Fishery Management Report No. 16-31

Alaska Peninsula–Aleutian Islands Herring Sac Roe and Food and Bait Fisheries Annual Management Report, 2015

by

Charles W. Russell

December 2016

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

Symbols and Abbreviations

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

Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Mathematics, statistics

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

FISHERY MANAGEMENT REPORT NO. 16-31

ALASKA PENINSULA–ALEUTIAN ISLANDS HERRING SAC ROE AND FOOD AND BAIT FISHERIES ANNUAL MANAGEMENT REPORT, 2015

by
Charles W. Russell
Alaska Department of Fish and Game, Division of Commercial Fisheries, Kodiak

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

December 2016

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

Charles W. Russell
Alaska Department of Fish and Game, Division of Commercial Fisheries
351 Research Court, Kodiak, AK 99615, USA

This document should be cited as follows:
Russell, C. W. 2016. Alaska Peninsula–Aleutian Islands herring sac roe and food and bait fisheries annual management report, 2015. Alaska Department of Fish and Game, Fishery Management Report No. 16-31, Anchorage.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ABSTRACT

This report presents information concerning commercial Pacific herring *Clupea pallasii* sac roe and food and bait fisheries that occurred in the Alaska Peninsula–Aleutian Islands Management Area (Area M) in 2015. Area M is split into three sub-areas: North Alaska Peninsula, South Alaska Peninsula, and Aleutian Islands.

In 2015, a commercial herring sac roe fishery did not occur on the North or South Alaska Peninsula due to lack of industry interest. There were no aerial surveys conducted on the North or South Peninsula or in the Aleutian Islands Management Area in 2015.

In 2015, commercial herring food and bait fishery harvests occurred in the Aleutian Islands during seine gear fishing periods. The Aleutian Islands Dutch Harbor herring food and bait allocation was set at 2,184 tons, of which 1,878 tons were allocated to the seine fleet and 306 tons to the gillnet fleet. A total of 1,972 tons of herring were harvested in the seine fishery, and there was no participation by the gillnet fleet during the 2015 season.

Key words: Area M, Alaska Peninsula, Aleutian Islands, *Clupea pallasii*, Adak, herring, harvest, age, length, weight, sac roe, food, bait, combine, Dutch Harbor, Atka-Amlia, AMR

INTRODUCTION

This report is a summary of commercial Pacific herring *Clupea pallasii* sac roe and food and bait fisheries that occurred in the Alaska Peninsula–Aleutian Islands Management Area (Area M) during the 2015 season. This report is intended as a reference document and provides a description of harvest strategies, a summary of 2015 fishery management activities, as well as age, weight, and length (AWL) data collected from commercial harvests. Harvest information was taken from the Alaska Department of Fish and Game (ADF&G) fish ticket database in November of 2015. Data provided in this report supersedes any data previously published by ADF&G.

Area M herring fisheries are divided into three sub-areas: North Alaska Peninsula, South Alaska Peninsula, and Aleutian Islands (Figures 1–8). The North Alaska Peninsula area consists of Bering Sea waters extending west from Cape Menshikof to Cape Sarichef, encompassing Port Heiden, Port Moller and Amak districts. In 2015, no commercial herring sac roe fishery occurred in the North Peninsula. Due to a lack of industry interest no aerial surveys were flown to estimate the total herring biomass on the North Alaska Peninsula (Table 1). The South Alaska Peninsula area consists of Pacific Ocean waters extending west of Kupreanof Point to a line on the south side of Unimak Island near Cape Lazaref (163°30′ W long.) and includes King Cove, Pavlof, and Sand Point districts (Figures 4 and 5). Finally, the Aleutian Islands area consists of Bering Sea waters extending west of Cape Sarichef and Pacific Ocean waters west of a point near Cape Lazaref (163°30′ W long.) to the International Date Line and includes the Unimak, Akutan, Unalaska, Umnak, and Adak districts (Figure 1 and Figures 6–8; 5 AAC 27.600 and 27.605).

ALEUTIAN ISLANDS "DUTCH HARBOR" HERRING FOOD AND BAIT FISHERIES

Historical Effort

From 1929 through 1938 and in 1945, herring food and bait fisheries occurred in the vicinity of Unalaska Bay (Table 2; Figures 6 and 7). During that time, gillnet, seine gear, and holding pounds were used to supply numerous, small, shore-based hand packing operations. A large portion of the catch was brined for either food or bait purposes. In those early years, seine gear provided the bulk of the herring harvest (Schwarz 1988). From 1946 through 1980, there was no commercial herring harvest.

When the fishery resumed in 1981, herring were harvested from Tigalda Island to Umnak Island (Figure 7). However, the majority of harvest occurred within several miles of shore-based processing facilities in Unalaska and Akutan bays. From 1981 through 1986, 1990 through 1996, and 1998 through 2000, only purse seine gear was used to harvest herring in the Dutch Harbor food and bait fishery (Tables 3 and 4). However, in 1987, 1989, and 1997, gillnet permit holders recorded landings.

Regulatory History

The first documented herring fisheries in the eastern Aleutian Islands occurred from 1929 through 1938 and again in 1945. The next herring fishery did not occur until 1981. Since 1981, the eastern Aleutian Islands herring fishery has occurred annually and is managed in accordance with the *Dutch Harbor Food and Bait Herring Fishery Allocation Plan* (5 AAC 27.655). During the 1981 and 1982 seasons, there were no harvest restrictions (Schwarz 1988). From 1983 through 1985, the Alaska Board of Fisheries (BOF) implemented a harvest ceiling of 3,527 tons. In 1986, ADF&G was directed by the BOF to reduce the established harvest ceiling of 3,527 tons to 2,453 tons over concern for depressed western Alaska herring stocks. In 1988, the BOF implemented the *Bering Sea Herring Fishery Management Plan* (5 AAC 27.060(c) and (d)) established the criteria for calculating the Dutch Harbor food and bait herring allocation. The plan directs ADF&G to manage the fishery so that the overall exploitation of a herring stock should not exceed 20% of the spawning biomass (Appendix A1 and B1). The dominant stock harvested in the Dutch Harbor food and bait fishery is from the Togiak spawning stock (Rowell et al. 1991). An allocation plan between the Togiak sac roe and spawn on kelp fisheries and the Dutch Harbor food and bait herring fishery was established to prevent harvest from exceeding 20% of observed spawning biomass (Appendix B1). The Dutch Harbor food and bait herring fishery was allocated 7% of Togiak District's harvestable biomass after deducting 1,500 tons for the Togiak District spawn-on-kelp fishery (5 AAC 27.865 (b)(7)).

In 1990, the BOF changed the opening date of the food and bait fishery from July 16 to August 15 to reduce the chance of catching non-Togiak and North Alaska Peninsula herring stocks (Rowell et al. 1991). In 1998, the BOF changed the opening date of the purse seine fishery to noon on July 15 because of safety concerns with the fishery being conducted in the dark (5 AAC 27.610(e)(2)(B); Witteveen et al. 1999). The gillnet fishery may open as early as noon on June 24.

In 2001, the BOF adopted a regulation that allocated 7% of the total Dutch Harbor Guideline Harvest Limit (GHL) to the gillnet fleet. From 2001 through 2003, the number of gillnet fishermen increased from 6 to 13 vessels (Tables 3 and 4). In 2004, the gillnet harvest allocation was further increased to 14%. Since 2004, the Dutch Harbor food and bait herring gillnet harvest has been minor (Table 3).

In 2004, the BOF established a herring seine and pound fishery in Alaska Peninsula–Aleutian Islands Management Area with an allocation of 100 tons (5 AAC 27.655(c)). In a pound fishery, seine-caught herring are transferred to a holding pound and retained for several days for gut clearance. The rationale for this was to minimize belly burn and achieve a high-quality product suitable for food markets. However, no significant amounts of herring were placed into the pounds.

During the 2010 BOF meeting, the BOF amended 5 AAC 27.655 (b), so that if the gillnet fishery has not harvested its allocation by July 25, the remaining allocation may be taken by either gear group. Additionally, if the seine group exceeds its allocation before July 25, then that amount

shall be deducted from any remaining gillnet quota for that year after July 25. However, if the seine group exceeds the total allocation after July 25, then the seine group overage shall be deducted from the next year's seine allocation as stated in 5 AAC 27.655 (b).

HARVEST STRATEGY

In recent years, three management plans, (1) the *Bering Sea Herring Fishery Management Plan* (5AAC 27.060), (2) the *Bristol Bay Herring Management Plan* (5 AAC 27.865 (b)(7)), and (3) the *Dutch Harbor Food and Bait Herring Allocation Plan* (5 AAC 27.655), have been used to manage the Aleutian Islands Dutch Harbor food and bait herring fishery. Fishing time is established by emergency order and is based on a 7% allocation of the available Togiak harvest (5 AAC 27.865 (b)(7)), the inseason evaluation of the observed biomass, effort levels, and harvest.

In order for the Unimak, Akutan, Unalaska, or Umnak districts (Figures 1 and 7) to open to herring food and bait fishing, certain western Alaska herring stocks (Togiak, Security Cove, Goodnews Bay, Cape Avinof, Nelson Island, Nunivak Island, Cape Romanzof, and Norton Sound) must surpass their respective BOF mandated spawning biomass threshold (5 AAC 27.060 (c) and (h); (Appendix B1). The biomass estimates are updated by ADF&G for each stock as herring move into coastal waters during spawning migrations.

The Dutch Harbor herring food and bait allocation is divided between gear groups according to the *Dutch Harbor Food and Bait Herring Allocation Plan*, which allocates 86% to the seine fishery and 14% to the gillnet fishery. These allocations are considered independent of each other so that one gear group may not harvest herring allocated to the other gear group until July 25. After July 25, if the gillnet fishery has not harvested its allocation, the remaining allocation may be taken by either group. Additionally, if the seine group exceeds its allocation before July 25, then that overage shall be deducted from any remaining gillnet quota for that year after July 25. However, if the seine group exceeds the total allocation after July 25, then the seine group overage shall be deducted from the next year's seine allocation as stated in 5 AAC 27.655 (b). Furthermore, 100 tons may be reserved from the purse seine allocation for a herring pound fishery.

CATCH SAMPLING

Commercial harvest samples were collected in the Aleutian Islands Dutch Harbor food and bait herring fishery. These samples provided age composition, sex, maturity status, weight-at-age, and length-at-age data from the commercial harvest. Age is determined by examining scales (Warner and Shafford 1979) taken from the preferred area located on the left side of the herring, three scales posterior to the center of the operculum. One scale is taken from each herring and the ages are recorded and entered into a database.

Fish length (lower jaw to the hypural plate) and weight measurements are collected and entered into the ADF&G herring database. Mean lengths (mm) and weights (g) are calculated for each year class and tabulated.

2015 SEASON SUMMARY

The Dutch Harbor food and bait fishery was allocated 2,184 tons of herring for the 2015 season (Table 4 and 5; Appendix B1). The purse seine fishery was allocated 1,878 tons and the 2015 gillnet fishery was allocated 306 tons of herring (Table 4). ADF&G did not conduct aerial surveys in 2015 to assess herring biomass in the Dutch Harbor area because of budget constraints and poor weather conditions.

Gillnet Fishery

In 2015, the Dutch Harbor food and bait herring commercial gillnet fishery occurred from July 15 through July 21 (Table 5; Appendix C1; Figures 6 and 7). In 2015, there was no participation by the gillnet fleet (Table 3).

Purse Seine Fishery

In 2015, the Dutch Harbor food and bait herring seine fishery occurred from July 15 through July 21 within Unalaska and Akutan districts (Table 5; Appendix C1; Figure 6 and 7). The seine fishery was allocated 1,878 tons of herring for the 2015 season and were eligible to harvest any remaining gillnet allocation after July 25 (Table 4). Three vessels and three processors registered to participate in this fishery. Over the course of the seine fishery, 15 deliveries were made for a total harvest of 1,972 tons of herring. The majority of this herring was harvested in the Akutan Bay and Unimak Pass area of the Akutan District (Tables 4 and 5; Figures 6 and 7). Exvessel prices ranged from $300 to $550 per ton, which has stayed consistent with the exvessel price range over the past ten years. Total exvessel value of the 2015 purse seine fishery was an estimated $838,000 (Table 2).

