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Results of a 1988 Trawl Survey of Groundfish Resources of the Upper Continental Slope off Oregon

by
Norman B. Parks, Franklin R. Shaw, and Rick L. Henry

U.S. DEPARTMENT OF COMMERCE
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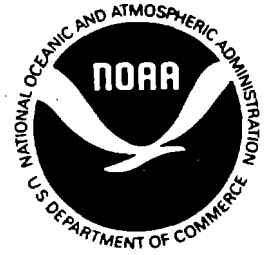

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Norman B. Parks, Franklin R. Shaw, and Rick L. Henry

Resource Assessment and Conservation Engineering Division
Alaska Fisheries Science Center
7600 Sand Point Way N.E., BIN C-15700
Seattle, WA 98115-0070

U.S. DEPARTMENT OF COMMERCE
Ronald H. Brown, Secretary
National Oceanic and Atmospheric Administration
Diana Josephson, Deputy Under Secretary

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A B S T R A C T

The Alaska Fisheries Science Center (AFSC),, in cooperation with the Southwest Fisheries Science Center (SWFSC), conducted a bottom trawl survey of groundfish on the upper continental slope off Oregon during November-December 1988. The survey area was between 44°06' N lat. (Heceta Head) and 45°22' N lat. (near Cape Lookout) between the depths of 183 and 1,280 m (100 and 700 fm). Sampling.-was conducted aboard the NOAA ship Miller Freeman and included standard bottom trawl hauls, neuston net tows, standard and deep oblique plankton net tows, and physical oceanographic observations from 62, predetermined stations. This report explains the sampling and analytical methods used and summarizes the results of the bottom trawl survey. The report presents environmental data, species composition, distribution, and relative abundances of major species of fish,. Biomass, population, and size composition estimates are presented for the survey target species by depth stratum. Estimates are presented in less detail for other species. Appendices include a trawl mensuration report, position and catch listings for each haul, catch rates of fish by depth stratum, population and biomass estimates for principal species, and population size compositions.

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INTRODUCTION

In 1988, the Alaska, Fisheries Science Center's (AFSC) Resource Assessment and Conservation Engineering (RACE) Division and the Southwest Fisheries Science Center's (SWFSC) Coastal Fisheries Division conducted a cooperative survey of the groundfish resources off the coast of Oregon between Heceta Head and 'Cape Lookout. Both science centers are part of the National Marine Fisheries Service (NMFS). Primary objectives were to examine sablefish, (Anoplopoma fimbria) size, age,. sex ratio, and reproductive condition as a function of bathymetric distribution; evaluate the application of area-swept bottom trawl and egg production survey methods to the continental slope demersal community; and define the reproductive biology, food habits, and habitat characteristics of key shelf species including sablefish, Dover sole (Microstomus [pacificus), shortspine thornyhead (Sebastolobus alascanus), and arrowtooth flounder (Atheresthes stomias). Other objectives were to describe the physical characteristics (temperature, oxygen, salinity, and current speed and direction) of the continental slope demersal habitat, the upper slope groundfish community and how it varies with depth, and juvenile sablefish movements through tagging.

This was the second survey of the upper continental slope fishery resources off the coast of Oregon. The preceding survey was conducted in 1984 (Raymore and Weinberg, 1990) to determine the feasibility of utilizing bottom trawls and vertically deployed strings of sablefish traps to assess abundance,'

geographic and bathymetric distribution, and biological characteristics of the major groundfish species. inhabiting the upper continental slope. The present survey replicated the southern part of the 1984 survey.

This report is intended to document the methods used and the results obtained from the 1988 survey. Included are summaries of catches, distribution, abundance, and size composition for all major components of the community, as well as analyses of age-length and length-weight relationships of selected species. In the report, we discuss the species composition of the upper slope community and how that composition changes over the 1,100 m depth range studied. Results of investigations into histology, pathology, reproductive biology, food habit studies and ichthyoplankton are being reported elsewhere.

SURVEY METHODS

Survey Area and Sampling Design

The area surveyed included about one-quarter of the International North Pacific Fisheries Commission (INPFC) Columbia statistical area from Heceta Head, Oregon (44°06'N), to near Cape Lookout, Oregon (45°22'N), between the depths of 183 and 1,280 m (100 and 700 f-m) (Fig. 1). The survey area was stratified into six depth intervals: 183-366 m, 367-549 m, 550-732 m, 733-914 m, 915-1,097 m, and 1,098-1,280 m (100-200 fm, 201-300 fm, 301-400 fm,. 401-500 fm, 501-600 fm, and 601-700 fm). Trawl- stations were placed randomly along parallel east-west tracklines which were spaced 16.7 km (9 nautical miles, nmi) apart. The number of stations was allocated proportionally to the trackline length across each depth stratum as follows:

Linear distance along trackline within depth stratum	'Number of stations allocated to trackline section
113.0 km (7.0 nmi)	1
13.1-26.0 km (7.1-14.0 nmi)	2
126.1 km (14.1 nmi)	3

Vessel and Fishing Gear

The NOAA ship Miller Freeman is 66.5 m (215 ft) long overall and has 2,300 continuous horsepower. -The vessel was equipped with two net reels, hydraulically powered split trawl winches, and had interior spaces for processing the catch and laboratories

for collecting and analyzing biological and oceanographic data. The vessel was staffed and equipped to operate 24 hours a day.

A polyethylene Noreastern high-opening bottom trawl equipped with mud-sheep roller gear was used to sample the groundfish community (Table 1). A small mesh liner was used in the codend to assure retention of small fish. SCANMAR trawl mensuration systems were used to monitor wing spread, door spread, headrope height, and trawl depth throughout the survey. Useful information, however, was acquired from just 16 survey tows because acoustic signals from the instruments could not be received when fishing deeper than 1,100 m.

Trawling Procedures

Sampling began on the southernmost trackline and the vessel continuously worked, northward during the course of the survey. If untrawlable terrain was encountered at a pre-selected station, a search for favorable ground was conducted within a 9.3 km (5 nmi) radius of the original site. If a trawlable area was not located after a reasonable search effort, the site was abandoned and the vessel proceeded to the next assigned trawl station. Once suitable bottom was located, the trawl was deployed and sufficient time was allowed while the vessel moved slowly ahead for the net to settle to the bottom (l0-55 min, depending on depth). At depths shallower than 732 m (400 fm), the trawl was towed for 30 minutes after settling using a scope ratio of approximately 2.5:1. Sixty-minute hauls were made at deeper

stations using scope ratios of approximately 2:l or less. Towing speed was approximately 3.7 km/hour (2 knots). This is slower than the standard 5.5 km/hour (3 knots) used during the 1984 slope survey and during triennial surveys; but was considered necessary to keep the trawl fishing on bottom during the deeper tows when warp lengths began to approach winch capacities and low scope ratios had to be used. When the net was snagged, badly or significantly damaged, the trawl-haul was considered unsatisfactory and the station was repeated or abandoned, depending on the time available. On the other hand, a trawl haul was considered satisfactory if a minor snag or untrawlable bottom was encountered, but no gear damage resulted and over half of the tow had been completed.

Catch Sampling Procedures

Standard RACE catch sampling procedures were followed as described by Hughes (1976) and Smith and Bakkala (1982). All l - catches were released from the-codend directly onto the sorting table, sorted into baskets by species, counted, and weighed.., Invertebrates were identified to species as time and expertise permitted. After catches were, weighed and counted, biological data and specimens were collected.

Oceanographic Data Collection

Sea surface temperature (SST) was obtained with a bucket thermometer at all sampling stations. Bottom water temperature (BWT), as well as salinity and temperature profiles of the entire water column, were obtained at all survey stations using a Seabird conductivity-temperature-depth (CTD) probe. Seawater samples for oxygen and salinity were collected at selected stations. Oxygen concentrations were determined by titration using a modified Winkler method.

Biological Data Collection

Samples of all fish species were measured to characterize how their size composition varies with depth. Length measurements for up to 100 specimens of each of the primary target species were collected by sex per haul. Otoliths were collected from sablefish, Dover sole, arrowtooth flounder, shortspine thornyhead, Pacific hake (also known as Pacific whiting)(Merluccius productus), and darkblotched rockfish (Sebastes crameri). Three biological sampling strata, 183-549 m, 550-914 m, and 915-1,280 m (l00-300 fm, 301-500 fm, and 501-700 fm), were established to assure that samples were taken from the full range of depths. Otoliths were collected from stratified samples of five fish per sex/centimeter interval per biological sampling stratum.

Whole ovaries were collected from sablefish, Dover sole, arrowtooth flounder, shortspine thornyhead, darkblotched

rockfish, and Pacific hake for fecundity studies. Samples of ovaries were also collected from sablefish, Dover sole, and shortspine thornyhead for histological verification of the maturity stages assigned at sea.

Sablefish that were captured in good condition were tagged and released alive to support a continuing study of their movements. Sablefish were placed in live tanks with-circulating sea water. Usually within 15 minutes of completing the haul, viable sablefish were measured, tagged in a padded tagging cradle, and released. Each fish was tagged with a single anchor tag implanted just below the first dorsal fin (see methods in Shaw 1984).

Additional biological collections were made for a variety of studies. Stomach samples were collected from sablefish, Dover sole, deepsea sole, (Embassichthys bathybius), longspine thornyhead (Sebastolobus altivelis), and shortspine thornyhead for an ecological study. Pacific hake samples were collected for viral and parasite studies. Tissues of major organs were taken from Dover sole, arrowtooth flounder, Pacific hake, shortspine thornyhead, sablefish, and selected crabs for pathology studies.

Because the cruise occurred before most groundfish spawn, ichthyoplankton samples to collect eggs and larvae were taken only at approximately one-third of the bottom trawl stations. A

[1] Major organs included tissues from the liver, gills, skin, muscle, gall bladder, kidney, intestine, stomach, and gonad.

thorough survey of the ichthyoplankton was conducted during the later NOAA vessel David Starr Jordan cruise 89-3 (16 February - 5 April 1989) which replicated the NOAA vessel Miller Freeman cruise 88-9 station pattern. Miller Freeman ichthyoplankton sampling included nekton tows, 200 m bongo tows, and deep bongo tows. Neuston tows were conducted with a Manta net frame, a 45.4 kg weight, and a 505µ mesh net. Tows were 15 minutes in duration with a wire angle ranging between 20° and 25°. Standard (200 m) bongo tows were taken obliquely to 212 m using a CalCOFI 71 cm bongo net frame, a 34.O kg weight, and a 505µ mesh net. The net maintained a descent rate of 50 wire-meters per minute and was allowed to stabilize for 30 seconds at terminal depth. Haul-back was maintained at a rate of 20 m per minute. Wire angles ranged between 38° and 51°. Deep bongo tows were conducted with a 505µ mesh net on a 71 cm CalCOFI frame, equipped with a 56.7 kg weight, and a 9040 series Plessey TD (temperature-depth) sensor. Descent rates were approximately 35 m. per minute and ascent rates were approximately 14 m per minute. The net was lowered to within 50 m of the sea bottom and maximum depth was limited to 1,250 m.

Data Analysis

Four standard analyses are routinely performed on RACE-survey. data. These provide:.

(1) estimates of the species. biomass,

(2) estimates of the total population numbers,

(3) estimates of the population size composition, and

(4) estimates of the population age composition.

It should be noted that estimates of biomass and population are based on the following assumptions:

1. All fish in the path of the trawl are caught. There is no significant effect from avoidance or herding. The catchability coefficient is assumed to equal one.
2. The entire fishable resource is vulnerable to capture by the trawl used.

Partial availability of the species to the sampling gear and catchability of less than 100% will result in conservative estimates of abundance when using-the area-swept survey method. These, assumptions are probably. weakest for sablefish, larger specimens of which are known to avoid capture by trawls (Parks 1 9 7 3) .

Biomass and population numbers for species of interest are estimated by the area,-swept method (Gunderson and Sample 1980). Mean CPUE is expressed in terms of kg/ha to derive a biomass estimate and in terms of no./ha, to obtain a population estimate. Size composition within a stratum is calculated by apportioning. the, estimated total population numbers into sex-centimeter

intervals based on haul-by-haul length frequency estimates which have been weighted by CPUE and summed over all hauls in the stratum., Age composition estimates are derived by applying an age-length key to the size composition estimate.

RESULTS

Haul, Catch, and Biological Data

Of the 62 bottom trawl stations scheduled for this survey, 57 were successfully sampled (Fig. 1). Table 2 summarizes the type and number of samples by depth stratum and the size of each stratum in square kilometers.

The fishing dimensions of the trawl were measured during 24 tows. The complete trawl mensuration report is presented in Appendix A. After removing the five unsatisfactory tows, the mean wing spread for the survey trawl was calculated to be 14.7 m. This value was used to represent the mean net width for the area-swept biomass calculations.

A total of 85 fish species representing 32 families were caught (Table 3). Table 4 lists the nearly 40 invertebrate. species encountered, representing 12 classes.. Appendix B presents detailed station information for each haul and catch weights of major fish and invertebrate species for all satisfactory, trawls.

Table 5 lists the number of length observations and the observed length ranges for each of the 84 fish species measured (total of 34,918 observations).. Table 6 summarizes the length observations from satisfactory tows by depth stratum.

Table. 7 presents a summary of biological data collected. A total of 120 sablefish were tagged and released during the course of the survey (Table 8).

Temperature Data

Surface and bottom temperatures were collected at all 70 stations fished. Mean bottom temperatures ranged from 3.3°C in the deepest depth stratum to 6.6°C in the shallowest depth stratum (Fig. 2.). Mean surface water temperatures ranged from 11.5° to 11.7C.

Relative Density and Distribution of Species

Figures 3-9 show the relative densities (kg/km trawled) at each station for the six primary target species and spiny dogfish (Squalus acanthias) which was included because of its high abundance in the shallow stratum.

The 20 most abundant species in each stratum were ranked in order of mean catch per unit effort (CPUE) expressed in kg/km trawled (Table 9). For all depths combined, spiny dogfish was by far the most abundant species taken (118.5 kg/km) with virtually all of that taken in the shallowest depth interval (183-366 m). Sablefish and Dover sole were next in abundance with overall mean CPUEs of 51.7 and 49.0 kg/km, respectively, followed by longspine and shortspine thornyheads (28.5 and 25.3 kg/km, respectively).

Among the target species, sablefish, longspine thornyhead, and Dover sole had the highest CPUEs across the various depth strata (Fig. 10). Nearly all of the target species were found in all depth strata. Longspine thornyhead was not caught in the shallowest stratum and arrowtooth flounder was encountered only in the two shallowest strata with relatively low catch rates

(less than 12 kg/km. trawled),. Sablefish was the most abundant species in the 550-732 m stratum (179.3 kg/km) and either the second or third most abundant species in all other strata except the shallowest (Table 9, Fig. 11). Dover sole was the most abundant species in the 367-549 m stratum (100.3 kg/km) and its -catch rates exceeded 19.5 kg/km trawled in all but the deepest stratum. Longspine thorny head was the most abundant species (117.3 and 85.0 kg/km) in the 733-914 and 915-1,097 m strata, respectively. It was-also the second most abundant species in the 'deepest stratum. Shortspine thornyhead was the third most abundant species in the three shallowest depth strata and was most abundant (38.2 kg/km) in the 550-732 m stratum.,

The CPUE of shortspine thornyhead declined gradually with depth. This decline in CPUE is more apparent in terms of number than it is in terms of weight (Fig. 12) because the average size of shortspine thornyhead increases with depth (Fig. 13). Longspine thornyhead catch rates begin to increase at about 550 m and by 700 m they eclipse catch-rates for shortspine thorhyhead. Although both species occur over the entire depth range of the survey (183-1,280 m), shortspine thornyheads are generally more abundant at depths below about 460 m, whereas longspine thornyheads are more.-abundant at depths greater than about 680 m.

As expected, the dominant species in the catch changed among depth strata. In the shallowest stratum (183-366 m);spiny

dogfish were most abundant with a mean CPUE of 452.8 kg/km, (Table 9, Fig. 11). Splitnose rockfish (Sebastes diploproa), shortspine thornyhead and Dover sole were the next most abundant (25.6, 24.8, and 23.1 kg/km, respectively). Less important in the shallowest stratum were Pacific hake (15.6 kg/km) and sablefish (9.0 kg/km).

In the 367-549 m stratum, Dover sole, was the most abundant of all groundfish taken with a mean CPUE of 100.3 kg/km. Sablefish and shortspine thornyhead were next with mean CPUEs of 32.0 and 27.9 kg/km, respectively, followed by Pacific ocean perch (Sebastes alutus) (20.9 kg/km), longnose skate (Raja rhina) (12.9 kg/km), Pacific hake (12.3 kg/km), and arrow-tooth flounder (11.8 kg/km).

In the 550-732 m stratum, sablefish with a CPUE of 179.3 kg/km was the most abundant groundfish species, followed by shortspine thornyhead, Dover sole, and longspine thornyhead (38.2, 36.1, and 34.8 kg/km, respectively). Grooved Tanner crab (Chionoecetes tanneri) -was the second most abundant species taken in this depth interval (39.9 kg/km).

In the 733-914 m stratum, longspine thornyhead was the most abundant (117.3 kg/km) of all grounhfish. Sablefish, Dover sole, and shortspine thornyhead (54.0, 24.9, and 16.2 kg/km, -respectively) were the next most abundant groundfish in this stratum. Grooved Tanner crab and giant grenadiers (Albatrossia pectoralis) followed at 6.6 and 6.4 kg/km, respectively.

In the 915-1,097 m stratum, longspine thornyhead continued to predominate with a mean CPUE of 85.0 kg/km. Next in abundance were sablefish and Dover sole (31.6 and 19.7 kg/km, respectively): Giant grenadiers and shortspine- thornyhead were also abundant in this depth stratum (18.4 and 16.0 kg/km, respectively).

In the <deepest stratum (1,098-1,280 m), longspine thornyhead -again had the highest mean CPUE (37.4 kg/km) of the six-target species, although giant grenadier catch rates were higher (41.7 kg/km). Sablefish (19.8 kg/km), shortspine thornyhead (8.5 kg/km) and Dover sole (3.0 kg/km) became less important in this stratum. Other important species included Pacific grenadier (Corynhaenoides acrolepis) and grooved Tanner crab (18.7 and 9.3 kg/km, respectively).

Appendix C lists all fish species in order of mean catch rate for each depth stratum.

Biomass and Population Numbers

The largest biomass estimates calculated for commercially important fish species encountered during this survey were for sablefish, Dover sole, longspine thornyhead, shortspine thornyhead, Pacific hake, and arrowtooth flounder with total biomass estimates of 18,504, 17,552, 10,218, 9,044, 2,973, and 1,900 metric tons (t), respectively' (Tables 10-15).

The sablefish biomass estimate was the greatest of the commercially important species over all depths but 81% of the

estimated biomass for sablefish was found shallower than 733 m Table 10). Fifty-six percent of its biomass was concentrated in the 550-732 m depth stratum.

The Dover sole biomass estimate was the largest of the commercially important species in the 367-549 m stratum, where 67% of its estimated biomass occurred. Seventy-nine percent of the estimated biomass for Dover sole was found shallower than 550 m (Table 11).

All of the estimated biomass for arrowtooth flounder was found in the two shallowest strata, 183-549 m (Table 12). Seventy-two percent of the biomass was observed in the 367-549 m stratum.

Nearly all (97%) of the estimated Pacific hake biomass was split evenly between the two shallowest strata (Table 13). Pacific hake had the third highest biomass estimate of the commercially important species in the 183-366 stratum after shortspine thornyhead and Dover sole, and the fifth most abundant species in the 367-549 m stratum behind Dover sole, sablefish, shortspine thornyhead, and Pacific ocean perch.

Eighty-six percent of the estimated shortspine thornyhead biomass occurred in the three shallowest depth strata (Table 14). Its peak biomass was seen in the 367-549 m stratum (36%), where it ranked third behind Dover sole and sablefish, respectively.

Ninety-seven percent of the estimated biomass for longspine thornyhead was found within the 550-1,280 m depth strata. Fifty-

two percent of its biomass was found in the 733-914 m depth. stratum (Table- 15), where the estimated longspine thornyhead biomass was the largest of all the commercially important fish.

Tables 16-31 provide summaries of biomass estimates for all non-target species. A full listing of program BIOMASS for each of the target species, including biomass, population numbers, mean CPUE, and mean individual weight for each stratum and for all strata combined- is located in Appendix-D..

Age and Size Composition

Length frequency distributions for sablefish, Dover sole, arrowtooth flounder, Pacific hake, shortspine thornyhead, and longspine thornyhead by depth stratum and for all strata combined are presented in Figures 13-15. Sablefish mean lengths ranged from 43.6 cm in the shallow depth stratum to 58.9 cm in the deepest stratum, Dover sole from 33.2 cm to 45.6 cm, and shortspine thornyhead from 22.1 cm to 45.8 cm, respectively. All : three of these species exhibit a marked increase in mean length as depths increases. In all three of these species, the largest increase in mean length occurred between the second and third depth stratum. Arrowtooth flounder, Pacific hake, and longspine thornyhead showed little change in mean length in the depth strata where they were taken. Size composition estimates for each of the target species. for the entire survey area are provided in Appendix, E.

Although age structures were collected,.for sablefish, darkblotched rockfish, shortspine thornyhead, Dover sole, Pacific hake, and arrowtooth flounder, only Pacific hake and darkblotched rockfish otoliths had been assigned ages at the time this report -was prepared.-

Small otolith sample sizes for Pacific hake (n = 213) -and darkblotched rockfish (n = 157) reduce the certainty of age composition estimates but afford us some relatively rare information about these species in the late fall. Because of these small sample sizes, a single age-length, key was applied to estimates of the population size composition for each species to calculate age compositions for each depth zone.

A Pacific hake growth curve is not presented because there were so few age classes that a meaningful age-length relationship could not be developed. The majority of Pacific hake were 8 year olds, members of the 1980 year class (Table 32, Fig. 16). This year class was dominant in all depth strata, although 4 year olds (1984 ‘year class) and 11 year olds (1977 year class) also contributed significantly to the population. These year classes have been previously observed as stronger than average (Dorn et al. 1991) and were again the predominant year classes in the summer of 1989 in the Columbia INPFC area (personal communication K.L. Weinberg, AFSC, NOAA, 7600 Sand Point Way NE, Seattle, WA 98115, unpublished data).

observed ages for darkblotched rockfish ranged from 1 to 68 years. The strongest year class was from the 1985 spawning, representing 13% of the estimated population (Table 33, Fig. 17). The 1985 year class dominated the shallowest stratum (183-366 m) making up 22% of that population, but was not found in the deeper -stratum (367-549 m). All of the youngest fish (1, 2, and 3 years) were found only in the shallower stratum. In the deeper stratum, the 1979 through 1982 year classes were most abundant, making up over 53% of the population in that stratum. Nichol (1990) found similar depth variability in age compositions off Oregon with primarily l-3 year olds in 74 fm, 3-5 year olds in 108 fm, and 6-9 year olds in deeper than about 150 fm.

Figure 18 presents the darkblotched rockfish age-length relationship by sex for all depth strata combined. Length at age for both males and females are very close to those found by Nichol (1990)% Mean length-at-age data was fit to a von Bertalanffy growth curve which indicates asymptotic lengths of 38.0 cm for males and 39.7 cm for females. Most growth is completed by about age 12.

Length-Weight Relationship

The length-weight relationships (sexes combined) for sablefish, Dover sole, arrowtooth flounder, Pacific hake, shortspine thornyhead, and darkblotched rockfish are shown by depth interval in Figures 19 through 24.

Sablefish less than 60 cm had similar length-weight relationships in all three depth intervals, whereas the weight at length decreased with depth for sablefish greater than 60 cm (Fig. 19).

In the shallowest interval (183-549 m), Dover sole sizes weighed less at all-lengths than their counterparts in the deeper zones (Fig. 20). The length-weight relationships in the two deeper intervals were similar, although in the deepest zone (915-1,280 m) fish less than 46 cm outweighed those in the middle depth zone while fish greater than 46 cm weighed less than those in the middle interval.

Shortspine thornyhead from the shallowest depth interval weighed less at all sizes than did fish from the two deeper intervals, which displayed nearly identical length-weight relationships (Fig. 21).

Arrowtooth flounder, Pacific hake, and darkblotched rockfish length-weight data were taken only from the shallowest depth interval (Figs. 22, 23, and 24).

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TABLES

Table 1.--Summary of characteristics and accessories for the polyethylene Noreastern high-opening demersal trawl used aboard the NOAA ship Miller Freeman during the 1988 West Coast upper continental slope survey.

Headrope Length (m)	Footrope Length (m)	Codend Mesh (cm)	Liner Mesh (cm)	Mud-sweep Roller Gear		Accessory Gear	
				Rubber Disks (cm)	Steel Chains (cm)	V-doors (m x m)	Dandylines (m x cm)
27.2	32.4	8.9	3.2	20.3	1.6	1.8 x 2.7	55 x 1.6

Table 2.--Summary of sampling by depth stratum during the 1988 West Coast upper continental slope survey.

Depth (m)	Stratum Size(km²)	Allocated Tows/Casts	Successful Standard Tows/Casts	Trawl Comparison Tows	Temperature			Salinity	Surface	Standard Oblique	Deep Oblique
					Bucket	CTD	XBT	CTDO	Manta	Bongo	Bongo
183-366	1,372.57	18	14	3	18	15	3	15	9	9	2
367-549	1,717.59	18	12	4	18	14	4	14	-	-	-
550-732	849.42	10	9	1	10	9	1	9	9	9	9
733-914	668.55	8	8	-	8	8	-	8	-	-	-
915-1097	280.83	8	6	-	8	8	-	8	-	-	-
1098-1280	372.22	8	8	-	8	8	-	8	9	9	9
Total Survey Area											
183-1280	5,261.18	70	57	8	70	62	8	62	27	27	20

Table 3.--Fish species caught during the 1988 West Coast upper continental slope survey.

Family and Species"	Common Name'
Myxinidae	
Eptatretus stouti	Pacific hagfish
Scyliorhinidae	
Apristurus brunneus	Brown cat shark
Squalidae	
Squalus acanthias	Spiny dogfish
Rajidae	
Raja rhina	Longnose skate
Raja abyssicola	Deepsea skate
Bathyraja kincaidi	Sandpaper skate
Bathyraja trachura	Black skate
Chimaeridae	
Hydrolagus colliei	Spotted ratfish
Nemichthyidae	
Nemichthyidae unidentified	Snipe eel unidentified
Nemichthys scolopaceus	Slender snipe eel
Clupeidae	
Alosa sapidissima	American shad
Salmonidae	
Oncorhynchus tshawytscha	Chinook salmon
Osmeridae	
Allosmerus elongatus	Whitebait smelt
Osmerus mordax	Rainbow smelt
Thaleichthys pacificus	Eulachon
Bathylagidae	
Bathylagus milleri	Robust blacksmelt
Chauliodontidae	
Chauliodontidae unidentified	Viperfish unidentified
Chauliodus macouni	Pacific viperfish
Melanostomiidae	
Tactostoma macropus	Longfin dragonfish
Bathophilus flemingi	Highfin dragonfish
Alepocephalidae	
Alepocephalus tenebrosus	California slickhead
Talismania bifurcata	Threadfin slickhead
Searsiidae	
Searsiidae unidentified	Tubeshoulder unidentified
Sagamichthys abei	Shining tubeshoulder

Table 3. --Continued.

Family and Species[a]	Common Name[a]
Scopelarchidae	
Benthalbella dentata	Northern pearleye
Myctophidae	
Myctophidae unidentified	Lanternfish unidentified
Diaphus theta	California headlightfish
Stenobrachius leucopsarus	Northern lampfish
Lampanyctus ritteri	Broadfin lanternfish
Notoscopelus resplendens	Patchwork lampfish
Tarletonbeania crenularis	Blue lanternfish
Gadidae	
Gadus macrocephalus	Pacific cod
Theragra chalcogramma	Walleye pollock
Merlucciidae[b]	
Merluccius productus	Pacific hake
Moridae	
Antimora microlepis	Pacific flatnose
Macrouridae	
Albatrossia pectoralis	Giant grenadier
Coryphaenoides acrolepis	Pacific grenadier
Coryphaenoides filifera	Filamented grenadier
Nezumia stelgidolepis	California grenadier
Ophidiidae	
Dicrolene filamentosa	Threadfin cusk-eel
Zoarcidae	
Aprodon cortezianus	Bigfin eelpout
Lycodes diapterus	Black eelpout
Lycodes pacificus	Blackbelly eelpout
Lycodapus mandibularis	Pallid eelpout
Lycodapus fierasfer	Blackmouth eelpout
Bothrocara brunneum	Twoline eelpout
Bothrocara molle	Soft eelpout
Embryx crotalinus	Snakehead eelpout
Scomberesocidae	
Cololabis saira	Pacific saury
Trachipteridae	
Trachipterus altivelis	King-of-the-salmon
Anoplogastridae	
Anoplogaster cornuta	Fangtooth

Table 3.--Continued.

Family and Species[a]	Common Name[a]
Scorpaenidae	
Sebastes aleutianus	Rougheye rockfish
Sebastes alutus	Pacific ocean perch
Sebastes aurora	Aurora rockfish
Sebastes babcocki	Redbanded rockfish
Sebastes brevispinis	Silvergray rockfish
Sebastes crameri	Darkblotched rockfish
Sebastes diploproa	Splitnose rockfish
Sebastes elongatus	Greenstriped rockfish
Sebastes entomelas	Widow rockfish
Sebastes helvomaculatus	Rosethorn rockfish
Sebastes jordani	Shortbelly rockfish
Sebastes pinniger	Canary rockfish
Sebastes proriger	Redstripe rockfish
Sebastes reedi	Yellowmouth rockfish
Sebastes saxicola	Stripetail rockfish
Sebastes zacentrus	Sharpchin rockfish
Sebastolobus alascanus	Shortspine thornyhead
Sebastolobus altivelis	Longspine thornyhead
Anoplopomatidae	
Anoplopoma fimbria	Sablefish
Hexagrammidae	
Ophiodon elongatus	Lingcod
Cottidae	
Icelinus filamentosus	Threadfin sculpin
Agonidae	
Agonidae unidentified	Poacher unidentified
Xeneretmus latifrons	Blacktip poacher
Bathyagonus nigripinnis	Blackfin poacher
Cyclopteridae	
Cyclopteridae unidentified	Snailfish unidentified
Careproctus melanurus	Blacktail snailfish
Pleuronectidae	
Atheresthes stomias	Arrowtooth flounder
Eopsetta jordani	Petrale sole
Glyptocephalus zachirus	Rex sole
Hippoglossus stenolepis	Pacific halibut
Lyopsetta exilis	Slender sole
Microstomus pacificus	Dover sole
Parophrys vetulus	English sole
Embassichthys bathybius	Deepsea sole
Pisces unidentified	

[a] Nomenclature from Robins (1980) unless otherwise noted.
[b] Nomenclature from Eschmeyer and Herald (1983)

Table 4.--Invertebrate species caught during the 1988 West Coast upper continental slope survey.

Phylum and Class'	Species'
Porifere	
Hexactinellida	Unidentified sponge
Cnidaria	
Hydrozoa	Unidentified hydroid
Anthozoa	Unidentified anemone
	Unidentified sea pen
Scyphozoa	Unidentified jellyfish
Echinodermsta	
Asteroidea	Ctenodiscus crispatus
	Unidentified sea star
	Brisaster latifrons
	Luidia foliata
	Thrissacanthras penicillatus
	Pteraster tesselatus
	DiDlopteraster multif3les
	PoranioDsis inflate
Holothuroidea	Scotoplanes theeli
	Psolus sp.
	Unidentified sea cucumber
Ophiuroidea	Ophiura sarsi
Echinoidea	Allocentrotus fragilis
	Unidentified sea urchin
Mellusca	
Gastropoda	Neptunea sp.
	Bathvbembix bairdii
	Unidentified snail
	Unidentified nudibrench
Cephalopoda	Opisthoreuthis californiana
	Berryteuthis magister
	Unidentified squid
	Octopus leini
	OCtOPUS L
	Unidentified octopus
Arthropoda	
Cruscacea	Pandalus iordani
	Pandalus Platyceros
	Chionoecetes tanneri
	Lithodes couesi
	Paralomis multispina
	Looholithodes foraminatus
	Unidentified crab
Chordata	
Ascidiacea	Unidentified tunicate
	Unidentified salps

' Nomenclature from Morrii, Abbott, and Haderlie (1980).

Table 5.--Summary of length data collected from fish species caught during the 1988 upper continental slope survey.

Species Name	Length Observations	Length Range (cm)	Species Name	Length Observations	Length Range (cm)	Species Name	Length Observations	Length Range (cm)
Pacific hagfish	465	25-52	California grenadier	1	8	King-of-the-salmon	2	169-177
Brown cat shark	254	11-70	Pacific grenadier	1654	2-40	Twoline eelpout	204	15-63
Spiny dogfish	838	25-114	Giant grenadier	1300	7-84	Soft eelpout	5	17-18
Deepsea skate	1	60	Filamented grenadier	4	7-10	Snakehead eelpout	109	23-46
Bering skate	283	10-57	Threadfin sculpin	7	19-24	Bigfin eelpout	620	18-50
Longnose skate	168	17-97	Pacific cod	10	57-64	Blackmouth eelpout	2	12-14
Black skate	149	11-56	Pacific flatnose	760	11-53	Pallid eelpout	2	11-12
Spotted ratfish	345	20-63	Walleye pollock	58	25-32	Black eelpout	252	14-32
Arrowtooth flounder	648	15-74	Lingcod	7	64-97	Blackbelly eelpout	3	18-21
Pacific halibut	16	58-106	Blacktail snailfish	374	9-35	Shortspine thornyhead	4454	8-74
Slender sole	2068	10-28	Longfin dragonfish	8	20-34	Longspine thornyhead	4458	5-34
Petrale sole	134	27-54	Highfin dragonfish	1	20	Rougheye rockfish	46	18-80
English sole	210	27-42	Pacific hake	967	30-69	Pacific ocean perch	803	18-43
Dover sole	3087	19-58	Unidentified lanternfish	73	6-21	Aurora rockfish	119	14-55
Deepsea sole	531	8-43	Northern lampfish	25	7-14	Silvergray rockfish	3	51-63
Rex sole	2142	10-41	California headlightfish	1	8	Darkblotched rockfish	255	15-46
Unidentified poacher	10	15-22	Broadfin lanternfish	14	11-21	Splitnose rockfish	524	7-38
Blacktip poacher	43	8-20	Blue lanternfish	1	6	Greenstriped rockfish	174	14-36
Blackfin poacher	30	12-20	Unidentified snipe eel	1	41	Widow rockfish	23	34-49
California slickhead	1048	13-45	Slender snipe eel	1	44	Rosethorn rockfish	88	11-33
Threadfin slickhead	224	16-30	Ribbon barracudina	1	25	Shortbelly rockfish	10	16-28
Fangtooth	2	13-15	Eulachon	243	7-20	Blackgill rockfish	9	42-52
Sablefish	3369	28-97	Whitebait smelt	1	19	Canary rockfish	2	44-48
Robust blacksmelt	220	10-23	Rainbow smelt	146	12-20	Redstripe rockfish	29	20-30
Threadfin cusk-eel	1	9	Chinook salmon	40	44-63	Redbanded rockfish	71	11-57
Unidentified viperfish	1	24	Pacific saury	2	24-24	Stripetail rockfish	19	16-33
Pacific viperfish	83	13-29	Northern pearleye	3	12-22	Sharpchin rockfish	384	16-37
American shad	4	28-42	Shining tubeshoulder	6	14-21	Yellowmouth rockfish	65	21-45

Table 6. --Summary- of length observations from all fish species by depth stratum (m) for successful tows.

Species Name	Depth Stratum 183-366 m	367-546 m	550-732 m	733-914 m	915-1097 m	1098-1280 m	All Strata
Pacific hagfish	16	135	25	140	79	63	458
Brown cat shark	9	75	67	45	17	1	214
Spiny dogfish	728	22	---	3	---	---	753
Deepsea skate	---	---	---	---	---	1	1
Bering skate	190	76	6	---	---	1	273
Longnose skate	91	59	8	1	---	---	159
Black skate	---	---	12	11	19	102	144
Spotted ratfish	315	15	2	1	---	---	333
Arrowtooth flounder	233	259	---	---	---	---	492
Pacific halibut	6	7	---	---	---	---	13
Slender sole	1,204	489	---	---	---	---	1,693
Petrale sole	105	14	---	---	---	---	119
English sole	209	---	---	---	---	---	209
Dover sole	519	929	314	604	209	71	2,646
Deepsea sole	---	---	8	156	126	203	493
Rex sole	1,027	716	39	---	---	---	1,782
Unidentified poacher	10	---	---	---	---	---	10
Blacktip poacher	34	9	---	---	---	---	43
Blackfin poacher	---	21	3	5	---	---	29
California slickhead	---	---	33	532	293	173	1,031
Threadfin slickhead	---	---	15	189	17	3	224
Fangtooth	---	---	---	1	---	1	2
Sablefish	208	476	846	683	316	270	2,799
Robust blacksmelt	---	1	42	58	50	69	220
Threadfin cusk-eel	---	---	---	---	1	---	1
Unidentified viperfish	---	---	---	---	---	1	1
Pacific viperfish	---	6	24	35	4	12	81
American shad	1	---	---	---	---	---	1
California grenadier	---	1	---	---	---	---	1
Pacific grenadier	---	---	172	259	487	721	1,639
Giant grenadier	---	---	136	186	326	596	1,244
Filamented grenadier	---	---	---	---	1	---	1
Threadfin sculpin	5	---	1	1	---	---	7
Pacific cod	9	---	---	---	---	---	9
Pacific flatnose	---	---	36	11	47	664	758
Walleye pollock	58	---	---	---	---	---	58
Lingcod	6	---	---	---	---	---	6
Blacktail snailfish	24	180	113	41	3	6	367
Longfin dragonfish	---	---	2	4	---	2	8
Highfin dragonfish	---	---	---	1	---	---	1
Pacific hake	322	331	21	7	1	7	689
Unidentified lanternfish	49	1	13	4	4	2	73

Table 6.--Continued.

Species Name	Depth Stratum 183-366 m	367-546 m	550-732 m	733-914 m	915-1097 m	1098-1280 m	All Strata
Northern lampfish	---	1	16	---	5	3	25
California headlightfish	---	---	1	---	---	---	1
Broadfin lanternfish	---	---	11	1	---	2	14
Blue lanternfish	---	---	---	---	1	---	1
Unidentified snipe eel	---	---	---	1	---	---	1
Slender snipe eel	---	---	---	---	1	---	1
Eulachon	100	---	---	---	---	---	100
Whitebait smelt	1	---	---	---	---	---	1
Rainbow smelt	146	---	---	---	---	---	146
Chinook salmon	29	---	---	---	---	---	29
Pacific saury	---	1	---	1	---	---	2
Northern pearleye	---	---	1	---	---	2	3
Shining tubeshoulder	---	---	5	---	---	---	5
King-of-the-salmon	---	---	---	---	---	2	2
Twoline eelpout	---	1	31	38	92	40	202
Soft eelpout	5	---	---	---	---	---	5
Snakehead eelpout	---	---	---	36	48	20	104
Bigfin eelpout	320	265	2	---	---	---	587
Blackmouth eelpout	---	---	---	2	---	---	2
Pallid eelpout	---	---	---	1	1	---	2
Black eelpout	63	75	68	4	---	3	213
Blackbelly eelpout	3	---	---	---	---	---	3
Shortspine thornyhead	1,108	1,088	609	408	235	173	3,621
Longspine thornyhead	---	151	694	1,009	800	1,282	3,936
Rougheye rockfish	5	21	---	---	---	---	26
Pacific ocean perch	100	438	6	---	---	---	544
Aurora rockfish	3	62	1	---	---	---	66
Silvergray rockfish	3	---	---	---	---	---	3
Darkblotched rockfish	162	55	---	---	---	---	217
Splitnose rockfish	488	2	---	---	---	---	490
Greenstriped rockfish	155	---	---	---	---	---	155
Widow rockfish	22	1	---	---	---	---	23
Rosethorn rockfish	83	1	---	---	---	---	84
Shortbelly rockfish	5	1	---	---	---	---	6
Canary rockfish	---	---	---	2	---	---	2
Redstripe rockfish	29	---	---	---	---	---	29
Redbanded rockfish	50	7	---	---	---	---	57
Stripetail rockfish	19	---	---	---	---	---	19
Sharpchin rockfish	361	10	---	---	---	---	371
Yellowmouth rockfish	65	---	---	---	---	---	65
Total Survey Area	8,703	6,002	3,383	4,481	3,183	4,496	30,248

Table 7.--summary of biological data collected by species. Samples include data from good performance tows, poor performance tows, and comparative tows.

	Length Observations	Stomach Contents	Otoliths	Fecundity[a]	Maturity	Histology[c]	Parasitology
Sablefish	3,369	359	751	330	850[b]	28	---
Dover sole	3,087	517	548	390	850[b]	33	---
Arrowtooth flounder	648	---	389	389	389	11	---
Deep-sea sole	531	151	---	---	---	---	---
Longspine thornyhead	4,558	375	---	---	---	---	---
Shortspine thornyhead	4,454	353	884	210	900[b]	30	---
Darkblotched rockfish	255	---	157	140	157	---	---
Pacific hake	967	---	221	86	221	45	135
Rex sole	2,142	---	---	---	---	1	---
Grooved Tanner crab	18	---	---	---	---	18	---
Lopholithodes foraminatus	1	---	---	---	---	1	---
Lithodes couesi	17	---	---	---	---	17	---
Paralomis multispina	18	---	---	---	---	18	---
Rockfish (19 species)	11,636	728	1,040	350	1,057	30	---
Flatfish (8 species)	8,836	668	937	779	1,239	44	---
Roundfish (76 species)	26,082	1,087	2,012	766	2,128	103	135
All fishes (84 species)	34,918	1,755	2,949	1,545	3,367	148	135

a Whole ovaries were collected.
[b] An ovary section was collected to verify maturity classification.
[c] Specimens were collected for the Alaska Fisheries Science Center Pathology Laboratory.

Table 8.--Summary of sablefish tagged during the survey.

Number of Fish	Depth of Capture (m)	Location of Capture	Length Range (cm)	Mean Length (cm)	Mean Weight (kg)	Tag Number Range
17	421	44° 54.40'N - 124° 53.12'W	44-59	50.0	1.14	SB 39001-39019
17	395	44° 54.31'N - 124° 33.64'W	30-50	41.2	0.62	SB 39020-39512
40	293	45° 22.55'N - 124° 24.19'W	38-46	40.5	0.64	SB 39513-39553
46	198	45° 19.06'N - 124° 18.47'W	28-37	31.1	0.28	SB 39554-39600
All tows						
120	326.5		28-59	38.4	0.55	SB 39001-39600

Table 9.--Mean CPUE (kg/km) by depth stratum of the 20 most abundant groundfish and selected crab species caught during the 1988 West Coast upper continental slope survey.

Species Name	183-366 m	Species Name	367-549 m	Species Name	550-732 m	Species Name	733-914 m
Spiny dogfish	452.8	Dover sole	100.3	Sablefish	179.3	Longspine thornyhead	117.3
Splitnose rockfish	25.6	Sablefish	32.0	Grooved Tanner crab	39.9	Sablefish	54.0
Shortspine thornyhead	24.8	Shortspine thornyhead	27.9	Shortspine thornyhead	38.2	Dover sole	24.9
Dover sole	23.1	Pacific ocean perch	20.9	Dover sole	36.1	Shortspine thornyhead	16.2
Longnose skate	18.0	Longnose skate	12.9	Longspine thornyhead	34.8	Grooved Tanner crab	6.6
Pacific hake	15.6	Pacific hake	12.3	Giant grenadier	8.5	Giant grenadier	6.4
Rex sole	11.8	Arrowtooth flounder	11.8	Longnose skate	3.8	California slickhead	3.3
Slender sole	10.7	Rex sole	4.9	Black skate	2.0	Deepsea sole	2.1
Sablefish	9.0	Darkblotched rockfish	3.7	Twoline eelpout	1.3	Pacific grenadier	1.5
Spotted ratfish	9.0	Bigfin eelpout	3.3	Brown cat shark	1.2	Threadfin slickhead	1.1
English sole	7.7	Longspine thornyhead	2.6	Pacific hake	1.1	Pacific hagfish	0.7
Bering skate	7.7	Bering skate	2.5	Pacific grenadier	1.0	Chionoecetes sp.	0.6
Petrale sole	6.0	Brown cat shark	2.4	Blacktail snailfish	0.8	Twoline eelpout	0.5
Arrowtooth flounder	5.6	Pacific halibut	2.0	Black eelpout	0.8	Black skate	0.5
Sharpchin rockfish	4.1	Slender sole	1.9	Rex sole	0.7	Brown cat shark	0.4
Darkblotched rockfish	3.5	Rougheye rockfish	1.6	Pacific flatnose	0.6	Snakehead eelpout	0.2
Pacific ocean perch	2.5	Blacktail snailfish	1.5	Bering skate	0.4	Spiny dogfish	0.2
Bigfin eelpout	2.5	Aurora rockfish	1.2	California slickhead	0.4	Pacific hake	0.2
Chinook salmon	2.2	Spiny dogfish	1.1	Deepsea sole	0.4	Robust blacksmelt	0.1
Greenstriped rockfish	2.1	Pacific hagfish	1.0	Pacific ocean perch	0.4	Canary rockfish	0.1
Number of hauls	14	Number of hauls	12	Number of hauls	9	Number of hauls	8

Species Name	915-1,097 m	Species Name	1,098-1,280 m	Species Name	183-1,280 m
Longspine thornyhead	85.0	Giant grenadier	41.7	Spiny dogfish	118.5
Sablefish	31.6	Longspine thornyhead	37.4	Sablefish	51.7
Dover sole	19.7	Sablefish	19.8	Dover sole	49.0
Giant grenadier	18.4	Pacific grenadier	18.7	Longspine thornyhead	28.5
Shortspine thornyhead	16.0	Grooved Tanner crab	9.3	Shortspine thornyhead	25.3
Pacific grenadier	7.2	Shortspine thornyhead	8.5	Longnose skate	9.6
California slickhead	4.0	Pacific flatnose	7.6	Pacific hake	8.3
Grooved Tanner crab	3.0	Black skate	5.2	Grooved Tanner crab	8.1
Deepsea sole	2.6	Dover sole	3.0	Pacific ocean perch	7.5
Twoline eelpout	2.0	Deepsea sole	2.5	Splitnose rockfish	6.7
Black skate	1.7	Chionoecetes sp.	2.2	Giant grenadier	6.1
Chionoecetes sp.	0.9	California slickhead	1.3	Arrowtooth flounder	5.3
Pacific hagfish	0.6	Twoline eelpout	0.9	Rex sole	4.8
Pacific flatnose	0.3	King-of-the-salmon	0.4	Slender sole	3.4
Snakehead eelpout	0.3	Pacific hagfish	0.4	Bering skate	2.9
Brown cat shark	0.3	Paralomis multispina	0.4	Spotted ratfish	2.6
Threadfin slickhead	0.2	Lithodes couesi	0.3	Darkblotched rockfish	2.1
Robust blacksmelt	0.2	Robust blacksmelt	0.2	Pacific grenadier	2.1
Lithodes couesi	0.1	Deepsea skate	0.2	English sole	2.0
King-of-the-salmon	0.1	Pacific hake	0.2	Petrale sole	1.8
Number of hauls	6	Number of hauls	8	Number of hauls	57

Table 10. --Sablefish biomass estimates with 90% confidence limits, population numbers, mean lengths, and mean weights by depth stratum.

