

Regional Information Report No. 3A07-03

**Norton Sound/ Port Clarence Herring Gillnet and
Seine Commercial Fisheries Management Plan, 2007**

by

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and

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April 2007

Alaska Department of Fish and Game

Division of Commercial Fisheries



Symbols and Abbreviations

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

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COMMERCIAL FISHERIES MANAGEMENT PLAN, 2007**

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The Regional Information Report Series was established in 1987 and was redefined in 2006 to meet the Division of Commercial Fisheries regional need for publishing and archiving information such as project operational plans, area management plans, budgetary information, staff comments and opinions to Board of Fisheries proposals, interim or preliminary data and grant agency reports, special meeting or minor workshop results and other regional information not generally reported elsewhere. Reports in this series may contain raw data and preliminary results. Reports in this series receive varying degrees of regional, biometric and editorial review; information in this series may be subsequently finalized and published in a different department reporting series or in the formal literature. Please contact the author or the Division of Commercial Fisheries if in doubt of the level of review or preliminary nature of the data reported. Regional Information Reports are available through the Alaska State Library and on the Internet at: <http://www.sf.adfg.ak.us/statewide/divreprots/html/intersearch.cfm>.

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ABSTRACT

A management plan was developed to manage the Norton Sound herring fishery and provide information concerning the Port Clarence and Kotzebue Herring Districts. During 2006, the Norton Sound herring inseason biomass was estimated to be 24,610 tons, but poor survey conditions prevented a peak aerial survey from being conducted. Consequently, the 2005 aerial survey biomass estimate was used for the 2007 projection. The 2007 biomass is estimated to be 38,415 tons, allowing a harvest of 7,683 tons at a 20% exploitation rate. A total of 7,363 tons will be allowed for the sac roe harvest (6,627 tons by gillnets, 736 tons by beach seines) and any subsequent bait fisheries. Ages 10, 11 and 5 are expected to dominate the returning population, 33%, 17% and 28%, respectively. Age 9 and older herring are expected to comprise 61% of the biomass. Presently, there is no buyer in Norton Sound for the 2007 herring season. However, if market conditions change and there is a buyer, the department will open the fishery and allow the buyer to direct the fleet to locations where herring are of marketable quality. The buyer will tell fishers where and when to fish within the district and ADF&G will allow this management strategy to continue as long as a wastage problem does not occur. A wild *Fucus* spawn-on-kelp fishery for sac roe permit holders who have not sold sac roe product will also be allowed in the area west of Wood Point to Canal Point, including Stuart Island.

Key words: *Macrocystis*, spawn-on-kelp, *Fucus*, Cape Denbigh, Stuart Island, sac roe, herring, Norton Sound, Port Clarence, Kotzebue.

INTRODUCTION

This management plan was developed to inform fishers and processors of strategies that will be employed by the Alaska Department of Fish and Game (ADF&G) to manage the Norton Sound herring fishery and to provide information regarding Port Clarence and Kotzebue Herring Districts. Recent regulation changes are noted and briefly discussed. Also included in this management plan is a review of the status of the Norton Sound fishery and stocks, processor/buyer requirements, and a description of ADF&G activities.

Unalakleet will be the base of operations for ADF&G management, research, and enforcement activities within Norton Sound. A field camp will be established at Cape Denbigh. ADF&G activities will include aerial biomass assessment surveys, processor registration, catch monitoring, test fishing, and catch sampling of herring for age, sex, size, and maturity information.

Announcements regarding fishery openings and closures will be made on SSB 4125 and VHF 7 and will also be provided to AM radio stations (KICY 850 and KNOM 780). There is one buyer interested in obtaining 50 tons of bait and no sac roe buyers are expected so minimal updates of the fishery will be needed. If necessary, daily updates of the fishery will be made at noon. The Unalakleet office will be open daily after May 22 from approximately 8:00 a.m. to 5:00 p.m.

