

Fishery Management Report No. 14-56

**Kodiak Management Area Herring Fisheries Annual
Management Report, 2012**

by

Geoff Spalinger

December 2014

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



Symbols and Abbreviations

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

FISHERY MANAGEMENT REPORT NO. 14-56

**KODIAK MANAGEMENT AREA HERRING FISHERIES
ANNUAL MANAGEMENT REPORT, 2012**

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 2012.

The KMA 2012 herring sac roe fishery was open from April 15 through June 30. Fishermen harvested 4,260 tons, compared to the preseason guideline harvest level (GHL) of 5,355 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 4,253 tons, nearly 100% of the total catch, and gillnet fishermen harvested only 7 tons. Roe recovery percentages averaged 10.7% for the fishery. The total exvessel value of the fishery was an estimated \$1,278,000. The harvest was composed primarily of 9.0% age-5, 60.1% age-7, 17.8% age-8, and 4.4% age-9 fish.

A combine fishery was conducted for the KMA herring food and bait fishery for the 2001 to 2012 seasons due to the low GHLs. Food and bait harvests totaled 299 tons with 197 tons (180-ton GHL) coming from the Uganik District and 102 tons (87-ton GHL) from the South Afognak District. The Eastside District (137-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 2012 was 3,260 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 2012. 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, south to the Trinity Islands. 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 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, 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 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 2012, section GHLS ranged from 10 to 1,700 tons (short; Table 2). Establishing the 2012 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 department 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

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 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 ADF&G is directed to strive for the highest quality product (5 AAC 27.535(e)(6)).

2012 SEASON SUMMARY

The 2012 sac roe season opened at noon April 15. The last harvest occurred on June 25, and 36 EOs were issued during the season (Figure 12; Appendix A1). The total 2012 KMA GHG was established at 5,355 tons, and 4,260 tons were harvested (Table 3; Figure 13).

In 2012, 23 purse seine permit holders made 164 landings harvesting 4,253 tons. Gillnet permit holders harvested 7 tons (Table 3; Figure 14). Purse seine fishermen harvested nearly 100% of the total catch (Figure 15). The 2012 average individual purse seine permit holder harvest was 185 tons, the second highest average harvest on record (Table 3). Six companies operated 7 shore-based processing facilities to buy and process herring.

ADF&G monitored the fishery with 2 shore-based field crews and 2 research vessels, all of which were stationed in anticipated herring harvest locations. 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 51 sections open to fishing; however, 13 sections were designated exploratory, having little or no historical harvests. Harvests occurred within 19 sections, and the remaining sections were not fished.

Purse Seine Fishery

The majority of the 4,253 ton purse seine 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). Harvests included 1,623 tons from the Village Islands/Uganik Bay sections, 691 tons from the Danger Bay Section, and 1,573 tons from sections in the Eastside District. Only 137 tons were harvested from the Alitak District, well under the GHL of 775 tons. The Inner Uyak Bay Section of the Uyak District did not open due to low herring abundance for the second straight year (Table 2). Roe recovery from purse seine harvests averaged 10.7% (Figure 16).

Gillnet Fishery

Gillnet effort was expected to be minimal in 2012. 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 7 tons, the lowest on record (Table 3). The only harvest occurred in the combined Village Islands/Uganik Bay sections (Table 2). The number of vessels fished is confidential. Roe recovery from gillnet harvests averaged 5.6% (Figure 8).

Inseason Gear Changes

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, Barling Bay, Outer Ugak Bay, Inner Ugak Bay, Viekoda Bay, Terror Bay, West Uganik Passage, Tonki Bay, Izhut/Kittoi/MacDonalds Lagoon, and Kizhuyak Bay sections. The Shearwater Bay Section was opened on May 13 when the R/V K-Hi-C became available to monitor that fishery. An additional 480 tons were harvested as a result of these changes.

Exvessel Value of the Fishery

In 2012 the exvessel price paid for 10% roe recovery herring was approximately \$300 per ton at the dock, up \$100 per ton from 2011 (Table 3). The estimated average exvessel earnings per purse seine permit holder was \$55,474 (Figure 17). The total exvessel value of the 2012 fishery was worth an estimated \$1,278,000 (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 10.7% (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 provides insight into recruitment and aids managers in making GHL adjustments. For example, areas with strong percentages of age-4 and younger herring (recruitment) will not be aggressively fished and will have conservative GHGs established, whereas areas with older age classes (9 or more years old) will be more aggressively fished with higher GHGs.

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 4,220 herring were collected and analyzed for AWL data from harvests and ADF&G trawl samples during the 2012 sac roe season. Samples were taken from 12 sections, 11 of which had commercial harvests. Age-7 herring were the predominant age class harvested in 2012, representing approximately 60.1% of the total commercial harvest (Table 4). The complete commercial harvest consisted of 1.2% age-3, 0.4% age-4, 9.0% age-5, 2.3% age-6, 60.1% age-7, 17.8% age-8, 4.4% age-9, 3.0% age-10, and 2.1% age-11 and older herring (Table 4). Herring weights in 2012 were fairly consistent between areas throughout the Kodiak Archipelago (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 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 2012. The Perenos Bay Section was open to gillnet gear in 2012 with a 10-ton GHL, and the Delphin Bay Section was open as exploratory. No harvest occurred in the North Afognak District.

West Afognak District

The West Afognak District has 6 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. Hydroacoustic and aerial surveys in 2012 did not locate herring.

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 700-ton GHL for both purse seine (525-ton GHL) and gillnet (175-ton GHL) permit holders (Table 2). Purse seine fishermen harvested 691 tons, and this section was not fished by gillnetters (Table 2). Commercial catch samples in the Danger Bay Section consisted of 1.1% age-3, 0.4% age-4, 14.2% age-5, 4.5% age-6, 54.8% age-7, 22.3% age-8, 2.0% age-9, 0.5% age-10, and 0.4% age-11 herring (Table 4). Hydroacoustic surveys conducted by ADF&G observed over 6,500 tons of herring.

In 2012, the MacDonald 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). Purse seine permit holders harvested 49 tons. Commercial catch samples from these sections consisted of 3.0% age-3, 3.0% age-4, 22.0% age-5, 8.0% age-6, 54.0% age-7, 5.0% age-8, 2.0% age-9, and 3.0% age-10 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 2012 GHL 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 1,623 tons, and gillnet fishermen harvested 7 tons (Table 2). Catch samples from the Village Islands/Uganik Bay sections were composed mainly of 0.5% age-4, 9.9% age-5, 2.5% age-6, 49.0% age-7, 27.4% age-8, 6.9% age-9, 1.7% age-10, 1.3% age-11, 0.7% age-12, and 0.1% age-15 herring (Table 4). Hydroacoustic surveys estimated over 10,000 tons of herring. The West Uganik Passage Section had a 50-ton GHL, 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. In 2012 the Inner Uyak Section was to be managed for quality with a 200-ton GHL; however, ADF&G hydroacoustic and aerial surveys could not locate enough herring to allow a fishery, and the Inner Uyak Section was not opened.

The Browns Lagoon Section was open to gillnet gear in 2012 with a 50-ton GHL (Table 2). No harvest occurred in this section (Table 2). Hydroacoustic and aerial surveys only estimated 50 tons in this section. Herring are known to stage in this section and then move into the Inner Uyak Section.

The Zachar Bay and Spiridon Bay sections were both open to gillnet gear. Zachar Bay had a 30-ton GHL, while Spiridon Bay had a 10-ton GHL. Neither of these sections was fished (Table 2).

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 2012, The Inner and Outer Deadman Bay sections were combined and managed as one section. These combined sections had a GHL of 400 tons and purse seine fishermen harvested just 34 tons (Table 2).

The East Upper Olga Bay and West Upper Olga Bay sections were each open in 2012 with a 75-ton GHL. Purse seine fishermen harvested 5 tons from each of these sections (Table 2).

The Sulua Bay Section had a 75-ton GHL for gillnet gear. After April 30, purse seine gear was also allowed in this section. Purse seine fishermen harvested 93 tons from Sulua Bay. Commercial catch samples from Sulua Bay were combined with Inner Deadman Bay. Samples from these sections consisted of 0.7% age-3, 0.7% age-4, 7.8% age-5, 2.8% age-6, 40.4% age-7, 4.3% age-8, 10.6% age-9, 18.4% age-10, 12.8% age-11, 0.7% age-12, and 0.7% age-13 herring (Table 4).

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, sometimes occurring as early as late March. In 2012, the GHL for the East Sitkalidak Section was established at 200 tons, and 253 tons were harvested by purse seine gear (Table 2). The commercial harvest from the West Sitkalidak Section was composed of older fish with 71.6% age-7, 13.5% age-8, 4.4% age-9, 6.4% age-10, and 4.1% age-11 herring representing the harvest (Table 4).

The West Sitkalidak Section GHL was established at 200 tons, and 329 tons were harvested by purse seine gear (Table 2). Commercial catch samples from West Sitkalidak consisted of 0.3% age-6, 76.7% age-7, 10.4% age-8, 3.0% age-9, 7.3% age-10, 1.5% age-11, and 0.8% age-12 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 100-ton GHL initially open to gillnet gear (Table 2). On May 1 this section was opened to purse seine gear as well, and 75 tons were harvested (Table 2). The commercial harvest was made up of 1.4% age-3, 1.7% age-5, 0.6% age-6, 80.7% age-7, 7.8% age-8, 2.9% age-9, 3.7% age-10, 0.9% age-11, and 0.3% age-12 (Table 4).

The GHL for the Outer Kiliuda Bay Section was set at 125 tons, and 157 tons were harvested by purse seine fishermen (Table 2). Age compositions of the harvest were 0.6% age-5, 0.3% age-6, 78.5% age-7, 8.8% age-8, 4.7% age-9, 3.8% age-10, 2.9% age-11, and 0.3% age-12 (Table 4). The Inner Kiliuda Bay Section was opened as a gillnet section with a 50-ton GHL, and no harvest occurred (Table 2).

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; 478 tons were harvested (Table 2). Samples from the harvest consisted of 5.9% age-3, 0.2% age-4, 13.6% age-5, 1.9% age-6, 75.9% age-7, 1.2% age-8, 0.2% age-9, 0.7% age-10, 0.3% age-11, and 0.2% age-13 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 150 tons and 186 tons were harvested (Table 2). The harvest was composed of 1.8% age-3, 5.3% age-5, 0.6% age-6, 76.0% age-7, 9.9% age-8, 1.8% age-9, 3.5% age-10, 0.6% age-11, and 0.6% age-12 herring (Table 4).

The Shearwater Bay Section was initially allocated to the gillnet fleet with a 75-ton GHL (Table 2). On May 13, this section was opened to purse seine gear, and the purse seine fleet harvested 95 tons (Table 2). Age compositions from the harvest consisted of 5.7% age-3, 8.2% age-5, 0.8% age-6, 73.0% age-7, 3.3% age-8, 3.3% age-9, 4.9% age-10, and 0.8% age-11 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 opened to the gillnet fleet only with a 50-ton GHL and no harvest occurred (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. In 2012, this section was opened to purse seine gear with a 150-ton GHL, and 150 tons were harvested (Table 2).

Mainland District

There are 3 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 2012; 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 2012. Samples taken by trawl net from this biomass were composed of 21.1% age-2, 44.0% age-3, 17.6% age-4, 16.3% age-5, 0.3% age-6, 0.3% age-7, and 0.5% age-8 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 and CFEC agreed to allow a combine fishery to occur. The 13 interim permit holders determined which vessel would conduct the harvest and be responsible for 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 from 2002 through 2011. 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 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)).

KAMISHAK FISHERY CLOSURE

The 2013 biomass forecast for Kamishak Bay herring affects the 2012/2013 Kodiak food and bait fishery in the Shelikof Strait. The biomass forecast for Kamishak Bay herring for the 2013 season was below the minimum spawning biomass of 6,000 tons that must be met before commercial fisheries may occur ([5 AAC 27.465(e)(4)]; Ted Otis, Lower Cook Inlet Finfish Research Biologist, ADF&G; Homer, Alaska, *Personal Communication*). The Kamishak Bay District sac roe fishery has been closed since 1999. Due to the 2013 Kamishak Bay sac roe fishery closure, the Shelikof Strait food and bait fishery north of the latitude of Miner's Point was closed for the 2012/2013 season.

