

Onboard Sampling of the Rockfish and Lingcod Commercial Passenger Fishing Vessel Industry in Northern and Central California, January through December 1995

***by Paul N. Reilly, Deb Wilson-Vandenberg, Carrie E. Wilson, and
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**Marine Region
Administrative Report 98-1
1998**



Marine Region Administrative Report Series

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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 fifth report in a series presents data collected in 1995, refers to historical data from 1987 to 1994, 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 12 ports, ranging from Fort Bragg in the north to Port San Luis (Avila Beach) in the south. Technicians observed a total of 1829 anglers fishing on 218 CPFV trips. These observed anglers caught 26,197 fish of which samplers determined 22,888 were kept. Over 62% of these fish were caught at Monterey or Morro Bay area ports. Only 18 of 55 species comprised at least one percent of the catch. The top ten species in order of abundance were yellowtail, blue, olive, and rosy rockfishes, lingcod, and canary, widow, gopher, starry, and vermilion rockfishes. Blue and yellowtail rockfishes together comprised approximately 47% of the observed catch. Overall, rockfishes represented 35 species or 64% of the 55 identified species. By number, rockfishes comprised 91.9% of the observed catch.

All CPUE and length data collected since 1987 were partitioned into six location groups for each port area, based on a combination of location, bottom depth, and distance from the nearest port. This allowed examination of indicator trends without potential biases due to non-random trip selection or ontogenetic changes in depth distribution for certain rockfishes. Results indicate that the two primary species in the northern and central California CPFV fishery, blue and yellowtail rockfishes (accounting for 47% of all observed fish in 1995), are in reasonably good condition with no steady declines in either average catch per angler hour or mean length during the last 8 years. The primary species of concern are mainly shallow-water species impacted by a recently expanded commercial hook-and-line fishery or deep-water species (chilipepper and bocaccio) which are fished intensively by the commercial industry and have experienced recent statewide stock declines.

Estimated total rockfish catch, adjusted by logbook compliance rates and on board sampling data, has declined significantly in all port areas since 1992. This is largely attributable to increased recreational fishing effort for salmon as well as coast-wide stock declines in several important commercially fished species.

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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 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 fifth report in a series presents data collected in 1995, data summaries from 1987 to 1995, and refers to historical data from 1987 to 1994. This report documents trends by port area in species composition, angler effort, catch, and, for selected species, catch per unit effort (CPUE), mean length and length frequency. In addition, total catch and effort estimates are presented based on adjustments of logbook data by sampling information.

Before 1987 catch information was primarily obtained 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.

CPFV operators are required by law to record total catch and location for all fishing trips in logbooks provided by the California Department of Fish and Game (CDFG). 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. In addition, regulations permitting the filleting of most fish species on board CPFVs at sea render dockside species identification and measurement impossible. Thus, there is a strong need to collect catch information on board CPFVs at sea. However,

this project never reports locations of specific fishing sites due to their confidentiality.

In May 1987 the Central California Marine Sport Fish Project began onboard sampling of the CPFV fleet in the Monterey area. In 1988 sampling was expanded to the Fort Bragg, Bodega Bay, San Francisco, and Morro Bay areas and continued until June 1990. Sampling resumed in August 1991 and continued until March 1995. Limited data were collected in May and June 1995 with the assistance of the Marine Recreational Fisheries Statistics Survey (MRFSS). Project sampling resumed in July and continued until December 1995. The program depends on the voluntary cooperation of CPFV owners and operators.

METHODS

Study Area

Angler catches on board central and northern California CPFVs were sampled from 12 ports, ranging from Fort Bragg in the north to Port San Luis (Avila Beach) in the south (Figure 1). Since the project began, data have been collected at fishing locations ranging from off Crescent City (ca. lat. 41°50'N) to Purisima Point (ca. lat. 34°45'N), a distance of approximately 425 naut. mi., and out to approximately 100 fm. In 1995 Fishery Technicians, hired under contract with the Pacific States Marine Fisheries Commission (PSMFC), Department of Fish and Game Scientific Aids, and project biologists conducted all onboard sampling of catches. The following ports or port groups were sampled in 1995: 1) Fort Bragg (**FB**); 2) Bodega Bay and Dillon Beach (**BB**); 3) Princeton (Half Moon Bay), Berkeley, Emeryville, and Point San Pablo (**SF**); 4) Santa Cruz and Monterey (**MT**); 5) San Simeon, Morro Bay, and Port San Luis (**MB**).

The number of cooperating CPFVs per port area ranged from 4 to 16. Trips were usually one-half or one full day; the latter typically departing at 0700 and returning by 1600. The

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2- or 3-day weekend trips occasionally operating from Morro Bay were not sampled in 1995.

Trip Selection

Trips were selected on a random basis from a complete list of rockfish/lingcod CPFVs for each port area. CPFV operators were telephoned and asked if a trip was available. If the boat was either unavailable or full to capacity, or if the sampler was refused passage, successive boats on the list were contacted until a trip was secured. When the sampler began scheduling the next trip, the next boat on the list was contacted first.

Sampling Procedures

Samplers were initially trained in marine fish species identification. Each sampler was equipped with foul-weather gear, gloves, clipboard, waterproof data sheets, fish length measuring board, lead pencils, and field guides to California marine fishes. At the start of each trip, the sampler asked the vessel operator for the number of paid and free anglers (the latter was increased if the captain and/or deck hand(s) 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 a standard sampling form.

When the vessel arrived at the first fishing location, the sampler chose a reasonable number of anglers to observe throughout the trip and recorded this number (usually less than 15). In most cases, this was less than the total number of anglers. The sampler then recorded bottom depth, the time when fishing lines were lowered, the number of observed and total anglers, and either latitude and longitude, LORAN coordinates, or compass bearings to land. When the last observed fishing line was raised, signifying the end of a "drift", time and occasionally depth were

again recorded and the process was repeated throughout the day. New location coordinates or bearings were obtained only when the sampler determined that the vessel had moved to a different location, as defined under 'Shoreside Data Processing'.

Samplers observed anglers in the stern half of the vessel, where a larger sample size could be obtained. An assumption in our sampling methodology, proven statistically in 1993 (Wilson-Vandenberg et al. 1995), is 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. To avoid sample bias, samplers were careful not to influence the fishing activity of observed anglers. Samplers 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. The ultimate fate of each observed fish was recorded as either kept, released, used as bait, or unknown. If the fish was released, the sampler attempted to determine if it survived or died (in the latter case, it was usually consumed by a pelican or gulls). The combined catch by species for all observed anglers was recorded on one data sheet; individual catches per angler were not recorded.

All observed fish were recorded separately by location. If the sampler could not determine whether one location differed 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 sampler 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. Fork length was measured for mackerel species. 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 kept 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 mammals. Lingcod length and sex data, and fin rays were collected for a cooperative study with the National Marine Fisheries Service whenever possible.

Use of MRFSS Samples

The Marine Recreational Fisheries Statistics Survey (MRFSS), a federally-funded survey emphasizing catch statistics and demographics, was used to supplement our database from May to July. We were unable to sample some or all port areas during this time due to budget reductions or a hiring freeze. MRFSS samplers generally observed five anglers per trip and recorded information, using our standard procedures, on fishing time, location, depth, and species observed and their fate. However, all measurements of fishes were in fork length as prescribed by MRFSS sampling protocol. In order to make these data comparable, we converted fork lengths to total lengths for rockfishes using regressions from Echeverria and Lenarz (1984). For lingcod length conversions we used a regression developed from our own data:

$$TL = -14.21 + 1.0439 FL$$

For other fishes in which fork length did not equal total length and regressions were not available, length data were not used.

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 at least 0.5 naut. mi. apart. For depths from 20 to 40 fm, location centers were at least 1.0 naut. mi. apart. Location centers in depths greater than 40 fm were at least 2.0 naut. mi. apart.

All fish measurements on the measuring board were determined to the nearest mm and transferred to length data forms by species. At this time, all species' length data were assigned either a single location code or a range of location codes.

Data Entry and Analysis

Data were entered into dBASE databases by field samplers using a C program and were edited first by field samplers and again in Monterey by project biologists. Data analyses, 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 as 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 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 and CPAH of selected sport fishes relative to distance from port and depth, fishing locations were assigned one of the following six categories: I)

near/shallow (NS); ii) near/mixed (NM); iii) near/deep (ND); iv) distant/shallow (DS); v) distant/mixed (DM); or vi) distant/deep (DD). 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. Shallow and deep fishing locations were defined as ones in which all observed depths during all sampled trips were less than or greater than 40 fm, respectively. A mixed location was defined as one in which minimum depth was less than or equal 40 fm and maximum depth was greater than or equal to 40 fm. For the period 1987-1995, the historic depth range of locations was used for comparisons.

This two-stage partitioning was based on Miller and Geibel (1973). More than two decades ago, they found that 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. They also reported a change in rockfish species composition north of Point Arguello (lat. 34°35'N) at approximately 240 ft (40 fm).

In examining differences in depths fished by trip among port areas for any single year, locations were defined by depths observed only in that year. Thus an historic mixed depth location could be considered as deep or shallow for this comparison.

Use of Cluster Analysis in Identifying Trends in CPAH from the Monterey Area

In a Department of Fish and Game Technical Report (Sullivan 1995), CPFV fishing locations within the Monterey/Santa Cruz port area were grouped by similarities in observed species, using either of two cluster analysis techniques: Pearson Product-Moment Correlation Coefficient and Kendall's Tau Ranking Coefficient. Subsequent analyses

calculated annual mean CPAH and standard deviation by location group for the most frequently observed rockfish species. Means were weighted by angler effort per trip visit. A trip visit was defined as an observed trip to a location within a particular clustered group. Data from 1990 and 1991 were combined because each year was partially sampled with no overlap of months, and most months were represented.

In 1995 additional locations were added to the location groups identified in Sullivan (1995). Because these locations were all within the respective geographical boundaries defined by the original groups, sample size for each group increased and comparative tests of mean CPAH became more powerful. The additional locations were omitted in the original cluster analysis due to a low frequency of trip visits. For eight midwater and eight benthic species, mean CPAH by location group was then compared among the years 1987-1995 using ANOVA, followed by Bonferroni T tests to identify specific years of significance. Five Pearson location groups were examined for midwater species, and three Pearson and four Kendall's Tau location groups were examined for benthic species. We will present only those location groups and species with significant differences ($p \leq 0.05$) in mean CPAH involving 1994 and 1995 data. Use of cluster analysis essentially stratifies our random sampling of CPFVs and fishing locations and reduces the variability in CPAH estimates by eliminating effort in areas where a particular species occurs infrequently or not at all.

Length Frequency Histograms

Length frequency histograms for 1995, by species and port area, were generated for samples of at least 20 fish. Note that the Y-axis scale is not consistent among graphs. Total length intervals of either 5 or 10 mm were 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.

Estimated Total Catch and Effort

CPFV operators are required to submit logs every month for 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 CDFG's mainframe computer for 1995 to estimate total catch and effort for all marine sport fish caught on rockfish and 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.

We used two criteria to eliminate trips targeting other species (e.g. sturgeon, striped bass, or salmon). 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. We assumed that this type of trip was likely targeting salmon rather than rockfish. We feel confident that these criteria were successful in establishing a more representative database.

The logbook data contain one two-day trip taken from the Morro Bay area. To standardize this trip relative to total number of angler days, number of anglers was doubled

before data were analyzed.

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 areas in this study; Crescent City, Eureka, Pt. Arena, Shelter Cove, and Trinidad (Figure 1) constituted the Northern California group.

Based on these log data summaries are presented for northern and central California ports detailing total numbers of kept fish, rockfish, lingcod and other fish, angler days, trips, 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. In the Monterey area, we determined that CPFVs which allowed samplers on board had a substantially different compliance rate than those which did not allow samplers on board; an overall compliance rate was developed based on a combination of our knowledge of relative fishing effort of individual vessels and the percentage of observed trips for which logs were received. For the Fort Bragg area sample size was small and we did not determine compliance rate.

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. Summaries are also presented with total estimates adjusted

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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 and Fort Bragg port groups due to an insufficient number of sampled trips.

Additional tables are presented by port area with adjusted total CPFV catch estimates by species for the most important rockfishes and lingcod. The rockfish catch estimates were developed by partitioning the total estimated rockfish catch by the percent frequency observed for each species from sampled trips.

RESULTS AND DISCUSSION

Total Observed and Measured Catch and Catch Per Angler Effort

In 1995 samplers observed 1829 anglers who fished for 5757 hr on 218 CPFV trips, partitioned by port area as follows: Fort Bragg, 7 trips; Bodega Bay, 12 trips; San Francisco, 60 trips; Monterey, 71 trips; Morro Bay, 68 trips. Seventeen of these trips, thirteen in the Monterey area and four in the Fort Bragg area, were observed by MRFSS samplers. The total observed catch of 26,197 fish represented 53 species, 34 of these being rockfishes (Appendix 1). CPAD for all fishes averaged 14.3, and CPAH for all fishes averaged 4.6. Both values were the highest observed since 1988 (Table 1) but may have been influenced by the scarcity or absence of observed trips from April to June, particularly in the San Francisco area; there the average catch rate for those months was 20% lower than the rest of the year. No trends were apparent in average CPAD or average CPAH in any of the five port areas from 1987 to 1995.

In 1995 observed anglers retained 22,888

fishes, or 87.4% of the total catch. CPAD for kept fishes averaged 12.5, within the range from previous years but near the previously observed maximum in 1992. The San Francisco area had the highest average CPAD while the Morro Bay area had the lowest. The Morro Bay area has a higher frequency of half-day trips than areas to the north and this tends to lower CPAD in this area compared with other port groups.

CPAH for kept fishes averaged 4.0, equal to the previous maximum observed in 1992. The Bodega Bay area had the highest average CPAH while the Morro Bay area had the lowest.

Samplers measured 35,485 fish representing 49 species (Appendix 1). Approximately 1300 of these fish were measured as fork length by MRFSS samplers and subsequently converted to total length. Summary data are presented in Appendices 2 through 11 concerning average CPAH and mean length by port area and year partitioned by locations based on bottom depth and distance from port. Important trends will be discussed in the Port Area Summaries section. Appendices 12-30 contain histograms, by species and port area, for lingcod and the 18 most frequently measured rockfish species in 1995. In most cases, histograms are included only to provide a continuing time series of data. Notable results will be discussed when appropriate. An updated list of maximum lengths by port area for all species measured since 1987 is presented in Appendix 31.

Average Fishing Time

Average fishing time for 1612 observed CPFV trips since 1987 has ranged from 2.6 hr in the Fort Bragg area to 3.4 hr in the San Francisco area (Table 2). No port area demonstrated a trend of increasing average fishing time, an encouraging sign.

Trends in Fishing Effort

Distance from Port

The Fort Bragg, Monterey, and Morro Bay areas continued to be characterized by a high percentage of observed trips to locations within 10 miles of port, while the opposite was true for the Bodega Bay and San Francisco areas (Table 3). The only apparent trend was in the San Francisco area, where the frequency of observed trips to near locations declined steadily since 1992, a reversal of a trend from 1988 to 1992.

Depth

A decrease in frequency of trips to deep fishing locations by CPFV operators may be in response to one or more factors: 1) improvement in angler success in shallow areas; 2) depth changes of schooling rockfishes to shallower water due to ocean temperature decreases following El Niño events; and 3) lower availability of desirable offshore rockfish species such as chilipepper and bocaccio.

In 1995 the frequency of observed trips to deep locations in all port areas was below long-term means (Table 4). In 1992, coinciding with the onset of a major El Niño, the opposite was true except in the Fort Bragg area. Since the 1990-91 period, the Monterey area has shown a steady decline, from 72% to 25%, in the frequency of observed trips to deep locations. This may be due in part to a decline in the availability of chilipepper, a targeted deep-water species. In addition, bocaccio stocks appear to be in a state of general decline throughout their range in California. Catch rate for yellowtail rockfish in the Monterey area at Near Shallow locations steadily improved from 1989 to 1995 and at Distant Shallow locations in 1995 was the highest ever observed (Appendix 8).

Single-location Trips

The frequency of trips to single locations may be considered an indicator of CPFV angler success. However, CPFV operators may intentionally visit multiple locations to ease fishing pressure at favorite sites or to provide a variety of species for anglers. In 1995 observed frequency of single-location trips was below historic averages for all port areas and in the Morro Bay and Fort Bragg areas was the lowest ever recorded. This may be indicative of declining productivity in some frequently-fished locations. However, in light of the relatively high catch rates in general for 1995, this does not appear to be the case.

Port Area Summaries

Fort Bragg Area

Species Composition and Percentage

Retained by Species In the Fort Bragg area twelve species comprised 95% of the observed catch (Table 6). Blue, yellowtail, black, and canary rockfishes accounted for 69% of the observed catch. Overall species composition was 90% rockfishes by number, and lingcod comprised 4% of the observed catch. Eighty-six percent of all observed fishes were kept by anglers; the relatively low retention rate for black rockfish (76%) is an encouraging sign in that a goal of this project since 1994 has been to promote a catch-and-release program for black rockfish less than 355 mm (14.0 in.).

Analysis of Partitioned Location Groups

Sufficient data from the 1988-95 period were available only from the Near Mixed group to examine possible trends in average CPAH and mean length (Appendices 2 and 3). Only four species: blue, yellowtail, canary, and rosy rockfishes, were observed at frequencies ≥ 10 in most years. No trends were apparent in catch rate, although blue rockfish CPAH was above average for the past 2 years. Mean length declined considerably from before 1990 to 1995 for blue, yellowtail and canary rockfishes and may be cause for concern.

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However, the lack of a corresponding declining trend in catch rates indicates that the trend in mean length may be related to increased recruitment.

Between the two shallow-location groups, overall CPAH for DS blue and black rockfishes were 84% and 51% greater, respectively.

There was no consistent relationship indicating larger fish were found at greater distances from port. When comparing near and distant locations within a depth stratum, species such as black, canary, vermilion, and yellowtail rockfishes (shallow) and olive rockfish (mixed) were substantially larger at distant locations (Appendix 3). However, some of these same species, including olive rockfish (shallow) and yellowtail rockfish (mixed) were larger at near locations.

A general concern in all port areas is the scarcity of adult black rockfish in the sampled CPFV catch (Appendix 22). Length at 50% sexual maturity is 360 mm for males and 410 mm for females (Wyllie-Echeverria 1987).

Bodega Bay Area

Species Composition and Percentage

Retained by Species In the Bodega Bay area 13 species comprised 95% of the observed catch (Table 7). Yellowtail and blue rockfishes comprised about 60% of the observed catch, and chilipepper were under-represented compared with previous years. The latter is likely an artifact of sampling, as only two deep-water trips were observed during January to April when chilipepper are caught most frequently in this area (Wilson-Vandenberg et al. 1995). Overall species composition was 92% rockfishes by number, and lingcod comprised almost 6% of the observed catch. Black rockfish ranked fourth, the highest rank observed since 1988. Yelloweye rockfish increased slightly in relative importance from the previous year but have not ranked in the top ten since 1989. On the other hand, widow

rockfish retained their relatively new importance. In 1988 and 1989 this species ranked 23rd and 13th, respectively, while from 1992 to 1995 it consistently ranked in the top seven species.

Retention rate for all observed fishes was 96%, the highest among all port areas. Among the most frequently observed rockfishes, only blue, rosy, and greenspotted had retention rates less than 95%.

Analysis of Partitioned Location Groups

Four of the six groups (NS, DS, DM, and DD) were fairly well represented (Appendices 4 and 5).

Shallow Declining trends in CPAH were apparent for NS yellowtail and brown rockfishes. However, CPAH for DM and DD yellowtail rockfish were the highest ever observed, so the trend in shallow water for this species may be related to changes in distribution rather than abundance.

DS brown, China, copper and gopher rockfishes, cabezon, and kelp greenling were observed much less frequently from 1992 to 1995 than from 1988 to 1991. Average CPAH for these six species combined was 0.56 from 1988 to 1991 and 0.13 from 1992 to 1995, a decline of 77%. Although all of these species except brown rockfish are minor components of the CPFV fishery, this trend is of concern and may be related to the expansion of the commercial hook-and-line fishery in nearshore waters in the late 1980s. NS and DS brown rockfish average CPAH declined by 67% and 92%, respectively from 1988-91 to 1992-95. This species ranked 6th in overall importance in the CPFV fishery in the earlier period and dropped to rank 13 in 1994 and rank 22 in 1995.

Shallow-water species (black, blue, and brown rockfishes) demonstrated generally declining trends in mean length during the past eight years in one or both of the shallow-location groups (Appendix 5). It is likely that the declining trend for blue rockfish is

recruitment-related and therefore is not a cause for concern. From 1989 to 1994 **DS** catch rate increased dramatically while mean length declined 17%. In 1987 and 1988, young-of-the-year blue rockfish were of relatively high abundance in central California (Ralston and Howard 1995) and began recruiting to the fishery in 1992 and 1993, respectively.

Catch rates for **DS** black rockfish showed no trend but the decline in mean length is cause for concern due to the scarcity of adults in the sampled catch (Appendix 22). Brown rockfish catch rates and mean lengths both have shown declining trends since the late 1980s. This species is targeted in the commercial live-fish fishery and these trends warrant concern. Sample size for measured China, copper, and gopher rockfishes, cabezon, and kelp greenling were insufficient to examine trends in mean length.

When comparing **NS** and **DS** location groups for all years combined, overall average CPAH was greater in the latter for blue and black rockfishes, while the opposite was true for most other important species, including brown, canary, and yellowtail rockfishes. All but two of the most frequently-observed species showed greater mean lengths in the Distant Shallow group, and differences for China and copper rockfishes exceeded 10%. Differences in mean length are probably the best indicators of fishing pressure relative to distance from port.

Distant Mixed Declining trends in mean length were observed for greenspotted and yellowtail rockfishes. No corresponding trend in declining catch rate was evident for yellowtail rockfish, but greenspotted rockfish CPAH has been below average for the past 3 years. Thus there is some indication of stress on this species in the Cordell Bank area, the primary location of capture.

On the positive side, in 1995 yellowtail rockfish and lingcod showed the highest catch rates ever recorded in this location group.

Distant Deep Only **DD** yelloweye rockfish showed a long-term, general decline in CPAH; average catch rate was 70% lower in the 1993-95 period than in 1988-92. Number of fish measured was insufficient to reveal any trend in mean length. Mean length of greenspotted rockfish declined 7% from 1988 to 1994, and catch rate during the last 2 years was well below average, consistent with **DM** trends.

Although there is general concern about a stock decline of chilipepper in California (D. Thomas, CDFG, Menlo Park, pers. comm.), data since 1988 show no apparent decline in catch. Annual average CPAH showed high variability and the highest value occurred in 1994.

San Francisco Area

Species Composition and Percentage Retained by Species In the San Francisco area, 15 species comprised 95% of the observed catch (Table 8). Yellowtail, blue, and olive rockfishes were the three most frequently observed species, comprising 59% of the observed catch. Olive rockfish had the highest rank (3) observed since sampling began in 1988. Overall species composition was 92% rockfishes by number, and lingcod comprised 5% of the observed catch, both similar to the previous year. Greenspotted rockfish declined sharply from rank 6 in 1994 to rank 18 in 1995, no doubt due in part to the lowest observed frequency of trips to deep locations where this species is common. Quillback rockfish, an infrequently observed species, reached its highest-ever rank at 12; this and the importance of olive rockfish were related to the relatively high percentage of observed trips to the Farallon Islands in 1995.

The San Francisco area had a retention rate of 88% for all observed fishes compared with 95% in 1994. The lowest observed retention rate for lingcod (60%) was partly responsible for this decline and is related to increased recruitment of several year classes of juveniles

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for this species. Eighty percent of black rockfish were retained, compared with 93% in 1994. This is an encouraging sign relative to our voluntary catch-and-release program, especially considering the lower catch rates at shallow locations compared with 1994.

Analysis of Partitioned Location Groups No locations in the San Francisco area qualify as Near Deep. In addition, insufficient data exist to examine trends in CPAH and mean length in the Distant Deep group.

Shallow NS canary rockfish and DS widow rockfish (Distant Shallow) were observed infrequently from 1993 to 1995 compared with the previous years (Appendix 6). Since these two species are more commonly observed at mixed locations and 1995 CPAH values were relatively high there, the shallow location group trend may be distributionally related.

Among the shallow-water species in 1995, the highest annual average CPAH was observed for DS olive rockfish. Too few NS brown or gopher rockfish were observed caught since 1988 for these species to be included in Appendix 6. Total observed angler effort in this group was 95.9 hr from 1988 to 1991 and 220.3 hr from 1992 to 1995. CPAH for brown and gopher rockfishes declined by 82% and 92%, respectively, from the 1988-91 period to the 1992-95 period. Similar to the Bodega Bay area, this may be related to increased nearshore commercial hook-and-line effort and is cause for concern. Insufficient sample size prevented analysis of trends in mean length in this group.

DS black rockfish, cabezon, and kelp greenling showed generally declining mean lengths since 1988 (Appendix 7). Mean length of cabezon in 1995 was 405 mm and was approaching the length at 50% sexual maturity of 390 mm (O'Connell 1953); this is cause for concern. Although corresponding declines in average catch rate were not apparent, concern is still warranted for black rockfish due to the scarcity of adult fish in the sampled catch

(Appendix 22).

On a positive note, the resilience of gopher rockfish was apparent. This was the fourth most frequently measured DS benthic species and mean length varied by only 6% during eight years of sampling.

For blue rockfish, one of the most important species in the CPFV fishery, overall average NS CPAH was much higher than DS CPAH. Among other important species, CPAH was higher for DS lingcod and black rockfish. Although sample size was small for measured fish in the NS group, mean length for all of the frequently observed species except blue and black rockfishes was greater in the DS group compared with the NS group.

Mixed No species demonstrated declining trends in both average catch rate and mean length during the 8-yr period (Appendices 6 and 7). In the DM group, only yelloweye rockfish showed a declining trend in CPAH; since 1992 CPAH has been below the long-term average. In 1995 the highest annual average CPAH was observed for DM blue, canary, olive, and vermilion rockfishes, and NM canary, rosy, starry, vermilion, and yellowtail rockfishes. Similar to other port areas, in 1995 lingcod CPAH was relatively high. In 1995 the lowest annual average CPAH was observed for NM brown rockfish (0.01, two fish observed).

Mean length of greenspotted and starry rockfishes have declined in both groups in the last 4-6 years, but NM catch rates have been above average for the last 2 years, suggesting increased recruitment. Mean length of NM yellowtail rockfish group has been remarkably uniform since 1988, varying by only 3%. With the exception of 1994, blue rockfish mean length ranged from only 312 to 318 mm during the same period. This suggests a remarkable resiliency for the two most heavily fished species in the CPFV fishery.

DM blue rockfish mean length has declined 12% since 1988 and has been fairly similar to

the NM mean since 1992.

Between the two mixed location groups, CPAH was higher for DM lingcod and greenspotted, olive, rosy, and starry rockfishes and NM blue, vermilion, and yellowtail rockfish. For the 16 species listed in both groups in Appendix 6, all but lingcod yielded greater overall mean lengths in the DM group compared with the NM group. Differences equaled or exceeded 10% for bocaccio and China, olive, rosy, starry, vermilion, and yellowtail rockfishes.

Monterey Area

Species Composition and Percentage Retained by Species In the Monterey area 19 species comprised 95% of the observed catch (Table 9) and reflect the greatest catch diversity among port areas for important species. Yellowtail and blue rockfishes comprised 45% of the observed catch; for the first time since 1987, chilipepper was not among the three most frequently observed species, yielding to olive rockfish. Overall species composition was 87% rockfishes by number, the lowest among port areas, and lingcod comprised 4% of the observed catch. Widow rockfish and bocaccio increased in relative abundance compared with 1994 but were still under-represented compared with earlier years. Chub mackerel achieved the highest rank ever recorded (6), reflecting both increased availability and a trend toward more observed trips where live bait was used. Black rockfish declined from rank 10 in 1994 to rank 24.

The Monterey area had the lowest overall retention rate among all port areas (83%), primarily due to the occurrence of live-bait fishing. Pacific sanddabs, chub mackerel, jack mackerel, and Pacific sardines were caught frequently and subsequently used as bait. The exclusion of these species yielded an overall retention rate of 89%, comparable to the San Francisco and Morro Bay areas. Other species

with relatively low retention rates included rosy rockfish (78%), squarespot rockfish (51%), and lingcod (54%). The former two species rarely exceed 300 mm (11.8 in.). The retention rate for lingcod (54%) was the second lowest observed since 1987 and reflects increased recruitment of juveniles to the fishery.

Analysis of Partitioned Location Groups In general 1995 was a good year in terms of angler success. Highest observed catch rates occurred for lingcod (NM) and many important rockfishes, including yellowtail (NM, ND, DS, and DM), canary (NM, ND, and DS), olive (DS and DM), rosy (NM, ND, and DM), starry (ND), vermilion (NM), gopher (NM), and yelloweye (DD).

Shallow Annual observed totals of cabezon, brown and China rockfishes were insufficient to include in Appendix 8. However, when combining years these three species showed substantial declines in average CPAH from the 1987-91 period to 1992-95. Average CPAH of NS brown and China rockfishes declined 63% and 80%, respectively. For DS cabezon and China rockfish average CPAH declined 56% and 86%, respectively, between the same periods. While these three species are minor components of the CPFV fishery, these declines are still cause for concern and may be related to increasing nearshore commercial hook-and-line fishing during that time.

