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U.S. DEPARTMENT OF COMMERCE
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ABSTRACT

The 1989 Alaska Fisheries Science Center west coast triennial bottom trawl survey was conducted to assess stocks of groundfish inhabiting the continental shelf waters off California, Oregon, and Washington. This was the fifth survey in a series to monitor long-term trends in the distribution and abundance of these groundfish populations.

In contrast to the preceeding triennial trawl surveys, the 1989 survey design shifted emphasis away from estimating rockfish abundance. Instead, the 1989 survey objectives emphasized assessing a broader range of groundfish species. The design also focused upon precisely estimating the near-bottom component of the Pacific hake (Merluccius products) resource and juvenile (age l+) sablefish (Anoplopoma fimbria),. which inhabit waters shallower than 366 m. The survey extended from Pt. Conception, California, to central Vancouver Island, British Columbia (34°30'-49°40'N lat.), between the depths of 55 and 366 m. A total of 601 stations were occupied, of which 539 were successfully sampled. Catches included 121 groundfish species.

In this report, we document the survey design and the methods used, summarize the data collected, and report the results of our analyses of distribution, abundance, and biological parameters? Included are temperature data, catch composition, relative abundance, and species distribution information Estimates of biomass, population numbers, and length and age composition are also presented.

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INTRODUCTION

In 1989, the fifth in an ongoing series of groundfish assessment surveys of the continental shelf resources off the coasts of California, Oregon, and Washington was carried out by the Resource Assessment and Conservation Engineering (RACE) Division of the Alaska Fisheries Science Center (AFSC). These bottom trawl surveys, initiated in 1977 and performed triennially, were designed to provide resource managers with fishery-independent data about the distribution, abundance, and biological characteristics of several commercially important species, particularly Pacific hake (Merluccius productus) (also known as Pacific whiting), sablefish (Anoplopoma fimbria), and many of the shelf rockfish species. Hydroacoustic surveys of the off-bottom component of the Pacific hake population were performed in conjunction with these bottom trawl surveys by the hydroacoustic task of the RACE Division. Using the data collected in these surveys, AFSC researchers are now able to describe the population trends of major west coast groundfish species over the last 13 years.

The 1977 bottom trawl survey sampled between Pt. Hueneme, California, (34°N lat.) to the U.S.-Canada border in depths ranging from 91 to 457 m (50-250 fm). Sampling effort was allocated based on then-current fishery catch information into depth and geographic strata. The following two surveys, conducted in 1980 and 1983, emphasized obtaining better estimates of canary (Sebastes pinniger) and yellowtail rockfish (S. flavidus), while maintaining the goals of a multispecies

monitoring program. Strata were adjusted and sampling depths shifted to cover 55 to 366 m (30-200 fm), while the latitudinal boundaries extended from Monterey Bay, California (36°48'N lat.), to northern Vancouver Island, British Columbia, (50°N lat.) in 1980 and to Vancouver Island's Estevan Point (49°15'N lat.) in 1983. The results of the latter two surveys indicated the need for further work on improving the precision of the canary and yellowtail rockfish abundance estimates. Consequently, the sampling effort was again reallocated in 1986. The results of the 1977, 1980, 1983, and 1986 surveys were presented by Gunderson and Sample (1980), Weinberg et al. (1984), and Coleman (1986, 1988). Results of the these first four surveys were also used to examine trends in the distribution and abundance of 14 commercially important groundfish species (Dark and Wilkins, in press), while data from all of the triennial surveys to date were examined to define rockfish assemblages off the Oregon and Washington coast (Weinberg, in press).

Despite efforts to improve the precision of rockfish abundance estimates over the first four iterations of the triennial survey, the large variances of the estimates remained a problem. We concluded that precise estimates of rockfish abundance were not possible using current trawl survey methods and that a higher priority should be given to obtaining the information that the survey methods can provide. Consequently, the 1989 survey design emphasized a multispecies monitoring survey which also focused on precisely estimating Pacific hake

and pre-recruit sablefish abundance. The following were the specific objectives of the 1989 survey:

1) to continue monitoring the status of groundfish stocks;
2) to describe and assess the demersal component of the Pacific hake resource;
3) to describe and assess the abundance of pre-recruit sablefish;
4) to determine the biological characteristics, such as, size and age compositions, length-weight relationships, feeding habits, and size at maturity of the populations of commercially important groundfish species;
5) to continue to study the movement of juvenile sablefish through tagging;
6) to collect oceanographic data describing habitat, including sea temperature and salinity profiles; and,
7) to collect samples requested for special studies conducted by scientists at various fishery agencies and academic institutions.

This report documents the survey design and field procedure used, summarizes the data collected, and presents the results of the standard PACE analyses. Included are summaries of catches, relative densities, distributions, and estimates of biomass, population numbers, and size compositions for the more commercially important species. Age compositions are also presented for Pacific- hake, Pacific ocean perch (S. alutus)., canary rockfish, and splitnose rockfish (S. diplonroa), the four

species having age analyses completed to date. For the sake of brevity, discussion concentrates on the survey's primary target species, Pacific hake and sablefish, for the areas of -most concern to management. Unabridged printouts of the results from major analyses are available -upon request as appendices bound in a separate volume or on floppy disk.

SURVEY METHODS

Survey Period and Sampling Area

The 1989 survey was conducted from July 7 to September 29, paralleling the time period of previous triennial surveys. Operations began off Pt. Conception, California, and proceeded northward into Canadian waters off central Vancouver Island (Nootka Sound), British Columbia (34°30'-49°40'N lat.). Water depth at survey stations ranged between 55 and 366 m (30-200 fm). The 1989 survey area extended farther south than recent triennial surveys to facilitate the detection of concentrations of juvenile Pacific hake and sablefish. Stations off Vancouver Island were sampled to help determine Pacific hake densities at the northern limits of its distribution and to collect complete data sets on transboundary stocks such as yellowtail rockfish, Pacific ocean perch, and lingcod (Ophiodon elongatus).

Vessels and Sampling Gear

The 30.8 m F/V Pat San Marie powered by an 865 horsepower main engine and the 31.7 m F/V Golden Fleece powered by a pair-of 624 horsepower main engines were chartered for the survey. Each

vessel was equipped with dual net reels, modern electronics, and Loran C navigational aids.

The Resource and Conservation Engineering Division's standardized high-opening polyethylene Noreastern rockfish trawls equipped with roller gear were used by both vessels throughout the 1989 survey (Fig. 1). This trawl has a 27.2 m headrope and a 37.4 m footrope. All trawls were rigged consistent with RACE Division's survey gear standards employing three 55 m dandylines (1.59 cm steel cable) connected to each wing and fished with 2.1 x 1.5 m steel V-doors weighing approximately 567 kg each.

Measurements of the trawl's horizontal opening (wingtip to wingtip) were collected during most tows using a Scanmar net mensuration system. Mean net widths were calculated for each trawl haul. The overall mean path width of trawl hauls by the Pat San Marie was 13.4 m (range 10.9-16.3 m). The overall mean path width of trawl hauls by the Golden Fleece was 12.4 m (range 9.5-14.9 m). In those instances when horizontal measurements were unavailable, average net width was estimated using the following relationship between scope (length of trawl warp deployed) and net width:

$$\text{Width (m)} = 14.8828 - (513.4241 / \text{Scope (m)}).$$

This relationship was determined by a regression of net width on scope from hauls with valid observations. In past surveys, we used an overall survey mean net width for hauls without net width data, however this new procedure results in more accurate

measures of effort for each trawl haul (distance fished x mean net width) which is an essential factor for estimating biomass and population abundance using the area-swept methodology.

Station Allocation

A systematic-random design was used to allocate sampling effort in accordance with the primary survey objectives: to estimate the abundance of Pacific hake and juvenile sablefish while maintaining the broader multispecies assessment goal. The entire survey area was fitted with a sampling framework similar to the low density levels used in prior surveys. Four bands of latitude were identified from recent fishery statistics and survey results as having higher than average densities of age l+ sablefish. These areas were designated "high-density" strata and were sampled at a higher rate. The boundaries of these high-density strata were 34°30'-35°40', 36°50'-38°00', 44°40'-46°30', and 47°50'-48°'2O'N lat.

The survey area was further divided into two depth strata separated by the 183 m contour (100 fm); Pacific hake and juvenile sablefish catch rates decline significantly below this depth. Tracklines were placed across the shallow (55-183 m) and deep (184-366 m) strata at 18.5 km intervals. In the four high-density strata, additional tracklines were placed, halfway between the 18.5 km tracklines across the shallow depth stratum only. Figure 2 illustrates the station allocation strategy. Stations were randomly located along tracklines at the rate of one station per 7.4 km in the shallow stratum and 9.3 km in the deep stratum.

At least one station was assigned to each depth stratum along each trackline segment. A total of 601 stations were established. The two vessels fished alternate tracklines (alternate pairs in the high-density areas) to help usmeasure the relative fishing power of the two-vessels more accurately.

Trawling Procedures

Stations were first located by Loran C and then examined using an echo sounder prior, to towing. If the terrain was determined to be too rough to allow the successful completion of a tow, an alternate site was searched for within a 1 mile radius of the original. If no favorable ground was located within a reasonable time, the station was declared untrawlable and abandoned. Towing was conducted at a speed of 3.0 knots for 30. minutes in duration. Skippers tried to maintain a constant depth while towing. The gear was allowed to settle-for 3 to 8 minutes following the braking of the winches before towing actually commenced. If the gear was damaged during the tow severely enough to affect catch composition, the haul was considered, unsatisfactory and the station was either repeated or abandoned. Unsuccessful tows were not used in later analyses.

Catch Sampling and Oceanographic Data Collection

The same procedures for catch processing documented by, Gunderson and Sample (1980) were used in 1989. Briefly, catches, which fit on the sampling table (about 1 metric ton (t)) were processed entirely, while larger catches where either weighed by

an electronic load cell (up to 4.5 t), measured volumetrically, or estimated visually. In all cases, samples greater than 1 t were subsampled using the method described by Hughes (1976). Catches were then sorted, weighed, and enumerated by species with subsamples extrapolated to the entire catch using a microcomputer on board the vessel. Fork length measurements (FL) to the nearest centimeter were obtained for Pacific hake and sablefish by sex at all stations. Lengths were also taken for other species of commercial importance when 10 or more individuals were caught.

Otoliths, used for age determination, along with individual specimen weight and maturity data were collected from a variety of species. Sample collections for Pacific hake and sablefish were stratified by size (5 per sex per centimeter (FL)) for biological subareas. Collections for canary and splitnose rockfish were stratified by size intervals for the entire survey area. Random collections were made for yellowtail, canary, and shortbelly (S. jordani) rockfish, and Pacific ocean perch. Special requests included the collection of. length-width and length-girth measurements for selected flatfish-and roundfish species, respectively, stomachs, fin rays, tissue samples, and whole fish specimens.

Oceanographic data collection was limited to surface temperatures taken by bucket thermometer at most sites and temperature/salinity profiles of the water column which included bottom-conditions using a Seabird CTD probe at the innermost and

outermost stations of tracklines sampled, by the Pat San Marie.

Data Analyses

Several analyses are performed routinely on the RACE survey data. These include:

1) estimation of relative abundance,
2) estimation of population biomass,
3) estimation of population numbers,
4) estimation of the population's size composition, and
5) estimation of the population's age composition.

We used the area-swept method described by Gunderson and Sample (1980) to estimate population biomass and numbers. Briefly, this method entailed standardizing samples from each station into catch per unit effort (CPUE)- in terms of either kilograms or number per hectare trawled (kg/ha, no/ha) and calculating the arithmetic mean for each sampling stratum. Relative abundance, (mean CPUE) computed for International North Pacific Fisheries Commission (INPFC) statistical areas and for the total survey is the sum of sampling strata mean CPUEs weighted by their respective areas. Population biomass and number are defined as the sum of the strata mean CPUEs multiplied by the stratum areas. In cases where our sampling strata boundaries overlap more than one INPFC area, we take the proportion of the sampling stratum area within the INPFC region and multiply it by the overall sampling stratum mean CPUE.

Estimated population size compositions are based on the

length frequency data collected at each station. These data are extrapolated to estimate the number of fish per sex-centimeter per hectare trawled. These estimates were combined for all stations to estimate relative length frequencies for the stratum population; the relative frequencies were then applied to each stratum population estimate to yield the number of fish in each sex-centimeter category in the stratum. As with abundance estimates, stratum estimates were summed to derive the estimated size compositions for individual INPFC areas and for the total survey.

Population age compositions are based upon data from otoliths read using the break-and-burntechnique. Pacific hake and Pacific ocean perch otoliths were aged by the Age and Growth Unit of the AFSC's Resource Ecology and Fisheries Management Division. Otoliths from canary-and splitnose rockfish were aged by Mary Yoklavich of the Moss Landing Marine Labs, Moss Landing, California. Population age composition was estimated by apportioning ages to the estimated population at each length interval. Regional age length keys were derived to minimize the effects of age-length relationships which may vary latitudinally (Westrheim and Ricker 1978; Kimura 1977).

RESULTS

Haul, Catch, and Biological Data

During the 1989 survey, 539 of 601 stations were successfully completed within the 55 to 366 m depth bounds.

Fifteen tows were unsuccessful due to damaged trawls, one haul was made too shallow and thus omitted from the analyses, and 46 stations were abandoned due to untrawlable bottom. Figure 2 illustrates the number of planned stations and the number of successfully completed stations by stratum. Table 1 shows the sampling densities achieved for the survey strata. Figure 3. shows the location of successful tows by vessel.

A total of 12l fish species representing 42 families were identified over the course of the survey. Members from three additional families, the lampreys (Petromyzontidae), the viperfish (Stomiidae), and the hatchetfish (Sternoptychidae) were taken but identified only to genus. Table 2 lists the families and species (Robins 1991) in addition to their frequencies of occurrence and depth ranges in trawl samples. The greatest number of species taken belonged to the rockfish (Scorpaenidae) family with 38, followed by the flatfishes (Pleuronectidae) with 14, and the skates (Rajidae) with 7 species. Table 3 reports the additional sampling of biological data completed on a species-by-species basis. Appendix A summarizes the catch data by position for each vessel.

Temperature Data

Sea surface temperatures obtained from 520 stations using a bucket thermometer ranged from 9.2° to 17.6°C The overall mean surface temperature-was 13.3°C. Bottom temperatures obtained from 87 CTD castsranged from 6.3° to 9.7°C. The mean bottom. temperature was 7.6°C. Figures 4 and 5 illustrate the-observed

surface and bottom temperatures, respectively, by latitude from the 1989 survey and in previous triennial surveys.

Relative Abundance

The 20 most predominant groundfish species are presented by depth stratum for the entire survey area, U.S. waters, and individual INPFC statistical areas in Tables 4-12. The mean groundfish CPUE for the total area surveyed was 213.6 kg/ha (Table 4). By area, mean fish densities were highest in the Vancouver INPFC area (286.5 kg/ha), followed by the Monterey (233.9 kg/ha), Columbia (188.5 kg/ha), Eureka (115.8 kg/ha), and Conception (106.0 kg/ha) INPFC areas (Tables 6-12). The complete listings of the relative abundance of all fish ranked by mean CPUE for INPFC areas and by depth strata are presented in Appendix B in addition to rankings of fish and invertebrates for the entire survey area.

Pacific hake was the most abundant groundfish species overall, accounting for 34% of the total survey groundfish CPUE (72.8 kg/ha) (Table 4) and 43% of the CPUE in U.S. waters alone (82.4 kg/ha) (Table 5). The highest average CPUE for Pacific hake was in the Columbia INPFC area (114.3 kg/ha) where it comprised nearly 61% of the area's total. They were least abundant in the Conception INPFC area (6.9 kg/ha) where it accounted for only 7% of all-groundfish. Besides the Columbia INPFC area, Pacific hake also dominated samples in the Monterey (79.1 kg/ha), Eureka (39.5 kg/ha), and the U.S. portion of the Vancouver (39.2 kg/ha) INPFC areas (Tables 6-12).

Sablefish ranked fifth in relative abundance among groundfish species surveywide (8.8 kg/ha) (Table 4) and fourth in U.S. waters alone (8.6 kg/ha) (Table 5), accounting for about 4% of the catch in both regions. Sablefish catch rates, on average, were highest in the Monterey INPFC area (14.5 kg/ha), followed by Vancouver (7.7 kg/ha), Eureka (7.4 kg/ha), Columbia, (7.4 kg/ha), and conception (1.9 kg/ha) INPFC areas (Tables 6-12). Sablefish accounted for between 2 and 6 percent of INPFC area groundfish catches.

Catch composition and relative densities varied widely among the different geographic areas. After Pacific hake, the four most dominant species (See Table 2 for scientific names) for the total survey area were spiny dogfish, arrowtooth flounder, jack mackerel, and sablefish (Table 4). These five species as a whole accounted for 65% of groundfish CPUE., In U.S. waters only, Pacific sanddab replaced arrowtooth flounder among the five most dominant species (Table 5). Moving from south to north and listed in order of abundance, the five most prominent species in the Conception INPFC area were bocaccio, Pacific sanddab, widow rockfish, chilipepper, and Pacific hake (Table 6); in the Monterey INPFC area, Pacific hake, spiny dogfish, shortbelly rockfish, chilipepper,and sablefish (Table 7) in the Eureka INPFC area Pacific hake, jack mackerel, sablefish, chub-mackerel, and Dover sole (Table 8); in the Columbia INPFC area Pacific hake, jack mackerel, Pacific sanddab, sablefish, and rex sole (Table 9); and in the Vancouver INPFC area spiny dogfish,

arrowtooth flounder, Pacific hake, bocaccio, and yellowtail rockfish (Table 12).

The catch composition also varied between depth strata. In the shallow stratum for the entire survey area Pacific hake dominated catches, followed by spiny dogfish, jack mackerel, arrowtooth flounder, and Pacific sanddab (Table 4). Sablefish ranked sixth in abundance in the shallow stratum. The five most dominant species in the deep stratum (184-366 m) were Pacific hake, shortbelly rockfish, Pacific ocean perch, sablefish, and arrowtooth flounder (Table 4).

Maps of species relative abundance based on station CPUE values and their geographical distributions are presented in Figures 6-31. This series of maps begin with the target species, Pacific hake and sablefish and are followed by these other commercially valued groundfish listed in alphabetical order.

Arrowtooth flounder	English sole	Petrale sole	Silvergray rockfish
Bocaccio	Greenstriped rockfish	Redstripe rockfish	Spiny dogfish
Canary rockfish	Lingcod	Rex sole	Splitnose rockfish
Chilipepper	Pacific halibut	Sharpchin rockfish	Stripetail rockfish
Darkblotched rockfish	Pacific ocean perch	Shortbelly rockfish	Widow rockfish
Dover sole	Pacific sanddab	Shortspine thornyhead	Yellowtail rockfish

Positive catch rates for each station were sorted in decreasing order and categorized as the top 10%, middle 30%, and lowest 60% of the values. The CPUE levels are represented by circles with the larger circles matched to the higher CPUE values. The distribution of sampling effort should be considered when using these charts since increased sampling in an area may give the impression of high densities when, in fact, CPUE was only moderate or even fairly low.

Biomass and Population Estimates

Estimates of abundance in terms of biomass, measured in metric tons, and associated 90% confidence intervals are presented for various taxa in the total survey and by INPFC area and depth stratum in Tables 13-15. Similarly, estimates of population numbers are presented for various species in Tables 16-18. Computer generated listings of biomass and population numbers are presented for major species in Appendix C.

The on-bottom component of the Pacific hake population was estimated at 379,810 t for the entire area surveyed (Table 13). Three of the five INPFC areasaccounted for 95 of the total estimate: 59% in the Columbia area, 24% in the Monterey-area, and 12% in the Vancouver area. Only 6% of the estimated biomass was in Canadian waters (22,764 t) (Table 13). In the shallow stratum, Pacific hake biomass was estimated to be 314,817 t or roughly 83% of the total Pacific hake biomass, while 64,993 t was estimated for the deep stratum (Tables 14 and 15).

Sablefish biomass was, estimated to be 45,931 t for the total area surveyed (Table 13). The Monterey (36%), Columbia (32%). and Vancouver (23%) INPFC areas contributed to nearly 91% of this total biomass between the depths of 55 and 366 m. Sablefish in Canadian waters (7,465 t) contributed to 16% of the total estimate (Table 13). In the shallow stratum, sablefish biomass was estimated to be 35,552 t or 77% of the total sablefish biomass, while 10,380 t was estimated for the deep stratum (Tables 14 and 15).

We should caution that the biomass and population estimates presented are likely to be conservative since only a portion of the stock may be available to the bottom trawl and some escapement may occur. Because of the lack of data on species-by-species catchability, abundance calculations are based on the assumption that all fish in front of the trawl between wingtips are captured. The degree of conservative bias will vary among species. For instance, a large portion of the total Pacific hake stock is pelagic and would be missed by a bottom trawl. Also, because roller gear is used, escapement underneath the trawl is likely to occur, particularly for flatfish species. Depths and areas sampled should always be considered when evaluating species abundance estimates.

Length Composition

The estimated population length compositions for several commercially important species by sex and INPFC area are depicted in Figures 32-60. Figures 32-34 include length compositions for Pacific hake by INPFC area and depth stratum, while similar data for sablefish are illustrated in Figures 35-37. Length compositions by INPFC area only are given for the remaining species, presented in alphabetical order (Figs. 38-60). In each of these figures, three curves are shown per area: the percentage of males at each length; the percentage of females at each length, and the percentage of males, females, and unsexed fish combined (total) at each length. Although typically not present in the male/female plots, juvenile modes can be seen in

the panels labeled "total."In some instances, the proportion of the population at a specific length or length interval may exceed the scale. In these cases, only the peak percentages are indicated by an arrow and the percentage of that peak stated. Population percentages at lengths adjacent to or close to peak values may not be readily apparent. For more detail, Appendix D contains the computer generated listings of estimated length compositions in tabular form for major species. by sex for each, INPFC area. Upon request, the results of these analyses can be. made available on floppy disk for any species of interest in which length data was collected.

In general, there were four length modes in the Pacific hake population. Small peaks were at 12, 25, and 37 cm, but the majority of the population was centered at 45 cm (Fig. 32). The overall population mean length was 41.6 cm. Specimens ranged in length from 9 to 85 cm, surveywide. The male and female components of the population were very similar with-the average size of females (42.5 cm) being only slightly larger than that of the males (41.3 cm). Pacific hake were generally, smaller in the southern portion of the survey region. Juveniles (under 20 cm) were encountered in greatest abundance in the Conception and Monterey INPFC areas, whereas the majority of specimens larger than 55 cm were encountered in the Vancouver INPFC area. Pacific hake lengths averaged 22.3, 38.7, 30.1, 45.8, and 49.0 cm for the Conception, Monterey, Eureka, Columbia, and Vancouver INPFC areas, respectively. On average, lengths of Pacific hake were

slightly larger in deeper waters, however no strong indication of depth- stratification was observed (Figs. 33 and 34).

The 55-366 m depth bounds of the survey encompasses the shallower end of the sablefish distribution. At these-depths, the estimated length distribution for sablefish was generally bimodal with peaks at 24 and 39 cm (Fig. 35). Larger fish were present, however their numbers diminished with increasing size, particularly greater than 55 cm. The majority of the population ranged between 37 and 48 cm in length. The overall average length of the population was 42.4 cm. Sablefish samples from throughout the survey area ranged from 19 to 95 cm in length. The average length of both male and-females was about 44 cm. Juvenile modes (under 30 cm) were present in all INPFC areas except Monterey and contributed most to the area's total population in the Conception and-Vancouver INPFC areas. Sablefish lengths generally increased as sampling moved northward. The population averaged 37.1, 40.5, 46.0, 46.4, and 40.1 cm for the Conception, Monterey, Eureka, Columbia, and Vancouver INPFC. areas, respectively. The smaller average size observed in the Vancouver INPFC area was due to a proportionally large number of juveniles (24-27 cm in length) encountered in U.S. waters. The largest sablefish encountered were in Canadian waters where two modes occurred, 28 and 61 cm. Not surprisingly, larger fish tended to inhabit deeper waters (Figs. 36 and 37)

Age Composition

Structures for age determinationwere collected for a variety of species. To date, however, only otoliths from Pacific hake, Pacific ocean perch, canary rockfish, and splitnose rockfish have been analyzed. Population estimates for these species by year class and mean length at age are presentedby INPFC area in Tables 19-48. Estimated age composition by sex and INPFC area are illustrated in Figures 61-72 for each depth stratum. Computer listings of the age-length -keys by sex and INPFC area are presented in Appendix E.

Pacific hake ages from 946 specimens ranged from 0 to 19 years (Tables 19-26, Figs. 61-63). Age-length keys were constructed from samples using: the combined Conception and Monterey INPFC areas; the combined Eureka, Columbia, and U.S. portion of the Vancouver INPFC areas; the Canadian portion of the Vancouver INPFC area; the total Vancouver INPFC area; and the entire survey area. The l-, 5-, and 9-year olds, corresponding to the 1988, 1984, and 1980 year classes, were the most abundant age groups accounting for approximately 14%, 26%, and 38% of the total estimated population, respectively.

Pacific ocean perch ages from 830 specimens ranged from 1 to 81 years (Tables27-32, Figs. 64-66). Age-length keys were constructed from samples using: the combined Eureka and Columbia INPFC areas; the U.S. portion of the Vancouver INPFC area, the Canadian portion of the Vancouver INPFC area, the total, Vancouver INPFC area, and the entire survey area. The 4- and 8-year olds,

corresponding to the 1985 and 1981 year classes, were the most abundant age groups accounting for approximately 19% and 15% of the total estimated population, respectively.

Canary rockfish ages from 256 specimens ranged from 3 to 57 years (Tables 33-40, Figs. 67-69). Due to the small sample size, a single age-length key was constructed using samples from the entire survey area. The 5- and 11-year olds, corresponding to the 1984 and 1978 year classes, were the most abundant age groups accounting for approximately 13% and 11% of the total estimated population, respectively.

Splitnose rockfish ages from 274 specimens ranged from 1 to 68 years (Tables 41-48, Figs. 70-72). Like canary rockfish, a single age-length key was constructed using samples from the entire survey area. The 5-year olds, corresponding to the 1984 year class. was the most abundant age group accounting for approximately 20% of the total estimated population.

Length - Weight Relationships

Individual whole fish weights (g) were obtained from a variety of species according to a stratified sampling scheme, 5/sex/cm per INPFC area. A length-weight regression using a linear least squares model calculated a predicted weight given a known fork length. The following equations describe the relationships for Pacific hake and sablefish:

$$\text{Estimated Pacific hake weight in grams} = 0.0054866 \times L^{3.043290}$$

$$\text{Estimated sablefish weight in grams} = 0.0011674 \times L^{3.549646}$$

Table 49 summarizes the length-weight relationships by sex and sexes combined for all species sampled. Predicted mean weights were typically greater for females than males.

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Table 1.--The 1989 sampling strata boundaries used for analysis purposes[1], areas (nmi^2), and sampling statistics based on successful towing performance. Strata have been grouped according to International North Pacific Fisheries Commission management areas. Differences in totals are due to rounding.

' The original survey design combined strata 13-15 and 23-25 into one shallow and one deep stratum for the allocating sampling effort.

Table 2.--Fish species caught during the 1989 west coast groundfish survey.

Family and Species[a]	Common Name[a]	Frequency of occurrence	Min. depth (m)	Max. depth (m)	Mean depth (m)	Latitude range S/N (ddmm)
Myxinidae						
Eptatretus stouti	Pacific hagfish	6	115	293	161	3834/4845
Petromyzontidae						
Petromyzontidae unidentified	Lamprey unidentified	1	115	115	115	3759/3759
Chimaeridae						
Hydrolagus colliei	Spotted ratfish	240	57	337	147	3434/4935
Hexanchidae						
Hexanchus griseus	Sixgill shark	4	71	190	127	3749/4354
Scyliorhinidae						
Apristurus brunneus	Brown cat shark	4	282	337	308	3445/4234
Apristurus kampae[b]	Longnose cat shark[b]	3	289	331	316	3925/4224
Carcharhinidae						
Galeorhinus zyopterus	Soupfin shark	1	108	108	108	3504/3504
Squalidae						
Squalus acanthias	Spiny dogfish	364	55	357	142	3446/4935
Squatinidae						
Squatina californica	Pacific angel shark[b]	1	57	57	57	3445/3445
Torpedinidae						
Torpedo californica	Pacific electric ray	44	59	260	113	3434/4631
Rajidae						
Rajidae unidentified	Skate unidentified	4	59	278	174	3915/4905
Bathyraja interrupta	Sandpaper skate	77	79	357	195	3436/4924
Bathyraja parmifera	Alaska skate	2	119	124	122	3501/4539
Bathyraja trachura	Black skate[b]	5	128	166	148	4534/4800
Raja binoculata	Big skate	55	57	315	130	3554/4904

Table 2.--Continued.

Family and Species[a]	Common Name[a]	Frequency of occurrence	Min. depth (m)	Max. depth (m)	Mean depth (m)	Latitude range S/N (ddmm)
Rajidae (cont.)						
Raja inornata	California skate	39	60	311	114	3501/4304
Raja rhina	Longnose skate	136	60	327	158	3436/4934
Acipenseridae						
Acipenser medirostris	Green sturgeon	1	60	60	60	4745/4745
Clupeidae						
Alosa sapidissima	American shad	100	57	315	116	3644/4935
Clupea pallasi	Pacific herring	140	57	262	103	3441/4935
Engraulidae						
Engraulis mordax	Northern anchovy	29	57	238	105	3434/4006
Argentinidae						
Argentina sialis	Pacific argentine	27	63	283	116	3443/3855
Osmeridae						
Osmeridae unidentified	Smelt unidentified	4	59	137	84	4624/4857
Allosmerus elongatus	Whitebait smelt	20	60	218	88	3824/4914
Hypomesus pretiosus	Surf smelt	26	84	185	116	3434/3814
Thaleichthys pacificus	Euachon	222	60	333	141	3436/4935
Salomonidae						
Oncorhynchus kisutch	Coho salmon	3	110	333	190	4126/4823
Oncorhynchus tshawytscha	Chinook salmon	92	57	238	102	3527/4914
Sternoptychidae[b]						
Sternoptychidae unidentified	Hatchetfish unidentified[b]	1	221	221	221	4244/4244
Stomiidae						
Stomiidae unidentified	Viperfish unidentified	1	247	247	247	4254/4254

Table 2.--Continued.

Family and Species[a]	Common Name[a]	Frequency of occurrence	Min. depth (m)	Max. depth (m)	Mean depth (m)	Latitude range S/N (ddmm)
Synodontidae						
Synodus lucioceps	California lizardfish	2	55	62	58	3450/3645
Myctophidae						
Myctophidae unidentified	Lanternfish unidentified	11	137	348	244	4205/4824
Tarletonbeania crenularis	Blue lanternfish	2	227	293	260	4534/4554
Gadidae						
Gadus macrocephalus	Pacific cod	108	57	315	148	4054/4935
Microgadus proximus	Pacific tomcod	61	59	150	81	3754/4935
Theragra chalcogramma	Walleye pollock	55	59	333	150	4354/4934
Merlucciidae[b]						
Merluccius productus	Pacific hake	409	57	357	151	3434/4935
Ophidiidae						
Chilara taylori	Spotted cusk-eel	21	62	271	136	3515/4619
Batrachoididae						
Porichthys notatus	Plainfin midshipman	87	55	238	94	3436/4855
Scomberesocidae						
Cololabis saira	Pacific saury	1	128	128	128	4559/4559
Trachipteridae						
Trachipterus altivelis	King-of-the-salmon	1	327	327	327	3944/3944
Scorpaenidae						
Scorpaenidae unidentified	Rockfish unidentified	22	55	311	162	3450/4824
Scopaena guttata	California scorpionfish	1	62	62	62	3457/3457
Sebastes aleutianus	Rougheye rockfish	57	106	351	186	3834/4913
Sebastes alutus	Pacfic ocean perch	75	124	329	201	4044/4934
Sebastes auriculatus	Brown rockfish	7	60	75	69	3659/3814
Sebastes babcocki	Redbanded rockfish	79	113	357	222	3555/4913
Sebastes brevispinis	Silvergray rockfish	28	128	241	171	4425/4935

Table 2.--Continued.

Family and Species*	Common Name*	Frequency of occurrence	Min. depth (m)	Max. depth (m)	Mean depth (m)	Latitude range S/N (ddmm)
Scorpaenidae (cont.)						
Sebastes caurinus	Copper rockfish	13	55	102	76	3450/3855
Sebastes chlorostictus	Greenspotted rockfish	22	57	320	153	3434/4414
Sebastes constellatus	Starry rockfish	1	115	115	115	3755/3755
Sebastes crameri	Darkblotched rockfish	200	60	357	174	3434/4925
Sebastes dalli	Calico rockfish	1	62	62	62	3457/3457
Sebastes diploproa	Splitnose rockfish	103	59	357	230	3434/4923
Sebastes elongatus	Greenstriped rockfish	234	57	351	155	3441/4934
Sebastes entomelas	Widow rockfish	41	71	311	168	3436/4923
Sebastes flavidus	Yellowtail rockfish	76	57	192	134	3654/4935
Sebastes goodei	Chilipepper	111	55	320	138	3434/4619
Sebastes helvomaculatus	Rosethorn rockfish	76	73	329	180	3645/4926
Sebastes hopkinsi	Squarespot rockfish	2	57	106	81	3436/3449
Sebastes jordani	Shortbelly rockfish	103	57	320	138	3434/4906
Sebastes lentiginosus	Freckled rockfish	1	311	311	311	3436/3436
Sebastes levis	Cowcod	24	93	234	148	3441/4334
Sebastes maliger	Quillback rockfish	3	57	88	72	4304/4856
Sebastes melanops	Black rockfish	2	66	146	106	4734/4810
Sebastes miniatus	Vermilion rockfish	9	73	320	167	3436/3739
Sebastes mystinus	Blue rockfish	1	73	73	73	3739/3739
Sebastes ovalis	Speckled rockfish	1	102	102	102	3756/3756
Sebastes paucispinis	Bocaccio	98	55	311	144	3436/4935
Sebastes pinniger	Canary rockfish	114	57	315	148	3436/4934
Sebastes proriger	Redstripe rockfish	57	88	283	171	3903/4926
Sebastes reedi	Yellowmouth rockfish	10	128	241	178	4305/4913
Sebastes rosenblatti	Greenblotched rockfish	4	102	238	144	3449/3734
Sebastes ruberrimus	Yelloweye rockfish	42	57	201	142	3729/4926
Sebastes rubrivinctus	Flag rockfish	1	106	106	106	3654/3654
Sebastes rufus	Bank rockfish	7	62	353	240	3436/4335
Sebastes saxicola	Stripetail rockfish	142	57	357	157	3434/4814
Sebastes semicinctus	Halfbanded rockfish	23	57	311	109	3436/4734
Sebastes wilsoni	Pygmy rockfish	37	104	207	147	3746/4926
Sebastes zacentrus	Sharpchin rockfish	103	73	351	188	3436/4934
Sebastolobus alascanus	Shortspine thornyhead	134	60	357	215	3434/4923

Table 2.--Continued.

Family and Species[a]	Common Name[a]	Frequency of occurrence	Min. depth (m)	Max. depth (m)	Mean depth (m)	Latitude range S/N (ddmm)
Anoplopomatidae						
Anoplopoma fimbria	Sablefish	369	55	357	150	3434/4935
Hexagrammidae						
Hexagrammidae unidentified	Greenling unidentified	1	68	68	68	4904/4904
Hexagrammos decagrammus	Kelp greenling	5	57	123	88	3739/4856
Ophiodon elongatus	Lingcod	255	55	315	128	3436/4935
Zaniolepis frenata	Shortspine combfish	1	132	132	132	3520/3520
Zaniolepis latipinnis	Longspine combfish	26	57	238	99	3501/3915
Cottidae						
Cottidae unidentified	Sculpin unidentified	4	60	293	168	3834/4544
Hemilepidotus spinosus	Brown Irish lord	2	73	106	90	3739/4304
Icelinus filamentosus	Threadfin sculpin	73	71	315	167	3535/4924
Leptocottus armatus	Pacific staghorn sculpin	2	62	234	148	3645/4543
Scorpaenichthys marmoratus	Cabezon	1	71	71	71	4304/4304
Agonidae						
Agonidae unidentified	Poacher unidentified	4	130	293	214	3834/4906
Agonopsis vulsa	Northern spearnose poacher	3	157	179	168	4534/4759
Bathyagonus nigripinnis	Blackfin poacher	1	229	229	229	4523/4523
Bathyagonus pentacanthus	Bigeye poacher	1	238	238	238	4624/4624
Odontopyxis trispinosa	Pygmy poacher	1	168	168	168	4509/4509
Podothecus acipenserinus	Sturgeon poacher	5	59	194	109	4414/4906
Xeneretmus latifrons	Blacktip poacher	22	115	238	170	3806/4754
Cyclopteridae						
Cyclopteridae unidentified	Snailfish unidentified	4	108	289	221	3854/4255
Careproctus melanurus	Blacktail snailfish	4	157	357	283	3714/4906
Carangidae						
Trachurus symmetricus	Jack mackerel	64	59	214	107	3644/4800
Sciaenidae						
Genyonemus lineatus	White croaker	53	55	238	85	3436/3824

Table 2. --Continued.

Family and Species*	Common Name*	Frequency of occurrence	Min. depth (m)	Max. depth (m)	Mean depth (m)	Latitude range S/N (ddmm)
Embiotocidae						
Cymatogaster aggregata	Shiner perch	15	57	88	68	3446/4856
Zalembius rosaceus	Pink seaperch	88	55	238	94	3436/3954
Bathymasteridae						
Bathymaster signatus	Seacher	1	168	168	168	4759/4759
Zoarcidae						
Zoarcidae unidentified	Eelpout unidentified	6	80	353	204	4234/4631
Lycodes brevipes	Shortfin eelpout	5	119	174	139	3934/4546
Lycodes cortezianus	Bigfin eelpout	121	60	357	180	3437/4914
Lycodes diapterus	Black eelpout	15	143	351	268	3456/4809
Lycodopsis pacifica	Blackbelly eelpout	42	79	315	139	3456/4758
Cryptacanthodidae						
Cryptacanthodes giganteus	Giant wrymouth	4	135	176	154	4335/4707
Anarhichadidae						
Anarrhichthys ocellatus	Wolf-eel	2	82	117	98	3544/3954
Icosteidae						
Icosteus aenigmaticus	Ragfish	1	337	337	337	4434/4434
Scombridae						
Scomber japonicus	Chub mackerel	37	59	315	113	3457/4725
Stromateidae						
Peprilus simillimus	Pacific pompano	45	55	311	90	3436/3754
Bothidae						
Citharichthys sordidus	Pacific sanddab	269	55	294	100	3434/4935
Paralichthys californicus	California halibut	1	55	55	55	3450/3450
Pleuronectidae						
Atheresthes stomias	Arrowtooth flounder	288	59	357	150	3714/4935

Table 2.--Continued.

Family and Species[a]	Common Name[a]	Frequency of occurrence	Min. depth (m)	Max. depth (m)	Mean depth (m)	Latitude range S/N (ddmm)
Pleuronectidae (cont.)						
Eopsetta exilis	Slender sole	349	59	357	148	3434/4935
Eopsetta jordani	Petrale sole	315	55	315	114	3434/4935
Errex zachirus	Rex sole	480	55	357	140	3434/4935
Hippoglossus elassodon	Flathead sole	90	60	282	143	4354/4935
Hippoglossus stenolepis	Pacific halibut	140	60	351	146	3729/4935
Microstomus pacificus	Dover sole	471	55	357	142	3434/4935
Platichthys stellatus	Starry flounder	7	59	121	76	3754/4759
Pleuronectes bilineatus	Rock sole	48	57	179	90	3625/4916
Pleuronectes isolepis	Butter sole	4	60	75	65	4745/4814
Pleuronectes vetulus	English sole	324	55	289	115	3443/4935
Pleuronichthys decurrens	Curlfin sole	58	55	238	82	3436/4906
Pleuronichthys ritteri	Spotted turbot	1	57	57	57	3436/3436
Psettichthys melanostictus	Sand sole	7	57	77	64	3729/4906
Soleidae						
Symphurus atricauda	California tonguefish	2	97	130	113	3719/3719

[a] Nomenclature from Robins (1991) unless otherwise noted.
[b] Nomenclature from Eschmeyer et al. (1983).

Table 3.--Inventory of biological data by species, depth stratum; and International North Pacific Fisheries Commission statistical area collected during the 1989 west coast triennial groundfish survey (A = otoliths, W = individual weight, G = girth or width, M = maturity, S = stomach observations, T = tagged fish, L = length, P = pathology data).

Species name	Conception area		Monterey area		Eureka area		Columbia area		Vancouver area	
	55-183m	184-366m	55-183m	184-366m	55-183m	184-366m	55-183m	184-366m	55-183m	184-366m
Arrowtooth flounder	--	--	2L	1L	69L	69L	3044L;52W; 114S;24P; 119G	540L;42S; 10P;5G	5022L; 237W;169S	620L;120W; 16S;56G
Butter sole	--	--	--	--	--	--	--	--	26L	--
Curlfin sole	--	--	9L	--	--	--	--	--	--	--
Dover sole	324L;42S	404L; 36G;10S	3121L; 276S;25M; 25W;10P	1325L; 71W	758L;68W; 88G;45S; 27P	812L; 62G;90S; 35P	4978L; 73G; 387S	710L;94S; 10P	2680L;95W; 22G;316S	885L; 142W;79G; 30S
English sole	99L;10G	--	5554L; 43W;82G	147L	344L;51W; 60G	2L	4411L; 63W;60G	128L	2416L; 115W;99G	28L
Flathead sole	--	--	--	--	--	--	135L	--	287L	8L
Pacific halibut	2L	--	11L	--	11L	11L	100L	22L	123L	19L
Pacific sanddab	964L;30G	--	3597;58G	20L	467L;152G	--	2554L; 60G	--	1861L	--
Petrale sole	44L	6L	846L;52G	22L	35L;14W; 25G	--	413L;70G	2L	250L;60W; 18G	2L
Rex sole	325L	371L	5279L; 90G;70P; 90W	1036L	561L; 66W;76G	986L; 51W;51G; 1P	12508L; 99G;7P	1272L	3284L; 119W;21G	737L;25W; 25G
Rock sole	--	--	80L	--	--	--	55L	--	193L;59W	--
Sand sole	--	--	2L;2G	--	--	--	--	--	--	--
Slender sole	--	--	3L	--	--	1L	--	--	--	--
Shortspine thornyhead	--	68L;15S	--	351L;51P 15S	15L	283L	189L; 17G;48S	711L; 76G;60S	51L;16S	191L;46S
Bank rockfish	--	24L	--	4L	--	--	--	--	--	--
Black rockfish	--	--	--	--	--	--	--	--	2L	--
Blue rockfish	--	--	14L	--	--	--	--	--	--	--

Table 3.--Continued.

Species name	Conception area		Monterey area		Eureka area		Columbia area		Vancouver area	
	55-183m	184-366m	55-183m	184-366m	55-183m	184-366m	55-183m	184-366m	55-183m	184-366m
Bocaccio	449L;12W; 27G	--	728L;65W; 65M	181L	--	2L	1L;1W;2G	2L	78L;1W;1G	--
Brown rockfish	--	--	47L	--	--	--	--	--	--	--
Canary rockfish	1L	--	356L;110W; 110M;110A	2L	11L;7A	--	341L;61W; 8G;1M; 21A;25P	206L;1W; 1G;1A	768L;114W; 114G;110A	13L;2W; 2G;7A
Chilipepper	1663L; 38W;24G	182L	4243L; 135G; 167W	640L	59L	76L	2L	43L;37W; 37G	--	--
Copper rockfish	--	--	74L	--	--	--	--	--	--	--
Cowcod	7L	--	13L	2L	--	--	--	--	--	--
Darkblotched rockfish	--	2L	113L	173L	118L	762L;100W; 101G	1368L; 91W	307L	166L	47L
Flag rockfish	--	--	1L	--	--	--	--	--	--	--
Greenblotched rockfish	1L	--	2L	--	--	--	--	--	--	--
Greenspotted rockfish	14L	1L	170L;11M	3L	--	--	--	--	--	--
Greenstriped rockfish	4L	--	1349L	28L	41L	83L	1718L;8P	233L;20P	807L;98W	86L
Halfbanded rockfish	16L	--	89L	--	--	--	3L	--	--	--
Pacific ocean perch	--	--	--	--	--	192L;28W; 27G;78A; 2P	73L;43W; 43G;43A; 1P	481L;50M; 27G;130W; 111A;46P	566L;97W; 97G;6P; 135A	1483L; 202W;151G 469A
Pygmy rockfish	--	--	2L	--	--	--	22L	--	195L	--
Redbanded rockfish	--	--	--	18L	--	--	4L	7L	11L	16L;14W
Redstriped rockfish	--	--	--	--	--	--	864L	76L	1454L; 24W;60G	178L;63W

Table. 3.--Continued.

Species name	Conception area		Monterey area		Eureka area		Columbia area		Vancouver area	
	55-183m	184-366m	55-183m	184-366m	55-183m	184-366m	55-183m	184-366m	55-183m	184-366m
Rosethorn rockfish	--	--	23L	27L	9L	--	347L; 55W;54M	176L	522L	11L
Rougheye rockfish	--	--	--	1L	--	36L	129L;16W	12L	69L	30L
Sebastes sp.	1L	--	--	--	--	--	--	--	--	--
Sharpchin rockfish	--	--	135L	149L	410L	8L	710L;78G	129L;51G	1041L	278L; 135W
Shortbelly rockfish	441L;50A	--	1920L; 50M;150A	810L;90A	--	--	1L	--	61L	--
Silvergrey rockfish	--	--	--	--	--	--	--	1L	220L	128L
Speckled rockfish	--	--	5L	--	--	--	--	--	--	--
Splitnose rockfish	--	446L;30M; 30A	22L	1780L; 148A	--	811L;44A	116L; 57W,58G	743L;30A	--	311L;22A
Squaresnout rockfish	211L	--	--	--	--	--	--	--	--	--
Stripetail rockfish	909L	1L	2080L; 71W	1338L	410L	303L	49L	129L	18L	--
Vermillion rockfish	139L	3L	67L	1L	--	--	--	--	--	--
Widow rockfish	138L	1L	161L	1L	166L;103G	--	141L	--	105L	--
Yelloweye rockfish	--	--	10L	--	2L	--	12L;4W	--	47L	--
Yellowmouth rockfish	--	--	--	--	--	--	13L	--	66L	8L
Yellowtail rockfish	--	--	274L;109W; 109M;109A	--	22L;15G	--	849L;181W; 72G;232A	3L	679L;142W; 98G;123A	1L

Table 3.--Continued.

Species name	Conception area		Monterey area		Eureka area		Columbia area		Vancouver area	
	55-183m	184-366m	55-183m	184-366m	55-183m	184-366m	55-183m	184-366m	55-183m	184-366m
American shad	--	--	6L	--	--	--	--	--	--	--
Chinook salmon	--	--	9L	--	2L	--	3L	--	--	--
Chub mackerel	--	--	95L	--	--	--	35L	--	--	--
Jack mackerel	--	--	174L	--	5P	--	64L	--	31L	--
Lingcod	65L	--	303L;2W	6L	19L	16L;3W;3G	135L;15W;32G	37L;18G	324L;81W;15G;193A	16L;7W;7A
Pacific cod	--	--	--	--	--	--	23L;23G	4L;16G	130L;36G	27L;17G
Pacific hake	167L;19S;13A	1769L;46S;34A;61P	8244L;218W;164S;114M;196A;66P	3462L;126W;126M;74A105S;	1456L;4W;30S;29A	1817L;8W;76G;9A	15041L;245W;209G;508S;37M;318A;89P	3156L;158W;27G;61S;100M;55A;10P	2789L;97W;139S;6M;153A	900L;5W;5G;35S;46A
Pacific herring	--	--	464L	--	--	--	315L	--	--	--
Pacific pompano	130L	--	82L	--	--	--	--	--	--	--
Pacific tomcod	--	--	75L	--	31L	--	--	--	--	--
Sablefish	122L;31T;17S;8M;8A	155L;2T;15S;36M;36A	814L;42W;95T;79S;55M;76A;25P	265L;20S;54M;98A	157L;6T;13S;3A	623L;17G;77A	1642L;2W;32T;108G;97S;157A	917L;67T;81G;41S;15A	735L;66W;179S;37M;124A	184L;27W;3G;40S;27M;31A
Shiner perch	--	--	2L	--	--	--	--	--	--	--
Walleye pollock	--	--	--	--	--	--	13L	--	575L	219L
White croaker	--	--	595L	--	--	--	--	--	--	--

Table 4.--Dominant fish species observed during the 1989 triennial west coast groudfish survey; ranked by CPUE (kg/ha trawled) for the entire survey area.

Rank	Total (55-183 m) total effort 1557.7 ha total mean CPUE for fish 223.82 kg/ha				Total (184-366 m) total effort 396.3 ha total mean CPUE for fish 171.49 ha				Total (55-366 m) total effort 1953.9 ha total mean CPUE for fish 213.55 kg/ha			
	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion
1	Pacific hake	75.11	136.54	0.336	Pacific hake	63.48	456.95	0.370	Pacific hake	72.83	105.80	0.341
2	Spiny dogfish	45.67	206.92	0.540	Shortbelly rockfish	17.61	123.79	0.473	Spiny dogfish	38.01	134.38	0.519
3	Jack mackerel	11.63	15.71	0.592	Pacific ocean perch	11.96	24.99	0.543	Arrowtooth flounder	10.53	4.75	0.568
4	Arrowtooth flounder	11.17	7.08	0.642	Sablefish	10.14	9.18	0.602	Jack mackerel	9.35	10.15	0.612
5	Pacific sanddab	8.54	7.27	0.680	Arrowtooth flounder	7.87	4.59	0.648	Sablefish	8.81	9.00	0.653
6	Sablefish	8.48	13.38	0.718	Dover sole	7.37	1.21	0.691	Pacific sanddab	6.88	4.70	0.686
7	Bocaccio	6.10	16.74	0.745	Splitnose rockfish	7.08	1.95	0.732	Dover sole	5.11	0.22	0.709
8	Yellowtail rockfish	5.09	4.87	0.768	Spiny dogfish	6.64	18.84	0.771	Bocaccio	5.06	10.82	0.733
9	Pacific herring	4.66	4.77	0.788	Sharpchin rockfish	5.45	12.40	0.802	Yellowtail rockfish	4.09	3.15	0.752
10	Dover sole	4.55	0.26	0.809	Stripetail rockfish	4.03	2.83	0.826	Shortbelly rockfish	4.04	4.84	0.771
11	Chilipepper	3.88	1.35	0.826	Walleye pollock	3.53	4.22	0.847	Chilipepper	3.80	0.94	0.789
12	Lingcod	3.57	0.57	0.842	Chilipepper	3.47	1.71	0.867	Pacific herring	3.75	3.08	0.807
13	Rex sole	3.44	0.07	0.857	Rex sole	2.80	0.19	0.883	Rex sole	3.31	0.05	0.822
14	English sole	3.34	0.13	0.872	Canary rockfish	2.79	6.84	0.899	Lingcod	3.16	0.38	0.837
15	Redstripe rockfish	2.61	1.05	0.884	Darkblotched rockfish	2.24	0.26	0.912	English sole	2.76	0.08	0.850
16	Canary rockfish	2.47	0.63	0.895	Shortspine thornyhead	1.64	0.06	0.922	Canary rockfish	2.53	0.67	0.862
17	Widow rockfish	2.28	1.27	0.905	Lingcod	1.46	0.28	0.930	Pacific ocean perch	2.46	0.96	0.873
18	Chub mackerel	2.02	0.74	0.914	Longnose skate	1.44	0.15	0.939	Redstripe rockfish	2.29	0.70	0.884
19	Stripetail rockfish	1.86	0.33	0.922	Pacific halibut	1.39	0.27	0.947	Stripetail rockfish	2.28	0.32	0.895
20	Pacific cod	1.53	0.16	0.929	Spotted ratfish	1.36	0.37	0.955	Widow rockfish	1.84	0.82	0.903

Table 5.--Dominant fish species observed during the 1989 triennial west coast groundfish survey, ranked by CPUE (kg/ha trawled) in the United States.

	United States (55-183 m) total effort 1336.3 ha total mean CPUE for fish 207.51 kg/ha			United States (184-366 m) total effort 366.6 ha total mean CPUE for fish 135.18 kg/ha			United States (55-366 m) total effort 1702.9 ha total mean CPUE for fish 191.91 kg/ha		
Rank	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion
1	Pacific hake	91.59	209.78	0.441	Pacific hake	49.07	124.11	0.363	Pacific hake	82.42	134.80	0.429
2	Spiny dogfish	21.36	88.26	0.544	Shortbelly rockfish	19.41	150.41	0.507	Spiny dogfish	17.23	54.30	0.519
3	Jack mackerel	14.43	24.20	0.614	Sablefish	9.96	10.80	0.580	Jack mackerel	11.32	14.89	0.578
4	Pacific sanddab	10.15	11.18	0.663	Splitnose rockfish	6.78	1.80	0.630	Sablefish	8.61	12.58	0.623
5	Sablefish	8.24	19.63	0.702	Dover sole	6.71	1.21	0.680	Pacific sanddab	7.98	6.87	0.665
6	Bocaccio	7.00	23.92	0.736	Pacific ocean perch	6.03	14.53	0.725	Bocaccio	5.66	14.72	0.694
7	Yellowtail rockfish	5.30	6.62	0.762	Stripetail rockfish	4.44	3.44	0.758	Shortbelly rockfish	4.89	7.10	0.720
8	Chilipepper	4.81	2.08	0.785	Arrowtooth flounder	3.99	0.41	0.787	Chilipepper	4.60	1.37	0.744
9	English sole	3.66	0.18	0.803	Chilipepper	3.83	2.08	0.815	Yellowtail rockfish	4.16	4.07	0.765
10	Pacific herring	3.50	3.55	0.819	Canary rockfish	2.98	8.30	0.837	Dover sole	4.10	0.12	0.787
11	Arrowtooth flounder	3.48	1.42	0.836	Rex sole	2.73	0.22	0.858	Arrowtooth flounder	3.59	0.89	0.805
12	Dover sole	3.39	0.10	0.853	Darkblotched rockfish	2.43	0.31	0.876	Rex sole	3.03	0.05	0.821
13	Rex sole	3.12	0.06	0.868	Spiny dogfish	2.21	0.28	0.892	English sole	2.95	0.11	0.837
14	Widow rockfish	2.77	1.85	0.881	Walleye pollock	1.72	0.91	0.905	Stripetail rockfish	2.77	0.47	0.851
15	Chub mackerel	2.50	1.14	0.893	Sharpchin rockfish	1.71	0.59	0.917	Pacific herring	2.74	2.18	0.865
16	Stripetail rockfish	2.30	0.51	0.904	Shortspine thornyhead	1.68	0.07	0.930	Widow rockfish	2.18	1.14	0.877
17	Lingcod	1.89	0.23	0.913	Longnose skate	1.20	0.13	0.939	Chub mackerel	1.96	0.70	0.887
18	White croaker	1.67	0.56	0.921	Lingcod	1.16	0.26	0.947	Canary rockfish	1.85	0.51	0.896
19	Canary rockfish	1.54	0.20	0.929	White croaker	1.05	1.11	0.955	Lingcod	1.73	0.16	0.906
20	American shad	1.51	0.55	0.936	Pacific halibut	0.82	0.13	0.961	White croaker	1.54	0.40	0.914

Table 6.--Dominant fish species observed during the 1989 triennial west coast groundfish survey, ranked by CPUE (kg/ha trauled) in the International North Pacific Fisheries Commission Conception area.

