

Unalakleet and St. Michael  
Herring Test Fish Project, 1989

By  
Fred Bue

Regional Information Report' No 3N89-22

Alaska Department of Fish and Game  
Division of Commercial Fisheries, AYK Region  
333 Raspberry Road  
Anchorage, Alaska 99518

October 1989

---

'The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate timely reporting of recently collected information, reports in this series undergo only limited internal review and may contain preliminary data; this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the author or the Division of Commercial fisheries.

TABLE OF CONTENTS

	Page
LIST OF TABLES.....	III
LIST OF FIGURES.....	IV
INTRODUCTION.....	1
SEASON SUMMARY.....	1
Test Fishing.....	1
Commercial Herring Fishery.....	1
Spawn and Substrate Evaluations.....	2
Climatological Observations.....	2
Camp Comments.....	3
Fuel Consumption.....	3
Personnel.....	3

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Variable mesh gill net catch composition and effort by set number, Unalakleet and St. Michael subdistricts, Norton Sound District, 1989.	4
2. Percent herring caught in test nets by mesh size, St. Michael sub-district, Norton Sound District, 1989.....	5
3. Percent composition, gonad maturity, and roe recovery of herring captured by test nets in St. Michael subdistrict, Norton Sound District, 1989.....	6
4. Percent age composition of herring sampled from commercial gill net catches in St. Michael subdistrict, Norton Sound District, 1989.....	7
5. Percent gonad maturity and roe recovery of herring sampled from commercial gill net catches, St. Michael subdistrict, Norton Sound District, 1989.....	8
6. Description of spawn and spawn substrate, St. Michael subdistrict, Norton Sound District, 1989.....	9
7. Climatological observations at test fish sites, Norton Sound District, 1989.....	11

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Norton Sound commercial herring district (333) and statistical boundaries.....	12
2. Location of variable mesh gill net test fish sets by set number, Unalakleet and St. Michael subdistricts, Norton Sound District, 1989.....	13
3. Location map of spawn and spawn substrate evaluation areas, St. Michael subdistrict, Norton Sound District, 1989.....	14

## INTRODUCTION

This report is presented as a season summary of the 1989 spring herring field project in the Unalakleet and St. Michael subdistricts of the Norton Sound commercial herring fishing district (Figure 1). Project objectives and procedures are outlined in the 1989 Bering Sea Herring Operational Plans for Norton Sound and the Bering Sea Herring A-W-L Sampling Manual.

On May 15 the Unalakleet field office was opened and gear preparation began. From an aerial survey and subsistence herring samples on May 24 it became apparent that herring were arriving on the grounds. State D.O.T. used loaders to clear a path through ice on the beach and launch the test fish skiffs.

Test fishing began at Unalakleet on May 25 and on May 26 the Klikitarik field camp was set up. Primary duties of the crew included: test fishing with variable mesh gill nets, test and commercial catch sampling, and spawn deposition surveys. Additional assistance was provided in the collection and sampling of herring to be used in a separate stock identification project which is not included in this report. The Klikitarik field camp was pulled on June 7.

## SEASON SUMMARY

### Test Fishing

Test fishing was done using a 100 foot floating variable mesh gill net. The net was made up of four 25 foot panels with mesh sizes of 1.5, 2.0, 2.5, and 3.0 inch stretched measure. A total of 1458 herring were captured during 10.1 hours of fishing time with a resultant overall CPUE of 144 (Table 1). Time fished during set number 3 was not recorded and therefore was not included in the total catch and total CPUE. The 2.5 inch mesh was the most productive panel accounting for 52% of the total herring catch (Table 2). Pacific herring made up 99% of the combined pelagic species catch. Test fish site locations are indicated by set number in Figure 2.

Two hundred ten herring were sampled for age, sex, and gonad maturity. Age was estimated in the field using the 1988 Norton Sound herring length-at-age table. Samples indicated that older fish arrived on the grounds first with younger herring increasing in proportion later in the season (Table 3). Scales were taken from all samples for post season age determination.

Female herring comprised 41% of the total fish sampled and were assigned a gonad index value to compare gonad maturity. Sixty seven percent of the females sampled had ripe ovaries, with sac roe recoveries ranging from 4.9% to 6.0% (Table 3).