STATUS OF THE FISHERY

A large scale domestic herring fishery was not initiated in Norton Sound until 1979, although a smaller fishery had occurred sporadically within this area since the early 1900s. The historical catch information is presented in Table 1. During recent years, the majority of the harvest has occurred between Stuart Island and Cape Denbigh (Figures 1 and 2). Since 1981 biomass estimates have ranged from 19,403 tons to 57,974 tons; harvests in the sac roe fishery have ranged from 961 to 6,787 tons. No commercial sac roe fisheries occurred during 1992 because of persistent heavy sea ice conditions and in 2004 due to lack of buyers.

During recent decades, efficiency of the fishing fleet has increased dramatically. In response, the length of openings has gradually been decreased from 10 days during 1981 to 14 hours of gillnet

fishing in 1996. This increase in efficiency is primarily due to advances in gear technology, i.e., mechanical aids, larger boats, and more efficient nets. However, in recent years there has been a limited market for herring fishers and the lack of adequate buyer capacity has resulted in harvest limits placed on the fleet. In recent years with the limited markets, the department has opened the fishery continuously once the buyer was ready and allowed the buyer to direct the fleet when to fish based on herring quality and abundance.

STATUS OF STOCKS

The arrival of herring on the Norton Sound spawning grounds appears to be greatly influenced by climatological conditions, particularly the extent and distribution of the Bering Sea ice pack. Spawning herring generally appear near the coast soon after ice breakup, sometime in May or early June. The first commercial deliveries made in Norton Sound have ranged from May 18 to June 14, approximately 3 weeks after initiation of the Togiak herring fishery. Primary spawning areas have been observed from Stuart Island to Tolstoi Point. When sea ice has remained in the southern area into June, spawning has been more extensive along Cape Denbigh and several locations along the northern shore of Norton Sound between Bald Head and Topkok Bluffs.

During 2006, the inseason biomass was estimated to be 24,610 tons. However, poor weather conditions precluded department personnel from conducting a peak biomass aerial survey. Therefore, the 2005 aerial survey biomass estimate was used to formulate the 2007 projection. By adjusting for growth and survival, it is estimated that the 2007 biomass will be 38,415 tons, allowing a harvest of 7,683 tons at a 20% exploitation rate. A maximum of 320 tons of herring are to be reserved to allow for the harvest of not more than 90 tons of spawn on kelp. This leaves 7,363 tons for the sac roe harvest (6,627 tons by gillnets, 736 tons by beach seines) and any subsequent bait fisheries. The beach seine harvest equates to 10% of the allowable sac roe harvest. Ages 10, 11 and 5 are expected to dominate the returning population, 33%, 17% and 28%, respectively. Age 9 and older herring are expected to comprise 61% of the biomass (Table 2).

STOCK ASSESSMENT

Herring abundance will be estimated primarily by aerial biomass survey results. Surface area estimates will be made of each school and depending on water depth, a tonnage conversion factor will be assigned. Tonnage conversion factors are determined by capturing schools of herring with known surface areas and weighing the resulting catch. The tonnage conversion database is updated from research conducted in the Togiak and Norton Sound Districts. There are problems inherent with aerial surveys, and some of these are inclement weather, variable densities and depths of schools, fish school species identification, and multiple school counting. ADF&G will monitor test fish catches in order to assess the incidence of other schooling fish in the district.

If inclement weather and water conditions prohibit satisfactory aerial surveys, then stock abundance and condition will be assessed by using a combination of data from test and commercial catches including catch rates, percentage roe recovery, ratios of pre- to post-spawners and relative age class composition.

MANAGEMENT STRATEGIES

The Norton Sound District herring biomass will be harvested up to the 20% exploitation rate as market conditions allow. ADF&G personnel will be conducting aerial surveys and sampling age class compositions inseason to obtain current year biomass information. Since methods to reliably forecast herring returns are still being developed, and estimates of recruitment are not available, harvest levels will be adjusted during the season according to observed biomass and age structure. If there is a sac roe buyer and poor roe recovery becomes a problem, areas may be closed in order to direct fishing effort to concentrations of more marketable herring. Herring buyers are likely to limit the fishery to 300 gram or larger herring. If that is the case, fishery managers will target the older age classes, which typically arrive earliest. Any late season openings will be announced to exclude areas where 6 year old or younger herring might be concentrated in order to reduce mortality of these age classes.

