



NOAA Technical Memorandum NMFS-AFSC-128

# **The 2001 Pacific West Coast Bottom Trawl Survey of Groundfish Resources: Estimates of Distribution, Abundance, and Length and Age Composition**

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**U.S. DEPARTMENT OF COMMERCE**  
National Oceanic and Atmospheric Administration  
National Marine Fisheries Service  
Alaska Fisheries Science Center

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## ABSTRACT

The Alaska Fisheries Science Center's 2001 West Coast triennial bottom trawl survey was conducted to assess stocks of groundfish inhabiting the continental shelf waters off the coasts of California, Oregon, Washington, and southern British Columbia. This was the ninth and final survey in a series spanning 25 years to monitor long-term trends in the distribution and abundance of these groundfish populations.

Although the objectives of the 2001 survey were similar to those of the previous surveys in the series, minor changes in the survey design have been made over the years. The five most recent surveys have shifted emphasis away from estimating rockfish abundance, as had been the case from 1977 through 1986, toward better assessing a broader range of groundfish species. The current design also focuses upon more precisely estimating the near-bottom component of the Pacific hake (*Merluccius productus*) and juvenile (age 1+) sablefish (*Anoplopoma fimbria*) resources. The 2001 survey encompassed the coastal waters from Pt. Conception, California, to central Vancouver Island, British Columbia (34°30'-49°06'N). The depth range of the 2001 survey was 55 to 500 m, the same as it has been since 1995 when sampling was extended from the previous maximum depth of 366 m in order to cover the habitat of slope rockfish more completely. A total of 527 stations were occupied, of which 506 were successfully

sampled. Catches included over 166 fish species representing more than 57 families.

This report documents the survey design and methods used in 2001, summarizes biological and environmental data collected, and presents the results of standard analyses of distribution, abundance, and biological parameters for the commercially important groundfish species in the region. Data on water temperature, catch composition, relative abundance, and geographic distribution are reported. Estimates of biomass, population abundance, length composition and age composition are also presented. Data appendices are located in a separate volume.

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## INTRODUCTION

In 2001, the ninth and final in our series of groundfish assessment surveys of the continental shelf resources off the coasts of California, Oregon, Washington, and southern British Columbia was carried out by the National Marine Fisheries Service (NMFS) Resource Assessment and Conservation Engineering (RACE) Division of the Alaska Fisheries Science Center (AFSC). These bottom trawl surveys, initiated in 1977 and repeated triennially, have been designed to provide resource managers with fishery-independent data about the distribution, abundance, and biological characteristics of several commercially important species, particularly Pacific hake (also known as Pacific whiting; *Merluccius productus*), sablefish (*Anoplopoma fimbria*), and many of the shelf and slope rockfish (genus *Sebastes*) species (Wilkins 1996). Hydroacoustic surveys of the off-bottom component of the Pacific hake population have been conducted concurrently with these bottom trawl surveys by the Midwater Assessment and Conservation Engineering (MACE) Task of the RACE Division.

The first of these bottom trawl surveys, conducted in 1977 (Gunderson and Sample 1980), sampled between Pt. Hueneme, California (34°00'N), and the U.S.-Canada border in depths ranging from 91 to 457 m. The sampling effort was stratified by depth and latitude according to fishery catch information. The following two surveys, conducted in 1980 (Coleman 1986) and 1983 (Weinberg et al. 1984), emphasized obtaining better biomass

estimates of canary (*Sebastes pinniger*) and yellowtail rockfish (*S. flavidus*), while maintaining the important general goals of a multispecies monitoring program. In 1980, strata were adjusted and sampling depths shifted to cover the 55-366 m depth interval, while the latitudinal boundaries extended from Monterey Bay, California (36°48'N), to northern Vancouver Island, British Columbia (50°00'N). The same area was surveyed using the same survey design in 1983 but only extended as far north as Vancouver Island's Estevan Point (49°15'N). The results of the 1980 and 1983 surveys indicated that a better sampling design was needed to improve the precision of canary and yellowtail rockfish abundance estimates. Consequently, in 1986 the sampling effort was reallocated to concentrate on the 92-219 m depth interval north of 42°35'N latitude, where canary and yellowtail rockfish were thought to be most abundant (Coleman 1988). Results of these first four surveys were used to examine trends in the distribution and abundance of 14 of the more commercially important groundfish species (Dark and Wilkins 1994).

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 realistic sampling levels. It was clear that higher priority should be given to obtaining the information that our survey was better able to provide. Consequently, beginning in 1989 the

triennial bottom trawl survey was modified to monitor a broad range of demersal species and also focus on providing more precise estimates of the demersal component of the Pacific hake stock and sablefish pre-recruits (age 1+) (Weinberg et al. 1994, Zimmermann et al. 1994, Wilkins et al. 1998). The results of the 1977-92 surveys were used by Weinberg (1994) to describe rockfish community structure and species assemblages. His findings, as well as recent assessments of slope and shelf rockfish stocks (Rogers et al. 1996) indicated that more complete depth coverage of the habitats of these species during our surveys would improve our ability to assess them. In 1995, we redirected a portion of our samples from four small areas of high density sampling for Pacific hake and sablefish and placed them in a new, coastwide, deeper depth stratum ranging between 367 and 500 m. This survey design was repeated in 1998 (Shaw et al. 2000) and again in 2001.

The specific objectives of the 2001 survey were:

- 1) to describe and assess the demersal component of the Pacific hake resource;
- 2) to describe and assess the abundance of the shallow component of the sablefish resource, specifically those 1.5 years old, because the abundance of these pre-recruits estimated from trawl survey data has been shown to be consistent with that inferred from commercial catch levels;
- 3) to describe and assess shelf and slope rockfish stocks throughout their entire depth ranges;

- 4) to monitor the status of other important groundfish stocks;
- 5) to determine the biological characteristics (e.g., size and age compositions, size at maturity, length/weight relationships and feeding habits) of key groundfish species;
- 6) to collect oceanographic data describing the habitat, including surface temperatures, bottom temperatures, and water column temperature profiles at each sampling station; and
- 7) to collect samples from a variety of species for biological studies that will be conducted by scientists at various fishery agencies and academic institutions.

This report documents the 2001 survey design and field procedures used, summarizes the data collected, and presents the results of the standard RACE analyses. Included are summaries of catches, relative densities, distributions, and estimates of biomass, population abundance, and size composition for selected species. Age composition estimates are also included for three species for which ages have been determined from otolith collections and length-weight relationships are described for many groundfish species. For the sake of brevity, our discussion concentrates on the two primary target species of this survey, Pacific hake and sablefish, in the areas presently of most



concern to management. This report is also available on the AFSC web site,

<http://www.afsc.noaa.gov/Publications/techmemos.htm>

and can be viewed or printed using Adobe Acrobat Reader. Electronic data files and files containing results of analyses (e.g., size and age composition) can also be obtained from the authors upon request.

## SURVEY METHODS

### Survey Period and Sampling Area

The 2001 survey was conducted from 1 June to 27 August. While the start time coincided with the 1998 survey, it was earlier than most previous triennial surveys (mid-July through September). Trawl operations began off Pt. Conception, California (34°30'N), and proceeded northward to central Vancouver Island off Esowista Peninsula (49°06'N) sampling stations between the depths of 55 and 500 m. The survey area has extended southward to Point Conception since 1989 to allow for the detection of juvenile Pacific hake and sablefish concentrations which may be present between Point Conception and Monterey Bay. Stations off Vancouver Island were sampled to help estimate fish densities at the northern limit of the Pacific hake distribution and to collect more complete data sets on transboundary stocks such as yellowtail rockfish, Pacific ocean perch (*S. alutus*), and lingcod (*Ophiodon elongatus*).

## Vessels and Sampling Gear

Two commercial trawlers, the U.S.-flagged F/V *Sea Storm* and the Canadian-flagged F/V *Frosti*, were chartered to conduct the bottom trawl survey. The *Sea Storm* fished continuously from 1 June to 5 August. The *Frosti* fished from 1 June to 27 August but was off charter between 23 June and 15 July. Each vessel was equipped with modern electronics including global positioning system (GPS) navigational aids. Vessel-specific details are presented in Table 1.

The standard RACE high-opening Nor'eastern trawl, constructed of polyethylene mesh and equipped with rubber bobbin roller gear, was used aboard both vessels throughout the 2001 survey (Fig. 1). This trawl has a 27.2 m headrope and a 37.4 m footrope. All trawls were rigged consistently to RACE survey gear standards employing triple 55 m dandyline (1.59 cm steel cable) connected to each wing and fished with 2.1 × 1.5 m steel V-doors weighing approximately 567 kg each.

Measurements of the trawl opening were collected throughout the survey using a SCANMAR acoustical net mensuration system. Horizontal (wingtip to wingtip) openings were measured for 439 (87%) of the successfully completed tows. Vertical (center of headrope to bottom) openings were measured on all but three tows. Mean net widths and heights were calculated for each successfully measured trawl haul. In those instances when horizontal measurements were unavailable and good net height was available,

the best predictor of average net width (m) was width regressed on net height using the following relationships:

*F/V Sea Storm*

$$\text{Net width} = -1.24 \times H + 23.216$$

*R/V Frosti*

$$\text{Net width} = -0.9524 \times H + 21.268$$

where: H = net height (m).

For the tows for which no net height measurement was available the best predictor was a regression of net width on inverse depth using the following equation:

*F/V Sea Storm*

$$\text{Net width} = -58.271 / D + 14.131$$

These equations were derived by examining the relationship between mean net width and a set of variables known to be important in determining the horizontal opening of the net (Rose 1993). The overall mean path width of the net from successfully completed hauls was 13.71 m (range 11.28-15.24 m) by the *Sea Storm* and 14.05 m (range 12.24-15.89 m) by the *Frosti*.

### Survey Area Stratification

The 2001 triennial survey sampled the entire survey area with a nearly uniform sampling density, which was similar to the low-density levels used in surveys prior to 1995. Ten latitudinal strata of similar size (Fig. 2) were used during the analyses to help ensure catch rates of various species were extrapolated to meaningful areas of their respective habitats.

The survey area was also stratified by depth since most groundfish species in the area exhibit a strong depth range preference. All West Coast triennial surveys prior to 1995 were divided into two major depth strata: 55-183 m representing a continental shelf habitat and 184-366 m representing the shelf break and the uppermost continental slope. Pacific hake and juvenile sablefish catch rates, in particular, are usually significantly higher in the shallower stratum. An additional deeper depth stratum (367-500 m) was added to the design of the survey beginning in 1995 so that the survey area would encompass the entire depth range of slope rockfish (*Sebastes*) species.

### Trawl Station Allocation

The 2001 survey replicated the 1995 and 1998 station pattern. A systematic-random design was used to allocate trawl stations to best achieve the primary survey objectives, which were to estimate the abundance and biological characteristics of Pacific hake and juvenile sablefish stocks and concurrently monitor the condition of a broader range of commercially

important groundfish species. Tracklines were placed across the survey area from the 55 m isobath due west extending to the 500 m isobath at intervals of 18.5 km along the coast. Stations were randomly placed along tracklines at the rate of one station per 7.4 km in the shallow stratum and one station per 9.3 km in the two deeper stratum. At least one station was assigned to each depth stratum along each trackline segment. A total of 610 stations were established. The number of stations allocated to each stratum, as well as the number successfully sampled, are shown in Table 2.

#### Trawling Procedures

Stations were located using GPS and then surveyed with an echo sounder prior to towing. Trawl site selection was determined by the lead scientist and the vessel captain based upon the following guidelines, listed in order of priority:

- 1) a 30 minute tow through the station at a constant depth or minimal change in depth (about 9-18 m);
- 2) a partial tow (15-29 minutes in duration) through the station at a constant or minimal change in depth;
- 3) choose an alternative site within 2.5 minutes of the original station's latitude and within about 18 m of the original station's depth; and
- 4) choose an alternative site which lies closer to the original intended station than any other adjacent

station and is within the depth boundaries of the stratum in which the original station is assigned.

If no favorable ground was located within about 2 hours, the station was declared untrawlable and abandoned.

Before starting the survey, the trawl warps on each vessel were measured with a wire meter and marked at 45.7 m (25 fm) increments. An exercise was then conducted to establish an appropriate amount of trawl warp to deploy at a given depth. We did this by deploying the trawl and towing it at the survey target speed of 1.5 m/sec (3 knots, speed over ground) over deep water, increasing the length of trawl warp by 183 m (100 fm) intervals and allowing the trawl to settle to an equilibrium depth at each warp length. A micro-bathythermograph (MBT) was attached to the trawl headrope during this exercise and the settling depth was recorded for different trawl warp lengths. We tabulated the minimum length of trawl warp needed to fish the trawl at any given bottom depth and paid out an additional 90-240 m of warp to enhance bottom contact.

Towing procedures were standardized following strict protocols so as to obtain standard samples. Skippers set the trawl and payed out the prescribed amount of trawl warp while traveling faster than the target towing speed. The vessel was slowed as the brakes were set on the trawl winches and the gear was allowed to sink toward bottom. Before the gear reached bottom, the speed of the vessel was increased to 1.5 m/sec (speed

over ground) so that the trawl was nearly in its fishing configuration when it contacted the bottom. The duration of the tow was measured from when the trawl reached bottom and settled into its equilibrium fishing configuration as determined from information provided by the Scanmar trawl mensuration system until retrieval was initiated. After achieving equilibrium, the trawl was towed at 1.5 m/sec for 30 minutes. The net was then retrieved by engaging the winches while maintaining the 1.5 m/sec tow speed. If the gear was damaged during the tow severely enough to affect catch composition, the haul was considered unsatisfactory and the station was either retowed or abandoned. Unsuccessful tows were not used to calculate biomass or population estimates. The two vessels usually fished alternate tracklines when operating together to distribute any potential vessel-specific sampling effect equally over the survey area.

#### Catch Sampling and Oceanographic Data Collection

Trawl catches weighing about 1.2 metric tons (t) or less were deposited directly onto a table and sorted to species. Species were then weighed to the nearest 0.1 kg using a mechanical platform scale and enumerated. Individual species or species groups weighing approximately 2 kg or less were typically weighed to the nearest gram on an electronic Marel digital read-out scale. Larger catches were weighed with a dynamometer or their weight estimated volumetrically. These large catches were then either processed in their entirety by bringing multiple loads to the sorting table or by emptying the codend into a deck

bin and lifting a representative subsample to the table with a cargo net in a manner described by Hughes (1976), or by single-species subsampling when the major component of the catch was one species (e.g., Pacific hake or spiny dogfish (*Squalus acanthias*)). For those few hauls when the cargo net was used to obtain a subsample of the catch, major groundfish species occurring in limited numbers and remaining in the deck bin were 100% sampled. For those hauls when a single species clearly comprised the majority of the catch a randomly selected subsample of that species was obtained and the remainder (non-subsample) discarded. The difference between the total catch weight measured by the dynamometer and the sum of the subsample weight for the dominant species and all other species was used to estimate the total non-subsample weight for the dominant species.

Fork length (FL) measurements (up to 200 per tow) were randomly obtained by sex for all flatfish, all rockfish, Pacific hake, sablefish, Pacific cod (*Gadus macrocephalus*), and walleye pollock (*Theragra chalcogramma*) whenever they were caught. Lengths were also obtained for other species as time allowed. Total length (TL) measurements were obtained for sharks and skates while anal length (tip of snout to origin of anal fin) measurements were taken for grenadiers. All Pacific halibut (*Hippoglossus stenolepis*) were measured and released, their weights estimated from the length data.

Otoliths (used for age determination), along with individual specimen weight and maturity data, were collected from



a variety of species. Collections for Pacific hake and sablefish were stratified by length interval (5 otoliths/sex/cm) for biological subareas. Random collections were made for bocaccio (*S. paucispinis*), chilipepper (*S. goodei*), Pacific ocean perch, and aurora (*S. aurora*), blackgill (*S. melanostomus*), canary, darkblotched (*S. crameri*), redstripe (*S. proriger*), silvergray (*S. brevispinis*), sharpchin (*S. zacentrus*), splitnose (*S. diploproa*), yelloweye (*S. ruberrimus*), yellowmouth (*S. reedi*), and yellowtail rockfish. Fin rays were collected from lingcod for determining age. Other requests for meristic data and for samples of stomach contents, tissues, and whole fish were also fulfilled as time allowed.

Surface temperatures were measured with bucket thermometers and MBTs. Water column temperature profiles and bottom temperatures were collected with MBTs. Additionally, several sediment samples were collected on an opportunistic basis with a Shipek sediment grab.

#### Data Analyses

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

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

We use the area-swept method described by Gunderson and Sample (1980) to calculate catch rates, which are in turn used to estimate population biomass and numbers. Briefly, this method entails standardizing species catch rates from each station into catch per unit effort (CPUE) in terms of kilograms or numbers per hectare trawled (kg/ha, no./ha) and calculating the arithmetic mean CPUE for each sampling stratum. Effort, the product of distance fished during the tow (net on bottom) and path width, is determined from information provided by an electronic bottom contact sensor (BCS; Somerton and Weinberg 2001), MBT, the Scanmar trawl mensuration system, and GPS. Relative abundance (mean CPUE) of each species is then calculated for each International North Pacific Fisheries Commission (INPFC) area as the sum of the mean CPUEs of each appropriate sampling stratum weighted by their respective stratum areas. Population biomass and numbers in each stratum are estimated by multiplying the stratum mean CPUE by the stratum area. Stratum estimates are summed to provide biomass and population estimates for various portions of the survey area (e.g., INPFC areas, U.S. waters). In cases where our sampling strata overlap more than one INPFC area, we expand the overall sampling stratum mean CPUE to the area of that portion of the sampling stratum lying within the INPFC area.

The size composition of each species was estimated in a manner similar to the population estimate. Length-frequency data collected at each station were weighted by the CPUE (no./ha) of that species at that station, summed over all hauls in a stratum, and expanded to the stratum population estimate. As with

population estimates, stratum estimates were summed to derive the estimated size compositions for various portions of the survey area.

Ages were determined from otolith or fin ray samples collected from groundfish species. The age compositions of these stocks were estimated by multiplying their population size composition by age-length keys (matrices of length vs. age) constructed from the age data from corresponding or appropriately pooled strata.

## RESULTS

### Haul, Catch, and Biological Data

Successful samples were obtained from 506 of the 610 stations within the entire survey bounds. Twenty-one tows were unsuccessful due to damaged trawls or poor gear performance, 51 stations were abandoned due to untrawlable bottom, and 32 stations remained unsampled on the northernmost four tracklines due to lack of time. Figure 3 shows the location of successful tows by depth stratum. Sampling density in each INPFC area ranged from 3.94 to 11.97 hauls per 1,000 km<sup>2</sup> in the shallow strata, from 2.91 to 19.07 hauls per 1,000 km<sup>2</sup> in the middle strata, and from 4.52 to 30.08 hauls per 1,000 km<sup>2</sup> in the deep strata (Table 2). Over the entire survey area, the sampling density was slightly higher in the deep strata (13.06 hauls per 1,000 km<sup>2</sup>) than in the middle (10.28 hauls per 1,000 km<sup>2</sup>) or the shallow (7.35 hauls per 1,000 km<sup>2</sup>) strata. Overall, the average

sampling density was also higher in the U.S. portion of the survey area than in the Canadian portion.

To date, a total of 166 fish species representing 57 families have been identified to the species level from good performance tows over the course of the survey (Table 3). These numbers are likely to increase as specimens collected at sea and brought back to the AFSC for identification are processed. Table 3 also lists the frequencies of occurrence, depth ranges, and the range of distribution by latitude for all fish taxa identified in trawl samples. The rockfishes (family Scorpaenidae) were the most diverse with 40 species taken in successful trawl samples coastwide, followed by the flatfishes (families Bothidae and Pleuronectidae) with 18, and the sculpins (family Cottidae) with 14 species.

Length measurements were taken from 275,122 fish. A summary of the number of fish measured is presented in Table 4 by species, INPFC area, and depth stratum. The number of specimens collected surveywide for age analyses, length-weight relationships, and maturity are reported in Table 5. Appendix A (see separate Data Appendices volume) summarizes the catch data by haul for each vessel.

#### Temperature Data

Sea surface temperatures measured at 489 stations using MBT and bucket thermometer data ranged from 6.5° to 16.7°C. The overall mean surface temperature was 12.0°C. Temperature profiles of the water column (surface to bottom) were collected

at 463 stations. Bottom temperatures from these stations ranged from 5.2° to 10.8°C, averaging 7.2°C. Figure 4 illustrates the observed surface and bottom temperatures by latitude.

#### Relative Abundance

The 20 most abundant groundfish species are presented by depth stratum for the individual INPFC areas in Table 6. The complete listings of the relative abundance of all fish and invertebrates ranked by mean CPUE for each INPFC area and depth stratum are presented in Appendix B (see separate volume of Data Appendices). Average total fish densities were highest in the Monterey (212.8 kg/ha) INPFC area followed by the Vancouver (200.8 kg/ha), Columbia (159.1 kg/ha), Eureka (155.1 kg/ha), and Conception (144.3 kg/ha) INPFC areas.

Pacific hake was the most abundant species overall, accounting for about 36% (64.3 kg/ha) of the total survey CPUE and about 39% (67.5 kg/ha) in U.S. waters alone. Pacific hake abundance was greatest in the Eureka INPFC area (91.8 kg/ha), where it comprised about 59% of the area's total CPUE. Pacific hake were least abundant in the Vancouver INPFC area (21.7 kg/ha) where it accounted for about 11% of all fish. Besides the Eureka INPFC area, Pacific hake also dominated samples in the Monterey (82.1 kg/ha), Columbia (69.0 kg/ha) and Conception (31.4 kg/ha) INPFC areas.

Sablefish was the second most abundant fish species, both overall and in U.S. waters. Sablefish CPUE averaged 19.5 kg/ha for the entire survey, or about 11% of the total fish CPUE and

20.5 kg/ha, or about 12% of the CPUE in U.S. waters. Sablefish abundance was greatest in the Columbia INPFC area (23.9 kg/ha), followed by the Monterey (23.3 kg/ha), Vancouver (20.9 kg/ha), Conception (9.5 kg/ha), and Eureka (5.6 kg/ha) INPFC areas. Sablefish accounted for between 4% and 15% of INPFC area fish catches.

Dover sole (*Microstomus pacificus*) was the third most abundant fish species, both surveywide and in U.S. waters. The mean Dover sole catch rate was 14.9 kg/ha throughout the entire survey area, or about 8% of the CPUE and 15.1 kg/ha in the U.S. area or about 9% of the CPUE. Dover sole abundance was greatest in the Monterey (20.7 kg/ha) INPFC area, followed by the Conception (17.9 kg/ha), Vancouver (12.9 kg/ha), Columbia (12.2 kg/ha), and Eureka (11.7 kg/ha) INPFC areas. Dover sole accounted for between 6% and 12% of INPFC area fish catches.

Catch composition and relative densities varied widely among geographic areas. The five most prominent species in the Conception INPFC area were: Pacific hake, chilipepper (30.4 kg/ha), Dover sole, Pacific sanddab (*Citharichthys sordidus*; 13.9 kg/ha), and sablefish; in the Monterey INPFC area, Pacific hake, sablefish, Dover sole, shortbelly rockfish (*S. jordani*; 18.9 kg/ha), and chilipepper (11.5 kg/ha); in the Eureka INPFC area, Pacific hake, Dover sole, rex sole (*Glyptocephalus zachirus*; 8.6 kg/ha), Pacific sanddab (6.9 kg/ha), and spiny dogfish (5.7 kg/ha); in the Columbia INPFC area, Pacific hake,

sablefish, Dover sole, Pacific sanddab (10.9 kg/ha), and rex sole (7.5 kg/ha); in the U.S. Vancouver INPFC area, walleye pollock (34.8 kg/ha), sablefish, arrowtooth flounder (*Atheresthes stomias*; 25.7 kg/ha), spiny dogfish (16.9 kg/ha), and Pacific hake; and in the Canadian Vancouver INPFC area, walleye pollock (40.4 kg/ha), spiny dogfish (31.1 kg/ha), Pacific hake, arrowtooth flounder (21.4 kg/ha), and yellowtail rockfish (16.0 kg/ha).

The catch composition also varied among depth strata. In the shallow stratum (55-183 m) for the entire survey area, Pacific hake (85.8 kg/ha) dominated catches, followed by sablefish (23.9 kg/ha), Pacific sanddab (13.6 kg/ha), walleye pollock (9.7 kg/ha), and spiny dogfish (9.1 kg/ha). The five most abundant species in the middle depth stratum (184-366 m) were Pacific hake (44.1 kg/ha), shortbelly rockfish (22.9 kg/ha), Dover sole (22.6 kg/ha), splitnose rockfish (16.9 kg/ha), and sablefish (14.2 kg/ha). The five most abundant species in the deep stratum (367-500 m) were Dover sole (31.6 kg/ha), Pacific hake (14.2 kg/ha), sablefish (11.0 kg/ha), rex sole (7.6 kg/ha), and shortspine thornyhead (*Sebastolobus alascanus*; 5.3 kg/ha).

Maps of the geographical distribution of economically important species, based on catch rates at each station, are presented by species in Figures 5-35 in alphabetical order. Some commercially important species such as yelloweye and yellowmouth rockfish have not been mapped because they were caught so

infrequently. Distribution maps for the following species are provided:

Arrowtooth flounder	Aurora rockfish	Blackgill rockfish
Bocaccio	Canary rockfish	Chilipepper
Darkblotched rockfish	Dover sole	English sole
Greenstriped rockfish	Lingcod	Longspine thornyhead
Pacific hake	Pacific halibut	Pacific ocean perch
Pacific sanddab	Petrable sole	Redstripe rockfish
Rex sole	Rougheye rockfish	Sablefish
Sharpchin rockfish	Shortbelly rockfish	Shortspine thornyhead
Silvergray rockfish	Spiny dogfish	Splitnose rockfish
Stripetail rockfish	Walleye pollock	Widow rockfish
Yellowtail rockfish		

The distribution of each species is presented by relative density classifications (high, moderate, and low) in the distribution maps. For each species, all non-zero station catch rates were sorted in increasing order and classified in either the lowest 60%, middle 30%, or top 10% of the catch rate values. Stations where the species was not caught are also shown. The distribution of sampling effort should be considered when viewing these charts since heavier sampling in an area may give the impression of high densities when, in fact, CPUE was only moderate or low.

#### Biomass and Population Estimates

Abundance estimates in metric tons (t) of biomass and associated 90% confidence intervals are presented for various taxa in the total survey and by INPFC area and depth stratum in Tables 7-10. Similarly, estimates of population numbers are presented for important species groups in Tables 11-14. Detailed



listings of biomass and population estimates are presented for the major species in Appendix C in the Data Appendices volume.

The on-bottom component of the Pacific hake population was estimated to be 383,560 t for the entire area (Table 7). Two of the five INPFC areas accounted for 69% of the total estimated Pacific hake biomass, 42% in the Columbia INPFC area and 27% in the Monterey area. Nearly 7% of the total estimated Pacific hake biomass (25,628 t) was found in Canadian waters. Pacific hake biomass was distributed mostly in the shallow stratum, 333,231 t (87%), with 41,352 t (11%) in the middle depth stratum, and 8,977 t (2%) in the deep stratum (Tables 8-10).

The total sablefish biomass estimate was 117,945 t (Table 7). The Columbia and Monterey INPFC areas contributed 45% and 25%, respectively, of the total sablefish biomass between the depths of 55 and 500 m. Sablefish in Canadian waters (8,869 t) amounted to 8% of the total. The distribution of sablefish biomass was greatest in the shallow stratum with 96,643 t (82%), 14,263 t (12%) in the middle depth stratum, and 7,040 t (6%) in the deep stratum (Tables 8-10).

The biomass and population estimates presented here 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 and between the wingtips are captured. The degree of this 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 the flatfish species. Furthermore, the survey covers limited portions of the depth and geographic range of many of these species.

### Length Composition

Estimated population length compositions for several groundfish species are presented in alphabetical order by sex and INPFC area (Figs. 36-69). The length compositions for Pacific hake and sablefish include separate presentations of their length compositions by depth stratum. The length compositions of the remaining species are presented for the combined depths only. Computer files of estimated length compositions, by sex and INPFC area, are available upon request for any species from which length data were collected.

Two length modes were evident in the Pacific hake length distributions. For the total survey area, a discrete peak was seen at 33 cm, and a smaller peak was seen at 47 cm (Fig. 47). The overall population mean length was 39.4 cm. Pacific hake ranged in length from 10 to 91 cm. The male and female components of the population were similar with the average length of females (40.6 cm) being slightly longer than that of the males (38.1 cm). The Conception INPFC area contained mostly small to medium-sized (<35 cm) Pacific hake, the Monterey INPFC area had mostly medium (>30 cm) and some large (>40 cm) Pacific hake, the

Eureka and Columbia INPFC areas contained mostly medium and large Pacific hake, and north of the Columbia INPFC area we found mostly large hake. Some small Pacific hake were evident in the Canadian portion of the Vancouver INPFC area. Pacific hake mean lengths increased steadily from south to north ranging from 32.2 cm in the Conception area to 52.2 cm in the Canadian portion of the Vancouver INPFC area. Mean lengths of Pacific hake increased with depth in the Conception and Monterey INPFC areas but decreased in the middle depth strata in the Eureka and Columbia INPFC areas. Both portions of the Vancouver INPFC contained larger fish, on average, than INPFC areas to the south but also demonstrated a general decrease in size between the shallow and deep depth strata (Figs. 48, 49, and 50).

Sablefish inhabit a wide range of depths, exceeding the bounds of this survey. Its size distribution can be described by data from this survey for only the shallow end of its range. At these depths, the estimated length distribution for sablefish for the entire area was generally bimodal with a sharp peak of smaller fish at 36 cm and a smaller peak at 42 cm (Fig. 58). The overall population mean length was 39.5 cm. Sablefish ranged in length from 18 to 91 cm. The male and female population components were similar with the mean length of females (39.8 cm) being slightly longer than that of the males (39.1 cm). Juvenile sablefish (<43 cm) accounted for 79% of the estimated population. Unimodal distributions were observed in the Conception, Monterey, and U.S. portion of the Vancouver INPFC area with peaks at 40 cm,

42 cm, and 38 cm, respectively. More bimodal size distributions were seen in Eureka, Columbia, and the Canadian portion of the Vancouver INPFC area with peaks at 38 and 47 cm, 36 and 46 cm, and 38 cm, respectively. A large population of sablefish under 40 cm were detected north of the Eureka INPFC area in the shallow depth stratum (Fig. 59). Sablefish in the deep stratum were larger than those found in the two shallower strata (Fig. 61).

#### Age Compositions

Otoliths or dorsal fin rays were collected for age determination from specimens of 17 groundfish species (Table 5). To date, ages have been assigned to the structures collected from Pacific hake, canary rockfish, and yellowtail rockfish. The age composition of these species has been estimated and is presented in Figures 70-72. For this report, each of these species has been treated as a single, homogenous stock and all age data collected during the 2001 survey has been used to estimate the species's length-age relationship. When it has been appropriate, the age compositions of several of these resources have been estimated and presented in more geographic detail in stock assessment documents published by the Pacific Fishery Management Council.

The age composition of the Pacific hake resource (Fig. 70) shows that the population is primarily supported by 2-year-olds followed by a decreasing continuum ranging from 3 to 8 years in

age. Older fish contribute relatively little to the size of this resource.

Both rockfish species also demonstrated unimodal age compositions where the majority of the population is supported by a continuous range of ages that taper off with time. The canary rockfish resource was comprised mostly of 5-to-11-year-old fish with the population most strongly supported by the 1993-1995 year classes (Fig. 71). The eldest canary rockfish in our sample was 56 years old. The yellowtail rockfish resource was comprised mostly of 11-to-16-year-old fish with the majority of the population coming from the 1987 to 1990 year classes (Fig. 72). These two rockfish species generally become fully available to the survey and commercial trawl gear when they are between 3 and 7 years old. Prior to that, they can be detected by the survey trawl when the younger age groups are notably abundant. Following their full recruitment to the gear, the age composition figures (Figs. 71 and 72) track the relatively constant decrease in their abundance as they age, a normal result of natural and fishing-induced mortality.

#### Length-Weight Relationships

From the individual fish weight samples, we determined length-weight relationships using a non-linear, least-squares regression model. Results of these analyses are summarized in Table 15 for males, females, and for all fish combined (including

unsexed fish, if data existed for them). The following equations describe the relationships for Pacific hake and sablefish:

Pacific hake:       $W = 0.0060727 \times L^{3.010904}$       for males  
                           $W = 0.0044392 \times L^{3.103434}$       for females  
                           $W = 0.0051681 \times L^{3.060471}$       for all sexes

Sablefish:             $W = 0.0030949 \times L^{3.292493}$       for males  
                           $W = 0.0031333 \times L^{3.287077}$       for females  
                           $W = 0.0031534 \times L^{3.286425}$       for all sexes

where:

W = estimated weight (g)

L = fork length (cm).

#### AFSC WEST COAST SURVEY DATA SOURCES

The 2001 West Coast triennial survey is the main source of fishery-independent information on the abundance, distribution, and length and age-composition for most of the commercially important species occupying the continental shelf. Other AFSC fishery-independent data sources used for stock assessments include the echo integration-trawl survey of the West Coast Pacific hake resource and the bottom trawl survey of upper continental slope groundfish resources (sablefish, Dover sole, and thornyheads). Future National Marine Fisheries Service stock

assessment surveys of West Coast shelf and slope resources have been assigned to the Northwest Fisheries Science Center (2725 Montlake Blvd. E., Seattle, WA 98112).

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Table 1.--Attributes of the vessels and net used during the 2001 triennial West Coast groundfish survey.

Vessel	Vessel length	Horsepower	Mean net width	Survey period
F/V <i>Sea Storm</i>	38.0 m	1,710	13.71 m	1 June-5 August
F/V <i>Frosti</i>	39.0 m	1,000	14.05 m	1 June-27 August*

\* The *Frosti* was off charter 23 June to 15 July.

Table 2.--Sampling stratum boundaries used for analyses, stratum areas (km<sup>2</sup>), and realized sampling density (hauls/1,000 km<sup>2</sup>) based on successful tows during the 2001 triennial West Coast groundfish survey. Strata have been grouped according to International North Pacific Fisheries Commission (INPFC) areas. Differences in totals are due to rounding.

INPFC Areas / Latitude bounds	Stratum Code	Shallow Strata (55-183 m)				Middle Strata (184-366 m)					Deep Strata (367-500 m)				
		Area (km <sup>2</sup> )	Allotted stations	Good hauls	Hauls per 1,000 km <sup>2</sup>	Stratum Code	Area (km <sup>2</sup> )	Allotted stations	Good hauls	Hauls per 1,000 km <sup>2</sup>	Stratum Code	Area (km <sup>2</sup> )	Allotted stations	Good hauls	Hauls per 1,000 km <sup>2</sup>
<b>Vancouver</b>															
48°20' - 49°40'	19	8,587.0	69	36	4.19	29	1,211.2	14	6	4.95	39	442.2	11	2	4.52
47°50' - 48°20'	18	2,282.2	21	14	6.13	28	874.6	10	7	8.00	38	241.0	7	3	12.45
47°30' - 47°50'	17	1,032.6	8	8	7.75	27	124.7	2	2	16.04	37	102.2	2	1	9.78
47°30' - 49°40'	--	11,901.8	98	58	4.87	--	2,210.5	26	15	6.79	--	785.4	20	6	7.64
<b>Vancouver (Canada only)</b>															
48°20' - 49°40'	19	8,224.4	66	33	4.01	29	941.7	11	3	3.19	39	442.2	11	2	4.52
Border - 48°20'	18	159.4	0	0	0.00	28	87.6	1	0	0.00	38	66.5	2	2	30.08
Border - 49°40'	--	8,383.8	66	33	3.94	--	1,029.3	12	3	2.91	--	508.7	13	4	7.86
<b>Vancouver (U.S. only)</b>															
48°20' - Border	19	362.6	3	3	8.27	29	269.5	3	3	11.13					
47°50' - 48°20'	18	2,122.8	21	14	6.60	28	787.0	10	7	8.89	38	174.5	5	1	5.73
47°30' - 47°50'	17	1,032.6	8	8	7.75	27	124.7	2	2	16.04	37	102.2	2	1	9.78
47°30' - Border	--	3,518.0	32	25	7.11	--	1,181.2	15	12	10.16	--	276.7	7	2	7.23
<b>Columbia</b>															
46°30' - 47°30'	17	3,378.0	26	25	7.40	27	412.0	7	5	12.14	37	217.8	7	1	4.59
44°40' - 46°30'	16	6,014.3	49	49	8.15	26	2,118.5	21	20	9.44	36	2,101.2	19	17	8.09
43°00' - 44°40'	15	6,250.0	49	44	7.04	25	1,508.1	16	16	10.61	35	775.0	12	12	15.48
43°00' - 47°30'	--	15,642.3	124	118	7.54	--	4,038.6	44	41	10.15	--	3,094.0	38	30	9.70
<b>Eureka</b>															
40°30' - 43°00'	14	4,090.6	39	38	9.29	24	1,076.2	16	16	14.87	34	736.6	16	12	16.29

Table 2.--Continued.

INPFC Areas / Latitude bounds	Stratum Code	Shallow Strata (55-183 m)				Middle Strata (184-366 m)				Deep Strata (367-500 m)					
		Area (km <sup>2</sup> )	Allotted stations	Good hauls	Hauls per 1,000 km <sup>2</sup>	Stratum Code	Area (km <sup>2</sup> )	Allotted stations	Good hauls	Hauls per 1,000 km <sup>2</sup>	Stratum Code	Area (km <sup>2</sup> )	Allotted stations	Good hauls	Hauls per 1,000 km <sup>2</sup>
<b>Monterey</b>															
38°00' - 40°30'	13	4,724.4	45	44	9.31	23	1,112.2	17	13	11.69	33	676.8	15	15	22.16
36°50' - 38°00'	12	3,735.0	30	30	8.03	22	493.9	8	6	12.15	32	354.4	8	4	11.29
36°00' - 36°50'	11	551.6	7	6	10.88	21	189.1	6	3	15.86	31	189.2	5	4	21.14
36°00' - 40°30'	--	9,011.0	82	80	8.88	--	1,795.2	31	22	12.25	--	1,220.4	28	23	18.85
<b>Conception</b>															
35°40' - 36°00'	11	167.1	2	2	11.97	21	104.9	2	2	19.07	31	113.2	2	2	17.67
34°30' - 35°40'	10	1,343.4	14	14	10.42	20	1,089.7	10	10	9.18	30	943.6	17	17	18.02
34°30' - 36°00'	--	1,510.5	16	16	10.59	--	1,194.6	12	12	10.05	--	1,056.8	19	19	17.98
<b>2001 Totals</b>															
<b>U.S. Total</b>		33,772.4	293	277	8.20		9,285.8	118	103	11.09		6,384.5	108	86	13.47
<b>Entire Survey</b>		42,156.2	359	310	7.35		10,315.1	130	106	10.28		6,893.2	121	90	13.06

Table 3.--Frequency of occurrence, depth, and latitude ranges for fish species caught during the 2001 triennial West Coast groundfish survey.

Family and Scientific Name*	Common Name	Frequency of Occurrence	Minimum Depth (m)	Maximum Depth (m)	Mean Depth (m)	Latitude Range** South / North
Myxiniidae	hagfishes					
<i>Myxiniidae unident.</i>	hagfish unident.	27	67	484	244	4054 / 4814
<i>Eptatretus stouti</i>	Pacific hagfish	1	97	97	97	3814 / 3814
Petromyzontidae	lampreys					
<i>Petromyzontidae unident.</i>	lamprey unident.	7	76	474	321	3914 / 4555
<i>Lampetra tridentata</i>	Pacific lamprey	5	373	442	412	3546 / 4813
Chimaeridae	ratfishes					
<i>Hydrolagus colliciei</i>	spotted ratfish	301	59	483	183	3433 / 4905
Scyllorhinidae	cat sharks					
<i>Scyllorhinidae unident.</i>	cat shark unident.	25	75	484	345	3433 / 4245
<i>Apristurus brunneus</i>	brown cat shark	105	79	492	347	3445 / 4904
<i>Parmaturus xaniurus</i>	filetail cat shark	17	97	489	389	3445 / 4404
Triakidae	houndsharks					
<i>Galeorhinus galeus</i>	soufín shark	1	74	74	74	4753 / 4753
Carcharhinidae	requiem sharks					
<i>Prionace glauca</i>	blue shark	1	474	474	474	4324 / 4324
Hexanchidae	cow sharks					
<i>Hexanchus griseus</i>	sixgill shark	1	100	100	100	3733 / 3733
Dalatiidae	sleeper sharks					
<i>Somniosus pacificus</i>	Pacific sleeper shark	2	348	408	378	3434 / 4453
Squalidae	dogfish sharks					
<i>Squalus acanthias</i>	spiny dogfish	234	61	481	154	3433 / 4906
Torpedinidae	electric rays					
<i>Torpedo californica</i>	Pacific electric ray	20	60	254	109	3434 / 4335
Rajidae	skates					
<i>Rajidae unident.</i>	skate unident.	1	117	117	117	4404 / 4404
<i>Raja binoculata</i>	big skate	45	57	409	113	3434 / 4814
<i>Raja inornata</i>	California skate	12	69	137	90	3655 / 3826
<i>Raja rhina</i>	longnose skate	293	60	492	206	3433 / 4905
<i>Bathyraja aleutica</i>	Aleutian skate	1	435	435	435	4304 / 4304
<i>Bathyraja interrupta</i>	Bering skate	168	64	489	280	3434 / 4905
<i>Bathyraja parmifera</i>	Alaska skate	1	91	91	91	4405 / 4405
Acipenseridae	sturgeons					
<i>Acipenser medirostris</i>	green sturgeon	1	74	74	74	3824 / 3824
Nemichthyidae	snipe eels					
<i>Nemichthyidae unident.</i>	snipe eel unident.	2	68	251	160	4254 / 4644
Serrivomeridae	sawtooth eels					
<i>Serrivomer sector</i>	sawtooth eel	1	483	483	483	3445 / 3445
Engraulidae	anchovies					
<i>Engraulis mordax</i>	northern anchovy	15	57	169	81	3434 / 4644
Clupeidae	herrings					
<i>Clupea pallasii</i>	Pacific herring	94	59	225	99	3435 / 4904
<i>Alosa sapidissima</i>	American shad	95	59	208	108	3441 / 4905
<i>Sardinops sagax</i>	Pacific sardine	49	61	367	116	3724 / 4906
Argentinidae	argentines					
<i>Argentinidae unident.</i>	argentines unident.	8	68	207	124	3441 / 3744
<i>Argentina sialis</i>	Pacific argentine	15	60	407	172	3453 / 3825
Bathylagidae	deepsea smelts					
<i>Bathylagidae unident.</i>	deepsea smelt unident.	1	407	407	407	4245 / 4245
<i>Bathylagus sp.</i>	blacksmelt unident.	1	484	484	484	4243 / 4243
<i>Bathylagus milleri</i>	robust blacksmelt	1	484	484	484	4243 / 4243
<i>Leuroglossus stilbius</i>	California smoothtongue	3	369	419	398	4233 / 4524

Table 3.--Continued.

Family and Scientific Name*	Common Name	Frequency of Occurrence	Minimum Depth (m)	Maximum Depth (m)	Mean Depth (m)	Latitude Range** South / North
Platyroctidae (Searsiidae)	tubeshoulders					
<i>Platyroctidae unident.</i>	tubeshoulder unident.	1	469	469	469	3935 / 3935
<i>Sagamichthys abei</i>	shining tubeshoulder	3	267	474	342	3455 / 4236
Osmeridae	smelts					
<i>Thaleichthys pacificus</i>	eulachon	130	62	466	147	4225 / 4905
<i>Allosmerus elongatus</i>	whitebait smelt	13	64	104	80	3814 / 4906
Salmonidae	salmonids					
<i>Oncorhynchus gorbuscha</i>	pink salmon	2	95	118	107	4835 / 4835
<i>Oncorhynchus tshawytscha</i>	chinook salmon	37	59	215	91	3441 / 4854
<i>Oncorhynchus kisutch</i>	coho salmon	4	66	108	90	3946 / 4623
Sternoptychidae	marine hatchetfishes					
<i>Sternoptychidae unident.</i>	hatchetfish unident.	3	240	454	355	3455 / 4336
Stomiidae	dragonfishes					
<i>Aristostomias scintillans</i>	shining loosejaw	2	442	474	458	3455 / 4813
<i>Chauliodontus unident.</i>	viperfish unident.	12	294	435	383	4213 / 4533
<i>Chauliodus macouni</i>	Pacific viperfish	21	211	492	408	3443 / 4813
<i>Iliacanthus antrostomus</i>	Pacific blackdragon	5	240	484	390	3455 / 4343
<i>Melanostomus unident.</i>	scales dragonfish unident.	5	217	458	369	4054 / 4534
<i>Bathophilus flemingi</i>	highfin dragonfish	5	347	492	419	4343 / 4643
<i>Tactostoma macropus</i>	longfin dragonfish	20	293	492	404	3455 / 4905
Scopelarchidae	pearleyes					
<i>Benthalbella dentata</i>	northern pearleye	1	407	407	407	4245 / 4245
Paralepidae	barracudinas					
<i>Notolepsis risso</i>	ribbon barracudina	1	330	330	330	4755 / 4755
Anotopteridae	daggertooths					
<i>Anotopterus pharao</i>	daggertooth	2	419	475	447	4343 / 4524
Alepisauridae	lancetfishes					
<i>Alepisaurus ferox</i>	longnose lancetfish	1	453	453	453	3607 / 3607
Myctophidae	lanternfishes					
<i>Myctophidae unident.</i>	lanternfish unident.	61	174	492	375	3434 / 4755
<i>Diaphus sp.</i>		1	414	414	414	4616 / 4616
<i>Diaphus theta</i>	California headlightfish	27	115	475	296	4233 / 4826
<i>Lampanyctus sp.</i>		1	474	474	474	3534 / 3534
<i>Lampanyctus ritteri</i>	broadfin lanternfish	5	407	492	446	4253 / 4734
<i>Stenobrachius leucopsarus</i>	northern lampfish	7	144	466	353	4734 / 4826
<i>Tarletonbeania crenularis</i>	blue lanternfish	6	230	474	364	3455 / 4905
Trachipteridae	ribbonfishes					
<i>Trachipterus altivelis</i>	king-of-the-salmon	2	97	419	258	3754 / 3951
Ophidiidae	cusks-eels					
<i>Ophidiion scrippsae</i>	basketweave cusk-eel	1	260	260	260	3656 / 3656
<i>Chilara taylori</i>	spotted cusk-eel	45	72	260	159	3443 / 4655
Macrouridae	grenadiers					
<i>Albatrossia pectoralis</i>	giant grenadier	4	450	492	473	4243 / 4904
<i>Coryphaenoides acrolepis</i>	Pacific grenadier	4	405	469	447	3624 / 4223
<i>Nezumia stelgidolepis</i>	California grenadier	3	468	474	470	3455 / 3632
Moridae	codlings					
<i>Antimora microlepis</i>	Pacific flatnose	22	345	492	436	3824 / 4904
<i>Physiculus rastrelliger</i>	hundred fathom codling	1	267	267	267	4236 / 4236
Merlucciidae	merluccid hakes					
<i>Merluccius productus</i>	Pacific hake	434	57	492	213	3433 / 4905
Gadidae	cods					
<i>Gadus macrocephalus</i>	Pacific cod	35	61	253	148	4644 / 4905
<i>Microgadus proximus</i>	Pacific tomcod	62	57	136	85	3755 / 4906
<i>Theragra chalcogramma</i>	walleye pollock	32	78	295	147	4354 / 4905
Batrachoididae	toadfishes					
<i>Porichthys notatus</i>	plainfin midshipman	78	59	261	100	3434 / 4854
Scomberesocidae	sauries					

Table 3.--Continued.

Family and Scientific Name*	Common Name	Frequency of Occurrence	Minimum Depth (m)	Maximum Depth (m)	Mean Depth (m)	Latitude Range** South / North
<i>Cololabis saira</i>	Pacific saury	2	64	82	73	4305 / 4436
Melamphaidae	bigscapes					
<i>Melamphidae unident.</i>	bigscale unident.	1	460	460	460	4454 / 4454
Anoplogastridae	fangtooths					
<i>Anoplogaster cornuta</i>	fangtooth	1	417	417	417	3904 / 3904
Scorpaenidae	scorpionfishes					
<i>Sebastobus alascanus</i>	shortspine thornyhead	198	64	492	322	3433 / 4905
<i>Sebastobus altivelis</i>	longspine thornyhead	25	310	492	442	3445 / 4814
<i>Sebastes sp.</i>	rockfish unident.	9	131	326	185	3845 / 4905
<i>Sebastes aleutianus</i>	rougheye rockfish	67	122	450	285	4003 / 4905
<i>Sebastes alutus</i>	Pacific ocean perch	87	113	460	278	3732 / 4905
<i>Sebastes aurora</i>	aurora rockfish	80	264	492	421	3444 / 4814
<i>Sebastes brevispinis</i>	silvergray rockfish	12	77	402	192	4415 / 4905
<i>Sebastes camatus</i>	gopher rockfish	2	69	86	78	3814 / 3815
<i>Sebastes charrinus</i>	copper rockfish	3	68	90	80	3454 / 3655
<i>Sebastes chlorostictus</i>	greenspotted rockfish	14	105	254	148	3638 / 4424
<i>Sebastes crameri</i>	darkblotched rockfish	186	78	460	218	3453 / 4905
<i>Sebastes dalli</i>	calico rockfish	2	73	90	82	3655 / 3724
<i>Sebastes diploproa</i>	splitnose rockfish	178	97	489	267	3433 / 4905
<i>Sebastes elongatus</i>	greenstriped rockfish	180	79	387	159	3441 / 4905
<i>Sebastes emphaeus</i>	Puget Sound rockfish	1	77	77	77	4704 / 4704
<i>Sebastes entomelas</i>	widow rockfish	29	90	348	200	3443 / 4853
<i>Sebastes flavidus</i>	yellowtail rockfish	58	72	217	139	3615 / 4905
<i>Sebastes goodei</i>	chilipepper	79	63	426	167	3434 / 4853
<i>Sebastes helvomaculatus</i>	rosethorn rockfish	43	105	442	220	3453 / 4905
<i>Sebastes hopkinsi</i>	squarespot rockfish	4	81	240	190	3534 / 4524
<i>Sebastes jordani</i>	shortbelly rockfish	40	64	489	169	3434 / 4905
<i>Sebastes levis</i>	cowcod	7	99	240	178	3453 / 4545
<i>Sebastes maliger</i>	quillback rockfish	7	64	113	89	4123 / 4854
<i>Sebastes melanops</i>	black rockfish	1	78	78	78	4714 / 4714
<i>Sebastes melanostomus</i>	blackgill rockfish	49	90	483	389	3433 / 4314
<i>Sebastes miniatus</i>	vermillion rockfish	5	68	370	142	3454 / 3655
<i>Sebastes paucispinis</i>	bocaccio	31	66	260	167	3441 / 4905
<i>Sebastes pinniger</i>	canary rockfish	77	68	249	143	3441 / 4903
<i>Sebastes proriger</i>	redstripe rockfish	24	90	301	165	3617 / 4905
<i>Sebastes rosaceus</i>	rosy rockfish	1	81	81	81	3615 / 3615
<i>Sebastes ruberrimus</i>	yelloweye rockfish	16	77	197	142	4403 / 4905
<i>Sebastes babcocki</i>	redbanded rockfish	85	139	426	271	3504 / 4905
<i>Sebastes saxicola</i>	stripetail rockfish	113	66	382	184	3434 / 4905
<i>Sebastes semicinctus</i>	halfbanded rockfish	30	73	230	109	3441 / 4643
<i>Sebastes wilsoni</i>	pygmy rockfish	14	79	215	139	3615 / 4905
<i>Sebastes zacentrus</i>	sharpchin rockfish	47	119	387	235	3504 / 4905
<i>Sebastes rufus</i>	bank rockfish	18	261	483	360	3433 / 4823
<i>Sebastes borealis</i>	shortraker rockfish	9	293	466	398	3523 / 4905
<i>Sebastes reedi</i>	yellowmouth rockfish	2	209	240	225	4545 / 4651
<i>Sebastes rosenblatti</i>	greenblotched rockfish	4	100	298	192	3504 / 3656
<i>Scorpaena guttata</i>	California scorpionfish	1	72	72	72	3503 / 3503
Anoplopomatidae	sablefishes					
<i>Anoplopoma fimbria</i>	sablefish	404	60	492	223	3433 / 4905
Hexagrammidae	greenlings					
<i>Hexagrammos decagrammus</i>	kelp greenling	9	73	120	95	3615 / 4817
<i>Ophiodon elongatus</i>	lingcod	271	57	435	128	3434 / 4906
<i>Zaniolepis latipinnis</i>	longspine combfish	30	59	119	89	3434 / 3845
Cottidae	sculpins					
<i>Cottidae unident.</i>	sculpin unident.	1	74	74	74	4414 / 4414
<i>Chitonotus pugetensis</i>	roughback sculpin	4	57	72	63	3755 / 4404

Table 3.--Continued.

