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**Abundance, Age, Sex and Size Statistics for Pacific
Herring in the Togiak District of Bristol Bay, 2004**

by

Chuck Brazil

April 2007

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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ABSTRACT

The Pacific herring (*Clupea pallasii*) total run in the Togiak District of Bristol Bay was monitored for abundance/biomass and sampled for age, size, and sex composition in 2004. Abundance was estimated from aerial surveys with chartered aircraft. Commercial catch samples were collected from purse seine and gillnet landings. During closed fishing periods, herring samples were obtained from test fish purse seine catches made by volunteers from the commercial fleet. A total of 6,399 herring were sampled from 27 April to 8 May. Scales for aging, along with sex, length, weight, and sexual maturity information were collected. Herring age varied from 3 to 18 years with purse seine samples predominately age-7 and -8, while gillnet samples were primarily age-8 through age-12. Mean length and weight from the purse seine fishery samples were 295 mm and 359 grams, while fish sampled from the gillnet fishery averaged 307 mm and 425 grams. Total harvest from the purse seine fishery was 13,888 tons and total harvest from the gillnet fishery was 4,980 tons. Inadequate aerial survey information prevented the estimation of a total run biomass estimate in 2004.

Key words: Pacific herring, *Clupea pallasii*, sac roe, spawning biomass, commercial herring fishery, Bristol Bay, Togiak District, age, length, weight, sex.

INTRODUCTION

Pacific herring *Clupea pallasii* are harvested in several spawning locations along the eastern Bering Sea coast from Norton Sound south to Port Moller. The Togiak District of Bristol Bay supports the largest discrete spawning biomass of Pacific herring in Alaskan waters. Biomass estimates based on aerial surveys have been conducted since 1978 and have ranged from 68,686 tons¹ (62,312 tonnes²) in 1980 to 239,022 tons (216,839 tonnes) in 1979 (Table 1). From 1994 through 2003, the total run biomass has averaged 141,572 tons (101,692 tonnes).

Herring spawn within the Togiak District from late April through May. After spawning, herring leave the fishing district and migrate south in a clockwise movement along the Alaska Peninsula to feeding areas near Unalaska Island. In August and September, these fish move to over-wintering grounds near the Pribilof Islands (Funk 1990; Rumyantsev and Darda 1970; Shaboneev 1965; Wespestad and Barton 1981; Figure 1).

The largest fishery for herring that spawn in the Togiak District occurs during their inshore spawning period. The most valuable product from this harvest is the ripened ovaries, or egg skeins, referred to as sac roe. This product is primarily marketed in Japan. Commercial harvest of herring for sac roe was first documented in the Togiak District in 1968. Passage of the Fisheries Conservation and Management Act in 1976 and the resulting inability of Japanese fishers to harvest sac roe from U.S. waters prompted increased interest in the Togiak fishery by U.S. fishers. The 20-year mean sac roe harvest is presently 20,214 tons (18,338 tonnes). The greatest harvest of 30,315 tons (27,502 tonnes) occurred during the 1994 season (Table 1).

Herring spawn, deposited on brown algae (rockweed) *Fucus spp* is also harvested within the Togiak District. This wild spawn-on-kelp product is harvested either by hand or by rake. The harvest, documented since 1967, has been intermittent in recent years because of low demand with no fishery occurring during the 1997, 1998, 2000, 2001 and 2004 seasons. The 20-year mean spawn-on-kelp harvest has averaged 185 tons (167 tonnes; Table 1).

¹ The Alaska Board of Fisheries requires that inseason catch and aerial survey biomass estimates be calculated and reported in short tons. The English short ton = 2,000 lb or 907.2 kg.

² The metric tonne = 1,000 kg or 2,205 lbs: The conversion is tonnes (t) = tons/1.1023

During their post spawning migration, herring that spawn in Togiak District are susceptible to other fisheries. A directed food/bait fishery occurs during mid-to-late summer months in the Unalaska Island area. Catches were first documented on these feeding herring in 1929. Harvests reached a maximum of 3,006 tons (2,727 tonnes) in 1932. The fishery declined and ended completely by 1938 because of poor market demand, but was renewed in 1981. The annual food and bait harvest since 1984 has averaged 2,265 tons (2,054 tonnes; Table 1).

Incidental harvest of Togiak herring occurs as bycatch in fisheries targeting groundfish in the southeastern Bering Sea. Foreign vessels first exploited these groundfish fisheries but domestic fishers have recently dominated. These fisheries often occur along the migratory route of feeding herring (Funk 1990; Rowell et al. 1991). The additional harvest upon a fully exploited herring population has been a concern brought before the North Pacific Fishery Management Council and the Alaska Board of Fisheries by western Alaskan fishermen.

Togiak herring have been managed as a single spawning population distinct from others in the Bering Sea. A maximum regulatory exploitation rate of 20% of the spawning biomass has been established in the Bristol Bay Herring Management Plan, 5 AAC 27.865. This plan provides an allocation of 1,500 tons (1,361 tonnes) to the wild spawn-on-kelp fishery and 7% of the remaining harvest for the Dutch Harbor food/bait fishery. The rest of the harvestable surplus is reserved for the sac roe fishery: 30% for gillnet and 70% for the purse seine fleet.

Stock assessment studies of the Togiak herring population began in 1976 and have continued annually since 1978 (Fried et al. 1982a, 1982b, 1983a, 1983b, and 1984; Lebida 1987; Lebida and Sandone 1988; Lebida et al. 1985a, 1985b; McBride et al. 1981; McBride and Whitmore 1981; Rowell 1995, 2002a, 2002b; Sandone and Brannian 1988; Schwanke 2003; West 2002; West et al. 2003). One annual objective is to document the age, size and sex composition, as well as maturity of the commercial harvest, and estimate run biomass and the spawning escapement of herring in the Togiak District. These data provide the basis for development of population and forecasting models used to determine harvest strategies and set annual harvest quotas.

METHODS

STUDY AREA

The Togiak District consists of all state waters between the longitude of the tip of Cape Constantine and the longitude of the tip of Cape Newenham, a linear distance of approximately 193 km (Figure 2). Because of its large size, the Togiak District is divided into 6 management sections: Kulukak, Nunavachak, Togiak, Hagemeister, Pyrite Point, and Cape Newenham.

A wide intertidal zone and several shallow bays characterize the shoreline. Diurnal tidal range may reach 4.6 m (Selkregg 1976). The primary marine vegetation in the Togiak District consists of ribbon kelp *Laminaria spp.*, rockweed, and eelgrass *Zostera spp.* Herring have spawned throughout the fishing district, particularly in areas where eelgrass and rockweed have been present. Rockweed is the most visible species of aquatic vegetation because it grows on cobble substrate in intertidal areas and upon rocky outcroppings.

AGE, SIZE, AND SEX DATA

Data Collection

Pacific herring were collected from management sections within the fishing district during fishery openings and closures. Herring were sampled for each gear type and fishing section at the close of each commercial fishing period from tenders or individual fishing vessels. Attempts were made to collect samples from several vessels to ensure multiple schools were represented. During closed fishing periods, volunteer commercial fishers made test purse seine sets to capture herring for sampling roe content.

Samples were also collected for age, sex, and length information from these sets. Purse seine gear, whether commercial or test fish, is considered non-selective gear.

A scale, for age determination, was removed from the left side of each fish approximately 2.5 cm behind the operculum and 2.5 cm below the lateral line. If scales were absent from this preferred area, a scale was removed from the right side of the fish in the same location, or anywhere a readable scale was present. Removed scales were dipped in 10% mucilage solution, mounted sculptured side up on glass slides, and read by annuli interpretation using a microfiche reader. Scales were aged by counting the annuli formed at the end of winter prior to spawning (Shaboneev 1965). This timing was coincidental to the collection of samples in the spawning migration; thus, the outer edge of the scale was counted as an annulus.

Standard length from the tip of the snout to the hypural plate at the base of the tail was measured to the nearest millimeter. Each herring was weighed to the nearest gram.

Sex and maturity were determined for each herring by visual examination of the gonads, or sex products. Maturity of both male and female herring was rated by the eight-scale guideline outlined in Barton and Steinhoff (1980). These categories were combined and summarized as green, ripe or spent.

Sample Sizes

The desired sample size of a multinomial population would result in an estimate that would simultaneously fall within 5% ($\alpha=0.05$) of the true population age proportions 95% of the time (Thompson 1987). A sample size of 400 herring would guarantee this level of precision for the number of age classes represented with consideration of 10 age classes (ages 3–12). Sample sizes required to represent the biomass from test purse seines were 400 fish per 3-day strata, or 134 fish per day based on the time required to collect and process the herring. The sample size for each time strata for the commercial purse seine harvest was 400 herring per section, per day. The sample size for each time strata for the commercial gillnet harvest was 150 herring per section, per day.

Age, Weight and Length Data

Age composition of the commercial harvest was estimated from herring collected from the commercial and test fisheries throughout the Togiak District. The percent age composition by number, for each age class P_a , was estimated for each gear-time-area by:

$$P_a = \frac{n_a}{n}, \quad (1)$$

where:

n_a = the number of herring in the sample that were age a and

n = the total number of herring in the sample.

The mean weight-at-age, \bar{W}_a for herring was estimated for each gear-time-area stratum by

$$\bar{W}_a = \frac{\sum_{i=1}^{n_a} W_{ai}}{n_a}, \quad (2)$$

where:

W_{ai} = the individual weight of herring in sample n that were age a .

The mean length-at-age was calculated by substituting the individual length L_{ai} of herring for the individual weight W_{ai} .

Commercial Harvest

Fish tickets (sales receipts) were completed by processing companies and buyers for each commercial delivery of herring. Estimates of waste or discarded herring were obtained from aerial survey estimates of discarded herring or processor reports. Estimated waste was included in the fish ticket database and used in the calculation of exploitation rates.

Age composition, by weight, of the commercial harvest was estimated by

$$B_a = \left[\frac{n_a \bar{W}_a}{\sum_{a=1}^{\max_a} (n_a \bar{W}_a)} \right] B, \quad (3)$$

where:

B_a = the harvest for age a ,

n_a = the number of herring in the sample that were age a ,

\bar{W}_a = the mean weight for herring of age a , and

B = the total estimated harvest expressed as biomass or daily biomass estimate.

Age composition of the waste, or deadloss (i.e., herring that were caught but not sold), was represented by the age composition for the same gear type in the commercial fishery.

The number of fish for each age class, N_a , was calculated by

$$N_a = \frac{B_a}{W_a}. \quad (3)$$

The migration of herring between management sections within the Togiak District is not well understood. Residence time of herring within the district and rate of turnover for the biomass on the grounds is unknown. Age information from the herring samples collected by nonselective gear were pooled across management sections to determine any temporal trends in age composition, which would indicate immigration of new herring or emigration of spent herring from the fishing district.

Biomass Estimation

Herring biomass for the Togiak District was estimated using aerial survey assessment procedures outlined by Lebida and Whitmore (1985). When weather permitted, aerial surveys were flown daily at low tide to estimate herring abundance. Each management section was divided into index areas to facilitate survey documentation. Aerial survey estimates for each index area were summed to provide biomass estimates for each management section by day. Biomass estimates of these management sections were then summed to provide the observed district-wide biomass for each day.

RESULTS

COMMERCIAL HARVEST

A commercial harvest of 18,868 tons (17,117 tonnes) occurred within the Togiak District for sac roe product (Table 1). Commercial openings were from 29 April to 9 May (Table 2), and test purse seine fisheries occurred on 27 through 29 April and 6, 7, 8, and 10 May (Table 2; Appendix B12). Age

composition of the total harvest is presented in Table 3 and Figure 3. Average roe percentages of all harvested herring was 9.7% (Table 2).

Biological information was collected from 6,399 herring caught by purse seine and gillnet gear in the Togiak District from 27 April to 8 May, 2004 (Table 4). Regenerated or illegible scales composed 4.4% of all scale samples. The percentage of unreadable scales from commercial gillnet samples was 5.9%, followed by commercial purse seine and test purse seine at 4.0%.

PURSE SEINE

There were 12 commercial purse seine openings in the Togiak District from 29 April to 9 May totaling 78 hours (Table 2). A total of 13,888 tons (12,599 tonnes) of herring were harvested, including 102.5 tons (93 tonnes) of deadloss estimated from aerial surveys and reported loss from commercial fishing vessels. Catches from Hagemeister Section accounted for 62% of the total purse seine harvest, followed in magnitude by Togiak (24%), Pyrite Point (9%) and Nunavachak (6%) sections (Table 2; Figure 4). Row percentages averaged 9.5% from the purse seine harvested herring.

Herring sampled from the purse seine fishery ranged from age-4 to age-17 (Table 5). Age groups 7, 8 and 11 were the major age classes comprising 36.8%, 24.0% and 9.4% of the commercial purse seine harvest by weight and 43.7%, 24.6%, and 7.1% by number (Table 3; Figure 5; Appendix A1). Age composition of herring samples collected with non-selective gear by sampling period, east Togiak District and west Togiak District, is found in Figure 6. Mean weight of herring sampled from the harvest was 359 g and mean length was 295 mm (Table 5). Mean weights by age class of herring sampled from the purse seine fishery are in Appendix B1–B4. Based on samples from the purse seine harvest, there was no substantial temporal change in age class structure of the biomass.

Sex composition varied over time, but overall sex composition of all aged samples from the commercial purse seine fishery was 50.7% female (Appendix B4).

GILLNET

Ten commercial gillnet openings totaling 162 hours occurred from 30 April to 9 May harvesting a total of 4,980 tons (4,517 tonnes). Catches from Kulukak Section accounted for 79% of the total gillnet harvest and Nunuvachak Section accounting for the remaining 21% (Table 2). The fishery peaked on 2 May with a harvest of 1,257.3 tons (1,140.6 tonnes). Row percentage from commercial gillnet fishery averaged 10.4%.

Age composition of the samples collected from the gillnet fishery ranged from age-6 to age-18 (Table 5). Age-8 herring was the most abundant age class in the harvest comprising 25.3% of the harvest by weight and 27.6% by number of fish (Table 3; Figure 5; Appendix A2). Herring age-9 and older composed 63.4% of the gillnet harvest by weight and 58.6% by number. Contribution of herring age-6 and younger was minimal, representing 0.6% by weight and 0.8% by number. Mean weight of herring sampled from the commercial gillnet harvest was 425 g and mean length was 307 mm (Table 5). Mean weight, by age class, of herring sampled from the gillnet fishery are in Appendix B5.

Sex composition varied over time, but overall sex composition of all aged samples from the gillnet fishery was 50.6% female (Appendix B5).

SPAWN-ON-KELP

No companies registered to buy herring spawn-on-kelp in 2004, therefore there were no openings and no commercial harvest (Table 1).

BIOMASS ESTIMATION

Herring surveys were flown in the Togiak District from 15 April to 26 May (Table 6). Herring were first observed on 22 April when 14 tons (15.4 tonnes) were observed in the Tongue Point and Matogak index

areas in the Hagemeister Section. The first substantial biomass of 20,494 tons (18,592 tonnes) was documented on 25 April with the bulk of the herring observed in the Kulukak Section and Nushagak Peninsula. A peak daily estimate of 34,607 tons (31,395 tonnes) was documented on 3 May with nearly half of the fish observed in the Kulukak and Togiak Sections. On 20 and 26 May, the last 2 surveys flown, approximately 1,173 tons (1,064 tonnes) and 154 tons (139 tonnes) were observed (Table 6). Because survey conditions during the peak of the run were poor no combination of daily aerial survey estimates could produce a reliable total inseason biomass estimate; therefore, a total run biomass was not calculated for 2004.

Spawn was first documented on 28 April when 5.7 linear miles were observed in Nunavachak Bay and Anchor Point. The amount of visible spawn peaked on 30 April at 10.3 linear miles. A second smaller peak of spawn occurred on 5 May when 7.1 linear miles of spawn was observed. A total of 36.4 linear miles of spawn was documented throughout the survey period (Table 6).

DISCUSSION

The 2004 fishery started on 29 April, which was the third earliest starting date in the last 20 years (Table 7). The duration of the fisheries, both purse seine and gillnet, were the second longest in the last 20 years. The number of processing companies was the lowest in recent history, and daily processing capacity was 2,150 tons per day (Table 7). The number of fishing vessels, based on peak aerial counts, was the lowest in the last 20 years. All of these factors played a role in the 2004 herring harvest.

The preseason forecast allowed for a harvest of 25,226 tons (22,884 tonnes; Appendix C1). The 2004 harvest was 25% below this guideline.

Based on the purse seine harvest, it appears that the offspring (recruits) of the 1997 (age-7) and 1996 (age-8) brood years will continue to dominate the population and fishery biomass in the near future. These two age classes comprised 68% of the purse seine harvest by number of fish and 60% by weight.

Since total run biomass could not be estimated in 2004, age composition of the purse seine harvest was the best indication of age structure of the total run, and was compared to the preseason forecast (Table 3; Appendix C1). A few disparities exist between the 2004 total run forecast and the 2004 purse seine catch. The most notable disparity was the mean weight of the fish. The overall mean weight of individual fish was forecasted to be 325 g; however, the actual mean weight of fish from the purse seine fishery was 359 g. Additionally, actual mean weights, by age class, were slightly lower than the forecasted weights for all age classes (Table 3; Appendix C1). The differences, by individual age classes, ranged from 4% heavier to 6% less than forecast weight. There are many possibilities for these disparities. A possible reason for the disparity is that the 325 g number was not weighted (straight average). Had the forecast been weighted by numbers of herring in each age class, it would have been closer to what was observed in the fishery.

The fishermen and processors formed co-ops in 2001 and started working together to ensure quality in the harvest. This factor allows the purse seine fishermen to inspect their catches more closely, and harvest only the most valuable fish. Larger fish tend to have a higher gonad somatic index (gonad weight/fish weight), and are more valuable. This “high grading” is a likely reason why the average weight of herring harvested in the purse seine fishery was 10% higher than forecasted.

A temporal change in age composition from older to younger herring is typically observed in the fishery, but age-7, -8, and -11 herring predominated throughout the fishery. Age composition of the purse seine harvest was similar to what was forecasted to comprise the total run. Only a few disparities exist; fewer than expected age-4 and -5 fish were found in the fishery, which may suggest weak age classes in the future, or it could simply be an artifact of run timing, fishery timing or “high grading”. No surveys were

conducted between 7 May and 20 May contributing to the difficulty of assessing the younger age classes, age-4 and-5 herring, which generally spawn later than older fish.

Observations of herring spawn were down in 2004 with only 36 linear miles as compared to the recent 10-year average of 54 miles. In addition, the peak daily biomass of herring was relatively low (34,607 tons (31,395 tonnes)) in 2004. These observations of lower than expected biomass and herring spawn may have occurred from one or more of the following: (1) herring numbers actually did drop in 2004; (2) the herring forecast was too high; or (3) herring spawned less, spawned deeper, or spawn was mixed in turbid water making observations difficult.

An age structured analysis (ASA) model was used to forecast the 2004 return. Historical total run biomass estimates are included to weight the model with the most recent estimate having the most influence. The last biomass estimate included in the model was from 2001 because inadequate aerial survey information has prevented the estimation of total run biomass estimates for 2002 and 2003. Given that the 2001 estimate was determined to be high, returning age classes predicted in the 2004 forecast were inflated leading to the overestimation of the total run.

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TABLES AND FIGURES

Table 1.—Historical total run biomass and commercial harvest (tons) of Pacific herring returning to the Togiak District, Bristol Bay, 1968–2004.

