

Fishery Management Report No. 05-67

**2006 Report to The Alaska Board of Fisheries:
Southeast Alaska-Yakutat Herring Fisheries**

by

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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	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	e.g.	degrees of freedom	df
pound	lb	(for example)		expected value	<i>E</i>
quart	qt	Federal Information Code	FIC	greater than	>
yard	yd	id est (that is)	i.e.	greater than or equal to	≥
		latitude or longitude	lat. or long.	harvest per unit effort	HPUE
Time and temperature		monetary symbols (U.S.)	\$, ¢	less than	<
day	d	months (tables and figures): first three letters	Jan, ..., Dec	less than or equal to	≤
degrees Celsius	°C	registered trademark	®	logarithm (natural)	ln
degrees Fahrenheit	°F	trademark	™	logarithm (base 10)	log
degrees kelvin	K	United States (adjective)	U.S.	logarithm (specify base)	log ₂ , etc.
hour	h	United States of America (noun)	USA	minute (angular)	'
minute	min	U.S.C.	United States Code	not significant	NS
second	s	U.S. state	use two-letter abbreviations (e.g., AK, WA)	null hypothesis	H ₀
Physics and chemistry				percent	%
all atomic symbols				probability	P
alternating current	AC			probability of a type I error (rejection of the null hypothesis when true)	α
ampere	A			probability of a type II error (acceptance of the null hypothesis when false)	β
calorie	cal			second (angular)	"
direct current	DC			standard deviation	SD
hertz	Hz			standard error	SE
horsepower	hp			variance	
hydrogen ion activity (negative log of)	pH			population	Var
parts per million	ppm			sample	var
parts per thousand	ppt, ‰				
volts	V				
watts	W				

FISHERY MANAGEMENT REPORT NO. 05-67

**2006 REPORT TO THE ALASKA BOARD OF FISHERIES:
SOUTHEAST ALASKA-YAKUTAT HERRING FISHERIES**

by

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TABLE OF CONTENTS

	Page
LIST OF TABLES.....	ii
LIST OF FIGURES.....	ii
ABSTRACT	1
INTRODUCTION.....	1
History of the Herring Fishery.....	1
Management Strategy.....	2
2004–2005 SEASON SUMMARY	3
2004–2005 Winter Food and Bait Fishery.....	4
2004–2005 Test Fisheries.....	4
2004–2005 Sac Roe Fishery.....	5
2004–2005 Herring Pound Fisheries.....	6
Herring Spawn-on-Kelp Subsistence Fishery.....	6
HISTORICAL VALUE.....	7
2005–2006 SEASON OUTLOOK	7
TABLES AND FIGURES.....	9

LIST OF TABLES

Table	Page
1. Southeast Alaska Herring harvests in tons, 1900–1901 to 2004–2005.	10
2. Southeast Alaska region annual herring catch in tons by fishery type, 1960–1961 through 2004–2005 seasons.....	11
3. Herring spawning threshold levels for major herring aggregates in Southeast Alaska and Yakutat.	12
4. Southeast Alaska winter food and bait herring harvest in tons, by fishing area and season, 1982–1983 through 2004–2005.	13
5. Annual Southeast Alaska sac roe herring harvest by area, in tons, 1971 to 2005.	14
6. Fresh herring bait pound harvests in tons by area, 1983–2005.	15
7. Herring spawn-on-kelp (SOK) pound fishery harvest in tons of SOK product, 1990-2005.....	16
8. Herring spawn-on-kelp subsistence estimated harvests (lb), 1967 to 2005.	17
9. Southeast Alaska commercial herring fisheries exvessel value, gross earnings, 1977–2004, by calendar year.....	18

LIST OF FIGURES

Figure	Page
1. Southeast Alaska Region (Region 1) herring registration areas (Southeast Alaska Area A and Yakutat Area D) and management area boundaries.....	19
2. Generalized harvest strategy for Southeast Alaska herring showing allowable percent annual exploitation rate as related to estimated biomass of mature herring, expressed as a multiple of the threshold level.	20
3. Food and bait fishing areas and guideline harvest levels, 2004–2005 season.	21
4. Sac roe Fishing Areas and guideline harvest levels, 2005.....	22
5. Fresh bait pound fishing locations and 2005 guideline harvest levels.....	23
6. Major Southeast Alaska spawn-on-kelp subsistence fishery areas.....	24
7. Spawn-on-kelp pound fishing areas and 2005 guideline harvest levels in tons of herring.....	25

ABSTRACT

Herring in Southeast Alaska and Yakutat are harvested for commercial bait, commercial sac roe, commercial spawn-on-kelp, subsistence spawn-on-kelp, and personal use fisheries and Alaska Department of Fish and Game test fisheries. Prior to 1967 a reduction fishery accounted for most of the harvest with a historic high of 78,749 tons during the 1929–1930 season. A winter bait fishery has generally occurred every year since the turn of the century. The sac roe fisheries became the dominant fishery beginning in 1971. A wild spawn-on-kelp fishery occurred between 1963 and 1969 with a closed pound fishery authorized by the Board of Fisheries beginning in 1990. During the 2004–2005 season, the total regional commercial harvest of herring (including herring estimated for commercial spawn on kelp) was 18,410 tons. The sac roe harvest and winter bait fishery totaled 12,515 tons and 552.8 tons, respectively. The commercial harvest of spawn on kelp was 391.1 tons. Test fisheries accounted for approximately 391.1 tons of herring. No herring fishery occurred in Yakutat.

Key words: commercial herring harvest, 2004–2005 herring season, commercial bait, commercial sac roe, commercial spawn-on-kelp, subsistence, personal use fisheries, Southeast Alaska, and Yakutat.

INTRODUCTION

This report summarizes historical harvests and management actions for commercial herring fisheries in Region I through the 2004–2005 season with an outlook for the 2005–2006 season. The Southeast Alaska Region is a composite of two Registration Areas. Area A, the Southeast Alaska area, encompasses the waters south of Cape Fairweather and north of the International Boundary at Dixon Entrance. Area D, the Yakutat area, extends west from Cape Fairweather to Cape Suckling (Figure 1). Commercial winter bait, sac roe, spawn-on-kelp, and bait pound fisheries occur in only the Southeast Alaska area. Only a winter bait season is provided by regulation in the Yakutat area. Subsistence and personal use harvesting of herring and spawn on kelp occurs in both areas.

HISTORY OF THE HERRING FISHERY

Pacific herring spawning aggregates are found throughout Southeast Alaska. Spawning aggregates vary greatly in size and productivity. In general, herring that spawn on the outer-coastal areas are more productive than those that spawn in the inside waters. Southeast Alaska herring have been commercially harvested since a salting operation was initiated in the 1880s. From the 1890s to the mid-1960s the catch was used primarily to supply herring for reduction to meal and oil. The reduction fishery occurred on mixed aggregates of feeding herring during the summer months. The reduction fishery production peaked during the 1920s and 1930s when annual harvests commonly exceeded 50,000 tons (Table 1). The reduction industry was phased out in the mid 1960s due a decline in the abundance of herring and to the development of the Peruvian anchovy reduction industry.

Southeast Alaska herring have historically supplied most of the bait for Alaskan commercial longline and pot fisheries. This harvest occurs during the fall and winter months, a time when bait quality is best, on discrete wintering schools in major bays and inlets. All of the bait harvest is taken by purse seine gear. Relatively small quantities of herring have been harvested for fresh bait pounds. Existing regulations provide for a tray-pack bait fishery designed to produce a sport and commercial troll bait product; however, very little harvest has occurred for this purpose in recent years.

Currently, most of the annual herring harvest is taken in the spring sac roe fishery, which developed in the early 1970s. The sac roe fishery takes herring immediately prior to spawning when egg maturity is highest. A wild, spawn-on-kelp fishery occurred during the 1960s; however, this fishery was phased out in 1969. A new herring spawn-on-kelp pound fishery was

approved by the Alaska Board of Fisheries to begin in the spring of 1990 in Hoonah Sound. In 1992 the Alaska Board of Fisheries created a spawn-on-kelp fishery for the Craig/Klawock area and in 2003 created spawn-on-kelp fisheries in Ernest Sound and Tenakee Inlet.

Subsistence herring products have traditionally included spawn on kelp and herring spawn-on-hemlock branches. Commercial fishing regulations allow commercial fishers to harvest herring for their own bait.

The commercial utilization of Southeast Alaska herring resources has been historically controversial and that remains true today. The subsistence and personal use harvest levels are a minor portion of the total annual take, but are considered very important to the lifestyle and culture of local residents. Commercial harvesting is viewed by much of the public as having a great impact on the local availability of herring. Additionally, herring are a major forage fish and their abundance at fairly high levels is commonly viewed as necessary to ensure healthy populations of predatory fish such as salmon and halibut and associated marine life such as marine birds and several species of marine mammals.

MANAGEMENT STRATEGY

The following management plan for Southeast Alaska commercial herring fisheries was formalized at the January 1994 Board of Fisheries meeting.

5 AAC 27.190. HERRING MANAGEMENT PLAN FOR SOUTHEASTERN ALASKA AREA. For the management of herring fisheries in the Southeastern Alaska Area, the Alaska Department of Fish and Game (ADF&G):

- (1) Shall identify stocks of herring on a spawning area basis;
- (2) Shall establish minimum spawning biomass thresholds below which fishing will not be allowed;
- (3) Shall assess the abundance of mature herring for each stock before allowing fishing to occur;
- (4) Except as provided elsewhere, may allow a harvest of herring at an exploitation rate between 10 percent and 20 percent of the estimated spawning biomass when that biomass is above the minimum threshold level;
- (5) May identify and consider sources of mortality in setting harvest guidelines;
- (6) By emergency order, may modify fishing periods to minimize incidental mortalities during commercial fisheries.

