

Fishery Management Report No. 15-04

**Kodiak Management Area Herring Fisheries Annual
Management Report, 2013**

By

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January 2015

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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

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ANNUAL MANAGEMENT REPORT, 2013**

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 2013.

The KMA 2013 herring sac roe fishery was open from April 15 through June 30. Fishermen harvested 4,447 tons, compared to the preseason guideline harvest level (GHL) of 5,410 tons. Prior to May 1, as outlined in regulation, 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. Purse seine fishermen harvested 4,298 tons and gillnet fishermen harvested 149 tons. Roe recovery percentages averaged 11.9% for the fishery. The total exvessel value of the fishery was an estimated \$1,022,810. The harvest was composed primarily of age-6, age-8, and age-9 herring.

A combine fishery was conducted for the KMA herring food and bait fishery for the 2001 to 2013 seasons due to the low GHLs. Food and bait harvests totaled 291 tons with 179 tons (180-ton GHL) coming from the Uganik District and 112 tons (99-ton GHL) from the South Afognak District. The Eastside District (175-ton GHL) could have been opened; however, no requests were made to ADF&G to open these districts.

Subsistence herring harvests were reported from a total of 24 subsistence permits. The total subsistence herring harvest for the KMA in 2013 was 2,393 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 2013. 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 which 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 seine gear is 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 seine gear is from noon until 10:00 PM on odd-numbered days and from 9:00 AM 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)).

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 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. For each district that has more than one section open to fishing, ADF&G is required to assign 20% to 30% of the GHLS to gillnet permit holders and 70% to 80% of the GHLS 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 GHLS. In districts where assigning one gear type for each section would not achieve the required allocation, the department 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 or to open additional areas during the season.

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 GHLS 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 2013, section GHLS ranged from 10 to 1,700 tons (short tons; Table 2). Establishing the 2013 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. industry and ADF&G aerial surveys;
5. hydroacoustic surveys; and,
6. test fishery data including age composition and biomass estimates.

Preseason GHGs have generally reflected the actual harvests and have aided fishermen and processors in planning prior to the start of each season.

Inseason Fishery Management

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 GHG, 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, 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 the department is directed to strive for the highest quality product (5 AAC 27.535(e)(6)).

2013 SEASON SUMMARY

The 2013 sac roe season opened at noon April 15. The last harvest occurred on June 18 and 42 EO's were issued during the season (Figure 12; Appendix A1). The total 2013 KMA GHG was established at 5,410 tons and 4,447 tons were harvested (Table 3; Figure 13).

In 2013, 33 purse seine permit holders made 189 landings harvesting approximately 4,298 tons. Five gillnet permit holders made 18 landings and harvested 149 tons (Table 3; Figure 14). Purse seine fishermen harvested 97% of the total catch while gillnet permit holders harvested 3% (Figure 15). The 2013 average individual harvest was 130 tons for purse seiners and 30 tons for gillnetters (Table 3). Six companies operated 7 shore-based processing facilities to buy and process herring.

ADF&G monitored the fishery with one shore-based field crew and two research vessels, all of which were stationed in anticipated herring harvest locations. Biologist aboard research vessels

and the field crew gathered effort and harvest data for managing the fishery, and collected commercial catch samples to obtain age, weight, length (AWL), and maturity data.

There were a total of 50 sections open to fishing, however 13 sections were designated exploratory having little or no historical harvests (Table 2). Harvests occurred within 19 sections and the remaining sections were not fished.

Purse Seine Fishery

The majority of the harvest occurred in the combined Village Islands/Uganik Bay sections of the Uganik District, the Danger Bay Section of the South Afognak District, and in several sections of the Eastside District (Table 2). From the Village Islands/Uganik Bay sections 1,544 tons were taken, 708 tons from the Danger Bay Section, and 1,606 tons from sections in the Eastside District. Purse seine fishermen also harvested 292 tons from sections in the Alitak District and 149 tons from the Kizhuyak Bay Section in the Inner Marmot District (Table 2). Roe recovery from purse seine harvests averaged 12.0% (Figure 16).

Gillnet Fishery

Gillnet effort was expected to be minimal in 2013. 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).

Gillnet permit holders harvested 149 tons (Tables 2 and 3). Harvest occurred in the Danger Bay, Barling Bay, Shearwater Bay, Inner Kiliuda Bay, Kalsin Bay, and the combined Village Islands/Uganik Bay sections (Table 2). Roe recovery from gillnet harvests averaged 9.6% (Figure 16).

Inseason Gear Changes

Beginning at noon on 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, East Sitkalidak, 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 15 when the R/V *K-Hi-C* became available to monitor those fisheries. Purse seine gear was also allowed back into the Danger Bay and Village Islands/Uganik Bay as a result of remaining GHV by the gillnet fleet. An additional 889 tons were harvested as a result of these changes.

Exvessel Value of the Fishery

In 2013 the exvessel price paid for 10% roe recovery herring was approximately \$230 per ton at the dock, the lowest on record (Table 3). The estimated average exvessel earnings per purse seine permit holder was \$29,956 and \$6,854 for gillnet permit holders (Figure 17). The total exvessel value of the 2013 fishery was an estimated \$1,022,810 (Table 3; Figure 18), which did not include any adjustments in value for roe recovery above or below 10% recovery, herring sold as bait, or herring that were discarded. Roe recovery averaged 11.9% (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 GHM adjustments. For example, areas with strong percentages of age-4 and younger herring (recruitment) will not be aggressively fished and will have conservative GHMs established, whereas areas with older age classes (9 or more years old) will be more aggressively fished with higher GHMs.

Industry aerial observers and permit holders have aided managers by providing information on 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 4,019 herring were collected and analyzed for AWL data from harvests and ADF&G trawl samples during the 2013 sac roe season. Samples were taken from 13 sections, 12 of which had commercial harvests. Age-8 herring were the predominant age class harvested in 2013, representing approximately 57.0% of the total commercial harvest (Table 4). The complete commercial harvest consisted of 5.4% age-3, 3.3% age-4, 1.5% age-5, 11.0% age-6, 5.5% age-7, 57.0% age-8, 11.7% age-9, 2.5% age-10, and 2.0% age-11 and older herring (Table 4). To simplify reporting hereafter, age composition estimates will be rounded to the nearest percent. The largest herring harvested were from the Eastside and Alitak districts (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 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 five sections, although these stocks tend to be small (less than 20 tons; Figure 3). The Tonki Bay Section currently has the largest biomass, and had a GHF of 40 tons in 2012. The Perenosa Bay Section was open to gillnet gear in 2013 with a 10-ton GHF and the Delphin Bay Section was open as an exploratory fishery. No harvest occurred in the North Afognak District.

West Afognak District

The West Afognak District has six sections, five 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 2013.

South Afognak District

The South Afognak District is comprised of six sections. The Danger Bay Section currently has the largest stock of herring in this district and opened with an 800-ton GHF for both purse seine (600-ton GHF) and gillnet (200-ton GHF) permit holders (Figure 3; Table 2). Purse seine fishermen harvested 708 tons and gillnetters harvested 67 tons (Table 2). Commercial catch samples from the Danger Bay Section consisted of 1% age-3, 2% age-4, 2% age-5, 13% age-6, 7% age-7, 56% age-8, 16% age-9, and 2% age-10 herring (Table 4). Hydroacoustic surveys conducted by ADF&G observed nearly 10,000 tons of herring.

In 2013, the MacDonald Lagoon, Kitoi Bay, and Izhut Bay sections were combined and managed as one unit allocated to purse seine gear with a 125-ton GHF (Table 2). No harvest occurred and fishermen only observed juvenile herring.

Uganik District

The Uganik District consists of nine 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 2013 GHF for the combined Village Islands/Uganik Bay sections was 1,700 tons (1,350 purse seine and 350 gillnet; Table 2). Purse seine fishermen harvested 1,544 tons and gillnet fishermen harvested 31 tons (Table 2). Catch samples from the Village Islands/Uganik Bay sections were composed of 6% age-3, 5% age-4, 2% age-5, 16% age-6, 7% age-7, 45% age-8, 16% age-9, 4% age-10, and 1% age-11 and older herring (Table 4). Hydroacoustic surveys estimated over 10,000 tons of herring. The West Uganik Passage Section had a 50-ton GHF but no herring were harvested (Table 2).

Uyak District

The Uyak District is made of seven 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. In 2012 not enough herring were observed to open any

sections in the Uyak District and the district remained closed in 2013. Despite the closure, herring were observed in several sections. In the Inner Uyak Bay Section 720 tons were observed, 300 tons in the Browns Lagoon Section, and 650 tons in the Zachar Bay Sections. These were most likely juvenile herring.

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.

In 2013, The Inner and Outer Deadman Bay sections were combined and managed as one section. These combined sections had a GHL of 300 tons and purse seine fishermen harvested 203 tons (Table 2).

The East Upper Olga Bay and West Upper Olga Bay sections were each open in 2013 with a 50-ton GHL. Purse seine fishermen harvested 67 tons from the West Upper Olga Bay Section (Table 2). The harvest consisted of 10% age-5, 10% age-6, 5% age-7, 45% age-8, 5% age-9, 5% age-10, and 20% age-11 and older herring (Table 4).

Eastside District

The Eastside District is composed of four bay complexes: Uyak 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. 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, sometimes occurring as early as late March. In 2013, the GHL for the East Sitkalidak Section was established at 300 tons, and 373 tons were harvested by purse seine gear (Table 2). The commercial harvest from the East Sitkalidak Section was composed mostly of older fish with 1% age-3, 1% age-4, 2% age-6, 4% age-7, 75% age-8, 9% age-9, 2% age-10, and 6% age-11 and older herring representing the harvest (Table 4).

The West Sitkalidak Section GHL was established at 300 tons and 102 tons were harvested by purse seine gear (Table 2). Commercial catch samples from West Sitkalidak consisted of 32% age-3, 2% age-4, 3% age-6, 2% age-7, 50% age-8, 9% age-9, and 2% age-11 and older herring (Table 4).

The Barling Bay Section, adjacent to the West Sitkalidak Section, has been the most consistent herring producer in the Eastside District. The 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 and 21 tons were harvested by seine gear and 4 tons by gillnet gear (Table 2). The commercial harvest was made up of 11% age-3, 2% age-4, 5% age-6, 3% age-7, 70% age-8, 8% age-9, and 1% age-11 and older herring (Table 4).

The GHL for the Outer Kiliuda Bay Section was set at 175 tons, and 207 tons were harvested by purse seine fishermen (Table 2). Age compositions of the harvest were 1% age-3, 1% age-4, 3%

age-6, 2% age-7, 83% age-8, 7% age-9, 2% age-10, and 1% age-11, and older herring (Table 4). The Inner Kiliuda Bay Section was opened as a gillnet section with a 75-ton GHL and later opened to purse seine gear on May 15. Purse seine permit holders harvested 78 tons and gillnet fishermen harvested 2 tons (Table 2). Samples consisted of 5% age-3, 3% age-4, 1% age-5, 3% age-6, 5% age-7, 73% age-8, 5% age-9, 3% age-10, and 4% age-11 and older herring (Table 4).

The Inner and Outer Ugak Bay sections have recently been strong herring producers. The GHL for the Outer Ugak Bay Section was 400 tons and allocated to purse seiners, 424 tons were harvested (Table 2). Samples from the harvest consisted of 3% age-3, 6% age-4, 1% age-5, 10% age-6, 3% age-7, 72% age-8, 4% age-9, and 2% age-11 and older (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 186 tons were harvested (Table 2).

The Shearwater Bay Section was initially allocated to the gillnet fleet with a 100-ton GHL and on May 15, this section was also opened to purse seine gear (Table 2). The gillnet fleet harvested 36 tons and the purse seine fleet harvested 71 tons (Table 2). Age compositions from the harvest consisted of 1% age-3, 2% age-4, 1% age-5, 6% age-6, 6% age-7, 77% age-8, 3% age-9, 3% age-10, and 2% age-11 and older herring (Table 4).

Northeast District

The Northeast District is composed of five sections, four of which have known spawning stocks of herring (Figure 8). The Womens Bay Section currently has the largest stock of herring in this district. This section was initially allocated to the purse seine fleet with a 50-ton GHL; however, not enough herring were observed to warrant a fishery (Table 2). The Kalsin Bay Section was opened with a 15-ton GHL allocated to gillnet gear. Gillnet fishermen harvested 9 tons (Table 2).

