

Fishery Management Report No. 11-11

**Alaska Peninsula-Aleutian Islands Management Area
Herring Food and Bait Fishery Management Plans,
2011**

by

Alex C. Bernard

March 2011

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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

FISHERY MANAGEMENT REPORT NO. 11-11

**ALASKA PENINSULA-ALEUTIAN ISLANDS MANAGEMENT AREA
HERRING FOOD AND BAIT FISHERY MANAGEMENT PLANS, 2011**

by

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TABLE OF CONTENTS

	Page
LIST OF TABLES.....	ii
LIST OF FIGURES.....	ii
LIST OF APPENDICES.....	ii
ABSTRACT.....	1
INTRODUCTION.....	1
THE ALASKA PENINSULA-ALEUTIAN ISLANDS (DUTCH HARBOR) HERRING FOOD AND BAIT FISHERY.....	2
Fishery Requirements.....	2
Allocation and Harvest Projections.....	2
Registration Requirements for Permit Holders, Tenders, and Processors.....	3
Fish Tickets.....	3
Fishing Periods.....	3
Herring Seine Pound Fishery.....	4
Gear Testing.....	4
Commercial Harvest Sampling.....	4
ALASKA PENINSULA-ALEUTIAN ISLANDS (ADAK) HERRING FISHERY.....	4
Commissioner’s Permit.....	5
Fishing Seasons, Area, and Gear Operation.....	5
REFERENCES CITED.....	5
TABLES AND FIGURES.....	7
APPENDIX A: ARCTIC-YUKON-KUSKOKWIM HERRING OUTLOOK AND MANAGEMENT STRATEGY FOR 2011.....	13
APPENDIX B: FORECASTED HARVEST ALLOCATION FOR TOGIAK SAC ROE AND DUTCH HARBOR HERRING FOOD AND BAIT FISHERIES, 2011.....	19

LIST OF TABLES

Table	Page
1. Harvest allocation of the 2011 forecasted Pacific herring run biomass, Togiak District, Bristol Bay.	8

LIST OF FIGURES

Figure	Page
1. Map of the Bering Sea Management Plan (5 AAC 27.060) commercial herring districts.	9
2. Map of the Aleutian Islands from Tigalda Island to Umnak Island illustrating the herring fishing statistical areas.....	10
3. Map of the Adak District illustrating the herring fishery boundaries.	11
4. Map of the eastern Aleutian Islands from Samalga Pass to Unimak Island illustrating the herring fishing district boundaries.	12

LIST OF APPENDICES

Appendix	Page
A1. Arctic-Yukon-Kuskokwim herring outlook and management strategy for 2011.	14
B1. Forecasted harvest allocation for Togiak sac roe and Dutch Harbor herring food and bait fisheries, 2011.....	20

ABSTRACT

The commercial food and bait fisheries for Pacific herring *Clupea pallasii* in the Alaska Peninsula-Aleutian Islands Herring Management Area (Area M) occur within the Unimak, Akutan, Unalaska, Umnak, and Adak districts. The Dutch Harbor herring food and bait fishery takes place from June 24 until February 28 and is allocated 7 percent of the Togiak sac roe herring total allowable harvest (minus the Togiak spawn-on-kelp fishery fixed allocation). The 2011 Dutch Harbor herring food and bait allocation is 1,867 tons, of which 261 tons (14%) is allocated to the gillnet fishery. The purse seine allocation will be 1,606 tons, of which 100 tons is set aside for the experimental pound fishery. The Adak herring food and bait fishery is allocated 500 tons that may be harvested from June 24 until February 28 with both purse seine and gillnet gear. This document describes how the fisheries will be managed, the industry requirements to participate in the fisheries, and how to contact and relay information to the Alaska Department of Fish and Game.

Key words: Pacific herring, *Clupea pallasii*, commercial food and bait fishery, Alaska Peninsula-Aleutian Islands, Area M, Dutch Harbor herring fishery, Togiak, herring gillnet, herring sac roe, herring seine, herring pound, Adak herring fishery, Fishery Management Plan.

INTRODUCTION

This document is intended to provide commercial herring harvesters and buyers with information and guidelines for participating in the Alaska Peninsula-Aleutian Islands Management Area (Area M) Pacific herring *Clupea pallasii* food and bait fisheries. Information on inseason management of the Area M herring sac roe fisheries can be found in Bernard (2011).

Area M consists of Bering Sea waters extending west of Cape Menshikof, and Pacific Ocean state waters extending west of Kupreanof Point, to the International Dateline (Figure 1; 5 AAC 27.600). Fishermen may only harvest herring food and bait in the Unimak, Akutan, Unalaska, Umnak and Adak districts (Figures 1–4).

There are two food and bait fisheries in Area M: the Dutch Harbor and Adak herring fisheries. In recent years, three management plans have been used to manage the Dutch Harbor herring fishery: (1) the Bering Sea Herring Fishery Management Plan (5 AAC 27.060) establishes that in any district, if any of the southwest herring stocks are below their minimum threshold, the Dutch Harbor food and bait fishery will be closed for the season; (2) the Bristol Bay Herring Management Plan (5 AAC 27.865 (b)) establishes a 7% allocation of the Togiak Districts sac roe herring harvest to the Dutch Harbor food and bait fishery; and (3) the Dutch Harbor Food and Bait Herring Fishery Allocation Plan (5 AAC 27.655) which splits the 7% allocation by gear type, 86% for the purse seine and 14% for the gillnet fishery. At the February 2010 Alaska Board of Fisheries (BOF) meeting, the BOF amended the language to 5 AAC 27.655 to require that 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 amount shall be deducted from any remaining 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 years' seine allocation as stated in 5 AAC 27.655 (b).

In 2004, the BOF created the Alaska Peninsula-Aleutian Islands Herring Management Plan (5 AAC 27.657), establishing a herring fishery in the Adak District (Figure 3) with a 500 ton allocation independent of the Dutch Harbor food and bait allocation. This plan was amended at the 2010 BOF meeting to allow both purse seine and gillnet gear to harvest the 500 ton Adak allocation. Since the inception of the management plan in 2004, there has been no harvest in the Adak District.

