NOAA Technical Memorandum NMFS-NWFSC-55

The 1999
Northwest Fisheries Science Center
Pacific West Coast
Upper Continental Slope Trawl Survey of Groundfish Resources

off Washington, Oregon, and California:
Estimates of Distribution, Abundance,
and Length Composition

December 2002

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

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This document should be cited as follows:

Builder Ramsey, T., et al. 2002. The 1999 Northwest Fisheries Science Center Pacific West Coast upper continental slope trawl survey of groundfish resources off Washington, Oregon, and California. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-55, 143 p.

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The 1999 Northwest Fisheries Science Center Pacific West Coast Upper Continental Slope Trawl Survey of Groundfish Resources

off Washington, Oregon, and California: Estimates of Distribution, Abundance, and Length Composition

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December 2002

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EXECUTIVE SUMMARY

In 1999 the Northwest Fisheries Science Center (NWFSC) conducted the second year of a new bottom trawl survey of the commercial groundfish resources in the slope zone (100-700 fathoms [fm], 183-1,280 meters [m]) of the continental U.S. West Coast (Washington, Oregon, California) chartering local West Coast trawlers. The survey was conducted from Cape Flattery, Washington (lat. 48°10'N) to Morro Bay, California (lat. 35°N), between July 3, 1999 and September 24, 1999.

An Aberdeen-style net with a small mesh (2" stretched measure or less) liner in the codend (to retain pre-recruits) was used to sample fish biomass. The tow duration of each haul was targeted for 15 minutes. Tow duration was measured using the bottom contact sensor (BCS) as the simple difference between the times marking touchdown and lift-off of the trawl net from the seafloor.

Survey sampling locations were arranged along east-west transects of latitude. Transects were designated to be separated by 10 minutes of latitude. There were 80 such transects in total, covering the coast between survey endpoints. Five stations in each transect were selected from two categories: shallow (100-300 fm), and deep (300-700 fm). The category with the greatest linear distance was assigned three randomly-selected depth ranges to sample, while the category with the lesser linear distance was assigned two randomly-selected depth ranges to sample. Out of a total of 400 possible sampling locations, attempts at sampling were made in 380 of these. Of the stations in which sampling was attempted, 327 were successful. Simrad ITI net mensuration data, as well as global positioning system (GPS) course and position data were obtained from 350 of the successful tows. Bottom contact sensor data was obtained from 369 of the successful tows.

Catches were sorted to species level or to other appropriate taxon levels and then weighed using an electronic, motion compensated scale. Sampling efforts were concentrated on Dover sole (*Microstomus pacificus*), shortspine thornyhead (*Sebastolobus alascanus*), longspine thornyhead (*Sebastolobus altivelis*), and sablefish (*Anoplopama fimbria*), which is known as the Dover sole, thornyheads, and sablefish (DTS) complex. Dover sole and sablefish were separated by sex and a total of up to 125-length measurements per haul were collected from each species for both sexes combined. Sexual maturity information was gathered on sablefish. A total of 187 species or families were identified over the entire survey area.

ACKNOWLEDGMENTS

We would like to thank the captains and crews of the FVs *Blue Horizon, Captain Jack*, *Sea Eagle*, and *Miss Leona*, for their hard work during the 1999 NWFSC West Coast groundfish slope survey. We would also like to thank the scientists who participated in the survey, including (in alphabetical order) Allison Bailey, Cara Campbell, Ronnie Hunt, Mel Kahn, Heather Munro, Victor Simon, Waldo Wakefield, Bill West, and Janelle Zimmerman. We are grateful to Scott McEntire at the Resource Assessment and Conservation Engineering (RACE) Division of the Alaska Fisheries Science Center (AFSC) for creating the bottom contact sensors (BCS) and assisting in the use of these very valuable instruments. Also, thanks to the personnel at the AFSC net loft for refurbishing the survey nets, manufacturing small nets for splitting large hauls, and supplying the net accessories used for this survey. We would also like to express our appreciation to Herb Sanborn, Mary Breaker, and Mary Craig for their shore-side logistical support.

INTRODUCTION

Scientists from the Fishery Resource Analysis and Monitoring (FRAM) Division, National Marine Fisheries Service (NMFS), Northwest Fisheries Science Center (NWFSC), conducted the second year of the NWFSC bottom trawl survey of the commercial groundfish resources in the slope zone (183-1,280 meters [m], 100-700 fathoms [fm]) of the continental U.S. West Coast (Washington, Oregon, and California) in 1999. One of the objectives of the NWFSC bottom trawl slope survey (hereafter referred to as the NWFSC slope survey) was to provide information that would complement and extend two pre-existing U.S. West Coast groundfish resource surveys that have historically been conducted by the NMFS Alaska Fisheries Science Center (AFSC), Resource Assessment and Conservation Engineering (RACE) Division, and to continue the NWFSC slope survey time series initiated in 1998 (Turk et al. 2001). Prior to 1998, the two surveys conducted by the AFSC were the principal sources of fishery-independent data used in stock assessments of the commercial groundfish resources in the slope zone (Methot et al. 2000).

The initiation of the NWFSC slope survey was prompted by the determination in the mid-1990s that stock assessments of the slope groundfish species did not have sufficient data to provide precise results. The need for greater precision in stock assessments was a concern because, at the time, five groundfish species had declined to the point where they were in a depleted state (Methot et al. 2000). The 1999 NWFSC slope survey was the second in a yearly time series of indices of abundance for the commercial deep water species. The NWFSC slope survey is a cooperative survey, employing fishing vessels from the West Coast commercial fishing industry. The cooperative aspect of this survey utilizes the skills of the captains who are most familiar with the unique challenges of fishing in the deep waters off the West Coast, and it fulfills the cooperative-research provisions of the Magnuson-Stevens Sustainable Fisheries Act[1]. By conducting yearly surveys, the information that is gathered would provide a measure of changes in relative abundances, distributions, and the conditions of these stocks. These yearly surveys also provide information to fisheries managers, fishers and concerned citizens.

The NWFSC slope survey covers habitats in depths ranging from 100-700 fathoms (183-1,280 m), from Cape Flattery, Washington (lat. 48°10'N), to Morro Bay, California (lat. 35°N). The results are summarized by 2-depth strata (183-549 m and 550-1,280 m, 100-300 fm and 301-700 fm) within this area, and are further divided into the five International North Pacific Fisheries Commission (INPFC) statistical areas (Fig. 1).

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[1] Management authority over fisheries along the West Coast of the United States, including specifically, the States of California, Oregon and Washington, principally with the Pacific Fishery Management Council (PFMC). This organization was created by Congress in 1976 as part of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), the legislation that originally established a 200-mile extended economic zone (EEZ) surrounding the nation's coastline.

The purpose of this report is to document the survey design and field procedures, summarize the survey data, identify and record analyses of survey data, and present the results of the 1999 NWFSC slope survey. Included are summaries of catches, distribution, abundance, and size composition of species.

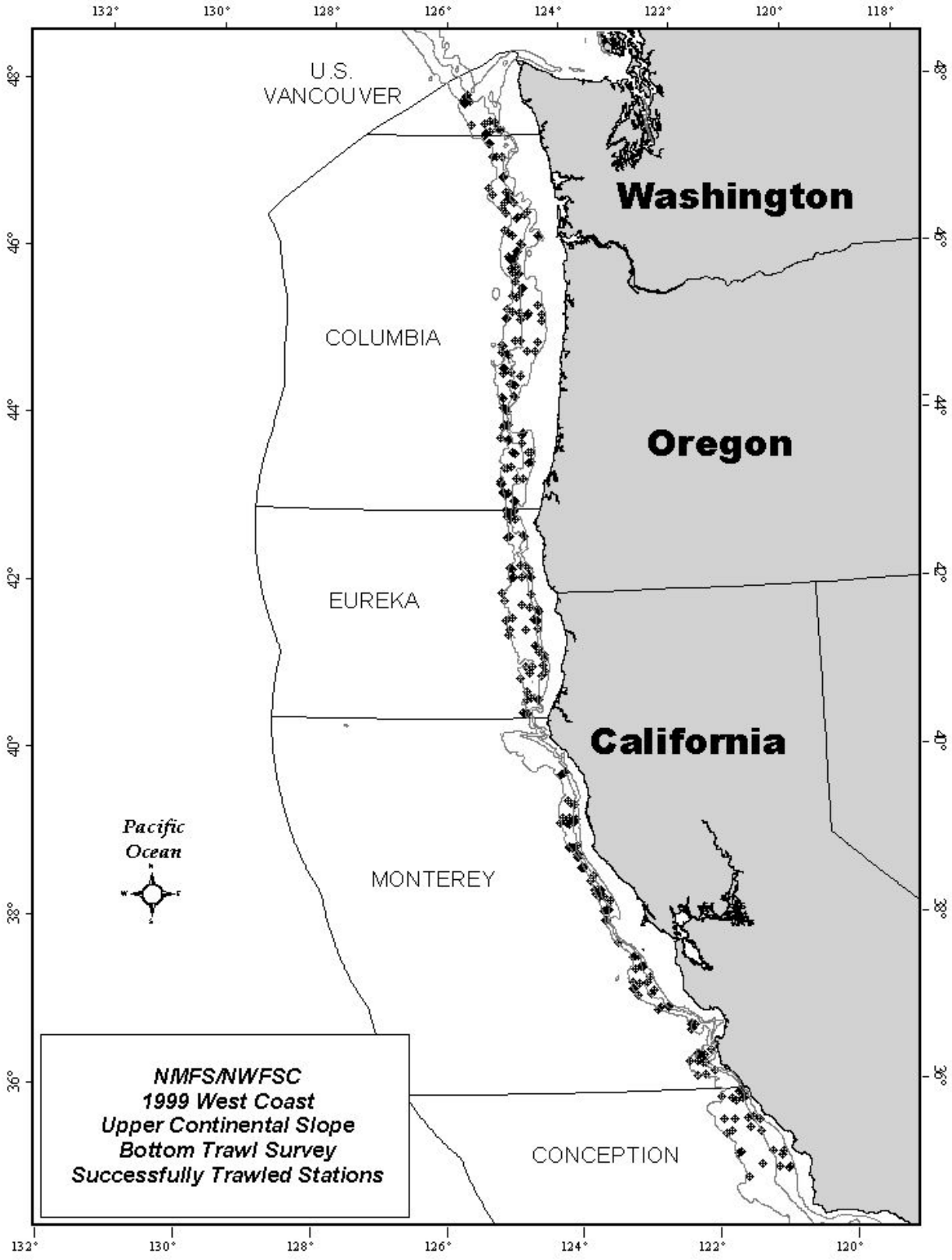


Figure 1. Map showing the extent of the 1999 NWFSC slope survey and the location of 327 successful tows.

SURVEY METHODS

Survey Period and Sampling Area

The 1999 NWFSC slope survey was conducted from Cape Flattery, Washington (lat. 48°10'N), to Morro Bay, California (lat. 35°N), between July 3, 1999 and September 24, 1999. Two trawling vessels, the FishingVessel (FV) *Miss Leona* and the FV *Blue Horizon*, were used during the first survey period, from July 3, 1999 to August 3, 1999. A second set of vessels, the FV *Captain Jack* and the FV *Sea Eagle*, was used during the second survey period, from August 25, 1999 to September 24, 1999. These vessels started the survey off of Cape Flattery and then progressed south along the coast, finishing the survey in Morro Bay.

Vessels and Sampling Gear

An Aberdeen style net with a small-mesh (2" stretched measure or less) liner in the codend (to retain pre-recruits) was used to sample fish biomass (Figs. 2, 3). The Aberdeen trawl was chosen as the standard sampling gear for this survey because it has demonstrated relatively stable performance over the range of conditions that were expected to be encountered. The tow duration of each haul was targeted for 15 minutes. Acoustic and bottom contact instruments attached to the nets recorded various aspects of their mechanical performance, while other data on the operational conditions (e.g., depth, amount of towing cable deployed, towing speed, tow duration, and weather conditions) were recorded from instruments on the vessels.

Trawl Station Allocation

The 1999 NWFSC slope survey was a combination of both systematic and random sampling strategies. The survey sampling locations were arranged along east-west transects of latitude. Fishing operations were carried out in depths ranging from 100-700 fathoms, on a variety of bottom types. Transects were designated to be separated by 10 minutes of latitude. There were 80 such transects in total covering the coast between the survey endpoints. Five stations in each transect were selected from two categories: shallow (183-549 m, 100-300 fm) and deep (550-1,280 m, 300-700 fm). The category with the greatest linear distance was assigned three randomly-selected depth ranges to sample, while the category with the lesser linear distance was assigned two randomly-selected depth ranges to sample. Each of the four vessels occupied a different subset of 20 transects separated by 40 minutes of latitude, such that by the end of the survey, all 80 transects were sampled.

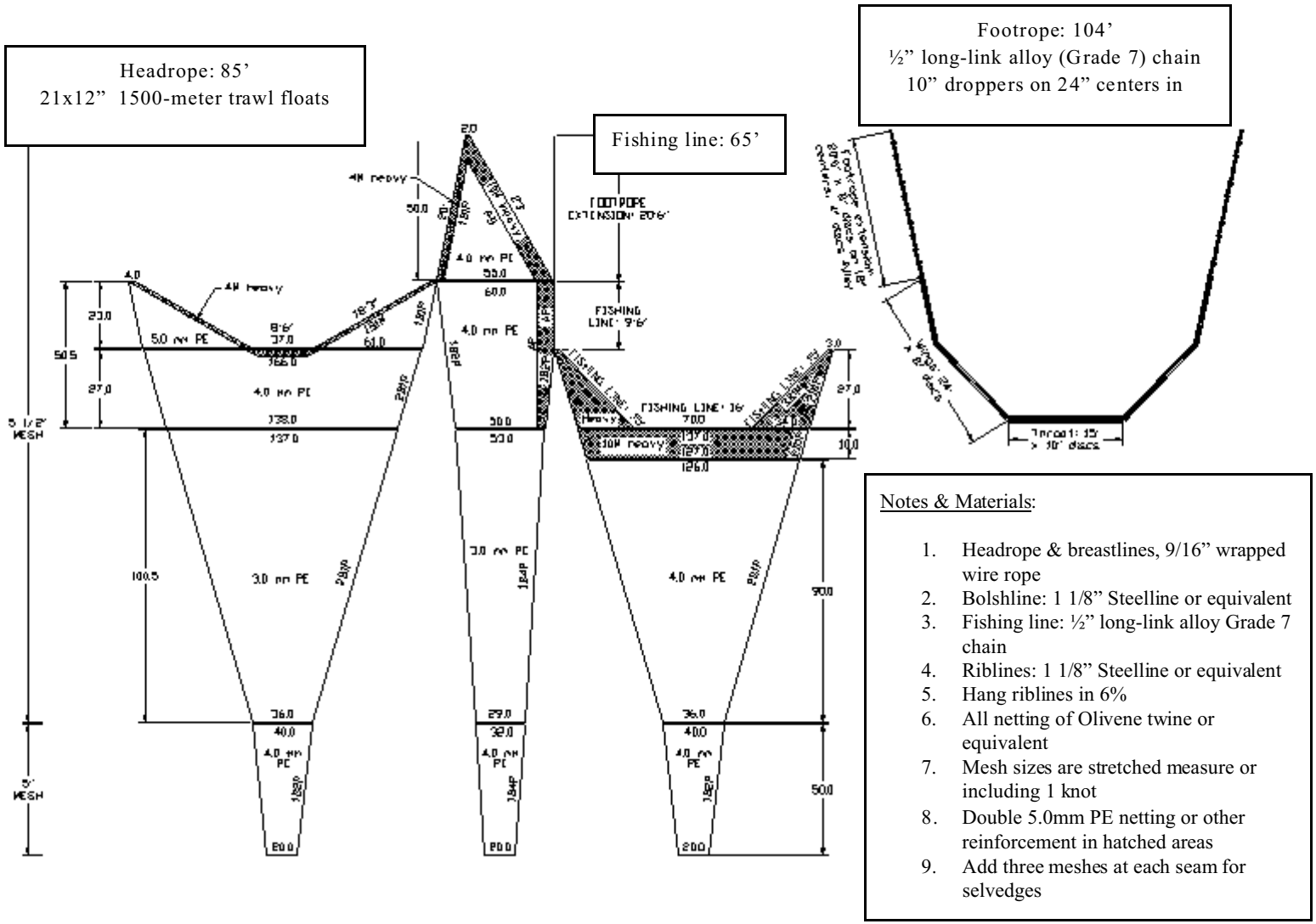
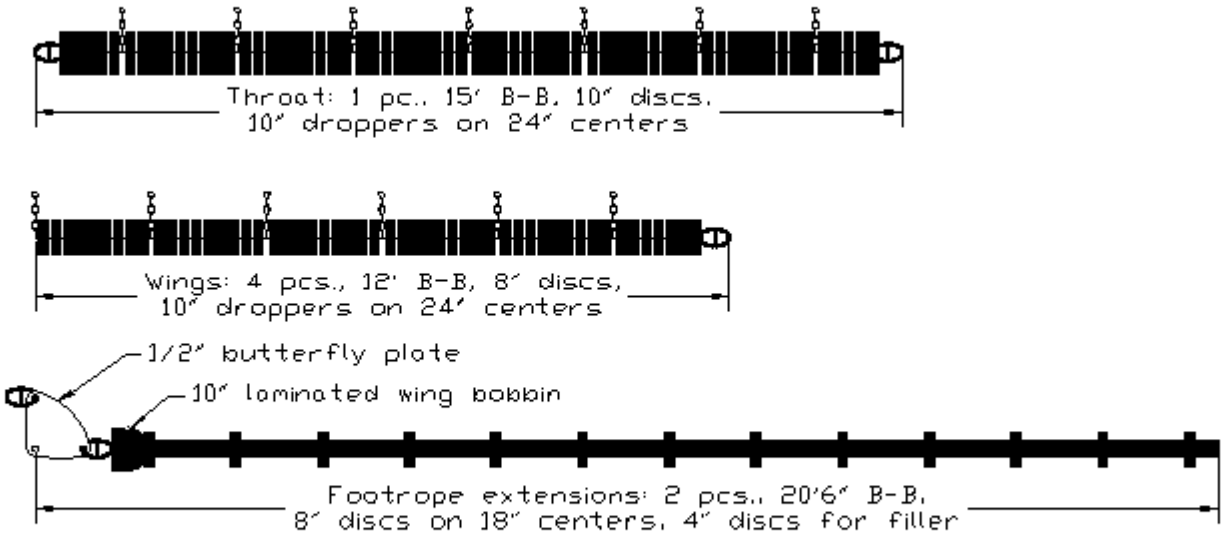


Figure 2. The NMFS Aberdeen sampling trawl (85’/104’/5.5”).



NOTES:
Footrope: ½" long-link alloy (grade7) chain
Connectors: Campbell ½ " hammerlocks with stainless pins & spacers
Dropper connectors: ½" black shackles

Figure 3. Footrope for NMFS 85'/104' Aberdeen sampling trawl 7 sections, 104' length over all.

Trawling Protocol

The goal of trawling operations was to maintain constant sampling (fishing) efficiency both across all of the conditions encountered during the survey and through time. The first tow of the day could not begin (net on seafloor) before sunrise, and the last tow of the day had to be completed (net off seafloor) before sunset. Once the vessel was in the area of a station, the captain was instructed to follow these search rules: 1) Stay within the boundary depth ranges, 2) stay within 5 minutes north or south of the transect latitude, and 3) allow no more than 2 hours to search for trawlable ground, after which time the station was to be abandoned and noted in the log as untrawlable, and the vessel was to proceed to the next station. The only exception to the 2-hour rule would be in instances where the station was the last one scheduled for the day/transect, and there remained sufficient daylight hours to continue the search and complete a tow before sunset. Once a station was abandoned, the decision would be final, and no attempt should be made to go back and complete it.

If the gear was damaged severely enough during a tow that it might affect the composition of the catch, or if the gear performance was deemed to be unacceptable (because of large quantities of mud or jellyfish, or if lost or abandoned fishing gear was ensnared in the net, or it was off bottom a long time during the trawling), the haul was to be considered unsatisfactory. Unsuccessful hauls were not used in the analyses that follow, but they are included in Appendix A.

The chief scientist, or Field Party Chief (FPC), was responsible for monitoring the fishing operations, including vessel operations and gear performance, as reported by the trawl instrumentation systems. The target towing speed for each survey haul was 2.2 knots (kn) (speed over ground) as determined by the NMFS-supplied differential GPS navigation unit (Northstar 500[2]).

The experience and judgment of each Captain was used to choose the initial scope for each depth and sampling station. Trawl performance was monitored using the Simrad Integrated Trawl Instrumentation (ITI)[3] and scope was adjusted when necessary. Sensors from the ITI trawl system were placed on the net prior to setting of the gear. Two instruments were placed in the middle of the net headrope. The first was the trawl eye, which gives an image of the vertical opening of the trawl and its height above the bottom. The second sensor was a temperature and depth recorder which recorded ambient temperature at depth and the depth from trawl headrope to the ocean surface. A pair of wing units (one master and one slave) was placed on the port and starboard wings of the net to measure the wing spread. A BCS was placed in the middle of the fishing line on the footrope portion of the net. The BCS recorded the angle of incline of the net, indicating when the net landed on the bottom and when it lifted off.

[2]Northstar Technologies, 30 Sudbury Rd., Acton, MA 01720.

[3] Kongsberg Simrad Mesotech Ltd., 1598 Kebet Way, V3C 5M5 Port Coquitlam, BC, Canada.

Tow duration was targeted at 15 minutes in length. While the gear was being set, the vessel speeds varied from 5 kn to the targeted 2.2 kn when the net made contact with the bottom. The haul officially began when the net was in proper fishing configuration and was maintaining steady contact with the bottom. The haul ended when the net lifted off of the bottom after the start of haulback. The Simrad ITI trawl eye was used to monitor ground-gear contact during a haul, but the actual bottom time was determined using data from the BCS. Position data was collected at 2-second intervals for each haul using a GPS. These data, in addition to the real time net mensuration information, were automatically stored in an onboard data logging system, known as Flipper (Scientific Fisheries Systems, Inc.[4]). In addition to storing the GPS and ITI trawl information, Flipper also provided a means to download and save information from the BCS and the Fish Meter (FM) board that was used to collect data from the catch (as follows).

Sampling Procedures and Biological Data Collection

Catches were sorted to species level or to other appropriate taxon levels and then weighed using an electronic, motion-compensated scale (Ryco, Inc.[5]). Sampling efforts were concentrated on Dover sole (*Microstomus pacificus*), shortspine thornyhead (*Sebastolobus alascanus*), longspine thornyhead (*Sebastolobus altivelis*), and sablefish (*Anoplopama fimbria*), which is known as the Dover sole, thornyheads, and sablefish (DTS) complex. Dover sole and sablefish were separated by sex and a total of up to 125-length measurements per haul were collected from each species for both sexes combined. Up to 125-length measurements were also collected for both LST and SST, but individual sexes were not determined. For species other than the DTS complex, only total counts and weights were recorded, except when additional information was needed for special projects.

Otoliths were collected from the DTS complex. Fifteen otoliths were collected from a random subset taken from each of the length samples of sablefish and Dover sole. Similarly, five otoliths were collected from a subset of both SST and LST length samples. When other important commercial species were encountered, such as bocaccio and shortbelly rockfish, length measurements and otoliths were collected from these as well. Any unidentified species were labeled, frozen and retained for later identification. After all of the scientific data was collected, marketable fish were placed in the hold of the vessel, iced and then delivered to a shoreside processing facility within 5 days. All other species which had no commercial value or which were prohibited from being landed were returned to the sea as soon as possible.

[4] Scientific Fisheries Systems, Inc., P.O. Box 242065, Anchorage, AK 99524

[5] Ryco, Inc., 2100 Avenue B, Riviera Beach, FL 33404

SURVEY ANALYSIS

Sensor Data

Primarily three sensor systems bottom contact sensors (B CS), Simrad's Integrated Trawl Instrumentation System (ITI), and global positioning systems (GPS) provided the data for effort-related estimations. All sensor streams were preprocessed to address spurious readings known to be related to the recording electronics. In particular, because the computer system receiving the ITI sensor signals often recorded readings at a rate exceeding that at which new readings were delivered, some sensor readings were recorded multiple times. This persistence of a single sensor reading through several recordings is evident in the data streams as varying length strings of constant value.

Persistent strings that greatly distorted the overall signal pattern were removed using a variety of techniques. They include objective statistical trimming methods and more subjective manual removal of data points. In particular, persistent strings that originated before and extended into the time intervals bounding subsamples used for estimation were routinely removed manually prior to analysis. But for the most part, the phenomena under observation vary little during the on-bottom time period of interest, so that the overall pattern of sensor readings was not substantially distorted by moderate periods of data repetition. Therefore, it was assumed that treating the members of a persistent string as independent samples within the sample set would not substantially affect the mean estimate. However, it would result in unacceptable underestimation of the standard error of the mean and, accordingly, standard error estimates were not reported for mean estimates.

Because none of the ITI sensor readings should ever be zero during the tow duration, such were considered missing values and were filtered out prior to all depth, net dimension, and temperature estimations. Exclusion of extreme points was more problematic. Large spikes in the depth, net dimension, and temperature signals were assumed to be the result of electronic noise and were filtered out prior to processing. Such data points were even more questionable when several isolated occurrences seemed to be identical in value, as was apparent for various points in the gear depth data set. In contrast, sensor data streams also indicate that there can be large swings in the net during a tow, sloping and bumpy substrates, and trawl execution problems that manifest themselves in highly variable data sets. Extreme points that appeared to be part of some contiguous variation in magnitude, or some particularly variable stretch of readings were not excluded prior to analysis.

The sensor readings used to estimate depths and net width and height were limited to the center 80% of the tow duration to ensure only on-bottom readings were included. In the vast majority of tows, this boundary did not appreciably reduce the number of observations, but did effectively exclude small timing offsets between the BCS and ITI sensor systems and any instantaneous noise introduced by net touchdown and lift-off.

For some tows, there were few depth, net dimension, and temperature sensor readings that both fell within the estimation time interval and were satisfactorily unaffected by persistent data strings. The extent to which these single or few point subsamples were representative of the entire tow was necessarily a subjective judgment. If the points seemed to be in alignment with the trajectory of points outside the subset time interval, they were used as the basis for estimation. Paper records, hand recorded at sea from real time displays, offered a certain level of data redundancy. These were subsequently entered into electronic format and, in some cases, provided an alternate sample set for depth and net dimension estimation when the above criteria could not be met.

Dimensions of the Tow

Tow duration was measured as the simple difference between the times marking touchdown and lift-off of the trawl net. Wherever possible, these times were determined from BCS traces of tow progression from net deployment to retrieval. Gaps left by unrecorded or otherwise suspect BCS information were filled using either patterns in ITI sensor readings or FPC observations of net touchdown and lift-off times.

Wherever possible, mean estimates of net width and height were calculated from trawl sensor readings of wingspread and headrope height from bottom, respectively. Electronically recorded sensor readings provided the preferred basis for estimation; hand-recorded sensor readings were substituted where necessary and reasonable. When neither data set provided acceptable information, estimates were calculated by prediction from separate linear regressions over the width and height estimates of the other survey tows. Each dimension was regressed against tow depth, with vessel identification incorporated as an indicator variable. Net height predictions were made using robust linear regression (S-Plus 1999). Although the interaction between vessel identification and depth proved to be significant by analysis of variance (ANOVA), it neither added appreciably to the proportion of explained variation nor produced coefficients that were significantly different from zero. Therefore, it was not included in the net height predictions. Similar regression for net width failed the default S-Plus test for bias, so prediction by simple linear regression was used instead. Two tows were designated outliers based on Cook's distance. Although their distances were less than 0.2, they were markedly higher than the rest, so these two tows were removed from the fit. All estimates were tagged with qualifying information indicating estimation method.

To estimate distance fished, the period of time a net was dragged over the seafloor was split into two distinct phases. The first phase, defined as normal towing, starts when the net begins fishing as it reaches the seafloor and ends when net haulback is initiated. The length of the first phase is controlled by the FPC and, unless problems occur, is maintained for 15 minutes. The second phase follows the first and represents the time required for the net to lift off the seafloor in response to the haulback operation. Labeled lift-off lag, the length of this phase varies by vessel and depth.

Smoothing of the trackline yields a reasonable estimate of the location of the net and an estimate of towing distance for the normal towing phase. However, typically the vessel is not moving forward during the lift-off lag phase, and consequently the survey's GPS sends erroneous bearing information to the ITI. The ITI, in turn, calculates an invalid geographical position of the trawl net. Hence, the distance and direction the net moves during the lift-off lag phase needs to be extrapolated.

The extrapolation technique begins by fixing the trawl's bearing at the average bearing from the last 5 minutes of normal towing. This is combined with the range information (the distance between the vessel and the net), and the geographic location of the vessel, to obtain the extrapolated location and distance covered by the net during the lift-off lag phase. This extrapolated trackline is connected to the end of the normal towing trackline, and the combined trackline is then smoothed with a two-dimensional Simple Exponential Smoother. Visual examination was used to determine the correct amount of smoothness that was needed for each haul. A default value for the smoothing parameter has been found to work in a majority of cases, including, but not limited to, those tows that were done in a relative straight line with good signals from the ITI system. The percent of tows for which the default smoothing parameter worked varied by vessel, but all vessels had extreme cases for which the default value was not used. Details of this procedure can be found in Wallace (in prep.).

The trigonometric method, developed for the 1998 survey analysis (West et al. in press, Turk et al. 2001), was used when the there was insufficient information for the above procedure. Within the database, all estimates were tagged with qualifying information indicating which estimation method was employed.

Gear Depth and Bottom Depth

Wherever possible, gear depth and bottom depth were estimated from electronically recorded trawl sensor readings of headrope depth and headrope distance from bottom. Gear depth was taken as the headrope depth sensor reading and bottom depth was taken as the sum of headrope depth and headrope distance from bottom. Hand-recorded data sets were substituted when necessary and reasonable. For cases where data of sufficient quality were available, mean estimates were calculated for each, using a subsample limited to the center 80% of the tow duration to ensure only on-bottom readings were included. In a few cases where no acceptable data existed within the center 80% of the tow duration in either the electronically or hand-recorded sets of gear depth readings, estimation was made from observations just outside of it. These estimations were within what could reasonably be assumed the observed limits of net touchdown and lift-off. For some tows, few to no coincident records of headrope depth and headrope distance from bottom existed. In these cases, if gear depth and net height were estimable for a tow, bottom depth was estimated as the sum of these two endpoints, regardless of how the separate estimates had been derived. In cases where no reasonable observation of gear depth was recorded, but depth from the vessel navigational equipment was, bottom depth was estimated from these vessel records. All estimates were tagged with qualifying information indicating estimation method.

Area Estimates

Area estimates were calculated using digital-bathymetry points acquired from Naval Oceanographic Office DBDB-V Version 2.0 (Digital Bathymetric Data Base – Variable resolution) (Naval Oceanographic Office, unpubl. data). The input data had variable resolutions of 5.0 minute, 1.0 minute, and 0.5 minutes. The data points were gridded at 1 minute pixel resolution and contour lines for the survey depth zones were created from this grid. The contour lines were created at 100, 140, 180, 220, 260, 300, 380, 460, 540, 620, and 700 fms. Then contour lines were combined with INPFC area boundaries and with the maximum latitudinal extent of the survey (Point Conception in the South, and 48.25 decimal degrees or the extended economic zone [EEZ] in the North) to make polygons of each depth zone. Bathymetry data was projected to Albers Equal Area projection, and the total area of the seafloor in 2-depth zones (100-300 fm, and 300-700 fm) and the five INPFC areas were calculated. Note, any areas that were westward of the primary 700 fm contour or eastward of the primary 100 fm contour were not included in the area calculations, even if they were at between a 100 fm, and 700 fm depth.

Temperature

Water temperature at the mouth of the net (i.e., bottom temperature) was estimated using temperature sensor readings recorded electronically during each tow. The general pattern of sensor output did not indicate any effect relating to net touchdown or lift-off, but rather that the sensor required the full duration of the tow to acclimate. Therefore, this temperature was estimated as the mean of sensor readings from the final 10% of the tow duration.

RESULTS

Haul, Catch, and Biological Data

The 1999 NWFSC slope survey consisted of a total of 400 possible sampling locations, and attempts at sampling were made in 380 of these. Of the stations in which sampling was attempted, 327 tows were successful (Fig. 1). Simard ITI net mensuration data, as well as GPS course and position data, were obtained from 350 of the successful tows. Bottom-contact sensor data was obtained from 369 of the successful tows. Table 1 shows the latitude boundaries, depth-stratum areas (km^2), and sampling densities by INPFC statistical area based on successful tows.

The mean net widths and distances fished were calculated for each haul. When net mensuration instrumentation gave estimates of net width, the mean net width for each tow was calculated for 80% of the tow duration, leaving out the first and last 10% of the tow duration. Distances fished were calculated by estimating the linear length that the net traveled on the seafloor from the point where it touched down to the point where it lifted off. An overall mean width of 15.25 m was calculated using data from the 327 tows that both exhibited good trawl performance and had available net-mensuration estimates. The mean net widths for the 327 tows ranged from 8.4 m to 17.8 m and had a standard deviation of 0.92 m. When the net mensuration instrumentation was not performing correctly, the mean net width was calculated using linear regressions, in which trawl depth was a factor, for the individual chartered vessel (Fig. 4).

The number of lengths and age structures that were collected from the nine main groundfish species are summarized in Table 2. A total of 187 species or families were identified over the entire survey area. The frequency of occurrence, depth range, mean depth, and the latitudinal range for all of the identified organisms are listed in Table 3. Species unidentified are referred to as “unident.” in the tables and figures following the text. Appendix A provides detailed station information for each haul, as well as the associated catch weights of the major fish species and the total weights of invertebrates. Tables 4-9 list the number of individual fish lengths collected by species and by depth strata for the individual INPFC areas.

Temperature Data

Bottom temperatures ranged from 1.8°C to 7.5°C during the July-August 1999 portion of the survey, and from 1.6°C to 8.5°C during the August-September 1999 portion of the survey (Fig. 5). The mean bottom temperature was 4.17°C. Sea surface temperatures ranged from 10.5°C to 16.6°C during the July-August 1999 portion of the survey, and from 8.8°C to 18.3°C during the August-September 1999 portion of the survey (Fig. 6). The mean sea-surface temperature was 13.6°C.

Table 1. Latitude boundaries, depth stratum areas (km^2), and sampling densities by INPFC statistical area based on successful tows during the 1999 NWFSC slope survey.

INPFC Area/ Latitude bounds	Stratum 1 (183-549m)			Stratum 2 (550-1280m)			All Strata (183-1280m)		
	Area (km^2)	No. hauls	Hauls/ 1,000km^2	Area (km^2)	No. hauls	Hauls/ 1,000km^2	Area (km^2)	No. hauls	Hauls/ 1,000km^2
U.S.-Vancouver 47°30' - Border	2,123	7	3.3	2,245	11	4.9	4,368	18	4.1
Columbia 43°00' - 47°30'	8,345	57	6.8	9,724	67	6.9	18,069	124	6.9
Eureka 40°30' - 43°00'	2,043	28	13.7	6,344	36	5.7	8,387	64	7.6
Monterey 36°00 - 40°30'	3,665	48	13.1	8,608	49	5.7	12,273	97	7.9
Conception 34°30' - 36°00'	2,889	11	3.8	7,659	13	1.7	10,548	24	2.3
Entire Survey Area 34°30' - Border	19,065	151	7.9	34,580	176	5.1	53,645	327	6.1

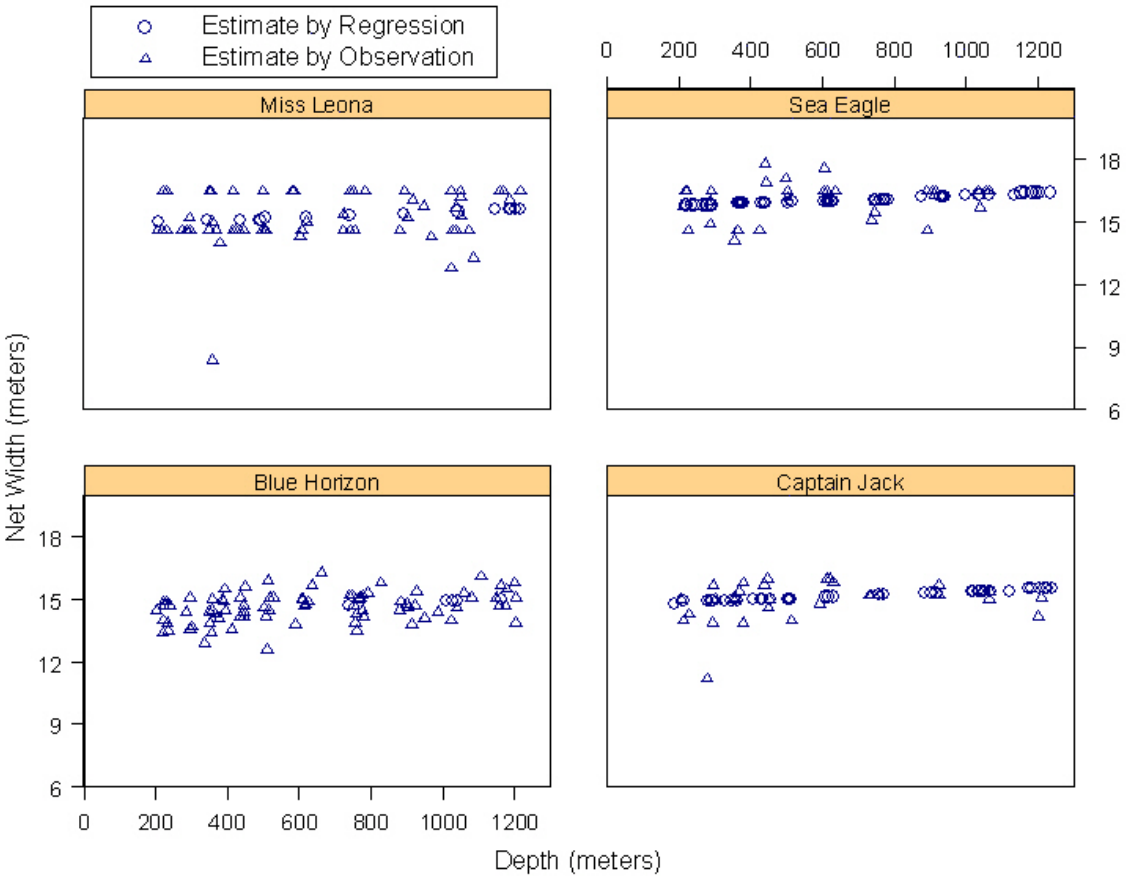


Figure 4. Estimates of mean net width for trawls conducted as part of the 1999 NWFSC slope survey. Estimates are grouped by vessel and plotted relative to trawl depth. Prediction from linear regression of width against trawl depth and factored by vessel was used to estimate net widths for tows lacking direct width observations. [NetWidth = 15.6267 + 0.0006 * Depth + Vessel Coef, where Vessel Coef is zero for the FV *Sea Eagle*, -1.3993 for the FV *Blue Horizon*, - 0.7877 for the FV *Miss Leona*, and -0.9072 for the FV *Captain Jack*.]

Table 2. Biological data collected during the 1999 NWFSC slope survey.

Common Name	Lengths	Age Structure
longspine thornyhead	27,151	497
shortspine thornyhead	10,061	828
aurora rockfish	6	6
bocaccio	7	6
shortbelly rockfish	47	46
lingcod	17	0
curlfin sole	2	0
Dover sole	21,510	1,987
Pacific halibut	16	0
petrale sole	61	61
sablefish	3,036	1,092

Table 3. Frequency of occurence, depth, and latitudinal ranges for fish and invertebrate species, grouped by family, caught during the 1999 NWFSC slope survey.

Family and Scientific Name	Common Name	Frequency of Occurrence	Depth (m)			Latitudinal Range (dd)	
			Min.	Max.	Mean	South	North
Myxinidae							
Eptatretus sp.	hagfish unident.	140	207	1,234	797	34.92	47.88
Ptermyzontidae							
Lampetra tridentata	Pacific Lamprey	2	287	287	287	38.36	38.36
Chimeridae							
Hydrolagus colliei	spotted ratfish	92	186	1,145	335	35.03	48.00
Scyliorhinidae							
Apristurus brunneus	brown cat shark	221	207	1,220	703	34.92	47.93
Parmaturus xaniurus	filetail cat Shark	21	291	1,047	489	35.01	38.70
Apristurus kampae	longnose cat shark	2	359	425	392	37.01	41.20
Squalidae							
Squalus acanthias	spiny dogfish	40	186	759	338	35.22	47.39
Rajidae							
Raja sp.	skate unident.	1	754	754	754	44.22	44.22
Bathyraja abyssicola	deepsea skate	3	505	1,234	908	37.23	45.57
Bathyraja interrupta	Bering skate	145	186	1,145	397	35.01	48.00
Raja rhina	longnose skate	166	186	1,145	430	35.01	48.00
Bathyraja trachura	black skate	80	363	1,240	996	35.23	47.90
Torpedinidae							
Torpedo californica	Pacific electric ray	5	214	365	275	35.62	38.07
Nemichthyidae							
Nemichthyidae	snipe eel unident.	3	511	1,040	772	38.54	47.91
Nemichthys scolopaceus	slender snipe eel	1	747	747	747	46.29	46.29
Clupeidae							
Alosa sapidissima	American shad	1	1,145	1,145	1,145	47.56	47.56
Argentinidae							
Argentina sialis	Pacific argentine	5	229	931	582	35.03	44.35
Bathylagidae							
Bathylagidae unident.	deepsea smelt unident.	135	206	1,240	949	34.92	47.93
Leuroglossus stilbius	California smoothtongue	1	610	610	610	41.13	41.13
Opisthoproctidae							
Macropinna microstoma	barreleye	8	776	1,240	1,031	40.72	47.24
Alepocephalidae							
Alepocephalus tenebrosus	California slickhead	143	386	1,240	914	34.92	47.88
Bajacalifornia erimoensis		5	622	1,043	825	43.83	46.18
Talismania bifurcata	threadfin slickhead	38	609	1,050	868	34.92	47.64
Platytroctidae							
Sagamichthys abei	shining tubeshoulder	3	616	1,107	872	35.64	46.56
Sternoptychidae							
Sternoptychidae unident.	hatchetfish unident.	2	425	739	582	37.01	39.80
Argyropelecus sp.		1	621	621	621	39.30	39.30
Argyropelecus lychnus	tropical hatchetfish	3	380	1,187	764	35.96	37.46
Sternoptyx diaphana	longspine hatchetfish	1	619	619	619	39.22	39.22
Sternoptyx sp.		2	636	986	811	35.07	37.23
Gonostomatidae							
Gonostomatidae	bristlemouth unident.	2	609	878	743	46.33	46.51

Table 3. Frequency of occurence, depth and latitudinal ranges for fish and invertebrate species, grouped by family, caught during the 1999 NWFSC slope survey. Continued.

Family and Scientific Name	Common Name	Frequency of Occurrence	Depth (m)			Latitudinal Range (dd)	
			Min.	Max.	Mean	South	North
Stomiidae							
Chauliodus macouni	Pacific viperfish	48	206	1,240	893	36.33	47.91
Idiacanthus antrostomus	Pacific blackdragon	2	609	783	696	42.96	46.51
Tactostoma macropus	longfin dragonfish	26	436	1,185	799	36.33	47.91
Bathophilus flemingi	highfin dragonfish	5	766	1,201	990	43.83	46.56
Aristostomias scintillans	shining loosejaw	7	436	1,158	803	35.22	46.69
Scopelarchidae							
Benthalbella dentata	northern pearleye	1	749	749	749	45.71	45.71
Neoscopelidae							
Scopelengys tristis	blackchin	1	1,023	1,023	1,023	42.17	42.17
Myctophidae							
Myctophidae	lanternfish unident.	68	219	1,226	785	35.03	47.93
Diaphus theta	California headlightfish	1	914	914	914	36.42	36.42
Lampanyctus sp.		54	206	1,240	852	35.07	47.62
Moridae							
Antimora microlepis	Pacific flatnose	180	350	1,240	866	34.92	47.91
Gadidae							
Gadus macrocephalus	Pacific cod	2	216	1,145	681	47.56	48.00
Theragra chalcogramma	walleye pollock	1	237	237	237	46.27	46.27
Merluccius productus	Pacific hake	148	186	1,050	401	35.01	48.00
Macouridae							
Nezumia stelgidolepis	California grenadier	11	380	1,240	592	35.03	42.66
Nezumia liolepis	smooth grenadier	3	761	914	852	34.92	37.15
Coryphaenoides acrolepis	Pacific grenadier	165	350	1,240	895	35.22	47.93
Albatrossia pectoralis	giant grenadier	158	446	1,240	911	34.92	47.93
Coryphaenoides cinereus	popeye grenadier	4	792	1,040	946	41.89	47.23
Bythitidae							
Cataetyx rubrirostris	rubynose brotula	2	503	622	563	35.03	42.88
Ophidiidae							
Ophidiidae	cusk-eel unident.	3	214	236	226	35.62	39.85
Chilara taylori	spotted cusk-eel	2	222	731	476	35.22	37.29
Lamprogrammus niger	paperbone cusk-eel	1	1,158	1,158	1,158	35.89	35.89
Oneirodidae							
Oneirodidae	dreamer unident.	1	923	923	923	47.24	47.24
Trachipteridae							
Trachipterus altivelis	king-of-the-salmon	1	1,150	1,150	1,150	37.23	37.23
Rondeletiidae							
Rondeletia loricata	redmouth whalefish	1	902	902	902	42.18	42.18
Anaplogastridae							
Anoplogaster cornuta	fangtooth	12	492	1,216	913	34.92	46.81
Melamphaidae							
Melamphaidae	bigscale unident.	3	776	1,201	1,003	39.24	44.69
Poromitra crassiceps	crested bigscale	8	206	1,234	768	35.22	46.33
Melamphaes lugubris	highsnout bigscale	2	1,178	1,204	1,191	39.23	41.12

Table 3. Frequency of occurence, depth and latitudinal ranges for fish and invertebrate species, grouped by family, caught during the 1999 NWFSC slope survey. Continued.

Family and Scientific Name	Common Name	Frequency of Occurrence	Depth (m)			Latitudinal Range (dd)	
			Min.	Max.	Mean	South	North
Scorpaenidae							
Sebastolobus alascanus	shortspine thornyhead	303	186	1,240	655	34.92	47.97
Sebastolobus altivelis	longspine thornyhead	212	206	1,240	819	34.92	47.93
Sebastes sp.	rockfish unident.	3	222	416	304	37.49	44.90
Sebastes aleutianus	rougheye rockfish	19	220	1,145	456	38.93	47.97
Sebastes alutus	Pacific ocean perch	39	208	1,145	354	38.61	48.00
Sebastes aurora	aurora rockfish	67	207	1,036	438	35.01	47.00
Sebastes brevispinis	silvergray rockfish	2	203	247	225	42.98	44.49
Sebastes chlorostictus	greenspotted rockfish	6	213	295	236	37.36	39.85
Sebastes crameri	darkblotched rockfish	53	186	496	287	37.20	47.90
Sebastes diploproa	splitnose rockfish	92	186	894	319	35.01	46.79
Sebastes elongatus	greenstriped rockfish	24	186	1,145	271	35.62	47.56
Sebastes entomelas	widow rockfish	18	186	438	278	37.20	44.60
Sebastes flavidus	yellowtail rockfish	4	216	1,145	502	47.00	48.00
Sebastes goodei	chilipepper	13	213	355	256	35.62	43.10
Sebastes helvomaculatus	rosethorn rockfish	23	203	1,145	329	36.32	47.90
Sebastes jordani	shortbelly rockfish	10	203	351	248	35.22	44.49
Sebastes levis	cowcod	3	218	296	246	35.03	38.30
Sebastes melanostomus	blackgill rockfish	26	273	507	379	35.87	44.50
Sebastes paucispinis	bocaccio	6	213	286	239	35.62	48.00
Sebastes pinniger	canary rockfish	6	186	268	221	40.71	48.00
Sebastes polyspinis	northern rockfish	1	1,145	1,145	1,145	47.56	47.56
Sebastes proriger	redstripe rockfish	7	203	442	285	35.65	48.00
Sebastes ruberrimus	yelloweye rockfish	1	247	247	247	42.98	42.98
Sebastes babcocki	redbanded rockfish	50	186	1,145	325	35.96	47.65
Sebastes saxicola	stripetail rockfish	47	186	512	271	35.01	45.45
Sebastes wilsoni	pygmy rockfish	1	203	203	203	44.49	44.49
Sebastes zacentrus	sharpchin rockfish	24	186	416	248	37.36	46.79
Sebastes rufus	bank rockfish	15	247	414	326	35.01	42.98
Sebastes borealis	shortraker rockfish	1	365	365	365	47.00	47.00
Sebastes reedi	yellowmouth rockfish	1	203	203	203	44.49	44.49
Anoplopomatidae							
Anoplopoma fimbria	sablefish	295	186	1,240	679	34.92	48.00
Hexagrammidae							
Ophiodon elongatus	lingcod	12	206	373	281	35.22	43.57
Cottidae							
Icelinus filamentosus	threadfin sculpin	23	186	1,145	332	35.62	48.00
Icelinus borealis	northern sculpin	1	302	302	302	38.61	38.61
Radulinus asprellus	slim sculpin	1	207	207	207	41.26	41.26
Malacocottus kincaidi	blackfin sculpin	2	356	1,066	711	42.28	47.90
Psychrolutes phrictus	blob sculpin	5	1,050	1,226	1,150	41.49	46.63
Icelinus burchami	dusky sculpin	2	286	302	294	38.61	40.55
Agonidae							
Xeneretmus latifrons	blacktip poacher	7	186	1,216	457	37.63	47.90
Bathyagonus pentacanthus	bigeye poacher	14	208	1,145	376	36.47	47.97

Table 3. Frequency of occurence, depth and latitudinal ranges for fish and invertebrate species, grouped by family, caught during the 1999 NWFSC slope survey. Continued.

