ONBOARD SAMPLING OF THE ROCKFISH AND LINGCOD COMMERCIAL PASSENGER FISHING VESSEL INDUSTRY IN NORTHERN AND CENTRAL CALIFORNIA, JANUARY THROUGH DECEMBER 1993

by **Deb Wilson-Vandenberg, Paul N. Reilly** *and* **Laura Halko**

Marine Resources Division
Administrative Report No. 95-2
1995

Marine Resources Division Administrative Report Series

These internal documents provide a quick way to disseminate diverse material such as preliminary research results, fishery status reports, and reports to contracting agencies, the Legislature, the Fish and Game Commission, and Department Headquarters. The series is authored by department personnel and is not subject to peer review.

Instructions on report preparation can be obtained from the Administrative Report editors:

Northern California - Diana Waters, Menlo Park
Southern California - Greg Walls, Long Beach

ONBOARD SAMPLING OF THE ROCKFISH AND LINGCOD COMMERCIAL PASSENGER FISHING VESSEL INDUSTRY IN NORTHERN AND CENTRAL CALIFORNIA, JANUARY THROUGH DECEMBER 1993

Deb Wilson-Vandenberg, Paul N. Reilly and Laura Halko
Marine Resources Division
California Department of Fish and Game
20 Lower Ragsdale Drive, Suite 100
Monterey, CA 93940

ABSTRACT

The Central California Marine Sport Fish Project has been collecting angler catch data on board Commercial Passenger Fishing Vessels (CPFVs) fishing for rockfish or lingcod since 1987. The program depends on the voluntary cooperation of CPFV owners and operators. This third report in a series presents data collected in 1993, refers to historical data from 1987 to 1992, and documents trends in species composition, angler effort, catch per unit effort (CPUE), and, for selected species, mean length and length frequency.

Angler catches on board central and northern California CPFVs were sampled from 15 ports, ranging from Crescent City in the north to Port San Luis (Avila Beach) in the south. Technicians observed a total of 2385 anglers fishing on 248 CPFV trips. These observed anglers caught 29,622 fish of which Technicians determined 27,421 were kept. Over 60% of these fish were caught at Monterey or Morro Bay area ports. Only 18 of the 58 species each comprised at least one percent of the catch. The top ten species in order of abundance were blue, yellowtail, chilipepper, rosy, widow, canary, greenspotted, bocaccio, and vermilion rockfishes and lingcod. Blue and yellowtail rockfishes, and chilipepper, together comprised over 50% of the observed catch. Overall, rockfishes represented 35 species or 59% of the 58 identified species.

In general, 1993 data indicated that in all port areas CPFV fishery resources, with a few exceptions, were in a viable and sustainable condition, similar to the previous 6 years. This study identified nine species, lingcod and eight rockfishes, with areas of concern which were primarily port-specific. Six of these ranked among the 10 most frequently observed species, five were schooling or migratory species, two were nearshore species, and three were offshore species. Trends of most concern continue to be declining catch per angler hour (CPAH) - of yellowtail rockfish in the Bodega Bay area, lingcod in shallow locations near the Monterey area, and yelloweye rockfish in the San Francisco area, as well as decreasing mean lengths of canary rockfish in the Monterey area and brown rockfish in the Morro Bay area. Populations of black rockfish, the species presently of greatest concern in the CPFV fishery, showed some positive signs this year. Also on the positive side, the Monterey and Morro Bay areas experienced an increased availability of newly-recruited smaller, juvenile vermilion rockfish in observed catches. Total catch estimates were within values observed in previous years.

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

LIST OF FIGURES

LIST OF TABLES

LIST OF TABLES (continued)

LIST OF TABLES (continued)

LIST OF TABLES (continued)

LIST OF TABLES (continued)

LIST OF APPENDICES

INTRODUCTION

The Central California Marine Sport Fish Project has been collecting angler catch data from the Commercial Passenger Fishing Vessel (CPFV) industry intermittently for several decades in order to assess the status of this valuable nearshore recreational fishery. The project has focused on rockfish and lingcod angling and has not sampled salmon trips. This third report in a series will present data collected in 1993, refer to historical data from 1987 to 1992, and will document trends in species composition, angler effort, catch, catch per unit effort (CPUE), and, for selected species, mean length and length frequency.

Before 1987 catch information was primarily obtained on a general port basis from dockside sampling of CPFVs, also called party boats. This did not allow documentation of specific areas of importance to recreational anglers and was not sufficient to assess the status of rockfish populations at specific locations.

Sport anglers and the CPFV industry continue to express concerns about the decline in the quality of fishing for rockfish and lingcod in central and northern California. Specifically, they believe the sizes of fish have decreased, catch rates have decreased, and that they must travel farther from port to achieve bag limits of quality (i.e. large) fish. Declines have been attributed in part to commercial fishing activities at or near locations fished by sport anglers.

CPFV operators are required by law to record total catch and location for all fishing trips in Department-provided logbooks. However, the required information is too general for use in assessing the status of the multi-species rockfish complex on a reef-by-reef basis. Rockfish catch data are not reported by species and information on location is only requested by block number (a block is an area of 100 square miles). Many rockfishes tend to be residential, underscoring the need for site-specific data. Thus, there is a strong need to collect catch information on board CPFVs at sea. However, location of specific fishing sites will not be identified due to their confidentiality.

In May 1987 the Central California Marine Sport Fish Project began on board sampling of the CPFV fleet. Data collection continued until June 1990, when state budgetary constraints temporarily precluded further sampling, resumed in August 1991, and continues at present. The program depends on the voluntary cooperation of CPFV owners and operators.

Total catch and effort estimates are made based on adjustments of logbook data by sampling information, and trends in catch composition and length frequency for selected species are discussed.

METHODS

Study Area

Angler catches on board central and northern California CPFVs were sampled from 15 ports, ranging from Crescent City in the north to Port San Luis (Avila Beach) in the south (Figure 1). In 1987 the program began in the Santa Cruz-Monterey area and was subsequently expanded to other ports. Before 1993 only one CPFV trip was sampled in the Eureka-Crescent City area. During 1993, we attempted to expand our area of sampling and were able to observe fishing on several trips from the Eureka-Crescent City area. Data were collected at fishing locations ranging from Point St. George (ca. lat. 41°50'N) to Purisima Point (ca. lat. 34°45'N), a distance of approximately 425 naut. mi., and out to 132 fm. Fishery Technicians, hired under contract with the Pacific States Marine Fisheries Commission (PSMFC), conducted the majority of on board sampling of catches; a few trips were sampled by Project biologists. Technicians were assigned to the following port groups: 1) Eureka, Trinidad, and Crescent City (**EK**); 2) Fort Bragg (**FB**); 3) Bodega Bay and Dillon Beach (**BB**); 4) Princeton (Half Moon Bay), Berkeley, Emeryville, and

Sausalito (**SF**); 5) Santa Cruz and Monterey (**MT**); 6) San Simeon, Morro Bay, and Port San Luis (**MB**).

Description of CPFV Fleet

CPFV logbook data indicated 104 vessels fished for rockfish or lingcod in central and northern California during 1993; of these, 71 logged more than 10 trips each. Technicians observed fishing on board 52 CPFVs from Trinidad south to Port San Luis, representing 73% of the fleet. CPFVs which allowed on board sampling ranged in length from 26 to 102 ft and passenger capacity ranged from 6 to 120 persons (average capacity 45 persons). The number of cooperating CPFVs per port ranged from 1 to 14. Trips were usually one half or one full day, the latter typically departing at 0700 and returning by 1600. Two vessels from the Morro Bay area occasionally operated a 2- or 3-day trip on weekends.

Trip Selection

Trips were selected by Technicians on a random basis from a complete list of rockfish/lingcod CPFVs for each port group. CPFV operators were telephoned and asked if a trip was available. If the boat was either unavailable or full to capacity, or if the Technician was refused passage, successive boats on the list were contacted until a trip was secured. When the Technician began scheduling their next trip, they began with the next boat on the list. Targeted sample size for each Technician was one trip for each successive 3-day block in a month, or approximately 10 trips per month. Primarily due to weather constraints and unavailability of trips, this sample size was seldom achieved.

Sampling Procedures

During 1992 and 1993 we made several changes and additions to the data collection procedures. These were done to refine data collection, increase efficiency, and in some cases, obtain more accurate information.

Technicians were initially trained in marine fish species identification. Each Technician was equipped with foul weather gear, gloves, clipboard, waterproof data sheets, fish length measuring board, lead pencils, and field guides to California marine fishes. Four basic forms were used for data collection: trip form (Appendix A); species count form (Appendix B); length form (Appendix C). In 1993, a log form was added for comments on items such as weather, commercial fishing activity, or marine mammal activity (Appendix D). At the start of each trip, the Technician asked the vessel operator for the number of paid and free anglers (the latter was increased if the captain and/or deck hand fished during the trip). Department of Fish and Game vessel number, port code, departure time, type of fishing trip (offshore, nearshore, surface, bottom, mix), and type of fishing tackle used were recorded on the trip form.

When the vessel arrived at a fishing location, the Technician recorded depth in fathoms, and either latitude and longitude, LORAN coordinates, or land bearings, and the time when fishing lines were lowered. When the last fishing line was raised, time and depth were again recorded and the process was repeated throughout the day. New location coordinates were obtained only when the Technician determined that the vessel had moved to a different location, as defined under 'Shoreside Data Processing'.

At the first fishing location, the Technician chose a reasonable number of anglers to observe throughout the trip and recorded this number (usually less than 20). In most cases, this was less than the total number of anglers. Beginning in 1992, Technicians started recording the number of observed and total anglers actually fishing during each drift.

Technicians traditionally chose the stern area of the boat to observe anglers, where a larger sample size could be obtained. An assumption in our sampling methodology has been that catch,

effort, and catch per unit effort (CPUE) data from observed anglers in the stern of the vessel are representative of all anglers on the vessel. This assumption was tested statistically after a 1-year study period, from July 1992 to July 1993, during which two observers, one on the bow and one on the stern, simultaneously recorded catch and effort data. Paired-t tests and a Wilcoxon Signed Rank test were used to compare mean CPAD, mean CPAH, and species composition between bow and stern anglers.

To avoid sample bias, Technicians were careful not to influence the fishing activity of observed anglers (i.e. advising them of catch regulations only when asked). Using the species count form, the Technician identified and counted each fish caught by all observed anglers. If a fish could not be identified to species, it was identified to the lowest taxon possible, or recorded as "unknown". The ultimate fate of each observed fish was recorded as either kept, released, or used as bait. If the fish was released, the Technician attempted to determine if it survived or died (in the latter case, it was usually consumed by a pelican or gulls). If the fate of a released fish could not be determined, it was recorded as "fate unknown". The combined catch by species for all observed anglers was recorded on one data sheet; individual catches per angler were not recorded. However, supplementary data on individual catch per angler were collected when a project biologist or another Technician accompanied a Technician on a trip.

All observed fish were separated by location on the species count form. If the Technician could not determine whether one location was different from a previous one, it was considered to be different until the locations could be compared using nautical charts.

When fishing had ceased for the day, the Technician then measured total length (TL) in mm of as many observed kept fishes as possible by marking the length of each fish on a plastic measuring board, keeping all species separated. Not all observed kept fishes were measured due to refusal of an angler to have his/her catch examined, early filleting by the deck hand, or hazardous working conditions caused by inclement weather. When time permitted, fishes caught by unobserved anglers also were measured and their lengths were recorded separately from observed fishes' lengths.

Miscellaneous data were recorded on reproductive condition of fishes, weather and sea conditions, commercial fishing activity in the area, and sightings of marine birds and mammals. Lingcod length and sex data, and fin rays were collected for a cooperative study with the National Marine Fisheries Service whenever possible. In addition, during January and February Technicians collected fish larvae samples from ripe female blue rockfish as time permitted. These will be used by another CDFG study to determine the actual larval release date.

Shoreside Data Processing

Confidential codes were assigned to each unique fishing location after plotting the location on a nautical chart. Unique fishing locations were defined as circular areas separated from other locations by a minimum distance based on depth. For depths less than 20 fm, location centers were no closer than 0.5 naut. mi. to other locations. For depths between 20 and 40 fm, location centers were no closer than 1.0 naut. mi. to each other. For depths greater than 40 fm, location centers were no closer than 2.0 naut. mi. to each other.

All fish measurements on the measuring board were determined to the nearest mm and transferred to the length data form by species. At this time, all species' length data were assigned to a range of location codes as specific as possible.

Data Entry and Analysis

Data were entered into dBASE databases by Technicians using a C program, whereupon Technicians then edited their own data. Data were subsequently transferred to the Monterey office

where project biologists checked the edited data, performed analyses and summaries, and graphical displays were produced using dBASE, Lotus 123, and Sigma Plot software programs.

Catch Per Angler Day and Catch Per Angler Hour

Catch per angler day (CPAD) is the average catch per angler per day for one or more port areas calculated from the total number of fish divided by the total number of anglers. Catch per angler hour (CPAH), also an average, was calculated by adding the products of the number of observed anglers and the fishing time in hours on each trip and dividing this into the total number of fish caught, for one or more port areas, months, or fishing locations. This standardized the catch rate by weighting fishing time by number of anglers in order to compare angler success.

Mean Length and Catch Per Angler Hour by Location

In order to compare mean length, CPAD, and CPAH of selected sport fishes relative to distance from port and depth, fishing locations were defined as either "near" or "distant", or "shallow", "mixed" or "deep". Near locations were defined as having the location center less than or equal to 10 naut. mi. from any sampled port. Distant locations were defined as having the location center greater than 10 naut. mi. from all sampled ports. This partitioning was based on a tagging study by Miller and Geibel (1973), in which all tagged fish returned by CPFV anglers were caught within 10 naut. mi. of a port area, indicating low or no utilization of more distant fishing areas.

Shallow and deep fishing locations were defined as ones in which all observed depths during sampling trips were less than or greater than 40 fm, respectively. A mixed location was defined as one in which some observed maximum and minimum depths were greater than and less than 40 fm during the study period or where all depths were exactly 40 fm. These criteria also were based on work by Miller and Geibel (1973), who reported a change in rockfish species composition north of Point Arguello (lat. 34°35'N) at approximately 240 ft (40 fm).

Fishing has been observed at some locations since 1987, and Technicians have recorded depth each time a documented location is sampled. As a result, some locations have been reclassified from a shallow or deep location to a mixed location designation.

Mean length and CPAH by port for samples of less than 20 fish are presented in tables but will not be discussed.

Length Frequency Histograms

Length frequency histograms are presented for lingcod and the 18 most frequently observed rockfish species, by port area, for samples of at least 20 fish. Total length intervals of either 5 or 10 mm are used, based on the maximum total length of the species, with the upper bound of every fifth or tenth interval labeled on the X axis (i.e. 150 = 146-150 mm TL). One exception to this was for lingcod, where the 551- to 560-mm interval was partitioned into a 551- to 558-mm interval (less than minimum legal size) and a 559- to 560-mm interval; the latter was combined with the 561- to 570-mm interval. Note that the y-axis scale is not consistent among graphs.

Estimated Total Catch and Effort

CPFV skippers are required to submit logs every month of each fishing trip made during the month. Logbook data include number of rockfish caught, number of hours fished, number of anglers, and block number where the vessel fished. CPFV log data were obtained from the California Department of Fish and Game's (CDFG) mainframe computer for 1993 to estimate total catch and effort for all marine sport fish caught on rockfish or lingcod trips in northern and central California. Interpretation and

summarization of logbook data required several intermediate steps for meaningful comparisons with our sampling data. Logs from salmon trips and trips fishing in the San Francisco Bay estuarine complex were eliminated. We restricted analyses to all northern and central California trips targeting only lingcod or rockfish.

Logbook data did not indicate target species; criteria used to eliminate trips targeting other species (e.g. sturgeon, striped bass, or salmon) were twofold. First, rockfish or lingcod must have been caught on the trip (virtually eliminating striped bass or sturgeon trips). Second, if salmon were caught, and the catch of all fish was less than four per angler, the trip was eliminated from the data set. The assumption was that this type of trip was likely targeting salmon rather than rockfish. We feel confident that these criteria were successful in establishing a more realistic database.

The logbook data contained a number of multi-day trips taken from the Morro Bay area. To standardize these trips relative to total number of angler days, number of anglers was either doubled or tripled on these trips, depending on whether it was considered a 2- or 3-day trip.

Logbook data initially included trips from all northern and central California ocean and bay ports and were combined into port groups. In general, these port groups corresponded to port groups in this study; Crescent City, Eureka, Point Arena, Shelter Cove, and Trinidad (Figure 1), constituted the northern California group.

Based on these log data, tables are presented for northern and central California ports, summarizing the total number of all fish kept, number of rockfish, lingcod, and other fish kept, total number of angler days, total number of trips, total number of hours fished, and average catch per angler day and per angler hour.

Although logs are required for each fishing trip, all CPFV operators do not always submit logs for each trip. In order to estimate the total catch and effort for central and northern California it was necessary to determine the proportion of the logs that was not submitted. We determined a compliance rate for each port group by using the total number of trips we observed (known fishing trips) and checking for each of those trips in the logbook data. Thus the **compliance rate** is the number of observed trips which were logged divided by the total number of observed trips for that port group expressed as a percentage. Data from observed trips, including average catch per angler, total number of anglers and actual fishing time (lines in the water) were then compared with logbook data.

Additional tables are presented with total estimates adjusted by compliance rate and sampling data for each port area. Correction factors, based on observed number of anglers and kept fish per angler from sampled trips, were applied to log data from the same trips. Additional adjustments were made based on log compliance ratios. No adjustments were made for the northern California port group.

Total catch estimates by port for lingcod, the 18 most frequently observed rockfishes, and other rockfishes were made based on adjusted catch estimates of total fish and the proportion of each species from sampling data.

Throughout the report, comparisons to "previous data" refer to our project data from 1987 to 1992 which have been summarized in two previous Administrative Reports (Reilly et al. 1993, Wilson et al. 1996). For the sake of brevity, this will be the only specific reference to those reports. Data from sources other than these will be cited in the text.

RESULTS AND DISCUSSION

Total Observed Catch and Catch Per Angler Day

Technicians observed a total of 2385 anglers fishing on 248 CPFV trips from Crescent City to Port San Luis during 1993 (Table 1); this was an average of 9.6 anglers per trip. These observed

anglers caught 29,622 fish of which Technicians determined 27,421 were kept. Over 60% of these fish were caught at Monterey or Morro Bay area ports.

When effort was compared as Catch per Angler Day (CPAD), catches for all fish were lowest in Morro Bay area ports and highest in the Bodega Bay area. CPAD was also highest in the Bodega Bay area for kept fish only, but lowest in the Eureka area. Values for CPAD varied by only 2 fish and ranged from 11.6 to 13.7 and 10.7 to 13.2 for all and kept fish, respectively. These values were lower than in 1992 but comparable to other years. The most dramatic drop in CPAD was observed in catches from San Francisco area anglers between 1992 and 1993, although earlier data indicate CPAD from the former year was the highest observed since 1988.

Total Species Composition

Of the almost 30,000 fish observed caught, only 18 species each made up at least one percent of the catch (Table 2). The top ten species in order of abundance were blue, yellowtail, chilipepper, rosy, widow, canary, greenspotted, bocaccio, and vermilion rockfishes and lingcod. This was very similar to the list of most abundant species in 1992, although greenspotted rockfish replaced olive rockfish in the top ten. This top ten species list was also similar to catches observed from 1987 to 1991.

Blue and yellowtail rockfishes comprised 45.5% of the overall observed catch, with another 7.8% of the catch represented by chilipepper. Thus, the observed take of these three species alone was over 50% of the observed catch for all trips. Fifty-eight species of fishes were identified in the observed catch; overall, rockfishes represented 35 or 59% of these 58 species.

Rockfish and lingcod combined comprised over 97% of the 1993 observed catch. In terms of numbers of fish, less than six percent of the catch was not rockfish. Of the total non-rockfish catch, three percent were lingcod alone.

Blue, yellowtail, and canary rockfishes and lingcod, and to a lesser extent widow, vermilion, olive, and copper rockfishes, tended to be caught in abundance in all port areas. Two deeper water species showed different patterns of distribution in the catches. Chilipepper were caught almost exclusively in the Bodega Bay, Monterey and, to a lesser extent, Morro Bay areas, while greenspotted rockfish catches occurred primarily from the Bodega Bay (Cordell Bank) to Monterey areas. Black rockfish, a shallow water species, were caught primarily from the San Francisco area north.

Expatriates (species normally found in southern California waters) observed in 1992 catches were either absent or rare in 1993 catches, indicating a return to more normal water temperatures, most likely due to the subsidence of a major El Niño event.

Total Observed Fishing Effort

Observed anglers fished for a total of approximately 7332 hours. Sampling effort in the Monterey and Morro Bay areas, where actual effort is higher, comprised 64% of the total trips sampled and 62% of the observed anglers and total catch. The northern ports of Crescent City, Trinidad and Eureka were sampled only during the months of August and September and were represented by eight trips.

Overall effort on observed trips indicated actual fishing time averaged 3.08 hours (range 2.61 to 3.59) with the shortest times in the Morro Bay and Fort Bragg areas and longest times in the San Francisco area (Table 3). Differing values of mean CPAD by port area may thus be partly explained by greater actual effort per trip in San Francisco and less effort in Morro Bay. The overall average was similar to previous years.

Due to the voluntary nature of our sampling program, Technicians are only allowed to sample trips when they are not taking the place of a paying customer. As a result, our effort to sample weekend trips is dependent on both the frequency

of those trips relative to weekday trips, and the amount of "open space" on weekend trips, which are often full. In 1993, Technicians observed "weekend" fishing on 51 out of 248 trips (Table 4), which represented 21% of their total trips. This number varied from a high of 50% in Eureka and Ft. Bragg area ports to a low of 7% in the Morro Bay area. Weekday trips are more common from Bodega Bay south.

Catch Per Angler Hour

The more standardized measurement of effort, Catch per Angler Hour (CPAH) indicated anglers were most successful in the Ft. Bragg area, with the highest CPAH, and least successful in the San Francisco area (Table 1). This was true for both all and kept fish. CPAH values among port areas differed by about 1.3 fish. When these values were compared with past years, they were more similar to 1988 and 1989 in that catches were higher in the areas of Fort Bragg, Bodega Bay and Monterey and lower in San Francisco. However, in 1992 catch rates were highest in the San Francisco area and lowest in the Monterey area.

Comparison of CPAD, CPAH, and Species Composition for Bow and Stern Anglers

Thirty trips were sampled with two observers from the Bodega Bay to the Morro Bay area; 544 observed anglers caught a total of 6622 fish, including those released. Average catch per angler was 12.9 fish in the bow area and 11.7 fish in the stern area. This difference of 1.2 fish per angler was not statistically significant ($p=0.08$). The mean difference in CPAH between bow and stern anglers of 0.46 fish also was not statistically significant ($p=0.06$).

A paired t-test of mean CPAH for each species showed no significant differences between bow and stern anglers ($p=0.20$). Since the differences in CPAH among species were significantly different from normality ($p<0.001$), a Wilcoxon Signed Rank test was performed and the test statistics were not significant ($p=0.51$).

Thus our assumption is verified that the observed species composition, CPAD, and CPAH for anglers observed in the stern area of CPFVs are representative of all anglers on the boat.

There were 38 cases during this study in which a species was observed caught by a bow angler but not by a stern angler for a particular trip. In all cases the number of fish observed per species on the bow was less than five, and in 29 cases (76%), the number observed per species was one. Four of these species, cowcod, rosethorn rockfish, bonito shark, and sardine, were not observed caught by stern anglers on any of the 30 trips and, in general, were uncommon among all observed trips in 1992 and 1993. In summary, differences in species observed between bow and stern anglers involved only species caught in low numbers during a particular trip or rarely observed throughout the year.

Analysis of Angler Effort Per Drift

Angler effort per drift was analyzed for 178 trips observed in 1993 from the Eureka to the Monterey area. Of the 3166 total anglers, 3075 (97.1%) actually fished. The primary reason for paid anglers not fishing was seasickness. When the number of total anglers was adjusted for time not fished during one or more drifts, the calculated number of total anglers was 2833.4 (89.5%). An alternate interpretation of this number would be that 2833.4 anglers (of 3166 counted) fished for every minute of every observed trip, and no other anglers fished.

By definition, all of the 1660 observed anglers fished at least part of the time. The calculated number of observed anglers, adjusted for time not fished during one or more drifts, was 1530.0 (92.2%).

All data in this and previous administrative reports involving observed CPAH have assumed that all observed anglers fished every minute of every drift. Because true fishing effort for observed anglers in 1993 was actually 92.2% of reported effort, true estimates for CPAH would be

1.085 (1/0.922) times those of reported estimates. For purposes of comparing CPAH from previous years with this and future years, the above assumption will continue. However, for comparing these data with other studies in which angler effort is recorded by drift, reported CPAH values should be multiplied by 1.085.

Individual Catch Per Angler

Individual catch was recorded for 370 observed anglers on 47 CPFV trips from July 1992 to November 1993 from the Eureka area to the Morro Bay area (Figure 2). Catch per angler for kept and released fish combined was highly variable and ranged from 0 to 60, averaging 14.2. Catch per angler for kept fish only ranged from 0 to 49 and averaged 12.6. Sixteen fish best represents the equivalent 15-rockfish bag limit, since approximately 88 to 98% (average 93%) of the observed CPFV catch by port is composed of rockfishes. The percentage of anglers with greater than 16 fish was fairly similar, with 34% and 28%, for all fish and kept fish, respectively.

The mean value of 12.6 kept fish per angler from this individual catch study is approximately equivalent to 11.7 rockfish per angler. This observed rate is more representative of actual angler success relative to bag limits due to the common practice on CPFVs of sharing the catch among all anglers. The frequency distribution of kept fish per angler as anglers leave the vessel, after the catch has been redistributed, would have a greater central tendency, and would be less variable.

Fishing Effort by Depth

On the 248 fishing trips observed by Technicians, fishing occurred at a total of 170 discrete locations. For central and northern California as a whole, 21% of the trips were at exclusively shallow locations and 17% were to exclusively deep locations, with the majority of all trips to a combination of shallow, deep, and/or mixed locations (Table 5). The Fort Bragg and Eureka areas had the highest trip frequency to only shallow locations; this reflects the high use of the nearshore coastline for CPFVs fishing in those areas. The Bodega Bay and San Francisco area ports presented very similar results, with a shallow, deep, mixed trip breakdown of approximately 27%, 10% and 63%, respectively. In both areas, the large number of mixed trips was due to the fact that many trips to both Cordell Bank and the Farallon Islands fish in both shallow and deep locations. The Monterey area had the highest proportion of exclusively deep trips, primarily due to the proximity of the Monterey Submarine Canyon. In the Morro Bay area, the majority of trips were to shallow or mixed locations, indicating the preponderance of fishing inside or along the 40-fathom contour.

When these results are compared with data from previous years, there has been a trend of more trips to either mixed locations or a combination of shallow, deep, and/or mixed locations. The reduction in the percentage of trips to deep locations reverses a trend observed from 1987 and 1988 to 1991 or 1992 and is an encouraging sign. The reduction in the percentage of trips to shallow locations, most evident in the most southern port areas, is cause for concern, particularly in light of an increased nearshore commercial hook-and-line fishery. However, these reductions may be due in part to reclassification of previous shallow or deep locations to mixed. Seventeen locations identified as shallow or deep in 1992 were reclassified to mixed in 1993, and 8 were in the Morro Bay area.

Fishing Effort by Distance from Port

The same 248 trips were partitioned by distance from port to determine whether CPFVs were fishing further from port than in past years. Overall, anglers fished exclusively at near locations on 53% of the trips and at distant locations on 32% of trips (Table 6). The Fort Bragg area had the highest ratio of near to distant trips with all but one trip within 10 naut. mi. of

port, followed by Morro Bay area ports with 57/70 trips near to port. The Bodega Bay area had the greatest percentage of trips to distant locations, again reflecting the heavy dependence on fishing at Cordell Bank. Over 50% of observed trips from the San Francisco area were to distant locations, utilizing both the Farallon Islands and the San Mateo County coastline. At Monterey area ports, at least 55% of trips were within 10 nm of port, with the majority of distant (20%) and mixed (25%) trips reflecting primarily fishing trips along the central California coast to Año Nuevo or Point Sur. Eureka trips were evenly split between near and distant locations.

CPFVs have not been travelling further from port to fish, based on comparisons between previous data and 1993. Results indicate that the proportion of trips to near or distant areas has not changed much since 1987. The choice of fishing locations on a particular day is partly dependent on existing weather conditions (e.g. CPFVs do not travel to Cordell Bank during very rough seas).

The similarity in trip distribution between near and distant locations among years indicates fishing effort relative to distance from port has changed little.

Catch Per Angler Hour by Depth and Distance from Port

Catch per unit effort was compared between shallow and deep locations (Table 7) and near and distant locations (Table 8). For comparisons by depth, 48% of the catch was taken at exclusively shallow or deep locations. There were no observed trips to deep locations from the Eureka or Fort Bragg areas. In general, catch rates were higher in shallow locations than in deep locations.

The highest catch per angler hour (CPAH) observed was 6.26 from shallow Monterey locations, well above any of the other port areas. Large catches of blue rockfish, and to a lesser extent olive rockfish, were primarily responsible for the high catch rate. Among shallow locations, the Eureka area had the lowest CPAH. Catch rates from deep locations were very consistent and varied by less than 0.5 fish per angler hour from the Bodega Bay to the Morro Bay area.

Catch rate comparisons by depth are tempered by the fact that it takes longer to raise and lower lines from deep water. By definition, this can effectively increase fishing time at deep locations relative to shallow water when similar gear types are used. Likewise, if distant areas are also deeper areas, the same trend could be apparent in comparisons between near and distant locations.

All catch data were used to compare standardized effort by distance from port. CPAH values at distant locations were fairly consistent and varied by only 1.0 fish (Table 8). The Eureka, Bodega Bay, and Monterey areas had the highest "distant" catch rates. The Eureka area had the lowest catch rate (2.66) from near locations. Near locations in the Morro Bay area had the highest catch rate, followed by the Fort Bragg area.

In the Bodega Bay and Eureka areas, fishing success was better at distant locations than near locations, and for the other port groups the reverse was true. In the Bodega Bay area this is due to the high quality fishing at Cordell Bank, and in Eureka anglers are most likely fishing in relatively unfished areas. The low success rate in shallow, near locations around Eureka may be due to the paucity of rocky habitat within 10 miles of port and heavy utilization of the few existing areas.

Trends in catch rates among years were not apparent for any port area and rates fluctuated widely for all location groups.

Fishing Effort by Single Location Trips

Utilization of only a single location on a fishing trip can be indicative of high quality fishing in that area. CPFV operators may remain in an area until limits are caught if the fishing is good rather than leave to try other spots. However, some operators may leave a good location to avoid excessive fishing pressure. In

addition, weather conditions could force a boat to leave one location to try a safer one, even if the fishing is good.

Among all port areas, 31% of the trips were to single locations (Table 9). These percentages varied broadly across port areas from a high of 87.5% in the Eureka area, to a low of 17% in the Bodega Bay area. While fishing in the northern port areas occurred mainly at one location, from the Bodega Bay area south Technicians observed boats fishing at a single location on no more than 35% of the trips. Up to seven locations were fished on sampled trips in 1993.

The 31% single-location trip frequency average for all ports is much lower than values from previous years which ranged from 56 to 58%. Although the Bodega Bay area continued to have the lowest value among all port areas, in previous years at least 36% of trips had been to only single locations. This decrease in trips to single locations is of concern and may indicate an overall lower availability of quality fish.

Species Composition by Port Area and Month

Eureka Area

Fishing in the Eureka port areas is primarily restricted to the season between Memorial Day and Labor Day, approximately June to September, due to rough winter weather and a decline in the number of customers. In 1993, we were able to sample trips in August and September. Seven species each comprised at least 5% of the catch and made up over 90% of the combined catch (Table 10). In order of decreasing abundance they were black, yellowtail, copper, canary, and blue rockfishes, lingcod and yelloweye rockfish. Black rockfish alone comprised 38% of the catch and yellowtail, copper and canary rockfishes made up another 32% of the catch. All of these species occur either in shallow water or have broad depth ranges -- fishing trips to deep water were not observed. Eureka was the only port area where quillback rockfish, another shallow water species, comprised almost 4% of the catch. This is to be expected since this is primarily a more northern species.

Fort Bragg Area

Five species each comprised more than 5% of the observed catch in this area during 1993 (Table 11). A total of 11 species made up 95% of the observed catch. Dominant species were blue, yellowtail, and canary rockfishes which together comprised almost 70% of the combined observed take. These three species dominated catches from 1988 to 1991, although in 1992 widow rockfish replaced canary rockfish in the top three. With the exception of black rockfish, the same species dominated the catch as in the Eureka area. Quillback rockfish comprised only 0.5% of the observed catches. Rockfishes made up 78% of the species caught, and 96% of the observed catch by number.

In 1993, no fishing trips were observed during January, May, or December due to rough weather or the lack of a Technician (Table 12). In the other months, fishing was observed on an average of 1.3 trips. However, some seasonal trends are apparent from the monthly CPAH data. Overall, CPAH was highest in March (1 trip) and lowest in July (1 trip). Lingcod catches were highest during April and lowest from August through November. Black rockfish catches were observed only during the spring and fall. Canary rockfish were caught primarily in August and September at a rate up to ten times higher than the rest of the year.

Bodega Bay Area

Chilipepper ranked first in abundance from observed catches on trips from the Bodega Bay area (Table 13). Seven species each comprised more than 5% of the catch (chilipepper, yellowtail, blue, widow, bocaccio, canary, and greenspotted rockfishes), and thirteen species made up 95% of the observed catch. The top four species each comprised from 11% to 18% of the observed catch and no one species dominated the

catch, as occurred in most other ports. These four species represented 61% of the observed catch.

By number of fish, rockfishes comprised 97% of the observed catch and by number of species, they represented 25 out of 32 (78%) identified species. Deep water species were prevalent in Bodega Bay area catches including chilipepper, widow, bocaccio, greenspotted, greenstriped, and rosethorn rockfishes.

High chilipepper catches in 1993 were more reminiscent of 1988 catches than those in 1992 when chilipepper ranked only fifth in abundance. Widow rockfish and bocaccio continued to be well represented in 1993 catches as they were in 1992, and reflect a shift from previous years (1988-1991). Brown rockfish, which ranked sixth from 1988 to 1991, ranked 13th in 1992 and 15th in 1993. The increase in deeper water fish such as bocaccio and widow rockfish, and the corresponding decrease in more shallow water species such as brown rockfish is consistent with a decrease in the frequency of shallow-location trips as mentioned previously.

Technicians observed fishing on trips from Bodega Bay area ports in all months except May (Table 14). The number of trips each month varied from one to four, with an average of three. Yellowtail and canary rockfishes and lingcod were caught in all months observed. Catches of yellowtail rockfish peaked during April and tended to be higher in the winter and spring. The highest catch rate for canary rockfish occurred during February (one trip); otherwise catches were higher from April through August. Lingcod catches varied threefold over the year with higher catches (CPAH = .12 to .17) in June, October and December. It is notable that black rockfish catches were significant only during July. This resulted from a directed shallow-water effort during the month. As CPAH for black rockfish was also highest in July 1992, this would support the idea of targeted fishing during the month.

Blue rockfish were only caught during 5 months of the year, with the highest catches during summer months, similar to previous years. In past years, no blue rockfish were caught during January through April. This was also true in 1993 except for some catches during April.

Although fishing was observed at Cordell Bank in all months except May and July, chilipepper were caught in abundance only between August and November, and January through March. Data from previous years indicated chilipepper CPAH was highest in February and March and lowest during the summer (no fish caught), as in 1993.

San Francisco Area

Yellowtail (25.0%), blue (22.9%) and rosy rockfishes (10.5%) continued to dominate catches from this port area, as in past years, together representing 58% of the observed catch (Table 15). With canary rockfish and lingcod, these five species each comprised at least 5% of the observed catch. Sixteen species comprised 95% of the observed catch. Rockfishes comprised 92% of the catch by number, and represented 25 out of 36 (69%) identified species. Lingcod have remained in the top eight species since 1988, and in 1993 they were fifth in abundance comprising close to 5% of the catch by number of fish.

Both deep and shallow water species were well represented in the San Francisco area catches during 1993. While catches included deeper water species such as rosy, greenspotted, and starry rockfishes, shallow water species were common including black, olive, brown, China and gopher rockfishes.

Seasonal trends were examined from CPAH values from all months except December (Table 16). Yellowtail, blue, rosy, canary, and starry rockfishes were caught in all months sampled, and lingcod, copper, olive, bocaccio and widow rockfishes and Pacific sanddabs were caught in all but one month. Catch rates of yellowtail rockfish were higher in August and from October to January. The winter months from January through March included the highest catches of blue, rosy,

canary, copper, olive, vermilion, widow, brown, bocaccio, and China rockfishes and lingcod; however, most of these high values are based on only one sampled trip per month. Blue rockfish catch rates peaked again in July. The summer months of June through September included the highest catches of greenspotted, black, and gopher rockfishes. High values for the latter two species are expected as a major shift to shallow-water fishing effort occurs in summer in this area.

