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Age, Sex, and Size Composition of Pacific Herring From Coastal Spawning Sites in the Arctic-Yukon-Kuskokwim Region, 1989

by

Carol M. Kerkvliet

Helen H. Hamner

State of Alaska Walter J. Hickel, Governor

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and

Helen H. Hamner

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AUTHORS

Carol M. Kerkvliet is the Herring Research Assistant for the Alaska Department of Fish and Game, Region III, Division of Commercial Fisheries, 333 Raspberry Road, Anchorage, Ak 99518-1599.

Helen H. Hamner is the Assistant Regional Biometrician for the Alaska Department of Fish and Game, Region III, Division of Commercial Fisheries, 333 Raspberry Road, Anchorage, Ak 99518-1599.

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ABSTRACT

Pacific herring *Clupea pallasi* were sampled from seven of the eight commercial fishing districts within the Arctic-Yukon-Kuskokwim Region of the Bering Sea during the 1989 spring spawning migration. Samples were collected with variable-mesh gillnets operated by the Alaska Department of Fish and Game and from commercial beach seine and gillnet harvests. Within each district, samples were grouped by gear type, location, and fishing period or sampling week. Between 6 May and 16 June, 7,339 herring were examined for age, sex, and size information. Overall, age-7 herring dominated the 1989 spawning population: Age-9 and older fish contributed an estimated 47.2% to the biomass and 35.3% of the spawning population by number. Herring recruits, ages 3, 4, and 5 accounted for an estimated 7.8% of the biomass and 15.8% by number. Substantial recruitment of herring to the spawning biomass last occurred in 1982 and 1983 as a result of strong 1977 and 1978 year classes. Herring biomass in AYK herring districts is considered to be in a state of decline with the exception of Norton Sound which is considered stable. In 1989 the AYK herring biomass estimate was 43,967 tons and the commercial harvest was 7,316 tons, for an overall exploitation rate of 16.6%. The mean length of fish within each age class progressively decreased from Security Cove northward to Norton Sound. In most samples, male to female ratios remained nearly equal.

KEY WORDS: Pacific herring, *Clupea pallasi,* Bering Sea, age, sex, size, population, biomass

INTRODUCTION

The purpose of this study was to estimate the age, sex, and size composition of the spawning biomass of Pacific herring *Clupea pallasi* in the Arctic-Yukon-Kuskokwim (AYK) Region portion of the Bering Sea. Similar studies have been conducted annually by the Alaska Department of Fish and Game (ADF&G) since 1976 (McBride et al. 1981; McBride and Whitmore 1981; Fried et al. 1982a, 1982b, 1983a, 1983b, 1984; Lebida et al. 1985a, 1986; Lebida 1986; Lebida and Sandone 1987). Development of annual fishery management plans for Bering Sea herring stocks rely on these data.

The coastal waters of Alaska from Cape Newenham to Cape Prince of Wales comprised the study area (Figure 1, 2). The eight regulatory commercial fishing districts within this study area are Security Cove, Goodnews Bay, Cape Avinof, Nelson Island, Nunivak Island, Cape Romanzof, Norton Sound, and Port Clarence. Norton Sound is further subdivided into seven subdistricts. These districts and subdistricts are specifically identified and described by ADF&G (1989). The commercial harvest in the AYK Region was primarily taken by gillnets, except in Norton Sound where a small portion of the harvest was taken by beach seine.

METHODS

Sampling Techniques

Samples were taken from the following commercial fishing districts: Security Cove, Goodnews Bay, Cape Avinof, Nunivak Island, Nelson Island, Cape Romanzof, and Norton Sound (St. Michael, Unalakleet, and Cape Denbigh Subdistricts). Gear type was categorized as either non-selective or selective for a group of discrete age classes. Non-selective gear was assumed to sample all age classes in the population in proportion to their abundance. Variable-mesh gillnet and beach seine composed the non-selective category; standard-mesh gillnet composed the selective category. Variable-mesh gillnet sets were made by ADF&G personnel. Commercial beach seine and gillnet sets were made by commercial fishermen. Age, size, sex, and gonadal condition data was collected from herring catches taken by each gear type. Since buyers were not present in Port Clarence this year, no commercial or test fishery occurred. Consequently there is no age composition data for the Port Clarence District.

Data collection methods were similar to those described by Barton and Steinhoff (1980). We attempted to sample at least 420 herring from each commercial harvest, gear type, and fishing period. Similar sampling goals were established for test fishing for each weekly sampling period. Conrad (R. Conrad, 1988, Alaska Department of Fish and Game, Anchorage, personnel communication) described the methods used in determine sample size. Sampled fish were measured from tip of the snout to the hyperal plate to the nearest millimeter, weighed to the nearest gram, and aged by counting scale annuli viewed with a microfiche reader.

Biomass Estimation

The estimated herring biomass, spawn timing and distribution was determined by aerial surveys flown throughout the season in each district. Aerial survey procedures followed those outlined by Lebida and Whitmore (1985). In districts where survey conditions were poor, biomass was estimated using partial aerial surveys, pre-season projections, and age composition.

The age composition of the mature herring return was grouped in three ways: total age composition (which was calculated by combining commercial catch with escapement for each age class), commercial harvest age composition, and escapement age composition (which was estimated from non-selective gear). For each group, herring numbers were estimated by dividing the total tonnage of each age class by the average fish weight in that age class.

RESULTS AND DISCUSSION

ADF&G personnel examined 7,339 Pacific herring between 6 May and 16 June (Appendix A.1–A.20). The data suggest (nonstatistical comparisons = NSC) that older-aged Pacific herring (age-5 and older) arrived and spawned earlier in the season than younger-aged (age-4 and younger) herring (Appendix A.9–A.20). This temporal spawning segregation trend was also apparent in former years (McBride et al. 1981; Fried et al. 1982a, 1982b, 1983b, and 1984).

In 1989 the AYK herring biomass estimate was 43,967 tons for the surveyed portions of the commercial fishing districts. The commercial harvest was 7,316 tons, for an overall exploitation rate of 16.6% (Table 1). Biomass was distributed among the districts as follows: 6.4% in Security Cove, 9.2% in Goodnews Bay, 6.3% in Cape Avinof, 7.5% in Nelson Island, 1.4% in Nunivak Island, 10.0% in Cape Romanzof, and 59.1% in Norton Sound (Figure 3).

Overall, age 7 was the dominant age class of herring to return to the region. This age class accounted for 19.5% of the biomass and 22.1% of the population of AYK herring (Tables 1, 2; Figures 4, 5, 6). Age-9 and older herring accounted for 47.2% of the biomass and 35.3% of the population. Recruits, ages 3, 4, and 5, represented 7.8% of the biomass and 15.8% of the herring population. Substantial recruitment to the region last occurred in 1982 and 1983 and was associated with the 1977 and 1978 year classes. In 1989 these herring comprised the 11 and 12 age classes. They made up 16.6% of the biomass and 11.3% of the population. The decline of these year classes, due to high natural mortality of older aged herring, marks a decline in the total harvestable surplus of herring in the region. Ages-8 and -10 herring represented 48.0% of the AYK commercial harvest biomass.

Ages 8, 10, and 11 dominated the Security Cove herring return (Tables 1, 2; Figures 4, 5, 6). These age classes composed 58.4% of the biomass and 51.4% of the population. Age-9 and older herring accounted for 58.5% of the biomass and 48.7% of the population. Herring recruits made up 5.5% of the biomass

and 9.8% of the population (Figure 7). Twenty-five percent of the commercial harvest biomass in Security Cove was age-8 herring.

In the Goodnews Bay District, age-10 herring made up 24.6% of the biomass and 19.6% of the population (Tables 1, 2; Figures 4, 5, 6). Sixty-seven percent of the biomass and 52.9% of the population of herring in this district were represented by age-9 and older fish. Herring recruits represented 9.7% of the biomass and 19.4% of the population (Figure 7). Age-10 herring comprised 30.9% of the commercial harvest biomass.

For the Cape Avinof herring return, the dominant age class in the biomass was age 10 (17.5%); however, the dominant age class in the population was age 5 (21.1%) (Tables 1, 2; Figures 4, 5, 6). Age-9 and older fish accounted for 48.7% of the biomass and 34.2% of the population. Recruits represented 16.6% of the biomass and 29.7% of the population (Figure 7). The commercial fishery evenly harvested ages 9, 10, and 11 herring. Each of these age classes accounted for 24.6% of the commercial harvest biomass.

The Nelson Island herring return was dominated by age-10 fish which composed 22.9% of the biomass and 19.4% of the population (Tables 1, 2; Figures 4, 5, 6). Sixty-nine percent of the biomass and 56.5% of the population consisted of age-9 and older herring. Recruits made up 7.1% of the biomass and 15.5% of the population (Figure 7). Age-10 herring comprised 32.8% of the commercial harvest biomass.

Ages-10 and -11 herring were the strongest age classes returning to the Nunivak Island District (Tables 1, 2; Figures 4, 5, 6). These age classes accounted for 49.1% of the biomass and 43.7% of the population of herring in this district. Age-9 and older herring comprised 74.9% of the biomass and 66.6% of the population. Herring recruits represented only 2.5% of the biomass, and 5.4% of the population (Figure 7). Ages-10 and -11 herring made up 62.9% of the commercial harvest biomass.

At Cape Romanzof, 20.1% of the biomass and 20.0% of the population was represented by age-8 herring (Tables 1, 2; Figures 4, 5, 6). Age-9 and older herring accounted for 54.1% of the biomass and 42.6% of the population. Recruits represented 8.6% of the biomass and 16.2% of the population in this district (Figure 7). For the commercial harvest biomass, age-8 and -10 herring represented 47.2% of the catch.

Age-7 herring was the dominant age class in the Norton Sound return (Tables 1, 2; Figures 4, 5, 6). This age class accounted for 27.9% of the herring biomass and 30.0% of the herring population. Age-9 and older herring contributed 38.1% to the biomass and 28.6% to the population. Recruits represented 6.9% of the biomass and 14.2% of the population (Figure 7). A large number of three year old fish were caught in the Cape Denbigh test net on 13 June. However, these fish were not included in age composition summaries since there was no aerial survey estimate for this time period. Age-8 herring represented 29.7% of the Norton Sound commercial harvest biomass.

Throughout the region, trends in mean age class sizes generally paralleled those noted in previous years (Lebida et al. 1985a, 1986; Lebida and Sandone, 1987). The mean length within an age class appeared to decrease (NSC) moving from the southern to the more northerly districts (Figure 8). In addition, the

mean length within an age class differed (NSC) among samples taken by different gear types within Norton Sound where gillnets and beach seines were used in the commercial fishery (Appendices A.8, A.9). The commercial gillnet fishery appeared to harvest larger herring within an age class (NSC) than did the beach seine fishery.

Overall, sex ratios remained fairly equal, with males slightly outnumbering females in most districts (Appendices A.1-A.20). The male:female for non-selective gear were as follows: Security Cove = 1.5:1, Goodnews Bay = 1.6:1, Cape Avinof = 0.7:1, Nelson Island = 0.9:1, Nunivak Island = 1.4:1, Cape Romanzof = 1.4:1, and Norton Sound = 1.2:1. The overall ratio for non-selective gear types was 1.2:1 compared to 0.96:1 for the combined commercial harvest.

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Table 1. Age composition of Pacific herring spawning biomass for the total run, commercial harvest and escapement for commercial fishing districts within the Arctic–Yukon–Kuskokwim Region, Alaska, 1989.

