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1993 Bottom Trawl Survey of the Eastern Bering Sea Continental Shelf

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1993 BOTTOM TRAWL SURVEY OF THE EASTERN BERING SEA CONTINENTAL SHELF

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ABSTRACT

The Resource Assessment and Conservation Engineering Division of the Alaska Fisheries Science Center conducts annual bottom trawl surveys to monitor the condition of the demersal fish and crab stocks of the eastern Bering Sea continental shelf. The standard study area, surveyed each year since 1979, encompasses a major portion of the eastern Bering Sea shelf between the 20-m and the 200-m isobaths and from the Alaska Peninsula north to approximately the latitude of St. Matthew Island (lat. 60° 50' N). In 1993, this area was again surveyed by two chartered trawlers, the 40 m Arcturus and the 40 m Aldebaran.

Demersal populations were sampled by trawling for 30 minutes at stations centered in 20 x 20 nautical mile grids covering the survey area. At each station, species composition of the catch was determined and commercially important species were sampled to obtain length distributions and age structure samples.

Survey results presented in this report include relative fishing powers of the survey vessels, abundance estimates for fish and invertebrates, geographic distributions of important fish species, size composition of principal fish species, and age and growth information for selected species. Surface and bottom temperatures recorded at each sampling station are also presented.

Appendices provide station data, species listings, and detailed results of analyses of abundance and biological data of the sampled populations.

CONTENTS

INTRODUCTION

The eastern Bering Sea continental shelf supports one of the most productive groundfish fisheries in the world (Bakkala 1988). Since 1970, annual commercial catches of groundfish have ranged from 1.2 to 2.2 million metric tons (t) (North Pacific Fishery Management Council 1993). Although many species are caught commercially, the most abundant has been walleye pollock (Theragra chalcogramma) which, since 1970, has comprised more than 70% of the total landings. The next most abundant species have been yellowfin sole (Pleuronectes asper) and Pacific cod (Gadus macrocephalus) which have comprised 8% and 5%, respectively, of the commercial landings.

Since 1971, the Resource Assessment and Conservation Engineering (RACE) Division of the Alaska Fisheries Science Center (AFSC) has conducted annual bottom trawl surveys of the eastern Bering Sea continental shelf. In 1975, the first large-scale survey of the eastern Bering Sea shelf was conducted under contract from the Bureau of Land Management in response to a need for baseline data to assess the potential impact of proposed offshore oil exploration and development on fishery resources (Pereyra et al. 1976). During this baseline survey, sampling was conducted over the eastern Bering Sea shelf between the 20 m and 200 m isobaths and from the Alaska Peninsula north to approximately 62°N latitude. In subsequent years, the areal coverage of the annual surveys was reduced, until 1979 when the most comprehensive survey of the Bering Sea shelf was undertaken in cooperation with the Japan Fisheries Agency (Bakkala and Wakabayashi 1985). The 1979 survey encompassed the entire region sampled in the 1975 baseline study, and in addition, the continental slope waters between the Aleutian Islands and the U.S.-U.S.S.R. convention line, and the shelf region between St. Matthew and St. Lawrence

Islands. A hydroacoustic survey was also conducted in 1979 to assess the midwater component of the walleye pollock population. Subsequent annual bottom trawl surveys have essentially resampled the stations established during the 1975 survey, with slight modifications each year. This region encompasses the major portion of economically important eastern Bering Sea groundfish populations, except those primarily located in continental slope waters. Every third year (1979, 1982, 1985, 1988, 1991) an extended survey has been conducted, including hydroacoustic assessment of midwater pollock, bottom trawl sampling of the continental slope, and bottom trawl sampling in the region between St. Matthew and St. Lawrence Islands. The information gathered by the annual surveys serves to: 1) provide the North Pacific Fishery Management Council with annual fishery-independent estimates of abundance and biological condition of commercially exploited stocks, 2) provide distribution and abundance information to commercial fishermen, and 3) develop a time-series data base contributing to our understanding of the population dynamics and interactions of groundfish species.

This report presents information collected by the AFSC in the eastern Bering Sea during the 1993 bottom trawl survey. The groundfish/crab survey and several ancillary projects were conducted from 2 June to 1 August by two U.S. vessels. Detailed information on principal crab species can be found in a report by Stevens et al. (1993).

METHODS

Survey Area and Sampling Design

The standard station pattern for the eastern Bering Sea survey is based on a systematic 20 x 20 nautical mile grid. In areas surrounding St. Matthew and the Pribilof Islands, grid block corners were also sampled to better assess blue king crab (Paralithodes platypus) concentrations. The survey design pattern called for 356 stations. In 1993, 355 standard stations and 20 additional stations north-west of the standard pattern were successfully sampled (Fig. 1, Appendix A).

Starting with the eastern stations, the two vessels fished alternate north/south lines of stations such that coverage of the survey area was similar for each vessel. This sampling design facilitated the computation of relative fishing powers (or catch efficiencies) of the two vessels. The progression from east to west was established to prevent multiple encounters of yellowfin sole, Alaska plaice (Pleuronectes quadrituberculatus), and perhaps other species which may be migrating eastward during the course of the survey (Smith and Bakkala 1982). Tows were usually 30 minutes in duration and fishing was limited to daylight hours. For data analysis, the survey region was divided into six subareas bounded by the 50 m, 100 m, and 200 m isobaths and by a line separating the northwest and southeast portions of the study area (Fig. 1). This stratification scheme was designed to reduce the variances of population and biomass estimates by conforming to oceanographic domains which seem related to distributions of Bering Sea fishes (Bakkala 1988). The presence of high-density sampling for blue king crab in subareas 3, 4, and 6 necessitated a further division of these subareas into high-density and standard-density

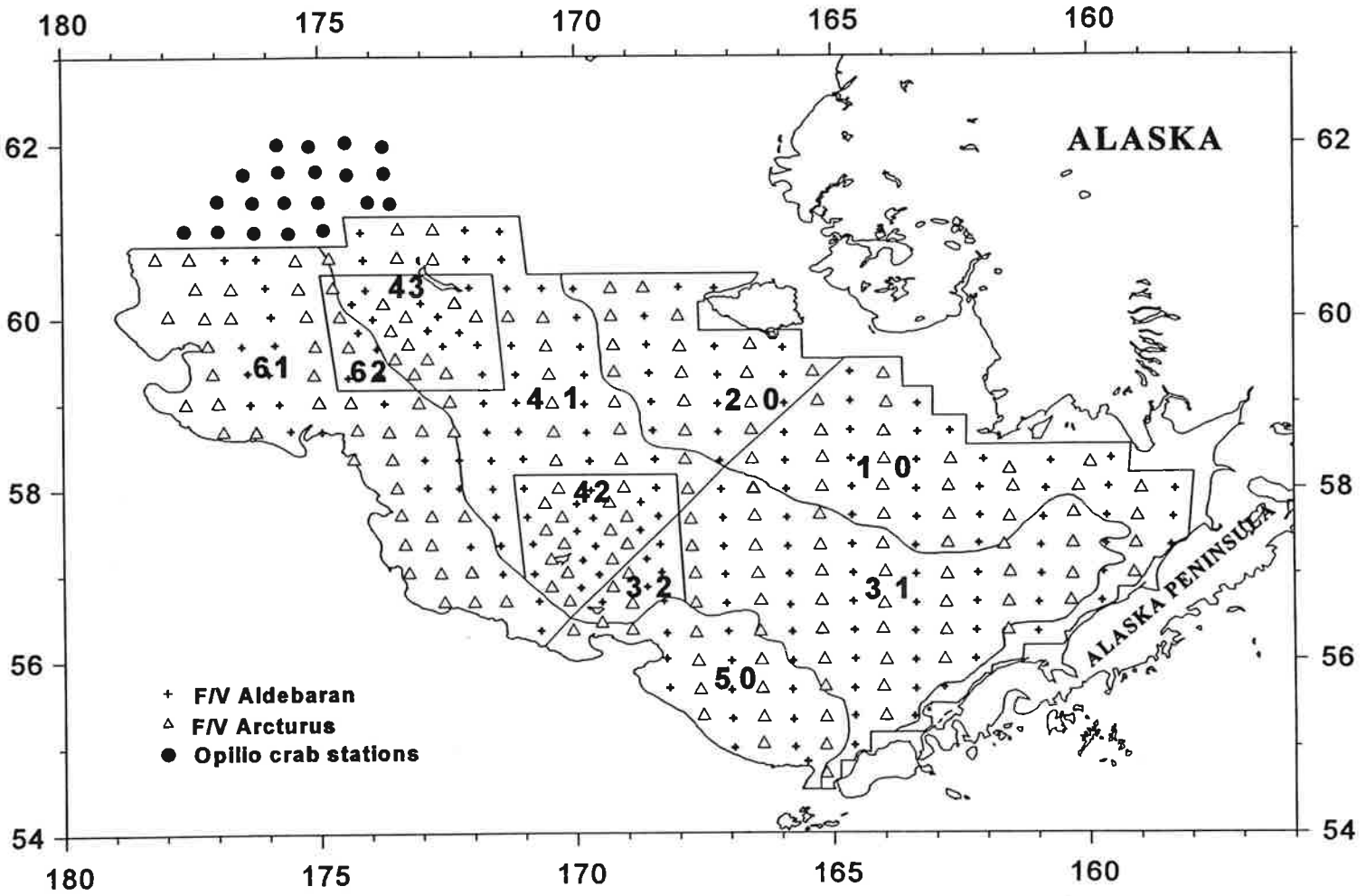

Figure 1.--Standard and special study stations sampled during the 1993 eastern Bering Sea bottom trawl survey, and stratification used for analysis of data.

sample strata, resulting in a total of 10 geographic strata. The overall sampling density for the entire survey area was one station per 1,305 km^2 (Table 1). However, because of the high-density sampling in subareas 3, 4, and 6, and the irregular subarea boundaries, sampling density among the six subareas varied from one station per 1,123 km^2 to one per 1,552 km^2.

Table 1.--Size of subareas and strata and sampling densities for the 1993 eastern Bering Sea bottom trawl survey (see also Fig. 1)

Subarea	Area (km^2)	No. Stations successfully sampled	Sampling density (km^2/stn)
1 (10)	77,871	58	1,343
2 (20)	41,027	31	1,323
3	103,300	78	1,324
(31)	94,526	69	
(32)	8,774	9	
4	107,822	96	1,123
(41)	62,703	44	
(42)	24,011	30	
(43)	21,108	22	
5	38,792	25	1,552
6	94,562	67	1,411
(61)	88,134	60	
(62)	6,429	7	
Subareas combined	463,374	355	1,305

Vessels and Fishing Gear

The 1993 eastern Bering Sea bottom trawl survey was conducted aboard the 40 m fishing vessels Arcturus and Aldebaran (Table 2). As in previous years, both vessels were equipped with 83-112 eastern otter trawls which have 25.3 m (83 ft) headropes and 34.1 m (112 ft) footropes (Fig. 2). These nets were attached to tail chains with 54.9 m (30 fathoms) paired dandylines. Each lower dandyline had a 0.61 m chain extension connected to the lower wing edge to improve bottom tending characteristics. Steel "V"-doors measuring 1.8 x 2.7 m and weighing 816 kg were used.

Table 2.--Characteristics of vessels used during the 1993 eastern Bering Sea bottom trawl survey.

Vessel	Overall Length (m)	Horsepower	Survey Period Start	Survey Period Finish
Arcturus	40	1525	2 June	1 August
Aldebaran	40	1525	2 June	1 August

SCANMAR[1] net mensuration systems were used aboard each vessel to measure net height and width. Net width was measured by the distance between two sensors attached to the upper starboard and port dandylines, about 0.61 m in front of the net. Mean net widths were calculated from observations recorded within each tow. These data were then used to establish a net width-scope (wire-out) relationship for each vessel to enable prediction of net width for tows where net width data were not available (Fig. 3) as described by Rose and Walters (1990). Estimates of net width were used in area-swept calculations.

[1] Reference to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.

83/112 EASTERN

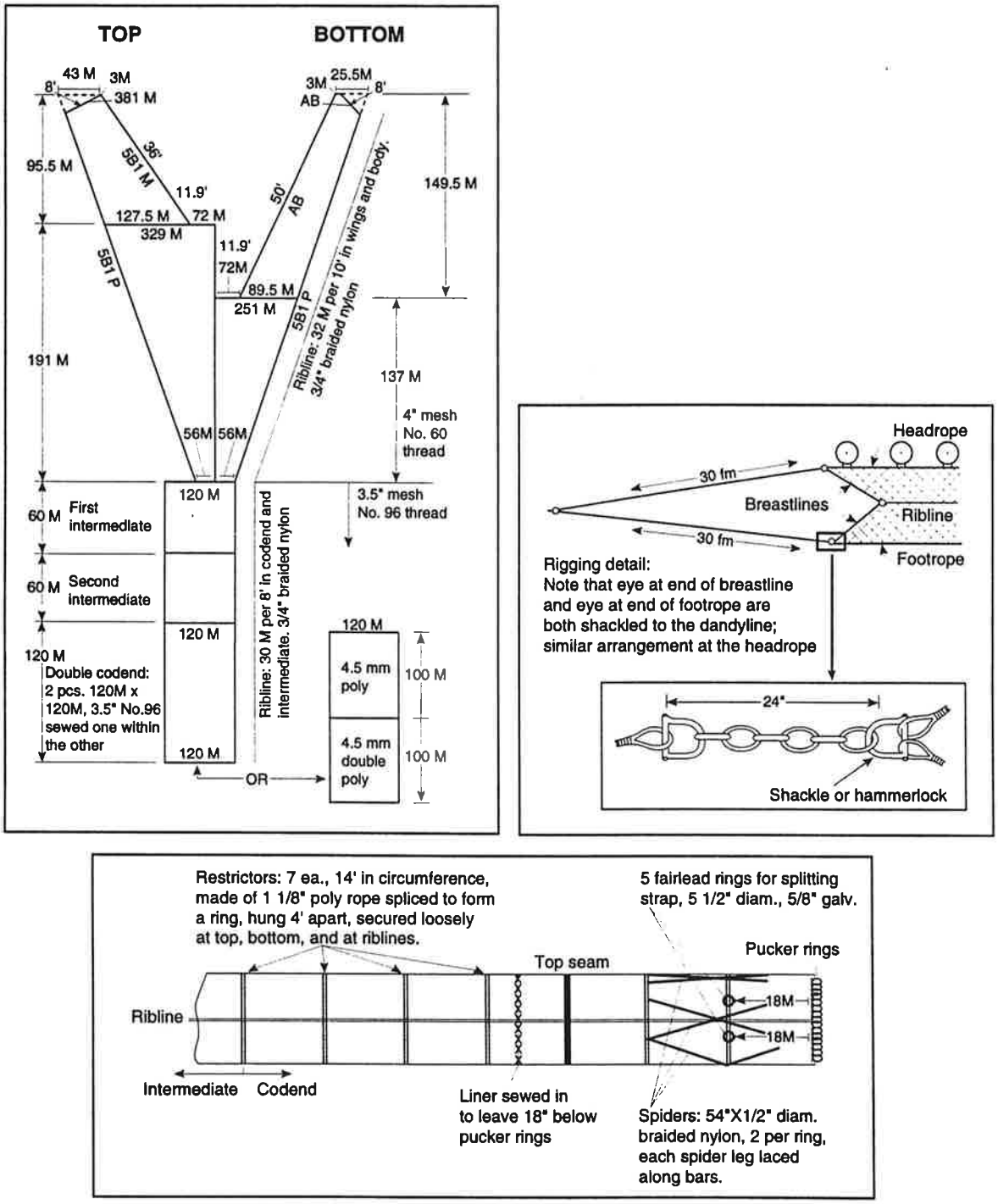

Figure 2.-- Schematic diagram of trawl used during the 1993 eastern Bering Sea bottom trawl survey.

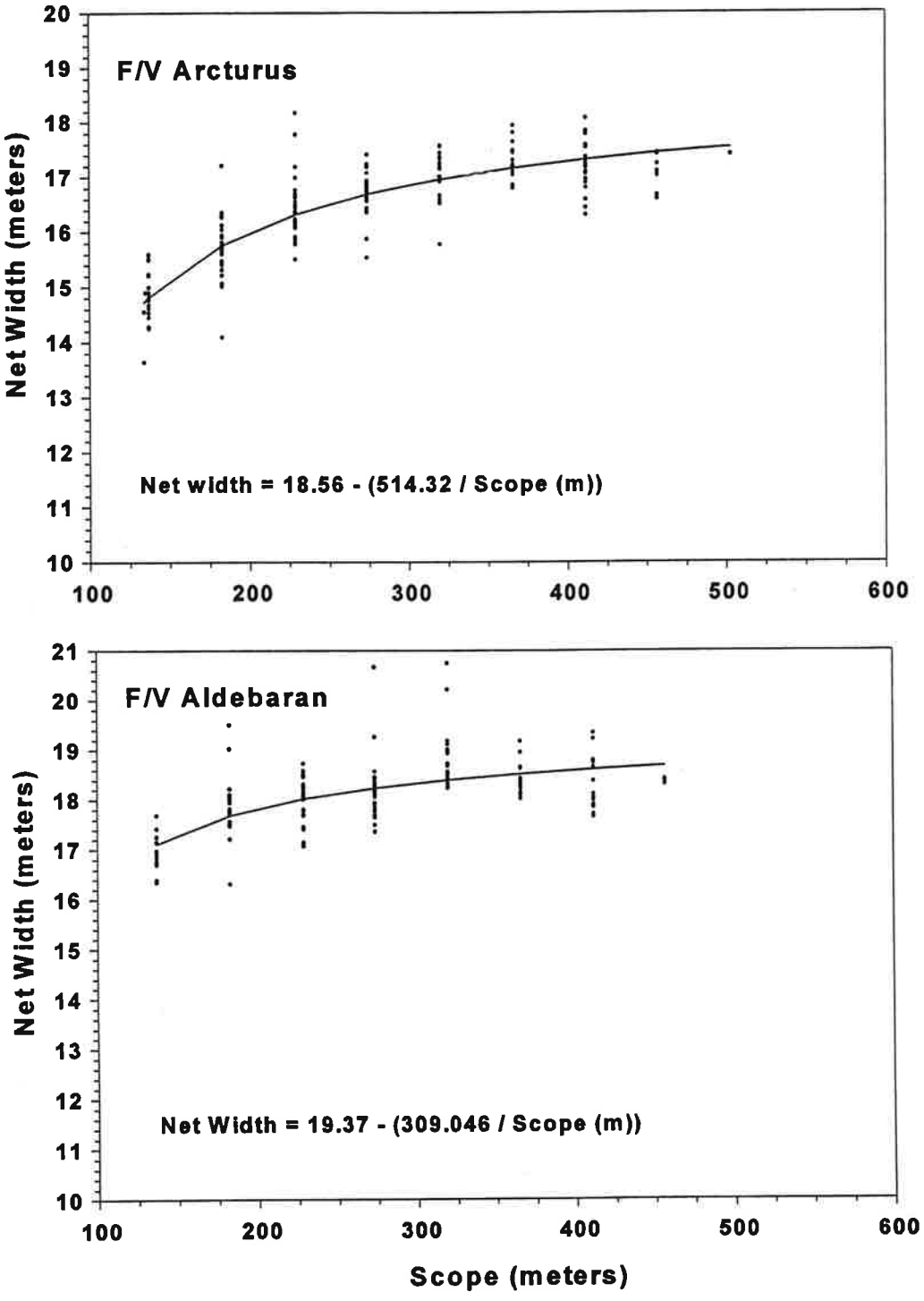

Figure 3.--Relationship between net-width and scope (wire-out) for vessels participating in the 1993 eastern Bering Sea bottom trawl survey.

Data Collection

Sampling procedures used in RACE eastern Bering Sea assessment surveys are described in detail by Wakabayashi et al. (1985). A brief summary follows.

Samples were collected by trawling at the center of each 20 x 20 nautical mile grid block (or corner station, in the case of high-density strata) for 30 minutes (timed after the net had settled on the bottom), towing at a speed of 1.54 m/sec (3 knots). If the bottom appeared to be untrawlable at the specified location, the nearest trawlable site within the same grid square was used. If the net was ripped or "hung up" on some object on the bottom during the tow, the catch was discarded and a new sample obtained.

Catches of less than approximately 1,150 kg (2,500 lb) were processed entirely while larger catches were subsampled. Economically important fish and invertebrates were sorted to species with the exception of four species of flatfish. Similar features between arrowtooth (Atheresthes stomias) and Kamchatka flounder (Atheresthes evermanni), and flathead sole (Hippoglossoides elassodon) and Bering flounder (Hippoglossoides robustus) made identification of these species difficult within the time constraints of the survey; thus, these species were grouped by genus for purposes of this report. Minor species of fish and invertebrates were sorted to the lowest taxonomic level practicable. Catch weights and numbers by species or species group were estimated directly or, when subsampled, estimated by extrapolating the proportion in the subsample to that of the entire catch weight. Pacific halibut (Hippoglossus stenolepis) and crab species of the genera Paralithodes (red and blue king crabs, camtschatica and platypus, respectively), Chionoecetes (snow and Tanner crabs, opilio and bairdi, respectively), and

Erimacrus (hair crabs, isenbeckii) were usually weighed and enumerated from the entire catch.

Size composition data were collected for each commercially important species. Pacific halibut, walleye pollock, Pacific cod, and yellowfin sole were measured whenever caught while other species were measured as time permitted (Table 3). Pacific halibut were measured immediately upon capture and returned to the sea in an effort to reduce sampling mortality for this species. Random samples of the remaining species of up to approximately 200 individuals (300 in the case of walleye pollock) were sexed and measured to the nearest centimeter from the tip of the snout to the end of the middle rays of the caudal fin (fork length).

Sagittal otoliths were collected from nine fish species (Table 4). In both the northwestern and southeastern divisions of the survey area, three otolith pairs per sex/centimeter interval were collected for Pacific cod and rock sole (Pleuronectes bilineatus), and five pairs per sex/centimeter interval for all other species. Scales as well as otoliths were taken from Pacific cod to aid in age determination of young fish. Individual fish weight data were collected for Alaska plaice in conjunction with otolith sampling. In the case of the Hippoglossoides, otoliths were collected only from individuals that were identified with certainty as flathead sole. Age structures for roundfish were preserved in 50% ethanol/water; flatfish otoliths were preserved in 50% glycerol/water.

Temperature profiles were taken at each station using either a micro-bathythermograph (MBT) attached to the head rope of the net or with an expendable bathythermograph cast (XBT); surface temperatures were taken by bucket thermometer.

Table 3.--Number of length measurements taken during the 1993 eastern Bering Sea bottom trawl survey. Totals include measurements outside standard survey area.

	Length measurements by subarea						
Species	1	2	3	4	5	6	TOTAL
walleye pollock	2,938	911	9,431	10,309	2,877	10,432	39,269
rock sole	7,907	3,554	7,236	7,477	101	1,275	27,624
yellowfin sole	8,956	4,877	7,807	4,986	20	1	26,651
flathead sole	720	1	5,175	2,127	3,543	5,491	17,182
Pacific cod	2,691	1,093	1,723	3,436	315	1,076	10,441
Alaska plaice	1,748	1,591	1,798	3,088	--	137	8,365
arrowtooth flounder	48	--	2,059	659	2,123	2,477	7,367
Bering flounder	--	10	3	1,779	--	250	3,786
Pacific halibut	626	237	302	374	63	194	1,799
Pacific herring	1,000	10	98	93	--	8	1,215
Kamchatka flounder	--	--	171	76	275	545	1,117
Greenland turbot	--	--	--	79	3	318	632
rex sole	2	--	21	--	328	116	467
starry flounder	95	8	--	--	--	--	103
saffron cod	--	74	--	--	--	--	74
Sakhalin sole	--	--	--	26	--	--	55
longhead dab	--	22	--	--	--	--	22
Arctic cod	--	--	--	3	--	--	3
Pacific ocean perch	--	--	--	--	3	--	3
sablefish	--	--	--	--	3	--	3
Dover sole	--	--	--	--	1	--	1

Table 4.--Number of fish in which age structures (otoliths and/or scales) were collected, by species and subarea, during the 1993 eastern Bering Sea bottom trawl survey.

	Subarea						
Species	1	2	3	4	5	6	TOTAL
walleye pollock	32	38	392	552	83	246	1,398[a]
Pacific cod[b]	154	104	40	221	18	95	653
yellowfin sole	108	187	147	107	--	--	549
rock sole	130	114	48	148	3	--	443
flathead sole	--	--	237	--	39	--	276
arrowtooth flounder	--	--	50	--	28	133	211
Alaska plaice	47	51	27	58	--	--	183
Greenland turbot	--	--	--	33	--	88	179
Kamchatka flounder	--	--	30	3	45	61	148

[a] Some age structures were collected outside the standard survey area.
[b] Scales were also taken.

Data Analysis

A brief description of the procedures used in analysis of RACE Bering Sea survey data follows (for a detailed description see Wakabayashi et al. 1985). Some of the species collected were grouped by family for data analysis because of their insignificant commercial value or questionable identification.

Relative fishing powers between the two vessels were determined using the methods of Kappenman (1992). Three-hundred-twenty-seven stations sampled by the two vessels during the standard survey (Fig. 1) plus 11 stations from special studies were used in that analysis (see Appendix A).

Mean catch per unit effort (CPUE) values for each species were calculated in kilograms per hectare and number per hectare for each of the 10 strata; area swept (hectares) was computed as the distance towed multiplied by the mean net width (Alverson and Pereyra 1969). Mean CPUE values, weighted by strata areas, were calculated for individual subareas and for the overall survey area. Biomass and population estimates were derived for each stratum by multiplying the stratum mean CPUE by the stratum area. Stratum totals were then added together to produce estimates for each subarea and for the total survey area.

In estimating the size composition of populations of principal commercial species, length-frequency data obtained at each station were expanded to the station catch by proportion and then extrapolated to the stratum population by the weighted CPUE. Stratum estimates were summed to derive the estimated size composition by subarea and for the overall survey area.

Otolith and scale samples collected during the survey were read by the Age and Growth Determination Unit of the AFSC's Resource Ecology and Fisheries Management (REFM)

Division. From these age samples, stratified by sex and length, an age-length key was produced that showed the distribution of ages by sex at each centimeter interval. Population age composition was estimated by apportioning ages to the estimated population number at each length interval. Only species whose age samples have been read by the time of writing of this publication have been included in the age analyses. Species completed at a later date will be presented in subsequent publications.

Growth characteristics of principal species were described with von Bertalanffy (1938) growth curves fitted to age-length data collected in this survey.

Special Studies

Stomach samples from several of the most prevalent commercial species in each haul were collected and preserved in formalin for later examination by the Food Habits Program of the AFSC's REFM Division (Table 5).

Additional activities included collecting specimens for observer training programs, collecting samples for fish and crab pathology studies (Table 5), and fulfilling requests from academic institutions.

Table 5.--Biological fish samples collected for special studies during the 1993 eastern Bering Sea bottom trawl survey.

Species	Stomach samples collected	Pathobiological samples collected
Walleye pollock	3,363	8
Pacific cod	2,499	7
Yellowfin sole	792	--
Rock sole	445	--
Flathead sole	491	--
Pacific halibut	388	--
Alaska plaice	300	--
Arrowtooth flounder	585	--
Greenland turbot	100	--
Skates	424	--
Marbled eelpout	--	10
Wattled eelpout	--	1
Bering flounder	--	1

RESULTS

Station Data

Station data from the 1993 survey are listed in Appendix A. Relevant information such as position, tow parameters, time, and environmental measurements are listed for each vessel for all standard bottom trawl stations used in the analyses.

Environmental Conditions

Sea surface temperatures recorded during the survey ranged from 3.3° to 10.9°C (Fig. 4). As in most previous years, surface temperature increased from east to west across the shelf, probably reflecting the progression of summer warming as the survey proceeded from east to west.

Bottom temperatures ranged from -1.1° to 7.9°C (Fig. 5). The warmest temperatures (above 4°C) occurred in shallow waters along the Alaska mainland, along portions of the outer shelf, and in the southern portion of the outer shelf just north of Unimak Pass. The coldest bottom temperatures observed were in the northern portion of the mid-shelf at depths between 50 and 100 m.

The mean bottom water temperature for the total survey area in 1993 was 3.0°C (Fig. 6). Historically, this was in the mid-range of values recorded for mean summer bottom water temperatures in the standard survey area (range in annual means 1.8° to 5.1°C, average of annual means 2.8°C). Mean bottom temperatures observed over a more limited region of the southeast Bering Sea, which has been sampled annually since 1971, have ranged from 1.2° to 4.8°C; the

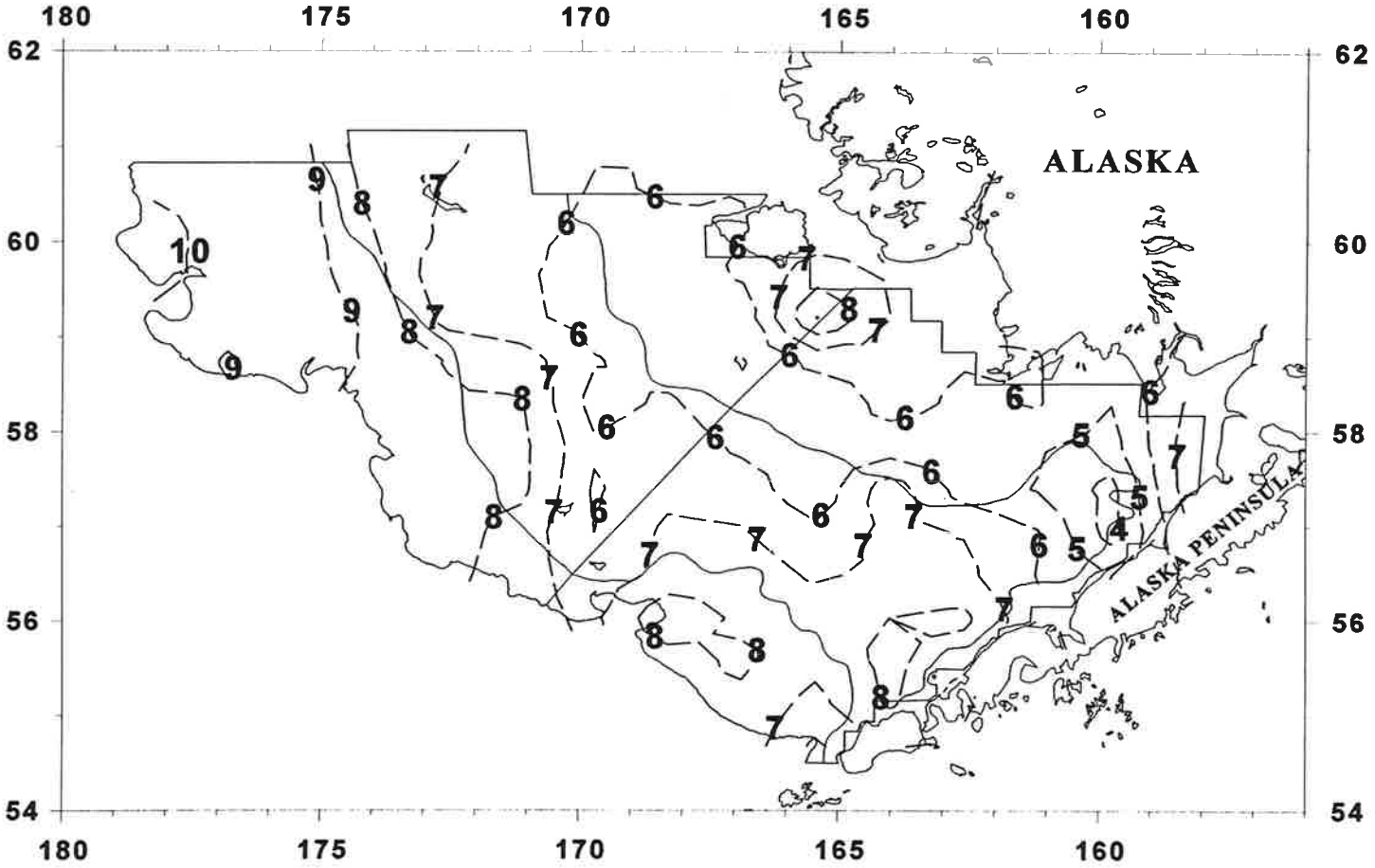

Figure 4.--Distribution of surface water temperatures (°C) observed during the 1993 eastern Bering Sea bottom trawl survey.

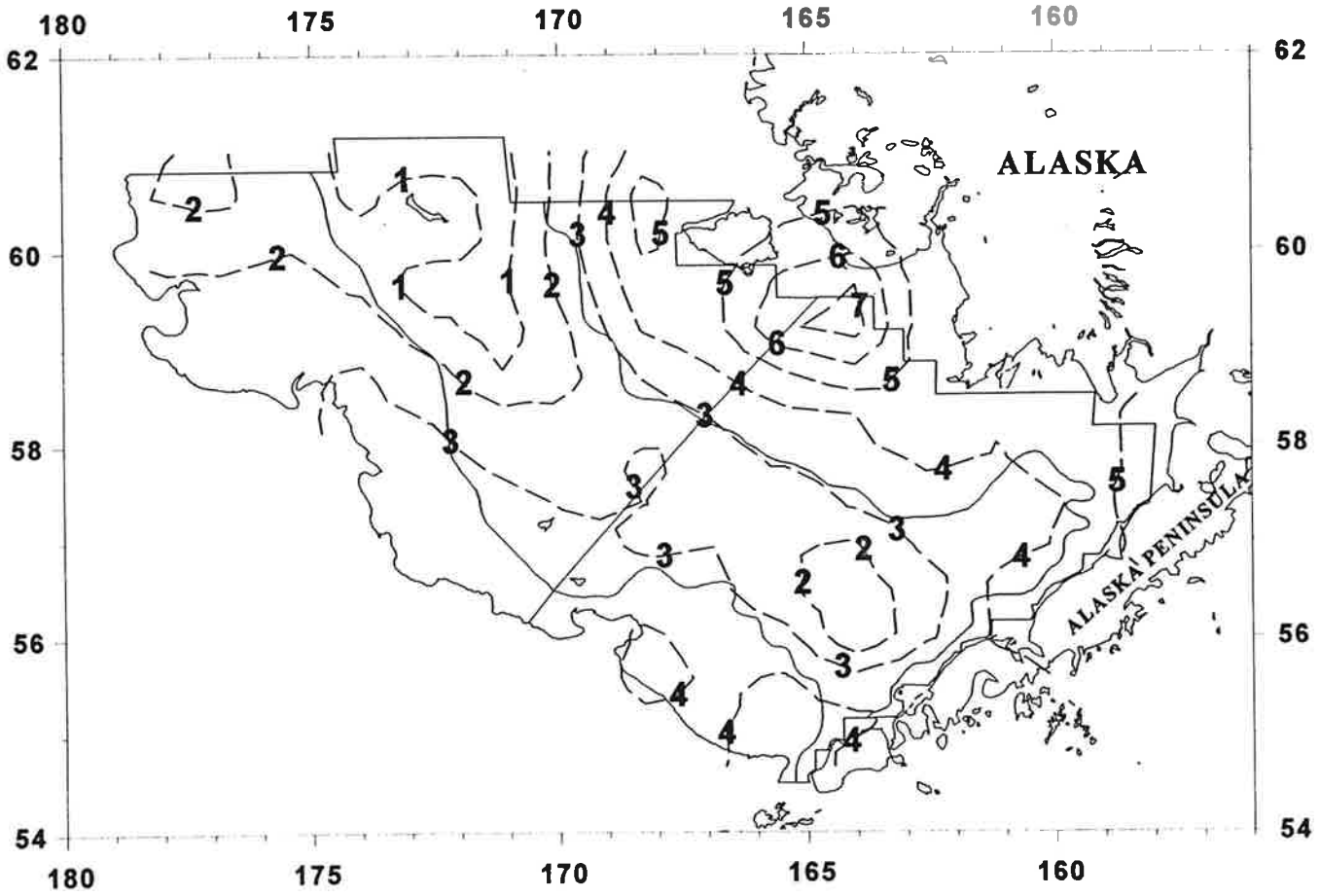

Figure 5.--Distribution of bottom water temperatures (°C) observed during the 1993 eastern Bering Sea bottom trawl survey.

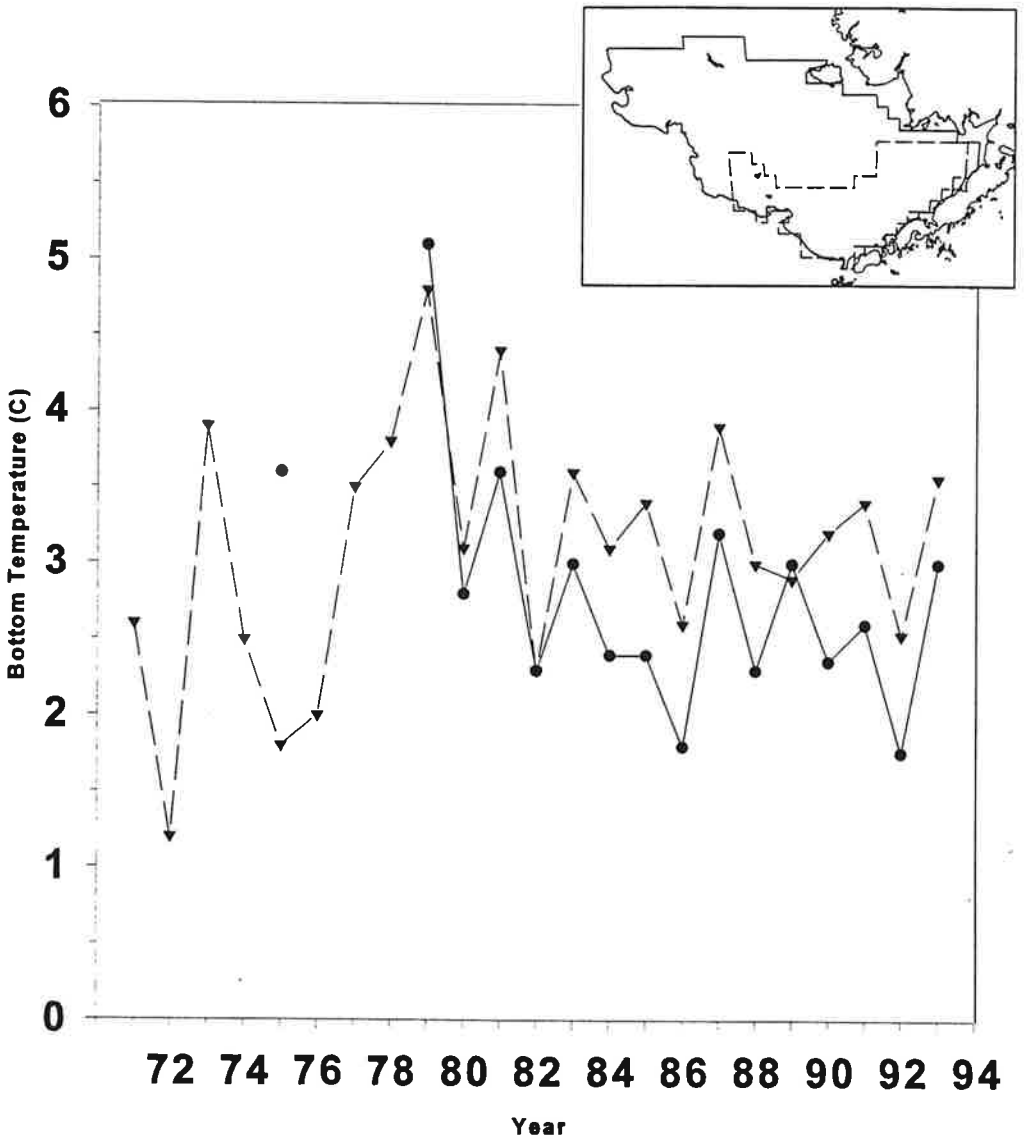

Figure 6.--Mean summer bottom water temperatures based on expendable bathythermograph casts or micro-bathythermographs attached to the net headrope during Alaska Fisheries Science Center bottom trawl surveys. The 1971-93 means (dashed line) are from the southeast Bering Sea (see inset) and the 1975 and 1979-93 means are from the larger survey area outlined on the inset. The 1975 data point for the overall survey area is based on data collected from August through September, while those in all other years and areas were collected from June through early August.

1993 value for this area was 3.6°C, just above the long-term average (3.1°C)(Fig. 6.).

Relative Fishing Powers of Survey Vessels

A total of 338 alternate-row tows (169 for each vessel) were used in the comparison of vessel catch rates with the methods developed by Kappenman (1992). There were 327 tows from the standard area and 11 more from the special studies work (Appendix A). Based on this analysis, the Aldebaran was more efficient than the Arcturus at capturing the following species and species groups: walleye pollock, Pacific cod, rock sole, and Atheresthes spp.. Fishing power corrections were applied to catches (by species) of the less efficient vessel (Table 6).

Table 6.--Species for which fishing power corrections were applied, and scaling factors determined by the method of Kappenman (1992) based on 338 total hauls.

Species	Hauls with catch		Catch multiplier	
	Arcturus	Aldebaran	Arcturus	Aldebaran
Atheresthes spp.	91	88	1.27	1.0
Rock sole	154	154	1.13	1.0
Pacific cod	167	164	1.09	1.0
Walleye pollock	164	167	1.15	1.0

Estimated Biomass of Major Fish and Invertebrate Groups

Total demersal animal biomass for the overall survey area was estimated at 16.0 million t, of which fish species accounted for 82% (13.1 million t, Table 7), and invertebrates 18% (2.9 million t, Table 8). Concentrations of fish biomass were located in Bristol Bay and along the Alaska Peninsula, around the Pribilof Islands, and northwest of the Pribilofs (Fig. 7). Although 20 families and 69 species of fish were identified in the catches (Appendix B), the fish biomass was dominated by flatfishes (Pleuronectidae, 6.2 million t) and cods (Gadidae, 6.1 million t) (Table 7). The biomass of invertebrates was comprised primarily of the phyla Echinodermata (1.2 million t), Crustacea (0.9 million t), and Mollusca (0.25 million t). A total of 82 invertebrate species from 12 phyla were identified in the survey (Table 8, Appendix B).

Relative Abundance of Individual Fish Species

Relative abundance of the 11 most abundant species and species groups of fish are shown in Figure 8. These taxa accounted for 79% (290 kg/ha) of total animal mean CPUE (365 kg/ha) and 97% of total fish mean CPUE (298 kg/ha). Overall, but particularly in water deeper than 50 m, walleye pollock were the dominant species in the catch with a mean CPUE of 122 kg/ha. Pacific cod were abundant across all depths with an overall mean CPUE of 15.2 kg/ha. Yellowfin sole and rock sole, with overall mean catch rates of 54 kg/ha and 48 kg/ha respectively, dominated catches in water less than 50 m. Yellowfin sole and rock sole were also prominent on the mid-shelf waters between 50 and 100 m along with Alaska plaice and Hippoglossoides spp. See Appendix C for a descending rank of all organisms caught.

Table 7.--Biomass estimates (t) for major fish species and fish groups taken during the 1993 eastern Bering Sea bottom trawl survey.

Taxon	Estimated total biomass (t)[a] and 95% confidence interval		Proportion of total animal biomass[b]	Estimated biomass by subarea (t)					
				1	2	3	4	5	6
Gadidae (cods)									
Walleye pollock	5,443,689	± 18%	0.341	425,472	40,668	1,934,835	1,165,816	435,664	1,441,233
Pacific cod	669,671	± 16%	0.042	167,548	14,746	189,869	148,133	37,438	111,937
Other cods	5,075	± 173%	<0.000	601	4,388	0	85	0	0
Total cods	6,118,434	± 16%	0.383	593,621	59,803	2,124,703	1,314,034	473,102	1,553,170
Anoplopomatidae									
Sablefish	158	± 146%	0.000	0	0	0	0	158	0
Scorpaenidae (rockfish)									
Pacific ocean perch	237	± 198%	0.000	0	0	0	0	237	0
Other rockfish	145	± 198%	0.000	0	0	145	0	0	0
Total rockfish	382	± 144%	0.000	0	0	145	0	237	0
Pleuronectidae (flatfishes)									
Yellowfin sole	2,286,375	± 13%	0.143	1,016,562	175,609	791,534	301,778	791	100
Rock sole	2,016,984	± 13%	0.126	1,177,421	100,423	346,904	353,039	2,332	36,866
Hippoglossoides spp.	607,443	± 14%	0.038	37,882	114	266,929	64,932	87,262	150,325
Alaska plaice	484,804	± 20%	0.030	122,568	18,874	140,207	184,835	0	18,320
Atheresthes spp.	538,312	± 17%	0.034	5,755	0	123,173	24,909	149,635	234,841
Greenland turbot	30,270	± 32%	0.002	0	0	0	3,228	769	26,273
Pacific halibut	152,390	± 19%	0.010	48,262	7,643	26,432	25,009	15,488	29,557
Other flatfish	42,345	± 32%	0.003	23,509	2,094	5,467	72	9,108	2,095
Total flatfish	6,158,924	± 8%	0.385	2,431,958	304,756	1,700,646	957,802	265,386	498,377
Clupeidae									
Pacific herring	142,786	± 116%	0.009	139,642	790	1,187	1,033	0	134
Cottidae (sculpins)	203,777	± 20%	0.013	48,324	9,704	44,782	65,498	2,743	32,725
Zoarcidae (eelpouts)	47,854	± 25%	0.003	22	2	2,199	16,254	598	28,780
Osmeridae (smelts)	15,814	± 100%	0.001	2,256	10,420	124	811	2,204	0
Agonidae (poachers)	27,154	± 21%	0.002	7,503	969	8,073	9,919	534	156
Cyclopteridae (snailfishes)	11,953	± 37%	0.001	32	1	1,187	8,756	13	1,964
Rajidae (skates)	366,721	± 13%	0.023	23,781	4,000	64,374	99,269	30,138	145,158
Other fish	9,613	± 78%	0.001	6,526	456	255	342	430	1,604
Total fish	13,103,570	± 9%	0.820	3,253,665	390,901	3,947,676	2,473,718	775,542	2,262,069

[a] Differences in sums of estimates and totals are due to rounding
[b] Proportion of total estimated biomass, fish and invertebrates combined, for the total survey area. Total estimated biomass= 15,979,337 t

Table 8.--Biomass estimates (t) for major invertebrate species and invertebrate groups taken during the 1993 eastern Bering Sea bottom trawl survey.

Taxon	Estimated total biomass (t)[a] and 95% confidence interval	Proportion of total animal biomass[b]	Estimated biomass by subarea (t)					
			1	2	3	4	5	6
Crustacea								
Chionoecetes sp. (snow crab)	432,658 ± 14%	0.027	16,279	17,397	64,328	210,330	28,402	95,922
Lithodes sp. king crab	0 ± 0%	0.000	0	0	0	0	0	0
Paralithodes sp. (king crab)	85,835 ± 36%	0.005	12,239	155	40,378	30,930	0	2,133
Erimacrus isenbeckii (hair crab)	3,731 ± 50%	0.000	386	152	1,187	1,997	9	0
Paguridae hermit crab	359,927 ± 18%	0.023	23,998	6,165	127,569	142,997	4,132	55,065
Other crab	22,902 ± 36%	0.001	4,028	4,466	5,439	8,477	228	264
Total crab	905,053 ± 10%	0.057	56,930	28,335	238,901	394,732	32,771	153,384
Shrimps	20,768 ± 99%	0.001	168	73	10,181	605	151	9,589
Other crustaceans	1,352 ± 112%	0.000	577	1	43	682	0	50
Total crustaceans	927,174 ± 10%	0.058	57,675	28,409	249,125	396,019	32,922	163,024
Mollusca								
Gastropoda (snails)	248,741 ± 20%	0.016	16,090	7,304	91,960	66,938	6,365	60,084
Pelecypoda (bivalves)	2,834 ± 47%	0.000	946	64	1,472	183	42	127
Squids	32 ± 126%	0.000	0	0	0	0	22	10
Octopuses	1,355 ± 78%	0.000	0	0	425	22	233	676
Other mollusks	0 ± 0%	0.000	0	0	0	0	0	0
Total mollusks	252,963 ± 19%	0.016	17,036	7,368	93,857	67,143	6,662	60,897
Echinodermata								
Asteroidea (starfish)	1,009,011 ± 14%	0.063	482,686	70,752	266,565	124,381	553	64,075
Ophiuroidea (brittle stars)	150,417 ± 23%	0.009	4,026	1,002	51,961	22,434	4,737	66,258
Echinoidea (sea urchin)	15,986 ± 129%	0.001	64	0	12,125	227	2,543	1,027
Holothuroidea (sea cucumbers)	7,528 ± 97%	0.000	3,876	0	3,105	547	0	0
Total echinoderms	1,183,107 ± 13%	0.074	490,692	71,756	333,764	147,625	7,866	131,403
Ascidiacea	199,531 ± 35%	0.012	19,762	3,346	98,971	77,423	30	0
Porifera (sponges)	123,093 ± 87%	0.008	6,725	215	113,799	2,156	27	171
Coelenterata	178,413 ± 23%	0.011	27,416	442	86,109	41,294	15,943	7,209
Other invertebrates	11,651 ± 52%	0.001	6,446	12	2,121	239	76	2,757
Total invertebrates	2,875,767 ± 9%	0.180	625,710	111,545	977,738	731,862	63,493	365,418

[a] Differences in sums of estimates and totals are due to rounding
[b] Proportion of total estimated biomass, fish and invertebrates combined, for the total survey area. Total estimated biomass= 15,979,337 t

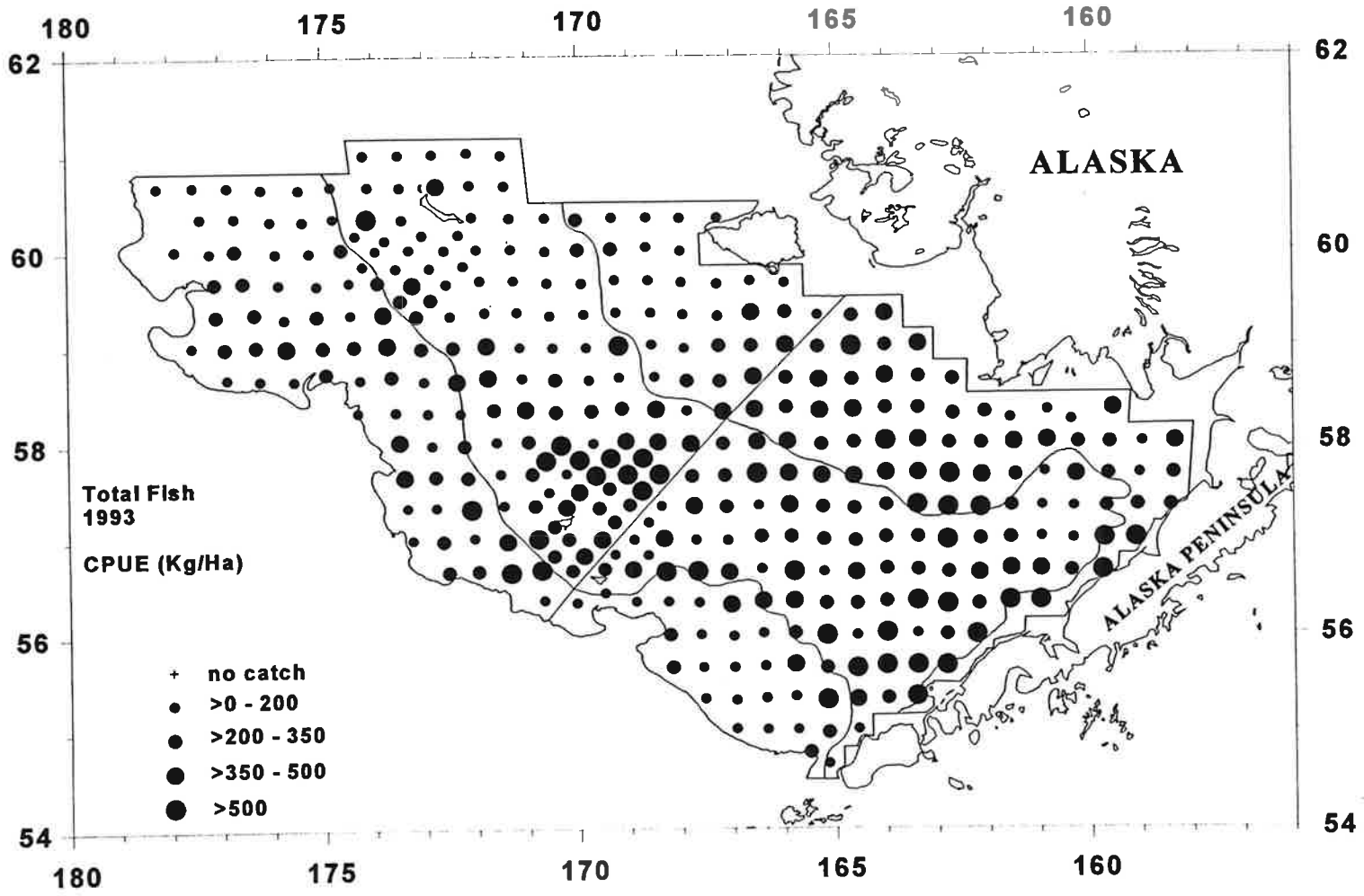

Figure 7.--Distribution and relative abundance of total fish, 1993 eastern Bering Sea bottom trawl survey.