Family and Scientific Name	Common Name	Frequency of Occurrence	Depth (m)			Latitudinal Range (dd)	
			Min.	Max.	Mean	South	North
Agonidae							
Bathyagonus nigripinnis	blackfin poacher	9	229	792	521	36.32	47.23
Liparidae							
Liparidinae	snailfish unident.	5	380	1,080	719	35.22	46.28
Elassodiscus caudatus	humpback snailfish	9	350	1,073	674	36.17	44.88
Careproctus sp.		5	289	1,174	819	40.55	44.63
Careproctus melanurus	blacktail snailfish	102	186	1,189	613	35.01	47.97
Careproctus cypselurus	blackfin snailfish	28	327	1,234	897	36.72	47.66
Careproctus colletti	Alaska snailfish	1	914	914	914	36.42	36.42
Paraliparis cephalus	swellhead snailfish	2	581	621	601	39.30	39.47
Carangidae							
Trachurus symmetricus	jack mackerel	1	281	281	281	45.26	45.26
Zoarcidae							
Bothrocara brunneum	twoline eelpout	145	380	1,240	875	34.92	47.93
Bothrocara remigerum	longfin eelpout	1	891	891	891	46.18	46.18
Embryx crotalinus	snakehead eelpout	119	206	1,226	861	34.92	47.91
Lycodes cortezianus	bigfin eelpout	149	186	1,158	392	35.01	47.97
Lycenchelys sp.		1	892	892	892	46.77	46.77
Lycenchelys camchatica	Kamchatka eelpout	1	1,086	1,086	1,086	43.49	43.49
Lycodapus endemoscotus	deepwater eelpout	1	593	593	593	35.96	35.96
Lycodapus fierasfer	blackmouth Eelpout	6	503	1,163	860	35.03	45.40
Lycodapus mandibularis	pallid eelpout	5	593	1,196	947	35.88	42.30
Lycodes palearis	wattled eelpout	2	222	603	412	35.03	47.53
Lycodes diapterus	black eelpout	105	207	1,196	517	35.03	47.93
Lycodes pacificus	blackbelly eelpout	26	207	1,036	471	35.47	46.79
Trichiuridae							
Aphanopus carbo	black scabbardfish	1	792	792	792	47.23	47.23
Lepidopus xantusi	scabbardfish	1	621	621	621	39.30	39.30
Bothidae							
Citharichthys sordidus	Pacific sanddab	3	214	226	221	35.03	37.63
Pleuronectidae							
Atheresthes stomias	arrowtooth flounder	79	203	1,145	377	36.32	48.00
Hippoglossus stenolepis	Pacific halibut	7	206	363	250	39.85	46.55
Lyopsetta exilis	slender sole	99	186	1,145	324	35.01	48.00
Eopsetta jordani	petrale sole	18	186	1,145	301	36.32	47.56
Parophrys vetulus	English sole	48	206	514	290	35.01	47.65
Microstomus pacificus	Dover sole	282	186	1,234	591	34.92	48.00
Embassichthys bathybius	deepsea sole	150	447	1,240	920	34.92	47.93
Glyptocephalus zachirus	rex sole	163	186	1,145	397	35.01	48.00
Pleuronichthys decurrens	curlfin sole	1	213	213	213	38.06	38.06
Malacostraca							
Gnathophausia gigas		4	1,033	1,204	1,119	36.35	41.68
Gnathophausia ingens		1	782	782	782	40.55	40.55
Decopoda	shrimp unident.	8	507	1,165	956	35.22	47.62
Pandalidae	pandalid shrimp unident.	5	206	1,055	563	35.64	45.33

Table 3. Frequency of occurence, depth and latitudinal ranges for fish and invertebrate species, grouped by family, caught during the 1999 NWFSC slope survey. Continued.

Family and Scientific Name	Common Name	Frequency of Occurrence	Depth (m)			Latitudinal Range (dd)	
			Min.	Max.	Mean	South	North
Pandalidae							
Pandalus jordani	ocean shrimp	5	219	289	236	35.03	45.00
Pandalus tridens	yellowleg pandalid	11	514	1,234	739	39.24	47.62
Pandalus platyceros	spot shrimp	16	207	1,107	317	35.01	46.56
Pandalus hypsinotus	coonstripe shrimp	1	280	280	280	42.99	42.99
Pandalopsis dispar	sidestripe shrimp	1	289	289	289	43.56	43.56
Pandalopsis ampla		6	782	1,216	1,091	35.47	41.49
Eualus macrophthalmus	bigeye eualid	1	585	585	585	42.18	42.18
Crangon communis	twospine crangon	2	222	222	222	35.03	35.22
Pasiphaea pacifica	Pacific glass shrimp	9	503	636	578	35.07	45.73
Pasiphaea tarda	crimson pasiphaeid	54	206	1,234	942	35.22	46.29
Notostomus japonicus	spinyridge shrimp	1	1,187	1,187	1,187	36.18	36.18
Acanthephyra curtirostris	peaked shrimp	2	1,170	1,204	1,187	35.47	41.12
Decopoda	crab unident.	4	226	1,220	656	36.72	47.40
Cancer sp.	cancer crab unident.	1	222	222	222	35.22	35.22
Cancer magister	dungeness crab	22	186	507	284	37.02	47.65
Cancer productus	red rock crab	2	214	226	220	35.62	37.63
Mursia gaudichaudii		2	213	229	221	37.36	38.06
Chorilia longipes	longhorned decorator crab	5	607	902	743	36.78	42.18
Chionoecetes tanneri	grooved tanner crab	216	203	1,240	792	34.92	47.93
Hyas lyratus	Pacific lyre crab	10	365	1,226	769	35.03	47.00
Lopholithodes sp.	box crab unident.	10	186	365	254	37.02	48.00
Acantholithodes hispidus	fuzzy crab	1	240	240	240	43.89	43.89
Lithodes couesi	scarlet king crab	15	214	1,068	792	35.03	47.64
Paralithodes sp.		2	359	1,158	759	35.17	35.89
Paralomis verrilli		2	878	923	900	46.33	47.24
Paralomis multispina		36	206	1,240	1070	35.22	47.48
Munida quadrispina	pinchbug	3	222	609	351	35.03	46.74
Stereomastus sculpta		6	621	1,187	946	36.17	41.56
Heteropoda							
Heteropoda	heteropod unident.	1	1,080	1,080	1,080	35.22	35.22
Cephalopoda							
Octopus Unident.		55	214	1,240	651	35.01	46.74
Octopus leioderma	smoothskin octopus	3	367	1,165	843	47.62	47.65
Japatella heathi	yellowring octopus	1	918	918	918		
Opisthoteuthis californiana	flapjack devilfish	22	359	1,165	725	35.17	47.88
Octopus dofleini	giant octopus	9	355	751	536	35.17	46.51
Vampyroteuthis infernalis	vampire squid	25	206	1,201	910	35.03	47.64
Squid Unident.		19	348	1,150	693	35.96	47.97
Rossia pacifica	eastern Pacific bobtail	9	186	369	234	35.22	45.45
Loligo opalescens	California market squid	28	327	1,060	694	34.92	47.39
Gonatus onyx	clawed armhook squid	1	506	506	506	38.83	38.83
Berryteuthis magister	magistrate armhook squid	11	207	1,174	530	36.22	47.65
Moroteuthis robusta	robust clubhook squid	10	278	905	475	35.84	45.33
Octopoteuthis deletron	octopus squid	7	607	1,216	833	36.78	43.37

Table 3. Frequency of occurence, depth and latitudinal ranges for fish and invertebrate species, grouped by family, caught during the 1999 NWFSC slope survey. Continued.

Family and Scientific Name	Common Name	Frequency of Occurrence	Depth (m)			Latitudinal Range (dd)	
			Min.	Max.	Mean	South	North
Cephalopoda							
Histioteuthis heteropsis	cockeyed squid	43	207	1,201	726	35.22	47.66
Histioteuthis hoylei	cockeyed squid	8	436	1,060	676	36.43	44.34
Thaliacea							
Thaliacea unident.	salps unident.	1	232	232	232	43.10	43.10

Table 4. Number of length-frequency measurements collected by stratum during the 1999 NWFSC slope survey for all of the INPFC areas combined.

Species	Stratum 1 (183-549m)	Stratum 2 (550-1,280m)	Total
longspine thornyhead	1,675	25,476	27,151
shortspine thornyhead	8,113	1,948	10,061
aurora rockfish	6	0	6
bocaccio	7	0	7
shortbelly rockfish	47	0	47
lingcod	17	0	17
curlfin sole	2	0	2
Dover sole	14,920	6,590	21,510
Pacific halibut	16	0	16
petrale sole	59	2	61
sablefish	1,048	1,988	3,036

Table 5. Number of length-frequency measurements collected by stratum during the 1999 NWFSC slope survey for the INPFC Conception area.

Species	Stratum 1 (183-549 m)	Stratum 2 (550-1,280 m)	Total
longspine thornyhead	243	2,112	2,355
shortspine thornyhead	205	217	261
aurora rockfish	0	0	0
bocaccio	2	0	2
shortbelly rockfish	27	0	14
lingcod	3	0	3
curlfin sole	0	0	0
Dover sole	825	558	1,383
Pacific halibut	0	0	0
petrale sole	0	0	0
sablefish	55	177	232

Table 6. Number of length-frequency measurements collected by stratum during the 1999 NWFSC slope survey for the INPFC Monterey area.

Species	Stratum 1 (183-549 m)	Stratum 2 (550-1,280 m)	Total
longspine thornyhead	300	6,100	6,400
shortspine thornyhead	1,614	693	1,247
aurora rockfish	0	6	6
bocaccio	2	0	2
shortbelly rockfish	17	0	17
lingcod	6	0	6
curlfin sole	2	0	2
Dover sole	5,615	3,232	8,847
Pacific halibut	1	0	1
petrale sole	43	0	43
sablefish	332	486	818

Table 7. Number of length-frequency measurements collected by stratum during the 1999 NWFSC slope survey for the INPFC Eureka area.

Species	Stratum 1 (183-549 m)	Stratum 2 (550-1,280 m)	Total
longspine thornyhead	50	5,017	5,067
shortspine thornyhead	1,765	288	2,053
aurora rockfish	0	0	0
bocaccio	1	0	1
shortbelly rockfish	2	0	2
lingcod	7	0	7
curlfin sole	0	0	0
Dover sole	2,855	1,393	4,248
Pacific halibut	1	0	1
petrale sole	10	0	10
sablefish	187	428	615

Table 8. Number of length-frequency measurements collected by stratum during the 1999 NWFSC slope survey for the INPFC Columbia area.

Species	Stratum 1 (183-549 m)	Stratum 2 (550-1,280 m)	Total
longspine thornyhead	1,000	9,081	10,081
shortspine thornyhead	3,485	492	3,977
aurora rockfish	0	0	0
bocaccio	1	0	1
shortbelly rockfish	1	0	1
lingcod	0	0	0
curlfin sole	0	0	0
Dover sole	4,485	722	5,207
Pacific halibut	13	0	13
petrale sole	6	0	6
sablefish	415	747	1,162

Table 9. Number of length-frequency measurements collected by stratum during the 1999 NWFSC slope survey for the INPFC U.S.-Vancouver area

Species	Stratum 1 (183-549 m)	Stratum 2 (550-1,280 m)	Total
longspine thornyhead	0	2,138	2,138
shortspine thornyhead	407	75	482
aurora rockfish	0	0	0
bocaccio	1	0	1
shortbelly rockfish	0	0	0
lingcod	0	0	0
curlfin sole	0	0	0
Dover sole	593	345	938
Pacific halibut	0	0	0
petrale sole	0	2	2
sablefish	13	33	46

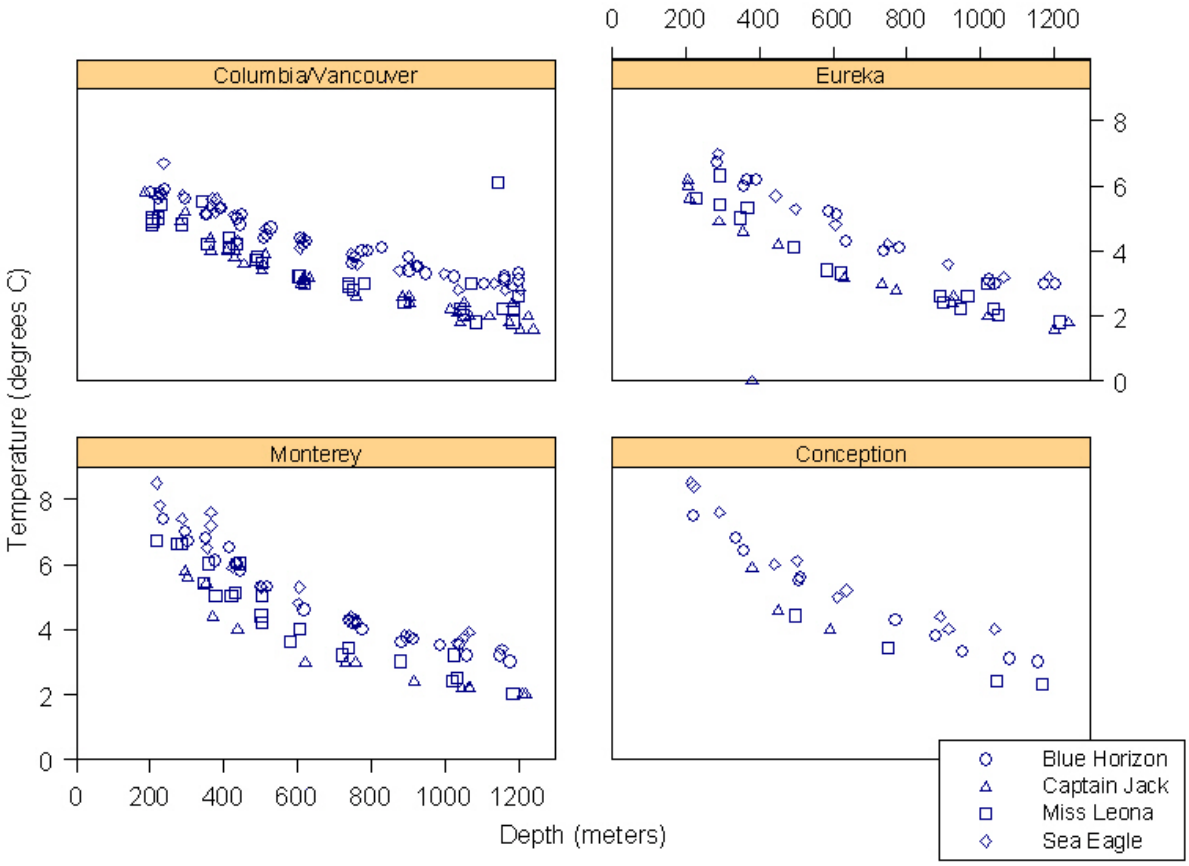


Figure 5. Water temperature was observed at the mouth of the net for each tow conducted as part of the 1999 NWFSC slope survey. Observations are grouped by INPFC area and plotted relative to tow depth.

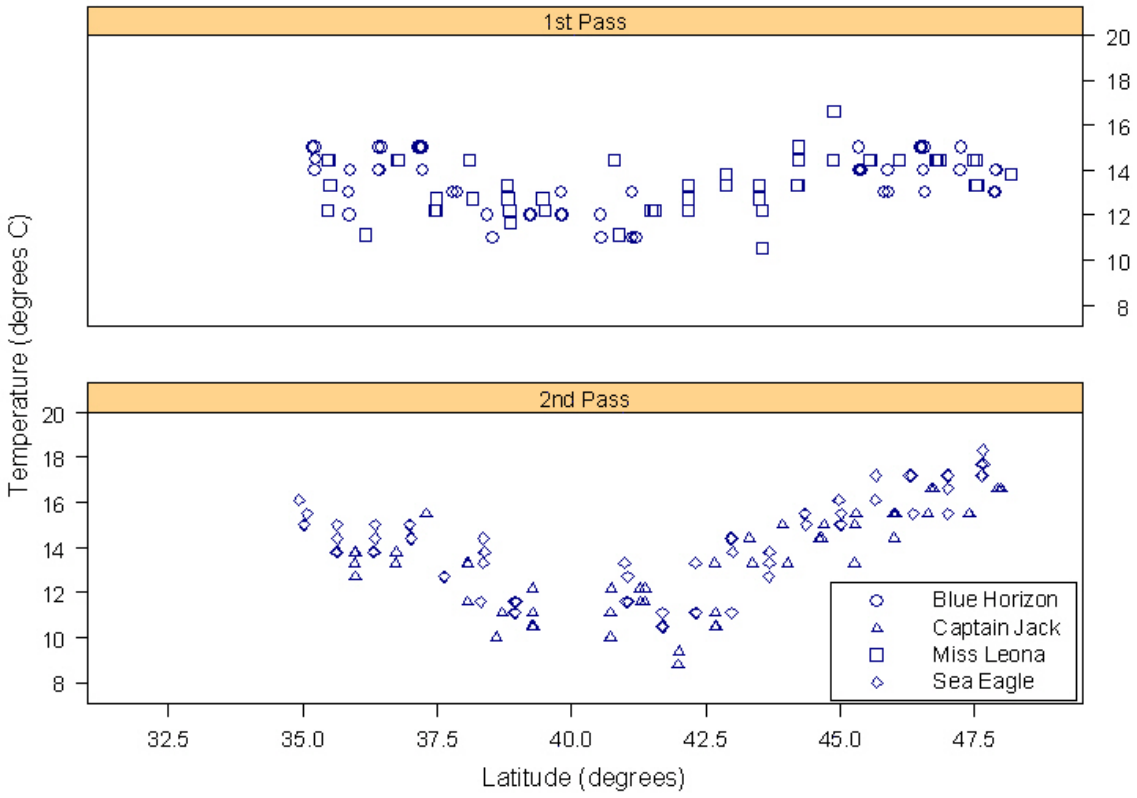


Figure 6. Sea surface temperature observed for each tow conducted as part of the 1999 NWFSC slope survey. Observations are grouped by the time of year they were taken (1st pass from 7/3/99 to 8/3/99 and 2nd pass from 8/25/99 to 9/24/99), and plotted relative to latitude.

Relative Density and Distribution of Species

Information on the relative density and distribution of the 20 most abundant groundfish and select crab species are reported in several ways: 1) for all depth strata and INPFC areas combined (Table 10), 2) by depth strata for all INPFC areas combined (Table 11), and 3) by depth stratum within each individual INPFC area (Tables 12-16). Dover sole had the highest catch rates in the Columbia and Monterey INPFC areas for all depth strata combined, and also for all INPFC areas and depth strata combined (e.g., survey-wide). Spotted ratfish (*Hydrolagus colliei*) had the highest catch rates in the U.S.-Vancouver INPFC area for all depth strata combined, longspine thornyheads had the highest catch rates in the Eureka INPFC area for all depth strata combined, and spiny dogfish (*Squalus acanthias*) had the highest catch rates in the Conception INPFC area for all depth strata combined (Table 10). Note that in the U.S.-Vancouver INPFC area, where spotted ratfish had the highest catch rates, and in the Conception INPFC area, where spiny dogfish had the highest catch rates, it was attributable to one haul where these species had an excessively large catch. When all of the INPFC areas combined were parsed by depth stratum, Dover sole had the highest catch rates in the shallowest stratum and longspine thornyhead had the highest catch rates in the deepest stratum (Table 11).

Catch rates varied with depth stratum for the individual INPFC areas (Tables 12-16). Generally, Dover sole was the predominant species in the shallow stratum in the Columbia, Eureka, and Monterey INPFC areas, spotted ratfish was the predominant species in the Vancouver INPFC area, and spiny dogfish in the Conception INPFC areas. For the deepest stratum, longspine thornyhead were the dominant species in the U.S.-Vancouver, Columbia, Eureka, and Conception INPFC areas, while Dover sole was the dominant species in the Monterey INPFC area.

Figures 7- 20[6] are maps showing the geographical distributions and relative abundances of select groundfish species and the grooved Tanner crab (*Chionoecetes tanneri*). These maps show the location points of the hauls where the species were caught. Catch rates were categorized as follows: 1) no catch, 2) greater than zero but less than or equal to the mean catch-per-unit effort (CPUE), 3) greater than the mean CPUE but less than or equal to one standard deviation from the mean, 4) between one and two standard deviations greater than the mean CPUE, and 5) over two standard deviations greater than the mean CPUE.

[6]Figures 7-20 were created with ArcView Software. Enviornmental Systems Research Institute, Inc., 380 New York Street, Redlands, CA 92373-8100 USA.

Table 10. Mean CPUE (kg/ha) of the 20 most abundant groundfish and selected crab species caught in each of the INPFC areas for all strata (183-1,280 m) combined during the 1999 NWFSC slope survey.

All Areas		U.S.-Vancouver Area		Columbia Area	
Dover sole	22.87	spotted ratfish	21.71	Dover sole	14.84
longspine thornyhead	15.47	Dover sole	21.40	longspine thornyhead	10.52
sablefish	8.33	arrowtooth flounder	11.16	sablefish	8.80
Pacific grenadier	7.31	longspine thornyhead	6.53	giant grenadier	5.55
shortspine thornyhead	5.04	longnose skate	4.55	Pacific grenadier	5.10
giant grenadier	4.78	rex sole	3.16	grooved tanner crab	4.47
spiny dogfish	4.01	grooved tanner crab	2.93	shortspine thornyhead	4.41
grooved tanner crab	3.68	shortspine thornyhead	2.78	longnose skate	2.87
longnose skate	3.14	giant grenadier	2.71	rex sole	2.82
rex sole	2.96	sablefish	2.60	stripetail rockfish	2.72
splitnose rockfish	2.71	Pacific grenadier	2.01	sharpchin rockfish	2.57
Pacific whiting	2.61	Pacific ocean perch	1.37	Pacific halibut	2.47
spotted ratfish	2.58	darkblotched rockfish	1.16	arrowtooth flounder	2.23
arrowtooth flounder	1.74	Bering skate	0.89	Pacific whiting	1.55
California slickhead	1.65	deepsea sole	0.75	splitnose rockfish	1.42
stripetail rockfish	1.60	bigfin eelpout	0.65	Pacific ocean perch	1.40
shortbelly rockfish	1.34	swoline eelpout	0.42	Bering skate	0.77
deepsea sole	1.03	slender sole	0.31	deepsea sole	0.64
brown cat shark	0.92	Pacific whiting	0.28	black skate	055
sharpchin rockfish	0.89	Pacific flatnose	0.27	redbanded rockfish	0.54
Number of hauls	**326**	**Number of hauls**	**18**	**Number of hauls**	**124**

Table 10. Mean CPUE (kg/ha) of the 20 most abundant groundfish and selected crab species caught in each of the INPFC areas for all strata (183-1,280 m) combined during the 1999 NWFSC slope survey. Continued.

Eureka Area		Monterey Area		Conception Area	
longspine thornyhead	21.86	Dover sole	45.12	spiny dogfish	19.17
Dover sole	19.84	longspine thornyhead	19.88	longspine thornyhead	17.42
Pacific grenadier	9.70	Pacific grenadier	14.84	Dover sole	13.73
aablefish	8.98	sablefish	10.90	shortbelly rockfish	6.76
grooved tanner crab	7.00	shortspine thornyhead	7.19	sablefish	6.39
giant grenadier	5.72	giant grenadier	5.77	shortspine thornyhead	5.26
shortspine thornyhead	4.12	Pacific whiting	5.73	splitnose rockfish	3.02
rex sole	3.48	splitnose rockfish	5.71	California slickhead	2.87
splitnose rockfish	2.09	rex sole	4.69	Pacific grenadier	2.62
Pacific whiting	2.02	longnose skate	4.61	longnose skate	2.48
longnose skate	1.67	California slickhead	3.58	giant grenadier	2.42
deepsea sole	1.45	grooved tanner crab	3.39	Pacific whiting	2.20
California slickhead	0.93	spotted ratfish	2.28	filetail cat shark	1.41
brown cat shark	0.88	stripetail rockfish	1.95	brown cat shark	1.10
Pacific flatnose	0.83	brown cat shark	1.84	aurora rockfish	1.01
black skate	0.64	deepsea sole	1.69	stripetail rockfish	0.84
twoline eelpout	0.54	Bering skate	1.17	rex sole	0.70
Bering skate	0.54	bigfin eelpout	1.07	spotted ratfish	0.70
bigfin eelpout	0.52	filetail cat shark	1.04	deepsea sole	0.69
darkblotched rockfish	0.47	spiny dogfish	0.88	slender sole	0.40
Number of hauls	**63**	**Number of hauls**	**97**	**Number of hauls**	**24**

Table 11. Mean CPUE (kg/ha) of the 20 most abundant groundfish and selected crab species by depth strata caught in all of the INPFC areas combined during the 1999 NWFSC slope survey.

Stratum 1 (183-549 m)		Stratum 2 (550-1,280 m)	
Dover sole	162.62	longspine thornyhead	111.80
spiny dogfish	73.31	Dover sole	82.55
spotted ratfish	56.80	Pacific grenadier	50.77
longnose skate	43.67	sablefish	39.01
rex sole	41.91	giant grenadier	34.32
splitnose rockfish	41.75	grooved tanner crab	26.92
Pacific whiting	38.76	shortspine thornyhead	23.11
sablefish	34.97	California slickhead	11.03
arrowtooth flounder	29.28	deepsea sole	7.91
shortbelly rockfish	24.76	brown cat shark	4.36
shortspine thornyhead	21.73	black skate	3.44
stripetail rockfish	17.39	twoline eelpout	3.36
Bering skate	9.70	Pacific flatnose	3.20
bigfin eelpout	7.83	longnose skate	1.50
filetail cat shark	7.64	snakehead eelpout	1.28
Pacific halibut	6.73	rex sole	1.09
darkblotched rockfish	6.11	hagfish unident.	1.00
sharpchin rockfish	6.08	black eelpout	0.58
aurora rockfish	6.00	bigfin eelpout	0.40
Pacific ocean perch	5.97	filetail cat shark	0.40
Number of hauls	**150**	**Number of hauls**	**176**

Table 12. Mean CPUE (kg/ha) of the 20 most abundant groundfish and selected crab species caught by depth strata in the INPFC Conception area during the 1999 NWFSC slope survey.

Stratum 1 (183-549 m)		Stratum 2 (550-1,280 m)	
spiny dogfish	70.00	longspine thornyhead	23.28
shortbelly rockfish	24.68	Dover sole	15.10
splitnose rockfish	11.04	sablefish	7.75
Dover sole	10.08	shortspine thornyhead	5.85
longnose skate	8.03	California slickhead	3.95
Pacific whiting	7.80	Pacific grenadier	3.57
filetail cat shark	4.50	giant grenadier	3.33
shortspine thornyhead	3.70	brown cat shark	0.96
aurora rockfish	3.70	deepsea sole	0.95
stripetail rockfish	3.06	grooved tanner crab	0.48
sablefish	2.77	longnose skate	0.38
rex sole	2.56	twoline eelpout	0.31
spotted ratfish	2.55	filetail cat shark	0.25
longspine thornyhead	1.88	Pacific flatnose	0.23
brown cat shark	1.46	hagfish unident.	0.13
slender sole	1.45	Pacific whiting	0.09
Bering skate	0.61	bigfin eelpout	0.08
bigfin eelpout	0.61	snakehead eelpout	0.06
black eelpout	0.19	blacktail snailfish	0.03
lingcod	0.14	black eelpout	< 0.01
Number of hauls	**11**	**Number of hauls**	**13**

Table 13. Mean CPUE (kg/ha) of the 20 most abundant groundfish and selected crab species caught by depth strata in the INPFC Monterey area during the 1999 NWFSC slope survey.

Stratum 1 (183-549 m)		Stratum 2 (550-1,280 m)	
Dover sole	53.62	Dover sole	41.50
splitnose rockfish	19.13	longspine thornyhead	28.12
Pacific whiting	18.85	Pacific grenadier	21.16
rex sole	15.67	sablefish	9.17
sablefish	14.96	shortspine thornyhead	8.26
longnose skate	14.13	giant grenadier	8.23
spotted ratfish	7.64	California slickhead	5.10
stripetail rockfish	6.53	grooved tanner crab	4.79
shortspine thornyhead	4.69	deepsea sole	2.40
Bering skate	3.74	brown cat shark	1.85
bigfin eelpout	3.40	black skate	1.13
filetail cat shark	3.14	Pacific flatnose	0.92
spiny dogfish	2.94	twoline eelpout	0.90
English sole	2.73	longnose skate	0.56
brown cat shark	1.82	hagfish unident.	0.42
aurora rockfish	1.69	snakehead eelpout	0.32
slender sole	1.04	filetail cat shark	0.15
darkblotched rockfish	0.80	Pacific whiting	0.15
redstripe rockfish	0.64	bigfin eelpout	0.08
longspine thornyhead	0.51	Bering skate	0.07
Number of hauls	**48**	**Number of hauls**	**49**

Table 14. Mean CPUE (kg/ha) of the 20 most abundant groundfish and selected crab species caught by depth strata in the INPFC Eureka area during the 1999 NWFSC slope survey.

Stratum 1 (183-549 m)		Stratum 2 (550-1,280 m)	
Dover sole	34.73	longspine thornyhead	28.59
rex sole	11.16	Dover sole	15.05
splitnose rockfish	8.51	Pacific grenadier	12.82
Pacific whiting	8.19	sablefish	9.56
sablefish	7.19	grooved tanner crab	9.11
longnose skate	6.39	giant grenadier	7.50
shortspine thornyhead	3.30	shortspine thornyhead	4.39
Bering skate	1.92	deepsea sole	1.91
darkblotched rockfish	1.92	California slickhead.	1.23
stripetail rockfish	1.91	Pacific flatnose.	1.09
arrowtooth flounder.	1.68	rex sole	1.01
bigfin eelpout	1.65	black skate	0.85
brown cat shark	1.39	brown cat shark	0.71
spotted ratfish	1.24	twoline eelpout	0.68
Pacific halibut	1.14	snakehead eelpout	0.56
English sole	0.94	black eelpout	0.28
longspine thornyhead	0.94	hagfish unident.	0.22
lingcod	0.74	longnose skate	0.15
black eelpout	0.64	bigfin eelpout	0.15
slender sole	0.60	Bering skate	0.09
Number of hauls	**27**	**Number of hauls**	**36**

Table 15. Mean CPUE (kg/ha) of the 20 most abundant groundfish and selected crab species caught depth strata in the INPFC Columbia area during the 1999 NWFSC slope survey.

Stratum 1 (183-549 m)		Stratum 2 (550-1,280 m)	
Dover sole	27.22	longspine thornyhead	19.11
sablefish	7.15	giant grenadier	10.28
Rex sole	6.04	sablefish	10.21
longnose skate	5.97	Pacific grenadier	9.31
stripetail rockfish	5.89	grooved tanner crab	7.42
shortspine thornyhead	5.88	Dover sole	4.22
sharpchin rockfish	5.56	shortspine thornyhead	3.14
Pacific halibut	5.35	deepsea sole	1.19
arrowtooth flounder	4.77	black skate	1.00
Pacific whiting	3.34	Pacific flatnose.	0.72
splitnose rockfish	3.07	California slickhead	0.65
Pacific ocean perch	3.04	twoline eelpout	0.65
Bering skate	1.62	brown cat shark	0.39
redbanded rockfish	1.18	longnose skate	0.21
slender sole	1.03	snakehead eelpout	0.16
grooved tanner crab	1.03	hagfish unident.	0.13
darkblotched rockfish	1.00	black eelpout	0.07
bigfin eelpout	0.93	rex sole	0.05
redstripe rockfish	0.73	arrowtooth flounder	0.05
spotted ratfish	0.71	Bering skate	0.04
Number of hauls	**57**	**Number of hauls**	**67**

Table 16. Mean CPUE (kg/ha) of the 20 (18 species total were caught in Stratum 1) most abundant groundfish and selected crab species caught by depth strata in the INPFC U.S.-Vancouver area during the 1999 NWFSC slope survey.

Stratum 1 (183-549 m)		Stratum 2 (550-1,280 m)	
arrowtooth flounder	22.62	longspine thornyhead	12.70
longnose skate	9.15	Dover sole	6.68
rex sole	6.48	grooved tanner crab	5.12
shortspine thornyhead	4.16	giant grenadier	4.98
sablefish	2.90	Pacific grenadier	3.91
Pacific ocean persh	2.82	sablefish	2.32
darkblotched rockfish	2.39	shortspine thornyhead	1.47
Bering skate	1.81	deepsea sole	1.46
bigfin eelpout	1.24	twoline eelpout	0.82
slender sole	0.64	black skate	0.46
grooved tanner crab	0.62	brown cat shark	0.45
Pacific whiting	0.58	arrowtooth flounder	0.32
giant grenadier	0.32	Pacific flatnose	0.24
Pacific flatnose	0.30	longnose skate	0.20
black eelpout	0.23	black eelpout	0.19
redbanded rockfish	0.10	snakehead eelpout	0.18
brown cat shark	0.04	hagfish unident.	0.10
English sole	0.03	California slickhead	0.10
		bigfin eelpout	0.09
		Bering skate	0.02
Number of hauls	**7**	**Number of hauls**	**11**

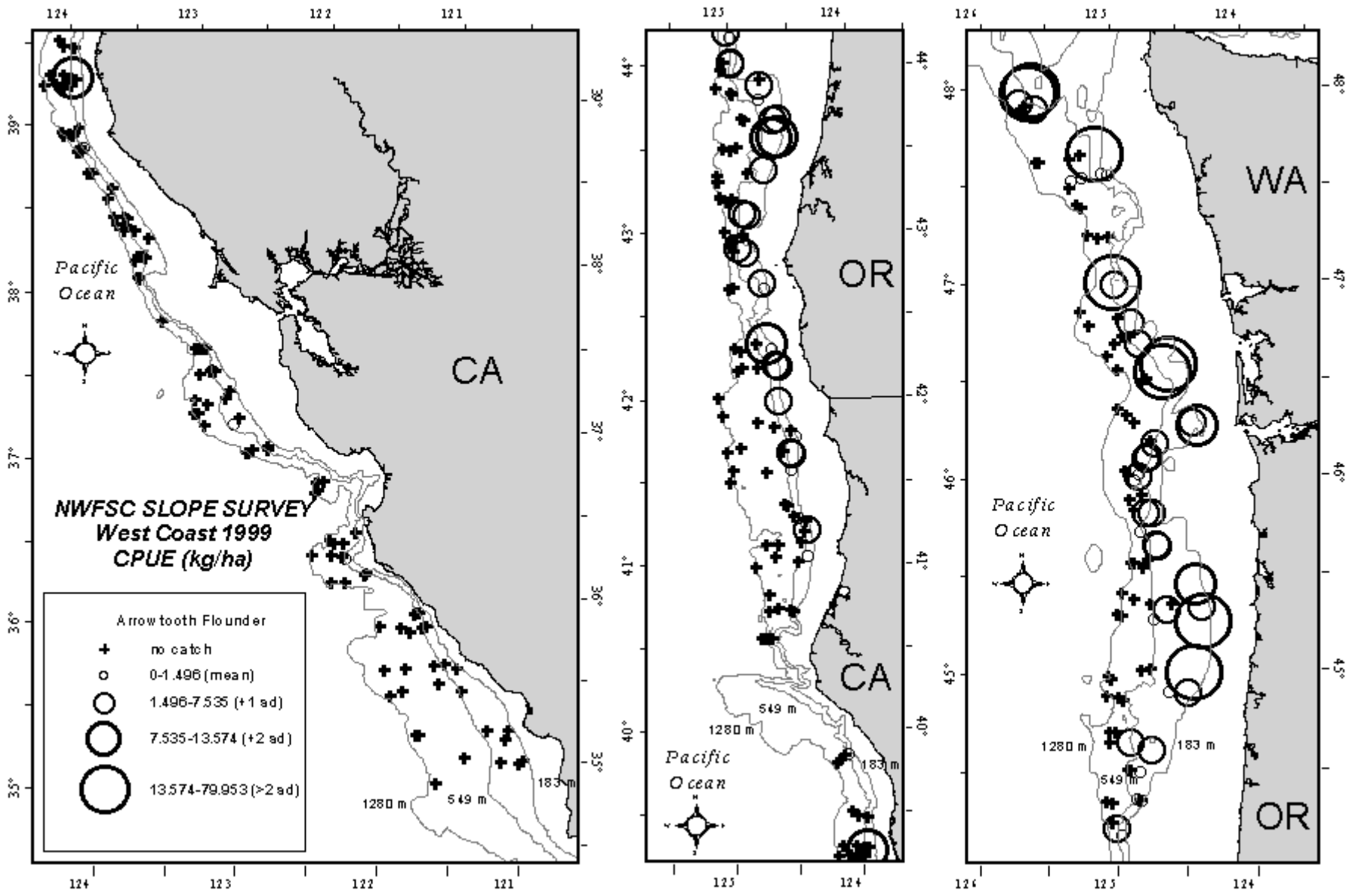


Figure 7. Arrowtooth flounder distribution and relative abundance (kg/ha) from the 1999 NWFSC slope survey.

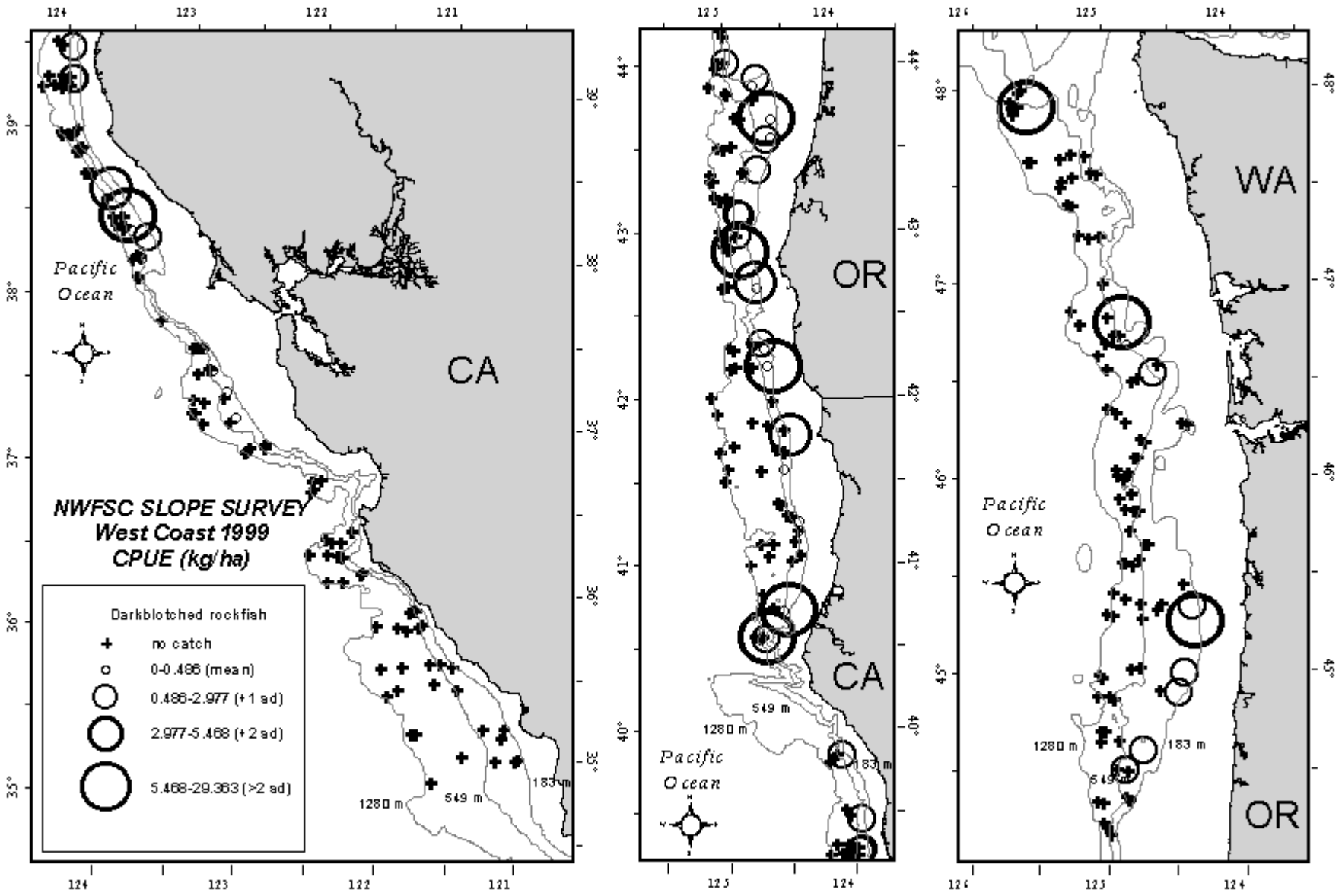


Figure 8. Darkblotched rockfish distribution and relative abundance (kg/ha) from the 1999 NWFSC slope survey.

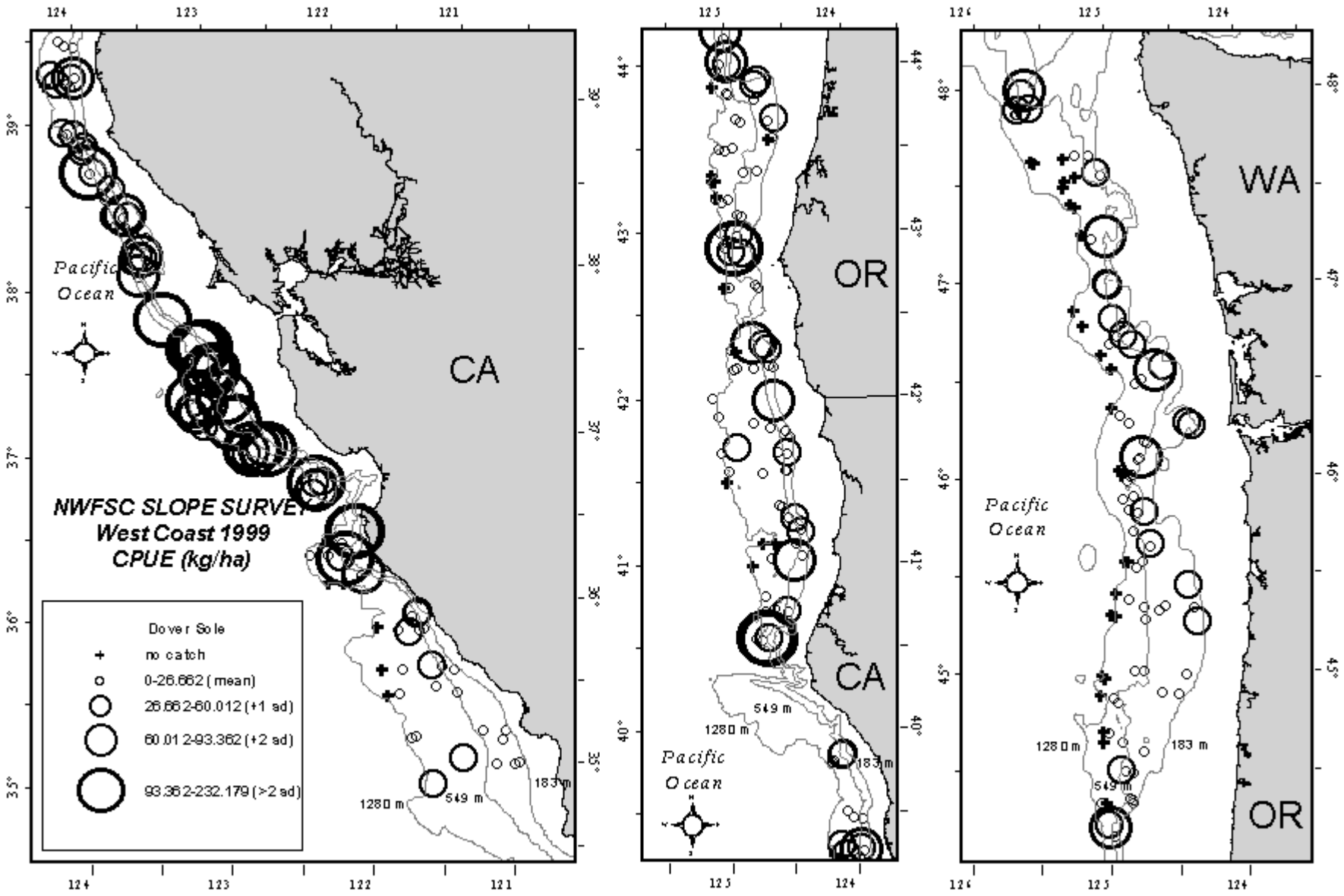


Figure 9. Dover sole distribution and relative abundance (kg/ha) from the 1999 NWFSC slope survey.

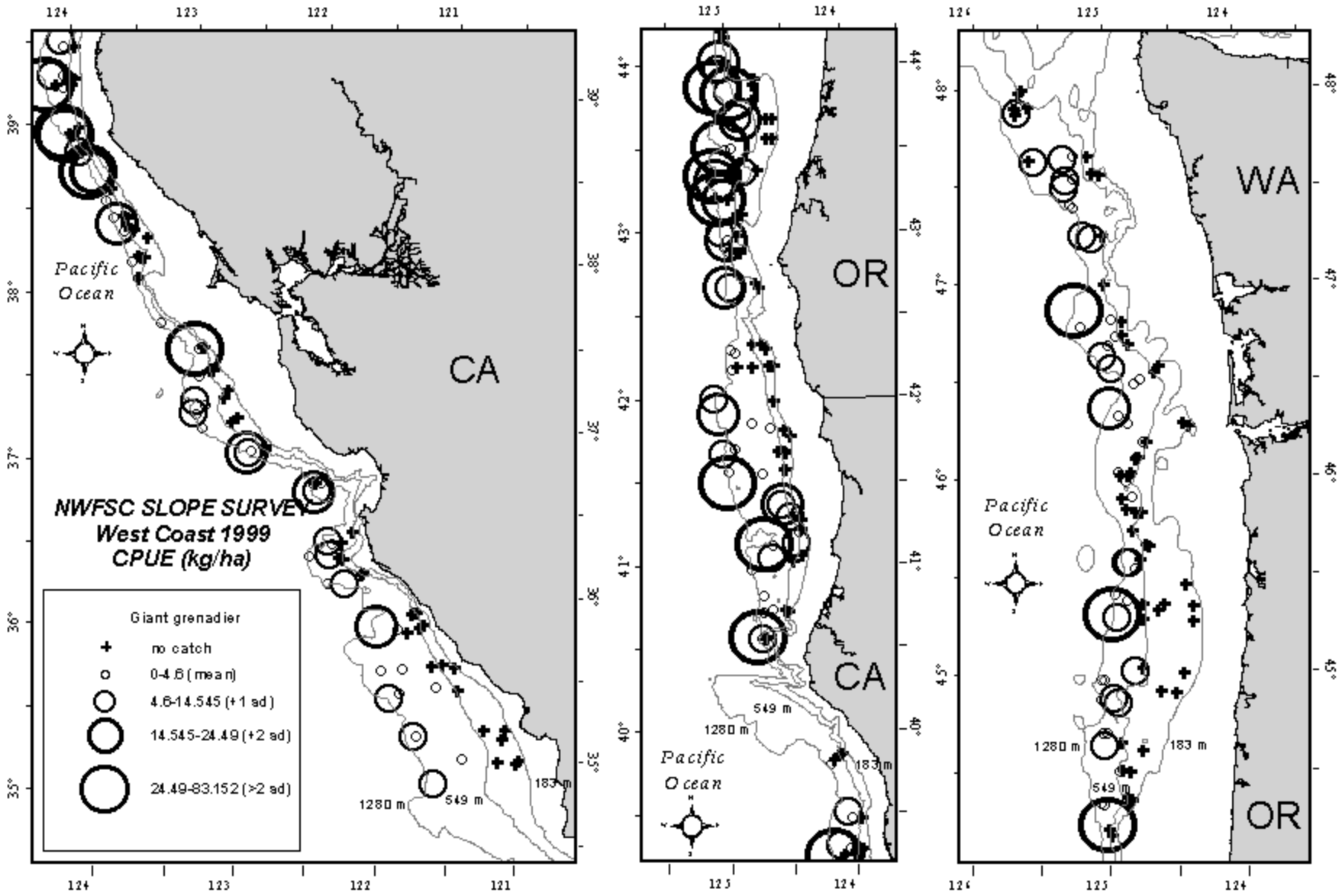


Figure 10. Giant grenadier distribution and relative abundance (kg/ha) from the 1999 NWFSC slope survey.