Inner Marmot District

There are five 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. In 2013, this section was opened to purse seine gear with a 150-ton GHL and 149 tons were harvested (Table 2). The harvest consisted of 5% age-3, 4% age-4, 2% age-5, 8% age-6, 6% age-7, 66% age-8, 7% age-9, 1% age-10, and 1% age-11 and older (Table 4).

Mainland District

There are three Mainland districts comprising 12 sections (Figure 10). The last commercial herring harvest from the Mainland districts occurred in 1997. Seven sections were open as exploratory in 2013; 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 in 2013. Samples were taken by trawl net from this biomass and were composed of 29% age-2, 68% age-3, and 3% age-4 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 on 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 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 catch. In July 2002, the CFEC made a final determination on these limited entry permits. Nine permanent limited entry permits were issued, consisting of five purse seine/gillnet permits and four trawl permits.

Combine fisheries have been conducted under similar conditions each season from 2002 through 2012. Generally, one 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 GHLS, and the South Afognak District in recent years. Areas with smaller GHLS, such as the Eastside, Alitak, and Uyak districts, have generally seen 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 2013 projected biomass was above minimum threshold and no restrictions were placed on the food and bait fishery north of Miners Point.

2013/2014 SEASON

Permit holders again requested a combine fishery for the 2013/2014 season. The biggest obstacle to a competitive fishery is how to determine an equitable fishing period between purse seine and trawl gear. ADF&G accommodated the permit holders' request, and the South Afognak District (99-ton GH) and the Uganik District (180-ton GH) opened on September 20 (Table 6). Approximately 112 tons were harvested from the South Afognak District on September 23 and September 24. The South Afognak District was closed September 24. From September 24 through September 26, approximately 179 tons were harvested from the Uganik District and was subsequently closed on September 26 (Tables 6 and 7). The Eastside District (175-ton GH) could have been opened if there was any interest in fishing the area (Table 6).

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 escalated due to bait needs created with the reopening of the commercial tanner crab fishery in the KMA. The department 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).

2013 SEASON SUMMARY

A total of 24 KMA subsistence permits were returned to ADF&G, as required for reporting purposes, with herring subsistence harvest data. The reported subsistence herring harvests totaled 2,393 pounds (Table 8). The majority of the harvest occurred in the Northeast, Eastside, and Afognak districts.

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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 2013.

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

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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
Average					
1964 to 2012	2,230	215	2,445	91	9
10 Year average					
2003 to 2012	3,459	205	3,663	94	6
5 Year average					
2008 to 2012	4,155	233	4,389	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, 2013.

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	Purse Seine	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	Closed	-	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	125	Purse Seine	0	0	6/30	6/30
SA20 ^c	Kitoi Bay	c	c	c	c	c	c
SA30 ^c	MacDonald Lagoon	c	c	c	c	c	c
SA40	Danger Bay	800	600PS/200GN	708	67	5/4	5/12
SA50	Litnik	Closed	-	-	-	-	-
SA60	Duck Bay	Closed	-	-	-	-	-
TOTAL ALL AFOGNAK DISTRICTS		995		708	67		
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	1,544	31	5/8	5/8
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		1,544	31		
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							

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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	203	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	67	0	6/12	6/12
AL60	Geese/Twoheaded	Exploratory	Both	22	0	5/12	5/12
DISTRICT TOTAL		600		292	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	75	Purse Seine	127	0	5/13	5/13
EA22	Newman Bay	Exploratory	Both	16	0	6/30	6/30
EA23	W. Sitkalidak Strait	300	Purse Seine	102	0	6/30	6/30
EA24	Barling Bay	125	Gillnet	21	4	6/30	6/30
EA30	E. Sitkalidak Strait	300	Purse Seine	373	0	5/13	5/13
EA31	Tanginak Anchorage	Exploratory	Both	0	0	6/30	6/30
EA40	Outer Sitkalidak	Closed	-	-	-	-	-
EA41	Boulder Bay	Closed	-	-	-	-	-
EA42	Shearwater Bay	100	Gillnet	71	36	5/15	5/15
EA43	Outer Kiliuda Bay	175	Purse Seine	207	-	4/18	-
EA44	Inner Kiliuda Bay	75	Gillnet	78	2	5/15	5/15
EA50	Outer Ugak Bay	400	Purse Seine	424	-	4/25	-
EA51	Inner Ugak Bay	200	Gillnet	186	0	5/11	5/11
EA52	Pasagshak Bay	Closed	-	-	-	-	-
DISTRICT TOTAL		1,750		1,606	42		
NORTHEAST DISTRICT							
NE10	Womens Bay	50	Purse Seine	-	-	Closed	Closed
NE20	Kalsin Bay	15	Gillnet	-	9	6/30	6/30
NE30	Middle Bay	Closed	-	-	-	-	-
NE40	Inshore Chiniak	Closed	-	-	-	-	-
NE50	Offshore Chiniak	Closed	-	-	-	-	-
DISTRICT TOTAL		65		0	9		
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	150	Purse Seine	149	-	4/30	-
IM50	Spruce Island	Closed	-	-	-	-	-
DISTRICT TOTAL		195		149	0		

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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				5,410	4,298	149	

^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 UG 34 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 2013.

Year	Season length (Days)	GHL (Tons)	Total harvest (Tons)	Harvest (tons)		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		
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)		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
Average																	
1979 to 2012	54	3,056	2,843	2,409	435	83%	17%	149	287	39	51	73	14	\$42,335	\$9,392	\$717	\$1,982,608
10-Year																	
2003 to 2012	45	4,325	3,459	3,305	153	95%	5%	134	27	26	8	133	24	\$51,916	\$11,415	\$413	\$1,433,148
5-Year																	
2008 to 2012	52	5,324	4,155	4,073	83	98%	2%	172	13	25	5	167	22	\$61,929	\$9,674	\$390	\$1,655,050

^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, 2013.

Section	n	Percent at Age										Harvest (tons)
		Age-2	Age-3	Age-4	Age-5	Age-6	Age-7	Age-8	Age-9	Age-10	Age-11+	
Barling Bay	93	0.0%	10.8%	2.2%	0.0%	5.4%	3.2%	69.9%	7.5%	0.0%	1.1%	25
Danger Bay	527	0.0%	1.3%	1.9%	2.3%	13.3%	7.2%	56.0%	15.7%	1.9%	0.4%	783
East Sitkalidak	528	0.0%	1.1%	1.3%	0.0%	2.3%	3.8%	74.6%	8.9%	2.1%	5.9%	373
Inner Kiliuda	151	0.0%	4.6%	2.6%	0.7%	2.6%	5.3%	72.8%	4.6%	2.6%	4.0%	80
Inner Kukak	289	29.4%	67.5%	2.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0
Kizhuyak Bay	209	0.0%	4.8%	4.3%	2.4%	8.1%	6.2%	65.6%	6.7%	1.0%	1.0%	149
Outer Kiliuda	240	0.0%	0.8%	1.3%	0.0%	2.9%	2.1%	82.9%	7.1%	2.1%	0.8%	207
Outer Ugak	185	0.0%	2.7%	5.9%	0.5%	10.3%	3.2%	71.9%	3.8%	0.0%	1.6%	424
Shearwater	125	0.0%	0.8%	1.6%	0.8%	5.6%	5.6%	76.8%	3.2%	3.2%	2.4%	107
Three Saints Bay	129	0.0%	32.6%	3.1%	0.8%	2.3%	5.4%	38.8%	3.9%	6.2%	7.0%	127
Village Islands/Uganik Bays	1,252	0.0%	6.3%	4.5%	1.8%	15.6%	6.5%	45.2%	15.7%	3.5%	1.0%	1575
West Sitkalidak	335	0.0%	31.9%	1.8%	0.0%	3.0%	1.8%	49.9%	9.0%	0.3%	2.4%	102
West Upper Olga Bay	20	0.0%	0.0%	0.0%	10.0%	10.0%	5.0%	45.0%	5.0%	5.0%	20.0%	67
All Samples Combined ^a	4,083	0.0%	5.4%	3.3%	1.5%	11.0%	5.5%	57.0%	11.7%	2.5%	2.0%	4,019

^a For all samples combined^a 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, 2013.

Section	n	Weight at Age (g)									
		Age-2	Age-3	Age-4	Age-5	Age-6	Age-7	Age-8	Age-9	Age-10	Age-11+
Barling Bay	93	-	96	109	-	231	264	274	272	-	287
Danger Bay	527	-	98	120	150	184	213	233	251	276	290
East Sitkalidak	528	-	101	136	-	197	224	275	282	302	317
Inner Kiliuda	151	-	97	142	194	189	248	258	274	311	328
Inner Kukak	289	27	53	73	-	-	-	-	-	-	-
Kizhuyak Bay	209	-	101	124	153	183	207	224	248	302	286
Outer Kiliuda	240	-	100	122	-	179	226	259	287	314	356
Outer Ugak	185	-	97	150	168	196	233	254	280	-	312
Shearwater	125	-	79	164	188	215	229	246	271	268	298
Three Saints Bay	129	-	99	130	179	218	283	282	298	351	341
Village Islands/Uganik Bays	1,252	-	92	126	162	185	210	232	250	272	284
West Sitkalidak	335	-	101	160	-	228	243	286	307	256	349
West Upper Olga Bay	20	-	-	-	246	254	309	311	339	391	381

Table 6.–Herring food and bait commercial fishery GHLS and harvest (tons) by district, KMA, 2013.

Management District	GHLS	Harvest
F/B 3 - South Afognak	99	112
F/B 4 - Uganik	180	179
F/B 8 - Eastside	175	0
Total	454	291

Table 7.–Herring food and bait commercial fishery GHLS and harvest (tons), KMA, 2001 through 2013.

Year	GHLS	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
Average 2003 to 2012	357	205

Table 8.—Subsistence herring harvest summary for the KMA, 1991 through 2013.

Year	Permits	Permits	Estimated Harvest in Pounds by District								Total
	Issued	Returned	Afognak	Northeast	Inner Marmot	Uganik	Uyak	Eastside	Alitak	Other	
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

Note: Beginning in 2002 herring was added to the Kodiak subsistence salmon and crab permit; no separate permit was required.

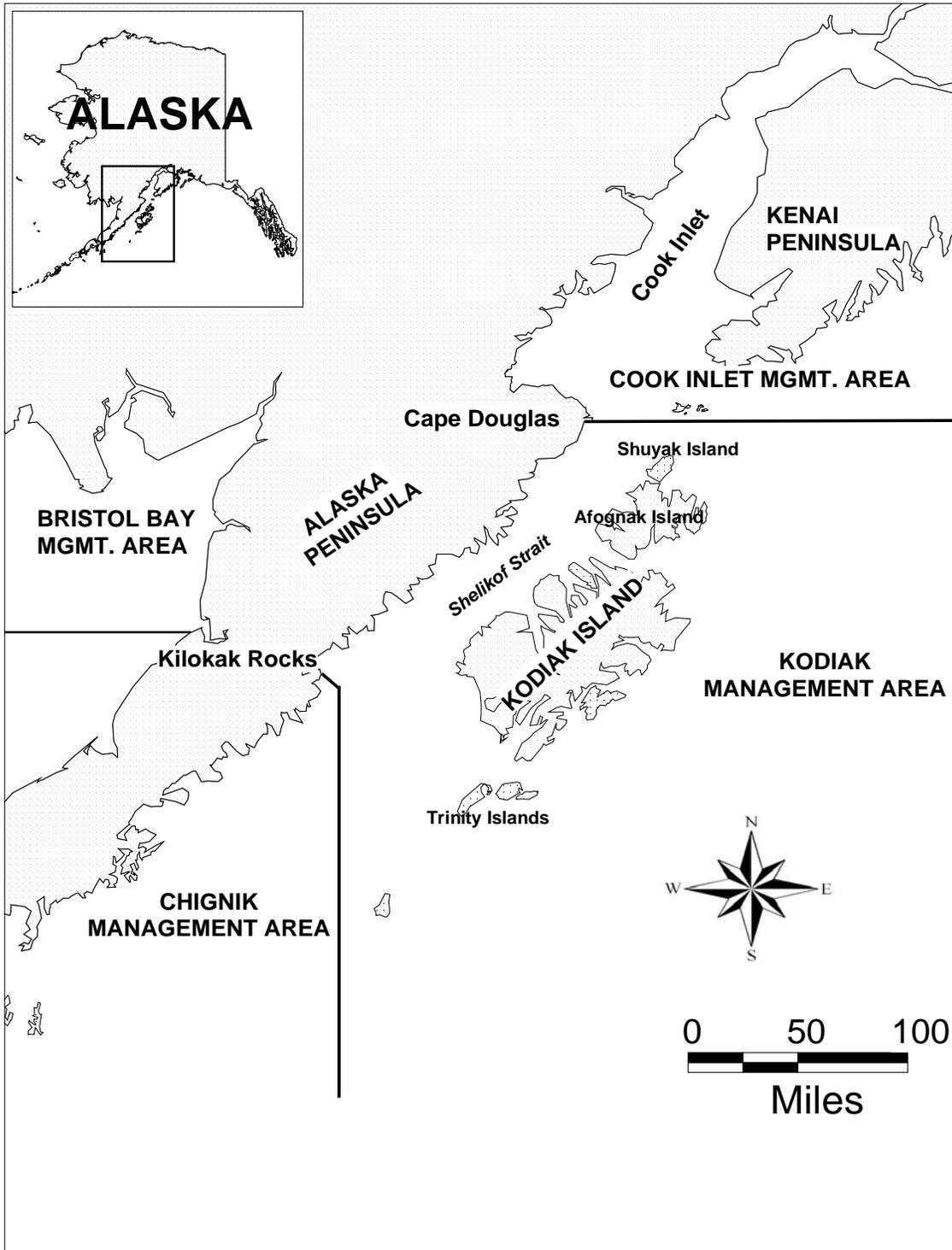


Figure 1.—Map of southwestern Alaska showing the KMA and surrounding management areas.