Year	Togiak		Spawn-on-Kelp			Dutch Harbor
	Total Run Biomass (tons) ^{a,b}	Sac Roe Harvest (tons) ^c	Harvest (lbs) ^c	Harvest (tons) ^c	Herring Equivalent (tons) ^d	Food and Bait Harvest (tons) ^e
1968		80				
1969		47	10,125	5		
1970		28	38,855	19		
1971		^f	51,795	26		
1972		80	64,165	32		
1973		51	11,596	6		
1974		123	125,646	63		
1975		56	111,087	56		
1976		^f	295,780	148		
1977		2,795	275,774	138		
1978	191,537	7,734	329,858	165		
1979	239,022	11,558	414,727	207		
1980	68,686	24,516	189,662	95		
1981	158,650	12,489	378,207	189		704
1982	97,902	21,821	234,924	117		3,565
1983	141,782	26,786	274,866	137		3,567
1984	114,880	19,419	406,587	203	1,552	3,578
1985	131,400	25,812	^f	^f	^f	3,480
1986	94,700	16,276	374,142	187	1,446	2,394
1987	88,400	15,530	307,307	154	1,309	2,503
1988	134,717	14,168	489,400	245	1,782	2,004
1989	98,965	12,259	559,754	280	2,499	3,081
1990	88,105	12,230	413,844	207	1,617	820
1991	83,329	14,970	348,357	174	1,310	1,325

-continued-

Table 1.–Page 2 of 2.

Year	Togiak		Spawn-on-Kelp			Dutch Harbor
	Total Run Biomass (tons) ^{a,b}	Sac Roe Harvest (tons) ^c	Harvest (lbs) ^c	Harvest (tons) ^c	Herring Equivalent (tons) ^d	Food and Bait Harvest (tons) ^e
1992	156,955	25,808	363,600	182	1,482	1,949
1993	193,847	17,956	383,000	192	1,481	2,790
1994	185,454	30,315	308,400	154	1,134	3,349
1995	149,093 ^g	26,732	281,600	141	996	1,748
1996	135,585 ^g	24,871	455,800	228	1,899	2,239
1997	144,887	23,813	^f	^f	^f	1,950
1998	121,000 ^g	22,776	^f	^f	^f	1,994
1999	156,183	19,878	419,563	210	1,605	2,398
2000	130,904 ^g	20,421	^f	^f	^f	2,014
2001	146,209 ^k	22,330	^f	^f	^f	1,439
2002	120,196 ^g	17,049	67,793	34	260	2,751
2003	126,213 ^g	21,663	^j	^j	^j	1,487
2004	143,124 ^g	18,868	^f	^f	^f	1,258
<hr/>						
1984–2003						
Mean ^h	130,051	20,214	369,939	185	1,455	2,265
1994–2003						
Mean ⁱ	141,572	22,985	306,631	153	1,179	2,137

^a Data not available prior to 1978.

^b Source: ADF&G (2002).

^c Source : Harvest data for years 1968–1979 provided by ADF&G (*Unpublished*); years 1980–1987 by Sandone and Brannian (1988); and years 1988–2002 by fish ticket receipts.

^d Management plan adopted by Alaska Board of Fisheries in 1984 setting a 350,000 lb. harvest guideline, specifying 2- to 3-year rotation, and including spawn-on-kelp herring equivalent in exploitation rate. Herring equivalent calculation reported in ADF&G (1997).

^e Source: ADF&G (2002); catches documented since 1929. Fishery did not occur between 1946 and 1980.

^f No fishery conducted.

^g Aerial surveys to determine abundance were hampered by poor weather conditions preventing calculation of a final season's biomass estimate. Inseason management used preseason forecast.

^h The 1983–2002 calculated mean for spawn-on-kelp fishery does not include years 1985, 1997,1998, 2000 and 2001 and the calculated mean harvest for the Dutch Harbor food and bait fishery does not include 1979 and 1980.

ⁱ The 1993–2002 calculated mean for the spawn-on-kelp fishery does not include years 1997,1998, 2000 and 2001.

^j Data confidential under Alaska Statute 16.05.815

^k The 2001 total run biomass was revised to an estimate of 115, 155, which is the sum of (1) a biomass estimate of 1,013 tons on 26 April; (2) the harvest of 6,508 tons on 6 and 7 May; (3) a biomass estimate of 8,755 tons on 8 May; (4) the peak biomass estimate of 67,244 tons on 15 May, and (5) a biomass estimate of 21,635 tons on 29 May.

Table 2.—Commercial herring harvest (tons) by fishing section, gear type, Togiak District, Bristol Bay, 2004.

Date	Duration (hh:mm)	Periods	Kulukak		Nunavachak		Togiak		Hagemeister		Pyrite Point		Cape Newenham		Total	Roe %
			Tons	Roe %	Tons	Roe %	Tons	Roe %	Tons	Roe %	Tons	Roe %	Tons	Roe %		
<u>Purse Seine</u>																
4/29	6:00	1	0.0	0.0	302.6	9.3 ^a	2,160.6	8.7 ^a	0.0	0.0	0.0	0.0	0.0	0.0	2,463.2	8.8
4/30	6:00	2	0.0	0.0	0.0	0.0	667.7	9.3	161.6	10.1	0.0	0.0	0.0	0.0	829.3	9.5
5/01	11:00	3	0.0	0.0	0.0	0.0	257.3	9.4	918.6	9.6	113.0	10.2	0.0	0.0	1,288.9	9.6
5/02	10:00	4	0.0	0.0	142.1	9.0	46.9	10.5	1,860.3	9.0	262.1	10.5	0.0	0.0	2,311.4	9.2
5/03	12:00	5	0.0	0.0	52.9	8.3	0.0	0.0	1,070.5	9.5 ^b	205.9	9.3	0.0	0.0	1,329.3	9.4
5/04	12:00	6	0.0	0.0	259.9	7.8	0.0	0.0	1,405.0	9.7	28.2	12.2	0.0	0.0	1,693.1	9.4
5/05	12:00	7	0.0	0.0	0.0	0.0	171.6	11.7	1,879.4	9.5	432.0	10.7	0.0	0.0	2,483.0	9.9
5/06			0.0	0.0	0.0	0.0	0.0	0.0	205.2	9.6 ^a	0.0	0.0	0.0	0.0	205.2	9.6
5/07	0:30	8	0.0	0.0	0.0	0.0	0.0	0.0	120.3	9.2 ^c	0.0	0.0	0.0	0.0	120.3	9.2
5/08	0:30	9	0.0	0.0	31.9	9.9 ^a	0.0	0.0	9.6	10.2	0.0	0.0	0.0	0.0	41.5	10.0
5/08	1:00	10	0.0	0.0	0.0	0.0	0.0	0.0	173.3	10.6	135.0	10.5	0.0	0.0	308.3	10.6
5/08	2:00	11	0.0	0.0	0.0	0.0	0.0	0.0	547.5	10.6	41.1	10.9	0.0	0.0	588.6	10.6
5/09	5:00	12	0.0	0.0	0.0	0.0	0.0	0.0	30.7	9.5	0.0	0.0	0.0	0.0	30.7	9.5
5/10			0.0	0.0	0.0	0.0	0.0	0.0	195.2	10.8 ^a	0.0	0.0	0.0	0.0	195.2	10.8
Subtotal	78:00:00		0.0	0.0	789.4	8.7 ^a	3,304.1	9.1 ^a	8,577.2	9.6 ^{a,b,c}	1,217.3	10.4	0.0	0.0	13,887.9	9.5
<u>Gillnet</u>																
4/30	12:00	1	17.5	12.8	775.1	10.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	792.6	10.6
5/01	13:00	2	0.0	0.0	276.1	10.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	276.1	10.4
5/02	14:00	3	1,257.3	10.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,257.3	10.4
5/03	14:00	4	920.6	10.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	920.6	10.7
5/04	18:00	5	188.2	10.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	188.2	10.5
5/05–06	37:00	6	681.7	10.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	681.7	10.2
5/06–07	12:00	7	506.8	9.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	506.8	9.9
5/07–08	20:00	8	249.8	10.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	249.8	10.3
5/08	16:00	9	92.8	10.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	92.8	10.4
5/09	6:00	10	14.4	10.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.4	10.9
Subtotal	162:00:00		3,929.1	10.4	1,051.2	10.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4,980.3	10.4

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Table 2.–Page 2 of 2.

Date	Duration Periods (hh:mm)	Kulukak		Nunavachak		Togiak		Hagemeister		Pyrite Point		Cape Newenham		Total	Roe %
		Tons	Roe %	Tons	Roe %	Tons	Roe %	Tons	Roe %	Tons	Roe %	Tons	Roe %		
<u>Combined</u>															
4/29		0.0	0.0	302.7	9.3 ^a	2,160.6	8.7 ^a	0.0	0.0	0.0	0.0	0.0	0.0	2,463.3	8.8
4/30		17.5	12.8	775.1	10.5	667.7	9.3	161.6	10.1	0.0	0.0	0.0	0.0	1,621.9	10.0
4/01		0.0	0.0	276.1	10.4	257.3	9.4	918.6	9.6	113.0	10.2	0.0	0.0	1,565.0	9.8
4/02		1,257.3	10.4	142.1	9.0	46.9	10.5	1,860.3	9.0	262.1	10.5	0.0	0.0	3,568.7	9.6
4/03		920.6	10.7	52.9	8.3	0.0	0.0	1,070.5	9.5 ^b	205.9	9.3	0.0	0.0	2,249.9	9.9
4/04		188.2	10.5	259.9	7.8	0.0	0.0	1,405.0	9.7	28.2	12.2	0.0	0.0	1,881.3	9.6
4/05		460.3	10.1	0.0	0.0	171.6	11.7	1,879.4	9.6	432.0	10.7	0.0	0.0	2,943.3	10.0
4/06		574.7	10.1	0.0	0.0	0.0	0.0	205.2	9.6 ^a	0.0	0.0	0.0	0.0	779.9	10.0
4/07		365.0	10.3	0.0	0.0	0.0	0.0	120.3	9.2 ^c	0.0	0.0	0.0	0.0	485.3	10.0
4/08		133.0	10.3	31.9	9.9 ^a	0.0	0.0	730.4	10.6	0.0	0.0	0.0	0.0	895.3	10.5
4/09		12.5	11.0	0.0	0.0	0.0	0.0	30.7	9.5	176.2	10.6	0.0	0.0	219.4	10.5
4/10		0.0	0.0	0.0	0.0	0.0	0.0	195.2	10.8 ^a	0.0	0.0	0.0	0.0	195.2	10.8
Total		3,929.1	10.4	1,840.7	9.7 ^a	3,304.1	9.1 ^a	8,577.2	9.6 ^{a,b,c}	1,217.4	10.4	0.0	0.0	18,868.4	9.7

^a Includes test fish harvest which is conducted during closed commercial periods.

^b Includes 60.5 tons documented waste.

^c Includes 42 tons documented waste.

Table 3.—Harvest by age and gear type from the herring sac roe fishery, Togiak District, 2004.

Purse Seine					Gillnet					Total Harvest				
Age	Biomass ST	% by Weight	Number (x 1,000)	% by No.	Age	Biomass ST	% by Weight	Number (x 1,000)	% by No.	Age	Biomass ST	% by Weight	Number (x 1,000)	% by No.
1	0	0.0	0	0.0	1	0	0.0	0	0.0	1	0	0.0	0	0.0
2	0	0.0	0	0.0	2	0	0.0	0	0.0	2	0	0.0	0	0.0
3	0	0.0	0	0.0	3	0	0.0	0	0.0	3	0	0.0	0	0.0
4	7	0.1	38	0.1	4	0	0.0	0	0.0	4	7	0.0	38	0.1
5	23	0.2	90	0.3	5	0	0.0	0	0.0	5	23	0.1	90	0.2
6	481	2.9	1,593	3.8	6	37	0.6	104	0.8	6	517	2.7	1,698	3.6
7	5,402	36.8	16,333	43.7	7	548	10.7	1,419	13.0	7	5,951	31.5	17,752	38.1
8	3,408	24.0	8,949	24.6	8	1,238	25.3	2,884	27.6	8	4,646	24.6	11,833	25.4
9	543	4.0	1,261	3.6	9	634	12.8	1,391	13.1	9	1,177	6.2	2,652	5.7
10	807	6.7	1,671	5.4	10	929	18.6	1,887	17.6	10	1,736	9.2	3,559	7.6
11	1,214	9.4	2,349	7.1	11	528	11.1	1,018	10.0	11	1,742	9.2	3,367	7.2
12	820	6.2	1,549	4.6	12	630	12.7	1,175	11.1	12	1,450	7.7	2,724	5.8
13	380	3.1	691	2.2	13	201	3.9	363	3.3	13	581	3.1	1,054	2.3
14	403	3.2	732	2.3	14	129	2.5	230	2.1	14	532	2.8	962	2.1
15	289	2.4	498	1.6	15	94	1.6	160	1.3	15	383	2.0	658	1.4
16	82	0.9	135	0.6	16	6	0.1	12	0.1	16	88	0.5	147	0.3
17	28	0.2	43	0.1	17	0	0.0	0	0.0	17	28	0.1	43	0.1
18	0	0.0	0	0.0	18	6	0.1	12	0.1	18	6	0.0	12	0.0
19	0	0.0	0	0.0	19	0	0.0	0	0.0	19	0	0.0	0	0.0
20	0	0.0	0	0.0	20	0	0.0	0	0.0	20	0	0.0	0	0.0
Total	13,888	100.0	35,932	100.0	Total	4,980	100.0	10,657	100.0	Total	18,868	100.0	46,590	100.0

Table 4.—Number of samples collected by gear type during the 2004 Togiak herring season.

Gear Type	Number of Readable Scale Samples	Number of Unreadable Scale Samples	Total	% Unreadable Scale Samples
Commercial Purse Seine	3,862	163	4,025	4.0
Commercial Gillnet	1,094	69	1,163	5.9
Test Commercial Purse Seine	1,163	48	1,211	4.0
Total	6,119	280	6,399	4.4

Table 5.—Mean length (mm), weight (g), and standard deviation by age for herring of the commercial harvest by gear type, Togiak District, 2004.

Commercial Purse Seine						Commercial Gillnet					
Age	Number of Samples	Mean Length (mm)	SD	Mean Weight (g)	SD	Age	Number of Samples	Mean Length (mm)	SD	Mean Weight (g)	SD
4	5	237	9.3	164	24.1	4	-	-	-	-	-
5	11	262	13.8	239	47.4	5	-	-	-	-	-
6	136	274	8.6	272	33.6	6	9	279	9.9	322	36.9
7	1,638	282	10.1	301	40.4	7	142	289	9.6	350	39.3
8	963	294	11.6	348	52.5	8	302	300	8.6	389	36.7
9	141	304	11.5	392	55.9	9	143	305	7.4	415	36.4
10	215	314	10.9	441	55.3	10	193	313	8.1	449	36.4
11	286	319	9.8	473	55.3	11	109	318	8.4	472	45.4
12	186	324	10.0	485	52.8	12	121	322	7.9	485	47.2
13	92	326	8.6	497	49.2	13	36	326	9.0	507	52.6
14	87	328	11.4	488	61.5	14	23	328	6.6	505	38.2
15	71	331	8.4	523	45.7	15	14	331	13.2	537	68.1
16	27	335	10.6	536	58.8	16	1	325		447	
17	4	344	10.5	595	95.2	17		-	-	-	-
						18	1	340		448	
All Samples											
Combined	3,862	295	19.8	359	88.5		1,094	307	14.4	425	63.5

Table 6.—Daily observed estimates (tons) of herring by index area, Togiak District, 2004.

Date	Start Time	Survey Rating ^a	Miles of Spawn	Estimated Biomass by Index Area ^b													Daily Total
				NUS	KUK	MET	NVK	UGL	TOG	TNG	MTG	OSK	PYR	CPN	HAG	WAL	
4/15	08:30	4.1															
4/18	16:30	3.7															
4/21	11:30	3.3															
4/22	12:00	2.5								11	3						14
4/23	10:15	2.7								26					8		34
4/24	02:15	1.3		687	3,132	268	300		1,969	358				1,144		9,142	
4/25	14:10	1.5		6,958	6,016	523	55	12	1,119	2,693	10			3,109		20,494	
4/28	14:40	3.5	5.7	8	1,657	13	441	797	1,920	1,920	119	4,180	229	248		11,532	
4/29 ^c	05:00	5.0	3.0														
4/30 ^c	12:00	4.0	10.3														
5/02	10:50	3.7	0.7	9	460	420	868	624								2,381	
5/03	12:00	3.7	2.9	3,908	7,210	2,064	703	4,285	9,413	1,303	3,158	1,514	859	173	18	34,607	
5/05	12:00	3.7	7.1	76	550		1,210	90	3,557	1,983	583	1,168	150	88	437	9,891	
5/07	14:00	3.7	4.0								1,360	346	42			1,749	
5/20	16:40	3.7	2.5	422	130	32	587				3					1,173	
5/26	10:45	3.7	0.2			149		6								154	
Total^d		3.4	36.4													Peak Biomass	34,607

Note: Days with no data indicate days when data was not collected.

^a 1 = Excellent, 2 = Good, 3 = Fair, 4 = Poor, 5 = Unsatisfactory.

^b Index areas: NUS - Nushagak Peninsula; KUK - Kulukak; MET - Metervik; NVK - Nunavachak; UGL - Ungalikthluk/Togiak; TOG - Togiak; TNG - Tongue Pt; MTG - Matogak; OSK - Osviak; PYT - Pyrite Point; CPN - Cape Newenham; HAG - Hagemeister; WAL - Walrus Islands.

^c Vessel count and spawn survey only.

^d The 2004 Togiak District Pacific herring total run biomass could not be estimated from aerial survey information because of poor survey conditions.

Table 7.—Sac roe herring industry participation, fishing effort and harvest, Togiak District 1984–2004.

Year	No. of Companies	Daily Processing Capacity ^a	Fishery Dates	Gillnet				Purse Seine				Total Harvest ^c		
				Effort ^b	Duration (hrs.)	Harvest ^c	CPUE	Roe%	Effort ^b	Duration (hrs.)	Harvest ^c		CPUE	Roe%
1984	25		5/18–5/21	300	35.0	4,934	0.5	8.4	196	11.0	14,485	6.7	10.2	19,419
1985	23		5/23–5/25	302	11.0	4,482	1.3	7.4	155	3.0	21,330	45.9	10.0	25,812
1986	23		5/14–5/15	209	10.0	3,448	1.6	8.8	209	1.0	12,828	61.4	9.9	16,276
1987	18		4/27–5/06	148	36.0	2,685	0.5	8.6	111	5.5	12,845	21.0	8.9	15,530
1988	22		5/17	300	4.0	3,695	3.1	8.3	239	0.5	10,472	87.6	10.9	14,167
1989	19		5/09–5/14	320	5.0	2,844	1.8	7.8	310	3.0	9,415	10.1	8.5	12,259
1990	16	3,100	5/08–5/20	277	66.0	3,072	0.2	9.0	221	3.0	9,158	13.8	9.7	12,230
1991	16	3,350	5/10–5/17	170	14.0	3,182	1.3	8.5	200	3.0	11,788	19.6	10.0	14,970
1992	18	3,700	5/20–5/27	274	25.5	5,030	0.7	8.8	301	0.3	20,778	230.1	9.2	25,808
1993	12	2,500	4/27–5/09	75	144.5	3,564	0.3	10.1	140	33.8	14,392	3.0	9.6	17,956
1994	16	3,300	5/11–5/20	146	76.0	7,462	0.7	12.0	240	4.6	22,853	20.7	9.4	30,315
1995	22	4,350	5/07–5/15	250	33.5	6,995	0.8	12.0	254	12.2	19,737	6.4	10.1	26,732
1996	19	4,850	5/03–5/08	461	18.0	6,863	0.8	11.1	268	2.4	18,008	27.8	9.0	24,871
1997	18	4,200	5/02–5/06	336	24.0	5,164	0.6	11.8	231	6.4	18,649	12.6	9.4	23,813
1998	15	2,475	4/29–5/10	152	46.0	5,952	0.9	12.5	123	16.5	16,824	8.3	9.6	22,776
1999	12	2,400	5/18–5/26	171	28.0	4,858	1.0	11.5	96	4.7	15,020	33.3	9.2	19,878
2000	12	2,100	5/06–5/14	227	67.0	5,464	0.4	10.6	90	15.8	14,957	10.6	10.1	20,421
2001	11	2,255	5/06–5/13	96	84.0	6,481	0.8	10.6	64	26.0	15,849	9.5	9.2	22,330
2002	8	1,920	5/03–5/13	82	102.0	5,216	0.6	10.9	37	57.5	11,833	5.6	9.3 ^e	17,049
2003	7	1,920	4/25–5/07	75	142.0	6,505	0.6	10.9	35	110.2	15,158	3.9	8.9 ^e	21,663
1984–2003 Ave	17	3,030		219	48.6	4,895	0.9	10.0	176	16.0	15,319	31.9	9.6	20,214
1994–2003 Ave	14	2,977		200	62.1	6,096	0.7	11.4	144	25.6	16,889	13.9	9.5	22,985
2004	6	2,150	4/29–5/09	54	162.0	4,980	0.6	10.4	31	78.0	13,888	5.7	9.5	18,868

^a Number of tons per day based on companies registered.