Section 16.05.940.(16) defines a stock as "...a species, subspecies, geographic grouping or other category of fish manageable as a unit" and is here synonymous with spawning aggregate.

A "threshold level" is the minimum herring biomass needed to ensure sustained yield and maintain biological productivity. Threshold levels have been established for each of the winter bait, sac roe, and spawn-on-kelp pound spawning aggregate. Threshold levels are based on all available data and may be evaluated and revised over time. Current threshold levels vary from 1,000 to 20,000 tons for the major sac roe, winter bait, and spawn-on-kelp fishery spawning aggregate in various areas (Table 3).

Herring aggregates with a spawning biomass of less than 2,000 tons, of which there are many, are not considered for harvesting in either the Southeast Alaska winter bait or sac roe fisheries.

Under the current approach for setting seasonal harvest limits, herring aggregates of 2,000 tons of adult fish would allow for an annual harvest of 200 tons of herring. The region's current management capability prevents successful management of the winter bait or sac roe fisheries for harvests of less than 200 tons. The exceptions are the Hoonah Sound spawn-on-kelp fishery, and the Yakutat winter bait fishery (outside of Yakutat Bay, which is closed to commercial herring fishing), where the spawning threshold is 1,000 tons.

Annual harvest limits are based on a graduated scale that allows for higher harvest rates as the herring population increases relative to the threshold level (Figure 2). When the estimate of mature spawning aggregate is at the threshold level, a 10% harvest is allowed. The harvest rate increases 2% each time the estimated spawning biomass increases by an amount equal to the threshold level. The harvest rate reaches a maximum of 20% when the population is six times the threshold level. The approach allows for an annual harvest rate of between 10–20% of the mature herring if the established spawning threshold levels are satisfied. No commercial harvesting is allowed if the biomass estimate for the aggregate is less than the threshold.

Historically, there have been two direct observation methods for estimating herring biomass in Southeast Alaska: (1) post-spawning egg deposition dive surveys and (2) vessel hydroacoustical surveys. In cases where egg deposition surveys are used, the biomass estimate uses data only for mature herring that spawned that season. For those instances where the population estimate was derived acoustically, only those herring that would be expected to contribute to the spawn are included in the estimate. Acoustic surveys have not been used to estimate biomass since the 1993–1994 season. Beginning in 1994, ADF&G modified the primary method of forecasting herring abundance for major spawning aggregates in Southeast Alaska. Age Structured Analysis (ASA), which relies on a time series of herring population assessment data, was used to forecast herring biomass for those spawning aggregates with adequate historical data (Kah Shakes/Cat Island, Craig, Sitka Sound, Tenakee Inlet, and Seymour Canal). ASA uses estimates of recruitment, age, growth, maturation, natural mortality, weight-at-age, and spawning escapement to forecast herring abundance. Age and growth information is obtained by samples collected from test fishing, commercial harvests, mid-water trawling (department survey), and sampling on the spawning grounds by the department. Forecasts for herring other than the five ASA areas are currently computed using a biomass accounting method where the observed spawning biomass and age composition from one year is modified by estimates of growth and mortality to produce a subsequent year's biomass forecast.

In the future, ASA-based forecasts may be applied to other areas as the time series of data for those areas becomes sufficiently long. ADF&G plans to use this tool in additional areas where there is regular, annual collection of relevant age composition and abundance data. The ASA method is also used to forecast spawning biomass of herring in Southcentral Alaska, the Eastern Bering Sea, and British Columbia. Different forms of ASA models are also integral parts of the biomass assessment for most groundfish stocks in the Bering Sea and the Gulf of Alaska.

2004–2005 SEASON SUMMARY

The 2004–2005 season herring catch totaled approximately 18,410 tons of herring and herring equivalents (for spawn-on-kelp fisheries where mature herring are not harvested; Tables 1 and 2). The catch included 552.8 tons of winter bait herring, 12,515 tons of sac roe herring, approximately 440.1 tons of herring caught in test fisheries (consisting of 145.1 tons sac roe, 50 tons winter bait, and 19.6 tons of spawn-on-kelp) and 392.2 tons of spawn-on-kelp.

Six sac roe herring fishing areas are established by regulation. They include two exclusive purse seine areas (Sitka Sound and Lynn Canal) and two exclusive set gillnet areas (Kah Shakes/Cat Island and Seymour Canal). Regulations for the Hobart Bay/Port Houghton area provide for a herring gillnet fishery if the winter bait fishery does not harvest the entire guideline harvest level (Figure 4). West Behm Canal provides for a commercial sac roe fishery such that set gillnet and purse seine fisheries alternate years (5 AAC 27.197). Both gear types are under a limited entry system. Sac roe fisheries opened in Sitka Sound, Seymour Canal, and Hobart-Houghton areas in spring 2005. During the 1998–1999 season, in the Kah Shakes/Cat Island area, the total return of herring was much less than forecast and despite the fact that a guideline harvest level of 870 tons of herring was set for this area, the fishery did not open. The Kah Shakes/Cat Island area has since remained below threshold. Lynn Canal remained below threshold level and did not open in 2005. For the 2004–2005 season, in Seymour Canal 61 gillnet permits reported landings, 48 gillnet permits in Hobart/Houghton, and 51 purse seine permits in Sitka Sound reported landings.

Spawn-on-kelp fisheries were conducted in Craig, Tenakee Inlet, and Hoonah Sound during 2005. The winter bait fishery was opened in Craig and Tenakee Inlet. All other areas remained below required threshold levels and were not open to commercial harvest during the 2004–2005 season.

2004–2005 WINTER FOOD AND BAIT FISHERY

Winter herring fishing for food and bait is allowed by regulation in Districts and/or Sections 1–10, 11-B, 11-C, 12, 13-A, 13-B (only south of the latitude of Aspid Cape), 14, 15-A, and 16 in the Southeast Alaska area. In the Yakutat area, Yakutat Bay is closed to herring fishing. The fishing season is set by regulation from October 1 through February 28 in both areas. In the Southeast Alaska area, regulations specify that open fishing periods be established by emergency order. Although the existing regulations specify purse seines and set gillnets as legal allowable gear, only purse seine gear has been fished in recent years.

Three spawning aggregates were identified as having harvestable quantities of bait herring during the 2004–2005 winter season (Figure 3): the Craig/Klawock area with a guideline harvest level (GHL) of 1,330 tons, Hobart-Houghton with a GHL of 223 tons, and the Tenakee Inlet fishery with a GHL of 428 tons. All three fisheries were opened to the commercial harvest of herring December 6, 2004 and closed by regulation February 28, 2005. A total of 552.8 tons was harvested from the Craig/Klawock area during the season (Table 4). Though opened to commercial harvest, none occurred in Tenakee Inlet or the Hobart-Houghton area. The forecast of returning biomass was below threshold for Ernest Sound and was therefore not opened.

2004–2005 TEST FISHERIES

A total of six test fisheries were conducted in Southeast Alaska during the 2004–2005 season. These included two herring sac roe fisheries (Sitka Sound, Seymour Canal), three spawn-on-kelp fisheries, and one winter bait fishery (Sitka Sound). A total of 196 tons of spawn-on-kelp, 145 tons of herring for sac roe, and 50 tons of winter bait herring were harvested in test fisheries. The funds generated were used to obtain data on age structure, spawn timing, and abundance of herring spawning populations. Revenues were also used to defray costs for managing and assessing herring populations in other areas of Southeast Alaska.

2004–2005 SAC ROE FISHERY

A harvest of 12,515 tons of herring were taken in sac roe fisheries during the 2004–2005 season. This harvest resulted from a Sitka Sound purse-seine catch of 11,366 tons, a Hobart Bay/Port Houghton gillnet catch of 204 tons, and a Seymour Canal gillnet catch of 945 tons (Table 5). Abundance forecasts were below minimum population threshold levels in Lynn Canal, Kah Shakes/Cat Island, and West Behm Canal and no fisheries were allowed in these areas during the 2004–2005 season.

In Sitka, a 20% harvest rate was applied to the 2005 spawning biomass forecast of 55,962 tons for a GHF of 11,192 tons. The Sitka sac roe fishery went on two-hour notice effective March 20, 2005. Most of the GHF, 91%, was taken during four competitive openings on March 23, 25, 26, and 27, 2005. The remaining 9% was taken during a cooperative style fishery that occurred March 28 and 29, 2005. All 51 permit holders and eight processors participated in the 2005 fishery. Fishers harvested approximately 78.8 tons of herring in excess of the agreed amount for the cooperative fishery. The value of those fish was returned to the Alaska Department of Fish and Game test fish program.

The 2005 forecast of the mature spawning biomass for the Seymour Canal herring was 7,040 tons. The sliding scale harvest rate allowed a 12.7% harvest rate for this biomass and a GHF of 894 tons for the 2004–2005 season. The fishery went on 12-hour notice effective April 25, 2005. The fishery opened May 1 from 9:00 a.m. to 5:00 p.m. for a total of 9 hours of fishing time, including the one-hour grace period. Approximately 945 tons were taken by a total of 61 permit holders and three processors participated in the Seymour Canal fishery.