Monterey Bay Area

The Monterey area has the greatest overall CPFV fishing effort of any port area in central and northern California except Morro Bay, and, in part due to the proximity of the Monterey Submarine Canyon, the sampled catch had the highest species diversity (Table 17). Technicians observed anglers catch 51 identified species of fishes and of these, 36 species (71%) were rockfishes. The Monterey area catch represented 33% of the total observed catch for 1993 and was comprised of 94% rockfishes.

Since 1987, blue, yellowtail and chilipepper rockfishes have dominated the observed catches from the Monterey area. In 1993, blue rockfish were first in abundance comprising 32% of the catch, followed by chilipepper (15%) and yellowtail rockfish (11%). Together with greenspotted rockfishes, these were the only four species which individually comprised more than 5% of the catch, and as a group accounted for 64% of the catch. Eighteen species accounted for 95% of the catch and 14 of these were rockfishes. Lingcod and Pacific sanddabs were the only two non-rockfish species comprising at least one percent of the catch.

The Monterey area ports had the highest percentage of sampled trips (3.0) and averaged seven trips per month, providing sufficient data to identify many seasonal trends (Table 18). Catch rates of chilipepper were highest from April through July, with a secondary peak during January. The summer months are the traditional "chilipepper season" for this area, in comparison to the Bodega Bay area where chilipepper CPAH peaked between August and November and from January through March. Limited tagging data from more than 20 years ago from the Monterey area did not reveal any long-term movements or migratory patterns (Frey 1971). Anecdotal information from CPFV operators has also suggested the presence of residential chilipepper populations.

Blue rockfish CPAH values were highest in February and March and in July through September. Monthly mean CPAH for blue rockfish in February and July were the highest reported since observations began in 1987 in this area. These peaks in blue rockfish catch rate were primarily responsible for February and July having CPAH rates greater than 7.0 fish.

Catches of yellowtail rockfish were highest during the summer and fall, July through November. As in past years lingcod catch rates were highest from October through December. A group of species including greenspotted, canary, copper, starry, and vermilion rockfishes were caught at higher rates during June than any other month. The shallow water species group of black, brown, olive, and gopher rockfishes were caught more frequently during August. Jack mackerel were caught primarily during July and August.

Morro Bay Area

In the Morro Bay area blue and yellowtail rockfishes comprised 54.5% of the observed catch during 1993 (Table 19). These two species along with vermilion and rosy rockfishes were the only four species individually comprising more than 5% of the observed catch. Vermilion rockfish are targeted in the Morro Bay port area due to their desirability and high relative abundance. Among northern and central California ports, this species occurs in the top ten only in this area and the Fort Bragg area. Gopher rockfish represented 4.8% of the catch, primarily due to the large number of "shallow water, light tackle" trips from these

ports, especially San Simeon. Morro Bay was the only port area where this species was listed among the top ten.

Fourteen species made up 95% of the catch and all of those except lingcod were rockfishes. Rockfishes were represented by 26 out of 39 species identified from the Morro Bay area, or two thirds of all species, and 97% of all fishes in the observed catch were rockfishes.

Fishing was observed on an average of six trips per month, with at least two trips each month during 1993, and there were sufficient data to identify several seasonal trends in catches. Nine species were caught in every month (Table 20). CPAH for yellowtail rockfish was highest during the fall, October through December, and CPAH for olive rockfish peaked during August through October. Chilipepper were primarily caught in July as in Monterey area ports although CPAH was much lower in Morro Bay area catches.

Copper and canary rockfish CPAH peaked simultaneously in January and February. It is important to realize that many of the peaks in seasonal abundance for species discussed in all port areas are artifacts of directed fishing effort by depth rather than reflective of changes in absolute abundance.

Percentage of Fish Retained by Port and Species

There are several reasons why anglers do not keep all fish caught on CPFVs. Small size is the primary reason fish are released. Additional reasons may be related to regulations, such as returning small salmon or lingcod which have a minimum legal size, or returning salmon caught out of season or with the wrong gear type (barbed hook). Some anglers will release small fish of species without a size limit, to catch larger fish to complete their bag limit. Unfortunately, many rockfishes which are released due to small size do not survive because of physiological difficulties associated with swim bladder expansion (Lea et al. 1996). Anglers sometimes return undesirable species such as spiny dogfish or white croaker.

In all port areas, at least 90% of the fish observed caught were kept (Table 21) the average for all ports was 93%. The Fort Bragg and Bodega Bay port areas had the highest retention rate (96%) while the Monterey and Eureka areas had the lowest rate (90%). All vermilion, quillback, and speckled rockfishes, and all but one copper rockfish were kept; reflecting their high desirability as well as the scarcity of small juveniles in the observed catch. Most rockfishes with the lowest retention rates were species which rarely exceed 305 mm (12.0 in.) such as rosy, rosethorn, and squarespot. Retention rates for rosy rockfish varied from 67% (Morro Bay area) to 93% (Monterey area.)

For species such as king salmon, lingcod, the sanddabs, and blue, olive, black, greenstriped, and greenspotted rockfishes, small individuals were the most likely fishes returned. Black rockfish had retention rates lower than 90% in the San Francisco and Monterey port areas, continuing a trend observed in 1992. In the Eureka area, olive and yellowtail rockfishes were released much more frequently than in other port areas; this was likely due to the high proportion of observed trips in shallow locations, and the fact that small individuals of these species are much more common in shallow depths.

Lingcod have a minimum legal size of 559 mm (22 in.) and retention rates varied considerably from 47% (Morro Bay area) to 79% (Bodega Bay area). This variation reflected a combination of differences in availability of sublegal-sized fish and angler variability in returning small ones.

Retention rate apparently was influenced by angler preference for species such as white croaker, jack and chub mackerel, and Pacific hake. Species observed infrequently in 1993 but always returned were blue shark, spiny dogfish, California skate, California lizardfish, and Pacific sardine.

Overall, retention rates have not changed appreciably compared to previous years. In 1992,

the average for all ports was also 93% and this was within the range for prior years as well (90 to 96%.)

Number of Fish Measured and Maximum Lengths

For all port areas combined, Technicians measured 29,979 fish, or an average of 121 fish per trip. Maximum lengths for each species measured on board CPFVs since 1987 are reported in Appendix E.

Catch and Length Data for Nineteen Species

Blue Rockfish

The blue rockfish, *Sebastes mystinus*, is a shallow-water, schooling species commonly caught by sport anglers over nearshore rocky reefs to a depth of 300 ft. Its distribution is not restricted to the bottom; it is often caught near the surface or in midwater where it feeds on macroplankton such as salps or crustaceans (Houk 1992b). It is one of the most important sport species for marine anglers in central and northern California.

This was the most common species in observed catches, represented by more than 8100 fish for all port areas. Catches varied by more than three fish per angler day among port areas (Table 22). Highest catches per angler were in the Fort Bragg and Monterey areas, followed by the Morro Bay area, and the lowest catches were in the Eureka and Bodega Bay areas. Catch per unit effort values showed a similar trend; CPAH was highest in the Fort Bragg and Monterey areas and lowest in the Eureka area. This species is more common from Fort Bragg south to the Morro Bay area, which may explain the lower catch rates in the Eureka area. Lower catch rates in the Bodega Bay area are a reflection of substantial fishing effort observed at Cordell Bank where depths commonly exceed 300 ft and blue rockfish are not abundant. The high catch rates in the Fort Bragg area are consistent with the trend observed in previous years; Monterey area CPAH has increased more than twofold since 1989 and was the highest observed since 1987.

Where comparisons could be made among locations relative to distance from port, catch rates were more than three times higher at near locations in the Bodega Bay and Morro Bay areas (Table 23.) Except for the Eureka area, CPAH rates were similar for near and distant locations in other areas. Blue rockfish were caught almost exclusively in mixed and shallow locations, with the exception of the Morro Bay area, consistent with data from previous years.

No trend was apparent in mean length of fish relative to distance from port among port areas. Relative to depth, it is notable that the mean length of two fish measured from deep water in the San Francisco area was 65 mm (2.5 in.) greater than that of fish measured from shallow water. However, in the Morro Bay area, where blue rockfish were caught in greater numbers at deep locations, the opposite trend was apparent.

Mean total length showed a general decreasing trend with decreasing latitude (Table 24) and in the Morro Bay area was 59 mm (2.3 in.) less than that of the Eureka area. The larger fish from the Eureka area may represent catches from less utilized areas, or more anglers releasing small fish since this port area had the lowest retention rate for blue rockfish. Wyllie-Echeverria (1987) reported the mean length at 50% sexual maturity for blue rockfish to be 280 mm (11.0 in.) and 290 mm (11.4 in.) for males and females, respectively.

Mean lengths were close to these values in the Monterey and Morro Bay areas and exceeded them in other port areas.

In all port areas, anglers' catches showed a length frequency distribution spanning approximately 200 mm (7.9 in.)(Figure 3). According to Miller and Giebel (1973), fish in the 250 to 350 mm (9.8 to 13.8 in.) length range represent ages from 5 to 13 years. From the San Francisco area north to Eureka 13 to 35% of anglers' catches included fish over 13 years of age. In spite of heavy utilization of this resource,

the length frequency distributions and abundance of sexually mature fish in observed catches indicate a stable fishery for this species in all port areas. Although blue rockfish greater than 350 mm (13.8 in.) now are rare in the sampled catch from the Monterey and Morro Bay areas compared with the early 1960's (Miller and Geibel 1973), little change has occurred in mean length of CPFV-caught fish in the past quarter century.

Yellowtail Rockfish

The yellowtail rockfish, *Sebastes flavidus*, has a distribution which covers a wide depth range (Love 1991) and can best be described as a midwater schooling species. Although it is commonly caught between 100 and 450 ft, young-of-the-year often settle out in water less than 60 ft near kelp beds then migrate to deeper water as they get older (Lea et al. 1996). It is frequently caught by both commercial and sport anglers and is an important component of fisheries in central and northern California.

Range in CPAD was less dramatic among port areas than in previous years (Table 25). The San Francisco area had the highest CPAD followed closely by the Morro Bay, Bodega Bay and Fort Bragg areas. The Morro Bay area had the highest CPAH followed by Fort Bragg, and CPAH among all areas varied only by a factor of two. CPAH in the Morro Bay area was higher in 1992 and 1993 compared with previous years. Since 1989 the Monterey area has had the lowest CPAH among all port areas south of Eureka. In the Bodega Bay area, the declines observed in CPAD and CPAH since 1990-91 may be evidence of a continuing trend and represent a cause for concern due to the heavy utilization of this species by both commercial and CPFV anglers near Cordell Bank.

CPAH relative to distance from port area was higher at near locations for the San Francisco and Morro Bay areas while the opposite was true for the Bodega Bay and Eureka areas (Table 26). CPAH at distant locations was less variable than comparable values in 1992, and more similar to values in previous years, with the exception of the Fort Bragg area. Catch rates at distant locations in the Fort Bragg area have continued to decline, although in 1993 the data for CPAH at distant locations were based on one trip which may not be representative.

In the four most southern areas CPAH was higher at deep locations. In the Eureka area, yellowtail rockfish were observed caught almost exclusively at distant, shallow locations, a reflection of the scarcity of available near locations.

Since 1988, mean lengths of yellowtail rockfish from all port areas except Fort Bragg have varied by only 6 to 18%. In the Fort Bragg area a 47% decrease in observed mean lengths has occurred from 1989 (420 mm or 16.5 in.) to 1993 (286 mm or 11.3 in.)(Table 27). However, this most likely reflects the lack of observed trips in 1993 to deep water, where larger yellowtail rockfish are more common. Since 1990, the Bodega Bay area has had the greatest mean length of any port area, most likely due to fish taken at Cordell Bank. Mean lengths in 1993 from all other port areas except San Francisco were within the range observed in previous years. The mean length of yellowtail rockfish from the San Francisco area is the lowest observed to date and represents a 9% decrease since 1991.

Yellowtail rockfish continued to be larger at distant locations compared with near locations in the Bodega Bay, San Francisco, and Morro Bay areas. In the Monterey area, mean length of fish was greater at near locations due to the close proximity of the deep-water Monterey Submarine Canyon. Fish continued to be larger at deep locations at all port areas except Morro Bay. This has been a consistent trend observed since 1987 and 1988 and reflects ontogenetic movement to deeper water (Lea et al. 1996).

Further evidence that the lack of larger fish in shallow locations is biological rather than a result of differential fishing effort was seen during a 1993 CDFG research cruise. Thirty-one

yellowtail rockfish were caught, measured, and released from Point Lobos Marine Ecological Reserve, an area closed to fishing for more than 2 decades, from depths of 43 to 155 ft; mean length was only 266 mm (10.5 in.) (R. Lea, CDFG, Monterey. pers. comm.). This was less than the mean length of yellowtail rockfish sampled from deeper locations during the research cruise and less than the mean length of the sampled CPFV catch from the Monterey area in every year since 1987.

Length frequency distributions were enlightening in reflecting the use of different populations of yellowtail rockfish near each port area (Figure 4). The Fort Bragg, San Francisco, and Morro Bay area catches consisted primarily of subadult fish at lengths corresponding to 3 to 8 years of age (Lea et al. 1996). Catches from the Eureka and Monterey areas represented a broad mix of lengths corresponding to ages from 3 to more than 14 years (Lea et al. 1996). In the Bodega Bay area anglers continued to catch primarily sexually mature fish at lengths corresponding to 7 to 14 years of age (Lea et al. 1996). In all port areas except Fort Bragg, length frequency distributions were consistent with those from previous years, indicating fished populations are remaining fairly stable. The lack of adult fish from observed catches in the Fort Bragg area is most likely due to a lack of observed effort in deep locations.

For the past 6 years mean length of yellowtail rockfish from the Morro Bay area has only ranged from 281 to 299 mm (11.1 to 11.8 in.). Length frequency distributions have been unimodal in most years, with few fish above 360 mm (14.2 in.), the length of 50% sexual maturity for females (Wyllie-Echeverria 1987). Episodes of recruitment, indicated by a higher proportion of fish less than 250 mm (9.8 in.) were apparent in 1988 and 1991. CPAH was higher in 1992 and 1993 than in previous years. The Morro Bay area is at the southern end of this species' range. Considering all of the above factors, it is likely that recruitment to the fishery may be dependent on adult populations to the north, and thus the relatively small mean length and lack of adults in the sampled catch are not causes for concern from a management standpoint.

Chilipepper

Chilipepper, *Sebastes goodei*, is an important component of both the commercial and recreational fisheries in California (Oda 1992). It can be described as primarily an offshore, schooling species found near the bottom and in midwater at depths of 300 to 1400 ft. This rockfish is targeted in the Monterey area primarily in spring and summer and in the Bodega Bay area during winter. Although chilipepper ranked third in overall abundance among all port areas, over 97% of the observed catch was from the above areas. Chilipepper were not observed caught in the Eureka or Fort Bragg areas, and observed catches from the San Francisco area included only one individual. Observed chilipepper catches from the Morro Bay area have varied considerably since 1988 but have never comprised more than 3% of the catch.

Contrary to CPAH comparisons in past years by port area, anglers had better success in the Bodega Bay area compared with the Monterey area during 1993 (Table 28). This reversal reflects a declining trend in CPAH in the Monterey area from 1987 to 1992 and an increase in CPAH in the Bodega Bay area from low levels observed from 1990 to 1992. Morro Bay area CPAH was low, similar to previous years.

In the Bodega Bay and Morro Bay areas chilipepper were caught almost exclusively at distant locations (Table 29) and in the Monterey area anglers had much better success close to port, primarily due to effort in the Monterey Submarine Canyon. At Bodega Bay area locations chilipepper were caught primarily at Cordell Bank. There were no fish observed caught in shallow water and the highest CPAH observed at deep locations was in the Monterey port area.

This was consistent with relative success among port areas observed in the past.

In past years, the largest fish have consistently been observed in catches from the Bodega Bay area. However, in 1993 the greatest mean length of chilipepper was observed from the Morro Bay area (Table 30) representing an increase of 104 mm (4.1 in.) since 1989. In the Bodega Bay and Monterey port areas mean length has varied by 53 and 33 mm (2.1 and 1.3 in.) respectively, since data collection began.

In the Monterey area, chilipepper from distant locations were larger than from near locations, a trend observed in 1992 but not in earlier years. Based on length-age data from Phillips (1964), Bodega Bay area anglers caught primarily 5- to 16-year old adult fish, while Monterey area anglers were observed to catch mainly 3- to 9-year old fish, including both subadults and adults. Chilipepper observed in Morro Bay area catches were more similar to the Bodega Bay area catches, but fish were primarily between 400 to 500 mm (15.7 and 19.7 in.), corresponding to an age range of 7 to 12 years.

Rosy Rockfish

The rosy rockfish, *Sebastes rosaceus*, is found most commonly between 180 and 350 ft near the bottom over rocky relief (Love 1991). It is a solitary species and a common component in sport catches from central California. Almost 86% of the rosy rockfish observed caught were taken from the San Francisco to Morro Bay port areas.

CPAD and CPAH rates for rosy rockfish were very consistent with those observed in previous years. The San Francisco port area continued to have the highest rates (Table 31) while the Monterey and Bodega Bay area had the lowest rates.

When CPAH was compared based on distance from port and location depth, there were no consistent trends (Table 32). In the Fort Bragg area rosy rockfish were caught only at near shallow locations but not distant shallow locations; CPAH was higher at distant locations in the Bodega Bay area compared with near locations, fairly equal in the San Francisco and Monterey areas, and higher at near locations in the Morro Bay area. Deep locations in the Bodega Bay and San Francisco areas had higher observed CPAH than shallow locations.

As mentioned previously, rosy rockfish observed caught usually do not exceed 305 mm (12.0 in.) and mean length in observed catches has ranged between 220 and 270 mm (8.7 and 10.6 in.) since 1988 (Table 33). Mean length has decreased in the Fort Bragg, Bodega Bay, and San Francisco areas compared to previous years by as much as 47 mm or 1.9 in. (Bodega Bay area 1989 to 1993); a significant decline due to the small overall size of this species. Mean length in the Monterey and Morro Bay areas has been remarkably constant since 1987 and 1988, varying by only 6 mm (0.2 in.) and 7 mm (0.3 in.), respectively.

There were no apparent trends in mean length of rosy rockfish with respect to either distance from port or depth, with the following exception. Rosy rockfish from the Monterey and San Francisco area distant and deep locations continued to have slightly higher mean lengths than fish from near and shallow locations.

Length frequency distributions from all port areas were similar to those observed in past years for the Monterey and Morro Bay areas (Figure 6). The decrease in mean length noted above from the Fort Bragg to San Francisco areas is due to the absence of fish from 300 to 350 mm (11.8 to 13.8 in.) in observed catches. This absence may be due to no fishing effort, in the case of the Fort Bragg area, or less fishing observed in deep locations than in past years, but may also reflect an actual decrease in availability of larger fish. In all areas, the majority of fish were above the size of 50% sexual maturity for females (Wyllie-Echeverria, 1987) indicating a stable and viable population. It is interesting that there is an absence of rosy rockfish in the 150 to 175 mm (5.9 to 6.9 in) size

classes in the Monterey area even though that port area had the highest retention rate and the sample size was well over 300 fish.

Widow Rockfish

The widow rockfish, *Sebastes entomelas*, is a schooling species found over a wide depth range from shallow water to 1200 ft, often in association with rocky reefs, and it is caught by both sport and commercial anglers. Observed catch rates of widow rockfish on board CPFVs from the Eureka to the Morro Bay areas fluctuated substantially among port areas (Table 34). These wide fluctuations in CPAD and CPAH values are not unexpected for a migratory schooling species, which may respond to food availability or oceanographic conditions (Lenarz 1992), and reflects opportunistic success by CPFV anglers. In 1993 CPAH was the lowest observed to date in the San Francisco area and for other areas was within the range from previous years.

Relative to distance from port, CPAH was higher at distant locations in the Bodega Bay area, and higher at near locations in the Monterey and Morro Bay areas (Table 35), similar to past years. Unlike past years, in the San Francisco area, catch rates were similar at both near and distant locations. In all port areas where comparisons could be made, CPAH was higher at deep locations relative to shallow locations.

Consistent with past data, mean length of widow rockfish was greatest in the Bodega Bay area, most likely from catches made at Cordell Bank (Table 36). Within each of the three most southern port areas, mean length has varied by 12 to 16% during the past 5-6 years.

In 1993 widow rockfish from distant and deep locations in the Bodega Bay (Cordell Bank) were substantially larger than those measured from other port areas, as reported previously. In the Monterey area widow rockfish caught at near locations were larger than those caught far from port.

While length frequency distributions from most areas showed a broad size range of fish in observed catches, anglers from the Bodega Bay area were apparently catching older and larger fish than those in other areas (Figure 7). Wyllie-Echeverria (1987) reported size at 50% sexual maturity for female widow rockfish as 370 mm (14.5 inches), an age of between 5 and 7 years (Phillips 1964). Thus, the Bodega Bay area catches would represent fish aged 5 to 12 or more years, while catches from the other port areas include mainly fish aged 2 to 5 years. A mode in widow rockfish lengths in the 260 to 330 mm (10.2 to 13.0 in.) was evident in the Bodega Bay area catch in 1992 but not in 1993. In 4 of the past 6 years (1988, 1989, 1990, 1993), Morro Bay area observed catches were notable for having a mode in the 200- to 260-mm (7.9- to 10.3-in.) length range, indicating successful recruitment.

Canary Rockfish

The canary rockfish, *Sebastes pinniger*, is found over a wide depth range from 150 to 750 ft in association with rocky reefs, with juveniles occurring in shallower water and adults found below 300 ft (Love 1991). This species is commonly caught by sport anglers in central and northern California and has been an important contributor to commercial catches as well (Adams 1992b).

Catch rates measured as CPAD and CPAH were all within the range of values observed in previous years for a particular area (Table 37). There continued to be a general decline in CPAH with decreasing latitude, with the Eureka and Fort Bragg areas having the highest CPAH. This is not unexpected as the center of distribution for this species is further north, in Washington and British Columbia (Adams 1992b).

The only consistent trends in CPAH among years relative to distance from port and depth have been a higher CPAH at near locations in the Bodega Bay area, and higher CPAH at deep locations around the Morro Bay area (Table 38).

In species with an age-related depth

distribution such as the canary rockfish, the relative proportion of fishing effort observed at shallow and deep locations is an important factor affecting mean length when all data are combined for a port area. Canary rockfish from the Bodega Bay area have consistently had the greatest mean length of any port area since 1988 (Table 39). As with other species in which adults primarily inhabit deeper water, this trend is due to a significant proportion of the catch originating from Cordell Bank. However, the availability of deep fishing locations in itself does not guarantee fish as large as those from the Bodega Bay area.

Mean lengths from deep locations generally declined in a north-south gradient from the Bodega Bay to the Morro Bay area, with mean length in the latter 29% less than that in the former. The Monterey area has shown a continual decline in mean length since 1990, averaging 3-5% per year. Catches from the Fort Bragg area also experienced a decline in mean length, although the lack of observed effort from distant, deep locations no doubt contributed to this decline. Thus, the decline in the Fort Bragg area is not necessarily a cause for concern.

Canary rockfish were consistently larger at distant locations in all port areas, although the differences were more dramatic in the Bodega Bay area (Table 38). As in past years, canary rockfish were also larger at deep locations compared to shallow locations.

Broad ranges were observed in length frequency distributions for all port areas, but particularly in the Bodega Bay area (Figure 8). This reflects both the large length (maximum 762 mm or 30.0 in.) and high longevity (75 years) attained by this species (Love 1991) as well as the wide depth range of locations from which it is caught. Length frequency distributions were most notable in that, consistent with previous years, in all port areas except Bodega Bay the majority of the catches were juvenile and subadult fish. Wyllie-Echeverria (1987) reported the average size at 50% sexual maturity for females as 440 mm (17.3 in.) which represents an age of 7 to 8 years (Lea et al. 1996). Thus, Bodega Bay area catches represent a range of ages of about 2 to more than 14 years, while observed catches at other port areas include very few fish that would be more than 8 years of age. This pattern is consistent with size distributions observed in previous years and does not indicate a cause for concern, with the possible exception of the Monterey area as discussed below. It is expected that with good larval dispersal, and the continued presence of adult fish in some areas replenishment will continue to occur in areas with apparently few adult fish in the catch. Some evidence of recruitment may be apparent; in the three most northern port areas there was a mode between 250 and 310 mm (9.8 and 12.2 in.)

The proportion of adult fish > 440 mm (17.3 in.) in the Monterey area catches is disappointing because it represents a decrease from previous years; in 1987 this size class represented 15% of the observed catch, while in 1993 it was only 1%. This decrease can not be attributed to a lack of effort in deep water and may represent evidence of overfishing and an area of concern.

Greenspotted Rockfish

The greenspotted rockfish, *Sebastes chlorostictus*, is a solitary, bottom-dwelling species found most commonly between depths of 300 to 600 ft (Love 1991) and can be described as an offshore rockfish. It is harvested to some extent by commercial fishers, and represents a common component of the CPFV fishery from the Bodega Bay to the Monterey areas.

Catch rates in 1993 showed no consistent trends compared to previous years. The highest CPAD and CPAH were again observed in the Bodega Bay, San Francisco, and Monterey areas, and the Monterey and Bodega Bay areas continued to have similar CPUE values (Table 40). CPAH was low in Morro Bay (0.03), similar to previous years, and no greenspotted rockfish were observed caught in the Eureka and Fort

Bragg areas.

In the Bodega Bay and San Francisco areas, CPAH was higher at distant locations, while values were comparable between near and distant locations from the Monterey and Morro Bay areas (Table 41). Consistent with past years, greenspotted rockfish were caught almost exclusively at deep locations.

Mean length of greenspotted rockfish has shown moderate variability among port areas (Table 42) and years. Variation in mean length during 1993 was 49 mm (1.9 in.) among areas while from 1987 to 1992 mean length has varied by 72 mm (2.8 in.), a factor of about 25%.

Greenspotted rockfish were larger at distant locations in the San Francisco and Morro Bay areas (Table 41). All but two fish were measured at mixed and deep locations from the Bodega Bay area south to the Morro Bay area. From the Bodega Bay to the Monterey area, where the origin of 99% of all fish measured was from deep locations, mean length varied by only 20 mm (0.8 in.).

Length frequency distributions from the Bodega Bay area south to the Morro Bay area indicated anglers were catching a broad size distribution of fish (Figure 9). In all port areas, mean length exceeded the size of 50% maturity for females reported by Wyllie-Echeverria (1987) of 280 mm (11 in) TL. The broad length range in catches from all port areas, and the fact that a significant portion of the catches in all port areas are adult fish, are indicative of a stable fishery for greenspotted rockfish.

Bocaccio

The bocaccio, *Sebastes paucispinis*, is primarily an offshore, schooling species of rockfish caught over a broad depth range (150 to 1000 ft) although small, juvenile fish are often found much shallower than adults (Love 1991). It is common in commercial catches and was commonly observed in CPFV catches from the Bodega Bay area south to the Morro Bay area. Bocaccio are most common in CPFV catches from depths between 250 and 750 ft. over rocky reefs (Thomas and Bence 1992).

CPAD and CPAH of bocaccio were more than three times higher in the Bodega Bay area than at all other port groups (Table 43). Prior to 1990, the Monterey area had higher catch rates than the other port areas, but in 1993 CPUE values were 54% or less of values from all previous years. Observed catch rates in the Morro Bay area in 1993 also were the lowest observed to date.

In the Bodega Bay area, bocaccio were not observed caught at near or shallow locations and primarily were observed at Cordell Bank (Table 44). Catch rates were higher at distant locations in both the San Francisco and Morro Bay areas, while in the Monterey area CPAH was higher at near locations, due to the proximity of the Monterey Submarine Canyon where bocaccio are common. CPAH values were significantly higher at deep locations compared to shallow locations for all port areas, consistent with previous data.

Mean length of bocaccio has fluctuated over the past 6 years, more so among areas than within a particular area, with a trend of decreasing mean length with decreasing latitude from Bodega Bay south. The Bodega Bay area continued to have the greatest mean length of all port areas (Table 45).

In all port areas, mean length was higher at distant locations compared to near locations. Bocaccio also had a larger mean size at deep locations compared to shallow locations within port areas, a trend not consistent among areas in previous years.

Length frequency distributions of bocaccio among port groups were fairly similar to distributions observed since 1987 (Figure 10). As in past years, the vast majority of fish measured from catches in the Bodega Bay area corresponded to adults from 6 to 18 years old (Lea et al. 1996). Catches from the San Francisco, Monterey and Morro Bay areas contained a broad length distribution corresponding to both subadult and adult fish as observed previously. In 1992,

evidence of a potentially strong year class entering the Monterey area fishery was present, indicated by fish in the 325- to 350-mm (12.8- to 13.8-in.) range; this mode was not well-defined in the 1993 histogram although some fish were present in this interval.

Vermilion Rockfish

The vermilion rockfish, *Sebastes miniatus*, is considered a prized rockfish in both the sport and commercial fisheries and in the CPFV fishery is targeted in the Morro Bay area. It is usually found aggregated over rocky bottom in shallow water to depths of 900 ft (Love 1991) and could be considered a broad depth range species. In 1993, 67% of observed catches were from the Morro Bay area, and 94% were observed caught from the San Francisco area south to the Morro Bay area.

Consistent with past years, the Morro Bay area had the highest CPAD and CPAH of all port areas (Table 46); observed catch rates for vermilion rockfish were four times higher at this port area than any other area sampled and were within the range previously observed for this area. CPAD and CPAH were fairly comparable from the Fort Bragg area south to the Monterey area, and in all port areas north of Morro Bay values were equal to or greater than those observed in previous years.

In the Bodega Bay area, angler success was seven times higher at near locations than at distant locations (Table 47). In the Monterey area, success was better at distant locations, and populations far from port may be experiencing less fishing pressure. Differences between locations near or far from port were minimal for the other port areas. There were no definitive trends in angler success between shallow and deep locations, possibly due to low sample sizes at most port areas.

A comparison of mean length by port area indicated the largest fish were caught in the Bodega Bay area (Table 48), in contrast to 1991 and 1992 when the largest fish were caught in the Fort Bragg area. In fact, mean length of vermilion rockfish from the Bodega Bay area was 10% greater than the San Francisco area (next greatest mean length). In previous years there was a trend in the Morro Bay area of increasing mean length of vermilion rockfish, from 318 mm (12.5 in.) in 1988 to 413 mm (16.3 in.) in 1992, primarily due to the presence of a strong year class. In 1993 mean length declined to 396 mm (15.6 in.). The percentage of vermilion rockfish greater than 500 mm (19.7 in.) was almost identical in 1993 and 1992 (8% vs. 7%). Thus the decline in mean length may reflect the increased availability of newly-recruited smaller, juvenile fish in the observed catches (see below).

In all port areas, fish caught at distant locations were larger than fish caught at locations closer to port (Table 47); this was generally consistent with previous observations. In the Monterey and Morro Bay areas, differences were minimal. Catches could not be compared by location depth due to small sample size in some areas.

Length frequency histograms were similar to previous years and encouraging for two reasons (Figure 11). Wyllie-Echeverria (1987) reported the size of 50% maturity for female vermilion rockfish as 370 mm (14.6 in) and in all port areas more than 50% of observed catches were above this size. In addition, the Morro Bay area catches indicated a recent pulse of recruitment in the 260- to 290-mm (10.2- to 11.4-in.) size classes. According to Lea et al. (1996) this would represent primarily 3-year old fish, an encouraging sign for maintaining a stable Morro Bay area fishery for this species. In the Monterey area there was also evidence of possible recruitment, indicated by an increased abundance of fish between 300 and 310 mm (11.8 to 12.2 in), corresponding to 3- to 4-year old fish (Lea et al. 1996).

Lingcod

The lingcod, *Ophiodon elongatus*, is a species prized by recreational anglers for its large size and

good flavor, and it is targeted in central and northern California during fall and winter. Lingcod are also common in the catches of commercial fishers, and most hook-and-line harvest occurs at depths from 30 to 330 ft over rocky areas (Adams and Hardwick 1992). Seasonal variation in catch is due to the migration of females, primarily between deep and shallow water during fall. Lingcod sex data from observed CPFV catches in both 1992 and 1993 indicated females comprised 65 to 90% of the catches in fall and winter from all port areas (Figure 12). The proportion of females in summer catches was much more variable in those two years -- from 15 to 65% of all observed fish.

Catch rates for lingcod were highest in the Eureka area, followed by the San Francisco and Monterey areas (Table 49). Data were not available from the Eureka area in previous years. However, CPAH varied only by a factor of 2.5 among areas, similar to observations in 1993.

In the Eureka, Fort Bragg, San Francisco and Monterey areas, CPAH was higher at distant locations compared to locations closer to port indicating anglers were more successful fishing in less utilized areas (Table 50). This trend was most pronounced in the Fort Bragg area although sample size was low. In a reversal of a trend from previous years, Morro Bay area CPAH was higher at locations closer to port. This was due to a four-fold decline in CPAH at distant locations in the Morro Bay area compared with previous years, although again sample size was low. In the Bodega Bay area CPAH was higher at shallow locations while the reverse was true for the San Francisco and Monterey areas. Prior to 1993, catch per unit effort in the Monterey area had been higher in shallow locations compared to deep locations; this reversal was due to a more than four-fold drop in CPAH at shallow locations compared to past years.

Mean length by port area exhibited a general decrease with decreasing latitude (Table 51). Mean length of lingcod in the Eureka area in 1993 (761 mm or 30.0 in.) was the highest recorded from any area since data collection began in 1987. This is to be expected since their center of distribution is British Columbia and this species grows to a larger size at the more northern portions of its range (Adams and Hardwick 1992). When mean length from the Fort Bragg port area south are compared with past years, the Bodega Bay area continued to have the largest fish. There have been no consistent trends in mean length within port areas since 1987. However, in 1993 the Monterey area had the smallest mean length of any year sampled and the Morro Bay area had the greatest mean length of any year sampled.

Lingcod were larger at distant locations in all port areas except Fort Bragg and Monterey; in the Monterey area this was likely due to the proximity of deep water in the Monterey Submarine Canyon where large females occur year-round, and in the Fort Bragg area the sample size from distant locations was small. In all areas except San Francisco, small sample size was problematic in interpreting any trend with depth. In the San Francisco area, slightly larger fish were found at deeper locations and were predominantly females, as females grow to a larger size than males (Figure 13) and are more commonly caught in deep water.

Length frequency histograms from the six port areas indicated 1993 observed catches were fairly similar to those from previous years (Figure 14). In all port areas a broad length range of fish were caught, particularly in the Eureka and Bodega Bay areas. There is a minimum legal size of 559 mm (22 in.) for lingcod; observed catches from the San Francisco and Monterey areas contained the highest proportion of sublegal-sized fish, 13 and 12%, respectively. This represented a significant improvement in the San Francisco area when compared with a 24% proportion of sublegal-sized fish retained in 1992. The reported size for 50% sexual maturity for females is 590 mm (23.2 in.) (Miller and Giebel 1973) and in all port areas at least 50% of the catch was above this size.

Observed catches from the San Francisco and Monterey areas, and particularly the Morro Bay area, continued to show signs of heavy fishing pressure on this species. Lingcod grow very quickly during the first few years of life, reaching a length of 330 mm (13.0 in.) after 1 year, and 500 mm (19.7 in.) by age 3 (Miller and Giebel 1973). Growth rate differs between males and females after age 3 so that by age 14 males average 800 mm (31.5 in.) and females 1100 mm (43.3 in.). Lingcod grow about 75 mm (3.0 in.) from age 3 to 4, and the proportions of the observed catch from these port areas in the 560-mm to 635-mm (22.0- to 25.0-in.) length range were 43, 41 and 59% respectively. This length range, just above minimum legal size and including some sexually immature females, represents the majority of the observed catch from the Morro Bay area. Without frequent episodes of substantial recruitment, these results imply that the stability of the lingcod fishery is questionable in this area and provide reason for concern.

On the positive side, the three most southern port areas also had the lowest retention rates for lingcod, which may be indicative of higher recruitment of juvenile fish. This is supported by observations of high numbers of young-of-the-year lingcod along the central California coast in 1990, 1991, and 1993 (D. VenTresca, CDFG, Monterey, pers. comm.). If in fact recent recruitment events have been significant we expect to see the mean length of lingcod increase in these areas in 1995 and in following years.

Olive Rockfish

The olive rockfish, *Sebastes serranoides*, can best be described as a nearshore species commonly found near rocky reefs and kelp beds. This schooling species is of primary importance to skiff and CPFV anglers and it is commonly caught at depths less than 200 ft. In general the most southern port areas, primarily Monterey and Morro Bay, have shown higher mean CPAD and CPAH for canary rockfish during the previous 5-6 years; this was again true in 1993 (Table 52). All values of CPAD and CPAH in 1993 were within the range of values from previous years for a particular port area and no trends were apparent.

In the Monterey and Morro Bay areas, where sufficient numbers of olive rockfish were observed from near and distant locations, CPAH was higher at the latter (Table 53), similar to all previous years.

Mean length of olive rockfish among port areas south of Eureka varied by only 26 mm (1.0 in.)(Table 54). The relatively small mean length of olive rockfish from the Eureka area is not unexpected because these fish are at the northern edge of their geographical distribution (Miller and Lea 1972).

Mean lengths from the Bodega Bay and Monterey areas were within the range from previous years, however in the San Francisco and Morro Bay areas, annual mean lengths were the highest recorded during this study. Annual mean lengths in the San Francisco area have ranged from 366 to 380 mm (14.4 in. to 15.0), a relatively narrow range and one indicative of a stable population and fishery.