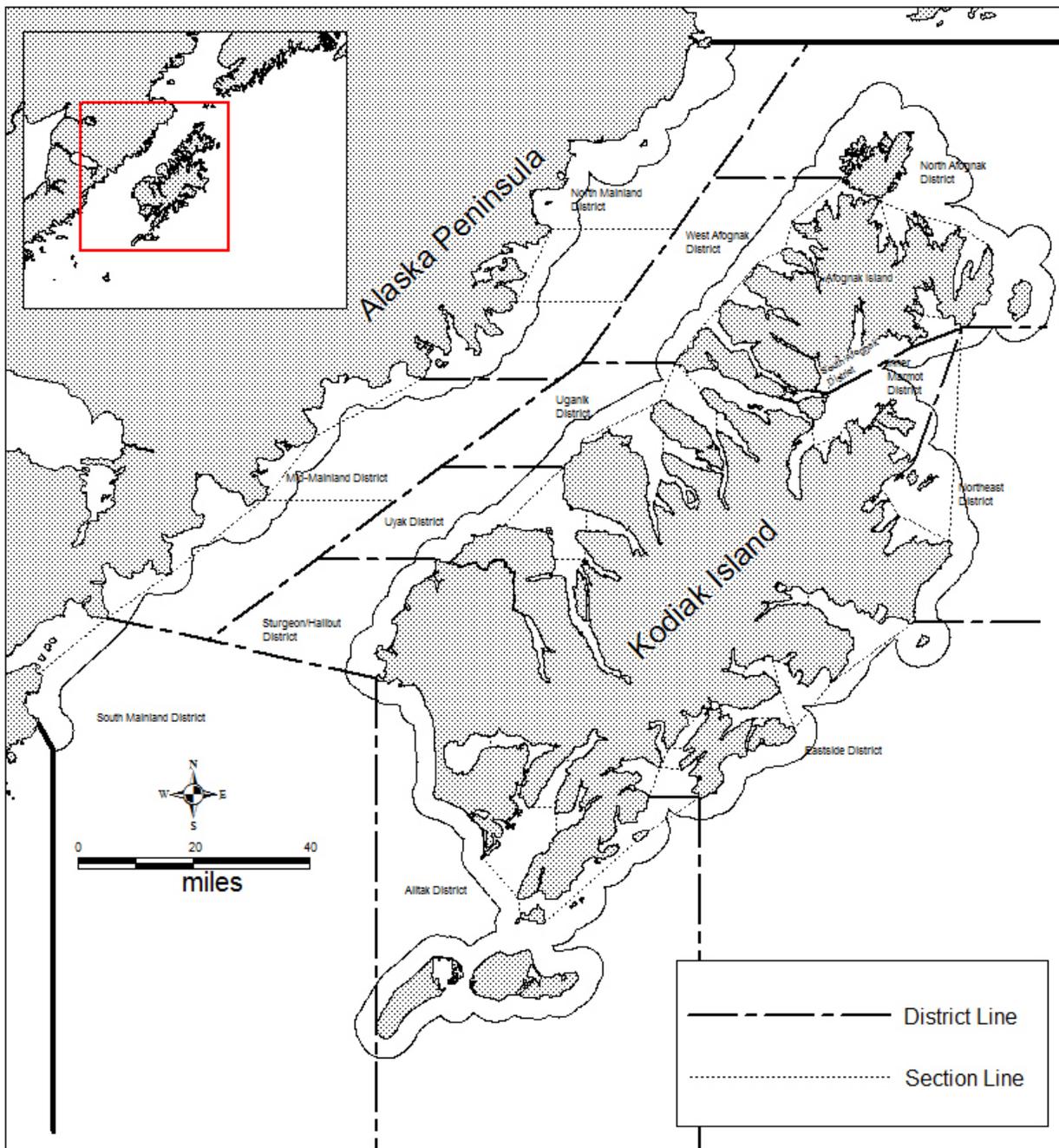


Figure 2.—Map of the KMA illustrating the herring commercial fishery districts.

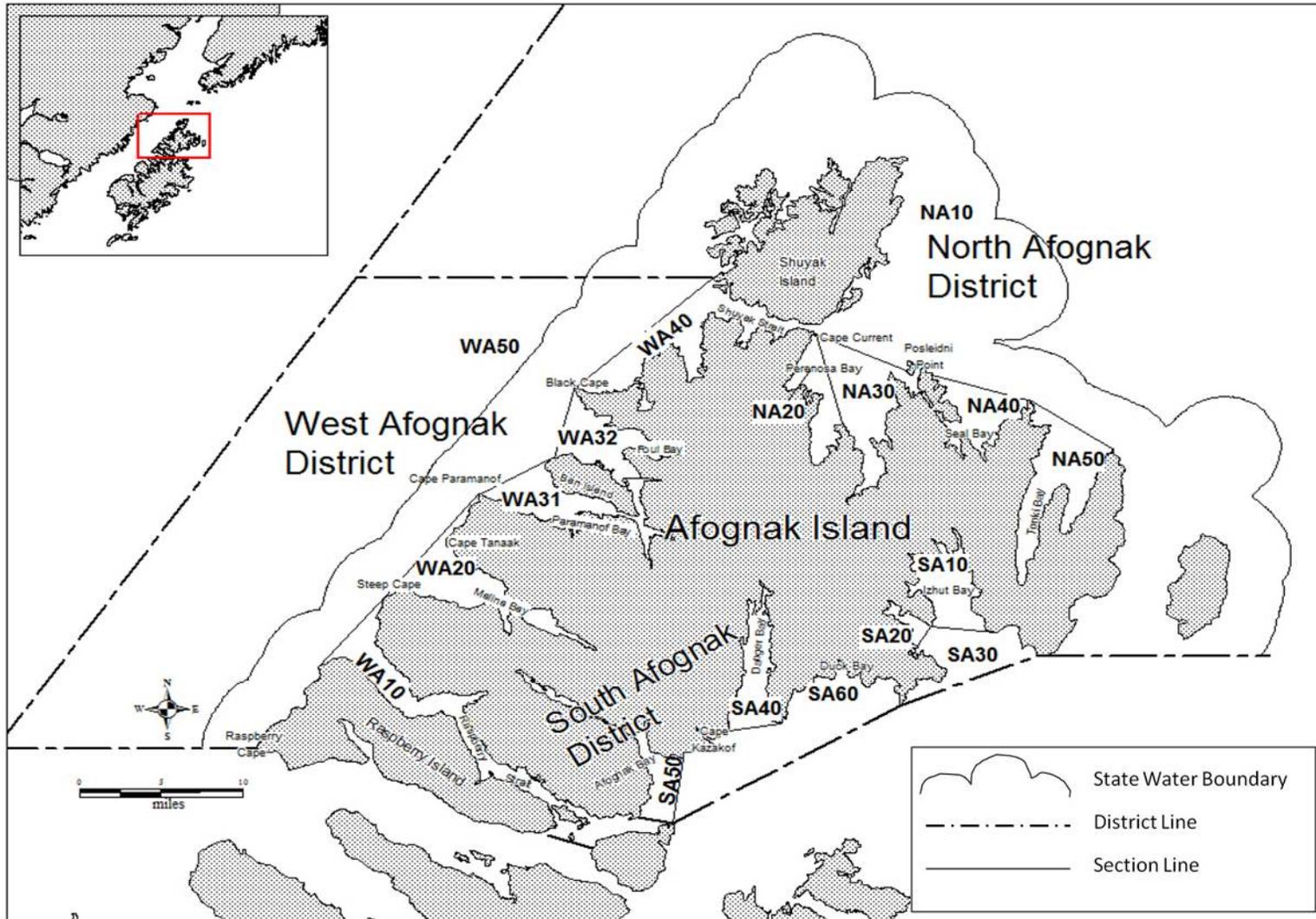


Figure 3.–Map showing the Afognak districts.

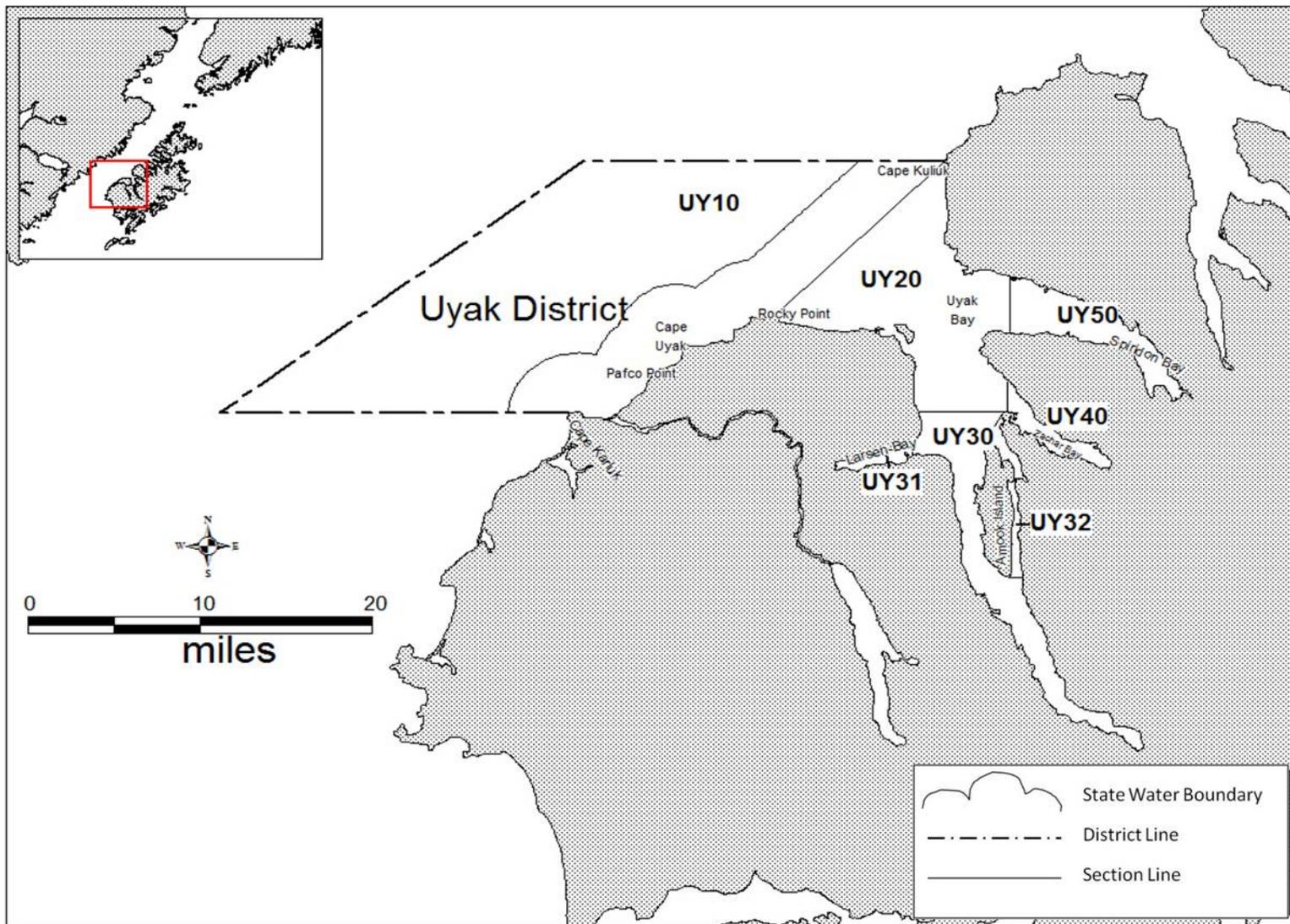


Figure 5.—Map showing the Uyak District.

