Historical Catch Data From California's Commercial Passenger Fishing Vessel Fleet: Status and Comparison of Two Sources

by **Kevin T. Hill** *and* **J. Thomas Barnes**

California Department of Fish and Game
Marine Region
Technical Report No. 60
1998

CALIFORNIA DEPARTMENT OF FISH AND GAME
MARINE REGION TECHNICAL REPORT SERIES

****

Marine Region Technical Reports are research documents by Department personnel that are of sufficient importance to be preserved, but which for some reason are not appropriate for primary scientific publication. No restrictions are placed on subject matter.

These reports may be cited in publication. The material in these Reports may eventually appear in the primary scientific literature.

Inquiries concerning these reports should be directed to the editor:
Ms. Carrie Wilson, Marine Region Headquarters, Department of Fish and Game, 20 Lower Ragsdale Drive, Suite #100, Monterey, California 93940.

State of California
The Resources Agency
Department of Fish and Game

Historical Catch Data From California's Commercial Passenger Fishing Vessel Fleet: Status and Comparison of Two Sources

by

Kevin T. Hill and J. Thomas Barnes
California Department of Fish and Game
Southwest Fisheries Science Center
8604 La Jolla Shores Drive
La Jolla, California 92038

MARINE REGION TECHNICAL REPORT NO. 60
CALIFORNIA DEPARTMENT OF FISH AND GAME
1998

Abstract

Two sources of historical landing data from California's commercial passenger fishing vessel (CPFV) fleet were examined to: 1) assess status and content of each archival data source, 2) identify reporting differences, and 3) evaluate potential usefulness of the data for enhancing resource assessment. Current and historical CPFV logbook data collected by California Department of Fish and Game are described with respect to status, content, and approximate cost of recovering historical data (1936-78) to electronic format. CPFV landing data available from *Los Angeles Times*, archived in libraries since 1959, are similarly described.

CPFV logbook data were compared with observer data from 1985-89 to evaluate accuracy of logbook records. Comparison of catch and effort for major species targeted by southern California CPFV anglers revealed significant relationships between reported and observed catch rates for six of ten species examined. Agreement of catch rate trends validates use of logbook data for measuring relative changes in catch and effort for these sport fish species.

Direct comparisons of landings data from CPFV logs and *Los Angeles Times* fish reports were made for years in which *Times* data are already available in electronic database format, including 1959, 1967, 1975, 1983, 1991, and 1992. Comparisons of total landings by species among years revealed strong correlations between the two sources for those species (e.g., California barracuda, yellowtail, bonito) most heavily targeted over the entire period. Other species, such as California sheephead, spotted scorpionfish, and ocean whitefish, were underreported or not reported by the *Times* until recently. Comparison of port-wide total landings of all species (1983, 1991, 1992) revealed varied reports of total catch (all species) between sources among ports and years. *Times*-logbook landing report comparisons were highly correlated for Los Angeles area ports (r^2=0.956), but were also most different in absolute number, with *Times* reports being an average of 48% higher than logbook totals. Comparison of species landings by port in 1992 revealed additional port-wide differences in reporting between both sources.

Historical CPFV logbook records have higher spatial resolution (catch location as opposed to port of landing), span a greater period, and will be cheaper to recover into electronic database format than *Times* fish reports. Historical *Times* data have higher temporal resolution (daily v. monthly), but ll cost approximately $165,000 to recover as opposed to $11,000 for logbook data summaries covering a longer period. Strong correlation between the two sources shows usefulness of *Times* data for tracking real-time changes in sport catch in southern California.

Table of Contents

Abstract i
Table of Contents ii
Acknowledgements ii
List of Tables iii
List of Figures iii
Introduction 1
Current Status of Historical CPFV Data 1
    CPFV Logbook Records 1
    Los Angeles Times Fish Reports 2
Validation of CPFV Logbook Accuracy 2
Comparisons of *LOS ANGELES TIMES* and Logbook Data 3
    Annual Catch by Species - 1959 to 1992 4
    Total Landings by Port and Year 5
    Total Landings by Species and Port 6
Relative Value of *LOS ANGELES TIMES* and Logbook Data 7
Literature Cited 8

Acknowledgements

Thanks are due to NMFS Southwest Fisheries Science Center for providing the *Los Angeles Times* landings databases, and to Dr. Doyle Hanan, Dr. Larry Jacobson, and Mr. Paul Reilly for reviewing the report and providing useful suggestions. Mr. Bob Read provided data and insight regarding the CDFG observer program. This research was supported by Federal Aid in Sport Fish Restoration Act Funds (California Project F-50-R-9).

List of Tables

TABLE 1. Catch-per-effort data for 10 sport fish species in the southern California CPFV fleet. 9

TABLE 2. Relationship between CPFV logs and *Los Angeles Times* reports for historically important sport species. Percent difference values and regression coefficients (R-square) are *Los Angeles Times* relative to logbook totals for 1959, 1967, 1975, 1983, 1991, and 1992. Regression slopes and coeffiencients of determination were P<0.01 (n=6) for all comparisons. 10

TABLE 3: Relationship between sport fish landings reported by the *Los Angeles Times* and the CPFV logbooks for major southern California port complexes. Percent difference values are for *Los Angeles Times* totals relative to CPFV logs. Regression slopes and coefficients of determination (R-square) were P<0.001 (n=12) for all comparisons. 11

TABLE 4: Relationship between total sport fish landings by species reported by the *Los Angeles Times* and the CPFV logbooks for major southern California port complexes in 1992. Percent difference values are *Los Angeles Times* totals relative to CPFV logs. Regression slopes and coefficients of determination (R-square) were all significant at P<0.01 (n=12), unless otherwise indicated as not-significant (N/S). N/A indicates insufficient data for comparison. 12

List of Figures

FIGURE 1: Commercial passenger fishing vessel logbook forms used in northern and central California (A), southern California (B), and in the San Francisco Bay estuarine complex (C) in early 1950's. 13