Distant locations yielded a larger average fish than near locations in the Monterey and Morro Bay areas (Table 53), however this relationship has not been consistent over the years. Length frequency distributions indicate a decreasing proportion of sexually mature fish in the sampled catch with decreasing latitude from the Fort Bragg area south, and a wide length range in the four most southern port areas (Figure 15). Unlike previous years, the histograms from the Monterey and Morro Bay areas are remarkably similar.

In 1991, a relatively strong pulse of recruitment was evident in the sampled catch from the Morro Bay area, with 31% of all fish measured less than 300 mm (11.8 in.), corresponding primarily to an age of 3 years (Lea et al. 1996). By 1993, this proportion had decreased to 6%, and mean length had increased by 42 mm (1.7 in.). While the quantity of

available fish had decreased due to natural and fishing mortality (CPAH fell from 0.33 to 0.18), the quality of fish increased, as indicated by the mean length.

Copper Rockfish

Copper rockfish, *Sebastes caurinus*, are solitary bottom dwellers and are among the most desirable species sought by sport anglers. Based on values of CPAD and CPAH, they are relatively more important in the Eureka area CPFV catch (Table 55). Among other port areas, CPUE values were higher in the Fort Bragg and San Francisco areas and lowest in the Bodega Bay area. No consistent trends in CPAD or CPAH have occurred for copper rockfish in any port area sampled since 1987 or 1988. In the San Francisco area, values in 1993 were the highest among all years sampled. In the Morro Bay area, mean annual CPAD and CPAH have been remarkably constant since 1988, ranging from 0.31 to 0.36 and 0.09 to 0.12, respectively.

The only consistent relationship between CPAH from near and distant locations among years has been in the San Francisco area, where CPAH from near locations has always exceeded that from distant locations (Table 56). When considering CPAH from shallow and deep locations, no consistent relationships have occurred among areas or years; this is to be expected for a species with a widespread depth distribution.

Mean length of copper rockfish ranged from 444 mm (17.5 in.) in the Eureka area to 350 mm (13.8 in.) in the Morro Bay area (Table 57). For the three most southern port areas, where sufficient data have been collected in most years since 1987 or 1988, mean lengths in 1993 were within the range of mean lengths from previous years, and no trends were apparent for any port area.

In the San Francisco area, mean length was greater for copper rockfish sampled from distant locations compared with near locations, while the reverse was true for the Morro Bay and Monterey areas (Table 56). Copper rockfish from the Monterey area averaged 59 mm (2.3 in.) longer from deep locations compared with shallow locations (Table 56).

In all port areas sampled in 1993, the majority of copper rockfish sampled exceeded the length at 50% sexual maturity for females (340 mm or 13.4 mm)(Wyllie-Echeverria 1987)(Figure 16). Within a particular port area and among years, no dramatic changes have occurred in length frequency distributions. Most histograms include a wide length range of sampled fish, corresponding to a healthy mix of ages (Lea et al. 1996). Histograms from the Morro Bay area have been characterized by periodic pulses of recruitment, indicated by significant numbers of fish less than 300 mm (11.8 in.). This occurred in 1988, 1989, 1991, and 1993, and the represented lengths correspond to ages 3 and 4 years (Lea et al. 1996).

Starry Rockfish

The starry rockfish, *Sebastes constellatus*, is found over hard bottom in association with large rocks; while adults are most abundant from 180 to 450 ft, juveniles are common from 90 to 250 ft. They occur from San Francisco south to Baja California (Miller and Lea 1972) and are common in catches from Monterey south (Love 1991).

Similar to previous years, the three most southern port areas accounted for the large majority of starry rockfish observed and measured. CPAH and CPAD were highest in the Morro Bay area and were more than twice as high as any other port area (Table 58). No consistent trend in CPAD or CPAH has occurred for any port area during the past 6-7 years, although these two estimates of angler success have increased each year since 1989 in the Morro Bay area.

The only consistent CPAH trend relative to distance from port during this study has been a higher rate for near locations in the Morro Bay area (Table 59). The San Francisco area

continued to show the greatest disparity in CPAH from shallow and deep locations, with CPAH from the latter 13 times greater.

Mean lengths of starry rockfish were remarkably similar in 1993 for all port areas except Bodega Bay (Table 60), where mean length was at least 31 mm (1.2 in.) greater than that of any other port area. In the Monterey and Morro Bay areas, mean lengths have only varied by 16 and 10 mm (0.6 and 0.4 in.), respectively, since 1988. However, in the San Francisco area, mean length in 1993 declined 40 mm (1.6 in.), or 12%, from the average of the 1988 to 1991 period.

Starry rockfish averaged 49 mm larger at distant locations compared with near locations in the San Francisco area (Table 59), comparable to the 1988-91 period but not to 1992. Since the majority of starry rockfish were observed caught at locations in the mixed depth range, relatively few measurements were available from shallow and deep locations. No consistent relationship has been observed during the past 6-7 years for mean length and depth for port areas with sufficient sample size.

In the three most southern port areas, the majority of starry rockfish measured exceeded the length at 50% sexual maturity for females (270 mm or 10.6 in.)(Wyllie-Echeverria 1987)(Figure 17). In the San Francisco area, significant recruitment was observed in 1992 and 1993 and most likely explains the large decrease in mean length. The percentage of fish greater than 400 mm (15.7 in.) has only decreased from 7.1% to 3.4% from 1988-1991 to 1992-93, while the percentage of fish less than 250 mm (9.8 in.) has increased from 8.0% to 24.0% during the same period. Recruitment was particularly evident in 1992 by a strong mode at 241 to 250 mm (9.5 to 9.8 in.).

Length frequency distributions for the Monterey and Morro Bay areas have changed little since 1987 and 1988, with the large majority of fish between 250 and 350 mm (9.8 and 13.8 in.). The sampled length range from the three most southern ports corresponds to a wide age range (Lea et al. 1996) and the fished population in general appears to be fairly stable.

Black rockfish

The black rockfish, *Sebastes melanops*, is primarily a nearshore schooling species found associated with rocky reefs. Black rockfish are commonly caught shallower than 120 ft., although they are occasionally caught in midwater over deeper (to 400 ft) reefs (Houk 1992a). This species is the dominant nearshore schooling rockfish from northern California to Washington. In 1993, the Eureka area was sampled sufficiently to document the dramatic importance of black rockfish in this area's CPFV catch. Mean CPAD and CPAH were more than 10 times greater than any other port area (Table 61). Among the other port areas, San Francisco had the highest values. Because black rockfish have a relatively limited and shallow depth range, comparisons of CPUE values among ports and years must be made with caution; a high proportion of trips may be to locations outside this species' range and may depress CPUE values artificially.

In the San Francisco area, a negative trend in CPAH warranting concern occurred from 1988 to 1992; in 1993 CPAH increased for the first time, an encouraging sign.

In the Monterey area, black rockfish were absent from observed catches from 1990 to 1992. In 1990 and 1991 this was most likely due to an absence of observed trips fishing at locations where black rockfish are normally caught.

However, in 1992, locations were sampled which historically have produced black rockfish but none were observed. Black rockfish were present in observed catches in 1993; interestingly, 50% of the locations where they were observed were near locations and two of these had not been sampled before. CPAH in Monterey was relatively higher in 1993 than previous years, although all values have ranged only from 0.01 to

0.03.

In considering mean CPAH from near and distant locations, it is apparent that in the Eureka area there is an abundance of fish available at the few sampled locations close to port (Table 62). In the San Francisco area, the primary black rockfish fishing areas were at distant locations, similar to previous years, as indicated by higher CPAH.

By including black rockfish from the Eureka area, a wide disparity in mean length was apparent in 1993, ranging from 408 mm (16.1 in.) in this area to 297 mm (11.7 in.) in the Fort Bragg and Morro Bay areas (Table 63). No consistent trends in mean length have occurred for black rockfish at any port area. In 1993 mean length in the San Francisco area increased by 15 mm (0.6 in.) compared with the previous year but was still 14% lower than that of 1988. In the Bodega Bay area, mean length decreased by approximately 10% from 372 mm (14.6 in.) in 1992 to 336 mm (13.2 in.) in 1993.

When comparing mean length from near and distant locations, the Eureka area shows that, while stocks are in high abundance close to port (based on CPAH values), the largest fish have been removed; mean length was 55 mm (2.2 in.) greater at distant locations.

Length frequency histograms for black rockfish show a dramatic difference between the Eureka area and areas to the south (Figure 18). In the four most southern port areas, few fish were sampled above the length at 50% sexual maturity for females (410 mm or 15.4 in.) or males (350 mm or 13.8 in.)(Wyllie-Echeverria 1987). Because black rockfish are a shallow water species, it is not likely that populations of unexploited adult fish remain in remote, deep locations south of the Eureka area, which may be the case for canary rockfish. Recruitment must originate from shallow water stocks, which appear to consist of few sexually mature adults. Among all rockfish species harvested by CPFVs in central California, this one is of greatest concern.

An encouraging sign is the occurrence of some black rockfish above 410 mm (15.4 in.) in the sampled catch from the San Francisco area in 1993; in the previous year there were none. However, in the Bodega Bay area, the percentage of sampled fish above this length decreased from 24% in 1992 to 15% in 1993.

Gopher Rockfish

The gopher rockfish, *Sebastes carnatus*, is a nearshore, solitary, benthic species found commonly on rocky reefs from 30 to 180 ft. Consistent with previous years, gopher rockfish were caught with greatest frequency in the Morro Bay area, where CPAD and CPAH were more than four times greater than any other port area (Table 64). Both indices of CPUE in the Morro Bay area were within the range of values from the previous 5 years. The Monterey area CPAD and CPAH were the highest observed in that area during the last 6-7 years. No consistent trends in observed CPAD or CPAH have occurred for gopher rockfish in any port area sampled during the last 6 years.

Among port areas with sufficient sample size, CPAH was greater at distant locations than at near locations for the San Francisco and Monterey areas (Table 65), similar to previous years. In the Morro Bay area, CPAH was greater at near locations, reversing a trend from previous years. Consistent with its recorded depth distribution (Miller and Lea 1972), all gopher rockfish measured were taken at shallow locations (Table 65).

Gopher rockfish is the third smallest rockfish among those frequently caught by sport anglers with a maximum length of 425 mm or 16.7 in. (Reilly et al. 1993), but nonetheless is desirable due to its good flavor. Among port areas with sufficient sample size, mean length varied by only 5% for gopher rockfish measured in 1993 (Table 66). Since 1987 or 1988, mean length has varied by only 2-9% within each of the three most southern port areas. No increasing or decreasing trends in mean length have been apparent during

this period.

Consistent with previous years, gopher rockfish from the Monterey and Morro Bay areas had greater mean lengths from distant locations compared with near locations (Table 65). This is probably the best indicator of relatively greater fishing pressure closer to port.

Fairly similar length frequency distributions of gopher rockfish measured from the three most southern port areas indicated all fish were above the reported length at 50% sexual maturity for females (170 mm or 6.7 in.) (Wyllie-Echeverria 1987)(Figure 19).

More than 2700 gopher rockfish caught by CPFV anglers in the Morro Bay area have been measured by this project since 1988. Length frequency histograms have been remarkably consistent throughout this period, with a unimodal distribution and a mode from 260 to 300 mm (10.2 to 11.8 in.). This is indicative of relatively constant recruitment. The sampled population corresponds to a relatively wide age range (Lea et al. 1996) and appears to be in stable condition.

Greenstriped Rockfish

Greenstriped rockfish, *Sebastes elongatus*, is the second smallest rockfish among those frequently caught by CPFV anglers, with a maximum length of 408 mm (16.1 in.)(Reilly et al. 1993). Although it is not considered desirable by many anglers due to its size, it is occasionally an important component of the catch, particularly in the Bodega Bay and Monterey areas. CPAD and CPAH were highest in 1993 for greenstriped rockfish in these port areas (Table 67), which are characterized by a higher percentage of trips to deep locations where this species commonly occurs. CPAH from near and distant locations was fairly similar from the Monterey area (Table 68). The low CPAH from near locations in the Bodega Bay and San Francisco areas was influenced by the paucity of trips to near locations that were also deep.

Mean length of greenstriped rockfish varied by only 20 mm (0.8 in.) among the four most southern port areas (Table 69). Since 1987, more than 1600 greenstriped rockfish have been measured from the Monterey area; annual mean length has ranged from 266 to 287 mm (10.5 to 11.3 in.), with no trend.

Similar to previous years, greenstriped rockfish from distant locations in the Morro Bay area were substantially larger than those from near locations (15% larger in 1993)(Table 68).

Consistent with previous years, the majority of greenstriped rockfish measured in 1993 from the four most southern port areas were above the reported length at 50% sexual maturity for females (230 mm or 9.1 in.)(Wyllie-Echeverria 1987)(Figure 20). In the Monterey area (our largest data base for this species), length frequency histograms have been remarkably steady since 1989, with 89 to 96% of all fish measured ranging from 241 to 350 mm (9.5 to 13.8 in.). In general, the harvested population in all port areas sampled appears stable.

Brown Rockfish

The brown rockfish, *Sebastes auriculatus*, is a nearshore species primarily found in shallow waters, but also caught to depths of 420 ft. (Adams 1992a). This species was caught with greater frequency in the San Francisco and Morro Bay areas, where values of CPAD and CPAH were highest (Table 70). CPAD for brown rockfish in the Bodega Bay area has declined from 0.83 in 1989 to 0.09 in 1993. However, these values are averages from all trips observed during a year. A trend of fishing in deeper locations, where brown rockfish are seldom caught, has occurred in the Bodega Bay area since 1988. Thus, this decline in CPAD may not reflect a reduction in absolute abundance within the normal depth range of this species in the Bodega Bay area. In the San Francisco and Morro Bay areas, CPAD and CPAH in 1993 were within the range of the previous 5 years, while in Monterey, values were the highest observed to date.

CPAH for near locations was higher than for distant locations in the Bodega Bay and San Francisco areas, while the opposite was true for the two most southern port areas (Table 71). In the Morro Bay area, the difference has been striking since 1988; CPAH has averaged almost 14 times greater at distant locations. It is unknown whether this is due to higher fishing pressure close to port or to more available habitat in more distant locations.

In 4 of the previous 5 years, brown rockfish from the Morro Bay area had the greatest mean length of any port area. In 1993, among port areas with sufficient sample size ($n \geq 20$), Morro Bay had the lowest mean length (Table 72). Mean length has declined steadily in this area from 1989 (381 mm or 15.0 in.) to 1993 (313 mm or 12.3 in.) and is a cause for concern. In the San Francisco area, mean length was higher than in any of the previous 5 years but has varied by only 10 mm (0.4 in.) during this time. The San Francisco and Morro Bay areas, those with the greatest sample size, showed differences in mean length approximately 20 mm (0.8 in.) greater from distant locations compared with near locations (Table 71).

Length frequency histograms for brown rockfish from the San Francisco and Monterey areas showed a large majority of sampled fish above the length at 50% sexual maturity for females (310 mm or 12.2 in.)(Wyllie-Echeverria)(Figure 21). However, in the Morro Bay area, for the first time since observations began in 1988, 50% of the sampled fish were at or below this length. In summary, a steady decrease in mean length, a relatively high proportion of juvenile fish in the sampled catch, and a dramatic difference in CPAH between near and distant locations may all indicate that brown rockfish stocks in the Morro Bay area close to port are exhibiting signs of heavy fishing pressure.

China Rockfish

China rockfish, *Sebastes nebulosus*, are caught infrequently and in 1993, CPAD and CPAH were highest in the Fort Bragg and San Francisco areas (Table 73). CPAH in the San Francisco area increased to 0.04 in 1993 from 0.02 in 1992, reversing a declining trend observed from 1988 to 1992.

In all port areas except Bodega Bay, CPAH was higher from distant locations compared with near locations (Table 74); the difference was pronounced in Fort Bragg, but sample size was small. Consistent with its known depth distribution, almost all China rockfish observed and measured were from shallow or mixed locations (Table 74).

There was little variation in mean length among port areas south of Eureka (Table 75) and no latitudinal trend. In the San Francisco area, where the majority of China rockfish in this study's 7 years were measured, mean length in 1993 increased by 12 mm (0.5 in.), reversing a declining trend from 1988 to 1992.

In all port areas with sufficient sample size, length frequencies of China rockfish measured in 1993 showed a majority of the fish above the length at 50% sexual maturity for females (270 mm or 10.6 in.)(Wyllie-Echeverria 1987)(Figure 22). In the San Francisco area, length frequencies from 1992 and 1993 revealed an absence of fish larger than 350 mm (13.8 in.), in contrast with histograms from 1988 to 1990. This may indicate some stress on stocks in this area. China rockfish are a highly desirable species and are also fished commercially, along with gopher and brown rockfish, for the live fish market in the San Francisco area.

Yelloweye Rockfish

Yelloweye rockfish, *Sebastes ruberrimus*, is an offshore, non-schooling species. Individuals of this species are among the largest and most prized of the "red" rockfishes, and although not abundant, are of considerable importance in recreational catches. In 1993 CPAD and CPAH generally decreased with decreasing latitude

(Table 76), consistent with its overall relative abundance along the California coast. In the Bodega Bay area, CPAD and CPAH continued a declining trend observed since 1988. CPAD and CPAH have decreased from 0.29 and 0.09 to 0.07 and 0.02, respectively. In the San Francisco area, CPAD and CPAH have varied but have also declined in general by 56% and 60%, respectively. In these two areas, this trend signifies an area of concern.

Sample size was small in most port areas, but in general CPAH was greater at distant and deep locations (Table 77), similar to previous years. Mean length of yelloweye rockfish was highly variable by port area, ranging from 502 mm (19.8 in.) in the Bodega Bay area to 366 mm (14.4 mm) in the Eureka area (Table 78). A significant portion of this variability was due to depth of capture. Juvenile yelloweye rockfish usually are found in shallower water than adults. The port areas of Eureka, Fort Bragg, and Morro Bay (with the smallest mean lengths) had a combined total of 1 fish measured from deep locations out of 97 fish measured for the year. Conversely, the Bodega Bay, San Francisco, and Monterey areas had a combined total of 66 fish measured from deep locations out of 106 fish measured from all locations.

No consistent trends in mean length have been observed for yelloweye rockfish from any port area during the 6-7 years of this study. All mean lengths observed in 1993 for a particular port area were within the range of previous years except for the San Francisco area, which had the highest mean length observed to date (previous range 376 to 421 mm or 14.8 to 16.6 in.).

Similar to mean length data, length frequency histograms in 1993 were highly variable among port areas (Figure 23). A majority of measured fish were less than the length at 50% sexual maturity for females in the Eureka and Fort Bragg areas only, again most likely due to the depth of capture.

The San Francisco area has accounted for more than 40% of all yelloweye rockfish measured during the 7 years of this study. Length frequency histograms from all years sampled have shown a wide length range from at least 250 mm to 600 mm (9.8 to 23.6 in.). The percentage of fish greater than 500 mm (19.7 in.) increased dramatically in 1993 to 43%, from a range of 14 to 23% during 1988 to 1992. This is most likely due to a lower percentage of trips to shallow locations in 1993 (27%), compared with 1988 to 1992 (50 to 74%). Fish in the size range of 500 to 600 mm (19.7 to 23.6 in) represent age classes of 11 to 17 years (Lea et al. 1996).

In summary, mean lengths of yelloweye rockfish have not demonstrated a declining trend in any port area. In addition, length frequency histograms in all ports except Fort Bragg indicate a wide length range and corresponding age range in the sampled catch. However, in the San Francisco area, declines in CPAD and CPAH are cause for concern as discussed above, and this species should continue to be monitored closely.

Comparison of Species Composition and Mean Length of Selected Fishes in CPFV and Skiff Fisheries

After a 3-yr hiatus, in 1993 most public boat launch ramps from Trinidad south to Avila were sampled for skiff angler catch and effort by the Marine Recreational Fisheries Statistics Survey (MRFSS) (D. Albin, CDFG, Fort Bragg, unpubl. data). Comparison of the 10 most frequently observed species from CPFV and skiff sampling from the six port areas showed major differences in species composition (Table 79).

Species Composition

In general, four non-rockfish species, white croaker, Pacific sanddab, jack mackerel, and jacksmelt, were of major importance in the skiff fishery, particularly in the San Francisco and Monterey areas, but not in the CPFV fishery. Of the rockfishes, only blue and yellowtail were among the 10 most frequently observed species in

the CPFV and skiff fisheries in all port areas. Black, gopher, and brown rockfishes, typically shallow-water species, were relatively more important in the observed skiff catch. Chilipepper, bocaccio, and rosy, greenspotted, and widow rockfishes, more abundant at depths exceeding 100 ft, were relatively more abundant in the observed CPFV catch.

As a percentage of the total observed skiff catch, rockfishes ranged from 50 to 90% by port area and averaged 66.8%. In the CPFV fishery, rockfishes comprised from 92 to 97% by port area of all observed fishes and averaged 94.1% of the total catch.

Lingcod ranked among the ten most frequently observed species in the CPFV fishery for all port areas except Bodega Bay and in the skiff fishery for all port areas except Monterey and Morro Bay. Lingcod accounted for 3.1% of the total observed CPFV catch and 2.9% of the total observed skiff catch.

Mean Length

Sufficient sample sizes ($n \geq 20$) were available for lingcod and 14 species of rockfishes from 1993 MRFSS skiff fishery and CPFV fishery data from at least one port area to allow comparisons of mean length (Table 80). Species are categorized by depth ranges: 1) nearshore- primarily less than 40 fm; 2) wide depth range; 3) offshore- primarily greater than 40 fm.

In the Eureka area, four rockfishes and lingcod had greater mean lengths in CPFV samples, both from all locations and from shallow locations only. When comparing all CPFV locations with skiff data, differences in mean length exceeded 25 mm (1.0 in.) for lingcod and black, canary, and yellowtail rockfishes. Only blue rockfish were larger on average in the skiff fishery.

In the Fort Bragg area, results were atypical in that every species compared except lingcod had a greater mean length from the skiff fishery. This is likely a reflection of the absence of deep-location trips sampled on CPFVs in this area. For wide-depth range species, the inclusion of fish from deep locations tends to increase mean lengths.

In the Bodega Bay area, mean lengths were greater from the skiff fishery for two nearshore rockfishes, black and blue, but were greater from the CPFV fishery for canary rockfish, yellowtail rockfish, and lingcod when all locations were considered. It is notable that shallow CPFV locations produced much smaller canary and yellowtail rockfishes than the skiff fishery, which may indicate that some skiff fishing occurs in deep water in this area.

In the San Francisco area, black and blue rockfishes showed only slightly greater mean lengths in the CPFV fishery, while differences for brown, canary, and yellowtail rockfishes were more pronounced. Brown rockfish from shallow CPFV locations averaged 51 mm (2.0 in.) longer than those sampled from the skiff fishery, and may be due to a higher proportion of CPFV trips to distant locations. Similar to the Bodega Bay area, yellowtail rockfish from shallow CPFV locations were smaller than those from the skiff fishery.

The Monterey and Morro Bay areas were similar in that all wide-depth range species except yellowtail rockfish were larger from the CPFV fishery (all locations). Some differences were substantial, in particular canary and copper rockfishes from both port areas and yellowtail rockfish from the Monterey area.

Six nearshore species in the Monterey area had greater mean lengths from the CPFV fishery, with differences for brown and olive rockfishes exceeding 35 mm (1.4 in.). Among all port areas, the Monterey area demonstrated the greatest disparity between mean lengths from the skiff and CPFV fisheries for nearshore species.

In the Morro Bay area, four of six nearshore species were larger in the skiff fishery, although differences never exceeded 17 mm (0.7 in.). Only China and olive rockfishes had greater mean lengths in the CPFV fishery.

Among offshore species, the skiff fishery generally showed greater mean lengths in the Monterey and Morro Bay areas. These differences may not be real due to the uncertainty of discards in the skiff fishery. Small adult rosy rockfish and small juvenile starry and greenspotted rockfishes are commonly observed caught on CPFVs. Due to the conscientious efforts of operators and anglers, a relatively high percentage of these are retained. Retention rates for rosy rockfish and small starry and greenspotted rockfishes may be substantially lower in the skiff fishery and thus may cause a bias in the mean length of sampled fish.

In summary, pronounced differences in mean lengths of fishes sampled in the CPFV and skiff fisheries were observed in all port areas except Fort Bragg for species with a wide depth range. Most of these species tend to be larger with increasing depth, and many have greater mean lengths at distant locations compared with locations close to port. Thus, the greater mean lengths observed in the CPFV fishery most likely reflect a higher proportion of fishing effort at deep and distant locations where fishing pressure in general is lower.

Estimated Total Catch and Effort

Logbook Data

While logbook data are too general to provide useful information on CPFV catch and effort at specific locations, they are essential for annual estimation of the overall catch and effort by CPFV anglers in central and northern California.

This project has used these data, in conjunction with our sampling data, to determine a "best approximation" of the overall total catch by species and total effort by CPFV anglers on a port area basis.

During 1993, CPFV operators logged 27,160 fishing trips from California ports. Of these, 10,258 originated from central and northern California ports north of Point Arguello, excluding trips originating from ports in the Sacramento-San Joaquin Delta. From the more than 10,000 trips, rockfishes or lingcod were caught on 5723 trips. In order to make appropriate comparisons of recreational fishing for rockfish and lingcod in central and northern California, based on extrapolations of our project data, we summarized only trips which had been primarily fishing for these species. A total of 309 of the 5723 trips were eliminated as trips targeting salmon, rather than rockfish or lingcod, because the catch per angler was less than four fish. There were 15 trips identified within the group of target trips as multi-day trips which were all 2 day trips. These were each considered as two trips to maintain comparability with the other trips. Thus the total number of trips targeting rockfishes or lingcod was 5429 (Table 81.)

Compared to the previous 4 years, the overall number of trips catching rockfish or lingcod has decreased. Although the total number of fish caught also decreased in 1993, over 65% of all fish were caught in the Monterey or Morro Bay port areas. At the same time, catch per angler was higher than in previous years and CPAH was comparable to values from previous years. When catch per unit effort calculated from logbook data for rockfish/lingcod trips was compared with project data from 1993, our observed CPAD for kept fish (11.5) was lower than the computed value for logged data (12.1), but observed CPAH for kept fish only (3.74) was higher than the comparable value calculated for reported catch data (2.68). The latter discrepancy was most likely due to the more accurate measure of actual fishing time in our observed angler data, which is generally less than that recorded in logbook data for the same trips. Most notable was the decline in the number of trips logged from Fort Bragg in 1993. In past years, there were more trips logged from Fort Bragg compared to the northern California port area.

Adjusted Logbook Data

As observed in past years, compliance varied by port area from a high of 90% in Bodega Bay to

a low of 58% in both the Fort Bragg and Monterey areas. Compliance was 83% in San Francisco, 75% in northern California, and 70% in Morro Bay. This was only the second year that enough trips were sampled in the Fort Bragg area to provide a reliable compliance estimate, and only the first year that a compliance rate was calculated for the northern California port group.

As observed in past years, the Monterey area had one of the lowest compliance rates. It was determined that variable compliance among vessels combined with poor cooperation in the Monterey area, resulting in non-random sampling of CPFVs, produced an artificially low compliance rate for that port area. As a result, the compliance rate used for data adjustments was 63.5%, an average of that obtained from this study and an independent aerial survey project (D. Wilson-Vandenberg, CDFG, Monterey, unpub. data). Compliance rate calculations from the aerial survey do not suffer from a "cooperation bias" as each vessel has an equal probability of being observed.

When project trip data were used to adjust total catch and effort estimates, based on compliance, the total number of trips from all ports increased by 28% from 5429 to 7503 (Table 82). Adjusted catch and effort data from 1993 were substantially lower than in 1992 but comparable to data from 1988 to 1991; adjusted estimated catch was 36% higher than the reported total. Adjusted CPAD was lower than that calculated in 1992, but higher than comparable values from 1988 to 1991. Mean CPAD from observed trips was lower than adjusted CPAD from all trips in 1993. Assuming our sampled trips are representative of all trips, this implies that actual fishing success was less than that reported in logbooks. Based on the adjusted total number of trips, our project sampled 3.3% of trips targeting rockfish or lingcod in 1993 (248/7503).

Adjusted total estimated catch was partitioned by species using percent abundance for each port group from sampling information (Tables 83 - 88); adjusted catches by port could only be compared from Fort Bragg south to look at relative trends in catch composition since 1987 or 1988.

Changes observed in relative abundance among years are somewhat difficult to interpret for several reasons. First, total catch was not adjusted in all port groups in all years due to insufficient sample size. Second, observed species composition is dependent on the proportion of observed trips to certain general fishing areas (i.e., shallow/deep and near/distant locations). The proportion of observed trips to each of those general areas determines the relative abundance of the dominant species in that port area, but may not necessarily reflect the actual proportion of trips to each general area. Third, because the total catch is dominated by only a few species, changes related to the proportion of trips observed at each area or area-type can profoundly influence the overall catch estimate of each species.

In 1993, 38% of all black rockfish were caught from the northern California ports (Eureka, Trinidad, and Crescent City). In the Fort Bragg area, total estimated catch of black rockfish has declined since 1990.

In the Bodega Bay area, the 1993 estimated catch of yellowtail rockfish was more comparable to levels in 1988 but lower than in more recent years, while catches of widow rockfish and bocaccio were still high relative to previous years. Chilipepper estimated catch has increased for the past 3 years and brown rockfish estimated catches have declined steadily since 1990.

In the San Francisco area, estimated catches of yellowtail and blue rockfish were comparable to previous years prior to 1992 and rosy rockfish catches returned to levels estimated in 1988 and 1989. From 1988 to 1993, lingcod estimated catches have experienced a continual decline.

In the Monterey area, although chilipepper catches have remained fairly constant from 1990 to 1993, there has been a 58% decline in total catch of chilipepper since 1987. On the contrary,

total catch of blue rockfish in 1993 was the highest calculated since 1987. Lingcod catches were more comparable to values from 1988 and 1989. While 1993 saw an increase in the catch of greenspotted rockfish, estimated catch of bocaccio declined for the third consecutive year.

In the Morro Bay area, estimated catch of blue rockfish was similar to that calculated in 1992, while yellowtail rockfish catch estimates were the highest in the past 6 years. While the estimated catch of starry rockfish increased by 63% over the previous year, estimated catches of lingcod and bocaccio were the lowest in the past 6 years.

SUMMARY

Rockfishes are the mainstay of the recreational CPFV and skiff fisheries of central and northern California. Sport anglers fishing from Point Arguello to near the Oregon border and observed in this study caught 35 species of rockfishes; by number, rockfishes comprised the overwhelming majority of CPFV catches. Lingcod is the only non-rockfish species that was an important component of the CPFV catch in all port areas and generally ranked among the ten most frequently observed species. All areas fished by CPFVs now receive significant fishing pressure from commercial hook-and-line fisheries, and lingcod and most species of rockfishes observed in the CPFV catch are also observed in the commercial fishery.

Many of the life history aspects of rockfishes render them susceptible to overfishing. Most species are slow-growing, are long-lived, from 10 to 20 years up to 120 years, and many do not reproduce for the first 5 to 8 years of life. Some schooling species such as yellowtail, widow and bocaccio are migratory or undergo limited movement, but most species are highly residential by the time they are accessible to fishing effort. This increases their vulnerability to localized over-utilization. Due to their physiology and depth distribution, many species do not survive at any size if released. This causes additional mortality, particularly for juveniles.

Anglers' concerns over the quality of their fishing experiences require us to examine our data for long-term effects of fishing, both recreational and commercial, on fishery resources. Although 7 years of on-board sampling data seem short-term in the context of rockfish lifespans, this database is critical for establishing and documenting fishery trends in specific areas. We have identified some species-specific and port-specific trends in 1993 and also observed reversals of trends identified in previous years. These trends included changes in mean length and/or catch per unit effort, relative abundance of adults or juveniles in populations, and changes in general location of fishing effort. Some of these trends are cause for concern.

In general, 1993 data indicated that in all port areas CPFV fishery resources, with a few exceptions, were in a viable and sustainable condition, similar to the previous 6 years. Overall, the three most important species, blue rockfish, yellowtail rockfish, and chilipepper, comprised over 50% of the observed catch. When catch per unit effort and mean length were compared with previous data, results were indicative of a stable fishery for these species, with several port-specific areas of concern noted.

CPUE Trends

Yelloweye rockfish are among the largest and most prized of the "red" rockfishes. In the Bodega Bay and San Francisco port areas catch per unit effort has experienced a declining trend. In the Bodega Bay area, CPAD and CPAH continued a declining trend observed since 1988; CPAD and CPAH have decreased from 0.29 and 0.09 to 0.07 and 0.02, respectively. In the San Francisco area, CPAD and CPAH have varied but have also declined in general by 56% and 60%, respectively. These trends signify an area of concern. Mean lengths of yelloweye rockfish did not demonstrate a declining trend in any port area,

indicating there are still large fish present. In addition, length frequency histograms in all ports except Fort Bragg indicated a wide length range and corresponding age range in the sampled catch. However, due to the declines in CPAD and CPAH, this species should continue to be monitored closely.

During 1993, there was evidence of reversals of trends identified previously for lingcod, chilipepper and black rockfish. Prior to 1993, lingcod catch per unit effort in the Monterey area had been higher in shallow locations compared to deep locations; a reversal was noted this year due to a more than four-fold drop in CPAH at shallow locations compared to past years. With respect to chilipepper, CPAH comparisons among port areas showed anglers had better success catching fish in the Bodega Bay area compared with the Monterey area during 1993, contrary to previous years. This reversal reflects a declining trend in CPAH in the Monterey area from 1987 to 1992 and an increase in CPAH in the Bodega Bay area from low levels observed from 1990 to 1992.

Among all rockfish species harvested by CPFVs in central California, the black rockfish is presently of greatest concern. In the San Francisco area, a negative trend in CPAH warranting concern occurred from 1988 to 1992; in 1993 CPAH increased for the first time, an encouraging sign.

Recent trends in declining catch per unit effort were identified for bocaccio and yellowtail and widow rockfishes - all schooling species. In the Bodega Bay area, yellowtail rockfish have experienced declines in observed CPAD and CPAH since 1990-91. This may be a cause for concern due to the heavy utilization of this species by both commercial and CPFV anglers near Cordell Bank. In 1993, CPAH of widow rockfish was the lowest observed to date in the San Francisco area. Wide fluctuations in catch rate may not necessarily indicate cause for concern for this migratory schooling species due to the opportunistic nature of catches, however it does warrant future monitoring to determine whether this trend continues. In 1993 CPUE values for bocaccio in the Monterey area were 54% or less than those from previous years. Observed catch rates in the Morro Bay area in 1993 also were the lowest observed to date. The reason for this is not known.

Trends in Mean Length and Proportion of Adults

A declining trend in mean length has occurred in the black rockfish population in the San Francisco area and is cause for concern. An encouraging sign is the occurrence of some black rockfish above the size of 50% sexual maturity for females in the sampled catch from the San Francisco area in 1993; in the previous year there were none. However, in the Bodega Bay area, the percentage of sampled fish above this length decreased from 24% in 1992 to 15% in 1993. Thus, the proportion of adults in these populations warrants further concern. Because black rockfish are a shallow water species, it is not likely that populations of unexploited adult fish remain in remote, deep locations south of the Eureka area, so recruitment must originate from shallow water stocks. These stocks appear to consist of few sexually mature adults, as mentioned, creating concern over the source for recruiting juveniles and overall stock stability. This species will be monitored closely for future evidence of recruitment.

A trend of declining mean length has become apparent for canary and brown rockfishes due to changes in the relative abundance of adult fishes. Canary rockfish in observed catches from the Monterey area have shown a continual decline in mean length since 1990, averaging 3-5% per year. The proportion of adult fish > 440 mm (17.3 in.) in the Monterey area catches represents a decrease from previous years; in 1987 this size class represented 15% of the observed catch, while in 1993 it was only 1%. This decrease can not be attributed to a lack of effort in deep water and

may represent evidence of overfishing and an area of concern. This species will be monitored for evidence of recruitment to the fishery which would be an encouraging sign.

In 4 of the previous 5 years, brown rockfish from the Morro Bay area had the greatest mean length of any port area, but in 1993, Morro Bay had the lowest mean length. Mean length has declined steadily in this area from 1989 (381 mm or 15.0 in.) to 1993 (313 mm or 12.3 in.) and is a cause for concern. In the Morro Bay area, for the first time since observations began in 1988, at least 50% of the sampled fish were at or below the size at which half of the females are sexually mature. In summary, a steady decrease in mean length, a relatively high proportion of juvenile fish in the sampled catch, and a dramatic difference in CPAH between near and distant locations may all indicate that brown rockfish stocks in the Morro Bay area close to port are exhibiting signs of heavy fishing pressure.

In the Morro Bay area yellowtail rockfish are at the southern end of this species' range and observed catches continued to include very few adult fish. The paucity of adults in the sampled catch is not necessarily a cause for concern from a management standpoint, because recruitment necessary for a sustainable fishery here may be dependent on adult populations to the north.

Recruitment

For harvested species as a whole, it is expected that with good larval dispersal, and the continued presence of adult fish in some areas, replenishment will continue to occur in areas with apparently few adult fish in the catch via successful recruitment of juveniles. Some evidence of recruitment has been apparent in various port areas for some species warranting concern, including lingcod, brown rockfish, canary rockfish, and vermilion rockfish, and is an encouraging sign.