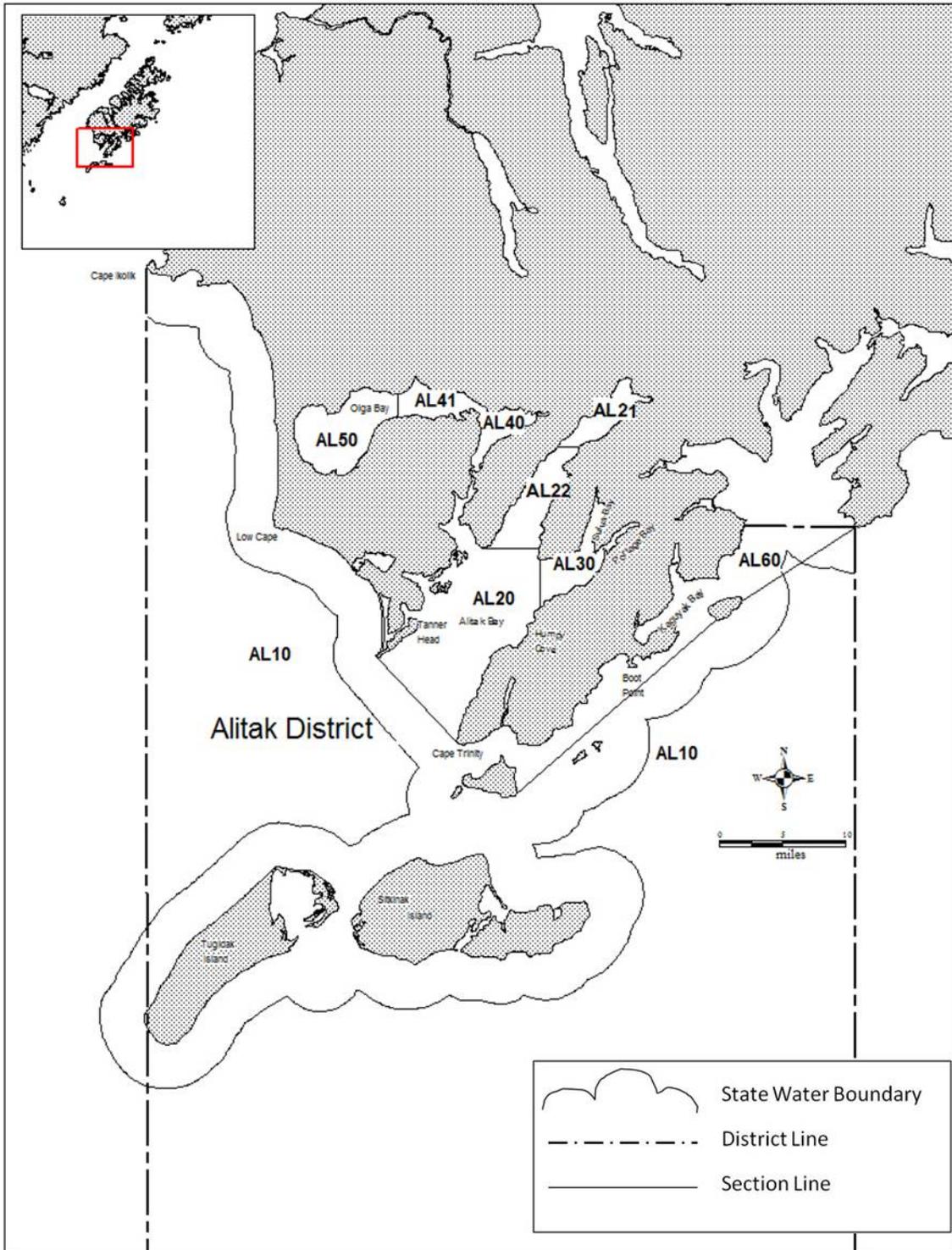


Figure 6.—Map showing the Alitak District.

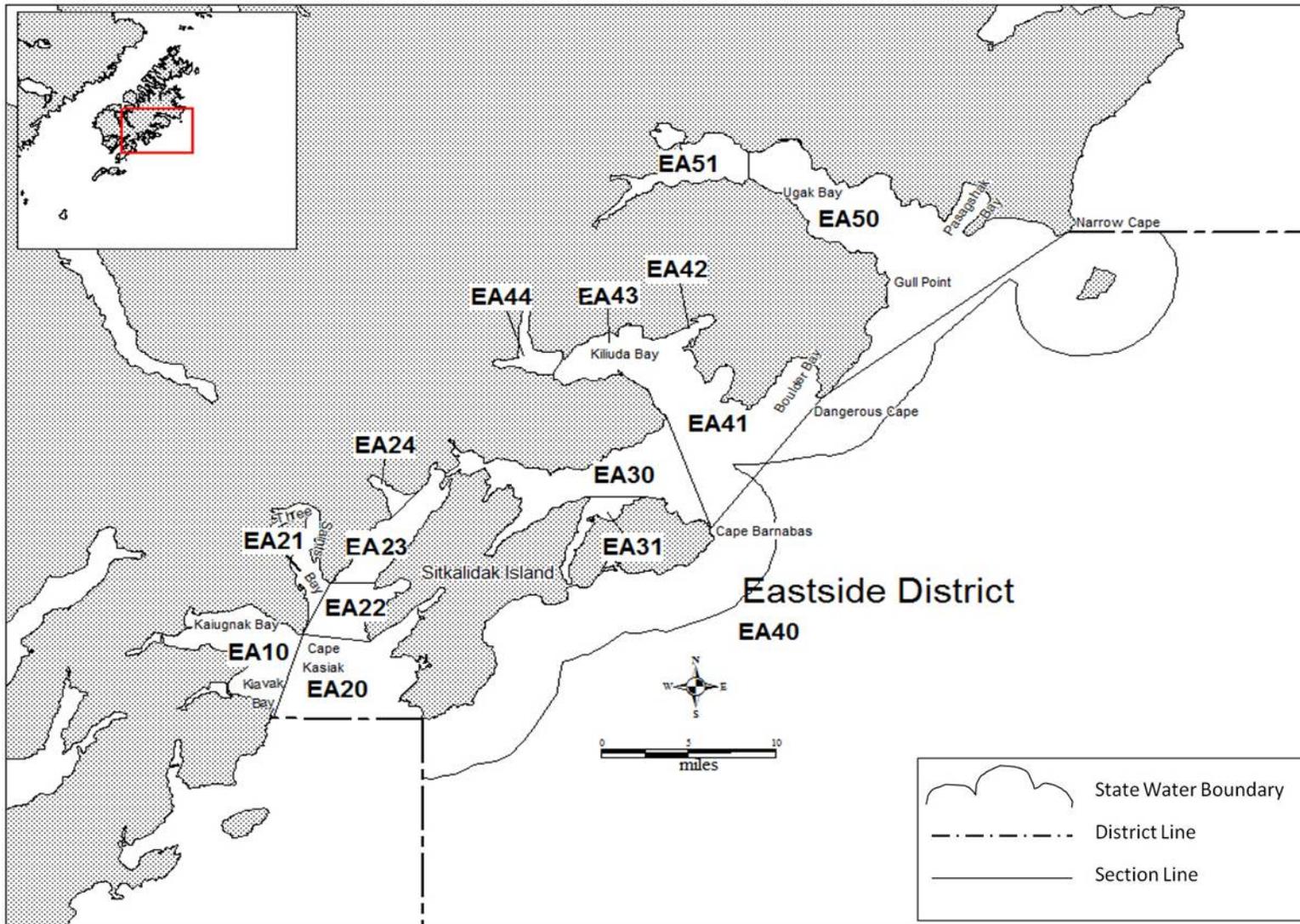


Figure 7.—Map showing the Eastside District.

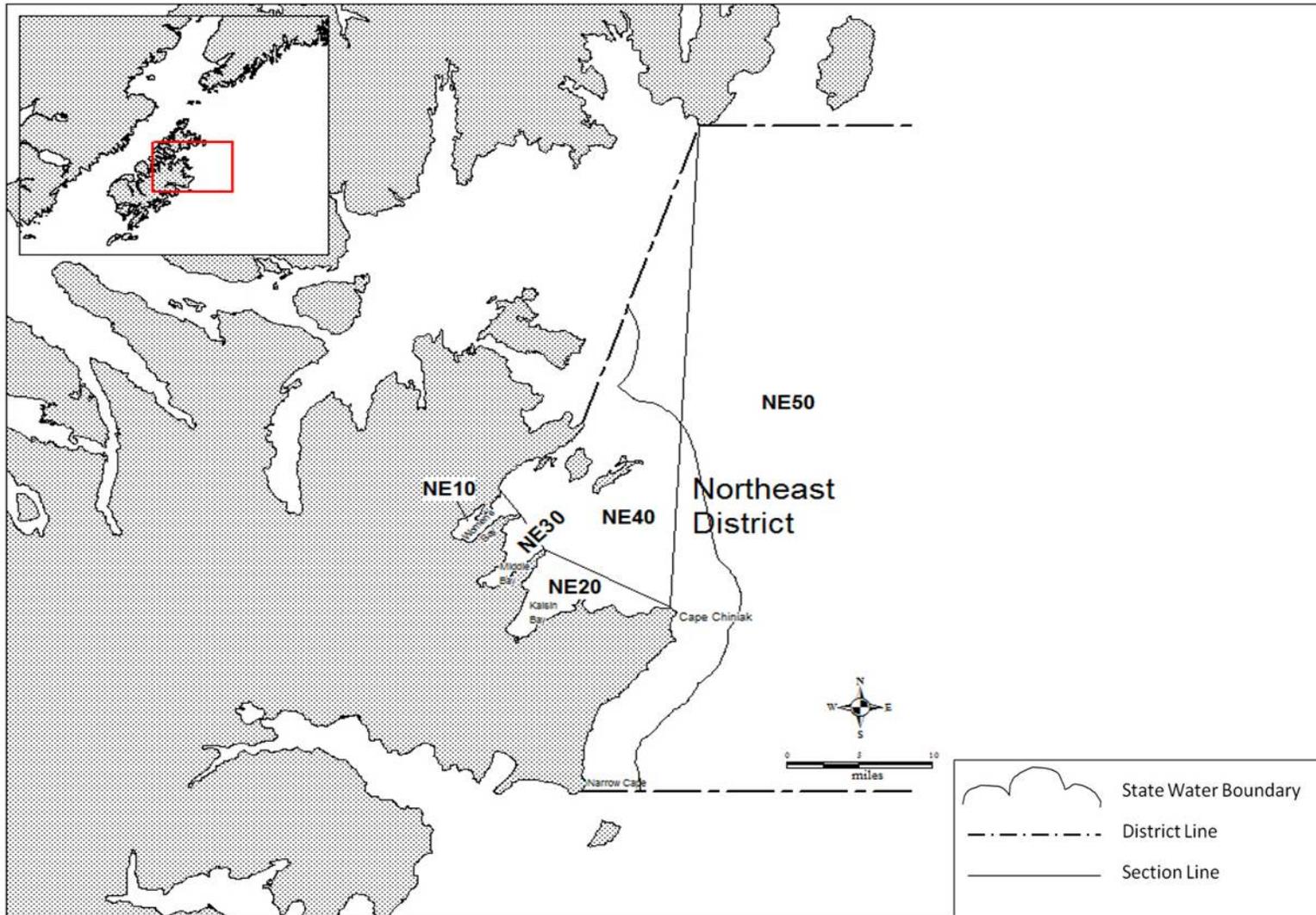


Figure 8.—Map showing the Northeast District.