2015 Catch Sampling

A total of 249 herring were sampled from the Dutch Harbor food and bait purse seine fishery (Table 6). The most abundant age classes were age-7 (30.9%), age-6 (19.7%), and age-8 (19.3%), followed by age-9 which represented 10.0% (Tables 6 and 7; Figure 9). Average herring length in the sample was 304 mm, and average weight was 488 g (Table 6). The sex composition of the sample was 53% male and 47% female. The most abundant age class in the Dutch Harbor commercial herring food and bait fishery over the past 10 years has been age-8 (19.7%; Table 7; Figure 10).

REFERENCES CITED

Rowell, K. A., H. J. Geiger, and B. G. Bue. 1991. Stock identification of Pacific herring in the eastern Bering Sea trawl bycatch and the Dutch Harbor directed food and bait fishery. Proceedings of the International Herring Symposium. Alaska Sea Grant Report, AK-SG-91-01, Fairbanks.

Schwarz, L. 1988. Peninsula/Aleutians herring sac-roe fishery report to the Board of Fisheries. Alaska Department of Fish and Game, Commercial Fisheries Division, Regional Information Report 4K88-3, Kodiak.

Warner, I. M., and P. Shafford. 1979. Forage fish spawning surveys-southern Bering Sea. Alaska Marine Environmental Assessment Project. Completion Report (revised November 1979), Alaska Department of Fish and Game, Kodiak.

Witteveen, M. J., R. D. Campbell, R. L. Murphy. 1999. Alaska Peninsula and Aleutian Islands Management Areas sac roe report and the Aleutian Islands Management Area food and bait herring report. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report. 4K99-23, Kodiak.

TABLES AND FIGURES

Table 1.–Herring biomass estimates (tons) for the North Alaska Peninsula, by area, 1984–2015.

	Port Moller District			Port Heiden District				
							Aerial survey date	
Date	Herendeen Bay	Port Moller Bay	Additional biomass harvested	Bear River to Strogonof Point	Port Heiden Bay Section	Total biomass estimate	First	Last
1984 [a]	2,000	1,500–1,900	0	0	0	3,500–3,900	May 9	Jul 31
1985	260	1,305	0	5,240	0	6,805	May 1	Jun 13
1986	1	28	0	0	0	29	May 16	Jun 7
1987	0	5,125	0	0	0	5,125	May 6	Jun 3
1988	1,737	442	0	8	0	2,187	May 17	Jun 15
1989	1,163	1,471	0	0	0	2,634	May 19	Jun 16
1990	155	387	0	0	0	542	May 21	Jun 14
1991	2,278 (250)[b]	4,651	0	1,471	0	8,400	May 17	Jun 26
1992	755	8,269	0	5,798	10,021	24,843	May 19	Jun 18
1993	775	2,878	0	33	0	3,686	May 4	Jun 9
1994	381	274	74	0	0	729	May 22	May 28
1995	60	477	200	0	0	737	May 13	Jun 2
1996	390 (390)[b]	986 (755)[b]	0	309	65	1,750	May 9	Jun 18
1997	160	45	0	0	0	205	May 22	Jun 12
1998	930	135	0	360 (200)[b]	0	1,425	May 11	Jun 3
1999	10	220	0	0	0	230	May 16	Jun 14
2000	115	350	0	0	0	465	May 15	May 28
2001	335	1,980	0	0	0	2,315	May 14	May 22
2002	85	255	0	0	0	340	May 15	May 28
2003	400	100	0	500	0	1,000	May 17	May 29
2004	0	0	0	0	0	0	Jun 2	Jun 10
2005	1,500 [c]	3,300	351	50	0	5,201	May 8	May 24
2006	4,500	1,150	0	585	0	6,235	May 26	May 28
2007	290	1,515	0	0	0	1,805	May 19	May 20
2008	75	975	0	0	0	1,050	May 25	May 26

-continued-

Table 1.–Page 2 of 2.

	Port Moller District			Port Heiden District				
							Aerial survey date	
Date	Herendeen Bay	Port Moller Bay	Additional biomass harvested	Bear River to Strogonof Point	Port Heiden Bay Section	Total biomass estimate	First	Last
2009	1,692	36,610	0	365	0	38,667	May 16	Jun 2
2010	720	1,725	0	30,000	0	32,445	May 21	May 22
2011	70	662	0	4,110	0	4,842	May 18	May 19
2012	3,930	990	0	0	0	4,920	May 21	May 29
2013	0	0	0	2,500	0	2,500	May 15	Jun 5
2014	200	200	0	2,300	0	2,700	May 22	May 22
2015 [d]	-	-	-	-	-	-	-	-
2005–2014 Average	1,298	4,713	35	3,991	0	10,037		

[a] Surveys were conducted 1976–1983; however, biomass estimates were not calculated.

[b] Biomass estimates (tons) conducted by commercial spotter pilots are enclosed in parentheses ( ); these estimates are not included in the total biomass estimates. They may not be comparable to ADF&G estimates.

[c] Biomass estimates (tons) conducted by both commercial spotter pilots and ADF&G biologists.

[d] No surveys completed due to lack of industry interest

Table 2.–Aleutian Islands Area (Dutch Harbor) commercial herring food and bait seine fishery historical summary, 1929–2015.

Year	Harvest in tons	No. vessels making landings	Number landings	Tons per vessel	Tons per landing	Price per ton	Exvessel value (thousands)	Exvessel value per vessel (thousands)
1929	1,259	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1930	1,916	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1931	1,056	26	[a]	[a]	[a]	[a]	[a]	[a]
1932	2,510	30	[a]	[a]	[a]	[a]	[a]	[a]
1933	1,585	38	[a]	[a]	[a]	[a]	[a]	[a]
1934	1,533	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1935	2,412	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1936	1,379	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1937	579	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1938	513	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1939–1944[b]		-	-	-	-	-	-	-
1945	75	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1946–1980[b]		-	-	-	-	-	-	-
1981	704	[c]	[c]	[c]	[c]	[c]	[c]	[c]
1982	3,565	7	95	509	38	$300	$1,020	$146
1983	3,567	8	96	446	37	$232	$828	$104
1984	3,578	9	61	398	59	$210	$751	$83
1985	3,554	6	68	592	52	$162	$564	$94
1986	2,394	7	54	342	44	$254	$600	$86
1987	2,485	8	44	311	56	$300	$751	$94
1988	1,983	8	50	248	40	$252	$505	$63
1989	3,079	9	67	342	46	$283	$873	$97
1990	820	7	15	117	55	$350	$287	$41
1991	1,325	8	18	166	74	$300	$398	$50
1992	1,982	11	27	180	73	$300	$573	$52
1993	2,824	13	33	217	86	$300	$837	$64
1994	3,349	14	65	239	52	$300	$1,005	$72
1995	1,705	14	23	122	74	$300	$524	$37
1996	2,279	24	30	95	76	$300	$684	$28
1997	1,950	26	63	75	31	$300	$585	$23
1998	1,994	22	22	91	91	$300	$598	$27
1999	2,437	21	72	116	34	$400–600	$1,038	$49
2000	2,014	20	22	101	92	$300–500	$671	$34

-continued-

Table 2.–Page 2 of 2.

Year	Harvest in tons	No. vessels making landings	Number landings	Tons per vessel	Tons per landing	Price per ton	Exvessel value (thousands)	Exvessel value per vessel (thousands)
2001	1,332	14	29	95	46	$300–500	$406	$29
2002	2,664	12	15	222	178	$300–450	$909	$76
2003[d]	1,379	6	16	230	86	$50–400	$342	$57
2004[d]	1,038	3	16	346	65	$100–500	$309	$103
2005[d]	1,159	3	7	386	166	$100–500	$370	$123
2006[d]	952	2	18	476	53	$100–500	$384	$192
2007[d]	1,248	2	12	624	104	$100–500	$437	$219
2008[d]	1,536	2	14	768	110	$300–490	$592	$296
2009[d]	1,310	2	12	655	109	$300–500	$519	$260
2010[d]	1,941	2	18	971	108	$100–500	$724	$362
2011[d]	1,795	2	15	898	120	$500	$898	$449
2012[d]	1,807	2	16	904	113	$100–500	$542	$271
2013	1,764	3	12	588	147	$300–550	$750	$250
2014	1,645	3	11	548	150	$300–550	$700	$233
2015	1,972	3	15	657	131	$300–550	$838	$279
1929–1938 Average	1,474	[a]	[a]	[a]	[a]	[a]	[a]	[a]
2010–2014 Average	1,492	2	12	651	106	250	602	261
2005–2014 Average	1,516	2	14	682	118	500	592	265

[a] Information not available.

[b] No fishery.

[c] This information cannot be released due to state confidentiality requirements.

[d] Several permit holders formed a cooperative and used one vessel.

Table 3.–Aleutian Islands Area (Dutch Harbor) commercial herring food and bait gillnet fishery historical summary, 2001–2015.

Year	Harvest in tons	No. vessels Making landings	Number landings	Tons per boat	Tons per landing	Price per ton	Exvessel value (thousands)	Exvessel value per vessel (thousands)
2001	105	6	25	18	4	$300–500	$53	$9
2002	134	13	37	10	4	$400	$54	$4
2003	108	13	23	8	5	$400	$35[a]	$11
2004	216	7	37	31	6	$300	$65	$9
2005[b]	0	0	0	0	0	$300	$0	$0
2006[c]	-	-	-	-	-	-	-	-
2007[c]	-	-	-	-	-	-	-	-
2008[c]	-	-	-	-	-	-	-	-
2009[c]	-	-	-	-	-	-	-	-
2010–2015[d]	NP	NP	NP	NP	NP	NP	NP	NP
2010–2014 Average	0	0	0	0	0	0	0	0

[a] 20 of the 108 tons were not purchased due to spoilage.

[b] No participation by gillnet fleet.

[c] This information cannot be released due to state confidentiality requirements.

[d] No participation by gillnet fleet.(NP)

Table 4.–Aleutian Islands Area (Dutch Harbor) herring food and bait fisheries allocations (tons), commercial harvest (tons), and effort by gear type, 1991–2015.

	All gear types		Gillnet fishery					Seine fishery				
Year	Allocation	Harvest	Allocation	Harvest	Permits	Landings	Days fished	Allocation	Harvest	Permits	Landings	Days fished
1991	931	1,325	[a]	0	0	0	0	931	1,325	8	18	1.0
1992	1,940	1,982	[a]	0	0	0	0	1,940	1,982	12	26	5.0
1993	2,193	2,824	[a]	0	0	0	0	2,193	2,824	14	33	2.0
1994	2,215	3,349	[a]	[b]	[b]	[b]	1	2,215	3,349	14	65	4.0
1995	1,982	1,705	[a]	[b]	[b]	[b]	1	1,982	1,705	15	23	1.0
1996	1,793	2,279	[a]	0	0	0	0	1,793	2,279	27	30	1.0
1997	1,645	1,950	[a]	[b]	[b]	[b]	1	1,645	1,950	26	63	5.0
1998	1,590	1,994	[a]	[b]	[b]	[b]	1	1,590	1,994	22	22	1.0
1999	2,082	2,437	[a]	0	0	0	0	2,082	2,437	22	72	4.0
2000	1,728	2,014	[a]	0	0	0	0	1,728	2,014	20	22	1.0
2001	1,572	1,437	110	105	6	25	9	1,462	1,332	14	29	2.0
2002	1,578	2,799	110	134	13	37	16	1,468	2,664	13	15	1.0
2003	1,662	1,487	116	88	13	23	5	1,546	1,379	6[c]	16	4.0
2004	1,899	1,255	266	216	7	37	13	1,533	1,038	3[c]	16	13.0
2005	1,365	1,159	191	0	0	0	0	1,174	1,154	3[c]	7	9.0
2006	1,715	954	240	[b]	[b]	[b]	2	1,375	952	2[c]	18	15.0
2007	1,779	1,254	249	[b]	[b]	[b]	2	1,530	1,248	2[c]	12	12.0
2008	1,722	1,575	241	[b]	[b]	[b]	7	1,481	1,536	2[c]	14	10.0
2009	1,600	1,334	224	[b]	[b]	[b]	28	1,321	1,310	2[c]	12	5.0
2010[d]	1,950	1,941	273	0	0	0	0	1,677	1,941	2[c]	18	14.5
2011	1,867	1,795	261	0	0	0	0	1,606	1,795	2[c]	15	6.5
2012	1,627	1,807	227	0	0	0	0	1,400	1,807	2[c]	16	5.5
2013	2,082	1,764	317	0	0	0	0	1,765	1,764	3	12	5.0
2014	2,099	1,645	294	0	0	0	0	1,805	1,645	3	11	5.0
2015	2,184	1,972	306	0	0	0	0	1,878	1,972	3	15	6.0
Average												
2010–2014	1,925	1,790	274	0	0	0	0	1,651	1,790	3	14	7
2005–2014	1,781	1,523	252	[b]	[b]	[b]	5	1,513	1,515	3	14	9

[a] No allocation.