Family and Scientific Name*	Common Name	Frequency of Occurrence	Minimum Depth (m)	Maximum Depth (m)	Mean Depth (m)	Latitude Range** South / North
<i>Dasycottus setiger</i>	spinyhead sculpin	1	97	97	97	4854 / 4854
<i>Enophrys taurina</i>	bull sculpin	1	101	101	101	3605 / 3605
<i>Hemilepidotus spinosus</i>	brown Irish lord	4	77	119	96	4317 / 4704
<i>Icelinus burchami</i>	dusky sculpin	1	240	240	240	4545 / 4545
<i>Icelinus oculatus</i>	frogmouth sculpin	1	122	122	122	4424 / 4424
<i>Icelinus filamentosus</i>	threadfin sculpin	77	79	419	167	3805 / 4905
<i>Icelinus tenuis</i>	spotfin sculpin	1	109	109	109	3638 / 3638
<i>Leptocottus armatus</i>	Pacific staghorn sculpin	1	57	57	57	4404 / 4404
<i>Malacocottus kincaidi</i>	blackfin sculpin	1	206	206	206	4553 / 4553
<i>Malacocottus zonurus</i>	darkfin sculpin	1	333	333	333	4503 / 4503
<i>Paricelinus hopliticus</i>	thornback sculpin	1	115	115	115	4403 / 4403
<i>Radulinus asprellus</i>	slim sculpin	7	68	167	112	3804 / 4817
<i>Triglops macellus</i>	roughspine sculpin	1	131	131	131	4423 / 4423
Agonidae	poachers					
<i>Agonidae unident.</i>	poacher unident.	3	165	400	261	4404 / 4454
<i>Agonopsis vulsa</i>	northern spearnose poacher	4	64	137	102	4302 / 4543
<i>Bathyagonus nigripinnis</i>	blackfin poacher	21	113	458	275	4104 / 4814
<i>Bathyagonus pentacanthus</i>	bigeye poacher	41	112	419	213	4234 / 4905
<i>Ocella verrucosa</i>	warty poacher	5	57	106	75	4333 / 4644
<i>Podothecus acipenserinus</i>	sturgeon poacher	3	64	139	94	4744 / 4904
<i>Xeneretmus latifrons</i>	blacktip poacher	2	64	214	139	4045 / 4305
Liparidae (Liparididae)	snailfishes					
<i>Liparidae unident.</i>	snailfish unident.	9	321	469	401	3832 / 4354
<i>Careproctus sp.</i>		13	210	460	366	4213 / 4616
<i>Careproctus cypselurus</i>	blackfin snailfish	1	375	375	375	3444 / 3444
<i>Careproctus melanurus</i>	blacktail snailfish	53	169	492	371	3433 / 4904
<i>Liparis pulchellus</i>	showy snailfish	3	68	163	114	4644 / 4845
Carangidae	jacks					
<i>Trachurus symmetricus</i>	jack mackerel	24	66	251	114	3905 / 4844
Sciaenidae	croakers (drums)					
<i>Genyonemus lineatus</i>	white croaker	34	59	119	86	3434 / 3824
Embiotocidae	surfperches					
<i>Hyperprosopon anale</i>	spotfin surfperch	1	101	101	101	3605 / 3605
<i>Zalemblus rosaceus</i>	pink seaperch	59	59	140	93	3434 / 3957
Bathymasteridae	ronquils					
<i>Bathymasteridae unident.</i>	ronquil indent.	2	194	209	202	4644 / 4651
<i>Ronquilus jordani</i>	northern ronquil	2	119	208	164	4317 / 4734
Zoarcidae	eelpouts					
<i>Zoarcidae unident.</i>	eelpout unident.	10	66	409	164	3504 / 4156
<i>Bothrocara brunneum</i>	twoline eelpout	4	452	492	471	4203 / 4734
<i>Lycodapus sp.</i>		1	414	414	414	4048 / 4048
<i>Lycodapus mandibularis</i>	pallid eelpout	7	267	475	376	4233 / 4825
<i>Lycodes brevipes</i>	shortfin eelpout	11	72	375	192	3434 / 3524
<i>Lycodes cortezianus</i>	bigfin eelpout	235	61	492	283	3433 / 4904
<i>Lycodes diapterus</i>	black eelpout	111	78	492	379	3433 / 4904
<i>Lycodes pacificus</i>	blackbelly eelpout	86	62	415	141	3453 / 4906
Cryptacanthodidae	wrymouths					
<i>Cryptacanthodes giganteus</i>	giant wrymouth	6	154	253	195	4544 / 4825
<i>Lyconectes aleutensis</i>	dwarf wrymouth	1	83	83	83	4655 / 4655
Anarrhichadidae	wolffishes					
<i>Anarrhichthys ocellatus</i>	wolf-eel	1	81	81	81	3615 / 3615
Zaproridae	prowfishes					
<i>Zaprora silenus</i>	prowfish	1	60	60	60	3655 / 3655
Trichodontidae	sandfishes					
<i>Trichodon trichodon</i>	Pacific sandfish	1	57	57	57	4404 / 4404
Ammodytidae	sand lances					



Table 3.--Continued.

Family and Scientific Name*	Common Name	Frequency of Occurrence	Minimum Depth (m)	Maximum Depth (m)	Mean Depth (m)	Latitude Range** South / North
<i>Ammodytes hexapterus</i>	Pacific sand lance	2	68	102	85	4425 / 4444
Icosteidae	ragfishes					
<i>Icosteus aenigmaticus</i>	ragfish	4	72	450	340	3503 / 4135
Trichiuridae	scabbardfishes					
<i>Trichiurus unident.</i>	scabbardfishes unident.	1	422	422	422	4213 / 4213
Scombridae	mackerels and tunas					
<i>Scomber japonicus</i>	chub mackerel	41	59	368	122	3434 / 4854
Stromateidae	butterfishes					
<i>Peprilus simillimus</i>	Pacific pompano	22	59	112	81	3434 / 3843
Bothidae	lefteye flounders					
<i>Citharichthys sordidus</i>	Pacific sanddab	249	57	475	109	3434 / 4906
<i>Paralichthys californicus</i>	California halibut	3	60	90	72	3644 / 3655
Pleuronectidae	righteye flounders					
<i>Atheresthes stomias</i>	arrowtooth flounder	326	57	492	178	3617 / 4906
<i>Embassichthys bathybius</i>	deepsea sole	1	422	422	422	3844 / 3844
<i>Eopsetta jordani</i>	petrale sole	279	57	402	119	3434 / 4906
<i>Glyptocephalus zachirus</i>	rex sole	492	57	492	199	3433 / 4906
<i>Hippoglossoides elassodon</i>	flathead sole	159	57	311	128	4123 / 4905
<i>Hippoglossus stenolepis</i>	Pacific halibut	67	64	382	153	4011 / 4905
<i>Isopsetta isolepis</i>	butter sole	10	57	83	70	4225 / 4904
<i>Lepidopsetta bilineata</i>	southern rock sole	58	57	168	94	3615 / 4906
<i>Lyopsetta exilis</i>	slender sole	390	57	466	173	3434 / 4906
<i>Microstomus pacificus</i>	Dover sole	494	57	492	201	3433 / 4906
<i>Parophrys vetulus</i>	English sole	312	57	360	124	3433 / 4906
<i>Platichthys stellatus</i>	starry flounder	11	59	100	76	3755 / 4854
<i>Psetichthys melanostictus</i>	sand sole	7	57	72	64	3746 / 4904
<i>Pleuronichthys decurrens</i>	curlfin sole	77	57	208	88	3434 / 4904
<i>Pleuronichthys ritteri</i>	spotted turbot	4	72	90	82	3655 / 3755
<i>Pleuronichthys verticalis</i>	hornyhead turbot	1	119	119	119	3441 / 3441
Cynoglossidae	tonguefishes					
<i>Symphurus atricauda</i>	California tonguefish	1	60	60	60	3655 / 3655

\* Families ordered according to Nelson (1994)

\*\* ddm=degrees and minutes of latitude

Table 4.--Number of length frequency measurements collected from successful tows by International North Pacific Fisheries Commission area and depth stratum (m) during the 2001 West Coast triennial groundfish bottom trawl survey.

Species	Conception			Monterey			Eureka			Columbia			Vancouver		
	55-183	184-366	367-500	55-183	184-366	367-500	55-183	184-366	367-500	55-183	184-366	367-500	55-183	184-366	367-500
Brown cat shark	18	3	142	16	101	483	1	88	256		20	226		1	15
Filetail cat shark	2	24	80		4	84						14			
Spiny dogfish	54	23	7	542	36	75	251	23		76	5		1,390	124	
Big skate	11	1		25			8			36		1	2		
Bering skate		15	31	6	43	31	8	40	30	37	81	58	12	33	5
Longnose skate	19	69	95	97	39	45	60	34	6	214	49	28	86	31	4
Pacific sanddab	1,968			6,810	3		3,486	10		6,487	1	1	1,185	2	
California halibut				15											
Arrowtooth flounder				158	16	1	798	367	8	4,255	950	76	3,789	641	9
Pacific halibut				1			6	6		28	21	2	62	14	1
Flathead sole							81			2,369	116		1,312	108	
Slender sole	175	259	86	1,166	406	124	899	413	5	6,192	2,438	261	1,961	408	27
Petrale sole	161	6		823	6		339	1		1,416	17		400	9	2
English sole	594	15		5,281	449		2,436	110		6,197	335		1,264	35	
Dover sole	349	1,152	2,019	2,357	2,882	3,058	1,593	2,020	1,014	8,085	3,348	2,213	3,062	998	321
Deepsea sole						1									
Rex sole	152	995	1,563	4,234	2,384	2,093	4,207	2,015	1,266	11,386	3,591	1,832	3,069	545	221
Starry flounder				43			1			2			1		
Sand sole				7			5			26			2		
Southern rock sole				75						254			59		
Butter sole							27			62			6		
Curlfin sole	134			347	7		28			98			17		
Hornyhead turbot	1														
Spotted turbot				7											
Sablefish	341	852	643	794	860	753	428	320	553	4,617	1,023	713	1,118	394	63
Northern anchovy				6						18					

Table 4.--Continued.

Species	Conception			Monterey			Eureka			Columbia			Vancouver		
	55-183	184-366	367-500	55-183	184-366	367-500	55-183	184-366	367-500	55-183	184-366	367-500	55-183	184-366	367-500
Jack mackerel				7			65			217			4		
Pacific herring	75			620			324			906			640		
American shad	4			90			28			118			607	3	
Pacific sardine				35						160			112	1	
Pacific tomcod				203			750			314					
Pacific cod										3	23		180	14	
Walleye pollock										122	2		1,335	25	
Lingcod	53	9		299	8		180	31		659	132	1	159	2	
Kelp greenling				1											
Pacific hake	331	2,486	2,062	6,941	3,535	1,685	5,027	2,856	586	10,986	2,892	1,753	1,629	413	256
Chinook salmon	3			9			127	2		4			17		
Coho salmon				2						2					
White croaker				593											
Chub mackerel				28			8			474	2	1	8		
Shortspine thornyhead	1	28	791	10	511	985	9	699	1,001	124	2,341	3,076	15	517	367
Longspine thornyhead		2	482												227
Rougheye rockfish						1			4	92	24	84	54	66	101
Pacific ocean perch				1	3	1		16	2	13	216	118	186	516	108
Aurora rockfish		2	1,096		125	1,279			434		5	320			35
Silvergray rockfish										1	10		29	7	1
Copper rockfish				22											
Greenspotted rockfish				32	5			1		21					
Darkblotched rockfish		5		252	100	5	262	410	5	1,095	577	61	78	85	
Splitnose rockfish	8	1,659	872	74	2,245	52	311	1,163	31	479	2,994	127	81	269	1
Greenstriped rockfish	9			871	66		554	326		2,016	921	3	388	166	
Puget Sound rockfish										3					
Widow rockfish	26	1		54	1		2	14		16	11		5	14	
Yellowtail rockfish				27			12			236	7		767	110	

Table 4.--Continued.

Species	Conception			Monterey			Eureka			Columbia			Vancouver		
	55-183	184-366	367-500	55-183	184-366	367-500	55-183	184-366	367-500	55-183	184-366	367-500	55-183	184-366	367-500
Chilipepper	746	119	5	1,884	306	1	22	66			2				1
Rosethorn rockfish		2		34	6					184	253	1	92	7	4
Squarespot rockfish		2		46											
Shortbelly rockfish	267	126	1	339	403		25	4		1	1		19		
Cowcod	2	1		2	4						1				
Quillback rockfish							2			42			3		
Black rockfish										2					
Blackgill rockfish		4	228	1	14	182						6			
Vermilion rockfish	45		1	54											
Bocaccio	26	9		24	9		1	2		3	2		2	3	
Canary rockfish	1			29	1		39	6		274	9		55	15	
Redstripe rockfish					2			1		201	8		343	50	
Rosy rockfish				1											
Yelloweye rockfish										24	2		12		
Redbanded rockfish		1	2		31	3		32	1	12	89	7	4	40	5
Stripetail rockfish	284	1,002	30	1,433	1,191		407	656		18	893	4	9	4	
Halfbanded rockfish	480	1		579						1					
Pygmy rockfish				3						116	100		41		
Sharpchin rockfish		7			63		12	239		14	507	3	41	2	
Bank rockfish		6	5		27	3		1	1						
Shorthead rockfish		1										3		2	25
Yellowmouth rockfish											3				
Greenblotched rockfish		2		1											

Table 5.--Number of biological data samples collected during the 2001 triennial West Coast bottom trawl survey.

Species	Age structures*	Specimen weights	Maturity observations
Pacific hake	851	851	165
Sablefish	1,394	1,394	808
Lingcod	1,231	1,240	540
English sole	--	124	--
Aurora rockfish	714	714	332
Blackgill rockfish	375	375	104
Bocaccio	106	106	48
Canary rockfish	381	381	147
Chilipepper	486	482	--
Darkblotched rockfish	1,058	1,058	688
Pacific ocean perch	556	556	462
Redstripe rockfish	215	215	169
Sharpchin rockfish	330	330	127
Silvergray rockfish	55	55	54
Splitnose rockfish	1,219	1,218	651
Yelloweye rockfish	49	49	32
Yellowmouth rockfish	4	4	4
Yellowtail rockfish	781	781	571

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\*Dorsal finrays were collected from lingcod. Otoliths were collected from all other species.

Table 6.--Mean catch per unit of effort (CPUE, kg/ha) for the 20 most abundant groundfish species in each International North Pacific Fisheries Commission area and depth stratum during the 2001 West Coast triennial groundfish survey.

Conception Area 55-183 m		Conception Area 184-366 m		Conception Area 367-500 m		Conception Area 55-500 m	
Mean CPUE		Mean CPUE		Mean CPUE		Mean CPUE	
Species name	(kg/ha)	Species name	(kg/ha)	Species name	(kg/ha)	Species name	(kg/ha)
Chilipepper	88.42	Pacific hake	72.66	Dover sole	31.11	Pacific hake	31.38
Pacific sanddab	40.76	Dover sole	19.61	Pacific hake	24.82	Chilipepper	30.36
Pacific hake	8.21	Splitnose rockfish	19.15	Rex sole	9.12	Dover sole	17.87
Shortbelly rockfish	5.58	Stripetail rockfish	16.09	Sablefish	9.05	Pacific sanddab	13.87
Sablefish	5.31	Sablefish	15.73	Pacific sleeper shark	7.32	Sablefish	9.48
English sole	1.85	Rex sole	15.71	Aurora rockfish	4.77	Rex sole	7.77
Spiny dogfish	1.84	Shortbelly rockfish	7.17	Splitnose rockfish	3.12	Splitnose rockfish	6.16
Big skate	1.73	Cat shark unident.	2.53	Shortspine thornyhead	2.99	Stripetail rockfish	4.24
White croaker	1.64	Longnose skate	1.95	Blackgill rockfish	2.54	Shortbelly rockfish	3.73
Plainfin midshipman	1.35	Spotted ratfish	1.04	Cat shark unident.	2.20	Pacific sleeper shark	2.96
Pacific herring	1.28	Chilipepper	0.98	Longspine thornyhead	1.91	Aurora rockfish	1.93
Petrale sole	1.25	Spiny dogfish	0.56	Longnose skate	1.90	Cat shark unident.	1.54
Dover sole	0.84	Bigfin eelpout	0.53	Bigfin eelpout	1.84	Longnose skate	1.39
Spotted ratfish	0.69	Slender sole	0.36	Black eelpout	0.80	Shortspine thornyhead	1.25
Halfbanded rockfish	0.69	Filetail cat shark	0.23	Spotted ratfish	0.69	Blackgill rockfish	1.05
Lingcod	0.49	Brown cat shark	0.21	Filetail catshark	0.69	Bigfin eelpout	0.89
Northern anchovy	0.45	Lingcod	0.21	Brown cat shark	0.34	Spiny dogfish	0.79
Longnose skate	0.36	Bering skate	0.20	Bering skate	0.32	Spotted ratfish	0.78
Pink surfperch	0.35	Black eelpout	0.20	Slender sole	0.10	Longspine thornyhead	0.78
Stripetail rockfish	0.32	Shorthead rockfish	0.19	Blacktail snailfish	0.06	English sole	0.67
Number of hauls	16	Number of hauls	12	Number of hauls	19	Number of hauls	47

Table 6.--Continued.

Monterey Area 55-183 m		Monterey Area 184-366 m		Monterey Area 367-500 m		Monterey Area 55-500 m	
Species name	Mean CPUE (kg/ha)	Species name	Mean CPUE (kg/ha)	Species name	Mean CPUE (kg/ha)	Species name	Mean CPUE (kg/ha)
Pacific hake	96.54	Shortbelly rockfish	106.59	Dover sole	69.96	Pacific hake	82.06
Sablefish	28.43	Pacific hake	97.73	Pacific hake	16.70	Sablefish	23.26
White croaker	13.13	Splitnose rockfish	46.91	Sablefish	12.76	Dover sole	20.69
Chilipepper	10.70	Dover sole	37.28	Rex sole	12.35	Shortbelly rockfish	18.86
Pacific sanddab	8.61	Chilipepper	26.59	Aurora rockfish	5.62	Chilipepper	11.52
Spiny dogfish	7.21	Stripetail rockfish	16.94	Shortspine thornyhead	3.35	White croaker	8.41
English sole	5.12	Sablefish	15.41	Bigfin eelpout	2.42	Splitnose rockfish	8.32
Pacific herring	4.94	Rex sole	12.83	Blackgill rockfish	1.72	Rex sole	6.02
Stripetail rockfish	2.80	English sole	2.40	Longnose skate	1.46	Pacific sanddab	5.51
Rex sole	2.33	Bigfin eelpout	2.18	Brown cat shark	1.34	Stripetail rockfish	4.77
Dover sole	1.96	Shortspine thornyhead	1.35	Black eelpout	1.20	Spiny dogfish	4.68
Petrale sole	1.03	Longnose skate	1.19	Cat shark unident.	0.70	English sole	3.70
Pacific argentine	0.74	Spotted ratfish	1.06	Longspine thornyhead	0.52	Pacific herring	3.16
Greenstriped rockfish	0.73	Aurora rockfish	0.82	Filetail cat shark	0.41	Aurora rockfish	1.18
Lingcod	0.70	Darkblotched rockfish	0.56	Ragfish	0.38	Shortspine thornyhead	0.86
Spotted ratfish	0.70	Slender sole	0.42	Splitnose rockfish	0.28	Longnose skate	0.86
Plainfin midshipman	0.69	Lingcod	0.35	Spotted ratfish	0.26	Bigfin eelpout	0.83
Longnose skate	0.60	Brown cat shark	0.33	Bering skate	0.22	Spotted ratfish	0.68
Big skate	0.58	Sharpchin rockfish	0.31	Spiny dogfish	0.19	Petrale sole	0.67
Vermilion rockfish	0.51	Bering skate	0.28	Blacktail snailfish	0.10	Lingcod	0.51
Number of hauls	80	Number of hauls	22	Number of hauls	23	Number of hauls	125

Table 6.--Continued.

Eureka Area 55-183 m		Eureka Area 184-366 m		Eureka Area 367-500 m		Eureka Area 55-500 m	
Species name	Mean CPUE (kg/ha)	Species name	Mean CPUE (kg/ha)	Species name	Mean CPUE (kg/ha)	Species name	Mean CPUE (kg/ha)
Pacific hake	131.86	Pacific hake	59.07	Sablefish	14.21	Pacific hake	91.80
Pacific sanddab	12.02	Dover sole	27.89	Dover sole	13.77	Dover sole	11.71
Spiny dogfish	9.78	Rex sole	16.18	Pacific hake	8.60	Rex sole	8.55
Rex sole	6.15	Splitnose rockfish	6.45	Rex sole	5.96	Pacific sanddab	6.92
English sole	5.68	Sablefish	6.34	Aurora rockfish	2.95	Spiny dogfish	5.67
Dover sole	4.24	Stripetail rockfish	4.27	Shortspine thornyhead	2.48	Sablefish	5.56
Stripetail rockfish	3.43	Bigfin eelpout	1.78	Black eelpout	2.04	English sole	3.49
Pacific herring	3.32	Lingcod	1.69	Bigfin eelpout	1.44	Stripetail rockfish	3.01
Sablefish	2.49	Shortspine thornyhead	1.49	Brown cat shark	1.15	Splitnose rockfish	1.91
Jack mackerel	2.40	Spotted ratfish	1.46	Cat shark unident.	0.82	Pacific herring	1.86
Chinook salmon	1.63	Darkblotched rockfish	1.45	Ragfish	0.81	Jack mackerel	1.39
Greenstriped rockfish	1.57	Arrowtooth flounder	1.39	Longnose skate	0.42	Greenstriped rockfish	1.12
Pacific tomcod	1.45	Longnose skate	1.27	Bering skate	0.41	Lingcod	1.08
Lingcod	1.16	Brown cat shark	1.18	Arrowtooth flounder	0.24	Chinook salmon	0.99
Arrowtooth flounder	1.01	English sole	0.92	Splitnose rockfish	0.20	Arrowtooth flounder	0.96
Big skate	0.81	Greenstriped rockfish	0.87	Pacific flatnose	0.11	Pacific tomcod	0.83
Petrals sole	0.73	Pacific halibut	0.83	Rougheye rockfish	0.10	Shortspine thornyhead	0.83
Pacific halibut	0.65	Sharpchin rockfish	0.61	Spotted ratfish	0.09	Bigfin eelpout	0.76
Slender sole	0.63	Chilipepper	0.56	Giant grendier	0.08	Longnose skate	0.66
Longnose skate	0.48	Slender sole	0.36	Longspine thornyhead	0.07	Pacific halibut	0.58
Number of hauls	38	Number of hauls	16	Number of hauls	12	Number of hauls	66



Table 6.--Continued.

Columbia Area 55-183 m		Columbia Area 184-366 m		Columbia Area 367-500 m		Columbia Area 55-500 m	
Species name	Mean CPUE (kg/ha)	Species name	Mean CPUE (kg/ha)	Species name	Mean CPUE (kg/ha)	Species name	Mean CPUE (kg/ha)
Pacific hake	102.99	Sablefish	15.08	Dover sole	12.58	Pacific hake	68.99
Sablefish	30.31	Pacific hake	14.95	Sablefish	10.68	Sablefish	23.89
Pacific sanddab	17.51	Dover sole	14.66	Pacific hake	9.08	Dover sole	12.22
Dover sole	11.29	Sharpchin rockfish	10.89	Shortspine thornyhead	8.94	Pacific sanddab	10.94
Rex sole	8.11	Splitnose rockfish	10.14	Rex sole	4.66	Rex sole	7.47
English sole	4.96	Lingcod	9.56	Bigfin eelpout	1.48	Arrowtooth flounder	3.83
Pacific herring	4.86	Rex sole	7.69	Rougeye rockfish	1.39	English sole	3.25
Arrowtooth flounder	3.72	Arrowtooth flounder	5.97	Arrowtooth flounder	1.32	Pacific herring	3.04
Greenstriped rockfish	2.47	Shortspine thornyhead	4.45	Aurora rockfish	0.95	Lingcod	2.75
Jack mackerel	1.78	Stripetail rockfish	1.75	Pacific ocean perch	0.74	Shortspine thornyhead	2.43
Canary rockfish	1.69	Pacific halibut	1.72	Longspine thornyhead	0.66	Sharpchin rockfish	2.37
Slender sole	1.67	Pacific ocean perch	1.61	Longnose skate	0.60	Splitnose rockfish	2.27
Chub mackerel	1.41	Darkblotched rockfish	1.57	Brown cat shark	0.54	Greenstriped rockfish	1.81
Petrale sole	1.23	Slender sole	1.31	Black eelpout	0.46	Slender sole	1.35
Lingcod	1.08	Greenstriped rockfish	1.24	Darkblotched rockfish	0.42	Jack mackerel	1.11
Longnose skate	0.85	Bigfin eelpout	1.10	Spotted ratfish	0.34	Canary rockfish	1.07
Spotted ratfish	0.68	Longnose skate	0.98	Bering skate	0.34	Chub mackerel	0.88
Yellowtail rockfish	0.67	English sole	0.69	Splitnose rockfish	0.29	Longnose skate	0.84
Pacific halibut	0.67	Spotted ratfish	0.68	Blue shark	0.21	Pacific halibut	0.82
Big skate	0.53	Pacific sleeper shark	0.40	Pacific halibut	0.17	Petrale sole	0.78
Number of hauls	118	Number of hauls	41	Number of hauls	30	Number of hauls	189

Table 6.--Continued.

U.S. Vancouver Area 55-183 m		U.S. Vancouver Area 184-366 m		U.S. Vancouver Area 367-500 m		U.S. Vancouver Area 55-500 m	
Species name	Mean CPUE (kg/ha)	Species name	Mean CPUE (kg/ha)	Species name	Mean CPUE (kg/ha)	Species name	Mean CPUE (kg/ha)
Walleye pollock	54.26	Arrowtooth flounder	50.58	Dover sole	8.08	Walleye pollock	34.81
Sablefish	44.33	Dover sole	21.95	Pacific hake	7.55	Sablefish	34.32
Spiny dogfish	23.90	Sablefish	18.80	Shortspine thornyhead	2.50	Arrowtooth flounder	25.74
Pacific hake	21.00	Darkblotched rockfish	14.61	Sablefish	2.35	Spiny dogfish	16.87
Arrowtooth flounder	15.82	Pacific ocean perch	12.07	Shortraker rockfish	1.46	Pacific hake	16.09
Yellowtail rockfish	10.02	Pacific hake	7.29	Longnose skate	1.35	Dover sole	13.32
Dover sole	9.59	Spiny dogfish	5.05	Rougheye rockfish	1.32	Yellowtail rockfish	6.48
Pacific sanddab	4.99	Rex sole	3.01	Pacific ocean perch	1.18	Darkblotched rockfish	4.53
Pacific herring	4.13	Shortspine thornyhead	2.67	Longspine thornyhead	0.87	Pacific ocean perch	3.80
Rex sole	4.07	Spotted ratfish	1.78	Arrowtooth flounder	0.66	Rex sole	3.57
English sole	3.32	Longnose skate	1.76	Rex sole	0.62	Pacific sanddab	3.20
Greenstriped rockfish	2.96	Pacific halibut	1.65	Bigfin eelpout	0.50	Pacific herring	2.65
Pacific halibut	2.56	Slender sole	1.42	Giant grenadier	0.43	English sole	2.25
American shad	2.06	Redbanded rockfish	1.35	Pacific flatnose	0.42	Greenstriped rockfish	2.18
Pacific cod	1.77	Rougheye rockfish	1.17	Brown cat shark	0.38	Pacific halibut	2.15
Slender sole	1.59	Greenstriped rockfish	0.92	Black eelpout	0.16	Slender sole	1.46
Petrale sole	1.28	Eulachon	0.89	Twoline eelpout	0.13	American shad	1.32
Lingcod	1.21	Bering skate	0.63	Pacific lamprey	0.09	Pacific cod	1.25
Longnose skate	0.93	Splitnose rockfish	0.62	Splitnose rockfish	0.07	Longnose skate	1.21
Redstripe rockfish	0.88	Flathead sole	0.42	Bering skate	0.05	Shortspine thornyhead	0.96
Number of hauls	25	Number of hauls	12	Number of hauls	2	Number of hauls	39

Table 6.--Continued.

Canadian Vancouver Area 55-183 m		Canadian Vancouver Area 184-366 m		Canadian Vancouver Area 367-500 m		Canadian Vancouver Area 55-500 m	
Species name	Mean CPUE (kg/ha)	Species name	Mean CPUE (kg/ha)	Species name	Mean CPUE (kg/ha)	Species name	Mean CPUE (kg/ha)
Walleye pollock	48.99	Yellowtail rockfish	131.82	Dover sole	20.16	Walleye pollock	40.44
Spiny dogfish	37.66	Pacific ocean perch	49.38	Rougheye rockfish	11.90	Spiny dogfish	31.08
Pacific hake	31.61	Arrowtooth flounder	26.18	Shortspine thornyhead	10.32	Pacific hake	27.09
Arrowtooth flounder	23.46	Sablefish	9.64	Pacific hake	7.76	Arrowtooth flounder	21.38
Eulachon	16.06	Dover sole	8.64	Pacific ocean perch	7.69	Yellowtail rockfish	15.98
Dover sole	11.90	Redstripe rockfish	5.07	Sablefish	6.63	Eulachon	13.25
Sablefish	7.86	Greenstriped rockfish	4.99	Shortraker rockfish	4.52	Dover sole	12.49
Rex sole	7.70	Pacific halibut	3.72	Rex sole	3.49	Sablefish	7.87
Yellowtail rockfish	7.38	Pacific hake	3.09	Aurora rockfish	0.98	Rex sole	6.74
Pacific sanddab	6.73	Widow rockfish	2.12	Arrowtooth flounder	0.62	Pacific sanddab	5.55
Flathead sole	5.03	Bocaccio	1.94	Longnose skate	0.49	Pacific ocean perch	4.64
English sole	3.22	Spotted ratfish	1.39	Longspine thornyhead	0.39	Flathead sole	4.15
Redstripe rockfish	2.75	Canary rockfish	1.35	Pacific flatnose	0.32	English sole	2.65
Pacific tomcod	2.40	Silvergray rockfish	1.18	Bering skate	0.23	Redstripe rockfish	2.65
Slender sole	2.06	Shortspine thornyhead	1.10	Black eelpout	0.22	Pacific tomcod	1.98
Pacific halibut	1.94	Splitnose rockfish	1.06	Brown cat shark	0.21	Pacific halibut	1.88
Lingcod	1.71	Shortraker rockfish	0.67	Silvergray rockfish	0.19	Slender sole	1.76
Longnose skate	1.45	Slender sole	0.64	Bigfin eelpout	0.17	Lingcod	1.42
Pacific cod	1.06	Rex sole	0.61	Redbanded rockfish	0.15	Rougheye rockfish	1.27
Petrale sole	1.01	Pacific cod	0.53	Slender sole	0.12	Longnose skate	1.25
Number of hauls	33	Number of hauls	3	Number of hauls	4	Number of hauls	40

Table 6.--Continued.

Vancouver Area 55-183 m		Vancouver Area 184-366 m		Vancouver Area 367-500 m		Vancouver Area 55-500 m	
Species name	Mean CPUE (kg/ha)	Species name	Mean CPUE (kg/ha)	Species name	Mean CPUE (kg/ha)	Species name	Mean CPUE (kg/ha)
Walleye pollock	51.26	Arrowtooth flounder	45.70	Dover sole	16.14	Walleye pollock	37.66
Spiny dogfish	31.73	Yellowtail rockfish	26.51	Rougheye rockfish	8.38	Spiny dogfish	24.07
Pacific hake	27.04	Pacific ocean perch	19.53	Shortspine thornyhead	7.71	Arrowtooth flounder	23.53
Sablefish	23.58	Dover sole	19.29	Pacific hake	7.69	Pacific hake	21.66
Arrowtooth flounder	20.17	Sablefish	16.96	Pacific ocean perch	5.52	Sablefish	20.93
Dover sole	10.91	Darkblotched rockfish	11.72	Sablefish	5.21	Dover sole	12.90
Eulachon	9.20	Pacific hake	6.45	Shortraker rockfish	3.50	Yellowtail rockfish	11.29
Yellowtail rockfish	8.52	Spiny dogfish	4.08	Rex sole	2.53	Eulachon	6.89
Rex sole	6.13	Rex sole	2.53	Longnose skate	0.78	Rex sole	5.18
Pacific sanddab	5.98	Shortspine thornyhead	2.35	Aurora rockfish	0.65	Pacific sanddab	4.39
English sole	3.26	Pacific halibut	2.07	Arrowtooth flounder	0.64	Pacific ocean perch	4.22
Flathead sole	3.22	Greenstriped rockfish	1.73	Longspine thornyhead	0.55	English sole	2.45
Pacific halibut	2.21	Spotted ratfish	1.71	Pacific flatnose	0.35	Flathead sole	2.43
Pacific herring	1.94	Longnose skate	1.43	Bigfin eelpout	0.28	Darkblotched rockfish	2.25
Redstripe rockfish	1.94	Slender sole	1.27	Brown cat shark	0.26	Pacific halibut	2.01
Slender sole	1.86	Redbanded rockfish	1.11	Black eelpout	0.20	Redstripe rockfish	1.62
Pacific cod	1.69	Rougheye rockfish	1.03	Giant grenadier	0.19	Slender sole	1.61
Greenstriped rockfish	1.53	Redstripe rockfish	1.01	Bering skate	0.17	Greenstriped rockfish	1.45
Lingcod	1.49	Eulachon	0.71	Silvergray rockfish	0.13	Pacific herring	1.43
American shad	1.43	Splitnose rockfish	0.71	Redbanded rockfish	0.10	Pacific tomcod	1.24
Number of hauls	58	Number of hauls	15	Number of hauls	6	Number of hauls	79

Table 6.--Continued.

U.S. Survey Area 55-183 m		U.S. Survey Area 184-366 m		U.S. Survey Area 367-500 m		U.S. Survey Area 55-500 m	
Species name	Mean CPUE (kg/ha)	Species name	Mean CPUE (kg/ha)	Species name	Mean CPUE (kg/ha)	Species name	Mean CPUE (kg/ha)
Pacific hake	92.22	Pacific hake	45.32	Dover sole	32.08	Pacific hake	67.51
Sablefish	25.77	Shortbelly rockfish	23.60	Pacific hake	14.49	Sablefish	20.54
Pacific sanddab	14.40	Dover sole	22.97	Sablefish	11.18	Dover sole	15.08
Chilipepper	8.20	Splitnose rockfish	17.36	Rex sole	7.79	Pacific sanddab	8.56
Dover sole	6.87	Sablefish	14.30	Shortspine thornyhead	5.08	Rex sole	6.94
Spiny dogfish	5.75	Rex sole	10.50	Aurora rockfish	3.30	Chilipepper	6.18
Rex sole	5.35	Arrowtooth flounder	8.50	Bigfin eelpout	1.79	Shortbelly rockfish	5.44
Walleye pollock	5.03	Stripetail rockfish	6.85	Pacific sleeper shark	1.62	Splitnose rockfish	4.05
English sole	4.78	Chilipepper	5.88	Longnose skate	1.11	Arrowtooth flounder	3.86
Pacific herring	4.40	Sharpchin rockfish	4.50	Blackgill rockfish	1.04	Spiny dogfish	3.59
White croaker	3.89	Lingcod	4.18	Black eelpout	0.95	English sole	3.06
Arrowtooth flounder	3.18	Darkblotched rockfish	2.67	Splitnose rockfish	0.90	Walleye pollock	2.99
Greenstriped rockfish	1.74	Shortspine thornyhead	2.62	Longspine thornyhead	0.82	Pacific herring	2.62
Stripetail rockfish	1.30	Pacific ocean perch	2.09	Brown cat shark	0.79	White croaker	2.31
Yellowtail rockfish	1.24	Longnose skate	1.27	Cat shark unident.	0.79	Stripetail rockfish	2.29
Petrale sole	1.11	Bigfin eelpout	1.25	Roughey rockfish	0.53	Shortspine thornyhead	1.54
Jack mackerel	1.09	Spotted ratfish	1.06	Arrowtooth flounder	0.51	Lingcod	1.49
Slender sole	1.03	Pacific halibut	1.01	Spotted ratfish	0.35	Greenstriped rockfish	1.21
Lingcod	0.96	English sole	1.00	Bering skate	0.30	Sharpchin rockfish	1.01
Canary rockfish	0.87	Slender sole	0.88	Pacific ocean perch	0.29	Longnose skate	0.90
Number of hauls	277	Number of hauls	103	Number of hauls	86	Number of hauls	466

Table 6.--Continued.

Entire Area 55-183 m		Entire Area 184-366 m		Entire Area 367-500 m		Entire Area 55-500 m	
Mean CPUE		Mean CPUE		Mean CPUE		Mean CPUE	
Species name	(kg/ha)	Species name	(kg/ha)	Species name	(kg/ha)	Species name	(kg/ha)
Pacific hake	85.76	Pacific hake	44.12	Dover sole	31.55	Pacific hake	64.31
Sablefish	23.87	Shortbelly rockfish	22.94	Pacific hake	14.19	Sablefish	19.54
Pacific sanddab	13.58	Dover sole	22.57	Sablefish	10.98	Dover sole	14.88
Walleye pollock	9.71	Splitnose rockfish	16.90	Rex sole	7.60	Pacific sanddab	8.32
Spiny dogfish	9.14	Sablefish	14.17	Shortspine thornyhead	5.31	Rex sole	6.92
Dover sole	7.41	Rex sole	10.22	Aurora rockfish	3.20	Walleye pollock	5.95
Chilipepper	7.33	Arrowtooth flounder	9.00	Bigfin eelpout	1.71	Spiny dogfish	5.76
Rex sole	5.60	Stripetail rockfish	6.66	Pacific sleeper shark	1.54	Chilipepper	5.69
Arrowtooth flounder	5.34	Chilipepper	5.72	Longnose skate	1.08	Arrowtooth flounder	5.25
English sole	4.61	Sharpchin rockfish	4.37	Rougheye rockfish	1.04	Shortbelly rockfish	5.01
Pacific herring	3.96	Lingcod	4.06	Blackgill rockfish	0.99	Splitnose rockfish	3.74
White croaker	3.47	Yellowtail rockfish	3.78	Black eelpout	0.92	English sole	3.03
Yellowtail rockfish	1.89	Pacific ocean perch	3.43	Splitnose rockfish	0.86	Pacific herring	2.43
Eulachon	1.86	Darkblotched rockfish	2.60	Longspine thornyhead	0.80	White croaker	2.13
Greenstriped rockfish	1.61	Shortspine thornyhead	2.57	Brown cat shark	0.77	Stripetail rockfish	2.11
Stripetail rockfish	1.16	Longnose skate	1.24	Cat shark unident.	0.75	Yellowtail rockfish	1.95
Slender sole	1.14	Bigfin eelpout	1.21	Pacific ocean perch	0.62	Shortspine thornyhead	1.51
Petrale sole	1.10	Pacific halibut	1.09	Arrowtooth flounder	0.52	Lingcod	1.49
Lingcod	1.04	Spotted ratfish	1.06	Spotted ratfish	0.34	Greenstriped rockfish	1.17
Jack mackerel	0.98	English sole	0.97	Bering skate	0.30	Eulachon	1.17
Number of hauls	310	Number of hauls	106	Number of hauls	90	Number of hauls	506

Table 7.--Estimates of fish biomass from the 2001 West Coast triennial bottom trawl survey by International North Pacific Fisheries Commission (INPFC) area for all depth strata combined (55-500 m). Precision of the estimates are presented as coefficients of variation (CV%). "T" denotes trace value. Differences in totals result from rounding.

Taxon	Estimated biomass (t) and CV%		Percent of total fish biomass	Estimated biomass (t) and CV% by INPFC area													
	Total survey area			Conception	Monterey	Eureka	Columbia	U.S. Vancouver	Canadian Vancouver	Total U.S. area							
Cartilaginous																	
Skates and rays	9,003	8	0.82	858	23	1,756	19	765	24	3,103	13	798	28	1,723	21	7,280	9
Spiny dogfish	51,299	22	4.69	358	26	6,261	66	4,019	81	597	29	10,141	57	29,924	24	21,375	37
Other sharks	2,647	32	0.24	1,549	52	323	17	287	38	375	49	89	93	23	65	2,623	32
Total cartilaginous	67,085	17	6.13	3,075	28	9,075	46	5,324	61	5,466	11	11,359	50	32,786	22	34,299	23
Flatfish																	
Arrowtooth flounder	44,828	13	4.10	T	71	91	47	580	17	8,207	10	12,048	27	23,902	18	20,926	16
Dover sole	75,265	5	6.88	7,162	13	15,766	9	5,752	15	26,442	8	6,592	12	13,550	16	61,714	5
English sole	19,942	8	1.82	373	27	5,008	13	2,423	17	8,258	13	1,086	18	2,794	26	17,148	8
Pacific halibut	5,219	17	0.48	0	-	18	100	357	46	1,772	24	1,333	27	1,738	36	3,480	17
Pacific sanddab	53,641	13	4.90	6,219	68	8,007	15	4,916	24	27,493	17	1,875	27	5,130	37	48,511	14
Petrale sole	4,708	9	0.43	209	31	906	12	300	20	1,945	13	490	29	858	28	3,850	8
Rex sole	39,225	6	3.59	3,314	29	5,849	12	4,697	13	16,607	7	2,270	13	6,488	23	32,737	6
Total flatfish	255,472	4	23.35	17,416	27	36,410	7	19,373	9	94,839	6	27,103	12	60,333	11	195,140	5
Rockfish																	
Shortspine thornyhead	7,457	7	0.68	407	21	564	18	353	11	4,908	9	521	20	705	18	6,752	7
Bocaccio	404	33	0.04	52	45	110	37	27	58	67	49	27	96	120	80	284	23
Canary	3,642	51	0.33	8	74	98	55	164	40	2,294	62	710	62	368	54	3,274	57

Table 7.--Continued.

Taxon	Estimated biomass (t) and CV%			Estimated biomass (t) and CV% by INPFC area													
	Total survey area	Percent of total fish biomass		Conception		Monterey		Eureka		Columbia		U.S. Vancouver		Canadian Vancouver		Total U.S. area	
Rockfish (cont.)																	
Chilipepper	27,847	50	2.55	13,658	93	14,109	40	76	80	1	100	1	100	2	100	27,844	50
Darkblotched	3,029	44	0.28	3	49	292	43	254	27	2,049	50	401	76	31	38	2,999	44
Greenstriped	7,909	28	0.72	1	76	681	34	736	58	4,563	43	1,267	62	660	38	7,249	30
Pacific ocean perch	5,920	43	0.54	0	-	8	47	26	49	1,710	56	1,110	49	3,067	58	2,853	44
Redstripe	3,134	63	0.29	T	100	2	85	1	100	305	58	493	41	2,334	80	800	34
Sharpchin	4,837	87	0.44	2	100	57	70	74	55	4,557	92	132	67	16	75	4,821	87
Shortbelly	18,659	65	1.71	4,104	64	14,531	76	7	84	1	74	1	98	15	98	18,644	65
Silvergray	429	41	0.04	0	-	0	-	0	-	27	80	81	43	321	50	108	41
Splitnose	16,028	30	1.46	2,663	23	7,945	57	896	39	4,362	32	101	31	60	84	15,968	30
Stripetail	10,016	22	0.92	1,685	56	5,744	30	1,862	51	700	41	17	72	8	91	10,008	22
Widow	326	44	0.03	10	73	20	85	41	47	102	48	52	71	102	98	224	30
Yellowtail	19,137	46	1.75	17	100	75	78	24	71	1,107	56	5,830	38	12,084	58	7,053	32
Total rockfish	137,093	19	12.53	12,998	57	46,177	35	4,798	26	29,207	22	11,439	26	21,474	46	115,619	20
Other fish																	
Lingcod	8,019	22	0.73	85	55	693	18	654	16	3,908	34	1,324	32	1,356	27	6,664	26
Pacific hake	383,560	11	35.06	13,236	18	104,735	24	60,929	24	160,450	14	18,582	22	25,628	45	357,932	11
Sablefish	117,945	26	10.78	3,824	15	30,000	55	2,748	11	53,656	41	18,848	62	8,869	26	109,076	27
Total fish	1,094,099	6	100.00	63,416	23	246,915	14	98,165	16	363,266	10	115,422	21	206,915	14	887,184	7



Table 8.--Estimates of fish biomass from the 2001 West Coast triennial bottom trawl survey by International North Pacific Fisheries Commission (INPFC) area for the shallowest depth stratum (55-183 m). Precision of the estimates are presented as coefficients of variation (CV%). "T" denotes trace value. Differences in totals result from rounding.

Taxon	Estimated biomass (t) and CV%			Estimated biomass (t) and CV% by INPFC area													
	survey area	Total	Percent of total fish biomass	Conception		Monterey		Eureka		Columbia		U.S. Vancouver		Canadian Vancouver		Total U.S. area	
<b>Cartilaginous</b>																	
Skates and rays	6,378	11	0.75	370	47	1,244	26	538	33	2,321	16	588	36	1,317	21	5,061	12
Spiny dogfish	50,079	22	5.86	275	27	6,203	67	4,002	81	576	30	9,701	60	29,321	24	20,757	38
Other sharks	112	80	0.01	7	69	14	44	2	56	T	100	83	100	6	100	106	79
Total cartilaginous	59,338	19	6.94	793	26	7,984	52	4,628	70	3,959	14	10,543	54	31,429	23	27,909	28
<b>Flatfish</b>																	
Arrowtooth flounder	31,266	14	3.66	T	100	81	52	412	15	5,625	13	6,330	27	18,818	21	12,448	15
Dover sole	34,542	8	4.04	129	70	1,780	24	1,736	35	16,838	11	3,937	16	10,121	18	24,421	9
English sole	19,100	8	2.23	327	30	4,619	14	2,323	18	7,990	14	1,052	19	2,790	26	16,310	8
Pacific halibut	3,936	21	0.46	0	-	18	100	267	57	1,090	31	1,032	33	1,528	40	2,408	21
Pacific sanddab	53,637	13	6.27	6,219	68	8,006	15	4,915	24	27,493	17	1,875	27	5,129	37	48,508	14
Petrale sole	4,633	9	0.54	191	34	900	12	299	20	1,923	13	485	30	835	28	3,798	9
Rex sole	24,948	8	2.92	36	59	2,122	18	2,517	21	12,278	9	1,850	15	6,146	24	18,802	7
Total flatfish	183,529	5	21.47	6,981	63	18,208	8	12,778	13	76,781	7	17,788	11	50,993	12	132,536	6
<b>Rockfish</b>																	
Shortspine thornyhead	145	33	0.02	2	100	10	76	10	70	96	43	12	64	14	68	131	36
Bocaccio	207	28	0.02	38	51	77	43	12	100	51	61	1	100	29	100	179	28
Canary	3,469	54	0.41	8	74	95	56	149	44	2,261	63	655	67	301	64	3,168	58

Table 8.--Continued.

Taxon	Estimated biomass (t) and CV%		Percent of total fish biomass	Estimated biomass (t) and CV% by INPFC area													
	survey area	Total		Conception	Monterey	Eureka	Columbia	U.S. Vancouver	Canadian Vancouver	Total U.S. area							
Rockfish (cont.)																	
Chilipepper	22,835	58	2.67	13,550	93	9,270	38	15	72	0	-	0	-	0	-	22,835	58
Darkblotched	668	23	0.08	0	-	183	65	94	50	346	23	28	51	17	53	651	24
Greenstriped	6,895	32	0.81	1	76	646	36	642	66	4,022	48	1,159	67	424	46	6,471	33
Pacific ocean perch	176	85	0.02	0	-	1	100	T	100	2	42	19	60	153	94	23	50
Redstripe	2,816	70	0.33	0	-	0	-	0	-	296	59	425	45	2,095	89	721	36
Sharpchin	97	76	0.01	0	-	0	-	8	100	6	65	68	99	16	75	82	84
Shortbelly	1,016	81	0.12	846	97	147	46	6	100	1	100	1	98	15	98	1,001	82
Silvergray	305	54	0.04	0	-	0	-	0	-	3	100	54	59	249	62	57	57
Splitnose	278	50	0.03	3	59	15	77	188	71	60	60	2	48	9	71	268	52
Stripetail	3,909	37	0.46	44	72	2,449	46	1,402	66	6	53	1	69	7	96	3,902	37
Widow	131	44	0.02	10	74	17	98	8	70	71	68	24	100	2	100	129	44
Yellowtail	11,112	33	1.30	17	100	75	78	24	71	1,078	58	4,042	32	5,877	54	5,236	27
Total rockfish	56,450	28	6.60	14,765	91	13,741	30	2,560	46	9,202	30	6,701	26	9,481	55	46,970	31
Other fish																	
Lingcod	4,681	11	0.55	74	62	619	19	473	17	1,526	16	640	23	1,349	28	3,332	11
Pacific hake	333,231	12	38.98	1,264	76	84,797	28	53,939	28	151,220	15	17,592	23	24,418	47	308,813	12
Sablefish	96,643	31	11.30	818	58	25,767	64	1,018	24	44,788	49	16,723	70	7,529	30	89,114	33
Total fish	854,951	7	100.00	26,045	54	169,989	18	79,141	20	301,813	11	96,511	24	181,452	15	673,499	8

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Table 9.--Estimates of fish biomass from the 2001 West Coast triennial bottom trawl survey by International North Pacific Fisheries Commission (INPFC) area for the middle depth stratum (184-366 m). Precision of the estimates are presented as coefficients of variation (CV%). "T" denotes trace value. Differences in totals result from rounding.