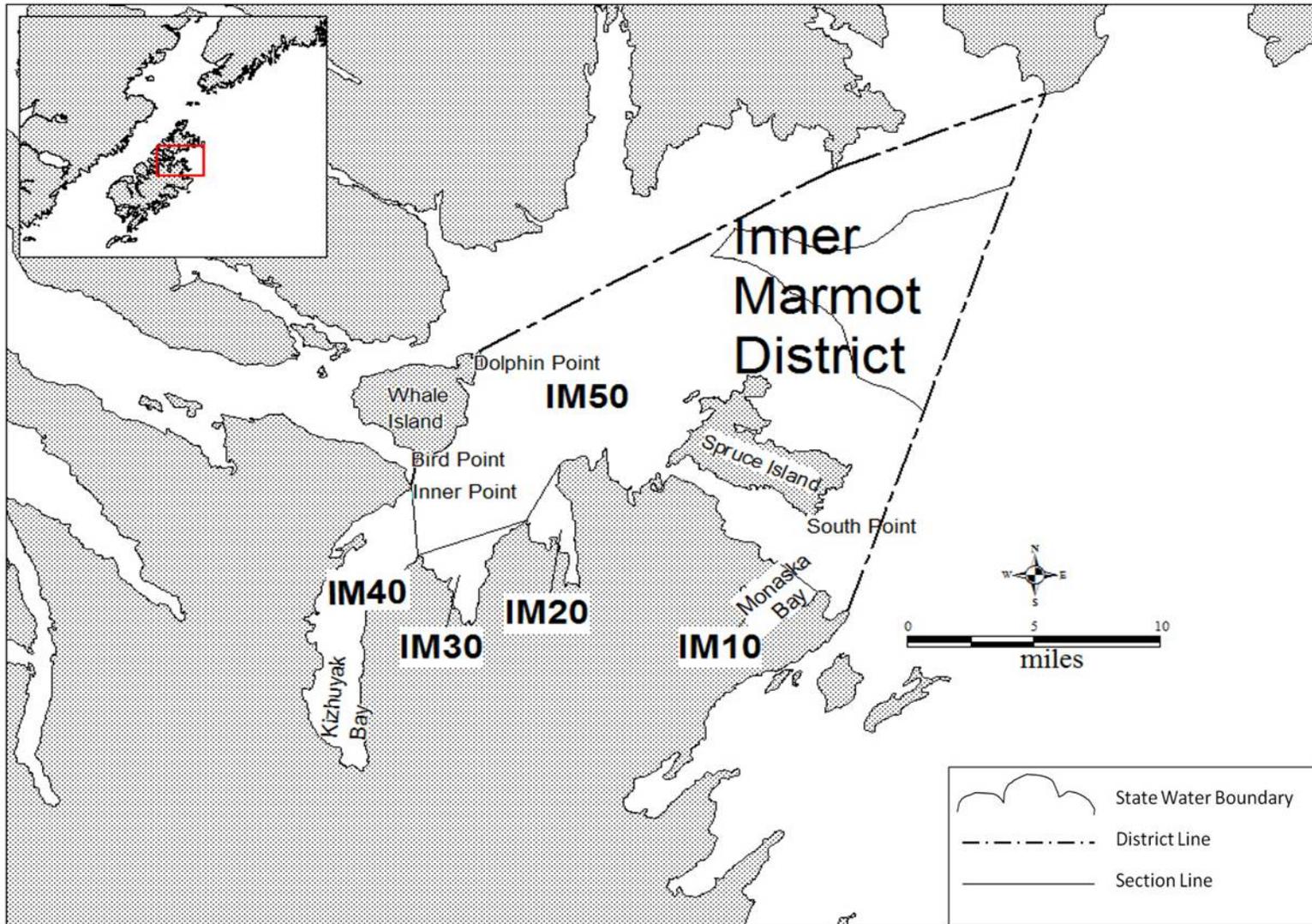


Figure 9.—Map showing the Inner Marmot District.

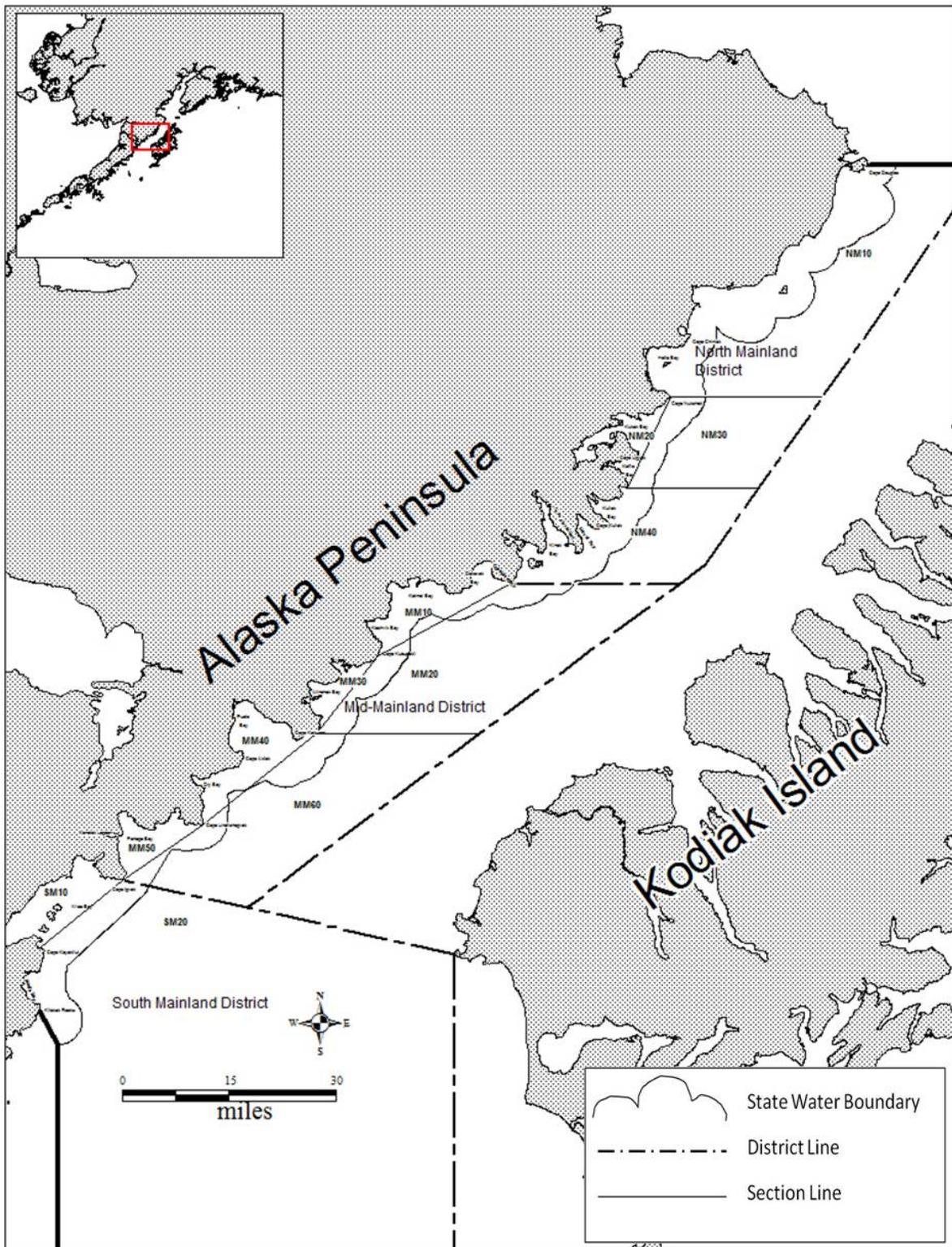


Figure 10.—Map showing the Mainland districts.

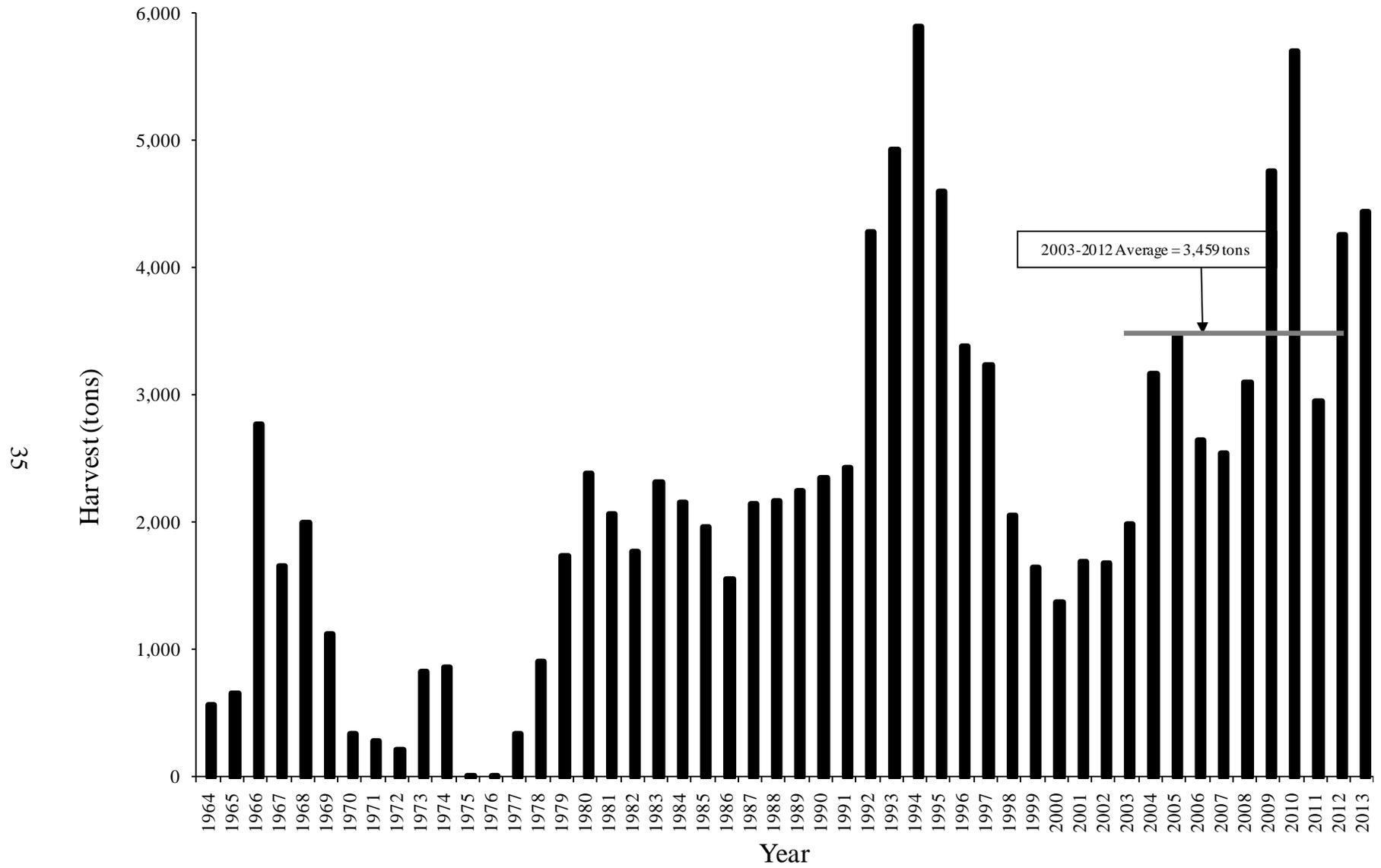


Figure 11.—Herring sac roe commercial fishery harvest in the KMA, 1964 through 2013.