	Conception (55-183 m) total effort 71.0 ha total mean CPUE for fish 147.14 kg/ha				Conception (184-366 m) total effort 32.0 ha total mean CPUE for fish 55.74 kg/ha				Conception (55-366 m) total effort 103.0 ha total mean CPUE for fish 105.97 kg/ha			
Rank	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion
1	Bocaccio	66.36	4271.21	0.451	Pacific hake	14.85	44.25	0.266	Bocaccio	36.47	1289.86	0.344
2	Pacific sanddab	20.52	103.74	0.590	Dover sole	11.33	58.54	0.470	Pacific sanddab	11.30	31.33	0.451
3	Widow rockfish	18.17	330.05	0.714	Splitnose rockfish	6.28	9.12	0.582	Widow rockfish	10.00	99.67	0.545
4	Chilipepper	14.02	33.37	0.809	Stripetail rockfish	5.01	23.69	0.672	Chilipepper	9.15	10.64	0.631
5	Squarespot rockfish	6.57	38.44	0.854	Rex sole	4.29	8.66	0.749	Pacific hake	6.91	8.99	0.697
6	Vermilion rockfish	3.63	6.33	0.879	Shortbelly rockfish	3.53	12.36	0.813	Dover sole	5.57	11.93	0.749
7	Stripetail rockfish	2.99	3.02	0.899	Sablefish	3.29	1.66	0.872	Stripetail rockfish	3.90	5.72	0.786
8	Pacific pompano	1.95	1.73	0.912	Chilipepper	3.21	2.75	0.929	Squarespot rockfish	3.61	11.61	0.820
9	Plainfin midshipman	1.63	0.22	0.923	Shortspine thornyhead	0.61	0.23	0.940	Splitnose rockfish	2.83	1.85	0.847
10	White croaker	1.43	0.54	0.933	Bank rockfish	0.58	0.34	0.951	Rex sole	2.25	1.77	0.868
11	Spiny dogfish	1.26	0.45	0.941	Surf smelt	0.55	0.30	0.960	Vermilion rockfish	2.08	1.92	0.888
12	Dover sole	0.84	0.15	0.947	Petrale sole	0.45	0.09	0.968	Shortbelly rockfish	2.02	2.54	0.907
13	Sablefish	0.82	0.07	0.953	Longnose skate	0.29	0.04	0.974	Sablefish	1.93	0.36	0.925
14	Shortbelly rockfish	0.78	0.12	0.958	Spotted ratfish	0.21	0.01	0.977	Pacific pompano	1.08	0.52	0.935
15	Pacific electric ray	0.63	0.07	0.962	Spiny dogfish	0.19	0.01	0.981	Plainfin midshipman	0.90	0.07	0.944
16	Petrale sole	0.58	0.03	0.966	Vermilion rockfish	0.18	0.02	0.984	White croaker	0.78	0.16	0.951
17	Rex sole	0.58	0.03	0.970	Pacific electric ray	0.16	0.03	0.987	Spiny dogfish	0.78	0.14	0.958
18	English sole	0.45	0.03	0.973	Slender sole	0.13	0.01	0.989	Petrale sole	0.52	0.03	0.963
19	Pacific hake	0.41	0.04	0.976	Bigfin eelpout	0.12	0.01	0.992	Bank rockfish	0.49	0.11	0.968
20	Bank rockfish	0.39	0.15	0.979	California skate	0.12	0.01	0.994	Pacific electric ray	0.42	0.03	0.972

Table 7.--Dominant fish species observed during the 1989 triennial west coast groundfish survey, ranked by CPUE (kg/ha trawled) in the International North Pacific Fisheries Commission Monterey area.

	Monterey (55-183 m) total effort 371.6 ha total mean CPUE for fish 220.89 kg/ha				Monterey (184-366 m) total effort 86.6 ha total mean CPUE for fish 294.37 kg/ha				Monterey (55-366 m) total effort 458.3 ha total mean CPUE for fish 233.92 kg/ha			
Rank	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion
1	Pacific hake	70.54	475.79	0.319	Pacific hake	118.83	1737.25	0.404	Pacific hake	79.10	376.63	0.338
2	Spiny dogfish	54.54	1129.64	0.566	Shortbelly rockfish	87.52	462.60	0.701	Spiny dogfish	45.61	764.53	0.533
3	Sablefish	16.70	223.77	0.642	Splitnose rockfish	17.87	26.35	0.762	Shortbelly rockfish	18.06	15.94	0.610
4	Chilipepper	15.45	26.72	0.712	Stripetail rockfish	15.46	54.12	0.814	Chilipepper	15.39	19.26	0.676
5	Jack mackerel	11.18	34.20	0.762	Chilipepper	15.12	37.43	0.866	Sablefish	14.54	151.48	0.738
6	Pacific sanddab	7.04	0.62	0.794	Dover sole	10.61	6.71	0.902	Jack mackerel	9.19	23.14	0.778
7	Stripetail rockfish	6.49	5.94	0.824	White croaker	4.87	23.75	0.918	Stripetail rockfish	8.08	5.72	0.812
8	White croaker	5.84	7.32	0.850	Sablefish	4.56	1.54	0.934	Pacific sanddab	5.87	0.42	0.837
9	English sole	5.30	0.67	0.874	Spiny dogfish	4.19	3.24	0.948	White croaker	5.67	5.70	0.861
10	Shortbelly rockfish	3.08	2.05	0.888	Bocaccio	3.25	4.29	0.959	English sole	4.55	0.46	0.881
11	Pacific herring	3.00	1.62	0.902	Rex sole	3.17	1.29	0.970	Dover sole	3.99	0.33	0.898
12	Dover sole	2.57	0.18	0.913	Shortspine thornyhead	1.25	0.14	0.974	Splitnose rockfish	3.18	0.83	0.912
13	Rex sole	2.54	0.07	0.925	Darkblotched rockfish	1.08	0.19	0.978	Rex sole	2.65	0.09	0.923
14	Lingcod	2.23	0.30	0.935	English sole	1.07	0.41	0.981	Pacific herring	2.47	1.09	0.933
15	Plainfin midshipman	1.73	0.23	0.943	Spotted ratfish	0.86	0.22	0.984	Lingcod	1.87	0.20	0.941
16	Petrale sole	1.34	0.04	0.949	Sharpchin rockfish	0.78	0.38	0.987	Bocaccio	1.49	0.39	0.948
17	Greenstriped rockfish	1.30	0.09	0.955	Longnose skate	0.57	0.16	0.989	Plainfin midshipman	1.45	0.16	0.954
18	Bocaccio	1.11	0.37	0.960	Bigfin eelpout	0.46	0.04	0.990	Petrale sole	1.14	0.03	0.959
19	Yellowtail rockfish	0.95	0.40	0.964	Pacific sanddab	0.40	0.12	0.992	Greenstriped rockfish	1.12	0.06	0.964
20	Widow rockfish	0.83	0.56	0.968	Greenstriped rockfish	0.27	0.01	0.993	Yellowtail rockfish	0.78	0.27	0.967

Table 8.--Dominant fish species observed during the 1989 triennial west coast groundfish survey, ranked by CPUE (kg/ha trawled) in the International North Pacific Fisheries Commission Eureka area.

	Eureka (55-183 m) total effort 134.9 ha total mean CPUE for fish 118.85 kg/ha				Eureka (184-366 m) total effort 58.8 ha total mean CPUE for fish 104.05 kg/ha				Eureka (55-366 m) total effort 193.7 ha total mean CPUE for fish 115.76 kg/ha			
Rank	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion
1	Pacific hake	43.16	397.17	0.363	Sablefish	32.29	453.94	0.310	Pacific hake	39.51	251.42	0.341
2	Jack mackerel	33.29	155.54	0.643	Pacific hake	25.63	56.93	0.557	Jack mackerel	26.36	97.49	0.569
3	Chub mackerel	8.28	13.20	0.713	Darkblotched rockfish	9.49	15.02	0.648	Sablefish	7.41	19.85	0.633
4	Widow rockfish	4.84	22.79	0.754	Dover sole	8.78	4.96	0.732	Chub mackerel	6.55	8.27	0.690
5	Dover sole	4.84	2.24	0.794	Splitnose rockfish	6.31	3.67	0.793	Dover sole	5.66	1.62	0.738
6	Spiny dogfish	4.05	10.42	0.828	Rex sole	3.90	1.87	0.830	Widow rockfish	3.83	14.28	0.772
7	Pacific sanddab	3.45	1.33	0.857	Stripetail rockfish	2.97	3.59	0.859	Spiny dogfish	3.59	6.64	0.803
8	Stripetail rockfish	3.22	3.62	0.885	Pacific ocean perch	2.33	0.86	0.881	Stripetail rockfish	3.17	2.42	0.830
9	Chinook salmon	1.88	0.37	0.900	Pacific halibut	1.89	0.54	0.899	Pacific sanddab	2.73	0.83	0.854
10	Rex sole	1.25	0.08	0.911	Longnose skate	1.81	0.75	0.917	Darkblotched rockfish	2.22	0.68	0.872
11	English sole	1.11	0.08	0.920	Spiny dogfish	1.80	2.46	0.934	Rex sole	1.80	0.13	0.888
12	Longnose skate	1.00	0.16	0.929	Shortspine thornyhead	1.52	0.19	0.949	Chinook salmon	1.49	0.23	0.901
13	Yellowtail rockfish	0.95	0.44	0.937	Lingcod	1.03	0.39	0.959	Splitnose rockfish	1.32	0.16	0.913
14	Lingcod	0.88	0.10	0.944	Arrowtooth flounder	0.94	0.21	0.968	Longnose skate	1.17	0.13	0.923
15	Sablefish	0.87	0.26	0.951	Chilipepper	0.51	0.26	0.973	Lingcod	0.92	0.08	0.931
16	Sharpchin rockfish	0.76	0.58	0.958	Greenstriped rockfish	0.40	0.04	0.976	English sole	0.88	0.05	0.938
17	Greenstriped rockfish	0.64	0.17	0.963	Redbanded rockfish	0.28	0.01	0.979	Pacific halibut	0.85	0.08	0.946
18	Pacific halibut	0.58	0.10	0.968	Eulachon	0.27	0.03	0.982	Yellowtail rockfish	0.75	0.27	0.952
19	Petrale sole	0.55	0.02	0.973	Spotted ratfish	0.25	0.03	0.984	Sharpchin rockfish	0.62	0.36	0.957
20	Eulachon	0.51	0.07	0.977	Bocaccio	0.23	0.01	0.986	Greenstriped rockfish	0.59	0.11	0.962

Table 9.--Dominant fish species observed during the 1989 triennial nest coast groundfish survey, ranked by CPUE (kg/ha trawled) in the International North Pacific Fisheries Commission Columbia area.

	Columbia (55-183 m)				Columbia (184-366 m)				Columbia (55-366 m)			
	total effort 602.8 ha total mean CPUE for fish 214.87 kg/ha				total effort 146.0 ha total mean CPUE for fish 86.23 kg/ha				total effort 748.8 ha total mean CPUE for fish 188.47 kg/ha			
Rank	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion
1	Pacific hake	134.23	755.18	0.625	Pacific hake	37.07	215.01	0.430	Pacific hake	114.29	486.10	0.606
2	Jack mackerel	15.73	90.00	0.698	Sablefish	10.15	24.29	0.548	Jack mackerel	12.51	56.85	0.673
3	Pacific sanddab	14.58	51.14	0.766	Canary rockfish	7.30	50.68	0.632	Pacific sanddab	11.59	32.31	0.734
4	Sablefish	6.70	11.91	0.797	Arrowtooth flounder	4.07	0.76	0.679	Sablefish	7.40	8.54	0.774
5	Yellowtail rockfish	4.75	5.86	0.819	Splitnose rockfish	3.37	2.20	0.718	Rex sole	3.94	0.15	0.795
6	Rex sole	4.49	0.22	0.840	Pacific ocean perch	3.30	4.11	0.757	Yellowtail rockfish	3.79	3.70	0.815
7	Pacific herring	4.03	15.27	0.859	Sharpchin rockfish	3.03	2.91	0.792	Dover sole	3.55	0.15	0.833
8	Dover sole	3.89	0.22	0.877	Dover sole	2.25	0.16	0.818	Pacific herring	3.20	9.65	0.850
9	English sole	3.54	0.53	0.893	Lingcod	2.12	1.43	0.843	Arrowtooth flounder	2.88	0.11	0.866
10	Chub mackerel	3.11	4.41	0.908	Shortspine thornyhead	2.00	0.30	0.866	English sole	2.87	0.34	0.881
11	American shad	2.70	2.50	0.920	Rex sole	1.84	0.14	0.887	Chub mackerel	2.47	2.79	0.894
12	Arrowtooth flounder	2.57	0.12	0.932	Darkblotched rockfish	1.84	0.45	0.908	Canary rockfish	2.26	2.27	0.906
13	Lingcod	1.96	0.95	0.941	Pacific halibut	1.24	0.64	0.923	American shad	2.17	1.58	0.918
14	Spiny dogfish	1.70	0.10	0.949	Greenstriped rockfish	1.21	0.17	0.937	Lingcod	1.99	0.66	0.928
15	Pacific halibut	1.43	0.16	0.956	Longnose skate	1.12	0.36	0.950	Spiny dogfish	1.41	0.06	0.936
16	Greenstriped rockfish	1.12	0.07	0.961	Spotted ratfish	0.79	0.37	0.959	Pacific halibut	1.39	0.13	0.943
17	Petrale sole	1.00	0.21	0.966	Stripetail rockfish	0.52	0.09	0.965	Sharpchin rockfish	1.23	0.23	0.950
18	Canary rockfish	0.96	0.21	0.970	Chilipepper	0.35	0.12	0.969	Greenstriped rockfish	1.14	0.05	0.956
19	Redstripe rockfish	0.85	0.24	0.974	Rosethorn rockfish	0.34	0.03	0.973	Petrale sole	0.81	0.13	0.960
20	Sharpchin rockfish	0.76	0.18	0.978	Spiny dogfish	0.31	0.01	0.977	Longnose skate	0.75	0.05	0.964

Table 10.--Dominant fish species observed during the 1989 triennial west coast groundfish survey, ranked by CPUE (kg/ha trawled) in the U.S. portion of the International North Pacific Fisheries Commission Vancouver area.

	USVancouver (55-183 m)				USVancouver (184-366 m)				USVancouver (55-366 m)			
	total effort 155.9 ha total mean CPUE for fish 263.57 kg/ha				total effort 43.2 ha total mean CPUE for fish 127.72 kg/ha				total effort 199.1 ha total mean CPUE for fish 229.42 kg/ha			
Rank	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion
1	Spiny dogfish	47.99	196.16	0.182	Pacific ocean perch	33.82	849.25	0.265	Pacific hake	39.15	327.27	0.171
2	Pacific hake	45.09	577.31	0.353	Pacific hake	21.46	58.78	0.433	Spiny dogfish	37.78	110.32	0.335
3	Bocaccio	41.76	1732.96	0.512	Arrowtooth flounder	16.61	15.98	0.563	Bocaccio	31.27	971.26	0.472
4	Yellowtail rockfish	26.13	490.75	0.611	Walleye pollock	13.46	56.51	0.668	Arrowtooth flounder	20.34	73.04	0.560
5	Arrowtooth flounder	21.59	128.52	0.693	Dover sole	9.69	8.03	0.744	Yellowtail rockfish	19.57	275.05	0.646
6	Widow rockfish	11.05	97.81	0.735	Spiny dogfish	7.38	6.05	0.802	Pacific ocean perch	8.87	53.70	0.684
7	Redstripe rockfish	10.48	24.82	0.774	Sablefish	3.71	1.34	0.831	Widow rockfish	8.28	54.82	0.720
8	Canary rockfish	8.11	13.22	0.805	Longnose skate	2.78	2.77	0.853	Redstripe rockfish	8.16	13.96	0.756
9	Pacific herring	7.68	13.60	0.834	Rex sole	2.67	0.27	0.874	Walleye pollock	6.52	7.92	0.784
10	Walleye pollock	4.19	7.76	0.850	Shortspine thornyhead	2.36	0.35	0.892	Canary rockfish	6.09	7.41	0.811
11	English sole	3.87	1.44	0.865	Darkblotched rockfish	2.20	1.08	0.909	Pacific herring	5.75	7.62	0.836
12	Sablefish	3.82	4.21	0.879	Sharpchin rockfish	1.81	1.71	0.924	Dover sole	4.30	0.79	0.855
13	Pacific halibut	3.16	0.92	0.891	Spotted ratfish	1.61	0.29	0.936	Sablefish	3.79	2.45	0.871
14	Pacific sanddab	3.01	0.78	0.903	Rougheye rockfish	1.33	0.40	0.947	English sole	2.93	0.81	0.884
15	Dover sole	2.49	0.51	0.912	Redstripe rockfish	1.25	0.69	0.956	Pacific halibut	2.50	0.52	0.895
16	Lingcod	2.33	0.44	0.921	Pacific cod	1.04	0.19	0.965	Pacific sanddab	2.26	0.44	0.905
17	Silvergray rockfish	2.02	1.13	0.929	Flathead sole	0.88	0.42	0.972	Lingcod	1.94	0.27	0.913
18	Pacific tomcod	1.90	1.28	0.936	Lingcod	0.80	0.44	0.978	Rex sole	1.84	0.15	0.921
19	Sharpchin rockfish	1.70	0.50	0.942	Pacific halibut	0.51	0.11	0.982	Sharpchin rockfish	1.73	0.39	0.929
20	Greenstriped rockfish	1.64	0.42	0.949	Splitnose rockfish	0.48	0.20	0.986	Longnose skate	1.65	0.32	0.936

Table 11.--Dominant fish species observed during the 1989 triennial west coast groundfish survey, ranked by CPUE (kg/ha trawled) in the Canadian portion of the International North Pacific Fisheries Commission Vancouver area.

	CanVancouver (55-183 m) total effort 221.4 ha total mean CPUE for fish 334.90 kg/ha			CanVancouver (184-366 m) total effort 29.6 ha total mean CPUE for fish 544.69 kg/ha			CanVancouver (55-366 m) total effort 251.0 ha total mean CPUE for fish 356.80 kg/ha		
Rank	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion
1	Spiny dogfish	188.74	3309.54	0.564	Pacific hake	222.75	49448.12	0.409	Spiny dogfish	174.69	2682.94	0.490
2	Arrowtooth flounder	43.55	166.77	0.694	Pacific ocean perch	59.13	477.05	0.518	Arrowtooth flounder	43.74	139.65	0.612
3	Lingcod	11.40	11.37	0.728	Spiny dogfish	54.11	2604.31	0.617	Pacific hake	28.26	543.80	0.691
4	Sablefish	11.24	16.28	0.761	Sharpchin rockfish	45.52	1629.65	0.700	Sablefish	11.17	13.32	0.723
5	Pacific herring	9.57	68.09	0.790	Arrowtooth flounder	45.40	540.06	0.784	Lingcod	10.71	9.20	0.753
6	Dover sole	9.43	5.43	0.818	Walleye pollock	22.57	502.47	0.825	Dover sole	9.79	4.62	0.780
7	Pacific cod	7.89	3.65	0.842	Dover sole	12.91	24.66	0.849	Pacific herring	8.58	54.62	0.804
8	Redstripe rockfish	7.21	22.85	0.863	Silvergray rockfish	12.37	143.61	0.872	Redstripe rockfish	7.44	19.16	0.825
9	Canary rockfish	6.66	13.65	0.883	Splitnose rockfish	10.97	62.33	0.892	Pacific cod	7.35	2.97	0.846
10	Pacific hake	5.59	5.97	0.900	Sablefish	10.61	24.56	0.911	Pacific ocean perch	6.48	5.22	0.864
11	Rex sole	4.82	0.85	0.914	Redstripe rockfish	9.45	76.19	0.929	Canary rockfish	6.07	10.96	0.881
12	Yellowtail rockfish	3.72	6.39	0.925	Pacific halibut	7.61	21.13	0.943	Sharpchin rockfish	5.53	17.94	0.896
13	Walleye pollock	3.05	1.84	0.934	Spotted ratfish	7.55	43.66	0.956	Walleye pollock	5.08	6.96	0.911
14	Pacific halibut	2.74	0.96	0.942	Lingcod	4.79	7.91	0.965	Rex sole	4.68	0.70	0.924
15	English sole	1.98	0.16	0.948	Longnose skate	3.81	5.21	0.972	Yellowtail rockfish	3.33	5.13	0.933
16	Silvergray rockfish	1.92	0.75	0.954	Rex sole	3.50	1.61	0.979	Pacific halibut	3.24	1.00	0.942
17	Pacific sanddab	1.86	0.53	0.960	Pacific cod	2.69	4.24	0.984	Silvergray rockfish	3.01	2.16	0.951
18	Bocaccio	1.55	0.55	0.964	Rosethorn rockfish	1.64	1.65	0.987	Spotted ratfish	1.98	0.66	0.956
19	Greenstriped rockfish	1.48	0.21	0.969	Redbanded rockfish	1.58	0.60	0.989	English sole	1.78	0.13	0.961
20	Longnose skate	1.37	0.11	0.973	Shortspine thornyhead	1.17	0.25	0.992	Pacific sanddab	1.67	0.42	0.966

Table 12.--Dominant fish species observed during the 1989 triennial west coast groundfish survey, ranked by CPUE (kg/ha trawled) in the International North Pacific.. Fisheries Commission Vancouver area.

Rank	Vancouver (55-183 m) total effort 377.3 ha total mean CPUE for fish 283.01 kg/ha			Vancouver (184-366 m) total effort 72.8 ha total mean CPUE for fish 305.50 kg/ha			Vancouver (55-366 m) total effort 450.2 ha total mean CPUE for fish 286.49 kg/ha		
	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion	Species	Mean CPUE (kg/ha)	Variance	Cumulative proportion
1	Spiny dogfish	116.74	1949.47	0.412	Pacific hake	103.02	8207.17	0.337	Spiny dogfish	102.79	1404.04	0.359
2	Arrowtooth flounder	36.59	91.13	0.542	Pacific ocean perch	49.91	561.69	0.501	Arrowtooth flounder	35.51	67.61	0.483
3	Pacific hake	18.36	57.56	0.607	Arrowtooth flounder	29.62	103.18	0.598	Pacific hake	31.43	236.96	0.592
4	Bocaccio	14.26	173.35	0.657	Spiny dogfish	26.39	431.23	0.684	Bocaccio	12.11	123.94	0.635
5	Yellowtail rockfish	10.80	52.02	0.695	Sharpchin rockfish	19.73	275.40	0.749	Yellowtail rockfish	9.14	37.19	0.667
6	Pacific herring	8.95	33.05	0.727	Walleye pollock	16.94	97.36	0.804	Pacific ocean perch	8.06	13.42	0.695
7	Redstripe rockfish	8.23	13.16	0.756	Dover sole	11.52	7.54	0.842	Dover sole	7.96	2.04	0.723
8	Lingcod	8.08	5.48	0.784	Sablefish	7.35	7.07	0.866	Sablefish	7.72	6.33	0.749
9	Sablefish	7.78	8.61	0.812	Silvergray rockfish	5.05	24.03	0.882	Redstripe rockfish	7.66	9.72	0.776
10	Dover sole	7.31	2.60	0.838	Splitnose rockfish	4.73	10.91	0.898	Pacific herring	7.56	23.63	0.803
11	Canary rockfish	6.85	7.71	0.862	Redstripe rockfish	4.54	12.99	0.913	Lingcod	7.20	3.96	0.828
12	Pacific cod	5.00	2.05	0.880	Spotted ratfish	4.09	7.15	0.926	Walleye pollock	5.87	4.10	0.848
13	Walleye pollock	3.85	2.48	0.893	Pacific halibut	3.38	3.85	0.937	Canary rockfish	5.86	5.52	0.869
14	Rex sole	3.82	0.43	0.907	Longnose skate	3.22	1.73	0.948	Pacific cod	4.50	1.49	0.884
15	Widow rockfish	3.49	9.77	0.919	Rex sole	3.01	0.34	0.957	Sharpchin rockfish	4.01	6.68	0.898
16	Pacific halibut	2.90	0.54	0.929	Lingcod	2.38	1.56	0.965	Rex sole	3.69	0.31	0.911
17	English sole	2.58	0.24	0.938	Shortspine thornyhead	1.88	0.16	0.971	Pacific halibut	2.98	0.48	0.922
18	Pacific sanddab	2.20	0.32	0.946	Pacific cod	1.79	0.74	0.977	Widow rockfish	2.96	6.99	0.932
19	Silvergray rockfish	1.95	0.46	0.953	Darkblotched rockfish	1.39	0.42	0.982	Silvergray rockfish	2.43	0.90	0.940
20	Greenstriped rockfish	1.53	0.14	0.958	Redbanded rockfish	0.85	0.14	0.985	English sole	2.20	0.17	0.948

Table 13.--Estimates of fish biomass from the 1989 west coast groundfish survey by INPFC area for the combined depth (55-366 m). Confidence intervals are expressed as a percentage of the point estimate. T denotes trace value. Differences in totals result from rounding.

Taxon	Estimated total biomass (t) and 90% confidence interval	% of total fish biomass	Estimated biomass (t) by INPFC subarea and 90% confidence interval						
			Conception	Monterey	Eureka	Columbia	US-Vancouver	Can-Vancouver	Vancouver
Cartilagenous									
Spiny dogfish	198,234 ± 51	17.8	167 ± 72	51,643 ±103	1,852 ±121	3,404 ± 24	40,937 ± 90	100,231 ± 73	141,168 ± 61
Skates and rays	7,081 ± 18	0.6	189 ± 49	978 ± 28	852 ± 40	2,426 ± 38	937 ± 41	1,699 ± 31	2,636 ± 27
Others	4,233 ± 35	0.4	114 ± 45	846 ± 87	71 ± 55	606 ± 58	902 ± 56	1,693 ± 57	2,596 ± 49
Total cartilagenous	209,548 ± 48	18.8	470 ± 32	53,467 ± 99	2,776 ± 81	6,435 ± 21	42,776 ± 86	103,623 ± 71	146,399 ± 59
Flatfish									
Arrowtooth flounder	54,893 ± 34	4.9	--	8 ±100	237 ± 44	5,977 ± 18	11,295 ± 59	37,377 ± 45	48,671 ± 39
Dover sole	26,629 ± 15	2.4	1,095 ±114	4,640 ± 25	2,923 ± 38	6,965 ± 18	1,928 ± 23	9,078 ± 34	11,006 ± 30
English sole	14,370 ± 17	1.3	82 ± 62	5,131 ± 25	456 ± 43	5,606 ± 32	1,302 ± 48	1,792 ± 37	3,095 ± 31
Pacific halibut	7,475 ± 27	0.7	--	200 ± 68	441 ± 56	2,924 ± 42	1,080 ± 29	2,830 ± 48	3,910 ± 39
Pacific sanddab	35,869 ± 53	3.2	2,312 ± 79	6,764 ± 18	1,412 ± 56	22,851 ± 82	1,061 ± 39	1,468 ± 63	2,529 ± 42
Petrale sole	4,358 ± 30	0.4	138 ± 45	1,269 ± 24	225 ± 43	1,567 ± 77	230 ± 24	929 ± 34	1,159 ± 29
Rex sole	17,286 ± 11	1.6	452 ±107	3,044 ± 19	931 ± 34	7,600 ± 16	1,103 ± 24	4,156 ± 29	5,259 ± 24
Others	4,116 ± 21	0.4	37 ± 65	516 ± 27	38 ± 39	938 ± 30	530 ± 32	2,056 ± 36	2,586 ± 31
Total flatfish	164,996 ± 17	14.8	4,117 ± 59	21,572 ± 13	6,662 ± 25	54,428 ± 37	18,529 ± 39	59,687 ± 29	78,216 ± 25
Rockfish									
Shortspine thornyhead	2,019 ± 22	0.2	54 ±146	259 ± 58	219 ± 45	980 ± 39	283 ± 42	224 ± 43	506 ± 33
Bocaccio	26,363 ±109	2.4	7,534 ±155	2,022 ± 78	41 ± 78	59 ± 86	14,320 ±168	2,387 ± 90	16,708 ±156
Canary	13,186 ± 55	1.2	2 ±200	732 ± 73	124 ± 73	3,614 ±112	3,838 ± 61	4,876 ± 97	8,713 ± 63

Table 13. --Continued.

Taxon	Estimated total biomass (t) and 90% confidence interval	% of total fish biomass	Estimated biomass (t) by INPFC subarea and 90% confidence interval						
			Conception	Monterey	Eureka	Columbia	US-Vancouver	Can-Vancouver	Vancouver
Rockfish (cont.)									
Chilipepper	19,799 ± 43	1.8	2,332 ± 55	17,072 ± 49	253 ±134	141 ±172	--	--	--
Darkblotched	3,242 ± 28	0.3	3 ±133	288 ± 59	1,148 ± 65	1,478 ± 34	213 ± 43	132 ±111	345 ± 59
Greenstriped	5,709 ± 20	0.5	3 ±100	1,267 ± 37	304 ± 95	2,199 ± 32	696 ± 55	1,241 ± 47	1,937 ± 38
Pacific ocean perch	12,822 ± 73	1.2	--	--	251 ± 69	1,536 ± 93	7,719 ±107	3,316 ± 84	11,035 ± 85
Redstripe	11,966 ± 61	1.1	--	6 ±167	8 ±138	1,355 ± 93	4,179 ± 70	6,418 ± 96	10,597 ± 68
Sharpchin	8,518 ± 78	0.8	5 ±140	266 ± 89	318 ±165	2,360 ± 67	1,846 ± 86	3,723 ±134	5,569 ±117
Shortbelly	21,067 ± 97	1.9	10,053 ±173	10,953 ± 85	13 ±138	20 ± 80	1 ±200	25 ±156	27 ±148
Silvergray	3,400 ± 66	0.3	--	--	--	49 ± 84	1,013 ± 73	2,338 ± 76	3,350 ± 67
Splitnose	7,284 ± 34	0.7	626 ± 78	3,589 ± 56	683 ± 53	1,367 ± 76	281 ±111	738 ±133	1,019 ±127
Stripetail	11,908 ± 42	1.1	1,528 ± 94	8,484 ± 64	1,637 ± 83	222 ± 75	35 ±131	1 ±100	36 ±128
Widow	9,583 ± 82	0.9	1,898 ±171	1,023 ±120	1,979 ±166	577 ±116	3,793 ±151	313 ±147	4,106 ±150
Yellowtail	21,335 ± 73	1.9	--	880 ±112	387 ±118	7,054 ± 84	9,441 ±136	3,573 ± 94	13,014 ±109
Others	6,060 ± 34	0.5	1,244 ±123	1,117 ± 63	133 ± 61	952 ± 36	1,238 ± 49	1,376 ± 49	2,614 ± 37
Total rockfish	184,260 ± 27	16.5	25,284 ± 97	47,939 ± 34	7,498 ± 61	23,964 ± 35	48,895 ± 65	30,681 ± 48	79,576 ± 47
Other fish									
Lingcod	16,469 ± 32	1.5	45 ± 76	2,115 ± 40	473 ± 52	3,701 ± 71	1,872 ± 39	8,262 ± 52	10,134 ± 45
Pacific hake	379,810 ± 23	34.1	1,362 ± 81	89,711 ± 41	20,415 ± 68	224,055 ± 31	21,503 ± 56	22,764 ±119	44,267 ± 82
Sablefish	45,931 ± 57	4.1	383 ± 57	16,502 ±142	3,829 ±105	14,720 ± 65	3,031 ± 63	7,465 ± 69	10,497 ± 55
Others	112,662 ± 31	10.1	1,021 ± 49	23,956 ± 44	18,162 ± 57	43,250 ± 68	6,657 ± 35	19,616 ± 57	26,273 ± 46
Total fish	1,113,676 ± 15	100.0	32,682 ± 74	255,263 ± 31	59,816 ± 32	370,554 ± 22	143,264 ± 36	252,098 ± 37	395,361 ± 29

Table 14.--Estimates of fish biomass from the 1989 west coast groundfish survey by INPFC area for the shallow depth stratum (55-183 m). Confidence intervale are expressed as a percentage of the point estimate. T denotes trace value. Differences in totals result from rounding.

Taxon	Estimated biomass (t) and 90% confidence interval	% of shallow fish biomass	Estimated biomass (t) by INPFC subarea and 90% confidence interval						
			Conception	Monterey	Eureka	Columbia	US-Vancouver	Can-Vancouver	Vancouver
Cartilagenous									
Spiny dogfish	191,431 ± 52	20.4	150 ± 80	50,800 ±104	1,659 ±134	3,274 ± 25	39,239 ± 94	96,309 ± 76	135,548 ± 63
Skates and rays	5,358 ± 20	0.6	134 ± 65	794 ± 30	622 ± 48	1,908 ± 44	629 ± 51	1,270 ± 33	1,899 ± 29
Others	2,805 ± 38	0.3	79 ± 57	677 ±106	35 ± 60	341 ± 35	591 ± 73	1,082 ± 56	1,673 ± 47
Total cartilagenous	199,594 ± 50	21.3	364 ± 38	52,271 ±101	2,316 ± 96	5,523 ± 23	40,459 ± 91	98,661 ± 74	139,120 ± 62
Flatfish									
Arrowtooth flounder	46,837 ± 40	5.0	--	7 ±100	135 ± 45	4,339 ± 21	8,277 ± 79	34,079 ± 48	42,356 ± 44
Dover sole	19,081 ± 19	2.0	93 ± 75	2,399 ± 27	1,979 ± 52	6,069 ± 20	988 ± 31	7,553 ± 40	8,541 ± 37
English sole	14,001 ± 18	1.5	82 ± 62	4,915 ± 26	452 ± 44	5,482 ± 33	1,282 ± 49	1,786 ± 37	3,068 ± 31
Pacific halibut	6,053 ± 29	0.6	--	200 ± 68	237 ± 90	2,425 ± 46	872 ± 31	2,319 ± 54	3,191 ± 42
Pacific sanddab	35,782 ± 53	3.8	2,307 ± 79	6,682 ± 18	1,412 ± 56	22,851 ± 82	1,061 ± 39	1,468 ± 63	2,529 ± 42
Petrale sole	4,223 ± 31	0.4	98 ± 42	1,223 ± 25	223 ± 43	1,552 ± 78	220 ± 25	907 ± 34	1,127 ± 29
Rex sole	14,423 ± 13	1.5	72 ± 44	2,365 ± 18	512 ± 38	6,862 ± 18	774 ± 33	3,839 ± 31	4,613 ± 27
Others	3,794 ± 22	0.4	25 ± 72	462 ± 29	35 ± 43	883 ± 31	430 ± 38	1,959 ± 37	2,389 ± 32
Total flatfish	144,193 ± 19	15.4	2,678 ± 69	18,253 ± 14	4,985 ± 31	50,462 ± 40	13,904 ± 51	53,910 ± 32	67,814 ± 28
Rockfish									
Shortspine thornyhead	337 ± 35	T	T	1 ±200	55 ±107	180 ± 34	47 ±113	54 ±100	101 ± 78
Bocaccio	25,583 ±113	2.7	7,534 ±155	1,370 ±103	17 ±135	30 ±120	14,301 ±168	2,331 ± 92	16,632 ±156
Canary	10,332 ± 54	1.1	2 ±200	726 ± 74	118 ± 77	1,493 ± 80	3,185 ± 67	4,808 ± 98	7,993 ± 68

Table 14.--Continued.

Taxon	Estimated biomass (t) and 90% confidence interval	% of shallow fish biomass	Estimated biomass (t) by INPFC subarea and 90% confidence interval						
			Conception	Monterey	Eureka	Columbia	US-Vancouver	Can-Vancouver	Vancouver
Rockfish (cont.)									
Chilipepper	16,246 ± 50	1.7	1,578 ± 66	14,469 ± 56	198 ±166	T	--	--	--
Darkblotched	948 ± 25	0.1	T	52 ± 65	127 ±105	677 ± 26	63 ± 43	29 ± 62	92 ± 36
Greenstriped	5,008 ± 23	0.5	3 ±100	1,214 ± 38	261 ±110	1,735 ± 39	622 ± 61	1,173 ± 49	1,795 ± 40
Pacific ocean perch	575 ± 53	0.1	--	--	--	96 ±122	102 ± 99	378 ± 66	479 ± 59
Redstripe	10,937 ± 65	1.2	--	6 ±167	1 ±200	1,301 ± 97	3,848 ± 75	5,782 ±105	9,629 ± 73
Sharpchin	2,941 ± 48	0.3	T	114 ± 89	312 ±168	1,187 ± 92	615 ± 66	712 ± 83	1,327 ± 57
Shortbelly	3,037 ± 73	0.3	216 ± 99	2,775 ± 80	2 ±100	18 ± 83	1 ±200	25 ±156	27 ±148
Silvergray	2,293 ± 58	0.2	--	--	--	24 ±121	754 ± 82	1,515 ± 73	2,269 ± 58
Splitnose	31 ± 52	T	--	8 ±138	4 ±100	14 ± 71	1 ±100	4 ±150	5 ±120
Stripetail	7,780 ± 51	0.8	396 ± 81	6,012 ± 63	1,318 ±100	42 ±100	11 ±109	1 ±100	12 ±108
Widow	9,536 ± 83	1.0	1,896 ±172	1,000 ±123	1,979 ±166	567 ±118	3,790 ±151	304 ±152	4,095 ±151
Yellowtail	21,321 ± 73	2.3	--	880 ±112	387 ±118	7,043 ± 85	9,438 ±136	3,573 ± 94	13,011 ±109
Others	5,082 ± 41	0.5	1,147 ±134	1,048 ± 67	75 ± 96	750 ± 44	990 ± 60	1,072 ± 60	2,062 ± 45
Total rockfish	121,988 ± 34	13.0	12,773 ±129	29,674 ± 39	4,855 ± 92	15,157 ± 49	37,767 ± 81	21,762 ± 58	59,529 ± 60
Other fish									
Lingcod	14,977 ± 35	1.6	45 ± 76	2,076 ± 41	382 ± 60	2,941 ± 86	1,616 ± 44	7,937 ± 54	9,553 ± 48
Pacific hake	314,817 ± 26	33.6	46 ± 74	65,701 ± 51	17,657 ± 78	209,146 ± 33	14,988 ± 60	7,279 ± 62	22,266 ± 46
Sablefish	35,552 ± 72	3.8	92 ± 53	15,555 ±151	354 ± 99	10,609 ± 84	2,261 ± 81	6,681 ± 77	8,941 ± 64
Others	106,982 ± 32	11.4	957 ± 51	22,757 ± 46	18,088 ± 57	42,940 ± 69	4,948 ± 37	17,292 ± 63	22,241 ± 52
Total fish	938,102 ± 17	100.0	16,955 ± 98	206,288 ± 37	48,618 ± 39	336,778 ± 24	116,942 ± 43	213,622 ± 41	329,464 ± 32

Table 15.--Estimates of fish biomass from the 1989 west coast groundfish survey by INPFC area for the deep stratum (184-366 m). Confidence intervals are expressed as a percentage of the point estimate. T denotes trace, value. Differences in totals result from rounding.

Taxon	Estimated biomass (t) and 90% confidence interval	% of deep fish biomass	Estimated biomass (t) by INPFC subarea and 90% confidence interval						
			Conception	Monterey	Eureka	Columbia	US-Vancouver	Can-Vancouver	Vancouver
Cartilagenous									
Spiny dogfish	6,803 ±120	3.9	17 ± 88	843 ± 76	194 ± 71	130 ± 42	1,698 ±114	3,922 ±158	5,620 ±144
Skates and rays	1,723 ± 38	1.0	55 ± 69	184 ± 77	230 ± 70	518 ± 80	308 ± 78	429 ± 79	737 ± 66
Others	1,428 ± 77	0.8	35 ± 77	169 ± 98	36 ± 94	265 ±127	312 ± 86	611 ±130	923 ±114
Total cartilagenous	9,954 ± 95	5.7	107 ± 52	1,196 ± 57	459 ± 71	912 ± 56	2,317 ± 98	4,962 ±145	7,280 ±130
Flatfish									
Arrowtooth flounder	8,057 ± 49	4.6	--	1 ±300	102 ± 35	1,638 ± 37	3,018 ± 48	3,298 ± 87	6,315 ± 62
Dover sole	7,548 ± 25	4.3	1,003 ±125	2,240 ± 44	945 ± 44	898 ± 30	940 ± 37	1,525 ± 52	2,465 ± 43
English sole	369 ± 77	0.2	--	216 ±126	3 ±100	123 ±116	20 ±110	6 ±117	26 ± 98
Pacific halibut	1,422 ± 65	0.8	--	--	203 ± 68	499 ±112	208 ± 89	511 ±114	719 ±107
Pacific sanddab	87 ±167	T	5 ±180	82 ±177	--	--	--	--	--
Petrale sole	135 ± 59	0.1	40 ±123	46 ±115	2 ±100	15 ±100	10 ±110	22 ±145	32 ±134
Rex sole	2,864 ± 26	1.6	380 ±127	679 ± 66	419 ± 62	738 ± 35	330 ± 27	317 ± 51	646 ± 34
Others	322 ± 61	0.2	11 ±164	54 ± 48	3 ± 67	56 ± 57	100 ± 60	98 ±146	197 ± 97
Total flatfish	20,803 ± 22	11.8	1,439 ±122	3,319 ± 37	1,677 ± 41	3,965 ± 31	4,625 ± 33	5,776 ± 52	10,402 ± 39
Rockfish									
Shortspine thornyhead	1,681 ± 26	1.0	54 ±144	258 ± 58	164 ± 50	800 ± 47	235 ± 48	170 ± 49	405 ± 38
Bocaccio	780 ±126	0.4	--	652 ±150	24 ± 96	28 ±139	19 ± 84	56 ± 86	75 ± 85
Canary	2,864 ±182	1.6	--	6 ±167	6 ±167	2,122 ±188	653 ±185	67 ±172	720 ±169

Table 15. --Continued.

Taxon	Estimated biomass (t) and 90% confidence interval	% of deep fish biomass	Estimated biomass (t) by INPFC subarea and 90% confidence interval						
			Conception	Monterey	Eureka	Columbia	US-Vancouver	Can-Vancouver	Vancouver
Rockfish (cont.)									
Chilipepper	3,553 ± 73	2.0	754 ±112	2,803 ±101	55 ±175	141 ±172	--	--	--
Darkblotched	2,294 ± 39	1.3	3 ±100	216 ± 72	1,021 ± 72	801 ± 59	150 ± 59	103 ±141	253 ± 80
Greenstriped	702 ± 42	0.4	--	53 ± 75	43 ± 86	464 ± 51	74 ± 82	68 ± 87	142 ± 70
Pacific ocean perch	12,246 ± 77	7.0	--	--	251 ± 69	1,440 ± 99	7,617 ±109	2,939 ± 95	10,556 ± 89
Redstripe	1,029 ±137	0.6	--	--	6 ±183	54 ± 91	332 ±108	636 ±168	968 ±145
Sharpchin	5,577 ±117	3.2	5 ±140	152 ±145	6 ± 67	1,173 ± 99	1,231 ±125	3,010 ±164	4,242 ±153
Shortbelly	18,030 ±113	10.3	9,838 ±177	8,178 ±116	11 ±164	3 ±100	--	--	--
Silvergray	1,107 ±173	0.6	--	--	--	26 ±115	259 ±175	822 ±178	1,081 ±177
Splitnose	7,253 ± 34	4.1	626 ± 78	3,581 ± 56	679 ± 53	1,354 ± 77	280 ±111	734 ±134	1,014 ±127
Stripetail	4,128 ± 79	2.4	1,132 ±125	2,472 ±128	319 ±112	180 ± 90	24 ±188	T	24 ±188
Widow	47 ± 66	T	3 ±133	24 ±113	--	10 ± 90	3 ±100	8 ±138	11 ±127
Yellowtail	14 ± 64	T	--	--	--	11 ± 64	3 ± 67	--	3 ± 67
Others	977 ± 35	0.6	97 ±114	69 ± 62	58 ± 71	202 ± 56	248 ± 50	305 ± 70	552 ± 54
Total rockfish	62,272 ± 43	35.5	12,511 ±156	18,264 ± 75	2,643 ± 43	8,807 ± 51	11,128 ± 77	8,918 ± 91	20,047 ± 65
Other fish									
Lingcod	1,492 ± 62	0.8	--	39 ±103	111 ±106	760 ± 92	256 ± 82	325 ±110	581 ± 85
Pacific hake	64,993 ± 59	37.0	1,318 ± 84	24,010± 64	2,758 ± 52	14,909 ± 67	6,515 ±130	15,486 ±174	22,000 ±161
Sablefish	10,380 ± 51	5.9	291 ± 74	947 ± 49	3,475 ±116	4,111 ± 84	771 ± 83	785 ± 80	1,556 ± 64
Others	5,679 ± 72	3.2	64 ±136	1,199 ±190	74 ± 54	310 ± 48	1,709 ± 87	2,323 ±117	4,032 ± 92
Total fish	175,574 ± 32	100.0	15,728 ±121	48,975 ± 45	11,198 ± 38	33,776 ± 35	27,322 ± 50	38,576 ± 96	65,897 ± 74

Table 16.--Estimates of fish population numbers (x1000) from the 1989 west coast groundfish survey by INPFC area for the combined depth strata (55-366 m). Confidence intervals are expressed as a percentage of the point estimate. T denotes trace value. Differences in totals result from rounding.

Taxon	Estimated total population and 90% confidence interval	Estimated population numbers (x 1000) by INPFC subarea and 90% confidence interval						
		Conception	Monterey	Eureka	Columbia	US-Vancouver	Can-Vancouver	Vancouver
Cartilagenous								
Spiny dogfish	183,432 ± 53	155 ± 65	67,401 ±101	2,430 ±118	3,598 ± 29	32,850 ± 98	76,999 ± 77	109,848 ± 64
Flatfish								
Arrowtooth flounder	48,791 ± 20	--	22 ± 84	957 ± 49	12,087 ± 21	9,086 ± 30	26,638 ± 32	35,724 ± 26
Dover sole	78,449 ± 14	3,772 ±100	19,191 ± 23	8,775 ± 39	22,295 ± 19	4,570 ± 23	19,846 ± 38	24,416 ± 33
English sole	65,270 ± 18	269 ± 63	23,122 ± 23	1,931 ± 42	28,595 ± 34	4,581 ± 56	6,771 ± 38	11,352 ± 33
Pacific halibut	1,060 ± 27	--	27 ± 61	56 ± 61	386 ± 42	178 ± 30	413 ± 48	591 ± 38
Pacific sanddab	257,006 ± 38	19,125 ± 70	63,410 ± 18	12,478 ± 56	142,330 ± 68	7,016 ± 39	12,648 ± 70	19,663 ± 49
Petrale sole	10,035 ± 43	213 ± 40	3,040 ± 25	597 ± 39	4,636 ± 90	379 ± 26	1,171 ± 29	1,549 ± 24
Rex sole	137,637 ± 12	3,259 ± 89	23,685 ± 17	9,274 ± 34	73,177 ± 18	6,656 ± 21	21,587 ± 26	28,243 ± 22
Rockfish								
Shortspine thornyhead	11,519 ± 22	244 ±147	1,610 ± 53	1,381 ± 35	5,484 ± 39	1,689 ± 62	1,110 ± 43	2,800 ± 43
Bocaccio	39,929 ±131	30,623 ±152	5,819 ± 97	19 ± 71	16 ± 90	2,894 ±168	557 ± 83	3,452 ±152
Canary	8,943 ± 52	4 ±172	1,063 ± 83	53 ± 65	2,859 ±106	2,206 ± 62	2,758 ± 84	4,965 ± 56
Chilipepper	66,792 ± 37	25,443 ± 63	40,920 ± 43	298 ±115	131 ±165	--	--	--
Darkblotched	15,626 ± 19	11 ± 75	900 ± 46	3,034 ± 45	10,215 ± 24	1,080 ± 35	385 ± 74	1,465 ± 35
Greenstriped	24,177 ± 19	20 ± 90	6,575 ± 34	1,103 ± 82	9,917 ± 31	2,297 ± 47	4,265 ± 48	6,562 ± 37
Pacific ocean perch	23,002 ± 64	--	--	380 ± 70	2,900 ± 86	12,371 ±103	7,351 ± 65	19,722 ± 73

Table 16.--Continued.

Taxon	Estimated total population and 90% confidence interval	Estimated population numbers (x 1000) by INPFC subarea and 90% confidence interval						
		Conception	Monterey	Eureka	Columbia	US-Vancouver	Can-Vancouver	Vancouver
Rockfish (cont.)								
Redstripe	34,182 ± 53	--	78 ± 169	13 ±143	6,757 ± 96	12,179 ± 73	15,155 ± 90	27,334 ± 62
Sharpchin	37,380 ± 55	36 ±114	1,579 ± 75	1,451 ±162	13,667 ± 69	7,640 ± 63	13,007 ±110	20,647 ± 91
Shortbelly	193,954 ± 83	89,454 ±153	103,596 ± 67	122 ±104	553 ±103	10 ±155	219 ±155	229 ±155
Silvergray	1,619 ± 71	--	--	--	21 ± 77	476 ± 75	1,122 ± 81	1,598 ± 72
Splitnose	43,076 ± 29	3,446 ± 70	16,167 ± 50	7,805 ± 71	11,931 ± 62	1,310 ± 91	2,417 ±121	3,727 ±105
Stripetail	141,539 ± 44	29,309 ± 73	100,083 ± 58	10,231 ± 75	1,651 ± 81	259 ±143	5 ±112	264 ±141
Widow	14,745 ± 79	3,890 ±171	3,254 ±137	2,908 ±166	562 ± 96	3,821 ±160	310 ±159	4,132 ±160
Yellowtail	15,256 ± 69	--	1,230 ±118	243 ±112	5,113 ± 86	6,329 ±136	2,341 ± 88	8,670 ±110
Other fish								
Lingcod	4,897 ± 22	124 ± 50	1,353 ± 39	164 ± 55	943 ± 42	534 ± 46	1,778 ± 44	2,312 ± 37
Pacific hake	723,009 ± 24	14,419 ± 77	206,881 ± 37	88,688 ±112	360,264 ± 31	28,799 ± 53	23,958 ±115	52,757 ± 71
Sablefish	56,552 ± 74	710 ± 50	26,605 ±149	4,074 ±100	15,729 ± 59	5,827 ±127	3,607 ± 51	9,434 ± 87

Table 17.--Estimate6 of fish population numbers (x1000) from the 1989 west coast groundfish survey by INPFC area for the shallow stratum (55-183 m). Confidence intervals are expressed as a percentage of the point estimate. T denotes trace value. Differences in totals result from rounding.

Taxon	Estimated shallow population and 90% confidence interval	Estimated population numbers (x 1000) by INPFC subarea and 90% confidence interval						
		Conception	Monterey	Eureka	Columbia	US-Vancouver	Can-Vancouver	Vancouver
Cartilagenous								
Spiny dogfish	178,533 ± 54	100 ± 90	66,198 ±103	2,162 ±132	3,465 ± 30	31,829 ±101	74,779 ± 80	106,608 ± 66
Flatfish								
Arrowtooth flounder	43,442 ± 22	--	20 ± 93	799 ± 56	10,240 ± 24	7,407 ± 35	24,977 ± 33	32,384 ± 28
Dover sole	57,980 ± 17	622 ± 72	11,686 ± 25	6,100 ± 52	19,991 ± 21	2,648 ± 27	16,934 ± 44	19,582 ± 40
English sole	63,882 ± 19	269 ± 63	22,158 ± 24	1,922 ± 42	28,241 ± 34	4,543 ± 56	6,747 ± 38	11,290 ± 34
Pacific halibut	860 ± 29	--	27 ± 61	37 ± 88	325 ± 47	145 ± 31	326 ± 54	471 ± 40
Pacific sanddab	256,220 ± 38	19,091 ± 70	62,658 ± 18	12,478 ± 56	142,330 ± 68	7,016 ± 39	12,648 ± 70	19,663 ± 49
Petrale sole	9,862 ± 43	176 ± 42	2,955 ± 25	594 ± 39	4,613 ± 91	370 ± 26	1,154 ± 29	1,523 ± 24
Rex sole	117,747 ± 13	819 ± 49	19,247 ± 18	5,644 ± 42	67,092 ± 20	4,902 ± 27	20,042 ± 28	24,944 ± 24
Rockfish								
Shortspine thornyhead	1,571 ± 38	2 ±172	14 ±166	320 ±105	711 ± 38	254 ±106	271 ± 99	525 ± 76
Bocaccio	39,327 ±133	30,623 ±152	5,252 ±107	9 ±122	9 ±118	2,890 ±168	543 ± 85	3,433 ±153
Canary	6,857 ± 43	4 ±172	1,058 ± 83	50 ± 68	1,288 ± 71	1,728 ± 64	2,729 ± 84	4,457 ± 60
Chilipepper	59,659 ± 40	23,850 ± 67	35,630 ± 47	176 ±158	3 ±166	--	--	--
Darkblotched	10,131 ± 24	3 ±119	446 ± 61	1,037 ± 83	7,730 ± 28	726 ± 43	189 ± 52	915 ± 36
Greenstriped	21,220 ± 21	20 ± 90	6,307 ± 36	927 ± 97	7,961 ± 37	1,998 ± 53	4,006 ± 51	6,004 ± 40
Pacific ocean perch	3,203 ± 50	--	--	--	152 ± 82	489 ± 79	2,562 ± 58	3,051 ± 53

Table-17 .--Continued.

Taxon	Estimated shallow population and 90% confidence interval	Estimated population numbers (x 1000) by INPFC subarea and 90% confidence interval						
		Conception	Monterey	Eureka	Columbia	US-Vancouver	Can-Vancouver	Vancouver
Rockfish (cont.)								
Redstripe	32,044 ± 56	--	78 ±169	3 ±169	6,488 ±100	11,583 ± 76	13,912 ± 97	25,475 ± 66
Sharpchin	16,602 ± 47	12 ±172	911 ± 86	1,409 ±167	7,057 ± 90	3,314 ± 63	3,898 ± 79	7,213 ± 54
Shortbelly	54,249 ± 70	5,364 ± 82	48,086 ± 78	43 ± 68	526 ±108	10 ±155	219 ±155	229 ±155
Silvergray	1,049 ± 62	--	--	--	10 ±120	343 ± 84	696 ± 79	1,039 ± 63
Splitnose	1,255 ± 64	--	87 ±123	236 ±112	883 ± 86	19 ± 71	32 ±149	51 ±100
Stripetail	89,379 ± 53	13,129 ± 67	67,732 ± 68	8,105 ± 90	343 ± 99	64 ±108	5 ±118	69 ±109
Widow	14,699 ± 79	3,884 ±172	3,230 ±138	2,908 ±166	552 ± 98	3,820 ±160	306 ±161	4,126 ±160
Yellowtail	15,249 ± 70	--	1,230 ±118	243 ±112	5,108 ± 86	6,328 ±136	2,341 ± 88	8,668 ±110
Other fish								
Lingcod	4,627 ± 23	124 ± 50	1,333 ± 39	133 ± 65	807 ± 48	491 ± 49	1,738 ± 45	2,229 ± 38
Pacific hake	595,472 ± 28	1,587 ±158	154,532 ± 46	82,155 ±121	327,817 ± 34	21,364 ± 61	8,018 ± 63	29,382 ± 48
Sablefish	46,919 ± 88	275 ± 40	25,711 ±155	525 ± 77	11,676 ± 74	5,440 ±136	3,294 ± 55	8,733 ± 94

Table 18.--Estimates of fish population numbers (x1000) from the 1989 west coast groundfish survey by INPFC area for the deep atratum (184-366 m). Confidence intervala are expressed as a percentage of the point estimate. T denotes trace value. Differencea in totals result from rounding.

Taxon	Estimated deep population and 90% confidence interval	Estimated population numbers (x 1000) by INPFC subarea and 90% confidence interval						
		Conception	Monterey	Eureka	Columbia	US-Vancouver	Can-Vancouver	Vancouver
Cartilagenous								
Spiny dogfish	4,898 ± 95	55 ± 91	1,202 ± 80	268 ±146	133 ± 40	1,021 ±108	2,219 ±157	3,240 ±141
Flatfish								
Arrowtooth flounder	5,348 ± 36	--	2 ±213	159 ± 87	1,847 ± 39	1,679 ± 46	1,661 ± 79	3,340 ± 55
Dover sole	20,469 ± 28	3,150 ±119	7,505 ± 51	2,675 ± 48	2,304 ± 32	1,922 ± 41	2,912 ± 52	4,833 ± 43
English sole	1,388 ±102	--	964 ±144	9 ± 82	354 ±127	38 ± 80	24 ±155	62 ± 89
Pacific halibut	199 ± 71	--	--	20 ± 59	60 ± 94	33 ± 98	87 ±117	120 ±112
Pacific sanddab	786 ±169	33 ±170	752 ±177	--	--	--	--	--
Petrale sole	172 ± 63	37 ±122	85 ±121	3 ±120	22 ± 80	9 ±106	17 ±164	28 ±135
Rex sole	19,891 ± 25	2,440 ±118	4,438 ± 57	3,629 ± 62	6,084 ± 35	1,754 ± 24	1,544 ± 55	3,299 ± 35
Rockfish								
Shortspine thornyhead	9,948 ± 25	242 ±148	1,596 ± 54	1,062 ± 34	4,774 ± 44	1,435 ± 71	839 ± 49	2,275 ± 52
Bocaccio	602 ±104	--	567 ±111	10 ± 84	7 ±146	5 ± 89	14 ± 97	19 ± 95
Canary	2,086 ±186	--	5 ±134	3 ±175	1,571 ±190	478 ±189	29 ±169	507 ±178
Chilipepper	7,133 ± 95	1,594 ±106	5,290 ±129	122 ±175	128 ±169	--	--	--
Darkblotched	5,494 ± 30	8 ± 94	454 ± 73	1,997 ± 55	2,484 ± 46	354 ± 65	196 ±139	550 ± 74
Greenstriped	2,957 ± 45	--	267 ± 74	176 ± 88	1,956 ± 54	299 ± 95	259 ± 99	558 ± 73
Pacific ocean perch	19,799 ± 74	--	--	380 ± 70	2,749 ± 91	11,883 ±107	4,789 ± 96	16,671 ± 88

Table 18.--Continued.