The Hobart-Houghton 2005 forecast for mature spawning biomass was 2,189 tons. The GHF was 223 tons based on a 10.2% harvest rate for the 2004–2005 season. The fishery was placed on two-hour notice effective 8:00 a.m., April 24, 2005. The fishery opened April 24, 2005 from 11:00 a.m. to 12:50 p.m. for a total of 2.8 hours of fishing time, including the one-hour grace period. A total of 204 tons of sac-ro herring were harvested by 48 permit holders and three processors participated in the Seymour Canal fishery.

The biomass for the West Behm Canal spawning aggregate was very small in the 1970s through the early 1990s. From approximately 1993 through 2003 the spawning biomass forecast increased from an estimated 283 tons in 1991 to a maximum forecast of 15,968 tons in 1999. The 2004 forecast was for 9,366 tons of mature spawning herring. In 2003 the threshold for West Behm Canal was increased from 2,000 tons to 6,000 tons. During the January 2000 Board of Fisheries meeting the herring committee recommended opposing, and the Board voted against, creating commercial herring fisheries in West Behm Canal. At its 2003 meeting in Sitka, the Alaska Board of Fisheries authorized a commercial herring sac roe fishery in Behm Canal. The fishery is to be managed (5 AAC 27.197.) such that in years when the threshold level is forecast to be met, fishing gear groups will alternate between set gillnet and purse seine. The West Behm Canal forecast for 2004 was 9,366 tons which would have allowed for a GHF of 940 tons for the gillnet sac roe fishery and 100 tons for the bait pound fishery. This was the first time a sac-ro herring fishery was to have been opened since the mid 1970s. Actual returns for West Behm Canal in 2004 were estimated at only 443 tons, much lower than forecast. Due to the much lower than expected return, there was no commercial fishery on West Behm Canal herring in 2004. The forecast for 2005 was a mature spawning biomass of 446 tons which is below the 6,000 ton

threshold necessary to conduct a commercial fishery. No commercial herring sac roe fisheries have occurred in West Behm Canal since the mid 1970s.

2004–2005 HERRING POUND FISHERIES

There are three types of herring impoundment or “pound” fisheries in Southeast Alaska: tray pack bait, fresh bait, and spawn on kelp. The tray pack pound fishery was created in 1979 when the Board of Fisheries allocated a harvest of up to 100 tons. Fresh bait pounds have historically been allowed by regulation under a permit system in five areas: Tee Harbor, Indian Cove, Scow Bay, Sitka Sound (Section 13-B), and Lisianski Inlet (Figure 5). The conduct and management of the fresh bait and tray pack pound fisheries are essentially the same in that herring are impounded in net pens for a period of time to be sold as bait and both require a commissioner’s permit. During the 2003 Board of Fisheries meeting the two were combined under one management plan, 5 AAC 27.180. and 5 AAC 27.160.(b). In recent years there has been relatively little participation in either of the fresh bait pound fisheries and data is confidential for the 2004–2005 season (Table 6).

There are four spawn-on-kelp pound fisheries in Southeast Alaska: Craig/Klawock and Ernest Sound in Southern Southeast, and Hoonah Sound and Tenakee Inlet in Northern Southeast (Figure 7). The spawn-on-kelp fishery for the Craig/Klawock area was initiated in the spring of 1992. The harvest limit of herring is shared with the bait fishery with 40% of the total guideline harvest allocated to the spawn-on-kelp fishery and 60% allocated to the bait fishery. The 40:60% allocation split was new as of the 1997–1998 season due to Board of Fisheries action (at the January 1997 meeting) which changed the previous allocation of 15% for spawn-on-kelp and 85% for bait. For the 2004–2005 season, the original herring allocation of 887 tons was increased by 780 tons, the amount remaining on the bait fishery allocation, resulting in a total GHL of 1,667 tons. There were a total of 43 active pounds on the grounds during the 2004–2005 season with 78 permit holders landing 115.2 tons of spawn-on-kelp product (Table 7).

For the Hoonah Sound spawn-on-kelp fishery 2004–2005 season, the GHL was 728 tons of herring. There were 84 herring pounds on the fishing grounds from which 95 permit holders landed spawn-on-kelp product. A total of 183.3 tons of product was harvested during the fishery (Table 7).

During its meeting in January 2003, the Board of Fisheries created two new herring spawn-on-kelp fisheries in Southeast Alaska: District 7 (Ernest Sound) and Section 12-A (Tenakee Inlet). The Ernest Sound fishery is considered part of the Southern Southeast spawn-on-kelp limited entry fishery and Tenakee Inlet is considered part of the Northern Southeast spawn-on-kelp limited entry fishery. The Ernest Sound fishery has been opened once, in 2004, when forecast spawning biomass was above threshold. The Tenakee Inlet spawn-on-kelp fishery has been open each of the last three years. The Tenakee Inlet spawn-on-kelp fishery GHL for the 2004–05 season was 476 tons of herring. A total of 98 permit holders operated 46 pounds landing 93.7 tons of spawn-on-kelp product (Table 7).

HERRING SPAWN-ON-KELP SUBSISTENCE FISHERY

The harvest of "wild" herring spawn on kelp has occurred traditionally throughout the region. The Southeast Alaska fishery is regulated solely through the issuance of subsistence spawn-on-kelp permits at local ADF&G offices, while no permit is required for the Yakutat area. The permits specify times, areas, and amounts of spawn on kelp allowed. The annual possession limit for herring spawn-on-kelp is 32 pounds for an individual or 158 pounds for a household of two

or more persons. Additional permits for herring spawn-on-kelp above the annual possession limit is allowed, at the department's discretion.

Subsistence spawn-on-kelp harvests generally occur in March and April near Craig, Hydaburg, and Sitka where major herring spawning populations are found (Figure 6). *Macrocystis* kelp is the preferred species of kelp. In 2005, based on department permits, an estimated combined total of 13,320 pounds (Table 8) of spawn-on-kelp was harvested in these areas.

HISTORICAL VALUE

Exvessel value data was obtained from the Commercial Fisheries Entry Commission's (CFEC) web site at <http://www.cfec.state.ak.us/bit/mnuherr.htm> for 1977 through 2004. Data for 2005 is not expected to be available until late 2006 and 2004 data is preliminary. Data downloaded Sept. 28, 2005 from CFEC at <http://www.CFEC.state.ak.us/bit/mnuherr.htm>. Data is not inflation adjusted. Questions, definitions, and additional information concerning exvessel value may be directed to the above web site and CFEC, and is reproduced here for convenience (Table 9). CFEC data is collected and recorded on an annual basis. Consequently, winter bait fisheries values do not reflect the seasonal but the annual values of a fishery.

From 1990 through 2004, commercial exvessel values have ranged from a low of \$1,971,960 in 1991 to a high of \$17,342,622 in 1996. During this period approximately 50–75% of the total value occurs in the seine sac roe fishery.

2005–2006 SEASON OUTLOOK

Forecasts were not yet available for Seymour Canal, West Behm Canal, and Hoonah Sound by publication of this report. The Craig/Klawock herring forecast is above threshold with an estimated 2006 pre-fishery mature spawning biomass of 14,262 tons. This forecast exceeds the long-term average (1974–2005) of 10,319 tons but approximates the recent five-year average of 14,394 tons. The Craig/Klawock spawning stock is expected to consist primarily of age-6 fish (33%). Regulations specify 60% of the GHL be allocated to the winter bait fishery with any portion not taken by the winter bait fishery allocated to the Section 3-B herring spawn-on-kelp fishery (5 AAC 27.185). The Section 3-B bait fishery GHL is 1,173 tons.

The Hobart Bay/Port Houghton area, Ernest Sound, and Tenakee Inlet spawning stocks are forecast to be below threshold for the 2005–2006 season and no commercial herring harvests are scheduled for these areas. The Lynn Canal spawning stock remains below threshold; no commercial harvest has occurred in Lynn Canal since the 1981–1982 season. Similarly, relatively little to no spawning has occurred in recent years in the Kah Shakes/Cat Island area. Average miles of spawn for the Kah Shakes/Cat Island area from 1974 through 1998 (latest year a commercial harvest occurred) was approximately 11 nautical miles; average spawn from 1999 through 2005 has been approximately three nautical miles with no spawn observed for three of those seven years.

The 2006 preliminary forecast for Sitka Sound is 50,333 tons with a preliminary GHL of 10,067 tons. The Sitka spawning aggregate is expected to consist primarily of age-7 (30%) and age-8+(44%) fish. Samples will be collected from the scheduled winter bait test fishery in Sitka Sound to update the forecast.