Depth (m)	Biomass* (t)	Percent of Total Biomass*	90% Confidence interval	Mean CPUE (kg/km)	Population Numbers*	Mean Length (cm)	Mean Weight (kg)
183-366	842.2	5	485 - 1,199 (± 42%)	9.0	920,285	43.6	0.92
367-549	3,737.5	20	1,829 - 5,646 (± 51%)	32.0	3,514,922	45.3	1.06
550-732	10,361.5	56	6,862 - 13,861 (± 34%)	179.3	6,987,328	51.4	1.48
733-914	2,456.4	13	1,753 - 3,160 (± 29%)	54.0	1,411,709	54.3	1.74
915-1097	604.2	3	198 - 1,010 (± 67%)	31.6	330,237	55.6	1.83
1098-1280	502.0	3	313 - 691 (± 38%)	19.8	213,638	58.9	2.35
183-1280	18,503.9	100	14,607 - 22,401 (± 21%)	51.7	13,378,119	49.8	1.38

*Differences in totals may exist due to rounding.

Table 11. --Dover sole biomass estimates with 90% confidence limits, population numbers, mean lengths, and mean weights by depth stratum.

Depth (m)	Biomass* (t)	Percent of Total Biomass*	90% Confidence interval	Mean CPUE (kg/km)	Population Numbers*	Mean Length (cm)	Mean Weight (kg)
183-366	2,158.4	12	291 - 4,026 (± 87%)	23.1	3,885,696	33.2	0.56
367-549	11,722.2	67	1,473 - 21,971 (± 87%)	100.3	28,166,907	33.6	0.42
550-732	2,085.4	12	2 - 4,208 (±100%)	36.1	2,236,910	42.6	0.93
733-914	1,133.9	6	657 - 1,623 (± 42%)	24.9	1,222,541	42.8	0.93
915-1097	376.3	2	0 - 858 (±128%)	19.7	388,051	43.5	0.97
1098-1280	76.1	Tr	0 - 170 (±119%)	3.0	60,526	45.6	1.26
183-1280	17,552.3	100	7,067 - 28,038 (± 60%)	49.0	35,960,630	34.6	0.49

*Differences in totals may exist due to rounding.
Tr: Trace amount.

Table 12. --Arrowtooth flounder biomass estimates with 90% confidence limits, population numbers, mean lengths, and mean weights by depth stratum.

Depth (m)	Biomass* (t)	Percent of Total Biomass*	90% Confidence interval	Mean CPUE (kg/km)	Population Numbers*	Mean Length (cm)	Mean Weight (kg)
183-366	525.7	28	167 - 884 (± 68%)	5.6	1,223,409	34.8	0.43
367-549	1,374.1	72	0 - 2,831 (±106%)	11.8	2,710,121	35.9	0.51
550-732	0.0	0	---- - ----	----	----	----	----
733-914	0.0	0	---- - ----	----	----	----	----
915-1097	0.0	0	---- - ----	----	----	----	----
1098-1280	0.0	0	---- - ----	----	----	----	----
183-1280	1,899.7	100	410 - 3,390 (± 78%)	5.3	3,933,529	35.6	0.48

*Differences in totals may exist due to rounding.

Table 13. --Pacific hake biomass estimates with 96% confidence limits, population numbers, mean lengths, and mean weights by depth stratum.

Depth (m)	Biomass* (t)	Percent of Total Biomass*	90% Confidence interval	Mean CPUE (kg/km)	Population Numbers*	Mean Length (cm)	Mean Weight (kg)
183-366	1,461.3	49	493 - 2,430 (± 66%)	15.7	2,228,280	46.6	0.66
367-549	1,437.3	48	770 - 2,104 (± 46%)	12.3	2,183,162	45.7	0.66
550-732	61.6	2	8 - 116 (± 88%)	1.1	80,905	47.1	0.76
733-914	8.0	Tr	1 - 15 (± 88%)	0.2	10,954	45.8	0.73
915-1097	0.6	Tr	0 - 2 (±233%)	Tr	855	54.0	0.68
1098-1280	4.4	Tr	2 - 7 (± 57%)	0.2	5,830	46.8	0.75
183-1280	2,973.1	100	1,837 - 4,109 (± 38%)	8.3	4,509,986	46.2	0.66

*Differences in totals may exist due to rounding.
Tr: Trace amount.

Table 14.--Shortspine thornyhead biomass estimates with 90% confidence limits', population numbers, mean lengths, and mean weights by depth stratum.

Depth (m)	Biomass* (t)	Percent of Total Biomass*	90% confidence interval	Mean CPUE (kg/km)	Population Numbers*	Mean Length (cm)	Mean Weight (kg)
183-366	2,317.0	26	829 - 3,805 (± 64%)	24.8	14,049,198	22.1	0.17
367-549	3,264.6	36	2,141 - 4,388 (± 34%)	27.9	18,011,803	22.2	0.18
550-732	2,205.0	24	1,175 - 3,235 (± 47%)	38.2	2,659,092	35.5	0.83
733-914	737.6	8	536 - 939 (± 27%)	16.2	626,901	42.8	1.18
915-1097	305.3	3	158 - 453 (± 48%)	16.0	206,462	45.9	1.48
1098-1280	214.6	2	160 - 269 (± 25%)	8.5	146,317	45.8	1.47
183-1280	9,044.1	100	7,022 - 11,066 (± 22%)	25.3	35,699,773	23.7	0.25

*Differences in totals may exist due to rounding.

Table 15. --Longspine thornyhead biomass estimates with 90% confidence limits, population numbers, mean lengths, and mean weights by depth stratum.

Depth (m)	Biomass* (t)	Percent of Total Biomass*	90% Confidence interval	Mean CPUE (kg/km)	Population Numbers*	Mean Length (cm)	Mean Weight (kg)
183-366	0.0	Tr	---- - ----	----	----	----	----
367-549	301.9	3	0 - 785 (±160%)	2.6	2,925,889	19.7	0.10
550-732	2,012.1	20	1,288 - 2,736 (± 36%)	34.8	17,719,216	19.2	0.11
733-914	5,333.8	52	4,147 - 6,491 (± 22%)	117.3	36,802,797	20.2	0.13
915-1097	1,623.2	16	958 - 2,289 (± 43%)	85.0	11,814,867	21.2	0.14
1098-1280	946.8	9	647 - 1,247 (± 32%)	37.4	11,029,030	17.9	0.09
183-1280	10,217.8	100	8,743 - 11,693 (± 14%)	28.5	83,291,799	19.8	0.12

*Differences in totals may exist due to rounding.
Tr: Trace amount.

Table 16.--Pacific hagfish, brown cat shark, spiny dogfish, deepsea skate, and Bering skate; estimates of biomass, mean CPUE (kg/km), population numbers, mean lengths, and mean weights by depth stratum.

	Depth (m)	Biomass* (t)	Percent of total Biomass*	Mean CPUE (kg/km)	Total Population Numbers*	Mean length (cm)	Mean Weight (kg)
Pacific hagfish	183-366	15.2	7	0.2	90,846	41.0	0.17
	367-549	122.2	59	1.1	1,036,203	37.7	0.12
	550-732	19.1	9	0.3	86,921	42.7	0.22
	733-914	31.8	15	0.7	220,882	41.4	0.14
	915-1097	11.0	5	0.6	66,946	42.8	0.16
	1098-1280	9.1	4	0.4	50,871	43.4	0.18
	183-1280	208.4	100	0.6	1,552,670	39.1	0.13
brown cat shark	183-366	90.2	19	1.0	101,027	60.1	0.89
	367-549	278.8	60	2.4	426,290	54.5	0.65
	550-732	69.8	15	1.2	229,338	41.3	0.30
	733-914	19.4	4	0.4	65,733	40.2	0.29
	915-1097	5.1	1	0.3	14,228	44.2	0.36
	1098-1280	0.6	Tr	Tr	859	54.0	0.68
	183-1280	463.9	100	1.3	837,475	50.3	0.55
spiny dogfish	183-366	42,283.3	100	452.8	58,881,794	57.3	0.72
	367-549	131.0	Tr	1.1	135,651	61.3	0.97
	550-732	0.0	0	0.0	0	----	----
	733-914	8.5	Tr	0.2	6,021	62.8	1.41
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	42,422.8	100	118.5	59,023,465	57.4	0.72
deepsea skate	183-366	0.0	0	0.0	0	----	----
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	4.9	100	0.2	740	60.0	6.58
	183-1280	4.9	100	Tr	740	60.0	6.58
Bering skate	183-366	715.6	69	7.7	1,059,910	30.6	0.68
	367-549	293.2	28	2.5	452,550	30.3	0.65
	550-732	25.4	2	0.4	20,299	38.5	0.25
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.3	Tr	Tr	868	26.0	0.36
	183-1280	1,034.5	100	2.9	1,533,626	30.6	0.68

*Differences in totals may exist due to rounding.
Tr: Trace amount.

Table 17. --Longnose skate, black skate, spotted ratfish, Pacific halibut, and slender sole; estimates of biomass, mean CPUE (kg/km), population numbers, mean lengths, and mean weights by depth stratum.

	Depth (m)	Biomass* (t)	Percent of total Biomass*	Mean CPUE (kg/km)	Total Population Numbers*	Mean length (cm)	Mean Weight (kg)
longnose skate	183-366	1,684.5	49	18.0	461,362	54.7	3.65
	367-549	,513.3	44	13.0	390,447	54.2	3.88
	550-732	218.4	6	3.8	28,493	77.9	7.66
	733-914	4.1	Tr	0.1	1,295	58.0	3.18
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	3,420.3	100	9.6	881,598	55.2	3.88
black skate	183-366	0.0	0	0.0	0	----	----
	367-549	0.0	0	0.0	0	----	----
	550-732	116.7	39	2.0	42,448	48.0	2.75
	733-914	21.6	7	0.5	16,445	33.6	1.31
	915-1097	31.9	11	1.7	17,294	41.8	1.85
	1098-1280	131.1	43	5.2	80,470	37.0	1.63
	183-1280	301.4	100	0.8	156,657	40.2	1.92
spotted ratfish	183-366	837.4	92	9.0	2,008,600	41.2	0.42
	367-549	61.3	7	0.5	98,497	49.9	0.62
	550-732	5.5	1	0.1	10,165	46.0	0.54
	733-914	1.1	Tr	Tr	1,551	45.0	0.68
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	905.3	100	2.5	2,118,813	41.6	0.43
Pacific halibut	183-366	121.4	34	1.3	21,536	75.2	5.64
	367-549	239.4	66	2.1	35,736	79.6	6.70
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	360.9	100	1.0	57,272	77.9	6.30
slender sole	183-366	996.4	82	10.7	22,901,711	18.4	0.04
	367-549	222.6	18	1.9	4,381,782	19.6	0.05
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	1,218.9	100	3.4	27,283,494	18.6	0.05

*Differences in totals may exist due to rounding.
Tr: Trace amount.

Table 18.--Petrale sole, English sole, deepsea sole, rex sole, and unidentified poacher; estimates of biomass, mean CPUE (kg/km), population numbers, mean lengths, and mean weights by depth stratum.

	Depth (m)	Biomass* (t)	Percent of total Biomass*	Mean CPUE (kg/km)	Total Population Numbers*	Mean length (cm)	Mean Weight (kg)
petrale sole	183-366	560.3	86	6.0	674,723	38.5	0.83
	367-549	93.2	14	0.8	90,442	41.9	1.03
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	653.5	100	1.8	765,165	38.9	0.85
English sole	183-366	722.5	100	7.7	2,061,772	33.2	0.35
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	730-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	722.5	100	2.0	2,061,772	33.2	0.35
deepsea sole	183-366	0.0	0	0.0	0	----	----
	367-549	0.0	0	0.0	0	----	----
	550-732	22.8	10	0.4	26,876	37.1	0.85
	733-914	97.1	42	2.1	239,318	29.7	0.41
	915-1097	49.4	21	2.6	107,977	31.7	0.46
	1098-1280	62.9	27	2.5	163,702	30.0	0.38
	183-1280	232.2	100	0.7	537,872	30.6	0.43
rex sole	183-366	1,099.3	64	11.8	8,627,509	26.3	0.13
	367-549	570.3	33	4.9	5,540,665	24.8	0.10
	550-732	38.5	2	0.7	143,366	33.3	0.27
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	1,708.1	100	4.8	14,311,540	25.8	0.12
unidentified poacher	183-366	1.8	90	Tr	52,165	19.9	0.04
	367-549	0.0	0	0.0	0	----	----
	550-732	0.2	10	Tr	3,366	----	0.05
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	2.0	100	Tr	55,531	19.9	0.04

*Differences in totals may exist due to rounding.
Tr: Trace amount.

Table 19.--Blacktip poacher, blackfin poacher, California slickhead, threadfin slickhead, and fangtooth; estimates of biomass, mean CPUE (kg/km), population numbers, mean lengths, and mean weights by depth stratum.

	Depth (m)	Biomass* (t)	Percent of total Biomass*	Mean CPUE (kg/km)	Total Population Numbers*	Mean length (cm)	Mean Weight (kg)
blacktip poacher	183-366	6.4	86	0.1	186,980	17.5	0.03
	367-549	1.0	14	Tr	49,788	18.8	0.02
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	7.4	100	Tr	236,769	17.8	0.03
blackfin poacher	183-366	0.0	0	0.0	0	----	----
	367-549	2.0	71	Tr	116,671	15.9	0.02
	550-732	0.6	21	Tr	13,219	17.2	0.05
	733-914	0.2	7	Tr	8,146	15.6	0.02
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	2.8	100	Tr	138,036	16.0	0.02
California slickhead	183-366	0.0	0	0.0	0	----	----
	367-549	0.0	0	0.0	0	----	----
	550-732	23.6	8	0.4	168,697	23.3	0.14
	733-914	152.1	53	3.3	797,517	27.0	0.19
	915-1097	76.8	27	4.0	334,571	29.1	0.23
	1098-1280	33.6	12	1.3	134,874	31.6	0.25
	183-1280	286.0	100	0.8	1,435,659	27.5	0.20
threadfin slickhead	183-366	0.0	0	0.0	0	----	----
	367-549	0.0	0	0.0	0	----	----
	550-732	9.5	15	0.2	50,560	25.9	0.19
	733-914	51.7	79	1.1	292,156	24.8	0.18
	915-1097	3.5	5	0.2	14,405	24.3	0.24
	1098-1280	0.5	1	Tr	2,220	25.0	0.23
	183-1280	65.1	100	0.2	359,342	25.0	0.18
fangtooth	183-366	0.0	0	0.0	0	----	----
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	0.1	53	Tr	1,462	13.0	0.09
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.1	47	Tr	868	15.0	0.14
	183-1280	0.3	100	Tr	2,330	13.7	0.11

*Differences in totals may exist due to rounding.
Tr: Trace amount.

Table 20.--Robust blacksmelt, threadfin cuskeel, unidentified viperfish, Pacific viperfish, and American shad; estimates of biomass, mean CPUE (kg/km), population numbers, mean lengths, and mean weights by depth stratum.

	Depth (m)	Biomass* (t)	Percent of total Biomass*	Mean CPUE (kg/km)	Total Population Numbers*	Mean length (cm)	Mean Weight (kg)
robust blacksmelt	183-366	0.0	0	0.0	0	----	----
	367-549	0.6	2	Tr	4,533	23.0	0.14
	550-732	9.2	38	0.2	194,166	16.0	0.05
	733-914	6.0	25	0.1	122,613	16.5	0.05
	915-1097	3.0	12	0.2	59,582	16.2	0.05
	1098-1280	5.3	22	0.2	80,221	17.1	0.07
	183-1280	24.1	100	0.1	461,115	16.4	0.05
threadfin cuskeel	183-366	0.0	0	0.0	0	----	----
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	Tr	100	Tr	827	9.0	0.05
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	Tr	100	Tr	827	9.0	0.05
unidentified viperfish	183-366	0.0	0	0.0	0	----	----
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	0.1	26	Tr	1,551	----	0.05
	915-1097	Tr	13	Tr	804	----	0.05
	1098-1280	0.2	60	Tr	2,161	24.0	0.08
	183-1280	0.3	100	Tr	4,515	24.0	0.06
Pacific viperfish	183-366	0.0	0	0.0	0	----	----
	367-549	1.0	11	Tr	33,564	16.0	0.03
	550-732	4.8	53	0.1	78,602	22.5	0.06
	733-914	2.0	23	Tr	49,927	21.4	0.04
	915-1097	0.5	5	Tr	7,741	23.2	0.06
	1098-1280	0.7	8	Tr	10,719	24.3	0.06
	183-1280	9.0	100	Tr	180,552	21.1	0.05
American shad	183-366	6.4	100	0.1	4,678	42.0	1.36
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	6.4	100	Tr	4,678	42.0	1.36

*Differences in totals may exist due to rounding.
Tr: Trace amount.

Table 21.--California grenadier, Pacific grenadier, giant grenadier, filamented grenadier, and threadfin sculpin; estimates of biomass, mean CPUE (kg/km), population numbers, mean lengths, and mean weights by depth stratum.

	Depth (m)	Biomass* (t)	Percent of total Biomass*	Mean CPUE (kg/km)	Total Population Numbers*	Mean length (cm)	Mean Weight (kg)
California grenadier	183-366	0.0	0	0.0	0	----	----
	367-549	2.5	100	Tr	5,594	8.0	0.45
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	2.5	100	Tr	5,594	8.0	0.45
Pacific grenadier	183-366	0.0	0	0.0	0	----	----
	367-549	0.0	0	0.0	0	----	----
	550-732	55.7	8	1.0	599,602	8.2	0.09
	733-914	69.9	9	1.5	391,576	10.6	0.18
	915-1097	138.5	19	7.3	474,190	12.8	0.29
	1098-1280	474.6	65	18.7	1,289,087	13.5	0.37
	183-1280	738.6	100	2.1	2,754,454	11.8	0.27
giant grenadier	183-366	0.0	0	0.0	0	----	----
	367-549	0.0	0	0.0	0	----	----
	550-732	492.7	22	8.5	490,012	28.1	1.01
	733-914	291.2	13	6.4	293,589	18.7	0.99
	915-1097	351.5	16	18.4	349,208	19.0	1.01
	1098-1280	1,056.2	48	41.7	829,190	20.7	1.27
	183-1280	2,191.6	100	6.1	1,962,000	21.9	1.12
filamented grenadier	183-366	0.0	0	0.0	0	----	----
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.4	100	Tr	855	10.0	0.45
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	0.4	100	Tr	855	10.0	0.45
threadfin sculpin	183-366	6.4	88	0.1	32,385	21.7	0.20
	367-549	0.0	0	0.0	0	----	----
	550-732	0.8	10	Tr	3,366	19.0	0.23
	733-914	0.1	2	Tr	1,551	23.0	0.09
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	7.3	100	Tr	37,302	21.5	0.20

*Differences in totals may exist due to rounding.
Tr: Trace amount.

Table 22.--Pacific cod, Pacific flatnose, walleye pollock, lingcod, and blacktail snailfish; estimates of biomass, mean CPUE (kg/km), population numbers, mean lengths, and mean weights by depth stratum.

	Depth (m)	Biomass* (t)	Percent of total Biomass*	Mean CPUE (kg/km)	Total Population Numbers*	Mean length (cm)	Mean Weight (kg)
Pacific cod	183-366	147.1	100	1.6	54,696	59.9	2.69
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	147.1	100	0.4	54,696	59.9	2.69
Pacific flatnose	183-366	0.0	0	0.0	0	----	----
	367-549	0.0	0	0.0	0	----	----
	550-732	33.5	14	0.6	135,764	30.4	0.25
	733-914	2.4	1	0.1	17,608	27.2	0.14
	915-1097	6.3	3	0.3	39,346	28.6	0.16
	1098-1280	191.4	82	7.6	589,640	36.4	0.33
	183-1280	233.7	100	0.7	782,358	34.8	0.30
walleye pollock	183-366	51.8	100	0.6	200,608	29.7	0.26
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	51.8	100	0.1	200,608	29.7	0.26
lingcod	183-366	192.2	100	2.1	24,604	84.3	7.81
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	192.2	100	0.5	24,604	84.3	7.81
blacktail snailfish	183-366	28.5	11	0.3	105,739	24.4	0.27
	367-549	180.8	68	1.6	1,036,941	22.8	0.17
	550-732	49.1	19	0.9	411,387	19.9	0.12
	733-914	4.6	2	0.1	70,237	15.9	0.07
	915-1097	0.6	Tr	Tr	3,343	19.5	0.19
	1098-1280	1.5	1	0.1	6,626	22.5	0.22
	183-1280	265.1	100	0.7	1,634,273	21.9	0.16

*Differences in totals may exist due to rounding.
Tr: Trace amount.

Table 23.--Longfin dragonfish, highfin dragonfish, unidentified lanternfish, northern lampfish, and California headlightfish; estimates of biomass, mean CPUE (kg/km), population numbers, mean lengths, and mean weights by depth stratum.

	Depth (m)	Biomass* (t)	Percent of total Biomass*	Mean CPUE (kg/km)	Total Population Numbers*	Mean length (cm)	Mean Weight (kg)
longfin dragonfish	183-366	0.0	0	0.0	0	----	----
	367-549	0.0	0	0.0	0	----	----
	550-732	1.0	66	Tr	9,908	23.0	0.11
	733-914	0.4	24	Tr	5,515	29.4	0.07
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.2	10	Tr	2,663	31.0	0.06
	183-1280	1.6	100	Tr	18,086	26.1	0.09
highfin dragonfish	183-366	0.0	0	0.0	0	----	----
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	0.2	100	Tr	1,669	20.0	0.09
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	0.2	100	Tr	1,669	20.0	0.09
unidentified lanternfish	183-366	1.4	53	Tr	189,771	17.1	0.01
	367-549	0.3	10	Tr	5,594	13.0	0.05
	550-732	0.6	21	Tr	44,932	9.5	0.01
	733-914	0.3	10	Tr	8,949	16.8	0.03
	915-1097	0.1	3	Tr	3,422	11.8	0.02
	1098-1280	0.1	3	Tr	3,248	8.0	0.02
	183-1280	2.6	100	Tr	255,915	15.5	0.01
northern lampfish	183-366	0.0	0	0.0	0	----	----
	367-549	0.2	16	Tr	4,533	9.0	0.05
	550-732	0.9	69	Tr	52,418	9.5	0.02
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.1	6	Tr	4,133	10.4	0.02
	1098-1280	0.1	9	Tr	3,326	11.0	0.03
	183-1280	1.3	100	Tr	64,410	9.6	0.02
California headlightfish	183-366	0.0	0	0.0	0	----	----
	367-549	0.0	0	0.0	0	----	----
	550-732	0.1	100	Tr	3,271	8.0	0.05
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	0.1	100	Tr	3,271	8.0	0.05

*Differences in totals may exist due to rounding.
Tr: Trace amount.

Table 24.--Broadfin lanternfish, blue lanternfish, unidentified snipe eel, slender snipe eel, and eulachon; estimates of biomass, mean CPUE (kg/km), population numbers, mean lengths, and mean weights by depth stratum.

	Depth (m)	Biomass* (t)	Percent of total Biomass*	Mean CPUE (kg/km)	Total Population Numbers*	Mean length (cm)	Mean Weight (kg)
broadfin lanternfish	183-366	0.0	0	0.0	0	----	----
	367-549	0.2	13	Tr	5,366	----	0.05
	550-732	1.0	54	Tr	35,981	13.1	0.03
	733-914	0.3	15	Tr	4,770	18.0	0.06
	915-1097	0.1	5	Tr	2,136	----	0.05
	1098-1280	0.3	14	Tr	2,475	19.0	0.11
	183-1280	1.9	100	Tr	50,728	14.0	0.04
blue lanternfish	183-366	0.0	0	0.0	0	----	----
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	Tr	100	Tr	827	6.0	0.05
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	Tr	100	Tr	827	6.0	0.05
unidentified snipe eel	183-366	0.0	0	0.0	0	----	----
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	0.1	79	Tr	2,911	41.0	0.05
	915-1097	Tr	21	Tr	804	----	0.05
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	0.2	100	Tr	3,725	41.0	0.05
slender snipe eel	183-366	0.0	0	0.0	0	----	----
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	0.1	64	Tr	1,520	----	0.05
	915-1097	Tr	36	Tr	855	44.0	0.05
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	0.1	100	Tr	2,375	44.0	0.05
eulachon	183-366	64.7	100	0.7	2,193,806	17.0	0.03
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	64.7	100	0.2	2,193,806	17.0	0.03

*Differences in totals may exist due to rounding.
Tr: Trace amount.

Table 25.--Whitebait smelt, rainbow smelt, chinook salmon, Pacific saury, and northern pearleye; estimates of biomass, mean CPUE (kg/km), population numbers, mean lengths, and mean weights by depth stratum.

	Depth (m)	Biomass* (t)	Percent of total Biomass*	Mean CPUE (kg/km)	Total Population Numbers*	Mean length (cm)	Mean Weight (kg)
whitebait smelt	183-366	0.4	100	Tr	3,873	19.0	0.09
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	0.4	100	Tr	3,873	19.0	0.09
rainbow smelt	183-366	48.9	100	0.5	1,258,937	16.0	0.04
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	48.9	100	0.1	1,258,937	16.0	0.04
chinook salmon	183-366	201.4	100	2.2	105,793	51.2	1.90
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	201.4	100	0.6	105,793	51.2	1.90
Pacific saury	183-366	0.0	0	0.0	0	----	----
	367-549	0.6	80	Tr	8,912	24.0	0.07
	550-732	0.0	0	0.0	0	----	----
	733-914	0.1	19	Tr	1,624	24.0	0.09
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	0.8	100	Tr	10,537	24.0	0.07
northern pearleye	183-366	0.0	0	0.0	0	----	----
	367-549	0.0	0	0.0	0	----	----
	550-732	0.8	87	Tr	3,366	22.0	0.23
	733-914	0.1	8	Tr	1,551	----	0.05
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	Tr	4	Tr	1,735	12.5	0.02
	183-1280	0.9	100	Tr	6,652	18.8	0.13

*Differences in totals may exist due to rounding.
Tr: Trace amount.

Table 26.--Shining tubeshoulder, king-of-the-salmon, twoline eelpout, soft eelpout, and snakehead eelpout; estimates of biomass, mean CPUE (kg/km), population numbers, mean lengths, and mean weights by depth stratum.

	Depth (m)	Biomass* (t)	Percent of total Biomass*	Mean CPUE (kg/km)	Total Population Numbers*	Mean length (cm)	Mean Weight (kg)
shining tubeshoulder	183-366	0.0	0	0.0	0	----	----
	367-549	0.0	0	0.0	0	----	----
	550-732	1.2	100	Tr	16,518	16.4	0.07
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	1.2	100	Tr	16,518	16.4	0.07
king-of-the-salmon	183-366	0.0	0	0.0	0	----	----
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	1.2	11	0.1	1,742	----	0.68
	1098-1280	9.5	89	0.4	1,608	173.3	5.93
	183-1280	10.7	100	Tr	3,349	173.3	3.20
twoline eelpout	183-366	0.0	0	0.0	0	----	----
	367-549	5.1	3	Tr	8,912	46.0	0.57
	550-732	72.5	45	1.2	127,012	45.6	0.57
	733-914	23.3	14	0.5	57,582	39.7	0.40
	915-1097	38.3	24	2.0	80,982	42.9	0.47
	1098-1280	23.5	14	0.9	31,966	49.1	0.74
	183-1280	162.6	100	0.5	306,454	44.2	0.53
soft eelpout	183-366	0.4	100	Tr	20,010	17.6	0.02
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	0.4	100	Tr	20,010	17.6	0.02
snakehead eelpout	183-366	0.0	0	0.0	0	----	----
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	10.0	52	0.2	56,289	38.5	0.18
	915-1097	5.7	30	0.3	40,050	37.5	0.14
	1098-1280	3.5	18	0.1	20,367	40.5	0.17
	183-1280	19.2	100	0.1	116,705	38.5	0.17

*Differences in totals may exist due to rounding.
Tr: Trace amount.

Table 27.--Bigfin eelpout, blackmouth eelpout, pallid eelpout, black eelpout, and blackbelly eelpout; estimates of biomass, mean CPUE (kg/km), population numbers, mean lengths, and mean weights by depth stratum.

	Depth (m)	Biomass* (t)	Percent of total Biomass*	Mean CPUE (kg/km)	Total Population Numbers*	Mean length (cm)	Mean Weight (kg)
bigfin eelpout	183-366	229.1	37	2.5	1,424,364	31.3	0.16
	367-549	390.5	63	3.3	1,870,450	34.5	0.21
	550-732	1.2	Tr	Tr	6,542	30.5	0.18
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	620.7	100	1.7	3,301,356	33.1	0.19
blackmouth eelpout	183-366	0.0	0	0.0	0	----	----
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	0.1	100	Tr	3,337	13.0	0.02
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	0.1	100	Tr	3,337	13.0	0.02
pallid eelpout	183-366	0.0	0	0.0	0	----	----
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	0.1	64	Tr	1,616	12.0	0.05
	915-1097	Tr	35	Tr	886	11.0	0.05
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	0.1	100	Tr	105,793	11.6	0.05
black eelpout	183-366	9.5	11	0.1	206,017	24.4	0.05
	367-549	27.7	33	0.2	469,038	24.8	0.06
	550-732	46.7	55	0.8	582,484	28.6	0.08
	733-914	0.4	Tr	Tr	6,498	27.5	0.06
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.2	Tr	Tr	2,590	27.0	0.08
	183-1280	84.4	100	0.2	1,266,628	26.5	0.07
blackbelly eelpout	183-366	1.1	100	Tr	14,033	19.7	0.08
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	1.1	100	Tr	14,033	19.7	0.08

*Differences in totals may exist due to rounding.
Tr: Trace amount.

Table 28.--Rougheye rockfish, Pacific ocean perch, aurora rockfish, silvergray rockfish, and darkblotched rockfish; estimates of biomass, mean CPUE (kg/km), population numbers, mean lengths, and mean weights by depth stratum.

	Depth (m)	Biomass* (t)	Percent of total Biomass*	Mean CPUE (kg/km)	Total Population Numbers*	Mean length (cm)	Mean Weight (kg)
rougheye rockfish	183-366	32.0	15	0.3	18,802	46.5	1.70
	367-549	184.3	85	1.6	142,111	39.7	1.30
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	216.3	100	0.6	160,912	40.5	1.34
Pacific ocean perch	183-366	229.8	9	2.5	412,175	32.3	0.56
	367-549	2,440.9	91	20.9	3,175,559	38.0	0.77
	550-732	22.5	1	0.4	29,720	37.7	0.76
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	2,693.2	100	7.5	3,617,454	37.4	0.74
aurora rockfish	183-366	7.6	5	0.1	13,480	27.8	0.57
	367-549	143.0	93	1.2	428,558	27.4	0.33
	550-732	3.9	3	0.1	3,467	36.0	1.13
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	154.5	100	0.4	445,505	27.5	0.35
silvergray rockfish	183-366	47.0	100	0.5	14,166	58.9	3.31
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	47.0	100	0.1	14,166	58.9	3.31
darkblotched rockfish	183-366	329.1	43	3.5	708,233	28.1	0.46
	367-549	435.8	57	3.7	492,413	35.3	0.88
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	764.8	100	2.1	1,200,645	31.1	0.64

*Differences in totals may exist due to rounding.
Tr: Trace amount.

Table 29.--Splitnose, greenstriped, widow, rosethorn, and shortbelly rockfishes; estimates of biomass, mean CPUE (kg/km), population numbers, mean lengths, and mean weights by depth stratum.

	Depth (m)	Biomass* (t)	Percent of total Biomass*	Mean CPUE (kg/km)	Total Population Numbers*	Mean length (cm)	Mean Weight (kg)
splitnose rockfish	183-366	2,394.7	100	25.6	12,192,015	21.0	0.20
	367-549	11.4	Tr	0.1	24,954	29.4	0.46
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	2,406.1	100	6.7	12,216,969	21.1	0.20
greenstriped rockfish	183-366	196.6	100	2.1	722,444	26.1	0.27
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	196.6	100	0.6	722,444	26.1	0.27
widow rockfish	183-366	148.0	93	1.6	182,836	36.8	0.81
	367-549	11.9	7	0.1	5,258	49.0	2.27
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	160.0	100	0.5	188,094	37.2	0.85
rosethorn rockfish	183-366	58.0	72	0.6	287,523	22.7	0.20
	367-549	22.3	28	0.2	61,578	29.0	0.36
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	80.4	100	0.2	349,101	23.8	0.23
shortbelly rockfish	183-366	3.1	56	Tr	22,077	19.3	0.14
	367-549	2.4	44	Tr	5,258	28.0	0.45
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	5.5	100	Tr	27,335	21.0	0.20

*Differences in totals may exist due to rounding.
Tr: Trace amount.

Table 30.--Canary, redstripe, redbanded, stripetail, and sharpchin rockfishes; estimates of biomass, mean CPUE (kg/km), population numbers, mean lengths, and mean weights by depth stratum.

	Depth (m)	Biomass* (t)	Percent of total Biomass*	Mean CPUE (kg/km)	Total Population Numbers*	Mean length (cm)	Mean Weight (kg)
canary rockfish	183-366	0.0	0	0.0	0	----	----
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	5.6	100	0.1	3,101	46.0	1.81
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	5.6	100	Tr	3,101	46.0	1.81
redstripe rockfish	183-366	83.0	100	0.9	269,799	26.0	0.31
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	83.0	100	0.2	20,010	26.0	0.31
redbanded rockfish	183-366	93.0	63	1.0	186,801	26.7	0.50
	367-549	55.4	37	0.5	39,057	38.4	1.42
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	148.5	100	0.4	225,858	28.7	0.66
stripetail rockfish	183-366	21.6	100	0.2	85,413	21.1	0.25
	367-549	0.0	0	0.0	0	----	----
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	21.6	100	0.1	85,413	21.1	0.25
sharpchin rockfish	183-366	379.2	96	4.1	1,722,324	24.3	0.22
	367-549	14.6	4	0.1	69,377	23.1	0.21
	550-732	0.0	0	0.0	0	----	----
	733-914	0.0	0	0.0	0	----	----
	915-1097	0.0	0	0.0	0	----	----
	1098-1280	0.0	0	0.0	0	----	----
	183-1280	393.8	100	1.1	1,791,701	24.3	0.22

*Differences in totals may exist due to rounding.
Tr: Trace amount.

Table 31.--Yellowmouth rockfish; estimates of biomass, mean CPUE (kg/km), population numbers, mean lengths, and mean weights by depth stratum.

yellowmouth rockfish

Depth (m)	Biomass* (t)	Percent of total Biomass*	Mean CPUE (kg/km)	Total Population Numbers*	Mean length (cm)	Mean Weight (kg)
183-366	137.8	100	1.5	197,500	34.6	0.70
367-549	0.0	0	0.0	0	----	----
550-732	0.0	0	0.0	0	----	----
733-914	0.0	0	0.0	0	----	----
915-1097	0.0	0	0.0	0	----	----
1098-1280	0.0	0	0.0	0	----	----
183-1280	137.8	100	0.4	197,500	34.6	0.70

*Differences in totals may exist due to rounding.

Table 32.--Estimated age composition and mean length at age of Pacific hake by year class. Results are presented by depth stratum and for all strata combined.

183 - 366 m

Age	Year Class	Population Number	Proportion	Cumulative Proportion	Mean Length (cm)
4	1984	159,282	0.247	0.247	426.9
5	1983	7,021	0.011	0.258	445.7
6	1982	11,607	0.018	0.276	447.5
7	1981	7,385	0.012	0.288	464.6
8	1980	300,007	0.466	0.753	484.6
9	1979	4,841	0.008	0.761	490.7
10	1978	33,316	0.052	0.812	620.0
11	1977	92,266	0.143	0.956	534.8
15	1973	22,211	0.035	0.990	540.0
Between key lengths		3,027	0.005	0.995	410.0
Above maximum key length		3,463	0.005	1.000	690.0
Average Total		644,426	1.000	1.000	485.9

367 - 549 m

Age	Year Class	Population Number	Proportion	Cumulative Proportion	Mean Length (cm)
4	1984	419,446	0.300	0.300	438.9
5	1983	27,513	0.020	0.320	447.0
6	1982	26,058	0.019	0.339	443.6
7	1981	8,906	0.006	0.345	460.0
8	1980	742,612	0.531	0.876	466.4
9	1979	8,889	0.006	0.883	494.4
11	1977	109,200	0.078	0.961	491.3
15	1973	7,228	0.005	0.966	570.0
Between key lengths		47,772	0.034	1.000	447.2
Average Total		1,397,573	1.000	1.000	459.3

550 - 732 m

Age	Year Class	Population Number	Proportion	Cumulative Proportion	Mean Length (cm)
4	1984	11,297	0.243	0.243	442.5
5	1983	619	0.013	0.257	450.0
8	1980	24,554	0.529	0.786	477.1
9	1979	1,651	0.036	0.821	510.0
11	1977	8,307	0.179	1.000	510.1
Average Total		46,428	1.000	1.000	475.4

Table 32. --Continued.

733 - 914 m

Age	Year Class	Population Number	Proportion	Cumulative Proportion	Mean Length (cm)
4	1984	1,706	0.177	0.177	453.9
5	1983	209	0.022	0.198	450.0
6	1982	196	0.020	0.219	460.0
7	1981	196	0.020	0.239	460.0
8	1980	5,451	0.564	0.803	469.8
11	1977	382	0.040	0.843	489.7
Between key lengths		1,520	0.157	1.000	410.0
Average Total		9,658	1.000	1.000	457.3

1,098 - 1,280 m

Age	Year Class	Population Number	Proportion	Cumulative Proportion	Mean Length (cm)
4	1984	390	0.122	0.122	445.4
8	1980	2,326	0.725	0.847	481.7
11	1977	491	0.153	1.000	497.4
Average Total		3,207	1.000	1.000	479.7

183 - 1,280 m

Age	Year Class	Population Number	Proportion	Cumulative Proportion	Mean Length (cm)
4	1984	592,121	0.282	0.282	435.8
5	1983	35,362	0.017	0.299	446.8
6	1982	37,860	0.018	0.317	444.9
7	1981	16,487	0.008	0.325	462.1
8	1980	1,074,949	0.512	0.836	471.8
9	1979	15,381	0.007	0.843	494.9
10	1978	33,316	0.016	0.859	620.0
11	1977	210,645	0.100	0.960	511.1
15	1973	29,439	0.014	0.974	547.4
Between key lengths		52,269	0.025	0.998	444.0
Above maximum key length		3,463	0.002	1.000	690.0
Average Total		2,101,292	1.000	1.000	467.8

Table 33.--Estimated age composition and mean length at age of darkblotched rockfish by year class. Results are presented by depth stratum and for all strata combined.

183-366 m

Age	Year Class	Population Number	Proportion	Cumulative Proportion	Mean Length (cm)
Below minimum key lengths		9,355	0.013	0.013	160.0
1	1987	12,162	0.017	0.030	160.0
2	1986	102,232	0.144	0.175	214.4
3	1985	159,510	0.225	0.400	240.8
4	1984	92,054	0.130	0.530	289.5
5	1983	49,121	0.069	0.599	290.7
6	1982	58,017	0.082	0.681	318.9
7	1981	30,549	0.043	0.724	328.2
8	1980	32,214	0.046	0.770	339.8
9	1979	31,393	0.044	0.814	323.5
10	1978	10,665	0.015	0.829	338.9
11	1977	15,245	0.022	0.851	344.0
12	1976	3,107	0.004	0.855	340.0
13	1975	4,081	0.006	0.861	370.0
14	1974	12,500	0.018	0.879	318.9
15	1973	5,780	0.008	0.887	367.1
17	1971	1,699	0.002	0.889	360.0
18	1970	7,626	0.011	0.900	370.2
19	1969	10,008	0.014	0.914	371.9
21	1967	3,693	0.005	0.919	380.0
24	1964	4,081	0.006	0.925	370.0
25	1963	1,699	0.002	0.927	360.0
26	1962	1,846	0.003	0.930	380.0
37	1951	3,398	0.005	0.935	420.0
38	1950	4,081	0.006	0.941	370.0
40	1948	2,109	0.003	0.944	400.0
41	1947	4,081	0.006	0.949	370.0
45	1943	1,846	0.003	0.952	380.0
47	1941	2,109	0.003	0.955	400.0
48	1940	1,846	0.003	0.958	380.0
50	1938	10,194	0.014	0.972	410.0
68	1920	2,109	0.003	0.975	400.0
Between key lengths		17,824	0.025	1.000	184.8
Average Total		708,233	1.000	1.000	281.1

Table 33. --Continued:

	Age	Year Class	Population Number	Proportion	Cumulative Proportion	Mean Length (cm)
367 - 549 m	4	1984	5,848	0.012	0.012	310.0
	5	1983	10,357	0.021	0.033	314.4
	6	1982	63,774	0.130	0.162	331.9
	7	1981	48,554	0.099	0.261	330.5
	8	1980	79,333	0.161	0.422	344.5
	9	1979	71,091	0.144	0.567	341.6
	10	1978	35,484	0.072	0.639	342.8
	11	1977	27,877	0.057	0.695	346.8
	12	1976	767	0.002	0.697	340.0
	13	1975	2,824	0.006	0.703	370.0
	14	1974	10,560	0.021	0.724	381.4
	15	1973	11,215	0.023	0.747	362.5
	17	1971	8,391	0.017	0.764	360.0
	18	1970	14,605	0.030	0.793	366.6
	19	1969	9,038	0.018	0.812	373.8
	21	1967	6,780	0.014	0.826	380.0
	24	1964	2,824	0.006	0.831	370.0
	25	1963	8,391	0.017	0.848	360.0
	26	1962	3,390	0.007	0.855	380.0
	33	1955	4,346	0.009	0.864	390.0
	38	1950	2,824	0.006	0.870	370.0
	39	1949	4,346	0.009	0.879	390.0
	40	1948	7,820	0.016	0.895	400.0
	41	1947	7,170	0.015	0.909	382.1
	45	1943	3,390	0.007	0.916	380.0
	47	1941	7,820	0.016	0.932	400.0
	48	1940	3,390	0.007	0.939	380.0
	59	1929	4,346	0.009	0.948	390.0
	64	1924	18,038	0.037	0.984	460.0
	68	1920	7,820	0.016	1.000	400.0
	Average					353.2
	Total		492,413	1.000	1.000	

Table 33. --Continued.

Age	Year Class	Population Number	Proportion	Cumulative Proportion	Mean Length (cm)
Below minimum key lengths		9,355	0.008	0.008	160.0
1	1987	12,162	0.010	0.018	160.0
2	1986	102,232	0.085	0.103	214.4
3	1985	159,510	0.133	0.236	240.8
4	1984	97,902	0.082	0.318	290.8
5	1983	59,478	0.050	0.367	294.8
6	1982	121,791	0.101	0.468	325.7
7	1981	79,103	0.066	0.534	329.6
8	1980	111,547	0.093	0.627	343.1
9	1979	102,485	0.085	0.713	336.1
10	1978	46,149	0.038	0.751	341.9
11	1977	43,121	0.036	0.787	345.8
12	1976	3,874	0.003	0.790	340.0
13	1975	6,905	0.006	0.796	370.0
14	1974	23,060	0.019	0.815	347.5
15	1973	16,995	0.014	0.829	364.1
17	1971	10,090	0.008	0.838	360.0
18	1970	22,231	0.019	0.856	367.8
19	1969	19,046	0.016	0.872	372.8
21	1967	10,473	0.009	0.881	380.0
24	1964	6,905	0.006	0.887	370.0
25	1963	10,090	0.008	0.895	360.0
26	1962	5,236	0.004	0.899	380.0
33	1955	4,346	0.004	0.903	390.0
37	1951	3,398	0.003	0.906	420.0
38	1950	6,905	0.006	0.912	370.0
39	1949	4,346	0.004	0.915	390.0
40	1948	9,929	0.008	0.923	400.0
41	1947	11,251	0.009	0.933	377.7
45	1943	5,236	0.004	0.937	380.0
47	1941	9,929	0.008	0.945	400.0
48	1940	5,236	0.004	0.950	380.0
50	1938	10,194	0.009	0.958	410.0
59	1929	4,346	0.004	0.962	390.0
64	1924	18,038	0.015	0.977	460.0
68	1920	9,929	0.008	0.985	400.0
Between key lengths		17,824	0.015	1.000	184.8
Average Total		1,200,645	1.000	1.000	310.7

183.549 m

FIGURES

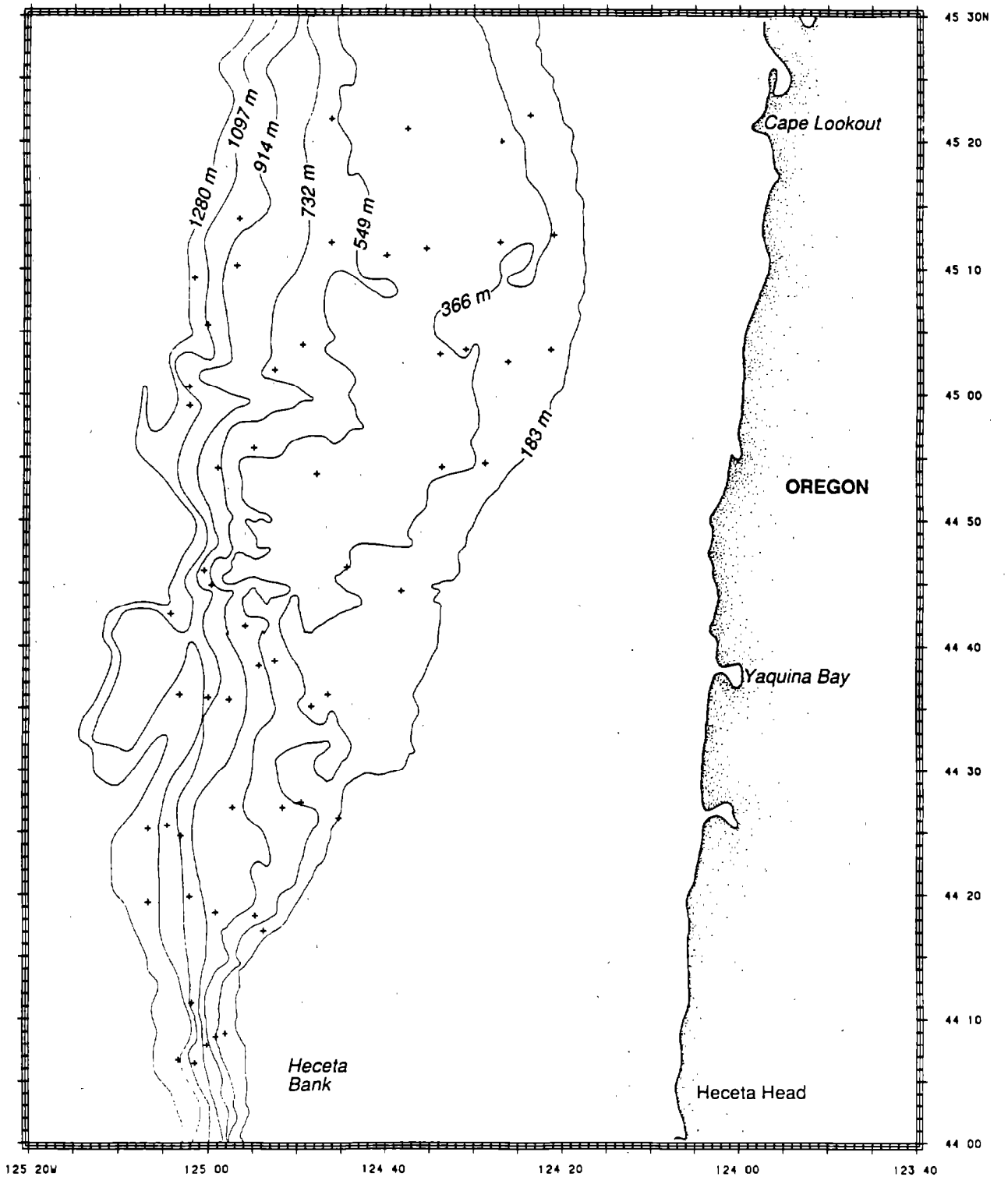


Figure 1.--Survey area showing the location of 57 successful bottom trawl tows of the 1988 upper continental slope groundfish survey.