### Commercial Herring Fishery

On May 27 the 1989 Norton Sound commercial herring fishing season opened by emergency order. Gill net fishermen harvested 4,351.5 st of herring in 10 hours of fishing time during three openings while beach seiners took 389.7 st during four openings totaling 14 hours of fishing time. The average sac roe recovery for all gear types was 9.2%. On May 30 the herring sac roe fishery was closed.

Commercial catch samples were collected directly from the fishermen during all three of the gill net openings in subdistrict 1. A total of 473 herring were examined from 16 different gill net catches. Ages 6, 7, 8, 9, and 10+ comprised approximately 3, 14, 21, 6, and 56%, respectively as estimated using length-at-age tables (Table 4). Forty six percent of these samples were females. Gonad maturities of 5% green, 47% index 5, 37% index 6 (ripe), and 11% spent were observed (Table 5). The estimated roe recovery for the samples was 7.8%.

### Spawn and Substrate Evaluations

Spawn and substrate surveys were conducted June 3 through June 6 in the St. Michael subdistrict. Nearly the entire shoreline from Tolstoi Point to Cape Stephens was examined (Figure 3). The survey crew slowly cruised near shore and spot checked almost all sites which either had spawn or Fucus (kelp). Observers noted the date, location, estimated lengths and widths of kelp beds or spawn, substrate type, number of egg layers, percent egg mortality, and any other pertinent information (Table 6).

This survey found that herring egg deposition and kelp beds were extensive throughout the St. Michael subdistrict. Eggs were present in over 80% of the kelp beds and occasionally on bare rock. As usual the thickest egg layers were found in Liebe's Cove and St. Michael Bay areas with averages as high as 20 egg layers near Channel Island. This year the section of coast between Shorty Cove and Black Point received moderate to heavy spawn while the north coast of St. Michael Island and Myoukchuk Point areas held light to moderate numbers of egg layers. Spawn near Tolstoi Point occurred on bare rock as thick sheets of eggs averaging between 3 and 6 layers.

Spawn deposits in the southwest areas were the most recent with spawning often taking place at the same time as the survey. The further north areas had more grit and algae within egg layers along with increased percentages of dead and desiccated eggs. Where spawn was heaviest on bare rock, large sheets seemed to be peeling off and drifting away. Few deposits had eyed eggs and mortality was less than 10% at the time of the survey. Low mortality was probably due to the small number of eggs laid high in the intertidal zone along with the overcast cool, damp weather.

Herring eggs were primarily deposited on kelp or on rock in conjunction with kelp in areas of intense spawning. Both sides of the Fucus blades seemed to be covered equally by eggs. Kelp appeared to be in good condition throughout the area. Buds were just beginning to form, only a few beds were red, and there was very little ice scouring. This survey noted more individual kelp beds than usual.

### Climatological Observations

Much of southern Norton Sound had been ice free since early April while extensive shorefast ice remained extending from Wood Point westward around Stuart Island and from Shaktoolik northward just prior to the fishery. The combination of ice and turbid water, due to wind in ice free areas, hindered aerial surveys and forced management to rely on test fishing and pre-season forecasts. By the time

of the fishery, subdistricts 1, 2, and 3 were predominately ice free, however the northern half of Norton Sound remained ice bound until well after the fishery had taken place.

Favorable ice conditions finally allowed the Klikitarik field camp to be reestablished this year. The only problem due to ice encountered by the crew was launching the skiffs from ice covered beaches at Unalakleet. Occasionally rough seas limited travel, but seas remained fair during most of the fishery. Climatological observations were made daily, usually at each test fish site, and are shown in Table 7.

#### Camp Comments

With poor aerial survey conditions this year management relied heavily on test fish information. Good communication between field camps and the Unalakleet office is essential, not to mention the entire fishing fleet. If nonfunctional SSB radios continue to be a problem, possibly marine VHF sets could be used in conjunction with power amps running off of portable generators. Another solution may be equipping the test fish skiffs with radios. Hand held air-to-ground radios work well but can only be relied on for occasional and limited use.