TABLES AND FIGURES

Table 1.—Southeast Alaska Herring harvests in tons, 1900–1901 to 2004–2005.^{a, b}

Season ^c	Total Catch	Season	Total Catch	Season	Total Catch
1900–01	1,194	1935–36	58,155	1970–71	5,015
1901–02	1,250	1936–37	36,713	1971–72	3,867
1902–03	812	1937–38	50,334	1972–73	6,307
1903–04	1,494	1938–39	22,356	1973–74	7,837
1904–05	1,521	1939–40	20,028	1974–75	7,985
1905–06	1,309	1940–41	3,137	1975–76	7,942
1906–07	1,005	1941–42	6,230	1976–77	8,640
1907–08	1,382	1942–43	3,691	1977–78	6,071
1908–09	1,711	1943–44	6,235	1978–79	6,532
1909–10	1,075	1944–45	16,801	1979–80	9,217
1910–11	6,867	1945–46	24,126	1980–81	8,393
1911–12	12,057	1946–47	37,564	1981–82	8,723
1912–13	16,067	1947–48	41,829	1982–83	9,764
1913–14	13,496	1948–49	16,125	1983–84	9,076
1914–15	8,318	1949–50	14,279	1984–85	11,079
1915–16	6,964	1950–51	13,411	1985–86	9,792
1916–17	11,194	1951–52	10,652	1986–87	8,369
1917–18	12,445	1952–53	16,020	1987–88	16,152
1918–19	17,825	1953–54	12,435	1988–89	16,191
1919–20	10,962	1954–55	6,446	1989–90	8,194
1920–21	16,452	1955–56	11,368	1990–91	6,034
1921–22	6,012	1956–57	22,819	1991–92	9,975
1922–23	16,950	1957–58	24,745	1992–93	12,253
1923–24	21,240	1958–59	38,797	1993–94	7,514
1924–25	29,395	1959–60	49,866	1994–95	5,104
1925–26	57,782	1960–61	38,906	1995–96	9,854
1926–27	73,843	1961–62	24,709	1996–97	14,729
1927–28	45,310	1962–63	16,959	1997–98	10,590
1928–29	53,007	1963–64	15,703	1998–99	12,903
1929–30	78,749	1964–65	23,553	99–2000	6,451
1930–31	70,855	1965–66	12,390	2000–01	14,706
1931–32	44,857	1966–67	5,670	2001–02	13,671
1932–33	49,786	1967–68	3,214	2002–03	11,950
1933–34	61,588	1968–69	1,852	2003–04	17,015
1934–35	66,842	1969–70	2,644	2004–05	18,410

^a Harvests include the fresh bait pound harvest and test fishery harvests.

^b Includes spawn-on-kelp harvests converted to herring equivalents at 12.5 to 1 ratio.

^c Season includes total harvest from fall through spring. Example: October 1976–May 1977.

Table 2.—Southeast Alaska region annual herring catch in tons by fishery type, 1960–1961 through 2004–2005 seasons.

Year	Reduction	Winter Bait	Spawn on Kelp ^a	Sac Roe	Test Fishery ^b	Bait Pound	Total ^b
1960–61	36,790	2,116					38,906
1961–62	22,869	1,840					24,709
1962–63	13,765	3,172	22				16,959
1963–64	13,539	2,064	100				15,703
1964–65	21,397	1,957	199				23,553
1965–66	10,062	2,094	234				12,390
1966–67	2,918	2,422	330				5,670
1967–68		3,025	189				3,214
1968–69		1,816	36				1,852
1969–70		2,644					2,644
1970–71		3,324		1,691			5,015
1971–72		2,045		1,822			3,867
1972–73		3,954		2,353			6,307
1973–74		5,856		1,981			7,837
1974–75		5,910		2,075			7,985
1975–76		5,688		2,254			7,942
1976–77		6,409		2,231			8,640
1977–78		4,042		2,029			6,071
1978–79		3,485		3,047			6,532
1979–80		2,717		6,500			9,217
1980–81		1,671		6,722			8,393
1981–82		1,530		7,193			8,723
1982–83		1,030		8,713		21	9,764
1983–84		620		8,411		45.2	9,076
1984–85		1,406		9,636		37	11,079
1985–86		2,442		7,319		31	9,792
1986–87		2,347		5,957		65	8,369
1987–88		4,016		11,246		17	15,279
1988–89		3,155		12,970		66	16,191
1989–90		3,843	12.0	4,163		38	8,194
1990–91		3,273	13.3	2,514		81	6,034
1991–92		2,719	48.8	6,614		32.3	9,975
1992–93		1,052	19.7	10,955		*	12,253
1993–94		879	49.2	5,884	136	0	7,514
1994–95		464	54.4	3,850	109.8	0	5,104
1995–96		484	37.3	8,749	154.5	0	9,854
1996–97		727	88.0	12,726	176	0	14,729
1997–98		840	108.4	8,233	162	0	10,590
1998–99		1,033	108.0	10,348	172	0	12,903
99–2000		926	36	4,966	109	*	6,451
2000–01		775	92.2	12,654	124	0	14,706
2001–02		355	171.9	10,854	306.4	6.8	13,671
2002–03		*	263.4	8,570	86.5	0.6	11,950
2003–04		*	447.4	11,296	231	7.3	17,015
2004–05		552.8	392.2	12,515	440.1	*	18,410

Note: * When number of permits is less than three, information is considered confidential.

^a A spawn-on-kelp pound fishery was implemented in the spring of 1990; prior harvests were from the “wild” spawn-on-kelp fishery. Harvest is tons of spawn-on-kelp product.

^b Includes spawn-on-kelp product converted to herring equivalents at 12.5 to 1 ratio.

Table 3.—Herring spawning threshold levels for major herring aggregates in Southeast Alaska and Yakutat.

Area	Threshold Level (tons)
Hoonah Sound	1,000
Yakutat Bay	1,000
Ernest Sound	2,500
Anita Bay	2,500
Port Camden	2,500
Hobart Bay/Port Houghton	2,000
Lisianski Inlet	2,500
Seymour Canal	3,000
Tenakee Inlet	3,000
Tongass Narrows and George and Carroll Inlets	3,500
Craig/Klawock	5,000
Kah Shakes and Cat Island	6,000
Lynn Canal	5,000
Sitka Sound	20,000
West Behm Canal	6,000
Other aggregates not included above	2,000

Table 4.—Southeast Alaska winter food and bait herring harvest in tons, by fishing area and season, 1982–1983 through 2004–2005.

Year	Craig / Klawock	Anita Bay	Earnest Sound	Hobart Bay/Houghton	Port Camden	Tenakee Inlet	Lisianski Inlet	Whale/ Necker Bay	Scow Bay	Slocum Arm	Total
1982-83	140	124	0	0	0	749	0	0	17	0	1,030
1983-84	0	0	0	0	42	619	0	0	0	0	661
1984-85	0	0	0	0	0	1,406	0	0	0	0	1,406
1985-86	302	0	0	0	0	2,040	0	0	0	0	2,342
1986-87	1,231	0	0	0	0	1,275	0	0	0	0	2,506
1987-88	2,014	0	0	0	0	1,577	280	0	0	257	4,128
1988-89	1,730	0	0	0	0	655	770	0	0	0	3,155
1989-90	3,221	0	0	0	0	595	27	0	0	0	3,843
1990-91	3,272	0	0	0	0	0	0	0	0	0	3,272
1991-92	2,295	0	0	0	0	0	353	0	0	0	2,648
1992-93	629	0	8	0	0	0	239	176	0	0	1,052
1993-94	636	0	0	140	0	0	0	103	0	0	879
1994-95	124	0	111	229	0	0	0	0	0	0	464
1995-96	34	0	220	230	0	0	0	0	0	0	264
1996-97	525	0	6	104.4	0	98	0	0	0	0	727
1997-98	254	0	0	0	0	586	0	0	0	0	840
1998-99	102	0	96	0	0	835	0	0	0	0	1,033
99-2000	*	0	0	432	0	494	0	0	0	0	926
2000-01	*	0	0	0	0	775	0	0	0	0	775
2001-02	*	0	0	0	0	355	0	0	0	0	355
2002-03	*	0	0	0	0	*	0	0	0	0	*
2003-04	*	0	*	0	0	*	0	0	0	0	*
2004-05	552.8	0	0	0	0	0	0	0	0	0	552.8

Note: * Data considered confidential with fewer than three permits.

Table 5.—Annual Southeast Alaska sac roe herring harvest by area, in tons, 1971 to 2005.

Year	Sitka Sound	Lynn Canal	Seymour Canal	Revillagigedo Channel	Other Areas	All Areas
1971	748	688	35	0	220 ^a	1,691
1972	602	524	495	0	201 ^b	1,822
1973	597	798	506	0	452 ^c	2,353
1974	681	396	904	0	0	1,981
1975	1,517	558	0	0	0	2,075
1976	800	630	195	426	203 ^d	2,254
1977	0	926	485	820	0	2,231
1978	175	954	729	171	0	2,029
1978	2,250	0	269	528	0	3,047
1980	4,385	975	0	1,140	0	6,500
1981	3,506	761	615	1,840	0	6,722
1982	4,363	551	0	2,279	0	7,193
1983	5,450	0	0	3,250	0	8,713
1984	5,830	0	518	2,182	0	8,411
1985	7,475	0	0	2,161	0	9,636
1986	5,443	0	339	1,537	0	7,319
1987	4,216	0	302	1,439	0	5,957
1988	9,575	0	586	1,087	0	11,246
1989	12,135	0	547	592	0	12,970
1990	3,804	0	359	0	0	4,163
1991	1,908	0	0	660	0	2,514
1992	5,368	0	0	1,246	0	6,614
1993	10,186	0	0	737	0	10,953
1994	4,758	0	382	749	0	5,884
1995	2,908	0	319	626	0	3,853
1996	8,144	0	0	605	0	8,749
1997	11,147	0	0	1,137	442 ^e	12,726
1998	6,705	0	586	616	351 ^e	8,233
1999	9,136	0	706	0	506 ^e	10,348
2000	4,813	0	389	0	0	4,966
2001	11,972	0	620	0	0	12,654
2002	9,789	0	1,066	0	0	10,854
2003	7,051	0	1,519	0	0	8,570
2004	10,492	0	804	0	0	11,296
2005	11,366	0	945	0	204 ^e	12,515

^a Washington Bay (76 tons), Lisianski Inlet (100 tons).