[b] This information cannot be released due to state confidentiality requirements.

[c] Several permit holders formed a cooperative and used one vessel.

[d] Starting in 2010, any remaining gillnet allocation after July 25 may be harvested by either purse seine or gillnet gear (5 AAC 27.655 (b)).

Table 5.–Aleutian Islands Area (Dutch Harbor) commercial herring food and bait fisheries (all gear combined) summary, 1981–2015.

Year	Landing date First	Landing date Last	Days fished	Togiak forecast tons	Dutch Harbor allocation tons	Dutch Harbor harvest tons	Number vessels fishing
1981	Aug 3	Aug 23	21	159,000	[a]	[b]	[b]
1982	Aug 5	Sep 12	39	98,000	[a]	3,565	7
1983	Jul 23	Sep 6	46	142,000	3,525[c]	3,567	8
1984	Jul 17	Jul 27	11	115,000	3,525[c]	3,578	9
1985	Jul 17	Aug 11	26	132,000	3,525[c]	3,554	6
1986	Jul 16	Jul 28	13	96,000	2,453	2,394	7
1987	Jul 16	Jul 23	4	88,000	2,332	2,485	9
1988	Jul 16	Sep 18	21	132,000	3,100	1,999	9
1989	Jul 16	Aug 5	19	100,108	3,100	3,081	9
1990	Aug 15	Aug 15	<1	72,000	903	820	7
1991	Jul 17	Jul 17	<1	83,229	931	1,325	8
1992	Jul 16	Jul 28	5	60,214	1,940	1,982	12
1993	Jul 16	Jul 16	<1	164,135	2,193	2,824	14
1994	Jul 16	Jul 19	4	165,747	2,215	3,349	14
1995	Jul 16	Jul 16	<1	149,093	1,982	1,705	15
1996	Jul 16	Jul 16	<1	135,585	1,793	2,279	27
1997	Jul 15	Jul 19	5	125,000	1,645	1,950	27
1998	Jul 16	Jul 16	<1	121,054	1,590	1,994	22
1999	Jul 16	Jul 20	4	156,200	2,082	2,437	22
2000	Jul 15	Jul 15	<1	130,904	1,728	2,014	20
2001[d]	Jun 25	Jul 16	10	119,818	1,572	1,437[e]	22
2002	Jun 25	Jul 16	17	120,196	1,578	2,799[e]	28
2003	Jun 24	Jul 19	7	126,213	1,662	1,487[e]	24[f]
2004	Jul 15	Jul 29	26	143,124	1,899	1,038[e]	15[f]
2005	Jul 15	Aug 20	11	105,029	1,365	1,159[e]	4[f]
2006	Jul 16	Jul 27	12	129,976	1,715	954[e]	4[f]
2007	Jul 16	Jul 27	12	134,566	1,779	1,254[e]	4[f]
2008	Jul 12	Jul 27	10	130,516	1,722	1,575[e]	3[f]
2009	Jun 24	Jul 25	28	121,800	1,600	1,334[e]	4[f]
2010[g]	Jul 15	Jul 29	15	146,775	1,950	1,941	2[f]

-continued-

Table 5.–Page 2 of 2.

Year	Landing date First	Landing date Last	Days fished	Togiak forecast tons	Dutch Harbor allocation tons	Dutch Harbor harvest tons	Number vessels fishing
2011	Jul 15	Jul 22	7	140,860	1,867	1,795	2[f]
2012	Jul 15	Jul 27	6	123,745	1,627	1,807	2[f]
2013	Jul 15	Jul 21	5	169,094	2,082	1,764	3
2014	Jul 15	Jul 20	5	157,488	2,099	1,645	3
2015	Jul 15	Jul 21	6	163,480	2,184	1,972	3
2010–2014 Average			7	147,592	1,925	1,790	3
2005–2014 Average			11	135,981	1,781	1,790	3

[a] Allocation.

[b] This information cannot be released due to state confidentiality requirements.

[c] Harvest ceiling of 3,525 established by Alaska Board of Fisheries.

[d] \In 2001, a gillnet fishery was established.

[e] Includes both gillnet and seine harvest.

[f] Several permit holders formed a cooperative and used one vessel.

[g] Starting in 2010, any remaining gillnet allocation after July 25 may be harvested by either purse seine or gillnet gear (5 AAC 27.655 (b)).

Table 6.–Age, sex, weight and length of herring harvested in the Aleutian Islands Area (Dutch Harbor) commercial food and bait fisheries, 2015.

	Sex				Percent	Standard length			Weight		
Age (Years)	Male	Female	Unknown	Total	of total	Mean (mm)	Standard dev.	Number measured	Mean (g)	Standard dev.	Number weighed
3	0	0	0	0	0.0	0	0	0	0	0	0
4	0	0	0	0	0.0	0	0	0	0	0	0
5	5	5	0	10	4.0	268.0	6.5	10	334.0	28.3	10
6	18	31	0	49	19.7	294.0	10.6	49	438.0	52.2	49
7	41	36	0	77	30.9	304.0	9.8	77	493.0	53.5	77
8	36	12	0	48	19.3	308.0	10.1	48	506.0	52.0	48
9	12	13	0	25	10.0	315.0	9.5	25	544.0	61.4	25
10	3	6	0	9	3.6	324.0	5.3	9	578.0	54.2	9
11	1	1	0	2	0.8	323.0	3.5	2	554.0	2.1	2
12	1	2	0	3	1.2	337.0	10.4	3	655.0	44.5	3
13	0	0	0	0	0.0	0	0	0	0	0	0
14	0	0	0	0	0.0	0	0	0	0	0	0
Regen. [a]	14	12	0	26	10.4	298.0	15.9	26	463.6	65.9	26
Total	131	118	0	249	100.0	-	-	249	-	-	249
Average	-	-	-	-	-	304	15.1	-	488	73.3	-

[a] Age could not be determined due to regenerated scale.

Table 7.–Estimated age composition of Aleutian Islands Area (Dutch Harbor) commercial herring food and bait purse seine harvests, 1991–2015.

	Percent at age (years)														
Year	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1991	0.2	0.2	0.2	8.7	11.0	5.7	13.4	11.2	22.1	17.2	8.9	1.0	0.0	0.2	0.0
1992	0.0	0.3	0.2	0.3	23.3	25.0	4.8	15.2	8.9	10.0	9.4	2.5	0.2	0.0	0.0
1993	0.3	9.5	51.8	5.1	5.9	13.2	6.2	2.5	1.6	1.7	1.3	0.8	0.0	0.0	0.0
1994	0.2	1.7	24.3	36.7	3.8	4.0	13.3	6.5	3.6	3.3	1.0	0.9	0.9	0.0	0.0
1995	0.2	3.2	5.6	30.4	27.5	4.5	4.3	10.4	5.0	1.9	4.8	1.4	0.6	0.2	0.0
1996	0.0	0.7	8.2	16.1	35.8	25.8	3.3	2.9	2.7	1.6	1.5	0.8	0.4	0.2	0.0
1997	0.0	3.2	15.2	31.3	9.3	21.2	9.5	1.8	4.5	1.6	1.2	0.5	0.1	0.0	0.0
1998	0.0	6.5	7.9	25.3	26.0	8.5	14.6	8.4	0.5	1.4	0.3	0.0	0.1	0.1	0.0
1999	0.2	0.2	12.2	8.2	21.8	21.1	10.2	15.6	5.6	2.2	0.9	1.3	0.4	0.0	0.0
2000	0.0	0.0	0.7	19.8	16.6	12.4	14.5	10.8	12.4	8.2	2.3	1.3	0.5	0.0	0.0
2001	0.0	3.5	2.1	6.4	31.4	12.8	11.9	9.7	5.7	10.7	4.0	0.9	0.4	0.0	0.0
2002	0.0	0.0	3.0	6.3	4.3	25.3	11.6	9.3	12.3	9.0	12.0	5.0	0.0	3.0	2.0
2003	0.0	0.0	3.0	27.4	16.8	7.5	15.6	9.9	5.4	6.6	3.3	2.7	0.9	0.6	0.0
2004	0.0	0.0	0.0	18.8	39.3	8.4	3.9	14.6	3.4	5.9	1.9	0.7	1.4	1.2	0.0
2005	1.1	2.5	1.4	4.3	40.0	27.2	5.6	5.1	6.4	1.9	1.2	1.4	0.8	0.3	0.0
2006	0.4	5.9	6.2	3.5	5.2	32.0	23.9	3.4	4.7	5.3	2.9	3.1	1.3	1.0	0.4
2007	0.5	5.2	12.2	7.8	12.8	21.6	20.7	9.3	4.6	2.3	0.8	0.8	0.2	0.2	0.0
2008	0.7	6.9	17.6	17.6	17.1	18.3	13.1	5.0	2.6	0.7	0.2	0.2	0.0	0.0	0.0
2009	5.6	15.9	23.4	23.4	15.9	5.6	3.7	4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2010	2.2	11.1	25.9	27.8	16.2	8.4	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2011	0.7	10.5	28.7	34.3	18.2	2.8	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2012	0.4	2.4	16.3	28.6	22.2	16.7	7.1	2.4	2.0	2.0	0.0	0.0	0.0	0.0	0.0
2013	0.4	1.8	8.8	17.5	25.3	15.8	11.6	10.9	4.9	2.1	0.4	0.4	0.0	0.0	0.0
2014	0.0	9.0	20.1	19.8	24.3	13.8	6.0	2.6	1.1	0.4	0.4	0.0	0.0	0.0	0.0
2015	0.0	4.0	19.7	30.9	19.3	10.0	3.6	0.8	1.2	0.0	0.0	0.0	0.0	0.0	0.0
2005–2014 Average	1.2	7.1	16.1	18.5	19.7	16.2	9.4	4.4	2.6	1.5	0.6	0.6	0.2	0.2	0.0
2010–2014 Average	0.7	7.0	20.0	25.6	21.2	11.5	5.4	3.3	1.6	0.9	0.2	0.1	0.0	0.0	0.0