FIGURE 2: Commercial passenger fishing vessel logbook forms used in northern and central California (A), southern California (B), until 1993. 14

FIGURE 3: Commercial passenger fishing vessel scannable logbook forms used in northern and central California as of 1994. 15

FIGURE 4: Commercial passenger fishing vessel scannable logbook form used in southern California as of 1994. 16

FIGURE 5: Table structure for PMASTER databases (dBASE IV), 1980-94. 17

FIGURE 6: Table structure for PMASTER databases (dBASE IV) since 1995. 18

FIGURE 7: Sample of commercial passenger fishing vessel archival data (Report VI; 1936-1957) summarizing species catch and effort by month and origin. 19

FIGURE 8: Sample of commercial passenger fishing vessel archival data (Report VI; 1957-1978) summarizing species catch and effort by month and origin. RECAP summarizes effort information for entire month by block. 20

FIGURE 9: Sample of commercial passenger fishing vessel archival data (Report II; 1957-1978) summarizing species catch and effort by month and port. 21

FIGURE 10: Sample of daily *Los Angeles Times* fish report from 1960. 22

FIGURE 11: Table structure for *Los Angeles Times* fish report files (dBASE IV). 23

FIGURE 12: Southern California annual landings of sand/kelp bass (A), California barracuda (B), California halibut (C), and white seabass (D) as reported in CPFV logbooks and *Los Angeles Times* for selected years. 24

FIGURE 13: Southern California annual landings of yellowfin tuna (A), Pacific bonito (B), albacore (C), and yellowtail (D) as reported in CPFV logbooks and *Los Angeles Times* for selected years. 25

FIGURE 14: Southern California annual landings of Pacific mackerel (A), spotted scorpionfish (B), halfmoon (C), and California sheephead (D) as reported in CPFV logbooks and *Los Angeles Times* for selected years. 26

FIGURE 15: Southern California annual landings of bluefin tuna (A) and ocean whitefish (B) as reported in CPFV logbooks and *Los Angeles Times* for selected years. 27

FIGURE 16a: Total monthly landings of fish in southern California ports as reported in CPFV logbooks and *Los Angeles Times* in 1983, 1991, and 1992. 28

FIGURE 16b: Correlation between total monthly landings reported in CPFV logbooks and *Los Angeles Times* in 1983, 1991, and 1992. 28

FIGURE 17: Total monthly landings of fish in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times* in 1983, 1991, and 1992. 29

FIGURE 18: Correlations between total portwide monthly landings reported in CPFV logbooks and *Los Angeles Times* in 1983, 1991, and 1992. 30

FIGURE 19: Total 1992 landings of Pacific mackerel in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times*. 31

FIGURE 20: Total 1992 landings of spotted scorpionfish in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times*. 32

FIGURE 21: Total 1992 landings of yellowtail in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times*. 33

FIGURE 22: Total 1992 landings of white seabass in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times*. 34

FIGURE 23: Total 1992 landings of albacore in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times*. 35

FIGURE 24: Total 1992 landings of barred sand bass in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times*. 36

FIGURE 25: Total 1992 landings of kelp bass in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times*. 37

FIGURE 26: Total 1992 landings of Pacific bonito in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times*. 38

FIGURE 27: Total 1992 landings of bluefin tuna in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times*. 39

FIGURE 28: Total 1992 landings of halfmoon in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times*. 40

FIGURE 29: Total 1992 landings of California barracuda in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times*. 41

FIGURE 30: Total 1992 landings of California halibut in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times.* 42

FIGURE 31: Total 1992 landings of yellowfin tuna in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times.* 43

FIGURE 32: Total 1992 landings of California sheephead in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times.* 44

Introduction

Historical catch data from California's commercial passenger fishing vessel (CPFV) industry have a wide range of potential uses in assessment and management of the state's marine sport fish resources. Historical records of catch and occurrence provide species-specific information useful for characterizing long-term changes in the marine fish communities due to fishing activity, habitat alteration, pollution, and natural variability in the environment. Fishery managers might use this information to assess effectiveness of regulations imposed on sport and commercial sectors of the industry. Fishery economists may also use historical data to track trends in effort as related to changing value of the fishery. Long-term catch and occurrence data, meshed with historical oceanographic data (e.g., sea surface temperature from shore stations), will provide an opportunity to predict future fishing opportunities of migratory species based on seasonal forecasts of climate and oceanic conditions.

The purpose of this report is to review status and content of two sources of historical catch data from California's CPFV industry and to evaluate potential usefulness of Los Angeles *Times* catch reports by comparing the data with CPFV logbooks.

Current Status of Historical CPFV Data

CPFV Logbook Records

Since 1936, owners and operators of CPFV's have been required by law to keep daily trip records of catches made from their boats. Skippers log this information on official forms provided by the Department of Fish and Game and submit them to the Department monthly. The Department has collected CPFV logbook information since 1936, except six years during World War II (1941-46) when CPFV activity was effectively halted.

While design of CPFV logbooks has evolved over time, most variables have been consistently collected from the onset. This information includes: (1) date of fishing, (2) port code or town of landing, (3) boat name, (4) Fish and Game boat number, (5) Fish and Game block areas fished (primarily 10 minutes latitude x 10 minutes longitude), (6) angler effort (measured various ways), and (7) number of fish kept by species. Different logbook forms have always existed for northern-central and southern California regions, differing only by species listed on the form (Figure 1a,b). At one time, a separate form was used for the San Francisco Bay estuarine complex (Figure 1c).

Method of estimating fishing effort has changed considerably over time. From 1947 through 1959, angling effort was measured only as angler days, defined as one full day of angling by one fisherman (Young 1969). During this period, no attempt was made to record number of hours spent fishing. During 1960 and 1961, effort was measured in two ways - number of angler days and number of angler hours. Young (1969) used this information to develop an estimation method for calculating effort in angler-hours for data from 1947 to 1959. From 1962, effort information was measured as number of anglers and total hours the CPFV spent fishing, allowing calculation of angler-hours (Figure 2a,b).