	Security Cove		Goodnews Bay		Cape Avinof		Nelson Island		Nunivak Island		Cape Romanzof		Norton Sound		Arctic–Yukon–Kuskowkim	
Age	% by weight	tons	% by weight	tons	% by weight	tons	% by weight	tons	% by weight	tons	% by weight	tons	% by weight	tons	% by weight	tons
								Total Run								
2	0.0	0	0.0	0	0.2	6	0.0	0	0.0	0	0.0	0	0.0	0	0.0	6
3	0.0	0	0.0	2	1.1	31	0.1	3	0.0	0	0.1	5	1.2	312	0.8	353
4	0.0	0	0.3	11	2.3	63	0.7	24	0.2	1	0.6	26	1.0	272	0.9	397
5	5.5	155	9.4	379	13.0	362	6.3	210	2.3	14	7.9	348	4.7	1,221	6.1	2,689
6	9.9	281	8.6	349	9.5	263	5.9	196	3.6	22	5.7	253	8.2	2,121	7.9	3,485
7	6.8	192	3.6	147	10.9	303	4.4	145	5.3	33	11.4	503	27.9	7,244	19.5	8,567
8	19.3	546	11.0	445	14.4	400	13.5	449	13.8	85	20.1	885	18.9	4,908	17.6	7,718
9	13.4	378	11.1	449	12.1	336	13.2	439	12.8	79	9.5	419	12.8	3,323	12.3	5,423
10	20.1	570	24.6	994	17.5	485	22.9	756	25.3	156	15.7	689	15.5	4,028	17.5	7,680
11	19.0	537	20.5	830	11.9	329	21.0	696	23.8	147	17.7	780	7.3	1,897	11.9	5,218
12	4.9	139	9.4	380	7.1	196	10.1	336	11.7	72	9.8	431	2.0	520	4.7	2,074
13+	1.1	32	1.4	58	0.1	2	1.8	61	1.3	8	1.4	62	0.5	136	0.8	359
Total	100	2,830	100	4,044	100	2,776	100	3,317	100	617	100	4,401	100	25,962	100	43,967
								Commercial Harvest								
2	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
3	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
4	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5	2.3	13	0.2	1	0.8	1	0.0	0	0.0	0	0.4	4	0.5	22	0.6	41
6	10.1	56	4.2	26	0.8	1	0.4	1	0.0	0	2.5	23	2.3	109	3.0	216
7	8.6	48	3.1	19	2.3	3	3.0	7	0.9	1	10.4	96	17.2	816	13.5	990
8	25.0	139	16.9	104	12.3	16	9.9	23	8.6	10	26.9	249	29.7	1,410	26.7	1,951
9	16.5	92	19.7	121	24.6	32	12.9	30	12.9	15	12.1	112	16.9	800	16.4	1,202
10	16.9	94	30.9	190	24.6	32	32.8	76	31.9	37	20.3	188	19.9	941	21.3	1,558
11	15.1	84	17.1	105	24.6	32	24.6	57	31.0	36	17.2	159	9.4	447	12.6	920
12	4.7	26	6.5	40	8.5	11	13.8	32	12.9	15	9.1	84	3.9	187	5.4	395
13+	0.7	4	1.5	9	1.5	2	2.6	6	1.7	2	1.3	12	0.2	8	0.6	43
Total	100	556	100	615	100	130	100	232	100	116	100	927	100	4,740	100	7,316
								Escapement								
2	0.0	0	0.0	0	0.2	6	0.0	0	0.0	0	0.0	0	0.0	0	0.0	6
3	0.0	0	0.1	2	1.2	31	0.1	3	0.0	0	0.1	5	1.5	312	1.0	353
4	0.0	0	0.3	11	2.4	63	0.8	24	0.2	1	0.7	26	1.3	272	1.1	397
5	6.2	142	11.0	377	13.7	362	6.8	210	2.8	14	9.9	344	5.6	1,198	7.2	2,647
6	9.9	225	9.4	322	9.9	262	6.3	195	4.4	22	6.6	229	9.5	2,011	8.9	3,266
7	6.3	144	3.7	126	11.3	299	4.5	138	6.4	32	11.7	407	30.3	6,428	20.7	7,576
8	17.9	407	10.0	342	14.5	385	13.8	425	14.8	74	18.3	636	16.5	3,499	15.7	5,768
9	12.6	287	9.6	329	11.5	304	13.3	409	13.0	65	8.8	307	11.9	2,523	11.5	4,224
10	20.9	476	23.4	804	17.1	453	22.1	682	23.8	119	14.4	501	14.5	3,087	16.7	6,122
11	19.9	453	21.1	725	11.2	297	20.7	638	22.0	110	17.9	621	6.8	1,450	11.7	4,294
12	5.0	113	9.9	340	7.0	185	9.8	303	11.6	58	10.0	347	1.6	333	4.6	1,679
13+	1.2	28	1.4	49	0.0	0	1.8	55	1.2	6	1.5	51	0.6	126	0.9	317
Total	100	2,275	100	3,429	100	2,647	100	3,082	100	501	100	3,474	100	21,241	100	36,649

Table 2. Age composition of Pacific herring spawning populations expressed in percent by number for commercial fishing districts within the Arctic–Yukon–Kuskokwim Region, Alaska, 1989.

Age	Security Cove	Goodnews Bay	Cape Avinof	Nelson Island	Nunivak Island	Cape Romanzof	Norton Sound	Arctic–Yukon–Kuskokwim Total
2	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.1
3	0.0	0.1	3.4	0.4	0.2	0.4	4.2	3.0
4	0.0	0.7	4.3	2.1	0.3	1.5	2.6	2.3
5	9.8	18.6	21.1	13.0	4.9	14.3	7.4	10.4
6	14.1	12.7	12.8	8.9	6.1	7.9	10.7	10.8
7	8.0	4.3	11.4	5.7	7.1	13.2	30.0	22.1
8	19.4	10.7	12.0	13.5	14.8	20.0	16.5	16.0
9	12.0	9.7	9.4	11.4	12.3	8.2	10.0	10.1
10	17.0	19.6	12.4	19.4	23.5	12.9	11.8	13.4
11	15.0	15.6	7.8	16.6	20.2	13.5	5.0	8.2
12	3.9	7.0	4.5	7.8	9.5	7.0	1.4	3.1
13+	0.8	1.0	0.1	1.3	1.1	1.0	0.4	0.5
Total	100	100	100	100	100	100	100	100

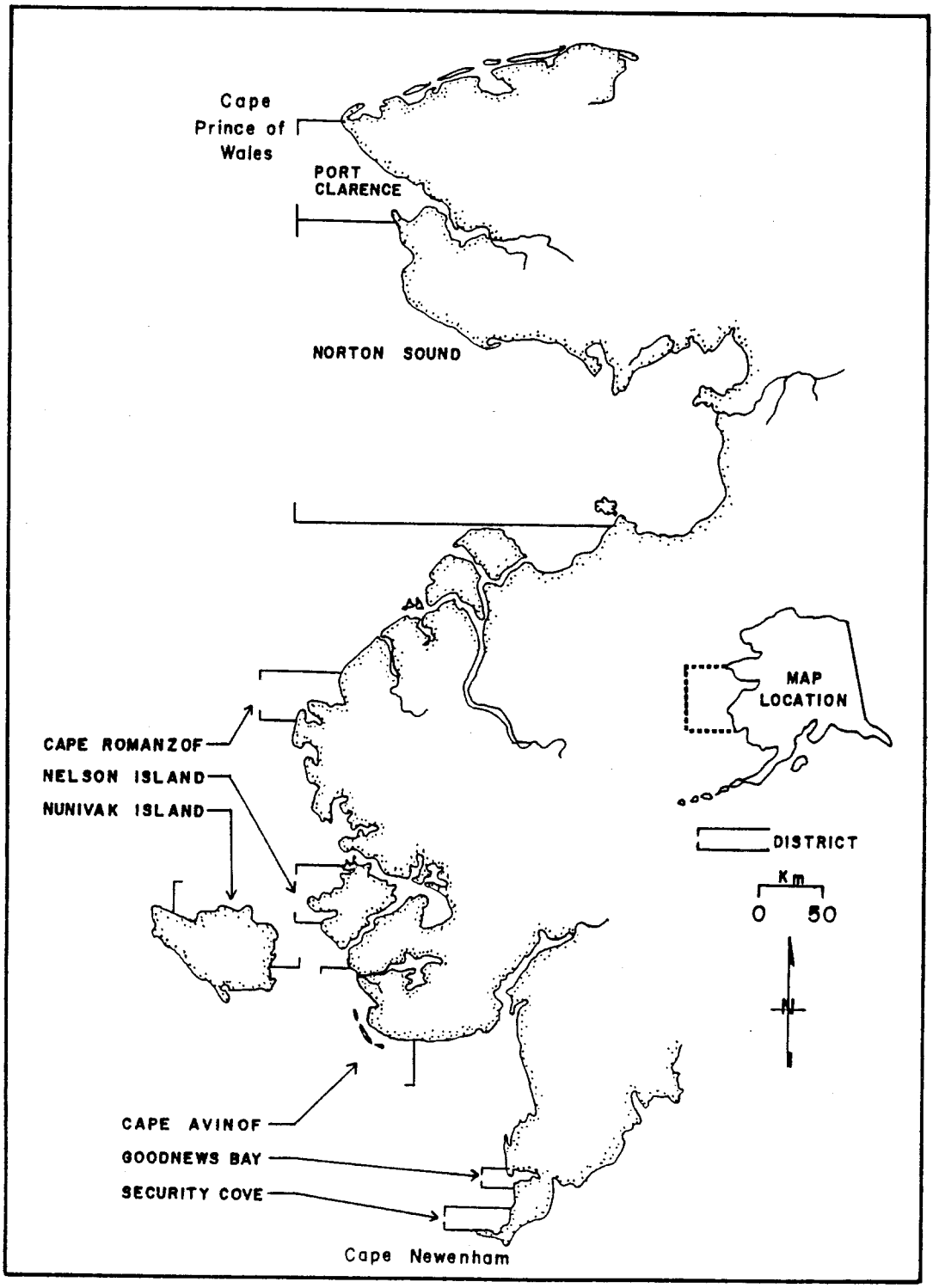

Figure 1. Commercial herring fishing districts within the Arctic-Yukon-Kuskokwim Region, Alaska, 1989.

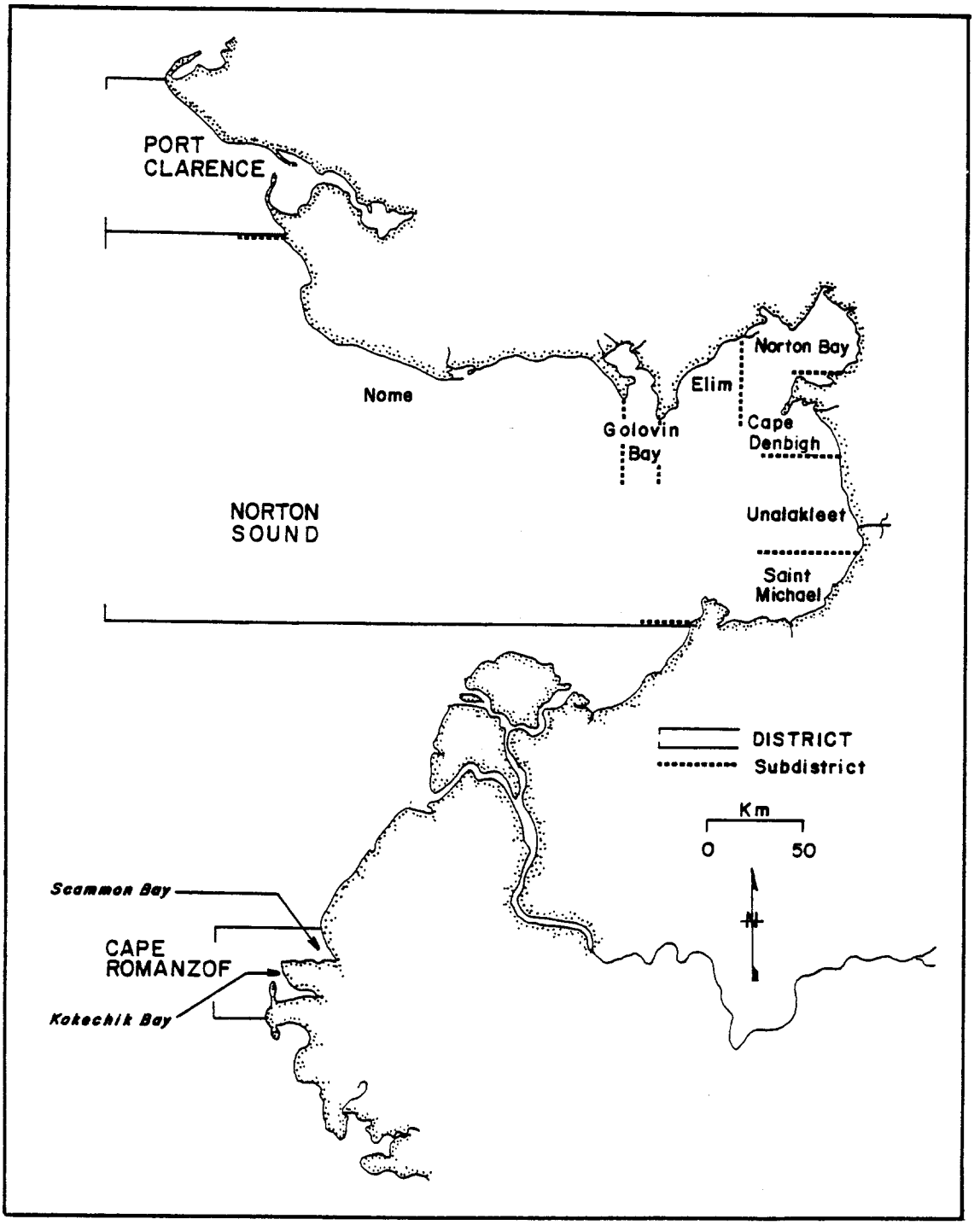

Figure 2. Commercial herring fishing districts and subdistricts of Norton Sound and Cape Romanzof, Arctic-Yukon-Kuskokwim Region, Alaska, 1989.

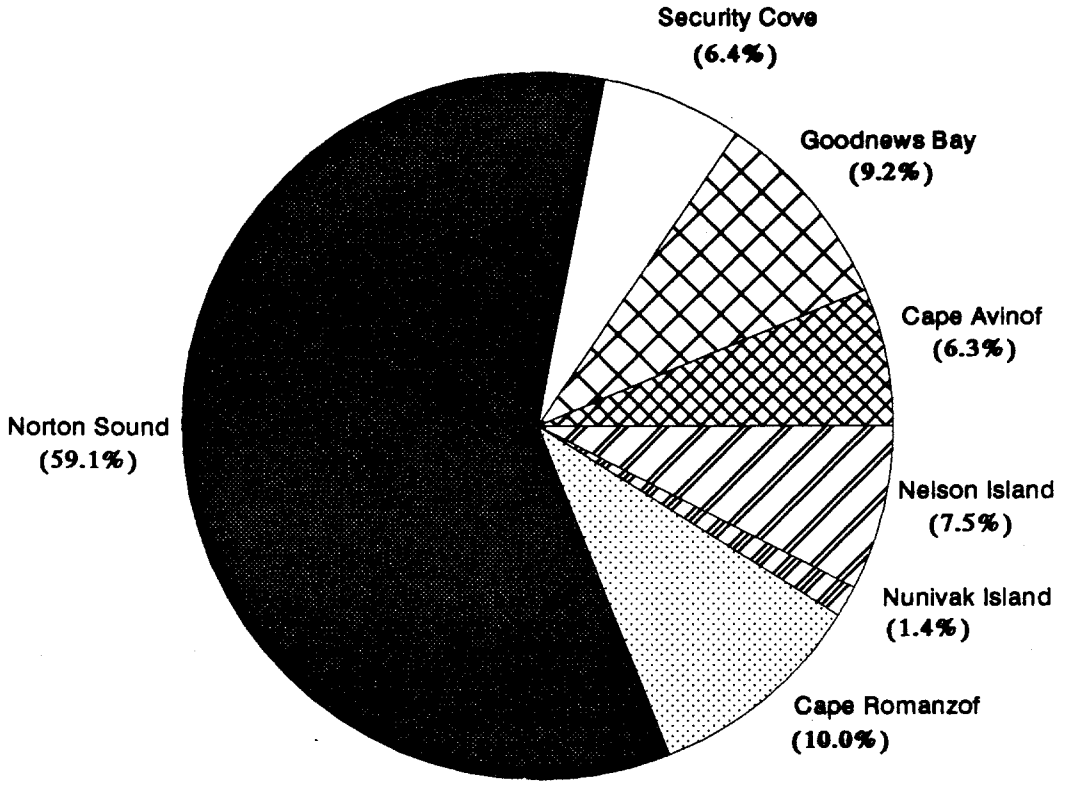

Figure 3. Pacific herring spawning biomass distribution by commercial fishing district, Arctic–Yukon–Kuskokwim Region, Alaska, 1989.