Taxon	Estimated deep population and 90% confidence interval	Estimated population numbers (x 1000) by INPFC subarea and 90% confidence interval						
		Conception	Monterey	Eureka	Columbia	US-Vancouver	Can-Vancouver	Vancouver
Rockfish (cont.)								
Redstripe	2,138 ±131	--	--	10 ±175	269 ±105	616 ±111	1,243 ±170	1,859 ±149
Sharpchin	20,778 ± 93	24 ±155	667 ±140	42 ± 71	6,610 ±108	4,326 ±103	9,109 ±154	13,435 ±137
Shortbelly	139,706 ±113	84,090 ±163	55,510 ±113	79 ±157	27 ±110	--	--	--
Silvergray	570 ±173	--	--	--	11 ±104	133 ±175	426 ±177	559 ±177
Splitnose	41,820 ± 30	3,446 ± 70	16,080 ± 51	7,570 ± 73	11,049 ± 67	1,291 ± 92	2,385 ±123	3,676 ±106
Stripetail	52,161 ± 85	16,180 ±124	32,351 ±131	2,127 ±111	1,308 ± 99	195 ±191	T	195 ±191
Widow	46 ± 69	6 ±124	24 ±122	--	10 ± 86	2 ± 99	4 ±122	6 ±114
Yellowtail	7 ± 69	--	--	--	6 ± 69	2 ± 69	--	2 ± 69
Other fish								
Lingcod	270 ± 47	--	19 ±109	31 ± 90	137 ± 68	43 ± 81	40 ± 91	83 ± 68
Pacific hake	127,536 ± 41	12,831 ± 85	52,349 ± 62	6,534 ± 52	32,447 ± 73	7,436 ±115	15,940 ±171	23,376 ±153
Sablefish	9,633 ± 54	436 ± 79	894 ± 46	3,549 ±115	4,054 ± 83	387 ± 66	314 ± 74	701 ± 54

Table 19.--Population estimates for Pacific hake by age group and mean length at age in the International North Pacific Fisheries Commission Conception area.

Age	Year class	Population number	Cumulative %	Mean length (cm)
0	1989	3,456,286	24.1	12.2
1	1988	8,846,738	85.5	25.0
2	1987	888,434	91.6	27.7
3	1986	54,373	92.0	36.8
4	1985	21,552	92.1	38.4
5	1984	96,330	92.8	43.8
6	1983	8,787	92.9	46.7
7	1982	19,274	93.0	45.8
8	1981	4,700	93.0	47.7
9	1980	162,713	94.2	48.7
10	1979	14,647	94.3	50.1
11	1978	570	94.3	50.0
12	1977	71,373	94.8	52.4
13	1976	1,900	94.8	55.0
14	1975	4,396	94.8	56.9
16	1973	2,564	94.8	57.9
17	1972	1,900	94.8	58.0
19	1970	1,425	94.9	61.0
Above, below, or between key lengths		760,635	100.0	-
Total[a]		14,418,600	100.0	22.3

[a]Differences in totals may exist due to rounding.

Table 20.--Population estimates for Pacific hake by age group and mean length at age in the International North Pacific Fisheries Commission Monterey area.

Age	Year class	Population number	Cumulative %	Mean length (cm)
0	1989	3,158,249	1.5	11.8
1	1988	33,398,126	17.7	26.7
2	1987	35,453,897	34.8	33.3
3	1986	14,162,080	41.7	37.0
4	1985	8,729,517	45.9	38.7
5	1984	34,524,207	62.6	42.8
6	1983	3,712,764	64.4	44.7
7	1982	6,788,450	67.7	44.6
8	1981	1,273,910	68.3	47.5
9	1980	50,247,110	92.6	45.4
10	1979	3,734,584	94.4	46.4
11	1978	241,516	94.5	50.0
12	1977	9,048,638	98.9	49.3
13	1976	72,171	98.9	55.0
14	1975	167,441	99.0	55.6
16	1973	293,179	99.1	55.7
17	1972	33,298	99.1	58.0
19	1970	269,985	99.3	64.3
Above, below, or between key lengths		1,571,638	100.0	--
Total[a]		206,880,759	100.0	38.7

[a]Differences in totals may exist due to rounding.

Table 21.--Population estimates for Pacific hake by age group and mean length at age in the International North Pacific Fisheries Commission Eureka area.

Age	Year class	Population number	Cumulative %	Mean length (cm)
1	1988	48,147,889	54.3	23.9
2	1987	6,110,982	61.2	27.2
3	1986	102,601	61.3	40.0
4	1985	232,946	61.6	43.7
5	1984	8,228,357	70.8	44.3
6	1983	127,759	71.0	46.0
7	1982	372,449	71.4	46.9
8	1981	162,551	71.6	47.0
9	1980	12,290,326	85.4	46.5
10	1979	223,068	85.7	48.8
11	1978	128,268	85.8	48.1
12	1977	1,243,649	87.2	49.6
13	1976	1,397	87.2	58.0
14	1975	6,196	87.3	53.0
16	1973	39,807	87.3	56.0
17	1972	1,706	87.3	71.0
19	1970	143	87.3	56.0
Above, below, or between key lengths		11,268,056	100.0	--
Total[a]		88,688,150	100.0	30.1

'Differences in totals may exist due to rounding.

Table 22.--Population estimates for Pacific hake by age group and mean-length at age in the International North Pacific Fisheries Commission Columbia area.

Age	Year class	Population number	Cumulative %	Mean length (cm)
1	1988	202,227	0.1	23.8
2	1987	280,736	0.1	36.2
3	1986	480,951	0.3	40.9
4	1985	3,992,257	1.4	45.0
5	1984	137,290,440	39.5	44.2
6	1983	2,233,231	40.1	46.1
7	1982	6,129,408	41.8	46.4
8	1981	1,833,560	42.3	47.0
9	1980	185,970,516	94.0	46.5
10	1979	2,583,797	94.7	49.3
11	1978	1,295,796	95.0	48.4
12	1977	16,662,419	99.7	49.7
13	1976	44,703	99.7	58.0
14	1975	103,826	99.7	53.0
16	1973	679,405	99.9	56.3
17	1972	88,793	99.9	68.5
19	1970	59,996	99.9	56.0
Above, below, or between key lengths		241,368	100.0	--
Total[a]		360,173,429	100.0	45.8

[a]Differences in totals may exist due to rounding.

Table 23.--Population estimates for Pacific hake by age group and mean length at age in the International North Pacific Fisheries Commission U.S. Vancouver area.

Age	Year class	Population number	Cumulative %	Mean length (cm)
1	1988	578	0.0	23.5
2	1987	56,673	0.2	39.0
3	1986	41,573	0.3	41.0
4	1985	248,558	1.2	45.0
5	1984	7,839,575	28.4	44.8
6	1983	201,384	29.1	46.7
7	1982	548,784	31.0	47.6
8	1981	106,276	31.4	47.0
9	1980	15,877,836	86.5	48.0
10	1979	337,725	87.7	50.9
11	1978	125,779	88.1	50.7
12	1977	2,950,477	98.4	52.7
13	1976	13,154	98.4	58.0
14	1975	35,814	98.6	53.0
16	1973	272,137	99.5	56.1
17	1972	39,113	99.6	65.2
19	1970	31,115	99.8	56.0
Above, below, or between key lengths		72,858	100.0	--
Total[a]		28,799,408	100.0	47.7

[a]Differences in totals may exist due to rounding.

Table 24.--Population estimates for Pacific hake by age group and mean length at age in the International North Pacific Fisheries Commission Canadian Vancouver area.

Age	Year class	Population number	Cumulative %	Mean length (cm)
1	1988	12,707	0.1	26.0
2	1987	42,106	0.2	31.4
5	1984	2,625,741	11.2	47.2
6	1983	482,376	13.2	46.9
7	1982	335,251	14.6	50.0
8	1981	208,449	15.5	45.2
9	1980	14,673,224	76.7	50.7
10	1979	630,830	79.4	53.9
12	1977	3,227,227	92.8	53.4
16	1973	706,412	95.8	54.8
Above, below, or between key lengths		1,013,535	100.0	--
Total[a]		23,957,857	100.0	50.5

[a]Differences in totals may exist due to rounding.

Table 25.--Population estimates for Pacific hake by age group and mean length at age in the International North Pacific Fisheries Commission Vancouver area.

Age	Year class	Population number	Cumulative %	Mean length (cm)
1	1989	13,284	0.0	26.0
2	1987	44,020	0.1	31.4
5	1984	10,048,273	19.2	45.8
6	1983	1,135,747	21.3	46.8
7	1982	570,880	22.4	50.0
8	1981	293,808	23.0	45.5
9	1980	31,176,844	82.1	49.4
10	1979	889,717	83.7	53.6
12	1977	5,354,018	93.9	53.2
16	1973	1,018,540	95.8	54.6
Above, below, or between key lengths		2,212,134	100.0	--
Total[a]		52,757,266	100.0	44.2

[a]Differences in totals may exist due to rounding.

Table 26.--Population estimates for Pacific hake by age group and mean length at age for all International North Pacific Fisheries Commission areas combined.

Age	Year class	Population number	Cumulative %	Mean length (cm)
0	1989	6,614,535	0.9	12.0
1	1988	102,702,680	15.1	25.0
2	1987	44,230,363	21.2	32.7
3	1986	13,356,915	23.1	37.1
4	1985	10,938,495	24.6	40.4
5	1984	188,179,221	50.6	44.1
6	1983	10,712,548	52.1	45.4
7	1982	12,894,100	53.9	45.9
8	1981	5,067,437	54.6	45.3
9	1980	277,593,273	93.0	46.5
10	1979	7,977,182	94.1	47.9
11	1978	1,392,574	94.3	49.3
12	1977	36,360,561	99.3	50.4
13	1976	185,817	99.3	55.8
14	1975	472,459	99.4	54.3
16	1973	2,283,970	99.7	56.8
17	1972	198,631	99.8	64.4
19	1970	288,481	99.8	63.8
Above, below, or between key lengths		1,559,582	100.0	--
Total[a]		723,008,824	100.0	41.6

[a]Differences in totals may exist, due to rounding.

Table 27.--Population estimates for Pacific ocean perch by age group and mean length at age in the International North Pacific Fisheries Commission Eureka area.

Age	Year class	Population number	Cumulative %	Mean length (cm)
2	1987	1,875	0.5	20.0
3	1986	2,164	1.1	24.0
4	1985	28,459	8.6	26.9
5	1984	29,921	16.4	29.8
6	1983	21,612	22.1	30.8
7	1982	10,791	25.0	34.1
8	1981	18,381	29.8	34.4
9	1980	22,138	35.6	34.4
10	1979	20,685	41.1	37.0
11	1978	19,516	46.2	36.9
12	1977	15,345	50.3	37.5
13	1976	13,982	54.0	37.5
14	1975	18,401	58.8	37.6
15	1974	12,609	62.1	36.4
16	1973	4,871	63.4	39.3
17	1972	4,230	64.5	40.4
18	1971	8,054	66.6	38.3
19	1970	18,378	71.5	37.1
20	1969	10,889	74.3	38.1
21	1968	5,819	75.9	38.6
22	1967	9,798	78.5	39.8
23	1966	5,616	79.9	36.6
24	1965	16,264	84.2	36.6
25	1964	12,797	87.6	38.4
26	1963	1,365	87.9	40.0
27	1962	2,340	88.6	36.0
28	1961	4,641	89.8	37.9
29	1960	1,520	90.2	41.0
30	1959	681	90.4	41.0
31	1958	1,365	90.7	40.0
32	1957	2,656	91.4	41.7
35	1954	1,975	91.9	42.0
36	1953	3,801	92.9	38.5
37	1952	681	93.1	41.0
38	1951	4,095	94.2	38.0
39	1950	1,753	94.7	39.0
40	1949	3,276	95.5	37.0
49	1940	1,753	96.0	39.0
53	1936	2,047	96.5	43.0
Above, below, or between key lengths		13,122	100.0	--
Total[a]		379,665	100.0	34.8

[a]Differences in totals may exist due to rounding.

Table 28.--Population estimates for Pacific ocean perch by age group and mean length at age in the International North Pacific Fisheries Commission Columbia area.

Age	Year class	Population number	Cumulative %	Mean length (cm)
2	1987	44,322	1.6	20.0
3	1986	8,492	1.9	24.0
4	1985	320,298	13.4	27.1
5	1984	514,091	31.9	30.2
6	1983	431,243	47.4	30.9
7	1982	150,033	52.8	33.2
8	1981	204,027	60.1	34.0
9	1980	215,836	67.9	33.5
10	1979	114,736	72.0	36.0
11	1978	92,678	75.3	36.7
12	1977	69,521	77.8	36.8
13	1976	45,868	79.5	37.6
14	1975	44,087	81.1	38.0
15	1974	24,770	81.9	36.4
16	1973	6,567	82.2	39.4
17	1972	20,177	82.9	41.2
18	1971	9,974	83.3	38.7
19	1970	36,993	84.6	38.6
20	1969	20,936	85.4	38.3
21	1968	9,742	85.7	38.7
22	1967	23,570	86.6	41.2
23	1966	10,436	86.9	40.9
24	1965	22,637	87.7	36.5
25	1964	29,585	88.8	39.0
26	1963	2,316	88.9	40.0
27	1962	14,625	89.4	43.5
28	1961	4,663	89.6	38.5
29	1960	16,059	90.2	43.3
30	1959	2,486	90.3	41.0
31	1958	2,316	90.3	40.0
32	1957	8,813	90.7	41.7
34	1955	6,098	90.9	44.0
35	1954	7,950	91.2	43.0
36	1953	11,227	91.6	39.3
37	1952	11,382	92.0	43.8
38	1951	5,990	92.2	38.0
39	1950	7,485	92.5	43.7
40	1949	2,347	92.5	37.0
41	1948	1,622	92.6	48.0
46	1943	9,445	92.9	42.0
49	1940	2,125	93.0	39.0
52	1937	2,799	93.1	46.0
53	1936	11,520	93.5	43.5
64	1925	3,737	93.7	45.0
Above, below, or between key lengths		176,851	100.0	--
Total[a]		2,782,475	100.0	32.1

[a]Differences in totals may exist due to rounding.

Table 29.--Population estimates for Pacific ocean-perch by age group and mean length at age in the International North Pacific Fisheries Commission U.S. Vancouver area.

Age	Year class	Population number	Cumulative %	Mean length (cm)
1	1988	43,109	0.4	14.2
2	1987	167,832	1.7	18.9
3	1986	73,735	2.3	22.9
4	1985	2,848,778	25.4	27.1
5	1984	699,078	31.1	29.3
6	1983	223,064	32.9	29.9
7	1982	683,466	38.5	32.9
8	1981	2,149,447	55.9	33.9
9	1980	712,783	61.7	34.2
10	1979	634,192	66.9	36.7
11	1978	481,306	70.8	36.6
12	1977	346,802	73.6	37.3
13	1976	307,222	76.1	35.8
14	1975	175,129	77.5	37.0
16	1973	122,715	78.5	37.7
21	1968	39,446	78.8	37.0
23	1966	108,637	79.7	40.0
24	1965	110,070	80.6	37.0
26	1963	39,446	80.9	37.0
27	1962	307,052	83.4	43.2
28	1961	66,722	83.9	39.0
30	1959	133,105	85.0	38.5
33	1956	108,637	85.9	40.0
35	1954	189,249	87.4	41.0
37	1952	40,035	87.7	47.0
38	1951	239,905	89.7	42.0
39	1950	189,249	91.2	41.0
41	1948	108,637	92.1	40.0
43	1946	66,722	92.7	39.0
44	1945	66,722	93.2	39.0
46	1943	18,210	93.3	42.0
50	1939	39,446	93.7	37.0
57	1932	66,722	94.2	39.0
78	1911	171,671	95.6	44.0
81	1908	179,301	97.1	41.0
Above, below, or between key lengths		363,000	100.0	--
Total[a]		12,320,638	100.0	33.7

'Differences in totals may exist due to rounding.

Table 30.--Population estimates for Pacific ocean perch age group and mean length at age in the International North Pacific Fisheries Commission Canadian Vancouver area.

Age	Year class	Population number	Cumulative %	Mean length (cm)
1	1988	149,451	2.4	13.9
2	1987	139,801	4.6	18.2
3	1986	70,218	5.8	21.7
4	1985	553,609	14.7	26.9
5	1984	519,293	23.0	28.0
6	1983	155,998	25.5	30.4
7	1982	248,690	29.5	32.8
8	1981	1,085,711	46.9	33.9
9	1980	317,687	52.0	35.8
10	1979	596,713	61.6	36.3
11	1978	656,139	72.1	37.3
12	1977	500,141	80.1	37.7
13	1976	49,071	80.9	39.5
14	1975	89,065	82.3	39.3
15	1974	23,792	82.7	38.4
17	1972	34,733	83.3	39.4
18	1971	54,022	84.1	41.6
19	1970	12,427	84.3	41.0
20	1969	18,827	84.6	43.6
21	1968	27,209	85.1	43.0
23	1966	16,236	85.3	46.0
24	1965	52,690	86.2	41.0
25	1964	69,449	87.3	41.2
26	1963	110,088	89.1	43.5
27	1962	40,368	89.7	41.0
35	1954	10,352	89.9	44.0
37	1952	30,248	90.4	47.0
38	1951	30,016	90.9	40.0
39	1950	2,132	90.9	45.0
40	1949	32,718	91.4	45.0
43	1946	15,421	91.7	45.3
47	1942	16,236	91.9	46.0
54	1935	16,236	92.2	46.0
57	1932	10,352	92.4	44.0
Above, below, or between key lengths		478,284	100.0	--
Total[a]		6,233,423	100.0	33.0

[a]Differences in totals may exist due to rounding.

Table 31.--Population estimates for Pacific ocean perch by age group and mean length at age in the International North Pacific Fisheries Commission Vancouver area.

Age	Year class	Population number	Cumulative %	Mean length (cm)
1	1988	200,300	1.1	14.0
2	1987	365,627	3.1	18.7
3	1986	164,468	3.9	23.0
4	1985	3,873,050	24.8	27.0
5	1984	1,113,847	30.8	29.0
6	1983	377,139	32.8	30.1
7	1982	926,010	37.8	32.9
8	1981	3,206,273	55.1	33.9
9	1980	1,060,619	60.8	34.8
10	1979	1,165,755	67.1	36.3
11	1978	1,347,189	74.4	37.2
12	1977	1,048,801	80.0	37.7
13	1976	335,587	81.8	36.7
14	1975	288,455	83.4	38.4
15	1974	39,759	83.6	38.5
16	1973	71,976	84.0	37.5
17	1972	101,057	84.5	39.9
18	1971	165,967	85.4	41.3
19	1970	29,114	85.6	41.0
20	1969	49,565	85.8	43.6
21	1968	97,151	86.4	41.3
23	1966	113,731	87.0	42.3
24	1965	197,299	88.0	39.7
25	1964	232,990	89.3	41.7
26	1963	353,286	91.2	42.8
27	1962	257,120	92.6	42.2
28	1961	51,283	92.9	39.0
30	1959	86,772	93.3	38.6
33	1956	69,327	93.7	40.0
35	1954	96,085	94.2	42.0
37	1952	70,283	94.6	47.0
38	1951	252,388	96.0	41.5
39	1950	68,359	96.3	41.2
40	1949	87,950	96.8	45.0
41	1948	69,327	97.2	40.0
43	1946	114,230	97.8	43.1
44	1945	51,283	98.1	39.0
46	1943	15,783	98.2	42.0
47	1942	44,404	98.4	46.0
50	1939	33,316	98.6	37.0
54	1935	44,404	98.8	46.0
57	1932	81,801	99.3	40.9
78	1911	30,517	99.4	44.0
81	1908	29,114	99.6	41.0
Above, below, or between key lengths		75,300	100.0	--
Total[a]		18,554,061	100.0	33.5

[a]Differences in totals may exist due to rounding.

Table 32.--Population estimates for Pacific ocean perch by age group and mean length at age for all International North Pacific Fisheries Commission areas combined.

Age	Year class	Population number	Cumulative %	Mean length (cm)
1	1988	216,333	1.0	14.0
2	1987	473,856	3.2	18.9
3	1986	221,478	4.2	22.9
4	1985	4,123,824	23.2	26.9
5	1984	1,926,205	32.1	29.6
6	1983	878,508	36.1	30.8
7	1982	1,070,043	41.0	33.1
8	1981	3,165,418	55.6	33.9
9	1980	1,169,406	61.0	34.5
10	1979	1,191,347	66.5	36.1
11	1978	1,305,507	72.5	37.2
12	1977	988,279	77.1	37.5
13	1976	395,628	78.9	36.8
14	1975	374,471	80.6	38.0
15	1974	167,701	81.4	36.7
16	1973	116,535	81.9	38.4
17	1972	119,298	82.5	40.8
18	1971	192,212	83.3	40.2
19	1970	239,517	84.4	38.0
20	1969	124,672	85.0	39.7
21	1968	144,137	85.7	40.4
22	1967	109,444	86.2	40.5
23	1966	153,371	86.9	39.8
24	1965	263,075	88.1	38.3
25	1964	321,276	89.6	40.7
26	1963	239,451	90.7	42.2
27	1962	291,850	92.0	42.0
28	1961	60,460	92.3	38.4
29	1960	77,668	92.7	44.7
30	1959	91,858	93.1	39.8
31	1958	12,774	93.1	40.0
32	1957	58,475	93.4	41.2
33	1956	52,085	93.6	40.0
34	1955	19,122	93.7	44.0
35	1954	92,626	94.2	42.7
36	1953	97,095	94.6	39.3
37	1952	115,470	95.1	43.9
38	1951	237,581	96.2	40.8
39	1950	133,783	96.9	42.8
40	1949	70,258	97.2	42.2
41	1948	74,846	97.5	42.4
43	1946	61,220	97.8	43.3
44	1945	23,271	97.9	39.0
46	1943	82,636	98.3	42.0
47	1942	19,441	98.4	46.0
49	1940	23,271	98.5	39.0
50	1939	24,415	98.6	37.0
52	1937	19,441	98.7	46.0
53	1936	34,310	98.8	43.6
54	1935	19,441	98.9	46.0
57	1932	42,393	99.1	41.3
64	1925	45,843	99.3	45.0
78	1911	19,122	99.4	44.0
81	1908	23,756	99.5	41.0
Above, below, or between key lengths		100,698	100.0	--
Total[a]		21,716,202	100.0	33.3

[a]Differences in totals may exist due to rounding.

Table 33.--Population estimates for canary rockfish by age group and mean length at age in the International North Pacific Fisheries Commission Conception area.

Age	Year class	Population number	Cumulative %	Mean length (cm)
5	1984	4,027	100.0	31.0
Above, below, or between key lengths		0	100.0	--
Total[a]		4,027	100.0	31.0

[a]Differences in totals may exist due to rounding.

Table 34.--Population estimates for canary rockfish by age group and mean length at age in the International North Pacific Fisheries Commission Monterey area.

Age	Year class	Population number	Cumulative %	Mean length (cm)
3	1986	27,869	2.6	22.3
4	1985	7,342	3.3	27.0
5	1984	606,336	60.4	30.5
6	1983	32,638	63.4	30.9
7	1982	100,252	72.9	36.3
8	1981	154,707	87.4	38.8
9	1980	73,809	94.3	39.8
10	1979	10,969	95.4	42.5
11	1978	6,509	96.0	46.9
12	1977	4,800	96.4	49.9
13	1976	2,602	96.7	45.4
14	1975	1,583	96.8	49.5
15	1974	1,583	97.0	49.5
17	1972	2,609	97.2	50.0
20	1969	1,265	97.3	59.0
22	1967	1,265	97.5	59.0
Above, below, or between key lengths		0	100.0	--
Total[a]		0	100.0	33.4

[a]Differences in totals may exist due to-rounding.

Table 35.--Population estimates for canary rockfish by age group and mean, length at age in the International North Pacific Fisheries. Commission Eureka area.

Age	Year class	Population number	Cumulative %	Mean length (cm)
9	1980	1,708	3.4	46.8
10	1979	2,295	8.1	49.6
11	1978	8,136	24.4	50.3
12	1977	8,989	42.5	54.0
13	1976	1,823	46.2	47.4
14	1975	2,549	51.3	52.5
15	1974	3,741	58.8	53.7
16	1973	4,774	68.4	54.8
17	1972	516	69.5	56.0
18	1971	4,809	79.2	54.2
19	1970	801	80.8	52.0
20	1969	2,657	86.1	59.0
22	1967	2,657	91.4	59.0
24	1965	801	93.1	52.0
32	1957	801	94.7	52.0
57	1932	2,657	100.0	55.0
Above, below, or between key lengths		0	--	--
Total[a]		49,714	100.0	53.2

[a]Differences in totals may exist due to rounding.

Table 36.--Population estimates for canary rockfish by age group and mean length at age in the International North Pacific Fisheries Commission Columbia area.

Age	Year class	Population number	Cumulative %	Mean length (cm)
3	1986	1,056	0.0	27.0
4	1985	1,056	0.1	27.0
5	1984	174,691	6.2	31.0
6	1983	9,604	6.5	35.3
7	1982	83,004	9.4	37.9
8	1981	167,420	15.3	41.0
9	1980	116,922	19.4	43.7
10	1979	194,944	26.2	48.5
11	1978	311,305	37.1	49.0
12	1977	273,214	46.7	50.3
13	1976	115,830	50.7	47.8
14	1975	100,085	54.2	50.3
15	1974	185,787	60.7	51.8
16	1973	101,244	64.2	52.4
17	1972	61,574	66.4	51.2
18	1971	59,029	68.5	53.6
19	1970	128,893	73.0	51.9
20	1969	23,782	73.8	52.4
22	1967	2,654	73.9	59.0
23	1966	7,962	74.2	57.0
24	1965	35,134	75.4	52.0
26	1963	7,962	75.7	57.0
27	1962	17,147	76.3	51.0
32	1957	73,715	78.9	52.5
33	1956	12,583	79.3	54.0
37	1952	8,602	79.6	54.0
44	1945	3,981	79.7	54.0
47	1942	3,981	79.9	54.0
57	1932	24,464	80.7	55.0
Above, below, or between key lengths		551,008	100.0	--
Total[a]		2,858,634	100.0	45.5

[a]Differences in totals may exist due to rounding.

Table 37. --Population estimates for canary rockfish by age group and mean length at age in the International North Pacific Fisheries. Commission U.S. Vancouver area.

Age	Year class	Population number	Cumulative %	Mean length (cm)
3	1986	2,660	0.1	21.4
4	1985	313	0.1	27.0
5	1984	34,143	1.7	30.7
6	1983	3,633	1.8	35.6
7	1982	67,437	4.9	39.2
8	1981	258,010	16.6	41.7
9	1980	146,823	23.2	43.6
10	1979	189,748	31.8	47.5
11	1978	287,915	44.9	48.5
12	1977	253,684	56.4	49.3
13	1976	113,230	61.5	47.6
14	1975	75,637	65.0	50.4
15	1974	155,091	72.0	51.4
16	1973	88,229	76.0	51.4
17	1972	41,338	77.9	50.9
18	1971	36,982	79.5	54.1
19	1970	97,346	83.9	51.5
20	1969	28,534	85.2	54.3
22	1967	4,099	85.4	59.0
23	1966	7,842	85.8	57.0
24	1965	19,895	86.7	52.0
26	1963	7,842	87.0	57.0
27	1962	9,712	87.5	51.0
32	1957	48,923	89.7	52.6
33	1956	15,238	90.4	54.0
37	1952	14,407	91.0	56.2
44	1945	8,596	91.4	54.0
47	1942	8,596	91.8	54.0
57	1932	8,390	92.2	55.0
Above, below, or between key lengths		172,152	100.0	--
Total[a]		2,206,448	100.0	48.1

[a]Differences in totals may exist due to rounding.

Table 38.--Population estimates for canary rockfish by age group and mean length at age in the International North Pacific Fisheries Commission Canadian Vancouver area.

Age	Year class	Population number	Cumulative %	Mean length (cm)
3	1986	58,512	2.1	21.4
4	1985	6,884	2.4	27.0
5	1984	338,459	14.6	27.7
6	1983	12,279	15.1	27.8
7	1982	81,765	18.1	38.5
8	1981	179,372	24.6	42.2
9	1980	173,286	30.8	44.5
10	1979	213,078	38.6	48.1
11	1978	336,618	50.8	48.0
12	1977	253,127	59.9	48.7
13	1976	108,320	63.9	47.3
14	1975	97,423	67.4	51.4
15	1974	189,913	74.3	51.8
16	1973	99,973	77.9	52.0
17	1972	42,412	79.5	50.8
18	1971	37,687	80.8	54.9
19	1970	120,333	85.2	52.0
20	1969	41,717	86.7	53.1
22	1967	2,213	86.8	59.0
23	1966	6,962	87.0	57.0
24	1965	21,156	87.8	52.0
26	1963	6,962	88.0	57.0
27	1962	20,711	88.8	51.0
32	1957	54,963	90.8	52.6
33	1956	30,465	91.9	54.0
37	1952	27,461	92.9	55.7
44	1945	14,825	93.4	54.0
47	1942	14,825	94.0	54.0
57	1932	7,260	94.2	55.0
Above, below, or between key lengths		159,094	100.0	--
Total[a]		2,758,054	100.0	45.2

[a]Differences in totals may exist due to rounding.

Table 39.--Population estimates for canary rockfish by age group and mean length at age in the International North Pacific Fisheries Commission Vancouver area.

Age	Year class	Population number	Cumulative %	Mean length (cm)
3	1986	61,173	1.2	21.4
4	1985	7,197	1.4	27.0
5	1984	372,602	8.9	28.0
6	1983	15,913	9.2	29.5
7	1982	149,202	12.2	38.8
8	1981	437,382	21.0	41.9
9	1980	320,108	27.5	44.1
10	1979	402,826	35.6	47.8
11	1978	624,534	48.2	48.3
12	1977	506,811	58.4	49.0
13	1976	221,550	62.8	47.4
14	1975	173,061	66.3	51.0
15	1974	345,005	73.3	51.6
16	1973	188,202	77.1	51.8
17	1972	83,751	78.8	50.8
18	1971	74,669	80.3	54.5
19	1970	217,679	84.6	51.8
20	1969	70,251	86.1	53.6
22	1967	6,313	86.2	59.0
23	1966	14,804	86.5	57.0
24	1965	41,051	87.3	52.0
26	1963	14,804	87.6	57.0
27	1962	30,422	88.2	51.0
32	1957	103,886	90.3	52.6
33	1956	45,703	91.2	54.0
37	1952	41,868	92.1	55.9
44	1945	23,420	92.5	54.0
47	1942	23,420	93.0	54.0
57	1932	15,650	93.3	55.0
Above, below, or between key lengths		331,245	100.0	--
Total[a]		4,964,502	100.0	46.5

[a]Differences in totals may exist due to rounding.

Table 40.--Population estimates for canary rockfish by age group and mean length at age for all International North Pacific Fisheries Commission areas combined.

Age	Year class	Population number	Cumulative %	Mean length (cm)
3	1986	90,097	1.0	21.7
4	1985	15,594	1.2	27.0
5	1984	1,157,656	14.1	29.8
6	1983	58,155	14.8	31.2
7	1982	332,458	18.5	37.8
8	1981	759,509	27.0	41.1
9	1980	512,547	32.7	43.4
10	1979	611,035	39.6	48.0
11	1978	950,484	50.2	48.5
12	1977	793,813	59.1	49.5
13	1976	341,805	62.9	47.6
14	1975	277,278	66.0	50.7
15	1974	536,117	72.0	51.7
16	1973	294,220	75.3	52.0
17	1972	148,450	76.9	51.0
18	1971	138,507	78.5	54.1
19	1970	347,372	82.4	51.8
20	1969	97,956	83.5	53.5
22	1967	12,889	83.6	59.0
23	1966	22,766	83.9	57.0
24	1965	76,986	84.7	52.0
26	1963	22,766	85.0	57.0
27	1962	47,569	85.5	51.0
32	1957	178,401	87.5	52.6
33	1956	58,286	88.2	54.0
37	1952	50,470	88.7	55.6
44	1945	27,401	89.0	54.0
47	1942	27,401	89.3	54.0
57	1932	42,771	89.8	55.0
Above, below, or between key lengths		909,160	100.0	--
Total[a]		8,939,922	100.0	44.6

[a]Differences in totals may exist due to rounding.

Table 41.--Population estimates for splitnose rockfish by age group and mean length at age in the International North Pacific Fisheries Commission Conception are.

Age	Year class	Population number	Cumulative %	Mean length (cm)
2	1987	199,711	5.8	13.1
3	1986	353,630	16.1	14.3
4	1985	534,418	31.6	17.2
5	1984	679,411	51.3	18.6
6	1983	233,730	58.1	20.2
7	1982	402,717	69.8	20.0
8	1981	150,228	74.1	21.7
9	1980	78,887	76.4	24.2
10	1979	91,116	79.1	24.9
11	1978	23,503	79.7	25.0
12	1977	62,395	81.5	21.0
13	1976	40,450	82.7	24.5
14	1975	4,838	82.9	27.0
15	1974	18,881	83.4	24.2
16	1973	17,822	83.9	27.6
18	1971	30,875	84.8	23.7
19	1970	12,534	85.2	25.8
20	1969	13,684	85.6	24.0
21	1968	19,224	86.1	27.6
22	1967	6,820	86.3	24.9
24	1965	3,181	86.4	26.0
25	1964	7,565	86.7	25.0
26	1963	40,064	87.8	27.6
27	1962	14,539	88.2	31.0
28	1961	15,896	88.7	28.9
29	1960	24,524	89.4	30.2
30	1959	11,432	89.7	30.3
31	1958	13,795	90.1	28.7
34	1955	21,571	90.8	25.5
35	1954	13,684	91.2	24.0
36	1953	7,106	91.4	26.1
37	1952	14,539	91.8	31.0
38	1951	14,101	92.2	32.6
39	1950	24,853	92.9	30.6
41	1948	14,539	93.3	31.0
42	1947	10,313	93.6	30.0
43	1946	18,341	94.2	32.1
45	1944	18,393	94.7	34.0
46	1943	15,327	95.1	35.0
48	1941	7,357	95.4	30.8
49	1940	15,327	95.8	35.0
50	1939	26,363	96.6	35.2
51	1938	1,839	96.6	29.0
52	1937	9,196	96.9	37.0
53	1936	21,301	97.5	30.0
55	1934	6,407	97.7	23.5
56	1933	9,196	98.0	34.0
57	1932	1,839	98.0	29.0
58	1931	3,065	98.1	28.0
62	1927	13,769	98.5	31.2
64	1925	14,922	98.9	27.3
68	1921	5,518	99.1	30.0
Above, below, or between key lengths		31,098	100.0	--
Total[a]		3,445,839	100.0	20.2

[a]Differences in totals may exist due to rounding.

Table 42.--Population estimates for splitnose rockfish by age group and mean length at age in the International North Pacific Fisheries Commission Monterey area.

Age	Year class	Population number	Cumulative %	Mean length (cm)
1	1988	14,111	0.1	8.0
2	1987	591,434	3.8	12.9
3	1986	1,587,289	13.6	14.8
4	1985	2,355,396	28.1	17.1
5	1984	2,296,132	42.3	19.3
6	1983	991,433	48.5	20.3
7	1982	1,704,489	59.0	20.2
8	1981	787,990	63.9	22.1
9	1980	227,897	65.3	23.9
10	1979	493,784	68.3	25.1
11	1978	100,933	69.0	26.6
12	1977	448,568	71.7	23.2
13	1976	110,139	72.4	24.5
14	1975	15,329	72.5	27.0
15	1974	249,785	74.1	26.2
16	1973	184,809	75.2	28.1
18	1971	176,982	76.3	23.9
19	1970	29,974	76.5	26.0
20	1969	30,625	76.7	24.0
21	1968	66,434	77.1	27.8
22	1967	75,636	77.5	25.8
24	1965	66,192	78.0	26.0
25	1964	80,163	78.5	25.0
26	1963	249,975	80.0	28.0
27	1962	33,331	80.2	31.0
28	1961	231,196	81.6	28.1
29	1960	74,275	82.1	29.9
30	1959	114,864	82.8	28.5
31	1958	293,974	84.6	27.7
34	1955	304,761	86.5	26.1
35	1954	30,625	86.7	24.0
36	1953	261,108	88.3	26.5
37	1952	33,331	88.5	31.0
38	1951	159,483	89.5	29.2
39	1950	120,475	90.3	30.3
41	1948	33,331	90.5	31.0
42	1947	87,144	91.0	30.0
43	1946	120,058	91.8	32.2
45	1944	24,922	91.9	34.0
46	1943	7,325	92.0	35.0
48	1941	57,726	92.3	31.2
49	1940	7,325	92.4	35.0
50	1939	51,574	92.7	34.5
51	1938	42,133	93.0	29.0
52	1937	11,708	93.0	37.4
53	1936	213,923	94.4	29.1
55	1934	216,676	95.7	27.7
56	1933	12,461	95.8	34.0
57	1932	75,159	96.2	29.9
58	1931	150,699	97.2	28.7
61	1928	33,025	97.4	31.0
62	1927	83,683	97.9	31.2
64	1925	157,307	98.9	27.2
66	1923	26,392	99.0	32.0
68	1921	35,011	99.2	30.0
Above, below, or between key lengths		126,389	100.0	--
Total[a]		16,166,893	100.0	21.3

[a]Differences in totals may exist due to rounding.

Table 43.--Population estimates for splitnose rockfish by age group and mean length at age in the International North Pacific Fisheries Commission Eureka area.

Age	Year class	Population number	Cumulative %	Mean length (cm)
2	1987	439,415	5.8	13.4
3	1986	623,743	14.0	14.2
4	1985	1,319,962	31.5	17.2
5	1984	2,118,277	59.5	18.7
6	1983	518,796	66.3	19.5
7	1982	857,817	77.6	19.9
8	1981	293,828	81.5	20.8
9	1980	122,690	83.1	24.2
10	1979	106,564	84.6	24.8
11	1978	14,943	84.8	23.9
12	1977	99,157	86.1	20.2
13	1976	57,228	86.8	24.6
14	1975	3,514	86.9	27.0
15	1974	21,382	87.2	21.8
16	1973	21,710	87.4	26.7
18	1971	41,870	88.0	22.5
19	1970	16,060	88.2	25.4
20	1969	10,658	88.3	24.0
21	1968	17,359	88.6	26.1
22	1967	11,613	88.7	24.4
24	1965	2,405	88.8	26.0
25	1964	11,542	88.9	25.0
26	1963	17,284	89.1	25.0
27	1962	912	89.1	31.0
28	1961	3,514	89.2	27.0
29	1960	1,503	89.2	30.2
30	1959	3,500	89.3	27.9
31	1958	2,995	89.3	28.2
34	1955	26,256	89.7	21.0
35	1954	10,658	89.8	24.0
36	1953	4,809	89.9	26.0
37	1952	912	89.9	31.0
38	1951	6,672	90.0	31.7
39	1950	912	90.0	31.0
41	1948	912	90.0	31.0
43	1946	3,285	90.0	32.3
45	1944	6,344	90.1	34.0
46	1943	1,825	90.1	35.0
48	1941	3,633	90.2	30.9
49	1940	1,825	90.2	35.0
50	1939	8,395	90.3	35.4
51	1938	1,443	90.3	29.0
53	1936	4,090	90.4	29.2
55	1934	19,359	90.6	25.8
56	1933	3,172	90.7	34.0
57	1932	4,180	90.7	30.3
58	1931	6,055	90.8	30.4
61	1928	2,737	90.8	31.0
62	1927	3,633	90.9	30.6
64	1925	15,523	91.1	26.2
66	1923	3,650	91.2	32.0
68	1921	2,538	91.2	30.0
Above, below, or between key lengths		666,573	100.0	--
Total[a]		7,569,633	100.0	18.2

[a]Differences in totals may exist due to rounding.

Table 44.--Population estimates for splitnose rockfish by age group and mean length at age in the International North Pacific Fisheries Commission Columbia area.

Age	Year class	Population number	Cumulative %	Mean length (cm)
1	1988	13,900	0.1	8.0
2	1987	764,280	6.5	12.9
3	1986	1,071,239	15.5	13.8
4	1985	1,429,807	27.5	17.9
5	1984	2,436,363	47.9	19.4
6	1983	727,220	54.0	20.6
7	1982	1,656,829	67.9	20.6
8	1981	679,007	73.6	21.5
9	1980	365,155	76.7	23.6
10	1979	221,166	78.5	24.3
11	1978	66,102	79.1	23.4
12	1977	119,118	80.1	21.4
13	1976	142,231	81.2	23.7
14	1975	6,758	81.3	27.0
15	1974	45,835	81.7	24.6
16	1973	45,727	82.1	28.7
18	1971	93,833	82.9	23.9
19	1970	34,790	83.1	25.4
20	1969	26,554	83.4	24.0
21	1968	9,461	83.4	28.0
22	1967	44,619	83.8	24.5
24	1965	12,012	83.9	26.0
25	1964	13,514	84.0	25.0
26	1963	105,773	84.9	25.8
27	1962	6,034	85.0	31.0
28	1961	31,723	85.2	27.4
29	1960	12,342	85.3	30.0
30	1959	18,319	85.5	28.1
31	1958	50,983	85.9	27.7
34	1955	66,565	86.5	23.4
35	1954	26,554	86.7	24.0
36	1953	45,048	87.1	26.5
37	1952	6,034	87.1	31.0
38	1951	33,113	87.4	29.4
39	1950	9,976	87.5	30.6
41	1948	6,034	87.5	31.0
42	1947	3,942	87.6	30.0
43	1946	22,075	87.8	32.4
48	1941	28,382	88.0	31.0
50	1939	9,461	88.1	33.0
51	1938	18,921	88.2	29.0
53	1936	36,266	88.5	28.9
55	1934	65,967	89.1	24.3
57	1932	18,921	89.2	29.0
58	1931	23,652	89.4	28.0
62	1927	25,229	89.6	30.5
64	1925	51,357	90.1	28.3
68	1921	18,921	90.2	30.0
Above, below, or between key lengths		1,164,098	100.0	--
Total[a]		11,931,210	100.0	18.8

[a]Differences in totals may exist due to rounding.

Table 45. --Population estimates for splitnose rockfish by age group and mean length at age in the International North Pacific Fisheries Commission U.S. Vancouver area.

Age	Year class	Population number	Cumulative %	Mean length (cm)
2	1987	11,878	0.9	12.0
3	1986	245,877	19.8	13.1
4	1985	124,070	29.3	18.2
5	1984	146,856	40.5	19.1
6	1983	35,463	43.2	22.2
7	1982	155,681	55.2	20.9
8	1981	66,432	60.3	22.7
9	1980	71,639	65.7	24.6
10	1979	74,997	71.5	25.1
11	1978	20,478	73.1	26.5
12	1977	13,629	74.1	27.0
13	1976	39,564	77.1	25.1
14	1975	4,954	77.5	27.0
15	1974	13,074	78.5	27.7
16	1973	22,738	80.3	26.9
18	1971	9,632	81.0	25.5
19	1970	10,681	81.8	25.9
20	1969	4,453	82.2	24.0
21	1968	17,974	83.5	26.2
22	1967	15,029	84.7	25.0
24	1965	7,779	85.3	26.0
25	1964	7,799	85.9	25.0
26	1963	24,842	87.8	26.6
27	1962	109	87.8	31.0
28	1961	15,606	89.0	28.7
29	1960	1,408	89.1	29.2
30	1959	9,078	89.8	26.9
31	1958	5,258	90.2	27.9
34	1955	10,877	91.0	29.3
35	1954	4,453	91.4	24.0
36	1953	17,351	92.7	26.1
37	1952	109	92.7	31.0
38	1951	3,596	93.0	30.0
39	1950	8,968	93.7	30.0
41	1948	109	93.7	31.0
42	1947	8,859	94.4	30.0
43	1946	4,029	94.7	32.4
48	1941	5,328	95.1	30.8
50	1939	1,430	95.2	33.0
52	1937	19,491	96.7	37.7
53	1936	4,764	97.1	29.4
55	1934	8,798	97.7	23.8
58	1931	2,166	97.9	28.0
62	1927	5,198	98.3	30.5
64	1925	11,697	99.2	26.7
68	1921	3,898	99.5	30.0
Above, below, or between key lengths		7,002	100.0	--
Total[a]		1,305,102	100.0	21.4

[a]Differences in totals may exist due to rounding.

Table 46.--Population estimates for splitnose rockfish by age group and mean length at age in the International North Pacific Fisheries Commission Canadian Vancouver area.

Age	Year class	Population number	Cumulative %	Mean length (cm)
3	1986	22,912	1.0	13.0
4	1985	56,916	3.4	21.0
5	1984	94,615	7.3	21.5
6	1983	100,767	11.5	22.7
7	1982	280,782	23.3	23.0
8	1981	154,156	29.8	24.2
9	1980	231,827	39.5	24.6
10	1979	242,694	49.7	25.1
11	1978	66,268	52.5	26.5
12	1977	41,801	54.2	27.4
13	1976	128,032	59.6	25.1
14	1975	16,032	60.2	27.0
15	1974	42,183	62.0	27.7
16	1973	73,581	65.1	26.9
18	1971	31,170	66.4	25.5
19	1970	34,563	67.9	25.9
20	1969	14,409	68.5	24.0
21	1968	58,163	70.9	26.2
22	1967	48,633	72.9	25.0
24	1965	25,173	74.0	26.0
25	1964	25,238	75.1	25.0
26	1963	80,391	78.4	26.6
27	1962	353	78.4	31.0
28	1961	50,500	80.6	28.7
29	1960	4,558	80.8	29.2
30	1959	29,378	82.0	26.9
31	1958	17,014	82.7	27.9
34	1955	35,197	84.2	29.3
35	1954	14,409	84.8	24.0
36	1953	56,148	87.1	26.1
37	1952	353	87.1	31.0
38	1951	11,636	87.6	30.0
39	1950	29,020	88.8	30.0
41	1948	353	88.9	31.0
42	1947	28,668	90.1	30.0
43	1946	13,038	90.6	32.4
48	1941	17,243	91.3	30.8
50	1939	4,628	91.5	33.0
52	1937	63,074	94.2	37.7
53	1936	15,418	94.8	29.4
55	1934	28,470	96.0	23.8
58	1931	7,008	96.3	28.0
62	1927	16,820	97.0	30.5
64	1925	37,853	98.6	26.7
68	1921	12,615	99.1	30.0
Above, below, or between key lengths		21,025	100.0	--
Total[a]		2,385,085	100.0	25.6

[a]Differences in totals may exist due to rounding.

Table 47. --Population estimates for splitnose rockfish by age group and mean length at age in the International North Pacific Fisheries Commission Vancouver area.

Age	Year class	Population number	Cumulative %	Mean length (cm)
2	1987	11,878	0.3	12.0
3	1986	268,790	7.6	13.1
4	1985	180,986	12.5	19.1
5	1984	241,471	19.0	20.0
6	1983	136,230	22.7	22.6
7	1982	436,464	34.6	22.2
8	1981	220,588	40.5	23.8
9	1980	303,466	48.8	24.6
10	1979	317,692	57.4	25.1
11	1978	86,746	59.7	26.5
12	1977	55,431	61.2	27.3
13	1976	167,596	65.8	25.1
14	1975	20,986	66.3	27.0
15	1974	55,257	67.8	27.7
16	1973	96,319	70.4	26.9
18	1971	40,802	71.6	25.5
19	1970	45,243	72.8	25.9
20	1969	18,862	73.3	24.0
21	1968	76,137	75.4	26.2
22	1967	63,661	77.1	25.0
24	1965	32,952	78.0	26.0
25	1964	33,037	78.9	25.0
26	1963	105,233	81.7	26.6
27	1962	462	81.7	31.0
28	1961	66,106	83.5	28.7
29	1960	5,966	83.7	29.2
30	1959	38,457	84.7	26.9
31	1958	22,272	85.3	27.9
34	1955	46,074	86.6	29.3
35	1954	18,862	87.1	24.0
36	1953	73,498	89.1	26.1
37	1952	462	89.1	31.0
38	1951	15,232	89.5	30.0
39	1950	37,988	90.5	30.0
41	1948	462	90.5	31.0
42	1947	37,526	91.6	30.0
43	1946	17,067	92.0	32.4
48	1941	22,571	92.6	30.8
50	1939	6,058	92.8	33.0
52	1937	82,565	95.0	37.7
53	1936	20,182	95.6	29.4
55	1934	37,268	96.6	23.8
58	1931	9,174	96.8	28.0
62	1927	22,017	97.4	30.5
64	1925	49,550	98.8	26.7
68	1921	16,513	99.2	30.0
Above, below, or between key lengths		28,027	100.0	--
Total[a]		3,690,187	100.0	24.1

[a]Differences in totals may exist due to rounding.

Table 48.--Population estimates for splitnose rockfish by age group and mean length at age for all International North Pacific Fisheries Commission areas combined.

Age	Year class	Population number	Cumulative %	Mean length (cm)
1	1988	28,012	0.1	08.0
2	1987	2,006,718	4.8	13.1
3	1986	3,904,692	13.9	14.2
4	1985	5,820,569	27.5	17.4
5	1984	7,771,654	45.6	19.1
6	1983	2,607,410	51.7	20.3
7	1982	5,058,316	63.6	20.4
8	1981	2,131,642	68.5	21.9
9	1980	1,098,095	71.1	24.1
10	1979	1,230,321	74.0	24.9
11	1978	292,227	74.7	25.6
12	1977	784,669	76.5	22.7
13	1976	517,644	77.7	24.5
14	1975	51,425	77.8	27.0
15	1974	391,140	78.7	25.9
16	1973	366,387	79.6	27.7
18	1971	384,362	80.5	23.9
19	1970	138,601	80.8	25.7
20	1969	100,383	81.0	24.0
21	1968	188,614	81.5	27.0
22	1967	202,349	81.9	25.2
24	1965	116,742	82.2	26.0
25	1964	145,820	82.6	25.0
26	1963	518,329	83.8	27.1
27	1962	55,279	83.9	31.0
28	1961	348,435	84.7	28.2
29	1960	118,610	85.0	29.9
30	1959	186,571	85.4	28.2
31	1958	384,019	86.3	27.8
34	1955	465,228	87.4	25.7
35	1954	100,383	87.6	24.0
36	1953	391,570	88.6	26.4
37	1952	55,279	88.7	31.0
38	1951	228,601	89.2	29.6
39	1950	194,205	89.7	30.3
41	1948	55,279	89.8	31.0
42	1947	138,925	90.1	30.0
43	1946	180,826	90.5	32.2
45	1944	49,659	90.7	34.0
46	1943	24,477	90.7	35.0
48	1941	119,670	91.0	31.0
49	1940	24,477	91.1	35.0
50	1939	101,851	91.3	34.5
51	1938	64,337	91.4	29.0
52	1937	103,469	91.7	37.6
53	1936	295,763	92.4	29.2
55	1934	345,676	93.2	26.4
56	1933	24,830	93.2	34.0
57	1932	100,100	93.5	29.7
58	1931	192,644	93.9	28.6
61	1928	35,763	94.0	31.0
62	1927	148,330	94.4	30.9
64	1925	288,659	95.0	27.3
66	1923	30,042	95.1	32.0
68	1921	78,501	95.3	30.0
Above, below, or between key lengths		2,016,184	100.0	--
Total[a]		42,803,763	100.0	20.2

[a]Differences in totals may exist due to rounding.

Table 49.--The length-weight relationships from the 1989 triennial west coast survey using a linear least squares fit for the equation: Estimated Weight (g) = a * Fork Length (cm), ** b.

Species	Sex	Number sampled	Length - weight coefficients a	b	Predicted weight at length (gm)		
					30 cm	50 cm	70 cm
Pacific hake	M	344	0.0080136	2.939627	176.2	791.0	2126.8
	F	517	0.0048625	3.076383	170.2	819.5	2307.2
	T	861	0.0054866	3.043290	171.6	812.4	2261.9
					40 cm	60 cm	80 cm
Sablefish	M	67	0.0008418	3.639501	570.0	2493.3	7104.1
	F	70	0.0015331	3.473664	563.1	2302.9	6255.6
	T	137	0.0011674	3.549646	567.5	2393.5	6645.3
					30 cm	45 cm	60 cm
Arrowtooth fl.	M	169	0.0104690	2.957681	244.8	812.0	1901.6
	F	240	0.0037501	3.264323	248.8	934.7	2390.6
	T	409	0.0044811	3.210228	247.3	909.0	2289.0
					30 cm	45 cm	60 cm
Bocaccio	M	42	0.0069212	3.136198	297.0	1059.2	2611.1
	F	37	0.0103080	3.016847	294.7	1001.5	2385.5
	T	79	0.0074708	3.113927	297.2	1050.4	2572.8
					20 cm	40 cm	55 cm
Canary rf.	M	160	0.0125210	3.082479	128.2	1086.4	2899.3
	F	128	0.0153660	3.027599	133.5	1088.8	2855.6
	T	288	0.0136900	3.058656	130.6	1087.8	2881.2
					25 cm	35 cm	45 cm
Chilipepper	M	96	0.0021121	3.570093	206.8	687.4	1685.9
	F	146	0.0037301	3.377893	196.7	612.9	1432.5
	T	242	0.0035663	3.398049	200.7	629.6	1478.8
					20 cm	30 cm	45 cm
Darkblot. rf.	M	80	0.0120820	3.133990	144.4	514.5	1833.5
	F	111	0.0120080	3.132049	142.7	508.0	1808.9
	T	191	0.0121620	3.129598	143.4	510.3	1815.0
					20 cm	35 cm	50 cm
Dover sole	M	167	0.0059527	3.132697	70.9	409.1	1250.5
	F	234	0.0060739	3.133248	72.4	418.2	1278.7
	T	401	0.0057704	3.145116	71.3	414.5	1272.5
					20 cm	30 cm	40 cm
English sole	M	132	0.0143600	2.874093	78.8	252.7	577.6
	F	140	0.0076206	3.065090	74.1	256.7	620.1
	T	272	0.0099870	2.986591	76.7	257.6	608.3
					25 cm	30 cm	35 cm
Greenstr. rf.	M	39	0.2306900	2.157430	239.3	354.7	494.6
	F	59	0.0079428	3.618517	213.5	380.4	620.0
	T	98	0.0312790	2.776326	230.4	381.5	584.3
					30 cm	60 cm	90 cm
Lingcod	M	37	0.0013777	3.476209	187.9	2091.1	8560.7
	F	71	0.0042633	3.185964	216.7	1971.8	7176.1
	T	108	0.0039782	3.209859	219.3	2029.1	7456.3
					20 cm	30 cm	45 cm
Pac. oc. perch	M	238	0.0092261	3.143272	113.4	405.5	1450.5
	F	262	0.0119330	3.072970	118.8	413.0	1435.6
	T	500	0.0104930	3.107952	116.0	409.0	1442.1

Table 49.--Continued.