In 1994, many changes to CPFV logbook forms were implemented which continue at present. Additional information on effort was required, including target species, fishing method, bait type, and trip departure and return times. Besides reporting number of fish kept (landed), operators were required to report number of fish thrown back and number lost to seals (sea lions or harbor seals). Sea surface temperature information was also required. Logbooks expanded from a half page to a full page, optically-scannable form (Figures 3 & 4).

Final CPFV logbook data for 1980 through present are in dBASE format and ready for analysis. Daily trip records in 1980-98 databases include fields for CDFG boat number, date, block (area fished), port code, number of anglers, hours fished, angler-hours, species code, number of fish by species, and a unique code for each trip log (Figure 5). Additional information from the scannable logbook design is available in 1995 to 1998 databases which are now divided into header and catch detail tables (Figure 6).

Until 1994, the Department summarized and mass-distributed preliminary CPFV landings data on a quarterly basis. Annual summaries of final data sets were also distributed to Department biologists and the CPFV industry. Monthly and annual reports summarized catch by species statewide and by port complex. Total effort (angler days and angler hours) was also included. Due to recent reductions in funding and staff, only final summaries are distributed annually at present.

CPFV logbook data from 1936 to 1978 are stored on paper as monthly summaries for block (Report VI; Figures 7 & 8) or port (Report II; Figure 9). Catch and effort information from that period are no longer available at daily trip-level resolution. Summary reports consist of handwritten (1936-1957) and computer-generated (1957-1978) tables summarizing catch and effort information in various ways. Data include number of fish caught by species, total number of fish (all species), and total effort by port and/or block. Effort has been variously reported over time as angler-days (1936-65), number of anglers (1947-78), angler-hours (1959-78), and boat-days (1957-78).

Detailed CPFV logbook summary reports were not generated in 1979, and the status of an electronic archive is uncertain as of this writing. Attempts are being made to locate any remaining computer tapes. The only known CPFV logbook data from 1979 is in the form of the standard annual report summarizing landings by port complex.

Archived paper reports are beginning to age, suffering from mildew and silverfish. Many reports have been copied onto microfiche, but some microfiches have water damage. Duplicate hard copies of this information do not exist elsewhere. Report VI is filed by CDFG block number and consists of approximately 16,000 summary pages. Report II is filed by CDFG port code and has approximately 13,000 summary pages. Recovery of Report VI (catch by block) data to electronic database format is currently being funded by the Saltonstall-Kennedy Program (NMFS). Keypunching of summary reports is complete. The final database should be available for distribution by the end of 1999.

Los Angeles Times Fish Reports

Los Angeles Times publishes daily reports of marine sportfish landings from CPFV's fishing off southern California. Fish reports are widely used by anglers who wish to make real-time decisions about when and where to fish, and are a useful advertising tool for local CPFV owners/operators. Newspaper reports include information on port of landing, date of capture, species kept, and total number boats and anglers (Figure 10). Reports summarize catch information for landings from San Simeon to San Diego. Publication of daily catch information began in mid-1958 and has been reported continuously for the past 39 years. Past issues of *Times* are accessible as microfilm at University of California libraries in southern California. Catch records can be readily extracted by photocopy and entered into database format.

A recent contract between National Marine Fisheries Service (Dr. J. Hunter, NMFS/SWFSC) and Mr. Charles Mitchell (MBC Applied Environmental Sciences, Costa Mesa) resulted in electronic recovery of *Times* data from six years (1959, 1967, 1975, 1983, 1991, and 1992) at a cost of $5,000 per year of information. Saltonstall-Kennedy Funds were recently provided to Mr. Mitchell to recover *Times* data for all remaining years.

Database files and photocopies of currently recovered reports are now held at the Southwest Fisheries Science Center, La Jolla, and were used for subsequent comparisons in this report. Separate database files (dBASE IV format) exist for each year. Included with each file is a spreadsheet listing of port (or landing) names and species names (common and scientific) and their respective abbreviation codes (Figure 11).

Validation of CPFV Logbook Accuracy

During 1985 through 1989, the Department conducted a program to place observers on southern California CPFV's (Ally et al. 1991). A subset of about 600-700 fishing trips were observed each year. Observers were placed on randomly chosen weekday trips of 24 hour duration or less. Information was recorded on

various aspects of fishing activity, including catch by species, number of anglers, and total fishing time.

Comparison of data from CPFV logbooks with corresponding data obtained from the observer program provide an indication of the validity of logbook data. Direct comparison of logbook versus observer data for specific trips was not practical. Logbooks were not submitted from all observed trips. Also, the practice of vessels departing on more than one trip within a 24 hour period precluded simple direct merging of individual trip data from both sources because departure and return times are not recorded on logbooks. Therefore, we calculated annual catch rates (number of fish caught per angler hour) from both databases, for each of ten target species. We assumed that sampled trips were representative of logged trips. Since the occurrence of some sportfish species in southern California waters is seasonal, not all annual fishing effort was included for each species in the catch rate calculations. Annual species-specific fishing effort was estimated separately from both databases, based only on those CPFV trips that landed at least one specimen of a given species.

Annual catch rates for ten target species are given in Table 1. Logbook data were first filtered so that only data from trips that were potentially available to the observer program were included in the calculations (i.e., weekday trips of 24 hour duration or less). Changes in catch rates during the study period were in general agreement from both data sources for six of the ten species studied. For those six species, coefficients of determination (r^2) calculated from paired annual catch rates ranged from 0.981 (white seabass) to 0.749 (Pacific bonito). Catch rates were poorly correlated for yellowtail and California sheephead. Regression for California halibut catch rates was not deemed appropriate because they were quite consistent throughout the study period, and small year to year changes for that species were likely due to random variation. However, relatively constant halibut catch rates from both sources may show good agreement despite a low regression coefficient.