THE ALASKA PENINSULA-ALEUTIAN ISLANDS (DUTCH HARBOR) HERRING FOOD AND BAIT FISHERY

FISHERY REQUIREMENTS

In order for the Alaska Department of Fish and Game (ADF&G) to open Unimak, Akutan, Unalaska, or Umnak districts (Figure 2) to herring food and bait fishing, each Western Alaska herring biomass projection must surpass its BOF mandated district threshold (5 AAC 27.060). These biomass projections are for fisheries located in the Security Cove, Goodnews Bay, Cape Avinof, Nelson Island, Nunivak Island, Cape Romonzof, Togiak, and Norton Sound districts (Figure 1). In 2011, the biomass of all the Bering Sea herring stocks are forecast to be above their mandated threshold levels and the probability of the 2011 Dutch Harbor herring food and bait fishery occurring is favorable (Appendix A1). However, the 2011 fishery will be based on the estimated spawning biomass of each Bering Sea herring stock in 2011. ADF&G will update biomass estimates for each stock as herring move into coastal waters during spawning migrations.

ALLOCATION AND HARVEST PROJECTIONS

ADF&G will attempt to manage the Dutch Harbor herring food and bait fishery so that the harvest remains within the allocated 7% of the remaining allowable Togiak District herring sac roe harvest (Appendix B1). A “rollover” provision was adopted during the 2001 BOF meeting (5 AAC 27.655 (b)), as an incentive to conduct a fishery that stays within the allocation. During years when herring harvest exceeds the allocation, the amount of harvest over the allocation shall be deducted from the next year’s allocation, by gear group. During the 2010 season, neither the purse or gillnet gear group exceeded their respective allocations.

The Dutch Harbor food and bait allocation is divided between gear groups: 86% is allocated to the seine fishery and 14% to the gillnet fishery (5 AAC 27.655 (a)). These allocations are considered independent of each other so that one gear group may not harvest herring allocated to the other gear group prior to July 25. Furthermore, 100 tons may be reserved from the purse seine allocation for an experimental herring pound fishery (5 AAC 27.655(c)). 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 the excess harvest shall be deducted from any remaining gillnet allocation for the current fishing season 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). The 2011 harvest allocations are 1,606 tons for the purse seine fishery, of which 100 tons is reserved for the seine pound fishery, and 261 tons for the gillnet fishery (Table 1).

Inseason news releases will be broadcast on VHF channel 12 in Dutch Harbor, which will serve as the designated ADF&G channel for communications during the herring fishery. Fishermen, tenders, and processors should monitor this channel.

REGISTRATION REQUIREMENTS FOR PERMIT HOLDERS, TENDERS, AND PROCESSORS

All processors must make daily reports of all herring purchased from fishermen, and other processing records as specified by ADF&G (5 AAC 27.662 (a)(2)). These daily reports can be provided to ADF&G by VHF, SSB, phone, fax, or e-mail. ADF&G offices can be contacted for information concerning the Dutch Harbor and Adak herring food and bait fisheries at the following locations:

Sand Point:

Alaska Department of Fish and Game
P.O. Box 129
Sand Point, AK 99661

Phone: (907) 383-2066
Fax: (907) 383-2606
VHF channels 6 & 72
Single Side Band 3.230 MHz
KWB 362 (call sign)

Dutch Harbor:

Alaska Department of Fish and Game
P.O. Box 920587
Dutch Harbor, AK 99692

Phone: (907) 581-1239
Fax: (907) 581-1572
VHF 12
Single Side Band 4.125 MHz
WIM 76 (call sign)

Prior to catching, tendering, buying, or processing any herring, permit holders must register at the ADF&G office in Dutch Harbor. Even if no herring are harvested or vessels are not actively fishing, each permit holder, tender and processor must still report daily by 10:00 AM or until registration from the fishery is withdrawn. If conditions arise which require additional time for permit holders to report herring harvests, ADF&G must be informed of the situation prior to fishing operations. Catch reporting instructions will be explained in detail during registration.

FISH TICKETS

Permit holders must provide specific harvest locations (statistical area and specific landmark) to buyers so that they can be recorded on fish tickets. **Fish tickets must be delivered, by mail or in person, to the Dutch Harbor ADF&G office within ten days after the closure of the fishery** (5 AAC 27.662 (3)). If 10 days are insufficient time to submit fish tickets, other arrangements must be made by contacting ADF&G in Sand Point.

FISHING PERIODS

The herring gillnet fishery can open by emergency order beginning noon June 24 and may be extended until the allocation is reached or until the season ends on February 28 (5AAC 27.610 (e)(2)(A)). ADF&G may also close the fishery if they decide that an additional fishing period might exceed the allocation. It is the intention of ADF&G to begin the fishery no later than July 1. Effort levels and harvest rates will be considered when establishing fishery openings.

The initial purse seine herring fishing period may occur as early as noon on July 15 (5 AAC 27.610 (e) (2) (B)). Unless harvesters form a combine, the department anticipates that purse seine fishing periods will be short in duration and the fishery will be conducted within portions of Unalaska Bay. Short openings over several days may be required to prevent exceeding the allocation. Generally, there will be a 12-hour closure between fishing periods to allow permit holders an opportunity to deliver their catch and ADF&G to assess the harvest and processing capacity. A shorter closed period may be allowed if ADF&G receives harvest reports

promptly from all permit holders. ADF&G may cancel or extend a fishing period with little notice.

In the past, widespread overharvesting has occurred in the Dutch Harbor food and bait fishery. To avoid potential overharvest issues, ADF&G instituted the following policy; if the average allocation per vessel fished (total allocation/number of vessels registered) is less than 150 tons per registered vessel, ADF&G will limit both the length of the fishing periods and the size of the area open to commercial herring fishing.

Harvesters and spotter pilots are encouraged to relay biomass information to ADF&G prior to the fishery opening. Past cooperation between ADF&G and the fishing industry has proven valuable in providing information critical to management of the fishery. ADF&G will try to assess herring biomass in the area prior to opening the fishery.

HERRING SEINE POUND FISHERY

One hundred tons of herring will be allocated to the herring seine pound fishery, which is deducted from the purse seine allocation. A person planning to operate a pound must check in with ADF&G and include detailed plans describing the design and operation of the pound, including exact location and timing of pound operation. These plans must be received by ADF&G in a timely manner to allow preparation of a Commissioner's permit for pound operation. A permit holder intending to operate a pound is encouraged to register with ADF&G in Dutch Harbor or Sand Point no later than 4:30 PM June 30, 2011.

Herring for the pound fishery may be harvested during purse seine fishery openings. If the herring pound allocation is not harvested, it will then be rolled over into the seine allocation. If the seine fishery exceeds the allocation, the penalty provision (5 AAC 27.655(b)) will be applied to the next year's total allocation. If two or more permit holders register for the pound fishery, the pound allocation is divided equally among them.