Species	Sex	Number Sampled	Length - weight coefficients a	b	Predicted weight at length (gm)		
					25 cm	35 cm	45 cm
Petrale sole	M	25	0.0035437	3.350348	171.0	528.0	1225.4
	F	49	0.0022689	3.473527	162.8	523.8	1254.0
	T	74	0.0027121	3.425217	166.6	527.3	1247.1
					25 cm	30 cm	40 cm
Redstripe rf.	M	46	0.0116590	3.060951	221.7	387.3	934.3
	F	41	0.0159050	2.960045	218.5	374.9	878.4
	T	87	0.0178510	2.930886	223.3	381.0	885.3
					20 cm	30 cm	40 cm
Rex sole	M	174	0.0051435	3.069746	50.7	176.1	425.8
	F	177	0.0049536	3.090012	51.9	181.7	441.9
	T	351	0.0048336	3.093232	51.1	179.2	436.3
					20 cm	30 cm	40 cm
Rock sole	M	19	0.0184120	2.875517	101.4	325.5	744.5
	F	40	0.0077163	3.144639	95.2	340.7	842.0
	T	59	0.0099488	3.070287	98.2	341.2	825.2
					15 cm	20 cm	25 cm
Rosethorn rf.	M	25	0.0055439	3.352985	48.7	127.7	269.8
	F	30	0.0115550	3.112524	52.9	129.5	259.4
	T	55	0.0095003	3.177786	51.9	129.5	263.1
					25 cm	30 cm	35 cm
Sharpchin rf.	M	86	0.0117510	3.084261	240.8	422.6	679.8
	F	49	0.0107030	3.113610	241.1	425.3	687.3
	T	135	0.0111450	3.101054	241.1	424.3	684.4
					15 cm	20 cm	25 cm
Splitnose rf.	M	35	0.0114880	3.156849	59.3	147.0	297.4
	F	22	0.0376240	2.771854	68.4	152.0	282.1
	T	57	0.0167920	3.034296	62.2	148.9	293.0
					15 cm	20 cm	30 cm
Stripetail rf.	M	28	0.0219310	2.874006	52.6	120.3	385.8
	F	43	0.0227750	2.886880	56.6	129.8	418.5
	T	71	0.0145010	3.022707	52.0	124.2	423.0
					30 cm	40 cm	50 cm
Yellowtail rf.	M	220	0.0113280	3.090761	416.5	1013.3	2019.6
	F	212	0.0166160	2.987168	429.5	1014.3	1975.3
	T	432	0.0139260	3.034519	422.8	1012.3	1992.4

FIGURES

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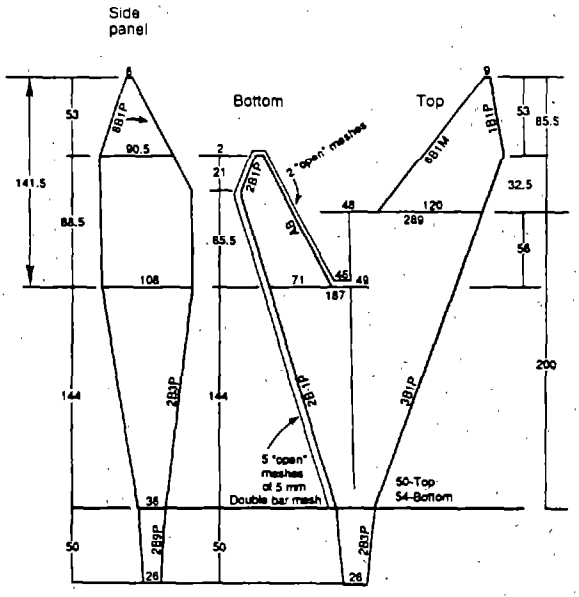
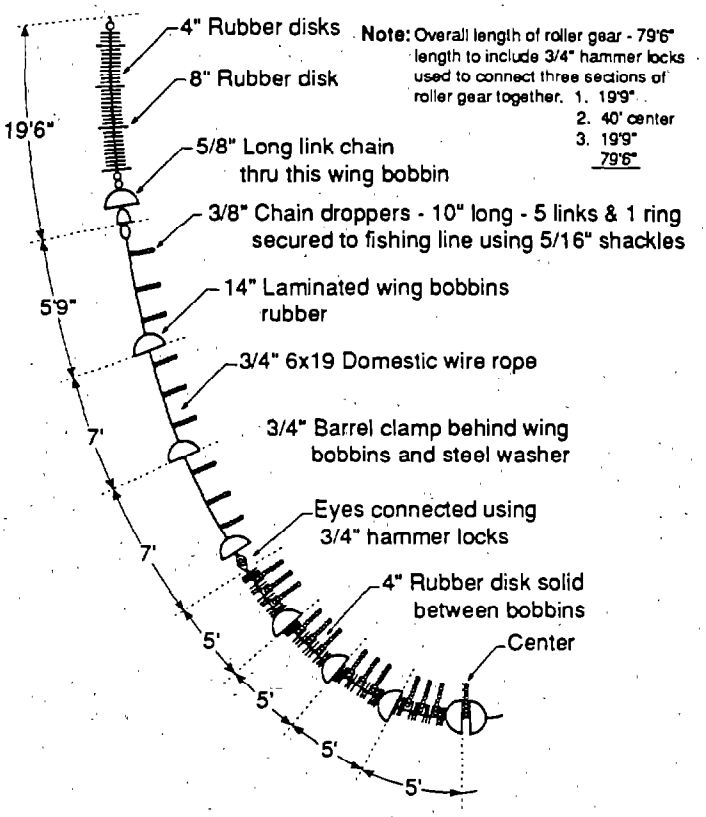
Poly Nor'Eastern trawl

Total mesh counts
Twine sizes: top and sides .4mm
bottom and intermediate .5mm



Web: Chaffing strip along inside of Bottom wings and Busom. Cut 8 meshes wide. 5 mm Double Bar mesh, goring 3 meshes on each side (leaving 2 open meshes). Secure 3 mesh of gore on inside (Bar Cut) of Bottom wings, and securing other gore to footrope (Bolsh).

Roller gear



Note: Overall length of roller gear - 79'6"
length to include 3/4" hammer locks used to connect three sections of roller gear together. 1. 19'9"
2. 40' center
3. 19'9"
79'6"

Netting	-	Polyethylene, 5 inch, 4 mm and 5 mm twine. 4 mm top and sides. 5 mm bottom and intermediate.
Headrope	-	89' 1" plus thimbled eyes of 1/2" 6 x 19 galvanized wire rope wrapped with 3/8" 3-strand polypropylene rope.
Footrope (Bolsh Line)	-	81' 7" plus thimbled eyes of 3/8" 6 x 19 galvanized wire rope wrapped with polypropylene rope.
Fishing Line	-	79' 7 1/2" shot peened long link chain. Safe working load 11,300 lbs.
Roller gear	-	79' 6" eye to eye of 3/4" diameter, 6 x 19 galvanized wire rope with 14" bobbins.
Breastlines	-	3/8" 6 x 19 galvanized wire rope wrapped with 3/8" polypropylene. Top corner 19' 6"; bottom corner 8' 8"; top side panel 19' 6"; bottom side panel 30' 6". Over all lengths are "plus" thimbled eye at wing tips.
Riblines	-	3/4" Sampson 2 and 1 Duralon. Top two 114.17' and bottom two 104.45' (hung 98% of stretched seam length). Web secured to riblines using Benzels every 16".
Flotation	-	90 pieces, 8" aluminum XX Deep Sea water floats.
Restrictors	-	Polypropylene rope, 1" diameter, 14 ft circumference and secured loosely to codend at each ribline, 4 ft apart, 5 pieces.
Splitting gear	-	1/2" diameter galvanized wire rope, 21 ft long. The wire is passed through 4 galvanized steel rings which are secured to each ribline.
Side seams	-	Panels are joined to each other gathering 3 meshes (4 knots) from each panel. Panels which are secured to framing lines have a selvaged edge created by gathering 3 meshes.
Codend	-	110 meshes long x 100 meshes deep. 3 1/2" stretched (including 1 knot) 4 mm Double Bar mesh.
		A) Chaffing gear - 5 1/2" 6 mm Double Bar mesh with huls skirt secured to Chaffer. Full coverage of codend.
Codend liner	-	Nylon, no. 18, 1 1/4" stretched mesh, 315 meshes circumference and 200 meshes deep, laced to the inside of codend. When stretched the liner protrudes 2 to 3 ft beyond codend.

*Note: Chaffing strip along inside of Bottom wings and Busom.

Figure 1.--The poly-Nor'Eastern bottom trawl and roller gear used during the 1989 west coast triennial bottom trawl survey.

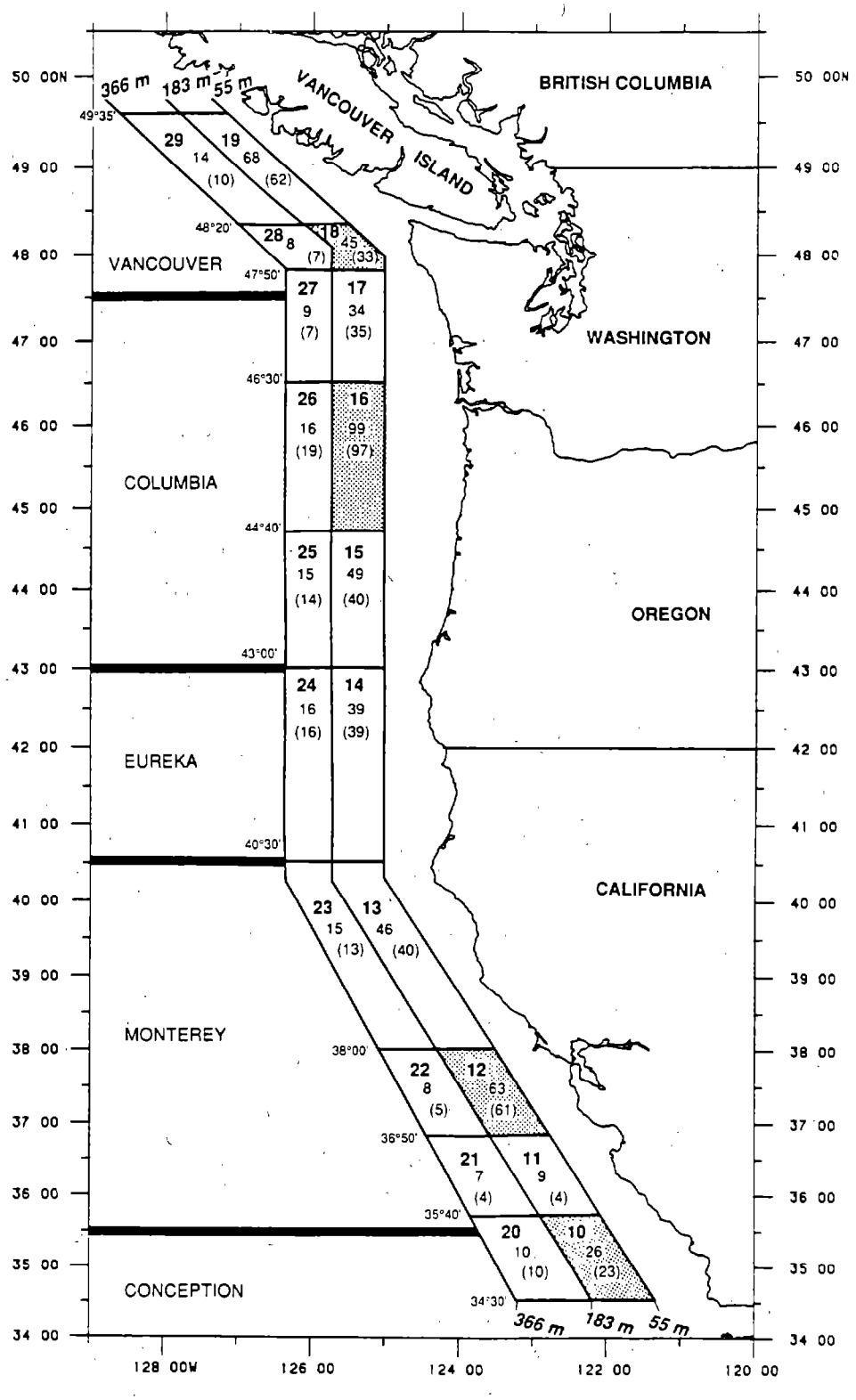


Figure 2.--The 1989 bottom trawl survey area and sampling strata. Shaded areas are high-density sampling strata. Values shown in each stratum refer to the stratum code (top), number of planned stations (middle), and number of successfully completed stations (bottom). International North Pacific Fisheries Commission statistical areas are shown to the left.

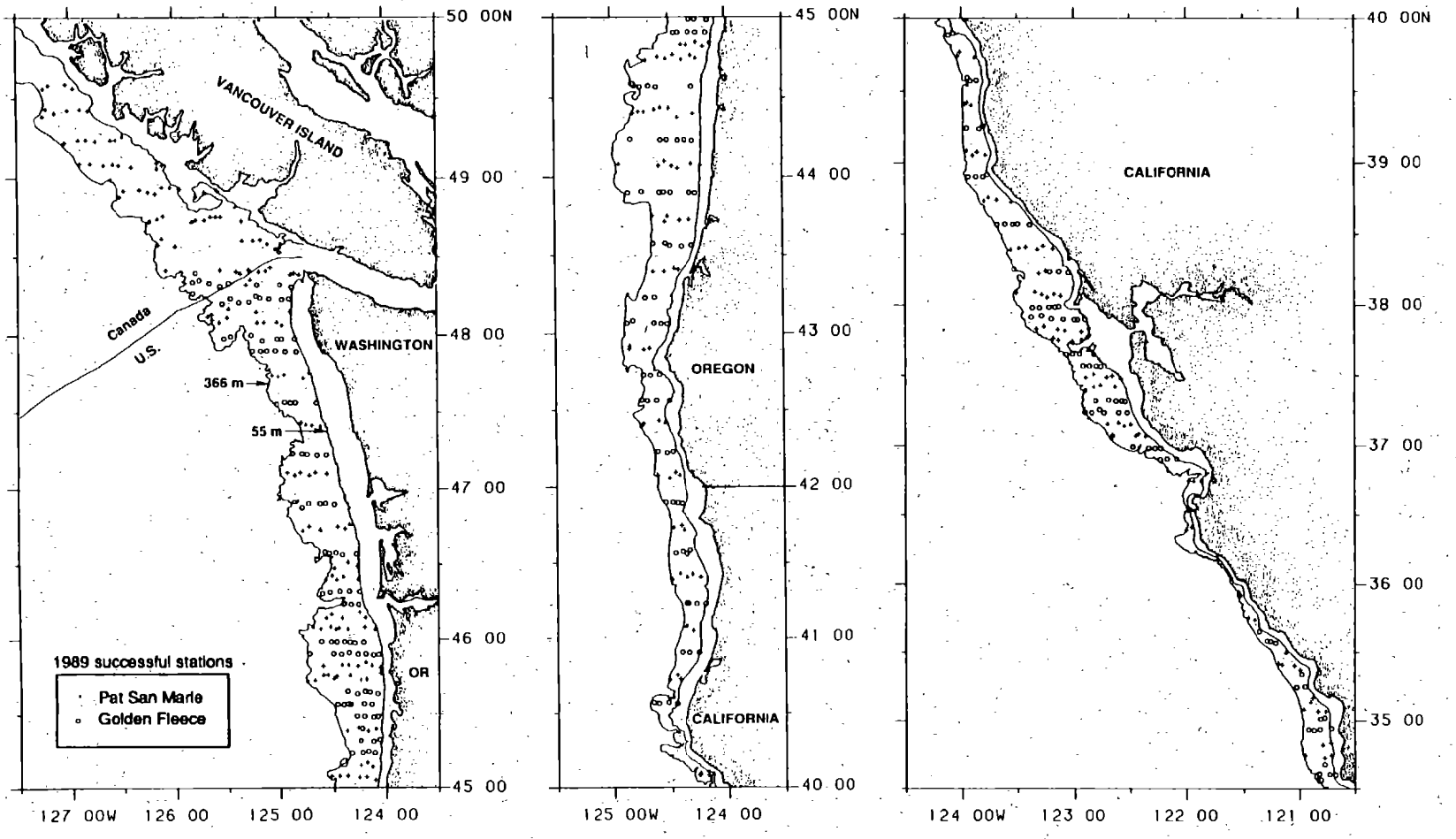


Figure 3.--The location of successful tows during the 1989 west coast bottom trawl survey.

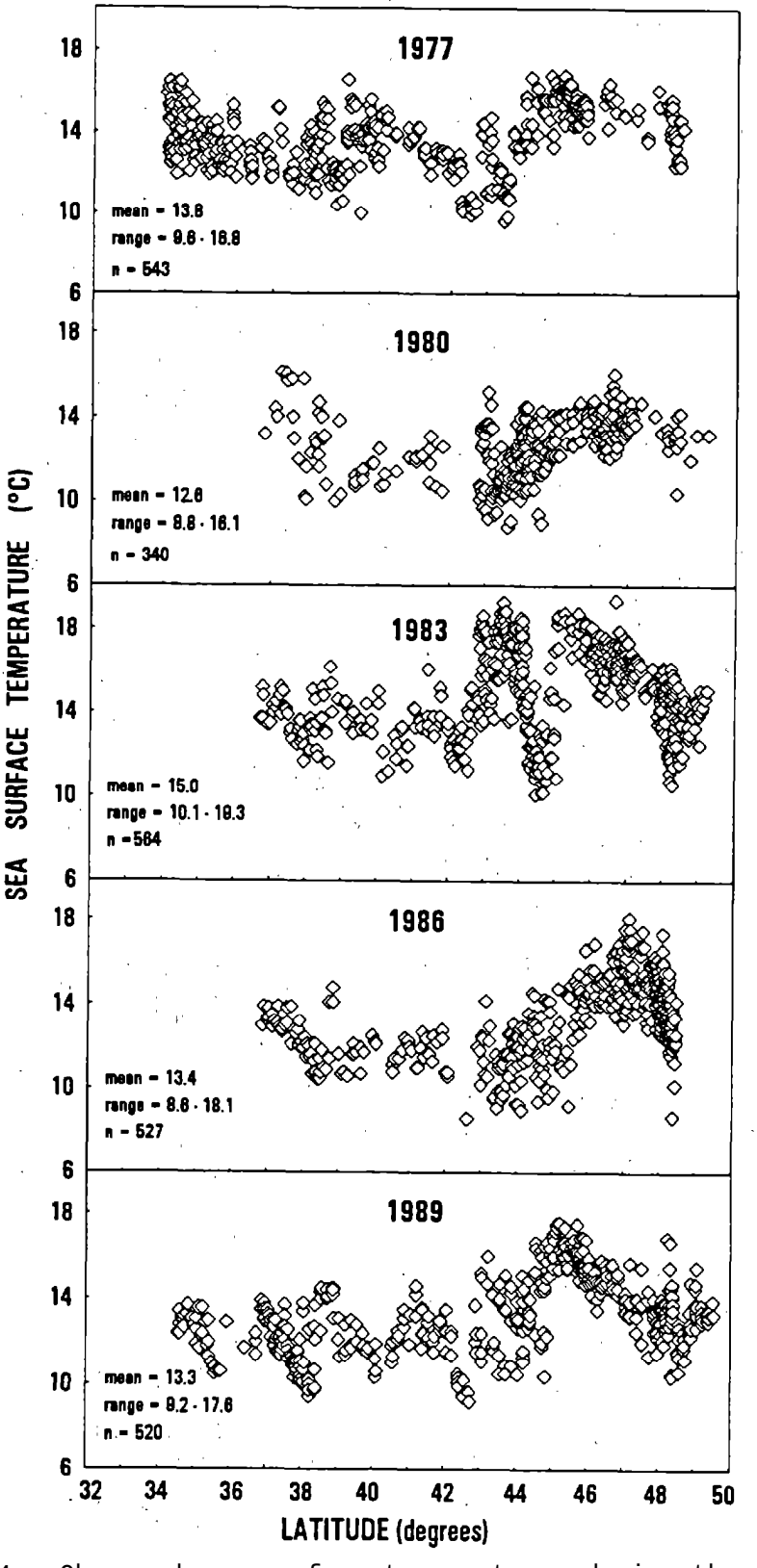


Figure 4.--Observed sea surface temperatures during the 1989 west coast survey and previous triennial bottom trawl surveys.

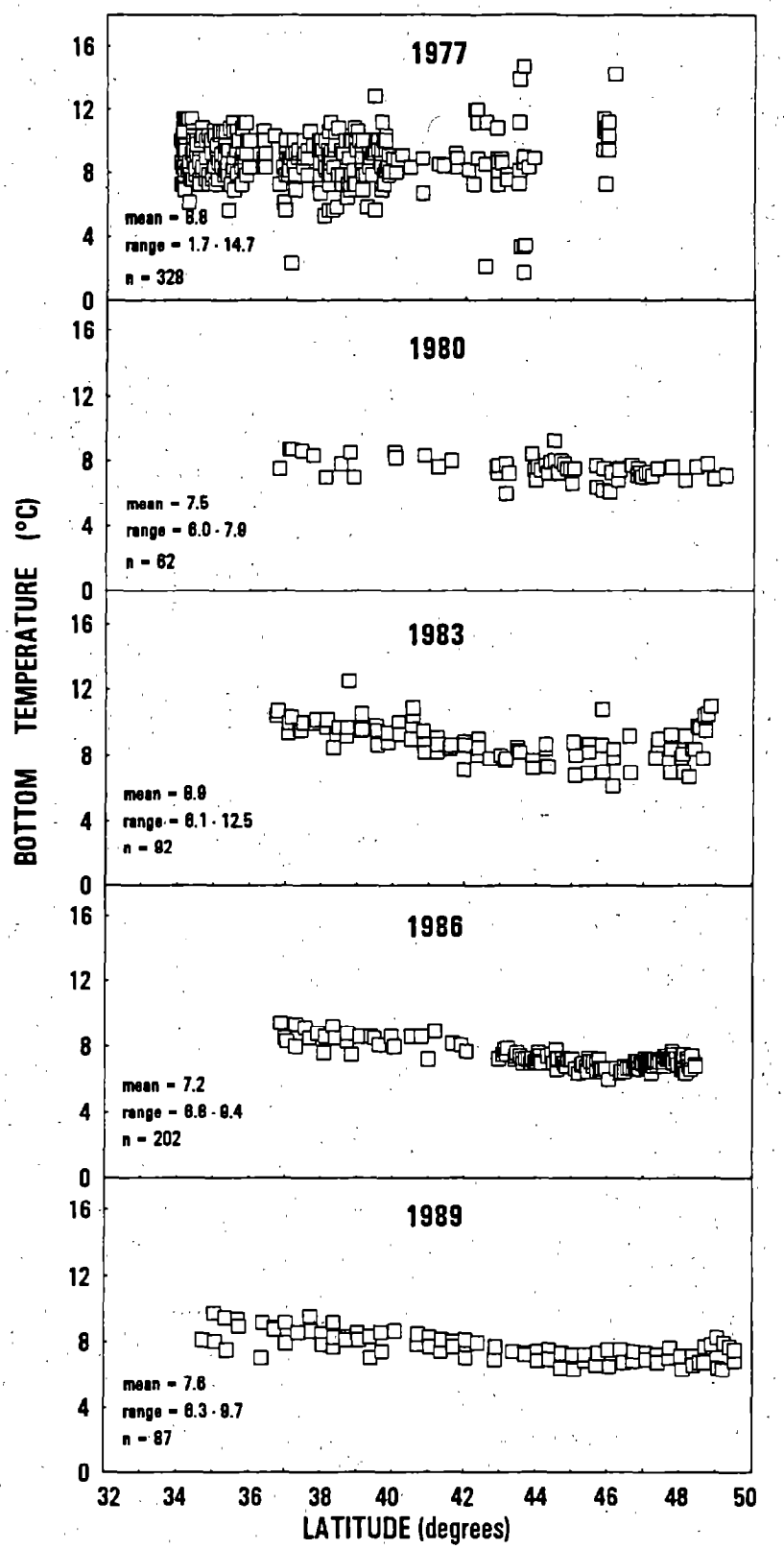


Figure 5.--Observed bottom temperatures during the 1989 west coast survey and previous triennial bottom trawl surveys.

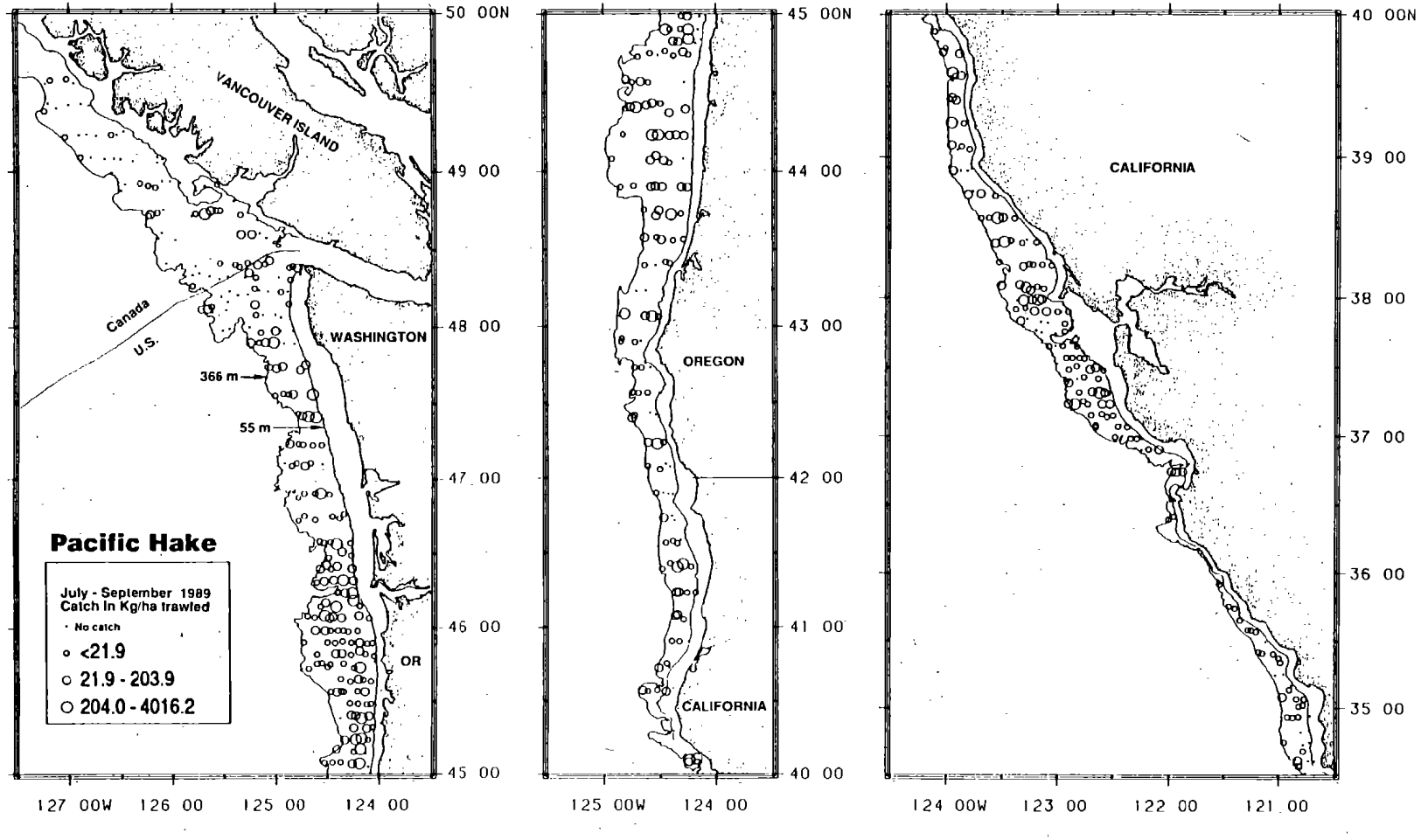


Figure 6.--Pacific hake distribution and relative abundance (kg/ha) from the 1989 west coast bottom trawl survey.

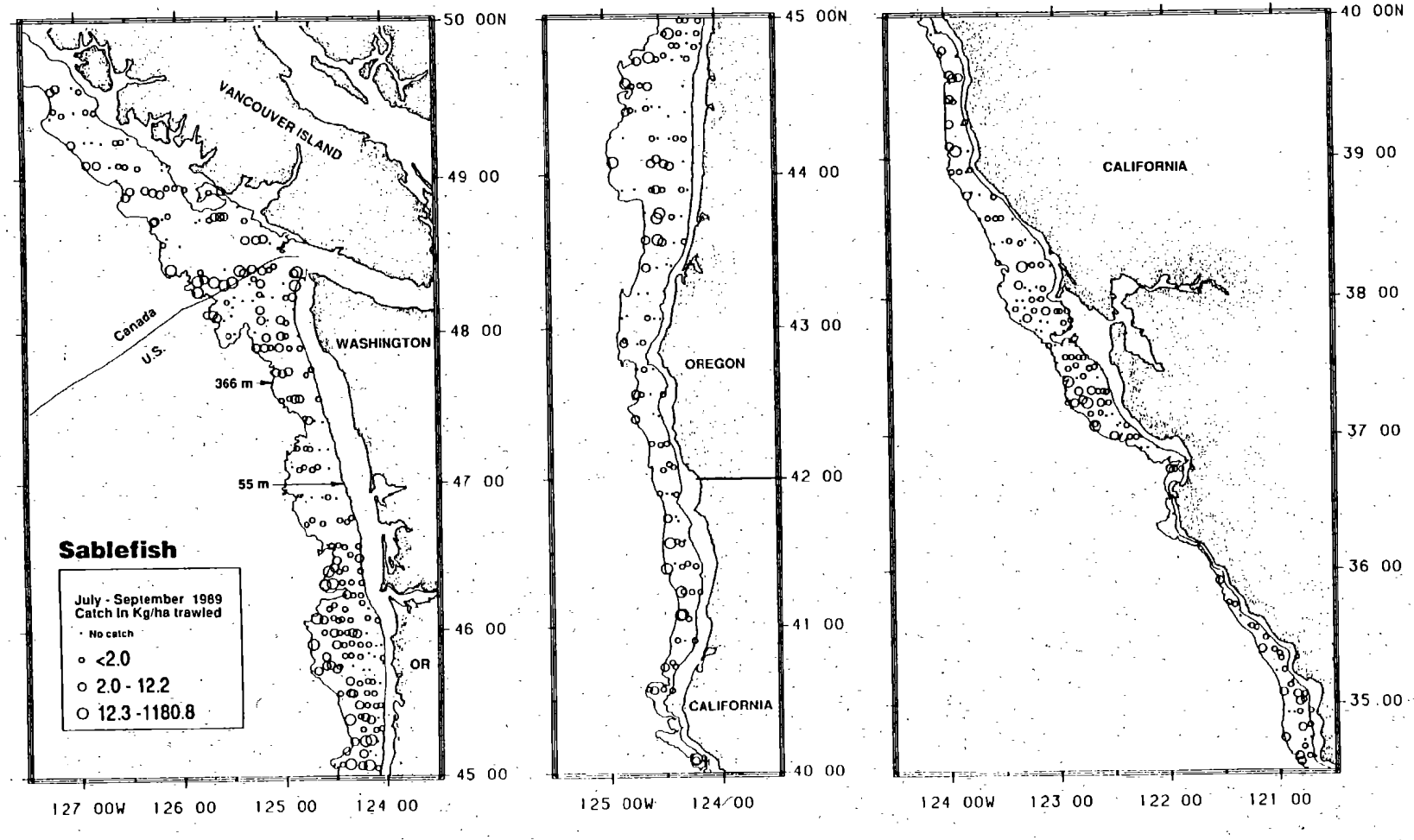


Figure 7.--Sablefish distribution and relative abundance (kg/ha) from the 1989 west coast bottom trawl survey.

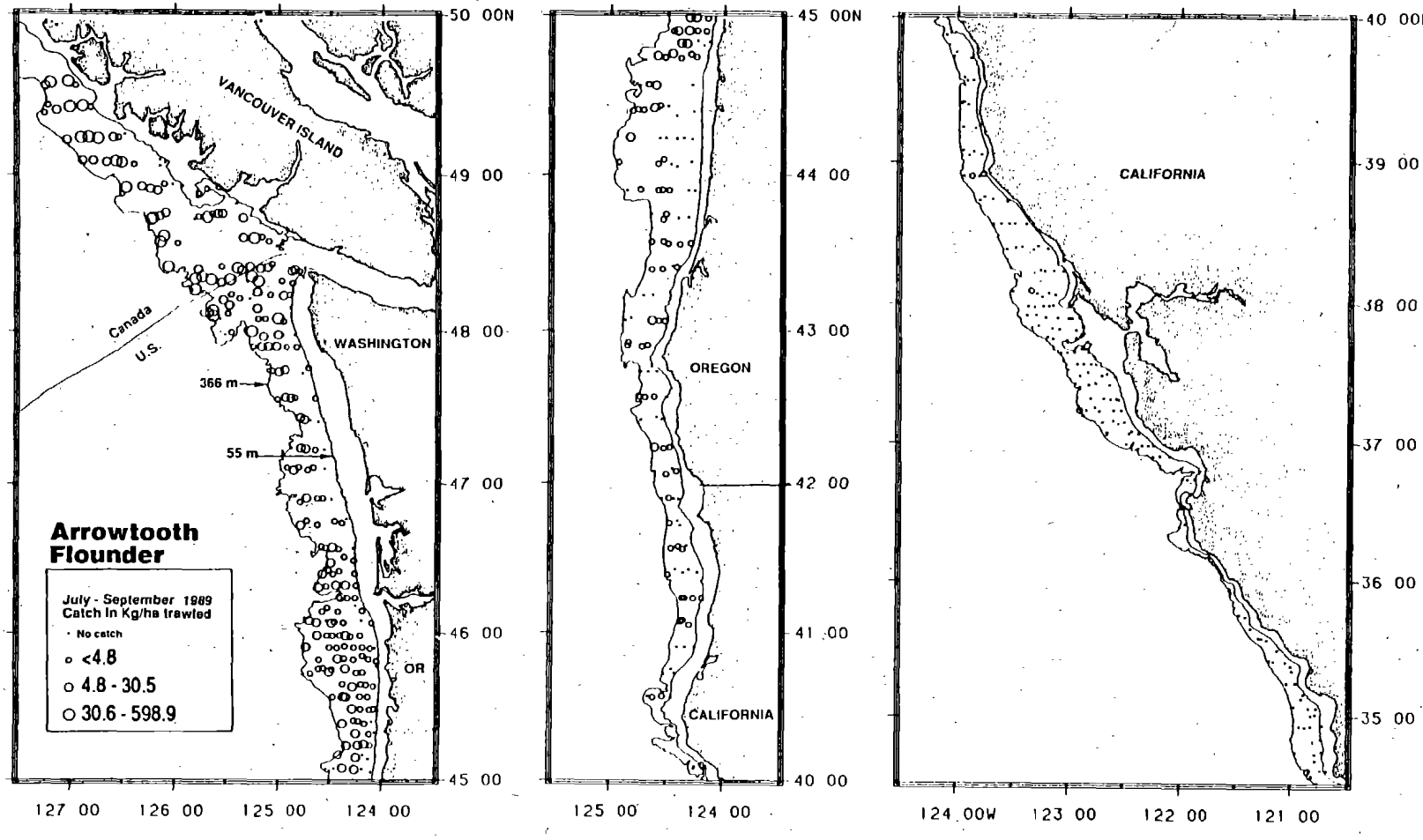


Figure 8.--Arrowtooth flounder distribution and relative abundance (kg/ha) from the 1989 west coast bottom trawl survey.

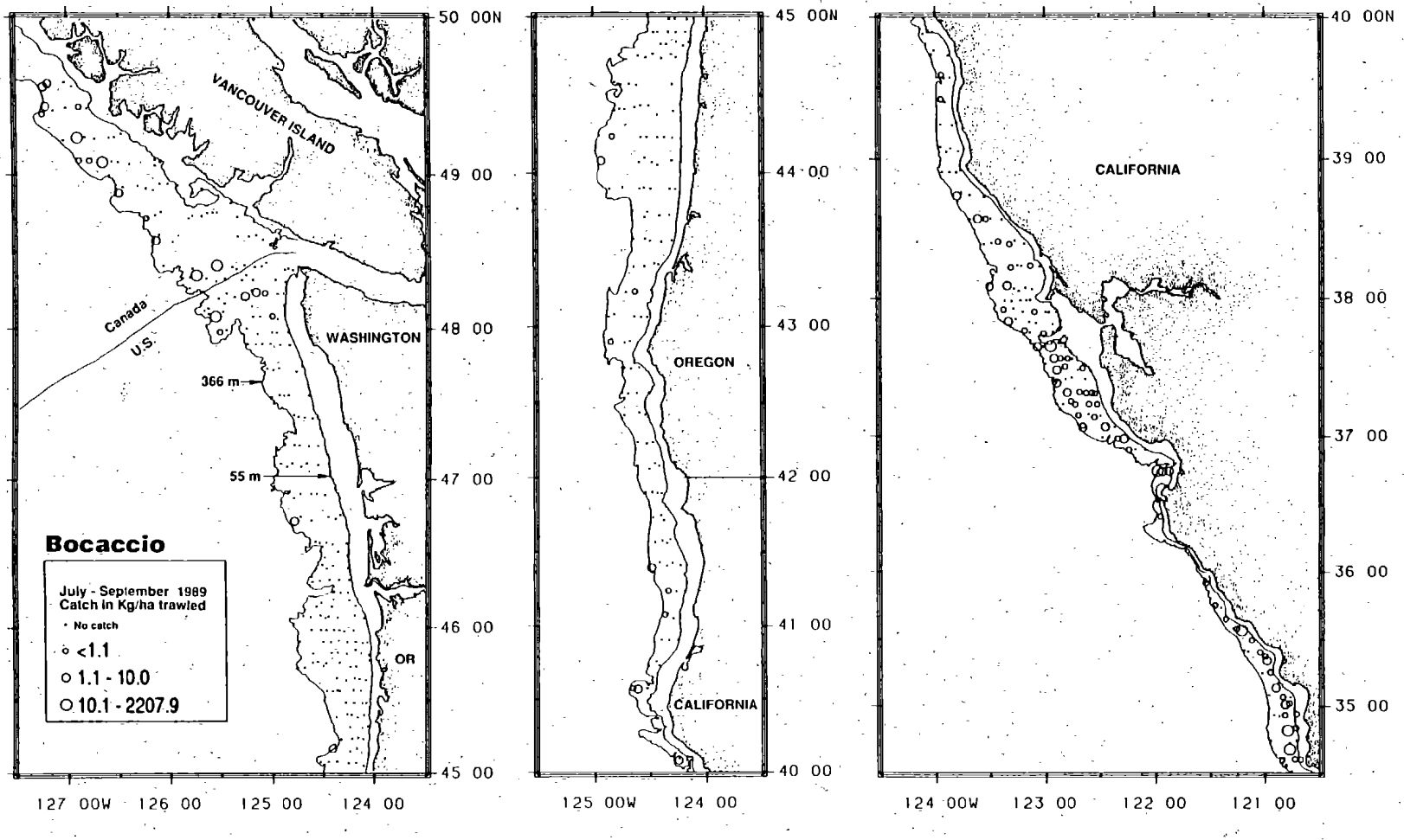


Figure 9.--Bocaccio distribution and relative abundance (kg/ha) from the 1989 west coast bottom trawl survey.

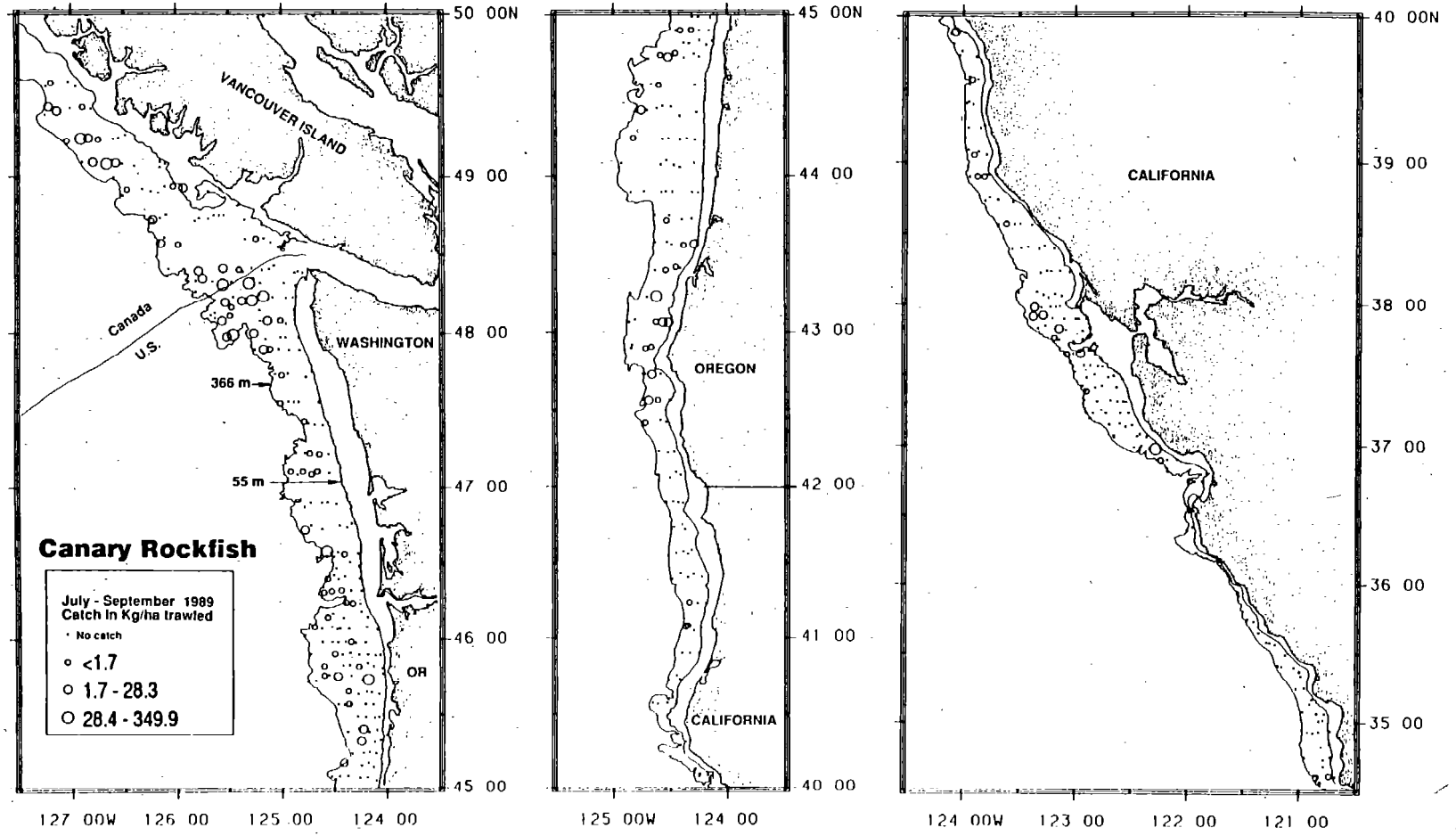


Figure 10. --Canary rockfish distribution and relative abundance (kg/ha) from the 1989 west coast bottom trawl survey.

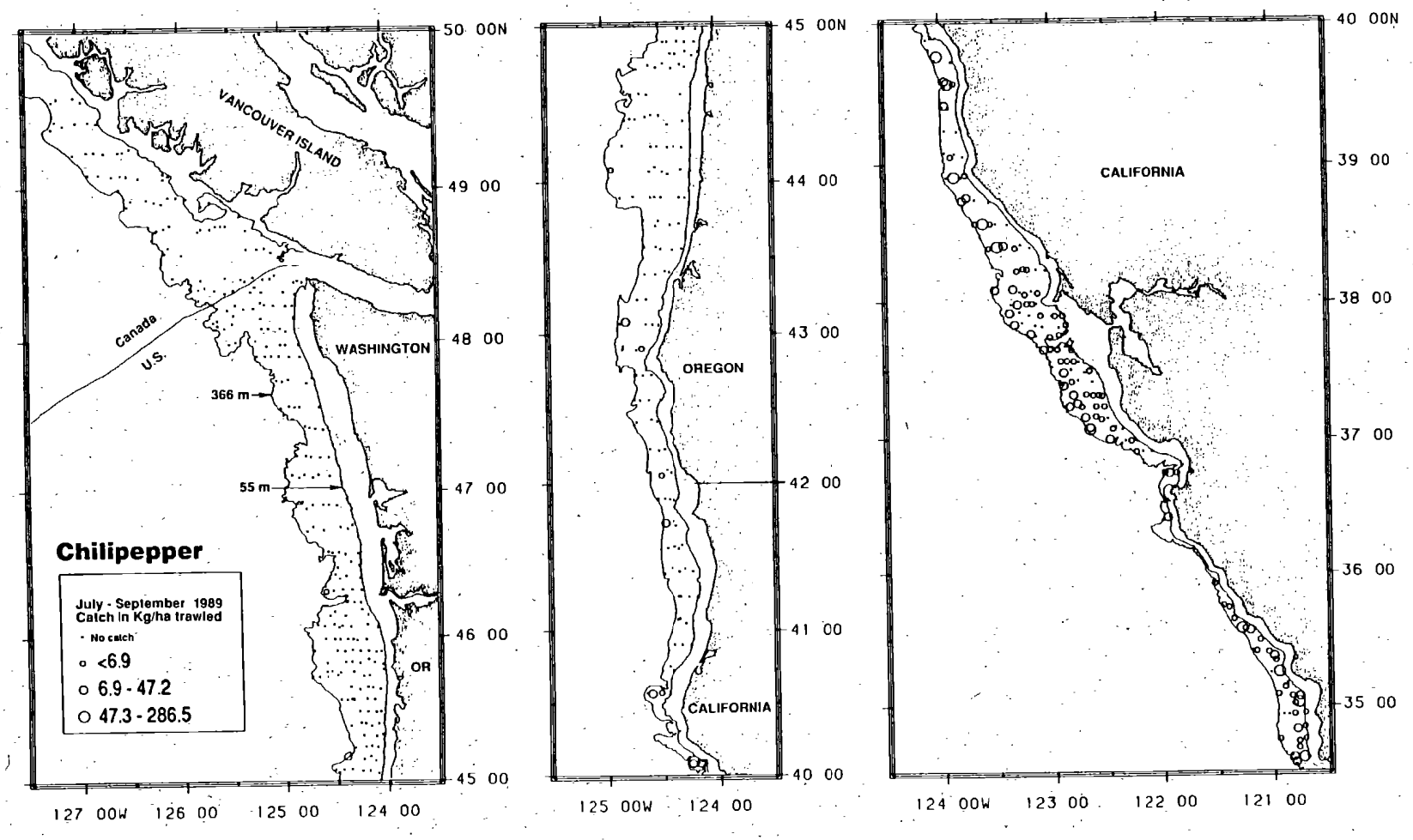


Figure 11.--Chilipepper distribution and relative abundance (kg/ha) from the 1989 west coast bottom trawl survey.

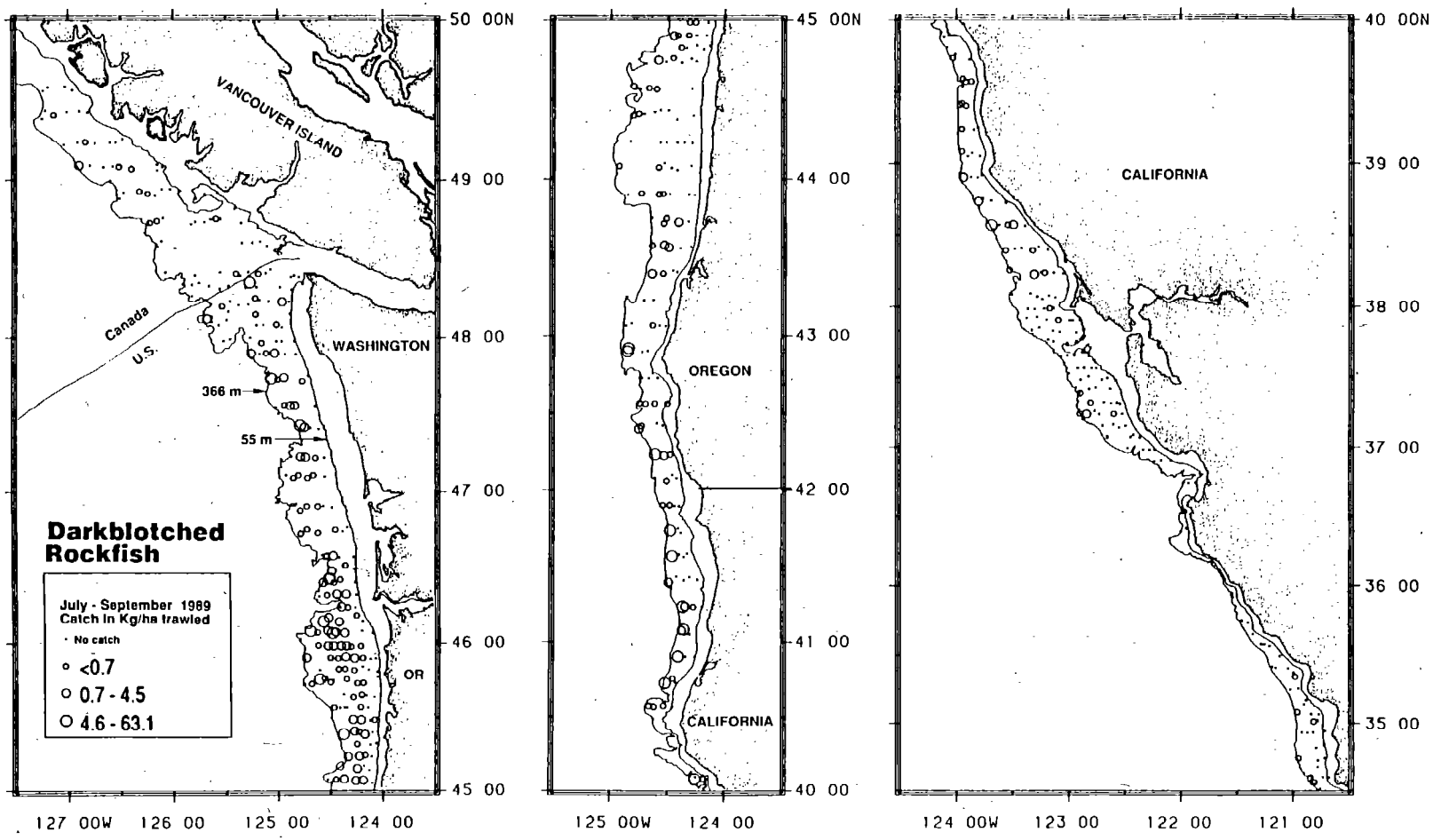


Figure 12. --Darkblotched rockfish distribution and relative abundance (kg/ha) from the 1989 west coast bottom trawl survey.

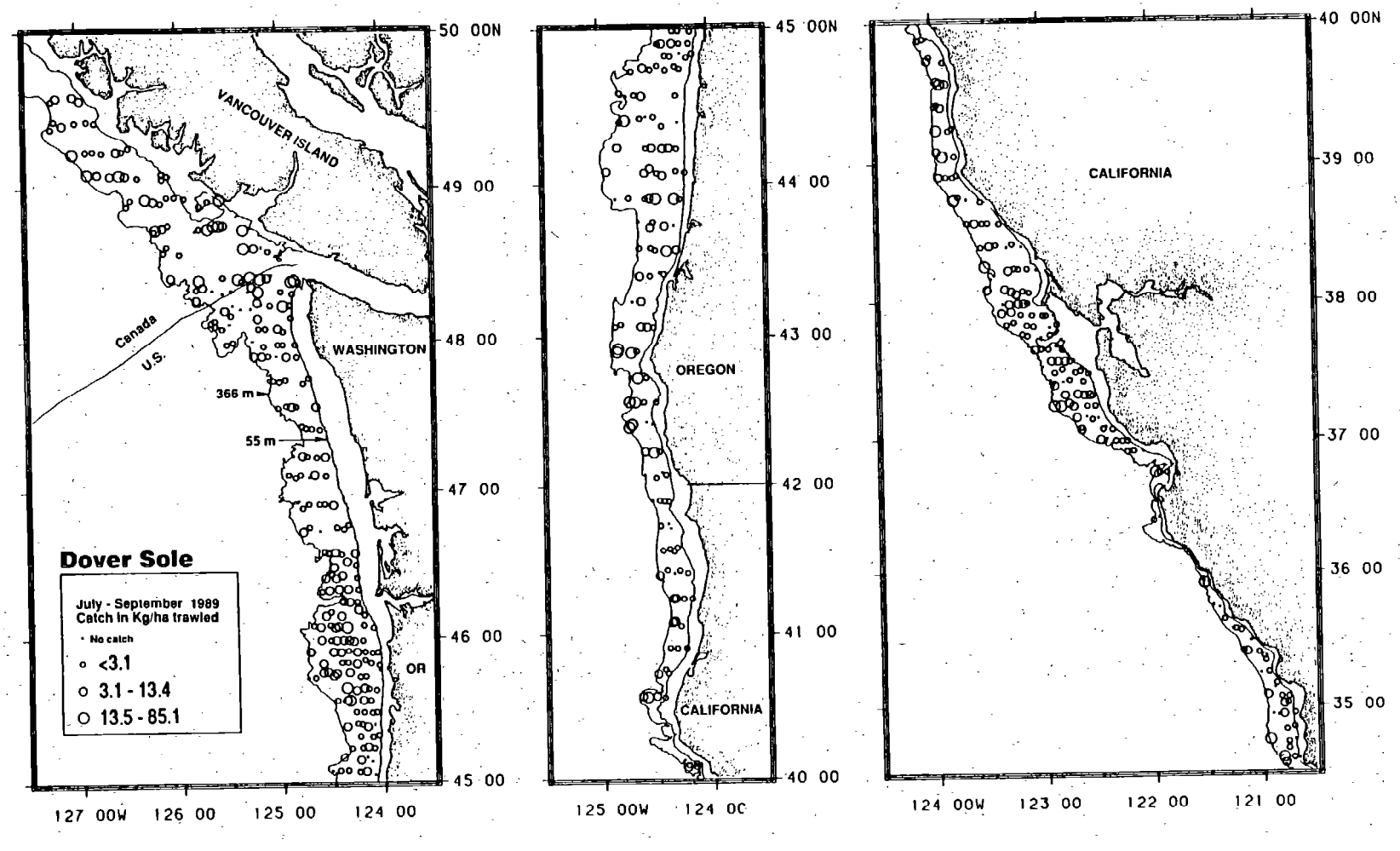


Figure 13. --Dover sole distribution and relative abundance (kg/ha) from the 1989 west coast bottom trawl survey.

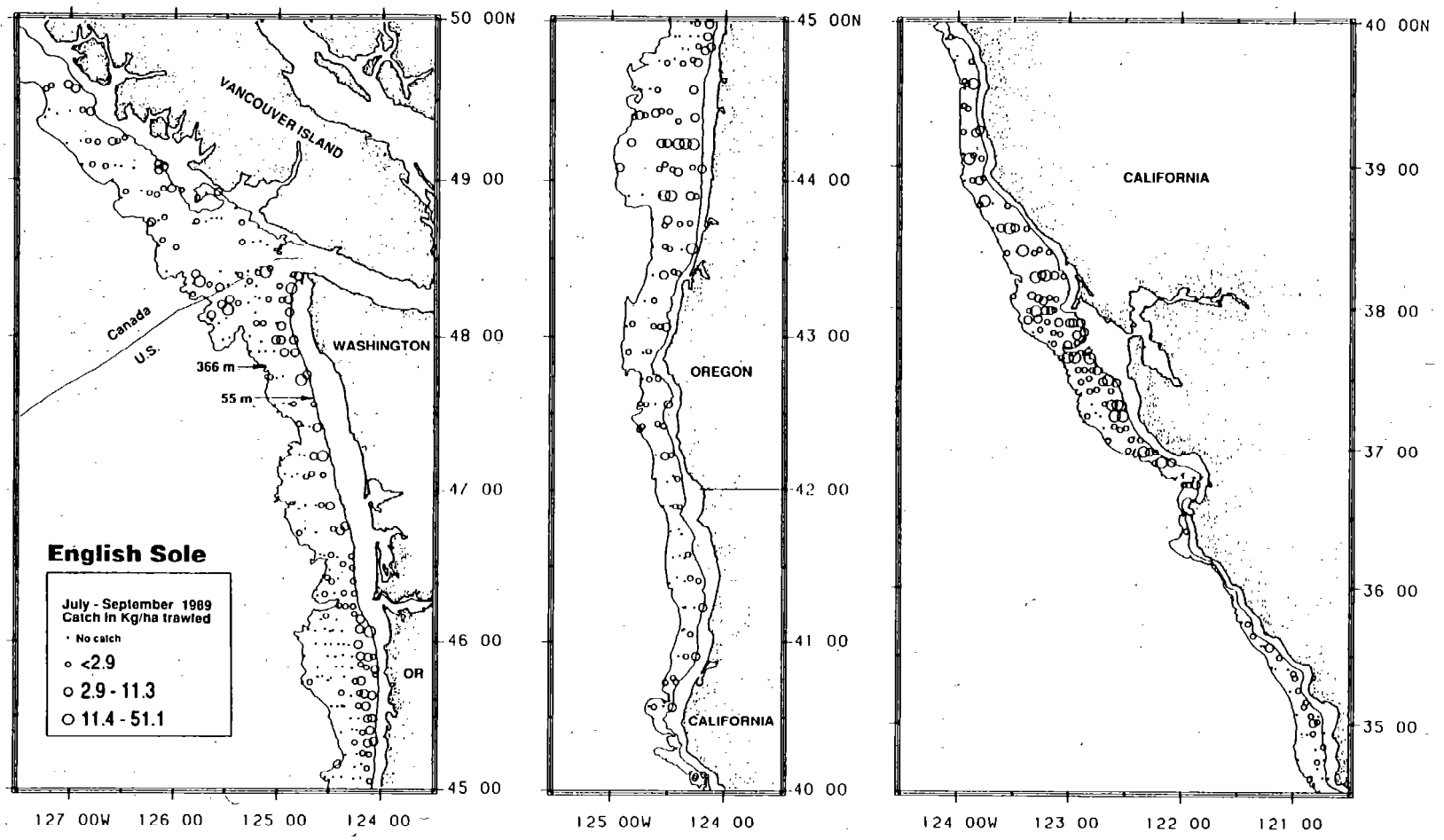


Figure 14. --English sole distribution and relative abundance (kg/ha) from the 1989 west coast bottom trawl survey.