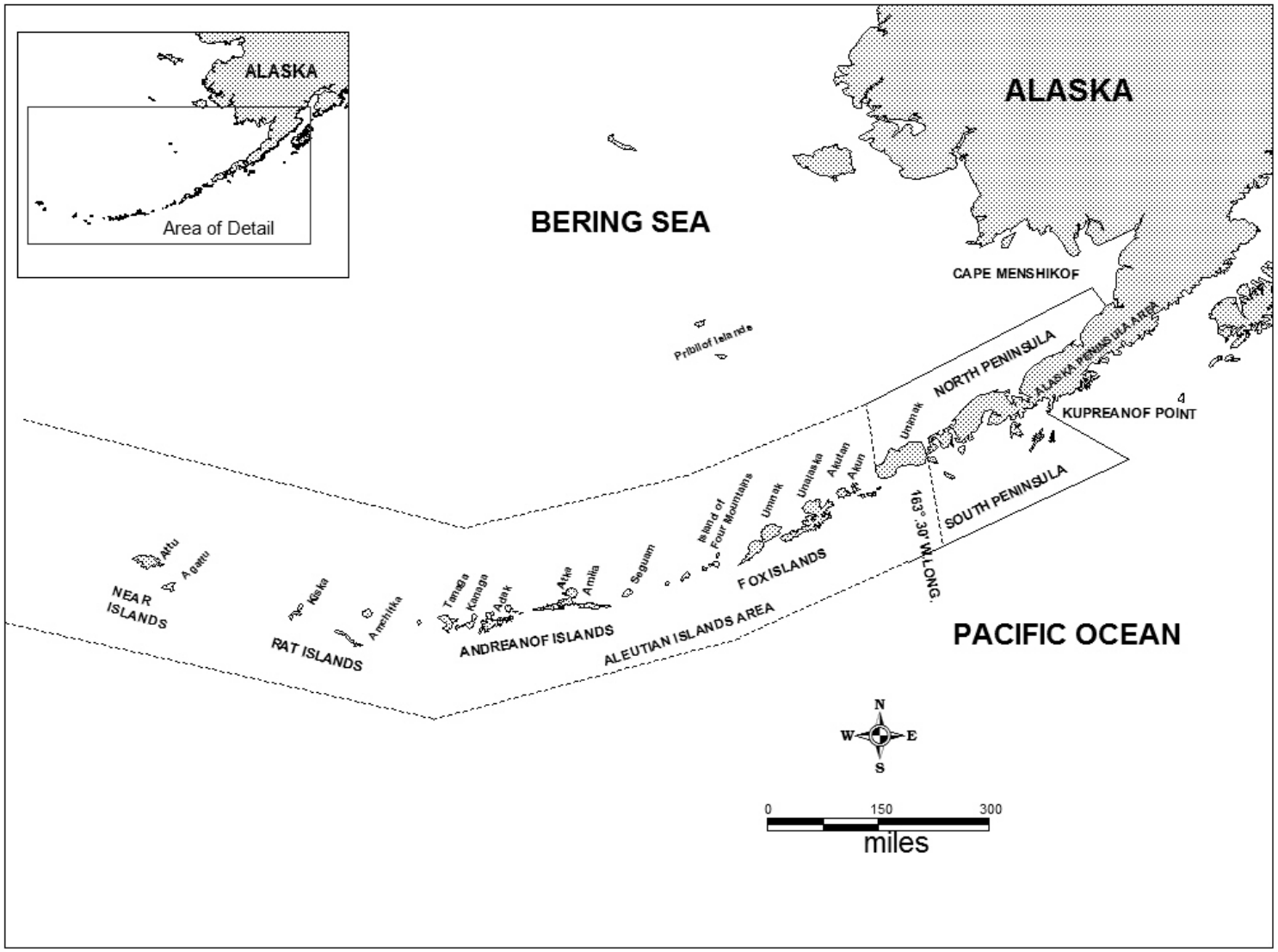

Figure 1.–Map of Bering Sea Management Plan (5 AAC 27.060) commercial herring districts.

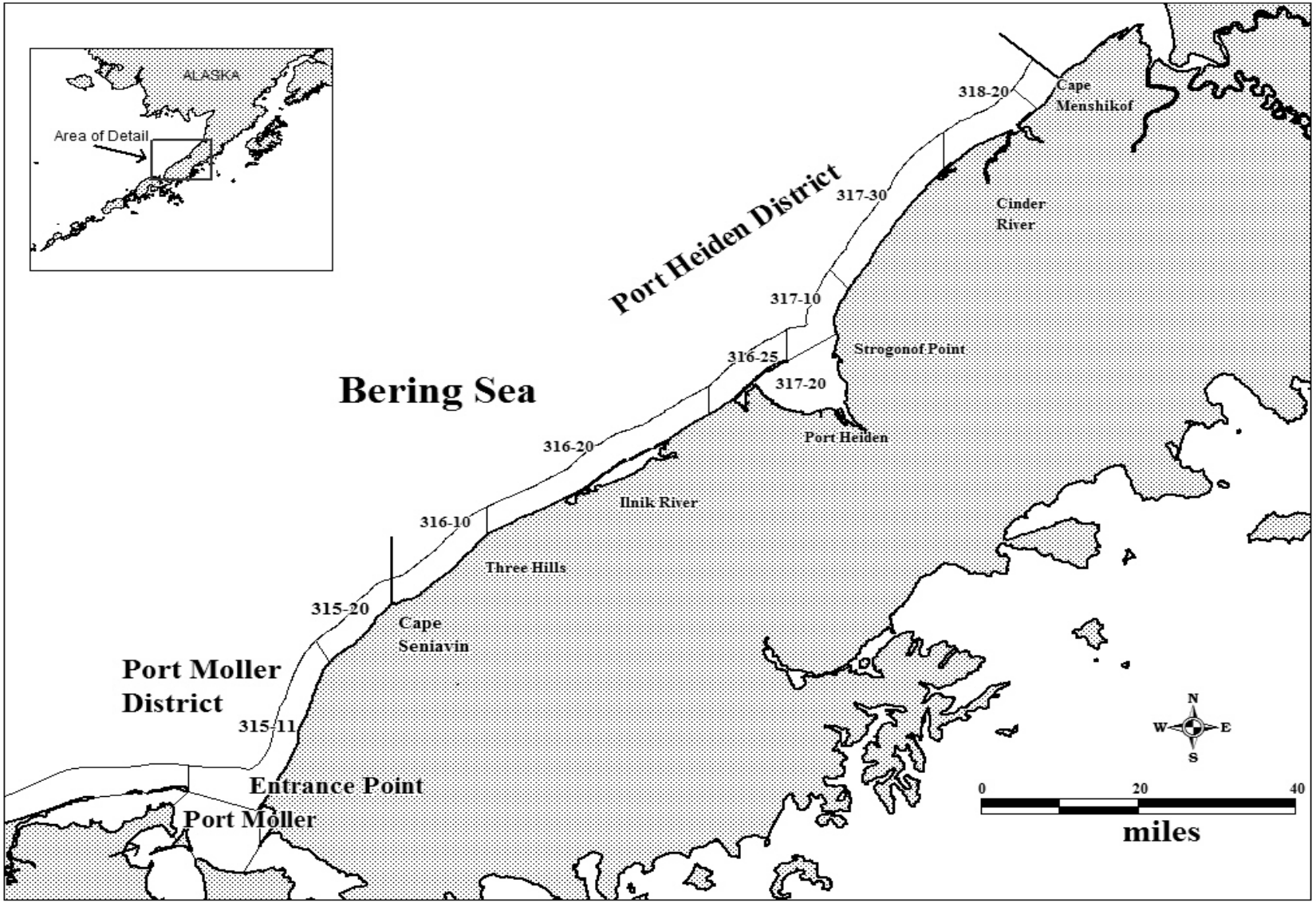

Figure 2.–Map of Port Heiden and Port Moller districts with commercial herring fishing statistical areas shown.

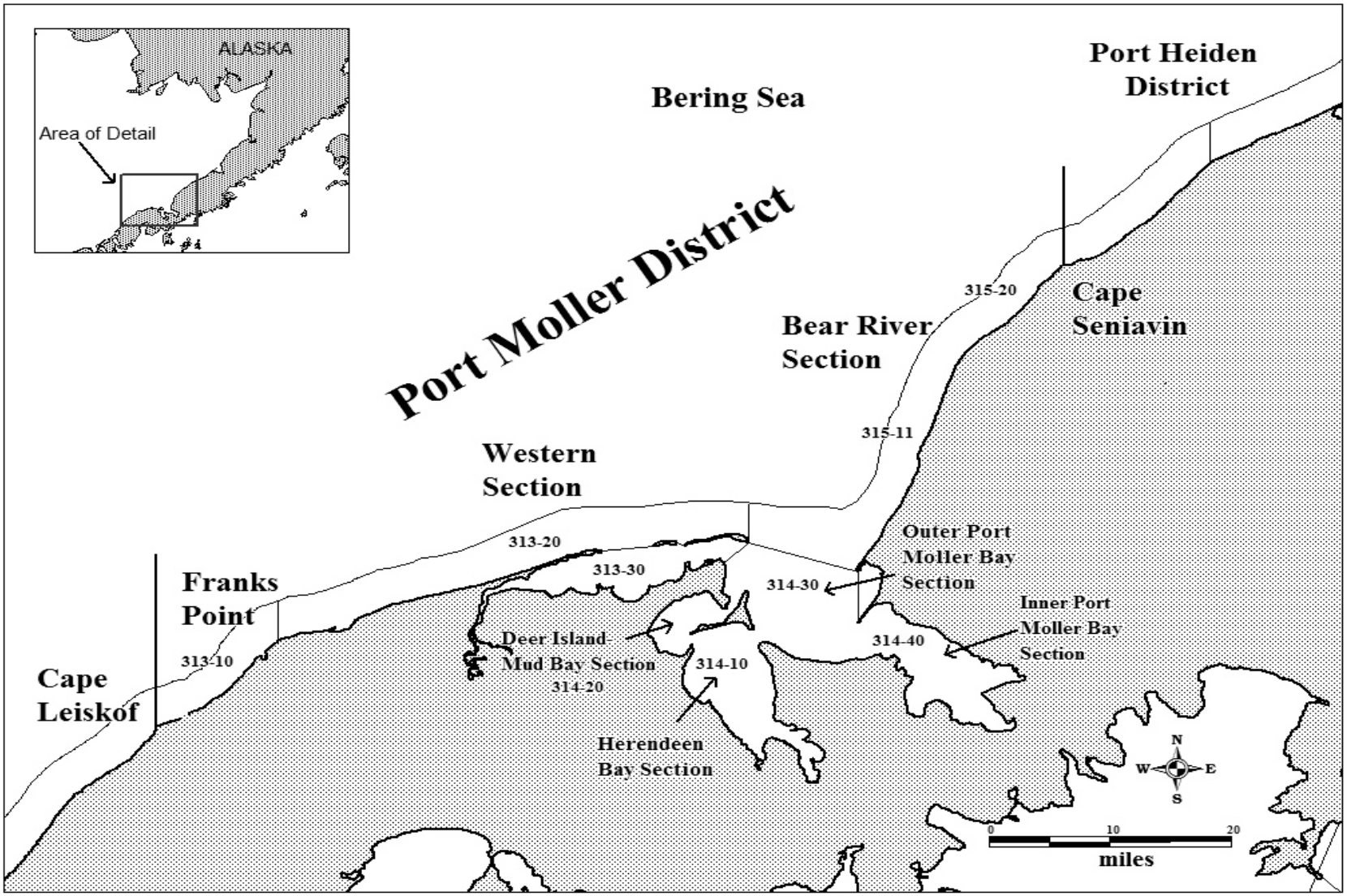

Figure 3.–Map of Port Moller District with commercial herring fishing statistical areas shown.