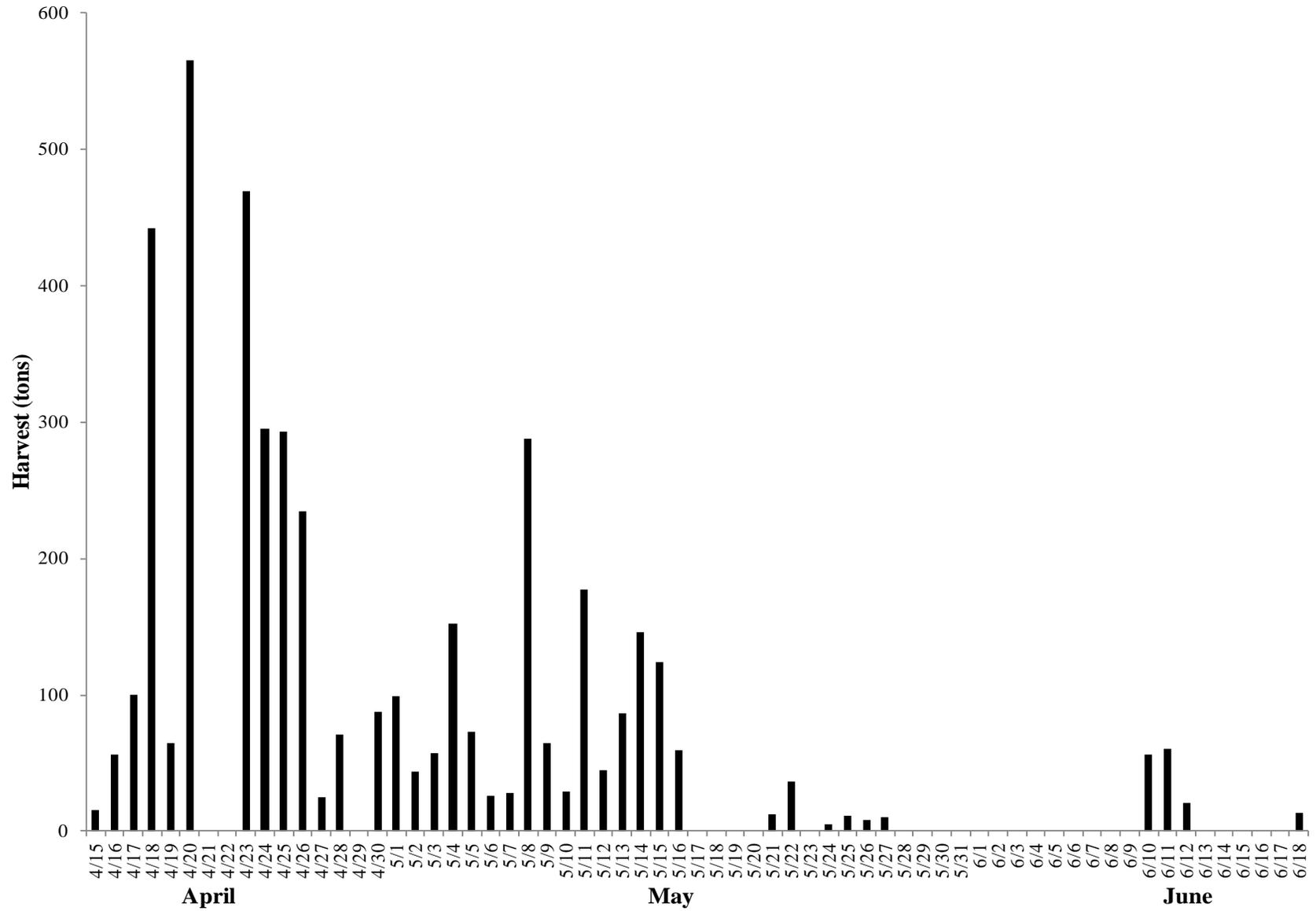


Figure 12.—Herring sac roe fishery harvest by day in the KMA, 2013.

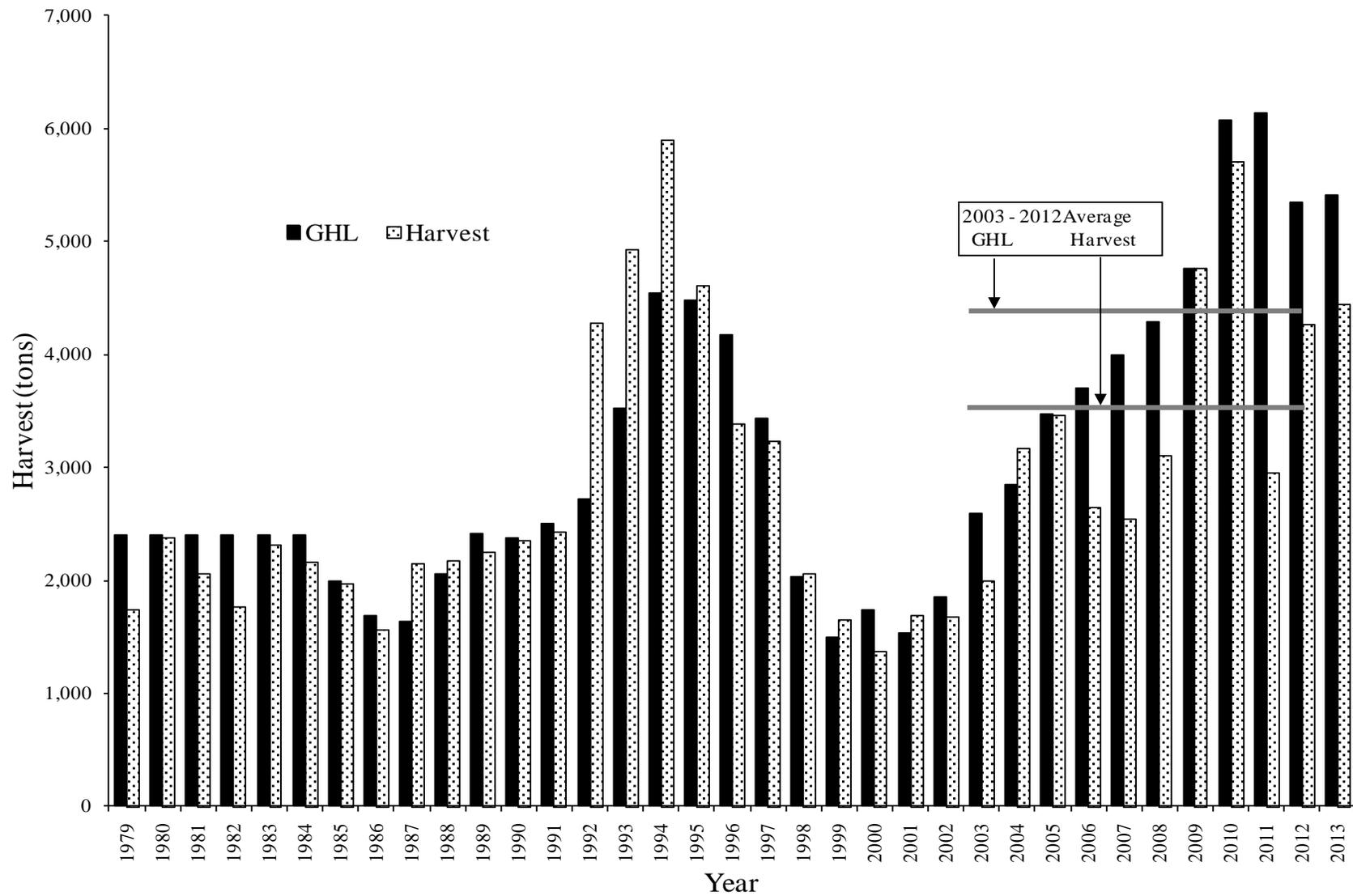
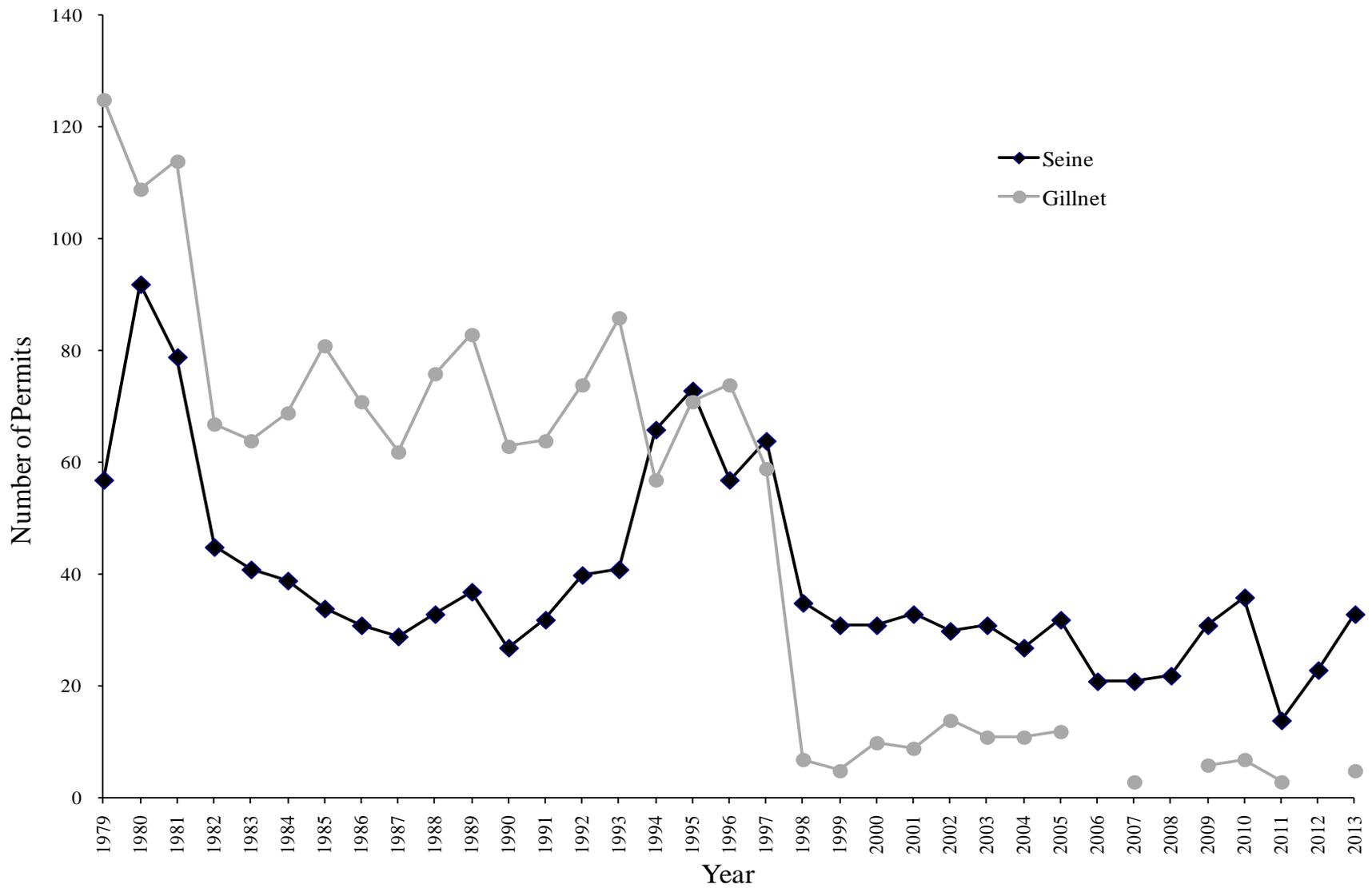


Figure 13.—Comparison of herring sac roe GHLs to harvest, KMA, 1979 through 2013.



*2006, 2008, and 2012 gillnet data is confidential

Figure 14.—Herring sac roe commercial fishery participation, by gear type in the KMA, 1979 through 2013.