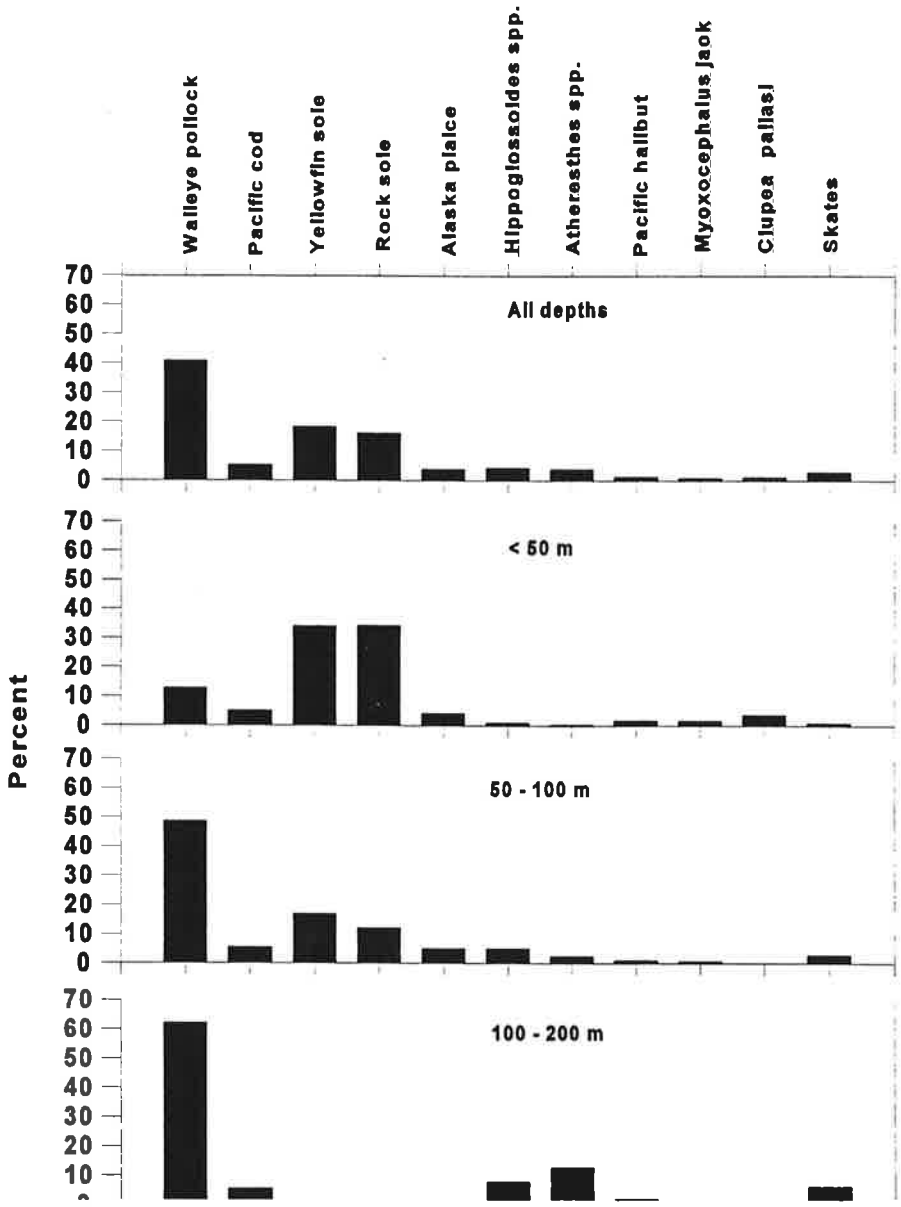

Figure 8.--Relative abundance (%CPUE in kg/ha) of principal groundfish species (top 11 for all depths combined) by depth zones and for all depths combined, 1993 eastern Bering Sea bottom trawl survey.

Abundance, Distribution, and Size and Age Composition of Principal Species and Species Groups

Geographical distributions, population numbers, biomass estimates, and size composition are presented for each of the following commercially important eastern Bering Sea groundfish: walleye pollock, Pacific cod, yellowfin sole, rock sole, Hippoglossoides spp., Alaska plaice, Greenland turbot (Reinhardtius hippoglossoides), Atheresthes spp., and Pacific halibut. Estimated biomass, population numbers, and mean size (by length and weight) are summarized by subarea and for the entire survey area. Size composition data are illustrated in histograms relating the population percentage of length by centimeter interval for each subarea and in population numbers for the total survey area. Age composition and von Bertalanffy growth parameters are given for walleye pollock, Pacific cod, yellowfin sole, rock sole, and Atheresthes spp. It is recognized that the Atheresthes group contains both Atheresthes stomias and Atheresthes evermanni and ageing results are potentially biased. Geographical distributions for some common, but generally noncommercial fish species are presented. These are total skates, great sculpin (Myoxocephalus polyacanthocephalus), plain sculpin (M. jaok), bigmouth sculpin (Hemitripterus bolini), wattled eelpout (Lycodes palearis), shortfin eelpout (L. brevipes), marbled eelpout (L. raridens), sturgeon poacher (Podothecus acipenserinus), Bering poacher (Occella dodecaedron), eulachon (Thaleichthys pacificus), capelin (Mallotus villosus), and Pacific herring (Clupea pallasi). Biomass and population estimates as well as mean weight are given by subarea and total area. These tables are not given for the pelagic species eulachon, capelin, and Pacific herring due to the bottom sampling nature of the survey. We do not feel these species are adequately represented in the samples, however, plots are shown to give some idea of geographic distribution.

Appendices to the report contain detailed results of the analysis. CPUE, population, and biomass estimates as well as the variances and confidence limits for each species by stratum in are given Appendix D. Population estimates by sex and size class for the total survey area are listed in Appendix E.

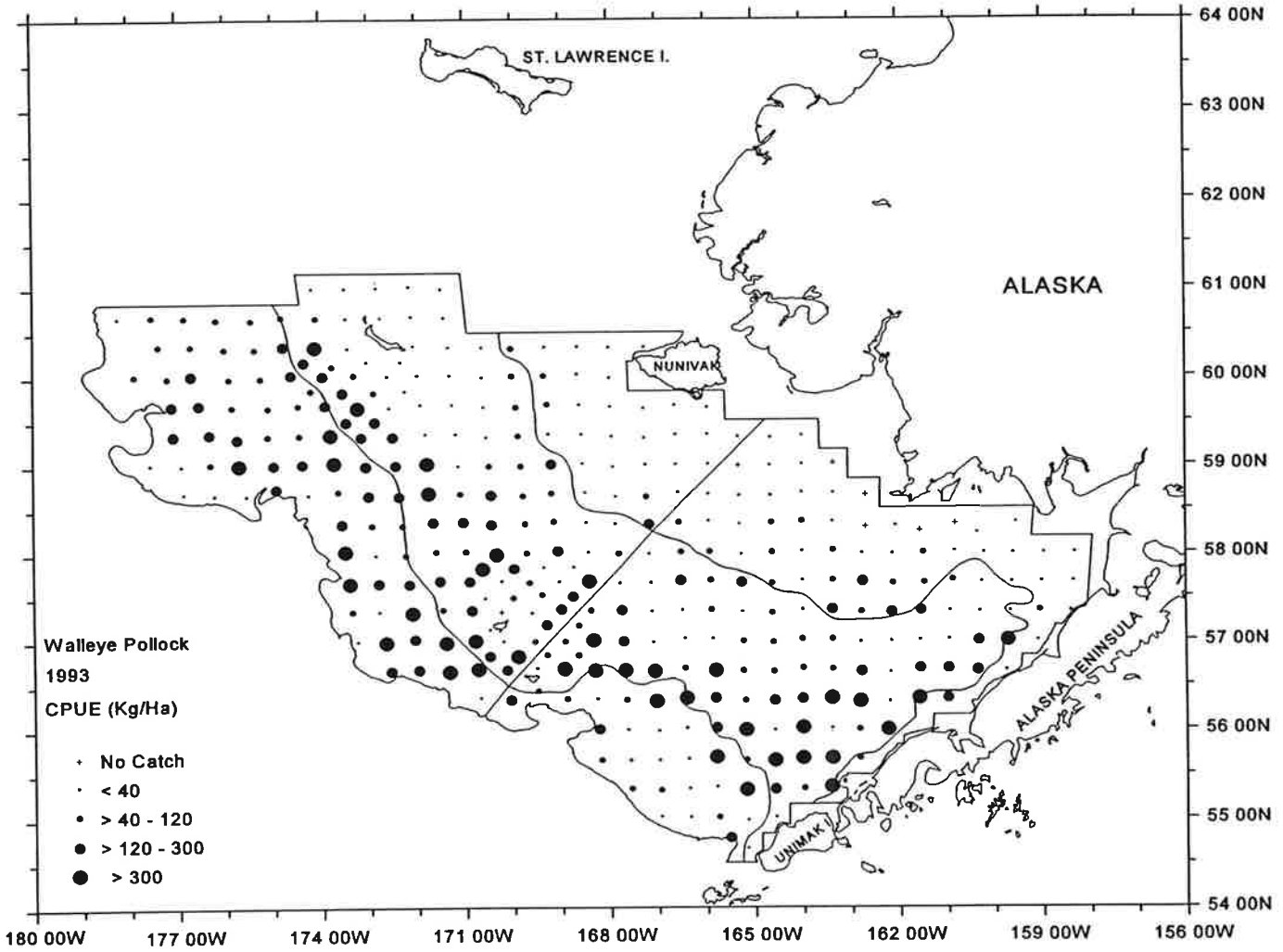

Figure 9.--Distribution and relative abundance in kg/ha of walleye pollock, 1993 eastern Bering Sea bottom trawl survey.

Table 9.--Abundance estimates and mean size of walleye pollock by subarea, 1993 eastern Bering Sea bottom trawl survey.

Subarea	Mean CPUE (kg/ha)	Estimated biomass (t)[a]	Proportion of estimated biomass	Estimated population numbers	Proportion of estimated population[a]	Mean Size Weight (kg)	Mean Size Length (cm)
1	54.64	425,472	0.077	635,366,424	0.066	0.670	34.6
2	19.61	80,447	0.015	758,122,304	0.079	0.106	13.2
3	187.30	1,934,835	0.350	3,195,173,923	0.331	0.606	40.9
4	111.60	1,203,241	0.218	2,259,916,464	0.234	0.532	35.1
5	112.31	435,664	0.079	607,476,907	0.063	0.717	44.9
6	152.41	1,441,233	0.261	2,190,847,681	0.227	0.658	40.7
All subareas combined[b]	119.14	5,520,892	1.000	9,646,903,703	1.000	0.572	37.2
95% Confidence interval		±956,473		±1,808,726,774			

[a]Variances of abundance estimates are given in Appendix D.
[b]Differences in sums of estimates and totals are due to rounding

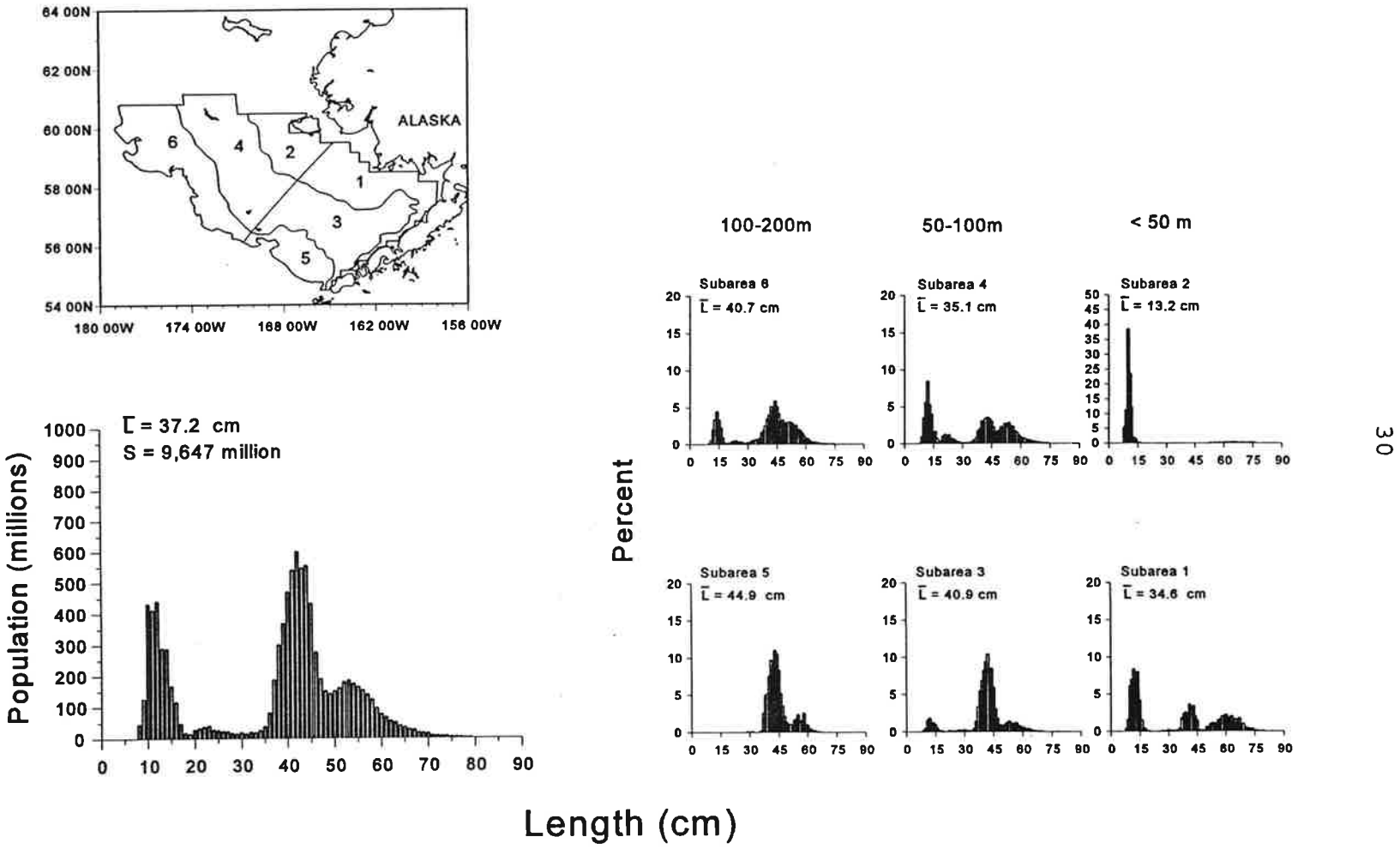

Figure 10.--Estimated relative size distribution (sexes combined) of walleye pollock in terms of population numbers and percent for subareas 1-6, 1993 eastern Bering Sea bottom trawl survey.

Table 10.--Estimated population numbers (millions of fish) of walleye pollock by age group and subarea, 1993 eastern Bering Sea bottom trawl survey.

		DEPTH AND SUBAREA							
		100-200 m		50-100 m		<50 m			
AGE	YEAR CLASS	6	5	4	3	2	1	ALL SUBAREAS COMBINED	PROPORTION
1	1991	338.69	0.15	673.63	247.08	589.29	250.66	2,099.51	0.2176
2	1990	102.47	1.33	186.79	58.39	3.66	19.49	372.13	0.0386
3	1989	133.80	48.53	93.09	340.97	0.03	27.09	643.51	0.0667
4	1988	602.01	300.21	415.41	1,471.34	0.00	93.07	2,882.05	0.2988
5	1987	154.62	65.14	99.93	294.35	0.01	17.52	631.58	0.0655
6	1986	139.91	50.23	88.97	218.72	0.08	12.97	510.87	0.0530
7	1985	91.19	24.51	60.54	87.96	0.19	5.54	269.94	0.0280
8	1984	133.12	24.73	107.36	97.09	0.74	13.74	376.78	0.0391
9	1983	178.17	31.11	167.24	112.21	2.64	26.40	517.77	0.0537
10	1982	105.03	20.22	101.17	70.40	2.01	20.83	319.65	0.0331
11	1981	83.19	16.51	85.21	62.97	4.65	28.87	281.40	0.0292
12	1980	51.95	12.62	59.46	49.53	5.43	26.35	205.34	0.0213
13	1979	36.68	5.76	47.11	34.39	6.81	31.14	161.88	0.0168
14	1978	18.97	3.45	22.91	18.20	5.60	20.56	89.70	0.0093
15	1977	12.66	2.26	18.00	14.02	4.43	15.93	67.32	0.0070
16	1976	3.18	0.51	6.20	4.54	2.22	6.52	23.17	0.0024
17	1975	0.52	0.03	0.76	0.54	0.37	0.74	2.94	0.0003
18	1974	2.01	0.12	2.70	1.81	0.85	2.47	9.97	0.0010
22	1970	0.29	0.00	0.39	0.81	0.21	0.74	2.43	0.0003
Age unknown		2.39	0.04	23.04	9.87	128.91	14.73	178.98	0.0186
All Ages Combined		2,190.85	607.48	2,259.92	3,195.17	758.12	635.37	9,646.90	1.0000

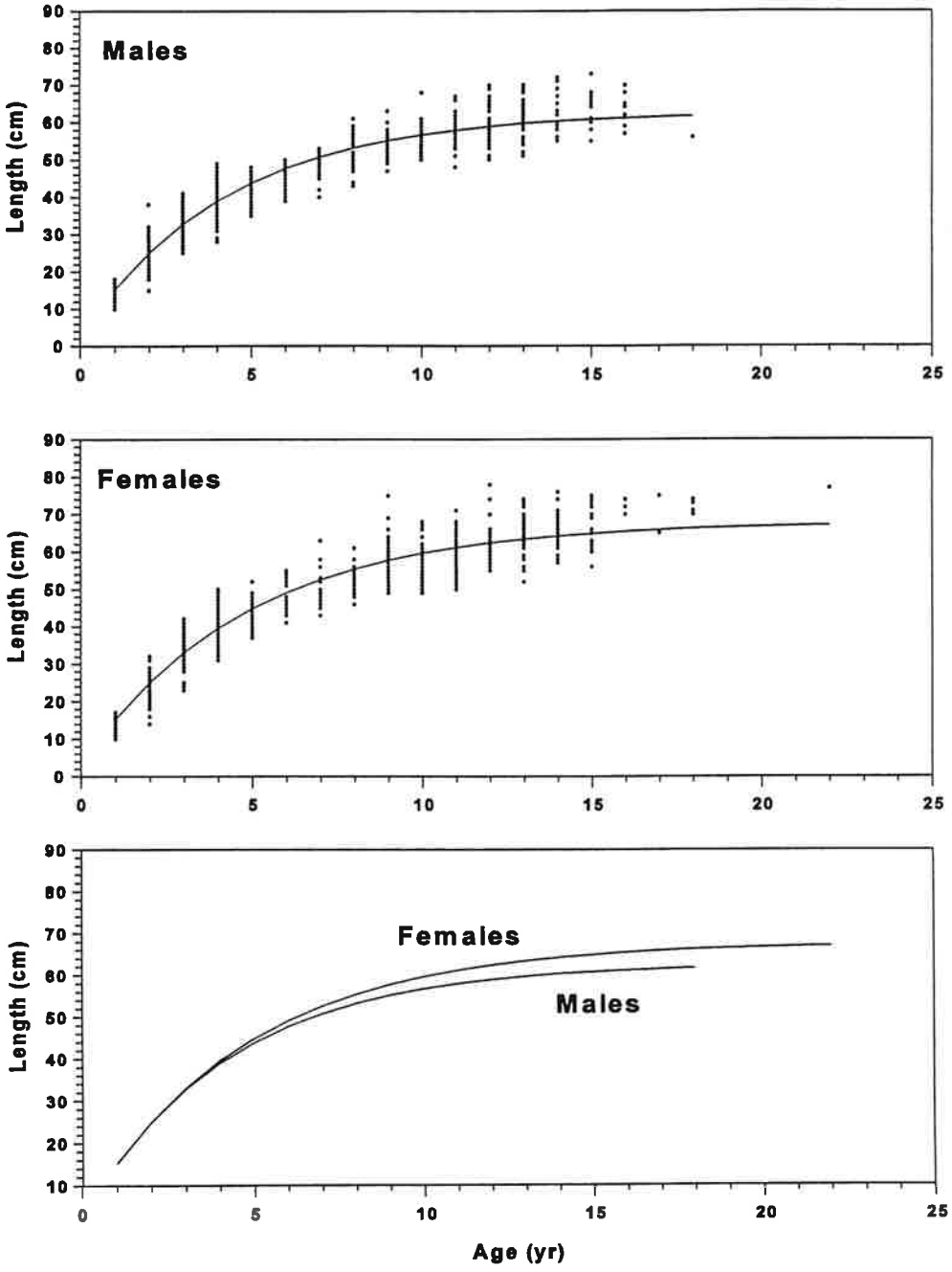

Figure 11.--Distribution of walleye pollock aged samples from the 1993 eastern Bering Sea bottom trawl survey by length for males, females, and compared showing non-linear von-Bertalanffy estimates.

Table 11.--von-Bertalanffy growth parameter estimates for walleye pollock by sex, based on otolith age reading and length data from the 1993 eastern Bering Sea bottom trawl survey.

Sex	Number of age readings	Age range (years)	Length range (cm)	Parameters		
				L_{inf}	K	t_o
Male	667	1-18	10-73	62.7	0.23	-0.21
Female	719	1-22	10-78	67.8	0.21	-0.24

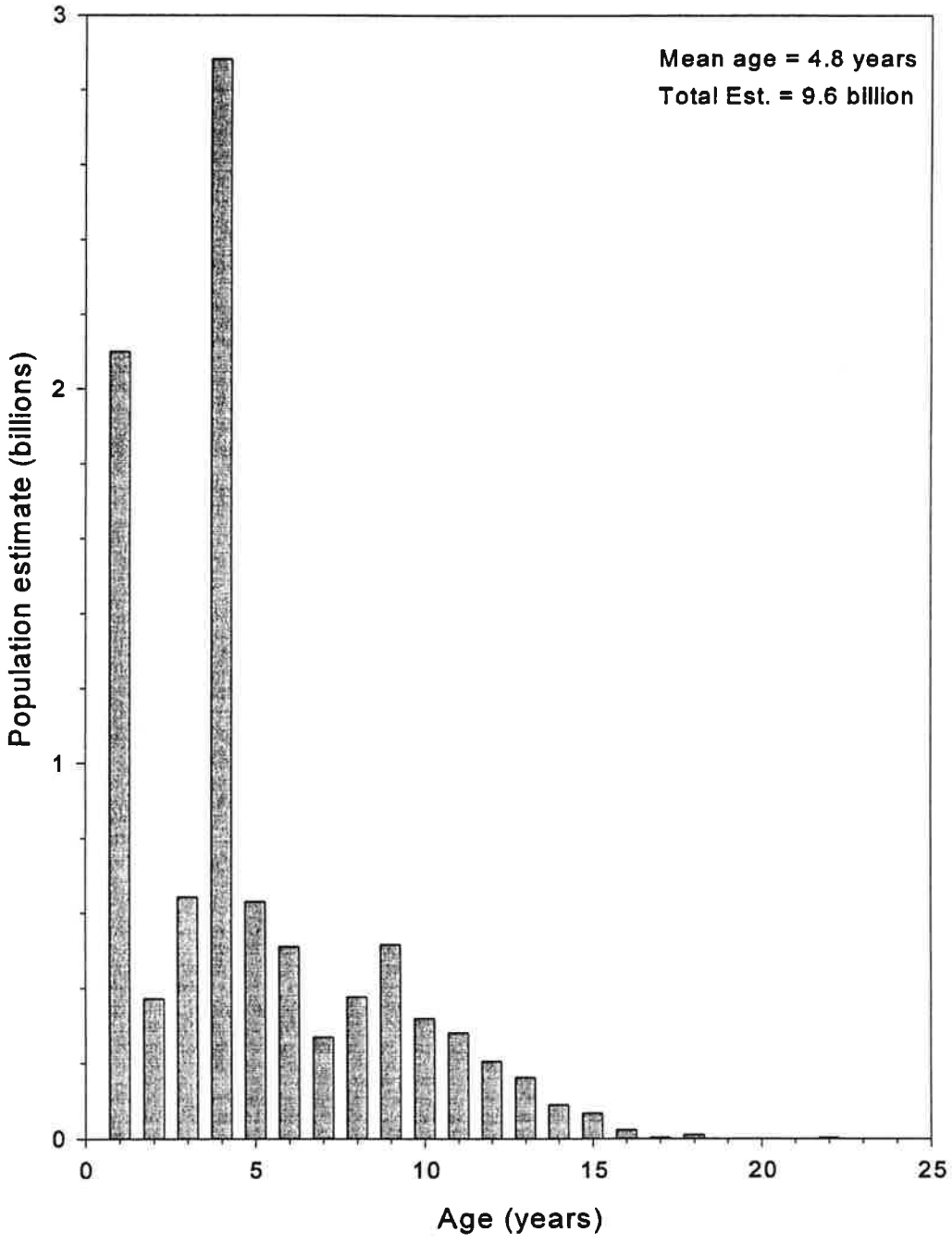

Figure 12.--Population number estimates by age for walleye pollock, 1993 eastern Bering Sea bottom trawl survey.

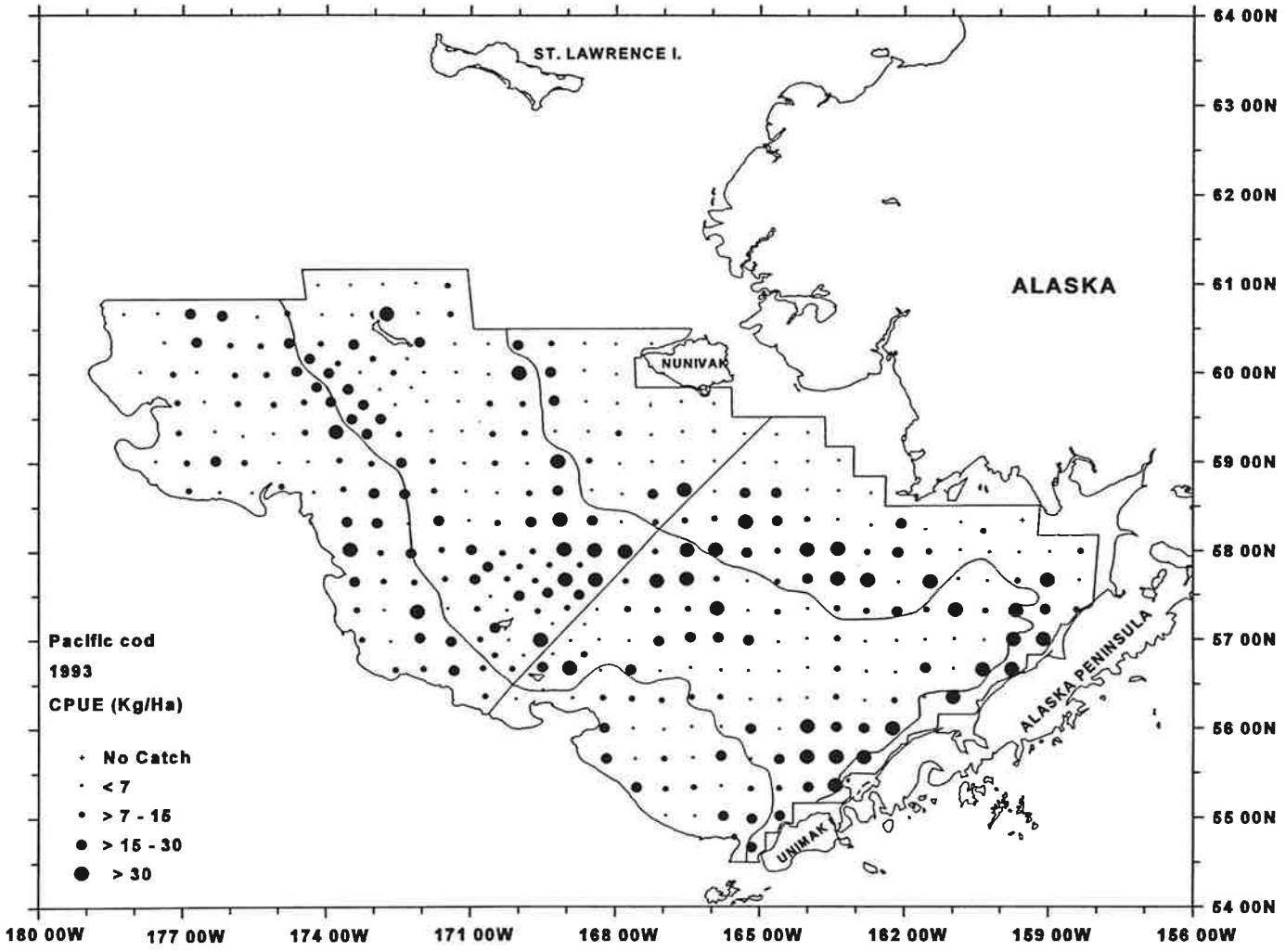

Figure 13.--Distribution and relative abundance in kg/ha of Pacific cod, 1993 eastern Bering Sea bottom trawl survey.

Table 12.--Abundance estimates and mean size of Pacific cod by subarea, 1993 eastern Bering Sea bottom trawl survey.

Subarea	Mean CPUE (kg/ha)	Estimated biomass (t)[a]	Proportion of estimated biomass	Estimated population numbers[a]	Proportion of estimated population	Mean Size Weight (kg)	Mean Size Length (cm)
1	21.52	167,548	0.243	318,179,271	0.374	0.527	30.0
2	7.11	29,169	0.042	81,807,175	0.096	0.357	25.4
3	18.38	189,869	0.275	197,977,735	0.232	0.959	37.2
4	14.34	154,573	0.224	198,261,490	0.233	0.780	36.1
5	9.65	37,438	0.054	13,497,372	0.016	2.774	57.9
6	11.84	111,937	0.162	42,140,379	0.049	2.656	56.9
All subareas combined[b]	14.90	690,535	1.000	851,863,422	1.000	0.811	34.4
95% Confidence interval		±107,673		±211,686,569			

[a]Variances of abundance estimates are given in Appendix D.
[b]Differences in sums of estimates and totals are due to rounding

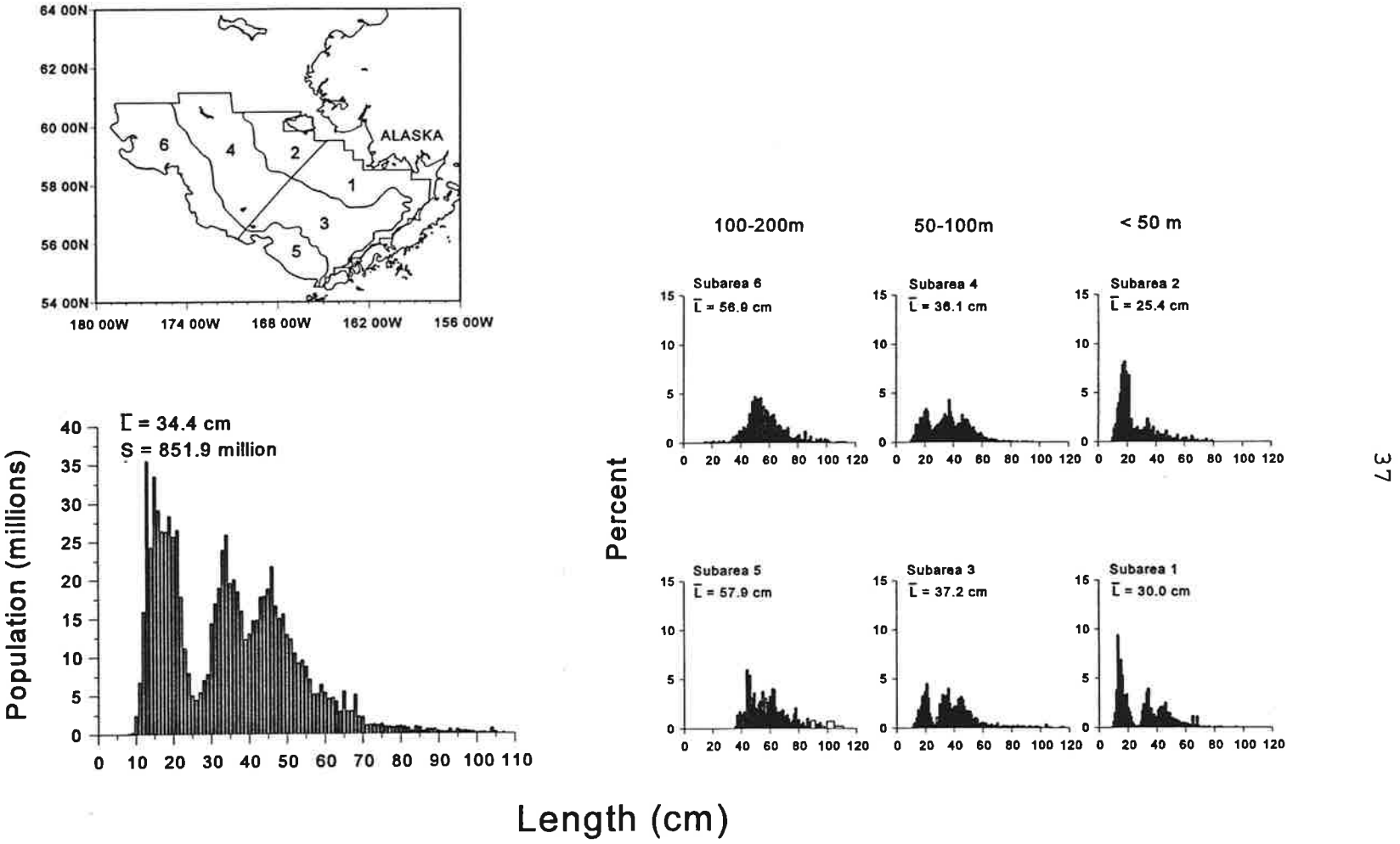

Figure 14.--Estimated relative size distribution (sexes combined) of Pacific cod in terms of population numbers, and percent for subareas 1-6, 1993 eastern Bering Sea bottom trawl survey.

Table 13.--Estimated population numbers (millions of fish) of Pacific cod by age group and subarea, 1993 eastern Bering Sea bottom trawl survey.

		DEPTH AND SUBAREA							
		100-200 m		50-100 m		<50 m			
AGE	YEAR CLASS	6	5	4	3	2	1	ALL SUBAREAS COMBINED	PROPORTION
1	1991	0.25	0.00	40.08	42.46	44.28	140.37	267.43	0.3139
2	1990	0.31	0.01	34.30	30.41	15.39	33.71	114.13	0.1340
3	1989	2.16	0.77	43.86	45.67	9.12	48.73	150.32	0.1765
4	1988	8.79	3.32	38.35	41.32	5.08	47.65	144.51	0.1696
5	1987	15.64	4.12	26.95	21.53	3.55	27.36	99.14	0.1164
6	1986	7.85	2.83	7.89	6.05	1.96	12.28	38.86	0.0456
7	1985	2.39	0.50	1.75	2.00	0.53	3.34	10.51	0.0123
8	1984	1.08	0.39	0.90	1.47	0.10	0.68	4.61	0.0054
9	1983	0.60	0.29	0.44	1.37	0.15	0.26	3.11	0.0036
10	1982	0.27	0.15	0.30	0.41	0.00	0.08	1.23	0.0014
11	1981	0.18	0.02	0.08	0.00	0.00	0.10	0.38	0.0004
12	1980	0.23	0.03	0.05	0.28	0.00	0.27	0.86	0.0010
14	1978	0.12	0.06	0.00	0.28	0.00	0.00	0.46	0.0005
Age unknown		2.27	1.02	3.30	4.73	1.64	3.35	16.32	0.0192
All Ages Combined		42.14	13.50	198.26	197.98	81.81	318.18	851.86	1.0000

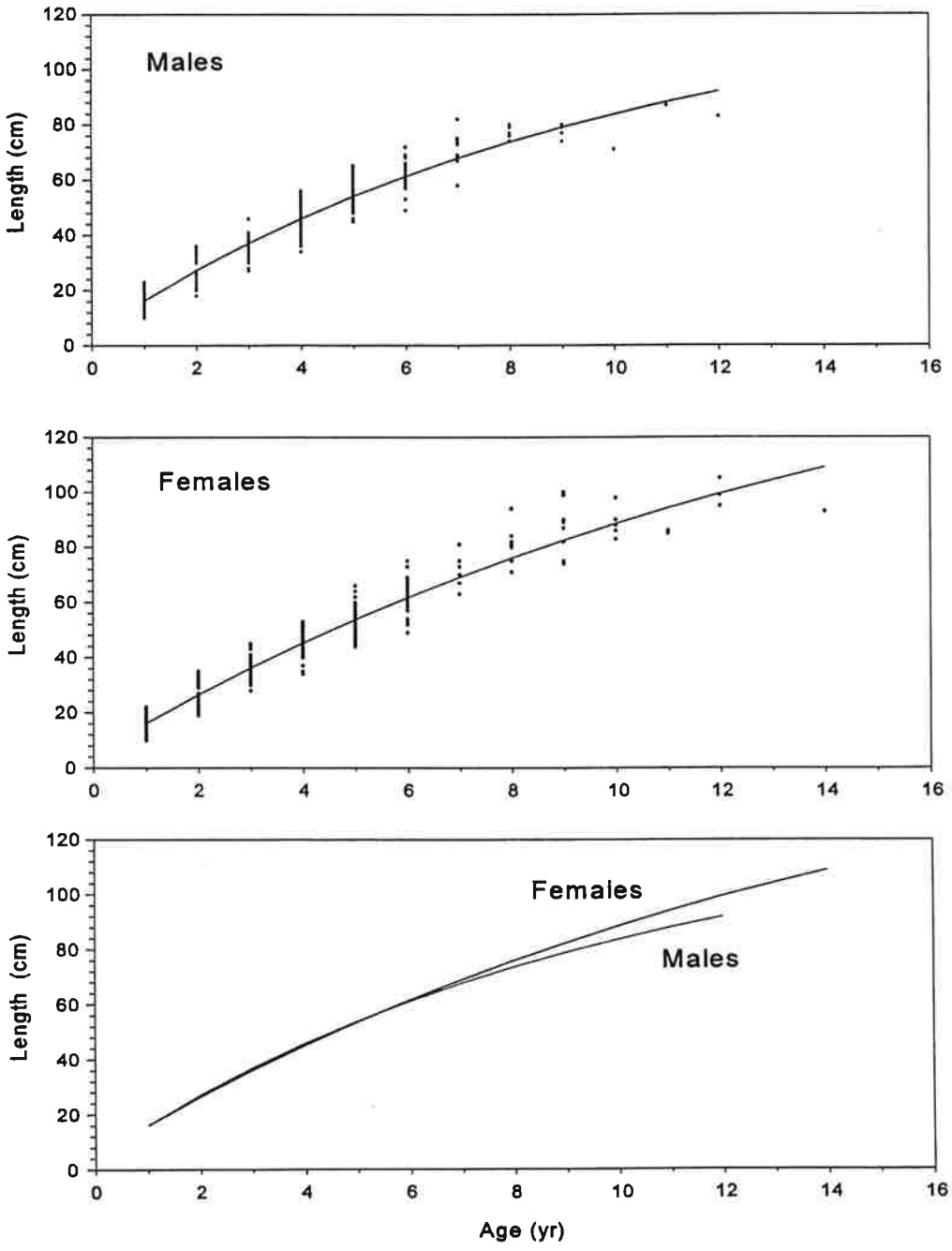

Figure 15.--Distribution of Pacific cod aged samples from the 1993 eastern Bering Sea bottom trawl survey by length for males, females, and compared with symbols showing non-linear von-Bertalanffy estimates.

Table 14.--von-Bertalanffy growth parameter estimates for Pacific cod by sex, based on otolith age reading and length data from the 1993 eastern Bering Sea bottom trawl survey.

Sex	Number of age readings	Age range (years)	Length range (cm)	Parameters L_{inf}	K	t_o
Male	295	1-12	10-87	127.5	0.10	-0.31
Female	340	1-14	10-105	174.5	0.07	-0.42

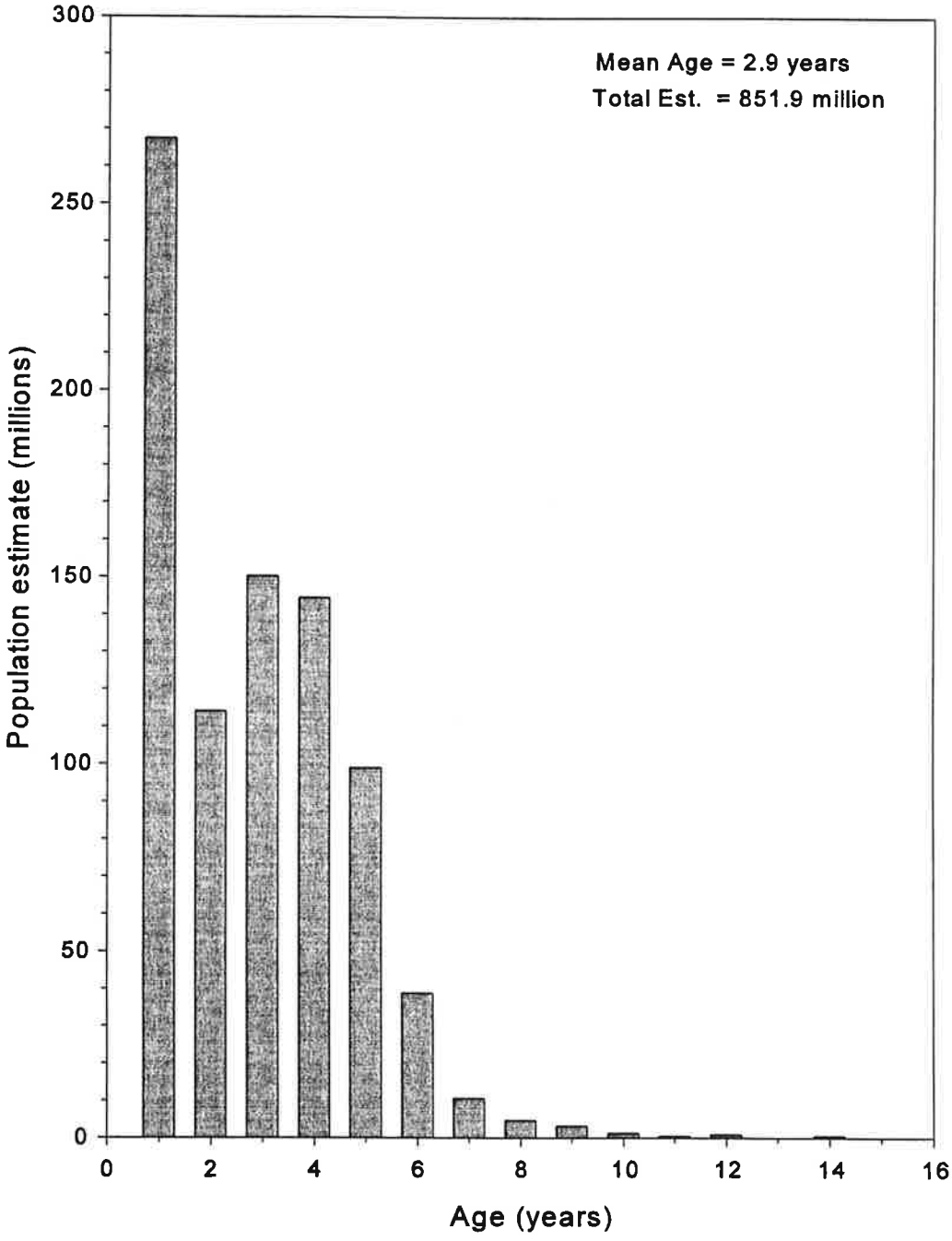

Figure 16.--Population number estimates by age for Pacific cod, 1993 eastern Bering Sea bottom trawl survey.

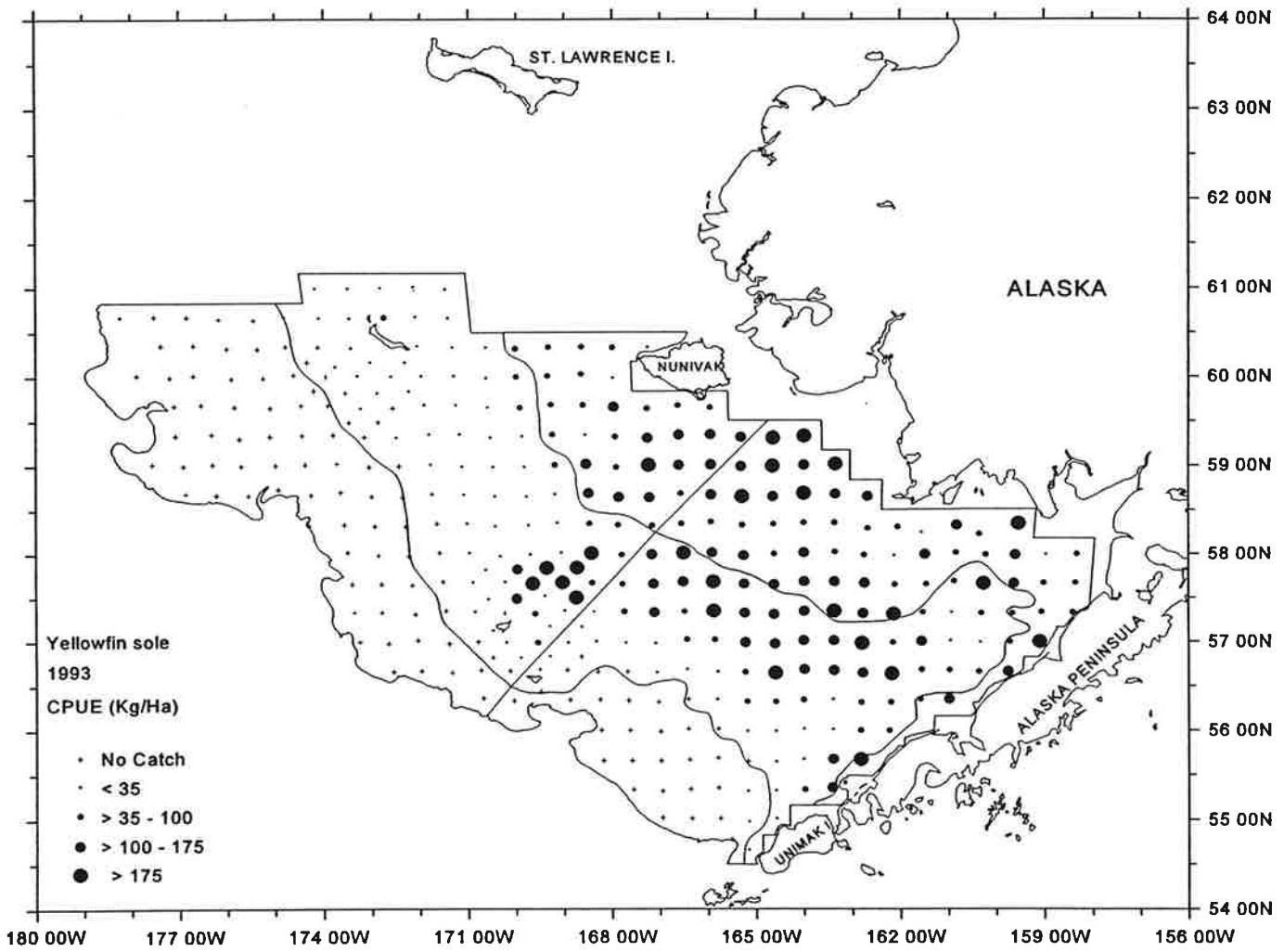

Figure 17.--Distribution and relative abundance in kg/ha of yellowfin sole, 1993 eastern Bering Sea bottom trawl survey.

Table 15.--Abundance estimates and mean size of yellowfin sole by subarea, 1993 eastern Bering Sea bottom trawl survey.

