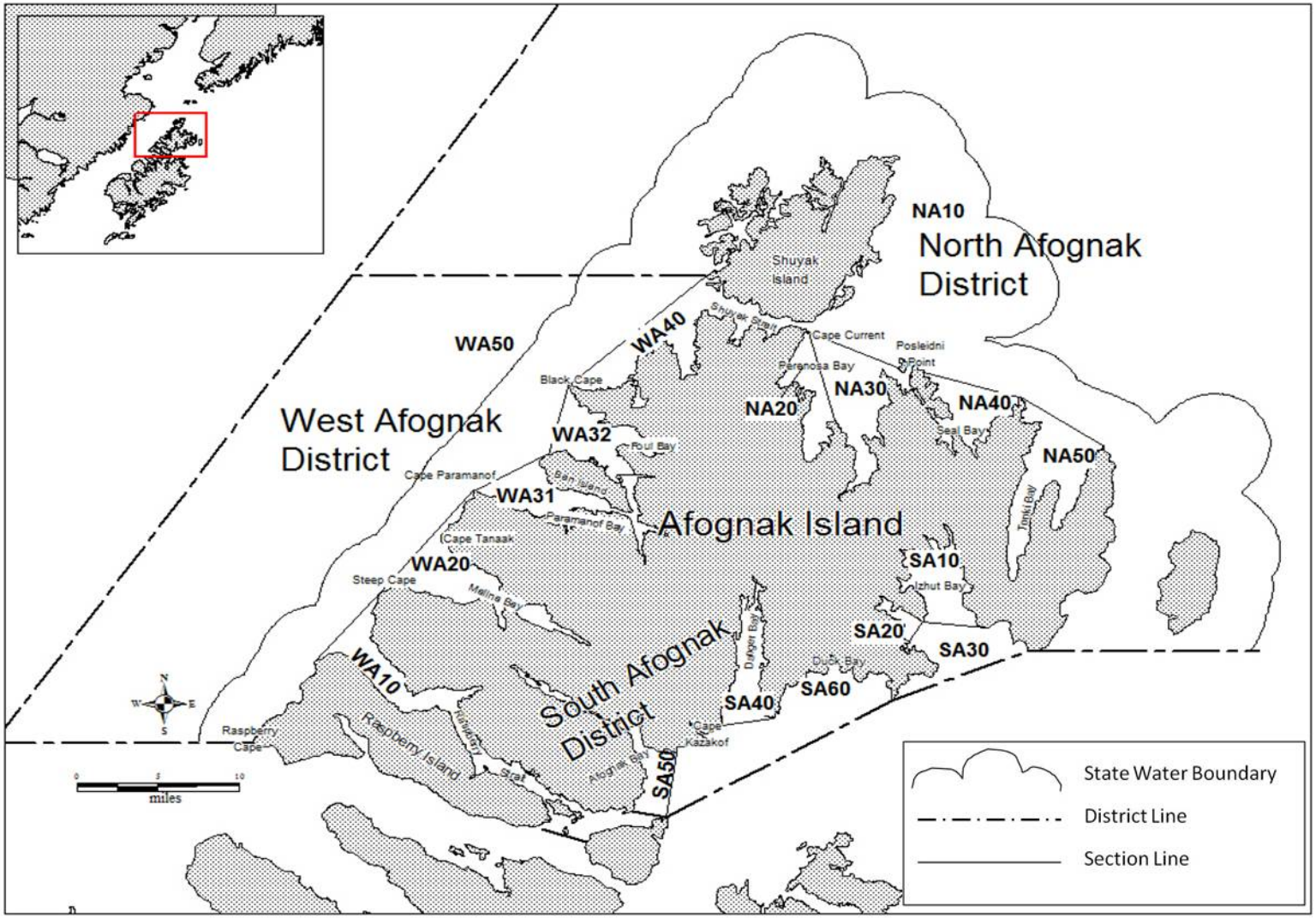


Figure 3.–Map showing the Afognak districts.

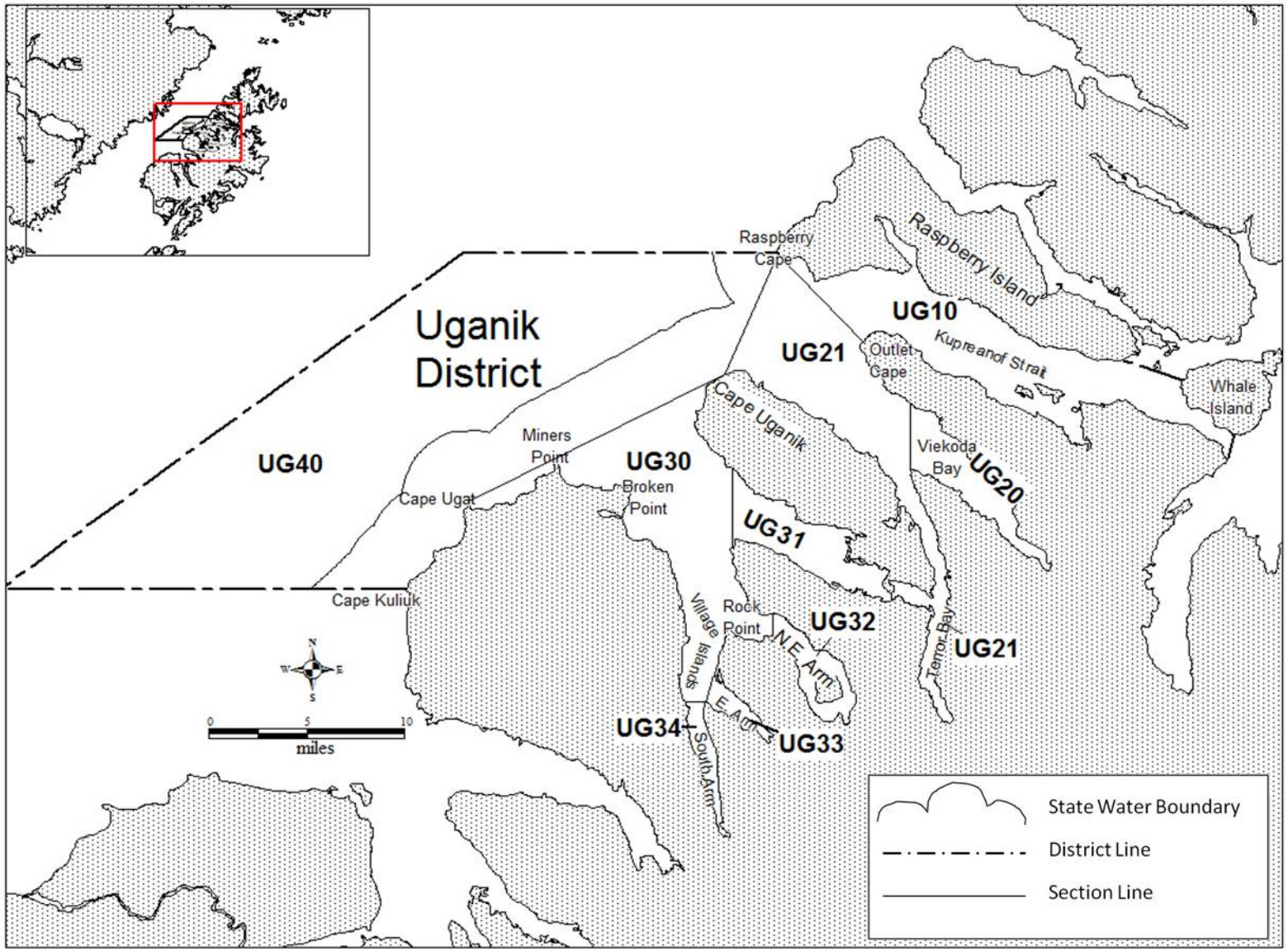


Figure 4.–Map showing the Uganik District.