^b Peak aerial survey count.

^c Harvest total does include deadloss and test fish harvest.

^d Fishery managed by emergency order.

^e Values are lower than inseason assessment due to more stringent post-season market scrutiny compared with previous years.

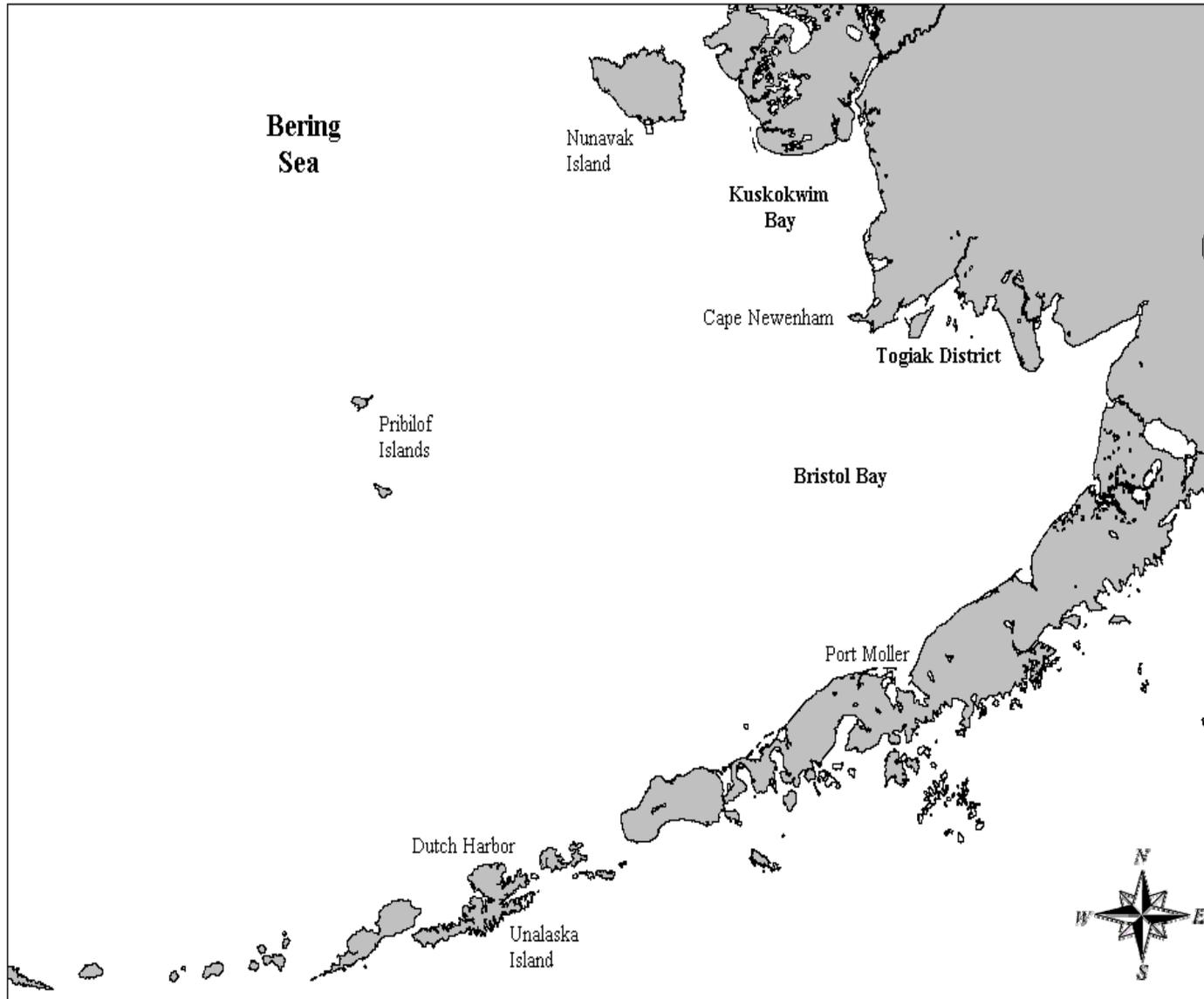


Figure 1.—Map of southeastern Bering Sea.

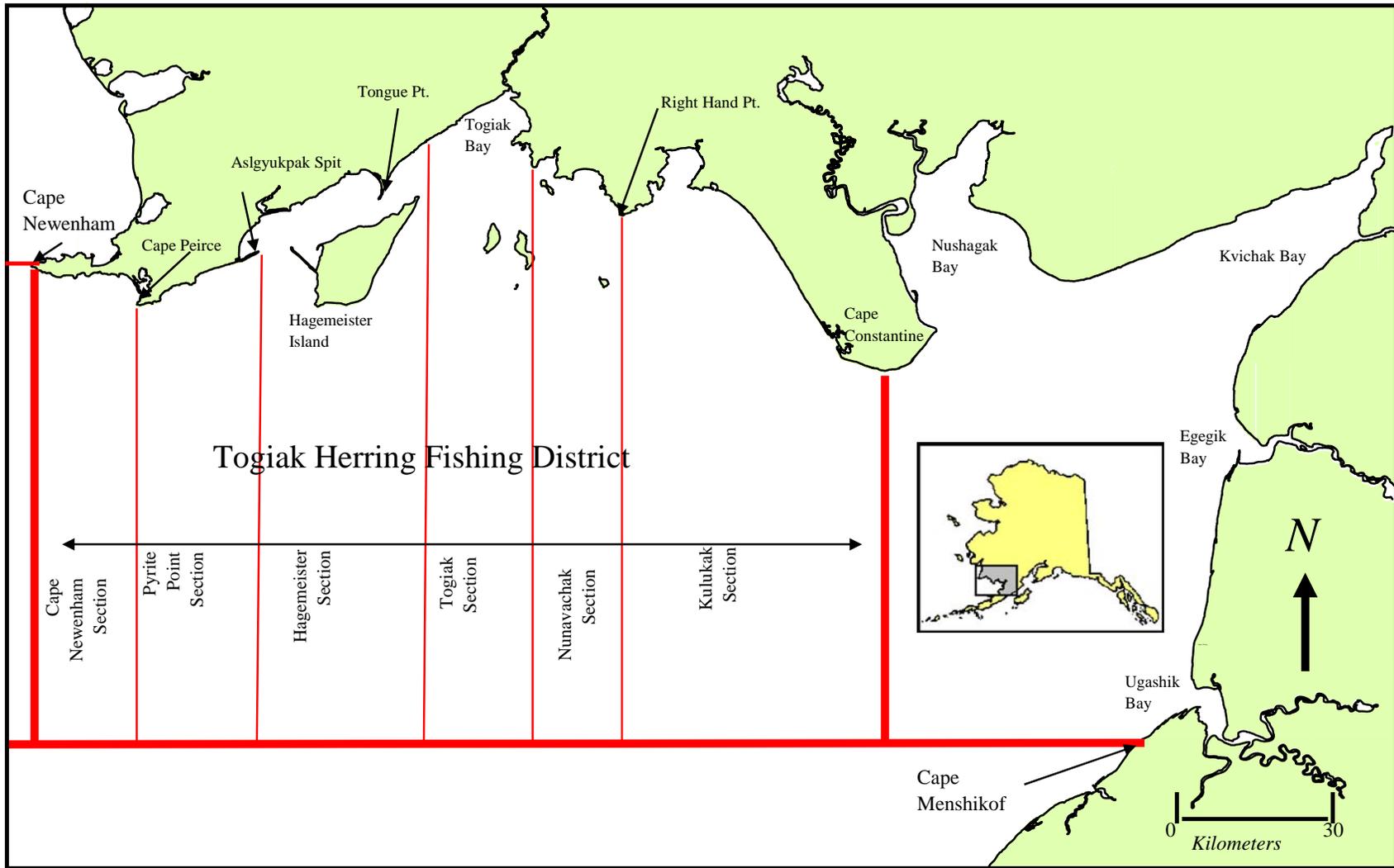


Figure 2.—Map of Togiak Herring District, Bristol Bay.

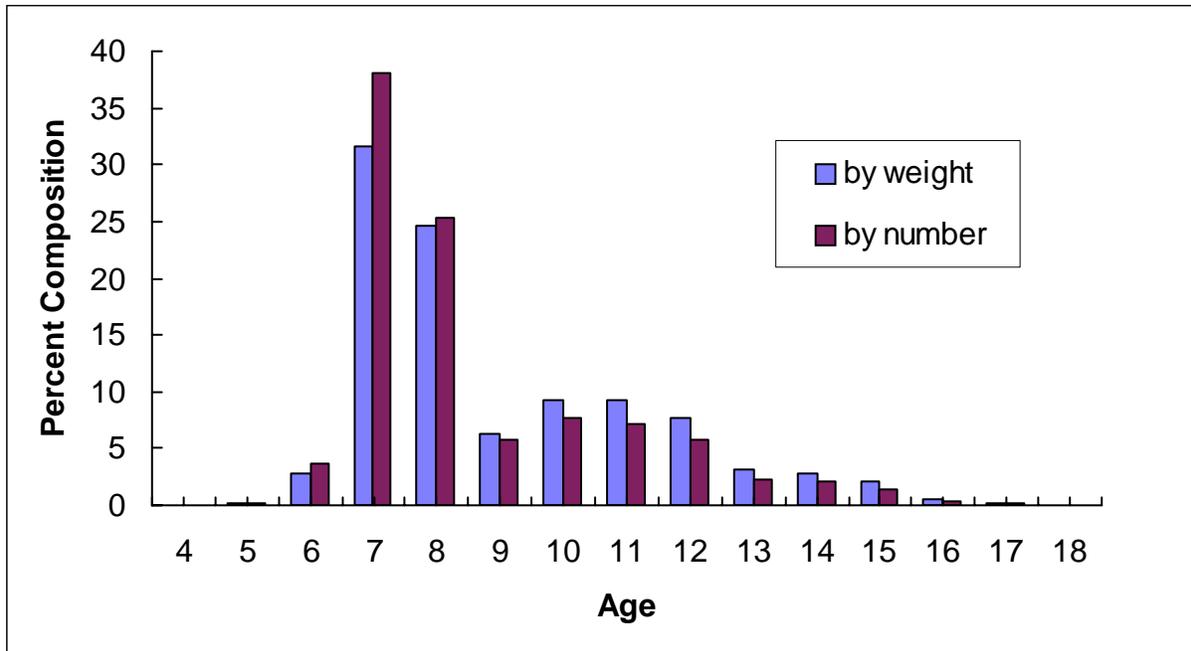


Figure 3.—Age composition of the total herring harvest, Togiak District, 2004.

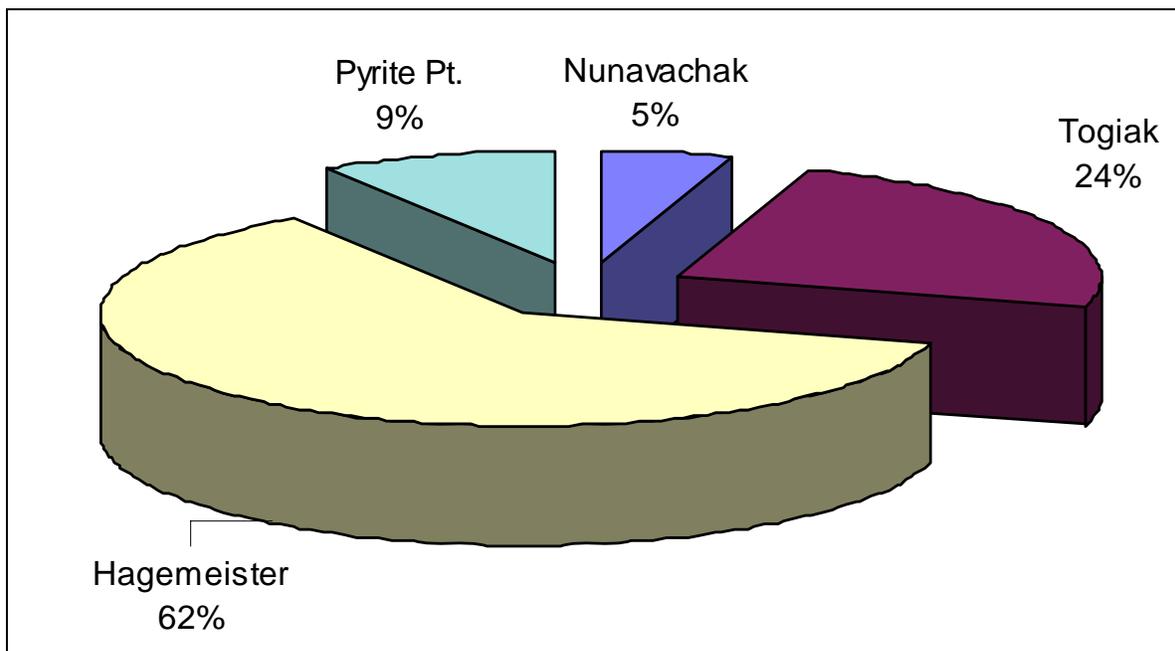


Figure 4.—Commercial purse seine harvest distribution by fishing section, Togiak District, 2004.

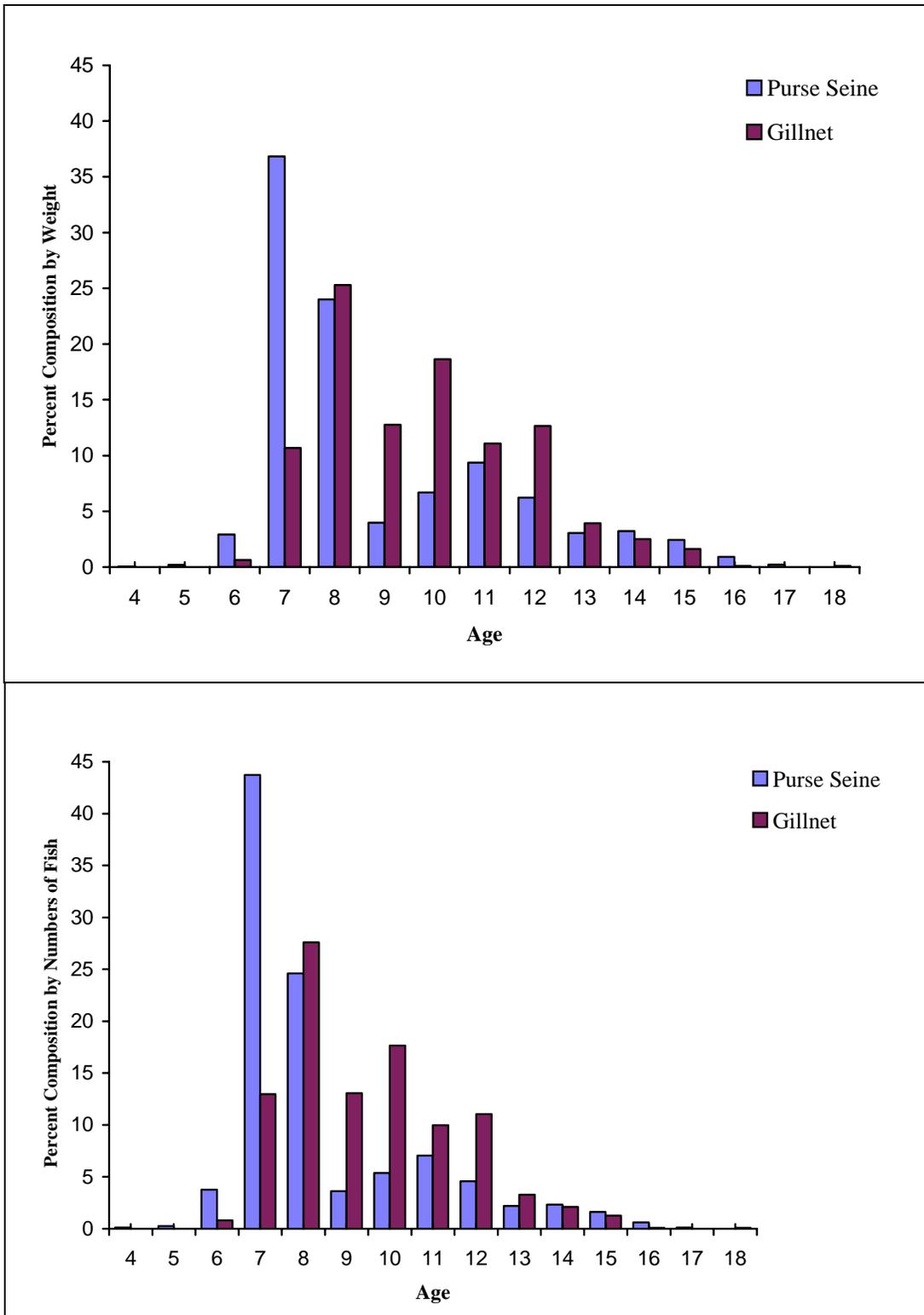


Figure 5.—Percent age composition of the commercial harvest by gear type for weight (top) and for numbers of fish (bottom), Togiak District, 2004.