Taxon	Estimated biomass (t) and CV%		Percent of total fish biomass	Estimated biomass (t) and CV% by INPFC area													
	survey area	Total		Conception	Monterey	Eureka	Columbia	U.S.	Vancouver	Canadian Vancouver	Total U.S. area						
Cartilaginous																	
Skates and rays	1,755	19	0.95	268	34	284	22	167	26	493	18	173	40	370	63	1,385	12
Spiny dogfish	1,186	37	0.64	76	70	30	30	17	34	21	42	439	40	603	52	583	32
Other sharks	781	33	0.42	397	39	49	34	141	72	192	91	1	100	2	100	779	33
Total cartilaginous	4,872	16	2.64	857	22	523	18	482	35	939	22	765	30	1,305	40	3,567	12
Flatfish																	
Arrowtooth flounder	13,088	14	7.10	T	100	9	54	150	49	2,201	15	5,681	49	5,047	37	8,041	35
Dover sole	22,434	10	12.18	2,686	22	6,071	14	3,001	19	6,002	16	2,112	22	2,562	46	19,872	8
English sole	843	23	0.46	47	47	389	39	99	61	269	35	35	44	4	59	838	23
Pacific halibut	1,201	28	0.65	0	-	0	-	90	62	626	41	275	31	211	52	991	30
Pacific sanddab	4	41	0.00	0	-	1	100	1	74	1	100	T	66	1	66	3	45
Petrale sole	65	27	0.04	18	65	6	66	1	100	22	26	5	45	12	65	52	27
Rex sole	9,717	12	5.27	2,121	43	2,240	15	1,741	16	3,110	16	334	23	170	36	9,547	12
Total flatfish	48,459	11	26.31	4,919	28	8,788	13	5,123	13	12,766	11	8,619	32	8,244	35	40,215	9
Rockfish																	
Shortspine	2,777	13	1.51	37	54	210	25	160	15	1,830	17	292	25	247	37	2,530	13
Bocaccio	197	62	0.11	14	94	33	70	16	69	16	69	26	100	91	100	105	38
Canary	173	43	0.09	0	-	2	100	16	69	33	38	55	68	67	71	105	39

Table 9.--Continued.

Taxon	Estimated biomass (t) and CV%		Percent of total fish biomass	Estimated biomass (t) and CV% by INPFC area													
	survey area	Total		Conception	Monterey		Eureka		Columbia		U.S. Vancouver		Canadian Vancouver		Total U.S. area		
Rockfish (cont.)																	
Chilipepper	5,009	87	2.72	107	50	4,838	90	60	99	1	100	1	100	2	100	5,006	87
Darkblotched	2,250	59	1.22	3	49	104	35	156	32	1,603	64	371	82	13	52	2,237	59
Greenstriped	1,011	25	0.55	0	-	34	57	94	38	539	24	108	47	235	70	775	20
Pacific ocean perch	4,862	51	2.64	0	-	6	58	24	53	1,455	66	1,033	53	2,345	72	2,518	50
Redstripe	318	96	0.17	T	100	2	85	1	100	9	94	68	100	239	100	80	86
Sharpchin	4,739	88	2.57	2	100	57	70	66	60	4,550	92	63	91	0	-	4,739	88
Shortbelly	17,643	69	9.58	3,258	77	14,384	76	1	100	T	100	0	-	0	-	17,643	69
Silvergray	107	57	0.06	0	-	0	-	0	-	24	88	27	53	56	75	51	59
Splitnose	15,293	32	8.30	2,415	26	7,807	58	694	47	4,229	33	97	32	51	98	15,241	32
Stripetail	6,099	27	3.31	1,636	57	3,296	39	459	46	693	42	15	81	T	86	6,099	27
Widow	195	67	0.11	T	100	3	90	33	56	31	38	29	100	100	100	95	38
Yellowtail	8,025	99	4.36	0	-	0	-	0	-	30	49	1,788	99	6,207	100	1,817	98
Total rockfish	70,001	29	38.00	7,566	39	30,928	50	1,800	23	15,459	37	4,205	58	10,044	83	59,958	29
Other fish																	
Lingcod	3,333	51	1.81	10	55	73	44	182	33	2,377	55	684	58	7	81	3,326	51
Pacific hake	41,352	22	22.45	9,498	22	17,854	47	6,357	18	6,084	20	759	28	800	37	40,552	22
Sablefish	14,263	14	7.74	2,007	11	2,810	29	683	18	5,780	24	1,984	29	999	24	13,264	15
Total fish	184,216	12	100.00	25,000	17	61,378	28	14,881	10	44,177	14	17,216	21	21,564	36	162,652	12

Table 10.--Estimates of fish biomass from the 2001 West Coast triennial bottom trawl survey by International North Pacific Fisheries Commission (INPFC) area for the deepest depth stratum (367-500 m). Precision of the estimates are presented as coefficients of variation (CV%). "T" denotes trace value. Differences in totals result from rounding.

Taxon	Estimated biomass (t) and CV%		Percent of total fish biomass	Estimated biomass (t) and CV% by INPFC area													
	survey area	Total		Conception	Monterey	Eureka	Columbia	U.S. Vancouver	Canadian Vancouver	Total U.S. area							
Cartilaginous																	
Skates and rays	870	14	1.58	220	18	228	25	61	51	288	29	37	48	36	28	833	14
Spiny dogfish	35	63	0.06	6	42	28	76	0	-	0	-	0	-	0	-	35	63
Other sharks	1,753	46	3.19	1,145	70	261	20	145	27	183	28	5	51	15	92	1,739	46
Total cartilaginous	2,875	28	5.23	1,425	56	568	15	213	19	567	20	50	43	52	15	2,823	29
Flatfish																	
Arrowtooth flounder	473	19	0.86	0	-	1	100	18	46	381	19	37	65	36	23	437	21
Dover sole	18,289	10	33.29	4,348	16	7,914	14	1,015	26	3,602	17	543	33	867	8	17,422	10
English sole	0	-	0.00	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Pacific halibut	81	100	0.15	0	-	0	-	0	-	55	100	26	100	0	-	81	100
Pacific sanddab	T	100	0.00	0	-	0	-	0	-	T	100	0	-	0	-	T	100
Petrale sole	11	100	0.02	0	-	0	-	0	-	0	-	0	-	11	100	0	-
Rex sole	4,560	15	8.30	1,157	23	1,487	32	439	18	1,219	25	86	45	172	61	4,388	16
Total flatfish	23,484	10	42.75	5,516	16	9,413	15	1,472	20	5,292	17	696	37	1,096	8	22,388	10
Rockfish																	
Shortspine thornyhead	4,535	9	8.26	368	23	344	25	183	15	2,981	11	216	34	443	20	4,092	9
Bocaccio	0	-	0.00	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Canary	0	-	0.00	0	-	0	-	0	-	0	-	0	-	0	-	0	-

Table 10.--Continued.

Taxon	Estimated biomass (t) and CV%		Percent of total fish biomass	Estimated biomass (t) and CV% by INPFC area													
	survey area			Conception	Monterey		Eureka		Columbia		U.S. Vancouver		Canadian Vancouver		Total U.S. area		
Rockfish (cont.)																	
Chilipepper	3	71	0.01	1	100	1	100	0	-	0	-	0	-	0	-	3	71
Darkblotched	111	39	0.20	0	-	5	60	5	36	100	43	2	100	0	-	111	39
Greenstriped	3	77	0.00	0	-	0	-	0	-	2	73	1	100	0	-	3	77
Pacific ocean perch	881	63	1.60	0	-	1	100	2	68	253	33	58	23	569	97	313	28
Redstripe	0	-	0.00	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Sharpchin	1	61	0.00	0	-	0	-	0	-	1	61	T	100	0	-	1	61
Shortbelly	T	100	0.00	T	100	0	-	0	-	0	-	0	-	0	-	T	100
Silvergray	17	100	0.03	0	-	0	-	0	-	0	-	0	-	17	100	0	-
Splitnose	458	29	0.83	245	41	123	53	15	58	73	35	1	37	0	-	458	29
Stripetail	7	73	0.01	5	89	0	-	0	-	1	100	T	100	0	-	7	73
Widow	0	-	0.00	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Yellowtail	0	-	0.00	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Total rockfish	10,642	11	19.37	1,667	10	1,509	22	437	13	4,546	10	533	31	1,950	49	8,692	7
Other fish																	
Lingcod	5	100	0.01	0	-	0	-	0	-	5	100	0	-	0	-	5	100
Pacific hake	8,977	11	16.34	2,473	19	2,084	37	633	43	3,146	12	230	9	410	13	8,566	12
Sablefish	7,040	9	12.82	998	24	1,424	18	1,047	14	3,088	12	141	33	341	92	6,699	8
Total fish	54,932	6	100.00	12,371	12	15,548	11	4,143	13	17,276	8	1,695	28	3,899	16	51,033	6

Table 11.--Estimates of fish population numbers (x 1,000) from the 2001 West Coast triennial bottom trawl survey by International North Pacific Fisheries Commission (INPFC) area for all depth strata combined (55-500 m). Precision of the estimates are presented as coefficients of variation (CV%). "T" denotes trace value. Differences in totals result from rounding.

Taxon	Estimated population number (x 1,000) and CV%		Estimated population number (x 1,000) and CV% by INPFC area													
	Total survey area		Conception		Monterey		Eureka		Columbia		U.S. Vancouver		Canadian Vancouver		Total U.S. area	
Cartilaginous																
Skates and rays	4,860	10	512	15	1,413	29	504	23	1,490	9	308	17	634	18	4,227	11
Spiny dogfish	63,174	35	583	59	6,440	60	23,063	87	1,011	35	8,443	49	23,633	26	39,541	53
Other sharks	6,833	15	2,828	24	2,006	30	1,065	22	881	33	17	49	37	83	6,797	15
Total cartilaginous	84,663	26	4,781	17	11,657	34	25,157	80	6,308	11	9,517	43	27,243	23	57,420	36
Flatfish																
Arrowtooth flounder	80,952	8	1	71	497	48	2,918	17	21,645	9	15,116	17	40,775	13	40,177	8
Dover sole	245,404	6	26,905	14	57,628	10	19,711	15	88,517	8	16,870	11	35,773	28	209,631	6
English sole	109,110	9	2,390	30	33,142	13	12,357	18	48,160	16	4,053	22	9,008	26	100,102	9
Pacific halibut	581	19	0	-	3	100	26	36	154	22	156	20	242	37	339	15
Pacific sanddab	471,775	11	51,149	50	88,141	11	48,823	21	238,109	15	13,358	29	32,196	37	439,580	11
Petrale sole	11,537	9	410	25	2,574	13	930	21	5,278	14	999	31	1,346	32	10,192	9
Rex sole	296,792	5	23,757	28	46,891	12	41,815	13	137,739	7	13,937	13	32,653	18	264,140	6
Total flatfish	1,353,709	4	106,704	27	236,175	6	132,209	9	603,899	7	77,156	8	197,566	10	1,156,143	5
Rockfish																
Shortspine thornyhead	50,801	8	1,501	26	2,459	15	2,807	13	38,174	10	2,921	21	2,939	18	47,862	9
Bocaccio	267	27	87	44	131	45	6	58	15	45	4	89	23	71	243	29
Canary	3,499	63	5	71	104	55	121	41	2,322	73	691	75	256	55	3,243	68

Table 11.--Continued.

Taxon	Estimated population number (x 1,000) and CV%		Estimated population number (x 1,000) and CV% by INPFC area													
			Conception		Monterey		Eureka		Columbia		U.S. Vancouver		Canadian Vancouver		Total U.S. area	
	Total survey area															
Rockfish (cont.)																
Chilipepper	147,875	62	96,454	92	51,251	41	159	64	5	100	1	100	4	100	147,871	62
Darkblotched	10,849	23	18	47	1,730	54	1,450	30	6,649	27	906	55	96	38	10,753	23
Greenstriped	31,980	22	25	76	4,104	32	5,029	60	17,421	33	3,524	61	1,876	40	30,104	23
Pacific ocean perch	11,449	34	0	-	10	45	38	40	2,841	53	2,121	36	6,439	45	5,010	39
Redstripe	8,237	58	1	100	4	77	2	100	1,958	69	1,031	43	5,243	84	2,994	48
Sharpchin	18,603	84	20	100	474	76	418	53	17,194	91	417	66	79	85	18,524	85
Shortbelly	132,465	60	40,560	61	91,714	71	70	92	6	72	5	91	109	91	132,355	60
Silvergray	232	43	0	-	0	-	0	-	17	74	39	40	176	52	57	40
Splitnose	133,600	23	21,752	24	50,837	53	11,227	35	47,846	25	1,672	45	265	60	133,335	23
Stripetail	84,387	22	15,363	56	51,826	28	12,616	49	4,432	38	108	65	42	79	84,345	22
Widow	465	43	67	72	179	97	27	43	85	45	47	73	59	96	405	46
Yellowtail	13,525	45	20	100	87	80	35	74	849	53	3,951	38	8,584	56	4,941	32
Total rockfish	684,183	21	183,854	56	267,293	31	34,807	27	151,917	17	18,620	18	27,691	36	656,491	21
Other fish																
Lingcod	5,485	11	158	45	976	15	557	13	2,606	16	671	22	517	29	4,968	11
Pacific hake	827,791	13	53,294	26	337,559	28	128,342	24	262,093	16	21,760	22	24,743	43	803,048	14
Sablefish	185,496	33	5,970	17	41,965	59	2,644	13	98,324	51	29,131	69	7,461	25	178,035	34
Total fish	4,503,225	9	375,671	28	1,122,454	13	362,235	12	1,289,452	8	304,877	28	1,048,537	30	3,454,688	7



Table 12.--Estimates of fish population numbers (x 1,000) from the 2001 West Coast triennial bottom trawl survey by International North Pacific Fisheries Commission (INPFC) area for the shallowest depth stratum (55-183 m). Precision of the estimates are presented as coefficients of variation (CV%). "T" denotes trace value. Differences in totals result from rounding.

Taxon	Estimated population number (x 1,000) and CV%		Estimated population number (x 1,000) and CV% by INPFC area													
			Total survey area		Conception		Monterey		Eureka		Columbia		U.S. Vancouver		Canadian Vancouver	
Cartilaginous																
Skates and rays	3,163	14	151	26	1,048	39	326	35	992	12	181	23	466	20	2,697	17
Spiny dogfish	61,536	36	153	28	6,215	62	23,022	87	998	35	8,086	51	23,063	27	38,473	54
Other sharks	201	37	63	64	66	42	64	82	4	100	4	100	T	100	200	37
Total cartilaginous	71,884	31	830	32	8,625	46	23,600	85	4,234	14	8,711	47	25,884	24	46,000	45
Flatfish																
Arrowtooth flounder	71,542	9	1	100	455	52	2,276	14	18,719	10	11,935	19	38,156	14	33,386	9
Dover sole	124,939	11	1,235	66	11,656	23	8,239	30	62,238	11	11,464	15	30,108	33	94,831	9
English sole	106,401	9	2,208	32	31,753	13	12,103	19	47,357	16	3,979	22	9,001	26	97,401	9
Pacific halibut	463	22	0	-	3	100	17	46	104	27	125	23	215	41	248	17
Pacific sanddab	471,740	11	51,149	50	88,135	11	48,807	21	238,105	15	13,355	29	32,188	37	439,552	11
Petrals sole	11,418	9	392	26	2,561	13	928	21	5,238	14	988	31	1,310	33	10,108	9
Rex sole	197,812	7	421	53	20,757	19	25,390	19	108,622	9	11,800	15	30,822	19	166,990	7
Total flatfish	1,101,554	5	56,382	48	161,248	8	102,713	11	532,783	8	64,354	9	184,074	10	917,480	6
Rockfish																
Shortspine thornyhead	546	39	2	100	49	85	24	79	356	52	57	63	59	67	487	42
Bocaccio	199	34	66	50	109	53	3	100	10	57	T	100	11	100	188	35
Canary	3,406	65	5	71	102	56	112	44	2,301	74	661	79	224	62	3,182	70

Table 12.--Continued.

Taxon	Estimated population number (x 1,000) and CV%		Estimated population number (x 1,000) and CV% by INPFC area													
			Total survey area		Conception		Monterey		Eureka		Columbia		U.S. Vancouver		Canadian Vancouver	
Rockfish (cont.)																
Chilipepper	137,100	66	96,057	93	40,982	45	60	52	0	-	0	-	0	-	137,100	66
Darkblotched	5,980	21	0	-	1,431	65	755	43	3,449	21	275	40	70	50	5,910	21
Greenstriped	27,894	25	25	76	3,931	34	4,473	68	15,057	38	3,200	67	1,208	49	26,686	26
Pacific ocean perch	2,263	79	0	-	3	100	8	100	69	42	299	55	1,885	90	378	44
Redstripe	7,768	61	0	-	0	-	0	-	1,938	70	932	47	4,898	89	2,870	50
Sharpchin	339	61	0	-	0	-	36	100	45	51	179	98	79	85	260	69
Shortbelly	12,565	84	10,932	96	1,450	44	64	100	4	100	5	91	109	91	12,455	85
Silvergray	165	57	0	-	0	-	0	-	3	100	24	56	139	64	26	52
Splitnose	7,599	45	37	50	188	63	4,539	70	2,579	51	99	51	157	82	7,442	46
Stripetail	34,934	32	1,155	58	24,470	39	9,195	65	64	38	12	48	38	88	34,896	32
Widow	338	55	67	73	176	99	6	70	57	64	31	97	2	100	336	55
Yellowtail	8,042	33	20	100	87	80	35	74	830	54	2,730	32	4,340	54	3,701	26
Total rockfish	268,738	38	112,124	89	81,529	28	19,317	46	32,880	27	9,011	29	13,876	56	254,862	40
Other fish																
Lingcod	4,834	11	143	50	951	15	507	14	2,163	17	557	24	513	29	4,321	11
Pacific hake	685,260	16	7,604	73	280,207	33	109,043	29	244,380	17	20,633	23	23,393	45	661,868	16
Sablefish	168,784	36	1,549	57	37,957	66	1,292	25	93,353	54	27,783	72	6,851	27	161,933	37
Total fish	3,619,943	11	195,094	51	790,434	15	289,049	14	1,055,831	9	275,349	31	1,014,186	31	2,605,758	8

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Table 13.--Estimates of fish population numbers (x 1,000) from the 2001 West Coast triennial bottom trawl survey by International North Pacific Fisheries Commission (INPFC) area for the middle depth stratum (184-366 m). Precision of the estimates are presented as coefficients of variation (CV%). "T" denotes trace value. Differences in totals result from rounding.

Taxon	Estimated population number (x 1,000) and CV%		Estimated population number (x 1,000) and CV% by INPFC area													
			Total survey area		Conception		Monterey		Eureka		Columbia		U.S. Vancouver		Canadian Vancouver	
Cartilaginous																
Skates and rays	1,147	12	200	27	251	24	125	17	313	18	112	28	145	45	1,002	11
Spiny dogfish	1,488	37	414	83	92	31	41	57	13	36	357	38	570	55	918	40
Other sharks	2,146	31	1,531	41	234	38	303	51	74	27	1	100	4	100	2,143	31
Total cartilaginous	7,222	15	2,440	30	977	18	790	33	945	26	768	28	1,303	42	5,919	15
Flatfish																
Arrowtooth flounder	9,172	19	1	100	41	56	630	58	2,747	18	3,163	36	2,591	30	6,581	20
Dover sole	71,121	8	12,939	21	24,301	13	8,849	17	16,959	12	4,083	19	3,991	40	67,131	8
English sole	2,709	24	181	57	1,389	37	254	66	803	35	74	45	8	60	2,701	24
Pacific halibut	111	28	0	-	0	-	9	59	45	41	29	31	28	56	84	29
Pacific sanddab	34	45	0	-	6	100	16	78	3	100	2	63	7	63	27	53
Petrale sole	109	25	18	67	12	66	2	100	40	25	11	44	26	60	84	23
Rex sole	70,307	11	16,330	40	16,326	13	13,028	16	21,798	14	1,749	23	1,075	58	69,231	11
Total flatfish	172,615	7	30,365	28	43,286	12	23,456	11	53,585	10	11,005	15	10,918	33	161,697	7
Rockfish																
Shortspine thornyhead	19,150	16	185	60	1,107	25	1,137	16	14,458	21	1,249	25	1,014	39	18,136	17
Bocaccio	67	41	20	92	23	55	4	68	5	68	3	100	12	100	55	42
Canary	94	42	0	-	2	100	9	68	20	38	30	70	32	74	61	38

Table 13.--Continued.

Taxon	Estimated population number (x 1,000) and CV%		Estimated population number (x 1,000) and CV% by INPFC area													
			Total survey area		Conception		Monterey		Eureka		Columbia		U.S. Vancouver		Canadian Vancouver	
Rockfish (cont.)																
Chilipepper	10,766	88	391	54	10,266	93	99	98	5	100	1	100	4	100	10,762	88
Darkblotched	4,731	45	18	47	293	31	688	41	3,077	53	629	77	26	40	4,705	45
Greenstriped	4,075	21	0	-	173	55	556	38	2,356	24	322	45	668	70	3,407	19
Pacific ocean perch	8,101	42	0	-	7	56	27	46	2,457	61	1,751	43	3,858	58	4,242	45
Redstripe	469	95	1	100	4	77	2	100	20	88	99	100	345	100	125	81
Sharpchin	18,256	86	20	100	474	76	382	58	17,143	91	237	89	0	-	18,256	86
Shortbelly	119,899	66	29,626	76	90,264	72	6	100	2	100	0	-	0	-	119,899	66
Silvergray	62	55	0	-	0	-	0	-	15	85	16	52	32	73	30	59
Splitnose	123,862	25	20,353	26	50,186	54	6,643	34	45,010	26	1,562	48	108	86	123,754	25
Stripetail	49,400	29	14,169	60	27,356	41	3,422	46	4,358	39	91	76	4	88	49,396	29
Widow	126	59	1	100	3	73	22	52	27	36	16	100	57	100	69	32
Yellowtail	5,484	100	0	-	0	-	0	-	19	49	1,221	99	4,244	100	1,240	98
Total rockfish	367,153	26	64,983	44	180,592	44	13,052	22	90,412	27	7,461	28	10,653	58	356,500	27
Other fish																
Lingcod	649	41	15	50	26	40	49	35	441	46	113	54	4	93	645	41
Pacific hake	123,772	22	38,681	33	52,745	45	18,172	22	12,505	18	845	28	825	38	122,947	22
Sablefish	11,770	12	3,327	13	2,875	30	525	15	3,327	24	1,257	29	458	23	11,311	12
Total fish	706,589	14	141,448	26	283,267	29	58,557	11	170,976	15	24,806	11	27,536	21	679,053	15

Table 14.--Estimates of fish population numbers (x 1,000) from the 2001 West Coast triennial bottom trawl survey by International North Pacific Fisheries Commission (INPFC) area for the deepest depth stratum (367-500 m). Precision of the estimates are presented as coefficients of variation (CV%). "T" denotes trace value. Differences in totals result from rounding.

Taxon	Estimated population number (x 1,000) and CV%		Estimated population number (x 1,000) and CV% by INPFC area													
			Total survey area		Conception		Monterey		Eureka		Columbia		U.S. Vancouver		Canadian Vancouver	
Cartilaginous																
Skates and rays	550	13	161	24	113	27	54	41	185	24	15	59	23	6	528	14
Spiny dogfish	150	76	17	51	133	84	0	-	0	-	0	-	0	-	150	76
Other sharks	4,486	17	1,235	21	1,706	35	698	23	803	36	12	60	33	92	4,453	17
Total cartilaginous	5,558	13	1,511	20	2,055	29	768	21	1,129	26	39	36	57	53	5,501	14
Flatfish																
Arrowtooth flounder	238	21	0	-	1	100	12	43	179	20	18	71	27	56	210	22
Dover sole	49,343	13	12,732	19	21,672	18	2,623	29	9,320	18	1,323	36	1,674	9	47,669	13
English sole	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Pacific halibut	7	100	0	-	0	-	0	-	5	100	2	100	0	-	7	100
Pacific sanddab	1	100	0	-	0	-	0	-	1	100	0	-	0	-	1	100
Petrale sole	10	100	0	-	0	-	0	-	0	-	0	-	10	100	0	-
Rex sole	28,673	17	7,006	26	9,808	34	3,397	22	7,319	23	388	55	755	68	27,918	18
Total flatfish	79,540	13	19,957	20	31,641	22	6,040	19	17,531	19	1,796	41	2,574	22	76,965	14
Rockfish																
Shortspine thornyhead	31,104	9	1,314	28	1,303	17	1,646	19	23,361	11	1,615	34	1,866	17	29,238	10
Bocaccio	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Canary	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-

Table 14.--Continued.

Taxon	Estimated population number (x 1,000) and CV%		Estimated population number (x 1,000) and CV% by INPFC area													
			Total survey area		Conception		Monterey		Eureka		Columbia		U.S. Vancouver		Canadian Vancouver	
Rockfish (cont.)																
Chilipepper	9	77	6	100	3	100	0	-	0	-	0	-	0	-	9	77
Darkblotched	138	34	0	-	6	64	7	36	123	38	1	100	0	-	138	34
Greenstriped	10	76	0	-	0	-	0	-	8	73	2	100	0	-	10	76
Pacific ocean perch	1,085	63	0	-	1	100	3	67	315	33	71	19	695	97	390	28
Redstripe	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Sharpchin	8	60	0	-	0	-	0	-	7	60	1	100	0	-	8	60
Shortbelly	1	100	1	100	0	-	0	-	0	-	0	-	0	-	1	100
Silvergray	5	100	0	-	0	-	0	-	0	-	0	-	5	100	0	-
Splitnose	2,139	31	1,362	41	463	54	45	57	257	33	12	80	0	-	2,139	31
Stripetail	53	69	39	86	0	-	0	-	10	100	5	100	0	-	53	69
Widow	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Yellowtail	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Total rockfish	48,292	7	6,746	11	5,172	20	2,438	13	28,625	11	2,148	26	3,162	23	45,129	8
Other fish																
Lingcod	2	100	0	-	0	-	0	-	2	100	0	-	0	-	2	100
Pacific hake	18,758	13	7,009	21	4,607	35	1,127	38	5,208	14	282	7	525	16	18,233	13
Sablefish	4,942	9	1,095	24	1,133	23	827	13	1,645	12	91	40	152	93	4,790	9
Total fish	176,693	7	39,129	12	48,752	15	14,629	12	62,645	9	4,722	29	6,816	12	169,877	7

Table 15.--The length-weight relationships from the 2001 triennial West Coast survey using a nonlinear least squares fit for the following equation:  
Fish weight (grams) =  $a \times \{\text{fork length (cm)}\}^b$ .

Species	Sex	Number sampled	Length-weight coefficients		Predicted weight at length (g)		
			a	b			
Pacific hake	M	360	0.0060727	3.010904	<u>20 cm</u>	<u>40 cm</u>	<u>60 cm</u>
	F	482	0.0044392	3.103434	50.2	404.6	1371.6
	T	851	0.0051681	3.060471	48.4	416.1	1464.5
Sablefish	M	627	0.0030949	3.292493	49.6	413.4	1429.9
	F	767	0.0031333	3.287077	<u>30 cm</u>	<u>50 cm</u>	<u>70 cm</u>
	T	1394	0.0031534	3.286425	226.0	1214.8	3678.1
Aurora rockfish	M	373	0.0108567	3.118362	224.6	1204.1	3639.0
	F	332	0.0107867	3.122281	225.5	1208.7	3652.2
	T	714	0.0105277	3.128707	<u>15 cm</u>	<u>25 cm</u>	<u>35 cm</u>
Blackgill rockfish	M	207	0.0142778	3.014161	50.5	248.3	709.0
	F	168	0.0165847	2.975931	50.7	249.8	714.3
	T	375	0.0153757	2.995032	50.3	248.9	713.3
Bocaccio	M	59	0.0045730	3.239514	<u>20 cm</u>	<u>35 cm</u>	<u>50 cm</u>
	F	47	0.0040397	3.275680	119.2	643.8	1886.4
	T	106	0.0042432	3.260832	123.4	652.8	1886.8
Canary rockfish	M	199	0.0138564	3.059307	121.2	647.7	1885.0
	F	182	0.0115905	3.105364	<u>30 cm</u>	<u>50 cm</u>	<u>70 cm</u>
	T	381	0.0126437	3.083032	278.8	1458.9	4339.3
Chilipepper	M	233	0.0063107	3.239330	278.6	1484.7	4469.9
	F	252	0.0097608	3.095154	278.2	1471.5	4408.1
	T	486	0.0087167	3.133896	<u>15 cm</u>	<u>25 cm</u>	<u>35 cm</u>
Darkblotched rockfish	M	500	0.0131273	3.099308	54.9	262.0	733.5
	F	548	0.0121405	3.125127	52.0	254.2	722.8
	T	1058	0.0124302	3.117100	53.4	258.1	728.3
English sole	M	18	0.0127274	2.863745	<u>15 cm</u>	<u>25 cm</u>	<u>35 cm</u>
	F	106	0.0042009	3.226983	40.7	213.0	633.6
	T	124	0.0041802	3.227938	42.6	207.2	587.0
Lingcod	M	465	0.0018582	3.391929	42.3	209.6	601.6
	F	774	0.0021261	3.344610	<u>10 cm</u>	<u>25 cm</u>	<u>40 cm</u>
	T	1240	0.0021418	3.346777	16.5	282.4	1211.9
Pacific ocean perch	M	256	0.0100035	3.113535	16.2	283.8	1232.8
	F	300	0.0088700	3.154898	16.3	283.1	1225.8
	T	556	0.0093101	3.138259	<u>20 cm</u>	<u>30 cm</u>	<u>40 cm</u>
Redstipe rockfish	M	97	0.0085058	3.143527	67.7	216.2	492.8
	F	118	0.0093237	3.109138	66.3	245.5	621.1
	T	215	0.0095297	3.105685	66.2	245.0	620.2
Pacific ocean perch	M	256	0.0100035	3.113535	<u>20 cm</u>	<u>60 cm</u>	<u>100 cm</u>
	F	300	0.0088700	3.154898	48.1	1997.4	11296.7
	T	556	0.0093101	3.138259	47.8	1882.8	10394.5
Redstipe rockfish	M	97	0.0085058	3.143527	48.4	1913.6	10576.3
	F	118	0.0093237	3.109138	<u>20 cm</u>	<u>30 cm</u>	<u>40 cm</u>
	T	215	0.0095297	3.105685	112.4	397.4	973.2
Pacific ocean perch	M	97	0.0085058	3.143527	112.9	405.6	1005.2
	F	118	0.0093237	3.109138	112.7	402.3	992.3
	T	215	0.0095297	3.105685	<u>15 cm</u>	<u>25 cm</u>	<u>35 cm</u>
Redstipe rockfish	M	97	0.0085058	3.143527	42.3	210.9	607.5
	F	118	0.0093237	3.109138	42.3	207.0	589.3
	T	215	0.0095297	3.105685	42.8	209.2	594.9

Table 15.--Continued.

Species	Sex	Number sampled	<u>Length-weight coefficients</u>		<u>Predicted weight at length</u> (g)		
			a	b			
Sharpchin rockfish	M	183	0.0066535	3.247279	<u>15 cm</u> 43.9	<u>25 cm</u> 230.4	<u>35 cm</u> 687.2
	F	147	0.0075967	3.202616	44.4	227.9	669.4
	T	330	0.0074092	3.211590	44.4	228.8	674.0
Silvergray rockfish	M	29	0.0126530	3.022163	<u>40 cm</u> 878.8	<u>50 cm</u> 1724.9	<u>60 cm</u> 2992.7
	F	26	0.0171646	2.943002	890.2	1716.7	2935.9
	T	55	0.0153497	2.972010	886.0	1719.7	2956.5
Splitnose rockfish	M	633	0.0163661	3.013126	<u>15 cm</u> 57.2	<u>25 cm</u> 266.8	<u>35 cm</u> 735.2
	F	482	0.0162793	3.020938	58.1	272.1	751.9
	T	1218	0.0157723	3.027018	57.3	268.8	744.4
Yelloweye rockfish	M	26	0.0086113	3.193953	<u>40 cm</u> 1127.1	<u>55 cm</u> 3116.8	<u>70 cm</u> 6733.3
	F	23	0.0126498	3.102418	1181.3	3172.6	6704.2
	T	49	0.0112831	3.128394	1159.6	3140.3	6677.6
Yellowtail rockfish	M	372	0.0082844	3.175873	<u>35 cm</u> 663.8	<u>45 cm</u> 1474.5	<u>55 cm</u> 2788.9
	F	409	0.0125750	3.060268	668.0	1441.4	2663.7
	T	781	0.0124611	3.064501	672.0	1451.5	2684.7



# Poly-Nor' Eastern Trawl

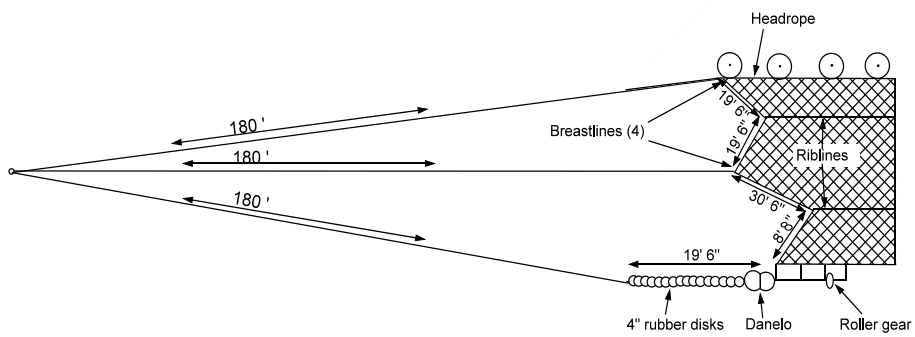
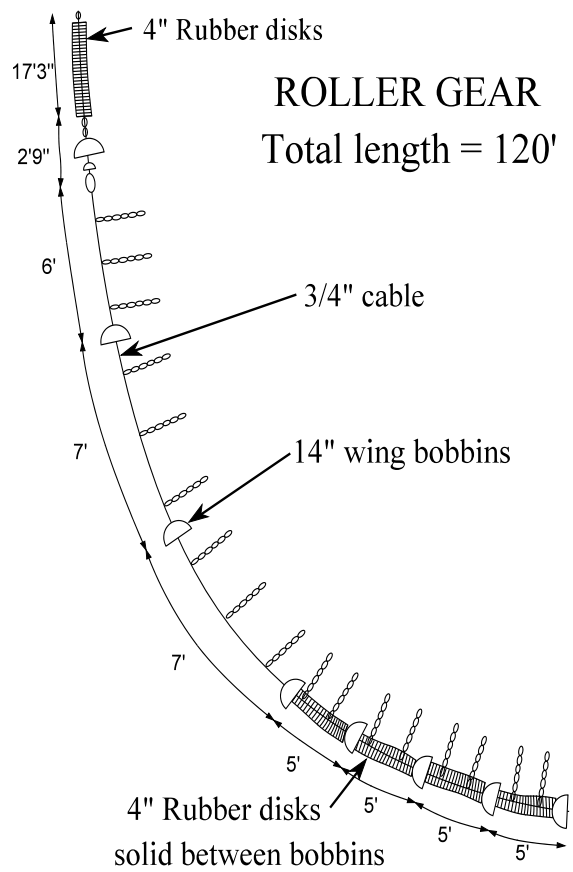
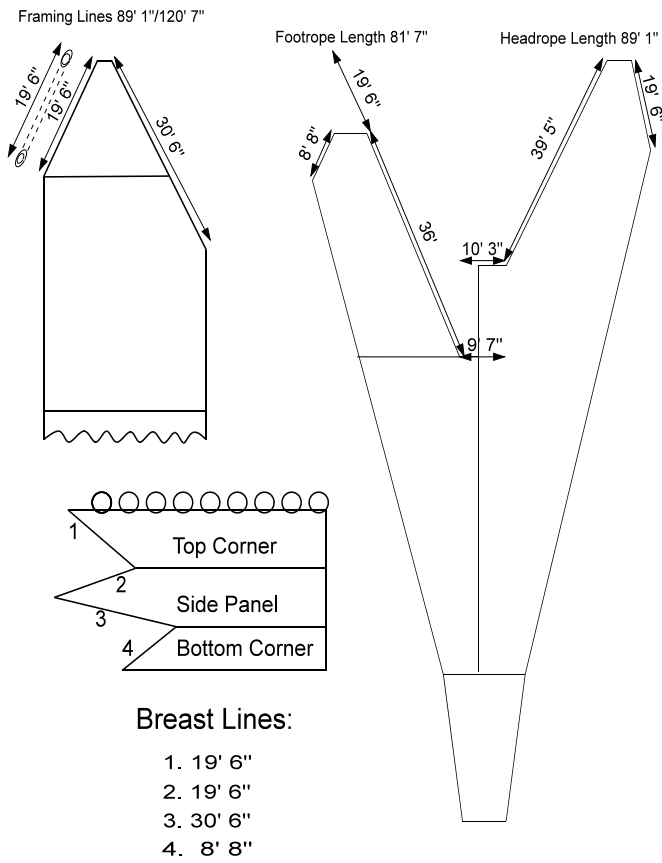


Figure 1.--The standardized poly-Nor' Eastern trawl and accessories used to sample groundfish during the 2001 West Coast triennial bottom trawl survey.

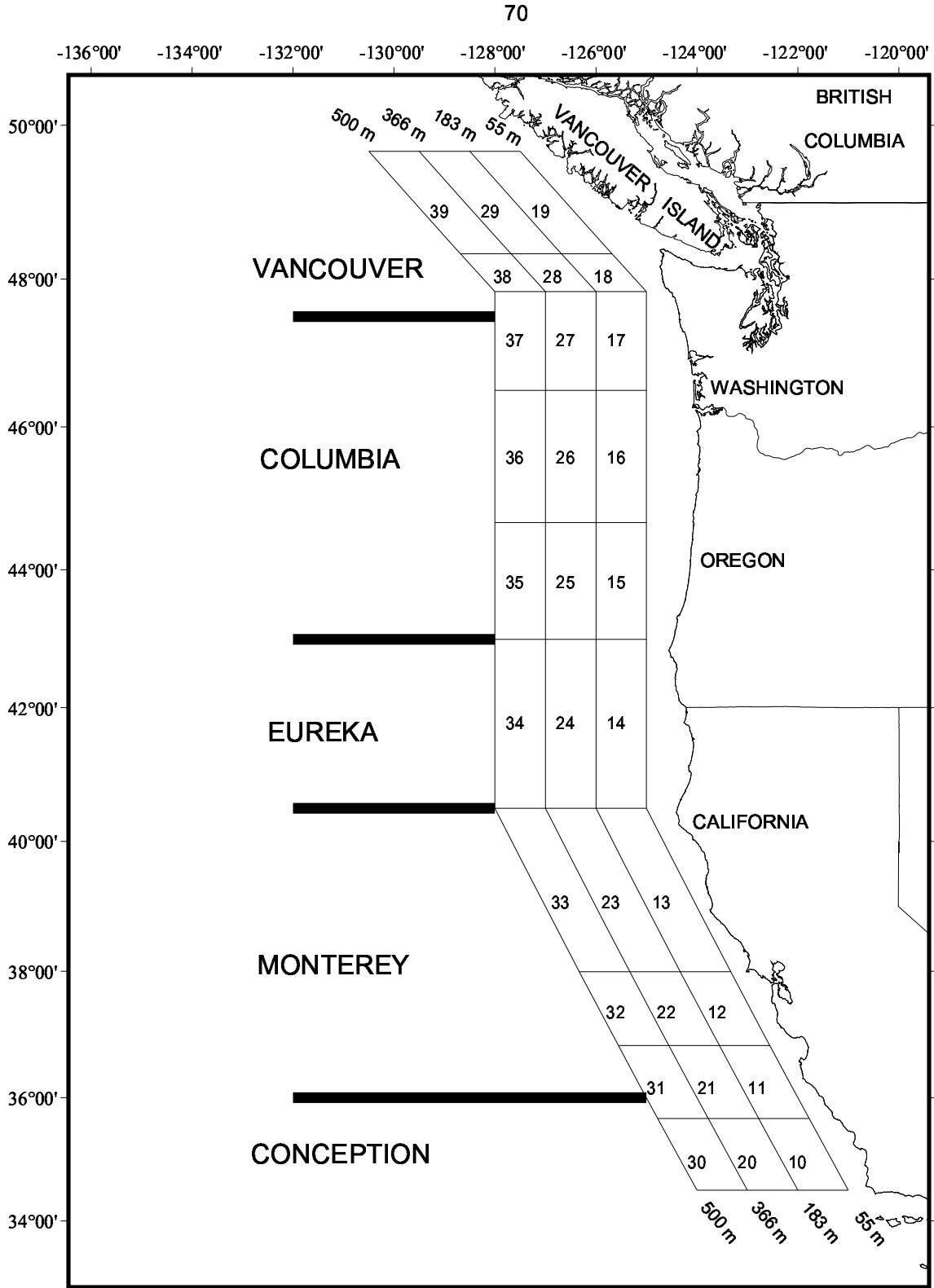


Figure 2.--The 2001 West Coast triennial bottom trawl survey area and stratification scheme (stratum numbers shown), also showing International North Pacific Fisheries Commission statistical areas.

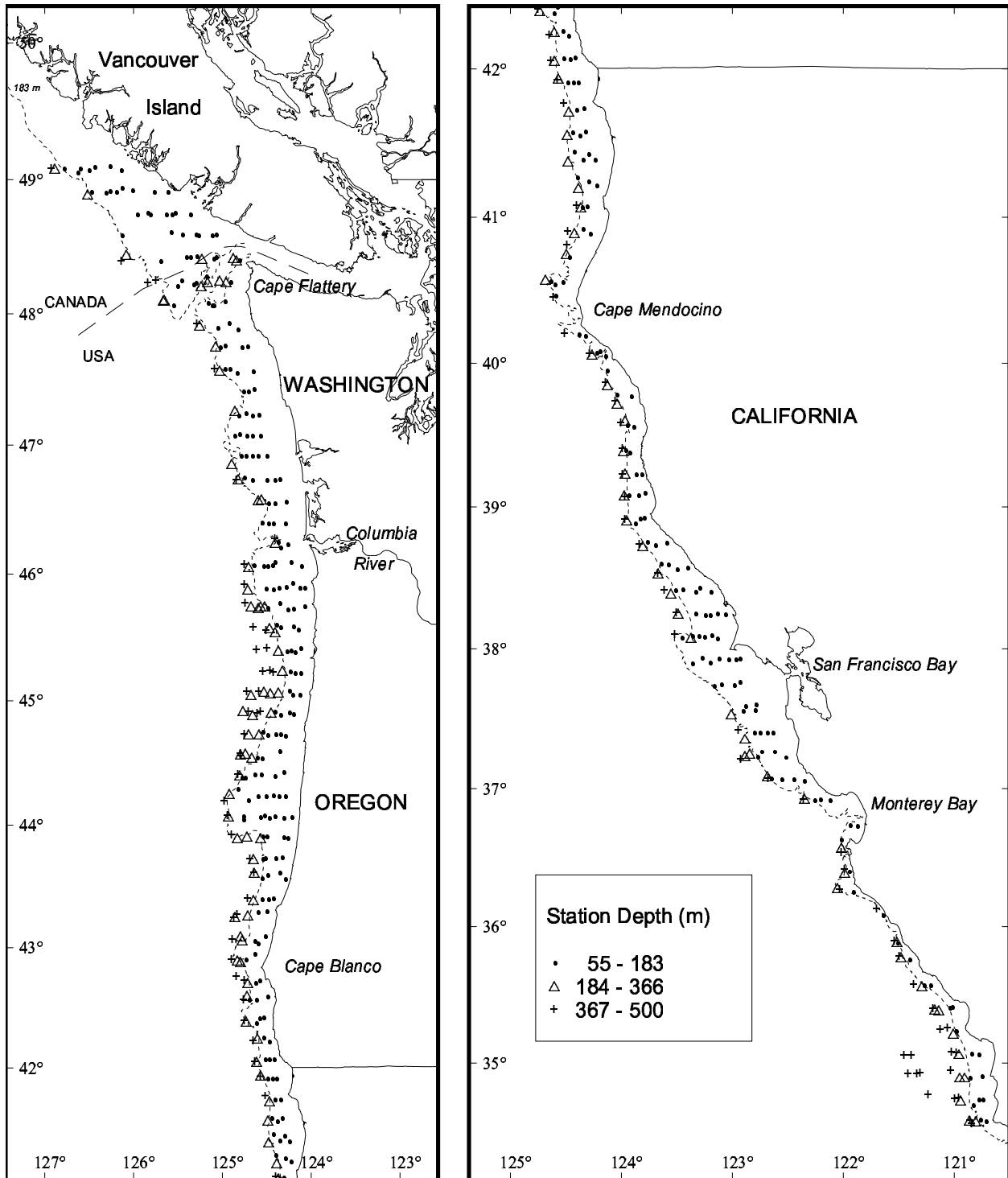


Figure 3.--Stations sampled successfully with bottom trawl hauls during the 2001 West Coast triennial bottom trawl survey.

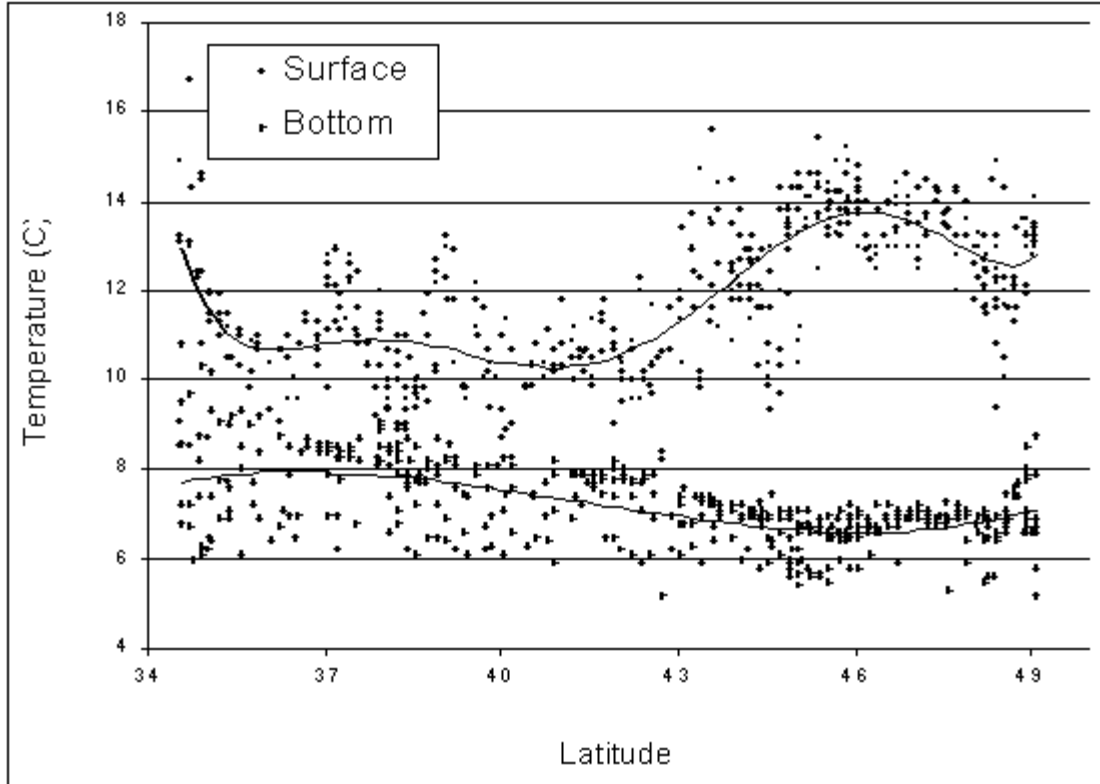


Figure 4.--Sea surface and bottom temperatures observed during the 2001 West Coast triennial bottom trawl survey.