No trends in length were found for blue rockfish, the only NS species with sufficient data for comparisons (Appendix 9). DS lingcod showed a generally declining mean length for the 9-year period, but this is likely related to increased recruitment, particularly during the past 2 years, and thus is not a cause for concern. Sample size was insufficient for cabezon and brown and China rockfishes to examine trends in mean length.

On the positive side, average CPAH of NS blue rockfish, one of two primary species in the fishery, was remarkably constant for 7 of 9

Rockfish and Lingcod Catches from CPFVs, 1995

years, varying by only 13%. Catch rates for DS blue rockfish and for the other primary species in both groups, yellowtail rockfish, were above average in 1995. Lingcod showed higher overall CPAH in the distant group, while blue and yellowtail rockfishes, both schooling species, had substantially higher catch rates in the near group.

All frequently measured species had greater mean lengths (all years combined) in the distant group. Differences in mean length between the near and distant groups exceeded 10% for copper, vermilion, and yellowtail rockfishes.

Mixed The two mixed location groups comprise our largest data set among all port areas, with 47,400 observed fish in 9 years. Only NM widow rockfish and bocaccio exhibited generally declining trends in CPAH. Since 1992 average catch rates were below the long-term average and in the past 2 years were the lowest ever recorded. Average CPAH in the 1993-95 period for widow rockfish and bocaccio declined by 70% and 48%, respectively, from 1987 to 1992. In addition CPAH for DM chilipepper declined from a high of 2.64 in 1987 to 0.10 in 1995. This warrants concern as these species are major components of the commercial fishery and these trends may reflect overall stock declines throughout California.

Several NM species, including lingcod and blue, yellowtail, greenstriped, and greenspotted rockfishes, exhibited recent short-term trends of declining mean length, but these may be recruitment related as average CPAH was relatively high during the same period. Starry rockfish have shown a gradual decline in mean length since 1987 of approximately 9% while catch rates have been fairly steady during the past 4 years.

Two DM species, widow and yellowtail rockfishes, demonstrated extremely high variability in annual mean length, ranging from 267 to 418 mm and 296 to 415 mm,

respectively (Appendix 9). This may be related to a separation of cohorts in the population as well as the greater mobility of these cohorts which may make them available only sporadically to anglers. Similar to the NM group, lingcod and greenspotted rockfishes exhibited a short-term recent trend of declining mean length. However, a similar trend for bocaccio is cause for concern in light of the corresponding decrease in catch rate.

Deep The two deep location groups comprise our second largest data set, with more than 43,600 observed fish. ND and DD chilipepper exhibited steady declines in CPAH. Average CPAH for the 1994-95 period declined 73% and 95%, respectively, from 1987-93 for these two groups. ND mean length had declined steadily from 1989 to 1994 but in 1995 was above the long-term average. In general, this combination of factors is cause for concern and is likely a reflection of an overall stock decline in California.

In both deep location groups, CPAH for bocaccio was below the long-term average for the past 3 years. However, no trend of declining mean length was apparent so the concern expressed for the mixed depth groups does not apply here. Widow rockfish CPAH was highly variable but in ND group was well below average for the past 2 years. A recent trend of above average catch rates continued for greenspotted rockfish in both deep location groups.

In both groups canary rockfish have shown a general trend of declining mean length over the 9-year period. However, catch rates have been above average during the last 3 years and thus the length trend may be recruitment related.

Use of Cluster Analysis in Identifying Trends in CPAH from the Monterey Area Midwater species Two species in two location groups demonstrated significant differences in weighted mean CPAH among the years 1987

to 1995 (Table 10). In the relatively shallow location group "Blue," olive rockfish CPAH was significantly greater in 1992 than in 1987, 1988, and 1994 ($p < 0.001$); thus there is no consistent trend during the entire 9-year period.

In the "Blue" group, yellowtail rockfish CPAH was significantly lower in 1993 than in 1988 and 1995 ($p < 0.001$). We believe that this is related to a physiological response of this species to move from shallow, relatively warm water during the 1992-93 El Niño event in central California to deeper water. As El Niño conditions weakened in 1994 and 1995, fish returned to shallower water. In support of this theory is the significant difference ($p < 0.05$) observed in mean CPAH in the deeper "Yellowtail" group in 1992 (high catch rate) and 1994 (low catch rate).

Benthic species Three species in three location groups demonstrated significant differences in weighted mean CPAH among the years 1987 to 1995 (Table 11). Although the Bonferroni test did not identify individual years contributing to the overall significant difference ($p < 0.03$) in mean CPAH for "South Shallow" gopher rockfish, the trend towards a higher catch rate in the later years was an encouraging sign. Mean CPAH for rosy rockfish in the "Rosy" group was significantly greater ($p < 0.01$) in 1995 than in 1988. For vermilion rockfish in the "South Shallow" and "Shelf Flats" groups, the significant differences ($p < 0.01$ and 0.005 , respectively) showed greater means in the more recent years, again an encouraging sign.

Although the partitioning of locations into six groups does not allow the statistical comparisons of cluster analysis, it does provide a type of stratified sampling for analyzing trends in important species only in those areas where they frequently occur. All of the results presented with cluster analysis were also apparent in the partitioned groups for the Monterey area, even though the locations were

grouped somewhat differently.

Morro Bay Area

Species Composition and Percentage

Retained by Species In the Morro Bay area 13 species comprised 95% of the observed catch (Table 12). As with all previous complete years sampled, blue and yellowtail rockfishes were the two most frequently observed species and comprised 46% of the observed catch in 1995. Overall species composition was 94% rockfishes by number, highest among all port areas; lingcod comprised 4% of the observed catch. Compared with other ports, few substantial changes in relative abundance of important species were noted when compared with previous years. For example, gopher and vermilion rockfishes have consistently ranked among the top six species since 1988. Among the ten most frequently observed species in 1995, brown rockfish replaced bocaccio when compared with the previous year.

The Morro Bay area had an overall retention rate of 89%, compared with 95% in 1994, and among those rockfish species with at least 20 individuals observed, only black, rosy and greenstriped were kept at frequencies less than 90%. The decline in retention rates appeared to be distributed among many species, including blue, yellowtail, gopher, starry, and olive rockfishes and may be related to increased availability of newly-recruited individuals. Similar to previous years, lingcod had the lowest retention rate (35%), and thus the highest percentage of sub-legal sized fish among all port areas. The last two years have produced the lowest retention rates observed in the Morro Bay area since 1988 and along with an increasing catch rate from 1993 to 1995, suggest increased recruitment to the fishery of juvenile lingcod.

Analysis of Partitioned Location Groups All groups were represented, but numbers of fish observed or measured were low and trips were not sampled in all years in the two deep

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location groups (Appendices 10 and 11).

Shallow Generally declining trends in CPAH were apparent only for DS China and black rockfishes. Average CPAH declined by 77% and 74%, respectively, from the 1989-92 period to 1993-95. These species are caught in the nearshore commercial hook-and-line fishery, which expanded in the late 1980s. However, mean length did not decline concurrently and in 1995 was above the overall average for both species.

Gopher and brown rockfishes, important in both sport and commercial fisheries, did not show long-term declines in catch rate in the shallow groups. In fact, these species showed dramatic improvements in DS CPAH from 1993 to 1995, reversing shorter-term declines previously observed. Average CPAH more than doubled in this 3-yr period, primarily due to angler success south of Port San Luis. However, these species exhibited moderate declines in NS CPAH since 1992.

It is notable that overall average DS catch rates for many important benthic rockfishes (brown, copper, gopher, and vermilion) caught by the CPFV fishery were higher than corresponding NS values (Appendix 11).

Recent short-term declines in mean length for NS blue and yellowtail rockfishes and for DS blue rockfish may be recruitment related, as average catch rates were relatively high since 1992 or 1993. For example, mean length of DS blue rockfish declined by 6% from 1993 to 1994 but the catch rate doubled. DS yellowtail rockfish exhibited extreme variability in annual mean length, ranging from 244 mm to 357 mm.

Among the four primary midwater species in the shallow groups, blue and yellowtail rockfishes had higher overall average CPAH in the near group while black and olive rockfishes had higher values in the distant group. All of these species were larger on average in the distant group.

Mixed The NM group is the largest database

in the Morro Bay area, with 31,000 observed fish. No generally declining trends in CPAH were apparent among the most important species (Appendix 10). Several species, including blue, starry, widow, and yellowtail rockfishes showed short-term declines beginning from 1990 to 1993 in mean length in the NM group (Appendix 11). However, catch rates were generally above average during this time and the declines in mean length may be recruitment related.

Concern is warranted for two species, bocaccio since 1990-91 and greenspotted rockfish since 1993. Both species exhibited a combination of a declining mean length and average catch rate in the NM group. DM bocaccio and greenspotted rockfish exhibited gradual declines in average CPAH from 1990-91 or 1992. Bocaccio CPAH declined 88% from 1990-91 to 1995, and for the past 3 years greenspotted rockfish CPAH was well below the long-term average. Although few DM greenspotted rockfish were measured since 1992, mean lengths were below the overall mean. Since mean length of bocaccio showed remarkably low variability in 5 of 6 years, ranging from only 490 to 499 mm (Appendix 11), concern for this species is more localized.

Catch rates for two NM benthic species, copper and gopher rockfishes, demonstrated relatively low variability. Average CPAH for copper rockfish ranged from 0.10 to 0.13 for the 8-yr period, and for gopher rockfish the range was 0.12 to 0.18 (Appendix 11). Furthermore, annual mean length of gopher rockfish in this group has varied only 5% since 1988, ranging from 260 to 273 mm (Appendix 11).

The strong 1985 year class of vermilion rockfish began recruiting to the sport fishery in 1988 (Reilly et al. 1993) and has provided exceptionally good fishing opportunities for Morro Bay area anglers. Seventy-four percent of all NM vermilion rockfish were observed on Morro Bay area CPFV trips. Mean NM

vermilion rockfish length increased 29% from 1988 to 1992 and gradually declined thereafter. Average CPAH peaked in 1989 and since 1992 has gradually declined. However, the combination of a declining average catch rate and mean length since 1992 appears to be a natural response to a declining strong year class and thus is not necessarily a cause for concern.

No consistent pattern was evident when comparing overall average CPAH by species for the NM and DM groups. For many of the most important species, including lingcod and canary, vermilion, widow, and yellowtail rockfishes, differences were minor. Only bocaccio and greenspotted and olive rockfishes showed substantially higher CPAH at distant locations. For blue rockfish, the second most frequently observed species, overall average CPAH was 38% higher in the near group.

Lingcod and all 16 of the most frequently measured rockfishes showed a greater overall mean length in the DM group compared with the NM group. This is perhaps the strongest evidence relating the quality of sport fishing to distance from port.

Deep Insufficient data prevented examination of long-term trends in the two deep location groups. No consistent pattern was evident relating overall average CPAH to distance from port. Several of the most important rockfishes in this group, including chilipepper, vermilion, and yellowtail, had substantially higher catch rates in the near group. Although only five species of rockfish were measured in sufficient numbers, all of these yielded greater overall mean lengths in the DD group compared with the ND group.

Summary of Partitioned Group Analysis and Areas of Concern

The partitioning of all sampling data by depth range and distance from port has allowed us to examine trends of the most important species in the CPFV fishery in their primary areas of

harvest. Areas of concern have been identified for species demonstrating: 1) declining trends in average catch rate and mean length; 2) declining catch rate but insufficient length measurements; 3) declining catch rate relating to a recognized overall statewide stock decline; 4) declining mean length and proportion of sexually mature adults; or 5) chronic scarcity of sexually mature adults in an area where adults are expected.

Table 13 summarizes the areas of concern, by port area and species, in the northern and central California CPFV fishery based on our sampling data. In general, species of concern fall into two categories: 1) nearshore species also harvested by a recently-expanded commercial hook-and-line fishery; 2) offshore schooling species with large commercial harvests (bocaccio, chilipepper, and widow rockfish). Two species, yelloweye and greenspotted rockfishes, are offshore, benthic species and fit neither of these categories.

CPFV fishing effort for rockfishes and lingcod in terms of total angler days has declined steadily since 1992. However, no combinations of long-term declining trends in CPUE and mean length were apparent for lingcod and many of the primary rockfish species, including blue, canary, olive, starry, vermilion, and yellowtail. In general, stocks of these targeted species appear to be in good condition. The biological concerns identified are primarily related to species which have recently experienced heavier commercial fishing pressure in the nearshore area or have traditionally been a major component of the offshore commercial fishery.

A logical and expected consequence of greater fishing pressure in areas closer to port is a resultant lower mean length of a species in near locations compared with distant locations, as defined by our study. We were able to compare mean lengths by species and port area from near and distant location groups for 139 cases (e.g. mean length of vermilion rockfish

from the Morro Bay area in the NM group and the DM group = one case). Of these, 111 cases (80%) showed a greater mean length in the distant group, and 28 cases (20%) showed a greater mean length in the near group. Table 14 lists all comparisons for which the difference in mean length, all years combined, exceeds 10%.

Total Observed Effort and Estimated Total Catch and Effort

Logbook Data

CPFVs logged 30,197 trips in 1995 for all of California; of these 10,451, or 35%, originated from ports in northern and central California (Table 15). Based on our criteria 4231 trips targeted rockfish and/or lingcod in northern and central California, including one reported multi-day trip and those catching both rockfish and salmon. This does not include 218 trips which were eliminated from our database because they met our criteria for targeting salmon, even though rockfish also were caught. Beginning in 1995, all CPFV logbooks included a column for indicating target species or species group; 3809 of the 4231 trips were designated as targeting rockfish or lingcod. Thus, although the column was used on a high percentage of CPFV rockfish/lingcod trips, relying on this as the only estimator of targeted rockfish trips would underestimate total effort.

Based on our criteria, 111 vessels reported fishing for rockfish and lingcod north of Point Conception in 1995, and of these, 66 reported more than 10 trips. In addition, three vessels known to have fished for these species did not submit any logs during the year. Samplers observed fishing on board 48 different CPFVs, representing 70% of the active portion of the fleet.

In 1995 logbook data also included categories for fish "LANDED" (interpreted as kept) and fish (put) "BACK". Summarized data indicated anglers caught a total of 788,882 rockfishes in central and northern California during the

year, including those on trips not targeting rockfish; they kept 776,119 and returned 12,763 (1.6%). Our sampling data indicate that 8.3% of 23,801 observed rockfishes were returned. Total lingcod catch reported from all logbook data was 33,666 with 25,907 fish kept and 7,759 released (23.0%). Our sampling data indicate that 47.5% of 1185 observed lingcod were returned; thus logbook data substantially underestimated the percentage of rockfishes and lingcod returned.

When only trips which met our criteria for targeting these species were included, total catches for kept fish included 773,759 rockfishes and 25,695 lingcod (Table 15). Thus over 99% of the total reported logbook catch of these species on all central and northern California trips was accounted for on trips meeting our targeting criteria.

Similar to previous years, the Monterey and Morro Bay port areas continued to provide over 50% of the logged catch of rockfishes and lingcod for northern and central California. There has been a declining trend in rockfish and lingcod catch and effort since 1990 when logbook data indicated anglers caught 1,535,549 rockfish and 47,628 lingcod. Catch estimates from 1995 represent decreases of 50% and 46%, respectively. However, annual recreational salmon catches increased steadily from 1992 to 1995, and in 1995 a record 124,489 chinook salmon were caught on northern and central California CPFVs. Therefore, rather than indicating true stock reductions for rockfishes, much of the decline in CPFV rockfish landings may be due to a shift in effort towards salmon.

Adjusted Logbook Data

Compliance rates used to adjust CPFV catch estimates in 1995 are as follows: Bodega Bay, 75%; San Francisco, 77%; Monterey, 44%; and Morro Bay, 65%. Fort Bragg catch data were not adjusted by compliance rate due to insufficient samples. Adjusted logbook catch

and effort estimates for port groups from Bodega Bay south (Table 16) were, as expected, considerably higher than unadjusted values. Adjusted catch and effort values also have declined from 1992 to 1995. However, as stated previously, the same caveat applies regarding the shift in effort to salmon, a prized species, from rockfishes, which can be considered the "bread and butter" species group for the northern and central California CPFV industry.

Total catch estimates for major rockfish species (those comprising at least 1% of the observed catch) and for lingcod by port area are presented in Tables 17 to 21. Trends by port area from Bodega Bay south since 1987-1990 are discussed below. A basic assumption is that our sampled trips (3.4% of the adjusted total number of CPFV trips in 1995) are representative of the fishery. If in fact they are not representative due to disproportionate sampling in areas where certain species do or do not occur, total catch estimates may be biased and trends may not be real. For this reason, for some species we place more emphasis on catch-per-unit-effort, mean length, and length frequency data as indicators of the health of the CPFV fishery.

In the Fort Bragg area, most rockfishes experienced declines in total catch from 1990 to 1995, most likely related to an increase in directed salmon effort.

In the Bodega Bay area, annual total catch estimates for all rockfishes combined have remained relatively constant since 1988. However, there have been apparent declines in the total catch of chilipepper since 1994, in bocaccio since 1990, in canary, widow, and greenspotted rockfishes, all deep-water species, since 1992, and in brown rockfish, also since 1992. Recent increases in total catch estimates have occurred for lingcod and yellowtail rockfish since 1993.

In the San Francisco area, the total rockfish catch estimate increased 39% from 1994 to

1995, in spite of an excellent salmon year in 1995. We attribute this primarily to an increase in rockfish effort; total angler days reported on logbooks for rockfish trips in 1995 increased by 28% over those reported in 1994, the highest increase of any port area. Annual catch estimates of yellowtail and blue rockfishes have mimicked each other since onboard sampling began and have shown no apparent trend; both total catch estimates increased from 1994 to 1995. Declines have been observed in total catch estimates for greenspotted rockfish since 1992, and for brown and China rockfishes since 1990. A gradually declining trend in total estimated lingcod catch was reversed in 1995. In 1995 estimated total catch of olive rockfish was approximately three times greater than any previous year since 1988. We attribute this in part to an increased frequency of sampled trips to the Farallon Islands where olive rockfish is a principal species.

Estimated catches for most rockfish species declined steadily in the Monterey area from 1992 to 1995, no doubt linked in part to an increase in salmon catch and effort. However, several deep-water, schooling species important to the CPFV fishery are also important components of the commercial fishery and currently are experiencing coast-wide stock declines. Adjusted total catch estimate for chilipepper exceeded 200,000 fish in 1987 and was less than 18,000 fish in 1995. Significant declines also were observed in total catch estimates of bocaccio since 1990 and in widow rockfish since 1992. These species are characterized by episodic recruitment events and one or more strong year classes are needed to reverse these disturbing trends. A substantial increase in the total catch estimate of olive rockfish occurred from 1994 to 1995.

Similar to the Monterey area, total catch estimates in the Morro Bay area declined for most rockfish species from 1992 to 1995. Estimated annual catch of blue rockfish

declined by more than 50% during this period, and estimated vermilion rockfish and canary rockfish catches declined 61% and 53%, respectively, from 1989 to 1995. On the other hand, brown and gopher rockfish total catch estimates increased during the last 2 years.

Comparison of CPFV and Commercial Hook-and-Line Sampling Data

Since the commercial hook-and-line fishery expanded in northern and central California in the late 1980s, there has been considerably greater overlap in species composition with the recreational fishery, both CPFV and private and rental skiff, than in previous years. Indeed, the 14 most frequently observed species in our 1995 samples (Appendix 1) are all fished commercially. However, the relative contribution of rockfish species to the commercial and recreational fisheries by port areas reveals some important differences.

Unpublished data on commercial hook-and-line fishery sampling in 1995 from the port areas of Bodega Bay south to Morro Bay were available from CDFG unit staff at the various field offices.

In the Bodega Bay area, accurate total catch estimates from the commercial hook-and-line fishery are difficult to obtain due to chronic logistic problems in market sampling. However, relative species composition based on market receipts and sampling show that there were nine primary species in the commercial hook-and-line fishery in 1995: chilipepper, bocaccio, and widow, canary, and yellowtail rockfishes from the offshore component, and gopher, brown, China, and black-and-yellow rockfishes from the nearshore component. The primary difference compared with our observed CPFV catches is the relative scarcity of the four nearshore benthic species; collectively these comprised only 1% of the observed CPFV catch. In addition, blue and black rockfishes were relatively more important to the CPFV fishery.

In the San Francisco area, the five most frequently sampled species in the commercial hook-and-line fishery were brown, canary, rosy, starry, and copper rockfishes. Yellowtail, blue, and olive rockfishes, the three most important species in the CPFV fishery, were either rarely encountered or not sampled. However, all five commercial species were among the top thirteen species in CPFV samples.

In the Monterey area, the relative species composition between the CPFV and commercial hook-and-line fisheries was more similar than in other port areas. In both fisheries, yellowtail rockfish and chilipepper both ranked among the five most frequently observed species, and blue rockfish and lingcod both were among the top ten. A notable difference is the importance of blackgill rockfish, ranking third in the commercial fishery in estimated pounds landed but never observed in CPFV samples.

In the Morro Bay area, commercial hook-and-line landings can be partitioned into nearshore and offshore components. The former is dominated by five species which comprised 73% of nearshore landings in 1995: cabezon, grass, black-and-yellow, and gopher rockfishes, and lingcod. The top five species in the offshore component were vermilion rockfish, bocaccio, chilipepper, and yellowtail and blackgill rockfishes. The first three nearshore species were infrequently encountered in 1995 CPFV samples, primarily due to their shallow depth distribution. In the offshore component, chilipepper and blackgill rockfish are infrequently or never encountered in CPFV samples due to their relatively deep occurrence. However, among total estimated commercial landings from both components, vermilion and gopher rockfishes ranked third and fifth, respectively. These species were among the five most frequently observed fishes in CPFV samples.

In summary, the primary differences between

relative abundance of species in the commercial hook-and-line and CPFV fisheries in central and northern California are threefold: 1) the relative importance of brown, China, gopher and black-and-yellow rockfishes in the Bodega Bay area commercial fishery is much greater than that of the CPFV fishery; 2) the relative importance of blue and yellowtail rockfishes is much greater in the CPFV fishery from the Bodega Bay to the Morro Bay area; 3) the nearshore component of the Morro Bay area commercial hook-and-line fishery relies heavily on species with a rather narrow and shallow depth distribution, three of which (cabezon, black-and-yellow rockfish, grass rockfish) are infrequently observed in CPFV samples.

Most benthic rockfishes as well as lingcod found in the 10- to 50-fathom depth range appear to be extensively utilized in both fisheries; these rockfishes include brown, copper, gopher, greenspotted, starry, and vermilion. However, the two most abundant pelagic, schooling rockfishes over this bottom depth range, blue and yellowtail, are significantly more utilized by the CPFV fishery.

CONCLUSIONS

This represents the eighth consecutive year, and sixth complete year, in which onboard sampling data have been collected in all major northern and central California CPFV port areas. Unfortunately, due to funding reductions field sampling will be limited to 6 months per year beginning in 1996; the July-December period was chosen as the best continuous period to maximize sampling effort as well as reflect budget-year limitations. We believe that our species-, location-, and depth-specific database, focusing on catch per unit effort, mean length, and length frequency for lingcod and rockfishes, will provide the best long-term information needed to properly assess existing sport as well as commercial

management regulations for this valuable resource. Onboard data collection began coincident with the beginning of a meteoric increase in commercial hook-and-line fishing. Because of this, it will be difficult at best to separate any negative impacts from this expanded fishery from any which might result from the continual but relatively steady fishing effort of the CPFV fishery.

However, our partitioned-group CPAH and mean length analyses indicate that the two primary species in the northern and central California CPFV fishery, blue and yellowtail rockfishes (accounting for 47% of all observed fish in 1995), are in reasonably good condition with no steady declines in either indicator during the last 8 years. For example, annual mean length of NM yellowtail rockfish in the San Francisco area has varied by only 3% since 1988. The primary species of concern we have identified are in most cases shallow-water species impacted by the expanded commercial hook-and-line fishery or deep-water schooling species (chilipepper and bocaccio) which are fished intensively by the commercial industry and recently have experienced statewide stock declines. In addition, a generally declining trend in adjusted annual catch estimates for most rockfish species in the CPFV fishery is related to an increase in recreational salmon catch and effort during the same period.

ACKNOWLEDGMENTS

This project was supported by Federal Aid in Sport Fish Restoration Act Funds (California Project F-50-R).

We extend our sincere appreciation to the many CPFV owners, operators, and deck hands who voluntarily allowed us on their vessels in the pursuit of science. We all share a common goal, that of sustainability of this valuable recreational fishery.

We wish to thank our Scientific Aids in 1995, J. Asmus, H. Fish, L. Halko, D.

Leggett, T. Phillips, D. Portman. K. Rager, and I. Stephens for their professionalism, enthusiasm, and perseverance in collecting data on board CPFVs. In addition, non-project samplers C. Robson and S. Taylor contributed their time and energy.

Dr. R. N. Lea provided valuable taxonomic assistance for some of the more difficult species identifications. F. Henry provided critical review of the manuscript. Jerry Kashiwada provided valuable editorial assistance.

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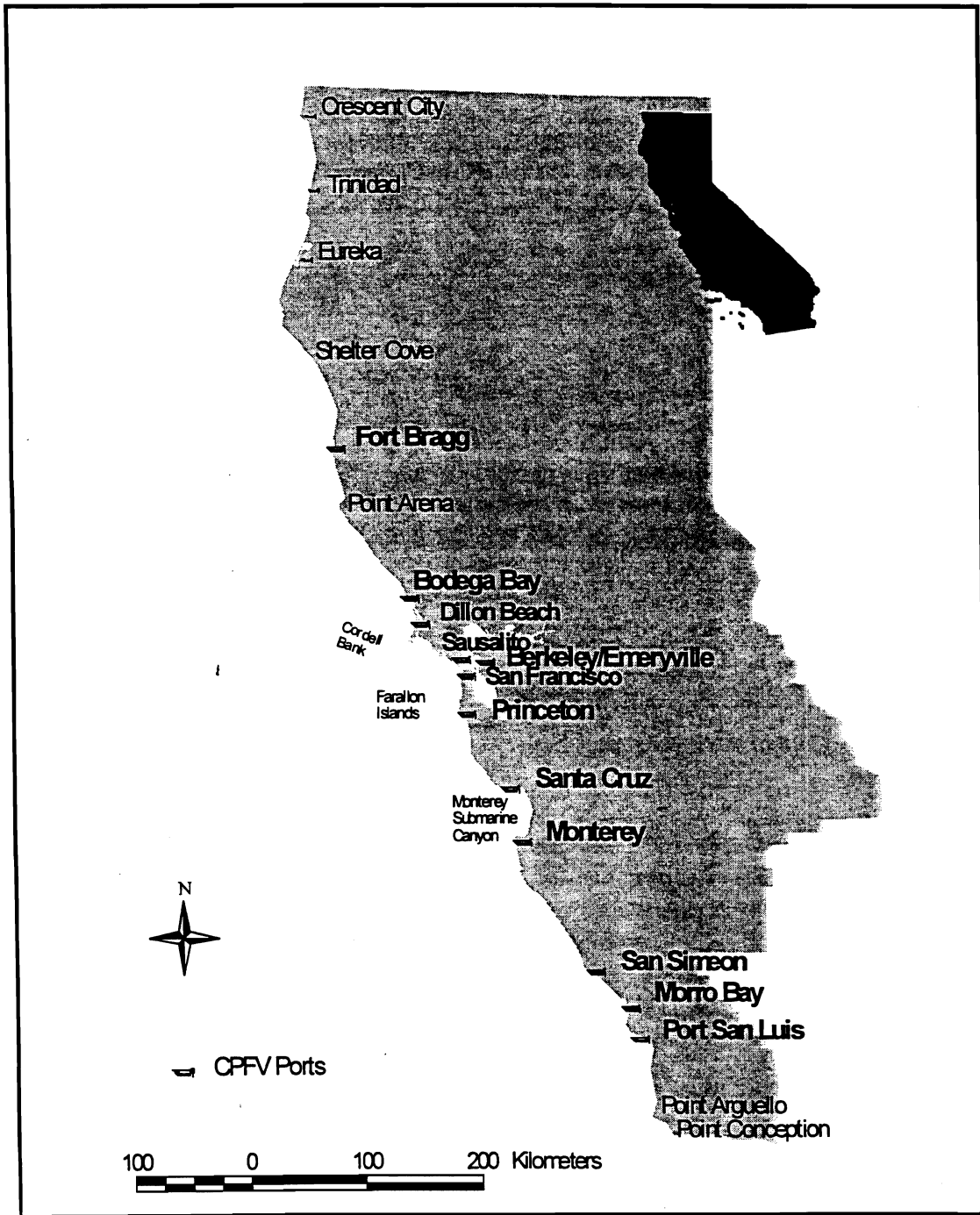


Figure 1. CFPV sampling area in central and northern California.

Rockfish and Lingcod Catches from CPFVs, 1995

TABLE 1. Annual average catch per angler day (CPAD) and catch per angler hour (CPAH) for all fishes, including those returned to water or used for bait, by port area, 1987-1995.