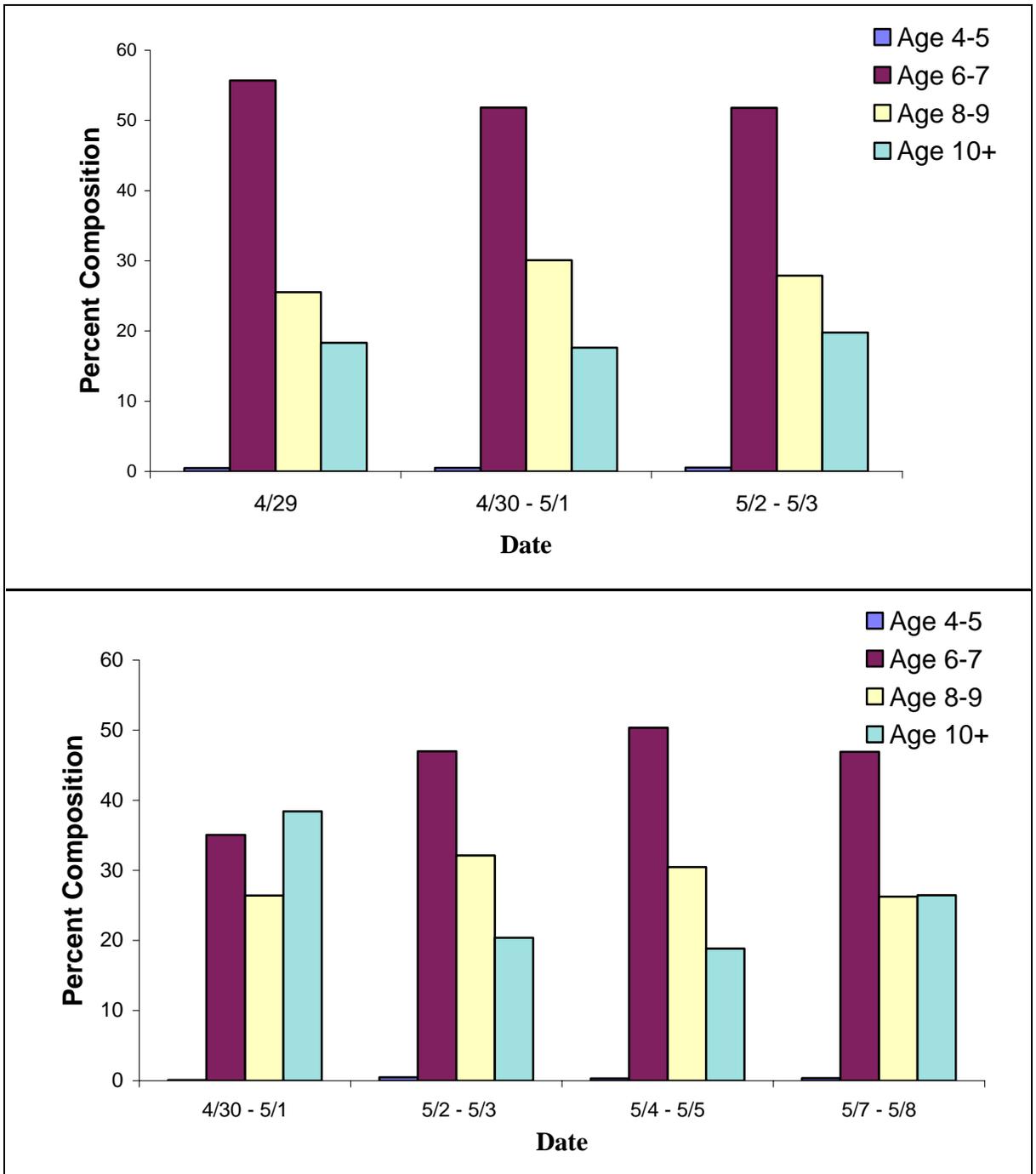
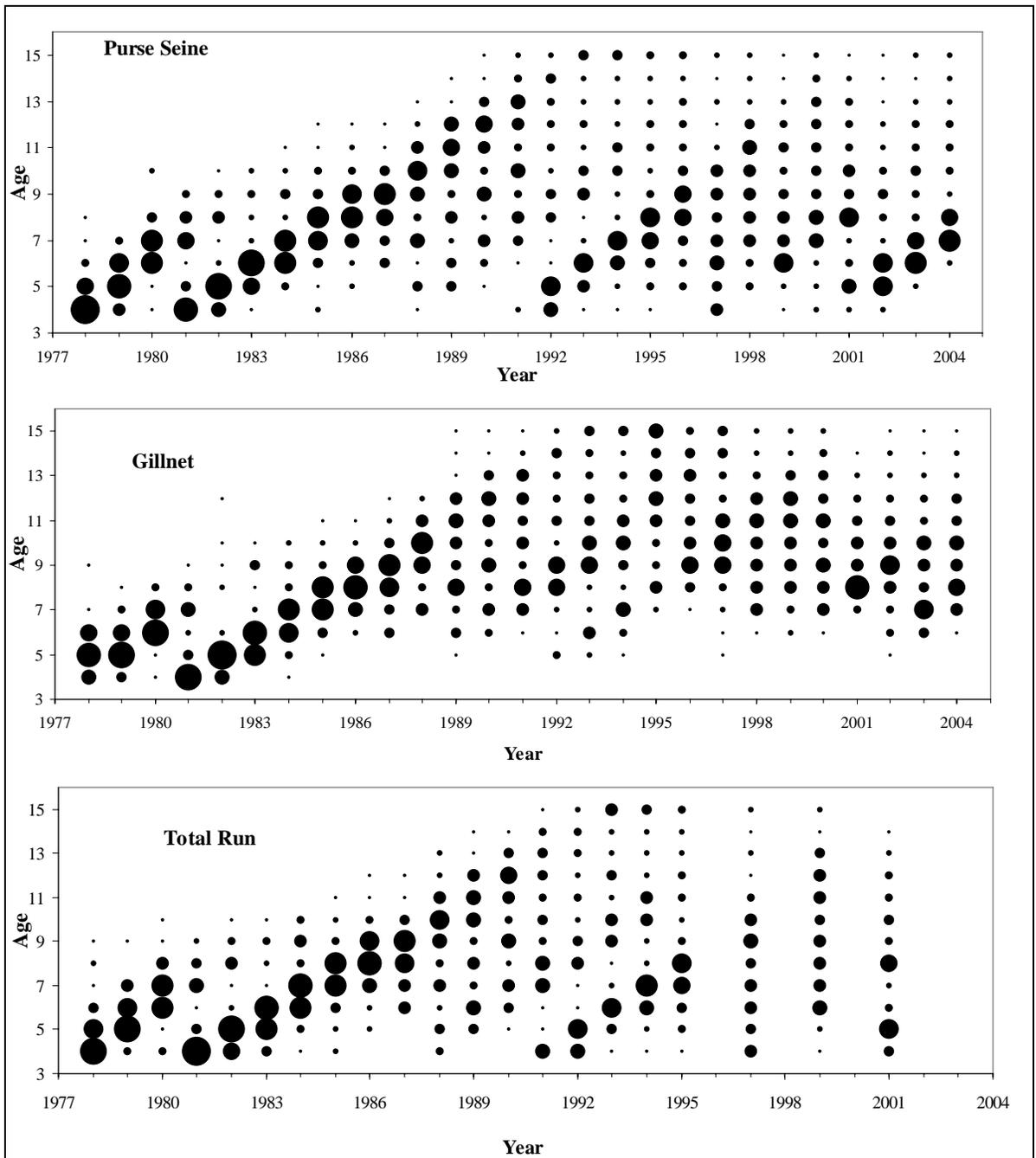


Figure 6.—Age composition of herring samples collected with non-selective gear by sampling period, east Togiak District (Nunavachak and Togiak Sections (top)) and west Togiak District (Hagemeister and Pyrite Point sections (bottom)), 2004.



Note: diameter of the circles represents percent age composition, determined by number of fish.

Figure 7.—Historic age composition of the purse seine harvest, gillnet harvest and total run, Togiak District, Bristol Bay, 1977–2004.

APPENDIX A

Appendix A1.—Estimated age composition of the commercial purse seine harvest, by date and fishing section, Togiak District, 2004.

Sample Date(s): 4/29 Section(s): Nun, Tog Harvest biomass: 2,463 (tons)				Sample Date(s): 4/30 Section(s): Hag, Tog Harvest biomass: 829 (tons)				Sample Date(s): 5/1 Section(s): Hag, Pyp, Tog Harvest biomass: 1,289 (tons)				Sample Date(s): 5/2 Section(s): Hag, Nun, Pyp, Tog Harvest biomass: 2,311 (tons)			
Age	No. of Samples	Percent by No.	No. of fish (x1,000)	Age	No. of Samples	Percent by No.	No. of fish (x1,000)	Age	No. of Samples	Percent by No.	No. of fish (x1,000)	Age	No. of Samples	Percent by No.	No. of fish (x1,000)
1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0
2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0
3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0
4	2	0.3%	20	4	1	0.2%	3	4	0	0.0%	0	4	2	0.3%	16
5	1	0.2%	10	5	1	0.2%	3	5	1	0.2%	5	5	3	0.4%	23
6	32	5.1%	323	6	12	2.0%	39	6	16	2.5%	78	6	34	4.4%	266
7	315	50.6%	3,183	7	209	35.2%	683	7	267	41.1%	1,301	7	350	45.2%	2,740
8	133	21.3%	1,344	8	138	23.3%	451	8	157	24.2%	765	8	218	28.1%	1,707
9	26	4.2%	263	9	26	4.4%	85	9	22	3.4%	107	9	18	2.3%	141
10	19	3.0%	192	10	49	8.3%	160	10	39	6.0%	190	10	42	5.4%	329
11	40	6.4%	404	11	54	9.1%	177	11	53	8.2%	258	11	44	5.7%	344
12	19	3.0%	192	12	41	6.9%	134	12	32	4.9%	156	12	31	4.0%	243
13	10	1.6%	101	13	21	3.5%	69	13	19	2.9%	93	13	8	1.0%	63
14	15	2.4%	152	14	19	3.2%	62	14	16	2.5%	78	14	10	1.3%	78
15	6	1.0%	61	15	15	2.5%	49	15	17	2.6%	83	15	10	1.3%	78
16	2	0.3%	20	16	7	1.2%	23	16	9	1.4%	44	16	4	0.5%	31
17	3	0.5%	30	17	0	0.0%	0	17	1	0.2%	5	17	1	0.1%	8
18	0	0.0%	0	18	0	0.0%	0	18	0	0.0%	0	18	0	0.0%	0
Total	623	100.0%	6,295	Total	593	100.0%	1,939	Total	649	100.0%	3,162	Total	775	100.0%	6,067
Age	Weight	Percent by Weight	Biomass (tons)	Age	Weight	Percent by Weight	Biomass (tons)	Age	Weight	Percent by Weight	Biomass (tons)	Age	Weight	Percent by Weight	Biomass (tons)
1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0
2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0
3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0
4	286	0.1%	3	4	198	0.1%	1	4	0	0.0%	0	4	334	0.1%	3
5	238	0.1%	3	5	258	0.1%	1	5	211	0.1%	1	5	832	0.3%	7
6	9,080	4.1%	101	6	3,340	1.5%	12	6	4,241	1.8%	23	6	9,093	3.4%	78
7	97,593	44.1%	1,087	7	64,753	28.1%	233	7	80,369	33.5%	432	7	104,650	39.1%	903
8	46,683	21.1%	520	8	50,388	21.9%	182	8	55,497	23.1%	298	8	75,603	28.2%	652
9	9,866	4.5%	110	9	10,412	4.5%	38	9	9,042	3.8%	49	9	6,960	2.6%	60
10	8,974	4.1%	100	10	21,987	9.6%	79	10	17,893	7.5%	96	10	17,733	6.6%	153
11	19,605	8.9%	218	11	25,810	11.2%	93	11	25,654	10.7%	138	11	20,548	7.7%	177
12	9,535	4.3%	106	12	20,668	9.0%	75	12	15,480	6.4%	83	12	15,067	5.6%	130
13	5,132	2.3%	57	13	10,582	4.6%	38	13	9,638	4.0%	52	13	3,806	1.4%	33
14	7,811	3.5%	87	14	9,897	4.3%	36	14	7,709	3.2%	41	14	5,004	1.9%	43
15	3,369	1.5%	38	15	7,844	3.4%	28	15	9,043	3.8%	49	15	5,430	2.0%	47
16	1,216	0.5%	14	16	3,927	1.7%	14	16	4,658	1.9%	25	16	2,208	0.8%	19
17	1,763	0.8%	20	17	0	0.0%	0	17	570	0.2%	3	17	589	0.2%	5
18	0	0.0%	0	18	0	0.0%	0	18	0	0.0%	0	18	0	0.0%	0
Total	221,151	100.0%	2,463	Total	230,064	100.0%	829	Total	240,005	100.0%	1,289	Total	267,857	100.0%	2,311

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Sample Date(s): 5/3 Section(s): Hag, Nun, Pyp Harvest biomass: 1,329 (tons)				Sample Date(s): 5/4 Section(s): Hag, Nun, Pyp Harvest biomass: 1,693 (tons)				Sample Date(s): 5/5 Section(s): Hag, Pyp, Tog Harvest biomass: 2,483 (tons)				Sample Date(s): 5/6 - 5/7 Section(s): Hag Harvest biomass: 326 (tons)			
Age	No. of Samples	Percent by No.	No. of fish (x1,000)	Age	No. of Samples	Percent by No.	No. of fish (x1,000)	Age	No. of Samples	Percent by No.	No. of fish (x1,000)	Age	No. of Samples	Percent by No.	No. of fish (x1,000)
1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0
2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0
3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0
4	0	0.0%	0	4	0	0.0%	0	4	0	0.0%	0	4	0	0.0%	0
5	1	0.3%	10	5	2	0.5%	23	5	0	0.0%	0	5	1	0.4%	4
6	16	4.4%	155	6	13	3.5%	170	6	14	6.7%	459	6	9	3.9%	33
7	160	44.4%	1,549	7	158	42.2%	1,835	7	109	51.9%	3,573	7	113	49.1%	408
8	90	25.0%	871	8	105	28.1%	1,250	8	53	25.2%	1,737	8	50	21.7%	181
9	15	4.2%	145	9	15	4.0%	174	9	5	2.4%	164	9	7	3.0%	25
10	22	6.1%	213	10	22	5.9%	284	10	3	1.4%	98	10	8	3.5%	29
11	19	5.3%	184	11	27	7.2%	325	11	10	4.8%	328	11	18	7.8%	65
12	15	4.2%	145	12	15	4.0%	172	12	8	3.8%	262	12	5	2.2%	18
13	10	2.8%	97	13	7	1.9%	75	13	3	1.4%	98	13	5	2.2%	18
14	5	1.4%	48	14	7	1.9%	74	14	2	1.0%	66	14	8	3.5%	29
15	7	1.9%	68	15	2	0.5%	24	15	3	1.4%	98	15	5	2.2%	18
16	0	0.0%	0	16	1	0.3%	0	16	0	0.0%	0	16	1	0.4%	4
17	0	0.0%	0	17	0	0.0%	0	17	0	0.0%	0	17	0	0.0%	0
18	0	0.0%	0	18	0	0.0%	0	18	0	0.0%	0	18	0	0.0%	0
Total	360	100.0%	3,485	Total	374	100.0%	4,405	Total	210	100.0%	6,883	Total	230	100.0%	831
Age	Weight	Percent by Weight	Biomass (tons)	Age	Weight	Percent by Weight	Biomass (tons)	Age	Weight	Percent by Weight	Biomass (tons)	Age	Weight	Percent by Weight	Biomass (tons)
1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0
2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0
3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0
4	0	0.0%	0	4	0	0.0%	0	4	0	0.0%	0	4	0	0.0%	0
5	223	0.2%	2	5	446	0.3%	6	5	0	0.0%	0	5	219	0.3%	1
6	4,654	3.7%	50	6	3,781	2.9%	50	6	3,794	5.5%	137	6	2,412	3.0%	10
7	47,192	37.9%	504	7	46,602	36.1%	611	7	31,610	46.0%	1,142	7	34,126	41.8%	136
8	30,723	24.7%	328	8	35,844	27.8%	470	8	17,861	26.0%	645	8	17,600	21.5%	70
9	5,555	4.5%	59	9	5,555	4.3%	73	9	2,095	3.0%	76	9	2,961	3.6%	12
10	9,834	7.9%	105	10	9,834	7.6%	129	10	1,353	2.0%	49	10	3,520	4.3%	14
11	8,844	7.1%	94	11	12,568	9.7%	165	11	4,430	6.4%	160	11	9,072	11.1%	36
12	7,257	5.8%	77	12	7,257	5.6%	95	12	3,440	5.0%	124	12	2,175	2.7%	9
13	4,634	3.7%	49	13	3,244	2.5%	43	13	1,491	2.2%	54	13	2,670	3.3%	11
14	2,150	1.7%	23	14	3,010	2.3%	39	14	1,102	1.6%	40	14	3,776	4.6%	15
15	3,493	2.8%	37	15	998	0.8%	13	15	1,551	2.3%	56	15	2,655	3.2%	11
16	0	0.0%	0	16	0	0.0%	0	16	0	0.0%	0	16	547	0.7%	2
17	0	0.0%	0	17	0	0.0%	0	17	0	0.0%	0	17	0	0.0%	0
18	0	0.0%	0	18	0	0.0%	0	18	0	0.0%	0	18	0	0.0%	0
Total	124,559	100.0%	1,329	Total	129,139	100.0%	1,693	Total	68,727	100.0%	2,483	Total	81,733	100.0%	326

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Sample Date(s): 5/8 - 5/10 Section(s): Hag Harvest biomass: 1,164.3 (tons)				Sample Date(s): 4/29 - 5/10 Section(s): Hag, Nun, Hag Harvest biomass: 11,833.0 (tons)			
Age	No. of Samples	Percent by No.	No. of fish (x1,000)	Age	No. of Samples	Percent by No.	No. of fish (x1,000)
1	0	0.0%	0	1	0	0.0%	0
2	0	0.0%	0	2	0	0.0%	0
3	0	0.0%	0	3	0	0.0%	0
4	0	0.0%	0	4	5	0.1%	38
5	1	0.4%	11	5	11	0.3%	90
6	8	3.0%	86	6	154	3.8%	1,593
7	104	38.7%	1,122	7	1,785	43.7%	16,333
8	60	22.3%	647	8	1,004	24.6%	8,949
9	14	5.2%	151	9	148	3.6%	1,261
10	15	5.6%	162	10	219	5.4%	1,671
11	23	8.6%	248	11	288	7.1%	2,349
12	21	7.8%	227	12	187	4.6%	1,549
13	7	2.6%	76	13	90	2.2%	691
14	13	4.8%	140	14	95	2.3%	732
15	2	0.7%	22	15	67	1.6%	498
16	1	0.4%	11	16	25	0.6%	135
17	0	0.0%	0	17	5	0.1%	43
18	0	0.0%	0	18	0	0.0%	0
Total	269	100.0%	2,902	Total	4,083	100.0%	35,932
Age	Weight	Percent by Weight	Biomass (tons)	Age	Weight	Percent by Weight	Biomass (tons)
1	0	0.0%	0	1	0	0.0%	0
2	0	0.0%	0	2	0	0.0%	0
3	0	0.0%	0	3	0	0.0%	0
4	0	0.0%	0	4	818	0.1%	7
5	188	0.2%	2	5	2,615	0.2%	23
6	2,120	2.2%	25	6	42,515	2.9%	481
7	31,304	32.0%	372	7	538,199	36.8%	5,402
8	20,520	21.0%	244	8	350,719	24.0%	3,408
9	5,502	5.6%	65	9	57,948	4.0%	543
10	6,375	6.5%	76	10	97,503	6.7%	807
11	10,373	10.6%	123	11	136,904	9.4%	1,214
12	9,996	10.2%	119	12	90,875	6.2%	820
13	3,479	3.6%	41	13	44,676	3.1%	380
14	6,409	6.5%	76	14	46,868	3.2%	403
15	1,034	1.1%	12	15	35,417	2.4%	289
16	597	0.6%	7	16	13,153	0.9%	82
17	0	0.0%	0	17	2,922	0.2%	28
18	0	0.0%	0	18	0	0.0%	0
Total	97,897	100.0%	1,164	Total	1,461,132	100.0%	13,888

Appendix A2.—Estimated age composition of the commercial gillnet harvest, by date and fishing section, Togiak District, 2004.