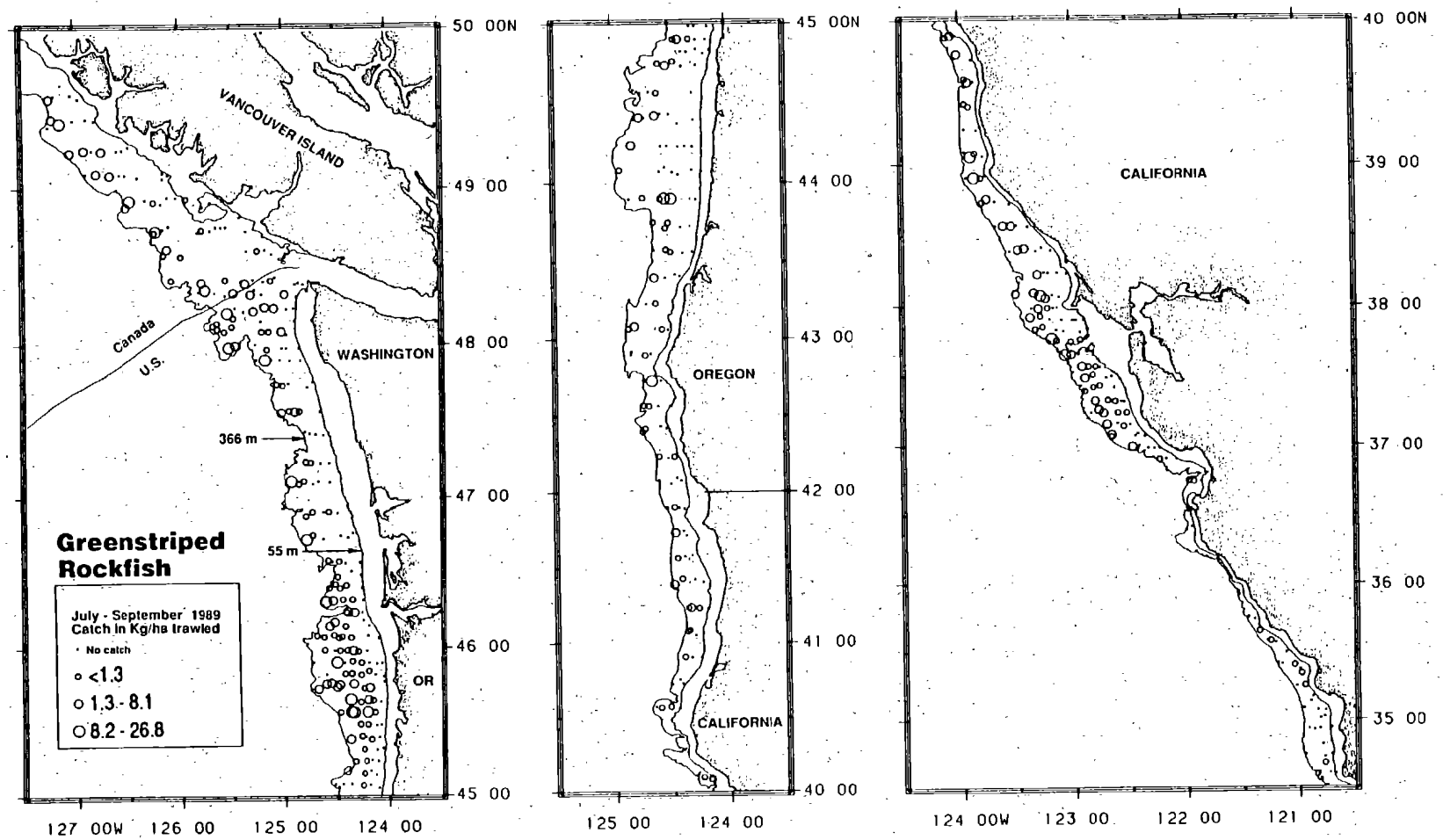


Figure 15.--Greenstriped rockfish distribution and relative abundance (kg/ha) from the 1989 west coast bottom trawl survey.

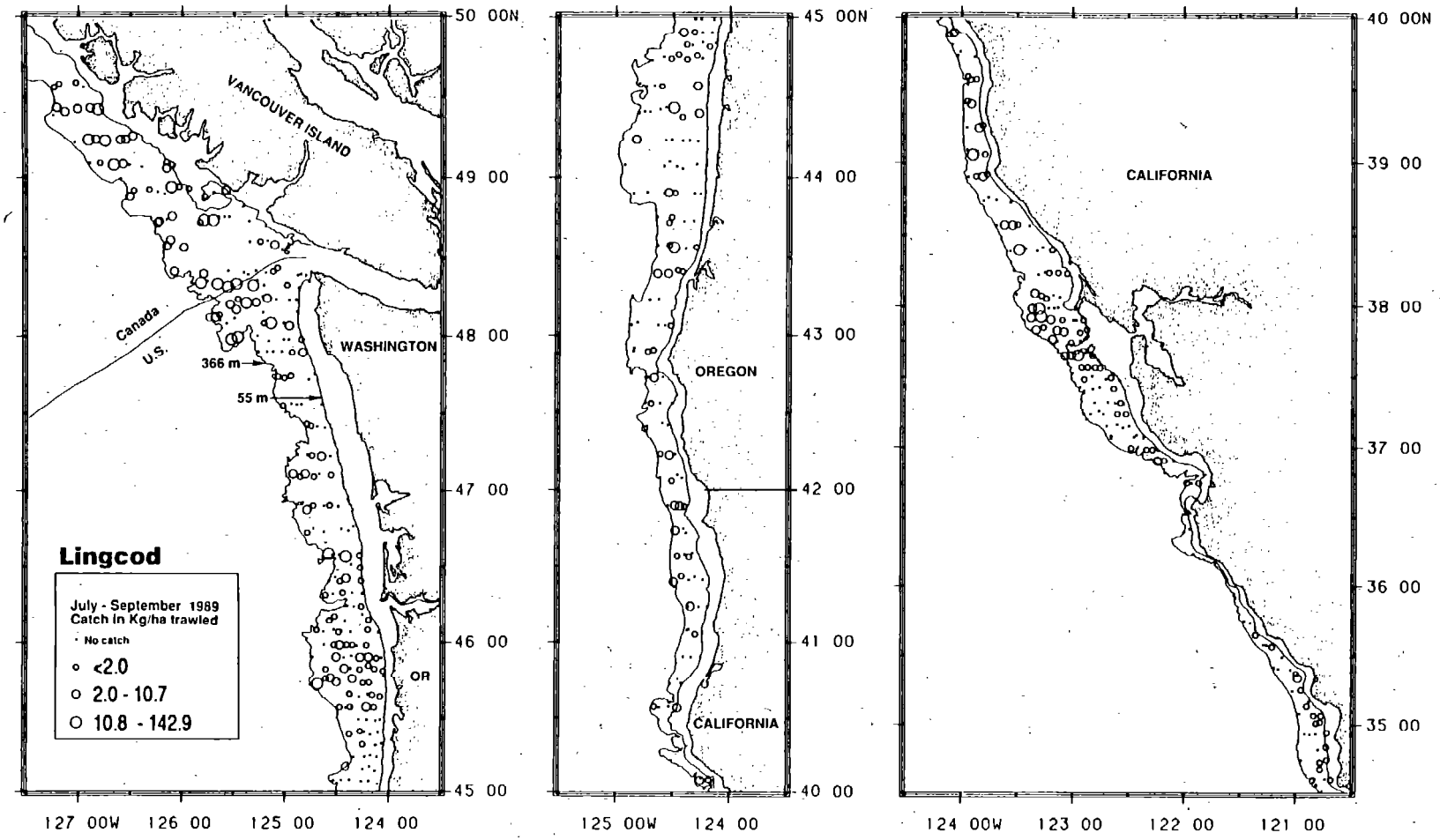


Figure 16.--Lingcod distribution and relative abundance (kg/ha) from the 1989 west coast bottom trawl survey.

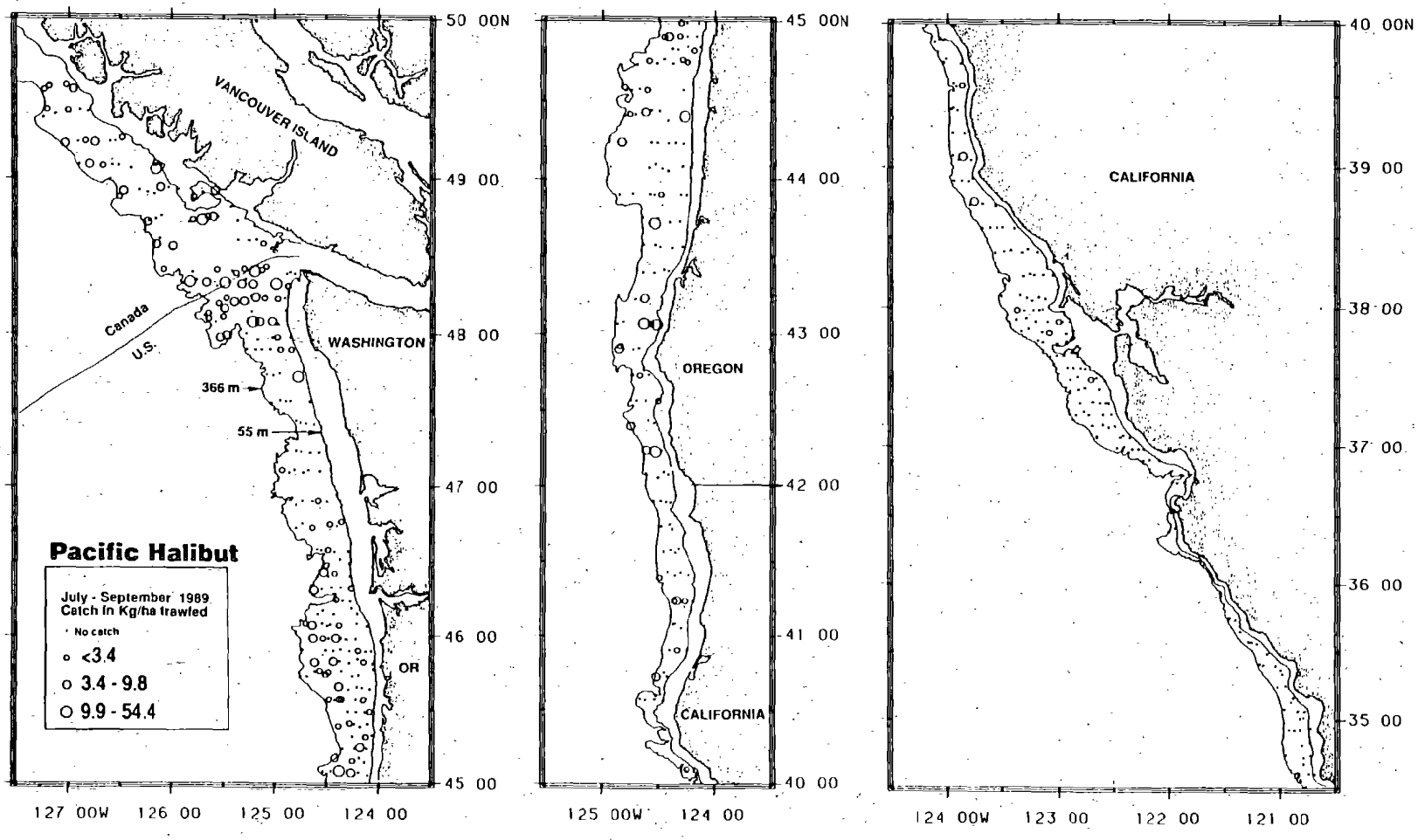


Figure 17.--Pacific halibut distribution and relative abundance (kg/ha) from the 1989 west coast bottom trawl survey.

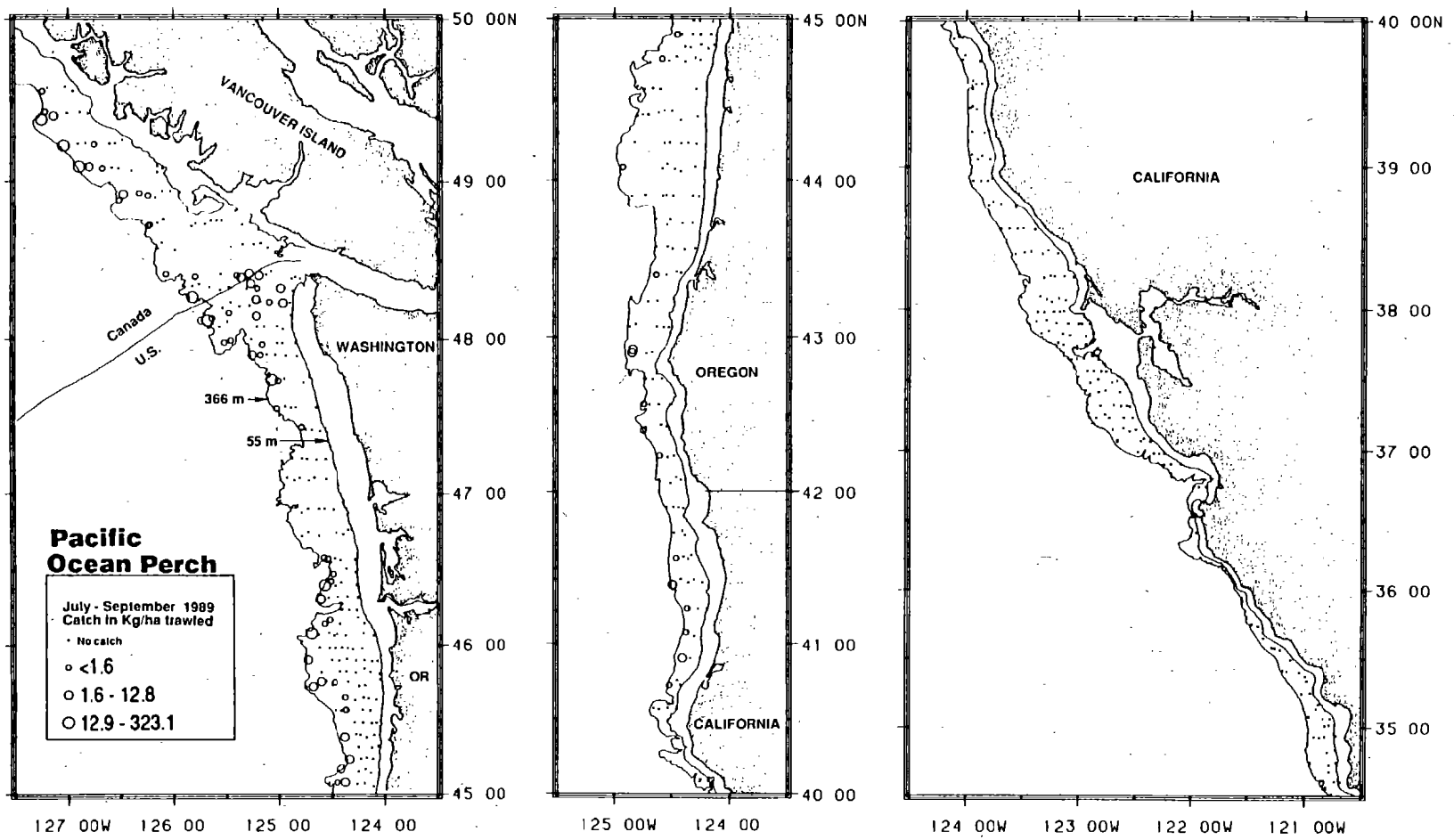


Figure 18.--Pacific ocean perch distribution and relative abundance (kg/ha) from the 1989 west coast bottom trawl survey.

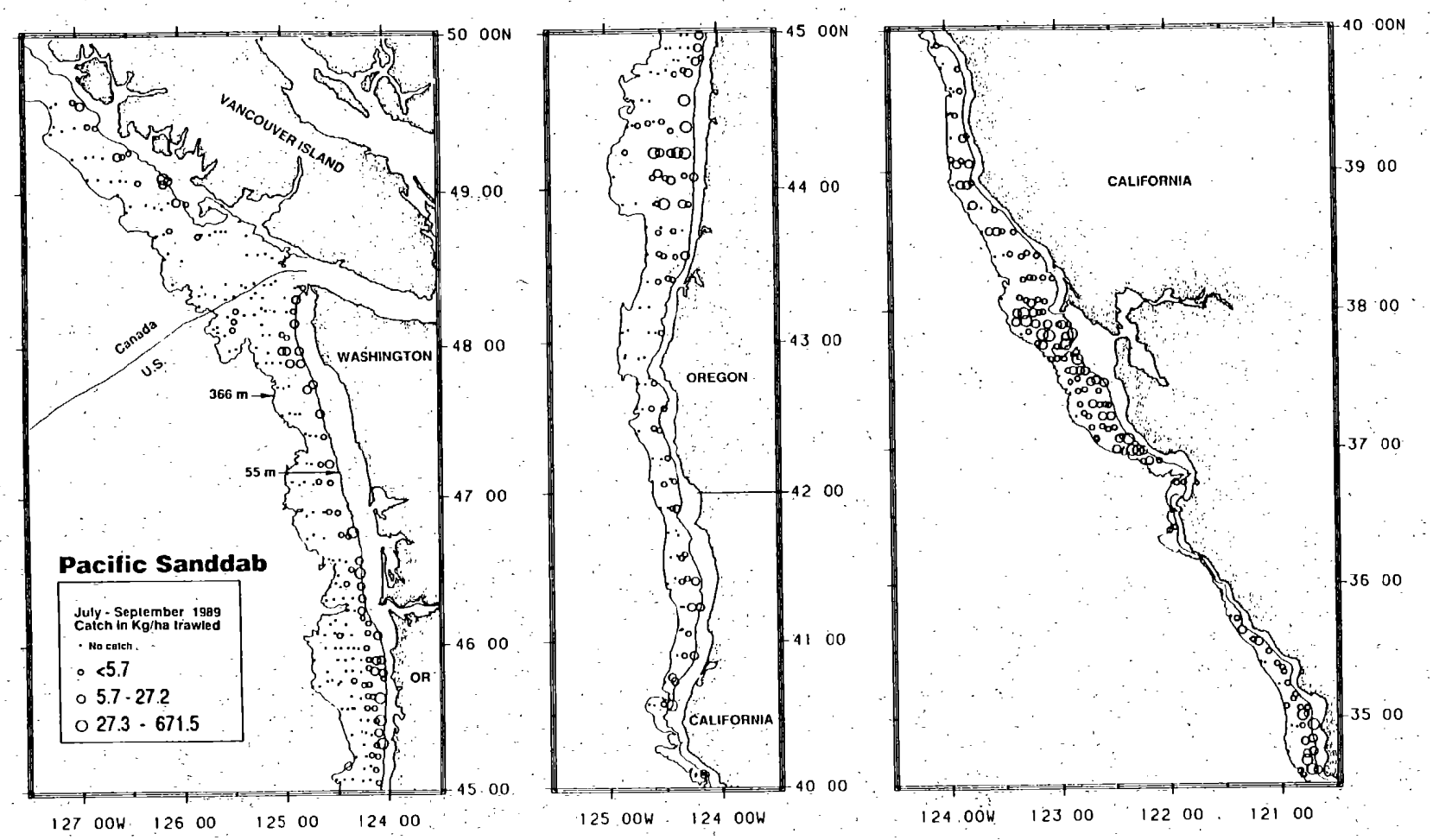


Figure 19.--Pacific sanddab distribution and relative abundance (kg/ha) from the 1989 west coast bottom trawl survey.

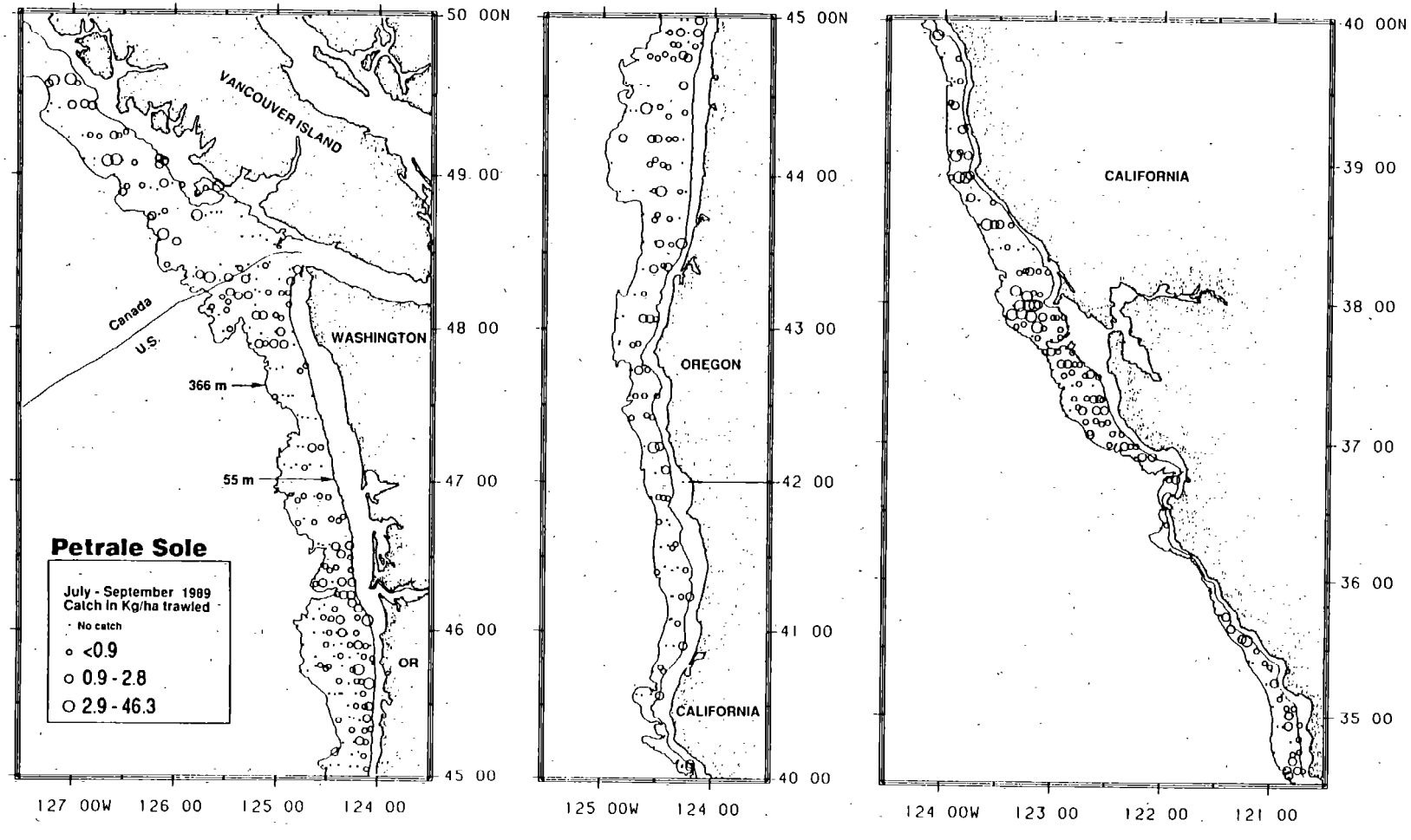


Figure 20.--Petrale sole distribution and relative abundance (kg/ha) from the 1989 west coast bottom trawl survey.

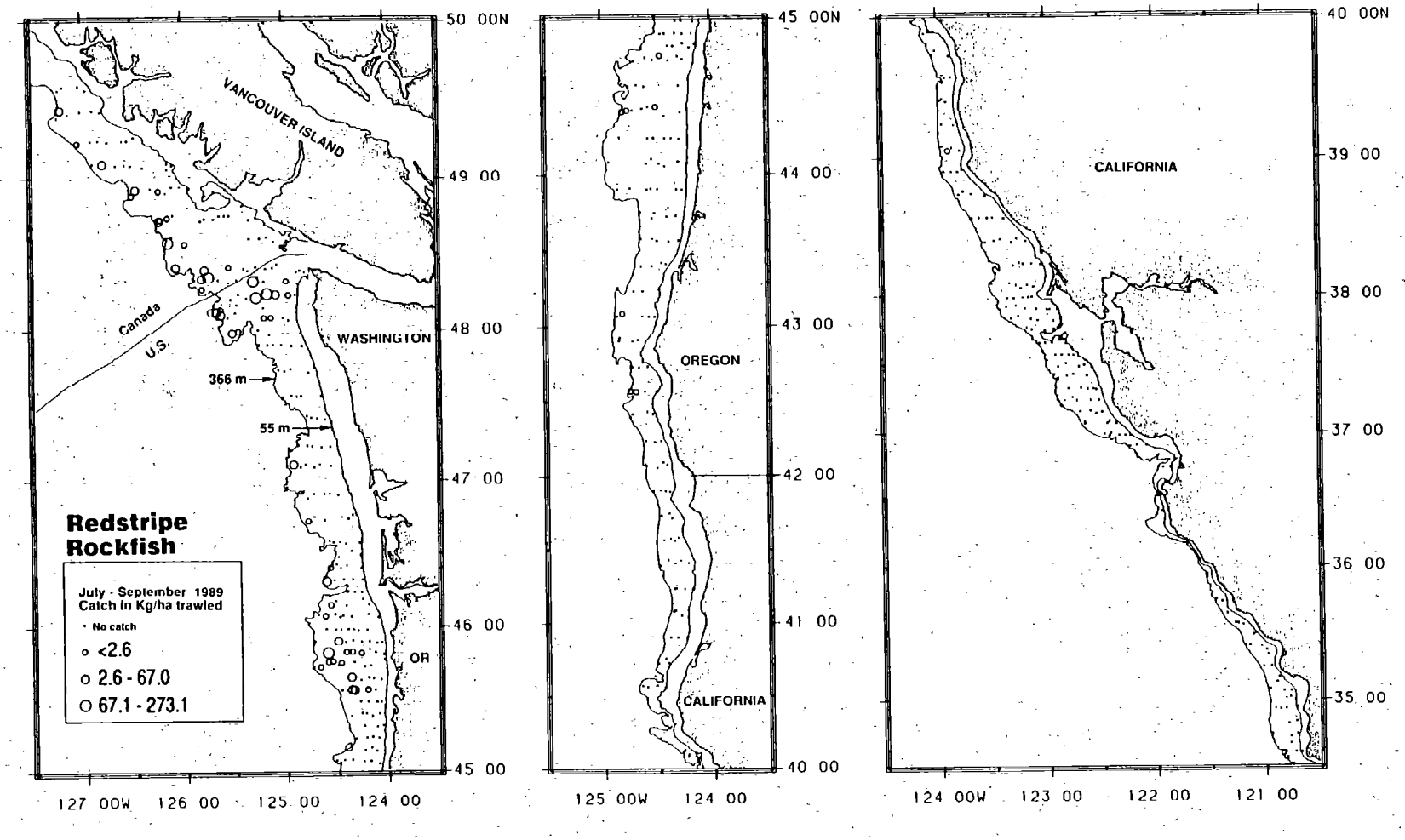


Figure 21.--Redstripe rockfish distribution and relative abundance (kg/ha) from the 1989 west coast bottom trawl survey.

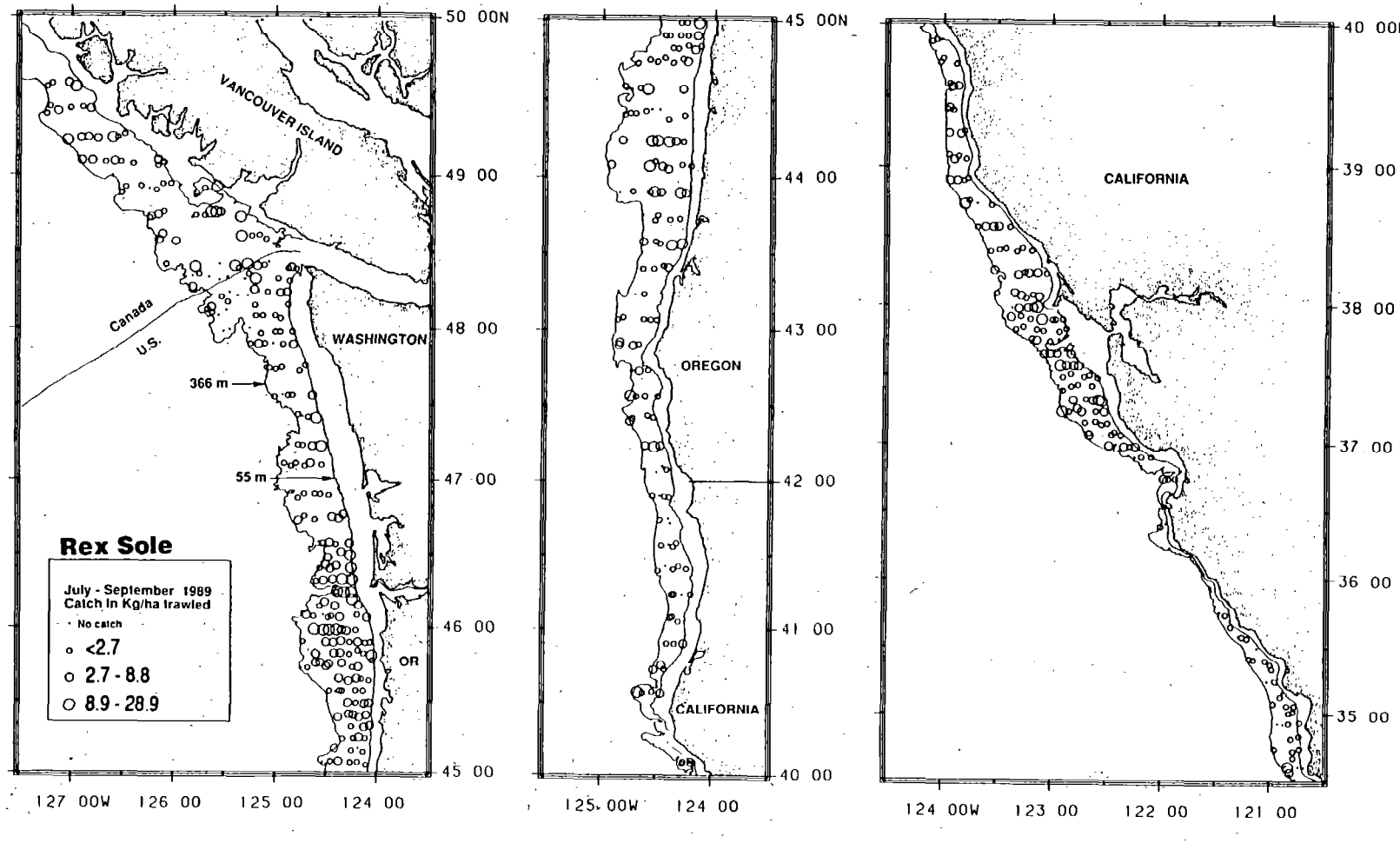


Figure 22.--Rex sole distribution and relative abundance (kg/ha) from the 1989 west coast bottom trawl survey.

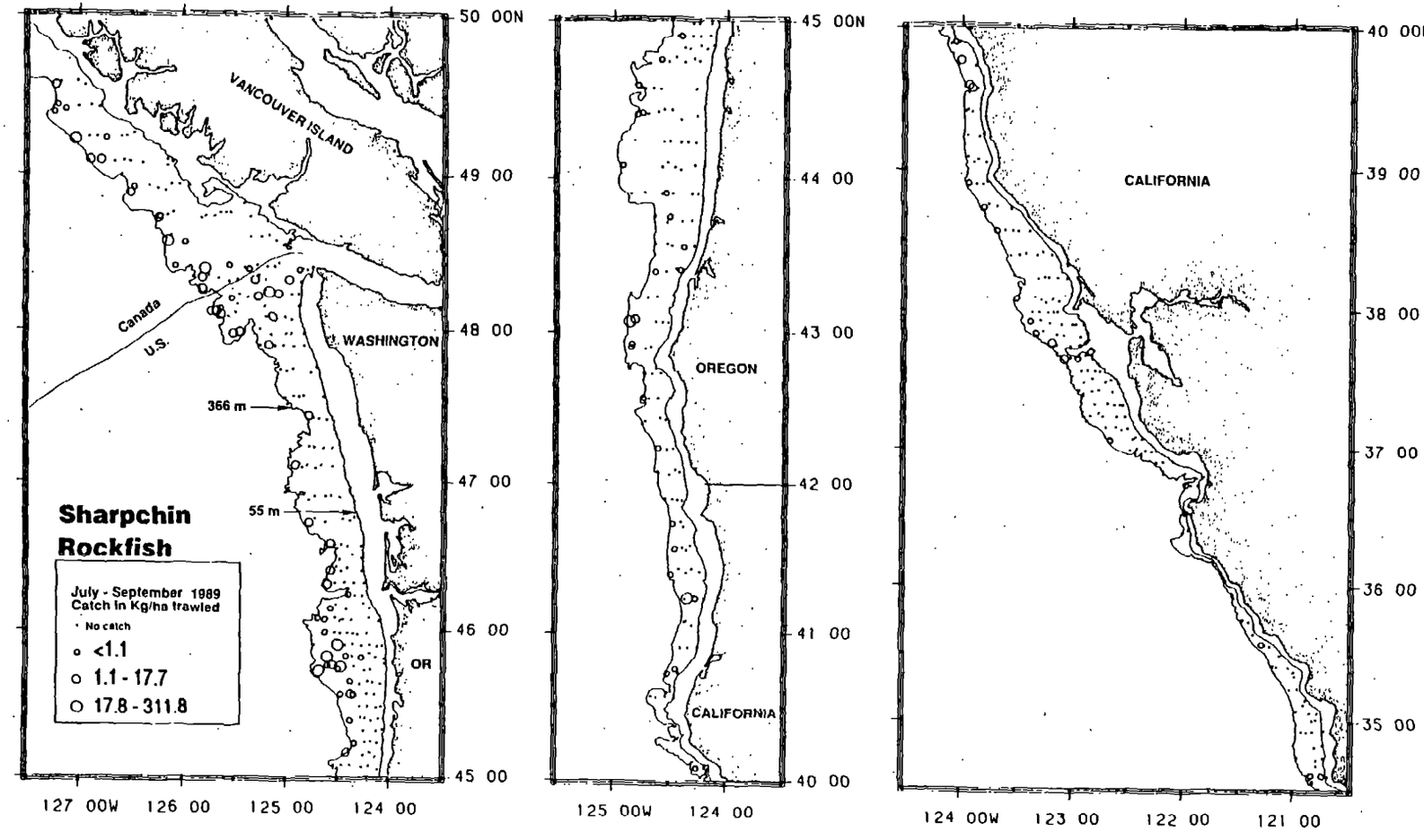


Figure 23.--Sharpchin rockfish distribution and relative abundance (kg/ha) from the 1989 west coast bottom trawl survey.

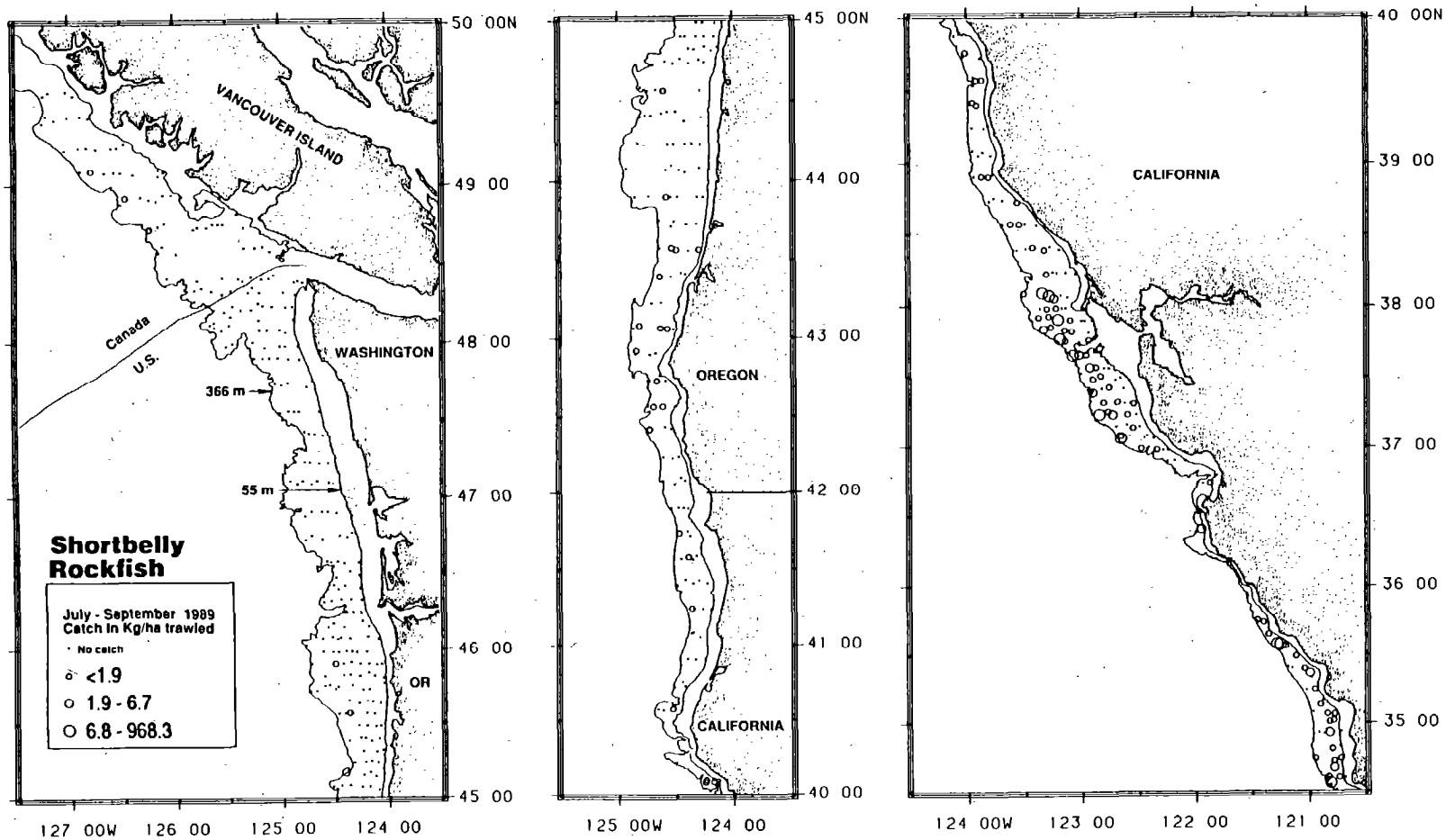


Figure 24. --Shortbelly rockfish distribution and relative abundance (kg/ha) from the 1989 west coast bottom trawl survey.

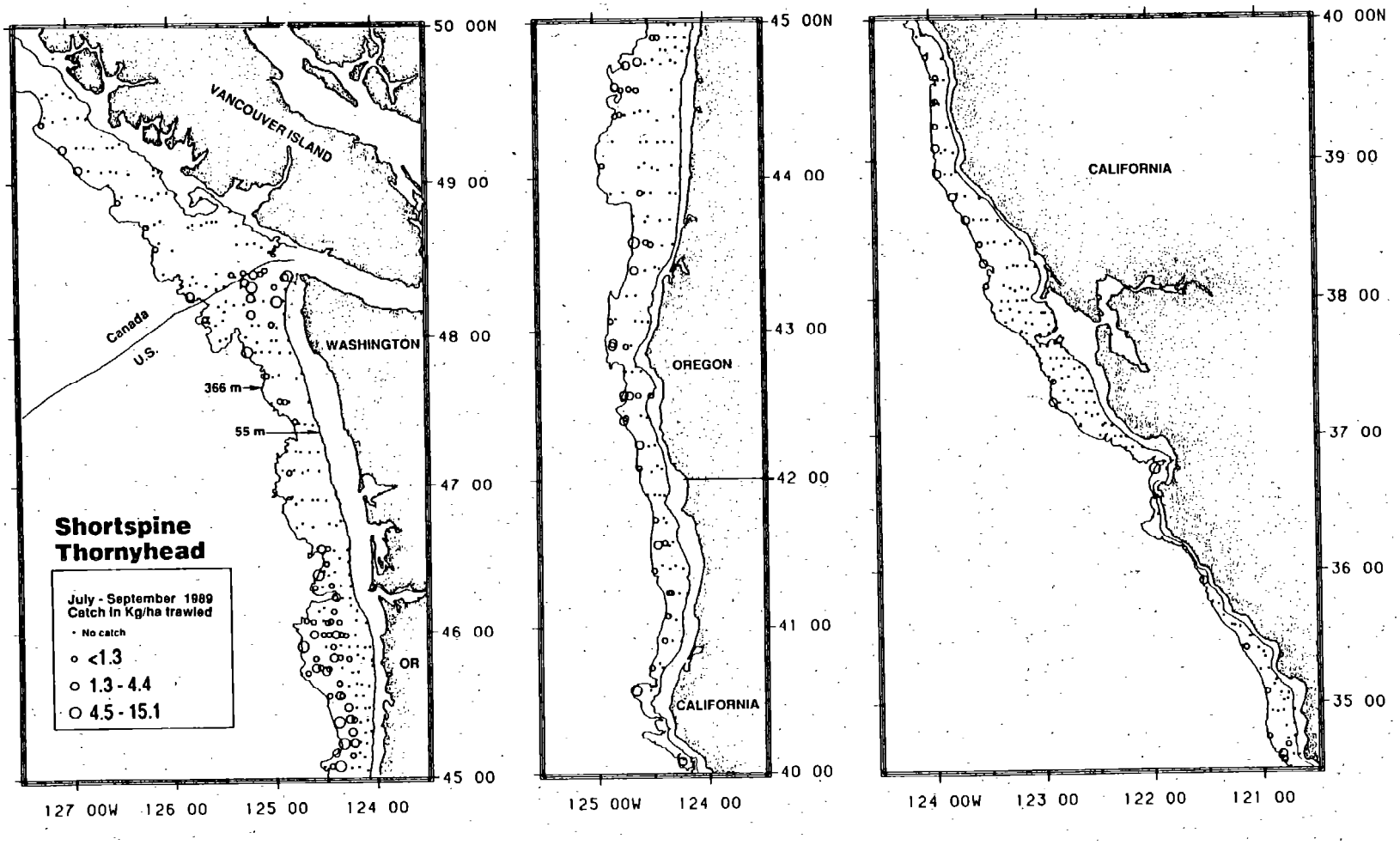


Figure 25. --Shortspine thornyhead distribution and relative abundance (kg/ha) from the 1989 west coast bottom trawl survey.

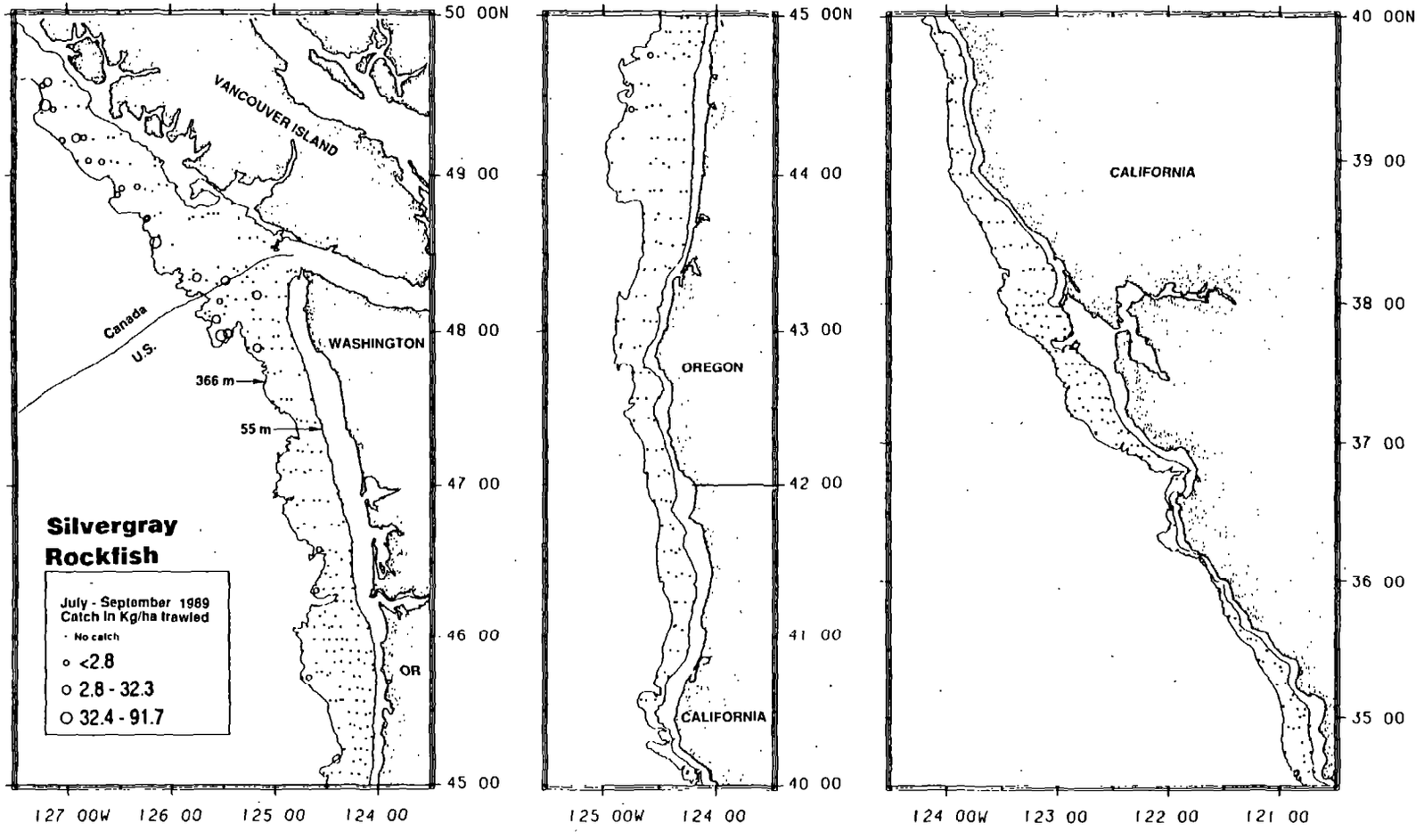


Figure 26.--Silvergray rockfish distribution and relative abundance (kg/ha) from the 1989 west coast bottom trawl survey.

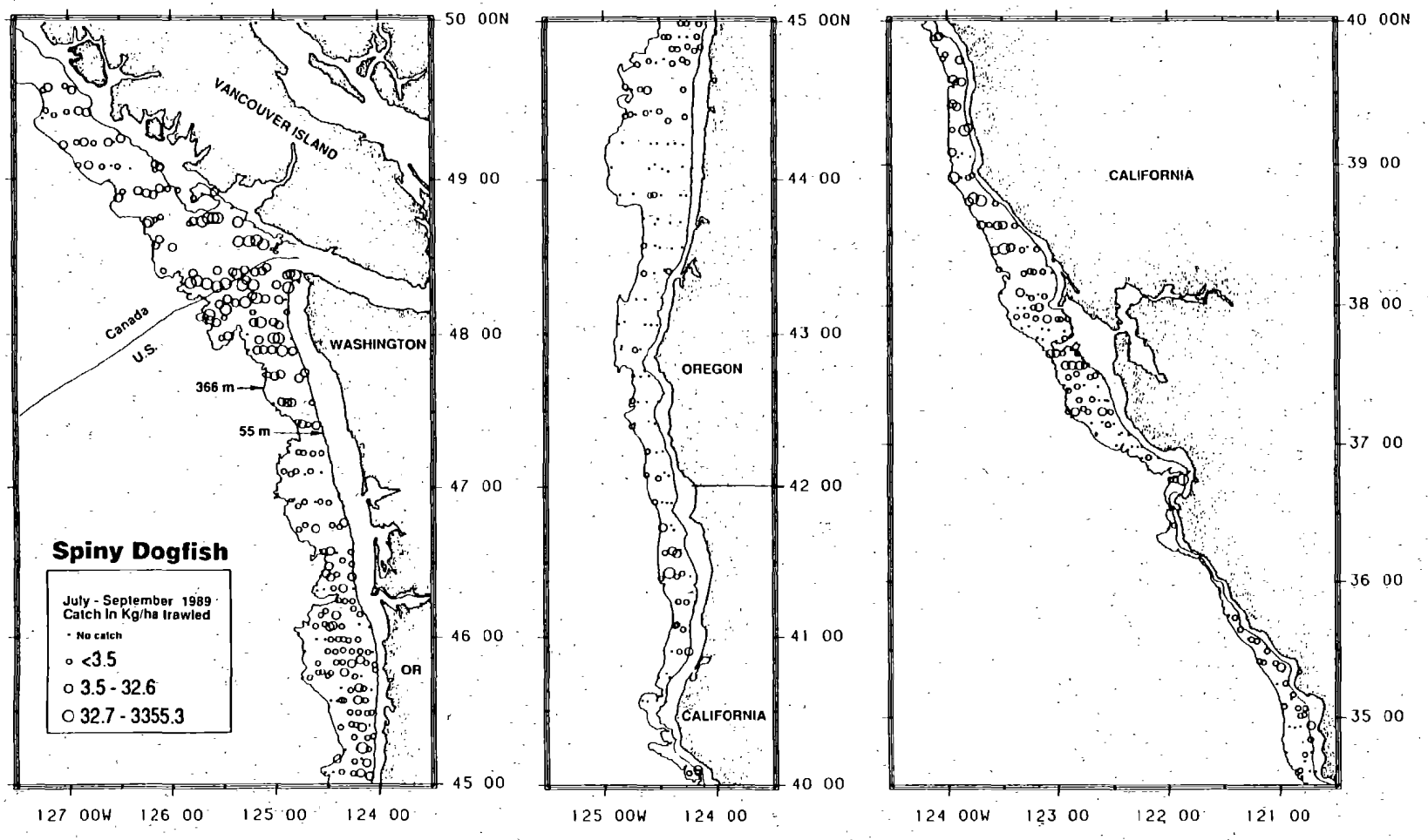


Figure 27.--Spiny dogfish distribution and relative abundance (kg/ha) from the 1989 west coast bottom trawl survey.

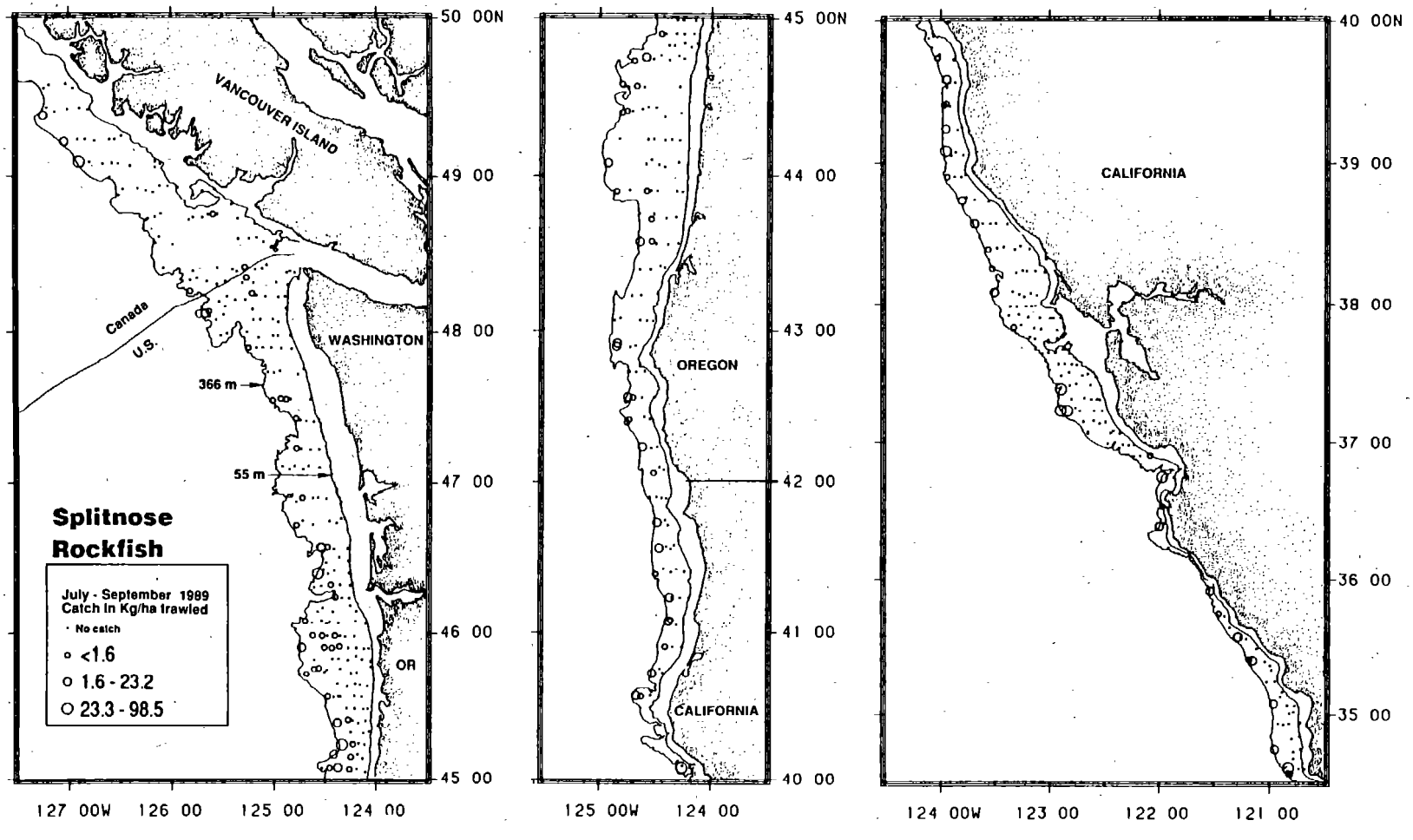


Figure 28. --Splitnose rockfish distribution and relative abundance (kg/ha) from the 1989 west coast bottom trawl survey.