Transportation is often a problem in the spring. Marginal vehicles stored over winter cannot always be depended upon. The Unalakleet office could really use a new 4-wheeler especially during herring season. Another option would be to rent a truck locally but be aware that it would have to be reserved well ahead of time.

New variable mesh gill nets will need to be purchased soon. The current nets are still in acceptable condition, but have been used 4 seasons and are simply wearing out. Two new nets would be enough if the web matched the nets we are using now. Otherwise, 4 nets would be required to keep uniform efficiencies.

One final item needed to be brought to attention has to do with survival gear carried on board the skiffs, specifically signal flares and smoke bombs. These have been carried for a long time and ones tested didn't work this year. Fortunately they are not often used, but can be very important when needed.

#### Fuel Consumption

Approximately 3 gallons of blazo, 5 gallons of kerosene, 350 gallons of regular gas and 4 gallons of 2-cycle motor oil were used.

#### Personnel

Fred Bue - Crew Leader Biologist  
Jason Peterson - Fisheries Technician

Table 1. Variable mesh gill net catch composition and effort by set net number and area, Unalakleet and St. Michael subdistricts, Norton Sound District, 1989.

Date	Set No.	Time Set	Hours Fished	Water Temp (F)	Depth (ft)	Percent a/ Herring	CPUE Herring/Hr.	P.H.	S.C.	Catch Wf.	b/ S.F.	Scu.	Gr.	W.E.
5/25	1	1510	1.7	42	15	100	77	130						
5/25	2	1539	0.5	42	13	100	300	150						
5/25	3	-	-	-	-	100	-	211						
5/29	4	1520	0.2	38	10	100	130	26						
5/29	5	1545	0.3	38	12	100	837	251						
5/30	6	1015	0.4	39	7	86	15	6		1				
5/30	7	1100	0.3	39	11	100	0	0						
5/30	8	1145	1.0	39	13	100	13	13						
5/30	9	1250	0.3	39	10	100	0	0						
5/30	10	1335	0.3	40	6	0	0	0	1					1
5/30	11	1400	0.3	40	7	98	393	118	1	1	1	2		1
5/31	12	1030	2.5	41	7	100	73	183						
5/31	13	1045	0.6	41	10	100	10	6						
5/31	14	1125	0.3	41	11	100	120	36						
5/31	15	1230	0.3	41	12	100	527	158						
6/2	16	1325	1.1	45	8	99	346	381	2		1		2	
Totals c/			10.1			99	144	1669	2	2	3	1	4	2

a/ Percent herring composition of total pelagic catch (pelagic species include Pacific Herring, Saffron Cod, and Whitefish).

b/ Catch Code: PH-Pacific Herring; SC-Saffron Cod; SF-Starry Flounder; Scu-Sculpin; Gr-Greenling; WE-Wolf Eel.

c/ Total hours fished and total CPUE does not include Set 3.

Table 2. Percent herring caught in test nets by mesh size, St. Michael subdistrict, Norton Sound District, 1989.

Date	Location	Number Caught	Mesh size (inches)			
			1.5	2.0	2.5	3.0
5/29	St. Michaels	277	0	11	72	17
5/30	St. Michaels	131	0	23	60	17
6/2	St. Michaels	381	0	64	34	2
Totals		789	0	38	52	10

Table 3. Percent composition, gonad maturity, and roe recovery of herring captured by test nets in St. Michael subdistrict, Norton Sound District, 1989.

Date	Location	Number Sampled	Estimated % Age Composition a/							Percent Females	Gonad Maturity Index				% Roe Recovery
			4	5	6	7	8	9	10+		3 & 4	5	6	7 & 8	
5/29	St. Michaels	60	2	0	10	18	13	3	53	38	4	57	26	13	6.0
5/30	St. Michaels	60	2	3	17	15	15	7	42	33	5	35	35	25	4.9
6/2	St. Michaels	90	8	30	34	10	4	2	11	47	5	38	43	14	5.6
Totals		210	4	14	22	14	10	4	32	41	4	36	31	14	5.5

a/ Age estimated from historical length frequency data.