Year	CPAD					All ports
	FB	BB	SF	MT	MB	
1987	-	-	-	14.4	-	-
1988	12.9	11.9	9.9	16.1	7.5	12.4
1989	12.7	13.1	11.5	12.8	10.1	12.0
1990	14.8	11.7	12.7	12.3	12.5	12.5
1991	11.5	14.5	10.7	11.7	11.3	11.5
1992	12.3	14.3	16.9	12.7	12.8	13.6
1993	11.8	13.7	11.8	13.2	11.6	12.4
1994	12.6	13.0	14.2	12.4	10.3	12.1
1995	13.1	13.7	16.5	15.9	11.6	14.3
				CPAH		
1987	-	-	-	4.7	-	-
1988	5.9	3.9	2.8	5.1	2.2	3.7
1989	4.8	4.0	3.2	4.2	3.5	3.8
1990	5.5	3.4	3.8	4.6	3.7	4.0
1991	4.0	4.7	2.9	3.6	3.6	3.5
1992	4.6	4.7	5.0	3.8	4.2	4.3
1993	4.5	4.1	3.2	4.3	4.4	4.0
1994	5.6	3.9	4.0	3.8	4.0	3.9
1995	4.4	4.7	5.1	4.9	3.8	4.6

TABLE 2. Average fishing time (hours) per observed trip by port area, 1987-1995.

Year	Fort Bragg	Bodega Bay	San Francisco	Monterey	Morro Bay
1987	-	-	-	3.0	-
1988	2.1	3.1	3.6	3.0	3.4
1989	2.7	3.2	3.4	3.0	2.9
1990	2.7	3.5	3.3	2.7	3.4
1991	2.9	3.1	3.6	3.1	3.2
1992	2.7	2.9	3.2	3.2	3.0
1993	2.6	3.3	3.6	3.0	2.6
1994	2.3	3.3	3.3	3.3	2.5
1995	3.0	2.9	3.2	3.2	3.0
Average	2.6	3.2	3.4	3.1	3.0

Rockfish and Lingcod Catches from CPFVs, 1995

TABLE 3. Percent frequency of observed CPFV trips by location distance for port area, 1987-1995.

Port area	1987	1988	1989	1990-91	1992	1993	1994	1995	Mean
<u>Fort Bragg</u>									
Near	-	67*	100*	92	87	92	63*	100*	86
Distant	-	33	0	8	11	8	37	0	14
Mixed	-	0	0	0	0	0	0	0	0
<u>Bodega Bay</u>									
Near	-	9	10	0*	14	7	8	0	7
Distant	-	87	75	100	68	87	77	75	81
Mixed	-	4	15	0	18	7	15	25	12
<u>San Francisco</u>									
Near	-	13	17	29	34	25	17	10	21
Distant	-	80	76	60	53	55	75	75	68
Mixed	-	7	7	11	13	20	8	15	11
<u>Monterey</u>									
Near	61	81	67	70	61	55	58	59	64
Distant	29	14	21	21	26	20	31	28	24
Mixed	10	5	12	9	13	25	11	13	12
<u>Morro Bay</u>									
Near	-	95	86	77	82	81	83	69	82
Distant	-	0	7	18	14	11	13	18	12
Mixed	-	5	7	5	4	7	4	13	6

* less than 10 trips sampled for port area

TABLE 4. Percent frequency of observed CPFV trips by depth of fishing locations for port area, 1987-1995.

Port area	1987	1988	1989	1990-91	1992	1993	1994	1995	Mean
<u>Fort Bragg</u>									
Shallow	-	33*	0*	83	78	67	100*	100*	66
Deep	-	33	67	0	13	0	0	0	16
Mixed	-	33	33	17	9	33	0	0	18
<u>Bodega Bay</u>									
Shallow	-	35	35	12*	32	27	39	33	30
Deep	-	43	45	63	50	10	46	8	38
Mixed	-	22	20	25	18	63	15	59	32
<u>San Francisco</u>									
Shallow	-	74	63	53	50	28	52	47	52
Deep	-	4	11	18	16	10	15	2	11
Mixed	-	22	26	29	34	62	33	51	37
<u>Monterey</u>									
Shallow	17	22	19	19	20	7	31	24	20
Deep	56	56	63	72	64	40	33	25	51
Mixed	27	21	17	9	16	53	36	51	29
<u>Morro Bay</u>									
Shallow	-	52	20	35	40	17	59	47	39
Deep	-	10	9	11	22	1	13	4	10
Mixed	-	38	71	54	38	81	28	49	51

* less than 10 trips sampled for port area

Rockfish and Lingcod Catches from CPFVs, 1995

TABLE 5. Percent frequency of observed CPFV trips to single locations for port area, 1987-1995.

Port area	1987	1988	1989	1990-91	1992	1993	1994	1995	Mean
Fort Bragg	-	67*	67*	83	83	67	75*	43*	69
Bodega Bay	-	43	40	62*	36	17	19	25	35
San Francisco	-	65	70	58	78	35	57	42	58
Monterey	53	59	64	66	53	22	30	27	47
Morro Bay	-	62	42	44	53	34	55	22	45

* less than 10 trips sampled for port area

TABLE 6. Summary of sport fishes caught by observed CPFV anglers from Fort Bragg, 1995.

Species	Total Catch	Percent Composition	Rank	Percent Retained
Blue rockfish	130	29.2	1	96
Yellowtail rockfish	75	16.9	2	84
Black rockfish	54	12.1	3	76
Canary rockfish	49	11.0	4	92
Rosy rockfish	24	5.4	5	83
China rockfish	22	4.9	6	9
Lingcod	18	4.0	7	67
Kelp greenling	17	3.8	8	76
Gopher rockfish	10	2.3	9	50
Copper rockfish	9	2.0	10	100
Widow rockfish	9	2.0	10	100
Yelloweye rockfish	7	1.6	12	100
Vermilion rockfish	6	1.4	13	83
King salmon	5	1.1	14	0
Quillback rockfish	5	1.1	14	80
Olive rockfish	2	0.5	16	100
Pacific sanddab	1	0.2	17	100
Silver salmon	1	0.2	17	0
Unidentified flatfish	1	0.2	17	100
Total	445	100.0		86

Rockfish and Lingcod Catches from CPFVs, 1995

TABLE 7. Summary of sport fishes caught by observed CPFV anglers from Bodega Bay and Dillon Beach, 1995.

Species	Total Catch	Percent Composition	Rank	Percent Retained
Yellowtail rockfish	749	47.5	1	99+
Blue rockfish	192	12.2	2	90
Lingcod	88	5.6	3	78
Black rockfish	80	5.1	4	99
Bocaccio	73	4.6	5	100
Canary rockfish	60	3.8	6	98
Widow rockfish	59	3.7	7	100
Rosy rockfish	51	3.2	8	84
Speckled rockfish	42	2.7	9	98
Chilipepper	35	2.2	10	100
Olive rockfish	33	2.1	11	100
Greenspotted rockfish	21	1.3	12	57
Jack mackerel	19	1.2	13	100
Starry rockfish	16	1.0	14	94
Yelloweye rockfish	14	0.9	15	100
Chub mackerel	8	0.5	16	100
King salmon	8	0.5	16	87
Vermilion rockfish	7	0.4	18	100
Kelp greenling	6	0.4	19	100
China rockfish	4	0.3	20	100
Gopher rockfish	4	0.3	20	100
Brown rockfish	3	0.2	22	100
Copper rockfish	2	0.1	23	100
Squarespot rockfish	2	0.1	23	50
Quillback rockfish	1	0.1	25	100
Redstripe rockfish	1	0.1	25	100
Total	1578	100.0		96

TABLE 8. Summary of sport fishes caught by observed CPFV anglers from Princeton, Emeryville, Berkeley, and Pt. San Pablo, 1995.

Species	Total Catch	Percent Composition	Rank	Percent Retained
Yellowtail rockfish	1987	25.4	1	92
Blue rockfish	1854	23.7	2	90
Olive rockfish	810	10.3	3	99
Rosy rockfish	543	6.9	4	74
Canary rockfish	531	6.8	5	96
Lingcod	418	5.3	6	60
Black rockfish	393	5.0	7	80
Widow rockfish	281	3.6	8	94
Starry rockfish	138	1.8	9	88
Copper rockfish	107	1.4	10	99
Vermilion rockfish	103	1.3	11	98
Quillback rockfish	96	1.2	12	94
Brown rockfish	73	0.9	13	96
Chub mackerel	69	0.9	14	78
China rockfish	62	0.8	15	97
Bocaccio	62	0.8	15	100
Pacific sanddab	60	0.8	17	87
Greenspotted rockfish	57	0.7	18	88
Gopher rockfish	40	0.5	19	72
Squarespot rockfish	29	0.4	20	41
Kelp greenling	25	0.3	21	92
Yelloweye rockfish	23	0.3	22	100
King salmon	16	0.2	23	56
White croaker	13	0.2	24	38
Cabazon	13	0.2	24	92
Speckled rockfish	8	0.1	26	87
Flag rockfish	5	0.1	27	100
Jack mackerel	4	0.1	28	75
Rock sole	4	0.1	28	75
Greenstriped rockfish	3	-	30	100

Rockfish and Lingcod Catches from CPFVs, 1995

TABLE 8. (Cont.)

Blue shark	2	-	31	50
Unidentified sculpin	2	-	31	0
English sole	1	-	33	100
Jacksmelt	1	-	33	0
Rosethorn rockfish	1	-	33	100
Silver salmon	1	-	33	0
Tiger rockfish	1	-	33	100
Unidentified skate	1	-	33	100
Total	7837	100.0		88

TABLE 9. Summary of sport fishes caught by observed CPFV anglers from Santa Cruz and Monterey, 1995.

Species	Total Catch	Percent Composition	Rank	Percent Retained
Blue rockfish	2211	25.4	1	85
Yellowtail rockfish	1742	20.0	2	96
Olive rockfish	537	6.2	3	96
Rosy rockfish	483	5.6	4	78
Chilipepper	423	4.9	5	89
Chub mackerel	365	4.2	6	8
Lingcod	333	3.8	7	54
Greenspotted rockfish	331	3.8	8	99
Canary rockfish	257	3.0	9	99+
Starry rockfish	246	2.8	10	94
Bocaccio	238	2.7	11	99
Widow rockfish	236	2.7	12	97
Pacific sanddab	188	2.2	13	64
Jack mackerel	170	2.0	14	2
Squarespot rockfish	133	1.5	15	51
Copper rockfish	121	1.4	16	99
Vermilion rockfish	103	1.2	17	100
Gopher rockfish	102	1.2	18	92
Greenstriped rockfish	93	1.1	19	97
Speckled rockfish	91	1.1	20	100
Pacific sardine	54	0.6	21	2
Brown rockfish	53	0.6	22	100
Rosethorn rockfish	38	0.4	23	92
Black rockfish	35	0.4	24	94
Yelloweye rockfish	32	0.4	25	100
Flag rockfish	22	0.3	26	100
China rockfish	18	0.2	27	94
King salmon	14	0.2	28	21
Rock sole	8	0.1	29	100
Cowcod	4	0.1	30	100

Rockfish and Lingcod Catches from CPFVs, 1995

TABLE 9. (Cont.)

Kelp rockfish	4	0.1	30	75
Petrale sole	4	0.1	30	100
Undentified rockfish	4	-	30	25
Black-and-yellow rockfish	2	-	34	100
Quillback rockfish	2	-	34	100
Redstripe rockfish	2	-	34	100
Spiny dogfish	2	-	34	0
Stripetail rockfish	2	-	34	50
Sharpchin rockfish	1	-	39	100
White croaker	1	-	39	0
Total	8705	100.0		83

TABLE 10. Midwater rockfish species with significant ($p < 0.05$) differences (mean values underlined) in annual weighted mean catch per angler hour from the Monterey area based on cluster analysis grouping, 1987-1995 (n= number of trip visits).

Species	Location group		Year							
			1987	1988	1989	1990-91	1992	1993	1994	1995
Olive	Blue	Mean	<u>0.12</u>	<u>0.24</u>	0.51	0.10	<u>0.62</u>	0.26	<u>0.18</u>	0.47
		SD	1.81	1.37	3.10	0.89	2.29	2.08	1.11	1.48
		n	40	53	37	7	33	67	68	73
Yellowtail	Blue	Mean	0.81	<u>1.21</u>	1.17	1.30	0.39	<u>0.39</u>	0.98	<u>1.13</u>
		SD	2.97	6.33	4.30	2.71	1.59	1.70	3.52	2.90
		n	40	53	37	7	33	67	68	73
	Yellowtail	Mean	1.04	1.01	0.91	0.85	<u>1.28</u>	0.88	<u>0.50</u>	1.26
		SD	3.40	5.02	4.99	3.61	4.44	3.31	3.38	4.04
		n	29	25	48	20	45	52	37	50

TABLE 11. Benthic rockfish species with significant ($p < 0.05$) differences (mean values underlined) in annual weighted mean catch per angler hour from the Monterey area based on cluster analysis grouping, 1987-1995 (n= number of trip visits).

Species	Location group		Year							
			1987	1988	1989	1990-91	1992	1993	1994	1995
Gopher	South Shallow	Mean	0.03	0.01	0.03	0.06	0.04	0.07	0.11	0.11
		SD	0.60	0.49	0.53	0.79	0.79	0.84	1.22	1.99
		n	50	64	41	11	35	62	74	79
Rosy	Rosy	Mean	0.27	<u>0.23</u>	0.34	0.38	0.30	0.24	0.33	<u>0.42</u>
		SD	1.44	0.92	1.27	1.22	1.59	1.18	1.29	1.49
		n	61	67	55	16	38	76	77	88
Vermilion	South Shallow	Mean	0.02	0.08	0.05	0.04	<u>0.03</u>	0.02	<u>0.04</u>	<u>0.05</u>
		SD	0.42	0.61	0.49	0.40	0.30	0.37	0.36	0.67
		n	50	64	41	11	35	62	74	79
	Shelf Flats	Mean	0.02	0.01	0.06	<u>0.02</u>	<u>0.03</u>	<u>0.11</u>	0.06	0.05
		SD	0.40	0.29	0.83	0.32	0.38	0.83	0.62	0.45
		n	45	39	52	22	58	77	57	59

TABLE 12. Summary of sport fishes caught by observed CPFV anglers from San Simeon, Port San Luis, and Morro Bay, 1995

Species	Total Catch	Percent Composition	Rank	Percent Retained
Blue rockfish	1799	23.6	1	93
Yellowtail rockfish	1687	22.1	2	94
Gopher rockfish	668	8.8	3	90
Rosy rockfish	463	6.1	4	74
Vermilion rockfish	416	5.5	5	99
Brown rockfish	415	5.4	6	94
Starry rockfish	349	4.6	7	93
Lingcod	328	4.3	8	34
Olive rockfish	305	4.0	9	94
Widow rockfish	281	3.7	10	100
Copper rockfish	204	2.7	11	95
Canary rockfish	196	2.6	12	98
Bocaccio	139	1.8	13	98
Pacific sanddab	55	0.7	14	65
Greenspotted rockfish	42	0.6	15	95
Chub mackerel	29	0.4	16	14
Greenstriped rockfish	29	0.4	16	79
China rockfish	26	0.3	18	100
Kelp rockfish	26	0.3	18	92
Black rockfish	24	0.3	20	62
Flag rockfish	20	0.3	21	95
Yelloweye rockfish	18	0.2	22	100
Chilipepper	16	0.2	23	100
Cabezon	14	0.2	24	71
Speckled rockfish	11	0.1	25	100
Calico rockfish	10	0.1	26	0
Squarespot rockfish	9	0.1	27	89
Kelp greenling	8	0.1	28	62
Black-and-yellow rockfish	7	0.1	29	86
King salmon	4	0.1	30	50

Rockfish and Lingcod Catches from CPFVs, 1995

TABLE 12. (cont.)

Petrale sole	4	0.1	30	100
Rosethorn rockfish	4	0.1	30	100
Spiny dogfish	4	0.1	30	0
Blacksmith	3	-	34	33
Grass rockfish	3	-	34	100
Halfbanded rockfish	3	-	34	33
Ocean whitefish	3	-	34	100
Treefish	3	-	34	100
Rock sole	2	-	39	100
Unidentified rockfish	2	-	39	0
Cowcod	1	-	41	100
Pacific hake	1	-	41	100
White croaker	1	-	41	0
Totals	7632	100.0		89

TABLE 13. Species of concern in the northern and central California CPFV fishery based on sampling data 1987-1995.

Port area	Species	Reasons for concern
Fort Bragg	Black rockfish	Declining mean length Scarcity of adults in sampled catch
Bodega Bay	Black rockfish	Declining mean length Scarcity of adults in sampled catch
	Brown rockfish	Declining mean length and catch rate
	Cabazon	Declining catch rate
	China rockfish	Declining catch rate
	Copper rockfish	Declining catch rate
	Gopher rockfish	Declining catch rate
	Greenspotted rockfish	Declining mean length and catch rate
	Kelp greenling	Declining catch rate
	Yelloweye rockfish	Declining catch rate
San Francisco	Black rockfish	Declining mean length Scarcity of adults in sampled catch
	Brown rockfish	Declining catch rate
	Gopher rockfish	Declining catch rate
	Yelloweye rockfish	Declining catch rate
Monterey	Black rockfish	Scarcity of adults in sampled catch
	Brown rockfish	Declining catch rate
	Bocaccio	Declining mean length and catch rate
	Cabazon	Declining catch rate
	Chilipepper	Declining mean length and catch rate
	Widow rockfish	Declining catch rate
Morro Bay	Black rockfish	Scarcity of adults in sampled catch
	Bocaccio	Declining mean length and catch rate
	Greenspotted rockfish	Declining mean length and catch rate

Rockfish and Lingcod Catches from CPFVs, 1995

TABLE 14. Species with differences in mean length (mm) exceeding 10.0 percent between near and distant location groups, all years combined, by port area.

Species	Port area	Location groups	Mean length	Percent difference
Bocaccio	San Francisco	Distant mixed	514	11
		Near mixed	465	
	Morro Bay	Distant mixed	493	14
		Near mixed	434	
	Morro Bay	Distant deep	507	16
		Near deep	438	
Brown rockfish	Morro Bay	Distant shallow	357	12
		Near shallow	319	
Cabezon	Morro Bay	Distant shallow	452	16
		Near shallow	391	
Canary rockfish	Bodega Bay	Distant deep	470	46
		Near deep	323	
Chilipepper	Morro Bay	Distant deep	431	31
		Near deep	328	
China rockfish	Bodega Bay	Distant shallow	330	29
		Near shallow	256	
	Monterey	Distant mixed	307	12
		Near mixed	274	
Copper rockfish	Bodega Bay	Distant shallow	428	14
		Near shallow	375	
	Monterey	Distant shallow	372	13
		Near shallow	328	
Greenspotted rockfish	Monterey	Distant mixed	327	10+
		Near mixed	297	
Lingcod	San Francisco	Distant shallow	642	10+
		Near shallow	581	
Olive rockfish	Fort Bragg	Near shallow	387	17
		Distant shallow	331	
Olive rockfish	San Francisco	Distant mixed	383	12
		Near mixed	343	
	Morro Bay	Distant mixed	417	17
		Near mixed	356	
Rosy rockfish	San Francisco	Distant mixed	241	10+
		Near mixed	219	
Starry rockfish	San Francisco	Distant mixed	322	12
		Near mixed	287	

TABLE 14. (cont.)

Species	Port area	Location groups	Mean length	Percent difference
Vermilion rockfish	Fort Bragg	Distant shallow	506	16
		Near shallow	438	
	San Francisco	Distant mixed	438	20
		Near mixed	365	
Monterey	Distant mixed	394	15	
	Near mixed	343		
Morro Bay	Distant mixed	418	15	
	Near mixed	365		
Yelloweye rockfish	Monterey	Distant mixed	467	19
		Near mixed	392	
Yellowtail rockfish	Fort Bragg	Near mixed	340	11
		Distant mixed	307	
	San Francisco	Distant mixed	348	12
		Near mixed	312	
Monterey	Distant shallow	306	13	
	Near shallow	270		
Morro Bay	Distant mixed	318	12	
	Near mixed	283		

Rockfish and Lingcod Catches from CPFVs, 1995

TABLE 15. Summary of total CPFV catch and effort estimates for northern and central California from logbook data, 1995.

	Port Areas						Total All Ports
	Northern California	Fort Bragg	Bodega Bay	San Francisco	Monterey	Morro Bay	
Total Trips	237	214	552	1,171	641	1,415	4,231
No. fish kept	13,348	23,455	142,622	216,955	138,148	282,096	816,624
No. angler days	1,674	2,109	10,277	23,016	11,865	25,693	74,634
No. hours fished	1,230.1	886.0	2,854.6	5,919.6	2,833.0	5,783.5	19,506.8
Average CPAD	8.0	11.1	13.9	9.4	11.6	11.0	10.9
Average CPAH	1.7	2.7	2.8	1.9	2.6	2.6	2.4
Total rockfish	12,440	22,502	136,199	193,659	132,616	276,343	773,759
Total lingcod	784	616	5,505	9,982	4,140	4,668	25,695
Total other fish	124	337	918	13,948	1,392	1,085	17,708

TABLE 16. Summary of total CPFV catch and effort estimates for northern and central California from adjusted logbook data, 1995.

	Bodega Bay	San Francisco	Monterey	Morro Bay	Total All Ports ¹
Number of trips	736	1,521	1,457	2,177	6,342
Number of fish	195,969	320,831	360,127	418,766	1,332,496
Number of angler days	16,121	29,924	29,123	39,632	118,583
CPAD	12.2	10.7	12.4	10.6	11.2

1. Totals include unadjusted values for the Northern California and Fort Bragg groups.

TABLE 17. Estimate of total CPFV catch of rockfishes and lingcod, based on unadjusted logbook data from Fort Bragg, 1995.

Species	Number in thousands
Blue rockfish	7.2
Yellowtail rockfish	4.3
Black rockfish	3.0
Canary rockfish	2.8
Rosy rockfish	1.4
China rockfish	1.2
Gopher rockfish	0.5
Copper rockfish	0.5
Widow rockfish	0.5
Yelloweye rockfish	0.4
Vermilion rockfish	0.3
Quillback rockfish	0.3
Other rockfish	0.1
Total rockfish	22.5
Lingcod	0.6

Rockfish and Lingcod Catches from CPFVs, 1995

TABLE 18. Estimate of total CPFV catch of rockfishes and lingcod, based on adjusted logbook data from Bodega Bay and Dillon Beach, 1995.

Species	Number in thousands
Yellowtail rockfish	93.1
Blue rockfish	23.9
Black rockfish	10.0
Bocaccio	9.0
Canary rockfish	7.4
Widow rockfish	7.3
Rosy rockfish	6.3
Speckled rockfish	5.3
Chilipepper	4.3
Olive rockfish	4.1
Greenspotted rockfish	2.5
Starry rockfish	2.0
Yelloweye rockfish	1.8
Other rockfish	3.0
Total rockfish	181.9
Lingcod	11.0

TABLE 19. Estimate of total CPFV catch of rockfishes and lingcod, based on adjusted logbook data from Princeton, Emeryville, Berkeley, and Pt. San Pablo, 1995.

Species	Number in thousands
Yellowtail rockfish	81.7
Blue rockfish	76.2
Olive rockfish	33.1
Rosy rockfish	22.2
Canary rockfish	21.9
Black rockfish	16.1
Widow rockfish	11.6
Starry rockfish	5.8
Copper rockfish	4.5
Vermilion rockfish	4.2
Quillback rockfish	3.9
Brown rockfish	2.9
China rockfish	2.6
Bocaccio	2.6
Greenspotted rockfish	2.3
Gopher rockfish	1.6
Other rockfish	2.8
Total rockfish	295.8
Lingcod	17.0

Rockfish and Lingcod Catches from CPFVs, 1995

TABLE 20. Estimate of total CPFV catch of rockfishes and lingcod, based on adjusted logbook data from Monterey and Santa Cruz, 1995.

Species	Number in thousands
Blue rockfish	91.4
Yellowtail rockfish	72.0
Olive rockfish	22.3
Rosy rockfish	19.8
Chilipepper	17.6
Greenspotted rockfish	13.7
Canary rockfish	10.8
Starry rockfish	10.1
Bocaccio	9.7
Widow rockfish	9.7
Squarespot rockfish	5.4
Copper rockfish	5.0
Vermilion rockfish	4.3
Gopher rockfish	4.3
Greenstriped rockfish	4.0
Speckled rockfish	4.0
Brown rockfish	2.2
Other rockfish	6.8
Total rockfish	313.9
Lingcod	13.7

TABLE 21. Estimate of total CPFV catch of rockfishes and lingcod, based on adjusted logbook data from San Simeon, Port San Luis, and Morro Bay, 1995.

Species	Number in thousands
Blue rockfish	98.8
Yellowtail rockfish	92.5
Gopher rockfish	36.9
Rosy rockfish	25.5
Vermilion rockfish	23.0
Brown rockfish	22.6
Starry rockfish	19.3
Olive rockfish	16.8
Widow rockfish	15.5
Copper rockfish	11.3
Canary rockfish	10.9
Bocaccio	7.5
Greenspotted rockfish	2.5
Other rockfish	11.5
Total rockfish	393.6
Lingcod	18.0

Rockfish and Lingcod Catches from CPFVs, 1995

Appendix 1. Summary of sport fishes caught by CPFV anglers from all ports, 1995.

Common name	Scientific name	Number observed	Number measured
Yellowtail rockfish	<i>Sebastes flavidus</i>	6240	9077
Blue rockfish	<i>Sebastes mystinus</i>	6186	8628
Olive rockfish	<i>Sebastes serranoides</i>	1687	2767
Rosy rockfish	<i>Sebastes rosaceus</i>	1564	1610
Lingcod	<i>Ophiodon elongatus</i>	1185	952
Canary rockfish	<i>Sebastes pinniger</i>	1093	1761
Widow rockfish	<i>Sebastes entomelas</i>	866	1187
Gopher rockfish	<i>Sebastes carnatus</i>	824	1156
Starry rockfish	<i>Sebastes constellatus</i>	749	1070
Vermilion rockfish	<i>Sebastes miniatus</i>	635	968
Black rockfish	<i>Sebastes melanops</i>	586	840
Brown rockfish	<i>Sebastes auriculatus</i>	544	846
Bocaccio	<i>Sebastes paucispinis</i>	512	749
Chilipepper	<i>Sebastes goodei</i>	474	631
Chub mackerel	<i>Scomber japonicus</i>	471	99
Greenspotted rockfish	<i>Sebastes chlorostictus</i>	451	643
Copper rockfish	<i>Sebastes caurinus</i>	443	728
Pacific sanddab	<i>Citharichthys sordidus</i>	304	329
Jack mackerel	<i>Trachurus symmetricus</i>	193	44
Squarespot rockfish	<i>Sebastes hopkinsi</i>	173	113
Speckled rockfish	<i>Sebastes ovalis</i>	152	209
China rockfish	<i>Sebastes nebulosus</i>	132	211
Greenstriped rockfish	<i>Sebastes elongatus</i>	125	175
Quillback rockfish	<i>Sebastes maliger</i>	104	164
Yelloweye rockfish	<i>Sebastes ruberrimus</i>	94	151
Kelp greenling	<i>Hexagrammos decagrammus</i>	56	56
Pacific sardine	<i>Sardinops sagax</i>	54	1
Flag rockfish	<i>Sebastes rubrivinctus</i>	47	76
King salmon	<i>Oncorhynchus tshawytscha</i>	47	11
Rosethorn rockfish	<i>Sebastes helvomaculatus</i>	43	46

APPENDIX 1. (cont.)

Kelp rockfish	<i>Sebastes atrovirens</i>	30	42
Cabezon	<i>Scorpaenichthys marmoratus</i>	27	37
White croaker	<i>Genyonemus lineatus</i>	15	12
Rock sole	<i>Pleuronectes bilineatus</i>	14	25
Calico rockfish	<i>Sebastes dallii</i>	10	6
Black and yellow rockfish	<i>Sebastes chrysomelas</i>	9	15
Petrале sole	<i>Eopsetta jordani</i>	8	12
Spiny dogfish	<i>Squalus acanthias</i>	6	0
Unidentified rockfishes	<i>Sebastes spp.</i>	6	1
Cowcod	<i>Sebastes levis</i>	5	6
Treefish	<i>Sebastes serriceps</i>	3	6
Grass rockfish	<i>Sebastes rastrelliger</i>	3	6
Redstripe rockfish	<i>Sebastes proriger</i>	3	3
Halfbanded rockfish	<i>Sebastes semicinctus</i>	3	1
Blacksmith	<i>Chromis punctipinnis</i>	3	4
Ocean whitefish	<i>Caulolatilus princeps</i>	3	4
Stripetail rockfish	<i>Sebastes saxicola</i>	2	0
Silver salmon	<i>Oncorhynchus kisutch</i>	2	0
Unidentified sculpin	Cottidae	2	0
Blue shark	<i>Prionace glauca</i>	2	1
Sharpchin rockfish	<i>Sebastes zacentrus</i>	1	1
Unidentified skate	<i>Raja sp.</i>	1	0
Jacksmelt	<i>Atherinopsis californiensis</i>	1	0
Pacific hake	<i>Merluccius productus</i>	1	0
English sole	<i>Parophrys vetulus</i>	1	1
Tiger rockfish	<i>Sebastes nigrocinctus</i>	1	2
Unidentified flatfish	Pleuronectidae	1	0
California barracuda	<i>Sphyræna argentea</i>	0	1
Totals		26,197	35,485

Rockfish and Lingcod Catches from CPFVs, 1995

Appendix 2. Annual average catch per angler hour for selected species from the Fort Bragg area by partitioned groups, 1988 to 1995 (* = < 10 fish observed; - = no fish observed; --- = no effort observed).