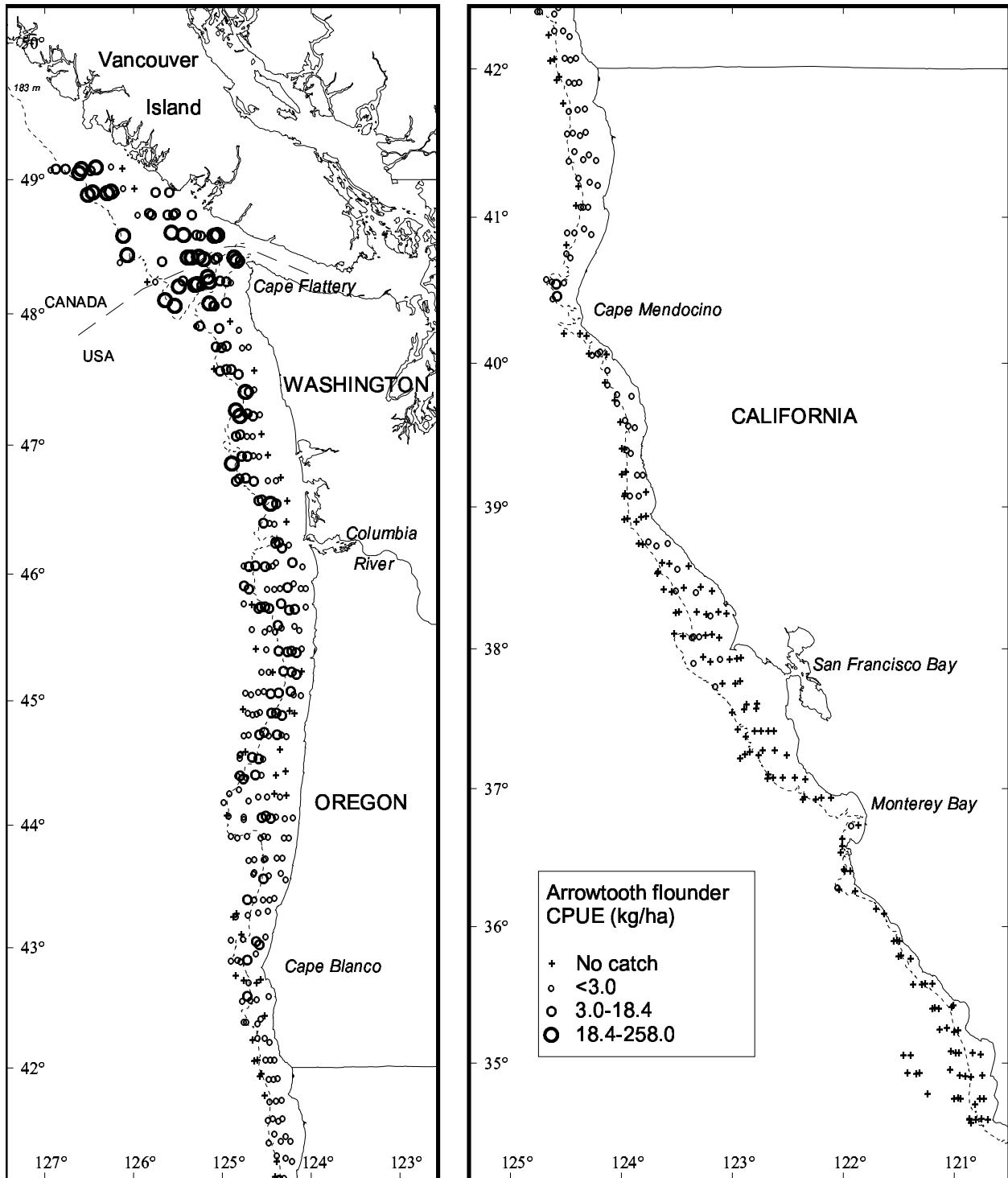


Figure 5.--Arrowtooth flounder distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

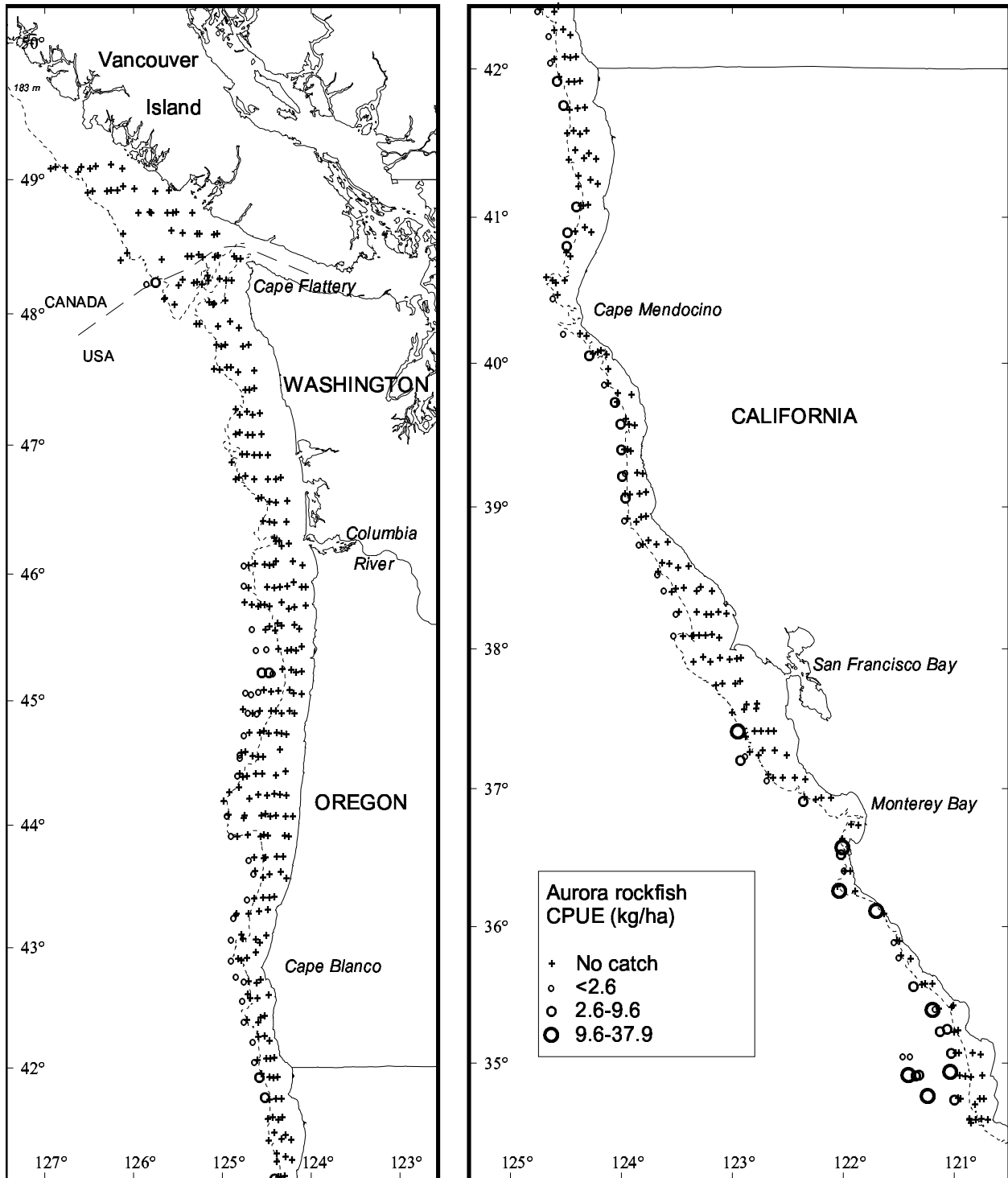


Figure 6.--Aurora rockfish distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

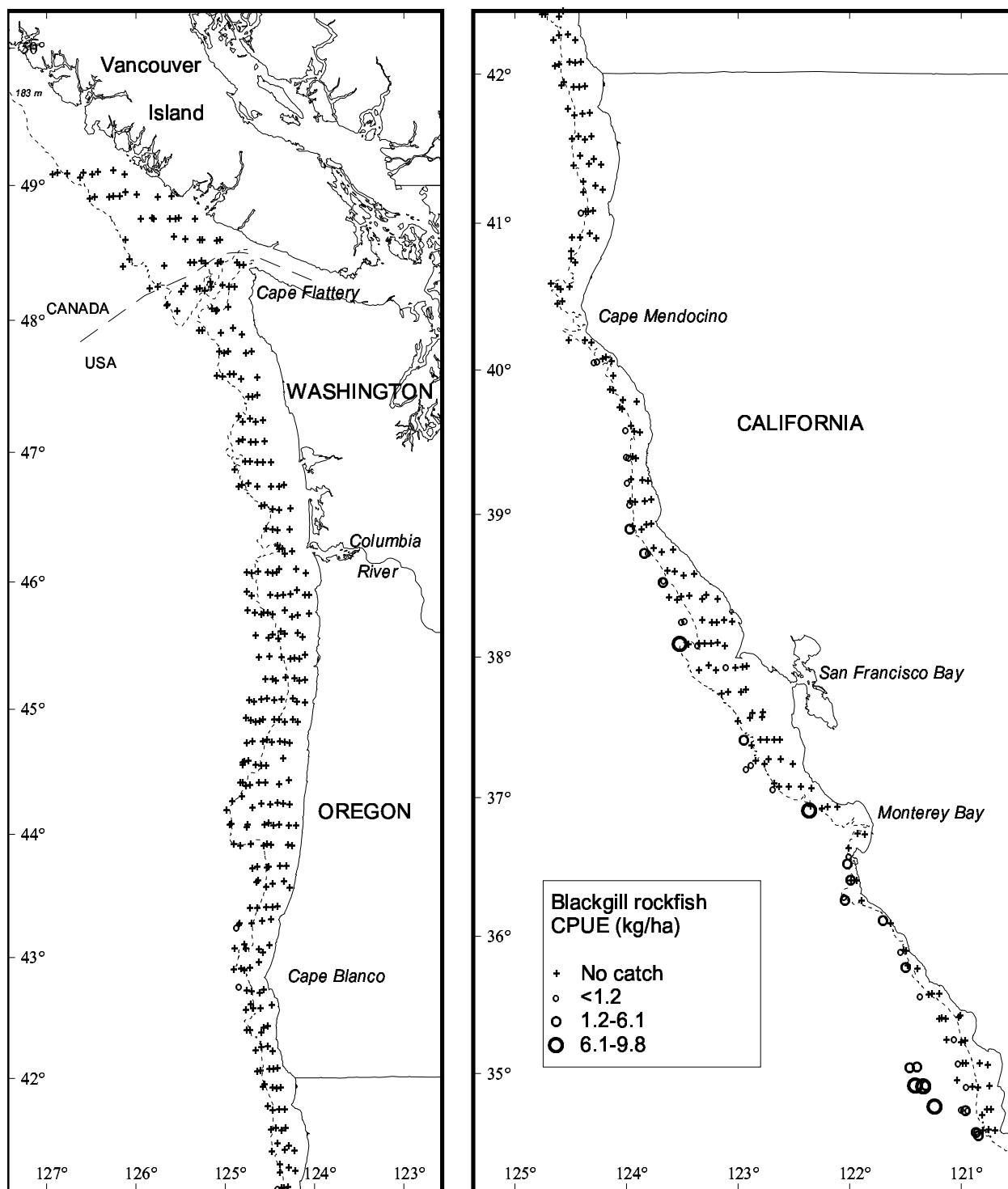


Figure 7.--Blackgill rockfish distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

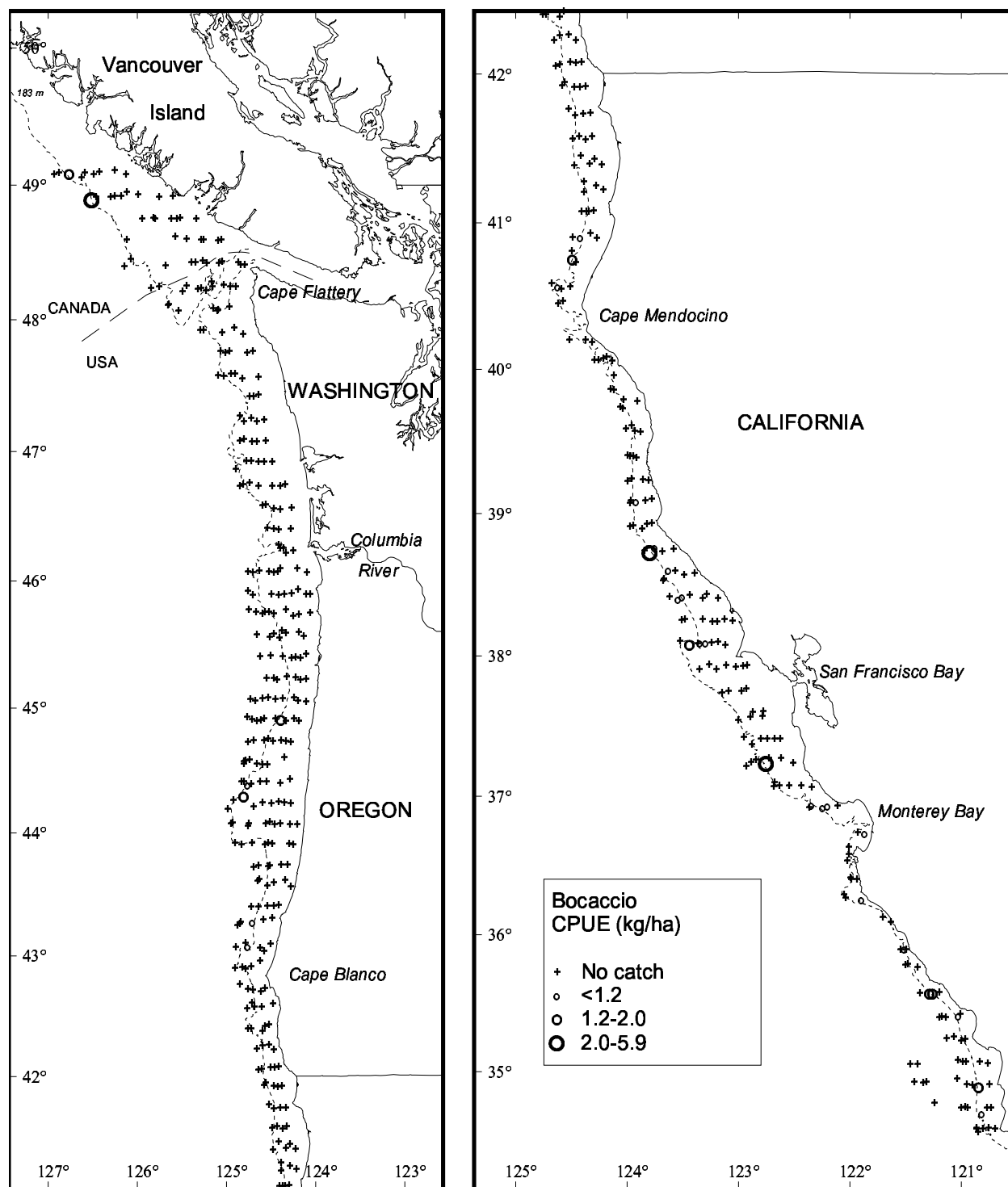


Figure 8.--Bocaccio distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.



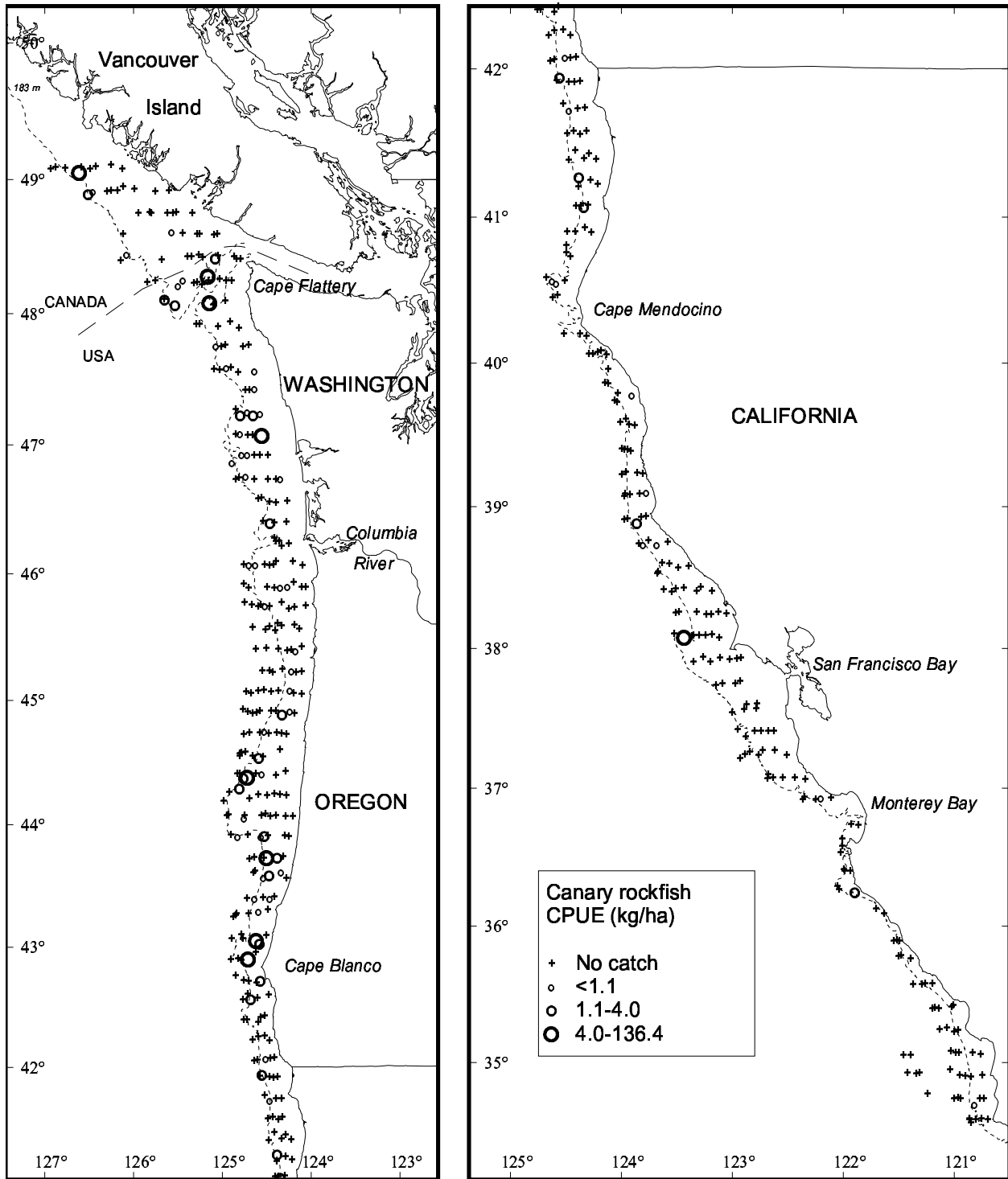


Figure 9.--Canary rockfish distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

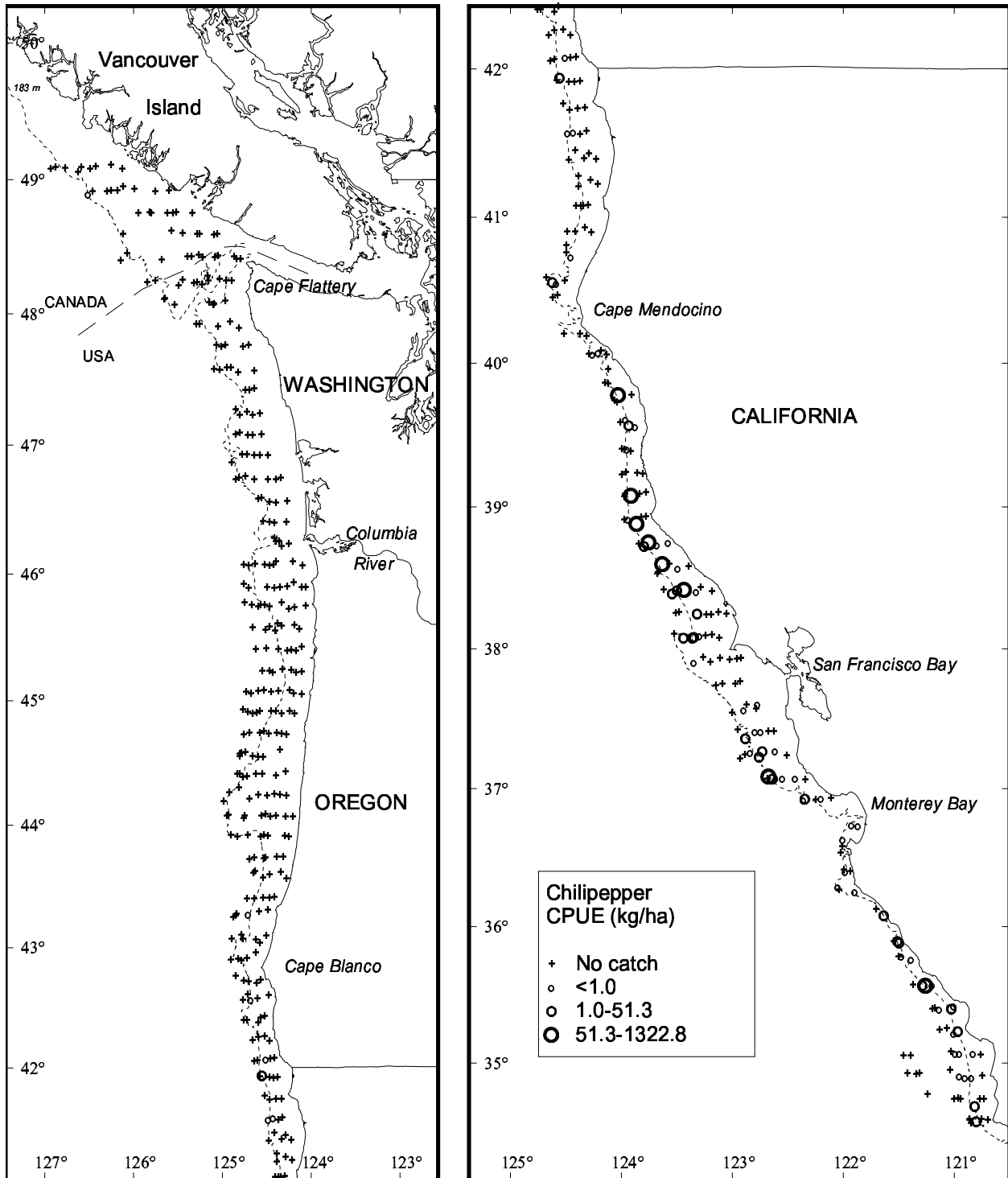


Figure 10.—Chilipepper distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

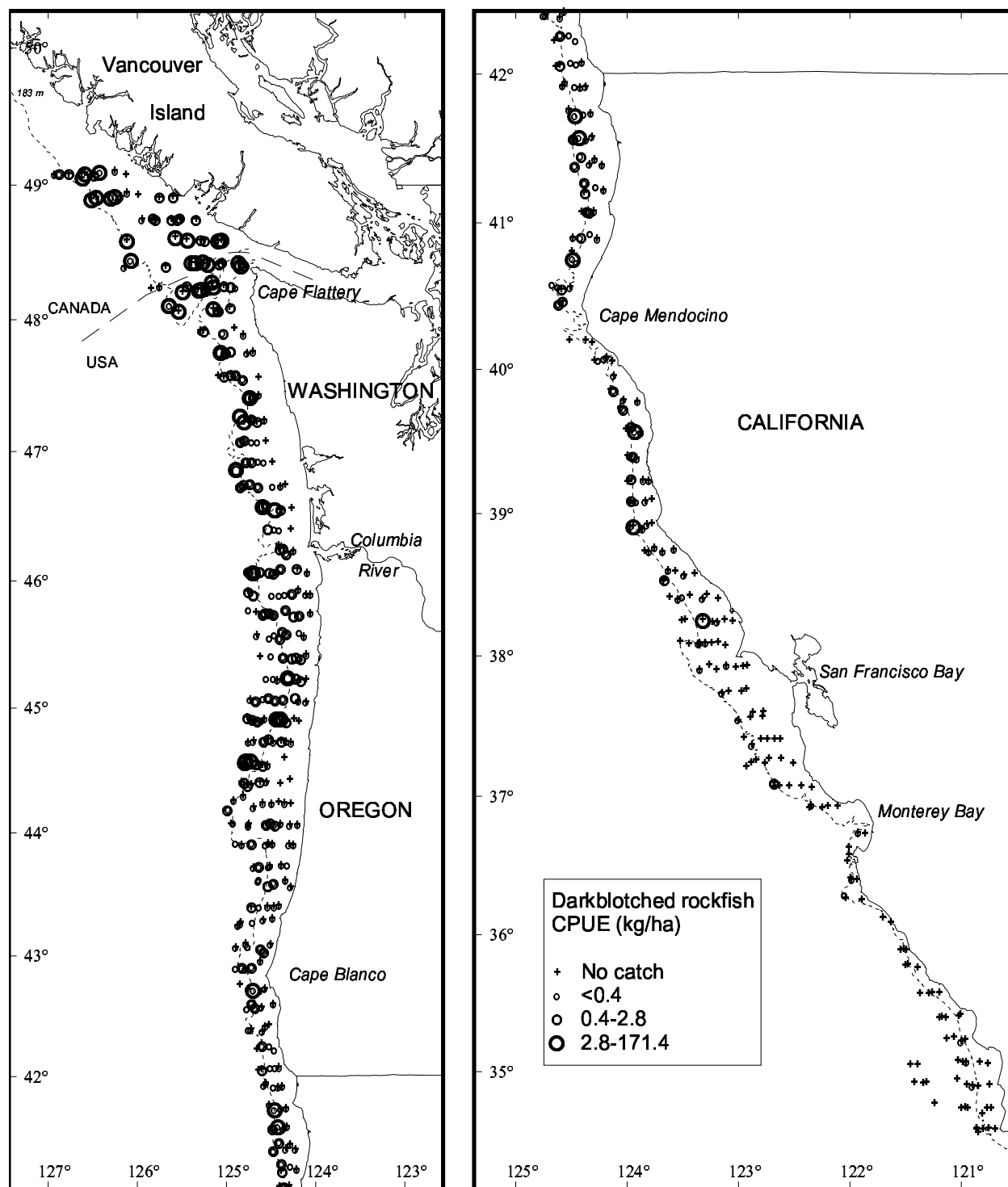


Figure 11.--Darkblotched rockfish distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

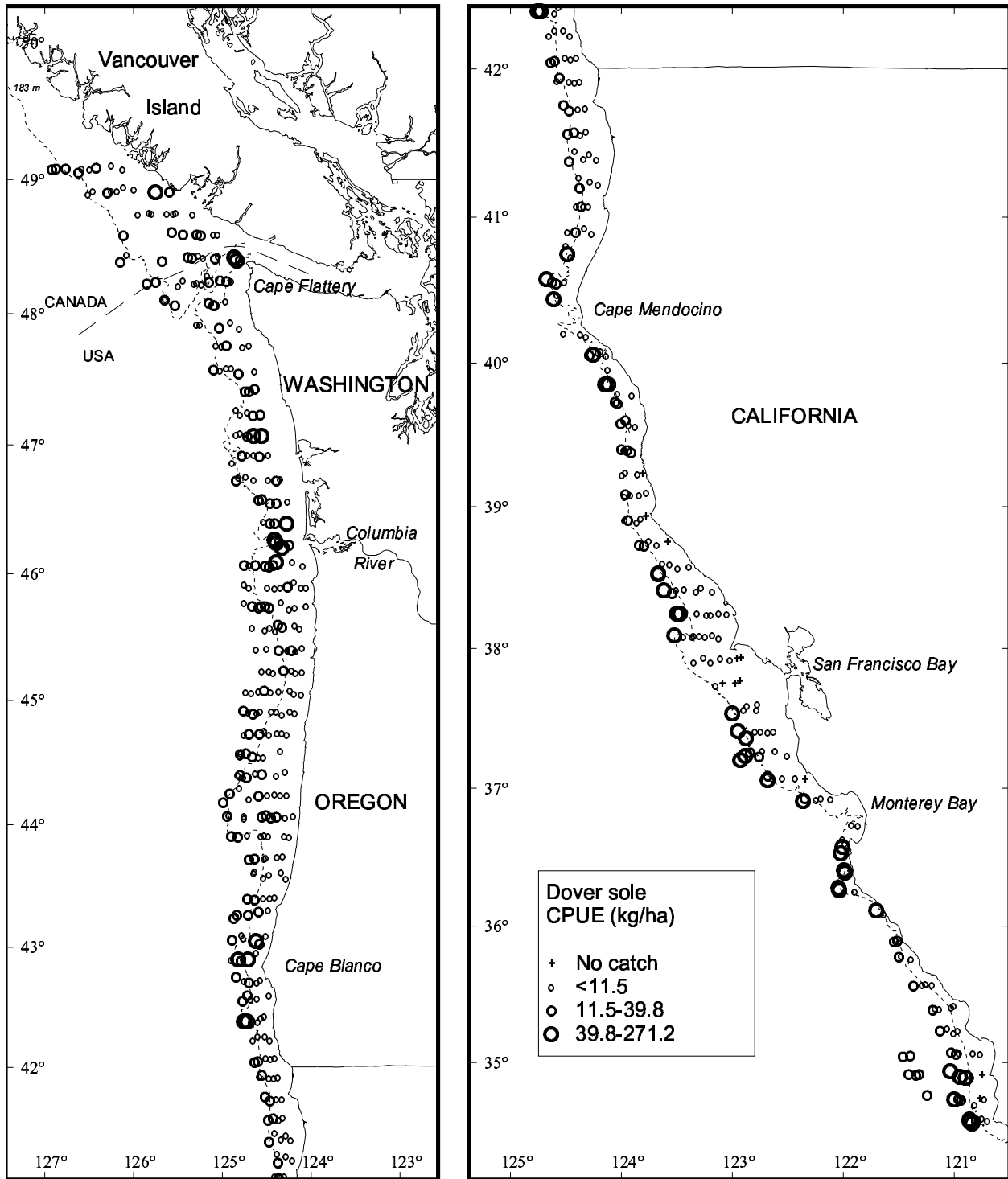


Figure 12.--Dover sole distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

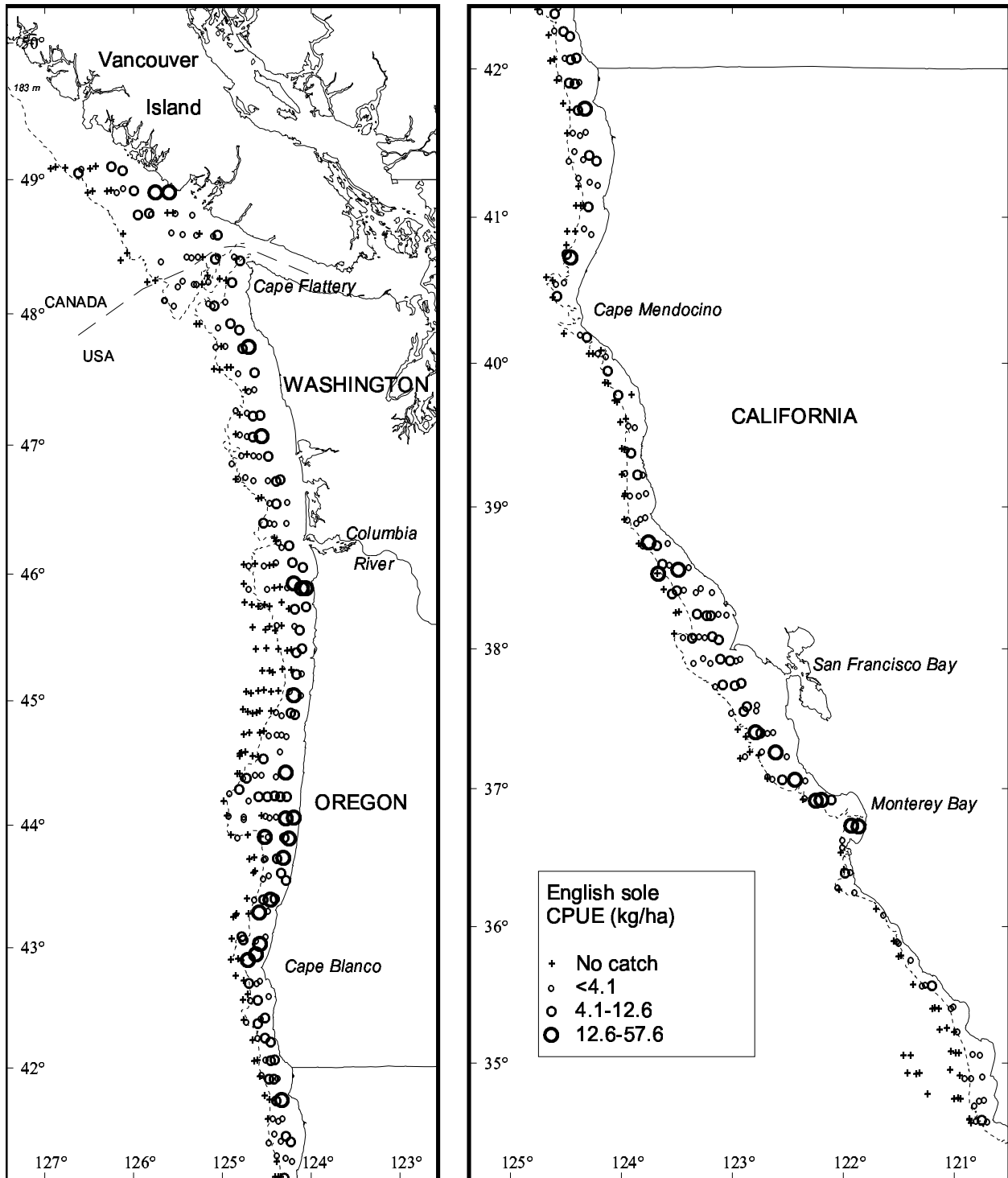


Figure 13.—English sole distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

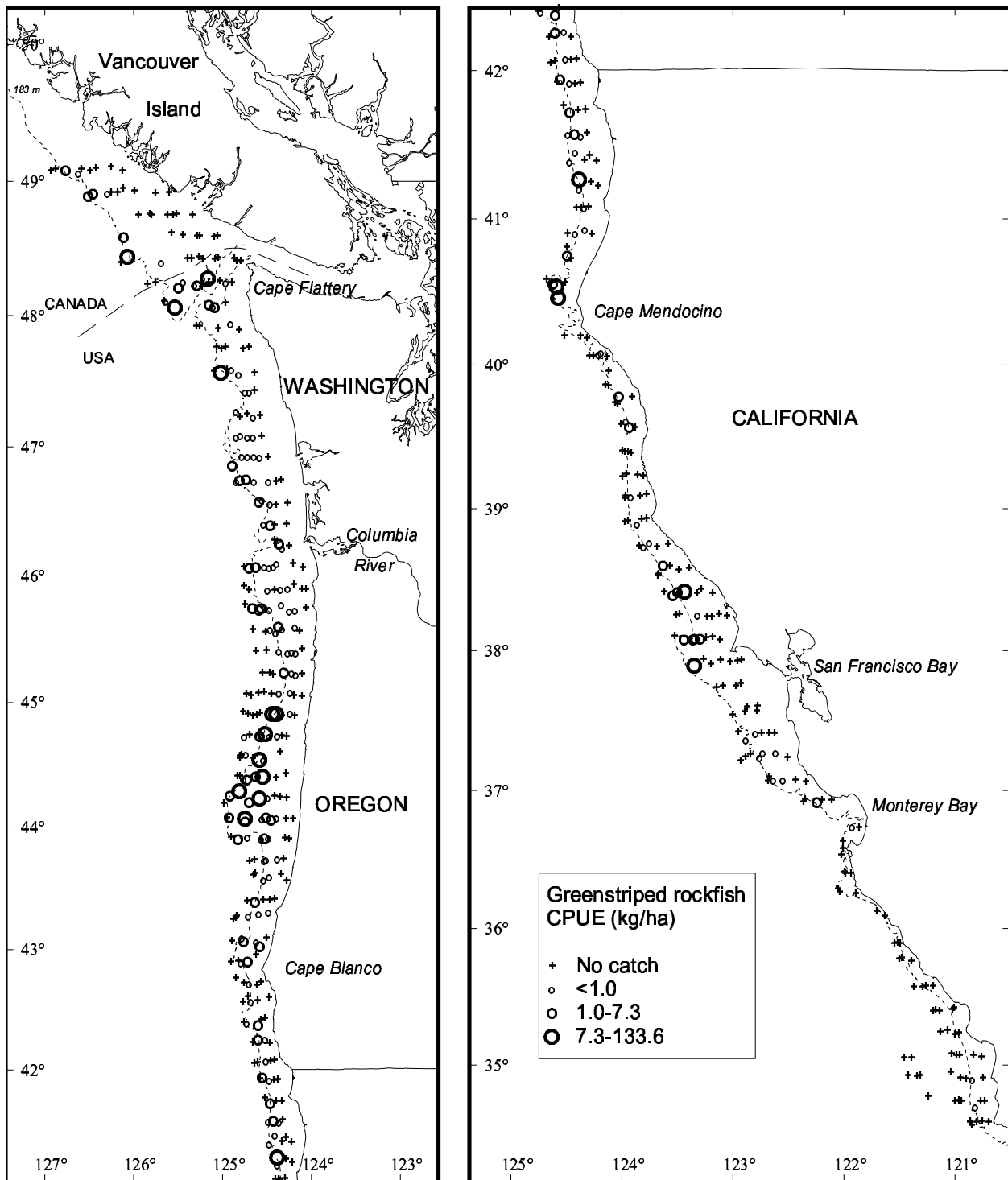


Figure 14.--Greenstriped rockfish distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

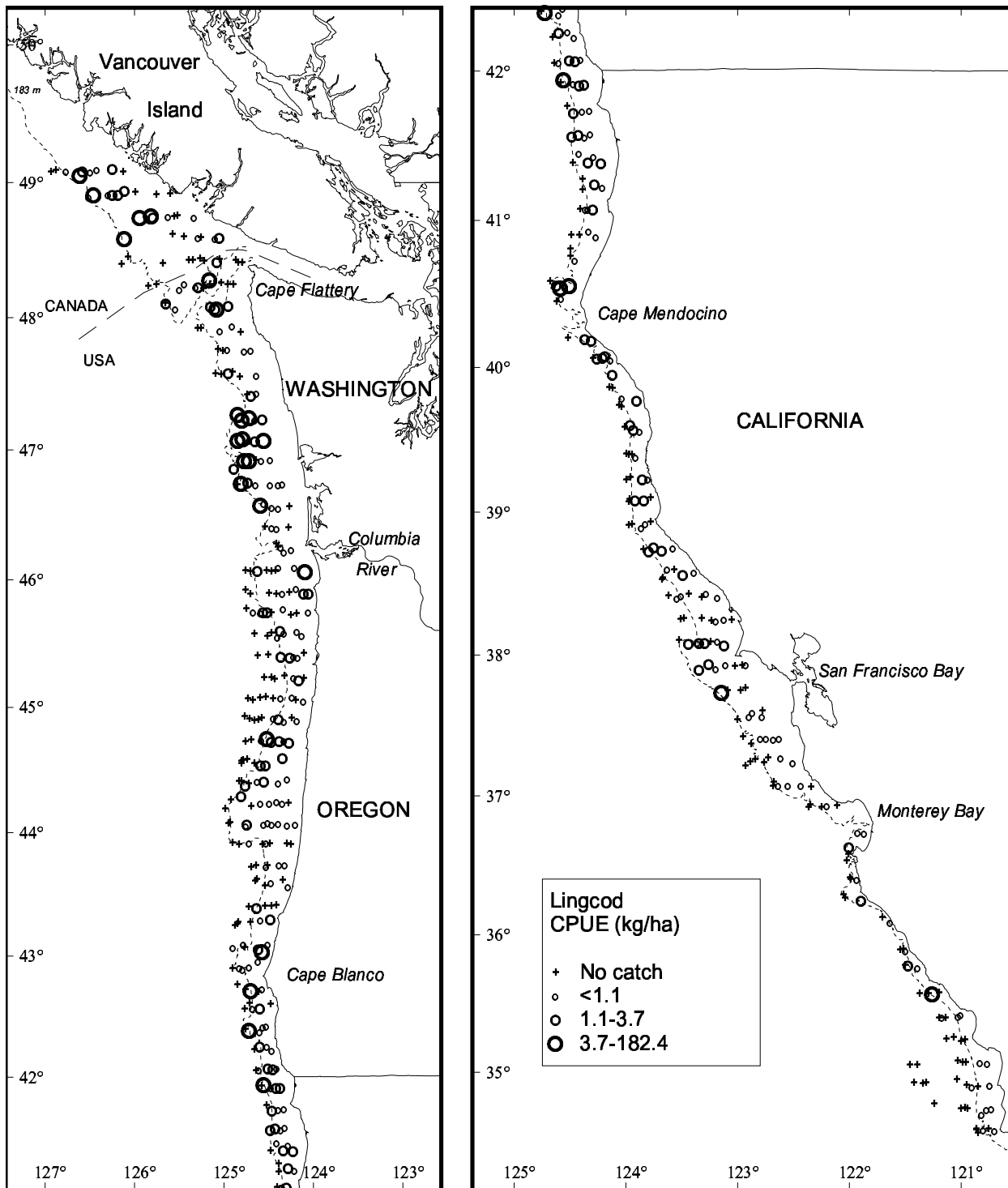


Figure 15.--Lingcod distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

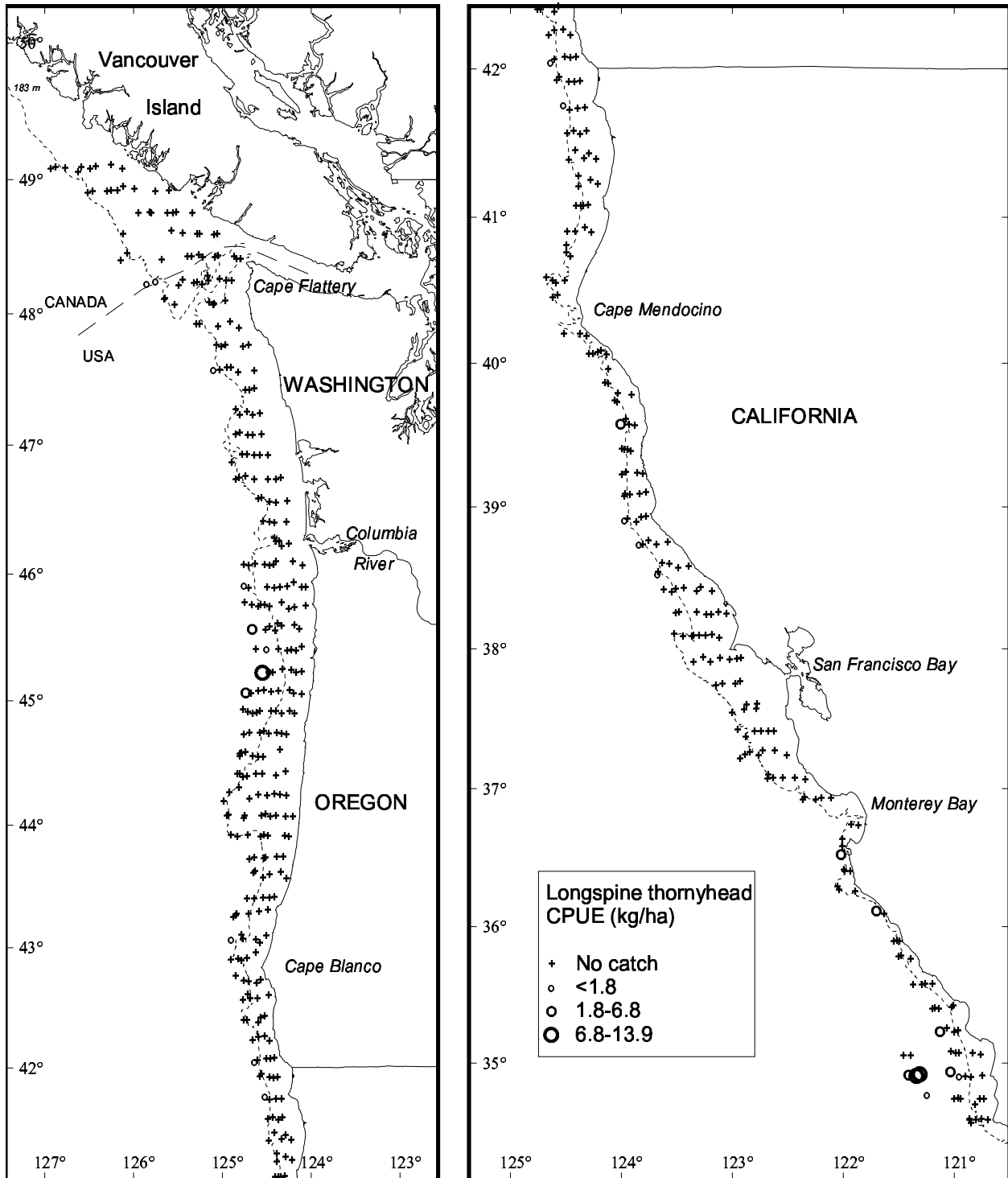


Figure 16.--Longspine thornyhead distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.



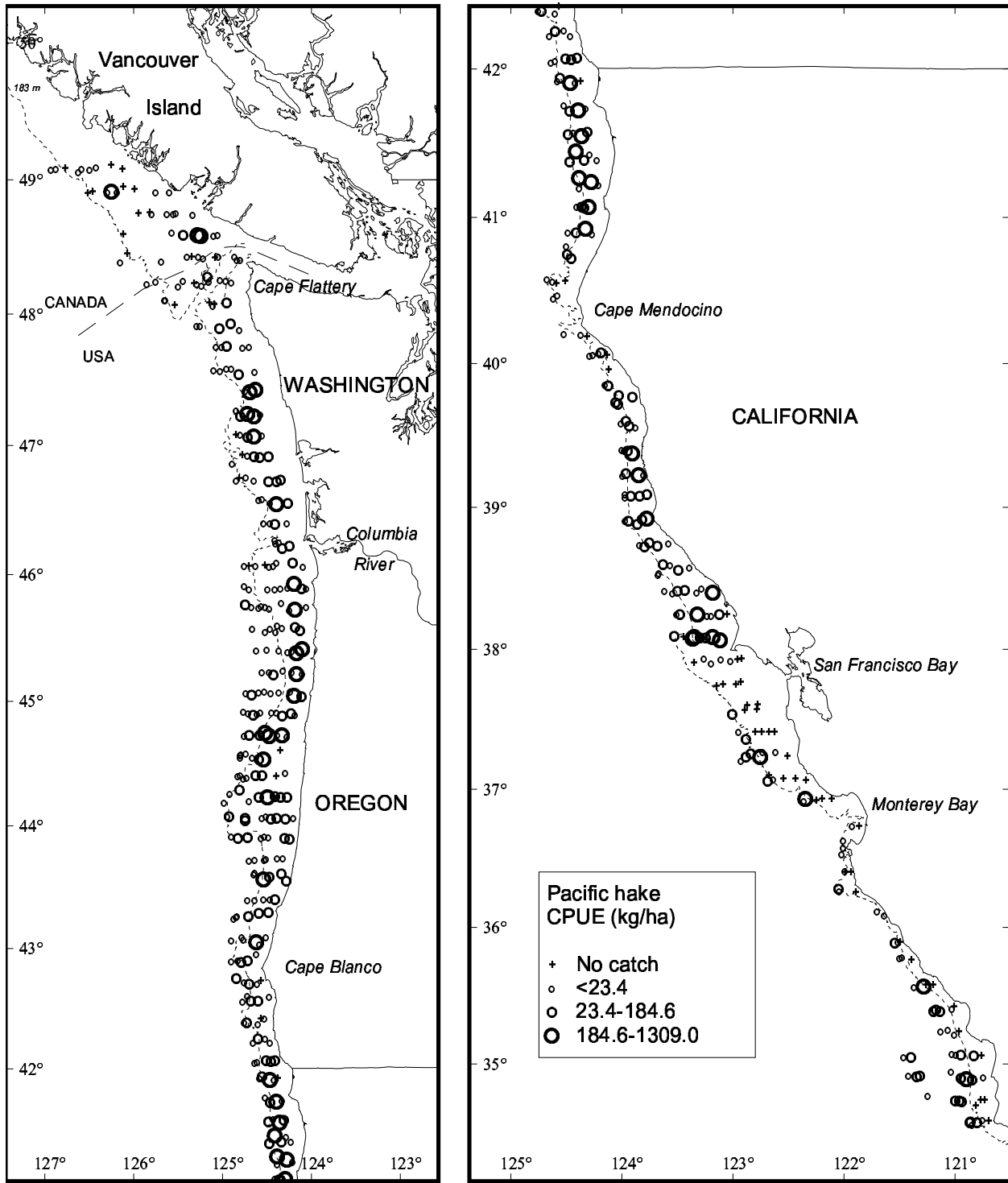


Figure 17.--Pacific hake distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

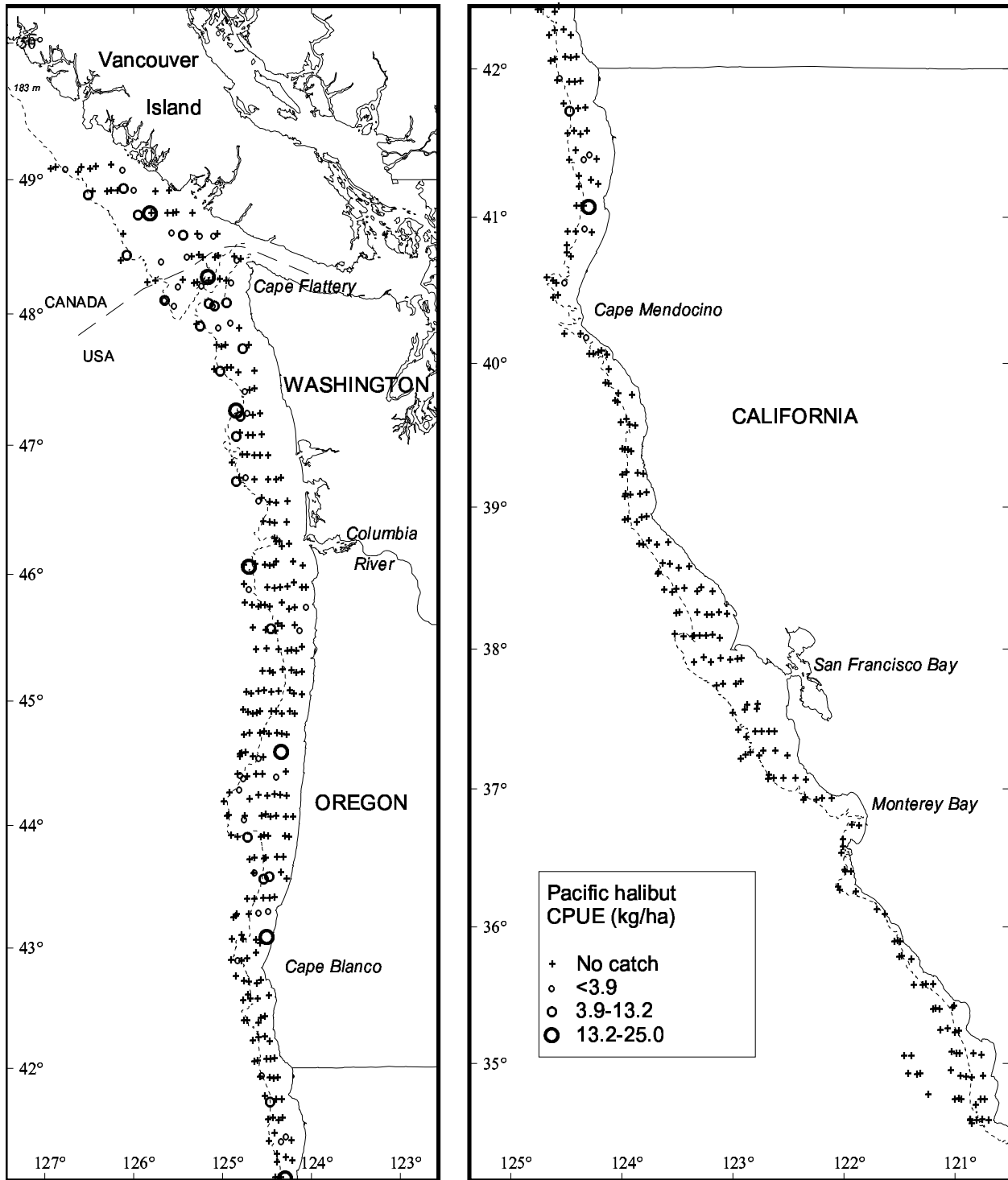


Figure 18.--Pacific halibut distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

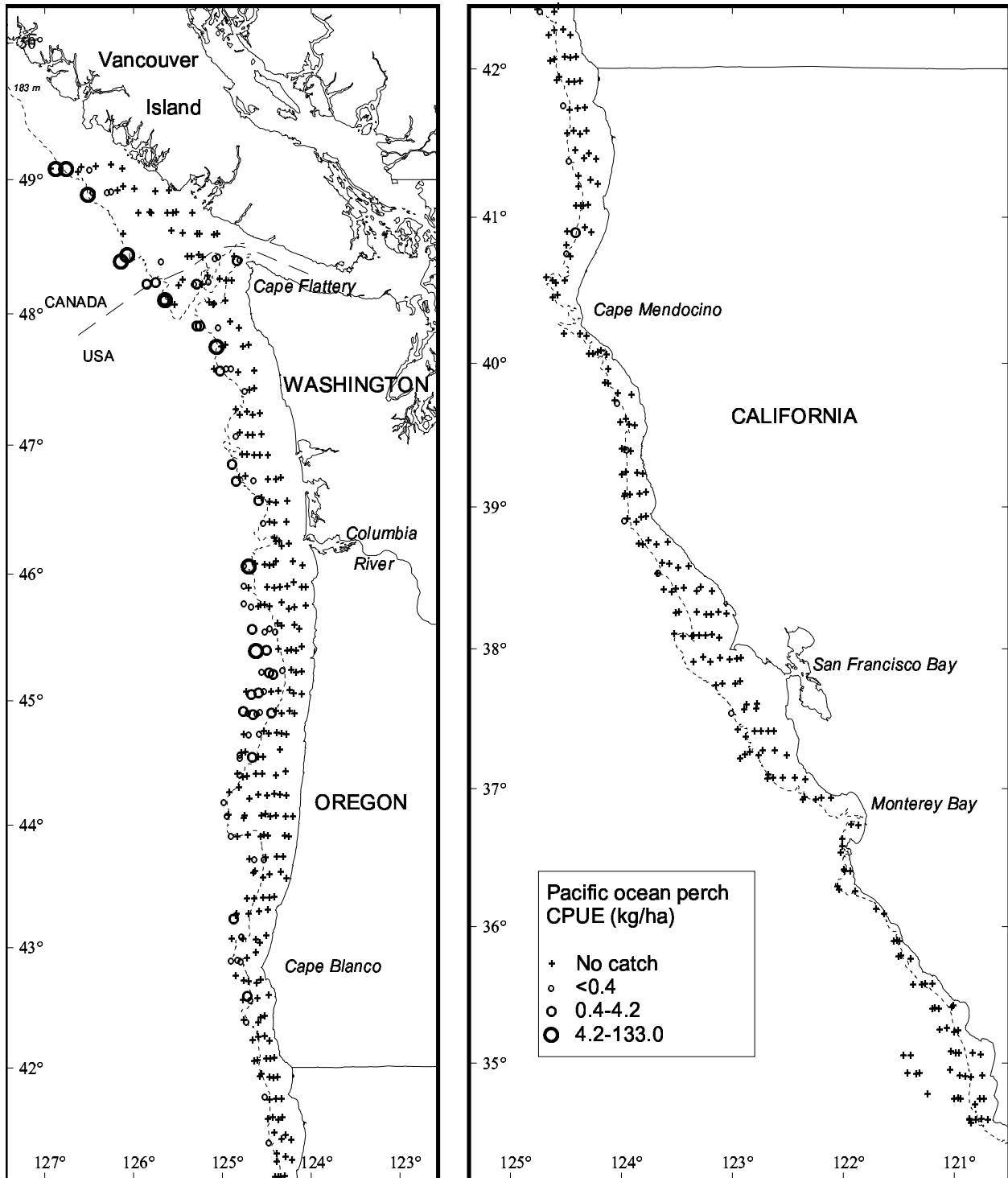


Figure 19.—Pacific ocean perch distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