2012/2013 SEASON

Permit holders again requested a combine fishery for the 2012/2013 season. The biggest obstacle to a competitive fishery is how to determine an equitable fishing period for the different gear types. ADF&G accommodated the permit holders' request, and the South Afognak District (87-ton GHL) and the Uganik District (180-ton GHL) south of the latitude of Miner's Point opened on September 24 (Table 6). Approximately 102 tons were harvested from the South Afognak District from September 24 through September 26. The South Afognak District was closed September 27. On September 28 and September 29 approximately 197 tons were harvested from the Uganik District, which was closed on October 1 (Tables 6 and 7). The Eastside District (137-ton GHL) could have been opened if there were 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. 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).

2012 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 3,260 pounds (Table 8). The majority of the harvest occurred in the Northeast and Eastside districts.

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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, Kodiak.

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 2012.

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
Average					
1964 to 2011	2,187	213	2,401	91	9
10 Year average					
2002 to 2011	3,200	188	3,389	94	6
5 Year average					
2007 to 2011	3,812	204	4,017	95	5

Table 2.–Herring sac roe fishery GHL by section and gear type, harvest by section and gear type, and date sections were closed, KMA, 2012.

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	-	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	100	Purse Seine	49	-	4/27	-
SA20 ^c	Kitoy Bay	c	c	c	c	c	c
SA30 ^c	MacDonald Lagoon	c	c	c	c	c	c
SA40	Danger Bay	700	525PS/175GN	691	0	5/6	5/5
SA50	Litnik	Closed	-	-	-	-	-
SA60	Duck Bay	Closed	-	-	-	-	-
TOTAL ALL AFOGNAK DISTRICTS				870	740	0	
UGANIK DISTRICT							
UG10	Kupreanof	Closed	-	-	-	-	-
UG20	Viekoda Bay	25	Gillnet	-	0	6/30	6/30
UG21	Terror Bay	30	Gillnet	30	0	5/3	5/3
UG30 ^d	Village Islands	1,700	1,350PS/350GN	1,623	7	4/21	5/3
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	1,653	7	
UYAK DISTRICT							
UY10	Offshore Uyak	Closed	-	-	-	-	-
UY20	Harvester Island	Closed	-	-	-	-	-
UY30	Inner Uyak	200	Purse Seine	-	-	-	-
UY32	Browns Lagoon	50	Gillnet	-	0	-	6/30
UY31	Larsen Bay	Closed	-	-	-	-	-
UY40	Zachar Bay	25	Gillnet	-	-	-	6/30
UY50	Spiridon Bay	10	Gillnet	-	0	-	6/30
DISTRICT TOTAL				285	0	0	

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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	100	Gillnet	0	0	6/30	6/30
AL21 ^c	Inner Deadman Bay	400	Purse Seine	34	0	6/30	6/30
AL22 ^c	Outer Deadman Bay	^c	^c	^c	^c	^c	^c
AL30	Sulua Bay	75	Gillnet	93	0	6/25	6/25
AL40	Lower Olga	50	Gillnet	0	0	6/30	6/30
AL41	East Upper Olga Bay	75	Purse Seine	5	0	6/30	6/30
AL50	West Upper Olga Bay	75	Purse Seine	5	0	6/30	6/30
AL60	Geese/Twoheaded	Exploratory	Both	0	0	6/30	6/30
DISTRICT TOTAL		775		137	0		
STURGEON/HALIBUT DISTRICT							
SH10	Sturgeon/Halibut	CLOSED	CLOSED	CLOSED			
EASTSIDE DISTRICT							
EA10	Kaiugnak	Exploratory	Both	0	0	-	-
EA20	SW. Sitkalidak	Exploratory	Both	0	0	6/30	6/30
EA21	Three Saints Bay	75	Purse Seine	0	0	6/30	6/30
EA22	Newman Bay	Exploratory	Both	0	0	6/30	6/30
EA23	W. Sitkalidak Strait	200	Purse Seine	329	-	4/17	-
EA24	Barling Bay	100	Gillnet	75	0	5/14	5/14
EA30	E. Sitkalidak Strait	200	Purse Seine	253	-	4/17	-
EA31	Tanginak Anchorage	Exploratory	Both	0	0	6/30	6/30
EA40	Outer Sitkalidak	Closed	-	-	-	-	-
EA41	Boulder Bay	Closed	-	-	-	-	-
EA42	Shearwater Bay	75	Gillnet	95	0	5/13	5/13
EA43	Outer Kiliuda Bay	125	Purse Seine	157	-	4/18	-
EA44	Inner Kiliuda Bay	50	Gillnet	0	0	6/30	6/30
EA50	Outer Ugak Bay	400	Purse Seine	478	-	5/1	5/1
EA51	Inner Ugak Bay	150	Gillnet	186	0	5/21	5/21
EA52	Pasagshak Bay	Closed	-	-	-	-	-
DISTRICT TOTAL		1,375		1,573	0		
NORTHEAST DISTRICT							
NE10	Womens Bay	50	Gillnet	0	0	-	6/30
NE20	Kalsin Bay	Closed	-	-	-	-	-
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	150	Purse Seine	150	-	5/8	5/8
IM50	Spruce Island	Closed	-	-	-	-	-
DISTRICT TOTAL		195		150	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				5,355	4,253	7	

^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 2012.

Year	Season length (Days)	Total GHL (Tons)	Harvest (tons) harvest	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		
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	Total GHL 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	Estimated	
	length (Days)		Seine	Gillnet	Seine	Gillnet	Seine	Gillnet	Seine	Gillnet	Seine	Gillnet	Seine	Gillnet	Ton ^a	Total Value ^a	
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
Average																	
1979 to 2011	54	3,056	2,843	2,353	447	83	17	148	269	40	48	69	14	\$41,937	\$9,138	\$717	\$1,982,608
10 Year																	
2002 to 2011	43	3,976	3,200	3,008	193	93	7	121	24	27	7	119	22	\$48,492	\$10,470	\$433	\$1,389,198
5 Year																	
2007 to 2011	45	5,053	3,812	3,724	88	98	2	161	10	25	4	154	18	\$60,397	\$8,130	\$410	\$1,603,130

^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, 2012.

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	347	0.0	1.4	0.0	1.7	0.6	80.7	7.8	2.9	3.7	1.2	75.0
Danger Bay	557	0.0	1.1	0.4	14.2	4.5	54.8	22.3	2.0	0.5	0.4	691
Deadman/Sulua	141	0.0	0.7	0.7	7.8	2.8	40.4	4.3	10.6	18.4	14.2	127
East Sitkalidak	296	0.0	0.0	0.0	0.0	0.0	71.6	13.5	4.4	6.4	4.1	253
Inner Kukak	398	21.1	44.0	17.6	16.3	0.3	0.3	0.5	0.0	0.0	0.0	0
Inner Ugak	171	0.0	1.8	0.0	5.3	0.6	76.0	9.9	1.8	3.5	1.2	186
Izhut/Kittoi/MacDonalds	100	0.0	3.0	3.0	22.0	8.0	54.0	5.0	2.0	3.0	0.0	49
Outer Kiliuda	340	0.0	0.0	0.0	0.6	0.3	78.5	8.8	4.7	3.8	3.2	157
Outer Ugak	594	0.0	5.9	0.2	13.6	1.9	75.9	1.2	0.2	0.7	0.5	478
Shearwater	122	0.0	5.7	0.0	8.2	0.8	73.0	3.3	3.3	4.9	0.8	95
Village Islands/Uganik Bays	759	0.0	0.0	0.5	9.9	2.5	49.0	27.4	6.9	1.7	2.1	1,630
West Sitkalidak	395	0.0	0.0	0.0	0.0	0.3	76.7	10.4	3.0	7.3	2.3	329
All Samples Combined ^a	4,220	0.0	1.2	0.4	9.0	2.3	60.1	17.8	4.4	3.0	2.1	4,070

^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, 2012.

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	347	-	102	-	182	236	237	256	254	277	301
Danger Bay	557	-	80	118	153	188	203	223	236	298	272
Deadman/Sulua	141	-	95	166	189	222	266	296	305	323	343
East Sitkalidak	296	-	-	-	-	-	235	250	277	301	299
Inner Kukak	398	26	52	80	107	114	130	201	-	-	-
Inner Ugak	171	-	87	-	134	184	211	237	279	265	246
Izhut/Kittoi/MacDonalds	100	-	93	143	160	173	206	242	280	288	-
Outer Kiliuda	340	-	-	-	138	267	221	244	268	276	291
Outer Ugak	594	-	90	156	150	172	200	237	276	297	321
Shearwater	122	-	83	-	166	169	224	247	275	289	288
Village Islands/Uganik Bays	759	-	-	139	158	187	214	233	250	275	288
West Sitkalidak	395	-	-	-	-	224	236	261	277	298	300

Table 6.–Herring food and bait commercial fishery GHLS and harvest (tons) by district, KMA, 2012.

Management District	GHL	Harvest
F/B 3 - South Afognak	87	102
F/B 4 - Uganik	180	197
F/B 8 - Eastside	137	0
Total	404	299

Table 7.–Herring food and bait commercial fishery GHLS and harvest (tons), KMA, 2001 through 2012.

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
Average		
2002 to 2011	330	188

Table 8.—Subsistence herring harvest summary for the KMA, 1991 through 2012.

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

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

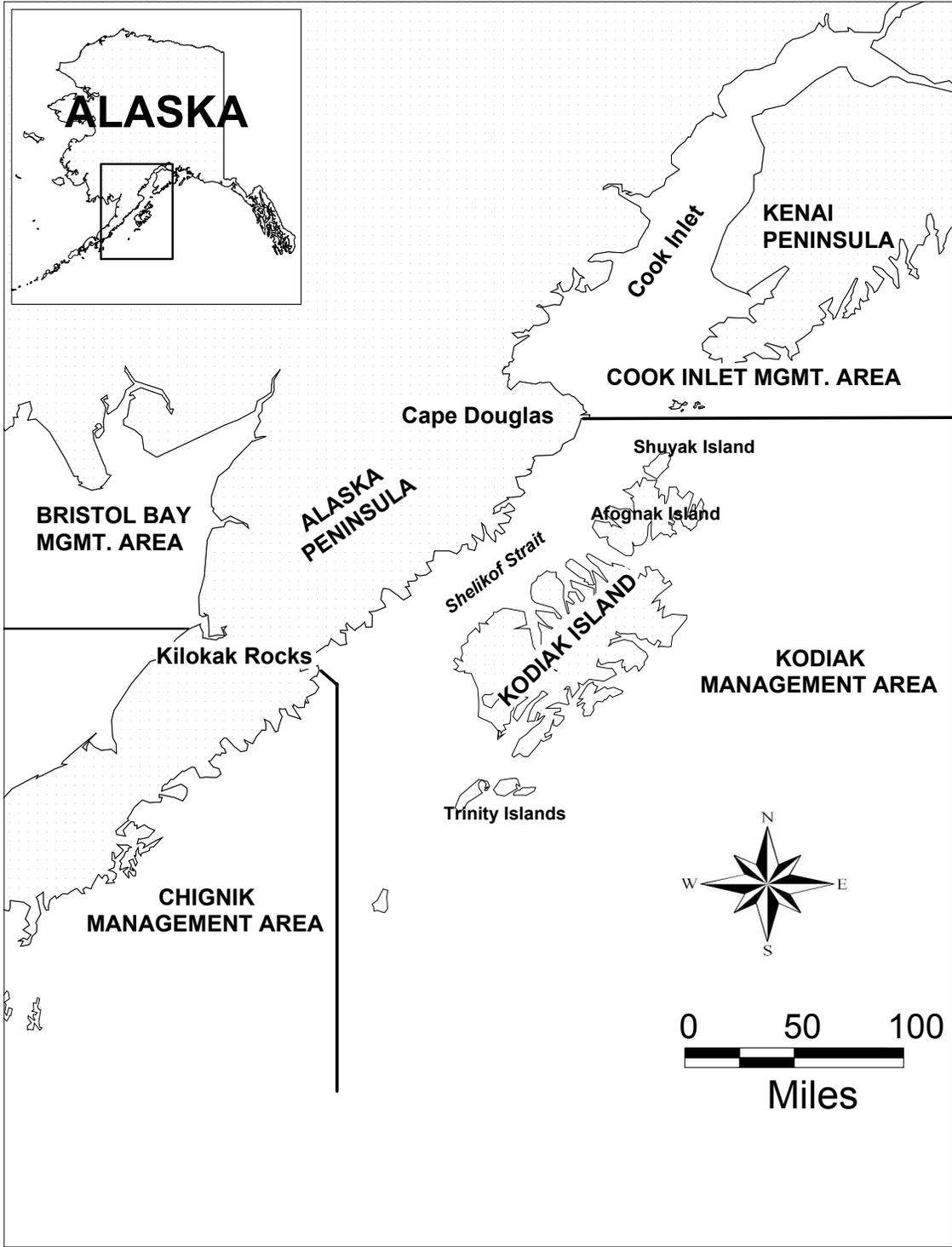


Figure 1.—Map of southwestern Alaska showing the KMA and surrounding management areas.