Agreement in catch rate trends for six of ten target species suggests that logbook data provide useful information concerning relative changes in catch and effort for some species. Absolute catch rates were usually also similar from both sources, but some differences such as significantly lower observer values for white croaker are not readily explained. It is possible that low croaker catches were routinely not recorded in logbooks because it is a less desirable species, leading to a logbook bias in croaker catch rates. Lack of agreement for yellowtail and California sheephead may be due to errors in the logbook database, inadequate observer sampling for those species, or seasonality effects not taken into account in our analysis.

Comparisons of *LOS ANGELES TIMES* and Logbook Data

By comparing CPFV landings data from *Times* and logbooks, it is possible to identify possible areas of bias and define limitations for utility of either source. Sportfishing landings have reported their catch to *Times* since the late 1950's - a source of free advertising used to attract anglers to fish aboard CPFV's. In this regard, some simple *a priori* hypotheses are made regarding CPFV data: 1) reported catch for some species will be higher in *Times* than on logs; 2) *Times* catch will be inflated for port areas with largest readership (i.e., greater Los Angeles area) and less-likely to be inflated for other areas; 3) *Times* catch will be inflated for highly popular species and less inflated or under-reported others; 4) reports will be inflated during peak fishing seasons for each respective species, or during summer months in general; 5) smaller CPFV's ("six-packs") not associated with sport fish landing offices will be unrepresented in *Times* reports.

CPFV logbook data are not free from reporting bias. Previous Department studies addressing this issue over the years have identified problems with reporting bias (under- and overestimation of catch) and overall reporting compliance (Baxter and Young 1953). Reilly et al. (1993) calculated CPFV logbook compliance

based upon onboard sampling surveys from 1987 to 1991. Annual compliance rates for CPFV's from central California ranged from 61% to 92% for particular ports and years. Biases in catch reporting occur in both directions to varying degrees, but Baxter and Young (1953) concluded that magnifications of some boat operators were compensated by minimizations of others. The Department's Central California Sport Fish Research Project has compared CPFV logbook to sampled trip data. They discovered a tendency for catch under-reporting when catch rates are high and over-reporting when catch rates are low (Mr. Paul Reilly, CDFG, pers. comm.).

It is recognized that both data sources are prone to some bias, but we assume that catch recorded on CPFV logs is less prone to exaggeration bias than *Times* fish reports. CPFV logs are not considered advertising tools, so there should be little seasonal or regional bias in reporting compared with *Times*. For the same reason, over-reporting in logs is less likely relative to *Times* for more seasonal or popular species. Under-reporting in logs probably occurs for species typically caught at limits, as well as less popular, non-targeted species.

CPFV catch data were compared between CDFG logbook records and complimentary *Times* reports available in dBASE format for 1959, 1967, 1975, 1983, 1991, and 1992. CPFV logbook summary tables were used for 1959, 1967, and 1975 and PMASTER databases were used for 1983, 1991, and 1992 comparisons. Catch data were compared for fifteen of the top species currently caught in southern California waters. The following comparative analyses were conducted to examine the relationship, if any, between *Times* and logbook data.

Annual Catch by Species - 1959 to 1992

The first comparison was designed to examine historical reporting of major sport fish species for years from which both data were available (1959, 1967, 1975, 1983, 1991, and 1992). Listed in relative order of recent abundance in landings, species included were Pacific mackerel, barred sand bass, kelp bass, California barracuda, Pacific bonito, spotted scorpionfish, ocean whitefish, halfmoon, yellowfin tuna, California sheephead, yellowtail, California halibut, white seabass, bluefin tuna, and albacore. Rockfishes were excluded from analysis due to lack of species-specific information in logs and to the varied names assigned to rockfish species in *Times* reports. Barred sand bass and kelp bass were historically grouped together in *Times* and logs, and were summed accordingly for this comparison. Total catch (number of fish) of each species was summed for California ports ranging from Morro Bay to San Diego.

Paired annual landings (*Times* v. Logs) were similar for nine of 15 species for the period examined using regression analysis. Total landings were highly correlated for sand/kelp bass, California barracuda, California halibut, white seabass, yellowfin tuna, bonito, albacore, and yellowtail (Figures 12 & 13). Coefficients of determination (r^2) ranged from 0.846 ($P<0.01$) for sand/kelp bass to 0.996 ($P<0.001$) for California halibut (Table 2). Average percent difference in catch totals (*Times* relative to logbook) ranged from 2.2% for Yellowtail to 32.6% for California Halibut (Table 2). Strong correlation between sources is not surprising for these species, as all have been popular targets for marine anglers over the historical period (Baxter & Young, 1947).

Total annual landings of Pacific mackerel, spotted scorpionfish, ocean whitefish, halfmoon, California sheephead, and bluefin tuna were poorly correlated for years examined (Figures 14 & 15). Bluefin tuna has always been a popular target species, so it is unusual that total landings reported by the *Times* would be under reported in four of six years examined (Figure 15).

Differences in reported landings for the other five species (Pacific mackerel, spotted scorpionfish, ocean whitefish, halfmoon, and California sheephead) reflect a relative increase in popularity over time. None of these five species are considered highly desirable by marine anglers, but all are currently landed in large quantity and prevent some novice CPFV anglers from returning with an empty bag. Pacific mackerel have always been taken in large quantity by CPFV's, but not in peak numbers until the 1970's. Pacific mackerel is still one of the most frequently landed species, but catch has steadily declined since 1980. Pacific mackerel landings were largely under reported by *Times* in 1959,

1967, and 1975, but reports were subsequently higher than logbook totals in 1983, 1991, and 1992 (Figure 14a). Increased reporting of Mackerel landings by *Times* shows an increased importance of this relatively unpopular species, perhaps due to recent declines in catch of similar species such as Pacific bonito, or increased availability during those years due to El Nino conditions. Similar changes in *Times* reporting were observed for spotted scorpionfish, halfmoon, and California sheephead (Figure 14b-d). Each of these species was recorded in CPFV logs at least as early as 1975, but was virtually unreported by *Times* until 1991. Ocean whitefish landings have increased over the entire period, but were mostly unreported by *Times* through 1992 (Figure 15b).