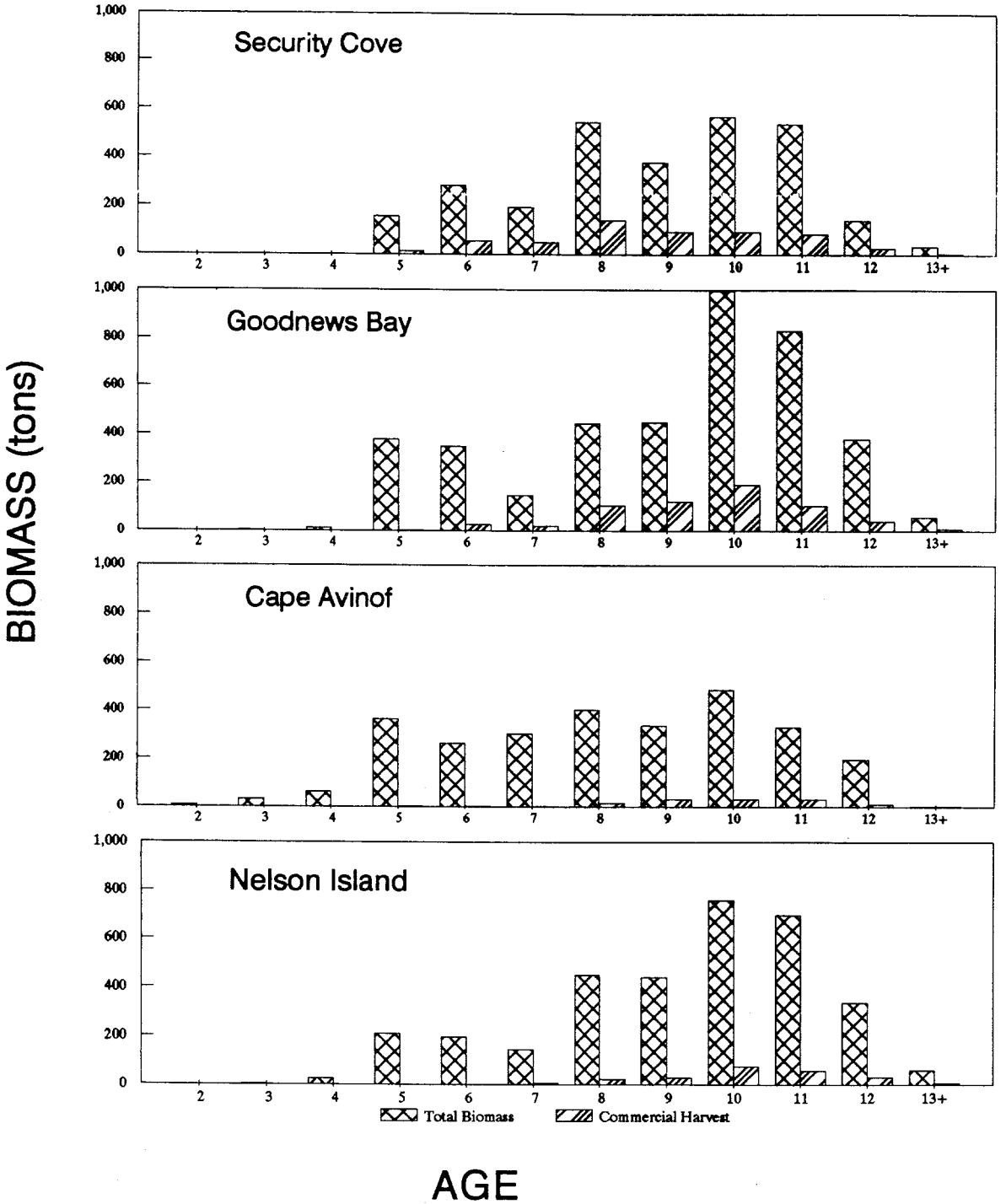

Figure 4. Age composition of Pacific herring by total biomass and commercial harvest for the Security Cove, Goodnews Bay, Cape Avinof, and Nelson Island commercial fishing districts within the Arctic–Yukon–Kuskokwim Region, Alaska, 1989.

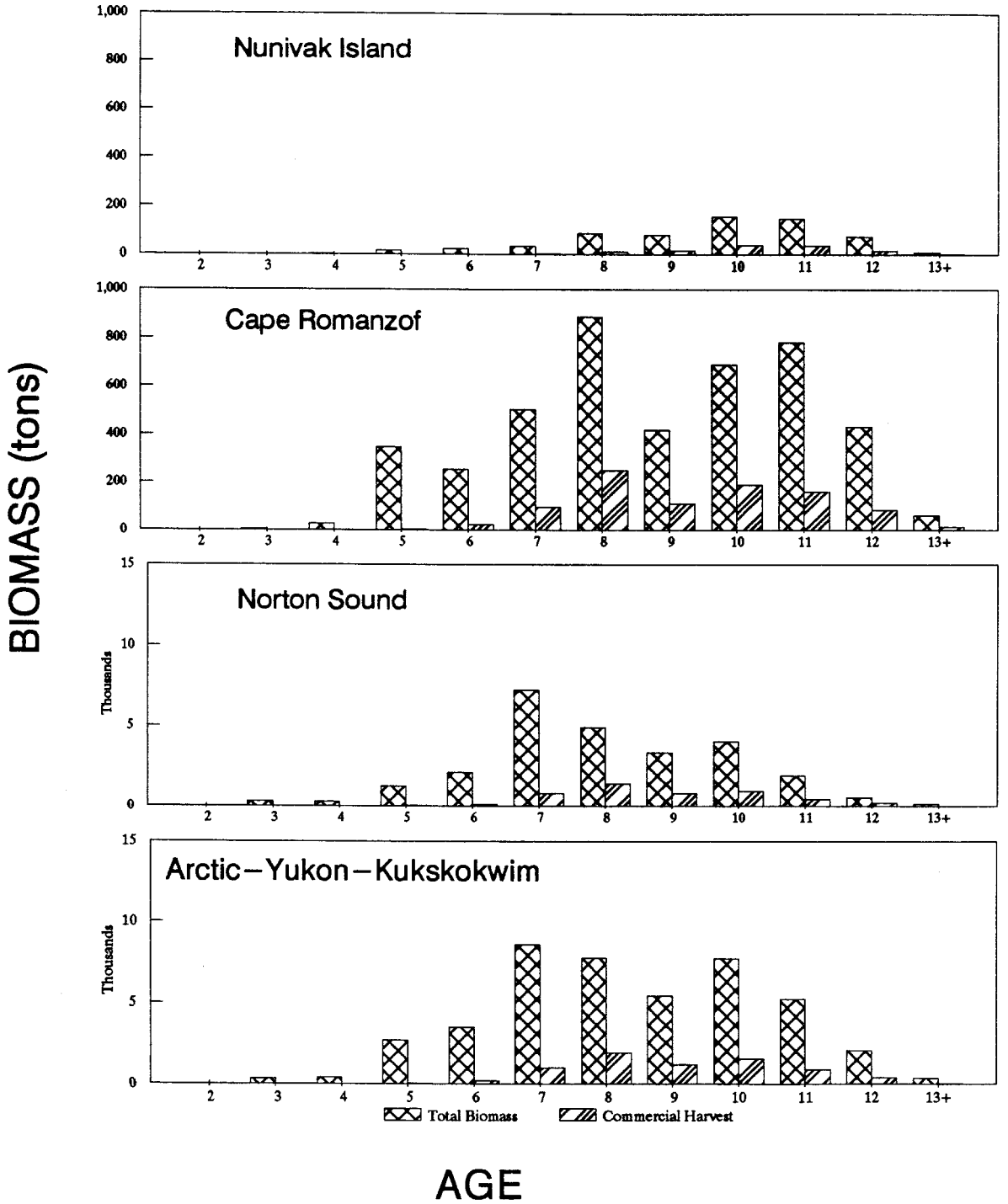

Figure 5. Age composition of Pacific herring by total biomass and commercial harvest for the Nunivak Island, Cape Romanzof, Norton Sound commercial fishing districts, and the Arctic–Yukon–Kuskokwim Region, Alaska, 1989.

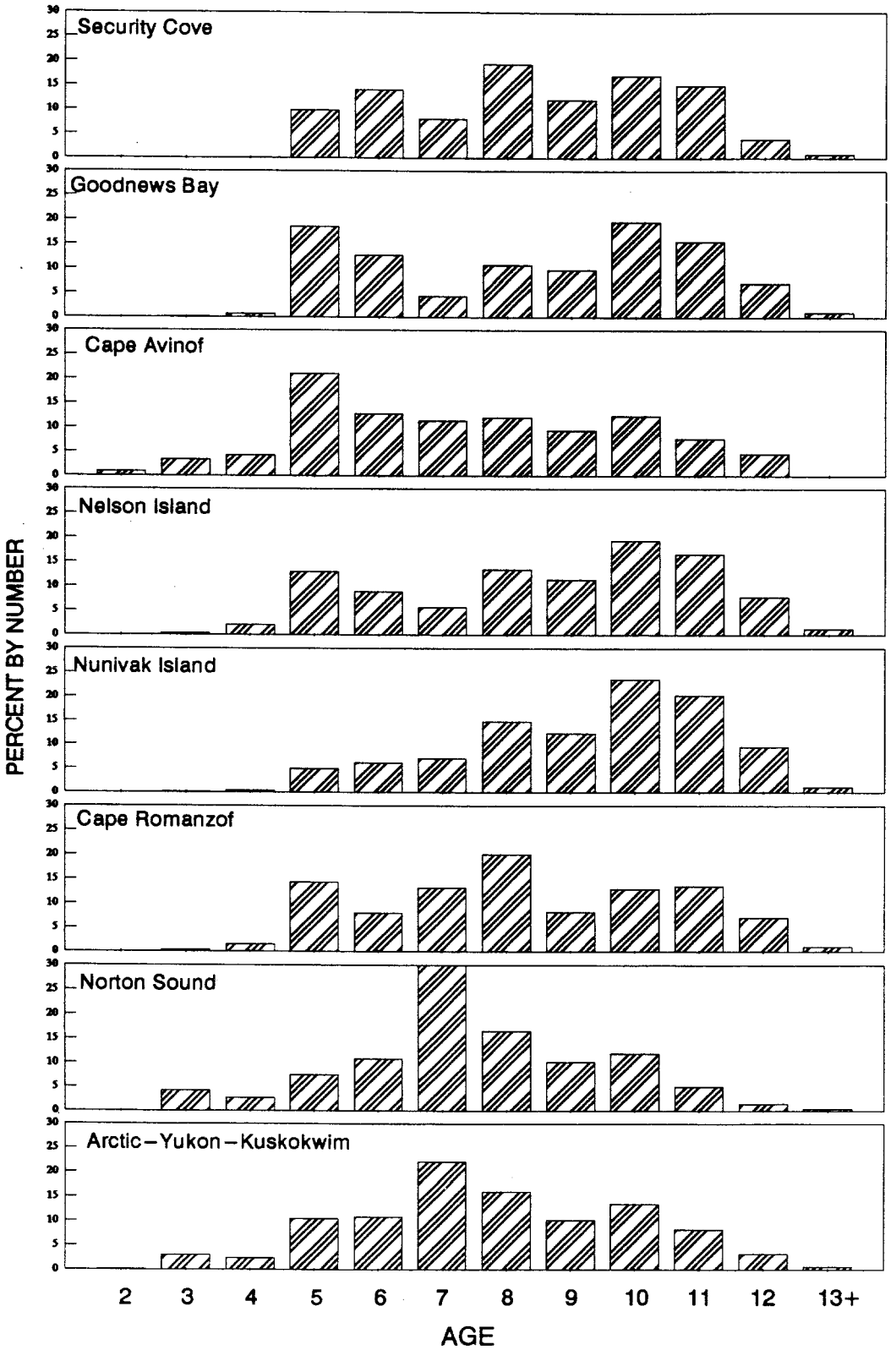

Figure 6. Age composition of Pacific herring spawning populations for commercial fishing districts within the Arctic–Yukon–Kuskokwim Region, Alaska, 1989.