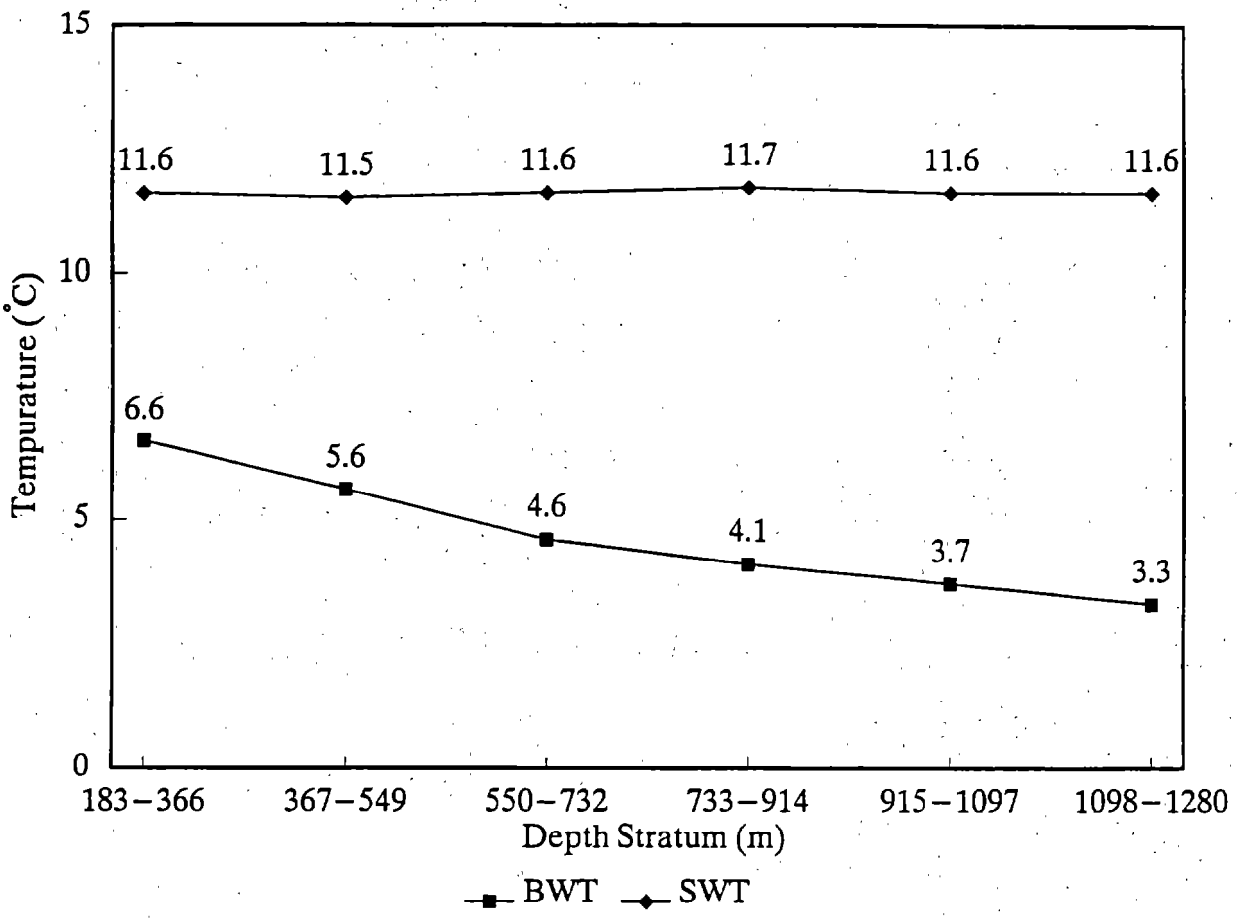


Figure.2. --Mean bottom (BWT) and surface (SWT) water temperatures by depth stratum during the 1988 upper continental slope groundfish survey.

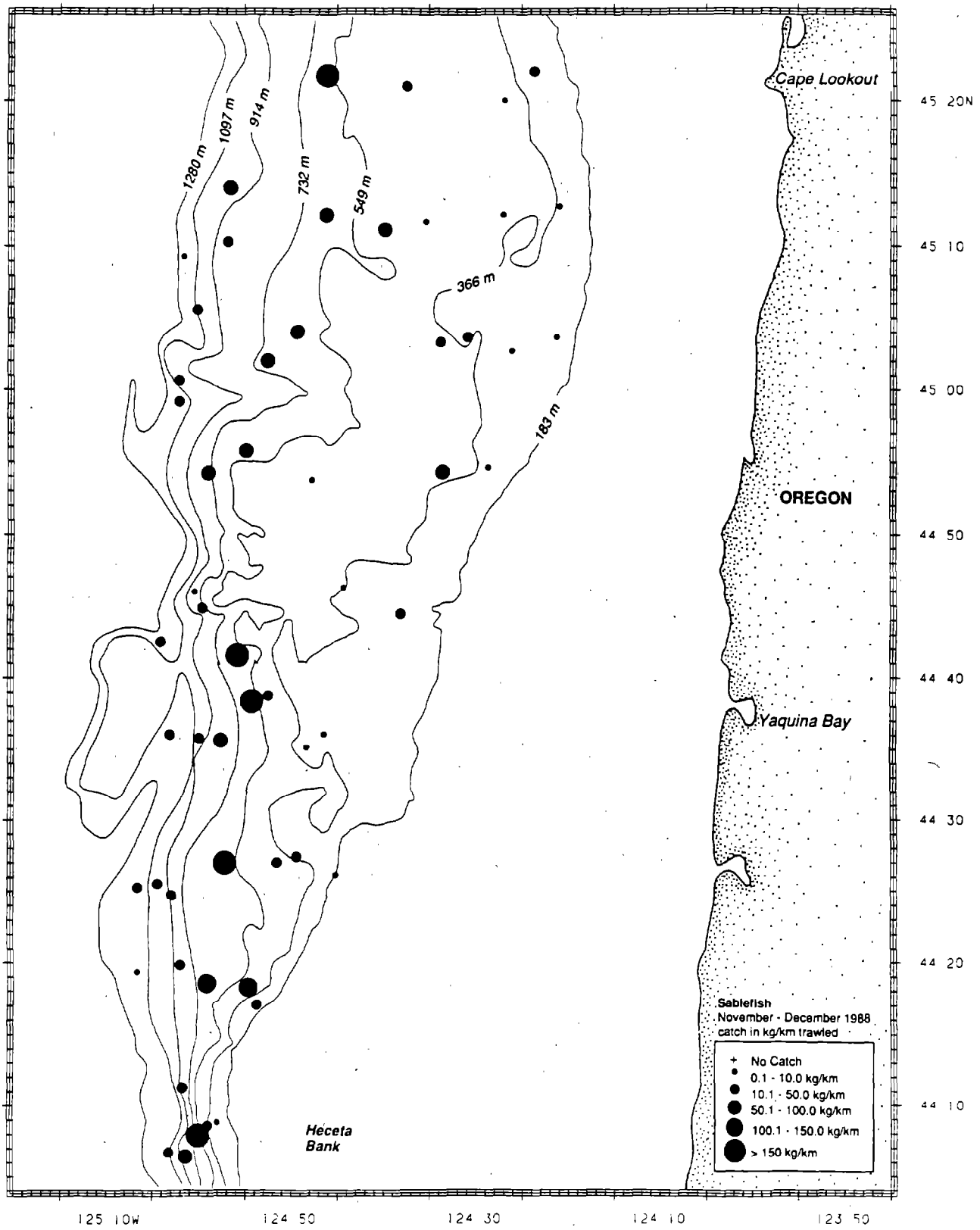


Figure 3.--Distribution and relative abundance of sablefish during the 1988 continental slope groundfish survey.

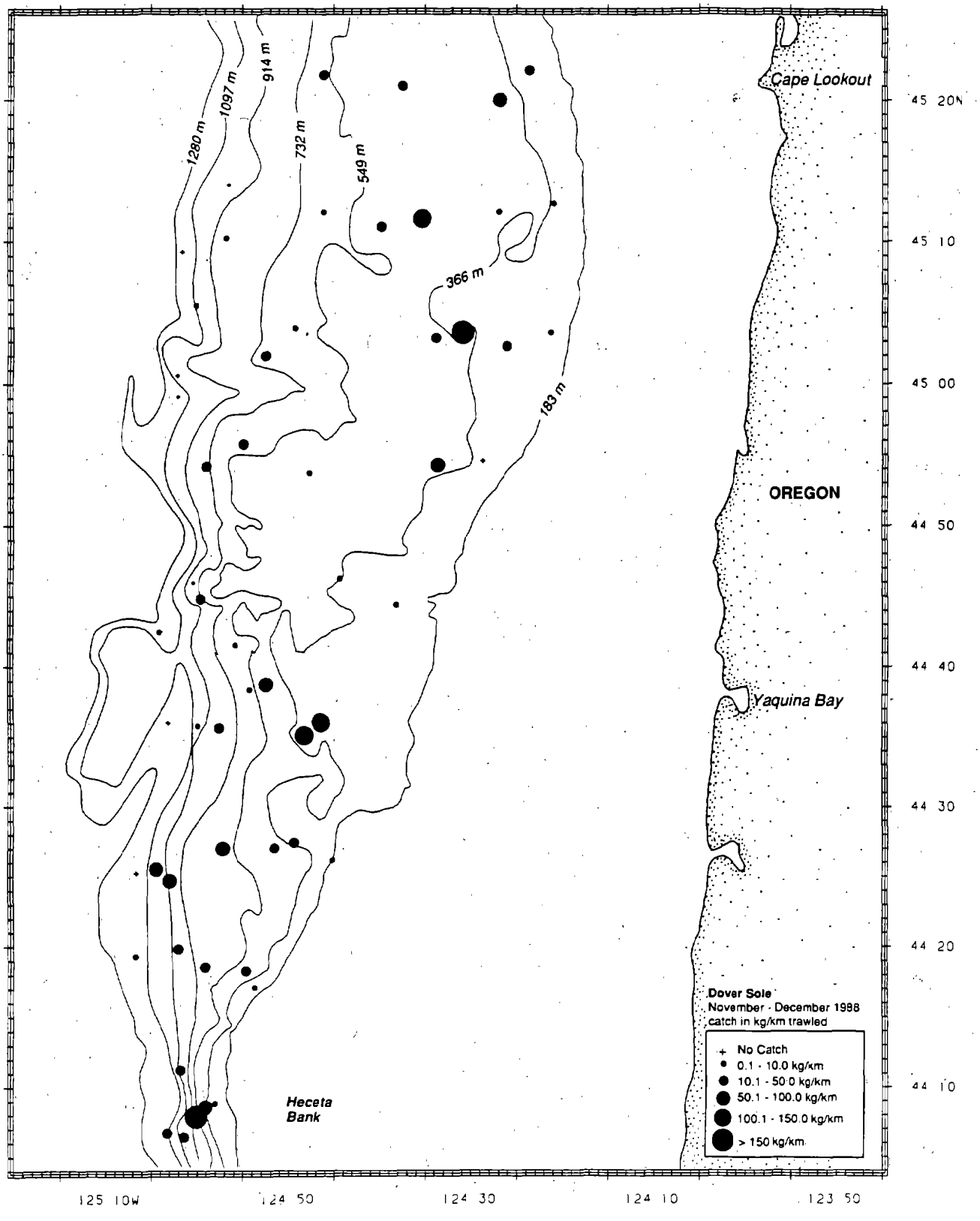


Figure 4.--Distribution and relative abundance of Dover sole during the 1988 continental slope groundfish survey.

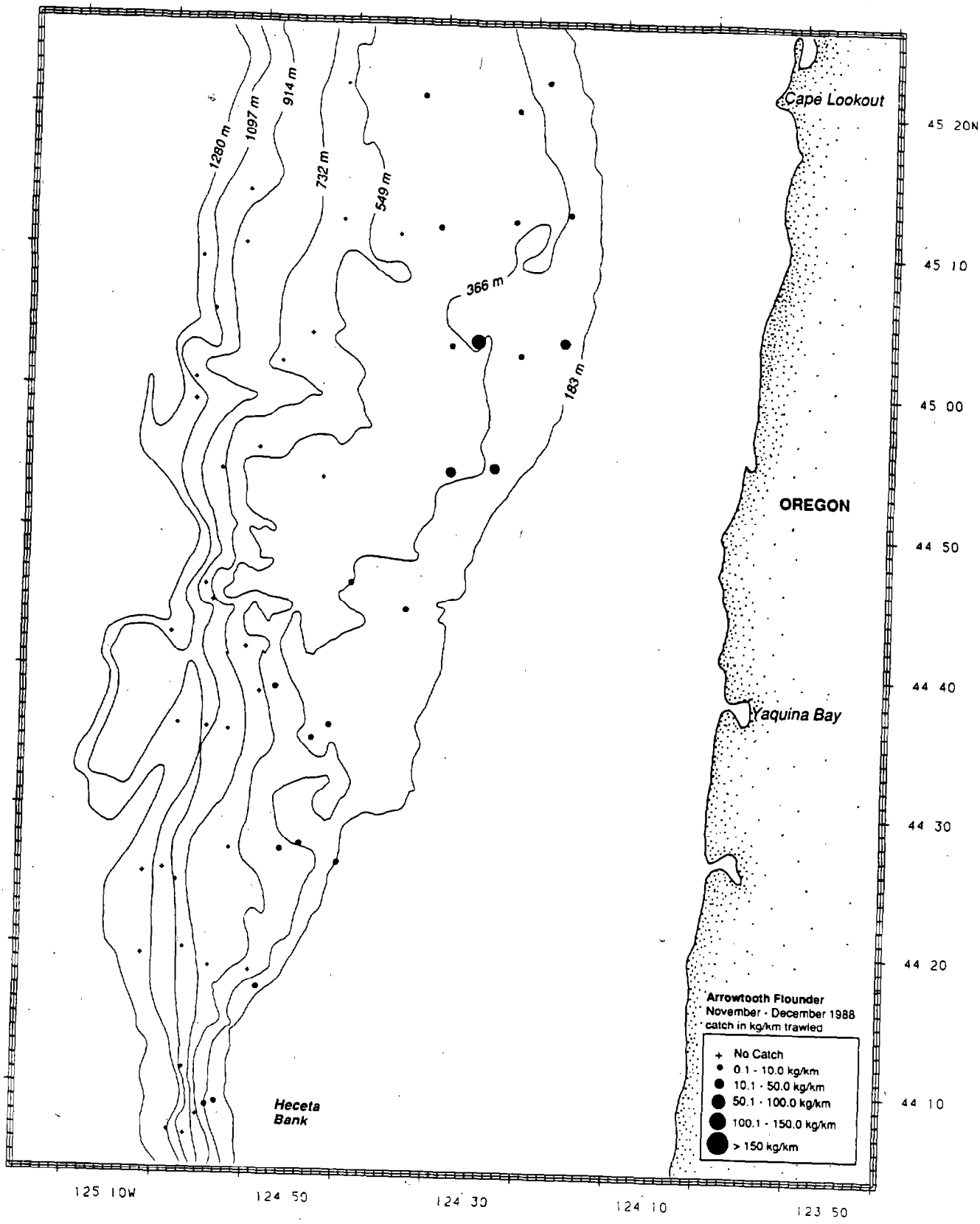


Figure 5.--Distribution and relative abundance of arrowtooth flounder during the 1988 continental slope groundfish survey.

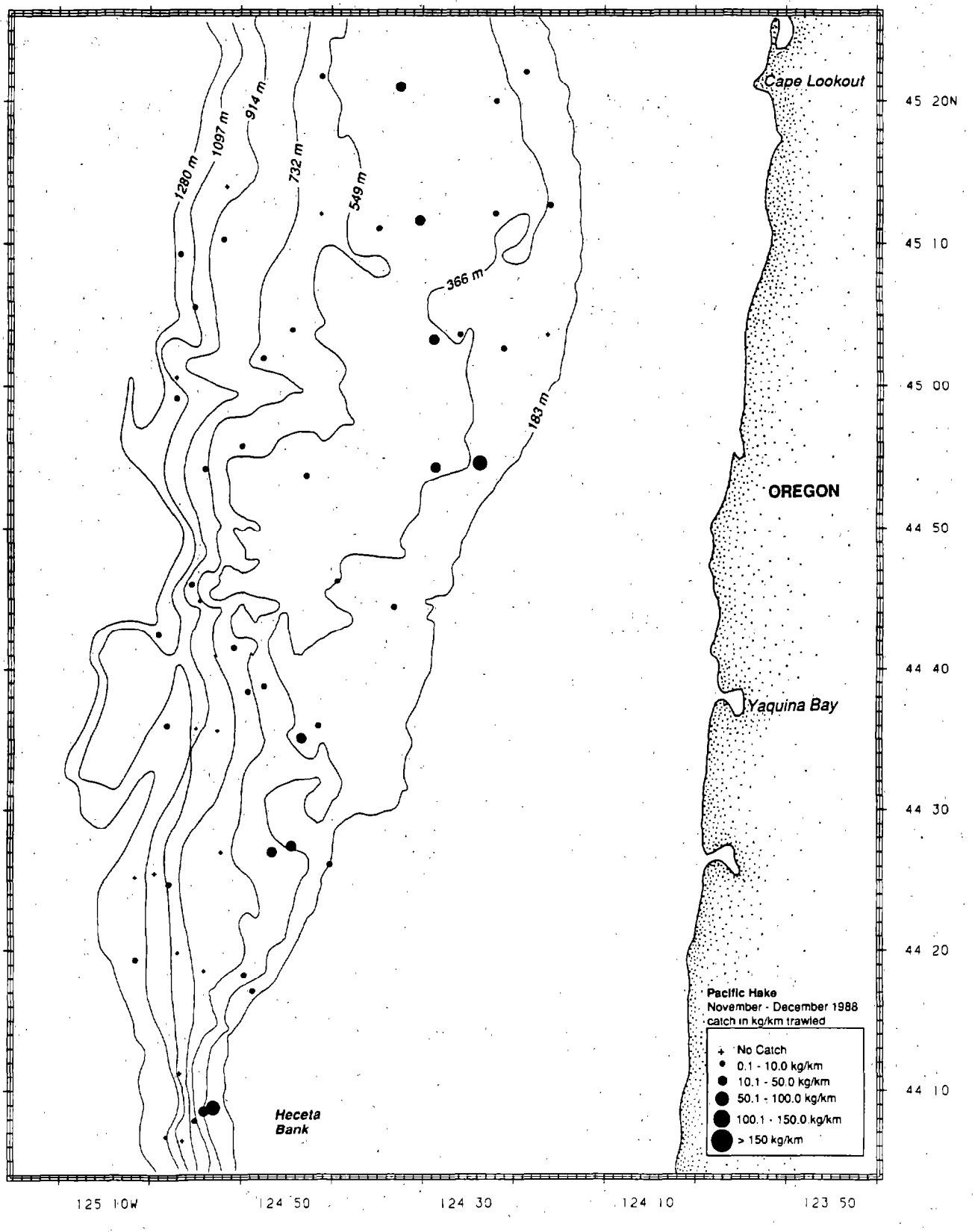


Figure 6.--Distribution and relative abundance of Pacific hake during the 1988 continental slope groundfish survey.

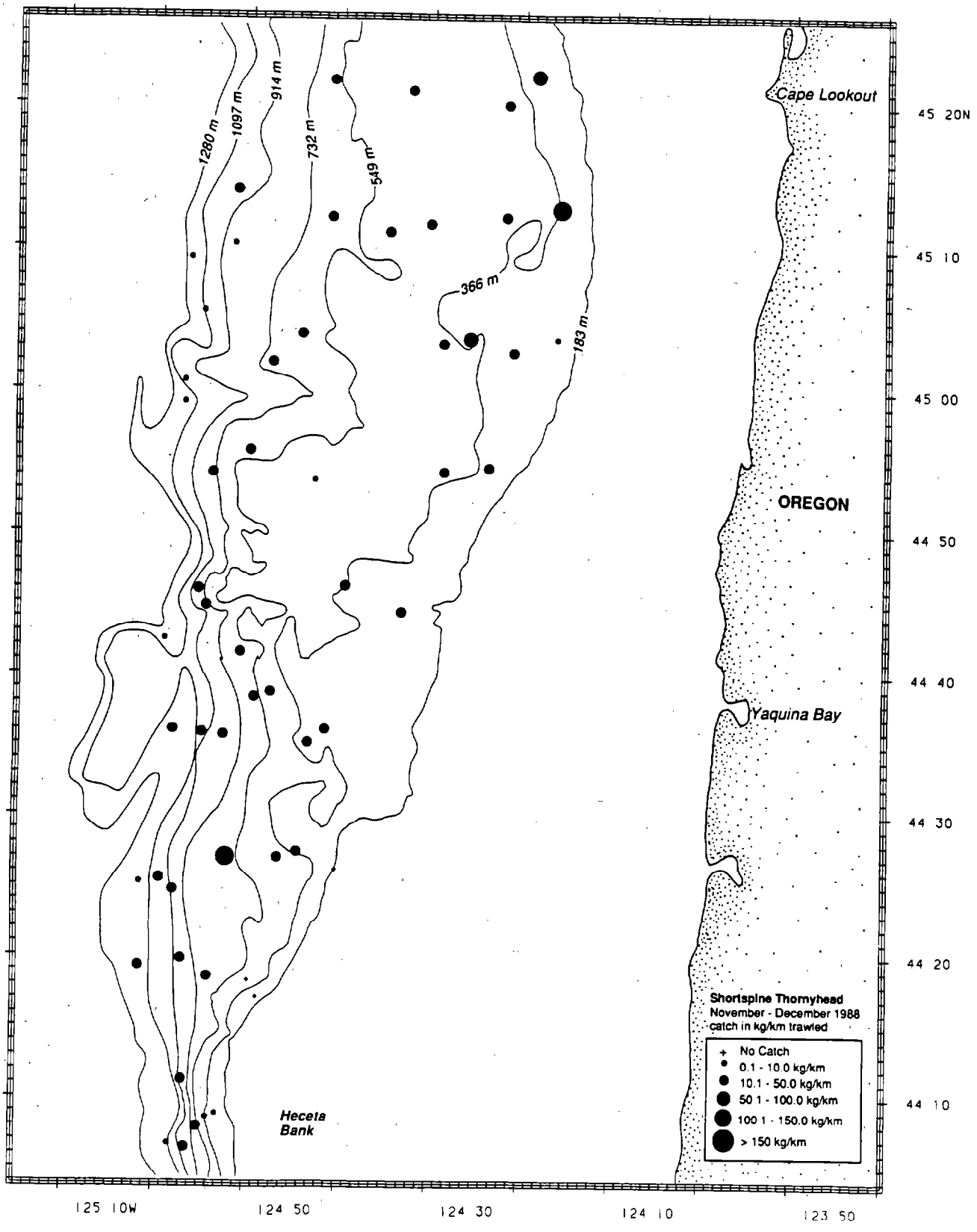


Figure 7.--Distribution and relative abundance of shortspine thornyhead during the 1988 continental slope groundfish survey.

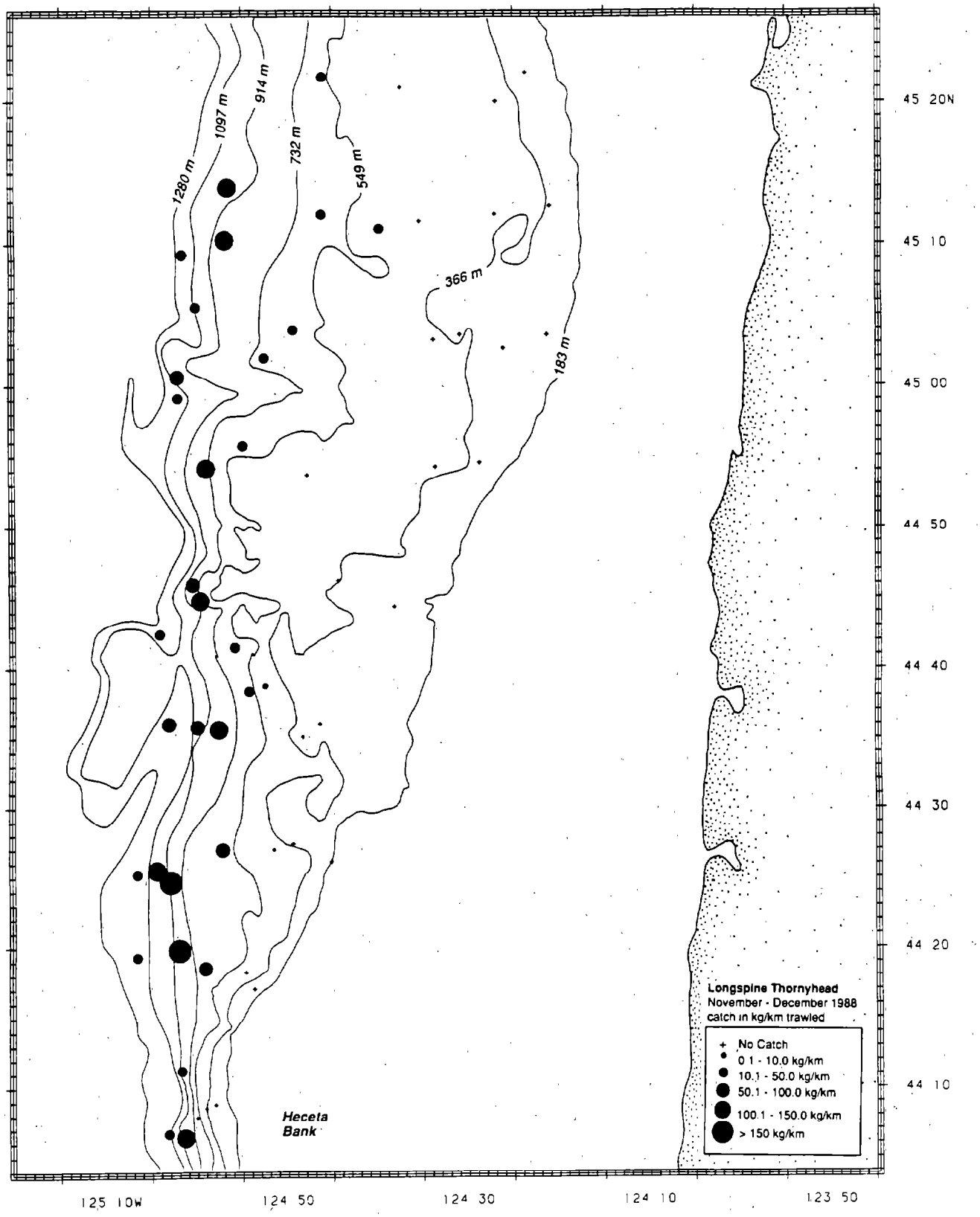


Figure 8. --Distribution and relative abundance of longspine thornyhead. during the 1988 continental slope groundfish survey.

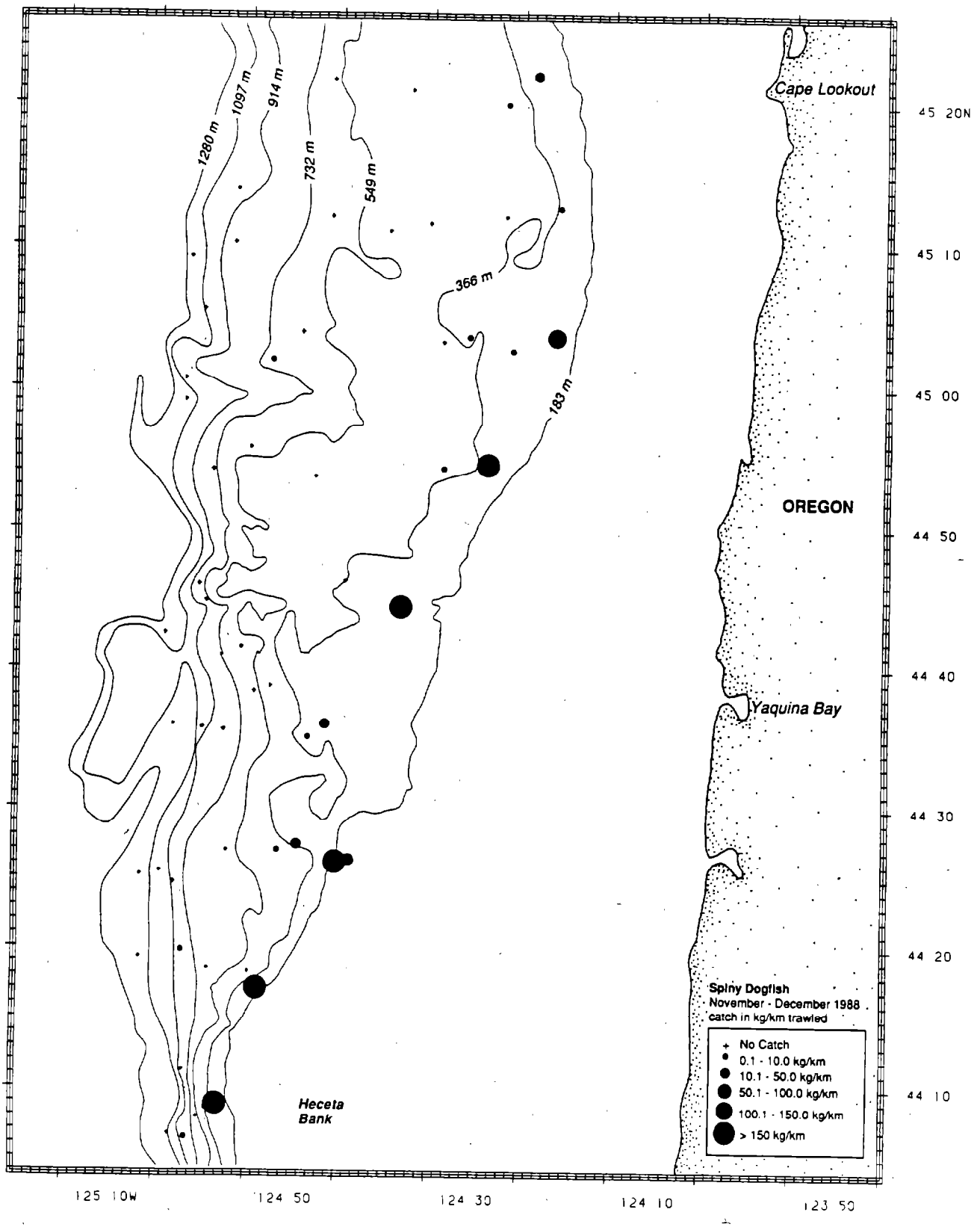


Figure 9.--Distribution and relative abundance of spiny dogfish during the 1988 continental slope groundfish survey.

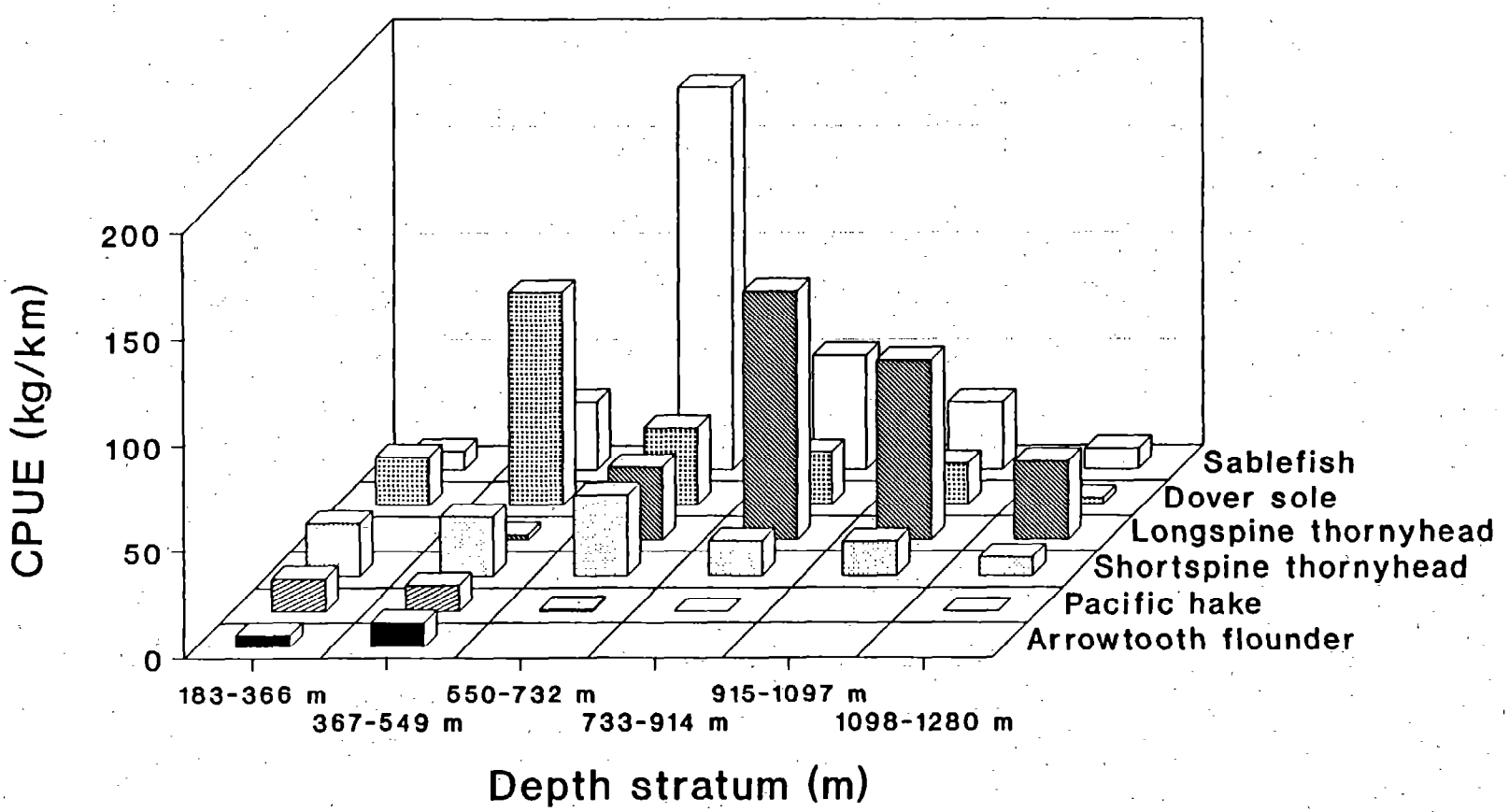


Figure 10.--Mean CPUE for six primary groundfish target species shown by depth stratum.

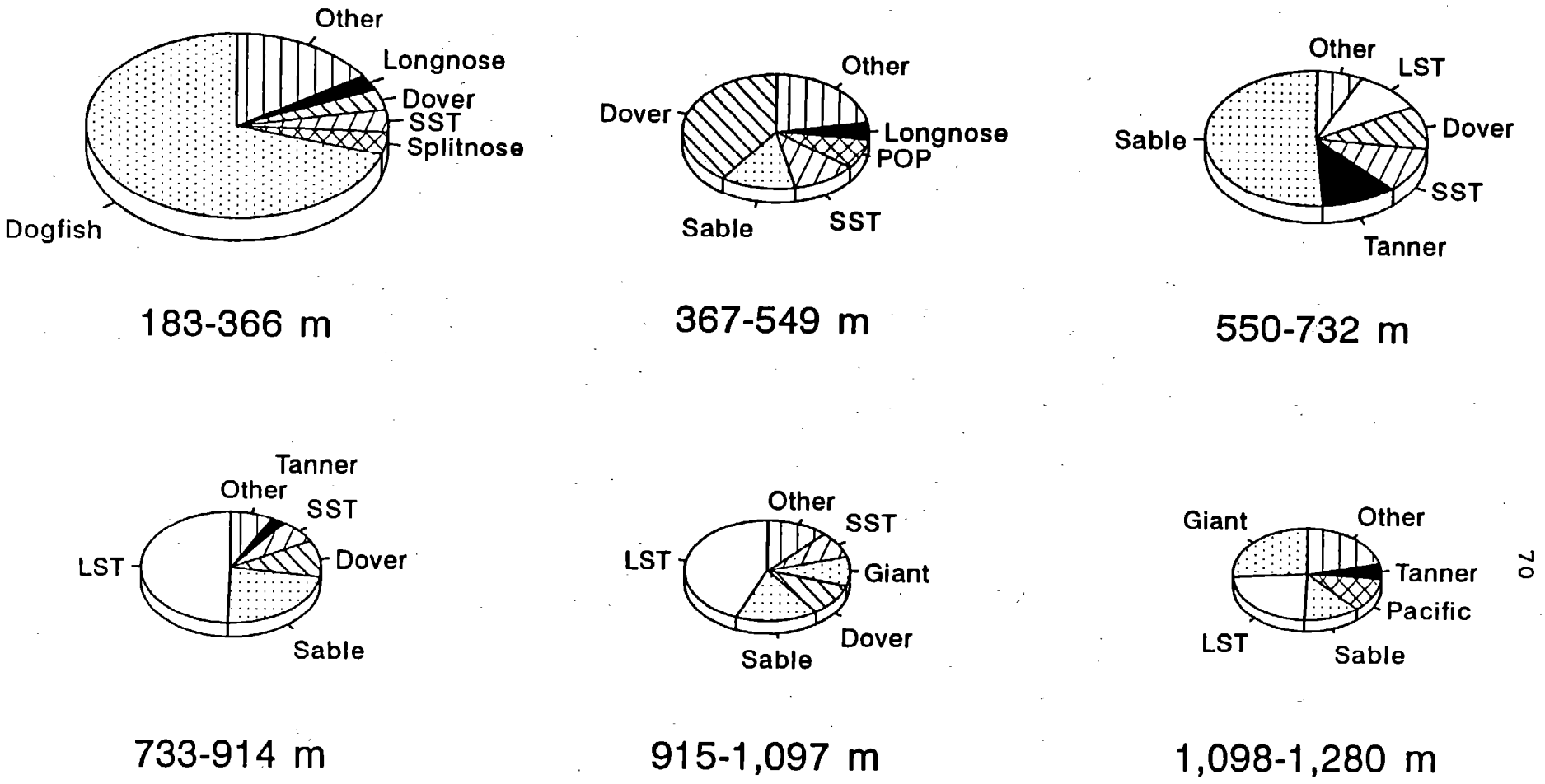


Figure ll.--Mean CPUE (kg/km trawled) of five most abundant species in each depth stratum (Circle/size, is directly proportional to the total mean CPUE in each depth stratum).

Species key:

Dogfish = spiny dogfish
Dover = Dover sate
Giant = giant grenadier
Longnose = longnose skate
LST = lonspine thornyheed
Pacific m Pacific grenadier
POP = Pacific ocean perch
Sable k sablefish
Splitnose = splitnose rockfish
SST = shortspine thornyhead
Tanner = grooved Tanner crab

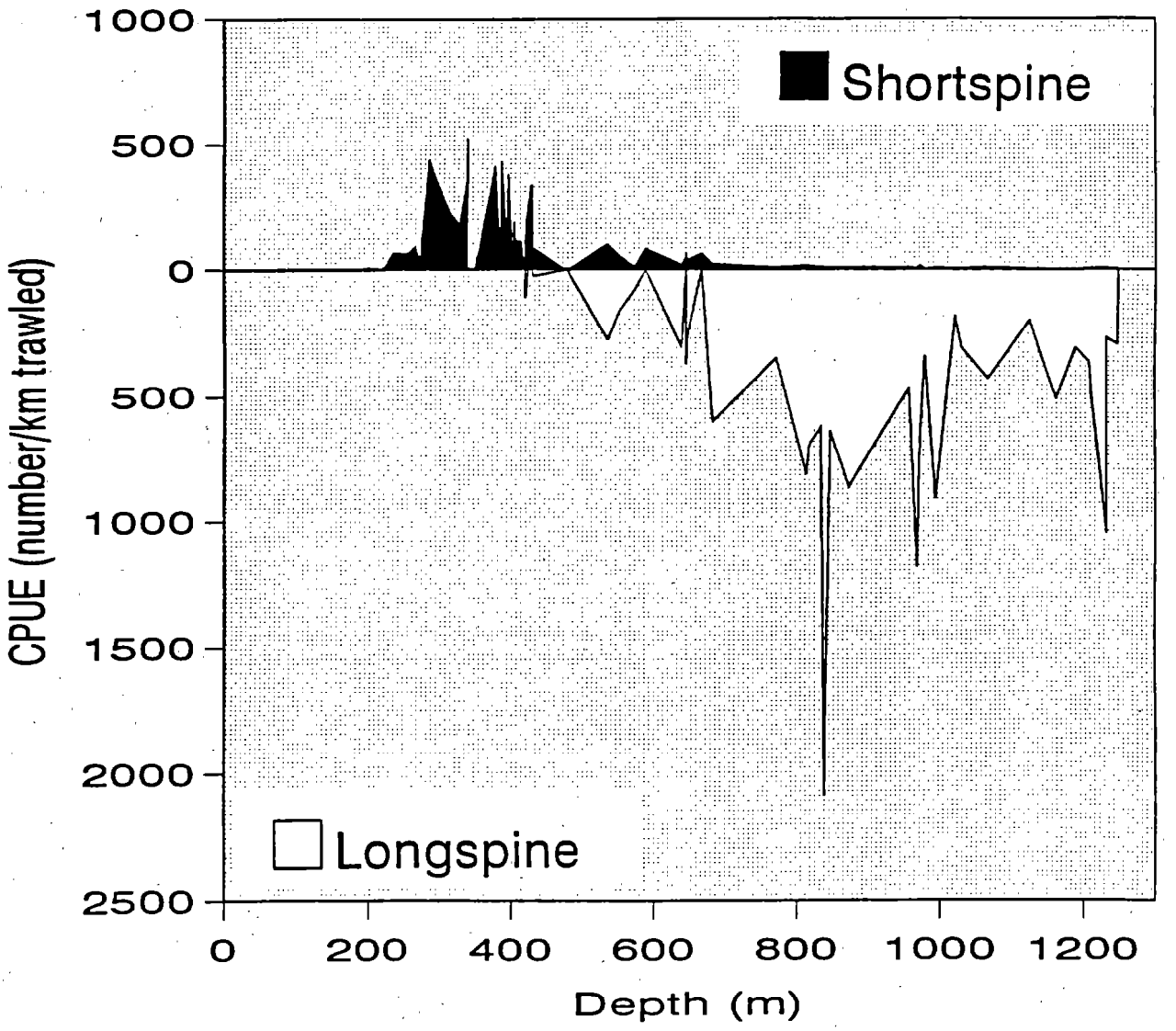
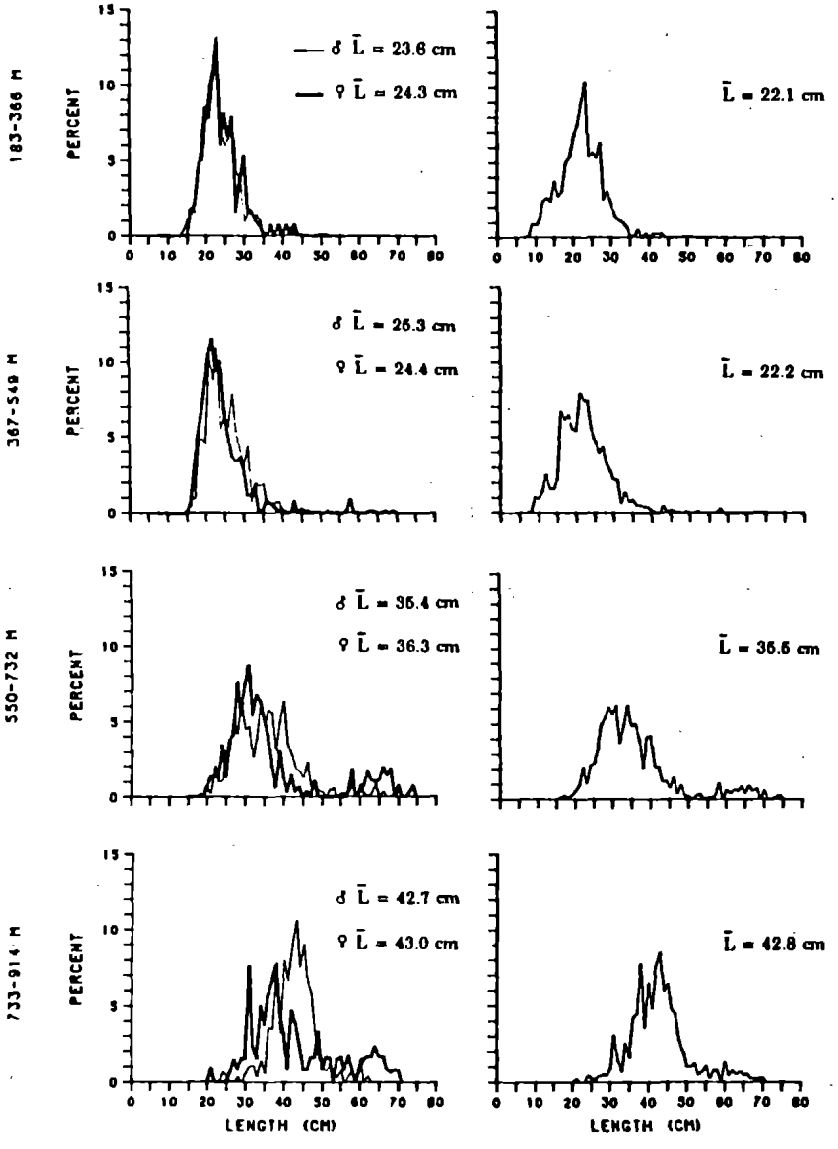


Figure 12. --Shortspine and longspine thornyhead catch per unit effort (no./km trawled) by depth.