Examination of total annual landings of highly popular sport fish species revealed strong correlations between CPFV log and *Times* data over time (Table 2). Conversely, clear reporting biases have been shown for less popular species that have recently gained importance due to declining stocks of other species (e.g., some rockfishes, Pacific bonito, California halibut). This is the first evidence to confirm the advertising nature of *Times* reports.

Total Landings by Port and Year

The second comparison was designed to assess similarity of *Times* reports and logbook data within and between southern California port complexes. If *Times* reports are used as an advertising tool, then it is expected that total reported landings will be higher in the Los Angeles/Orange County area where *Times* circulation is greatest. Total landings (all species combined) were summed by month for 1983, 1991, and 1992 for port complexes in Morro Bay, Santa Barbara, Los Angeles, and San Diego areas. Selection of these years for analysis was based on availability of database information from logbook records. Port complexes selected for analysis were based on matches between Sport Fish Landing serial codes in the *Times* database and corresponding CDFG port codes. CDFG port codes not represented in the *Times* database were excluded from analysis. For this analysis, Morro Bay complex included landings from San Simeon, Morro Bay, and Avila Beach. Santa Barbara area complex included harbors in Santa Barbara, Ventura, Oxnard, and Pt. Hueneme. Los Angeles area included harbors from Malibu to Dana Pt., excluding Catalina Island. San Diego complex represents sport fish landings in Oceanside, Mission Bay, Pt. Loma, and San Diego harbors.

Results from pairwise comparisons (% difference and r^2 values) of *Times* and logbook data are presented in Table 3. Comparisons for all ports combined reveal a strong correlation between the two data sources for the three years examined, with r^2 values ranging from 0.970 to 0.996 ($P<0.001$; Table 3). Percent difference data (*Times* relative to logbook) for all ports showed increasing differences between *Times* and log data from 1983 (+12.7%) to 1992 (+47.1%)(Table 3). Percent difference between *Times* and logbook data for all ports and all years combined was +29.6% (Figure 16a,b; $r^2=0.941$, $P<0.001$).

Difference between total catch reported in logs and *Times* for Morro Bay increased from -17.7% to +25.2% between 1983 and 1992 (Table 3; Figure 17). Percent difference among all years was +10.7% ($r^2=0.803$, $P<0.001$; Figure 18). Coefficients of determination decreased from 0.978 ($P<0.001$) in 1983 to 0.726 ($P<0.001$) in 1992 (Table 3). This trend would suggest either an increased use of *Times* as an advertising source, or a decrease in logbook reporting compliance. Alternatively, it may reflect in increase in actual total landings in Morro Bay between 1983 and 1992. El Nino conditions were present both years, but potential adverse impacts on catch were more likely in 1983.

Santa Barbara CPFV landings were highly correlated in 1983 ($r^2=0.953$, $P<0.001$) and 1991 ($r^2=0.953$, $P<0.001$) and less so in 1992 ($r^2=0.812$, $P<0.001$)(Table 3; Figures 17 & 18). Landings reported by *Times* were on average +41% higher than logbook data, ranging from +31.7% to +53.4%. There was no apparent trend in reporting differences over time.

Differences between *Times* catch reports and logbooks were highest for Los Angeles area ports relative to logbook data (Table 3; Figure 17). Percent difference values ranged from +34.3% in 1983 to +58.8% in 1992, with an increasing trend over time. Average percent

difference for all years was +47.6%. Despite these large differences between sources, Los Angeles port data were most highly correlated of all complexes, and thus more accurate for measuring changes in landings over time (r^2=0.956, P<0.001; Table 3, Figure 18).

San Diego area landings were considerably under reported by *Times* in 1983 (-43.4%), but were quite similar to logbook data in 1991 (+8.4%) and 1992 (+16.4%)(Table 3; Figure 17). Coefficients of determination were high within each year, ranging from 0.922 to 0.966 (P<0.001) but relatively low when data among years were pooled (r^2=0.692, P<0.001; Figure 18). Similar to the case of Morro Bay ports, San Diego area landing operators may have begun increasing their use of *Times* as an advertising tool sometime over the past decade.

In summary, port-wide comparisons of total landings revealed several patterns in reporting between the two sources. First, catch reported in *Times* exceeded logbook data in most cases. Two exceptions to this were Morro Bay and San Diego ports in 1983. Geographically, differences between *Times* reports and logbooks were greatest for Los Angeles and Santa Barbara ports over all three years. Los Angeles landings data also had strongest correlation between the two sources. Season highs and lows are almost always equally represented by both data sets at all ports. Higher reporting in *Times* may represent exaggerations by CPFV operators/landings, under-reporting of logs, or both. Despite these differences, *Times* reports may still prove useful for following seasonal trends in catch of certain species or species groups on a real-time basis.

Total Landings by Species and Port

The final comparison was designed to identify reporting biases among ports at the species level. Total and port-wide landings reported in *Times* and logbooks were examined for fourteen top species landed by CPFV's in 1992. Species examined were Pacific mackerel, barred sand bass, kelp bass, California barracuda, Pacific bonito, spotted scorpionfish, halfmoon, yellowfin tuna, California sheephead, yellowtail, California halibut, white seabass, bluefin tuna, and albacore. Rockfishes were excluded from analysis for reasons stated previously. Ocean whitefish landings were not reported by *Times* in 1992, and were also excluded.

Paired comparisons (percent differences) of *Times* and logbook data were highly variable among ports for some species and also variable among species within port complexes (Table 4, Figures 19-32). For all species examined, percent difference data (*Times* relative to logbook) ranged from -78.0% for San Diego halfmoon to +100.4% for Los Angeles Pacific mackerel.