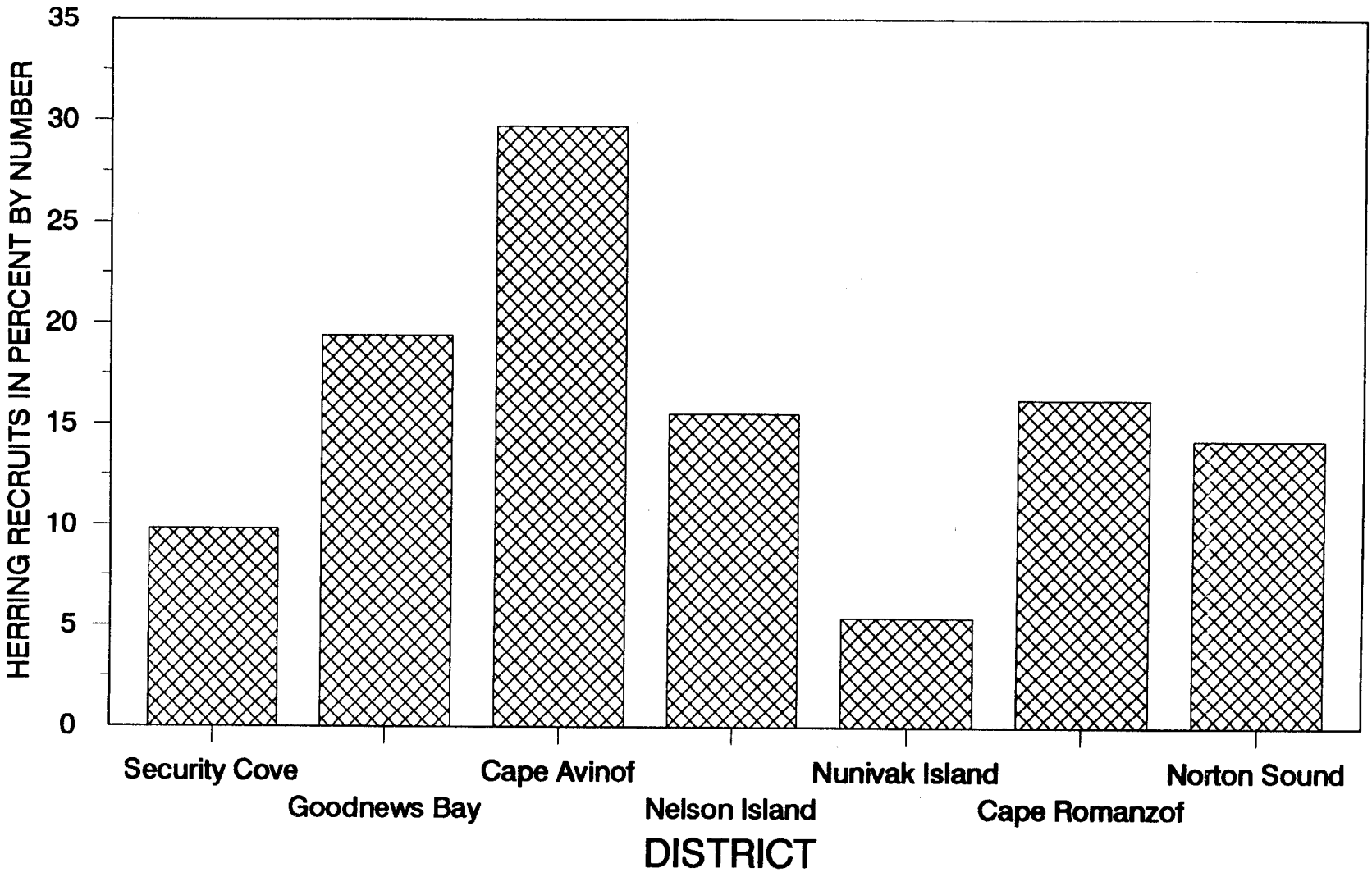

Figure 7. Pacific herring recruits (ages 2, 3, 4, and 5) for commercial fishing districts within the Arctic-Yukon-Kuskokwim Region, Alaska, 1989.

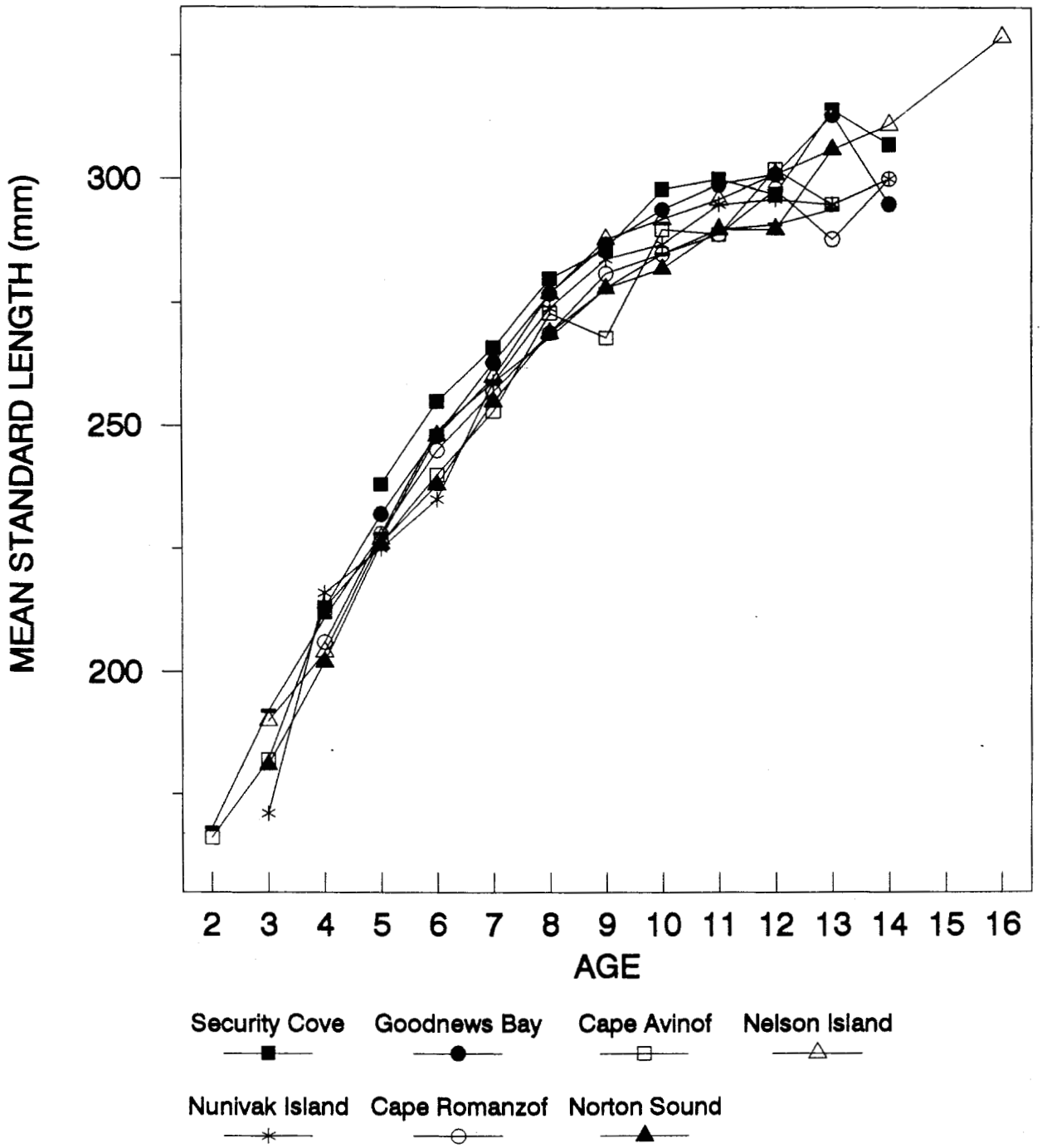

Figure 8. Mean standard length of sampled Pacific herring by age class and commercial fishing district, Arctic-Yukon-Kuskowim Region, Alaska, 1989.

Appendix A.1. Age, sex, and size composition of herring sampled from the commercial gillnet harvest, Security Cove District, 1989.

Sample Dates	Age	Sex (number)				Percent of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
	2											
	3											
	4											
	5	3	4	0	7	3.4	227	46.0	7	246	6.1	7
	6	13	14	0	27	13.0	263	43.8	27	265	12.9	27
	7	10	9	0	19	9.2	320	67.9	19	276	16.7	19
	8	25	30	0	55	26.6	322	44.8	55	281	12.7	55
17 May	9	15	17	0	32	15.5	364	45.7	32	293	8.7	32
	10	14	18	0	32	15.5	372	57.5	32	294	12.1	32
	11	14	12	0	26	12.6	408	53.9	26	303	8.8	26
	12	3	5	0	8	3.9	409	30.6	8	310	8.3	8
	13	0	1	0	1	0.5	455		1	313		1
	14											
	15											
	16											
Sample Total		97	110	0	207	100.0	340	69.5	207	285	18.6	207
Sex Composition (%)		46.9	53.1									
Not Aged		6	12	0	18	8.7	319	67.1	18	284	19.1	18
Sex Composition (%)		33.3	66.7									

Appendix A.2. Age, sex, and size composition of herring sampled from the commercial gillnet harvest, Goodnews Bay District, 1989.

Sample Dates	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
	2											
	3											
	4											
	5	1	1	0	2	0.5	183	12.7	2	240	2.1	2
	6	16	12	0	28	7.2	248	36.1	28	263	12.2	28
	7	8	8	0	16	4.1	269	54.7	16	267	12.3	16
	8	37	38	0	75	19.2	314	44.3	75	282	14.5	75
23 - 25 May	9	41	39	0	80	20.5	343	60.9	80	289	13.5	80
	10	55	52	0	107	27.4	377	63.1	107	295	10.2	107
	11	31	33	0	64	16.4	384	56.8	64	297	11.2	64
	12	12	4	0	16	4.1	402	66.9	16	298	9.7	16
	13	1	2	0	3	0.8	471	61.3	3	308	9.7	3
	14											
	15											
	16											
Sample Total		202	189	0	391	100.0	346	71.7	391	288	16.2	391
	2											
	3											
	4											
	5											
	6	1	0	0	1	1.0	366		1	314		1
	7	0	3	0	3	3.1	273	49.9	3	264	13.9	3
	8	7	9	0	16	16.7	316	42.0	16	285	11.0	16
28 - 29 May	9	7	10	0	17	17.7	340	43.5	17	288	8.0	17
	10	11	21	0	32	33.3	381	54.0	32	301	10.3	32
	11	8	4	0	12	12.5	365	38.5	12	288	14.3	12
	12	7	5	0	12	12.5	379	56.2	12	300	10.0	12
	13	1	2	0	3	3.1	373	83.3	3	295	13.6	3
	14											
	15											
	16											
Sample Total		42	54	0	96	100.0	357	55.9	96	293	13.5	96
	2											
	3											
	4											
	5	1	1	0	2	0.4	183	12.7	2	240	2.1	2
	6	17	12	0	29	6.0	252	41.6	29	265	15.3	29
	7	8	11	0	19	3.9	269	52.7	19	267	12.2	19
All Periods Combined	8	44	47	0	91	18.7	314	43.6	91	283	14.0	91
20 May - 2 June	9	48	49	0	97	19.9	343	58.0	97	289	12.7	97
	10	66	73	0	139	28.5	378	61.0	139	296	10.5	139
	11	39	37	0	76	15.6	381	54.6	76	296	12.1	76
	12	19	9	0	28	5.7	392	62.6	28	299	9.7	28
	13	2	4	0	6	1.2	422	84.9	6	302	12.5	6
	14											
	15											
	16											
All Samples Combined		244	243	0	487	100.0	348	68.9	487	289	15.8	487
Sex Composition (%)		50.1	49.9									
Not Aged		7	6	0	13	2.7	340	62.9	13	287	15.7	13
Sex Composition (%)		53.8	46.2									

Appendix A.3. Age, sex, and size composition of herring sampled from the commercial gillnet harvest, Cape Avinof District, 1989.

Sample Dates	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
	2											
	3											
	4											
	5											
	6	0	1	0	1	1.3	322		1	298		1
	7	3	2	0	5	6.4	309	37.5	5	281	13.6	5
	8	8	8	0	16	20.5	301	37.4	16	288	29.4	16
4 June	9	12	10	0	22	28.2	341	46.4	22	301	20.0	22
	10	6	8	0	14	17.9	345	36.9	14	298	8.1	14
	11	13	5	0	18	23.1	379	59.9	18	309	14.3	18
	12	0	2	0	2	2.6	388	62.2	2	292	23.3	2
	13											
	14											
	15											
	16											
Sample Total		42	36	0	78	100.0	341	53.0	78	298	20.5	78
	2											
	3											
	4											
	5	0	1	0	1	0.8	306		1	298		1
	6											
	7	0	1	0	1	0.8	345		1	301		1
	8	2	10	0	12	9.6	305	52.4	12	286	16.5	12
8 June	9	12	17	0	29	23.2	311	35.5	29	288	16.0	29
	10	19	20	0	39	31.2	322	31.1	39	292	13.2	39
	11	8	19	0	27	21.6	346	31.2	27	298	8.5	27
	12	4	9	0	13	10.4	331	18.6	13	294	5.7	13
	13	1	0	0	1	0.8	312		1	292		1
	14	1	1	0	2	1.6	369	0.7	2	304	2.1	2
	15											
	16											
Sample Total		47	78	0	125	100.0	324	35.9	125	292	13.2	125
	2											
	3											
	4											
	5											
	6											
	7											
	8	2	0	0	2	9.5	326	0.0	2	290	5.7	2
9 June	9	2	3	0	5	23.8	334	20.4	5	296	7.9	5
	10	0	3	0	3	14.3	351	34.4	3	305	13.2	3
	11	3	3	0	6	28.6	336	29.9	6	298	8.2	6
	12	1	3	0	4	19.0	349	25.7	4	302	7.1	4
	13	0	1	0	1	4.8	361		1	302		1
	14											
	15											
	16											
Sample Total		8	13	0	21	100.0	340	24.7	21	299	8.6	21

-Continued-

Appendix A.3. (p. 2 of 2)

Sample Dates	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
	2											
	3											
	4											
	5	0	1	0	1	0.4	306		1	298		1
	6	0	1	0	1	0.4	322		1	298		1
	7	3	3	0	6	2.7	315	36.7	6	285	14.6	6
All Periods Combined	8	12	18	0	30	13.4	304	42.5	30	288	23.5	30
4- 9 June	9	26	30	0	56	25.0	325	41.4	56	293	18.1	56
	10	25	31	0	56	25.0	329	34.1	56	294	12.6	56
	11	24	27	0	51	22.8	356	45.9	51	302	11.9	51
	12	5	14	0	19	8.5	340	29.9	19	295	8.5	19
	13	1	1	0	2	0.9	337	34.6	2	297	7.1	2
	14	1	1	0	2	0.9	369	0.7	2	304	2.1	2
	15											
	16											
	17											
All Samples Combined		97	127	0	224	100.0	332	42.5	224	295	16.0	224
Sex Composition (%)		43.3	56.7									
Not Aged		3	0	0	3	1.3	353	29.1	3	302	8.7	3
Sex Composition (%)		100.0	0.0									

Appendix A.4. Age, sex, and size composition of herring sampled from the commercial gillnet harvest, Nelson Island District, 1989.