Subarea	Mean CPUE (kg/ha)	Estimated biomass (t)[a]	Proportion of estimated biomass	Estimated population numbers[a]	Proportion of estimated population	Mean Size Weight (kg)	Mean Size Length (cm)
1	130.54	1,016,562	0.412	4,722,091,680	0.471	0.215	25.3
2	84.67	347,377	0.141	1,440,560,280	0.144	0.241	25.2
3	76.63	791,534	0.321	2,987,957,574	0.298	0.265	27.6
4	28.67	309,078	0.125	877,139,251	0.087	0.352	30.0
5	0.20	791	0.000	1,807,486	0.000	0.438	32.3
6	0.01	100	0.000	134,374	0.000	0.744	27.0
All subareas combined[b]	53.21	2,465,443	1.000	10,029,690,645	1.000	0.246	26.4
95% Confidence interval		±313,899		±1,577,783,853			

[a]Variances of abundance estimates are given in Appendix D.
[b]Differences in sums of estimates and totals are due to rounding

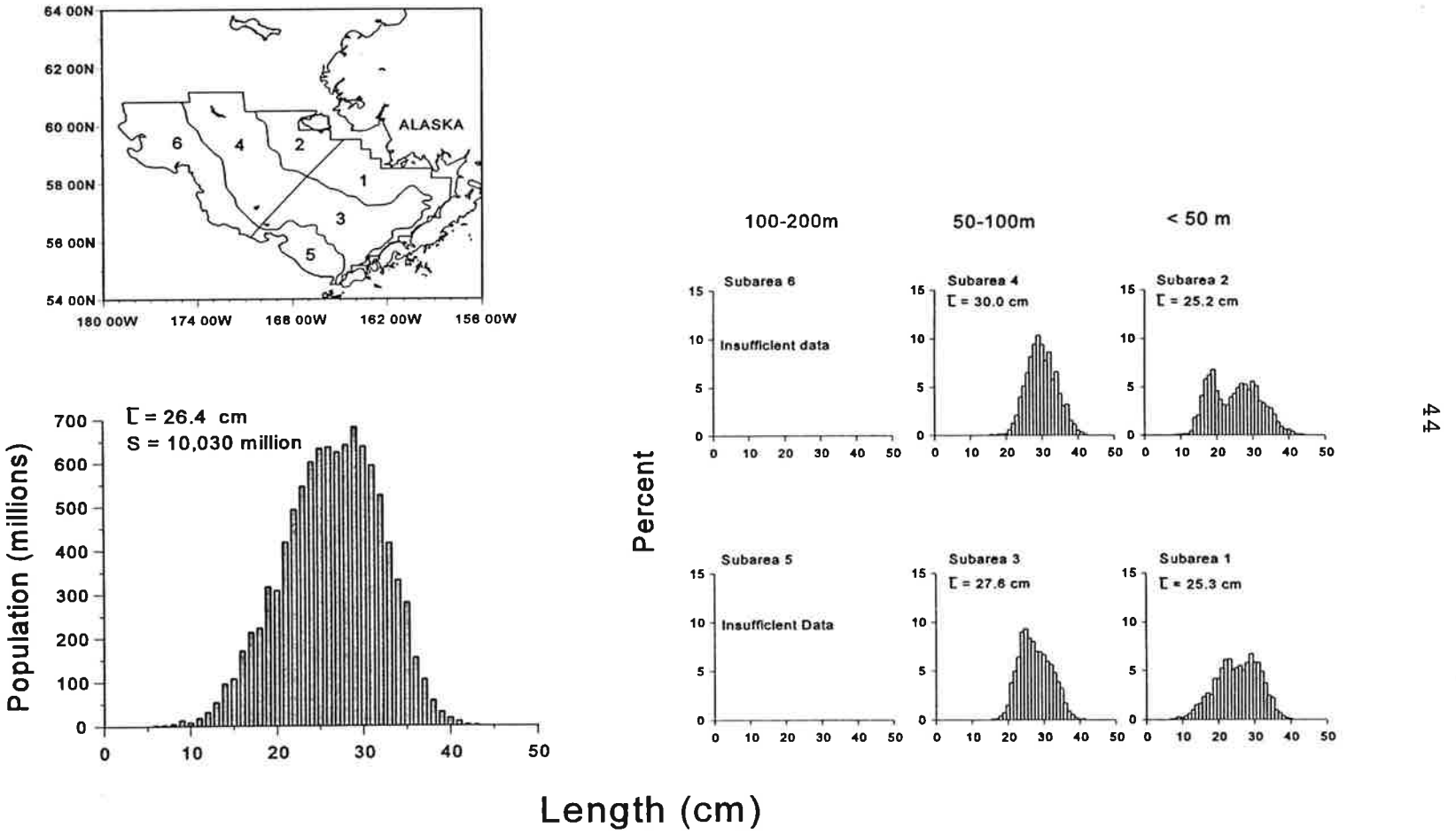

Figure 18.--Estimated relative size distribution (sexes combined) of yellowfin sole in terms of population numbers, and percent for subareas 1-6, 1993 eastern Bering Sea bottom trawl survey.

Table 16.--Estimated population numbers (millions of fish) of yellowfin sole by age group and subarea, 1993 eastern Bering Sea bottom trawl survey.

		DEPTH AND SUBAREA							
		100-200 m		50-100 m		<50 m			
AGE	YEAR CLASS	6	5	4	3	2	1	ALL SUBAREAS COMBINED	PROPORTION
3	1989	0.00	0.00	0.06	0.02	6.81	37.28	44.17	0.0044
4	1988	0.00	0.00	0.15	2.02	43.19	106.79	152.16	0.0152
5	1987	0.00	0.00	3.87	50.02	179.30	358.17	591.36	0.0590
6	1986	0.00	0.00	23.13	263.92	259.87	734.44	1,281.36	0.1278
7	1985	0.00	0.03	48.57	287.18	101.86	390.55	828.18	0.0826
8	1984	0.01	0.01	35.80	196.08	57.14	258.99	548.04	0.0546
9	1983	0.01	0.04	46.36	167.10	52.76	205.47	471.74	0.0470
10	1982	0.10	0.36	265.19	882.71	269.56	997.05	2,414.98	0.2408
11	1981	0.00	0.02	18.85	49.64	16.48	62.80	147.80	0.0147
12	1980	0.01	0.50	192.13	569.73	189.85	761.89	1,714.11	0.1709
13	1979	0.00	0.09	34.91	65.10	26.22	83.95	210.28	0.0210
14	1978	0.00	0.12	33.64	74.22	27.14	84.14	219.28	0.0219
15	1977	0.00	0.06	15.27	36.78	13.51	53.97	119.60	0.0119
16	1976	0.00	0.03	14.68	22.54	11.07	19.60	67.92	0.0068
17	1975	0.00	0.09	20.12	44.31	18.42	57.09	140.04	0.0140
18	1974	0.00	0.09	22.54	57.34	27.58	86.55	194.10	0.0194
19	1973	0.00	0.04	10.54	20.30	9.86	18.54	59.28	0.0059
20	1972	0.00	0.03	11.24	22.99	10.26	32.73	77.25	0.0077
21	1971	0.00	0.03	12.47	18.43	10.79	22.12	63.85	0.0064
22	1970	0.00	0.01	5.02	6.24	5.53	6.89	23.69	0.0024
23	1969	0.00	0.08	16.58	35.66	18.22	38.31	108.85	0.0109
24	1968	0.00	0.05	16.73	32.23	17.07	45.00	111.09	0.0111
25	1967	0.00	0.03	9.40	24.17	12.68	47.51	93.79	0.0094
26	1966	0.00	0.08	16.03	38.70	13.85	42.57	111.23	0.0111
27	1965	0.00	0.00	1.11	1.33	2.20	1.75	6.39	0.0006
28	1964	0.00	0.01	1.86	6.15	3.41	12.39	23.81	0.0024
30	1962	0.00	0.00	0.13	1.58	0.98	5.40	8.09	0.0008
Age unknown		0.00	0.00	0.74	11.44	34.93	150.15	197.26	0.0197
All Ages Combined		0.13	1.81	877.14	2,987.96	1,440.56	4,722.09	10,029.69	1.0000

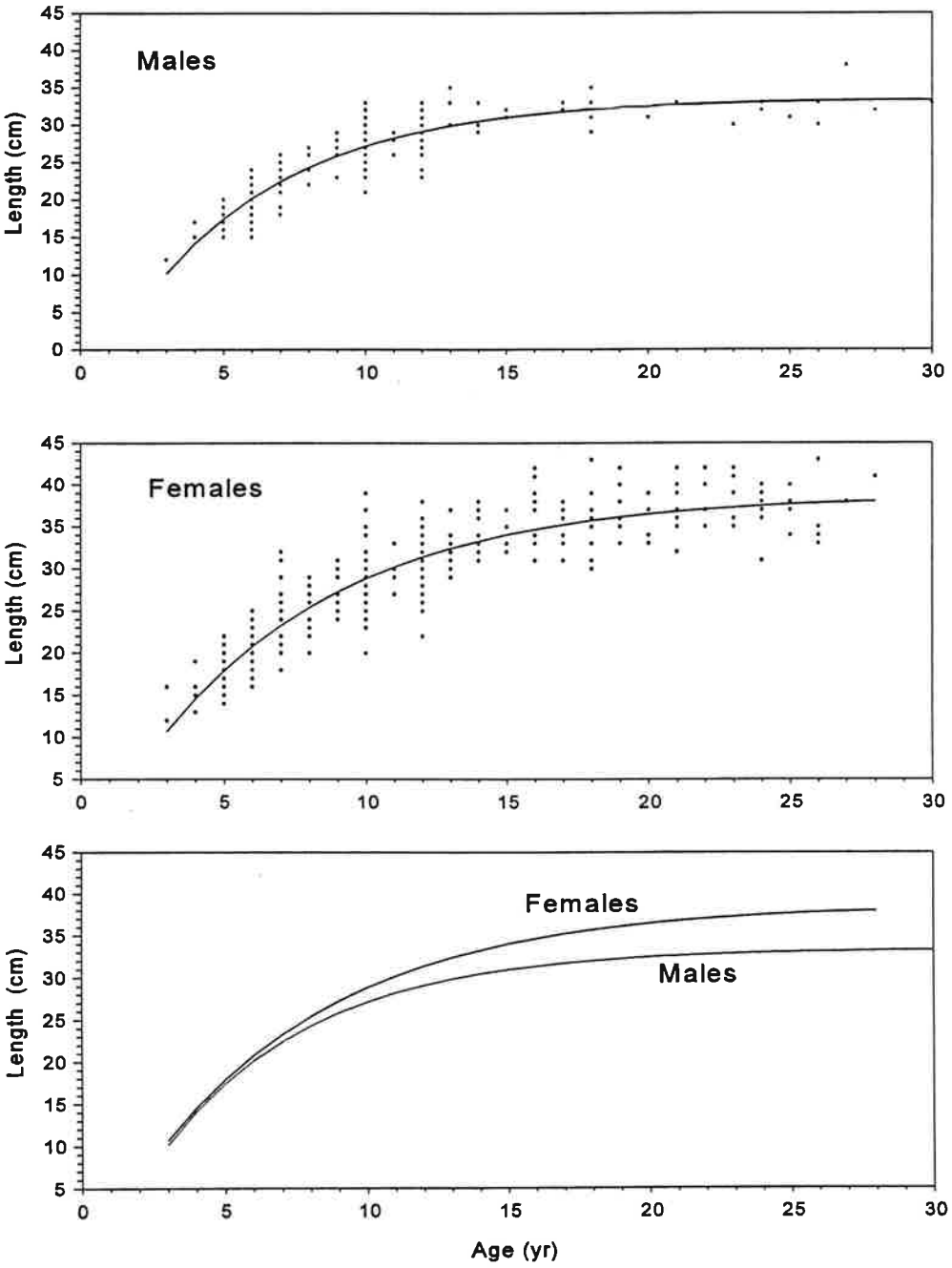

Figure 19.--Distribution of yellowfin sole aged samples from the 1993 eastern Bering Sea bottom trawl survey by length for males, females, and compared with non-linear von-Bertalanffy estimates.

Table 17.--von-Bertalanffy growth parameter estimates for yellowfin sole by sex, based on otolith age reading and length data from the 1993 eastern Bering Sea bottom trawl survey.

Sex	Number of age readings	Age range (years)	Length range (cm)	Parameters L_{inf}	K	t_o
Male	192	3-30	12-38	33.5	0.19	1.05
Female	357	3-28	12-43	38.7	0.15	0.81

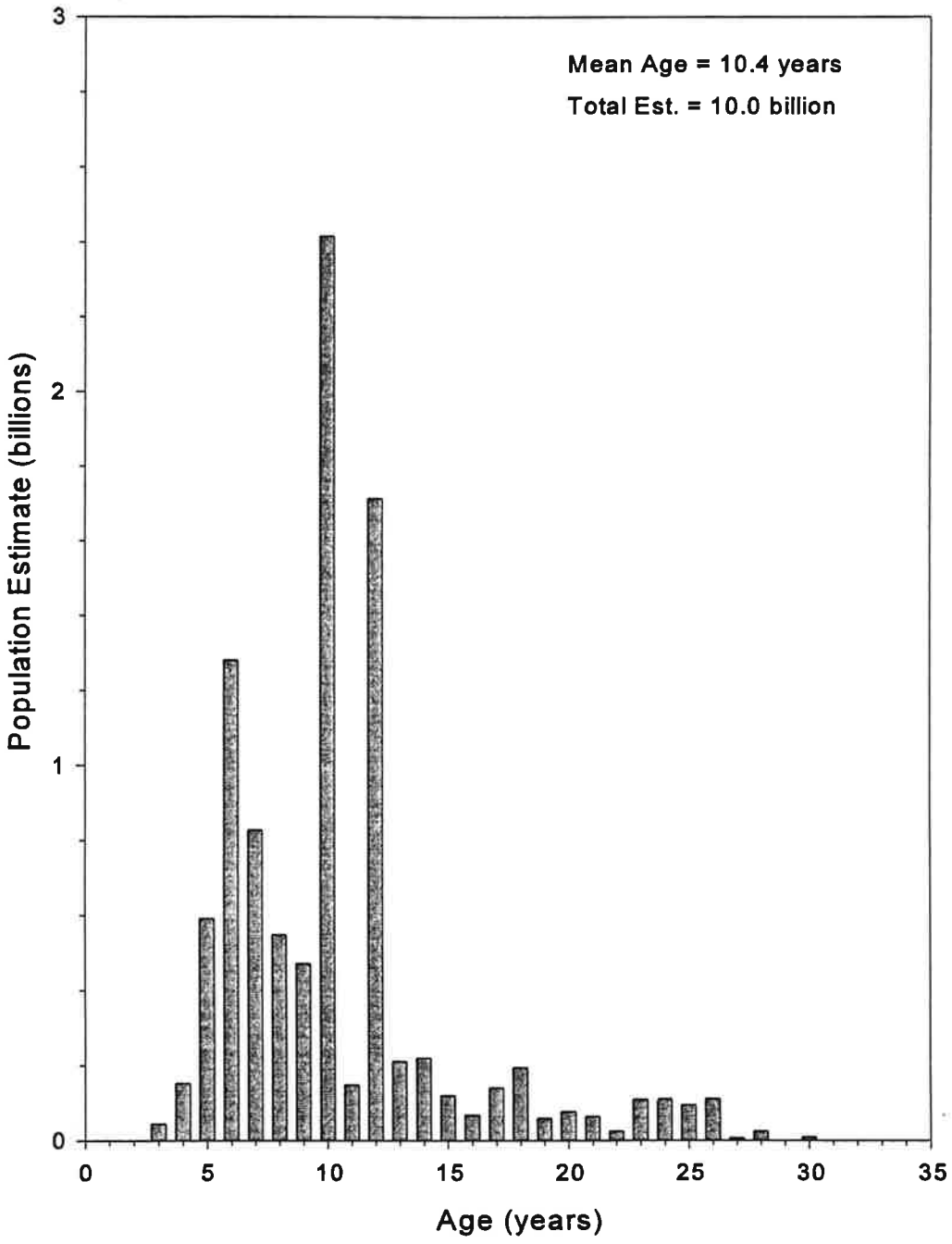

Figure 20.--Population number estimates by age for yellowfin sole, 1993 eastern Bering Sea bottom trawl survey.

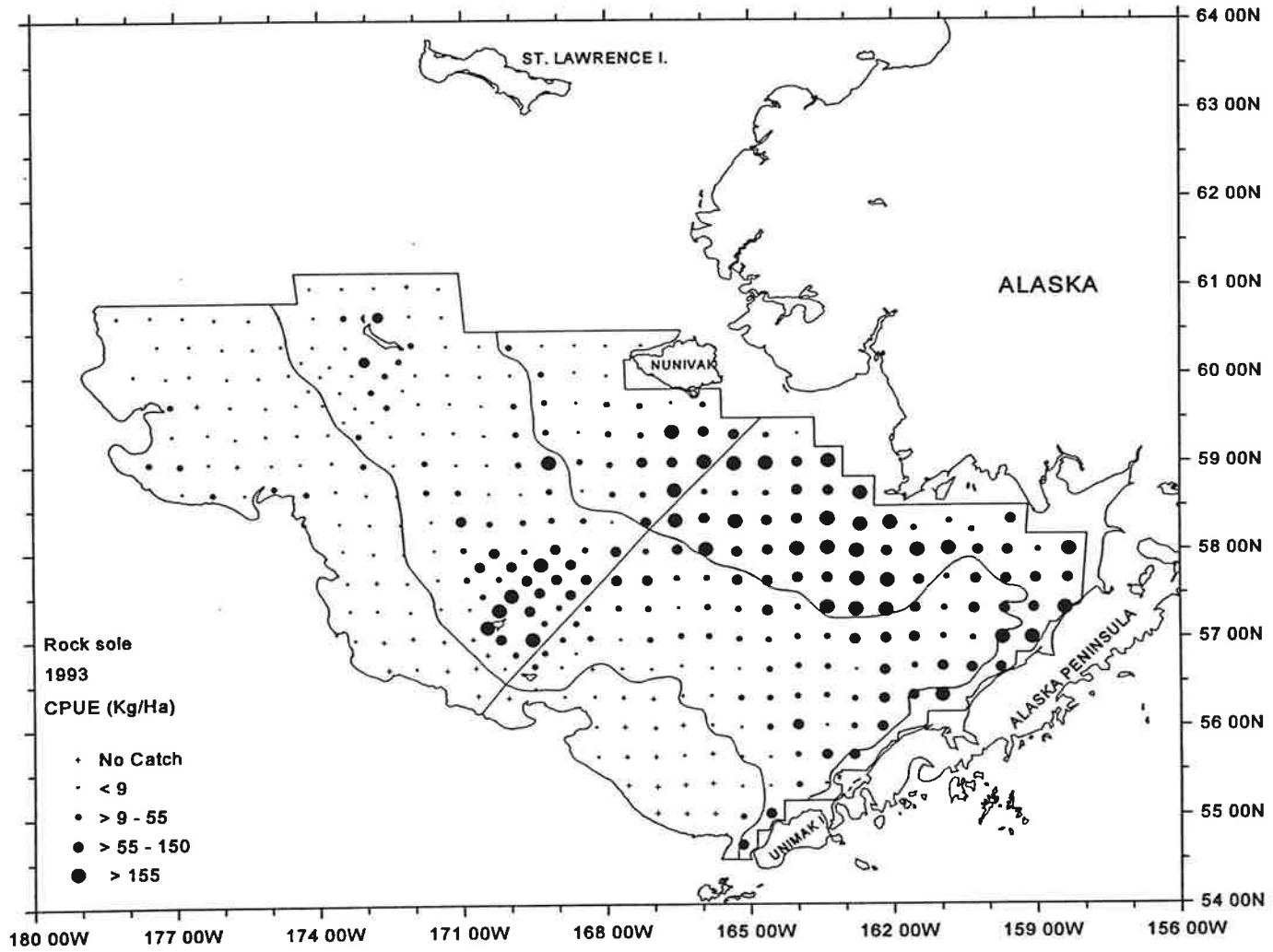

Figure 21.--Distribution and relative abundance in kg/ha of rock sole, 1993 eastern Bering Sea bottom trawl survey.

Table 18.--Abundance estimates and mean size of rock sole by subarea, 1993 eastern Bering Sea bottom trawl survey.

Subarea	Mean CPUE (kg/ha)	Estimated biomass (t)[a]	Proportion of estimated biomass	Estimated population numbers[a]	Proportion of estimated population	Mean Size Weight (kg)	Mean Size Length (cm)
1	151.20	1,177,421	0.554	8,205,637,449	0.629	0.143	21.8
2	48.42	198,650	0.094	1,098,565,548	0.084	0.181	22.5
3	33.58	346,904	0.163	2,193,117,177	0.168	0.158	23.2
4	33.51	361,362	0.170	1,456,042,144	0.112	0.248	25.9
5	0.60	2,332	0.001	7,868,953	0.001	0.296	27.9
6	3.90	36,866	0.017	81,098,954	0.006	0.455	32.2
All subareas combined[b]	45.83	2,123,534	1.000	13,042,330,226	1.000	0.163	22.6
95% Confidence interval		±265,191		±2,108,116,414			

[a]Variances of abundance estimates are given in Appendix D.
[b]Differences in sums of estimates and totals are due to rounding

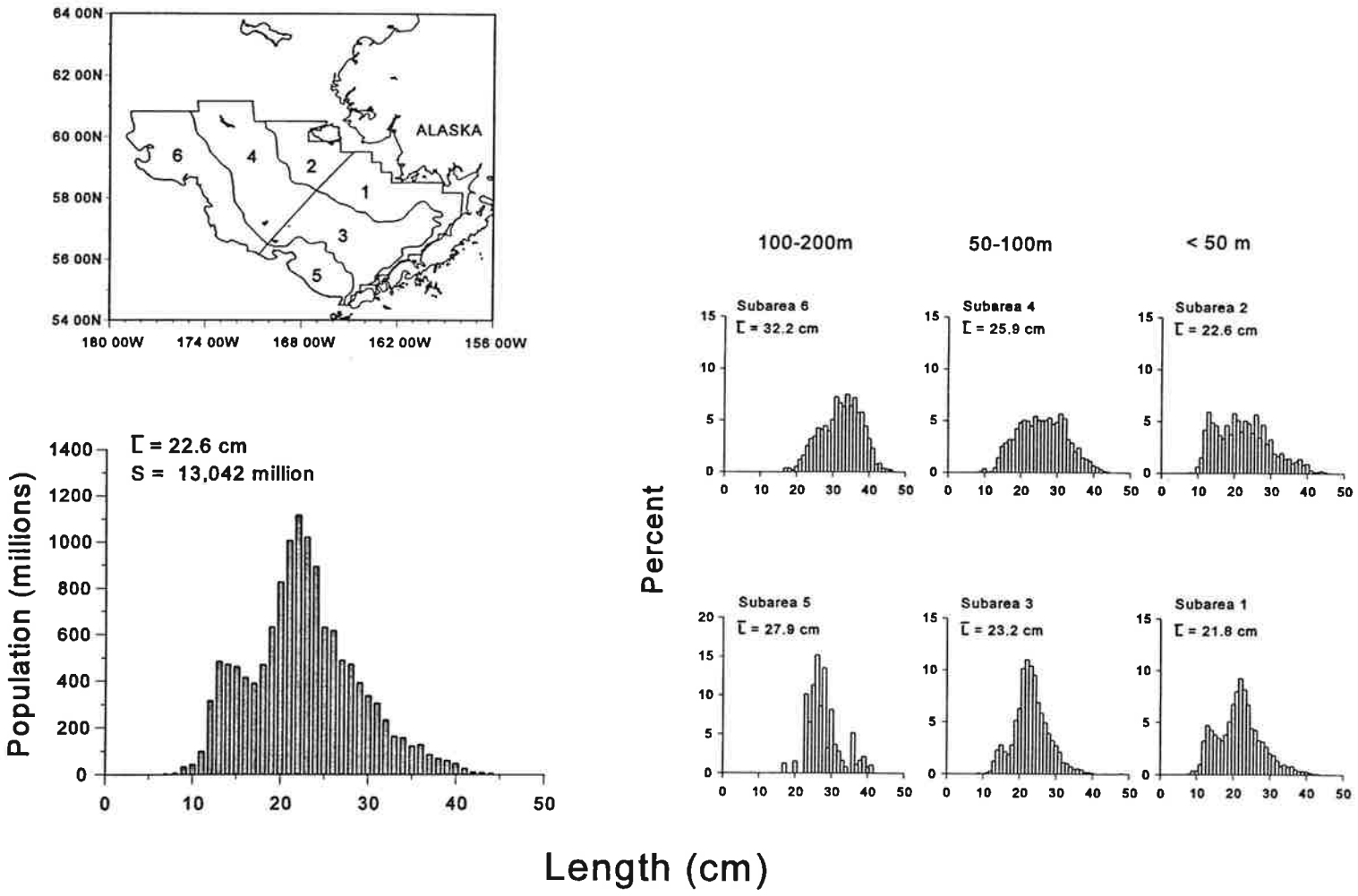

Figure 22.--Estimated relative size distribution (sexes combined) of rock sole in terms of population numbers, and percent for subareas 1-6, 1993 eastern Bering Sea bottom trawl survey.

Table 19.--Estimated population numbers (millions of fish) of rock sole by age group and subarea, 1993 eastern Bering Sea bottom trawl survey.

		DEPTH AND SUBAREA							
		100-200 m		50-100 m		<50 m			
AGE	YEAR CLASS	6	5	4	3	2	1	ALL SUBAREAS COMBINED	PROPORTION
2	1990	0.00	0.00	4.41	1.23	3.83	36.05	45.52	0.0035
3	1989	0.00	0.00	29.11	59.89	134.95	774.76	998.71	0.0766
4	1988	0.12	0.02	96.38	149.64	148.02	996.05	1,390.23	0.1066
5	1987	0.98	0.20	120.16	196.22	101.74	836.42	1,255.72	0.0963
6	1986	5.60	1.02	313.18	811.00	233.50	2,609.62	3,973.90	0.3047
7	1985	10.09	2.48	245.48	469.86	169.76	1,292.32	2,189.99	0.1679
8	1984	6.44	1.21	131.93	206.48	83.12	595.21	1,024.39	0.0785
9	1983	11.51	1.24	191.25	164.99	86.27	507.54	962.80	0.0738
10	1982	10.97	0.65	128.18	70.90	54.12	277.69	542.51	0.0416
11	1981	7.79	0.31	49.21	20.93	18.15	61.76	158.16	0.0121
12	1980	7.46	0.22	39.73	12.62	21.40	68.31	149.74	0.0115
13	1979	8.06	0.29	43.86	11.50	15.57	61.58	140.86	0.0108
14	1978	4.94	0.15	27.43	10.55	13.42	40.88	97.36	0.0075
15	1977	3.49	0.07	14.94	4.27	8.51	17.04	48.32	0.0037
16	1976	0.62	0.02	2.17	0.39	2.47	5.25	10.92	0.0008
19	1973	0.30	0.00	2.35	0.20	0.56	1.78	5.20	0.0004
21	1971	1.19	0.00	2.17	0.35	0.95	0.28	4.93	0.0004
23	1969	0.30	0.00	2.35	0.20	0.56	1.78	5.20	0.0004
Age unknown		1.23	0.00	11.75	1.89	1.68	21.33	37.88	0.0029
All Ages Combined		81.10	7.87	1,456.04	2,193.12	1,098.57	8,205.64	13,042.33	1.0000

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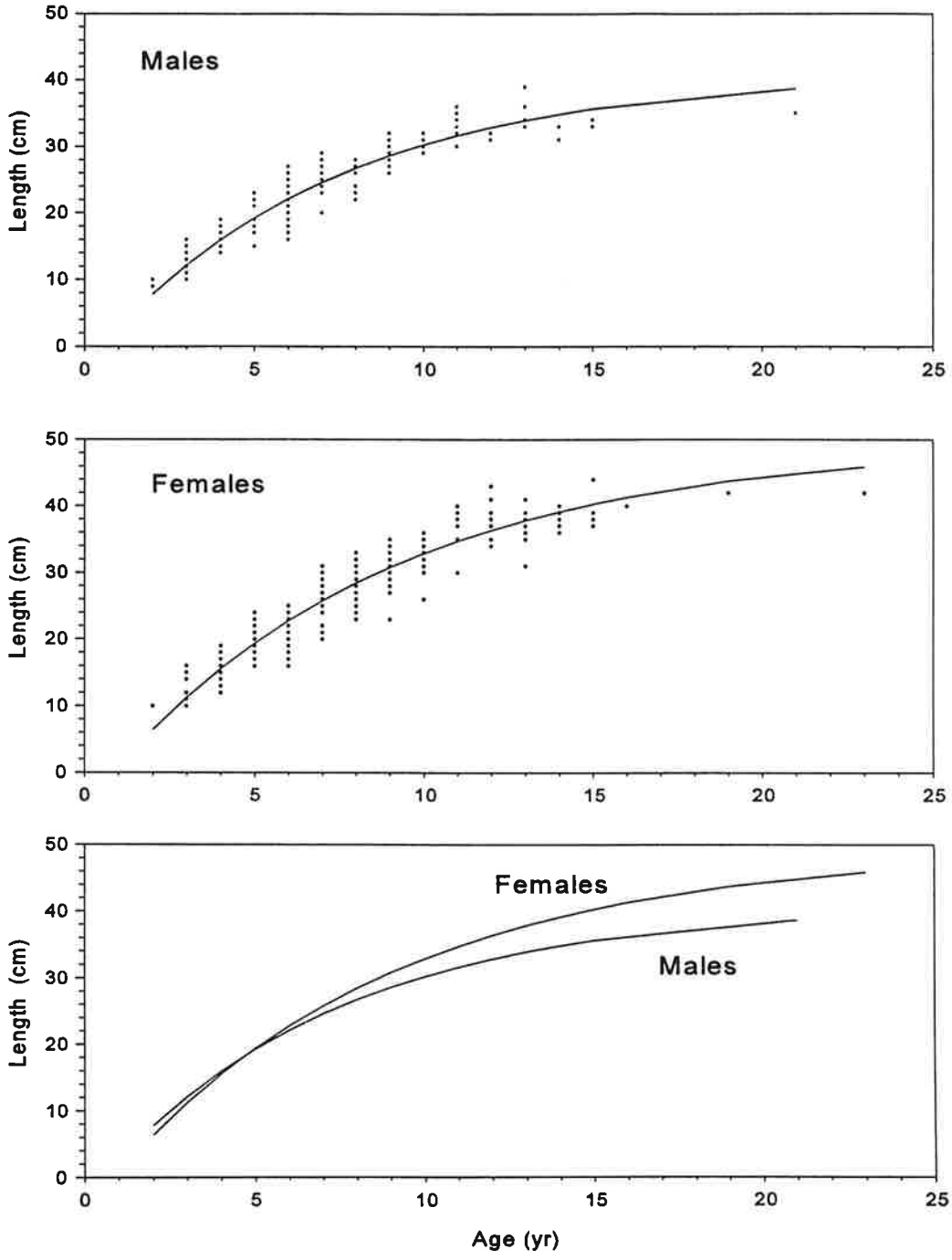

Figure 23.--Distribution of rock sole aged samples from the 1993 eastern Bering Sea bottom trawl survey by length for males, females, and compared showing non-linear von-Bertalanffy estimates.

Table 20.--von-Bertalanffy growth parameter estimates for rock sole by sex, based on otolith age reading and length data from the 1993 eastern Bering Sea bottom trawl survey.

Sex	Number of age readings	Age range (years)	Length range (cm)	Parameters L_{inf}	K	t_o
Male	195	2-21	9-39	41.0	0.14	0.48
Female	248	2-23	10-44	49.3	0.12	0.83

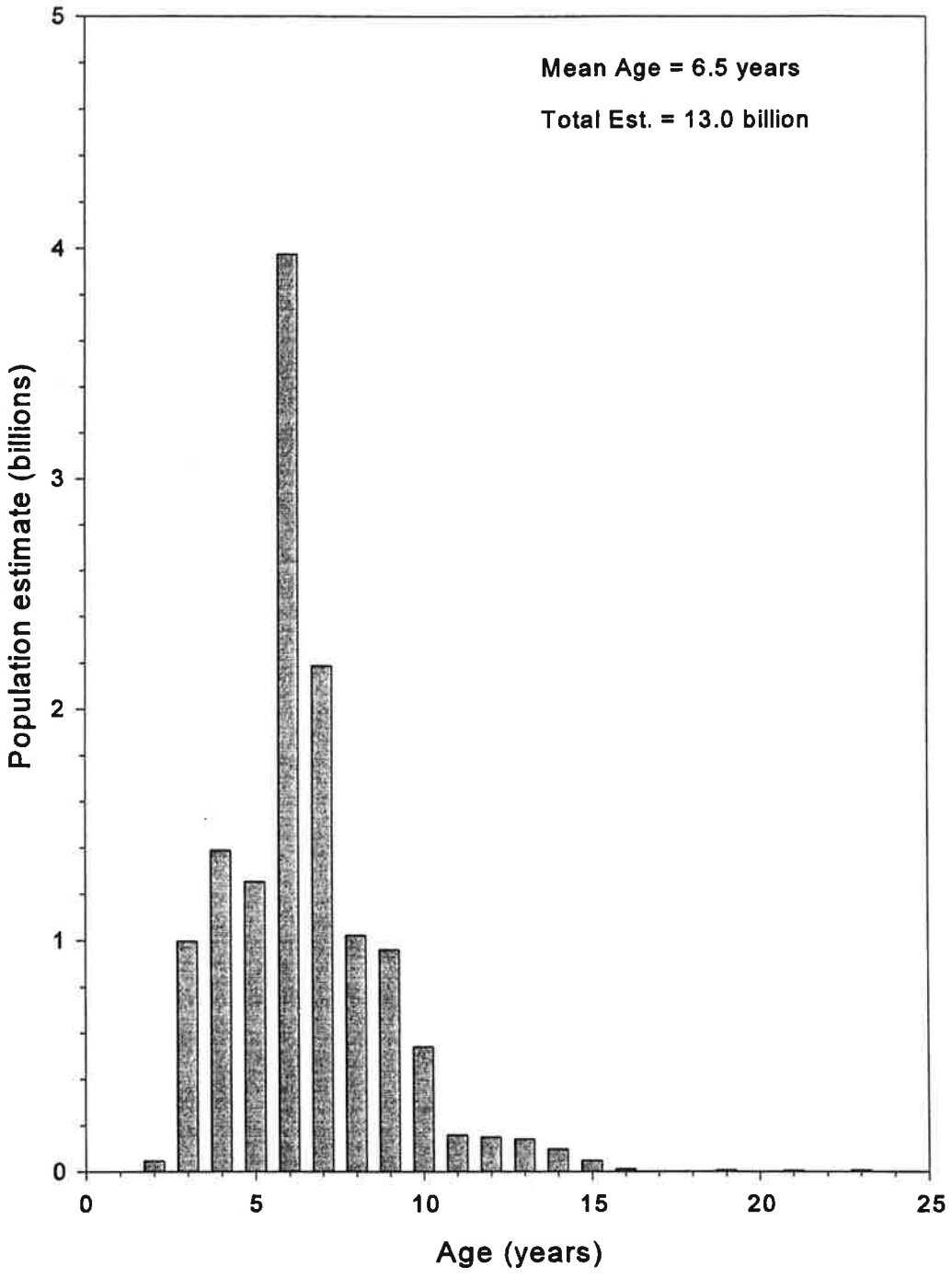

Figure 24.--Population number estimates by age for rock sole, 1993 eastern Bering Sea bottom trawl survey.

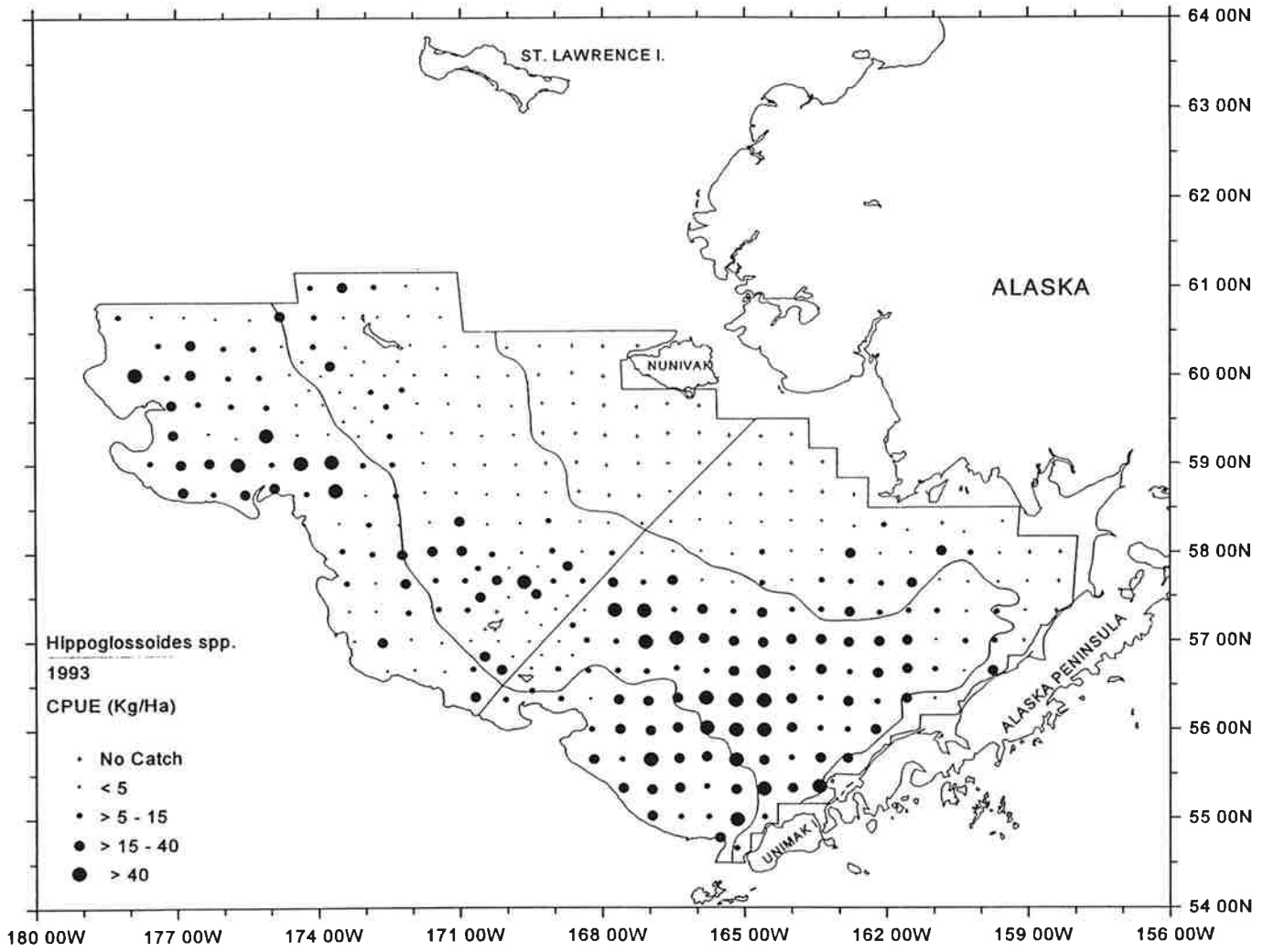

Figure 25.--Distribution and relative abundance in kg/ha of Hippoglossoides spp., 1993 eastern Bering Sea bottom trawl survey.

Table 21.--Abundance estimates and mean size of Hippoglossoides spp. by subarea, 1993 eastern Bering Sea bottom trawl survey.

Subarea	Mean CPUE (kg/ha)	Estimated biomass (t)[a]	Proportion of estimated biomass	Estimated population numbers[a]	Proportion of estimated population	Mean Size Weight (kg)	Mean Size Length (cm)
1	4.86	37,882	0.062	89,948,801	0.039	0.421	33.3
2	0.05	225	0.000	1,000,946	0.000	0.225	30.3
3	25.84	266,929	0.437	790,903,192	0.344	0.337	31.8
4	6.27	67,636	0.111	228,415,645	0.099	0.296	28.3
5	22.50	87,262	0.143	537,709,645	0.234	0.162	25.2
6	15.90	150,325	0.246	651,894,048	0.283	0.231	26.0
All subareas combined[b]	13.17	610,259	1.000	2,299,872,277	1.000	0.265	28.3
95% Confidence interval		±86,032		±319,707,063			

[a]Variances of abundance estimates are given in Appendix D.
[b]Differences in sums of estimates and totals are due to rounding

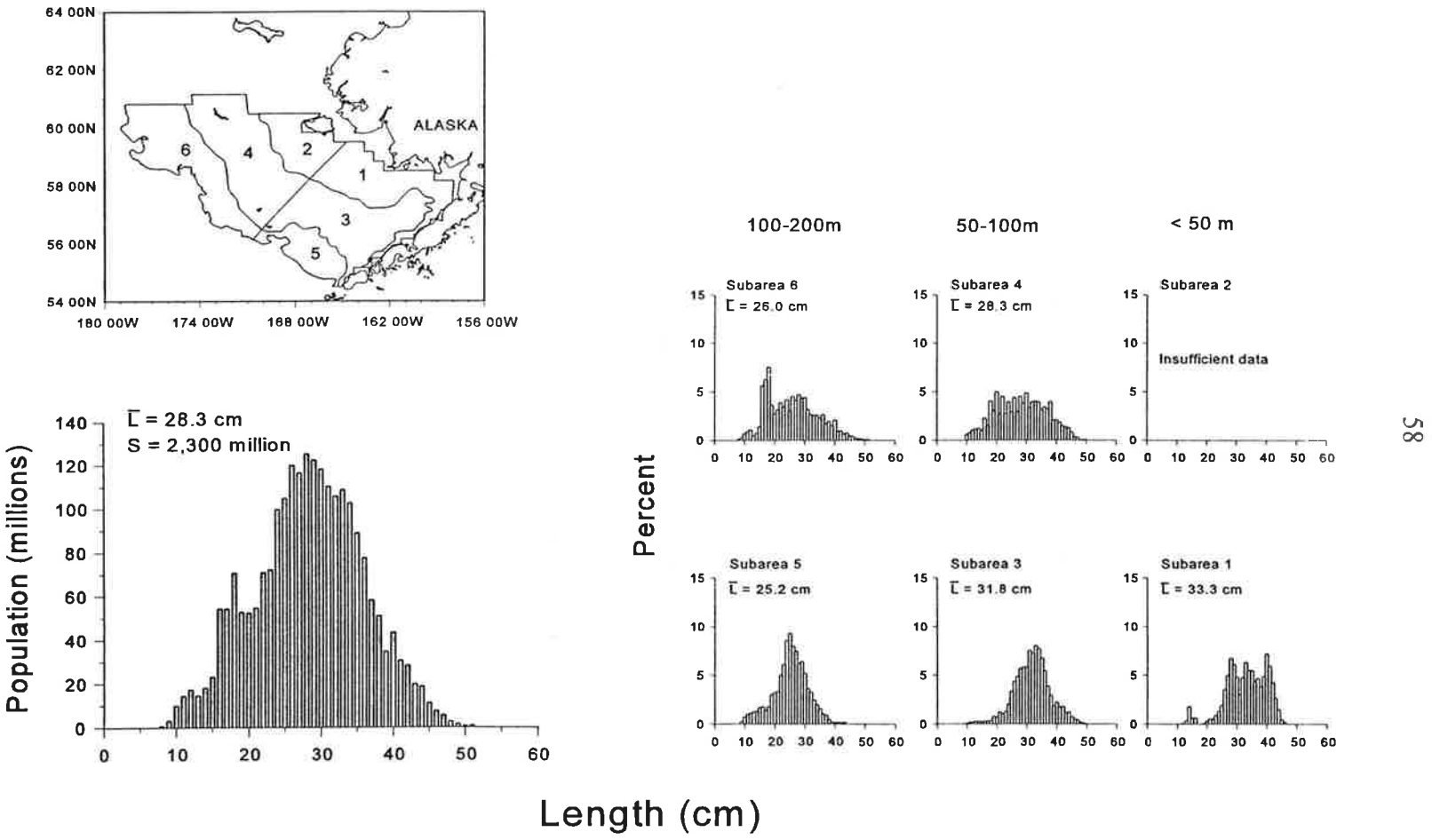

Figure 26.--Estimated relative size distribution (sexes combined) of Hippoglossoides spp. in terms of population numbers, and percent for subareas 1-6, 1993 eastern Bering Sea bottom trawl survey.

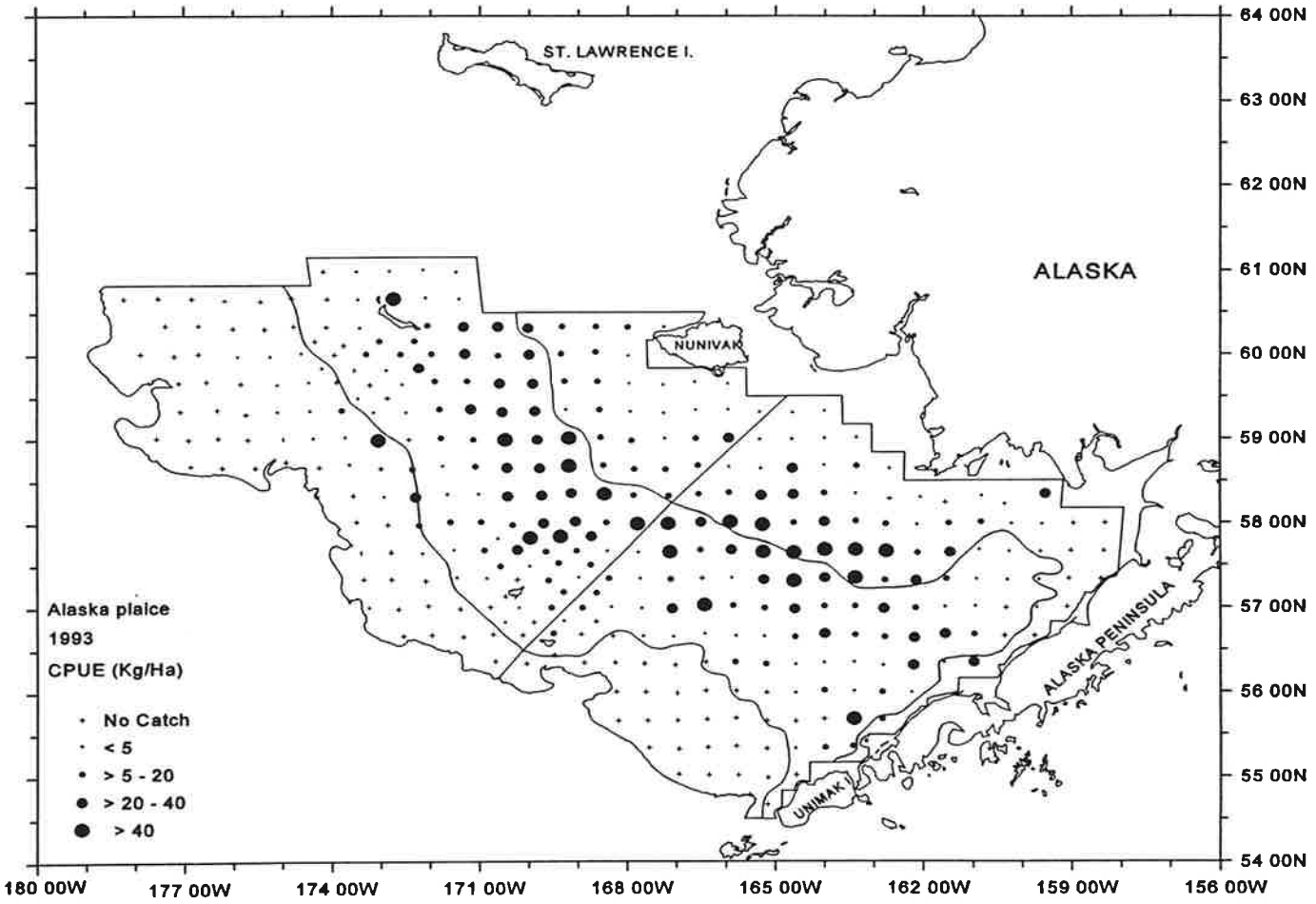

Figure 27.--Distribution and relative abundance in kg/ha of Alaska plaice, 1993 eastern Bering Sea bottom trawl survey.

Table 22.--Abundance estimates and mean size of Alaska plaice by subarea, 1993 eastern Bering Sea bottom trawl survey.

Subarea	Mean CPUE (kg/ha)	Estimated biomass (t)[a]	Proportion of estimated biomass	Estimated population numbers[a]	Proportion of estimated population	Mean Size Weight (kg)	Mean Size Length (cm)
1	15.74	122,568	0.238	221,756,664	0.282	0.553	33.2
2	9.10	37,335	0.072	90,722,904	0.115	0.412	30.4
3	13.57	140,207	0.272	200,381,303	0.255	0.700	36.8
4	18.25	196,760	0.382	262,935,853	0.334	0.748	37.2
5	0.00	0	0.000	0	0.000	0.000	0.0
6	1.94	18,320	0.036	10,747,829	0.014	1.705	48.0
All subareas combined[b]	11.12	515,191	1.000	786,544,554	1.000	0.655	35.3
95% Confidence interval		±100,072		±159,283,770			

[a]Variances of abundance estimates are given in Appendix D.
[b]Differences in sums of estimates and totals are due to rounding

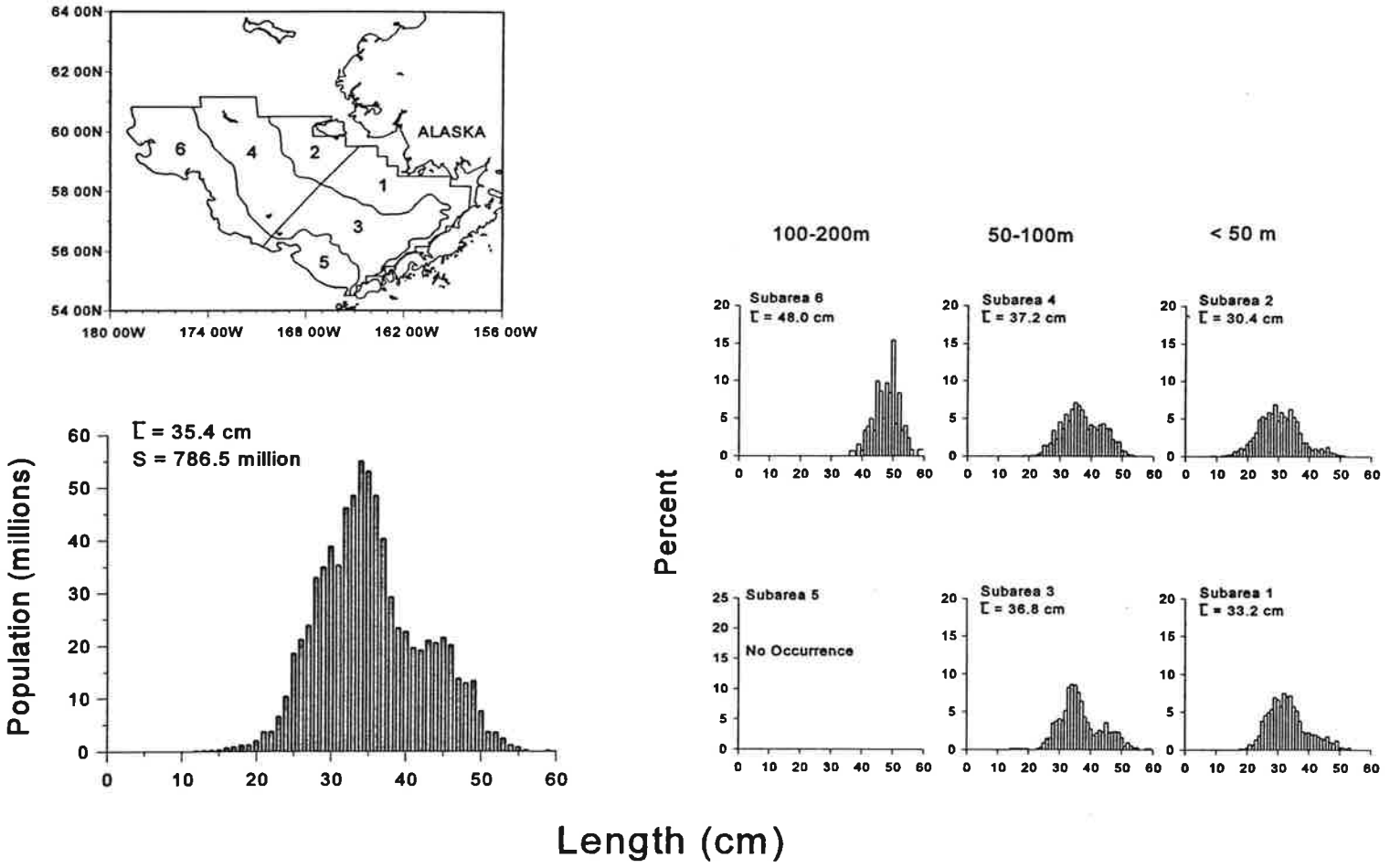

Figure 28.--Estimated relative size distribution (sexes combined) of Alaska plaice in terms of population numbers and percent for subareas 1-6, 1993 eastern Bering Sea bottom trawl survey.