GEAR TESTING

Prior to opening the fishery, purse seine gear may be tested during daylight hours until 5:00 PM July 14. Gear testing will only be allowed at a time and place designated by ADF&G. Permit holders must contact ADF&G in Dutch Harbor on VHF channel 12 or in person prior to setting gear. In addition, any fish caught during gear testing must immediately be released unharmed. After the fishery has been closed and all herring on the vessel have been offloaded, participants may, after notifying ADF&G, set their net to straighten, clean, and organize their gear at a time and place designated by ADF&G.

COMMERCIAL HARVEST SAMPLING

Cooperation from harvesters, tender operators, and processors will be appreciated when ADF&G personnel request herring samples from the commercial catch. These samples will be used to determine the age, sex, and size composition of the stock.

ALASKA PENINSULA-ALEUTIAN ISLANDS (ADAK) HERRING FISHERY

Beginning in 2004, the BOF authorized a herring set gillnet fishery in the Adak District (Figure 3) with a 500-ton allocation. However in 2010, the BOF amended the regulations to

include both seine and gillnet gear in the harvest of up to 500 tons within the waters around Adak. This allocation is independent of the Dutch Harbor food and bait allocation. Herring can be harvested in this fishery as either sac roe or food and bait (Bernard *In prep*). ADF&G has no information about the size, timing, or condition of herring stocks in the Adak area. ADF&G may station a representative in Adak to manage this fishery and collect herring samples.

COMMISSIONER'S PERMIT

Each permit holder, tender operator, and buyer must register and obtain a Commissioner's permit for the Adak herring fishery at the ADF&G office in Sand Point or Dutch Harbor prior to catching, tendering, buying, or processing herring. The buyer and tender reporting requirements are described in 5AAC 27.662. Permit holders are encouraged to secure a market for their harvest prior to fishing.

FISHING SEASONS, AREA, AND GEAR OPERATION

In that portion of the Adak District from 175°30' W long to 177° W long, herring may be taken in the food and bait fishery from June 24 through February 28 (5 AAC 27.657; Figure 3).

The permit holder must be physically present while the set gillnet is being fished. Each set gillnet in operation must be anchored and buoyed at both ends. Each buoy must be plainly and legibly marked with the permanent vessel license plate number (ADF&G number) of the vessel operating the gear. The numbers must be painted on the top one-third of the buoy in numerals at least four inches in height, one-half inch in width and in a color contrasting to that of the buoy. The buoy markings must be visible above the water surface.

REFERENCES CITED

- Bernard, A. C. 2011. Alaska Peninsula-Aleutian Islands Management Area herring sac roe and food and bait fisheries annual management report, 2010. Alaska Department of Fish and Game, Fishery Management Report No. 11-06, Anchorage.
- Bernard, A. C. *In prep*. Alaska Peninsula-Aleutian Islands Management Area herring sac roe fishery management plan, 2011. Alaska Department of Fish and Game, Fishery Management Report, Anchorage.

TABLES AND FIGURES

Table 1.–Harvest allocation of the 2011 forecasted Pacific herring run biomass, Togiak District, Bristol Bay.

	Biomass (Tons)	Harvest (Tons)
2011 Togiak District Forecasted Biomass Exploitation at maximum 20%	140,860	
Total Allowable Harvest		28,172
Togiak Spawn on Kelp Fishery (Fixed Allocation)		1,500
Remaining Allowable Harvest		26,672
Dutch Harbor Food/Bait Allocation ^a		1,867
Purse Seine Allocation (86%) ^b		1,506
Overharvest penalty from previous year.		0
2011 Seine Allocation		1,506
Pound Fishery Allocation		100
Overharvest penalty from previous year.		0
Gillnet Allocation (14%) ^c		261
Overharvest penalty from previous year.		0
2011 Gillnet Allocation		261

^a The Dutch Harbor Food/Bait allocation is 7% of the remaining allowable harvest from the Togiak District.

^b The purse seine allocation for 2011 is 86% of the Dutch Harbor allocation minus the pound fishery allocation of 100 tons.

^c The gillnet allocation for 2011 is 14% of the Dutch Harbor allocation.