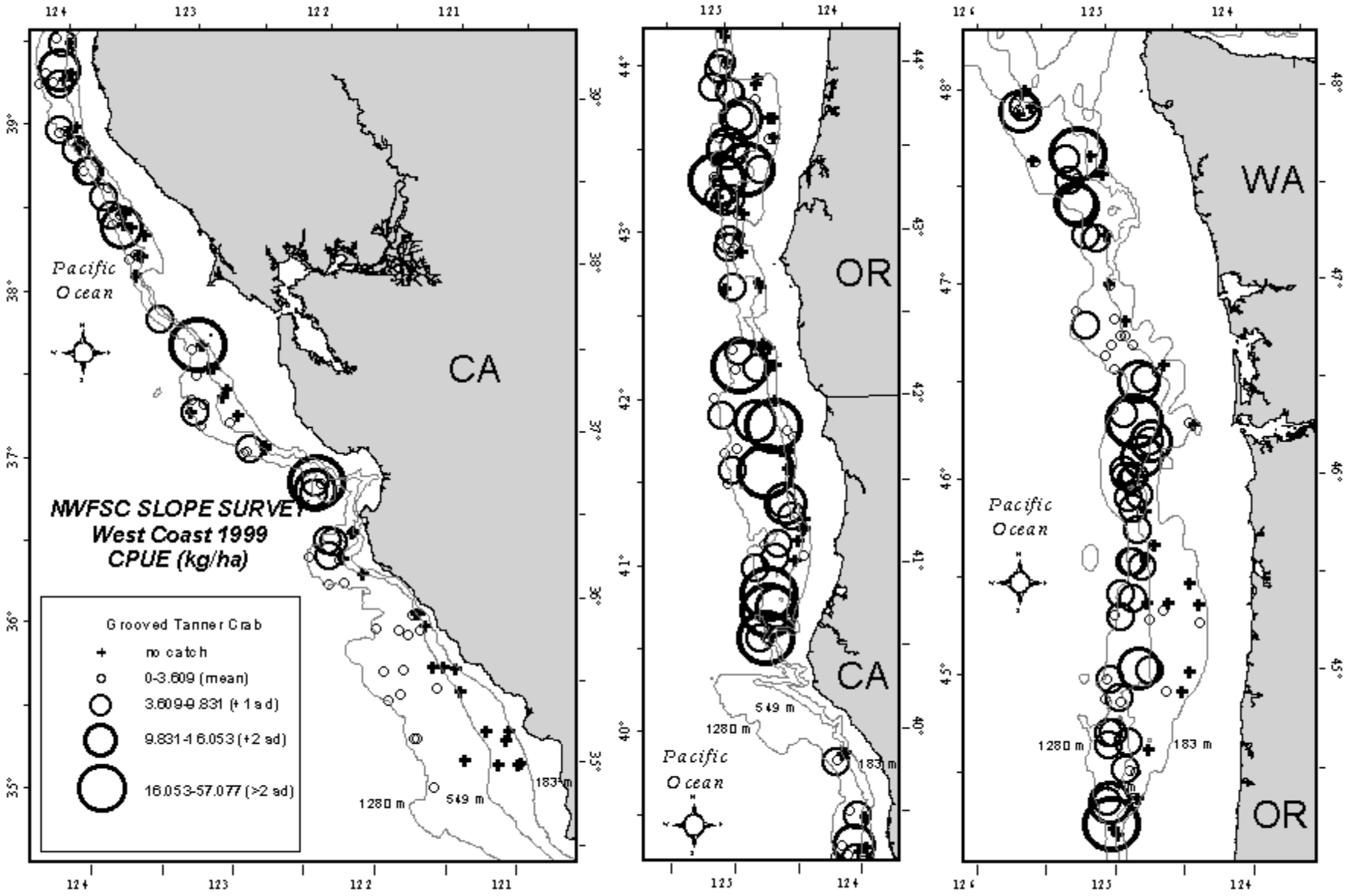


Figure 11. Grooved Tanner crab distribution and relative abundance (kg/ha) from the 1999 NWFSC slope survey.

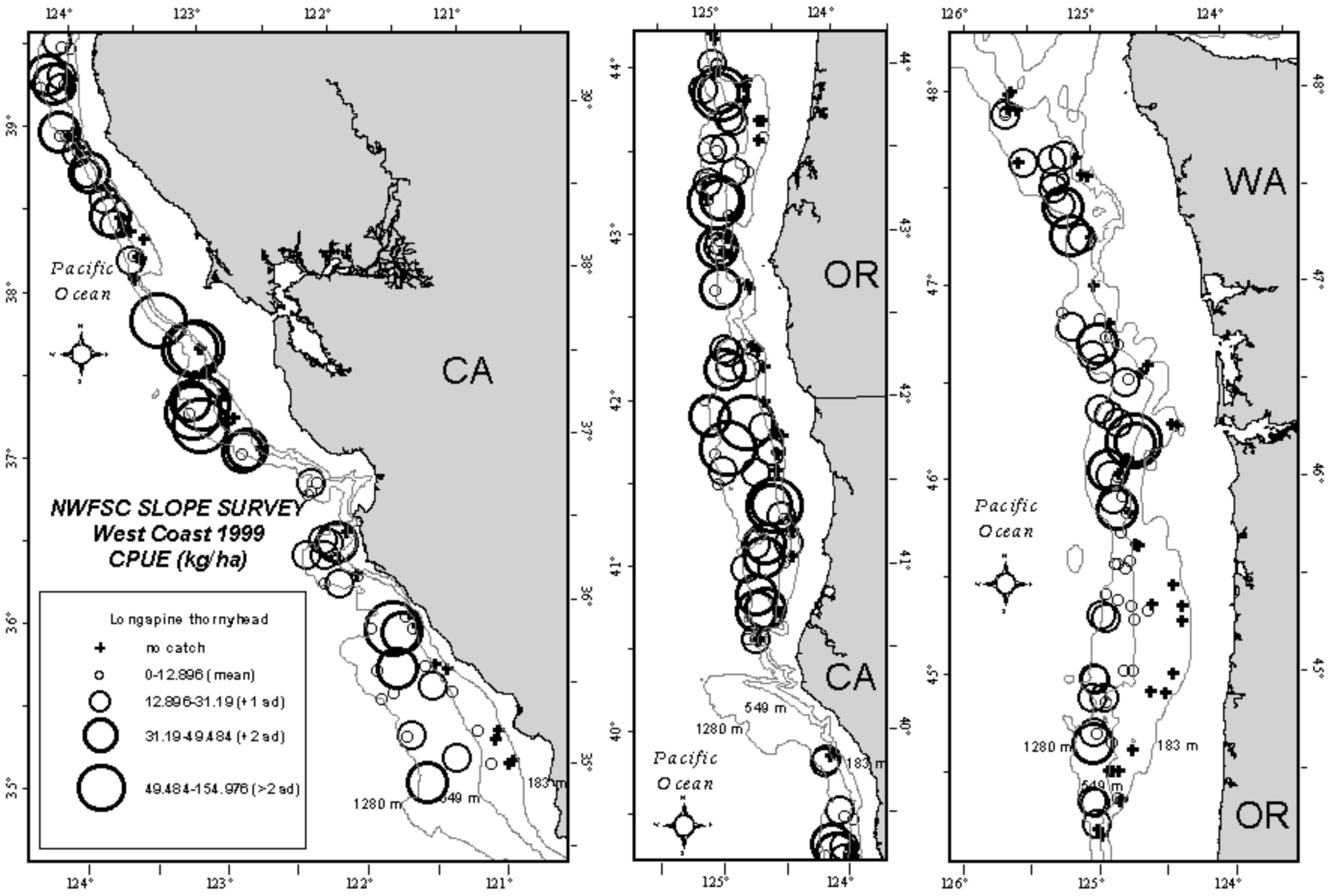


Figure 12. Longspine thornyhead distribution and relative abundance (kg/ha) from the 1999 NWFSC slope survey.

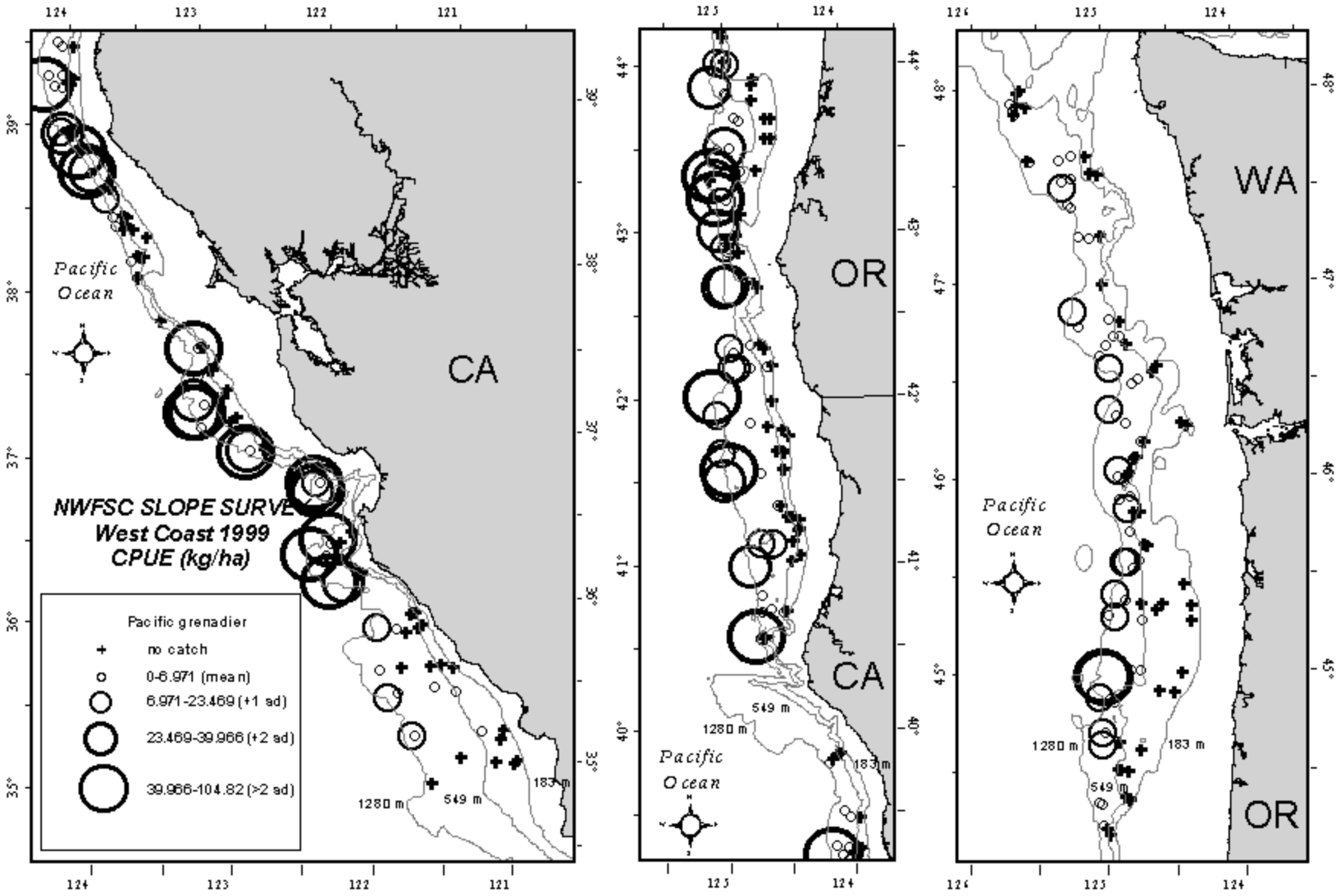


Figure 13. Pacific grenadier distribution and relative abundance (kg/ha) from the 1999 NWFSC slope survey.

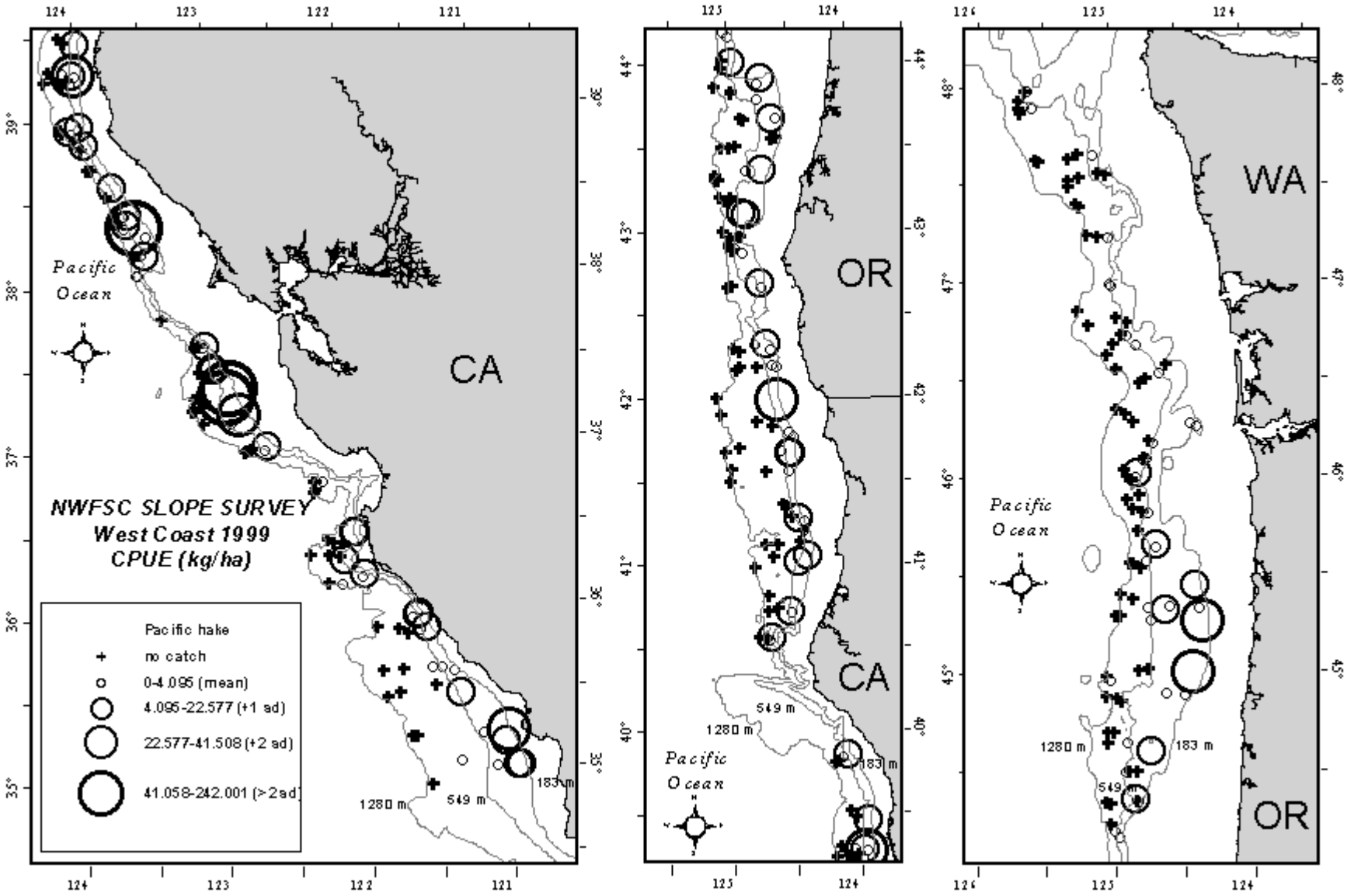


Figure 14. Pacific hake distribution and relative abundance (kg/ha) from the 1999 NWFSC slope survey.

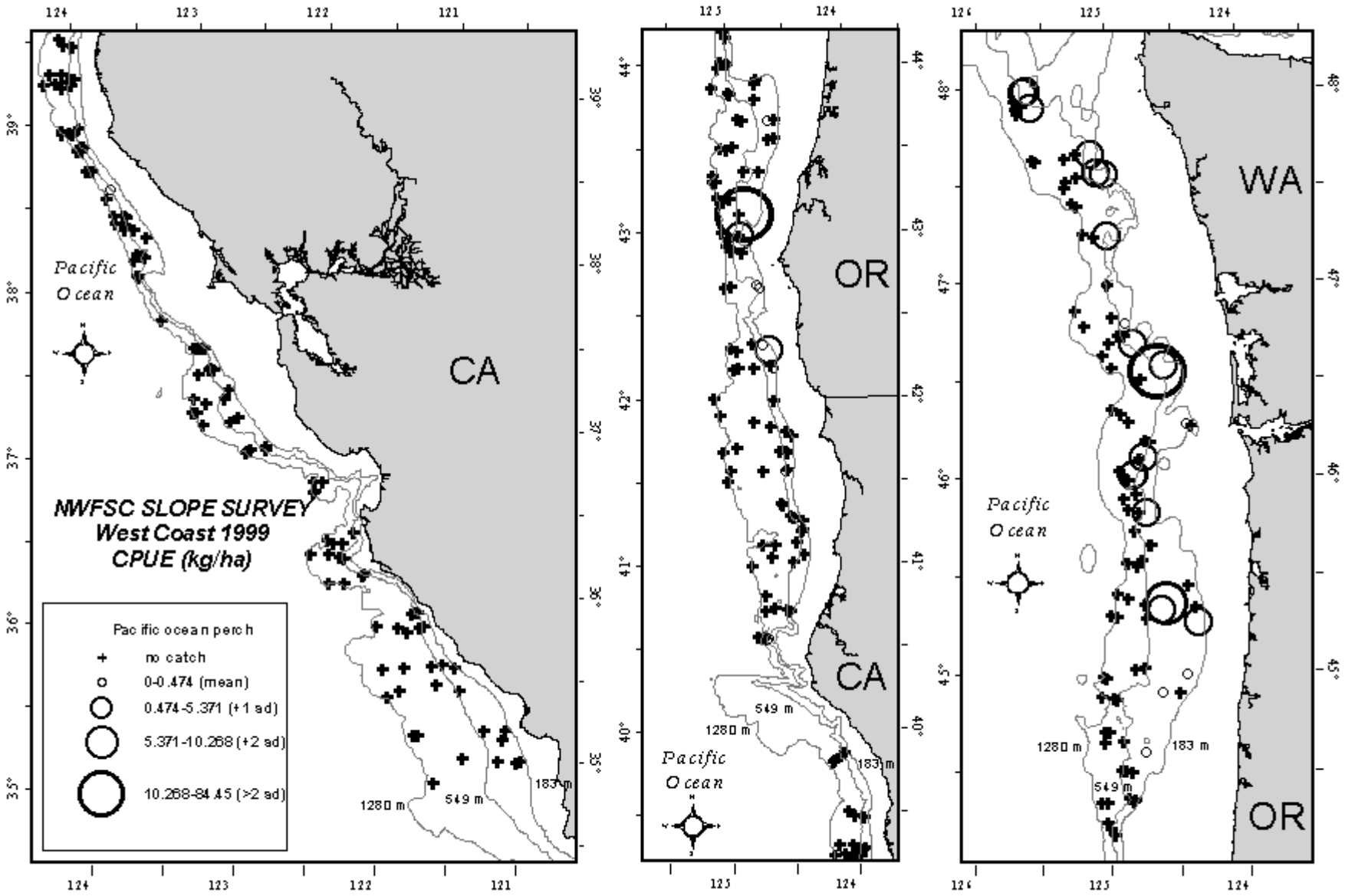


Figure 15. Pacific ocean perch distribution and relative abundance (kg/ha) from the 1999 NWFSC slope survey.

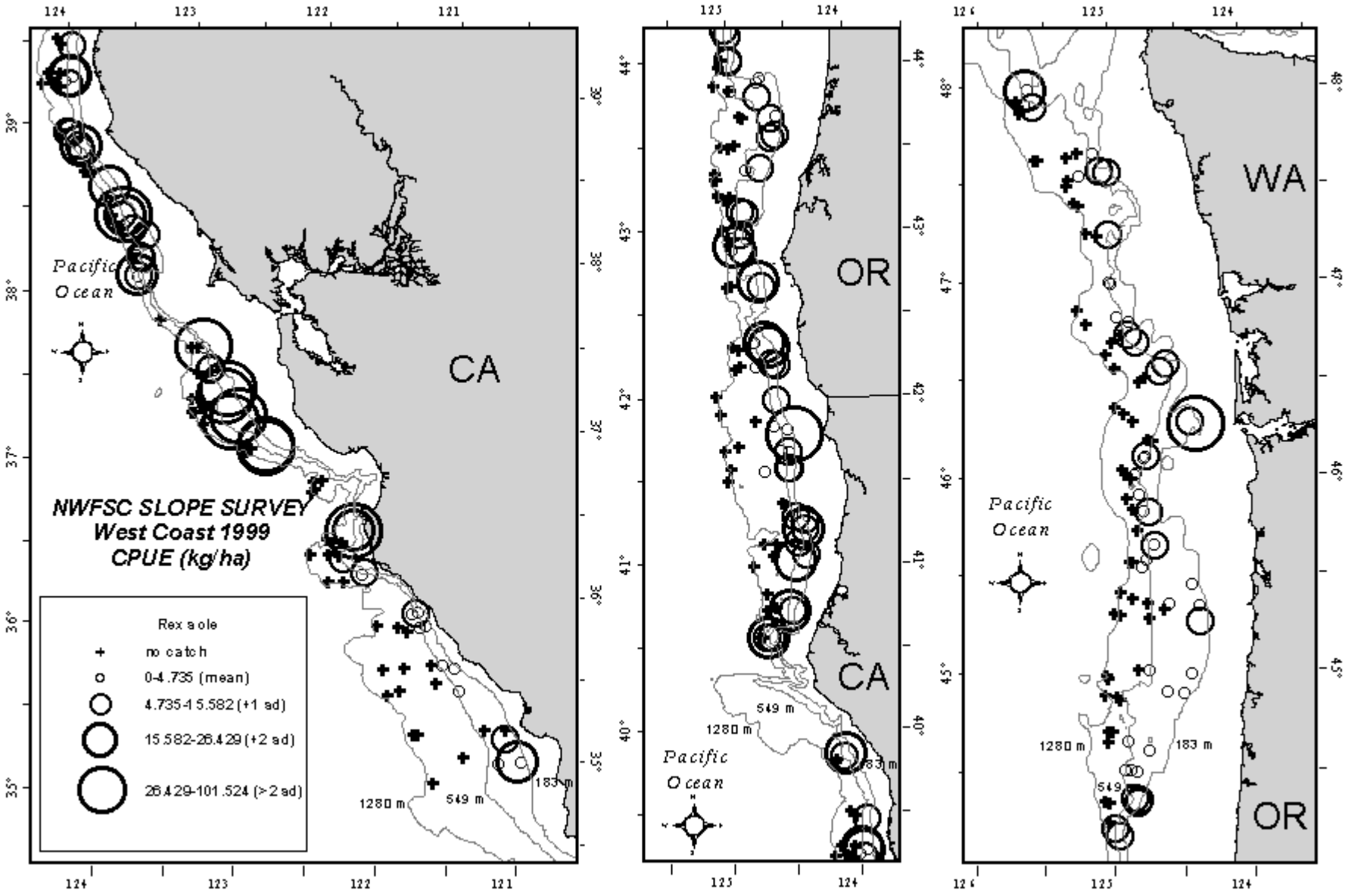


Figure 16. Rex sole distribution and relative abundance (kg/ha) from the 1999 NWFSC slope survey.

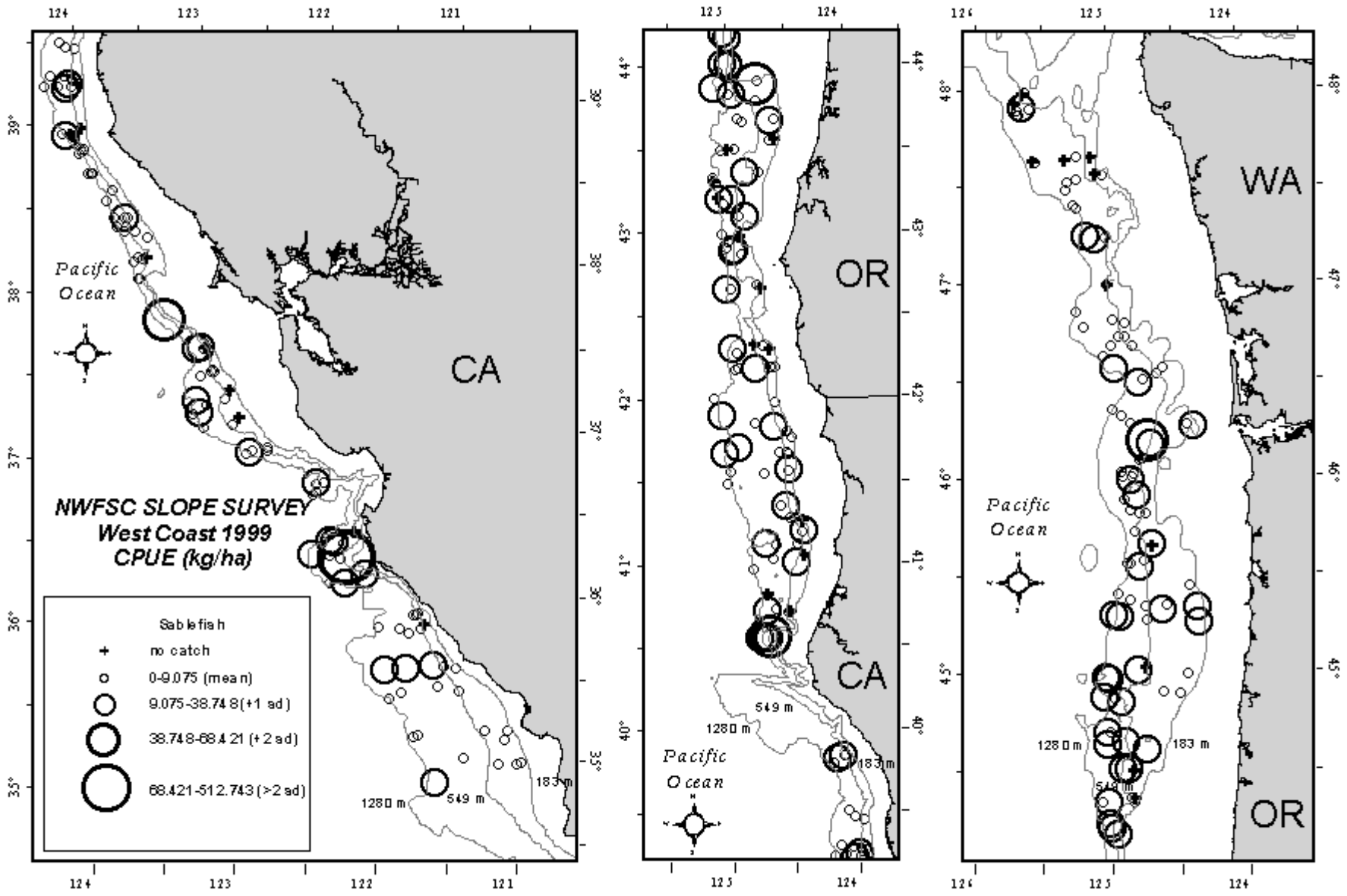


Figure 17. Sablefish distribution and relative abundance (kg/ha) from the 1999 NWFSC slope survey.

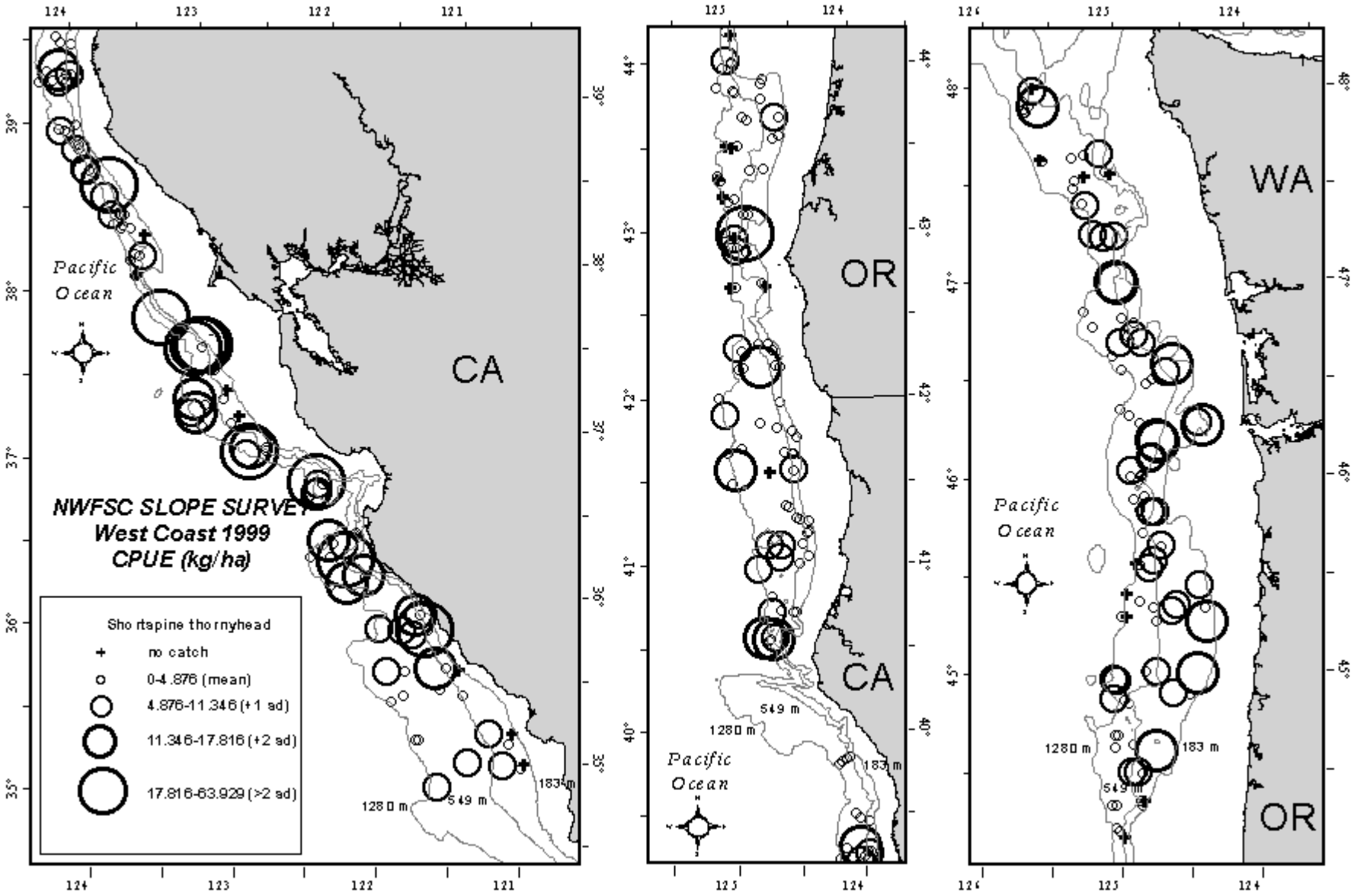


Figure 18. Shortspine thornyhead distribution and relative abundance (kg/ha) from the 1999 NWFSC slope survey.

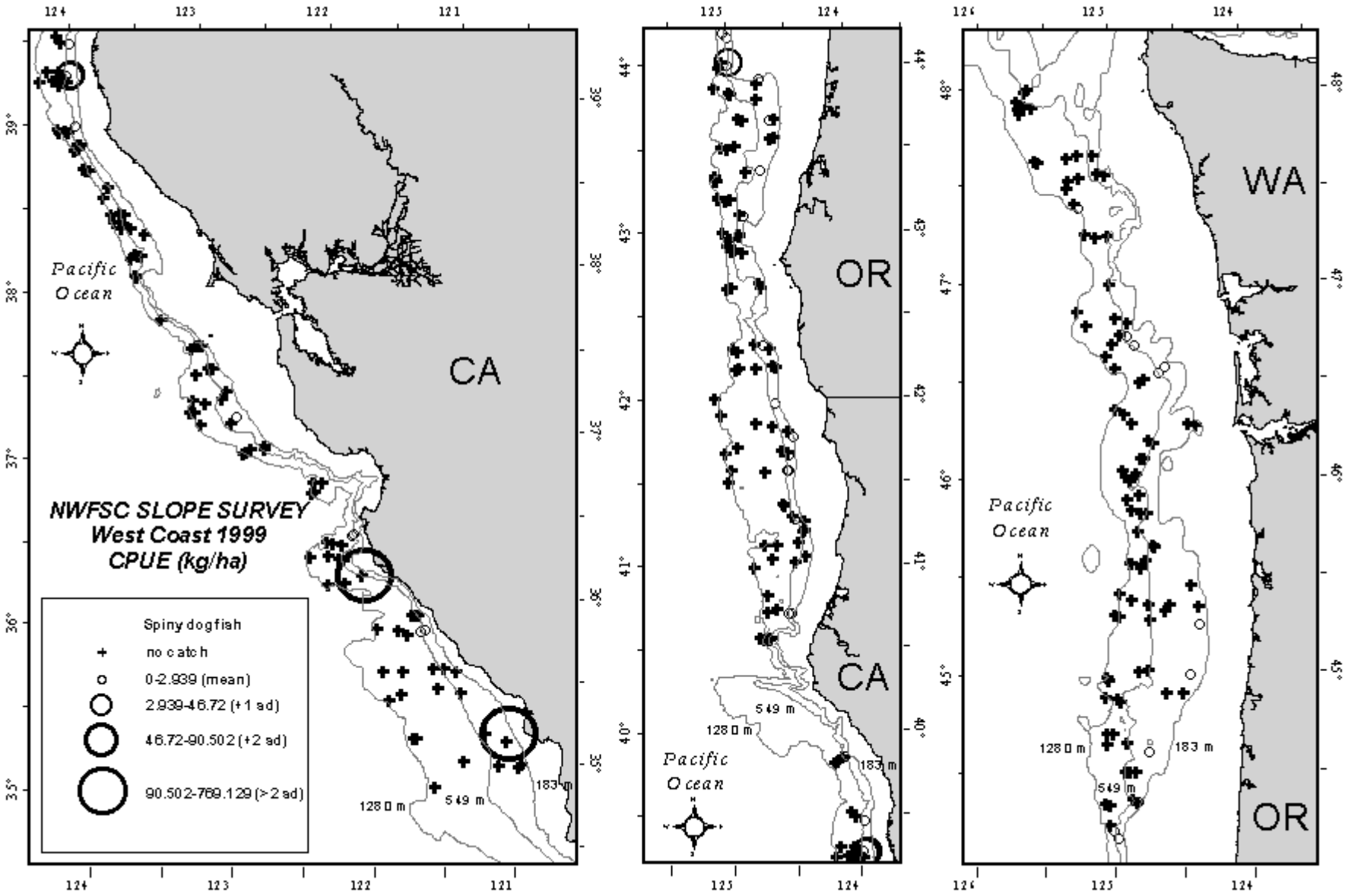


Figure 19. Spiny dogfish distribution and relative abundance (kg/ha) from the 1999 NWFSC slope survey.

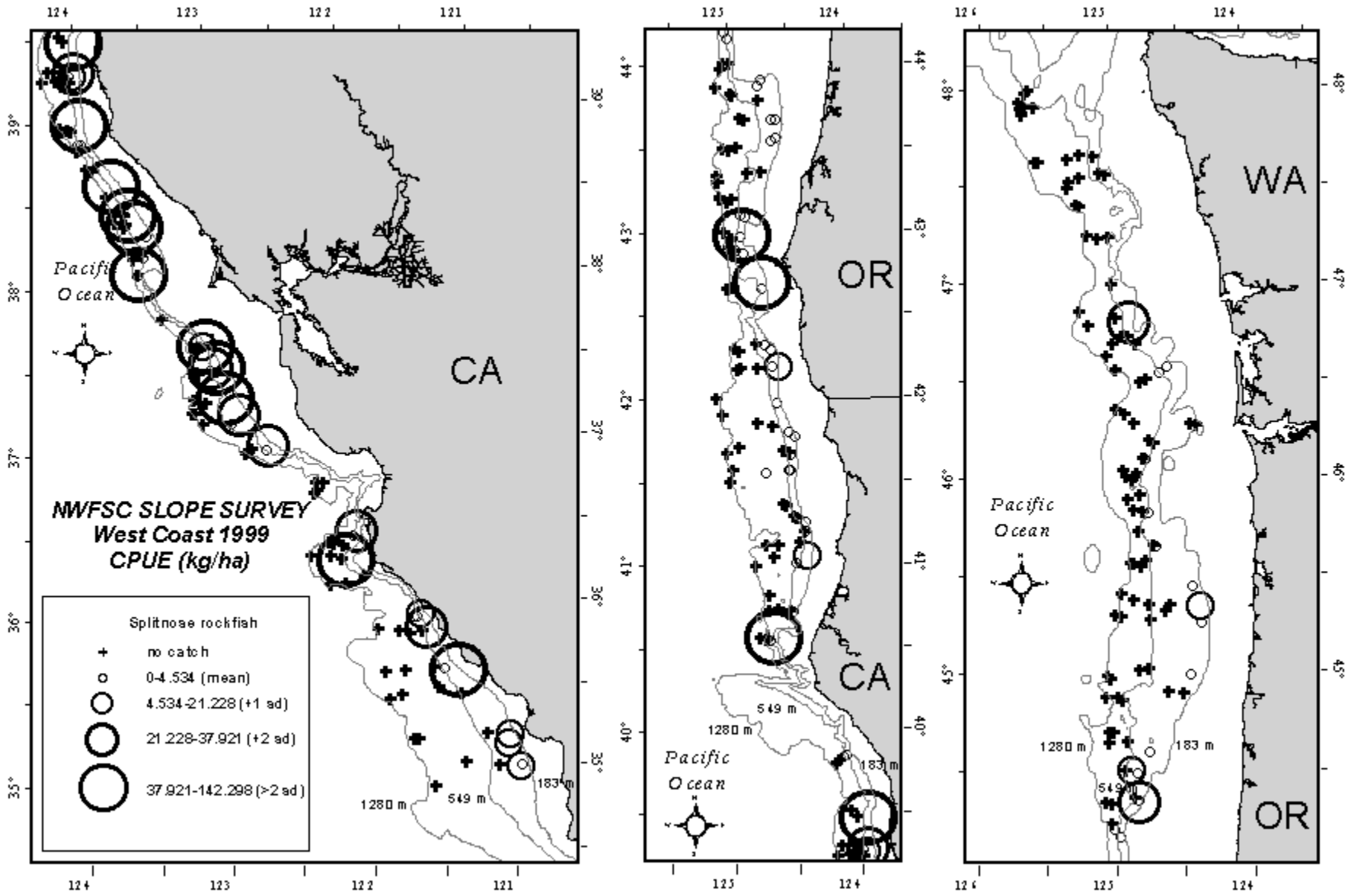


Figure 20. Splitnose rockfish distribution and relative abundance (kg/ha) from the 1999 NWFSC slope survey.

Biomass and Population Estimates

Abundance estimates of biomass in metric tons (t) along with associated coefficients of variation (CV) are presented for selected taxa by depth strata and INFPC areas in Tables 17-22. Note that CVs are calculated using the standard error (standard deviation/number sampled) divided by the mean CPUE. The total number of hauls, by haul catch weights and numbers, and length data are shown in Tables 23-28 by stratum and INPFC area for each fish species.

The calculated biomass estimates are not absolute estimates. Herding caused by doors and bridles, as well as escapement from underneath the trawl footrope, around the net opening, and through the net mesh, may affect the trawl catches (Gunderson 1993). Abundance calculations are based on the assumption that all of the fish that are in front of the trawl and between the wingtips have an equal chance of being caught. The ability of a fish to avoid the net will depend on the species, fish shape, size, and speed, and its reaction to the part of the net it encounters (Lauth 1999). Furthermore, this survey only covers limited portions of the total depth and geographic ranges in which many of the species are caught.

Table 17. Estimates of fish biomass (metric tons) and coefficients of variation (C.V.) by stratum for the INPFC U.S.-Vancouver, Columbia, Eureka, Monterey, and Conception areas combined from the 1999 NWFSC slope survey.

	Stratum 1		Stratum 2		All strata	
Species	183-549 m		550-1,280 m		183-1,280 m	
	Biomass (m.t.)	C.V. %	Biomass (m.t.)	C.V. %	Biomass (m.t.)	C.V. %
Dover sole	60,223	7	62,440	10	122,663	6
longspine thornyhead	1,356	28	81,608	7	82,964	7
dhortspine thornyhead	9,252	11	17,759	8	27,012	6
sablefish	14,335	28	30,344	8	44,678	10
Pacific grenadier	196	68	39,013	12	39,209	12
Pacific whiting	13,745	19	237	40	13,982	18
rex sole	15,179	11	707	37	15,886	11
Pacific ocean perch	3,161	45	-	-	3,161	45
darkblotched rockfish	2,027	32	-	-	2,027	32
redbanded rockfish	1,072	81	-	-	1,072	81
shortbelly rockfish	7,183	99	-	-	7,183	99
lingcod	566	40	-	-	566	40
English sole	1,482	25	-	-	1,482	25
slender sole	1,918	15	-	-	1,918	15
arrowtooth flounder	9,203	27	116	48	9,319	27
giant grenadier	147	55	25,507	10	25,654	10
Bering skate	3,675	8	160	31	3,835	8
longnose skate	15,728	10	1,117	32	16,846	9
grooved tanner crab	1,129	26	18,635	8	19,764	8
deepsea sole	16	61	5,490	8	5,506	8

Table 18. Estimates of fish biomass (metric tons) and coefficients of variation (C.V.) by stratum for the INPFC Conception area from the 1999 NWFSC slope survey.

	Stratum 1		Stratum 2		All strata	
Species	183-549 m		550-1,280 m		183-1,280 m	
	Biomass (m.t.)	C.V. %	Biomass (m.t.)	C.V. %	Biomass (m.t.)	C.V. %
Dover sole	2,912	27	11,565	30	14,477	25
longspine thornyhead	543	51	17,831	24	18,374	23
shortspine thornyhead	1,069	50	4,481	15	5,549	16
sablefish	800	29	5,936	22	6,736	20
Pacific grenadier	25	98	2,734	45	2,759	45
Pacific whiting	2,253	33	66	79	2,319	32
rex sole	740	57	-	-	740	57
Pacific ocean perch	-	-	-	-	-	-
darkblotched rockfish	-	-	-	-	-	-
redbanded rockfish	-	-	-	-	-	-
shortbelly rockfish	7,129	100	-	-	7,129	100
lingcod	40	98	-	-	40	98
English sole	17	70	-	-	17	70
slender sole	419	47	-	-	419	47
arrowtooth flounder	-	-	-	-	-	-
giant grenadier	-	-	2,551	37	2,551	37
Bering skate	176	30	-	-	176	30
longnose skate	2,320	25	291	99	2,611	25
grooved tanner crab	12	100	368	24	379	24
deepsea sole	-	-	728	30	728	30

Table 19. Estimates of fish biomass (metric tons) and coefficients of variation (C.V.) by stratum for the INPFC Monterey area from the 1999 NWFSC slope survey.

	Stratum 1		Stratum 2		All strata	
Species	183-549 m		550-1,280 m		183-1,280 m	
	Biomass (m.t.)	C.V. %	Biomass (m.t.)	C.V. %	Biomass (m.t.)	C.V. %
Dover sole	19,652	13	35,723	13	55,375	10
longspine thornyhead	187	51	24,206	13	24,393	13
shortspine thornyhead	1,719	32	7,110	15	8,829	14
sablefish	5,483	71	7,894	17	13,376	31
Pacific grenadier	-	-	18,215	20	18,215	20
Pacific whiting	6,909	33	129	59	7,038	33
rex sole	5,743	18	11	93	5,754	18
Pacific ocean perch	6	71	-	-	6	71
darkblotched rockfish	293	77	-	-	293	77
redbanded rockfish	27	38	-	-	27	38
shortbelly rockfish	9	52	-	-	9	52
lingcod	132	59	-	-	132	59
English sole	1,001	34	-	-	1,001	34
slender sole	381	26	-	-	381	26
arrowtooth flounder	77	80	-	-	77	80
giant grenadier	-	-	7,084	19	7,084	19
Bering skate	1,371	12	60	65	1,431	12
longnose skate	5,179	16	482	35	5,661	15
grooved tanner crab	34	37	4,123	14	4,157	14
deepsea sole	3	100	2,066	16	2,069	16

Table 20. Estimates of fish biomass (metric tons) and coefficients of variation (C.V.) by stratum for the INPFC Eureka area from the 1999 NWFSC slope survey.

Species	Stratum 1 183-549 m		Stratum 2 550-1,280 m		All strata 183-1,280 m	
	Biomass (m.t.)	C.V. %	Biomass (m.t.)	C.V. %	Biomass (m.t.)	C.V. %
Dover sole	7,094	18	9,548	23	16,643	16
longspine thornyhead	192	91	18,139	10	18,331	10
shortspine thornyhead	674	18	2,785	15	3,459	13
sablefish	1,469	27	6,065	14	7,534	12
Pacific grenadier	4	65	8,133	24	8,137	24
Pacific whiting	1,673	33	21	61	1,694	33
rex sole	2,280	12	641	41	2,920	13
Pacific ocean perch	20	37	-	-	20	37
darkblotched rockfish	392	38	-	-	392	38
redbanded rockfish	39	38	-	-	39	38
shortbelly rockfish	-	-	-	-	-	-
lingcod	151	43	-	-	151	43
English sole	192	55	-	-	192	55
slender sole	123	43	-	-	123	43
arrowtooth flounder	343	27	-	-	343	27
giant grenadier	41	93	4,758	21	4,799	21
Bering skate	392	19	58	46	450	18
longnose skate	1,305	20	95	41	1,400	19
grooved tanner crab	92	46	5,780	18	5,872	17
deepsea sole	5	100	1,212	15	1,217	15

Table 21. Estimates of fish biomass (metric tons) and coefficients of variation (C.V.) by stratum for the INPFC Columbia area from the 1999 NWFSC slope survey.

	Stratum 1		Stratum 2		All strata	
Species	183-549 m		550-1,280 m		183-1,280 m	
	Biomass (m.t.)	C.V. %	Biomass (m.t.)	C.V. %	Biomass (m.t.)	C.V. %
Dover sole	22,717	11	4,103	20	26,820	9
longspine thornyhead	434	37	18,582	8	19,016	8
shortspine thornyhead	4,907	12	3,053	13	7,961	9
sablefish	5,967	15	9,928	12	15,895	10
Pacific grenadier	167	78	9,053	19	9,220	19
Pacific whiting	2,787	22	20	60	2,808	22
rex sole	5,041	24	52	57	5,093	24
Pacific ocean perch	2,537	56	-	-	2,537	56
darkblotched rockfish	835	38	-	-	835	38
redbanded rockfish	985	88	-	-	985	88
shortbelly rockfish	45	81	-	-	45	81
lingcod	242	82	-	-	242	82
English sole	267	38	-	-	267	38
slender sole	860	20	-	-	860	20
arrowtooth flounder	3,981	17	44	62	4,025	17
giant grenadier	38	59	9,996	18	10,034	18
Bering skate	1,352	16	36	43	1,388	15
longnose skate	4,982	20	204	54	5,187	20
grooved tanner crab	860	31	7,215	13	8,075	12
deepsea sole	8	100	1,157	11	1,165	11

Table 22. Estimates of fish biomass (metric tons) and coefficients of variation (C.V.) by stratum for the INPFC U.S.-Vancouver area from the 1999 NWFSC slope survey.