Sample Dates	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
	2											
	3											
	4											
	5											
	6											
	7	3	1	0	4	1.5	284	114.4	4	286	16.2	4
	8	17	18	0	35	12.8	276	70.8	35	281	12.2	34
29 May	9	8	11	0	19	6.9	311	75.1	19	294	12.9	18
	10	29	37	0	66	24.1	328	59.8	66	295	8.8	66
	11	31	44	0	75	27.4	353	65.5	75	302	9.5	75
	12	23	43	0	66	24.1	370	68.6	66	304	8.0	65
	13	4	2	0	6	2.2	374	66.2	6	308	7.5	6
	14	0	3	0	3	1.1	490	79.8	3	329	7.6	3
	15											
	16											
Sample Total		115	159	0	274	100.0	340	74.9	274	298	12.5	271
	2											
	3											
	4											
	5											
	6											
	7	1	2	0	3	30.0	341	79.9	3	281	21.6	3
	8											
1 June	9											
	10	1	1	0	2	20.0	401	21.2	2	297	0.0	2
	11	1	2	0	3	30.0	441	64.1	3	303	9.6	3
	12	2	0	0	2	20.0	380	45.3	2	307	4.2	2
	13											
	14											
	15											
	16											
Sample Total		5	5	0	10	100.0	391	65.9	10	296	15.5	10
	2											
	3											
	4											
	5											
	6	0	1	0	1	1.9	274		1	274		1
	7	0	2	0	2	3.8	369	91.9	2	283	19.1	2
	8	1	5	0	6	11.3	317	36.6	6	280	6.5	6
3 June	9	0	4	0	4	7.5	327	45.6	4	290	8.2	4
	10	5	10	0	15	28.3	333	43.2	15	295	6.7	15
	11	7	8	0	15	28.3	389	56.4	15	303	9.7	15
	12	4	3	0	7	13.2	338	26.2	7	301	6.1	7
	13	0	1	0	1	1.9	358		1	308		1
	14	0	1	0	1	1.9	448		1	324		1
	15	1	0	0	1	1.9	388		1	308		1
	16											
Sample Total		18	35	0	53	100.0	351	53.7	53	296	11.8	53

-Continued-

Appendix A.4. (p. 2 of 2)

Sample Dates	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
	2											
	3											
	4											
	5											
	6	0	1	0	1	0.3	274		1	274		1
	7	4	5	0	9	2.7	322	94.8	9	284	16.3	9
All Periods Combined	8	18	23	0	41	12.2	282	68.1	41	281	11.4	40
29 May - 3 June	9	8	15	0	23	6.8	314	70.2	23	293	12.0	22
	10	35	48	0	83	24.6	331	57.3	83	295	8.3	83
	11	39	54	0	93	27.6	362	66.4	93	302	9.5	93
	12	29	46	0	75	22.3	368	65.7	75	304	7.8	74
	13	4	3	0	7	2.1	372	60.8	7	308	6.9	7
	14	0	4	0	4	1.2	480	68.4	4	328	6.6	4
	15	1	0	0	1	0.3	388		1	308		1
	16											
	17											
All Samples Combined		138	199	0	337	100.0	343	72.1	337	298	12.5	334
Sex Composition (%)		40.9	59.1									
Not Aged		35	28	0	63	18.7	337	53.7	63	294	19.2	63
Sex Composition (%)		55.6	44.4									

Appendix A.5. Age, sex, and size composition of herring sampled from the commercial gillnet harvest, Nunivak Island District, 1989.

Sample Dates	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
	2											
	3											
	4											
	5											
	6											
	7											
	8	0	7	0	7	7.5	309	40.2	7	284	8.4	7
25 May	9	3	5	0	8	8.6	329	60.0	8	283	11.2	8
	10	14	12	1	27	29.0	345	40.3	26	290	7.8	26
	11	15	17	0	32	34.4	381	43.5	32	300	19.1	32
	12	8	8	0	16	17.2	383	57.9	16	298	9.0	16
	13	1	2	0	3	3.2	364	66.1	3	295	8.1	3
	14											
	15											
	16											
Sample Total		41	51	1	93	100.0	361	52.1	92	294	14.4	92
	2											
	3											
	4											
	5											
	6	0	1	0	1	0.3	232		1	259		1
	7	2	2	0	4	1.1	310	57.1	4	278	22.1	4
	8	13	24	0	37	10.3	310	50.5	36	287	22.4	37
29 May - 2 June	9	23	29	0	52	14.5	331	35.4	52	289	9.2	52
	10	65	55	0	120	33.4	346	47.4	120	292	12.2	120
	11	53	50	0	103	28.7	365	45.7	103	296	12.7	103
	12	16	22	0	38	10.6	364	54.8	38	297	9.5	38
	13	2	1	0	3	0.8	319	48.2	3	291	2.1	3
	14											
	15	1	0	0	1	0.3	404		1	305		1
	16											
Sample Total		175	184	0	359	100.0	347	49.9	358	292	13.8	359
	2											
	3											
	4											
	5											
	6	0	1	0	1	0.2	232		1	259		1
	7	2	2	0	4	0.9	310	57.1	4	278	22.1	4
All Periods Combined	8	13	31	0	44	9.7	310	48.5	43	286	20.8	44
25 May - 2 June	9	26	34	0	60	13.3	331	38.8	60	288	9.6	60
	10	79	67	1	147	32.5	346	46.1	146	291	11.6	146
	11	68	67	0	135	29.9	368	45.6	135	297	14.5	135
	12	24	30	0	54	11.9	370	55.9	54	297	9.3	54
	13	3	3	0	6	1.3	342	57.2	6	293	5.8	6
	14											
	15	1	0	0	1	0.2	404		1	305		1
	16											
All Samples Combined		216	235	1	452	100.0	350	50.6	450	293	13.9	451
Sex Composition (%)		47.9	52.1									
Not Aged		10	17	0	27	6.0	347	49.3	27	291	15.3	27
Sex Composition (%)		37.0	63.0									

Appendix A.6. Age, sex, and size composition of herring sampled from the commercial gillnet harvest, Kokechik Bay area, Cape Romanzof District, 1989.

Sample Dates	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
26 May	2											
	3											
	4											
	5											
	6	2	4	0	6	3.5	237	27.0	6	252	6.3	6
	7	8	14	0	22	12.7	237	39.8	22	257	8.9	22
	8	26	29	0	55	31.8	272	37.8	55	266	11.2	55
	9	6	7	0	13	7.5	312	33.6	13	275	10.4	13
	10	16	13	0	29	16.8	346	31.6	29	285	7.6	29
	11	11	20	0	31	17.9	347	52.7	31	285	12.6	31
	12	9	8	0	17	9.8	339	39.3	17	286	5.7	17
	13											
	14											
	15											
	16											
Sample Total		78	95	0	173	100.0	302	57.8	173	274	15.0	173
27 May	2											
	3											
	4											
	5											
	6	1	1	0	2	1.1	246	20.5	2	257	6.4	2
	7	6	6	0	12	6.8	257	23.2	12	265	4.2	12
	8	34	34	0	68	38.4	293	38.2	68	274	8.9	67
	9	16	10	0	26	14.7	332	46.1	26	284	10.3	26
	10	18	15	0	33	18.6	348	55.9	33	289	12.4	33
	11	8	14	0	22	12.4	380	58.2	22	294	9.1	22
	12	5	8	0	13	7.3	397	79.9	13	302	12.1	13
	13	1	0	0	1	0.6	438		1	306		1
	14											
	15											
	16											
Sample Total		89	88	0	177	100.0	325	63.3	177	282	14.5	176
29 May	2											
	3											
	4											
	5	0	3	0	3	1.7	208	30.0	3	250	11.9	3
	6	3	4	0	7	4.1	242	21.7	7	258	7.0	7
	7	14	14	0	28	16.3	249	24.6	28	260	8.3	28
	8	21	20	0	41	23.8	289	38.7	41	276	21.1	41
	9	6	17	0	23	13.4	327	50.1	23	280	11.9	22
	10	18	19	0	37	21.5	349	50.5	37	289	7.5	37
	11	12	7	0	19	11.0	356	50.7	19	292	11.6	19
	12	5	5	0	10	5.8	402	38.9	10	299	6.8	10
	13	1	1	0	2	1.2	451	60.1	2	305	14.8	2
	14	1	1	0	2	1.2	458	2.8	2	310	7.8	2
	15											
	16											
Sample Total		81	91	0	172	100.0	315	65.9	172	279	18.5	171

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Appendix A.6. (p. 2 of 2)

Sample Dates	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
	2											
	3											
	4											
	5	1	0	0	1	0.6	208		1	243		1
	6	2	6	0	8	4.4	237	40.9	8	273	35.7	8
	7	10	19	0	29	16.1	248	57.5	29	264	12.1	29
	8	22	22	1	45	25.0	260	36.6	45	271	9.8	45
30 May	9	8	11	0	19	10.6	321	35.4	19	287	6.5	19
	10	18	13	0	31	17.2	320	41.1	31	288	9.8	31
	11	19	14	0	33	18.3	351	52.2	33	294	11.9	33
	12	3	10	0	13	7.2	368	63.3	13	300	14.9	13
	13	0	1	0	1	0.6	471		1	305		1
	14											
	15											
	16											
Sample Total		83	96	1	180	100.0	299	64.9	180	281	17.7	180
	2											
	3											
	4											
	5	1	3	0	4	0.6	208	24.5	4	249	10.4	4
	6	8	15	0	23	3.3	239	29.3	23	262	22.5	23
	7	38	53	0	91	13.0	247	41.1	91	261	9.8	91
All Periods Combined	8	103	105	1	209	29.8	280	39.8	209	272	13.3	208
26 - 30 May	9	36	45	0	81	11.5	325	43.1	81	282	10.6	80
	10	70	60	0	130	18.5	341	47.4	130	288	9.5	130
	11	50	55	0	105	15.0	357	54.0	105	291	12.1	105
	12	22	31	0	53	7.5	372	61.9	53	296	12.3	53
	13	2	2	0	4	0.6	453	37.3	4	305	8.6	4
	14	1	1	0	2	0.3	458	2.8	2	310	7.8	2
	15											
	16											
All Samples Combined		331	370	1	702	100.0	310	63.8	702	279	16.8	700
Sex Composition (%)		47.2	52.8									
Not Aged		87	77	0	164	23.4	325	67.4	164	285	55.0	164
Sex Composition (%)		53.0	47.0									

Appendix A.7. Age, sex, and size composition of herring sampled from the commercial gillnet harvest, St Michael Subdistrict, Norton Sound District, 1989.

Sample Dates	Age	Sex (number)				Percent of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
27 May	2											
	3											
	4											
	5	2	1	0	3	1.9	225	17.0	3	250	5.0	3
	6	1	2	0	3	1.9	216	26.0	3	258	9.3	3
	7	23	15	0	38	23.9	258	57.8	38	265	9.1	38
	8	32	22	0	54	34.0	302	53.3	54	275	10.2	54
	9	16	11	0	27	17.0	332	50.6	27	281	9.5	27
	10	10	8	0	18	11.3	343	54.5	18	284	9.0	18
	11	6	3	0	9	5.7	380	36.3	9	293	10.2	9
	12	6	1	0	7	4.4	361	39.3	7	289	10.3	7
	13											
	14											
	15											
	16											
Sample Total		96	63	0	159	100.0	305	64.5	159	276	13.2	159
28 May	2											
	3											
	4											
	5											
	6	3	3	0	6	2.9	254	56.4	6	265	10.9	6
	7	18	14	0	32	15.6	268	32.3	32	265	8.8	32
	8	33	46	0	79	38.5	295	39.6	79	272	10.7	79
	9	17	17	0	34	16.6	327	51.1	34	278	10.2	34
	10	19	15	0	34	16.6	350	43.7	34	286	9.5	34
	11	9	8	0	17	8.3	378	63.6	17	290	12.2	17
	12	1	1	0	2	1.0	405	9.9	2	302	1.4	2
	13	0	1	0	1	0.5	494		1	317		1
	14											
	15											
	16											
Sample Total		100	105	0	205	100.0	313	57.3	205	276	13.4	205
29 May	2											
	3											
	4											
	5											
	6	0	1	0	1	2.2	258		1	258		1
	7	1	7	0	8	17.4	268	31.6	8	265	9.5	8
	8	4	8	0	12	26.1	281	37.2	12	275	10.4	12
	9	8	4	0	12	26.1	301	40.6	12	278	8.6	12
	10	6	4	0	10	21.7	309	38.2	10	285	7.2	10
	11	0	3	0	3	6.5	359	36.1	3	297	5.5	3
	12											
	13											
	14											
	15											
	16											
Sample Total		19	27	0	46	100.0	294	42.2	46	277	12.0	46

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Appendix A.7. (p. 2 of 2)

Sample Dates	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
	2											
	3											
	4											
	5	2	1	0	3	0.7	225	17.0	3	250	5.0	3
	6	4	6	0	10	2.4	243	47.5	10	262	10.1	10
	7	42	36	0	78	19.0	263	46.2	78	265	8.9	78
All Periods Combined	8	69	76	0	145	35.4	297	45.1	145	274	10.5	145
27 - 29 May	9	41	32	0	73	17.8	324	49.9	73	279	9.7	73
	10	35	27	0	62	15.1	341	47.9	62	285	8.9	62
	11	15	14	0	29	7.1	376	53.1	29	291	11.1	29
	12	7	2	0	9	2.2	371	39.4	9	292	10.5	9
	13	0	1	0	1	0.2	494		1	317		1
	14											
	15											
	16											
All Samples Combined		215	195	0	410	100.0	308	59.0	410	276	13.2	410
Sex Composition (%)		52.4	47.6									
Not Aged		13	10	0	23	5.6	321	61.1	23	278	12.2	23
Sex Composition (%)		56.5	43.5									

Appendix A.8. Age, sex, and size composition of herring sampled from the commercial gillnet harvest, Cape Denbigh Subdistrict, Norton Sound District, 1989.