SHORTSPINE THORNYHEAD

BY SEX



TOTAL

LONGSPINE THORNYHEAD

BY SEX

NO DATA

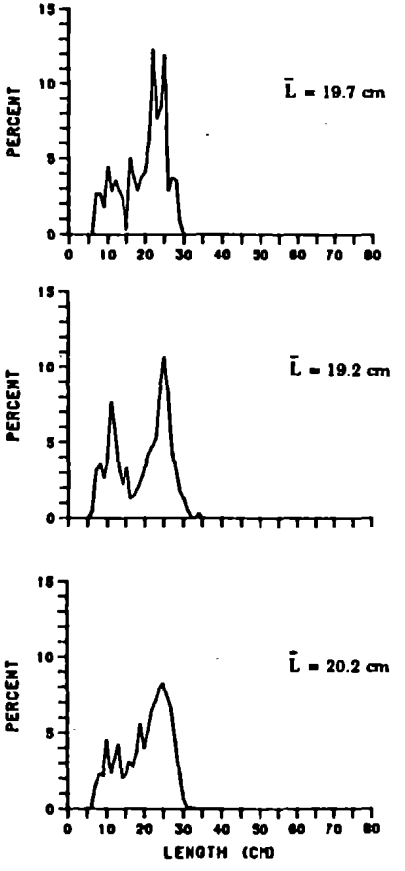
NO DATA

NO DATA

NO DATA

TOTAL

NO DATA



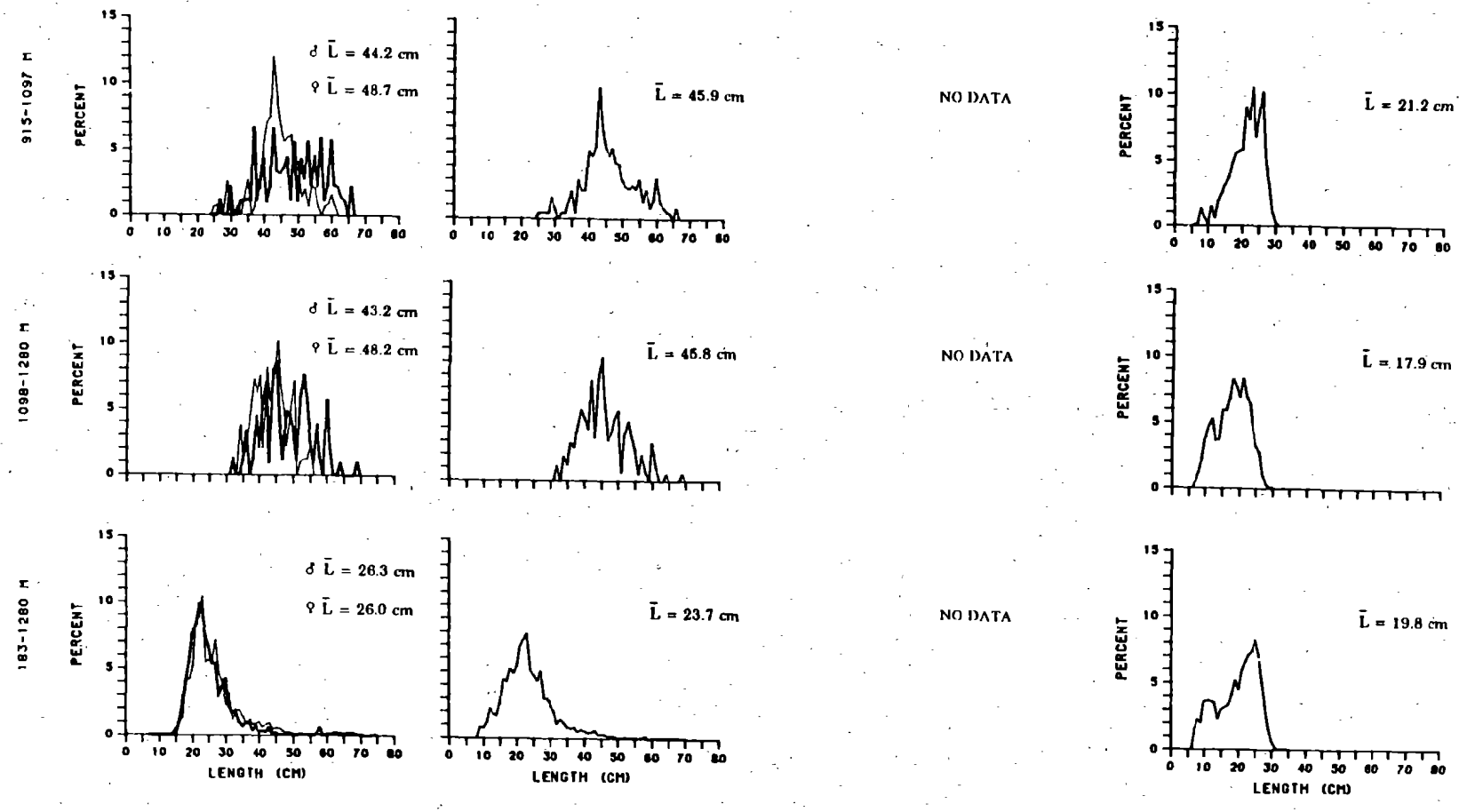


Figure 13.--Shortspine thornyhead and longspine thornyhead size composition and mean length by sex for each stratum and for all strata combined.

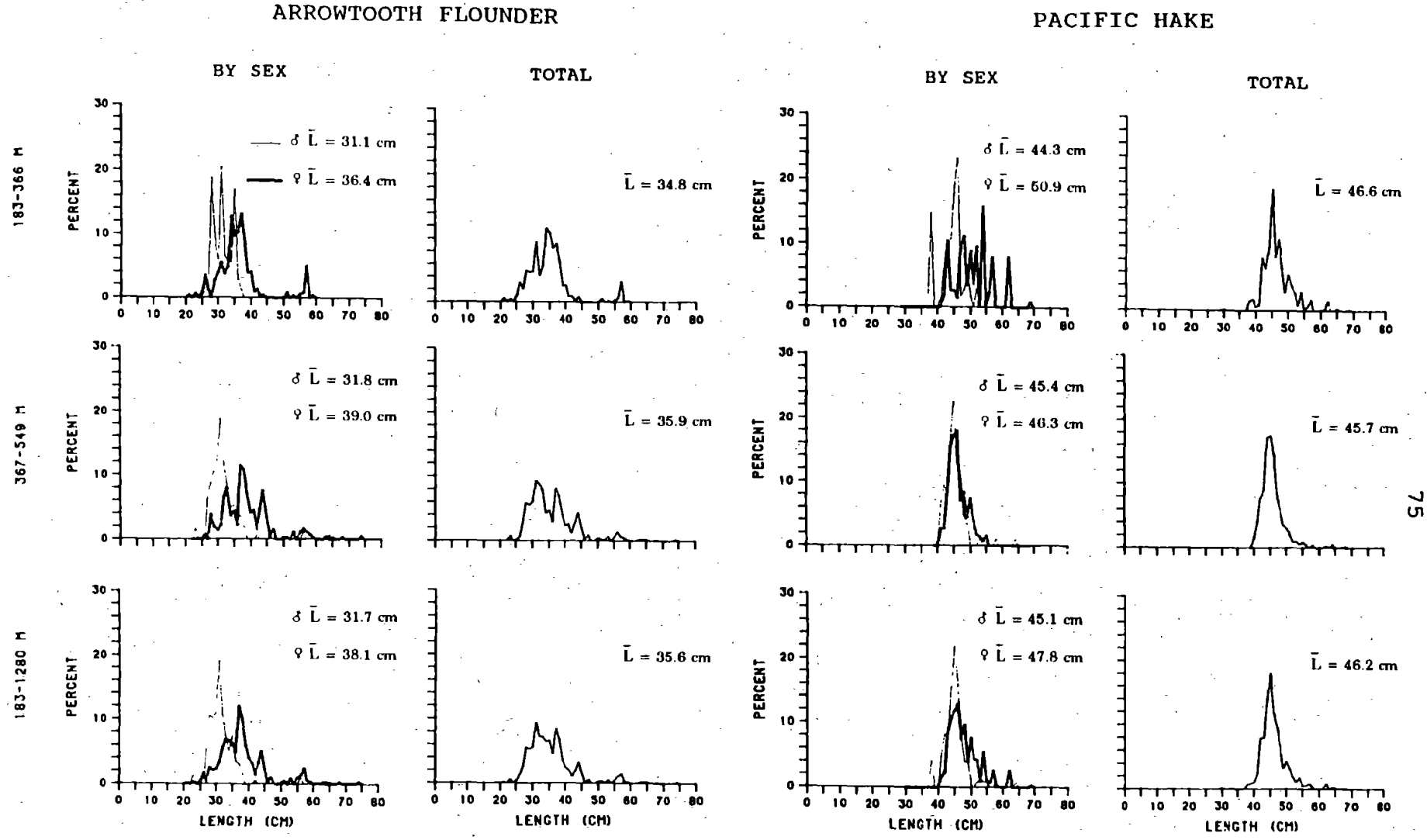
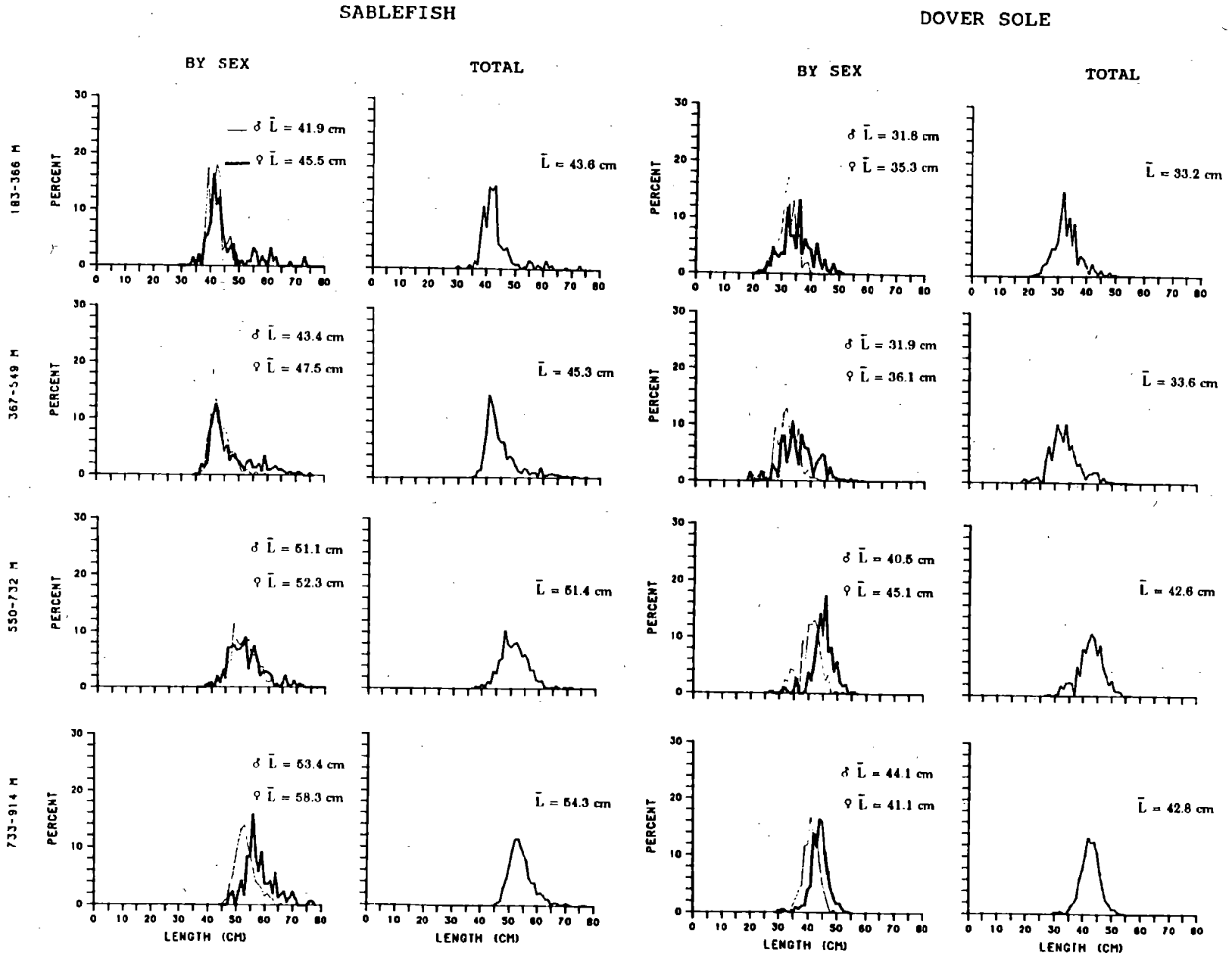


Figure 14.--Arrowtooth flounder and Pacific hake size composition and mean length by sex for each stratum in which the species were encountered and for all strata combined.


SABLEFISH
DOVER SOLE
BY SEX
TOTAL
BY SEX
TOTAL
183-366 M
367-549 M
550-732 M
733-914 M
PERCENT
LENGTH (CM)
♂ L̄ = 41.9 cm
♀ L̄ = 45.5 cm
L̄ = 43.6 cm
♂ L̄ = 43.4 cm
♀ L̄ = 47.5 cm
L̄ = 45.3 cm
♂ L̄ = 51.1 cm
♀ L̄ = 52.3 cm
L̄ = 51.4 cm
♂ L̄ = 53.4 cm
♀ L̄ = 58.3 cm
L̄ = 54.3 cm
♂ L̄ = 31.8 cm
♀ L̄ = 35.3 cm
L̄ = 33.2 cm
♂ L̄ = 31.9 cm
♀ L̄ = 36.1 cm
L̄ = 33.6 cm
♂ L̄ = 40.5 cm
♀ L̄ = 45.1 cm
L̄ = 42.6 cm
♂ L̄ = 44.1 cm
♀ L̄ = 41.1 cm
L̄ = 42.8 cm

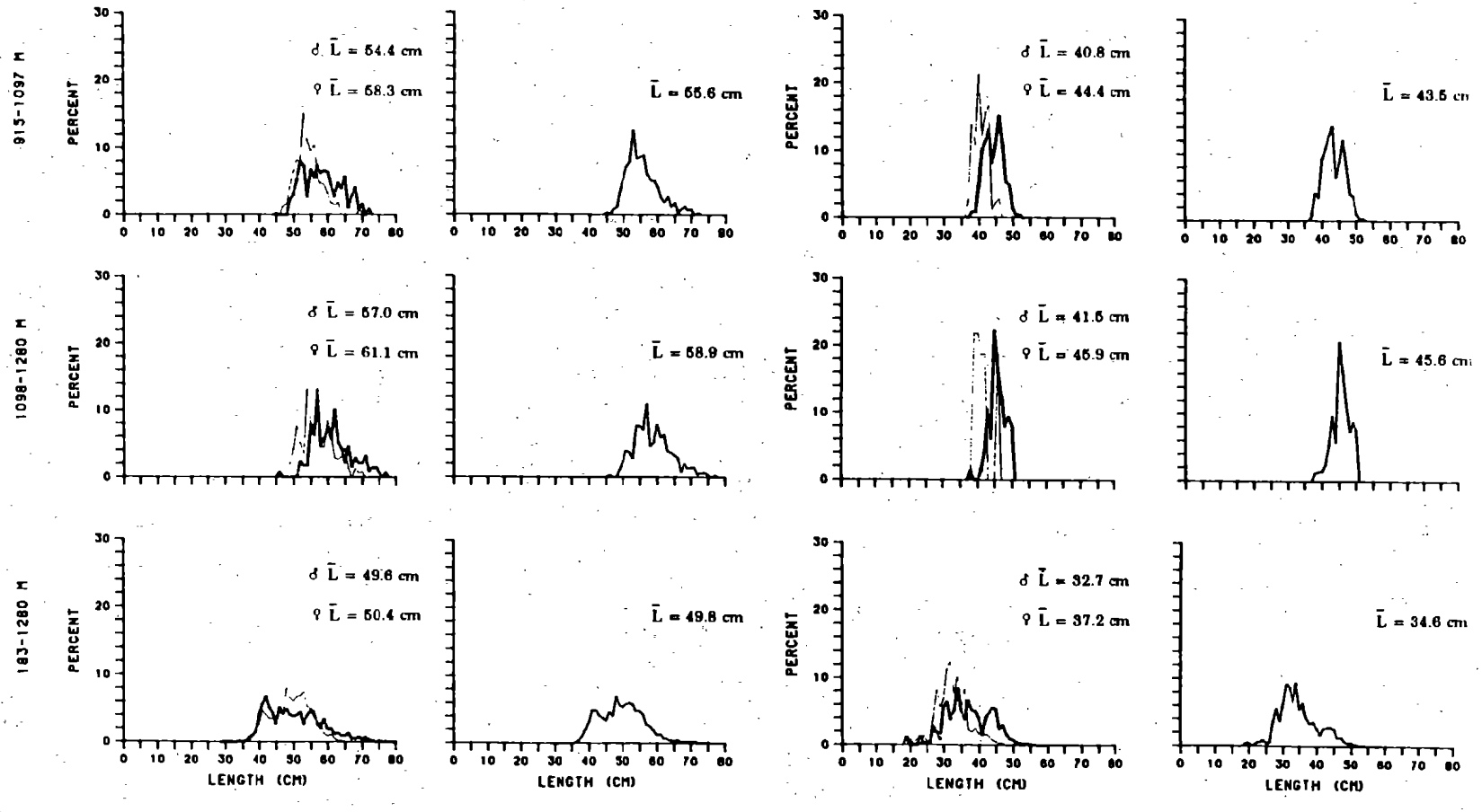


Figure 15.--Sablefish and Dover sole size composition and mean length by sex for each stratum and for all strata combined.

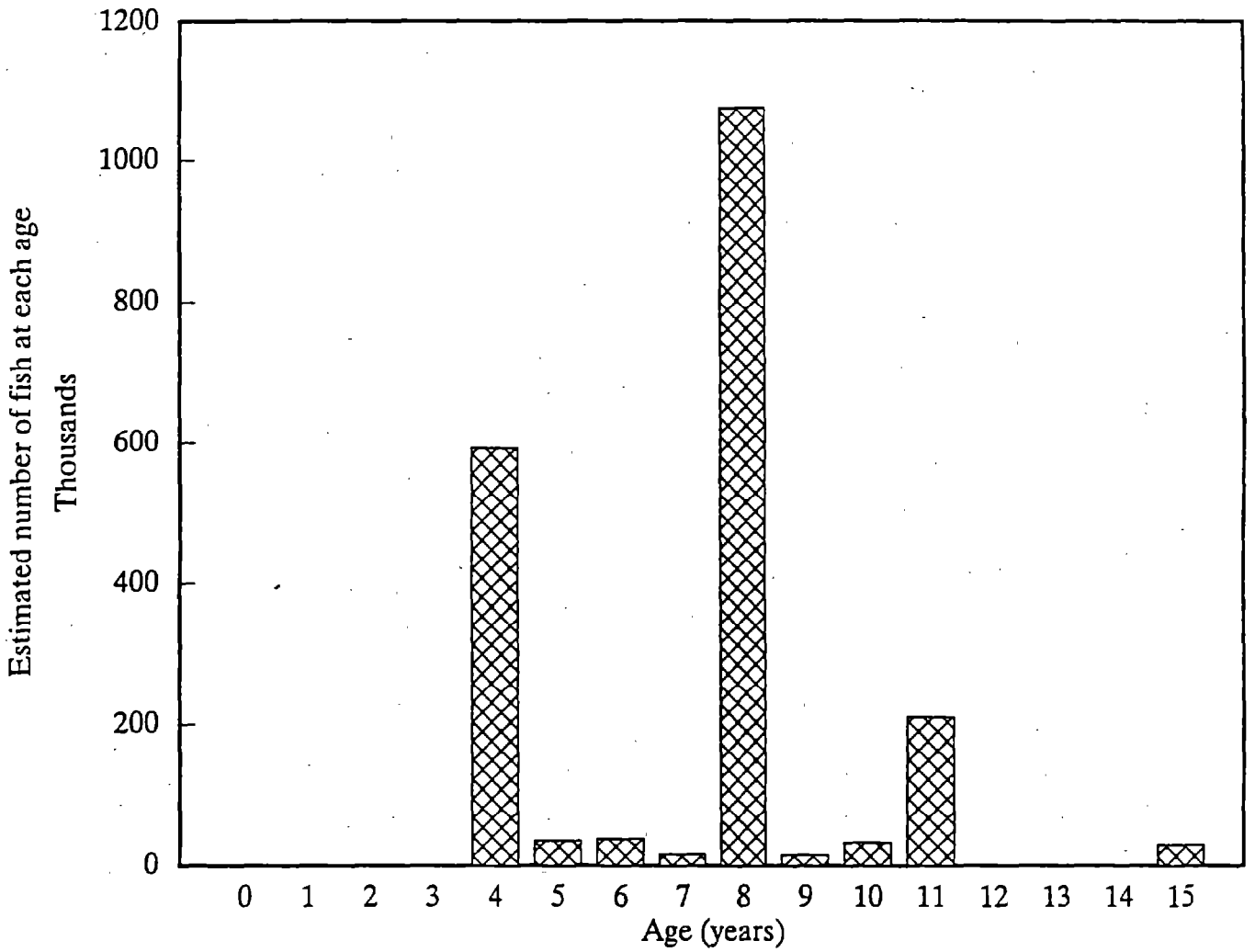


Figure 16. --Estimates of Pacific hake population numbers by age for all depth strata combined.

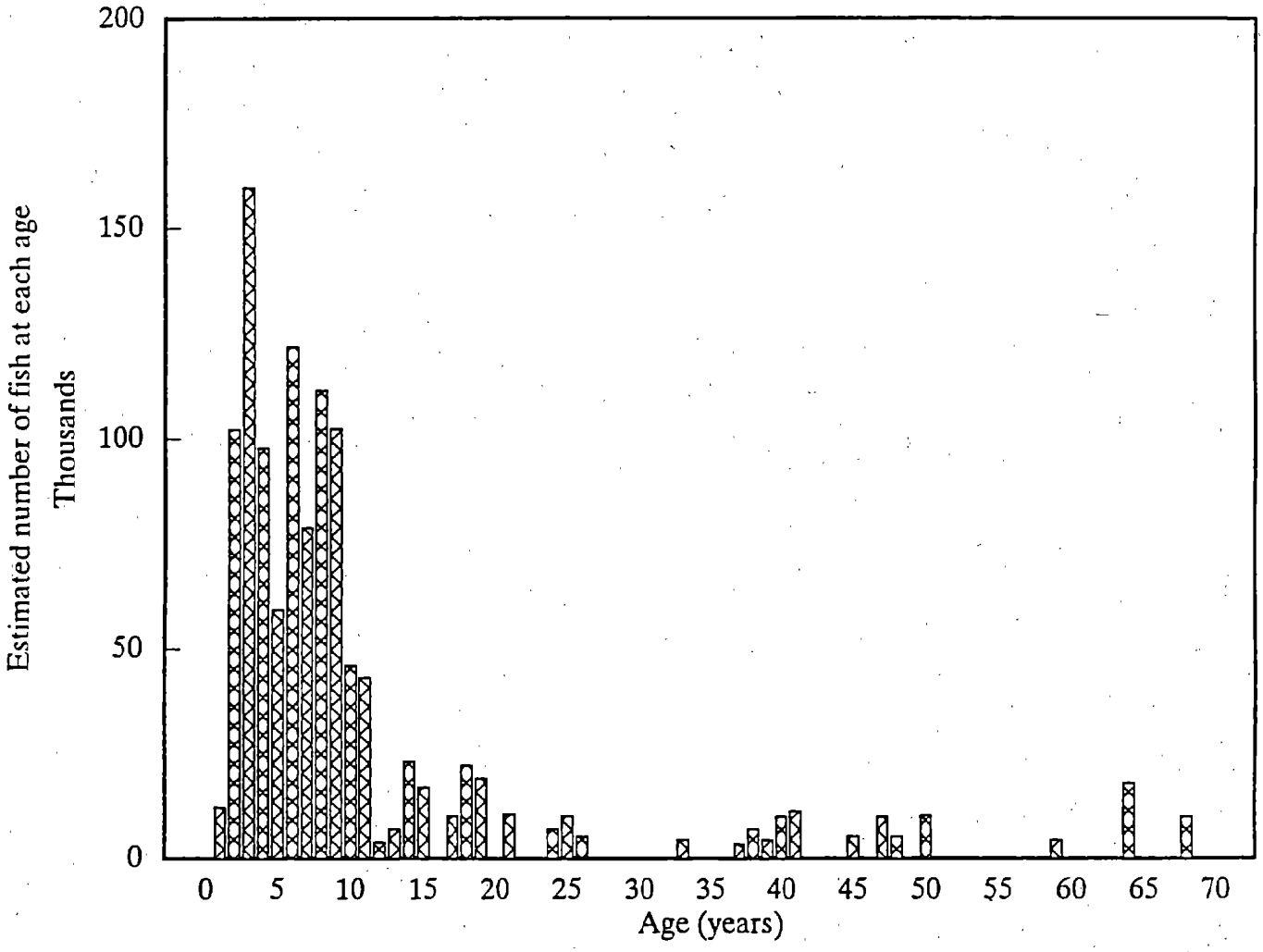


Figure 17.--Estimates of darkblotched rockfish population numbers by age for all depth strata combined.

Sex	L_∞	K	t_0	Sample size
Male	380.2610	.2249147	-1.42417	96
Female	396.5598	.2319485	-1.25777	60

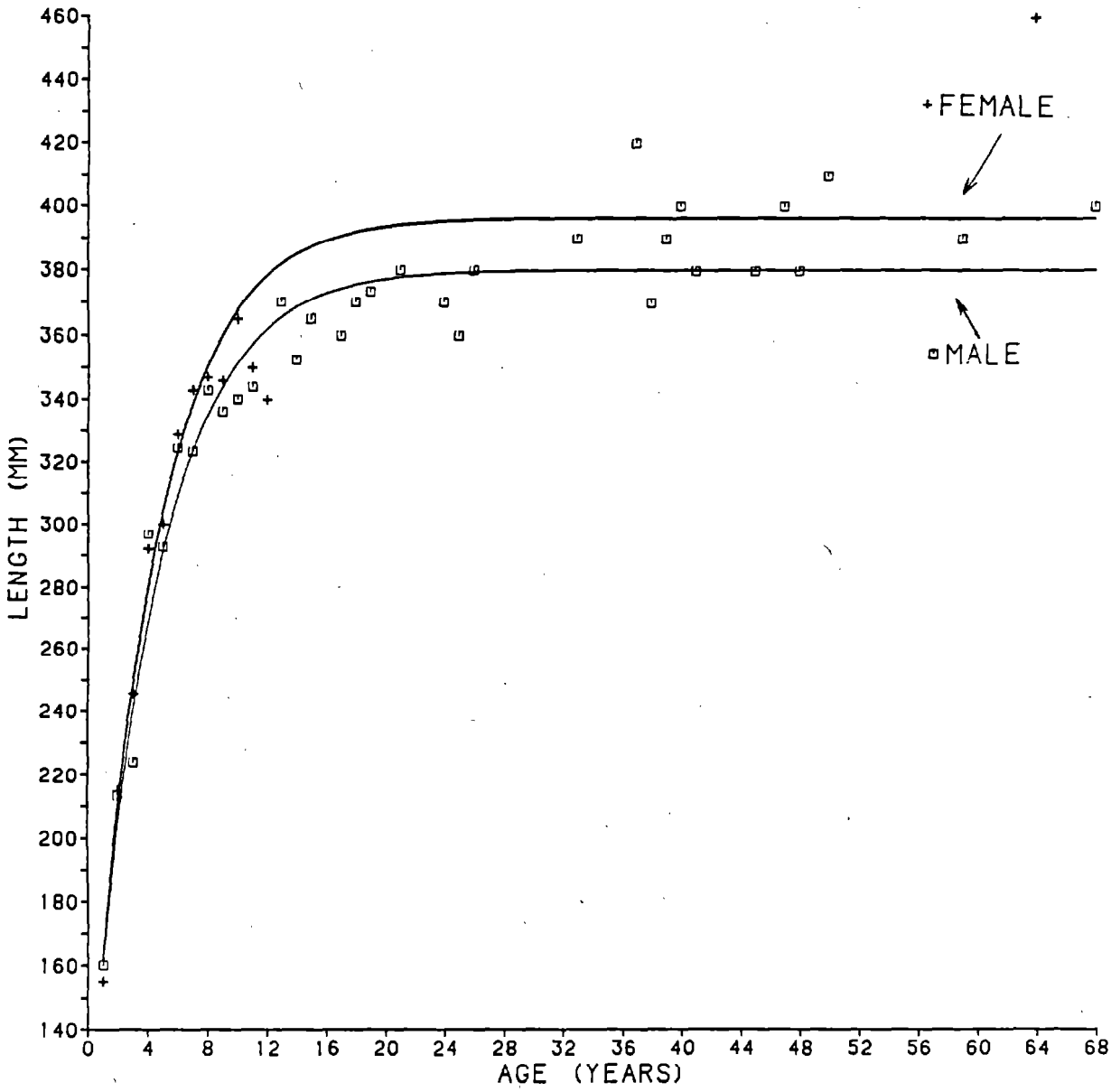


Figure 18.--Mean length at age and calculated age-length curves based on the von Bertalanffy growth function, $L = L_\infty[1-e$ (Ricker 1975: equation 9.9) for darkblotched rockfish by sex for all depth strata combined.

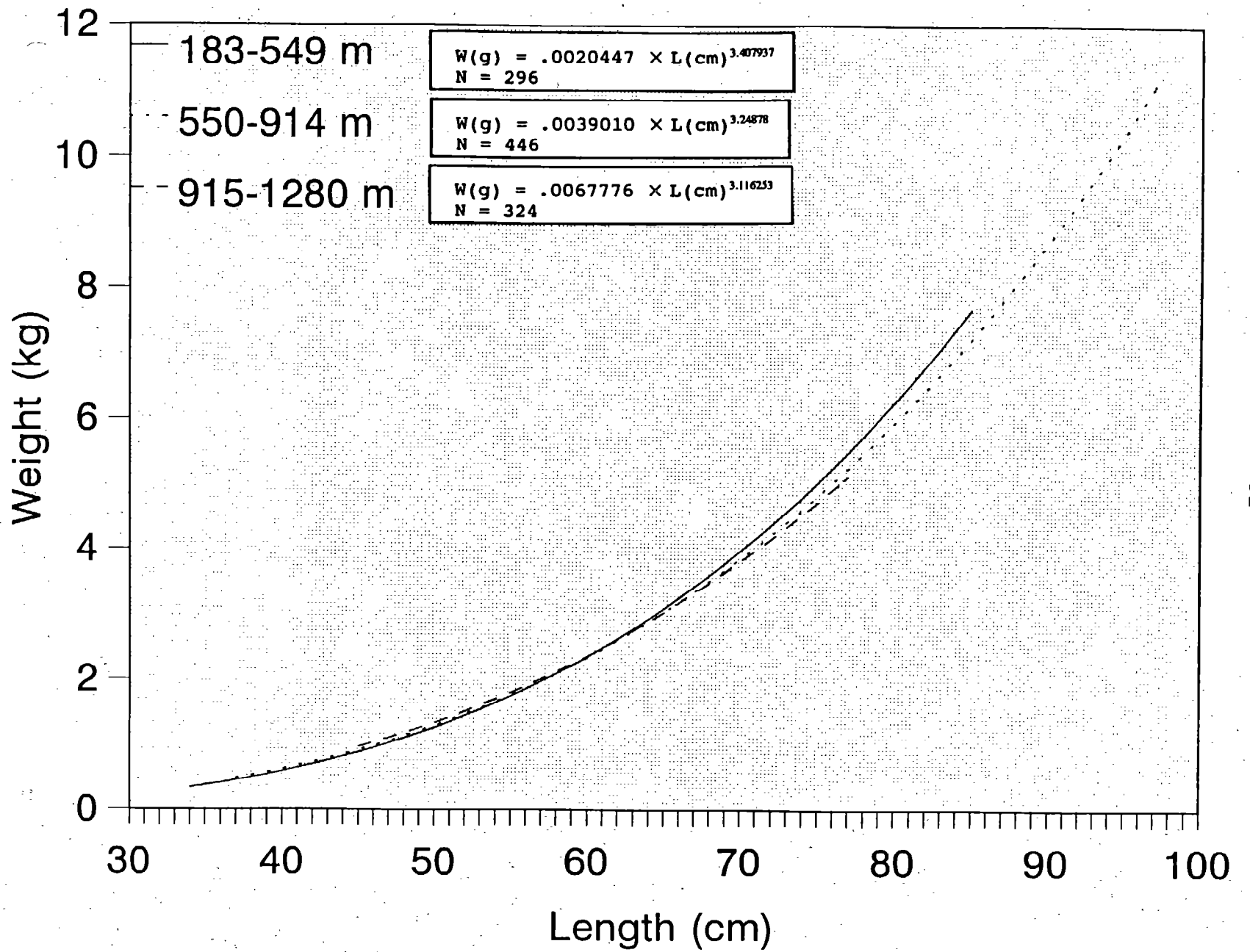


Figure 19.--Length-weight relationships for sablefish by depth.

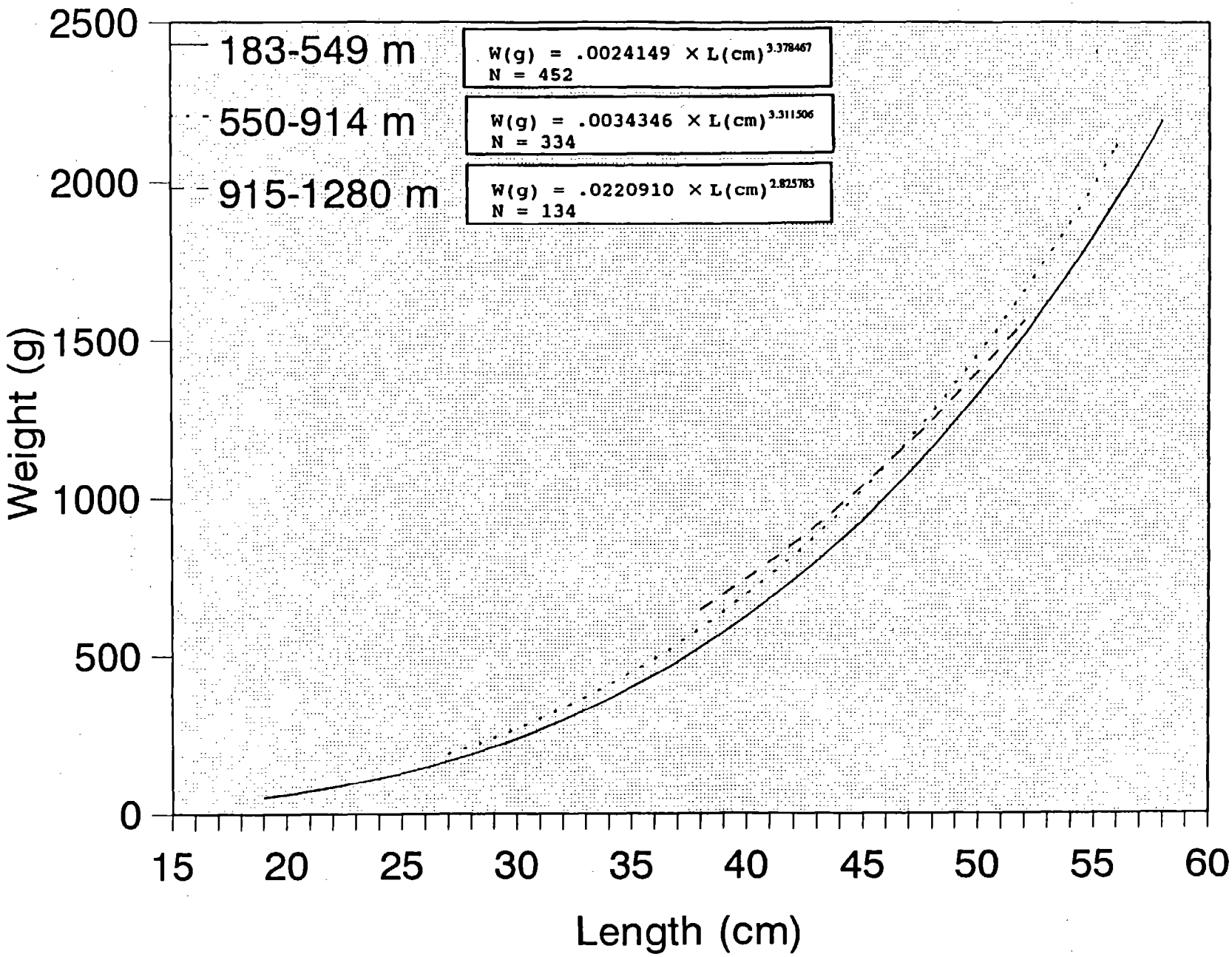


Figure 20.--Length-weight relationships for Dover sole by depth.

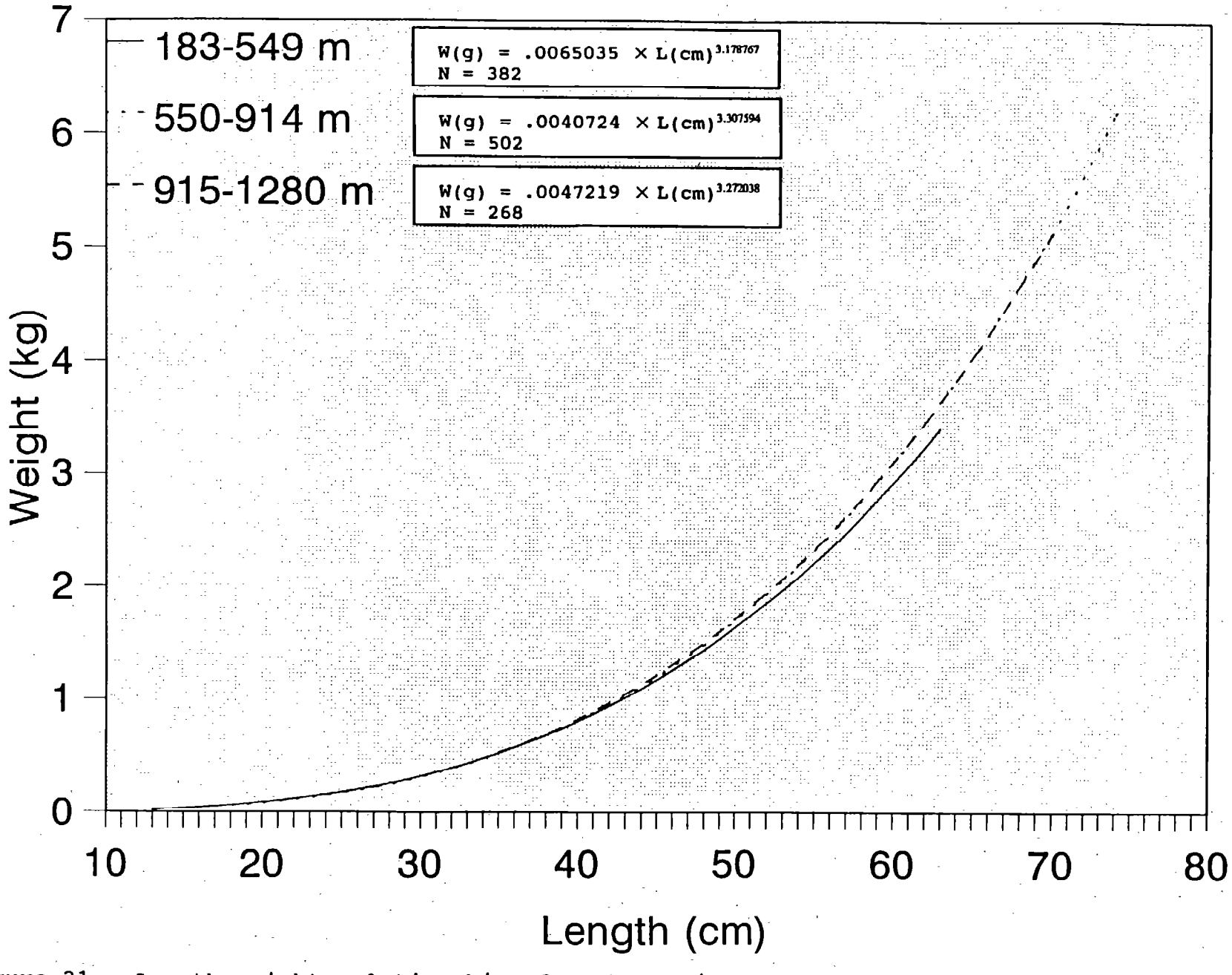


Figure 21.--Length-weight relationships for shortspine thornyhead by depth.

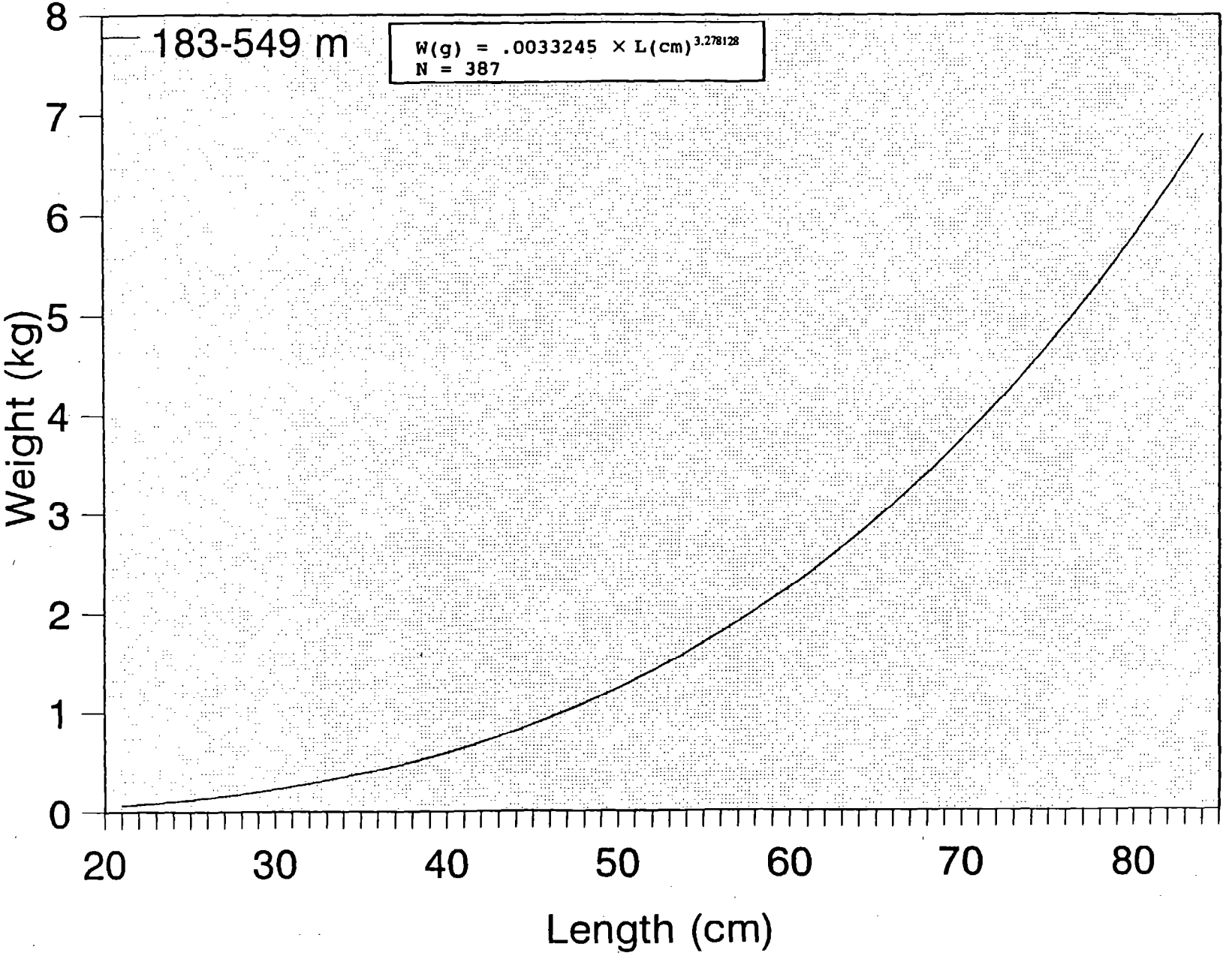


Figure 22.--Length-weight relationship for arrowtooth flounder.

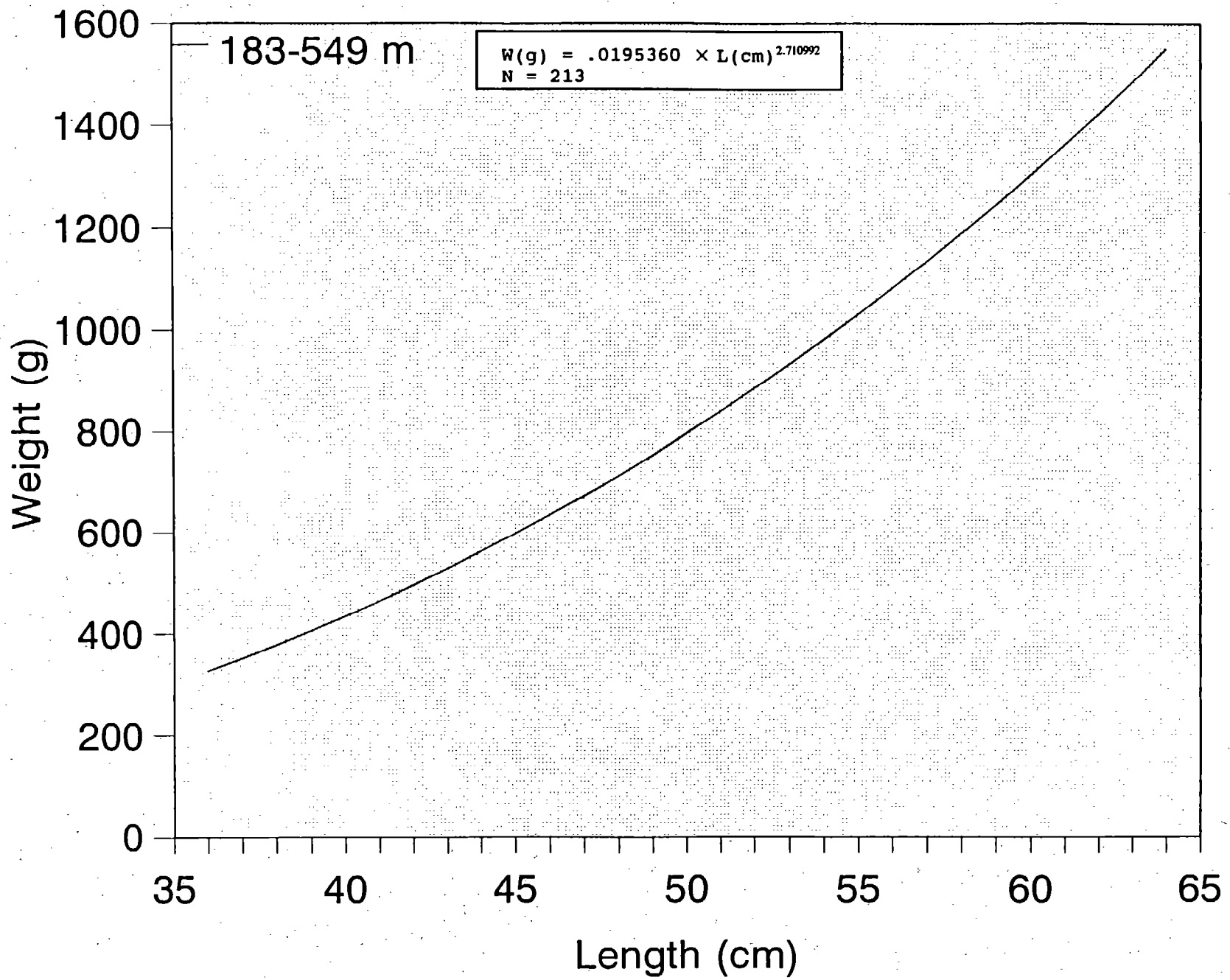


Figure 23.--Length-weight relationship for Pacific hake.