	Stratum 1		Stratum 2		All strata	
Species	183-549 m		550-1,280 m		183-1,280 m	
	Biomass (m.t.)	C.V. %	Biomass (m.t.)	C.V. %	Biomass (m.t.)	C.V. %
Dover sole	7,848	21	1,499	47	9,348	19
longspine thornyhead	-	-	2,850	21	2,850	21
shortspine thornyhead	883	37	330	25	1,213	27
sablefish	616	49	521	30	1,136	30
Pacific grenadier	-	-	878	52	878	52
Pacific whiting	123	56	-	-	123	56
rex sole	1,376	32	3	100	1,379	32
Pacific ocean perch	599	30	-	-	599	30
darkblotched rockfish	507	100	-	-	507	100
redbanded rockfish	21	58	-	-	21	58
shortbelly rockfish	-	-	-	-	-	-
lingcod	-	-	-	-	-	-
English sole	6	100	-	-	6	100
slender sole	136	40	-	-	136	40
arrowtooth flounder	4,802	51	72	68	4,874	50
giant grenadier	68	100	1,118	29	1,186	28
Bering skate	384	20	5	100	390	20
longnose skate	1,942	24	45	101	1,987	24
grooved tanner crab	132	91	1,149	39	1,281	36
deepsea sole	-	-	328	29	328	29

Table 23. Number of hauls by depth strata where weight (Wt.), number of fish (No.), and lengths (Len.) were collected for the 30 most abundant groundfish and selected invertebrate species in the INPFC U.S.-Vancouver, Columbia, Eureka, Monterey, and Conception areas from the 1999 NWFSC slope survey.

Species	Stratum 1 183-549m Total hauls = 150			Stratum 2 550-1,280 m Total hauls = 176		
	Hauls with:			Hauls with:		
	Wt.	No.	Len.	Wt.	No.	Len.
giant grenadier	6	6	0	152	152	0
California slickhead	2	2	0	146	146	0
sablefish	126	126	126	167	169	169
Pacific flatnose	24	24	0	155	156	0
brown cat shark	80	80	0	141	141	0
arrowtooth flounder	73	73	0	6	6	0
Bering skate	130	130	0	15	15	0
black skate	3	3	0	77	77	0
twoline eelpout	15	15	0	130	130	0
grooved Tanner crab	50	50	0	166	166	0
Pacific grenadier	12	12	0	153	153	0
deepsea sole	3	3	0	147	147	0
rex sole	146	146	0	17	17	0
spotted ratfish	92	92	0	0	0	0
bigfin eelpout	134	134	0	15	15	0
slender sole	99	99	0	0	0	0
Pacific hake	132	132	0	16	16	0
Dover sole	150	151	151	130	131	131
English sole	48	48	0	0	0	0
longnose skate	136	136	0	30	30	0
Pacific ocean perch	39	39	0	0	0	0
aurora rockfish	63	63	0	4	4	1
redbanded rockfish	50	50	0	0	0	0
darkblotched rockfish	53	53	0	0	0	0
splitnose rockfish	90	90	0	0	0	0
blackgill rockfish	26	26	0	0	0	0
stripetail rockfish	46	47	0	0	0	0
shortspine thornyhead	139	139	139	163	164	163
longspine thornyhead	37	39	37	173	173	173
spiny dogfish	39	39	0	1	1	0

Table 24. Number of hauls by depth strata where weight (Wt.), number of fish (No.), and lengths (Len.) were collected for the 30 most abundant groundfish and selected invertebrate species in the INPFC U.S.-Vancouver area from the 1999 NWFSC slope survey.

Species	Stratum 1 183-549m Total hauls = 7			Stratum 2 550-1,280 m Total hauls = 11		
	Hauls with:			Hauls with:		
	Wt.	No.	Len.	Wt.	No.	Len.
giant grenadier	1	1	0	8	8	0
California slickhead	0	0	0	3	3	0
sablefish	4	4	4	8	9	9
Pacific flatnose	1	1	0	7	7	0
brown cat shark	1	1	0	7	7	0
arrowtooth flounder	6	6	0	3	3	0
Bering skate	7	7	0	1	1	0
black skate	0	0	0	3	3	0
twoline eelpout	0	0	0	9	9	0
grooved Tanner crab	2	2	0	9	9	0
Pacific grenadier	0	0	0	9	9	0
deepsea sole	0	0	0	9	9	0
rex sole	7	7	0	1	1	0
spotted ratfish	5	5	0	0	0	0
bigfin eelpout	5	5	0	1	1	0
slender sole	6	6	0	0	0	0
Pacific hake	4	4	0	0	0	0
Dover sole	7	7	7	5	5	5
English sole	1	1	0	0	0	0
longnose skate	7	7	0	0	0	0
Pacific ocean perch	6	6	0	0	0	0
aurora rockfish	0	0	0	0	0	0
redbanded rockfish	3	3	0	0	0	0
darkblotched rockfish	1	1	0	0	0	0
splitnose rockfish	0	0	0	0	0	0
blackgill rockfish	0	0	0	0	0	0
stripetail rockfish	0	0	0	0	0	0
shortspine thornyhead	5	5	5	10	11	10
longspine thornyhead	0	0	0	10	10	10
spiny dogfish	0	0	0	0	0	0

Table 25. Number of hauls by depth strata where weight (Wt.), number of fish (No.), and lengths (Len.) were collected for the 30 most abundant groundfish and selected invertebrate species in the INPFC Columbia area from the 1999 NWFSC slope survey.

Species	Stratum 1 183-549m Total hauls = 57			Stratum 2 550-1,280 m Total hauls = 67		
	Hauls with:			Hauls with:		
	Wt.	No.	Len.	Wt.	No.	Len.
giant grenadier	3	3	0	59	59	0
California slickhead	1	1	0	56	56	0
sablefish	50	50	50	64	64	64
Pacific flatnose	13	13	0	65	65	0
brown cat shark	24	24	0	49	49	0
arrowtooth flounder	44	44	0	3	3	0
Bering skate	47	47	0	6	6	0
black skate	2	2	0	33	33	0
twoline eelpout	8	8	0	50	50	0
grooved Tanner crab	30	30	0	65	65	0
Pacific grenadier	7	7	0	63	63	0
deepsea sole	1	1	0	58	58	0
rex sole	54	54	0	5	5	0
spotted ratfish	46	46	0	1	1	0
bigfin eelpout	36	36	0	0	0	0
slender sole	0	0	0	36	36	0
Pacific hake	3	3	3	45	45	0
Dover sole	56	57	57	40	40	40
English sole	12	12	0	0	0	0
longnose skate	4	4	0	7	7	0
Pacific ocean perch	23	23	0	0	0	0
aurora rockfish	16	16	0	0	0	0
redbanded rockfish	19	19	0	0	0	0
darkblotched rockfish	22	22	0	0	0	0
splitnose rockfish	28	28	0	0	0	0
blackgill rockfish	2	2	0	0	0	0
stripetail rockfish	14	14	0	0	0	0
shortspine thornyhead	55	55	55	58	58	58
longspine thornyhead	17	18	17	65	65	65
spiny dogfish	16	16	0	1	1	0

Table 26. Number of hauls by depth strata where weight (Wt.), number of fish (No.), and lengths (Len.) were collected for the 30 most abundant groundfish and selected invertebrate species in the INPFC Eureka area from the 1999 NWFSC slope survey.

Species	Stratum 1 183-549m Total hauls = 27			Stratum 2 550-1,280 m Total hauls = 36		
	Hauls with:			Hauls with:		
	Wt.	No.	Len.	Wt.	No.	Len.
giant grenadier	2	2	0	31	31	0
California slickhead	0	0	0	30	30	0
sablefish	23	23	23	34	35	35
Pacific flatnose	4	4	0	31	32	0
brown cat shark	18	18	0	28	28	0
arrowtooth flounder	18	18	0	0	0	0
Bering skate	24	24	0	5	5	0
black skate	0	0	0	19	19	0
twoline eelpout	4	4	0	24	24	0
grooved Tanner crab	8	8	0	33	33	0
Pacific grenadier	3	3	0	31	31	0
deepsea sole	1	1	0	31	31	0
rex sole	28	28	0	9	9	0
spotted ratfish	14	14	0	0	0	0
bigfin eelpout	26	26	0	6	6	0
slender sole	21	21	0	0	0	0
Pacific hake	26	26	0	0	0	0
Dover sole	28	28	28	30	31	31
English sole	8	8	0	0	0	0
longnose skate	25	25	0	6	6	0
Pacific ocean perch	8	8	0	0	0	0
aurora rockfish	11	11	0	0	0	0
redbanded rockfish	14	14	0	0	0	0
darkblotched rockfish	17	17	0	0	0	0
splitnose rockfish	21	21	0	1	1	0
blackgill rockfish	2	2	0	0	0	0
stripetail rockfish	8	9	0	0	0	0
shortspine thornyhead	27	27	27	34	34	34
longspine thornyhead	6	6	6	36	36	36
spiny dogfish	9	9	0	0	0	0

Table 27. Number of hauls by depth strata where weight (Wt.), number of fish (No.), and lengths (Len.) were collected for the 30 most abundant groundfish and selected invertebrate species in the INPFC Monterey area from the 1999 NWFSC slope survey.

Species	Stratum 1 183-549m Total hauls = 48			Stratum 2 550-1,280 m Total hauls = 49		
	Hauls with:			Hauls with:		
	Wt.	No.	Len.	Wt.	No.	Len.
giant grenadier	0	0	0	43	43	0
California slickhead	1	1	0	44	44	0
sablefish	39	39	39	48	48	48
Pacific flatnose	6	6	0	43	43	0
brown cat shark	29	29	0	47	47	0
arrowtooth flounder	5	5	0	0	0	0
Bering skate	45	45	0	3	3	0
black skate	0	0	0	22	22	0
twoline eelpout	3	3	0	38	38	0
grooved Tanner crab	9	9	0	48	48	0
Pacific grenadier	0	0	0	42	42	0
deepsea sole	1	1	0	40	40	0
rex sole	48	48	0	2	2	0
spotted ratfish	39	39	0	0	0	0
bigfin eelpout	48	48	0	5	5	0
slender sole	30	30	0	0	0	0
Pacific hake	46	46	0	7	7	0
Dover sole	48	48	48	45	45	45
English sole	24	24	0	2	2	0
longnose skate	48	48	0	0	0	0
Pacific ocean perch	2	2	0	15	15	0
aurora rockfish	29	29	0	4	4	1
redbanded rockfish	14	14	0	0	0	0
darkblotched rockfish	13	13	0	0	0	0
splitnose rockfish	34	34	0	1	1	0
blackgill rockfish	21	21	0	0	0	0
stripetail rockfish	20	20	0	0	0	0
shortspine thornyhead	44	44	44	49	49	48
longspine thornyhead	10	11	10	49	49	49
spiny dogfish	11	11	0	0	0	0

Table 28. Number of hauls by depth strata where weight (Wt.), number of fish (No.), and lengths (Len.) were collected for the 30 most abundant groundfish and selected invertebrate species in the INPFC Conception area from the 1999 NWFSC slope survey.

Species	Stratum 1 183-549m Total hauls = 11			Stratum 2 550-1,280 m Total hauls = 13		
	Hauls with:			Hauls with:		
	Wt.	No.	Len.	Wt.	No.	Len.
giant grenadier	0	0	0	11	11	0
California slickhead	0	0	0	13	13	0
sablefish	10	10	10	13	13	13
Pacific flatnose	0	0	0	9	9	0
brown cat shark	8	8	0	10	10	0
arrowtooth flounder	0	0	0	0	0	0
Bering skate	7	7	0	0	0	0
black skate	1	1	0	0	0	0
twoline eelpout	0	0	0	9	9	0
grooved Tanner crab	1	1	0	11	11	0
Pacific grenadier	2	2	0	8	8	0
deepsea sole	0	0	0	9	9	0
rex sole	9	9	0	0	0	0
spotted ratfish	9	9	0	0	0	0
bigfin eelpout	9	9	0	2	2	0
slender sole	6	6	0	0	0	0
Pacific hake	11	11	0	2	2	0
Dover sole	11	11	11	10	10	10
English sole	3	3	0	0	0	0
longnose skate	11	11	0	1	1	0
Pacific ocean perch	0	0	0	0	0	0
aurora rockfish	7	7	0	0	0	0
redbanded rockfish	0	0	0	0	0	0
darkblotched rockfish	0	0	0	0	0	0
splitnose rockfish	7	7	0	0	0	0
blackgill rockfish	1	1	0	0	0	0
stripetail rockfish	4	4	0	0	0	0
shortspine thornyhead	8	8	8	13	13	13
longspine thornyhead	4	4	4	13	13	13
spiny dogfish	3	3	0	0	0	0

Size and Age Compositions

Figures 21-44 show the estimated population length-frequencies for the four DST complex species and are presented by depth stratum for all INPFC areas combined, and for individual INPFC areas. Note that the length-frequencies are the sum of all measured fish and are not adjusted for subsampling, area swept, or stratum size. No age data was available at the time this report was prepared.

Analysis Approach and Data Requests

The estimation of population parameters presented in this document followed statistical procedures similar to those used by Lauth (1999) for the comparable survey conducted on the RV *Miller Freeman*. This approach does not consider possible differences between vessels, treating each tow as both independent and random. A statistical analysis that explicitly considers vessel effects, the probability distribution of catch-per-tow, and alternative stratifications is under development (Helser et al. in prep.). The results from this more sophisticated analysis may lead to a better understanding of the slope survey data and may require an updating of the results and analysis presented in this document at a later date.

To conserve paper resources and avoid excessive detail and printing costs, this document only includes information for commercially important species. If you would like information on other species that are not listed in this document, or more detailed information, please contact Teresa Turk by phone at (206) 860-3460 or by email at teresa.turk@noaa.gov.

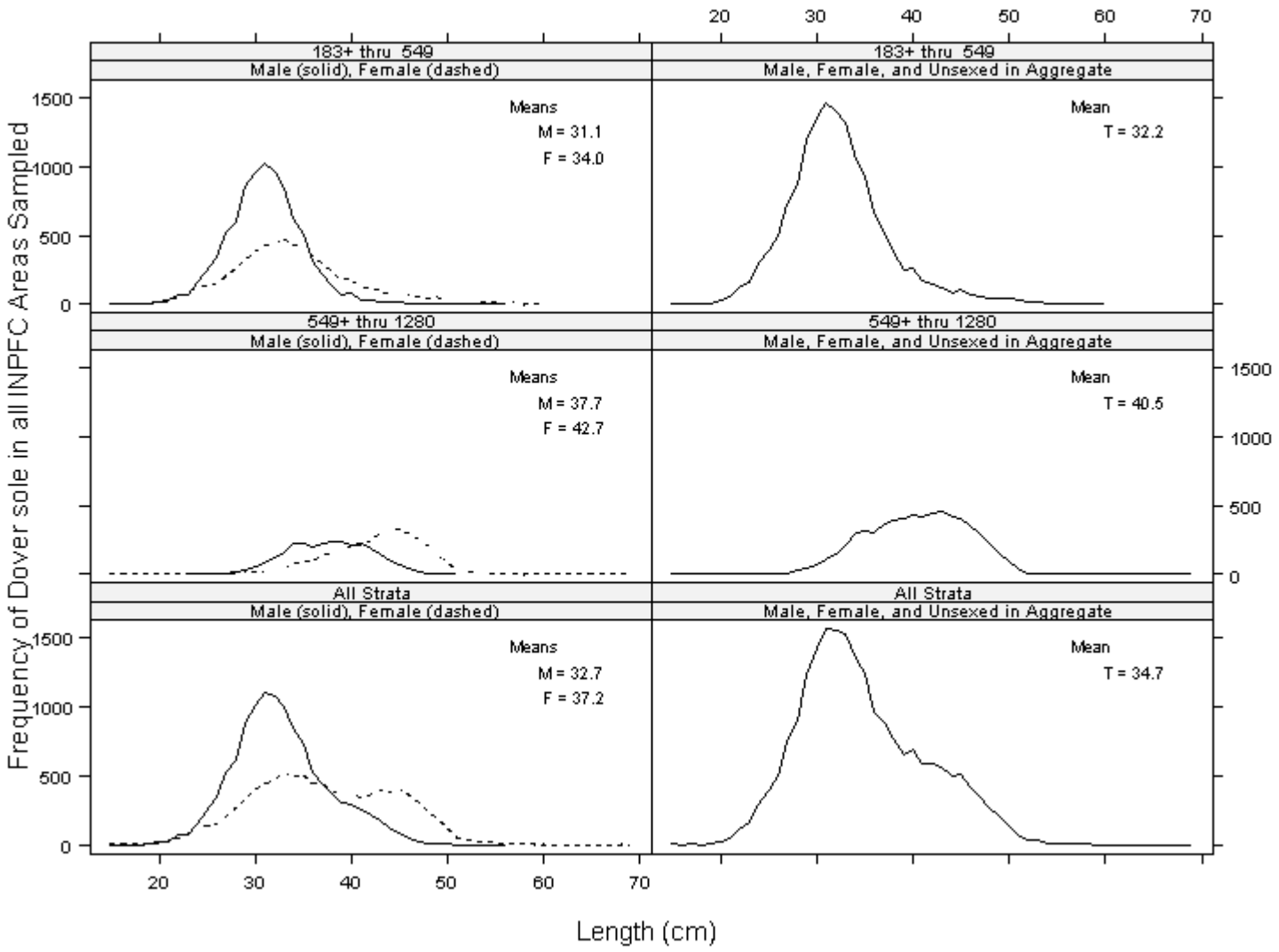


Figure 21. Unweighted length-frequency data and mean lengths (cm) of Dover sole by depth stratum (depth in m) and by sex (T=males, female, and unsexed in aggregate) for all the INPFC areas sampled from the 1999 NWFSC slope survey.

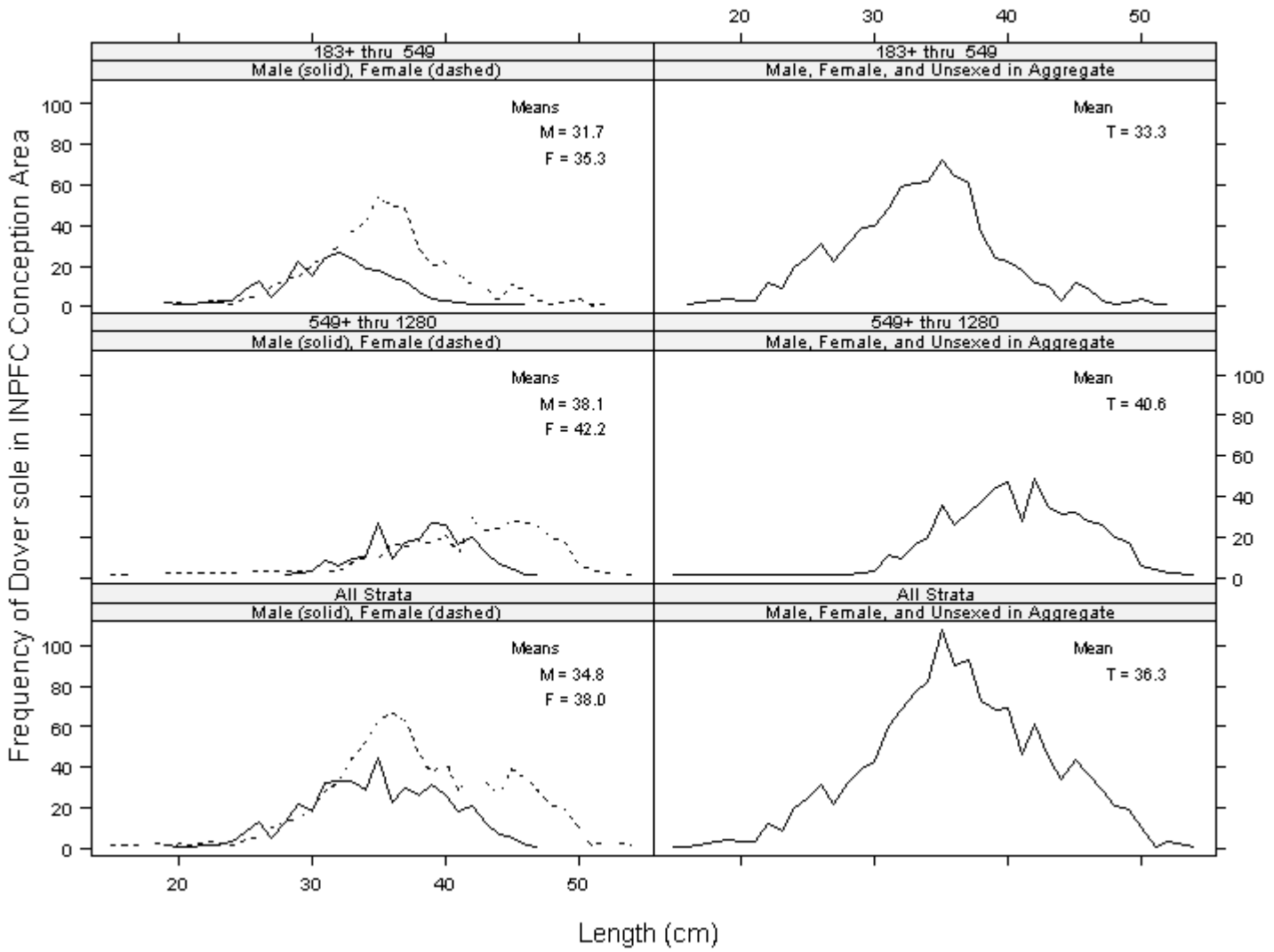


Figure 22. Unweighted length-frequency data and mean lengths (cm) of Dover sole by depth stratum (depth in m) and by sex (T=males, female, and unsexed in aggregate) for the INPFC Conception area from the 1999 NWFSC slope survey.

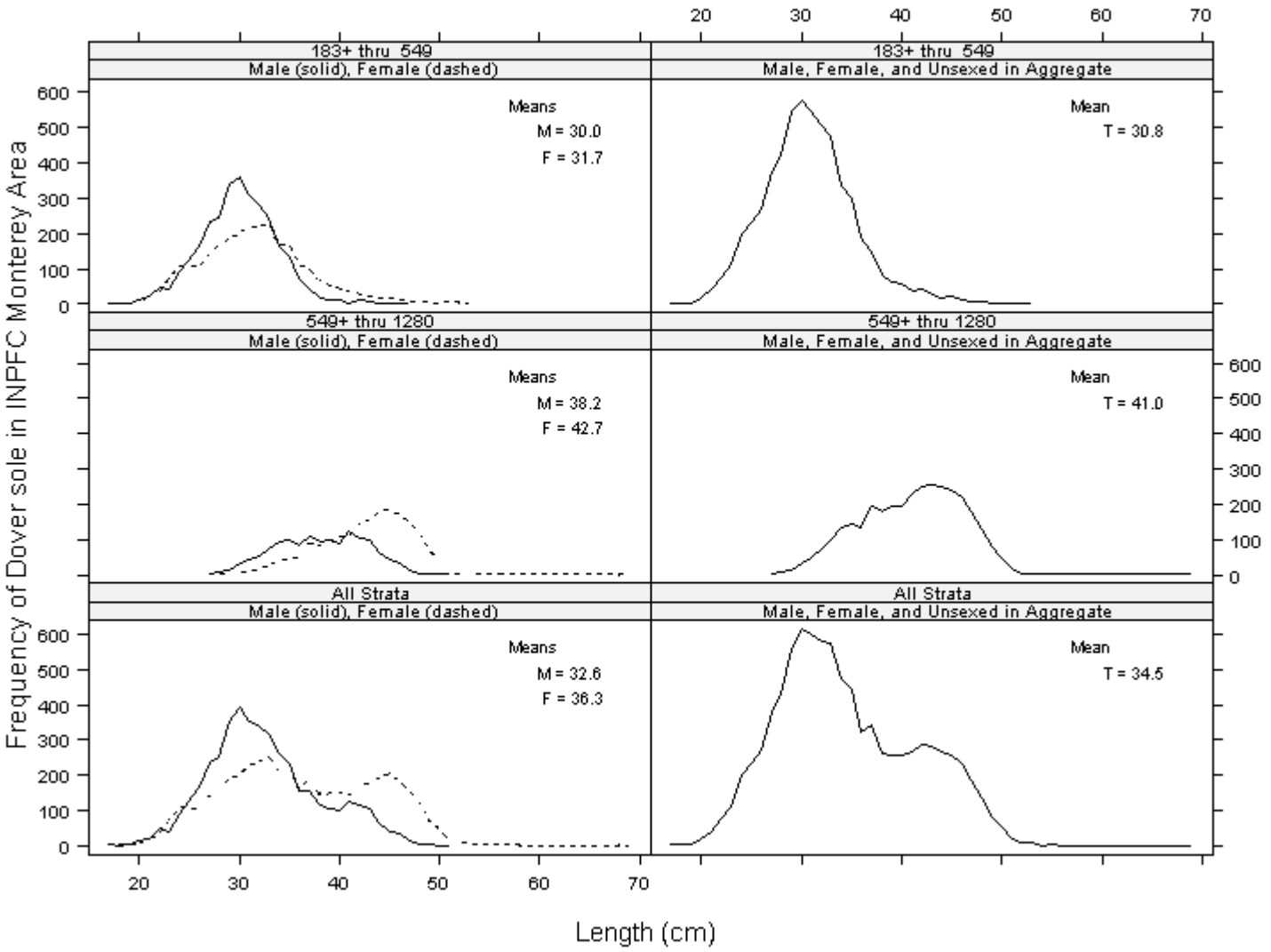


Figure 23. Unweighted length-frequency data and mean lengths (cm) of Dover sole by depth stratum (depth in m) and by sex (T=males, female, and unsexed in aggregate) for the INPFC Monterey area from the 1999 NWFSC slope survey.

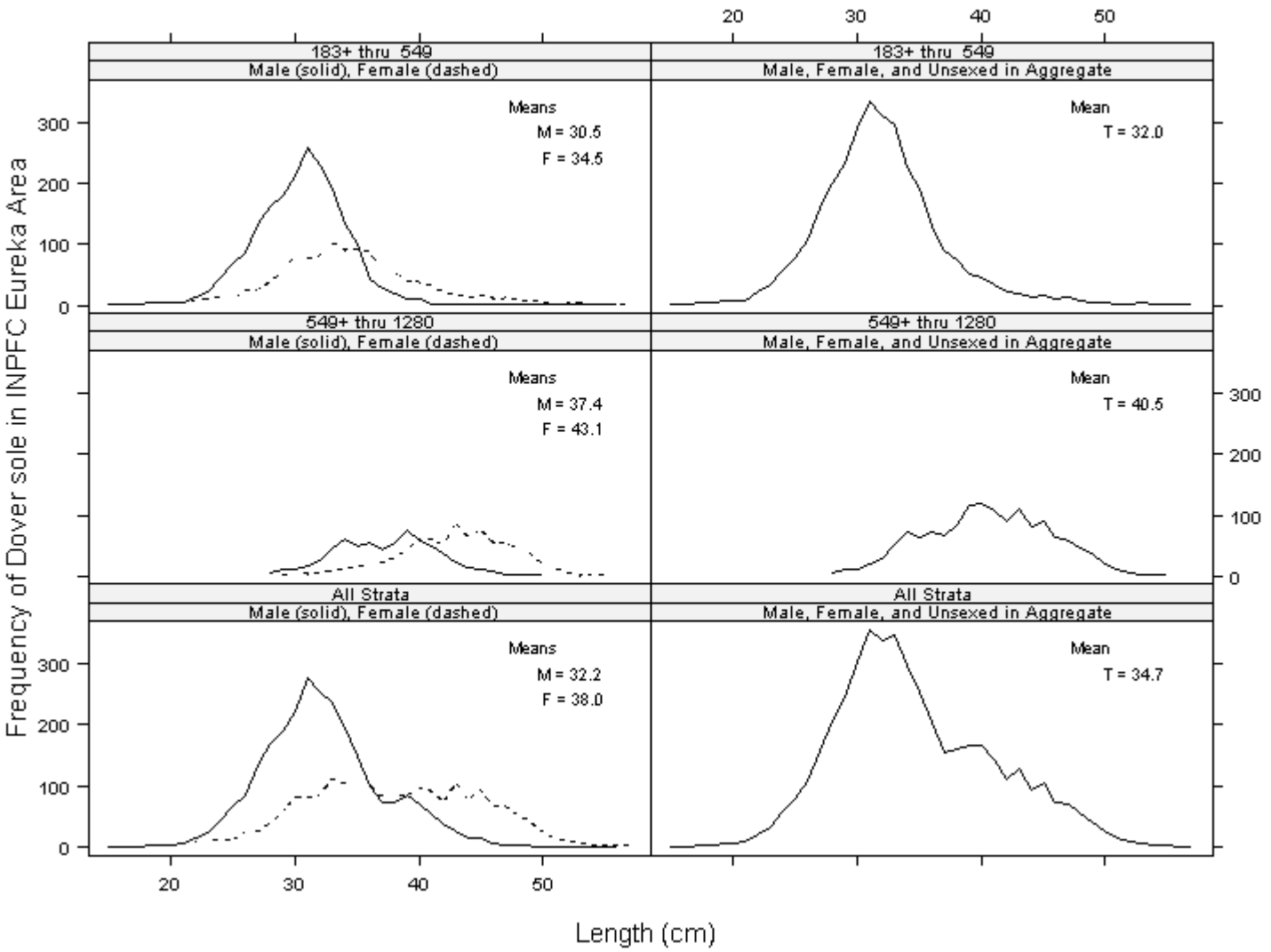


Figure 24. Unweighted length-frequency data and mean lengths (cm) of Dover sole by depth stratum (depth in m) and by sex (T=males, female, and unsexed in aggregate) for the INPFC Eureka area from the 1999 NWFSC slope survey.

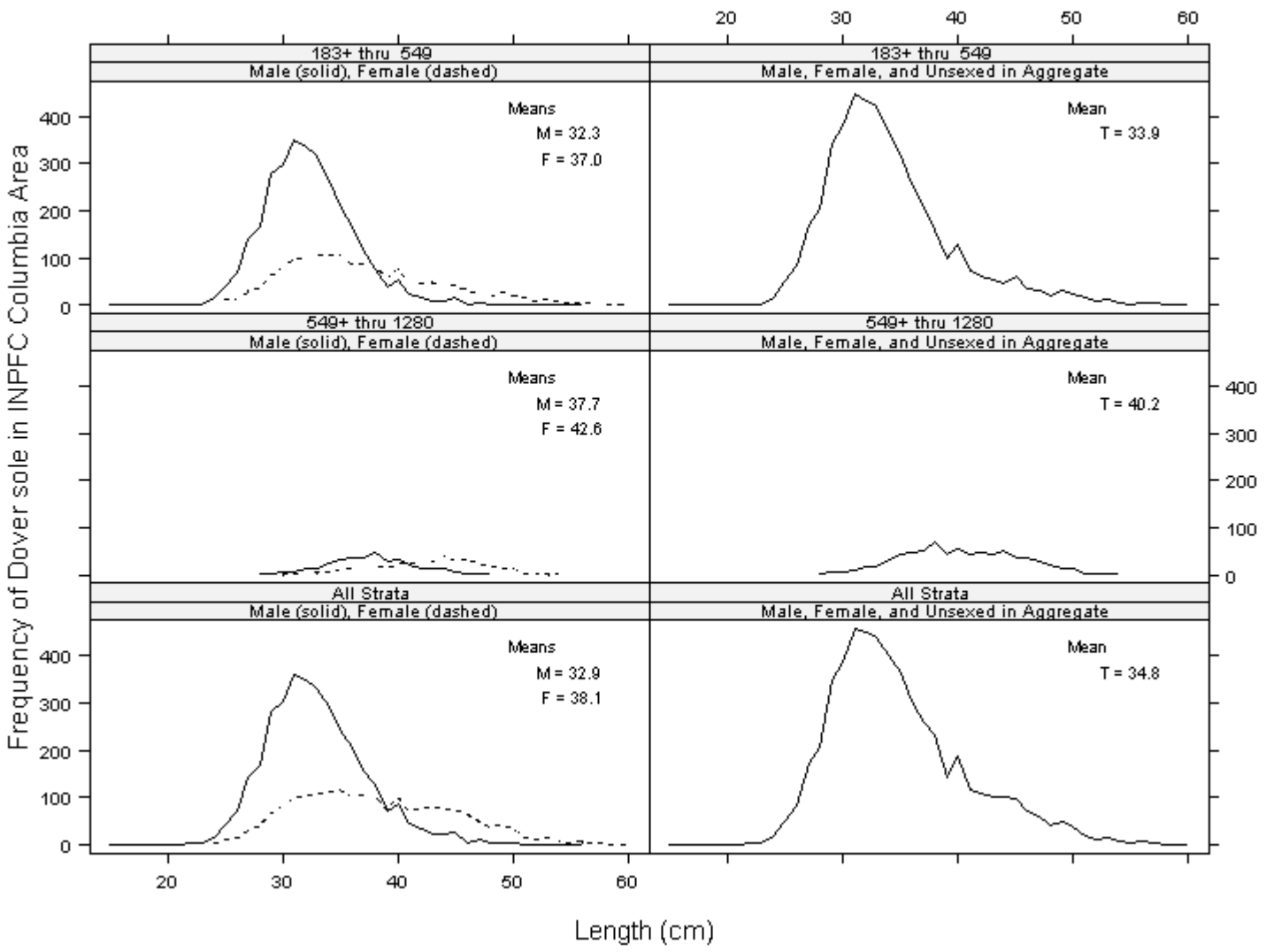


Figure 25. Unweighted length-frequency data and mean lengths (cm) of Dover sole by depth stratum (depth in m) and by sex (T=males, female, and unsexed in aggregate) for the INPFC Columbia area from the 1999 NWFSC slope survey.

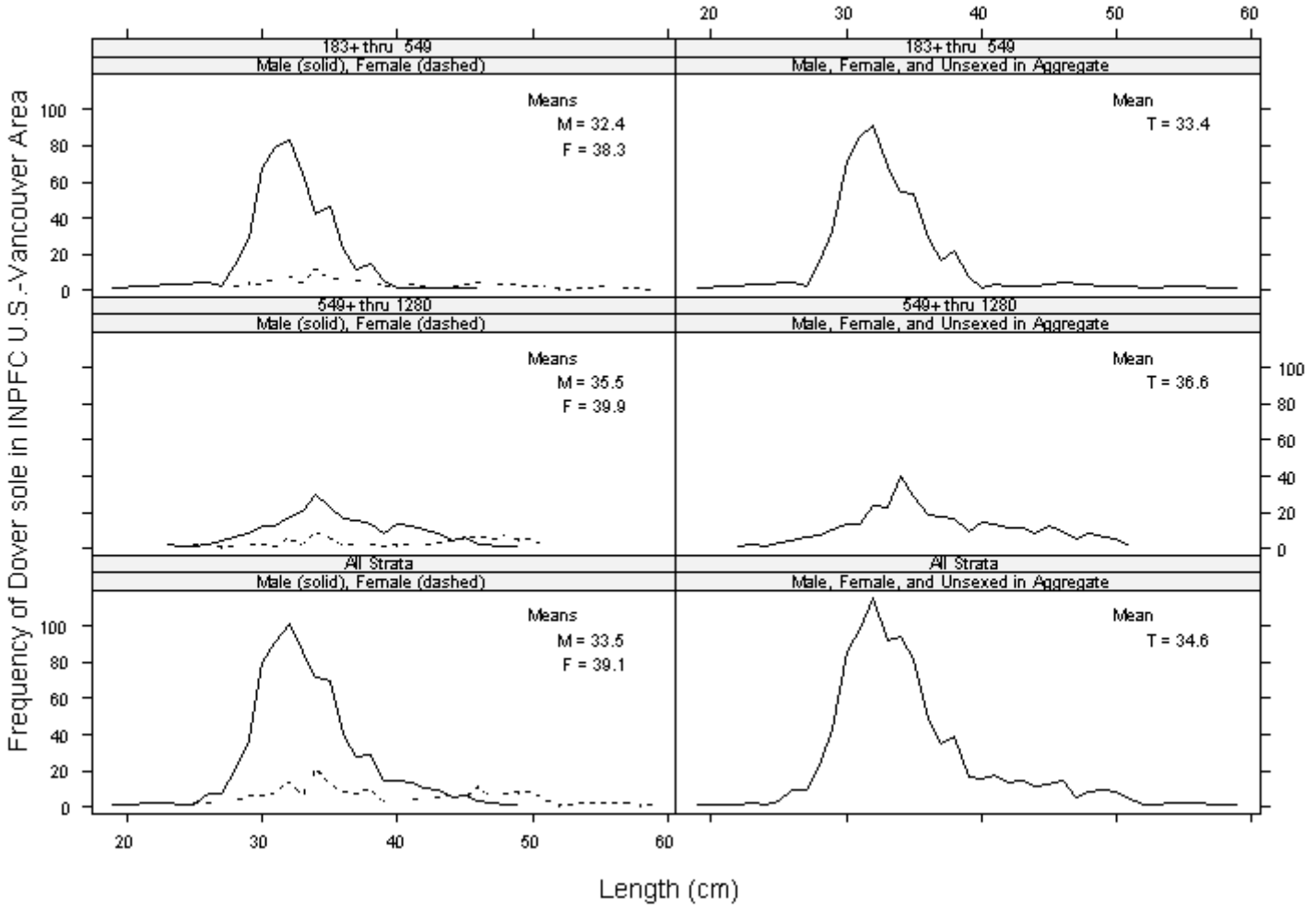


Figure 26. Unweighted length-frequency data and mean lengths (cm) of Dover sole by depth stratum (depth in m) and by sex (T=males, female, and unsexed in aggregate) for the INPFC U.S.-Vancouver area from the 1999 NWFSC slope survey.

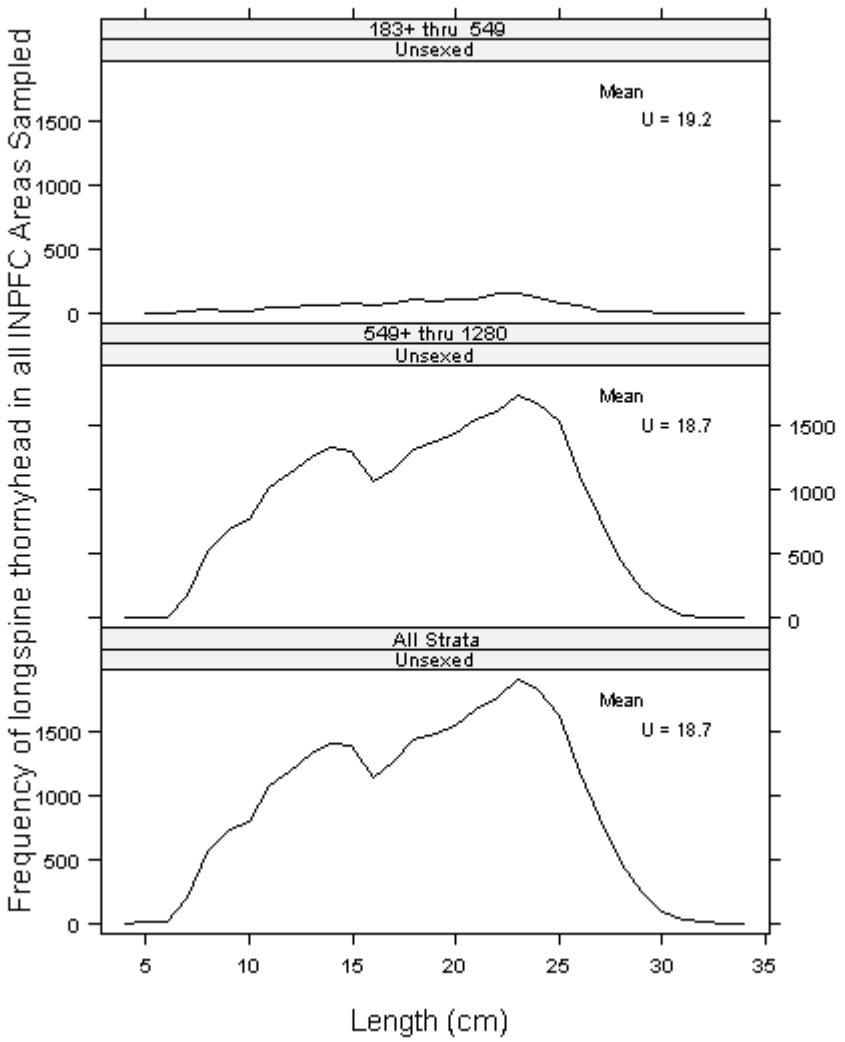


Figure 27. Unweighted length-frequency data and mean lengths (cm) of longspine thornyhead by depth stratum (depth in m) for unsexed fish only (U=unsexed) for all the INPFC areas sampled from the 1999 NWFSC slope survey.

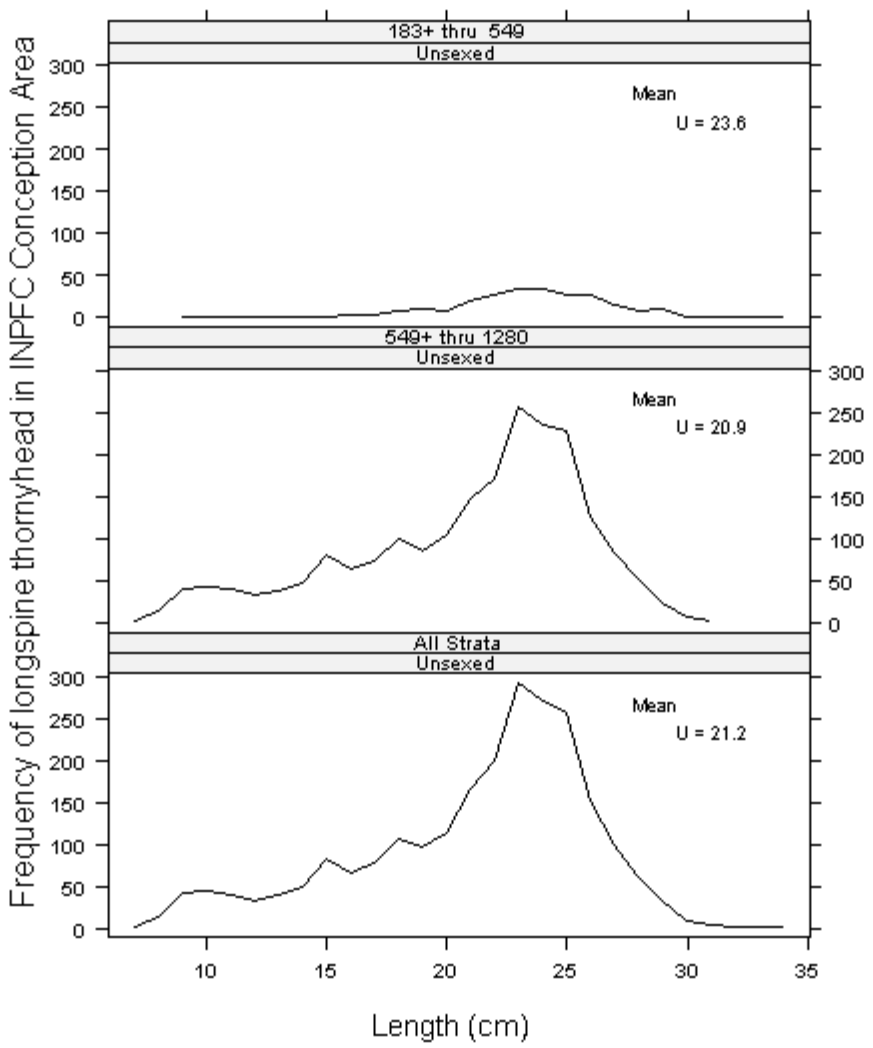


Figure 28. Unweighted length-frequency data and mean lengths (cm) of longspine thornyhead by depth stratum (depth in m) for unsexed fish only (U=unsexed) for the INPFC Conception area from the 1999 NWFSC slope survey.

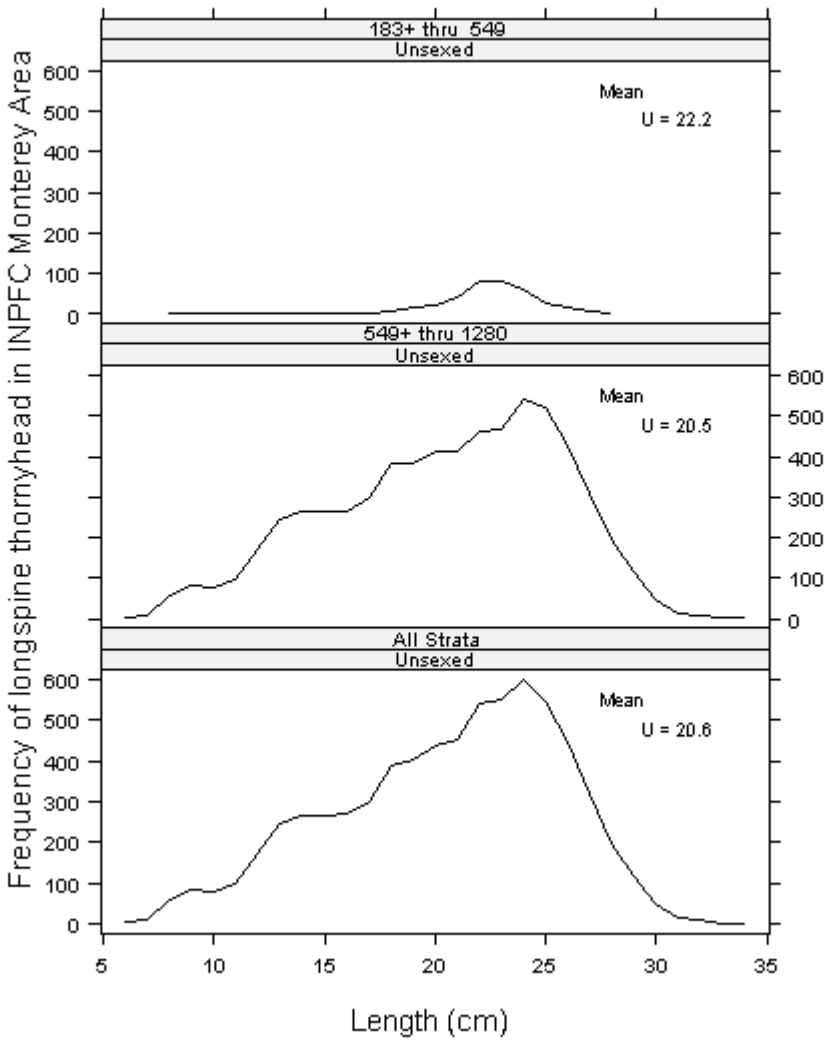


Figure 29. Unweighted length-frequency data and mean lengths (cm) of longspine thornyhead by depth stratum (depth in m) for unsexed fish only (U=unsexed) for the INPFC Monterey area from the 1999 NWFSC slope survey.

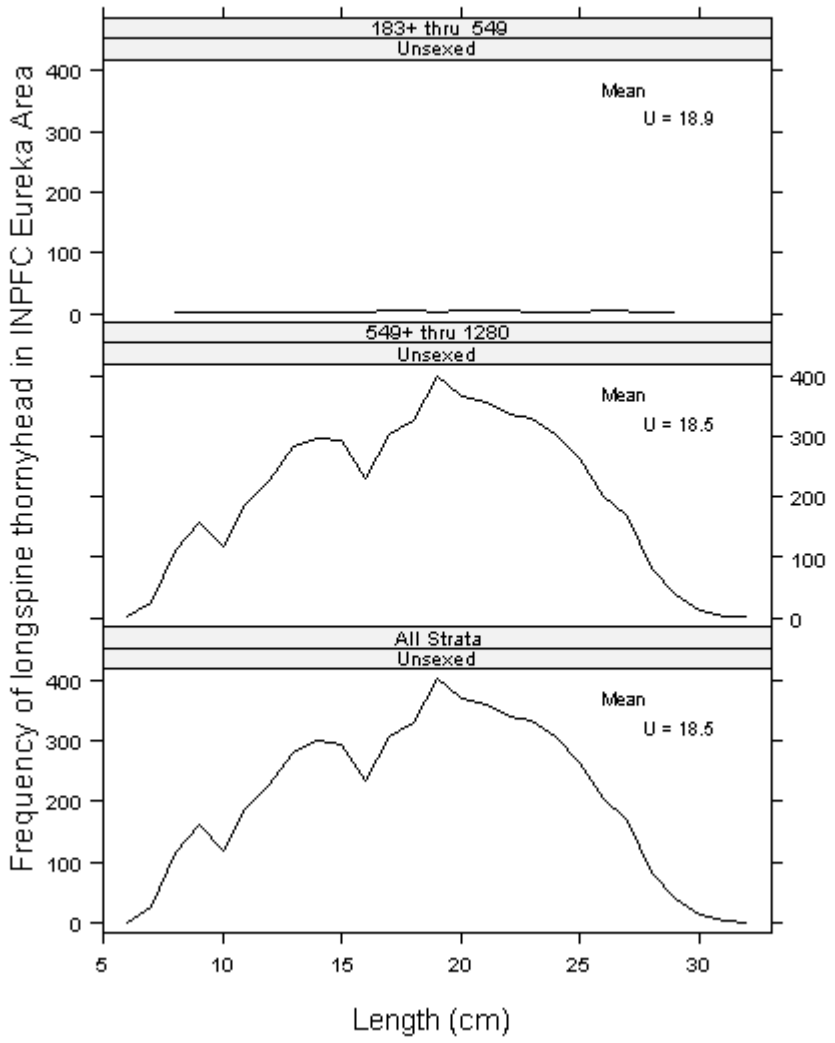


Figure 30. Unweighted length-frequency data and mean lengths (cm) of longspine thornyhead by depth stratum (depth in m) for unsexed fish only (U=unsexed) for the INPFC Eureka area from the 1999 NWFSC slope survey.