Group and species	1988	1989	1990- 1991	1992	1993	1994	1995	All years	Number observed
<u>Near shallow</u>									
Black rockfish	---	---	0.25	0.43	*	1.17	1.01	0.55	210
Blue rockfish	---	---	3.78	1.89	0.79	2.98	0.19	1.99	764
Canary rockfish	---	---	0.22	0.34	1.37	0.38	0.45	0.45	174
China rockfish	---	---	*	0.06	-	*	0.24	0.08	32
Lingcod	---	---	*	0.14	*	*	0.21	0.12	48
Yellowtail rockfish	---	---	0.54	0.24	0.60	0.28	0.54	0.38	145
<u>Near mixed</u>									
Blue rockfish	3.83	1.20	0.29	1.38	1.98	4.32	2.47	1.67	1245
Canary rockfish	0.55	0.38	0.30	0.25	0.36	*	0.52	0.32	242
Copper rockfish	*	*	*	0.06	0.15	*	*	0.09	66
Lingcod	*	-	0.08	0.05	0.10	*	*	0.08	59
Olive rockfish	0.52	-	*	0.07	0.09	*	*	0.08	56
Rosy rockfish	0.40	0.43	0.28	0.42	0.33	*	0.45	0.36	266
Widow rockfish	*	-	*	0.74	0.34	0.38	*	0.36	270
Yelloweye rockfish	*	*	0.09	*	0.08	*	*	0.07	50
Yellowtail rockfish	0.89	2.12	1.40	1.08	0.95	*	0.95	1.12	835
<u>Distant shallow</u>									
Black rockfish	-	---	---	1.36	*	0.95	---	0.83	99
Blue rockfish	3.60	---	---	4.18	1.64	4.01	---	3.67	439
Canary rockfish	*	---	---	0.49	*	0.28	---	0.32	38
<u>Distant mixed</u>									
Blue rockfish	-	---	0.81	3.05	---	---	---	1.96	106

Appendix 3. Annual mean length (and standard deviation) for selected species from the Fort Bragg area by partitioned groups, 1988 to 1995, where $n \geq 10$ fish for a particular year (* = < 10 fish measured).

Group and species	1988	1989	1990	1991	1992	1993	1994	1995	All yr	Number measured
<u>Near shallow</u>										
Black rockfish	-	-	-	336 33	334 42	*	307 29	294 27	321 39	330
Blue rockfish	-	-	-	301 36	306 39	306 37	298 38	326 41	304 38	1350
Canary rockfish	-	-	-	331 43	316 44	294 49	287 37	271 35	307 48	304
China rockfish	-	-	-	324 37	303 44	298 26	312 28	295 24	307 35	72
Copper rockfish	-	-	-	*	380 39	392 36	*	-	393 46	46
Gopher rockfish	-	-	-	306 54	289 15	*	*	*	291 40	35
Kelp greenling	-	-	-	*	360 24	*	*	-	348 27	21
Lingcod	-	-	-	680 88	668 89	661 95	*	*	673 89	75
Olive rockfish	-	-	-	392 36	383 37	405 44	*	-	387 43	57
Quillback rockfish	-	-	-	*	341 44	*	-	*	340 49	18
Rosy rockfish	-	-	-	273 29	246 25	248 24	*	*	250 27	141
Vermilion rockfish	-	-	-	471 77	*	399 50	*	-	438 76	45
Widow rockfish	-	-	-	273 14	292 25	290 40	294 27	*	291 27	265
Yelloweye rockfish	-	-	-	*	375 85	364 60	*	*	386 87	41
Yellowtail rockfish	-	-	-	311 35	317 39	280 35	273 25	315 31	303 41	424
<u>Near mixed</u>										
Blue rockfish	355 40	366 42	*	*	324 41	319 36	-	297 33	320 42	702
Bocaccio	*	*	-	-	*	*	-	-	511 115	14
Canary rockfish	378 51	359 45	*	*	345 32	316 44	-	287 43	324 50	166

Rockfish and Lingcod Catches from CPFVs, 1995

Appendix 3. (Fort Bragg mean length cont.)

Group and species	1988	1989	1990	1991	1992	1993	1994	1995	All yr	Number measured
<u>Near mixed</u> (cont.)										
China rockfish	-	-	-	*	-	*	-	315 33	299 37	24
Copper rockfish	*	-	-	*	396 43	406 40	-	419 38	412 43	59
Lingcod	*	-	-	-	*	*	-	*	701 98	20
Olive rockfish	*	-	-	*	*	*	-	*	354 61	29
Rosy rockfish	*	*	*	251 22	232 20	243 22	-	260 19	248 24	86
Starry rockfish	-	*	-	-	*	*	-	-	298 34	11
Vermilion rockfish	-	-	-	-	*	*	-	*	447 85	15
Widow rockfish	-	-	-	*	316 32	293 27	-	*	309 32	167
Yelloweye rockfish	*	*	*	*	*	*	-	*	407 84	35
Yellowtail rockfish	415 85	420 64	391 55	297 32	329 44	292 33	-	277 30	340 69	595
<u>Near deep</u>										
Canary rockfish	-	375 56	-	-	-	-	-	-	375 56	15
Yellowtail rockfish	-	450 53	-	-	-	-	-	-	450 53	34
<u>Distant shallow</u>										
Black rockfish	-	-	-	-	398 43	*	333 49	-	343 55	125
Blue rockfish	-	-	-	-	320 39	278 33	310 41	-	309 41	372
Canary rockfish	-	-	-	-	*	*	317 40	-	329 51	40
China rockfish	-	-	-	-	*	*	301 19	-	306 26	21
Kelp greenling	-	-	-	-	*	*	*	-	341 31	10
Olive rockfish	-	-	-	-	*	*	301 19	-	331 37	28
Vermilion rockfish	-	-	-	-	*	*	*	-	506 65	11

Appendix 3. (Fort Bragg mean length cont.)

Group and species	1988	1989	1990	1991	1992	1993	1994	1995	All yr	Number measured
<u>Distant mixed</u>										
Blue rockfish	-	-	-	346 40	314 36	-	-	-	325 40	113
Canary rockfish	-	-	-	328 48	-	-	-	-	328 48	36
Copper rockfish	-	-	-	406 52	*	-	-	-	402 50	23
Olive rockfish	-	-	-	-	388 25	-	-	-	388 25	10
Rosy rockfish	-	-	-	258 26	-	-	-	-	258 26	23
Yellowtail rockfish	-	-	-	307 28	*	-	-	-	307 28	86
<u>Distant deep</u>										
Canary rockfish	-	-	-	-	324 42	-	-	-	324 42	35
Widow rockfish	-	-	-	-	300 23	-	-	-	300 23	13
Yellowtail rockfish	-	-	-	-	323 38	-	-	-	323 38	45

Rockfish and Lingcod Catches from CPFVs, 1995

Appendix 4. Annual average catch per angler hour for selected species from the Bodega Bay area by partitioned groups, 1988 to 1995 (* = < 10 fish observed; - = no fish observed; --- = no effort observed).

Group and species	1988	1989	1990- 1991	1992	1993	1994	1995	All years	Number observed
<u>Near shallow</u>									
Black rockfish	*	-	---	0.67	0.30	0.49	0.87	0.40	201
Blue rockfish	0.53	*	---	2.12	1.58	0.13	1.17	0.97	486
Brown rockfish	0.63	0.50	---	0.20	0.15	0.27	-	0.28	140
Canary rockfish	0.80	0.50	---	0.62	0.66	0.99	-	0.71	354
China rockfish	*	-	---	*	0.12	0.11	-	0.08	42
Copper rockfish	*	*	---	*	0.10	0.13	-	0.08	41
Gopher rockfish	*	-	---	*	*	0.07	-	0.05	23
Lingcod	0.30	*	---	0.12	0.09	0.14	*	0.13	67
Vermilion rockfish	*	*	---	0.13	0.14	*	-	0.08	38
Yellowtail rockfish	1.24	1.65	---	0.70	0.47	0.21	-	0.61	306
<u>Distant shallow</u>									
Black rockfish	0.39	0.72	-	1.72	0.28	0.64	0.43	0.54	843
Blue rockfish	1.18	0.76	*	1.12	3.59	3.34	1.28	1.33	2099
Brown rockfish	0.19	0.15	4.58	*	*	*	*	0.21	326
Canary rockfish	0.10	0.11	0.83	*	0.25	0.14	0.17	0.13	205
China rockfish	0.08	0.05	*	*	*	*	*	0.06	96
Copper rockfish	0.13	0.06	*	-	*	*	*	0.08	123
Gopher rockfish	0.03	0.07	*	*	*	*	*	0.05	74
Lingcod	0.33	0.20	*	-	0.12	0.14	0.22	0.24	379
Vermilion rockfish	0.03	0.04	*	-	*	*	*	0.03	55
Yellowtail rockfish	0.10	0.33	*	1.17	0.20	*	0.78	0.25	395
<u>Distant mixed</u>									
Blue rockfish	*	0.23	-	0.59	0.08	*	*	0.18	382
Bocaccio	0.30	0.13	0.73	0.21	0.46	0.29	0.37	0.32	682
Canary rockfish	0.08	0.49	0.07	0.14	0.15	0.26	0.23	0.20	433
Chilipepper	0.91	*	0.07	0.21	0.57	0.51	0.16	0.39	833
Greenspotted rockfish	0.31	0.22	*	0.29	0.13	0.19	0.12	0.21	442
Greenstriped rockfish	0.05	*	*	0.05	0.09	0.12	-	0.06	134

Appendix 4. (Bodega Bay CPAH cont.)

Group and species	1988	1989	1990- 1991	1992	1993	1994	1995	All years	Number observed
<u>Distant mixed</u> (cont.)									
Lingcod	0.21	0.08	*	0.15	0.10	0.21	0.34	0.16	343
Olive rockfish	0.15	*	0.16	0.16	0.21	0.11	0.11	0.13	287
Rosy rockfish	0.28	0.22	0.12	0.43	0.27	0.18	0.20	0.27	576
Starry rockfish	*	*	*	0.13	0.03	0.04	0.07	0.06	124
Widow rockfish	*	0.05	0.20	0.38	0.70	0.14	0.26	0.27	589
Yelloweye rockfish	0.15	0.07	0.07	0.05	0.03	0.03	0.07	0.06	133
Yellowtail rockfish	0.56	1.01	2.56	1.73	0.88	1.34	3.63	1.47	3144
<u>Distant deep</u>									
Bocaccio	0.18	0.39	1.06	0.59	0.57	0.29	-	0.43	579
Canary rockfish	0.23	0.34	0.29	0.41	0.29	0.34	-	0.31	409
Chilipepper	1.62	2.25	0.89	0.31	1.32	2.63	*	1.53	2045
Greenspotted rockfish	0.80	0.49	0.29	0.45	0.44	0.17	-	0.49	649
Greenstriped rockfish	0.15	0.12	*	0.06	0.18	0.20	-	0.14	192
Lingcod	0.07	*	*	0.15	0.05	0.10	*	0.08	107
Rosy rockfish	0.09	0.16	*	0.25	0.06	*	-	0.10	135
Widow rockfish	-	*	*	0.57	0.45	0.52	-	0.31	407
Yelloweye rockfish	0.09	0.12	*	0.08	0.02	*	-	0.06	84
Yellowtail rockfish	0.35	0.76	1.10	1.88	0.68	0.52	3.04	0.79	1053

Rockfish and Lingcod Catches from CPFVs, 1995

Appendix 5. Annual mean length (and standard deviation) for selected species from the Bodega Bay area by partitioned groups, 1988 to 1995, where $n \geq 10$ fish for a particular year (* = < 10 fish measured).

Group and species	1988	1989	1990	1991	1992	1993	1994	1995	All yr	Number measured
<u>Near shallow</u>										
Black rockfish	*	-	-	-	394 31	*	*	-	386 69	23
Blue rockfish	284 31	*	-	-	311 41	324 50	*	-	314 45	293
Brown rockfish	298 48	323 35	-	-	325 37	286 34	288 24	-	308 41	155
Canary rockfish	305 30	321 23	-	-	313 63	318 56	292 33	-	307 47	321
China rockfish	-	-	-	-	-	*	*	-	256 32	16
Copper rockfish	*	*	-	-	*	351 55	366 64	-	375 67	39
Gopher rockfish	*	-	-	-	-	*	*	-	259 24	10
Lingcod	*	*	-	-	621 47	*	*	*	618 54	31
Olive rockfish	-	-	-	-	*	*	-	-	340 36	10
Rosy rockfish	*	*	-	-	*	*	*	-	257 16	16
Vermilion rockfish	*	*	-	-	*	431 87	*	-	425 93	31
Widow rockfish	-	-	-	-	*	301 21	-	-	296 21	31
Yellowtail rockfish	271 20	312 23	-	-	303 30	305 43	*	-	297 32	259
<u>Near deep</u>										
Brown rockfish	-	358 49	-	-	-	-	-	-	358 49	95
Canary rockfish	-	323 35	-	-	-	-	-	-	323 35	22
Yellowtail rockfish	-	409 84	-	-	-	-	-	-	409 84	64
<u>Distant shallow</u>										
Black rockfish	363 39	476 29	-	-	436 62	*	326 35	*	382 75	67
Blue rockfish	294 46	344 39	-	323 35	-	299 39	285 39	259 53	304 50	1522

Appendix 5. (Bodega Bay mean length cont.)

Group and species	1988	1989	1990	1991	1992	1993	1994	1995	All yr	Number measured
<u>Distant shallow</u> (cont.)										
Brown rockfish	343 33	357 53	-	304 42	-	*	-	*	312 46	207
Canary rockfish	317 45	356 38	-	287 38	-	313 52	*	292 55	328 52	242
China rockfish	*	337 38	-	*	-	*	*	*	330 40	36
Copper rockfish	457 40	412 66	-	*	-	*	*	*	428 60	79
Gopher rockfish	-	*	-	-	*	*	*	*	282 26	15
Kelp greenling	-	*	-	-	-	*	*	*	333 37	11
Lingcod	620 53	678 70	-	-	-	*	*	*	645 89	57
Olive rockfish	*	-	-	-	-	344 57	*	*	355 64	32
Rosy rockfish	-	*	-	-	-	-	*	*	280 32	14
Vermilion rockfish	533 62	496 79	-	*	-	*	*	*	453 119	37
Widow rockfish	-	*	-	-	-	-	*	*	303 63	15
Yelloweye rockfish	*	391 76	-	*	-	-	*	-	397 78	32
Yellowtail rockfish	300 60	343 38	-	-	-	*	*	275 47	326 51	355
<u>Distant mixed</u>										
Blue rockfish	-	-	-	-	324 36	375 38	*	*	336 42	219
Bocaccio	555 100	619 71	-	604 77	581 77	583 77	615 69	615 88	593 79	653
Canary rockfish	*	470 55	-	482 80	489 61	483 76	473 77	415 61	474 68	311
Chilipepper	-	-	-	444 38	431 44	406 52	336 31	419 47	414 51	763
Greenspotted rockfish	*	356 47	-	354 43	358 32	346 51	327 56	304 42	342 51	230
Greenstriped rockfish	*	*	-	*	-	*	262 32	*	273 39	48

Rockfish and Lingcod Catches from CPFVs, 1995

Appendix 5. (Bodega Bay mean length cont.)

Group and species	1988	1989	1990	1991	1992	1993	1994	1995	All yr	Number measured
<u>Distant mixed</u> (cont.)										
Lingcod	*	*	-	789 170	750 155	714 109	690 85	705 144	712 121	123
Olive rockfish	413 40	-	-	412 49	387 42	406 37	390 32	396 36	401 40	303
Rosy rockfish	*	248 19	-	*	*	217 24	239 25	233 27	236 27	136
Speckled rockfish	-	*	-	*	398 40	378 40	368 40	369 39	384 41	104
Starry rockfish	*	*	-	*	350 44	*	323 47	*	337 51	52
Vermilion rockfish	*	-	-	*	*	*	*	-	533 76	17
Widow rockfish	-	*	-	440 40	395 75	447 45	405 45	424 38	426 59	518
Yelloweye rockfish	*	476 110	-	*	486 82	*	*	493 86	487 80	66
Yellowtail rockfish	417 57	432 53	-	418 41	401 53	415 43	390 41	386 40	403 47	2756
<u>Distant deep</u>										
Bocaccio	538 109	608 73	648 69	-	592 75	581 78	-	-	589 81	318
Canary rockfish	436 58	498 56	*	-	500 63	463 55	418 52	-	470 61	274
Chilipepper	386 43	414 44	393 33	-	432 39	410 48	382 50	-	397 48	877
Greenspotted rockfish	358 48	356 39	344 44	-	*	322 49	332 52	-	343 50	309
Greenstriped rockfish	319 27	*	-	-	-	257 30	*	-	283 40	54
Lingcod	*	*	*	-	*	*	*	-	727 110	22
Widow rockfish	-	*	*	-	445 44	439 45	412 40	-	439 46	292
Yelloweye rockfish	*	491 126	*	-	*	*	*	-	456 107	31
Yellowtail rockfish	410 46	435 45	434 37	-	422 38	426 42	414 30	-	425 42	556

Appendix 6. Annual average catch per angler hour for selected species from the San Francisco area by partitioned groups, 1988 to 1995 (* = < 10 fish observed; - = no fish observed; --- = no effort observed).

Group and species	1988	1989	1990-1991	1992	1993	1994	1995	All years	Number observed
<u>Near shallow</u>									
Black rockfish	1.85	0.29	-	-	*	4.15	0.29	0.29	91
Blue rockfish	0.93	1.52	2.46	2.83	1.40	*	1.69	2.04	644
Canary rockfish	1.02	0.22	*	0.13	*	-	*	0.20	62
Lingcod	*	*	0.82	0.11	*	*	0.20	0.14	43
<u>Near mixed</u>									
Blue rockfish	1.08	1.03	0.58	1.68	0.68	0.89	1.26	0.98	2243
Bocaccio	0.06	0.06	0.12	0.05	0.04	*	*	0.06	146
Brown rockfish	0.17	0.05	0.10	0.04	0.12	0.12	*	0.09	211
Canary rockfish	0.15	0.16	0.25	0.35	0.19	0.35	0.41	0.25	577
Copper rockfish	0.15	0.15	0.30	0.24	0.27	0.21	0.17	0.23	526
Greenspotted rockfish	*	0.11	0.07	0.04	0.06	0.10	0.10	0.06	143
Lingcod	0.21	0.10	0.07	0.08	0.14	0.14	0.20	0.12	284
Olive rockfish	-	*	0.04	0.08	0.03	*	*	0.03	76
Rosy rockfish	0.35	0.36	0.38	0.55	0.42	0.43	0.63	0.43	990
Starry rockfish	0.05	0.06	0.05	0.08	0.06	0.11	0.15	0.07	154
Vermilion rockfish	*	*	0.09	0.06	0.07	0.10	0.11	0.06	146
Widow rockfish	0.55	0.84	0.09	0.38	0.06	0.06	0.38	0.30	686
Yellowtail rockfish	0.53	1.27	1.21	1.09	1.10	1.44	2.55	1.20	2759
<u>Distant shallow</u>									
Black rockfish	0.47	0.71	0.70	0.65	0.56	1.25	0.83	0.66	2528
Blue rockfish	0.86	0.64	1.17	3.54	1.90	0.90	1.68	1.13	4328
Brown rockfish	0.24	0.19	0.35	0.18	0.10	0.26	0.12	0.21	824
Cabazon	0.06	0.06	0.03	*	0.04	0.07	0.03	0.05	190
Canary rockfish	0.06	0.07	0.26	0.30	0.30	0.18	0.24	0.14	542
China rockfish	0.12	0.11	0.11	*	0.13	0.12	0.09	0.11	434
Copper rockfish	0.05	0.03	0.08	*	0.09	*	0.03	0.05	181
Gopher rockfish	0.09	0.14	0.08	0.12	0.14	0.12	0.09	0.11	413
Kelp greenling	0.02	0.05	0.03	*	0.06	0.06	0.04	0.04	144
Lingcod	0.23	0.19	0.19	0.16	0.12	0.14	0.23	0.20	758
Olive rockfish	*	*	0.03	0.08	0.10	0.06	0.94	0.13	505

Rockfish and Lingcod Catches from CPFVs, 1995

Appendix 6. (San Francisco CPAH cont.)

Group and species	1988	1989	1990- 1991	1992	1993	1994	1995	All years	Number observed
<u>Distant shallow</u> (cont.)									
Rosy rockfish	0.05	0.05	0.15	0.16	0.07	0.13	0.07	0.07	286
Vermilion rockfish	0.04	0.04	0.05	0.12	0.10	0.08	0.07	0.06	212
Widow rockfish	0.07	0.13	0.07	0.12	-	-	*	0.07	257
Yellowtail rockfish	0.12	0.10	0.31	0.59	0.30	0.36	0.34	0.21	808
<u>Distant mixed</u>									
Blue rockfish	0.30	0.22	0.22	0.46	0.40	0.62	0.92	0.39	2747
Bocaccio	0.06	0.09	0.07	0.09	0.06	0.06	0.06	0.07	509
Canary rockfish	0.14	0.17	0.11	0.11	0.19	0.25	0.40	0.19	1324
China rockfish	0.05	0.04	0.06	*	0.01	0.07	0.02	0.04	284
Copper rockfish	0.07	0.10	0.05	0.08	0.09	0.05	0.07	0.08	539
Greenspotted rockfish	0.15	0.11	0.13	0.29	0.08	0.17	0.05	0.13	903
Greenstriped rockfish	0.05	0.03	0.02	0.03	*	0.02	*	0.02	169
Lingcod	0.32	0.23	0.19	0.17	0.11	0.25	0.32	0.24	1652
Olive rockfish	*	0.15	0.14	0.14	0.10	0.16	0.45	0.16	1085
Quillback rockfish	0.05	0.03	0.04	*	*	0.02	0.05	0.03	232
Rosy rockfish	0.47	0.54	0.77	0.63	0.45	0.72	0.44	0.56	3942
Starry rockfish	0.14	0.06	0.19	0.15	0.10	0.24	0.12	0.13	895
Vermilion rockfish	0.04	0.03	0.03	0.05	0.04	0.03	0.06	0.04	261
Widow rockfish	0.03	0.22	0.18	0.15	0.10	0.11	0.20	0.15	1044
Yelloweye rockfish	0.10	0.05	0.09	0.05	0.02	0.04	0.02	0.06	399
Yellowtail rockfish	0.45	1.08	0.73	1.68	0.82	1.11	1.56	1.00	7010
<u>Distant deep</u>									
Bocaccio	*	---	*	0.81	0.15	*	-	0.25	98
Canary rockfish	*	---	*	0.42	0.21	0.25	*	0.24	92
Copper rockfish	*	---	*	1.33	0.07	-	*	0.32	125
Greenspotted rockfish	-	---	*	1.47	0.62	1.53	-	0.84	324
Greenstriped rockfish	-	---	-	0.20	0.18	0.25	-	0.16	63
Lingcod	*	---	*	0.55	0.42	*	-	0.32	125
Rosy rockfish	*	---	*	0.88	0.20	*	-	0.30	116
Starry rockfish	*	---	*	0.35	0.13	*	*	0.17	65
Yelloweye rockfish	-	---	*	0.23	0.09	0.16	-	0.12	47
Yellowtail rockfish	*	---	0.85	3.92	0.98	0.59	0.59	1.42	549

Appendix 7. Annual mean length (and standard deviation) for selected species from the San Francisco area by partitioned groups, 1988 to 1995, where $n \geq 10$ fish for a particular year (* = < 10).

Group and species	1988	1989	1990	1991	1992	1993	1994	1995	All yr	Number measured
<u>Near shallow</u>										
Blue rockfish	-	245 11	266 38	-	321 36	-	-	298 38	294 43	210
Brown rockfish	-	*	-	-	*	-	-	*	325 51	13
Canary rockfish	-	283 36	-	-	*	-	-	-	287 37	18
China rockfish	-	*	*	-	*	-	-	*	282 18	15
Gopher rockfish	-	258 18	-	-	*	-	-	*	258 17	18
Lingcod	-	*	-	-	*	-	-	*	581 35	10
Rosy rockfish	-	-	-	-	*	-	-	216 23	217 23	37
Yellowtail rockfish	-	*	*	-	*	-	-	274 24	275 25	29
<u>Near mixed</u>										
Blue rockfish	317 46	317 40	313 47	318 36	315 36	312 42	295 37	313 36	313 41	1887
Bocaccio	514 120	420 126	408 71	476 72	480 73	476 111	*	485 83	465 99	123
Brown rockfish	348 45	-	327 42	*	*	328 41	307 52	*	333 47	132
Canary rockfish	319 54	334 46	329 35	336 48	322 45	316 41	323 32	333 32	326 42	514
China rockfish	276 41	*	-	-	*	278 35	*	*	272 37	44
Copper rockfish	372 41	360 56	363 52	370 45	373 41	369 40	372 43	334 49	367 45	459
Flag rockfish	*	-	*	*	*	*	*	*	329 43	30
Greenspotted rockfish	*	322 60	337 36	287 48	287 68	306 46	*	245 52	306 58	128
Lingcod	697 81	647 78	*	*	*	632 67	*	645 90	652 82	113
Olive rockfish	-	*	335 27	*	338 62	355 48	*	*	343 46	49
Quillback rockfish	309 30	*	-	-	*	*	*	-	316 35	21
Rosy rockfish	224 18	227 22	224 18	213 24	226 21	211 22	197 29	228 20	219 23	514
Starry rockfish	299 38	340 48	288 54	278 54	288 68	265 50	270 69	272 49	287 58	165
Vermilion rockfish	*	*	346 54	*	393 65	365 74	389 82	344 58	365 66	128

Rockfish and Lingcod Catches from CPFVs, 1995

Appendix 7. (San Francisco mean length cont.)

Group and species	1988	1989	1990	1991	1992	1993	1994	1995	All yr	Number measured
<u>Near mixed</u> (cont.)										
Widow rockfish	305 29	317 39	309 36	319 28	311 30	341 28	334 44	296 41	311 35	625
Yelloweye rockfish	*	*	*	*	*	*	*	*	378 101	32
Yellowtail rockfish	318 51	315 47	314 43	314 40	312 52	308 46	313 39	308 46	312 46	2757
<u>Distant shallow</u>										
Black rockfish	370 84	371 67	322 32	311 42	302 36	321 57	291 42	288 29	337 71	2831
Black-and-yellow rockfish	285 30	*	-	-	-	*	*	-	283 27	46
Blue rockfish	280 47	264 38	278 36	279 37	295 32	294 44	267 31	287 40	282 42	3868
Bocaccio	*	*	-	*	*	-	-	-	459 105	14
Brown rockfish	329 54	337 49	345 44	331 62	330 41	351 38	346 59	322 48	334 52	797
Cabezon	470 70	464 78	*	*	*	448 62	429 83	405 55	453 75	161
Canary rockfish	295 38	295 48	291 45	*	276 38	287 48	303 34	319 45	299 45	440
China rockfish	295 33	291 35	282 31	286 33	278 24	291 31	265 22	275 33	289 33	536
Copper rockfish	397 65	364 56	351 58	*	*	383 70	*	370 42	378 62	170
Gopher rockfish	273 44	270 33	286 22	278 30	271 26	283 21	272 33	276 29	274 36	439
Kelp greenling	342 49	347 34	*	*	*	310 37	*	326 47	335 41	137
Lingcod	649 96	633 85	686 89	*	657 68	652 82	631 86	630 75	642 87	448
Olive rockfish	-	*	*	*	*	366 66	375 44	389 47	386 49	699
Quillback rockfish	-	-	-	-	313 37	*	*	306 43	308 41	106
Rosy rockfish	230 30	224 22	221 16	*	216 31	217 24	*	*	227 27	207
Vermilion rockfish	373 83	394 100	*	*	409 58	446 85	378 95	364 79	392 88	220
Widow rockfish	263 28	251 23	263 27	*	297 31	-	-	*	261 29	222
Yelloweye rockfish	*	*	*	-	*	*	*	*	361 88	30
Yellowtail rockfish	291 57	269 43	283 35	306 64	269 27	270 46	263 36	276 38	280 48	594

Appendix 7. (San Francisco mean length cont.)