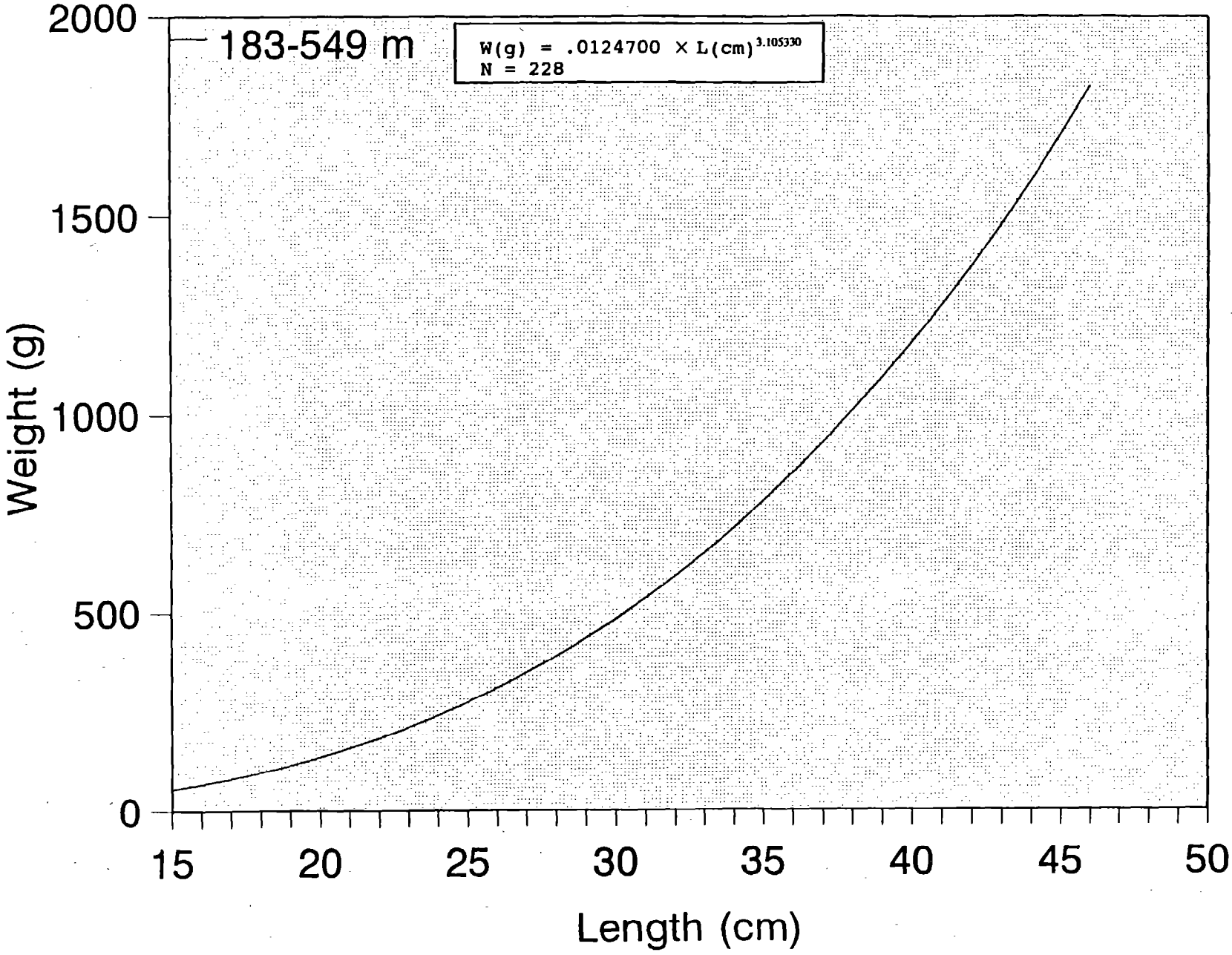


Figure 24.--Length-weight relationship for darkblotched rockfish.

CITATIONS

Dorn, M.W., R.D. Methot, E.P. Nunnallee, and M.E. Wilkins. 1991. Status of the coastal Pacific whiting resource-in 1990. U.S.Dep. Commer., NOAA Tech Memo. NMFS F/NWC-204, 97 p.

Eschmeyer, W. N., E. S. Herald, and H. Hammann 1983. A field guide to Pacific Coast fishes of North America. Houghton Mifflin Co., Boston, MA., 336 p.

Gunderson, D. R., and T. M. Sample. 1980. Distribution-and abundance of rockfish off Washington, Oregon, and California during 1977. Mar. Fish. Rev. 42(3-4):2-16.

Hughes, S. E. 1976. System for sampling large trawl catches of research vessels. J. Res. Board 'Can. 33:833-839.

Morris, R. H., D. P. Abbott, and E. C. Haderlie.. 1980. Intertidal Invertebrates of California. Stanford Univ. Press, 690 p;

Nichol, D. G. 1990. Life-history examination of darkblotched rockfish (Sebastes crameri) off the Oregon coast. M.S. Thesis. Oregon State University, Corvallis, OR, ,124 p.

Parks, N. B. 1973. Results of comparative trawl and trap fishing off Oregon for sablefish, Anoplopoma fimbria. Mar, Fish. Rev. 35(9):27-30.

Raymore, P. A., Jr., and K. L. Weinberg. 1990. 1984 spring and autumn surveys of Pacific West Coast upper continental slope groundfish resources. U.S. Dep. Commer., NOAA Tech. Memo. NMFS F/NWC-179, 196 p. Available from Natl. Tech. Info. Serv., 5285 Port Royal Road, Springfield, VA 22161, as PB90-207812.

Ricker, W. E. 1975. Computation and interpretation of, biological statistics of fish populations. Bull. Fish. Res. Board Can. 191, 382 p.

Robins, C. R. 1991. Common and scientific names of fishes from the United States and Canada, Fifth Edition, Am. Fish. Soc., Special Publ. 20, 183. p.

Shaw, F. R. 1984. Data report: results of sablefish tagging in waters off the coast of Washington, Oregon, and California,' 1979-83. RACE Division, Alaska Fish. Sci. Ctr., 7600 Sand Point Way N.E., BIN C15700, Seattle, WA 98115.

Smith, G. B., and R. G. Bakkala. 1982. Demersal fish resources of the eastern Bering Sea: Spring 1976. NOAA Tech. Rep. NMFS SSRF-754, 129 p.

APPENDIX A

Trawl **Mensuration Report**

Appendix A presents the trawl mensuration report for the 1988 West Coast upper continental slope groundfish survey.

APPENDIX A
Trawl Mensuration Report
Miller Freeman Cruise 88-9

Prepared by
Craig Rose
Conservation Engineering Task

Scanmar trawl mensuration systems were used to monitor wing spread, door spread, headrope height and trawl depth during the 1988 AFSC and SWFSC Cooperative Groundfish Survey of the Upper Continental Slope. This survey was carried out aboard the R/V Miller Freeman between Heceta Head and Cape Lookout, Oregon. Polyethylene Noreastern trawls were used throughout. For most survey tows, a heavy, continuous roller gear consisting of rubber discs (20 cm diameter) strung on heavy chain was used. At the end of the survey, some comparative tows were made using the lighter standard roller gear, made up of 36 cm bobbins separated by rubber spacers.

Useful information-was acquired for 24 tows, 16 with the disk footrope and 8 with the standard roller gear (Table A-l). While both data sets contained considerable variability, neither showed a consistent pattern of change with depth that could be characterized with these small sample sizes (Figs. A-l and A-2).

While all of the tows with standard roller gear showed consistent behavior while on bottom, several disc footrope tows could be considered abnormal. Tows 40, 43, 46, and 57 all showed indications of the gear snagging bottom obstructions. This usually involved a rapid decrease in door and wing spread followed by a widening as the gear released. Tow 40 was probably

the worst in that the net never assumed what would be considered a normal towing configuration. Tow 43 was terminated early when one of the doors hung up. This resulted in a widening of the wing spread at the end of the tow.

Another phenomenon that occurred with the disc footrope performance could be associated with the footrope digging, into the softer substrate, collecting mud in the codend. This resulted in a steady decrease in net and door-widths as well as height throughout tows 41, 46, and 58.

A comparison between the wing &read of the two trawl configuration types is presented in Figure A-3. The data points represent pairs of tows at the same station. The trawl with the disc footrope had a smaller wing spread in all cases, probably due to an increase in drag from harder bottom contact.

Mean wing spreads were 16.2, m with the standard rollers and 14.1 m with the small discs. It would be more appropriate for use as in area-swept calculations to remove those tows affected by snags. In that case, the net width of the disc footrope trawl averaged 14.7 m.

Table A-1.--Trawl mensuration data from Miller Freeman cruise 88-9.

Haul Number	Depth (m)	Scope (m)	Wing Spread (m)	Height[a] (m)	Door Spread (m)	Trawl Depth (m)
Small Discs on Chain Roller Gear						
29	355	777	12.7	6.2[b]	--	354[b]
30	415	869	13.7	--	--	400
40	274	640	8.6	9.8	24.1[b]	262
41	395	823	14.6	7.2	43.0	262
42	256	594	16.3	7.0	54.7	247
43	236	594	17.5	4.4	--	224
44	316	732	14.5	--	--	301
45	379	823	15.5	7.4	--	354
46	402	869	12.7	8.0	35.2	389
55	536	1,052	13.7	7.7	37.4	521
56	406	823	15.3	7.8	48.8	385
57	410	869	10.0	--	25.4[b]	390
58	340	777	14.3	6.5	35.4	330
59	287	640	16.1	7.6	--	275
60	388	860	14.6	9.4	--	372
61	424	869	15.1	11.1[b]	--	398
			$\bar{x}$=14.7	$\bar{x}$= 7.8		
Standard Roller Gear						
63	430	869	17.0	5.5	54.0	413
64	397	869	16.4	5.7	52.5	375[b]
65	293	640	17.2	5.8	56.5	283[b]
66	349	777	15.8	6.2	49.4	337[b]
67	408	869	15.9	5.6	51.9	383[b]
68	421	823	16.0	--	--	376[b]
69	552	1,143	16.9	7.4	--	534[b]
70	198	503	14.6	6.8	--	188[b]

[a]Footrope to headrope.
[b]Measurements unavailable for > ¼ of tow.

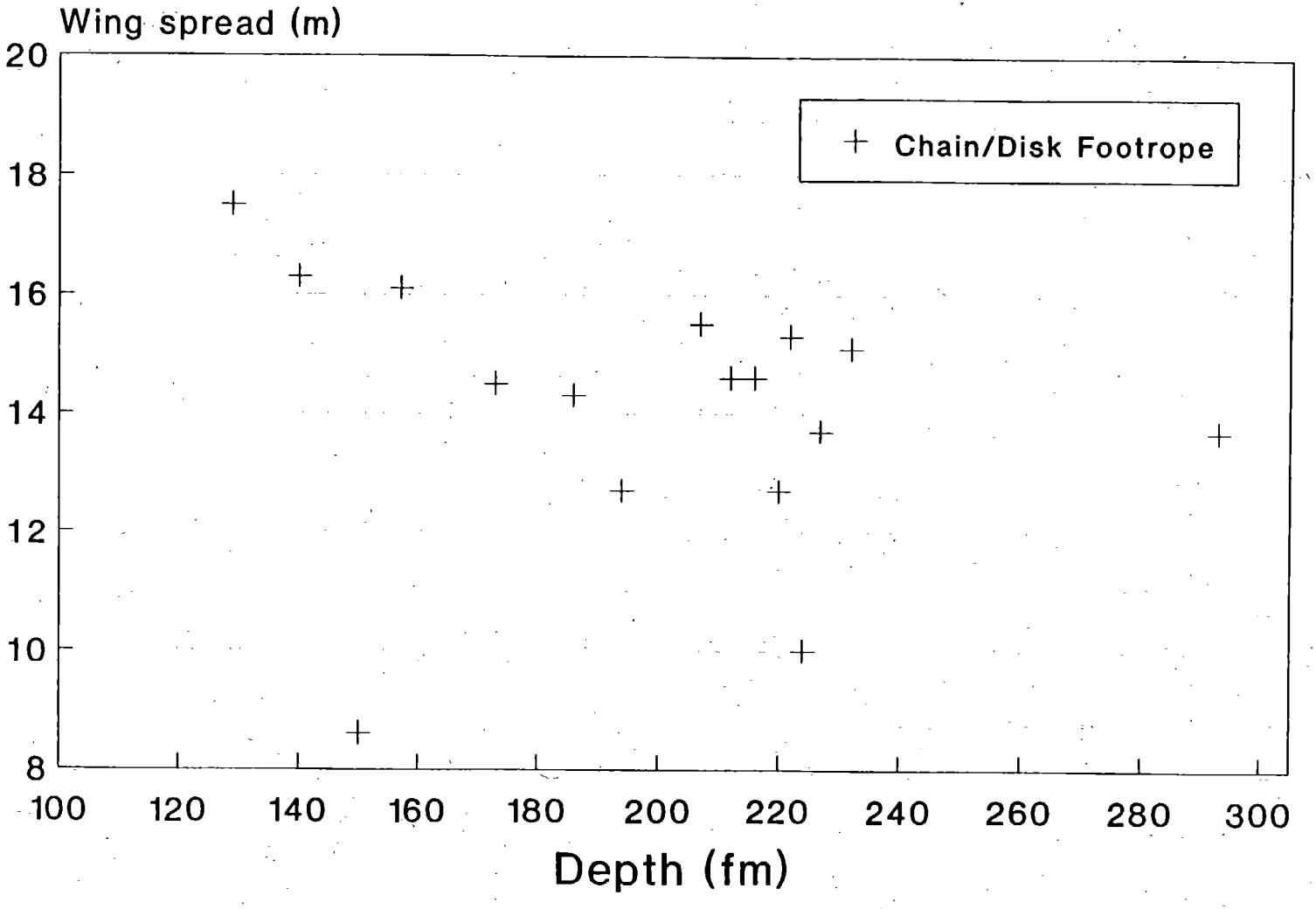


Figure A-l.--Polyethylene Noreastern trawl with disc and chain roller gear, wing spread measurements at depth.

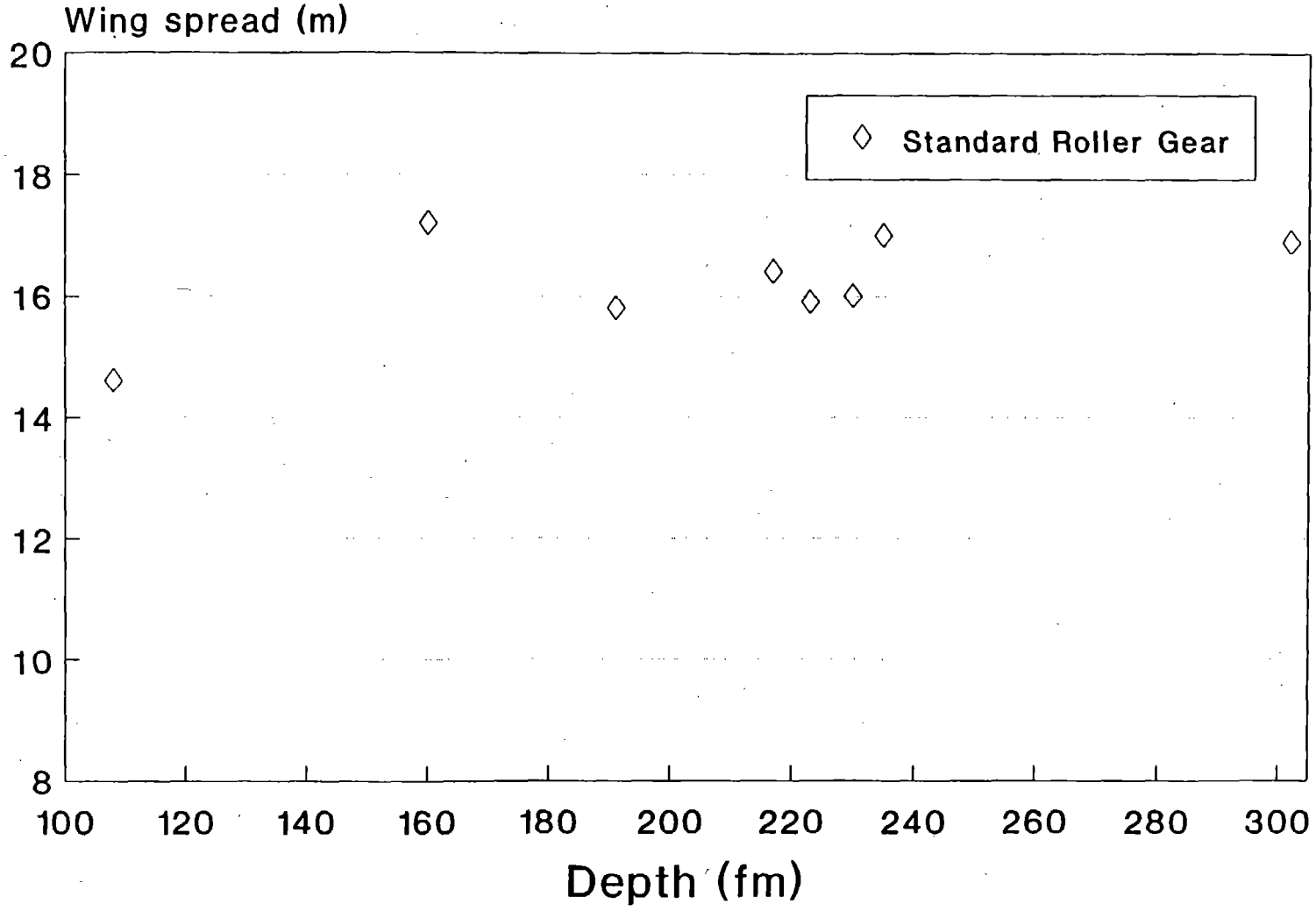


Figure A-2. --Polyethylene Noreastern trawl with standard roller gear, wing spread measurements at depth.

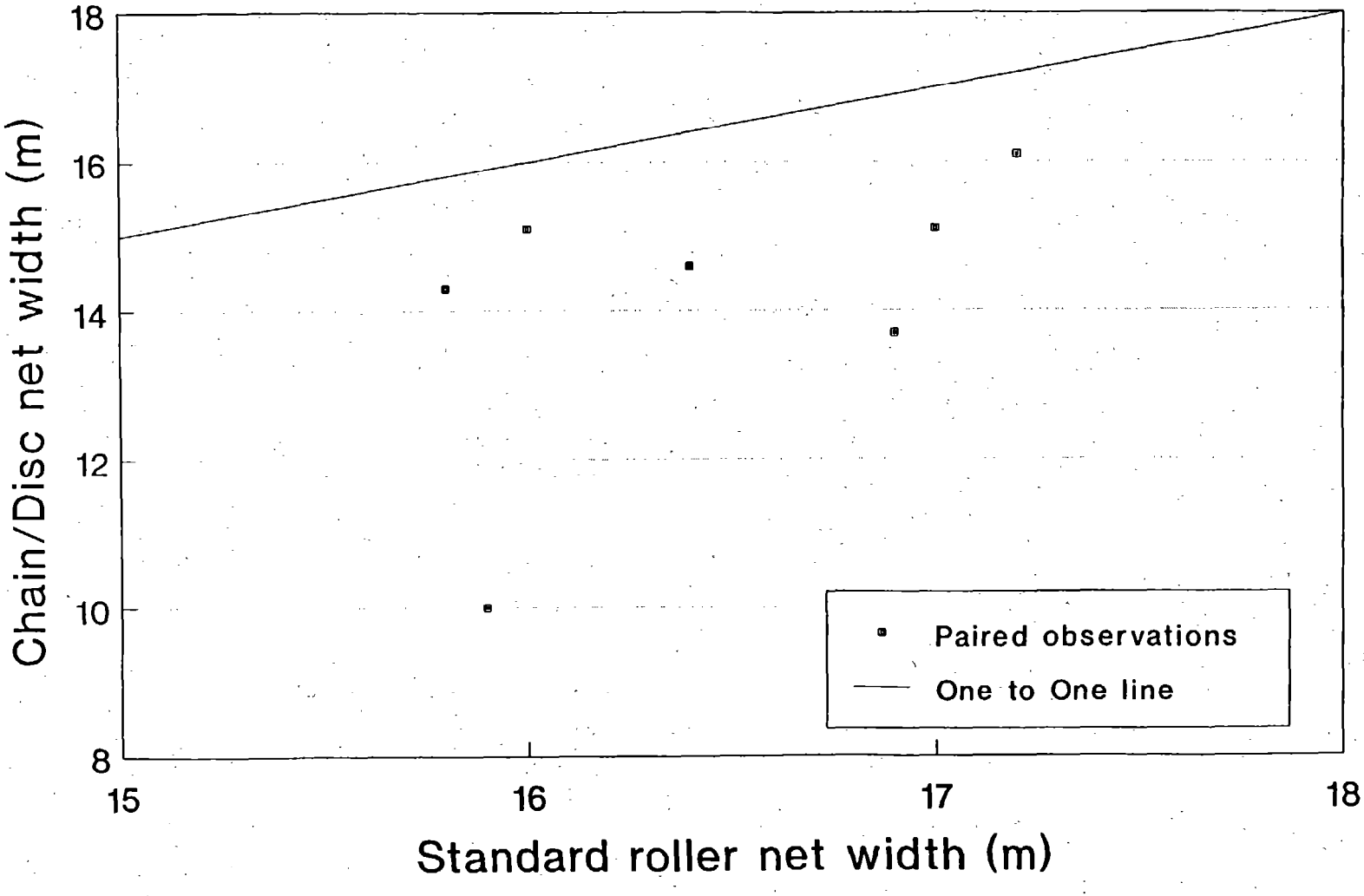


Figure A-3.--Polyethylene Noreastern wing spread measurements with disc and chain roller gear versus standard roller gear.

APPENDIX B

Haul and Catch Information

Appendix. B contains the computer listing generated from the PACE program DRAG/LOG& Latitudes and longitudes are indegrees, minutes, and fractions of minutes. Gear depth is in meters, distance fished is in kilometers, and catches are in kilograms. Performance of 0 indicates a satisfactory tow and performance of 7 indicates a unsatisfactory tow with a ripped net. All hauls were made using the Noreastern otter trawl with 20 cm disc/chain footrope.

Table B-1.--Haul and catch (kg) data for the Miller Freeman cruise 88-9.

HAUL #	1	2	3	4	5	6	7	8	9	10	11
MONTH/DAY/YEAR	11/28/88	11/28/88	11/28/88	11/28/88	11/28/88	11/29/88	11/29/88	11/29/88	11/30/88	11/30/88	11/30/88
LATITUDE START	44 8.9	44 8.8	44 8.6	44 7.9	44 6.4	44 11.3	44 6.7	44 19.4	44 20.6	44 19.9	44 18.6
LONGITUDE START	124 56.4	124 58.0	124 59.1	125 0.1	125 1.4	125 1.8	125 3.2	125 6.6	125 4.6	125 2.0	124 59.1
LATITUDE END	44 9.4	44 9.9	44 9.6	44 9.1	44 8.3	44 10.3	44 9.1	44 18.1	44 18.7	44 17.6	44 17.4
LONGITUDE END	124 56.0	124 58.6	124 59.1	124 59.9	125 1.3	125 1.2	125 2.8	125 6.0	125 4.7	125 1.5	124 58.7
LORAN START	13126.70	13127.10	13129.30	13135.00	13147.10	13107.90	13145.00	13042.00	13032.50	13038.10	13047.60
LORAN START	27795.80	27793.00	27790.80	27788.00	27783.30	27790.40	27780.60	27795.00	27800.30	27803.50	27806.40
LORAN END	13122.10	13118.20	13120.60	13125.00	13132.10	13115.60	13125.90	13053.50	13048.40	13056.00	13057.40
LORAN END	27797.40	27793.70	27792.50	27790.20	27786.40	27789.80	27785.20	27793.90	27797.20	27800.90	27805.20
GEAR DEPTH	194	340	421	589	817	1020	1207	1211	1066	838	682
DURATION IN HOURS	0.50	0.50	0.50	0.50	0.92	0.92	1.00	0.92	1.01	1.00	0.50
DISTANCE FISHED	1.07	1.85	1.69	1.85	3.50	2.98	3.67	3.13	3.28	3.67	1.91
PERFORMANCE / GEAR	7 /172	0 /172	0 /172	0 /172	0 /172	0 /172	0 /172	0 /172	7 /172	0 /172	0 /172
PACIFIC WHITING	0.0	100.2	40.0	6.4	0.0	0.0	0.0	0.7	0.0	0.0	0.0
SABLEFISH	2.5	5.4	38.8	583.1	243.4	55.1	97.5	25.4	118.8	139.5	251.3
PACIFIC COD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LINGCOD	12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GRENADIERS	0.0	0.0	0.0	26.3	101.8	51.5	515.3	121.3	144.5	20.2	54.0
SLICKHEADS	0.0	0.0	0.0	0.0	17.4	0.9	7.7	1.4	64.9	12.5	4.5
EELPOUTS	2.7	10.4	5.4	15.2	3.4	2.3	2.0	5.9	3.0	1.8	3.6
OTHER ROUNDFISH	10.1	0.0	29.3	3.4	0.6	0.6	38.5	27.7	14.3	1.5	3.8
TOTAL ROUNDFISH	27.3	116.1	113.4	634.3	366.5	110.4	661.0	182.3	345.5	175.4	317.2
PACIFIC OCEAN PERC	0.0	16.7	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DARKBLOTCHED ROCKF	0.7	12.5	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SPLITNOSE ROCKFISH	0.0	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SHORTSPINE THORNYH	0.0	3.8	5.7	73.0	84.4	39.7	24.3	41.7	108.0	52.2	39.5
LONSPINE THORYHEAD	0.0	0.0	0.0	0.0	416.2	91.6	103.9	111.1	176.7	604.4	130.0
OTHER ROCKFISH	67.1	10.9	5.9	1.1	0.0	0.0	0.0	0.0	0.0	3.6	0.0
TOTAL ROCKFISH	67.9	52.2	16.3	74.2	500.5	131.3	128.1	152.9	284.6	660.2	169.4
DOVER SOLE	0.0	12.5	135.1	336.8	84.8	124.5	57.2	11.3	5.4	164.2	92.5
REX SOLE	6.4	37.6	14.1	5.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENGLISH SOLE	12.2	56.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PETRALE SOLE	15.4	71.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ARROWTOOTH FLOUND	0.4	5.9	13.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHER FLATFISH	11.6	4.2	15.6	1.4	3.4	4.8	7.3	3.2	6.8	9.5	2.7
TOTAL FLATFISH	45.9	187.6	178.0	343.4	88.2	129.3	64.4	14.5	12.2	173.7	95.3
HAGFISH	0.0	0.0	0.0	0.7	2.7	0.0	1.3	0.9	1.1	5.0	1.1
BROWN CAT SHARK	8.4	16.7	26.8	2.9	0.0	0.0	0.0	0.0	0.0	1.4	1.8
SPINY DOGFISH	179.8	3003.5	7.3	0.0	0.1	0.0	0.0	0.0	0.0	4.8	0.0
SKATES	12.5	56.4	58.3	34.7	2.9	12.7	8.2	1.8	16.8	2.0	2.7
RATFISH	8.4	41.8	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.7
OTHER ELASMOBRANCH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL ELASMOBRANCH	209.1	3118.4	94.3	38.3	5.8	12.7	9.4	2.7	17.9	13.8	6.4
GROOVED TANNER CRA	0.0	0.0	0.5	6.6	12.2	15.6	98.0	87.3	21.8	0.0	108.0
SQUID	0.0	0.0	0.0	0.0	0.9	0.0	1.4	0.0	0.9	0.7	0.0
SEA URCHINS	0.0	0.0	39.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHER INVERTEBRAT	1.8	50.1	30.2	24.5	17.3	13.6	99.7	162.2	45.8	41.5	22.7
TOTAL INVERTEBRAT	1.8	50.1	69.6	31.1	30.5	29.2	199.0	249.5	68.5	42.2	130.6
TOTAL CATCH	352.0	3524.4	471.7	1121.3	991.6	412.9	1062.0	601.9	728.8	1065.4	718.9

Table 8-1 Continued.

HAUL #	12	13	14	15	16	17	18	19	20	21	22
MONTH/DAY/YEAR	11/30/88	12/ 1/88	12/ 1/88	12/ 1/88	12/ 1/88	12/ 1/88	12/ 2/88	12/ 2/88	12/ 2/88	12/ 3/88	12/ 3/88
LATITUDE START	44 18.3	44 17.1	44 26.2	44 27.4	44 27.0	44 27.0	44 24.7	44 25.5	44 25.2	44 36.0	44 35.8
LONGITUDE START	124 54.7	124 53.7	124 45.2	124 49.4	124 51.5	124 57.2	125 3.0	125 4.5	125 6.6	125 3.1	125 0.0
LATITUDE END	44 19.0	44 17.6	44 27.2	44 27.3	44 26.7	44 25.9	44 26.9	44 27.7	44 27.7	44 34.3	44 37.8
LONGITUDE END	124 53.7	124 52.5	124 44.6	124 47.5	124 49.9	124 57.1	125 3.2	125 4.1	125 5.7	125 4.3	124 59.1
LORAN START	13048.60	13058.20	12980.50	12971.70	12976.00	12978.20	12999.00	12992.90	12996.00	12908.20	12908.30
LORAN START	27813.70	27813.50	27842.10	27836.60	27832.30	27822.60	27809.40	27808.00	27804.00	27825.70	27830.80
LORAN END	13042.60	13053.70	12971.70	12972.00	12978.50	12987.00	12981.80	12975.50	12976.30	12922.90	12892.40
LORAN END	27816.50	27816.50	27844.60	27839.70	27834.60	27821.10	27812.20	27811.90	27809.10	27821.30	27835.00
GEAR DEPTH	479	221	194	329	386	668	814	967	1231	1231	971
DURATION IN HOURS	0.50	0.50	0.50	0.50	0.50	0.50	1.00	1.00	1.00	1.00	1.00
DISTANCE FISHED	2.19	1.80	1.98	1.76	1.85	1.89	3.63	3.96	4.37	3.65	3.59
PERFORMANCE / GEAR	0 /172	0 /172	1 /172	0 /172	0 /172	0 /172	0 /172	0 /172	0 /172	0 /172	0 /172
PACIFIC WHITING	0.7	3.0	0.7	87.3	23.1	0.0	1.7	0.0	0.0	1.1	0.0
SABLEFISH	228.4	36.4	5.4	22.7	68.5	460.1	110.7	125.0	68.3	86.2	134.5
PACIFIC COD	0.0	26.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LINGCOD	0.0	27.5	7.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GRENADIERS	0.0	0.0	0.0	0.0	0.0	19.0	18.1	95.7	282.1	255.4	58.3
SLICKHEADS	0.0	0.0	0.0	0.0	0.0	2.0	20.6	15.4	9.1	0.0	14.7
EELPOUTS	1.1	2.2	3.2	10.9	15.6	5.9	3.7	4.8	6.1	2.0	7.5
OTHER ROUNDFISH	0.1	33.1	48.0	1.8	0.7	4.5	0.5	2.4	53.3	35.6	3.7
TOTAL ROUNDFISH	230.4	128.3	64.6	122.7	108.0	491.4	155.4	243.3	418.8	380.3	218.7
PACIFIC OCEAN PERC	0.0	0.0	0.0	17.0	19.3	0.0	0.0	0.0	0.0	0.0	0.0
DARKBLOTCHED ROCKF	0.0	0.0	0.0	14.1	3.6	0.0	0.0	0.0	0.0	0.0	0.0
SPLITNOSE ROCKFISH	0.0	0.2	0.0	224.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SHORTSPINE THORNYH	0.0	0.0	0.0	48.8	20.9	213.5	97.1	48.1	38.1	47.2	124.5
LONSPINE THORYHEAD	0.0	0.0	0.0	0.0	0.0	99.7	596.9	576.5	97.5	280.1	345.2
OTHER ROCKFISH	0.0	51.4	5.7	5.7	3.2	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL ROCKFISH	0.0	51.7	5.7	310.0	46.9	313.2	694.0	624.6	135.6	327.3	469.7
DOVER SOLE	58.2	5.8	4.3	49.4	64.6	95.3	188.2	287.6	0.0	0.0	13.8
REX SOLE	0.7	34.6	45.6	18.8	17.0	1.0	0.0	0.0	0.0	0.0	0.0
ENGLISH SOLE	0.0	60.2	83.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PETRALE SOLE	0.0	17.1	18.6	1.8	0.9	0.0	0.0	0.0	0.0	0.0	0.0
ARROWTOOTH FLOUND	0.0	1.7	2.7	2.5	10.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHER FLATFISH	0.0	19.0	41.4	14.5	5.0	0.0	11.6	20.0	4.5	19.1	17.7
TOTAL FLATFISH	58.9	138.4	196.0	89.5	97.5	96.3	199.8	307.5	4.5	19.1	31.5
HAGFISH	0.0	0.0	0.0	0.0	0.7	0.6	1.7	2.7	2.7	1.8	3.2
BROWN CAT SHARK	2.2	6.3	0.0	0.0	1.1	0.0	1.3	1.6	0.0	0.0	1.6
SPINY DOGFISH	0.0	1226.6	357.9	55.6	6.1	0.0	0.0	0.0	0.0	0.0	0.0
SKATES	22.4	98.2	12.5	74.4	28.1	6.3	0.0	0.0	4.1	29.4	8.6
RATFISH	0.0	80.6	14.5	12.7	4.3	1.0	0.0	0.0	0.0	0.0	0.0
OTHER ELASMOBRANCH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL ELASMOBRANCH	24.6	1411.8	384.9	142.7	40.4	7.8	2.9	4.3	6.8	31.2	13.4
GROOVED TANNER CRA	0.7	0.0	0.0	0.0	0.0	39.9	24.0	0.0	0.0	31.3	22.2
SQUID	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.8	0.7
SEA URCHINS	0.0	24.5	0.0	11.8	1.4	0.0	0.0	0.0	0.0	0.0	0.0
OTHER INVERTEBRAT	891.8	0.9	2.5	2.3	17.5	17.5	123.5	42.6	227.6	161.4	20.0
TOTAL INVERTEBRAT	892.5	25.4	2.5	14.1	18.8	57.3	147.6	43.8	227.6	193.5	42.9
TOTAL CATCH	1206.5	1755.5	653.8	679.0	311.6	966.1	1199.7	1223.5	793.4	951.4	776.2

Table B-1.--Continued.

HAUL #	23	24	25	26	27	28	29	30	31	32	33
MONTH/DAY/YEAR	12/ 3/88	12/ 3/88	12/ 4/88	12/ 4/88	12/ 4/88	12/ 4/88	12/ 5/88	12/ 5/88	12/ 5/88	12/ 5/88	12/ 5/88
LATITUDE START	44 35.7	44 38.4	44 38.8	44 35.2	44 36.1	44 44.4	44 46.3	44 44.1	44 41.6	44 44.9	44 46.0
LONGITUDE START	124 57.6	124 54.3	124 52.5	124 48.3	124 46.5	124 38.2	124 44.3	124 46.6	124 55.8	124 59.6	125 0.4
LATITUDE END	44 37.6	44 37.5	44 38.0	44 36.2	44 35.9	44 43.9	44 45.4	44 46.0	44 42.7	44 42.9	44 44.2
LONGITUDE END	124 57.8	124 54.8	124 52.0	124 48.7	124 47.9	124 36.7	124 43.9	124 46.6	124 56.1	124 58.9	125 0.3
LORAN START		12884.80	12880.70	12907.90	12899.40	12826.00	12814.90	12827.90	12859.90	12836.00	12827.50
LORAN START		27844.10	27847.60	27849.60	27854.10	27880.00	27871.90	27866.00	27846.00	27844.20	27844.40
LORAN END	12893.30	12892.20	12886.80	12900.00	12901.80	12829.60	12821.80	12818.90	12851.00	12850.90	12841.40
LORAN END	27837.00	27841.90	27847.30	27850.30	27851.30	27881.80	27871.50	27867.50	27847.00	27842.60	27842.10
GEAR DEPTH	834	640	432	353	340	267	355	415	646	872	956
DURATION IN HOURS	1.00	0.50	0.30	0.50	0.50	0.50	0.50	0.50	0.50	1.00	1.00
DISTANCE FISHED	3.52	1.91	1.81	1.96	2.28	1.98	1.93	3.46	2.00	3.89	3.72
PERFORMANCE / GEAR	0 /172	0 /172	1 /172	0 /172	0 /172	0 /172	0 /172	7 /172	0 /172	0 /172	0 /172
PACIFIC WHITING	0.0	2.3	8.2	21.3	7.9	19.5	4.5	9.1	0.7	0.0	0.7
SABLEFISH	200.7	374.9	27.0	5.0	15.9	61.0	12.9	52.2	459.9	126.6	29.0
PACIFIC COD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LINGCOD	0.0	0.0	0.0	0.0	0.0	19.5	0.0	0.0	0.0	0.0	0.0
GRENADIERS	23.4	42.9	0.0	0.0	0.0	0.0	0.0	0.0	9.8	20.6	107.3
SLICKHEADS	6.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	7.0	14.3
EELPOUTS	2.3	3.9	4.4	4.1	9.1	4.5	4.2	5.2	4.1	2.3	7.9
OTHER ROUNDFISH	2.8	3.1	0.4	0.3	1.4	3.3	0.4	0.2	3.5	1.9	1.4
TOTAL ROUNDFISH	235.7	427.0	40.0	30.7	34.3	107.8	22.0	66.7	478.2	158.3	160.6
PACIFIC OCEAN PERC	0.0	0.0	0.0	0.0	2.0	0.0	0.7	0.9	0.0	0.0	0.0
DARKBLOTCHED ROCKF	0.0	0.0	0.0	21.5	5.2	0.7	1.4	3.2	0.0	0.0	0.0
SPLITNOSE ROCKFISH	0.0	0.0	0.0	7.0	6.4	3.2	1.8	1.1	0.0	0.0	0.0
SHORTSPINE THORNYH	66.7	44.0	81.2	34.5	66.2	23.1	30.4	59.0	64.2	45.4	58.3
LONSPINE THORYHEAD	392.4	50.1	5.9	0.0	0.0	0.0	0.0	0.0	88.0	440.9	269.4
OTHER ROCKFISH	0.0	0.0	6.6	6.8	7.9	27.7	0.2	2.3	0.0	0.0	0.0
TOTAL ROCKFISH	459.0	94.1	93.7	69.9	87.8	54.7	34.4	66.5	152.2	486.3	327.7
DOVER SOLE	80.3	8.2	124.7	200.0	314.6	7.3	2.7	163.3	1.1	83.5	0.0
REX SOLE	0.0	0.0	9.8	3.9	67.1	9.5	2.5	6.8	0.0	0.0	0.0
ENGLISH SOLE	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0
PETRALE SOLE	0.0	0.0	0.0	2.0	0.0	5.7	0.0	0.5	0.0	0.0	0.0
ARROWTOOTH FLOUND	0.0	0.0	4.8	2.3	22.0	4.5	0.5	8.6	0.0	0.0	0.0
OTHER FLATFISH	9.8	1.1	0.1	26.4	36.7	16.3	0.9	7.8	1.6	12.7	6.8
TOTAL FLATFISH	90.0	9.3	139.3	234.6	440.4	44.9	6.6	187.0	2.7	96.2	6.8
HAGFISH	4.1	0.9	2.0	0.0	0.5	1.6	0.2	0.2	0.3	1.8	2.7
BROWN CAT SHARK	2.5	2.3	13.2	0.0	0.0	0.0	1.1	0.0	2.3	1.4	0.5
SPINY DOGFISH	0.0	0.0	0.0	7.3	30.8	416.4	0.0	0.0	0.0	0.0	0.0
SKATES	5.0	19.5	11.3	26.3	56.5	14.1	17.9	33.6	11.8	0.0	8.2
RATFISH	0.0	0.0	0.0	4.3	5.2	12.0	2.5	2.3	0.0	0.0	0.0
OTHER ELASMOBRANCH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL ELASMOBRANCH	11.6	22.7	26.5	37.9	93.0	444.1	21.7	36.0	14.4	3.2	11.3
GROOVED TANNER CRA	10.4	27.2	0.0	0.0	0.0	0.0	0.0	0.0	110.0	9.3	11.6
SQUID	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.5	0.0
SEA URCHINS	0.0	0.0	97.7	7.7	14.1	7.3	0.0	16.8	0.0	0.0	0.0
OTHER INVERTEBRAT	20.9	32.7	37.0	275.0	0.5	5.4	185.7	94.8	23.1	15.2	33.3
TOTAL INVERTEBRAT	32.2	59.9	134.7	282.7	14.5	12.7	185.7	111.6	134.2	24.9	44.9
TOTAL CATCH	828.6	613.0	434.2	655.7	670.0	664.1	270.4	467.7	781.7	768.9	551.3

Table 8-1.--Continued.

HAUL #	34	35	36	37	38	39	40	41	42	43	44
MONTH/DAY/YEAR	12/ 6/88	12/ 6/88	12/ 6/88	12/ 7/88	12/ 7/88	12/ 7/88	12/ 7/88	12/ 8/88	12/ 8/88	12/ 8/88	12/ 8/88
LATITUDE START	44 42.5	44 59.2	44 55.2	44 54.2	44 55.8	44 54.4	44 53.8	44 54.3	44 54.6	45 3.6	45 2.7
LONGITUDE START	125 4.1	125 2.1	125 2.3	124 59.0	124 54.9	124 53.1	124 47.8	124 33.6	124 28.7	124 21.3	124 26.1
LATITUDE END	44 44.3	44 57.3	44 57.1	44 56.5	44 55.0	44 53.3	44 53.6	44 53.7	44 53.5	45 2.7	45 3.6
LONGITUDE END	125 3.5	125 2.7	125 1.1	124 58.3	124 55.5	124 53.0	124 46.2	124 34.8	124 29.3	124 21.7	124 25.4
LORAN START	12857.40	12725.30	12756.60	12761.60	12746.20	12755.90	12757.00	12741.80	12735.50	12654.80	12667.00
LORAN START	27833.50	27859.60	27853.80	27858.10	27866.90	27868.00	27876.00	27900.90	27909.80	27933.70	27924.30
LORAN END	12843.00	12740.70	12740.40	12743.00	12753.20	12764.80	12756.80	12747.50	12745.10	12662.60	12659.20
LORAN END	27836.90	27856.00	27858.60	27862.30	27864.70	27866.60	27878.50	27898.00	27907.30	27931.70	27926.50
GEAR DEPTH	1189	1161	978	847	647	421	274	395	256	236	316
DURATION IN HOURS	1.05	1.00	1.00	1.00	0.50	0.50	0.50	0.50	0.50	0.38	0.50
DISTANCE FISHED	4.28	4.44	3.89	3.41	1.89	2.15	2.20	1.81	2.32	1.43	1.89
PERFORMANCE / GEAR	0 /172	0 /172	7 /172	0 /172	0 /172	7 /172	1 /172	0 /172	0 /172	1 /172	0 /172
PACIFIC WHITING	1.4	0.7	0.0	2.0	0.8	7.0	18.6	18.8	144.1	0.0	15.4
SABLEFISH	133.1	159.7	37.2	301.4	123.4	127.9	11.1	134.7	12.5	2.9	14.7
PACIFIC COD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.1	2.3
LINGCOD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GRENADIERS	188.2	318.9	17.0	17.7	3.4	0.0	0.0	0.0	0.0	0.0	0.0
SLICKHEADS	9.3	13.8	6.8	27.4	3.0	0.0	0.0	0.0	0.0	0.0	0.0
EELPOUTS	3.2	9.5	0.9	3.9	1.0	0.7	1.8	8.4	1.3	0.5	3.9
OTHER ROUNDFISH	36.3	33.2	0.2	2.3	3.3	0.0	0.3	0.1	0.6	22.0	0.1
TOTAL ROUNDFISH	371.5	535.8	62.1	354.8	134.9	135.6	31.8	162.1	158.5	34.5	36.4
PACIFIC OCEAN PERC	0.0	0.0	0.0	0.0	0.0	44.0	11.3	7.3	0.0	0.0	10.0
DARKBLOTCHED ROCKF	0.0	0.0	0.0	0.0	0.0	17.7	0.0	5.0	0.0	6.4	23.4
SPLITNOSE ROCKFISH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	466.6	1.4	6.4
SHORTSPINE THORNYH	30.4	19.1	19.1	53.1	62.6	64.2	7.3	29.9	31.3	14.1	51.9
LONSPINE THORYHEAD	170.1	198.4	170.6	361.1	82.6	28.6	0.0	0.0	0.0	0.0	0.0
OTHER ROCKFISH	0.0	0.0	0.0	0.0	0.0	31.5	146.8	5.2	30.0	47.6	1.7
TOTAL ROCKFISH	200.5	217.5	189.6	414.1	145.1	186.0	165.4	47.4	527.9	69.4	93.3
DOVER SOLE	18.6	0.0	3.9	37.2	45.8	159.7	21.3	177.4	0.0	1.1	22.0
REX SOLE	0.0	0.0	0.0	0.0	0.5	22.7	5.4	13.8	21.9	15.4	15.9
ENGLISH SOLE	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0
PETRALE SOLE	0.0	0.0	0.0	0.0	0.0	0.0	21.8	4.1	15.6	1.4	1.8
ARROWTOOTH FLOUND	0.0	0.0	0.0	0.0	0.0	0.9	0.0	28.1	68.9	20.2	6.1
OTHER FLATFISH	23.1	11.3	5.9	4.3	0.0	0.3	0.1	2.5	25.0	74.8	8.6
TOTAL FLATFISH	41.7	11.3	9.8	41.5	46.3	184.2	48.6	225.9	131.5	112.9	54.4
HAGFISH	0.9	1.8	1.1	3.6	1.4	0.3	0.2	13.8	1.9	0.0	0.2
BROWN CAT SHARK	0.0	0.0	0.0	1.4	3.2	4.1	0.9	0.0	0.0	0.0	0.0
SPINY DOGFISH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	7992.0	155.6	16.8
SKATES	44.7	35.4	9.1	2.7	6.1	23.4	69.2	15.0	125.3	5.4	32.9
RATFISH	0.0	0.0	0.0	0.0	0.0	1.1	0.7	0.0	15.6	29.7	3.4
OTHER ELASMOBRANCH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL ELASMOBRANCH	45.6	37.2	10.2	7.7	10.7	28.9	71.0	31.1	8134.8	190.7	53.3
GROOVED TANNER CRA	17.2	0.0	1.8	89.1	127.5	3.6	0.0	0.0	0.0	0.0	0.0
SQUID	0.0	0.1	0.3	0.5	0.7	0.0	0.0	0.0	0.0	0.0	0.0
SEA URCHINS	0.0	0.0	0.0	0.0	0.9	1.8	0.0	0.0	119.0	210.5	0.0
OTHER INVERTEBRAT	78.1	174.6	12.7	33.8	17.7	16.3	5.4	411.9	0.0	0.5	15.0
TOTAL INVERTEBRAT	95.3	174.7	14.8	123.4	146.7	21.8	5.4	411.9	119.0	210.9	15.0
TOTAL CATCH	754.6	976.6	286.5	941.5	483.8	556.5	322.3	878.4	9071.8	618.5	252.4

Table B-1.--Continued.