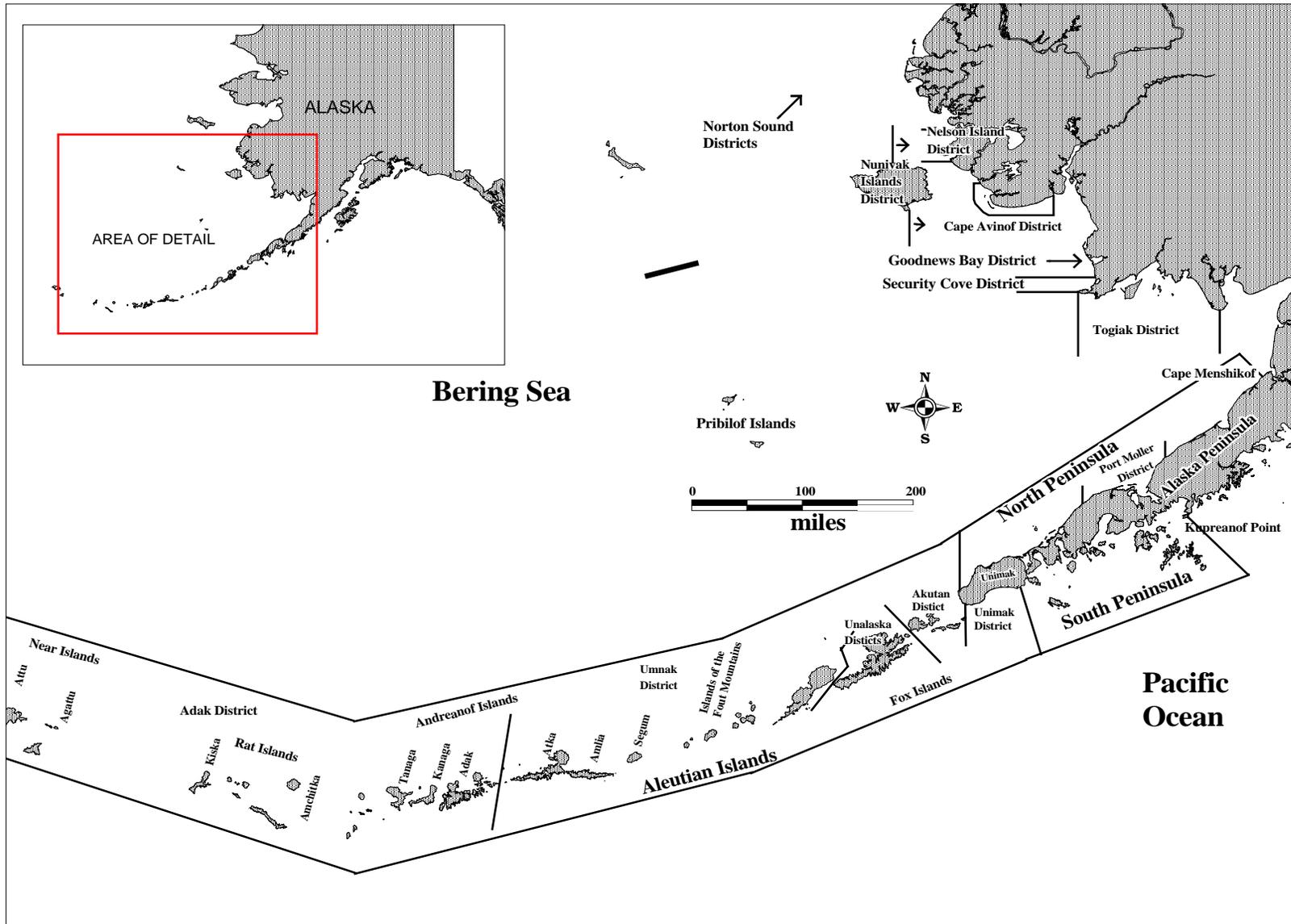


Figure 1.—Map of the Bering Sea Management Plan (5 AAC 27.060) commercial herring districts.

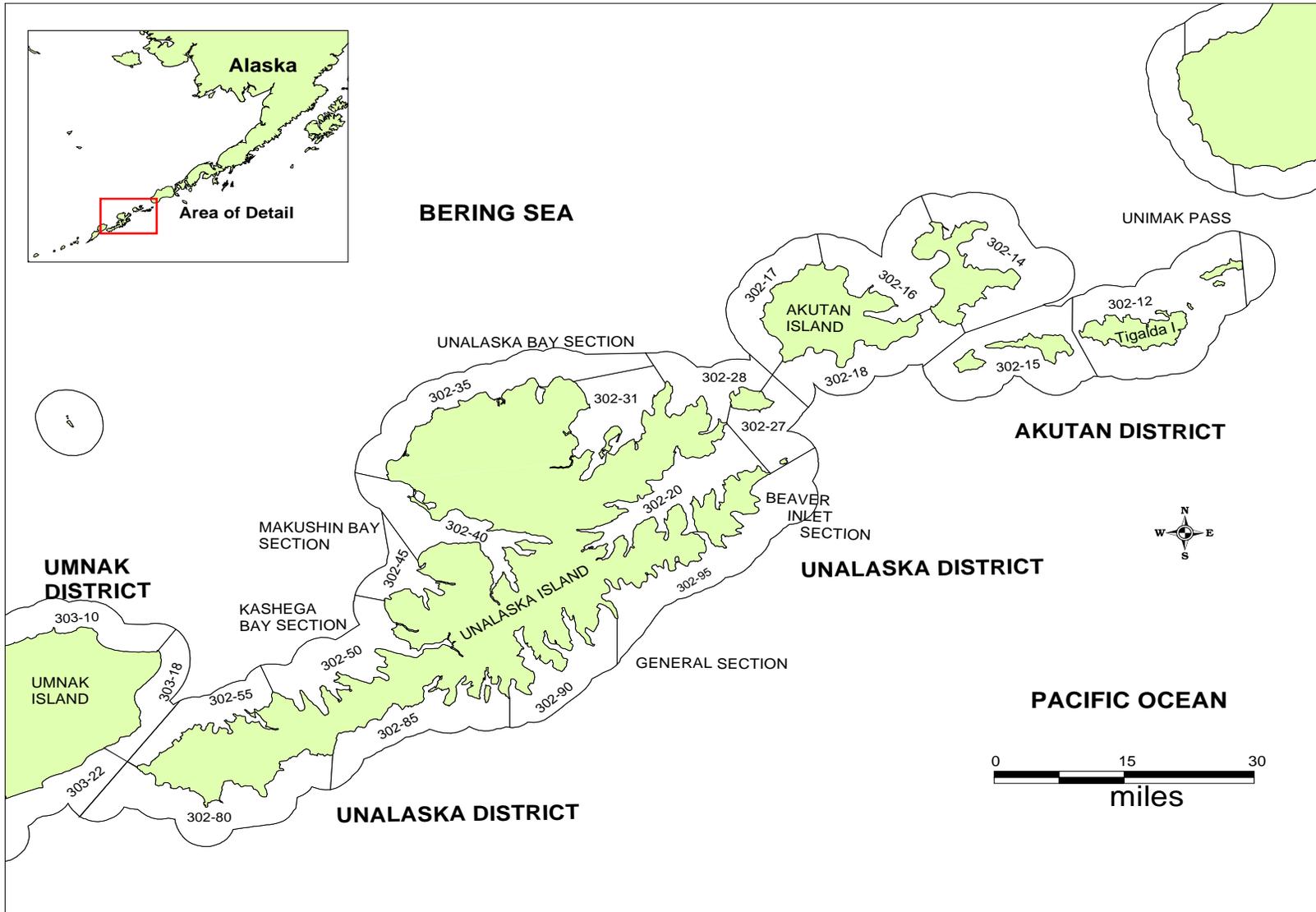


Figure 2.—Map of the Aleutian Islands from Tigalda Island to Umnak Island illustrating the herring fishing statistical areas.