Table 4. Percent age composition of herring sampled from commercial gill net catches in the St. Michael subdistrict, Norton Sound District, 1989.  
a/

-----  
May 27 at Twin Islands/Black Pt. Area

Sample Number	Number Sampled	Percent Age Composition (Years)					Mesh Size (inches)
		6	7	8	9	10+	
1	30		3	6		91	3.0
2	30	6	3	54	6	31	2.6
3	30	10	40	27		27	2.6
4	23	4		4	9	83	3.0
5	30	7	17	27	7	43	2.8
6	30	3	27	17		53	3.0
7	30		10	7	7	77	3.0
Combined	203	4	15	21	4	57	

-----  
May 28 at Five Mile Pt. Area

8	30	7	40	30	7	17	3.0
9	30	3	7	13	10	67	2.9
10	30	3	3	13	3	77	2.9
11	30			17	7	77	2.9
12	30		27	30	10	33	2.8
13	30	7	17	23	13	43	3.0
14	30		7	30	13	50	2.9
Combined	210	3	15	22	9	52	

-----  
May 29 at Black Pt. Area

15	30	3	10	7	3	77	2.9
16	30		7	27	7	60	2.9
Combined	60	2	8	17	5	68	
Total Combined Percentages	473	3	14	21	6	56	

-----

a/ Age estimated from historical length frequency data.

Table 5. Percent gonad maturity and roe recovery of herring sampled from commercial gill net catches, St. Michael subdistrict, Norton Sound District, 1989.

-----  
 May 27 at Twin Islands/Black Pt. Area

Sample Number	Number Sampled	Percent Female	Estimated % Roe Recovery	Gonad Maturity Index, (%)			
				Green 3&4	Ripe 5	Ripe 6	Spent 7&8
1	30	57	10.3	0	82	18	0
2	30	30	7.6	0	100	0	0
3	30	33	4.9	0	60	30	10
4	23	39	8.1	0	67	33	0
5	30	27	5.3	0	25	63	12
6	30	33	5.9	10	60	30	0
7	30	43	6.6	8	23	62	8
-----	-----	-----	-----	-----	-----	-----	-----
Combined	203	37	7.0	3	61	33	4

-----  
 May 28 at Five Mile Pt. Area

8	30	37	7.3	0	46	46	9
9	30	47	8.4	0	64	29	7
10	30	47	9.6	0	36	64	0
11	30	67	9.1	15	45	35	5
12	30	67	12.8	5	40	55	0
13	30	53	8.5	13	44	44	0
14	30	40	6.4	8	75	17	0
-----	-----	-----	-----	-----	-----	-----	-----
Combined	210	51	8.9	6	49	42	3

-----  
 May 29 near Black Point

15	30	53	5.6	6	25	19	50
16	30	67	7.3	5	5	40	50
-----	-----	-----	-----	-----	-----	-----	-----
Combined	60	60	6.5	6	14	31	50
-----	-----	-----	-----	-----	-----	-----	-----
Total Combined Percentages	473	46	7.8	5	47	37	11

-----

Table 6. Description of spawn and spawn substrates, St. Michael subdistrict, Norton Sound District, 1989.

Date	Location a/	Fucus b/ Conc.	Patch Length (yds)	Width (ft)	% Egg Coverage	Ave. # Egg Layers	% Egg Mortality	Remarks
6/5	1	3	150	10-15	50	2-3	<10	spawn in water
6/5	2	3	200	10-20	75	3-6	<10	spawn on rock and kelp
6/5	3	3	200	20-30	50	1-3	<10	
6/5	4	3	250	10-15	40	1-3	<10	some algae and grit
6/5	5	2	100	10	50	1-2	<10	
6/5	6	2	150	10-15	50	1-2	<10	spawn in water
6/5	7	2-3	200	10-15	50	1-3	<10	
6/5	8	2	100	10	50	1-2	<10	
6/5	9	2	75	10-15	50	1-2	<10	
6/5	10	2	150	10-20	50	1-2	<10	
6/6	11	2	200	10	25	0-1	25	some desiccation
6/6	12	3	150	10-15	40	1-2	<10	algae and grit
6/6	13	2	100	10-15	40	1-2	<10	
6/6	14	2	150	10	50	3-6	<10	new, clean
6/6	15	4	300	10-20	75	6-20	<10	clean
6/6	16	4	100	10	75	2-5	<10	clean, spawn in water
6/6	17	3	75	10	25	0-1	<10	
6/6	18	4	200	10-20	75	4-10	<10	clean, spawn in water
6/6	19	3-4	300	10-20	50	3-8	<10	algae, buds forming
6/6	20	2-3	300	10	50	1-3	<10	some algae
6/6	21	2	100	10-15	25	0-1	<10	
6/6	22	2	100	10	25	0-1	<10	