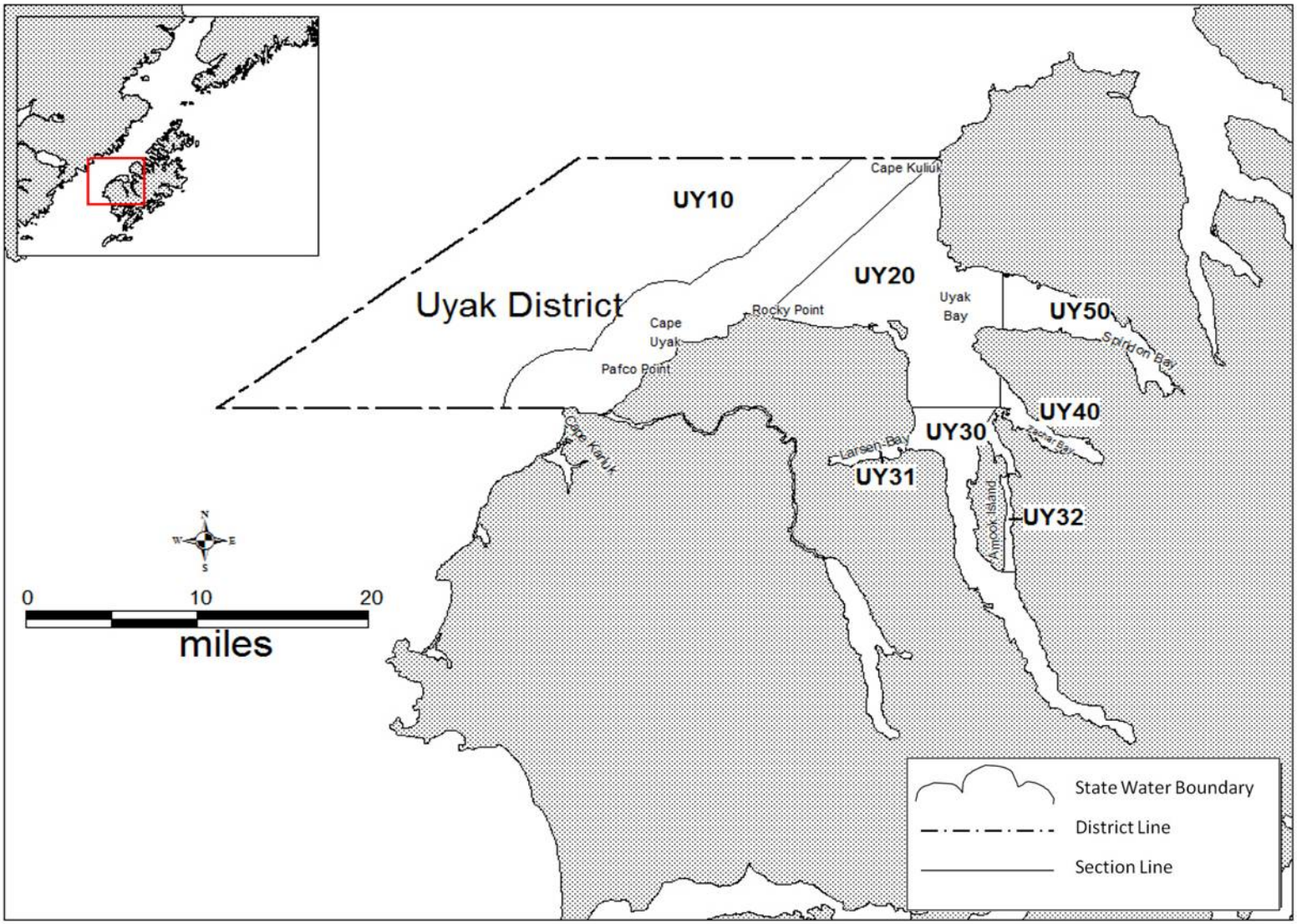


Figure 5.–Map showing the Uyak District.

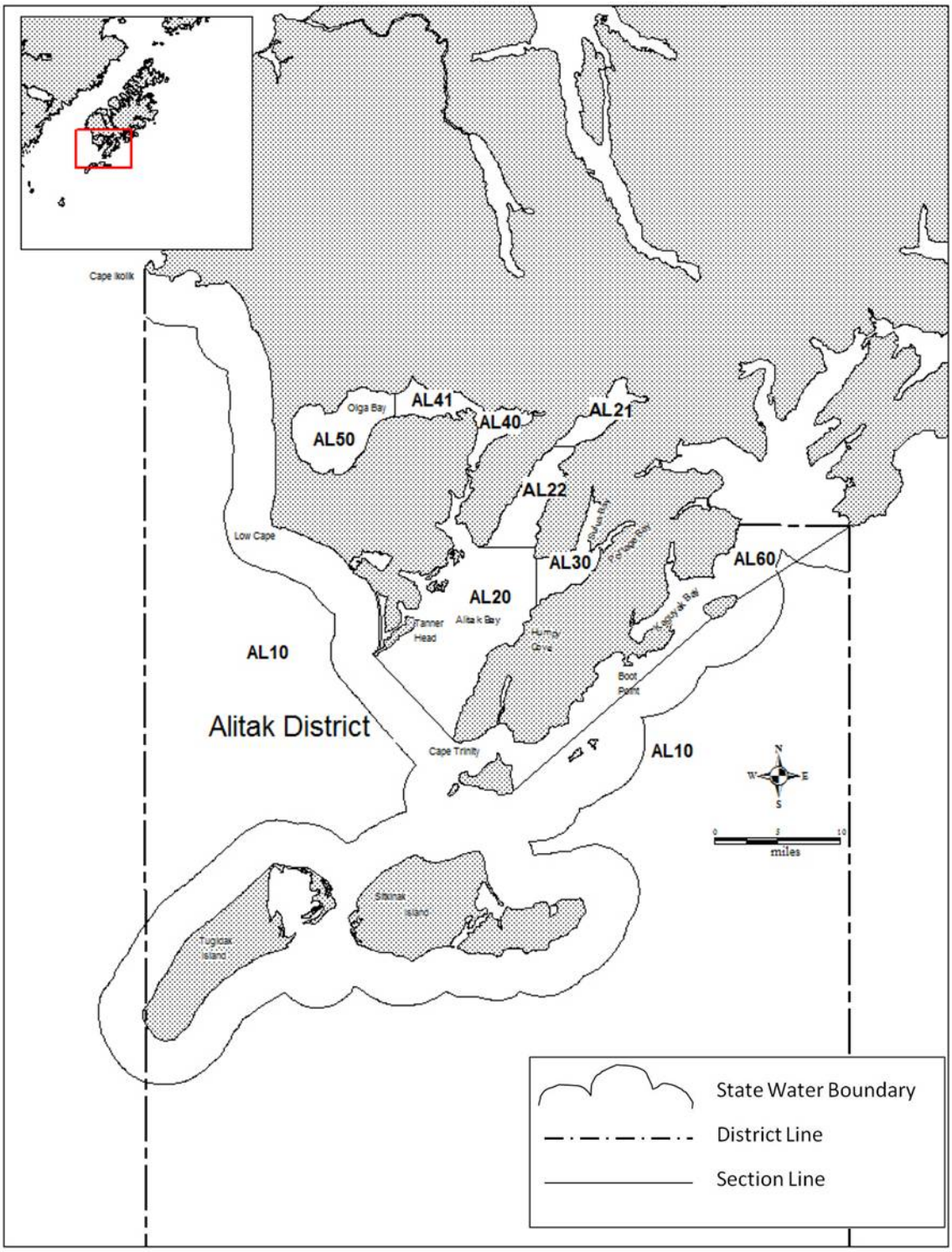


Figure 6.–Map showing the Alitak District.