Within species, greatest inconsistencies among ports were observed for Pacific mackerel, halfmoon, yellowtail, white seabass, and albacore (Table 4). Percent difference values for Pacific mackerel (*Times* relative to logbook) ranged from -33.8% in Santa Barbara to +100.4% in Los Angeles (Table 4; Figure 19). Halfmoon values ranged from -78.0% in San Diego to +16.0% in Los Angeles (Table 4; Figure 28). Yellowtail catch ranged from +8.1% in San Diego to +98.5% in Santa Barbara (Table 4; Figure 21), and white seabass varied from -22.9% in San Diego to +68.1% in Los Angeles (Table 4; Figure 22). Finally, albacore reports ranged from -58.2% in San Diego to +15.1% in Santa Barbara (Table 4; Figure 23). The only pattern apparent for these species was a tendency for reports to be lowest in San Diego and highest in either Los Angeles or Santa Barbara. Despite these vast differences in reporting, data within ports for each of these species were moderately to strongly correlated, ranging from r^2=0.634 (P<0.01) for San Diego albacore to 0.997 (P<0.001) for Santa Barbara albacore. The majority of comparisons within species and ports had r^2 values greater than 0.90 (Table 4).

Catch data from a number of species were reported in only one of the two sources. For example, Morro Bay landings of barred sand bass (Figure 24), kelp bass (Figure 25), Pacific bonito (Figure 26), and yellowtail (Figure 21) were reported by *Times* but not recorded in logbooks for the entire year. Likewise, Santa Barbara landings of bluefin tuna were recorded in *Times* but not logs (Figure 27). In contrast, Pacific mackerel (Morro Bay) and halfmoon (San Diego) were recorded in logs but not reported in *Times* (Figures 19 & 28).

Examination of percent difference values among species within port complexes revealed similar degrees of reporting inconsistencies (Table 4). For Morro Bay, *Times* data were only comparable to logbook data for California barracuda (Figure 29), California halibut (Figure 30), and albacore (Figure 23). The remaining species were either not present or not represented by one or the other data source. Comparisons of *Times* and logbook data for Santa Barbara area revealed percent difference values ranging from -33.8% for Pacific mackerel to +98.5% for yellowtail (Table 4). Percent differences values for *Times* reports were highest within Los Angeles ports for the majority of species, indicating a tendency for localized advertising. *Times* under reported the greatest number of species in San Diego.

In summary, wide variability in catch reporting was observed for 1992 data. *Times* data differed greatly from logbook data within species among ports, and within ports among species. Species sought by anglers within each region tend to be over reported, but there are many exceptions to this rule. For example, yellowfin tuna landings were 68.6% higher in Santa Barbara and 64.5% higher in Los Angeles, but only 13% higher than logs in San Diego (Figure 31). At the same time, less popular Pacific mackerel were 36.1% over reported in San Diego (Figure 19). Despite inconsistencies in reporting, *Times* and logbook data were, in most cases, highly correlated. *Times* and logbook data do not represent equal numbers of fish at any given time or place, but do reflect changes in catch equally well for many species.

Relative Value of *LOS ANGELES TIMES* and CPFV Logbook Data

There are obvious strengths and weaknesses to both sources of CPFV landings data. Logbook data are likely to be more accurate than *Times* reports for indexing relative abundance. Catch information from logs is less likely to be biased since there are fewer incentives for skippers to inflate or deflate numbers. Daily catch and effort information is available in logbooks from 1980 onward for individual vessels, allowing for more accurate estimation of catch per effort indices. Catch per angler-hour data are available from 1961 onward. CPFV logbook data also have spatial resolution information (10 minute latitude x 10 minute longitude CDFG blocks) not available from *Times* reports.

There are two disadvantages to historical CPFV logbook data relative to *Times* reports. First, historical logbook data are no longer available at individual trip resolution. All historical reports (1936 - 1978) have species level catch data summed by CDFG block or port complex in monthly increments. Effort information (boat days, number of anglers, angler hours) is similarly summarized. A second disadvantage of logbook data is the current two-month time lag from fishing date to computer database format. This may be inconvenient to biologists or fishers needing real-time information on catch as available in *Times*.

Obvious discrepancies exist between sport fish landings reported by *Times* and CPFV logs. Whether or not reporting differences present a problem depends on desired application of each data source. Potential uses of *Times* data include: 1) real-time monitoring of landings of important sport species at various southern California ports, 2) monitoring logbook compliance, and 3) application of historical *Times* records to catch forecasting models for making real-time predictions of catch.

Strong correlations between *Times* and logbook data within ports and years suggests that *Times* catch reports may be used for real-time monitoring of changes in catch over shorter periods of time until logbook data for the same period are available. In many cases, *Times* and logbook data equally reflected seasonal highs and lows, and sporadic changes in catch. *Times* data will be less useful for monitoring catch in Morro Bay and San Diego. The same principles hold true with respect to monitoring compliance. By examining reporting between the two sources, it may be possible to identify ports or landings with overall compliance problems. Due to considerable variability in over- and under-reporting of different species within port complexes, compliance issues can probably not be addressed by examining the two data sources at species level. The only exception would be the

case where fish are being reported by *Times* but do not appear at all in the logs. Vessels are not identified in the *Times* fish reports, but monitoring vessel activity is possible through other sources such as *Western Outdoor News* and World Wide Web sites where vessel schedules and fish counts are available. Periodic monitoring of catch bulletin boards posted at CPFV landings is another inexpensive means of assessing vessel compliance.