Due to the nature of the herring gillnet fishery, significant wastage can occur from unmarketable fish. Gillnet fishers can minimize wastage by staying with their nets and fishing only when herring are carrying a marketable quality of roe. The volume of fish that are not sold (utilized for subsistence or discarded) will be estimated and included in the total harvest.

FISHING SEASON

The commercial herring fishery will open by emergency order. An ADF&G field crews at Cape Denbigh will monitor roe quality this year. Preseason roe quality in Subdistrict 3 will be monitored by a combination of industry and department test fishers. At this time however, it is anticipated that there will be no buyer in Norton Sound for the 2007 herring season. If market conditions change and there is a buyer, the department will open the fishery and allow the buyer to direct the fleet once they've determined the herring are of marketable quality. In this case, the buyer will tell fishers where and when to fish within the district. ADF&G will allow this to continue as long as a wastage problem does not occur. Otherwise, fishing period length will depend on (1) processing capacity, (2) backlog of harvested, but unprocessed fish, (3) biomass distribution, (4) biomass age composition, and (5) timeliness of catch reporting. The fishery will close when 20% of the herring biomass is judged to have been harvested, when wastage is determined to be excessive, when there is a lack of marketable herring, or when the buying capacity has been reached.

The Board of Fisheries has instituted several new Norton Sound herring fisheries with actions taken at meetings over the last decade. The management of the *Macrocystis* spawn-on-kelp fishery is addressed in a separate management plan. A wild *Fucus* spawn-on-kelp fishery for sac roe permit holders who have not sold sac roe product will be allowed. The *Fucus* harvest is limited to that area west of Wood Point to Canal Point, including Stuart Island. Permit holders planning to participate in the *Fucus* spawn-on-kelp harvest are required to register with the ADF&G office in Unalakleet.

Permit holders are allowed to harvest herring as bait. A sac roe permit card is required to harvest herring during May and June, but a food and bait permit is required from July on. Bait harvesters must register with either the Nome or Unalakleet ADF&G offices.

Because most gillnets are sized to harvest 9+ age herring and those age classes tend to arrive first, a relatively short window of opportunity for harvest is anticipated. Several subdistricts will probably be opened simultaneously. However, subdistricts may be closed independently of each other to

prevent overharvesting if herring biomass distribution and harvest rates make such action necessary. A difference in spawn timing could also cause southern subdistricts to close before northern subdistricts or vice versa.

PORT CLARENCE AND KOTZEBUE DISTRICTS

Until 1987, commercial herring catches from the Port Clarence and Kotzebue Districts never totaled more than 10 tons. During the 1987 season, 147 tons of herring were delivered from the Port Clarence District roughly 2 weeks after the closure of the Norton Sound fishery. Roe condition indicated that the fishery could have occurred as much as 5 days later and yielded a higher value product.

During the 1988 season, a total of 80 tons were harvested with an average of 8.2 % roe. The bulk of commercial fishery landings occurred on June 11. Gillnet fishers landed 23.6 tons with an average roe recovery of 8.9%; purse seiners landed 56.4 tons at 7.6% roe recovery. High catches of incidental species complicated fishing operations for both gear types. Incidental species captured included whitefish, starry flounder, saffron cod, and char. No sac roe fishery has occurred in Port Clarence since the 1988 season.

Biomass observations in Port Clarence are made difficult because of late breakup and heavy tannin coloring of the water. Spotter pilots and fishers have experienced difficulty in distinguishing herring from saffron cod and other species.

Kotzebue Sound herring stocks have never supported a commercial fishery. It is thought that a fishery would have a similar timing to the Port Clarence fishery and would probably occur in the vicinity of Deering.

TABLES AND FIGURES

Table 1.—Historical commercial herring fishery summary information, Norton Sound District, 1979–2006.