Sample Date(s): 4/30 - 5/01 Section(s): Kulukak, Nunavachak Harvest biomass: 1,069 (tons)				Sample Dates: 5/02 - 5/04 Section(s): Kulukak Harvest biomass: 2,366 (tons)				Sample Dates: 5/5 - 5/9 Section(s): Kulukak Harvest biomass: 1,546 (tons)				Sample Dates: 4/25 - 5/9 Section(s): Kulukak, Nunavachak Harvest biomass: 4,980 (tons)			
Age	No. of Samples	Percent by No.	No. of fish (x1,000)	Age	No. of Samples	Percent by No.	No. of fish (x1,000)	Age	No. of Samples	Percent by No.	No. of fish (x1,000)	Age	No. of Samples	Percent by No.	No. of fish (x1,000)
1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0
2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0
3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0
4	0	0.0%	0	4	0	0.0%	0	4	0	0.0%	0	4	0	0.0%	0
5	0	0.0%	0	5	0	0.0%	0	5	0	0.0%	0	5	0	0.0%	0
6	1	0.2%	5	6	2	0.5%	25	6	6	2.2%	74	6	9	0.8%	104
7	49	11.7%	266	7	41	10.3%	511	7	52	18.7%	642	7	142	13.0%	1,419
8	124	29.6%	672	8	106	26.7%	1,322	8	72	25.9%	889	8	302	27.6%	2,884
9	55	13.1%	298	9	52	13.1%	649	9	36	12.9%	445	9	143	13.1%	1,391
10	73	17.4%	396	10	78	19.6%	973	10	42	15.1%	519	10	193	17.6%	1,887
11	48	11.5%	260	11	38	9.6%	474	11	23	8.3%	284	11	109	10.0%	1,018
12	47	11.2%	255	12	48	12.1%	599	12	26	9.4%	321	12	121	11.1%	1,175
13	12	2.9%	65	13	12	3.0%	150	13	12	4.3%	148	13	36	3.3%	363
14	8	1.9%	43	14	12	3.0%	150	14	3	1.1%	37	14	23	2.1%	230
15	2	0.5%	11	15	7	1.8%	87	15	5	1.8%	62	15	14	1.3%	160
16	0	0.0%	0	16	1	0.3%	12	16	0	0.0%	0	16	1	0.1%	12
17	0	0.0%	0	17	0	0.0%	0	17	0	0.0%	0	17	0	0.0%	0
18	0	0.0%	0	18	0	0.0%	0	18	1	0.4%	12	18	1	0.1%	12
19	0	0.0%	0	19	0	0.0%	0	19	0	0.0%	0	19	0	0.0%	0
20	0	0.0%	0	20	0	0.0%	0	20	0	0.0%	0	20	0	0.0%	0
Total	419	100.0%	2,271	Total	397	100.0%	4,952	Total	278	100.0%	3,433	Total	1,094	100.0%	10,657
Age	Weight	Percent by Weight	Biomass (tons)	Age	Weight	Percent by Weight	Biomass (tons)	Age	Weight	Percent by Weight	Biomass (tons)	Age	Weight	Percent by Weight	Biomass (tons)
1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0
2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0
3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0
4	0	0.0%	0	4	0	0.0%	0	4	0	0.0%	0	4	0	0.0%	0
5	0	0.0%	0	5	0	0.0%	0	5	0	0.0%	0	5	0	0.0%	0
6	382	0.2%	2	6	624	0.4%	9	6	1,890	1.7%	26	6	2,896	0.6%	37
7	16,989	9.5%	102	7	14,590	8.5%	201	7	18,064	15.9%	246	7	49,643	10.7%	548
8	48,136	26.9%	288	8	41,879	24.3%	576	8	27,517	24.2%	375	8	117,532	25.3%	1,238
9	23,053	12.9%	138	9	22,037	12.8%	303	9	14,184	12.5%	193	9	59,274	12.8%	634
10	33,381	18.7%	199	10	34,684	20.2%	477	10	18,550	16.3%	253	10	86,615	18.6%	929
11	22,855	12.8%	137	11	17,902	10.4%	246	11	10,669	9.4%	145	11	51,426	11.1%	528
12	22,635	12.7%	135	12	23,962	13.9%	329	12	12,158	10.7%	166	12	58,755	12.7%	630
13	6,278	3.5%	38	13	6,054	3.5%	83	13	5,925	5.2%	81	13	18,257	3.9%	201
14	3,933	2.2%	24	14	6,225	3.6%	86	14	1,467	1.3%	20	14	11,625	2.5%	129
15	1,206	0.7%	7	15	3,667	2.1%	50	15	2,652	2.3%	36	15	7,525	1.6%	94
16	0	0.0%	0	16	447	0.3%	6	16	0	0.0%	0	16	447	0.1%	6
17	0	0.0%	0	17	0	0.0%	0	17	0	0.0%	0	17	0	0.0%	0
18	0	0.0%	0	18	0	0.0%	0	18	448	0.4%	6	18	448	0.1%	6
19	0	0.0%	0	19	0	0.0%	0	19	0	0.0%	0	19	0	0.0%	0
20	0	0.0%	0	20	0	0.0%	0	20	0	0.0%	0	20	0	0.0%	0
Total	178,848	100.0%	1,069	Total	172,071	100.0%	2,366	Total	113,524	100.0%	1,546	Total	464,443	100.0%	4,980

APPENDIX B

Appendix B1.—Age, sex and size composition of Pacific herring caught by commercial purse seine, Nunavachak Section, 2 May–3 May, 2004.

Sample Dates	Age	Sex (number)				% of Total	Weight		Length				
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured	
5/02	4	1	0	0	1	0.3	178		1	239		1	
	5	1	0	0	1	0.3	202		1	252		1	
	6	13	6	0	19	4.9	267	33.2	19	277	8.8	19	
	7	100	87	0	187	48.2	299	39.7	187	285	9.6	187	
	8	53	50	0	103	26.5	341	48.7	103	295	10.6	103	
	9	4	2	0	6	1.5	394	42.5	6	306	11.3	6	
	10	10	7	0	17	4.4	424	40.6	17	315	7.6	17	
	11	14	8	0	22	5.7	470	47.9	22	321	7.1	22	
	12	7	9	0	16	4.1	487	57.5	16	328	8.0	16	
	13	2	0	0	2	0.5	457	39.6	2	333	2.8	2	
	14	3	3	0	6	1.5	500	46.0	6	333	8.2	6	
	15	1	4	0	5	1.3	564	47.7	5	342	5.4	5	
	16	1	1	0	2	0.5	591	28.3	2	342	5.7	2	
	17	1	0	0	1	0.3	589		1	338		1	
	Sample Total		211	177	0	388	100.0	342	82.8	388	295	18.5	388
	5/03	4											
		5	0	1	0	1	0.6	223		1	250		1
6		6	4	0	10	6.0	286	27.7	10	271	5.0	10	
7		34	38	0	72	42.9	301	49.7	72	277	11.7	72	
8		22	19	0	41	24.4	343	56.3	41	288	11.4	41	
9		1	4	0	5	3.0	391	54.8	5	302	13.7	5	
10		4	7	0	11	6.5	445	57.2	11	310	10.9	11	
11		4	6	0	10	6.0	474	55.9	10	316	10.5	10	
12		5	3	0	8	4.8	460	91.5	8	309	15.3	8	
13		1	1	0	2	1.2	477	17.0	2	320	3.5	2	
14		3	2	0	5	3.0	430	80.0	5	319	13.4	5	
15		3	0	0	3	1.8	503	46.7	3	323	6.4	3	
16													
17													
Sample Total		83	85	0	168	100.0	349	84.8	168	288	19.2	168	
5/02–03		4	1	0	0	1	0.2	178		1	239		1
		5	1	1	0	2	0.4	213	14.8	2	251	1.4	2
	6	19	10	0	29	5.2	274	32.2	29	275	8.1	29	
	7	134	125	0	259	46.6	299	42.6	259	283	10.9	259	
	8	75	69	0	144	25.9	342	50.8	144	293	11.3	144	
	9	5	6	0	11	2.0	393	45.9	11	304	12.0	11	
	10	14	14	0	28	5.0	432	48.0	28	313	9.2	28	
	11	18	14	0	32	5.8	472	49.7	32	319	8.5	32	
	12	12	12	0	24	4.3	478	69.8	24	322	14.1	24	
	13	3	1	0	4	0.7	467	27.4	4	326	8.2	4	
	14	6	5	0	11	2.0	468	70.5	11	327	12.4	11	
	15	4	4	0	8	1.4	541	53.8	8	335	10.9	8	
	16	1	1	0	2	0.4	591	28.3	2	342	5.7	2	
	17	1	0	0	1	0.2	589		1	338		1	
	All Samples Combined		294	262	0	556	100.0	344	83.4	556	293	18.9	556
	Sex Composition		52.9	47.1									
	Unaged		10	4	0	14	2.5	303	79.6	14	284	17.6	14
Sex Composition		71.4	28.6										

Appendix B2.—Age, sex and size composition of Pacific herring caught by commercial purse seine, Hagemeister Section, 29 April–8 May, 2004.

Sample Dates	Age	Sex (number)				% of Mean Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
4/29	4											
	5											
	6											
	7	25	7	0	32	22.9	307	43.0	32	288	9.5	32
	8	24	11	0	35	25.0	359	48.9	35	298	10.8	35
	9	4	1	0	5	3.6	360	42.1	5	301	10.4	5
	10	8	3	0	11	7.9	469	35.5	11	319	5.8	11
	11	16	7	0	23	16.4	464	53.1	23	320	9.1	23
	12	10	2	0	12	8.6	481	50.6	12	327	11.3	12
	13	8	1	0	9	6.4	495	28.1	9	329	7.6	9
	14	2	0	0	2	1.4	462	13.4	2	323	7.1	2
	15	4	3	0	7	5.0	507	46.7	7	330	7.1	7
	16	3	0	0	3	2.1	479	35.3	3	329	10.7	3
	17	0	1	0	1	0.7	725		1	358		1
Sample Total		104	36	0	140	100.0	406	90.2	140	309	19.0	140
4/30	4	1	0	0	1	0.3	198		1	251		1
	5											
	6	3	2	0	5	1.3	276	66.6	5	281	13.1	5
	7	51	58	0	109	29.2	317	41.6	109	289	8.9	109
	8	35	37	0	72	19.3	368	65.4	72	301	11.7	72
	9	8	13	0	21	5.6	407	41.7	21	310	10.8	21
	10	16	19	0	35	9.4	453	52.9	35	318	10.5	35
	11	23	18	0	41	11.0	477	46.1	41	322	6.8	41
	12	16	18	0	34	9.1	507	44.4	34	329	7.9	34
	13	8	9	0	17	4.6	514	34.7	17	330	4.6	17
	14	6	11	0	17	4.6	517	65.4	17	335	9.6	17
	15	8	6	0	14	3.8	522	46.1	14	335	7.6	14
	16	2	5	0	7	1.9	561	44.9	7	336	8.1	7
	17											
Sample Total		177	196	0	373	100.0	409	95.7	373	309	19.8	373
5/01	4											
	5											
	6	7	4	0	11	2.4	281	27.9	11	277	9.6	11
	7	84	83	0	167	36.3	307	39.6	167	282	10.1	167
	8	49	62	0	111	24.1	357	50.9	111	295	12.3	111
	9	8	8	0	16	3.5	417	41.4	16	307	10.2	16
	10	12	19	0	31	6.7	451	43.1	30	313	8.1	31
	11	20	24	0	44	9.6	482	48.4	44	320	10.2	44
	12	14	14	0	28	6.1	489	39.7	28	323	8.5	28
	13	8	8	0	16	3.5	500	57.3	16	329	11.2	16
	14	7	6	0	13	2.8	485	49.1	13	329	7.8	13
	15	6	8	0	14	3.0	530	53.4	14	331	8.1	14
	16	6	2	0	8	1.7	512	74.8	8	335	15.2	8
	17	0	1	0	1	0.2	570		1	345		1
Sample Total		221	239	0	460	100.0	382	91.2	459	300	20.9	460

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Sample Dates	Age	Sex (number)				% of Total	Weight			Length			
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured	
5/02	4	0	1	0	1	0.3	156		1	229		1	
	5	2	0	0	2	0.5	315	43.1	2	284	7.1	2	
	6	7	8	0	15	3.9	268	33.5	15	272	8.2	15	
	7	90	73	0	163	42.1	299	37.3	163	282	9.7	163	
	8	60	55	0	115	29.7	352	52.8	115	296	10.2	115	
	9	6	6	0	12	3.1	383	57.9	12	302	9.3	12	
	10	12	13	0	25	6.5	421	56.9	25	309	11.3	25	
	11	10	11	1	22	5.7	464	49.9	21	320	6.6	22	
	12	7	8	0	15	3.9	485	52.7	15	323	6.4	15	
	13	4	2	0	6	1.6	482	68.3	6	320	9.3	6	
	14	2	2	0	4	1.0	501	84.5	4	323	3.4	4	
	15	2	3	0	5	1.3	522	33.5	5	329	8.9	5	
	16	0	2	0	2	0.5	513	38.9	2	334	8.5	2	
	17												
	Sample Total		202	184	1	387	100.0	349	80.0	386	294	17.6	387
	5/03	4											
		5											
6		3	3	0	6	3.1	299	26.3	6	274	9.4	6	
7		36	51	1	88	45.8	290	39.3	86	276	9.9	88	
8		21	28	0	49	25.5	340	49.4	49	287	11.4	49	
9		5	5	0	10	5.2	360	44.6	10	292	8.1	10	
10		5	6	0	11	5.7	449	52.2	11	308	9.1	11	
11		4	5	0	9	4.7	456	31.7	9	315	3.9	9	
12		1	6	0	7	3.6	511	60.8	7	324	9.2	7	
13		6	2	0	8	4.2	460	42.9	8	318	9.7	8	
14													
15		3	1	0	4	2.1	496	64.8	4	327	4.7	4	
16													
17													
Sample Total			84	107	1	192	100.0	344	81.3	190	287	18.6	192
5/04		4											
		5	2	0	0	2	0.5	228	56.6	2	265	12.7	2
	6	7	6	0	13	3.5	265	40.7	13	272	7.7	13	
	7	82	76	0	158	42.2	302	46.3	158	280	10.1	158	
	8	42	63	0	105	28.1	341	52.7	105	291	12.1	105	
	9	4	11	0	15	4.0	380	66.6	15	298	12.1	15	
	10	14	8	0	22	5.9	412	62.0	22	309	11.8	22	
	11	9	18	0	27	7.2	460	71.5	27	313	12.4	27	
	12	6	9	0	15	4.0	503	45.4	15	324	7.0	15	
	13	2	5	0	7	1.9	517	40.4	7	326	4.8	7	
	14	4	3	0	7	1.9	486	74.2	7	328	11.0	7	
	15	1	1	0	2	0.5	505	46.0	2	331	9.9	2	
	16	0	1	0	1	0.3	508		1	336		1	
	17												
	Sample Total		173	201	0	374	100.0	349	84.6	374	291	18.4	374

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Appendix B2.–Page 3 of 4.

Sample Dates	Age	Sex (number)				% of Mean Total	Weight			Length		
		Male	Female	Unknown	Total		Number Weighed	Mean (mm)	SD	Number Measured		
5/05	4											
	5											
	6	6	8	0	14	6.7	271	38.0	14	273	11.8	14
	7	55	54	0	109	51.9	290	38.6	109	280	9.1	109
	8	31	22	0	53	25.2	337	53.1	53	292	10.0	53
	9	1	4	0	5	2.4	419	35.4	5	309	6.4	5
	10	0	3	0	3	1.4	451	86.4	3	314	23.6	3
	11	7	3	0	10	4.8	443	35.5	10	317	6.6	10
	12	5	3	0	8	3.8	430	56.6	8	315	7.9	8
	13	2	1	0	3	1.4	497	56.4	3	324	8.5	3
	14	2	0	0	2	1.0	551	12.0	2	330	7.8	2
	15	2	1	0	3	1.4	517	57.8	3	327	6.4	3
	16											
17												
Sample Total		111	99	0	210	100.0	328	75.5	210	288	16.9	210
5/07	4											
	5	0	1	0	1	0.4	219		1	249		1
	6	7	2	0	9	3.9	268	22.6	9	271	5.0	9
	7	53	60	0	113	49.1	302	36.4	113	280	8.3	113
	8	18	32	0	50	21.7	352	36.7	50	292	10.2	50
	9	5	2	0	7	3.0	423	81.2	7	303	12.9	7
	10	4	4	0	8	3.5	440	66.0	8	313	10.2	8
	11	9	9	0	18	7.8	504	63.6	18	318	11.6	18
	12	4	1	0	5	2.2	435	49.0	5	311	9.0	5
	13	2	3	0	5	2.2	534	49.8	5	326	6.9	5
	14	3	5	0	8	3.5	472	19.1	8	325	8.5	8
	15	2	3	0	5	2.2	531	15.8	5	328	4.3	5
	16	1	0	0	1	0.4	547		1	322		1
17												
Sample Total		108	122	0	230	100.0	356	87.7	230	291	18.8	230
5/08	4											
	5	1	0	0	1	0.4	188		1	251		1
	6	3	5	0	8	3.0	265	21.0	8	274	3.8	8
	7	50	54	0	104	38.7	301	37.0	104	281	9.8	104
	8	29	31	0	60	22.3	342	47.6	60	291	10.5	60
	9	6	8	0	14	5.2	393	58.5	14	302	10.7	14
	10	4	11	0	15	5.6	425	66.7	15	312	13.8	15
	11	12	11	0	23	8.6	451	68.5	23	315	15.1	23
	12	12	9	0	21	7.8	476	47.7	21	318	8.2	21
	13	5	2	0	7	2.6	497	47.9	7	322	6.0	7
	14	10	3	0	13	4.8	493	34.9	13	325	6.7	13
	15	0	2	0	2	0.7	517	14.8	2	330	4.2	2
	16	0	1	0	1	0.4	597		1	331		1
17												
Sample Total		132	137	0	269	100.0	364	87.7	269	295	19.5	269

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Appendix B2.–Page 4 of 4.

Sample Dates	Age	Sex (number)				% of Total	Weight			Length			
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured	
4/29–5/08	4	1	1	0	2	0.1	177	29.7	2	240	15.6	2	
	5	5	1	0	6	0.2	249	61.9	6	266	16.6	6	
	6	43	38	0	81	3.1	272	34.9	81	274	8.9	81	
	7	526	516	1	1043	39.6	302	40.5	1041	282	10.1	1043	
	8	309	341	0	650	24.7	350	52.6	650	294	11.7	650	
	9	47	58	0	105	4.0	395	55.1	105	303	11.5	105	
	10	75	86	0	161	6.1	439	56.4	160	313	11.1	161	
	11	110	106	1	217	8.2	470	55.9	216	319	10.3	217	
	12	75	70	0	145	5.5	488	50.5	145	323	9.4	145	
	13	45	33	0	78	3.0	500	48.0	78	326	8.7	78	
	14	36	30	0	66	2.5	496	54.3	66	329	9.0	66	
	15	28	28	0	56	2.1	520	45.0	56	331	7.4	56	
	16	12	11	0	23	0.9	527	59.6	23	334	10.8	23	
	17	0	2	0	2	0.1	648	109.6	2	352	9.2	2	
	All Samples Combined		1,312	1,321	2	2,635	100.0	366	90.3	2,631	296	20.3	2,635
	Sex Composition		49.8	50.2									
	Unaged		51	63	0	114	4.3	376	92.3	114	299	19.8	114
Sex Composition		44.7	55.3										

Appendix B3.—Age, sex and size composition of Pacific herring caught by commercial purse seine, Togiak Section, 29 April–1 May, 2004.