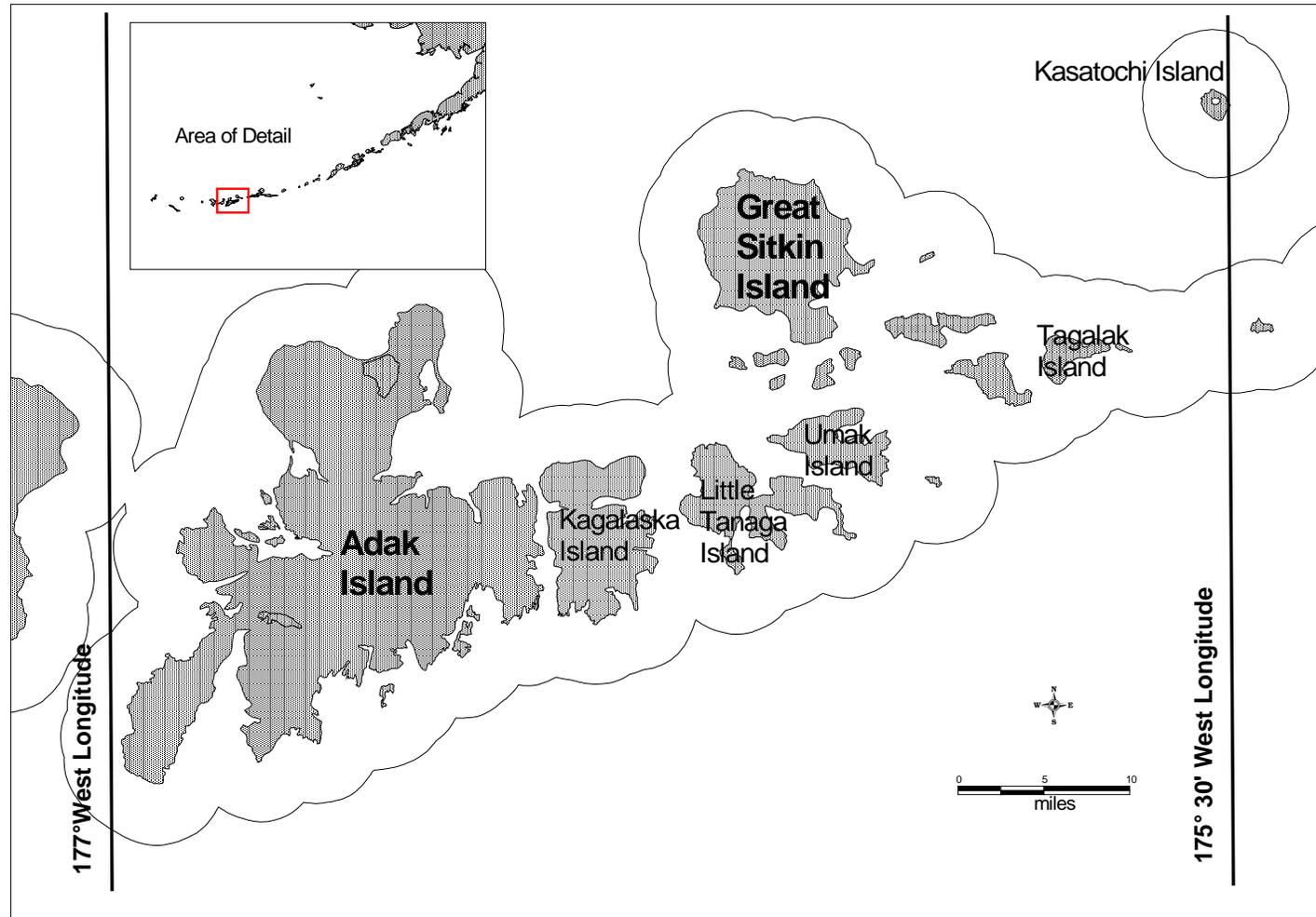


Figure 3.-Map of the Adak District illustrating the herring fishery boundaries.

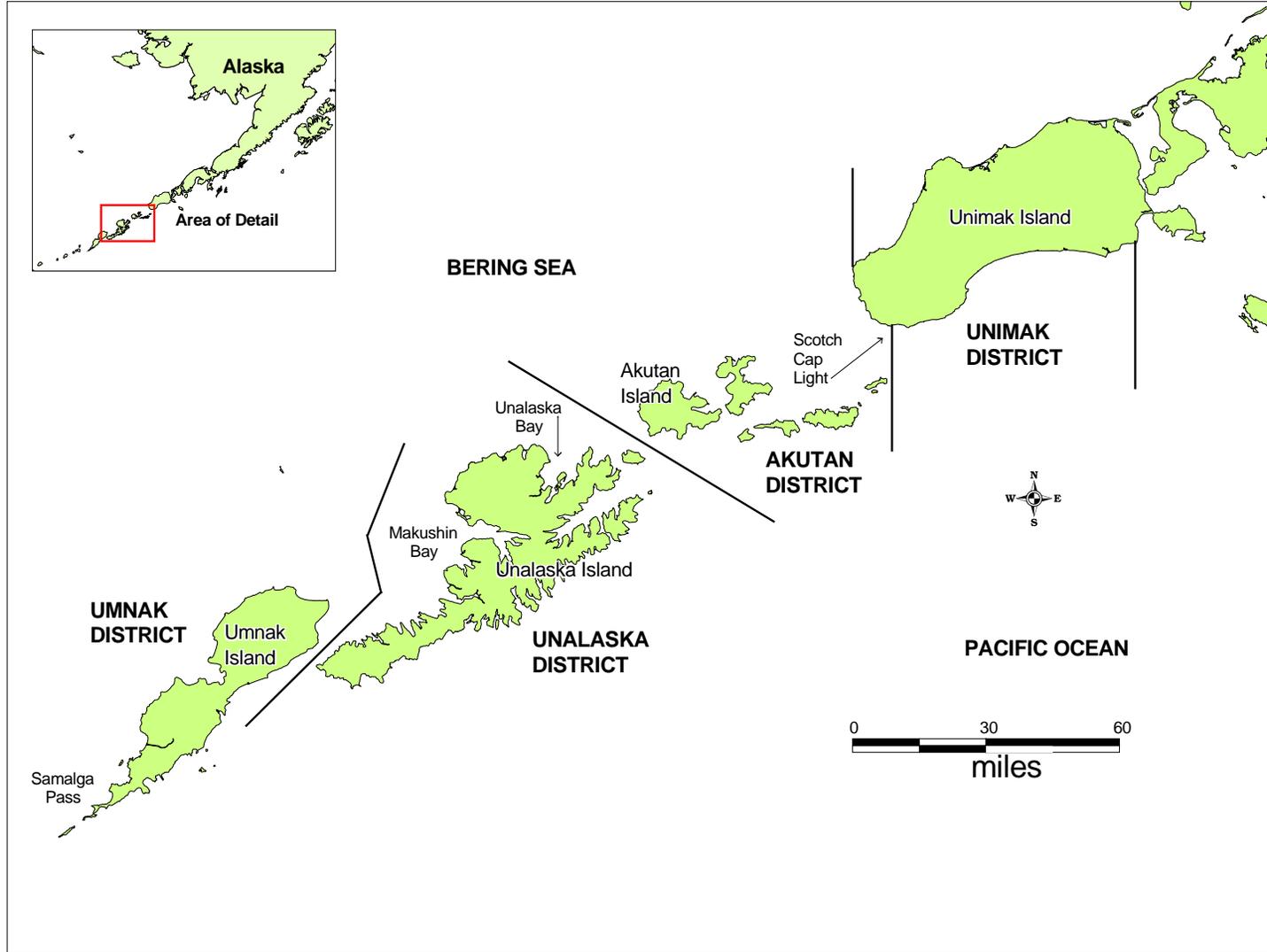


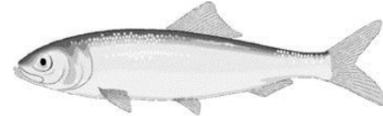
Figure 4.—Map of the eastern Aleutian Islands from Samalga Pass to Unimak Island illustrating the herring fishing district boundaries.