Year	Estimated	Catch	Beach	Wild	<i>Macrocystis</i>	Dollar			Peak	Fishery	
	Biomass (tons)	Gillnet (tons)	Seine (tons)	Kelp (tons)	Kelp (lbs.)	Number of Fishers	Value (millions)	Number of Buyers	Average Roe %	Catch Day	Duration
1979	7,700	1,292	0	13		67	0.6	7	7.0	25-May	19-May/14-June
1980	8,400	2,452	0	24		294	0.5	8	8.1	30-May	21-May/05-June
1981	25,100	4,371	0	47		332	1.5	13	8.8	24-May	18-May/28-May
1982	19,403	3,933	0	38		237	1.0	7	8.8	08-June	03-June/11-June
1983	28,100	4,541	41	29		272	1.4	9	8.6	23-May	18-May/28-May
1984	23,100	3,245	327	16	6,000	194	0.9	8	10.3	10-June	06-June/28-May
1985	20,000	3,379	169			277	1.4	11	9.9	20-June	13-June/21-June
1986	28,100	4,979	215			323	2.9	10	9.6	09-June	03-June/10-June
1987	32,370	3,759	323			564	2.6	11	8.6	07-June	07-June/08-June
1988	33,924	4,474	198			348	3.9	11	9.0	28-May	27-May/31-May
1989	25,981	4,351	390			357	2.3	9	9.2	28-May	27-May/30-May
1990	39,384	6,032	347			365	3.6	8	8.8	29-May	28-May/30-May
1991	42,854	5,150	522			279	2.4	8	9.3	25-May	23-May/25-May
1992 ^a	57,974	0	0				0.0			20-June ^b	
1993	46,549	4,291	742			264	1.5	5	9.9	25-May	24-May/05-June
1994	31,088	921	40			215	0.3	6	10.3	08-June	05-June/09-June
1995	37,779	6,033	614			215	4.2	6	10.4	24-May	23-May/30-May
1996	26,596	5,581	589			287	4.5	10	10.6	25-May	24-May/25-May
1997	47,748	3,459	513			220	0.6	9	9.9	22-May	20-May/24-May
1998	52,033	2,632	0	1	16,083	47	0.2	2	9.2	25-May	22-May/09-June
1999	34,314	2,755	0		7,482	122	0.6	4	10.5	17-June	13-June/22-June
2000	32,680	4,390	81		4,500	97	0.8	4	9.5	11-June	07-June/15-June
2001	26,305	2,245	0		4,400	76	0.3	3	12.3	12-June	12-June/16-June
2002	27,068	1,123	0		0	46	0.1	2	10.6	24-May	22-May/03-June
2003	32,918	1,608	0		1,750	32	0.2	2	10.5	18-May	16-May/25-May
2004 ^a	34,180	11	0	0	0	4	0.0	0		24-May ^b	
2005	43,013	1,951	0	0	0	56	0.3	1	11.4	04-June	03-June/10-June
2006	24,635 ^c	671 ^d	0	0.57	^e	41	0.1	1	10.2	9-Jun	08-June/11-June

^a No fishery due to late sea ice breakup in 1992 and no sac roe fishery in 2004 due to lack of a buyer.

^b Date of peak aerial survey biomass estimate, typically one or two days prior to peak catch.

^c Biomass estimate does not include surveys of subdistricts 4-7 due to poor weather conditions in 2006.

^d 25 tons out of total sac roe herring catch was sold off as bait to NSEDC in 2006.

^e No interest was expressed in the *Macrocystis* kelp fishery.

Table 2.–Norton Sound Herring Projections by Age Group, 2007.

Year Class	Age Class	Projection				
		Projected Weight (g)	Biomass (tons)	Number of Fish	Percent by Weight	Percent by Number
2005	2	55	0	0	0.0	0.0
2004	3	95	0	0	0.0	0.0
2003	4	142	155	987,782	0.4	0.8
2002	5	184	10,638	52,497,556	27.7	42.1
2001	6	249	2,504	9,135,266	6.5	7.3
2000	7	277	1,429	4,685,394	3.7	3.8
1999	8	310	326	955,674	0.8	0.8
1998	9	340	1,545	4,122,185	4.0	3.3
1997	10	369	12,632	31,060,821	32.9	24.9
1996	11	384	6,480	15,308,538	16.9	12.3
1995	12	399	1,126	2,560,152	2.9	2.1
1994	13	410	588	1,302,607	1.5	1.0
1993	14	417	527	1,147,051	1.4	0.9
1992	15	426	252	537,313	0.7	0.4
1991	16	448	212	428,307	0.6	0.3
1990	17	432	0	0	0.0	0.0
Totals & Means		279	38,415	124,728,646	100.0	100.0