a/ Locations by site number between Cape Stephens and Tolstoi Point.

b/ Qualitative assessment; 1-very light 2-light 3-medium  
4-heavy 5-none

Table 6. (continued)

Date	Location a/	Fucus b/ Conc.	Patch Length (yds)	Width (ft)	% Egg Coverage	Ave. # Egg Layers	% Egg Mortality	Remarks
6/3	23	1	100	10	25	0-1	15	some desiccation
6/3	24	2	50	10	25	0-1	25	desiccated
6/3	25	2	50	10	25	0-1	15	
6/3	26	2	50	10	25	0-1	15	
6/3	27	3	75	10	50	3-8	25	spawn on rock and kelp
6/3	28	3	50	10	20	0-1	15	
6/3	29	3	100	10-15	50	3-5	15	buds forming
6/3	30	2-3	100	10-15	50	1-2	15	
6/3	31	2-3	100	10-20	50	3-6	15	some ice scouring
6/3	32	2-3	50	10-15	35	1-3	15	
6/3	33	2-3	200	10	50	1-3	25	desiccated
6/3	34	2-3	100	5-10	35	1-3	25	desiccated
6/4	35	3	200	10	50	3-5	<10	brown kelp
6/4	36	4	200	10	75	4-8	<10	spawn on rock and kelp
6/4	37	4	300	10-20	75	4-10	25	desiccated, rock and kelp
6/4	38	3-4	200	10-15	75	3-5	15	
6/4	39	2-3	150	10	50	3-5	25	eyed eggs, desiccated, brown kelp
6/4	40	2	75	10	25	0-2	25	
6/4	41	1	75	10	50	2-4	15	mostly bare rock
6/4	42	5	50	5-10	75	3-5	25	sheets peeling off
6/4	43	5	75	5-10	75	3-5	25	

a/ Locations by site number between Cape Stephens and Tolstoi Point.

b/ Qualitative assessment; 1-very light 2-light 3-medium  
4-heavy 5-bare rock

Table 7. Climatological observations at test fish sites, Norton Sound District, 1989.

Date	Time	Location	Water Temp. (F)	Secch: Reading (M)	Cloud Cover a/	PPT b/	Wind Direction	Wind Speed (mph)	Remarks
5/22	-	Unalakleet	-	-	0	0	-	-	Unalakleet R. ice out
5/24	-	Unalakleet	34	-	5	1	-	0-5	possible river influence
5/25	1510	Tolstoi	42	1	3	7	SE	5-10	milty water
5/26	1445	Twin Islands	39	2.0	4	7	SE	5-10	milty water
5/27	1115	Klikitarik	38	2.0	4	7	SE	15-20	possible river influence
5/28	1145	Five Mile Pt.	39	1.0	2	7	S	20-35	milty water
5/29	1545	Klikitarik	38	2.2	4	1	SE	10-15	
5/30	1015	Raven Bluff	39	2.2	3	7	-	0-5	
5/31	1030	Klikitarik	40	2.5	2	7	S	5-10	
6/1	-	Unalakleet	-	-	4	7	S	15-25	Seas choppy 2'-3'
6/2	1330	Klikitarik	45	2.0	4	1	SW	10-20	Seas 3'-4'
6/3	2100	Wood Pt.	43	2.0	4	1	SW	10-15	Seas 2'-3'
6/4	2230	Tolstoi	44	2.6	3	7	-	0-5	
6/5	1900	Cape Stephens	42	2.4	4	1	S	5-10	
6/6	1830	St. Michael	42	1.8	4	7	S	5-8	
6/7	-	Klik-Unk	-	-	2	7	-	0-5	

a/ Cloud cover:  
 0-No observation  
 1-Less than 1/10  
 2-Not more than 1/2  
 3-More than 1/2  
 4-Completely overcast  
 5-Fog or thick haze

b/ Precipitation (PPT):  
 0-No observation  
 1-Intermittent rain  
 2-Continuous rain  
 3-Snow  
 4-Snow and rain mixed  
 5-Hail  
 6-Thunderstorm  
 7-No Precipitation