**APPENDIX A: ARCTIC-YUKON-KUSKOKWIM HERRING
OUTLOOK AND MANAGEMENT STRATEGY FOR 2011**

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



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2011 Arctic-Yukon-Kuskokwim Herring Outlook

The 2011 Arctic-Yukon-Kuskokwim herring forecast and harvest allocations, 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 harvest guideline for commercial fishing districts in the northeastern Bering Sea, Alaska, 2011.

District	Threshold	2010 Observed Biomass (tons)	2011 Projected Biomass (tons)	Exploitation Rate (%)	2011 Harvest Guideline (tons)
Security Cove	1,200	13,440	13,119	20	2,624
Goodnews Bay	1,200	33,490 ^b	36,810	20	7,362
Cape Avinof	500	2,393 ^c	2,324	15	349
Nelson Island ^a	3,000	5,449 ^c	5,252	16	850
Nunivak Island	1,500	3,141 ^c	3,322	20	664
Cape Romanzof	1,500	4,852 ^c	5,538	20	1,108
Norton Sound	7,000	43,454 ^c	42,477	20	8,495
Port Clarence	-	-	-	-	165
Totals			108,843	20	21,617

^a Nelson Island commercial harvest is 20% of projected biomass minus 200 tons for subsistence

^b Biomass estimates from Goodnews Bay include Jacksmith Bay aerial survey estimates conducted on the same day.

^c 2009 projected biomass was used because recent biomass estimate was unavailable.

-continued-

2011 Arctic-Yukon-Kuskokwim Herring Forecast Summary

This news release is to inform fishermen of projected herring biomass and guideline harvest levels, and the strategies employed if commercial fishing does occur. At this time, it is anticipated that some level of commercial herring fishing may occur in the AYK Region in 2011. 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 2011 estimated spawning biomass for northeastern Bering Sea herring stocks (Security Cove to Norton Sound Districts) will be 112,695 tons. If the return is as anticipated the total allowable harvest could be 21,617 tons. A harvest of this magnitude in the AYK herring fishery would be one of the largest on record.

The 2011 AYK Region biomass projection was based on good aerial survey biomass estimates from Security Cove, Goodnews Bay, and Jacksmith Bay. Biomass estimates from previous years were used for Cape Avanof, Nunivak Island, Nelson Island, Cape Romanzof, and Norton Sound. In 2010 the Alaska Department of Fish and Game (department) collected herring samples from the test fishery at Goodnews Bay and Nelson Island in Kuskokwim Bay, and from the commercial fishery in Norton Sound. Samples were analyzed for age class composition, which suggested that the forecasted population will be comprised of herring ages 6-7 (47%), ages 8-9 (32%), ages 10+ (15%), and ages 4-5 (6%).

The actual biomass observed in 2011 may fall above or below the preseason projections based on variability in the quality of aerial biomass assessments and annual fluctuation of survival or recruitment rates. Recruitment events typically occur every eight to ten years, as suggested by the dominant age 5-6 herring and high biomass estimates in Security Cove, Goodnews Bay, and Jacksmith Bay during 2010. The expected low proportion of age 4-5 herring in 2011 may signal that the recruitment period will be complete.

The department will conduct aerial surveys as regularly as possible and monitor catch statistics inseason. Guideline harvest levels, therefore, may be adjusted according to inseason aerial assessments of herring biomass. If aerial surveys are not adequate because of poor weather and water clarity conditions, stock abundance will alternately be assessed using projected biomass, test catches, and spawn deposition observations. 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 would vary in each district depending on inseason biomass estimates, roe quality, spawning activity, weather conditions, fishing effort, and processor input.

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Security Cove District

The 2011 projected biomass for the Security Cove District is 13,119 tons and the minimum biomass threshold is 1,200 tons. A 20% exploitation rate would result in a harvest of 2,624 tons. The department will plan to verify herring biomass inseason to determine if the biomass is large enough to support this level of harvest. Herring ages 6-9 are expected to comprise 80% of the returning biomass (30%, 21%, 13%, and 10%, respectively). Age 10 and older herring are expected to comprise 15% of the biomass.

Goodnews Bay District

The 2011 projected biomass for the Goodnews Bay District is 36,810 tons and the minimum biomass threshold is 1,200 tons. A 20% exploitation rate would result in a harvest of 7,362 tons. This harvest guideline is the largest on record. The department will plan to verify herring biomass inseason to determine if the biomass is large enough to support this level of harvest. Herring ages 6-7 (53%) and ages 8-9 (22%) are expected to dominate the fishery with age 10 and older (15%) and ages 4-5 (6%) are expected to comprise the remaining biomass.

Cape Avinof District

The 2011 projected biomass for the Cape Avinof District is 2,393 tons and the minimum biomass threshold is 500 tons. The exploitation rate will be no greater than 15% because of the limited database for this area and to ensure the subsistence fishing priority, and would potentially result in a harvest of 349 tons. Herring ages 6-9 are expected to comprise 83% of the returning biomass. Age 10 and older herring are expected to comprise approximately 13% of the biomass.

Nelson Island District

The 2011 projected biomass for the Nelson Island District is 5,252 tons and the minimum biomass threshold is 3,000 tons. A 20% exploitation rate would result in a commercial harvest of 850 tons after 200 ton subsistence harvest is accounted for. Herring Ages 6-9 are expected to make up 84% of the returning population, contributing 17%, 26%, 23%, and 18% respectively. Herring age 10 and older, 13%, and ages 4-5 (4%) are expected to comprise the remaining biomass.

Nunivak Island District

The 2011 projected biomass for the Nunivak Island District is 3,322 tons and a minimum biomass threshold of 1,500 tons. A 20% exploitation rate would result in a harvest of 664 tons. Ages 6-9 are expected to comprise 83% of the returning biomass, 16%, 26%, 23%, and 18% respectively. Herring age 10 and older, 13%, and ages 4-5 (4%) are expected to comprise the remaining biomass.