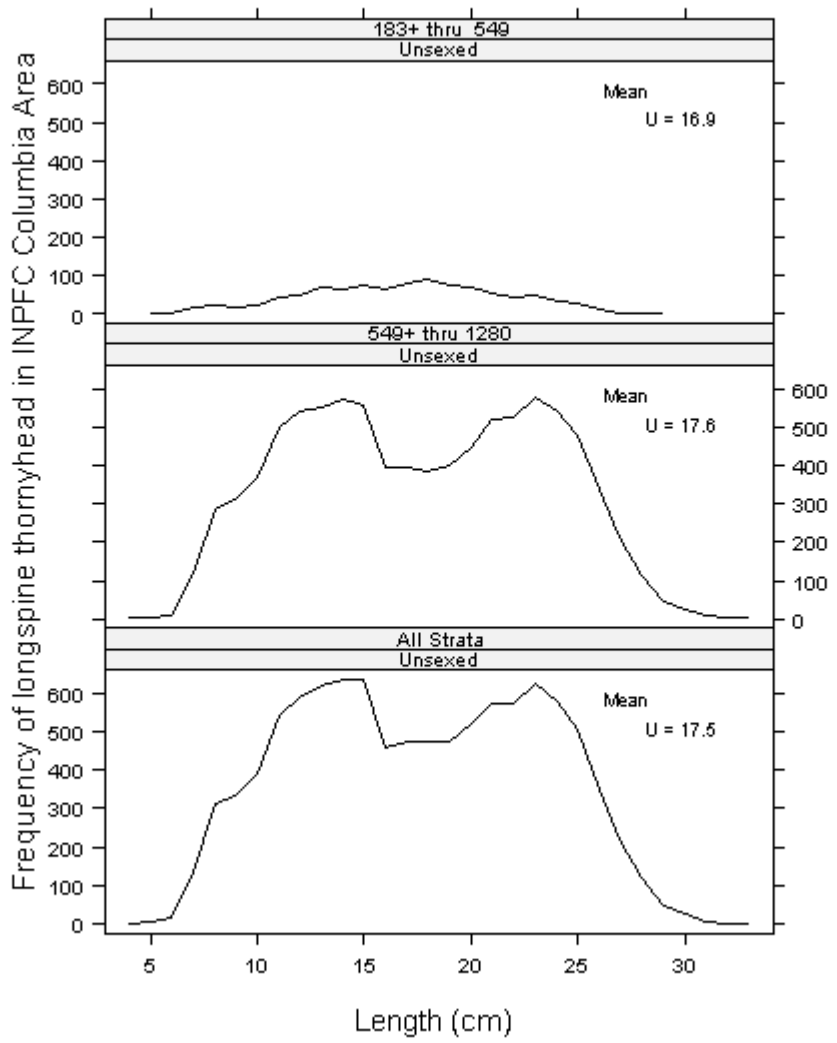


Figure 31. Unweighted length-frequency data and mean lengths (cm) of longspine thornyhead by depth stratum (depth in m) for unsexed fish only (U=unsexed) for the INPFC Columbia area from the 1999 NWFSC slope survey.

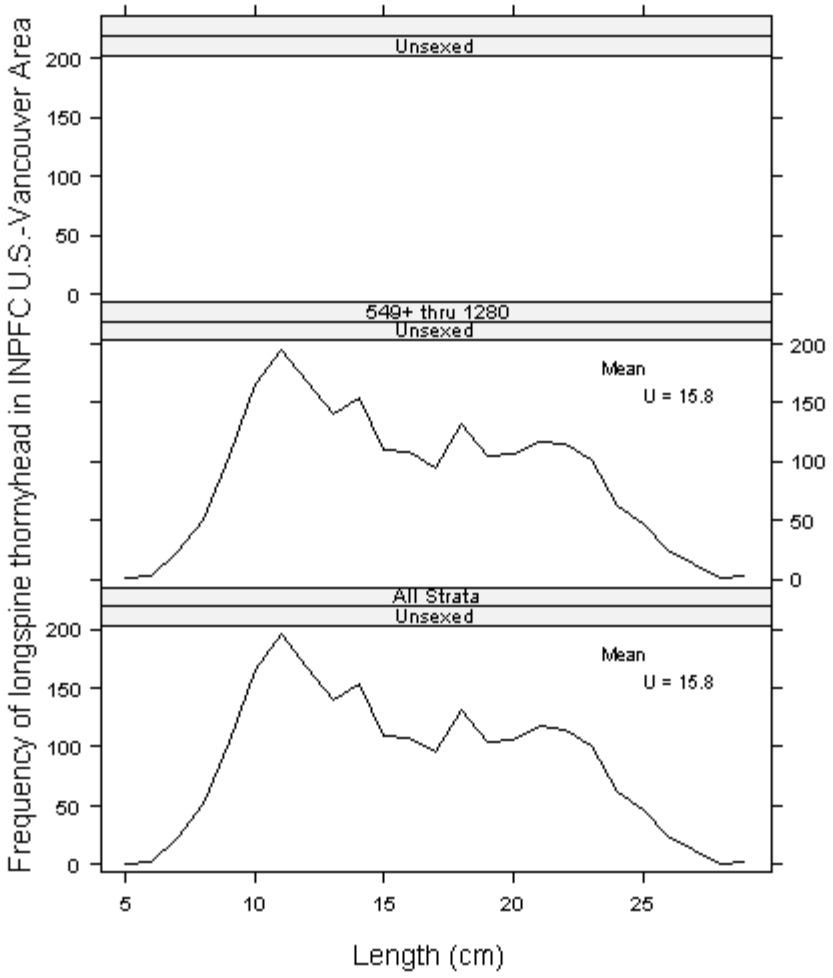


Figure 32. Unweighted length-frequency data and mean lengths (cm) of longspine thornyhead by depth stratum (depth in m) for unsexed fish only (U=unsexed) for the INPFC U.S.-Vancouver area from the 1999 NWFSC slope survey.

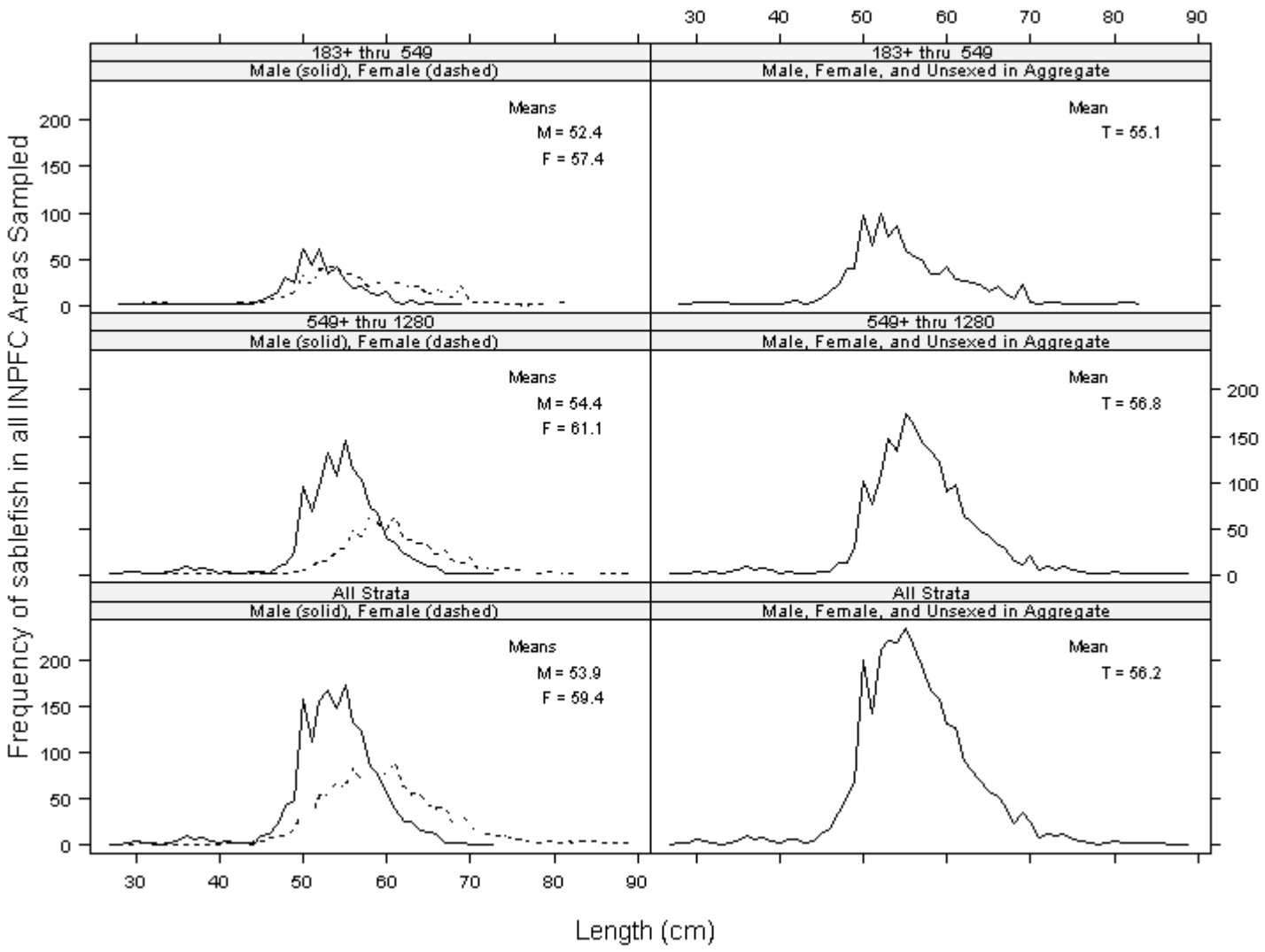


Figure 33. Unweighted length-frequency data and mean lengths (cm) of sablefish by depth stratum (depth in m) and by sex (T=males, female, and unsexed in aggregate) for all the INPFC areas sampled from the 1999 NWFSC slope survey.

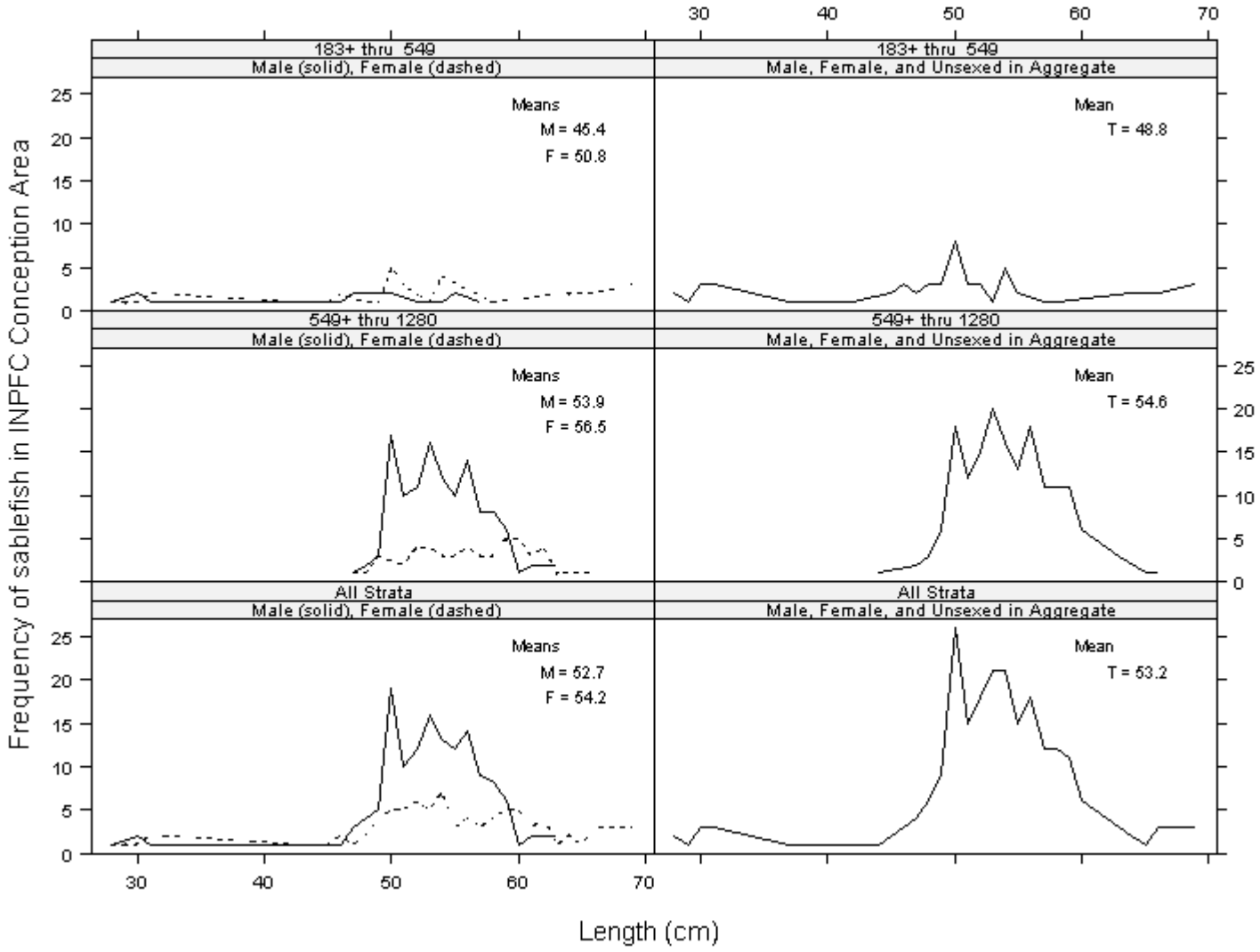


Figure 34. Unweighted length-frequency data and mean lengths (cm) of sablefish by depth stratum (depth in m) and by sex (T=males, female, and unsexed in aggregate) for the INPFC Conception area from the 1999 NWFSC slope survey.

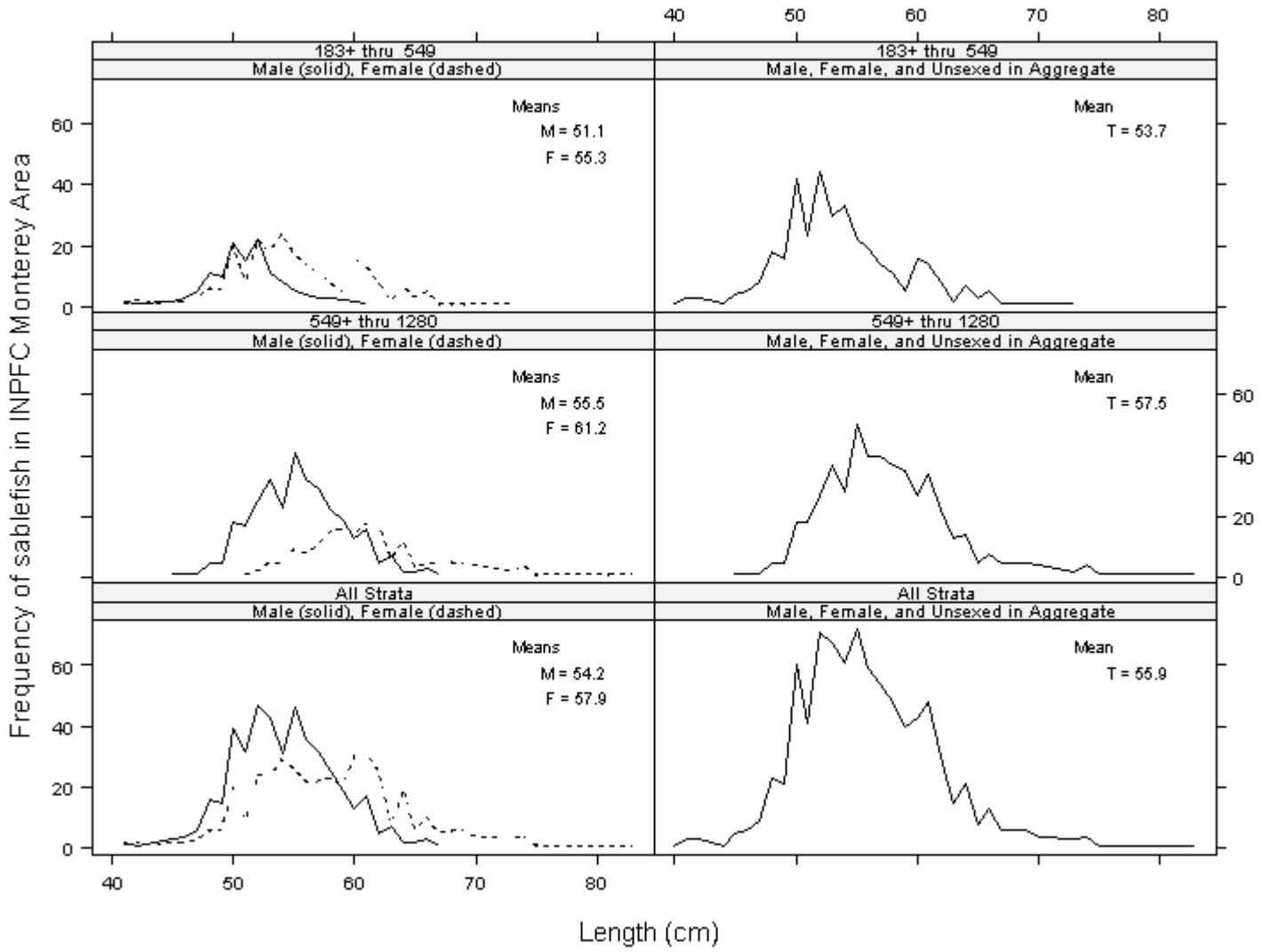


Figure 35. Unweighted length-frequency data and mean lengths (cm) of sablefish by depth stratum (depth in m) and by sex (T=males, female, and unsexed in aggregate) for the INPFC Monterey area from the 1999 NWFSC slope survey.

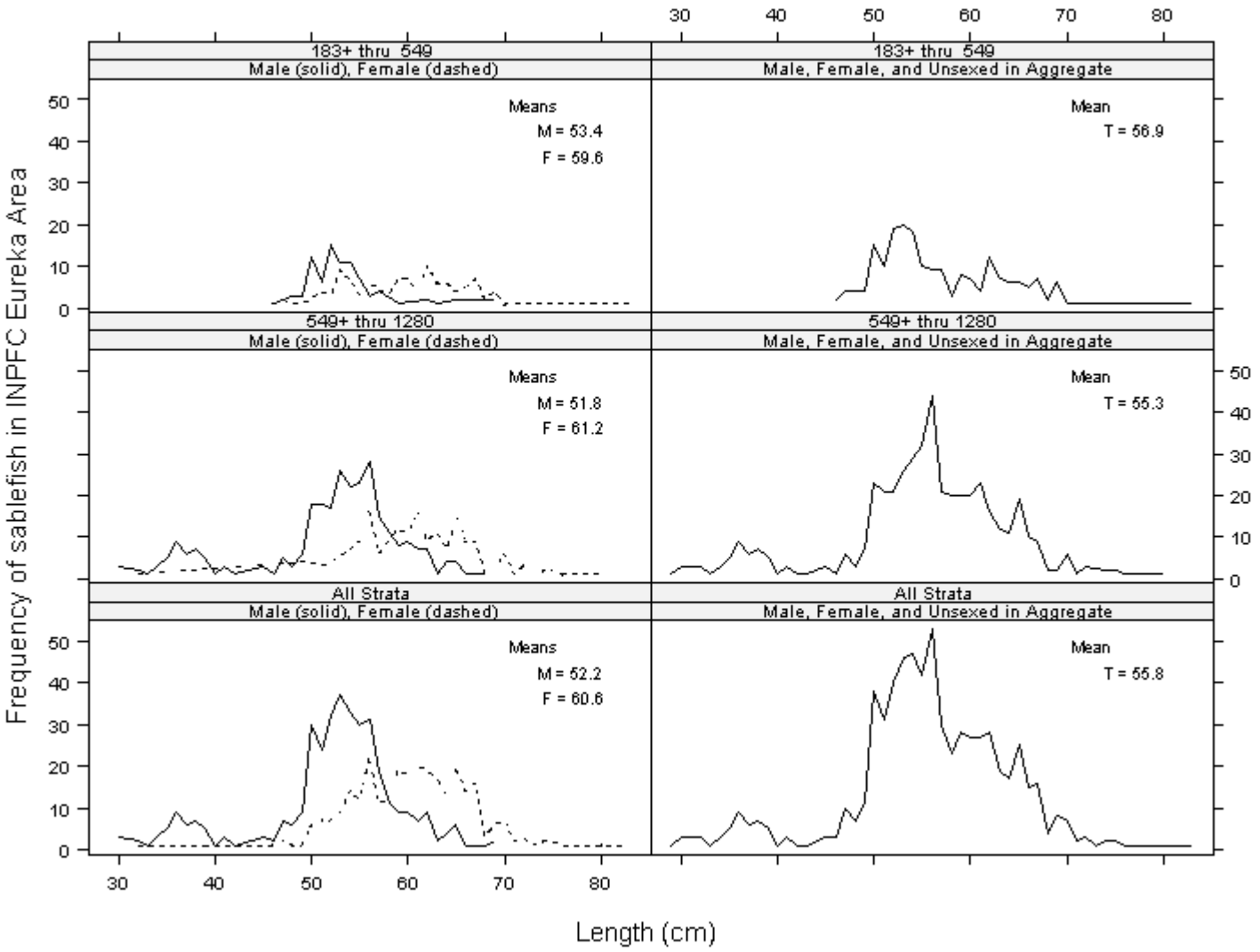


Figure 36. Unweighted length-frequency data and mean lengths (cm) of sablefish by depth stratum (depth in m) and by sex (T=males, female, and unsexed in aggregate) for the INPFC Eureka area from the 1999 NWFSC slope survey.

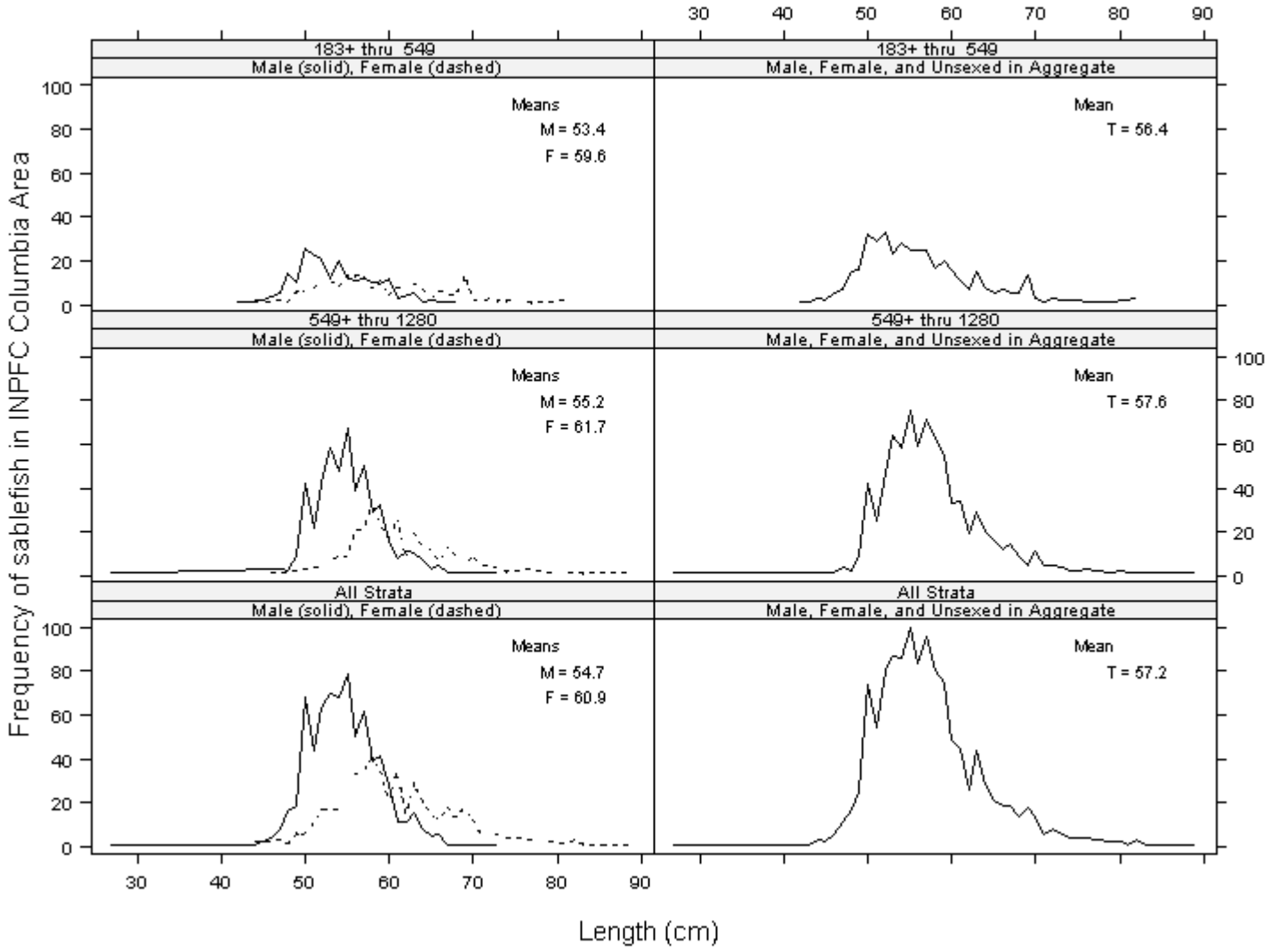


Figure 37. Unweighted length-frequency data and mean lengths (cm) of sablefish by depth stratum (depth in m) and by sex (T=males, female, and unsexed in aggregate) for the INPFC Columbia area from the 1999 NWFSC slope survey.

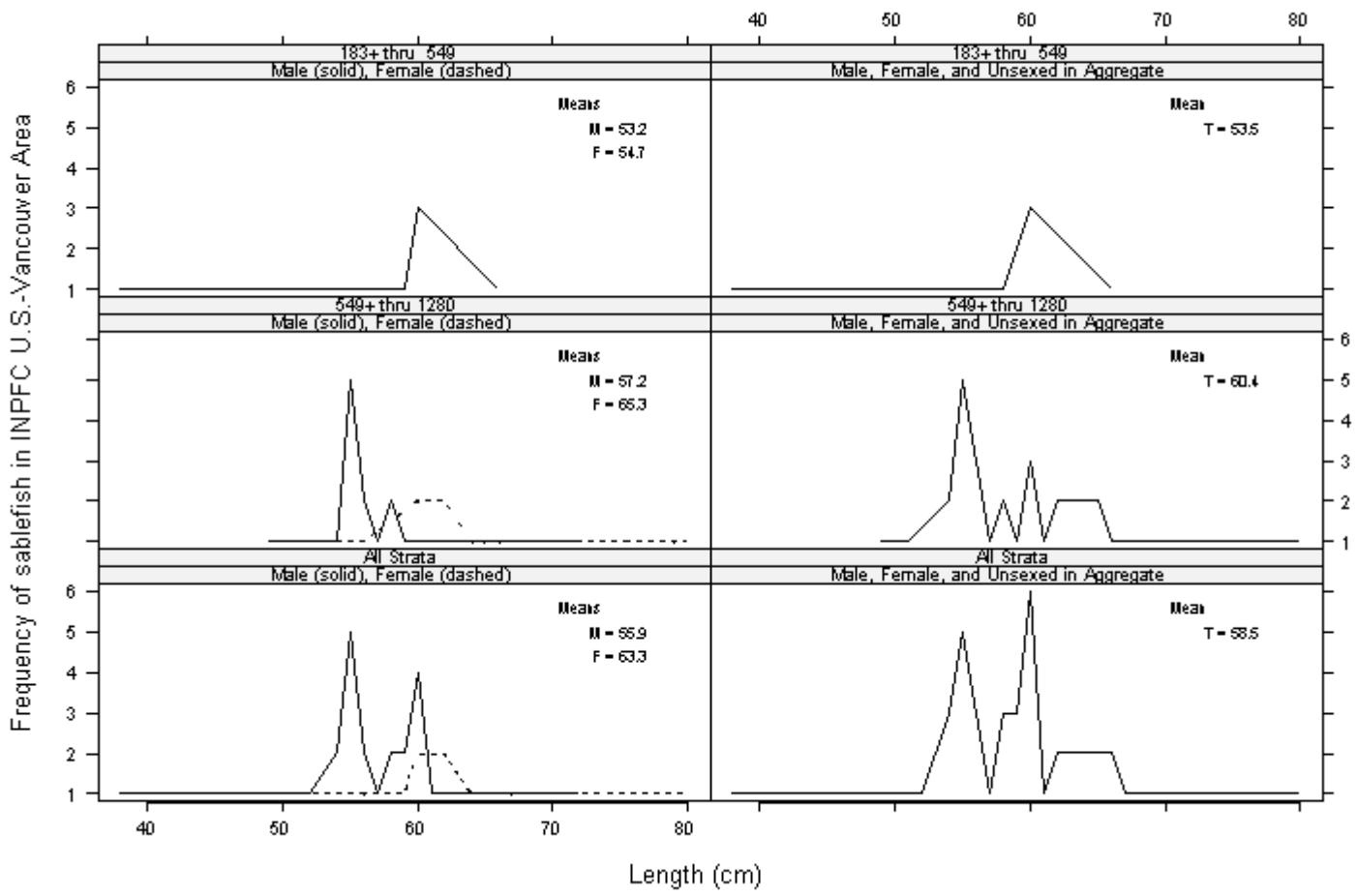


Figure 38. Unweighted length-frequency data and mean lengths (cm) of sablefish by depth stratum (depth in m) and by sex (T=males, female, and unsexed in aggregate) for the INPFC U.S.-Vancouver area from the 1999 NWFSC slope survey.

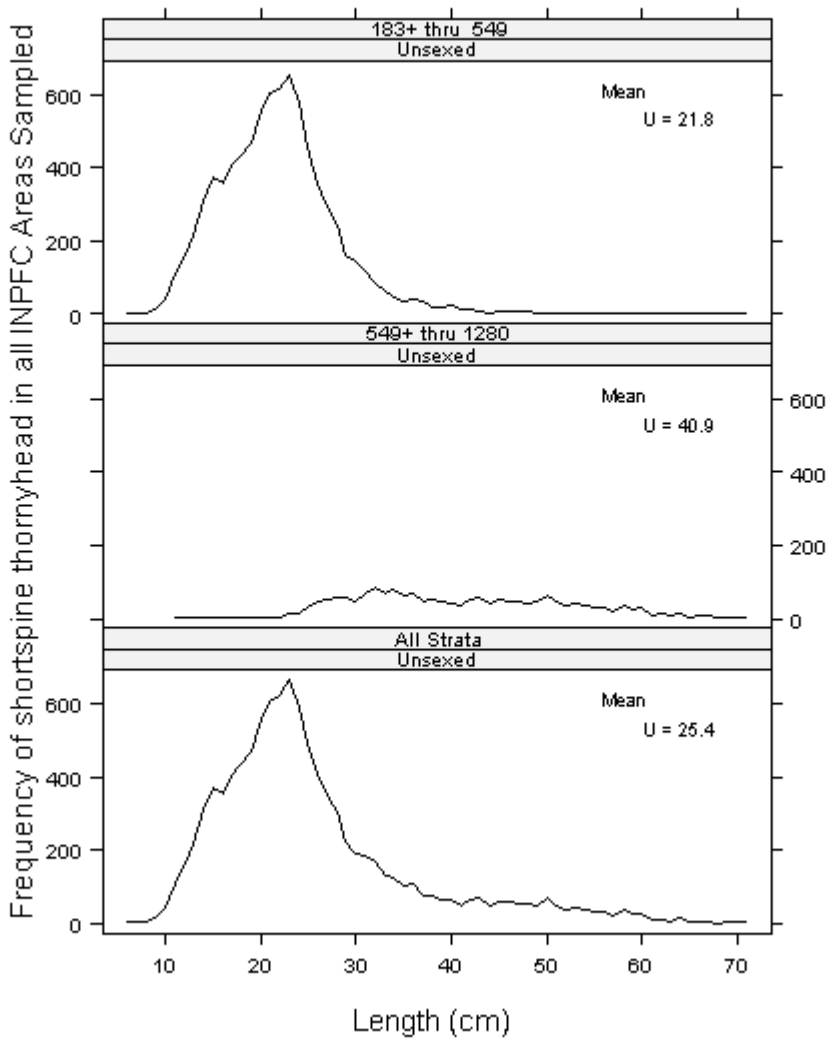


Figure 39. Unweighted length-frequency data and mean lengths (cm) of shortspine thornyhead by depth stratum (depth in m) for unsexed fish only (U=unsexed) for all the INPFC areas sampled from the 1999 NWFSC slope survey.

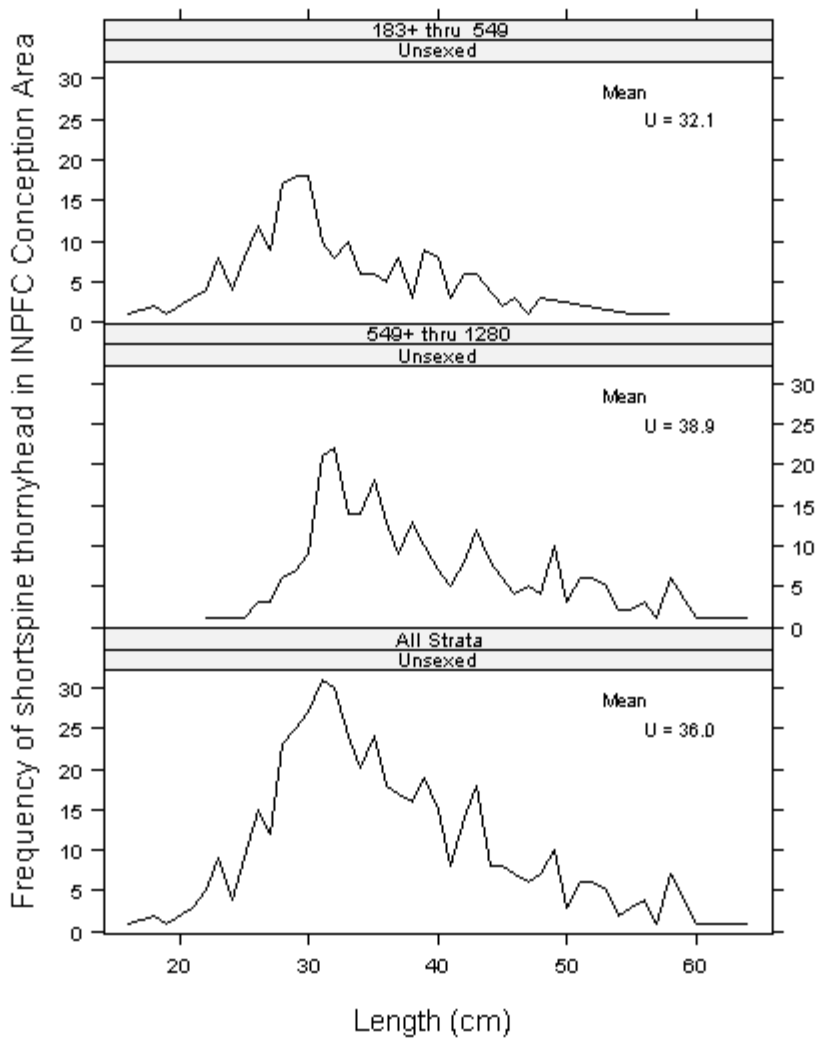


Figure 40. Unweighted length-frequency data and mean lengths (cm) of shortspine thornyhead by depth stratum (depth in m) for unsexed fish only (U=unsexed) for the INPFC Conception area from the 1999 NWFSC slope survey.

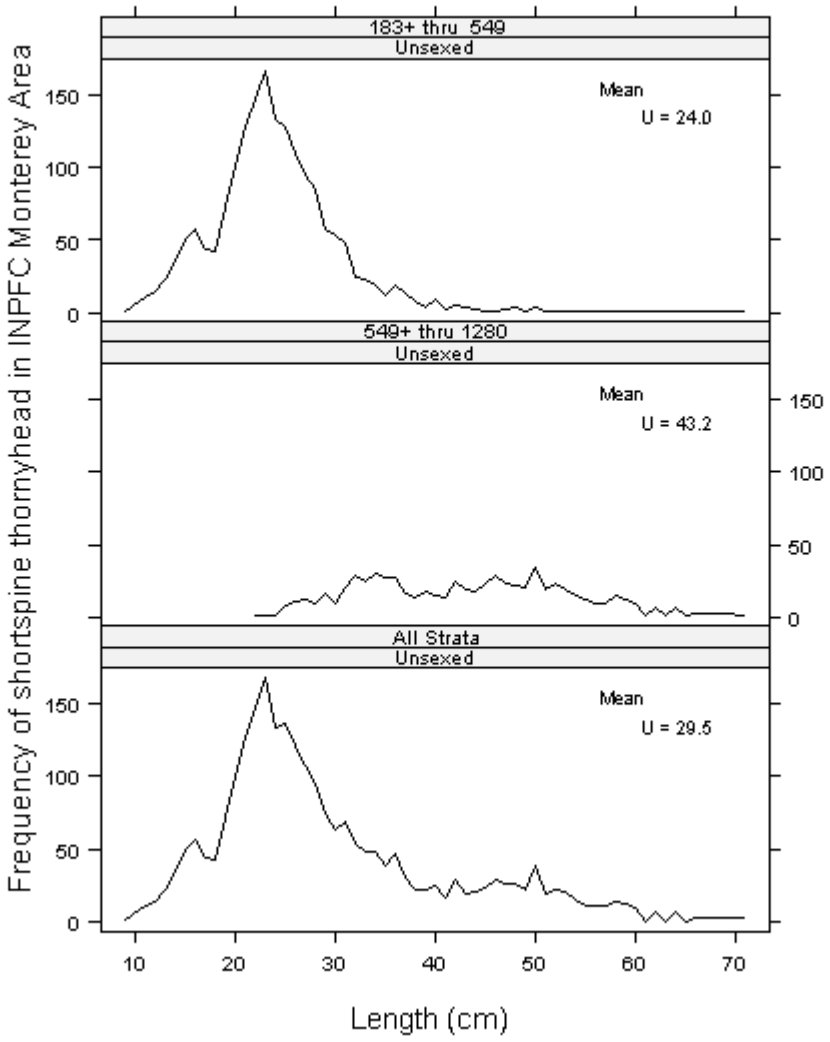


Figure 41. Unweighted length-frequency data and mean lengths (cm) of shortspine thornyhead by depth stratum (depth in m) for unsexed fish only (U=unsexed) for the INPFC Monterey area from the 1999 NWFSC slope survey.

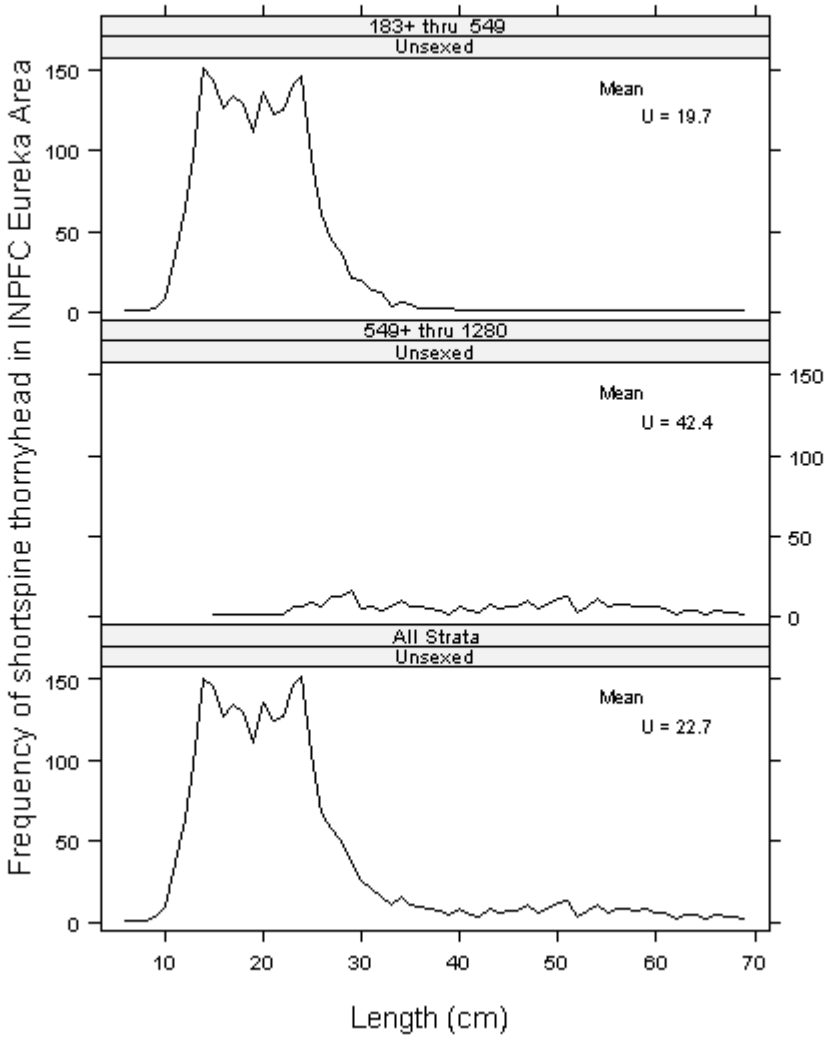


Figure 42. Unweighted length-frequency data and mean lengths (cm) of shortspine thornyhead by depth stratum (depth in m) for unsexed fish only (U=unsexed) for the INPFC Eureka area from the 1999 NWFSC slope survey.

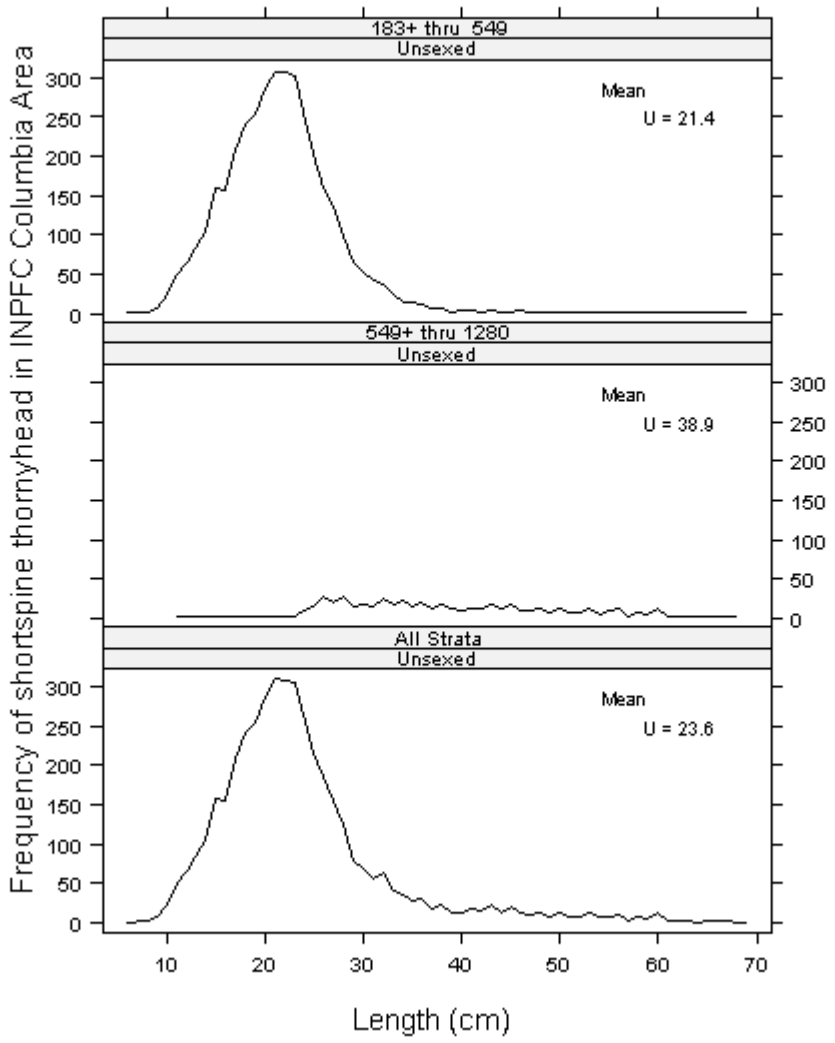


Figure 43. Unweighted length-frequency data and mean lengths (cm) of shortspine thornyhead by depth stratum (depth in m) for unsexed fish only (U=unsexed) for the INPFC Columbia area from the 1999 NWFSC slope survey.

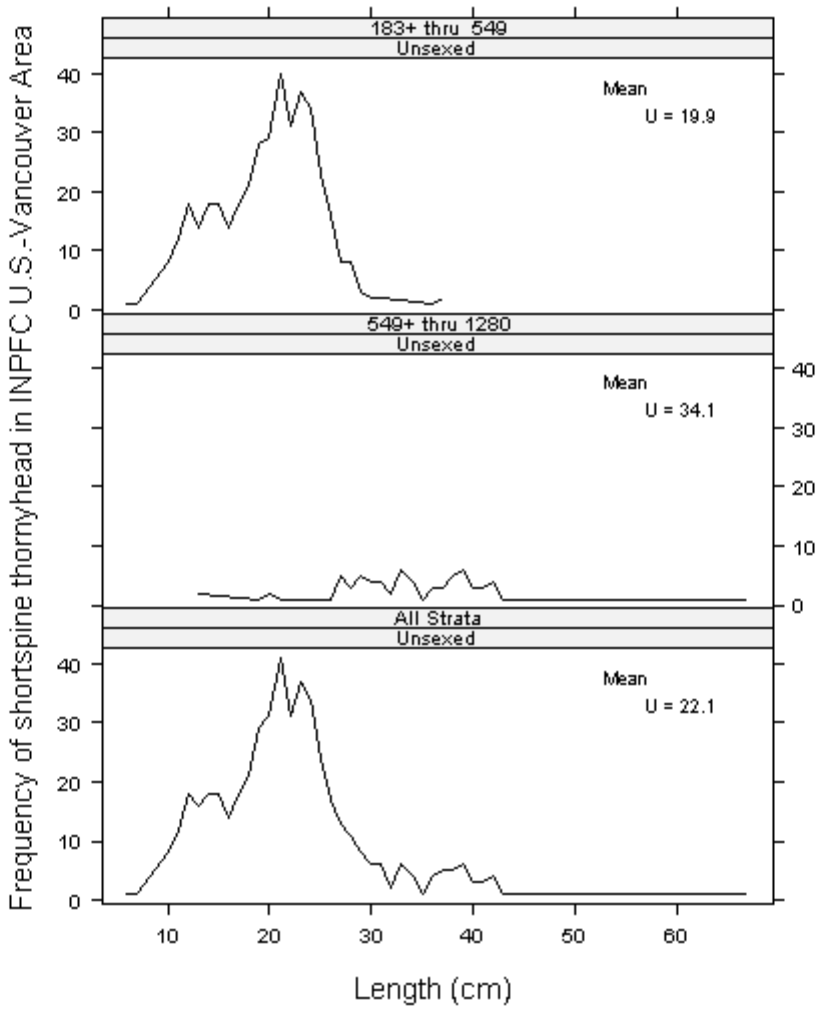


Figure 44. Unweighted length-frequency data and mean lengths (cm) of shortspine thornyhead by depth stratum (depth in m) for unsexed fish only (U=unsexed) for the INPFC U.S.-Vancouver area from the 1999 NWFSC slope survey.