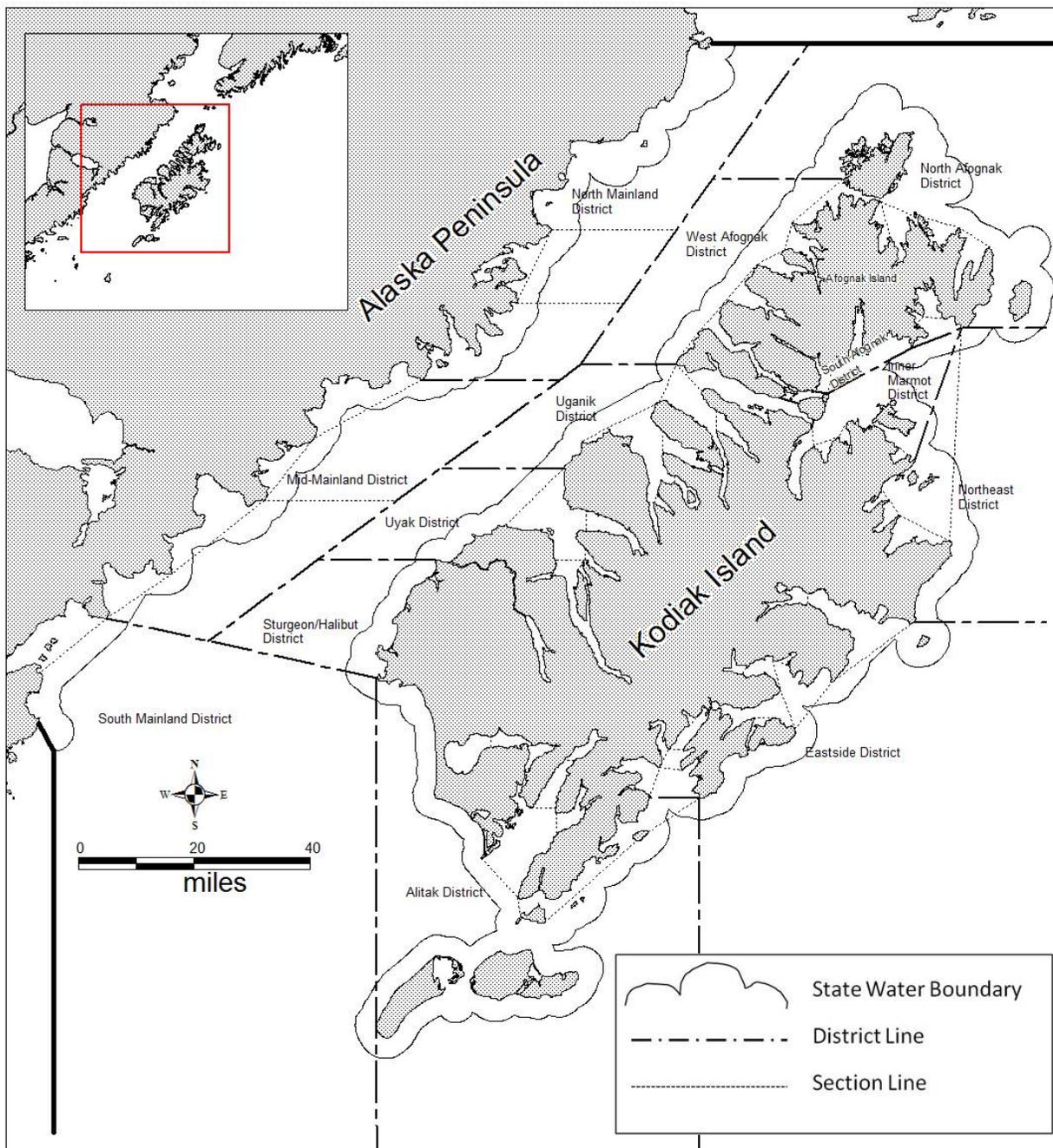


Figure 2.—Map of the KMA illustrating the herring commercial fishery districts.

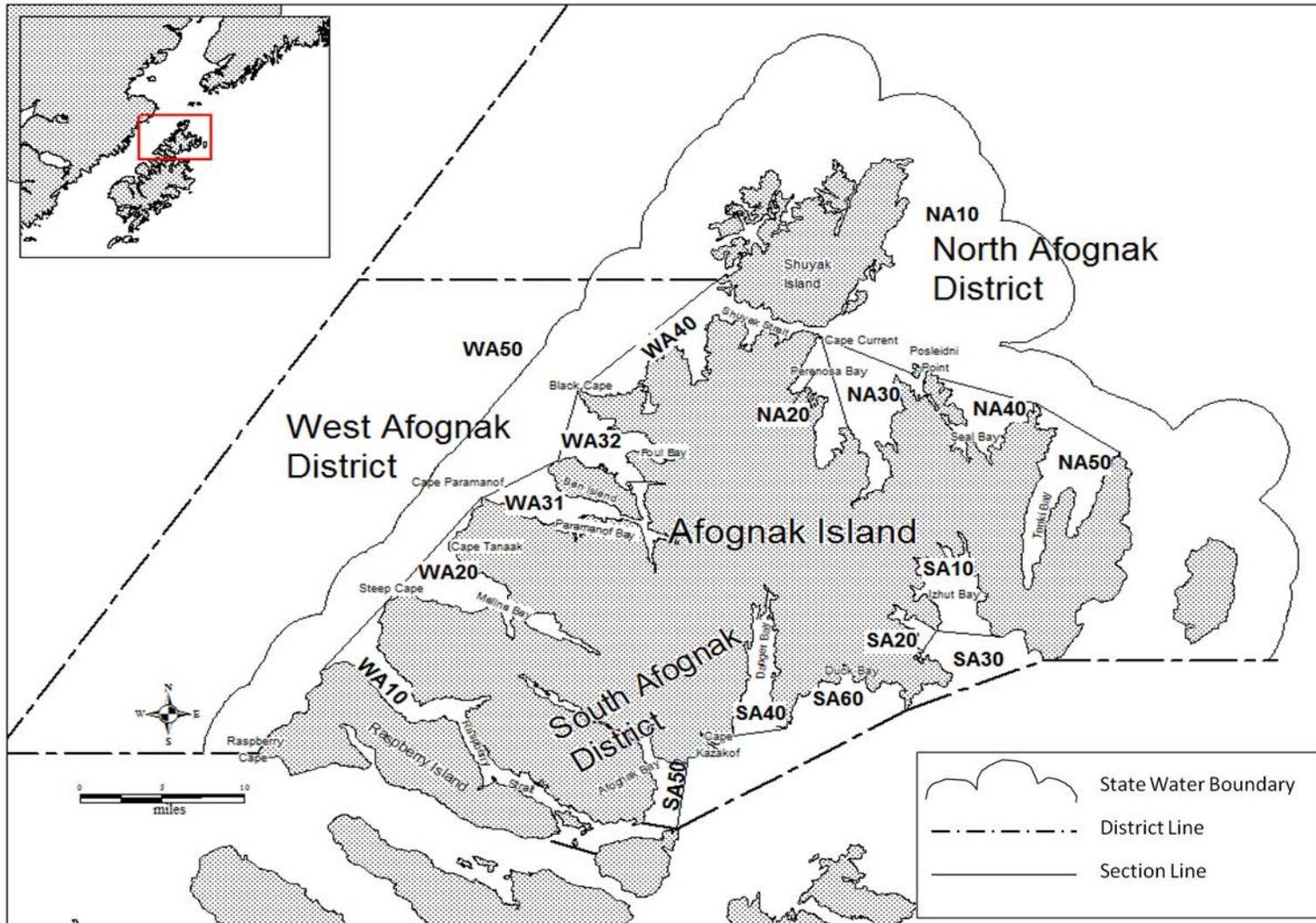


Figure 3.—Map showing the Afognak districts.

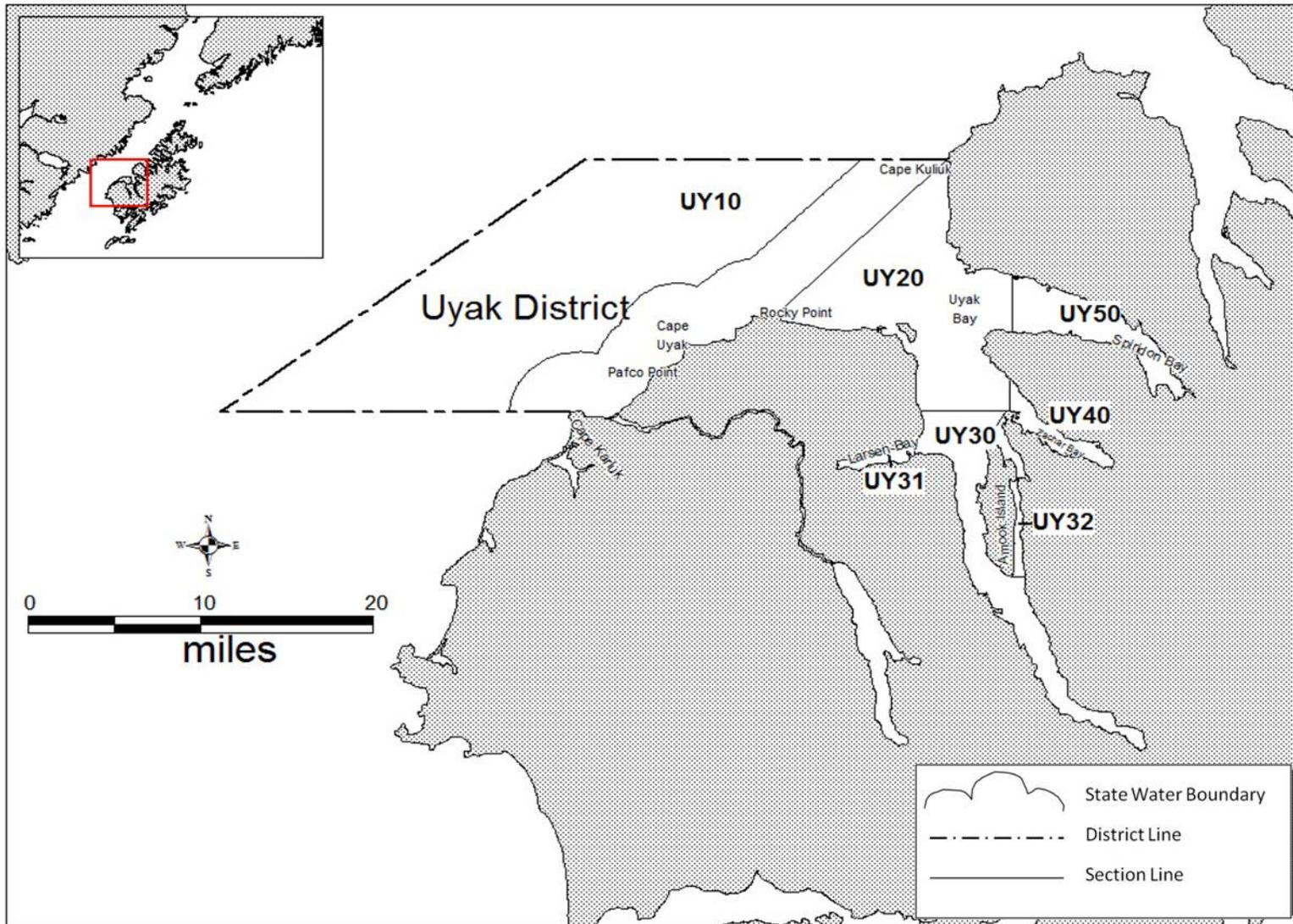


Figure 5.—Map showing the Uyak District.