Both data sources have potential for application to catch forecasting models based on historical CPFV data. CPFV logbook data lack daily resolution prior to 1980, but have the advantage of high spatial resolution in statewide catch as far back as 1936. Monthly effort information is available for the same blocks in time and space. Such spatial resolution may be important for building predictive models, whether they are based on absolute catch in number or on occurrence. *Times* fish reports have high temporal resolution since 1959, but may lack spatial resolution needed for some analyses. Seasonal appearance of several migratory species (yellowfin tuna, bluefin tuna, and yellowtail) was evident in *Times* data, but actual catch location is impossible to assess. For example, yellowfin tuna landed in Los to Angeles may have been caught during extended trips Mexico. Recovery of historical logbook summaries is relatively inexpensive compared to *Times* reports. It cost approximately $11,000 to keypunch 40 years of monthly logbook summaries, as opposed to ten times that amount for 33 years of daily *Times* reports. For contemporary purposes, *Times* data are less expensive to process (ca. $10 per day) and provide real-time catch data until logbook data are made available to biologists.

Literature Cited

Ally, J.R., D.S. Ono, R.B. Read and M. Wallace. 1991. Status of major southern California marine sport fish species with management recommendations, based on analysis of catch and size composition data collected on board commercial passenger fishing vessels from 1985 through 1987. Calif. Dept. Fish Game, Mar. Res. Div. Admin. Rep. 90-2. 376 p.

Baxter, J. L. and P. H. Young. 1953. An evaluation of the marine sportfishing record system in California. Calif. Fish and Game 39(3): 343-353.

Reilly, P. N., D. Wilson-Vandenberg, D. L. Watters, J. E. Hardwick, and D. Short. 1993. On board sampling of the rockfish and lingcod commercial passenger fishing vessel industry in northern and central California, May 1987 to December 1991. Calif. Dept. Fish Game, Marine Resour. Admin. Rep., (93-4): 1-242.

Young, P. H. 1969. The California partyboat fishery 1947-1967. Calif. Dept. Fish Game, Fish Bull. 145. 91 p.

Table 1. Catch-per-effort data for 10 sport fish species in the southern California CPFV fleet.

Species	Year	Number/Angler-Hour		R^2	P
		Observer	Logbook		
California barracuda	1985	0.118	0.127	0.843	0.028
	1986	0.110	0.138		
	1987	0.140	0.179		
	1988	0.207	0.225		
	1989	0.158	0.210		
Barred sand bass	1985	0.284	0.392	0.604	0.122
	1986	0.279	0.323		
	1987	0.343	0.456		
	1988	0.452	0.446		
	1989	0.417	0.490		
Pacific bonito	1985	0.202	0.180	0.749	0.05
	1986	0.295	0.359		
	1987	0.264	0.360		
	1988	0.214	0.238		
	1989	0.300	0.314		
California halibut	1985	0.029	0.023	0.046	0.728
	1986	0.030	0.023		
	1987	0.029	0.021		
	1988	0.029	0.025		
	1989	0.028	0.025		
Kelp bass	1985	0.242	0.290	0.920	0.009
	1986	0.324	0.360		
	1987	0.280	0.296		
	1988	0.230	0.281		
	1989	0.338	0.374		
Pacific mackerel	1985	0.467	0.778	0.942	0.006
	1986	0.293	0.607		
	1987	0.299	0.646		
	1988	0.223	0.498		
	1989	0.235	0.508		
California sheephead	1985	0.045	0.053	0.153	0.515
	1986	0.037	0.048		
	1987	0.039	0.034		
	1988	0.041	0.046		
	1989	0.034	0.045		
White croaker	1985	0.068	0.242	0.910	0.012
	1986	0.111	0.561		
	1987	0.098	0.440		
	1988	0.155	1.543		
	1989	0.091	0.545		
White seabass	1985	0.017	0.018	0.981	0.001
	1986	0.020	0.028		
	1987	0.015	0.013		
	1988	0.019	0.027		
	1989	0.016	0.016		
Yellowtail	1985	0.068	0.090	0.052	0.712
	1986	0.035	0.091		
	1987	0.057	0.094		
	1988	0.064	0.124		
	1989	0.054	0.125		

Table 2. Relationship between CPFV logs and *Los Angeles Times* reports for historically important sport species. Percent difference values and regression coefficients (R-square) are *Los Angeles Times* relative to logbook totals for 1959, 1967, 1975, 1983, 1991, and 1992. Regression slopes and coefficients of determination were $P<0.01$ (n=6) for all comparisons.

Species/group	% Difference	Slope	R^2
Sand and kelp bass	+6.0	1.03	0.846
California barracuda	+15.6	1.13	0.995
Pacific bonito	+20.3	1.13	0.988
Yellowfin tuna	+4.2	1.13	0.985
Yellowtail	+2.2	1.20	0.980
California halibut	+32.6	1.37	0.996
White seabass	+4.6	1.02	0.940
Albacore	+16.1	1.20	0.994

Table 3. Relationship between monthly sport fish landings reported by the *Los Angeles Times* and the CPFV logbooks for major southern California port complexes. Percent difference values are for *Los Angeles Times* totals relative to CPFV logs. Regression slopes and coefficients of determination (R-square) were $P<0.001$ ($n=12$) for all comparisons.

	1983			1991			1992			All Years		
Port Complex	**% Diff.**	**Slope**	**R^2**	**% Diff.**	**Slope**	**R^2**	**% Diff.**	**Slope**	**R^2**	**% Diff.**	**Slope**	**R^2**
Morro Bay	-17.7	0.84	0.978	+19.2	1.13	0.950	+25.2	1.17	0.726	+10.7	1.06	0.803
Santa Barbara	+53.4	1.68	0.952	+31.7	1.22	0.952	+40.1	1.01	0.813	+41.0	1.22	0.857
Los Angeles	+34.3	1.31	0.980	+50.9	1.39	0.962	+58.8	1.59	0.989	+47.6	1.40	0.956
San Diego	-43.4	0.71	0.965	+8.4	0.96	0.922	+16.4	1.33	0.932	-10.6	0.75	0.691
All Ports	+12.7	1.11	0.996	+34.9	1.28	0.986	+47.1	1.44	0.970	+29.6	1.23	0.941

Table 4. Relationship between total sport fish landings by species reported by the *Los Angeles Times* and the CPFV logbooks for major southern California port complexes in 1992. Percent difference values are *Los Angeles Times* totals relative to CPFV logs. Regression slopes and coefficients of determination (R-square) were all significant at $P<0.01$ (n=12), unless otherwise indicated as not-significant (N/S). N/A indicates insufficient data for comparison.