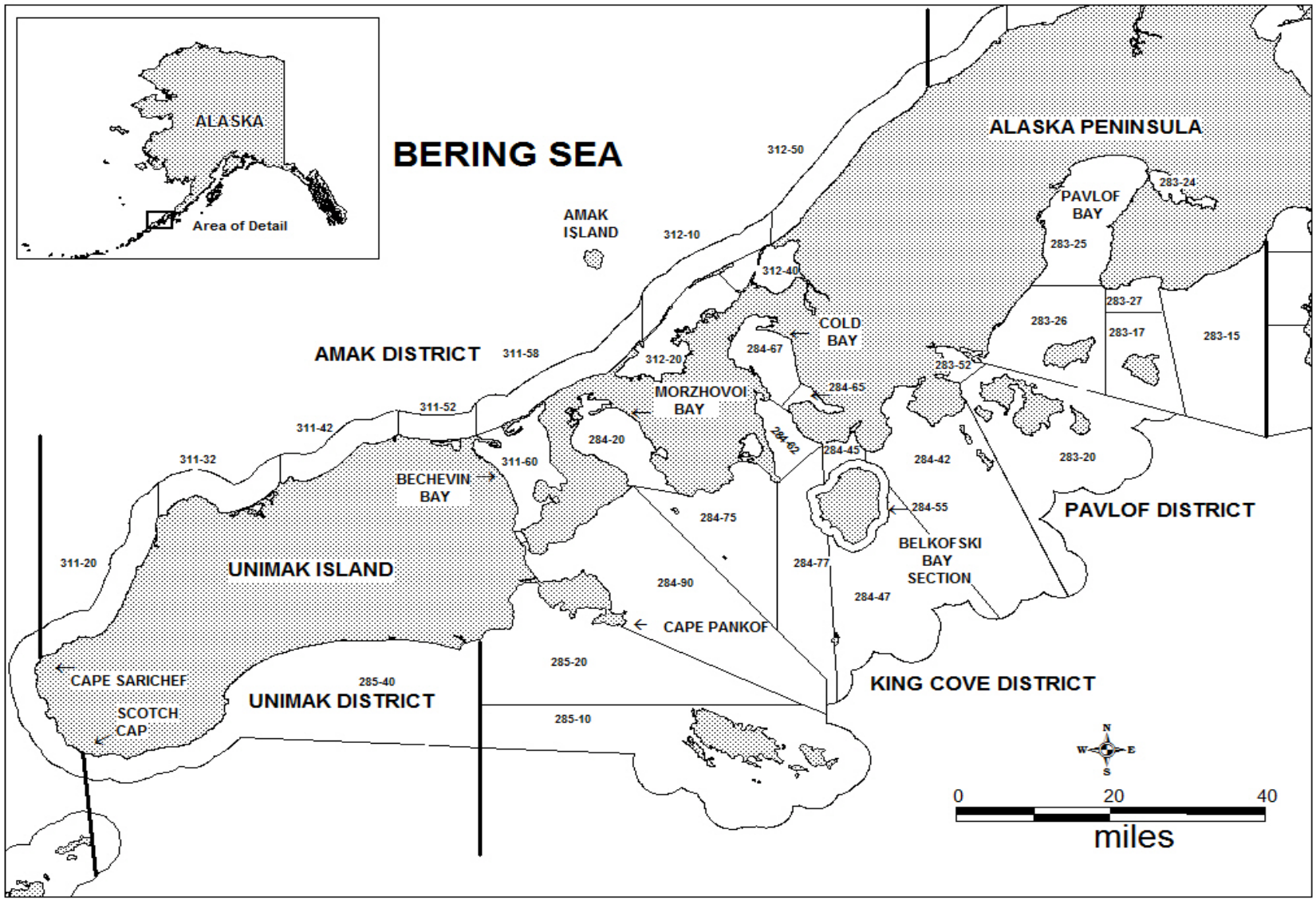

Figure 4.–Map of Amak, Unimak, King Cove, and Pavlof districts with commercial herring fishing statistical areas shown.

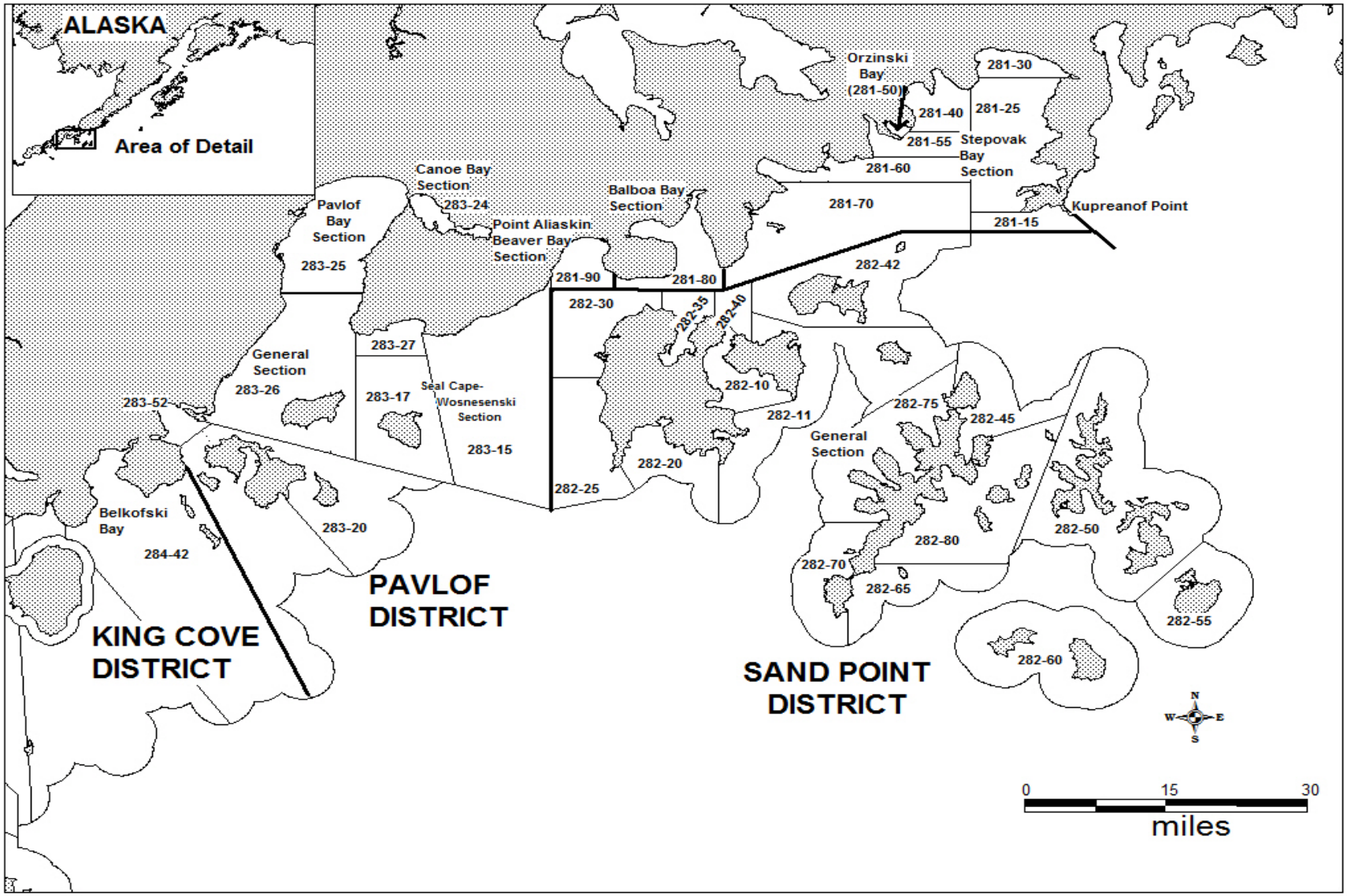

Figure 5.–Map of Pavlof and Sand Point districts with commercial herring fishing statistical areas shown.

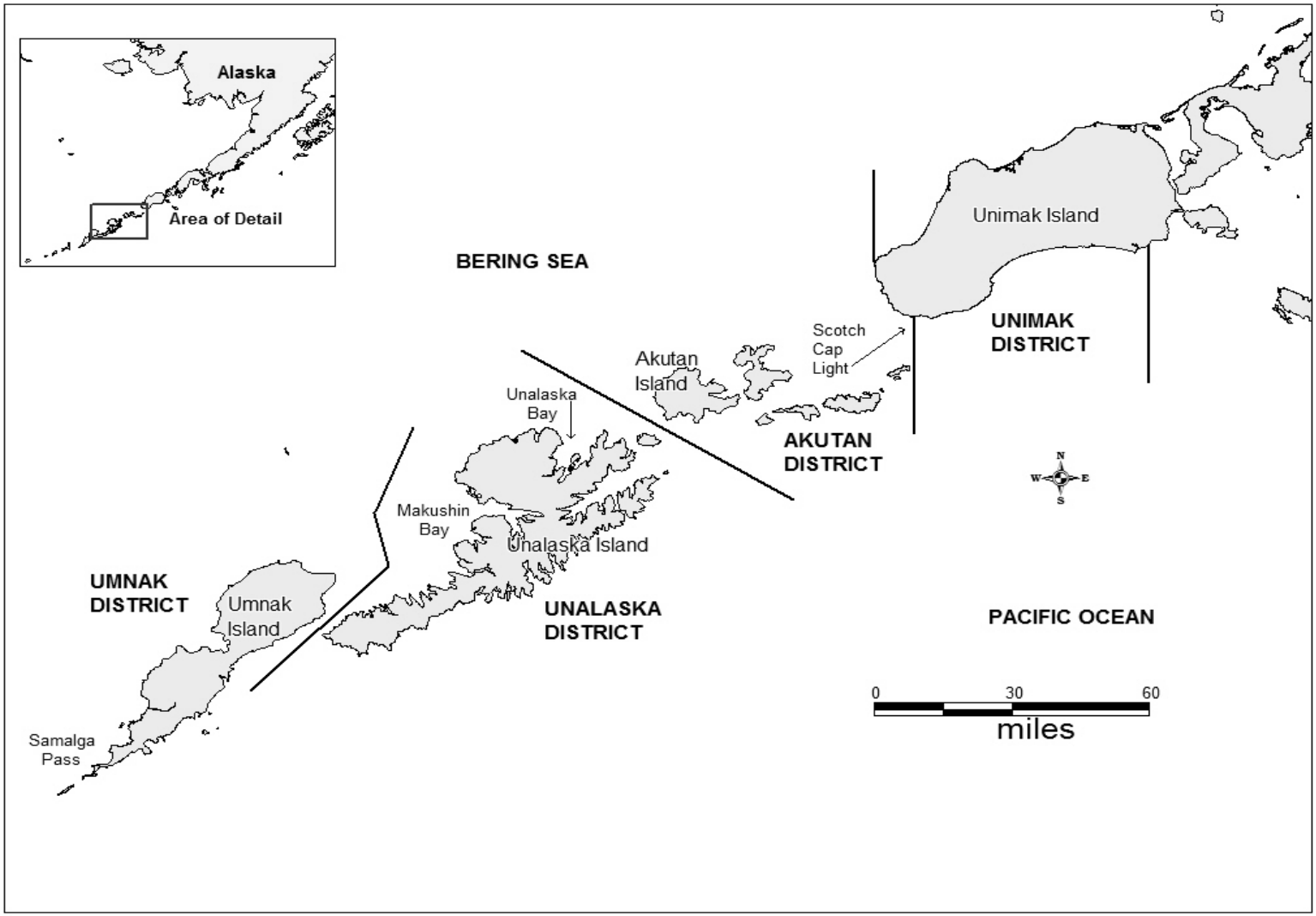

Figure 6.–Map of Aleutian Islands from Samalga Pass to Unimak Island with commercial herring fishing districts shown.