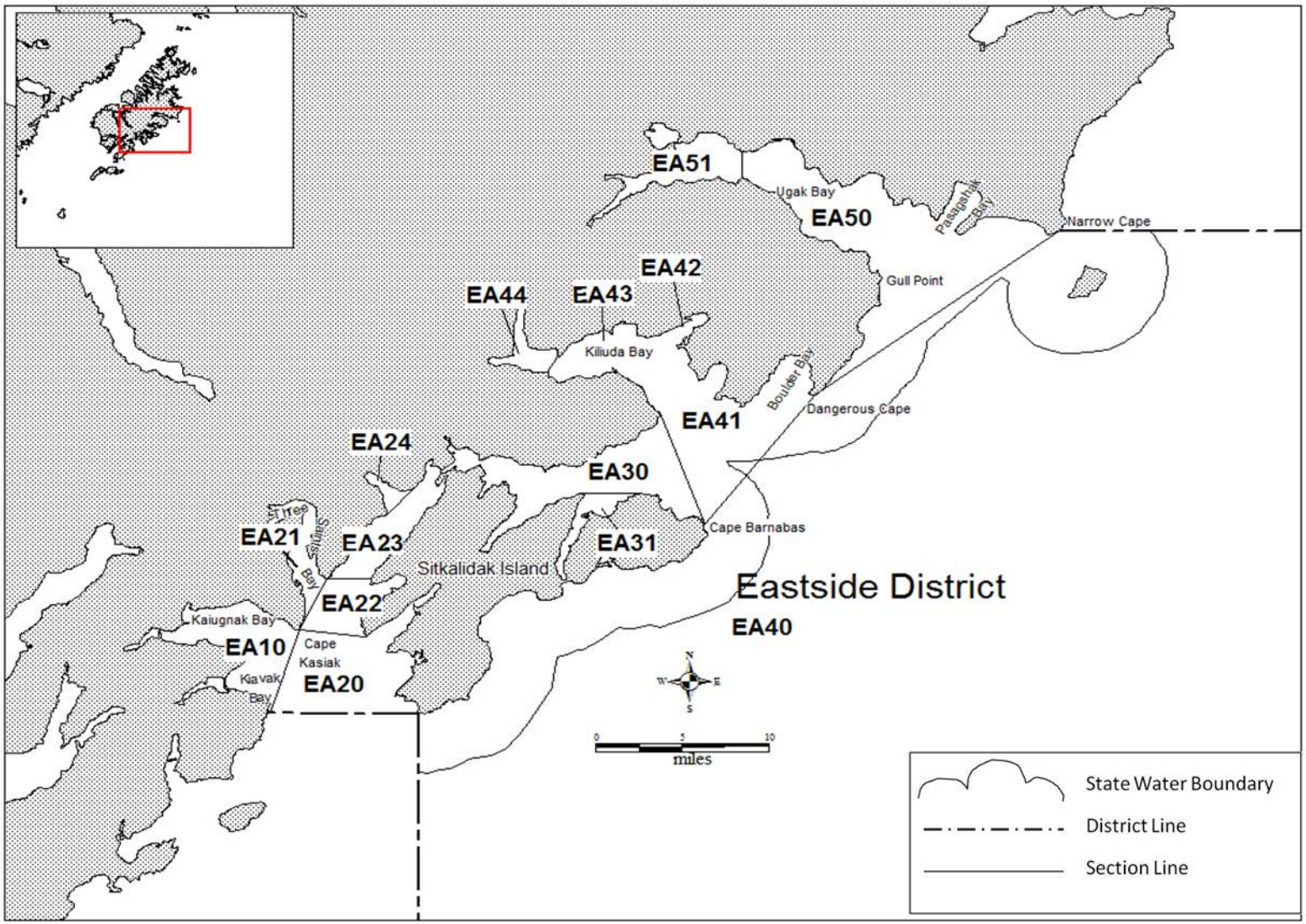


Figure 7.–Map showing the Eastside District.

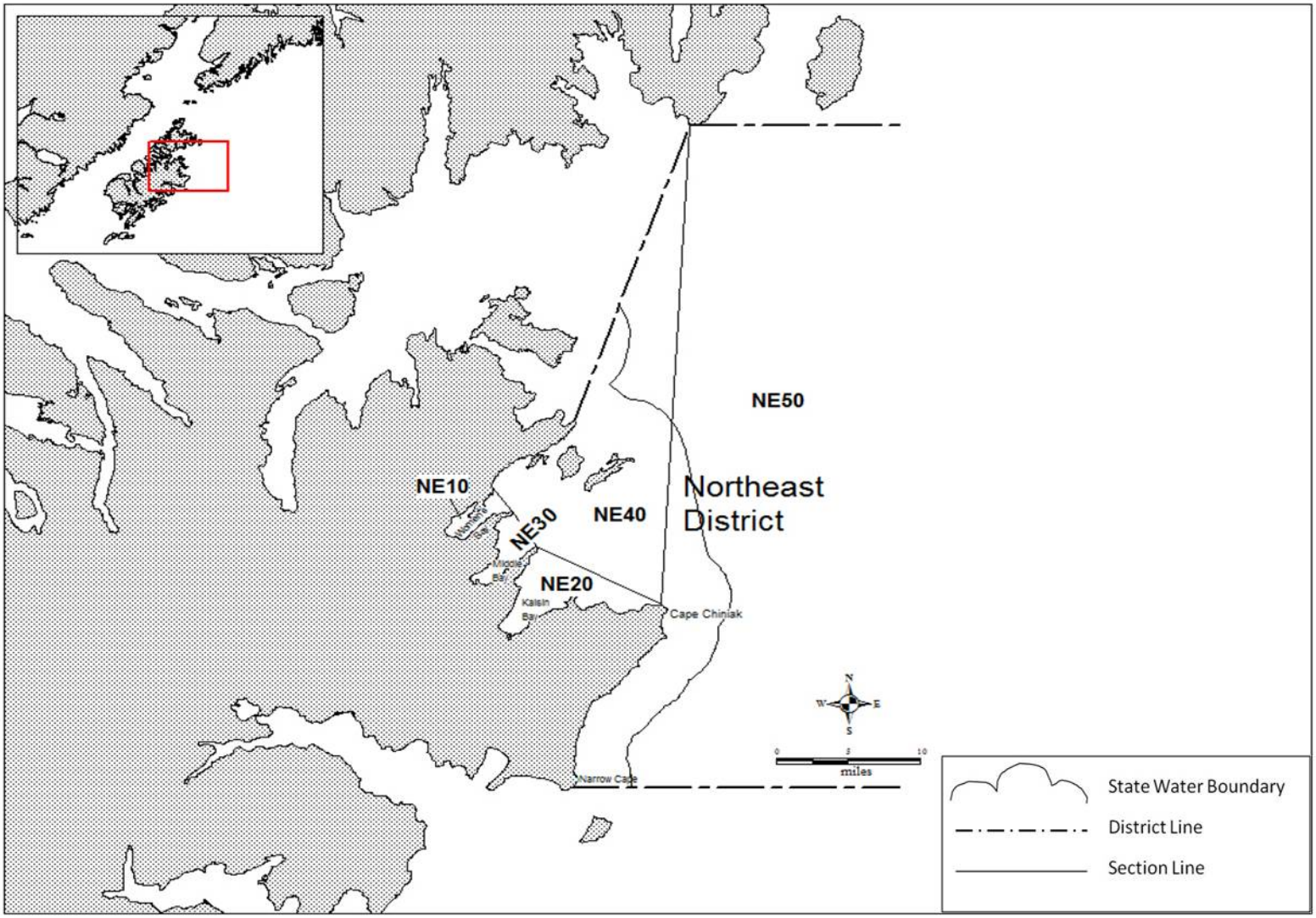


Figure 8.–Map showing the Northeast District.