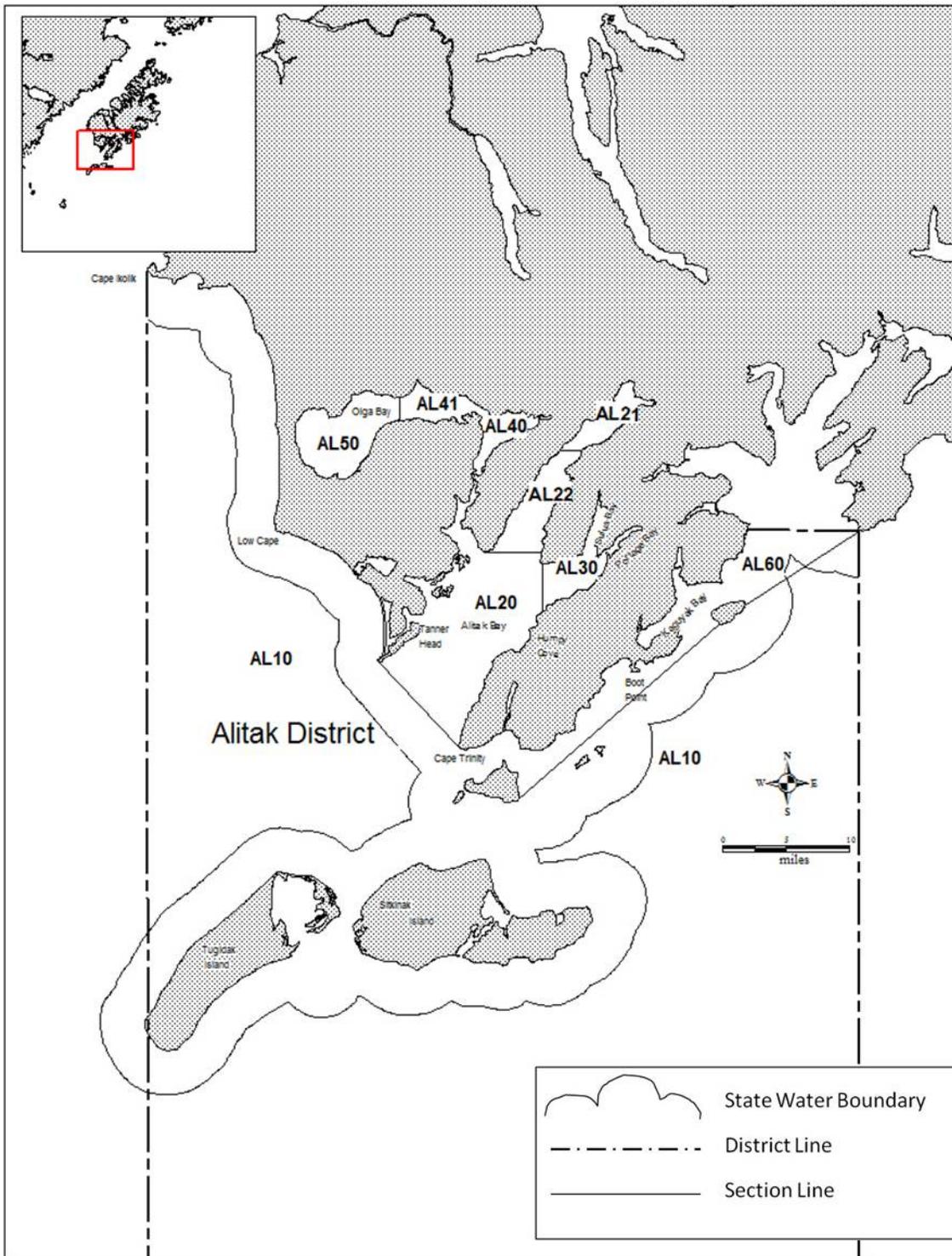


Figure 6.—Map showing the Alitak District.

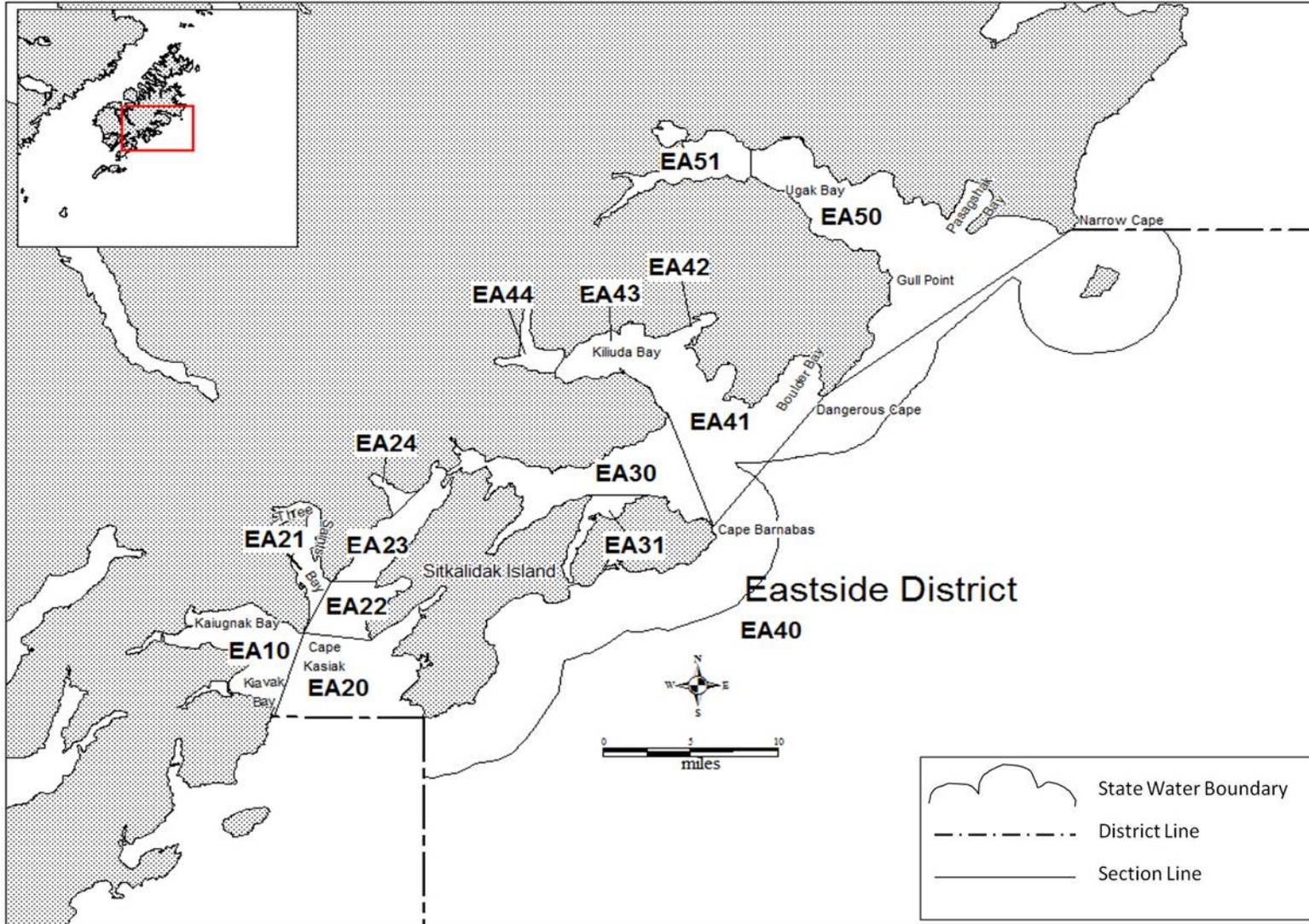


Figure 7.—Map showing the Eastside District.

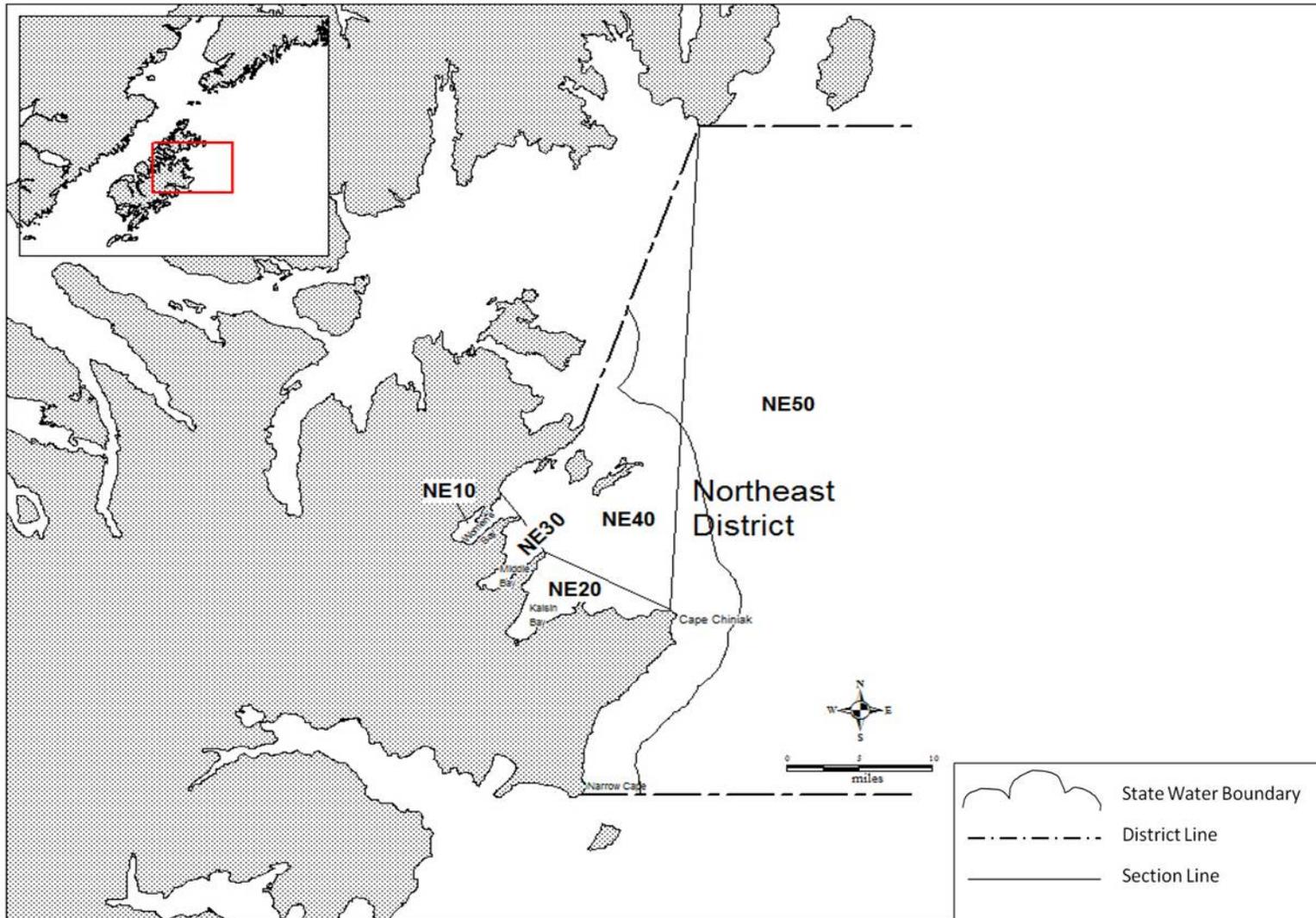


Figure 8.—Map showing the Northeast District.