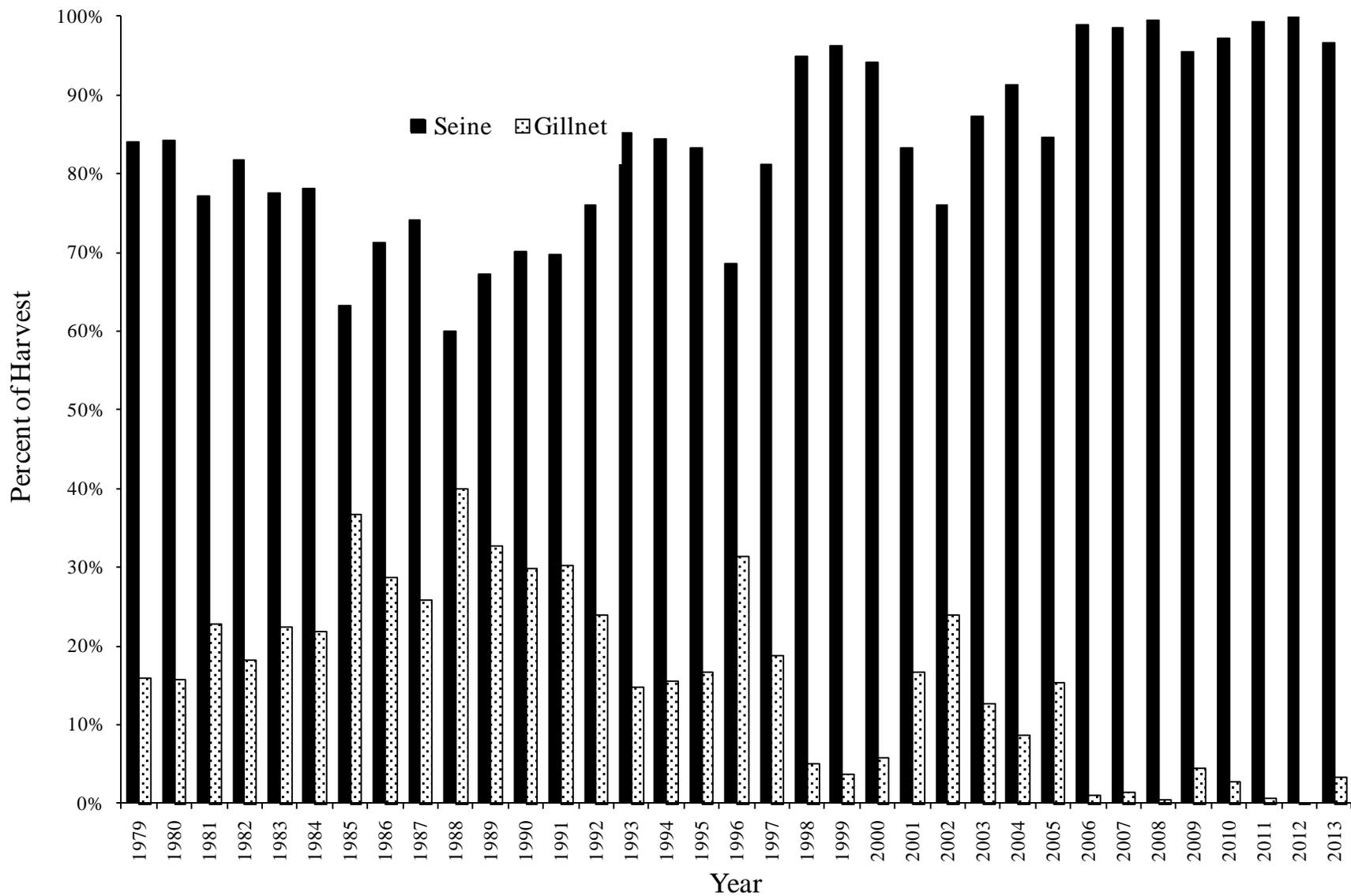


Figure 15.—Percent of the total harvest taken by gear type in herring sac roe commercial fishery, KMA, 1979 through 2013.

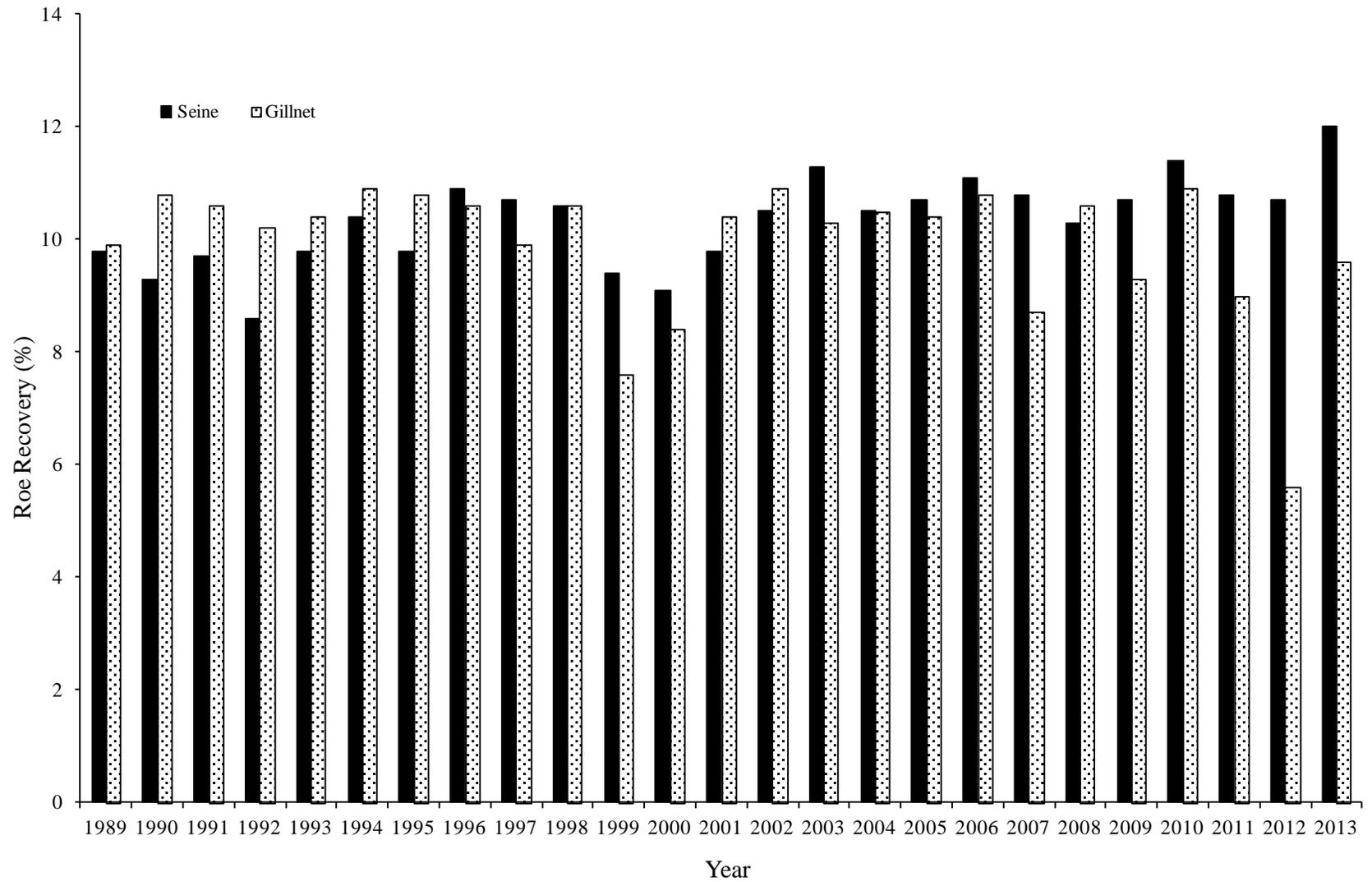
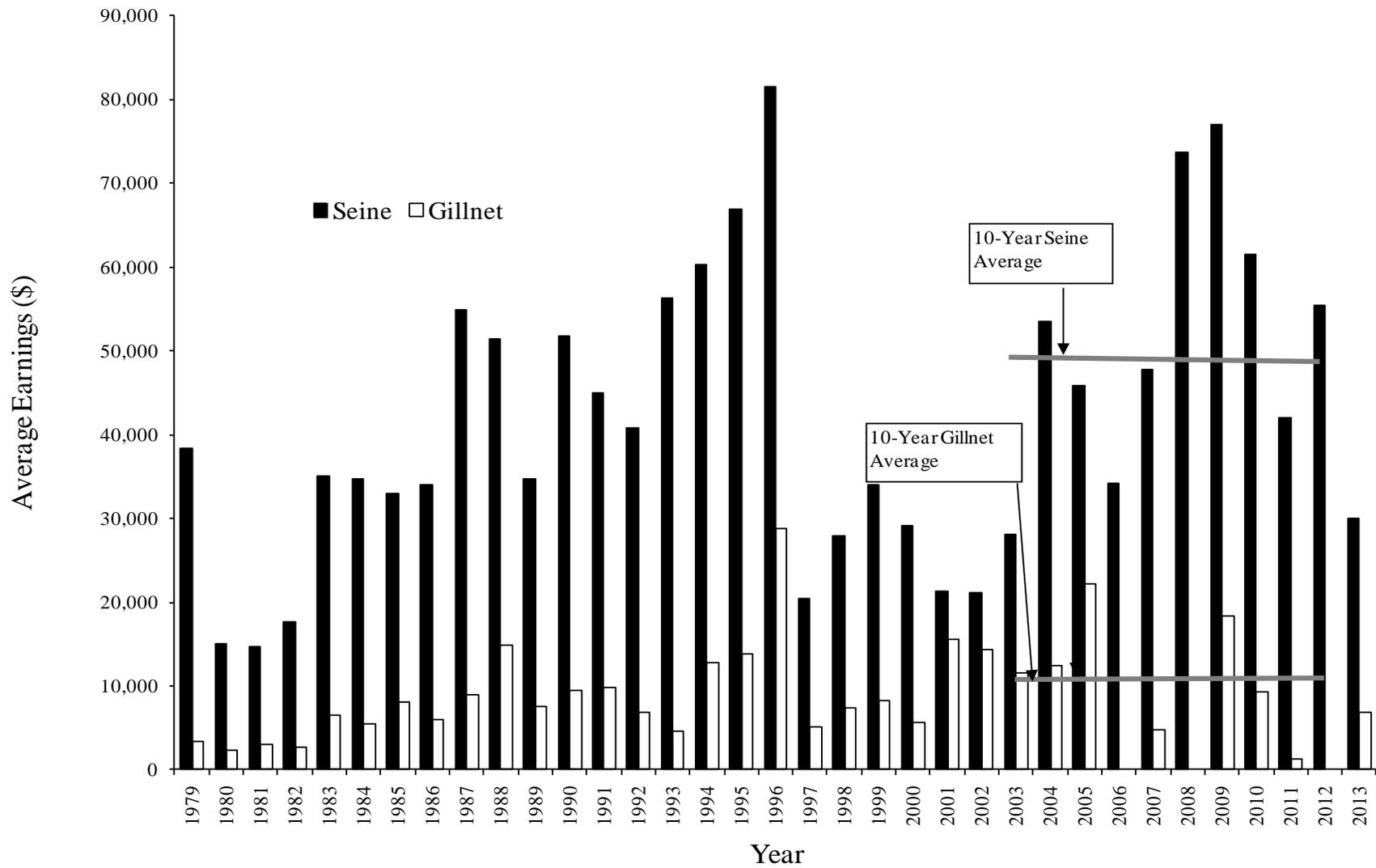


Figure 16.—Herring sac roe fishery, roe recovery in the KMA, 1989 through 2013



* 2006, 2008, and 2012 gillnet data is confidential

Figure 17.—Average earnings by gear type for herring sac roe commercial fisheries, KMA, 1979 through 2013.

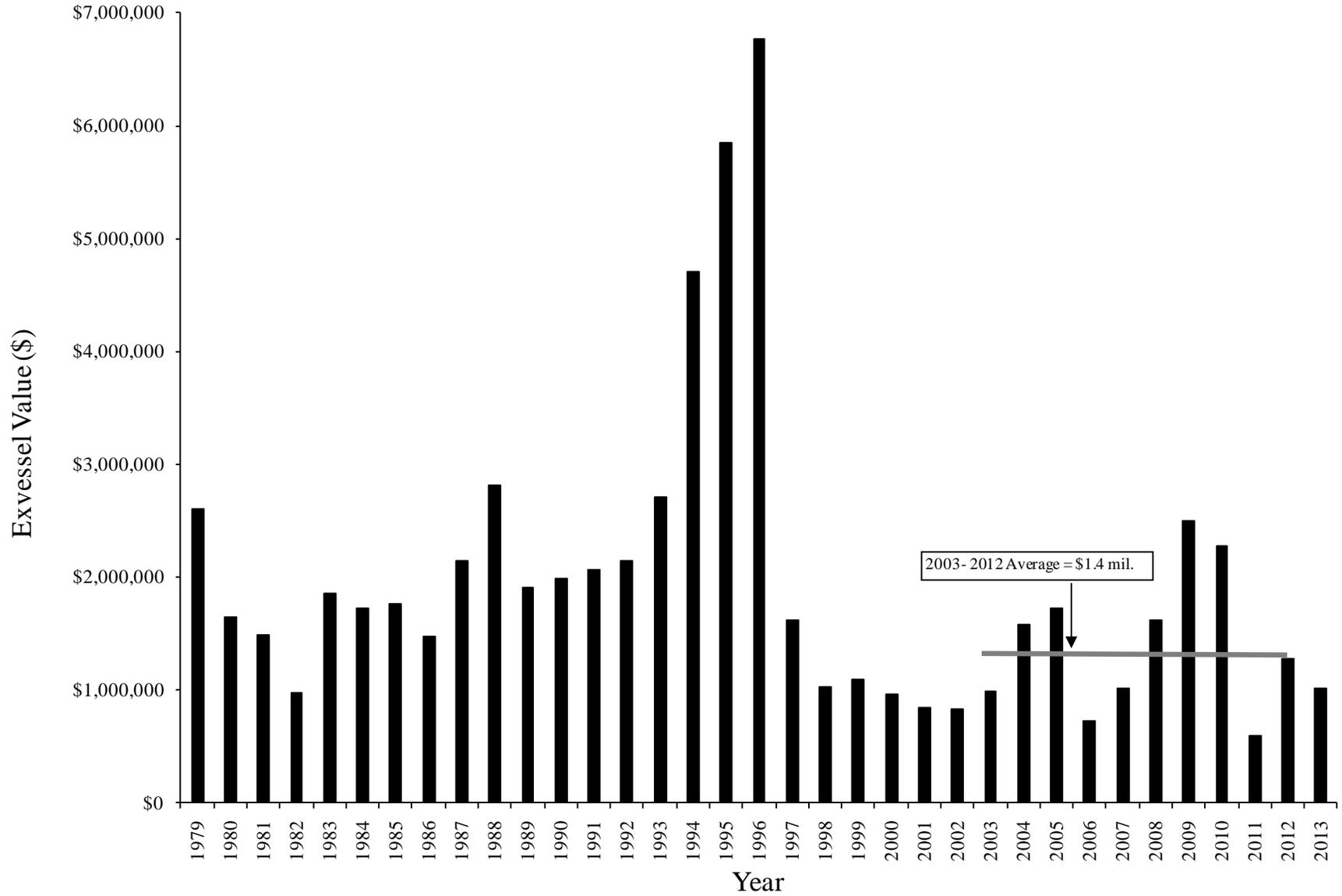


Figure 18.—Total exvessel value for herring sac roe commercial fisheries, KMA, 1979 to 2013.