Sample Dates	Age	Sex (number)			Total	% of Total	Weight		Length				
		Male	Female	Unknown			Mean (g)	Number SD Weighed	Mean (mm)	Number SD Measured			
4/29	4	1	1	0	2	0.8	143	4.2	2	233	7.1	2	
	5	0	1	0	1	0.4	238		1	259		1	
	6	8	6	0	14	5.4	277	33.4	14	278	9.0	14	
	7	55	81	0	136	52.1	303	40.8	136	284	10.1	136	
	8	23	34	0	57	21.8	335	54.0	57	290	11.4	57	
	9	11	3	0	14	5.4	373	71.4	14	302	12.3	14	
	10	1	3	0	4	1.5	466	3.7	4	325	11.6	4	
	11	10	5	0	15	5.7	487	50.1	15	322	6.3	15	
	12	4	2	0	6	2.3	482	37.8	6	320	6.4	6	
	13	3	0	0	3	1.1	460	48.6	3	325	11.5	3	
	14	2	2	0	4	1.5	454	52.6	4	337	5.4	4	
	15	1	2	0	3	1.1	522	22.5	3	338	7.5	3	
	16	1	0	0	1	0.4	587		1	341		1	
	17	1	0	0	1	0.4	497		1	334		1	
	Sample Total		121	140	0	261	100.0	337	79.8	261	291	18.7	261
	4/30	4											
		5	0	1	0	1	0.5	258		1	272		1
6		4	3	0	7	3.2	280	12.6	7	278	5.3	7	
7		50	49	1	100	45.5	302	41.5	100	285	9.6	100	
8		30	36	0	66	30.0	362	51.2	66	299	9.6	66	
9		3	2	0	5	2.3	373	16.2	5	307	2.7	5	
10		6	8	0	14	6.4	438	54.3	14	319	8.8	14	
11		7	6	0	13	5.9	481	60.8	13	322	6.6	13	
12		3	4	0	7	3.2	490	48.5	7	332	5.9	7	
13		2	2	0	4	1.8	461	52.5	4	324	6.4	4	
14		0	2	0	2	0.9	554	75.7	2	346	10.6	2	
15		1	0	0	1	0.5	536		1	318		1	
16													
17													
Sample Total		106	113	1	220	100.0	352	79.0	220	297	17.5	220	
5/01		4											
		5	0	1	0	1	0.5	211		1	254		1
	6	3	2	0	5	2.6	230	15.4	5	267	3.2	5	
	7	35	65	0	100	52.9	291	28.1	100	282	8.1	100	
	8	19	27	0	46	24.3	345	51.0	46	297	11.5	46	
	9	1	5	0	6	3.2	395	71.8	6	309	13.0	6	
	10	2	6	0	8	4.2	489	56.1	8	324	3.7	8	
	11	4	5	0	9	4.8	494	60.6	9	322	10.3	9	
	12	1	3	0	4	2.1	447	50.8	4	325	9.9	4	
	13	0	3	0	3	1.6	546	58.0	3	331	10.5	3	
	14	1	2	0	3	1.6	468	40.2	3	320	9.6	3	
	15	2	1	0	3	1.6	541	69.6	3	331	16.5	3	
	16	0	1	0	1	0.5	562		1	346		1	
	17												
	Sample Total		68	121	0	189	100.0	339	87.0	189	293	19.1	189

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Sample Dates	Age	Sex (number)				% of Total	Weight			Length			
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured	
4/29–5/01	4	1	1	0	2	0.3	143	4.2	2	233	7.1	2	
	5	0	3	0	3	0.4	236	23.6	3	262	9.3	3	
	6	15	11	0	26	3.9	269	32.1	26	276	8.3	26	
	7	140	195	1	336	50.1	299	38.0	336	284	9.4	336	
	8	72	97	0	169	25.2	348	53.0	169	296	11.4	169	
	9	15	10	0	25	3.7	378	63.0	25	304	11.3	25	
	10	9	17	0	26	3.9	458	54.4	26	321	8.3	26	
	11	21	16	0	37	5.5	486	55.2	37	322	7.3	37	
	12	8	9	0	17	2.5	477	46.1	17	326	8.7	17	
	13	5	5	0	10	1.5	486	62.5	10	326	8.8	10	
	14	3	6	0	9	1.3	480	62.6	9	333	12.5	9	
	15	4	3	0	7	1.0	532	43.4	7	332	12.7	7	
	16	1	1	0	2	0.3	575	17.7	2	344	3.5	2	
	17	1	0	0	1	0.1	497		1	334		1	
	All Samples Combined		295	374	1	670	100.0	342	81.8	670	294	18.6	670
	Sex Composition		44.1	55.9									
	Unaged		14	22	0	36	5.4	361	70.3	36	299	13.9	36
Sex Composition		38.9	61.1										

Appendix B4.—Age, sex and size composition of Pacific herring caught by commercial purse seine, Hagemeister, Nunavachak and Togiak sections, 29 April–8 May, 2004.

Sample Dates	Sex (number)				% of Total	Weight			Length				
	Age	Male	Female	Unknown		Total	Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured	
4/29	4	1	1	0	2	0.5	143	4.2	2	233	7.1	2	
	5	0	1	0	1	0.2	238		1	259		1	
	6	8	6	0	14	3.5	277	33.4	14	278	9.0	14	
	7	80	88	0	168	41.9	304	41.1	168	285	10.0	168	
	8	47	45	0	92	22.9	344	53.1	92	293	11.7	92	
	9	15	4	0	19	4.7	370	64.1	19	302	11.6	19	
	10	9	6	0	15	3.7	468	30.1	15	321	7.6	15	
	11	26	12	0	38	9.5	473	52.4	38	321	8.1	38	
	12	14	4	0	18	4.5	481	45.6	18	325	10.4	18	
	13	11	1	0	12	3.0	487	35.6	12	328	8.3	12	
	14	4	2	0	6	1.5	456	41.4	6	332	8.7	6	
	15	5	5	0	10	2.5	511	40.3	10	332	7.9	10	
	16	4	0	0	4	1.0	506	61.2	4	332	10.7	4	
	17	1	1	0	2	0.5	611	161.2	2	346	17.0	2	
	Sample Total		225	176	0	401	100.0	361	89.8	401	297	20.5	401
	4/30	4	1	0	0	1	0.2	198		1	251		1
		5	0	1	0	1	0.2	258		1	272		1
6		7	5	0	12	2.0	278	41.3	12	280	8.9	12	
7		101	107	1	209	35.2	310	42.1	209	287	9.4	209	
8		65	73	0	138	23.3	365	58.9	138	300	10.7	138	
9		11	15	0	26	4.4	400	40.3	26	309	9.8	26	
10		22	27	0	49	8.3	448	53.2	49	318	9.9	49	
11		30	24	0	54	9.1	478	49.4	54	322	6.7	54	
12		19	22	0	41	6.9	504	44.9	41	330	7.6	41	
13		10	11	0	21	3.5	504	42.9	21	329	5.4	21	
14		6	13	0	19	3.2	521	65.2	19	336	10.0	19	
15		9	6	0	15	2.5	523	44.6	15	334	8.5	15	
16		2	5	0	7	1.2	561	44.9	7	336	8.1	7	
17													
Sample Total			283	309	1	593	100.0	388	93.9	593	304	19.8	593
5/01		4											
		5	0	1	0	1	0.2	211		1	254		1
	6	10	6	0	16	2.5	265	34.1	16	274	9.3	16	
	7	119	148	0	267	41.1	301	36.5	267	282	9.4	267	
	8	68	89	0	157	24.2	353	51.0	157	296	12.0	157	
	9	9	13	0	22	3.4	411	50.5	22	308	10.7	22	
	10	14	25	0	39	6.0	459	47.9	38	315	8.8	39	
	11	24	29	0	53	8.2	484	50.2	53	321	10.2	53	
	12	15	17	0	32	4.9	484	42.7	32	324	8.6	32	
	13	8	11	0	19	2.9	507	58.3	19	329	10.9	19	
	14	8	8	0	16	2.5	482	46.9	16	328	8.7	16	
	15	8	9	0	17	2.6	532	54.3	17	331	9.3	17	
	16	6	3	0	9	1.4	517	72.0	9	336	14.7	9	
	17	0	1	0	1	0.2	570		1	345		1	
	Sample Total		289	360	0	649	100.0	370	92.1	648	298	20.7	649

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Sample Dates	Age	Sex (number)			Total	% of Mean Total	Weight			Length			
		Male	Female	Unknown			Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured	
5/02	4	1	1	0	2	0.3	167	15.6	2	234	7.1	2	
	5	3	0	0	3	0.4	277	71.8	3	273	19.1	3	
	6	20	14	0	34	4.4	268	32.8	34	275	8.8	34	
	7	190	160	0	350	45.2	299	38.5	350	284	9.8	350	
	8	113	105	0	218	28.1	347	51.1	218	295	10.4	218	
	9	10	8	0	18	2.3	387	52.3	18	304	9.9	18	
	10	22	20	0	42	5.4	422	50.4	42	312	10.2	42	
	11	24	19	1	44	5.7	467	48.4	43	320	6.8	44	
	12	14	17	0	31	4.0	486	54.3	31	326	7.5	31	
	13	6	2	0	8	1.0	475	60.7	8	324	9.9	8	
	14	5	5	0	10	1.3	500	59.6	10	329	8.2	10	
	15	3	7	0	10	1.3	543	44.7	10	335	9.7	10	
	16	1	3	0	4	0.5	552	53.1	4	338	7.5	4	
	17	1	0	0	1	0.1	589		1	338		1	
	Sample Total		413	361	1	775	100.0	345	81.4	774	294	18.0	775
	5/03	4											
		5	0	1	0	1	0.3	223		1	250		1
6		9	7	0	16	4.4	291	27.2	16	272	6.7	16	
7		70	89	1	160	44.4	295	44.6	158	276	10.8	160	
8		43	47	0	90	25.0	342	52.4	90	287	11.4	90	
9		6	9	0	15	4.2	370	48.7	15	295	11.1	15	
10		9	13	0	22	6.1	447	53.5	22	309	9.9	22	
11		8	11	0	19	5.3	466	45.7	19	315	7.9	19	
12		6	9	0	15	4.2	484	80.3	15	316	14.7	15	
13		7	3	0	10	2.8	463	39.0	10	318	8.7	10	
14		3	2	0	5	1.4	430	80.0	5	319	13.4	5	
15		6	1	0	7	1.9	499	53.3	7	325	5.2	7	
16													
17													
Sample Total			167	192	1	360	100.0	346	82.9	358	288	18.9	360
5/04		4											
		5	2	0	0	2	0.5	228	56.6	2	265	12.7	2
	6	7	6	0	13	3.5	265	40.7	13	272	7.7	13	
	7	82	76	0	158	42.1	302	46.3	158	280	10.1	158	
	8	42	63	0	105	28.0	341	52.7	105	291	12.1	105	
	9	4	11	0	15	4.0	380	66.6	15	298	12.1	15	
	10	14	8	0	22	5.9	412	62.0	22	309	11.8	22	
	11	9	18	0	27	7.2	460	71.5	27	313	12.4	27	
	12	6	9	0	15	4.0	503	45.4	15	324	7.0	15	
	13	2	5	0	7	1.9	517	40.4	7	326	4.8	7	
	14	4	4	0	8	2.1	461	100.2	8	321	21.2	8	
	15	1	1	0	2	0.5	505	46.0	2	331	9.9	2	
	16	0	1	0	1	0.3	508		1	336		1	
	17												
	Sample Total		173	202	0	375	100.0	349	84.6	375	291	18.4	375

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Sample Dates	Age	Sex (number)				% of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
5/05	4											
	5											
	6	6	8	0	14	6.7	271	38.0	14	273	11.8	14
	7	55	54	0	109	51.9	290	38.6	109	280	9.1	109
	8	31	22	0	53	25.2	337	53.1	53	292	10.0	53
	9	1	4	0	5	2.4	419	35.4	5	309	6.4	5
	10	0	3	0	3	1.4	451	86.4	3	314	23.6	3
	11	7	3	0	10	4.8	443	35.5	10	317	6.6	10
	12	5	3	0	8	3.8	430	56.6	8	315	7.9	8
	13	2	1	0	3	1.4	497	56.4	3	324	8.5	3
	14	2	0	0	2	1.0	551	12.0	2	330	7.8	2
	15	2	1	0	3	1.4	517	57.8	3	327	6.4	3
	16											
	17											
Sample Total		111	99	0	210	100.0	328	75.5	210	288	16.9	210
5/07	4											
	5	0	1	0	1	0.4	219		1	249		1
	6	7	2	0	9	3.9	268	22.6	9	271	5.0	9
	7	53	60	0	113	49.1	302	36.4	113	280	8.3	113
	8	18	32	0	50	21.7	352	36.7	50	292	10.2	50
	9	5	2	0	7	3.0	423	81.2	7	303	12.9	7
	10	4	4	0	8	3.5	440	66.0	8	313	10.2	8
	11	9	9	0	18	7.8	504	63.6	18	318	11.6	18
	12	4	1	0	5	2.2	435	49.0	5	311	9.0	5
	13	2	3	0	5	2.2	534	49.8	5	326	6.9	5
	14	3	5	0	8	3.5	472	19.1	8	325	8.5	8
	15	2	3	0	5	2.2	531	15.8	5	328	4.3	5
	16	1	0	0	1	0.4	547		1	322		1
	17											
Sample Total		108	122	0	230	100.0	356	87.7	230	291	18.8	230
5/08	4											
	5	1	0	0	1	0.4	188		1	251		1
	6	3	5	0	8	3.0	265	21.0	8	274	3.8	8
	7	50	54	0	104	38.7	301	37.0	104	281	9.8	104
	8	29	31	0	60	22.3	342	47.6	60	291	10.5	60
	9	6	8	0	14	5.2	393	58.5	14	302	10.7	14
	10	4	11	0	15	5.6	425	66.7	15	312	13.8	15
	11	12	11	0	23	8.6	451	68.5	23	315	15.1	23
	12	12	9	0	21	7.8	476	47.7	21	318	8.2	21
	13	5	2	0	7	2.6	497	47.9	7	322	6.0	7
	14	10	3	0	13	4.8	493	34.9	13	325	6.7	13
	15	0	2	0	2	0.7	517	14.8	2	330	4.2	2
	16	0	1	0	1	0.4	597		1	331		1
	17											
Sample Total		132	137	0	269	100.0	364	87.7	269	295	19.5	269

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Sample Dates	Age	Sex (number)				% of Total	Weight			Length			
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured	
4/29–5/08	4	3	2	0	5	0.1	164	24.1	5	237	9.3	5	
	5	6	5	0	11	0.3	239	47.4	11	262	13.8	11	
	6	77	59	0	136	3.5	272	33.6	136	274	8.6	136	
	7	800	836	2	1638	42.4	301	40.4	1636	282	10.1	1638	
	8	456	507	0	963	24.9	348	52.5	963	294	11.6	963	
	9	67	74	0	141	3.7	392	55.9	141	304	11.5	141	
	10	98	117	0	215	5.6	441	55.3	214	314	10.9	215	
	11	149	136	1	286	7.4	473	55.3	285	319	9.8	286	
	12	95	91	0	186	4.8	485	52.8	186	324	10.0	186	
	13	53	39	0	92	2.4	497	49.2	92	326	8.6	92	
	14	45	42	0	87	2.3	488	61.5	87	328	11.4	87	
	15	36	35	0	71	1.8	523	45.7	71	331	8.4	71	
	16	14	13	0	27	0.7	536	58.8	27	335	10.6	27	
	17	2	2	0	4	0.1	595	95.2	4	344	10.5	4	
	All Samples Combined		1,901	1,958	3	3,862	100.0	359	88.5	3,858	295	19.8	3,862
	Sex Composition		49.3	50.7									
	Unaged		75	88	0	163	4.2	367	88.9	163	298	18.8	163
Sex Composition		46.0	54.0										

Appendix B5.—Age, sex and size composition of Pacific herring caught by commercial gillnet, Kulukak Section, 30 April–7 May, 2004.

Sample Dates	Age	Sex (number)			% of Total	Weight			Length				
		Male	Female	Unknown		Total	Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured	
4/30	6												
	7	11	24	0	35	24.8	341	27.9	35	291	6.6	35	
	8	26	26	0	52	36.9	376	32.0	52	301	7.4	52	
	9	7	9	0	16	11.3	407	33.1	16	307	5.6	16	
	10	8	9	0	17	12.1	456	41.5	17	319	7.3	17	
	11	8	1	0	9	6.4	458	56.7	9	322	9.5	9	
	12	6	1	0	7	5.0	465	51.6	7	325	7.2	7	
	13	1	1	0	2	1.4	544	38.9	2	338	9.9	2	
	14	3	0	0	3	2.1	480	19.3	3	331	6.4	3	
	15												
	16												
	17												
	18												
Sample Total		70	71	0	141	100.0	395	59.1	141	305	14.1	141	
5/02	6												
	7	5	5	0	10	8.1	368	47.4	10	290	9.6	10	
	8	13	19	0	32	26.0	407	38.0	32	300	7.6	32	
	9	7	11	0	18	14.6	433	31.6	18	305	4.8	18	
	10	15	9	0	24	19.5	459	27.4	24	311	5.1	24	
	11	7	9	0	16	13.0	483	42.5	16	316	6.4	16	
	12	8	6	0	14	11.4	495	46.8	14	320	8.5	14	
	13	3	3	0	6	4.9	517	44.9	6	323	4.8	6	
	14	3	0	0	3	2.4	491	29.7	3	323	8.7	3	
	15												
	16												
	17												
	18												
Sample Total		61	62	0	123	100.0	445	55.3	123	308	11.6	123	
5/03	6	1	1	0	2	1.5	312	10.6	2	274	9.2	2	
	7	5	9	0	14	10.4	347	39.0	14	285	8.6	14	
	8	16	15	0	31	23.1	394	38.4	31	297	7.2	31	
	9	12	9	0	21	15.7	417	39.0	21	302	7.8	21	
	10	19	13	0	32	23.9	433	40.7	32	307	7.4	32	
	11	3	3	0	6	4.5	453	39.3	6	313	6.9	6	
	12	5	9	0	14	10.4	498	53.8	14	320	8.1	14	
	13	0	3	0	3	2.2	508	87.1	3	319	16.5	3	
	14	3	4	0	7	5.2	524	48.3	7	329	5.9	7	
	15	3	1	0	4	3.0	511	94.9	4	325	17.0	4	
	16												
	17												
	18												
Sample Total		67	67	0	134	100.0	427	66.6	134	305	14.5	134	