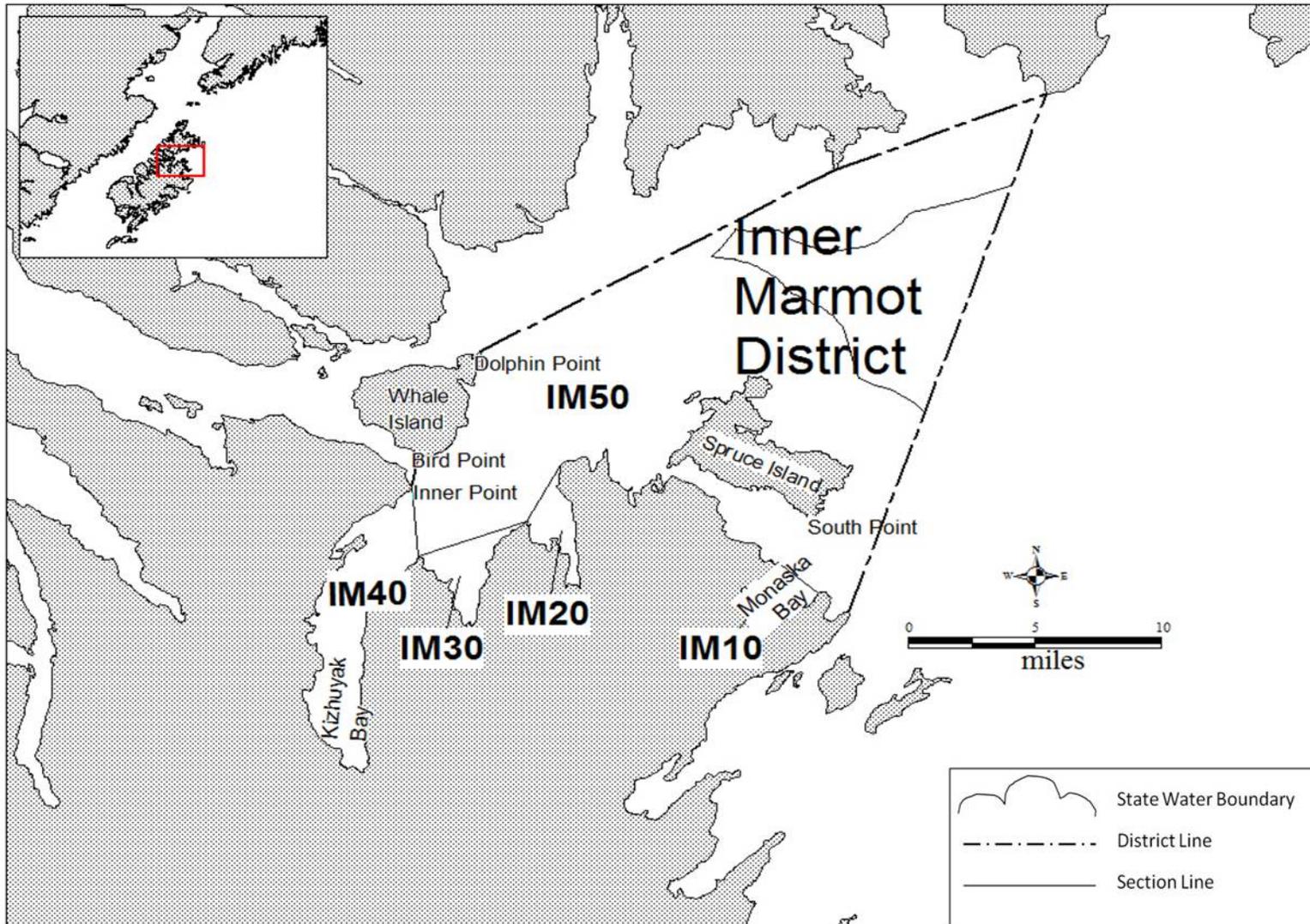


Figure 9.—Map showing the Inner Marmot District.

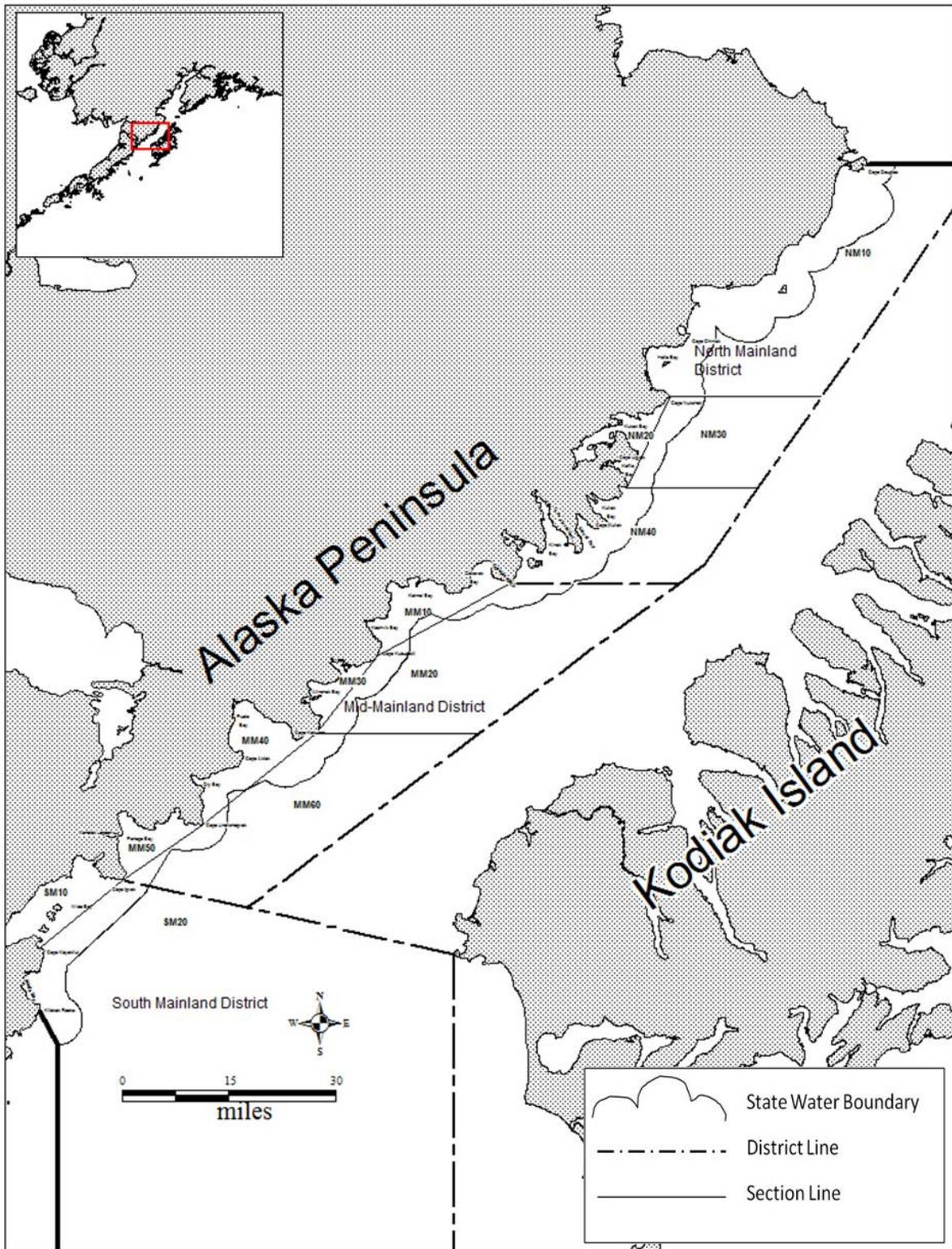


Figure 10.—Map showing the Mainland districts.

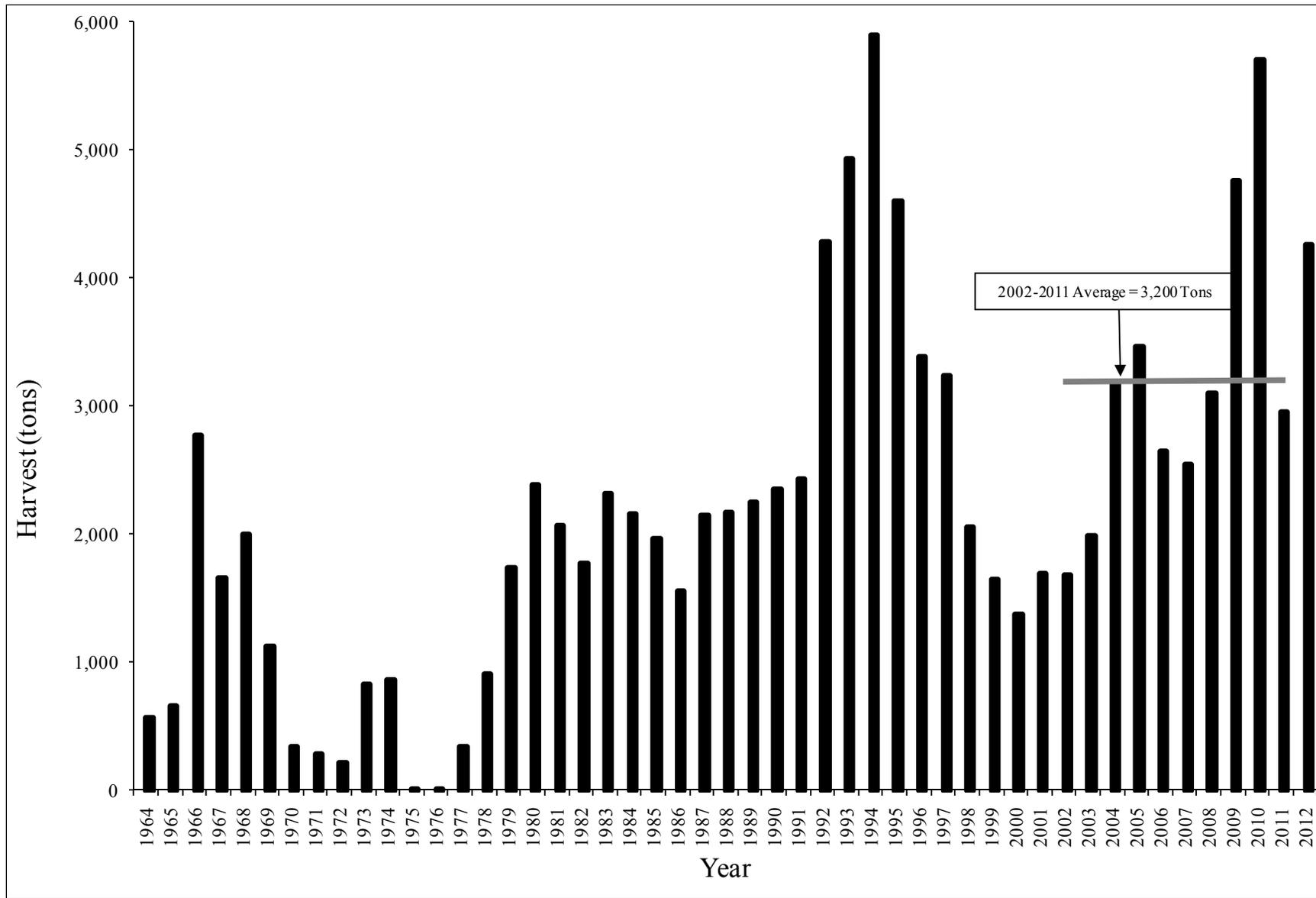


Figure 11.—Herring sac roe commercial fishery harvest in the KMA, 1964 through 2012.