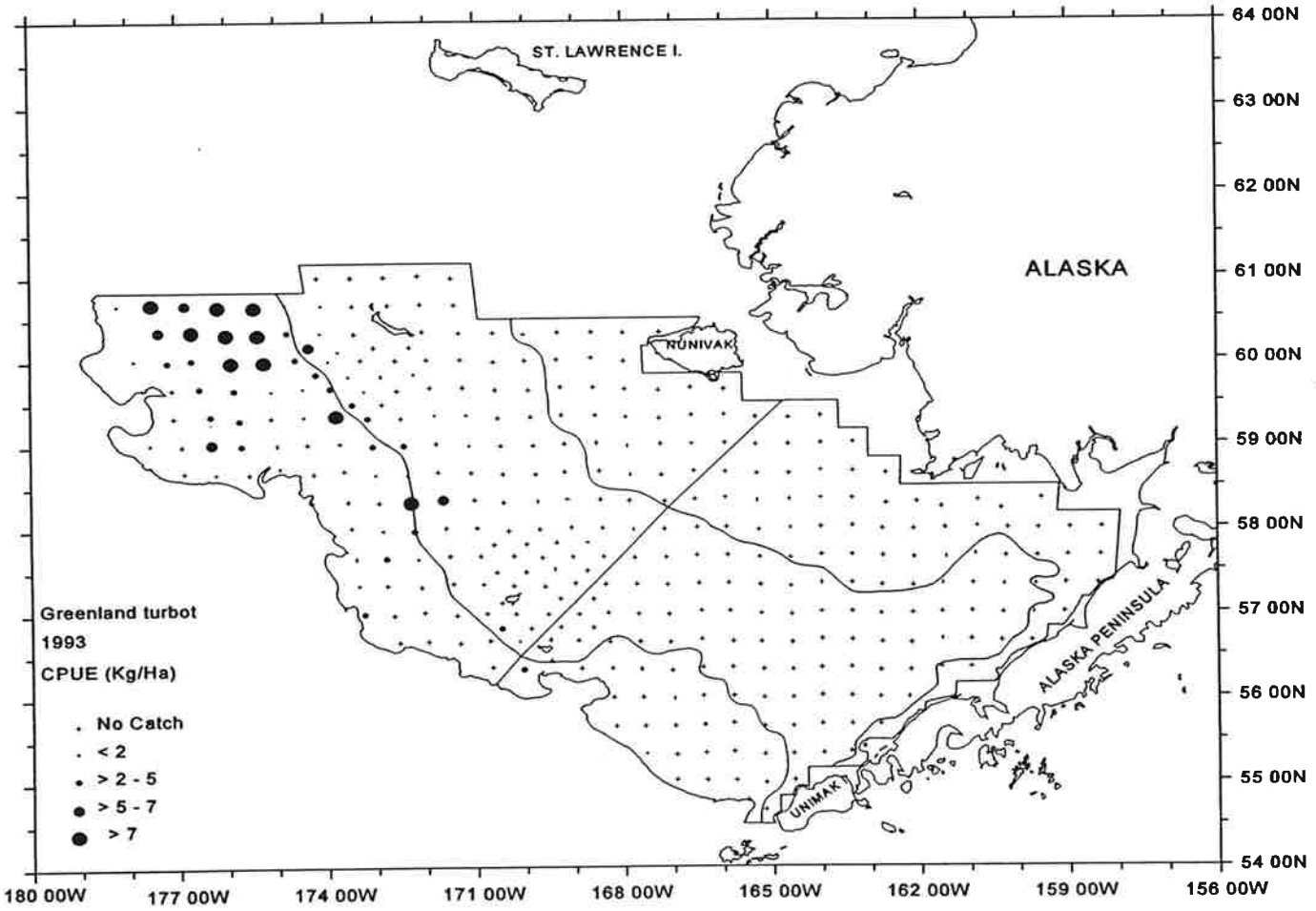

Figure 29.--Distribution and relative abundance in kg/ha of Greenland turbot, 1993 eastern Bering Sea bottom trawl survey.

Table 23.--Abundance estimates and mean size of Greenland turbot by subarea, 1993 eastern Bering Sea bottom trawl survey.

Subarea	Mean CPUE (kg/ha)	Estimated biomass (t)[a]	Proportion of estimated biomass	Estimated population numbers[a]	Proportion of estimated population	Mean Size Weight (kg)	Mean Size Length (cm)
1	0.00	0	0.000	0	0.000	0.000	0.0
2	0.00	0	0.000	0	0.000	0.000	0.0
3	0.00	0	0.000	0	0.000	0.000	0.0
4	0.31	3,356	0.110	2,734,688	0.146	1.227	40.0
5	0.20	769	0.025	133,916	0.007	5.742	82.6
6	2.78	26,273	0.864	15,923,782	0.847	1.650	46.8
All subareas combined[b]	0.66	30,399	1.000	18,792,386	1.000	1.618	46.0
95% Confidence interval		±9,640		±6,173,407			

[a]Variances of abundance estimates are given in Appendix D.
[b]Differences in sums of estimates and totals are due to rounding

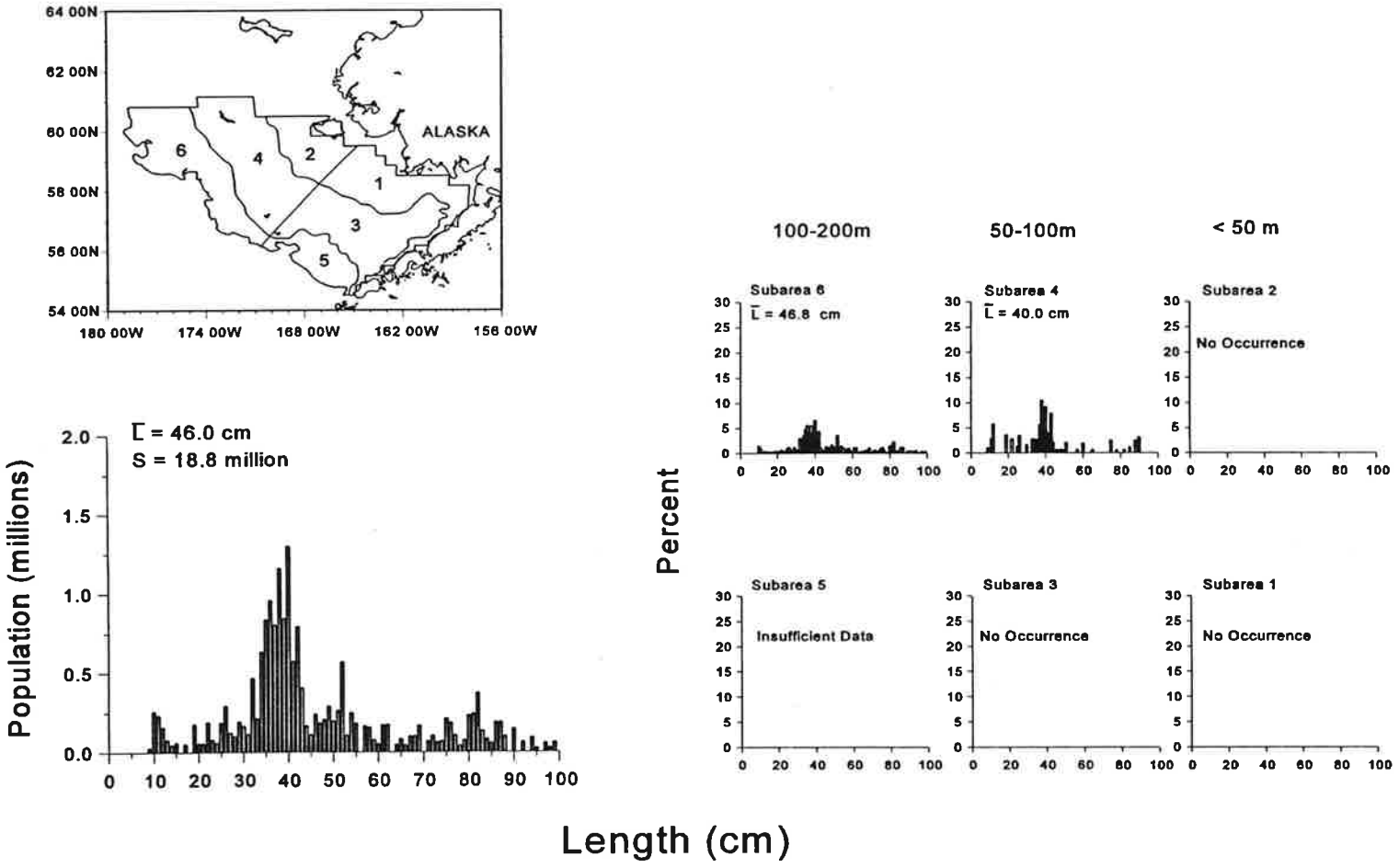

Figure 30.--Estimated relative size distribution (sexes combined) of Greenland turbot in terms of population numbers and percent for subareas 1-6, 1993 eastern Bering Sea bottom trawl survey.

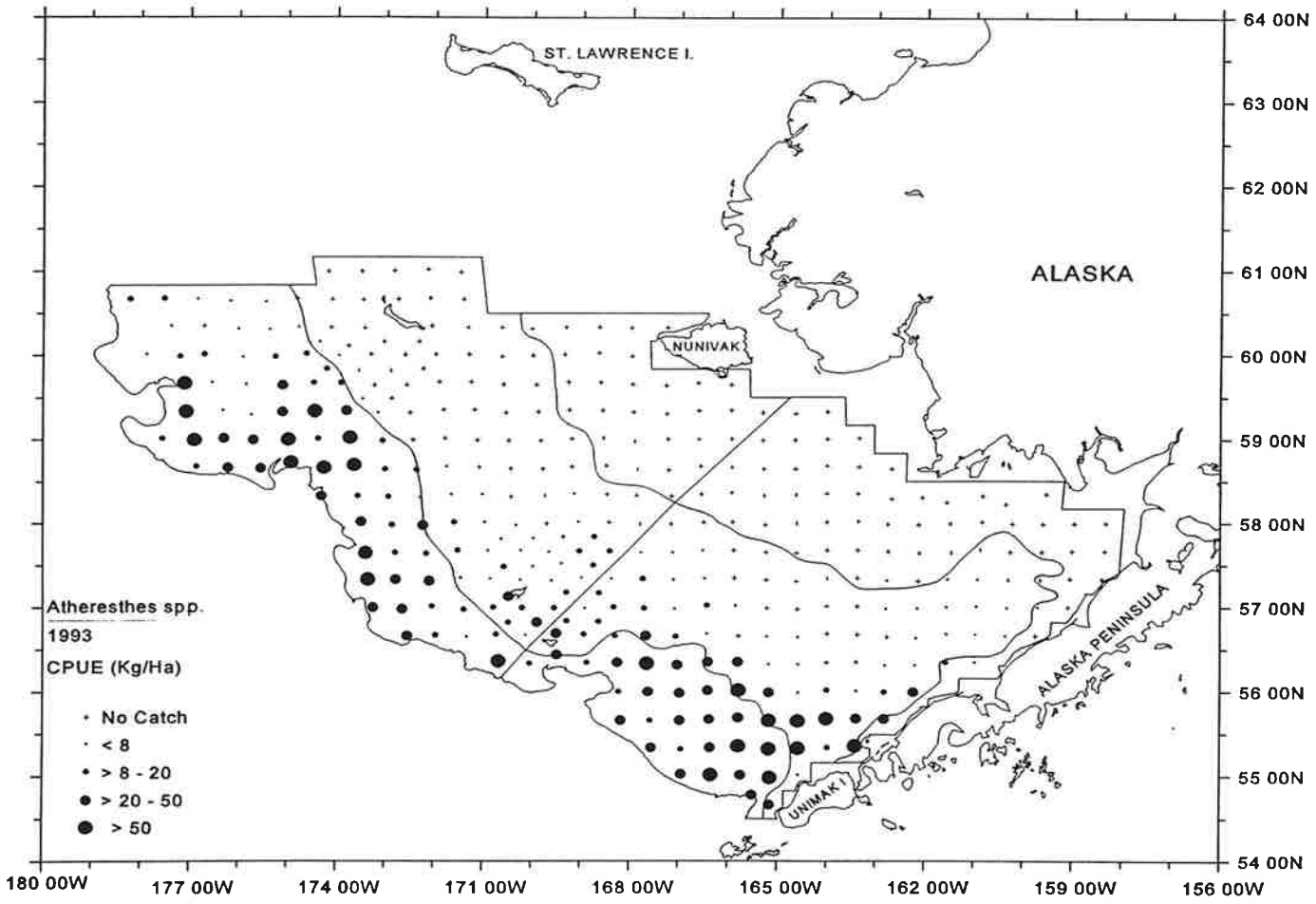

Figure 31.--Distribution and relative abundance in kg/ha of Atheresthes spp., 1993 eastern Bering Sea bottom trawl survey.

Table 24.--Abundance estimates and mean size of Atheresthes spp. by subarea, 1993 eastern Bering Sea bottom trawl survey.

Subarea	Mean CPUE (kg/ha)	Estimated biomass (t)[a]	Proportion of estimated biomass	Estimated population numbers[a]	Proportion of estimated population	Mean Size Weight (kg)	Mean Size Length (cm)
1	0.74	5,755	0.011	12,224,857	0.015	0.471	34.6
2	0.00	0	0.000	0	0.000	0.000	0.0
3	11.92	123,173	0.229	282,988,978	0.340	0.435	35.1
4	2.35	25,357	0.047	60,765,568	0.073	0.417	32.8
5	38.57	149,635	0.278	239,473,673	0.287	0.625	39.3
6	24.83	234,841	0.436	238,079,786	0.286	0.986	44.0
All subareas combined[b]	11.63	538,761	1.000	833,532,861	1.000	0.646	38.7
95% Confidence interval		±92,969		±160,196,104			

[a]Variances of abundance estimates are given in Appendix D.
[b]Differences in sums of estimates and totals are due to rounding

Table 25.--Estimated population numbers (millions of fish) of Atheresthes spp. by age group and subarea, 1993 eastern Bering Sea bottom trawl survey.

		DEPTH AND SUBAREA							
		100-200 m		50-100 m		<50 m			
AGE	YEAR CLASS	6	5	4	3	2	1	ALL SUBAREAS COMBINED	PROPORTION
3	1989	6.00	9.24	5.82	14.92	0.00	0.25	36.22	0.0431
4	1988	6.03	10.07	7.80	24.78	0.00	0.89	49.56	0.0589
5	1987	21.48	37.74	11.13	61.20	0.00	1.54	133.08	0.1582
6	1986	46.53	67.44	12.77	84.35	0.00	3.55	214.64	0.2551
7	1985	60.41	46.29	8.73	44.68	0.00	2.01	162.12	0.1927
8	1984	52.57	28.32	3.94	17.23	0.00	0.84	102.90	0.1223
9	1983	20.56	11.56	0.68	2.71	0.00	0.17	35.67	0.0424
10	1982	14.24	8.58	0.39	1.47	0.00	0.00	24.68	0.0293
11	1981	0.60	0.22	0.00	0.00	0.00	0.00	0.82	0.0010
12	1980	0.41	0.26	0.00	0.00	0.00	0.00	0.68	0.0008
13	1979	0.10	0.00	0.00	0.00	0.00	0.00	0.10	0.0001
Age unknown		13.69	21.16	10.25	32.83	0.00	2.98	80.92	0.0962
All Ages Combined		242.62	240.87	61.52	284.16	0.00	12.22	841.39	1.0000

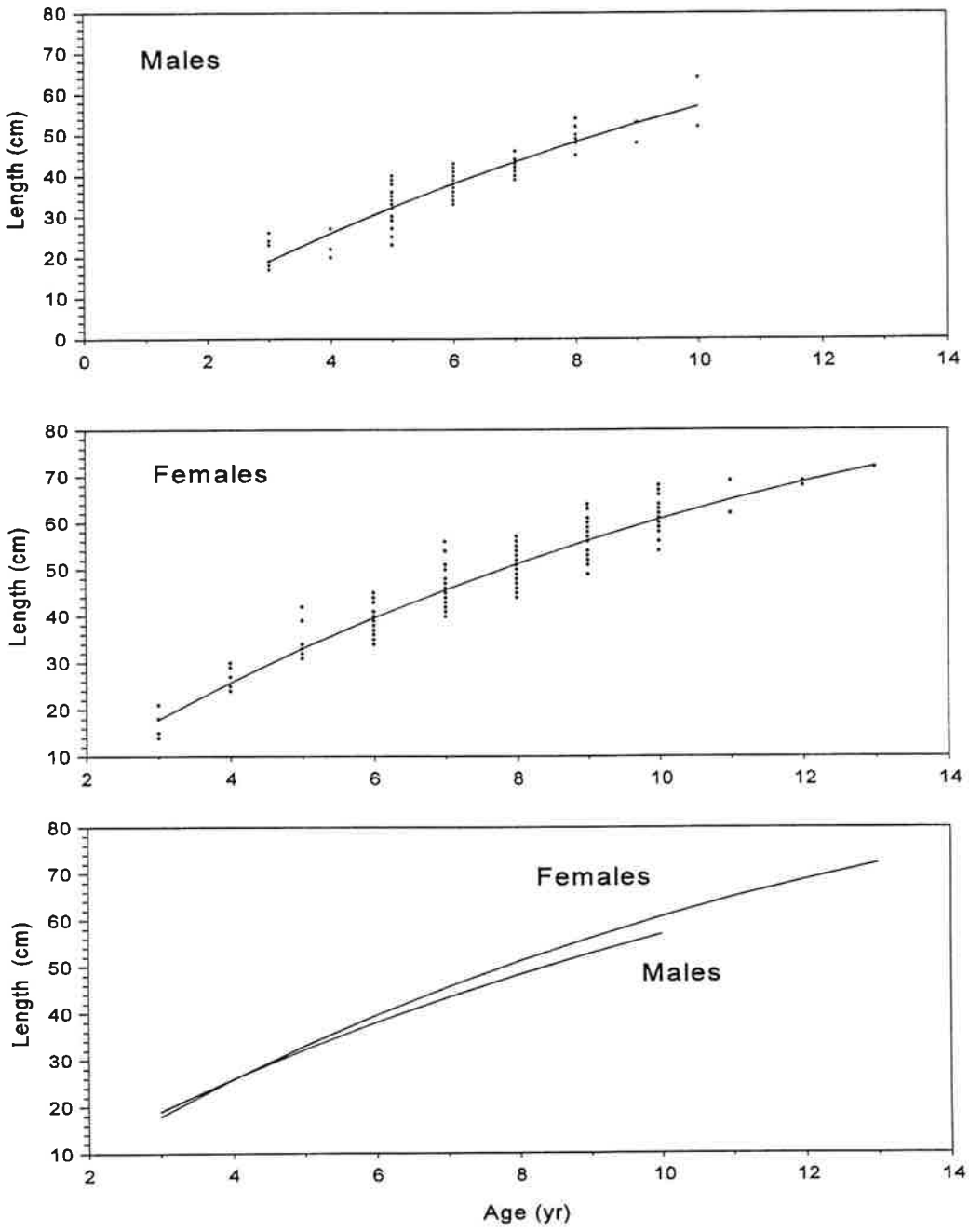

Figure 33.--Distribution of Atheresthes spp. aged samples from the 1993 eastern Bering Sea bottom trawl survey by length for males, females, and compared showing non-linear von-Bertalanffy estimates.

Table 26.--von-Bertalanffy growth parameter estimates for Atheresthes spp. by sex, based on otolith age reading and length data from the 1993 eastern Bering Sea bottom trawl survey.

Sex	Number of age readings	Age range (years)	Length range (cm)	Parameters L_{inf}	K	t_o
Male	71	3-10	17-64	104.7	0.08	0.60
Female	138	3-13	14-72	108.4	0.09	1.04

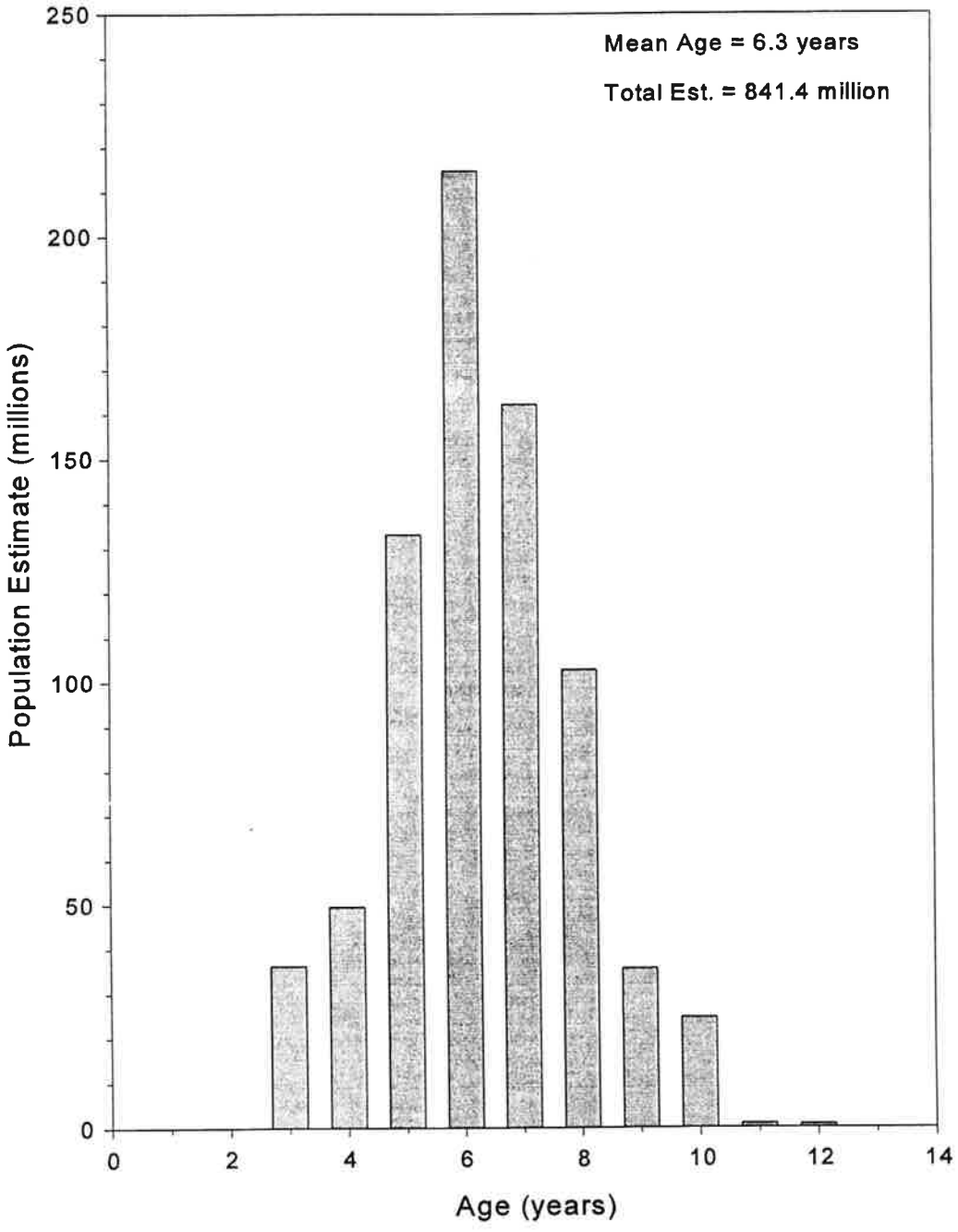

Figure 34.--Population number estimates by age for Atheresthes spp., 1993 eastern Bering Sea bottom trawl survey.

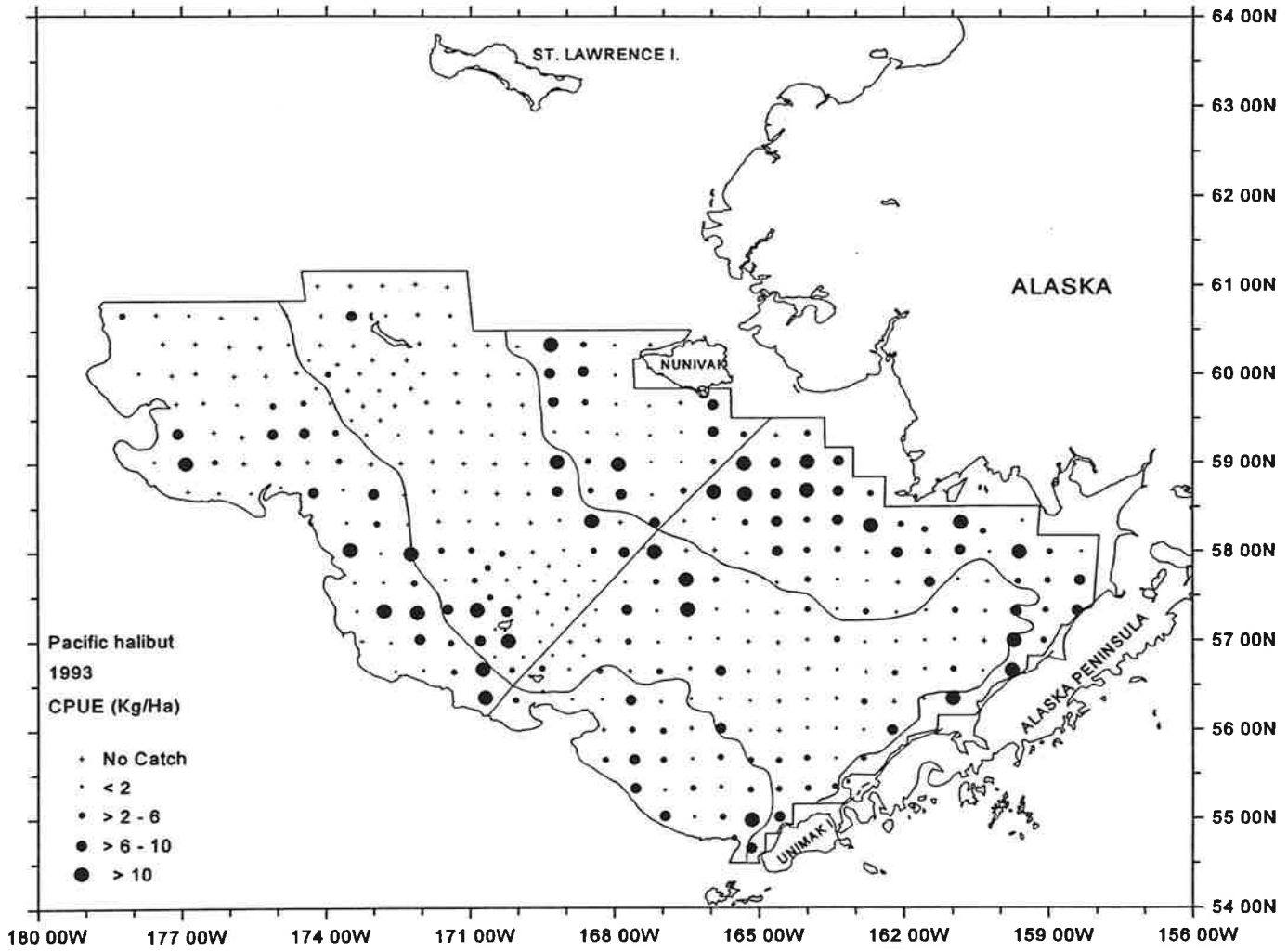

Figure 35.--Distribution and relative abundance in kg/ha of Pacific halibut, 1993 eastern Bering Sea bottom trawl survey.

Table 27.--Abundance estimates and mean size of Pacific halibut by subarea, 1993 eastern Bering Sea bottom trawl survey.

Subarea	Mean CPUE (kg/ha)	Estimated biomass (t)[a]	Proportion of estimated biomass	Estimated population numbers[a]	Proportion of estimated population	Mean Size Weight (kg)	Mean Size Length (cm)
1	6.20	48,262	0.299	18,797,981	0.350	2.567	56.3
2	3.68	15,118	0.094	8,394,027	0.156	1.801	50.5
3	2.56	26,432	0.164	9,221,209	0.172	2.866	57.9
4	2.45	26,428	0.164	9,633,296	0.179	2.743	55.8
5	3.99	15,488	0.096	2,286,803	0.043	6.773	77.8
6	3.13	29,557	0.183	5,350,418	0.100	5.524	71.1
All subareas combined[b]	3.48	161,284	1.000	53,683,734	1.000	3.004	58.0
95% Confidence interval		±30,493		±11,606,873			

[a]Variances of abundance estimates are given in Appendix D.
[b]Differences in sums of estimates and totals are due to rounding

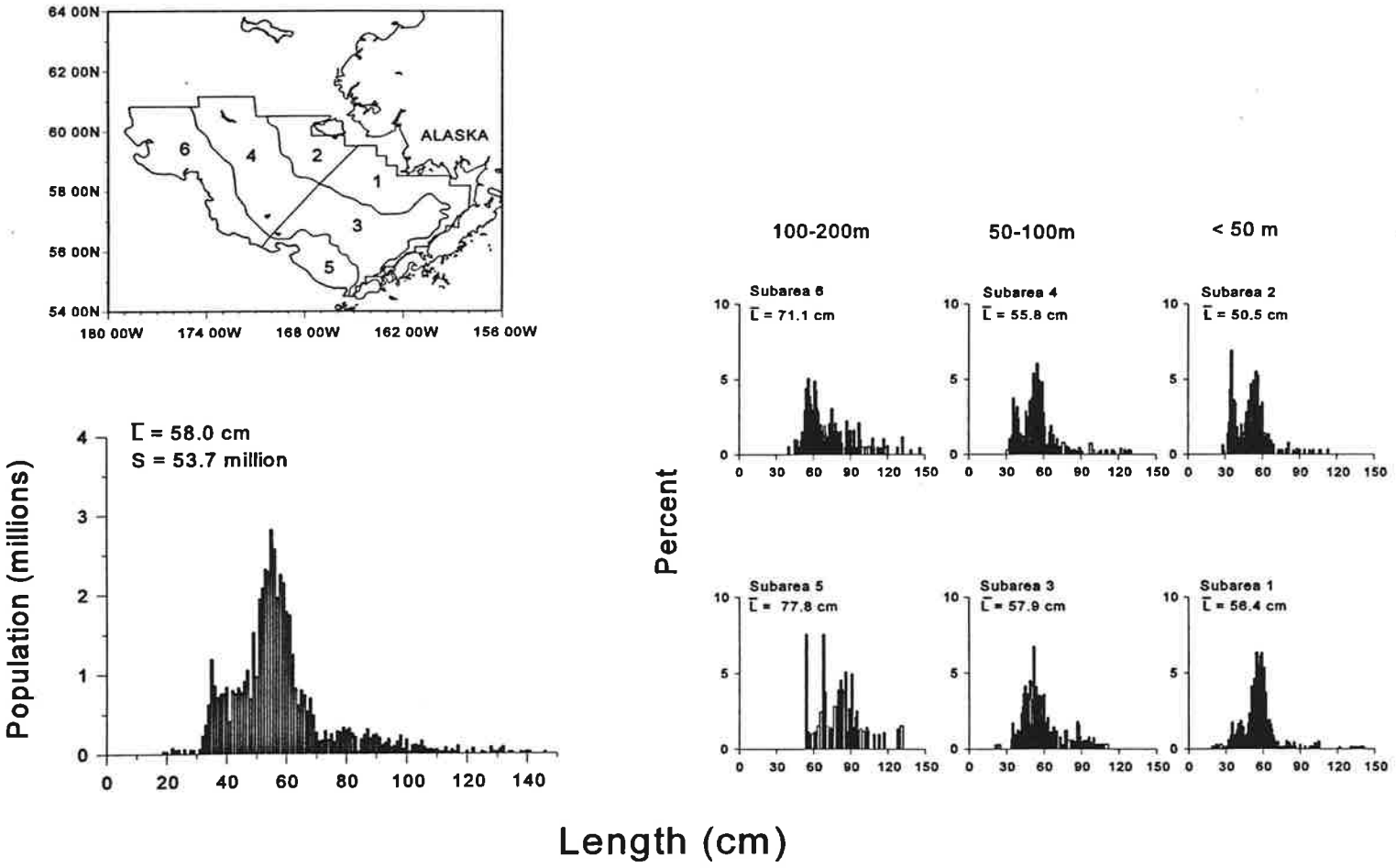

Figure 36.--Estimated relative size distribution (sexes combined) of Pacific halibut in terms of population numbers and percent for subareas 1-6, 1993 eastern Bering Sea bottom trawl survey.

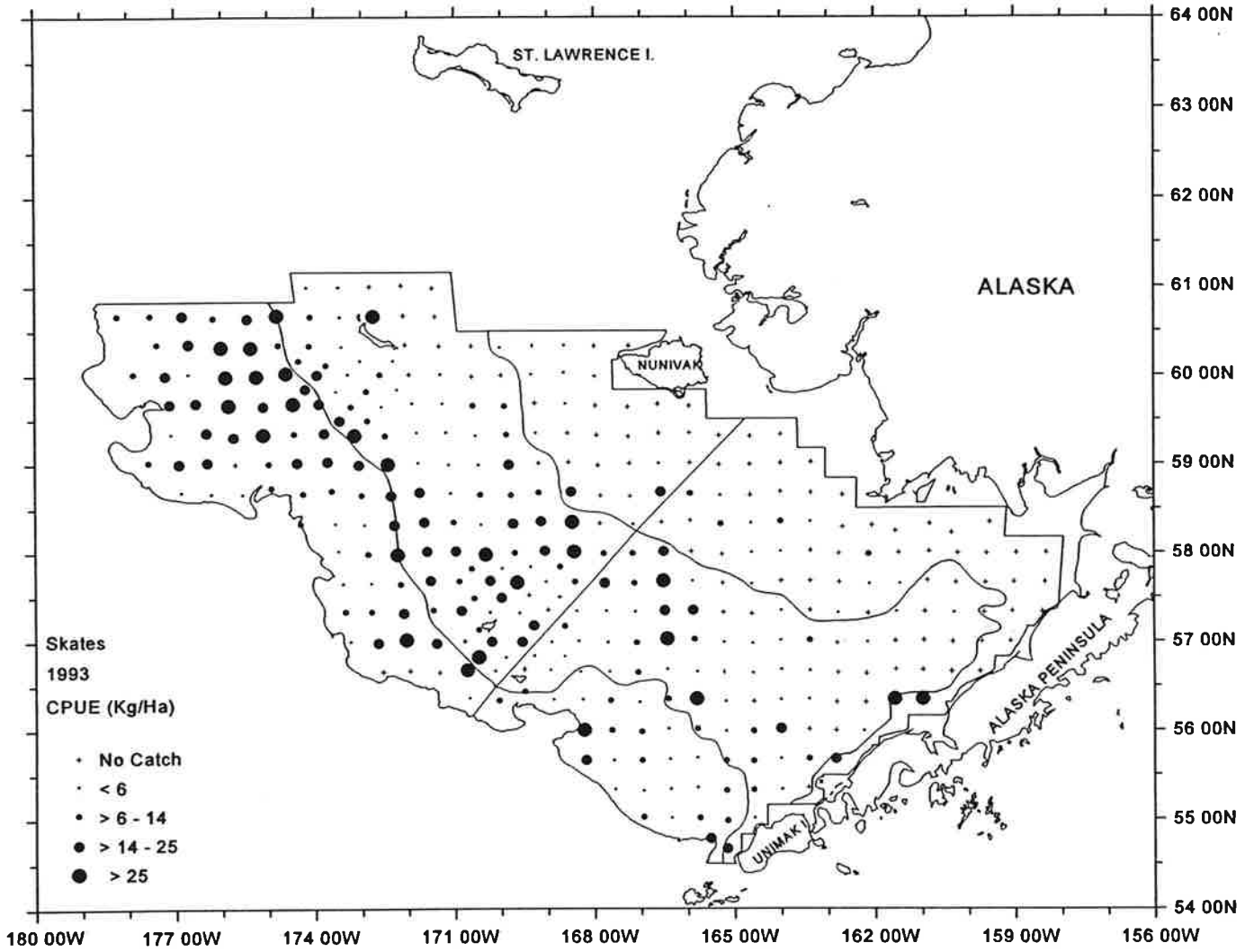

Figure 37.--Distribution and relative abundance in kg/ha of skates, 1993 eastern Bering Sea bottom trawl survey.

Table 28.--Abundance estimates and mean size of skates by subarea, 1993 eastern Bering Sea bottom trawl survey.

Subarea	Mean CPUE (kg/ha)	Estimated biomass (t)[a]	Proportion of estimated biomass	Estimated population numbers[a]	Proportion of estimated population	Mean Weight (kg)
1	3.05	23,781	0.063	3,889,911	0.046	6.114
2	1.93	7,913	0.021	1,344,227	0.016	5.887
3	6.23	64,374	0.172	18,289,738	0.218	3.520
4	9.61	103,675	0.276	23,665,843	0.282	4.381
5	7.77	30,138	0.080	6,840,030	0.082	4.406
6	15.35	145,158	0.387	29,746,210	0.355	4.880
All subareas combined[b]	8.09	375,040	1.000	83,775,959	1.000	4.477
95% Confidence interval		±50,129		±9,814,102		

[a]Variances of abundance estimates are given in Appendix D.
[b]Differences in sums of estimates and totals are due to rounding

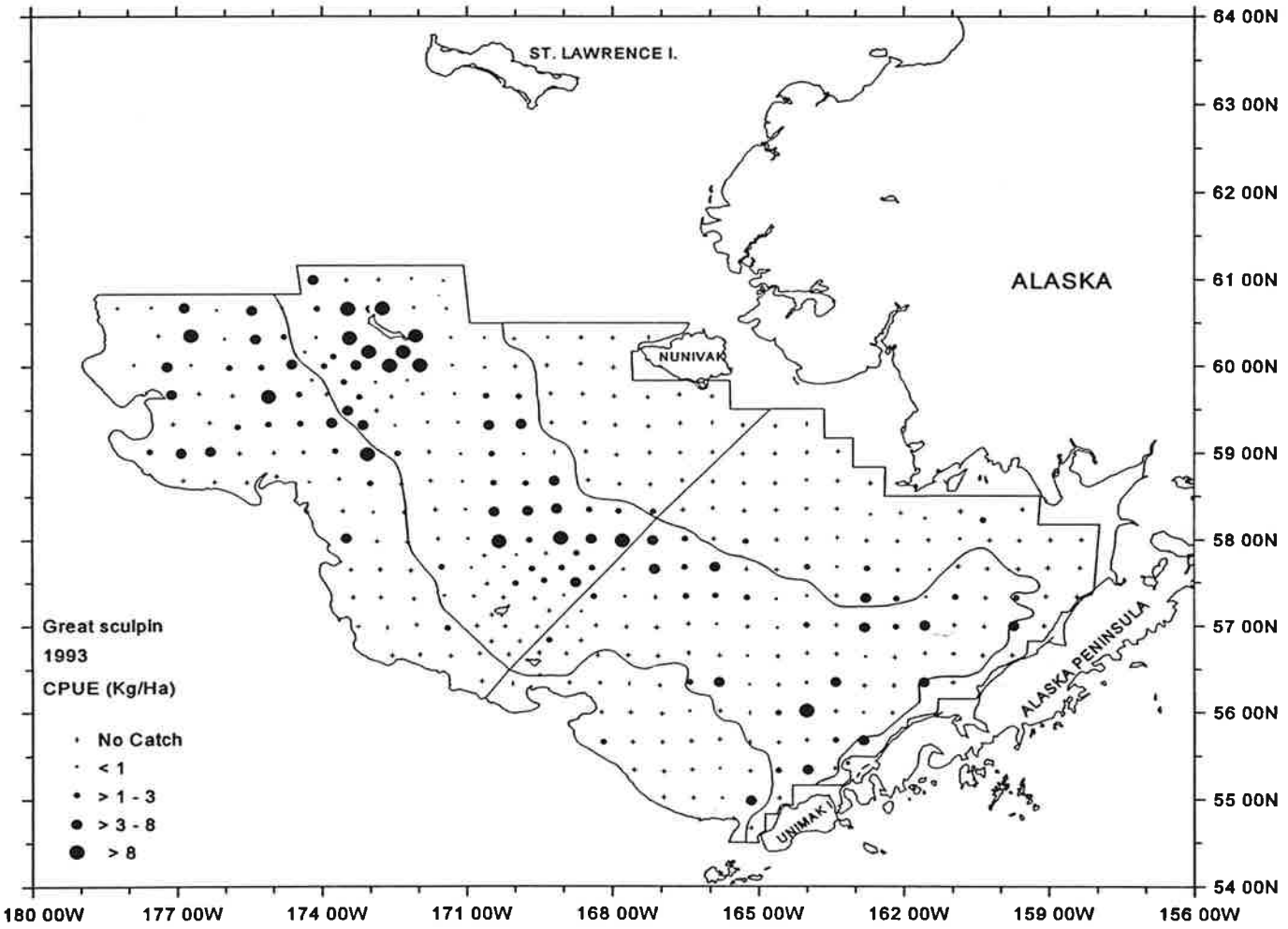

Figure 38.--Distribution and relative abundance in kg/ha of Myoxocephalus polyacanthocephalus, 1993 eastern Bering Sea bottom trawl survey.

Table 29.--Abundance estimates and mean size of great sculpin (Myoxocephalus polyacanthocephalus) by subarea, 1993 eastern Bering Sea bottom trawl survey.

Subarea	Mean CPUE (kg/ha)	Estimated biomass (t)[a]	Proportion of estimated biomass	Estimated population numbers[a]	Proportion of estimated population	Mean Weight (kg)
1	0.56	4,332	0.068	3,034,249	0.066	1.428
2	0.07	291	0.005	234,502	0.005	1.241
3	1.10	11,378	0.177	7,219,883	0.158	1.576
4	2.68	28,866	0.450	28,250,309	0.617	1.022
5	0.39	1,520	0.024	532,786	0.012	2.853
6	1.87	17,724	0.276	6,546,840	0.143	2.707
All subareas combined[b]	1.38	64,111	1.000	45,818,570	1.000	1.399
95% Confidence interval		±15,701		±12,307,862		

[a]Variances of abundance estimates are given in Appendix D.
[b]Differences in sums of estimates and totals are due to rounding

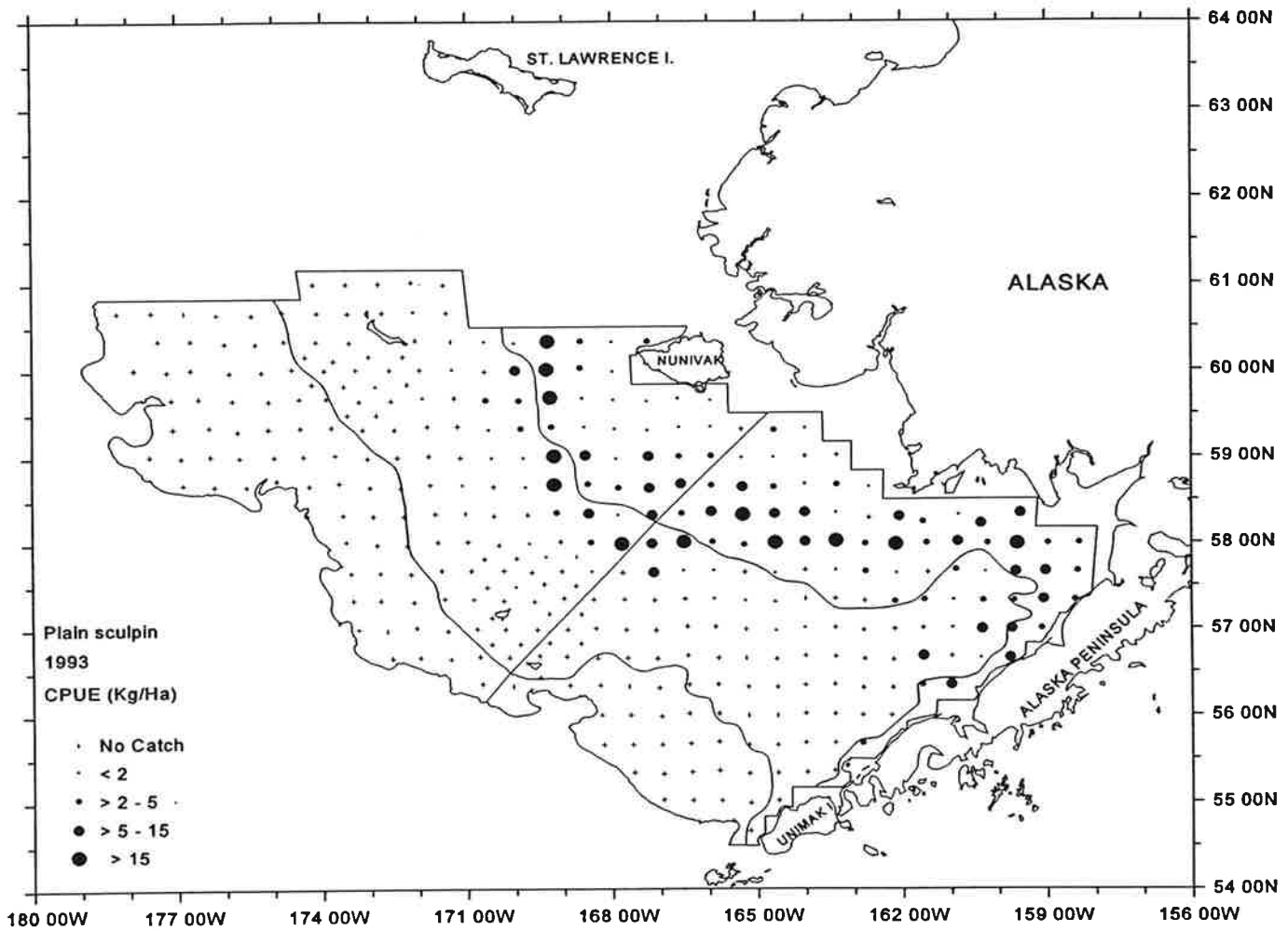

Figure 39.--Distribution and relative abundance in kg/ha of Myoxocephalus jaok, 1993 eastern Bering Sea bottom trawl survey.

Table 30.--Abundance estimates and mean size of plain sculpin (Myoxoxephalus jaok) by subarea, 1993 eastern Bering Sea bottom trawl survey.

Subarea	Mean CPUE (kg/ha)	Estimated biomass (t)[a]	Proportion of estimated biomass	Estimated population numbers[a]	Proportion of estimated population	Mean Weight (kg)
1	5.46	42,491	0.485	75,898,725	0.559	0.560
2	4.55	18,673	0.213	30,489,654	0.224	0.612
3	0.96	9,893	0.113	8,751,602	0.064	1.130
4	1.54	16,596	0.189	20,677,181	0.152	0.803
5	0.00	0	0.000	0	0.000	0.000
6	0.00	0	0.000	0	0.000	0.000
All subareas combined	1.89	87,653	1.000	135,817,162	1.000	0.645
95% Confidence interval		±22,151		±37,696,268		

[a]Variances of abundance estimates are given in Appendix D.
[b]Differences in sums of estimates and totals are due to rounding

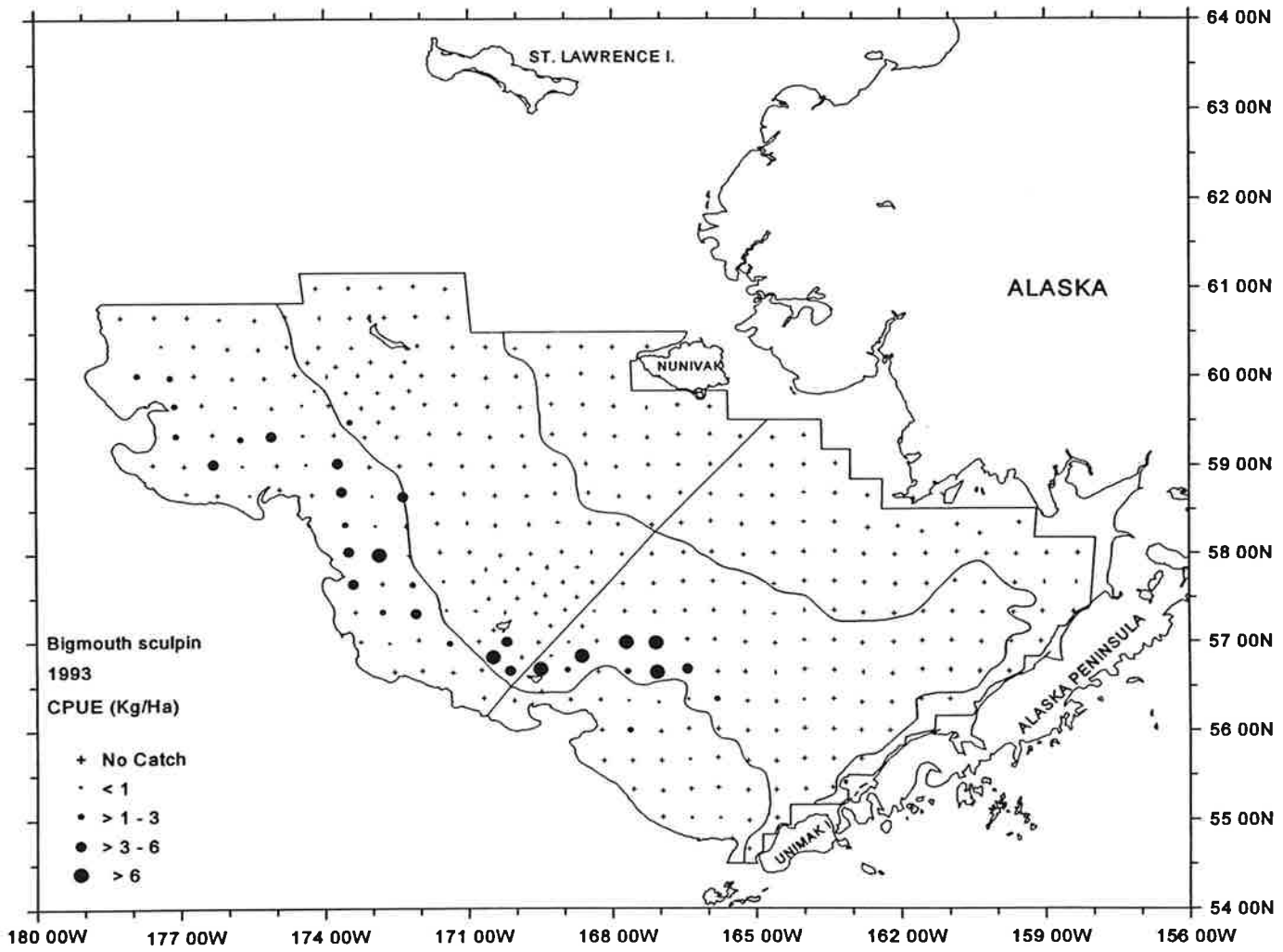

Figure 40.--Distribution and relative abundance in kg/ha of bigmouth sculpin, 1993 eastern Bering Sea bottom trawl.