Observed catches of lingcod continued to evoke cause for concern due to the high proportions of fish in the 560-mm to 635-mm (22.0- to 25.0-in.) length range from the Monterey and particularly the Morro Bay areas. This length range, just above minimum legal size and including some sexually immature females, represents the majority of the observed catch from the Morro Bay area in 1993. Without frequent episodes of substantial recruitment, the stability of the lingcod fishery is questionable in this area. However, evidence of recruitment (discussed below) has tempered this concern. In addition, in all port areas at least 50% of the catch was above the reported size for 50% sexual maturity for females.

While the majority of observed lingcod catches were primarily represented by fish just above legal size in the three most southern port areas, on the positive side, these areas also had the lowest retention rates for lingcod. Low retention rates may be indicative of higher recruitment of juvenile fish, and in fact, there were observations of high numbers of young-of-the-year lingcod along the central California coast in 1990, 1991, and 1993. If recent recruitment events have been successful we expect to see the mean length of lingcod increase in these areas in 1995 and in following years.

With respect to canary rockfish, in the three most northern port areas there was a mode between 250 and 310 mm (9.8 and 12.2 in.), most likely indicating successful recruitment by that species. We will be looking for successful recruitment events by canary rockfish in the Monterey area as well.

In 1993 mean length of observed vermilion rockfish declined in the Monterey and Morro Bay areas but these declines partly reflected the increased availability of newly-recruited smaller, juvenile vermilion rockfish in the observed catches. The Morro Bay area catches included a pulse representing primarily 3-year old fish, and in the Monterey area there was also evidence of possible recruitment, indicated by an increased abundance of fish corresponding to 3- to 4-year

old fish. These are encouraging signs for maintaining a stable fishery for this species.

There was evidence of high numbers of pelagic young-of-the-year brown rockfish in Monterey Bay during 1993 which may be indicative of a good recruitment year for this species (S. Ralston, NMFS, Tiburon, pers. comm.)

Trends in Fishing Effort

The proportional utilization of locations near to or far from port, or in shallow or deep water can be a relative indicator of fishing quality in a port area. For example, lower CPAH at shallow water locations compared to deep locations could be indicative of over-utilization of those shallow locations. Similarly, a reduction in the frequency of trips to distant locations could indicate they no longer represent "quality" fishing sites and are not worth the extra effort in travel. In 1993, there was no notable change in the percentage of trips to distant locations at any port area compared to previous years. However, there were trends identified in fishing effort relative to location for single vs. multiple location trips, and relative to depth.

Compared to previous years, in 1993 there was a reduction in the percentage of observed trips to exclusively deep or shallow locations and a corresponding increase in the number of trips to either mixed locations or a combination of shallow, deep, and/or mixed locations. A decrease in the frequency of trips to deep water with a concurrent increase in trip frequency to shallow locations would be an encouraging sign, since shallow nearshore areas traditionally have received more fishing pressure. However, fewer trips to shallow locations, more evident in the most southern port areas, is cause for concern, particularly in light of an increased nearshore commercial hook-and-line fishery. Unfortunately, the true significance of these changes is unclear as these trends may be an artifact of reclassifying some of the sites.

There was a reduction in the proportion of trips to single locations in 1993. This is significant because it indicates success at single locations has apparently decreased relative to previous years and is cause for concern.

The ongoing nature of this study emphasizes the critical need for continuous long-term data in order to adequately assess trends in effort, CPUE, and mean length of harvested species in the CPFV fishery. It is unwise to compare historical fishery data with only 1 year of recent data, as oceanographic variability, weather, and even the economy can influence fishing effort, catch rate, and mean length of sampled species. For example, unpublished project data has indicated an inverse relationship between ocean temperature and CPAH of yellowtail rockfish in the Monterey area, most likely due to a movement of yellowtail rockfish to deeper water, where they are less accessible to sport anglers, during years of warmer ocean temperatures. Biological relationships of increasing mean length of sport fish species with depth must also be considered when examining fishery trends.

In 1993 this study identified nine species, lingcod and eight rockfishes, with areas of concern. Most of these areas of concern were port-specific and not of a general coastwide nature. Six of these ranked among the 10 most frequently observed species, five were schooling or migratory species, two were nearshore species, and three were offshore species. Of these nine species, only yellowtail rockfish and bocaccio were not listed as species of concern in our 1987 to 1991 data summary (Reilly et al. 1993). Populations of black rockfish, the species presently of greatest concern, has shown some positive signs this year. In additions to those problems previously discussed with black rockfish, trends of most concern continue to be declining CPAH of yellowtail rockfish in the Bodega area, lingcod in shallow locations near the Monterey area, and yelloweye rockfish in the San Francisco area; and decreasing mean lengths of canary rockfish in the Monterey area and brown

rockfish in the Morro Bay area. Long-term on board sampling data are necessary to determine whether these trends are due to fishing pressure, either commercial or recreational, or due to the influence of changing oceanographic conditions, influencing recruitment, food availability or migration patterns.

When recreational fishing effort shifts away from reliance on salmon to rockfishes and lingcod, which occurred from 1988 to 1992 throughout central and northern California, indicators of stress such as declining CPAH and mean length are more likely to occur. Impacts from the nearshore commercial hook-and-line fishery in the past 7 years have been documented by decreases in mean length of most nearshore and wide depth range rockfish species harvested by skiff anglers between 1980-86 and 1993 (D. Albin, CDFG, Fort Bragg, pers. comm.). Impacts on CPFV-caught fishes have been less significant due to the greater range of the fleet relative to depth and distance from port.

ACKNOWLEDGMENTS

Our sincere thanks and deepest appreciation go to the PSMFC Fishery Technicians S. Ashcraft, I. (Hennig) Stephens, D. Portman, F. Smith and D. Wood for all their hard work and tireless data collection efforts. Their expertise in fish identification and conscientious work assured us of the best available data. They often were required to work under difficult circumstances in adverse weather conditions when CPFV operators felt they could still go out and catch fish -- they all did a commendable job. The project has maintained a good working rapport with the CPFV industry primarily through their efforts.

Without the voluntary cooperation of the CPFV operators and owners, deckhands, and landing operators this project would not be possible. We thank you for your past, continued, and/or future cooperation to monitor this important resource for the long-term. We can never achieve your combined knowledge of the fishery, but we are grateful for the information you have shared.

Many thanks go to Dr. R. N. Lea for his assistance and training in fish identification and careful scrutiny of our database. His expertise in fish taxonomy, particularly *Sebastes*, has increased our confidence in, and identified the limitations of, our data. We have all become better fish biologists with his enthusiastic help.

C. Wilson and M. Sullivan provided very capable support on logistical assistance for the Fishery Technicians (C. Wilson) and database management (M. Sullivan). Their earnest and vigilant assistance were extremely valuable in meeting the project objectives. C. Wilson provided additional expertise as a field sampler.

Thank you to R. Heimann for his critical review of the manuscript.

This project was funded through money from the Federal Aid in Sport Fish Restoration Act Program (75% -- California Project F-50-R) and matching funds from the California Department of Fish and Game (25%).

LITERATURE CITED

Adams, P.B. 1992a. Brown Rockfish. p. 127. In: Leet, W.S., C.M. Dewees, and C.W. Haugen (eds.). California's Living Marine Resources and Their Utilization. Calif. Sea Grant, Sea Grant Extension Pub. UCSGEP-92-12.

-----. 1992b. Canary Rockfish p. 129. In: Leet, W.S., C.M. Dewees, and C.W. Haugen (eds.). California's Living Marine Resources and Their Utilization. Calif. Sea Grant, Sea Grant Extension Pub. UCSGEP-92-12.

Adams, P.B. and J. Hardwick 1992. Lingcod p. 161-164. In: Leet, W.S., C.M. Dewees, and C.W. Haugen (eds.). California's Living Marine Resources and Their Utilization. Calif. Sea Grant, Sea Grant Extension Pub. UCSGEP-92-12.

Frey, H.W. 1971. (ed.) California's Living Marine Resources and Their Utilization. Calif. Dept. Fish and Game Publ. 148 pp.

Houk, J.L. 1992a. Black Rockfish. p. 117-118. In: Leet, W.S., C.M. Dewees, and C.W. Haugen (eds.). California's Living Marine Resources and Their Utilization. Calif. Sea Grant, Sea Grant Extension Pub. UCSGEP-92-12.

-----. 1992b. Blue Rockfish. p. 118-120. In: Leet, W.S., C.M. Dewees, and C.W. Haugen (eds.). California's Living Marine Resources and Their Utilization. Calif. Sea Grant, Sea Grant Extension Pub. UCSGEP-92-12.

Lea, R.N., R.D. McAllister and D.A. VenTresca. 1996. (in press). Biological aspects of nearshore rockfishes of the genus *Sebastes* with notes on ecologically related sportfishes. Calif. Dept. Fish and Game, Fish. Bull. 177.

Lenarz, W.H. 1992. Widow Rockfish. p. 125-126. In: Leet, W.S., C.M. Dewees, and C.W. Haugen (eds.). California's Living Marine Resources and Their Utilization. Calif. Sea Grant, Sea Grant Extension Pub. UCSGEP-92-12.

Love, M.S. 1991. Probably More Than You Want to Know About the Fishes of the Pacific Coast. Really Big Press, Santa Barbara, CA, 215 p.

Miller, D.J. and J.J Geibel. 1973. Summary of blue rockfish and lingcod life histories; a reef ecology study; and giant kelp, *Macrocystis pyrifera*, experiments in Monterey Bay, California. Calif. Dept. Fish Game, Fish. Bull.(158):1-137.

----- and R.N. Lea. 1972. Guide to the Coastal Marine Fishes of California. Calif. Dept. Fish Game, Fish. Bull.(157):1-249.

Oda, K.T. 1992. Chilipepper. p. 122-123. In: Leet, W.S., C.M. Dewees, and C.W. Haugen (eds.). California's Living Marine Resources and Their Utilization. Calif. Sea Grant, Sea Grant Extension Pub. UCSGEP-92-12.

Phillips, J.B. 1964. Life history studies on ten species of rockfish (genus *Sebastodes*). Calif. Dept. Fish Game, Fish. Bull. 126. 70 p.

Reilly, P.N., D. Wilson-Vandenberg, D.L. Watters, J.E. Hardwick and D. Short. 1993. On board sampling of the rockfish and lingcod Commercial Passenger Fishing Vessel Industry in northern and central California, May 1987 to December 1991. Calif. Dept. Fish and Game, Mar. Resour. Admin. Rep. 93-4. 242 p.

Thomas, D.H. and J.R. Bence. 1992. Bocaccio. p. 120-121. In: Leet, W.S., C.M. Dewees, and C.W. Haugen (eds.). California's Living Marine Resources and Their Utilization. Calif. Sea Grant, Sea Grant Extension Pub. UCSGEP-92-12.

Wilson, C., D.A. Wilson-Vandenberg, L. Halko and P. Reilly. 1996. On board sampling of the rockfish and lingcod Commercial Passenger Fishing Vessel Industry in northern and central California, January through December 1992. Calif. Dept. Fish and Game, Mar. Resour. Admin. Rep. 96-2.

Wyllie-Echeverria, T. 1987. Thirty-four species of California rockfishes: maturity and seasonality of reproduction. Fish Bull. 85:229-250.

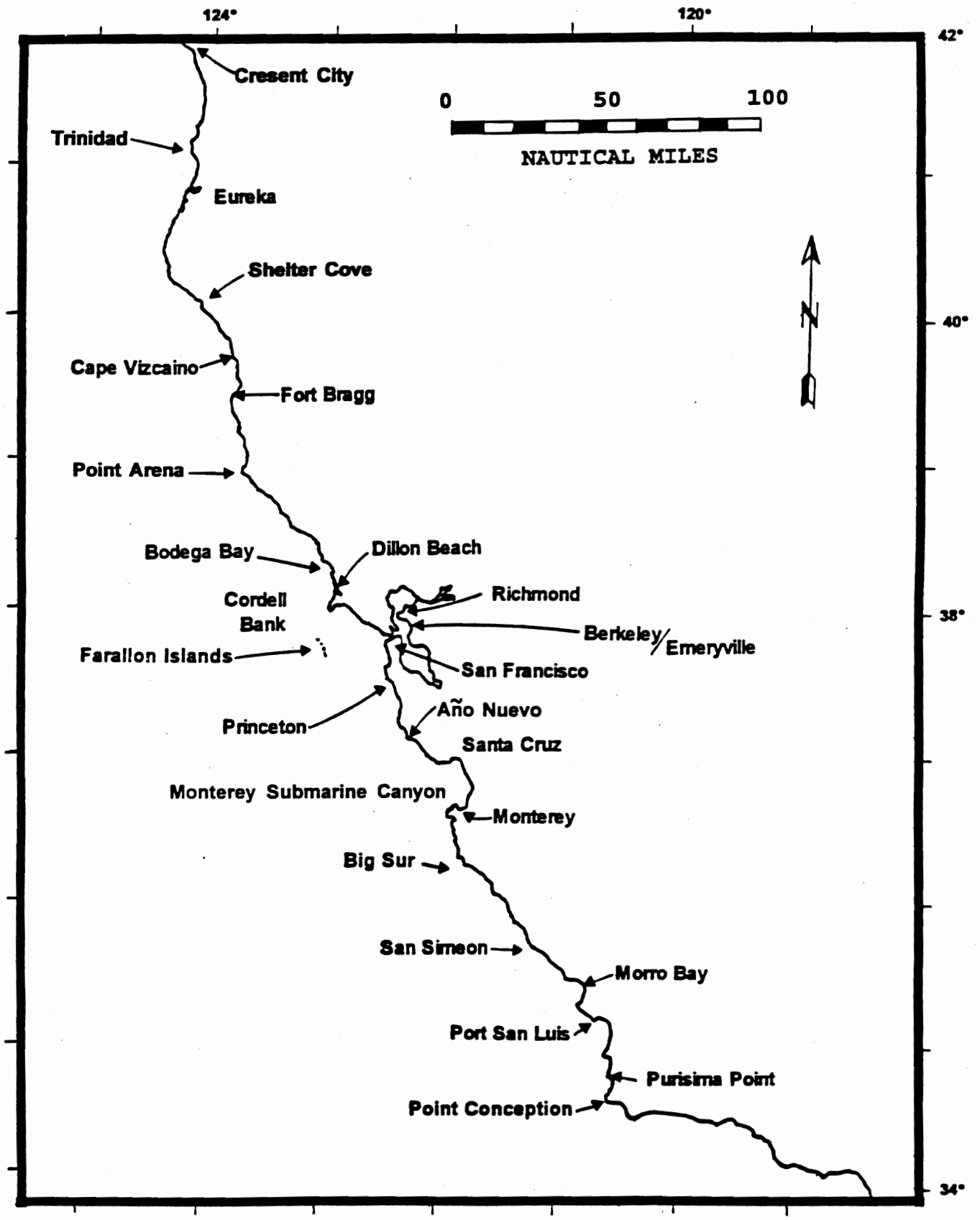

FIGURE 1. CPFV sampling area in central and northern California.

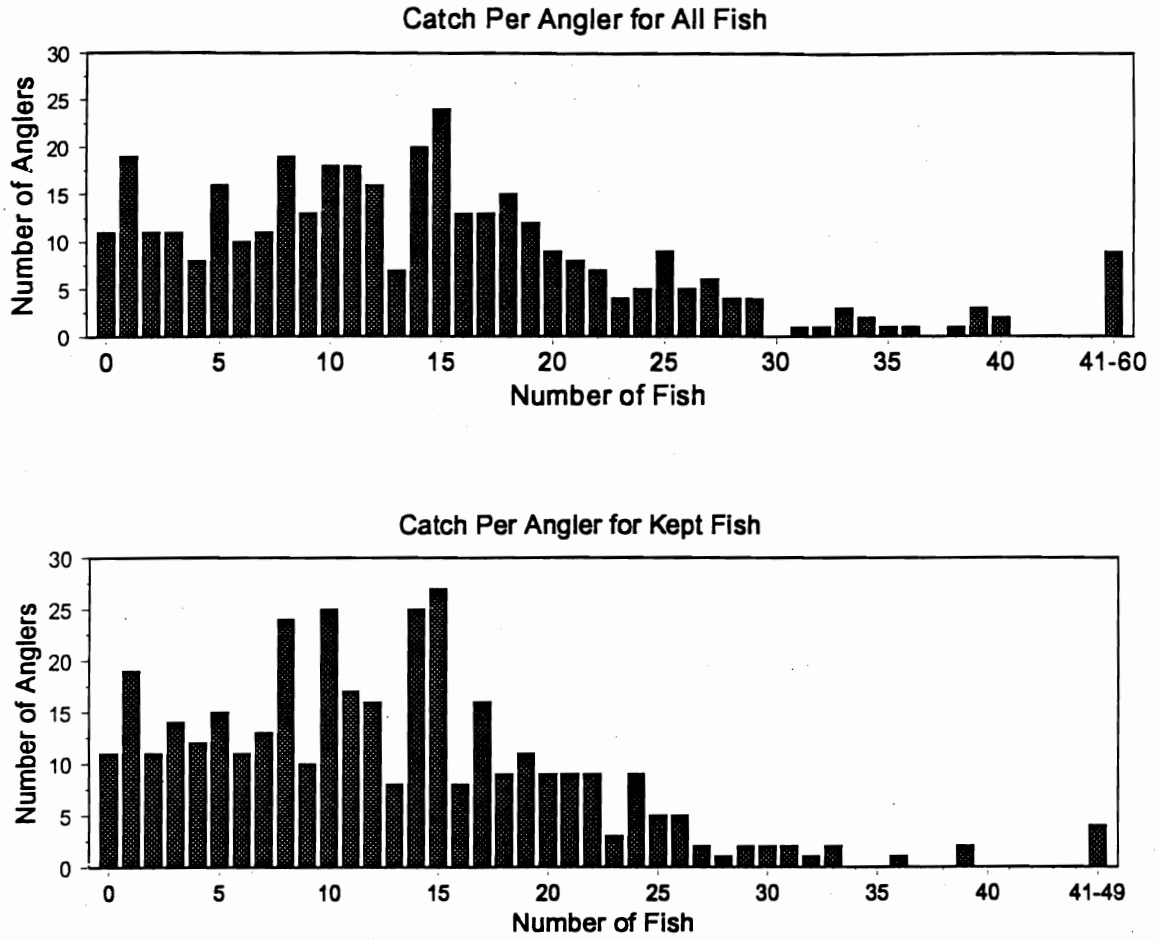

FIGURE 2. Distribution of individual catch per angler, for all and kept fish, for observed anglers July 1992 to November 1993.

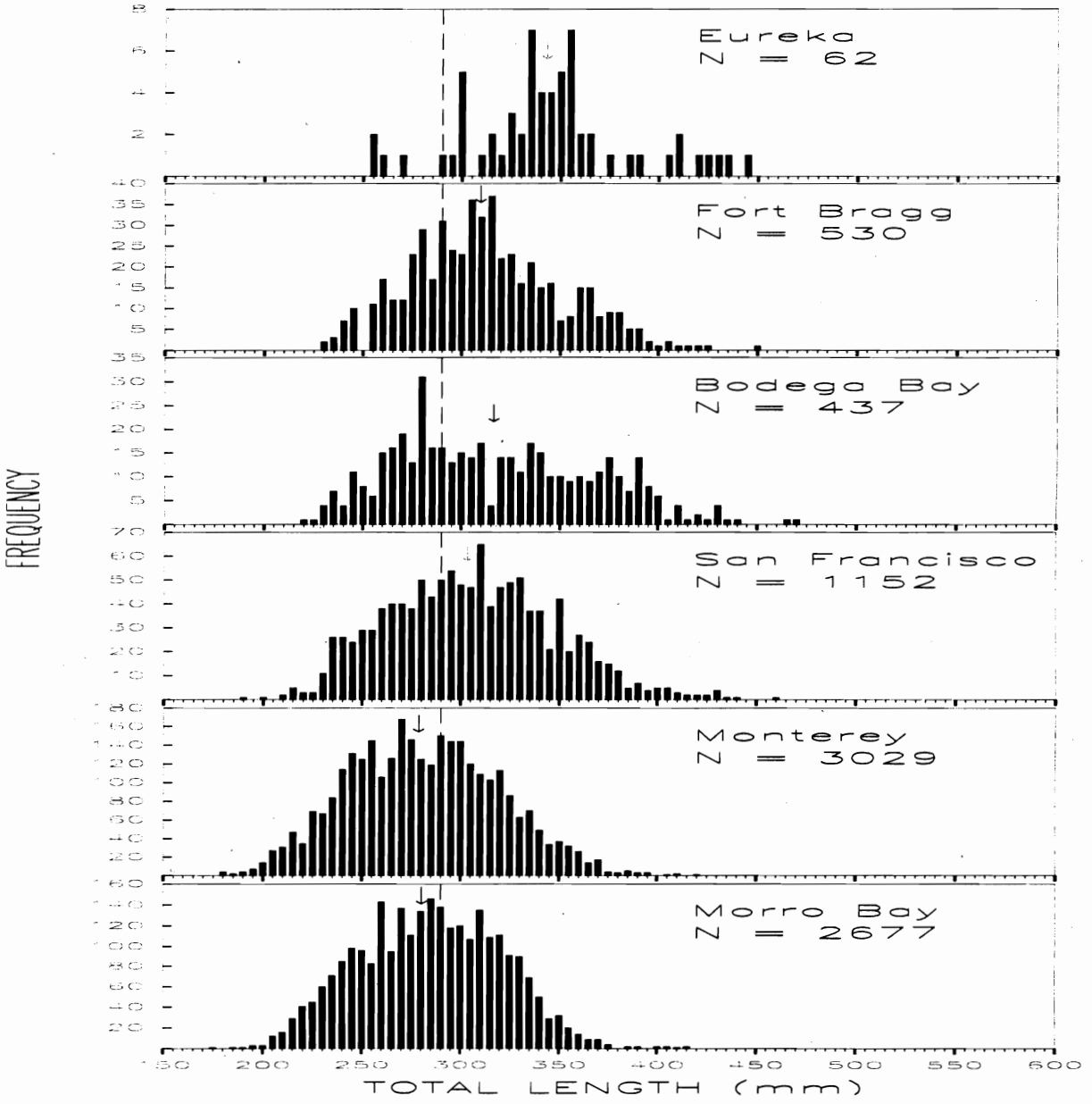

Figure 3. Length frequency of blue rockfish by port area. (Vertical dashed line indicates size at which 50% of females are mature. ↓ indicates mean size for that port area.)

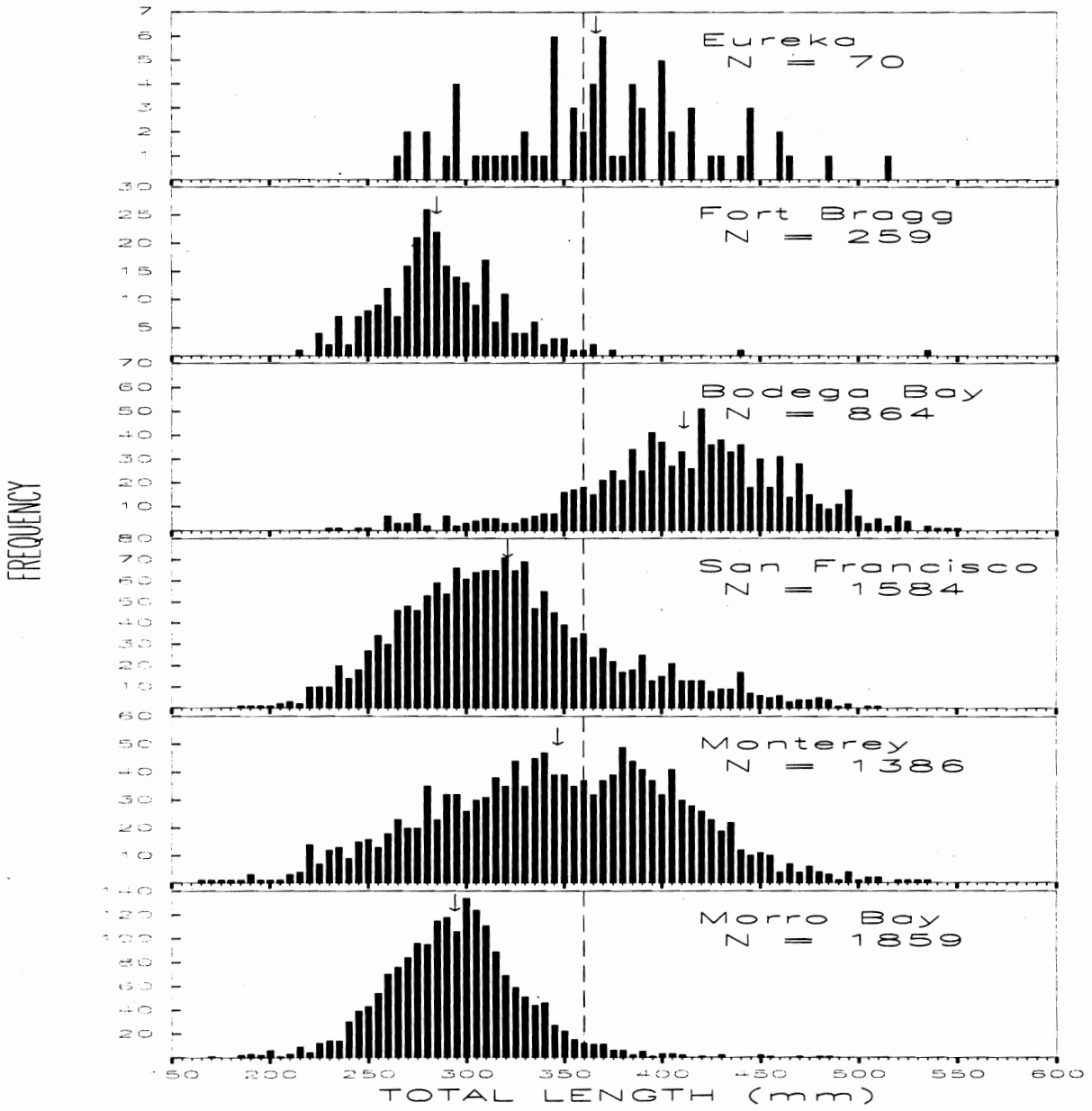

Figure 4. Length frequency of yellowtail rockfish by port area. (Vertical dashed line indicates size at which 50% of females are mature. ↓ indicates mean size for that port area.)

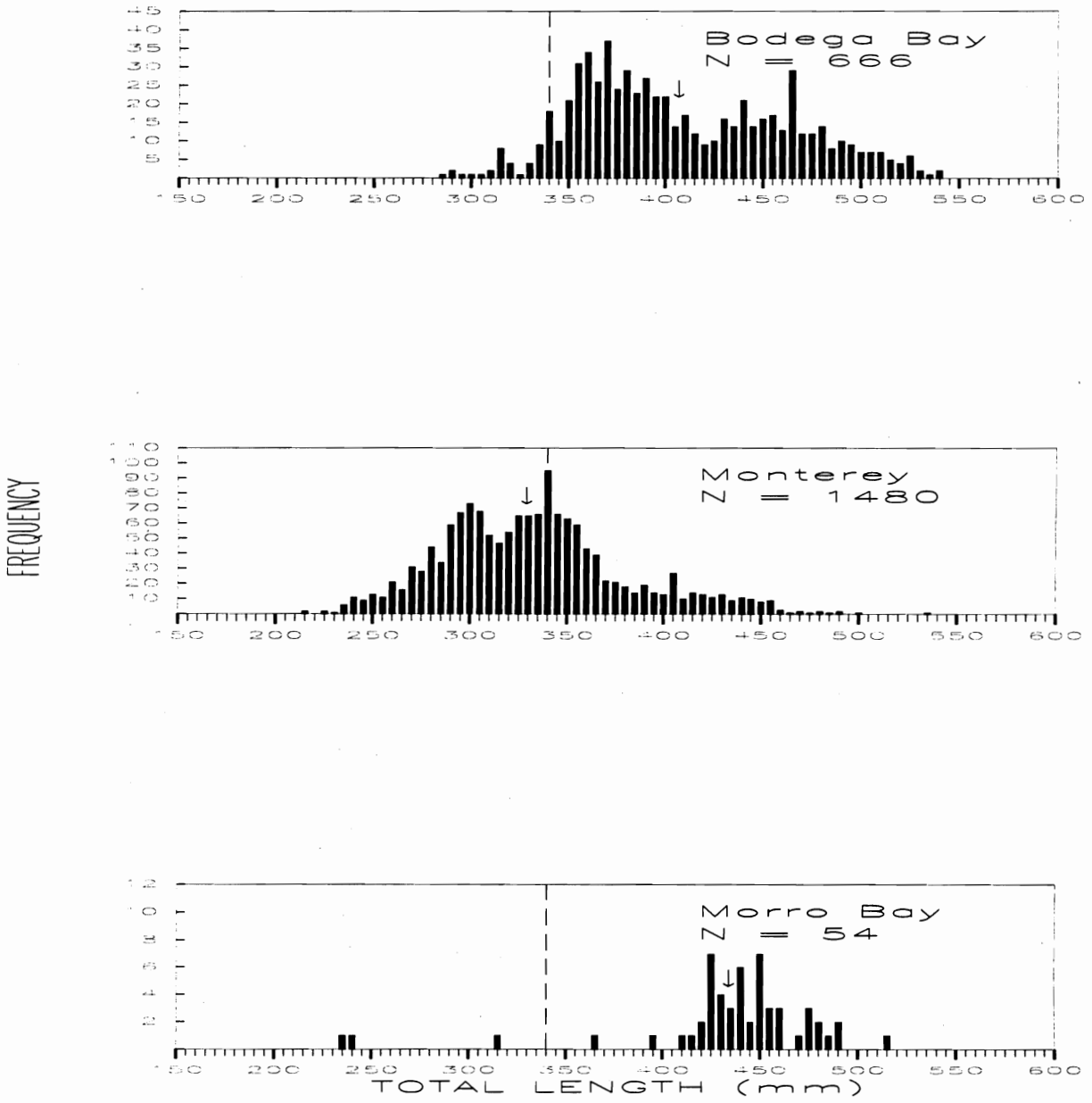

Figure 5. Length frequency of chilipepper by port area. (Vertical dashed line indicates size at which 50% of females are mature. ↓ indicates mean size for that port area.)

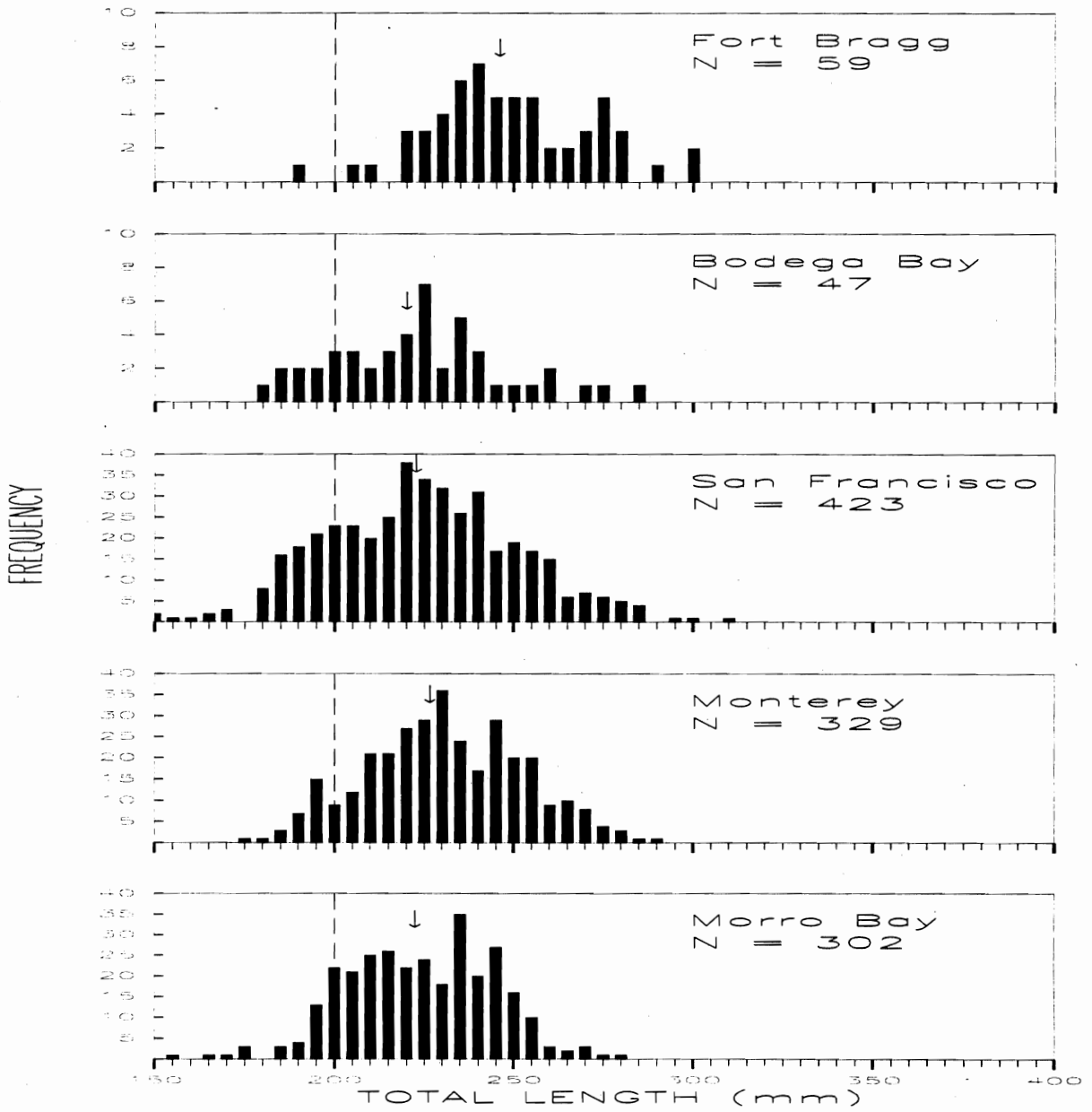

Figure 6. Length frequency of rosy rockfish by port area. (Vertical dashed line indicates size at which 50% of females are mature. ↓ indicates mean size for that port area.)

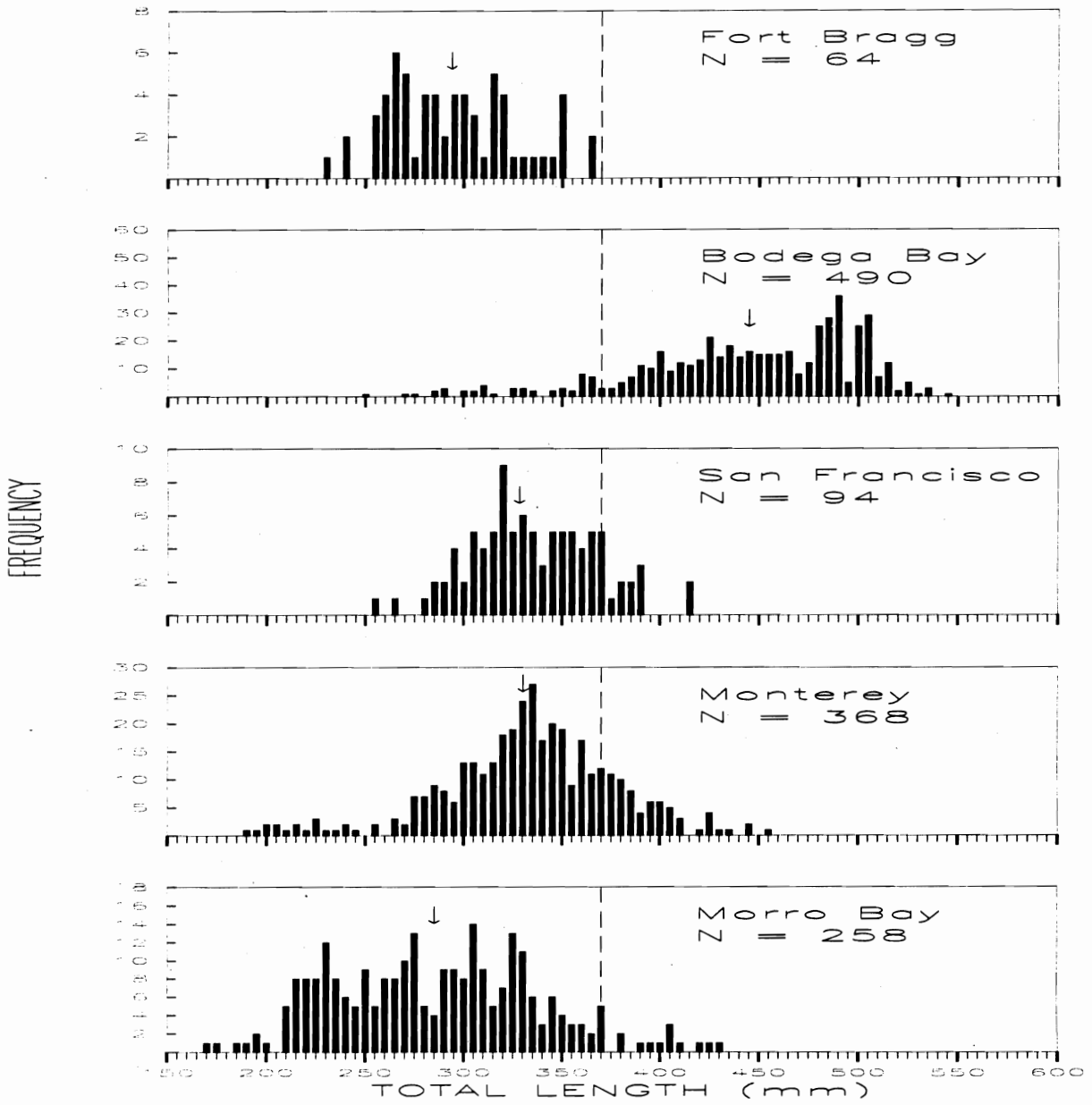

Figure 7. Length frequency of widow rockfish by port area. (Vertical dashed line indicates size at which 50% of females are mature. ↓ indicates mean size for that port area.)