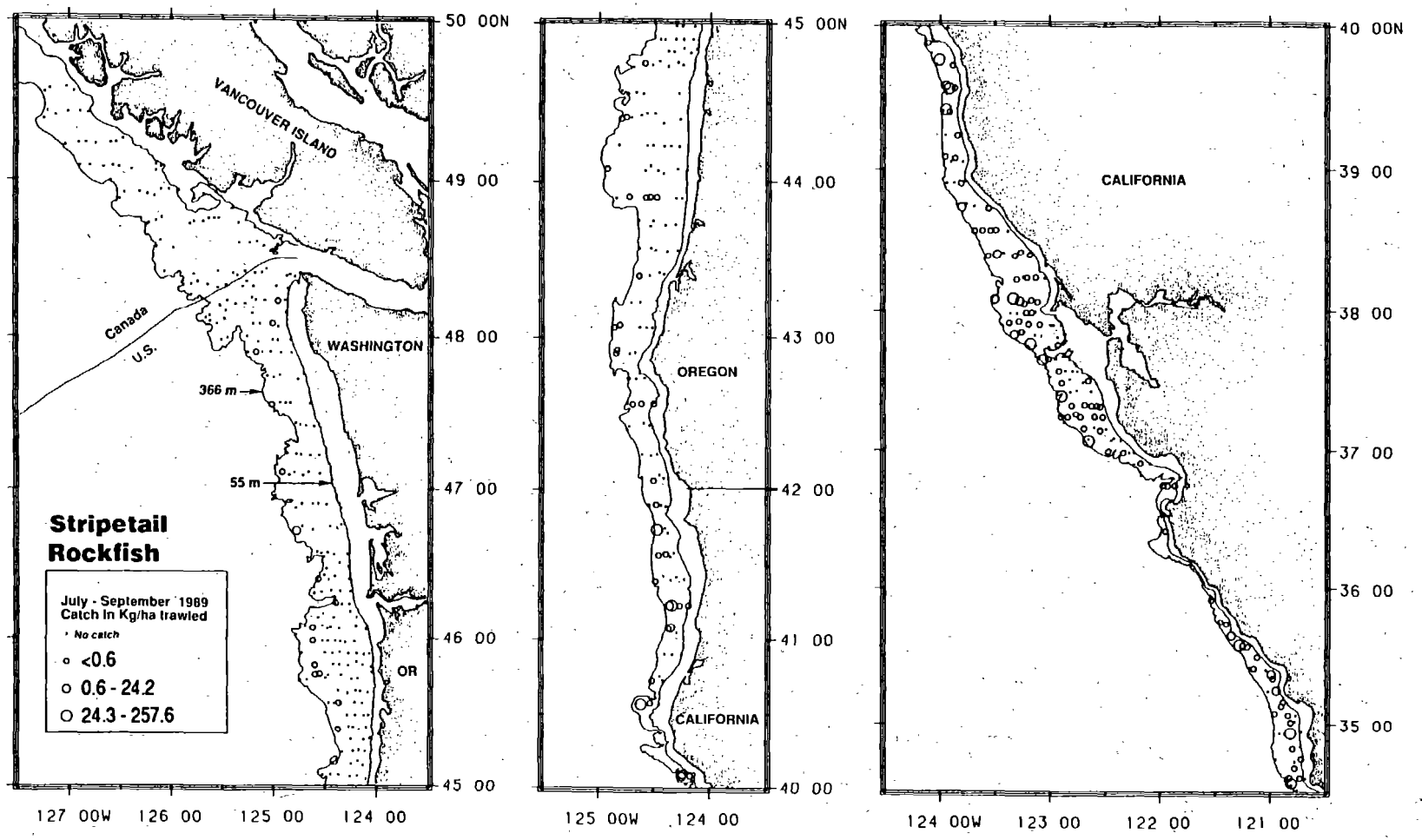


Figure 29.--Stripetail rockfish distribution and relative abundance (kg/ha) from the 1989 west coast bottom trawl survey.

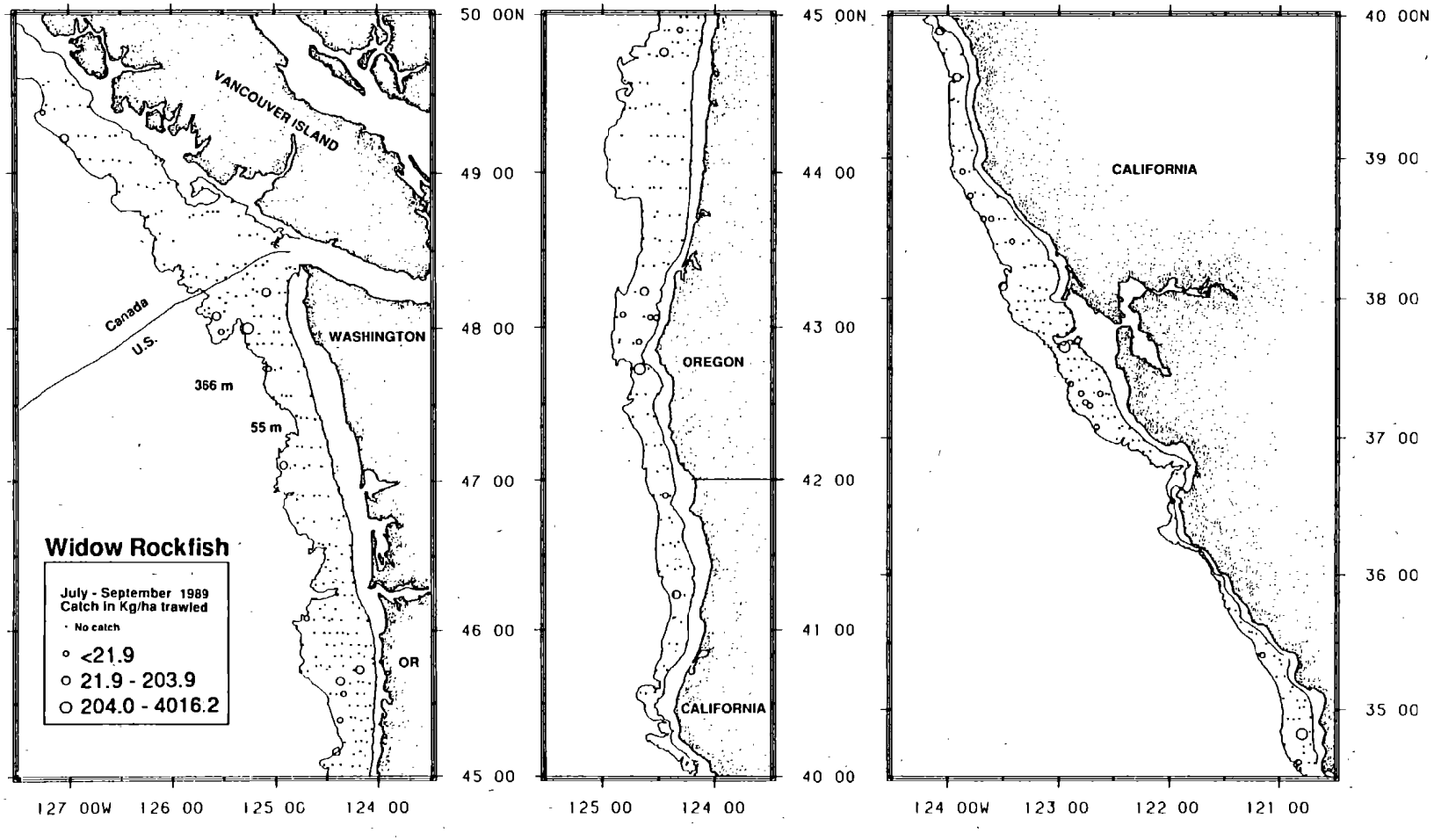


Figure 30.--Widow rockfish distribution and relative abundance (kg/ha) from the 1989 west coast bottom trawl survey.

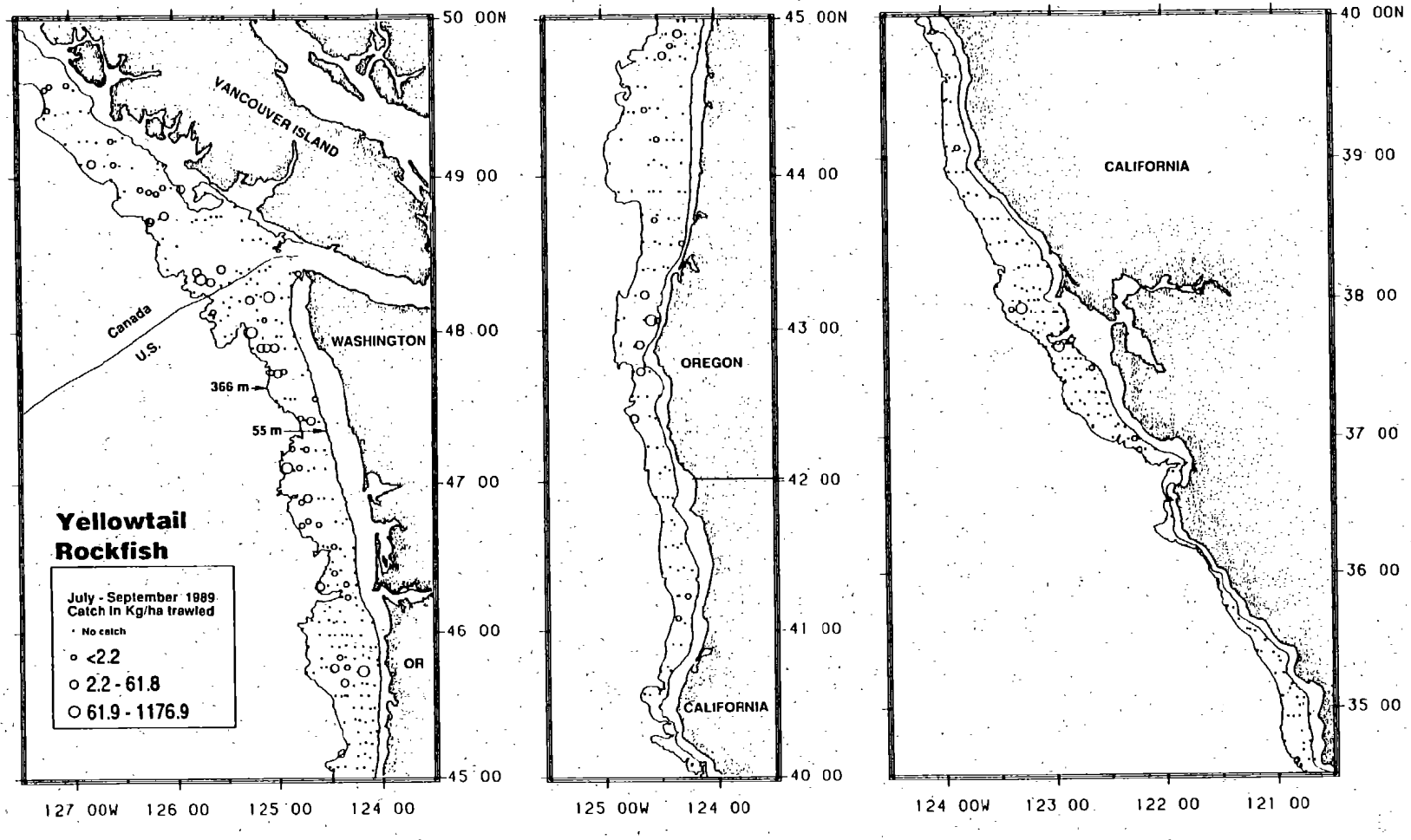


Figure 31.--Yellowtail rockfish distribution and relative abundance (kg/ha) from the 1989 west coast bottom trawl survey.

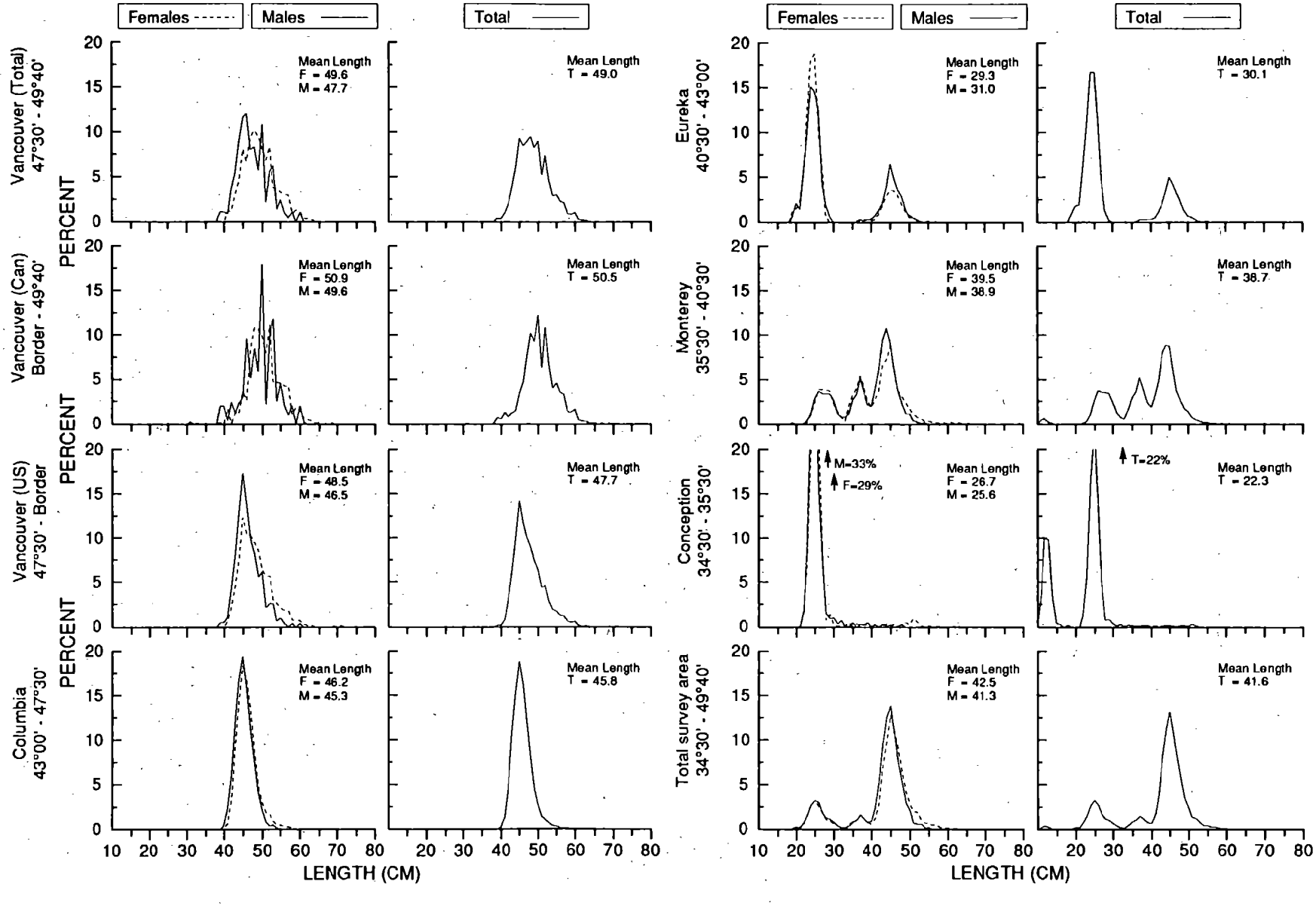


Figure 32.--Pacific hake estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl survey for depths 55-366 m. Lengths ranged 9-85 cm.

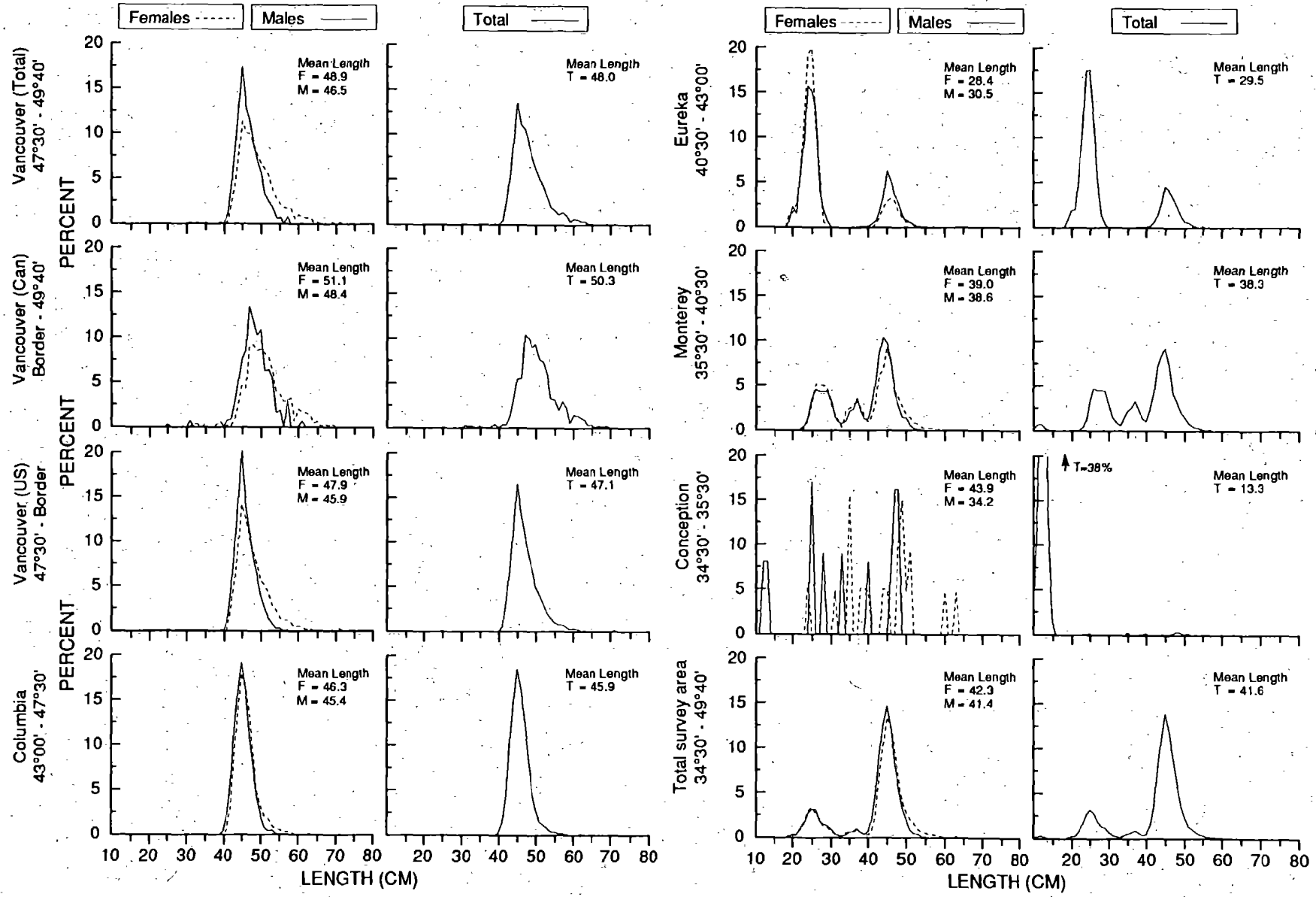


Figure 33.--Pacific hake estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl survey for depths 55-183 m. Lengths ranged 9-85 cm.

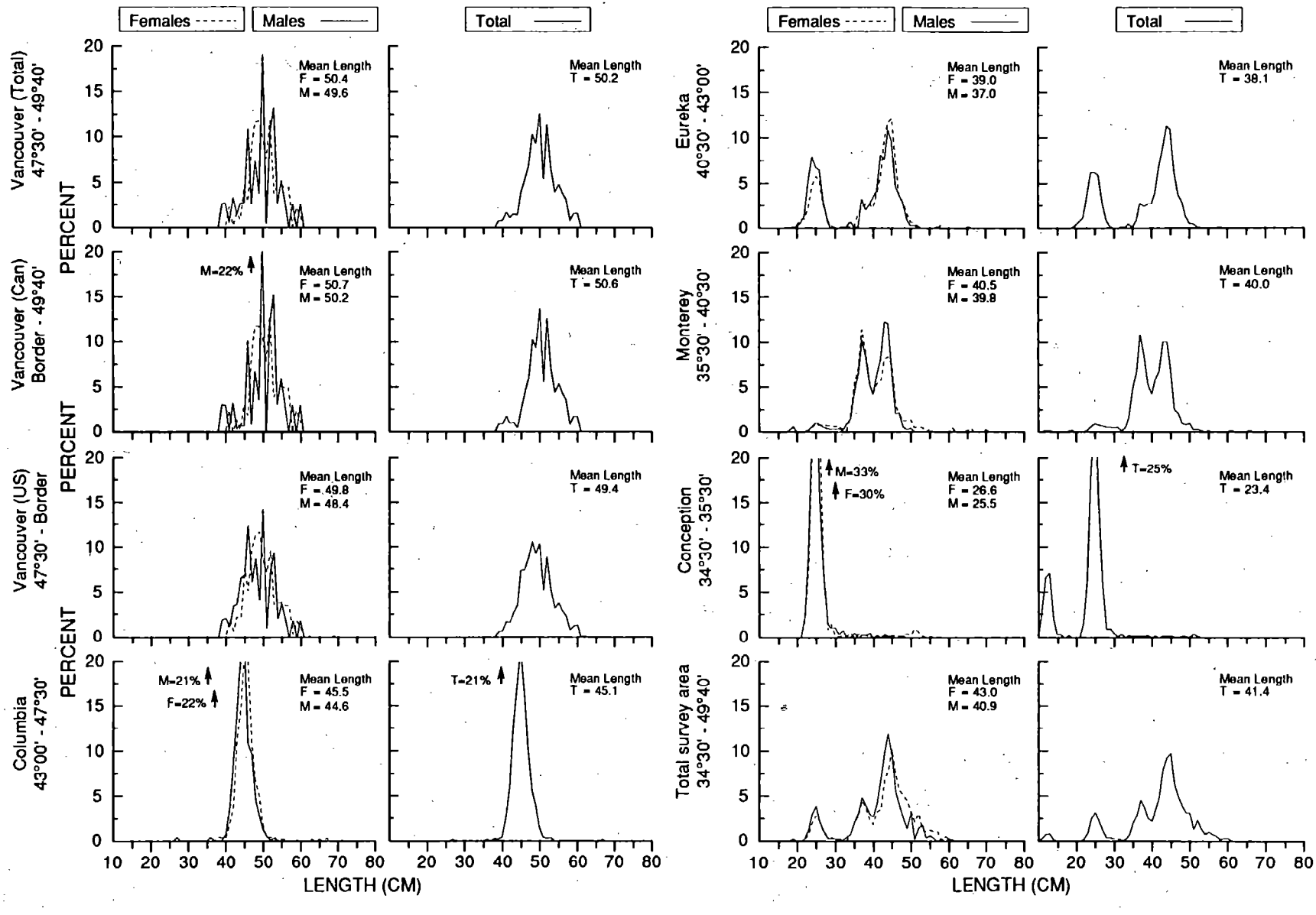


Figure 34.--Pacific hake estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl survey for depths 184-366 m. Lengths ranged 9-80 cm.

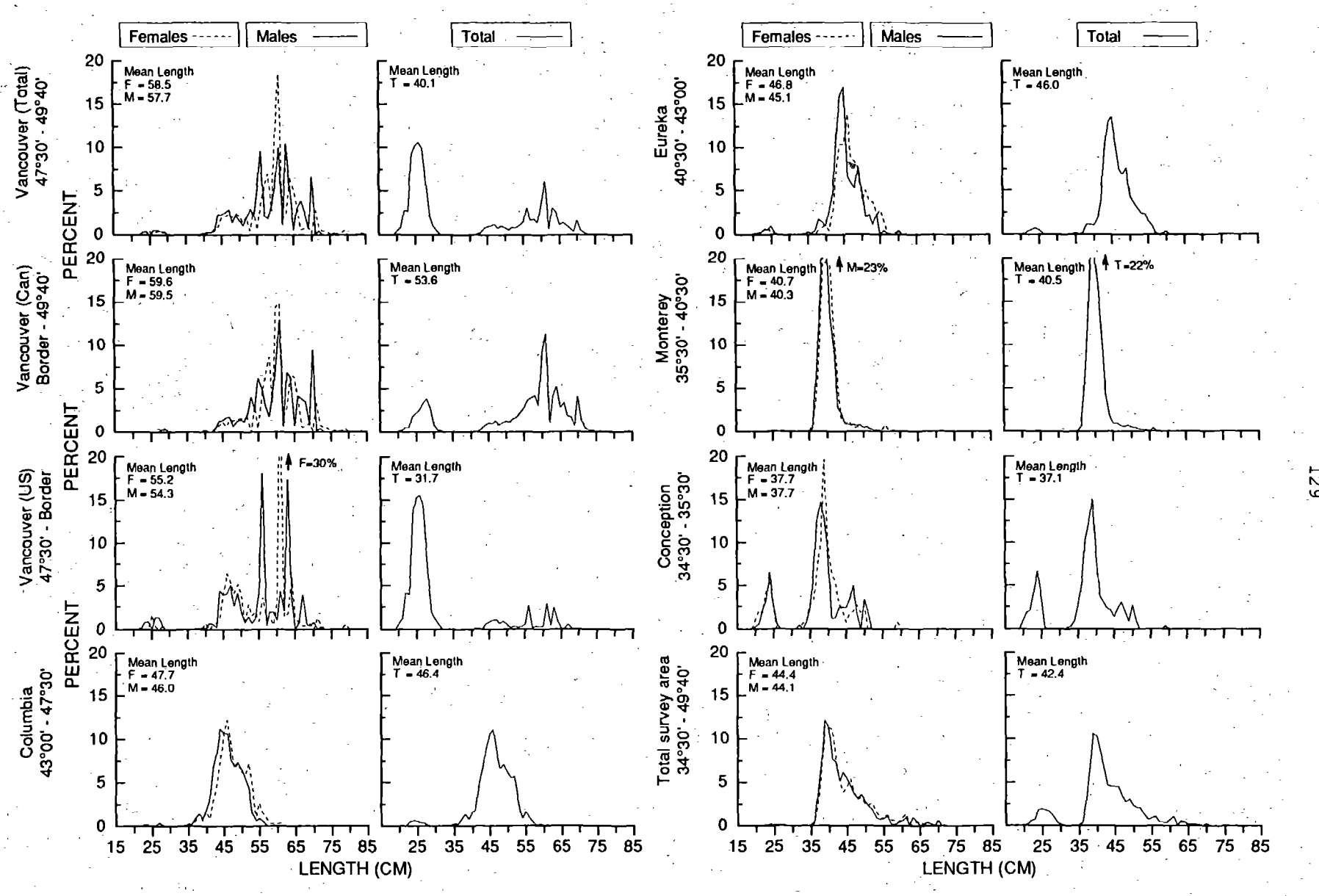


Figure 35.--Sablefish estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl survey for depths 55-366 m. Lengths ranged 19-95 cm.

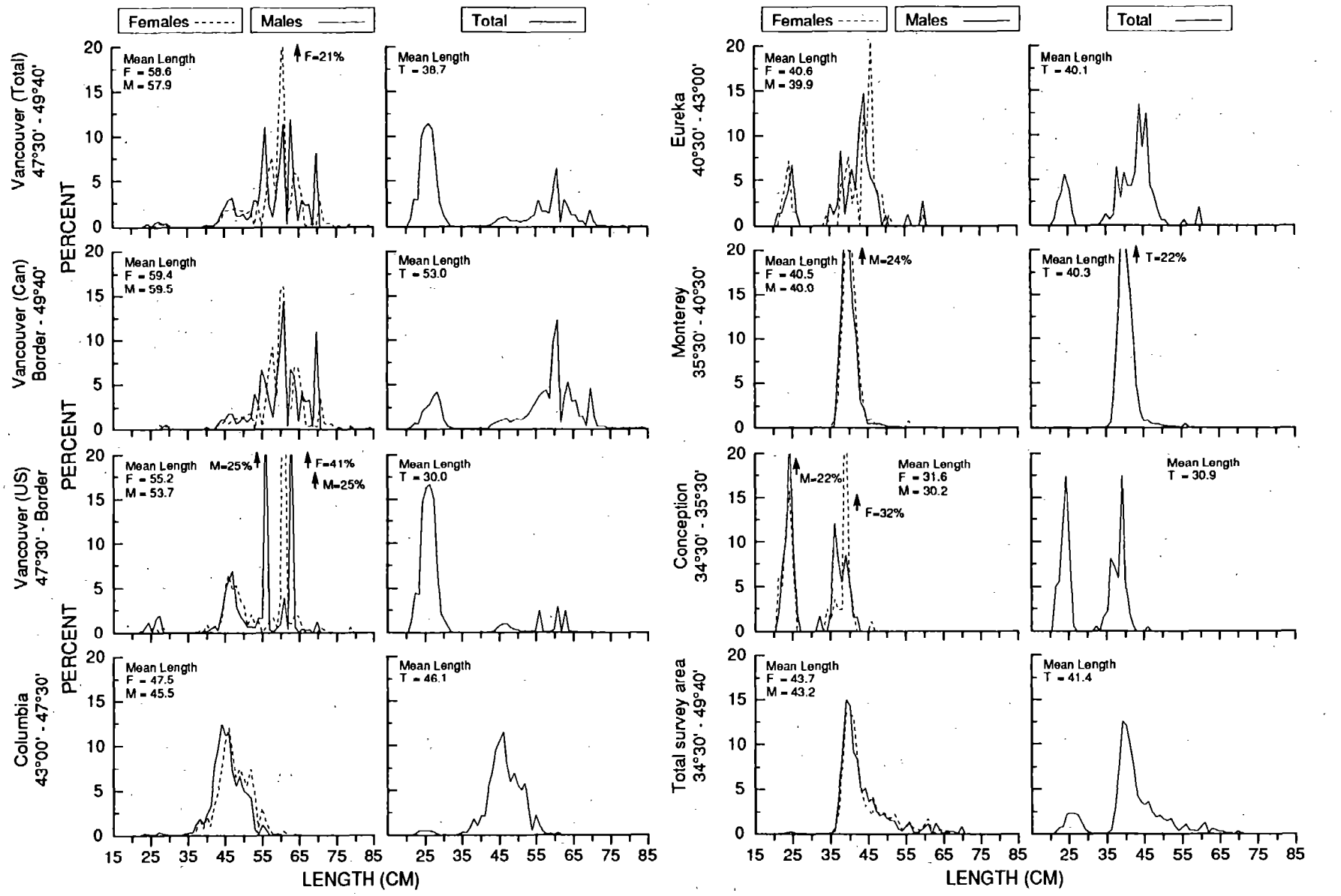


Figure 36.--Sablefish estimated population size composition by International North Pacific Fisheries Commission area from the 1989 trawl survey for depths. 55-183 m. Lengths ranged 21-95 cm.

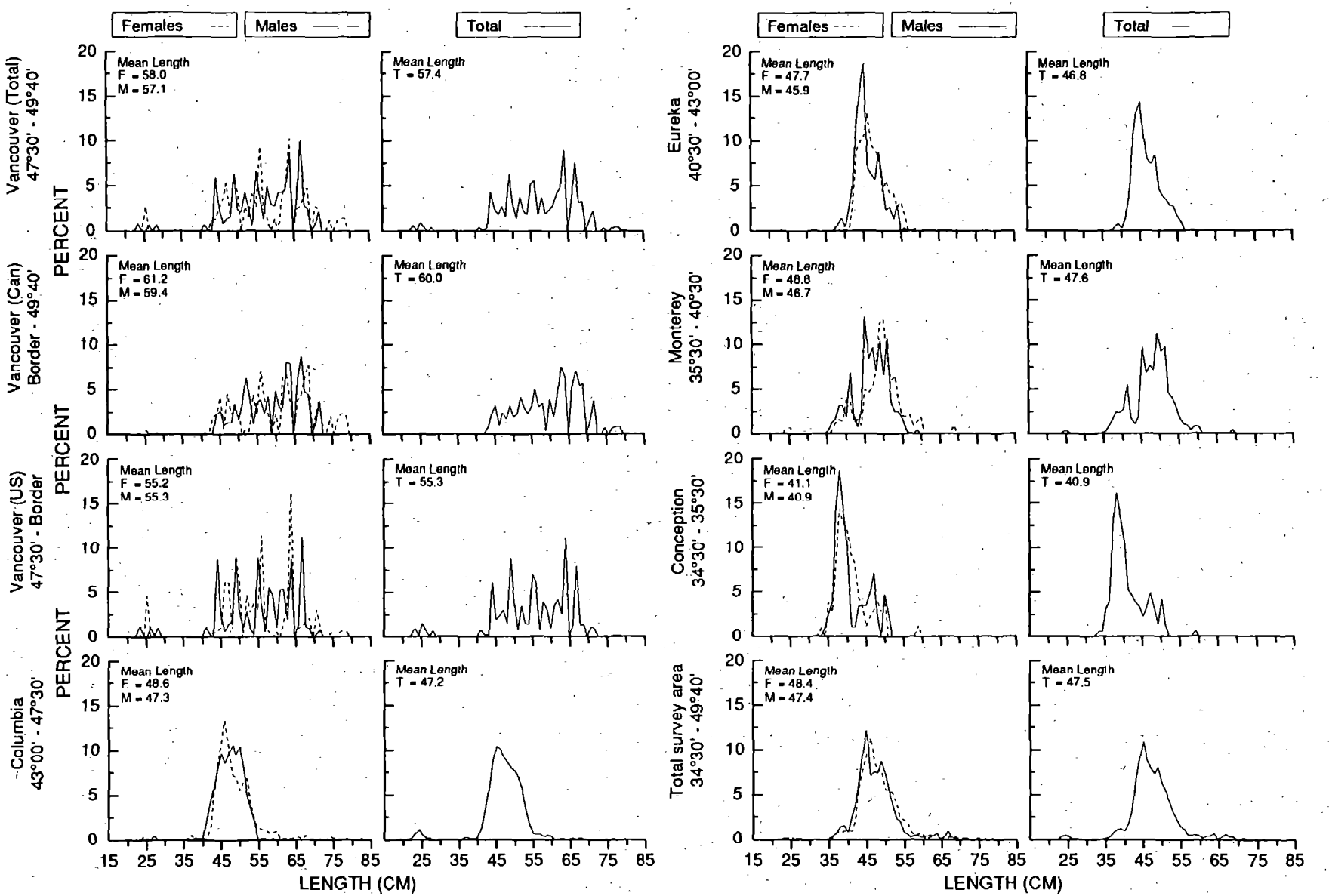


Figure 37.--Sablefish estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl survey for depths 184-366 m. Lengths ranged 19-85 cm.

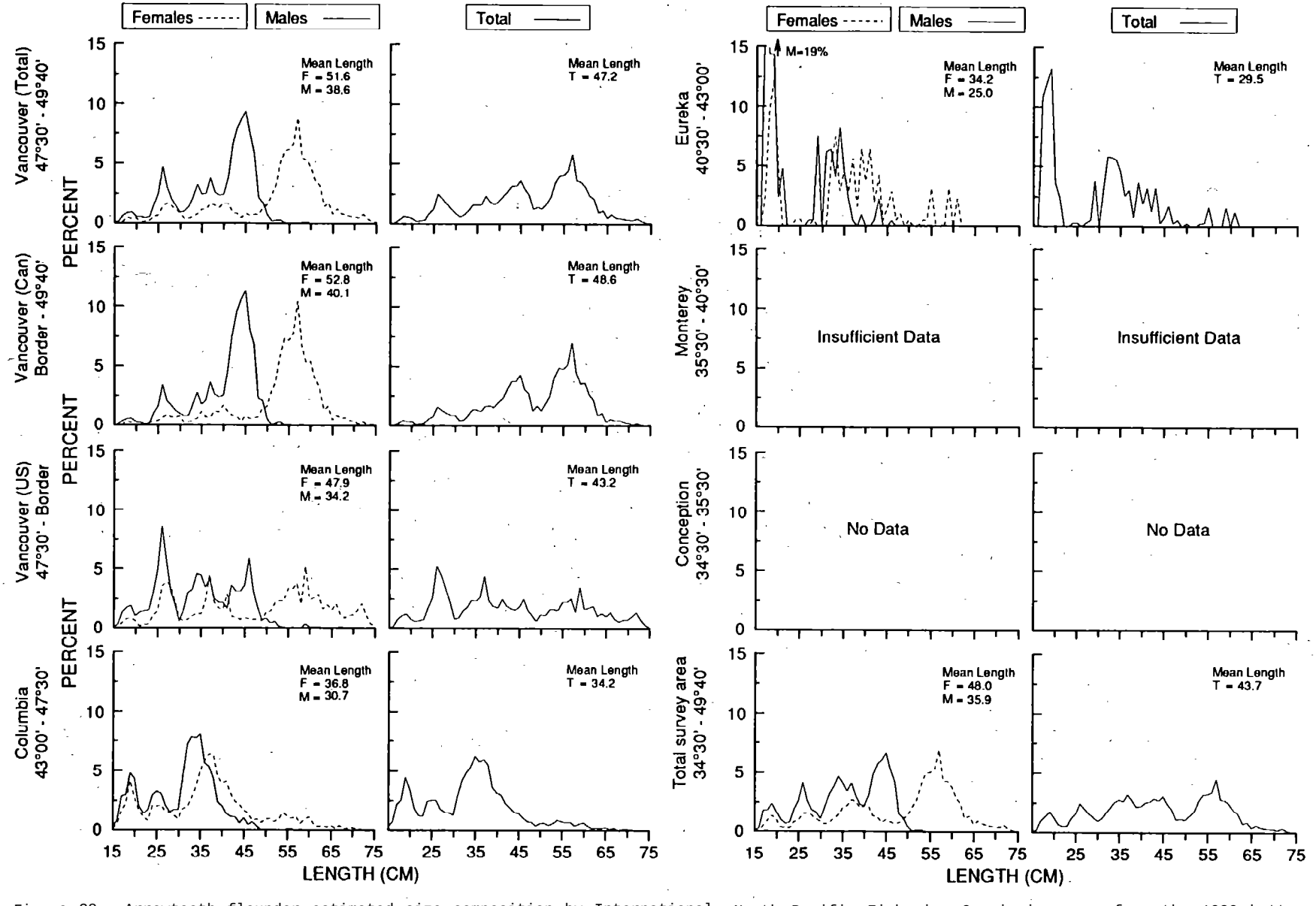


Figure 38.--Arrowtooth flounder estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl survey for depths 55-366 m. Lengths ranged 12-81 cm.

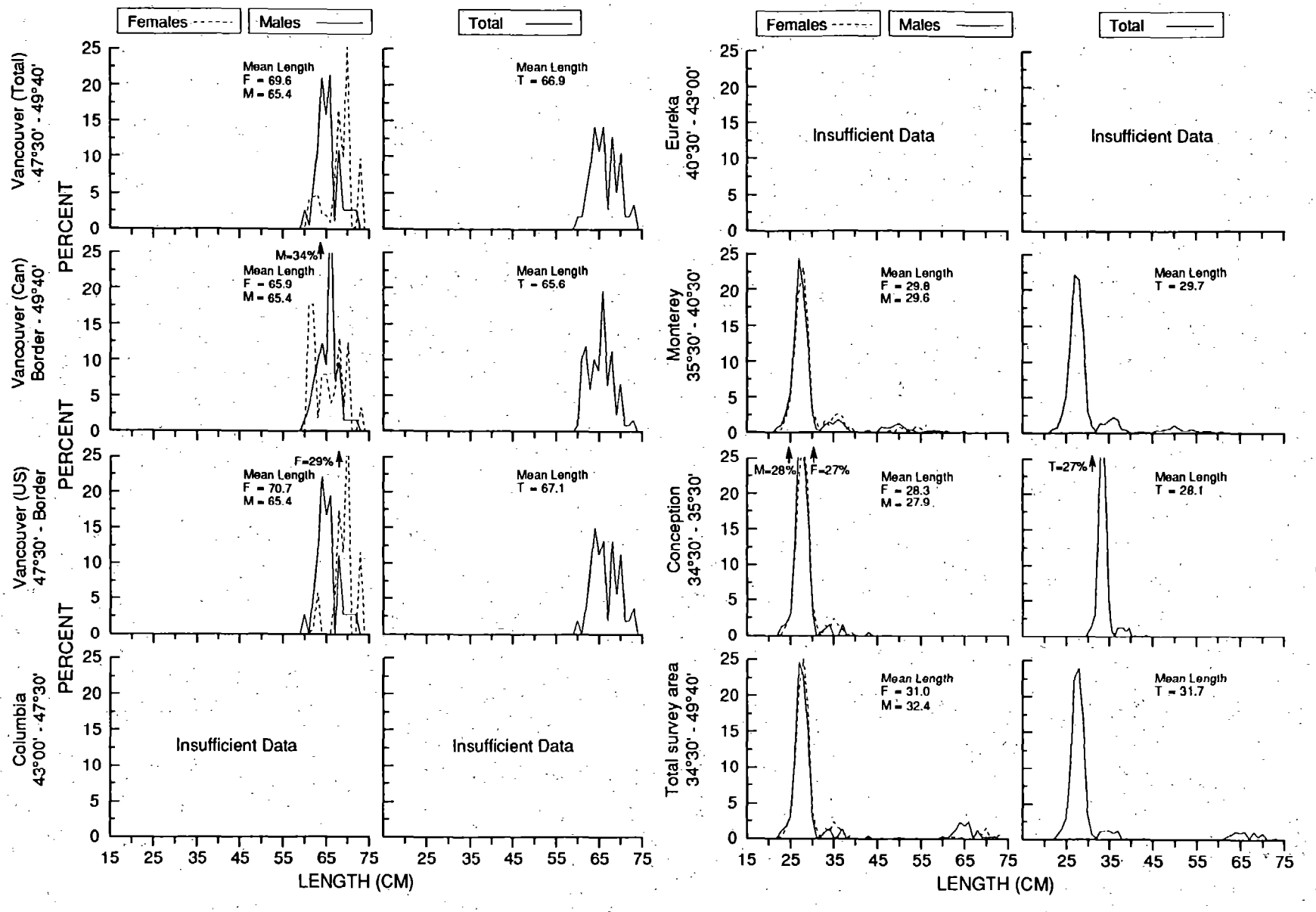


Figure 39.--Bocaccio estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl survey for depths 55-366 m. Lengths ranged 14-79 cm.

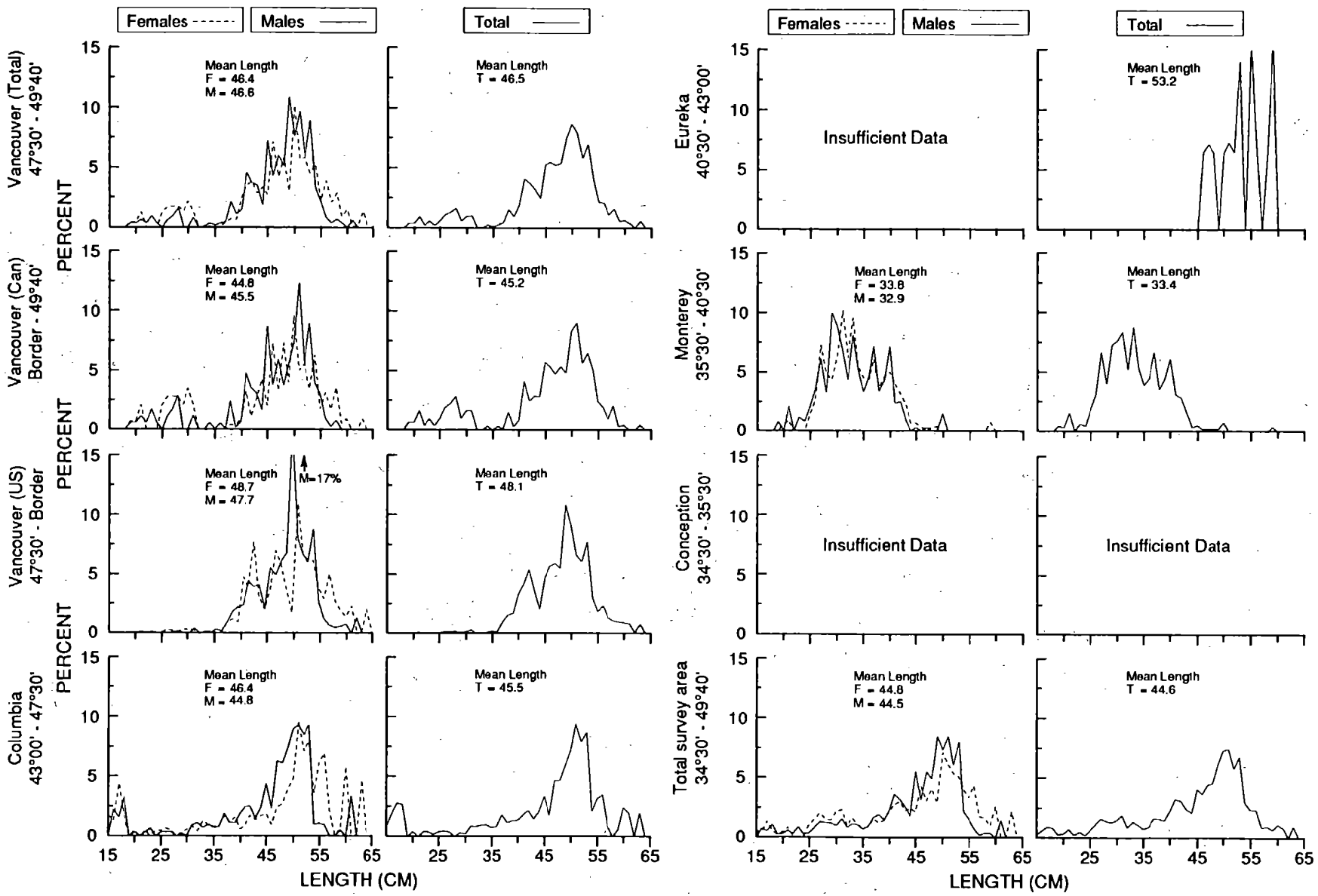


Figure 40.--Canary rockfish estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl survey for depths 55-366 m. Lengths ranged 12-63 cm.

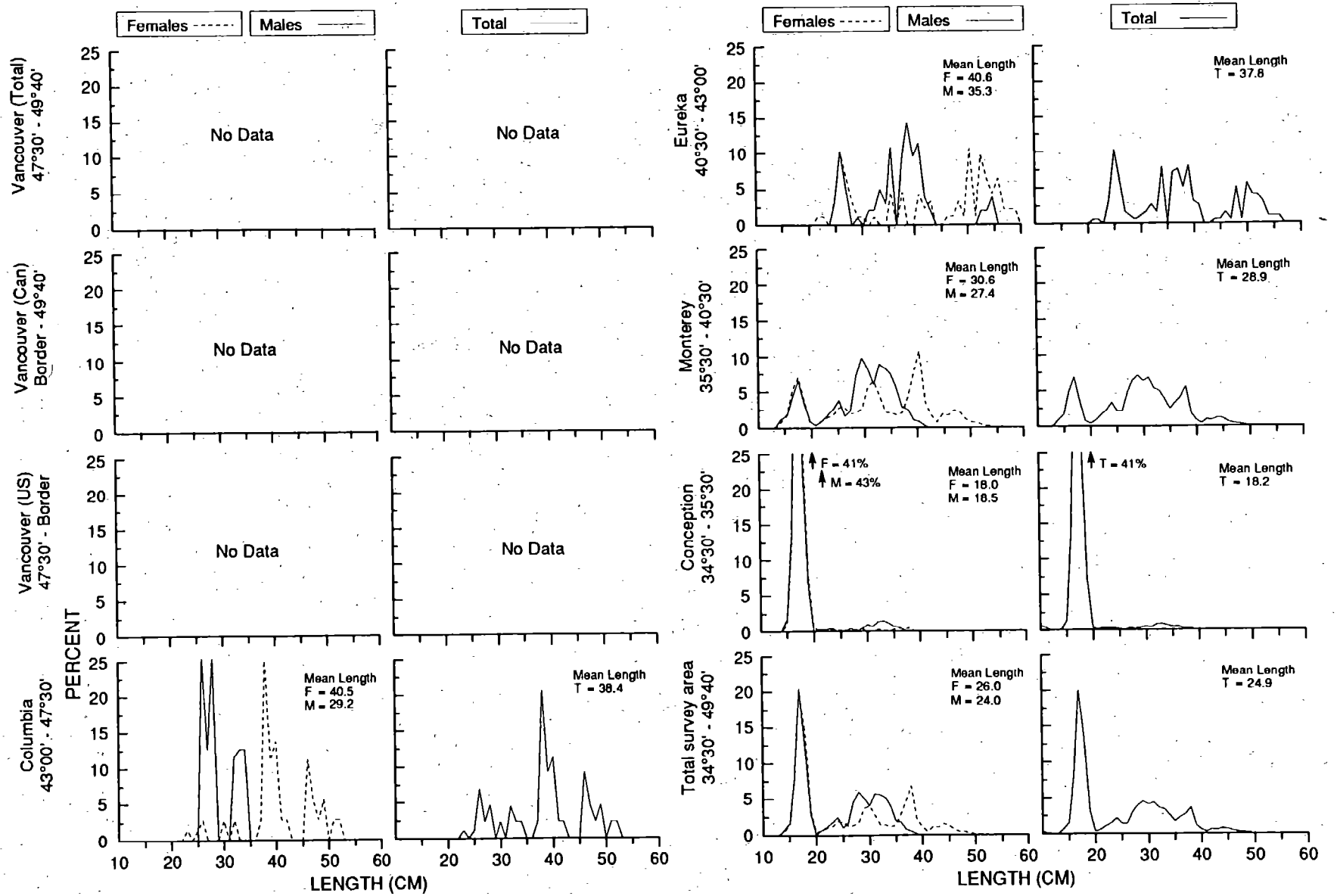


Figure 41.--Chilipepper estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl survey depths 55-366 m. Lengths ranged 9-56 cm.

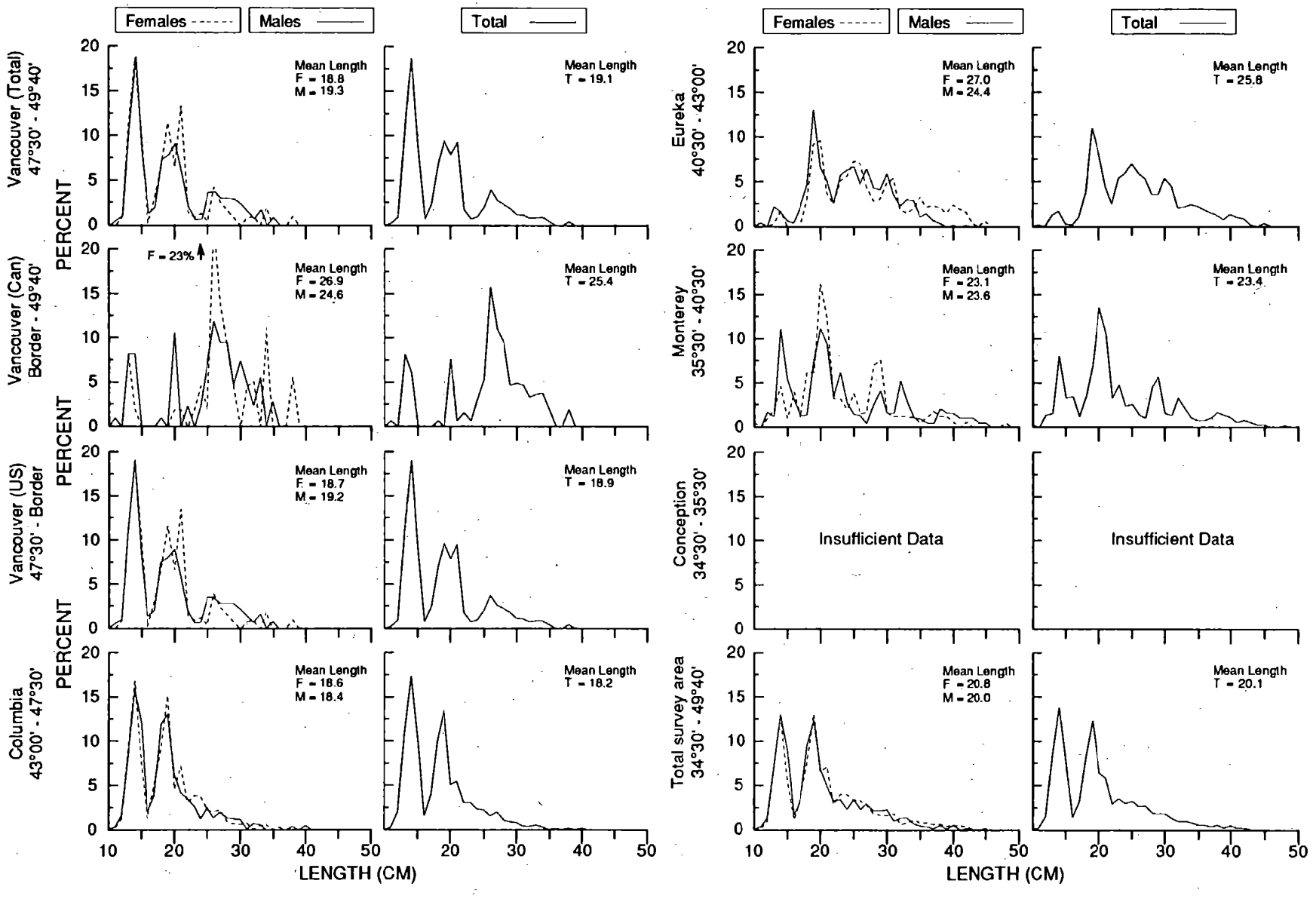


Figure 42.--Darkblotched rockfish estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl for depths 55-366 m. Lengths ranged 9-48 cm.

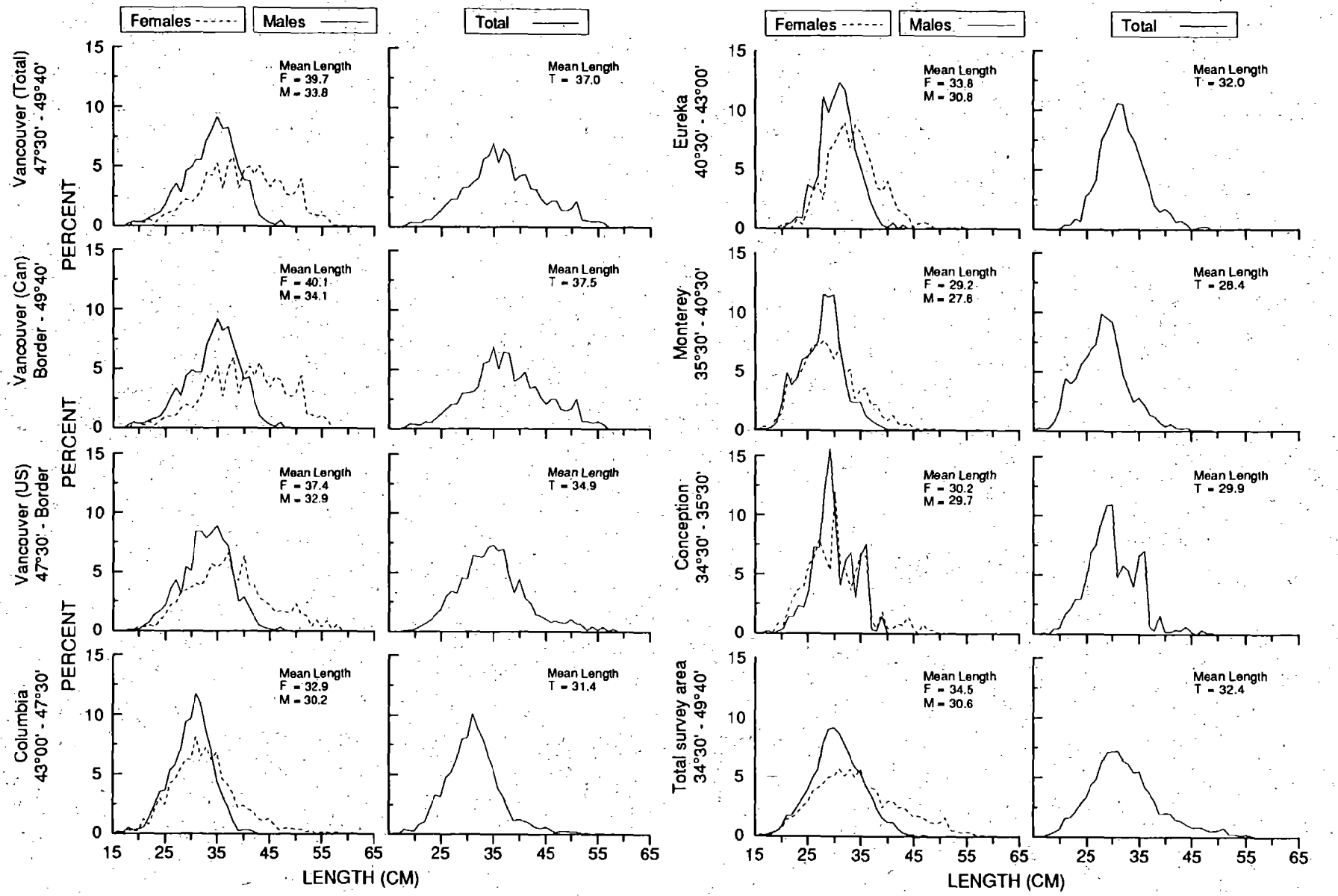


Figure 43.--Dover sole estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl survey for depths 55-366 m. Lengths ranged 14-66 cm.