Table 31.--Abundance estimates and mean size of bigmouth sculpin by subarea, 1993 eastern Bering Sea bottom trawl survey.

Subarea	Mean CPUE (kg/ha)	Estimated biomass (t)[a]	Proportion of estimated biomass	Estimated population numbers[a]	Proportion of estimated population	Mean Weight (kg)
1	0.00	0	0.000	0	0.000	0.000
2	0.00	0	0.000	0	0.000	0.000
3	0.69	7,171	0.371	1,874,816	0.267	3.825
4	0.16	1,730	0.090	646,690	0.092	2.675
5	0.13	516	0.027	252,802	0.036	2.041
6	1.05	9,891	0.512	4,258,473	0.606	2.323
All subareas combined[b]	0.42	19,307	1.000	7,032,782	1.000	2.745
95% Confidence interval		±6,698		±2,112,545		

[a]Variances of abundance estimates are given in Appendix D.
[b]Differences in sums of estimates and totals are due to rounding

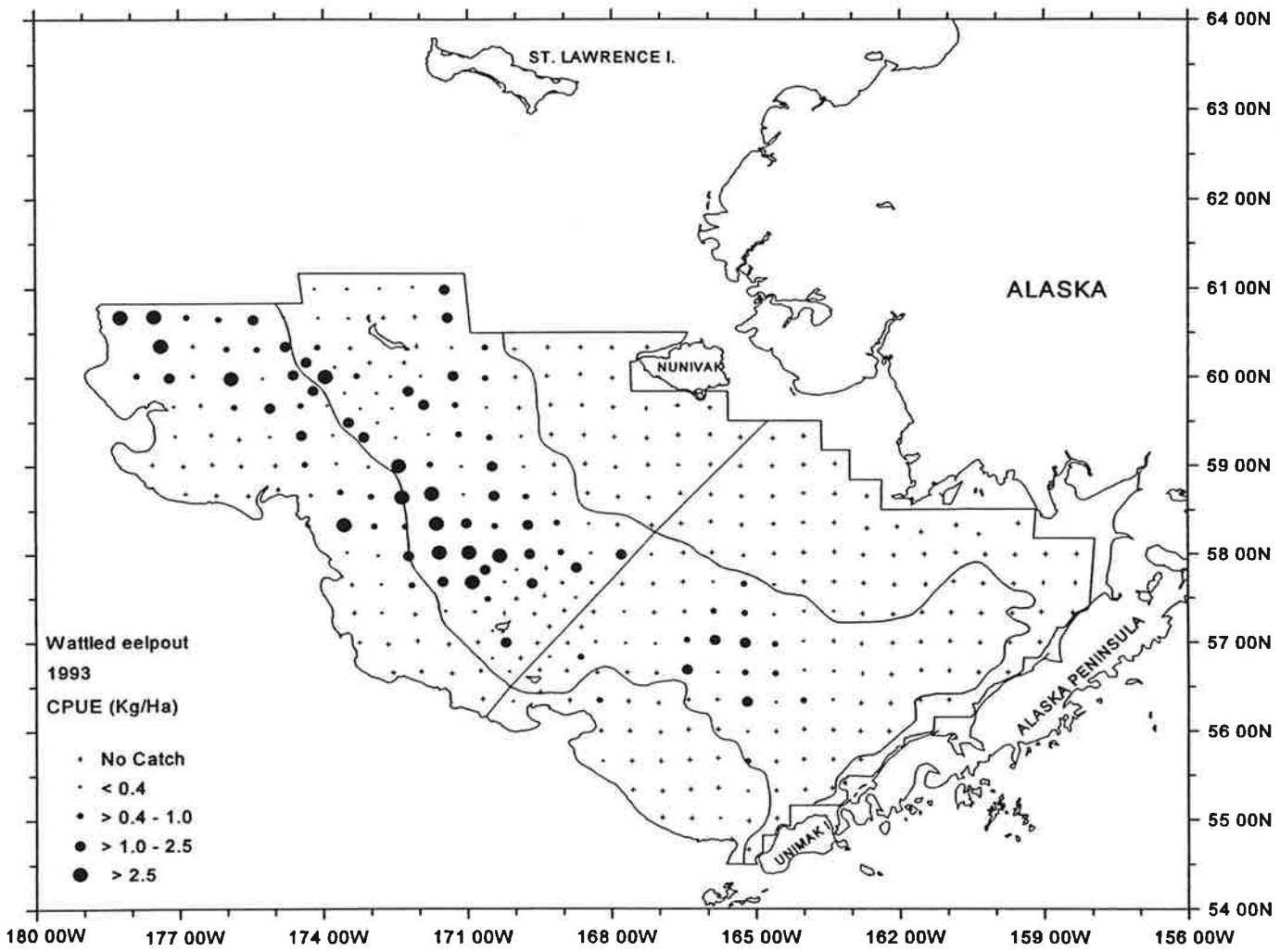

Figure 41.--Distribution and relative abundance in kg/ha of wattled eelpout, 1993 eastern Bering Sea bottom trawl survey.

Table 32.--Abundance estimates and mean size of wattled eelpout by subarea, 1993 eastern Bering Sea bottom trawl survey.

Subarea	Mean CPUE (kg/ha)	Estimated biomass (t)[a]	Proportion of estimated biomass	Estimated population numbers[a]	Proportion of estimated population	Mean Weight (kg)
1	0.00	22	0.001	243,457	0.002	0.090
2	0.00	0	0.000	0	0.000	0.000
3	0.21	2,159	0.111	12,521,471	0.111	0.172
4	0.95	10,271	0.529	60,602,795	0.540	0.169
5	0.04	170	0.009	1,006,239	0.009	0.169
6	0.72	6,789	0.350	37,949,597	0.338	0.179
All subareas combined[b]	0.42	19,410	1.000	112,323,559	1.000	0.173
95% Confidence interval		±5,303		±26,915,856		

[a]Variances of abundance estimates are given in Appendix D.
[b]Differences in sums of estimates and totals are due to rounding

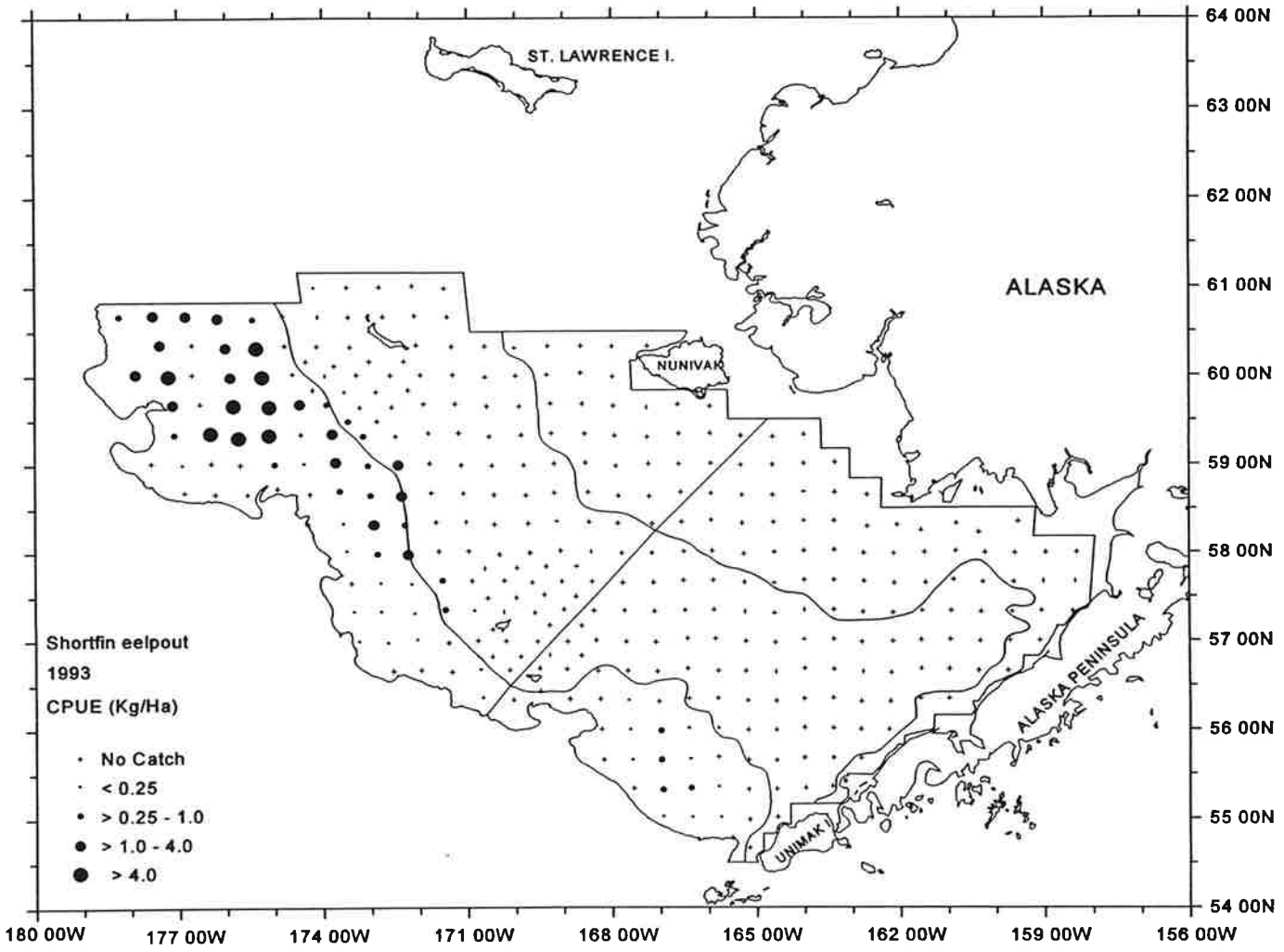

Figure 42.--Distribution and relative abundance in kg/ha of shortfin eelpout, 1993 eastern Bering Sea bottom trawl survey.

Table 33.--Abundance estimates and mean size of shortfin eelpout by subarea, 1993 eastern Bering Sea bottom trawl survey.

Subarea	Mean CPUE (kg/ha)	Estimated biomass (t)[a]	Proportion of estimated biomass	Estimated population numbers[a]	Proportion of estimated population	Mean Weight (kg)
1	0.00	0	0.000	0	0.000	0.000
2	0.00	0	0.000	0	0.000	0.000
3	0.00	4	0.000	80,224	0.000	0.050
4	0.05	503	0.037	12,823,287	0.051	0.039
5	0.11	428	0.031	7,255,555	0.029	0.059
6	1.35	12,717	0.932	233,326,300	0.920	0.055
All subareas combined[b]	0.29	13,652	1.000	253,485,367	1.000	0.054
95% Confidence interval		±4,989		±88,881,888		

[a]Variances of abundance estimates are given in Appendix D.
[b]Differences in sums of estimates and totals are due to rounding

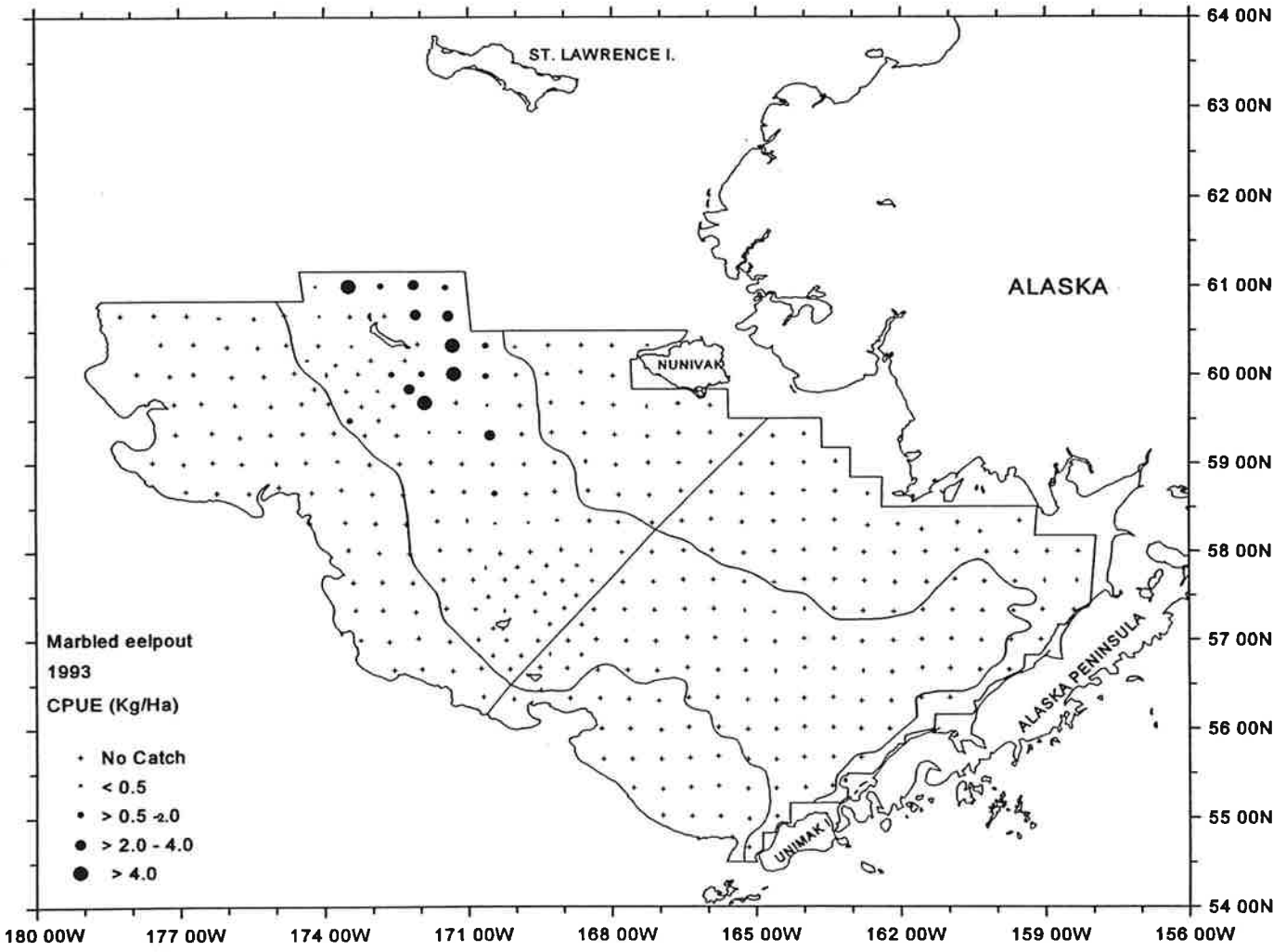

Figure 43.--Distribution and relative abundance in kg/ha of marbled eelpout, 1993 eastern Bering Sea bottom trawl survey.

Table 34.--Abundance estimates and mean size of marbled eelpout by subarea, 1993 eastern Bering Sea bottom trawl survey.

Subarea	Mean CPUE (kg/ha)	Estimated biomass (t)[a]	Proportion of estimated biomass	Estimated population numbers[a]	Proportion of estimated population	Mean Weight (kg)
1	0.00	0	0.000	0	0.000	0.000
2	0.00	4	0.001	27,110	0.003	0.148
3	0.00	0	0.000	0	0.000	0.000
4	0.60	6,467	0.999	9,483,307	0.997	0.682
5	0.00	0	0.000	0	0.000	0.000
6	0.00	0	0.000	0	0.000	0.000
All subareas combined[b]	0.14	6,471	1.000	9,510,417	1.000	0.680
95% Confidence interval		±3,375		±4,688,222		

[a]Variances of abundance estimates are given in Appendix D.
[b]Differences in sums of estimates and totals are due to rounding

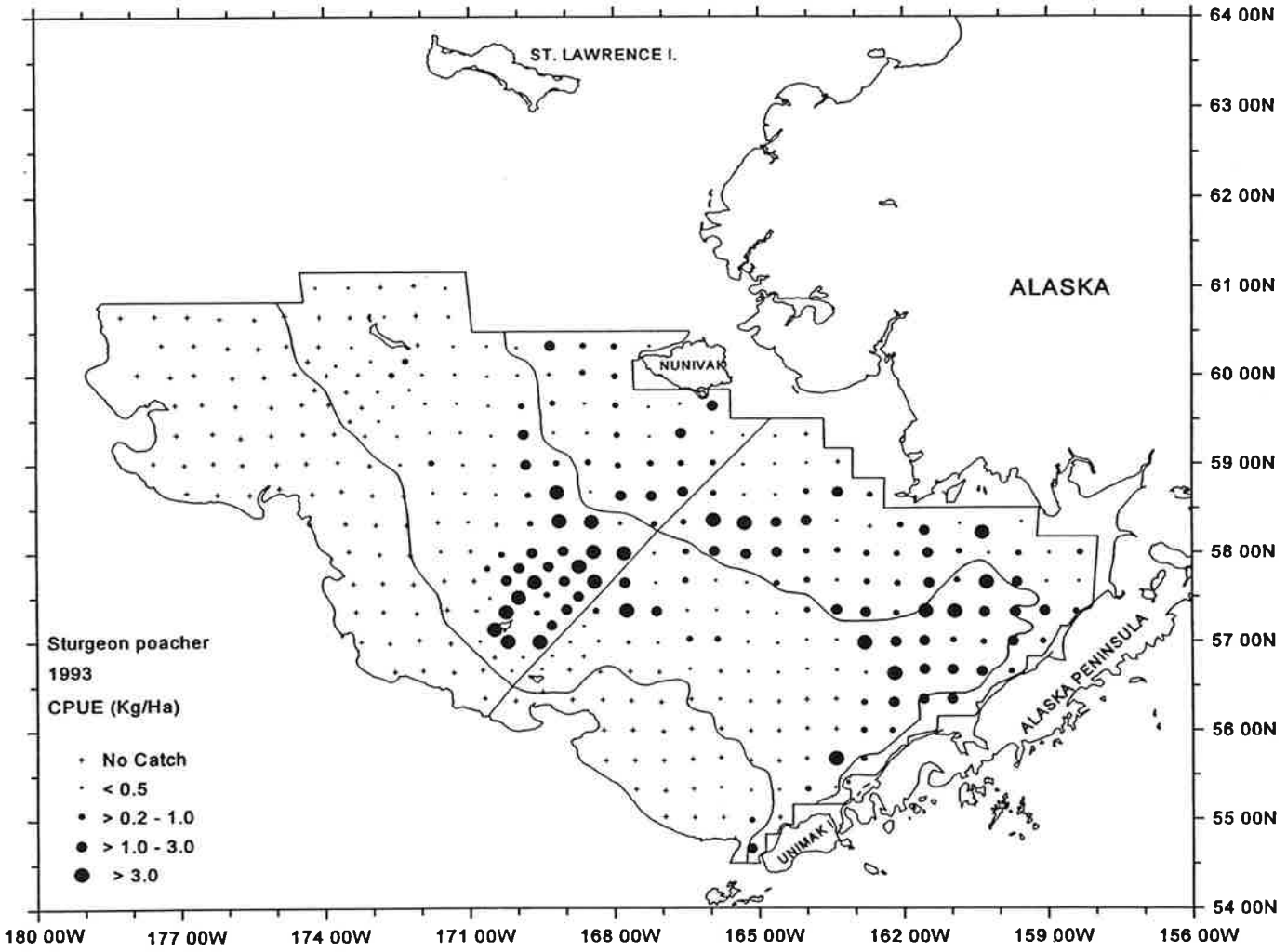

Figure 44.--Distribution and relative abundance in kg/ha of sturgeon poacher, 1993 eastern Bering Sea bottom trawl survey.

Table 35.--Abundance estimates and mean size of sturgeon poacher by subarea, 1993 eastern Bering Sea bottom trawl survey.

Subarea	Mean CPUE (kg/ha)	Estimated biomass (t)[a]	Proportion of estimated biomass	Estimated population numbers[a]	Proportion of estimated population	Mean Weight (kg)
1	0.95	7,382	0.270	101,711,530	0.263	0.073
2	0.46	1,877	0.069	22,374,763	0.058	0.084
3	0.76	7,829	0.286	104,315,554	0.269	0.075
4	0.94	10,093	0.369	157,108,974	0.406	0.064
5	0.05	186	0.007	1,929,552	0.005	0.096
6	0.00	0	0.000	0	0.000	0.000
All subareas combined[b]	0.59	27,367	1.000	387,440,373	1.000	0.071
95% Confidence interval		±5,658		±76,503,120		

[a]Variances of abundance estimates are given in Appendix D.
[b]Differences in sums of estimates and totals are due to rounding

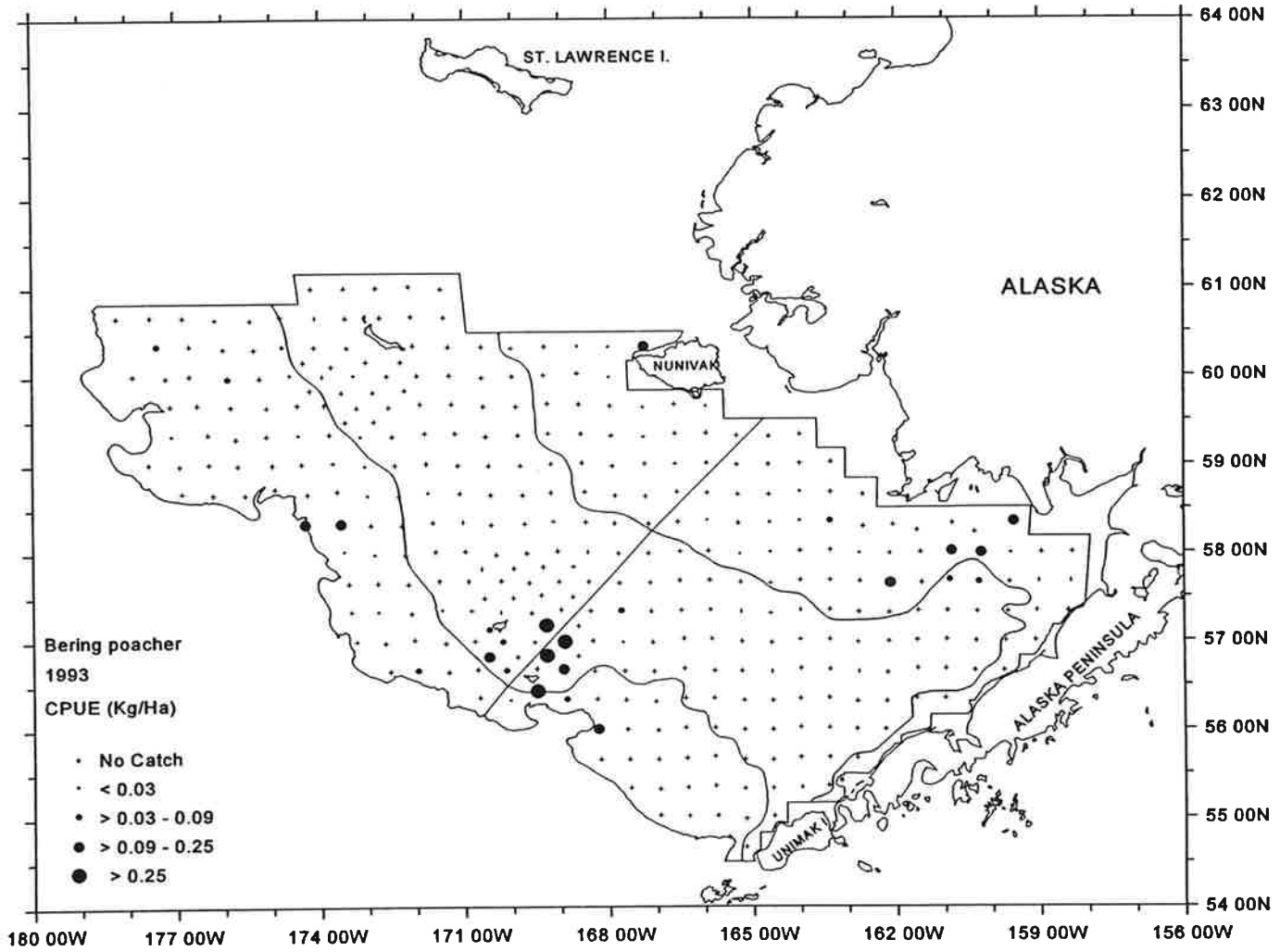

Figure 45.--Distribution and relative abundance in kg/ha of Bering poacher, 1993 eastern Bering Sea bottom trawl survey.

Table 36.--Abundance estimates and mean size of Bering poacher by subarea, 1993 eastern Bering Sea bottom trawl survey.

Subarea	Mean CPUE (kg/ha)	Estimated biomass (t)[a]	Proportion of estimated biomass	Estimated population numbers[a]	Proportion of estimated population	Mean Weight (kg)
1	0.01	110	0.221	3,602,966	0.281	0.031
2	0.01	40	0.080	1,939,112	0.151	0.021
3	0.01	145	0.292	2,852,188	0.222	0.051
4	0.01	65	0.131	1,297,301	0.101	0.050
5	0.01	43	0.087	803,513	0.063	0.054
6	0.01	95	0.191	2,349,388	0.183	0.040
All subareas combined	0.01	497	1.000	12,844,468	1.000	0.039
95% Confidence interval		±184		±5,372,392		

[a]Variances of abundance estimates are given in Appendix D.
[b]Differences in sums of estimates and totals are due to rounding

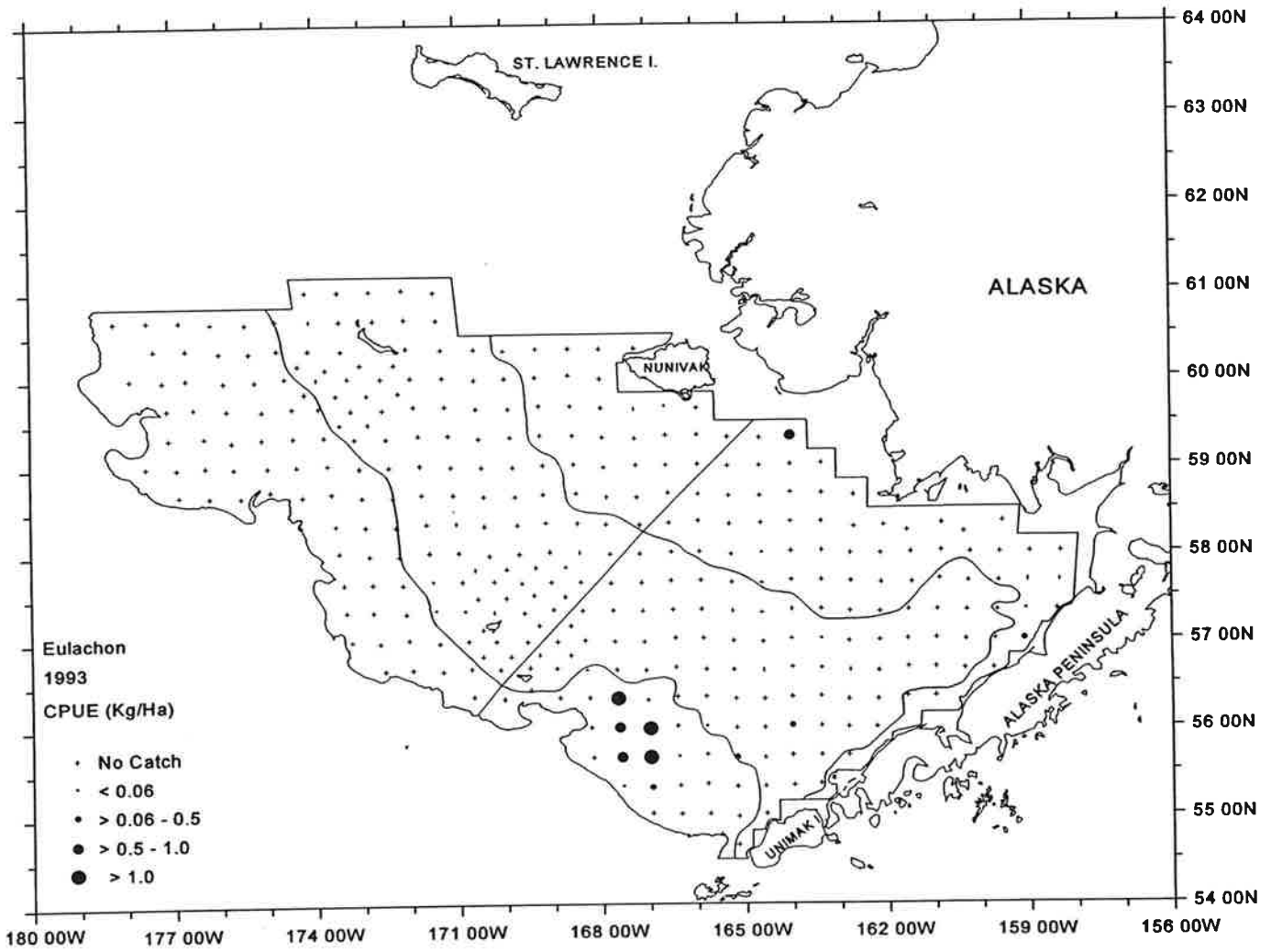

Figure 46.--Distribution and relative abundance in kg/ha of eulachon, 1993 eastern Bering Sea bottom trawl survey.

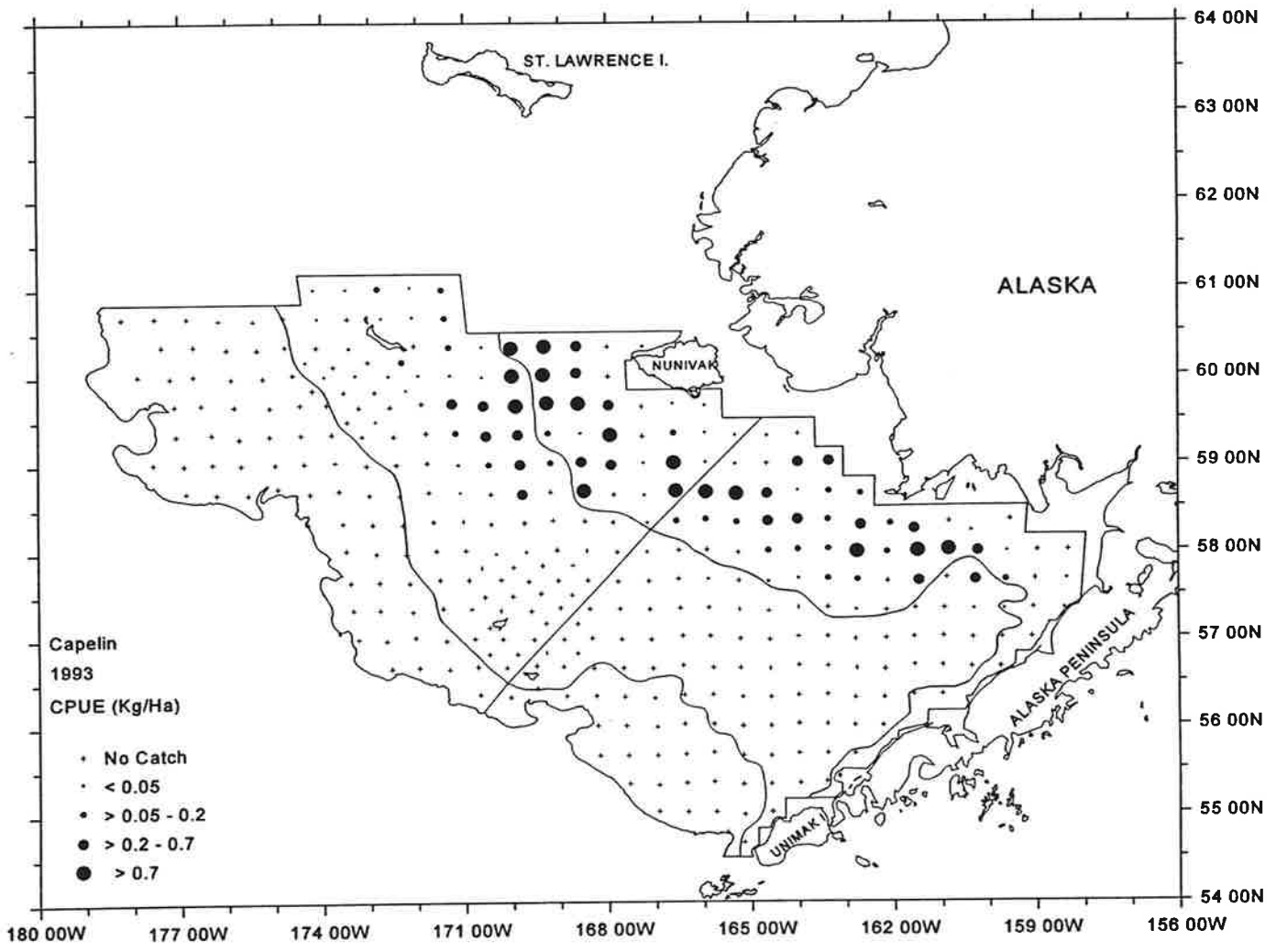

Figure 47.--Distribution and relative abundance in kg/ha of capelin, 1993 eastern Bering Sea bottom trawl survey.

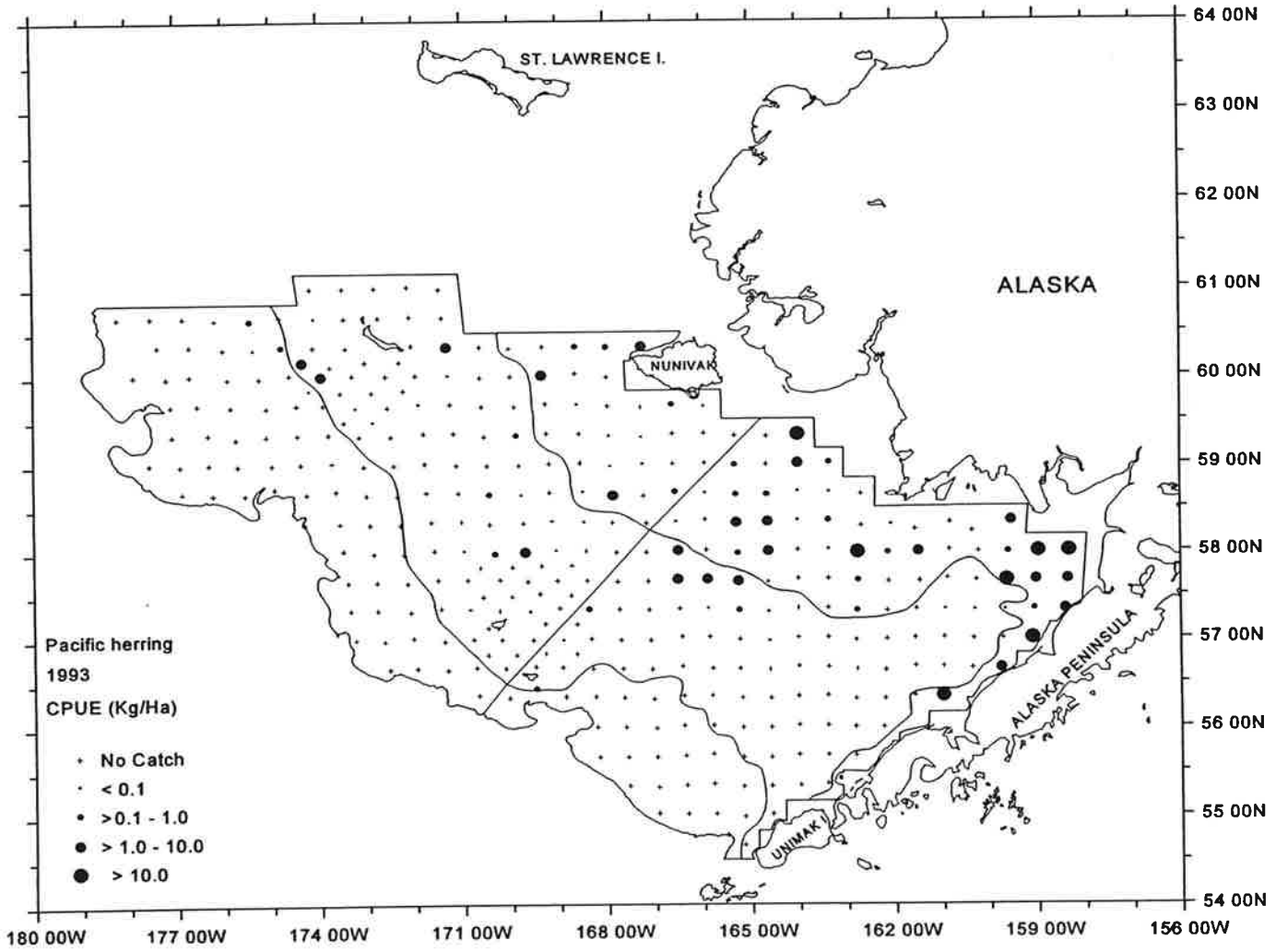

Figure 48.--Distribution and relative abundance in kg/ha of Pacific herring, 1993 eastern Bering Sea bottom trawl survey.

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APPENDIX A

Station Data, 1993 Eastern Bering Sea Bottom Trawl Survey

Appendix A contains station data by vessel for the 355 successfully completed standard survey stations. In using the tables, the following should be noted:

1. Time represents the nearest hour at the start of the tow.
2. Haul numbers are not always sequential because special study and unsatisfactory hauls were omitted.
3. Negative longitude indicates western hemisphere.
4. Width codes are as follows:

   M = Net width was measured by mensuration gear.

   F = Net width was estimated from a function of wire out or wire out and net height.
5. Hauls marked with an "*" were used for the FPC analysis. Eleven additional special study hauls not listed here were also used for that analysis. For reference purposes, these hauls were: Arcturus-173,174,177,178,193,194- Aldebaran - 158,159,177,178, 181.

List of Tables

Table A-1.--Haul data for stations sampled by the FV Arcturus during the 1993 eastern Bering Sea bottom trawl survey.

	Haul	MM/DD/YY	Latitude	Longitude	Depth (m)	Time (hr.)	Duration (hr.)	Distance (km)	Strata	Surf. Temp.	Gear. Temp.	Net Width (m)	Width Code
	1	06/04/93	57.334	-158.405	27	07	0.50	3.43	10	7.3	5.5	13.6	F
	2	06/04/93	57.668	-158.348	33	11	0.50	3.22	10	7.3	4.9	14.9	F
	3	06/04/93	57.997	-158.322	31	14	0.50	2.67	10	7.4	5.4	14.6	F
*	4	06/04/93	57.994	-158.966	35	17	0.50	3.61	10	5.5	4.6	15.6	F
*	5	06/05/93	57.668	-159.014	44	06	0.50	2.85	10	4.8	4.4	16.3	F
*	6	06/05/93	57.339	-159.057	46	09	0.50	2.82	10	6.1	4.8	15.7	F
*	7	06/05/93	57.000	-159.098	29	13	0.50	2.74	10	6.5	5.9	14.3	F
*	8	06/06/93	56.660	-160.365	59	06	0.50	2.83	31	5.2	4.0	16.2	F
*	9	06/06/93	56.993	-160.332	64	10	0.50	2.87	31	4.6	3.8	16.2	F
*	10	06/06/93	57.326	-160.307	60	12	0.50	3.09	31	4.6	3.1	16.1	F
*	11	06/06/93	57.661	-160.267	53	15	0.50	2.76	31	5.2	2.5	15.6	F
*	12	06/06/93	57.992	-160.221	49	17	0.50	2.96	10	5.6	3.9	15.6	F
*	14	06/07/93	58.223	-160.354	18	08	0.50	3.09	10	4.8		14.8	F
*	15	06/07/93	58.245	-161.557	38	15	0.27	1.56	10	6.3		14.8	F
*	16	06/07/93	57.995	-161.488	49	17	0.50	3.15	10	5.4	4.1	15.7	F
*	17	06/08/93	57.652	-161.461	53	06	0.50	3.09	10	5.2	4.1	15.7	F
*	18	06/08/93	57.338	-161.537	55	09	0.50	3.39	31	6.4	3.9	15.5	F
*	19	06/08/93	57.004	-161.564	68	13	0.50	3.09	31	7.8	3.2	15.9	F
*	20	06/08/93	56.684	-161.561	88	16	0.50	2.98	31	8.2	3.1	15.5	F
*	21	06/08/93	56.350	-161.582	64	19	0.30	1.82	10	7.9	3.6	15.9	F
*	22	06/09/93	55.676	-162.830	51	07	0.50	2.93	10	7.2	4.6	15.3	F
*	23	06/09/93	55.999	-162.829	79	10	0.50	3.19	31	9.6	2.6	16.6	F
*	24	06/09/93	56.313	-162.817	79	12	0.50	3.15	31	8.0	1.8	16.8	F
*	25	06/09/93	56.647	-162.784	71	14	0.50	3.07	31	7.0	2.3	16.1	F
*	26	06/10/93	56.982	-162.803	60	06	0.50	2.89	31	7.5	3.4	15.8	F
*	27	06/10/93	57.322	-162.778	48	09	0.50	2.83	10	5.5	3.8	15.7	F
*	28	06/10/93	57.666	-162.752	44	12	0.50	3.07	10	5.4	3.6	15.7	F
*	29	06/10/93	57.988	-162.759	40	14	0.50	3.06	10	5.8	4.6	15.4	F
*	30	06/10/93	58.290	-162.682	31	17	0.50	2.82	10	5.8	5.0	14.8	F
*	31	06/11/93	59.333	-163.999	22	07	0.50	3.22	10	7.2	7.9	14.7	F
*	32	06/11/93	59.007	-163.997	26	09	0.50	3.02	10	6.5	5.9	15.2	F
*	33	06/11/93	58.688	-164.006	33	11	0.50	2.76	10	6.4	5.8	14.8	F

Table A-1.--Continued.

	Haul	MM/DD/YY	Latitude	Longitude	Depth (m)	Time (hr.)	Duration (hr.)	Distance (km)	Strata	Surf. Temp.	Gear. Temp.	Net Width (m)	Width Code
*	34	06/11/93	58.356	-164.004	40	14	0.50	3.15	10	6.4	4.0	14.5	F
*	35	06/11/93	58.015	-164.001	44	16	0.50	3.11	10	5.2	3.4	15.7	F
*	36	06/12/93	57.683	-163.994	49	07	0.50	3.15	10	5.5	4.0	15.7	F
*	37	06/12/93	57.349	-163.996	60	09	0.50	3.11	31	7.6	3.2	16.5	F
*	38	06/12/93	57.013	-164.007	68	12	0.50	3.20	31	7.3	1.9	15.9	F
*	39	06/12/93	56.687	-163.994	73	14	0.50	3.07	31	7.0	1.6	16.6	F
*	40	06/13/93	56.345	-164.009	86	06	0.50	3.19	31	7.4	1.4	16.7	F
*	41	06/13/93	56.019	-164.002	90	09	0.20	0.87	31	8.0	1.0	15.8	F
*	42	06/13/93	55.680	-164.009	93	12	0.50	3.32	31	8.3	3.2	17.0	F
*	43	06/13/93	55.338	-163.982	75	14	0.50	2.87	31	8.5	4.5	16.1	F
*	44	06/14/93	54.665	-165.158	80	06	0.50	3.04	31	6.6	5.5	16.8	F
*	45	06/14/93	54.983	-165.150	108	09	0.50	2.93	50	6.5	4.8	17.6	F
*	46	06/14/93	55.323	-165.174	110	12	0.50	3.69	50	6.5	4.5	17.9	F
*	47	06/14/93	55.656	-165.176	108	15	0.50	3.32	31	7.8	4.3	17.8	F
*	48	06/14/93	55.993	-165.182	95	18	0.50	3.63	31	8.8	3.4	17.6	F
*	49	06/15/93	56.325	-165.186	86	07	0.50	3.37	31	6.8	1.3	17.3	F
*	50	06/15/93	56.657	-165.222	75	09	0.50	3.24	31	7.2	1.8	16.9	F
*	51	06/15/93	56.992	-165.221	70	11	0.50	3.11	31	6.5	1.9	16.2	F
*	52	06/15/93	57.328	-165.235	66	14	0.50	3.39	31	5.0	1.7	16.4	F
*	53	06/15/93	57.658	-165.246	60	17	0.50	3.17	31	6.4	2.8	16.5	F
*	54	06/16/93	57.981	-165.254	51	06	0.50	2.91	10	5.4	3.6	15.4	F
*	55	06/16/93	58.328	-165.287	44	09	0.50	3.15	10	5.0	3.7	15.5	F
*	56	06/16/93	58.650	-165.295	38	11	0.50	2.80	10	6.2	4.9	14.6	F
*	57	06/16/93	58.991	-165.314	26	13	0.50	3.19	10	7.8	6.0	14.5	F
*	58	06/16/93	59.320	-165.319	20	16	0.50	2.96	20	10.0	7.4	14.3	F
*	59	06/17/93	59.676	-166.631	26	10	0.50	2.93	20	6.5		14.9	F
*	60	06/17/93	59.345	-166.611	27	13	0.50	3.02	20	5.6	5.4	14.8	F
*	61	06/17/93	59.006	-166.610	33	15	0.50	2.69	20	5.2	4.4	15.0	F
*	62	06/18/93	58.685	-166.565	40	06	0.50	2.95	20	4.4	3.6	15.9	F
*	63	06/18/93	58.345	-166.549	46	09	0.50	3.15	10	4.2	3.1	16.1	F
*	64	06/18/93	58.011	-166.504	60	11	0.50	2.82	31	4.0	1.6	16.7	F
*	65	06/18/93	57.682	-166.511	66	13	0.50	3.06	31	4.8	2.7	16.4	F
*	66	06/18/93	57.347	-166.480	68	16	0.50	3.00	31	5.5	3.4	16.4	F

Table A-1.--Continued.

	Haul	MM/DD/YY	Latitude	Longitude	Depth (m)	Time (hr.)	Duration (hr.)	Distance (km)	Strata	Surf. Temp.	Gear. Temp.	Net Width (m)	Width Code
*	67	06/19/93	57.027	-166.435	73	06	0.50	3.00	31	6.6	3.3	16.6	F
*	68	06/19/93	56.688	-166.432	82	09	0.50	3.19	31	7.0	2.1	16.9	F
*	69	06/19/93	56.351	-166.411	102	11	0.50	3.39	31	7.5	3.3	17.2	F
*	70	06/19/93	56.016	-166.410	123	14	0.50	3.48	50	7.0	4.0	17.3	F
*	71	06/19/93	55.672	-166.381	126	16	0.50	2.59	50	8.5	4.1	17.8	F
*	72	06/20/93	55.340	-166.365	132	07	0.50	3.06	50	7.6	4.0	18.1	F
*	73	06/20/93	55.016	-166.342	143	09	0.50	3.69	50	7.8	3.9	17.3	F
	74	06/20/93	55.023	-166.947	155	11	0.50	3.96	50	7.6	3.9	17.4	F
*	75	06/24/93	55.336	-167.557	148	07	0.50	2.98	50	8.9	3.9	17.2	F
*	76	06/24/93	55.660	-167.587	134	10	0.50	2.96	50	8.8		17.3	F
*	77	06/24/93	56.001	-167.627	132	12	0.50	2.89	50	9.0		17.5	F
*	78	06/24/93	56.333	-167.655	128	14	0.50	2.52	50	9.2		17.5	F
*	79	06/24/93	56.663	-167.676	102	17	0.50	2.72	31	8.9	3.0	17.4	F
*	80	06/25/93	56.990	-167.710	77	06	0.50	2.87	31	8.2	2.7	16.7	F
*	81	06/25/93	57.342	-167.739	71	09	0.50	2.69	31	8.0	2.9	16.4	F
*	82	06/25/93	57.655	-167.776	68	12	0.50	3.11	31	8.0	3.2	16.1	F
*	83	06/25/93	57.990	-167.795	66	14	0.50	3.06	41	7.6		16.2	F
*	84	06/25/93	58.331	-167.871	59	18	0.50	2.89	41	6.0	4.5	16.8	F
*	85	06/27/93	58.643	-167.860	44	06	0.50	3.06	20	4.5	3.9	16.3	F
*	86	06/27/93	58.982	-167.914	40	09	0.50	3.09	20	4.6	4.2	16.4	F
*	87	06/27/93	59.326	-167.942	39	11	0.50	3.13	20	4.7	5.0	15.5	F
*	88	06/27/93	59.661	-167.968	33	14	0.50	3.19	20	5.5	5.0	15.5	F
*	89	06/27/93	59.989	-167.986	24	16	0.50	3.20	20	6.2	5.1	15.2	F
*	90	06/28/93	60.329	-168.001	29	06	0.50	2.63	20	7.0	6.7	14.8	F
*	91	06/28/93	60.335	-169.329	40	11	0.50	3.19	20	5.7	3.0	16.0	F
*	92	06/28/93	60.011	-169.348	44	14	0.50	2.67	20	5.3	3.6	15.8	F
*	93	06/28/93	59.688	-169.271	46	17	0.50	2.85	20	5.7	3.3	16.0	F
*	94	06/29/93	59.352	-169.249	48	06	0.50	2.98	20	4.9	2.7	17.2	F
*	95	06/29/93	59.009	-169.190	51	09	0.50	3.39	41	5.1	2.1	15.8	F
*	96	06/29/93	58.679	-169.186	60	11	0.50	3.00	41	5.5	1.7	16.7	F
*	97	06/29/93	58.355	-169.136	66	14	0.50	2.93	41	6.8	2.3	16.6	F
*	98	06/29/93	58.018	-169.055	68	17	0.39	2.37	42	7.1	3.2	16.1	F
*	99	06/30/93	57.840	-169.360	64	06	0.50	2.98	42	6.4	2.8	16.4	F
*	100	06/30/93	57.672	-169.030	66	09	0.50	3.28	42	7.1	3.0	16.6	F

Table A-1.--Continued.