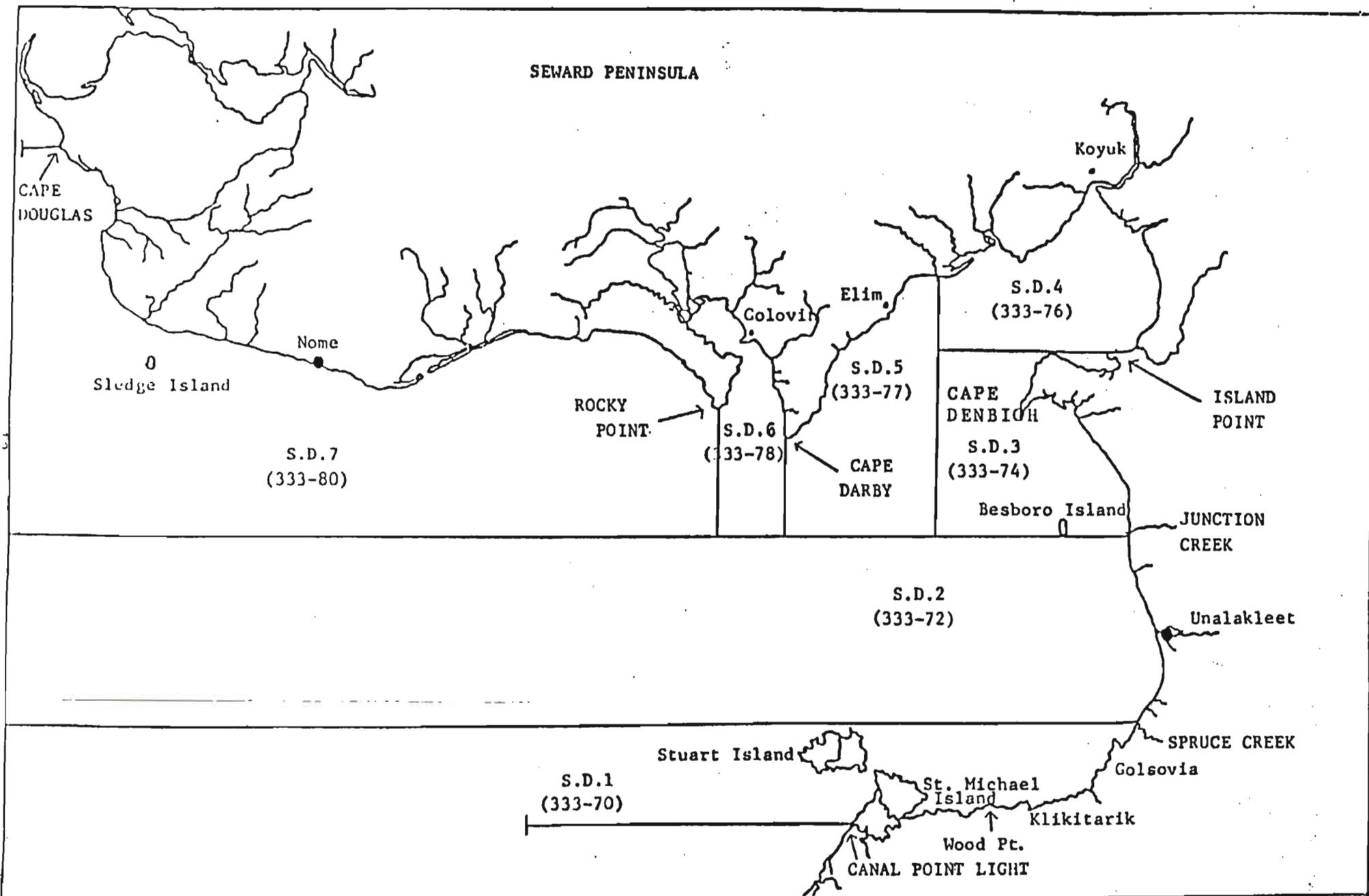


Figure 1. Norton Sound commercial herring district (333) and statistical boundaries.