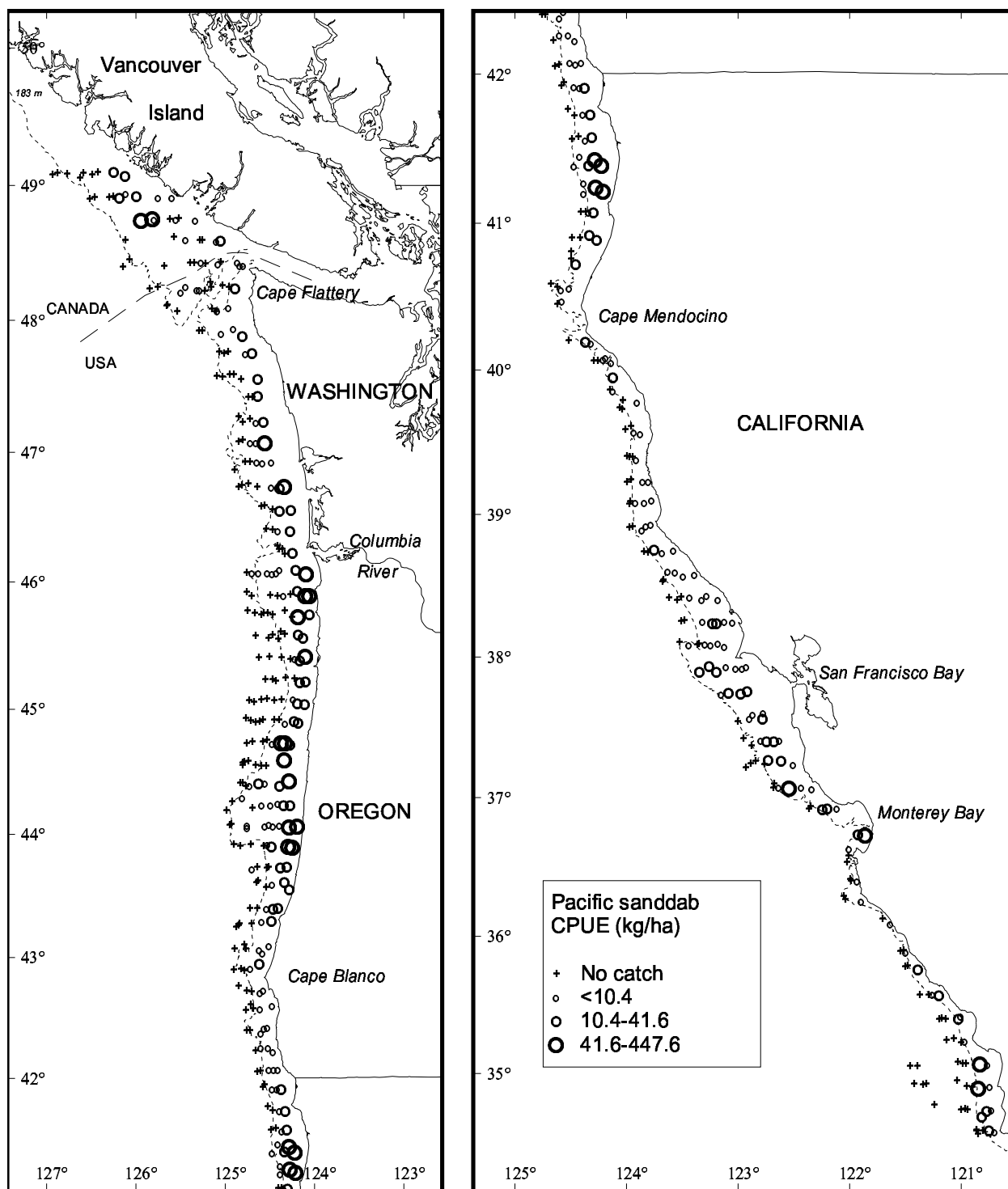


Figure 20.--Pacific sanddab distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

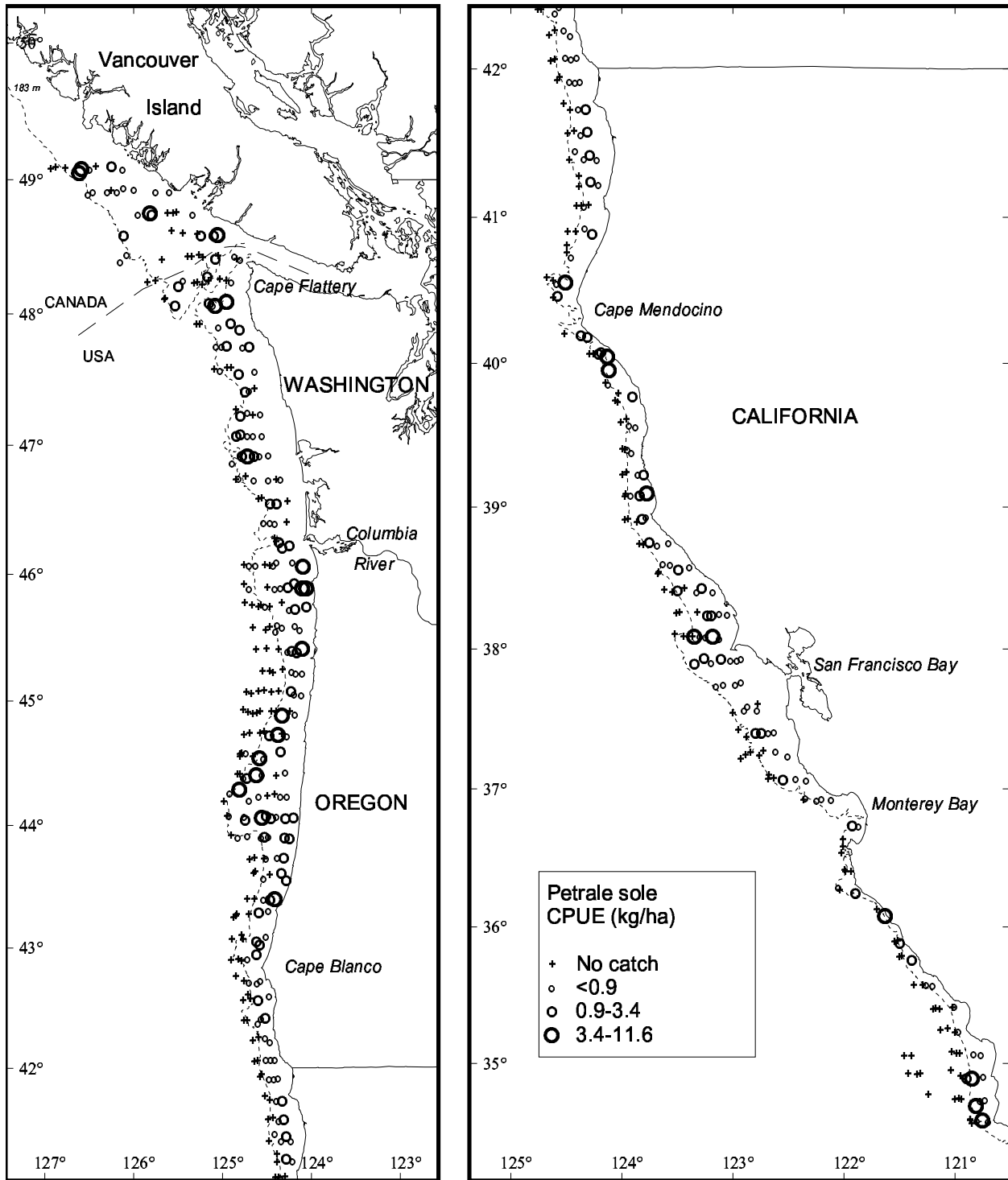


Figure 21.--Petrale sole distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

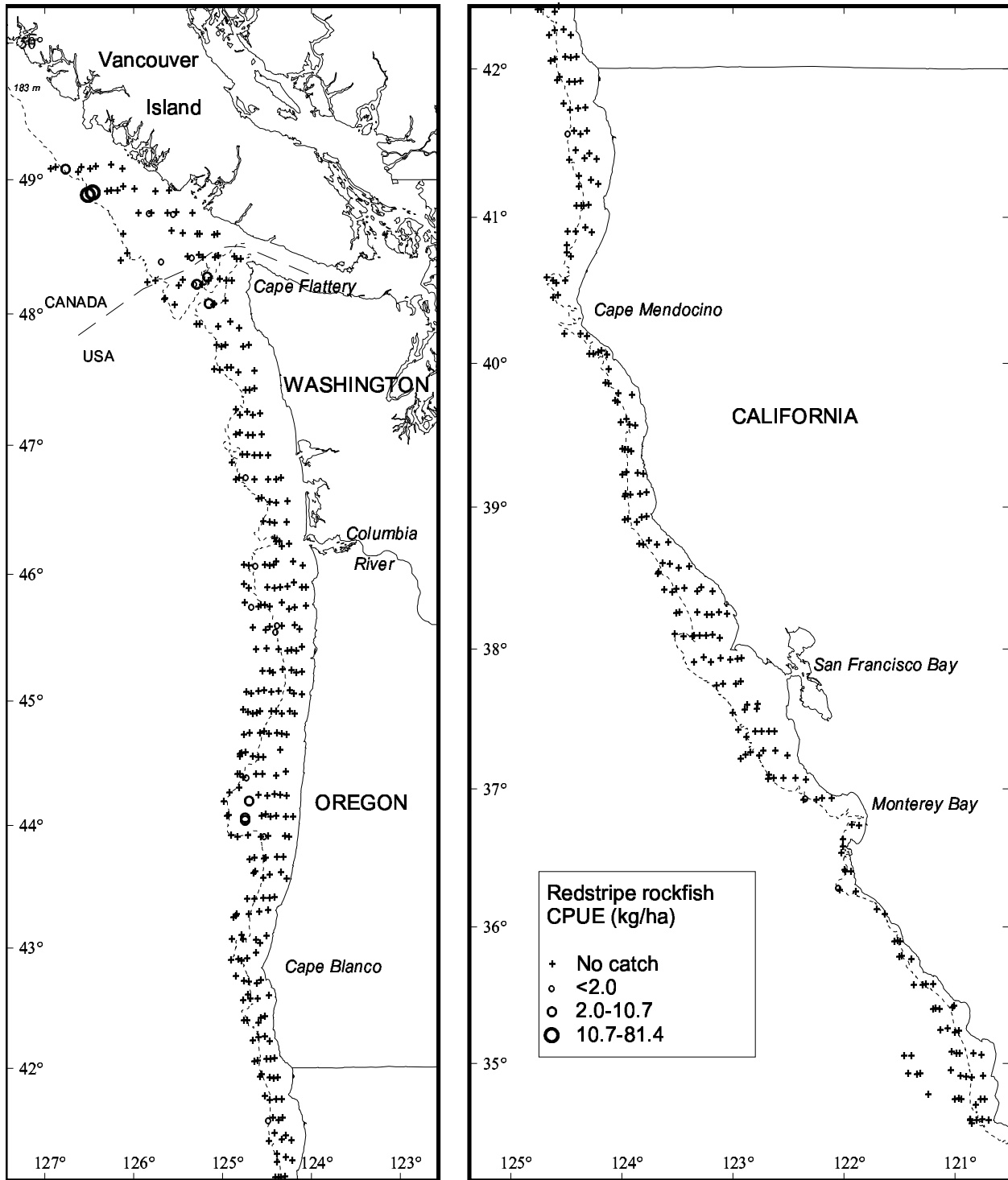


Figure 22.--Redstripe rockfish distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

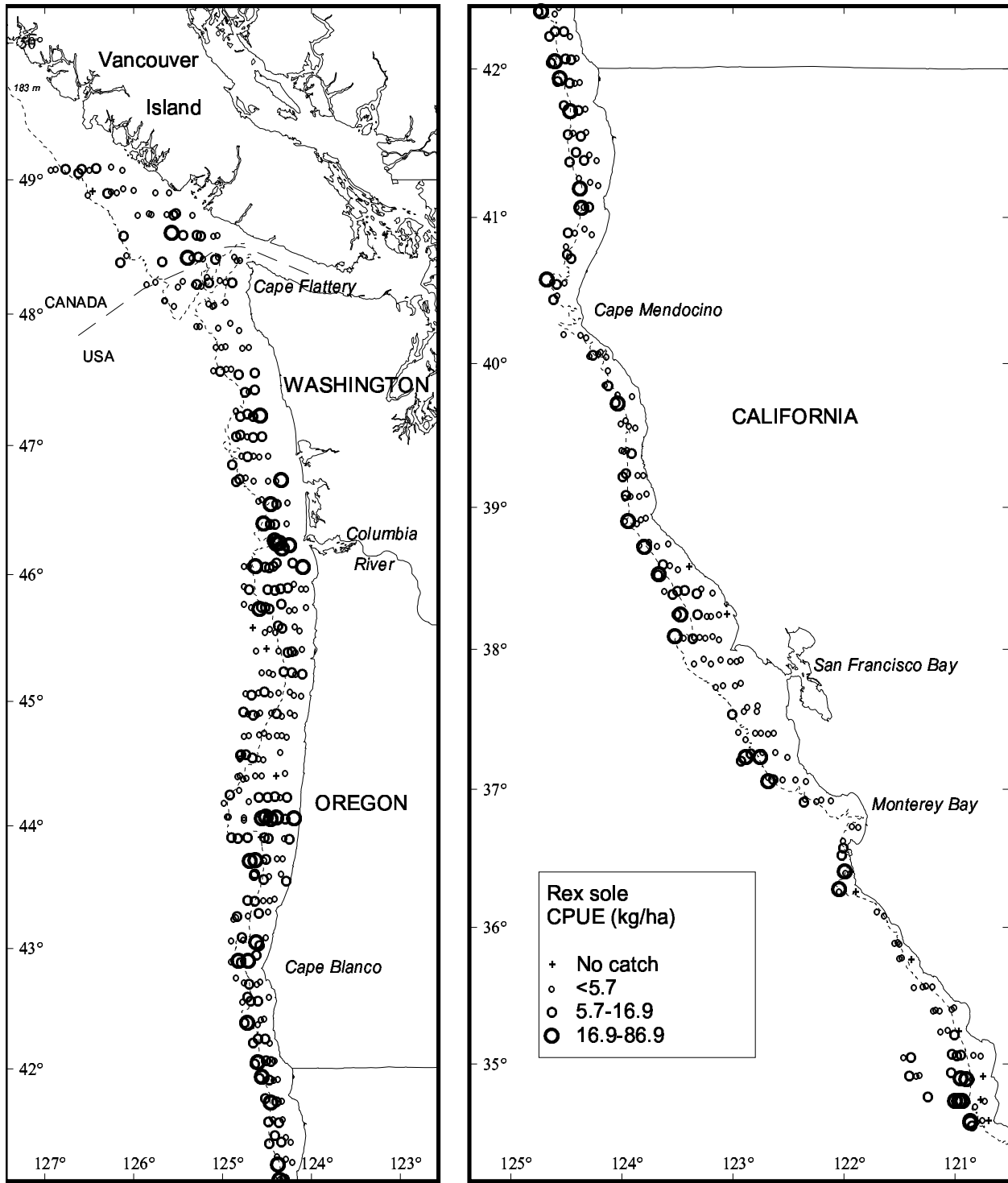


Figure 23.--Rex sole distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

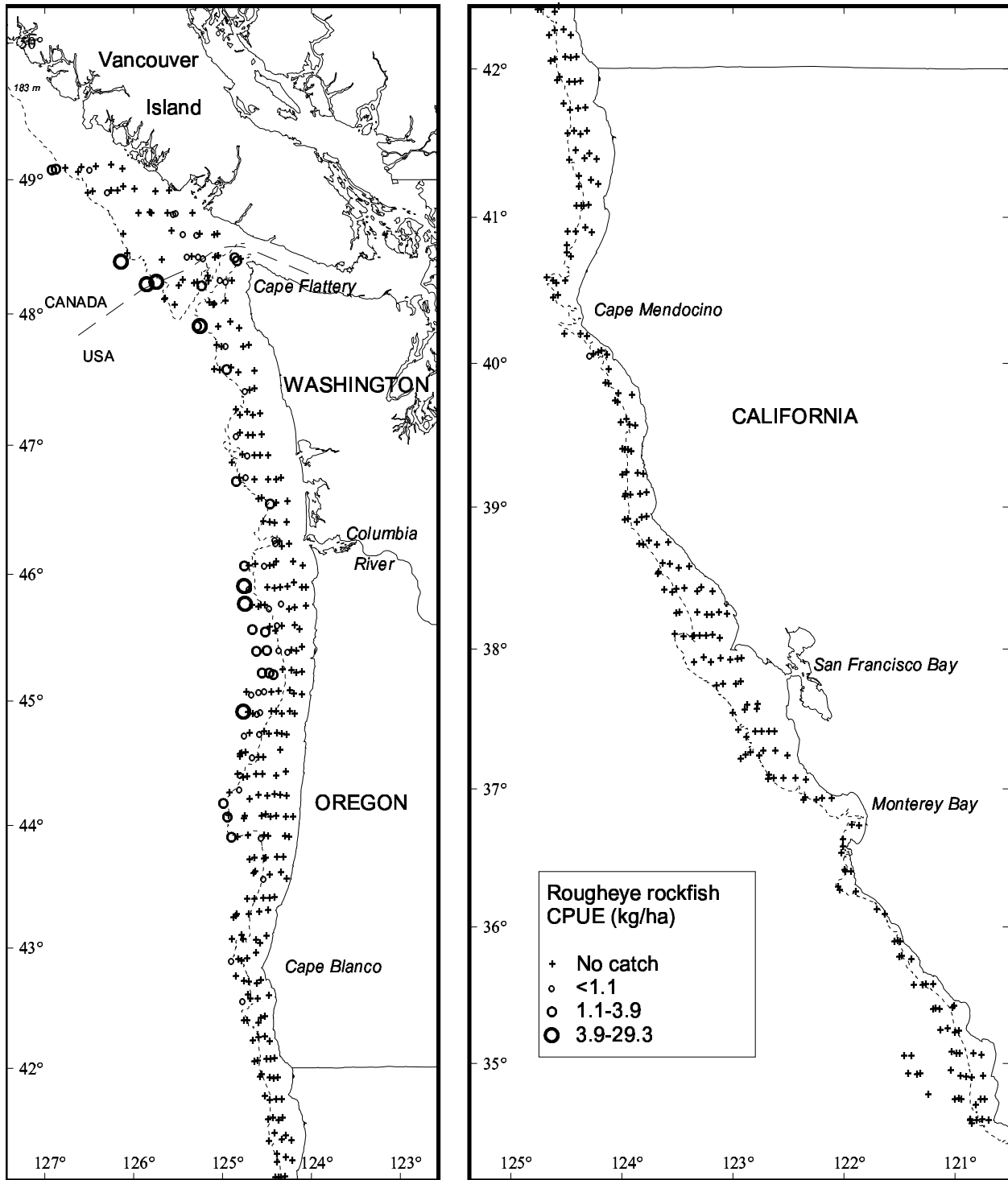


Figure 24.--Rougheye rockfish distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.



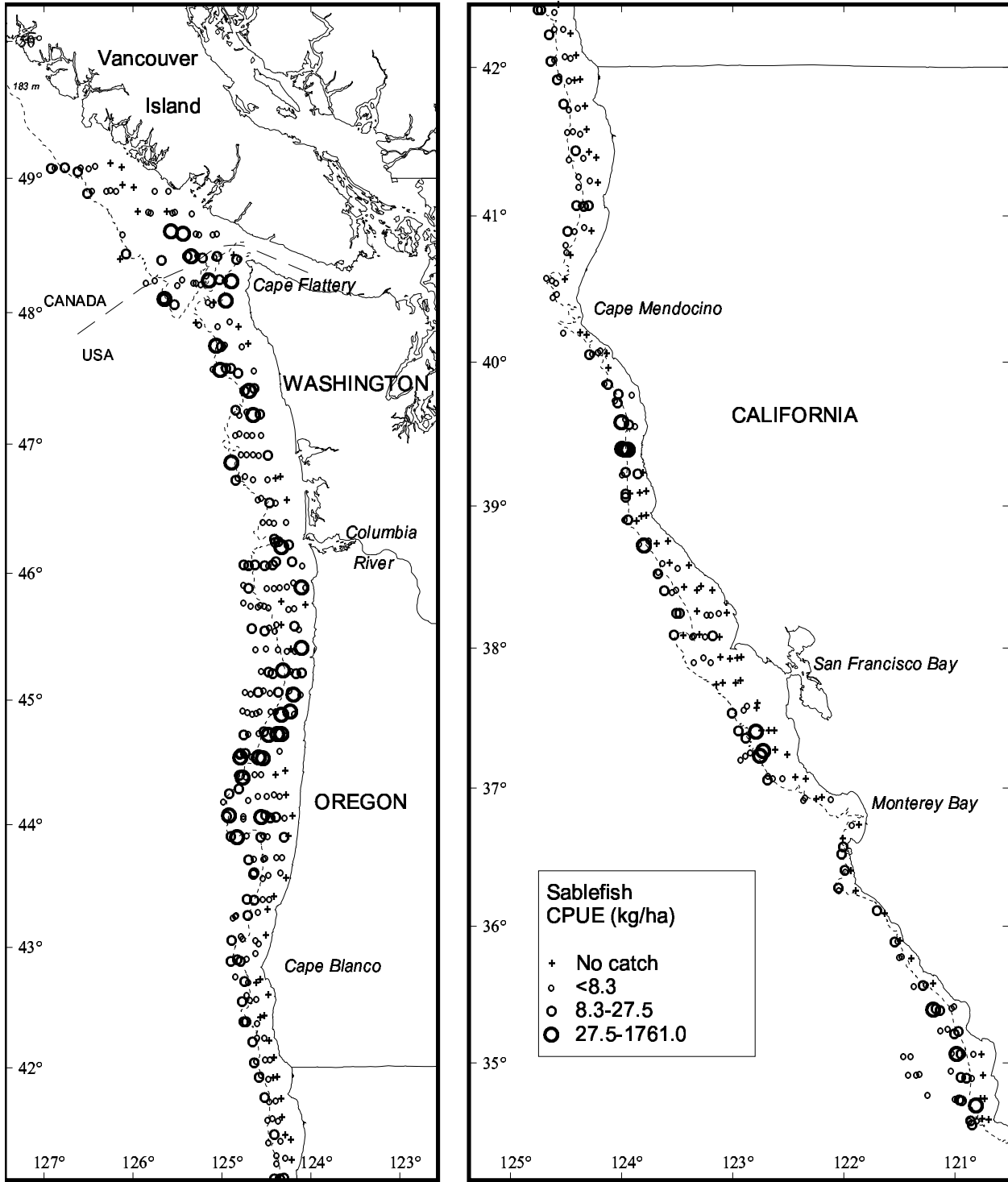


Figure 25.--Sablefish distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

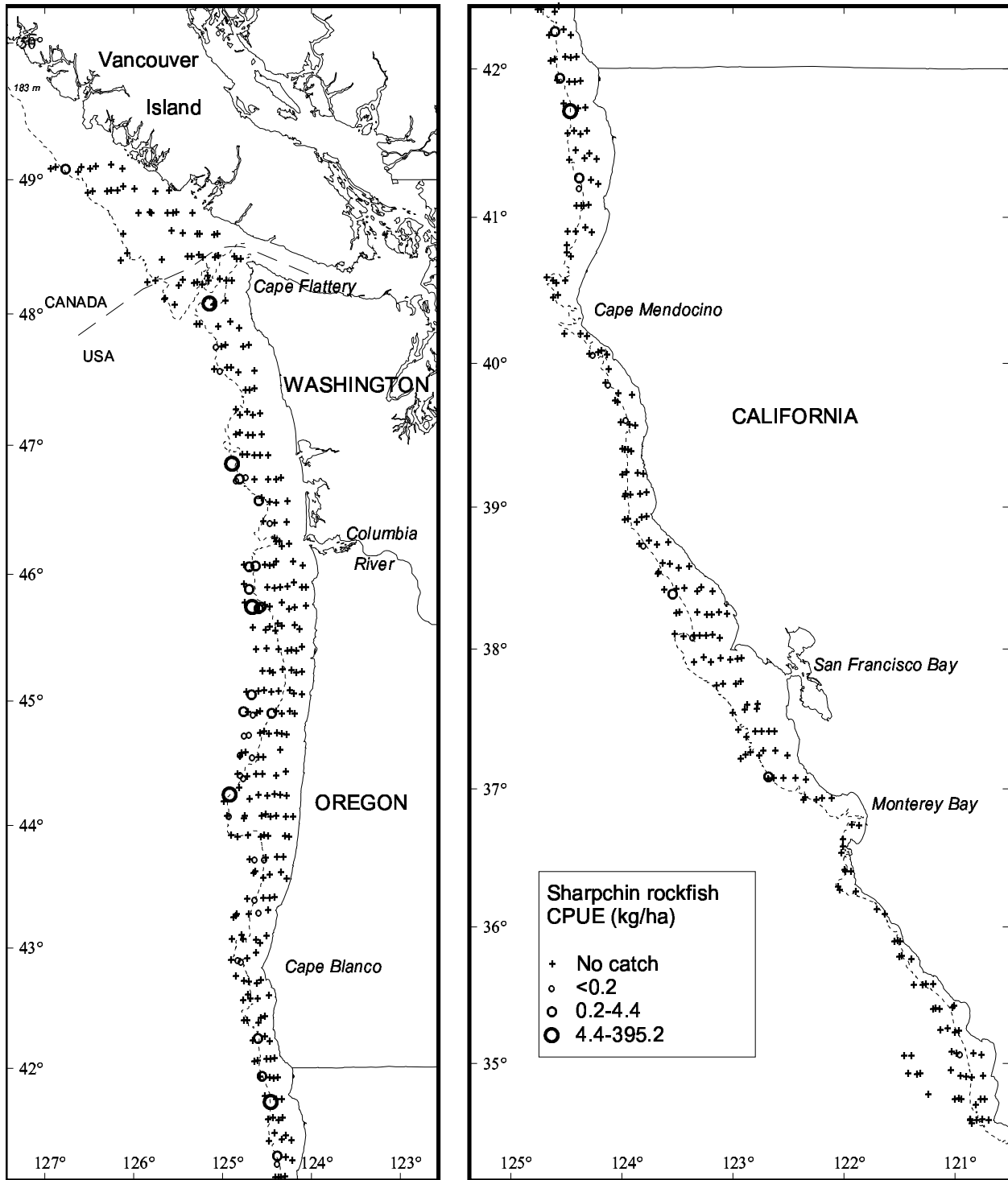


Figure 26.--Sharpchin rockfish distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

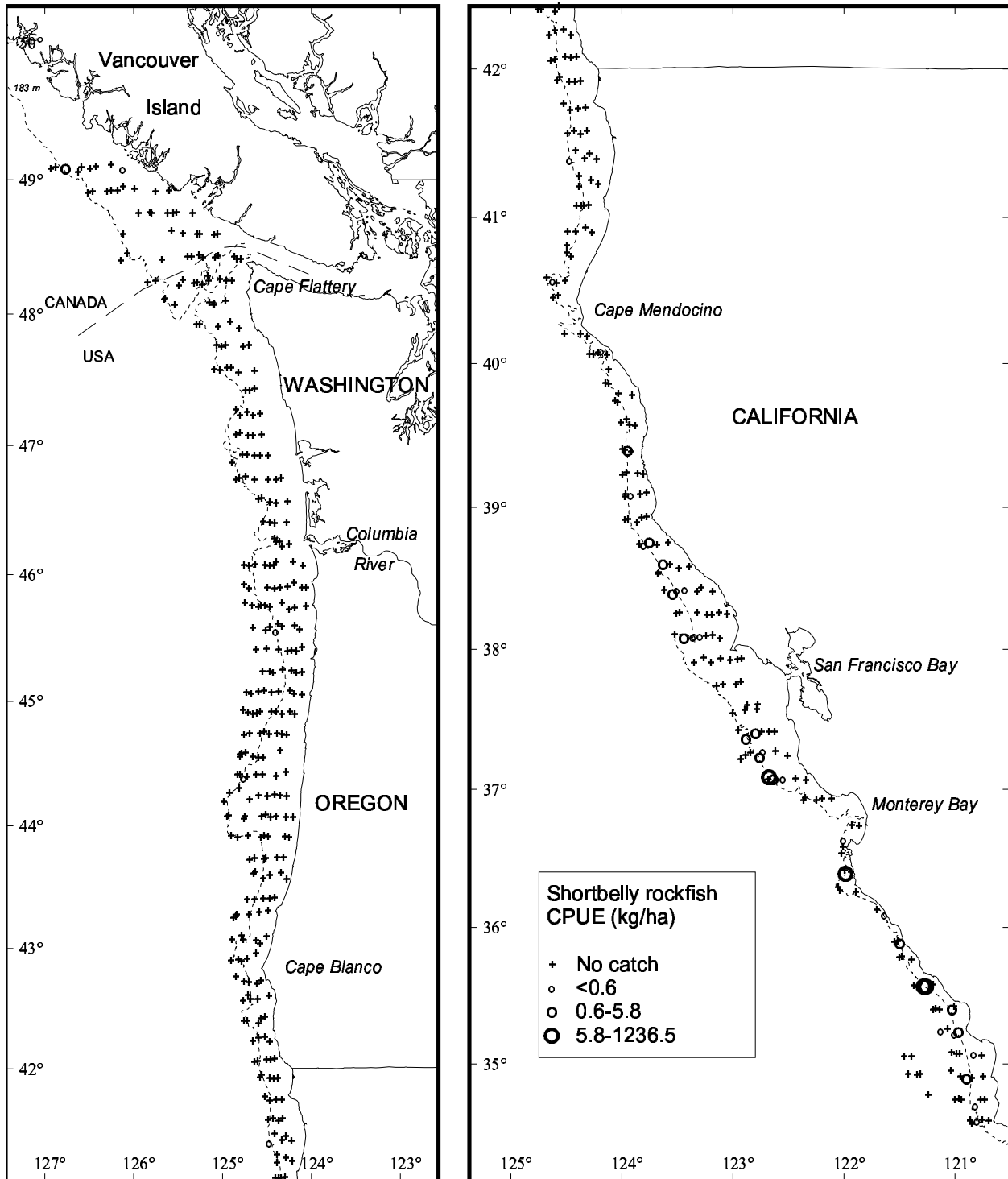


Figure 27.--Shortbelly rockfish distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

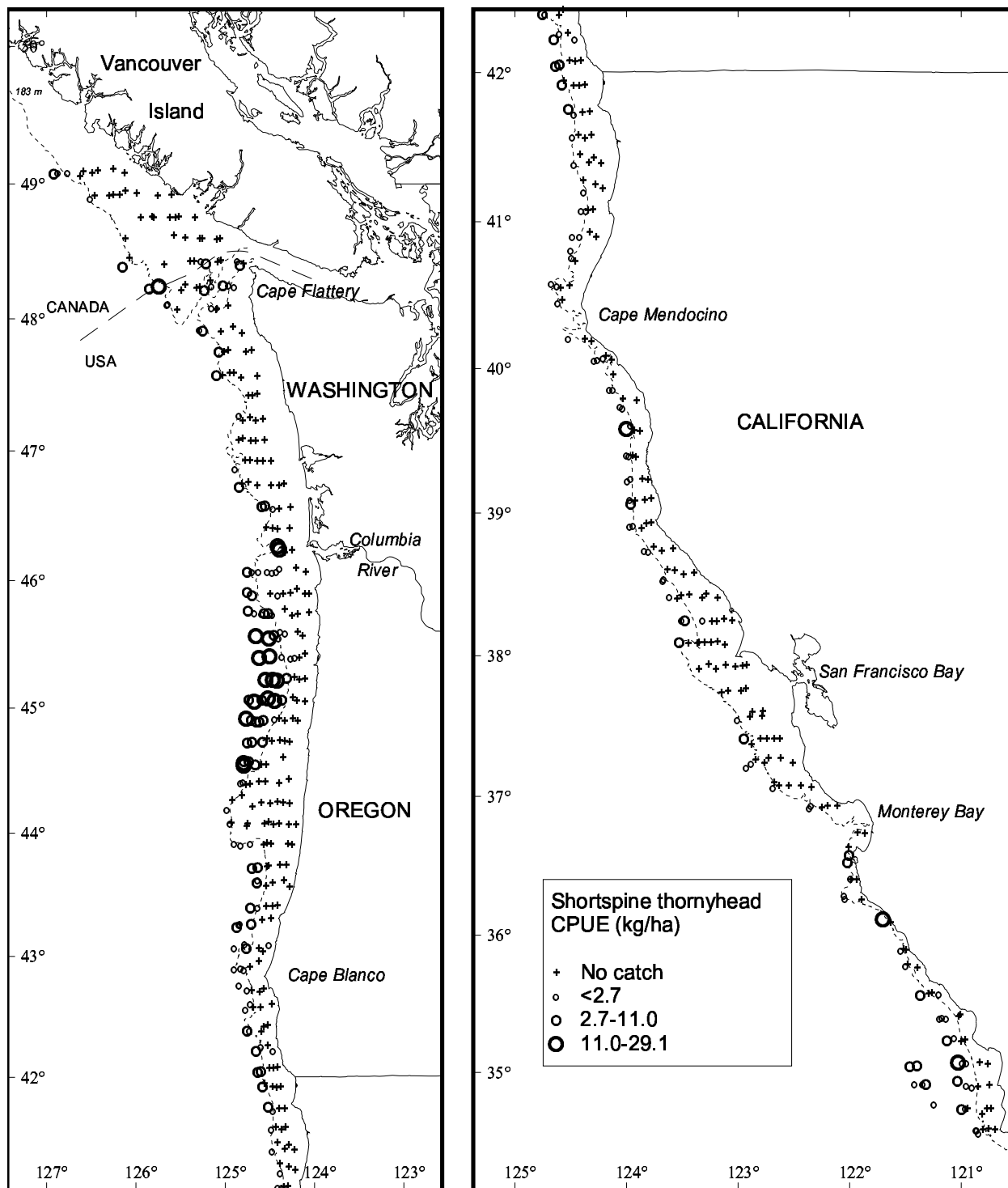


Figure 28.--Shortspine thornyhead distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

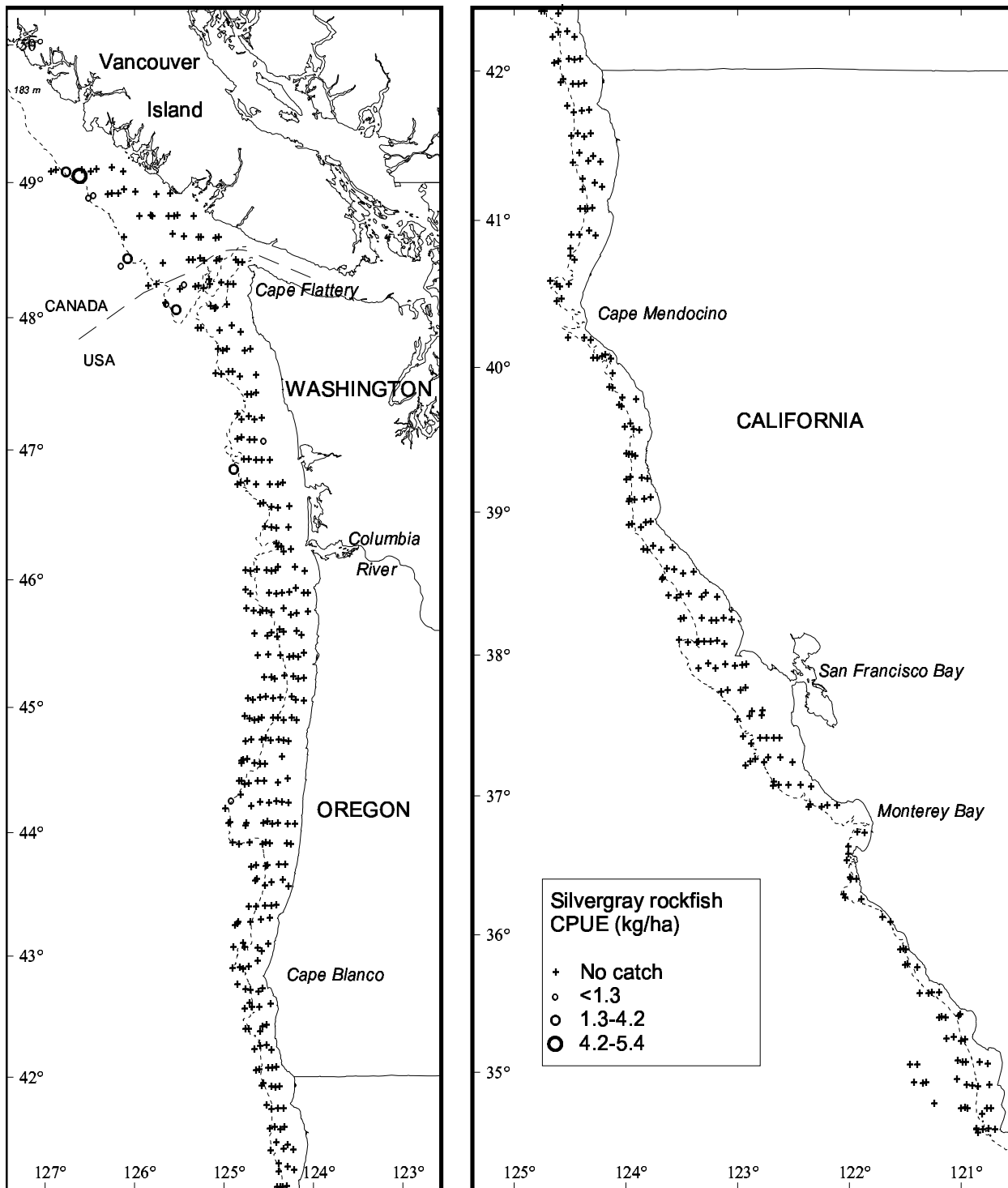


Figure 29.--Silvergray rockfish distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

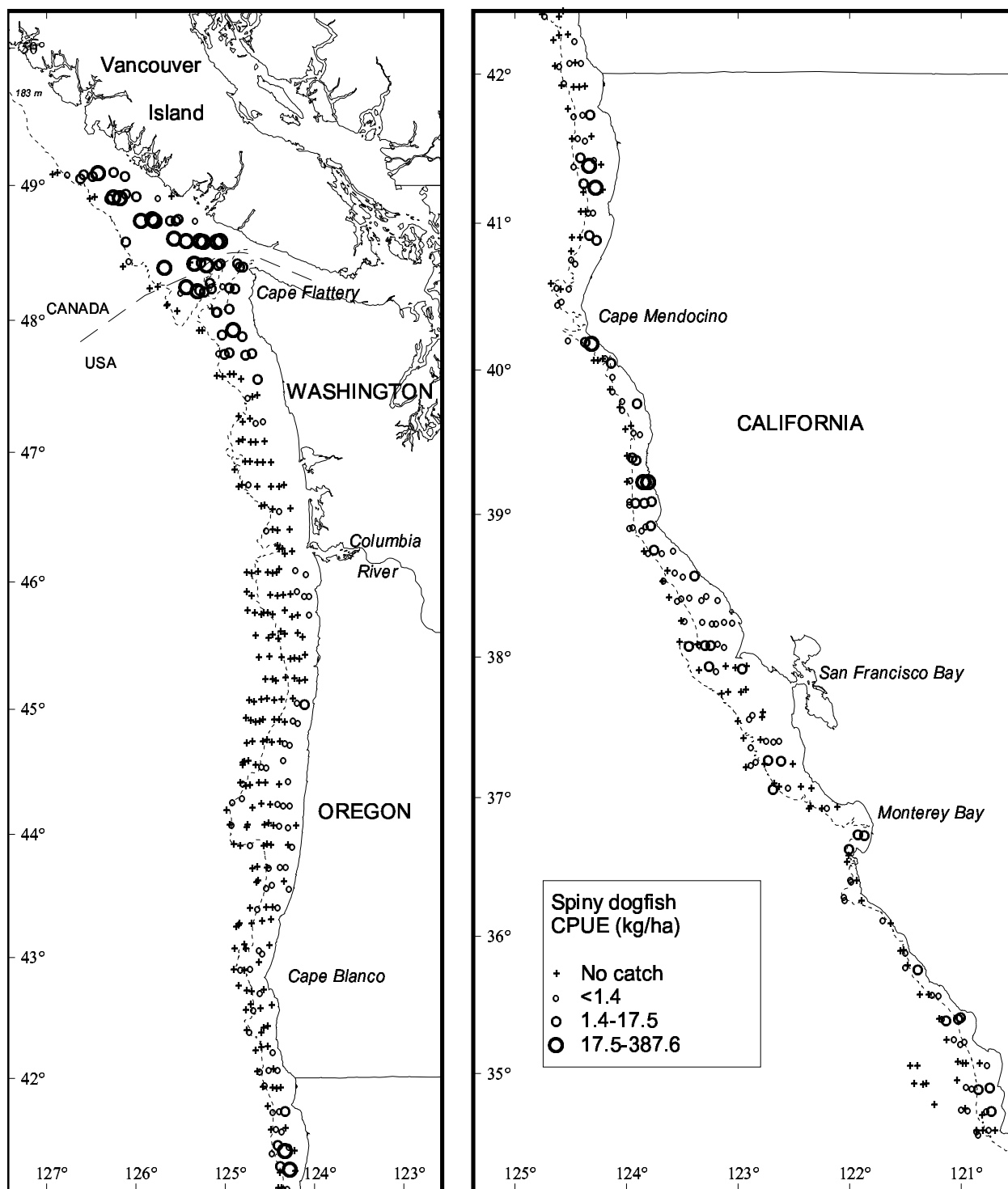


Figure 30.--Spiny dogfish distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

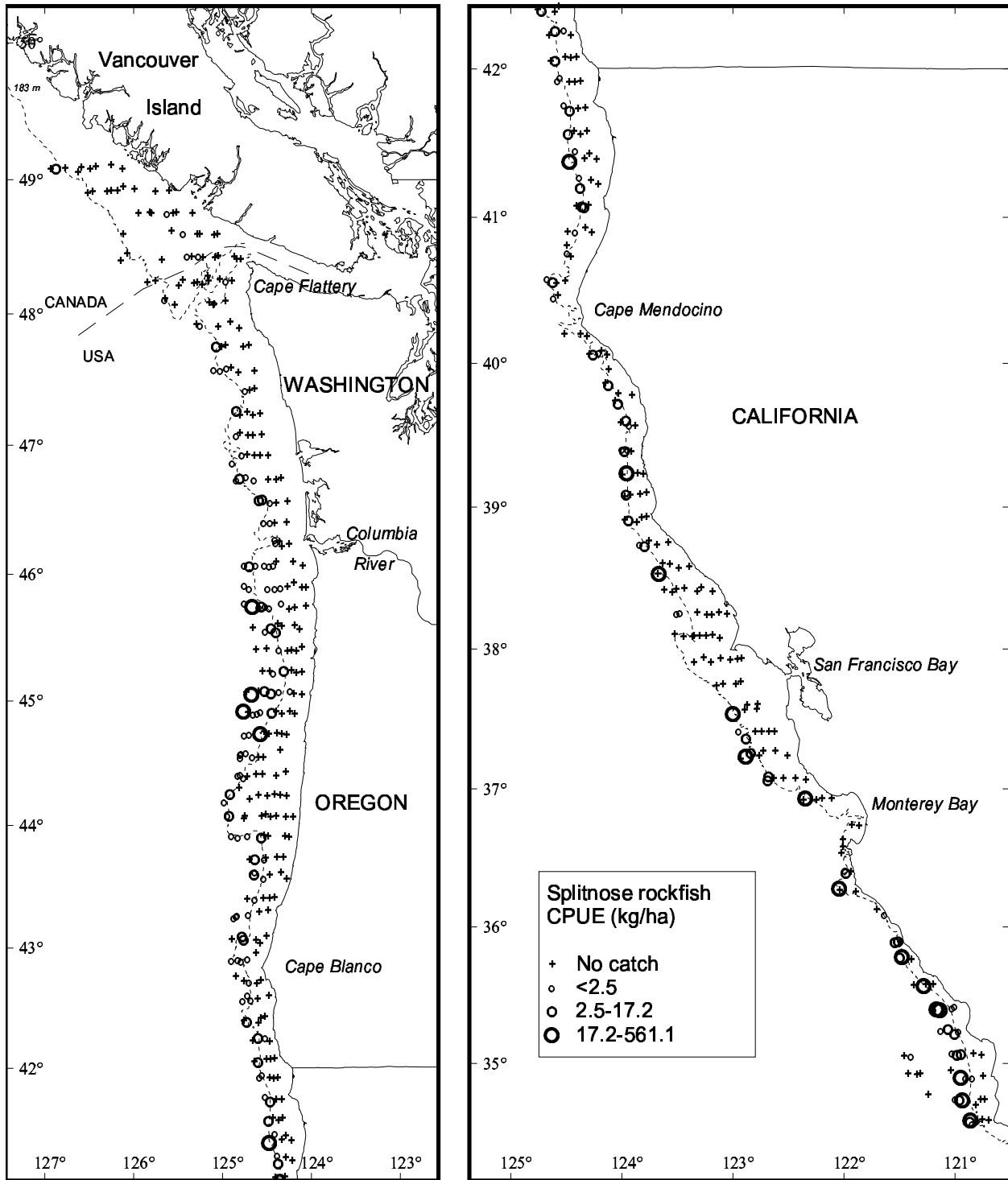


Figure 31.--Splitnose rockfish distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

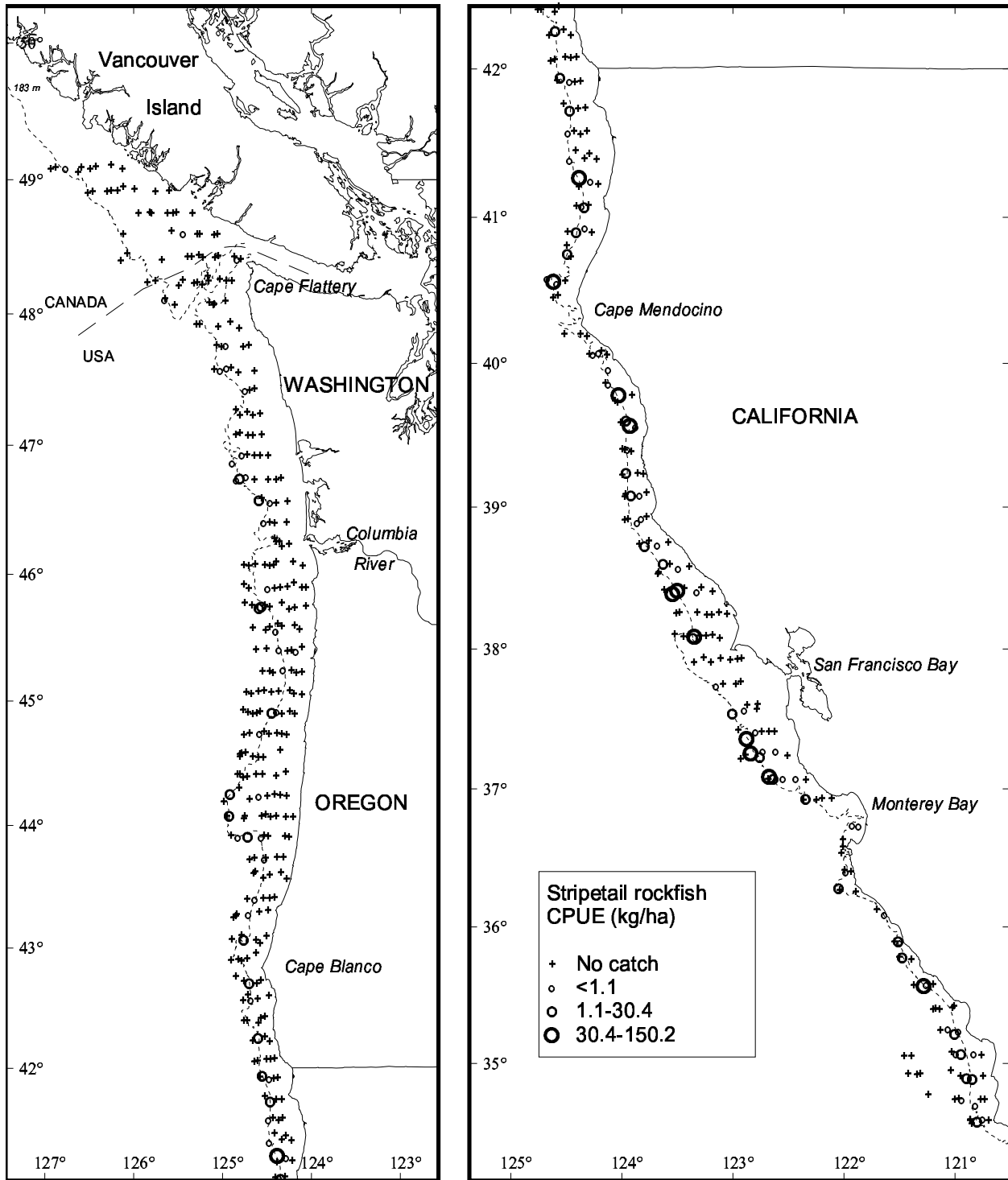


Figure 32.--Stripetail rockfish distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.