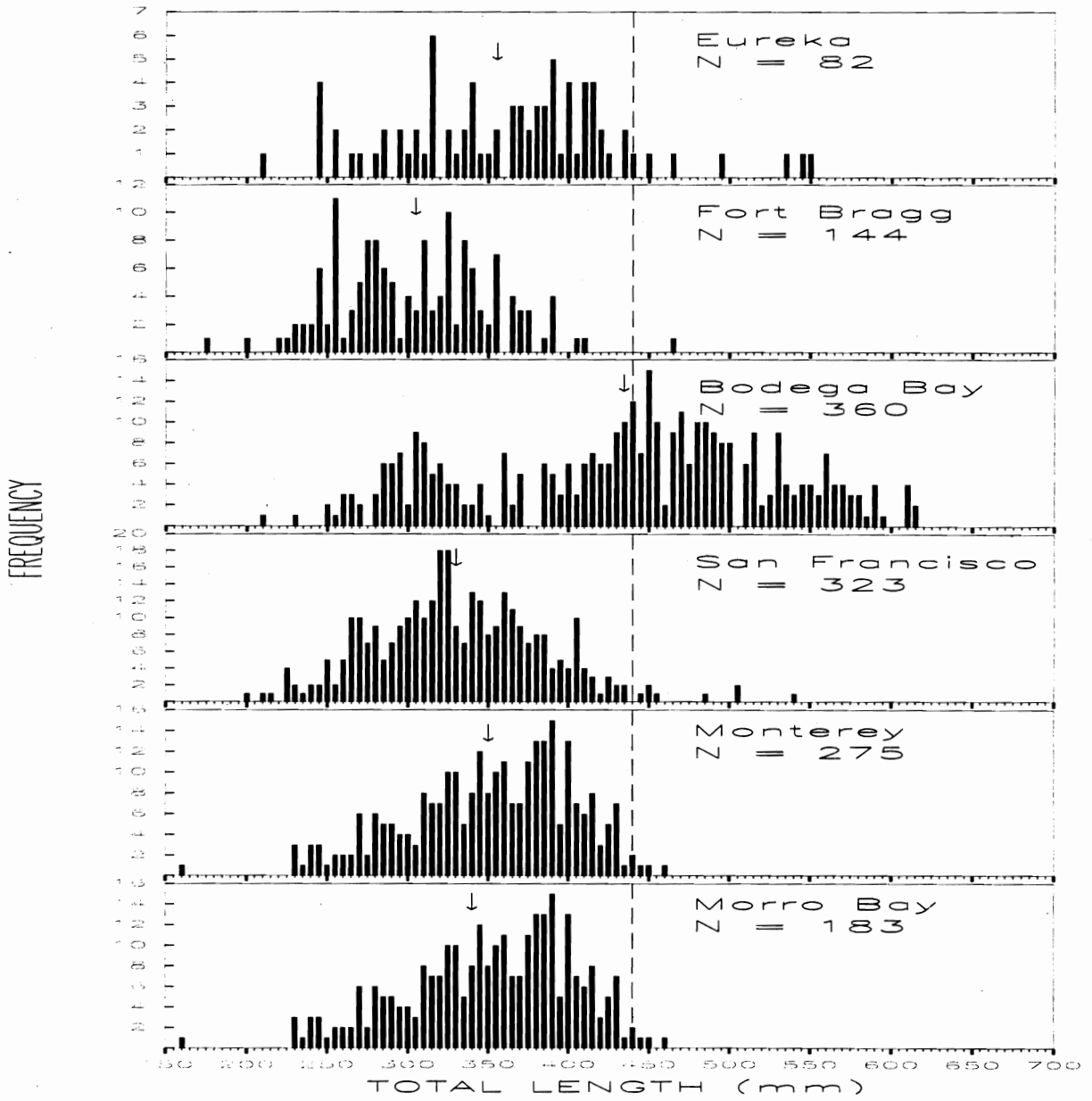

Figure 8. Length frequency of canary rockfish by port area. (Vertical dashed line indicates size at which 50% of females are mature. ↓ indicates mean size for that port area.)

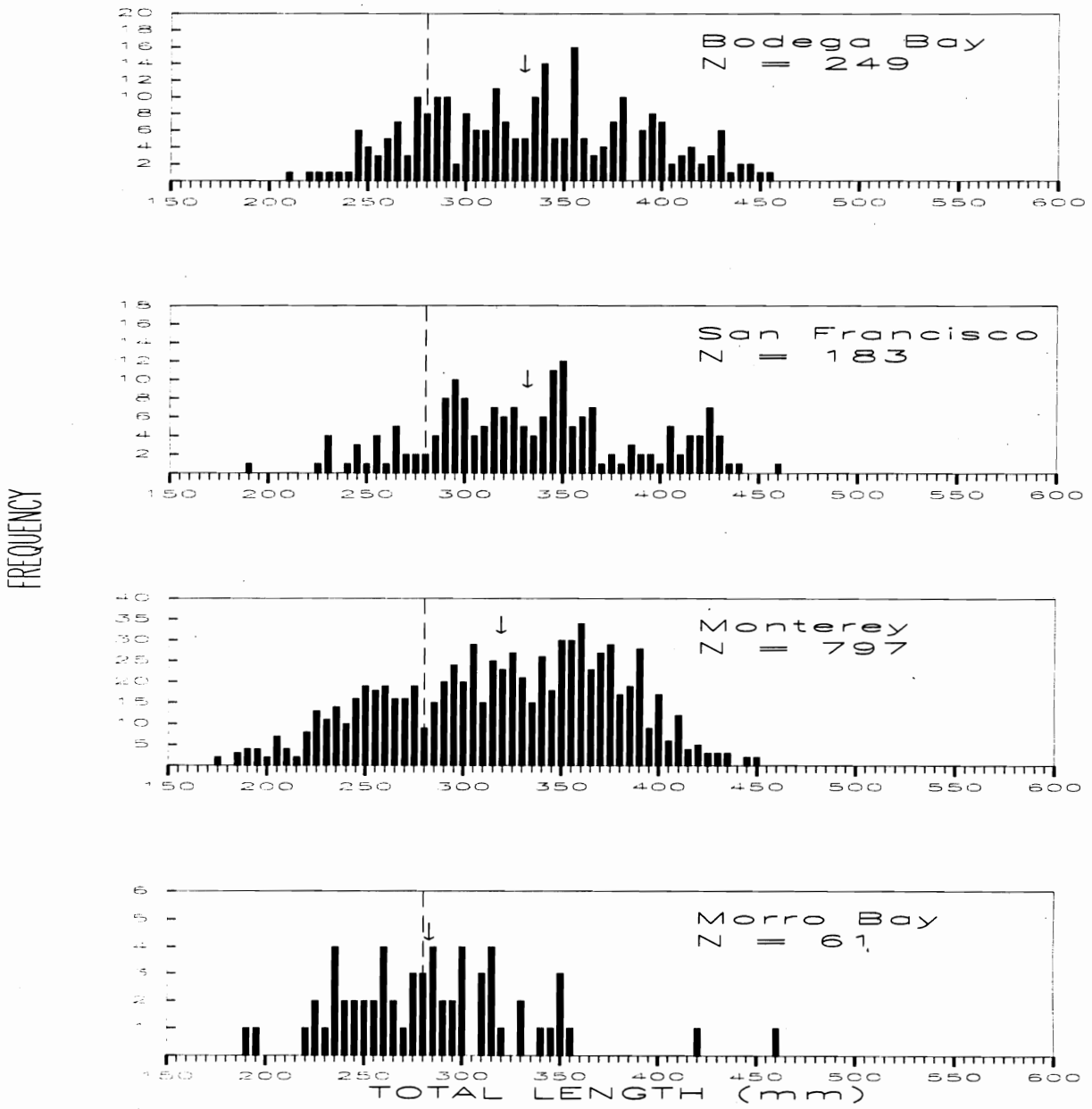

Figure 9. Length frequency of greenspotted rockfish by port area. (Vertical dashed line indicates size at which 50% of females are mature. ↓ indicates mean size for that port area.)

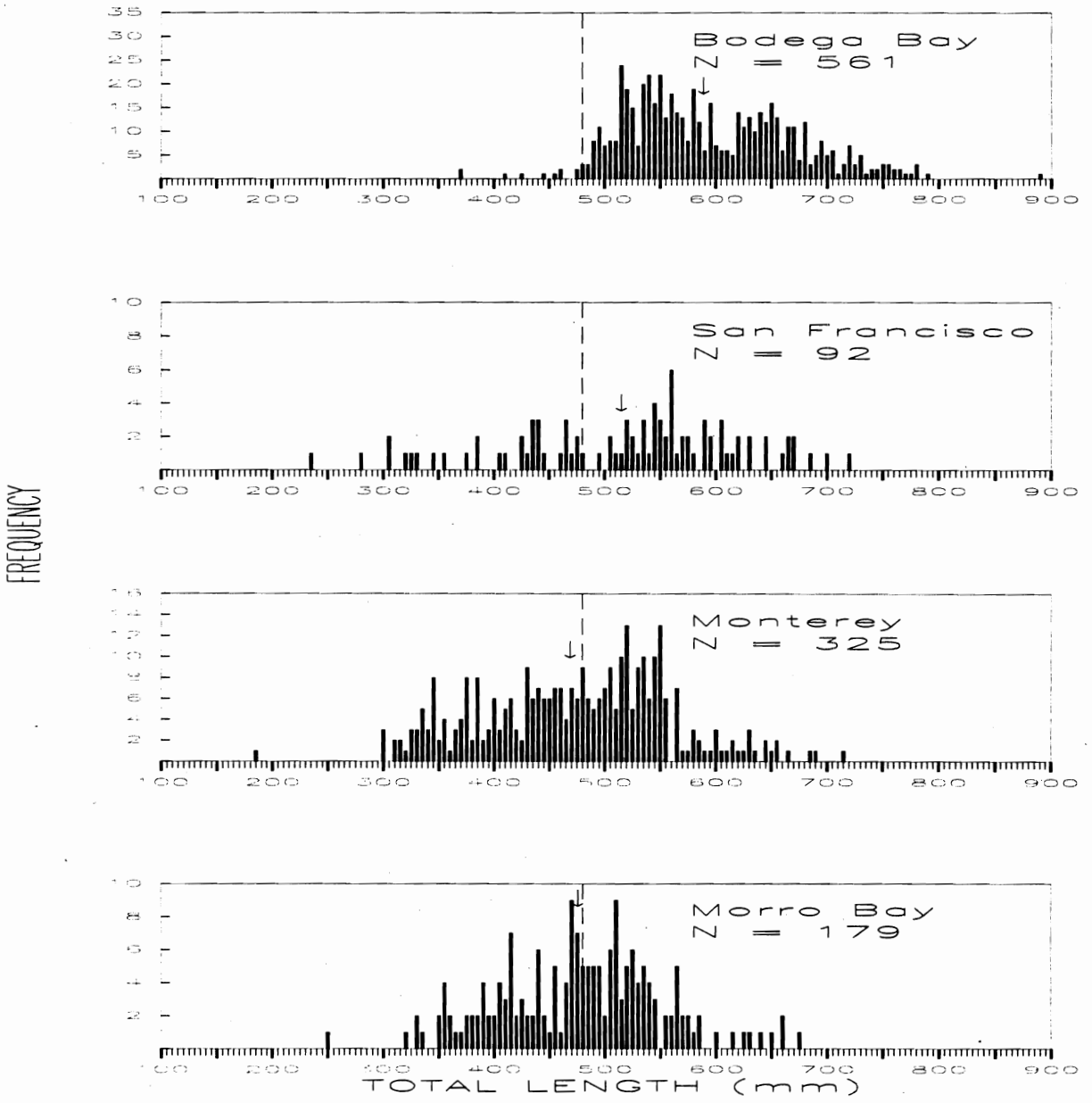

Figure 10. Length frequency of bocaccio by port area. (Vertical dashed line indicates size at which 50% of females are mature. ↓ indicates mean size for that port area.)

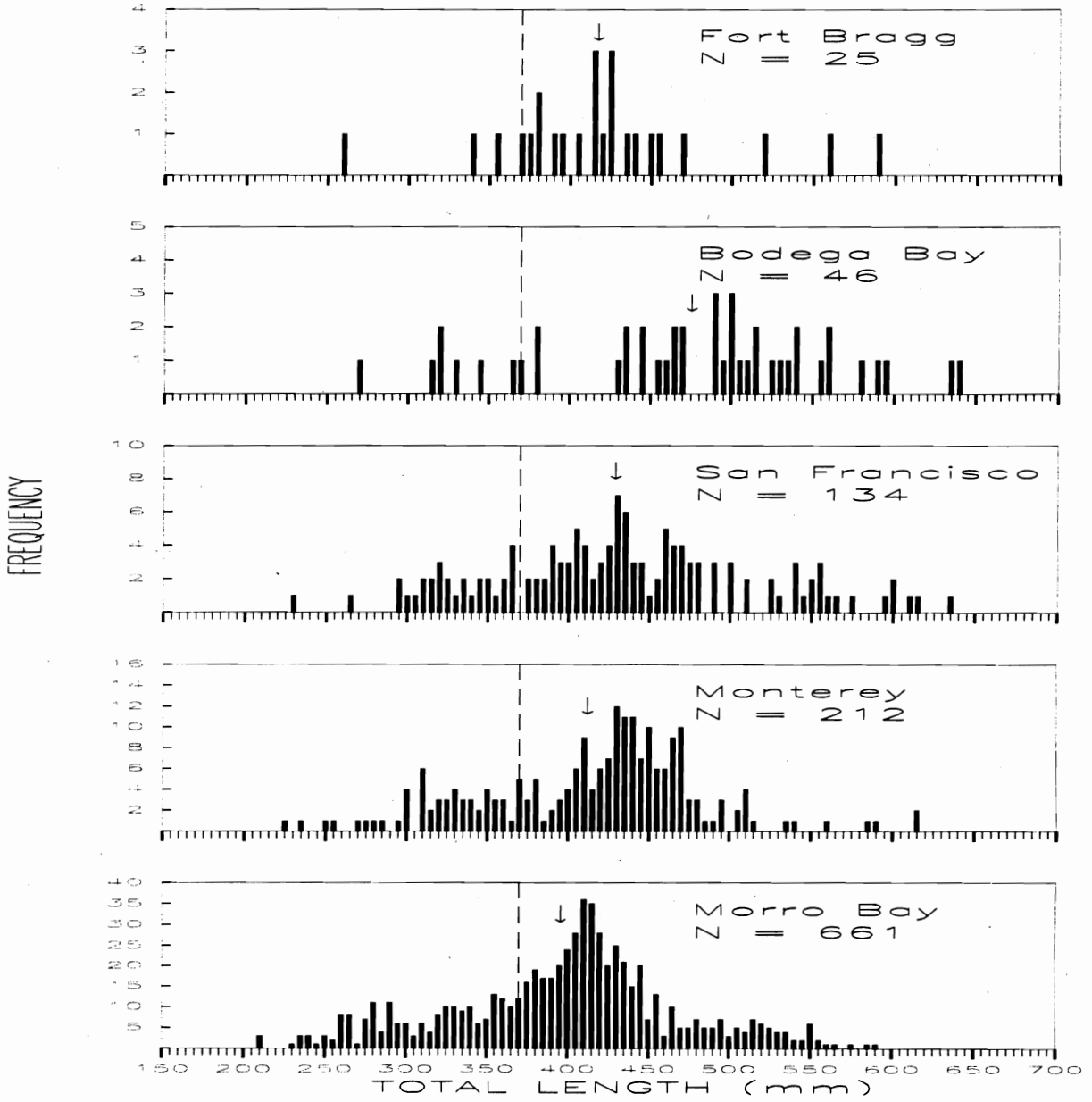

Figure 11. Length frequency of vermilion rockfish by port area. (Vertical dashed line indicates size at which 50% of females are mature. ↓ indicates mean size for that port area.)

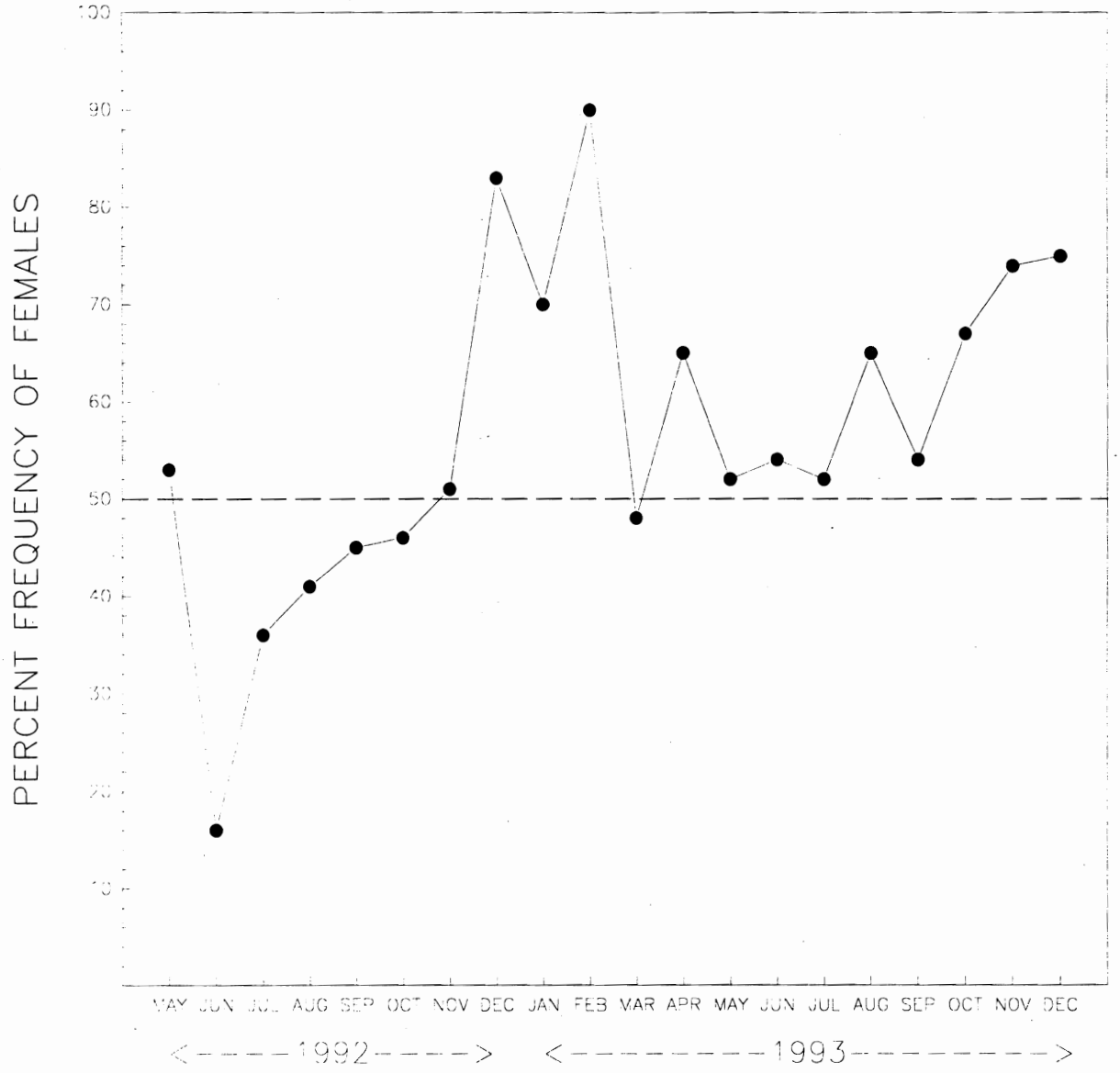

Figure 12. Percentage of female lingcod from observed CPFV catches, all ports combined, May 1992 - December 1993.

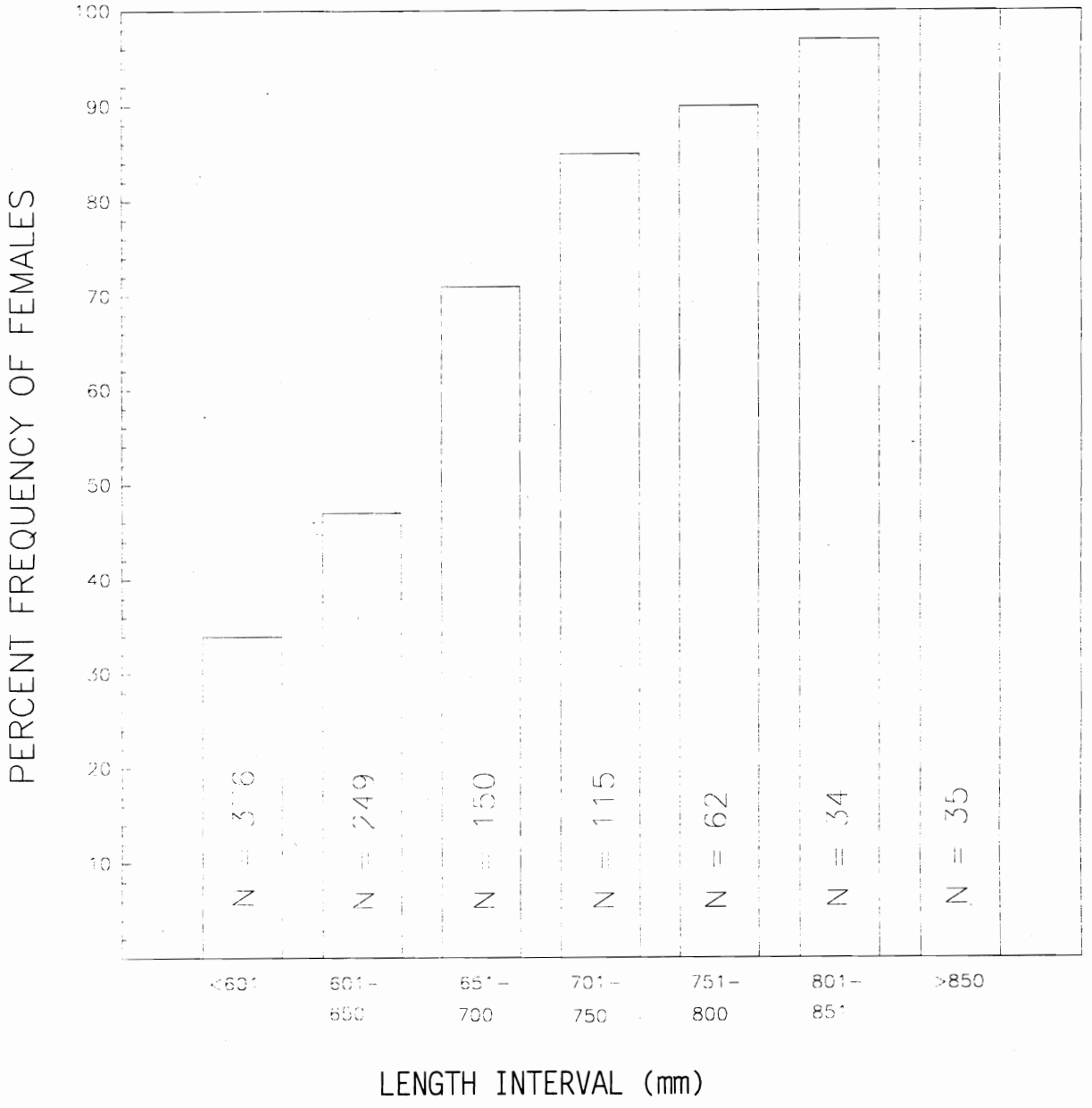

Figure 13. Percent frequency of female lingcod, by 50 mm total length (TL) intervals, from CPFV observed catches, all ports combined, June 1992 to December 1993.

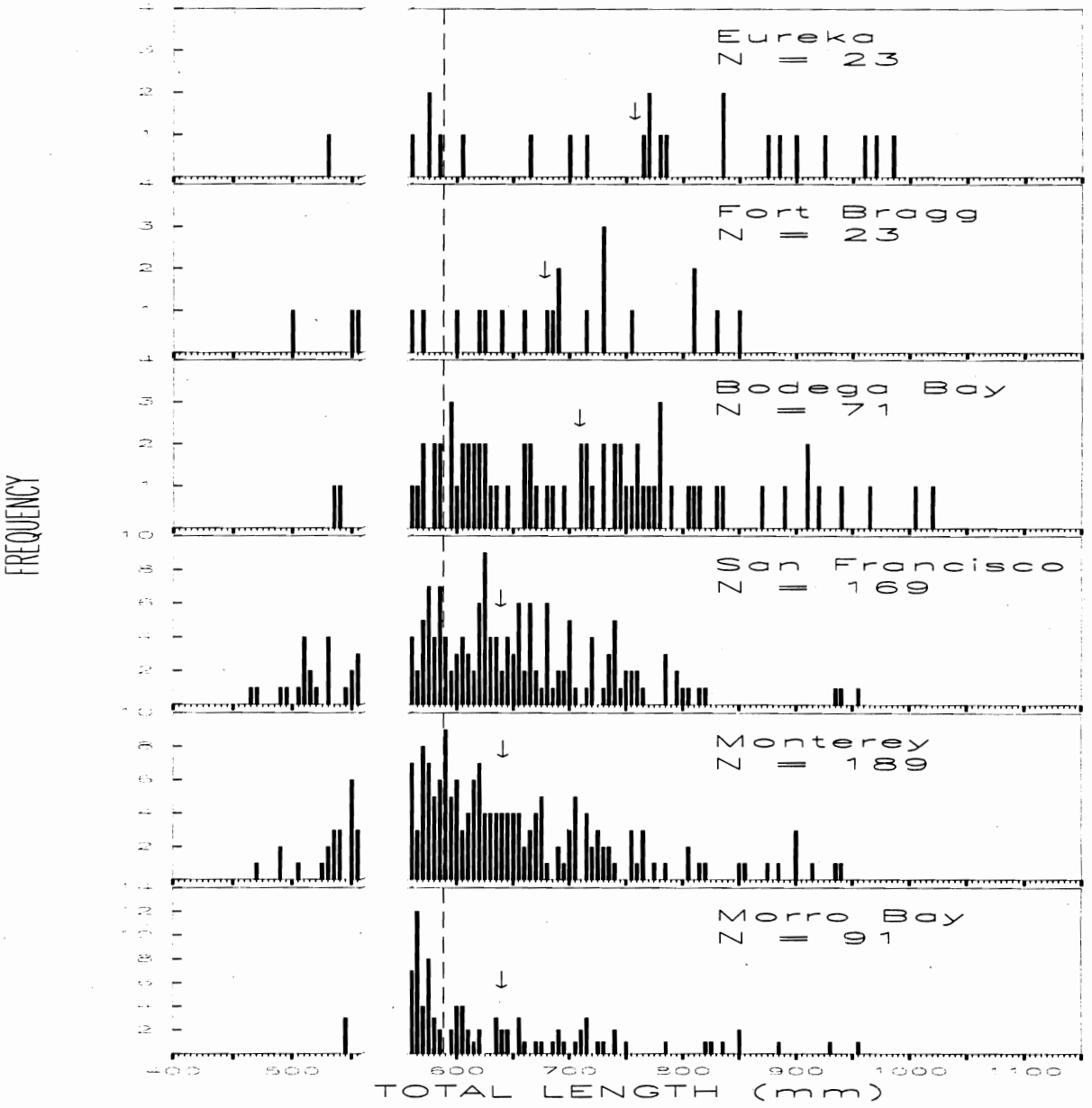

Figure 14. Length frequency of lingcod by port area. (Vertical dashed line indicates size at which 50% of females are mature. ↓ indicates mean size for that port area. Length interval gap is at minimum legal size.)

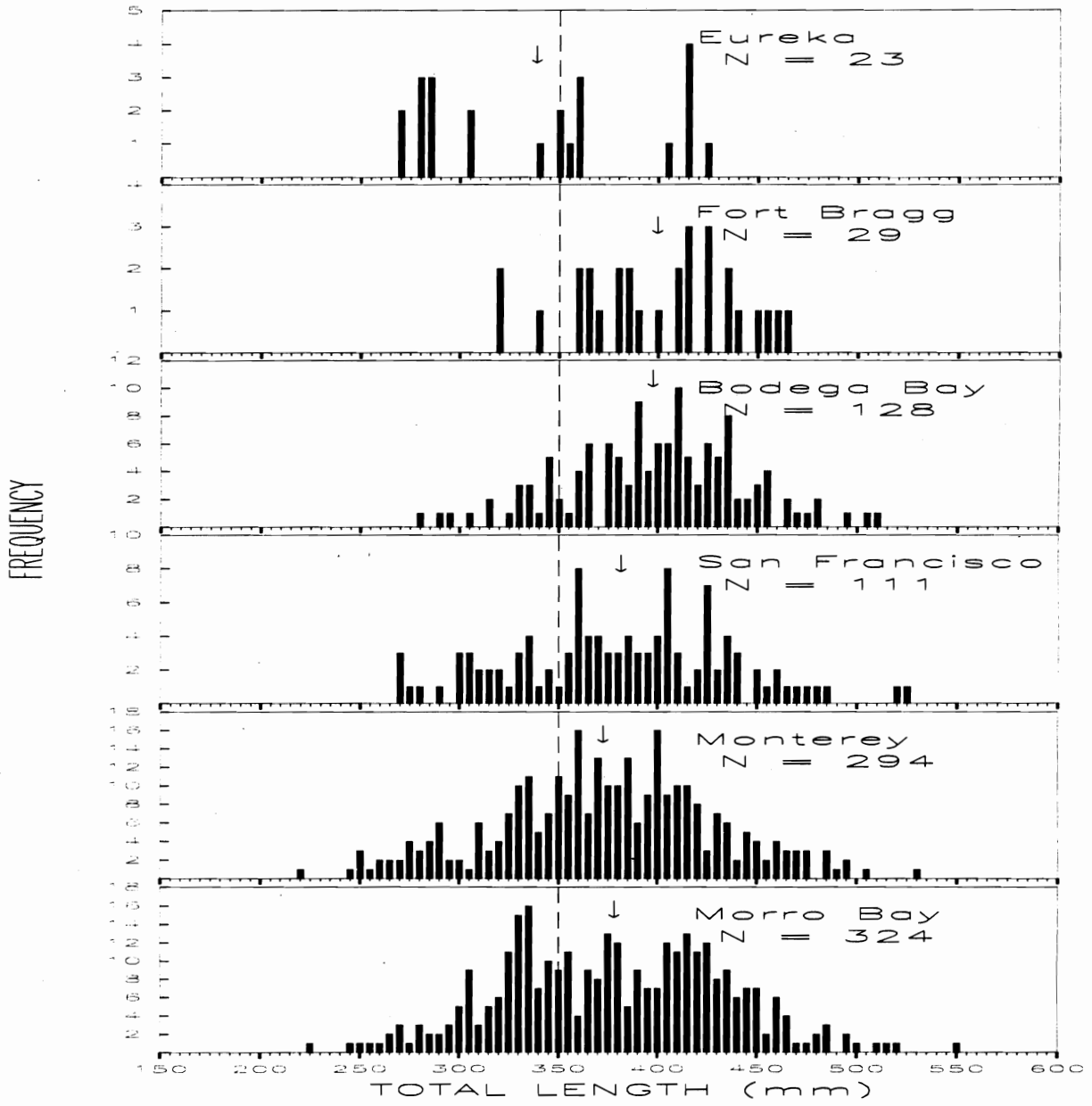

Figure 15. Length frequency of olive rockfish by port area. (Vertical dashed line indicates size at which 50% of females are mature. ↓ indicates mean size for that port area.)

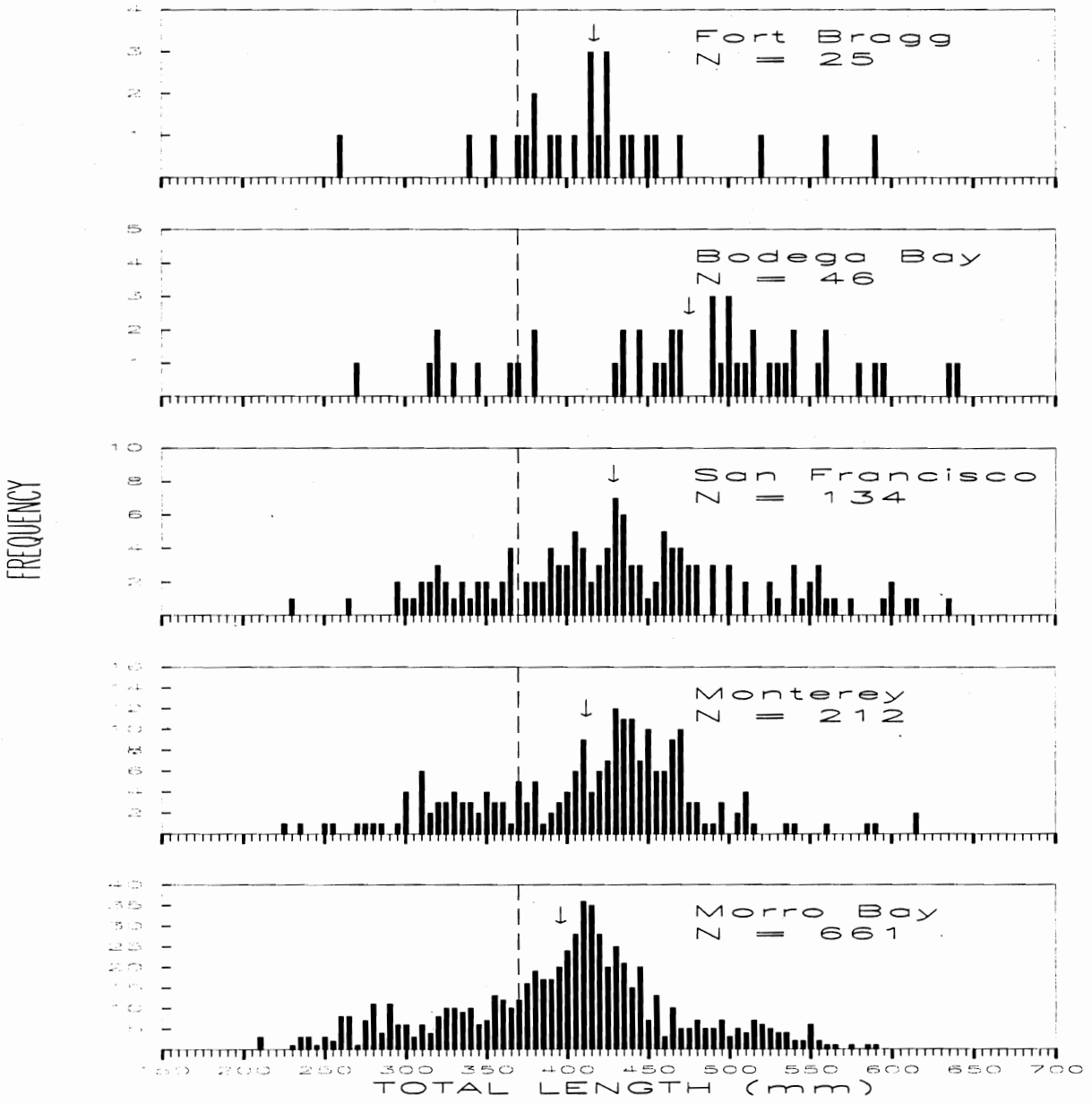

Figure 16. Length frequency of copper rockfish by port area. (Vertical dashed line indicates size at which 50% of females are mature. ↓ indicates mean size for that port area.)