Sample Dates	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
	2											
	3											
	4											
	5											
	6	1	0	0	1	1.2	270		1	271		1
	7	4	9	0	13	15.3	273	15.5	13	268	9.6	13
	8	6	8	0	15	17.6	309	32.0	15	283	29.4	15
27 May	9	7	6	0	13	15.3	343	49.5	13	282	11.6	13
	10	15	11	0	26	30.6	347	41.2	26	286	8.7	26
	11	6	5	0	11	12.9	376	21.6	11	291	5.9	11
	12	4	2	0	6	7.1	406	58.2	6	298	8.5	6
	13											
	14											
	15											
	16											
Sample Total		43	41	0	85	100.0	335	52.1	85	283	16.5	85
	2											
	3											
	4											
	5											
	6	0	1	0	1	1.1	284		1	272		1
	7	5	6	0	11	12.5	286	46.5	11	270	11.2	11
	8	6	13	0	19	21.6	309	28.2	19	277	6.9	19
28 May	9	9	6	0	15	17.0	326	35.6	15	283	9.5	15
	10	11	12	0	23	26.1	361	33.0	23	290	8.9	23
	11	4	7	0	11	12.5	361	45.9	11	295	11.3	11
	12	4	4	0	8	9.1	378	40.1	8	298	8.1	8
	13											
	14											
	15											
	16											
Sample Total		39	49	0	88	100.0	335	46.8	88	285	12.6	88
	2											
	3											
	4											
	5											
	6	2	1	0	3	7.7	225	26.4	3	251	8.3	3
	7	9	7	0	16	41.0	238	26.7	16	260	9.2	16
	8	5	7	0	12	30.8	293	53.0	12	274	10.5	12
29 May	9	1	1	0	2	5.1	282	33.9	2	276	6.4	2
	10	2	1	0	3	7.7	317	22.5	3	292	9.6	3
	11	2	1	0	3	7.7	383	126.2	3	297	24.7	3
	12											
	13											
	14											
	15											
	16											
Sample Total		21	18	0	39	100.0	273	62.9	39	270	16.7	39

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Appendix A.8. (p. 2 of 2)

Sample Dates	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
	2											
	3											
	4											
	5											
	6	3	2	0	5	2.4	246	34.6	5	259	12.5	5
	7	18	22	0	40	18.9	263	36.6	40	265	10.7	40
All Periods Combined	8	17	28	0	46	21.7	305	37.1	46	278	18.1	46
27 - 29 May	9	17	13	0	30	14.2	331	43.7	30	282	10.2	30
	10	28	24	0	52	24.5	351	38.0	52	288	9.0	52
	11	12	13	0	25	11.8	370	49.7	25	293	11.1	25
	12	8	6	0	14	6.6	390	48.7	14	298	7.9	14
	13											
	14											
	15											
	16											
	17											
All Samples Combined		103	108	0	212	100.0	324	57.2	212	281	16.0	212
Sex Composition (%)		48.8	51.2									
Not Aged		2	3	0	5	2.4	325	36.8	5	276	11.0	5
Sex Composition (%)		40.0	60.0									

Appendix A.9. Age, sex, and size composition of herring sampled from the commercial beach seine harvest, Cape Denbigh Subdistrict, Norton Sound District, 1989.

Sample Dates	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
	2											
	3											
	4											
	5	2	1	0	3	1.8	263	93.0	3	249	26.9	3
	6	9	7	0	16	9.8	238	43.6	16	250	10.9	16
	7	27	34	0	61	37.2	265	38.7	61	255	10.5	61
	8	18	20	0	38	23.2	304	41.5	38	265	8.8	38
27 May	9	9	4	0	13	7.9	334	55.6	13	274	10.6	13
	10	14	12	0	26	15.9	361	51.8	26	279	11.6	26
	11	2	2	0	4	2.4	359	46.5	4	280	1.9	4
	12	0	2	0	2	1.2	361	49.5	2	290	7.8	2
	13	1	0	0	1	0.6	346		1	278		1
	14											
	15											
	16											
Sample Total		82	82	0	164	100.0	296	59.9	164	263	14.9	164
Sex Composition (%)		50.0	50.0									
Not Aged		8	8	0	16	9.8	289	74.3	16	260	19.2	16
Sex Composition (%)		50.0	50.0									

Appendix A.10. Age, sex, and size composition of herring sampled from the variable-mesh gillnet catches, Security Cove District, 1989.

Sample Week	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
	2											
	3											
	4											
	5											
	6											
	7											
	8											
6 - 12 May	9											
	10	2	1	0	3	30.0	420	45.2	3	289	8.1	3
	11	1	3	0	4	40.0	485	69.8	4	304	17.4	4
	12	1	1	0	2	20.0	448	11.3	2	302	7.1	2
	13											
	14	1	0	0	1	10.0	426		1	307		1
	15											
	16											
Sample Total		5	5	0	10	100.0	452	54.7	10	300	13.1	10
	2											
	3											
	4											
	5	14	9	0	23	12.8	179	25.0	23	239	9.1	23
	6	22	8	0	30	16.8	221	38.7	30	256	11.8	30
	7	7	4	0	11	6.1	283	60.2	11	266	20.7	11
	8	21	13	0	34	19.0	308	61.5	34	279	8.9	34
13 - 19 May	9	4	6	0	10	5.6	331	77.8	10	286	8.0	10
	10	22	13	0	35	19.6	384	68.8	35	298	10.2	35
	11	19	12	0	31	17.3	394	53.9	31	300	8.4	31
	12	3	1	0	4	2.2	314	68.3	4	288	9.1	4
	13	1	0	0	1	0.6	472		1	314		1
	14											
	15											
	16											
Sample Total		113	66	0	179	100.0	307	95.3	179	277	23.9	179
	2											
	3											
	4											
	5	2	3	0	5	20.0	165	10.8	5	234	6.5	5
	6	1	1	0	2	8.0	198	19.8	2	241	0.7	2
	7	1	0	0	1	4.0	150		1	263		1
	8	3	1	0	4	16.0	354	27.8	4	284	2.6	4
20 - 26 May	9											
	10	2	3	0	5	20.0	362	53.7	5	300	14.8	5
	11	3	3	0	6	24.0	383	83.5	6	300	8.1	6
	12	1	1	0	2	8.0	449	66.5	2	309	13.4	2
	13											
	14											
	15											
	16											
Sample Total		13	12	0	25	100.0	312	112.1	25	279	30.0	25

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Appendix A.10. (p. 2 of 2)

Sample Week	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
	2											
	3											
	4											
	5	16	12	0	28	13.1	177	23.6	28	238	8.8	28
	6	23	9	0	32	15.0	219	38.0	32	255	12.0	32
	7	8	4	0	12	5.6	272	69.0	12	266	19.7	12
All Weeks Combined	8	24	14	0	38	17.8	313	60.3	38	280	8.5	38
6 - 26 May	9	4	6	0	10	4.7	331	77.8	10	286	8.0	10
	10	26	17	0	43	20.1	384	66.0	43	298	10.7	43
	11	23	18	0	41	19.2	401	64.9	41	300	9.2	41
	12	5	3	0	8	3.7	381	88.4	8	297	12.6	8
	13	1	0	0	1	0.5	472		1	314		1
	14	1	0	0	1	0.5	426		1	307		1
	15											
	16											
All Samples Combined		131	83	0	214	100.0	315	100.3	214	279	24.6	214
Sex Composition (%)		61.2	38.8									
Not Aged		19	18	0	37	17.3	329	91.4	37	281	23.6	37
Sex Composition (%)		51.4	48.6									

Appendix A.11. Age, sex, and size composition of herring sampled from the variable-mesh gillnet catches, Goodnews Bay District, 1989.

Sample Week	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
	2											
	3											
	4											
	5	1	0	0	1	0.8	184		1	240		1
	6											
	7	0	2	0	2	1.7	294	36.8	2	276	2.1	2
	8	3	7	0	10	8.3	368	30.9	10	287	6.2	10
6 - 12 May	9	4	5	0	9	7.4	386	66.6	9	295	11.5	9
	10	19	10	0	29	24.0	399	35.1	29	298	7.4	29
	11	37	9	0	46	38.0	425	41.8	46	304	7.2	46
	12	17	6	0	23	19.0	422	51.6	23	302	8.3	23
	13											
	14	1	0	0	1	0.8	396		1	295		1
	15											
	16											
Sample Total		82	39	0	121	100.0	406	52.7	121	299	10.9	121
	2											
	3											
	4											
	5	17	8	0	25	13.4	169	31.8	25	240	12.0	25
	6	10	15	0	25	13.4	205	31.0	25	251	10.0	25
	7	4	2	0	6	3.2	246	54.8	6	265	9.0	6
	8	19	9	0	28	15.0	301	43.3	28	277	9.5	28
13 - 19 May	9	9	1	0	10	5.3	307	59.2	10	281	9.5	10
	10	18	10	0	28	15.0	374	67.0	28	293	13.7	28
	11	28	9	0	37	19.8	387	56.1	37	295	10.9	37
	12	20	5	0	25	13.4	398	46.2	25	300	10.8	25
	13	2	1	0	3	1.6	465	77.4	3	312	4.7	3
	14											
	15											
	16											
Sample Total		127	60	0	187	100.0	313	99.5	187	278	24.3	187
	2											
	3											
	4	1	1	0	2	1.5	114	8.5	2	212	8.5	2
	5	27	20	0	47	36.2	156	24.3	47	230	7.8	47
	6	14	5	0	19	14.6	219	39.0	19	251	13.4	19
	7	1	4	0	5	3.8	256	26.9	5	263	6.7	5
	8	4	5	0	9	6.9	269	42.1	9	271	13.6	9
20 - 26 May	9	3	2	0	5	3.8	348	42.3	5	284	14.1	5
	10	6	7	0	13	10.0	344	114.9	13	288	9.6	13
	11	11	3	0	14	10.8	358	63.5	14	291	10.0	14
	12	11	4	0	15	11.5	406	51.9	15	300	10.6	15
	13	0	1	0	1	0.8	536		1	318		1
	14											
	15											
	16											
Sample Total		78	52	0	130	100.0	256	110.3	130	260	30.1	130

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Appendix A.11. (p. 2 of 2)

Sample Week	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
	2											
	3											
	4	0	2	0	2	1.5	116	5.7	2	214	5.7	2
	5	35	35	0	70	51.9	142	22.5	70	230	8.8	70
	6	13	11	0	24	17.8	177	30.3	24	242	9.6	24
	7	4	3	0	7	5.2	231	52.3	7	257	16.2	7
	8	5	4	0	9	6.7	265	32.7	9	270	6.5	9
27 May - 2 June	9	2	1	0	3	2.2	315	22.7	3	291	9.9	3
	10	7	2	0	9	6.7	335	48.8	9	292	10.1	9
	11	2	5	0	7	5.2	359	74.7	7	296	9.6	7
	12	4	0	0	4	3.0	366	43.6	4	300	5.3	4
	13											
	14											
	15											
	16											
Sample Total		72	63	0	135	100.0	195	83.5	135	247	26.3	135
	2											
	3											
	4	1	3	0	4	0.7	115	6.0	4	213	6.0	4
	5	80	63	0	143	25.0	151	26.9	143	232	9.8	143
	6	37	31	0	68	11.9	199	37.0	68	248	11.5	68
	7	9	11	0	20	3.5	248	47.2	20	263	12.0	20
All Weeks Combined	8	31	25	0	56	9.8	302	51.7	56	277	10.8	56
6 May - 2 June	9	18	9	0	27	4.7	342	64.3	27	287	12.3	27
	10	50	29	0	79	13.8	374	69.5	79	294	11.1	79
	11	78	26	0	104	18.2	398	58.2	104	299	10.4	104
	12	52	15	0	67	11.7	406	50.4	67	301	9.6	67
	13	2	2	0	4	0.7	483	72.5	4	313	5.0	4
	14	1	0	0	1	0.2	396		1	295		1
	15											
	16											
All Samples Combined		359	214	0	573	100.0	292	116.6	573	271	30.5	573
Sex Composition (%)		62.7	37.3									
Not Aged		55	39	0	94	16.4	328	100.0	94	282	26.9	94
Sex Composition (%)		58.5	41.5									

Appendix A.12. Age, sex, and size composition of herring sampled from the variable-mesh gillnet catches, Cape Avinof District, 1989.