HAUL #	45	46	47	48	49	50	51	52	53	54	55
MONTH/DAY/YEAR	12/ 8/88	12/ 9/88	12/ 9/88	12/ 9/88	12/ 9/88	12/10/88	12/10/88	12/11/88	12/11/88	12/11/88	12/11/88
LATITUDE START	45 3.6	45 3.3	45 4.0	45 2.0	45 0.7	45 5.6	45 9.3	45 14.0	45 10.3	45 12.1	45 11.1
LONGITUDE START	124 30.9	124 33.8	124 49.3	124 52.5	125 2.1	125 0.1	125 1.6	124 56.5	124 56.8	124 46.1	124 39.8
LATITUDE END	45 2.6	45 2.6	45 3.0	45 3.7	45 2.6	45 3.9	45 11.4	45 11.7	45 12.2	45 13.2	45 12.0
LONGITUDE END	124 30.3	124 32.8	124 49.7	124 54.0	125 3.0	124 59.4	125 1.6	124 57.8	124 55.6	124 46.1	124 40.4
LORAN START	12663.40	12668.90	12677.00	12695.30	12713.70	12673.90	12646.80	12606.00	12634.80	12610.30	12612.10
LORAN START	27917.20	27911.80	27886.70	27878.90	27861.50	27871.20	27873.50	27887.50	27882.40	27902.10	27911.30
LORAN END	12671.20	12673.50	12684.90	12683.00	12699.00	12686.60	12630.60	12624.50	12619.00	12602.00	12605.80
LORAN END	27916.90	27912.60	27884.80	27878.70	27862.80	27870.00	27876.20	27882.80	27886.80	27903.40	27911.30
GEAR DEPTH	379	402	649	772	1030	1125	1247	993	845	646	536
DURATION IN HOURS	0.50	0.50	0.50	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.50
DISTANCE FISHED	1.91	1.59	1.96	4.39	3.54	3.69	3.52	3.85	3.74	2.19	1.74
PERFORMANCE / GEAR	0 /172	0 /172	0 /172	0 /172	0 /172	0 /172	0 /172	0 /172	0 /172	0 /172	0 /172
PACIFIC WHITING	16.7	17.9	0.7	0.7	0.0	0.5	0.9	0.0	0.7	0.0	3.4
SABLEFISH	28.7	24.0	153.1	352.4	53.1	45.8	18.1	306.2	133.4	140.2	99.3
PACIFIC COD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LINGCOD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GRENADIERS	0.0	0.0	3.4	10.9	112.5	71.9	121.3	137.7	16.1	4.3	0.5
SLICKHEADS	0.0	0.0	0.0	32.4	32.9	3.2	0.0	14.5	10.0	0.0	0.0
EELPOUTS	17.8	4.8	0.4	1.8	17.0	2.3	2.5	10.9	2.5	1.5	0.5
OTHER ROUNDFISH	0.0	0.0	4.5	1.5	1.2	5.6	26.6	4.8	0.3	2.8	1.4
TOTAL ROUNDFISH	63.2	46.8	162.1	399.8	216.6	129.2	169.5	474.0	162.9	148.8	105.1
PACIFIC OCEAN PERC	22.3	69.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DARKBLOTCHED ROCKF	45.4	12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SPLITNOSE ROCKFISH	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SHORTSPINE THORNYH	108.3	33.1	45.8	44.9	34.9	22.7	30.4	39.5	30.8	73.0	82.6
LONSPINE THORYHEAD	0.0	0.0	58.1	191.4	178.3	95.3	91.2	441.8	432.0	71.7	48.3
OTHER ROCKFISH	9.1	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL ROCKFISH	187.0	120.5	103.9	236.3	213.2	117.9	121.6	481.3	462.9	144.7	130.9
DOVER SOLE	1188.8	25.2	1.4	68.5	0.0	1.8	0.0	0.0	29.0	1.8	47.2
REX SOLE	22.3	1.6	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4
ENGLISH SOLE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PETRALE SOLE	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ARROWTOOTH FLOUND	165.6	5.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHER FLATFISH	55.7	0.1	0.0	6.4	2.3	7.9	1.8	5.7	5.9	0.0	0.0
TOTAL FLATFISH	1435.5	32.5	4.8	74.8	2.3	9.8	1.8	5.7	34.9	1.8	48.5
HAGFISH	0.5	0.1	0.4	1.1	1.1	1.1	0.7	3.2	0.1	0.4	4.1
BROWN CAT SHARK	0.0	0.0	4.3	4.3	0.0	0.7	0.0	2.5	0.9	1.6	2.9
SPINY DOGFISH	4.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SKATES	62.1	14.5	0.0	3.7	0.0	17.7	28.3	4.5	0.2	11.8	42.4
RATFISH	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHER ELASMOBRANCH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL ELASMOBRANCH	68.2	14.6	4.7	9.8	1.1	19.5	29.0	10.2	1.3	13.7	49.4
GROOVED TANNER CRA	0.0	0.0	149.2	42.0	4.1	13.2	13.6	8.6	7.3	137.0	0.0
SQUID	0.0	0.0	4.5	0.0	0.7	0.2	0.6	0.9	0.1	1.4	0.0
SEA URCHINS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.8
OTHER INVERTEBRAT	1280.6	670.8	6.5	13.4	35.8	51.5	65.5	42.1	58.8	4.2	26.5
TOTAL INVERTEBRAT	1280.6	670.8	160.3	55.3	40.6	64.9	79.7	51.6	66.2	142.5	48.3
TOTAL CATCH	3034.6	885.1	435.7	776.1	473.8	341.3	401.6	1022.8	728.2	451.6	382.3

APPENDIX C

Relative Abundance Of All Species

Appendix C is comprised of the computer listing generated from RACE program RANK. All fish encountered during the 1988 West Coast upper continental slope groundfish survey have been ranked in order of their relative abundance measured in CPUE

Tables are presented by depth stratum and for all strata combined.

Table C-l. --Rank order of relative abundance (kg/km) of fish for the 183-366 m depth stratum.

Table C-2. --Rank order of relative abundance (kg/km) of fish for the 367-549 m depth stratum.

Table C-3. --Rank order of relative abundance (kg/km) of fish for the 550-732 m depth stratum.

Table C-4. --Rank order of relative abundance '(kg/km) of fish for the 733-914.m depth stratum.

Table C-5. --Rank order of relative abundance (kg/km) of fish for the 915-1,097 m depth stratum.

Table C-6. --Rank order of relative abundance (kg/km) of fish for the 1,098-1,280 m depth stratum.

Table C-7. --Rank order of weighted relative abundance (kg/km) of fish for all depth strata combined.

Table C-2.--Rank order of relative abundance (kg/km) of fish for the 367-549 m depth stratum.

TOTAL TRAWLS 12 TOTAL SPECIES 39 TOTAL EFFORT 21.8 KM

RANK	SPECIES	MEAN CPUE (KG/KM)	VARIANCE	90 PERCENT *---CONFIDENCE LIMITS---*		PROPORTION	CUMULATIVE PROPORTION	NAME
1	10180	100.30838	2384.415	12.60886	188.00790	0.40011189	0.40011189	DOVER SOLE
2	20510	31.98218	82.670	15.65235	48.31201	0.12757110	0.52768299	SABLEFISH
3	30020	27.93544	28.649	18.32247	37.54841	0.11142939	0.63911237	SHORTSPINE THORNYHEAD
4	30060	20.88708	75.437	5.28799	36.48617	0.08331475	0.72242713	PACIFIC OCEAN PERCH
5	00440	12.94935	9.503	7.41290	18.48580	0.05165260	0.77407973	LONGNOSE SKATE
6	22500	12.29901	10.102	6.59075	18.00727	0.04905852	0.82313825	PACIFIC HAKE (PREV. PACIFIC WHITING)
7	10110	11.75789	48.187	0.00000	24.22517	0.04690009	0.87003834	ARROWTOOTH FLOUNDER
8	10200	4.88015	1.721	2.52429	7.23601	0.01946603	0.88950437	REX SOLE
9	30170	3.72879	3.735	0.25768	7.19990	0.01487345	0.90437782	DARKBLOTCHED ROCKFISH
10	24140	3.34117	0.639	1.90576	4.77658	0.01332732	0.91770514	BIGFIN EELPOUT
11	30030	2.58314	5.307	0.00000	6.72045	0.01030369	0.92800883	LONGSPINE THORNYHEAD
12	00435	2.50922	0.224	1.66004	3.35840	0.01000881	0.93801765	BERING SKATE (=SANDPAPER SKATE)
13	00210	2.38587	1.850	0.00000	4.82898	0.00951679	0.94753444	BROWN CAT SHARK
14	10120	2.04892	4.198	0.00000	5.72877	0.00817276	0.95570720	PACIFIC HALIBUT
15	10150	1.90457	0.619	0.49146	3.31769	0.00759699	0.96330420	SLENDER SOLE
16	30050	1.57706	0.450	0.37225	2.78186	0.00629059	0.96959478	ROUGHEYE ROCKFISH
17	22220	1.54725	2.069	0.00000	4.13074	0.00617171	0.97576649	BLACKTAIL SNAILFISH
18	30090	1.22340	0.121	0.59762	1.84919	0.00487993	0.98064642	AURORA ROCKFISH
19	00310	1.12116	0.201	0.31526	1.92706	0.00447211	0.98511853	SPINY DOGFISH
20	00120	1.04544	0.395	0.00000	2.17490	0.00417008	0.98928861	PACIFIC HAGFISH
21	10160	0.79738	0.097	0.23687	1.35789	0.00318061	0.99246923	PETRALE SOLE
22	00710	0.52445	0.043	0.15383	0.89507	0.00209193	0.99456116	SPOTTED RATFISH

Table C-2.--Continued.

RANK	SPECIES	MEAN CPUE (KG/KM)	VARIANCE	90 PERCENT *---CONFIDENCE LIMITS---*		PROPORTION	CUMULATIVE PROPORTION	NAME
23	30475	0.47441	0.171	0.00000	1.21793	0.00189232	0.99645348	REDBANDED ROCKFISH
24	24190	0.23711	0.003	0.13320	0.34103	0.00094580	0.99739928	BLACK EELPOUT
25	30270	0.19121	0.030	0.00000	0.50310	0.00076270	0.99816197	ROSETHORN ROCKFISH
26	30560	0.12523	0.005	0.00268	0.24779	0.00049954	0.99866151	SHARPCHIN ROCKFISH
27	30220	0.10205	0.010	0.00000	0.28533	0.00040706	0.99906857	WIDOW ROCKFISH
28	30190	0.09730	0.007	0.00000	0.24661	0.00038811	0.99945668	SPLITNOSE ROCKFISH
29	24110	0.04324	0.002	0.00000	0.12090	0.00017248	0.99962917	TWOLINE EELPOUT
30	21201	0.02171	0.000	0.00000	0.06071	0.00008661	0.99971577	CALIFORNIA GRENADIER
31	30290	0.02041	0.000	0.00000	0.05707	0.00008141	0.99979719	SHORTBELLY ROCKFISH
32	20038	0.01706	0.000	0.00000	0.03448	0.00006804	0.99986523	BLACKFIN POACHER
33	21010	0.00869	0.000	0.00000	0.02428	0.00003464	0.99989987	PACIFIC VIPERFISH
34	20020	0.00862	0.000	0.00000	0.02026	0.00003439	0.99993426	BLACKTIP POACHER
35	20620	0.00528	0.000	0.00000	0.01476	0.00002105	0.99995532	ROBUST BLACKSMELT (PREV. STOUT BLACKSMELT)
36	23562	0.00519	0.000	0.00000	0.01451	0.00002070	0.99997601	PACIFIC SAURY
37	22600	0.00217	0.000	0.00000	0.00607	0.00000866	0.99998467	LANTERNFISH UNIDENT.
38	22623	0.00208	0.000	0.00000	0.00582	0.00000831	0.99999298	BROADFIN LANTERNFISH
39	22602	0.00176	0.000	0.00000	0.00492	0.00000702	1.00000000	NORTHERN LAMPFISH (PREV. NORTHERN LANTERNFISH)
	TOTAL	250.70082						

Table C-3.--Rank order of relative abundance (kg/km) of fish for the 550-732 m depth stratum.

TOTAL TRAWLS 9 TOTAL SPECIES 38 TOTAL EFFORT 16.9 KM

RANK	SPECIES	MEAN CPUE (KG/KM)	VARIANCE	90 PERCENT *---CONFIDENCE LIMITS---*		PROPORTION	CUMULATIVE PROPORTION	NAME
1	20510	179.28779	1059.728	118.73835	239.83723	0.57328040	0.57328040	SABLEFISH
2	30020	38.15307	91.830	20.32911	55.97703	0.12199608	0.69527648	SHORTSPINE THORNYHEAD
3	10180	36.08344	375.520	0.03976	72.12713	0.11537836	0.81065483	DOVER SOLE
4	30030	34.81538	45.312	22.29491	47.33586	0.11132368	0.92197851	LONGSPINE THORNYHEAD
5	21230	8.52463	8.593	3.07238	13.97688	0.02725787	0.94923638	GIANT GRENADIER
6	00440	3.77861	4.031	0.04440	7.51281	0.01208226	0.96131864	LONGNOSE SKATE
7	00460	2.01958	0.432	0.79667	3.24249	0.00645769	0.96777633	BLACK SKATE (PREV. ROUGHTAIL SKATE)
8	24110	1.25387	0.123	0.60279	1.90495	0.00400930	0.97178564	TWOLINE EELPOUT
9	00210	1.20753	0.044	0.81880	1.59626	0.00386113	0.97564676	BROWN CAT SHARK
10	22500	1.06505	0.253	0.12998	2.00013	0.00340555	0.97905232	PACIFIC HAKE (PREV. PACIFIC WHITING)
11	21220	0.96322	0.514	0.00000	2.29656	0.00307994	0.98213226	PACIFIC GRENADIER
12	22220	0.84973	0.002	0.76144	0.93802	0.00271705	0.98484931	BLACKTAIL SNAILFISH
13	24190	0.80759	0.509	0.00000	2.13409	0.00258231	0.98743162	BLACK EELPOUT
14	10200	0.66596	0.108	0.05587	1.27604	0.00212943	0.98956105	REX SOLE
15	21731	0.58039	0.013	0.36982	0.79097	0.00185582	0.99141687	PACIFIC FLATNOSE
16	00435	0.43871	0.119	0.00000	1.07998	0.00140281	0.99281968	BERING SKATE (=SANDPAPER SKATE)
17	20120	0.40847	0.038	0.04593	0.77101	0.00130609	0.99412577	CALIFORNIA SLICKHEAD
18	10190	0.39441	0.030	0.07234	0.71647	0.00126113	0.99538690	DEEPSEA SOLE
19	30060	0.38876	0.151	0.00000	1.11185	0.00124308	0.99662998	PACIFIC OCEAN PERCH
20	00120	0.33106	0.006	0.18709	0.47503	0.00105858	0.99768856	PACIFIC HAGFISH
21	20150	0.16412	0.017	0.00000	0.40960	0.00052478	0.99821334	THREADFIN SLICKHEAD
22	20620	0.15917	0.004	0.03677	0.28156	0.00050894	0.99872228	ROBUST BLACKSMELT (PREV. STOUT BLACKSMELT)

Table C-3.--Continued.

RANK	SPECIES	MEAN CPUE (KG/KM)	VARIANCE	90 PERCENT *---CONFIDENCE LIMITS---*		PROPORTION	CUMULATIVE PROPORTION	NAME
23	00710	0.09566	0.004	0.00000	0.21555	0.00030587	0.99902815	SPOTTED RATFISH
24	21010	0.08260	0.001	0.02175	0.14346	0.00026413	0.99929228	PACIFIC VIPERFISH
25	30090	0.06803	0.005	0.00000	0.19457	0.00021754	0.99950982	AURORA ROCKFISH
26	23710	0.02057	0.000	0.00254	0.03860	0.00006578	0.99957559	SHINING TUBESHOULDER
27	24140	0.02054	0.000	0.00000	0.05874	0.00006567	0.99964126	BIGFIN EELPOUT
28	22410	0.01812	0.000	0.00000	0.04278	0.00005794	0.99969921	LONGFIN DRAGONFISH
29	22623	0.01797	0.000	0.00000	0.05140	0.00005746	0.99975667	BROADFIN LANTERNFISH
30	22602	0.01536	0.000	0.00000	0.03119	0.00004912	0.99980579	NORTHERN LAMPFISH (PREV. NORTHERN LANTERNFISH)
31	23603	0.01321	0.000	0.00000	0.03778	0.00004224	0.99984803	NORTHERN PEARLEYE
32	21310	0.01321	0.000	0.00000	0.03778	0.00004224	0.99989027	THREADFIN SCULPIN
33	20038	0.01038	0.000	0.00000	0.02315	0.00003318	0.99992345	BLACKFIN POACHER
34	22600	0.00956	0.000	0.00000	0.02275	0.00003057	0.99995402	LANTERNFISH UNIDENT.
35	22642	0.00528	0.000	0.00000	0.01511	0.00001690	0.99997091	PATCHWORK LAMPFISH
36	00003	0.00389	0.000	0.00000	0.01112	0.00001243	0.99998334	FISH UNIDENT.
37	20000	0.00264	0.000	0.00000	0.00756	0.00000845	0.99999179	POACHER UNIDENT.
38	22610	0.00257	0.000	0.00000	0.00734	0.00000821	1.00000000	CALIFORNIA HEADLIGHTFISH
	TOTAL	312.74014						

Table C-4.--Rank order of relative abundance (kg/km) of fish for the 733-914 m depth stratum.

TOTAL TRAWLS 8 TOTAL SPECIES 40 TOTAL EFFORT 29.7 KM

RANK	SPECIES	MEAN CPUE (KG/KM)	VARIANCE	90 PERCENT *---CONFIDENCE LIMITS---*		PROPORTION	CUMULATIVE PROPORTION	NAME
1	30030	117.26051	180.272	91.81718	142.70384	0.50918587	0.50918587	LONGSPINE THORNYHEAD
2	20510	54.00284	66.670	38.52988	69.47579	0.23449908	0.74368495	SABLEFISH
3	10180	24.92795	30.612	14.44332	35.41259	0.10824584	0.85193079	DOVER SOLE
4	30020	16.21631	5.445	11.79437	20.63824	0.07041683	0.92234762	SHORTSPINE THORNYHEAD
5	21230	6.40272	7.123	1.34510	11.46033	0.02780282	0.95015043	GIANT GRENADIER
6	20120	3.34342	0.387	2.16510	4.52175	0.01451831	0.96466874	CALIFORNIA SLICKHEAD
7	10190	2.13507	0.105	1.52001	2.75012	0.00927120	0.97393994	DEEPSEA SOLE
8	21220	1.53677	0.174	0.74621	2.32734	0.00667321	0.98061315	PACIFIC GRENADIER
9	20150	1.13616	0.155	0.39082	1.88150	0.00493361	0.98554676	THREADFIN SLICKHEAD
10	00120	0.69835	0.027	0.38473	1.01196	0.00303247	0.98857923	PACIFIC HAGFISH
11	24110	0.51139	0.012	0.30139	0.72139	0.00222063	0.99079986	TWOLINE EELPOUT
12	00460	0.47502	0.034	0.12766	0.82239	0.00206271	0.99286257	BLACK SKATE (PREV. ROUGHTAIL SKATE)
13	00210	0.42542	0.011	0.22613	0.62472	0.00184734	0.99470991	BROWN CAT SHARK
14	24130	0.22028	0.003	0.12151	0.31905	0.00095654	0.99566645	SNAKEHEAD EELPOUT
15	00310	0.18659	0.026	0.00000	0.48982	0.00081023	0.99647668	SPINY DOGFISH
16	22500	0.17478	0.007	0.01759	0.33196	0.00075894	0.99723562	PACIFIC HAKE (PREV. PACIFIC WHITING)
17	20620	0.13099	0.002	0.05569	0.20628	0.00056878	0.99780441	ROBUST BLACKSMELT (PREV. STOUT BLACKSMELT)
18	30410	0.12370	0.015	0.00000	0.35810	0.00053713	0.99834154	CANARY ROCKFISH
19	22220	0.10062	0.001	0.03206	0.16918	0.00043693	0.99877846	BLACKTAIL SNAILFISH
20	00440	0.09042	0.008	0.00000	0.26178	0.00039265	0.99917112	LONGNOSE SKATE
21	21731	0.05379	0.002	0.00000	0.14761	0.00023358	0.99940469	PACIFIC FLATNOSE
22	21010	0.04496	0.001	0.00000	0.09941	0.00019525	0.99959994	PACIFIC VIPERFISH

Table C-4.--Continued.

RANK	SPECIES	MEAN CPUE (KG/KM)	VARIANCE	90 PERCENT *---CONFIDENCE LIMITS---*		PROPORTION	CUMULATIVE PROPORTION	NAME
23	00710	0.02319	0.001	0.00000	0.06714	0.00010071	0.99970066	SPOTTED RATFISH
24	22410	0.00841	0.000	0.00000	0.01984	0.00003654	0.99973720	LONGFIN DRAGONFISH
25	22200	0.00810	0.000	0.00000	0.02345	0.00003517	0.99977237	SNAILFISH UNIDENT.
26	24190	0.00810	0.000	0.00000	0.02345	0.00003517	0.99980754	BLACK EELPOUT
27	22623	0.00642	0.000	0.00000	0.01439	0.00002788	0.99983541	BROADFIN LANTERNFISH
28	22600	0.00592	0.000	0.00000	0.01431	0.00002571	0.99986112	LANTERNFISH UNIDENT.
29	00003	0.00437	0.000	0.00000	0.01266	0.00001899	0.99988011	FISH UNIDENT.
30	20038	0.00425	0.000	0.00000	0.00968	0.00001844	0.99989856	BLACKFIN POACHER
31	22420	0.00333	0.000	0.00000	0.00963	0.00001445	0.99991301	HIGHFIN DRAGONFISH
32	23562	0.00324	0.000	0.00000	0.00938	0.00001407	0.99992707	PACIFIC SAURY
33	21310	0.00309	0.000	0.00000	0.00895	0.00001343	0.99994050	THREADFIN SCULPIN
34	20420	0.00292	0.000	0.00000	0.00844	0.00001266	0.99995316	FANGTOOTH
35	22701	0.00290	0.000	0.00000	0.00653	0.00001261	0.99996577	SNIPE EEL UNIDENT.
36	24160	0.00166	0.000	0.00000	0.00482	0.00000723	0.99997299	BLACKMOUTH EELPOUT
37	24170	0.00161	0.000	0.00000	0.00466	0.00000700	0.99997999	PALLID EELPOUT
38	23603	0.00155	0.000	0.00000	0.00448	0.00000671	0.99998670	NORTHERN PEARLEYE
39	21000	0.00155	0.000	0.00000	0.00448	0.00000671	0.99999342	VIPERFISH UNIDENT.
40	22702	0.00152	0.000	0.00000	0.00439	0.00000658	1.00000000	SLENDER SNIPE EEL
	TOTAL	230.29019						

Table C-5.--Rank order of relative abundance (kg/km) of fish for the 915-1,097 m depth stratum.

TOTAL TRAWLS 6 TOTAL SPECIES 30 TOTAL EFFORT 21.6 KM

RANK	SPECIES	MEAN CPUE (KG/KM)	VARIANCE	90 PERCENT *---CONFIDENCE LIMITS---*		PROPORTION	CUMULATIVE PROPORTION	NAME
1	30030	84.95464	298.734	50.12752	119.78176	0.44671517	0.44671517	LONGSPINE THORNYHEAD
2	20510	31.62132	111.354	10.35811	52.88453	0.16627371	0.61298888	SABLEFISH
3	10180	19.69476	156.541	0.00000	44.90568	0.10356055	0.71654943	DOVER SOLE
4	21230	18.39876	10.257	11.94540	24.85213	0.09674582	0.81329525	GIANT GRENADIER
5	30020	15.97879	14.699	8.25340	23.70418	0.08402094	0.89731619	SHORTSPINE THORNYHEAD
6	21220	7.24641	1.276	4.96986	9.52296	0.03810363	0.93541982	PACIFIC GRENADIER
7	20120	4.01913	1.411	1.62601	6.41224	0.02113368	0.95655350	CALIFORNIA SLICKHEAD
8	10190	2.58290	0.601	1.02028	4.14553	0.01358162	0.97013513	DEEPSEA SOLE
9	24110	2.00406	0.365	0.78662	3.22151	0.01053792	0.98067304	TWOLINE EELPOUT
10	00460	1.67149	0.444	0.32830	3.01468	0.00878917	0.98946221	BLACK SKATE (PREV. ROUGHTAIL SKATE)
11	00120	0.57439	0.020	0.29190	0.85688	0.00302030	0.99248252	PACIFIC HAGFISH
12	21731	0.32828	0.019	0.04724	0.60931	0.00172618	0.99420869	PACIFIC FLATNOSE
13	24130	0.29800	0.009	0.11017	0.48583	0.00156698	0.99577567	SNAKEHEAD EELPOUT
14	00210	0.26865	0.012	0.04886	0.48844	0.00141264	0.99718831	BROWN CAT SHARK
15	20150	0.18111	0.004	0.05367	0.30856	0.00095235	0.99814066	THREADFIN SLICKHEAD
16	20620	0.15784	0.002	0.06366	0.25203	0.00082998	0.99897064	ROBUST BLACKSMELT (PREV. STOUT BLACKSMELT)
17	23932	0.06239	0.002	0.00000	0.14886	0.00032807	0.99929871	KING-OF-THE-SALMON
18	22220	0.03276	0.000	0.00000	0.07486	0.00017227	0.99947097	BLACKTAIL SNAILFISH
19	22500	0.03046	0.001	0.00000	0.09184	0.00016018	0.99963115	PACIFIC HAKE (PREV. PACIFIC WHITING)
20	21010	0.02490	0.000	0.00303	0.04678	0.00013096	0.99976211	PACIFIC VIPERFISH
21	21238	0.02031	0.000	0.00000	0.06123	0.00010679	0.99986890	FILAMENTED GRENADIER
22	22623	0.00507	0.000	0.00000	0.01529	0.00002666	0.99989556	BROADFIN LANTERNFISH

Table C-5.--Continued.

RANK	SPECIES	MEAN CPUE (KG/KM)	VARIANCE	90 PERCENT *---CONFIDENCE LIMITS---*		PROPORTION	CUMULATIVE PROPORTION	NAME
23	22600	0.00406	0.000	0.00000	0.01225	0.00002136	0.99991692	LANTERNFISH UNIDENT.
24	22602	0.00392	0.000	0.00000	0.01183	0.00002064	0.99993756	NORTHERN LAMPFISH (PREV. NORTHERN LANTERNFISH)
25	24170	0.00210	0.000	0.00000	0.00634	0.00001106	0.99994862	PALLID EELPOUT
26	22702	0.00203	0.000	0.00000	0.00612	0.00001068	0.99995930	SLENDER SNIPE EEL
27	22651	0.00196	0.000	0.00000	0.00592	0.00001032	0.99996962	BLUE LANTERNFISH
28	20910	0.00196	0.000	0.00000	0.00592	0.00001032	0.99997994	THREADFIN CUSK-EEL
29	21000	0.00191	0.000	0.00000	0.00575	0.00001003	0.99998997	VIPERFISH UNIDENT.
30	22701	0.00191	0.000	0.00000	0.00575	0.00001003	1.00000000	SNIPE EEL UNIDENT.
	TOTAL	190.17631						

Table C-6.--Rank order of relative abundance (kg/km) of fish for the 1,098-1,280 m depth stratum.

TOTAL TRAWLS 8 TOTAL SPECIES 32 TOTAL EFFORT 30.7 KM

RANK	SPECIES	MEAN CPUE (KG/KM)	VARIANCE	90 PERCENT *---CONFIDENCE LIMITS---*		PROPORTION	CUMULATIVE PROPORTION	NAME
1	21230	41.70452	127.559	20.30203	63.10701	0.28128669	0.28128669	GIANT GRENADIER
2	30030	37.38465	39.057	25.54178	49.22751	0.25215019	0.53343688	LONGSPINE THORNYHEAD
3	20510	19.82219	15.563	12.34639	27.29799	0.13369575	0.66713263	SABLEFISH
4	21220	18.74074	9.994	12.75006	24.73142	0.12640164	0.79353427	PACIFIC GRENADIER
5	30020	8.47225	1.282	6.32660	10.61789	0.05714321	0.85067748	SHORTSPINE THORNYHEAD
6	21731	7.55930	1.163	5.51527	9.60332	0.05098558	0.90166306	PACIFIC FLATNOSE
7	00460	5.17743	1.530	2.83379	7.52108	0.03492052	0.93658357	BLACK SKATE (PREV. ROUGHTAIL SKATE)
8	10180	3.00602	3.623	0.00000	6.61304	0.02027486	0.95685844	DOVER SOLE
9	10190	2.48512	0.438	1.23082	3.73943	0.01676154	0.97361998	DEEPSEA SOLE
10	20120	1.32521	0.167	0.55058	2.09985	0.00893824	0.98255822	CALIFORNIA SLICKHEAD
11	24110	0.92944	0.053	0.49302	1.36586	0.00626887	0.98882709	TWOLINE EELPOUT
12	23932	0.37661	0.063	0.00000	0.85127	0.00254011	0.99136720	KING-OF-THE-SALMON
13	00120	0.35968	0.003	0.26237	0.45700	0.00242597	0.99379318	PACIFIC HAGFISH
14	20620	0.20841	0.002	0.11980	0.29702	0.00140570	0.99519888	ROBUST BLACKSMELT (PREV. STOUT BLACKSMELT)
15	00410	0.19217	0.037	0.00000	0.55634	0.00129615	0.99649503	DEEPSEA SKATE
16	22500	0.17253	0.002	0.08780	0.25726	0.00116366	0.99765869	PACIFIC HAKE (PREV. PACIFIC WHITING)
17	24130	0.13761	0.002	0.04977	0.22546	0.00092817	0.99858686	SNAKEHEAD EELPOUT
18	22220	0.05803	0.001	0.00094	0.11513	0.00039142	0.99897828	BLACKTAIL SNAILFISH
19	21010	0.02712	0.000	0.00000	0.06613	0.00018295	0.99916122	PACIFIC VIPERFISH
20	22200	0.02319	0.001	0.00000	0.06714	0.00015643	0.99931766	SNAILFISH UNIDENT.
21	00210	0.02308	0.001	0.00000	0.06681	0.00015565	0.99947330	BROWN CAT SHARK
22	20150	0.01988	0.000	0.00000	0.05755	0.00013408	0.99960739	THREADFIN SLICKHEAD

Table C-6.--Continued.

RANK	SPECIES	MEAN CPUE (KG/KM)	VARIANCE	90 PERCENT *---CONFIDENCE LIMITS---*		PROPORTION	CUMULATIVE PROPORTION	NAME
23	00435	0.01243	0.000	0.00000	0.03599	0.00008385	0.99969124	BERING SKATE (=SANDPAPER SKATE)
24	22623	0.01042	0.000	0.00000	0.02528	0.00007029	0.99976153	BROADFIN LANTERNFISH
25	24190	0.00773	0.000	0.00000	0.02238	0.00005214	0.99981367	BLACK EELPOUT
26	21000	0.00644	0.000	0.00000	0.01466	0.00004346	0.99985713	VIPERFISH UNIDENT.
27	22410	0.00632	0.000	0.00000	0.01415	0.00004259	0.99989972	LONGFIN DRAGONFISH
28	20420	0.00466	0.000	0.00000	0.01350	0.00003145	0.99993116	FANGTOOTH
29	22602	0.00442	0.000	0.00032	0.00852	0.00002980	0.99996096	NORTHERN LAMPFISH (PREV. NORTHERN LANTERNFISH)
30	22600	0.00291	0.000	0.00000	0.00654	0.00001962	0.99998058	LANTERNFISH UNIDENT.
31	23603	0.00155	0.000	0.00000	0.00450	0.00001048	0.99999106	NORTHERN PEARLEYE
32	00003	0.00133	0.000	0.00000	0.00384	0.00000894	1.00000000	FISH UNIDENT.
	TOTAL	148.26341						

Table C-7.--Rank order of weighted relative abundance (kg/km) of fish for all depth strata combined.

TOTAL TRAWLS 57 TOTAL SPECIES 86 TOTAL EFFORT 147.6 KM

RANK	SPECIES	MEAN CPUE (KG/KM)	VARIANCE	90 PERCENT *---CONFIDENCE LIMITS---*		PROPORTION	CUMULATIVE PROPORTION	NAME
1	00310	118.51226	4575.357	5.30763	231.71689	0.33450112	0.33450112	SPINY DOGFISH
2	20510	51.69238	38.222	41.34547	62.03929	0.14590186	0.48040299	SABLEFISH
3	10180	49.03408	273.556	21.35354	76.71461	0.13839879	0.61880178	DOVER SOLE
4	30030	28.54448	5.704	24.54731	32.54164	0.08056685	0.69936862	LONGSPINE THORNYHEAD
5	30020	25.26563	11.093	19.69155	30.83970	0.07131229	0.77068091	SHORTSPINE THORNYHEAD
6	00440	9.55489	2.015	7.17913	11.93066	0.02696871	0.79764962	LONGNOSE SKATE
7	22500	8.30557	3.419	5.21116	11.39998	0.02344249	0.82109211	PACIFIC HAKE (PREV. PACIFIC WHITING)
8	30060	7.52370	8.103	2.75953	12.28786	0.02123565	0.84232776	PACIFIC OCEAN PERCH
9	30190	6.72155	17.894	0.00000	13.80108	0.01897160	0.86129936	SPLITNOSE ROCKFISH
10	21230	6.12254	1.007	4.44334	7.80174	0.01728089	0.87858025	GIANT GRENADIER
11	10110	5.30713	5.455	1.39825	9.21601	0.01497937	0.89355962	ARROWTOOTH FLOUNDER
12	10200	4.77160	0.594	3.48227	6.06094	0.01346786	0.90702749	REX SOLE
13	10150	3.40521	1.000	1.73137	5.07906	0.00961122	0.91663871	SLENDER SOLE
14	00435	2.89009	0.232	2.08363	3.69655	0.00815729	0.92479600	BERING SKATE (=SANDPAPER SKATE)
15	00710	2.52901	0.767	1.06346	3.99455	0.00713813	0.93193412	SPOTTED RATFISH
16	30170	2.13659	0.489	0.96633	3.30685	0.00603054	0.93796466	DARKBLOTCHED ROCKFISH
17	21220	2.06348	0.070	1.62111	2.50584	0.00582417	0.94378883	PACIFIC GRENADIER
18	10170	2.01833	1.118	0.24872	3.78795	0.00569675	0.94948558	ENGLISH SOLE
19	10160	1.82551	0.499	0.64310	3.00793	0.00515251	0.95463809	PETRALE SOLE
20	24140	1.73399	0.089	1.23408	2.23391	0.00489420	0.95953228	BIGFIN EELPOUT
21	00210	1.29589	0.229	0.49524	2.09654	0.00365765	0.96318993	BROWN CAT SHARK
22	30560	1.10011	0.551	0.00000	2.34280	0.00310506	0.96629499	SHARPCHIN ROCKFISH

Table C-7.--Continued.

RANK	SPECIES	MEAN CPUE (KG/KM)	VARIANCE	90 PERCENT *---CONFIDENCE LIMITS---*		PROPORTION	CUMULATIVE PROPORTION	NAME
23	10120	1.00816	0.497	0.00000	2.18760	0.00284553	0.96914052	PACIFIC HALIBUT
24	00460	0.84194	0.021	0.60096	1.08292	0.00237638	0.97151690	BLACK SKATE (PREV. ROUGHTAIL SKATE)
25	20120	0.79909	0.012	0.61508	0.98311	0.00225545	0.97377234	CALIFORNIA SLICKHEAD
26	22220	0.74048	0.222	0.00000	1.52906	0.00208999	0.97586234	BLACKTAIL SNAILFISH
27	21731	0.65287	0.006	0.52054	0.78521	0.00184274	0.97770507	PACIFIC FLATNOSE
28	10190	0.64867	0.006	0.51490	0.78245	0.00183089	0.97953596	DEEPSEA SOLE
29	30050	0.60432	0.052	0.22366	0.98497	0.00170568	0.98124164	ROUGHEYE ROCKFISH
30	00120	0.58213	0.043	0.23430	0.92995	0.00164306	0.98288470	PACIFIC HAGFISH
31	23220	0.56263	0.106	0.01682	1.10844	0.00158802	0.98447272	CHINOOK SALMON
32	30200	0.54932	0.222	0.00000	1.33758	0.00155046	0.98602318	GREENSTRIPED ROCKFISH
33	21910	0.53679	0.107	0.00000	1.08330	0.00151509	0.98753828	LINGCOD
34	24110	0.45427	0.005	0.33715	0.57138	0.00128217	0.98882045	TWOLINE EELPOUT
35	30220	0.44690	0.054	0.05787	0.83592	0.00126136	0.99008181	WIDOW ROCKFISH
36	30090	0.43173	0.013	0.23892	0.62455	0.00121857	0.99130038	AURORA ROCKFISH
37	30475	0.41481	0.029	0.12812	0.70149	0.00117079	0.99247117	REDBANDED ROCKFISH
38	21720	0.41099	0.081	0.00000	0.88799	0.00116003	0.99363120	PACIFIC COD
39	30600	0.38497	0.145	0.00000	1.02323	0.00108659	0.99471778	YELLOWMOUTH ROCKFISH
40	24190	0.23583	0.014	0.03903	0.43262	0.00066562	0.99538341	BLACK EELPOUT
41	30430	0.23200	0.022	0.00000	0.48239	0.00065483	0.99603824	REDSTRIPE ROCKFISH
42	30270	0.22449	0.009	0.06673	0.38225	0.00063362	0.99667186	ROSETHORN ROCKFISH
43	20150	0.18195	0.003	0.09081	0.27308	0.00051354	0.99718540	THREADFIN SLICKHEAD
44	23010	0.18078	0.033	0.00000	0.48334	0.00051026	0.99769566	EULACHON
45	21740	0.14477	0.018	0.00000	0.37238	0.00040862	0.99810428	WALLEYE POLLOCK

Table C-7.--Continued.

RANK	SPECIES	MEAN CPUE (KG/KM)	VARIANCE	90 PERCENT *---CONFIDENCE LIMITS---*		PROPORTION	CUMULATIVE PROPORTION	NAME
46	23055	0.13649	0.019	0.00000	0.36493	0.00038525	0.99848953	RAINBOW SMELT
47	30100	0.13116	0.013	0.00000	0.31885	0.00037020	0.99885973	SILVERGRAY ROCKFISH
48	20620	0.06724	0.000	0.04617	0.08831	0.00018977	0.99904950	ROBUST BLACKSMELT (PREV. STOUT BLACKSMELT)
49	30490	0.06045	0.001	0.01345	0.10746	0.00017063	0.99922013	STRIPETAIL ROCKFISH
50	24130	0.05363	0.000	0.03872	0.06855	0.00015138	0.99937151	SNAKEHEAD EELPOUT
51	23932	0.02997	0.000	0.00007	0.05988	0.00008460	0.99945611	KING-OF-THE-SALMON
52	21010	0.02513	0.000	0.01310	0.03717	0.00007094	0.99952705	PACIFIC VIPERFISH
53	20020	0.02057	0.000	0.00752	0.03361	0.00005805	0.99958510	BLACKTIP POACHER
54	21310	0.02053	0.000	0.00000	0.04662	0.00005793	0.99964304	THREADFIN SCULPIN
55	21120	0.01778	0.000	0.00000	0.04754	0.00005019	0.99969323	AMERICAN SHAD
56	30410	0.01572	0.000	0.00000	0.04202	0.00004437	0.99973759	CANARY ROCKFISH
57	30290	0.01524	0.000	0.00039	0.03010	0.00004303	0.99978062	SHORTBELLY ROCKFISH
58	00410	0.01360	0.000	0.00000	0.03635	0.00003837	0.99981899	DEEPSEA SKATE
59	20038	0.00778	0.000	0.00214	0.01343	0.00002197	0.99984096	BLACKFIN POACHER
60	22600	0.00735	0.000	0.00033	0.01438	0.00002075	0.99986172	LANTERNFISH UNIDENT.
61	21201	0.00709	0.000	0.00000	0.01895	0.00002001	0.99988172	CALIFORNIA GRENADIER
62	20000	0.00560	0.000	0.00056	0.01064	0.00001580	0.99989753	POACHER UNIDENT.
63	22623	0.00541	0.000	0.00023	0.01058	0.00001526	0.99991278	BROADFIN LANTERNFISH
64	22410	0.00444	0.000	0.00061	0.00828	0.00001254	0.99992532	LONGFIN DRAGONFISH
65	22602	0.00358	0.000	0.00105	0.00611	0.00001010	0.99993541	NORTHERN LAMPFISH (PREV. NORTHERN LANTERNFISH)
66	23710	0.00332	0.000	0.00070	0.00594	0.00000937	0.99994479	SHINING TUBESHOULDER
67	24200	0.00296	0.000	0.00000	0.00792	0.00000836	0.99995315	BLACKBELLY EELPOUT
68	22200	0.00267	0.000	0.00000	0.00591	0.00000754	0.99996069	SNAILFISH UNIDENT.

Table C-7.--Continued.

RANK	SPECIES	MEAN CPUE (KG/KM)	VARIANCE	90 PERCENT *---CONFIDENCE LIMITS---*		PROPORTION	CUMULATIVE PROPORTION	NAME
69	23603	0.00244	0.000	0.00000	0.00603	0.00000688	0.99996757	NORTHERN PEARLEYE
70	23562	0.00211	0.000	0.00000	0.00502	0.00000594	0.99997352	PACIFIC SAURY
71	00003	0.00128	0.000	0.00000	0.00269	0.00000360	0.99997712	FISH UNIDENT.
72	21238	0.00108	0.000	0.00000	0.00290	0.00000306	0.99998018	FILAMENTED GRENADIER
73	24120	0.00101	0.000	0.00000	0.00271	0.00000286	0.99998304	SOFT EELPOUT
74	23030	0.00098	0.000	0.00000	0.00262	0.00000277	0.99998581	WHITEBAIT SMELT
75	22642	0.00085	0.000	0.00000	0.00228	0.00000241	0.99998822	PATCHWORK LAMPFISH
76	21000	0.00075	0.000	0.00012	0.00139	0.00000213	0.99999035	VIPERFISH UNIDENT.
77	20420	0.00070	0.000	0.00000	0.00153	0.00000198	0.99999233	FANGTOOTH
78	22701	0.00047	0.000	0.00003	0.00091	0.00000133	0.99999366	SNIPE EEL UNIDENT.
79	22420	0.00042	0.000	0.00000	0.00113	0.00000119	0.99999485	HIGHFIN DRAGONFISH
80	22610	0.00041	0.000	0.00000	0.00111	0.00000117	0.99999602	CALIFORNIA HEADLIGHTFISH
81	23700	0.00037	0.000	0.00000	0.00099	0.00000105	0.99999707	TUBESHOULDER UNIDENT.
82	24170	0.00032	0.000	0.00000	0.00071	0.00000089	0.99999796	PALLID EELPOUT
83	22702	0.00030	0.000	0.00000	0.00067	0.00000085	0.99999881	SLENDER SNIPE EEL
84	24160	0.00021	0.000	0.00000	0.00057	0.00000060	0.99999941	BLACKMOUTH EELPOUT
85	22651	0.00010	0.000	0.00000	0.00028	0.00000030	0.99999970	BLUE LANTERNFISH
86	20910	0.00010	0.000	0.00000	0.00028	0.00000030	1.00000000	THREADFIN CUSK-EEL
	TOTAL	354.29555						

APPENDIX D

Population and Biomass Estimates

Appendix D is comprised of the computer listings generated from the PACE program "BIOMASS". Estimated population totals and their respective biomass estimates, measured in metric tons, for the target species of the 1988 West Coast upper slope survey are presented. The estimates are listed by stratum codes. The stratification scheme is as follows:

stratum 200 =	183	-	366 m
stratum 300 =	367	-	549 m
stratum 400 =	550	-	732 m
stratum 500 =	733	-	914 m
stratum 600 =	915	-	1,097 m
stratum 700 =	1,098	-	1,280 m
all strata =	183	-	1,280 m

Table D-1. --Sablefish biomass and population estimates by depth stratum and for the entire survey area.

Table D-2. --Dover sole biomass and population estimates by depth stratum and for the entire survey area.

Table D-3. --Arrowtooth flounder biomass and population estimates by depth stratum and for the entire survey area.

Table D-4. --Pacific hake biomass and population estimates by depth stratum and for the entire survey area.

Table D-5. --Shortspine thornyhead biomass and population estimates by depth stratum and for the entire survey area.

Table D-6. --Longspine thornyhead biomass and population estimates by depth stratum and for the entire survey area.

Table D-1.--Sablefish biomass and population estimates by depth stratum and for the entire survey area.

STANDING STOCK ESTIMATES FOR SABLEFISH, STANDARD TRAWL WIDTH = 14.70 METERS

STRATUM	AREA SQ. MI.	SAMPLES	TOTAL HAULS	HAULS WITH CATCH	HAULS WITH NUMS.	HAULS WITH L-F	MEAN CPUE KG/KM	VARIANCE MEAN CPUE KG/KM	MEAN CPUE NO/KM	VARIANCE MEAN CPUE NO/KM
200	400.	93,387	14	14	14	14	9.02	.465395E+01	9.85	.578952E+01
300	501.	116,862	12	12	12	12	31.98	.826708E+02	30.08	.110928E+03
400	248.	57,793	9	9	9	9	179.29	.105973E+04	120.90	.596143E+03
500	195.	45,487	8	8	8	8	54.00	.666699E+02	31.04	.293518E+02
600	82.	19,107	6	6	6	6	31.62	.111355E+03	17.28	.338140E+02
700	109.	25,325	8	8	8	8	19.82	.155632E+02	8.44	.290843E+01
TOTAL	1,534.	357,961	57	57	57	57	51.69	.382225E+02	37.37	.283407E+02

STRATUM	MEAN WT KG	POPULATION	VARIANCE POPULATION	METHOD USED	EFF. DEG. FREEDOM	90% CONFIDENCE LIMITS - POPULATION LOWER	UPPER
200	0.915	920,285	.504908337E+11	1	13.00	522,338	1,318,231
300	1.063	3,514,922	.151490979E+13	1	11.00	1,304,375	5,725,469
400	1.483	6,987,328	.199111481E+13	1	8.00	4,362,740	9,611,915
500	1.740	1,411,709	.607309783E+11	1	7.00	944,712	1,878,706
600	1.830	330,237	.123449041E+11	1	5.00	106,355	554,119
700	2.350	213,638	.186538309E+10	1	7.00	131,793	295,483
TOTAL	1.383	13,378,119	.363145670E+13		18.71	10,083,270	16,672,967

STRATUM	BIOMASS KG	VARIANCE BIOMASS	EFF. DEG. FREEDOM	90% CONFIDENCE LIMITS - BIOMASS LOWER	UPPER
200	842,193	.405874799E+11	13.00	485,401	1,198,984
300	3,737,500	.112900736E+13	11.00	1,829,164	5,645,835
400	10,361,548	.353950224E+13	8.00	6,862,225	13,860,871
500	2,456,435	.137944816E+12	7.00	1,752,614	3,160,255
600	604,194	.406537258E+11	5.00	197,914	1,010,474
700	502,004	.998176851E+10	7.00	312,676	691,331
TOTAL	18,503,873	.489767739E+13	14.24	14,606,657	22,401,089

CONFIDENCE LIMITS

	TOTAL BIOMASS KG LOWER	UPPER	TOTAL POPULATION LOWER	UPPER
80.000 PERCENT	15,527,294	21,480,452	10,847,431	15,908,806
95.000 PERCENT	13,756,838	23,250,907	9,389,618	17,366,619
90.000 PERCENT	14,606,657	22,401,089	10,083,270	16,672,967

Table D-2.--Dover sole biomass and population estimates by depth stratum and for the entire survey area.