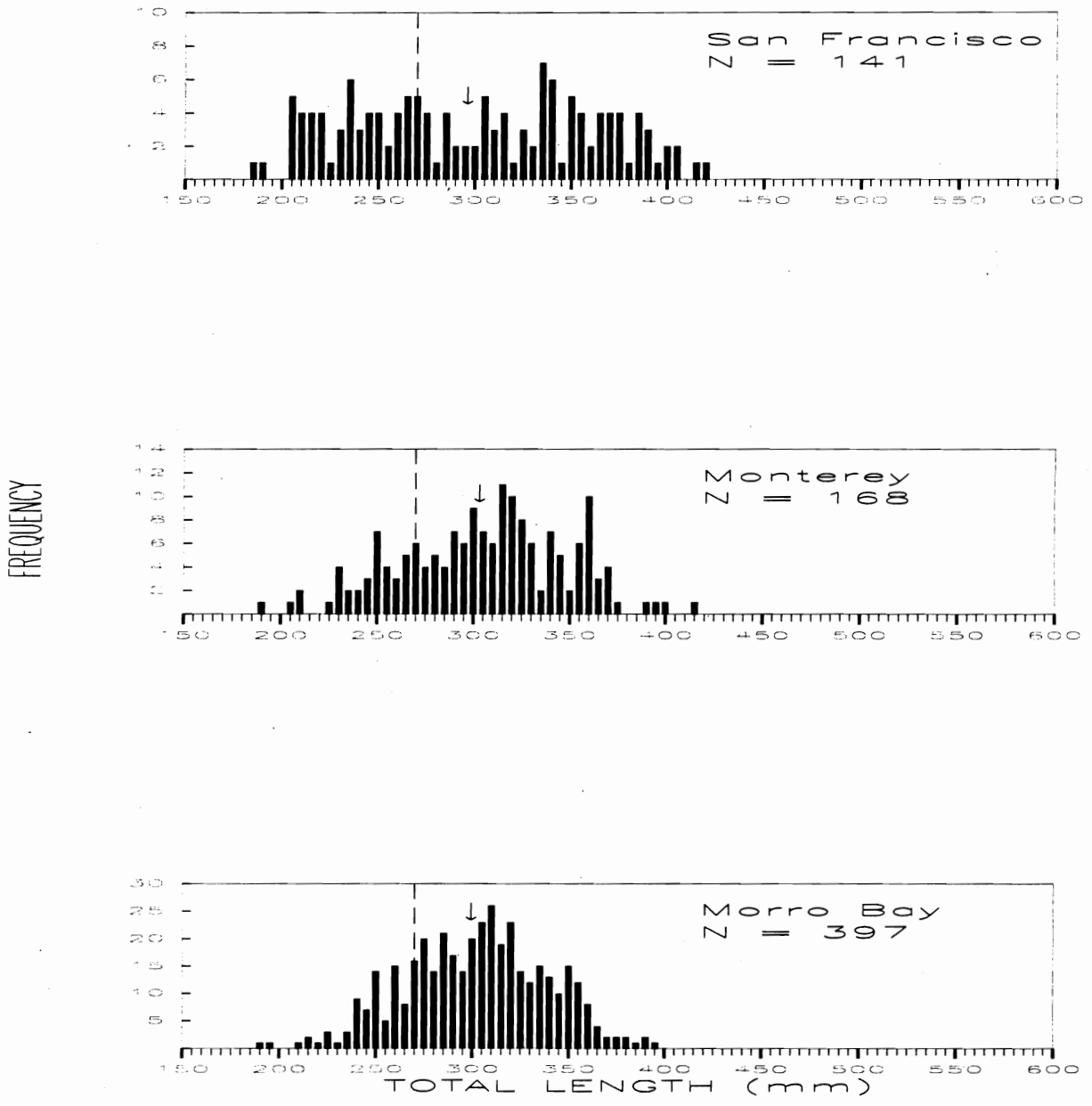

Figure 17. Length frequency of starry rockfish by port area. (Vertical dashed line indicates size at which 50% of females are mature. ↓ indicates mean size for that port area.)

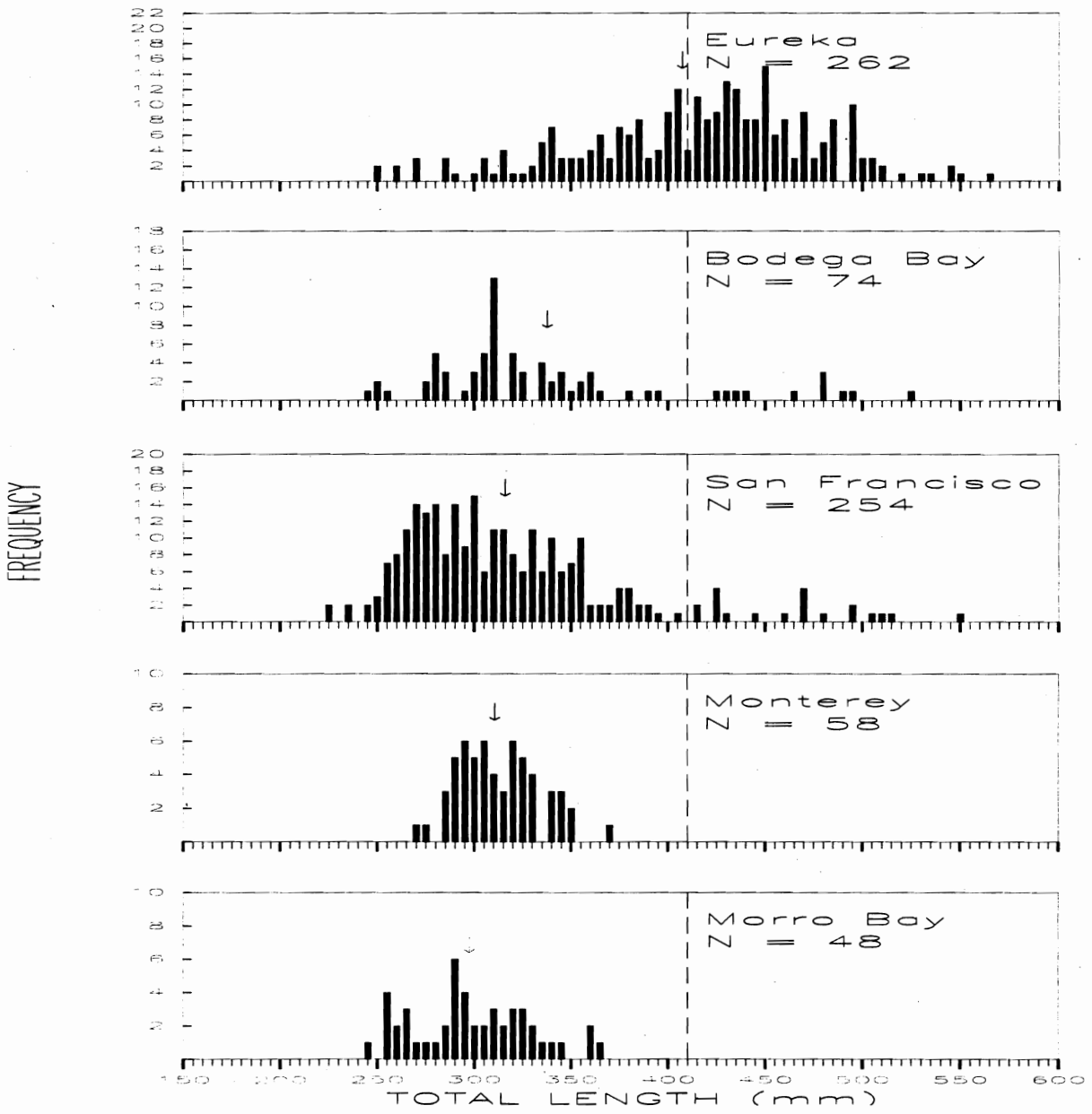

Figure 18. Length frequency of black rockfish by port area. (Vertical dashed line indicates size at which 50% of females are mature. ↓ on each histogram indicates mean size for that port area.)

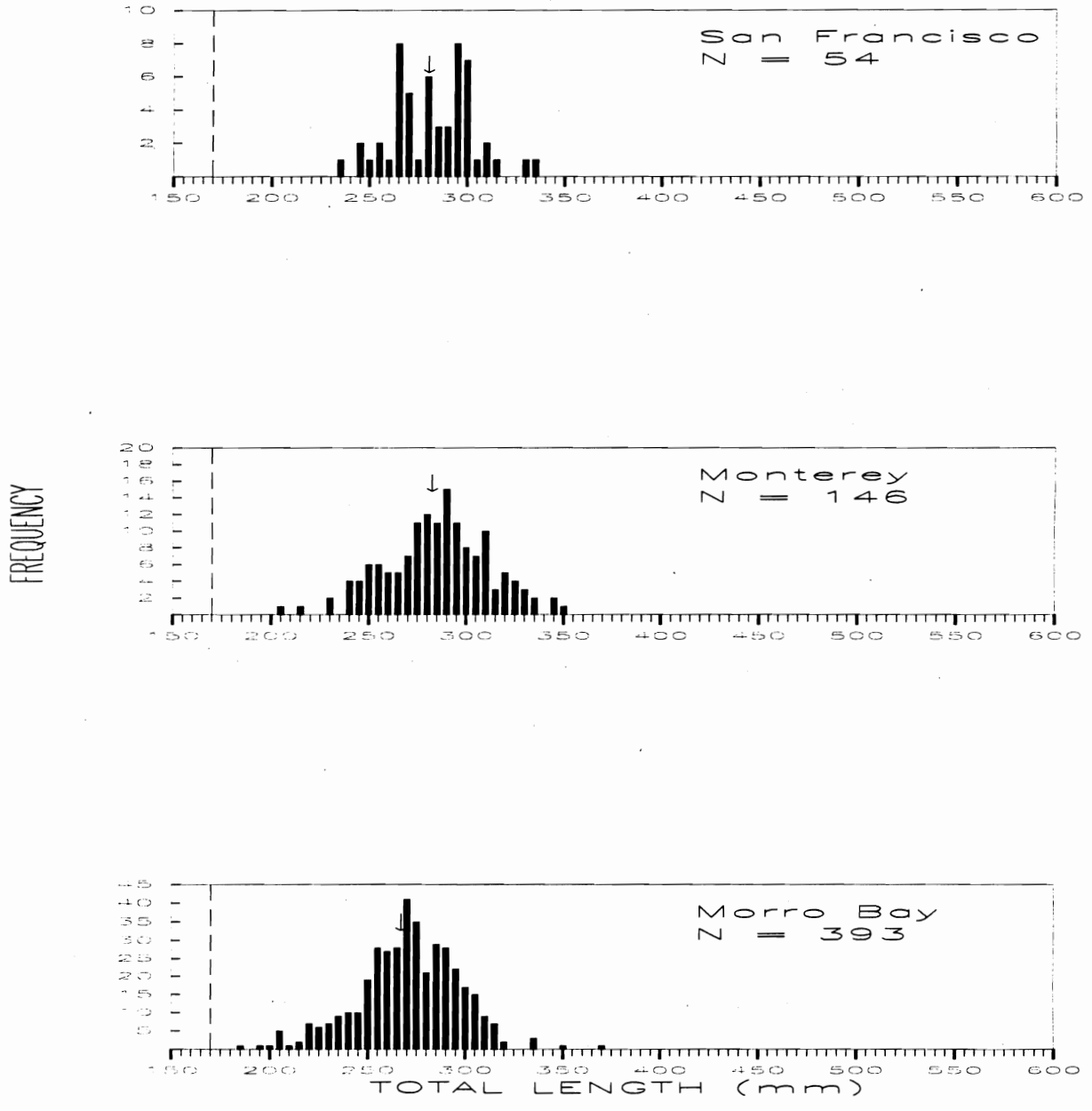

Figure 19. Length frequency of gopher rockfish by port area. (Vertical dashed line indicates size at which 50% of females are mature. ↓ indicates mean size for that port area.)

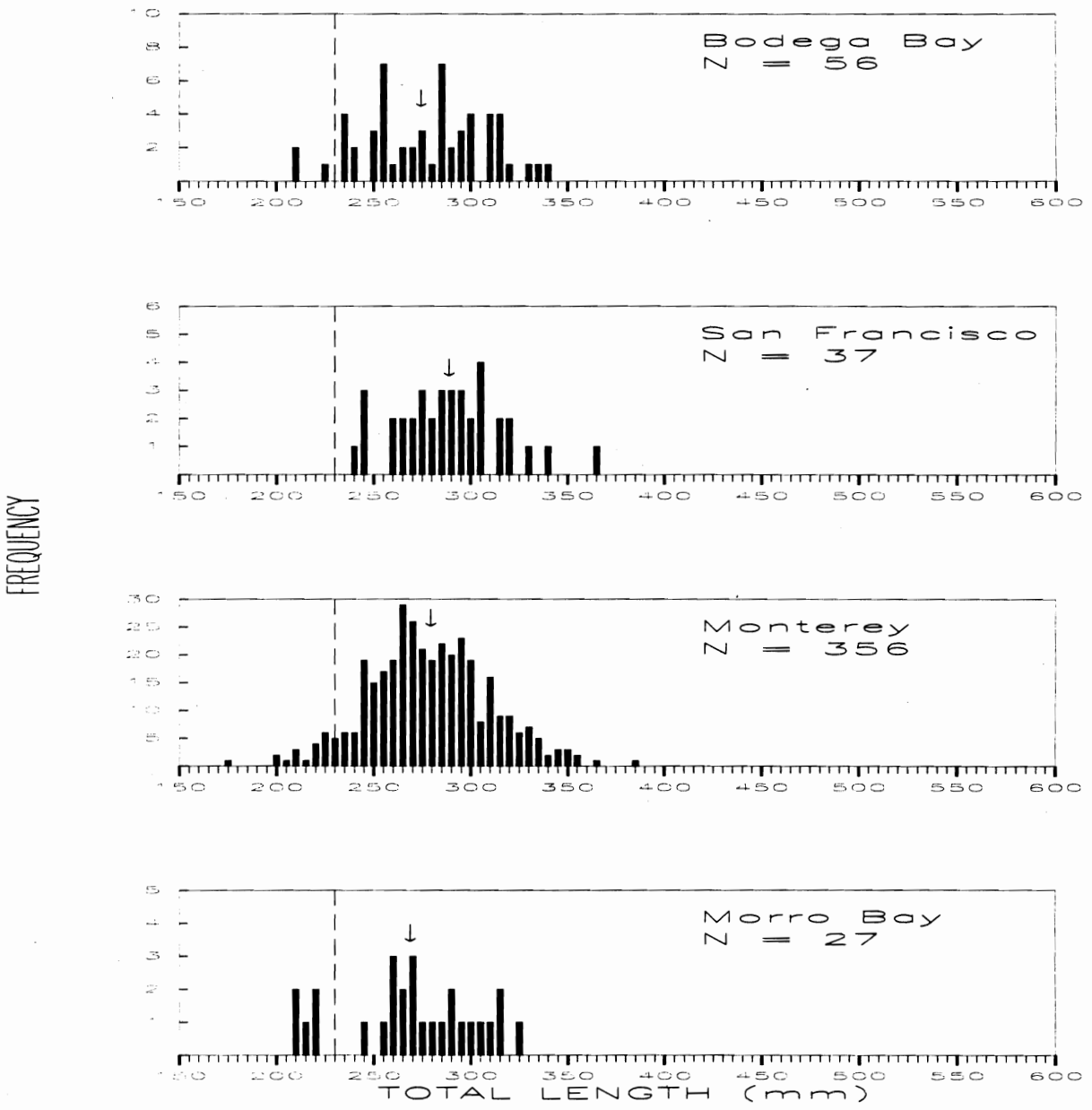

Figure 20. Length frequency of greenstriped rockfish by port area. (Vertical dashed line indicates size at which 50% of females are mature. ↓ indicates mean size for that port area.)

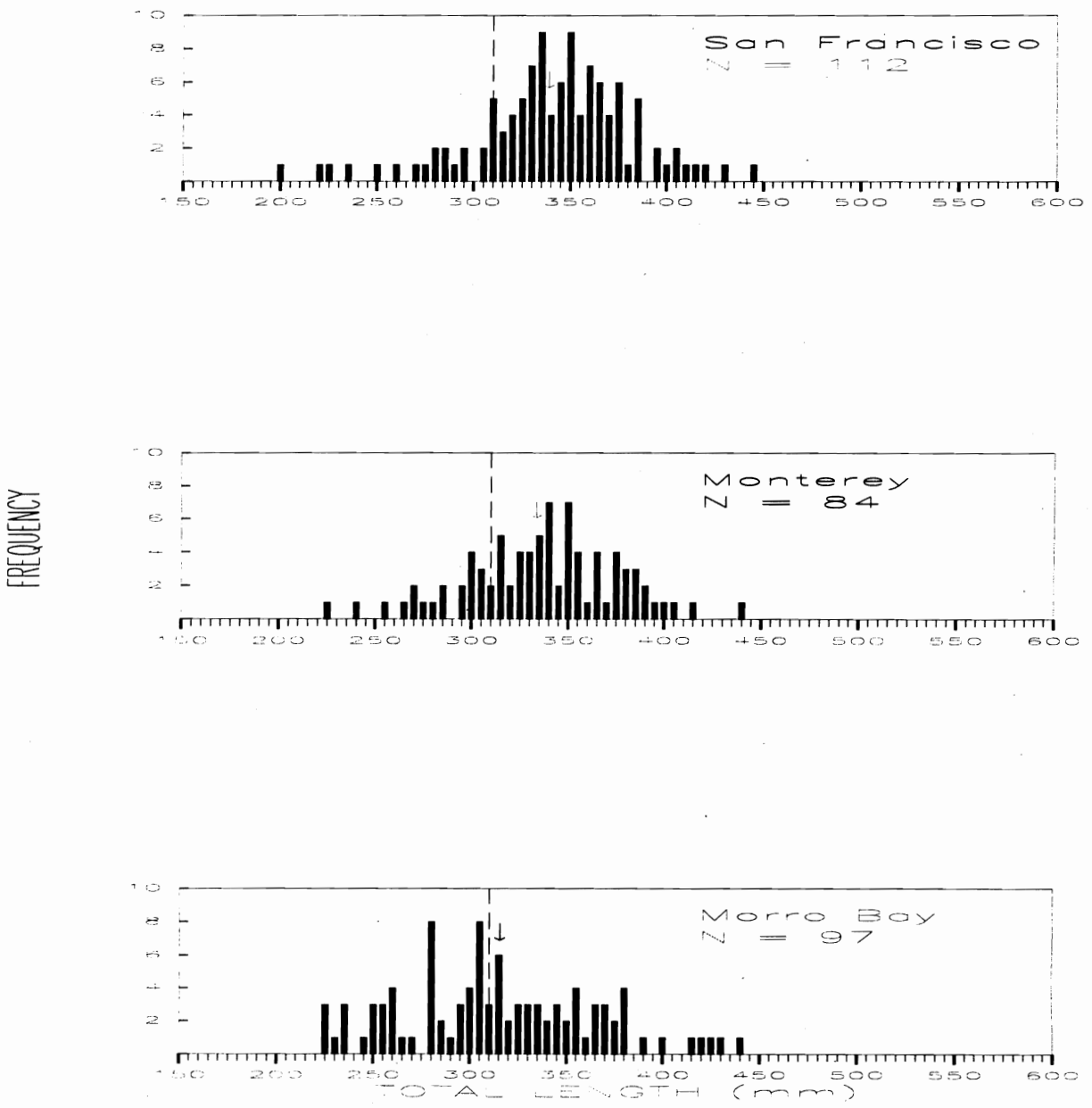

Figure 21. Length frequency of brown rockfish by port area. (Vertical dashed line indicates size at which 50% of females are mature. ↓ indicates mean size for that port area.)

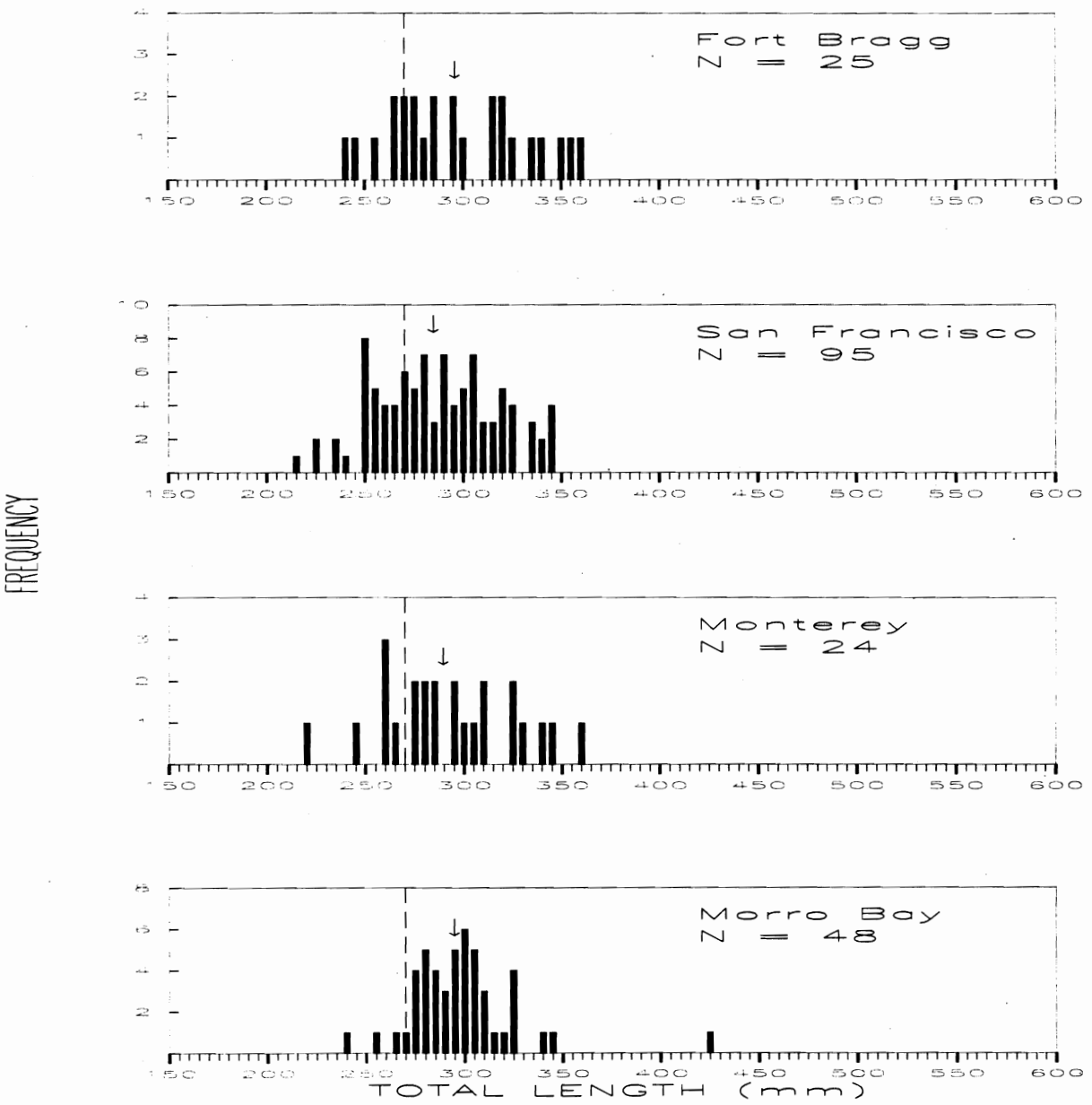

Figure 22. Length frequency of China rockfish by port area. (Vertical dashed line indicates size at which 50% of females are mature. ↓ indicates mean size for that port area.)

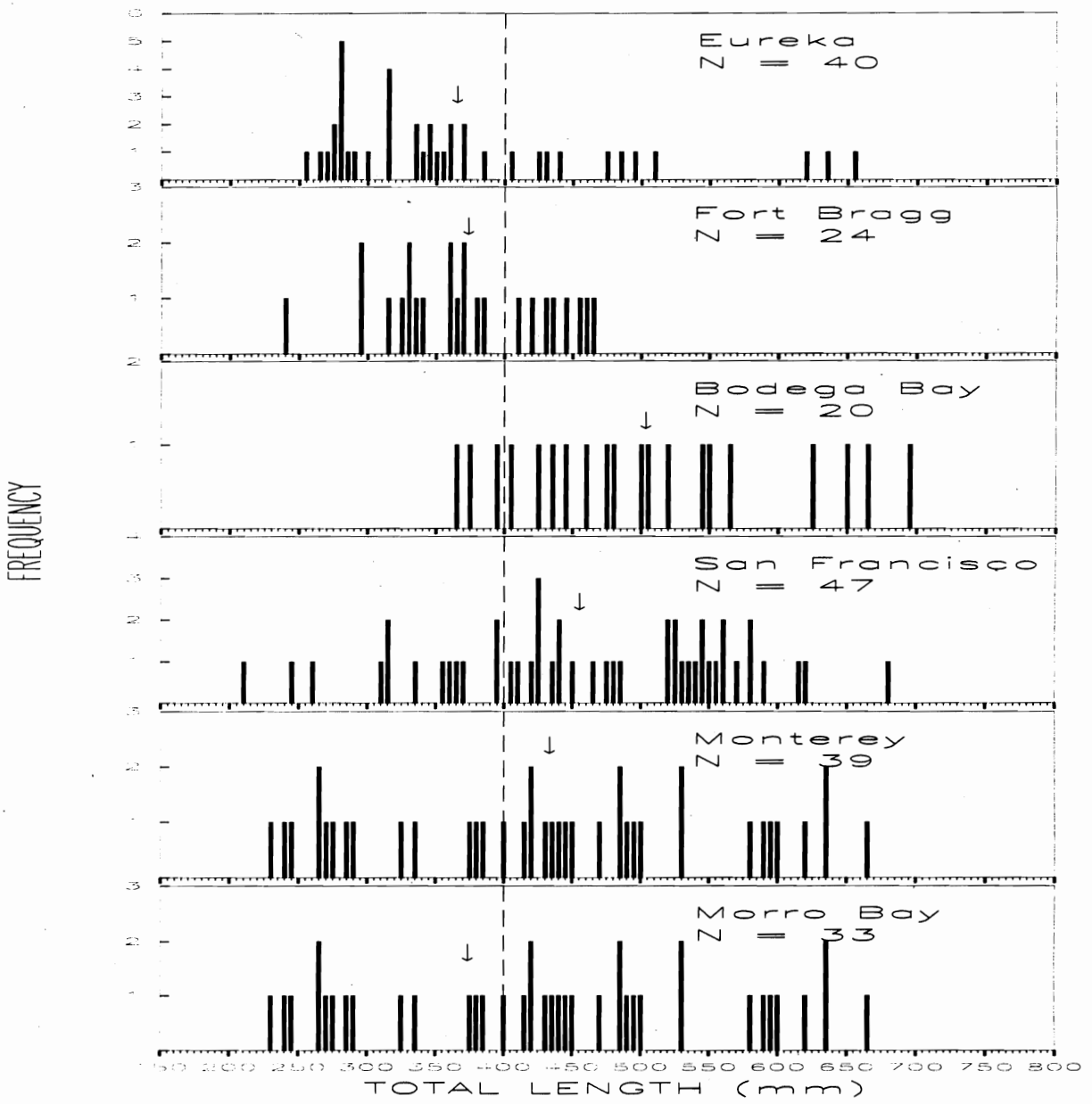

Figure 23. Length frequency of yelloweye rockfish by port area. (Vertical dashed line indicates size at which 50% of females are mature. ↓ indicates mean size for that port area.)

TABLE 1. Summary of CPFV trips sampled in northern and central California, 1993.

Port Area	Number of trips sampled	Number of anglers observed	Number of observed fish		Average number of fish per angler day		per angler hr	
			All	Kept	All	Kept	All	Kept
Eureka	8	65	770	693	11.85	10.66	3.55	3.19
Fort Bragg	12	97	1147	1106	11.82	11.40	4.50	4.34
Bodega Bay	30	303	4159	4008	13.73	13.22	4.10	3.95
San Francisco	40	453	5335	4949	11.78	10.83	3.21	2.95
Monterey	88	742	9787	8821	13.19	11.89	4.33	3.90
Morro Bay	70	725	8424	7891	11.62	10.88	4.37	4.10
Total	248	2385	29,622	27,421	12.42	11.50	4.04	3.74

TABLE 2. Summary of sport fishes caught by observed CPFV anglers from all ports, 1993.

Common Name	Scientific Name	Total Catch	Percent Composition	Rank
Blue rockfish	*Sebastes mystinus*	8128	27.4	1
Yellowtail rockfish	*Sebastes flavidus*	5370	18.1	2
Chilipepper	*Sebastes goodei*	2303	7.8	3
Rosy rockfish	*Sebastes rosaceus*	1526	5.2	4
Widow rockfish	*Sebastes entomelas*	1308	4.4	5
Canary rockfish	*Sebastes pinniger*	1213	4.1	6
Greenspotted rockfish	*Sebastes chlorostictus*	1021	3.5	7
Bocaccio	*Sebastes paucispinis*	969	3.3	8
Vermilion rockfish	*Sebastes miniatus*	957	3.2	9
Lingcod	*Ophiodon elongatus*	908	3.1	10
Olive rockfish	*Sebastes serranoides*	885	3.0	11
Copper rockfish	*Sebastes caurinus*	803	2.7	12
Starry rockfish	*Sebastes constellatus*	707	2.4	13
Black rockfish	*Sebastes melanops*	660	2.2	14
Gopher rockfish	*Sebastes carnatus*	551	1.9	15
Greenstriped rockfish	*Sebastes elongatus*	462	1.6	16
Pacific sanddab	*Citharichthys sordidus*	325	1.1	17
Brown rockfish	*Sebastes auriculatus*	282	1.0	18
China rockfish	*Sebastes nebulosus*	180	0.6	19
Yelloweye rockfish	*Sebastes ruberrimus*	175	0.6	20
Chub mackerel	*Scomber japonicus*	111	0.4	21
Unidentified sanddab	*Citharichthys* spp.	99	0.3	22
Speckled rockfish	*Sebastes ovalis*	93	0.3	23
Flag rockfish	*Sebastes rubrivinctus*	84	0.3	24
Jack mackerel	*Trachurus symmetricus*	73	0.3	25
Kelp greenling	*Hexagrammos decagrammus*	56	0.2	26
Squarespot rockfish	*Sebastes hopkinsi*	55	0.2	27
Quillback rockfish	*Sebastes maliger*	52	0.2	28
King salmon	*Oncorhynchus tshawytscha*	47	0.2	29
Cabezon	*Scorpaenichthys marmoratu*	28	0.1	30
Rosethorn rockfish	*Sebastes helvomaculatus*	26	0.1	31
Petrale sole	*Eopsetta jordani*	21	0.1	32
Speckled sanddab	*Citharichthys stigmaeus*	19	0.1	33

TABLE 2. (continued)

Common Name	Scientific Name	Total Catch	Percent Composition	Rank
Stripetail rockfish	*Sebastes saxicola*	12	-	34
Ocean whitefish	*Caulolatilus princeps*	10	-	35
Black-and-yellow rockfish	*Sebastes chrysomelas*	9	-	36
Kelp rockfish	*Sebastes atrovirens*	8	-	37
Splitnose rockfish	*Sebastes diploproa*	8	-	37
Rock sole	*Pleuronectes bilineatus*	8	-	37
Swordspine rockfish	*Sebastes ensifer*	7	-	40
California lizardfish	*Synodus lucioceps*	7	-	40
Cowcod	*Sebastes levis*	6	-	42
Spiny dogfish	*Squalus acanthias*	5	-	43
Shortbelly rockfish	*Sebastes jordani*	4	-	44
Blue shark	*Prionace glauca*	4	-	44
Grass rockfish	*Sebastes rastrelliger*	3	-	46
Halfbanded rockfish	*Sebastes semicinctus*	3	-	46
White croaker	*Genyonemus lineatus*	3	-	46
Redstripe rockfish	*Sebastes proriger*	3	-	46
California halibut	*Paralichthys californicus*	3	-	46
Unidentified rockfish	*Sebastes* spp.	5	-	46
Wolf-eel	*Anarrhichthys ocellatus*	3	-	46
Sarcastic fringehead	*Neoclinus blanchardi*	3	-	46
Bank rockfish	*Sebastes rufus*	2	-	54
Pacific hake	*Merluccius productus*	2	-	54
Unidentified flatfish	Pleuronectiformes	2	-	54
California skate	*Raja inornata*	1	-	58
California barracuda	*Sphyraena argentea*	1	-	58
Pacific sardine	*Sardinops sagax*	1	-	58
California sheephead	*Pimelometopon pulchrum*	1	-	58
Tiger rockfish	*Sebastes nigrocinctus*	1	-	58
Totals		**29,622**	**100**	**62**

TABLE 3. Average fishing time per observed trip for 1993.

Port area	Hours
Eureka	3.30
Fort Bragg	2.62
Bodega Bay	3.35
San Francisco	3.59
Monterey	2.98
Morro Bay	2.61
All ports	3.08

TABLE 4. Frequency of weekend trips sampled by port area in 1993.

	Eureka	Fort Bragg	Bodega Bay	San Francisco	Monterey	Morro Bay
Percent	50%	50%	37%	25%	17%	7%
No. trips	4/8	6/12	11/30	10/40	15/88	5/70
Overall	Percent = 21%		No. trips = 51/248			

TABLE 5. Summary of sampled CPFV trips by depth of fishing locations for each port area, 1993.

Eureka Area	N Trips	Percent	Fort Bragg Area	N Trips	Percent
Shallow	7	87.5	Shallow	8	67
Deep	0	0	Deep	0	0
Mixed	1	12.5	Mixed	4	33
Total	8	100	Total	12	100
Bodega Bay Area	**N Trips**	**Percent**	**San Francisco Area**	**N Trips**	**Percent**
Shallow	8	27	Shallow	11	27.5
Deep	3	10	Deep	4	10
Mixed	19	63	Mixed	25	62.5
Total	30	100	Total	40	100
Monterey Area	**N Trips**	**Percent**	**Morro Bay Area**	**N Trips**	**Percent**
Shallow	6	7	Shallow	12	17
Deep	35	40	Deep	1	1
Mixed	47	53	Mixed	57	81
Total	88	100	Total	70	100

TABLE 6. Summary of sampled CPFV trips by location distance from port for each port area, 1993.

Eureka Area	N Trips	Percent	Fort Bragg Area	N Trips	Percent
~~Shallow~~ Near	4	50	~~Shallow~~ Near	11	92
~~Deep~~ Distant	4	50	~~Deep~~ Distant	1	8
Mixed	0	0	Mixed	0	0
Total	8	100	Total	12	100
Bodega Bay Area	**N Trips**	**Percent**	**San Francisco Area**	**N Trips**	**Percent**
~~Shallow~~ Near	2	7	~~Shallow~~ Near	10	25
~~Deep~~ Distant	26	87	~~Deep~~ Distant	22	55
Mixed	2	7	Mixed	8	20
Total	30	100	Total	40	100
Monterey Area	**N Trips**	**Percent**	**Morro Bay Area**	**N Trips**	**Percent**
~~Shallow~~ Near	48	55	~~Shallow~~ Near	57	81
~~Deep~~ Distant	18	20	~~Deep~~ Distant	8	11
Mixed	22	25	Mixed	5	7
Total	88	100	Total	70	100

TABLE 7. Mean catch per angler hour (CPAH) from shallow, deep and mixed fishing locations by port area, 1993.

	SHALLOW		DEEP		MIXED	
Port Area	**N fish**	**Mean CPAH**	**N fish**	**Mean CPAH**	**N fish**	**Mean CPAH**
Eureka	658	3.33	0	--	112	5.74
Fort Bragg	732	3.91	0	--	415	6.12
Bodega Bay	1021	4.24	1126	3.70	2012	4.28
San Francisco	1479	3.50	565	3.31	3291	3.08
Monterey	2217	6.26	4249	3.68	3321	4.43
Morro Bay	2027	3.95	315	3.52	6082	4.60

TABLE 8. Mean catch per angler hour (CPAH) from near and distant fishing locations by port area, 1993.

	NEAR		DISTANT	
Port area	**N fish**	**Mean CPAH**	**N fish**	**Mean CPAH**
Eureka	239	2.66	531	4.18
Fort Bragg	1088	4.55	59	3.72
Bodega Bay	508	3.97	3651	4.12
San Francisco	1711	3.37	3624	3.15
Monterey	6171	4.49	3616	4.09
Morro Bay	7210	4.63	1214	3.30

TABLE 9. Number of single location trips sampled from each port area in 1993.

	N trips	**Percent**
Eureka	7	87.5
Fort Bragg	8	67
Bodega Bay	5	17
San Francisco	14	35
Monterey	19	22
Morro Bay	24	34
All Ports	**77**	**31**

TABLE 10. Summary of sport fishes caught by observed CPFV anglers from the ports of Trinidad, Crescent City, and Eureka, 1993.

Species	Total Catch	Percent Composition	Rank
Black rockfish	**294**	**38.2**	**1**
Yellowtail rockfish	**85**	**11.0**	**2**
Copper rockfish	**83**	**10.8**	**3**
Canary rockfish	**79**	**10.3**	**4**
Blue rockfish	**68**	**8.8**	**5**
Lingcod	**44**	**5.7**	**6**
Yelloweye rockfish	**42**	**5.5**	**7**
Quillback rockfish	**30**	**3.9**	**8**
Olive rockfish	**22**	**2.9**	**9**
China rockfish	**6**	**0.8**	**10**
Kelp greenling	**5**	**0.7**	**11**
Unidentified sanddab	**4**	**0.5**	**12**
Cabezon	**3**	**0.4**	**13**
Widow rockfish	**2**	**0.3**	**14**
King salmon	**1**	**0.1**	**15**
Vermilion rockfish	**1**	**0.1**	**15**
Rosy rockfish	**1**	**0.1**	**15**
Total	**770**	**100**	**17**

TABLE 11. Summary of sport fishes caught by observed CPFV anglers from the port of Fort Bragg, 1993.