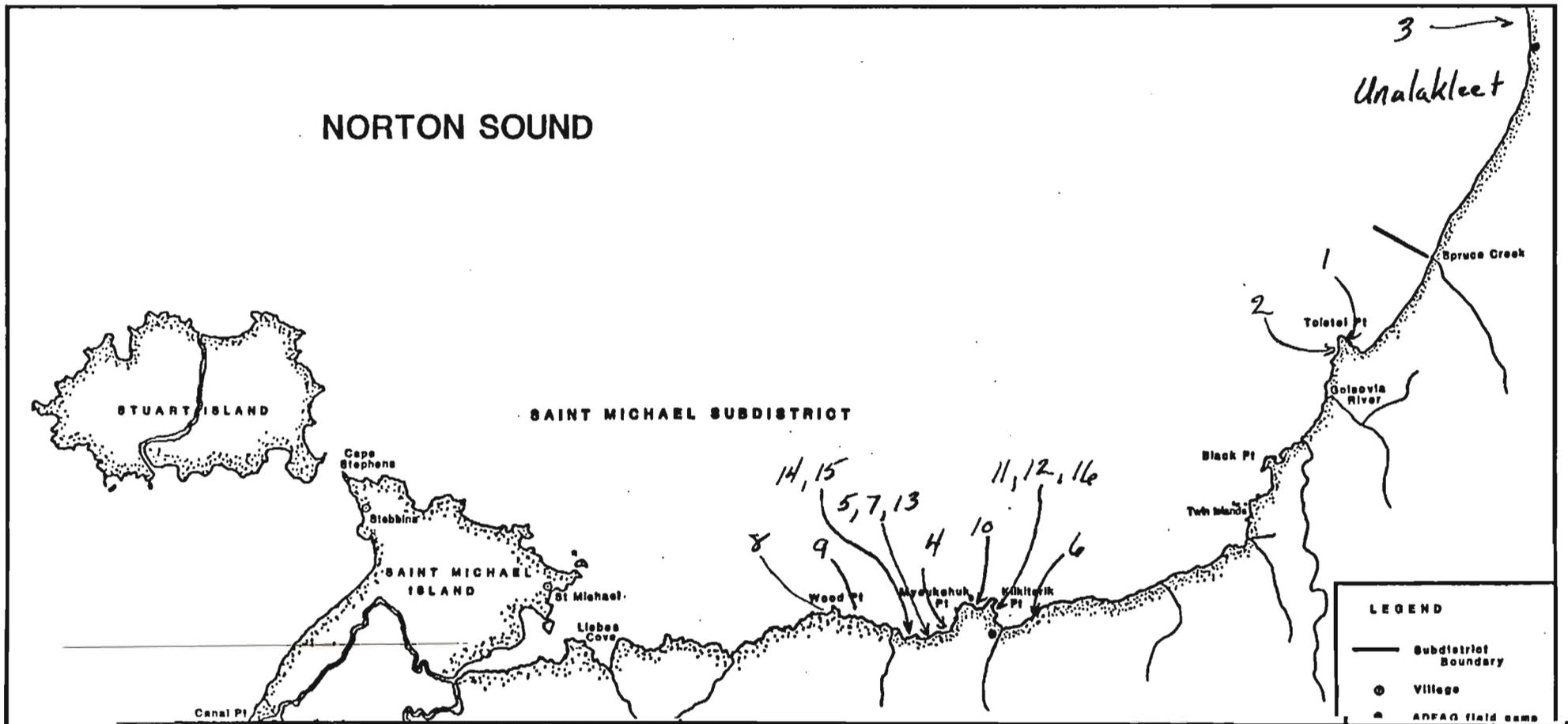


Figure 2. Location of variable mesh gill net test fish sets by set number, Unalakleet and St. Michael subdistricts, Norton Sound District, 1989.