STANDING STOCK ESTIMATES FOR DOVER SOLE, STANDARD TRAWL WIDTH = 14.70 METERS

STRATUM	AREA SQ. MI.	SAMPLES	TOTAL HAULS	HAULS WITH CATCH	HAULS WITH NUMS.	HAULS WITH L-F	MEAN CPUE KG/KM	VARIANCE MEAN CPUE KG/KM	MEAN CPUE NO/KM	VARIANCE MEAN CPUE NO/KM
200	400.	93,387	14	13	13	13	23.11	.127516E+03	41.61	.326369E+03
300	501.	116,862	12	12	12	12	100.31	.238442E+04	241.03	.188213E+05
400	248.	57,793	9	9	9	9	36.08	.375521E+03	38.71	.470868E+03
500	195.	45,487	8	8	8	8	24.93	.306119E+02	26.88	.360832E+02
600	82.	19,107	6	3	3	3	19.69	.156541E+03	20.31	.173315E+03
700	109.	25,325	8	4	4	4	3.01	.362309E+01	2.39	.218598E+01
TOTAL	1,534.	357,961	57	49	49	49	49.03	.273557E+03	100.46	.204154E+04

STRATUM	MEAN WT KG	POPULATION	VARIANCE POPULATION	METHOD USED	EFF. DEG. FREEDOM	90% CONFIDENCE LIMITS - POPULATION LOWER	UPPER
200	0.555	3,885,696	.284628864E+13	1	13.00	897,851	6,873,540
300	0.416	28,166,907	.257035888E+15	1	11.00	0	56,960,987
400	0.932	2,236,910	.157269960E+13	1	8.00	0	4,569,486
500	0.927	1,222,541	.746587835E+11	1	7.00	704,756	1,740,327
600	0.970	388,051	.632743058E+11	1	5.00	0	894,912
700	1.258	60,526	.140202009E+10	1	7.00	0	131,482
TOTAL	0.488	35,960,630	.261594211E+15		11.39	6,912,352	65,008,909

STRATUM	BIOMASS KG	VARIANCE BIOMASS	EFF. DEG. FREEDOM	90% CONFIDENCE LIMITS - BIOMASS LOWER	UPPER
200	2,158,364	.111207459E+13	13.00	290,757	4,025,972
300	11,722,233	.325632702E+14	11.00	1,473,496	21,970,969
400	2,085,364	.125423914E+13	8.00	2,298	4,168,430
500	1,133,901	.633382084E+11	7.00	656,985	1,610,818
600	376,311	.571504677E+11	5.00	0	858,020
700	76,128	.232374218E+10	7.00	0	167,477
TOTAL	17,552,302	.350523964E+14	12.71	7,067,085	28,037,519

CONFIDENCE LIMITS

	TOTAL BIOMASS KG LOWER	UPPER	TOTAL POPULATION LOWER	UPPER
80.000 PERCENT	9,559,619	25,544,986	13,915,640	58,005,621
95.000 PERCENT	4,764,008	30,340,596	361,933	71,559,328
90.000 PERCENT	7,067,085	28,037,519	6,912,352	65,008,909

Table D-3.--Arrowtooth flounder biomass and population estimates by depth stratum and for the entire survey area.

STANDING STOCK ESTIMATES FOR ARROWTOOTH FLOUNDER, STANDARD TRAWL WIDTH = 14.70 METERS

STRATUM	AREA SQ. MI.	SAMPLES	TOTAL HAULS	HAULS WITH CATCH	HAULS WITH NUMS.	HAULS WITH L-F	MEAN CPUE KG/KM	VARIANCE MEAN CPUE KG/KM	MEAN CPUE NO/KM	VARIANCE MEAN CPUE NO/KM
200	400.	93,387	14	13	13	13	5.63	.469176E+01	13.10	.225872E+02
300	501.	116,862	12	10	10	10	11.76	.481872E+02	23.19	.229186E+03
400	248.	57,793	9	0	0	0	0.00	0.	0.00	0.
500	195.	45,487	8	0	0	0	0.00	0.	0.00	0.
600	82.	19,107	6	0	0	0	0.00	0.	0.00	0.
700	109.	25,325	8	0	0	0	0.00	0.	0.00	0.
TOTAL	1,534.	357,961	57	23	23	23	5.31	.545510E+01	10.99	.259639E+02

STRATUM	MEAN WT KG	POPULATION	VARIANCE POPULATION	METHOD USED	EFF. DEG. FREEDOM	90% CONFIDENCE LIMITS - POPULATION LOWER	UPPER
200	0.430	1,223,409	.196984826E+12	1	13.00	437,386	2,009,431
300	0.507	2,710,121	.312992002E+13	1	11.00	0	5,887,529
400	0.000	0	0.	1	0.00	0	0
500	0.000	0	0.	1	0.00	0	0
600	0.000	0	0.	1	0.00	0	0
700	0.000	0	0.	1	0.00	0	0
TOTAL	0.483	3,933,529	.332690484E+13		12.39	683,196	7,183,863

STRATUM	BIOMASS KG	VARIANCE BIOMASS	EFF. DEG. FREEDOM	90% CONFIDENCE LIMITS - BIOMASS LOWER	UPPER
200	525,696	.409172400E+11	13.00	167,458	883,934
300	1,374,050	.658077036E+12	11.00	0	2,831,000
400	0	0.	0.00	0	0
500	0	0.	0.00	0	0
600	0	0.	0.00	0	0
700	0	0.	0.00	0	0
TOTAL	1,899,746	.698994276E+12	12.37	409,889	3,389,602

CONFIDENCE LIMITS

	TOTAL BIOMASS KG LOWER	UPPER	TOTAL POPULATION LOWER	UPPER
80.000 PERCENT	766,050	3,033,441	1,460,212	6,406,847
95.000 PERCENT	77,974	3,721,518	0	7,907,983
90.000 PERCENT	409,889	3,389,602	683,196	7,183,863

Table D-4.--Pacific hake biomass and population estimates by depth stratum and for the entire survey area.

STANDING STOCK ESTIMATES FOR PACIFIC HAKE, STANDARD TRAWL WIDTH = 14.70 METERS

STRATUM	AREA SQ. MI.	SAMPLES	TOTAL HAULS	HAULS WITH CATCH	HAULS WITH NUMS.	HAULS WITH L-F	MEAN CPUE KG/KM	VARIANCE MEAN CPUE KG/KM	MEAN CPUE NO/KM	VARIANCE MEAN CPUE NO/KM
200	400.	93,387	14	13	13	13	15.65	.343116E+02	23.86	.863081E+02
300	501.	116,862	12	12	12	12	12.30	.101018E+02	18.68	.245014E+02
400	248.	57,793	9	6	6	6	1.07	.252737E+00	1.40	.425851E+00
500	195.	45,487	8	4	4	4	0.17	.688002E-02	0.24	.131797E-01
600	82.	19,107	6	1	1	1	0.03	.927971E-03	0.04	.200458E-02
700	109.	25,325	8	6	6	6	0.17	.199907E-02	0.23	.315764E-02
TOTAL	1,534.	357,961	57	42	42	42	8.31	.341864E+01	12.60	.849691E+01

STRATUM	MEAN WT KG	POPULATION	VARIANCE POPULATION	METHOD USED	EFF. DEG. FREEDOM	90% CONFIDENCE LIMITS - POPULATION LOWER	UPPER
200	0.656	2,228,280	.752699692E+12	1	13.00	691,791	3,764,769
300	0.658	2,183,162	.334606829E+12	1	11.00	1,144,262	3,222,062
400	0.761	80,905	.142234113E+10	1	8.00	10,757	151,053
500	0.726	10,954	.272696841E+08	1	7.00	1,058	20,849
600	0.680	855	.731837100E+06	1	5.00	0	2,579
700	0.749	5,830	.202521885E+07	1	7.00	3,133	8,527
TOTAL	0.659	4,509,986	.108875889E+13		22.05	2,718,406	6,301,566

STRATUM	BIOMASS KG	VARIANCE BIOMASS	EFF. DEG. FREEDOM	90% CONFIDENCE LIMITS - BIOMASS LOWER	UPPER
200	1,461,332	.299234207E+12	13.00	492,554	2,430,110
300	1,437,286	.137956230E+12	11.00	770,208	2,104,365
400	61,552	.844139605E+09	8.00	7,512	115,593
500	7,950	.142352513E+08	7.00	800	15,100
600	582	.338786046E+06	5.00	0	1,755
700	4,369	.128214330E+07	7.00	2,224	6,515
TOTAL	2,973,073	.438050433E+12	22.27	1,836,670	4,109,475

CONFIDENCE LIMITS

	TOTAL BIOMASS KG LOWER	UPPER	TOTAL POPULATION LOWER	UPPER
80.000 PERCENT	2,098,764	3,847,381	3,131,607	5,888,365
95.000 PERCENT	1,600,388	4,345,757	2,345,899	6,674,072
90.000 PERCENT	1,836,670	4,109,475	2,718,406	6,301,566

Table D-5.--Shortspine thornyhead biomass and population estimates by depth stratum and for the entire survey area.

STANDING STOCK ESTIMATES FOR SHORTSPINE THORNYHEAD, STANDARD TRAWL WIDTH = 14.70 METERS

STRATUM	AREA SQ. MI.	SAMPLES	TOTAL HAULS	HAULS WITH CATCH	HAULS WITH NUMS.	HAULS WITH L-F	MEAN CPUE KG/KM	VARIANCE MEAN CPUE KG/KM	MEAN CPUE NO/KM	VARIANCE MEAN CPUE NO/KM
200	400.	93,387	14	12	12	12	24.81	.809513E+02	150.44	.210582E+04
300	501.	116,862	12	11	11	11	27.94	.286486E+02	154.13	.164656E+04
400	248.	57,793	9	9	9	9	38.15	.918299E+02	46.01	.561209E+02
500	195.	45,487	8	8	8	8	16.22	.544512E+01	13.78	.104216E+01
600	82.	19,107	6	6	6	6	15.98	.146991E+02	10.81	.437806E+01
700	109.	25,325	8	8	8	8	8.47	.128203E+01	5.78	.660195E+00
TOTAL	1,534.	357,961	57	54	54	54	25.27	.110929E+02	99.73	.320310E+03

STRATUM	MEAN WT KG	POPULATION	VARIANCE POPULATION	METHOD USED	EFF. DEG. FREEDOM	90% CONFIDENCE LIMITS - POPULATION LOWER	UPPER
200	0.165	14,049,198	.183650112E+14	1	13.00	6,459,680	21,638,715
300	0.181	18,011,803	.224865750E+14	1	11.00	9,495,168	26,528,437
400	0.829	2,659,092	.187443605E+12	1	8.00	1,853,810	3,464,375
500	1.177	626,901	.215631149E+10	1	7.00	538,905	714,898
600	1.479	206,462	.159835240E+10	1	5.00	125,904	287,021
700	1.466	146,317	.423429491E+09	1	7.00	107,323	185,312
TOTAL	0.253	35,699,773	.410432079E+14		23.42	24,719,037	46,680,510

STRATUM	BIOMASS KG	VARIANCE BIOMASS	EFF. DEG. FREEDOM	90% CONFIDENCE LIMITS - BIOMASS LOWER	UPPER
200	2,317,048	.705983138E+12	13.00	829,004	3,805,092
300	3,264,590	.391244711E+12	11.00	2,141,200	4,387,980
400	2,204,974	.306711584E+12	8.00	1,174,877	3,235,070
500	737,633	.112663566E+11	7.00	536,492	938,775
600	305,309	.536640214E+10	5.00	157,699	452,920
700	214,563	.822256189E+09	7.00	160,223	268,902
TOTAL	9,044,117	.142139445E+13	31.55	7,024,015	11,064,219

CONFIDENCE LIMITS

	TOTAL BIOMASS KG LOWER	UPPER	TOTAL POPULATION LOWER	UPPER
80.000 PERCENT	7,483,974	10,604,259	27,249,603	44,149,943
95.000 PERCENT	6,614,606	11,473,628	22,444,730	48,954,816
90.000 PERCENT	7,024,015	11,064,219	24,719,037	46,680,510

Table D-6.--Longspine thornyhead biomass and population estimates by depth stratum and for the entire survey area.

STANDING STOCK ESTIMATES FOR LONGSPINE THORNYHEAD, STANDARD TRAWL WIDTH = 14.70 METERS

STRATUM	AREA SQ. MI.	SAMPLES	TOTAL HAULS	HAULS WITH CATCH	HAULS WITH NUMS.	HAULS WITH L-F	MEAN CPUE KG/KM	VARIANCE MEAN CPUE KG/KM	MEAN CPUE NO/KM	VARIANCE MEAN CPUE NO/KM
200	400.	93,387	14	0	0	0	0.00	0.	0.00	0.
300	501.	116,862	12	2	2	2	2.58	.530669E+01	25.04	.517066E+03
400	248.	57,793	9	8	6	6	34.82	.453124E+02	0.00	0.
500	195.	45,487	8	8	8	8	117.26	.180273E+03	875.04	.341343E+05
600	82.	19,107	6	6	6	6	84.95	.298735E+03	618.35	.237100E+05
700	109.	25,325	8	8	8	8	37.38	.390568E+02	435.49	.910619E+04
TOTAL	1,534.	357,961	57	32	30	30	28.54	.570431E+01	183.18	.719427E+03

STRATUM	MEAN WT KG	POPULATION	VARIANCE POPULATION	METHOD USED	EFF. DEG. FREEDOM	90% CONFIDENCE LIMITS - POPULATION LOWER	UPPER
200	0.000	0	0.	1	0.00	0	0
300	0.103	2,925,889	.706140109E+13	1	11.00	0	7,698,453
400	0.114	17,719,216	0.	3	0.00	0	0
500	0.134	39,802,797	.706263809E+14	1	7.00	23,877,311	55,728,283
600	0.137	11,814,867	.865611123E+13	1	5.00	5,886,481	17,743,253
700	0.086	11,029,030	.584044116E+13	1	7.00	6,449,383	15,608,678
TOTAL	0.123	83,291,799	.921843343E+14		11.53	66,182,340	100,401,257

STRATUM	BIOMASS KG	VARIANCE BIOMASS	EFF. DEG. FREEDOM	90% CONFIDENCE LIMITS - BIOMASS LOWER	UPPER
200	0	0.	0.00	0	0
300	301,871	.724716297E+11	11.00	0	785,364
400	2,012,079	.151343360E+12	8.00	1,288,486	2,735,673
500	5,333,846	.372998185E+12	7.00	4,176,502	6,491,190
600	1,623,243	.109063062E+12	5.00	957,795	2,288,690
700	946,779	.250498760E+11	7.00	646,854	1,246,703
TOTAL	10,217,818	.730926114E+12	20.80	8,746,463	11,689,173

CONFIDENCE LIMITS

	TOTAL BIOMASS KG LOWER	UPPER	TOTAL POPULATION LOWER	UPPER
80.000 PERCENT	9,086,730	11,348,906	70,272,480	96,311,117
95.000 PERCENT	8,439,538	11,996,098	62,370,637	104,212,960
90.000 PERCENT	8,746,463	11,689,173	66,182,340	100,401,257

APPENDIX E

Population Size Composition

Appendix E is comprised of computer listings generated from the RACE program BIOMASS. Population size composition estimates are presented by sex-centimeter interval for each depth stratum and all depth-strata combined.

Table E-l. --Sablefish population size composition estimates by sex and size group for each depth stratum and for all depth strata combined.

Table E-2. --Dover sole population size composition estimates by sex, and size group for each depth stratum and for all depth strata combined.

Table E-3. --Arrowtooth flounder population size composition estimates by sex and size group for each depth stratum and for all depth strata combined.

Table E-4. --Pacific hake population size composition estimates by sex and size group for each depth stratum and for all depth strata combined.

Table E-5. --Shortspine thornyhead population size composition estimates by sex and size group for each depth, stratum and for all depth strata combined.

Table E-6. --Longspine thornyhead population size composition estimates by sex and size group for each depth stratum and for all depth strata combined;

Table E-l.--Sablefish population size composition estimates by sex and size group for each depth stratum and for all depth strata combined.

Stratum 183-366 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
300.0	0	0	3,531	3,531	0.00384	0.00384
340.0	0	6,076	0	6,076	0.00660	0.01044
360.0	3,366	8,550	0	11,917	0.01295	0.02339
370.0	3,366	0	3,531	6,897	0.00749	0.03088
380.0	24,069	22,224	7,062	53,355	0.05798	0.08886
390.0	70,692	24,771	7,062	102,525	0.11141	0.20026
400.0	29,905	34,063	3,531	67,500	0.07335	0.27361
410.0	60,309	73,237	0	133,547	0.14511	0.41873
420.0	72,570	49,059	7,062	128,692	0.13984	0.55857
430.0	64,264	54,149	17,656	136,069	0.14785	0.70642
440.0	11,030	29,966	0	40,996	0.04455	0.75097
450.0	14,139	18,609	3,531	36,279	0.03942	0.79039
460.0	16,154	10,605	3,531	30,290	0.03291	0.82330
470.0	21,001	14,011	0	35,012	0.03805	0.86135
480.0	4,002	16,842	0	20,844	0.02265	0.88400
490.0	9,474	0	0	9,474	0.01029	0.89429
500.0	0	3,366	3,531	6,897	0.00749	0.90179
510.0	3,791	3,791	0	7,583	0.00824	0.91003
530.0	0	3,791	0	3,791	0.00412	0.91415
540.0	0	3,791	0	3,791	0.00412	0.91827
550.0	0	13,930	0	13,930	0.01514	0.93340
560.0	0	10,981	0	10,981	0.01193	0.94533
580.0	0	7,322	0	7,322	0.00796	0.95329
590.0	0	3,791	0	3,791	0.00412	0.95741
610.0	0	14,223	0	14,223	0.01546	0.97287
620.0	0	4,002	0	4,002	0.00435	0.97721
630.0	0	7,029	0	7,029	0.00764	0.98485
680.0	0	3,366	0	3,366	0.00366	0.98851
730.0	0	7,112	0	7,112	0.00773	0.99624
850.0	0	3,463	0	3,463	0.00376	1.00000
TOTAL	408,134	452,121	60,030	920,285		

Table E-l. --Sablefish continued.

Stratum 367-549 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
350.0	5,473	0	0	5,473	0.00156	0.00156
360.0	5,473	0	0	5,473	0.00156	0.00311
370.0	11,251	31,676	0	42,927	0.01221	0.01533
380.0	21,983	24,474	0	46,457	0.01322	0.02854
390.0	118,193	35,390	0	153,582	0.04369	0.07224
400.0	154,872	127,638	0	282,510	0.08037	0.15261
410.0	338,598	173,102	0	511,700	0.14558	0.29819
420.0	241,589	210,681	0	452,269	0.12867	0.42686
430.0	204,501	157,119	0	361,620	0.10288	0.52974
440.0	131,063	116,295	0	247,358	0.07037	0.60012
450.0	150,567	71,104	0	221,671	0.06307	0.66318
460.0	134,180	87,408	0	221,588	0.06304	0.72623
470.0	71,388	43,781	0	115,169	0.03277	0.75899
480.0	75,432	59,723	0	135,155	0.03845	0.79744
490.0	67,353	49,727	0	117,080	0.03331	0.83075
500.0	30,907	40,585	0	71,492	0.02034	0.85109
510.0	11,188	28,600	0	39,788	0.01132	0.86241
520.0	13,146	17,366	0	30,512	0.00868	0.87109
530.0	16,738	39,837	0	56,575	0.01610	0.88719
540.0	6,573	45,140	0	51,713	0.01471	0.90190
550.0	0	22,654	0	22,654	0.00645	0.90835
560.0	11,188	22,533	0	33,721	0.00959	0.91794
570.0	0	33,386	0	33,386	0.00950	0.92744
580.0	0	11,939	0	11,939	0.00340	0.93083
590.0	5,594	56,675	0	62,269	0.01772	0.94855
600.0	0	16,204	0	16,204	0.00461	0.95316
610.0	0	17,304	0	17,304	0.00492	0.95808
620.0	0	22,197	0	22,197	0.00632	0.96440
630.0	0	27,271	0	27,271	0.00776	0.97216
640.0	0	17,519	0	17,519	0.00498	0.97714
650.0	0	17,412	0	17,412	0.00495	0.98210
660.0	0	11,831	0	11,831	0.00337	0.98546
670.0	0	5,594	0	5,594	0.00159	0.98705
680.0	0	11,067	0	11,067	0.00315	0.99020
690.0	0	5,778	0	5,778	0.00164	0.99185
700.0	0	6,573	0	6,573	0.00187	0.99372
710.0	0	10,946	0	10,946	0.00311	0.99683
720.0	0	5,366	0	5,366	0.00153	0.99836
750.0	0	5,778	0	5,778	0.00164	1.00000
TOTAL	1,827,250	1,687,672	0	3,514,922		

Table E-l.--Sablefish continued.

Stratum 550-732 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
370.0	3,753	0	0	3,753	0.00054	0.00054
380.0	29,369	0	0	29,369	0.00420	0.00474
390.0	0	10,572	0	10,572	0.00151	0.00625
400.0	39,940	12,726	0	52,666	0.00754	0.01379
410.0	16,643	0	0	16,643	0.00238	0.01617
420.0	49,929	33,175	0	83,104	0.01189	0.02807
430.0	46,012	13,971	0	59,983	0.00858	0.03665
440.0	165,703	46,739	0	212,442	0.03040	0.06705
450.0	161,613	27,117	0	188,730	0.02701	0.09406
460.0	231,131	125,017	0	356,147	0.05097	0.14504
470.0	253,329	126,262	0	379,591	0.05433	0.19936
480.0	590,744	132,696	0	723,440	0.10354	0.30290
490.0	437,494	117,356	0	554,849	0.07941	0.38230
500.0	397,599	120,484	0	518,083	0.07415	0.45645
510.0	428,235	130,772	0	559,007	0.08000	0.53645
520.0	422,538	156,343	0	578,881	0.08285	0.61930
530.0	446,795	57,426	0	504,222	0.07216	0.69146
540.0	299,804	99,392	0	399,197	0.05713	0.74859
550.0	301,905	129,160	0	431,065	0.06169	0.81029
560.0	289,412	85,438	0	374,851	0.05365	0.86393
570.0	189,584	35,863	0	225,447	0.03227	0.89620
580.0	191,585	47,098	0	238,683	0.03416	0.93036
590.0	58,326	49,567	0	107,892	0.01544	0.94580
600.0	47,647	44,367	0	92,014	0.01317	0.95897
610.0	65,377	35,317	0	100,693	0.01441	0.97338
620.0	24,811	3,399	0	28,210	0.00404	0.97742
630.0	0	10,572	0	10,572	0.00151	0.97893
640.0	12,726	0	0	12,726	0.00182	0.98075
650.0	0	11,205	0	11,205	0.00160	0.98236
660.0	0	35,247	0	35,247	0.00504	0.98740
670.0	3,399	8,266	0	11,665	0.00167	0.98907
690.0	2,938	20,992	0	23,930	0.00342	0.99249
700.0	0	3,399	0	3,399	0.00049	0.99298
710.0	12,726	11,378	0	24,103	0.00345	0.99643
720.0	0	6,396	0	6,396	0.00092	0.99735
750.0	10,572	0	0	10,572	0.00151	0.99886
970.0	0	7,978	0	7,978	0.00114	1.00000
TOTAL	5,231,637	1,755,690	0	6,987,328		

Table E-l.--Sablefish continued.

Stratum 733-914 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
450.0	2,941	0	0	2,941	0.00208	0.00208
460.0	7,664	0	0	7,664	0.00543	0.00751
470.0	11,908	0	0	11,908	0.00844	0.01595
480.0	40,944	4,666	0	45,610	0.03231	0.04826
490.0	58,690	5,980	0	64,670	0.04581	0.09407
500.0	97,926	0	0	97,926	0.06937	0.16343
510.0	130,670	6,128	0	136,798	0.09690	0.26033
520.0	153,283	10,994	0	164,277	0.11637	0.37670
530.0	160,251	4,502	0	164,752	0.11670	0.49341
540.0	121,784	22,009	0	143,793	0.10186	0.59526
550.0	103,610	22,125	0	125,735	0.08907	0.68433
560.0	71,590	41,019	0	112,609	0.07977	0.76410
570.0	46,123	21,663	0	67,786	0.04802	0.81211
580.0	40,351	15,214	0	55,565	0.03936	0.85147
590.0	33,126	24,050	0	57,176	0.04050	0.89198
600.0	17,834	9,658	0	27,492	0.01947	0.91145
610.0	22,922	9,598	0	32,521	0.02304	0.93449
620.0	15,327	10,758	0	26,085	0.01848	0.95296
630.0	11,510	5,220	0	16,729	0.01185	0.96481
640.0	0	14,573	0	14,573	0.01032	0.97514
650.0	0	3,395	0	3,395	0.00241	0.97754
660.0	2,924	4,800	0	7,723	0.00547	0.98301
670.0	0	6,278	0	6,278	0.00445	0.98746
680.0	0	1,566	0	1,566	0.00111	0.98857
690.0	0	3,395	0	3,395	0.00241	0.99098
700.0	0	6,058	0	6,058	0.00429	0.99527
710.0	0	3,013	0	3,013	0.00213	0.99740
760.0	0	1,876	0	1,876	0.00133	0.99873
770.0	0	1,794	0	1,794	0.00127	1.00000
TOTAL	1,151,378	260,330	0	1,411,709		

Table E-l. --Sablefish continued.

Stratum 915-1,097 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
450.0	886	0	0	886	0.00268	0.00268
470.0	2,811	0	0	2,811	0.00851	0.01120
480.0	3,614	0	0	3,614	0.01094	0.02214
490.0	9,269	2,292	0	11,560	0.03501	0.05715
500.0	14,921	3,012	0	17,933	0.05430	0.11145
510.0	18,742	5,273	0	24,015	0.07272	0.18417
520.0	18,057	8,115	0	26,172	0.07925	0.26342
530.0	34,299	7,513	0	41,812	0.12661	0.39004
540.0	25,185	2,673	0	27,858	0.08436	0.47439
550.0	21,732	6,943	0	28,675	0.08683	0.56122
560.0	23,870	5,685	0	29,556	0.08950	0.65072
570.0	12,442	7,610	0	20,051	0.06072	0.71144
580.0	10,709	6,353	0	17,062	0.05167	0.76311
590.0	10,262	6,755	0	17,017	0.05153	0.81464
600.0	7,458	6,558	0	14,016	0.04244	0.85708
610.0	3,879	4,583	0	8,462	0.02562	0.88270
620.0	3,277	2,772	0	6,049	0.01832	0.90102
630.0	4,047	4,896	0	8,943	0.02708	0.92810
640.0	0	3,951	0	3,951	0.01196	0.94006
650.0	0	5,780	0	5,780	0.01750	0.95757
660.0	0	1,068	0	1,068	0.00323	0.96080
670.0	0	2,855	0	2,855	0.00864	0.96945
680.0	0	4,216	0	4,216	0.01277	0.98221
690.0	1,405	855	0	2,261	0.00685	0.98906
700.0	1,068	1,659	0	2,727	0.00826	0.99732
720.0	0	886	0	886	0.00268	1.00000
TOTAL	227,933	102,304	0	330,237		

Table E-l.--Sablefish continued.

Stratum 1,098-1,280 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
460.0	0	712	0	712	0.00333	0.00333
490.0	2,332	0	0	2,332	0.01092	0.01425
500.0	4,667	0	0	4,667	0.02185	0.03610
510.0	8,473	0	0	8,473	0.03966	0.07576
520.0	5,602	2,300	0	7,902	0.03699	0.11274
530.0	4,046	1,735	0	5,782	0.02706	0.13981
540.0	14,738	1,727	0	16,465	0.07707	0.21688
550.0	8,348	7,982	0	16,330	0.07644	0.29331
560.0	8,697	6,383	0	15,079	0.07058	0.36390
570.0	9,879	13,390	0	23,269	0.10892	0.47282
580.0	4,879	4,815	0	9,694	0.04538	0.51819
590.0	5,045	5,786	0	10,831	0.05070	0.56889
600.0	9,367	7,397	0	16,764	0.07847	0.64736
610.0	6,761	5,789	0	12,550	0.05875	0.70611
620.0	3,187	10,373	0	13,561	0.06348	0.76958
630.0	2,916	5,240	0	8,156	0.03818	0.80776
640.0	3,490	4,337	0	7,827	0.03663	0.84439
650.0	4,722	2,204	0	6,926	0.03242	0.87681
660.0	1,452	4,643	0	6,095	0.02853	0.90535
670.0	0	1,576	0	1,576	0.00737	0.91272
680.0	1,449	2,886	0	4,335	0.02029	0.93301
690.0	712	2,137	0	2,849	0.01334	0.94635
700.0	900	2,164	0	3,064	0.01434	0.96069
710.0	0	3,151	0	3,151	0.01475	0.97544
720.0	0	863	0	863	0.00404	0.97948
730.0	0	1,452	0	1,452	0.00680	0.98628
740.0	0	1,480	0	1,480	0.00693	0.99320
750.0	0	740	0	740	0.00346	0.99667
770.0	0	712	0	712	0.00333	1.00000
TOTAL	111,663	101,975	0	213,638		

Table E-l.--Sablefish continued.

All strata combined

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
300.0	0	0	3,531	3,531	0.00026	0.00026
340.0	0	6,076	0	6,076	0.00045	0.00072
350.0	5,473	0	0	5,473	0.00041	0.00113
360.0	8,839	8,550	0	17,390	0.00130	0.00243
370.0	18,371	31,676	3,531	53,577	0.00400	0.00643
380.0	75,420	46,698	7,062	129,180	0.00966	0.01609
390.0	188,884	70,732	7,062	266,679	0.01993	0.03602
400.0	224,718	174,427	3,531	402,676	0.03010	0.06612
410.0	415,551	246,339	0	661,890	0.04948	0.11560
420.0	364,088	292,915	7,062	664,065	0.04964	0.16524
430.0	314,777	225,238	17,656	557,671	0.04169	0.20692
440.0	307,796	193,000	0	500,796	0.03743	0.24435
450.0	330,145	116,830	3,531	450,506	0.03367	0.27803
460.0	389,129	223,742	3,531	616,402	0.04608	0.32410
470.0	360,436	184,055	0	544,491	0.04070	0.36481
480.0	714,736	213,927	0	928,663	0.06942	0.43422
490.0	584,612	175,354	0	759,966	0.05681	0.49103
500.0	546,020	167,447	3,531	716,999	0.05359	0.54462
510.0	601,100	174,564	0	775,663	0.05798	0.60260
520.0	612,626	195,117	0	807,743	0.06038	0.66298
530.0	662,129	114,805	0	776,934	0.05807	0.72106
540.0	468,085	174,731	0	642,816	0.04805	0.76911
550.0	435,594	202,795	0	638,389	0.04772	0.81682
560.0	404,757	172,040	0	576,797	0.04311	0.85994
570.0	258,028	111,911	0	369,939	0.02765	0.88759
580.0	247,525	92,742	0	340,266	0.02543	0.91303
590.0	112,353	146,625	0	258,977	0.01936	0.93239
600.0	82,306	84,185	0	166,490	0.01244	0.94483
610.0	98,939	86,815	0	185,754	0.01388	0.95871
620.0	46,602	53,502	0	100,104	0.00748	0.96620
630.0	18,474	60,227	0	78,700	0.00588	0.97208
640.0	16,215	40,380	0	56,595	0.00423	0.97631
650.0	4,722	39,996	0	44,718	0.00334	0.97965
660.0	4,376	57,589	0	61,965	0.00463	0.98429
670.0	3,399	24,568	0	27,968	0.00209	0.98638
680.0	1,449	23,102	0	24,550	0.00184	0.98821
690.0	5,056	33,158	0	38,214	0.00286	0.99107
700.0	1,968	19,853	0	21,821	0.00163	0.99270
710.0	12,726	28,487	0	41,213	0.00308	0.99578
720.0	0	13,511	0	13,511	0.00101	0.99679
730.0	0	8,564	0	8,564	0.00064	0.99743
740.0	0	1,480	0	1,480	0.00011	0.99754
750.0	10,572	6,518	0	17,090	0.00128	0.99882
760.0	0	1,876	0	1,876	0.00014	0.99896
770.0	0	2,506	0	2,506	0.00019	0.99914
850.0	0	3,463	0	3,463	0.00026	0.99940
970.0	0	7,978	0	7,978	0.00060	1.00000
TOTAL	8,957,996	4,360,093	60,030	13,378,119		

Table E-2.--Dover sole population size composition estimates by sex and size group for each depth stratum and for all depth strata combined.

Stratum 183-366 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
210.0	4,678	0	0	4,678	0.00120	0.00120
220.0	13,253	0	0	13,253	0.00341	0.00461
230.0	12,928	3,366	0	16,295	0.00419	0.00881
240.0	21,439	3,366	0	24,805	0.00638	0.01519
250.0	49,673	27,369	0	77,043	0.01983	0.03502
260.0	67,194	20,792	0	87,986	0.02264	0.05766
270.0	61,623	69,948	0	131,571	0.03386	0.09152
280.0	138,696	54,301	0	192,997	0.04967	0.14119
290.0	140,549	45,921	0	186,471	0.04799	0.18918
300.0	177,202	56,182	0	233,383	0.06006	0.24924
310.0	342,288	53,917	0	396,205	0.10197	0.35121
320.0	400,833	180,774	0	581,608	0.14968	0.50089
330.0	177,996	103,269	0	281,266	0.07238	0.57327
340.0	305,230	104,229	0	409,459	0.10538	0.67865
350.0	145,421	69,458	0	214,879	0.05530	0.73395
360.0	160,790	202,415	0	363,205	0.09347	0.82742
370.0	25,713	56,440	0	82,152	0.02114	0.84856
380.0	44,547	93,480	0	138,027	0.03552	0.88408
390.0	47,605	72,256	0	119,860	0.03085	0.91493
400.0	7,583	65,884	0	73,467	0.01891	0.93384
410.0	0	20,438	0	20,438	0.00526	0.93910
420.0	0	82,780	0	82,780	0.02130	0.96040
430.0	0	38,908	0	38,908	0.01001	0.97041
440.0	0	14,905	0	14,905	0.00384	0.97425
450.0	0	38,010	0	38,010	0.00978	0.98403
460.0	0	10,281	0	10,281	0.00265	0.98668
470.0	0	6,053	0	6,053	0.00156	0.98824
480.0	0	26,932	0	26,932	0.00693	0.99517
490.0	0	7,322	0	7,322	0.00188	0.99705
500.0	0	7,664	0	7,664	0.00197	0.99902
510.0	0	3,791	0	3,791	0.00098	1.00000
TOTAL	2,345,241	1,540,455	0	3,885,696		

Table E-2.--Dover sole continued.

Stratum 367-549 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
190.0	0	166,197	0	166,197	0.00590	0.00590
200.0	166,197	0	0	166,197	0.00590	0.01180
210.0	26,560	0	0	26,560	0.00094	0.01274
220.0	166,197	0	0	166,197	0.00590	0.01864
230.0	26,560	184,494	0	211,054	0.00749	0.02614
240.0	259,433	45,419	0	304,852	0.01082	0.03696
250.0	63,226	24,411	0	87,637	0.00311	0.04007
260.0	69,711	33,566	0	103,277	0.00367	0.04374
270.0	797,838	332,394	0	1,130,232	0.04013	0.08386
280.0	1,569,677	236,179	0	1,805,855	0.06411	0.14798
290.0	1,059,928	86,774	0	1,146,702	0.04071	0.18869
300.0	1,249,348	809,605	0	2,058,953	0.07310	0.26179
310.1	2,011,632	916,841	0	2,928,473	0.10397	0.36575
320.0	2,143,641	382,867	0	2,526,509	0.08970	0.45545
330.0	1,417,719	670,595	0	2,088,314	0.07414	0.52959
340.0	1,772,375	1,155,387	0	2,927,763	0.10394	0.63354
350.0	992,516	688,918	0	1,681,434	0.05970	0.69323
360.0	1,534,048	342,951	0	1,876,999	0.06664	0.75987
370.0	437,806	941,915	0	1,379,721	0.04898	0.80885
380.0	211,423	682,456	0	893,879	0.03174	0.84059
390.0	316,924	664,181	0	981,105	0.03483	0.87542
400.0	100,767	462,546	0	563,313	0.02000	0.89542
410.0	99,844	120,643	0	220,487	0.00783	0.90325
420.0	85,222	359,652	0	444,875	0.01579	0.91904
430.0	29,013	454,666	0	483,679	0.01717	0.93621
440.0	23,388	539,559	0	562,948	0.01999	0.95620
450.0	12,952	517,356	0	530,308	0.01883	0.97503
460.0	18,089	58,701	0	76,791	0.00273	0.97775
470.0	0	277,799	0	277,799	0.00986	0.98762
480.0	0	88,563	0	88,563	0.00314	0.99076
490.0	7,358	63,235	0	70,593	0.00251	0.99327
500.0	26,560	35,601	0	62,161	0.00221	0.99547
510.0	0	25,447	0	25,447	0.00090	0.99638
520.0	0	31,562	0	31,562	0.00112	0.99750
540.0	0	38,278	0	38,278	0.00136	0.99886
550.0	0	10,731	0	10,731	0.00038	0.99924
560.0	0	10,731	0	10,731	0.00038	0.99962
580.0	0	10,731	0	10,731	0.00038	1.00000
TOTAL	16,695,953	11,470,954	0	28,166,907		

Table E-2.--Dover sole continued.

Stratum 550-732 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
270.0	0	3,271	0	3,271	0.00146	0.00146
280.0	4,953	0	0	4,953	0.00221	0.00368
300.0	2,938	0	0	2,938	0.00131	0.00499
310.0	8,224	0	0	8,224	0.00368	0.00867
320.0	29,414	9,907	0	39,321	0.01758	0.02625
330.0	26,143	3,271	0	29,414	0.01315	0.03939
340.0	52,680	0	0	52,680	0.02355	0.06295
350.0	50,901	3,366	0	54,267	0.02426	0.08720
360.0	23,171	26,143	0	49,314	0.02205	0.10925
380.0	116,649	0	0	116,649	0.05215	0.16140
390.0	77,438	4,953	0	82,391	0.03683	0.19823
400.0	151,936	36,837	0	188,773	0.08439	0.28262
410.0	151,382	23,204	0	174,586	0.07805	0.36067
420.0	161,437	57,202	0	218,639	0.09774	0.45841
430.0	144,641	103,577	0	248,218	0.11096	0.56937
440.0	87,373	142,399	0	229,772	0.10272	0.67209
450.0	59,316	104,205	0	163,521	0.07310	0.74519
460.0	28,781	174,550	0	203,330	0.09090	0.83609
470.0	40,798	74,893	0	115,691	0.05172	0.88781
480.0	0	82,818	0	82,818	0.03702	0.92483
490.0	3,399	40,434	0	43,833	0.01960	0.94443
500.0	4,953	56,707	0	61,661	0.02757	0.97199
510.0	0	20,892	0	20,892	0.00934	0.98133
520.0	4,953	13,564	0	18,517	0.00828	0.98961
530.0	0	16,471	0	16,471	0.00736	0.99698
550.0	0	3,366	0	3,366	0.00150	0.99848
560.0	0	3,399	0	3,399	0.00152	1.00000
TOTAL	1,231,482	1,005,428	0	2,236,910		

Table E-2.--Dover sole continued.

Stratum 733-914 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
300.0	2,815	1,295	0	4,111	0.00336	0.00336
310.0	3,352	0	0	3,352	0.00274	0.00610
320.0	2,831	3,188	0	6,020	0.00492	0.01103
330.0	1,295	1,295	0	2,591	0.00212	0.01315
350.0	7,672	1,462	0	9,134	0.00747	0.02062
360.0	13,942	6,079	0	20,022	0.01638	0.03700
370.0	21,190	4,277	0	25,467	0.02083	0.05783
380.0	26,894	7,783	0	34,677	0.02837	0.08619
390.0	65,759	8,915	0	74,674	0.06108	0.14727
400.0	67,291	26,282	0	93,573	0.07654	0.22381
410.0	93,938	30,047	0	123,985	0.10142	0.32523
420.0	72,851	90,531	0	163,382	0.13364	0.45887
430.0	76,630	75,674	0	152,305	0.12458	0.58345
440.0	47,556	107,362	0	154,917	0.12672	0.71017
450.0	27,932	103,905	0	131,836	0.10784	0.81801
460.0	19,492	68,388	0	87,880	0.07188	0.88989
470.0	9,015	45,947	0	54,962	0.04496	0.93485
480.0	0	28,062	0	28,062	0.02295	0.95780
490.0	3,352	18,468	0	21,820	0.01785	0.97565
500.0	0	10,519	0	10,519	0.00860	0.98425
510.0	0	11,204	0	11,204	0.00916	0.99342
520.0	0	4,917	0	4,917	0.00402	0.99744
530.0	0	1,669	0	1,669	0.00136	0.99880
540.0	0	1,462	0	1,462	0.00120	1.00000
TOTAL	563,809	658,733	0	1,222,541		

Table E-2.--Dover sole continued.

Stratum 915-1,097 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
370.0	2,475	0	0	2,475	0.00638	0.00638
380.0	13,723	2,475	0	16,198	0.04174	0.04812
390.0	10,786	2,475	0	13,260	0.03417	0.08229
400.0	20,892	14,849	0	35,741	0.09210	0.17439
410.0	12,135	29,682	0	41,816	0.10776	0.28215
420.0	15,519	33,729	0	49,248	0.12691	0.40906
430.0	16,421	38,439	0	54,860	0.14137	0.55044
440.0	1,349	23,830	0	25,179	0.06488	0.61532
450.0	2,235	31,924	0	34,159	0.08803	0.70335
460.0	2,698	44,043	0	46,741	0.12045	0.82380
470.0	0	31,940	0	31,940	0.08231	0.90611
480.0	0	15,519	0	15,519	0.03999	0.94610
490.0	0	14,393	0	14,393	0.03709	0.98319
500.0	0	3,824	0	3,824	0.00985	0.99305
510.0	0	1,349	0	1,349	0.00348	0.99652
520.0	0	1,349	0	1,349	0.00348	1.00000
TOTAL	98,233	289,818	0	388,051		

Stratum 1,098-1,280 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
380.0	0	740	0	740	0.01223	0.01223
390.0	863	0	0	863	0.01426	0.02649
400.0	863	0	0	863	0.01426	0.04075
410.0	740	740	0	1,480	0.02445	0.06520
420.0	740	2,467	0	3,207	0.05298	0.11818
430.0	0	5,945	0	5,945	0.09821	0.21639
440.0	0	3,478	0	3,478	0.05746	0.27386
450.0	0	12,604	0	12,604	0.20824	0.48210
460.0	740	9,126	0	9,866	0.16301	0.64511
470.0	0	7,079	0	7,079	0.11696	0.76207
480.0	0	4,465	0	4,465	0.07376	0.83583
490.0	0	5,328	0	5,328	0.08803	0.92386
500.0	0	4,608	0	4,608	0.07614	1.00000
TOTAL	3,946	56,580	0	60,526		

Table E-2.--Dover sole continued.

All strata combined

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
190.0	0	166,197	0	166,197	0.00462	0.00462
200.0	166,197	0	0	166,197	0.00462	0.00924
210.0	31,238	0	0	31,238	0.00087	0.01011
220.0	179,450	0	0	179,450	0.00499	0.01510
230.0	39,489	187,860	0	227,349	0.00632	0.02142
240.0	280,872	48,785	0	329,657	0.00917	0.03059
250.0	112,899	51,781	0	164,680	0.00458	0.03517
260.0	136,905	54,358	0	191,263	0.00532	0.04049
270.0	859,461	405,613	0	1,265,075	0.03518	0.07567
280.0	1,713,326	290,479	0	2,003,805	0.05572	0.13139
290.0	1,200,477	132,695	0	1,333,173	0.03707	0.16846
300.0	1,432,303	867,082	0	2,299,385	0.06394	0.23241
310.0	2,365,496	970,758	0	3,336,254	0.09278	0.32518
320.0	2,576,720	576,737	0	3,153,457	0.08769	0.41287
330.0	1,623,154	778,431	0	2,401,585	0.06678	0.47966
340.0	2,130,286	1,259,616	0	3,389,902	0.09427	0.57392
350.0	1,196,510	763,204	0	1,959,714	0.05450	0.62842
360.0	1,731,951	577,589	0	2,309,540	0.06422	0.69264
370.0	487,184	1,002,632	0	1,489,816	0.04143	0.73407
380.0	413,236	786,934	0	1,200,170	0.03337	0.76745
390.0	519,374	752,780	0	1,272,154	0.03538	0.80282
400.0	349,332	606,398	0	955,729	0.02658	0.82940
410.0	358,038	224,754	0	582,792	0.01621	0.84561
420.0	335,769	626,360	0	962,129	0.02676	0.87236
430.0	266,705	717,210	0	983,915	0.02736	0.89972
440.0	159,666	831,532	0	991,199	0.02756	0.92729
450.0	102,435	808,004	0	910,439	0.02532	0.95260
460.0	69,800	365,089	0	434,889	0.01209	0.96470
470.0	49,813	443,712	0	493,525	0.01372	0.97842
480.0	0	246,358	0	246,358	0.00685	0.98527
490.0	14,109	149,180	0	163,290	0.00454	0.98981
500.0	31,513	118,924	0	150,437	0.00418	0.99400
510.0	0	62,683	0	62,683	0.00174	0.99574
520.0	4,953	51,392	0	56,346	0.00157	0.99731
530.0	0	18,140	0	18,140	0.00050	0.99781
540.0	0	39,740	0	39,740	0.00111	0.99892
550.0	0	14,098	0	14,098	0.00039	0.99931
560.0	0	14,131	0	14,131	0.00039	0.99970
580.0	0	10,731	0	10,731	0.00030	1.00000
TOTAL	20,938,663	15,021,967	0	35,960,630		

Table E-3.--Arrowtooth flounder population size composition estimates by sex and size group for each depth stratum and for all depth strata combined.

Stratum 183-366 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
210.0	0	2,928	3,531	6,459	0.00528	0.00528
230.0	0	4,678	0	4,678	0.00382	0.00910
250.0	4,678	4,678	0	9,355	0.00765	0.01675
260.0	9,355	28,066	0	37,421	0.03059	0.04734
270.0	4,678	9,355	10,593	24,626	0.02013	0.06747
280.0	52,043	0	8,044	60,087	0.04911	0.11658
290.0	25,746	21,232	10,593	57,571	0.04706	0.16364
300.0	16,449	30,832	10,593	57,875	0.04731	0.21095
310.0	56,581	43,781	15,106	115,467	0.09438	0.30533
320.0	17,906	29,443	3,531	50,880	0.04159	0.34692
330.0	15,621	38,075	15,271	68,967	0.05637	0.40329
340.0	15,481	102,390	24,296	142,168	0.11621	0.51949
350.0	47,225	77,885	8,209	133,319	0.10897	0.62847
360.0	8,044	82,606	12,721	103,371	0.08449	0.71296
370.0	3,366	105,754	3,366	112,487	0.09195	0.80491
380.0	0	67,114	11,575	78,689	0.06432	0.86923
390.0	0	30,497	0	30,497	0.02493	0.89415
400.0	0	32,399	0	32,399	0.02648	0.92064
410.0	0	6,801	3,366	10,167	0.00831	0.92895
420.0	0	10,534	0	10,534	0.00861	0.93756
430.0	0	2,928	0	2,928	0.00239	0.93995
440.0	0	2,928	6,897	9,826	0.00803	0.94798
510.0	0	6,764	0	6,764	0.00553	0.95351
530.0	0	2,928	0	2,928	0.00239	0.95591
550.0	0	4,678	0	4,678	0.00382	0.95973
560.0	0	6,720	0	6,720	0.00549	0.96522
570.0	0	39,619	0	39,619	0.03238	0.99761
590.0	0	2,928	0	2,928	0.00239	1.00000
TOTAL	277,171	798,543	147,694	1,223,409		

Table E-3.--Arrowtooth flounder continued.