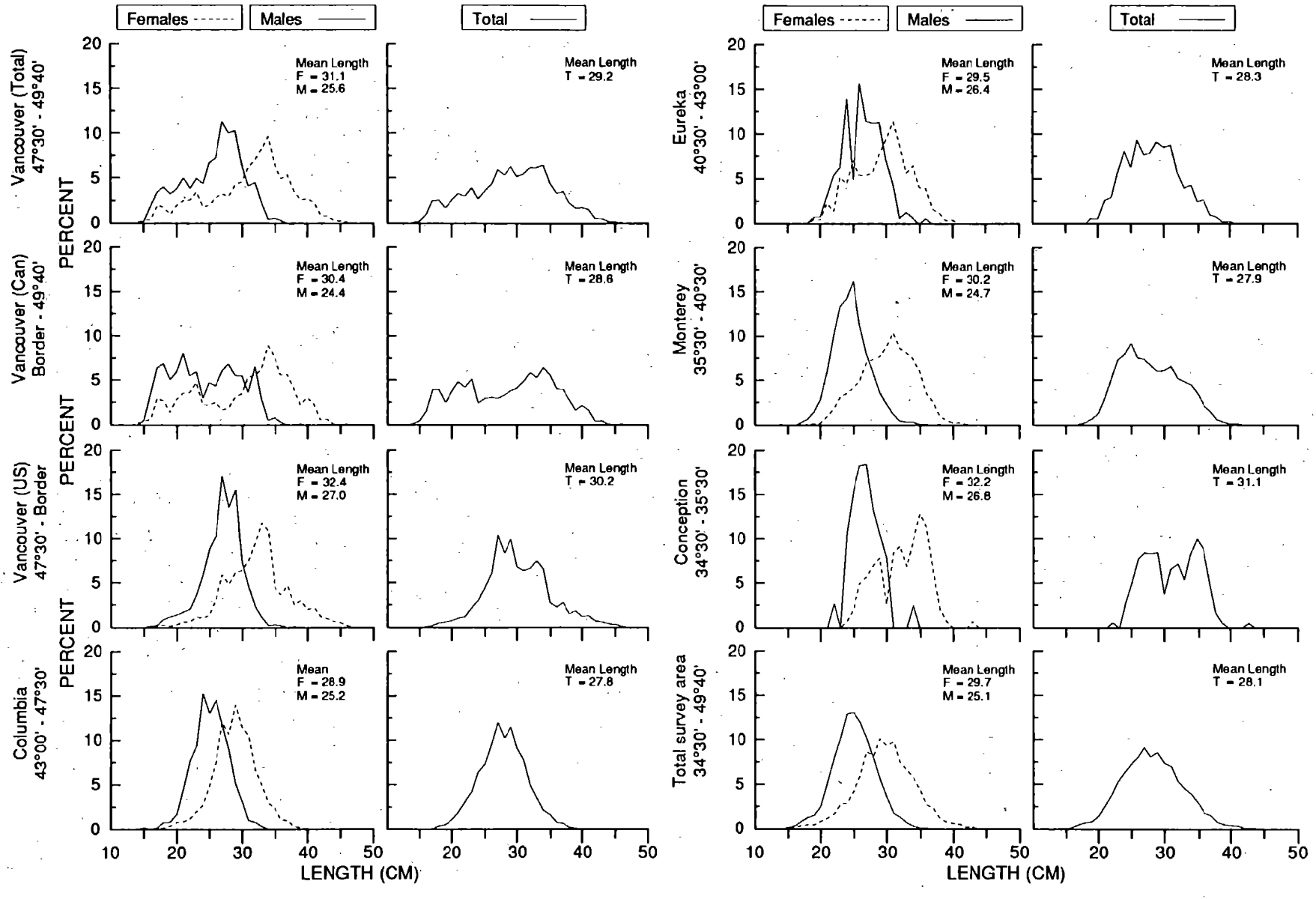


Figure 44.--English sole estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl survey for depths 55-366 m. Lengths ranged 14-47 cm.

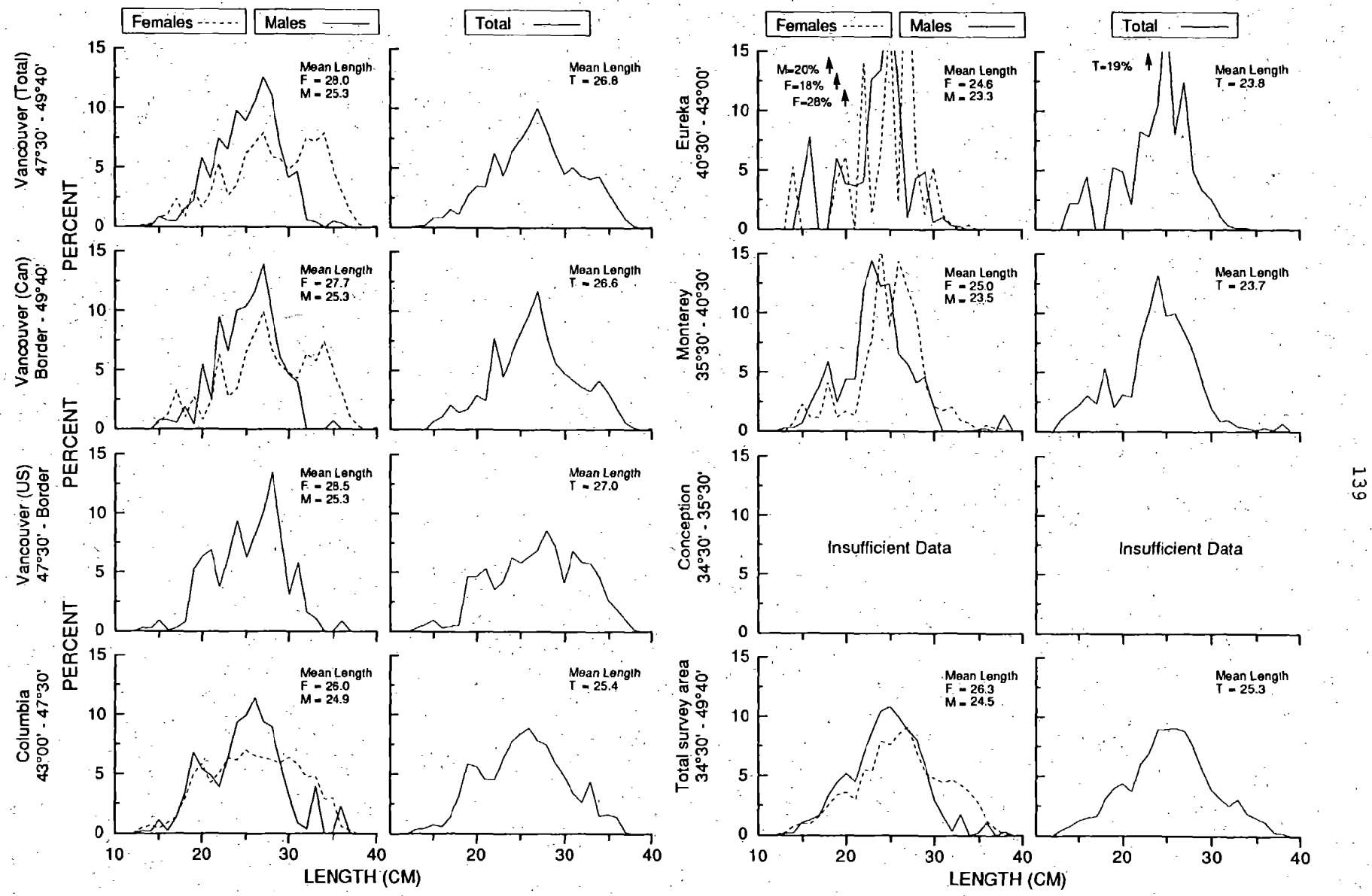


Figure 45.--Greenstriped rockfish estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl survey for depths 55-366 m. Lengths ranged 9-40 cm.

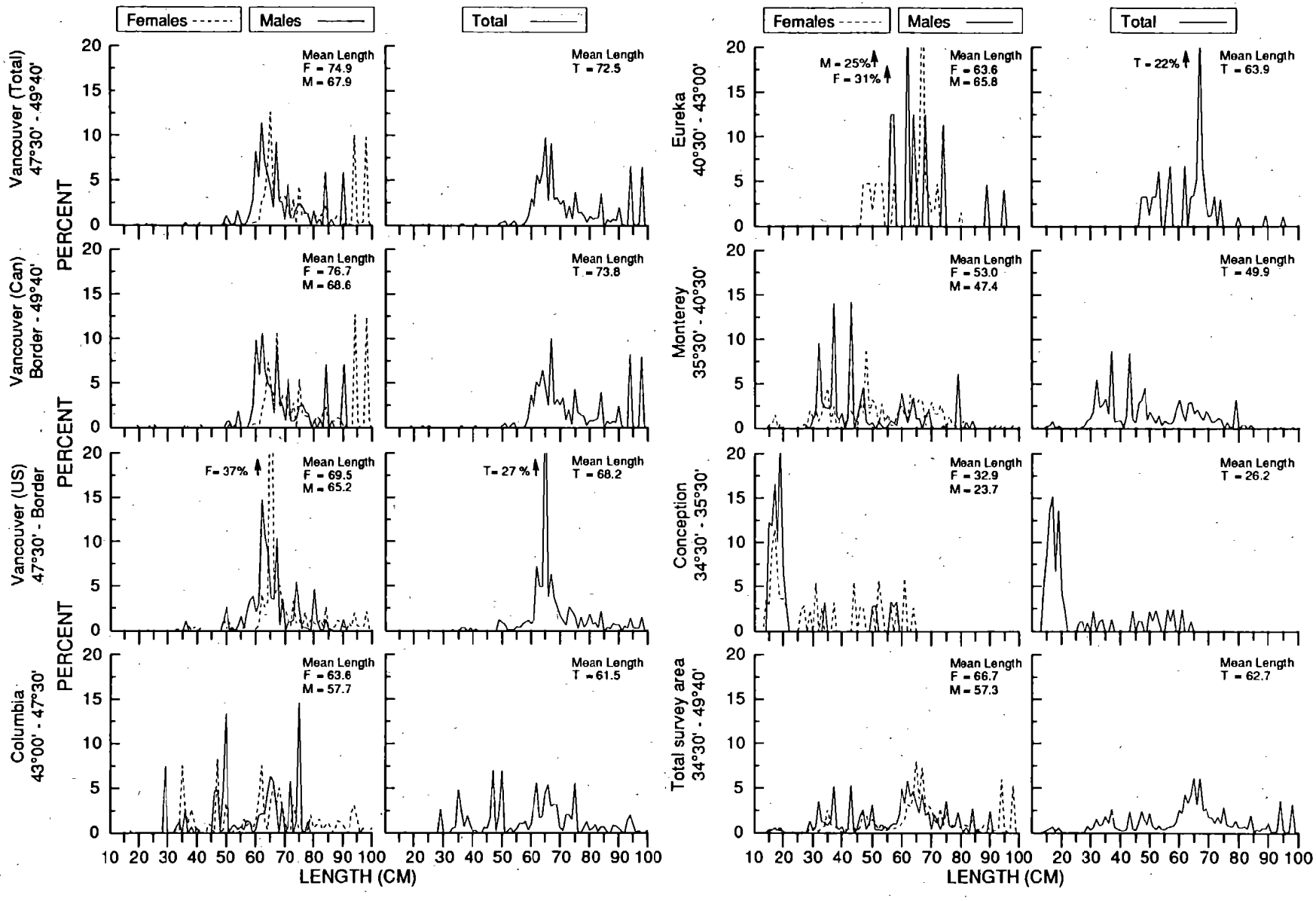


Figure 46.--Lingcod estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl survey for depths 55-366 m. Lengths ranged 12-113 cm.

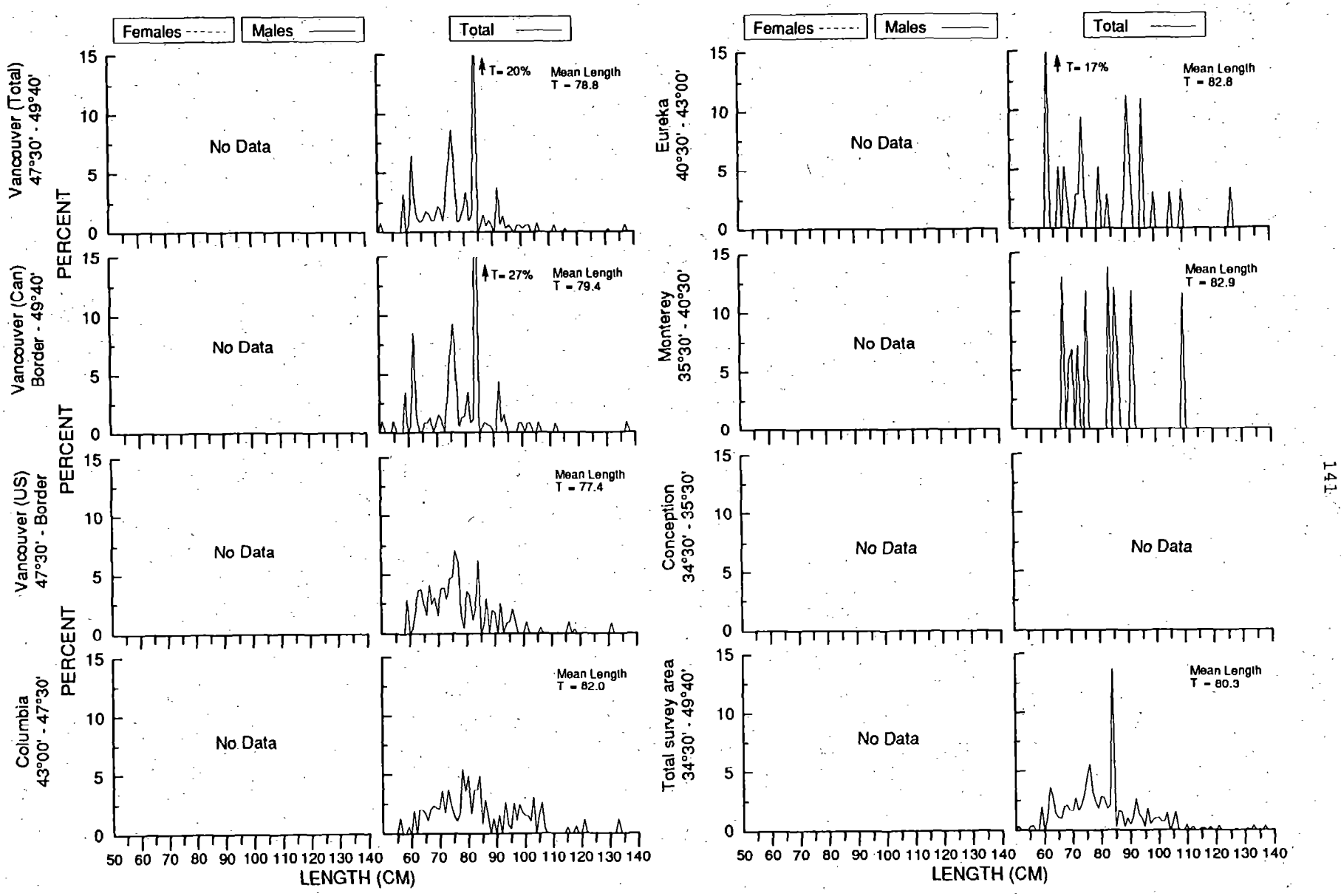


Figure 47.--Pacific halibut estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl survey for depths 55-366 m. Lengths ranged 27-157 cm.

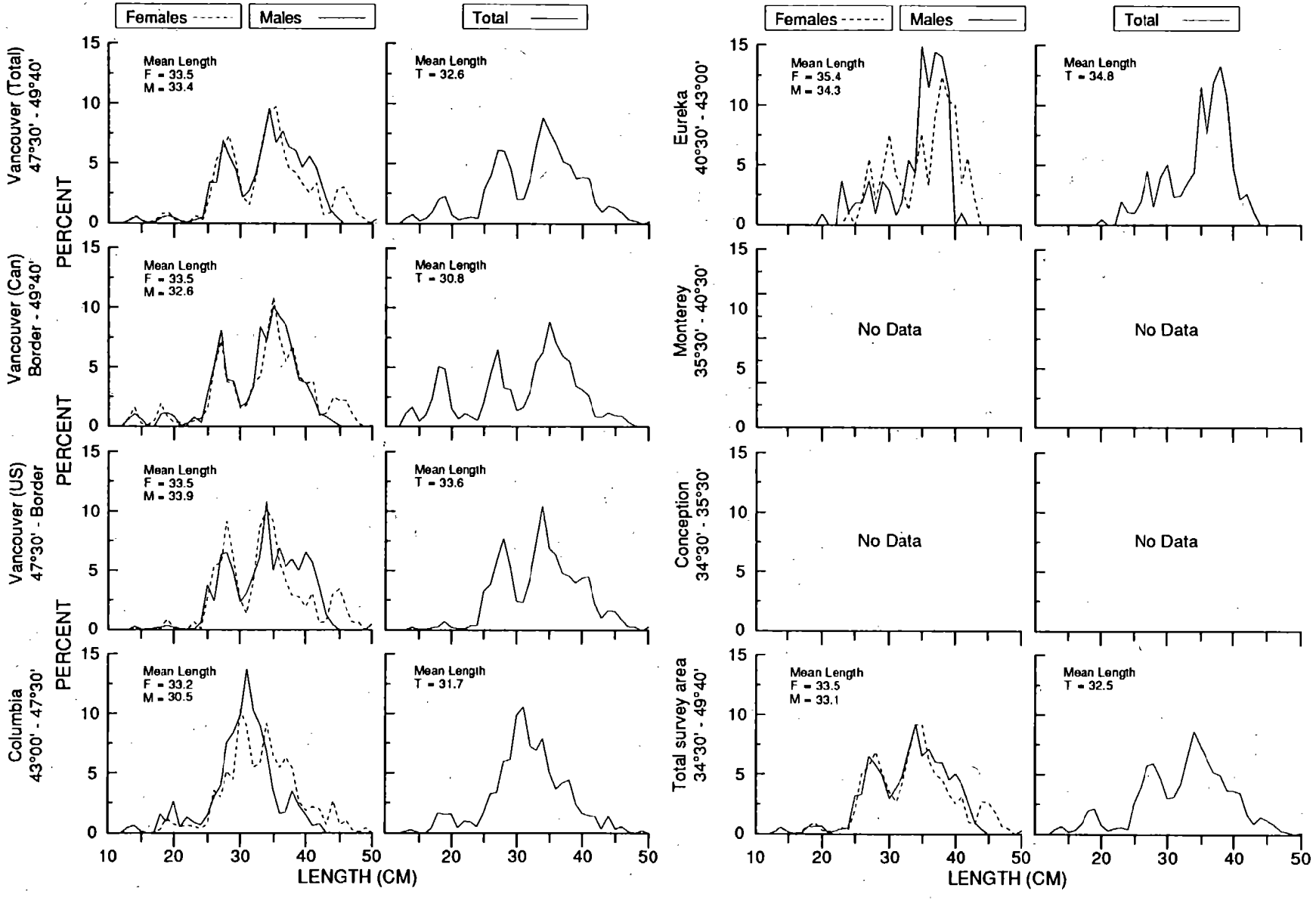


Figure 48.--Pacific ocean perch estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl survey for depths 55-366 m. Lengths ranged 12-50 cm.

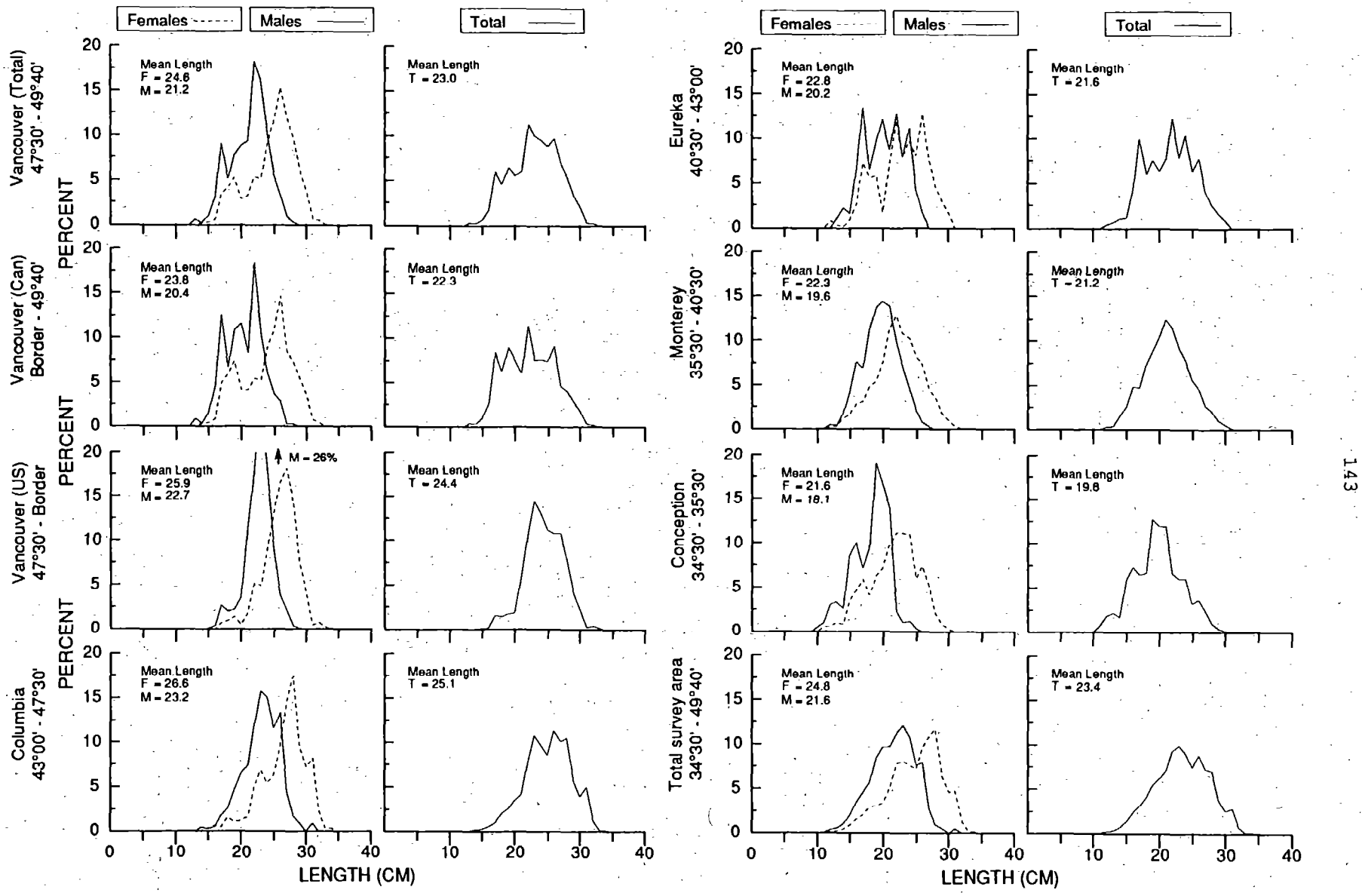


Figure 49.--Pacific sanddab estimated size composition by International North-Pacific Fisheries Commission area from the 1989 bottom trawl survey for depths 55-366 m. Lengths ranged 9-34 cm.

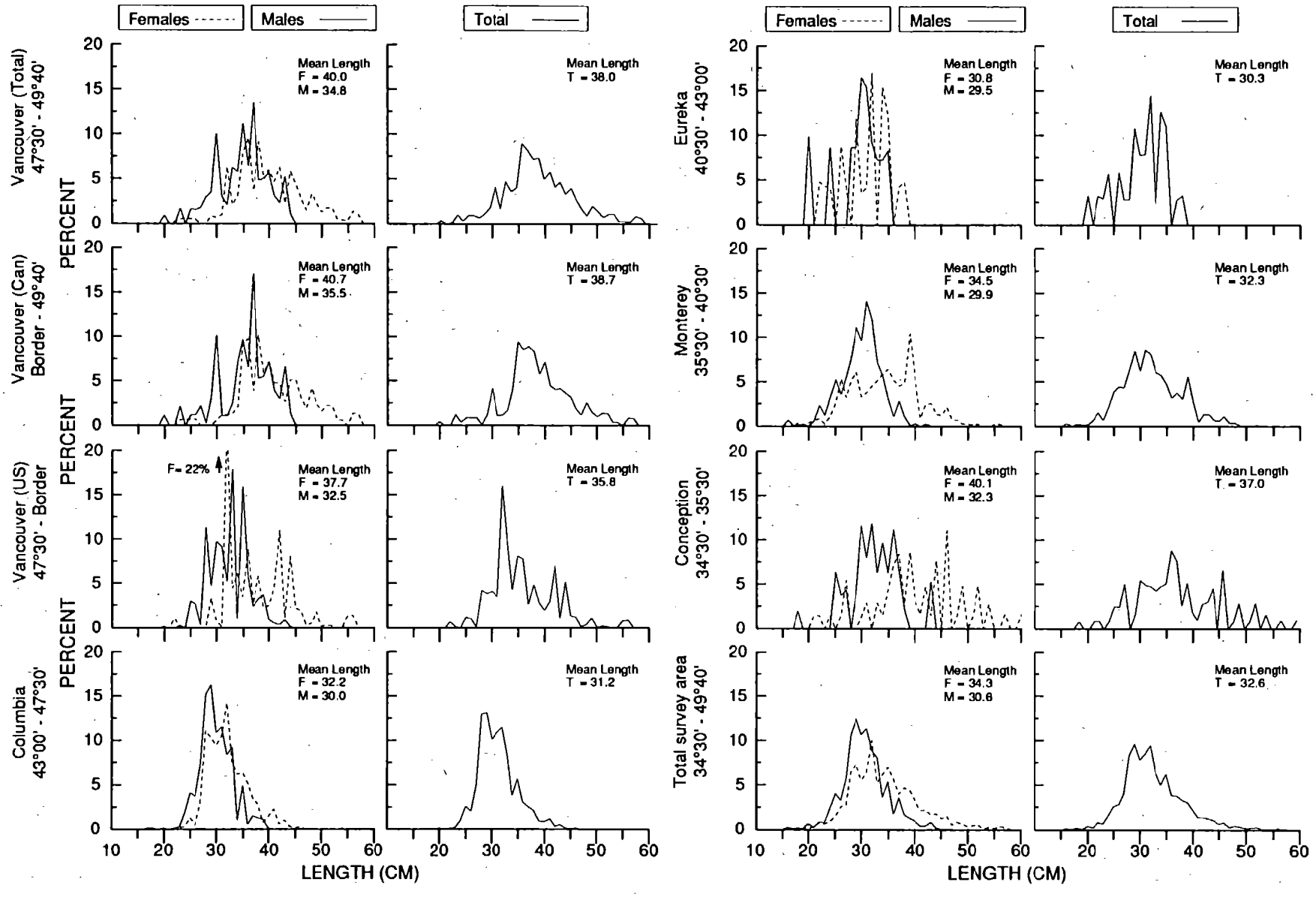


Figure 50.--Petrale sole estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl survey for depths 55-366 m. Lengths ranged 16-60 cm.

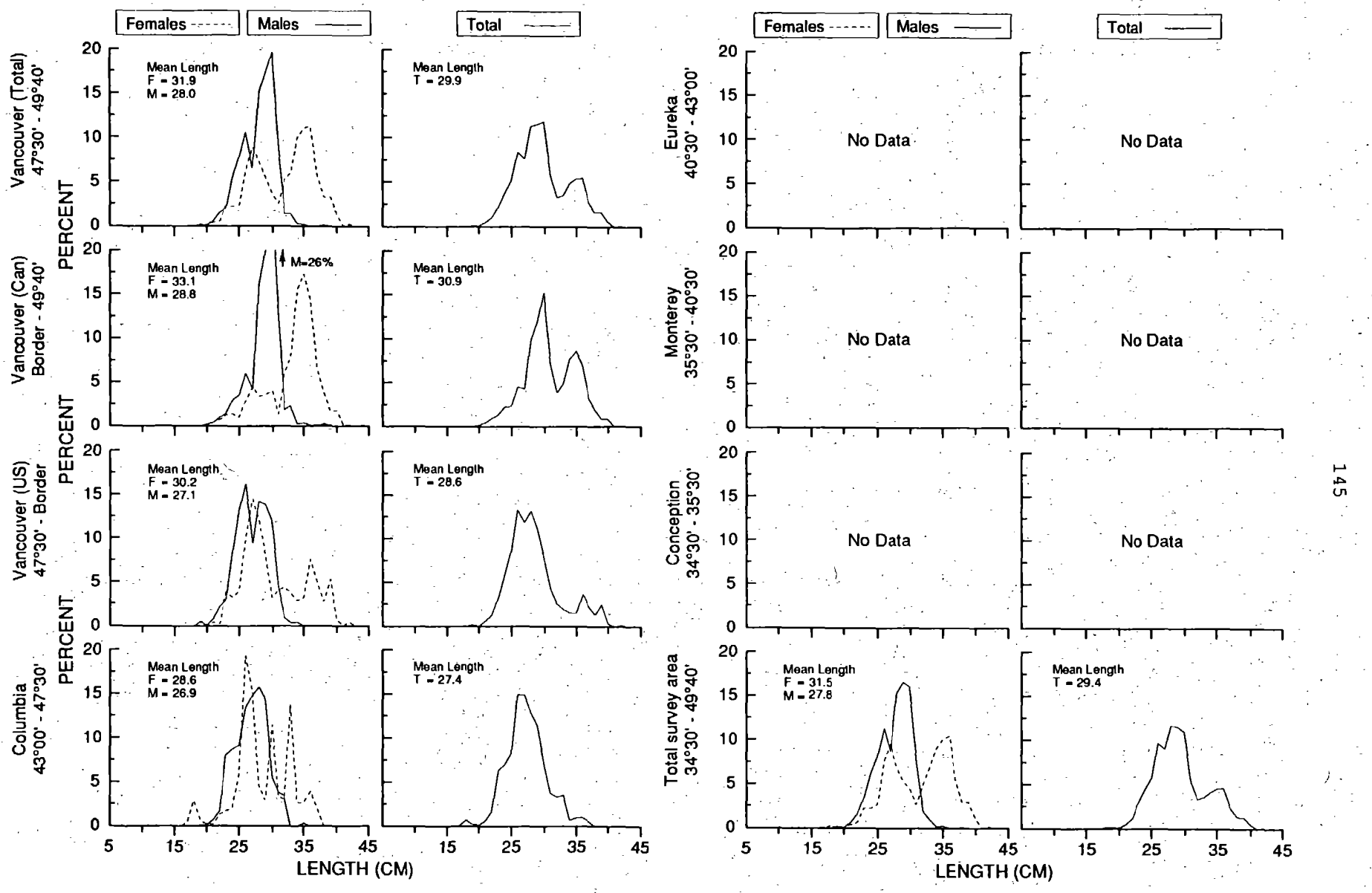


Figure 51.--Redstripe rockfish estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl survey for depths 55-366 m. Lengths ranged 15-44 cm.

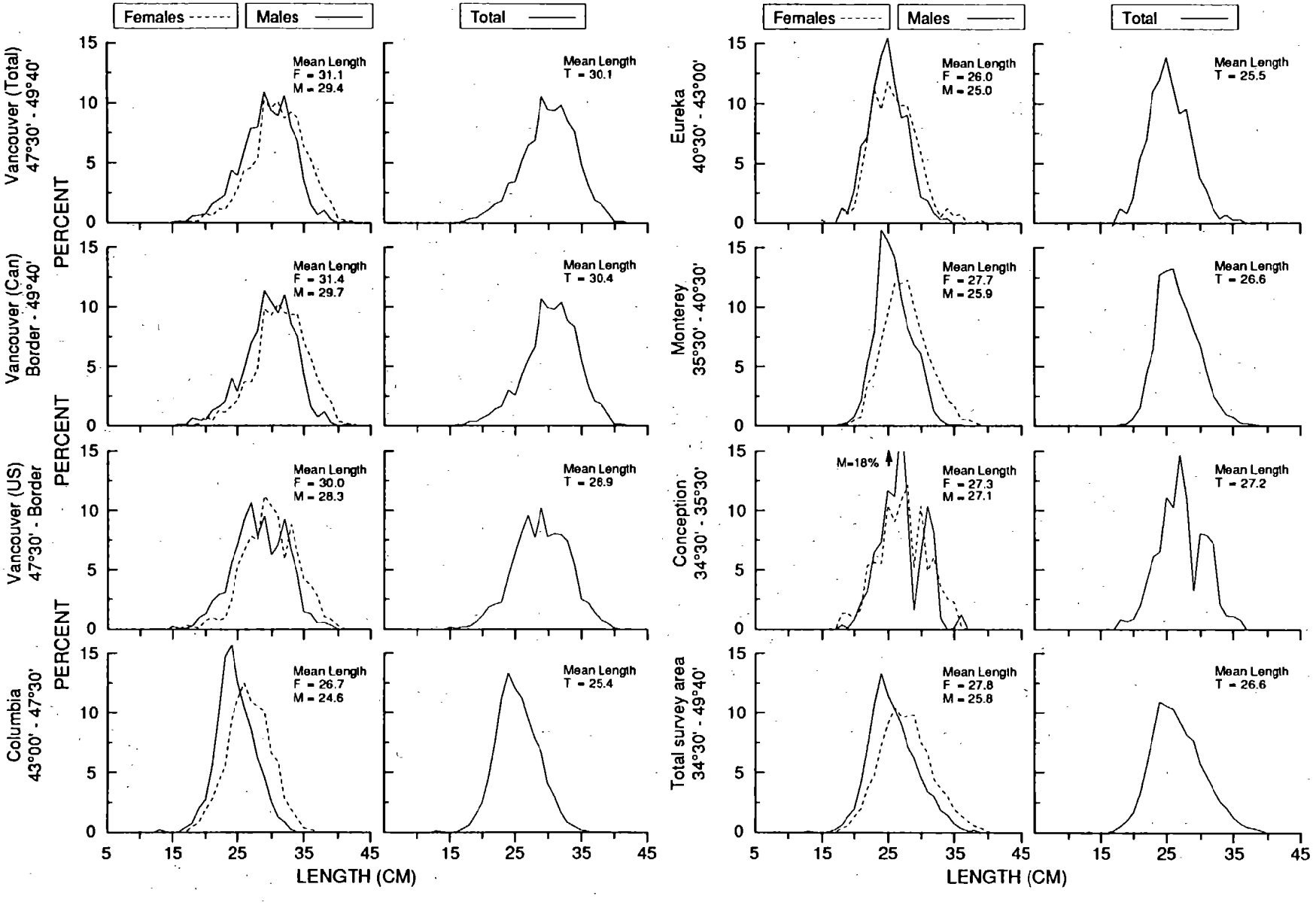


Figure 52.--Rex sole estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl survey for depths 55-366 m. Lengths ranged 8-43 cm.

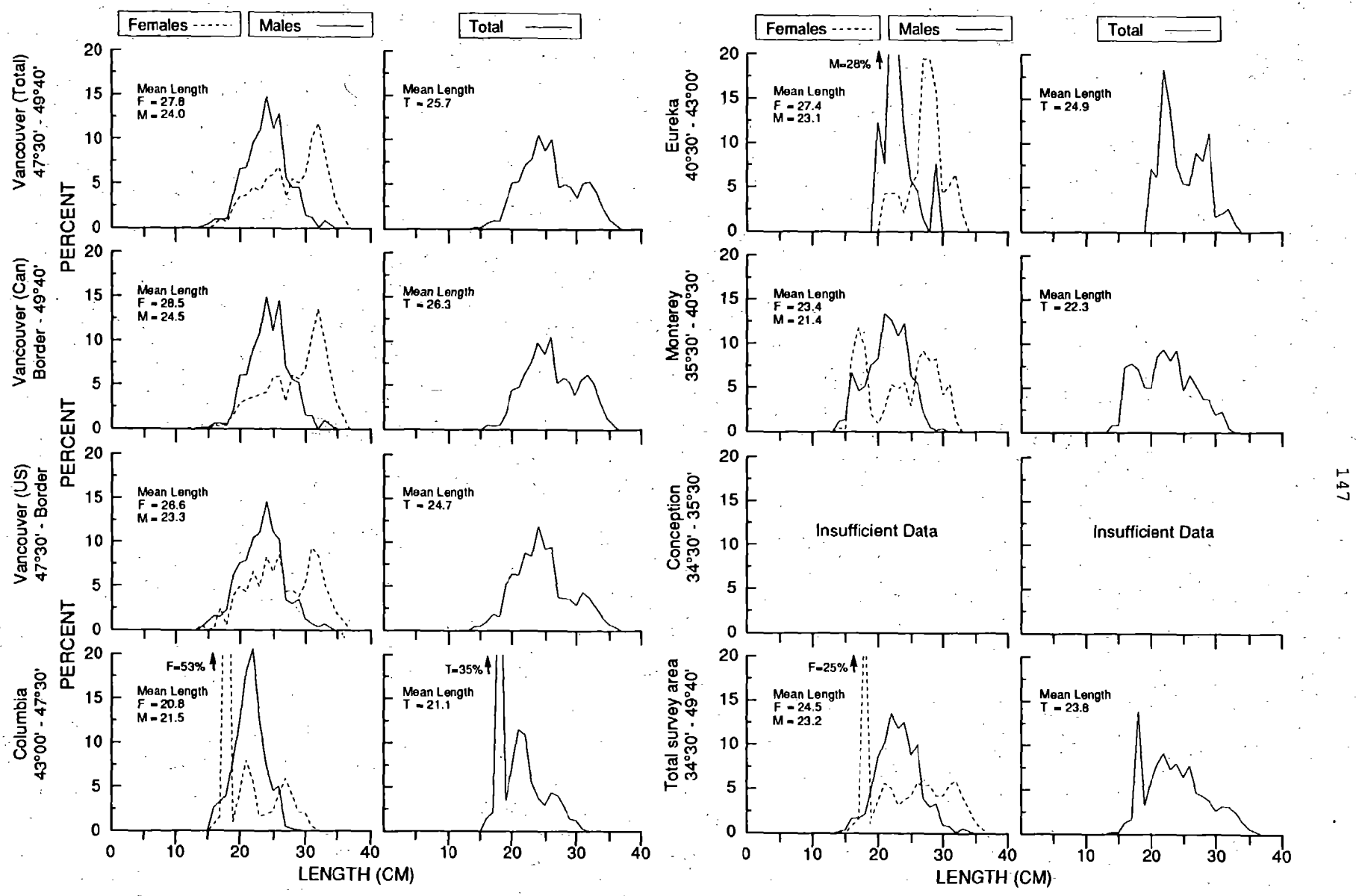


Figure 53.--Sharpchin rockfish estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl survey for depths 55-366 m. Lengths ranged 13-37 cm.

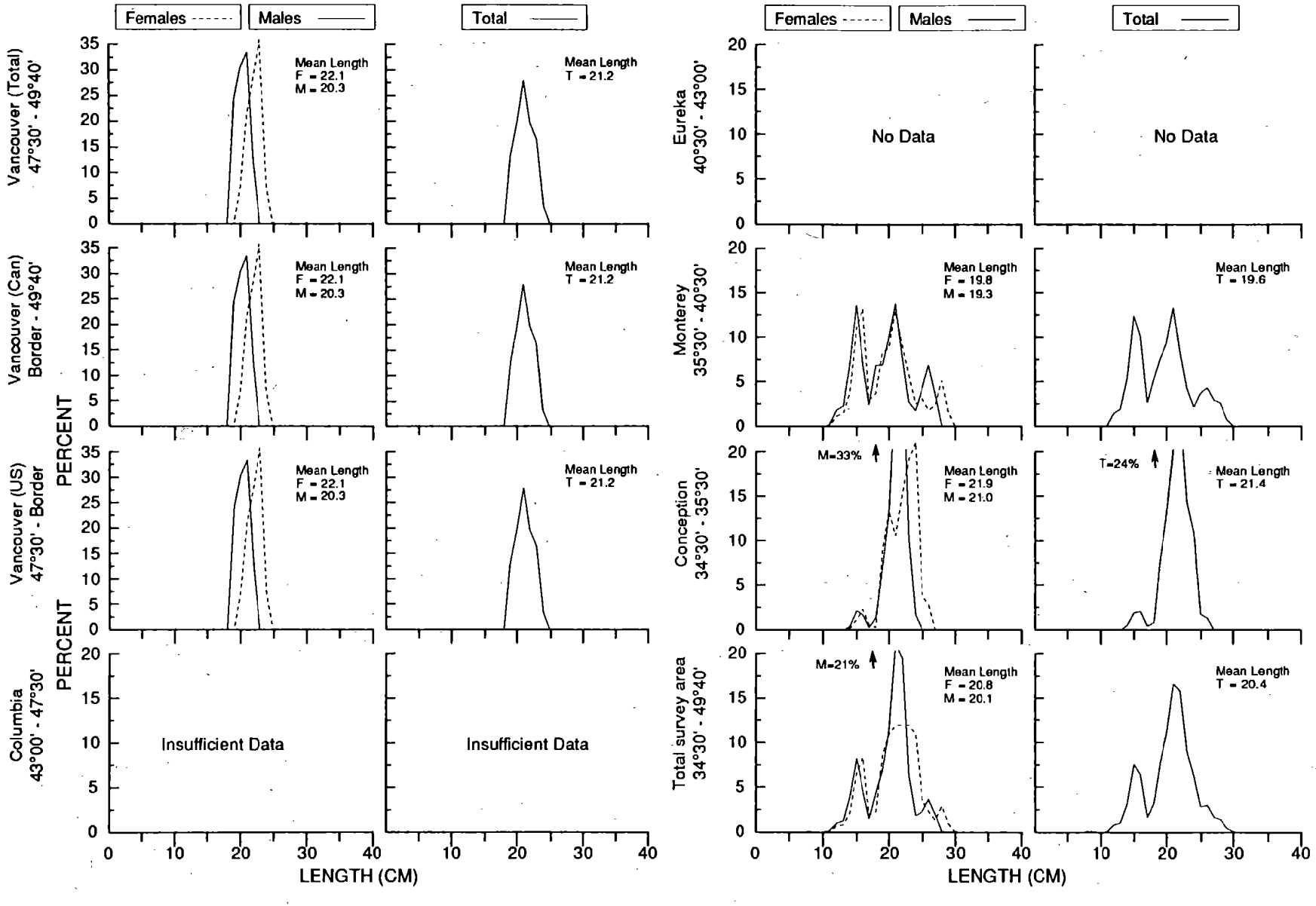


Figure 54.--Shortbelly rockfish estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl survey for depths 55-366 m. Lengths ranged 8-31 cm.

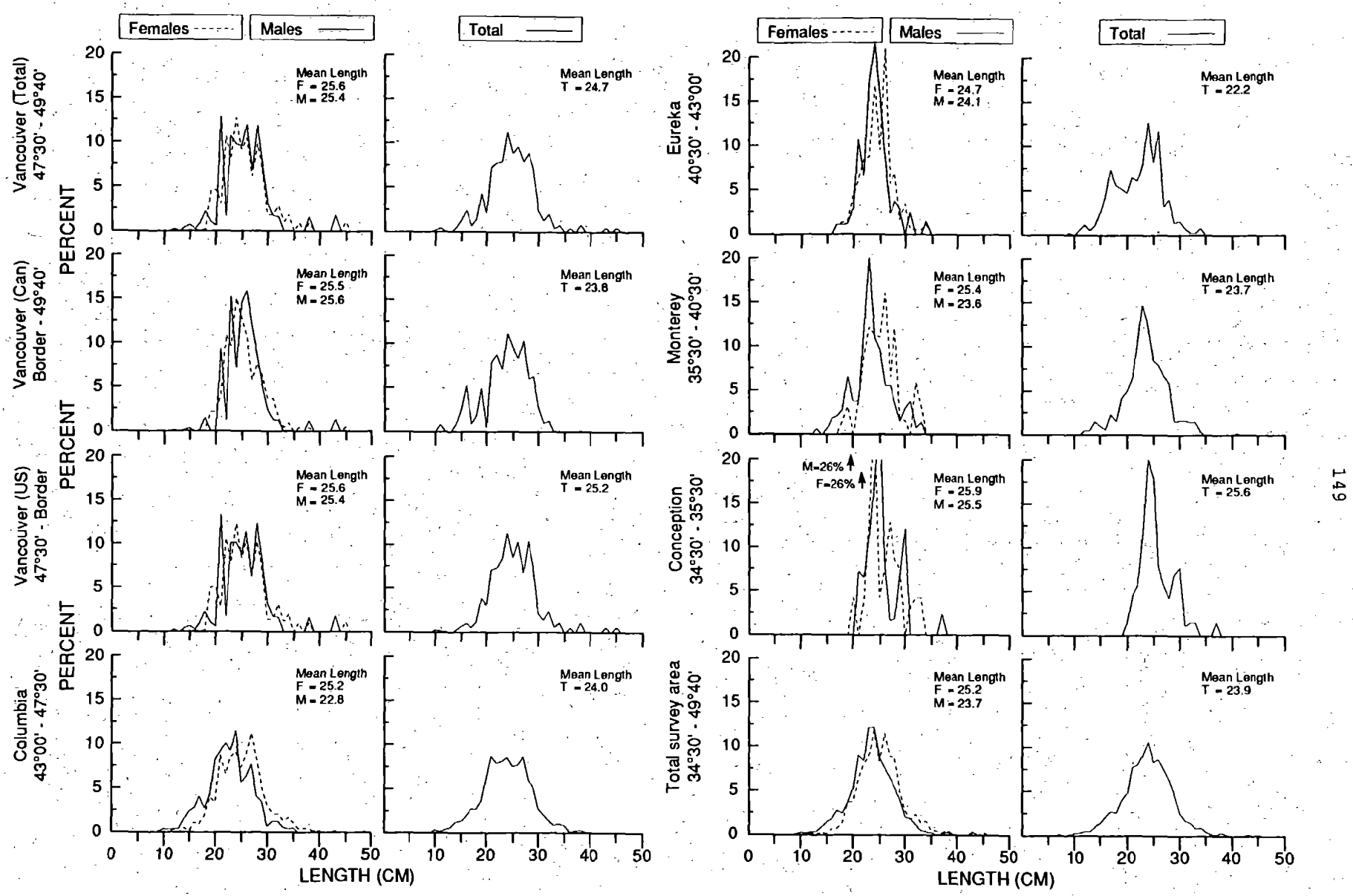


Figure 55.--Shortspine thornyhead estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl survey for depths 55-366 m. Lengths ranged 7-49 cm.

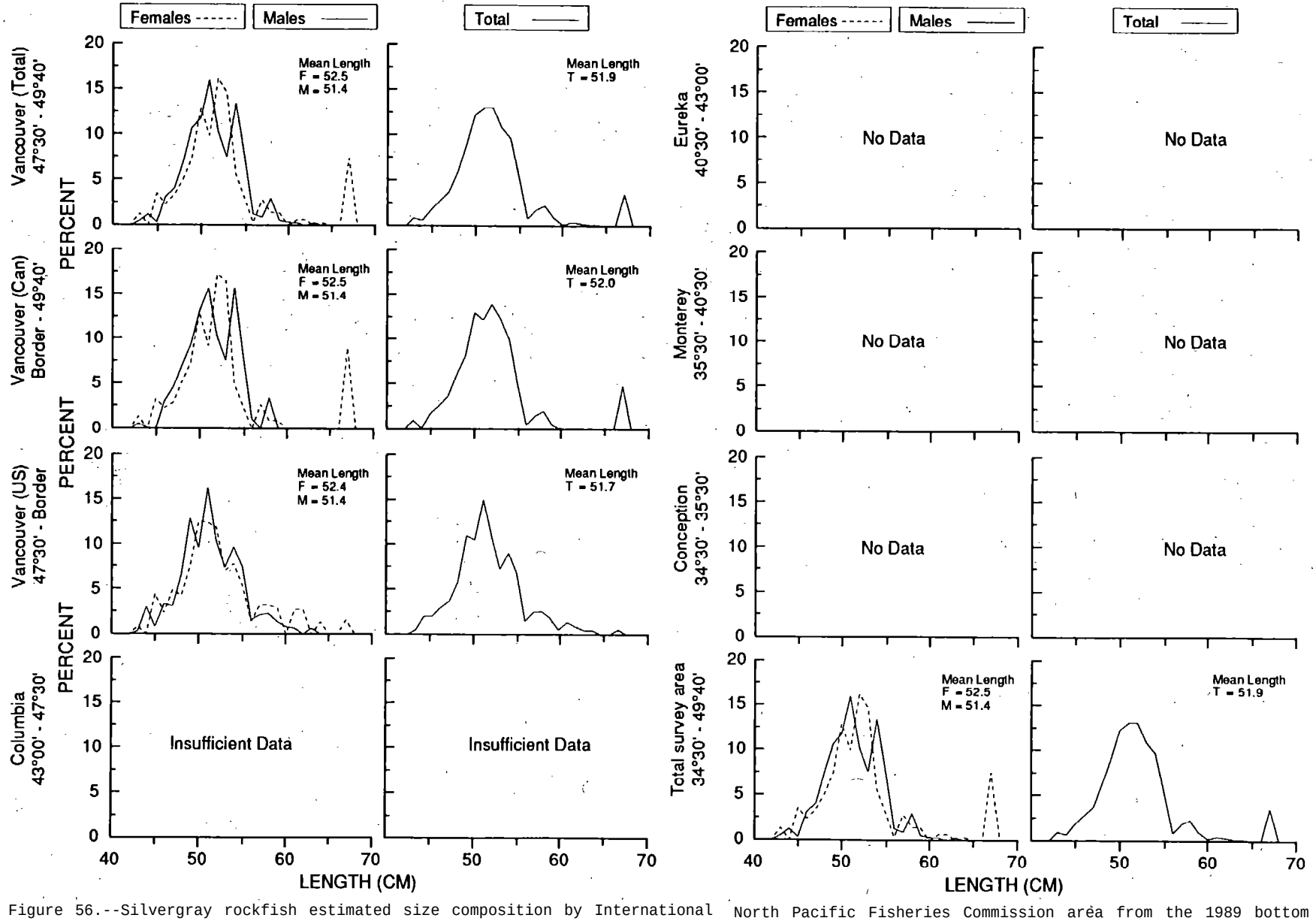


Figure 56.--Silvergray rockfish estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl survey for depths 55-366 m. Lengths ranged 43-67 cm.

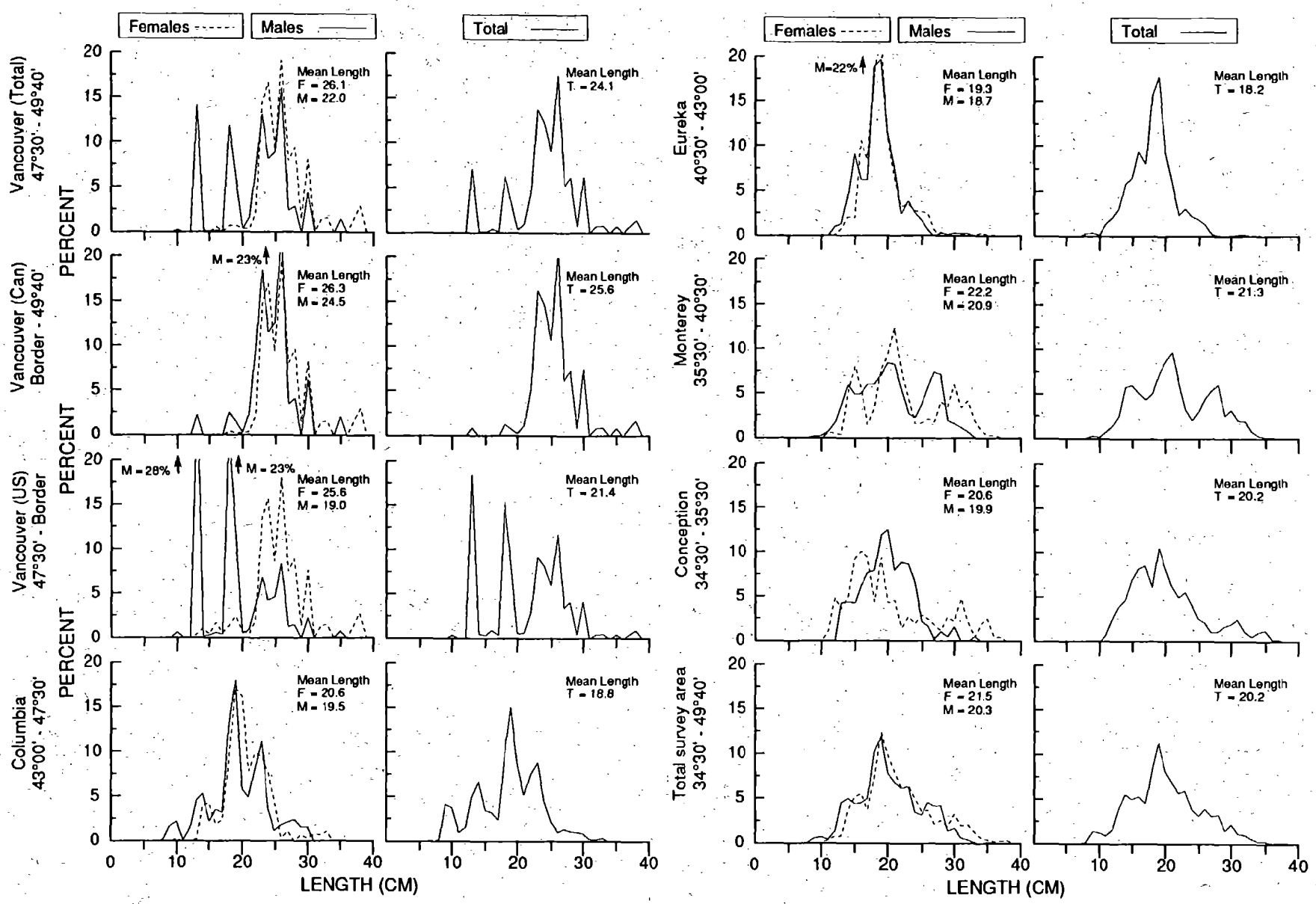


Figure 57.--Splitnose rockfish estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl survey for depths 55-366 m. Lengths ranged 7-38 cm.

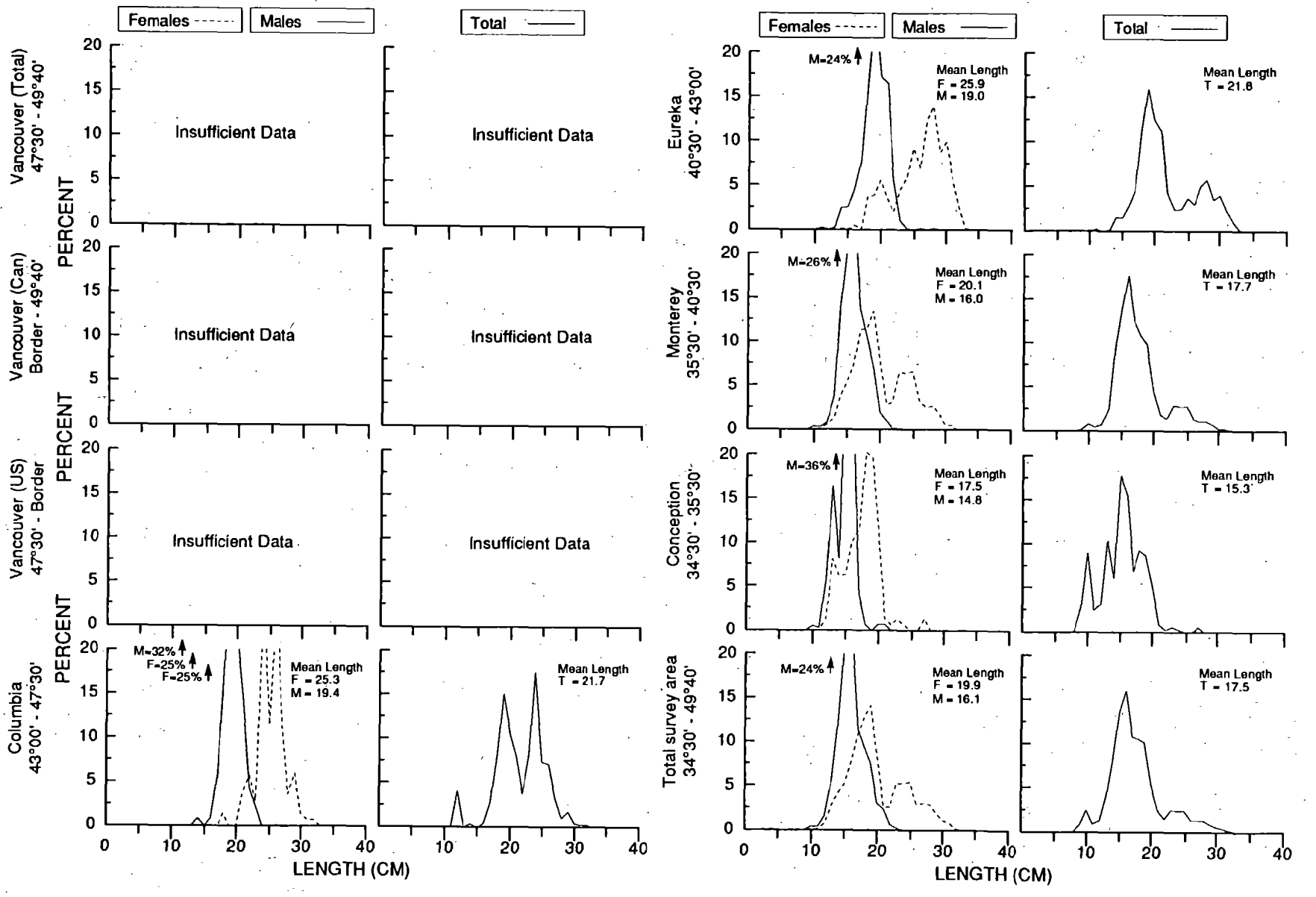


Figure 58.--Stripetail rockfish estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl survey for depths 55-366 m. Lengths ranged 8-33 cm.