	Haul	MM/DD/YY	Latitude	Longitude	Depth (m)	Time (hr.)	Duration (hr.)	Distance (km)	Strata	Surf. Temp.	Gear. Temp.	Net Width (m)	Width Code
*	101	06/30/93	57.523	-169.394	70	14	0.50	2.50	42	7.1	2.5	16.1	F
*	102	06/30/93	57.356	-168.989	70	16	0.50	2.96	42	7.1	3.0	15.9	F
*	103	06/30/93	57.178	-169.294	71	18	0.50	2.96	42	6.9	3.1	16.7	F
*	104	07/01/93	56.991	-168.917	77	07	0.50	3.28	32	7.1	2.8	16.9	F
*	105	07/02/93	56.839	-169.289	77	11	0.50	3.04	32	7.0		17.2	F
*	106	07/02/93	56.680	-168.937	95	13	0.50	2.76	32	7.1	3.8	17.3	F
*	107	07/02/93	56.345	-168.880	128	16	0.50	3.19	50	8.1	3.9	17.6	F
	109	07/03/93	56.436	-169.489	102	06	0.40	2.70	32	6.0	3.9	16.6	F
*	110	07/03/93	56.333	-170.052	108	09	0.50	3.41	50	7.2	3.8	17.6	F
*	111	07/03/93	56.670	-170.128	99	11	0.50	2.69	42	7.8	3.7	17.0	F
*	112	07/03/93	56.823	-170.487	101	13	0.50	2.89	42	8.4	3.5	17.2	F
*	113	07/03/93	56.996	-170.201	66	16	0.50	2.91	42	6.1	4.8	15.8	F
*	114	07/03/93	57.130	-170.479	49	18	0.40	2.48	42	6.1	5.2	15.0	F
*	118	07/04/93	57.329	-170.238	53	12	0.50	2.85	42	7.3	4.5	14.1	F
*	119	07/04/93	57.487	-170.578	71	14	0.50	3.24	42	7.9	3.1	16.4	F
*	120	07/04/93	57.817	-170.632	75	17	0.50	3.11	42	8.3	2.8	16.9	F
*	121	07/05/93	58.318	-170.433	73	06	0.50	3.30	41	6.6	1.4	16.8	F
*	122	07/05/93	58.656	-170.443	73	09	0.50	3.13	41	6.4	0.7	16.9	F
*	123	07/05/93	58.989	-170.487	70	11	0.50	3.06	41	6.8	1.7	15.5	F
*	124	07/05/93	59.318	-170.545	66	14	0.33	2.00	41	6.8	1.3	16.4	F
*	125	07/05/93	59.658	-170.600	64	16	0.50	3.09	41	7.0	1.1	16.1	F
*	126	07/06/93	60.667	-171.425	64	07	0.50	2.93	41	6.5	0.4	17.8	F
	127	07/06/93	60.987	-171.485	59	09	0.50	3.20	41	6.5	0.6	16.4	F
	128	07/06/93	61.015	-172.152	62	11	0.50	3.28	41	6.6	-0.7	18.2	F
	129	07/06/93	60.679	-172.106	66	14	0.50	3.43	41	6.6	-0.8	16.8	F
*	130	07/06/93	60.350	-172.065	57	16	0.50	3.20	43	6.3	0.4	16.2	F
*	131	07/07/93	60.167	-172.325	57	06	0.50	3.13	43	6.9	2.5	16.2	F
*	132	07/07/93	60.013	-171.978	66	08	0.50	3.00	43	6.0	1.1	16.2	F
*	133	07/07/93	59.842	-172.237	73	10	0.50	2.91	43	7.0	-0.1	16.4	F
*	134	07/07/93	59.688	-171.908	77	12	0.50	3.22	43	7.1	-0.1	16.6	F
*	135	07/07/93	59.356	-171.814	79	15	0.50	3.33	43	7.5	0.1	16.7	F
*	136	07/07/93	59.014	-171.781	84	17	0.50	2.96	41	7.6	1.2	15.9	F
*	137	07/08/93	58.681	-171.751	91	07	0.50	3.11	41	8.2	2.1	16.9	F

Table A-1.--Continued.

	Haul	MM/DD/YY	Latitude	Longitude	Depth (m)	Time (hr.)	Duration (hr.)	Distance (km)	Strata	Surf. Temp.	Gear. Temp.	Net Width (m)	Width Code
*	138	07/08/93	58.346	-171.647	95	09	0.50	3.17	41	9.0	2.6	16.5	F
*	139	07/08/93	58.015	-171.591	95	12	0.50	3.35	41	9.0	3.0	16.7	F
*	140	07/08/93	57.684	-171.518	97	14	0.50	3.56	41	8.9	3.1	17.0	F
*	141	07/08/93	57.354	-171.456	99	17	0.50	3.48	41	8.8	3.5	17.2	F
*	142	07/09/93	57.017	-172.042	117	06	0.50	2.70	61	8.5	3.9	17.0	F
*	143	07/09/93	56.671	-171.965	124	09	0.50	2.69	61	7.9	4.0	16.8	F
	144	07/09/93	56.660	-172.546	137	12	0.50	3.33	61	8.3	4.0	17.2	F
	145	07/09/93	56.980	-172.650	123	14	0.50	3.46	61	8.5	4.0	16.8	F
	146	07/09/93	56.998	-173.246	141	17	0.50	3.26	61	8.5	3.9	17.1	F
*	148	07/10/93	57.334	-172.783	115	08	0.50	2.93	61	8.6	3.8	17.2	F
*	149	07/10/93	57.656	-172.795	117	10	0.50	3.78	61	8.4	3.4	17.2	F
*	150	07/10/93	57.982	-172.858	108	13	0.43	3.00	61	8.6	3.5	17.2	F
*	151	07/10/93	58.315	-172.935	108	15	0.50	3.59	61	8.4	3.2	17.2	F
*	152	07/10/93	58.650	-173.004	112	17	0.50	3.41	61	8.5	3.0	17.2	F
*	153	07/11/93	58.988	-173.061	106	07	0.50	3.04	61	8.0	2.5	17.2	F
*	154	07/11/93	59.321	-173.155	99	09	0.50	3.41	43	7.9	2.1	17.0	F
*	155	07/11/93	59.488	-173.470	101	11	0.50	3.57	43	7.8	1.8	17.0	F
*	156	07/11/93	59.647	-173.232	95	13	0.50	3.41	43	6.8	1.6	17.0	F
*	157	07/11/93	59.821	-173.550	95	15	0.50	3.28	43	7.4	1.5	17.0	F
	158	07/12/93	58.326	-174.309	172	07	0.50	2.72	61	8.0	3.6	17.5	F
	159	07/12/93	58.330	-173.564	115	10	0.50	3.33	61	8.0	3.3	17.2	F
	160	07/12/93	58.018	-173.497	115	12	0.50	3.28	61	8.4	3.4	17.2	F
	161	07/16/93	56.002	-168.228	150	17	0.50	3.30	50	8.8	4.1	16.7	F
*	167	07/18/93	60.014	-173.301	73	15	0.50	2.82	43	8.6	0.0	16.7	F
*	168	07/18/93	60.114	-173.767	86	17	0.50	3.28	43	8.9	-0.5	16.7	F
*	169	07/19/93	60.660	-173.473	64	07	0.50	2.70	41	7.9	0.5	16.7	F
*	170	07/19/93	60.996	-173.503	73	10	0.50	2.72	41	7.8	-1.1	16.6	F
	171	07/19/93	61.002	-172.834	64	12	0.24	1.45	41	7.6	-0.9	17.2	F
	172	07/19/93	60.668	-172.757	42	15	0.50	3.28	41	6.9	3.0	15.9	F
*	179	07/21/93	60.676	-174.827	97	09	0.50	2.56	41	8.8	0.9	17.2	F
*	180	07/21/93	60.343	-174.788	102	12	0.50	2.95	62	9.0	1.7	17.4	F
*	181	07/21/93	60.022	-174.621	106	15	0.50	3.22	62	9.0	2.2	17.5	F
*	182	07/21/93	59.679	-174.470	113	17	0.50	3.20	62	9.9	2.7	17.2	F

Table A-1.--Continued.

	Haul	MM/DD/YY	Latitude	Longitude	Depth (m)	Time (hr.)	Duration (hr.)	Distance (km)	Strata	Surf. Temp.	Gear. Temp.	Net Width (m)	Width Code
*	183	07/22/93	59.341	-174.449	119	07	0.46	3.00	62	9.7	2.8	17.1	F
*	184	07/22/93	59.012	-174.381	126	10	0.50	2.93	61	9.8	3.0	16.6	F
	185	07/22/93	59.003	-174.989	128	12	0.50	2.69	61	9.4	2.8	17.3	F
*	186	07/22/93	58.998	-175.710	134	15	0.50	2.83	61	10.0	2.6	17.0	F
*	187	07/22/93	58.661	-175.558	135	18	0.50	2.89	61	10.1	3.0	17.4	F
*	188	07/23/93	59.299	-175.748	137	07	0.50	3.39	61	10.0	2.2	17.2	F
*	189	07/23/93	59.663	-175.855	137	10	0.50	3.35	61	10.1	2.1	17.1	F
*	190	07/23/93	59.983	-175.919	128	13	0.50	3.52	61	10.9	2.2	16.9	F
*	191	07/23/93	60.318	-176.018	121	15	0.50	3.43	61	10.2	2.0	16.9	F
*	192	07/23/93	60.650	-176.188	119	17	0.50	3.22	61	10.6	2.0	17.2	F
	198	07/25/93	60.672	-178.233	163	07	0.50	3.33	61	9.8	2.0	17.4	F
*	199	07/25/93	60.680	-177.533	144	10	0.50	3.63	61	10.3	1.6	17.0	F
*	200	07/25/93	60.354	-177.392	148	12	0.50	3.50	61	10.2	1.7	16.6	F
*	201	07/25/93	59.993	-177.209	137	16	0.50	3.69	61	10.8	1.6	16.4	F
	202	07/25/93	60.018	-177.892	141	19	0.50	3.48	61	10.8	1.8	16.3	F
*	203	07/26/93	59.675	-177.114	174	07	0.50	3.52	61	10.1	2.9	17.4	F
*	204	07/26/93	59.336	-177.084	150	10	0.50	3.69	61	10.0	3.2	17.1	F
*	205	07/26/93	59.017	-177.568	135	13	0.50	3.56	61	10.0	3.1	17.2	F

Table A-2.--Haul data for stations sampled by the FV Aldebaran during the 1993 eastern Bering Sea bottom trawl survey.

	Haul	MM/DD/YY	Latitude	Longitude	Depth (m)	Time (hr.)	Duration (hr.)	Distance (km)	Strata	Surf. Temp.	Gear. Temp.	Net Width (m)	Width Code
*	1	06/06/93	56.662	-159.754	33	07	0.50	2.59	10	5.0	5.0	17.1	F
*	2	06/06/93	56.998	-159.715	55	10	0.50	3.07	10	3.6	4.1	18.0	F
*	3	06/06/93	57.326	-159.667	55	13	0.42	2.39	10	3.6	4.0	18.0	F
*	4	06/06/93	57.661	-159.631	48	15	0.50	2.45	10	3.9	4.1	17.7	F
*	5	06/06/93	57.988	-159.602	40	18	0.50	3.09	10	5.0	4.6	18.1	F
*	6	06/07/93	58.346	-159.535	22	07	0.42	2.78	10	5.0		17.1	F
*	7	06/07/93	58.325	-160.821	18	11	0.50	3.19	10	7.8		17.1	F
*	8	06/07/93	58.013	-160.834	42	14	0.30	2.00	10	4.4	4.6	17.6	F
*	9	06/07/93	57.686	-160.875	53	16	0.50	3.32	31	4.4	3.5	17.7	F
*	10	06/08/93	57.335	-160.930	60	07	0.50	3.02	31	3.9	3.6	17.2	F
*	11	06/08/93	57.012	-160.953	60	09	0.50	3.11	31	6.1	3.7	18.1	F
*	12	06/08/93	56.678	-160.973	68	12	0.50	3.15	31	5.6	3.8	17.1	F
*	13	06/08/93	56.350	-160.983	53	15	0.28	1.63	10	5.6	4.9	16.3	F
*	14	06/09/93	55.996	-162.239	66	07	0.33	1.67	31	7.2	3.2	17.1	F
*	15	06/09/93	56.312	-162.202	71	09	0.50	3.20	31	7.2	2.8	17.7	F
*	16	06/09/93	56.637	-162.184	73	12	0.50	3.35	31	7.2	3.0	17.9	F
*	17	06/09/93	56.992	-162.157	59	15	0.50	3.46	31	6.7	3.8	17.5	F
*	18	06/09/93	57.316	-162.147	48	17	0.50	3.17	10	4.4	3.6	17.6	F
*	19	06/10/93	57.649	-162.119	44	07	0.50	2.85	10	3.3	3.8	17.8	F
*	20	06/10/93	57.983	-162.128	35	09	0.50	3.09	10	3.9	4.6	16.8	F
*	21	06/10/93	58.307	-162.056	44	11	0.50	2.98	10	6.1		17.7	F
	22	06/10/93	58.650	-162.684	22	14	0.50	3.26	10	6.1		17.1	F
*	23	06/11/93	59.018	-163.351	16	06	0.50	3.39	10	6.7		17.1	F
*	24	06/11/93	58.679	-163.353	27	09	0.50	2.89	10	5.6	5.9	17.0	F
*	25	06/11/93	58.354	-163.367	31	11	0.50	2.69	10	5.6	4.7	17.2	F
*	26	06/11/93	58.024	-163.365	40	14	0.50	2.96	10	3.9	3.7	17.5	F
*	27	06/11/93	57.683	-163.370	44	16	0.50	3.09	10	3.9	3.3	17.8	F
*	28	06/12/93	57.351	-163.379	51	06	0.27	1.54	10	6.1	3.9	17.9	F
*	29	06/12/93	57.014	-163.382	62	09	0.50	2.98	31	6.1	2.5	18.1	F
*	30	06/12/93	56.675	-163.383	71	11	0.50	3.09	31	5.6	1.9	18.1	F
*	34	06/13/93	56.351	-163.402	84	07	0.25	1.37	31	6.7	1.2	18.5	F
*	35	06/13/93	56.013	-163.403	86	09	0.50	3.04	31	6.7	1.5	17.4	F

Table A-2.--Continued.

	Haul	MM/DD/YY	Latitude	Longitude	Depth (m)	Time (hr.)	Duration (hr.)	Distance (km)	Strata	Surf. Temp.	Gear. Temp.	Net Width (m)	Width Code
*	36	06/13/93	55.681	-163.402	80	11	0.33	2.07	31	6.7	3.0	17.7	F
*	37	06/13/93	55.358	-163.421	53	14	0.33	1.80	31	6.7		17.7	F
*	38	06/14/93	55.017	-164.571	59	07	0.50	2.43	31	6.1		18.0	F
*	39	06/14/93	55.328	-164.585	101	09	0.25	2.04	31			18.4	F
*	40	06/14/93	55.652	-164.587	95	12	0.24	1.59	31	7.2		18.4	F
*	41	06/14/93	55.993	-164.586	91	15	0.50	3.06	31	6.7	1.9	19.1	F
*	42	06/14/93	56.322	-164.586	86	17	0.50	2.91	31	6.1	1.5	18.5	F
*	43	06/15/93	56.648	-164.597	73	07	0.50	2.80	31	5.6	1.5	18.2	F
*	44	06/15/93	56.978	-164.603	68	09	0.50	2.93	31	5.0	1.9	18.0	F
*	45	06/15/93	57.311	-164.621	62	12	0.50	2.87	31	5.6		18.6	F
*	46	06/15/93	57.650	-164.623	51	14	0.50	3.07	10	4.4		17.5	F
*	47	06/15/93	58.001	-164.619	42	17	0.50	3.15	10	3.9	4.0	17.5	F
*	48	06/16/93	58.340	-164.631	42	07	0.50	2.76	10	5.0	3.9	17.2	F
*	49	06/16/93	58.651	-164.651	35	09	0.50	2.87	10	5.6		16.9	F
*	50	06/16/93	58.995	-164.657	24	11	0.50	2.72	10	5.6		16.4	F
*	51	06/16/93	59.310	-164.650	18	14	0.50	2.89	10	7.2	7.2	16.4	F
*	52	06/17/93	59.654	-165.957	18	06	0.50	2.70	20	5.6		17.1	F
*	53	06/17/93	59.349	-165.953	22	09	0.50	3.11	20	5.6	6.2	16.7	F
*	54	06/17/93	59.011	-165.944	27	11	0.50	2.96	20	5.0	5.9	16.7	F
*	55	06/17/93	58.671	-165.937	33	14	0.50	2.91	10	4.4	5.1	17.3	F
*	56	06/18/93	58.366	-165.934	40	06	0.50	3.09	10	3.3	3.3	19.0	F
*	57	06/18/93	58.014	-165.909	51	08	0.50	2.93	10	3.3	2.9	17.7	F
*	58	06/18/93	57.682	-165.888	62	11	0.50	3.11	31	3.3	1.7	18.3	F
*	59	06/18/93	57.350	-165.879	64	14	0.50	3.17	31	3.3	2.0	18.3	F
*	60	06/18/93	57.023	-165.853	68	17	0.50	3.00	31	5.0	2.5	18.5	F
*	61	06/19/93	56.660	-165.799	77	07	0.32	1.78	31	6.1	1.8	18.2	F
*	62	06/19/93	56.351	-165.807	90	09	0.33	2.09	31	7.2	2.8	19.0	F
*	63	06/19/93	56.017	-165.792	104	11	0.50	2.74	31	7.2	4.2	18.7	F
*	64	06/19/93	55.692	-165.797	115	14	0.41	2.35	50	7.2	4.3	19.0	F
*	65	06/20/93	55.356	-165.791	119	07	0.50	2.87	50	7.2	4.2	19.2	F
*	66	06/20/93	55.014	-165.749	130	09	0.50	3.09	50	7.2	4.1	18.8	F
*	67	06/20/93	54.781	-165.513	209	11	0.50	3.30	50	5.6		18.8	F
*	68	06/24/93	55.319	-166.952	139	07	0.50	2.95	50	8.3	3.9	18.6	F

Table A-2.--Continued.

	Haul	MM/DD/YY	Latitude	Longitude	Depth (m)	Time (hr.)	Duration (hr.)	Distance (km)	Strata	Surf. Temp.	Gear. Temp.	Net Width (m)	Width Code
*	69	06/24/93	55.659	-166.981	134	10	0.50	2.87	50	8.3	3.9	19.4	F
*	70	06/24/93	55.985	-166.988	134	12	0.50	2.76	50	7.8	3.8	19.2	F
*	71	06/24/93	56.314	-167.032	113	15	0.33	2.32	50	7.8	3.7	18.7	F
*	72	06/24/93	56.654	-167.066	93	17	0.50	2.93	31	7.8	2.9	18.4	F
*	73	06/25/93	56.984	-167.089	71	06	0.50	2.85	31	7.2	3.0	17.8	F
*	74	06/25/93	57.334	-167.113	68	09	0.48	3.00	31	7.2	2.8	18.2	F
*	75	06/25/93	57.657	-167.131	66	12	0.50	3.02	31	6.7	2.5	18.5	F
*	76	06/25/93	57.992	-167.168	62	15	0.50	2.78	31	6.7	1.9	18.2	F
*	77	06/25/93	58.323	-167.166	49	17	0.50	2.80	20	5.7	3.0	18.0	F
*	78	06/27/93	58.638	-167.222	42	07	0.50	2.61	20	4.6	4.6	18.2	F
*	79	06/27/93	59.006	-167.240	40	09	0.50	2.89	20	4.6	4.6	18.1	F
*	80	06/27/93	59.309	-167.263	31	11	0.48	3.04	20	5.6		16.8	F
*	81	06/27/93	59.644	-167.276	27	14	0.49	3.00	20	5.6		17.3	F
*	82	06/28/93	60.334	-167.263	29	06	0.50	2.85	20	6.1		17.1	F
*	83	06/28/93	60.337	-168.648	33	10	0.45	2.96	20	5.0	5.1	16.7	F
*	84	06/28/93	60.032	-168.652	37	13	0.50	2.54	20	5.0	4.9	17.4	F
*	85	06/28/93	59.683	-168.614	37	16	0.50	3.13	20	5.0		17.7	F
*	86	06/29/93	59.347	-168.566	40	06	0.49	2.89	20	5.0		19.5	F
*	87	06/29/93	59.019	-168.544	44	09	0.50	2.89	20	5.6		17.7	F
*	88	06/29/93	58.687	-168.492	49	12	0.50	2.78	20		2.9	17.8	F
*	89	06/29/93	58.345	-168.470	64	15	0.50	2.70	41		1.7	18.0	F
*	90	06/29/93	58.009	-168.430	68	18	0.50	2.70	42		3.3	18.1	F
*	91	06/30/93	57.842	-168.729	68	07	0.50	2.89	42	6.1	3.0	17.8	F
*	92	06/30/93	57.671	-168.410	68	08	0.25	1.37	42	6.6	3.2	18.7	F
*	93	06/30/93	57.503	-168.745	68	10	0.33	2.02	42	6.4	2.9	18.5	F
*	94	06/30/93	57.343	-168.377	71	12	0.50	2.95	32	6.7	3.0	18.2	F
*	95	06/30/93	57.172	-168.630	73	14	0.50	2.89	32	6.1	3.0	18.1	F
*	96	06/30/93	57.004	-168.332	79	17	0.33	2.06	32	7.2	2.8	18.4	F
*	98	07/02/93	56.833	-168.638	95	11	0.50	2.56	32	7.3	3.0	19.0	F
*	99	07/02/93	56.660	-168.300	106	14	0.50	2.56	50	7.5	3.4	18.2	F
*	100	07/02/93	56.345	-168.254	152	17	0.50	2.80	50	7.2	3.8	18.4	F
*	101	07/03/93	56.690	-169.503	77	06	0.50	3.11	32	6.1		18.2	F
*	102	07/03/93	56.823	-169.898	71	09	0.25	1.43	42	6.1		18.2	F

Table A-2.--Continued.

	Haul	MM/DD/YY	Latitude	Longitude	Depth (m)	Time (hr.)	Duration (hr.)	Distance (km)	Strata	Surf. Temp.	Gear. Temp.	Net Width (m)	Width Code
*	103	07/03/93	56.991	-169.543	59	11	0.25	2.06	42	5.6		18.0	F
*	104	07/03/93	57.319	-169.599	60	14	0.33	1.95	42	5.6		18.0	F
*	105	07/03/93	57.490	-169.984	66	16	0.50	2.93	42	5.6		18.0	F
*	106	07/04/93	57.661	-169.652	68	06	0.50	2.43	42	6.9	2.8	17.4	F
*	107	07/04/93	57.823	-169.972	71	09	0.50	3.02	42	6.3	2.2	17.7	F
	108	07/04/93	57.682	-170.230	71	11	0.50	3.22	42	7.1	2.4	17.4	F
	109	07/04/93	57.977	-170.332	71	13	0.50	2.87	42	6.0	1.7	17.7	F
*	110	07/04/93	57.996	-169.699	68	16	0.50	3.06	42	5.6	2.0	17.8	F
*	111	07/05/93	58.328	-169.736	68	06	0.50	2.85	41	5.6	2.2	17.7	F
*	112	07/05/93	58.651	-169.781	64	09	0.50	2.85	41	6.2	1.8	18.0	F
*	113	07/05/93	58.989	-169.828	60	11	0.60	3.19	41	5.0	1.8	18.2	F
*	114	07/05/93	59.331	-169.881	59	14	0.50	2.98	41	5.7	2.0	18.1	F
*	115	07/05/93	59.654	-169.922	53	16	0.47	2.98	41	5.0	2.4	17.8	F
	116	07/06/93	59.988	-170.632	62	06	0.47	2.96	41	6.1	1.0	17.8	F
*	117	07/06/93	60.001	-170.001	53	09	0.50	2.93	41	5.9	2.9	18.0	F
*	118	07/06/93	60.316	-170.026	49	11	0.50	3.02	20	6.1	2.3	18.0	F
	119	07/06/93	60.334	-170.639	59	14	0.50	2.74	41	6.2	0.9	18.5	F
*	120	07/06/93	60.334	-171.331	64	16	0.50	2.76	41	6.4	0.1	18.2	F
*	121	07/07/93	60.013	-171.305	68	06	0.50	2.98	41	6.1		18.1	F
*	122	07/07/93	59.686	-171.254	71	09	0.50	3.06	41	6.1		18.2	F
*	123	07/07/93	59.356	-171.185	73	11	0.50	2.85	41	6.1	0.3	18.1	F
*	124	07/07/93	58.995	-171.128	77	14	0.50	2.89	41	6.1		18.3	F
*	125	07/07/93	58.675	-171.086	82	16	0.50	2.91	41	7.5	1.0	18.2	F
*	126	07/08/93	58.349	-171.022	82	06	0.50	2.83	41	8.1	2.3	17.8	F
*	127	07/08/93	58.016	-170.970	84	09	0.50	2.87	42	8.4	2.7	17.9	F
*	128	07/08/93	57.679	-170.902	86	12	0.50	2.87	42	8.5	2.8	18.2	F
*	129	07/08/93	57.346	-170.850	80	14	0.48	3.07	42	8.7	3.6	18.1	F
*	130	07/08/93	57.002	-170.786	93	17	0.42	2.35	42	8.4	3.5	18.7	F
*	131	07/09/93	56.678	-170.730	112	06	0.50	2.37	61	8.0	3.7	18.4	F
*	132	07/09/93	56.360	-170.685	119	09	0.50	3.07	61	6.7		18.5	F
*	133	07/09/93	56.652	-171.329	119	13	0.25	1.82	61			18.3	F
*	134	07/09/93	56.978	-171.394	110	15	0.33	2.04	61	6.7		18.6	F
*	135	07/10/93	57.316	-172.093	106	07	0.47	2.63	61	8.2	3.8	18.4	F

Table A-2.--Continued.

	Haul	MM/DD/YY	Latitude	Longitude	Depth (m)	Time (hr.)	Duration (hr.)	Distance (km)	Strata	Surf. Temp.	Gear. Temp.	Net Width (m)	Width Code
*	136	07/10/93	57.645	-172.157	106	09	0.50	2.98	61	8.4	3.4	18.4	F
*	137	07/10/93	57.975	-172.227	102	12	0.47	2.91	61	8.2	3.3	18.3	F
*	138	07/10/93	58.312	-172.296	101	14	0.50	2.87	61	8.1	3.0	18.3	F
*	139	07/10/93	58.644	-172.362	101	16	0.25	1.39	61	8.1	2.6	18.5	F
*	140	07/11/93	58.996	-172.433	97	07	0.50	2.74	41	7.8	1.9	18.3	F
*	141	07/11/93	59.320	-172.494	86	09	0.33	2.07	43	6.3	1.2	19.3	F
*	142	07/11/93	59.490	-172.874	91	11	0.33	2.19	43	6.4	1.5	18.6	F
*	143	07/11/93	59.652	-172.569	82	13	0.50	2.98	43	6.1	0.2	18.2	F
*	144	07/11/93	59.820	-172.895	79	15	0.50	2.80	43	5.6		18.2	F
*	145	07/16/93	55.660	-168.183	134	17	0.50	2.59	50	7.5	4.3	18.0	F
*	151	07/18/93	57.334	-173.350	121	07	0.50	2.91	61	7.2	3.9	18.5	F
*	152	07/18/93	57.651	-173.400	113	10	0.50	3.02	61	7.8	3.6	18.6	F
*	153	07/19/93	60.007	-172.605	64	07	0.33	2.13	43	6.7		18.0	F
*	154	07/19/93	60.167	-173.040	55	08	0.25	1.48	43	6.7		17.7	F
	155	07/19/93	60.327	-173.435	59	12	0.25	1.33	43	7.5	1.2	18.0	F
*	156	07/19/93	60.664	-174.104	84	15	0.50	3.07	41	7.3	0.5	17.7	F
*	157	07/20/93	60.995	-174.186	82	07	0.50	2.57	41	6.9	0.4	20.7	F
*	162	07/21/93	60.335	-174.124	91	07	0.50	2.59	43	7.8	1.3	19.0	F
*	163	07/21/93	60.164	-174.352	99	09	0.50	2.67	43	7.8	1.8	18.7	F
*	164	07/21/93	60.004	-173.956	95	12	0.50	3.07	43	7.8	1.7	18.9	F
*	165	07/21/93	59.844	-174.207	104	14	0.50	2.96	62	8.3	1.9	18.6	F
*	166	07/21/93	59.678	-173.910	102	16	0.50	2.87	62	8.3	1.8	18.5	F
*	167	07/22/93	59.345	-173.801	108	07	0.50	2.67	62	8.9	2.7	18.3	F
*	168	07/22/93	59.023	-173.725	117	10	0.50	2.82	61	8.9	3.0	18.0	F
*	169	07/22/93	58.701	-173.642	124	12	0.50	3.09	61	8.9	3.2	18.1	F
	170	07/22/93	58.668	-174.257	157	15	0.50	2.93	61	8.9	3.5	18.3	F
*	171	07/22/93	58.732	-174.934	148	18	0.50	2.85	61	8.9	3.3	18.4	F
*	172	07/23/93	59.330	-175.111	132	07	0.50	2.78	61	9.4	2.6	17.9	F
*	173	07/23/93	59.649	-175.106	124	10	0.50	2.78	61	9.4	2.5	18.0	F
*	174	07/23/93	59.987	-175.258	117	13	0.50	3.20	61	9.4		18.1	F
*	175	07/23/93	60.312	-175.382	110	15	0.50	2.87	61	9.4	1.8	18.2	F
*	176	07/23/93	60.640	-175.457	106	18	0.50	2.82	61	9.4	1.6	18.5	F
*	183	07/25/93	60.673	-176.853	128	07	0.50	2.70	61	9.4	2.2	18.1	F
*	184	07/25/93	60.353	-176.718	135	10	0.50	2.85	61	9.4	1.5	17.7	F

Table A-2.--Continued.

	Haul	MM/DD/YY	Latitude	Longitude	Depth (m)	Time (hr.)	Duration (hr.)	Distance (km)	Strata	Surf. Temp.	Gear. Temp.	Net Width (m)	Width Code
*	185	07/25/93	60.018	-176.714	141	12	0.50	3.00	61	9.4	1.6	17.9	F
*	186	07/25/93	59.686	-176.553	134	15	0.58	3.39	61	9.4	1.6	17.7	F
*	187	07/25/93	59.354	-176.334	135	18	0.33	1.98	61	9.4	2.0	17.9	F
*	188	07/26/93	59.017	-176.311	135	07	0.50	2.78	61	9.4	2.7	18.4	F
*	189	07/26/93	58.999	-176.918	135	10	0.50	3.00	61	8.9	3.2	18.8	F
	190	07/26/93	58.685	-176.871	134	13	0.50	3.04	61	8.9	2.9	18.8	F
*	191	07/26/93	58.668	-176.228	143	16	0.50	3.17	61	9.4	3.0	18.7	F

APPENDIX B

List of Species Encountered

Appendix B contains a listing of all fish and invertebrate species taken during the 1993 eastern Bering Sea bottom trawl survey.

List of Tables

Table B-1.--Fish Species encountered during the 1993 U.S. eastern Bering Sea bottom trawl survey.

Common name	Scientific name
Family Petromyzontidae	
Pacific lamprey	*Lampetra tridentata*
Family Squalidae	
Pacific sleeper shark	*Somniosus pacificus*
Family Rajidae	
skate unident.	*Rajidae* unident.
Bathyraja unident.	*Bathyraja* sp.
big skate	*Raja binoculata*
Bering skate	*Bathyraja interrupta*
longnose skate	*Raja rhina*
Alaska skate	*Bathyraja parmifera*
Aleutian skate	*Bathyraja aleutica*
Family Pleuronectidae	
arrowtooth flounder	*Atheresthes stomias*
Kamchatka flounder	*Atheresthes evermanni*
Greenland turbot	*Reinhardtius hippoglossoides*
Pacific halibut	*Hippoglossus stenolepis*
flathead sole	*Hippoglossoides elassodon*
Bering flounder	*Hippoglossoides robustus*
rex sole	*Glyptocephalus zachirus*
yellowfin sole	*Pleuronectes asper*
longhead dab	*Limanda proboscidea*
Sakhalin sole	*Limanda sakhalinensis*
starry flounder	*Platichthys stellatus*
northern rock sole	*Lepidopsetta peracuata*
butter sole	*Isopsetta isolepis*
Alaska plaice	*Pleuronectes quadrituberculatus*
Family Agonidae	
tubenose poacher	*Pallasina barbata*
sawback poacher	*Sarritor frenatus*
sturgeon poacher	*Podothecus acipenserinus*
Aleutian alligatorfish	*Aspidophoroides bartoni*
Arctic alligatorfish	*Aspidophoroides olriki*
Bering poacher	*Occella dodecaedron*
Family Ammodytidae	
Pacific sand lance	*Ammodytes hexapterus*
Family Anarhichadidae	
wolf-eel	*Anarrhichthys ocellatus*
Bering wolffish	*Anarhichas orientalis*
Family Bathymasteridae	
searcher	*Bathymaster signatus*

Table B-1.--Continued.

Common name	Scientific name
Family Clupeidae	
Pacific herring	Clupea pallasi
Family Cottidae	
Gymnocanthus unident.	Gymnocanthus sp.
armorhead sculpin	Gymnocanthus galeatus
Artediellus unident.	Artediellus sp.
blackfin sculpin	Malacocottus kincaidi
darkfin sculpin	Malacocottus zonurus
yellow Irish lord	Hemilepidotus jordani
butterfly sculpin	Hemilepidotus papilio
Triglops unident.	Triglops sp.
scissortail sculpin	Triglops forficata
spectacled sculpin	Triglops scepticus
ribbed sculpin	Triglops pingeli
great sculpin	Myoxocephalus polyacanthocephalus
plain sculpin	Myoxocephalus jaok
spinyhead sculpin	Dasycottus setiger
tadpole sculpin	Psychrolutes paradoxus
sailfin sculpin	Nautichthys oculofasciatus
bigmouth sculpin	Hemitripterus bolini
thorny sculpin	Icelus spiniger
Icelus unident.	Icelus sp.
Family Trichodontidae	
Pacific sandfish	Trichodon trichodon
Family Gadidae	
Pacific cod	Gadus macrocephalus
Arctic cod	Boreogadus saida
saffron cod	Eleginus gracilis
walleye pollock	Theragra chalcogramma
Family Hexagrammidae	
greenling unident.	Hexagrammidae
Hexagrammos unident.	Hexagrammos sp.
whitespotted greenling	Hexagrammos stelleri
Family Cyclopteridae	
lumpsucker unident.	Cyclopteridae
smooth lumpsucker	Aptocyclus ventricosus
snailfish unident.	Cyclopteridae
Liparis unident.	Liparis sp.
Careproctus unident.	Careproctus sp.
monster snailfish	Careproctus phasma

Table B-1.--Continued.

Common name	Scientific name
Family Osmeridae	
eulachon	Thaleichthys pacificus
capelin	Mallotus villosus
rainbow smelt	Osmerus mordax
Family Salmonidae	
chum salmon	Oncorhynchus keta
Family Stichaeidae	
prickleback unident.	Stichaeidae
daubed shanny	Lumpenus maculatus
snake prickleback	Lumpenus sagitta
decorated warbonnet	Chirolophis decoratus
Family Zaproridae	
prowfish	Zaprora silenus
Family Zoarcidae	
marbled eelpout	Lycodes raridens
wattled eelpout	Lycodes palearis
polar eelpout	Lycodes turneri
shortfin eelpout	Lycodes brevipes
Family Scorpaenidae	
Pacific ocean perch	Sebastes alutus
light dusky rockfish	Sebastes new species a
northern rockfish	Sebastes polyspinis

Table B-2.--Invertebrate species encountered during the 1993 U.S. eastern Bering Sea bottom trawl survey.

Common name	Scientific name
Phylum Porifera	
Sponge unident.	Porifera
Phylum Coelenterata	
Sea anemone unident.	Actinaria (order)
Metridium unident.	Metridium sp.
Tealia unident.	Tealia sp.
Sea raspberry	Gersemia rubiformis
Hydroid unident.	Hydrozoa (class)
Sea Pen unident.	Pennatulacea (order)
Smoothstem seawhip	Virgularia sp.
Jellyfish unident.	Scyphozoa (class)
Soft coral unident.	Alcyonacea (order)
Phylum Ctenophora	
Comb jelly unident.	Ctenophora (phylum)
Phylum Mollusca	
Gastropods	
Nudibranch unident.	Onchidoridae (family)
Rosy tritonia	Tritonia diomedea
Giant orange tochui	Tochuina tetraquetra
Keeled aforia	Aforia circinata
Alaska volute	Arctomelon stearnsii
Northern beringius	Beringius beringii
Beringius unident.	Beringius sp.
Boreotrophon unident.	Boreotrophon sp.
Angled whelk	Buccinum angulosum
Sinuous whelk	Buccinum plectrum
Polar whelk	Buccinum polare
Ladder (silky) whelk	Buccinum scalariforme
Buccinum unident.	Buccinum sp.
Colus unident.	Colus sp.
Thin-ribbed whelk	Colus herendeenii
Hall's colus	Colus halli
Oregon triton	Fusitriton oregonensis
Fusitriton unident.	Fusitriton sp.
Snail unident.	Gastropoda (phylum)
Natica unident.	Natica sp.
Little neptune	Neptunea borealis
Northern neptune	Neptunea heros
Lyre whelk	Neptunea lyrata
Helmet whelk	Neptunea magma
Pribilof whelk	Neptunea pribiloffensis
Neptunea unident.	Neptunea sp.
Fat whelk	Neptunea ventricosa
Kroyer's plicifus	Plicifusus kroyeri
Plicifusus unident.	Plicifusus sp.

Table B-2.--Continued.

Common name	Scientific name
Gastropods (cont'd)	
Polinices unident.	Polinices sp.
Pale moonsnail	Polinices pallidus
Snail (gastropod) eggs	Snail (gastropod) eggs
Warped whelk	Pyrulofusus deformis
Fragile whelk	Volutopsius fragilis
Large melon snail	Volutopsius melonis
Tulip whelk	Volutopsius middendorffii
Volutopsius unident.	Volutopsius sp.
Opisthobranch gastropod	Thecosomata (order)
Bivalves	
Bivalve unident.	Bivalvia (class)
Cockle unident.	Cardiidae (family)
Chlamys unident.	Chlamys sp.
Reddish scallop	Chlamys rubida
Clinocardium unident.	Clinocardium sp.
Cyclocardia unident.	Cyclocardia sp.
Macoma unident.	Macoma sp.
Artic surfclam	Mactromeris polynyma
Mactromeris unident.	Mactromeris sp.
Blue mussel	Mytilus edulis
Weathervane scallop	Patinopectin caurinus
Scallop unident.	Pectinidae (family)
Alaska falsejingle	Pododesmus macroschisma
Greenland cockle	Serripes groenlandicus
Serripes unident.	Serripes sp.
Siliqua unident.	Siliqua sp.
Alaska razor clam	Siliqua alta
Pacific razor clam	Siliqua patula
Crisscrossed yoldia	Yoldia scissurata
Cephalopods	
Octopus unident.	Octopodidae (family)
Squid unident.	Teuthoidea (order)
Phylum Annelida	
Sea mouse unident.	Aphroditidae (family)
Depressed scale worm	Eunoe depressa
Giant scale worm	Eunoe nodosa
Eunoe unident.	Eunoe sp.
Scale worm unident.	Polynoidae (family)
striped sea leech	Carcinobdella cyclostomum
Tube worm unident.	Polychaeta (class)
Phylum Arthropoda	
Giant barnacle	Balanus evermanni
Balanus unident.	Balanus sp.
Barnacle unident.	Thoracica (order)
Amphipod unident.	Amphipoda (order)

Table B-2.--Continued.

Common name	Scientific name
Crab	
Dungeness crab	Cancer magister
Oregon rock crab	Cancer oregonensis
Broad snow crab	Chionoecetes bairdi
Tanner crab	Chionoecetes hybrid
Narrow snow crab	Chionoecetes opilio
Horsehair crab	Erimacrus isenbeckii
Circumboreal toad crab	Hyas coarctatus
North Pacific toad crab	Hyas lyratus
Hyas unident.	Hyas sp.
Graceful decorator crab	Oregonia gracilis
Hermit crab unident.	Paguridae (family)
Red king crab	Paralithodes camtschatica
Blue king crab	Paralithodes platypus
Helmet crab	Telmessus cheiragonus
Shrimp	
Artic argid	Argis dentata
Northern argid	Argis lar
Argis unident.	Argis sp.
Crangon unident.	Crangon sp.
Ridged crangon	Crangon dalli
Eualus unident.	Eualus sp.
Hippolytid shrimp unident.	Hippolytidae (family)
Lebbeus unident.	Lebbeus sp.
Northern (pink) shrimp	Pandalus borealis
Humpy shrimp	Pandalus goniurus
Pandalus unident.	Pandalus sp.
Scultured shrimp	Sclerocrangon boreas
Shrimp unident.	Penaeidea (Section)
Phylum Sipuncula	
Sipunculid worm unident.	Sipuncula (phylum)
Phylum Nemertea	
Nemertean worm unident.	Nemertea (phylum)
Phylum Echiura	
Echiuroid worm unident.	Echiura (phylum)
Phylum Bryozoa	
Bryozoan unident.	Bryozoa (phylum)
Leafy bryozoan	Flustra serrulata
Ribbed bryozoan	Rhamphostomella costata
Phylum Echinodermata	
Holothuroidea	
Sea football	Cucumaria fallax

Table B-2.--Continued.

Common name	Scientific name
Holothuroidea (cont'd)	
Cucumaria unident.	*Cucumaria* sp.
Sea cucumber unident	Holothuroidea (class)
Redscaled sea cucumber	*Psolus* sp.
Echinoidea	
Sand dollar unident.	Clypeasteroida (order)
Sea urchin unident.	Sea urchin unident.
Green sea urchin	*Strongylocentrotus droebachiensis*
Asteroidea	
Purple-orange sea star	*Asterias amurensis*
Starfish unident.	Asteroidea (subclass)
Red bat star	*Ceramaster japonicus*
Rose sea star	*Crossaster papposus*
Common mud star	*Ctenodiscus crispatus*
Ctenodiscus unident.	*Ctenodiscus* sp.
Pincushion sea star	*Diplopteraster multipes*
Evasterias unident.	*Evasterias* sp.
Giant sea star	*Evasterias echinosoma*
Henricia unident.	*Henricia* sp.
Tumid sea star	*Henricia tumida*
Arctic sea star	*Leptasterias arctica*
Knobless six-rayed sea star	*Leptasterias hexactis*
Knobby six-rayed sea star	*Leptasterias polaris*
Leptasterias unident.	*Leptasterias* sp.
Blackspined sea star	*Lethasterias nanimensis*
Redbanded sea star	*Orthasterias koehleri*
Scarlet sea star	*Pseudarchaster parelii*
Obscure sea star	*Pteraster obscurus*
Pteraster unident.	*Pteraster* sp.
Twentyarm sea star	*Pycnopodia helianthoides*
Solaster unident.	*Solaster* sp.
Ophiuroidea	
Basket star	*Gorgonocephalus caryi*
Notched brittlestar	*Ophiura sarsi*
Brittlestarfish unident.	Ophiuroidea (subclass)
Phylum Chordata	
Aplidium unident.	*Aplidium* sp.
Tunicate unident.	Ascidian unident.
Sea onion	*Boltenia ovifera*
Sea onion unident.	*Boltenia* sp.
Compound ascidian unident.	Compound ascidian unident.
Sea peach	*Halocynthia aurantium*
Sea grape	*Molgula grifithsii*
Sea potato	*Styela rustica*

APPENDIX C

Rank Order of Relative Abundance of Fish and Invertebrates

Appendix C ranks all fish and invertebrates caught during the 1993 eastern Bering Sea bottom trawl survey by descending CPUE (kg/ha).

Table C-1.--Rank order of fish and invertebrate taxa by relative abundance (kg/ha) from the 1993 eastern Bering Sea bottom trawl survey.

RANK	SPECIES	MEAN CPUE (KG/HA)	VARIANCE	95 PERCENT CONFIDENCE LIMITS		PROPORTION	CUMULATIVE PROPORTION	NAME
1	21740	121.64899	122.968	99.91433	143.38364	0.33292601	0.33292601	Theragra chalcogramma
2	10210	54.44815	20.732	45.52378	63.37253	0.14901200	0.48193800	Pleuronectes asper
3	10260	47.87854	16.824	39.83917	55.91791	0.13103300	0.61297101	Lepidopsetta sp.
4	81742	21.06217	3.644	17.32065	24.80369	0.05764200	0.67061299	Asterias amurensis
5	21720	15.20033	1.442	12.84647	17.55419	0.04160000	0.71221298	Gadus macrocephalus
6	10130	12.10975	1.048	10.10281	14.11669	0.03314200	0.74535501	Hippoglossoides elassodon
7	10285	11.11134	1.243	8.92615	13.29652	0.03040900	0.77576399	Pleuronectes quadrituberculatus
8	10110	10.08406	1.136	7.99541	12.17272	0.02759800	0.80336201	Atheresthes stomias
9	69010	9.06419	1.097	7.01129	11.11709	0.02480700	0.82816797	Paguridae
10	400	8.16929	0.335	7.03425	9.30432	0.02235700	0.85052598	Rajidae unident.
11	68580	8.16774	0.610	6.63650	9.69898	0.02235300	0.87287903	Chionoecetes opilio
12	10120	3.39145	0.104	2.76048	4.02243	0.00928200	0.88216102	Hippoglossus stenolepis
13	21110	3.01887	3.062	0.00000	6.44853	0.00826200	0.89042300	Clupea pallasi
14	91000	2.69145	1.352	0.41240	4.97050	0.00736600	0.89778799	Porifera
15	40500	2.63789	0.145	1.89273	3.38304	0.00721900	0.90500802	Scyphozoa (class)
16	98082	2.10408	0.294	1.04113	3.16704	0.00575800	0.91076601	Styela rustica
17	83020	1.90719	0.063	1.41536	2.39902	0.00522000	0.91598600	Gorgonocephalus caryi
18	21371	1.83059	0.064	1.33463	2.32654	0.00501000	0.92099601	Myoxocephalus jaok
19	68560	1.75088	0.051	1.30700	2.19476	0.00479200	0.92578697	Chionoecetes bairdi
20	71884	1.59617	0.074	1.06317	2.12917	0.00436800	0.93015599	Neptunea heros
21	69322	1.59584	0.207	0.70313	2.48855	0.00436700	0.93452299	Paralithodes camtschaticus
22	21370	1.46714	0.036	1.09360	1.84069	0.00401500	0.93853801	Myoxocephalus polyacanthocephalus
23	71820	1.43519	0.064	0.93787	1.93252	0.00392800	0.94246602	Neptunea pribiloffensis
24	43000	1.27040	0.110	0.62047	1.92034	0.00347700	0.94594300	Actiniaria (order)
25	98205	1.23939	0.342	0.09343	2.38535	0.00339200	0.94933498	Halocynthia aurantium
26	81780	0.89987	0.253	0.00000	1.88598	0.00246300	0.95179802	Ctenodiscus crispatus
27	80590	0.86107	0.027	0.53784	1.18430	0.00235700	0.95415401	Leptasterias polaris
28	10112	0.80237	0.007	0.63625	0.96849	0.00219600	0.95635003	Atheresthes evermanni
29	71882	0.74240	0.014	0.51116	0.97364	0.00203200	0.95838201	Neptunea ventricosa
30	99902	0.67708	0.258	0.00000	1.67233	0.00185300	0.96023500	Molgula grifithsii
31	20040	0.66120	0.007	0.49935	0.82305	0.00181000	0.96204400	Podothecus acipenserinus
32	21347	0.63580	0.089	0.05158	1.22002	0.00174000	0.96378398	Hemilepidotus jordani
33	10115	0.62668	0.012	0.41078	0.84257	0.00171500	0.96550000	Reinhardtius hippoglossoides
34	69323	0.59271	0.019	0.32027	0.86515	0.00162200	0.96712202	Paralithodes platypus
35	68577	0.51656	0.016	0.27140	0.76172	0.00141400	0.96853501	Hyas coarctatus
36	71870	0.50413	0.015	0.26085	0.74740	0.00138000	0.96991497	Neptunea lyrata
37	23041	0.49908	0.105	0.00000	1.13520	0.00136600	0.97128099	Mallotus villosus
38	10140	0.48757	0.011	0.27761	0.69752	0.00133400	0.97261500	Hippoglossoides robustus
39	83010	0.46915	0.012	0.25137	0.68693	0.00128400	0.97389901	Basketstarfish unident.
40	24185	0.43086	0.004	0.31346	0.54827	0.00117900	0.97507799	Lycodes palearis
41	21420	0.42782	0.007	0.26463	0.59101	0.00117100	0.97624898	Hemitripterus bolini
42	83320	0.42075	0.041	0.02437	0.81712	0.00115100	0.97740102	Ophiura sarsi
43	98310	0.41111	0.012	0.19405	0.62817	0.00112500	0.97852600	Aplidium sp.
44	21348	0.40637	0.030	0.06651	0.74623	0.00111200	0.97963798	Hemilepidotus papilio

Table C-1.--Continued.