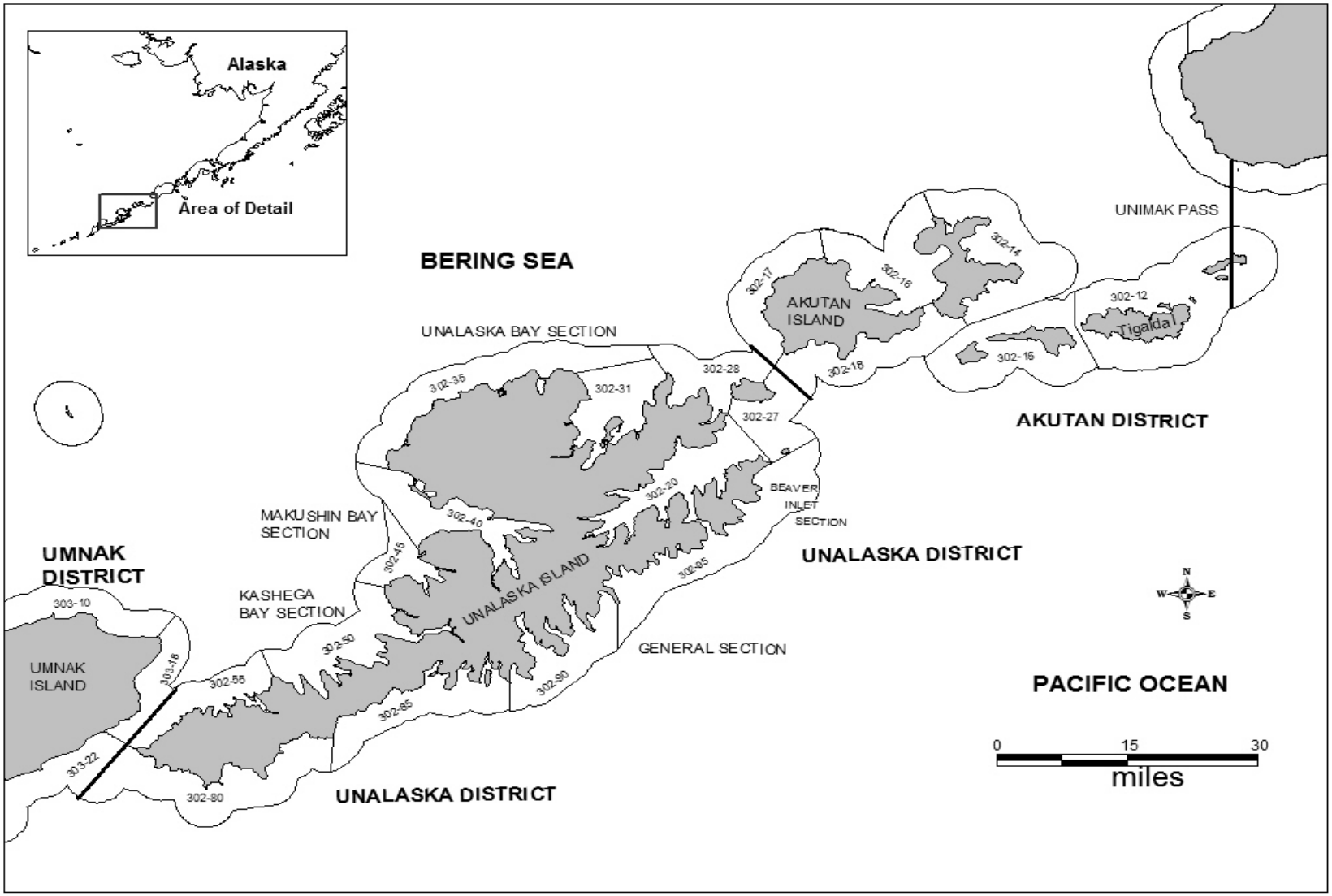

Figure 7.–Map of Aleutian Islands from Unimak Island to Umnak Island with commercial herring fishing statistical areas shown.

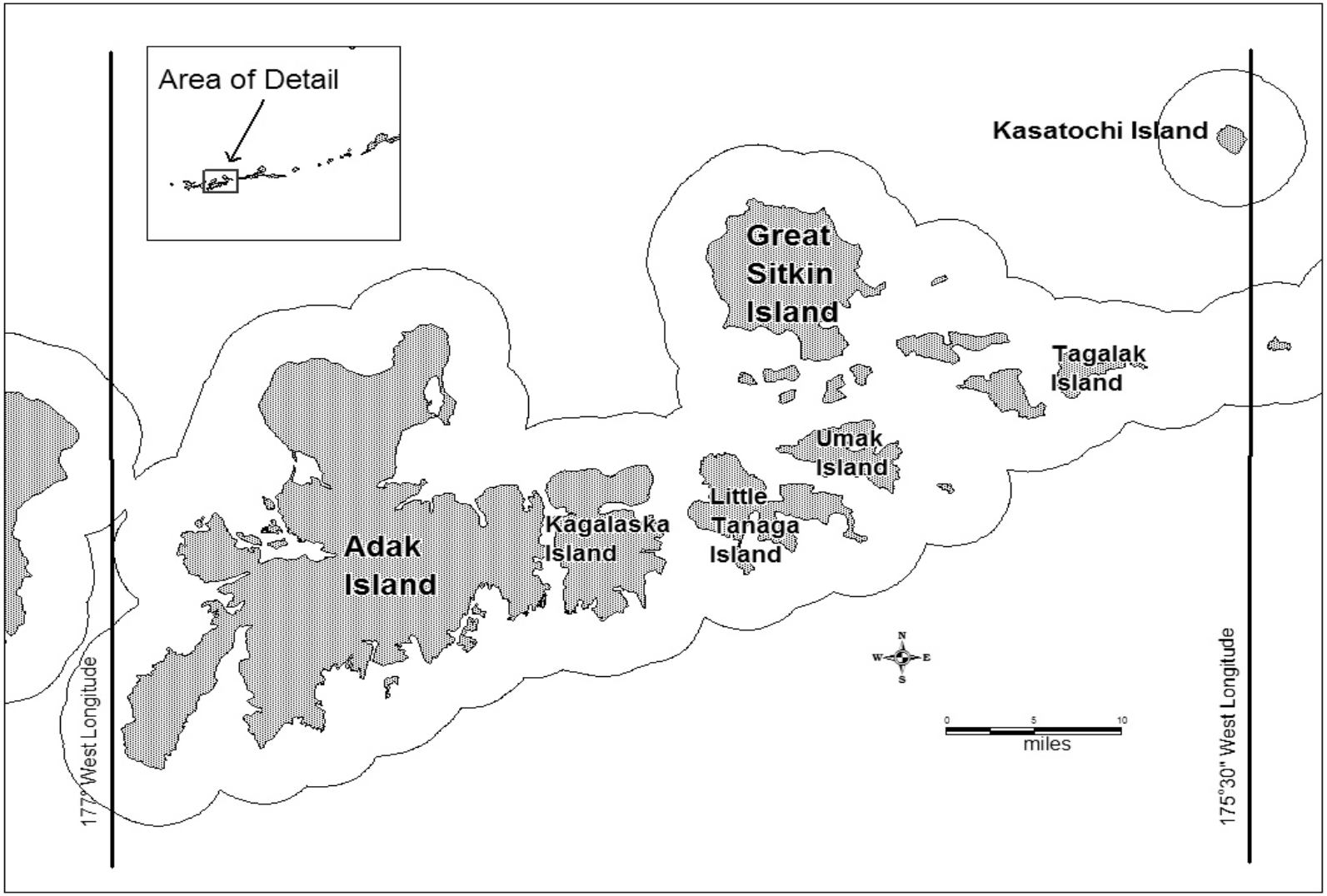

Figure 8.–Map of Adak Island area with boundaries of exploratory herring fishery defined.

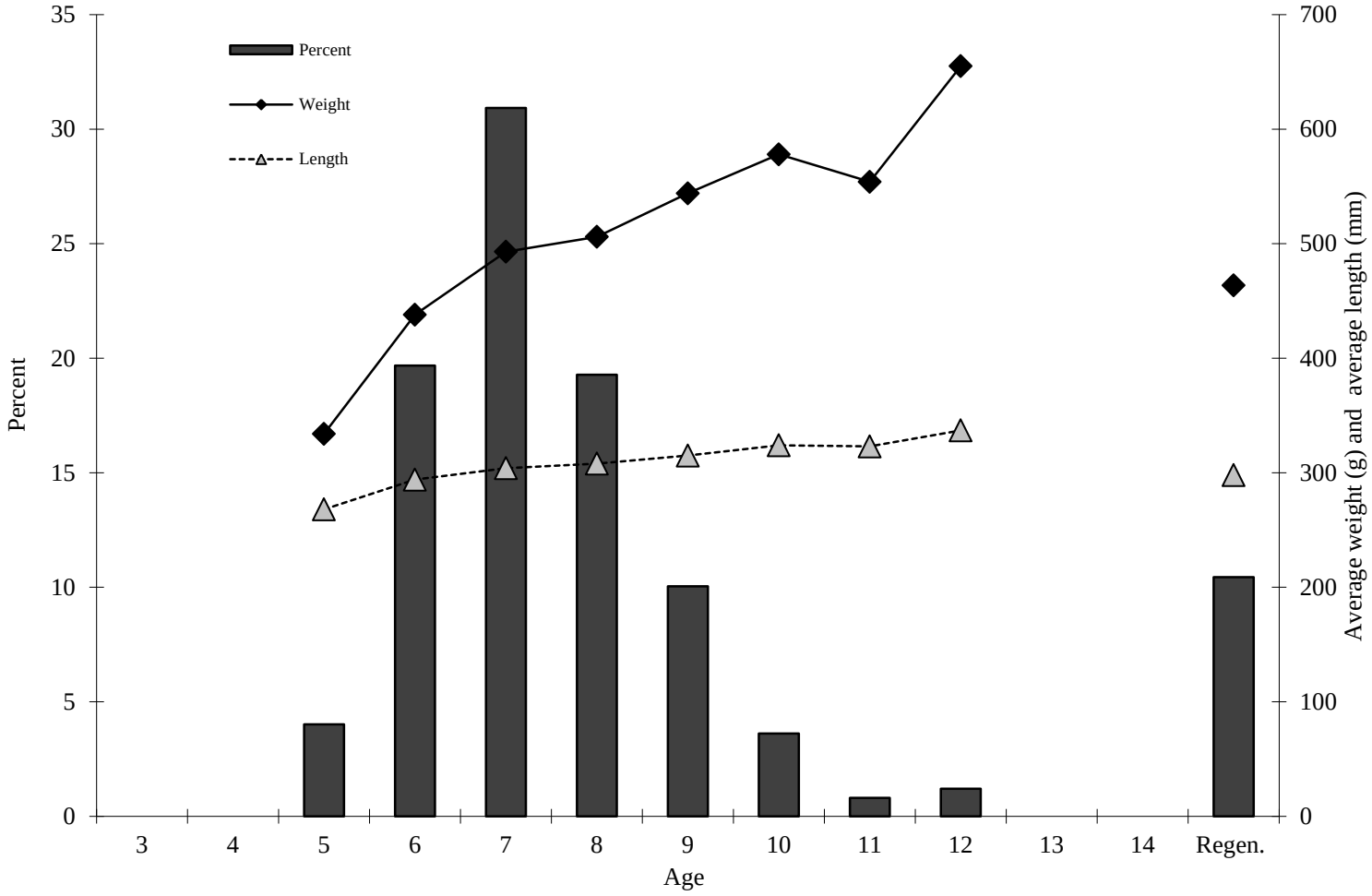

Figure 9.–Estimated average length-at-age (mm), average weight-at-age (g), and age composition of herring harvested in the Aleutian Islands Area (Dutch Harbor) commercial food and bait fisheries, 2015 (*n* = 249).