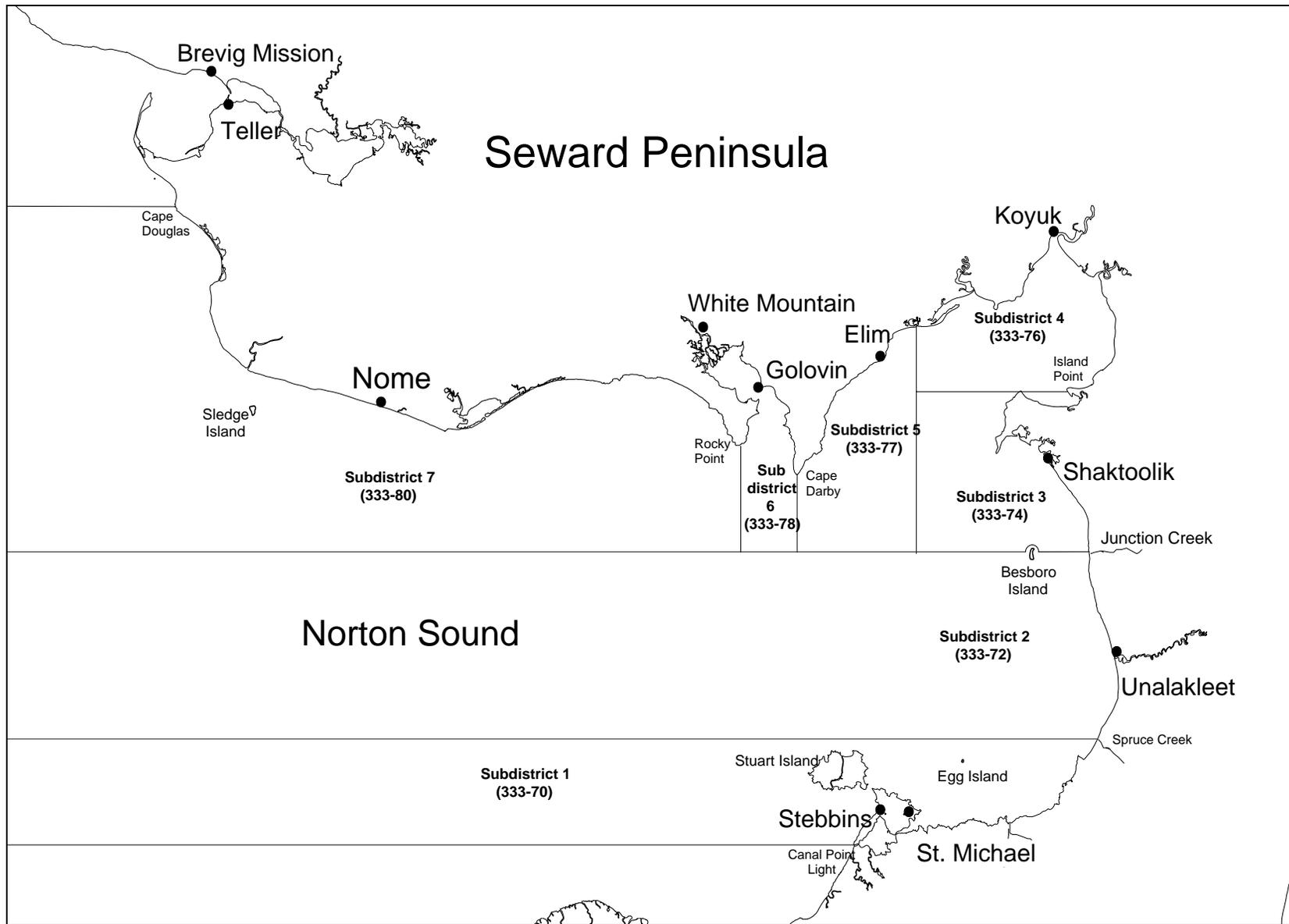


Figure 1.—Norton Sound herring districts and subdistricts.