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APPENDIX A:

HAUL AND CATCH INFORMATION

APPENDIX A

Haul and Catch Information

Appendix A consists of Table A-1, listing station data and catch data for all hauls from the 1999 NWFSC slope survey of the International North Pacific Fisheries Commission (INPFC) U.S.-Vancouver, Columbia, Eureka, Monterey and Conception statistical areas. Depths are reported in meters (m), distances fished in meters (m), and catch weights are in kilograms (kg). Geodetic positions are displayed in the table as decimal degrees (e.g., 45.3350 corresponds to 45°20'30"N latitude). Only catches from hauls with a performance code greater than or equal to 0 were used for data analyses.

The superscript a ([a]) indicates that the latitude and longitude were taken from the vessel position and superscript b ([b]) indicates that the latitude and longitude were taken from the Field Party Chief data sheets. The asterisk (*) indicates species appearance in the catch, but no weights were recorded. Performance codes that appear in this appendix are as follows:

Code	Explanation
0	Good performance
1	Satisfactory performance, hung up
1.1	Satisfactory performance, minor hang(s)
1.11	Satisfactory performance, completed tow
4.1	Satisfactory performance, caught large rock
5.1	Satisfactory performance, net came off bottom
---	---
-6	Unsatisfactory performance, unspecified problems
-5.1	Unsatisfactory performance, net came off bottom
-5	Unsatisfactory performance, unspecified gear performance problem
-4.5	Unsatisfactory performance, large invertebrate catch affected net performance
-4.2	Unsatisfactory performance, caught large quantity of mud
-4.1	Unsatisfactory performance, caught large rock
-3.12	Unsatisfactory performance, caught dungeness crab pot
-3.11	Unsatisfactory performance, caught sablefish pot
-2.4	Unsatisfactory performance, belly damaged
-1.12	Unsatisfactory performance, hauled back early due to hang(s)
-1.11	Unsatisfactory performance, completed tow
-1	Unsatisfactory performance, hung up

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey.

Haul number	199901001001	199901001002	199901001003	199901001004	199901001005	199901001006	199901001007	199901001008	199901001009
Start date and time	8/26/99 7:16	8/26/99 9:07	8/26/99 11:47	8/26/99 14:02		8/26/99 16:41	8/26/99 18:08	8/27/99 6:52	
Start gear latitude (dd)	47.6391	47.6048	47.6505	47.6464		47.6446	47.6388	46.9962 [a]	
Start gear longitude (dd)	-125.5670	-125.5233	-125.3285	-125.2326		-125.1170	-125.1235	-124.9826 [a]	
End gear latitude (dd)	47.6311	47.6148	47.6390	47.6385		47.6540	47.6456	46.9868 [a]	
End gear longitude (dd)	-125.5572	-125.5250	-125.3146	-125.2237		-125.1141	-125.1268	-124.9841 [a]	
Station	4J	4J	4H	4G	4C	4C	4D	8C	8D
Avg Bottom depth (m)	1207.91	1168.56	1001.81	765.62	365.76	371.49	438.91	370.37	438.91
Duration (hr)	0.31	0.30	0.42	0.38		0.29	0.26	0.32	
Distance fished (km)	1.17	1.15	1.76	1.69	0.00	1.12	0.93	1.22	0.00
Net width (m)	16.40	16.40	16.30	16.10		15.90		15.90	
Performance	0	0	0	5.1	-5.1	0	-5.1	5.1	-6
Hagfish			0.34						
Brown catshark			0.86	1.71					
Spiny dogfish									
Skates		5.25				25.38	20.79	13.82	
Other elasmobranchs						17.70	0.58		
Arrowtooth flounder						46.21	21.98	11.49	
Petrale sole									
Dover sole				1.59		39.09	29.54	73.20	
Deepsea sole		0.76	6.18	0.73					
Rex sole						2.19	3.48	4.13	
Other flatfish						0.58	10.60	0.24	
Sablefish		2.77		3.40			2.83		
Pacific grenadier		9.00	12.20	2.34					
Giant grenadier		21.28	21.46	9.30					
Other grenadier									
Pacific flatnose		0.01	1.31	0.30					
Slickheads			0.84	0.10					
Eelpouts		3.50	3.91	1.52		2.61	0.77	2.81	
Snailfish			0.22	0.11		0.29		0.23	
Pacific whiting						0.54		4.09	
Other roundfish		0.25	0.04	0.05					
Shortspine thornyhead		2.21	1.85	1.21		8.67	0.74	23.47	
Longspine thornyhead		38.48	49.94	37.76					
Rougheye rockfish						15.02	1.30		
Pacific ocean perch						5.18			
Aurora rockfish								0.12	
Darkblotched rockfish									
Splitnose rockfish									
Shortbelly rockfish									
Other rockfish						0.13		10.31	
Grooved tanner crab		1.59	19.87	53.09			2.15	0.19	
Other invertebrates		31.85	14.22	11.05		28.51	38.18	41.40	
Total catch weight (kg)		116.97	133.24	124.25		192.09	132.94	185.50	

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901001010	199901001011	199901001012	199901001013	199901001014	199901001015	199901001016	199901001017	199901001018
Start date and time	8/27/99 9:37	8/27/99 12:32	8/27/99 14:32	8/27/99 17:15	8/28/99 7:40	8/28/99 9:54	8/28/99 12:09	8/28/99 15:37	8/28/99 18:07
Start gear latitude (dd)	46.9997	47.0025	47.0304		46.3691	46.3429	46.2940	46.2783	46.2693
Start gear longitude (dd)	-124.9903	-125.0154	-125.0787		-124.9697	-124.8944	-124.8041	-124.3877	-124.3505
End gear latitude (dd)	46.9901	46.9928	47.0218		46.3590	46.3310	46.2891	46.2815	46.2675
End gear longitude (dd)	-124.9904	-125.0170	-125.0776		-124.9703	-124.8970	-124.8182	-124.4055	-124.3644
Station	8D	8F	8H	8I	12J	12H	12G	12C	12A
Avg Bottom depth (m)	430.96	621.79	914.40	1207.01	1187.58	881.50	750.87	383.44	240.84
Duration (hr)	0.33	0.24	0.30	0.17	0.29	0.38	0.31	0.35	0.31
Distance fished (km)	1.25	1.25	0.99	1.25	1.15	1.38	1.22	1.47	1.12
Net width (m)	15.90				16.40	16.20	16.10	15.90	15.80
Performance	5.1	-5.1	-5.1	-5.1	5.1	5.1	0	1.11	0
Hagfish			0.24			0.11			
Brown catshark	3.36						1.32	0.10	
Spiny dogfish									
Skates	5.37			8.27	4.37		0.29	10.74	31.05
Other elasmobranchs	1.00								10.21
Arrowtooth flounder	40.21							8.83	21.53
Petrale sole									
Dover sole	89.67	57.99	16.04			3.44	9.86	74.04	69.06
Deepsea sole			7.07	6.39	1.07	1.61	2.78		
Rex sole	3.83	0.31	0.34					34.85	142.09
Other flatfish	0.01								1.36
Sablefish	9.17	4.95	15.74	19.97	4.27	8.71	4.35	7.16	16.50
Pacific grenadier		0.19	1.57	24.16	24.92	2.69	0.82		
Giant grenadier		1.80	6.38	17.51	36.58	1.79	2.54		
Other grenadier				0.05					
Pacific flatnose	0.74	1.21	0.20	1.28	1.22	0.10	0.15		
Slickheads			0.62		1.38	2.59			
Eelpouts	1.94	5.63	0.44	0.46	0.79	0.35	1.35	0.88	1.29
Snailfish	0.32							0.10	
Pacific whiting	2.69							1.76	3.02
Other roundfish	0.10	0.11	0.04	0.45	0.25	0.16	0.40		6.61
Shortspine thornyhead	27.16	9.27	3.95	6.27	3.05	4.00	1.48	25.99	29.20
Longspine thornyhead		13.39	69.36	45.01	24.62	55.22	36.74		
Rougheye rockfish									
Pacific ocean perch	0.70							0.73	
Aurora rockfish	1.82								
Darkblotched rockfish									
Splitnose rockfish									
Shortbelly rockfish									
Other rockfish	1.10								104.78
Grooved tanner crab		2.48	4.74	2.07	6.43	8.15	38.91	0.76	
Other invertebrates	42.60	16.54	5.12	66.55	12.07	4.35	7.14	333.36	47.52
Total catch weight (kg)	231.79	113.88	131.85	198.44	121.02	93.28	108.13	499.30	484.20

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901001019	199901001020	199901001021	199901001022	199901001023	199901001024	199901001025	199901001026	199901001027
Start date and time	8/29/99 7:06	8/29/99 8:31	8/29/99 10:46	8/29/99 12:37	8/29/99 15:00	8/30/99 7:47	8/30/99 9:56	8/30/99 13:02	8/30/99 14:56
Start gear latitude (dd)	45.6640	45.6695	45.7424	45.7148°	45.6878	44.9940	44.9865	45.0302	45.0305
Start gear longitude (dd)	-124.6715	-124.6883	-124.8055	-124.8521°	-124.9052	-125.0522	-125.0337	-124.8110	-124.7328
End gear latitude (dd)	45.6536	45.6599	45.7314	45.7063°	45.6806	44.9846	44.9740	45.0200	45.0200
End gear longitude (dd)	-124.6727	-124.6936	-124.8062	-124.8462°	-124.8985	-125.0460	-125.0267	-124.8060	-124.7307
Station	16C	16D	16F	16G	16I	20I	20H	20F	20E
Avg Bottom depth (m)	380.88	440.40	610.75	753.46	1207.01	1138.53	1041.09	620.19	518.57
Duration (hr)	0.29	0.30	0.32	0.34	0.29	0.33	0.39	0.32	0.32
Distance fished (km)	1.18	1.16	1.25	1.28	0.98	1.19	1.55	1.21	1.20
Net width (m)	15.90	15.90	16.00	16.10		16.30	16.30	16.00	16.00
Performance	0	0	0	0	-5.1	0	0	0	0
Hagfish									
Brown catshark	1.01	1.00	0.12	0.21	0.19		0.33	2.00	6.75
Spiny dogfish									
Skates	21.16	9.43	1.03		9.30	14.75	3.45		8.81
Other elasmobranchs									
Arrowtooth flounder	6.64	9.18	1.60						
Petrale sole									
Dover sole	48.35	56.62	3.16	7.68				4.41	20.53
Deepsea sole			0.55	1.09	2.10	0.78	1.47	0.92	
Rex sole	12.92	3.27							0.25
Other flatfish									
Sablefish		20.94	8.89	15.58		36.56	23.76	21.08	
Pacific grenadier			0.50	0.65	31.43	84.38	108.11	1.29	0.74
Giant grenadier				8.69	18.02	5.47	1.31	13.23	
Other grenadier									
Pacific flatnose			2.94	0.84	2.51	0.62	2.59	1.22	1.25
Slickheads			0.10	2.48		1.17	3.32		
Eelpouts	3.14	6.90	2.41	0.24	0.27	2.81	0.14		1.75
Snailfish		0.47		0.05			0.15	0.05	0.63
Pacific whiting	3.17	10.09					0.73		
Other roundfish	0.36	0.20	0.59	0.30	0.13	0.15	0.32	0.23	0.13
Shortspine thornyhead	8.46	15.43	7.43	3.66	5.56	10.72	13.78	3.83	11.35
Longspine thornyhead			11.83	18.04	15.72	25.92	59.84	12.37	3.42
Rougheye rockfish		3.61							
Pacific ocean perch									
Aurora rockfish		0.34							2.71
Darkblotched rockfish									
Splitnose rockfish	1.81								
Shortbelly rockfish									
Other rockfish	0.70								
Grooved tanner crab		1.14	11.84	9.27	2.64	5.43	10.96	23.49	16.11
Other invertebrates	43.57	30.95	10.33	5.41	14.56	18.38	41.96	12.98	40.45
Total catch weight (kg)	151.30	169.58	63.30	74.17	102.43	207.12	272.21	97.11	114.89

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901001028	199901001029	199901001030	199901001031	199901001032	199901001033	199901001034	199901001035	199901001036
Start date and time	8/30/99 17:31	9/2/99 7:34	9/2/99 10:04	9/2/99 12:53	9/2/99 14:12	9/2/99 16:33	9/3/99 7:06	9/3/99 8:39	9/3/99 11:16
Start gear latitude (dd)	45.0068	44.3462	44.3362	44.3636	44.3449	44.3530	43.6848	43.6801	43.6748
Start gear longitude (dd)	-124.4280	-125.0554	-125.0209	-124.8537	-124.8252	-124.8173	-124.5733	-124.6152	-124.8410
End gear latitude (dd)	44.9972	44.3347	44.3274	44.3563	44.3365	44.3451	43.6764	43.6719	43.6651
End gear longitude (dd)	-124.4294	-125.0563	-125.0238	-124.8546	-124.8311	-124.8218	-124.5745	-124.6156	-124.8406
Station	20B	24H	24G	24E	24B	24A	28A	28B	28G
Avg Bottom depth (m)	293.66	934.09	775.23	521.87	271.28	226.49	223.06	291.17	779.80
Duration (hr)	0.31	0.42	0.33	0.25	0.34	0.29	0.30	0.30	0.39
Distance fished (km)	1.09	1.56	1.20	0.93	1.21	0.96	1.02	1.04	1.23
Net width (m)	15.80	16.20	16.10	16.00	15.80	15.80	15.80	15.80	16.10
Performance	0	0	0	0	5.1	0	0	0	0
Hagfish	0.35								0.29
Brown catshark		0.60		1.10	0.10				1.23
Spiny dogfish	1.33					0.52		2.84	
Skates	18.59			1.69	0.10	1.06	5.27	11.04	
Other elasmobranchs	0.85				1.41	2.75	0.51		
Arrowtooth flounder	28.74			0.94		1.81	5.93	9.34	
Petrale sole						0.37			
Dover sole	22.93	9.65		31.97	28.45	14.84	44.37	36.97	44.30
Deepsea sole		3.91	1.92						0.89
Rex sole	7.07			7.25	13.49	13.34	2.85	24.80	
Other flatfish	5.36				14.95	11.29	8.56	2.91	
Sablefish	12.15	2.72	28.08	2.01	0.92		7.29	16.97	15.07
Pacific grenadier		13.27	1.64						1.95
Giant grenadier		6.06	4.73						37.12
Other grenadier									
Pacific flatnose		2.32	0.76	0.46					0.88
Slickheads		4.51	1.48						0.79
Eelpouts	1.54	1.94	1.88	3.78	0.75	0.44	0.61	2.08	1.06
Snailfish		0.71	0.30	0.99	0.10				
Pacific whiting	39.98			16.73		0.20	2.97	33.69	
Other roundfish		0.66	0.35	0.01	0.10	0.50	0.19		0.10
Shortspine thornyhead	20.59	5.05	1.88	0.95	0.80		0.42	11.74	2.99
Longspine thornyhead		62.71	32.36	0.37					35.69
Rougheye rockfish									
Pacific ocean perch	0.51							0.63	
Aurora rockfish	0.43								
Darkblotched rockfish	4.95					0.45	0.45	9.17	
Splitnose rockfish	2.72				47.03	0.17	2.46	1.41	
Shortbelly rockfish									
Other rockfish	0.12				27.99	4.34		0.98	
Grooved tanner crab		20.92	26.71	0.65	0.10				29.97
Other invertebrates	18.75	10.84	3.52	10.04	4.78	12.07	6.83	3.30	8.44
Total catch weight (kg)	186.94	145.86	105.61	78.93	141.08	64.13	88.70	167.85	180.75

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901001037	199901001038	199901001039	199901001040	199901001041	199901001042	199901001043	199901001044	199901001045
Start date and time	9/3/99 13:48		9/3/99 18:25	9/4/99 7:42	9/4/99 10:26	9/4/99 12:24	9/4/99 14:22		9/4/99 16:33
Start gear latitude (dd)	43.6908°		43.7050°	42.9928°	42.9566°	42.9595°	42.9877°		42.9814°
Start gear longitude (dd)	-124.8792°		-124.8989°	-125.0132°	-124.9646°	-124.9489°	-124.8723°		-124.8717°
End gear latitude (dd)	43.6779°		43.7002°	43.0043°	42.9483°	42.9508°	42.9812°		42.9739°
End gear longitude (dd)	-124.8764°		-124.8957°	-125.0164°	-124.9657°	-124.9501°	-124.8784°		-124.8747°
Station	28H	28I	28I	32I	32G	32F	32B	32A	32A
Avg Bottom depth (m)	939.17	1060.70	1060.70	1237.39	786.72	627.13	283.66	219.46	250.18
Duration (hr)	0.53		0.38	0.42	0.35	0.34	0.30		0.26
Distance fished (km)	2.14	0.00	1.03	1.91	1.20	1.34	1.23	0.00	0.88
Net width (m)	16.20			16.40	16.10	16.00	15.80		15.80
Performance	0	-6	-5.1	5.1	1.11	1.11	0	-1	5.1
Hagfish	0.60		0.51	0.86		0.13			
Brown catshark	0.15		0.25		0.20	4.86			
Spiny dogfish									
Skates	0.22		3.64	19.70			7.63		6.66
Other elasmobranchs							1.92		3.62
Arrowtooth flounder									
Petrale sole									
Dover sole	10.28		7.40	2.24	42.95	38.93	105.33		12.12
Deepsea sole	3.76		4.30	10.35	3.24				
Rex sole						3.45	2.84		12.62
Other flatfish							1.60		1.25
Sablefish	12.23		6.50	13.66	7.14	13.81	0.84		
Pacific grenadier	16.41		71.98	92.98	0.90				
Giant grenadier	35.82		13.47	41.96	45.52	5.07			
Other grenadier									
Pacific flatnose	1.37		1.26	7.51	0.37	0.40			
Slickheads	2.46		0.53	0.76	1.51				
Eelpouts	8.48		2.44	0.67	1.48	1.01	3.38		0.57
Snailfish	0.28			0.46		0.10			
Pacific whiting							2.04		
Other roundfish	0.05		0.07	0.27	0.21				18.25
Shortspine thornyhead	2.00		4.87	3.26	11.43		6.39		26.15
Longspine thornyhead	86.41		45.34	24.45	29.96	1.51			
Rougheye rockfish									
Pacific ocean perch							2.34		
Aurora rockfish									
Darkblotched rockfish							3.12		
Splitnose rockfish							93.22		3.07
Shortbelly rockfish									0.65
Other rockfish							5.09		464.85
Grooved tanner crab	31.23		14.54	10.63	11.42	6.95	2.59		
Other invertebrates	15.76		21.71	98.42	7.83	7.14	57.05		5.70
Total catch weight (kg)	227.51		198.79	328.17	164.16	83.35	295.36		555.90

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901001046	199901001047	199901001048	199901001049	199901001050	199901001051	199901001052	199901001053	199901001054
Start date and time	9/5/99 7:00	9/5/99 8:57	9/5/99 10:44	9/5/99 13:07	9/5/99 16:06	9/12/99 7:41	9/12/99 9:51	9/12/99 11:50	9/12/99 15:02
Start gear latitude (dd)	42.2950°	42.3276°	42.3303°	42.2764°	42.3026°		41.6604	41.6693	41.6825
Start gear longitude (dd)	-124.6472°	-124.6937°	-124.7719°	-124.9072°	-124.9380°		-124.5176	-124.5619	-124.9103
End gear latitude (dd)	42.3034°	42.3218°	42.3222°	42.2889°	42.2959°	41.6668°	41.6708	41.6829	41.6988
End gear longitude (dd)	-124.6523°	-124.6877°	-124.7693°	-124.8979°	-124.9427°	-124.5039°	-124.5169	-124.5677	-124.9145
Station	36B	36C	36F	36I	36J	40C	40D	40F	40H
Avg Bottom depth (m)	296.65	376.91	632.35	1069.80	1199.71	368.20	447.35	613.04	916.09
Duration (hr)	0.32	0.24	0.33	0.51	0.26	0.30	0.30	0.40	0.42
Distance fished (km)	1.24	0.86	1.30	2.27	1.16	1.09	1.20	1.61	1.89
Net width (m)	15.80	15.90	16.00	16.30	16.40	15.90	16.90	17.60	16.30
Performance	0	0	1.11	0	0	0	0	0	0
Hagfish		0.22	0.10			0.13	0.96		0.27
Brown catshark			6.67	1.00		14.57	18.41	3.76	5.32
Spiny dogfish		1.25				0.32			
Skates	17.12	42.15	0.55	14.68	6.81	18.76	8.68	1.83	2.45
Other elasmobranchs	7.39	6.18							
Arrowtooth flounder	0.51	11.05				2.77	4.70		
Petrale sole									
Dover sole	52.75	65.87	131.09		14.14	37.81	60.80	36.02	93.54
Deepsea sole				6.84	3.27				5.64
Rex sole	34.38	22.57	1.83			5.99	31.43	5.16	
Other flatfish	1.53	0.02				0.10	0.10		
Sablefish		2.16		12.11	20.33	13.91	7.37	3.85	30.99
Pacific grenadier			0.82	24.25	23.07				2.82
Giant grenadier				15.14	3.63				10.49
Other grenadier									
Pacific flatnose			0.72	1.83	1.63				0.84
Slickheads				3.12	0.38			0.02	2.58
Eelpouts	3.92	3.80	3.87	1.03	0.43	2.15	11.19	8.12	7.38
Snailfish	0.32		0.03			0.18	1.83	0.43	
Pacific whiting	6.11	23.76	0.39			18.86	37.46	0.47	
Other roundfish		6.90	0.14	2.98	0.39	4.40			0.25
Shortspine thornyhead	6.03	3.52	0.57	9.43	14.76	8.05	2.88	3.99	3.98
Longspine thornyhead			0.04	102.73	30.93			38.35	153.81
Rougheye rockfish									
Pacific ocean perch	1.53	0.54							
Aurora rockfish							2.79		
Darkblotched rockfish	0.63	1.30							
Splitnose rockfish	6.42	0.69				0.62			
Shortbelly rockfish									
Other rockfish	2.68	1.72				0.28			
Grooved tanner crab			0.54	29.87	6.82				10.26
Other invertebrates	32.79	36.05	12.23	15.62	6.05	156.03	58.51	16.76	24.97
Total catch weight (kg)	174.08	229.74	159.58	240.62	132.62	284.94	247.10	118.76	355.58

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901001055	199901001056	199901001057	199901001058	199901001059	199901001060	199901001061	199901001062	199901001063
Start date and time	9/12/99 18:10	9/13/99 7:20	9/13/99 9:15	9/13/99 11:47		9/13/99 16:13	9/13/99 18:51		
Start gear latitude (dd)	41.6905	41.0618	41.0252	41.0494		40.9802	40.9773		
Start gear longitude (dd)	-125.0320	-124.3921	-124.4637	-124.6219		-124.7832	-124.7976		
End gear latitude (dd)	41.6818	41.0518	41.0162	41.0467		40.9681	40.9888		
End gear longitude (dd)	-125.0303	-124.3960	-124.4703	-124.6373		-124.7786	-124.7992		
Station	40J	44B	44E	44G	44H	44H	44I	48A	48B
Avg Bottom depth (m)	1189.65	291.15	501.89	753.40	914.40	914.40	1068.52	219.46	292.61
Duration (hr)	0.28	0.30	0.30	0.35		0.36	0.40		
Distance fished (km)	0.99	1.17	1.16	1.36	0.00	1.45	1.54	0.00	0.00
Net width (m)	16.40	16.00	17.10	16.00			16.30		
Performance	0	0	0	5.1	-5	-4.2	0	-5	-5.1
Hagfish			0.28	0.04			1.14		
Brown catshark	0.75	1.78	3.68	0.19			1.37		
Spiny dogfish									
Skates	1.14	18.42	10.46				0.03		8.01
Other elasmobranchs									5.56
Arrowtooth flounder		1.60							
Petrale sole		0.86							
Dover sole	24.52	16.91	146.23	55.91					60.76
Deepsea sole	5.74			9.86			2.74		
Rex sole		18.26	43.24						
Other flatfish		1.25	1.17						
Sablefish	17.64		22.47	17.09			9.37		7.20
Pacific grenadier	33.48						63.68		
Giant grenadier	15.39			24.57			5.99		
Other grenadier									
Pacific flatnose	7.10			0.30			4.58		
Slickheads				2.93			3.72		
Eelpouts	0.96	1.95	4.28	2.83			2.15		0.23
Snailfish							0.28		
Pacific whiting		9.31	16.71						
Other roundfish	0.44			0.67			0.28		65.50
Shortspine thornyhead	1.82	2.08	1.80	17.52			16.36		258.14
Longspine thornyhead	12.94		1.05	99.74			54.09		
Rougheye rockfish									
Pacific ocean perch									3.28
Aurora rockfish			0.83						
Darkblotched rockfish									1.55
Splitnose rockfish		10.15	0.26						0.16
Shortbelly rockfish									
Other rockfish		3.32							211.91
Grooved tanner crab	1.75	0.21		13.34			24.56		
Other invertebrates	23.36	90.81	55.69	23.66			82.41		6.07
Total catch weight (kg)	147.03	176.91	308.13	268.66			272.72		628.36

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901001064	199901001065	199901001066	199901001067	199901001068	199901001069	199901001070	199901001071	199901001072
Start date and time	9/15/99 7:21	9/15/99 8:58	9/15/99 11:00	9/15/99 13:25	9/16/99 9:48	9/16/99 11:50	9/16/99 13:49	9/16/99 15:12	9/16/99 16:47
Start gear latitude (dd)	39.4065°	39.3932°	39.4050°	39.3983°	38.9339°	38.9413	38.9304	38.9253	38.9757°
Start gear longitude (dd)	-124.0214°	-124.0259°	-124.0409°	-124.0765°	-124.0660°	-124.0566	-124.0147	-123.9964	-123.9491°
End gear latitude (dd)	39.4014°	39.3985°	39.3997°	39.3931°	38.9433°	38.9499	38.9398	38.9339	38.9663°
End gear longitude (dd)	-124.0202°	-124.0268°	-124.0406°	-124.0739°	-124.0745°	-124.0675	-124.0212	-124.0014	-123.9475°
Station	52D	52E	52F	52H	56I	56H	56E	56D	56B
Avg Bottom depth (m)	445.08	521.54	616.94	947.09	1039.87	931.49	507.83	442.59	282.31
Duration (hr)	0.27	0.33	0.32	0.40	0.44	0.41	0.31	0.30	0.33
Distance fished (km)	1.02	1.32	1.20	1.39	1.89	1.42	1.23	1.06	1.13
Net width (m)	15.90	16.00	16.00	16.20	16.30	16.20	15.90	15.90	15.80
Performance	0	0	0	5.1	0	0	0	1.11	0
Hagfish				<0.01		0.39		0.17	
Brown catshark	2.05	3.38	20.28	0.33	1.93	0.29	0.63	3.40	0.10
Spiny dogfish	11.84								1.16
Skates	22.91	8.29	3.11		6.70		4.02	14.34	26.04
Other elasmobranchs									1.99
Arrowtooth flounder									
Petrale sole									
Dover sole	17.05	62.41	112.15	4.32	17.46	90.20	25.16	71.62	36.17
Deepsea sole			1.08	6.49	14.55	16.21			
Rex sole	10.17	4.90	9.27				10.46	15.54	6.72
Other flatfish									10.30
Sablefish		13.72	6.03		31.19	15.91			
Pacific grenadier				6.36	96.62	29.78			
Giant grenadier			2.69	3.46	82.67	65.15			
Other grenadier									
Pacific flatnose			0.36	0.51	3.74	2.01	0.35		
Slickheads				1.99	10.00	5.89	0.12		
Eelpouts	2.34	5.62	0.18	0.70	9.84	4.09	19.85	12.86	3.80
Snailfish	0.21	0.10	0.37				0.23		
Pacific whiting	28.31	101.77	4.99				8.10	5.47	7.53
Other roundfish				0.36	0.19	0.18			
Shortspine thornyhead	4.07	6.36	2.47	2.26	27.32	11.06	3.40	1.89	5.08
Longspine thornyhead	0.27	11.25	18.69	51.38	37.11	76.55	0.25		
Rougheye rockfish								0.10	
Pacific ocean perch									
Aurora rockfish	3.39	11.64	0.25						
Darkblotched rockfish									
Splitnose rockfish									151.36
Shortbelly rockfish									
Other rockfish							1.65	2.18	39.44
Grooved tanner crab			5.83	14.70	8.04	12.08	0.86		
Other invertebrates	26.01	15.95	14.77	15.23	31.64	17.19	15.85	7.66	27.19
Total catch weight (kg)	128.63	245.38	202.51	108.09	378.98	346.98	90.95	135.22	316.85

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901001073	199901001074	199901001075	199901001076	199901001077	199901001078	199901001079	199901001080	199901001081
Start date and time	9/17/99 7:15	9/17/99 9:10	9/17/99 11:27	9/17/99 13:10	9/17/99 15:29	9/18/99 7:43	9/18/99 10:34		9/18/99 13:27
Start gear latitude (dd)	38.3014	38.3624	38.3874	38.3394	38.4004	37.6376	37.6370		37.6393
Start gear longitude (dd)	-123.4491	-123.5614	-123.6270	-123.6246	-123.6999	-123.1527	-123.1154		-123.0852
End gear latitude (dd)	38.3090	38.3531	38.3785	38.3509	38.3886	37.6277	37.6330		37.6310
End gear longitude (dd)	-123.4557	-123.5539	-123.6231	-123.6275	-123.6922	-123.1467	-123.1020		-123.0783
Station	60A	60B	60E	60F	60H	64I	64G	64E	64E
Avg Bottom depth (m)	223.00	291.66	507.58	607.23	894.93	1068.97	742.29	512.06	512.06
Duration (hr)	0.29	0.31	0.29	0.35	0.37	0.44	0.38		0.31
Distance fished (km)	1.10	1.26	1.08	1.33	1.54	1.25	1.33	0.00	1.11
Net width (m)	16.50	14.90	16.50	16.50	16.50	16.50	15.10		
Performance	0	0	0	0	0	0	5.1	-1	-5.1
Hagfish				0.11	0.18	0.81	0.15		
Brown catshark			7.40	7.44	2.03	0.85	3.49		2.05
Spiny dogfish									
Skates	4.90	24.60	10.61	1.09			4.46		6.98
Other elasmobranchs	4.76	9.82							1.88
Arrowtooth flounder									
Petrale sole		4.61							
Dover sole	38.77	40.92	24.43	19.05	58.91	202.09	210.33		147.16
Deepsea sole					4.87	26.94	2.08		3.60
Rex sole	12.20	9.69	6.37						21.30
Other flatfish	12.55	14.72	0.16						
Sablefish	10.41	14.04	4.26	1.72	11.89	76.70	69.85		42.06
Pacific grenadier					1.89	95.00	0.81		
Giant grenadier				2.10	61.38	65.14	6.24		1.33
Other grenadier				0.16					
Pacific flatnose				0.10	0.94	1.65			
Slickheads					1.06	85.37	45.66		
Eelpouts	0.10	0.73	20.26	1.52	1.22	3.72	2.78		15.22
Snailfish				0.10					0.34
Pacific whiting	4.05	453.76	26.33	0.88					2.90
Other roundfish		0.01	0.04	0.10	0.06	0.10	3.02		
Shortspine thornyhead		0.73	7.87	3.90	5.53	39.06	61.69		104.83
Longspine thornyhead				14.18	40.53	161.75	154.39		18.27
Rougheye rockfish									
Pacific ocean perch									
Aurora rockfish			2.39						11.69
Darkblotched rockfish	1.04	0.33							
Splitnose rockfish	0.99	124.52							
Shortbelly rockfish	0.40								
Other rockfish	187.29	25.66							
Grooved tanner crab				25.19	8.80	1.07	40.27		
Other invertebrates	8.73	47.51	16.25	6.59	9.72	21.59	8.26		18.90
Total catch weight (kg)	286.18	771.66	126.36	84.23	209.00	781.84	613.46		398.50

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901001082	199901001083	199901001084	199901001085	199901001086	199901001087	199901001088	199901001089	199901001090
Start date and time		9/18/99 16:13	9/18/99 18:25	9/21/99 7:18	9/21/99 9:01	9/21/99 11:06	9/21/99 13:17	9/21/99 15:48	9/22/99 7:36
Start gear latitude (dd)		37.6291	37.6339	37.0225	37.0066	37.0185	37.0059	36.9976	36.3685
Start gear longitude (dd)		-123.0556	-123.0465	-122.6432	-122.6452	-122.7538	-122.7818	-122.7959	-122.3453
End gear latitude (dd)		37.6327	37.6340	37.0171	37.0018	37.0069	36.9939	36.9888	36.3563
End gear longitude (dd)		-123.0644	-123.0556	-122.6345	-122.6355	-122.7436	-122.7717	-122.7886	-122.3418
Station	64C	64C	64A	68C	68D	68G	68I	68J	72I
Avg Bottom depth (m)	365.76	358.74	229.75	369.29	429.84	751.08	1037.46	1158.69	1059.58
Duration (hr)		0.29	0.30	0.27	0.30	0.38	0.41	0.34	0.38
Distance fished (km)	0.00	0.89	0.90	0.99	1.02	1.61	1.67	1.18	1.42
Net width (m)		14.10	14.60	14.60	14.60	15.50	16.50	16.40	16.50
Performance	-1	5.1	0	1.11	1.11	0	1.11	0	0
Hagfish						0.10			
Brown catshark				2.32	6.78	1.80	0.66	3.86	1.23
Spiny dogfish									
Skates		40.16	25.34	54.80	57.68	0.47	2.65	3.58	7.42
Other elasmobranchs		2.54	1.95	3.51	2.89				
Arrowtooth flounder									
Petrale sole				1.14					
Dover sole		160.51	4.42	99.03	168.88	241.72	202.48	57.46	62.19
Deepsea sole						0.95	10.24	9.41	2.85
Rex sole		126.82	5.16	42.90	46.18				
Other flatfish		0.69	19.02	6.95	0.28				
Sablefish		9.74		2.23	5.73	9.04	61.63	15.85	29.91
Pacific grenadier						0.04	105.21	98.18	109.11
Giant grenadier						0.91	33.63	45.41	2.72
Other grenadier									
Pacific flatnose							1.21	1.60	2.22
Slickheads						1.90	17.83	25.83	17.72
Eelpouts		12.38	1.07	5.24	7.57	0.10	1.22	0.18	
Snailfish				0.29					
Pacific whiting		0.94	10.68	25.27	2.03				
Other roundfish		8.90	0.62		0.05	0.05	0.10	0.24	0.59
Shortspine thornyhead		79.86	4.17	0.79	1.34	30.59	68.10	18.18	3.43
Longspine thornyhead						93.69	108.77	10.99	49.21
Rougheye rockfish									
Pacific ocean perch									
Aurora rockfish		11.30		0.45	2.60				
Darkblotched rockfish			0.58						
Splitnose rockfish		11.12	59.57	45.21	1.56				
Shortbelly rockfish									
Other rockfish		0.36	59.85	1.69					
Grooved tanner crab						10.34	7.58	3.06	1.53
Other invertebrates		123.83	28.16	7.15	20.63	2.12	12.37	14.98	6.91
Total catch weight (kg)		589.16	220.59	298.98	324.20	393.81	633.67	308.81	297.03

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901001091	199901001092	199901001093	199901001094	199901001095	199901001096	199901001097	199901001098	199901001099
Start date and time	9/22/99 10:12	9/22/99 12:20	9/22/99 14:07	9/22/99 17:47	9/23/99 7:32	9/23/99 9:45	9/23/99 11:38	9/23/99 14:24	9/23/99 17:30
Start gear latitude (dd)	36.3667	36.3397	36.3256		35.6235	35.6454	35.6533	35.6555	35.6484
Start gear longitude (dd)	-122.2047	-122.1299	-122.1039		-121.3463	-121.4256	-121.5096	-121.7134	-121.8779
End gear latitude (dd)	36.3539	36.3285	36.3159		35.6174	35.6379	35.6429	35.6419	35.6341
End gear longitude (dd)	-122.2074	-122.1308	-122.1002		-121.3375	-121.4200	-121.5041	-121.7118	-121.8655
Station	72H	72F	72C	72B	76A	76D	76F	76H	76I
Avg Bottom depth (m)	908.89	609.51	368.75	292.61	218.10	445.99	615.70	896.21	1043.06
Duration (hr)	0.40	0.32	0.29	0.30	0.30	0.30	0.31	0.40	0.46
Distance fished (km)	1.47	1.24	1.14	1.06	1.06	1.12	1.28	1.54	2.17
Net width (m)	16.50	16.00	14.60		15.80	17.80	16.50	14.60	15.70
Performance	0	0	0	-5.1	0	0	0	0	0
Hagfish	1.57	0.35							1.07
Brown catshark		17.62				5.64	11.42	0.38	
Spiny dogfish									
Skates	0.16	2.07	14.07	13.67	32.90	31.15	10.27		
Other elasmobranchs		2.38	26.01	30.85	25.17	62.59	5.76		
Arrowtooth flounder			1.40						
Petrale sole			40.02	14.46					
Dover sole	22.17	54.73	211.21	8.29	5.05	39.85	73.46	5.86	
Deepsea sole	7.05	2.92						4.48	10.32
Rex sole			14.24	3.59	0.65	7.28			
Other flatfish			0.10	0.62	4.70				
Sablefish	13.58	8.86	855.83		1.06	12.61	28.49	22.93	33.36
Pacific grenadier	2.53								2.31
Giant grenadier	22.61							0.85	1.24
Other grenadier									
Pacific flatnose	1.88							0.08	0.22
Slickheads	6.77						0.38	3.36	7.45
Eelpouts	6.21	6.62	3.37	0.65		3.91	0.05	0.77	0.22
Snailfish		0.39		0.24			0.08		
Pacific whiting			29.57	40.99	0.73	5.06	0.52		
Other roundfish	1.09	0.04	0.04	16.93	0.35		0.18	0.78	1.19
Shortspine thornyhead	4.78	2.91	49.62	0.20		6.97	27.26	10.94	29.01
Longspine thornyhead	56.69	1.96	1.40				25.19	104.50	33.98
Rougheye rockfish									
Pacific ocean perch									
Aurora rockfish			0.10			19.28			
Darkblotched rockfish									
Splitnose rockfish			76.12	23.13	71.55	0.12			
Shortbelly rockfish					454.40				
Other rockfish			10.82	36.20	24.11	0.86			
Grooved tanner crab	12.52	0.13						2.05	1.63
Other invertebrates	139.76	16.79		3.92	6.65	182.13	25.71	66.28	28.25
Total catch weight (kg)	299.36	117.78	1333.89	193.75	627.33	377.44	208.75	223.25	150.23

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901001100	199901001101	199901001102	199901001103	199901001104	199901001105	199901003001	199901003002	199901003003
Start date and time		9/24/99 10:08	9/24/99 13:38	9/24/99 16:02	9/24/99 17:44	9/24/99 18:35	7/4/99 6:15	7/4/99 9:28	7/4/99 12:19
Start gear latitude (dd)		34.9072	35.0760	35.0410	35.0084	35.0221	47.8630	47.8741	47.8965
Start gear longitude (dd)		-121.5337	-121.3360	-121.0810	-120.9381	-120.9073	-125.6389	-125.6303	-125.6432
End gear latitude (dd)		34.9230	35.0730	35.0317	35.0176	35.0305	47.8718	47.8790	47.8991
End gear longitude (dd)		-121.5345	-121.3245	-121.0755	-120.9389	-120.9097	-125.6580	-125.6497	-125.6621
Station	80H	80H	80F	80E	80B	80A	3H	3G	3F
Avg Bottom depth (m)	914.40	918.25	640.37	507.19	295.26	226.64	909.06	751.95	620.17
Duration (hr)		0.47	0.29	0.30	0.28	0.26	0.44	0.37	0.33
Distance fished (km)	0.00	1.84	1.13	1.17	1.06	0.97	1.75	1.58	1.48
Net width (m)		16.50	16.50	16.20	16.50	16.50	14.60	15.20	14.70
Performance	-1	0	0	0	0	0	0	0	0
Hagfish		0.68						0.87	
Brown catshark		3.74	1.15	1.49	0.10			3.98	1.20
Spiny dogfish									
Skates				8.19	10.46	21.15			3.26
Other elasmobranchs				6.37	0.60	0.63			
Arrowtooth flounder									
Petrale sole									
Dover sole		95.68	90.64	48.49	13.27	1.69	28.41	23.39	60.65
Deepsea sole		6.77						8.20	6.83
Rex sole				0.10	27.97	2.10			
Other flatfish					11.34	7.40			
Sablefish		73.96	6.24	12.32	1.24	0.66	9.74	14.87	14.40
Pacific grenadier								4.37	3.83
Giant grenadier		25.28	0.76					18.95	
Other grenadier		0.12		0.05					
Pacific flatnose		0.20						1.09	
Slickheads		38.23	0.71					1.77	
Eelpouts		7.37	1.81	0.64	6.06	1.11		5.45	5.25
Snailfish			0.10		0.10				
Pacific whiting			1.62	2.35	23.11	10.40			
Other roundfish		0.10	0.13	0.03			108.33		0.29
Shortspine thornyhead		24.61	9.33	13.42	0.52		5.14	9.51	4.23
Longspine thornyhead		146.39	31.03	17.18			65.75	27.57	4.57
Rougheye rockfish									
Pacific ocean perch									
Aurora rockfish				8.67	0.12				
Darkblotched rockfish									
Splitnose rockfish					25.60	3.13			
Shortbelly rockfish									
Other rockfish					13.64	3.56			
Grooved tanner crab		1.68						37.34	6.12
Other invertebrates		55.13	15.36	429.60	35.96	13.41		5.72	9.11
Total catch weight (kg)		479.95	158.89	548.90	170.10	65.25	217.38	163.07	119.75

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901003004	199901003005	199901003006	199901003007	199901003008	199901003009	199901003010	199901003011	199901003012
Start date and time	7/4/99 14:48	7/4/99 17:11	7/5/99 6:22	7/5/99 8:38	7/5/99 11:06	7/5/99 13:55	7/5/99 16:41	7/6/99 7:17	7/6/99 10:27
Start gear latitude (dd)	47.9058	47.9072	47.1331[a]	47.2248	47.2192	47.2299	47.1927	46.5427	46.4845[a]
Start gear longitude (dd)	-125.6151	-125.5567	-124.5288[b]	-124.9951	-125.0746	-125.1438	-125.1670	-124.9703	-124.7692[b]
End gear latitude (dd)	47.9114	47.9052	47.1388[a]	47.2355	47.2314	47.2416	47.2053	46.5522	46.4918[a]
End gear longitude (dd)	-125.6263	-125.5711	-124.5271[b]	-124.9962	-125.0824	-125.1559	-125.1666	-124.9580	-124.7779[b]
Station	3E	3C	7A	7D	7G	7H	7I	11I	11G
Avg Bottom depth (m)	515.87	361.19	226.05	440.01	795.98	927.73	1060.70	1111.54	763.24
Duration (hr)	0.26	0.28	0.30	0.30	0.35	0.44	0.40	0.39	0.38
Distance fished (km)	1.06	1.11	1.16	1.23	1.59	1.68	1.48	1.46	1.66
Net width (m)	12.60	13.40	13.40	15.10	15.30	14.70		16.10	14.30
Performance	0	1	1.11	0	0	0	-5.1	0	0
Hagfish					0.25	0.88	0.24		2.00
Brown catshark	0.41				1.03				2.86
Spiny dogfish									
Skates	21.28	11.58	7.14	2.58	4.32	9.66	3.31	2.59	
Other elasmobranchs		0.20	0.84						
Arrowtooth flounder		8.49	37.59						
Petrale sole									
Dover sole	24.64	71.23	35.49	122.39	2.68		2.11		20.65
Deepsea sole					2.61	10.54		2.46	6.51
Rex sole	4.19	14.41	9.68	11.77					
Other flatfish		0.17	16.40				5.06		
Sablefish	13.69	4.44	8.62	9.08	57.18	30.58	24.22	25.76	21.59
Pacific grenadier					1.24	3.42	81.12	30.32	0.66
Giant grenadier	3.00				16.57	22.34	52.49	18.01	1.43
Other grenadier					0.01				
Pacific flatnose	2.78				0.15	0.65	1.60	2.42	0.32
Slickheads					0.38	1.24	0.39	2.88	0.41
Eelpouts	5.44	1.90	0.97	11.65	2.12	0.69		0.30	2.33
Snailfish	0.40	0.16							
Pacific whiting	2.32	2.82	0.46	2.17					
Other roundfish	0.40	<0.01	0.01	0.02	1.22	0.44	0.24	1.05	0.44
Shortspine thornyhead	3.94	17.17	29.52	18.28	19.24	25.08	14.10	1.88	3.53
Longspine thornyhead					68.91	88.27	53.63	41.20	34.64
Rougheye rockfish		2.16	4.50	0.60					
Pacific ocean perch		6.83	74.91	3.64					
Aurora rockfish									
Darkblotched rockfish		24.81	17.99						
Splitnose rockfish			40.32						
Shortbelly rockfish									
Other rockfish		<0.01	6.43						
Grooved tanner crab	5.32				16.65	11.84	8.15	2.07	28.20
Other invertebrates	9.54	7.30	25.31	13.91	12.59	12.42	17.74	26.15	8.95
Total catch weight (kg)	97.35	173.86	316.19	196.09	207.14	218.03	264.37	157.09	134.54

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901003013	199901003014	199901003015	199901003016	199901003017	199901003018	199901003019	199901003020	199901003021
Start date and time	7/6/99 12:45	7/6/99 14:47	7/6/99 17:06	7/7/99 6:24	7/7/99 8:44	7/7/99 10:51	7/7/99 13:06		7/7/99 18:11
Start gear latitude (dd)	46.4987	46.5481	46.5763	45.8075	45.8070	45.8931	45.8894		45.8190
Start gear longitude (dd)	-124.7225	-124.6269	-124.5644	-124.7220	-124.7589	-124.7816	-124.8460		-124.8263
End gear latitude (dd)	46.5073	46.5384	46.5756	45.8248	45.8185	45.9052	45.8918		45.8340
End gear longitude (dd)	-124.7299	-124.6289	-124.5814	-124.7232	-124.7614	-124.7843	-124.8648		-124.8307
Station	11F	11B	11A	15C	15D	15F	15G	15H	15H
Avg Bottom depth (m)	614.11	300.39	232.70	357.57	451.96	629.50	771.11	914.40	953.34
Duration (hr)	0.33	0.27	0.29	0.43	0.32	0.33	0.36		0.41
Distance fished (km)	1.25	1.08	1.36	1.95	1.34	1.38	1.51	0.00	1.80
Net width (m)	15.00	15.10	14.90	14.40	14.20	14.90	15.00		14.10
Performance	0	0	0	0	0	0	0	-4.1	0
Hagfish				0.26					0.96
Brown catshark	3.46				0.92		1.19		0.74
Spiny dogfish		0.62	0.34						
Skates	1.05	48.84	15.77	25.95	4.89	2.57			
Other elasmobranchs		0.35	2.18	3.68					
Arrowtooth flounder		24.50	38.65	9.84	4.50				
Petrale sole									
Dover sole	0.65	139.18	62.70	111.03	25.15	2.84	50.81		16.73
Deepsea sole	2.14				1.03		2.04		4.13
Rex sole		18.06	19.76	16.20	2.72	0.93			
Other flatfish		17.79	2.16	0.28					
Sablefish	13.69	7.43	5.09	5.79	7.71	34.97	10.39		12.66
Pacific grenadier	2.76					0.02	1.17		23.93
Giant grenadier	0.52					1.93			
Other grenadier									
Pacific flatnose	2.20					1.67	0.94		2.52
Slickheads							0.33		3.14
Eelpouts	0.10	2.33	1.27	1.18		1.75	1.28		3.64
Snailfish							<0.01		0.15
Pacific whiting		2.33		0.99					
Other roundfish	<0.01					0.12	0.63		0.22
Shortspine thornyhead	6.55	8.03	33.09	17.20	17.81	5.89	2.78		6.35
Longspine thornyhead	16.58				8.08	18.60	46.00		98.64
Rougheye rockfish					1.75	0.43			
Pacific ocean perch		27.82	5.14	2.24					
Aurora rockfish									
Darkblotched rockfish		1.21							
Splitnose rockfish		0.13	1.76	0.42					
Shortbelly rockfish									
Other rockfish		0.64	1.96	0.73					
Grooved tanner crab	10.35	2.09			0.22	17.11	9.81		21.51
Other invertebrates	16.41	8.44	6.41	35.73	25.31	6.99	3.50		5.14
Total catch weight (kg)	76.45	309.80	196.28	231.51	100.11	95.81	130.86		200.46