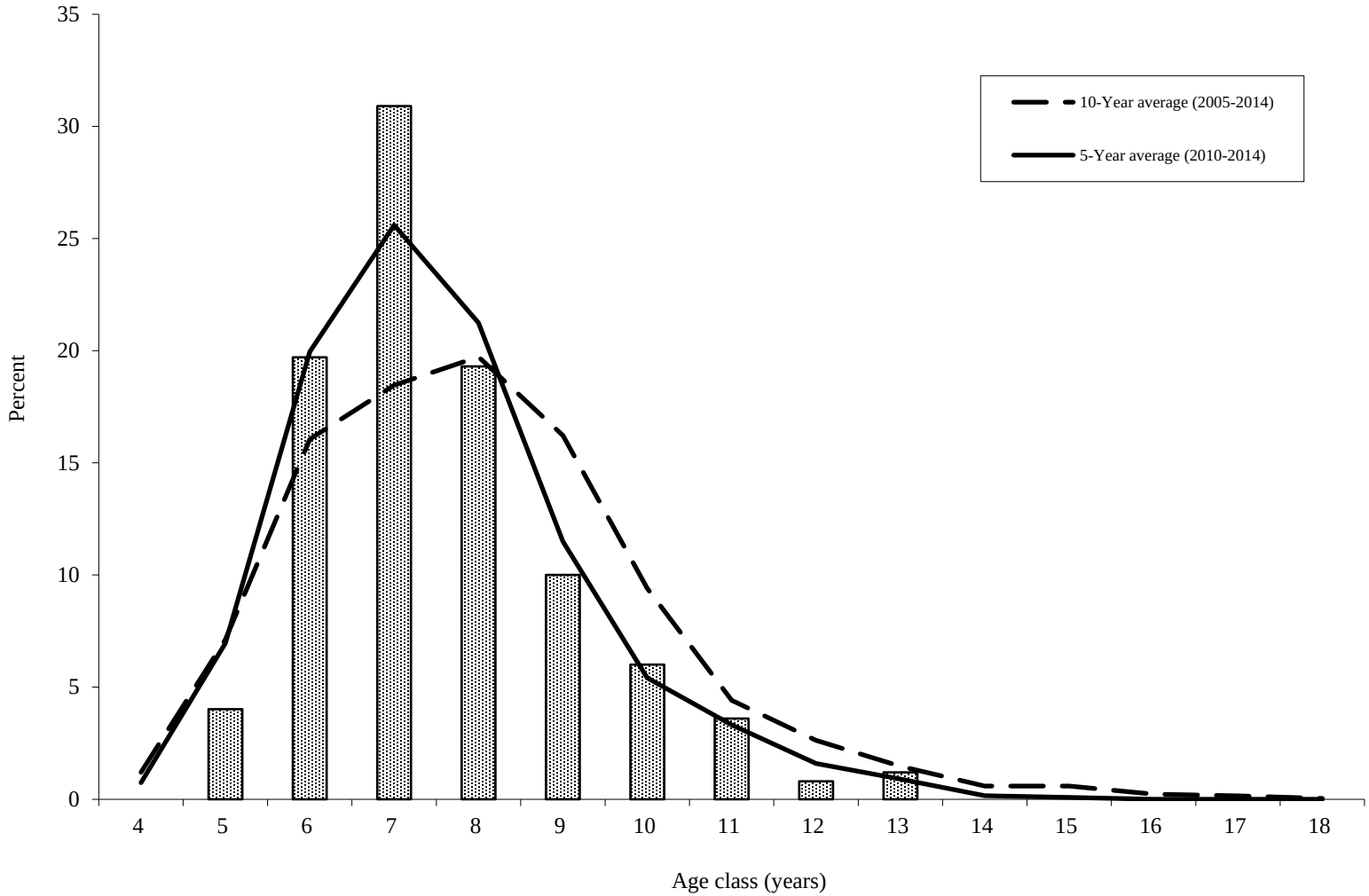

Figure 10.–Estimated 2015 percentage age composition of the Aleutian Islands Area (Dutch Harbor) commercial herring food and bait fisheries, with 5- and 10-year averages.

APPENDIX A. ARCTIC-YUKON-KUSKOKWIM HERRING OUTLOOK

ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF COMMERCIAL FISHERIES
NEWS RELEASE

Sam Cotten, Commissioner

Jeff Regnart, Director

Contact:
Jim Menard, Nome Area Manager (907) 443-5167
Jeff Estensen, Yukon Area Manager (907) 459-7274
Aaron Poetter, Kuskokwim Area Manager (907) 267-2303
Fax: (907) 267-2442

Anchorage Area Office
333 Raspberry Road
Anchorage, AK, 99518
Date issued: April 27, 2015

2015 Arctic-Yukon-Kuskokwim Herring Outlook

The 2015 Arctic-Yukon-Kuskokwim herring forecast and guideline harvest levels (GHLs), given a maximum 20% exploitation rate of the projected biomass, are listed below for the northeastern Bering Sea herring stocks (Table 1).

Table 1. Projections of Pacific herring spawning biomass and GHLs for commercial fishing districts in the northeastern Bering Sea, Alaska, 2015.

District	Threshold	2015 Projected Biomass (short tons)	Exploitation Rate (%)	2015 Harvest Guideline (short tons)
Security Cove	1,200	12,876	20	2,575
Goodnews Bay	1,200	18,532	20	3,706
Cape Avinof [a]	500	10,423	15	1,563
Nelson Island [b]	3,000	30,228	20	5,846
Nunivak Island	1,500	5,657	20	1,131
Cape Romanzof	1,500	4,813	20	963
Norton Sound [c]	7,000	53,786	20	10,757
Port Clarence [d]	–	–	–	165
Totals		136,315		26,707

[a] Cape Avinof commercial harvest is 15% of projected biomass (5 AAC 27.895(a)).

[b] Nelson Island commercial harvest is 20% of projected biomass minus 200 tons for subsistence harvest (5 AAC 27.895 (d)).

[c] See Norton Sound District management strategies for more details on GHL allocations.

[d] See Port Clarence District management strategies for GHL allocation details.

-continued-

This news release is to inform fishermen of projected herring biomass and GHLs, and the strategies employed if commercial fishing does occur. At this time, it is anticipated that some level of commercial herring fishing will occur in the AYK Region in 2015, most likely in the Norton Sound District. Each district may be opened by emergency order and the fishery will close by emergency order when GHLs are reached for each location. Under the Bering Sea Herring Fishery Management Plan 5 AAC 27.060, commercial fishing will not open in a district unless the minimum threshold biomass is observed in that district.

Based on postseason escapement projections, the 2015 estimated spawning biomass for northeastern Bering Sea herring stocks (Security Cove to Norton Sound Districts) will be 136,315 tons. If the return is as anticipated the total allowable harvest could be 26,707 tons. A harvest of this magnitude in the AYK herring fishery would be one of the largest on record.

In previous years, the AYK region herring biomass projection was based on an age-structured assessment (ASA) model. The ASA model requires age composition information, harvest data, and good aerial survey biomass estimates from each of the northeastern Bering Sea stocks. In 2014, test fishing projects only occurred in Norton Sound and Goodnews Bay; therefore, stock-specific age composition information is only available for these two areas. Aerials surveys in 2014 were conducted for Security Cove, Goodnews Bay, Cape Avinof, and Nelson Island. Only a small commercial harvest, approximately 2,448 tons for bait, occurred in the Norton Sound District in 2014. Due to the limited data available from 2014, the AYK region herring biomass was not assessed using an ASA model. The 2015 projected biomass is the average of biomass estimates of "good" (rating 3 or higher) aerial surveys from the last five years. If "good" aerial surveys were not available in the last five years then the last "good" aerial survey biomass estimate was used.

The actual biomass observed in 2015 may fall above or below the preseason projections based on variability in the quality of aerial biomass assessments and annual fluctuations of survival and recruitment rates.

2014 TEST FISHERY DATA

Goodnews Bay District

Test fishing using variable mesh gillnet gear occurred in Goodnews Bay in 2014. Length, weight, and age were recorded for a subsample of the catch. A total of 581 scales were taken with 6% age-4 fish, 29% age-5 fish, 11% age-6 fish, 15% age-7 fish, and 12% age-8 fish. Additionally, 22% of the sample was fish aged nine and older, 3% were unable to be read, and there were no age-3 fish encountered through test fishing. Ages ranged between 4 and 18 years with an average age of seven. Lengths ranged from 177–399 mm with an average length of 284 mm. Weights ranged from 83–609 g with an average weight of 247 g.

Norton Sound District

Test fishing using variable mesh gillnet gear occurred in Norton Sound in 2014. Length, weight, and age were recorded for a subsample of the catch. A total of 222 scales were taken with 3% age-4 fish, 23% age-5 fish, 8% age-6 fish, 25% age-7 fish, and 16% age-8 fish. Additionally, 26% of the

-continued-

sample was fish aged nine and older. Ages ranged between 4 and 19 years with an average age of eight. Lengths ranged from 220–325 mm with an average length of 271 mm. Weights ranged from 126–439 g with an average weight of 240 g.

2015 Management Strategies

The department will conduct aerial surveys and monitor catch statistics inseason if commercial fishing occurs. Guideline harvest levels may be adjusted according to inseason aerial assessments of herring biomass, except for the Norton Sound District where the preseason projection cannot be adjusted inseason. Given the new projection method requires reliable estimates of biomass from aerial surveys, the department will increase and prioritize efforts to conduct aerial surveys throughout the herring season. In accordance with the AYK Region harvest strategy, any operational commercial fishery will not target newly recruited age classes (age 2 through age 5 herring). The duration of fishing periods and harvests will vary in each district depending on inseason biomass estimates, roe quality, spawning activity, weather conditions, fishing effort, and processor input.

Cape Romanzof District

Since water turbidity in the Cape Romanzof area generally prevents aerial observations of herring, spawn deposition and commercial catch rates will be used to determine the timing and duration of commercial fishing periods if fishing occurs.

Norton Sound District

The 2015 projected biomass for the Norton Sound District is 53,786 tons which surpasses the minimum biomass threshold of 7,000 tons. A 20% exploitation rate would result in a guideline harvest of 10,757 tons. A maximum of 320 tons of herring are reserved to allow for the pound fishery to harvest a maximum of 90 tons of product (combined weight of herring roe and kelp; 5 AAC 27.965 (d,e)) leaving10,437 tons for sac roe harvest. The beach seine harvest is allocated 10% of the sac roe projected harvest, or 1,044 tons (5 AAC 27.960 (a)). Varied harvest rates may be applied to individual subdistricts based on biomass distribution, roe quality, weather, and sea ice conditions.

Port Clarence District

The department does not project an outlook for the Port Clarence fishery because of the lack of data and the limited scope of the fishery. The Alaska Board of Fisheries set a guideline harvest of 165 tons in 1981 and this will be the allowable harvest in 2015. This harvest guideline is based on 2 years of research conducted by the department in both the Port Clarence and Kotzebue Districts. Even though this guideline has not appeared in the regulation book since 1984, it still represents the best estimate of harvestable biomass.

APPENDIX B. ALEUTIAN ISLANDS AREA DUTCH HARBOR HERRING FOOD AND BAIT FORECASTS

Appendix B1.–Forecasted harvest allocation for Togiak sac roe and Dutch Harbor herring food and bait fisheries, 2015.

ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF COMMERCIAL FISHERIES
NEWS RELEASE

Cora Campbell, Commissioner
Jeff Regnart, Director

Contacts:
Greg Buck & Fred West, Asst. Area Research Biologists
Chuck Brazil, Area Research Biologist
Phone: (907) 267-2355
Fax: (907) 267-2442

Anchorage Regional Office
333 Raspberry Road
Anchorage, AK 99518

Date Issued: October 16, 2015
Time: 1:00 p.m.

2015 TOGIAK HERRING FORECAST

The 2015 Togiak herring forecast and harvest allocation are listed below for the Togiak District sac roe and spawn-on-kelp fishery, and the Dutch Harbor food and bait fishery, given a maximum 20% exploitation rate of the projected run biomass (Bristol Bay Herring Management Plan 5 AAC 27.865):

Harvest Allocation of the 2015 Forecasted Pacific Herring Run Biomass, Togiak District, Bristol Bay

	Biomass (Short Tons)	Harvest (Short Tons)
Forecasted Biomass	163,480	
Total Allowable Harvest (20% exploitation rate)		32,696
Togiak Spawn-on-Kelp Fishery (Fixed Allocation)		1,500
Remaining Allowable Harvest		31,196
Dutch Harbor Food/Bait Allocation (7.0% of the remaining allocation)		2,184
Remaining Allowable Harvest for Togiak District Sac Roe Fishery:		29,012
Purse Seine Allocation 70.0%		20,309
Gill Net Allocation 30.0%		8,704

-continued-

2015 TOGIAK HERRING FORECAST SUMMARY

The Pacific herring spawning biomass in the Togiak District was estimated at 203,267 tons in 2014 and is forecast to be 163,480 tons in 2015 (Figure 1). Age 9–11 herring are expected to comprise 50% of the biomass in 2015 while the remaining run is forecast to be ages 4–6 (17%), ages 7–8 (27%) and ages 12+ (6%) by weight (Figure 2). The weighted forecasted individual average weight of herring in the 2015 harvest is 383 g.

A run biomass of 163,480 tons would be ~110% of the recent 10-year average. A biomass of this size has the potential to produce an overall harvest of 32,696 tons in all fisheries and 29,012 tons in the Togiak sac roe fisheries (purse seine and gillnet). A harvest of this size would be ~117% of the recent 10-year average harvest.