Group and species	1988	1989	1990	1991	1992	1993	1994	1995	All yr	Number measured
Distant mixed										
Blue rockfish	347 52	340 49	329 49	*	312 46	309 41	315 40	305 46	319 48	2897
Bocaccio	518 88	484 103	532 89	561 67	522 107	488 113	540 102	553 88	514 101	527
Cabazon	463 86	420 42	*	-	-	-	*	-	441 70	37
Canary rockfish	347 52	352 53	359 48	388 58	342 41	343 44	339 47	343 45	347 49	1492
Chilipepper	-	451 62	424 40	-	-	-	-	-	430 47	53
China rockfish	312 33	310 45	310 42	*	*	*	300 29	290 30	306 38	348
Copper rockfish	388 59	370 49	352 44	-	377 45	408 46	378 48	376 43	376 51	583
Flag rockfish	*	337 38	*	-	*	*	*	*	343 42	37
Gopher rockfish	*	269 16	*	-	-	*	274 13	*	276 24	42
Greenspotted rockfish	326 57	345 50	330 52	332 50	319 57	335 62	292 59	297 55	325 58	858
Greenstriped rockfish	280 46	289 32	267 32	294 26	283 38	*	273 27	*	283 38	215
Kelp greenling	347 42	363 30	*	-	-	-	*	*	354 35	55
Lingcod	636 98	637 96	643 120	649 97	627 111	619 97	643 97	667 94	641 100	1304
Olive rockfish	368 39	377 44	377 44	385 27	383 47	395 42	386 43	393 39	383 43	1038
Quillback rockfish	315 58	335 51	305 49	*	*	*	288 36	306 38	320 53	240
Rosy rockfish	250 29	247 30	250 27	222 24	225 20	228 26	228 29	224 24	241 30	3853
Speckled rockfish	-	366 61	*	*	*	*	361 47	364 46	368 52	65
Starry rockfish	343 46	338 53	339 58	347 54	310 63	306 63	297 63	280 49	322 60	964
Vermilion rockfish	446 79	415 98	465 68	*	463 86	439 53	432 69	433 64	438 79	260
Widow rockfish	366 40	320 54	342 54	*	324 44	328 32	331 44	315 45	326 51	981
Yelloweye rockfish	407 102	425 98	413 104	458 88	351 101	428 109	434 112	398 94	414 102	409
Yellowtail rockfish	364 51	351 56	365 49	406 41	343 69	327 55	330 56	343 60	348 59	7275

Rockfish and Lingcod Catches from CPFVs, 1995

Appendix 7. (San Francisco mean length cont.)

Group and species	1988	1989	1990	1991	1992	1993	1994	1995	All yr	Number measured
Distant deep										
Bocaccio	-	-	-	476 101	473 83	557 77	*	-	515 93	98
Canary rockfish	-	-	-	344 40	294 60	399 49	-	-	355 69	85
Copper rockfish	*	-	-	*	405 42	377 33	-	-	394 49	77
Greenspotted rockfish	-	-	-	333 54	334 43	339 50	304 54	-	326 53	377
Greenstriped rockfish	-	-	-	-	*	284 27	278 30	-	283 28	44
Lingcod	-	-	-	687 121	620 119	662 92	-	-	664 116	155
Rosy rockfish	*	-	-	232 25	221 25	232 27	-	-	228 26	189
Starry rockfish	*	-	-	342 44	314 53	333 52	*	-	334 48	129
Vermilion rockfish	-	-	-	*	*	461 46	-	-	459 49	30
Widow rockfish	-	-	-	*	*	352 30	*	-	394 50	30
Yelloweye rockfish	-	-	-	400 84	416 92	492 89	-	-	439 96	70
Yellowtail rockfish	-	-	-	368 44	353 48	365 49	-	-	361 48	750

Appendix 8. Annual average catch per angler hour for selected species from the Monterey area by partitioned groups, 1987 to 1995 (* = < 10 fish observed; - = no fish observed).

Group and species	1987	1988	1989	1990- 1991	1992	1993	1994	1995	All years	Number observed
<u>Near shallow</u>										
Blue rockfish	3.42	5.59	*	3.16	3.43	3.43	3.56	3.30	3.59	3065
Lingcod	0.11	0.52	*	*	0.36	0.05	0.11	0.17	0.19	163
Olive rockfish	*	0.12	*	-	0.75	0.11	0.19	0.32	0.22	189
Rosy rockfish	0.20	0.09	*	*	*	0.06	0.21	0.20	0.13	112
Yellowtail rockfish	1.04	0.71	-	*	*	0.35	0.47	0.50	0.48	411
<u>Near mixed</u>										
Blue rockfish	1.24	1.58	1.55	0.71	1.04	2.03	0.98	1.66	1.40	11,627
Bocaccio	0.46	0.18	0.28	0.26	0.25	0.18	0.15	0.14	0.26	2162
Canary rockfish	0.08	0.05	0.06	*	0.02	0.06	0.08	0.14	0.07	539
Chilipepper	0.25	0.21	0.02	0.03	-	0.26	*	0.19	0.14	1190
Copper rockfish	0.01	0.01	0.03	*	0.03	0.02	0.06	0.05	0.02	197
Gopher rockfish	0.02	0.01	0.02	0.04	0.02	0.03	0.07	0.09	0.03	224
Greenspotted rockfish	0.02	0.01	0.01	0.02	*	0.06	0.02	*	0.02	143
Greenstriped rockfish	0.02	0.02	0.01	0.02	*	0.05	0.03	*	0.02	141
Lingcod	0.24	0.15	0.16	0.06	0.22	0.20	0.16	0.28	0.19	1538
Olive rockfish	0.08	0.13	0.27	0.07	0.35	0.13	0.11	0.33	0.17	1429
Rosy rockfish	0.17	0.17	0.22	0.32	0.27	0.23	0.27	0.39	0.22	1849
Speckled rockfish	0.03	0.02	0.02	0.12	0.04	*	0.02	0.04	0.03	247
Squarespot rockfish	0.04	0.07	0.05	0.02	0.10	0.03	0.04	0.14	0.06	503
Starry rockfish	0.11	0.09	0.17	0.27	0.16	0.12	0.14	0.15	0.14	1124
Vermilion rockfish	0.02	0.04	0.05	0.02	0.03	*	0.04	0.06	0.04	310
Widow rockfish	0.59	0.78	0.24	0.56	0.44	0.19	0.15	0.16	0.46	3848
Yellowtail rockfish	0.87	1.03	0.96	0.98	0.52	0.31	0.87	1.07	0.89	7374
<u>Near deep</u>										
Bocaccio	0.76	0.33	0.17	0.79	0.36	0.16	0.06	0.24	0.33	2121
Canary rockfish	0.04	0.05	0.05	0.25	0.06	0.11	0.19	0.26	0.10	635
Chilipepper	3.21	3.80	3.25	1.42	1.05	1.97	1.08	0.81	2.41	15,372
Copper rockfish	*	*	0.04	0.03	0.08	0.07	0.08	*	0.04	250
Greenspotted rockfish	0.05	0.03	0.16	0.31	0.19	0.41	0.38	0.34	0.20	1282
Greenstriped rockfish	0.11	0.10	0.14	0.28	0.15	0.19	0.32	0.11	0.17	1071
Lingcod	0.12	0.05	0.02	0.03	0.12	0.07	0.06	0.08	0.06	380

Rockfish and Lingcod Catches from CPFVs, 1995

Appendix 8. (Monterey CPAH cont.)

Group and species	1987	1988	1989	1990- 1991	1992	1993	1994	1995	All years	Number observed
<u>Near deep</u> (cont.)										
Rosy rockfish	*	*	0.06	0.09	0.12	0.07	0.17	0.31	0.08	501
Starry rockfish	*	*	0.02	0.02	0.06	0.07	0.11	0.17	0.04	272
Vermilion rockfish	*	*	0.01	0.08	0.03	0.07	0.06	*	0.03	188
Widow rockfish	0.04	0.65	0.10	0.47	0.39	0.48	0.10	0.15	0.32	2046
Yelloweye rockfish	*	*	0.01	0.01	0.02	0.02	0.02	*	0.01	76
Yellowtail rockfish	0.17	0.11	0.20	0.40	0.55	0.70	0.39	1.42	0.37	2364
<u>Distant shallow</u>										
Black rockfish	0.44	0.80	0.06	-	-	0.53	0.73	0.24	0.48	789
Blue rockfish	1.19	1.39	0.22	0.85	3.09	8.19	2.46	3.21	2.02	3288
Brown rockfish	*	0.04	0.10	-	0.09	-	0.03	0.11	0.05	86
Cabazon	0.27	0.03	*	-	*	-	*	-	0.06	90
Canary rockfish	0.10	0.04	0.06	*	0.13	*	0.06	0.19	0.07	120
China rockfish	0.18	0.06	0.10	-	*	*	0.06	*	0.08	125
Copper rockfish	*	*	0.08	-	0.09	0.23	0.05	0.19	0.06	102
Gopher rockfish	0.43	0.09	0.05	*	0.17	0.27	0.28	0.18	0.20	326
Lingcod	0.87	0.12	0.77	*	0.23	*	0.11	0.24	0.36	582
Olive rockfish	*	0.36	*	*	0.35	0.59	0.17	1.08	0.27	447
Rosy rockfish	*	*	*	-	0.07	0.13	0.08	0.11	0.04	73
Vermilion rockfish	0.12	0.05	0.05	-	0.20	*	0.05	*	0.07	114
Yellowtail rockfish	0.10	0.08	0.19	*	0.44	0.13	0.21	0.73	0.21	337
<u>Distant mixed</u>										
Blue rockfish	0.91	1.64	0.51	1.53	0.80	1.75	0.97	1.25	1.15	2685
Bocaccio	0.28	*	0.16	0.31	0.31	0.09	0.14	0.23	0.19	441
Canary rockfish	0.08	0.07	0.13	0.07	0.04	0.05	0.07	*	0.07	164
Chilipepper	2.64	-	-	-	*	0.12	-	0.10	0.55	1281
Copper rockfish	0.05	*	0.24	*	0.06	0.16	0.09	0.13	0.10	230
Greenspotted rockfish	0.26	*	0.10	*	0.06	0.04	0.03	*	0.09	207
Lingcod	0.25	0.07	0.07	0.28	0.38	0.26	0.15	0.27	0.22	513
Olive rockfish	0.07	0.34	0.22	0.41	0.85	0.33	0.24	0.87	0.36	843
Rosy rockfish	0.38	0.10	0.34	0.19	0.20	0.22	0.30	0.41	0.27	640
Starry rockfish	0.24	*	0.15	0.10	0.28	0.06	0.23	0.21	0.17	394

Appendix 8. (Monterey CPAH cont.)

Group and species	1987	1988	1989	1990- 1991	1992	1993	1994	1995	All years	Number observed
<u>Distant mixed</u> (cont.)										
Vermilion rockfish	0.06	*	0.08	0.13	0.04	0.07	0.10	0.06	0.07	162
Widow rockfish	0.20	*	0.53	0.40	0.20	0.08	0.04	0.43	0.20	466
Yellowtail rockfish	0.93	0.93	0.77	0.95	0.53	0.38	0.84	1.06	0.76	1774
<u>Distant deep</u>										
Bocaccio	0.42	0.67	0.47	0.62	0.35	0.13	0.07	0.14	0.39	1236
Canary rockfish	0.02	0.04	0.09	0.09	0.04	0.18	0.26	0.15	0.09	290
Chilipepper	4.96	2.81	0.96	0.43	0.75	0.13	0.14	0.24	1.70	5343
Copper rockfish	*	-	0.05	0.04	0.05	0.13	0.06	0.10	0.05	153
Greenspotted rockfish	0.13	0.31	0.78	0.25	0.50	0.59	0.71	0.69	0.48	1511
Greenstriped rockfish	0.09	0.42	0.52	0.15	0.31	0.32	0.33	0.18	0.30	939
Lingcod	0.03	*	0.06	0.04	0.10	0.11	*	0.11	0.06	191
Rosy rockfish	0.09	*	0.20	0.18	0.14	0.08	*	0.14	0.11	353
Starry rockfish	0.06	*	0.15	0.18	0.15	0.05	0.08	0.14	0.10	303
Vermilion rockfish	0.04	-	0.07	0.05	*	0.16	0.06	0.09	0.06	194
Widow rockfish	0.07	-	0.11	0.08	*	*	-	0.08	0.05	172
Yelloweye rockfish	*	*	0.03	0.05	*	0.03	*	0.06	0.03	96
Yellowtail rockfish	0.30	*	0.61	0.97	1.60	0.68	0.30	1.08	0.63	1972

Rockfish and Lingcod Catches from CPFVs, 1995

Appendix 9. Annual mean length (and standard deviation) for selected species from the Monterey area by partitioned groups, 1987 to 1995, where $n \geq 10$ fish for a particular year (* = < 10 fish measured).

Group and species	1987	1988	1989	1990	1991	1992	1993	1994	1995	All yr	Number measured
<u>Near shallow</u>											
Black rockfish	-	-	*	-	-	-	307 17	-	299 26	307 24	30
Blue rockfish	276 36	275 26	-	-	248 29	333 25	275 32	298 34	277 41	282 39	914
Brown rockfish	*	*	-	-	365 21	-	*	347 60	*	352 47	41
Canary rockfish	-	*	-	-	306 34	-	*	*	302 32	303 34	34
China rockfish	*	-	-	-	*	-	*	*	*	282 34	16
Copper rockfish	-	-	-	*	*	-	*	-	*	328 50	11
Gopher rockfish	*	-	-	-	*	*	*	284 34	264 30	274 31	54
Lingcod	-	*	-	-	*	596 46	*	*	*	615 63	30
Olive rockfish	*	-	-	-	-	358 33	*	337 57	346 37	344 44	93
Rosy rockfish	212 17	-	-	-	*	-	*	*	*	223 23	32
Vermilion rockfish	*	*	-	-	*	*	*	*	329 58	343 78	35
Widow rockfish	-	-	-	-	-	296 24	*	-	-	302 32	14
Yellowtail rockfish	254 43	279 17	-	-	*	-	266 34	*	279 26	270 33	137
<u>Near mixed</u>											
Blue rockfish	288 40	298 38	291 41	286 39	295 42	295 42	277 37	273 38	274 44	288 41	6640
Bocaccio	487 93	449 93	486 91	455 91	469 99	467 85	440 84	428 65	474 78	471 91	1310
Brown rockfish	*	*	-	*	-	-	*	329 74	*	336 59	29
Canary rockfish	396 41	361 52	348 41	*	*	373 48	328 67	333 48	343 49	356 53	352
Chilipepper	330 33	348 34	308 49	-	*	*	346 44	*	265 40	336 45	552
China rockfish	*	266 17	*	*	*	*	*	*	280 34	274 24	58
Copper rockfish	*	330 68	369 68	*	*	373 46	332 45	363 66	344 37	355 57	149
Flag rockfish	*	*	*	-	*	*	-	*	-	319 41	23

Appendix 9. (Monterey mean length cont.)

Group and species	1987	1988	1989	1990	1991	1992	1993	1994	1995	All yr	Number measured
<u>Near mixed</u> (cont.)											
Gopher rockfish	258 30	264 19	270 30	*	257 30	264 15	270 29	266 27	275 30	268 28	183
Greenspotted rockfish	317 38	*	*	-	*	263 61	292 80	290 53	-	297 59	84
Greenstriped rockfish	280 28	268 37	*	*	*	*	252 32	263 30	*	265 33	77
Lingcod	644 103	650 95	678 99	*	*	629 89	609 69	632 67	609 60	643 91	678
Olive rockfish	385 56	379 52	378 53	359 44	399 57	391 46	363 56	388 50	382 54	382 52	1117
Rosy rockfish	228 31	228 26	227 22	221 19	221 21	223 23	224 22	224 25	217 21	223 24	831
Speckled rockfish	331 62	347 47	322 40	*	352 55	324 32	*	310 56	320 46	331 49	174
Squarespot rockfish	227 30	239 23	212 14	*	-	236 29	*	224 20	231 29	232 26	148
Starry rockfish	308 42	302 42	300 41	289 62	279 35	298 34	289 40	276 38	279 48	293 43	822
Vermilion rockfish	407 83	336 64	365 46	*	*	445 46	377 68	389 54	438 68	385 72	228
Widow rockfish	310 52	316 37	308 44	322 48	*	348 45	324 34	317 49	298 65	319 45	2140
Yelloweye rockfish	*	*	*	-	*	*	*	*	*	392 109	33
Yellowtail rockfish	331 63	315 51	320 45	322 42	343 67	323 46	306 63	300 51	297 45	316 53	4344
<u>Near deep</u>											
Bocaccio	475 89	494 70	490 78	425 71	512 64	495 95	475 92	448 98	470 65	472 86	1733
Canary rockfish	431 51	404 27	384 46	392 38	379 32	381 46	365 37	366 44	370 43	379 42	645
Chilipepper	326 39	340 43	356 45	345 54	336 66	320 45	324 45	315 50	340 44	337 47	10,658
Copper rockfish	*	*	432 59	*	367 34	380 50	415 52	403 61	392 36	406 57	282
Flag rockfish	-	-	326 31	315 20	*	312 44	330 49	313 36	310 37	318 39	155
Greenspotted rockfish	318 39	309 37	330 52	332 53	329 46	320 54	327 57	310 59	307 51	322 55	1304
Greenstriped rockfish	262 32	267 30	277 28	282 26	276 29	272 28	283 31	263 29	257 29	273 30	899
Lingcod	705 117	706 101	705 85	*	*	700 88	700 130	682 94	*	700 104	315
Rosy rockfish	*	*	237 18	243 14	*	238 19	232 23	231 21	232 21	235 20	389

Rockfish and Lingcod Catches from CPFVs, 1995

Appendix 9. (Monterey mean length cont.)

Group and species	1987	1988	1989	1990	1991	1992	1993	1994	1995	All yr	Number measured
<u>Near deep</u> (cont.)											
Speckled rockfish	-	*	*	*	-	362 53	331 39	*	348 40	346 46	72
Starry rockfish	*	-	299 39	*	*	291 45	322 45	284 49	285 40	296 45	188
Vermilion rockfish	*	*	414 62	399 31	*	472 57	413 64	432 47	*	423 56	200
Widow rockfish	341 54	313 47	378 42	370 29	321 21	379 39	343 35	354 42	352 53	351 48	1664
Yelloweye rockfish	*	*	389 37	*	*	*	443 131	368 79	*	414 105	75
Yellowtail rockfish	370 42	354 57	369 49	370 37	332 57	375 45	375 50	344 48	357 45	365 49	2392
<u>Distant shallow</u>											
Black rockfish	320 45	299 42	339 28	-	-	-	312 22	310 31	299 26	311 34	453
Blue rockfish	285 35	298 32	318 39	-	-	307 43	313 33	278 42	284 43	292 42	1437
Brown rockfish	*	*	352 33	-	-	*	-	*	*	355 42	48
Cabazon	503 66	*	*	-	-	*	-	*	*	480 79	51
Canary rockfish	*	*	*	-	-	306 39	-	313 45	333 58	322 48	59
China rockfish	*	*	299 27	-	-	*	*	299 35	*	302 30	54
Copper rockfish	*	-	*	-	-	*	355 43	*	*	372 59	44
Gopher rockfish	296 28	287 37	302 41	-	-	294 21	289 15	278 30	278 21	285 30	231
Kelp greenling	*	-	*	-	-	*	*	*	*	333 48	19
Lingcod	657 96	*	638 53	-	-	620 69	*	632 92	617 72	639 75	260
Olive rockfish	*	334 39	*	-	-	399 37	349 32	341 48	370 44	362 47	301
Rosy rockfish	*	-	*	-	-	*	-	-	*	228 22	12
Vermilion rockfish	*	*	383 61	-	-	393 48	*	401 98	385 83	394 78	102
Yellowtail rockfish	326 74	*	*	-	-	312 19	*	274 32	305 47	306 47	93
<u>Distant mixed</u>											
Blue rockfish	280 31	*	320 34	-	289 30	331 43	283 39	272 49	294 46	294 46	1329
Bocaccio	445 86	*	509 97	-	514 60	517 78	473 61	464 57	*	485 76	291

Appendix 9. (Monterey mean length cont.)

Group and species	1987	1988	1989	1990	1991	1992	1993	1994	1995	All yr	Number measured
<u>Distant mixed</u> (cont.)											
Brown rockfish	-	*	352 28	-	-	-	334 40	*	-	339 41	100
Canary rockfish	*	*	345 45	*	*	*	300 44	349 48	*	342 60	104
Chilipepper	323 20	-	-	-	429 28	*	387 48	-	-	333 36	804
Copper rockfish	393 54	-	391 57	-	-	368 37	380 44	412 40	*	384 49	198
Flag rockfish	*	-	*	-	-	-	*	*	-	309 36	12
Gopher rockfish	*	-	*	-	*	*	291 23	294 33	*	288 26	80
Greenspotted rockfish	343 51	*	328 43	-	-	323 36	312 50	*	*	327 49	136
Greenstriped rockfish	277 36	-	298 27	-	*	*	*	-	*	290 39	55
Lingcod	657 128	*	*	*	*	625 79	602 80	605 69	*	619 87	152
Olive rockfish	386 43	*	437 34	-	368 49	409 37	390 55	402 61	399 44	420 45	646
Rosy rockfish	237 23	-	231 17	-	-	239 32	235 21	224 21	226 23	231 23	303
Speckled rockfish	365 42	-	-	-	392 19	376 45	-	370 51	-	372 44	63
Squarespot rockfish	218 12	-	-	-	-	-	-	-	-	224 22	27
Starry rockfish	327 44	-	293 37	-	332 31	329 35	316 41	311 43	277 27	317 41	317
Vermilion rockfish	*	*	398 85	-	*	467 53	386 71	448 58	*	423 76	112
Widow rockfish	289 55	-	287 26	273 51	418 46	360 29	267 64	330 58	*	298 57	267
Yelloweye rockfish	*	*	*	-	*	*	*	*	*	467 98	29
Yellowtail rockfish	322 47	*	334 47	-	415 56	344 42	296 45	344 60	300 55	335 59	1023
<u>Distant deep</u>											
Bocaccio	452 65	450 48	473 85	-	511 75	453 71	473 76	505 52	499 71	468 71	790
Canary rockfish	*	403 18	402 35	-	375 48	383 59	374 34	349 51	372 37	377 42	260
Chilipepper	324 24	344 28	370 40	-	*	347 57	342 53	426 45	*	338 36	2763
Copper rockfish	-	-	398 48	-	363 41	*	385 44	402 44	378 45	384 45	129

Rockfish and Lingcod Catches from CPFVs, 1995

Appendix 9. (Monterey mean length cont.)

Group and species	1987	1988	1989	1990	1991	1992	1993	1994	1995	All yr	Number measured
Distant deep (cont.)											
Flag rockfish	*	*	348 33	-	*	*	329 35	*	309 37	328 41	64
Greenspotted rockfish	344 41	319 51	323 54	*	312 66	317 49	313 56	297 52	300 51	314 54	1386
Greenstriped rockfish	289 29	279 31	291 31	*	285 27	276 28	270 29	279 33	268 30	282 32	700
Lingcod	*	*	*	-	724 96	*	643 77	*	659 52	668 85	83
Olive rockfish	-	-	-	-	414 48	*	-	-	*	417 48	27
Rosy rockfish	229 17	-	238 31	-	230 19	212 21	231 18	228 19	225 21	232 25	215
Speckled rockfish	*	-	386 34	-	*	356 46	*	*	368 44	374 43	97
Starry rockfish	322 36	*	301 47	-	315 45	307 43	299 37	308 28	302 44	307 43	206
Vermillion rockfish	-	-	372 81	-	418 53	*	430 52	424 60	432 56	418 65	191
Widow rockfish	372 40	-	342 40	-	382 41	*	-	-	345 49	356 47	104
Yelloweye rockfish	*1	*	386 66	-	*	*	431 102	*	430 116	421 98	78
Yellowtail rockfish	375 40	*	352 59	-	394 57	365 44	364 46	362 56	362 49	368 51	1765

Appendix 10. Annual average catch per angler hour for selected species from the Morro Bay area by partitioned groups, 1988 to 1995 (* = < 10 fish observed; - = no fish observed; --- = no effort observed).

Group and species	1988	1989	1990- 1991	1992	1993	1994	1995	All Years	Number Observed
<u>Near shallow</u>									
Black rockfish	-	-	0.36	*	0.08	0.17	*	0.02	138
Blue rockfish	0.40	0.42	0.92	2.23	2.51	1.69	1.22	1.37	2750
Brown rockfish	-	*	0.15	0.17	0.14	0.13	0.07	0.09	185
Canary rockfish	0.10	0.12	*	0.04	0.07	*	0.09	0.07	143
Copper rockfish	0.07	*	0.07	0.11	0.05	0.11	0.05	0.07	142
Gopher rockfish	0.15	0.28	0.34	0.57	0.53	0.50	0.43	0.40	802
Lingcod	0.11	0.15	0.16	0.14	0.11	0.16	0.17	0.14	287
Olive rockfish	*	-	0.39	0.35	0.22	0.21	0.12	0.18	352
Rosy rockfish	0.18	0.29	0.13	0.04	0.16	0.14	0.16	0.15	300
Starry rockfish	0.16	*	*	0.10	0.06	0.06	0.08	0.09	177
Vermillion rockfish	0.19	0.35	0.12	0.09	0.17	0.09	0.10	0.14	287
Yellowtail rockfish	0.50	0.58	0.10	0.18	0.51	0.43	0.57	0.43	863
<u>Near mixed</u>									
Blue rockfish	0.33	0.52	0.54	1.16	1.37	1.13	0.96	0.84	7227
Bocaccio	0.09	0.14	0.27	0.17	0.08	0.06	0.09	0.13	1110
Brown rockfish	0.02	0.02	0.02	*	*	0.02	-	0.01	108
Canary rockfish	0.14	0.20	0.13	0.12	0.09	0.08	0.09	0.12	1059
China rockfish	0.04	0.02	0.02	0.01	0.02	0.02	*	0.02	194
Copper rockfish	0.10	0.13	0.13	0.11	0.12	0.12	0.12	0.12	1009
Flag rockfish	0.01	0.01	0.01	0.02	0.03	0.03	0.01	0.02	153
Gopher rockfish	0.15	0.16	0.15	0.18	0.14	0.16	0.12	0.15	1302
Greenspotted rockfish	0.02	0.05	0.04	0.04	0.05	0.02	0.03	0.03	298
Greenstriped rockfish	0.01	0.02	0.02	0.01	0.03	*	0.02	0.02	139
Lingcod	0.13	0.19	0.15	0.13	0.11	0.08	0.12	0.13	1110
Olive rockfish	0.01	*	0.15	0.11	0.16	0.06	0.12	0.08	718
Rosy rockfish	0.13	0.21	0.17	0.16	0.28	0.35	0.28	0.21	1853
Starry rockfish	0.08	0.08	0.11	0.11	0.27	0.21	0.19	0.14	1233
Vermillion rockfish	0.18	0.46	0.33	0.40	0.37	0.30	0.25	0.32	2796
Widow rockfish	0.13	0.06	0.24	0.44	0.17	0.29	0.22	0.22	1924
Yelloweye rockfish	0.01	0.02	*	0.01	0.02	*	0.01	0.01	98

Rockfish and Lingcod Catches from CPFVs, 1995

Appendix 10. (Morro Bay CPAH cont.)

Group and species	1988	1989	1990- 1991	1992	1993	1994	1995	All years	Number observed
<u>Near mixed</u> (cont.)									
Yellowtail rockfish	0.47	0.94	0.97	0.94	1.25	1.14	1.05	0.93	8049
<u>Near deep</u>									
Vermilion rockfish	*	-	0.83	0.49	0.69	---	---	0.48	67
Yellowtail rockfish	2.29	-	0.63	1.14	1.59	---	---	1.11	155
<u>Distant shallow</u>									
Black rockfish	---	*	0.55	0.24	0.12	0.16	0.04	0.20	231
Blue rockfish	---	1.02	1.27	1.22	0.52	1.00	0.74	0.93	1096
Brown rockfish	---	1.62	0.85	0.97	0.31	0.73	1.12	0.91	1067
Canary rockfish	---	*	*	*	0.07	0.17	0.15	0.10	112
China rockfish	---	0.11	0.15	0.12	*	*	*	0.07	84
Copper rockfish	---	0.12	0.06	0.09	0.23	*	0.12	0.11	134
Gopher rockfish	---	0.94	0.50	0.81	0.33	0.69	1.02	0.73	862
Lingcod	---	0.42	0.28	0.32	*	0.13	0.31	0.25	293
Olive rockfish	---	0.11	0.46	0.60	0.17	0.23	0.34	0.34	399
Rosy rockfish	---	*	*	0.12	0.12	*	0.05	0.06	69
Vermilion rockfish	---	0.12	0.10	0.18	0.17	0.14	0.19	0.16	185
Yellowtail rockfish	---	0.53	0.11	0.14	0.14	0.49	0.47	0.31	366
<u>Distant mixed</u>									
Blue rockfish	1.94	0.18	0.39	0.39	0.68	0.84	0.47	0.61	654
Bocaccio	*	0.56	0.75	0.54	0.33	0.34	0.09	0.40	430
Canary rockfish	*	0.14	*	0.14	0.16	*	0.11	0.10	110
Copper rockfish	*	0.13	*	0.06	0.14	0.05	0.11	0.07	80
Gopher rockfish	*	0.14	*	0.09	*	-	*	0.04	46
Greenspotted rockfish	*	0.13	0.11	0.15	*	*	0.05	0.08	89
Lingcod	*	0.54	0.12	0.13	*	0.19	0.08	0.15	162
Olive rockfish	-	*	*	0.14	0.42	0.30	0.12	0.16	176
Rosy rockfish	0.20	0.31	0.10	0.15	0.18	0.14	0.47	0.22	235
Starry rockfish	0.19	*	0.06	0.15	0.38	0.19	0.29	0.19	206
Vermilion rockfish	0.20	0.31	0.25	0.38	0.62	0.33	0.37	0.36	389
Widow rockfish	*	0.15	0.17	0.38	*	0.26	0.11	0.20	215
Yellowtail rockfish	0.74	0.69	0.95	0.90	1.43	0.68	1.32	0.98	1055

Appendix 10. (Morro Bay CPAH cont.)