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Sample Dates	Age	Sex (number)				% of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
5/04	6											
	7	8	9	0	17	12.1	356	36.6	17	288	7.8	17
	8	23	20	0	43	30.7	387	33.9	43	297	7.0	43
	9	7	6	0	13	9.3	422	26.1	13	303	4.8	13
	10	11	11	0	22	15.7	446	38.4	22	308	8.2	22
	11	9	7	0	16	11.4	466	45.6	16	315	4.9	16
	12	11	9	0	20	14.3	503	39.4	20	320	8.3	20
	13	2	1	0	3	2.1	476	15.4	3	321	4.5	3
	14	1	1	0	2	1.4	542	33.2	2	322	8.5	2
	15	1	2	0	3	2.1	541	63.9	3	328	5.7	3
	16	1	0	0	1	0.7	447		1	325		1
17												
18												
Sample Total		74	66	0	140	100.0	429	63.0	140	305	13.3	140
5/05	6	1	2	0	3	2.1	314	53.9	3	272	7.9	3
	7	9	24	0	33	23.6	343	42.2	33	287	10.8	33
	8	14	29	0	43	30.7	385	36.3	43	296	10.5	43
	9	9	11	0	20	14.3	390	30.0	20	299	7.4	20
	10	13	4	0	17	12.1	450	25.7	17	311	6.1	17
	11	5	2	0	7	5.0	459	31.7	7	315	10.7	7
	12	9	1	0	10	7.1	459	52.5	10	318	6.0	10
	13	2	1	0	3	2.1	502	68.7	3	317	3.6	3
	14	0	3	0	3	2.1	489	30.9	3	326	4.6	3
	15	0	1	0	1	0.7	544		1	338		1
	16											
17												
18												
Sample Total		62	78	0	140	100.0	397	60.2	140	300	14.9	140
5/07	6	2	1	0	3	2.2	316	21.1	3	286	5.5	3
	7	12	7	0	19	13.8	355	45.5	19	291	10.9	19
	8	12	17	0	29	21.0	378	33.3	29	298	7.1	29
	9	6	10	0	16	11.6	399	44.4	16	303	6.8	16
	10	14	11	0	25	18.1	436	38.2	25	313	4.5	25
	11	10	6	0	16	11.6	466	56.4	16	316	10.4	16
	12	5	11	0	16	11.6	473	47.4	16	322	8.7	16
	13	5	4	0	9	6.5	491	50.7	9	328	5.9	9
	14											
	15	2	2	0	4	2.9	527	60.9	4	333	13.7	4
	16											
17												
18	1	0	0	1	0.7	448		1	340		1	
Sample Total		69	69	0	138	100.0	420	65.8	138	308	14.9	138

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Sample Dates	Sex (number)				% of Total	Weight			Length			
	Age	Male	Female	Unknown		Total	Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
4/30–5/07	6	4	4	0	8	1.0	314	31.3	8	278	9.2	8
	7	50	78	0	128	15.7	348	38.8	128	289	9.2	128
	8	104	126	0	230	28.2	387	36.1	230	298	8.1	230
	9	48	56	0	104	12.7	411	37.0	104	303	6.7	104
	10	80	57	0	137	16.8	445	37.0	137	311	7.5	137
	11	42	28	0	70	8.6	467	46.9	70	316	8.2	70
	12	44	37	0	81	9.9	486	49.0	81	321	8.0	81
	13	13	13	0	26	3.2	502	51.1	26	324	8.6	26
	14	10	8	0	18	2.2	507	40.5	18	327	6.5	18
	15	6	6	0	12	1.5	527	66.2	12	329	12.4	12
	16	1	0	0	1	0.1	447		1	325		1
17												
18	1	0	0	1	0.1	448		1	340		1	
All Samples Combined	403	413	0	816	100.0	418	64.2	816	305	14.2	816	
Sex Composition	49.4	50.6										
Unaged	24	31	0	55	6.7	445	69.4	55	311	14.2	55	
Sex Composition	43.6	56.4										

Appendix B6.—Age, sex and size composition of Pacific herring caught by commercial gillnet, Nunavachak Section, 30 April–1 May, 2004.

Sample Dates	Age	Sex (number)				% of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
4/30	6											
	7	2	4	0	6	4.5	369	47.3	6	303	6.7	6
	8	16	21	0	37	27.8	397	34.2	37	304	8.1	37
	9	8	16	0	24	18.0	428	32.6	24	311	7.8	24
	10	21	12	0	33	24.8	463	34.4	33	320	7.1	33
	11	7	6	0	13	9.8	461	41.3	13	319	8.6	13
	12	8	5	0	13	9.8	471	42.2	13	322	8.2	13
	13	5	0	0	5	3.8	501	69.6	5	333	12.6	5
	14	1	1	0	2	1.5	528	31.8	2	338	1.4	2
15												
Sample Total												
5/01	6	0	1	0	1	0.7	382		1	292		1
	7	4	4	0	8	5.5	355	41.8	8	292	11.4	8
	8	15	20	0	35	24.1	397	41.9	35	304	8.9	35
	9	5	10	0	15	10.3	419	35.2	15	308	5.0	15
	10	11	12	0	23	15.9	450	31.8	23	316	6.5	23
	11	11	15	0	26	17.9	490	39.6	26	322	7.8	26
	12	12	15	0	27	18.6	491	44.3	27	325	6.3	27
	13	2	3	0	5	3.4	537	42.4	5	328	2.2	5
	14	3	0	0	3	2.1	479	8.6	3	328	3.1	3
15	0	2	0	2	1.4	603	46.0	2	344	14.8	2	
Sample Total		63	82	0	145	100.0	449	63.0	145	315	13.1	145
4/30–5/1	6	0	1	0	1	0.4	382		1	292		1
	7	6	8	0	14	5.0	361	43.0	14	297	10.8	14
	8	31	41	0	72	25.9	397	37.8	72	304	8.5	72
	9	13	26	0	39	14.0	424	33.5	39	310	6.9	39
	10	32	24	0	56	20.1	458	33.7	56	318	7.0	56
	11	18	21	0	39	14.0	480	41.9	39	321	8.1	39
	12	20	20	0	40	14.4	484	44.1	40	324	7.0	40
	13	7	3	0	10	3.6	519	57.5	10	330	8.8	10
	14	4	1	0	5	1.8	498	31.7	5	332	5.8	5
15	0	2	0	2	0.7	603	46.0	2	344	14.8	2	
All Samples Combined		131	147	0	278	100.0	443	57.9	278	314	12.4	278
Sex Composition		47.1	52.9									
Unaged		6	8	0	14	5	425	49.6	14	310	10.4	14
Sex Composition		42.9	57.1									

Appendix B7.—Age, sex and size composition of Pacific herring caught by commercial gillnet, Kulukuk and Nunavachak sections, 30 April–7 May, 2004.

Sample Dates	Age	Sex (number)			% of Total	Weight			Length				
		Male	Female	Unknown		Total	Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured	
4/30	6												
	7	13	28	0	41	15.0	345	32.3	41	292	7.8	41	
	8	42	47	0	89	32.5	385	34.3	89	302	7.8	89	
	9	15	25	0	40	14.6	420	33.9	40	309	7.2	40	
	10	29	21	0	50	18.2	461	36.7	50	320	7.1	50	
	11	15	7	0	22	8.0	460	46.9	22	320	8.8	22	
	12	14	6	0	20	7.3	469	44.5	20	323	7.8	20	
	13	6	1	0	7	2.6	513	62.6	7	334	11.3	7	
	14	4	1	0	5	1.8	499	33.4	5	334	6.1	5	
	15												
	16												
17													
18													
Sample Total		138	136	0	274	100.0	415	59.3	274	309	13.7	274	
5/01	6	0	1	0	1	0.7	382		1	292		1	
	7	4	4	0	8	5.5	355	41.8	8	292	11.4	8	
	8	15	20	0	35	24.1	397	41.9	35	304	8.9	35	
	9	5	10	0	15	10.3	419	35.2	15	308	5.0	15	
	10	11	12	0	23	15.9	450	31.8	23	316	6.5	23	
	11	11	15	0	26	17.9	490	39.6	26	322	7.8	26	
	12	12	15	0	27	18.6	491	44.3	27	325	6.3	27	
	13	2	3	0	5	3.4	537	42.4	5	328	2.2	5	
	14	3	0	0	3	2.1	479	8.6	3	328	3.1	3	
	15	0	2	0	2	1.4	603	46.0	2	344	14.8	2	
	16												
17													
18													
Sample Total		63	82	0	145	100.0	449	63.0	145	315	13.1	145	
5/02	6												
	7	5	5	0	10	8.1	368	47.4	10	290	9.6	10	
	8	13	19	0	32	26.0	407	38.0	32	300	7.6	32	
	9	7	11	0	18	14.6	433	31.6	18	305	4.8	18	
	10	15	9	0	24	19.5	459	27.4	24	311	5.1	24	
	11	7	9	0	16	13.0	483	42.5	16	316	6.4	16	
	12	8	6	0	14	11.4	495	46.8	14	320	8.5	14	
	13	3	3	0	6	4.9	517	44.9	6	323	4.8	6	
	14	3	0	0	3	2.4	491	29.7	3	323	8.7	3	
	15												
	16												
17													
18													
Sample Total		61	62	0	123	100.0	445	55.3	123	308	11.6	123	

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Sample Dates	Age	Sex (number)				% of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
5/03	6	1	1	0	2	1.5	312	10.6	2	274	9.2	2
	7	5	9	0	14	10.4	347	39.0	14	285	8.6	14
	8	16	15	0	31	23.1	394	38.4	31	297	7.2	31
	9	12	9	0	21	15.7	417	39.0	21	302	7.8	21
	10	19	13	0	32	23.9	433	40.7	32	307	7.4	32
	11	3	3	0	6	4.5	453	39.3	6	313	6.9	6
	12	5	9	0	14	10.4	498	53.8	14	320	8.1	14
	13	0	3	0	3	2.2	508	87.1	3	319	16.5	3
	14	3	4	0	7	5.2	524	48.3	7	329	5.9	7
	15	3	1	0	4	3.0	511	94.9	4	325	17.0	4
16												
17												
18												
Sample Total		67	67	0	134	100.0	427	66.6	134	305	14.5	134
5/04	6											
	7	8	9	0	17	12.1	356	36.6	17	288	7.8	17
	8	23	20	0	43	30.7	387	33.9	43	297	7.0	43
	9	7	6	0	13	9.3	422	26.1	13	303	4.8	13
	10	11	11	0	22	15.7	446	38.4	22	308	8.2	22
	11	9	7	0	16	11.4	466	45.6	16	315	4.9	16
	12	11	9	0	20	14.3	503	39.4	20	320	8.3	20
	13	2	1	0	3	2.1	476	15.4	3	321	4.5	3
	14	1	1	0	2	1.4	542	33.2	2	322	8.5	2
	15	1	2	0	3	2.1	541	63.9	3	328	5.7	3
16	1	0	0	1	0.7	447		1	325		1	
17												
18												
Sample Total		74	66	0	140	100.0	429	63.0	140	305	13.3	140
5/05	6	1	2	0	3	2.1	314	53.9	3	272	7.9	3
	7	9	24	0	33	23.6	343	42.2	33	287	10.8	33
	8	14	29	0	43	30.7	385	36.3	43	296	10.5	43
	9	9	11	0	20	14.3	390	30.0	20	299	7.4	20
	10	13	4	0	17	12.1	450	25.7	17	311	6.1	17
	11	5	2	0	7	5.0	459	31.7	7	315	10.7	7
	12	9	1	0	10	7.1	459	52.5	10	318	6.0	10
	13	2	1	0	3	2.1	502	68.7	3	317	3.6	3
	14	0	3	0	3	2.1	489	30.9	3	326	4.6	3
	15	0	1	0	1	0.7	544		1	338		1
16												
17												
18												
Sample Total		62	78	0	140	100.0	397	60.2	140	300	14.9	140

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Sample Dates	Age	Sex (number)				% of Total	Weight			Length			
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured	
5/07	6	2	1	0	3	2.2	316	21.1	3	286	5.5	3	
	7	12	7	0	19	13.8	355	45.5	19	291	10.9	19	
	8	12	17	0	29	21.0	378	33.3	29	298	7.1	29	
	9	6	10	0	16	11.6	399	44.4	16	303	6.8	16	
	10	14	11	0	25	18.1	436	38.2	25	313	4.5	25	
	11	10	6	0	16	11.6	466	56.4	16	316	10.4	16	
	12	5	11	0	16	11.6	473	47.4	16	322	8.7	16	
	13	5	4	0	9	6.5	491	50.7	9	328	5.9	9	
	14												
	15	2	2	0	4	2.9	527	60.9	4	333	13.7	4	
	16												
	17												
	18	1	0	0	1	0.7	448		1	340		1	
Sample Total		69	69	0	138	100.0	420	65.8	138	308	14.9	138	
4/30–5/07	6	4	5	0	9	0.8	322	36.9	9	279	9.9	9	
	7	56	86	0	142	13.0	350	39.3	142	289	9.6	142	
	8	135	167	0	302	27.6	389	36.7	302	300	8.6	302	
	9	61	82	0	143	13.1	415	36.4	143	305	7.4	143	
	10	112	81	0	193	17.6	449	36.4	193	313	8.1	193	
	11	60	49	0	109	10.0	472	45.4	109	318	8.4	109	
	12	64	57	0	121	11.1	485	47.2	121	322	7.9	121	
	13	20	16	0	36	3.3	507	52.6	36	326	9.0	36	
	14	14	9	0	23	2.1	505	38.2	23	328	6.6	23	
	15	6	8	0	14	1.3	537	68.1	14	331	13.2	14	
	16	1	0	0	1	0.1	447		1	325		1	
	17												
	18	1	0	0	1	0.1	448		1	340		1	
All Samples Combined		534	560	0	1,094	100.0	425	63.5	1,094	307	14.4	1,094	
Sex Composition		48.8	51.2										
Unaged		30	39	0	69	6.3	441	66.0	69	311	13.4	69	
Sex Composition		43.5	56.5										

Appendix B8.—Age, sex and size composition of Pacific herring caught by test commercial purse seine, Hagemester Section, 6 May–7 May, 2004.

Sample Dates	Age	Sex (number)				% of Total	Weight			Length			
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured	
5/06	3	1	0	0	1	0.8	160		1	232		1	
	4	1	0	0	1	0.8	163		1	234		1	
	5												
	6	5	6	0	11	8.3	258	39.4	11	272	11.2	11	
	7	31	36	0	67	50.4	291	41.5	67	279	9.6	67	
	8	12	15	0	27	20.3	334	49.8	27	291	9.8	27	
	9	1	1	0	2	1.5	385	49.5	2	302	2.8	2	
	10	6	3	0	9	6.8	431	49.5	9	307	5.6	9	
	11	0	4	0	4	3.0	494	69.1	4	318	8.1	4	
	12	3	4	0	7	5.3	497	54.3	7	325	6.5	7	
	13												
	14	1	1	0	2	1.5	565	127.3	2	336	2.1	2	
	15	2	0	0	2	1.5	486	6.4	2	322	2.8	2	
	Sample Total		63	70	0	133	100.0	330	88.8	133	288	19.2	133
	5/07	3											
4													
5													
6		1	5	0	6	3.8	270	32.8	6	278	7.9	6	
7		29	34	0	63	40.1	299	33.3	63	281	7.3	63	
8		16	27	0	43	27.4	348	45.7	43	293	9.6	43	
9		2	3	0	5	3.2	392	32.4	5	308	8.0	5	
10		3	2	0	5	3.2	434	59.1	5	309	6.5	5	
11		3	7	0	10	6.4	470	75.4	10	320	11.6	10	
12		3	7	0	10	6.4	490	38.2	10	324	7.6	10	
13		1	6	0	7	4.5	519	50.2	7	326	8.4	7	
14		0	6	0	6	3.8	536	62.8	6	333	9.6	6	
15		1	1	0	2	1.3	490	37.5	2	321	0.7	2	
Sample Total			59	98	0	157	100.0	363	90.8	157	296	19.2	157
5/06–07		3	1	0	0	1	0.3	160		1	232		1
	4	1	0	0	1	0.3	163		1	234		1	
	5												
	6	6	11	0	17	5.9	263	36.6	17	274	10.4	17	
	7	60	70	0	130	44.8	295	37.9	130	280	8.6	130	
	8	28	42	0	70	24.1	342	47.4	70	292	9.6	70	
	9	3	4	0	7	2.4	390	33.5	7	306	7.2	7	
	10	9	5	0	14	4.8	432	50.8	14	308	5.8	14	
	11	3	11	0	14	4.8	476	71.9	14	320	10.4	14	
	12	6	11	0	17	5.9	493	44.0	17	324	7.0	17	
	13	1	6	0	7	2.4	519	50.2	7	326	8.4	7	
	14	1	7	0	8	2.8	543	73.0	8	334	8.3	8	
	15	3	1	0	4	1.4	488	22.1	4	321	1.9	4	
	All Samples Combined		122	168	0	290	100.0	348	91.2	290	292	19.6	290
	Sex Composition		42.1	57.9									
Unaged		2	5	0	7	2.4	359	91.7	7	294	20.2	7	
Sex Composition		28.6	71.4										

Appendix B9.—Age, sex and size composition of Pacific herring caught by test commercial purse seine, Kulukak Section, 27 April, 2004.

Sample Dates	Age	Sex (number)				% of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
4/27	6	4	0	0	4	3.1	265	39.0	4	275	6.9	4
	7	20	10	0	30	23.6	298	31.3	30	283	7.3	30
	8	24	34	0	58	45.7	366	51.6	58	294	10.3	58
	9	4	6	0	10	7.9	406	33.4	10	304	4.8	10
	10	4	1	0	5	3.9	473	41.8	5	313	7.3	5
	11	2	4	0	6	4.7	524	53.4	6	322	7.9	6
	12	2	4	0	6	4.7	525	36.3	6	329	8.1	6
	13	0	1	0	1	0.8	539		1	327		1
	14	1	1	0	2	1.6	566	3.5	2	342	4.9	2
15	0	5	0	5	3.9	594	56.5	5	337	6.9	5	
All Samples Combined		61	66	0	127	100.0	383	94.3	127	298	18.2	127
Sex Composition		48.0	52.0									
Unaged		1	7	0	8	6.3	463	140.3	8	311	30.0	8
Sex Composition		12.5	87.5									

Appendix B10.—Age, sex and size composition of Pacific herring caught by test commercial purse seine, Nunavachak Section, 28 April–29 April, 2004.

Sample Dates	Age	Sex (number)				% of Total	Weight			Length			
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured	
4/28	6	2	2	0	4	3.0	270	38.0	4	272	9.7	4	
	7	47	33	0	80	60.2	299	32.2	80	283	8.9	80	
	8	12	21	0	33	24.8	346	45.3	33	292	9.2	33	
	9	3	1	0	4	3.0	413	72.5	4	308	10.9	4	
	10	3	3	0	6	4.5	450	86.6	6	312	13.2	6	
	11	2	2	0	4	3.0	500	38.4	4	324	3.0	4	
	12	1	1	0	2	1.5	518	2.8	2	326	5.7	2	
	13												
	14												
	15												
16													
17													
Sample Total		70	63	0	133	100.0	329	68.0	133	289	14.3	133	
4/29	6	8	10	0	18	5.0	289	34.9	18	278	10.3	18	
	7	86	93	0	179	49.4	315	41.4	179	285	9.3	179	
	8	34	42	0	76	21.0	363	50.7	76	296	9.3	76	
	9	5	7	0	12	3.3	387	45.5	12	301	9.0	12	
	10	8	7	0	15	4.1	474	45.7	15	319	6.9	15	
	11	14	11	0	25	6.9	492	51.3	25	321	7.7	25	
	12	7	6	0	13	3.6	511	20.3	13	326	7.3	13	
	13	3	4	0	7	1.9	536	32.0	7	326	5.7	7	
	14	8	3	0	11	3.0	545	63.6	11	331	9.8	11	
	15	0	3	0	3	0.8	601	59.3	3	334	11.6	3	
16	0	1	0	1	0.3	629		1	340		1		
17	0	2	0	2	0.6	633	30.4	2	347	12.7	2		
Sample Total		173	189	0	362	100.0	369	91.8	362	296	18.5	362	
4/28–29	6	10	12	0	22	4.4	285	35.3	22	277	10.3	22	
	7	133	126	0	259	52.3	310	39.5	259	284	9.2	259	
	8	46	63	0	109	22.0	358	49.6	109	295	9.4	109	
	9	8	8	0	16	3.2	394	52.0	16	303	9.5	16	
	10	11	10	0	21	4.2	467	58.8	21	317	9.4	21	
	11	16	13	0	29	5.9	493	49.2	29	321	7.3	29	
	12	8	7	0	15	3.0	512	19.0	15	326	7.0	15	
	13	3	4	0	7	1.4	536	32.0	7	326	5.7	7	
	14	8	3	0	11	2.2	545	63.6	11	331	9.8	11	
	15	0	3	0	3	0.6	601	59.3	3	334	11.6	3	
16	0	1	0	1	0.2	629		1	340		1		
17	0	2	0	2	0.4	633	30.4	2	347	12.7	2		
All Samples Combined		243	252	0	495	100.0	358	87.7	495	294	17.7	495	
Sex Composition		49.1	50.9										
Unaged		10	10	0	20	4.0	356	90.6	20	293	18.2	20	
Sex Composition		50.0	50.0										

Appendix B11.—Age, sex and size composition of Pacific herring caught by test commercial purse seine, Togiak Section, 28 April–29 April, 2004.