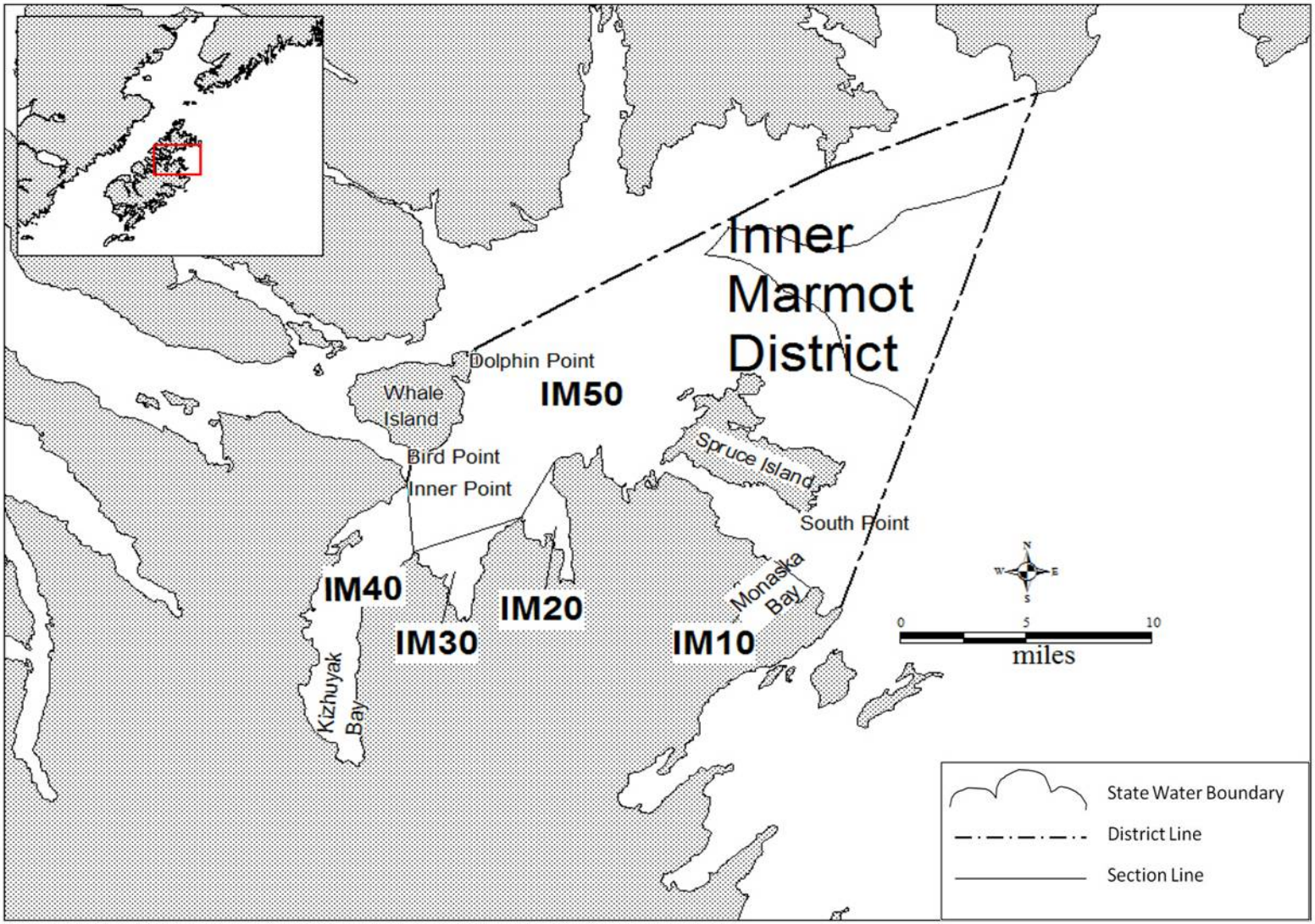


Figure 9.–Map showing the Inner Marmot District.

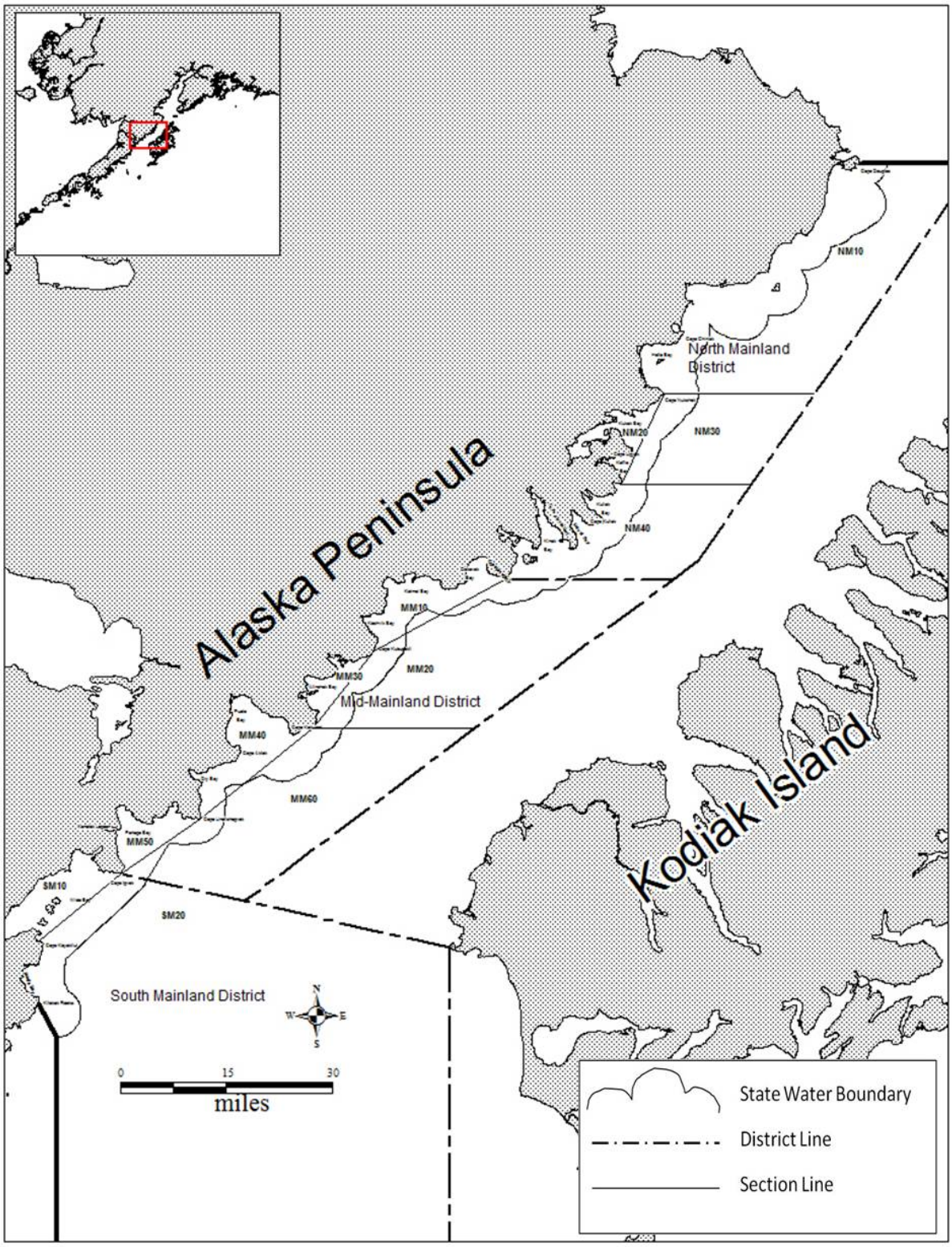


Figure 10.–Map showing the Mainland districts.

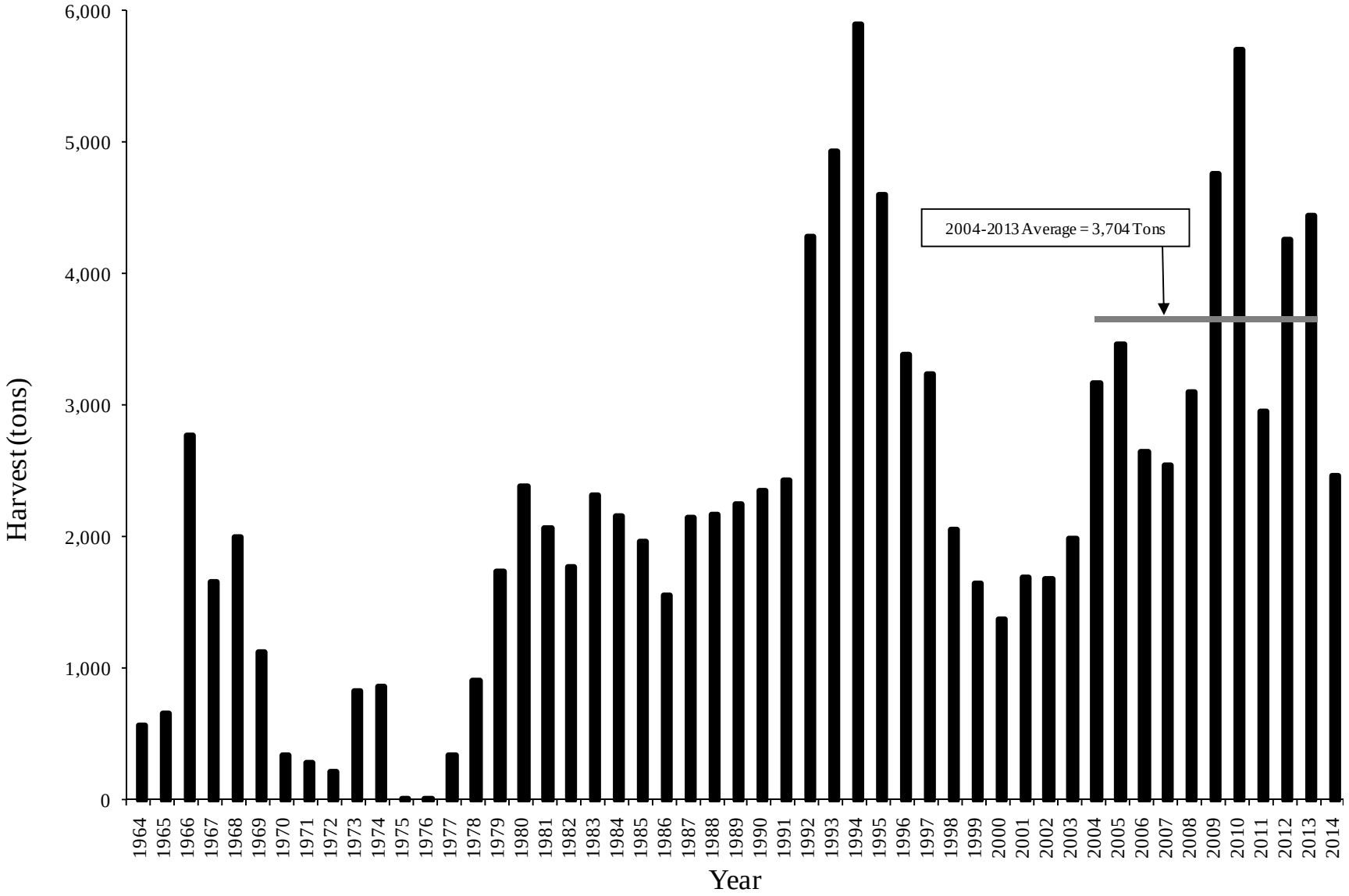


Figure 11.–Herring sac roe commercial fishery harvest in the KMA, 1964 through 2014.