Group and species	1988	1989	1990- 1991	1992	1993	1994	1995	All years	Number observed
<u>Distant deep</u>									
Bocaccio	---	---	---	0.17	0.51	0.68	0.28	0.41	121
Copper rockfish	---	---	---	0.12	*	0.13	*	0.09	26
Lingcod	---	---	---	0.32	*	0.29	0.26	0.27	75
Rosy rockfish	---	---	---	*	*	0.30	0.32	0.19	57
Starry rockfish	---	---	---	*	0.22	0.52	0.92	0.40	118
Vermilion rockfish	---	---	---	0.22	*	0.51	*	0.26	78
Widow rockfish	---	---	---	0.35	*	*	1.13	0.36	106
Yellowtail rockfish	---	---	---	0.30	*	0.53	0.32	0.34	101

Rockfish and Lingcod Catches from CPFVs, 1995

Appendix 11. Annual mean length (and standard deviation) for selected species from the Morro Bay area by partitioned groups, 1988 to 1995, where $n \geq 10$ fish for a particular year (* = < 10 fish measured).

Group and species	1988	1989	1990	1991	1992	1993	1994	1995	All yr	Number measured
<u>Near shallow</u>										
Black rockfish	-	-	-	306 35	*	291 31	326 30	*	308 34	148
Blue rockfish	288 23	292 25	-	290 31	291 42	278 34	273 34	266 38	280 36	1947
Bocaccio	438 104	-	-	*	*	*	-	*	447 100	102
Brown rockfish	-	*	-	340 52	326 38	300 51	317 53	323 36	319 47	173
Cabezon	*	-	-	*	*	*	*	*	391 37	20
Canary rockfish	289 49	266 49	-	*	332 57	322 49	*	292 36	301 52	129
China rockfish	292 24	280 27	-	*	290 20	*	*	284 32	287 25	64
Copper rockfish	377 75	309 36	-	*	376 47	327 54	304 48	325 46	346 62	135
Gopher rockfish	271 25	272 22	-	282 24	277 22	278 25	265 25	269 24	272 24	749
Grass rockfish	*	-	-	*	*	*	*	*	352 63	19
Kelp greenling	-	*	-	-	*	*	-	*	338 20	15
Kelp rockfish	-	-	-	-	*	*	313 25	*	316 25	36
Lingcod	687 60	*	-	*	622 74	625 83	*	624 58	632 70	98
Olive rockfish	*	-	-	308 38	373 54	370 55	353 41	355 63	360 56	324
Rosy rockfish	223 16	229 25	-	*	*	221 20	216 17	236 30	227 24	173
Starry rockfish	314 54	*	-	-	299 38	314 30	298 32	280 37	300 45	135
Vermilion rockfish	348 92	323 48	-	413 46	427 56	434 77	437 52	387 92	385 87	212
Widow rockfish	265 35	-	-	*	328 24	*	-	*	299 42	133
Yellowtail rockfish	290 43	285 57	-	297 19	296 34	285 25	265 30	269 33	279 37	575
<u>Near mixed</u>										
Black rockfish	-	-	-	289 39	287 24	*	-	-	289 34	58
Blue rockfish	282 40	289 32	299 39	291 36	288 37	282 38	272 35	273 37	283 37	7800
Bocaccio	470 77	408 98	400 89	489 85	459 89	451 70	423 60	416 92	434 93	1351

Appendix 11. (Morro Bay mean length cont.)

Group and species	1988	1989	1990	1991	1992	1993	1994	1995	All yr	Number measured
<u>Near mixed</u> (cont.)										
Brown rockfish	335 63	337 38	*	346 34	*	*	313 48	-	337 45	115
Canary rockfish	345 57	328 54	344 43	359 42	368 51	336 46	313 54	312 52	341 54	1221
China rockfish	283 48	282 29	*	295 19	290 24	301 32	277 24	301 30	288 34	220
Copper rockfish	336 73	342 78	391 67	376 71	365 60	364 56	346 61	356 54	359 68	1152
Flag rockfish	358 45	320 28	334 37	318 47	306 36	320 33	294 38	290 30	312 40	199
Gopher rockfish	260 29	266 23	*	273 22	271 24	261 23	263 24	264 22	266 25	1408
Greenspotted rockfish	283 41	312 45	318 39	323 57	315 49	273 39	299 58	277 50	303 49	368
Greenstriped rockfish	257 27	269 25	270 24	*	273 28	252 31	*	272 23	265 27	143
Kelp greenling	311 30	*	-	*	*	*	-	*	330 30	26
Lingcod	620 59	603 58	611 75	635 73	625 70	631 91	592 33	606 43	617 67	447
Olive rockfish	345 70	351 36	-	312 64	367 52	384 56	373 56	350 89	356 64	639
Rosy rockfish	219 26	228 25	229 21	228 21	226 21	223 20	220 19	220 22	224 22	1618
Speckled rockfish	-	*	-	-	*	314 44	307 30	*	319 42	41
Starry rockfish	307 46	309 46	304 41	301 43	298 40	297 37	288 40	292 38	298 41	1317
Vermilion rockfish	318 60	331 61	349 52	386 49	409 53	396 67	381 69	378 61	365 68	3143
Widow rockfish	270 38	300 33	297 43	322 46	319 43	280 51	288 48	292 44	299 47	2272
Yelloweye rockfish	363 59	358 51	*	*	443 76	363 58	414 82	366 75	384 72	120
Yellowtail rockfish	281 42	284 36	288 33	287 41	285 35	290 34	278 33	268 34	283 36	9202
<u>Near deep</u>										
Blue rockfish	*	-	-	-	297 33	*	-	-	296 33	113
Boccaccio	*	-	-	-	*	-	-	-	438 105	10
Canary rockfish	*	-	-	*	364 29	*	-	-	363 40	29
Chilipepper	-	329 46	-	-	321 33	-	-	-	328 46	156

Rockfish and Lingcod Catches from CPFVs, 1995

Appendix 11. (Morro Bay mean length cont.)

Group and species	1988	1989	1990	1991	1992	1993	1994	1995	All yr	Number measured
<u>Near deep</u> (cont.)										
Copper rockfish	-	-	*	*	394 71	376 54	-	-	387 69	39
Rosy rockfish	*	-	-	-	229 16	-	-	-	231 15	12
Starry rockfish	*	-	-	-	287 35	*	-	-	295 36	19
Vermilion rockfish	*	-	-	-	409 50	-	-	-	400 57	36
Widow rockfish	-	*	-	-	*	-	-	-	356 56	12
Yellowtail rockfish	297 28	-	-	-	287 25	-	-	-	290 26	128
<u>Distant shallow</u>										
Black rockfish	-	321 21	287 36	297 40	317 35	303 29	335 25	318 31	301 38	290
Blue rockfish	-	309 37	*	282 37	283 37	282 31	266 42	276 33	284 38	1195
Bocaccio	-	464 67	-	*	*	*	*	503 52	487 73	57
Brown rockfish	-	388 54	362 52	342 56	335 53	322 47	343 60	366 52	357 57	1508
Cabezon	-	-	*	*	*	*	*	*	452 84	24
Canary rockfish	-	311 32	*	324 55	-	319 27	318 46	329 47	322 44	133
China rockfish	-	277 21	281 23	294 18	280 16	*	*	306 33	290 23	125
Copper rockfish	-	349 72	*	340 56	348 73	304 45	*	350 72	335 65	158
Gopher rockfish	-	281 23	290 19	288 21	289 21	279 26	285 23	279 25	283 24	1084
Kelp rockfish	-	-	-	-	-	-	303 31	314 39	310 36	33
Lingcod	-	619 78	*	641 63	635 82	*	624 55	637 67	633 68	200
Olive rockfish	-	325 65	322 60	348 68	358 50	345 49	340 51	359 60	351 60	423
Rosy rockfish	-	*	*	229 16	*	*	*	231 19	229 20	42
Starry rockfish	-	-	-	-	*	*	-	302 59	302 50	15
Vermilion rockfish	-	406 65	*	430 95	427 91	356 93	407 86	425 77	411 85	198
Yellowtail rockfish	-	357 53	*	305 50	244 32	280 46	274 33	295 51	300 55	381

Appendix 11. (Morro Bay mean length cont.)

Group and species	1988	1989	1990	1991	1992	1993	1994	1995	All yr	Number measured
<u>Distant mixed</u>										
Blue rockfish	-	*	-	281 28	314 50	319 37	296 40	*	297 41	412
Bocaccio	-	492 81	-	498 62	499 68	492 57	444 71	490 87	493 69	406
Canary rockfish	*	*	*	346 77	365 46	365 35	399 33	360 32	363 52	124
Chilipepper	-	*	*	354 65	*	-	-	*	355 65	76
Copper rockfish	-	*	*	*	369 32	354 23	390 52	350 36	363 44	73
Flag rockfish	-	*	-	*	330 50	*	-	*	337 45	28
Gopher rockfish	273 19	*	-	*	-	-	-	-	268 23	57
Greenspotted rockfish	-	302 29	313 43	324 47	332 50	*	*	*	317 47	111
Greenstriped rockfish	-	277 18	-	292 32	285 21	-	*	*	285 26	58
Lingcod	*	-	-	*	680 146	*	*	*	645 93	35
Olive rockfish	-	*	-	*	441 41	415 40	417 47	408 45	417 46	127
Rosy rockfish	*	238 26	-	234 23	237 24	222 20	222 26	212 22	227 25	122
Speckled rockfish	-	-	-	*	347 37	*	*	*	345 36	58
Starry rockfish	273 27	320 29	-	301 26	314 36	295 43	313 51	314 37	305 41	180
Vermilion rockfish	-	479 56	-	419 38	411 50	411 30	433 25	*	418 43	288
Widow rockfish	*	*	-	322 47	344 39	339 50	306 43	267 29	326 48	202
Yelloweye rockfish	*	*	-	*	*	*	*	*	397 76	29
Yellowtail rockfish	-	*	290 14	329 67	313 47	324 31	304 24	292 33	318 51	821
<u>Distant deep</u>										
Bocaccio	-	-	-	-	*	518 77	502 38	*	507 66	49
Canary rockfish	-	-	-	-	384 34	-	*	-	386 29	14
Chilipepper	-	-	-	-	-	440 31	*	396 31	431 36	68
Greenspotted rockfish	-	-	-	-	-	*	330 51	*	336 53	32

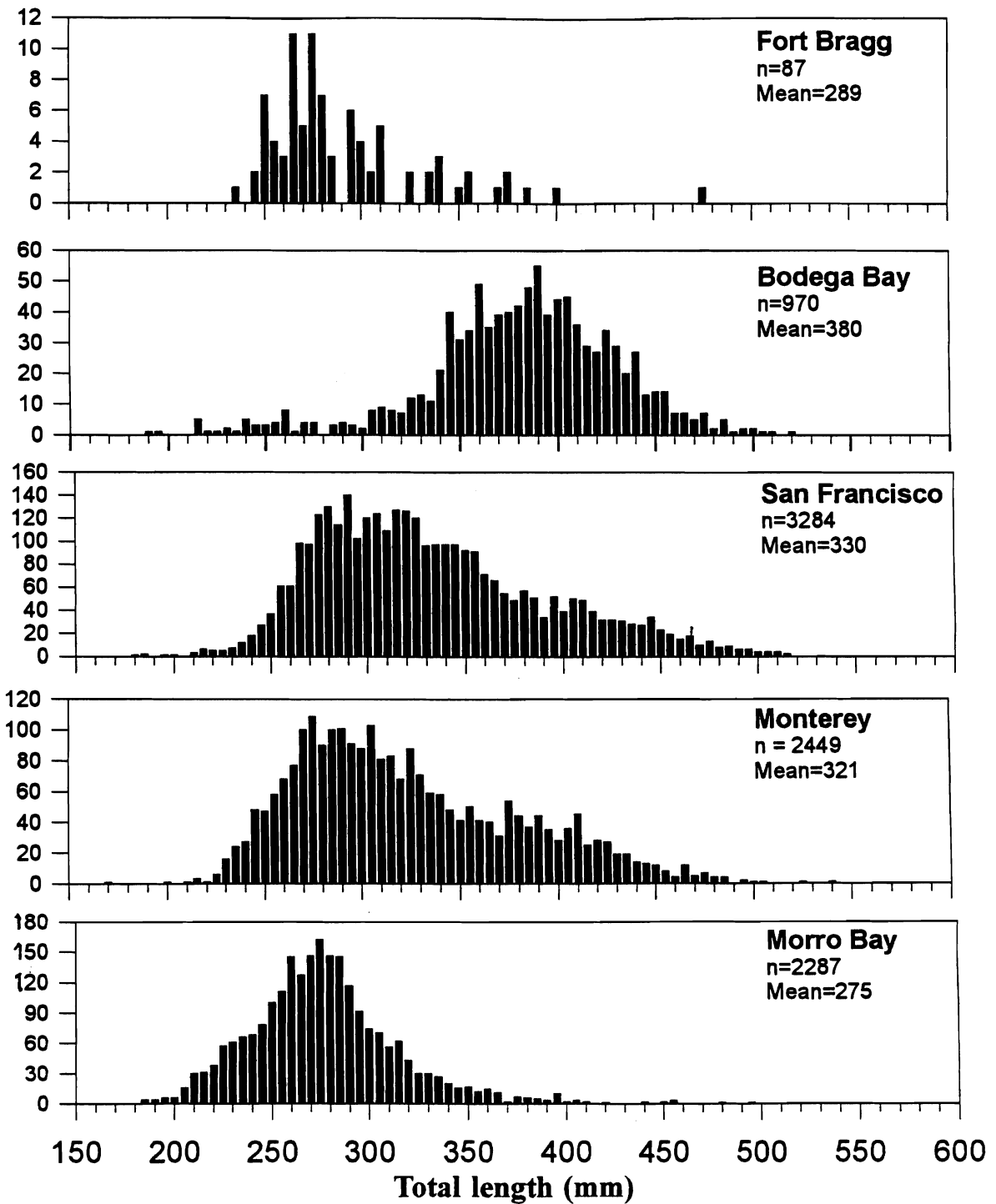
Rockfish and Lingcod Catches from CPFVs, 1995

Appendix 11. (Morro Bay mean length cont.)

Group and species	1988	1989	1990	1991	1992	1993	1994	1995	All yr	Number measured
<u>Distant deep</u> (cont.)										
Greenstriped rockfish	-	-	-	-	-	290 22	284 26	*	285 24	32
Speckled rockfish	-	-	-	-	*	313 23	*	*	331 33	36
Starry rockfish	-	-	-	-	*	*	305 31	*	316 35	49
Widow rockfish	-	-	-	-	356 24	*	*	399 38	386 47	65
Yelloweye rockfish	-	-	-	-	-	*	340 52	*	347 54	33

Appendix 12. Length frequency of yellowtail rockfish by port area, 1995.

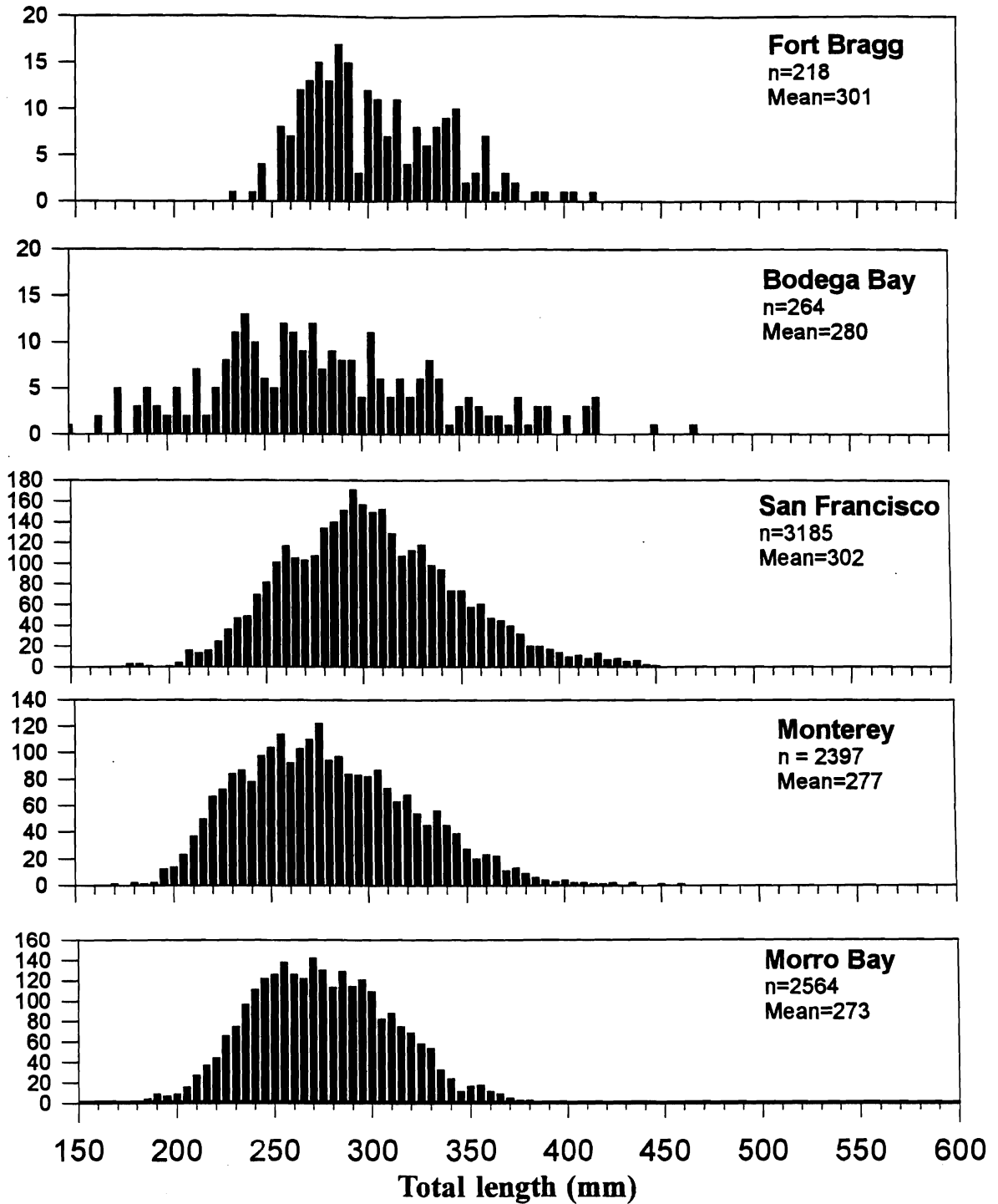
Frequency



Rockfish and Lingcod Catches from CPFVs, 1995

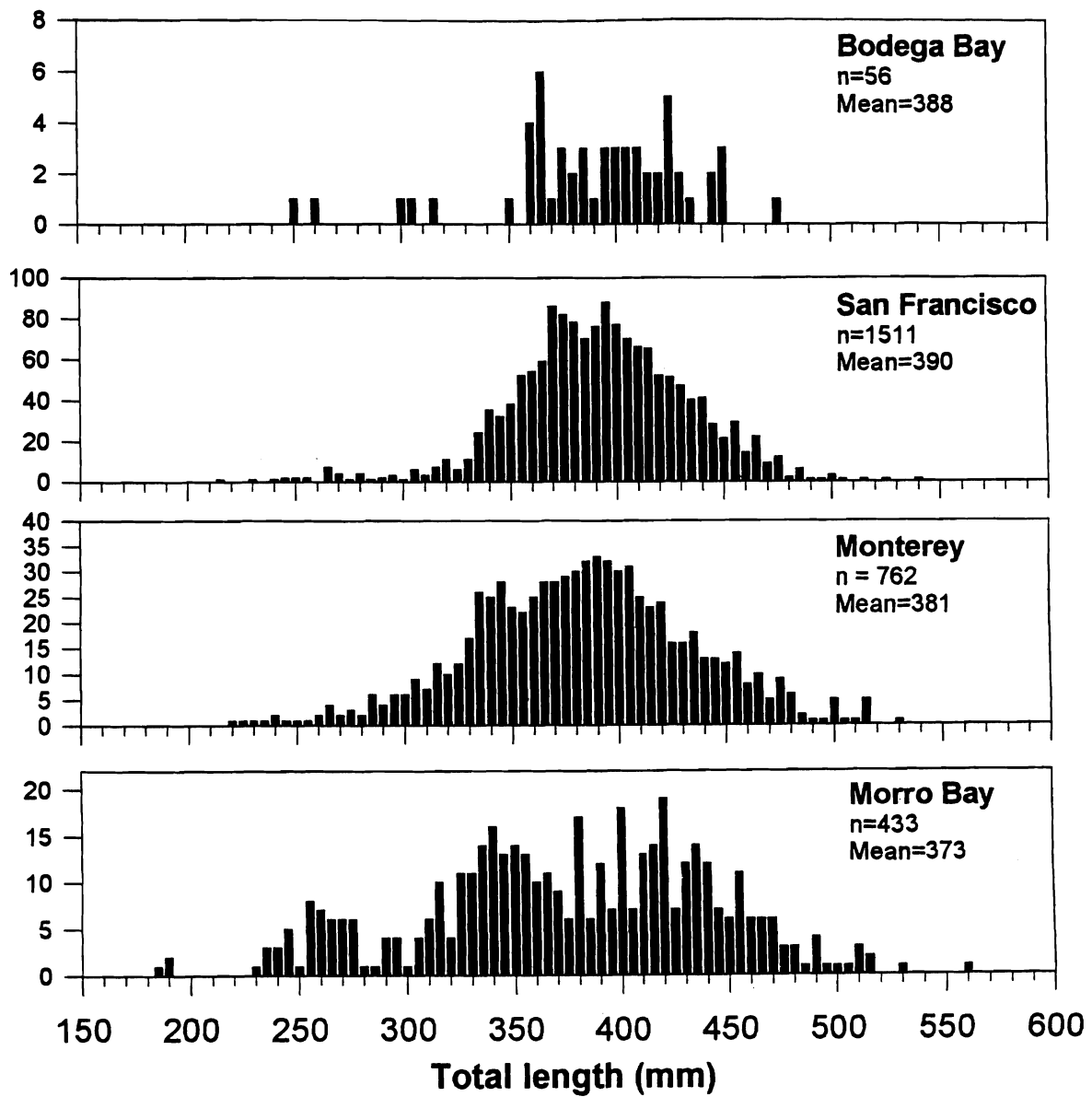
Appendix 13. Length frequency of blue rockfish by port area, 1995.

Frequency



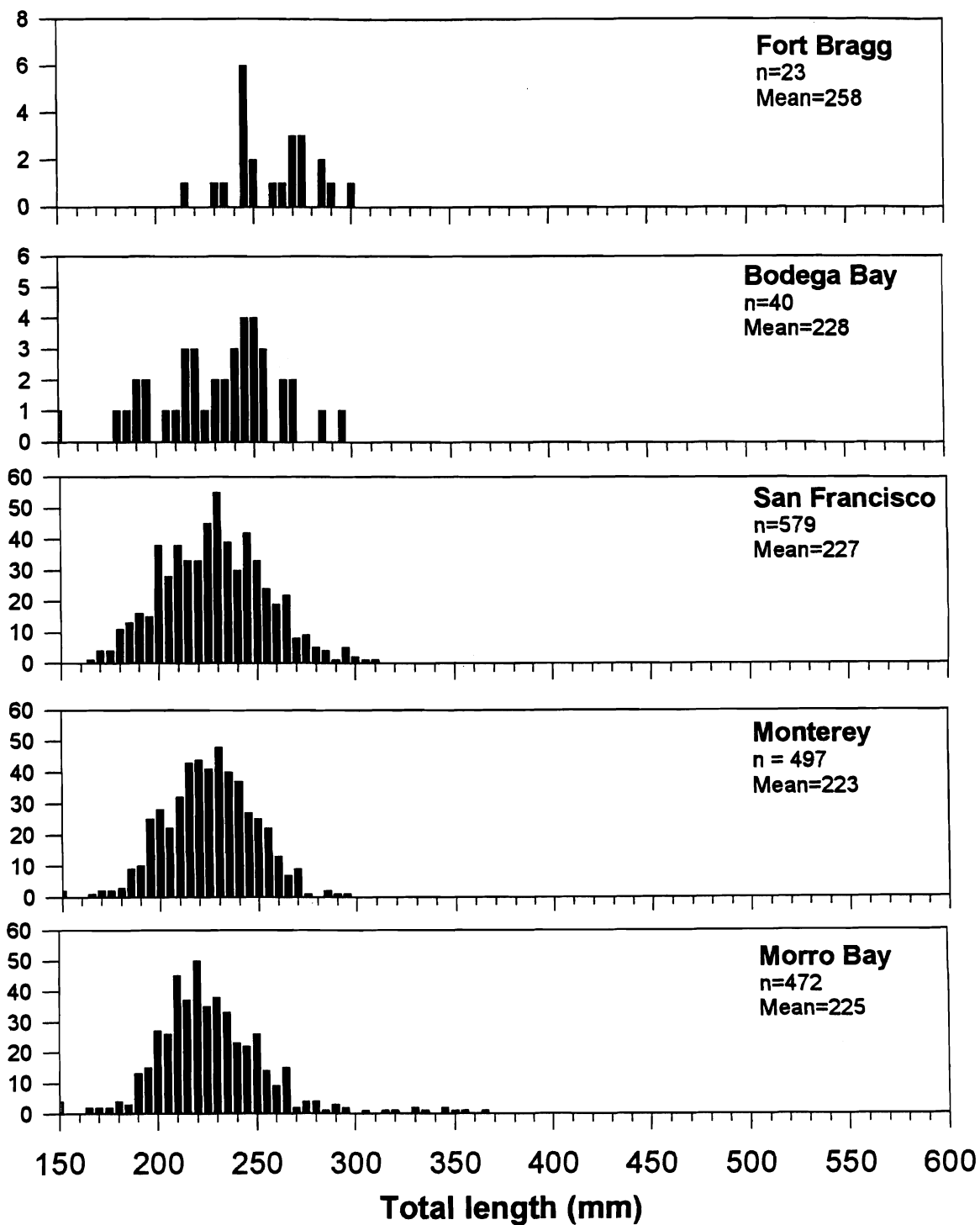
Appendix 14. Length frequency of olive rockfish by port area, 1995.

Frequency



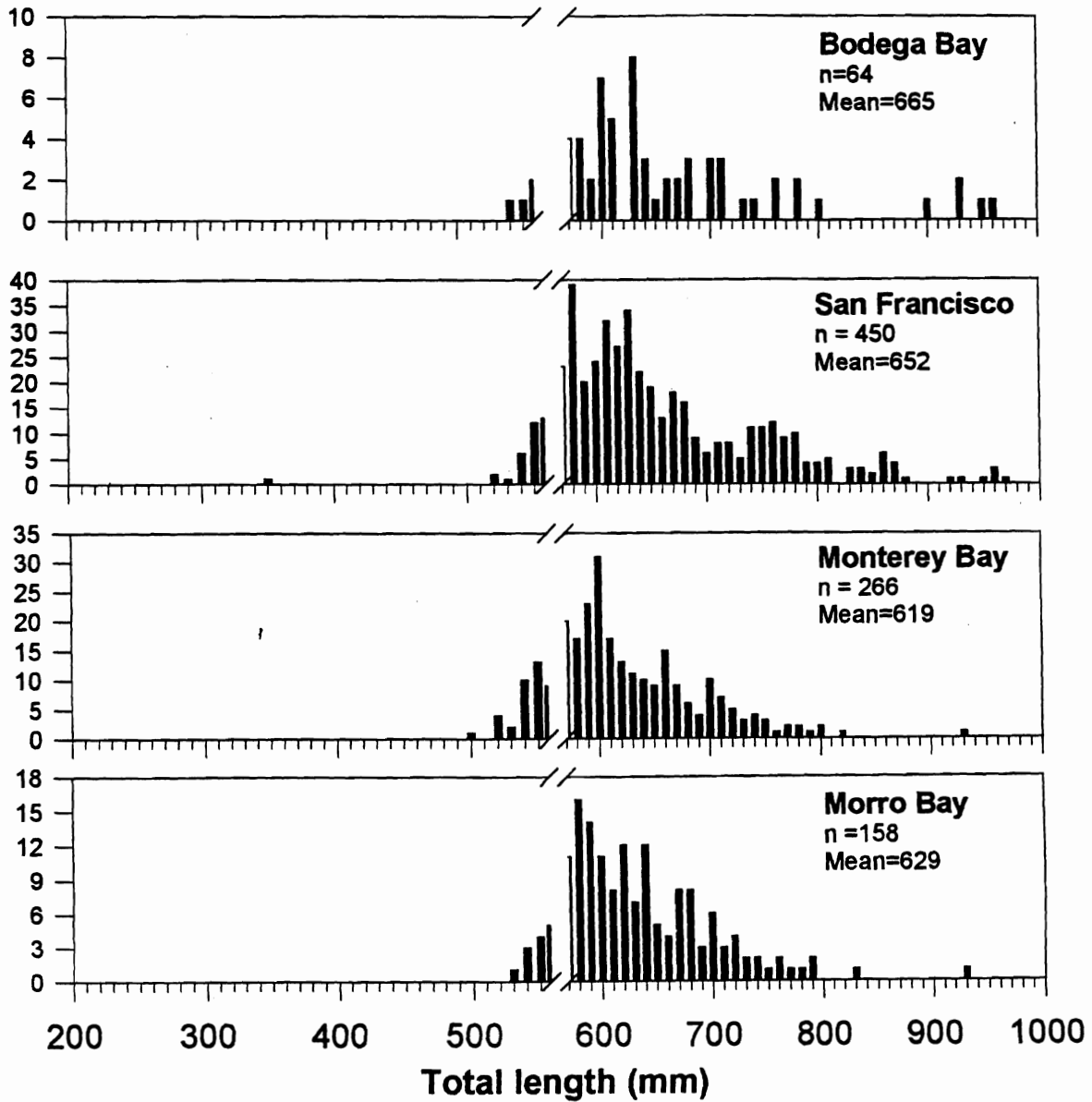
Appendix 15. Length frequency of rosy rockfish by port area, 1995.