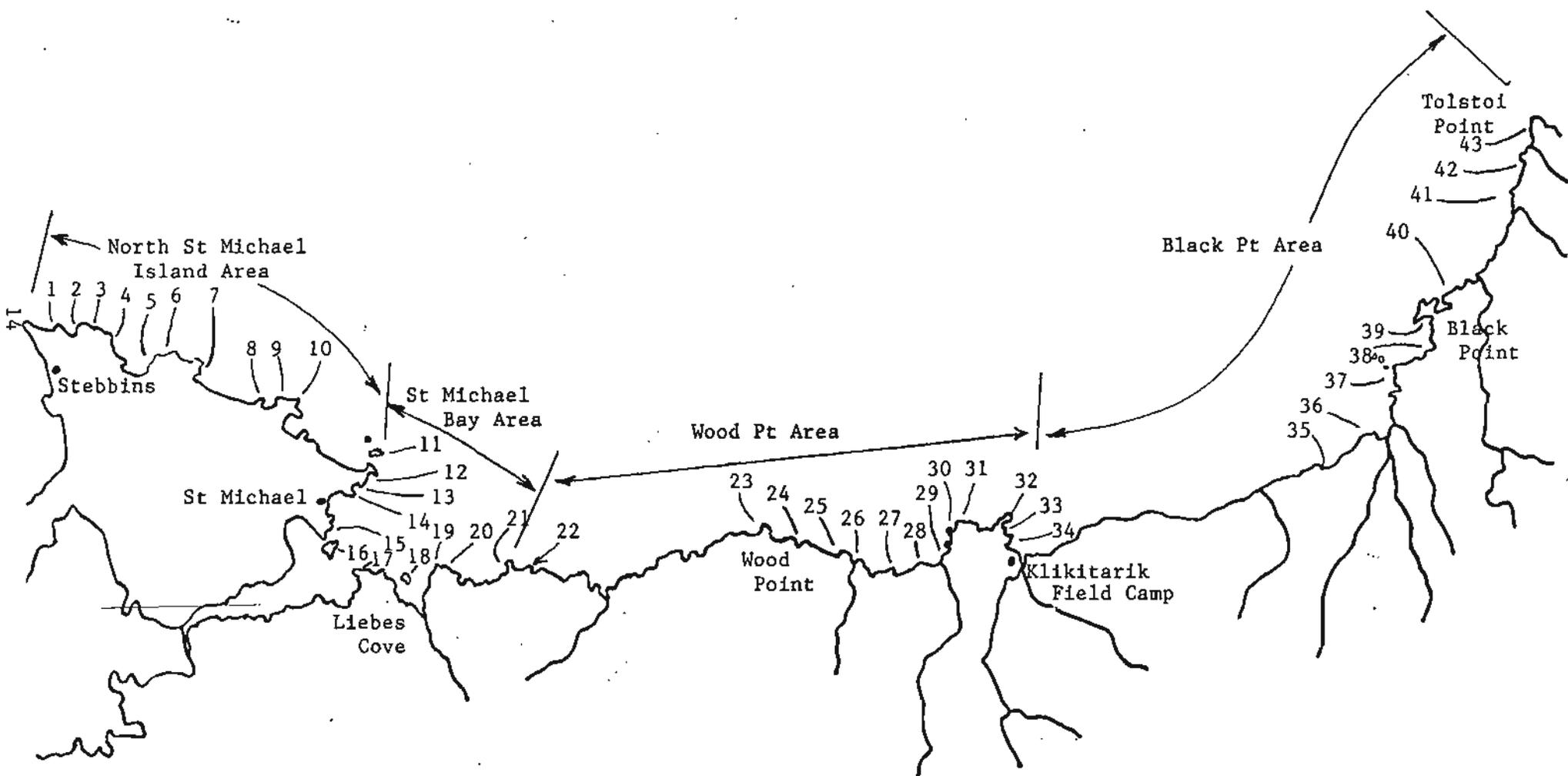


Figure 3. Location map of spawn and spawn substrate evaluation areas, St Michael subdistrict, Norton Sound District, 1989.