Stratum 367-549 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
230.0	17,944	0	0	17,944	0.00662	0.00662
260.0	5,366	10,731	0	16,097	0.00594	0.01256
270.0	71,776	0	0	71,776	0.02648	0.03905
280.0	100,344	59,198	0	159,542	0.05887	0.09791
290.0	121,252	28,675	0	149,928	0.05532	0.15324
300.0	141,043	22,211	0	163,255	0.06024	0.21347
310.0	218,421	34,041	0	252,462	0.09316	0.30663
320.0	135,244	100,451	0	235,696	0.08697	0.39360
330.0	89,891	123,761	0	213,652	0.07883	0.47243
340.0	57,918	55,504	0	113,422	0.04185	0.51428
350.0	61,014	68,082	0	129,096	0.04763	0.56192
360.0	42,461	34,041	0	76,502	0.02823	0.59015
370.0	41,254	177,764	0	219,018	0.08081	0.67096
380.0	21,340	168,184	0	189,524	0.06993	0.74089
390.0	0	110,833	0	110,833	0.04090	0.78179
400.0	0	62,825	0	62,825	0.02318	0.80497
410.0	0	69,929	0	69,929	0.02580	0.83078
420.0	7,384	23,310	0	30,693	0.01133	0.84210
430.0	0	71,776	0	71,776	0.02648	0.86859
440.0	0	117,297	0	117,297	0.04328	0.91187
450.0	0	54,003	0	54,003	0.01993	0.93179
460.0	0	5,366	0	5,366	0.00198	0.93377
470.0	0	23,310	0	23,310	0.00860	0.94237
500.0	5,258	5,421	0	10,679	0.00394	0.94631
510.0	0	5,366	0	5,366	0.00198	0.94829
530.0	0	17,944	0	17,944	0.00662	0.95491
550.0	0	17,944	0	17,944	0.00662	0.96154
560.0	12,642	25,328	0	37,969	0.01401	0.97555
570.0	0	17,944	0	17,944	0.00662	0.98217
580.0	0	12,749	0	12,749	0.00470	0.98687
590.0	0	5,258	0	5,258	0.00194	0.98881
630.0	0	6,573	0	6,573	0.00243	0.99124
640.0	7,384	0	0	7,384	0.00272	0.99396
650.0	0	4,533	0	4,533	0.00167	0.99563
680.0	0	5,258	0	5,258	0.00194	0.99757
740.0	0	6,573	0	6,573	0.00243	1.00000
TOTAL	1,157,937	1,552,184	0	2,710,121		

Table E-3.--Arrowtooth flounder continued.

All strata combined

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
210.0	0	2,928	3,531	6,459	0.00164	0.00164
230.0	17,944	4,678	0	22,622	0.00575	0.00739
250.0	4,678	4,678	0	9,355	0.00238	0.00977
260.0	14,721	38,797	0	53,518	0.01361	0.02338
270.0	76,454	9,355	10,593	96,402	0.02451	0.04788
280.0	152,387	59,198	8,044	219,629	0.05583	0.10372
290.0	146,998	49,907	10,593	207,499	0.05275	0.15647
300.0	157,492	53,044	10,593	221,130	0.05622	0.21269
310.0	275,002	77,822	15,106	367,930	0.09354	0.30622
320.0	153,150	129,894	3,531	286,575	0.07285	0.37908
330.0	105,512	161,836	15,271	282,619	0.07185	0.45093
340.0	73,399	157,894	24,296	255,589	0.06498	0.51590
350.0	108,239	145,967	8,209	262,415	0.06671	0.58262
360.0	50,505	116,647	12,721	179,873	0.04573	0.62835
370.0	44,620	283,518	3,366	331,504	0.08428	0.71262
380.0	21,340	235,298	11,575	268,213	0.06819	0.78081
390.0	0	141,330	0	141,330	0.03593	0.81674
400.0	0	95,225	0	95,225	0.02421	0.84095
410.0	0	76,730	3,366	80,096	0.02036	0.86131
420.0	7,384	33,844	0	41,227	0.01048	0.87179
430.0	0	74,704	0	74,704	0.01899	0.89078
440.0	0	120,225	6,897	127,123	0.03232	0.92310
450.0	0	54,003	0	54,003	0.01373	0.93683
460.0	0	5,366	0	5,366	0.00136	0.93819
470.0	0	23,310	0	23,310	0.00593	0.94412
500.0	5,258	5,421	0	10,679	0.00271	0.94683
510.0	0	12,130	0	12,130	0.00308	0.94992
530.0	0	20,872	0	20,872	0.00531	0.95522
550.0	0	22,622	0	22,622	0.00575	0.96097
560.0	12,642	32,047	0	44,689	0.01136	0.97234
570.0	0	57,564	0	57,564	0.01463	0.98697
580.0	0	12,749	0	12,749	0.00324	0.99021
590.0	0	8,187	0	8,187	0.00208	0.99229
630.0	0	6,573	0	6,573	0.00167	0.99396
640.0	7,384	0	0	7,384	0.00188	0.99584
650.0	0	4,533	0	4,533	0.00115	0.99699
680.0	0	5,258	0	5,258	0.00134	0.99833
740.0	0	6,573	0	6,573	0.00167	1.00000
TOTAL	1,435,108	2,350,727	147,694	3,933,529		

Table E-4.--Pacific hake population size composition estimates by sex and size group for each depth stratum and for all depth strata combined.

Stratum 183-366 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
300.0	0	0	2,928	2,928	0.00131	0.00131
380.0	33,316	0	0	33,316	0.01495	0.01627
390.0	0	0	39,764	39,764	0.01784	0.03411
400.0	0	0	13,959	13,959	0.00626	0.04038
410.0	3,027	0	14,987	18,013	0.00808	0.04846
420.0	14,261	8,004	165,563	187,828	0.08429	0.13275
430.0	21,679	43,711	83,514	148,903	0.06682	0.19958
440.0	24,455	11,031	187,784	223,269	0.10020	0.29977
450.0	42,768	10,798	371,957	425,522	0.19096	0.49074
460.0	52,284	6,053	130,681	189,019	0.08483	0.57557
470.0	4,002	39,741	208,616	252,359	0.11325	0.68882
480.0	6,053	47,141	104,758	157,953	0.07089	0.75970
490.0	12,849	14,196	36,117	63,162	0.02835	0.78805
500.0	3,398	37,318	86,075	126,791	0.05690	0.84495
510.0	0	15,021	75,785	90,806	0.04075	0.88570
520.0	6,425	40,345	17,831	64,601	0.02899	0.91469
530.0	0	0	18,106	18,106	0.00813	0.92282
540.0	0	66,633	0	66,633	0.02990	0.95272
550.0	0	0	3,366	3,366	0.00151	0.95423
560.0	0	9,822	3,791	13,614	0.00611	0.96034
570.0	0	33,316	3,791	37,108	0.01665	0.97700
600.0	0	0	3,531	3,531	0.00158	0.97858
620.0	0	33,316	0	33,316	0.01495	0.99353
650.0	0	0	7,157	7,157	0.00321	0.99674
680.0	0	0	3,791	3,791	0.00170	0.99845
690.0	0	3,463	0	3,463	0.00155	1.00000
TOTAL	224,516	419,910	1,583,854	2,228,280		

Stratum 367-549 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
400.0	0	0	33,767	33,767	0.01547	0.01547
410.0	34,577	22,011	23,694	80,282	0.03677	0.05224
420.0	51,881	22,011	92,867	166,759	0.07638	0.12862
430.0	42,412	66,011	86,507	194,930	0.08929	0.21791
440.0	96,449	130,030	150,221	376,700	0.17255	0.39046
450.0	125,750	144,688	111,115	381,553	0.17477	0.56523
460.0	71,252	150,834	102,068	324,154	0.14848	0.71371
470.0	61,158	58,811	60,610	180,579	0.08271	0.79642
480.0	26,001	69,565	41,779	137,346	0.06291	0.85934
490.0	18,680	36,991	22,028	77,698	0.03559	0.89493
500.0	0	61,965	5,258	67,223	0.03079	0.92572
510.0	0	32,574	11,511	44,085	0.02019	0.94591
520.0	0	14,521	5,258	19,780	0.00906	0.95497
530.0	5,366	11,939	5,366	22,670	0.01038	0.96536
540.0	6,573	5,421	0	11,994	0.00549	0.97085
550.0	6,573	12,687	0	19,260	0.00882	0.97967
560.0	0	0	11,511	11,511	0.00527	0.98494
580.0	5,421	0	5,258	10,679	0.00489	0.98984
620.0	0	0	6,145	6,145	0.00281	0.99265
640.0	5,421	0	5,366	10,787	0.00494	0.99759
680.0	0	0	5,258	5,258	0.00241	1.00000
TOTAL	557,513	840,060	785,589	2,183,162		

Table E-4.--Pacific hake continued.

Stratum 550-732 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
410.0	0	0	3,467	3,467	0.04286	0.04286
420.0	0	0	3,467	3,467	0.04286	0.08571
430.0	0	8,164	3,467	11,631	0.14376	0.22947
440.0	0	0	10,206	10,206	0.12614	0.35562
450.0	4,953	0	0	4,953	0.06122	0.41684
460.0	0	10,132	3,467	13,599	0.16809	0.58493
480.0	0	8,320	3,467	11,787	0.14569	0.73062
510.0	0	9,907	0	9,907	0.12245	0.85306
530.0	4,953	0	0	4,953	0.06122	0.91429
540.0	0	0	3,467	3,467	0.04286	0.95714
580.0	0	0	3,467	3,467	0.04286	1.00000
TOTAL	9,907	36,522	34,477	80,905		

Stratum 733-914 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
410.0	1,520	0	0	1,520	0.13875	0.13875
440.0	1,566	0	0	1,566	0.14300	0.28175
450.0	1,669	0	0	1,669	0.15233	0.43408
460.0	1,566	0	1,295	2,862	0.26126	0.69535
480.0	0	1,669	0	1,669	0.15233	0.84767
500.0	0	1,669	0	1,669	0.15233	1.00000
TOTAL	6,321	3,337	1,295	10,954		

Stratum 915-1,097 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
540.0	0	0	855	855	1.00000	1.00000
TOTAL	0	0	855			

Table E-4.--Pacific hake continued.

Stratum 1,098-1,280 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
440.0	740	0	1,011	1,751	0.30042	0.30042
450.0	0	0	712	712	0.12217	0.42259
460.0	0	740	0	740	0.12693	0.54951
470.0	0	0	900	900	0.15432	0.70383
490.0	0	859	0	859	0.14734	0.85117
520.0	0	868	0	868	0.14883	1.00000
TOTAL	740	2,467	2,623	5,830		

All strata combined

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
300.0	0	0	2,928	2,928	0.00065	0.00065
380.0	33,316	0	0	33,316	0.00739	0.00804
390.0	0	0	39,764	39,764	0.00882	0.01685
400.0	0	0	47,726	47,726	0.01058	0.02744
410.0	39,123	22,011	42,148	103,282	0.02290	0.05034
420.0	66,142	30,015	261,897	358,054	0.07939	0.12973
430.0	64,091	117,885	173,488	355,464	0.07882	0.20854
440.0	123,210	141,061	349,222	613,493	0.13603	0.34457
450.0	175,139	155,486	483,784	814,409	0.18058	0.52515
460.0	125,102	167,759	237,512	530,374	0.11760	0.64275
470.0	65,160	98,552	270,126	433,838	0.09620	0.73895
480.0	32,055	126,694	150,004	308,754	0.06846	0.80741
490.0	31,529	52,046	58,145	141,720	0.03142	0.83883
500.0	3,398	100,952	91,333	195,683	0.04339	0.88222
510.0	0	57,502	87,296	144,798	0.03211	0.91433
520.0	6,425	55,734	23,090	85,249	0.01890	0.93323
530.0	10,319	11,939	23,472	45,730	0.01014	0.94337
540.0	6,573	72,054	4,323	82,949	0.01839	0.96176
550.0	6,573	12,687	3,366	22,626	0.00502	0.96678
560.0	0	9,822	15,302	25,125	0.00557	0.97235
570.0	0	33,316	3,791	37,108	0.00823	0.98058
580.0	5,421	0	8,726	14,147	0.00314	0.98371
600.0	0	0	3,531	3,531	0.00078	0.98450
620.0	0	33,316	6,145	39,462	0.00875	0.99325
640.0	5,421	0	5,366	10,787	0.00239	0.99564
650.0	0	0	7,157	7,157	0.00159	0.99723
680.0	0	0	9,050	9,050	0.00201	0.99923
690.0	0	3,463	0	3,463	0.00077	1.00000
TOTAL	798,997	1,302,296	2,408,693	4,509,986		

Table E-5.--Shortspine thornyhead population size composition estimates by sex and size group for each depth stratum and for all depth strata combined.

Stratum 183-366 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
80.0	0	0	8,616	8,616	0.00061	0.00061
90.0	0	0	123,909	123,909	0.00882	0.00943
100.0	0	0	113,297	113,297	0.00806	0.01750
110.0	0	0	170,458	170,458	0.01213	0.02963
120.0	0	0	333,519	333,519	0.02374	0.05337
130.0	0	0	366,864	366,864	0.02611	0.07948
140.0	27,146	0	304,478	331,624	0.02360	0.10309
150.0	68,239	3,027	448,327	519,593	0.03698	0.14007
160.0	91,988	86,459	200,623	379,070	0.02698	0.16705
170.0	145,445	79,219	199,365	424,028	0.03018	0.19723
180.0	314,098	215,024	177,203	706,325	0.05028	0.24751
190.0	319,586	295,072	140,297	754,955	0.05374	0.30125
200.0	486,446	426,975	30,964	944,384	0.06722	0.36847
210.0	643,810	392,491	0	1,036,300	0.07376	0.44223
220.0	729,812	524,559	3,398	1,257,770	0.08953	0.53175
230.0	843,598	607,762	0	1,451,360	0.10331	0.63506
240.0	449,578	302,302	6,227	758,107	0.05396	0.68902
250.0	381,146	405,452	4,458	791,056	0.05631	0.74533
260.0	425,604	322,084	0	747,688	0.05322	0.79855
270.0	480,452	395,674	6,227	882,354	0.06280	0.86135
280.0	264,806	78,826	0	343,632	0.02446	0.88581
290.0	235,755	183,059	0	418,815	0.02981	0.91562
300.0	59,934	264,326	0	324,259	0.02308	0.93870
310.0	100,280	89,934	0	190,214	0.01354	0.95224
320.0	84,272	80,859	0	165,132	0.01175	0.96399
330.0	87,671	52,349	0	140,020	0.00997	0.97396
340.0	68,636	35,626	0	104,262	0.00742	0.98138
350.0	0	9,625	0	9,625	0.00069	0.98207
360.0	3,398	6,227	0	9,625	0.00069	0.98275
370.0	34,977	36,175	0	71,152	0.00506	0.98782
390.0	0	34,977	0	34,977	0.00249	0.99031
410.0	0	34,977	0	34,977	0.00249	0.99279
420.0	34,977	4,458	0	39,435	0.00281	0.99560
430.0	0	34,977	0	34,977	0.00249	0.99809
440.0	0	3,398	0	3,398	0.00024	0.99833
490.0	5,589	0	0	5,589	0.00040	0.99873
500.0	0	4,458	0	4,458	0.00032	0.99905
510.0	8,915	0	0	8,915	0.00063	0.99968
550.0	4,458	0	0	4,458	0.00032	1.00000
TOTAL	6,400,616	5,010,353	2,638,229	14,049,198		

Table E-5.--Shortspine thornyhead continued.

Stratum 367-549 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
80.0	0	0	15,920	15,920	0.00088	0.00088
90.0	0	0	182,378	182,378	0.01013	0.01101
100.0	0	0	170,610	170,610	0.00947	0.02048
110.0	0	0	249,741	249,741	0.01387	0.03435
120.0	0	0	454,634	454,634	0.02524	0.05959
130.0	0	0	289,303	289,303	0.01606	0.07565
140.0	0	0	279,103	279,103	0.01550	0.09115
150.0	18,178	0	377,294	395,472	0.02196	0.11310
160.0	64,598	30,406	1,101,604	1,196,608	0.06643	0.17954
170.0	68,010	177,975	856,540	1,102,526	0.06121	0.24075
180.0	338,751	277,956	544,145	1,160,852	0.06445	0.30520
190.0	352,558	373,104	266,138	991,801	0.05506	0.36026
200.0	331,234	492,443	143,741	967,418	0.05371	0.41397
210.0	759,277	596,865	62,832	1,418,974	0.07878	0.49275
220.0	635,954	654,569	46,536	1,337,059	0.07423	0.56698
230.0	790,581	536,850	0	1,327,431	0.07370	0.64068
240.0	398,450	571,974	34,544	1,004,968	0.05579	0.69648
250.0	462,118	387,450	0	849,569	0.04717	0.74364
260.0	412,370	291,485	0	703,856	0.03908	0.78272
270.0	569,128	210,401	0	779,529	0.04328	0.82600
280.0	391,055	193,315	0	584,371	0.03244	0.85844
290.0	295,279	205,384	0	500,663	0.02780	0.88624
300.0	228,668	167,194	0	395,862	0.02198	0.90822
310.0	316,887	68,222	0	385,108	0.02138	0.92960
320.0	49,386	66,015	0	115,402	0.00641	0.93601
330.0	142,072	99,196	0	241,268	0.01340	0.94940
340.0	127,908	9,957	0	137,865	0.00765	0.95706
350.0	139,907	9,957	0	149,864	0.00832	0.96538
360.0	43,183	49,788	0	92,971	0.00516	0.97054
370.0	45,090	36,778	0	81,869	0.00455	0.97508
380.0	48,307	23,268	0	71,575	0.00397	0.97906
390.0	53,308	9,957	0	63,265	0.00351	0.98257
400.0	18,435	8,478	0	26,913	0.00149	0.98406
410.0	9,957	0	0	9,957	0.00055	0.98462
430.0	58,762	18,178	0	76,939	0.00427	0.98889
440.0	5,258	0	0	5,258	0.00029	0.98918
450.0	19,753	15,399	0	35,153	0.00195	0.99113
460.0	11,276	0	0	11,276	0.00063	0.99176
470.0	11,276	0	0	11,276	0.00063	0.99238
490.0	9,957	5,258	0	15,216	0.00084	0.99323
520.0	8,478	8,478	0	16,956	0.00094	0.99417
540.0	6,114	0	0	6,114	0.00034	0.99451
550.0	5,258	0	0	5,258	0.00029	0.99480
570.0	0	9,957	0	9,957	0.00055	0.99535
580.0	0	49,788	0	49,788	0.00276	0.99812
630.0	0	8,478	0	8,478	0.00047	0.99859
640.0	0	8,478	0	8,478	0.00047	0.99906
670.0	0	8,478	0	8,478	0.00047	0.99953
690.0	0	8,478	0	8,478	0.00047	1.00000
TOTAL	7,246,782	5,689,960	5,075,061	18,011,803		

Table E-5.--Shortspine thornyhead continued.

Stratum 550-732 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
160.0	0	0	3,271	3,271	0.00123	0.00123
170.0	0	0	6,980	6,980	0.00262	0.00385
180.0	3,271	0	0	3,271	0.00123	0.00509
190.0	0	0	6,980	6,980	0.00262	0.00771
200.0	8,224	6,980	0	15,204	0.00572	0.01343
210.0	3,366	13,959	6,980	24,305	0.00914	0.02257
220.0	31,189	13,959	10,379	55,528	0.02088	0.04345
230.0	15,325	13,959	0	29,284	0.01101	0.05446
240.0	17,359	35,115	6,980	59,453	0.02236	0.07682
250.0	49,074	13,959	0	63,033	0.02370	0.10053
260.0	50,684	38,700	0	89,384	0.03361	0.13414
270.0	81,525	42,777	6,733	131,034	0.04928	0.18342
280.0	64,776	78,554	0	143,330	0.05390	0.23732
290.0	100,114	56,997	3,366	160,477	0.06035	0.29767
300.0	70,604	78,516	0	149,121	0.05608	0.35375
310.0	72,835	90,503	0	163,338	0.06143	0.41518
320.0	41,247	56,775	0	98,022	0.03686	0.45204
330.0	59,805	70,120	0	129,925	0.04886	0.50090
340.0	97,576	65,887	0	163,464	0.06147	0.56237
350.0	74,392	54,528	0	128,920	0.04848	0.61086
360.0	89,930	42,939	0	132,869	0.04997	0.66082
370.0	86,678	21,041	0	107,719	0.04051	0.70133
380.0	47,774	6,642	0	54,416	0.02046	0.72180
390.0	78,327	30,891	0	109,218	0.04107	0.76287
400.0	98,355	13,218	0	111,572	0.04196	0.80483
410.0	53,996	3,366	0	57,362	0.02157	0.82640
420.0	42,443	14,769	0	57,213	0.02152	0.84792
430.0	28,172	3,399	0	31,572	0.01187	0.85979
440.0	26,297	6,637	0	32,934	0.01239	0.87218
450.0	20,045	0	0	20,045	0.00754	0.87971
460.0	35,468	3,399	0	38,867	0.01462	0.89433
470.0	9,913	0	0	9,913	0.00373	0.89806
480.0	14,183	10,627	0	24,811	0.00933	0.90739
490.0	6,542	0	0	6,542	0.00246	0.90985
500.0	4,953	0	0	4,953	0.00186	0.91171
520.0	6,980	0	0	6,980	0.00262	0.91434
530.0	9,126	0	0	9,126	0.00343	0.91777
550.0	3,399	0	0	3,399	0.00128	0.91905
560.0	3,243	0	0	3,243	0.00122	0.92027
570.0	3,366	3,366	0	6,733	0.00253	0.92280
580.0	10,784	17,764	0	28,548	0.01074	0.93353
600.0	12,338	3,399	0	15,737	0.00592	0.93945
610.0	3,243	7,385	0	10,627	0.00400	0.94345
620.0	0	17,202	0	17,202	0.00647	0.94992
630.0	3,399	11,557	0	14,956	0.00562	0.95554
640.0	12,338	10,656	0	22,994	0.00865	0.96419
650.0	0	11,686	0	11,686	0.00439	0.96858
660.0	4,953	19,723	0	24,676	0.00928	0.97786
670.0	0	14,769	0	14,769	0.00555	0.98342
680.0	0	18,942	0	18,942	0.00712	0.99054
700.0	6,980	7,385	0	14,364	0.00540	0.99594
730.0	0	3,399	0	3,399	0.00128	0.99722
740.0	0	7,385	0	7,385	0.00278	1.00000
TOTAL	1,564,591	1,042,834	51,667	2,659,092		

Table E-5.--Shortspine thornyhead continued.

Stratum 733-914 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
210.0	0	1,616	0	1,616	0.00258	0.00258
240.0	2,757	0	0	2,757	0.00440	0.00698
250.0	1,520	0	0	1,520	0.00242	0.00940
260.0	0	1,295	0	1,295	0.00207	0.01147
270.0	0	2,757	0	2,757	0.00440	0.01587
280.0	1,462	1,669	0	3,131	0.00499	0.02086
290.0	0	2,924	0	2,924	0.00466	0.02552
300.0	2,591	2,964	0	5,555	0.00886	0.03438
310.0	4,444	14,694	0	19,138	0.03053	0.06491
320.0	4,592	4,324	0	8,916	0.01422	0.07913
330.0	1,520	2,964	0	4,484	0.00715	0.08629
340.0	6,050	9,741	0	15,791	0.02519	0.11148
350.0	2,591	7,299	0	9,890	0.01578	0.12725
360.0	15,557	11,261	0	26,818	0.04278	0.17003
370.0	14,993	13,067	0	26,060	0.04476	0.21479
380.0	33,782	14,895	0	48,677	0.07765	0.29244
390.0	13,780	8,774	0	22,554	0.03598	0.32841
400.0	34,563	6,195	0	40,757	0.06501	0.39343
410.0	28,792	1,669	0	30,460	0.04859	0.44202
420.0	39,060	9,125	0	48,185	0.07686	0.51888
430.0	45,912	7,555	0	53,468	0.08529	0.60417
440.0	32,656	4,782	0	37,438	0.05972	0.66389
450.0	38,925	1,551	0	40,476	0.06456	0.72845
460.0	28,406	1,566	0	29,973	0.04781	0.77626
470.0	25,208	3,136	0	28,344	0.04521	0.82147
480.0	14,177	3,086	0	17,264	0.02754	0.84901
490.0	6,305	6,407	0	12,712	0.02028	0.86929
500.0	4,741	1,624	0	6,366	0.01015	0.87944
510.0	3,175	3,191	0	6,366	0.01015	0.88960
520.0	4,711	3,086	0	7,797	0.01244	0.90204
530.0	3,182	0	0	3,182	0.00508	0.90711
540.0	1,462	2,911	0	4,373	0.00698	0.91409
550.0	3,235	3,191	0	6,426	0.01025	0.92434
560.0	0	1,624	0	1,624	0.00259	0.92693
570.0	1,616	3,284	0	4,900	0.00782	0.93475
580.0	3,240	1,566	0	4,807	0.00767	0.94241
600.0	6,426	1,669	0	8,094	0.01291	0.95533
610.0	0	2,911	0	2,911	0.00464	0.95997
620.0	1,616	3,249	0	4,865	0.00776	0.96773
630.0	0	3,235	0	3,235	0.00516	0.97289
640.0	0	4,470	0	4,470	0.00713	0.98002
650.0	0	3,240	0	3,240	0.00517	0.98519
660.0	0	3,235	0	3,235	0.00516	0.99035
670.0	0	1,669	0	1,669	0.00266	0.99301
680.0	0	1,295	0	1,295	0.00207	0.99508
690.0	0	1,520	0	1,520	0.00242	0.99750
700.0	0	1,566	0	1,566	0.00250	1.00000
TOTAL	433,047	193,854	0	626,901		

Table E-5.--Shortspine thornyhead continued.

Stratum 915-1,097 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
250.0	804	0	0	804	0.00389	0.00389
260.0	900	0	0	900	0.00436	0.00825
270.0	0	855	0	855	0.00414	0.01240
280.0	804	0	0	804	0.00389	0.01629
290.0	3,214	0	0	3,214	0.01557	0.03185
300.0	0	1,653	0	1,653	0.00801	0.03986
320.0	827	0	0	827	0.00400	0.04387
330.0	0	827	0	827	0.00400	0.04787
340.0	1,727	827	0	2,554	0.01237	0.06024
350.0	3,395	886	0	4,282	0.02074	0.08098
360.0	0	900	0	900	0.00436	0.08534
370.0	827	5,196	0	6,022	0.02917	0.11451
380.0	3,511	900	0	4,412	0.02137	0.13588
390.0	2,569	1,872	0	4,440	0.02151	0.15738
400.0	7,273	3,370	0	10,643	0.05155	0.20893
410.0	9,112	804	0	9,916	0.04803	0.25696
420.0	9,623	1,682	0	11,305	0.05476	0.31171
430.0	15,392	5,180	0	20,571	0.09964	0.41135
440.0	11,394	2,613	0	14,007	0.06784	0.47919
450.0	8,691	2,486	0	11,176	0.05413	0.53333
460.0	7,173	2,795	0	9,968	0.04828	0.58161
470.0	7,659	3,446	0	11,105	0.05379	0.63539
480.0	7,877	886	0	8,764	0.04245	0.67784
490.0	4,287	4,309	0	8,597	0.04164	0.71948
500.0	5,255	827	0	6,082	0.02946	0.74893
510.0	1,690	3,341	0	5,031	0.02437	0.77330
520.0	2,545	2,136	0	4,681	0.02267	0.79598
530.0	827	4,391	0	5,217	0.02527	0.82125
540.0	2,841	1,787	0	4,627	0.02241	0.84366
550.0	2,599	3,542	0	6,142	0.02975	0.87341
560.0	855	1,713	0	2,569	0.01244	0.88585
570.0	0	4,599	0	4,599	0.02227	0.90812
580.0	855	886	0	1,742	0.00844	0.91656
590.0	1,068	1,773	0	2,841	0.01376	0.93031
600.0	1,954	4,471	0	6,425	0.03112	0.96144
610.0	886	1,742	0	2,628	0.01273	0.97416
620.0	0	1,690	0	1,690	0.00818	0.98235
630.0	0	1,068	0	1,068	0.00517	0.98752
640.0	0	886	0	886	0.00429	0.99182
660.0	0	1,690	0	1,690	0.00818	1.00000
TOTAL	128,435	78,028	0	206,462		

Table E-5.--Shortspine thornyhead continued.

Stratum 1,098-1,280 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
320.0	900	712	0	1,612	0.01102	0.01102
340.0	2,667	0	0	2,667	0.01823	0.02924
350.0	859	859	0	1,718	0.01174	0.04098
360.0	1,767	2,448	0	4,215	0.02881	0.06979
370.0	3,678	0	0	3,678	0.02514	0.09493
380.0	5,180	900	0	6,079	0.04155	0.13648
390.0	4,465	3,350	0	7,815	0.05341	0.18989
400.0	5,401	1,599	0	7,000	0.04784	0.23773
410.0	1,424	4,210	0	5,634	0.03850	0.27624
420.0	5,809	5,248	0	11,058	0.07557	0.35181
430.0	4,014	724	0	4,739	0.03239	0.38420
440.0	5,230	5,945	0	11,175	0.07637	0.46057
450.0	7,263	6,374	0	13,637	0.09320	0.55377
460.0	4,911	3,024	0	7,935	0.05423	0.60800
470.0	3,614	868	0	4,482	0.03063	0.63863
480.0	1,580	3,614	0	5,194	0.03550	0.67413
490.0	3,598	3,342	0	6,940	0.04743	0.72156
500.0	5,099	2,603	0	7,702	0.05264	0.77420
510.0	0	900	0	900	0.00615	0.78035
520.0	724	4,494	0	5,218	0.03566	0.81601
530.0	863	5,650	0	6,514	0.04452	0.86053
540.0	868	4,115	0	4,983	0.03406	0.89459
550.0	1,588	1,911	0	3,499	0.02391	0.91850
560.0	0	724	0	724	0.00495	0.92345
570.0	0	2,886	0	2,886	0.01973	0.94317
580.0	0	1,011	0	1,011	0.00691	0.95009
600.0	0	4,227	0	4,227	0.02889	0.97898
610.0	0	1,624	0	1,624	0.01110	0.99008
640.0	0	712	0	712	0.00487	0.99494
690.0	0	740	0	740	0.00506	1.00000
TOTAL	71,502	74,816	0	146,317		

Table E-5.--Shortspine thornyhead continued.

All strata combined

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
80.0	0	0	24,535	24,535	0.00069	0.00069
90.0	0	0	306,287	306,287	0.00858	0.00927
100.0	0	0	283,906	283,906	0.00795	0.01722
110.0	0	0	420,198	420,198	0.01177	0.02899
120.0	0	0	788,152	788,152	0.02208	0.05107
130.0	0	0	656,167	656,167	0.01838	0.06945
140.0	27,146	0	583,581	610,727	0.01711	0.08655
150.0	86,417	3,027	825,621	915,065	0.02563	0.11219
160.0	156,585	116,865	1,305,498	1,578,949	0.04423	0.15642
170.0	213,455	257,194	1,062,885	1,533,534	0.04296	0.19937
180.0	656,120	492,980	721,348	1,870,448	0.05239	0.25177
190.0	672,145	668,176	413,415	1,753,736	0.04912	0.30089
200.0	825,904	926,397	174,705	1,927,006	0.05398	0.35487
210.0	1,406,453	1,004,931	69,811	2,481,195	0.06950	0.42437
220.0	1,396,956	1,193,087	60,313	2,650,356	0.07424	0.49861
230.0	1,649,504	1,158,571	0	2,808,075	0.07866	0.57727
240.0	868,144	909,391	47,751	1,825,285	0.05113	0.62840
250.0	894,662	806,862	4,458	1,705,981	0.04779	0.67618
260.0	889,559	653,565	0	1,543,123	0.04323	0.71941
270.0	1,131,104	652,466	12,960	1,796,530	0.05032	0.76973
280.0	722,902	352,364	0	1,075,267	0.03012	0.79985
290.0	634,362	448,364	3,366	1,086,093	0.03042	0.83027
300.0	361,796	514,654	0	876,450	0.02455	0.85483
310.0	494,446	263,353	0	757,799	0.02123	0.87605
320.0	181,224	208,685	0	389,909	0.01092	0.88697
330.0	291,067	225,456	0	516,524	0.01447	0.90144
340.0	304,565	122,039	0	426,603	0.01195	0.91339
350.0	221,144	83,155	0	304,299	0.00852	0.92192
360.0	153,835	113,564	0	267,398	0.00749	0.92941
370.0	186,244	112,257	0	298,500	0.00836	0.93777
380.0	138,554	46,605	0	185,159	0.00519	0.94295
390.0	152,448	89,821	0	242,269	0.00679	0.94974
400.0	164,026	32,859	0	196,885	0.00552	0.95526
410.0	103,281	45,025	0	148,306	0.00415	0.95941
420.0	131,913	35,282	0	167,195	0.00468	0.96409
430.0	152,252	70,014	0	222,266	0.00623	0.97032
440.0	80,835	23,376	0	104,211	0.00292	0.97324
450.0	94,676	25,810	0	120,486	0.00337	0.97661
460.0	87,233	10,785	0	98,018	0.00275	0.97936
470.0	57,671	7,449	0	65,120	0.00182	0.98118
480.0	37,818	18,214	0	56,032	0.00157	0.98275
490.0	36,279	19,316	0	55,596	0.00156	0.98431
500.0	20,049	9,512	0	29,561	0.00083	0.98514
510.0	13,780	7,432	0	21,212	0.00059	0.98573
520.0	23,438	18,194	0	41,632	0.00117	0.98690
530.0	13,998	10,041	0	24,039	0.00067	0.98757
540.0	11,285	8,813	0	20,098	0.00056	0.98813

Table E-5 .--Shortspine thornyhead continued.

All strata combined

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
550.0	20,537	8,644	0	29,181	0.00082	0.98895
560.0	4,098	4,062	0	8,160	0.00023	0.98918
570.0	4,982	24,093	0	29,075	0.00081	0.98999
580.0	14,880	71,016	0	85,895	0.00241	0.99240
590.0	1,068	1,773	0	2,841	0.00008	0.99248
600.0	20,718	13,766	0	34,484	0.00097	0.99345
610.0	4,129	13,662	0	17,791	0.00050	0.99394
620.0	1,616	22,140	0	23,756	0.00067	0.99461
630.0	3,399	24,338	0	27,737	0.00078	0.99539
640.0	12,338	25,202	0	37,540	0.00105	0.99644
650.0	0	14,926	0	14,926	0.00042	0.99686
660.0	4,953	24,647	0	29,601	0.00083	0.99769
670.0	0	24,916	0	24,916	0.00070	0.99838
680.0	0	20,237	0	20,237	0.00057	0.99895
690.0	0	10,738	0	10,738	0.00030	0.99925
700.0	6,980	8,951	0	15,931	0.00045	0.99970
730.0	0	3,399	0	3,399	0.00010	0.99979
740.0	0	7,385	0	7,385	0.00021	1.00000
TOTAL	15,844,972	12,089,845	7,764,957	35,699,773		

Table E-6.--Longspine thornyhead population size composition estimates by sex and size group for each depth stratum and for all depth strata combined.

Stratum 367-549 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
70.0	0	0	77,719	77,719	0.02656	0.02656
80.0	0	0	77,719	77,719	0.02656	0.05312
90.0	0	0	51,812	51,812	0.01771	0.07083
100.0	0	0	129,531	129,531	0.04427	0.11510
110.0	0	0	83,084	83,084	0.02840	0.14350
120.0	0	0	103,625	103,625	0.03542	0.17892
130.0	0	0	83,084	83,084	0.02840	0.20731
140.0	0	0	67,909	67,909	0.02321	0.23052
150.0	0	0	10,731	10,731	0.00367	0.23419
160.0	0	0	145,628	145,628	0.04977	0.28396
170.0	0	0	108,990	108,990	0.03725	0.32121
180.0	0	0	84,006	84,006	0.02871	0.34992
190.0	0	0	109,913	109,913	0.03757	0.38749
200.0	0	0	119,722	119,722	0.04092	0.42841
210.0	0	0	176,900	176,900	0.06046	0.48887
220.0	0	0	359,165	359,165	0.12275	0.61162
230.0	0	0	223,346	223,346	0.07633	0.68796
240.0	0	0	243,887	243,887	0.08335	0.77131
250.0	0	0	347,512	347,512	0.11877	0.89008
260.0	0	0	83,084	83,084	0.02840	0.91848
270.0	0	0	108,990	108,990	0.03725	0.95573
280.0	0	0	103,625	103,625	0.03542	0.99115
290.0	0	0	25,906	25,906	0.00885	1.00000
TOTAL	0	0	2,925,889	2,925,889		

Table E-6.--Longspine thornyhead continued.

Stratum 550-732 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
60.0	0	0	73,414	73,414	0.00414	0.00414
70.0	0	0	572,426	572,426	0.03231	0.03645
80.0	0	0	636,993	636,993	0.03595	0.07240
90.0	0	0	472,517	472,517	0.02667	0.09906
100.0	0	0	701,265	701,265	0.03958	0.13864
110.0	0	0	1,362,347	1,362,347	0.07689	0.21553
120.0	0	0	1,030,336	1,030,336	0.05815	0.27367
130.0	0	0	558,764	558,764	0.03153	0.30521
140.0	0	0	391,402	391,402	0.02209	0.32730
150.0	0	0	594,253	594,253	0.03354	0.36084
160.0	0	0	231,225	231,225	0.01305	0.37388
170.0	0	0	262,586	262,586	0.01482	0.38870
180.0	0	0	351,084	351,084	0.01981	0.40852
190.0	0	0	471,393	471,393	0.02660	0.43512
200.0	0	0	612,038	612,038	0.03454	0.46966
210.0	0	0	759,468	759,468	0.04286	0.51252
220.0	0	0	842,213	842,213	0.04753	0.56005
230.0	0	0	934,188	934,188	0.05272	0.61278
240.0	0	0	1,505,257	1,505,257	0.08495	0.69773
250.0	0	0	1,889,966	1,889,966	0.10666	0.80439
260.0	0	0	1,471,824	1,471,824	0.08306	0.88745
270.0	0	0	776,730	776,730	0.04384	0.93129
280.0	0	0	522,437	522,437	0.02948	0.96077
290.0	0	0	300,952	300,952	0.01698	0.97776
300.0	0	0	225,015	225,015	0.01270	0.99046
310.0	0	0	87,275	87,275	0.00493	0.99538
320.0	0	0	17,833	17,833	0.00101	0.99639
330.0	0	0	7,284	7,284	0.00041	0.99680
340.0	0	0	56,730	56,730	0.00320	1.00000
TOTAL	0	0	17,719,216	17,719,216		

Table E-6.--Long/spine thornyhead continued.

Stratum 733-914 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
50.0	0	0	15,848	15,848	0.00040	0.00040
60.0	0	0	15,848	15,848	0.00040	0.00080
70.0	0	0	590,015	590,015	0.01482	0.01562
80.0	0	0	914,234	914,234	0.02297	0.03859
90.0	0	0	850,360	850,360	0.02136	0.05995
100.0	0	0	1,791,117	1,791,117	0.04500	0.10495
110.0	0	0	935,930	935,930	0.02351	0.12847
120.0	0	0	1,267,088	1,267,088	0.03183	0.16030
130.0	0	0	1,678,149	1,678,149	0.04216	0.20246
140.0	0	0	794,599	794,599	0.01996	0.22243
150.0	0	0	892,722	892,722	0.02243	0.24485
160.0	0	0	1,223,791	1,223,791	0.03075	0.27560
170.0	0	0	1,098,244	1,098,244	0.02759	0.30319
180.0	0	0	1,443,105	1,443,105	0.03626	0.33945
190.0	0	0	2,226,742	2,226,742	0.05594	0.39539
200.0	0	0	1,570,023	1,570,023	0.03945	0.43484
210.0	0	0	2,006,914	2,006,914	0.05042	0.48526
220.0	0	0	2,584,419	2,584,419	0.06493	0.55019
230.0	0	0	2,822,721	2,822,721	0.07092	0.62111
240.0	0	0	3,131,621	3,131,621	0.07868	0.69979
250.0	0	0	3,273,238	3,273,238	0.08224	0.78202
260.0	0	0	2,946,780	2,946,780	0.07403	0.85606
270.0	0	0	2,658,181	2,658,181	0.06678	0.92284
280.0	0	0	1,773,552	1,773,552	0.04456	0.96740
290.0	0	0	917,463	917,463	0.02305	0.99045
300.0	0	0	250,854	250,854	0.00630	0.99675
310.0	0	0	43,509	43,509	0.00109	0.99785
320.0	0	0	50,789	50,789	0.00128	0.99912
330.0	0	0	34,941	34,941	0.00088	1.00000
TOTAL	0	0	39,802,797	39,802,797		

Table E-6. --Longspine thornyhead Continued.

Stratum 915-1,097 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
60.0	0	0	14,661	14,661	0.00124	0.00124
70.0	0	0	24,204	24,204	0.00205	0.00329
80.0	0	0	153,482	153,482	0.01299	0.01628
90.0	0	0	74,927	74,927	0.00634	0.02262
100.0	0	0	12,102	12,102	0.00102	0.02365
110.0	0	0	175,831	175,831	0.01488	0.03853
120.0	0	0	69,351	69,351	0.00587	0.04440
130.0	0	0	227,649	227,649	0.01927	0.06367
140.0	0	0	286,024	286,024	0.02421	0.08787
150.0	0	0	368,885	368,885	0.03122	0.11910
160.0	0	0	428,393	428,393	0.03626	0.15536
170.0	0	0	569,845	569,845	0.04823	0.20359
180.0	0	0	659,781	659,781	0.05584	0.25943
190.0	0	0	679,568	679,568	0.05752	0.31695
200.0	0	0	685,241	685,241	0.05800	0.37495
210.0	0	0	1,061,356	1,061,356	0.08983	0.46478
220.0	0	0	951,757	951,757	0.08056	0.54533
230.0	0	0	1,239,298	1,239,298	0.10489	0.65023
240.0	0	0	805,785	805,785	0.06820	0.71843
250.0	0	0	999,722	999,722	0.08462	0.80304
260.0	0	0	1,197,169	1,197,169	0.10133	0.90437
270.0	0	0	583,904	583,904	0.04942	0.95379
280.0	0	0	394,282	394,282	0.03337	0.98716
290.0	0	0	120,594	120,594	0.01021	0.99737
300.0	0	0	31,057	31,057	0.00263	1.00000
TOTAL	0	0	11,814,867	11,814,867		

Table E-6.--Longspine thornyhead continued.

Stratum 1,098-1,280 m

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
60.0	0	0	7,024	7,024	0.00064	0.00064
70.0	0	0	54,957	54,957	0.00498	0.00562
80.0	0	0	129,303	129,303	0.01172	0.01734
90.0	0	0	236,371	236,371	0.02143	0.03878
100.0	0	0	428,419	428,419	0.03884	0.07762
110.0	0	0	526,441	526,441	0.04773	0.12535
120.0	0	0	578,361	578,361	0.05244	0.17779
130.0	0	0	402,423	402,423	0.03649	0.21428
140.0	0	0	410,086	410,086	0.03718	0.25146
150.0	0	0	657,082	657,082	0.05958	0.31104
160.0	0	0	650,144	650,144	0.05895	0.36999
170.0	0	0	746,989	746,989	0.06773	0.43772
180.0	0	0	911,612	911,612	0.08266	0.52037
190.0	0	0	850,012	850,012	0.07707	0.59744
200.0	0	0	757,237	757,237	0.06866	0.66610
210.0	0	0	917,708	917,708	0.08321	0.74931
220.0	0	0	759,989	759,989	0.06891	0.81822
230.0	0	0	707,764	707,764	0.06417	0.88239
240.0	0	0	472,412	472,412	0.04283	0.92522
250.0	0	0	355,044	355,044	0.03219	0.95742
260.0	0	0	303,998	303,998	0.02756	0.98498
270.0	0	0	106,499	106,499	0.00966	0.99464
280.0	0	0	32,449	32,449	0.00294	0.99758
290.0	0	0	12,050	12,050	0.00109	0.99867
300.0	0	0	6,819	6,819	0.00062	0.99929
330.0	0	0	7,838	7,838	0.00071	1.00000
TOTAL	0	0	11,029,030	11,029,030		

Table E-6. --Longspine thornyhead continued.

All strata combined

LENGTH (MM)	MALES	FEMALES	UNSEXED	TOTAL	PROPORTION	CUMULATIVE PROPORTION
50.0	0	0	15,848	15,848	0.00019	0.00019
60.0	0	0	110,947	110,947	0.00133	0.00152
70.0	0	0	1,319,320	1,319,320	0.01584	0.01736
80.0	0	0	1,911,730	1,911,730	0.02295	0.04031
90.0	0	0	1,685,987	1,685,987	0.02024	0.06056
100.0	0	0	3,062,434	3,062,434	0.03677	0.09732
110.0	0	0	3,083,633	3,083,633	0.03702	0.13435
120.0	0	0	3,048,760	3,048,760	0.03660	0.17095
130.0	0	0	2,950,069	2,950,069	0.03542	0.20637
140.0	0	0	1,950,020	1,950,020	0.02341	0.22978
150.0	0	0	2,523,674	2,523,674	0.03030	0.26008
160.0	0	0	2,679,181	2,679,181	0.03217	0.29224
170.0	0	0	2,786,654	2,786,654	0.03346	0.32570
180.0	0	0	3,449,588	3,449,588	0.04142	0.36712
190.0	0	0	4,337,628	4,337,628	0.05208	0.41919
200.0	0	0	3,744,261	3,744,261	0.04495	0.46415
210.0	0	0	4,922,346	4,922,346	0.05910	0.52325
220.0	0	0	5,497,543	5,497,543	0.06600	0.58925
230.0	0	0	5,927,317	5,927,317	0.07116	0.66041
240.0	0	0	6,158,962	6,158,962	0.07394	0.73436
250.0	0	0	6,865,482	6,865,482	0.08243	0.81678
260.0	0	0	6,002,855	6,002,855	0.07207	0.88885
270.0	0	0	4,234,305	4,234,305	0.05084	0.93969
280.0	0	0	2,826,344	2,826,344	0.03393	0.97362
290.0	0	0	1,376,966	1,376,966	0.01653	0.99016
300.0	0	0	513,746	513,746	0.00617	0.99632
310.0	0	0	130,784	130,784	0.00157	0.99789
320.0	0	0	68,622	68,622	0.00082	0.99872
330.0	0	0	50,063	50,063	0.00060	0.99932
340.0	0	0	56,730	56,730	0.00068	1.00000
TOTAL	0	0	83,291,799	83,291,799		

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