Cape Romanzof District

The 2011 projected biomass for the Cape Romanzof District is expected to be 5,538 tons and the minimum biomass threshold is 1,500 tons. A 20% exploitation rate would result in a harvest of 1,108 tons. Since water turbidity in the Cape Romanzof area generally prevents aerial observations

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of herring, spawn deposition and test and commercial catch rates will be used to determine the timing and duration of commercial fishing periods. Herring ages 6-9 are expected to comprise 83% of the returning biomass, 16%, 26%, 23% and 18%, respectively. Herring age 10 and older, 13%, and ages 4-5 (4%) are expected to comprise the remaining biomass.

Norton Sound District

The 2011 projected biomass for the Norton Sound District is 42,477 tons and a minimum biomass threshold of 7,000 tons. A 20% exploitation rate would result in a guideline harvest of 8,495 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). This leaves 8,175 tons for sac roe harvest. The beach seine harvest is allocated 10% of the sac roe projected harvest, or 818 tons. The 2011 herring fishery will be opened by emergency order and the fishery will close by emergency order when up to 20% of the available herring biomass has been harvested. Varied harvest rates may be applied to individual subdistricts based on biomass distribution, roe quality, weather, and sea ice conditions. Herring ages 6-9 are expected to comprise 83% of the returning biomass, 16%, 26%, 23% and 18%, respectively. Herring age 10 and older, 13%, and ages 4-5 (4%) are expected to comprise the remaining biomass.

Port Clarence District

Generally, 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 guideline harvest of 165 tons established by the Alaska Board of Fisheries in 1981 will determine the allowable harvest in 2011. 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: FORECASTED HARVEST ALLOCATION FOR
TOGIAK SAC ROE AND DUTCH HARBOR HERRING FOOD
AND BAIT FISHERIES, 2011**

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



*Denby S. Lloyd, Commissioner
John Hilsinger, Director*



<p>Contacts: Greg Buck & Fred West, Asst. Area Research Biologists Tim Baker, Area Research Biologist Phone: (907) 267-2355 Fax: (907) 267-2442</p>	<p>Anchorage Regional Office 333 Raspberry Road Anchorage, AK 99518 Date Issued: November 12, 2010 Time: 1:00 p.m.</p>
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2011 TOGIAK HERRING FORECAST

The 2011 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:

Harvest Allocation of the 2011 Forecasted Pacific Herring Run Biomass, Togiak District, Bristol Bay

	Biomass (Short Tons)	Harvest (Short Tons)
Forecasted Biomass for 2011	140,860	
Total Allowable Harvest (20% exploitation rate)		28,172
Togiak Spawn-on-Kelp Fishery (Fixed Allocation)		1,500
Remaining Allowable Harvest		26,672
Dutch Harbor Food/Bait Allocation (7.0% of the remaining allocation)		1,867
Remaining Allowable Harvest for Togiak District Sac Roe Fishery:		24,805
Purse Seine Allocation 70.0%		17,364
Gill Net Allocation 30.0%		7,442

2011 TOGIK HERRING FORECAST SUMMARY

The Pacific herring population is forecasted to be 140,860 tons in Togiak District during 2011 (Figure 1). Younger herring (ages 4–6), returning from the 2005 through 2007 year classes, are expected to comprise 38.2% of the biomass in 2011 (Figure 2). The remainder of the population biomass will be comprised of herring ages 7–8 (32.8%), ages 9–11 (20.2%) and ages 12+ (8.8%). The forecasted individual average weight of herring in the harvest biomass is 340 g.

A run biomass of 140,860 tons would be ~1% less than the recent 10-year average observed biomass of 142,319 tons. A biomass of this size would potentially produce an overall harvest of 28,172 tons in all fisheries and 24,805 tons in the Togiak sac roe fisheries (purse seine and gillnet). A harvest of this size in the Togiak sac roe fisheries would be ~17% more than the recent 10-year average harvest of 20,589 tons.

We use an age-structured analysis (ASA) model to forecast the Togiak herring population that incorporates catch and age composition data as well as total run biomass estimates. The ASA model integrates data from purse seine fishery age compositions (1978–2010), total run age compositions (1978–1995, 1997, 1999, 2001, and 2005–2010), and aerial survey biomass estimates (1981, 1983, 1992–1994, 1997, 1999–2001, and 2005–2010). The model estimates were generated by comparing them to observed data. Samples from non-selective gear (commercial purse seine) were used to assess age composition of the total run biomass. Commercial purse seine catch samples ranged from age 3 to age 17. Age-4 herring average weight for 2011 was predicted using the recent four-year average while simple linear regression models were used to forecast average weight of age-5 through age-15 herring based on their weight the previous year.

A temporal change in age composition from older to younger herring typically occurs during this fishery. However, the 2010 inshore spawning biomass consisted largely of younger herring age 5–8 with a few discrete pulses of older fish. Herring between age 5 and age 8 (inclusive) made up 51.4% of the total commercial purse seine harvest, 45.2% of the total harvest, 37.8% of the total run and 47.8% of the escapement by weight.

Large recruitments in this population are typical every eight to ten years. During the last few years, one of these recruitment events appears to have been underway. However, the contribution of age-4 fish to the total run dropped to less than 5% in 2010 from the 10–20% observed in 2008 and 2009. This may be a signal that this period of high recruitment is complete. However, it should be noted that measuring contributions of younger age classes to the spawning biomass is difficult as they typically do not show up until late in the fishery and the department no longer conducts post-fishery sampling as was typical during the 1980s.

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. Total run biomass for 2010 was estimated to be 135,214 tons. This was the sum of the peak biomass observed on the aerial survey conducted 18 May (98,290 tons) and postseason survey conducted 2 June (36,924 tons). The time between these surveys leads us to believe that a near complete turnover of herring on the spawning grounds had occurred between these surveys. Herring were first observed in the district on 10 May, when approximately 2,371 tons were documented, mostly around Hagemeister Island and between Anchor Point and Right Hand Point. The biomass steadily increased through 18 May before declining, with herring most heavily concentrated in Togiak Bay throughout the season (Figure 3).

There is always uncertainty in forecasting the Togiak District herring biomass and predicting the 2011 run is no different. Although the ASA model has had a tendency to under-forecast since its inception in 1993, it over-forecast the 2010 run (146,775 tons forecast and 135,214 tons observed). The mean percent error (MPE) has been -19.7% for years with reliable total run biomass estimates (Figure 1). The accuracy or mean absolute percent error (MAPE) of the ASA model is currently running at 19%. The forecast range for 2011 is from 114,067 tons to 167,653 tons based on a MAPE of 20%. We consider this population to be healthy and sustainable.