Frequency



Appendix 16. Length frequency of lingcod by port area, 1995.

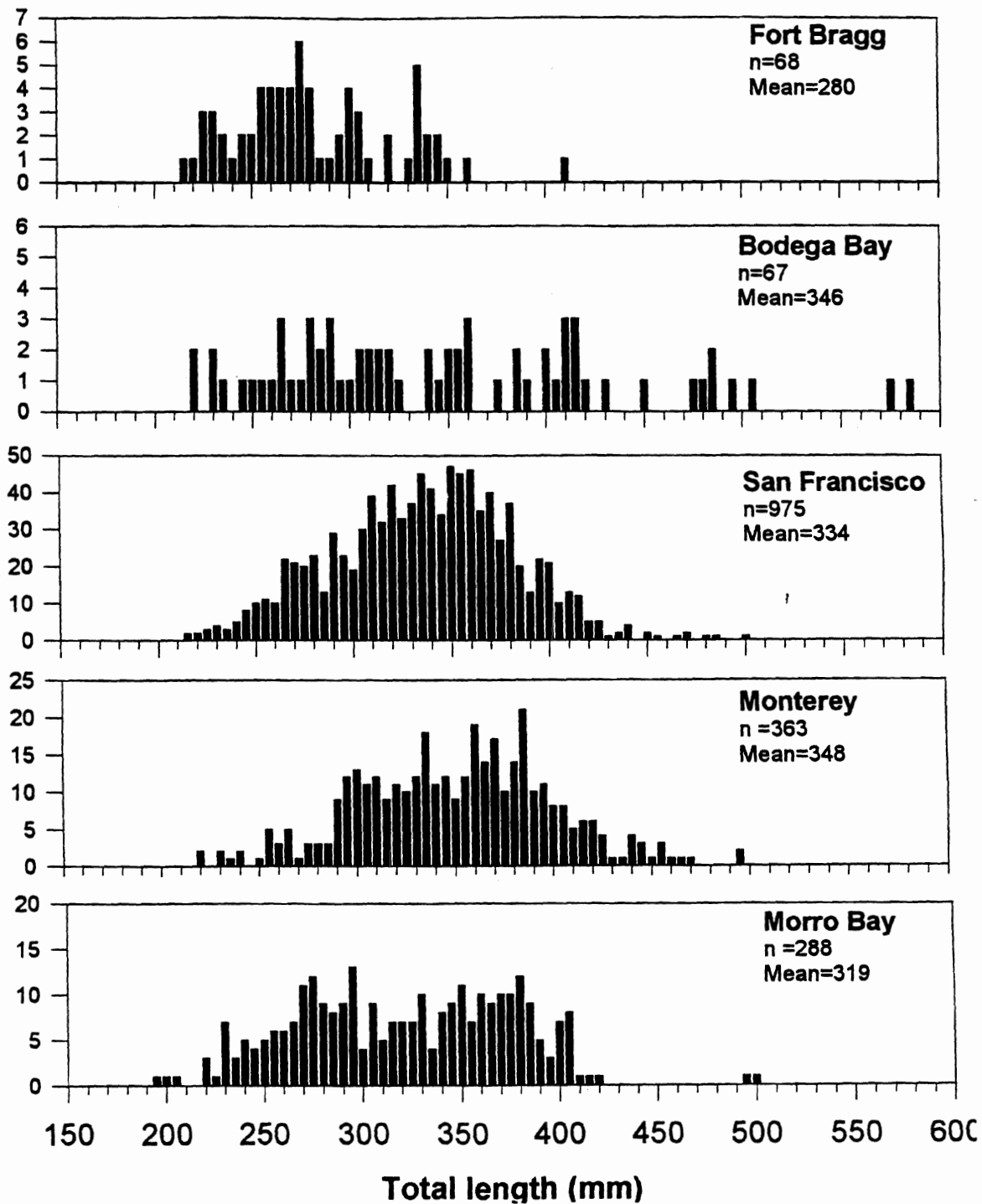
Frequency



Rockfish and Lingcod Catches from CPFVs, 1995

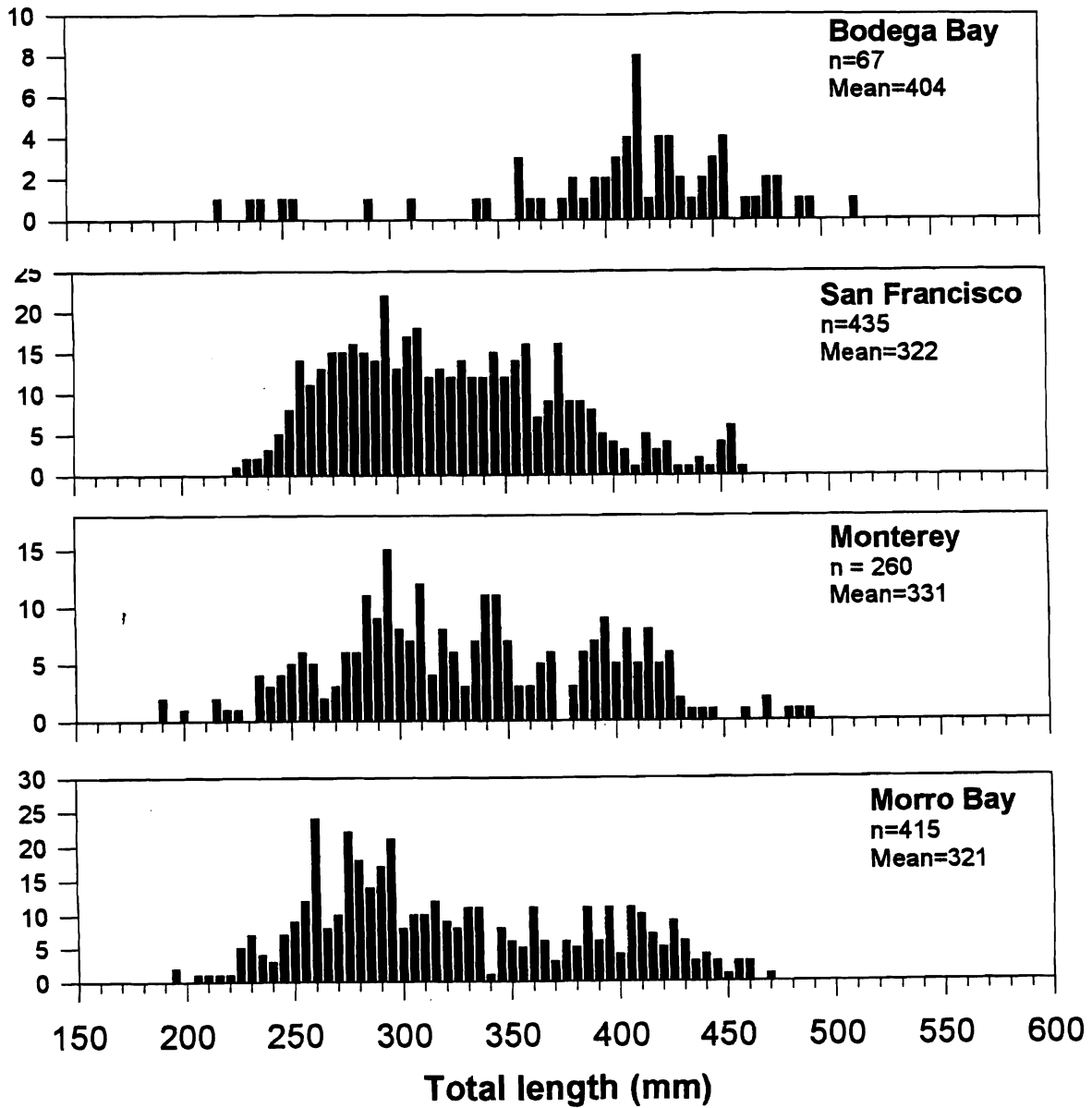
Appendix 17. Length frequency of canary rockfish by port area, 1995.

Frequency



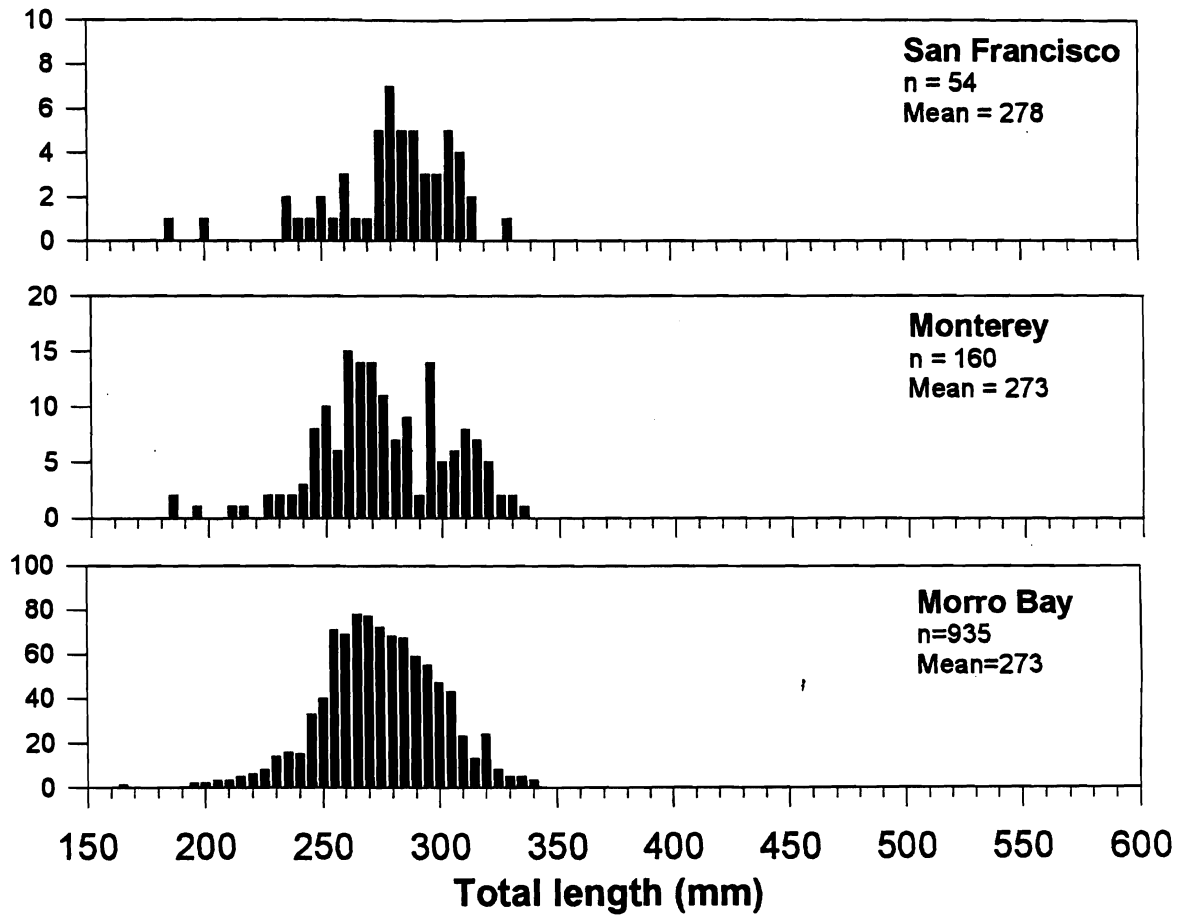
Appendix 18. Length frequency of widow rockfish by port area, 1995.

Frequency



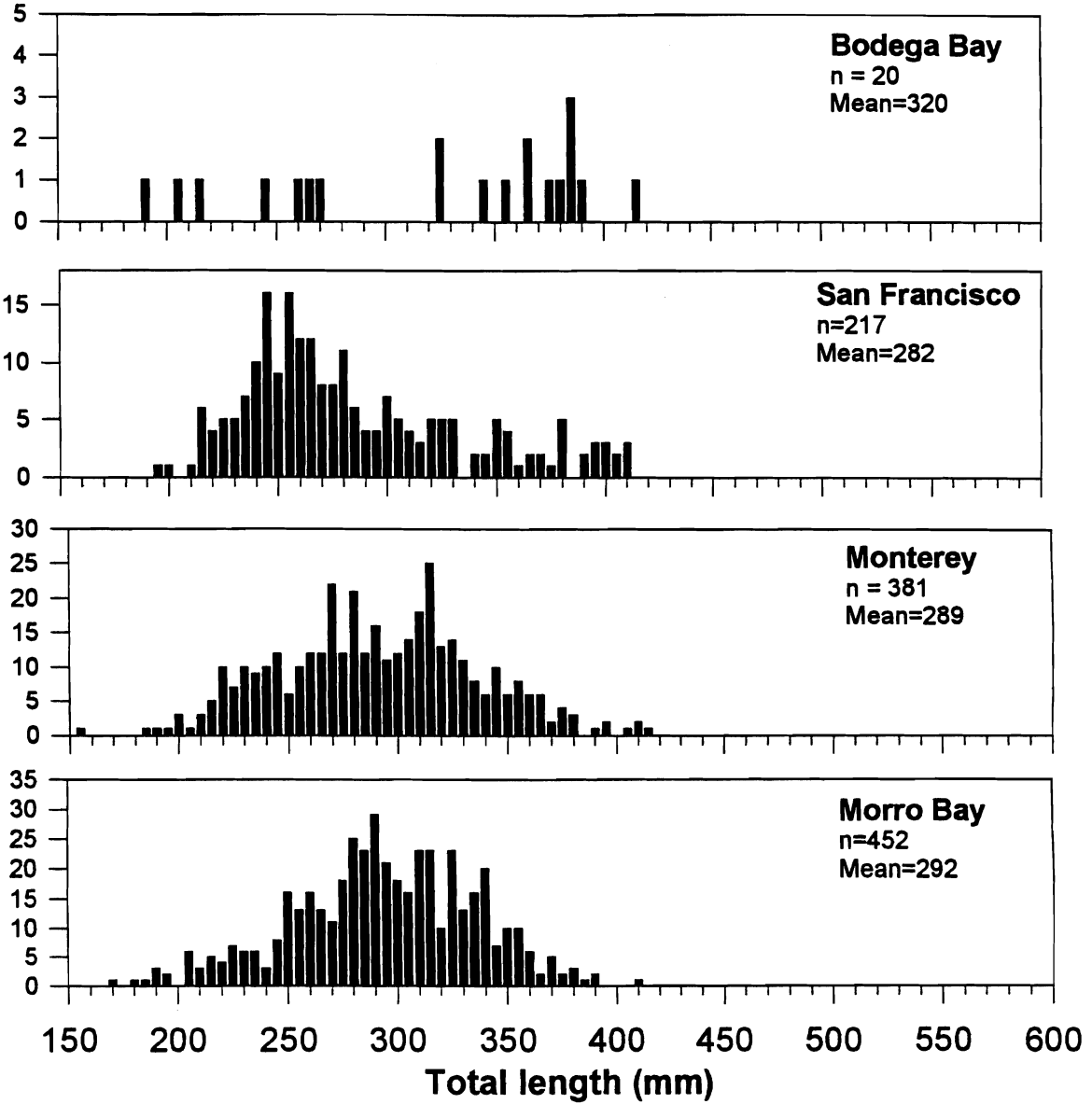
Appendix 19. Length frequency of gopher rockfish by port area, 1995.

Frequency



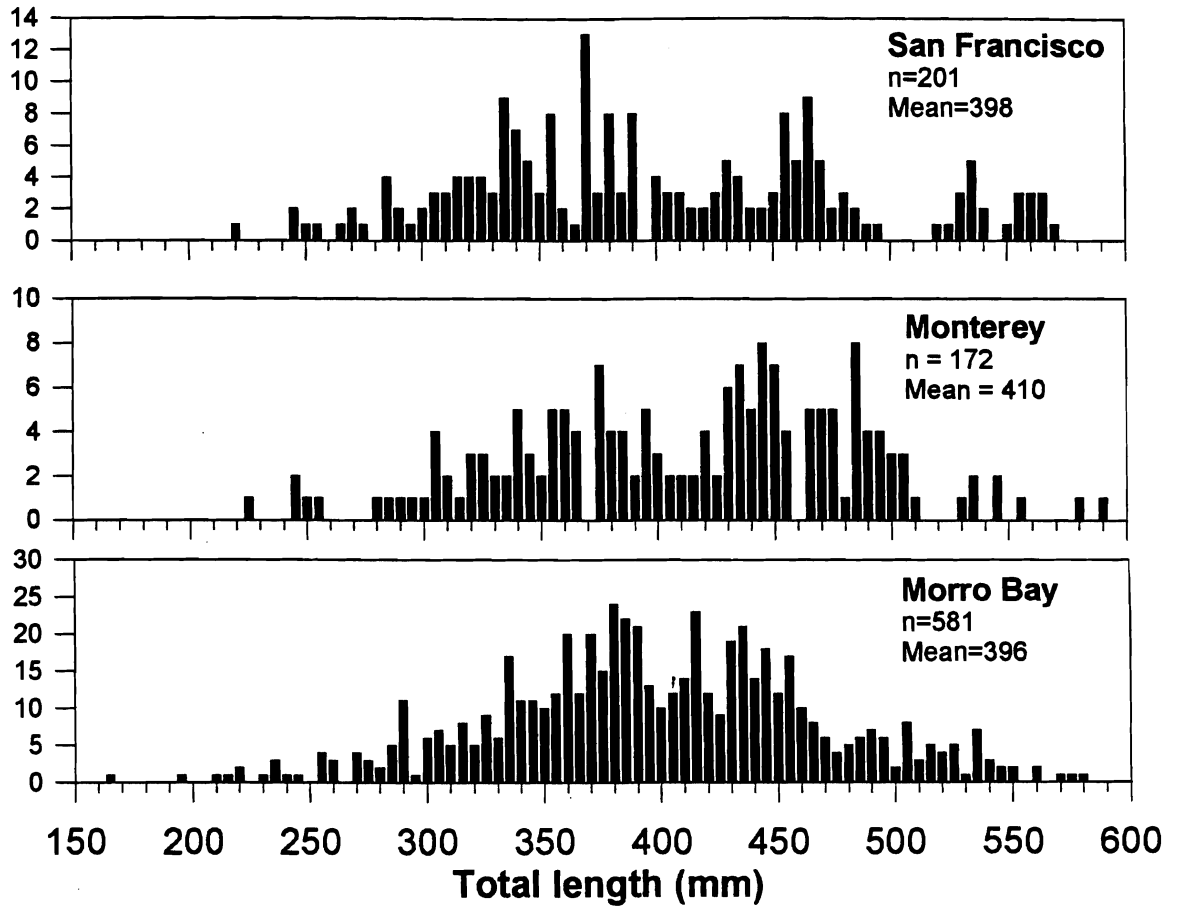
Appendix 20. Length frequency of starry rockfish by port area, 1995.

Frequency



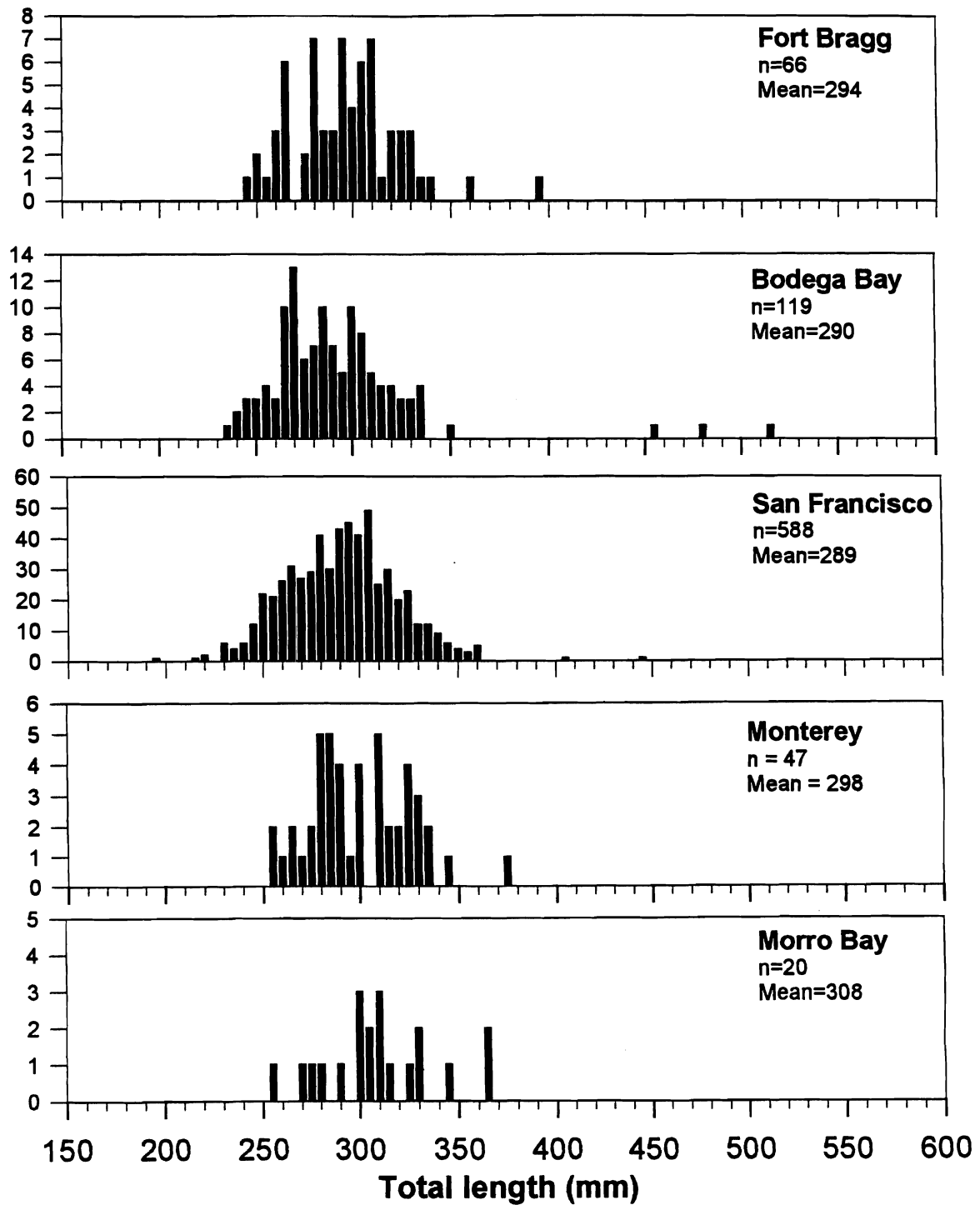
Appendix 21. Length frequency of vermillion rockfish by port area, 1995.

Frequency



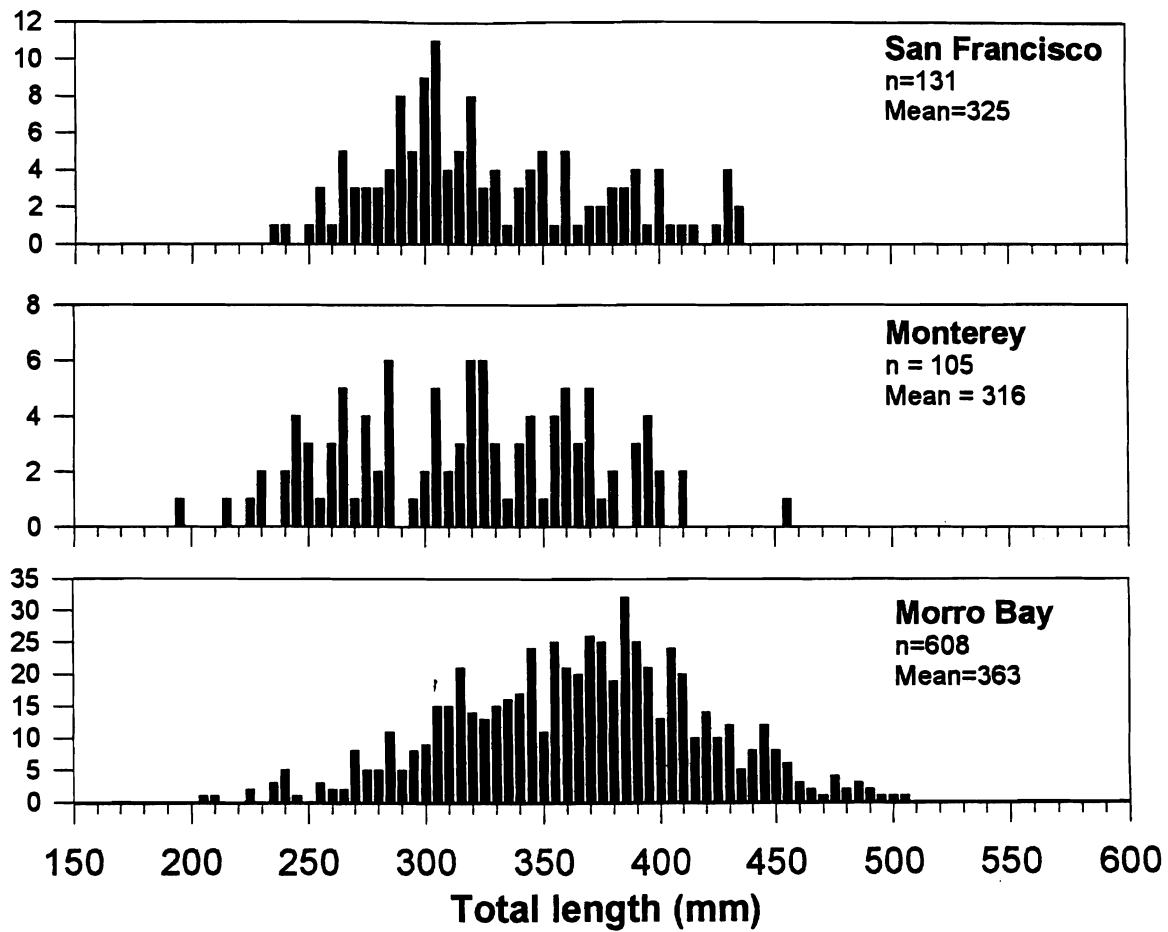
Appendix 22. Length frequency of black rockfish by port area, 1995.

Frequency



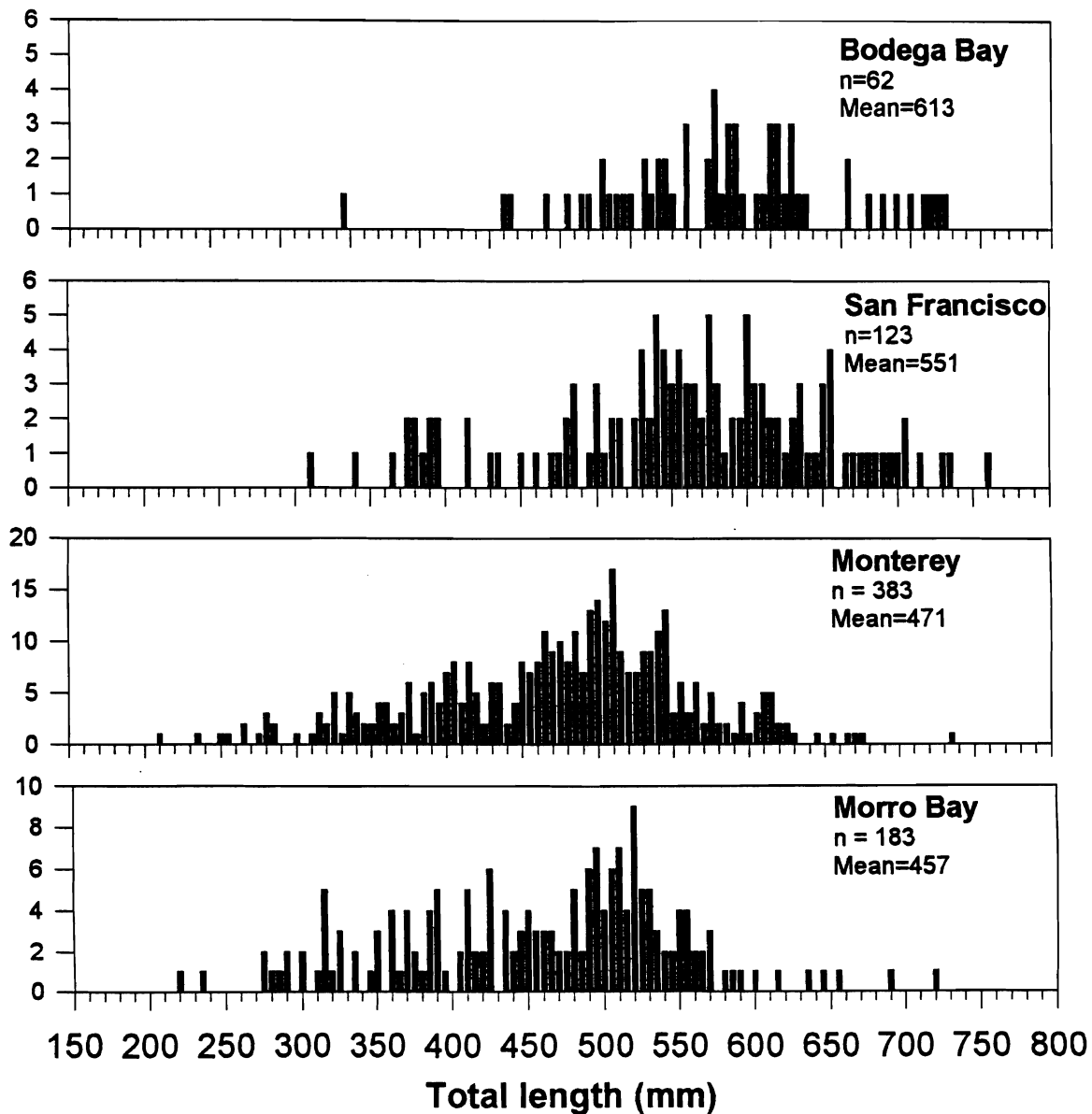
Appendix 23. Length frequency of brown rockfish by port area, 1995.