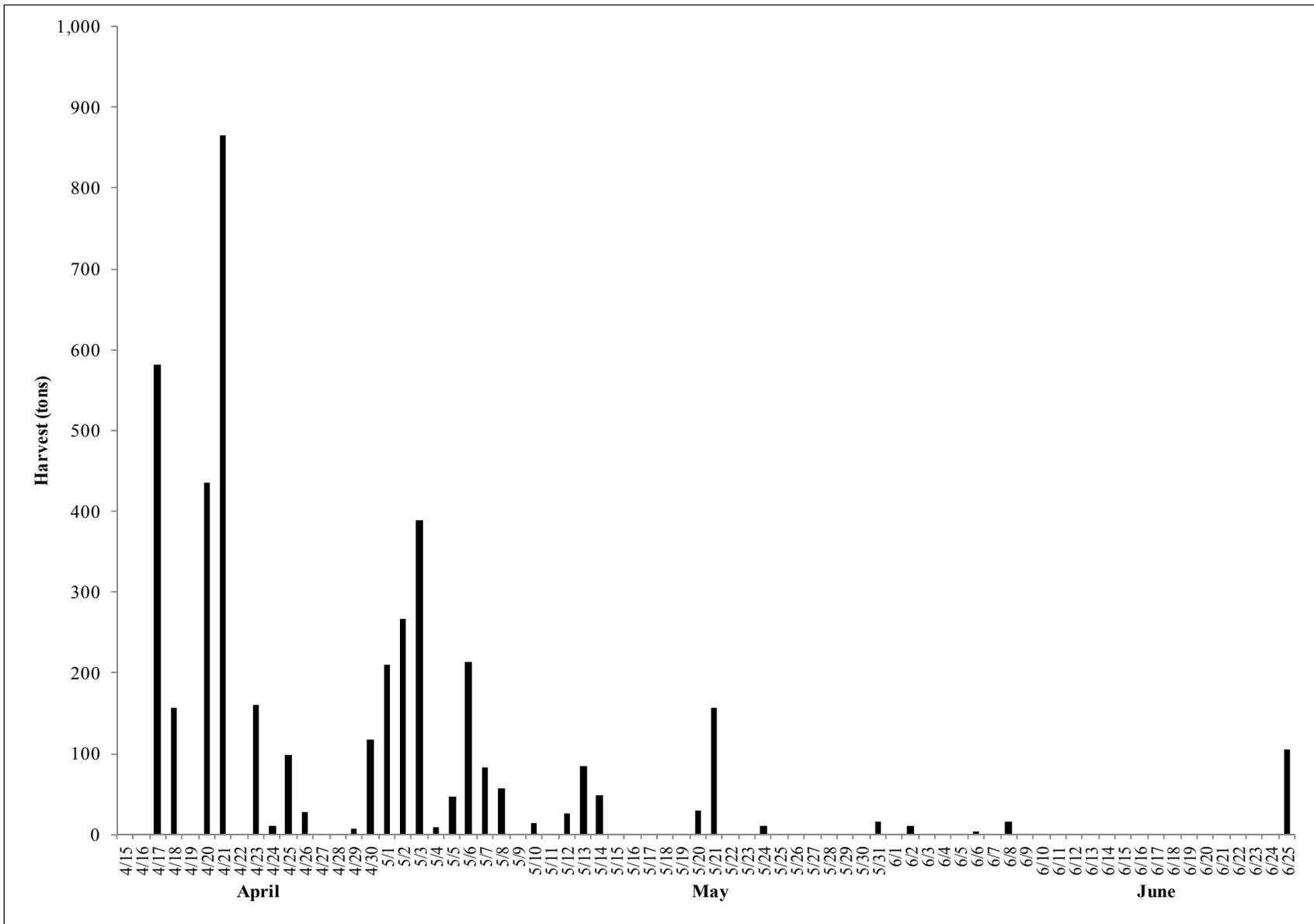


Figure 12.—Herring sac roe fishery harvest by day in the KMA, 2012.

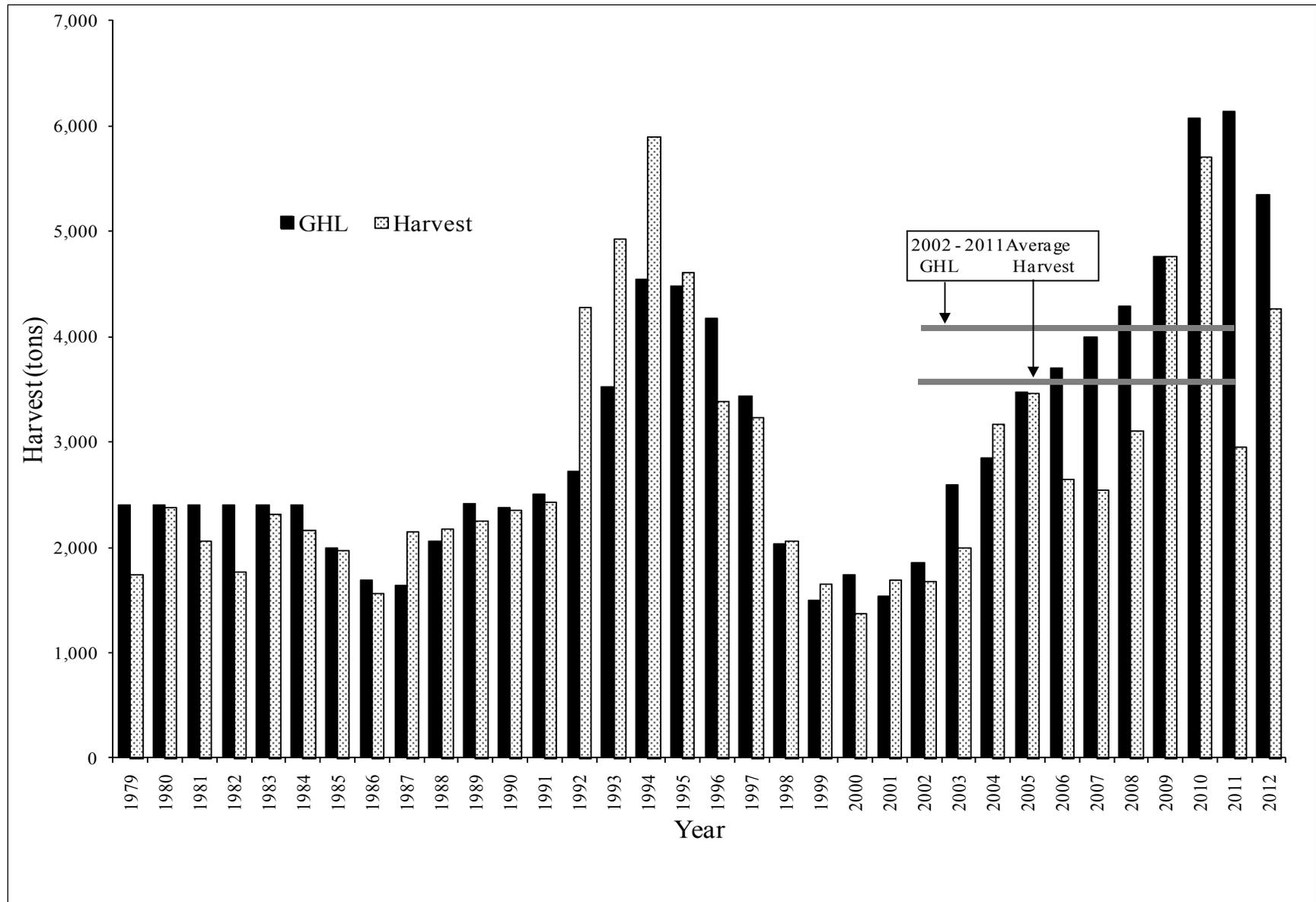


Figure 13.—Comparison of guideline harvest levels (GHLs) to the herring sac roe commercial harvest, KMA, 1979 through 2012.

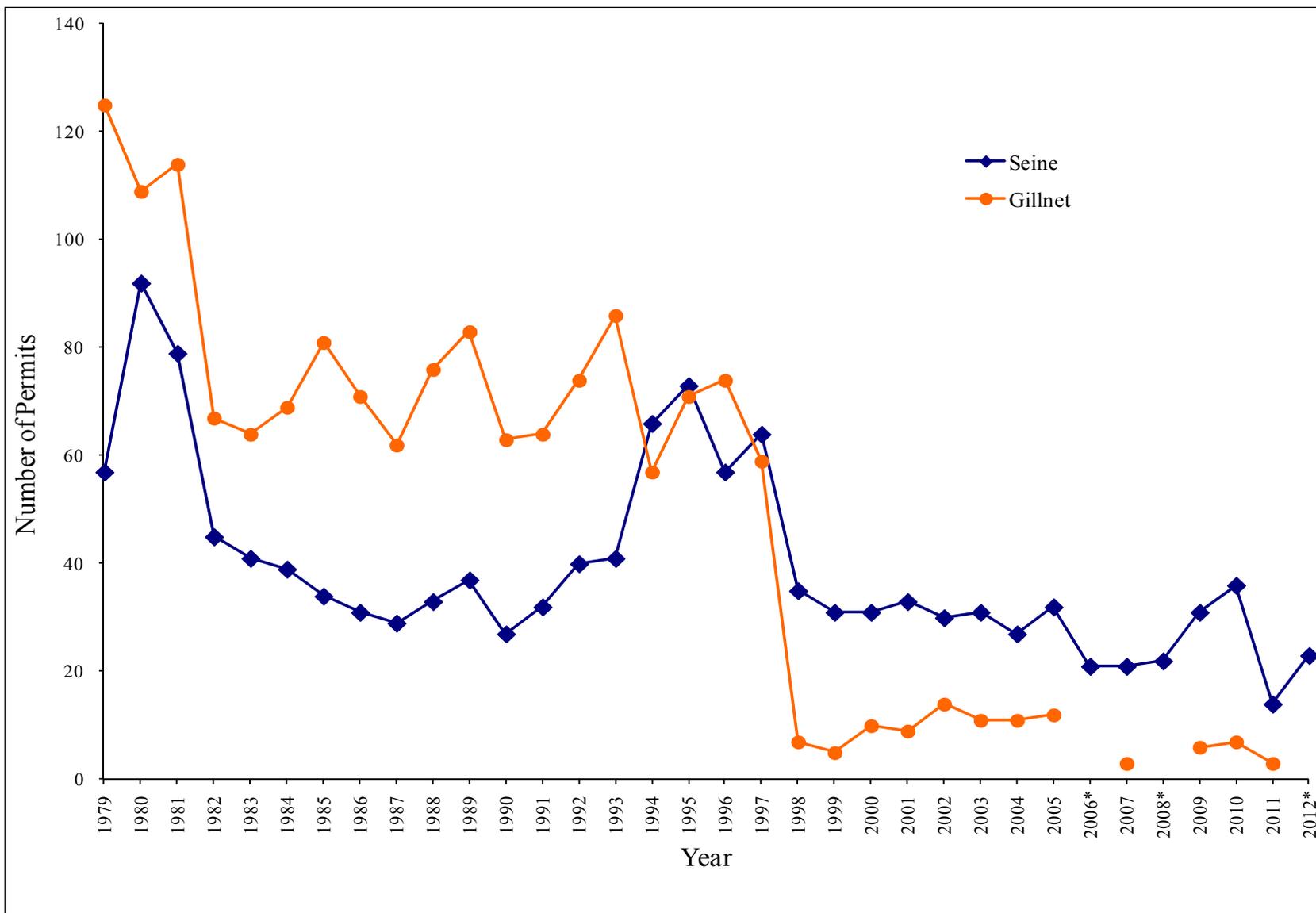


Figure 14.—Herring sac roe commercial fishery participation, by gear type in the KMA, 1979 through 2012.