^b Lisianski Inlet.

^c Yakutat Bay (158 tons), Helm Bay (194 tons), and Lisianski Inlet (100 tons).

^d Helm Bay (26 tons), Chaik Bay (40 tons), Pybus Bay (22 tons), Gambier Bay (8 tons), and Kasaan Bay (107 tons).

^e Hobart Bay/Port Houghton commercial sac roe gillnet fishery harvest, not including test fishery harvest.

Table 6.—Fresh herring bait pound harvests in tons by area, 1983–2005.

Year	Scow Bay	Farragut Bay	Sitka Sound	Tee Harbor	Indian Cove	Lisianski Inlet	West Behm Canal	Total Harvest
1983	7	14	0 ^a	0	0	0		21
1984	0	10.2	35	0	0	0		45.2
1985	0	4.3	33	0	0	0		37.3
1986	0	5	26	0	0	0		31
1987	0	3	62	0	0	0		65
1988	0	0	17	0	0	0		17
1989	0	0	66	0	0	0 ^a		66
1990	0	0	38	0	0	0		38
1991	0	16	65	0	0	0		81
1992	0	15	17	0	0	0		32
1993	0	0	*	0	0	0		*
1994	0	0	*	0	0	0		*
1995	0	0	0	0	0	0		0
1996	0	0	0	0	0	0		0
1997	0	0	0	0	0	0		0
1998	0	0	0	0	0	0		0
1999	0	0	0	0	0	0		0
2000	0	0	*	0	0	0		*
2001	0	0	0	0	0	0		0
2002	0	0	6.8	0	0	0		6.8
2003	0	0	*	0	0	0	0.6	0.6
2004	0	0	7.3	0	0	0	0	7.3
2005	0	0	*	0	0	0	0	*

Note: * When number of permits are less than three, information is confidential.

^a Pounds were allowed by regulation in Sitka Sound in 1983 and in Lisianski Inlet in 1989.

Table 7.—Herring spawn-on-kelp (SOK) pound fishery harvest in tons of SOK product, 1990-2005.

Year	Craig / Klawock	Hoonah Sound	Ernest Sound	Tenakee Inlet	Total
1990		11.9			11.9
1991		13.2			13.2
1992	25.7	23.1			48.8
1993	5.7	14.0			19.7
1994	16.5	32.7			49.2
1995	25.4	29.0			54.4
1996	37.2	0.0			37.2
1997	23.0	65.0			88.0
1998	22.4	86.0			108.4
1999	36.0	71.6			107.6
2000	0.0 ^a	35.7			35.7
2001	27.2	66.2			93.4
2002	41.7	136.6			178.3
2003	69.2	146.6	No Quota	47.6	263.4
2004	49.3	243.3	56.1	98.7	447.4
2005	115.2	183.3	No Quota	93.7	392.2

^a Craig/Klawock 2000 pound GHLL was 280 tons of herring. Estimated Craig spawning biomass was 9,591 tons. No product was landed.

Table 8.—Herring spawn-on-kelp subsistence estimated harvests (lb), 1967 to 2005.

Year	CRAIG-KLAWOCK-HYDABURG			SITKA			KAH SHAKES			Other		
	Permits		Estimated Harvest *	Permits		Estimated Harvest *	Permits		Estimated Harvest *	Permits		Estimated Harvest *
Issued	Returned	Issued		Returned	Issued		Returned	Issued		Returned		
1967	201	130	3,368									
1968	130	95	2,260									
1969	80	61	2,858									
1966	145	86	5,200									
1970	103	60	3,213									
1971	81	66	2,643									
1972	102	44	4,250									
1973	31	9	1,209									
1974	159	39	3,087									
1975	92	34	1,640									
1976	54	12	1,728									
1977	34	7	352									
1978	109	83	3,521				11	8	122			
1979	102	81	1,268	21	10	137	16	6	0			
1980	309	189	3,721	19	13	145	33	24	75			
1981	157	87	6,148	26	19	192	6	5	12			
1982	187	81	5,485	36	25	886	30	18	342			
1983	302	189	5,945	69	48	1,991	33	24	103			
1984	261	159	4,972	50	40	1,281	14	6	116			
1985	233	168	9,553	71	45	3,963	19	10	0			
1986	241	142	5,565	90	82	3,929	5	2	0			
1987	263	158	15,038	97	59	8,827	5	4	0			
1988	191	124	6,354	127	77	6,146	6	6	68			
1989	221	117	11,699	70	53	962	10	9	0			
1990	245	172	10,158	71	63	4,022	7	0	0			
1991	274	142	12,627	75	61	5,925	4	4	60			
1992	407	304	16,677	118	83	7,484	8	7	75			
1993	290	167	5,592	61	47	4,108	8	3	0			
1994	293	161	5,376	81	62	2,778	9	6	0			
1995	201	80	3,446	58	37	2,748	3	1	0			
1996	261	164	11,443	97	70	6,057	4	3	0			
1997	226	166	8,247	87	60	4,837	0	0	0			
1998	213	88	5,670	60	42	3,079	0	0	0			
1999	185	120	6,420	58	39	3,315	1	1	40			
2000	116	77	820	47	46	2,790	0	0	0			
2001	118	50	7,054	52	46	1,177	0	0	0			
2002	111	35	7,164	47	41	4,258	1	0	0			
2003	144	100	9,698	40	33	5,555	2	1	0	2 ^b	1	0
2004	95	57	5,685	52	36	4,332	6	5	0	7 ^b	6	0
2005	140	90	9,770	41	30	3,550	3	3	0	1 ^b	1	0

^a The total harvest was extrapolated from harvests reported on returned permits to include an estimate of unreported harvests.

^b West Behm Canal

Table 9.—Southeast Alaska commercial herring fisheries exvessel value, gross earnings, 1977–2004, by calendar year.

Year	Winter Bait	Seine Sac Roe	Gillnet Sac Roe	SOK -Southern	SOK -Northern	Total
1977	\$506,510 (42%)	\$694,641 (58%)				\$1,201,151
1978		\$1,421,682 (100%)				\$1,421,682
1979		\$9,051,787 (100%)				\$9,051,787
1980		\$2,132,181 (87%)	\$312,422 (13%)			\$2,444,603
1981	\$342,855 (9%)	\$2,375,768 (60%)	\$1,246,133 (31%)			\$3,964,756
1982	\$557,947 (20%)	\$1,662,806 (59%)	\$602,012 (21%)			\$2,822,765
1983	\$166,352 (2%)	\$5,032,197 (62%)	\$2,948,779 (36%)			\$8,147,328
1984	\$127,544 (2%)	\$3,728,712 (60%)	\$2,327,431 (38%)			\$6,183,687
1985	\$320,575 (3%)	\$7,882,532 (69%)	\$3,186,307 (28%)			\$11,389,414
1986	\$547,902 (5%)	\$7,412,678 (70%)	\$2,636,465 (25%)			\$10,597,045
1987	\$586,407 (8%)	\$4,396,233 (58%)	\$2,546,524 (34%)			\$7,529,164
1988	\$1,009,959 (12%)	\$4,169,182 (50%)	\$3,107,909 (38%)			\$8,287,050
1989	\$899,715 (26%)	\$1,181,649 (34%)	\$1,379,359 (40%)			\$3,460,723
1990	\$1,029,862 (30%)	\$1,950,240 (57%)	\$260,076 (8%)		\$198,657 (6%)	\$3,438,835
1991	\$916,312 (46%)	\$205,878 (10%)	\$623,623 (32%)		\$226,147 (11%)	\$1,971,960
1992	\$719,984 (16%)	\$1,373,195 (31%)	\$1,777,225 (40%)		\$529,294 (12%)	\$4,399,698
1993	\$471,231 (8%)	\$3,483,769 (61%)	\$1,299,931 (23%)		\$416,850 (7%)	\$5,671,781
1994	\$125,030 (2%)	\$3,625,530 (49%)	\$1,767,883 (24%)		\$1,822,697 (25%)	\$7,341,140
1995	\$146,721 (2%)	\$3,932,868 (47%)	\$1,863,868 (22%)	\$998,955 (12%)	\$1,476,467 (18%)	\$8,418,879
1996	(0%)	\$14,349,558 (83%)	\$1,664,653 (10%)	\$1,328,411 (8%)	Confidential	\$17,342,622
1997	\$175,370 (2%)	\$4,726,487 (65%)	\$990,014 (14%)	\$281,793 (4%)	\$1,082,340 (15%)	\$7,256,004
1998	\$526,030 (17%)	\$1,646,221 (54%)	\$613,016 (20%)	\$68,573 (2%)	\$168,709 (6%)	\$3,022,549
1999	\$397,160 (5%)	\$4,906,058 (64%)	\$713,163 (9%)	\$374,187 (5%)	\$1,244,021 (16%)	\$7,634,589
2000	\$235,875 (6%)	\$2,667,088 (72%)	\$225,552 (6%)		\$596,238 (16%)	\$3,724,753
2001	\$131,131 (2%)	\$5,794,440 (77%)	\$254,236 (3%)	\$342,027 (5%)	\$1,016,586 (13%)	\$7,538,420
2002	\$110,481 (2%)	\$4,440,796 (61%)	\$614,297 (8%)	\$352,452 (5%)	\$1,733,333 (24%)	\$7,251,359
2003	Confidential	\$3,200,765 (45%)	\$783,629 (11%)	\$759,459 (11%)	\$2,301,343 (33%)	\$7,045,196
2004	Confidential	\$4,778,567 (53%)	\$386,124 (4%)	\$768,863 (9%)	\$3,098,202 (34%)	\$9,031,756
Recent 10-yr (1995–2004) Average						
	\$246,110	\$5,044,285	\$810,855	\$586,080	\$1,413,027	\$7,826,613
Recent 5-yr (2000–2004) Average						
	\$159,162	\$4,176,331	\$452,768	\$555,700	\$1,749,140	\$6,918,297