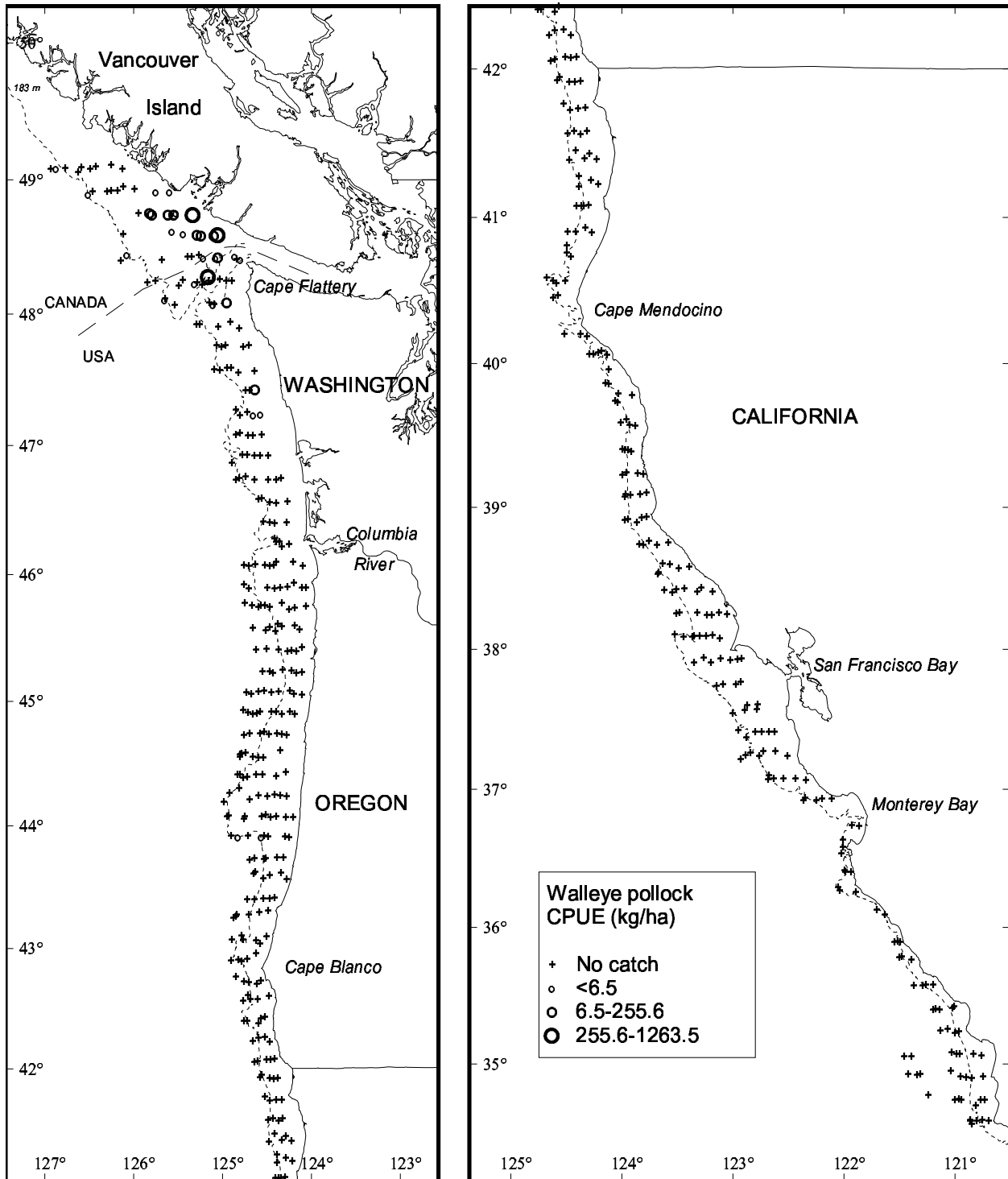


Figure 33.--Walleye pollock distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

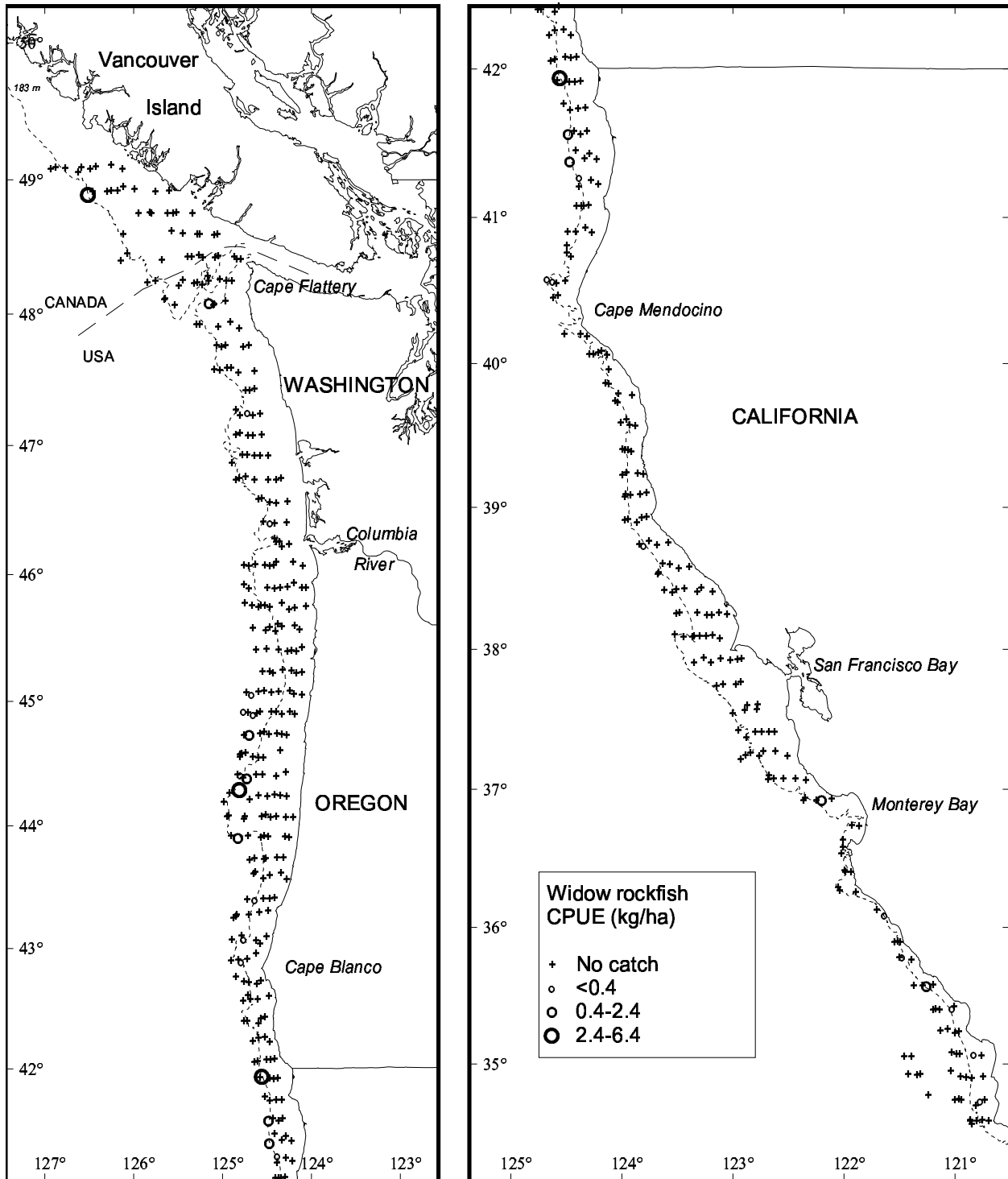


Figure 34.--Widow rockfish distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

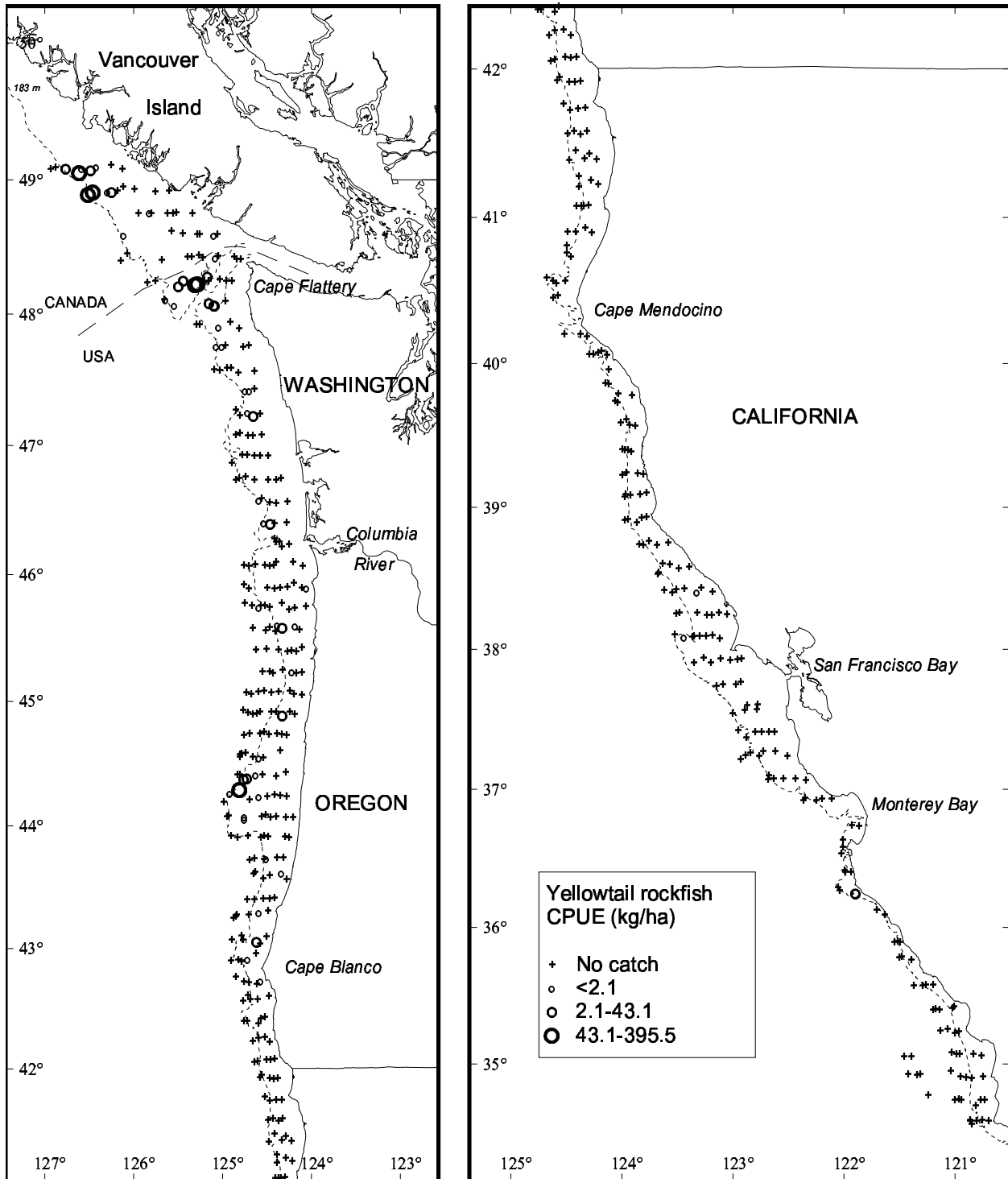


Figure 35.--Yellowtail rockfish distribution and relative abundance measured in catch rates (kg/ha) from the 2001 West Coast triennial bottom trawl survey.

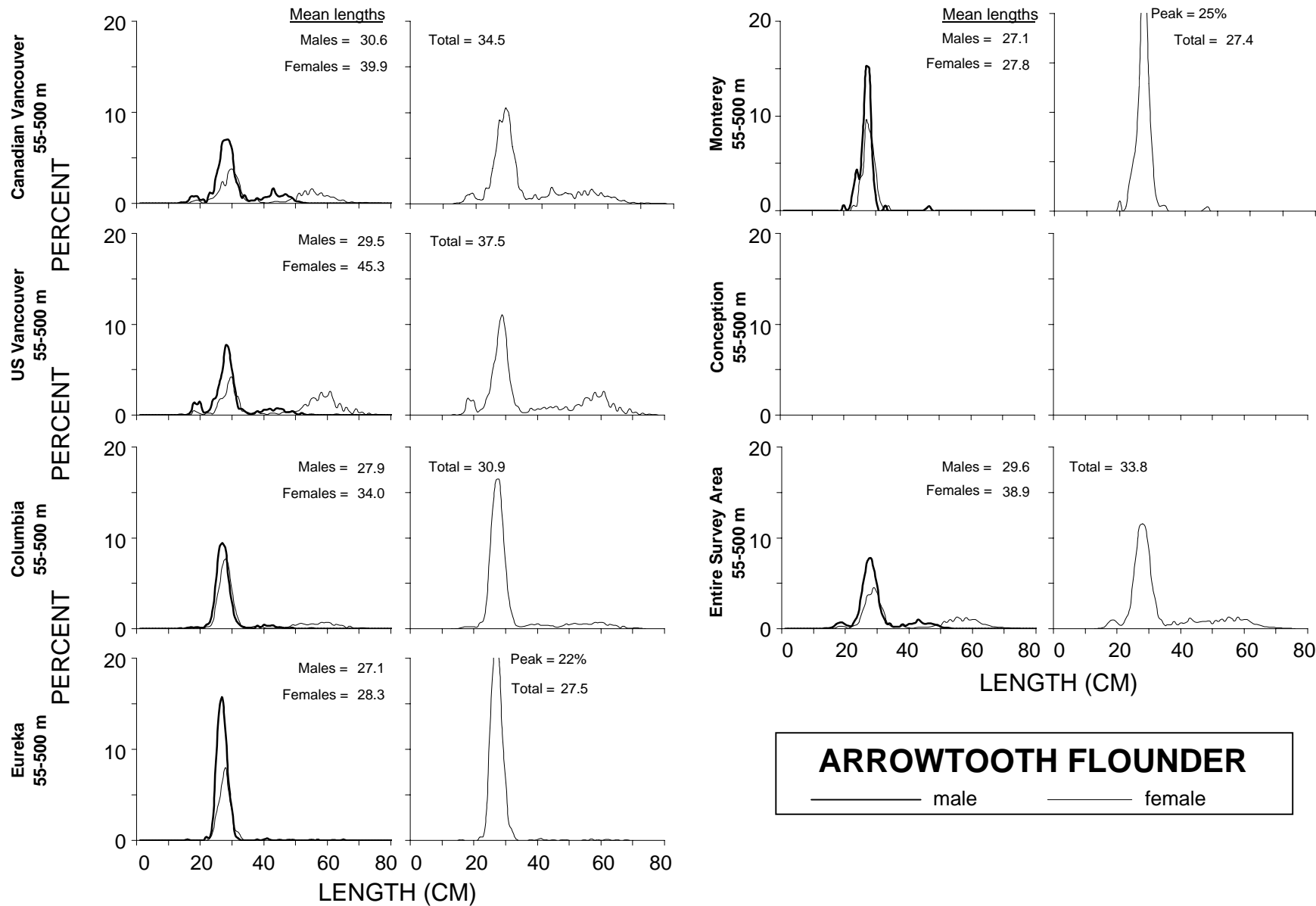


Figure 36.-- Estimated population size composition and mean lengths of arrowtooth flounder by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.

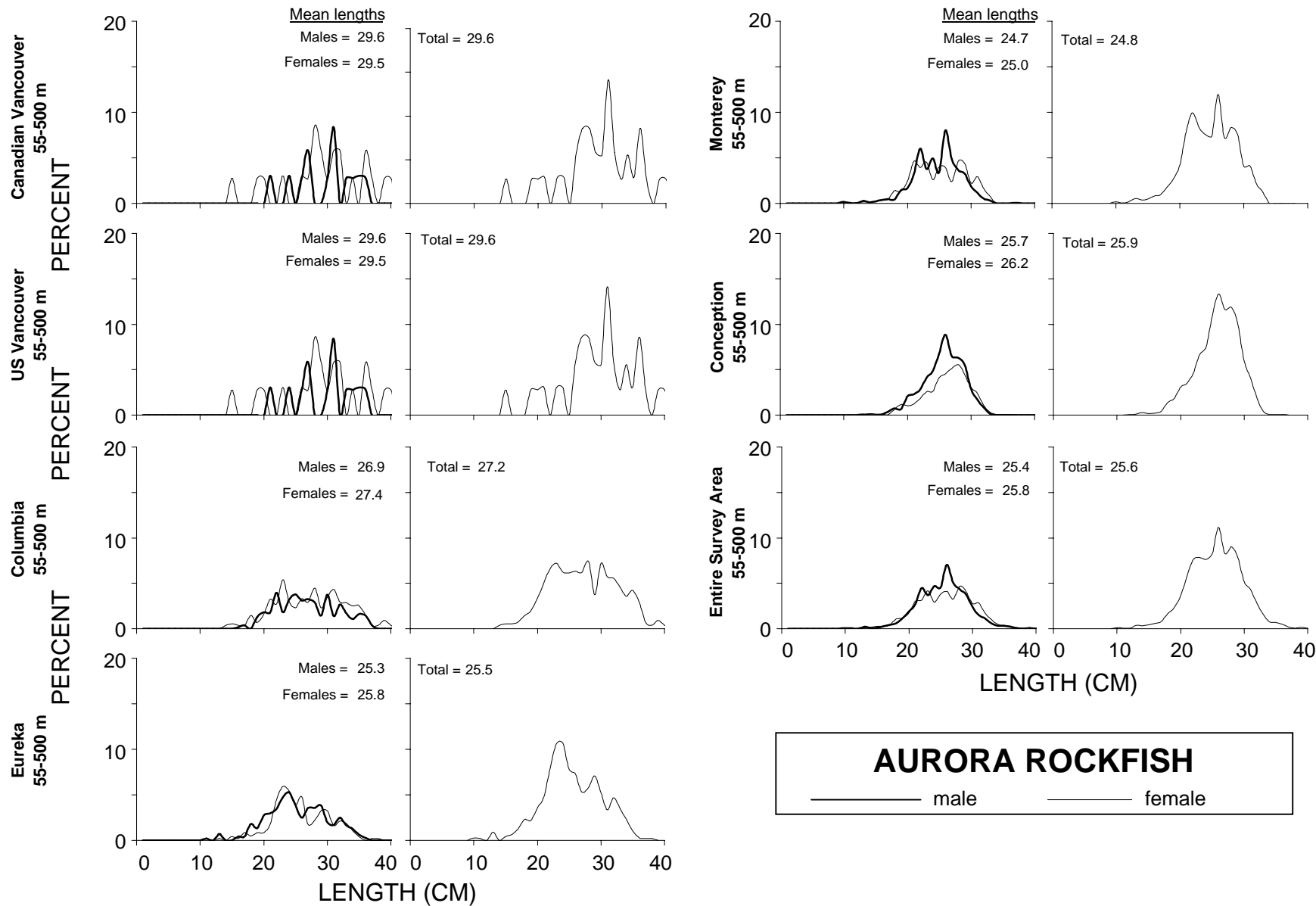


Figure 37.-- Estimated population size composition and mean lengths of aurora rockfish by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.

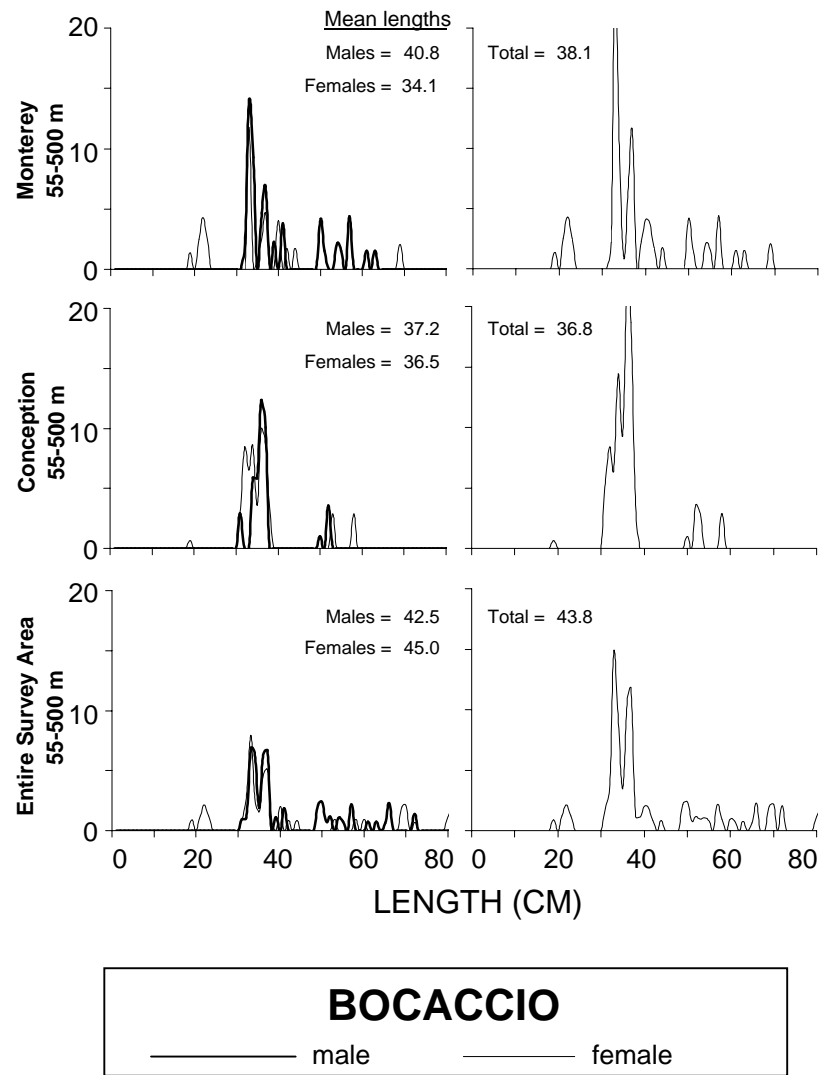
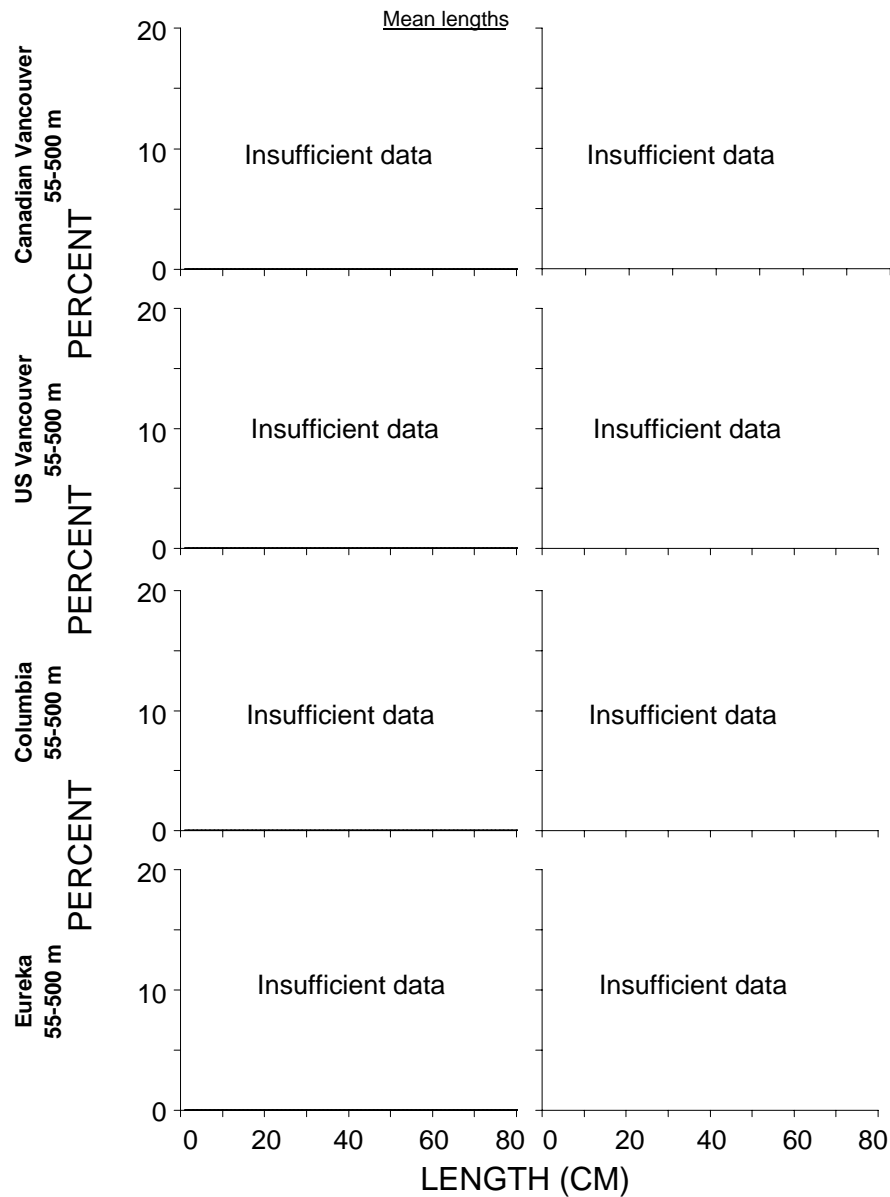


Figure 38.-- Estimated population size composition and mean lengths of bocaccio by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.

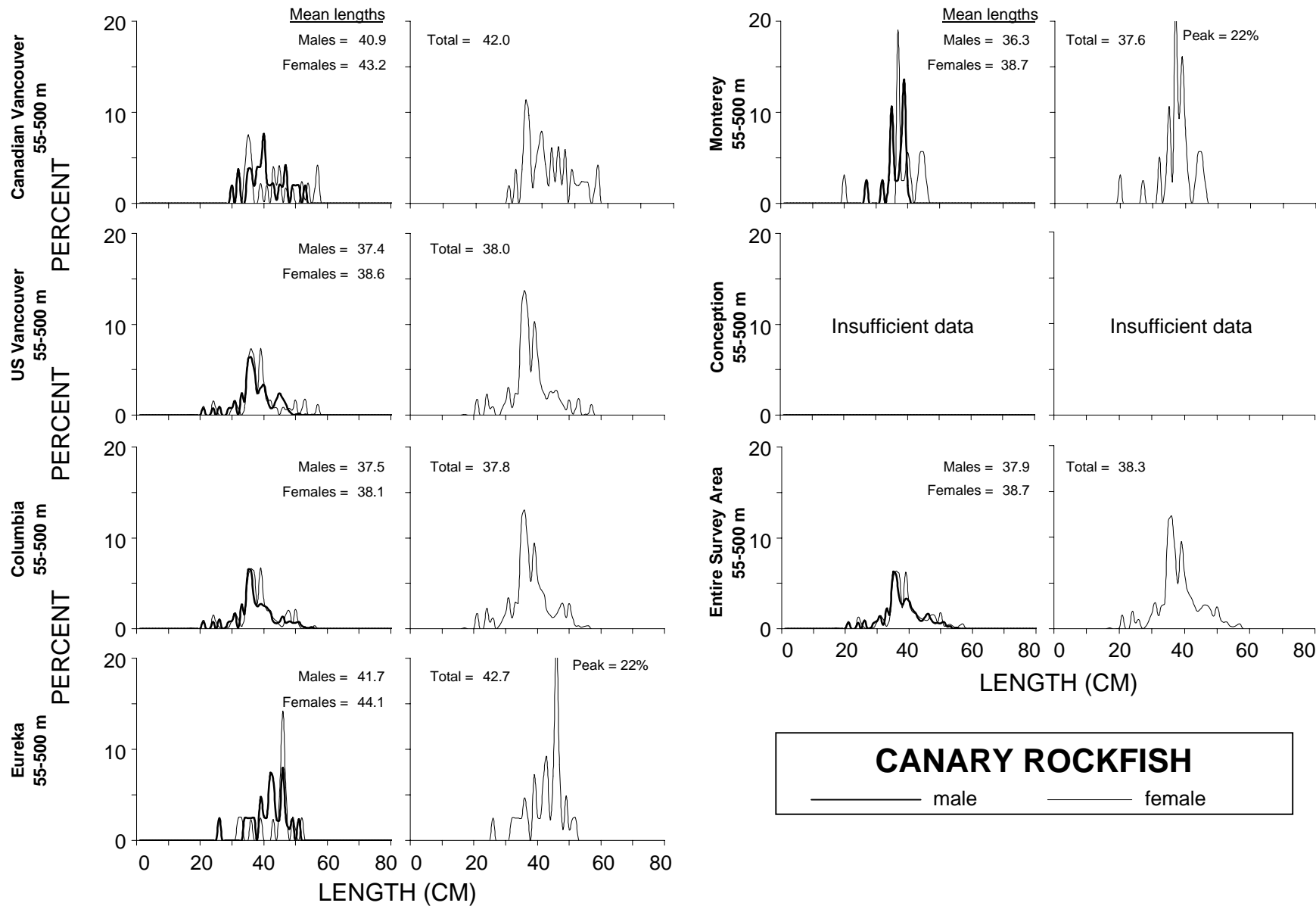


Figure 39.-- Estimated population size composition and mean lengths of canary rockfish by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.

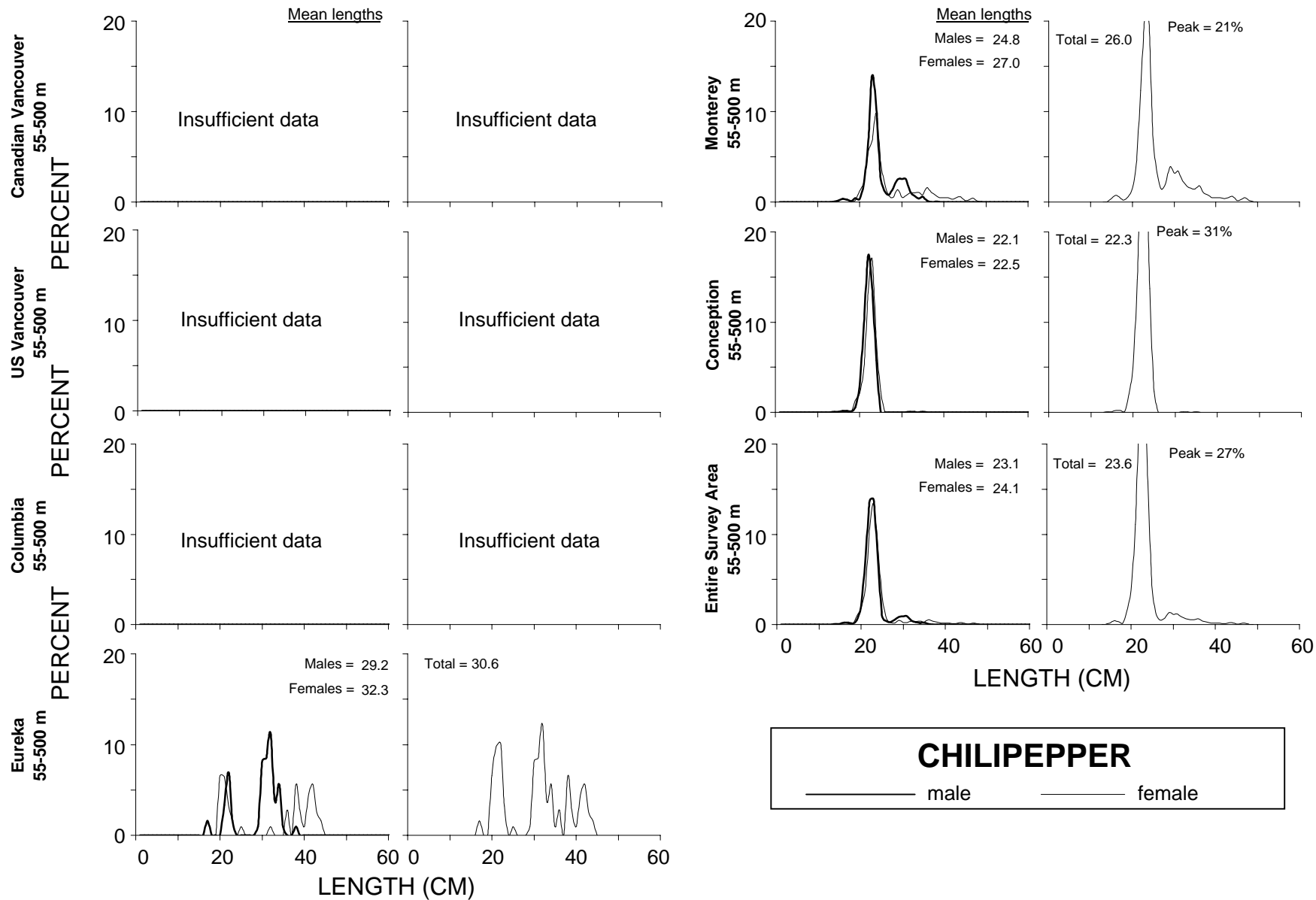


Figure 40.-- Estimated population size composition and mean lengths of chilipepper by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.



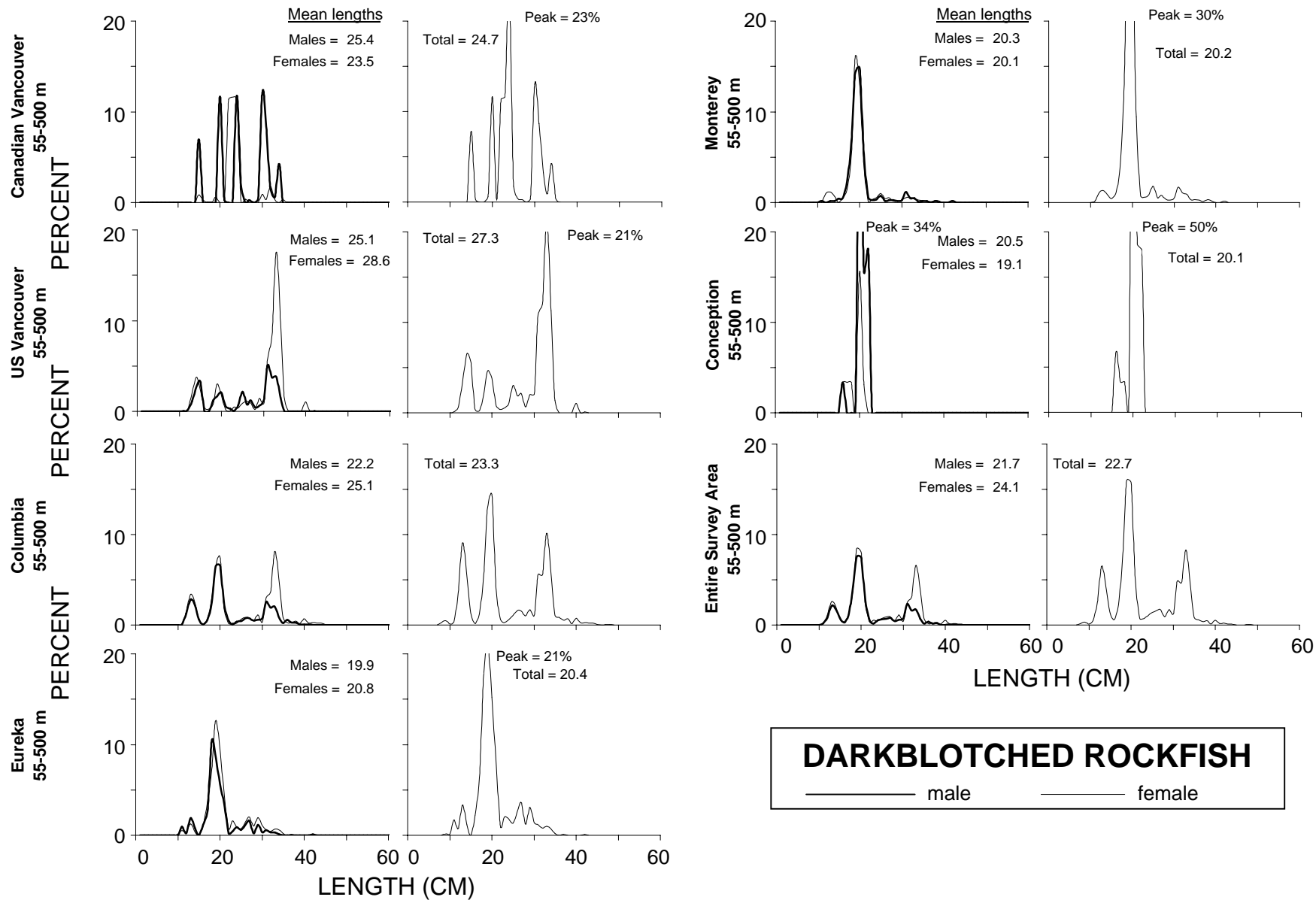


Figure 41.-- Estimated population size composition and mean lengths of darkblotched rockfish by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.

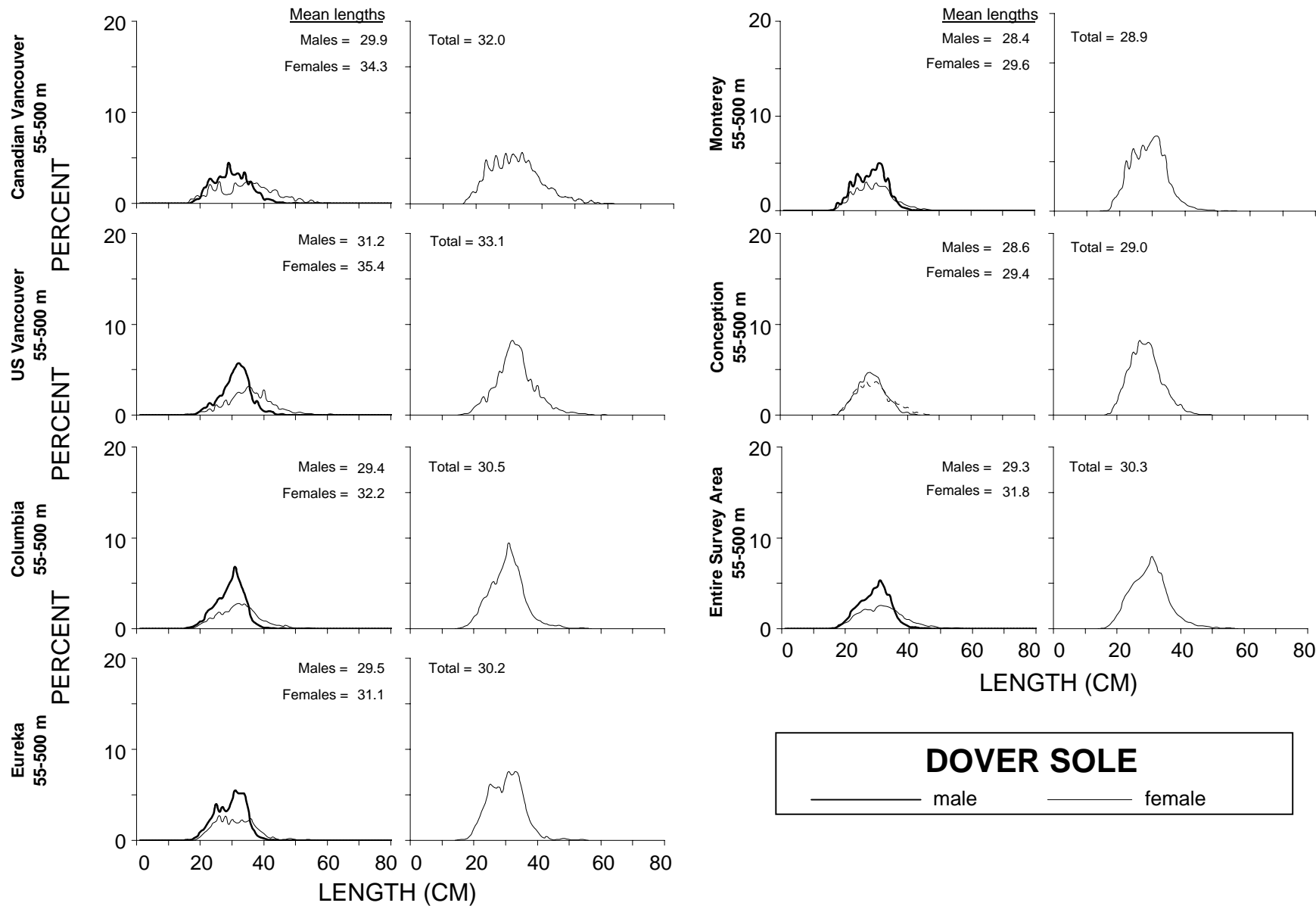


Figure 42.-- Estimated population size composition and mean lengths of Dover sole by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.

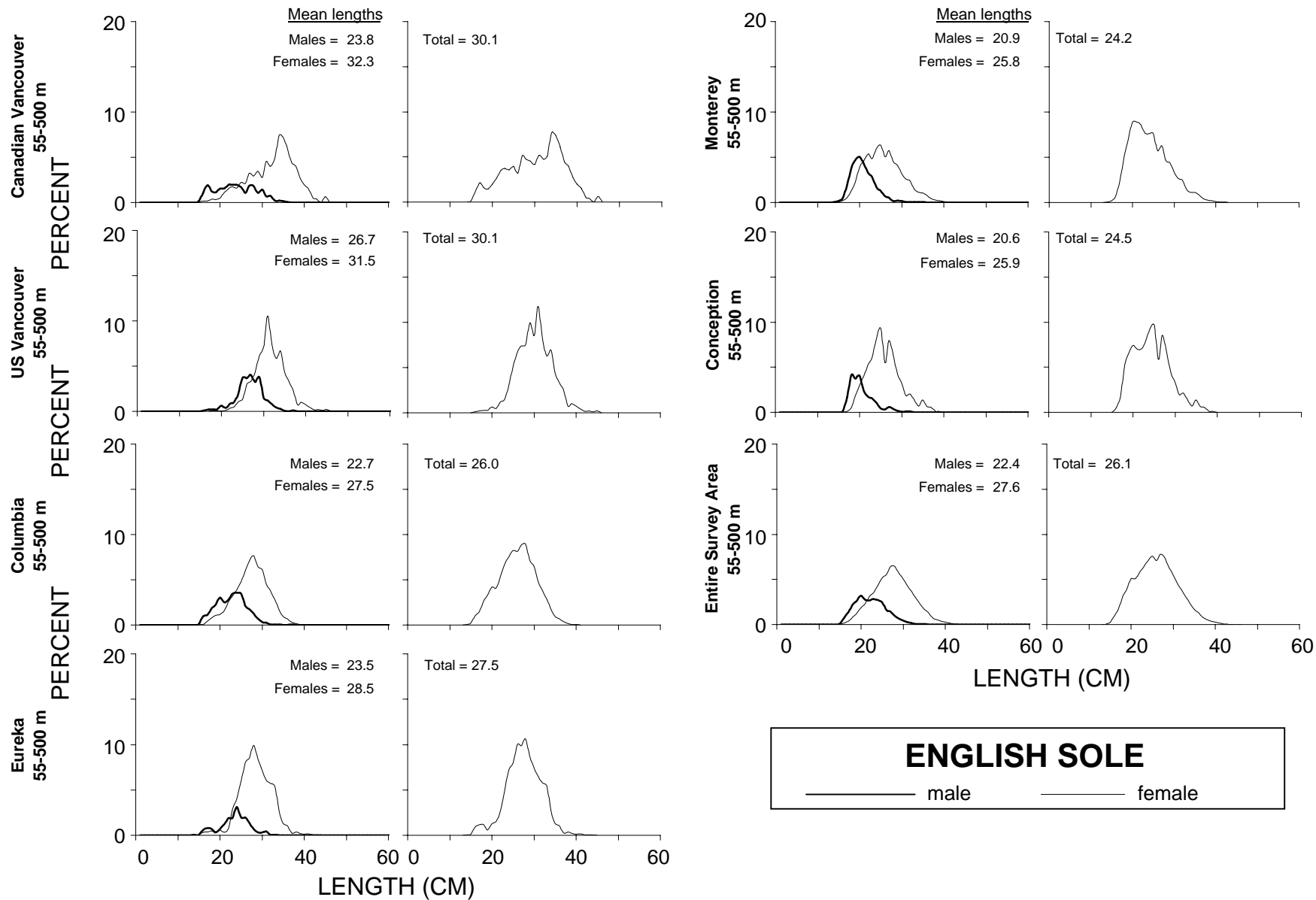


Figure 43.-- Estimated population size composition and mean lengths of English sole by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.

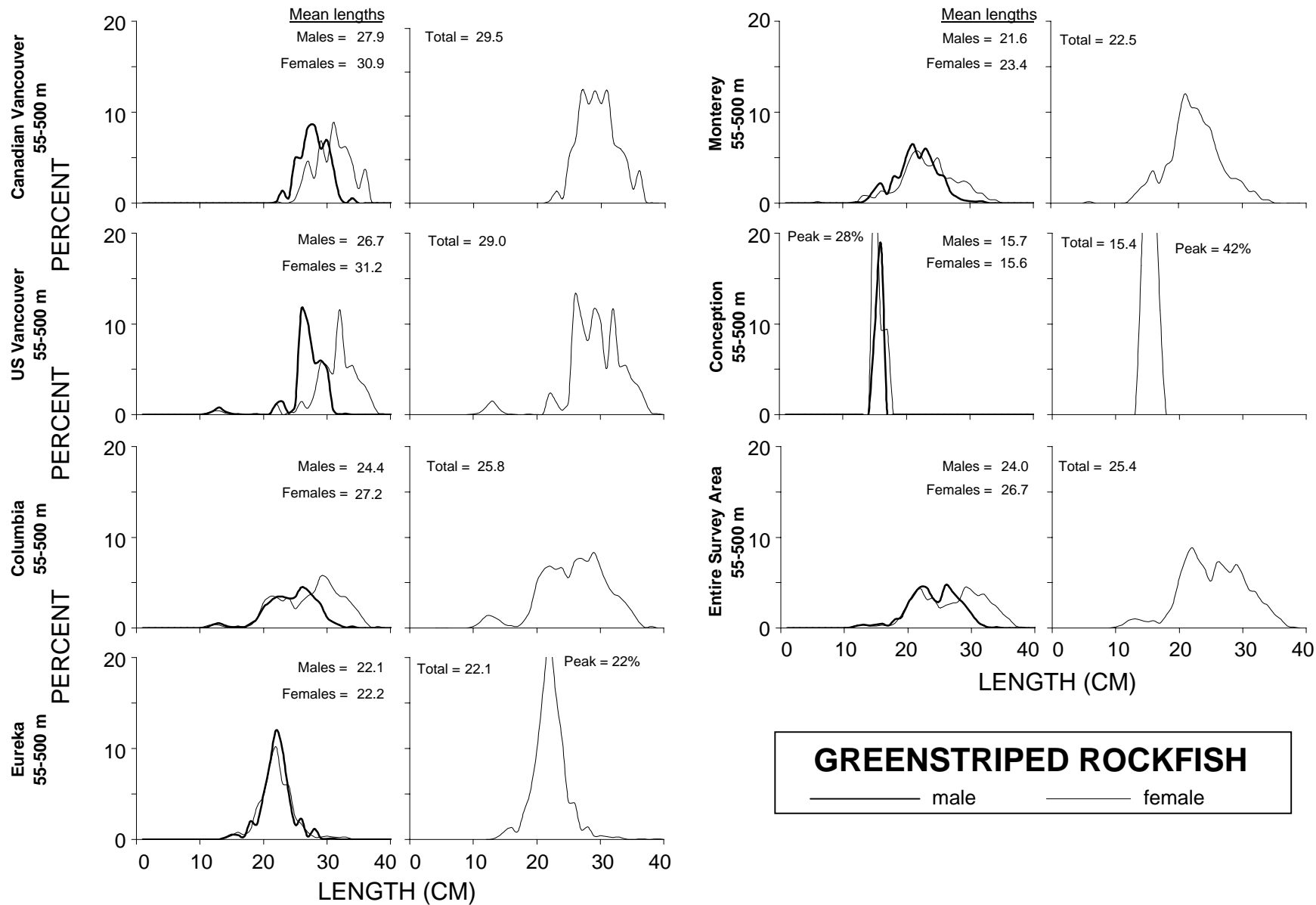


Figure 44.-- Estimated population size composition and mean lengths of greenstriped rockfish by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.

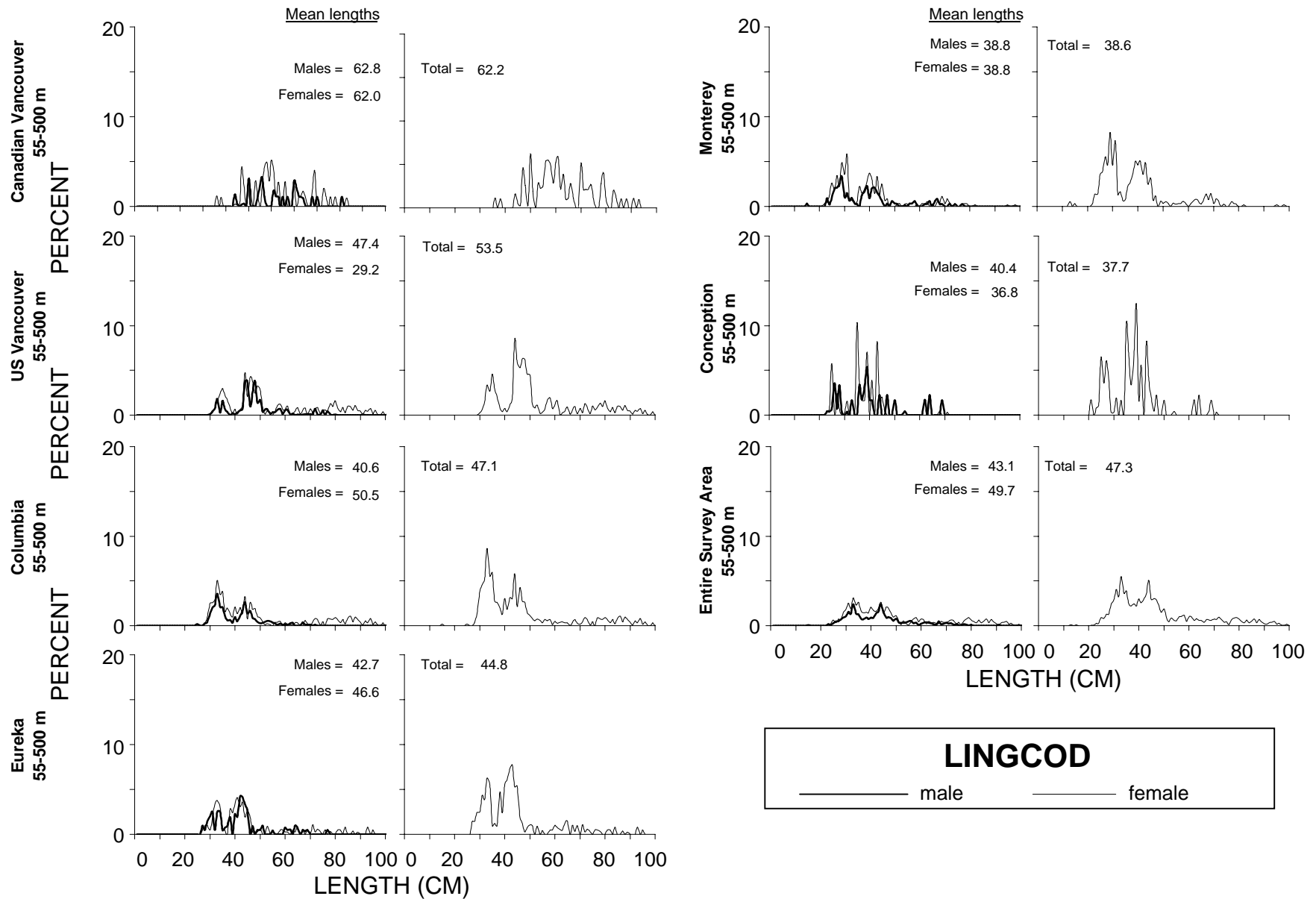


Figure 45.-- Estimated population size composition and mean lengths of lingcod by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.