RANK	SPECIES	MEAN CPUE (KG/HA)	VARIANCE	95 PERCENT CONFIDENCE LIMITS		PROPORTION	CUMULATIVE PROPORTION	NAME
45	83000	0.38476	0.013	0.16335	0.60618	0.00105300	0.98069102	Ophiuroid unident.
46	10220	0.34691	0.007	0.18354	0.51028	0.00094900	0.98163998	Platichthys stellatus
47	98000	0.33572	0.020	0.05707	0.61437	0.00091900	0.98255903	Ascidian unident.
48	80200	0.32871	0.017	0.07014	0.58729	0.00090000	0.98345900	Lethasterias nanimensis
49	82500	0.30750	0.045	0.00000	0.72224	0.00084200	0.98430002	sea urchin unident.
50	22200	0.28674	0.004	0.15770	0.41578	0.00078500	0.98508501	Cyclopteridae (Liparidinae)
51	10200	0.27561	0.008	0.09738	0.45384	0.00075400	0.98583901	Glyptocephalus zachirus
52	24191	0.26689	0.003	0.15889	0.37488	0.00073000	0.98657000	Lycodes brevipes
53	10211	0.24556	0.003	0.13630	0.35483	0.00067200	0.98724198	Limanda proboscidea
54	71753	0.22035	0.014	0.00000	0.45006	0.00060300	0.98784500	Pyrulofusus deformis
55	72500	0.20888	0.004	0.09013	0.32763	0.00057200	0.98841703	Fusitriton oregonensis
56	66580	0.20823	0.043	0.00000	0.61632	0.00057000	0.98898602	Argis dentata
57	71500	0.20250	0.003	0.09212	0.31288	0.00055400	0.98954099	Gastropod unident.
58	21735	0.19662	0.033	0.00000	0.55218	0.00053800	0.99007899	Eleginus gracilis
59	98100	0.19490	0.002	0.10440	0.28540	0.00053300	0.99061197	Boltenia sp.
60	66031	0.18428	0.002	0.09984	0.26872	0.00050400	0.99111599	Pandalus borealis
61	24180	0.17785	0.009	0.00000	0.36499	0.00048700	0.99160302	Lycodes sp.
62	81779	0.16803	0.005	0.02332	0.31274	0.00046000	0.99206299	Ctenodiscus sp.
63	71001	0.14890	0.002	0.05588	0.24192	0.00040800	0.99247098	snail (gastropod) eggs
64	80010	0.14460	0.010	0.00000	0.34110	0.00039600	0.99286598	Evasterias sp.
65	24184	0.13830	0.001	0.06314	0.21346	0.00037900	0.99324501	Lycodes raridens
66	72740	0.12702	0.001	0.07252	0.18153	0.00034800	0.99359202	Buccinum sp.
67	71750	0.11354	0.001	0.05719	0.16988	0.00031100	0.99390298	Volutopsius sp.
68	21592	0.11323	0.006	0.00000	0.26618	0.00031000	0.99421299	Trichodon trichodon
69	69400	0.11078	0.001	0.04738	0.17418	0.00030300	0.99451602	Erimacrus isenbeckii
70	98105	0.10356	0.010	0.00000	0.29776	0.00028300	0.99479997	Boltenia ovifera
71	80020	0.09516	0.002	0.00529	0.18503	0.00026000	0.99506003	Evasterias echinosoma
72	80594	0.09475	0.005	0.00000	0.23156	0.00025900	0.99531901	Leptasterias arctica
73	85201	0.08531	0.005	0.00000	0.22579	0.00023300	0.99555302	Cucumaria fallax
74	41201	0.08393	0.000	0.04768	0.12018	0.00023000	0.99578297	Gersemia sp.
75	95000	0.08003	0.002	0.00312	0.15694	0.00021900	0.99600202	bryozoan unident.
76	72755	0.07099	0.001	0.02099	0.12098	0.00019400	0.99619597	Buccinum polare
77	21446	0.06997	0.000	0.03677	0.10317	0.00019200	0.99638700	Icelus sp.
78	21313	0.06470	0.000	0.02514	0.10426	0.00017700	0.99656397	Gymnocanthus sp.
79	43040	0.06469	0.001	0.00000	0.13323	0.00017700	0.99674100	Tealia sp.
80	68578	0.05944	0.000	0.03204	0.08685	0.00016300	0.99690402	Hyas lyratus
81	85200	0.05678	0.001	0.00356	0.11000	0.00015500	0.99706000	Cucumaria sp.
82	20720	0.05071	0.000	0.02103	0.08039	0.00013900	0.99719799	Bathymaster signatus
83	72743	0.04659	0.000	0.02361	0.06958	0.00012800	0.99732602	Buccinum angulosum
84	71756	0.04644	0.001	0.00000	0.10094	0.00012700	0.99745297	Volutopsius fragilis
85	56311	0.04478	0.000	0.00949	0.08007	0.00012300	0.99757499	Eunoe nodosa
86	80595	0.04417	0.000	0.02405	0.06428	0.00012100	0.99769598	Leptasterias sp.
87	23010	0.04385	0.001	0.00000	0.09066	0.00012000	0.99781603	Thaleichthys pacificus
88	72752	0.03827	0.000	0.02220	0.05435	0.00010500	0.99792099	Buccinum scalariforme
89	68781	0.03708	0.000	0.01361	0.06055	0.00010100	0.99802297	Telmessus cheiragonus

Table C-1.--Continued.

RANK	SPECIES	MEAN CPUE (KG/HA)	VARIANCE	95 PERCENT CONFIDENCE LIMITS		PROPORTION	CUMULATIVE PROPORTION	NAME
90	21390	0.03524	0.000	0.02132	0.04917	0.00009600	0.99811900	Dasycottus setiger
91	80160	0.03156	0.001	0.00000	0.08229	0.00008600	0.99820501	Pycnopodia helianthoides
92	50010	0.03135	0.000	0.00004	0.06267	0.00008600	0.99829102	tube worm unident.
93	10270	0.03127	0.001	0.00000	0.07698	0.00008600	0.99837703	Isopsetta isolepis
94	82510	0.03011	0.000	0.01133	0.04889	0.00008200	0.99845898	Strongylocentrotus droebachiensis
95	65203	0.02868	0.000	0.00000	0.06933	0.00007800	0.99853802	Balanus evermanni
96	78010	0.02656	0.000	0.00577	0.04735	0.00007300	0.99861002	octopus unident.
97	71800	0.02010	0.000	0.00000	0.04699	0.00005500	0.99866498	Neptunea sp.
98	71835	0.01995	0.000	0.00962	0.03027	0.00005500	0.99871999	Neptunea borealis
99	74120	0.01671	0.000	0.00000	0.03708	0.00004600	0.99876601	Patinopecten caurinus
100	71769	0.01387	0.000	0.00426	0.02348	0.00003800	0.99880397	Beringius sp.
101	85210	0.01357	0.000	0.00000	0.03210	0.00003700	0.99884099	Psolus sp.
102	71886	0.01342	0.000	0.00512	0.02172	0.00003700	0.99887699	Neptunea magna
103	68590	0.01327	0.000	0.00551	0.02103	0.00003600	0.99891400	Chionoecetes hybrid
104	72751	0.01315	0.000	0.00000	0.02697	0.00003600	0.99895000	Buccinum plectrum
105	22232	0.01260	0.000	0.00172	0.02348	0.00003400	0.99898398	Careproctus scottae
106	50160	0.01236	0.000	0.00000	0.02578	0.00003400	0.99901801	Aphroditidae
107	20061	0.01192	0.000	0.00707	0.01677	0.00003300	0.99905097	Occella dodecaedron
108	81355	0.01174	0.000	0.00410	0.01939	0.00003200	0.99908298	Pteraster obscurus
109	75111	0.01146	0.000	0.00390	0.01902	0.00003100	0.99911398	Mactromeris polynyma
110	80000	0.01041	0.000	0.00156	0.01926	0.00002800	0.99914300	starfish unident.
111	81095	0.00991	0.000	0.00153	0.01829	0.00002700	0.99917001	Crossaster papposus
112	74080	0.00978	0.000	0.00000	0.02476	0.00002700	0.99919701	Mytilus edulis
113	71891	0.00939	0.000	0.00028	0.01850	0.00002600	0.99922198	Plicifusus kroyeri
114	21375	0.00928	0.000	0.00000	0.02007	0.00002500	0.99924803	Myoxocephalus sp.
115	20322	0.00910	0.000	0.00000	0.01844	0.00002500	0.99927300	Anarhichas orientalis
116	66045	0.00882	0.000	0.00388	0.01376	0.00002400	0.99929702	Pandalus goniurus
117	21932	0.00869	0.000	0.00000	0.02163	0.00002400	0.99932098	Hexagrammos stelleri
118	71010	0.00865	0.000	0.00400	0.01330	0.00002400	0.99934399	nudibranch unident.
119	23792	0.00863	0.000	0.00000	0.02556	0.00002400	0.99936801	Cryptacanthodes giganteus
120	20006	0.00827	0.000	0.00000	0.01829	0.00002300	0.99939001	Sarritor frenatus
121	21935	0.00795	0.000	0.00000	0.01894	0.00002200	0.99941200	Hexagrammos decagrammus
122	81310	0.00789	0.000	0.00240	0.01338	0.00002200	0.99943399	Pteraster sp.
123	69520	0.00748	0.000	0.00000	0.01642	0.00002000	0.99945402	Hyas sp.
124	71772	0.00747	0.000	0.00203	0.01291	0.00002000	0.99947500	Beringius beringii
125	68510	0.00721	0.000	0.00131	0.01310	0.00002000	0.99949402	Oregonia gracilis
126	71764	0.00720	0.000	0.00000	0.01876	0.00002000	0.99951398	Volutopsius middendorffii
127	42000	0.00674	0.000	0.00000	0.01591	0.00001800	0.99953300	Pennatulacea (order)
128	66570	0.00649	0.000	0.00295	0.01002	0.00001800	0.99954998	Argis sp.
129	85000	0.00596	0.000	0.00000	0.01314	0.00001600	0.99956697	Holothuroidea unident.
130	75285	0.00587	0.000	0.00169	0.01004	0.00001600	0.99958301	Serripes groenlandicus
131	81360	0.00556	0.000	0.00000	0.01490	0.00001500	0.99959803	Diplopteraster multipes
132	95030	0.00519	0.000	0.00000	0.01058	0.00001400	0.99961197	Flustra serrulata
133	21350	0.00509	0.000	0.00244	0.00774	0.00001400	0.99962598	Triglops sp.
134	21930	0.00490	0.000	0.00000	0.01039	0.00001300	0.99963897	Hexagrammos sp.

Table C-1.--Continued.

RANK	SPECIES	MEAN CPUE (KG/HA)	VARIANCE	95 PERCENT CONFIDENCE LIMITS		PROPORTION	CUMULATIVE PROPORTION	NAME
135	74104	0.00476	0.000	0.00000	0.01141	0.00001300	0.99965203	Chlamys sp.
136	30060	0.00431	0.000	0.00000	0.01275	0.00001200	0.99966401	Sebastes alutus
137	98200	0.00411	0.000	0.00000	0.01218	0.00001100	0.99967599	Halocynthia sp.
138	66502	0.00404	0.000	0.00150	0.00657	0.00001100	0.99968702	Crangon sp.
139	72501	0.00402	0.000	0.00000	0.01004	0.00001100	0.99969798	Fusitriton sp.
140	65201	0.00392	0.000	0.00000	0.01160	0.00001100	0.99970800	Balanus sp.
141	66170	0.00380	0.000	0.00000	0.01028	0.00001000	0.99971902	Eualus sp.
142	82730	0.00347	0.000	0.00115	0.00579	0.00001000	0.99972802	sand dollar unident.
143	66611	0.00341	0.000	0.00224	0.00459	0.00000900	0.99973798	Argis lar
144	72063	0.00323	0.000	0.00027	0.00619	0.00000900	0.99974602	Aforia circinata
145	21438	0.00319	0.000	0.00043	0.00596	0.00000900	0.99975502	Icelus spiniger
146	23235	0.00304	0.000	0.00000	0.00900	0.00000800	0.99976301	Oncorhynchus keta
147	401	0.00300	0.000	0.00000	0.00643	0.00000800	0.99977201	skate egg case unident.
148	95070	0.00297	0.000	0.00000	0.00753	0.00000800	0.99978000	Rhamphostomella costata
149	23055	0.00292	0.000	0.00000	0.00693	0.00000800	0.99978799	Osmerus mordax
150	20510	0.00286	0.000	0.00000	0.00706	0.00000800	0.99979597	Anoplopoma fimbria
151	71890	0.00286	0.000	0.00055	0.00517	0.00000800	0.99980301	Plicifusus sp.
152	74000	0.00276	0.000	0.00024	0.00527	0.00000800	0.99981099	Pelecypoda unident.
153	41100	0.00270	0.000	0.00000	0.00799	0.00000700	0.99981803	Alcyonacea (order)
154	75600	0.00262	0.000	0.00000	0.00733	0.00000700	0.99982601	Pododesmus macroschisma
155	66530	0.00257	0.000	0.00124	0.00390	0.00000700	0.99983299	Crangon dalli
156	74106	0.00248	0.000	0.00000	0.00735	0.00000700	0.99983901	Chlamys rubida
157	23808	0.00239	0.000	0.00109	0.00369	0.00000700	0.99984598	Lumpenus sagitta
158	42001	0.00234	0.000	0.00000	0.00693	0.00000600	0.99985200	Virgularia sp.
159	80106	0.00223	0.000	0.00000	0.00660	0.00000600	0.99985802	Orthasterias koehleri
160	71525	0.00207	0.000	0.00000	0.00434	0.00000600	0.99986398	Natica sp.
161	21725	0.00192	0.000	0.00022	0.00362	0.00000500	0.99986899	Boreogadus saida
162	68020	0.00185	0.000	0.00000	0.00549	0.00000500	0.99987400	Cancer magister
163	94000	0.00178	0.000	0.00000	0.00495	0.00000500	0.99987900	Sipuncula (phylum)
164	30150	0.00177	0.000	0.00000	0.00524	0.00000500	0.99988401	Sebastes ciliatus
165	71030	0.00169	0.000	0.00000	0.00416	0.00000500	0.99988902	Tritonia diomedea
166	45000	0.00168	0.000	0.00000	0.00496	0.00000500	0.99989301	Ctenophora (phylum)
167	20050	0.00156	0.000	0.00082	0.00230	0.00000400	0.99989802	Aspidophoroides bartoni
168	10212	0.00154	0.000	0.00045	0.00263	0.00000400	0.99990201	Limanda sakhalinensis
169	80111	0.00154	0.000	0.00000	0.00457	0.00000400	0.99990600	Leptasterias hexactis
170	65100	0.00154	0.000	0.00000	0.00350	0.00000400	0.99991000	Thoracica (order)
171	74980	0.00149	0.000	0.00000	0.00346	0.00000400	0.99991399	Clinocardium sp.
172	20202	0.00148	0.000	0.00065	0.00231	0.00000400	0.99991798	Ammodytes hexapterus
173	80540	0.00146	0.000	0.00051	0.00242	0.00000400	0.99992198	Henricia sp.
174	75110	0.00142	0.000	0.00000	0.00295	0.00000400	0.99992597	Mactromeris sp.
175	21368	0.00127	0.000	0.00000	0.00376	0.00000300	0.99993002	Myoxocephalus verrucosus(=M.
176	71580	0.00125	0.000	0.00000	0.00346	0.00000300	0.99993300	Polinices pallidus
177	66020	0.00124	0.000	0.00000	0.00297	0.00000300	0.99993700	Pandalus sp.
178	74100	0.00122	0.000	0.00000	0.00319	0.00000300	0.99993998	Pectinid unident.
179	30420	0.00121	0.000	0.00000	0.00359	0.00000300	0.99994302	Sebastes polyspinis

Table C-1.--Continued.

RANK	SPECIES	MEAN CPUE (KG/HA)	VARIANCE	95 PERCENT CONFIDENCE LIMITS		PROPORTION	CUMULATIVE PROPORTION	NAME
180	71721	0.00121	0.000	0.00000	0.00341	0.00000300	0.99994701	Colus herendeenii
181	71761	0.00114	0.000	0.00000	0.00330	0.00000300	0.99994999	Pyrulofusus melonis
182	71710	0.00110	0.000	0.00000	0.00222	0.00000300	0.99995297	Colus sp.
183	23805	0.00099	0.000	0.00039	0.00159	0.00000300	0.99995500	Lumpenus maculatus
184	71012	0.00098	0.000	0.00000	0.00289	0.00000300	0.99995798	Tochuina tetraquetra
185	98300	0.00079	0.000	0.00000	0.00235	0.00000200	0.99996001	compound ascidian unident.
186	21710	0.00075	0.000	0.00000	0.00162	0.00000200	0.99996197	Microgadus proximus
187	24100	0.00075	0.000	0.00000	0.00221	0.00000200	0.99996400	Zoarcidae
188	10180	0.00067	0.000	0.00000	0.00167	0.00000200	0.99996603	Microstomus pacificus
189	40011	0.00064	0.000	0.00000	0.00179	0.00000200	0.99996799	hydroid unident.
190	75284	0.00063	0.000	0.00000	0.00150	0.00000200	0.99997002	Serripes sp.
191	79000	0.00060	0.000	0.00000	0.00133	0.00000200	0.99997097	squid unident.
192	75267	0.00059	0.000	0.00012	0.00106	0.00000200	0.99997300	Siliqua alta
193	72790	0.00054	0.000	0.00000	0.00159	0.00000100	0.99997401	Arctomelon stearnsii
194	81060	0.00053	0.000	0.00000	0.00158	0.00000100	0.99997598	Solaster sp.
195	23809	0.00053	0.000	0.00000	0.00155	0.00000100	0.99997699	Acantholumpenus mackayi
196	21355	0.00052	0.000	0.00000	0.00133	0.00000100	0.99997902	Triglops pingeli
197	21300	0.00051	0.000	0.00000	0.00103	0.00000100	0.99997997	Cottidae
198	80660	0.00043	0.000	0.00000	0.00099	0.00000100	0.99998099	Pseudarchaster parelii
199	56300	0.00040	0.000	0.00002	0.00079	0.00000100	0.99998200	Polynoidae
200	23000	0.00037	0.000	0.00000	0.00090	0.00000100	0.99998301	Osmeridae
201	20000	0.00035	0.000	0.00000	0.00076	0.00000100	0.99998403	Agonidae
202	43010	0.00033	0.000	0.00000	0.00098	0.00000100	0.99998498	Metridium sp.
203	23807	0.00033	0.000	0.00000	0.00066	0.00000100	0.99998599	Lumpenus fabricii
204	75240	0.00031	0.000	0.00000	0.00076	0.00000100	0.99998701	Macoma sp.
205	75264	0.00028	0.000	0.00002	0.00054	0.00000100	0.99998802	Siliqua sp.
206	71510	0.00028	0.000	0.00000	0.00083	0.00000100	0.99998897	Naticidae
207	80729	0.00028	0.000	0.00000	0.00082	0.00000100	0.99998897	Ceramaster japonicus
208	59111	0.00026	0.000	0.00000	0.00066	0.00000100	0.99998999	Carcinobdella cyclostomum
209	72420	0.00022	0.000	0.00000	0.00065	0.00000100	0.99999100	Boreotrophon sp.
210	74981	0.00020	0.000	0.00000	0.00044	0.00000100	0.99999100	cockle unident.
211	66000	0.00020	0.000	0.00000	0.00051	0.00000100	0.99999201	shrimp unident.
212	56310	0.00020	0.000	0.00000	0.00059	0.00000100	0.99999201	Eunoe sp.
213	66019	0.00019	0.000	0.00000	0.00055	0.00000100	0.99999303	Pandalidae
214	22255	0.00018	0.000	0.00000	0.00054	0.00000000	0.99999303	Nectoliparis pelagicus
215	66150	0.00018	0.000	0.00000	0.00043	0.00000000	0.99999398	Hippolytidae (family)
216	21921	0.00017	0.000	0.00000	0.00051	0.00000000	0.99999398	Pleurogrammus monopterygius
217	68040	0.00017	0.000	0.00000	0.00042	0.00000000	0.99999499	Cancer oregonensis
218	56312	0.00016	0.000	0.00000	0.00048	0.00000000	0.99999499	Eunoe depressa
219	71731	0.00016	0.000	0.00000	0.00039	0.00000000	0.99999601	Colus halli
220	74656	0.00016	0.000	0.00000	0.00047	0.00000000	0.99999601	Cyclocardia sp.
221	94500	0.00016	0.000	0.00000	0.00041	0.00000000	0.99999601	Echiura (phylum)
222	60100	0.00015	0.000	0.00000	0.00036	0.00000000	0.99999702	amphipod unident.

Table C-1.--Continued.

RANK	SPECIES	MEAN CPUE (KG/HA)	VARIANCE	95 PERCENT CONFIDENCE LIMITS		PROPORTION	CUMULATIVE PROPORTION	NAME
223	21405	0.00012	0.000	0.00000	0.00036	0.00000000	0.99999702	Nautichthys pribilovius
224	22178	0.00012	0.000	0.00000	0.00029	0.00000000	0.99999702	Eumicrotremus orbis
225	92500	0.00010	0.000	0.00000	0.00031	0.00000000	0.99999797	Nemertea (phylum)
226	20002	0.00010	0.000	0.00000	0.00030	0.00000000	0.99999797	Percis japonicus
227	23800	0.00010	0.000	0.00000	0.00022	0.00000000	0.99999797	Stichaeidae
228	80546	0.00008	0.000	0.00000	0.00024	0.00000000	0.99999899	Henricia tumida
229	66200	0.00007	0.000	0.00000	0.00022	0.00000000	0.99999899	Lebbeus sp.
230	66601	0.00007	0.000	0.00000	0.00022	0.00000000	0.99999899	Sclerocrangon boreas
231	73500	0.00007	0.000	0.00000	0.00022	0.00000000	0.99999899	Opisthobranchia unident.
232	22201	0.00007	0.000	0.00000	0.00022	0.00000000	0.99999899	Liparis sp.
233	75266	0.00006	0.000	0.00000	0.00017	0.00000000	1.00000000	Siliqua patula
234	81090	0.00006	0.000	0.00000	0.00016	0.00000000	1.00000000	Crossaster sp.
235	21332	0.00005	0.000	0.00000	0.00015	0.00000000	1.00000000	Artediellus miacanthus
236	21341	0.00005	0.000	0.00000	0.00015	0.00000000	1.00000000	Malacocottus zonurus
237	21397	0.00003	0.000	0.00000	0.00008	0.00000000	1.00000000	Blepsias bilobus

APPENDIX D

Abundance Estimates for Principal Fish Species

Appendix D presents estimates of catch-per-unit-effort (CPUE), population numbers and biomass for the principal fish species. Estimates of variance and confidence intervals do not incorporate variation associated with fishing power corrections or measurements of effort. CPUE is measured in kilograms (kg) and numbers (no.) per hectare. Estimates are given separately for each of the 10 geographic strata used in the analysis; estimates for each of the six standard subareas are presented as subtotals of the component strata. Stratum codes correspond to subareas as follows:

Subarea	Stratum
1	10
2	20
3	31
	32 (Pribilof Islands high density)
4	41
	42 (Pribilof Islands high density)
	43 (St. Matthew Island high density)
5	50
6	61
	62 (St. Matthew Island high density)

List of Tables

Table D-1.--CPUE, population, and biomass estimates for walleye pollock.

CPUE

Stratum	Total hauls	Hauls with catch	Hauls with nums.	Hauls with L-F	Mean CPUE (kg/ha)	Variance mean CPUE (kg/ha)	Mean CPUE (no/ha)	Variance mean CPUE (no/ha)
10	58	52	52	52	54.64	.21080E+03	81.59	.60910E+03
20	31	31	31	31	19.61	.31920E+02	184.79	.98710E+04
31	69	69	69	69	191.69	.16070E+04	314.81	.40280E+04
32	9	9	9	9	140.05	.25880E+04	250.10	.93120E+04
Subtotal	78	78	78	78	187.30	.13640E+04	309.31	.34400E+04
41	44	44	44	44	77.54	.19850E+03	148.04	.14070E+04
42	30	29	29	29	199.67	.35820E+04	356.57	.11680E+05
43	22	22	22	22	112.57	.80100E+03	225.28	.47960E+04
Subtotal	96	95	95	95	111.59	.27550E+03	209.60	.12390E+04
50	25	24	24	24	112.31	.93500E+03	156.60	.23630E+04
61	60	60	60	60	151.75	.35990E+03	227.28	.10770E+04
62	7	7	7	7	161.54	.97850E+03	292.06	.26020E+04
Subtotal	67	67	67	67	152.41	.31720E+03	231.68	.94770E+03
Total	355	347	347	347	121.65	.12300E+03	214.64	.42840E+03

POPULATION

Stratum	Population	Variance population	Eff. deg. freedom	95% Confidence Limits Lower	Upper
10	635,366,424	.36934E+17	57.00	246,967,898	1,023,764,950
20	758,122,304	.16615E+18	30.00	0	1,590,468,212
31	2,975,730,487	.35990E+18	68.00	1,775,896,928	4,175,564,047
32	219,443,435	.71686E+16	8.00	24,200,084	414,686,787
Subtotal	3,195,173,923	.36707E+18	70.50	1,983,449,969	4,406,897,877
41	928,237,348	.55331E+17	43.00	452,846,882	1,403,627,813
42	856,172,733	.67326E+17	29.00	324,773,379	1,387,572,088
43	475,506,382	.21366E+17	21.00	171,468,480	779,544,285
Subtotal	2,259,916,464	.14402E+18	83.23	1,500,908,842	3,018,924,085
50	607,476,907	.35565E+17	24.00	217,290,321	997,663,494
61	2,003,094,033	.83665E+17	59.00	1,418,522,800	2,587,665,265
62	187,753,648	.10755E+16	6.00	107,503,666	268,003,631
Subtotal	2,190,847,681	.84740E+17	60.43	1,608,644,186	2,773,051,176
Total	9,646,903,703	.83448E+18	212.55	7,838,176,929	11,455,630,478

Table D-1.--Continued.

BIOMASS

Stratum	Biomass (t)	Variance biomass	Eff. deg. freedom	95% Confidence Limits Lower	Upper
10	425,472	.12785E+11	57.00	196,954	653,990
20	80,447	.53724E+09	30.00	33,117	127,778
31	1,811,953	.14358E+12	68.00	1,054,113	2,569,794
32	122,881	.19923E+10	8.00	19,952	225,810
Subtotal	1,934,835	.14557E+12	69.79	1,171,754	2,697,915
41	486,186	.78064E+10	43.00	307,623	664,750
42	479,435	.20651E+11	29.00	185,558	773,312
43	237,619	.35688E+10	21.00	113,361	361,877
Subtotal	1,203,241	.32026E+11	61.32	845,322	1,561,159
50	435,664	.14071E+11	24.00	190,834	680,494
61	1,337,386	.27957E+11	59.00	999,467	1,675,304
62	103,848	.40440E+09	6.00	54,639	153,056
Subtotal	1,441,233	.28361E+11	60.59	1,104,416	1,778,050
Total	5,520,892	.23335E+12	157.92	4,564,419	6,477,365

Table D-2.--CPUE, population, and biomass estimates for Pacific cod.

CPUE

Stratum	Total hauls	Hauls with catch	Hauls with nums.	Hauls with L-F	Mean CPUE (kg/ha)	Variance mean CPUE (kg/ha)	Mean CPUE (no/ha)	Variance mean CPUE (no/ha)
10	58	57	57	56	21.52	.25210E+02	40.86	.11180E+03
20	31	29	29	29	7.11	.33610E+01	19.94	.30290E+02
31	69	68	68	67	18.35	.91260E+01	20.25	.34980E+02
32	9	9	9	9	18.74	.12220E+03	7.48	.85840E+01
Subtotal	78	77	77	76	18.38	.85230E+01	19.17	.29350E+02
41	44	44	44	44	13.34	.57650E+01	17.43	.21150E+02
42	30	30	30	30	20.27	.17890E+02	24.36	.23410E+02
43	22	22	22	22	10.53	.26930E+01	14.45	.49890E+01
Subtotal	96	96	96	96	14.34	.29400E+01	18.39	.85040E+01
50	25	25	25	25	9.65	.20110E+01	3.48	.40410E+00
61	60	60	60	59	10.95	.88950E+00	3.98	.15310E+00
62	7	7	7	7	23.98	.51300E+02	10.93	.12010E+02
Subtotal	67	67	67	66	11.84	.10100E+01	4.46	.18850E+00
Total	355	351	351	348	15.20	.14420E+01	18.79	.53860E+01

POPULATION

Stratum	Population	Variance population	Eff. deg. freedom	95% Confidence Limits Lower	Upper
10	318,179,271	.67770E+16	57.00	151,805,167	484,553,374
20	81,807,175	.50989E+15	30.00	35,697,320	127,917,030
31	191,412,396	.31252E+16	68.00	79,605,563	303,219,228
32	6,565,340	.66084E+13	8.00	637,369	12,493,310
Subtotal	197,977,735	.31318E+16	68.29	86,052,754	309,902,716
41	109,271,404	.83143E+15	43.00	50,996,679	167,546,130
42	58,492,322	.13495E+15	29.00	34,735,983	82,248,661
43	30,497,764	.22230E+14	21.00	20,690,895	40,304,632
Subtotal	198,261,490	.98861E+15	58.42	134,716,748	261,806,232
50	13,497,372	.60814E+13	24.00	8,407,440	18,587,304
61	35,117,052	.11895E+14	59.00	28,146,738	42,087,365
62	7,023,327	.49621E+13	6.00	1,572,462	12,474,192
Subtotal	42,140,379	.16857E+14	43.72	33,842,635	50,438,123
Total	851,863,422	.11430E+17	134.03	640,176,853	1,063,549,991

Table D-2.--Continued.

BIOMASS

Stratum	Biomass (t)	Variance biomass	Eff. deg. freedom	95% Confidence Limits Lower	Upper
10	167,548	.15288E+10	57.00	88,527	246,569
20	29,169	.56572E+08	30.00	13,788	44,551
31	173,429	.81543E+09	68.00	116,318	230,540
32	16,440	.94041E+08	8.00	0	38,802
Subtotal	189,869	.90947E+09	76.00	129,554	250,184
41	83,672	.22666E+09	43.00	53,246	114,099
42	48,677	.10314E+09	29.00	27,877	69,476
43	22,224	.12000E+08	21.00	15,019	29,430
Subtotal	154,573	.34181E+09	74.48	117,597	191,550
50	37,438	.30260E+08	24.00	26,084	48,792
61	96,520	.69095E+08	59.00	79,721	113,320
62	15,417	.21199E+08	6.00	4,150	26,683
Subtotal	111,937	.90294E+08	52.33	92,733	131,141
Total	690,535	.29572E+10	162.67	582,862	798,208

Table D-3.--CPUE, population, and biomass estimates for yellowfin sole.

CPUE

Stratum	Total hauls	Hauls with catch	Hauls with nums.	Hauls with L-F	Mean CPUE (kg/ha)	Variance mean CPUE (kg/ha)	Mean CPUE (no/ha)	Variance mean CPUE (no/ha)
10	58	58	58	58	130.54	.18900E+03	606.40	.66340E+04
20	31	31	31	31	84.67	.62210E+02	351.12	.18110E+04
31	69	65	65	65	83.07	.92120E+02	314.64	.18410E+04
32	9	6	6	5	7.22	.12940E+02	15.75	.71220E+02
Subtotal	78	71	71	70	76.62	.77230E+02	289.25	.15420E+04
41	44	39	39	39	15.12	.10560E+02	44.74	.10460E+03
42	30	26	26	25	86.83	.68690E+03	242.57	.58050E+04
43	22	14	14	14	2.72	.11010E+01	6.73	.60040E+01
Subtotal	96	79	79	78	28.67	.37680E+02	81.35	.32350E+03
50	25	2	2	1	0.20	.39670E-01	0.47	.19480E+00
61	60	2	2	1	0.01	.12290E-03	0.02	.16020E-03
62	7	0	0	0	0.00	.00000E+00	0.00	.00000E+00
Subtotal	67	2	2	1	0.01	.10670E-03	0.01	.13910E-03
Total	355	243	243	239	54.45	.20730E+02	217.78	.43380E+03

POPULATION

Stratum	Population	Variance population	Eff. deg. freedom	95% Confidence Limits Lower	Upper
10	4,722,091,680	.40230E+18	57.00	3,440,222,900	6,003,960,459
20	1,440,560,280	.30484E+17	30.00	1,083,507,516	1,797,613,044
31	2,974,138,319	.16454E+18	68.00	2,162,876,621	3,785,400,016
32	13,819,255	.54830E+14	8.00	0	31,331,456
Subtotal	2,987,957,574	.16459E+18	68.05	2,176,560,715	3,799,354,433
41	280,514,298	.41120E+16	43.00	150,918,577	410,110,018
42	582,429,543	.33465E+17	29.00	207,778,464	957,080,622
43	14,195,411	.26752E+14	21.00	3,437,172	24,953,649
Subtotal	877,139,251	.37604E+17	36.25	481,159,911	1,273,118,592
50	1,807,486	.29318E+13	24.00	0	5,350,147
61	134,374	.12443E+11	59.00	0	359,811
62	0	.00000E+00	6.00	0	0
Subtotal	134,374	.12443E+11	8.76	0	391,602
Total	10,029,690,645	.63499E+18	121.90	8,451,906,792	11,607,474,498

Table D-3.--Continued.

BIOMASS

Stratum	Biomass (t)	Variance biomass	Eff. deg. freedom	95% Confidence Limits Lower	Upper
10	1,016,562	.11464E+11	57.00	800,176	1,232,948
20	347,377	.10472E+10	30.00	281,297	413,458
31	785,198	.82313E+10	68.00	603,746	966,651
32	6,336	.99590E+07	8.00	0	13,613
Subtotal	791,534	.82412E+10	68.16	609,972	973,097
41	94,833	.41519E+09	43.00	53,652	136,013
42	208,497	.39604E+10	29.00	79,802	337,193
43	5,748	.49035E+07	21.00	1,142	10,354
Subtotal	309,078	.43805E+10	35.22	173,928	444,229
50	791	.59699E+06	24.00	0	2,386
61	100	.95425E+04	59.00	0	297
62	0	.00000E+00	6.00	0	0
Subtotal	100	.95425E+04	8.08	0	325
Total	2,465,443	.25133E+11	162.66	2,151,544	2,779,342

Table D-4.--CPUE, population, and biomass estimates for rock sole.

CPUE

Stratum	Total hauls	Hauls with catch	Hauls with nums.	Hauls with L-F	Mean CPUE (kg/ha)	Variance mean CPUE (kg/ha)	Mean CPUE (no/ha)	Variance mean CPUE (no/ha)
10	58	58	58	58	151.20	.17930E+03	1053.74	.13880E+05
20	31	31	31	31	48.42	.14670E+03	267.77	.72040E+04
31	69	69	69	68	35.04	.17970E+02	223.99	.10500E+04
32	9	9	9	9	17.92	.31350E+02	86.47	.87970E+03
Subtotal	78	78	78	77	33.58	.15270E+02	212.31	.88530E+03
41	44	43	43	43	17.24	.26240E+02	60.00	.48930E+03
42	30	28	28	28	95.92	.31770E+03	423.27	.58900E+04
43	22	22	22	21	10.86	.10010E+02	30.08	.64750E+02
Subtotal	96	93	93	92	33.51	.25010E+02	135.04	.46000E+03
50	25	8	8	7	0.60	.16660E+00	2.03	.25140E+01
61	60	49	49	48	4.01	.71810E+00	8.75	.31840E+01
62	7	7	7	7	2.36	.29220E+00	6.19	.57820E+00
Subtotal	67	56	56	55	3.90	.62520E+00	8.58	.27690E+01
Total	355	324	324	320	47.88	.16820E+02	288.09	.87460E+03

POPULATION

Stratum	Population	Variance population	Eff. deg. freedom	95% Confidence Limits Lower	Upper
10	8,205,637,449	.84154E+18	57.00	6,351,664,169	10,059,610,729
20	1,098,565,548	.12126E+18	30.00	387,478,412	1,809,652,684
31	2,117,250,774	.93792E+17	68.00	1,504,742,605	2,729,758,942
32	75,866,404	.67727E+15	8.00	15,854,117	135,878,690
Subtotal	2,193,117,177	.94469E+17	68.95	1,578,401,522	2,807,832,832
41	376,219,108	.19236E+17	43.00	95,916,443	656,521,772
42	1,016,328,282	.33956E+17	29.00	638,940,712	1,393,715,853
43	63,494,754	.28846E+15	21.00	28,065,642	98,923,867
Subtotal	1,456,042,144	.53481E+17	59.15	988,667,905	1,923,416,384
50	7,868,953	.37839E+14	24.00	0	20,565,242
61	77,119,157	.24735E+15	59.00	45,334,341	108,903,973
62	3,979,797	.23896E+12	6.00	2,783,608	5,175,986
Subtotal	81,098,954	.24759E+15	59.11	49,298,788	112,899,119
Total	13,042,330,226	.11110E+19	94.28	10,934,223,812	15,150,446,639

Table D-4.--Continued.

BIOMASS

Stratum	Biomass (t)	Variance biomass	Eff. deg. freedom	95% Confidence Limits Lower	Upper
10	1,177,421	.10873E+11	57.00	966,681	1,388,160
20	198,650	.24697E+10	30.00	97,170	300,130
31	331,179	.16053E+10	68.00	251,047	411,312
32	15,724	.24135E+08	8.00	4,396	27,053
Subtotal	346,904	.16294E+10	69.93	266,171	427,637
41	108,124	.10317E+10	43.00	43,208	173,040
42	230,318	.18314E+10	29.00	142,801	317,835
43	22,920	.44597E+08	21.00	8,989	36,850
Subtotal	361,362	.29078E+10	60.19	253,514	469,210
50	2,332	.25065E+07	24.00	0	5,600
61	35,345	.55782E+08	59.00	20,251	50,440
62	1,520	.12076E+06	6.00	670	2,371
Subtotal	36,866	.55903E+08	59.25	21,755	51,976
Total	2,123,534	.17939E+11	131.02	1,858,343	2,388,725

Table D-5.--CPUE, population, and biomass estimates for Hippoglossoides sp.

CPUE

Stratum	Total hauls	Hauls with catch	Hauls with nums.	Hauls with L-F	Mean CPUE (kg/ha)	Variance mean CPUE (kg/ha)	Mean CPUE (no/ha)	Variance mean CPUE (no/ha)
10	58	40	40	40	4.86	.80200E+00	11.55	.88310E+01
20	31	4	4	2	0.05	.17350E-02	0.24	.28990E-01
31	69	69	69	69	27.79	.12140E+02	82.37	.16180E+03
32	9	9	9	9	4.87	.60560E+00	13.98	.85650E+01
Subtotal	78	78	78	78	25.84	.10170E+02	76.56	.13550E+03
41	44	43	43	43	5.60	.11820E+01	22.56	.29420E+02
42	30	28	28	28	10.20	.44780E+01	20.63	.13050E+02
43	22	22	22	21	3.79	.11170E+01	17.72	.32490E+02
Subtotal	96	93	93	92	6.27	.66470E+00	21.18	.11840E+02
50	25	25	25	25	22.49	.72460E+01	138.61	.27270E+03
61	60	60	60	60	16.91	.73100E+01	72.99	.71740E+02
62	7	7	7	6	2.00	.38500E+00	13.35	.58040E+02
Subtotal	67	67	67	66	15.90	.63520E+01	68.94	.62590E+02
Total	355	307	307	303	12.60	.10320E+01	46.27	.14730E+02

POPULATION

Stratum	Population	Variance population	Eff. deg. freedom	95% Confidence Limits Lower	Upper
10	89,948,801	.53550E+15	57.00	43,181,052	136,716,551
20	1,000,946	.48798E+12	30.00	0	2,427,401
31	778,640,121	.14453E+17	68.00	538,198,847	1,019,081,394
32	12,263,071	.65935E+13	8.00	6,341,765	18,184,377
Subtotal	790,903,192	.14460E+17	68.06	550,407,080	1,031,399,304
41	141,485,669	.11565E+16	43.00	72,755,973	210,215,366
42	49,535,166	.75237E+14	29.00	31,770,910	67,299,422
43	37,394,809	.14475E+15	21.00	12,297,292	62,492,326
Subtotal	228,415,645	.13765E+16	58.66	153,433,537	303,397,753
50	537,709,645	.41033E+16	24.00	405,496,495	669,922,795
61	643,311,553	.55726E+16	59.00	492,443,855	794,179,251
62	8,582,495	.23985E+14	6.00	0	20,566,592
Subtotal	651,894,048	.55966E+16	59.50	500,702,024	803,086,073
Total	2,299,872,277	.26072E+17	156.73	1,980,165,214	2,619,579,340

Table D-5.--Continued.

BIOMASS

Stratum	Biomass (t)	Variance biomass	Eff. deg. freedom	95% Confidence Limits Lower	Upper
10	37,882	.48630E+08	57.00	23,788	51,975
20	225	.29209E+05	30.00	0	575
31	262,655	.10846E+10	68.00	196,790	328,521
32	4,274	.46625E+06	8.00	2,659	5,888
Subtotal	266,929	.10850E+10	68.06	201,049	332,808
41	35,128	.46481E+08	43.00	21,350	48,907
42	24,503	.25815E+08	29.00	14,097	34,908
43	8,005	.49766E+07	21.00	3,352	12,659
Subtotal	67,636	.77273E+08	80.25	50,055	85,217
50	87,262	.10904E+09	24.00	65,657	108,867
61	149,037	.56780E+09	59.00	100,879	197,194
62	1,288	.15913E+06	6.00	312	2,264
Subtotal	150,325	.56796E+09	59.03	102,161	198,489
Total	610,259	.18880E+10	152.49	524,226	696,291

Table D-6.--CPUE, population, and biomass estimates for Alaska plaice.

CPUE

Stratum	Total hauls	Hauls with catch	Hauls with nums.	Hauls with L-F	Mean CPUE (kg/ha)	Variance mean CPUE (kg/ha)	Mean CPUE (no/ha)	Variance mean CPUE (no/ha)
10	58	47	47	45	15.74	.13660E+02	28.48	.24460E+02
20	31	31	31	31	9.10	.24130E+01	22.11	.11180E+02
31	69	58	58	58	14.39	.70700E+01	20.82	.20330E+02
32	9	6	6	6	4.82	.32680E+01	4.09	.25760E+01
Subtotal	78	64	64	64	13.57	.59430E+01	19.40	.17040E+02
41	44	40	40	40	24.71	.23770E+02	34.22	.73190E+02
42	30	25	25	25	12.42	.74480E+01	15.24	.12680E+02
43	22	15	15	15	5.68	.19860E+01	5.59	.19690E+01
Subtotal	96	80	80	80	18.25	.84840E+01	24.39	.25460E+02
50	25	0	0	0	0.00	.00000E+00	0.00	.00000E+00
61	60	13	13	13	1.97	.82910E+00	1.16	.28210E+00
62	7	5	5	5	1.48	.74790E+00	0.81	.19650E+00
Subtotal	67	18	18	18	1.94	.72370E+00	1.14	.24600E+00
Total	355	240	240	238	11.11	.12430E+01	16.82	.30980E+01

POPULATION

Stratum	Population	Variance population	Eff. deg. freedom	95% Confidence Limits Lower	Upper
10	221,756,664	.14832E+16	57.00	143,923,189	299,590,140
20	90,722,904	.18817E+15	30.00	62,670,331	118,775,477
31	196,792,727	.18169E+16	68.00	111,543,473	282,041,982
32	3,588,575	.19832E+13	8.00	341,091	6,836,060
Subtotal	200,381,303	.18188E+16	68.15	115,085,533	285,677,073
41	214,559,453	.28775E+16	43.00	106,148,386	322,970,521
42	36,583,599	.73132E+14	29.00	19,095,278	54,071,920
43	11,792,801	.87741E+13	21.00	5,613,854	17,971,748
Subtotal	262,935,853	.29594E+16	45.44	152,992,679	372,879,028
50	0	.00000E+00	24.00	0	0
61	10,229,716	.21915E+14	59.00	768,794	19,690,637
62	518,114	.81217E+11	6.00	0	1,215,475
Subtotal	10,747,829	.21996E+14	59.43	1,269,393	20,226,266
Total	786,544,554	.64716E+16	149.03	627,260,784	945,828,324

Table D-6.--Continued.

BIOMASS

Stratum	Biomass (t)	Variance biomass	Eff. deg. freedom	95% Confidence Limits Lower	Upper
10	122,568	.82857E+09	57.00	64,394	180,743
20	37,335	.40623E+08	30.00	24,320	50,350
31	135,978	.63168E+09	68.00	85,711	186,244
32	4,230	.25157E+07	8.00	572	7,887
Subtotal	140,207	.63420E+09	68.53	89,841	190,574
41	154,930	.93454E+09	43.00	93,148	216,712
42	29,832	.42941E+08	29.00	16,431	43,233
43	11,999	.88482E+07	21.00	5,794	18,204
Subtotal	196,760	.98633E+09	47.74	133,289	260,232
50	0	.00000E+00	24.00	0	0
61	17,370	.64403E+08	59.00	1,152	33,589
62	949	.30908E+06	6.00	0	2,310
Subtotal	18,320	.64712E+08	59.55	2,062	34,577
Total	515,191	.25544E+10	169.93	415,119	615,263

Table D-7.--CPUE, population, and biomass estimates for Greenland turbot.

CPUE

Stratum	Total hauls	Hauls with catch	Hauls with nums.	Hauls with L-F	Mean CPUE (kg/ha)	Variance mean CPUE (kg/ha)	Mean CPUE (no/ha)	Variance mean CPUE (no/ha)
10	58	0	0	0	0.00	.00000E+00	0.00	.00000E+00
20	31	0	0	0	0.00	.00000E+00	0.00	.00000E+00
31	69	0	0	0	0.00	.00000E+00	0.00	.00000E+00
32	9	0	0	0	0.00	.00000E+00	0.00	.00000E+00
Subtotal	78	0	0	0	0.00	.00000E+00	0.00	.00000E+00
41	44	6	6	6	0.27	.30470E-01	0.12	.58100E-02
42	30	2	2	2	0.14	.11480E-01	0.02	.22710E-03
43	22	10	10	10	0.64	.11630E+00	0.90	.13580E+00
Subtotal	96	18	18	18	0.31	.15330E-01	0.25	.71810E-02
50	25	2	2	2	0.20	.25530E-01	0.03	.75810E-03
61	60	34	34	34	2.74	.26500E+00	1.52	.10940E+00
62	7	7	7	7	3.30	.11650E+01	3.87	.90750E+00
Subtotal	67	41	41	41	2.78	.23560E+00	1.68	.99250E-01
Total	355	61	61	61	0.63	.12130E-01	0.41	.55950E-02

POPULATION

Stratum	Population	Variance population	Eff. deg. freedom	95% Confidence Limits Lower	Upper
10	0	.00000E+00	57.00	0	0
20	0	.00000E+00	30.00	0	0
31	0	.00000E+00	68.00	0	0
32	0	.00000E+00	8.00	0	0
Subtotal	0	.00000E+00	74.52	0	0
41	783,515	.22843E+12	43.00	0	1,749,436
42	49,784	.13091E+10	29.00	0	123,885
43	1,901,388	.60506E+12	21.00	278,781	3,523,995
Subtotal	2,734,688	.83480E+12	37.38	868,969	4,600,407
50	133,916	.11408E+11	24.00	0	354,901
61	13,438,045	.84999E+13	59.00	7,545,888	19,330,202
62	2,485,737	.37504E+12	6.00	987,180	3,984,295
Subtotal	15,923,782	.88750E+13	63.11	9,965,600	21,881,964
Total	18,792,386	.97212E+13	121.88	12,618,979	24,965,792

Table D-7.--Continued.

BIOMASS

Stratum	Biomass (t)	Variance biomass	Eff. deg. freedom	95% Confidence Limits Lower	Upper
10	0	.00000E+00	57.00	0	0
20	0	.00000E+00	30.00	0	0
31	0	.00000E+00	68.00	0	0
32	0	.00000E+00	8.00	0	0
Subtotal	0	.00000E+00	74.52	0	0
41	1,668	.11979E+07	43.00	0	3,880
42	338	.66181E+05	29.00	0	864
43	1,351	.51797E+06	21.00	0	2,848
Subtotal	3,356	.17820E+07	68.59	687	6,026
50	769	.38420E+06	24.00	0	2,048
61	24,154	.20587E+08	59.00	14,984	33,324
62	2,119	.48138E+06	6.00	422	3,817
Subtotal	26,273	.21068E+08	61.46	17,093	35,453
Total	30,399	.23234E+08	93.68	20,758	40,039

Table D-8.--CPUE, population, and biomass estimates for Atheresthes sp..

CPUE

Stratum	Total hauls	Hauls with catch	Hauls with nums.	Hauls with L-F	Mean CPUE (kg/ha)	Variance mean CPUE (kg/ha)	Mean CPUE (no/ha)	Variance mean CPUE (no/ha)
10	58	5	5	5	0.74	.26430E+00	1.57	.13580E+01
20	31	0	0	0	0.00	.00000E+00	0.00	.00000E+00
31	69	48	48	48	11.82	.71640E+01	26.68	.46940E+02
32	9	9	9	9	13.06	.58290E+01	35.11	.78540E+02
Subtotal	78	57	57	57	11.92	.60410E+01	27.39	.39870E+02
41	44	7	7	7	0.93	.20870E+00	1.32	.43640E+00
42	30	27	27	27	7.61	.18950E+01	21.56	.41560E+02
43	22	4	4	4	0.59	.11730E+00	0.34	.30500E-01
Subtotal	96	38	38	38	2.35	.16910E+00	5.64	.22100E+01
50	25	25	25	25	38.57	.33210E+02	61.73	.64510E+02
61	60	59	59	59	25.44	.12990E+02	26.05	.12510E+02
62	7	7	7	7	16.54	.37840E+02	13.16	.22800E+02
Subtotal	67	66	66	66	24.83	.11460E+02	25.18	.10970E+02
Total	355	191	191	191	10.89	.12200E+01	17.35	.36290E+01

POPULATION

Stratum	Population	Variance population	Eff. deg. freedom	95% Confidence Limits Lower	Upper
10	12,224,857	.82362E+14	57.00	0	30,566,166
20	0	.00000E+00	30.00	0	0
31	252,181,961	.41943E+16	68.00	122,654,782	381,709,141
32	30,807,016	.60465E+14	8.00	12,875,691	48,738,342
Subtotal	282,988,978	.42548E+16	69.85	152,531,508	413,446,447
41	8,289,116	.17158E+14	43.00	0	16,660,585
42	51,769,332	.23960E+15	29.00	20,114,447	83,424,216
43	707,120	.13591E+12	21.00	0	1,473,932
Subtotal	60,765,568	.25690E+15	33.22	28,036,283	93,494,853
50	239,473,673	.97075E+15	24.00	175,165,843	303,781,502
61	229,620,552	.97174E+15	59.00	166,620,506	292,620,597
62	8,459,234	.94242E+13	6.00	566,562	16,351,906
Subtotal	238,079,786	.98116E+15	60.09	175,432,775	300,726,797
Total	833,532,861	.65460E+16	135.38	673,336,757	993,728,965

Table D-8.--Continued.