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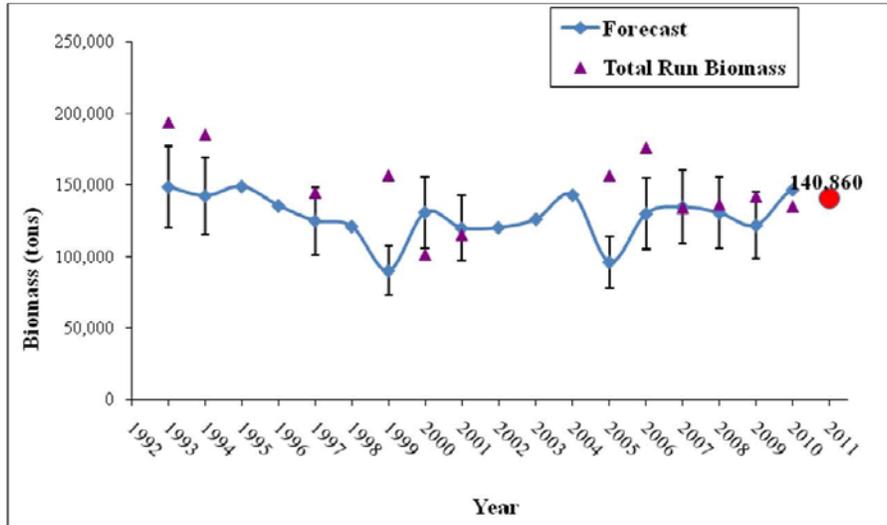


Figure 1.—Annual observed Togiak herring total run biomass estimates and preseason forecasts based on the ASA model. Mean absolute percent error (MAPE) of 25% around the forecast is also shown for years with a reliable total run biomass estimate.

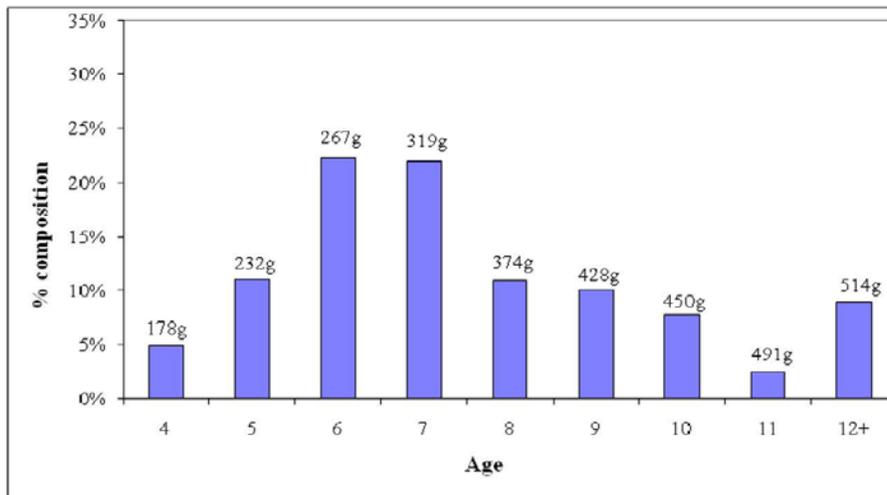


Figure 2.—Forecasted age composition by weight for the 2011 Togiak herring return. Forecasted average weight (grams) shown for each age category.

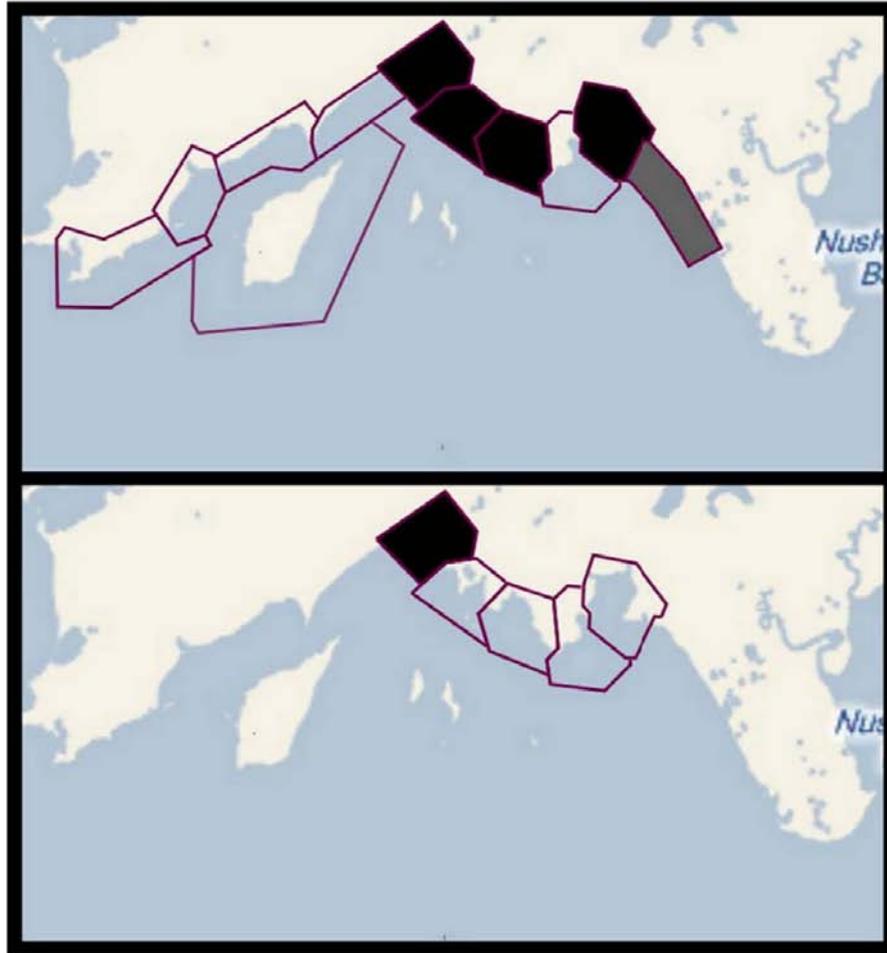


Figure 3.—Herring spawning distribution observed during aerial surveys conducted on 18 May 2010 (top) and 2 June 2010 (bottom). Aerial survey sections with measurable biomass are outlined while sections with biomass >5,000 tons are shaded grey and sections with biomass >10,000 tons are shaded black.