**APPENDIX A: SUMMARY OF EMERGENCY ORDERS
ISSUED FOR THE HERRING COMMERCIAL FISHERIES
IN THE KODIAK MANAGEMENT AREA, 2013**

Appendix A1.–Summary of emergency orders issued for the herring commercial fisheries in the Kodiak Management Area, 2013.

Emergency Order #	Issued	Effective:	Action Taken:
1	4:00 PM April 9	noon April 15	<u>Open Sac Roe Fishery:</u> initial opening times and fishing periods by gear and section for sac roe herring fishery announced.
2	11:00 AM April 16	11:15 AM April 16	<u>Fishing Period:</u> commercial herring fishing opened in the Village Islands/Uganik Bay Sections (UG30, 32-34) for purse seine gear from 11:15 AM to 1:15 PM in that portion north of 57° 45.4' N. lat. and south of 57° 47.6' N. lat.
3	9:00 AM April 17	9:15 AM April 17	<u>Fishing Period:</u> commercial herring fishing opened in the Village Islands/Uganik Bay Sections (UG30, 32-34) for purse seine gear from 9:15 AM to 11:15 AM in that portion north of 57° 45.4' N. lat. and south of 57° 47.0' N. lat.
4	9:00 AM April 18	9:15 AM April 18	<u>Fishing Period:</u> commercial herring fishing opened in the Village Islands/Uganik Bay Sections (UG30, 32-34) for purse seine gear from 9:15 AM to 11:15 AM in that portion north of 57° 45.0' N. lat. and south of 57° 47.0' N. lat.
5	3:00 PM April 18	noon April 18	<u>Closure:</u> The Outer Kiliuda Bay Section (EA43) at noon April 18.
6	6:15 PM April 18	6: 25 PM April 18	<u>Fishing Period:</u> Commercial herring fishing opened in the Village Islands/Uganik Bay Sections (UG30, 32-34) for purse seine gear from 6:25 PM to 8:25 PM in that portion north of 57° 42.1' N. lat. and south of 57° 44.5' N. lat. <u>Fishing Period:</u> Commercial herring fishing opened in the Village Islands/Uganik Bay Sections (UG30, 32-34) for gillnet gear from 9:00 PM April 18 to 9:00 AM April 20.
7	8:45 AM April 20	9:00 AM April 20	<u>Fishing Period:</u> Commercial herring fishing opened in the Danger Bay Section (SA40) for purse seine gear from 9:00 AM to 11:00 AM.

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Emergency Order #	Issued:	Effective:	Action Taken:
8	10:45 AM April 20	11:00 AM April 20	<u>Fishing Period:</u> Commercial herring fishing opened in the Danger Bay Section (SA40) for purse seine gear from 11:00 AM to 1:00 PM.
9	12:45 PM April 20	1:00 PM April 20	<u>Fishing Period:</u> Commercial herring fishing opened in the Danger Bay Section (SA40) for purse seine gear from 1:00 PM to 4:00 PM.
10	5:00 PM April 20	5:00 PM April 20	<u>Fishing Period:</u> Commercial herring fishing opened in the Danger Bay Section (SA40) for gillnet gear from 5:00 PM April 20 until further notice.
11	10:30 AM April 23	10: 45 AM April 23	<u>Fishing Period:</u> Commercial herring fishing opened in the Village Islands/Uganik Bay Sections (UG30, 32-34) for purse seine gear from 10:45 AM to 12:45 PM in that portion north of 57° 42.2' N. lat. and south of 57° 45.0' N. lat.
12	6:00 PM April 23	6:15 PM April 23	<u>Fishing Period:</u> Commercial herring fishing opened in the Village Islands/Uganik Bay Sections (UG30, 32-34) for purse seine gear from 6:15 PM to 9:00 PM in that portion north of 57° 40.6' N. lat. and south of 57° 45.2' N. lat.
13	10:00 PM April 23	10:00 PM April 23	<u>Fishing Period:</u> Commercial herring fishing opened in the Village Islands/Uganik Bay Sections (UG30, 32-34) for gillnet gear from 10:00 PM April 23 until further notice.
14	9:00 PM April 25	9:00 PM April 25	<u>Closure:</u> The Outer Ugak Bay Section (EA50) at 9:00 PM April 25.
15	10:00 AM April 27	noon May 1	<u>Fishing Period:</u> Establishes the section that will be opened to both gear types beginning May 1.

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Emergency Order #	Issued:	Effective:	Action Taken:
16	noon April 30	noon April 30	<u>Closure:</u> The Kizhuyak Bay Section (IM40) at noon April 30.
17	4:00 PM May 1	4:10 PM May 1	<u>Fishing Period:</u> Commercial herring fishing opened in the Village Islands/Uganik Bay Sections (UG30, 32-34) for purse seine gear from 4:10 PM to 6:10 PM in that portion north of 57° 45.2' N. lat. and south of 57° 48.5' N. lat.
18	3:45 PM May 2	4:00 PM May 2	<u>Fishing Period:</u> Commercial herring fishing opened in the Village Islands/Uganik Bay Sections (UG30, 32-34) for purse seine gear from 4:00 PM to 9:00 PM in that portion north of 57° 45.2' N. lat. and south of 57° 50.0' N. lat.
19	7:45 PM May 2	7:45 PM May 2	<u>Closure:</u> The Village Islands/Uganik Bay Sections (UG30, 32-34) for purse seine gear at 7:45 PM.
20	6:30 PM May 4	6:40 PM May 4	<u>Fishing Period:</u> Commercial herring fishing opened in the Danger Bay Section (SA40) for purse seine gear from 6:40 PM to 7:40 PM in that portion north of 58° 10.0' N. lat. and east of 152° 34.6' W. long.
21	7:30 PM May 4	7:40 PM May 4	<u>Fishing Period:</u> Commercial herring fishing opened in the Danger Bay Section (SA40) for purse seine gear from 7:40 PM to 9:00 PM in that portion north of 58° 10.0' N. lat. and east of 152° 34.6' W. long.
22	8:30 PM May 4	8:35 PM May 4	<u>Closure:</u> The Danger Bay Section (SA40) for purse seine gear at 8:35 PM.
23	6:30 PM May 6	6:40 PM May 6	<u>Fishing Period:</u> Commercial herring fishing opened in the Village Islands/Uganik Bay Sections (UG30, 32-34) for purse seine gear from 6:40 PM to 9:00 PM in that portion north of 57° 42.8' N. lat. and south of 57° 44.5' N. lat.

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Emergency Order #	Issued:	Effective:	Action Taken:
24	11:00 AM May 7	11:20 AM May 7	<u>Fishing Period:</u> Commercial herring fishing opened in the Village Islands/Uganik Bay Sections (UG30, 32-34) for purse seine gear from 11:20 AM to 12:20 PM in that portion north of 57° 42.8' N. lat. and south of 57° 44.5' N. lat.
25	noon May 7	1:20 PM May 7	<u>Fishing Period:</u> Commercial herring fishing opened in the Village Islands/Uganik Bay Sections (UG30, 32-34) for purse seine gear from noon to 1:20 PM in that portion north of 57° 42.8' N. lat. and south of 57° 44.5' N. lat.
26	2:30 PM May 7	2:45 PM May 7	<u>Fishing Period:</u> Commercial herring fishing opened in the Village Islands/Uganik Bay Sections (UG30, 32-34) for purse seine gear from 2:45 PM to 3:45 PM in that portion north of 57° 40.8' N. lat. and south of 57° 43.1' N. lat.
27	5:50 PM May 7	6:05 PM May 7	<u>Fishing Period:</u> Commercial herring fishing opened in the Village Islands/Uganik Bay Sections (UG30, 32-34) for purse seine gear from 6:05 PM to 9:00 PM in that portion north of 57° 42.8' N. lat. and south of 57° 44.5' N. lat.
28	9:00 AM May 8	9:15 AM May 8	<u>Fishing Period:</u> Commercial herring fishing opened in the Village Islands/Uganik Bay Sections (UG30, 32-34) for purse seine gear from 9:15 AM to 11:15 AM in that portion north of 57° 42.8' N. lat. and south of 57° 44.5' N. lat.
29	11:00 AM May 8	11:15 AM May 8	<u>Fishing Period:</u> Commercial herring fishing opened in the Village Islands/Uganik Bay Sections (UG30, 32-34) for purse seine gear from 11:15 AM to 1:15 PM in that portion north of 57° 42.8' N. lat. and south of 57° 44.5' N. lat.
30	1:00 PM May 8	1:15 PM May 8	<u>Fishing Period:</u> Commercial herring fishing opened in the Village Islands/Uganik Bay Sections (UG30, 32-34) for purse seine gear from 1:15 PM to 3:15 PM in that portion north of 57° 42.8' N. lat. and south of 57° 44.5' N. lat.

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Emergency Order #	Issued:	Effective:	Action Taken:
31	3:00 PM May 8	3:05 PM May 8	<u>Closure:</u> The Village Islands/Uganik Bay sections (UG30, 32-34) at 3:05 PM May 8.
32	4:45 PM May 11	5:00 PM May 11	<u>Closure:</u> The Inner Ugak Bay Section (EA51) at 5:00 PM May 11.
33	1:45 PM May 12	noon May 12	<u>Closure:</u> The Geese/Two Headed Section (AL60) at noon May 12.
34	3:30 PM May 12	4:00 PM May 12	<u>Closure:</u> The Danger Bay Section (SA40) for gillnet gear at 4:00 PM May 12.
35	12:30 PM May 13	12:40 PM May 13	<u>Closure:</u> The East Sitkalidak Section (EA30) at 12:40 PM May 13.
36	4:30 PM May 13	4:40 PM May 13	<u>Closure:</u> The Three Saints Bay Section (EA30) at 4:40 PM May 13.
37	11:45 AM May 15	noon May 15	<u>Fishing Period:</u> Commercial herring fishing opened in the Shearwater Bay Section (EA42) for purse seine gear from noon to 10:00 PM in that portion west of 152° 54.13' W. long.
38	11:45 AM May 15	noon May 15	<u>Fishing Period:</u> Commercial herring fishing opened in the Inner Kiliuda Bay Section (EA44) for purse seine gear from noon to 10:00 PM. Closed waters are those waters north of a line from 57° 18.63' N. lat., 153° 05.95' W. long. to 57° 19.10' N. lat., 153° 08.00' W. long.
39	4:20 PM May 15	4:30 PM May 15	<u>Fishing Period:</u> Commercial herring fishing opened in the Shearwater Bay Section (EA42) for purse seine gear from 4:30 PM to 10:00 PM in that portion east of 152° 54.13' W. long.
40	7:00 PM May 15	7:05 PM May 15	<u>Closure:</u> The Shearwater Bay Section (EA42) at 7:05 PM May 13.

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Emergency Order #	Issued:	Effective:	Action Taken:
41	10:00 PM May 15	10:00 PM May 15	<u>Closure:</u> The Inner Kiliuda Bay Section (EA44) at 10:00 PM May 15.
42	9:00 AM June 13	noon June 12	<u>Closure:</u> The West Upper Olga Bay Section (AL50) at noon June 12.