BIOMASS

Stratum	Biomass (t)	Variance biomass	Eff. deg. freedom	95% Confidence Limits Lower	Upper
10	5,755	.16027E+08	57.00	0	13,845
20	0	.00000E+00	30.00	0	0
31	111,711	.64015E+09	68.00	61,109	162,314
32	11,462	.44873E+07	8.00	6,577	16,347
Subtotal	123,173	.64464E+09	68.93	72,393	173,952
41	5,824	.82066E+07	43.00	35	11,614
42	18,280	.10926E+08	29.00	11,520	25,039
43	1,253	.52240E+06	21.00	0	2,756
Subtotal	25,357	.19655E+08	67.84	16,490	34,224
50	149,635	.49977E+09	24.00	103,382	195,889
61	224,206	.10090E+10	59.00	160,011	288,402
62	10,634	.15639E+08	6.00	957	20,311
Subtotal	234,841	.10246E+10	60.70	170,822	298,860
Total	538,761	.22047E+10	144.12	445,791	631,730

Table D-9.--CPUE, population, and biomass estimates for Pacific halibut.

CPUE

Stratum	Total hauls	Hauls with catch	Hauls with nums.	Hauls with L-F	Mean CPUE (kg/ha)	Variance mean CPUE (kg/ha)	Mean CPUE (no/ha)	Variance mean CPUE (no/ha)
10	58	52	52	52	6.20	.90420E+00	2.41	.14950E+00
20	31	28	28	28	3.68	.37220E+00	2.05	.18500E+00
31	69	50	50	49	2.72	.25060E+00	0.95	.46260E-01
32	9	7	7	7	0.87	.17580E+00	0.31	.26280E-01
Subtotal	78	57	57	56	2.56	.21110E+00	0.89	.38930E-01
41	44	16	16	16	2.94	.28690E+01	1.13	.41010E+00
42	30	21	21	21	2.93	.73680E+00	0.93	.91450E-01
43	22	6	6	6	0.46	.34510E-01	0.15	.32650E-02
Subtotal	96	43	43	43	2.45	.10080E+01	0.89	.14330E+00
50	25	22	22	22	3.99	.44300E+00	0.59	.29820E-01
61	60	38	38	38	3.16	.37590E+00	0.58	.11750E-01
62	7	6	6	6	2.59	.11650E+01	0.39	.15570E-01
Subtotal	67	44	44	44	3.13	.33190E+00	0.57	.10280E-01
Total	355	246	246	245	3.39	.10360E+00	1.14	.15790E-01

POPULATION

Stratum	Population	Variance population	Eff. deg. freedom	95% Confidence Limits Lower	Upper
10	18,797,981	.90635E+13	57.00	12,713,620	24,882,342
20	8,394,027	.31136E+13	30.00	4,785,562	12,002,492
31	8,948,955	.41337E+13	68.00	4,882,673	13,015,237
32	272,254	.20230E+11	8.00	0	608,630
Subtotal	9,221,209	.41539E+13	68.65	5,144,989	13,297,428
41	7,067,467	.16123E+14	43.00	0	15,182,494
42	2,242,647	.52725E+12	29.00	757,737	3,727,557
43	323,183	.14545E+11	21.00	71,609	574,756
Subtotal	9,633,296	.16665E+14	45.86	1,383,049	17,883,543
50	2,286,803	.44877E+12	24.00	904,117	3,669,489
61	5,102,641	.91268E+12	59.00	3,171,896	7,033,386
62	247,777	.64328E+10	6.00	51,516	444,037
Subtotal	5,350,418	.91911E+12	59.81	3,412,881	7,287,955
Total	53,683,734	.34364E+14	145.90	42,076,861	65,290,607

Table D-9.--Continued.

BIOMASS

Stratum	Biomass (t)	Variance biomass	Eff. deg. freedom	95% Confidence Limits Lower	Upper
10	48,262	.54830E+08	57.00	33,297	63,227
20	15,118	.62643E+07	30.00	10,007	20,229
31	25,671	.22392E+08	68.00	16,207	35,135
32	760	.13538E+06	8.00	0	1,609
Subtotal	26,432	.22527E+08	68.80	16,939	35,924
41	18,426	.11281E+09	43.00	0	39,891
42	7,028	.42478E+07	29.00	2,814	11,243
43	973	.15374E+06	21.00	155	1,791
Subtotal	26,428	.11721E+09	46.32	4,548	48,308
50	15,488	.66665E+07	24.00	10,159	20,817
61	27,892	.29195E+08	59.00	16,972	38,812
62	1,665	.48140E+06	6.00	0	3,449
Subtotal	29,557	.29677E+08	60.80	18,662	40,452
Total	161,284	.23717E+09	150.27	130,791	191,777

APPENDIX E

Population Estimates by Sex and Size Groups for Principal Fish Species

Appendix E presents estimates of the numbers of individuals within the overall survey area by sex and size group for principal fish species.

List of Tables

Table E-1.--Population estimates by sex and size group for walleye pollock from the 1993 eastern Bering Sea bottom trawl survey.

Length (mm)	Males	Females	Unsexed	Total	Proportion	Cumulative Proportion
70	0	0	401,162	401,162	0.0000	0.0000
80	0	0	46,000,813	46,000,813	0.0048	0.0048
90	41,132	94,721	125,817,232	125,953,085	0.0131	0.0179
100	64,236	0	431,295,867	431,360,103	0.0447	0.0626
110	0	0	413,126,620	413,126,620	0.0428	0.1054
120	256,282	637,851	438,919,304	439,813,438	0.0456	0.1510
130	167,388	1,141,406	288,436,651	289,745,445	0.0300	0.1810
140	1,605,460	1,032,395	285,442,206	288,080,060	0.0299	0.2109
150	345,338	703,248	166,370,276	167,418,861	0.0174	0.2282
160	1,853,937	776,557	114,138,374	116,768,868	0.0121	0.2404
170	1,078,109	1,838,785	44,365,356	47,282,251	0.0049	0.2453
180	800,103	330,446	16,384,527	17,515,076	0.0018	0.2471
190	1,113,193	1,359,382	12,201,277	14,673,852	0.0015	0.2486
200	3,861,417	2,488,806	21,175,384	27,525,607	0.0029	0.2514
210	4,692,096	5,151,756	23,184,894	33,028,746	0.0034	0.2549
220	10,940,022	9,400,710	16,579,277	36,920,009	0.0038	0.2587
230	11,283,701	10,018,257	19,116,944	40,418,902	0.0042	0.2629
240	8,676,498	9,504,839	8,992,214	27,173,551	0.0028	0.2657
250	8,539,673	7,547,516	9,725,306	25,812,496	0.0027	0.2684
260	8,069,540	6,325,053	8,821,037	23,215,630	0.0024	0.2708
270	8,853,693	9,235,346	3,903,354	21,992,393	0.0023	0.2731
280	6,701,798	8,194,898	1,951,677	16,848,372	0.0017	0.2748
290	8,047,149	5,050,842	959,299	14,057,290	0.0015	0.2763
300	12,556,838	5,714,111	0	18,270,949	0.0019	0.2782
310	8,952,111	6,618,543	0	15,570,654	0.0016	0.2798
320	11,637,048	8,794,088	0	20,431,136	0.0021	0.2819
330	10,195,899	8,590,535	0	18,786,434	0.0019	0.2838
340	16,567,397	8,662,900	0	25,230,297	0.0026	0.2865
350	25,398,561	12,536,569	0	37,935,130	0.0039	0.2904
360	48,943,568	32,285,274	0	81,228,843	0.0084	0.2988
370	122,891,080	64,171,881	0	187,062,961	0.0194	0.3182
380	179,097,077	121,230,483	0	300,327,560	0.0311	0.3493
390	195,245,903	173,037,497	0	368,283,400	0.0382	0.3875
400	258,413,007	212,160,512	0	470,573,519	0.0488	0.4363
410	290,742,940	249,402,702	0	540,145,642	0.0560	0.4923
420	337,912,258	261,533,727	0	599,445,985	0.0621	0.5544
430	278,190,692	268,380,117	0	546,570,808	0.0567	0.6111
440	269,093,146	285,758,579	0	554,851,725	0.0575	0.6686
450	205,261,801	228,251,233	0	433,513,034	0.0449	0.7135
460	129,861,870	147,025,383	0	276,887,254	0.0287	0.7422
470	85,579,429	104,830,145	0	190,409,574	0.0197	0.7620
480	75,728,739	76,242,398	0	151,971,137	0.0158	0.7777
490	82,068,395	60,807,543	0	142,875,938	0.0148	0.7925
500	89,814,395	61,131,518	0	150,945,913	0.0156	0.8082
510	95,400,336	65,429,652	0	160,829,989	0.0167	0.8249
520	116,715,283	63,198,685	0	179,913,968	0.0186	0.8435
530	112,873,202	72,474,780	0	185,347,982	0.0192	0.8627
540	96,239,636	78,518,778	0	174,758,415	0.0181	0.8808
550	84,137,204	79,799,060	0	163,936,264	0.0170	0.8978
560	74,779,549	79,395,037	0	154,174,587	0.0160	0.9138
570	61,009,896	78,868,058	0	139,877,954	0.0145	0.9283
580	50,958,487	72,440,282	0	123,398,769	0.0128	0.9411
590	40,145,048	55,860,511	0	96,005,559	0.0100	0.9511
600	33,526,137	43,027,862	0	76,553,999	0.0079	0.9590
610	28,534,139	39,112,806	0	67,646,945	0.0070	0.9660
620	23,435,476	31,876,620	0	55,312,096	0.0057	0.9717
630	17,898,469	32,953,202	0	50,851,670	0.0053	0.9770
640	12,642,487	26,983,617	0	39,626,104	0.0041	0.9811
650	15,193,964	19,464,685	0	34,658,649	0.0036	0.9847
660	10,036,848	18,090,365	0	28,127,213	0.0029	0.9876
670	7,466,191	18,858,308	0	26,324,499	0.0027	0.9903
680	5,923,302	12,174,553	0	18,097,855	0.0019	0.9922

Table E-1.--Continued.

Length (mm)	Males	Females	Unsexed	Total	Proportion	Cumulative Proportion
690	5,023,094	11,926,268	0	16,949,362	0.0018	0.9940
700	4,089,172	10,871,690	0	14,960,862	0.0016	0.9955
710	1,514,459	6,406,909	0	7,921,369	0.0008	0.9964
720	1,260,942	6,169,327	0	7,430,270	0.0008	0.9971
730	1,636,347	5,294,418	0	6,930,765	0.0007	0.9978
740	739,887	5,371,765	0	6,111,652	0.0006	0.9985
750	271,578	3,960,138	0	4,231,717	0.0004	0.9989
760	113,787	3,367,396	0	3,481,183	0.0004	0.9993
770	346,502	2,427,645	0	2,774,147	0.0003	0.9996
780	131,473	1,037,669	0	1,169,142	0.0001	0.9997
790	0	1,779,934	0	1,779,934	0.0002	0.9999
800	0	353,482	0	353,482	0.0000	0.9999
810	0	256,598	0	256,598	0.0000	0.9999
820	0	349,113	0	349,113	0.0000	1.0000
830	0	47,152	0	47,152	0.0000	1.0000
840	0	174,796	0	174,796	0.0000	1.0000
860	0	89,117	0	89,117	0.0000	1.0000
TOTAL	3,723,185,817	3,426,408,835	2,497,309,051	9,646,903,703		

Table E-2.--Population estimates by sex and size group for Pacific cod from the 1993 eastern Bering Sea bottom trawl survey.

Length (mm)	Males	Females	Unsexed	Total	Proportion	Cumulative Proportion
80	0	0	63,605	63,605	0.0001	0.0001
90	0	0	208,248	208,248	0.0002	0.0003
100	117,220	0	2,299,724	2,416,944	0.0028	0.0032
110	390,497	146,936	6,194,827	6,732,261	0.0079	0.0111
120	1,742,453	949,069	13,195,455	15,886,977	0.0186	0.0297
130	2,769,119	2,202,464	30,480,956	35,452,539	0.0416	0.0713
140	3,809,445	2,890,300	17,587,082	24,286,828	0.0285	0.0998
150	5,530,445	4,687,345	23,265,681	33,483,471	0.0393	0.1391
160	5,831,525	5,698,863	17,627,508	29,157,895	0.0342	0.1734
170	7,678,902	7,098,897	11,617,607	26,395,407	0.0310	0.2044
180	6,103,747	7,304,196	12,900,136	26,308,079	0.0309	0.2352
190	7,361,359	7,506,916	13,472,979	28,341,253	0.0333	0.2685
200	10,422,867	8,767,760	6,494,860	25,685,486	0.0302	0.2987
210	9,956,366	12,194,092	4,386,442	26,536,900	0.0312	0.3298
220	9,122,977	6,604,720	2,069,071	17,796,767	0.0209	0.3507
230	6,164,793	3,684,520	1,260,526	11,109,839	0.0130	0.3637
240	4,241,163	3,200,806	479,401	7,921,370	0.0093	0.3730
250	2,515,030	2,315,348	243,221	5,073,599	0.0060	0.3790
260	2,462,568	1,727,289	294,682	4,484,539	0.0053	0.3843
270	2,771,791	2,666,876	0	5,438,667	0.0064	0.3907
280	4,090,095	2,911,652	0	7,001,747	0.0082	0.3989
290	3,656,736	4,098,806	0	7,755,542	0.0091	0.4080
300	10,420,219	3,932,413	0	14,352,632	0.0168	0.4248
310	9,077,150	7,883,455	0	16,960,605	0.0199	0.4447
320	9,078,553	9,900,982	0	18,979,534	0.0223	0.4670
330	12,021,219	11,862,737	0	23,883,956	0.0280	0.4950
340	15,063,012	10,814,034	0	25,877,046	0.0304	0.5254
350	10,492,237	9,055,000	0	19,547,237	0.0229	0.5484
360	9,571,672	10,486,597	0	20,058,269	0.0235	0.5719
370	9,935,289	8,555,465	0	18,490,754	0.0217	0.5936
380	6,796,966	9,170,094	0	15,967,060	0.0187	0.6124
390	6,768,826	5,540,411	0	12,309,236	0.0144	0.6268
400	6,757,105	6,248,666	0	13,005,771	0.0153	0.6421
410	7,797,250	6,907,076	0	14,704,326	0.0173	0.6593
420	8,563,168	6,205,022	0	14,768,190	0.0173	0.6767
430	9,877,655	7,877,837	0	17,755,492	0.0208	0.6975
440	9,259,072	8,600,628	0	17,859,700	0.0210	0.7185
450	8,188,320	10,593,418	0	18,781,738	0.0220	0.7405
460	10,647,297	11,091,425	0	21,738,723	0.0255	0.7661
470	8,359,005	8,243,718	0	16,602,722	0.0195	0.7855
480	7,452,420	7,538,842	0	14,991,261	0.0176	0.8031
490	7,534,203	8,016,575	0	15,550,777	0.0183	0.8214
500	7,390,518	5,508,268	0	12,898,787	0.0151	0.8365
510	6,692,346	5,612,425	0	12,304,772	0.0144	0.8510
520	6,505,032	3,997,631	0	10,502,663	0.0123	0.8633
530	4,851,015	4,361,638	0	9,212,653	0.0108	0.8741
540	4,689,530	4,864,133	0	9,553,663	0.0112	0.8853
550	3,851,868	4,901,619	0	8,753,487	0.0103	0.8956
560	3,326,700	3,747,599	0	7,074,299	0.0083	0.9039
570	3,131,916	2,070,759	0	5,202,675	0.0061	0.9100
580	2,690,899	2,556,936	0	5,247,836	0.0062	0.9162
590	2,727,603	3,659,686	0	6,387,288	0.0075	0.9237
600	3,045,404	2,341,054	0	5,386,458	0.0063	0.9300
610	1,742,322	2,830,602	0	4,572,924	0.0054	0.9354
620	1,883,603	2,811,325	0	4,694,928	0.0055	0.9409
630	2,136,183	2,119,518	0	4,255,701	0.0050	0.9459
640	1,518,118	1,443,691	0	2,961,809	0.0035	0.9494
650	1,382,044	4,112,945	0	5,494,989	0.0065	0.9558
660	1,378,046	1,582,609	0	2,960,656	0.0035	0.9593
670	1,579,073	1,409,774	0	2,988,847	0.0035	0.9628
680	3,937,404	1,143,041	0	5,080,445	0.0060	0.9688
690	1,443,651	852,329	0	2,295,980	0.0027	0.9715

Table E-2.--Continued.

Length (mm)	Males	Females	Unsexed	Total	Proportion	Cumulative Proportion
700	771,885	1,468,245	0	2,240,130	0.0026	0.9741
710	331,656	799,436	0	1,131,092	0.0013	0.9754
720	621,240	597,436	0	1,218,676	0.0014	0.9769
730	782,861	469,959	0	1,252,820	0.0015	0.9783
740	627,292	509,924	0	1,137,215	0.0013	0.9797
750	633,810	664,453	0	1,298,263	0.0015	0.9812
760	621,849	364,302	0	986,151	0.0012	0.9823
770	521,075	429,263	0	950,338	0.0011	0.9835
780	552,348	328,607	0	880,955	0.0010	0.9845
790	572,011	408,312	0	980,324	0.0012	0.9856
800	319,803	690,268	0	1,010,072	0.0012	0.9868
810	460,511	431,756	0	892,266	0.0010	0.9879
820	258,859	502,620	0	761,479	0.0009	0.9888
830	269,651	98,776	0	368,427	0.0004	0.9892
840	193,809	742,891	0	936,700	0.0011	0.9903
850	514,402	334,803	0	849,205	0.0010	0.9913
860	307,004	48,155	0	355,159	0.0004	0.9917
870	17,177	566,516	0	583,693	0.0007	0.9924
880	254,605	347,140	0	601,744	0.0007	0.9931
890	197,580	428,189	0	625,769	0.0007	0.9938
900	24,162	308,273	0	332,436	0.0004	0.9942
910	183,690	79,058	0	262,749	0.0003	0.9945
920	288,552	0	0	288,552	0.0003	0.9949
930	125,044	455,056	0	580,100	0.0007	0.9956
940	102,949	105,038	0	207,987	0.0002	0.9958
950	260,905	312,615	0	573,519	0.0007	0.9965
960	180,496	204,431	0	384,927	0.0005	0.9969
970	82,384	296,948	0	379,332	0.0004	0.9974
980	33,392	270,147	0	303,539	0.0004	0.9977
990	159,024	121,727	0	280,751	0.0003	0.9981
1000	0	107,791	0	107,791	0.0001	0.9982
1010	0	159,878	0	159,878	0.0002	0.9984
1020	143,421	17,724	0	161,146	0.0002	0.9986
1030	26,348	26,000	0	52,348	0.0001	0.9986
1040	334,516	341,709	0	676,225	0.0008	0.9994
1050	0	213,584	0	213,584	0.0003	0.9997
1070	83,282	0	0	83,282	0.0001	0.9998
1080	0	26,406	0	26,406	0.0000	0.9998
1100	0	26,968	0	26,968	0.0000	0.9998
1120	0	23,266	0	23,266	0.0000	0.9999
1150	0	124,306	0	124,306	0.0001	1.0000
TOTAL	357,160,604	330,560,807	164,142,011	851,863,422		

Table E-3.--Population estimates by sex and size group for yellowfin sole from the 1993 eastern Bering Sea bottom trawl survey.

Length (mm)	Males	Females	Unsexed	Total	Proportion	Cumulative Proportion
60	253,771	976,390	0	1,230,161	0.0001	0.0001
70	0	1,952,780	0	1,952,780	0.0002	0.0003
80	4,159,331	976,390	0	5,135,721	0.0005	0.0008
90	3,905,559	9,456,965	0	13,362,524	0.0013	0.0022
100	4,777,838	3,434,458	0	8,212,296	0.0008	0.0030
110	8,954,209	9,549,466	0	18,503,675	0.0018	0.0048
120	20,144,077	11,381,975	0	31,526,051	0.0031	0.0080
130	23,252,434	31,013,026	0	54,265,460	0.0054	0.0134
140	51,772,591	44,800,599	0	96,573,190	0.0096	0.0230
150	49,347,282	58,411,137	0	107,758,420	0.0107	0.0338
160	83,070,215	88,481,016	0	171,551,231	0.0171	0.0509
170	108,973,649	104,810,676	0	213,784,325	0.0213	0.0722
180	108,209,976	114,305,158	313,389	222,828,523	0.0222	0.0944
190	162,081,979	155,336,935	313,389	317,732,303	0.0317	0.1261
200	139,202,689	169,985,418	0	309,188,107	0.0308	0.1569
210	209,337,637	209,043,663	313,389	418,694,689	0.0417	0.1986
220	235,381,025	256,719,157	1,566,943	493,667,125	0.0492	0.2479
230	290,145,267	255,758,934	940,166	546,844,367	0.0545	0.3024
240	330,536,730	271,554,643	626,777	602,718,150	0.0601	0.3625
250	351,801,220	281,266,566	626,777	633,694,563	0.0632	0.4257
260	330,152,183	306,817,762	313,389	637,283,334	0.0635	0.4892
270	343,645,202	281,371,615	313,389	625,330,206	0.0623	0.5515
280	341,830,154	298,649,456	1,880,332	642,359,942	0.0640	0.6156
290	345,636,466	335,293,044	1,566,943	682,496,453	0.0680	0.6836
300	304,416,650	332,991,736	1,566,943	638,975,330	0.0637	0.7473
310	272,825,049	320,839,107	1,253,555	594,917,711	0.0593	0.8067
320	201,067,892	322,536,038	2,820,498	526,424,429	0.0525	0.8592
330	112,330,684	301,962,325	2,193,721	416,486,729	0.0415	0.9007
340	59,448,987	269,475,219	3,447,276	332,371,482	0.0331	0.9338
350	32,369,935	245,433,276	3,133,887	280,937,098	0.0280	0.9618
360	8,225,474	145,727,035	940,166	154,892,675	0.0154	0.9773
370	4,982,936	100,112,775	313,389	105,409,100	0.0105	0.9878
380	1,717,904	56,080,325	0	57,798,229	0.0058	0.9935
390	458,759	30,737,417	313,389	31,509,565	0.0031	0.9967
400	0	17,304,979	0	17,304,979	0.0017	0.9984
410	0	10,850,603	0	10,850,603	0.0011	0.9995
420	0	2,589,791	0	2,589,791	0.0003	0.9997
430	0	1,810,069	0	1,810,069	0.0002	0.9999
440	0	641,034	0	641,034	0.0001	1.0000
450	0	78,227	0	78,227	0.0000	1.0000
TOTAL	4,544,415,755	5,460,517,184	24,757,706	10,029,690,645		

Table E-4.--Population estimates by sex and size group for rock sole from the 1993 eastern Bering Sea bottom trawl survey.

Length (mm)	Males	Females	Unsexed	Total	Proportion	Cumulative Proportion
60	0	0	1,164,561	1,164,561	0.0001	0.0001
70	0	0	2,149,385	2,149,385	0.0002	0.0003
80	64,412	384,915	5,202,768	5,652,095	0.0004	0.0007
90	16,373,953	10,069,968	6,210,991	32,654,912	0.0025	0.0032
100	12,719,516	28,261,910	544,525	41,525,951	0.0032	0.0064
110	60,814,918	37,593,035	156,338	98,564,292	0.0076	0.0139
120	175,023,600	139,737,462	397,629	315,158,692	0.0242	0.0381
130	286,748,624	196,772,130	320,848	483,841,601	0.0371	0.0752
140	271,696,201	199,777,757	320,848	471,794,806	0.0362	0.1114
150	290,300,410	170,911,423	422,298	461,634,131	0.0354	0.1468
160	223,135,068	190,654,448	422,298	414,211,814	0.0318	0.1785
170	254,039,858	134,732,775	38,391	388,811,023	0.0298	0.2083
180	282,022,033	188,166,562	76,781	470,265,377	0.0361	0.2444
190	365,643,553	267,321,479	0	632,965,032	0.0485	0.2929
200	514,060,091	312,990,676	0	827,050,767	0.0634	0.3563
210	591,162,871	415,043,543	0	1,006,206,414	0.0771	0.4335
220	584,652,587	531,073,235	0	1,115,725,822	0.0855	0.5190
230	536,033,010	484,908,452	0	1,020,941,462	0.0783	0.5973
240	489,201,015	404,520,260	0	893,721,275	0.0685	0.6658
250	327,705,707	304,152,917	0	631,858,625	0.0484	0.7143
260	313,799,940	302,502,306	0	616,302,246	0.0473	0.7615
270	278,055,698	211,246,270	0	489,301,968	0.0375	0.7991
280	266,793,656	206,430,006	0	473,223,662	0.0363	0.8353
290	229,313,072	162,086,205	0	391,399,277	0.0300	0.8653
300	184,855,203	152,251,821	0	337,107,025	0.0258	0.8912
310	152,300,926	154,255,820	0	306,556,747	0.0235	0.9147
320	90,484,273	142,685,966	0	233,170,239	0.0179	0.9326
330	41,937,083	120,632,535	0	162,569,617	0.0125	0.9450
340	28,071,203	127,898,559	0	155,969,761	0.0120	0.9570
350	9,852,061	112,248,227	0	122,100,288	0.0094	0.9664
360	11,372,406	116,667,365	0	128,039,771	0.0098	0.9762
370	6,946,573	78,749,211	0	85,695,784	0.0066	0.9827
380	3,943,709	63,744,912	0	67,688,621	0.0052	0.9879
390	3,929,460	55,482,305	0	59,411,765	0.0046	0.9925
400	3,266,614	43,684,684	0	46,951,298	0.0036	0.9961
410	1,182,796	24,320,830	0	25,503,626	0.0020	0.9980
420	0	10,393,920	0	10,393,920	0.0008	0.9988
430	0	7,442,634	0	7,442,634	0.0006	0.9994
440	483,813	4,096,865	0	4,580,678	0.0004	0.9998
450	0	1,310,848	0	1,310,848	0.0001	0.9999
460	0	381,512	0	381,512	0.0000	0.9999
470	0	65,861	0	65,861	0.0000	0.9999
480	766,888	498,152	0	1,265,040	0.0001	1.0000
TOTAL	6,908,752,802	6,116,149,762	17,427,662	13,042,330,226		

Table E-5.--Population estimates by sex and size group for Hippoglossoides sp. from the 1993 eastern Bering Sea bottom trawl survey.

Length (mm)	Males	Females	Unsexed	Total	Proportion	Cumulative Proportion
60	0	0	90,571	90,571	0.0000	0.0000
70	0	43,023	57,087	100,110	0.0000	0.0001
80	309,693	0	271,075	580,767	0.0003	0.0003
90	601,293	534,016	1,940,110	3,075,418	0.0013	0.0017
100	2,491,068	2,193,746	5,252,199	9,937,013	0.0043	0.0060
110	4,454,737	2,609,035	7,261,360	14,325,131	0.0062	0.0122
120	7,066,461	5,341,039	4,722,889	17,130,389	0.0074	0.0197
130	6,437,977	4,585,975	3,432,654	14,456,606	0.0063	0.0260
140	7,541,813	8,798,374	1,655,876	17,996,063	0.0078	0.0338
150	11,771,188	10,571,895	670,945	23,014,027	0.0100	0.0438
160	28,429,509	25,765,156	192,206	54,386,871	0.0236	0.0674
170	29,852,451	24,524,733	0	54,377,184	0.0236	0.0911
180	35,310,131	35,408,243	0	70,718,375	0.0307	0.1218
190	29,100,091	23,653,788	0	52,753,880	0.0229	0.1448
200	29,213,493	23,213,000	0	52,426,494	0.0228	0.1676
210	31,822,647	22,900,941	0	54,723,588	0.0238	0.1914
220	31,290,899	39,737,600	0	71,028,499	0.0309	0.2222
230	41,162,419	31,132,746	0	72,295,164	0.0314	0.2537
240	51,097,143	48,758,515	0	99,855,659	0.0434	0.2971
250	58,507,069	46,290,073	0	104,797,142	0.0456	0.3427
260	69,950,941	50,153,516	0	120,104,457	0.0522	0.3949
270	69,175,680	47,341,510	0	116,517,190	0.0507	0.4455
280	68,514,657	56,832,425	0	125,347,081	0.0545	0.5000
290	70,223,682	52,344,727	0	122,568,409	0.0533	0.5533
300	61,837,542	56,495,945	0	118,333,488	0.0515	0.6048
310	60,049,816	50,253,130	0	110,302,946	0.0480	0.6528
320	63,049,928	42,706,442	0	105,756,369	0.0460	0.6987
330	65,704,714	43,058,594	0	108,763,308	0.0473	0.7460
340	64,581,116	38,174,366	0	102,755,482	0.0447	0.7907
350	53,252,509	35,805,949	0	89,058,458	0.0387	0.8294
360	41,261,951	36,342,365	0	77,604,316	0.0337	0.8632
370	27,575,244	30,693,805	0	58,269,049	0.0253	0.8885
380	19,005,587	31,994,550	0	51,000,137	0.0222	0.9107
390	7,731,315	26,953,311	0	34,684,626	0.0151	0.9258
400	4,847,669	38,628,312	0	43,475,981	0.0189	0.9447
410	1,763,392	28,816,030	0	30,579,422	0.0133	0.9580
420	484,011	27,754,075	58,262	28,296,348	0.0123	0.9703
430	183,982	19,500,989	58,262	19,743,233	0.0086	0.9788
440	52,961	18,673,099	0	18,726,060	0.0081	0.9870
450	0	11,148,648	0	11,148,648	0.0048	0.9918
460	0	7,504,866	0	7,504,866	0.0033	0.9951
470	0	5,630,451	0	5,630,451	0.0024	0.9976
480	0	2,662,938	0	2,662,938	0.0012	0.9987
490	0	1,461,375	0	1,461,375	0.0006	0.9993
500	0	549,849	0	549,849	0.0002	0.9996
510	0	867,774	0	867,774	0.0004	1.0000
520	0	91,064	0	91,064	0.0000	1.0000
TOTAL	1,155,706,777	1,118,502,006	25,663,494	2,299,872,277		

Table E-6.--Population estimates by sex and size group for Alaska plaice from the 1993 eastern Bering Sea bottom trawl survey.

Length (mm)	Males	Females	Unsexed	Total	Proportion	Cumulative Proportion
90	33,978	0	0	33,978	0.0000	0.0000
110	0	28,594	0	28,594	0.0000	0.0001
120	55,704	30,356	0	86,060	0.0001	0.0002
130	33,978	82,814	0	116,792	0.0001	0.0003
140	87,823	82,814	0	170,637	0.0002	0.0006
150	165,708	140,281	0	305,989	0.0004	0.0009
160	404,427	281,310	0	685,737	0.0009	0.0018
170	284,034	569,163	0	853,197	0.0011	0.0029
180	628,037	558,272	0	1,186,309	0.0015	0.0044
190	672,506	527,322	0	1,199,828	0.0015	0.0059
200	1,184,725	820,403	0	2,005,128	0.0025	0.0085
210	2,173,947	1,507,842	0	3,681,789	0.0047	0.0132
220	1,774,388	1,959,157	0	3,733,545	0.0047	0.0179
230	3,714,992	2,859,126	0	6,574,118	0.0084	0.0263
240	4,720,646	5,683,366	0	10,404,012	0.0132	0.0395
250	10,306,605	8,290,553	0	18,597,158	0.0236	0.0631
260	13,298,380	7,771,356	77,732	21,147,469	0.0269	0.0900
270	13,569,218	10,272,163	0	23,841,381	0.0303	0.1203
280	20,207,085	12,774,172	0	32,981,257	0.0419	0.1623
290	20,797,643	14,135,304	77,732	35,010,679	0.0445	0.2068
300	22,148,216	16,503,497	233,196	38,884,909	0.0494	0.2562
310	21,469,867	13,835,832	77,732	35,383,431	0.0450	0.3012
320	31,253,407	14,857,099	77,732	46,188,239	0.0587	0.3599
330	36,844,049	11,605,249	155,464	48,604,762	0.0618	0.4217
340	39,958,109	15,062,154	77,732	55,097,995	0.0701	0.4918
350	37,601,777	15,304,608	310,928	53,217,314	0.0677	0.5594
360	35,048,914	13,248,842	233,196	48,530,952	0.0617	0.6211
370	28,174,245	12,156,261	77,732	40,408,238	0.0514	0.6725
380	15,151,257	14,120,917	0	29,272,175	0.0372	0.7097
390	9,421,734	14,007,206	0	23,428,940	0.0298	0.7395
400	5,269,774	17,375,712	77,732	22,723,218	0.0289	0.7684
410	1,377,738	18,162,950	77,732	19,618,420	0.0249	0.7933
420	852,829	18,280,687	77,732	19,211,248	0.0244	0.8178
430	529,624	20,507,206	0	21,036,830	0.0267	0.8445
440	455,080	20,115,726	0	20,570,805	0.0262	0.8707
450	147,389	21,411,438	0	21,558,827	0.0274	0.8981
460	224,062	19,909,161	0	20,133,223	0.0256	0.9237
470	253,886	13,585,875	0	13,839,761	0.0176	0.9413
480	166,915	12,802,208	0	12,969,123	0.0165	0.9578
490	0	13,405,527	0	13,405,527	0.0170	0.9748
500	0	7,638,235	0	7,638,235	0.0097	0.9845
510	0	3,720,493	0	3,720,493	0.0047	0.9892
520	0	3,560,955	0	3,560,955	0.0045	0.9938
530	99,797	2,356,060	0	2,455,857	0.0031	0.9969
540	0	1,148,339	0	1,148,339	0.0015	0.9984
550	0	769,088	0	769,088	0.0010	0.9993
560	0	228,564	0	228,564	0.0003	0.9996
590	0	205,250	0	205,250	0.0003	0.9999
600	0	90,178	0	90,178	0.0001	1.0000
TOTAL	380,562,493	404,349,687	1,632,374	786,544,554		

Table E-7.--Population estimates by sex and size group for Greenland turbot from the 1993 eastern Bering Sea bottom trawl survey.

Length (mm)	Males	Females	Unsexed	Total	Proportion	Cumulative Proportion
90	27,606	0	0	27,606	0.0015	0.0015
100	26,970	0	230,909	257,879	0.0137	0.0152
110	0	26,236	206,566	232,802	0.0124	0.0276
120	64,426	75,856	17,191	157,473	0.0084	0.0360
130	0	0	76,970	76,970	0.0041	0.0401
140	0	0	43,850	43,850	0.0023	0.0424
150	58,524	0	0	58,524	0.0031	0.0455
170	0	48,986	0	48,986	0.0026	0.0481
190	151,648	24,858	0	176,506	0.0094	0.0575
200	0	55,209	0	55,209	0.0029	0.0604
210	0	55,807	0	55,807	0.0030	0.0634
220	75,856	113,706	0	189,562	0.0101	0.0735
230	79,134	0	0	79,134	0.0042	0.0777
240	0	58,524	0	58,524	0.0031	0.0808
250	93,184	91,198	0	184,381	0.0098	0.0906
260	136,847	155,923	0	292,770	0.0156	0.1062
270	24,858	99,059	0	123,917	0.0066	0.1128
280	55,807	43,850	0	99,657	0.0053	0.1181
290	130,432	62,441	0	192,873	0.0103	0.1284
300	122,164	43,850	0	166,014	0.0088	0.1372
310	48,255	68,708	0	116,963	0.0062	0.1434
320	368,926	97,533	0	466,459	0.0248	0.1683
330	55,807	158,613	0	214,420	0.0114	0.1797
340	341,358	293,811	0	635,169	0.0338	0.2135
350	445,515	391,929	0	837,445	0.0446	0.2580
360	605,282	354,247	0	959,528	0.0511	0.3091
370	596,772	210,434	0	807,206	0.0430	0.3520
380	574,204	588,765	0	1,162,969	0.0619	0.4139
390	339,752	506,537	0	846,289	0.0450	0.4590
400	821,733	479,024	0	1,300,757	0.0692	0.5282
410	428,173	146,255	0	574,428	0.0306	0.5587
420	447,887	345,901	0	793,787	0.0422	0.6010
430	215,242	189,577	0	404,818	0.0215	0.6225
440	123,331	43,850	0	167,180	0.0089	0.6314
450	112,354	0	0	112,354	0.0060	0.6374
460	162,041	78,224	0	240,265	0.0128	0.6502
470	43,850	140,430	0	184,280	0.0098	0.6600
480	184,547	23,775	0	208,323	0.0111	0.6711
490	117,323	172,614	0	289,937	0.0154	0.6865
500	75,223	124,676	0	199,899	0.0106	0.6971
510	59,027	205,326	0	264,353	0.0141	0.7112
520	170,876	398,346	0	569,222	0.0303	0.7415
530	24,480	82,352	0	106,832	0.0057	0.7472
540	49,870	197,191	0	247,061	0.0131	0.7603
550	118,520	62,441	0	180,961	0.0096	0.7700
570	101,927	61,521	0	163,448	0.0087	0.7787
580	58,078	99,059	0	157,136	0.0084	0.7870
590	23,775	55,209	0	78,984	0.0042	0.7912
600	32,958	19,197	0	52,155	0.0028	0.7940
610	54,277	116,601	0	170,878	0.0091	0.8031
620	90,715	82,352	0	173,067	0.0092	0.8123
640	0	47,550	0	47,550	0.0025	0.8148
650	0	81,638	0	81,638	0.0043	0.8192
660	0	42,324	0	42,324	0.0023	0.8214
670	23,775	75,223	0	98,998	0.0053	0.8267
680	0	101,351	0	101,351	0.0054	0.8321
690	0	166,742	0	166,742	0.0089	0.8410
710	67,932	0	0	67,932	0.0036	0.8446
720	23,775	80,270	0	104,045	0.0055	0.8501
730	0	62,441	0	62,441	0.0033	0.8534
740	0	67,932	0	67,932	0.0036	0.8570
750	91,871	119,035	0	210,906	0.0112	0.8683

Table E-7.--Continued.

Length (mm)	Males	Females	Unsexed	Total	Proportion	Cumulative Proportion
760	0	184,346	0	184,346	0.0098	0.8781
770	23,775	82,352	0	106,127	0.0056	0.8837
780	0	41,289	0	41,289	0.0022	0.8859
790	0	76,337	0	76,337	0.0041	0.8900
800	0	233,343	0	233,343	0.0124	0.9024
810	0	242,314	0	242,314	0.0129	0.9153
820	0	372,564	0	372,564	0.0198	0.9351
830	0	134,157	0	134,157	0.0071	0.9423
840	0	82,943	0	82,943	0.0044	0.9467
850	0	58,151	0	58,151	0.0031	0.9498
860	0	190,074	0	190,074	0.0101	0.9599
870	0	189,432	0	189,432	0.0101	0.9700
880	0	98,296	0	98,296	0.0052	0.9752
900	0	147,579	0	147,579	0.0079	0.9830
920	0	62,441	0	62,441	0.0033	0.9864
940	0	90,715	0	90,715	0.0048	0.9912
950	0	24,072	0	24,072	0.0013	0.9925
970	0	56,391	0	56,391	0.0030	0.9955
980	0	26,412	0	26,412	0.0014	0.9969
990	0	58,524	0	58,524	0.0031	1.0000
TOTAL	8,170,663	10,046,237	575,486	18,792,386		

Table E-8.--Population estimates by sex and size group for Atheresthes sp. from the 1993 eastern Bering Sea bottom trawl survey.

Length (mm)	Males	Females	Unsexed	Total	Proportion	Cumulative Proportion
90	0	0	129,462	129,462	0.0002	0.0002
100	157,971	0	55,087	213,058	0.0003	0.0004
110	72,788	0	0	72,788	0.0001	0.0005
120	504,773	348,581	55,087	908,441	0.0011	0.0016
130	295,360	250,312	0	545,672	0.0006	0.0022
140	378,834	438,229	0	817,062	0.0010	0.0032
150	1,119,820	1,209,921	0	2,329,741	0.0028	0.0060
160	4,767,183	3,635,783	0	8,402,966	0.0100	0.0159
170	4,587,885	5,348,296	0	9,936,181	0.0118	0.0278
180	5,241,730	5,360,931	0	10,602,661	0.0126	0.0404
190	3,159,417	4,670,805	0	7,830,222	0.0093	0.0497
200	2,776,293	4,693,162	0	7,469,455	0.0089	0.0585
210	4,043,844	6,111,747	0	10,155,591	0.0121	0.0706
220	3,742,174	8,688,666	0	12,430,840	0.0148	0.0854
230	5,073,091	7,710,641	0	12,783,732	0.0152	0.1006
240	3,244,620	8,862,157	0	12,106,777	0.0144	0.1150
250	4,682,000	6,124,313	0	10,806,313	0.0128	0.1278
260	4,332,786	6,841,554	0	11,174,340	0.0133	0.1411
270	3,408,267	5,556,480	0	8,964,747	0.0107	0.1517
280	5,733,450	7,291,450	0	13,024,900	0.0155	0.1672
290	7,068,147	9,900,032	0	16,968,179	0.0202	0.1874
300	5,113,226	10,834,005	119,726	16,066,958	0.0191	0.2065
310	6,426,215	14,273,424	0	20,699,638	0.0246	0.2311
320	6,431,495	11,649,456	0	18,080,952	0.0215	0.2526
330	10,356,033	14,399,354	0	24,755,386	0.0294	0.2820
340	8,944,682	14,486,746	0	23,431,428	0.0278	0.3099
350	12,091,746	17,714,238	0	29,805,984	0.0354	0.3453
360	12,364,737	21,465,784	0	33,830,521	0.0402	0.3855
370	14,830,144	17,496,249	0	32,326,393	0.0384	0.4239
380	18,683,315	21,867,235	0	40,550,551	0.0482	0.4721
390	15,708,442	17,944,936	0	33,653,378	0.0400	0.5121
400	19,457,371	22,883,238	0	42,340,609	0.0503	0.5624
410	15,208,264	20,699,311	0	35,907,575	0.0427	0.6051
420	11,363,772	21,699,064	0	33,062,836	0.0393	0.6444
430	9,420,968	21,474,636	0	30,895,604	0.0367	0.6811
440	6,786,192	23,903,670	0	30,689,863	0.0365	0.7176
450	5,359,677	19,326,333	0	24,686,010	0.0293	0.7469
460	3,948,742	24,349,506	0	28,298,249	0.0336	0.7806
470	2,740,558	20,594,375	0	23,334,933	0.0277	0.8083
480	2,474,922	20,736,725	0	23,211,647	0.0276	0.8359
490	2,052,063	17,324,108	0	19,376,171	0.0230	0.8589
500	2,045,625	15,713,826	0	17,759,451	0.0211	0.8800
510	1,621,378	13,258,691	0	14,880,069	0.0177	0.8977
520	997,986	10,326,939	0	11,324,924	0.0135	0.9112
530	767,182	8,325,008	0	9,092,190	0.0108	0.9220
540	1,450,744	9,908,182	0	11,358,926	0.0135	0.9355
550	134,124	8,544,924	0	8,679,048	0.0103	0.9458
560	692,700	8,111,172	0	8,803,871	0.0105	0.9562
570	92,309	7,224,420	0	7,316,728	0.0087	0.9649
580	270,915	6,435,050	0	6,705,965	0.0080	0.9729
590	300,345	6,250,120	0	6,550,465	0.0078	0.9807
600	155,521	4,403,272	0	4,558,792	0.0054	0.9861
610	30,553	2,385,455	0	2,416,008	0.0029	0.9890
620	0	2,331,413	0	2,331,413	0.0028	0.9918
630	0	1,352,987	0	1,352,987	0.0016	0.9934
640	0	613,699	0	613,699	0.0007	0.9941
650	0	692,146	0	692,146	0.0008	0.9949
660	65,776	685,289	0	751,065	0.0009	0.9958
670	0	1,169,368	0	1,169,368	0.0014	0.9972
680	0	633,524	0	633,524	0.0008	0.9980
690	0	716,927	0	716,927	0.0009	0.9988
700	152,804	224,843	0	377,647	0.0004	0.9993

Table E-8.--Continued.

Length (mm)	Males	Females	Unsexed	Total	Proportion	Cumulative Proportion
710	0	338,410	0	338,410	0.0004	0.9997
720	0	102,380	0	102,380	0.0001	0.9998
750	0	117,143	0	117,143	0.0001	0.9999
760	0	66,477	0	66,477	0.0001	1.0000
TOTAL	262,930,958	578,097,117	359,364	841,387,438		

Table E-9.--Population estimates by sex and size group for Pacific halibut from the 1993 eastern Bering Sea bottom trawl survey.

Length (mm)	Males	Females	Unsexed	Total	Proportion	Cumulative Proportion
190	0	0	34,374	34,374	0.0006	0.0006
200	0	0	28,405	28,405	0.0005	0.0012
220	0	0	78,917	78,917	0.0015	0.0026
230	0	0	49,254	49,254	0.0009	0.0036
240	0	0	56,408	56,408	0.0011	0.0046
260	0	0	57,903	57,903	0.0011	0.0057
280	0	0	53,665	53,665	0.0010	0.0067
290	0	0	51,869	51,869	0.0010	0.0077
310	0	0	63,849	63,849	0.0012	0.0088
320	0	0	233,766	233,766	0.0044	0.0132
330	0	0	369,113	369,113	0.0069	0.0201
340	0	0	624,834	624,834	0.0116	0.0317
350	0	0	1,193,982	1,193,982	0.0222	0.0540
360	0	0	858,568	858,568	0.0160	0.0699
370	0	0	714,655	714,655	0.0133	0.0833
380	0	0	755,786	755,786	0.0141	0.0973
390	0	0	758,544	758,544	0.0141	0.1115
400	0	0	840,075	840,075	0.0156	0.1271
410	0	0	416,455	416,455	0.0078	0.1349
420	0	0	798,823	798,823	0.0149	0.1498
430	0	0	758,123	758,123	0.0141	0.1639
440	0	0	833,665	833,665	0.0155	0.1794
450	0	0	780,547	780,547	0.0145	0.1939
460	0	0	915,525	915,525	0.0171	0.2110
470	28,235	0	1,026,427	1,054,662	0.0196	0.2306
480	0	0	702,109	702,109	0.0131	0.2437
490	0	0	1,527,925	1,527,925	0.0285	0.2722
500	28,235	0	948,538	976,774	0.0182	0.2904
510	0	0	1,950,159	1,950,159	0.0363	0.3267
520	0	0	2,089,456	2,089,456	0.0389	0.3656
530	28,235	0	2,295,188	2,323,423	0.0433	0.4089
540	28,235	28,235	2,241,588	2,298,058	0.0428	0.4517
550	0	0	2,821,845	2,821,845	0.0526	0.5043
560	0	28,235	2,551,417	2,579,652	0.0481	0.5523
570	0	0	1,969,936	1,969,936	0.0367	0.5890
580	0	0	2,255,327	2,255,327	0.0420	0.6310
590	0	0	2,148,921	2,148,921	0.0400	0.6711
600	0	0	1,787,152	1,787,152	0.0333	0.7044
610	0	0	1,742,521	1,742,521	0.0325	0.7368
620	0	0	1,251,352	1,251,352	0.0233	0.7601
630	0	0	829,564	829,564	0.0155	0.7756
640	0	0	620,388	620,388	0.0116	0.7871
650	0	0	801,431	801,431	0.0149	0.8021
660	0	0	740,173	740,173	0.0138	0.8159
670	0	0	542,367	542,367	0.0101	0.8260
680	0	0	700,407	700,407	0.0130	0.8390
690	0	0	487,481	487,481	0.0091	0.8481
700	0	0	275,075	275,075	0.0051	0.8532
710	0	0	163,170	163,170	0.0030	0.8562
720	0	0	172,359	172,359	0.0032	0.8595
730	0	0	291,997	291,997	0.0054	0.8649
740	0	0	179,827	179,827	0.0033	0.8682
750	0	0	251,830	251,830	0.0047	0.8729
760	0	0	155,118	155,118	0.0029	0.8758
770	0	0	289,743	289,743	0.0054	0.8812
780	0	0	276,358	276,358	0.0051	0.8864
790	0	0	334,037	334,037	0.0062	0.8926
800	0	0	298,762	298,762	0.0056	0.8982
810	0	0	321,910	321,910	0.0060	0.9042
820	0	0	261,533	261,533	0.0049	0.9090
830	0	0	218,127	218,127	0.0041	0.9131
840	0	0	31,558	31,558	0.0006	0.9137

Table E-9--Continued.

Length (mm)	Males	Females	Unsexed	Total	Proportion	Cumulative Proportion
850	0	0	183,106	183,106	0.0034	0.9171
860	0	0	243,653	243,653	0.0045	0.9216
870	0	0	311,939	311,939	0.0058	0.9274
880	0	0	196,727	196,727	0.0037	0.9311
890	0	0	236,516	236,516	0.0044	0.9355
900	0	0	248,115	248,115	0.0046	0.9401
910	0	0	204,724	204,724	0.0038	0.9439
920	0	0	108,495	108,495	0.0020	0.9460
930	0	0	137,782	137,782	0.0026	0.9485
940	0	0	188,902	188,902	0.0035	0.9520
950	0	0	83,202	83,202	0.0015	0.9536
960	0	0	99,034	99,034	0.0018	0.9554
970	0	0	156,598	156,598	0.0029	0.9584
980	0	0	232,660	232,660	0.0043	0.9627
990	0	0	60,418	60,418	0.0011	0.9638
1000	0	0	179,960	179,960	0.0034	0.9672
1010	0	0	26,243	26,243	0.0005	0.9677
1020	0	0	102,661	102,661	0.0019	0.9696
1030	0	0	114,227	114,227	0.0021	0.9717
1040	0	0	99,442	99,442	0.0019	0.9736
1050	0	0	164,494	164,494	0.0031	0.9766
1060	0	0	82,822	82,822	0.0015	0.9782
1070	0	0	55,255	55,255	0.0010	0.9792
1080	0	0	59,362	59,362	0.0011	0.9803
1090	0	0	50,112	50,112	0.0009	0.9812
1100	0	0	56,378	56,378	0.0011	0.9823
1110	0	0	29,250	29,250	0.0005	0.9828
1120	0	0	25,795	25,795	0.0005	0.9833
1130	0	0	77,439	77,439	0.0014	0.9847
1140	0	0	18,796	18,796	0.0004	0.9851
1150	0	0	53,082	53,082	0.0010	0.9861
1160	0	0	29,250	29,250	0.0005	0.9866
1170	0	0	99,416	99,416	0.0019	0.9885
1200	0	0	31,880	31,880	0.0006	0.9891
1220	0	0	67,156	67,156	0.0013	0.9903
1250	0	0	31,558	31,558	0.0006	0.9909
1260	0	0	15,574	15,574	0.0003	0.9912
1280	0	0	85,573	85,573	0.0016	0.9928
1290	0	0	29,250	29,250	0.0005	0.9933
1300	0	0	26,597	26,597	0.0005	0.9938
1310	0	0	59,519	59,519	0.0011	0.9949
1320	0	0	87,443	87,443	0.0016	0.9966
1340	0	0	24,240	24,240	0.0005	0.9970
1350	0	0	27,639	27,639	0.0005	0.9975
1380	0	0	27,596	27,596	0.0005	0.9981
1390	0	0	17,912	17,912	0.0003	0.9984
1400	0	0	32,947	32,947	0.0006	0.9990
1410	0	0	28,276	28,276	0.0005	0.9995
1460	0	0	25,126	25,126	0.0005	1.0000
TOTAL	112,940	56,470	53,514,324	53,683,734		