*2006, 2008, and 2012 gillnet data is confidential

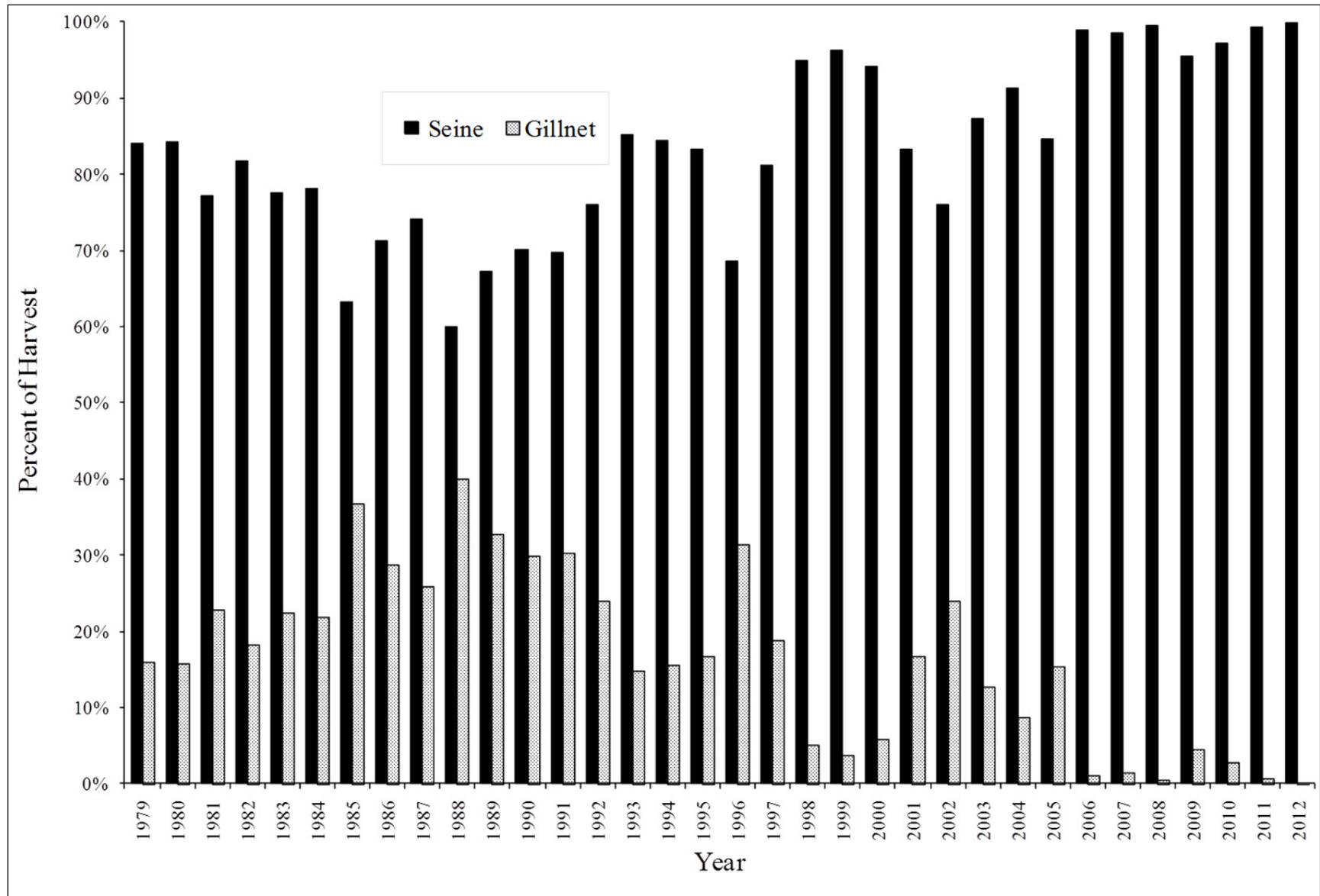


Figure 15.—Percent of the total harvest taken by gear type in herring sac roe commercial fishery, KMA, 1979 through 2012.

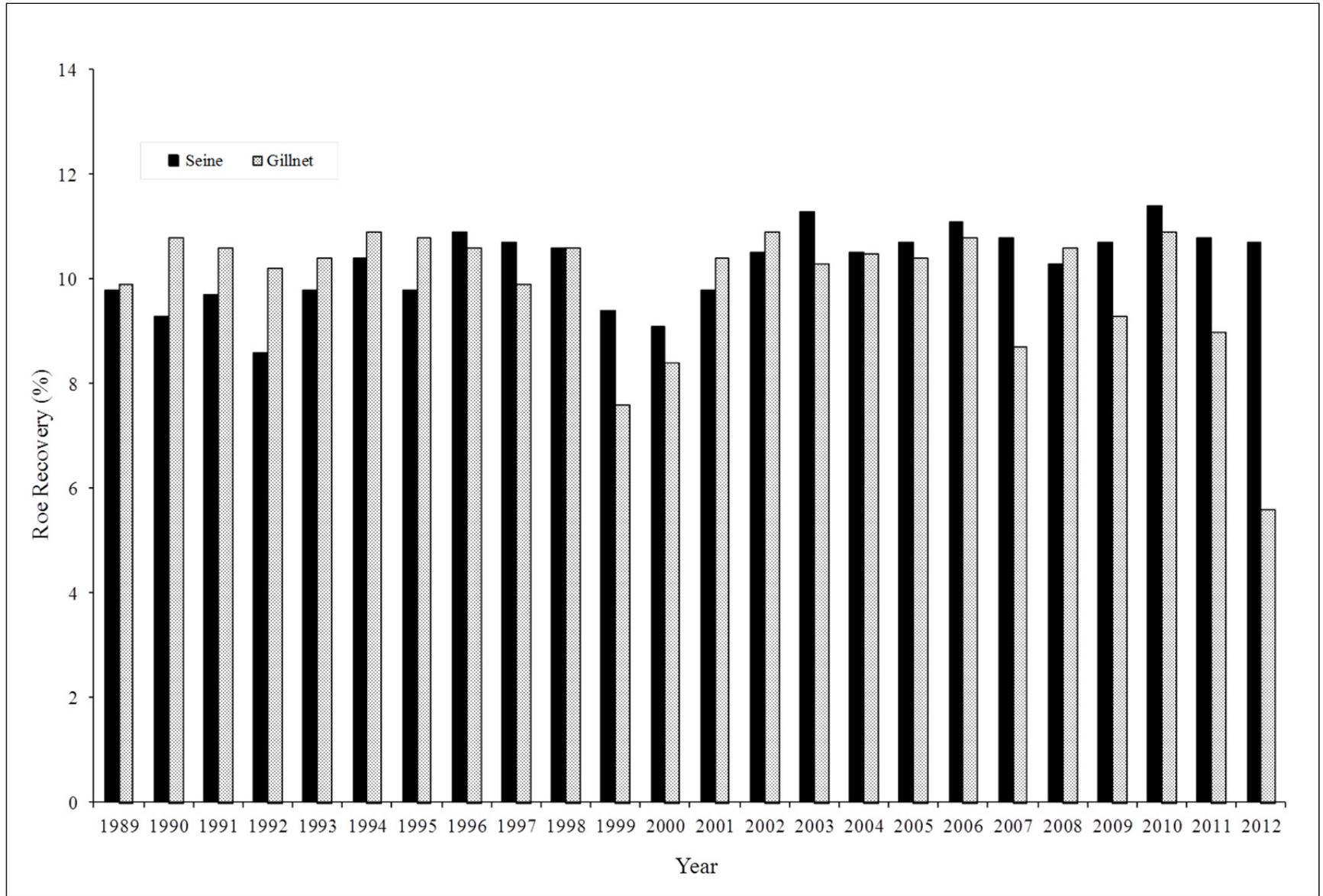


Figure 16.–Herring sac roe fishery, roe recovery in the KMA, 1989 through 2012

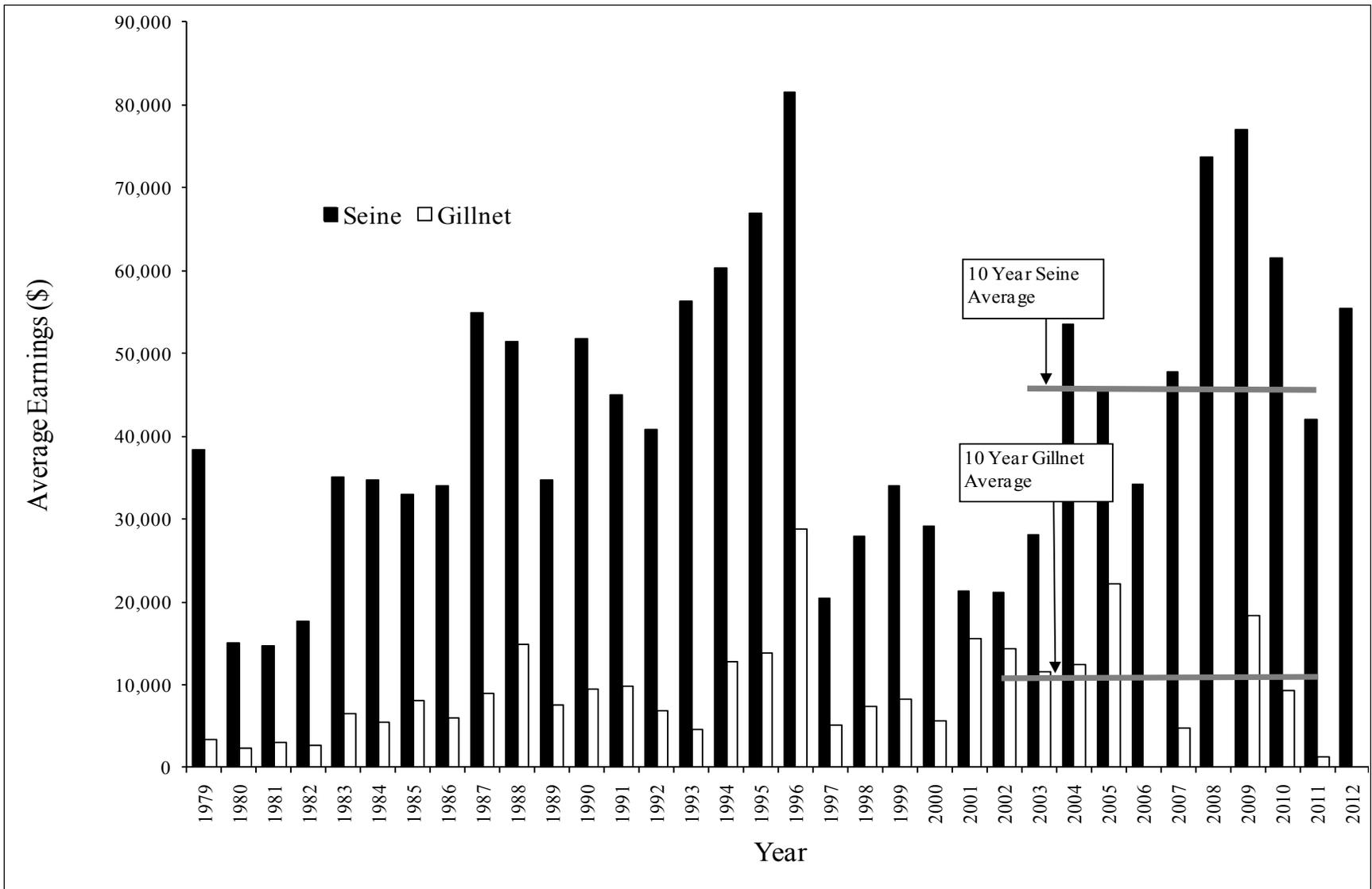


Figure 17.—Average earnings by gear type for herring sac roe commercial fisheries, KMA, 1979 through 2012.