Sample Week	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
	2											
	3											
	4	0	2	0	2	5.0	154	53.7	2	230	33.2	2
	5	6	6	0	12	30.0	174	57.6	12	233	9.4	12
	6	1	5	0	6	15.0	215	49.0	6	234	40.9	6
	7	0	2	0	2	5.0	218	28.3	2	255	10.6	2
	8	1	3	0	4	10.0	282	62.4	4	267	16.8	4
27 May - 2 June	9											
	10	3	4	0	7	17.5	348	53.4	7	284	9.6	7
	11	0	4	0	4	10.0	379	76.0	4	290	14.8	4
	12	1	2	0	3	7.5	386	59.4	3	296	9.1	3
	13											
	14											
	15											
	16											
Sample Total		12	28	0	40	100.0	259	100.2	40	257	31.4	40
	2											
	3	1	2	0	3	2.6	68	6.0	3	184	4.5	3
	4	3	2	0	5	4.4	122	34.8	5	213	17.3	5
	5	14	15	0	29	25.4	144	17.7	29	227	8.5	29
	6	6	4	0	10	8.8	189	40.4	10	244	10.3	10
	7	3	5	0	8	7.0	207	28.5	8	250	11.4	8
	8	8	10	0	18	15.8	271	43.0	18	273	8.9	18
3 - 9 June	9	0	1	0	1	0.9	242		1	273		1
	10	3	9	0	12	10.5	320	70.9	12	292	15.9	12
	11	5	8	0	13	11.4	318	35.6	13	291	11.5	13
	12	4	10	0	14	12.3	364	47.5	14	299	8.9	14
	13	0	1	0	1	0.9	302		1	294		1
	14											
	15											
	16											
Sample Total		47	67	0	114	100.0	237	94.8	114	260	33.4	114
	2	2	2	0	4	2.9	55	2.5	4	166	5.5	4
	3	2	6	0	8	5.8	70	7.7	8	182	4.6	8
	4	2	7	0	9	6.5	133	28.9	9	209	34.8	9
	5	17	16	0	33	23.9	134	18.4	33	224	10.9	33
	6	6	12	0	18	13.0	170	31.1	18	240	13.4	18
	7	5	8	0	13	9.4	204	52.3	13	255	22.9	13
	8	6	3	0	9	6.5	253	24.6	9	273	13.1	9
10 - 16 June	9	1	0	0	1	0.7	232		1	263		1
	10	6	8	0	14	10.1	293	43.1	14	292	23.1	14
	11	6	6	0	12	8.7	323	69.3	12	286	15.8	12
	12	9	7	0	16	11.6	321	48.3	16	306	22.6	16
	13	0	1	0	1	0.7	324		1	295		1
	14											
	15											
	16											
Sample Total		62	76	0	138	100.0	203	92.9	138	250	42.3	138

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Appendix A.12. (p. 2 of 2)

Sample Week	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
	2	2	2	0	4	1.4	55	2.5	4	166	5.5	4
	3	3	8	0	11	3.8	69	7.0	11	182	4.5	11
	4	5	11	0	16	5.5	132	32.5	16	213	29.1	16
	5	37	37	0	74	25.3	144	31.1	74	226	10.2	74
	6	13	21	0	34	11.6	183	40.0	34	240	19.7	34
	7	8	15	0	23	7.9	206	42.4	23	253	18.4	23
All Weeks Combined	8	15	16	0	31	10.6	267	41.2	31	273	11.1	31
27 May - 16 June	9	1	1	0	2	0.7	237	7.1	2	268	7.1	2
	10	12	21	0	33	11.3	314	59.0	33	290	18.2	33
	11	11	18	0	29	9.9	328	59.0	29	289	13.5	29
	12	14	19	0	33	11.3	345	53.3	33	302	17.1	33
	13	0	2	0	2	0.7	313	15.6	2	295	0.7	2
	14											
	15											
	16											
All Samples Combined		121	171	0	292	100.0	224	96.7	292	255	37.8	292
Sex Composition (%)		41.4	58.6									
Not Aged		16	20	0	36	12.3	255	87.1	36	275	38.0	36
Sex Composition (%)		44.4	55.6									

Appendix A.13. Age, sex and size composition of herring sampled from the variable-mesh gillnet catches, Nelson Island District, 1989.

Sample Week	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
	2											
	3											
	4											
	5	6	8	0	14	10.2	178	30.9	14	242	11.0	14
	6	10	5	0	15	10.9	217	21.9	15	257	8.9	15
	7	2	4	0	6	4.4	284	40.0	6	272	9.3	6
	8	8	10	0	18	13.1	329	49.3	18	287	11.5	18
20 - 26 May	9	5	8	0	13	9.5	365	48.4	13	295	9.7	13
	10	9	14	0	23	16.8	396	51.0	23	302	10.4	23
	11	19	17	0	36	26.3	425	54.2	36	303	18.7	36
	12	5	6	0	11	8.0	463	66.5	11	314	9.8	11
	13											
	14											
	15											
	16	1	0	0	1	0.7	476		1	329		1
Sample Total		65	72	0	137	100.0	351	102.3	137	288	25.6	137
	2											
	3	0	1	0	1	0.8	82		1	190		1
	4	2	1	0	3	2.3	96	2.0	3	203	5.0	3
	5	9	14	0	23	17.8	141	24.8	23	226	10.0	23
	6	8	3	0	11	8.5	245	107.4	11	240	43.3	11
	7	2	3	0	5	3.9	284	103.9	5	264	16.9	5
	8	3	9	0	12	9.3	296	42.0	12	276	7.7	12
27 May - 2 June	9	5	2	0	7	5.4	342	62.0	7	288	11.5	7
	10	7	13	0	20	15.5	364	52.5	20	294	7.8	20
	11	19	16	0	35	27.1	374	63.4	35	295	14.3	35
	12	5	5	0	10	7.8	379	66.6	10	293	12.2	10
	13											
	14	0	2	0	2	1.6	463	24.0	2	310	13.4	2
	15											
	16											
Sample Total		60	69	0	129	100.0	301	113.0	129	272	34.5	129
	2											
	3											
	4	4	1	0	5	2.5	109	7.9	5	205	4.9	5
	5	21	15	0	36	18.3	142	18.1	36	222	7.9	36
	6	10	8	0	18	9.1	203	24.7	18	246	10.7	18
	7	4	8	0	12	6.1	228	40.0	12	253	13.2	12
	8	7	15	1	23	11.7	286	45.5	23	271	12.5	23
3 - 9 June	9	9	9	0	18	9.1	312	84.1	18	282	17.2	18
	10	10	13	0	23	11.7	345	74.0	23	281	24.3	23
	11	23	15	0	38	19.3	362	60.4	38	290	14.4	38
	12	11	12	0	23	11.7	398	79.2	23	299	12.7	23
	13											
	14	0	1	0	1	0.5	558		1	315		1
	15											
	16											
Sample Total		99	97	1	197	100.0	282	109.3	197	266	31.7	197

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Appendix A.13. (p. 2 of 2)

Sample Week	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
	2											
	3	0	1	0	1	0.2	82		1	190		1
	4	6	2	0	8	1.7	104	9.1	8	204	4.7	8
	5	36	37	0	73	15.8	148	27.0	73	227	11.8	73
	6	28	16	0	44	9.5	218	58.0	44	248	23.5	44
	7	8	15	0	23	5.0	255	62.9	23	260	15.0	23
All Weeks Combined	8	18	34	1	53	11.4	303	49.1	53	277	13.1	53
20 May - 9 June	9	19	19	0	38	8.2	336	72.2	38	288	14.9	38
	10	26	40	0	66	14.3	369	63.4	66	292	18.2	66
	11	61	48	0	109	23.5	387	64.9	109	296	16.6	109
	12	21	23	0	44	9.5	410	78.6	44	301	13.9	44
	13											
	14	0	3	0	3	0.6	495	57.4	3	311	10.0	3
	15											
	16	1	0	0	1	0.2	476		1	329		1
All Samples Combined		224	238	1	463	100.0	308	111.9	463	274	32.2	463
Sex Composition (%)		48.5	51.5									
Not Aged		30	38	0	68	14.7	312	121.0	68	276	34.3	68
Sex Composition (%)		44.1	55.9									

Appendix A.14. Age, sex, and size composition of herring sampled from the variable-mesh gillnet catches, Nunivak Island District, 1989.

Sample Week	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
	2											
	3											
	4	0	1	0	1	0.6	138		1	222		1
	5	4	1	0	5	3.2	140	26.8	5	223	11.3	5
	6	3	3	0	6	3.8	200	38.1	6	244	11.2	6
	7	5	2	0	7	4.5	223	23.9	7	259	10.1	7
	8	16	10	0	26	16.6	290	46.6	26	273	9.7	26
20 - 26 May	9	7	10	0	17	10.8	329	36.8	17	284	6.4	17
	10	22	17	0	39	24.8	340	44.4	39	286	8.5	39
	11	19	7	0	26	16.6	359	52.2	26	293	7.1	26
	12	15	13	0	28	17.8	383	53.1	28	294	10.8	28
	13	1	0	0	1	0.6	346		1	295		1
	14	1	0	0	1	0.6	358		1	300		1
	15											
	16											
Sample Total		93	64	0	157	100.0	323	73.7	157	281	18.8	157
	2											
	3											
	4											
	5	1	2	0	3	2.5	161	45.8	3	236	21.8	3
	6	2	1	0	3	2.5	199	43.9	3	244	12.2	3
	7	4	0	0	4	3.3	237	44.9	4	256	13.6	4
	8	12	11	0	23	19.2	288	60.9	23	275	13.4	23
27 May - 2 June	9	4	3	0	7	5.8	324	39.6	7	278	7.8	7
	10	19	18	0	37	30.8	340	51.9	37	288	10.0	37
	11	12	11	0	23	19.2	390	54.1	23	296	8.0	23
	12	11	9	0	20	16.7	410	60.0	20	298	8.0	20
	13											
	14											
	15											
	16											
Sample Total		65	55	0	120	100.0	339	79.6	120	284	17.6	120
	2											
	3											
	4											
	5	2	1	0	3	6.4	132	36.2	3	232	2.9	3
	6	2	3	0	5	10.6	169	24.2	5	238	12.1	5
	7	5	2	0	7	14.9	191	17.3	7	254	9.9	7
	8	2	3	0	5	10.6	266	70.6	5	277	18.6	5
3 - 9 June	9	5	0	0	5	10.6	301	46.0	5	284	12.1	5
	10	6	5	0	11	23.4	310	59.7	11	288	17.6	11
	11	5	2	0	7	14.9	362	65.6	7	302	11.8	7
	12	1	3	0	4	8.5	387	56.3	4	302	2.2	4
	13											
	14											
	15											
	16											
Sample Total		28	19	0	47	100.0	275	92.5	47	276	26.9	47

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Appendix A.14. (p. 2 of 2)

Sample Week	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
	2											
	3	1	0	0	1	1.0	52		1	171		1
	4	0	1	0	1	1.0	102		1	210		1
	5	11	6	0	17	17.7	143	34.3	17	223	14.7	17
	6	13	5	0	18	18.8	149	21.0	18	229	5.7	18
	7	4	6	0	10	10.4	245	95.9	10	265	27.1	10
	8	5	5	0	10	10.4	269	48.5	10	271	17.0	10
10 - 16 June	9	2	5	0	7	7.3	325	63.5	7	291	13.5	7
	10	5	4	0	9	9.4	336	54.8	9	284	8.6	9
	11	8	5	0	13	13.5	368	83.2	13	292	21.5	13
	12	4	6	0	10	10.4	378	38.5	10	297	8.4	10
	13											
	14											
	15											
	16											
Sample Total		53	43	0	96	100.0	253	110.9	96	261	34.5	96
	2											
	3	1	0	0	1	0.2	52		1	171		1
	4	0	2	0	2	0.5	120	25.5	2	216	8.5	2
	5	18	10	0	28	6.7	143	33.2	28	225	14.3	28
	6	20	12	0	32	7.6	166	34.2	32	235	10.4	32
	7	18	10	0	28	6.7	225	62.9	28	259	18.2	28
All Weeks Combined	8	35	29	0	64	15.2	284	53.8	64	274	12.9	64
20 May - 16 June	9	18	18	0	36	8.6	324	43.7	36	284	9.7	36
	10	52	44	0	96	22.9	336	50.2	96	287	10.4	96
	11	44	25	0	69	16.4	372	61.1	69	295	12.0	69
	12	31	31	0	62	14.8	391	54.1	62	296	9.3	62
	13	1	0	0	1	0.2	346		1	295		1
	14	1	0	0	1	0.2	358		1	300		1
	15											
	16											
All Samples Combined		239	181	0	420	100.0	306	93.4	420	277	25.5	420
Sex Composition (%)		56.9	43.1									
Not Aged		55	35	0	90	21.4	323	81.1	90	283	20.7	90
Sex Composition (%)		61.1	38.9									

Appendix A.15. Age, sex, and size composition of herring sampled from the variable-mesh gillnet catches, Kokechik Bay area, Cape Romanzof District, 1989.