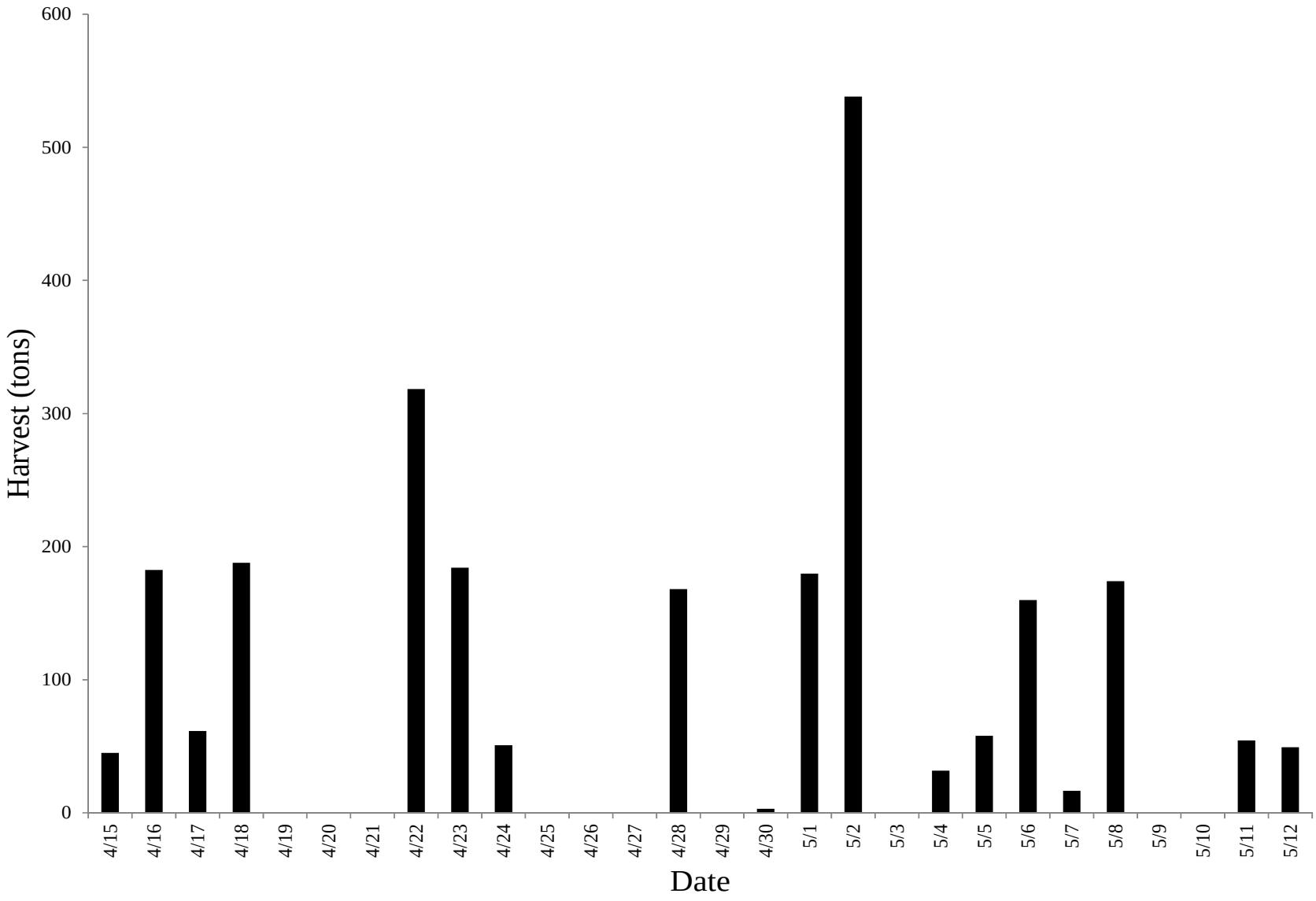


Figure 12.–Herring sac roe fishery harvest by day in the KMA, 2014.