Species	Total Catch	Percent Composition	Rank
Blue rockfish	449	39.2	1
Yellowtail rockfish	212	18.5	2
Canary rockfish	131	11.4	3
Rosy rockfish	81	7.1	4
Widow rockfish	69	6.0	5
Copper rockfish	39	3.4	6
Lingcod	29	2.5	7
China rockfish	22	1.9	8
Vermilion rockfish	21	1.8	9

TABLE 11. (continued)

Species	Total Catch	Percent Composition	Rank
Olive rockfish	20	1.7	10
Yelloweye rockfish	20	1.7	10
Black rockfish	14	1.2	12
Kelp greenling	9	0.8	13
Quillback rockfish	6	0.5	14
Unidentified sanddab	5	0.4	15
Gopher rockfish	5	0.4	15
Starry rockfish	4	0.4	17
Cabezon	2	0.2	18
Rosethorn rockfish	2	0.2	18
Chub mackerel	2	0.2	18
King salmon	2	0.2	18
Bocaccio	1	0.1	22
Tiger rockfish	1	0.1	22
Greenstriped rockfish	1	0.1	22
Totals	**1,147**	**100**	**24**

TABLE 12. Catch per angler hour by month, for 1993, for the 20 most frequently caught species from the Fort Bragg area.

	Catch per angler hour											
Species	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Blue rockfish		1.59	5.45	1.64		2.61	0.61	1.74	0.48	1.88	1.47	
Yellowtail rockfish		1.10	2.27			1.01	0.49	1.86	0.80	0.56	0.27	
Canary rockfish		0.27	0.18	0.13		0.38	0.16	1.74	1.80	0.28	0.07	
Rosy rockfish		0.25	0.73			0.09	0.08	0.24	0.52	0.38	0.70	
Widow rockfish		1.12	0.18				0.08		0.07	0.21	0.27	
Copper rockfish		0.05	0.27			0.19	0.12	0.66	0.28	0.02	0.11	
Lingcod			0.18	0.44		0.21	0.12	0.06	0.07	0.06	0.07	
China rockfish		0.02		0.44		0.12	0.08	0.12		0.06	0.07	
Vermilion rockfish		0.02	0.09	0.06		0.07		0.18	0.35	0.02	0.04	
Olive rockfish		0.02		0.19			0.08	0.24		0.13	0.14	
Yelloweye rockfish			0.18			0.07	0.08	0.24	0.10	0.04	0.14	
Black rockfish				0.44						0.15		
Kelp greenling				0.25					0.03	0.09		
Quillback rockfish		0.02				0.02	0.04	0.06	0.03		0.04	
Unidentified sanddab			0.09					0.12	0.07			
Gopher rockfish			0.09	0.13						0.02	0.04	
Starry rockfish		0.05									0.07	
Cabezon										0.04		
Rosethorn rockfish							0.04	0.06				
Chub mackerel			0.18									
Total CPAH		**4.56**	**10.00**	**3.72**		**4.77**	**2.05**	**7.33**	**4.63**	**3.95**	**3.54**	
Number of trips	**0**	**2**	**1**	**1**	**0**	**2**	**1**	**1**	**1**	**2**	**1**	**0**

TABLE 13. Summary of sport fishes caught by observed CPFV anglers from the ports of Bodega Bay and Dillon Beach, 1993.

Species	Total Catch	Percent Composition	Rank
Chilipepper	764	18.4	1
Yellowtail rockfish	690	16.6	2
Blue rockfish	593	14.3	3
Widow rockfish	470	11.3	4
Bocaccio	408	9.8	5
Canary rockfish	287	6.9	6
Greenspotted rockfish	233	5.6	7
Rosy rockfish	133	3.2	8
Greenstriped rockfish	108	2.6	9
Olive rockfish	95	2.3	10
Lingcod	80	1.9	11
Black rockfish	66	1.6	12
Chub mackerel	38	0.9	13
Vermilion rockfish	37	0.9	14
Brown rockfish	27	0.7	15
Yelloweye rockfish	21	0.5	16
Speckled rockfish	20	0.5	17
China rockfish	18	0.4	18
Copper rockfish	15	0.4	19
Starry rockfish	12	0.3	20
Rosethorn rockfish	10	0.2	21
King salmon	8	0.2	22
Gopher rockfish	7	0.2	23
Cowcod	4	0.1	24
Jack mackerel	3	0.1	25
Blue shark	2	0.1	26
Quillback rockfish	2	0.1	26
Petrale sole	2	0.1	26
Unidentified flatfish	2	0.1	26
Flag rockfish	1	-	30
Redstripe rockfish	1	-	30
Cabezon	1	-	30
Squarespot rockfish	1	-	30
Totals	**4,159**	**100**	

TABLE 14. Catch per angler hour by month, for 1993, for the 20 most frequently caught species from the Bodega Bay area.

	Catch per angler hour											
Species	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Chilipepper	2.21	0.66	0.55					1.24	1.30	0.88	0.51	
Yellowtail rockfish	0.62	1.00	0.96	1.93		0.16	0.33	0.51	0.73	0.51	0.61	1.24
Blue rockfish				0.46		5.06	1.27	0.32		0.80		
Widow rockfish	0.09	0.45	0.43	0.39		0.07		0.03	0.25	1.15	0.55	2.75
Bocaccio	0.38	0.38	1.13	0.50		0.02		0.41	0.46	0.47	0.48	0.14
Canary rockfish	0.16	0.77	0.21	0.42		0.33	0.39	0.38	0.02	0.33	0.14	0.14
Greenspotted rockfish	0.20	0.23	0.14	0.07		0.02		0.30	0.29	0.16	0.79	0.05
Rosy rockfish				0.07		0.75		0.29	0.31	0.07	0.05	
Greenstriped rockfish	0.23	0.06	0.10					0.08	0.21	0.05	0.32	
Olive rockfish				0.78		0.40	0.01	0.03	0.19	0.03		
Lingcod	0.03	0.04	0.05	0.09		0.12	0.10	0.05	0.03	0.17	0.04	0.14
Black rockfish						0.02	0.44	<0.01				
Chub mackerel	0.40		0.10									
Vermilion rockfish	0.01		0.01	0.02		0.07	0.05	0.08	<0.01	0.07		
Brown rockfish						0.16	0.05	0.07		0.02		
Yelloweye rockfish			0.01					0.03	0.05	0.02	0.03	0.09
Speckled rockfish				0.09		0.07			0.05		0.02	0.09
China rockfish							0.05	0.03		0.04		
Copper rockfish							0.04	0.06				
Starry rockfish						0.02		0.03	0.05		<0.01	
Total CPAH	**4.40**	**3.61**	**3.76**	**4.83**		**7.31**	**2.76**	**4.03**	**3.95**	**4.80**	**3.57**	**4.73**
Number of trips	**2**	**1**	**3**	**3**	**0**	**3**	**4**	**4**	**3**	**4**	**2**	**1**

TABLE 15. Summary of sport fishes caught by observed CPFV anglers from the ports of Princeton, Berkeley, Emeryville, and Sausalito, 1993.

Species	Total Catch	Percent Composition	Rank
Yellowtail rockfish	1334	25.0	1
Blue rockfish	1220	22.9	2
Rosy rockfish	560	10.5	3
Canary rockfish	348	6.5	4
Lingcod	249	4.7	5
Copper rockfish	229	4.3	6
Greenspotted rockfish	185	3.5	7
Black rockfish	178	3.3	8
Starry rockfish	121	2.3	9
Olive rockfish	121	2.3	9
Vermilion rockfish	106	2.0	11
Widow rockfish	102	1.9	12
Brown rockfish	93	1.7	13
Pacific sanddab	91	1.7	14
Bocaccio	84	1.6	15
China rockfish	65	1.2	16
Gopher rockfish	45	0.8	17
Greenstriped rockfish	38	0.7	18
Yelloweye rockfish	34	0.6	19
King salmon	31	0.6	20
Kelp greenling	27	0.5	21
Cabezon	14	0.3	22
Quillback rockfish	11	0.2	23
Petrale sole	9	0.2	24
Flag rockfish	8	0.2	25
Chub mackerel	6	0.1	26
Black & yellow rockfish	5	0.1	27
Rock sole	5	0.1	27
Speckled rockfish	5	0.1	27
Redstripe rockfish	2	-	30
Unidentified rockfish	2	-	30
California halibut	2	-	30
Chilipepper	1	-	33
Grass rockfish	1	-	33
Pacific hake	1	-	33
Squarespot rockfish	1	-	33
White croaker	1	-	33
Totals	**5335**	**100**	

TABLE 16. Catch per angler hour by month, for 1993, for the 20 most frequently caught species from the San Francisco area.

	Catch per angler hour											
Species	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Yellowtail rockfish	0.97	0.14	0.85	0.25	0.43	0.62	0.40	1.18	0.59	1.91	1.18	
Blue rockfish	2.86	2.73	0.51	0.08	0.02	0.28	1.45	0.24	0.76	0.09	0.94	
Rosy rockfish	0.40	1.32	0.29	0.03	0.44	0.29	0.25	0.41	0.09	0.66	0.62	
Canary rockfish	1.94	0.09	0.03	0.03	0.28	0.22	0.21	0.15	0.09	0.42	0.09	
Lingcod	0.35	0.05	0.04		0.22	0.17	0.10	0.27	0.14	0.18	0.04	
Copper rockfish	1.67		0.04	0.02	0.04	0.22	0.17	0.09	0.12	0.13	0.06	
Greenspotted rockfish	0.22				0.15	0.14		0.36	<0.01	0.15	0.02	
Black rockfish					<0.01		0.27		0.47			
Starry rockfish	0.04	0.14	0.05	<0.01	0.04	0.12	0.01	0.13	0.03	0.16	0.04	
Olive rockfish	0.13	0.09	0.30		0.14	0.08	0.10	<0.01	0.02	0.04	0.02	
Vermilion rockfish	0.26			<0.01	0.06	0.11	0.07	0.07	0.06	0.05	0.02	
Widow rockfish		0.82	0.32	0.07	0.06	0.02	<0.01	0.03	0.02	0.07	0.04	
Brown rockfish	0.48			0.02	0.06	0.03	0.06	0.12	0.06		0.04	
Pacific sanddab	0.09	0.05	0.03	0.03	0.03	0.14	0.04	0.09		0.03	0.02	
Bocaccio	0.04	0.14	0.06	<0.01	0.07	0.06	<0.01	0.10	0.02	0.09		
China rockfish	0.22		0.02		0.02	0.04	0.06	0.02	0.10	0.01	0.02	
Gopher rockfish	0.04				<0.01	<0.01	0.05		0.13		0.02	
Greenstriped rockfish					0.21			0.03	<0.01	0.02		
Yelloweye rockfish			<0.01		0.05	0.02	0.01	0.04	0.02	0.03		
King salmon			0.07	0.13	<0.01		0.02	<0.01	<0.01			
Total CPAH	**9.78**	**5.64**	**4.66**	**0.68**	**2.39**	**2.58**	**3.37**	**3.40**	**2.84**	**4.10**	**3.17**	
Number of trips	**1**	**1**	**4**	**2**	**3**	**4**	**7**	**6**	**5**	**5**	**2**	**0**

TABLE 17. Summary of sport fishes caught by observed CPFV anglers from the ports of Santa Cruz and Monterey, 1993.

Species	Total Catch	Percent Composition	Rank
Blue rockfish	3152	32.2	1
Chilipepper	1481	15.1	2
Yellowtail rockfish	1107	11.3	3
Greenspotted rockfish	537	5.5	4
Widow rockfish	440	4.5	5
Lingcod	316	3.2	6
Rosy rockfish	309	3.2	7
Bocaccio	288	2.9	8
Olive rockfish	278	2.8	9
Greenstriped rockfish	273	2.8	10
Canary rockfish	200	2.0	11
Copper rockfish	198	2.0	12
Pacific sanddab	196	2.0	13
Starry rockfish	154	1.6	14
Vermilion rockfish	148	1.5	15
Gopher rockfish	94	1.0	16
Unidentified sanddab	90	0.9	17
Jack mackerel	66	0.7	18
Brown rockfish	61	0.6	19
Black rockfish	60	0.6	20
Chub mackerel	55	0.6	21
Squarespot rockfish	43	0.4	22
Flag rockfish	34	0.4	23
Yelloweye rockfish	33	0.3	24
Speckled rockfish	30	0.3	25
China rockfish	24	0.3	26
Speckled sanddab	19	0.2	27
Rosethorn rockfish	13	0.1	28
Stripetail rockfish	11	0.1	29
Petrale sole	8	0.1	30
California lizardfish	7	0.1	31
Swordspine rockfish	7	0.1	31
Kelp greenling	6	0.1	33
Splitnose rockfish	6	0.1	33
King salmon	5	0.1	35
Shortbelly rockfish	4	-	36
Quillback rockfish	3	-	37
Rock sole	3	-	37
Halfbanded rockfish	3	-	37
Sarcastic fringehead	3	-	37
Juvenile rockfish	2	-	41
Bank rockfish	2	-	41
Cowcod	2	-	41
Black & yellow rockfish	2	-	41
Blue shark	2	-	41
Wolf eel	2	-	41
White croaker	2	-	41
Spiny dogfish	2	-	41
Grass rockfish	1	-	49
California skate	1	-	49
Pacific hake	1	-	49
Kelp rockfish	1	-	49
Unidentified rockfish	1	-	49
Pacific sardine	1	-	49
Totals	**9,787**	**100**	

TABLE 18. Catch per angler hour by month, for 1993, for the 20 most frequently caught species from the Monterey area.

	Catch per angler hour											
Species	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Blue rockfish	0.38	4.30	2.25	0.86	0.69	0.49	4.12	2.31	1.49	0.13	0.25	0.68
Chilipepper	0.96	0.01	0.33	2.85	1.44	1.07	1.07			<0.01	0.30	
Yellowtail rockfish	0.27	0.35	0.36	0.34	0.13	0.30	0.53	0.37	1.00	0.72	0.63	0.11
Greenspotted rockfish	0.28		0.18		0.07	1.10	0.41	0.11	0.21	0.17	0.16	
Widow rockfish	0.06	0.89	1.20	0.70	0.07	0.04	0.09			0.01	<0.01	0.02
Lingcod	0.13	0.14	0.08	0.05	0.04	0.05	0.05	0.04	0.05	0.39	0.33	0.32
Rosy rockfish	0.13	0.32	0.10	0.11	0.08	0.14	0.08	0.07	0.19	0.10	0.44	0.05
Bocaccio	0.24	0.14	0.15	0.03	0.25	0.09	0.06	0.02	0.13	0.15	0.10	0.25
Olive rockfish	0.07	0.20	0.15	0.09	0.22	0.11	0.19	0.19	0.09	0.11	<0.01	0.05
Greenstriped rockfish	0.15	0.03	0.37	0.11	0.16	0.34	0.08	0.01	0.09	0.10	0.02	
Canary rockfish	0.01	0.04	0.07	0.11	0.10	0.35	0.06	0.07	0.10	0.05	0.07	0.02
Copper rockfish	0.05	0.19	<0.01	0.03	0.07	0.24	0.09	0.13	0.05	0.06	0.21	0.04
Pacific sanddab	0.05	0.03	<0.01	<0.01	0.01	0.15	0.03	0.05	0.03	0.03	0.10	0.79
Starry rockfish	0.08	0.10	0.09	0.03	0.03	0.13	0.03	0.05	0.09	0.08	0.07	0.06
Vermilion rockfish	0.04	0.03	<0.01	0.02	<0.01	0.20	0.04	0.03	0.09	0.11	0.10	0.04
Gopher rockfish	0.03	0.08	0.06	0.03	0.03	0.02	0.04	0.12	0.02	0.02	0.02	0.10
Unidentified sanddab	0.56		0.01									
Jack mackerel	<0.01						0.17	0.06	0.03		0.02	
Brown rockfish							0.05	0.14			0.16	
Black rockfish					0.03		0.04	0.22				
Total CPAH	**3.84**	**7.09**	**5.76**	**5.49**	**3.49**	**5.00**	**7.37**	**4.10**	**3.73**	**2.34**	**3.02**	**2.85**
Number of trips	**6**	**3**	**8**	**9**	**8**	**6**	**12**	**9**	**9**	**10**	**5**	**4**

TABLE 19. Summary of sport fishes caught by observed CPFV anglers from the ports of San Simeon, Port San Luis and Morro Bay, 1993.

Species	Total Catch	Percent Composition	Rank
Blue rockfish	2646	31.4	1
Yellowtail rockfish	1942	23.1	2
Vermilion rockfish	644	7.6	3
Rosy rockfish	443	5.3	4
Starry rockfish	416	4.9	5
Gopher rockfish	400	4.8	6
Olive rockfish	349	4.1	7
Copper rockfish	239	2.8	8
Widow rockfish	225	2.7	9
Lingcod	190	2.3	10
Bocaccio	188	2.2	11
Canary rockfish	168	2.0	12
Brown rockfish	101	1.2	13
Greenspotted rockfish	66	0.8	14
Chilipepper	57	0.7	15
Black rockfish	48	0.6	16
China rockfish	45	0.5	17
Greenstriped rockfish	42	0.5	18
Flag rockfish	41	0.5	19
Speckled rockfish	38	0.5	20
Pacific sanddab	38	0.5	20
Yelloweye rockfish	25	0.3	22
Squarespot rockfish	10	0.1	23
Chub mackerel	10	0.1	23
Ocean whitefish	10	0.1	23
Kelp greenling	9	0.1	26
Cabezon	8	0.1	27
Kelp rockfish	7	0.1	28
Jack mackerel	4	0.1	29
Spiny dogfish	3	-	30
Splitnose rockfish	2	-	31
Black & yellow rockfish	2	-	31
Petrale sole	2	-	31
California sheephead	1	-	34
Stripetail rockfish	1	-	34
Wolf eel	1	-	34
California barracuda	1	-	34
Grass rockfish	1	-	34
California halibut	1	-	34
Totals	**8,424**	**100**	

TABLE 20. Catch per angler hour by month, for 1993, for the 20 most frequently caught species from the Morro Bay area.

	Catch per angler hour											
Species	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Blue rockfish	1.25	0.47	2.29	1.77	0.71	0.40	1.32	2.84	1.03	1.13	1.19	2.90
Yellowtail rockfish	0.92	1.13	0.50	0.30	0.29	0.47	1.09	0.82	1.24	3.06	2.16	1.39
Vermilion rockfish	0.42	0.97	0.18	0.08	0.19	0.57	0.47	0.26	0.23	0.45	0.28	0.04
Rosy rockfish	0.13	0.15	0.16	0.31	0.23	0.26	0.38	0.21	0.18	0.22	0.36	0.25
Starry rockfish	0.05	0.10	0.09	0.19	0.11	0.28	0.46	0.07	0.32	0.39	0.57	0.19
Gopher rockfish	0.17	0.12	0.31	0.11	0.18	0.22	0.04	0.61	0.13		0.06	
Olive rockfish	0.15	0.23	0.14	0.03	0.14	0.09	0.14	0.37	0.24	0.30	0.04	0.15
Copper rockfish	0.29	0.26	0.08	0.11	0.19	0.10	0.12	0.07	0.08	0.09	0.09	
Widow rockfish	0.07	0.02	0.23	0.38		<0.01	0.04		0.08	0.39	0.26	0.37
Lingcod	0.10	0.05	0.11	0.03	0.10	0.10	0.15	0.09	0.04	0.16	0.14	0.06
Bocaccio	0.17	0.38	0.02	0.04	0.05	0.07	0.12	<0.01	0.21	0.15	0.13	0.06
Canary rockfish	0.28	0.20	0.04	0.03	0.08	0.13	0.06	0.04	0.05	0.08	0.07	0.02
Brown rockfish	0.19				0.08	0.16		0.02	0.06			
Greenspotted rockfish	0.06	0.02	0.04		0.02	0.12	0.02		0.04	0.03		0.04
Chilipepper						<0.01	0.51		<0.01			
Black rockfish	0.03		<0.01		0.05	0.02		0.06	0.04			
China rockfish		0.02	0.03	0.05	0.04	0.04	0.03	0.03	<0.01			
Greenstriped rockfish	<0.01		0.03		0.02	0.08	0.04		0.04			
Flag rockfish	0.02	0.09	0.01	0.03	<0.01	0.03			0.01	0.03	0.06	0.04
Speckled rockfish	0.02			0.03					0.18	0.01	0.03	0.04
Total CPAH	**4.55**	**4.23**	**4.41**	**3.52**	**2.52**	**3.20**	**5.03**	**5.54**	**4.24**	**6.52**	**5.55**	**5.64**
Number of trips	**4**	**3**	**8**	**2**	**8**	**8**	**5**	**10**	**6**	**8**	**5**	**3**

TABLE 21. Percentage of observed fish retained by port area for the top 34 species in 1993 (where $n \geq 10$ at one or more port areas).

Species	Port area EK	FB	BB	SF	MT	MB
Blue rockfish	83	99	97	90	87	95
Yellowtail rockfish	81	99	98	98	97	97
Chilipepper	-	-	99	-	100	98
Rosy rockfish	-	80	71	86	93	67
Widow rockfish	-	100	100	100	98	100
Canary rockfish	92	95	98	95	100	99
Greenspotted rockfish	-	-	95	98	99	88
Bocaccio	-	-	99	100	100	99
Vermilion rockfish	-	100	100	100	100	100
Lingcod	75	72	79	67	61	47
Olive rockfish	82	100	100	98	95	99
Copper rockfish	99	100	100	100	100	100
Starry rockfish	-	-	92	98	97	97
Black rockfish	91	100	100	87	67	96
Gopher rockfish	-	-	-	96	97	99
Greenstriped rockfish	-	-	83	100	97	67
Pacific sanddab	-	-	-	89	36	58
Brown rockfish	-	-	96	97	100	97
China rockfish	-	95	89	100	100	100
Yelloweye rockfish	93	100	100	97	100	100
Chub mackerel	-	-	97	-	51	10
Unidentified sanddab	-	-	-	-	2	-
Speckled rockfish	-	-	100	-	100	100
Flag rockfish	-	-	-	-	97	98
Jack mackerel	-	-	-	-	94	-
Kelp greenling	-	-	-	100	-	-
Squarespot rockfish	-	-	-	-	86	-
Quillback rockfish	100	-	-	100	-	-
King salmon	-	-	-	71	-	-
Cabezon	-	-	-	100	-	-
Rosethorn rockfish	-	-	80	-	100	-
Speckled sanddab	-	-	-	-	5	-
Stripetail rockfish	-	-	-	-	100	-
Ocean Whitefish	-	-	-	-	-	100
Total all species	**90**	**96**	**96**	**93**	**90**	**94**

TABLE 22. Catch per angler day and catch per angler hour for blue rockfish by port.

Port area	Catch per angler day 1993	Catch per angler hour 1993
Eureka	1.05	0.31
Fort Bragg	4.63	1.76
Bodega Bay	1.96	0.58
San Francisco	2.69	0.73
Monterey	4.25	1.43
Morro Bay	3.65	1.37

TABLE 23. Catch per angler hour and mean length of blue rockfish for near and distant (dist) locations and shallow (shal) and deep locations by port for 1993.

	Catch per angler hour				Number of fish measured				Mean total length (mm)			
Port area	Near	Dist	Shal	Deep	Near	Dist	Shal	Deep	Near	Dist	Shal	Deep
Eureka	0.02	0.52	0.30	-	2	60	55	-	321	342	341	-
Fort Bragg	1.77	1.64	1.58	-	503	27	320	-	311	278	304	-
Bodega Bay	1.58	0.44	2.36	0	113	256	389	0	324	313	308	-
San Francisco	0.74	0.73	1.52	0.01	318	644	500	2	312	298	293	358
Monterey	1.31	1.59	4.93	<0.01	1555	734	634	0	274	290	289	-
Morro Bay	1.58	0.51	1.89	0.16	2357	117	682	47	282	297	278	244

TABLE 24. Mean length of blue rockfish caught by CPFV anglers by port for 1993.

Port area	Number of fish measured	Mean total length (mm)	(SD)
Eureka	62	342	42
Fort Bragg	530	310	38
Bodega Bay	437	315	50
San Francisco	1152	303	43
Monterey	3029	279	39
Morro Bay	2677	283	36

TABLE 25. Catch per angler day and catch per angler hour for yellowtail rockfish by port.

	Catch per angler day	Catch per angler hour
Port area	1993	1993
Eureka	1.31	0.39
Fort Bragg	2.19	0.83
Bodega Bay	2.28	0.68
San Francisco	2.94	0.80
Monterey	1.49	0.50
Morro Bay	2.68	1.01

TABLE 26. Catch per angler hour and mean length of yellowtail rockfish for near and distant (dist) locations and shallow (shal) and deep locations by port for 1993.

	Catch per angler hour				Number of fish measured				Mean total length (mm)			
Port area	**Near**	**Dist**	**Shal**	**Deep**	**Near**	**Dist**	**Shal**	**Deep**	**Near**	**Dist**	**Shal**	**Deep**
Eureka	0.01	0.66	0.20	-	1	69	27	-	277	368	332	-
Fort Bragg	0.89	0	0.60	-	259	0	127	-	286	-	280	-
Bodega Bay	0.47	0.71	0.39	0.74	33	812	60	208	305	417	297	426
San Francisco	1.03	0.70	0.32	0.98	608	832	90	233	308	332	273	365
Monterey	0.51	0.49	0.39	0.64	807	479	55	947	353	336	277	372
Morro Bay	1.10	0.61	0.37	0.50	1616	174	112	14	290	316	284	261

TABLE 27. Mean length of yellowtail rockfish caught by CPFV anglers by port for 1993.

Port area	**Number of fish measured**	**Mean total length (mm)**	**(SD)**
Eureka	70	367	54
Fort Bragg	259	286	34
Bodega Bay	864	410	53
San Francisco	1584	320	55
Monterey	1386	345	63
Morro Bay	1859	293	35

TABLE 28. Catch per angler day and catch per angler hour for chilipepper by port.

Port area	Catch per angler day 1993	Catch per angler hour 1993
Eureka	0	0
Fort Bragg	0	0
Bodega Bay	2.52	0.75
San Francisco	<0.01	<0.01
Monterey	2.00	0.67
Morro Bay	0.08	0.03

TABLE 29. Catch per angler hour and mean length of chilipepper for near and distant (dist) locations and shallow (shal) and deep locations by port for 1993.

	Catch per angler hour				Number of fish measured				Mean total length (mm)			
Port area	Near	Dist	Shal	Deep	Near	Dist	Shal	Deep	Near	Dist	Shal	Deep
Eureka	0	0	0	-	0	0	0	-	-	-	-	-
Fort Bragg	0	0	0	-	0	0	0	-	-	-	-	-
Bodega Bay	0	0.86	0	0.52	0	666	0	72	-	406	-	410
San Francisco	0	<0.01	0	0.01	0	1	0	1	-	268	-	268
Monterey	1.04	0.11	0	1.12	1324	156	0	1269	326	370	-	325
Morro Bay	<0.01	0.15	0	0.61	2	52	0	52	236	440	-	440

TABLE 30. Mean length of chilipepper caught by CPFV anglers by port for 1993.

Port area	Number of fish measured	Mean total length (mm)	(SD)
Eureka	0	-	-
Fort Bragg	0	-	-
Bodega Bay	666	406	54
San Francisco	1	268	0
Monterey	1480	330	48
Morro Bay	54	433	50

TABLE 31. Catch per angler day and catch per angler hour for rosy rockfish by port.

Port area	Catch per angler day 1993	Catch per angler hour 1993
Eureka	0.02	<0.01
Fort Bragg	0.84	0.32
Bodega Bay	0.44	0.13
San Francisco	1.24	0.34
Monterey	0.42	0.14
Morro Bay	0.61	0.23

TABLE 32. Catch per angler hour and mean length of rosy rockfish for near and distant (dist) locations and shallow (shal) and deep locations by port for 1993.

	Catch per angler hour				Number of fish measured				Mean total length (mm)			
Port area	**Near**	**Dist**	**Shal**	**Deep**	**Near**	**Dist**	**Shal**	**Deep**	**Near**	**Dist**	**Shal**	**Deep**
Eureka	0	<0.01	<0.01	-	0	1	1	-	-	312	312	-
Fort Bragg	0.34	0	0.32	-	59	0	41	-	246	-	248	-
Bodega Bay	0.03	0.15	0.02	0.09	3	44	3	0	242	221	242	-
San Francisco	0.39	0.31	0.08	0.20	100	292	15	24	210	228	216	232
Monterey	0.13	0.15	0.12	0.07	185	68	9	88	226	233	224	231
Morro Bay	0.25	0.13	0.14	0.10	255	27	35	16	222	221	224	214

TABLE 33. Mean length of rosy rockfish caught by CPFV anglers by port for 1993.

Port area	**Number of fish measured**	**Mean total length (mm)**	**(SD)**
Eureka	1	312	-
Fort Bragg	59	246	23
Bodega Bay	47	222	24
San Francisco	423	222	27
Monterey	329	229	22
Morro Bay	302	222	21

TABLE 34. Catch per angler day and catch per angler hour for widow rockfish by port.

Port area	Catch per angler day 1993	Catch per angler hour 1993
Eureka	0.03	0.01
Fort Bragg	0.71	0.27
Bodega Bay	1.55	0.46
San Francisco	0.23	0.06
Monterey	0.59	0.20
Morro Bay	0.31	0.12

TABLE 35. Catch per angler hour and mean length of widow rockfish for near and distant locations and shallow and deep locations by port for 1993.

	Catch per angler hour				Number of fish measured				Mean total length (mm)			
Port area	Near	Distant	Shallow	Deep	Near	Dist	Shal	Deep	Near	Dist	Shal	Deep
Eureka	0	0.02	0.01	-	0	2	2	-	-	300	300	-
Fort Bragg	0.29	0	0.12	-	64	0	22	-	292	-	290	-
Bodega Bay	0.19	0.50	0.10	0.56	23	467	23	66	301	450	301	439
San Francisco	0.05	0.07	<0.01	0.06	25	65	0	10	341	332	-	352
Monterey	0.31	0.04	0.01	0.27	335	33	3	253	338	263	321	343
Morro Bay	0.14	0.04	0.01	0.10	244	14	5	4	282	322	327	282

TABLE 36. Mean length of widow rockfish caught by CPFV anglers by port for 1993.

Port area	Number of fish measured	Mean total length (mm)	(SD)
Eureka	2	300	64
Fort Bragg	64	292	32
Bodega Bay	490	443	54
San Francisco	94	333	32
Monterey	368	331	45
Morro Bay	258	285	52

TABLE 37. Catch per angler day and catch per angler hour for canary rockfish by port.

Port area	Catch per angler day 1993	Catch per angler hour 1993
Eureka	1.22	0.36
Fort Bragg	1.35	0.51
Bodega Bay	0.95	0.28
San Francisco	0.77	0.21
Monterey	0.27	0.09
Morro Bay	0.23	0.09

TABLE 38. Catch per angler hour and mean length of canary rockfish for near and distant (dist) locations and shallow (shal) and deep locations by port for 1993.

	Catch per angler hour				Number of fish measured				Mean total length (mm)			
Port area	**Near**	**Dist**	**Shal**	**Deep**	**Near**	**Dist**	**Shal**	**Deep**	**Near**	**Dist**	**Shal**	**Deep**
Eureka	0	0.62	0.26	-	0	82	58	-	-	361	349	-
Fort Bragg	0.54	0	0.48	-	143	1	89	-	303	338	295	-
Bodega Bay	0.66	0.23	0.47	0.35	72	285	96	124	318	463	317	463
San Francisco	0.19	0.22	0.25	0.21	80	183	67	41	316	341	290	399
Monterey	0.08	0.11	0.03	0.13	160	108	3	191	346	351	240	371
Morro Bay	0.09	0.10	0.07	0.16	145	38	38	12	338	349	321	328

TABLE 39. Mean length of canary rockfish caught by CPFV anglers by port for 1993.

Port area	**Number of fish measured**	**Mean total length (mm)**	**(SD)**
Eureka	82	361	68
Fort Bragg	144	303	48
Bodega Bay	360	433	91
San Francisco	323	330	54
Monterey	275	350	52
Morro Bay	183	340	46

TABLE 40. Catch per angler day and catch per angler hour for greenspotted rockfish by port.

Port area	Catch per angler day 1993	Catch per angler hour 1993
Eureka	0	0
Fort Bragg	0	0
Bodega Bay	0.77	0.23
San Francisco	0.41	0.11
Monterey	0.72	0.24
Morro Bay	0.09	0.03

TABLE 41. Catch per angler hour and mean length of greenspotted rockfish for near and distant (dist) locations and shallow (shal) and deep locations by port for 1993.

	Catch per angler hour				Number of fish measured				Mean total length (mm)			
Port area	Near	Dist	Shal	Deep	Near	Dist	Shal	Deep	Near	Dist	Shal	Deep
Eureka	0	0	0	-	0	0	0	-	-	-	-	-
Fort Bragg	0	0	0	-	0	0	0	-	-	-	-	-
Bodega Bay	0	0.26	0	0.52	0	249	0	104	-	331	-	322
San Francisco	0.05	0.14	0.01	0.62	30	152	2	107	306	338	306	339
Monterey	0.22	0.28	0	0.43	441	312	0	736	326	312	-	319
Morro Bay	0.04	0.02	0	0.07	51	10	0	5	276	318	-	363

TABLE 42. Mean length of greenspotted rockfish caught by CPFV anglers by port for 1993.

Port area	Number of fish measured	Mean total length (mm)	(SD)
Eureka	0	-	-
Fort Bragg	0	-	-
Bodega Bay	249	331	54
San Francisco	183	332	54
Monterey	797	318	57
Morro Bay	61	283	49

TABLE 43. Catch per angler day and catch per angler hour for bocaccio by port.

Port area	Catch per angler day 1993	Catch per angler hour 1993
Eureka	0	0
Fort Bragg	0.01	<0.01
Bodega Bay	1.35	0.40
San Francisco	0.19	0.05
Monterey	0.39	0.13
Morro Bay	0.26	0.10

TABLE 44. Catch per angler hour and mean length of bocaccio for near and distant (dist) locations and shallow (shal) and deep locations by port for 1993.

	Catch per angler hour				Number of fish measured				Mean total length (mm)			
Port area	**Near**	**Dist**	**Shal**	**Deep**	**Near**	**Dist**	**Shal**	**Deep**	**Near**	**Dist**	**Shal**	**Deep**
Eureka	0	0	0	-	0	0	0	-	-	-	-	-
Fort Bragg	<0.01	0	0	-	2	0	0	-	387	-	-	-
Bodega Bay	0	0.46	0	0.59	0	561	0	120	-	592	-	581
San Francisco	0.04	0.06	<0.01	0.15	16	74	0	41	476	526	-	557
Monterey	0.15	0.10	0.05	0.18	192	96	11	225	463	470	408	475
Morro Bay	0.07	0.20	0.02	0.50	106	70	5	34	459	497	461	510

TABLE 45. Mean length of bocaccio caught by CPFV anglers by port for 1993.

Port area	**Number of fish measured**	**Mean total length (mm)**	**(SD)**
Eureka	0	-	-
Fort Bragg	2	387	90
Bodega Bay	561	592	74
San Francisco	92	516	103
Monterey	325	471	85
Morro Bay	179	475	74

TABLE 46. Catch per angler day and catch per angler hour for vermilion rockfish by port.

Port area	Catch per angler day 1993	Catch per angler hour 1993
Eureka	0.02	<0.01
Fort Bragg	0.22	0.08
Bodega Bay	0.12	0.04
San Francisco	0.23	0.06
Monterey	0.20	0.07
Morro Bay	0.89	0.33

TABLE 47. Catch per angler hour and mean length of vermilion rockfish for near and distant (dist) locations and shallow (shal) and deep locations by port for 1993.

Port area	Catch per angler hour				Number of fish measured				Mean total length (mm)			
	Near	Dist	Shal	Deep	Near	Dist	Shal	Deep	Near	Dist	Shal	Deep
Eureka	0	0.01	0.01	-	0	1	1	-	-	430	430	-
Fort Bragg	0.08	0.06	0.09	-	24	1	19	-	412	559	407	-
Bodega Bay	0.14	0.02	0.10	0.03	14	29	21	2	431	494	430	488
San Francisco	0.06	0.06	0.09	0.09	26	86	40	25	365	448	456	461
Monterey	0.04	0.11	0.02	0.10	74	123	11	164	411	415	419	420
Morro Bay	0.34	0.32	0.17	0.23	512	131	71	4	395	399	405	339

TABLE 48. Mean length of vermilion rockfish caught by CPFV anglers by port for 1993.

Port area	Number of fish measured	Mean total length (mm)	(SD)
Eureka	1	430	-
Fort Bragg	25	418	68
Bodega Bay	46	475	91
San Francisco	134	430	80
Monterey	212	412	67
Morro Bay	661	396	70

TABLE 49. Catch per angler day and catch per angler hour for lingcod by port.

Port area	Catch per angler day 1993	Catch per angler hour 1993
Eureka	0.68	0.20
Fort Bragg	0.30	0.11
Bodega Bay	0.26	0.08
San Francisco	0.55	0.15
Monterey	0.43	0.14
Morro Bay	0.26	0.10

TABLE 50. Catch per angler hour and mean length of lingcod for near and distant (dist) locations and shallow (shal) and deep locations by port for 1993.