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901003022	199901003023	199901003024	199901003025	199901003026	199901003027	199901003028	199901003029	199901003030
Start date and time	7/8/99 7:01	7/8/99 9:49	7/8/99 12:30	7/8/99 15:32	7/8/99 18:29	7/15/99 7:34	7/15/99 10:28		7/15/99 14:05
Start gear latitude (dd)	45.3998[a]	45.3586	45.3328	45.3370	45.3331[a]	44.2579[b]	44.2583[b]		44.5133
Start gear longitude (dd)	-124.9340[a]	-124.8337	-124.7259	-124.5622	-124.3534[a]	-125.0542[b]	-124.5779[b]		-124.9259
End gear latitude (dd)	45.4094[a]	45.3735	45.3439	45.3468	45.3416[a]	44.2621[b]	44.2645[b]		44.5021
End gear longitude (dd)	-124.9360[a]	-124.8391	-124.7291	-124.5665	-124.3597[a]	-125.0519[b]	-124.5785[b]		-124.9196
Station	19J	19G	19E	19C	19A	23I	23F	23E	23E
Avg Bottom depth (m)	1167.65	781.69	533.56	399.93	230.22	1016.02	667.58	512.06	521.45
Duration (hr)	0.34	0.38	0.31	0.26	0.30	0.50	0.31		0.31
Distance fished (km)	1.35	1.87	1.30	1.21	0.99	2.06	1.39	0.00	1.39
Net width (m)	15.70	15.20	15.10	14.50	14.70	14.90	16.30		14.50
Performance	0	0	0	0	0	0	0	-3.12	0
Hagfish	<0.01								0.50
Brown catshark	0.22	0.49	2.03			0.23	2.95		0.95
Spiny dogfish									
Skates	0.30	0.63			2.08		9.59		0.86
Other elasmobranchs									
Arrowtooth flounder					3.16				
Petrale sole									
Dover sole		3.58	11.85	15.65	21.93		18.66		65.45
Deepsea sole	0.58	3.50				5.71	0.81		
Rex sole				0.67	1.56				0.71
Other flatfish				0.10	1.27				
Sablefish	14.91	21.57	10.84	6.33	32.94	12.74	140.20		27.49
Pacific grenadier	24.87	1.34				99.84	0.90		
Giant grenadier	5.11	1.13				37.30	4.74		2.16
Other grenadier									
Pacific flatnose	1.42	0.77				1.58	1.91		0.60
Slickheads	0.22	4.50				1.55			
Eelpouts	0.63		0.14	1.43	0.15		0.68		10.69
Snailfish		0.21					0.42		0.98
Pacific whiting			1.37	2.17	2.41				0.87
Other roundfish	0.68	0.13			0.10	0.10	0.11		
Shortspine thornyhead		4.77	7.03	9.76	4.85	17.21	14.65		13.84
Longspine thornyhead	24.29	35.88	15.44			71.05	21.18		*
Rougheye rockfish									
Pacific ocean perch				10.57					
Aurora rockfish			4.65	0.10					
Darkblotched rockfish					0.78				
Splitnose rockfish					17.14				
Shortbelly rockfish									
Other rockfish				0.20	1.82				
Grooved tanner crab	8.43	10.95				18.90	4.35		13.70
Other invertebrates	72.08	14.35	21.40	53.54	37.49	36.13	5.24		9.41
Total catch weight (kg)	153.74	103.79	74.73	100.51	127.67	302.33	226.37		148.20

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901003031	199901003032	199901003033	199901003034	199901003035	199901003036	199901003037	199901003038	199901003039
Start date and time	7/15/99 16:18	7/15/99 18:25	7/16/99 6:36	7/16/99 8:38	7/16/99 11:50	7/16/99 14:01	7/16/99 17:27	7/17/99 6:24	7/17/99 9:05
Start gear latitude (dd)	44.4916	44.4839	43.8900	43.8062	43.8120	43.8159	43.8603	43.1876	43.1949
Start gear longitude (dd)	-124.8655	-124.8291	-124.7440	-124.7105	-124.9299	-124.9379	-125.0759	-125.0583	-125.0523
End gear latitude (dd)	44.5027	44.4956	43.8893	43.8020	43.8215	43.8324	43.8697	43.2023	43.2036
End gear longitude (dd)	-124.8747	-124.8319	-124.7302	-124.7264	-124.9330	-124.9417	-125.0817	-125.0512	-125.0429
Station	23C	23A	27A	27D	27G	27H	27I	31I	31J
Avg Bottom depth (m)	395.00	208.42	244.53	454.39	832.73	930.25	1205.47	1208.28	1171.72
Duration (hr)	0.34	0.29	0.26	0.30	0.27	0.47	0.36	0.49	0.42
Distance fished (km)	1.50	1.32	1.12	1.49	1.15	2.11	1.36	1.88	1.76
Net width (m)	14.90	14.50	14.70	15.60	15.80	15.40	15.80	13.90	15.00
Performance	0	1.11	0	0	0	1.11	0	0	0
Hagfish					0.28	1.06			
Brown catshark				1.38	1.92	0.73			
Spiny dogfish									
Skates	26.47	3.51	26.28	2.65			8.22		11.93
Other elasmobranchs	3.05								
Arrowtooth flounder		2.07	2.55	2.85					
Petrale sole									
Dover sole	29.98	0.46	51.53	15.67	5.76	15.10			1.13
Deepsea sole					2.89	2.58	2.71		4.14
Rex sole	6.20	0.90	0.13	16.56	0.32				
Other flatfish	0.19		2.20						
Sablefish	30.22		85.71	20.70	34.67	27.78	24.86		52.12
Pacific grenadier					2.45	17.56	67.79		139.26
Giant grenadier					44.97	34.33	112.96		219.42
Other grenadier						0.65			
Pacific flatnose					0.22	0.81	4.09		8.78
Slickheads					2.49	4.55			1.54
Eelpouts	2.70		0.63	5.65	0.55	8.28	0.10		2.77
Snailfish									
Pacific whiting			4.62	0.67					
Other roundfish		1.03	0.54			0.12	0.13		0.16
Shortspine thornyhead	12.66	1.52	3.54	10.15	3.77	10.32	9.95		
Longspine thornyhead					99.99	130.82	38.15		18.26
Rougheye rockfish									
Pacific ocean perch									
Aurora rockfish									
Darkblotched rockfish	4.43		0.62						
Splitnose rockfish	13.53	3.48	6.55						
Shortbelly rockfish		4.70							
Other rockfish	2.19	480.53	1.36						
Grooved tanner crab	0.46	0.09		0.13	8.35	14.09	12.94		11.57
Other invertebrates	61.01	2.03	12.76	15.72	3.49	7.51	65.87		26.60
Total catch weight (kg)	193.11	500.33	199.01	92.13	212.10	276.26	347.76		497.68

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901003040	199901003041	199901003042	199901003043	199901003044	199901003045	199901003046	199901003047	199901003048
Start date and time	7/17/99 11:10	7/17/99 13:43	7/17/99 16:11	7/17/99 18:19	7/19/99 7:03	7/19/99 11:52	7/19/99 14:19	7/19/99 16:40	7/19/99 18:18
Start gear latitude (dd)	43.1619	43.1768	43.1000	43.1003	41.8757	41.8368	41.8187	41.7894	41.7633
Start gear longitude (dd)	-124.9924	-124.9490	-124.8814	-124.8241	-125.0391	-124.7595	-124.6209	-124.5139	-124.4733
End gear latitude (dd)	43.1805	43.1950	43.1115	43.1019	41.8907	41.8499	41.8299	41.8028	41.7759
End gear longitude (dd)	-124.9900	-124.9442	-124.8777	-124.8404	-125.0433	-124.7639	-124.6296	-124.5165	-124.4760
Station	31I	31H	31C	31A	39I	39G	39F	39C	39A
Avg Bottom depth (m)	1031.79	906.27	391.45	237.48	1044.60	744.49	641.82	396.46	228.47
Duration (hr)	0.53	0.48	0.35	0.30	0.39	0.36	0.33	0.31	0.33
Distance fished (km)	2.23	2.19	1.48	1.41	1.77	1.54	1.47	1.54	1.54
Net width (m)	14.90	14.80	15.00	13.90	14.90	15.20	15.70	15.50	14.90
Performance	0	5.1	0	0	0	0	0	0	0
Hagfish	1.97	1.49			0.33		0.24	0.24	
Brown catshark	0.59	1.86	1.72		0.87	1.40	2.27	1.05	
Spiny dogfish				0.29					0.69
Skates	1.21		4.76	14.01	7.54			0.46	39.38
Other elasmobranchs				9.73					1.03
Arrowtooth flounder			7.65	5.15					2.50
Petrale sole				0.62					
Dover sole	17.96	28.83	37.19	22.70	19.16	10.98	37.73	40.74	45.82
Deepsea sole	15.96	4.64			5.11	1.07			
Rex sole			17.98	16.21			1.82	5.77	68.87
Other flatfish			0.47	8.14					50.67
Sablefish	16.37	68.05	17.18	19.85	31.93	17.52	34.99	13.21	2.96
Pacific grenadier	49.15	21.56	1.24		48.68	0.05			
Giant grenadier	79.15				44.16	10.52	6.34		
Other grenadier	0.01				<0.01				
Pacific flatnose	3.50	0.85	0.18		2.11				
Slickheads	6.80	7.40	0.24		2.81	0.31	0.54		
Eelpouts	4.22	2.72	1.10	0.02	13.00	1.12	4.78	3.32	2.05
Snailfish	<0.01		0.34			0.20	0.41		0.15
Pacific whiting			9.61	17.26				2.02	4.79
Other roundfish		0.14		0.20		0.12		0.01	6.31
Shortspine thornyhead	7.67	7.54	1.90	3.90	21.55	3.66	4.22	11.22	6.06
Longspine thornyhead	165.86	101.71	0.67		105.18	129.50	70.26		
Rougheye rockfish			3.69						
Pacific ocean perch				165.79					
Aurora rockfish									
Darkblotched rockfish			1.83	1.47					11.17
Splitnose rockfish			0.22	3.30				0.40	0.01
Shortbelly rockfish									
Other rockfish				243.20					44.65
Grooved tanner crab	29.27	25.87	0.58		12.64	25.24	48.40	3.69	0.27
Other invertebrates	36.34	11.28	9.41	16.52	51.92	25.55	11.25	34.94	62.44
Total catch weight (kg)	436.03	278.92	117.97	548.35	367.00	227.23	223.25	117.07	349.82

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901003049	199901003050	199901003051	199901003052	199901003053	199901003054	199901003055	199901003056	199901003057
Start date and time	7/22/99 7:08	7/22/99 8:53	7/22/99 11:23	7/22/99 14:39	7/22/99 17:30	7/23/99 7:02	7/23/99 9:43	7/23/99 12:34	7/23/99 14:34
Start gear latitude (dd)	41.1983	41.1862	41.1134	41.1137	41.1213	40.5391	40.5340	40.5408	40.5339
Start gear longitude (dd)	-124.3958	-124.4095	-124.4452	-124.6444	-124.7137	-124.7522	-124.7156	-124.7137	-124.6888
End gear latitude (dd)	41.2097	41.1989	41.1249	41.1169	41.1269	40.5524	40.5493	40.5544	40.5466
End gear longitude (dd)	-124.4019	-124.4108	-124.4439	-124.6233	-124.7025	-124.7565	-124.7168	-124.7138	-124.6927
Station	43C	43D	43F	43I	43J	47I	47G	47F	47C
Avg Bottom depth (m)	363.80	450.79	614.43	1029.95	1206.29	1185.10	785.55	594.40	372.47
Duration (hr)	0.29	0.31	0.29	0.43	0.31	0.44	0.37	0.35	0.31
Distance fished (km)	1.38	1.42	1.31	1.82	1.25	1.59	1.71	1.54	1.47
Net width (m)	15.00	14.40	15.00	14.00	15.10	14.70	14.20	13.80	14.30
Performance	0	0	0	0	0	0	0	0	5.1
Hagfish	0.23	8.00	0.59	1.14		0.16	0.12		
Brown catshark		1.06	3.01	4.27			1.91	3.83	
Spiny dogfish									
Skates		0.85	0.50	1.73	6.56	0.05		1.82	12.13
Other elasmobranchs									6.46
Arrowtooth flounder	5.45								
Petrale sole									
Dover sole	13.37	81.83	40.75	*		7.08	46.09	226.67	265.19
Deepsea sole			1.00	3.83	3.17	17.89	2.96	1.43	
Rex sole	12.25	34.51	20.17					17.44	37.06
Other flatfish									0.14
Sablefish	34.56	12.69	17.21	7.84	23.73	56.61	38.18	39.37	80.71
Pacific grenadier				32.03	35.18	149.51	10.51	0.21	
Giant grenadier		0.73	22.05	7.76	70.73	61.07	14.45	6.49	
Other grenadier									
Pacific flatnose			<0.01	3.66	4.26	5.55	1.23	0.59	
Slickheads				15.26	0.59		4.88	1.54	
Eelpouts	5.96	8.21	6.18	13.90	1.75	0.88	6.18	13.05	4.35
Snailfish	0.29		0.11			1.34	0.03	0.28	
Pacific whiting	0.38								5.54
Other roundfish		0.10	0.03	0.60	1.73	0.51	0.36	0.03	
Shortspine thornyhead	7.40	8.38	5.52	18.10	13.05	30.56	7.80	9.58	29.84
Longspine thornyhead		0.15	48.32	116.82	27.58	27.19	34.55	1.05	
Rougheye rockfish									
Pacific ocean perch									0.79
Aurora rockfish	0.65	7.96							
Darkblotched rockfish	0.53								1.37
Splitnose rockfish	0.31								2.72
Shortbelly rockfish									
Other rockfish	0.43								3.28
Grooved tanner crab				13.96	1.18	8.65	94.80	4.70	0.29
Other invertebrates	56.69	201.26	54.18	57.30	25.75	24.95	4.15	6.17	31.49
Total catch weight (kg)	138.51	365.93	219.61	298.37	215.25	391.99	268.20	334.26	481.36

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901003058	199901003059	199901003060	199901003061	199901003062	199901003063	199901003064	199901003065	199901003066
Start date and time	7/23/99 17:04	7/24/99 7:00	7/24/99 9:06	7/24/99 11:09	7/24/99 13:15	7/24/99 15:52	7/25/99 6:15	7/25/99 7:57	7/25/99 9:52
Start gear latitude (dd)	40.5445	39.8436	39.8561	39.8129	39.7994	39.8242	39.2203	39.2333	39.2039
Start gear longitude (dd)	-124.6824	-124.1102	-124.1452	-124.1776	-124.1983	-124.2161	-124.0056	-124.0240	-124.0623
End gear latitude (dd)	40.5571	39.8545	39.8443	39.8210	39.8080	39.8288	39.2309	39.2456	39.2169
End gear longitude (dd)	-124.6808	-124.1186	-124.1370	-124.1862	-124.2021	-124.2311	-124.0028	-124.0237	-124.0611
Station	47B	51A	51C	51F	51G	51H	55D	55E	55F
Avg Bottom depth (m)	291.73	241.69	382.25	629.50	743.99	914.40	452.23	522.96	623.70
Duration (hr)	0.29	0.30	0.34	0.36	0.40	0.36	0.33	0.34	0.36
Distance fished (km)	1.42	1.45	1.49	1.66	1.59	1.62	1.24	1.41	1.47
Net width (m)	14.40	13.50	14.10	14.90	14.70		14.70	15.10	14.80
Performance	1.11	0	0	0	0	-1.11	0	0	0
Hagfish					0.16		0.10		
Brown catshark			2.28	6.07	7.91		1.16	3.80	4.80
Spiny dogfish		0.18							
Skates	7.95	44.38	19.04	1.18			20.06	8.47	2.77
Other elasmobranchs	30.67	27.84	3.21				1.90		
Arrowtooth flounder		1.34							
Petrale sole		2.38							
Dover sole	68.48	106.39	66.25	20.18	44.74		47.58	50.00	19.54
Deepsea sole				0.64	6.65				4.32
Rex sole	12.78	31.33	10.75				16.84	1.37	
Other flatfish	0.70	37.92	1.01				0.01		
Sablefish	79.63	11.80	19.31	23.66	11.46		10.46	24.66	20.46
Pacific grenadier					0.19				0.01
Giant grenadier					2.89				2.88
Other grenadier								0.20	
Pacific flatnose				0.44	0.40				0.21
Slickheads				1.97	3.20				
Eelpouts	3.70	1.58	7.33	1.21	0.68		5.74	2.04	0.77
Snailfish		0.22		0.40			0.02		
Pacific whiting	16.99	8.16	0.98				0.43		
Other roundfish	12.51	5.94		0.69	0.39				0.02
Shortspine thornyhead	22.13	0.39	1.89	1.11	9.74		1.17	4.87	20.63
Longspine thornyhead				34.43	69.86			21.49	46.00
Rougheye rockfish									
Pacific ocean perch	0.64								
Aurora rockfish							6.72	0.33	
Darkblotched rockfish	12.88	0.96							
Splitnose rockfish	119.18	4.07	0.85						
Shortbelly rockfish									
Other rockfish	14.87	34.99	0.45						
Grooved tanner crab				6.16	17.99		0.84		20.33
Other invertebrates	3.35	40.82	19.43	14.59	8.14		29.28	18.01	9.31
Total catch weight (kg)	406.45	360.69	152.77	112.74	184.39		142.30	135.23	152.04

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901003067	199901003068	199901003069	199901003070	199901003071	199901003072	199901003073	199901003074	199901003075
Start date and time	7/25/99 11:58	7/25/99 14:42	7/26/99 6:59	7/26/99 9:55	7/26/99 12:18	7/26/99 14:11		7/26/99 18:06	7/27/99 7:49
Start gear latitude (dd)	39.2244	39.2131	38.5201	38.4186	38.4238	38.4223		38.4414	
Start gear longitude (dd)	-124.1032	-124.2049	-123.7428	-123.6893	-123.6266	-123.6110		-123.6140	
End gear latitude (dd)	39.2384	39.2260	38.5304	38.4298	38.4349	38.4323		38.4310	
End gear longitude (dd)	-124.1069	-124.2055	-123.7462	-123.6965	-123.6313	-123.6180		-123.6084	
Station	55G	55I	59I	59H	59E	59D	59B	59B	63I
Avg Bottom depth (m)	781.28	1182.88	1045.48	888.20	506.84	439.25	292.61	307.80	1060.70
Duration (hr)	0.41	0.38	0.31	0.41	0.30	0.30		0.28	0.38
Distance fished (km)	1.63	1.49	1.27	1.42	1.35	1.28	0.00	1.27	1.27
Net width (m)	14.50	15.50	14.60	14.90	14.60	14.20		13.70	
Performance	0	0	0	0	0	0	-1	1.11	-5.1
Hagfish			1.33	1.15					0.16
Brown catshark	6.24	5.37	0.14	1.21	4.70	2.14		1.27	1.21
Spiny dogfish									
Skates			4.90		11.62	21.85		8.33	4.49
Other elasmobranchs					0.79	0.65		4.73	
Arrowtooth flounder									
Petrale sole									
Dover sole	77.47		40.67	78.96	45.78	161.48		88.81	136.01
Deepsea sole	4.67		7.73	1.98					7.77
Rex sole					13.79	49.36		37.03	
Other flatfish						3.80		13.48	
Sablefish	13.75	14.26	9.91	12.88	19.14	15.71		7.22	64.72
Pacific grenadier	1.00	105.22	32.20	2.13					238.29
Giant grenadier		85.53	4.47	2.12					66.24
Other grenadier					0.40				
Pacific flatnose	0.20	7.97	0.81	0.48	0.15				0.89
Slickheads	1.91	10.70	3.88	1.64					22.07
Eelpouts	1.35	4.22	6.18	4.13	17.75	5.03		7.37	0.81
Snailfish						0.13			0.34
Pacific whiting					0.68	1.38		8.15	0.59
Other roundfish	0.13	0.05	0.24	0.13	0.01				
Shortspine thornyhead	8.08	7.58	13.45	14.56	7.68	0.91		0.73	26.10
Longspine thornyhead	111.32	19.34	39.01	73.54					98.97
Rougheye rockfish									
Pacific ocean perch									
Aurora rockfish					2.12	2.77			
Darkblotched rockfish								51.00	
Splitnose rockfish								120.53	
Shortbelly rockfish									
Other rockfish						0.67		30.43	
Grooved tanner crab	6.30	0.67	7.81	12.15	0.27				3.81
Other invertebrates	6.90	74.16	53.84	17.39	18.09	32.77		5.87	24.29
Total catch weight (kg)	239.32	335.05	226.56	224.42	142.94	298.65		384.94	696.73

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901003076	199901003077	199901003078	199901003079	199901003080	199901003081	199901003082	199901003083	199901003084
Start date and time	7/27/99 10:40	7/27/99 14:16		7/30/99 6:38	7/30/99 9:13	7/30/99 12:16	7/30/99 14:53	7/30/99 17:06	7/31/99 7:20
Start gear latitude (dd)	37.8026	37.8954		37.2322	37.2267	37.1418	37.1627	37.1977	36.4106
Start gear longitude (dd)	-123.3400	-123.4281		-123.1591	-123.1066	-123.0745	-122.8597	-122.8132	-122.2133
End gear latitude (dd)	37.8026	37.8861		37.2397	37.2329	37.1527	37.1681	37.2063	36.4233
End gear longitude (dd)	-123.3545	-123.4227		-123.1674	-123.1222	-123.0781	-122.8744	-122.8241	-122.2092
Station	63G	63B	63A	67I	67I	67G	67D	67B	71I
Avg Bottom depth (m)	755.96	292.61	219.46	1155.44	990.58	766.32	441.41	301.62	1065.07
Duration (hr)	0.35	0.26		0.36	0.39	0.35	0.32	0.29	0.40
Distance fished (km)	1.32	1.14	0.00	1.56	1.63	1.33	1.45	1.42	1.56
Net width (m)	14.70			15.10	14.40	13.50	14.20	13.60	15.30
Performance	5.1	-5.1	-5.1	0	0	0	0	0	0
Hagfish	1.03				0.19				1.88
Brown catshark	5.63			3.04	6.44	0.90	0.63		4.12
Spiny dogfish								13.5	
Skates				3.08	26.85	5.70	196.34	22.76	
Other elasmobranchs							1.29	3.63	
Arrowtooth flounder							0.80		
Petrale sole								2.37	
Dover sole	296.11			120.46	147.72	99.78	216.24	119.59	
Deepsea sole				10.04					7.01
Rex sole							103.27	82.89	
Other flatfish								9.48	
Sablefish	116.65			12.51	68.27	13.35	2.49		30.13
Pacific grenadier				101.60	246.37	0.69			212.36
Giant grenadier	3.56			27.34	2.15	1.43			18.59
Other grenadier						0.10			
Pacific flatnose				5.48	0.94	0.05			3.97
Slickheads	23.89			1.99	38.11	24.61			22.18
Eelpouts	1.24			0.41	5.20	3.79	8.49	18.78	9.81
Snailfish									
Pacific whiting							1.28	43.59	
Other roundfish				3.45	0.18	0.29			2.42
Shortspine thornyhead	89.81			16.35	30.46	5.15	2.25		40.02
Longspine thornyhead	301.53			8.90	130.46	111.67			63.29
Rougheye rockfish									
Pacific ocean perch									
Aurora rockfish							14.01		
Darkblotched rockfish								0.27	
Splitnose rockfish							0.49	69.72	
Shortbelly rockfish									
Other rockfish							4.61	7.14	
Grooved tanner crab	15.49				9.31	6.42	0.85		14.47
Other invertebrates	65.18			5.59	12.32	27.53	54.01	35.26	16.35
Total catch weight (kg)	920.11			320.21	724.97	301.44	607.04	416.84	446.58

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901003085	199901003086	199901003087	199901003088	199901003089	199901003090	199901003091	199901003092	199901003093
Start date and time	7/31/99 9:35	7/31/99 12:27	7/31/99 15:21	7/31/99 18:07	8/1/99 7:53	8/1/99 11:09	8/1/99 14:17	8/1/99 16:49	8/1/99 18:52
Start gear latitude (dd)	36.3998	36.4319	36.4615	36.4663	35.8747	35.8602	35.8377	35.8683	35.8778
Start gear longitude (dd)	-122.1871	-122.0926	-122.0084	-122.0077	-121.8747	-121.7224	-121.6638	-121.5657	-121.5355
End gear latitude (dd)	36.4135	36.4201	36.4719	36.4777	35.8858	35.8745	35.8516	35.8767	35.8884
End gear longitude (dd)	-122.1756	-122.1045	-122.0157	-122.0119	-121.8783	-121.7239	-121.6607	-121.5739	-121.5385
Station	71H	71G	71D	71C	75I	75H	75G	75E	75D
Avg Bottom depth (m)	919.32	761.63	418.55	355.52	1162.67	885.31	775.47	512.30	341.60
Duration (hr)	0.49	0.38	0.32	0.31	0.38	0.48	0.32	0.33	0.33
Distance fished (km)	1.94	1.82	1.43	1.36	1.34	1.75	1.67	1.39	1.37
Net width (m)	13.80	13.90	13.60	13.90	14.70	14.50	15.10	14.20	12.90
Performance	0	0	0	0	0	0	0	0	0
Hagfish	0.28				0.26	0.16	0.12		
Brown catshark	1.13	8.36	0.20		0.98	2.12	4.07	6.43	0.71
Spiny dogfish			1.49	0.44				1.66	0.14
Skates			43.47	27.70				0.93	27.19
Other elasmobranchs			27.31	28.49			1.37	20.86	13.82
Arrowtooth flounder									
Petrale sole									
Dover sole	46.48	31.85	452.59	227.73		52.19	74.18	11.10	18.70
Deepsea sole	6.27					4.67	1.15		
Rex sole			136.10	36.55				0.16	0.71
Other flatfish			0.14	10.27					0.21
Sablefish	34.58	7.85	1.15		2.54	21.93	10.41	12.09	
Pacific grenadier	0.17				30.54	0.57			
Giant grenadier	9.03				29.85	3.60			
Other grenadier						0.01		0.05	
Pacific flatnose	2.89				1.49	0.15			
Slickheads	20.55	6.30			29.15	13.28	1.94		
Eelpouts	7.50	1.19	7.83	2.60	0.10	2.67	0.12	0.63	0.23
Snailfish	0.11					0.27	0.21		
Pacific whiting			25.40	27.31				2.76	11.85
Other roundfish	0.05	0.05		0.10	1.59	0.25	0.02		
Shortspine thornyhead	3.74	16.80	1.59	3.14	9.87	18.65	23.91	40.18	1.47
Longspine thornyhead	82.80	98.47			17.76	165.14	97.06	7.05	
Rougheye rockfish									
Pacific ocean perch									
Aurora rockfish			2.02	2.05				23.72	0.66
Darkblotched rockfish									
Splitnose rockfish			1.21	47.14					62.04
Shortbelly rockfish				0.98					
Other rockfish			7.28	4.38				0.78	1.61
Grooved tanner crab	17.18	1.44			0.75	1.59	0.11	0.89	
Other invertebrates	254.26	67.44	42.98	130.85	69.89	205.45	188.17	124.56	82.83
Total catch weight (kg)	487.02	239.75	750.76	549.71	194.78	492.72	402.82	253.82	222.15

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901003094	199901003095	199901003096	199901003097	199901003098	199901005001	199901005002	199901005003	199901005004
Start date and time	8/2/99 7:51	8/2/99 10:16	8/2/99 15:10	8/2/99 17:39	8/2/99 19:33		7/3/99 13:52	7/3/99 16:25	
Start gear latitude (dd)	35.2175	35.2205	35.2226	35.1603	35.2163				
Start gear longitude (dd)	-121.6651	-121.6362	-121.1384	-121.0091	-120.9886				
End gear latitude (dd)	35.2277	35.2277	35.2314	35.1718	35.2250				
End gear longitude (dd)	-121.6629	-121.6396	-121.1478	-121.0148	-120.9927				
Station	79I	79H	79E	79C	79A	1I	1G	1F	1C
Avg Bottom depth (m)	1084.82	955.99	518.02	364.33	226.80	1060.70	768.10	621.79	365.76
Duration (hr)	0.46	0.48	0.39	0.33	0.34		0.33	0.28	
Distance fished (km)	2.07	2.31	1.35	1.39	1.55	0.00	1.20	1.02	0.00
Net width (m)	15.10	14.10	15.90	14.50	14.00				
Performance	0	5.1	0	0	0	-1.11	-5.1	-5.1	-3.12
Hagfish	1.00	0.20						0.60	
Brown catshark		0.59	3.19	1.80			0.74		
Spiny dogfish					1668.77				
Skates			10.17	24.22	4.22		1.36	0.90	
Other elasmobranchs			12.15	6.00	0.96				
Arrowtooth flounder								5.86	
Petrale sole									
Dover sole	34.09	16.33	50.83	8.40	1.22		6.05	33.68	
Deepsea sole	4.06	1.39					9.92	2.45	
Rex sole				12.61				1.20	
Other flatfish				0.13	5.53				
Sablefish	20.65	23.65	8.38	2.83	0.83		46.88	22.33	
Pacific grenadier	38.06	0.11	1.97				1.09		
Giant grenadier	16.53	4.95					1.33	4.82	
Other grenadier									
Pacific flatnose	2.75	0.99					0.30	0.80	
Slickheads	5.33	8.23					0.51		
Eelpouts	0.34	0.77	2.72	1.70	0.54		7.50	3.43	
Snailfish	0.01	0.10	0.03	0.10				0.79	
Pacific whiting			0.45	40.58	54.96				
Other roundfish	0.15	0.16			3.39		0.13	0.22	
Shortspine thornyhead	5.86	8.75	14.36	0.33			34.22	17.20	
Longspine thornyhead	16.33	53.96	14.33				14.02	11.07	
Rougheye rockfish									
Pacific ocean perch									
Aurora rockfish			8.99						
Darkblotched rockfish									
Splitnose rockfish				40.37	15.28				
Shortbelly rockfish					0.10				
Other rockfish				0.30	27.99				
Grooved tanner crab	4.43	2.38					6.14	3.55	
Other invertebrates	30.17	15.63	254.02	139.76	9.47		12.39	31.17	
Total catch weight (kg)	179.75	138.18	381.58	279.14	1793.24		142.57	140.07	

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901005005	199901005006	199901005007	199901005008	199901005009	199901005010	199901005011	199901005012	199901005013
Start date and time	7/4/99 6:24	7/4/99 8:58	7/4/99 11:38	7/4/99 15:09	7/4/99 18:16	7/5/99 6:39		7/5/99 11:43	7/5/99 15:53
Start gear latitude (dd)	47.5650	47.5786	47.5222	47.5024	47.4838	46.8353		46.7616	46.8131
Start gear longitude (dd)	-125.0318	-125.0729	-125.2130	-125.2795	-125.3043	-125.2510		-125.1504	-124.9313
End gear latitude (dd)	47.5568	47.5682	47.5384	47.5226	47.4977	46.8440		46.7756	46.8182
End gear longitude (dd)	-125.0184	-125.0632	-125.2163	-125.2928	-125.3039	-125.2388		-125.1584	-124.9427
Station	5A	5C	5F	5I	5J	9J	9I	9H	9E
Avg Bottom depth (m)	1150.58	364.29	607.60	1055.24	1191.18	1207.55	1060.70	897.05	497.13
Duration (hr)	0.37	0.39	0.45	0.58	0.53	0.38		0.40	0.31
Distance fished (km)	1.37	1.38	1.87	2.57	2.05	1.44	0.00	1.74	1.07
Net width (m)	15.60	8.40	14.30	15.30	15.60	15.60		15.40	15.10
Performance	0	5.1	0	5.1	0	0	-4.2	0	0
Hagfish				2.21	0.20			1.12	0.10
Brown catshark			1.21		0.20		0.50	2.06	1.01
Spiny dogfish									
Skates	15.36	21.59	6.64	3.13		4.91	2.88		3.69
Other elasmobranchs	604.05	17.41							
Arrowtooth flounder	2.30	1.34	0.40	4.29					
Petrale sole	0.80								
Dover sole	43.08	37.40							82.12
Deepsea sole			4.94	1.89	2.88	2.10	1.73	5.28	
Rex sole	12.71	6.09	0.40						1.13
Other flatfish	1.47	0.40							
Sablefish	10.59		4.90	10.42	5.34	4.06	2.49	3.47	9.02
Pacific grenadier			0.85	18.70	74.51	45.52	14.27	10.97	0.54
Giant grenadier			0.70	35.02	38.98	64.50	13.31	10.50	0.80
Other grenadier									
Pacific flatnose			0.30	2.96	2.29	4.46	0.30	0.85	0.62
Slickheads							1.55	2.45	
Eelpouts		0.60	2.42	3.53	2.58	0.80	0.68	1.02	3.08
Snailfish			0.56	0.60					0.36
Pacific whiting									
Other roundfish	9.17	0.30		0.21	0.29	0.61			0.07
Shortspine thornyhead		3.89	*	7.72	4.23	3.59	6.23	8.82	6.55
Longspine thornyhead			26.44	61.45	71.81	25.45	22.22	48.49	7.94
Rougheye rockfish	3.50	2.97							
Pacific ocean perch	2.24	0.94							
Aurora rockfish									
Darkblotched rockfish									
Splitnose rockfish									
Shortbelly rockfish									
Other rockfish	30.01	0.30							
Grooved tanner crab		0.40	1.99	23.53	4.95	1.45	2.12	14.94	1.15
Other invertebrates			12.67	19.25	24.40	11.22	9.10	5.79	13.62
Total catch weight (kg)	735.26	93.82	64.39	194.91	232.66	168.67	77.37	115.74	131.79

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901005014	199901005015	199901005016	199901005017	199901005018	199901005019	199901005020	199901005021	199901005022
Start date and time	7/5/99 17:41	7/6/99 6:25	7/6/99 8:11	7/6/99 9:55	7/6/99 12:28	7/6/99 14:45	7/7/99 6:58	7/7/99 9:21	7/7/99 11:26
Start gear latitude (dd)	46.7898	46.0894	46.0886	46.0863	46.1659	46.1693	45.5441	45.5395	45.5259
Start gear longitude (dd)	-124.8515	-124.7405	-124.7577	-124.7720	-124.7070	-124.7159	-124.8733	-124.8423	-124.7818
End gear latitude (dd)	46.7987	46.1020	46.1005	46.0946	46.1732	46.1788	45.5576	45.5530	45.5413
End gear longitude (dd)	-124.8607	-124.7395	-124.7517	-124.7591	-124.6854	-124.7096	-124.8601	-124.8389	-124.7822
Station	9A	13C	13D	13E	13G	13H	17J	17I	17F
Avg Bottom depth (m)	213.77	346.87	441.28	495.59	745.71	894.88	1193.34	1047.52	625.89
Duration (hr)	0.31	0.34	0.36	0.44	0.48	0.28	0.48	0.37	0.40
Distance fished (km)	1.22	1.43	1.55	1.51	2.05	1.25	1.85	1.55	1.79
Net width (m)	15.00	15.10	15.10	15.10	15.30	15.40	15.60	15.50	15.20
Performance	0	0	0	0	5.1	1.1	0	0	0
Hagfish			0.10		0.10	0.80			0.86
Brown catshark			0.10	0.82	1.16	0.97	0.20	1.53	9.37
Spiny dogfish									
Skates	4.81	10.70	10.04	3.31	4.05				3.62
Other elasmobranchs	0.77								
Arrowtooth flounder	13.62	8.56	9.85	12.49	5.01				
Petrale sole									
Dover sole	31.66	137.80	26.63	11.65	29.08	11.37			8.47
Deepsea sole					4.50	5.54			
Rex sole	5.62	26.28	2.54	0.10					0.30
Other flatfish	8.21								
Sablefish	5.34	15.49	13.42	11.38	101.30	77.16	24.82	8.05	71.10
Pacific grenadier						0.10	33.29	23.74	15.88
Giant grenadier						2.87	31.92	24.47	9.33
Other grenadier									
Pacific flatnose				0.10	0.10	0.01	1.73	1.05	2.55
Slickheads					1.38	3.49		1.77	0.60
Eelpouts	0.58	1.57	1.22	3.61	0.85	4.25	5.77	2.13	1.59
Snailfish				1.64		0.30	0.30		
Pacific whiting		1.29		1.31	1.98				
Other roundfish	1.52	0.10	0.10			0.24	0.50	0.16	0.10
Shortspine thornyhead	3.87	17.02	18.49	12.09	50.70	22.98		2.04	14.70
Longspine thornyhead					107.45	108.30	15.79	11.45	25.71
Rougheye rockfish			1.48						
Pacific ocean perch	0.40	3.00	0.80						
Aurora rockfish			0.20	0.10					
Darkblotched rockfish	31.42								
Splitnose rockfish	61.63	0.63							
Shortbelly rockfish									
Other rockfish	22.23	0.20							
Grooved tanner crab			3.14	28.86	39.92	15.03	14.73	12.86	11.78
Other invertebrates	8.61	14.35	20.53	20.33	9.17	16.02	74.10	44.81	4.56
Total catch weight (kg)	200.29	236.99	108.64	107.79	356.75	269.44	203.14	134.06	180.52

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901005023	199901005024	199901005025	199901005026	199901005027	199901005028	199901005029	199901005030	199901005031
Start date and time	7/7/99 13:01		7/7/99 16:57	7/17/99 6:55	7/17/99 10:18	7/17/99 12:17	7/17/99 15:44	7/17/99 17:44	7/18/99 6:50
Start gear latitude (dd)	45.5542		45.4581	44.8749	44.8543	44.8502	44.8966	44.9007	44.1634
Start gear longitude (dd)	-124.7438		-124.4180	-125.0229	-124.9516	-124.9127	-124.6199	-124.4706	-124.9612
End gear latitude (dd)	45.5735		45.4466	44.8792	44.8681	44.8571	44.8996	44.8940	44.1734
End gear longitude (dd)	-124.7434		-124.4120	-125.0381	-124.9565	-124.9253	-124.6060	-124.4807	-124.9612
Station	17E	17A	17A	21I	21G	21F	21D	21A	25A
Avg Bottom depth (m)	509.50	219.46	215.14	1077.31	788.26	613.55	421.05	226.91	234.07
Duration (hr)	0.49		0.36	0.32	0.42	0.34	0.31	0.30	0.29
Distance fished (km)	2.25	0.00	1.39	1.35	1.65	1.37	1.44	1.11	1.03
Net width (m)	15.20		15.00	14.60	16.50	14.60	14.60	16.50	14.60
Performance	0	-5	0	0	0	0	0	0	0
Hagfish				0.30	0.20				
Brown catshark	1.10			0.90	0.84	1.58			
Spiny dogfish									0.53
Skates	12.57		16.84	0.10	3.02	14.24	1.24	25.96	0.50
Other elasmobranchs			1.13					0.49	3.65
Arrowtooth flounder			16.34				2.20	9.95	2.02
Petrale sole								0.45	
Dover sole	75.28		56.87		30.52	24.73	33.43	24.84	34.88
Deepsea sole				0.93	2.05				
Rex sole	2.38		0.93				4.74	3.13	8.45
Other flatfish			6.63					5.21	13.24
Sablefish	13.15		11.08	22.93	9.73	26.60	14.38	4.13	31.30
Pacific grenadier	1.27			33.93	1.90	1.36			
Giant grenadier				8.68	23.09	11.07			
Other grenadier									
Pacific flatnose	1.96			1.60	0.51	3.70			
Slickheads				6.85	8.53	1.31			
Eelpouts	0.06		1.01	3.37	3.37	6.58	1.90	0.18	0.20
Snailfish				0.00			0.40		
Pacific whiting	1.57		9.82				1.43	0.40	1.29
Other roundfish			0.30	0.10	0.42	0.08			0.24
Shortspine thornyhead	19.24		11.50	11.15	5.55	1.89	10.54	1.24	
Longspine thornyhead	10.25			55.58	83.76	5.63			
Rougheye rockfish								2.14	
Pacific ocean perch							0.54		
Aurora rockfish	1.81						2.12	3.40	
Darkblotched rockfish								2.01	
Splitnose rockfish			1.70						4.17
Shortbelly rockfish									0.20
Other rockfish			21.56					5.75	1.54
Grooved tanner crab	6.24			5.06	11.48	6.00	0.92		
Other invertebrates	39.93		47.57	8.05	9.47	21.08	10.93	109.50	69.83
Total catch weight (kg)	186.80		203.27	159.53	194.44	125.84	84.77	198.77	172.04

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901005032	199901005033	199901005034	199901005035	199901005036	199901005037	199901005038	199901005039	199901005040
Start date and time	7/18/99 8:35		7/18/99 12:47		7/18/99 17:04	7/18/99 19:20	7/19/99 7:20	7/19/99 10:27	7/19/99 12:54
Start gear latitude (dd)	44.1882		44.2197		44.2098	44.2054	43.4799	43.4918	43.4961
Start gear longitude (dd)	-124.9958		-125.0104		-125.0216	-125.0317	-125.0052	-124.9667	-124.9035
End gear latitude (dd)	44.1997		44.2321		44.2228	44.2149	43.4984	43.5025	43.5098
End gear longitude (dd)	-124.9940		-125.0045		-125.0181	-125.0291	-125.0134	-124.9698	-124.9092
Station	25D	25F	25F	25G	25G	25H	29J	29I	29G
Avg Bottom depth (m)	421.08	621.79	621.79	768.10	758.37	914.40	1163.12	1089.17	747.04
Duration (hr)	0.33		0.37		0.37	0.30	0.57	0.46	0.37
Distance fished (km)	1.31	0.00	1.54	0.00	1.49	1.10	2.64	1.74	1.73
Net width (m)	16.50				14.60		16.50	13.30	16.50
Performance	0	-1.11	-5.1	-4.1	4.1	-5.1	0	5.1	0
Hagfish	0.20				0.44	0.50	0.60	0.50	0.30
Brown catshark	0.20		0.50		0.30		0.50		0.78
Spiny dogfish	1.36								
Skates	27.49		16.11		17.10	2.67	14.78	8.27	3.79
Other elasmobranchs	15.15								
Arrowtooth flounder	9.12								
Petrale sole									
Dover sole	181.74		176.25		63.21	27.14	1.14	0.96	3.45
Deepsea sole			7.08		4.93	2.50	5.41	7.29	0.60
Rex sole	16.32		6.90						
Other flatfish	1.67								
Sablefish	32.84		31.31		35.74	24.33	14.83		6.89
Pacific grenadier			0.30		1.55	2.92	18.55	63.87	4.84
Giant grenadier			112.43		86.82	186.56	113.30	8.75	9.39
Other grenadier									
Pacific flatnose			0.92		1.51	1.16	2.86	3.38	0.40
Slickheads					1.50	5.15	2.03		0.20
Eelpouts	3.68		18.63		2.79	1.69	2.03	2.01	0.30
Snailfish	0.10		1.60				0.50	0.87	0.50
Pacific whiting	5.68								
Other roundfish			0.01		0.10	0.10	0.30	0.37	0.58
Shortspine thornyhead	3.80		19.84		7.60	4.15			5.00
Longspine thornyhead			30.08		36.00	52.00	87.64	13.50	46.16
Rougheye rockfish									
Pacific ocean perch									
Aurora rockfish	0.75								
Darkblotched rockfish									
Splitnose rockfish	3.62								
Shortbelly rockfish									
Other rockfish	2.58		2.11						
Grooved tanner crab			14.56		71.54	26.78	28.72	28.92	15.15
Other invertebrates	13.95		24.22		8.23	4.48	60.63	6.62	11.43
Total catch weight (kg)	320.25		462.83		339.35	342.13	353.83	145.31	109.77

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901005041	199901005042	199901005043	199901005044	199901005045	199901005046	199901005047	199901005048	199901005049
Start date and time	7/19/99 16:25	7/19/99 18:03	7/20/99 6:23	7/20/99 8:07	7/20/99 10:07		7/20/99 14:14	7/20/99 16:32	7/21/99 6:35
Start gear latitude (dd)	43.5688	43.5765	42.8712	42.8850	42.8727		42.8880	42.8845	42.1553
Start gear longitude (dd)	-124.6260	-124.5790	-124.8433	-124.9133	-124.9335		-124.9684	-124.9835	-124.9029
End gear latitude (dd)	43.5595	43.5679	42.8781	42.8967	42.8858		42.9022	42.9046	42.1721
End gear longitude (dd)	-124.6288	-124.5831	-124.8606	-124.9188	-124.9362		-124.9708	-124.9820	-124.9121
Station	29B	29A	33B	33E	33F	33H	33H	33I	37I
Avg Bottom depth (m)	293.27	210.86	300.26	501.79	628.95	914.40	951.98	1055.18	1028.04
Duration (hr)	0.29	0.28	0.37	0.35	0.37		0.40	0.58	0.45
Distance fished (km)	1.06	1.03	1.70	1.40	1.51	0.00	1.61	2.30	2.15
Net width (m)	14.60	14.60	15.20	14.60	15.00		15.80	16.20	16.50
Performance	0	0	1.11	1.11	1.11	-5.1	5.1	5.1	0
Hagfish							6.97	2.81	0.40
Brown catshark				0.20	1.21		1.63		5.00
Spiny dogfish									
Skates	4.98	87.23	71.35	13.58	3.04			12.48	3.90
Other elasmobranchs	0.20		0.59						
Arrowtooth flounder	17.37	13.03	6.12	3.08					
Petrale sole		0.95							
Dover sole	*	36.91	110.03	289.98	129.07		24.22	16.35	6.41
Deepsea sole							4.40	6.46	6.86
Rex sole	18.97	9.23	32.30	50.14	7.97				
Other flatfish	0.61	436.57	0.40	0.48					
Sablefish	2.61		7.43	19.60	22.67		19.73	7.69	23.74
Pacific grenadier				0.54	0.10		4.70	75.12	41.95
Giant grenadier					5.21		7.91	16.33	15.14
Other grenadier									
Pacific flatnose				0.87	2.02		1.80	4.74	1.40
Slickheads					0.40		10.73	2.55	21.76
Eelpouts	1.23	<0.01	6.84	11.50	2.19		4.94	3.40	7.89
Snailfish	0.04			1.38	0.50		0.00	0.20	0.10
Pacific whiting			3.95	1.00				0.59	
Other roundfish		5.80			0.31		0.22	7.91	0.22
Shortspine thornyhead	4.73	2.07	1.72	2.50	16.48		8.09	12.99	6.22
Longspine thornyhead		0.01			36.31		79.10	124.01	158.13
Rougheye rockfish	0.56								
Pacific ocean perch									
Aurora rockfish									
Darkblotched rockfish	1.53	0.40	38.76	0.58					
Splitnose rockfish	0.05	0.10	1.48	0.10					
Shortbelly rockfish									
Other rockfish	0.20	0.10	1.13						
Grooved tanner crab	1.13			2.43	3.81		22.19	32.38	10.42
Other invertebrates	4.94	7.60	46.93	9.60	7.63		7.65	9.81	17.68
Total catch weight (kg)	59.16	599.99	329.03	407.55	238.90		204.27	335.80	327.21