Sample Weeks	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
	2											
	3											
	4	1	0	0	1	0.5	106		1	205		1
	5	11	8	0	19	10.4	143	25.8	19	226	10.8	19
	6	7	9	0	16	8.8	197	34.2	16	245	13.2	16
	7	17	10	0	27	14.8	240	36.6	27	259	11.0	27
	8	21	16	0	37	20.3	273	44.5	37	269	11.2	37
20 - 26 May	9	7	5	0	12	6.6	309	44.5	12	281	12.8	12
	10	16	7	0	23	12.6	331	47.8	23	288	11.7	23
	11	15	14	0	29	15.9	362	43.5	29	290	10.0	29
	12	10	6	0	16	8.8	385	45.7	16	298	9.8	16
	13	0	1	0	1	0.5	388		1	297		1
	14	1	0	0	1	0.5	402		1	300		1
	15											
	16											
Sample Total		106	76	0	182	100.0	282	84.8	182	270	24.7	182
	2											
	3											
	4	3	1	0	4	2.6	111	8.9	4	207	4.7	4
	5	14	9	0	23	14.9	159	28.8	23	230	10.3	23
	6	6	9	0	15	9.7	198	28.9	15	247	10.1	15
	7	7	11	0	18	11.7	228	37.2	18	255	10.9	18
	8	17	12	0	29	18.8	277	49.5	29	270	14.0	29
27 May - 2 June	9	12	2	0	14	9.1	320	31.4	14	280	8.0	14
	10	10	10	0	20	13.0	323	36.9	20	282	7.3	20
	11	9	11	0	20	13.0	353	64.7	20	288	13.9	20
	12	6	3	0	9	5.8	379	34.6	9	297	6.4	9
	13	0	1	0	1	0.6	312		1	279		1
	14	0	1	0	1	0.6	356		1	299		1
	15											
	16											
Sample Total		84	70	0	154	100.0	268	84.5	154	265	25.3	154
	2											
	3											
	4											
	5	12	3	0	15	57.7	157	25.3	15	230	7.8	15
	6	2	0	0	2	7.7	163	15.6	2	234	7.8	2
	7	3	1	0	4	15.4	221	37.5	4	251	11.9	4
	8	1	0	0	1	3.8	170		1	245		1
3 - 9 June	9	2	0	0	2	7.7	307	1.4	2	282	4.9	2
	10	0	1	0	1	3.8	300		1	274		1
	11	1	0	0	1	3.8	308		1	298		1
	12											
	13											
	14											
	15											
	16											
Sample Total		21	5	0	26	100.0	190	59.8	26	242	21.2	26

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Appendix A.15. (p. 2 of 2)

Sample Week	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
All Weeks Combined 20 May - 9 June	2											
	3											
	4	4	1	0	5	1.4	110	8.0	5	206	4.1	5
	5	37	20	0	57	15.7	153	27.5	57	228	9.9	57
	6	15	18	0	33	9.1	196	31.5	33	245	11.7	33
	7	27	22	0	49	13.5	234	36.8	49	257	11.2	49
	8	39	28	0	67	18.5	273	47.9	67	269	12.7	67
	9	21	7	0	28	7.7	315	36.3	28	281	9.9	28
	10	26	18	0	44	12.2	327	42.5	44	285	10.2	44
	11	25	25	0	50	13.8	357	52.7	50	289	11.6	50
	12	16	9	0	25	6.9	383	41.4	25	298	8.6	25
	13	0	2	0	2	0.6	350	53.7	2	288	12.7	2
	14	1	1	0	2	0.6	379	32.5	2	300	0.7	2
	15											
	16											
All Samples Combined		211	151	0	362	100.0	270	86.1	362	266	25.6	362
Sex Composition (%)		58.3	41.7									
Not Aged		32	31	0	63	17.4	295	94.5	63	272	27.2	62
Sex Composition (%)		50.8	49.2									

Appendix A.16. Age, sex, and size composition of herring sampled from the variable-mesh gillnet catches, Scammon Bay area, Cape Romanzof District, 1989.

Sample Weeks	Age	Sex (number)				Percent of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
All Weeks Combined 27 May - 2 June	2											
	3	1	0	1	2	12.5	65	16.3	2	187	4.2	2
	4	1	1	0	2	12.5	98	7.1	2	207	2.1	2
	5	8	1	0	9	56.3	129	12.3	9	227	4.3	9
	6	1	0	0	1	6.3	146		1	224		1
	7	1	0	0	1	6.3	217		1	265		1
	8											
	9											
	10											
	11											
	12	1	0	0	1	6.3	411		1	306		1
	13											
	14											
	15											
	16											
Sample Total		13	2	1	16	100.0	141	80.4	16	227	28.2	16
Sex Composition (%)		86.7	13.3									
Not Aged		4	6	0	10	62.5	189	110.7	10	243	43.2	10
Sex Composition (%)		40.0	60.0									

Appendix A.17. Age, sex, and size composition of herring sampled from the variable-mesh gillnet catches, Kokechik Bay/Scammon Bay areas combined, Cape Romanzof District, 1989.

Sample Week	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
	2											
	3											
	4	1	0	0	1	0.5	106		1	205		1
	5	11	8	0	19	10.4	143	25.8	19	226	10.8	19
	6	7	9	0	16	8.8	197	34.2	16	245	13.2	16
	7	17	10	0	27	14.8	240	36.6	27	259	11.0	27
	8	21	16	0	37	20.3	273	44.5	37	269	11.2	37
20 - 26 May	9	7	5	0	12	6.6	309	44.5	12	281	12.8	12
	10	16	7	0	23	12.6	331	47.8	23	288	11.7	23
	11	15	14	0	29	15.9	362	43.5	29	290	10.0	29
	12	10	6	0	16	8.8	385	45.7	16	298	9.8	16
	13	0	1	0	1	0.5	388		1	297		1
	14	1	0	0	1	0.5	402		1	300		1
	15											
	16											
Sample Total		106	76	0	182	100.0	282	84.8	182	270	24.7	182
	2											
	3	1	0	1	2	1.2	65	16.3	2	187	4.2	2
	4	4	2	0	6	3.5	107	10.1	6	207	3.7	6
	5	22	10	0	32	18.8	151	28.5	32	229	9.0	32
	6	7	9	0	16	9.4	195	30.9	16	245	11.3	16
	7	8	11	0	19	11.2	227	36.2	19	256	10.8	19
	8	17	12	0	29	17.1	277	49.5	29	270	14.0	29
27 May - 2 June	9	12	2	0	14	8.2	320	31.4	14	280	8.0	14
	10	10	10	0	20	11.8	323	36.9	20	282	7.3	20
	11	9	11	0	20	11.8	353	64.7	20	288	13.9	20
	12	7	3	0	10	5.9	382	34.2	10	298	6.7	10
	13	0	1	0	1	0.6	312		1	279		1
	14	0	1	0	1	0.6	356		1	299		1
	15											
	16											
Sample Total		97	72	1	170	100.0	256	91.7	170	261	27.8	170
	2											
	3											
	4											
	5	12	3	0	15	57.7	157	25.3	15	230	7.8	15
	6	2	0	0	2	7.7	163	15.6	2	234	7.8	2
	7	3	1	0	4	15.4	221	37.5	4	251	11.9	4
	8	1	0	0	1	3.8	170		1	245		1
3 - 9 June	9	2	0	0	2	7.7	307	1.4	2	282	4.9	2
	10	0	1	0	1	3.8	300		1	274		1
	11	1	0	0	1	3.8	308		1	298		1
	12											
	13											
	14											
	15											
	16											
Sample Total		21	5	0	26	100.0	190	59.8	26	242	21.2	26

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Appendix A.17. (p. 2 of 2)

Sample Week	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
	2											
	3	1	0	1	2	0.5	65	16.3	2	187	4.2	2
	4	5	2	0	7	1.9	107	9.2	7	206	3.5	7
	5	45	21	0	66	17.5	150	27.1	66	228	9.3	66
	6	16	18	0	34	9.0	194	32.2	34	244	12.1	34
	7	28	22	0	50	13.2	234	36.5	50	257	11.1	50
All Weeks Combined	8	39	28	0	67	17.7	273	47.9	67	269	12.7	67
20 May - 9 June	9	21	7	0	28	7.4	315	36.3	28	281	9.9	28
	10	26	18	0	44	11.6	327	42.5	44	285	10.2	44
	11	25	25	0	50	13.2	357	52.7	50	289	11.6	50
	12	17	9	0	26	6.9	384	41.0	26	298	8.6	26
	13	0	2	0	2	0.5	350	53.7	2	288	12.7	2
	14	1	1	0	2	0.5	379	32.5	2	300	0.7	2
	15											
	16											
All Samples Combined		224	153	1	378	100.0	264	89.5	378	264	26.9	378
Sex Composition (%)		59.4	40.6									
Not Aged		36	37	0	73	19.3	280	102.8	73	268	31.2	72
Sex Composition (%)		49.3	50.7									

Appendix A.18. Age, sex, and size composition of herring sampled from the variable-mesh gillnet catches, St Michael Subdistrict, Norton Sound District, 1989.

Sample Week	Age	Sex (number)				Percent of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
27 May- 2 June	2											
	3											
	4	0	3	0	3	1.5	123	9.7	3	210	4.6	3
	5	11	12	0	23	11.9	152	24.1	23	225	8.9	23
	6	10	13	0	23	11.9	194	29.7	23	242	11.9	23
	7	35	20	0	55	28.4	227	38.7	55	252	11.5	55
	8	21	10	0	31	16.0	271	44.4	31	267	12.8	31
	9	11	5	0	16	8.2	312	61.1	16	283	12.5	16
	10	21	9	0	30	15.5	328	45.9	30	282	9.6	30
	11	2	4	0	6	3.1	371	38.4	6	292	7.3	6
	12	2	4	0	6	3.1	382	39.2	6	290	9.8	6
	13	1	0	0	1	0.5	402		1	306		1
	14											
	15											
	16											
Sample Total		114	80	0	194	100.0	252	77.1	194	260	23.6	194
Sex Composition (%)		58.8	41.2									
Not Aged		11	5	0	16	8.2	276	72.6	16	266	17.7	16
Sex Composition (%)		68.8	31.3									

Appendix A.19. Age, sex, and size composition of herring sampled from the variable-mesh gillnet catches, Unalakleet Subdistrict, Norton Sound District, 1989.

Sample Week	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
	2											
	3											
	4											
	5	4	1	0	5	2.6	183	30.1	5	238	10.7	5
	6	4	8	0	12	6.3	213	21.3	12	246	7.2	12
	7	26	44	0	70	37.0	257	29.4	70	257	8.2	70
	8	9	19	0	28	14.8	303	50.3	28	268	10.7	28
27 May - 2 June	9	14	4	0	18	9.5	331	32.6	18	276	8.2	18
	10	22	19	0	41	21.7	351	34.8	41	279	8.2	41
	11	2	3	0	5	2.6	342	33.6	5	281	10.7	5
	12	4	6	0	10	5.3	386	31.8	10	291	22.1	10
	13											
	14											
	15											
	16											
Sample Total		85	104	0	189	100.0	296	61.4	189	266	16.1	189
Sex Composition (%)		45.0	55.0									
Not Aged		7	15	0	22	11.6	304	71.6	22	268	18.1	22
Sex Composition (%)		31.8	68.2									

Appendix A.20. Age, sex, and size composition of herring sampled from the variable-mesh gillnet catches, Cape Denbeigh Subdistrict, Norton Sound District, 1989.

Sample Week	Age	Sex (number)				Percent of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
27 May - 2 June	2											
	3											
	4											
	5	8	3	0	11	5.2	144	17.4	11	231	9.2	11
	6	9	11	0	20	9.4	180	25.0	20	242	9.5	20
	7	43	35	0	78	36.6	221	34.2	78	255	10.5	78
	8	16	14	0	30	14.1	270	47.1	30	270	10.8	30
	9	11	9	0	20	9.4	308	37.4	20	278	8.7	20
	10	25	13	0	38	17.8	324	37.7	38	284	9.4	38
	11	3	9	0	12	5.6	366	36.8	12	291	10.4	12
	12	3	1	0	4	1.9	354	96.5	4	292	19.6	4
	13											
	14											
	15											
	16											
Sample Total		118	95	0	213	100.0	257	70.5	213	265	19.6	213
3 - 9 June	2											
	3	18	10	0	28	13.7	72	7.1	28	185	5.8	28
	4	5	8	0	13	6.3	100	15.2	13	204	11.2	13
	5	13	9	0	22	10.7	136	22.4	22	224	10.1	22
	6	10	11	0	21	10.2	156	25.4	21	231	9.3	21
	7	31	20	0	51	24.9	217	26.9	51	256	7.3	51
	8	17	10	0	27	13.2	267	51.8	27	271	12.6	27
	9	4	2	0	6	2.9	306	46.9	6	277	12.9	6
	10	15	8	0	23	11.2	307	40.0	23	283	8.6	23
	11	3	4	0	7	3.4	370	46.5	7	291	8.9	7
	12	2	5	0	7	3.4	351	41.0	7	289	13.1	7
	13											
	14											
	15											
	16											
Sample Total		118	87	0	205	100.0	204	92.4	205	245	34.7	205
10 - 16 June	2											
	3	29	8	0	37	17.1	60	6.1	37	177	5.4	37
	4	7	3	0	10	4.6	78	14.7	6	197	9.9	10
	5	9	5	0	14	6.5	0		0	222	11.2	14
	6	21	19	0	40	18.4	186	25.5	2	236	8.5	40
	7	42	26	0	68	31.3	228	15.9	25	253	10.5	68
	8	16	5	0	21	9.7	240	17.6	18	267	7.9	21
	9	2	4	0	6	2.8	259	13.8	6	274	7.3	6
	10	9	1	0	10	4.6	279	26.3	10	280	8.4	10
	11	2	6	0	8	3.7	313	31.3	8	289	9.8	8
	12	1	2	0	3	1.4	313	61.2	3	287	12.8	3
	13											
	14											
	15											
	16											
Sample Total		138	79	0	217	100.0	181	97.5	115	237	34.7	217

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Appendix A.20. (p. 2 of 2)

Sample Week	Age	Sex (number) Male	Female	Unknown	Total	Percent of Total	Weight Mean (g)	SD	Number Weighed	Length Mean (mm)	SD	Number Measured
	2											
	3	47	18	0	65	10.2	65	9.1	65	181	6.7	65
	4	12	11	0	23	3.6	93	18.1	19	201	11.0	23
	5	30	17	0	47	7.4	139	20.9	33	225	10.6	47
	6	40	41	0	81	12.8	169	27.6	43	236	9.7	81
	7	116	81	0	197	31.0	221	29.6	154	254	9.9	197
All Weeks Combined	8	49	29	0	78	12.3	261	45.1	75	270	10.8	78
27 May - 16 June	9	17	15	0	32	5.0	298	40.2	32	277	9.1	32
	10	49	22	0	71	11.2	312	39.8	71	283	9.0	71
	11	8	19	0	27	4.3	351	44.4	27	291	9.5	27
	12	6	8	0	14	2.2	344	61.5	14	290	14.0	14
	13											
	14											
	15											
	16											
All Samples Combined		374	261	0	635	100.0	220	90.9	533	249	32.6	635
Sex Composition (%)		58.9	41.1									
Not Aged		13	5	0	18	2.8	248	75.2	18	263	20.7	18
Sex Composition (%)		72.2	27.8									

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