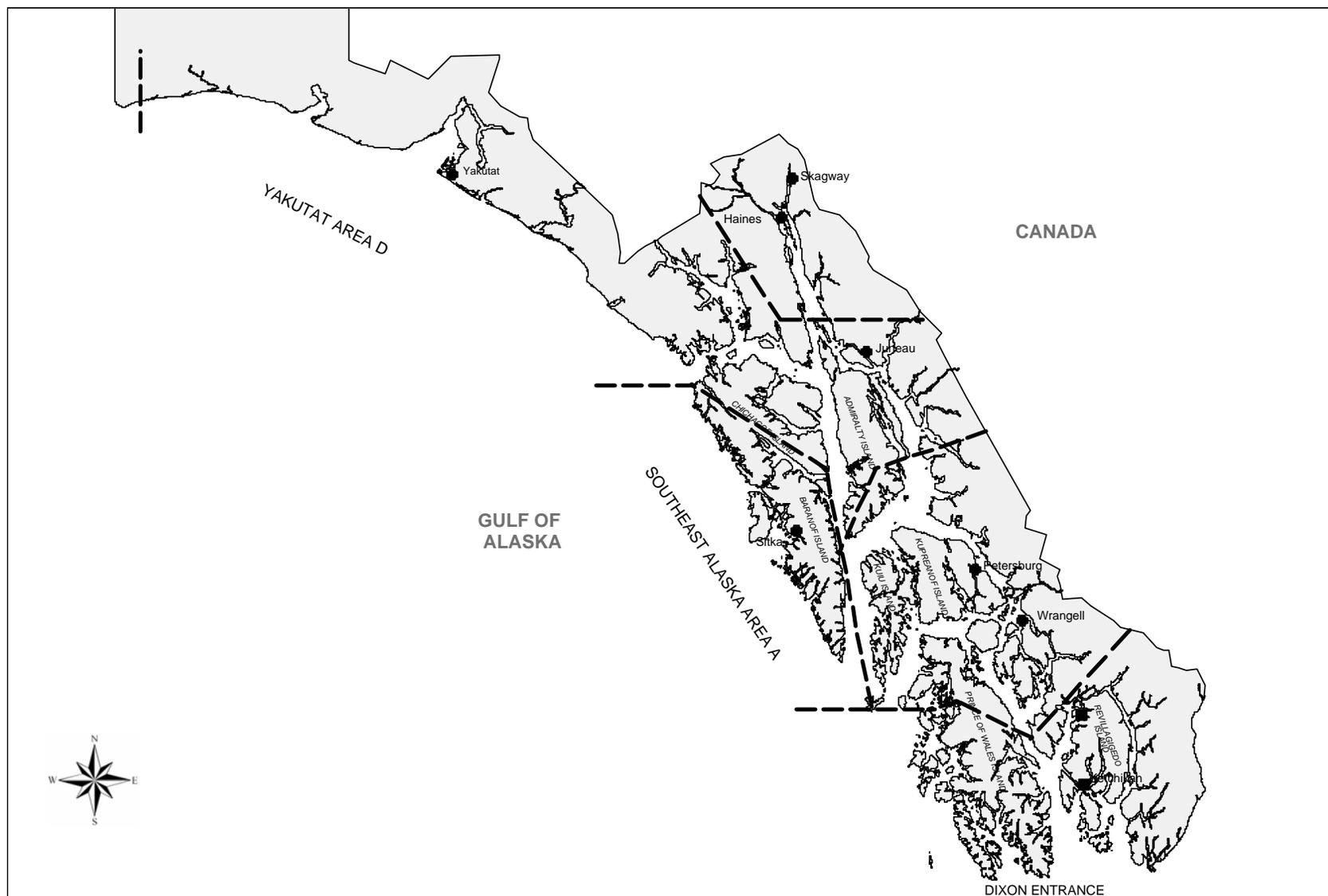


Figure 1.–Southeast Alaska Region (Region 1) herring registration areas (Southeast Alaska Area A and Yakutat Area D) and management area boundaries.

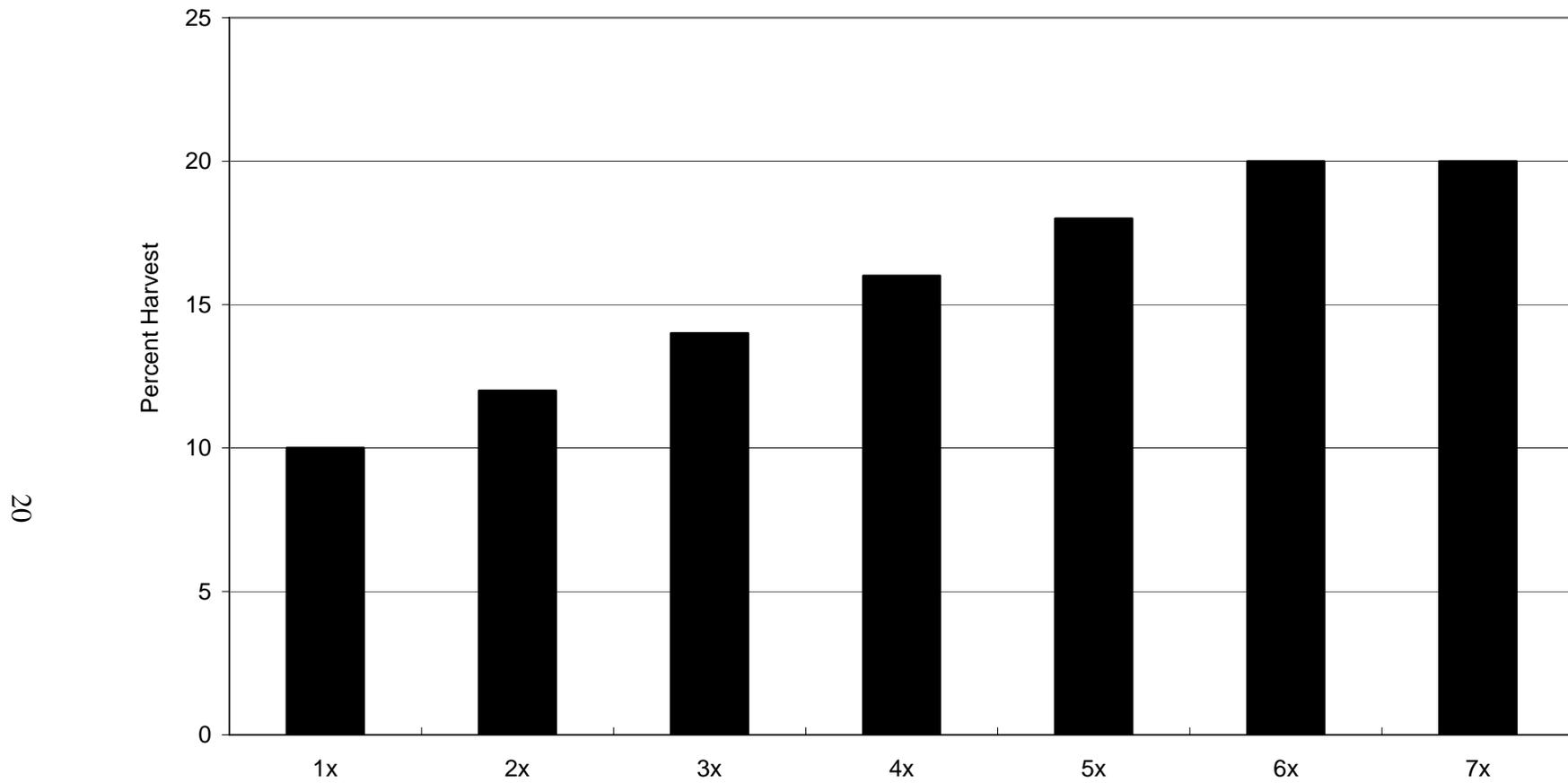


Figure 2.—Generalized harvest strategy for Southeast Alaska herring showing allowable percent annual exploitation rate as related to estimated biomass of mature herring, expressed as a multiple of the threshold level. Maximum harvest rate is 20%.