Sample Dates	Age	Sex (number)				% of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
4/28	5											
	6	3	3	0	6	4.6	242	57.3	6	267	19.4	6
	7	34	46	0	80	61.5	296	37.3	79	280	7.9	80
	8	13	20	0	33	25.4	341	56.7	33	290	11.7	33
	9	1	2	0	3	2.3	367	94.9	3	299	6.8	3
	10	3	0	0	3	2.3	493	11.7	3	324	4.0	3
	11	1	0	0	1	0.8	481		1	320		1
	12	2	1	0	3	2.3	544	36.9	3	327	12.1	3
	13	0	1	0	1	0.8	471		1	333		1
	14											
	15											
	16											
	17											
	Sample Total		57	73	0	130	100.0	320	70.8	129	285	15.4
4/29	5	1	0	0	1	0.8	190		1	256		1
	6	8	2	0	10	8.3	250	22.7	10	274	9.8	10
	7	48	13	0	61	50.4	297	44.8	61	282	8.6	61
	8	18	14	0	32	26.4	341	43.5	32	294	8.4	32
	9	1	0	0	1	0.8	290		1	296		1
	10	3	2	0	5	4.1	436	23.3	5	320	4.6	5
	11	4	2	0	6	5.0	455	58.0	6	313	8.5	6
	12	1	1	0	2	1.7	444	76.4	2	321	0.7	2
	13	0	1	0	1	0.8	507		1	351		1
	14	1	0	0	1	0.8	524		1	325		1
	15											
	16											
	17	0	1	0	1	0.8	582		1	340		1
	Sample Total		85	36	0	121	100.0	326	74.6	121	290	16.5
4/28–29	5	1	0	0	1	0.4	190		1	256		1
	6	11	5	0	16	6.4	247	37.7	16	271	14.0	16
	7	82	59	0	141	56.2	297	40.6	140	281	8.3	141
	8	31	34	0	65	25.9	341	50.2	65	292	10.3	65
	9	2	2	0	4	1.6	348	86.4	4	299	5.8	4
	10	6	2	0	8	3.2	458	34.6	8	322	4.7	8
	11	5	2	0	7	2.8	459	53.8	7	314	8.3	7
	12	3	2	0	5	2.0	504	71.7	5	324	9.3	5
	13	0	2	0	2	0.8	489	25.5	2	342	12.7	2
	14	1	0	0	1	0.4	524		1	325		1
	15											
	16											
	17	0	1	0	1	0.4	582		1	340		1
	All Samples Combined		142	109	0	251	100.0	323	72.6	250	287	16.0
Sex Composition		56.6	43.4									
Unaged		7	6	0	13	5.2	339	81.9	13	292	17.2	13
Sex Composition		53.8	46.2									

Appendix B12.—Age, sex and size composition of Pacific herring caught by test commercial purse seine, Kulukak, Nunavachak, and Togiak Section, 27 April–7 May, 2004.

Sample Dates	Age	Sex (number)				% of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
4/27	3											
	4											
	5											
	6	4	0	0	4	3.1	265	39.0	4	275	6.9	4
	7	20	10	0	30	23.6	298	31.3	30	283	7.3	30
	8	24	34	0	58	45.7	366	51.6	58	294	10.3	58
	9	4	6	0	10	7.9	406	33.4	10	304	4.8	10
	10	4	1	0	5	3.9	473	41.8	5	313	7.3	5
	11	2	4	0	6	4.7	524	53.4	6	322	7.9	6
	12	2	4	0	6	4.7	525	36.3	6	329	8.1	6
	13	0	1	0	1	0.8	539		1	327		1
	14	1	1	0	2	1.6	566	3.5	2	342	4.9	2
	15	0	5	0	5	3.9	594	56.5	5	337	6.9	5
	16											
	17											
Sample Total		61	66	0	127	100.0	383	94.3	127	298	18.2	127
4/28	3											
	4											
	5											
	6	5	5	0	10	3.8	253	50.1	10	269	15.7	10
	7	81	79	0	160	60.8	297	34.8	159	282	8.5	160
	8	25	41	0	66	25.1	343	51.0	66	291	10.5	66
	9	4	3	0	7	2.7	393	79.0	7	304	9.8	7
	10	6	3	0	9	3.4	464	71.9	9	316	12.3	9
	11	3	2	0	5	1.9	496	34.3	5	323	3.0	5
	12	3	2	0	5	1.9	534	29.7	5	327	9.0	5
	13	0	1	0	1	0.4	471		1	333		1
	14											
	15											
	16											
	17											
Sample Total		127	136	0	263	100.0	325	69.4	262	287	14.9	263
4/29	3											
	4											
	5	1	0	0	1	0.2	190		1	256		1
	6	16	12	0	28	5.8	275	35.9	28	277	10.2	28
	7	134	106	0	240	49.7	311	42.9	240	284	9.2	240
	8	52	56	0	108	22.4	357	49.6	108	296	9.1	108
	9	6	7	0	13	2.7	380	51.3	13	301	8.7	13
	10	11	9	0	20	4.1	464	44.0	20	320	6.3	20
	11	18	13	0	31	6.4	485	53.7	31	319	8.4	31
	12	8	7	0	15	3.1	502	36.3	15	325	7.0	15
	13	3	5	0	8	1.7	533	31.4	8	330	10.2	8
	14	9	3	0	12	2.5	544	60.9	12	331	9.5	12
	15	0	3	0	3	0.6	601	59.3	3	334	11.6	3
	16	0	1	0	1	0.2	629		1	340		1
	17	0	3	0	3	0.6	616	36.2	3	345	9.9	3
Sample Total		258	225	0	483	100.0	358	89.6	483	294	18.2	483

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Appendix B12.–Page 2 of 2.

Sample Dates	Age	Sex (number)				% of Total	Weight			Length			
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured	
5/06	3	1	0	0	1	0.8	160		1	232		1	
	4	1	0	0	1	0.8	163		1	234		1	
	5												
	6	5	6	0	11	8.3	258	39.4	11	272	11.2	11	
	7	31	36	0	67	50.4	291	41.5	67	279	9.6	67	
	8	12	15	0	27	20.3	334	49.8	27	291	9.8	27	
	9	1	1	0	2	1.5	385	49.5	2	302	2.8	2	
	10	6	3	0	9	6.8	431	49.5	9	307	5.6	9	
	11	0	4	0	4	3.0	494	69.1	4	318	8.1	4	
	12	3	4	0	7	5.3	497	54.3	7	325	6.5	7	
	13												
	14	1	1	0	2	1.5	565	127.3	2	336	2.1	2	
	15	2	0	0	2	1.5	486	6.4	2	322	2.8	2	
	16												
	17												
	Sample Total		63	70	0	133	100.0	330	88.8	133	288	19.2	133
	5/07	3											
4													
5													
6		1	5	0	6	3.8	270	32.8	6	278	7.9	6	
7		29	34	0	63	40.1	299	33.3	63	281	7.3	63	
8		16	27	0	43	27.4	348	45.7	43	293	9.6	43	
9		2	3	0	5	3.2	392	32.4	5	308	8.0	5	
10		3	2	0	5	3.2	434	59.1	5	309	6.5	5	
11		3	7	0	10	6.4	470	75.4	10	320	11.6	10	
12		3	7	0	10	6.4	490	38.2	10	324	7.6	10	
13		1	6	0	7	4.5	519	50.2	7	326	8.4	7	
14		0	6	0	6	3.8	536	62.8	6	333	9.6	6	
15		1	1	0	2	1.3	490	37.5	2	321	0.7	2	
16													
17													
Sample Total			59	98	0	157	100.0	363	90.8	157	296	19.2	157
4/27–5/07		3	1	0	0	1	0.1	160		1	232		1
	4	1	0	0	1	0.1	163		1	234		1	
	5	1	0	0	1	0.1	190		1	256		1	
	6	31	28	0	59	5.1	267	38.8	59	274	11.3	59	
	7	295	265	0	560	48.2	303	39.6	559	283	8.9	560	
	8	129	173	0	302	26.0	352	50.4	302	294	9.9	302	
	9	17	20	0	37	3.2	391	49.9	37	303	7.7	37	
	10	30	18	0	48	4.1	456	52.6	48	315	8.9	48	
	11	26	30	0	56	4.8	488	57.6	56	320	8.5	56	
	12	19	24	0	43	3.7	505	40.4	43	326	7.3	43	
	13	4	13	0	17	1.5	524	40.2	17	328	8.7	17	
	14	11	11	0	22	1.9	545	61.3	22	333	9.0	22	
	15	3	9	0	12	1.0	560	69.5	12	331	9.9	12	
	16	0	1	0	1	0.1	629		1	340		1	
	17	0	3	0	3	0.3	616	36.2	3	345	9.9	3	
	All Samples Combined		568	595	0	1,163	100.0	351	88.0	1162	293	18.2	1,163
	Sex Composition		48.8	51.2									
Unaged		20	28	0	48	4.1	370	104.3	48	296	21.0	48	
Sex Composition		41.7	58.3										

APPENDIX C



**ALASKA DEPARTMENT OF
FISH & GAME
COMMERCIAL FISHERIES DIVISION
MEMORANDUM**

TO: Distribution

DATE: December 5, 2003

FAX NO: 267-2442

FROM: Frederick West
Fishery Biologist
Central Region

TELEPHONE NO: 267-2237

SUBJECT: 2004 Togiak Herring
Forecast and Summary

The 2004 Togiak herring forecast and harvest allocation is listed below for the Togiak District sac roe fishery and the Dutch Harbor food and bait fishery, given a maximum 20% exploitation rate of the projected run biomass:

*Harvest Allocation of the 2004 Forecasted Pacific
Herring Run Biomass, Togiak District, Bristol Bay*

	Biomass (Short Tons)	Harvest (Short Tons)
Forecasted Biomass for 2004	143,124	
Exploitation @ maximum 20% for Total Allowable Harvest		28,625
Togiak Spawn-on-Kelp Fishery (Fixed Allocation)		1,500

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Remaining Allowable Harvest	27,125
Dutch Harbor Food/Bait Allocation (7.0% of the remaining allocation)	1,899
Remaining Allowable Harvest for Togiak District Sac Roe Fishery:	25,226
Purse Seine Allocation 70.0%	17,658
Gill Net Allocation 30.0%	7,568

Distribution:

Region II: Baker, Browning, Fair, Higgins, Morstad, Regnart, Sands, Weiland

Region III: Bergstrom, Brannian, Hilsinger, Kohler, Lingnau, Menard, Salomone, Sandone, Whitmore

Region IV: Bowers, Burkey, Lloyd, McCullough, Murphy, Nelson, Shaul, Witteveen

HQ: Mecum, Bruce, Clark, Savikko

2004 Togiak Herring Forecast Summary

Age-structured analysis (ASA) has been used since 1993 to forecast the Togiak herring population. This methodology estimates population abundance using catch and age composition data in conjunction with biomass estimates selected from the best aerial survey years.

The forecasted herring biomass for the Togiak District in 2004 is 143,124 tons. Returns from the 1996, and 1997 year classes (ages-8, and-7, respectively) are expected to dominate with 60% of

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the biomass and 59% of the abundance in numbers of fish (Figure 1). Age-11 herring from year class 1993 are expected to follow in magnitude with 9% of the biomass and 6% of the abundance. A Ricker stock-recruitment model with an environmental variable of Southeast Bering Sea sea surface temperature was used to forecast the 2004 age-4 abundance. The forecasted return of age-4 and -5 herring are uncertain because of the limited sample size of age-4 fish, and because new recruits are not confirmed until they return as age-5 herring. The forecasted average weight of the harvest biomass is 325 g. Simple linear regression models were used to forecast the weight of each age class based on their weights the previous year.

In 2003, inclement weather conditions and poor visibility throughout the herring fishery prevented an accurate aerial assessment of the total run biomass. No aerial surveys were conducted between May 2 and May 12. Therefore, in season management was based on the preseason forecast of 126,213 tons. Herring were first reported in the district on April 19, when 108 tons were documented at the northeast tip of Hagemeister Island. Poor visibility and weather conditions continued but observations of herring increased with the first substantial biomass documented during 2 surveys on April 25 with 29,805 tons observed in the Nunavachak, Togiak, Hagemeister, and Cape Newenham Sections. This allowed for the earliest start to the fishery since 1980. The peak biomass estimate of 36,487 tons, observed on April 29, was primarily documented in the Togiak and Hagemeister Sections. The last survey conducted on May 30 observed an estimated 6,798 tons of herring still on the grounds.

Samples from non-selective gear (commercial purse seine and test purse seine) were used to assess the age composition of the run biomass. Commercial purse seine catch and test fish samples ranged from age-4 to age-17. Age-7 and age-6 herring were the most prevalent and represented 52% of the harvest biomass and 62% of the abundance. Age-10 herring followed with 12% of the biomass and 9% of the abundance.

We normally see a temporal change in age composition from older to younger herring at some point in the fishery but age-6, -7, and -10 herring predominated and mean weight remained high. This may signify that the new recruit classes of herring are weak or that these age classes did not arrive during the commercial fishery. Poor visibility prevented accurate surveys during the latter portion of the harvest but post-season surveys assessed moderate biomass in late May signifying some strength in the young age classes. Future returns will determine the strength of these new recruits (age-4 and -5 herring).

The 2003 mean weights at age for age-4 through age-8 herring were the heaviest on record and age-9+ herring were the heaviest since 1992. Two factors may have contributed to this phenomenon: 1) warmer than average temperatures last winter and 2) the dramatic increase in fishing time per opening in 2003. The 2002 - 2003 winter was one of the warmest on record. An

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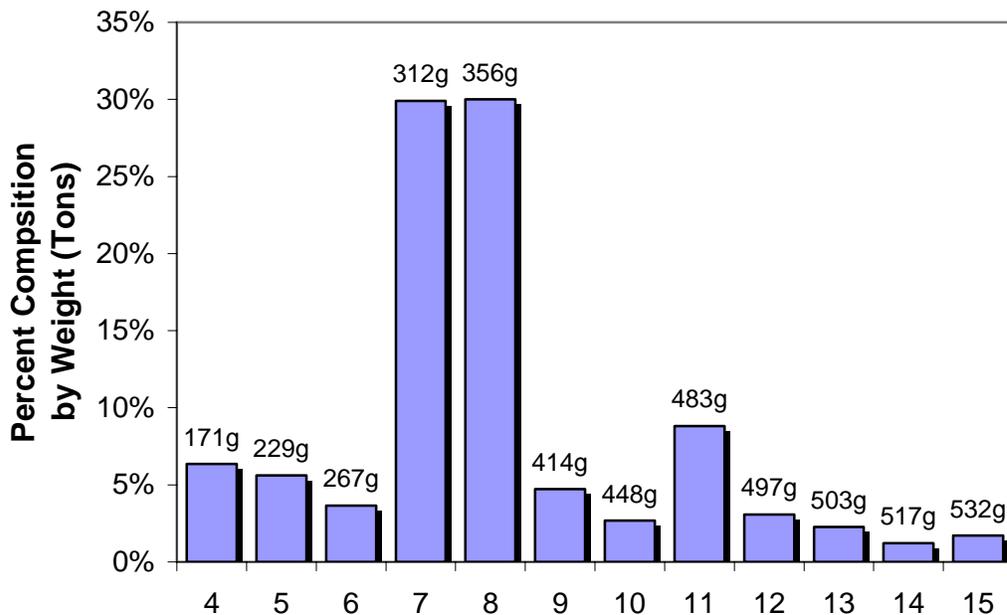
extended growing season and additional food could produce higher than average growth rates and gonad indexes prior to arriving on the spawning grounds. With the implementation of the coop fishery in 2001, duration of commercial openings has continued to increase every year with 2003 having the longest openings on record. This allows for a more “selective” nature of the harvest. Fishermen have more time and area to find better quality herring potentially increasing the average weight at age of the commercial harvest.

Biomass of the Togiak herring spawning population has been monitored since the late 1970’s, concurrent with the development of the sac-roe fishery. Peak biomass was observed during the 1986 and 1987 seasons when the large classes from brood years 1977 and 1978 fully recruited into the spawning population as age-8 herring. The 1977 and 1978 year classes dwarfed the magnitude of subsequent year classes. Modest recruitment events were evident in the 1987, 1988, 1996 and 1997 year classes. Current data suggests that the Togiak herring population is stable.

Frederick West

Bristol Bay Research Biologist

Anchorage



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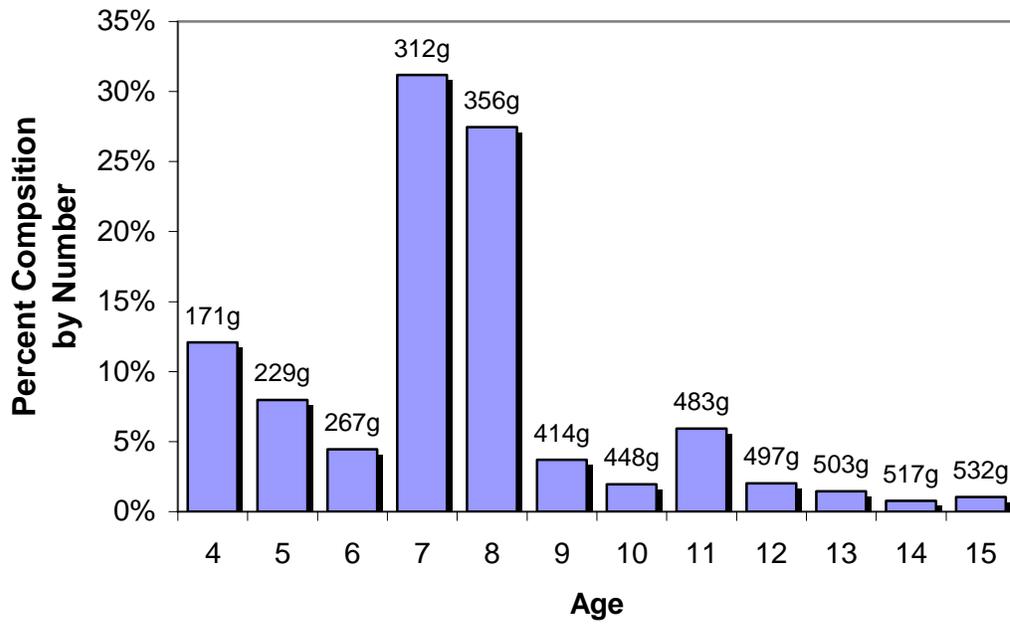


Figure 1. Forecasted age composition by weight (top) and number (bottom) for the 2004 Togiak herring return. Forecasted average weight (grams) by age is also presented.