	Catch per angler hour				Number of fish measured				Mean total length (mm)			
Port area	**Near**	**Dist**	**Shal**	**Deep**	**Near**	**Dist**	**Shal**	**Deep**	**Near**	**Dist**	**Shal**	**Deep**
Eureka	0.12	0.26	0.21	-	4	19	20	-	746	765	750	-
Fort Bragg	0.09	0.44	0.14	-	18	5	16	-	685	645	656	-
Bodega Bay	0.09	0.08	0.10	0.06	6	60	18	5	607	723	635	719
San Francisco	0.13	0.16	0.09	0.42	30	116	30	43	632	642	650	662
Monterey	0.12	0.18	0.06	0.14	56	100	10	97	653	632	682	654
Morro Bay	0.11	0.05	0.09	0.09	83	8	18	0	635	657	621	-

TABLE 51. Mean length of lingcod caught by CPFV anglers by port for 1993.

Port area	**Number of fish measured**	**Mean total length (mm)**	**(SD)**
Eureka	23	761	144
Fort Bragg	23	676	97
Bodega Bay	71	709	118
San Francisco	169	640	87
Monterey	189	640	91
Morro Bay	91	637	93

TABLE 52. Catch per angler day and catch per angler hour for olive rockfish by port.

Port area	Catch per angler day 1993	Catch per angler hour 1993
Eureka	0.34	0.10
Fort Bragg	0.21	0.08
Bodega Bay	0.31	0.09
San Francisco	0.27	0.07
Monterey	0.37	0.13
Morro Bay	0.48	0.18

TABLE 53. Catch per angler hour and mean length of olive rockfish for near and distant (dist) locations and shallow (shal) and deep locations by port for 1993.

	Catch per angler hour				Number of fish measured				Mean total length (mm)			
Port area	Near	Dist	Shal	Deep	Near	Dist	Shal	Deep	Near	Dist	Shal	Deep
Eureka	0	0.17	0.10	-	0	23	20	-	-	337	335	-
Fort Bragg	0.07	0.19	0.08	-	26	3	20	-	401	378	401	-
Bodega Bay	0.02	0.10	0.09	0.01	1	123	19	1	406	398	349	472
San Francisco	0.03	0.09	0.08	0.04	13	95	38	4	355	383	370	366
Monterey	0.07	0.21	0.28	0.01	77	139	54	10	360	380	352	434
Morro Bay	0.17	0.24	0.20	0.03	243	77	87	4	373	385	362	374

TABLE 54. Mean length of olive rockfish caught by CPFV anglers by port for 1993.

Port area	Number of fish measured	Mean total length (mm)	(SD)
Eureka	23	337	56
Fort Bragg	29	398	40
Bodega Bay	128	397	45
San Francisco	111	380	55
Monterey	294	372	55
Morro Bay	324	376	56

TABLE 55. Catch per angler day and catch per angler hour for copper rockfish by port.

Port area	Catch per angler day 1993	Catch per angler hour 1993
Eureka	1.28	0.38
Fort Bragg	0.40	0.15
Bodega Bay	0.05	0.01
San Francisco	0.51	0.14
Monterey	0.27	0.09
Morro Bay	0.33	0.12

TABLE 56. Catch per angler hour and mean length of copper rockfish for near and distant (dist) locations and shallow (shal) and deep locations by port for 1993.

	Catch per angler hour				Number of fish measured				Mean total length (mm)			
Port area	**Near**	**Dist**	**Shal**	**Deep**	**Near**	**Dist**	**Shal**	**Deep**	**Near**	**Dist**	**Shal**	**Deep**
Eureka	0.01	0.65	0.42	-	1	89	90	-	571	442	444	-
Fort Bragg	0.16	0	0.12	-	46	0	24	-	399	-	392	-
Bodega Bay	0.10	<0.01	0.06	0	13	3	14	0	351	372	349	-
San Francisco	0.25	0.09	0.15	0.07	121	61	23	11	369	393	381	377
Monterey	0.05	0.15	0.08	0.10	96	199	20	143	403	380	346	405
Morro Bay	0.11	0.17	0.12	0.23	186	64	50	1	359	326	311	382

TABLE 57. Mean length of copper rockfish caught by CPFV anglers by port for 1993.

Port area	**Number of fish measured**	**Mean total length (mm)**	**(SD)**
Eureka	90	444	55
Fort Bragg	46	399	39
Bodega Bay	16	355	54
San Francisco	268	376	48
Monterey	307	388	52
Morro Bay	250	350	60

TABLE 58. Catch per angler day and catch per angler hour for starry rockfish by port.

Port area	Catch per angler day 1993	Catch per angler hour 1993
Eureka	0	0
Fort Bragg	0.04	0.02
Bodega Bay	0.04	0.01
San Francisco	0.27	0.07
Monterey	0.21	0.07
Morro Bay	0.57	0.22

TABLE 59. Catch per angler hour and mean length of starry rockfish for near and distant (dist) locations and shallow (shal) and deep locations by port for 1993.

	Catch per angler hour				Number of fish measured				Mean total length (mm)			
Port area	Near	Dist	Shal	Deep	Near	Dist	Shal	Deep	Near	Dist	Shal	Deep
Eureka	0	0	0	-	0	0	0	-	-	-	-	-
Fort Bragg	0.02	0	0.01	-	6	0	2	-	309	-	275	-
Bodega Bay	0	0.01	<0.01	<0.01	0	13	0	0	-	340	-	-
San Francisco	0.05	0.08	0.01	0.13	36	93	2	29	265	314	283	333
Monterey	0.08	0.05	0.03	0.06	105	53	7	72	302	306	278	314
Morro Bay	0.23	0.17	0.04	0.20	333	51	12	14	300	298	313	300

TABLE 60. Mean length of starry rockfish caught by CPFV anglers by port for 1993.

Port area	Number of fish measured	Mean total length (mm)	(SD)
Eureka	0	-	-
Fort Bragg	6	309	32
Bodega Bay	13	340	32
San Francisco	141	297	60
Monterey	168	303	43
Morro Bay	397	300	37

TABLE 61. Catch per angler day and catch per angler hour for black rockfish by port.

Port area	Catch per angler day 1993	Catch per angler hour 1993
Eureka	4.52	1.36
Fort Bragg	0.14	0.05
Bodega Bay	0.22	0.07
San Francisco	0.39	0.11
Monterey	0.08	0.03
Morro Bay	0.07	0.02

TABLE 62. Catch per angler hour and mean length of black rockfish for near and distant (dist) locations and shallow (shal) and deep locations by port for 1993.

Port area	Catch per angler hour				Number of fish measured				Mean total length (mm)			
	Near	Dist	Shal	Deep	Near	Dist	Shal	Deep	Near	Dist	Shal	Deep
Eureka	2.46	0.57	1.48	-	184	78	261	-	392	447	408	-
Fort Bragg	0.03	0.44	0.07	-	7	8	15	-	303	292	297	-
Bodega Bay	0.30	0.03	0.27	0	1	1	74	0	427	355	336	-
San Francisco	0.02	0.15	0.42	0	0	213	254	0	-	321	317	-
Monterey	0.01	0.05	0.19	0	12	44	56	0	307	312	311	-
Morro Bay	0.02	0.06	0.09	0	26	22	47	0	292	303	296	-

TABLE 63. Mean length of black rockfish caught by CPFV anglers by port for 1993.

Port area	Number of fish measured	Mean total length (mm)	(SD)
Eureka	262	408	60
Fort Bragg	15	297	21
Bodega Bay	74	336	63
San Francisco	254	317	57
Monterey	58	311	21
Morro Bay	48	297	31

TABLE 64. Catch per angler day and catch per angler hour for gopher rockfish by port.

Port area	Catch per angler day 1993	Catch per angler hour 1993
Eureka	0	0
Fort Bragg	0.05	0.02
Bodega Bay	0.02	0.01
San Francisco	0.10	0.03
Monterey	0.13	0.04
Morro Bay	0.55	0.21

TABLE 65. Catch per angler hour and mean length of gopher rockfish for near and distant (dist) locations and shallow (shal) and deep locations by port for 1993.

	Catch per angler hour				Number of fish measured				Mean total length (mm)			
Port area	Near	Dist	Shal	Deep	Near	Dist	Shal	Deep	Near	Dist	Shal	Deep
Eureka	0	0	0	-	0	0	0	-	-	-	-	-
Fort Bragg	0.01	0.13	0.02	-	3	2	4	-	294	308	307	-
Bodega Bay	0.02	<0.01	0.03	0	2	5	7	0	244	276	267	-
San Francisco	<0.01	0.04	0.10	0	0	48	53	0	-	283	281	-
Monterey	0.02	0.08	0.09	0	33	96	30	0	273	288	286	-
Morro Bay	0.22	0.17	0.46	0	322	63	192	0	268	279	277	-

TABLE 66. Mean length of gopher rockfish caught by CPFV anglers by port for 1993.

Port area	Number of fish measured	Mean total length (mm)	(SD)
Eureka	0	-	-
Fort Bragg	5	300	16
Bodega Bay	7	267	18
San Francisco	54	281	21
Monterey	146	283	27
Morro Bay	393	269	26

TABLE 67. Catch per angler day and catch per angler hour for greenstriped rockfish by port.

Port area	Catch per angler day 1993	Catch per angler hour 1993
Eureka	0	0
Fort Bragg	0.01	<0.01
Bodega Bay	0.36	0.11
San Francisco	0.08	0.02
Monterey	0.37	0.12
Morro Bay	0.06	0.02

TABLE 68. Catch per angler hour and mean length of greenstriped rockfish for near and distant (dist) locations and shallow (shal) and deep locations by port for 1993.

Port area	Catch per angler hour				Number of fish measured				Mean total length (mm)			
	Near	Dist	Shal	Deep	Near	Dist	Shal	Deep	Near	Dist	Shal	Deep
Eureka	0	0	0	-	0	0	0	-	-	-	-	-
Fort Bragg	<0.01	0	0	-	1	0	0	-	305	-	-	-
Bodega Bay	0	0.12	0	0.18	0	56	0	27	-	275	-	257
San Francisco	<0.01	0.03	0	0.18	2	35	0	29	265	288	-	284
Monterey	0.11	0.14	0	0.21	183	122	0	315	278	272	-	278
Morro Bay	0.02	0.03	0	0.11	16	11	0	11	252	290	-	290

TABLE 69. Mean length of greenstriped rockfish caught by CPFV anglers by port for 1993.

Port area	Number of fish measured	Mean total length (mm)	(SD)
Eureka	0	-	-
Fort Bragg	1	305	0
Bodega Bay	56	275	31
San Francisco	37	287	27
Monterey	356	277	31
Morro Bay	27	267	33

TABLE 70. Catch per angler day and catch per angler hour for brown rockfish by port.

Port area	Catch per angler day 1993	Catch per angler hour 1993
Eureka	0	0
Fort Bragg	0	0
Bodega Bay	0.09	0.03
San Francisco	0.21	0.06
Monterey	0.08	0.03
Morro Bay	0.14	0.05

TABLE 71. Catch per angler hour and mean length of brown rockfish for near and distant (locations) and shallow (shal) and deep locations by port for 1993.

Port area	Catch per angler hour				Number of fish measured				Mean total length (mm)			
	Near	Dist	Shal	Deep	Near	Dist	Shal	Deep	Near	Dist	Shal	Deep
Eureka	0	0	0	-	0	0	0	-	-	-	-	-
Fort Bragg	0	0	0	-	0	0	0	-	-	-	-	-
Bodega Bay	0.15	0.01	0.11	0	11	5	16	0	283	302	289	-
San Francisco	0.12	0.03	0.09	0	39	36	39	0	328	348	350	-
Monterey	<0.01	0.06	0.01	0	8	76	1	0	333	334	295	-
Morro Bay	0.03	0.15	0.19	0	44	53	95	0	303	322	312	-

TABLE 72. Mean length of brown rockfish caught by CPFV anglers by port for 1993.

Port area	Number of fish measured	Mean total length (mm)	(SD)
Eureka	0	-	-
Fort Bragg	0	-	-
Bodega Bay	16	289	37
San Francisco	112	339	42
Monterey	84	334	40
Morro Bay	97	313	50

TABLE 73. Catch per angler day and catch per angler hour for China rockfish by port.

Port area	Catch per angler day 1993	Catch per angler hour 1993
Eureka	0.09	0.03
Fort Bragg	0.23	0.09
Bodega Bay	0.06	0.02
San Francisco	0.14	0.04
Monterey	0.03	0.01
Morro Bay	0.06	0.02

TABLE 74. Catch per angler hour and mean length of China rockfish for near and distant (dist) locations and shallow (shal) and deep locations by port for 1993.

	Catch per angler hour				Number of fish measured				Mean total length (mm)			
Port area	**Near**	**Dist**	**Shal**	**Deep**	**Near**	**Dist**	**Shal**	**Deep**	**Near**	**Dist**	**Shal**	**Deep**
Eureka	0	0.05	0.03	-	0	4	4	-	-	323	323	-
Fort Bragg	0.06	0.44	0.10	-	18	7	18	-	290	311	303	-
Bodega Bay	0.12	<0.01	0.07	0	9	1	15	0	265	323	291	-
San Francisco	0.03	0.04	0.10	0	12	65	65	0	278	288	288	-
Monterey	0.01	0.04	0.01	<0.01	7	16	4	0	263	304	312	-
Morro Bay	0.02	0.02	0.04	0	39	9	18	0	297	292	289	-

TABLE 75. Mean length of China rockfish caught by CPFV anglers by port for 1993.

Port area	**Number of fish measured**	**Mean total length (mm)**	**(SD)**
Eureka	4	323	14
Fort Bragg	25	296	35
Bodega Bay	15	291	49
San Francisco	95	285	31
Monterey	24	291	34
Morro Bay	48	296	28

TABLE 76. Catch per angler day and catch per angler hour for yelloweye rockfish by port.

Port area	Catch per angler day 1993	Catch per angler hour 1993
Eureka	0.65	0.19
Fort Bragg	0.21	0.08
Bodega Bay	0.07	0.02
San Francisco	0.08	0.02
Monterey	0.04	0.01
Morro Bay	0.03	0.01

TABLE 77. Catch per angler hour and mean length of yelloweye rockfish for near and distant (dist) locations and shallow (shal) and deep locations by port for 1993.

	Catch per angler hour				Number of fish measured				Mean total length (mm)			
Port area	Near	Dist	Shal	Deep	Near	Dist	Shal	Deep	Near	Dist	Shal	Deep
Eureka	0	0.33	0.11	-	0	40	20	-	-	366	367	-
Fort Bragg	0.08	0	0.07	-	24	0	15	-	369	-	364	-
Bodega Bay	0.01	0.02	<0.01	0.02	1	19	1	5	395	508	395	465
San Francisco	0.01	0.03	0.01	0.09	3	43	4	27	380	466	395	492
Monterey	0.01	0.02	0	0.02	24	15	0	34	430	435	-	434
Morro Bay	0.01	0.01	0	0.02	27	2	0	1	358	374	-	401

TABLE 78. Mean length of yelloweye rockfish caught by CPFV anglers by port for 1993.

Port area	Number of fish measured	Mean total length (mm)	(SD)
Eureka	40	366	103
Fort Bragg	24	369	59
Bodega Bay	20	502	97
San Francisco	47	459	107
Monterey	39	432	126
Morro Bay	33	372	72

TABLE 79. Comparison of rank abundance of CPFV and skiff catches for central and northern California in 1993.

PORT AREA

	Eureka		Fort Bragg		Bodega Bay	
	CPFV	Skiff	CPFV	Skiff	CPFV	Skiff
Rank						
1	Black rf	Black rf	Blue rf	Blue rf	Chilipepper	Blue rf
2	Yellowtail rf	Blue rf	Yellowtail rf	Black rf	Yellowtail rf	Yellowtail rf
3	Copper rf	Canary rf	Canary rf	Canary rf	Blue rf	Lingcod
4	Canary rf	Lingcod	Rosy rf	Lingcod	Widow rf	Black rf
5	Blue rf	Copper rf	Widow rf	Yellowtail rf	Bocaccio	Brown rf
6	Lingcod	Quillback rf	Copper rf	China rf	Canary rf	Chilipepper
7	Yelloweye rf	Cabezon	Lingcod	Copper rf	Greenspotted rf	Silver surfperch
8	Quillback rf	Vermilion rf	China rf	Gopher rf	Rosy rf	Canary rf
9	Olive rf	Yellowtail rf	Vermilion rf	Pac. Sanddab	Greenstriped rf	Gopher rf
10	China rf	Pac. Sanddab	Olive rf	Vermilion rf	Olive rf	China rf
Rockfishes as percent of total catch:						
	92.6	90.0	95.7	83.1	96.7	77.4

	San Francisco		Monterey		Morro Bay	
	CPFV	Skiff	CPFV	Skiff	CPFV	Skiff
Rank						
1	Yellowtail rf	White croaker	Blue rf	Blue rf	Blue rf	Blue rf
2	Blue rf	Blue rf	Chilipepper	Pac. Sanddab	Yellowtail rf	Gopher rf
3	Rosy rf	Pac. Sanddab	Yellowtail rf	White croaker	Vermilion rf	Vermilion rf
4	Canary rf	Canary rf	Greenspotted rf	Jack mackerel	Rosy rf	Yellowtail rf
5	Lingcod	Black rf	Widow rf	Jacksmelt	Starry rf	Olive rf
6	Copper rf	Yellowtail rf	Lingcod	Black rf	Gopher rf	Brown rf
7	Greenspotted rf	Lingcod	Rosy rf	Yellowtail rf	Olive rf	Copper rf
8	Black rf	No. Anchovy	Bocaccio	Gopher rf	Copper rf	White croaker
9	Starry rf	Brown rf	Olive rf	Chub mackerel	Widow rf	Black rf
10	Olive rf	Cabezon	Greenstriped rf	Brown rf	Lingcod	Canary rf
Rockfishes as percent of total catch:						
	91.8	50.4	92.0	51.4	96.7	88.0

TABLE 80. Comparison of mean lengths (mm) of selected sport fishes sampled from the skiff and CPFV fisheries in 1993.

Species	Eureka			Fort Bragg			Bodega Bay			San Francisco			Monterey			Morro Bay		
	Skiff	CPFV		Skiff	CPFV		Skiff	CPFV		Skiff	CPFV		Skiff	CPFV		Skiff	CPFV	
		all	shal		all	shal		all	shal		all	shal		all	shal		all	shal
Nearshore																		
Black rf	381	408	408	-	-	-	345	336	336	316	317	317	293	311	311	303	297	296
Blue rf	355	342	341	-	-	-	321	315	308	298	303	293	266	279	289	300	283	278
Brown rf	-	-	-	-	-	-	-	-	-	299	339	350	280	334	-	327	313	312
China rf	-	-	-	319	310	304	-	-	-	-	-	-	273	291	-	289	296	-
Gopher rf	-	-	-	-	-	-	-	-	-	-	-	-	262	283	286	284	269	277
Olive rf	-	-	-	-	-	-	-	-	-	-	-	-	333	372	352	356	376	362
Wide range																		
Canary rf	331	361	349	315	303	295	365	433	317	297	330	290	291	350	-	311	340	321
Copper rf	437	444	444	422	399	392	-	-	-	-	-	-	262	388	346	313	350	311
Vermilion rf	-	-	-	470	418	-	-	-	-	-	-	-	328	412	-	395	396	405
Yellowtail rf	323	367	332	342	286	280	343	410	297	304	320	273	279	345	277	300	293	284
Lingcod	717	761	750	665	676	-	659	709	-	674	640	650	621	640	-	589	637	-
Offshore																		
Bocaccio	-	-	-	-	-	-	-	-	-	-	-	-	-	499	471	-	-	-
Greenspotted rf	-	-	-	-	-	-	-	-	-	-	-	-	338	318	-	-	-	-
Rosy rf	-	-	-	276	246	248	-	-	-	-	-	-	227	229	-	247	222	224
Starry rf	-	-	-	-	-	-	-	-	-	-	-	-	310	303	-	316	300	-

TABLE 81. Summary of total catch and effort estimates for CPFV anglers in northern and central California from logbook data, 1993.

	Port Areas						
	Northern* California	**Fort Bragg**	**Bodega Bay**	**San Francisco**	**Monterey**	**Morro Bay**	**Total All Ports**
Total no. trips	341	120	545	980	1,574	1,869	5,429
No. fish kept	19,568	8,934	173,664	238,622	340,947	476,235	1,257,970
No. angler days	2,186	891	13,019	19,804	28,544	39,446	103,890
No. hours fished	1,719	548	2,458	4,700	7,028	7,629	24,081
Average CPAD	8.95	10.03	13.34	12.05	11.94	12.07	12.11
Average CPAH	1.74	2.19	2.96	2.44	2.71	2.79	2.68
Total rockfish	18,270	8,430	168,786	225,821	326,586	465,941	1,213,834
Total lingcod	1,006	376	4,348	6,473	10,630	8,374	31,207
Total other fish	292	128	530	6,328	3,731	1,920	12,929

*Northern California group includes ports from Del Norte and Humboldt counties.

TABLE 82. Summary of total catch and effort estimates for CPFV anglers in northern and central California from logbook data, 1993, adjusted by sampling information.

	Port Areas						
	Northern* California	**Fort Bragg**	**Bodega Bay**	**San Francisco**	**Monterey**	**Morro Bay**	**Total All Ports**
Total no. trips	455	207	606	1,181	2,479	2,575	7,503
No. fish kept	29,616	16,220	198,943	259,674	573,326	627,805	1,705,584
No. angler days	3,162	1,920	13,041	24,166	45,062	51,497	138,848
Average CPAD	9.4	8.4	15.3	10.7	12.7	12.2	12.3

* Northern California group includes ports in Del Norte and Humboldt counties.

TABLE 83. Estimate of total CPFV catch of rockfishes and lingcod, based on adjusted logbook data and sampling information, from the ports of the Northern California group, 1993.

Species	Number in Thousands
Black rockfish	11.3
Yellowtail rockfish	3.3
Copper rockfish	3.2
Canary rockfish	3.1
Blue rockfish	2.6
Yelloweye rockfish	1.6
Quillback rockfish	1.2
Olive rockfish	0.9
China rockfish	0.2
Widow rockfish	<0.1
Vermilion rockfish	<0.1
Other rockfish	0
Total rockfish	**27.4**
Lingcod	**1.7**

TABLE 84. Estimate of total CPFV catch of rockfishes and lingcod, based on adjusted logbook data and sampling information, from the port of Fort Bragg, 1993.

Species	Number in Thousands
Blue rockfish	6.4
Yellowtail rockfish	3.0
Canary rockfish	1.8
Rosy rockfish	1.2
Widow rockfish	0.9
Copper rockfish	0.6
China rockfish	0.3
Vermilion rockfish	0.3
Olive rockfish	0.3
Yelloweye rockfish	0.3
Black rockfish	0.2
Quillback rockfish	<0.1
Gopher rockfish	<0.1
Starry rockfish	<0.1
Other rockfish	<0.1
Total rockfish	**15.6**
Lingcod	**0.4**

TABLE 85. Estimate of total CPFV catch of rockfishes and lingcod, based on adjusted logbook data and sampling information, from the ports of Bodega Bay and Dillon Beach, 1993.

Species	Number in Thousands
Chilipepper	36.6
Yellowtail rockfish	33.0
Blue rockfish	28.4
Widow rockfish	22.5
Bocaccio	19.5
Canary rockfish	13.7
Greenspotted rockfish	11.1
Rosy rockfish	6.4
Greenstriped rockfish	5.2
Olive rockfish	4.6
Black rockfish	3.2
Vermilion rockfish	1.8
Brown rockfish	1.4
Yelloweye rockfish	1.0
Speckled rockfish	1.0
China rockfish	0.8
Other rockfish	2.5
Total rockfish	**192.7**
Lingcod	**3.8**

TABLE 86. Estimate of total CPFV catch of rockfishes and lingcod, based on adjusted logbook data and sampling information, from the ports of Princeton, Berkeley, Emeryville and Sausalito, 1993.

Species	Number in Thousands
Yellowtail rockfish	64.9
Blue rockfish	59.5
Rosy rockfish	27.3
Canary rockfish	16.9
Copper rockfish	11.2
Greenspotted rockfish	9.1
Black rockfish	8.6
Starry rockfish	6.0
Olive rockfish	6.0

TABLE 86. Continued

Vermilion rockfish	5.2
Widow rockfish	4.9
Brown rockfish	4.4
Bocaccio	4.2
China rockfish	3.1
Gopher rockfish	2.1
Greenstriped rockfish	1.8
Yelloweye rockfish	1.6
Other rockfish	3.4
Total rockfish	**238.5**
Lingcod	**12.2**

TABLE 87. Estimate of total CPFV catch of rockfishes and lingcod, based on adjusted logbook data and sampling information, from the ports of Monterey and Santa Cruz, 1993.

Species	Number in Thousands
Blue rockfish	184.6
Chilipepper	86.6
Yellowtail rockfish	64.8
Greenspotted rockfish	31.5
Widow rockfish	25.8
Rosy rockfish	18.3
Bocaccio	16.6
Olive rockfish	16.1
Greenstriped rockfish	16.1
Canary rockfish	11.5
Copper rockfish	11.5
Starry rockfish	9.2
Vermilion rockfish	8.6
Gopher rockfish	5.7
Brown rockfish	3.4
Black rockfish	3.4
Other rockfish	20.1
Total rockfish	**527.3**
Lingcod	**18.3**

TABLE 88. Estimate of total CPFV catch of rockfishes and lingcod, based on adjusted logbook data and sampling information, from the ports of San Simeon, Morro Bay and Port San Luis, 1993.

Species	Number in Thousands
Blue rockfish	197.1
Yellowtail rockfish	145.0
Vermilion rockfish	47.7
Rosy rockfish	33.3
Starry rockfish	30.8
Gopher rockfish	30.1
Olive rockfish	25.7
Copper rockfish	17.6
Widow rockfish	17.0
Bocaccio	13.8
Canary rockfish	12.6
Brown rockfish	7.5
Greenspotted rockfish	5.0
Chilipepper	4.4
Black rockfish	3.8
China rockfish	3.1
Greenstriped rockfish	3.1
Other rockfish	9.4
Total rockfish	**607.1**
Lingcod	**14.4**

APPENDIX A: Sample Trip Form

NOCAL CPFV SPORTFISH SURVEY

TRIPNOSAMP	
YR MO DAY	
BOAT NUMBER	
DEPART TIME	
RETURN TIME	
PORT	
LANDING	
TYPE OF TRIP	
PAID ANGLERS	
FREE ANGLERS	
OBSV ANGLERS	
SAMPLER	

LOCATION SUMMARY

LOCA	FISHING TIME	MIN. DEPTH(FM)	MAX. DEPTH(FM)	FISHING TYPE	FISHING TACKLE

FISHING TIME		TOTAL TIME (MIN)	FSHN TYPE	FSHN TCKL	#OBS ANGL	TOT #ANG	LOCATION		BOTTOM DEPTH(FM)	
START	END						CODE	LAT/LONG	MIN	MAX

Notes:

Boatnumber: Samplers Name:

APPENDIX B: Sample Species Count Form

Sampler	DepTime	Boat Number	Port	Yr Mo Day		Trip No Samp

Species	Code	Kept	Released/Fate

APPENDIX C: Sample Length Form

Sampler | DepTime | Boat Number | Port | Yr Mo Day | Trip No Samp

South Location ____ to ____ North Location

SPECIES CODE | FATE

SPECIES COMMON NAME

Length / Freq	Length / Freq	Length / Freq	Length / Freq	Length / Freq

SPECIES CODE | FATE

SPECIES COMMON NAME

Length / Freq	Length / Freq	Length / Freq	Length / Freq	Length / Freq

SPECIES CODE | FATE

SPECIES COMMON NAME

Length / Freq	Length / Freq	Length / Freq	Length / Freq	Length / Freq

SPECIES CODE | FATE

SPECIES COMMON NAME

Length / Freq	Length / Freq	Length / Freq	Length / Freq	Length / Freq

SPECIES CODE | FATE

SPECIES COMMON NAME

Length / Freq	Length / Freq	Length / Freq	Length / Freq	Length / Freq

APPENDIX D: Sample Field Notes Form

Trip. #	Departure Time	Boat #	Port	Yr/Mo/Da

LIMITS CAUGHT? Yes ☐ No ☐ DEPTH BOAT NAME. CREW

NOCAL CPFV SPORTFISH SURVEY

**** *FIELD NOTES* ****

1. *PRIMARY CATCH* -

2. *WEATHER* -

3. *COMMERCIAL FISHING* -

4. *FISH* -

5. *MARINE MAMMAL/FISHERY INTERACTION* -

6. *NOTES* -

APPENDIX E. Maximum total length of all species measured in CPFV catch, by port area, 1987 to 1993.

Common name	Observed maximum length (mm) EK[a]	FB	BB	SF	MT	MB	Observed maximum length (in.) EK	FB	BB	SF	MT	MB	Known maximum length (in.)[b]
Rockfishes													
Aurora rockfish	-	-	-	-	350	-	-	-	-	-	13.8	-	15.5
Bank rockfish	-	357	455	503	503	-	-	14.1	17.9	19.8	19.8	-	20.1
Black rockfish	557	475	550	575	465	455	21.9	18.6	21.7	22.6	18.3	17.9	23.75
Black& yellow rockfish	-	309	-	345	358	330	-	12.2	-	13.6	14.1	13.0	15.25
Blue rockfish	470	468	491	527	457	500	18.5	18.4	19.3	20.7	18.0	19.7	21.0
Bocaccio	-	790	889	840	836	756	-	31.1	35.0	33.1	32.9	29.8	36.0
Brown rockfish	451	-	497	504	451	532	17.8	-	19.6	19.8	17.8	20.9	21.5
Calico rockfish	-	-	-	146	-	242	-	-	-	5.7	-	9.5	9.8[c]
Canary rockfish	546	487	687	635	574	503	21.5	19.2	27.0	25.0	22.6	18.8	30.0
Chameleon rockfish	-	-	-	-	368	-	-	-	-	-	14.5	-	17.0
Chilipepper	-	-	556	530	535	512	-	-	21.9	20.9	21.0	20.2	22.0
China rockfish	331	395	416	412	359	422	13.0	15.6	16.4	16.2	14.1	16.6	17.0
Copper rockfish	571	560	519	582*	533	541	22.5	22.0	20.4	22.9*	21.0	21.3	22.5
Cowcod	-	-	771	-	768	686	-	-	30.4	-	30.2	27.0	37.0
Flag rockfish	-	-	410	495	451	440	-	-	16.1	19.5	17.8	17.3	25.0
Gopher rockfish	-	413*	319	425*	385	410*	-	16.3*	12.6	16.7*	15.2	16.1*	15.6
Grass rockfish	-	-	-	455	430	443	-	-	-	17.9	16.9	17.4	22.0
Greenblotched rockfish	-	-	-	-	475	285	-	-	-	-	18.7	11.2	19.0
Greenspotted rockfish	-	399	479	473	461	463	-	15.7	18.9	18.6	18.1	18.2	19.75
Greenstriped rockfish	-	305	392*	408*	397*	356	-	12.0	15.4*	16.1*	15.6*	14.0	15.0
Halfbanded rockfish	-	-	-	183	207	-	-	-	-	7.2	8.1	-	10.0
Kelp rockfish	-	-	-	386	382	414	-	-	-	15.2	15.0	16.3	16.75
Olive rockfish	421	464	508	523	557	560	16.6	18.3	20.0	20.6	21.9	22.0	24.0
Quillback rockfish	556	428	415	480	407	360	21.9	16.9	16.3	18.9	16.0	14.2	24.0
Redstripe rockfish	-	-	311	297	263	-	-	-	12.2	11.7	10.4	-	20.0
Rosy rockfish	312	335	346	353	344	352	12.3	13.2	13.6	13.9	13.5	13.9	14.2
Rosethorn rockfish	-	324	295	263	291	243	-	12.8	11.6	10.4	11.5	9.6	16.0
Sharpchin rockfish	-	-	-	303	-	-	-	-	-	11.9	-	-	13.0
Shortbelly rockfish	-	-	205	-	326*	-	-	-	8.1	-	12.8*	-	13.4[c]
Speckled rockfish	-	-	501	455	463	429	-	-	19.7	17.9	18.2	16.9	22.0
Splitnose rockfish	-	-	-	-	378	374	-	-	-	-	14.9	14.7	18.0
Squarespot rockfish	-	-	280	285	290*	258	-	-	11.0	11.2	11.4*	10.2	11.25

APPENDIX E. (Continued)

Common name	Observed maximum length (mm)						Observed maximum length (in.)						Known maximum length (in.)[e]
	EK[d]	FB	BB	SF	MT	MB	EK	FB	BB	SF	MT	MB	
Starry rockfish	-	340	427	439	449	444	-	13.4	16.8	17.3	17.7	17.5	18.0
Stripetail rockfish	-	-	-	-	313	-	-	-	-	-	12.3	-	15.3
Swordspine rockfish	-	-	-	297	250	-	-	-	-	11.7	9.8	-	12.0
Tiger rockfish	-	336	-	449	305	-	-	13.2	-	17.7	12.0	-	24.0
Treefish	-	-	-	-	-	408	-	-	-	-	-	16.1*	16.0
Vermilion rockfish	545	620	723	662	653	667	21.5	24.4	28.5	26.1	25.7	26.3	30.0
Widow rockfish	345	423	548	520	548	530	13.6	16.7	21.6	20.5	21.6	20.9	21.7[c]
Yelloweye rockfish	655	649	715	680	688	610	25.8	25.6	28.1	26.8	27.1	24.0	36.0
Yellowtail rockfish	515	544	594	573	557	553	20.3	21.4	23.4	22.6	21.9	21.8	26.0
Other Fish													
Blue shark	-	-	-	1560	-	1600	-	-	-	61.4	-	63.0	556.0
Butter sole	-	-	-	-	318	-	-	-	-	-	12.5	-	21.75
Cabezon	560	532	416	661	628	617	22.0	20.9	16.4	26.0	24.7	24.3	39.0
California barracuda	-	-	-	-	-	871	-	-	-	-	-	34.3	48.0
California halibut	-	-	-	900	-	758	-	-	-	35.4	-	29.8	60.0
California sheephead	-	-	-	-	-	525	-	-	-	-	-	20.7	36.0
Chub mackerel	-	447	428	477	521	403	-	17.6	16.9	18.8	20.5	15.9	25.0
Fantail sole	-	-	-	-	363	-	-	-	-	-	14.3	-	21.0
Jack mackerel	-	-	661	713	674	411	-	-	26.0	28.1	26.5	16.2	32.0
Jacksmelt	-	-	-	-	388	-	-	-	-	-	15.3	-	17.5
Kelp greenling	413	386	386	438	483	375	16.3	15.2	15.2	17.2	19.0	14.8	21.0
King salmon	-	800	724	840	917	736	-	31.5	28.5	33.1	36.1	29.0	58.0
Lingcod	985	912	1170	1097	1028	955	38.8	35.9	46.1	43.2	40.5	37.6	52.0
Ocean whitefish	-	-	-	-	519	633	-	-	-	-	20.4	26.1	40.0
Pacific bonito	-	-	-	-	815	-	-	-	-	-	32.1	-	40.0
Pacific hake	-	-	-	504	736	362	-	-	-	19.8	29.0	14.3	36.0
Pacific sanddab	286	-	-	415*	369	343	11.3	-	-	16.3*	14.5	13.5	16.0
Pacific sardine	-	-	-	-	275	-	-	-	-	-	10.8	-	16.0
Petrale sole	-	-	473	495	494	503	-	-	18.6	19.5	19.4	19.8	27.5
Rock sole	-	-	-	478	499	473	-	-	-	18.8	19.6	18.6	23.5
Rubberlip surfperch	-	-	-	-	-	408	-	-	-	-	-	16.1	18.5
Sablefish	-	-	-	525	630	393	-	-	-	20.7	24.8	15.5	40.0
Shortfin mako	-	-	-	-	-	1700	-	-	-	-	-	66.9	156.0
Silver salmon	-	656	-	-	668	-	-	25.8	-	-	26.3	-	38.5

APPENDIX E. (Continued)

Common name	Observed maximum length (mm)						Observed maximum length (in.)						Known maximum length (in.)[g]
	EK[f]	FB	BB	SF	MT	MB	EK	FB	BB	SF	MT	MB	
Spiny dogfish	-	-	-	-	1005	1017	-	-	-	-	39.6	40.0	62.4
Spotted ratfish	-	-	-	-	543	-	-	-	-	-	21.4	-	38.0
Striped surfperch	-	-	-	-	-	243	-	-	-	-	-	9.6	15.0
White croaker	-	-	-	302	301	287	-	-	-	11.9	11.9	11.3	16.3
Wolf eel	-	-	-	1424	1352	1524	-	-	-	56.1	53.2	60.0	80.0
Yellowfin croaker	-	-	-	297	-	-	-	-	-	11.7	-	-	20.1

a. **EK** = Eureka area, **FB** = Fort Bragg area, **BB** = Bodega Bay area, **SF** = San Francisco area, **MT** = Monterey area, **MB** = Morro Bay area

b. Maximum length as reported in Miller and Lea (1972)

c. Don Pearson, National Marine Fisheries Service, Tiburon (pers. comm.)

* Exceeds maximum length as reported in Miller and Lea (1972)

d. **EK** = Eureka area, **FB** = Fort Bragg area, **BB** = Bodega Bay area, **SF** = San Francisco area, **MT** = Monterey area, **MB** = Morro Bay area

e. Maximum length as reported in Miller and Lea (1972)

f. **EK** = Eureka area, **FB** = Fort Bragg area, **BB** = Bodega Bay area, **SF** = San Francisco area, **MT** = Monterey area, **MB** = Morro Bay area

g. Maximum length as reported in Miller and Lea (1972)