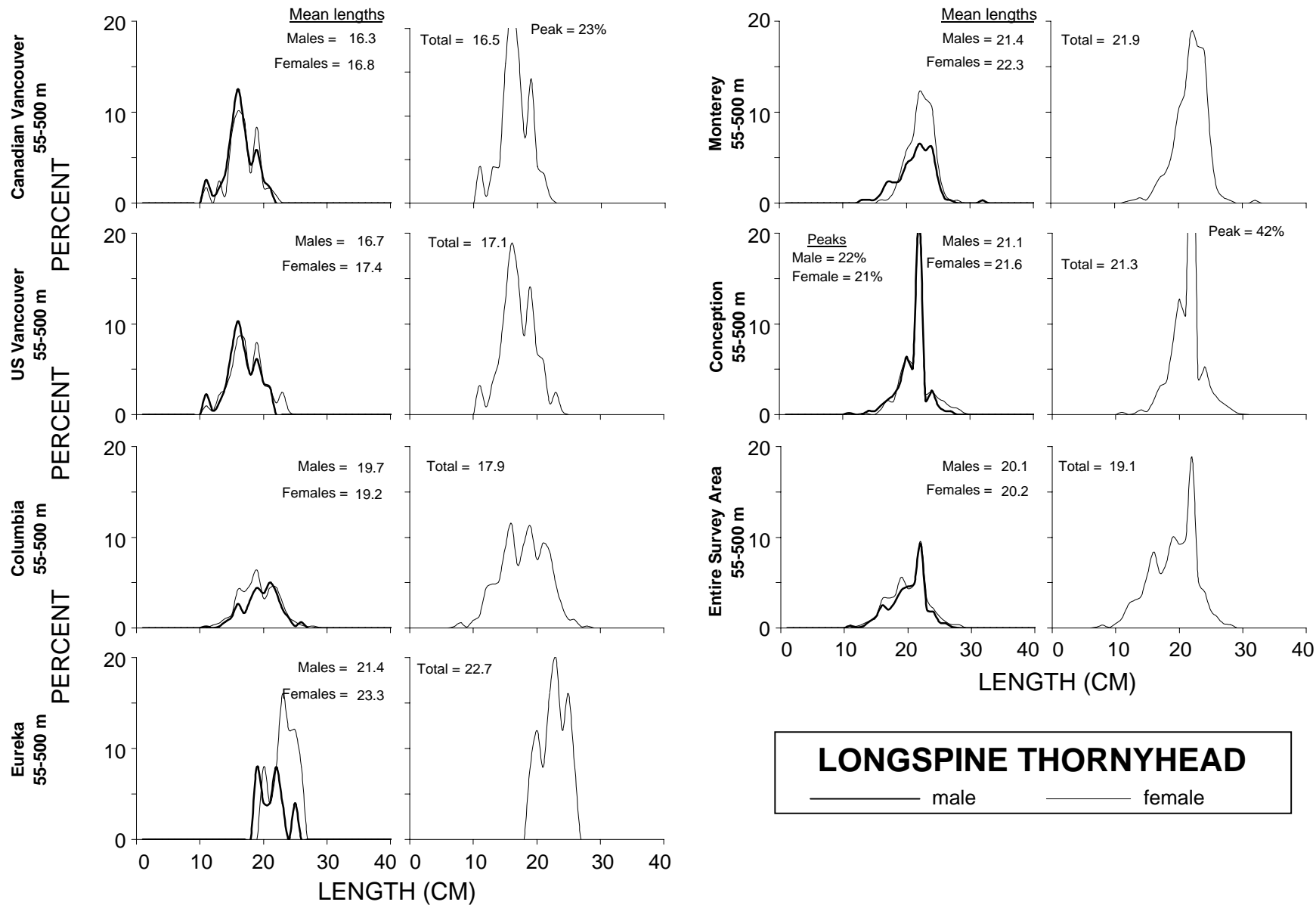


Figure 46.-- Estimated population size composition and mean lengths of longspine thornyhead by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.

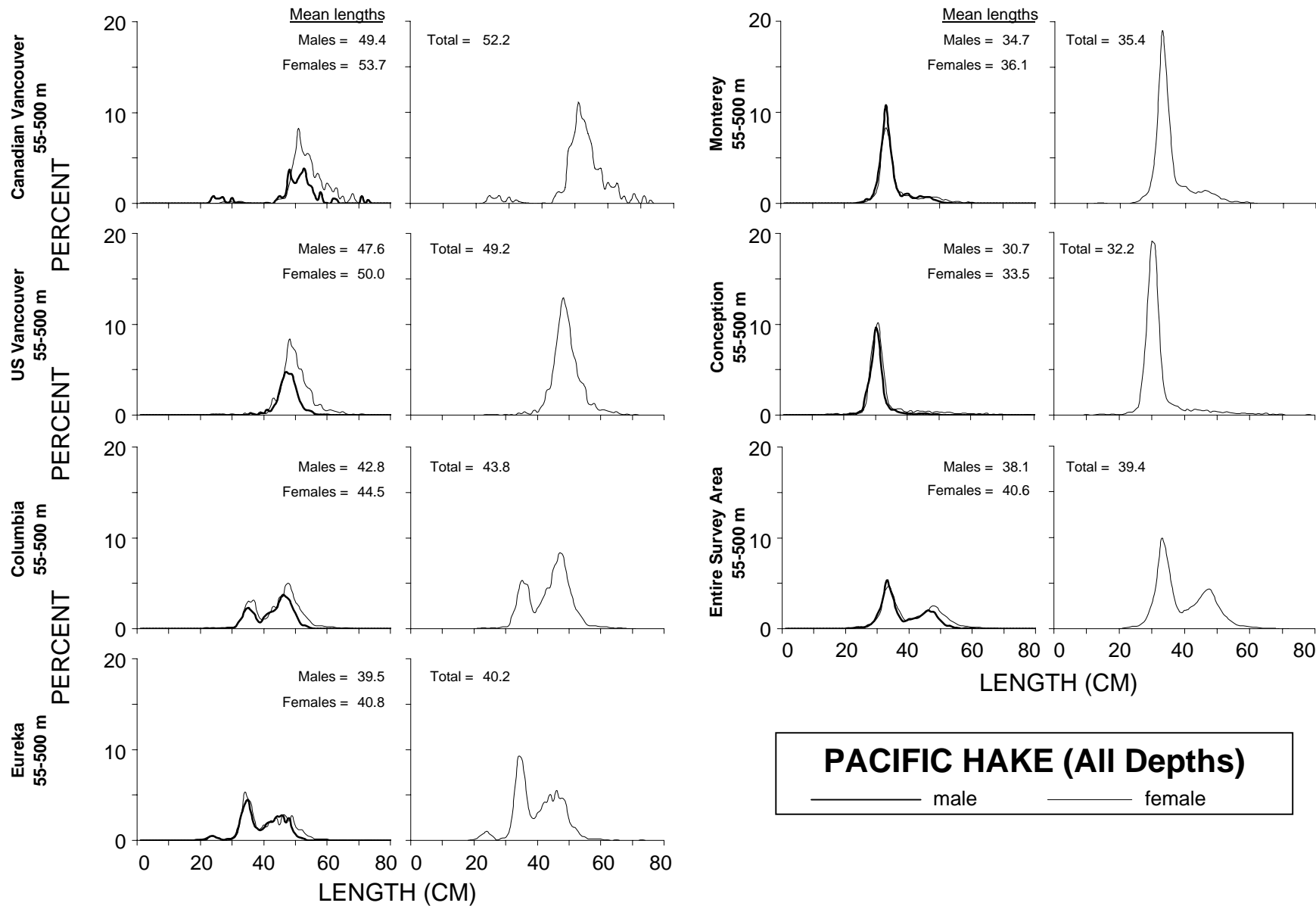


Figure 47.-- Estimated population size composition and mean lengths of Pacific hake by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.

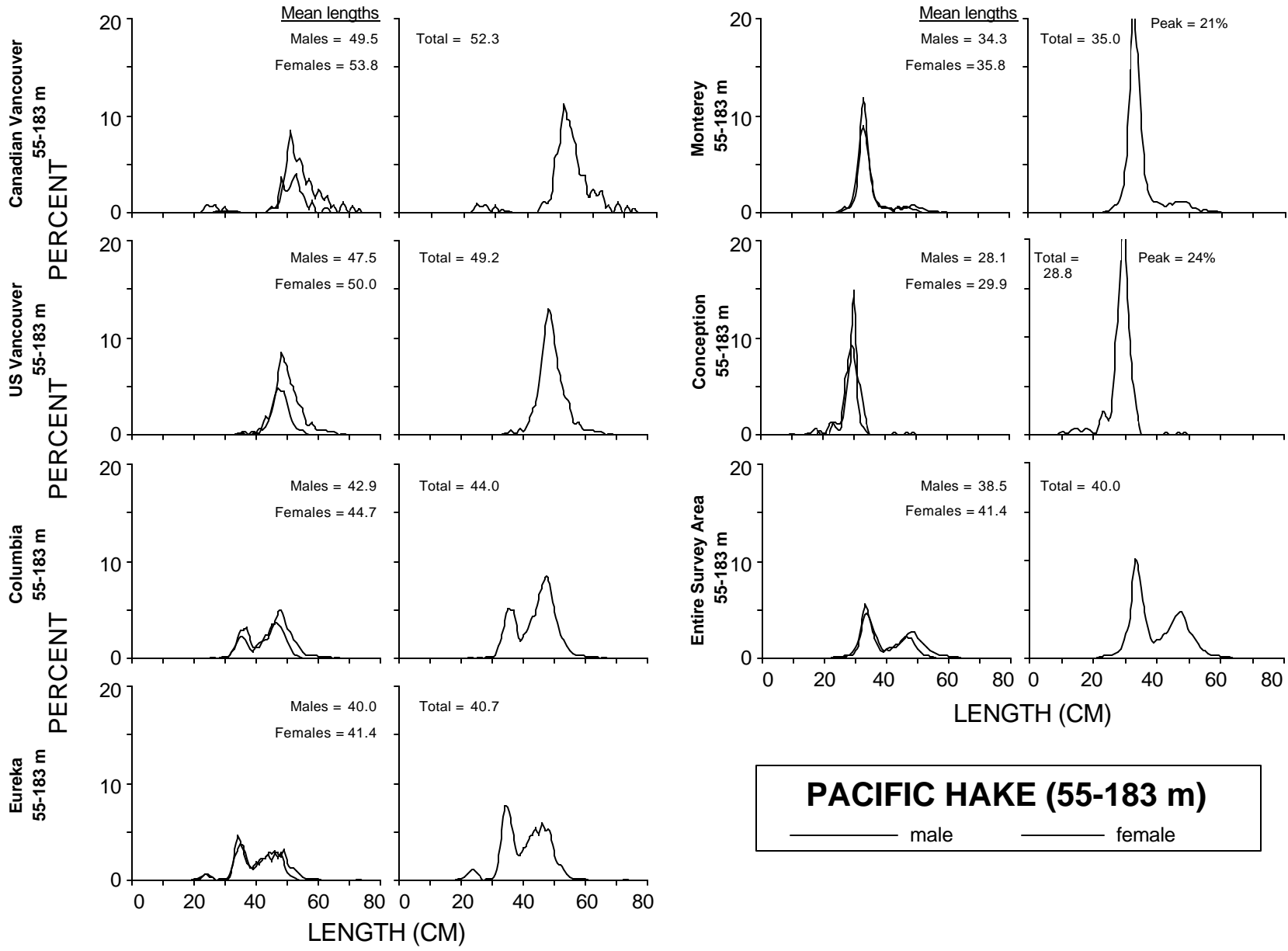


Figure 48.-- Estimated population size composition and mean lengths of Pacific hake by sex and International North Pacific Fisheries Commission area for the shallow depth stratum (55-183 m) from the 2001 triennial bottom trawl survey.



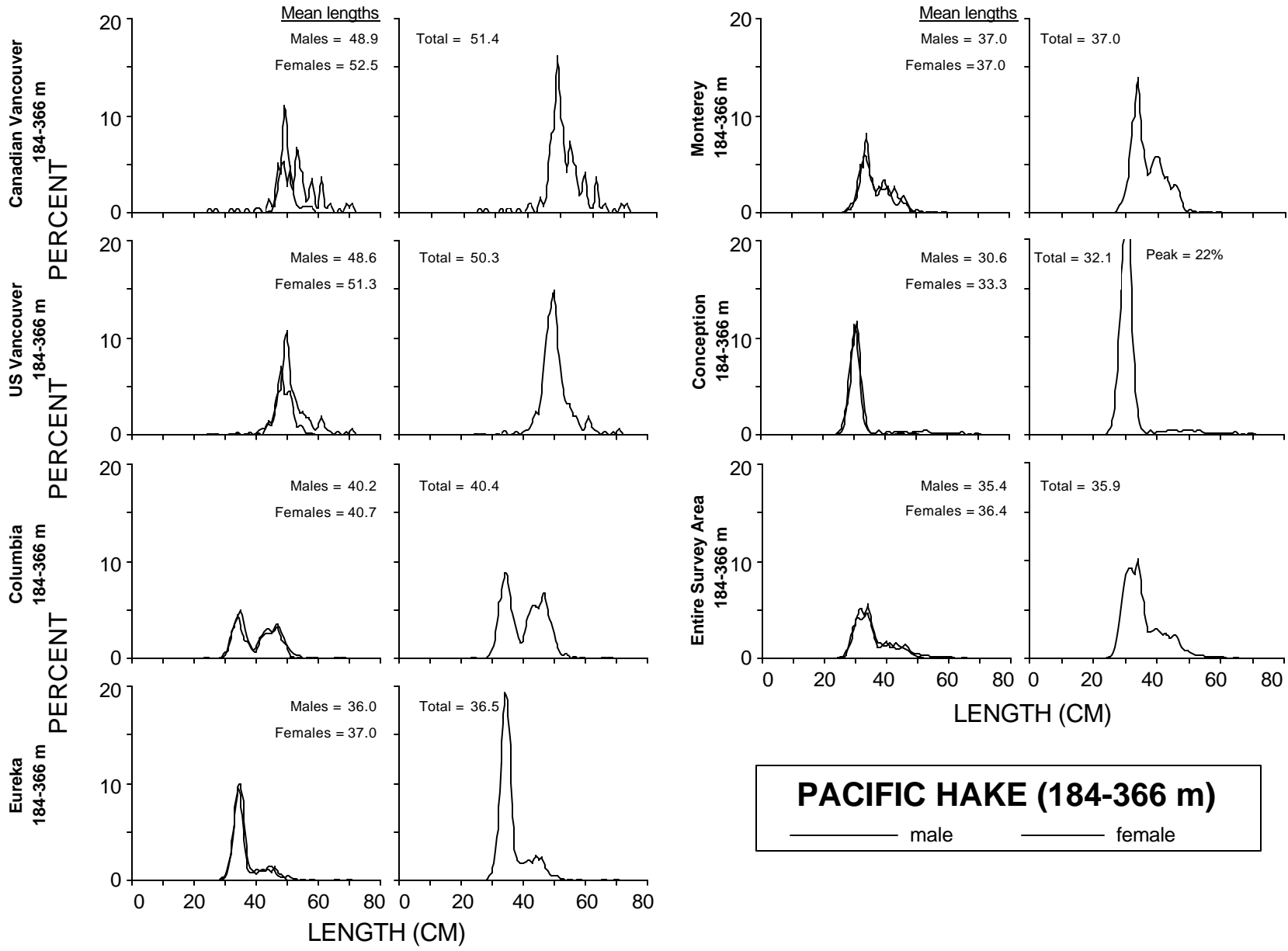


Figure 49.-- Estimated population size composition and mean lengths of Pacific hake by sex and International North Pacific Fisheries Commission area for the middle depth stratum (184-366 m) from the 2001 triennial bottom trawl survey.

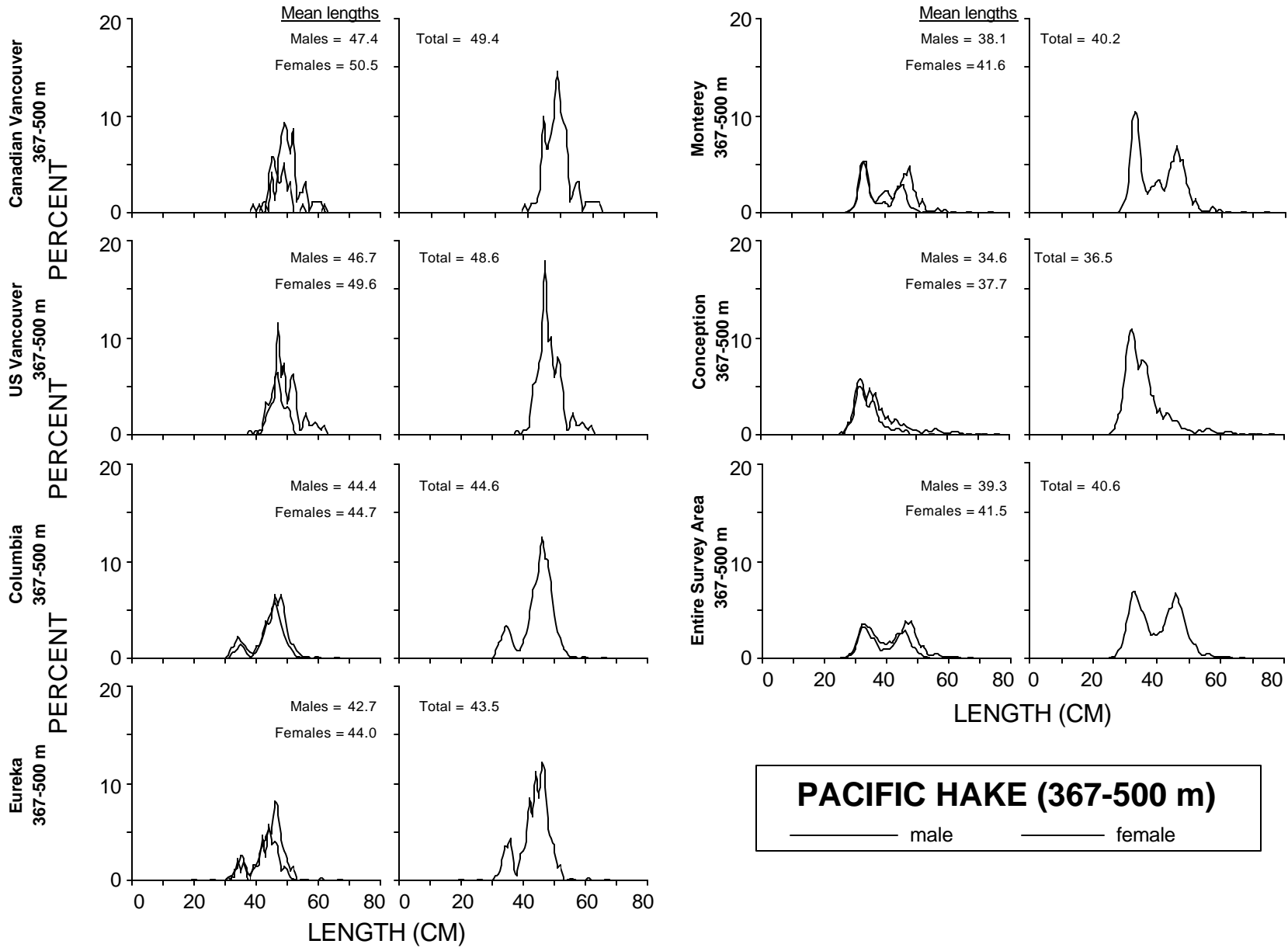


Figure 50.-- Estimated population size composition and mean lengths of Pacific hake by sex and International North Pacific Fisheries Commission area for the deep depth stratum (367-500 m) from the 2001 triennial bottom trawl survey.

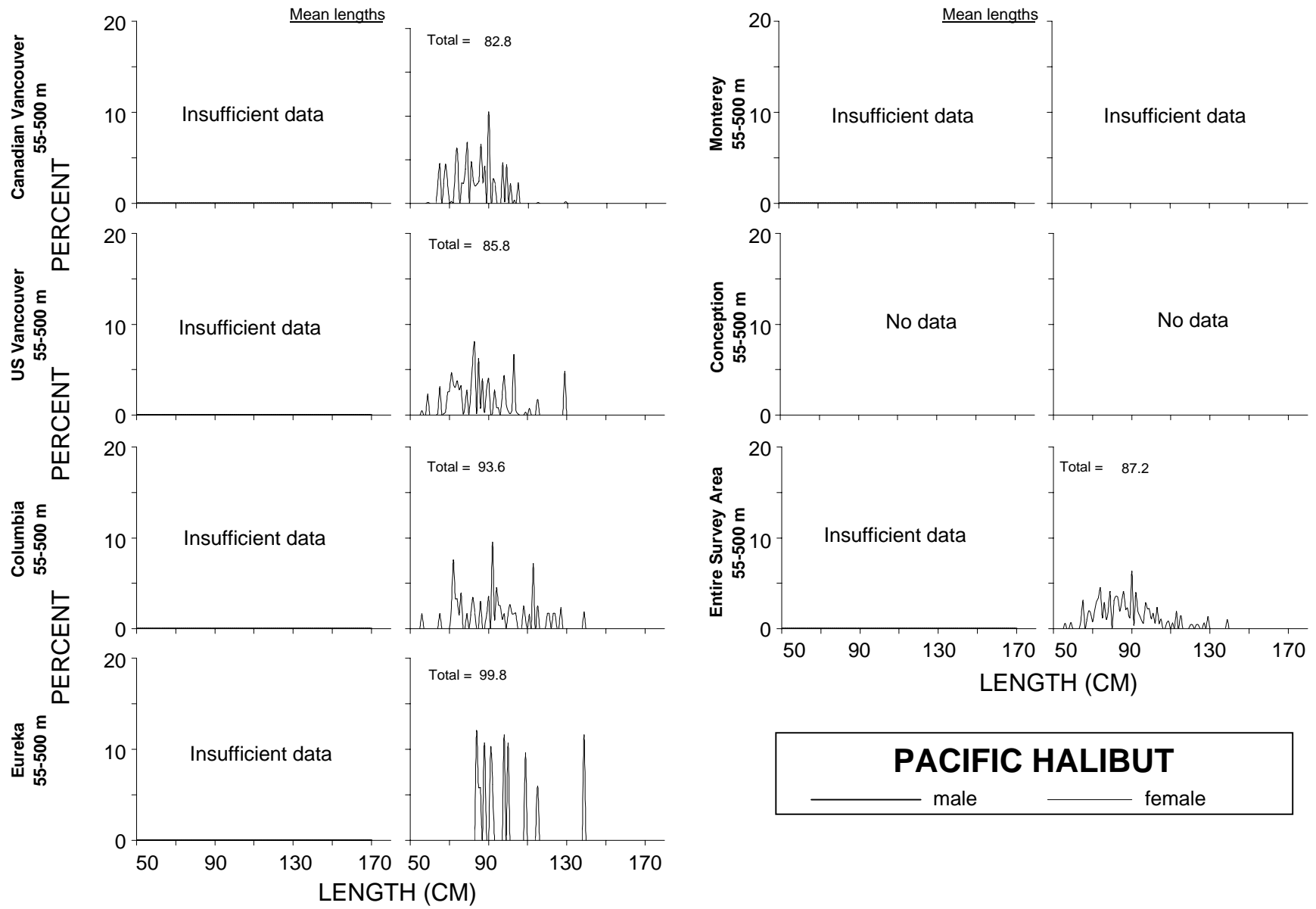


Figure 51.-- Estimated population size composition and mean length of Pacific halibut by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.

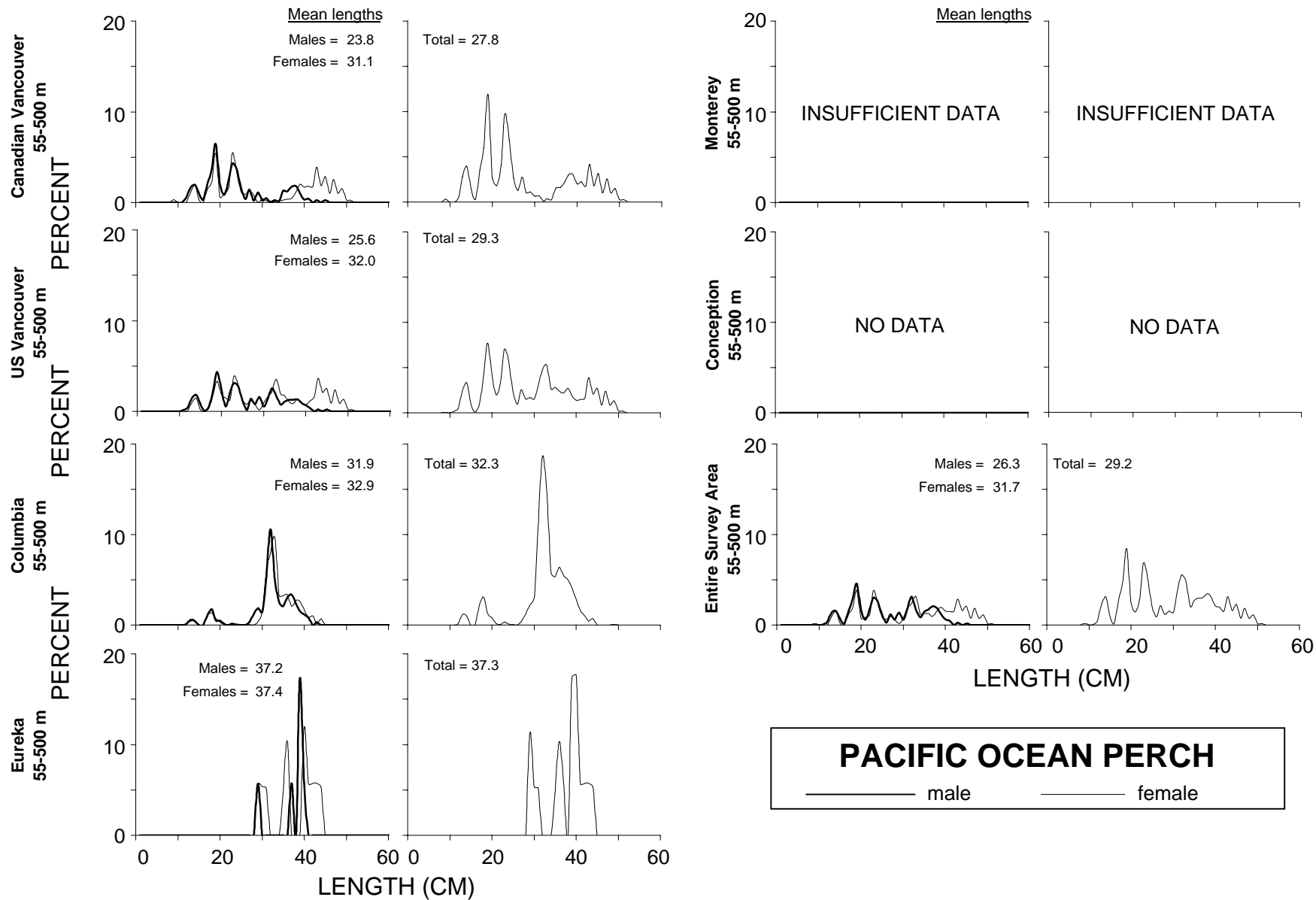


Figure 52.-- Estimated population size composition and mean lengths of Pacific ocean perch by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.

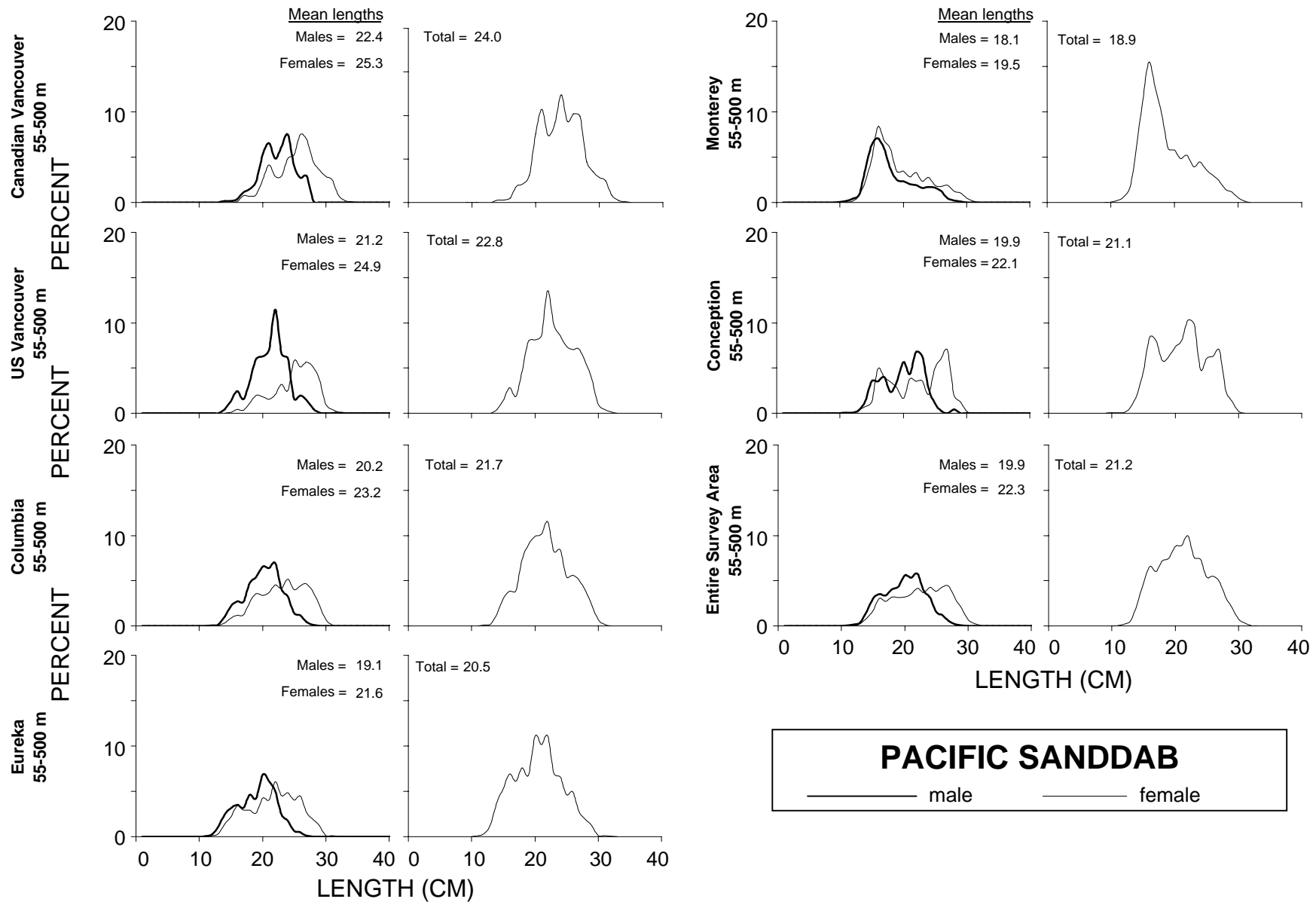


Figure 53.-- Estimated population size composition and mean lengths of Pacific sanddab by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.

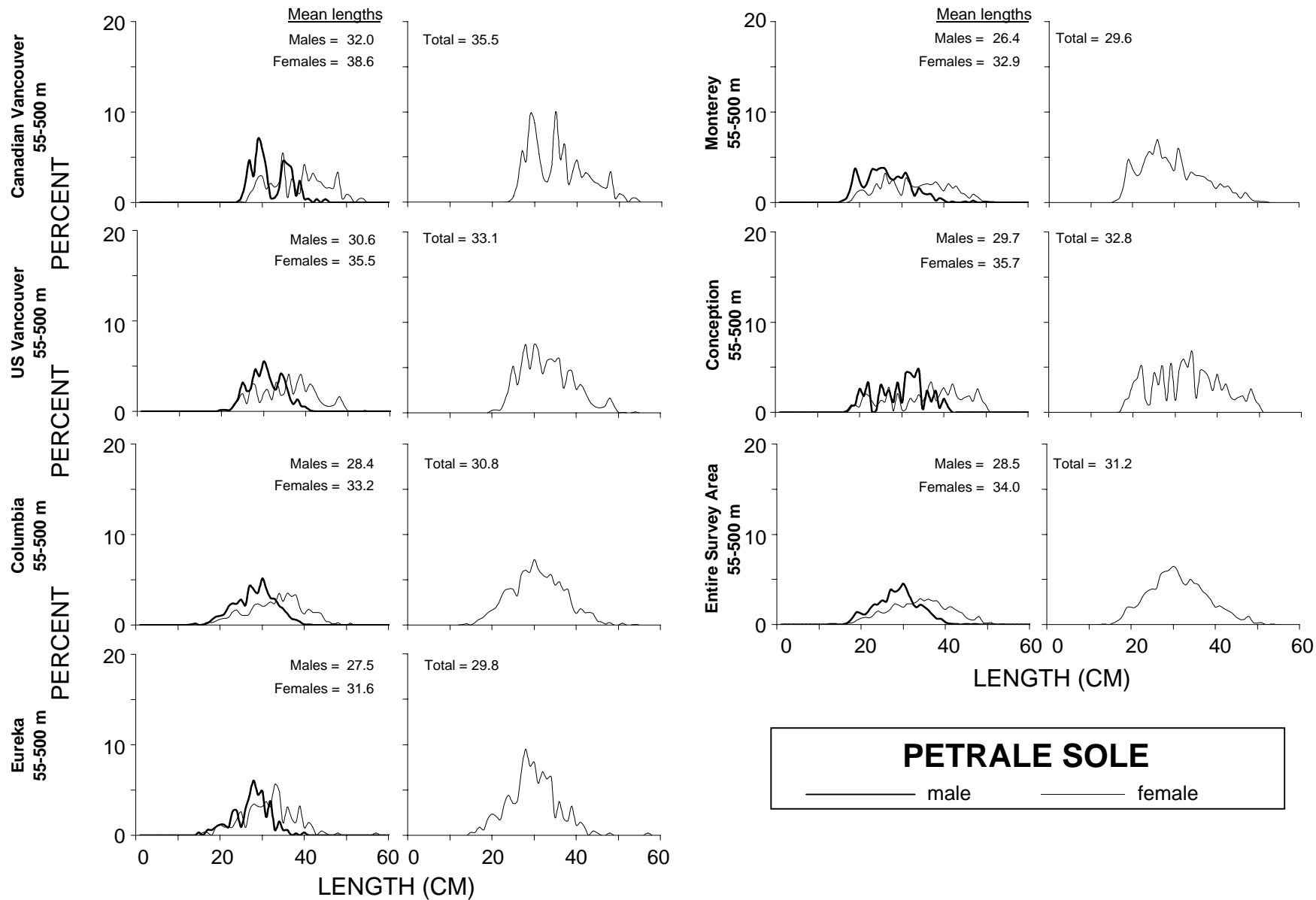


Figure 54.-- Estimated population size composition and mean lengths of petrale sole by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.

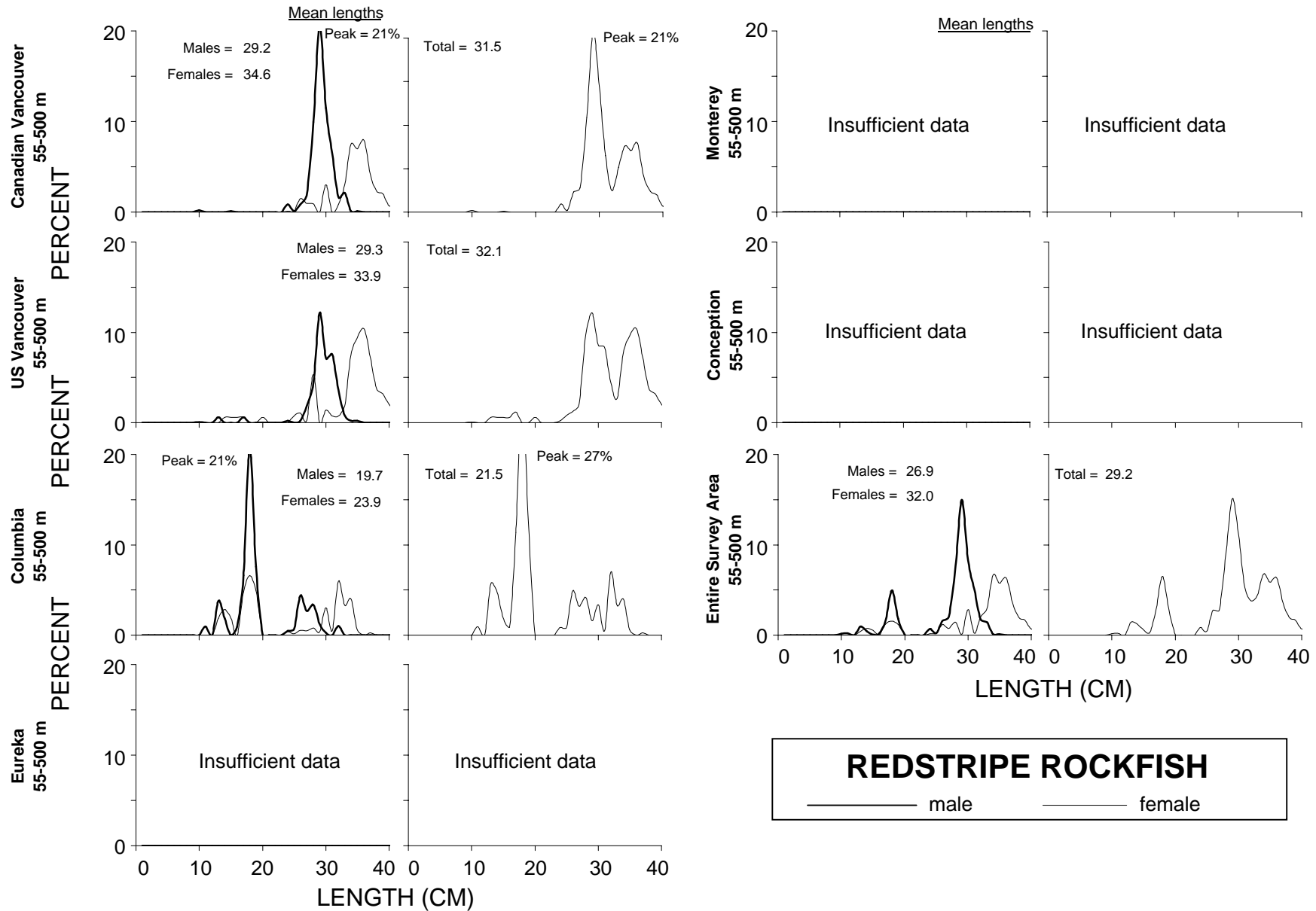


Figure 55.-- Estimated population size composition and mean lengths of redstripe rockfish by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.

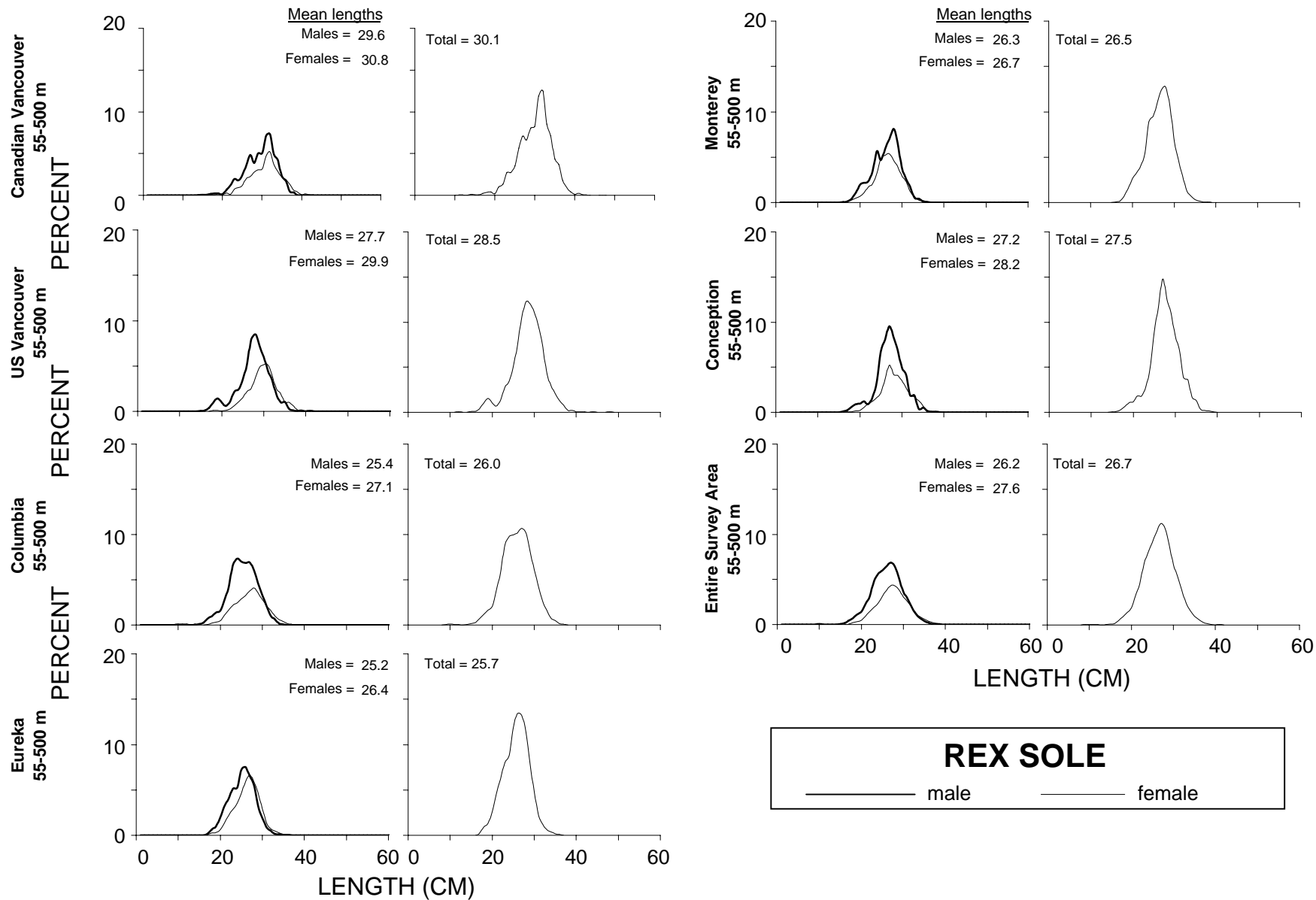


Figure 56.-- Estimated population size composition and mean lengths of rex sole by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.



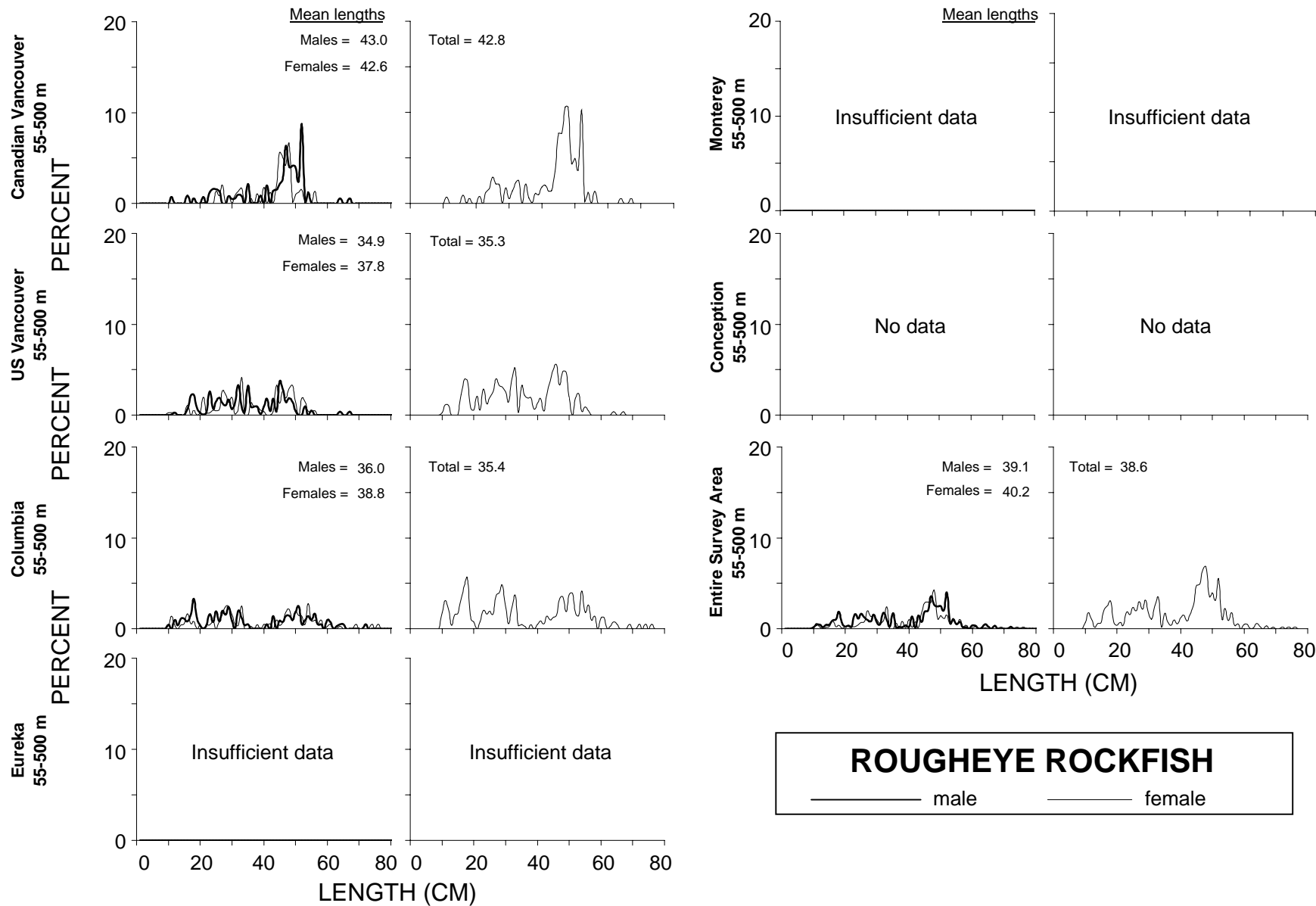


Figure 57.-- Estimated population size composition and mean lengths of rougheye rockfish by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.

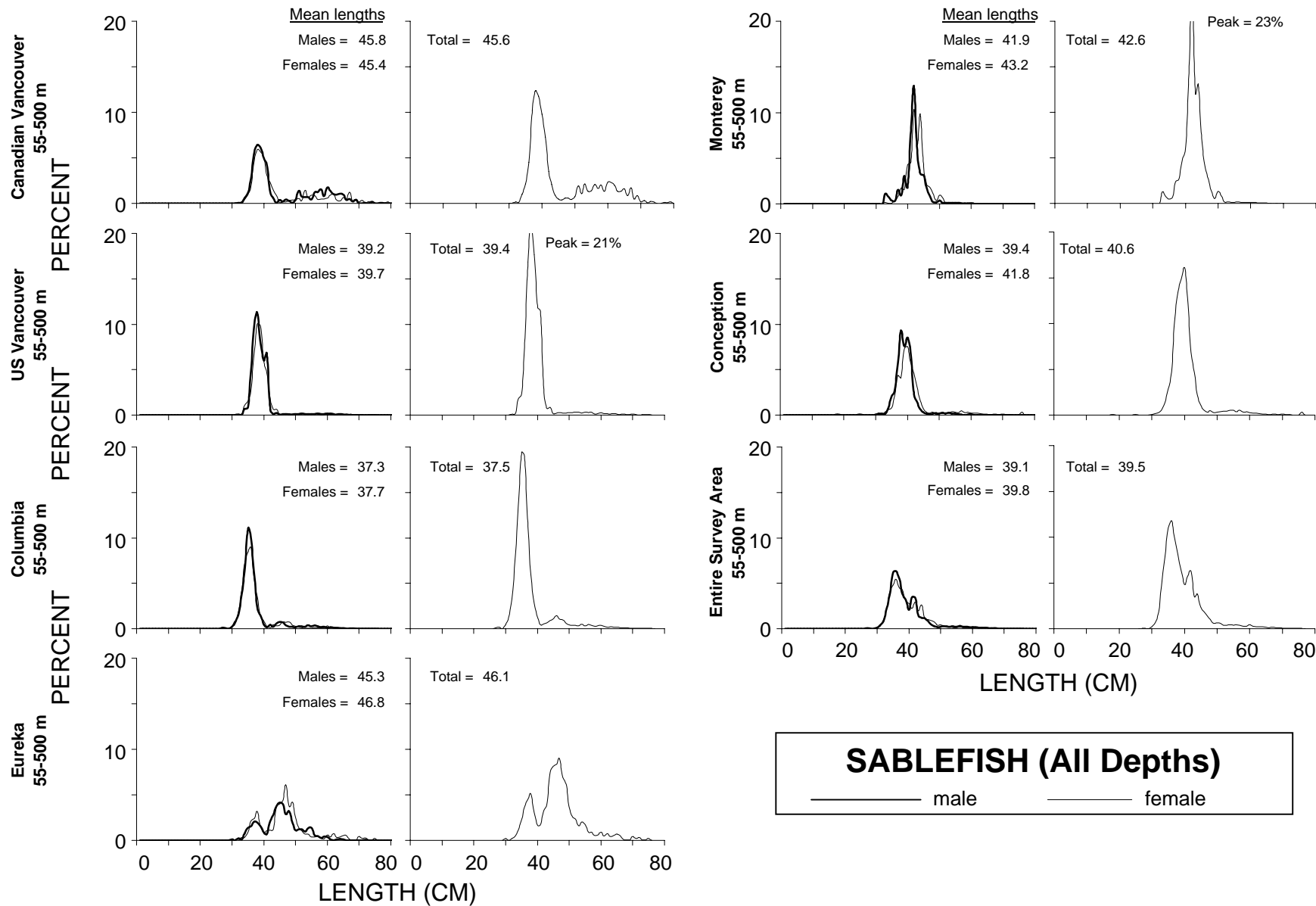


Figure 58.-- Estimated population size composition and mean lengths of sablefish by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.

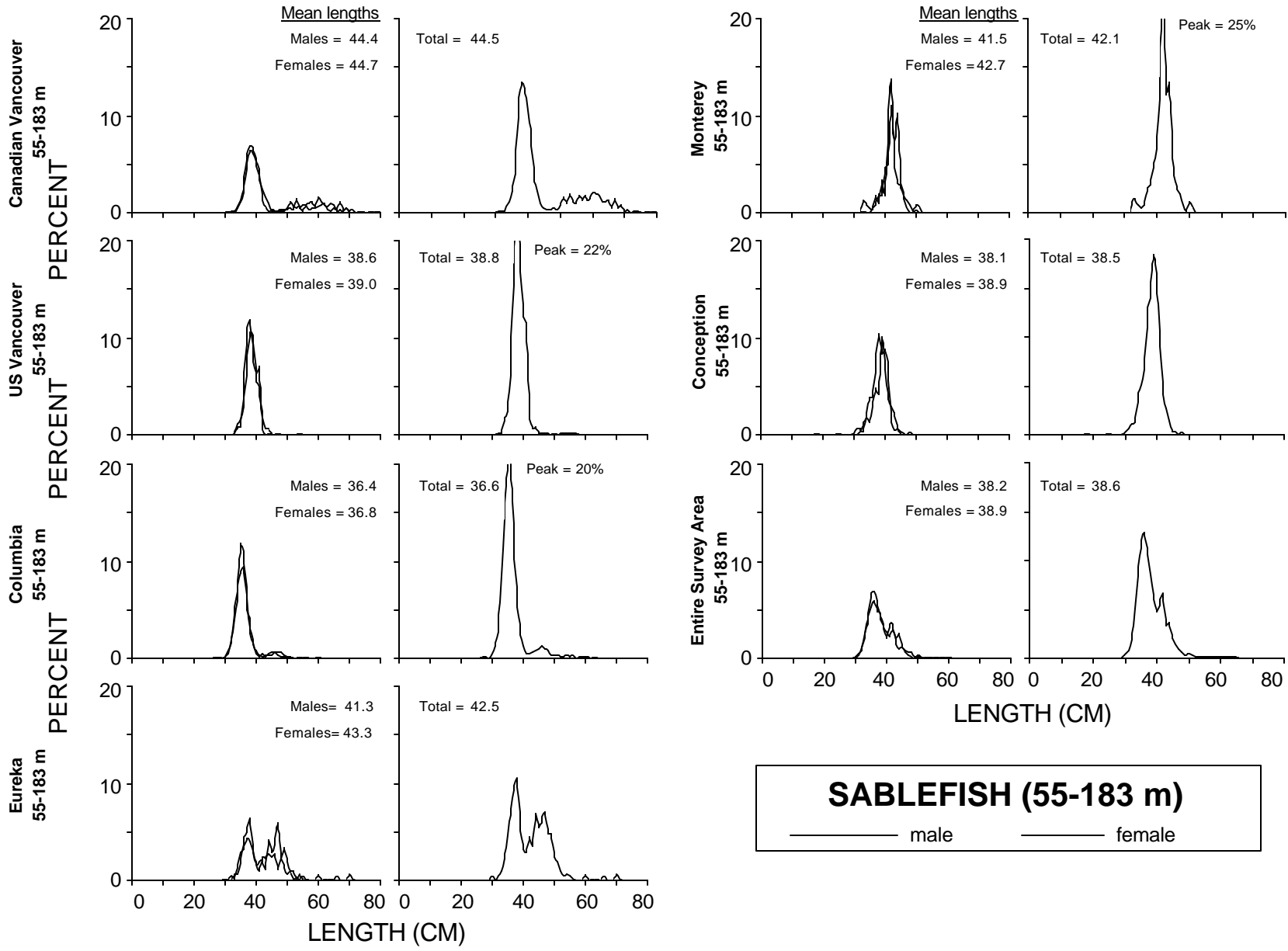


Figure 59.-- Estimated population size composition and mean lengths of sablefish by sex and International North Pacific Fisheries Commission area for the shallow depth stratum (55-183 m) from the 2001 triennial bottom trawl survey.