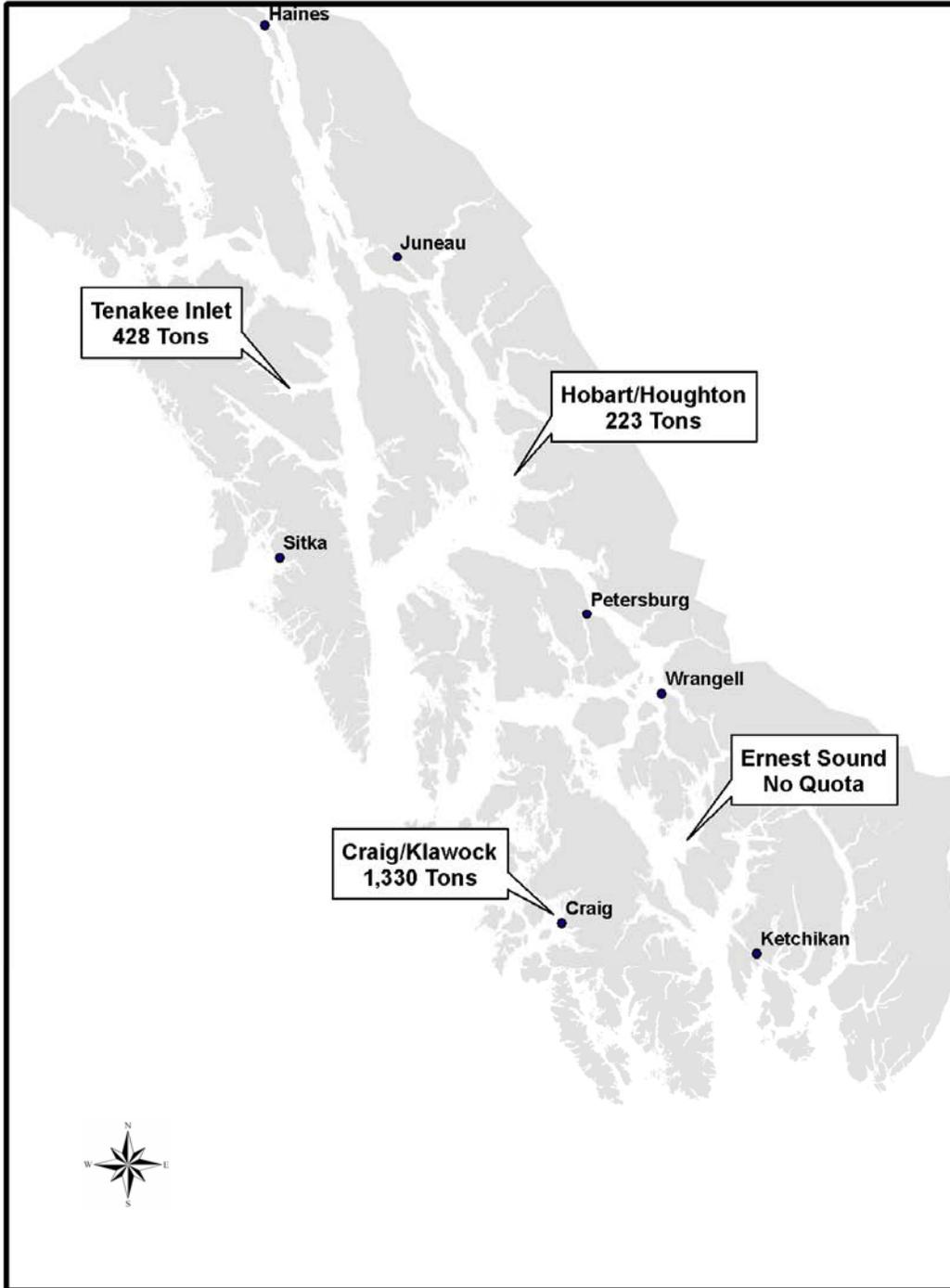


Figure 3.—Food and bait fishing areas and guideline harvest levels, 2004–2005 season.

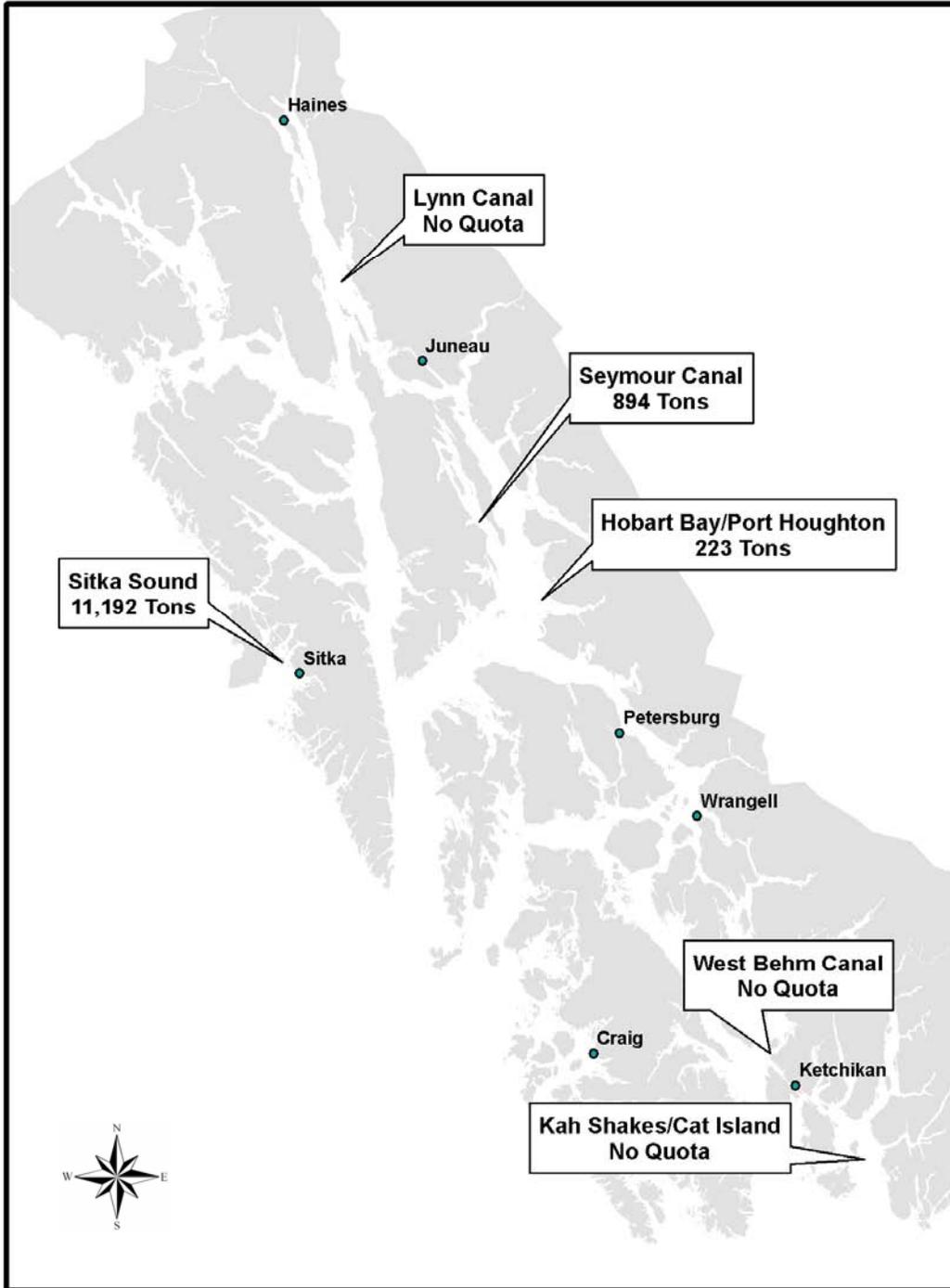


Figure 4.–Sac roe Fishing Areas and guideline harvest levels, 2005.