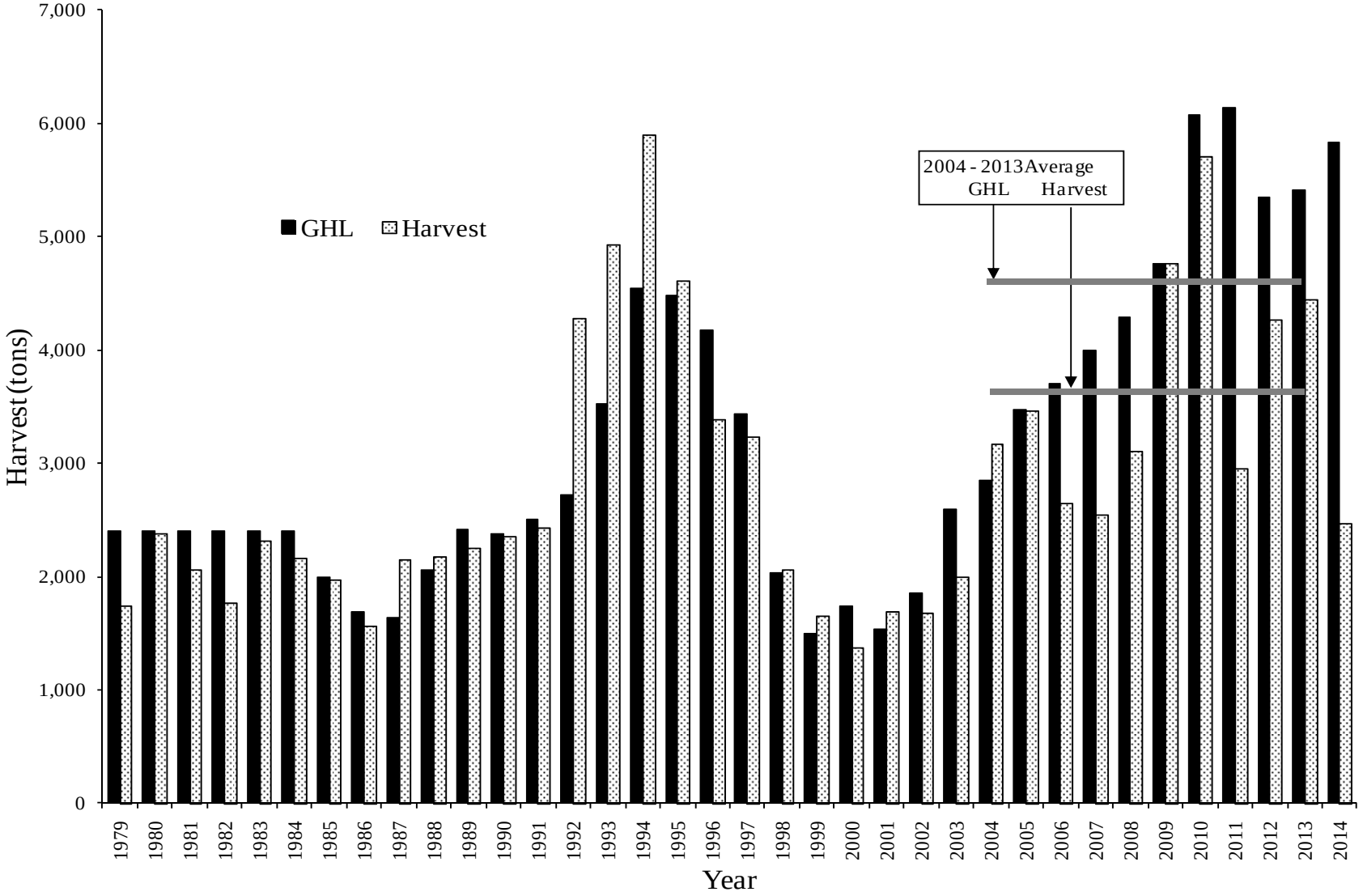
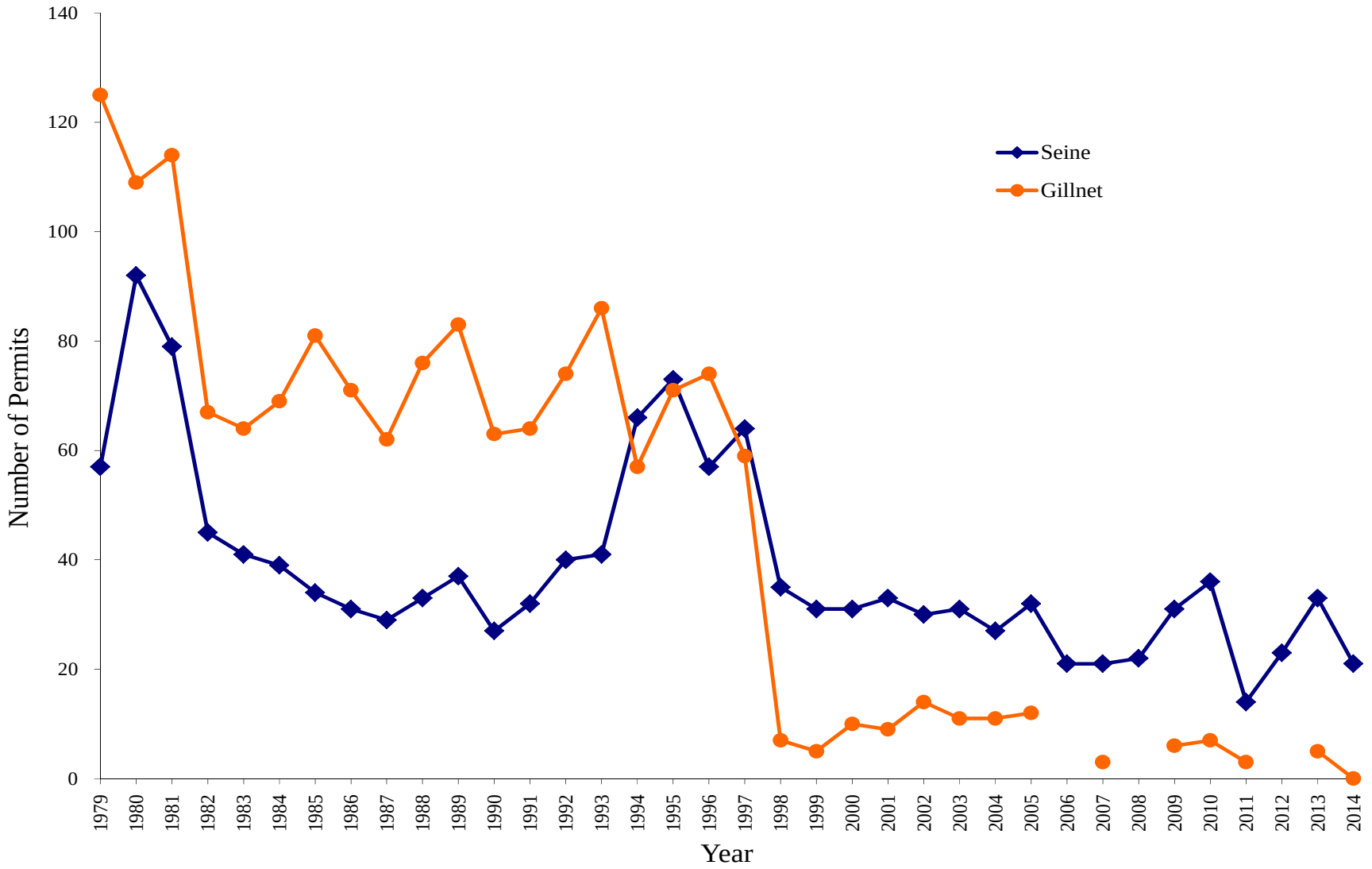


Figure 13.–Comparison of herring sac roe GHLs to harvest, KMA, 1979 through 2014.



*2006, 2008, and 2012 gillnet data is confidential

Figure 14.–Herring sac roe commercial fishery participation, by gear type in the KMA, 1979 through 2014.

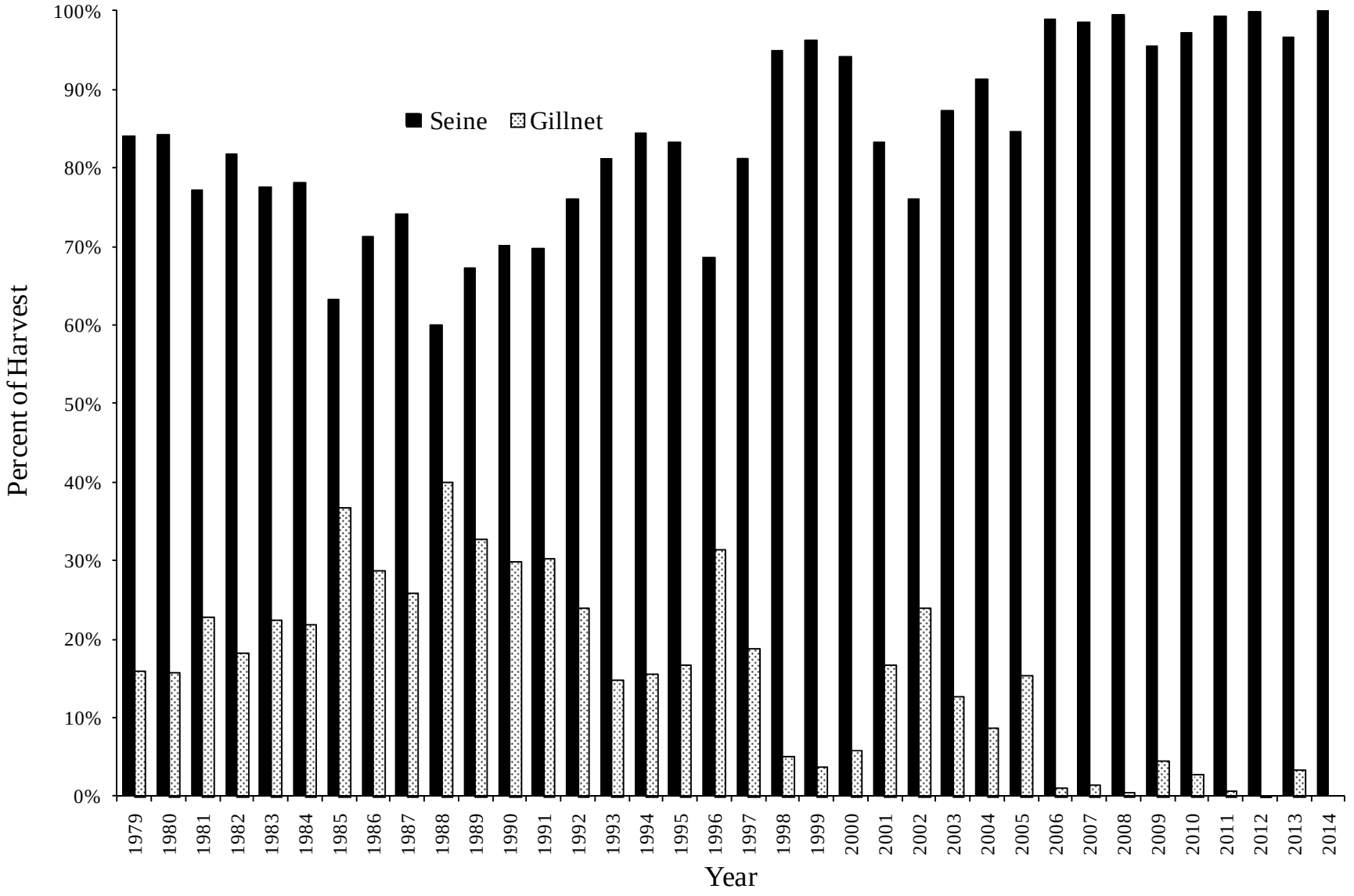


Figure 15.–Percent of the total harvest taken by gear type in herring sac roe commercial fishery, KMA, 1979 through 2014.