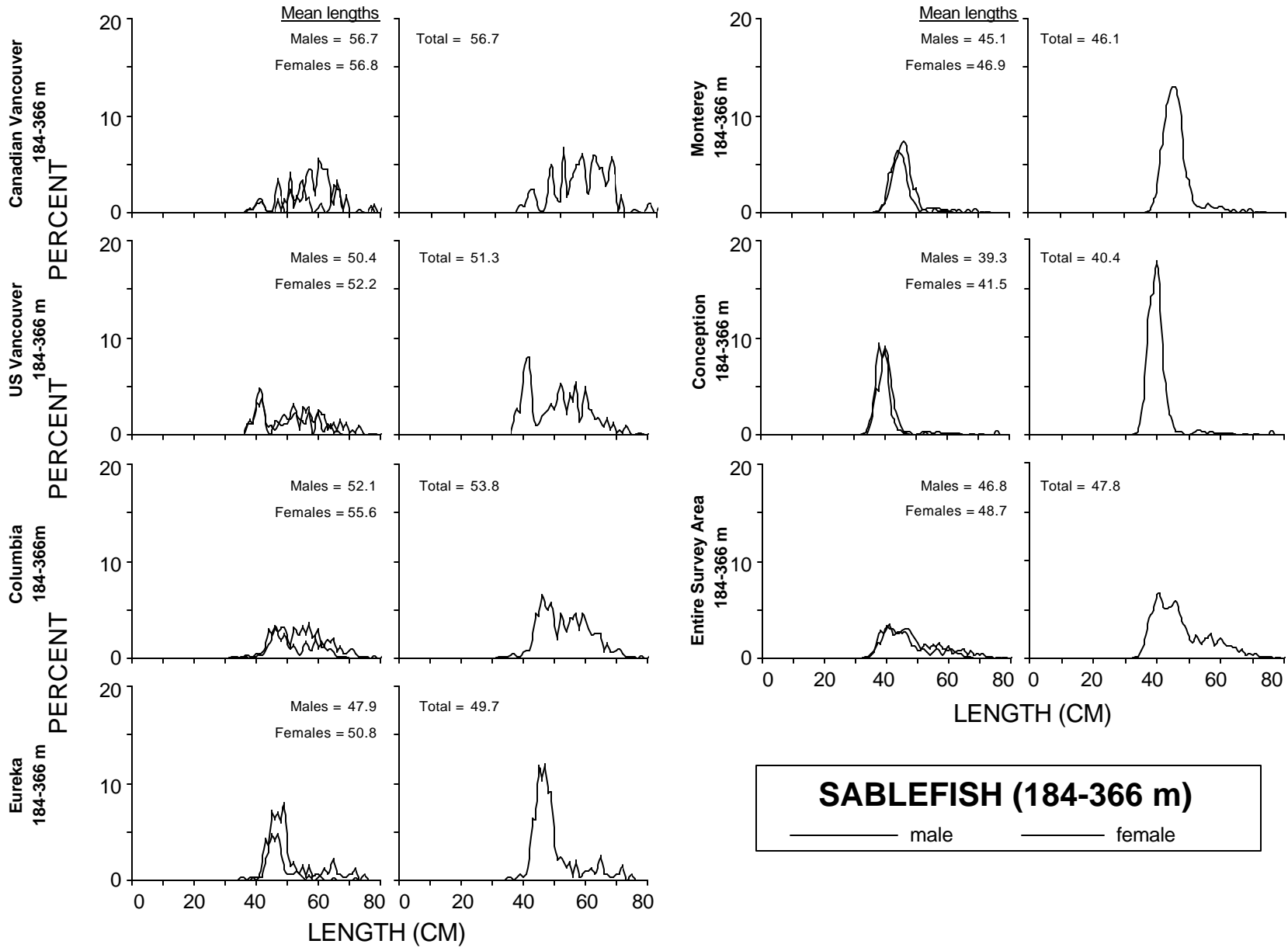


Figure 60.-- Estimated population size composition and mean lengths of sablefish by sex and International North Pacific Fisheries Commission area for the middle depth stratum (184-366 m) from the 2001 triennial bottom trawl survey.

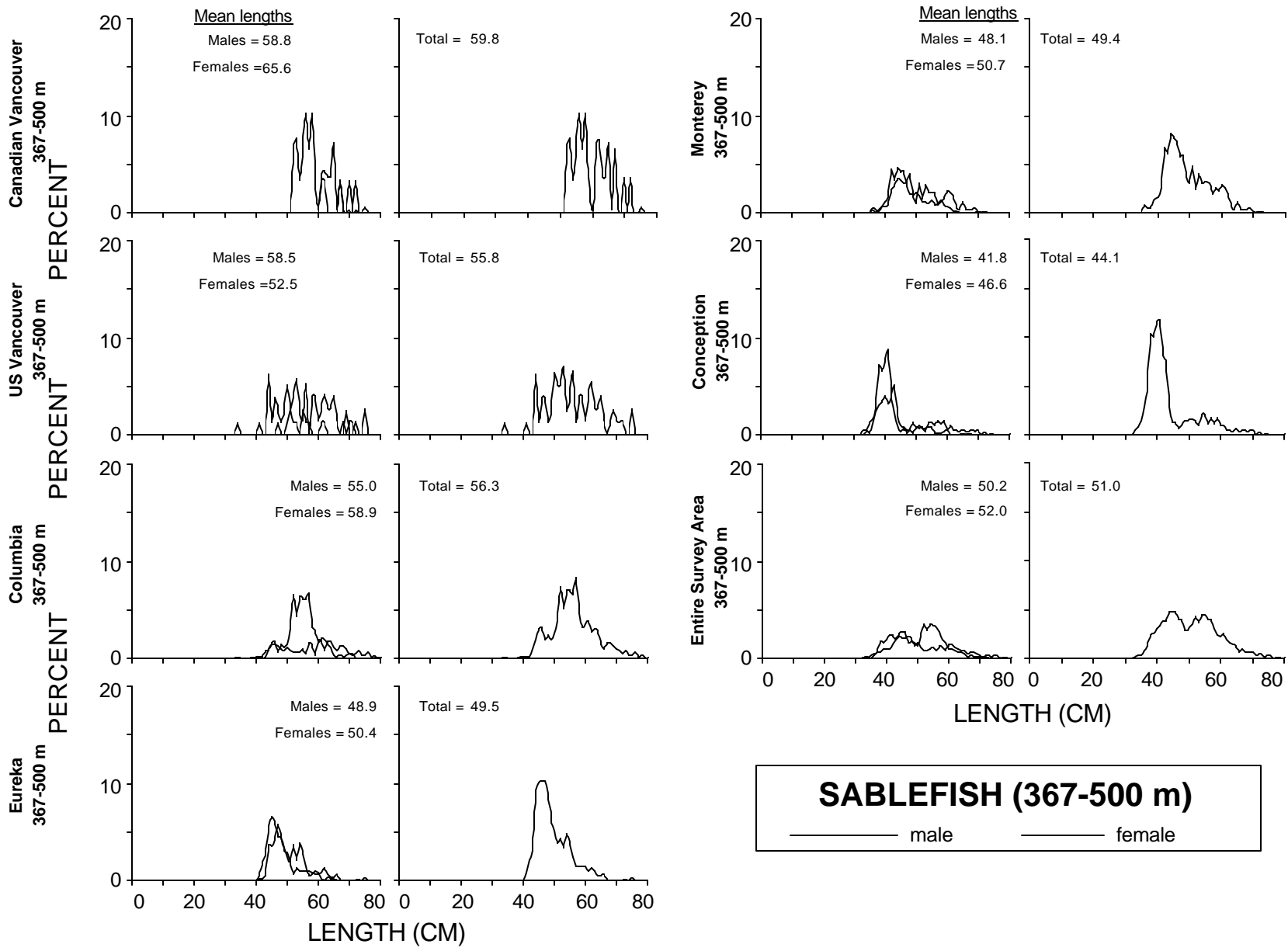


Figure 61.-- Estimated population size composition and mean lengths of sablefish by sex and International North Pacific Fisheries Commission area for the deep depth stratum (367-500 m) from the 2001 triennial bottom trawl survey.

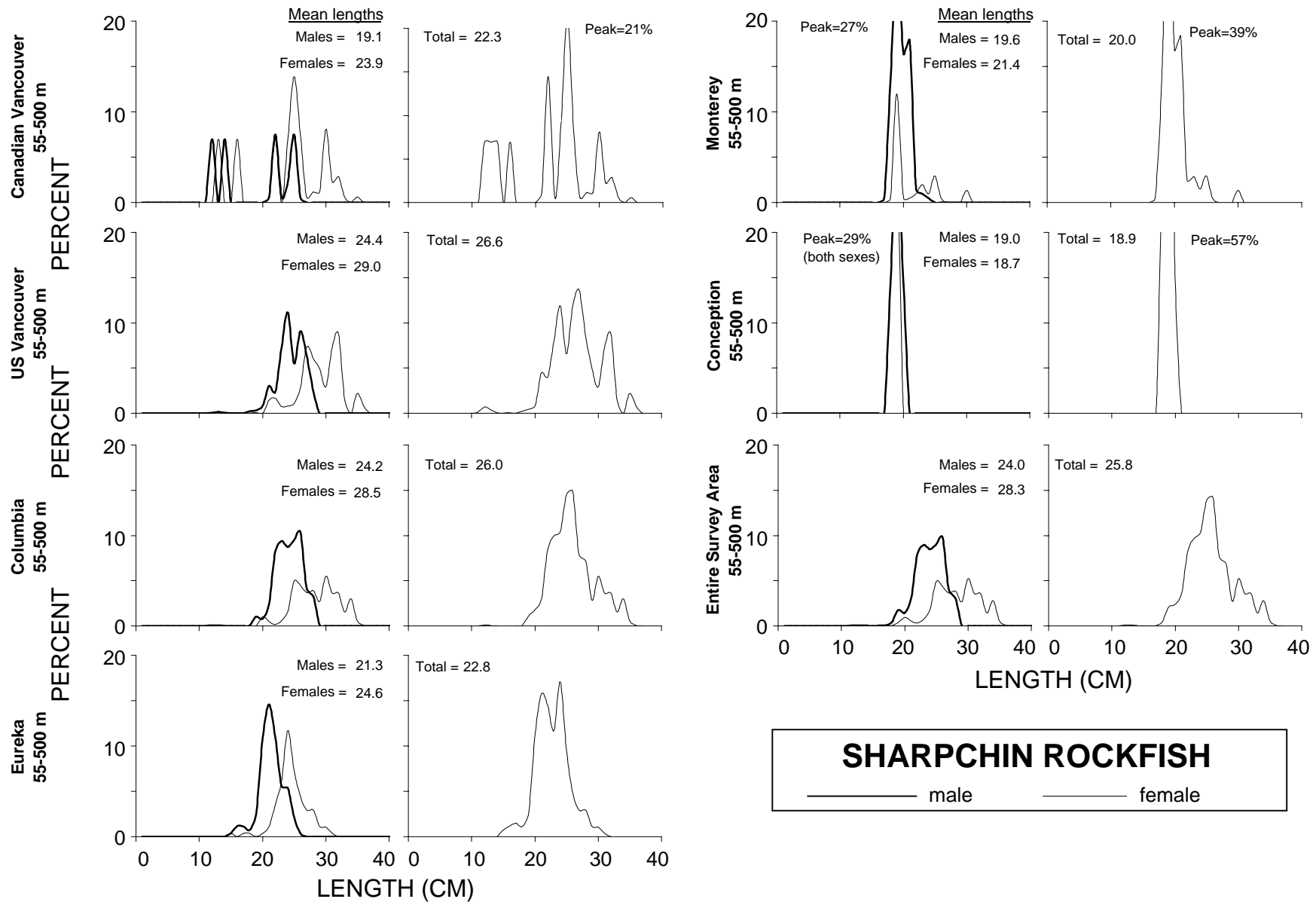
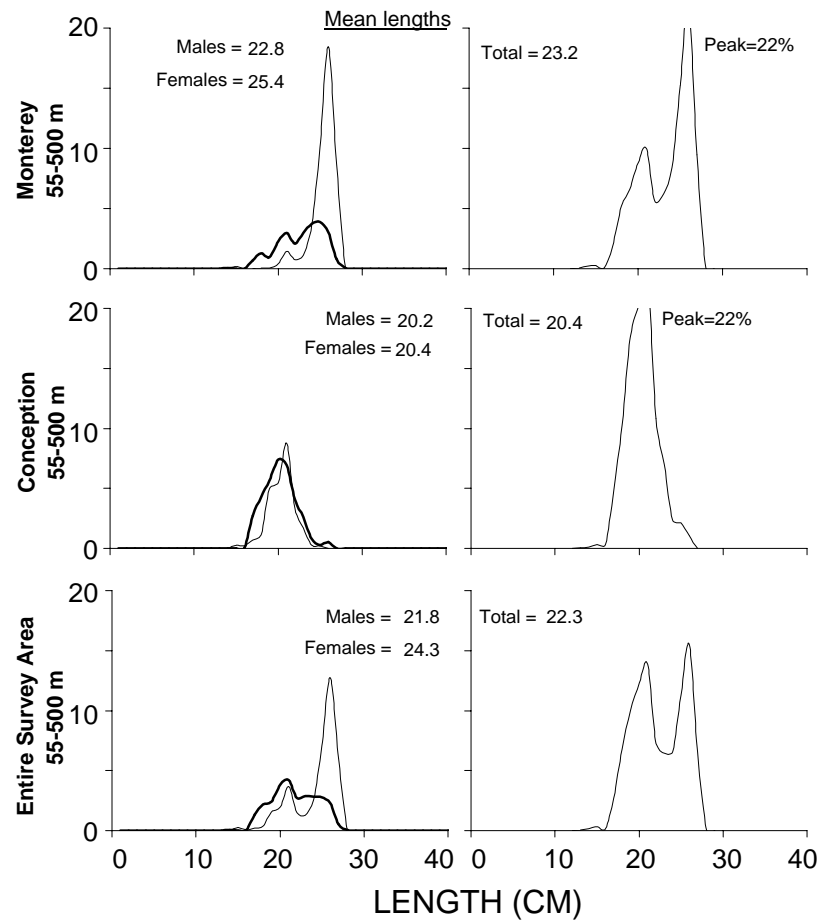
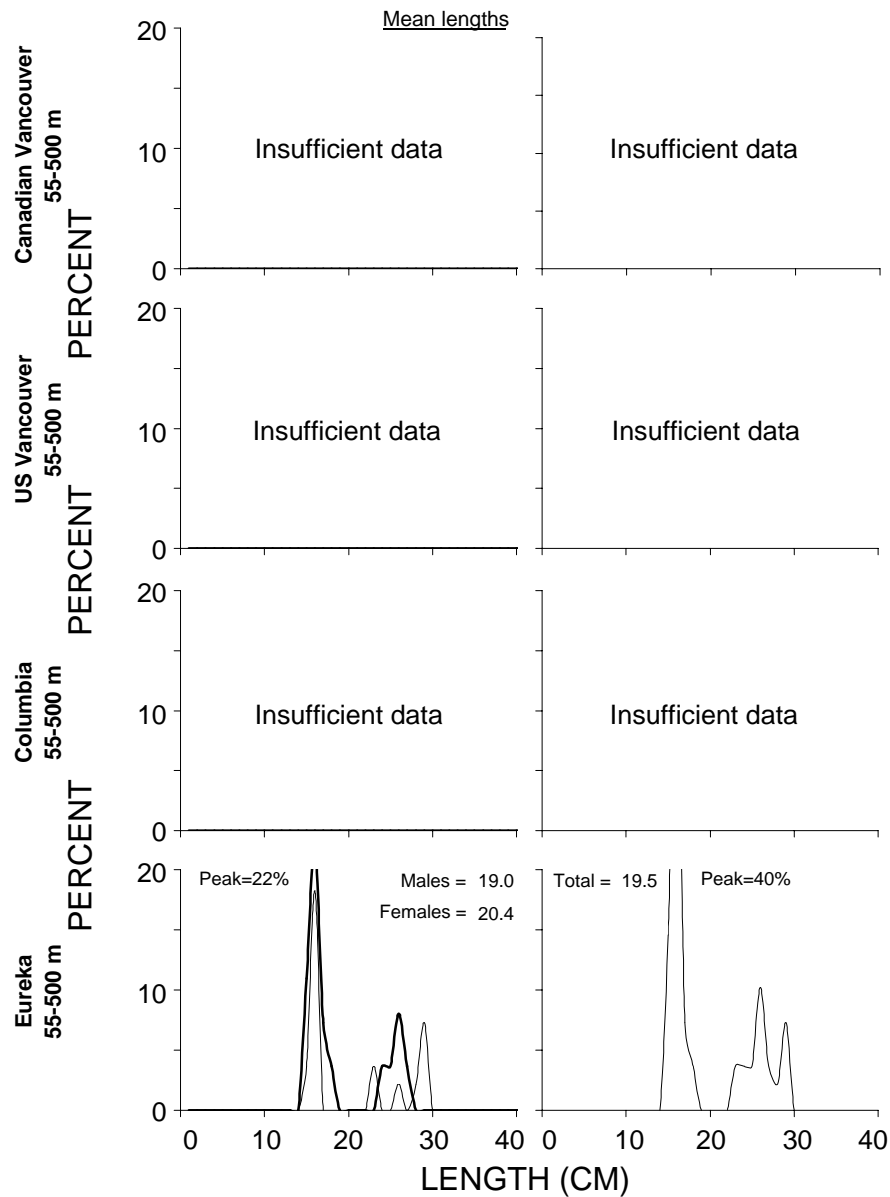


Figure 62.-- Estimated population size composition and mean lengths of sharpchin rockfish by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.



**SHORTBELLY ROCKFISH**

— male      — female

Figure 63.-- Estimated population size composition and mean lengths of shortbelly rockfish by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.

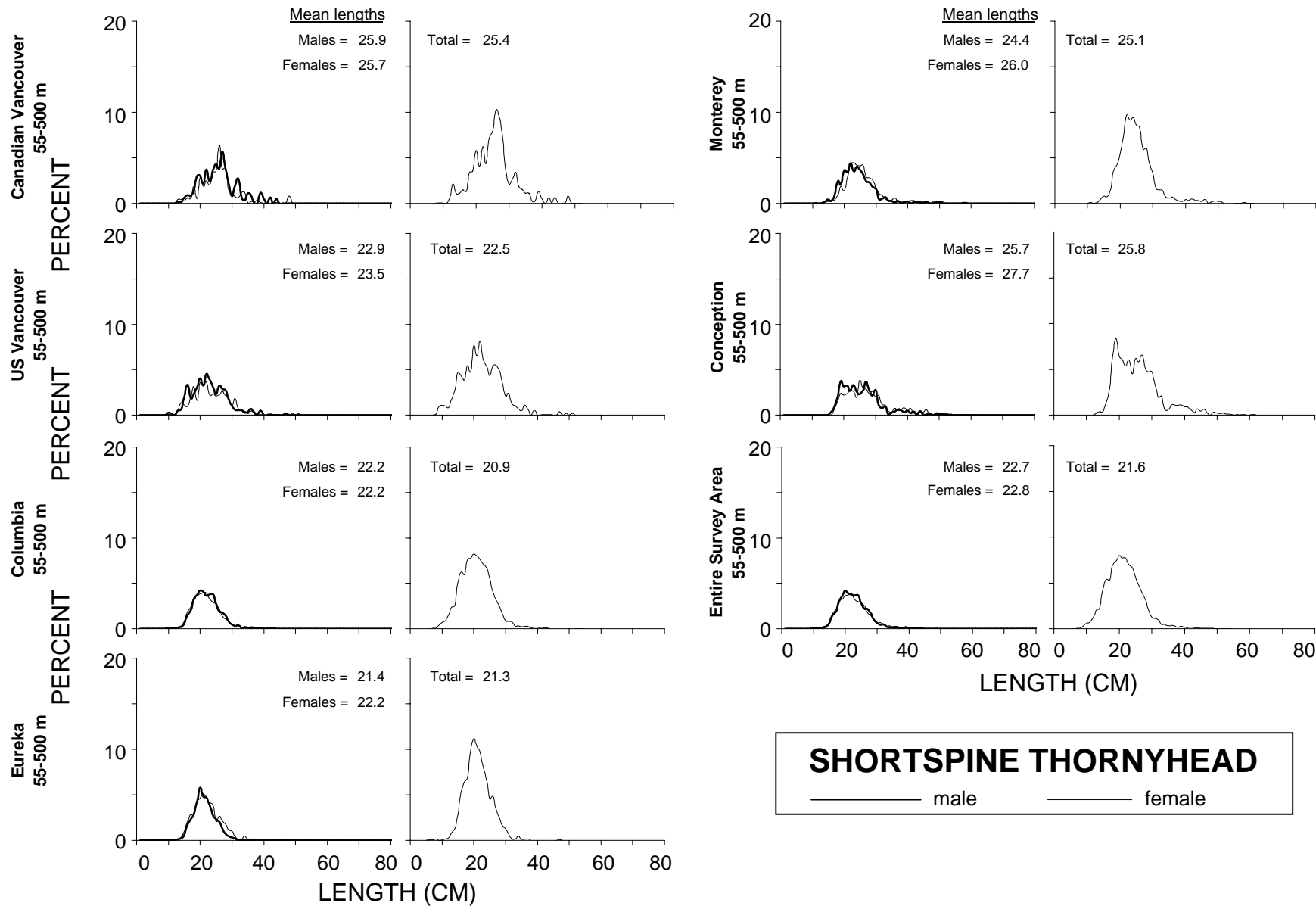


Figure 64.-- Estimated population size composition and mean lengths of shortspine thornyhead by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.



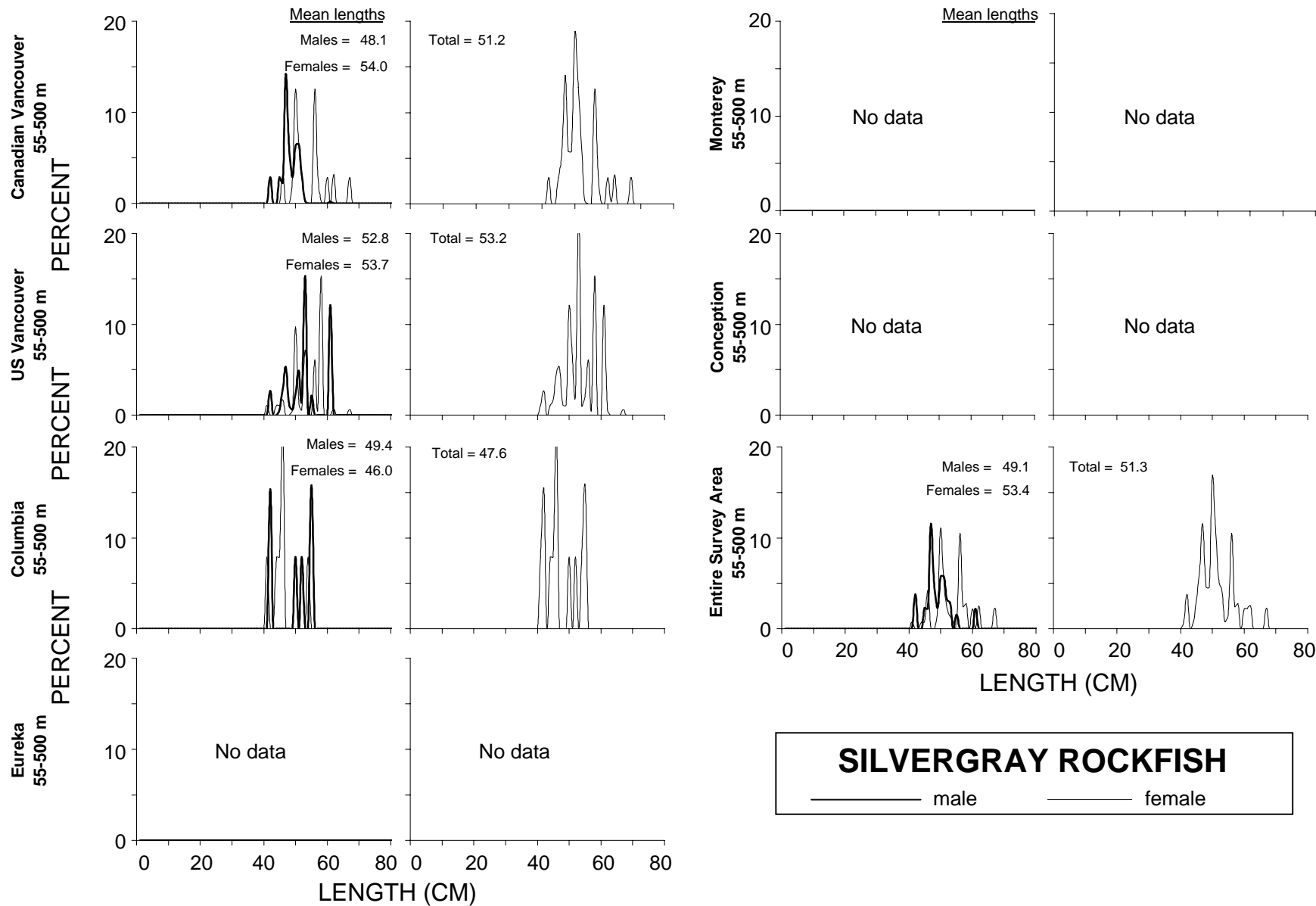


Figure 65.-- Estimated population size composition and mean lengths of silvergray rockfish by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.

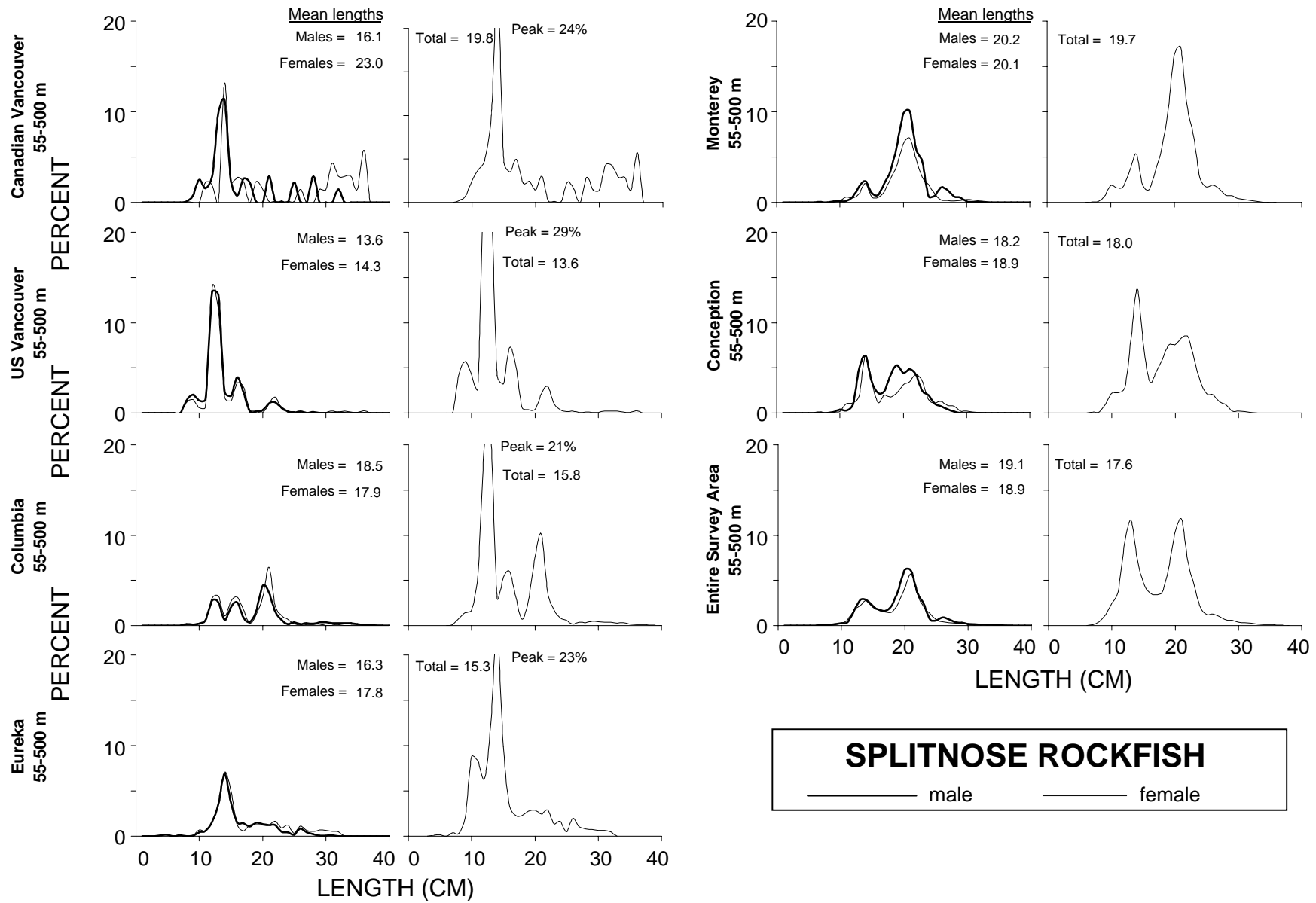


Figure 66.-- Estimated population size composition and mean lengths of splitnose rockfish by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.

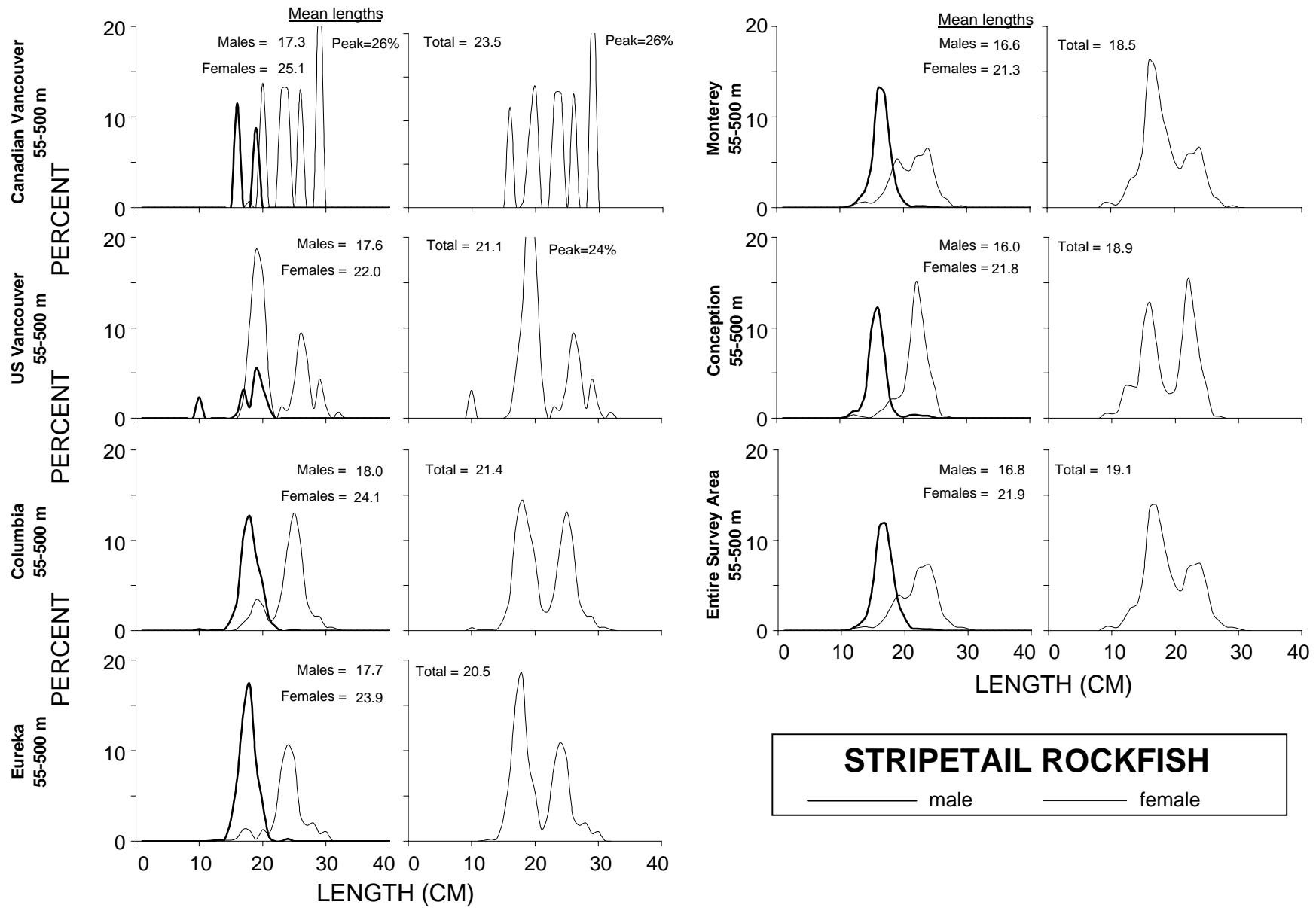


Figure 67.-- Estimated population size composition and mean lengths of stripetail rockfish by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.

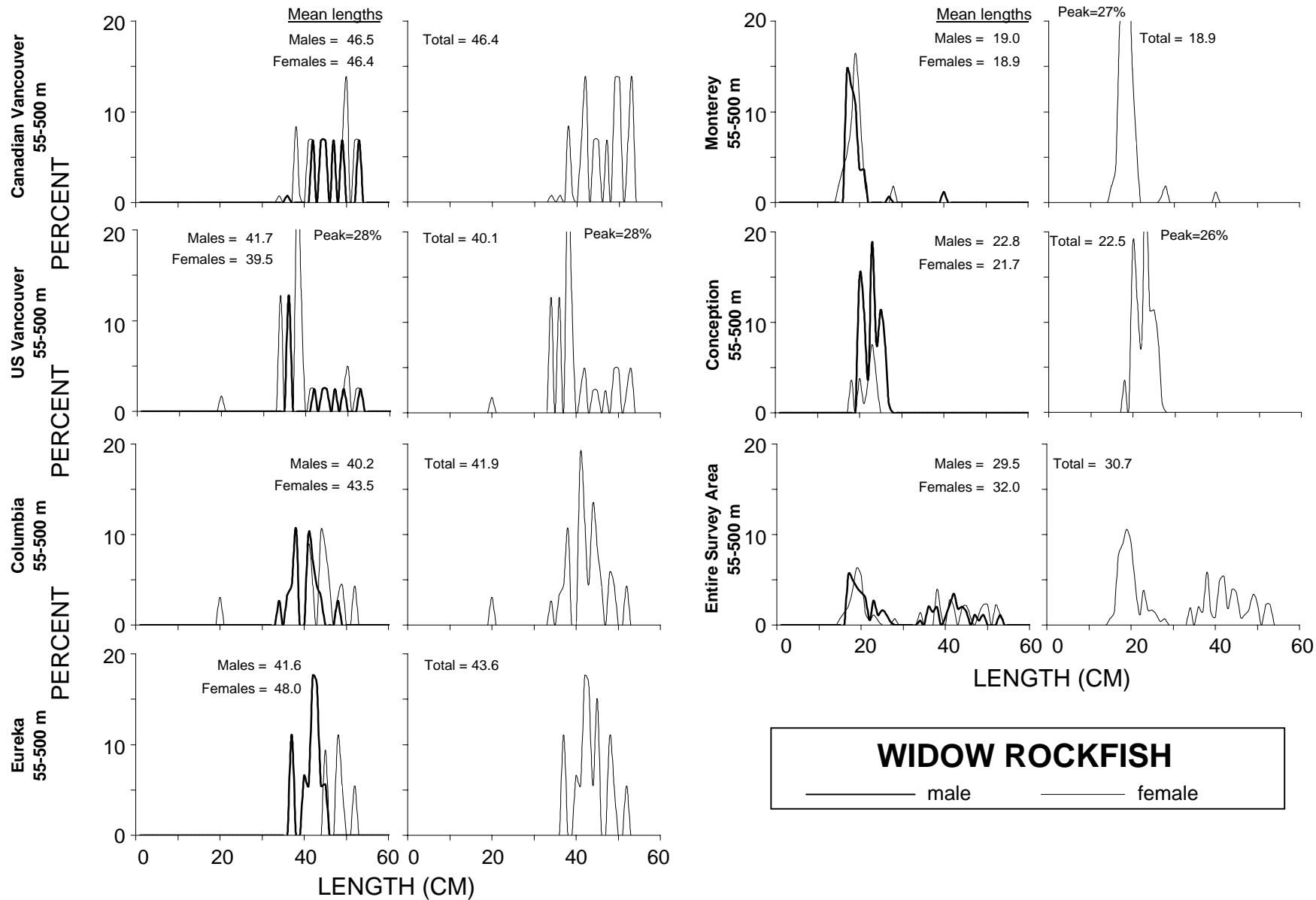


Figure 68.-- Estimated population size composition and mean lengths of widow rockfish by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.

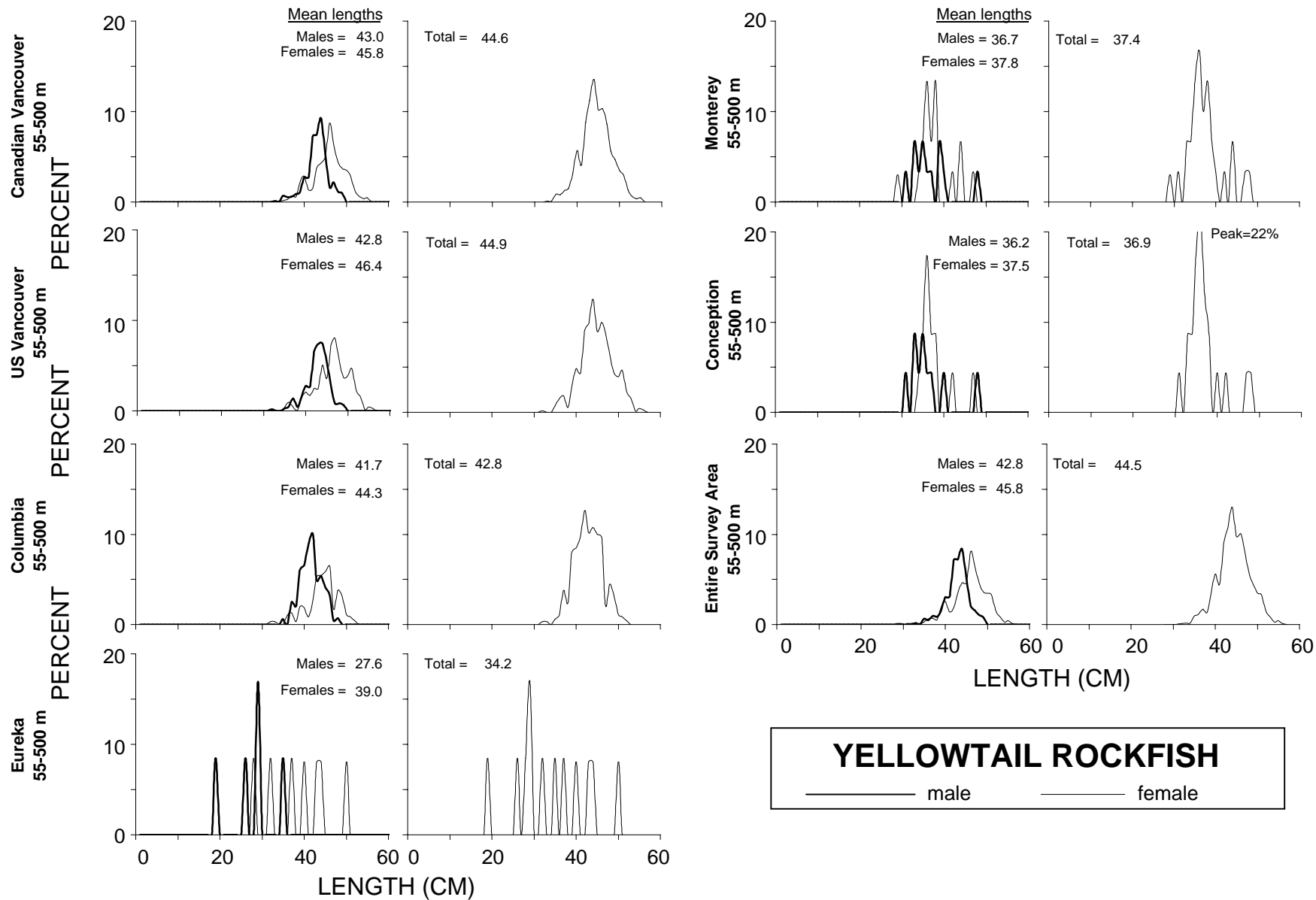


Figure 69.-- Estimated population size composition and mean lengths of yellowtail rockfish by sex and International North Pacific Fisheries Commission area for all depths (55-500 m) from the 2001 triennial bottom trawl survey.

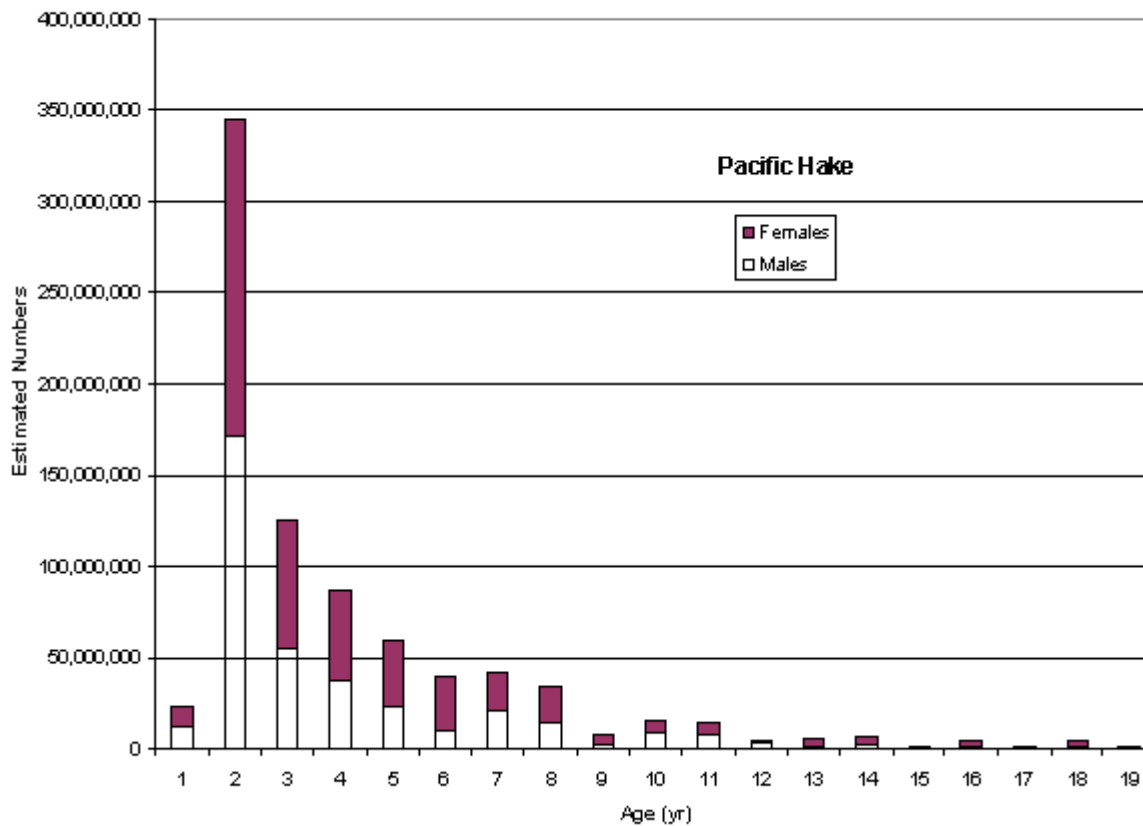


Figure 70.--The age composition of the Pacific hake resource off California, Oregon, Washington, and British Columbia in 2001, based upon results of the West Coast triennial bottom trawl survey, all areas and depths combined.

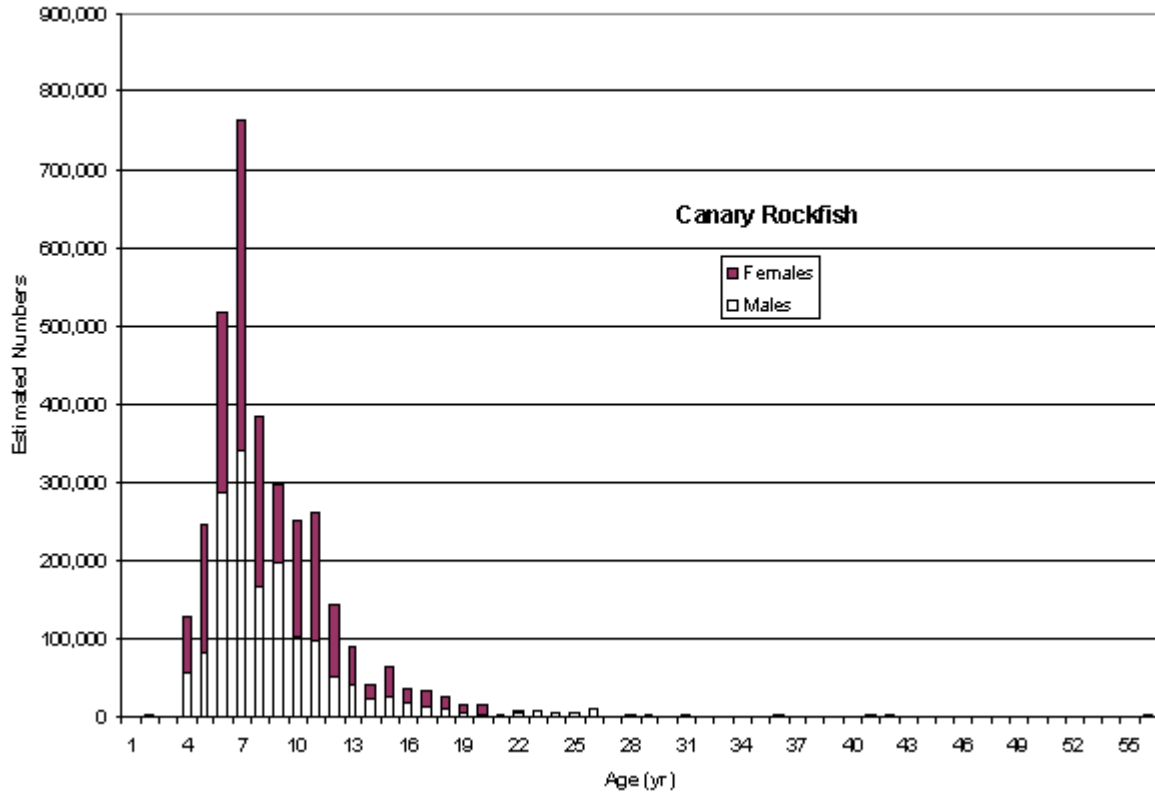


Figure 71.--The age composition of the canary rockfish resource off California, Oregon, Washington, and British Columbia in 2001, based upon results of the West Coast triennial bottom trawl survey, all areas and depths combined.

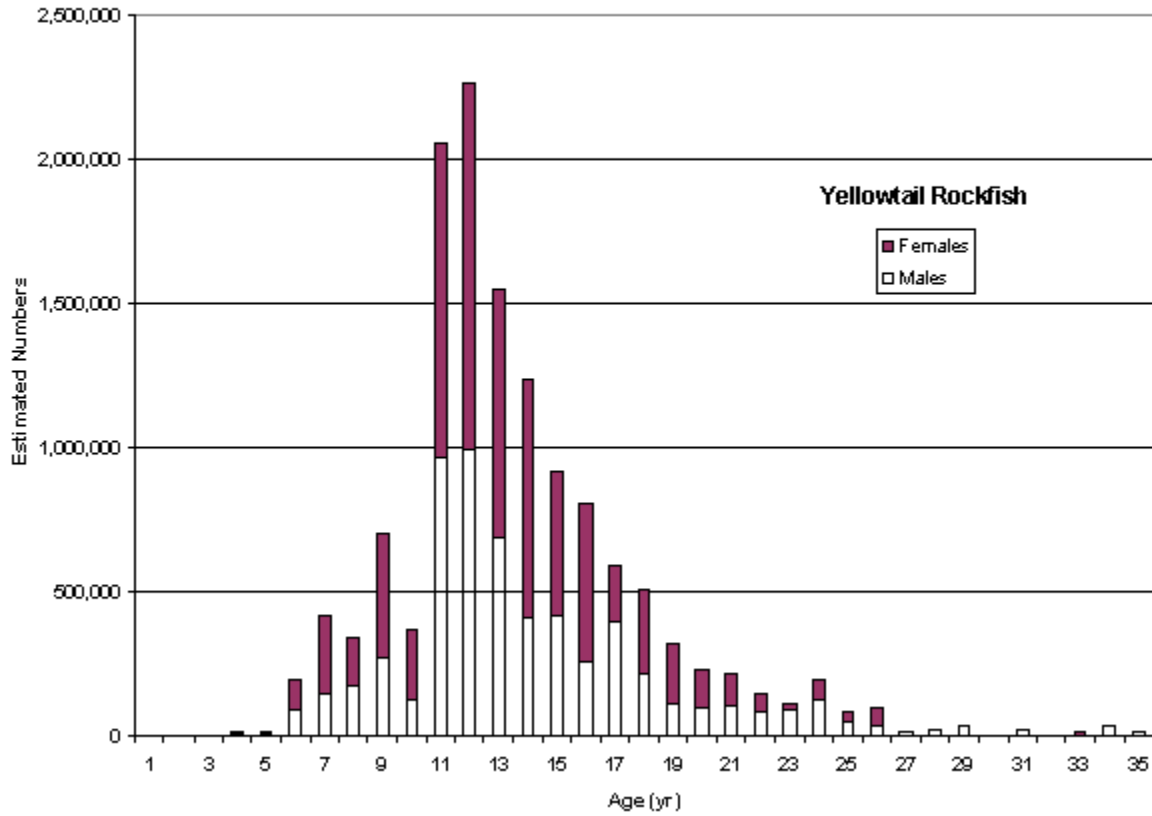


Figure 72.--The age composition of the yellowtail rockfish resource off California, Oregon, Washington, and British Columbia in 2001, based upon results of the West Coast triennial bottom trawl survey, all areas and depths combined.



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