* 2006, 2008, and 2012 gillnet data is confidential

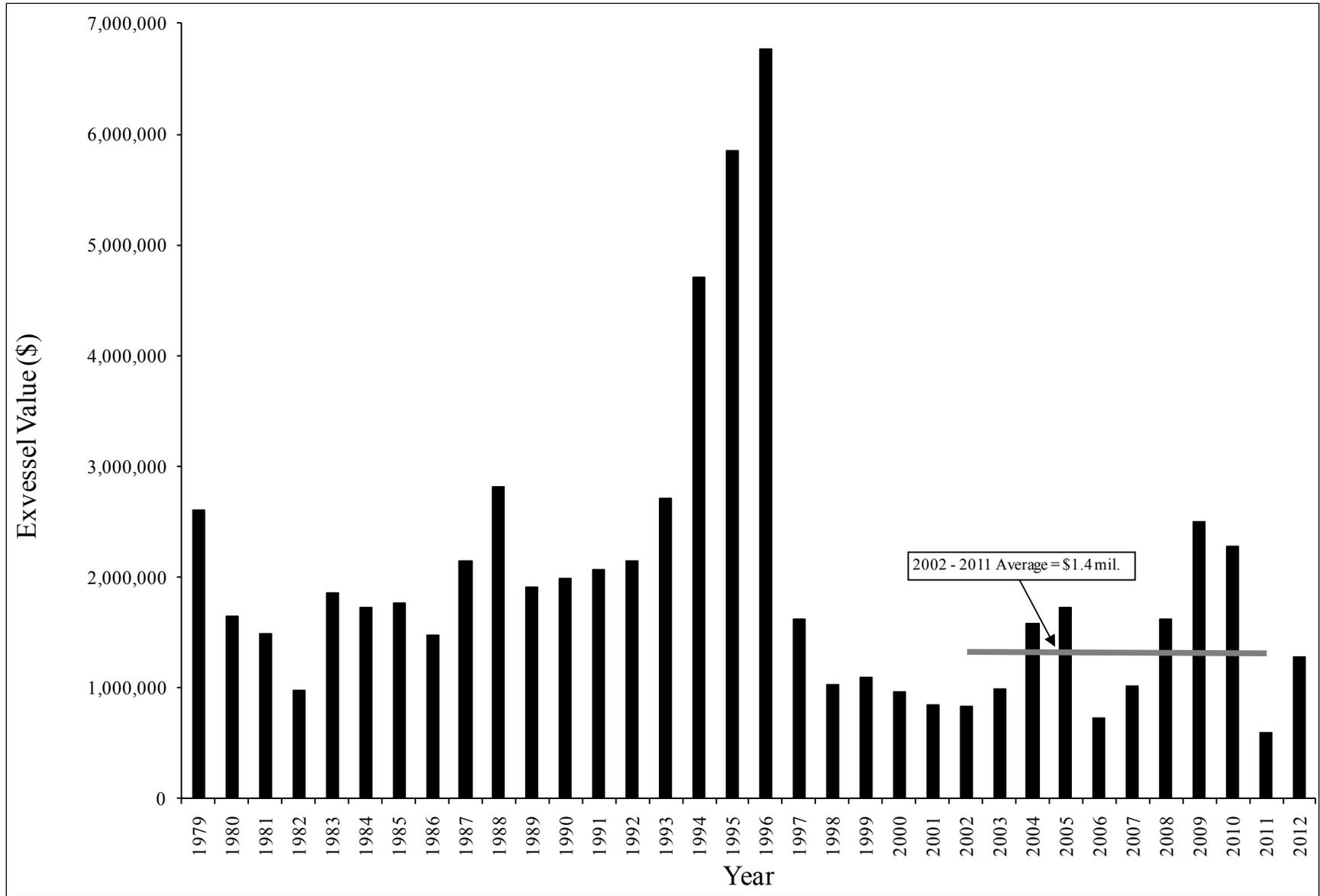


Figure 18.—Total exvessel value for herring sac roe commercial fisheries, KMA, 1979 to 2012.

**APPENDIX A: SUMMARY OF EMERGENCY ORDERS
ISSUED FOR THE HERRING COMMERCIAL FISHERIES
IN THE KODIAK MANAGEMENT AREA, 2012**

Appendix A1.–Summary of emergency orders issued for the herring commercial fisheries in the Kodiak Management Area, 2012.

Emergency Order #	Issued	Effective	Action taken
1	11:00 AM 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	5:02 PM April 17	5:02 PM April 17	<u>Closure:</u> The East Sitkalidak Section (EA30) for purse seine gear at 5:02 PM April 17.
3	7:25 PM April 17	7:25 PM April 17	<u>Closure:</u> The West Sitkalidak Section (EA23) for purse seine gear at 7:25 PM.
4	10:20 AM April 18	10:20 AM April 18	<u>Closure:</u> The Outer Kiliuda Bay Section (EA43) for purse seine gear at 10:20 AM April 18.
5	10:45 AM April 20	11:15 PM April 20	<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 12:15 PM in that portion south of 57° 41.00' N. lat.
6	1:45 PM April 20	2: 00 PM April 20	<u>Fishing Period:</u> Commercial herring fishing opened in the Village Islands/Uganik Bay Sections (UG30, 32-34) for purse seine gear from 2:00 PM to 3:00 PM in that portion south of 57° 41.00' N. lat.
7	2:50 PM April 20	3:00 PM April 20	<u>Fishing Period:</u> Commercial herring fishing opened in the Village Islands/Uganik Bay Sections (UG30, 32-34) for purse seine gear from 3:00 PM to 4:00 PM in that portion south of 57° 42.00' N. lat.
8	3:50 PM April 20	4:00 PM April 20	<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 5:00 PM in that portion south of 57° 42.00' N. lat.
9	4:50 PM April 20	5:00 PM April 20	<u>Fishing Period:</u> Commercial herring fishing opened in the Village Islands/Uganik Bay Sections (UG30, 32-34) for purse seine gear from 5:00 PM to 6:00 PM in that portion south of 57° 42.00' N. lat.

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Emergency Order #	Issued	Effective	Action taken
10	10:00 AM April 21	10:15 AM April 21	<u>Fishing Period:</u> Commercial herring fishing opened in the Village Islands/Uganik Bay Sections (UG30, 32-34) for purse seine gear from 10:15 AM to 11:15 AM in that portion south of 57° 39.70' N. lat.
11	11:00 AM April 21	11:15 AM April 21	<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 12:15 PM in that portion south of 57° 40.00' N. lat.
12	NOON April 21	12:15 PM April 21	<u>Fishing Period:</u> Commercial herring fishing opened in the Village Islands/Uganik Bay Sections (UG30, 32-34) for purse seine gear from 12:15 PM to 1:15 PM in that portion south of 57° 40.00' N. lat.
13	1:00 PM April 21	NOON April 23	<u>Fishing Period:</u> Commercial herring fishing opened in the Outer Ugak Bay Section (EA50) for purse seine gear at NOON April 23.
14	1:05 PM April 21	1:15 PM April 21	<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 2:15 PM in that portion south of 57° 40.00' N. lat.
15	3:00 PM April 21	3:00 PM April 21	<u>Fishing Period:</u> Commercial herring fishing opened in the Village Islands/Uganik Bay Sections (UG30, 32-34) for gillnet gear from 3:00 PM until further notice.
16	10:00 AM April 28	NOON May 1	<u>Fishing Period:</u> Establishes the section that will be opened to both gear types beginning May 1.
17	11:30 AM April 30	11:50 AM April 30	<u>Fishing Period:</u> Commercial herring fishing opened in the Danger Bay Section (SA40) for purse seine gear from 11:50 AM to 2:50 PM in that portion north of 58° 10.00' N. lat.

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Emergency Order #	Issued	Effective	Action taken
18	9:00 AM May 1	9:15 AM May 1	<u>Fishing Period:</u> Commercial herring fishing opened in the Danger Bay Section (SA40) for purse seine gear from 9:15 AM to 12:15 PM in that portion north of 58° 09.60' N. lat.
19	NOON May 1	12:15 PM May 1	<u>Fishing Period:</u> Commercial herring fishing opened in the Danger Bay Section (SA40) for purse seine gear from 12:15 PM to 3:15 PM in that portion north of 58° 09.60' N. lat.
20	3:00 PM May 1	3:15 P.M. May 1	<u>Fishing Period:</u> Commercial herring fishing opened in the Danger Bay Section (SA40) for purse seine gear from 3:15 PM to 9:00 PM in that portion north of 58° 09.60' N. lat.
21	10:00 PM May 1	9:00 PM May 1	<u>Closure:</u> The Outer Ugak Bay Section (EA50) at 9:00 PM May 1.
22	10:15 AM May 2	10:25 AM May 2	<u>Fishing Period:</u> Commercial herring fishing opened in the Danger Bay Section (SA40) for purse seine gear from 10:25 AM to 1:25 PM in that portion north of 58° 09.00' N. lat.
23	4:00 PM May 2	5:00 PM May 2	<u>Fishing Period:</u> Commercial herring fishing opened in the Danger Bay Section (SA40) for gillnet gear from 5:00 PM until further notice.
24	2:00 PM May 3	2:10 PM May 3	<u>Closure:</u> The Terror Bay Section (UG21) at 2:10 PM May 3
25	6:45 PM May 3	7:00 PM May 3	<u>Fishing Period:</u> Commercial herring fishing opened in the Village Islands/Uganik Bay Sections (UG30, 32-34) for purse seine gear from 7:00 PM to 8:00 PM in that portion south of 57° 46.00' N. lat. and north of 57° 44.50' N. lat.
26	8:30 AM May 4	9:00 AM May 5	<u>Closure:</u> The Danger Bay Section (SA40) for gillnet gear at 9:00 AM. May 5.

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Emergency Order #	Issued	Effective	Action taken
27	12:45 PM May 5	1:00 PM May 5	<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 in that portion north of 58° 09.00' N. lat.
28	6:45 PM May 5	7:00 PM May 5	<u>Fishing Period:</u> Commercial herring fishing opened in the Danger Bay Section (SA40) for purse seine gear from 7:00 PM to 9:00 PM in that portion north of 58° 09.00' N. lat.
29	8:45 AM May 6	9:00 A.M. May 6	<u>Fishing Period:</u> Commercial herring fishing opened in the Danger Bay Section (SA40) for purse seine gear from 9:00 AM to 9:00 PM in that portion north of 58° 09.00' N. lat.
30	7:15 PM May 6	7:30 PM May 6	<u>Closure:</u> The Danger Bay Section (SA40) for purse seine gear at 7:30 PM May 6.
31	1:30 PM May 8	NOON May 8	<u>Closure:</u> The Kizhuyak Bay Section (IM40) at NOON May 8.
32	11:45 AM May 13	12:10 PM May 13	<u>Fishing Period:</u> Commercial herring fishing opened for purse seine gear in the Shearwater Bay Section (EA42) from 12:10 PM to 1:10 PM.
33	12:25 PM May 13	12:27 PM May 13	<u>Closure:</u> The Shearwater Bay Section (EA42) at 12:17 May 13
34	2:30 PM May 14	NOON May 14	<u>Closure:</u> The Barling Bay Section (EA24) at NOON May 14.
35	6:00 PM May 21	6:00 PM May 21	<u>Closure:</u> The Inner Ugak Bay Section (EA51) at NOON May 21.
36	9:10 AM June 26	10:00 PM June 25	<u>Closure:</u> The Sulua Bay Section (AL30) at 10:00 PM June 25.

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Emergency Order #	Issued	Effective	Action taken
37	9:00 AM September 24	10:00 AM September 24	<u>F/B Fishing Period</u> : Established the initial fishing period for the food and bait fishery in the South Afognak and Uganik Districts at 10:00AM September 24.
38	10:30 AM September 27	10:30 AM September 27	<u>Closure</u> : The South Afognak District (F/B 3) at 10:30 AM September 27.
39	10:45 AM October 1	10:45 AM October 1	<u>Closure</u> : The Uganik District (F/B 4) at 10:45 AM October 1.