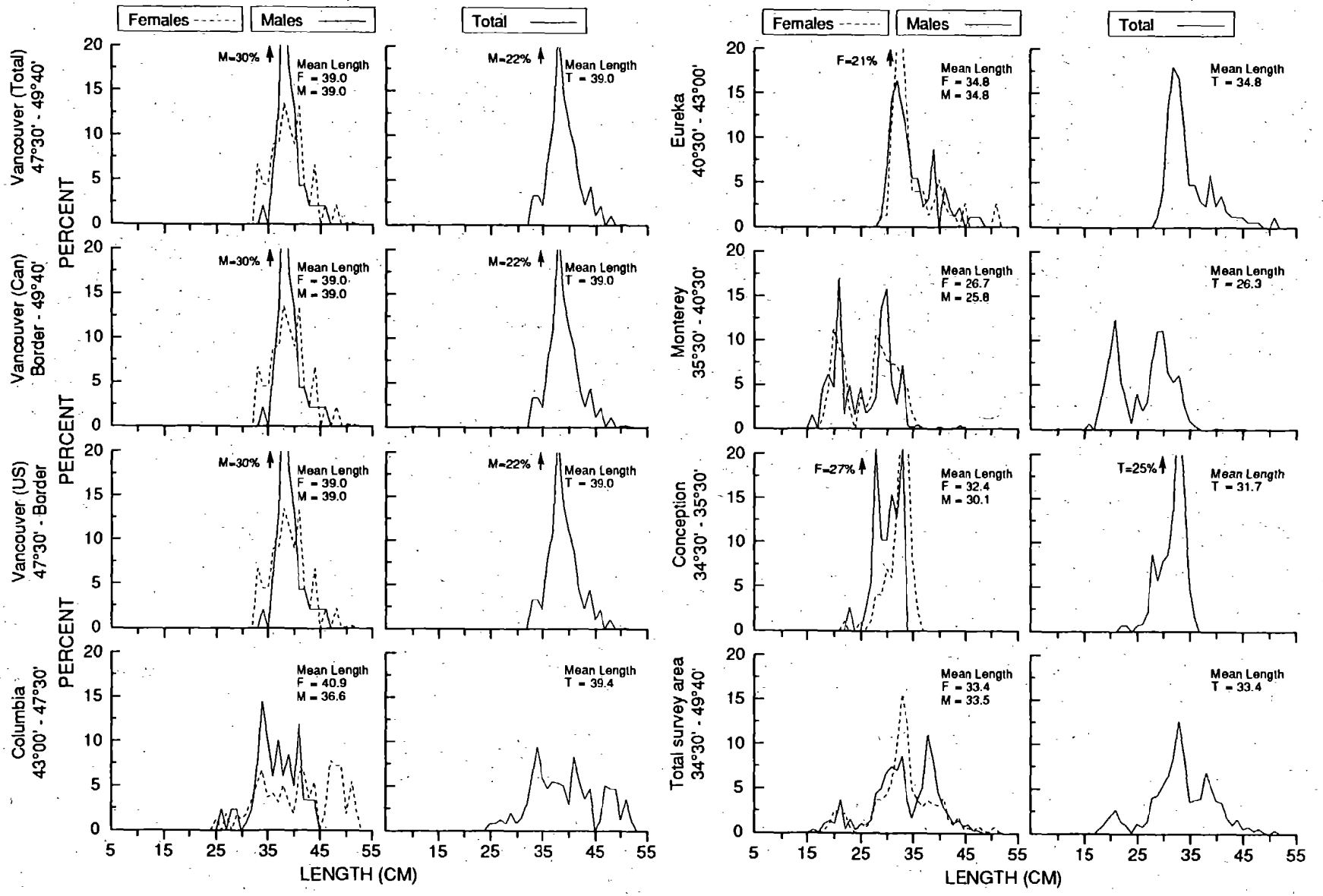


Figure 59.--Widow rockfish estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl survey for depths 55-366 m. Lengths ranged 16-52 cm.

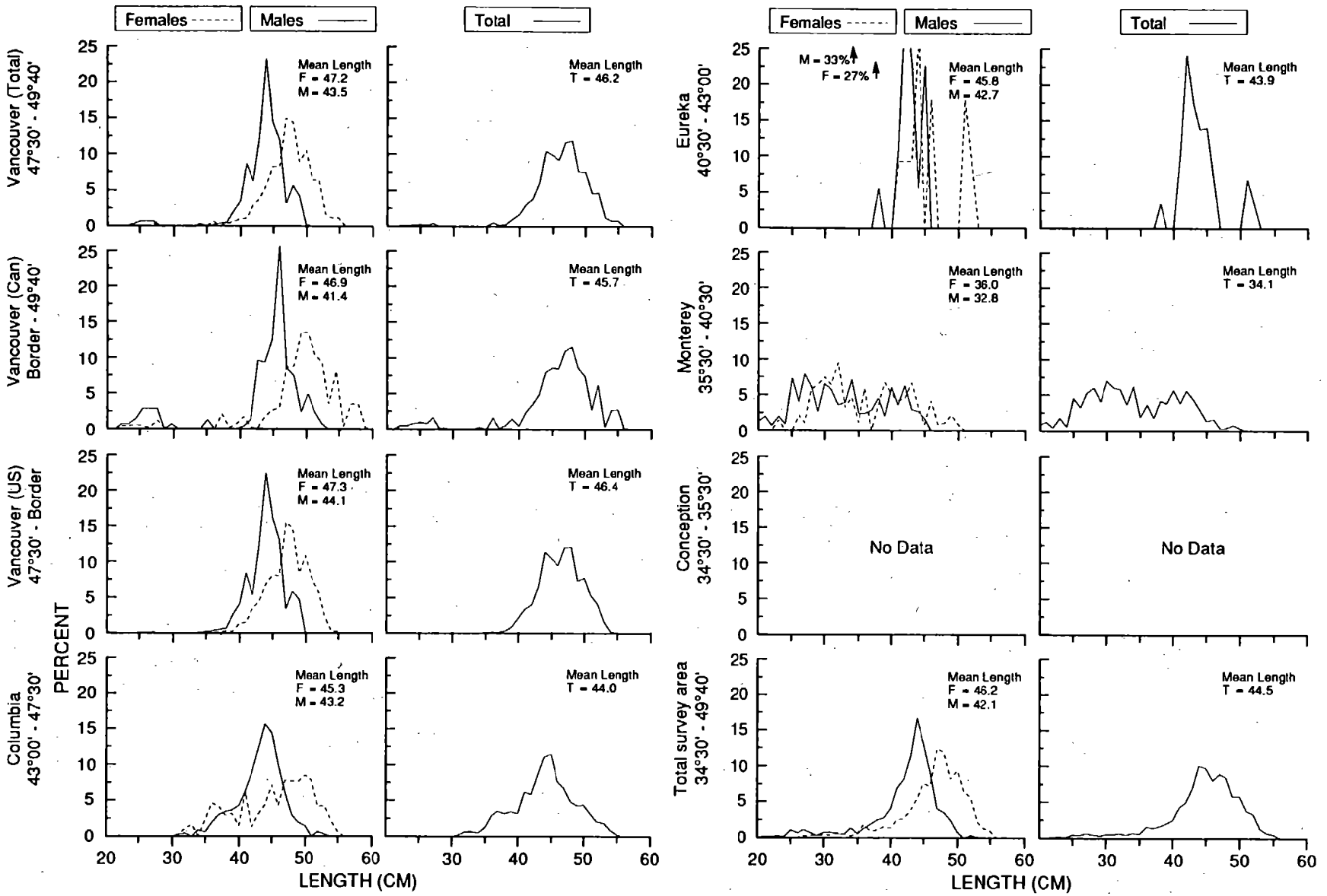


Figure 60.--Yellowtail rockfish estimated size composition by International North Pacific Fisheries Commission area from the 1989 bottom trawl survey for depths 55-366 m. Lengths ranged 18-56 cm.

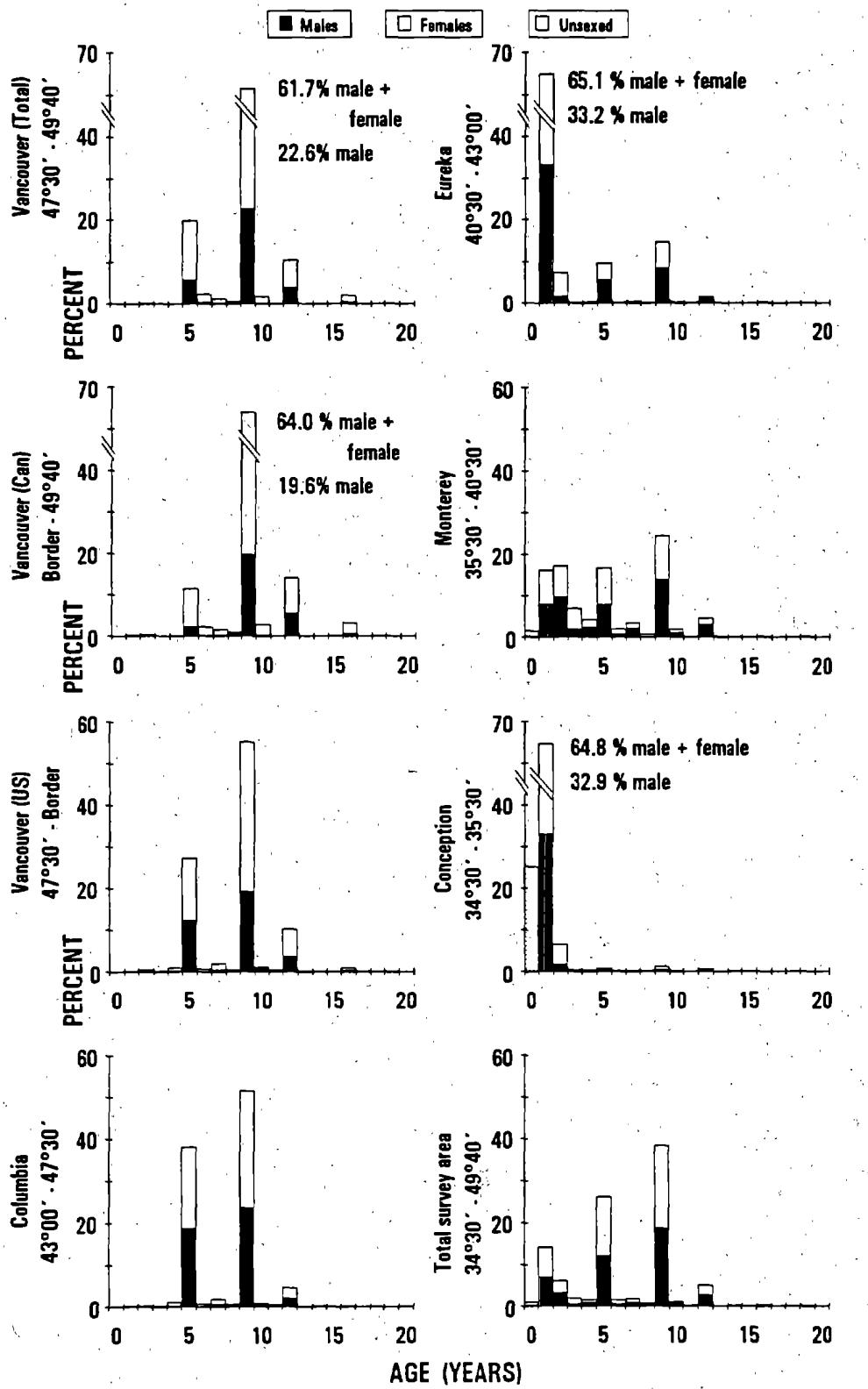


Figure 61.--Estimated age composition for Pacific hake by sex and International North Pacific Fisheries Commission (INPFC) area for all depths sampled (55-366 m) from the 1989 bottom trawl survey.

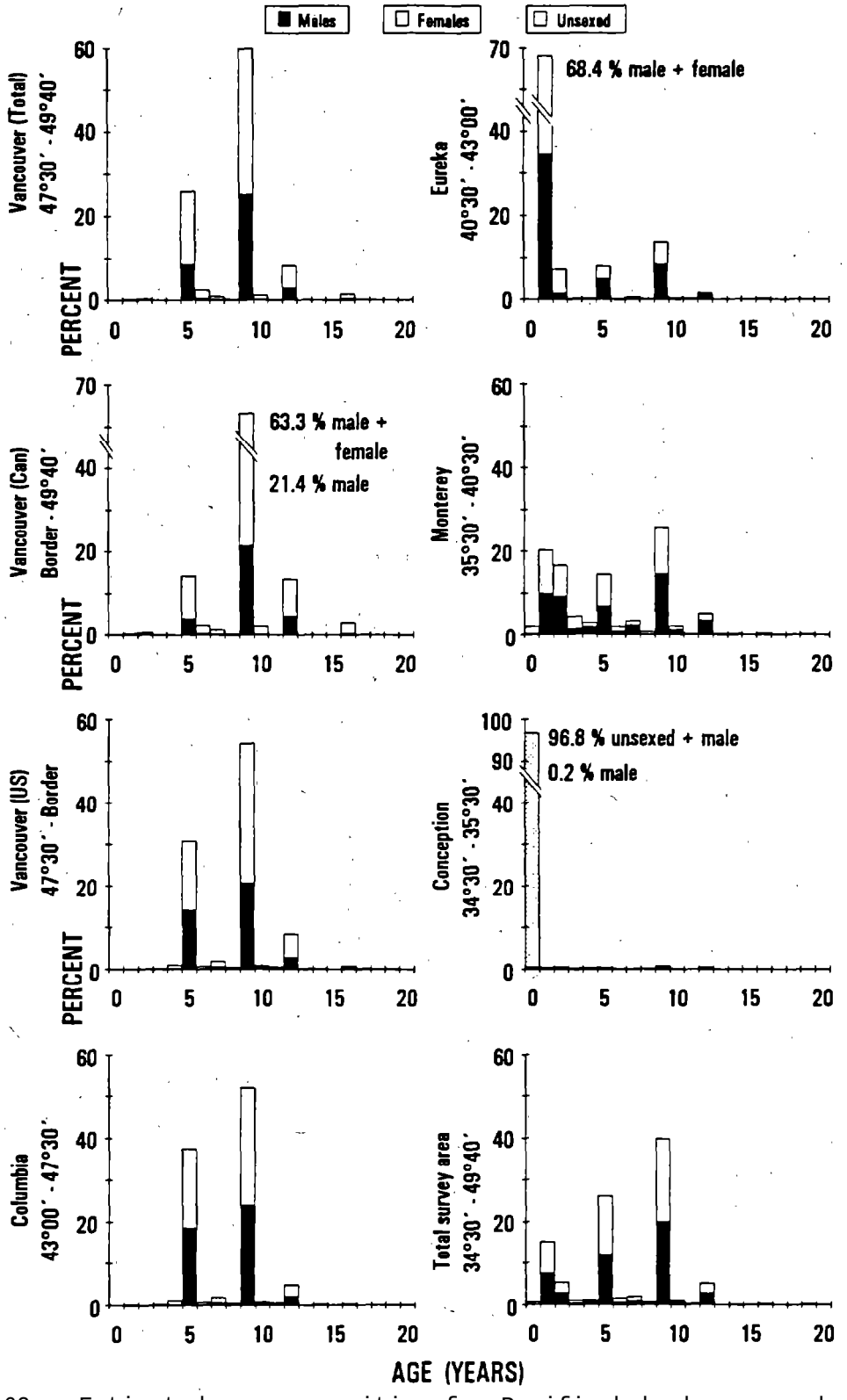


Figure 62. --Estimated age composition for Pacific hake by sex and International North Pacific Fisheries Commission (INPFC) area for depths between 55 and 183 m from the 1989 bottom trawl survey.

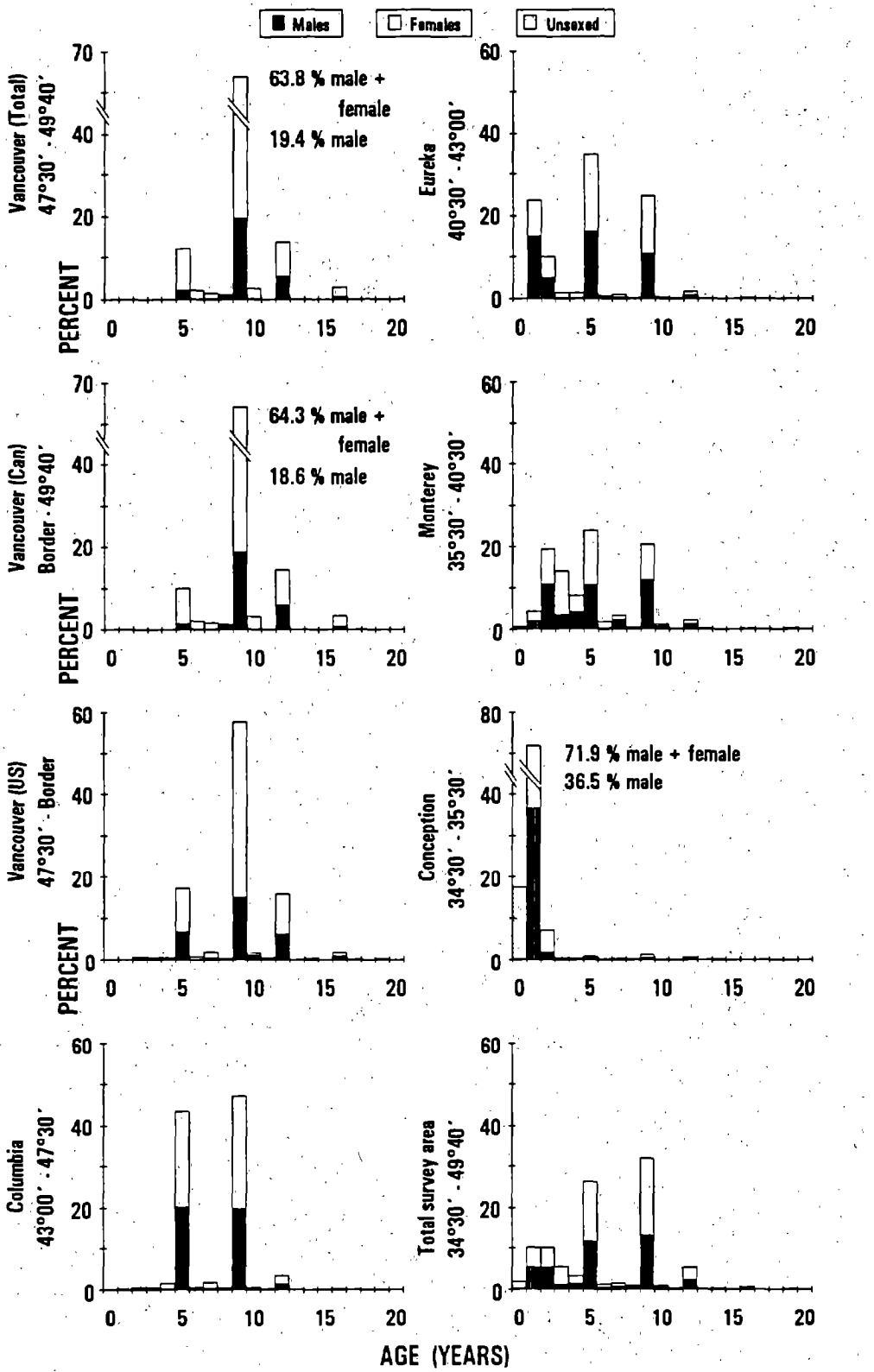


Figure 63. --Estimated age composition for Pacific hake by sex and International North Pacific Fisheries Commission (INPFC) area for depths between 184 and 366 m from the 1989 bottom trawl survey.

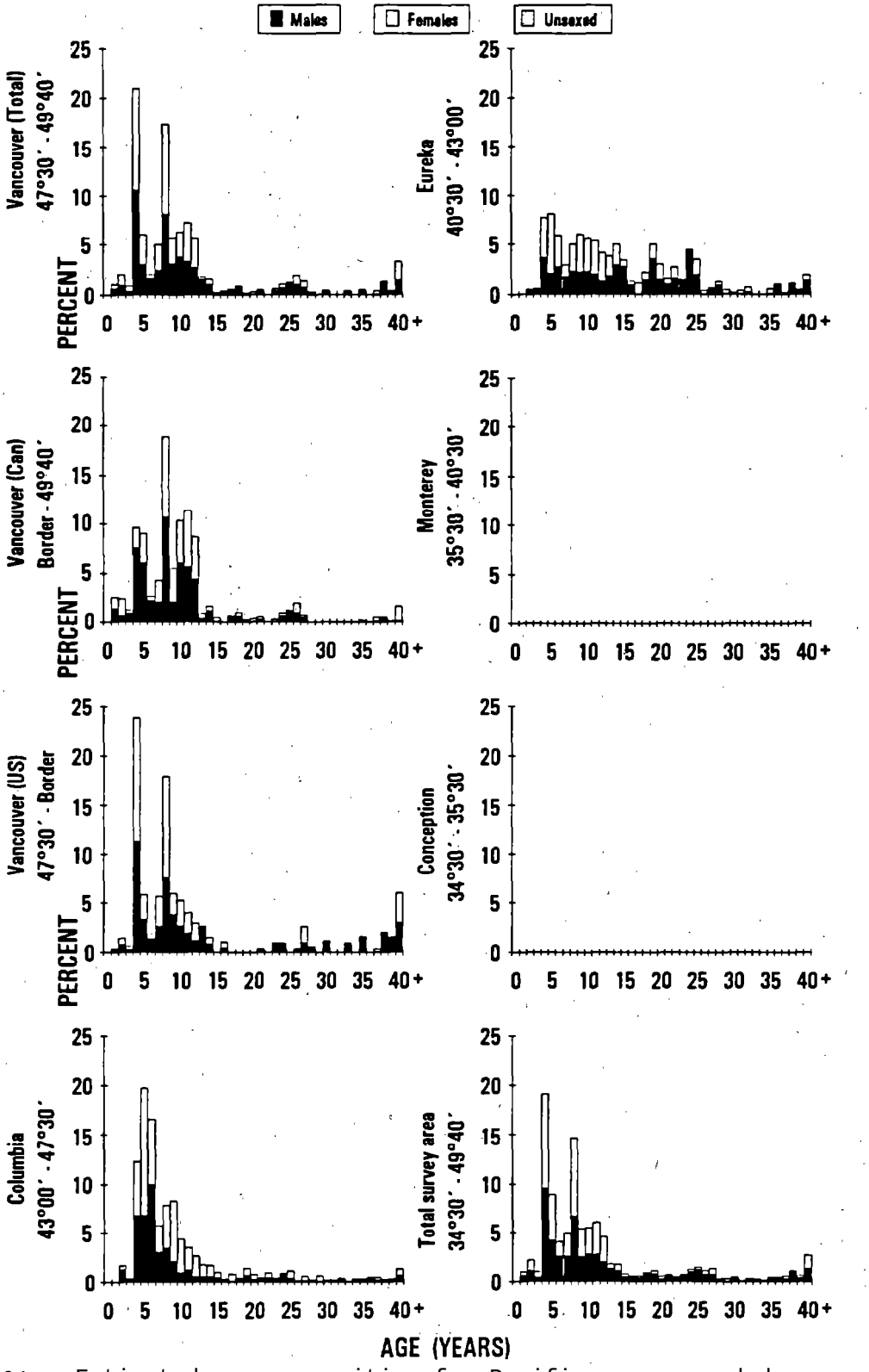


Figure 64. --Estimated age composition for Pacific ocean perch by sex and International North Pacific Fisheries Commission (INPFC) area for all depths sampled (55-366 m) from the 1989 bottom trawl survey.

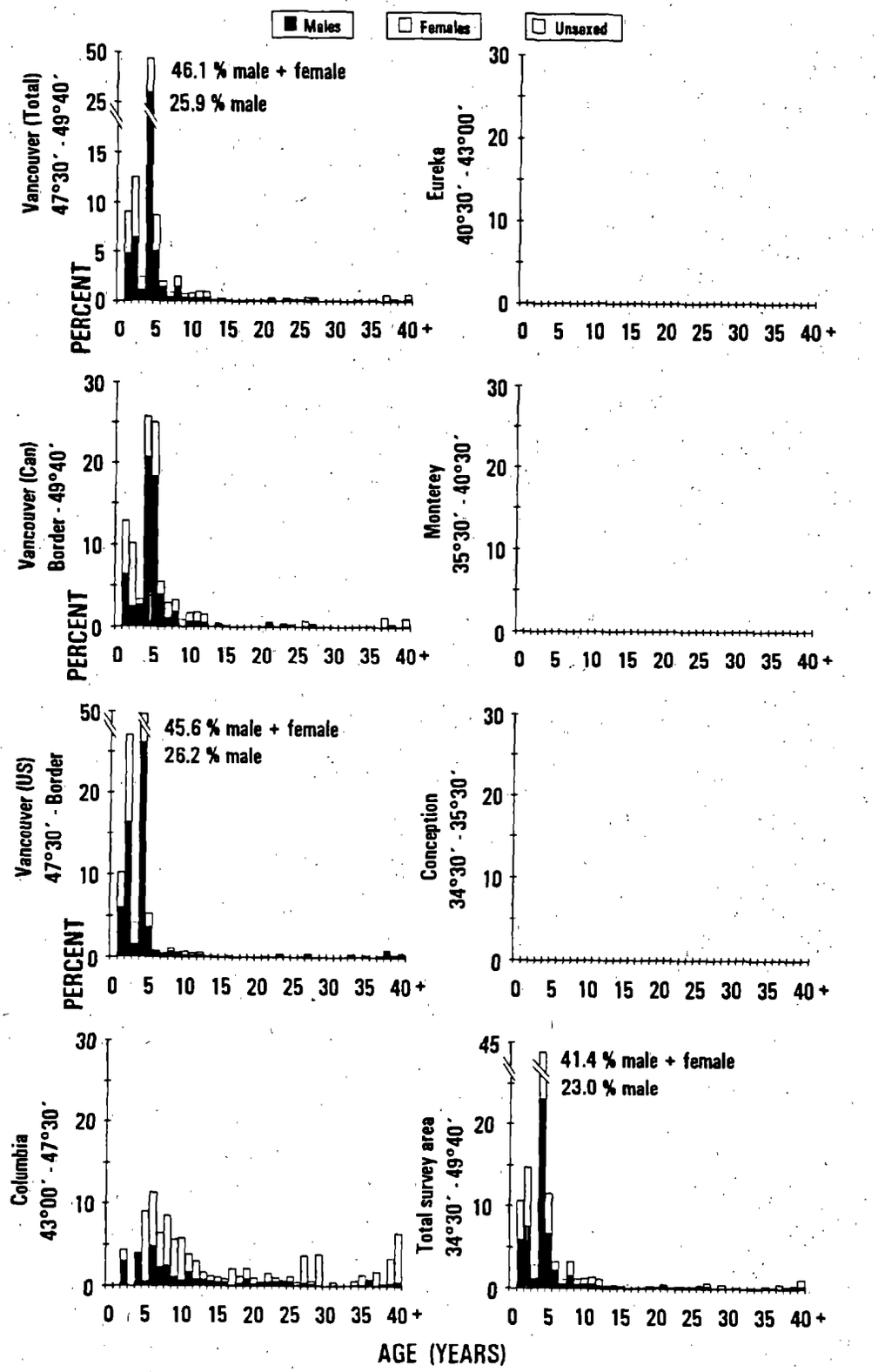


Figure 65.--Estimated age composition for Pacific ocean perch by sex and International North Pacific Fisheries Commission (INPFC) area for depths between 55 and 183 m from the 1989 bottom trawl survey.

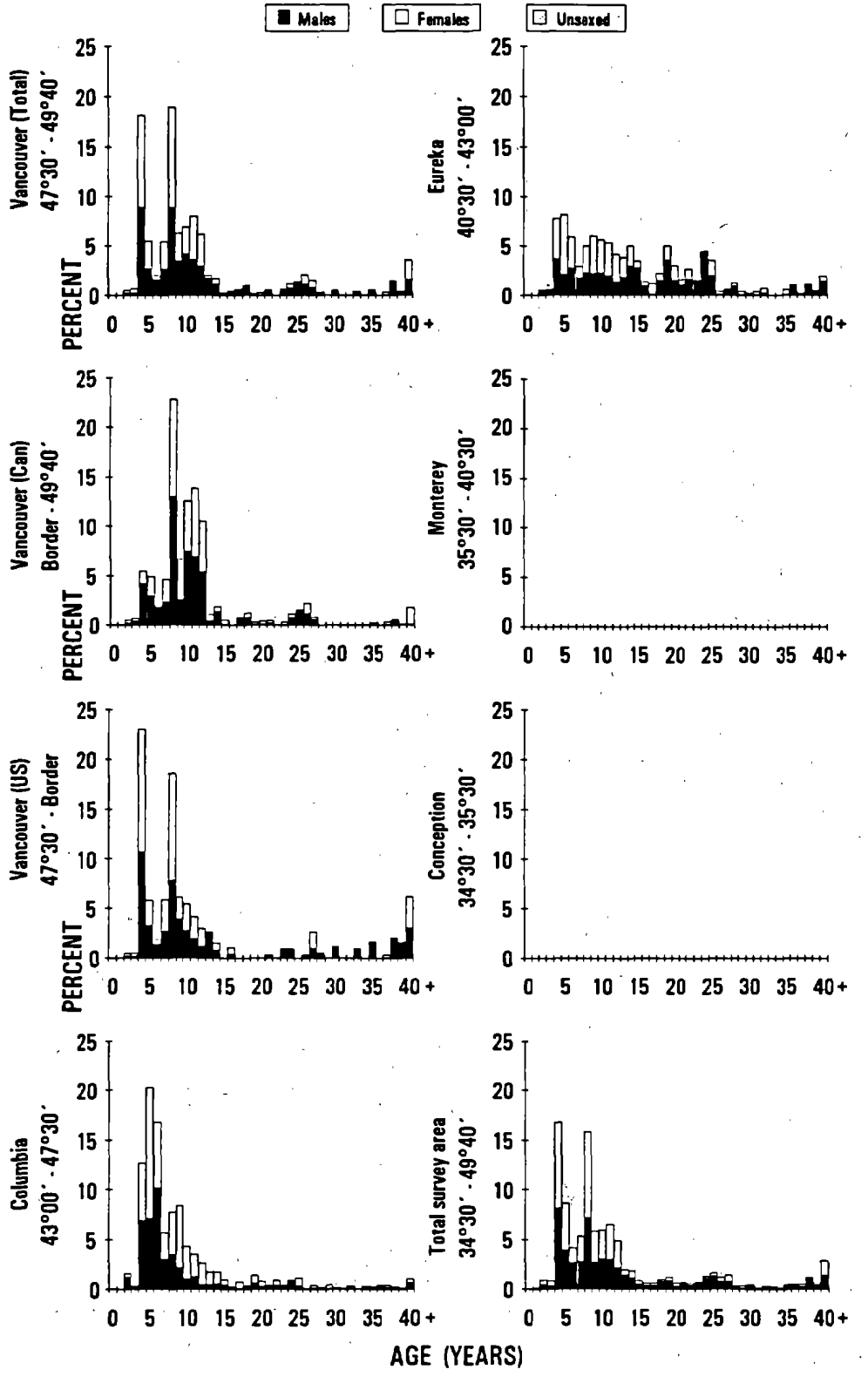


Figure 66.--Estimated age composition for Pacific ocean perch by sex and International North Pacific Fisheries Commission (INPFC) area for depths between 184 and 366 m from the 1989 bottom trawl survey.

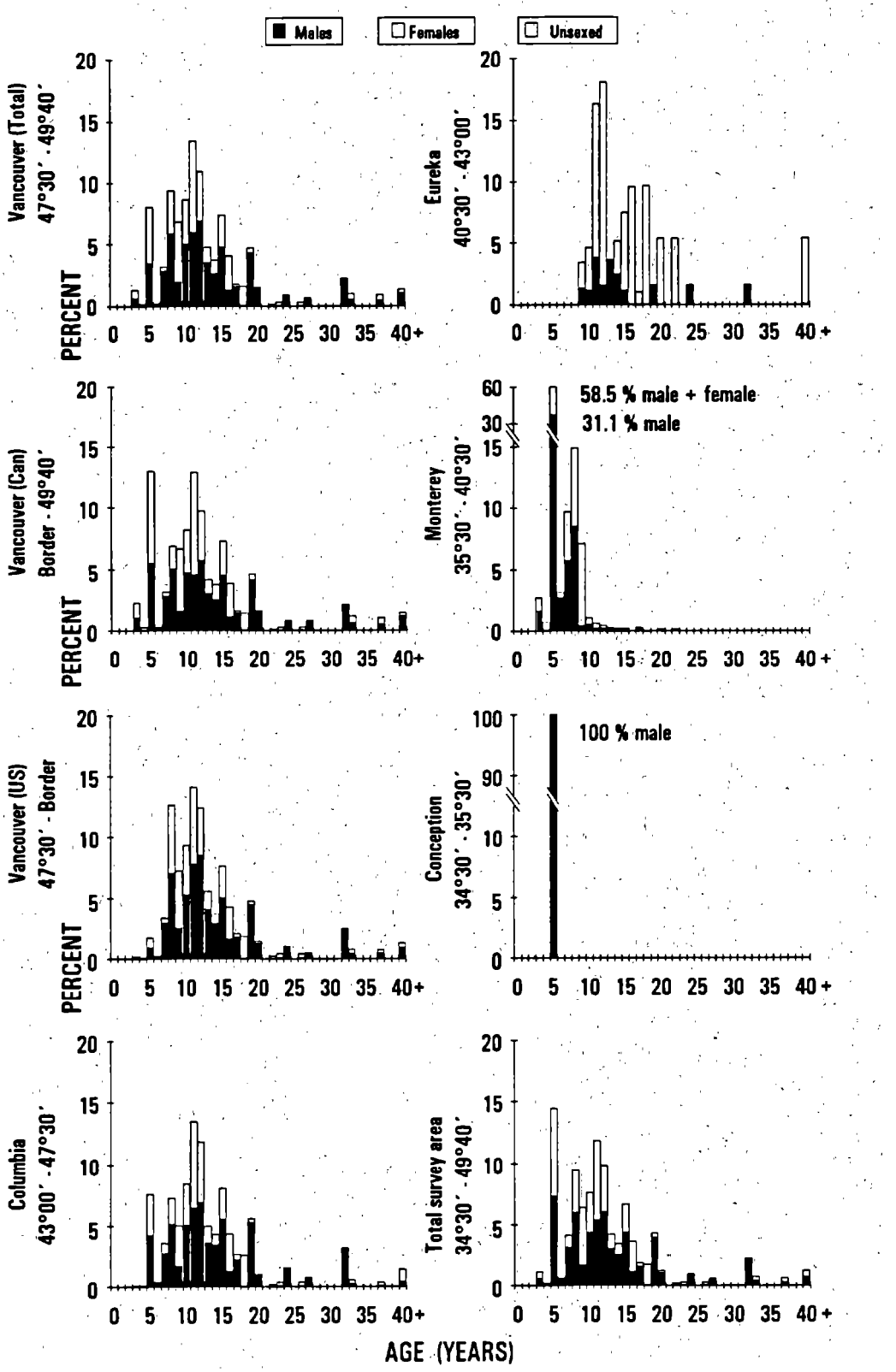


Figure 67.-Estimated age composition for canary rockfish by sex and International North Pacific Fisheries Commission

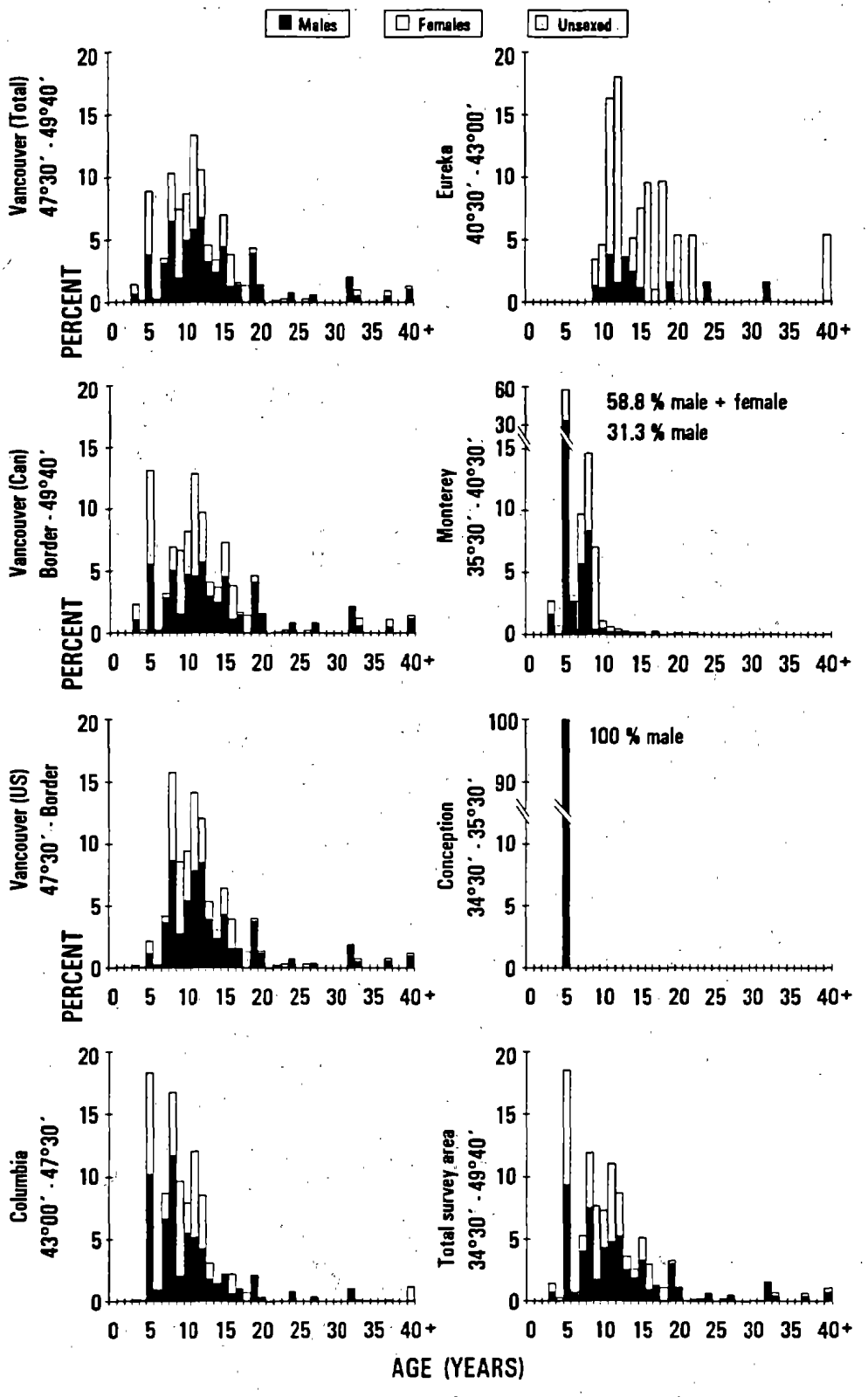


Figure 68.--Estimated age composition for canary rockfish by sex and International North Pacific Fisheries Commission (INPFC) area for depths between 55 and 183 m from the 1989 bottom trawl survey.

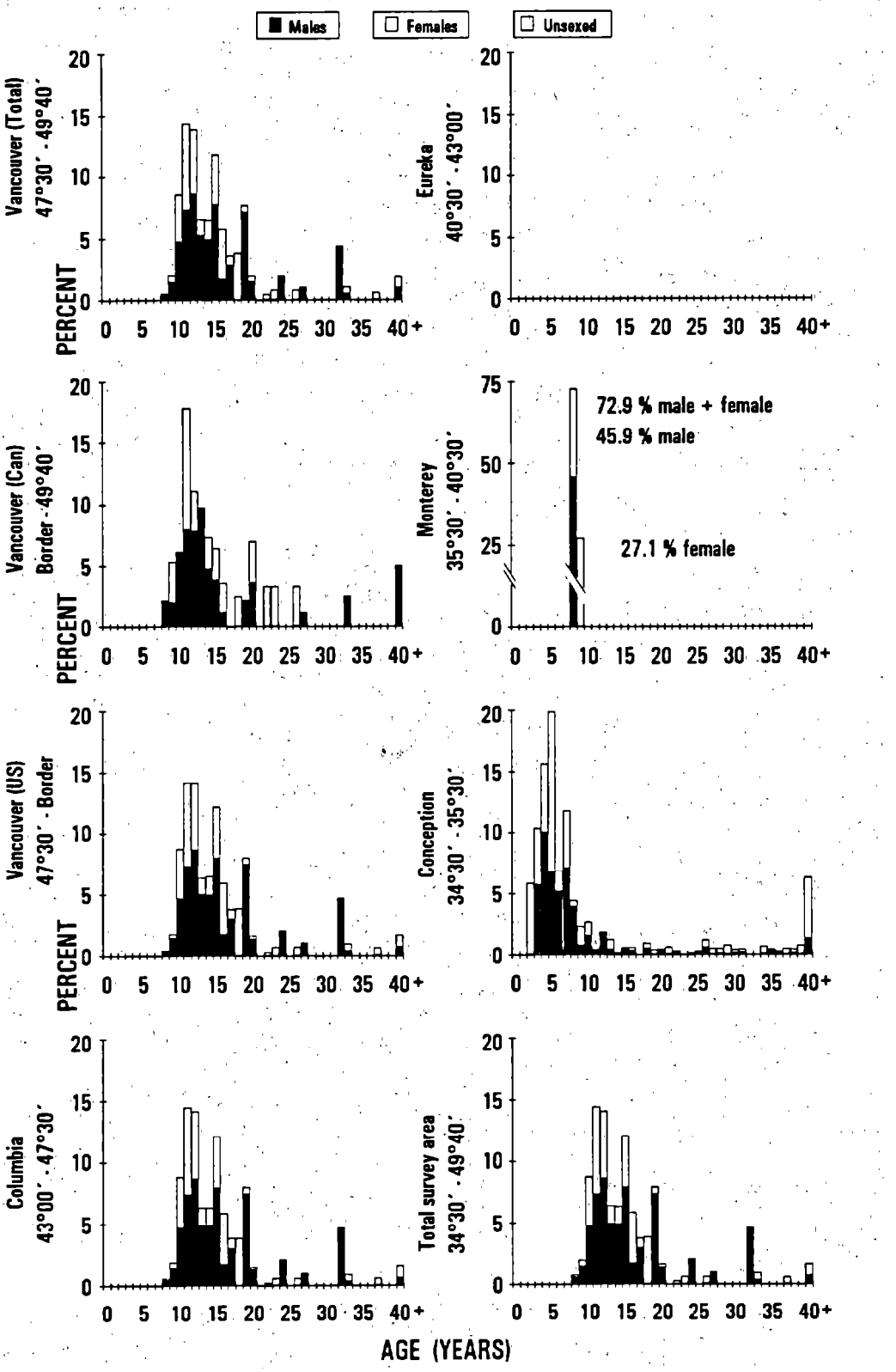


Figure 69.--Estimated age composition for canary rockfish by sex and International North Pacific Fisheries Commission (INPFC) area for depths between 184 and 366 m from the 1989 bottom trawl survey.

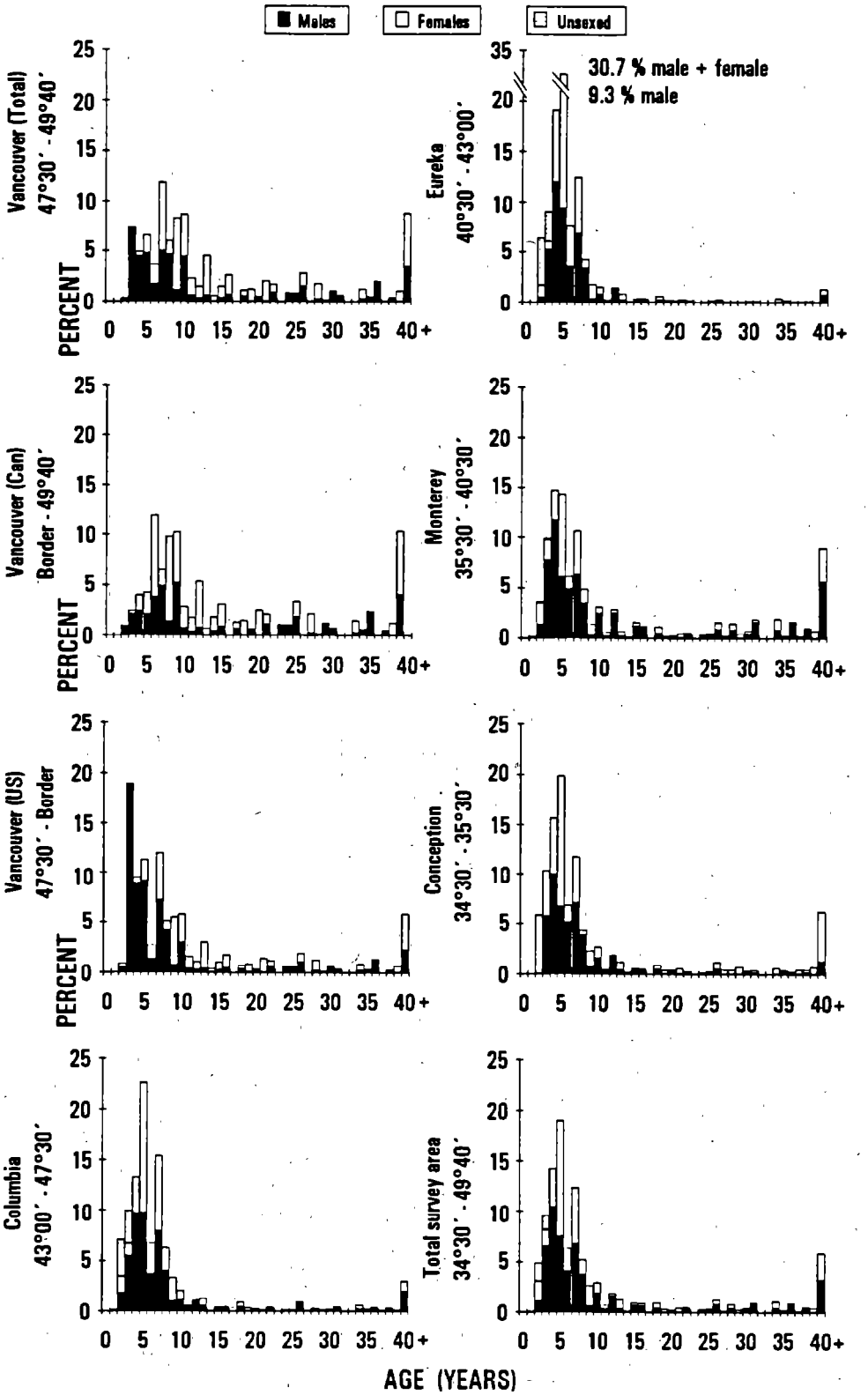


Figure 70.--Estimated age composition for splitnose rockfish by sex and International North Pacific Fisheries Commission (INPFC) area for all depths sampled (55-366 m) from the 1989 bottom trawl survey.

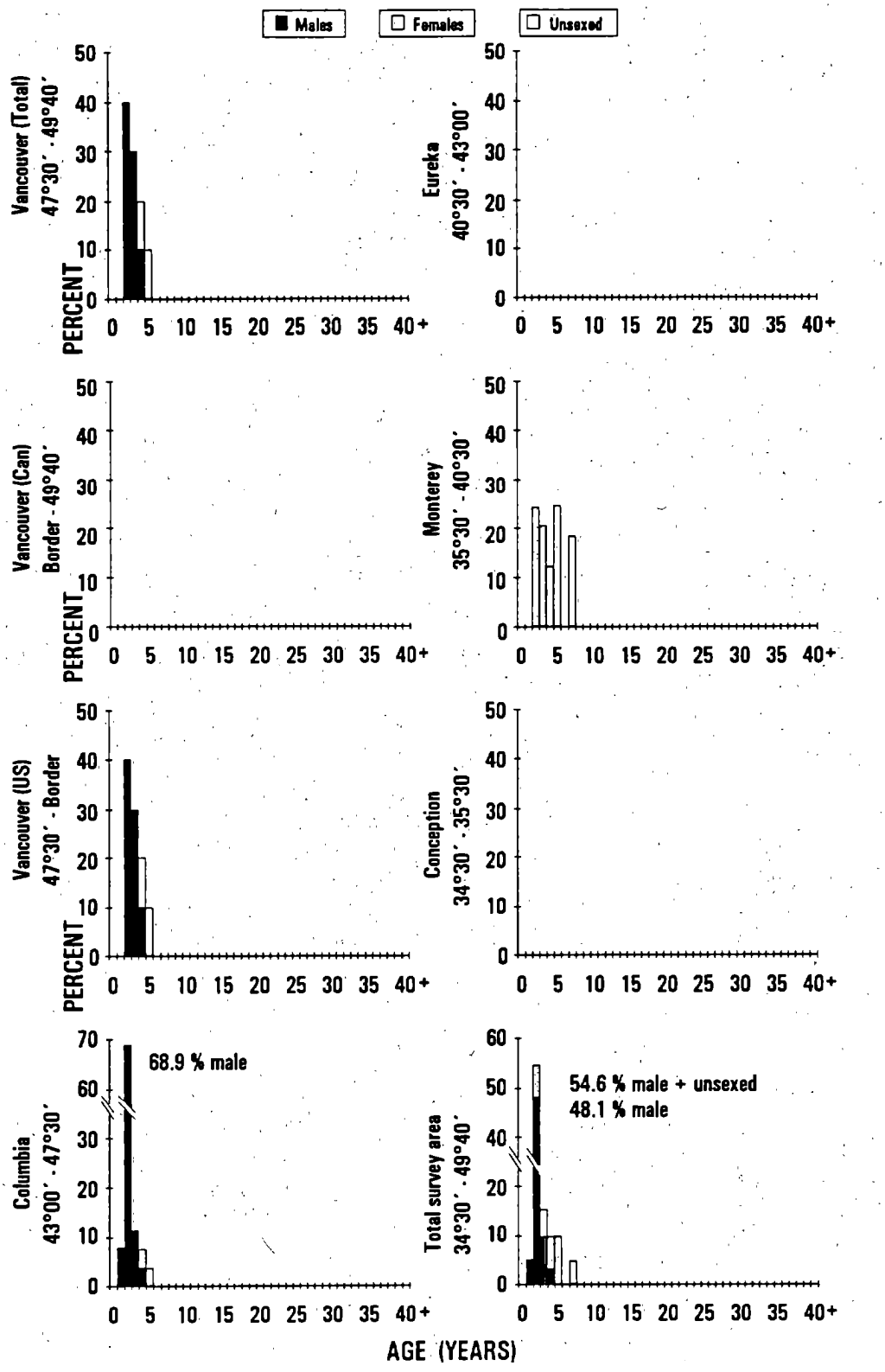


Figure 71.--Estimated age composition for splitnose rockfish by sex and International North Pacific Fisheries Commission (INPFC) area for depths between 55 and 183 m from the. 1989 bottom trawl survey.

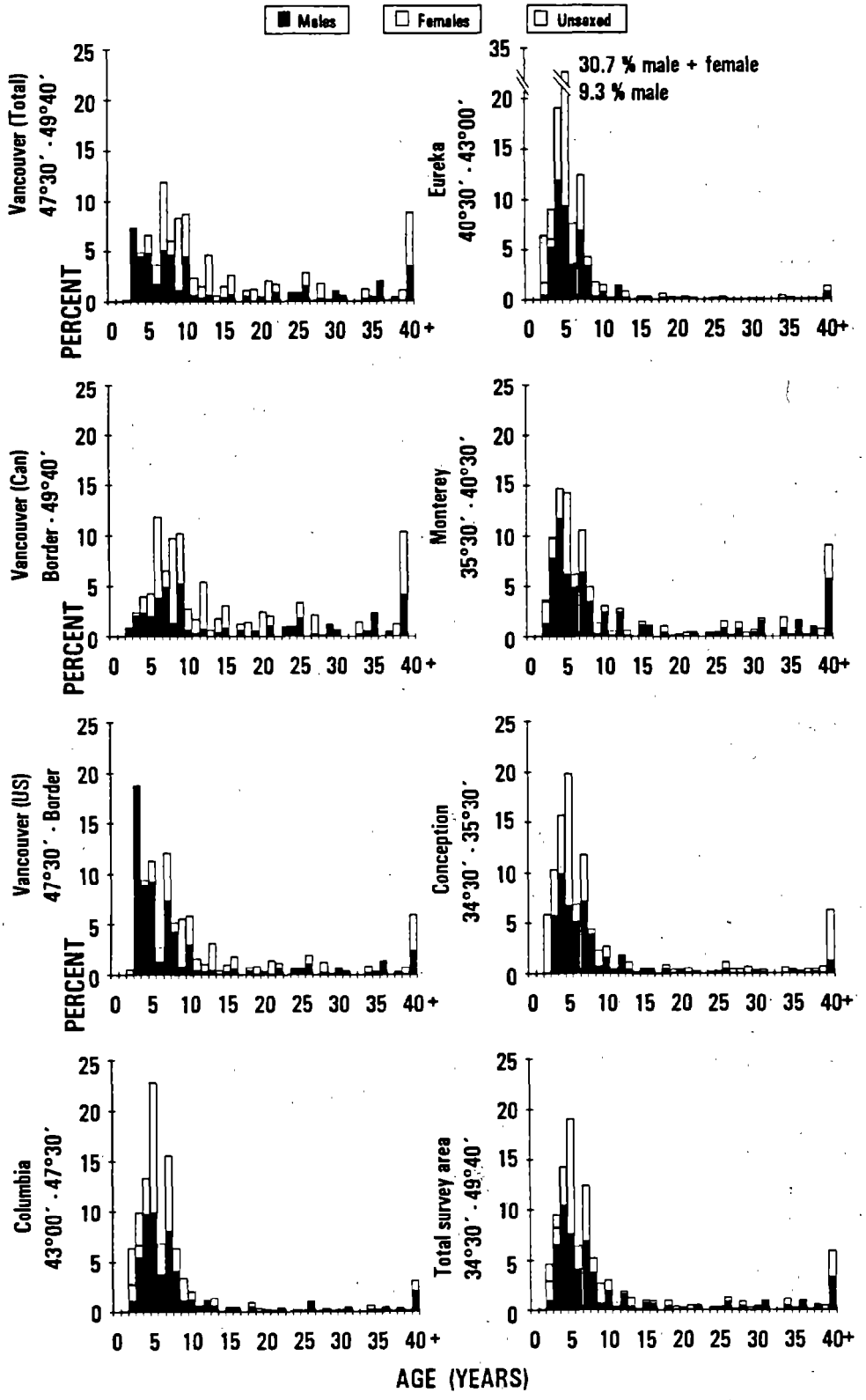


Figure 72.--Estimated age composition for splitnose rockfish by sex and International North Pacific Fisheries Commission (INPFC) area for depths between 184 and 366 m from the 1989 bottom trawl survey.

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Coleman, B.A. 1986. The 1980 Pacific west coast bottom trawl survey of groundfish resources: Estimates of distribution, abundance, length and age composition. U.S. Dep. Commer., NOM Tech. Memo . NMFS-F/NWC-100, 181 p.

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