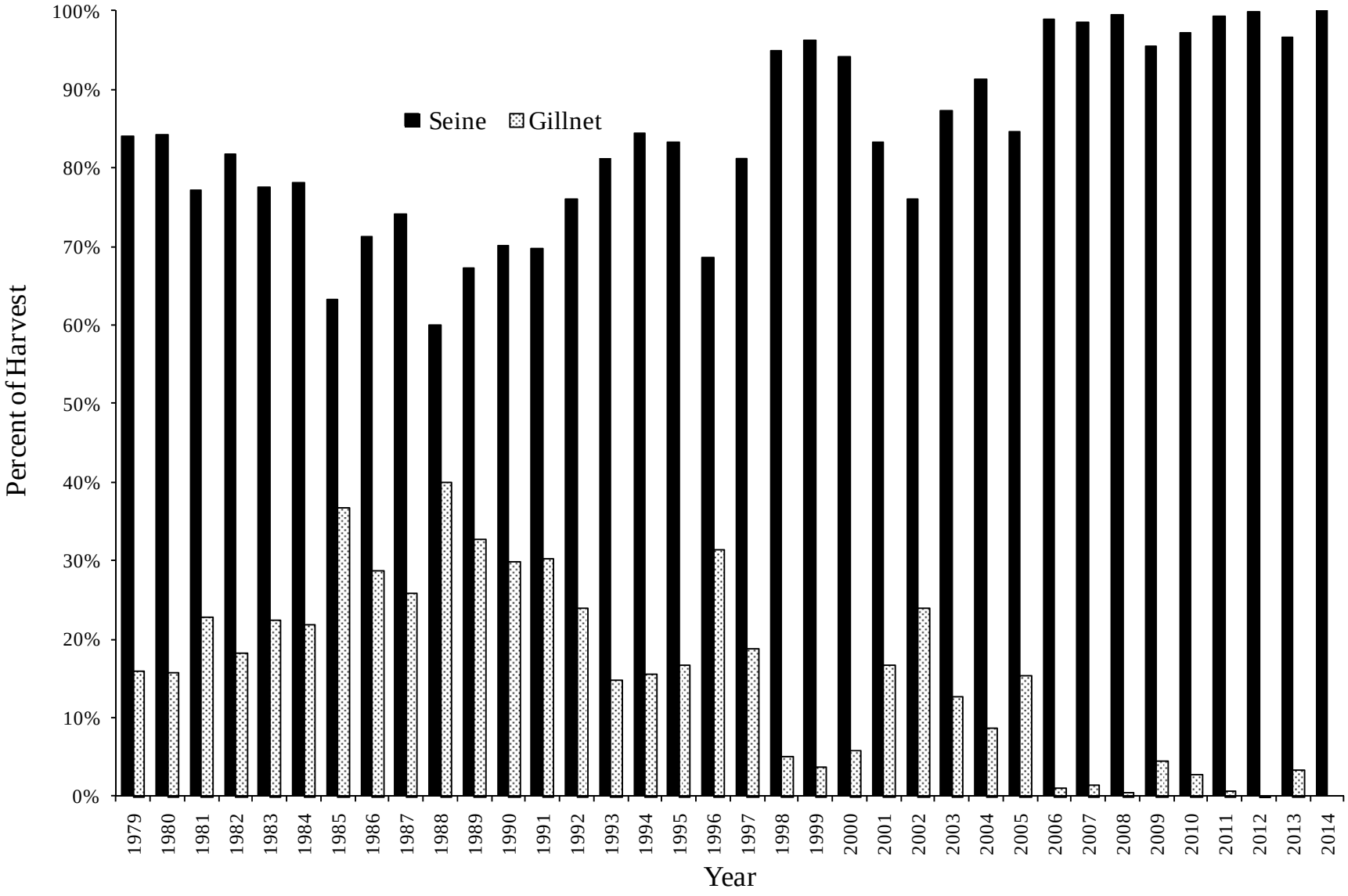
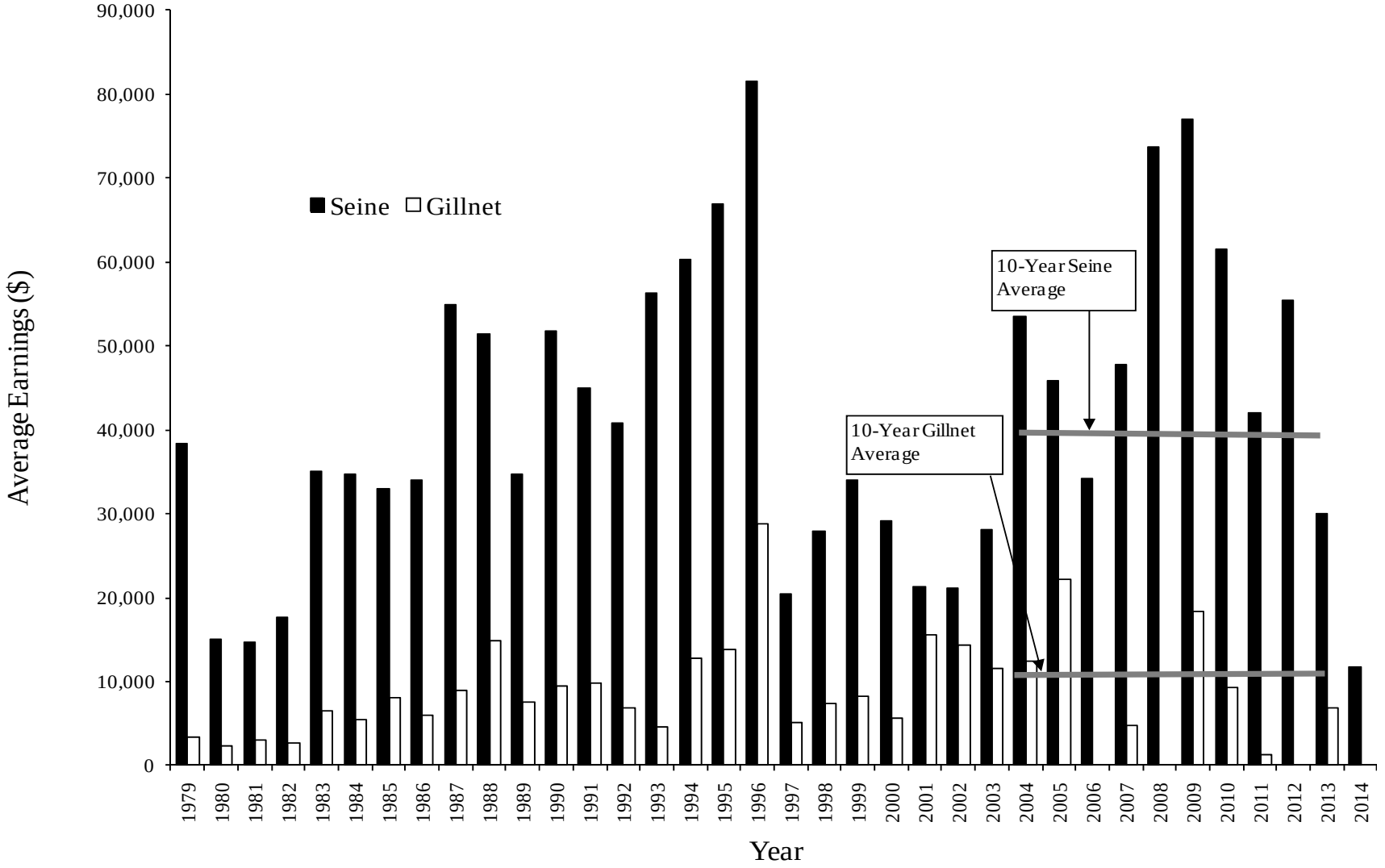


Figure 16.–Herring sac roe fishery, roe recovery in the KMA, 1989 through 2014.



* 2006, 2008, and 2012 gillnet data is confidential

Figure 17.–Average earnings by gear type for herring sac roe commercial fisheries, KMA, 1979 through 2014.