An age-structured analysis (ASA) model is used to forecast the Togiak herring population. This model utilizes catch and age composition data as well as total run biomass estimates. Currently, the ASA model integrates data from purse seine fishery age compositions (1978–2014), total run age compositions (1978–1995, 1997, 1999, 2001, 2005–2010, and 2012–2014), and aerial survey biomass estimates (1981, 1983, 1992–1994, 1997, 1999-2001, 2005–2010, and 2012–2014). Samples from non-selective gear (commercial purse seine) are used to assess age composition of the total run biomass when a total run biomass is estimated. Commercial purse seine catch samples from 2014 ranged from age-3 to age-16. The model calculates the average weight of age-4 herring for 2015 as the most recent four-year average while simple linear regression of historical trends are used to forecast average weights of remaining age classes.

A temporal change in age composition from older to younger herring typically occurs during this fishery. However, the 2014 inshore spawning biomass age composition was fairly stable and consisted largely of age-8 herring. This age class accounted for 27% of the total commercial purse seine harvest by weight and numbers of fish.

The biomass of the Togiak herring spawning population has been estimated with aerial surveys since the late 1970s, concurrent with development of the sac-roe fishery. Estimating the peak inshore biomass is a necessary precondition for estimating total run biomass. Surveys were flown between 22 April and 23 May 2014 with peak biomass observed on 2 May. Most of the biomass surveyed occurred in the center of Togiak Bay with a smaller concentration to the east in Kulukak Bay (Figure 3).

Herring become visible to our sampling effort when they recruit into the fishery; a process that we believe begins around age-4 and is fully complete by age-9. Large recruitments in this population generally occur every eight to ten years and typically last one or two years. The last large recruitment event experienced by the Togiak herring population occurred in 2004 and 2005 and was detected in 2008 and 2009 when the fishery experienced elevated age-4 catches. It should be noted that measuring contributions of younger age classes is difficult because these fish are not fully recruited (available) in the harvest and often arrive on the spawning grounds near the end of the fishery.

There is always uncertainty in forecasting the Togiak District herring biomass. The forecasted mean percent error (MPE) has been relatively stable at ~20% for years with reliable total run biomass estimates (Figure 1). The historical forecast accuracy or mean absolute percent error (MAPE) between 1994 and 2014 using the ASA model has been 18%. Using this historical forecast error, the forecast range for 2015 is between 133,842 tons and 193,118 tons. We consider this population to be healthy and sustainable.

-continued-

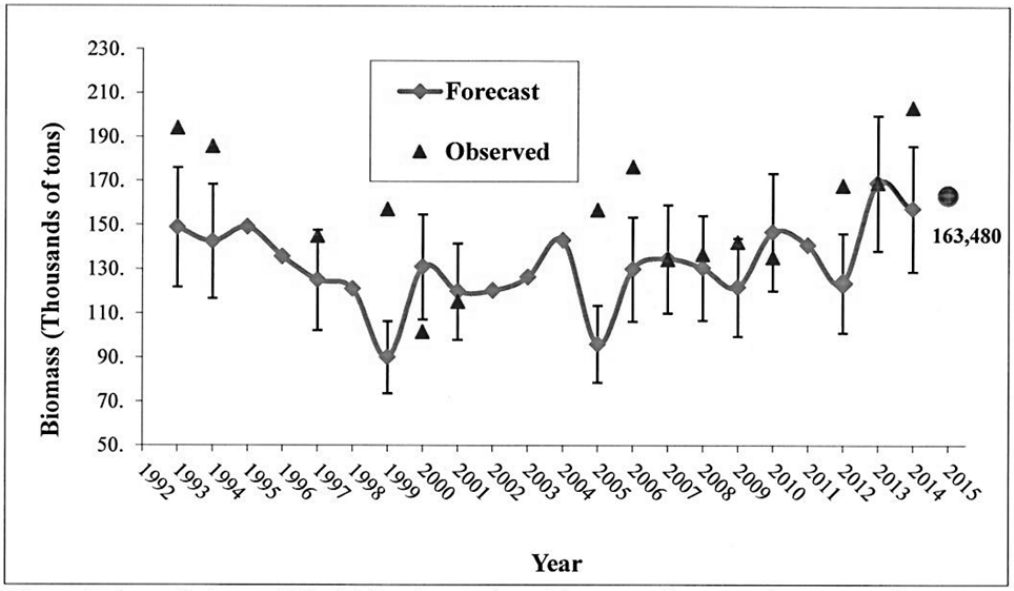

Figure 1- Annual observed Togiak herring total run biomass estimates and preseason forecasts based on the ASA model. Mean absolute percent error (MAPE) of 20% around the forecast is shown for years with a reliable total run biomass estimate.

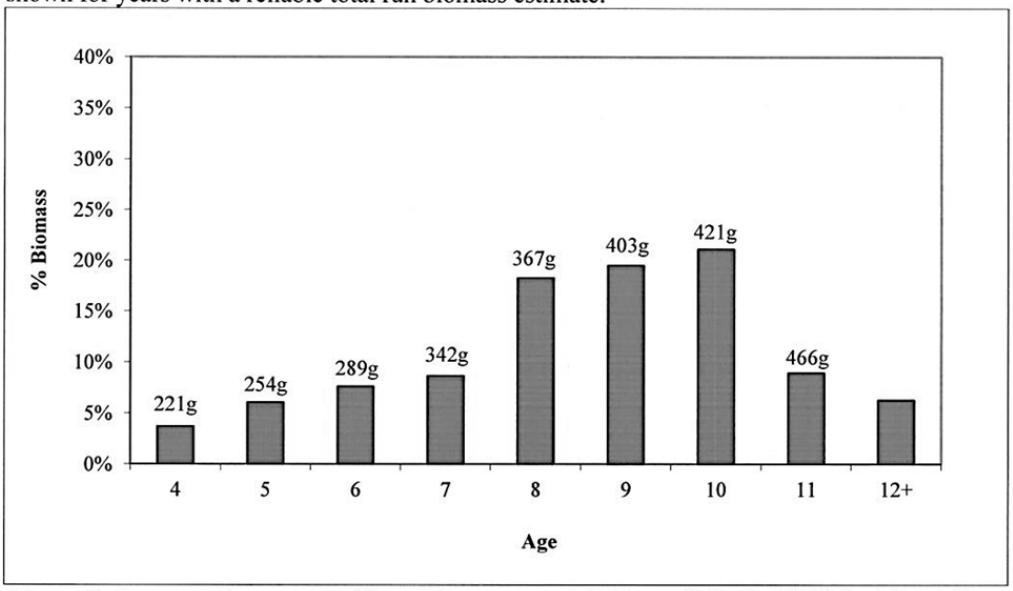

Figure 2- Forecasted age composition and average weight (grams) for the 2015 Togiak herring return.

-continued-

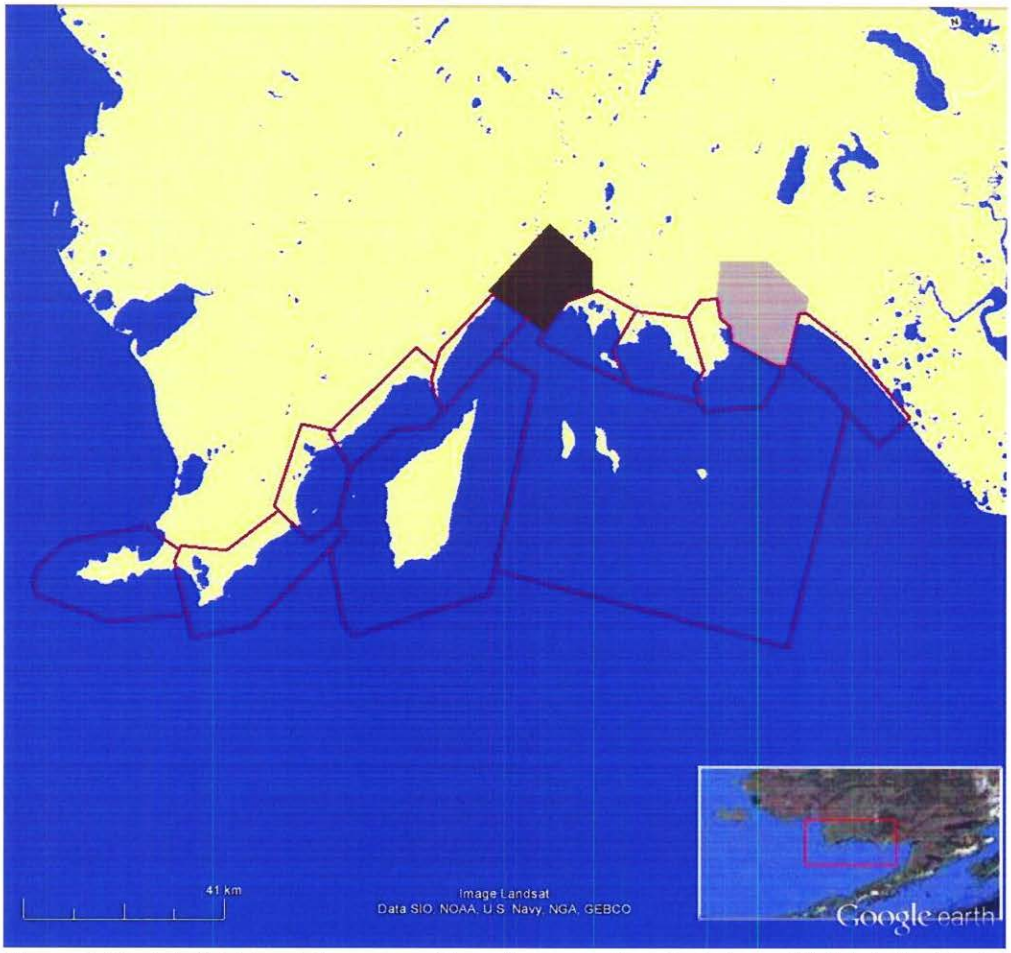

Figure 3- Togiak district aerial survey sections. Survey section shaded grey (Kulukak Bay) had 27% of all biomass surveyed in 2014 while Survey section shaded black (Togiak Bay) had 44%. All other sections had <10%.

APPENDIX C. DUTCH HARBOR FOOD AND BAIT HERRING FISHERY EMERGENCY ORDER SUMMARY

Appendix C1.–Emergency order summary, 2015.

EMERGENCY ORDER NO. 4-FH-M-SP-01-15

EFFECTIVE DATE: noon Wednesday, July 15, 2015

EXPLANATION: This emergency order establishes a commercial herring fishing period in the Unalaska and Akutan district for 24 hours from noon Wednesday, July 15 until noon Thursday, July 16, 2015.

EMERGENCY ORDER NO. 4-FH-M-SP-02-15

EFFECTIVE DATE: 9:00 AM Thursday, July 16, 2015

EXPLANATION: This emergency order extends the current commercial herring fishing period in the Unalaska and Akutan district for 48 hours from noon Thursday, July 16 until noon Saturday, July 18, 2015.

EMERGENCY ORDER NO. 4-FH-M-SP-03-15

EFFECTIVE DATE: noon Saturday, July 18, 2015

EXPLANATION: This emergency order extends the current commercial herring fishing period for 72 hours from noon Saturday, July 18 until noon Tuesday, July 21, 2015.

EMERGENCY ORDER NO. 4-FH-M-SP-04-15

EFFECTIVE DATE: noon Tuesday, July 21, 2015

EXPLANATION: This emergency order extends the current commercial herring fishing period in the Unalaska and Akutan district for 24 hours from noon Tuesday, July 21 until noon Wednesday, July 22, 2015.

EMERGENCY ORDER NO. 4-FH-M-SP-05-15

EFFECTIVE DATE: 5:30 p.m. Tuesday, July 21, 2015

EXPLANATION: This emergency order closes the current commercial herring fishing period in the Unalaska and Akutan districts at 5:30 p.m. Tuesday, July 21, 2015.