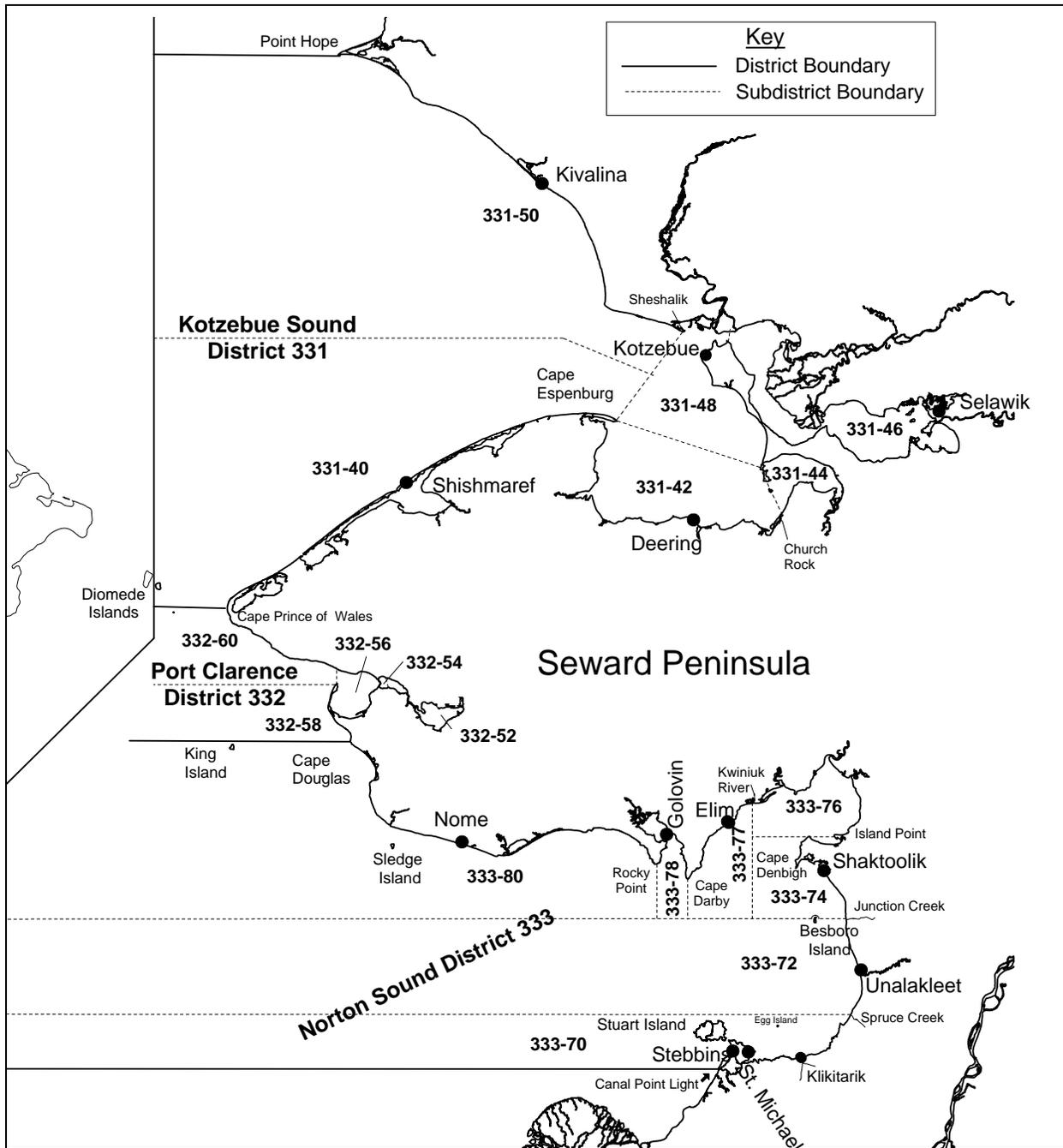


Figure 2.—Statistical areas of Norton Sound, Port Clarence and Kotzebue Sound commercial herring fishing districts.