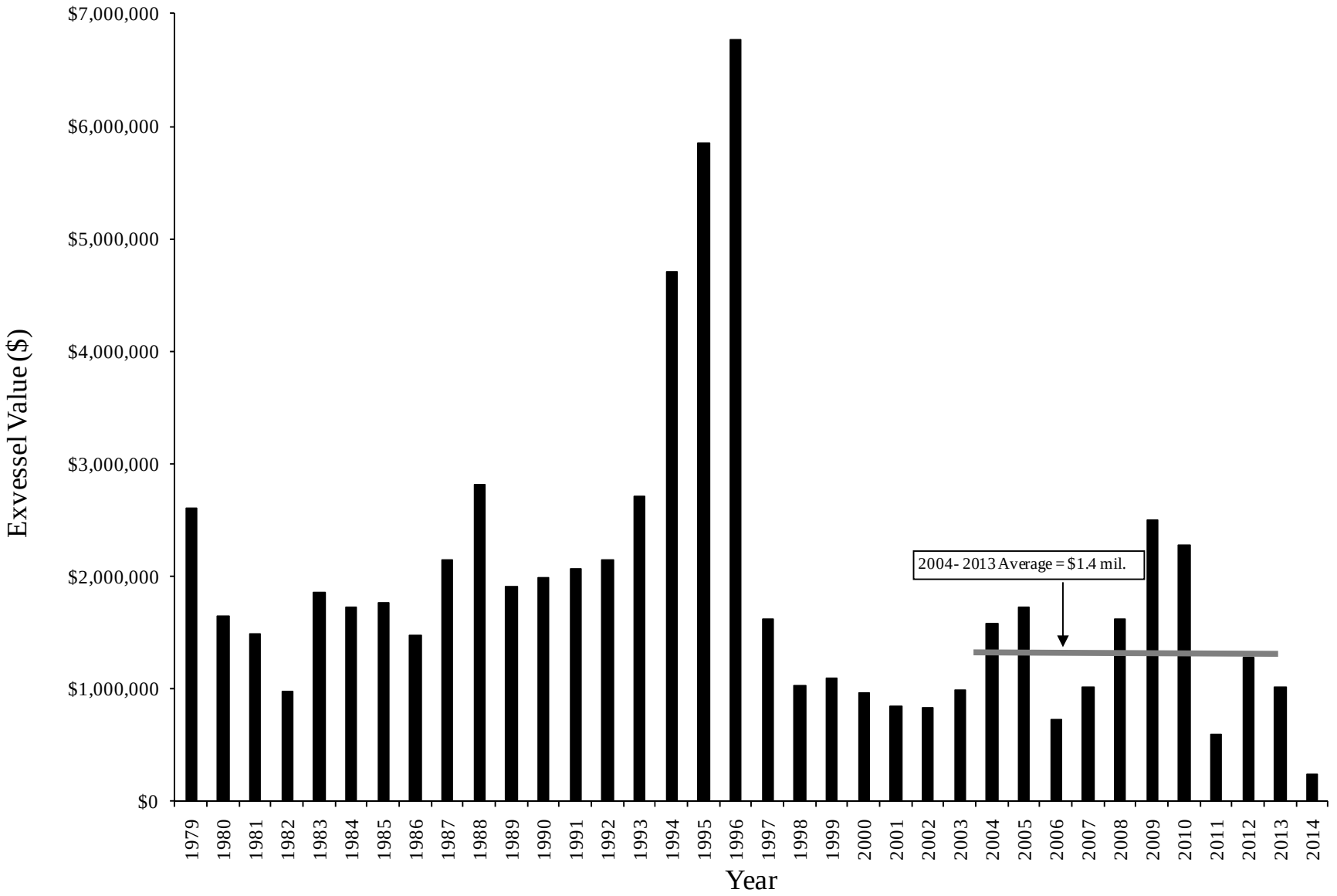


Figure 18.–Total exvessel value for herring sac roe commercial fisheries, KMA, 1979 to 2014.

APPENDIX A: SUMMARY OF EMERGENCY ORDERS ISSUED FOR THE HERRING COMMERCIAL FISHERIES IN THE KODIAK MANAGEMENT AREA, 2014

Appendix A1.–Summary of emergency orders issued for the herring commercial fisheries in the Kodiak Management Area, 2014.

Emergency Order #	Issued	Effective:	Action taken:
1	10:00 a.m. April 2	noon April 15	Open Sac Roe Fishery: initial opening times and fishing periods by gear and section for sac roe herring fishery announced.
2	11:00 a.m. April 16	11:10 a.m. April 16	Closure: The Outer Kiliuda Bay Section (EA43) at 11:10 a.m. April 16.
3	10:00 a.m. April 22	10:15 a.m. April 22	Fishing Period: Commercial herring fishing opened in the Danger Bay Section (SA40) for purse seine gear from 10:15 a.m. to 12:15 a.m. April 22.
4	2:45 p.m. April 22	3:00 p.m. April 22	Fishing Period: Commercial herring fishing opened in the Danger Bay Section (SA40) for purse seine gear from 3:00 p.m. to 7:00 p.m. April 22.
5	6:45 p.m. April 22	7:00 p.m. April 22	Fishing Period: Commercial herring fishing opened in the Danger Bay Section (SA40) for purse seine gear from 7:00 p.m. to 9:00 p.m. April 22.
6	2:15 p.m. April 23	2:30 p.m. April 23	Closure: The East Sitkalidak Section (EA30) at 2:30 p.m. April 23.
7	11:15 a.m. April 24	11:30 a.m. April 24	Fishing Period: Commercial herring fishing opened in the Danger Bay Section (SA40) south of 58° 07.90’ N. lat. for purse seine gear from 11:30 a.m. to 3:30 p.m. April 24.
8	3:15 p.m. April 24	3:30 p.m. April 24	Fishing Period: Commercial herring fishing opened in the Danger Bay Section (SA40) south of 58° 07.90’ N. lat. for purse seine gear from 3:30 p.m. to 9:00 p.m. April 24.
9	11:00 a.m. April 25	11:00 a.m. April 25	Update: Commercial herring fishing in the Village Islands/Uganik Bay sections (UG30, 32-34) on hold.

-continued-

Emergency Order #	Issued:	Effective:	Action Taken:
10	10:30 a.m. April 27	10:45 a.m. April 27	Fishing Period: Commercial herring fishing opened in the Danger Bay Section (SA40) south of 58° 07.31' N. lat. for purse seine gear from 10:45 a.m. to 2:45 p.m. April 27.
11	2:30 p.m. April 27	2:45 p.m. April 27	Fishing Period: Commercial herring fishing opened in the Danger Bay Section (SA40) south of 58° 07.31' N. lat. for purse seine gear from 2:45 p.m. to 6:45 p.m. April 27.
12	6:30 p.m. April 27	6:45 p.m. April 27	Fishing Period: Commercial herring fishing opened in the Danger Bay Section (SA40) south of 58° 07.31' N. lat. for purse seine gear from 6:45 p.m. to 9:00 p.m. April 27.
13	1:30 a.m. April 28	1: 45 a.m. April 28	Fishing Period: Commercial herring fishing opened in the Danger Bay Section (SA40) south of 58° 07.31' N. lat. for purse seine gear from 1:45 p.m. to 6:00 p.m. April 28.
14	5:45 p.m. April 28	6:00 p.m. April 28	Fishing Period: Commercial herring fishing opened in the Danger Bay Section (SA40) for gillnet gear from 6:00 p.m. April 28 until further notice.
15	10:00 a.m. April 30	noon May 1	Fishing Period: Establishes the sections that will be opened to both gear types beginning May 1.
16	4:00 p.m. May 1	4:15 p.m. May 1	Fishing Period: Commercial herring fishing opened in the Danger Bay Section (SA40) south of 58° 07.70' N. lat. for purse seine gear from 4:15 p.m. to 9:00 p.m. May 1.
17	8:00 a.m. May 2	8:20 a.m. May 2	Fishing Period: Commercial herring fishing opened in the Danger Bay Section (SA40) south of 58° 08.50' N. lat. for purse seine gear from 8:20 a.m. to 9:00 p.m. May 2.

-continued-

Emergency Order #	Issued:	Effective:	Action Taken:
18	9:15 a.m. May 2	noon May 2	Closure: The Kizhuyak Bay Section (IM40) at noon May 2.
19	9:15 a.m. May 2	noon May 2	Closure: The combined Kitoi, Izhut, MacDonalds lagoon sections (SA10, 20, 30) at noon May 2.
20	1:00 p.m. May 2	1:10 p.m. May 2	Closure: The Danger Bay Section (SA40) at 1:10 p.m. May 2.
21	10:00 a.m. May 6	10:05 a.m. May 6	Closure: The Outer Ugak Bay Section (EA50) at 10:05 a.m. May 6.
22	9:30 a.m. May 7	noon May 7	Fishing Period: Commercial herring fishing opened in the Shearwater Bay (EA42) and Inner Kiliuda Bay (EA44) sections at noon May 7.
23	4:00 p.m. May 8	noon May 8	Closure: The Inner Ugak Bay Section (EA51) at noon May 8.
24	11:30 a.m. May 12	noon May 12	Closure: The Shearwater Bay Section (EA42) at noon May 12.