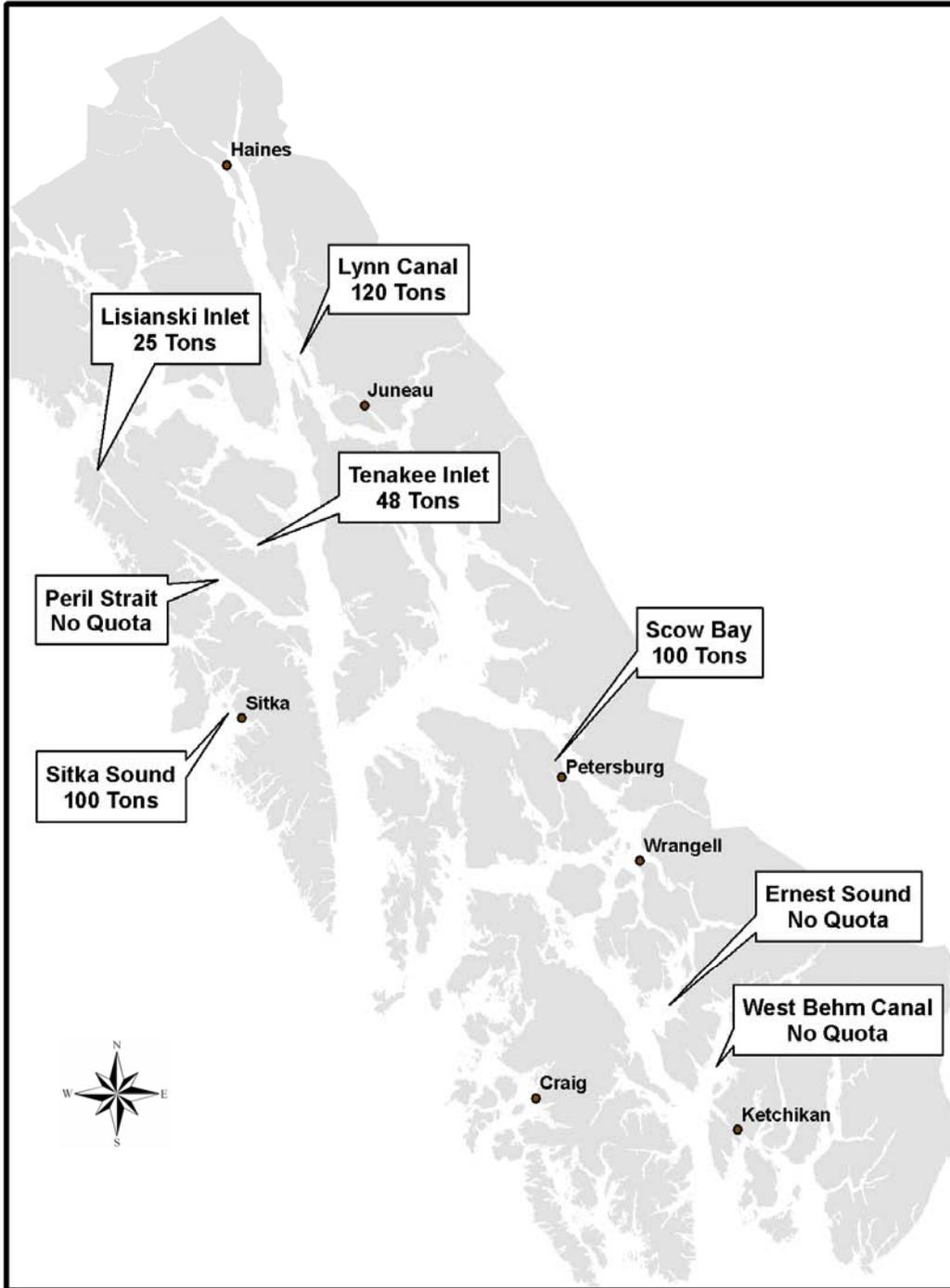


Figure 5.—Fresh bait pound fishing locations and 2005 guideline harvest levels.

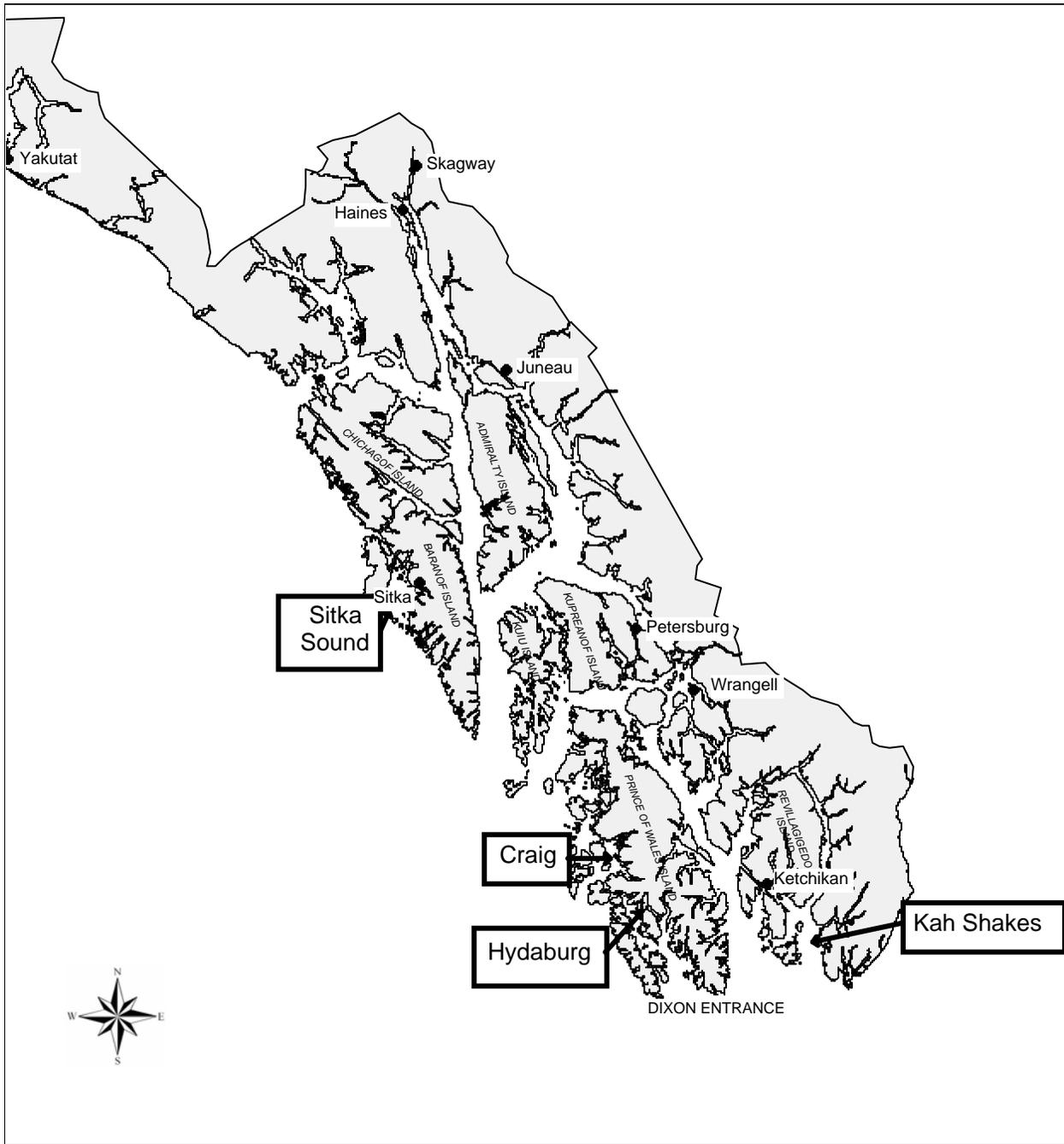


Figure 6.—Major Southeast Alaska spawn-on-kelp subsistence fishery areas.

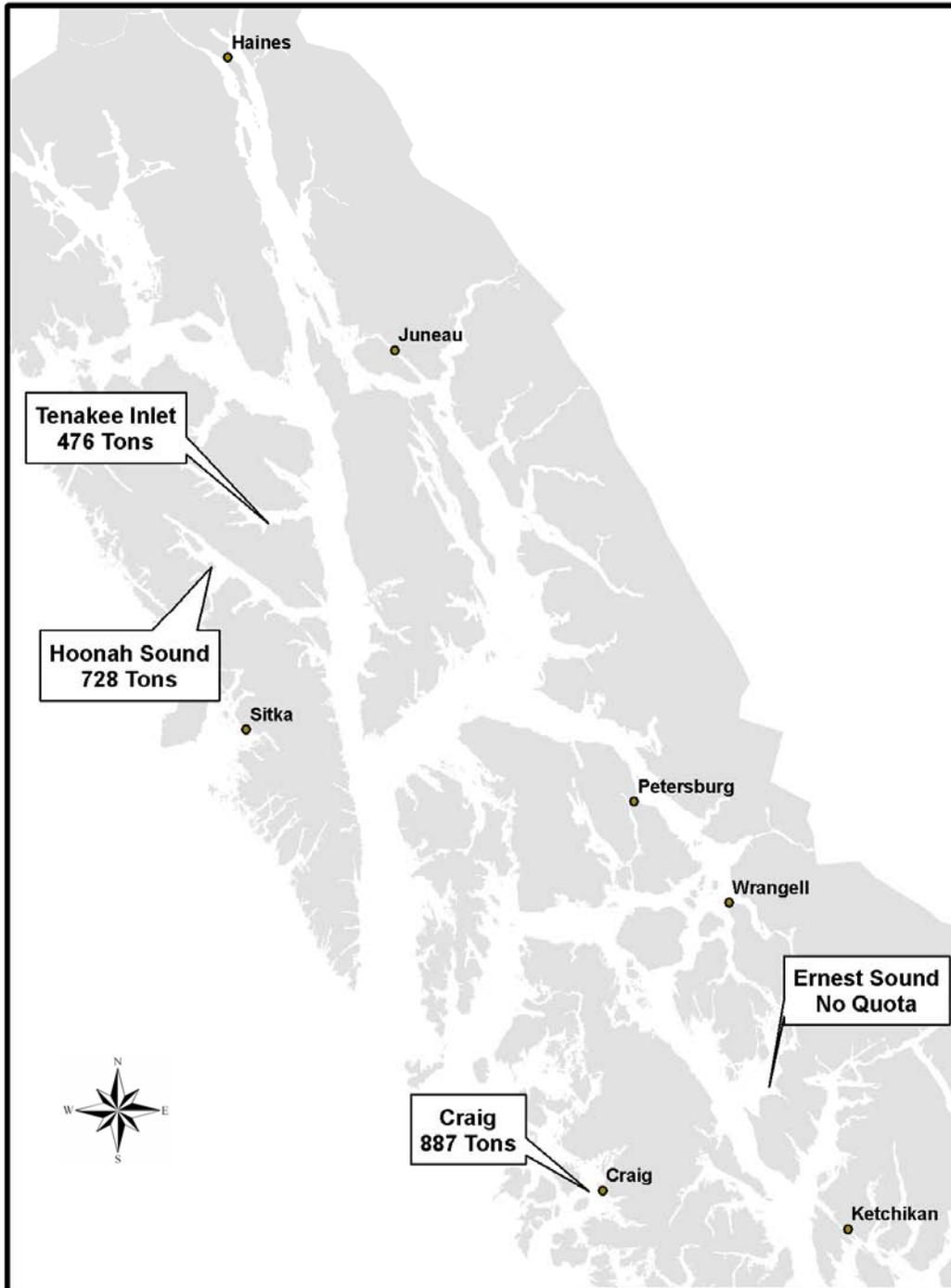


Figure 7.—Spawn-on-kelp pound fishing areas and 2005 guideline harvest levels in tons of herring.