Frequency



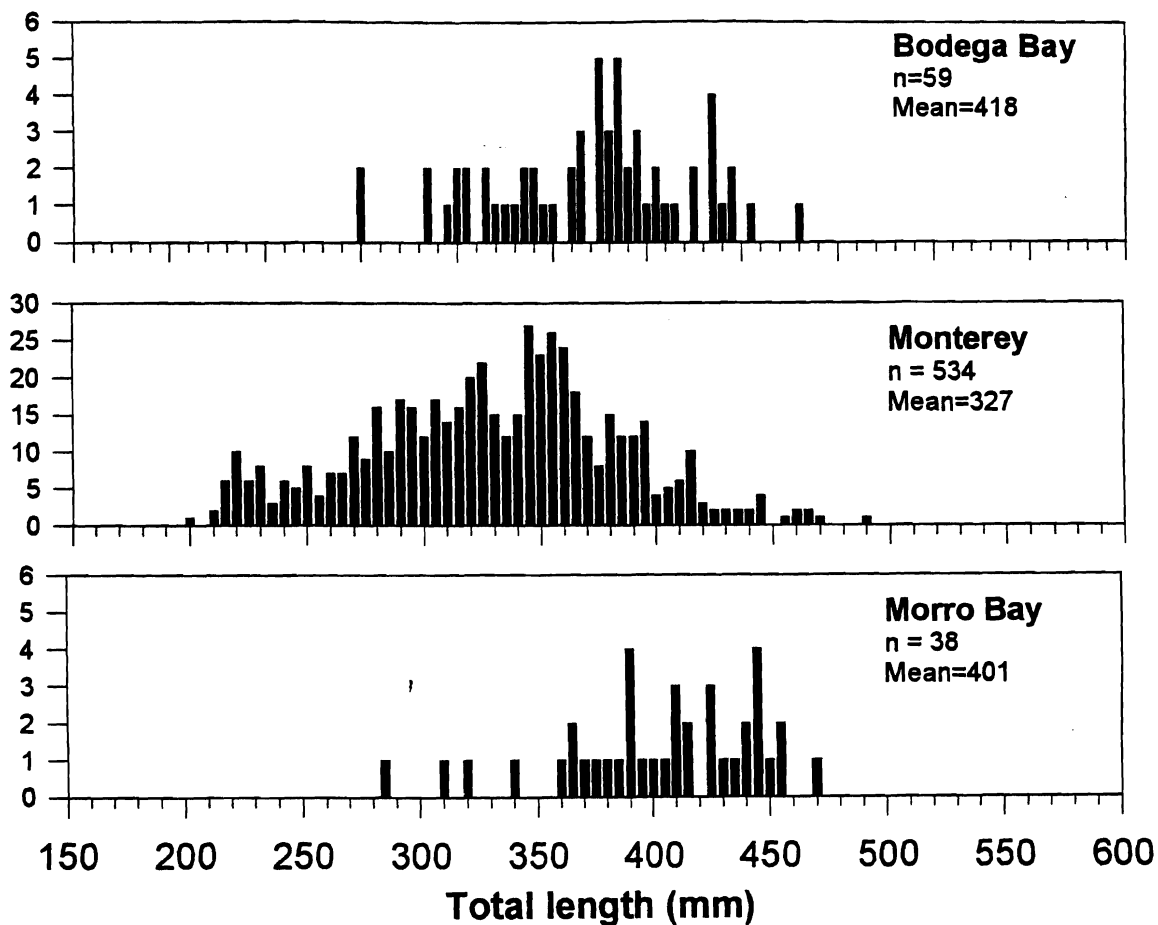
Appendix 24. Length frequency of bocaccio by port area, 1995.

Frequency



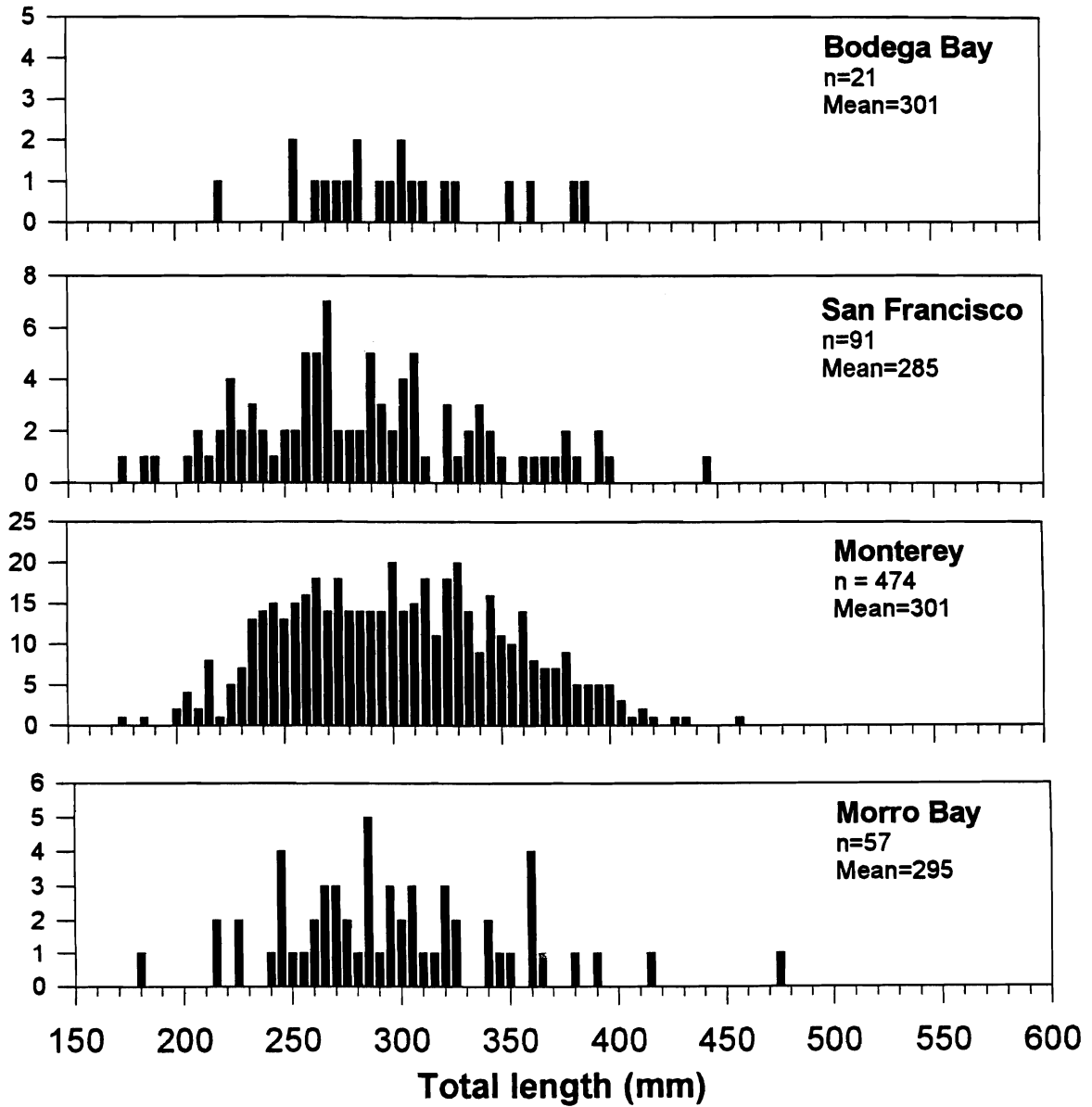
Appendix 25. Length frequency of chilipepper by port area, 1995.

Frequency



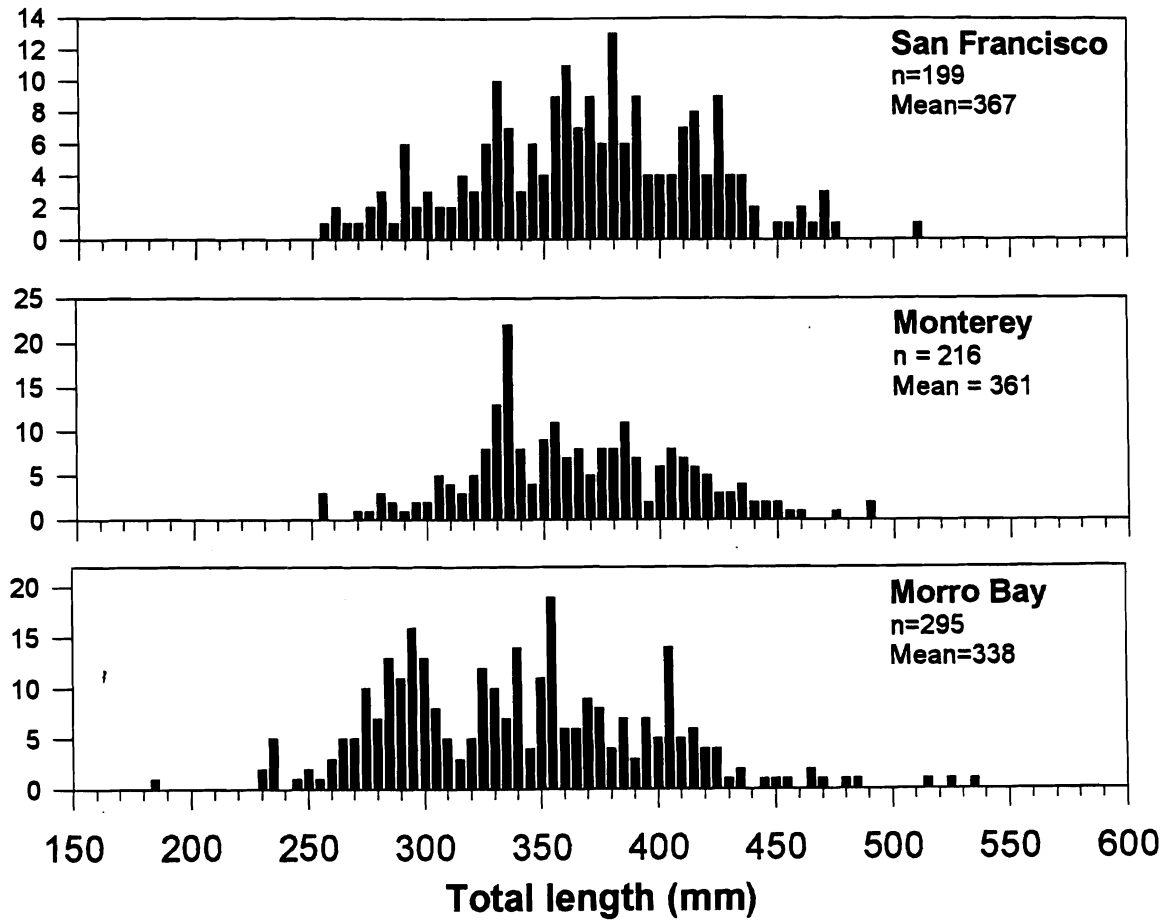
Appendix 26. Length frequency of greenspotted rockfish by port area, 1995.

Frequency



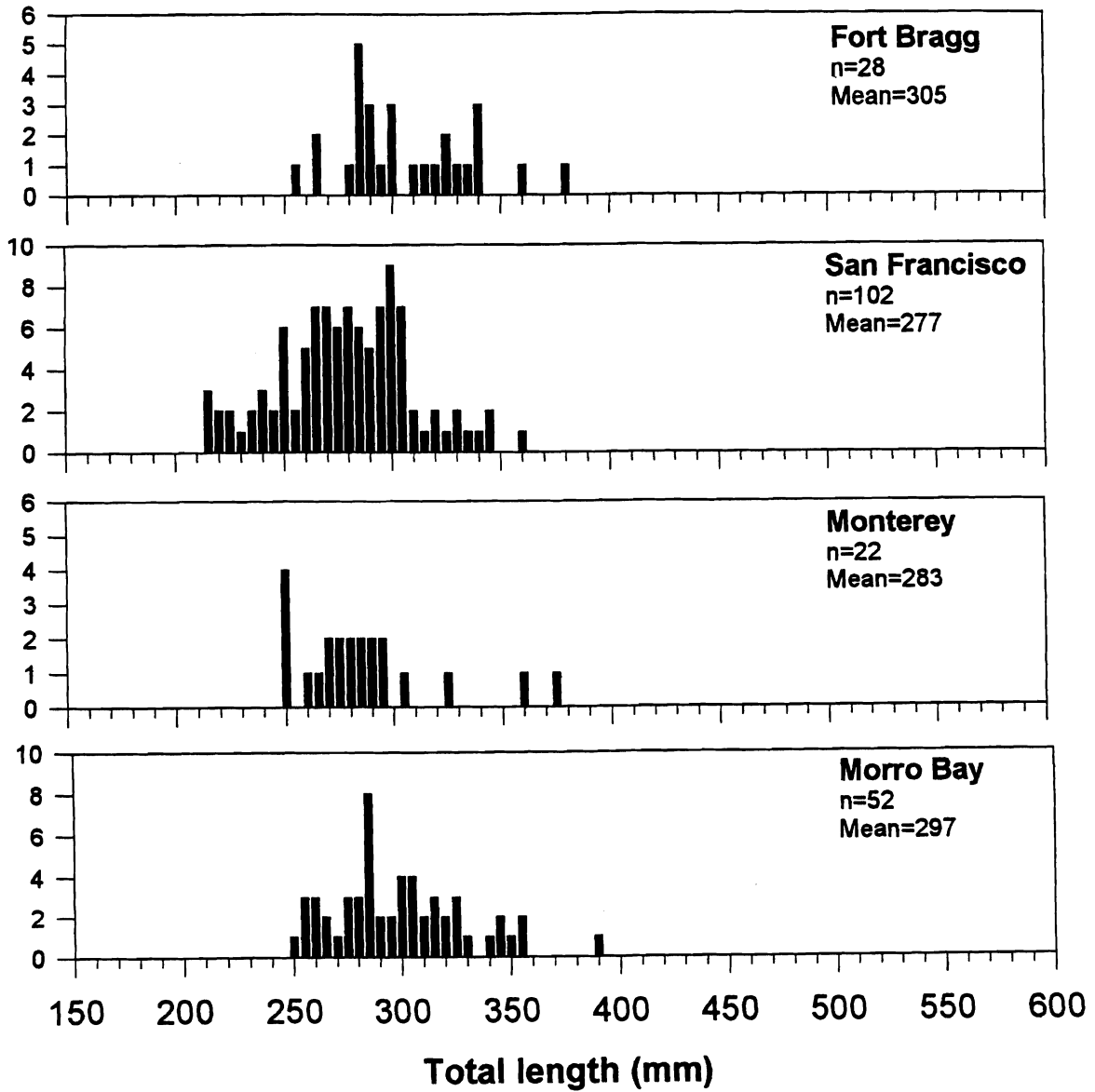
Appendix 27. Length frequency of copper rockfish by port area, 1995.

Frequency



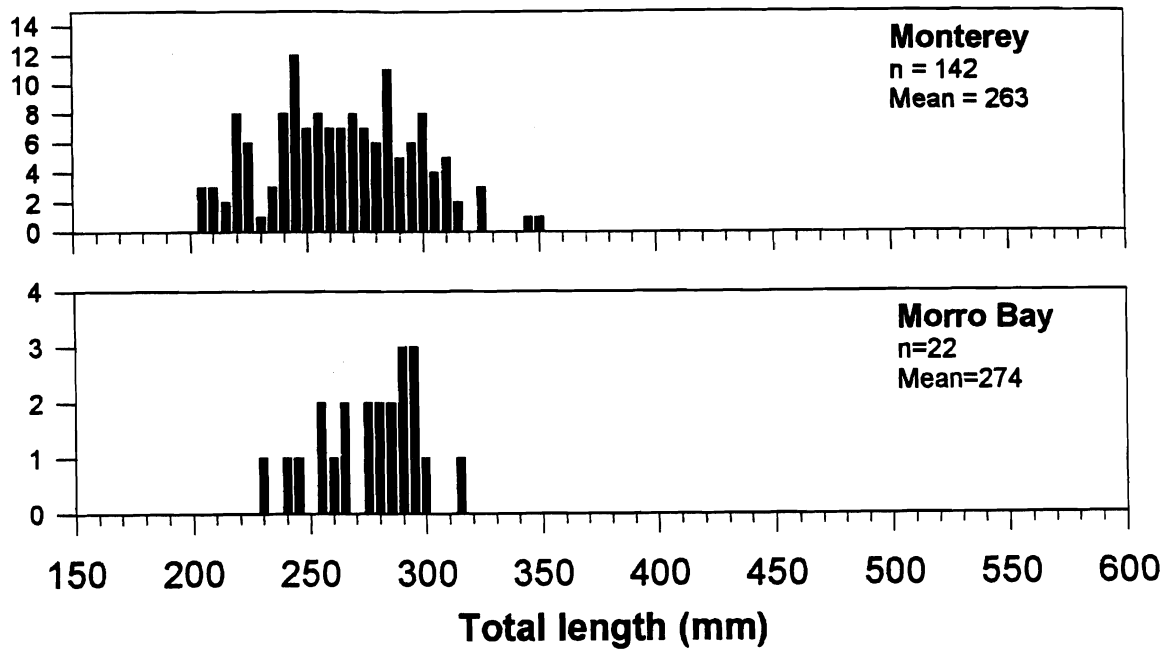
Appendix 28. Length frequency of China rockfish by port area, 1995.

Frequency



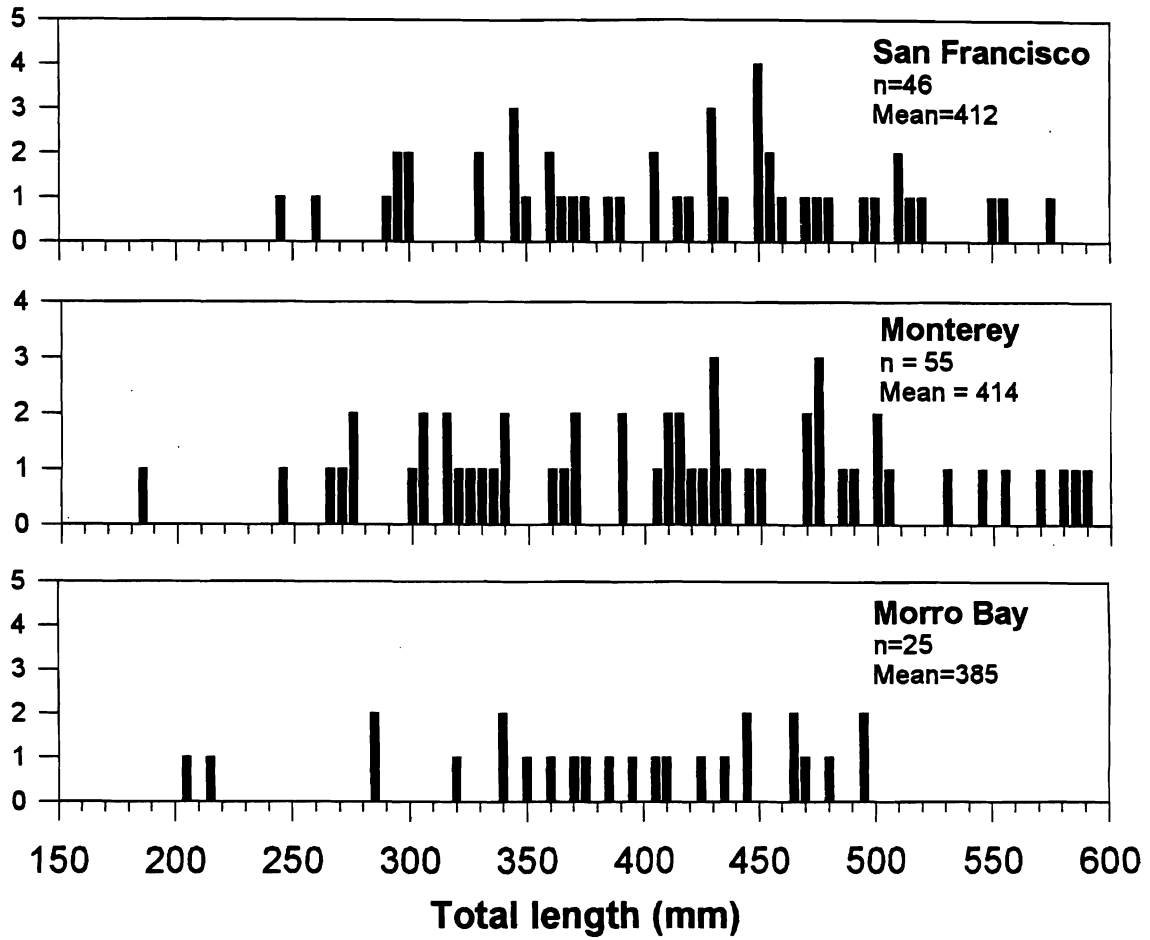
Appendix 29. Length frequency of greenstriped rockfish by port area, 1995.

Frequency



Appendix 30. Length frequency of yelloweye rockfish by port area, 1995.

Frequency



Rockfish and Lingcod Catches from CPFVs, 1995

Appendix 31. Maximum total length, by port area, of all species measured in CPFV catch, 1987 to 1995.

Common name	Observed maximum length (mm)				Observed maximum length (in.)				Known max. length (in.) ^b					
	EK ^a	FB	BB	SF	MT	MB	EK	FB		BB	SF	MT	MB	
<u>Rockfishes</u>														
Aurora rockfish	-	-	-	-	350	-	-	-	-	-	-	13.8	-	14.7
Bank rockfish	-	357	455	-	503	-	14.1	17.9	-	-	-	19.8	-	20.1
Black rockfish	557	496	550	575	497	455	21.9	19.5	21.7	22.6	19.6	17.9	17.9	23.75
Black-&-yellow rockfish	-	368	-	345	358	330	-	14.5	-	13.6	14.1	13.0	13.0	15.25
Blue rockfish	470	468	491	527	457	500	18.5	18.4	19.3	20.7	18.0	19.7	19.7	21.0
Bocaccio	544	790	889	840	836	756	21.4	31.1	35.0	33.1	32.9	29.8	29.8	36.0
Brown rockfish	451	-	497	504	468	532	17.8	-	19.6	19.8	18.4	20.9	20.9	21.5
Calico rockfish	-	-	-	146	-	242	-	-	-	5.7	-	9.5	9.5	9.8 ^c
Canary rockfish	546	487	687	635	574	503	21.5	19.2	27.0	25.0	22.6	19.8	19.8	30.0
Chameleon rockfish	-	-	-	-	368	-	-	-	-	-	-	14.5	-	17.0
Chilipepper	-	-	556	530	535	512	-	-	21.9	20.9	21.1	20.2	20.2	22.0
China rockfish	388	395	416	412	379	422	15.3	15.6	16.4	16.2	14.9	16.6	16.6	17.0
Copper rockfish	574	560	519	582	533	541	22.6	22.0	20.4	22.9*	21.0	21.3	21.3	22.5
Cowcod	-	-	771	560	768	701	-	-	30.4	22.0	30.2	27.6	27.6	37.0
Flag rockfish	-	-	410	495	451	440	-	-	16.1	19.5	17.8	17.3	17.3	25.0
Gopher rockfish	-	413	322	425	385	410	-	16.3*	12.7	16.7*	15.2	16.1*	16.1*	15.6
Grass rockfish	-	-	-	455	430	508	-	-	-	17.9	16.9	20.0	20.0	22.0
Greenblotched rockfish	-	-	-	-	475	285	-	-	-	-	18.7	11.2	11.2	19.0
Greenspotted rockfish	-	399	479	473	461	473	-	15.7	18.9	18.6	18.1	18.6	18.6	19.75
Greenstriped rockfish	-	305	392	408	397	356	-	12.0	15.4*	16.1*	15.6*	14.0	14.0	15.0
Halfbanded rockfish	-	-	-	183	207	136	-	-	-	7.2	8.1	5.4	5.4	10.0

Appendix 31 (Maximum total length cont.)

Common name	EK	FB	BB	SF	MT	MB	EK	FB	BB	SF	MT	MB	Max length
<u>Rockfishes (cont.)</u>													
Kelp rockfish	-	-	-	386	382	414	-	-	-	15.2	15.0	16.3	16.75
Olive rockfish	421	484	508	537	557	560	16.6	19.1	20.0	21.1	21.9	22.0	24.0
Pink rockfish	-	-	391	-	-	-	-	-	15.4	-	-	-	22.0
Quillback rockfish	556	428	415	480	407	360	21.9	16.9	16.3	18.9	16.0	14.2	24.0
Redstripe rockfish	-	-	319	297	318	-	-	-	12.6	11.7	12.5	-	20.0
Rosy rockfish	-	335	346	353	344	361	-	13.2	13.6	13.9	13.5	14.2	14.2
Rosethorn rockfish	312	324	298	270	291	272	12.3	12.8	11.7	10.6	11.5	10.7	16.0
Sharpchin rockfish	-	-	-	-	303	-	-	-	-	-	11.9	-	13.0
Shortbelly rockfish	-	-	205	-	326	-	-	-	8.1	-	12.8*	-	13.4 ^e
Speckled rockfish	-	-	501	455	502	429	-	-	19.7	17.9	19.8	16.9	22.0
Splitnose rockfish	-	-	-	-	378	374	-	-	-	-	14.9	14.7	18.0
Squarespot rockfish	-	-	280	287	305	282	-	-	11.0	11.3*	12.0*	11.1	11.25
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	-	-	-	-	368	408	-	-	-	-	14.5	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
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

Rockfish and Lingcod Catches from CPFVs, 1995

Appendix 31 (Maximum total length cont.)

Common name	EK	FB	BB	SF	MT	MB	EK	FB	BB	SF	MT	MB	Max length
<u>Other fishes</u>													
Blacksmith	-	-	-	-	297	273	-	-	-	-	11.7	10.7	12.0
Blue shark	-	-	-	1830	-	1600	-	-	-	72.0	-	63.0	156.0
Bonito shark	-	-	-	-	-	1700	-	-	-	-	-	66.9	156.0
Butter sole	-	-	-	-	441	-	-	-	-	-	17.4	-	21.75
Cabezon	560	550	416	661	628	617	22.0	21.7	16.4	26.0	24.7	24.3	39.0
California barracuda	-	-	-	-	-	886	-	-	-	-	-	34.9	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
English sole	-	-	-	255	-	-	-	-	-	10.0	-	-	22.5
Fantail sole	-	-	-	-	363	-	-	-	-	-	14.3	-	21.0
Jack mackerel	-	-	661	713	674	411	-	-	26.0	28.1	26.5	16.2	32.0
Jacksnelt	-	-	-	-	388	-	-	-	-	-	15.3	-	17.5
Kelp greenling	413	386	392	438	483	378	16.3	15.2	15.4	17.2	19.0	14.9	21.0
King salmon	-	800	934	840	917	736	-	31.5	36.8	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	24.9	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	212	220	415	369	343	11.3	8.3	8.7	16.3*	14.5	13.5	16.0
Pacific sardine	-	-	-	291	275	-	-	-	-	11.5	10.8	-	16.0

Appendix 31 (Maximum total length cont.)

Common name	EK	FB	BB	SF	MT	MB	EK	FB	BB	SF	MT	MB	Max length
<u>Other fishes (cont)</u>													
Petrale sole	-	-	473	495	494	503	-	-	18.6	19.5	19.4	19.8	27.5
Ratfish	-	-	-	-	543	-	-	-	-	-	21.4	-	38.0
Red brotula	-	-	-	-	412	-	-	-	-	-	16.2	-	20.0
Rock sole	-	-	342	482	499	473	-	-	13.5	19.0	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
Silver salmon	-	656	-	-	668	-	-	25.8	-	-	26.3	-	38.5
Spiny dogfish	-	-	-	-	1005	1017	-	-	-	-	39.6	40.0	62.4
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 Legend: EK-Eureka; FB-Fort Bragg; BB-Bodega Bay; SF-San Francisco; MT-Monterey; MB-Morro Bay.

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

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

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