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901005050	199901005051	199901005052	199901005053	199901005054	199901005055	199901005056	199901005057	199901005058
Start date and time	7/21/99 9:00	7/21/99 11:34	7/21/99 13:44	7/21/99 15:06	7/23/99 6:25	7/23/99 8:14	7/23/99 11:07	7/23/99 14:48	7/23/99 17:59
Start gear latitude (dd)	42.1659	42.1758	42.1868	42.1804	41.5798	41.5545	41.5545[a]	41.5478	41.4925[a]
Start gear longitude (dd)	-124.8744	-124.7475	-124.6310	-124.5985	-124.5043	-124.5164	-124.6937[a]	-124.9544	-124.9833[a]
End gear latitude (dd)	42.1814	42.1878	42.2023	42.1928	41.5681	41.5682	41.5565[a]	41.5620	41.5016[a]
End gear longitude (dd)	-124.8861	-124.7604	-124.6287	-124.5980	-124.5081	-124.5157	-124.7103[a]	-124.9625	-124.9943[a]
Station	37H	37F	37C	37A	41B	41C	41H	41I	41J
Bottom depth (m)	906.85	589.53	354.77	236.07	300.07	373.85	898.84	1042.07	1221.73
Duration (hr)	0.47	0.40	0.42	0.34	0.34	0.37	0.41	0.45	0.41
Distance fished (km)	2.05	1.74	1.80	1.39	1.36	1.55	1.95	1.88	1.56
Net width (m)	15.20	16.50	16.50	16.50	14.60	14.60	16.50	14.60	16.50
Performance	0	0	0	0	0	0	0	5.1	0
Hagfish	0.51	1.22	0.50				1.29	0.20	
Brown catshark	2.13	5.76	1.55		0.56	0.94	2.26	1.20	
Spiny dogfish					0.20	0.30			
Skates		2.87	28.98	22.58	4.97	10.02	4.31	9.44	5.75
Other elasmobranchs			0.65	0.95					
Arrowtooth flounder			6.07	16.87	2.03	2.20			
Petrale sole									
Dover sole	15.56	68.65	40.76	40.06	24.88	60.36	8.34	23.47	
Deepsea sole	2.04	3.67					5.36	3.41	6.35
Rex sole		11.15	17.91	26.32	10.30	12.37	0.40		
Other flatfish			0.10	0.88					
Sablefish	19.30	93.93	9.32	6.02	7.18	20.60	1.84	23.44	5.01
Pacific grenadier	26.43	4.92	0.10				3.71	146.45	78.80
Giant grenadier							2.76	8.61	95.14
Other grenadier									
Pacific flatnose	1.19	0.20	0.20				0.50	2.11	10.21
Slickheads	8.47	0.30					0.40	5.44	0.76
Eelpouts	2.82	3.87	15.16	4.15	1.22	4.51	2.72	1.49	0.20
Snailfish	0.01	0.94	0.02						
Pacific whiting			3.79	4.70	0.93	2.54			
Other roundfish	0.31	0.53		0.10	0.05		0.22	0.30	6.79
Shortspine thornyhead	4.28	50.42	12.95	1.75	5.64	11.23		33.78	8.46
Longspine thornyhead	93.52	81.20	0.97				60.82	72.34	27.75
Rougheye rockfish							2.47		
Pacific ocean perch				0.30		0.59			
Aurora rockfish						0.50			
Darkblotched rockfish			0.73	14.49	0.60	0.68			
Splitnose rockfish			2.09	22.37	2.55	8.47	2.71		
Shortbelly rockfish									
Other rockfish			0.10	2.18	0.40	0.50			
Grooved tanner crab	55.91	14.03					54.55	10.67	3.53
Other invertebrates	20.23	70.53	58.39	119.67	25.57	37.20	52.44	11.53	57.32
Total catch weight (kg)	252.71	414.17	200.33	283.38	87.07	173.01	207.11	353.88	306.06

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901005059	199901005060	199901005061	199901005062	199901005063	199901005064	199901005065	199901005066	199901005067
Start date and time	7/24/99 7:23	7/24/99 9:48	7/28/99 10:06	7/28/99 12:08	7/28/99 14:03	7/28/99 15:53	7/28/99 17:57	7/29/99 6:33	7/29/99 9:21
Start gear latitude (dd)	40.9084	40.7936	39.3079°	39.5244	39.4551	39.2784°	39.4716	38.8714	38.8704
Start gear longitude (dd)	-124.7557	-124.6935	-124.0824°	-124.0817	-124.0403	-123.5917°	-123.9728	-123.9351	-123.9541
End gear latitude (dd)	40.8971	40.8120	39.3020°	39.5114	39.4712	39.2848°	39.4607	38.8608	38.8605
End gear longitude (dd)	-124.7461	-124.6907	-124.0833°	-124.0808	-124.0417	-123.5906°	-123.9720	-123.9254	-123.9463
Station	45H	45H	53H	53G	53F	53C	53A	57B	57C
Avg Bottom depth (m)	914.40	972.34	922.81	746.31	585.40	358.74	224.30	291.30	383.58
Duration (hr)	0.37	0.56	0.50	0.40	0.41	0.37	0.33	0.37	0.33
Distance fished (km)	1.52	2.14	2.00	1.57	1.83	1.51	1.22	1.47	1.30
Net width (m)		14.30	16.10	14.60	16.50	16.50	14.60	14.60	14.00
Performance	-1.11	0	1.11	0	0	0	0	0	0
Hagfish		0.84	1.06	0.87	0.84			0.05	
Brown catshark			5.27	4.52	5.42	6.36	1.00		
Spiny dogfish							2.30		
Skates						4.70	65.68	54.64	39.71
Other elasmobranchs						3.54	14.62	26.41	2.78
Arrowtooth flounder								0.61	
Petrale sole									
Dover sole		29.60	38.00	47.46	46.54	25.89	36.47	70.55	12.12
Deepsea sole		9.24	13.38	1.01	2.06				
Rex sole						9.83	9.13	39.28	9.58
Other flatfish						0.05	5.21	3.55	0.20
Sablefish		*	5.45	3.25	21.79	35.50	15.72	8.91	6.37
Pacific grenadier		5.82	6.19	1.72	0.76				
Giant grenadier		0.87	26.83	15.95	1.54				
Other grenadier									
Pacific flatnose		0.98	0.10	0.30	0.48				
Slickheads		4.72	4.56	3.25	0.30				
Eelpouts		6.12	4.13	0.65	1.62	0.88	0.20	1.92	3.97
Snailfish					0.28				
Pacific whiting						2.40	27.36	14.17	2.55
Other roundfish		0.07	0.01	0.07				0.01	0.05
Shortspine thornyhead		1.13	1.05	1.88	2.67	9.72	3.95	3.00	1.44
Longspine thornyhead		108.71	76.63	50.98	28.96	0.30	0.10		
Rougheye rockfish									
Pacific ocean perch									
Aurora rockfish									0.49
Darkblotched rockfish							0.99		
Splitnose rockfish						1.08	209.37	9.38	1.92
Shortbelly rockfish									
Other rockfish						0.10	30.41	3.39	5.67
Grooved tanner crab		67.00	17.98	2.19	24.47	3.29			
Other invertebrates		25.96	8.90	9.98	28.48	45.89	26.77	43.95	22.40
Total catch weight (kg)		261.05	209.54	144.08	166.23	149.54	449.27	279.80	109.25

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901005068	199901005069	199901005070	199901005071	199901005072	199901005073	199901005074	199901005075	199901005076
Start date and time	7/29/99 11:20	7/29/99 14:25			7/30/99 6:51	7/30/99 9:56	7/30/99 12:34	7/30/99 15:03	7/30/99 17:14
Start gear latitude (dd)	38.8244	38.8371			38.0947	38.1557	38.1819	38.1837	38.1704
Start gear longitude (dd)	-123.9131	-123.9816			-123.5640	-123.5516	-123.5284	-123.4994	-123.4809
End gear latitude (dd)	38.8321	38.8293			38.1080	38.1666	38.1947	38.1936	38.1825
End gear longitude (dd)	-123.9269	-123.9715			-123.5679	-123.5623	-123.5302	-123.5021	-123.4855
Station	57E	57I	57I	57I	61H	61G	61E	61D	61C
Avg Bottom depth (m)	509.94	1029.09	1207.01	1219.29	914.40	727.16	507.99	427.67	353.57
Duration (hr)	0.36	0.34			0.37	0.38	0.37	0.34	0.36
Distance fished (km)	1.48	1.25	0.00	0.00	1.75	1.64	1.44	1.16	1.48
Net width (m)	14.60	12.80		15.60		14.60	14.60	14.60	14.60
Performance	0	1.11	-4.2	-6	-5.1	5.1	0	0	1.11
Hagfish	0.13	2.13			1.48	0.66	0.65		
Brown catshark	3.53	2.89			2.34	11.09	5.66	0.98	
Spiny dogfish									
Skates	29.61	4.85		0.10		1.38	25.77	42.40	21.14
Other elasmobranchs	2.69						1.11	9.45	19.94
Arrowtooth flounder									
Petrale sole									
Dover sole	94.60	39.58		25.33	110.92	138.54	112.52	114.36	101.75
Deepsea sole		9.86		16.12	10.22	0.10			
Rex sole	23.19	0.92					5.33	17.38	23.49
Other flatfish								1.24	6.46
Sablefish	10.60	3.26		2.07	13.38	9.15	9.45	11.67	
Pacific grenadier		103.39		114.83	16.13	0.10			
Giant grenadier		7.86		26.82	24.70	9.88			
Other grenadier									
Pacific flatnose	0.51	2.50		10.63	0.67	0.20	0.43	0.05	
Slickheads		23.21			7.43	0.50			
Eelpouts	3.41	2.78		0.13	4.55	0.41	9.29	10.38	5.14
Snailfish						0.05	0.39	0.20	
Pacific whiting		0.65			0.40		0.82	2.31	18.82
Other roundfish		0.05		0.21	0.15				0.10
Shortspine thornyhead	7.39	13.81		14.52	17.82	10.23	8.04	4.60	23.86
Longspine thornyhead	0.05	47.36		20.60	75.43	71.31	4.51		
Rougheye rockfish									
Pacific ocean perch									
Aurora rockfish							1.43	1.67	1.34
Darkblotched rockfish									0.30
Splitnose rockfish									6.73
Shortbelly rockfish									
Other rockfish	0.49								16.10
Grooved tanner crab		10.42			12.50	1.23	1.02		
Other invertebrates	29.15	24.08		100.24	23.78	7.35	13.04	12.67	16.51
Total catch weight (kg)	205.34	299.59		331.59	321.90	262.18	199.45	229.35	261.67

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901005077	199901005078	199901005079	199901005080	199901005081	199901005082	199901005083	199901005084	199901005085
Start date and time	7/31/99 6:48	7/31/99 10:11	7/31/99 13:02	7/31/99 15:39	7/31/99 18:20	8/1/99 7:06	8/1/99 10:05	8/1/99 13:19	
Start gear latitude (dd)	37.4872	37.4845	37.4808	37.4458	37.4620	36.7628	36.7608	36.7745	
Start gear longitude (dd)	-122.9782	-123.0001	-123.0133	-123.0567	-123.1073	-122.2931	-122.2730	-122.2209	
End gear latitude (dd)	37.4930	37.4963	37.4934	37.4607	37.4737	36.7756	36.7797	36.7881	
End gear longitude (dd)	-122.9886	-123.0063	-123.0167	-123.0611	-123.1052	-122.2892	-122.2729	-122.2285	
Station	65B	65C	65D	65F	65G	69I	69H	69F	69C
Avg Bottom depth (m)	278.47	363.79	436.60	621.79	728.72	1032.69	885.64	611.94	365.76
Duration (hr)	0.31	0.36	0.38	0.40	0.50	0.38	0.53	0.41	
Distance fished (km)	1.14	1.45	1.45	1.80	1.89	1.50	2.16	1.71	0.00
Net width (m)	14.60	15.00	14.60		15.40	14.60	14.60	14.60	
Performance	0	0	0	-5.1	0	0	0	0	-5.1
Hagfish	0.10			0.30	0.20	1.38	28.09	2.08	
Brown catshark		2.72	12.02	7.10	3.48	0.92	3.02	13.21	
Spiny dogfish									
Skates	19.65	45.45	134.28	35.11	10.69	9.85	3.01		
Other elasmobranchs	12.50	24.95	1.10						
Arrowtooth flounder									
Petrale sole									
Dover sole	137.07	172.63	314.36	139.84	223.45	104.73	396.16	127.07	
Deepsea sole				0.40	0.65	11.24	5.09		
Rex sole	4.77	22.10	12.84						
Other flatfish	1.83								
Sablefish	1.72	5.81	4.49	10.20	5.39	23.32	14.06	8.40	
Pacific grenadier				0.10	0.05	211.14	41.00	1.54	
Giant grenadier					103.1	2.96		0.95	
Other grenadier									
Pacific flatnose				0.84	0.20	1.10	1.19	0.20	
Slickheads				1.28	102.5	7.79	6.96	0.10	
Eelpouts	6.71	24.87	14.56	2.28	5.94	1.49	3.73	0.54	
Snailfish			0.20	0.10		0.67	0.44	0.85	
Pacific whiting	269.6	19.26	8.94	1.66				0.10	
Other roundfish					0.02	0.10	0.20	0.05	
Shortspine thornyhead	1.32	4.41	1.49	3.07	0.51	46.14	19.84	2.89	
Longspine thornyhead				14.28	29.99	37.01	51.81	8.29	
Rougheye rockfish									
Pacific ocean perch									
Aurora rockfish	4.82	1.73	12.20	2.79					
Darkblotched rockfish	0.70								
Splitnose rockfish	184.20	68.05	6.97						
Shortbelly rockfish	0.20								
Other rockfish	99.05	6.87	1.76	3.18					
Grooved tanner crab				0.77	9.33	11.42	74.93	3.32	
Other invertebrates	11.31	18.00	37.37	10.86	7.43	10.68	10.05	4.02	
Total catch weight (kg)	512.90	416.85	562.58	234.16	317.89	481.94	659.58	173.60	

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901005086	199901005087	199901005088	199901005089	199901005090	199901005091	199901005092	199901005093	199901005094
Start date and time		8/2/99 8:00	8/2/99 11:01	8/2/99 14:43	8/2/99 18:07	8/3/99 7:04	8/3/99 11:40	8/3/99 15:17	8/3/99 17:25
Start gear latitude (dd)		36.2229	36.2179	36.1746	36.1910	35.4782	35.4895	35.5048	35.4613
Start gear longitude (dd)		-121.9467	-121.9526	-122.0772	-122.1988	-121.8046	-121.7125	-121.4745	-121.3199
End gear latitude (dd)		36.2239	36.2222	36.1755	36.1815	35.4733	35.4936	35.5181	35.4740
End gear longitude (dd)		-121.9574	-121.9688	-122.0967	-122.2171	-121.8306	-121.7352	-121.4730	-121.3177
Station	69C	73D	73E	73I	73J	77I	77I	77G	77E
Avg Bottom depth (m)	365.76	451.52	511.60	1040.58	1191.09	1175.02	1052.53	754.66	504.08
Duration (hr)		0.28	0.34	0.50	0.46	0.57	0.53	0.39	0.36
Distance fished (km)	0.00	0.99	1.66	1.86	2.23	2.64	2.40	1.68	1.53
Net width (m)		14.60	14.60	15.70	16.10	16.50	16.50	16.50	16.50
Performance	-5.1	0	0	0	0	0	0	0	0
Hagfish				2.41		0.50	1.13	0.30	
Brown catshark		31.98	33.23	0.81	4.80	4.05		2.70	16.14
Spiny dogfish		149.21							
Skates		51.15	20.16	3.16	1.97				4.54
Other elasmobranchs		5.53	0.81						1.90
Arrowtooth flounder									
Petrale sole									
Dover sole		88.50	38.15				3.69	31.89	22.86
Deepsea sole			1.08	7.68	0.83	0.10	3.95		
Rex sole		8.02	0.32						0.30
Other flatfish									
Sablefish		8.19	50.09	32.65	7.55	6.04	20.49	13.96	10.33
Pacific grenadier				92.75	199.27	57.19	13.01	3.83	0.05
Giant grenadier				34.61	14.21	23.68	16.00	2.73	
Other grenadier									
Pacific flatnose				1.95	8.57	2.99	0.57		
Slickheads				27.48	2.02	18.13	13.30	7.42	
Eelpouts		9.16	4.72	4.96		0.92	0.40	0.57	0.75
Snailfish				0.21				0.20	
Pacific whiting		9.04	4.48	0.48					20.55
Other roundfish				0.15	0.34	0.10	0.05	0.13	
Shortspine thornyhead		3.25	38.86	38.07	16.43	19.99	11.00	7.86	4.44
Longspine thornyhead		*	12.92	48.88	18.28	22.97	25.18	64.18	3.49
Rougheye rockfish									
Pacific ocean perch									
Aurora rockfish		13.78	19.91	3.78					24.81
Darkblotched rockfish									
Splitnose rockfish		0.30							
Shortbelly rockfish									
Other rockfish		2.95							
Grooved tanner crab				7.97	0.05	0.10	2.73	0.93	
Other invertebrates		58.08	37.55	43.32	27.38	40.38	36.56	83.13	75.40
Total catch weight (kg)		439.12	262.28	351.31	301.71	197.16	148.05	219.83	185.57

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901006001	199901006002	199901006003	199901006004	199901006005	199901006006	199901006007	199901006008	199901006009
Start date and time	8/26/99 7:27	8/26/99 10:28	8/26/99 12:45	8/27/99 7:08	8/27/99 9:53		8/28/99 7:29		8/28/99 13:17
Start gear latitude (dd)	47.9993	47.9664	47.9143	47.3845	47.3760		46.6283		46.7424
Start gear longitude (dd)	-125.6163	-125.6189	-125.6871	-125.2343	-125.2115		-124.9881		-124.9275
End gear latitude (dd)	47.9887	47.9767	47.9272	47.3980	47.3906		46.6328		46.7331
End gear longitude (dd)	-125.6058	-125.6248	-125.6845	-125.2363	-125.2113		-125.0131		-124.9123
Station	2A	2C	2F	6H	6G	6F	10J	10H	10F
Avg Bottom depth (m)	219.81	352.02	620.31	887.77	762.30	621.79	1229.16	914.40	612.15
Duration (hr)	0.34	0.34	0.36	0.44	0.43		0.47		0.39
Distance fished (km)	1.44	1.23	1.47	1.61	1.64	0.00	2.38	0.00	1.58
Net width (m)	14.90	14.90	15.10	15.30	15.20		15.50		15.10
Performance	0	1.1	0	0	0	-2.4	5.1	-1.12	0
Hagfish				0.70	0.91		0.20		0.10
Brown catshark			2.90	0.31	0.50				2.37
Spiny dogfish					0.01				
Skates	19.40	5.15					14.16		3.19
Other elasmobranchs	9.00								
Arrowtooth flounder	171.20	79.95	5.00						
Petrale sole									
Dover sole	159.40	78.15	53.30						1.58
Deepsea sole			7.70	3.20	6.20		8.03		0.29
Rex sole	5.80	30.15							
Other flatfish	3.40	1.15							
Sablefish	4.40		*	11.90	9.70		23.22		15.78
Pacific grenadier			2.50	8.70	4.40		13.33		4.56
Giant grenadier			7.30	5.30	4.20		40.94		6.57
Other grenadier									
Pacific flatnose				0.30	3.30		2.05		1.43
Slickheads				5.40	0.70		0.49		0.10
Eelpouts		3.95	7.10	2.90	0.80		3.18		5.99
Snailfish		3.15	3.30						0.10
Pacific whiting	0.30								
Other roundfish	16.50	1.45	2.80	0.01	0.11		6.16		0.10
Shortspine thornyhead		9.95	6.00	11.00	15.90		4.70		3.04
Longspine thornyhead			1.30	52.70	85.90		59.34		12.90
Rougheye rockfish		8.05							
Pacific ocean perch	11.20	7.75							
Aurora rockfish									
Darkblotched rockfish									
Splitnose rockfish									
Shortbelly rockfish									
Other rockfish	32.50								
Grooved tanner crab			5.20	24.90	34.50		8.50		5.88
Other invertebrates	7.20	4.15	6.80	0.10	49.01		32.30		7.69
Total catch weight (kg)	440.30	283.00	111.20	127.42	216.14		216.58		71.68

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901006010	199901006011	199901006012	199901006013	199901006014	199901006015	199901006016	199901006017	199901006018
Start date and time	8/28/99 15:08	8/28/99 16:49	8/28/99 19:32		8/29/99 8:54	8/29/99 10:46	8/29/99 12:43	8/29/99 15:11	8/29/99 17:46
Start gear latitude (dd)	46.7462	46.6733	46.6866		46.0123	45.9939	45.9748	46.0032	46.0551
Start gear longitude (dd)	-124.8696	-124.8020	-124.9616		-124.8004	-124.8145	-124.8317	-124.8956	-124.8957
End gear latitude (dd)	46.7306	46.6885	46.6869		46.0252	46.0101	45.9886	46.0088	46.0409
End gear longitude (dd)	-124.8682	-124.8044	-124.9766		-124.8035	-124.8196	-124.8376	-124.8767	-124.9027
Station	10D	10C	10H	14D	14D	14E	14F	14H	14I
Avg Bottom depth (m)	412.64	330.52	914.40	438.912	435.99	510.75	635.52	907.92	1018.34
Duration (hr)	0.39	0.40	0.43		0.37	0.40	0.39	0.53	0.44
Distance fished (km)	1.86	1.75	1.59	0.00	1.50	1.94	1.63	2.18	1.72
Net width (m)	15.00	14.90	15.00		15.00	15.00	15.10	15.30	15.40
Performance	0	0	0	-6	5.1	0	0	0	0
Hagfish			0.74		0.20	0.20		0.58	0.64
Brown catshark	0.49		1.51			1.63	1.04	2.49	0.10
Spiny dogfish	0.64	0.61							
Skates	3.49	11.40	1.53		19.08	21.78	0.95		5.49
Other elasmobranchs					0.94				
Arrowtooth flounder		10.74			2.15	7.33	1.63		
Petrale sole									
Dover sole	94.62	136.91	1.89		21.07	16.28	1.66		
Deepsea sole			6.29				3.88	2.95	1.28
Rex sole	36.20	20.53			4.59	0.20			
Other flatfish	0.45	2.02							
Sablefish	4.87	3.99	15.90		10.40	20.52	28.11	20.18	15.61
Pacific grenadier	0.01		0.37				0.81	4.13	32.27
Giant grenadier			2.65				4.99		9.36
Other grenadier									
Pacific flatnose	0.11		0.20			1.56	1.63	1.44	1.15
Slickheads			1.88					3.27	1.99
Eelpouts	3.67	6.74	1.22		3.49	3.43	1.77	1.92	4.43
Snailfish	0.14	0.45	0.10		0.20	1.15	1.09		0.10
Pacific whiting	0.33	1.51			12.35	1.29			
Other roundfish			0.14		0.40		0.65	0.40	0.20
Shortspine thornyhead	17.40	12.75	14.11		4.70	7.73	5.97	0.70	27.36
Longspine thornyhead	0.97	0.05	86.45			1.66	7.73	82.15	116.71
Rougheye rockfish		0.97			4.65	2.27			
Pacific ocean perch		1.70			6.76	3.83			
Aurora rockfish									
Darkblotched rockfish		1.23							
Splitnose rockfish									
Shortbelly rockfish									
Other rockfish									
Grooved tanner crab	6.98	0.70	7.65		3.11	11.51	18.30	28.95	13.50
Other invertebrates	24.98	13.03	5.36		50.64	31.41	7.26	5.57	27.02
Total catch weight (kg)	195.35	225.34	147.98		144.73	133.80	87.46	154.73	257.21

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901006019	199901006020	199901006021	199901006022	199901006023	199901006024	199901006025	199901006026	199901006027
Start date and time	8/30/99 7:13	8/30/99 9:29	8/30/99 12:29	8/30/99 14:29	8/30/99 17:03	9/2/99 6:49	9/2/99 9:48	9/2/99 12:15	9/2/99 14:37
Start gear latitude (dd)	45.2901	45.3078	45.2615	45.3293	45.2705	44.5976	44.6334	44.6735	44.6730
Start gear longitude (dd)	-124.9783	-124.9341	-124.7068	-124.6278	-124.3614	-124.7209	-124.8822	-124.9884	-125.0320
End gear latitude (dd)	45.2987	45.2932	45.2747	45.3188	45.2589	44.6031	44.6436	44.6874	44.6925
End gear longitude (dd)	-124.9739	-124.9338	-124.7144	-124.6167	-124.3571	-124.7387	-124.8985	-124.9961	-125.0275
Station	18J	18I	18E	18D	18B	22B	22E	22H	22I
Avg Bottom depth (m)	1187.30	1044.23	506.54	431.73	284.34	299.06	515.07	905.75	1040.47
Duration (hr)	0.55	0.44	0.38	0.34	0.33	0.35	0.41	0.45	0.57
Distance fished (km)	2.03	1.66	1.60	1.51	1.37	1.62	2.08	1.87	2.48
Net width (m)	15.50	15.40	15.00	15.00	14.90	14.90	15.00	15.30	15.40
Performance	0	0	0	0	0	0	0	0	0
Hagfish		0.40					0.20	0.10	0.30
Brown catshark		0.86	1.42				1.45	0.50	0.62
Spiny dogfish					2.42	0.60			
Skates	13.22			7.57	28.93	5.73	23.91	2.29	0.10
Other elasmobranchs					1.83	4.13			
Arrowtooth flounder			1.55	3.60	47.89	15.34	18.37		
Petrale sole									
Dover sole			6.63	3.26	61.52	48.25	80.79	0.96	
Deepsea sole	0.66	2.78						2.79	1.34
Rex sole					12.28	7.90	0.90		
Other flatfish					8.35	4.81	0.10		
Sablefish	45.33	41.29	9.35	31.65	21.65	56.35	28.77	10.75	49.15
Pacific grenadier	20.18	25.74	2.73					1.68	30.09
Giant grenadier	102.09	21.00						2.21	7.82
Other grenadier									
Pacific flatnose	2.58	3.76	1.50				0.40	0.63	1.49
Slickheads	0.99	9.07						0.80	1.84
Eelpouts	9.07	5.87	2.48	0.39	3.93	9.89	1.95	0.62	0.87
Snailfish	0.20	0.40	0.10				0.50		
Pacific whiting			1.05	12.53	50.12	16.41	7.39		
Other roundfish	0.30		0.10	0.03	1.31	0.10		0.20	0.45
Shortspine thornyhead	2.40		9.91	18.68	32.73	40.14	4.12	2.66	12.64
Longspine thornyhead	45.70	76.11	8.51	0.58			2.34	31.09	85.79
Rougheye rockfish									
Pacific ocean perch				1.20	3.27	0.75			
Aurora rockfish			3.89	1.77					
Darkblotched rockfish					12.09	2.16			
Splitnose rockfish					6.90	0.70			
Shortbelly rockfish									
Other rockfish					1.25	2.12	0.30		
Grooved tanner crab	9.09	12.73	0.68	0.51	0.36		21.43	26.17	14.46
Other invertebrates	77.17	41.59	19.24	39.67	25.92	11.75	35.65	5.54	5.55
Total catch weight (kg)	328.97	241.60	69.14	121.43	322.75	227.12	228.57	88.97	212.50

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901006028	199901006029	199901006030	199901006031	199901006032	199901006033	199901006034	199901006035	199901006036
Start date and time	9/2/99 17:32	9/3/99 8:15	9/3/99 10:47	9/3/99 13:18	9/3/99 14:47	9/3/99 17:44	9/4/99 7:32	9/4/99 9:58	9/4/99 12:23
Start gear latitude (dd)	44.6311	43.9935	43.9554	44.0258	44.0305	43.9161	43.3241	43.3252	43.3598
Start gear longitude (dd)	-125.0359	-125.0122	-125.0447	-124.9628	-124.9475	-124.7215	-125.0849	-125.0649	-125.0807
End gear latitude (dd)	44.6298	44.0102	43.9712	44.0121	44.0200	43.9156	43.3075	43.3101	43.3450
End gear longitude (dd)	-125.0289	-125.0137	-125.0303	-124.9638	-124.9559	-124.7052	-125.0829	-125.0629	-125.0865
Station	22J	26I	26J	26D	26C	26A	30J	30I	30J
Avg Bottom depth (m)	1176.96	1055.40	1206.62	457.13	368.03	190.15	1124.20	1071.58	1242.37
Duration (hr)	0.59	0.49	0.54	0.40	0.34	0.33	0.57	0.45	0.48
Distance fished (km)	2.21	2.68	2.33	1.55	1.39	1.33	1.96	1.71	1.80
Net width (m)	15.50	15.40	15.50	15.00	14.90	14.80	15.40	15.40	15.50
Performance	0	5.1	1.1	5.1	5.1	0	0	0	0
Hagfish		2.51	0.12	0.10				0.10	
Brown catshark	0.59	2.20		9.18	1.72			1.08	
Spiny dogfish				0.44	6.94	3.15			
Skates	0.66	9.19	13.46	42.61	30.71	20.82		11.41	0.75
Other elasmobranchs					8.30	0.10			
Arrowtooth flounder				4.34	9.16				
Petrale sole						0.30			
Dover sole		95.00	33.59	123.57	192.05	105.20			
Deepsea sole	5.21	7.64	1.63						9.60
Rex sole				22.15	27.06	0.15			
Other flatfish				2.75	8.25	1.09			
Sablefish	62.83	93.20	12.90	25.93	33.18	1.71		7.21	21.27
Pacific grenadier	36.10	96.62	5.53	20.52				75.29	212.37
Giant grenadier	45.29	63.70	39.80	2.41				40.59	177.29
Other grenadier									
Pacific flatnose	3.13	2.76	0.88	3.87				4.18	10.10
Slickheads	1.02	10.10						2.17	0.10
Eelpouts	1.85	8.07	1.46	24.21	10.10	0.71		0.77	8.28
Snailfish	0.48	2.35	0.15	1.47	0.45	0.10		0.37	
Pacific whiting				17.74	23.48	15.40			
Other roundfish	0.10	11.24	12.72			0.62		0.30	0.30
Shortspine thornyhead	12.05	43.28	10.72	4.79	2.78	2.91		12.07	2.40
Longspine thornyhead	110.68	121.09	4.62	3.32	0.10			56.03	8.98
Rougheye rockfish									
Pacific ocean perch					0.38				
Aurora rockfish				0.51					
Darkblotched rockfish					2.78	0.98			
Splitnose rockfish						0.10			
Shortbelly rockfish									
Other rockfish						60.41			
Grooved tanner crab	25.58	22.54	17.41	1.43				50.23	6.26
Other invertebrates	48.93	15.25	13.64	27.64	10.41	12.48		15.36	33.06
Total catch weight (kg)	354.49	606.74	168.62	338.98	367.84	226.23		277.16	490.78

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901006037	199901006038	199901006039	199901006040	199901006041	199901006042	199901006043	199901006044	199901006045
Start date and time	9/4/99 16:15	9/4/99 18:44	9/5/99 6:53	9/5/99 8:39	9/5/99 10:58	9/5/99 14:36	9/5/99 17:32	9/12/99 7:08	9/12/99 9:35
Start gear latitude (dd)	43.3769	43.3797	42.6601	42.7044	42.4230[b]	42.6496	42.6406	41.9789[a]	42.0277[b]
Start gear longitude (dd)	-124.8273	-124.7042	-124.7082	-124.7346	-124.4519[b]	-124.9437	-124.9883	-124.6070[a]	-124.3812[b]
End gear latitude (dd)	43.3650	43.3676	42.6705	42.6934	42.4181[b]	42.6695	42.6564	41.9789[a]	42.4335[b]
End gear longitude (dd)	-124.8287	-124.7091	-124.7147	-124.7353	-124.4523[b]	-124.9411	-124.9877	-124.6070[a]	-124.3827[b]
Station	30F	30C	34A	34B	34D	34I	34J	38C	38D
Avg Bottom depth (m)	619.34	366.56	215.40	294.90	438.91	1023.24	1243.71	382.30	449.51
Duration (hr)	0.36	0.33	0.32	0.31	0.35	0.51	0.48	0.33	0.37
Distance fished (km)	1.34	1.47	1.37	1.23	1.26	2.32	1.79	1.25	1.45
Net width (m)	15.10	14.90	14.90	14.90		15.40	15.50	15.80	16.00
Performance	1.1	0	0	0	0	0	0	0	0
Hagfish					0.83	0.54		0.10	0.70
Brown catshark	0.50	0.20	1.83		8.05	0.58		4.04	16.25
Spiny dogfish		0.35						0.88	
Skates	4.27	85.22	32.48	6.47	47.82	7.48	4.23	29.42	6.34
Other elasmobranchs			3.54	5.21	3.14				
Arrowtooth flounder		9.87	0.60	8.44	2.00			14.22	
Petrale sole			0.60						
Dover sole	40.60	38.21	26.44	13.84	180.01	51.40		120.96	97.96
Deepsea sole	1.49					16.99	0.64		
Rex sole	2.53	12.85	10.49	29.29	10.13			13.73	14.04
Other flatfish		4.30	23.30	19.31	0.34			0.05	0.40
Sablefish	19.35	15.03		2.29	2.28	8.17	52.95	11.65	10.56
Pacific grenadier	2.75					130.49	100.28		
Giant grenadier	11.39					39.55	52.43		
Other grenadier					0.10		0.10		
Pacific flatnose	0.79					4.58	13.54		
Slickheads	1.00					17.80	6.31		
Eelpouts	2.76	3.57	0.10	5.49	10.83	9.22	4.90	9.46	10.94
Snailfish	0.10	0.60			1.26	0.10		0.40	
Pacific whiting	0.96	26.16	6.15	9.37	74.97			74.60	151.57
Other roundfish	0.01			5.50		0.10	0.37		
Shortspine thornyhead	8.28	5.11		2.96	8.64	12.45		4.05	11.47
Longspine thornyhead	31.47	0.30				123.17	21.35		
Rougheye rockfish									
Pacific ocean perch			0.30	0.42					
Aurora rockfish					2.08			0.78	7.90
Darkblotched rockfish		2.13	0.88	6.04					
Splitnose rockfish			0.77	260.78				0.30	
Shortbelly rockfish									
Other rockfish			32.26	6.03				0.58	
Grooved tanner crab	115.62	10.51				30.59			
Other invertebrates	35.75	49.56	41.26	27.17	152.90	36.65	84.55	56.11	136.97
Total catch weight (kg)	279.58	263.95	180.99	408.61	505.38	489.85	341.64	341.32	465.09

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901006046	199901006047	199901006048	199901006049	199901006050	199901006051	199901006052	199901006053	199901006054
Start date and time	9/12/99 12:05	9/12/99 15:29	9/12/99 18:37	9/13/99 7:33	9/13/99 10:12	9/13/99 12:39	9/13/99 14:53	9/13/99 17:11	9/14/99 7:39
Start gear latitude (dd)	42.0248°	42.0204°	41.9951°	41.3403	41.3417	41.2760	41.2726	41.2580°	40.7285°
Start gear longitude (dd)	-124.4348°	-124.5544°	-125.0872°	-124.5600	-124.5358	-124.4834	-124.4477	-124.4017°	-124.7616°
End gear latitude (dd)	42.0312°	42.0260°	42.0047°	41.3569	41.3522	41.2873	41.2837	41.2685°	40.7199°
End gear longitude (dd)	-124.4365°	-124.5548°	-125.0883°	-124.5588	-124.5365	-124.4949	-124.4588	-124.4071°	-124.7586°
Station	38F	38I	38J	42H	42G	42E	42D	42A	46I
Avg Bottom depth (m)	615.14	1060.70	1205.08	929.99	737.34	634.31	455.1101	210.3717	1060.704
Duration (hr)	0.39	0.49	0.41	0.42	0.29	0.38	0.34	0.31	0.44
Distance fished (km)	1.60	1.99	1.70	1.94	1.22	1.61	1.68	1.28	1.63
Net width (m)	16.00	15.40	14.20	15.20	15.20	15.80	15.00	15.00	
Performance	0	0	0	1.1	1.1	0	0	0	-5.1
Hagfish	0.30	0.40		0.59	0.50	1.91	2.03	0.20	2.00
Brown catshark	4.74	0.20		0.20	0.82	0.40	7.22	0.74	
Spiny dogfish							3.34		
Skates	3.97	1.28	1.93	0.50			17.74	3.35	8.69
Other elasmobranchs								1.30	
Arrowtooth flounder							2.79		
Petrale sole								2.27	
Dover sole	22.37	19.32	4.44	21.86	40.64	31.25	128.52	15.13	2.91
Deepsea sole		12.12	4.19	11.01	5.82	1.63			35.51
Rex sole	17.95					5.22	15.39	11.99	
Other flatfish								3.17	
Sablefish	59.30	2.24	17.87	17.38	27.53	20.59	21.31		11.84
Pacific grenadier	0.20	14.25	157.24	0.82					130.16
Giant grenadier		2.26	31.12	17.98	31.97	12.72			15.37
Other grenadier									
Pacific flatnose	0.79	2.58	14.82	0.90		0.30			13.61
Slickheads		3.63		2.48	0.78				
Eelpouts	4.19	8.65		8.07	1.76	4.41	7.56	2.63	
Snailfish	2.01	0.30			0.10	1.07	0.55		
Pacific whiting	1.78						20.60	6.54	
Other roundfish		0.20	0.30	0.14	0.10	0.01		0.01	0.11
Shortspine thornyhead	5.90	19.71	7.40	1.21	6.53	12.33	3.29	0.55	35.78
Longspine thornyhead	52.33	214.31	213.2	121.99	122.99	59.04	1.88		64.60
Rougheye rockfish									
Pacific ocean perch									
Aurora rockfish							0.40	0.69	
Darkblotched rockfish								0.70	
Splitnose rockfish								2.14	
Shortbelly rockfish									
Other rockfish								15.48	
Grooved tanner crab	84.43	33.41	1.32	26.15	29.36	12.06	4.27		27.20
Other invertebrates	47.01	73.85	11.62	16.42	8.92	9.01	82.76	17.20	221.28
Total catch weight (kg)	307.26	408.71	273.56	247.69	277.81	171.95	319.64	84.09	569.05

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901006055	199901006056	199901006057	199901006058	199901006059	199901006060	199901006061	199901006062	199901006063
Start date and time	9/14/99 11:09	9/14/99 13:50	9/14/99 16:10	9/14/99 18:15	9/16/99 7:20	9/16/99 9:35	9/16/99 11:53	9/16/99 13:59	9/16/99 16:30
Start gear latitude (dd)	40.7051	40.7339	40.7099	40.7120	39.2878	39.2806	39.2949	39.3109	39.3044
Start gear longitude (dd)	-124.6781	-124.6238	-124.5246	-124.5094	-123.9740	-123.9876	-124.0048	-124.0667	-124.1600
End gear latitude (dd)	40.7178	40.7416	40.7229	40.7209	39.2753	39.2684	39.2823	39.2985	39.2948
End gear longitude (dd)	-124.6914	-124.6339	-124.5238	-124.5063	-123.9731	-123.9865	-124.0037	-124.0636	-124.1570
Station	46H	46G	46C	46A	54B	54C	54D	54F	54H
Avg Bottom depth (m)	928.4057	775.7912	358.7598	210.4971	299.2093	373.1947	441.249	624.4722	920.9942
Duration (hr)	0.45	0.37	0.32	0.30	0.33	0.33	0.34	0.36	0.41
Distance fished (km)	1.82	1.64	1.51	1.08	1.44	1.37	1.43	1.42	1.81
Net width (m)	15.70	15.20	15.10	15.00	15.70	15.40	15.70	16.00	15.30
Performance	0	0	0	0	0	0	0	0	0
Hagfish	1.25		0.10					1.29	
Brown catshark	1.91	1.34	3.70					4.31	3.37
Spiny dogfish			2.26	0.10	15.60	37.76	3.48		
Skates	1.93		33.86	9.32	31.55	17.20	72.24	8.79	4.24
Other elasmobranchs			0.98	0.20	12.52		9.97		
Arrowtooth flounder						16.83			
Petrale sole				1.08	2.22				
Dover sole	58.96	16.28	60.96	14.71	9.17	159.82	78.64	39.64	91.55
Deepsea sole	14.18	0.59							5.98
Rex sole			35.70	13.68	5.65	44.30	43.96		
Other flatfish			0.54	37.18	28.13	7.79			
Sablefish	69.35	11.55	7.81		11.08	1.63	14.50	16.53	11.10
Pacific grenadier	9.30	0.92	0.50					0.01	5.35
Giant grenadier	3.50	8.35						2.36	14.66
Other grenadier								0.10	
Pacific flatnose	1.04	0.20	0.20					0.30	1.89
Slickheads	3.18	1.92						0.10	9.83
Eelpouts	1.03	2.61	6.33	0.50	1.62	0.88	6.61	11.94	7.30
Snailfish	0.40	0.10	0.22					0.22	
Pacific whiting			30.37	1.74	9.23	79.95	30.48	1.05	
Other roundfish	0.26	0.01	1.30		0.03		0.01	0.95	0.20
Shortspine thornyhead	24.89	3.52	6.88	4.02	0.30	17.05	5.45	38.78	11.00
Longspine thornyhead	136.64	93.74	1.07					40.54	106.55
Rougheye rockfish									
Pacific ocean perch							0.69		
Aurora rockfish			0.50				24.45	1.49	
Darkblotched rockfish			1.00	18.39	1.50	2.69			
Splitnose rockfish				0.30	80.84	26.89	1.31		
Shortbelly rockfish					0.40				
Other rockfish			0.60	47.36	14.14	1.50	1.12		
Grooved tanner crab	75.40	37.56	5.75			1.24	0.50	27.14	8.05
Other invertebrates	10.08	5.08	99.95	42.63	66.81	57.21	30.60	15.76	15.20
Total catch weight (kg)	413.28	183.77	300.58	191.20	290.80	472.73	323.99	211.30	296.78

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901006064	199901006065	199901006066	199901006067	199901006069	199901006070	199901006071	199901006072	199901006073
Start date and time	9/17/99 7:37	9/17/99 10:35	9/17/99 12:59	9/17/99 16:34	9/18/99 7:05		9/18/99 11:23	9/18/99 15:50	9/21/99 7:09
Start gear latitude (dd)	38.6878	38.6844	38.7006	38.6104	38.0616		38.0639	38.0762	37.3584
Start gear longitude (dd)	-123.8827	-123.8670	-123.8495	-123.7226	-123.5234		-123.5377	-123.5283	-122.8897
End gear latitude (dd)	38.7002	38.7010	38.7080	38.6008	38.0717		38.0738	38.0658	37.3689
End gear longitude (dd)	-123.8928	-123.8744	-123.8601	-123.7141	-123.5227		-123.5388	-123.5286	-122.8930
Station	58J	58I	58G	58B	62A	62B	62E	62B	66A
Avg Bottom depth (m)	1214.0517	1049.9653	760.7966	306.0583	216.7039	292.608	516.7686	298.4761	233.2901
Duration (hr)	0.48	0.46	0.39	0.30	0.33		0.33	0.31	0.32
Distance fished (km)	1.65	2.04	1.58	1.39	1.15	0.00	1.37	1.18	1.21
Net width (m)	15.10	15.40	15.20	15.00	14.00		14.00	13.90	14.30
Performance	0	0	0	5.1	1.1	-3.11	1.11	0	0
Hagfish		0.96	1.54				0.40		
Brown catshark	2.25		1.83	0.10			11.62		
Spiny dogfish									
Skates	21.11	8.35	2.15	5.61	23.76		38.94	5.34	22.19
Other elasmobranchs		1.32		14.51	268.79		8.56	23.30	6.54
Arrowtooth flounder									
Petrale sole					1.39				0.30
Dover sole	332.64	27.17	99.77	81.07	8.38		147.19	18.47	32.07
Deepsea sole	14.52	14.50	1.67						
Rex sole				32.90	3.85		30.26	15.45	51.98
Other flatfish				8.80	47.87		0.80	63.66	16.33
Sablefish	17.17	7.32	15.10	1.55	2.84		14.10	3.58	
Pacific grenadier	179.38	89.01	2.79						
Giant grenadier	106.33	60.39	53.41						
Other grenadier									
Pacific flatnose	13.09	3.76	0.65				0.82		
Slickheads	3.66	11.38	9.45						
Eelpouts		9.56	3.28	6.11	5.32		3.01	9.37	0.72
Snailfish			0.20				0.20	0.30	
Pacific whiting				37.12	1.36		0.82	0.40	237.09
Other roundfish	0.20	0.10		0.51	13.39		0.10	1.06	0.22
Shortspine thornyhead	23.26	24.48	4.32	38.80			5.53	3.69	
Longspine thornyhead	58.57	61.48	80.42						
Rougheye rockfish									
Pacific ocean perch				0.88					
Aurora rockfish							0.60	0.40	
Darkblotched rockfish				8.03					0.30
Splitnose rockfish				162.70		0.65		72.41	5.73
Shortbelly rockfish									0.20
Other rockfish				62.27	150.06			3.69	31.60
Grooved tanner crab	4.39	22.47	10.73	0.73					
Other invertebrates	113.50	77.00	17.23	9.06	17.74		42.36	12.39	7.83
Total catch weight (kg)	890.06	419.25	304.54	470.74	544.75	0.65	305.29	233.50	413.10

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901006074	199901006075	199901006076	199901006077	199901006078	199901006079	199901006080	199901006081	199901006082
Start date and time	9/21/99 9:41	9/21/99 12:44	9/21/99 16:13	9/21/99 18:32	9/22/99 7:35	9/22/99 10:18	9/23/99 7:13	9/23/99 8:28	9/23/99 10:26
Start gear latitude (dd)	37.3046	37.2734		37.2977	36.7099	36.7266		35.9602	35.9556
Start gear longitude (dd)	-122.9155	-123.0600		-123.1601	-122.2854	-122.2545		-121.5710	-121.5862
End gear latitude (dd)	37.3166	37.2868		37.3076	36.7209	36.7317		35.9687	35.9665
End gear longitude (dd)	-122.9207	-123.0538		-123.1517	-122.3008	-122.2724		-121.5811	-121.5954
Station	66C	66G	66H	66I	70J	70I	74B	74C	74D
Avg Bottom depth (m)	355.6839	734.5811	914.4	1072.0224	1223.7992	1068.6214	283.7105	384.2009	454.1701
Duration (hr)	0.33	0.39	0.40	0.38	0.51	0.43	0.26	0.31	0.35
Distance fished (km)	1.42	1.60	1.61	1.42	1.93	1.77	0.00	1.34	1.47
Net width (m)	15.00	15.20		15.40	15.50	15.00	11.20	13.90	14.60
Performance	0	1.11	-5.1	0	0	0	-4.5	0	0
Hagfish		0.65	1.12		0.30	1.40			
Brown catshark		2.30	2.44	1.74	2.43	3.66		6.68	6.35
Spiny dogfish									
Skates	58.68	3.76	9.28	0.94	26.85	5.76		13.18	28.09
Other elasmobranchs	28.76							76.10	245.50
Arrowtooth flounder									
Petrale sole									
Dover sole	295.10	182.78	85.63	220.36	103.16	189.58		55.24	80.62
Deepsea sole		1.67	15.12	1.58	26.88	14.32			
Rex sole	104.53							2.42	18.20
Other flatfish	5.99								
Sablefish	11.18	7.41	25.80	44.18	2.84	19.44		2.48	6.83
Pacific grenadier		0.01	8.08	87.46	103.46	163.22			
Giant grenadier		0.84	6.00	10.42	66.50	15.60			
Other grenadier								0.10	0.01
Pacific flatnose		0.10	0.95	1.62	32.40	8.45			
Slickheads		18.58	32.14	19.43	25.38	15.88			
Eelpouts	11.64		1.00		3.30	11.94		0.90	4.85
Snailfish		0.05		0.50	0.60	0.50			
Pacific whiting	324.66							34.78	11.83
Other roundfish		0.34	0.20	0.30	0.10	0.40		0.01	
Shortspine thornyhead	6.01	8.32	75.18	37.76	29.73	19.87		6.39	13.47
Longspine thornyhead		181.46	179.95	81.61	15.78	19.30			
Rougheye rockfish									
Pacific ocean perch									
Aurora rockfish	6.72							1.34	1.30
Darkblotched rockfish									
Splitnose rockfish	82.85							18.18	7.81
Shortbelly rockfish									
Other rockfish	6.57							0.40	
Grooved tanner crab		2.61	1.56	3.21	18.97	26.81			
Other invertebrates	33.35	25.99	18.61	14.88	46.91	23.80		78.41	97.67
Total catch weight (kg)	976.04	436.86	463.03	525.98	505.58	539.93		296.61	522.53

Table A-1. Station and catch (kg) data from the 1999 NWFSC slope survey. Continued.

Haul number	199901006083	199901006084
Start date and time	9/23/99 12:36	
Start gear latitude (dd)	35.9481	
Start gear longitude (dd)	-121.6160	
End gear latitude (dd)	35.9603	
End gear longitude (dd)	-121.6213	
Station	74F	74I
Avg Bottom depth (m)	595.5068	1060.704
Duration (hr)	0.38	
Distance fished (km)	1.45	0.00
Net width (m)	14.80	
Performance	0	-6
Hagfish	0.20	
Brown catshark	8.16	
Spiny dogfish		
Skates	21.47	
Other elasmobranchs	12.85	
Arrowtooth flounder		
Petrale sole		
Dover sole	6.72	
Deepsea sole		
Rex sole	0.10	
Other flatfish		
Sablefish	19.27	
Pacific grenadier		
Giant grenadier		
Other grenadier	0.01	
Pacific flatnose		
Slickheads		
Eelpouts	0.71	
Snailfish	0.53	
Pacific whiting	7.49	
Other roundfish		
Shortspine thornyhead	35.16	
Longspine thornyhead	10.51	
Rougheye rockfish		
Pacific ocean perch		
Aurora rockfish	2.06	
Darkblotched rockfish		
Splitnose rockfish	0.26	
Shortbelly rockfish		
Other rockfish		
Grooved tanner crab	3.00	
Other invertebrates	59.36	
Total catch weight (kg)	187.84	

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