Species	Morro Bay			Santa Barbara			Los Angeles			San Diego			All Ports		
	% Diff.	Slope	R^2	% Diff.	Slope	R^2	% Diff.	Slope	R^2	% Diff.	Slope	R^2	% Diff.	Slope	R^2
Pacific mackerel	N/A	N/A	N/A	-33.8	0.69	0.868	+100.4	2.02	0.891	+36.1	0.98	0.829	+70.6	1.77	0.865
Barred sand bass	N/A	N/A	N/A	-14.4	0.55	0.715	+56.9	1.59	0.997	+5.1	1.29	0.948	+40.6	1.45	0.991
Kelp bass	N/A	N/A	N/A	+47.5	1.55	0.974	+44.3	1.40	0.980	+7.5	1.06	0.917	+37.8	1.31	0.979
California barracuda	+13.0	1.00	0.969	+26.9	1.25	0.971	+48.3	1.47	0.968	-19.9	0.74	0.789	+35.4	1.42	0.983
Pacific bonito	N/A	N/A	N/A	+8.5	1.19	0.872	+60.9	1.59	0.961	+29.8	1.50	0.929	+53.8	1.56	0.965
Spotted scorpionfish	N/A	N/A	N/A	+57.6	1.32	0.974	+68.1	1.15	0.696	-22.9	0.75	0.913	+38.7	1.01	0.932
Halfmoon	N/A	N/A	N/A	-13.4	0.95	0.942	+16.0	1.18	0.935	-78.0	N/S	N/S	+8.2	1.15	0.926
Yellowfin tuna	N/A	N/A	N/A	+68.6	1.27	0.889	+64.5	1.60	0.903	+13.0	1.43	0.984	+21.7	1.44	0.994
California sheephead	N/A	N/A	N/A	+67.4	1.87	0.741	+45.7	1.28	0.853	+19.2	1.28	0.717	+47.9	1.15	0.880
Yellowtail	N/A	N/A	N/A	+98.5	2.31	0.897	+69.6	1.66	0.980	+8.1	1.19	0.976	+19.6	1.27	0.987
California halibut	+24.7	1.31	0.934	+28.6	1.09	0.856	+28.5	N/S	N/S	+7.2	N/S	N/S	+26.5	1.08	0.572
White seabass	N/A	N/A	N/A	+57.6	1.55	0.978	+68.1	1.73	0.953	-22.9	0.71	0.829	+38.7	1.38	0.947
Bluefin tuna	N/A	N/A	N/A	N/A	N/A	N/A	+36.1	1.38	0.995	+28.0	1.15	0.843	+34.5	1.39	0.884
Albacore	N/A	N/A	N/A	+15.1	1.09	0.997	-40.3	0.52	0.977	-58.2	0.54	0.634	-19.3	N/S	N/S

A

STATE OF CALIFORNIA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF FISH AND GAME

Date 12/19/51 Town of landing AVILA
Boat name DORIE Fish and Game No. 1234
Block areas fished 615 No. in party fishing 22

Indicate below number of fish of each species taken and your estimate of weight. Even if no fish are caught, state that no fish were taken and fill in other blanks. Blank lines are for species which are not shown in the list.

SPECIES		NO. OF FISH	TOTAL WT., LBS.
CABEZONE (BULLHEAD)	261	4	29
LING COD	195	5	20
FLOUNDERS, SOLE, SAND DABS	230		
HALIBUT	222		
KINGFISH	435		
MACKEREL	051		
PERCH	550		
ROCKFISH (ROCK COD)	250	36	56
BLACK ROCKFISH (BLUEFISH)	252		
YELLOWTAIL ROCKFISH	259		
SALMON	300		
SHARK	150		
SMELT	180		
SEA TROUT		1	1

95218 8-48 200 BKS. OF 100 ①
STATE PRINTING OFFICE

Nº 43523

B

CALIFORNIA DEPARTMENT OF FISH AND GAME

Date JUNE 15, 1952 Town of landing LONG BEACH
Boat name KINGFISH Fish and Game No. 6789
Block areas fished 762 No. in party fishing 17

Indicate below number of fish of each species taken and your estimate of weight. Even if no fish are caught, state that no fish were taken and fill in other blanks. Blank lines are for species which are not shown in the list.

SPECIES		NO. OF FISH	TOTAL WT., LBS.
ALBACORE	005		
BARRACUDA	130	25	125
BONITO	003		
CABEZONE	261		
LING COD	195		
FLOUNDERS, SOLE, SAND DABS	230		
HALIBUT	222	2	8
KINGFISH (TOM COD)	435		
MACKEREL, PACIFIC	051		
ROCKFISH (ROCK COD)	250		
SAND BASS AND KELP BASS	275	59	71
SCULPIN	260	7	10
SHARK	150		
SHEEPSHEAD	145	3	9
SKIPJACK	002		
SMELT	180		
TUNA, BLUEFIN	004		
WHITEFISH	490	3	9
WHITE SEA BASS	400		
YELLOWTAIL	040	1	12

Nº 95302

99692 7-52 1500 BKS ① SPO

C

Daily Log of Boat [illegible] F. [illegible] No. 1789 Place of Landing BERKELEY Date 5/16/52 (Month Day Year)

Areas Fished LIGHTSHIP (Local Name of Place) Block No. 455

ONE TRIP PER DAY BOATS FILL IN THIS SIDE	TWO TRIPS PER DAY BOATS FILL IN THIS SIDE
Number in party fishing 6	Number fishing in the morning
Approximate number of hours of fishing 7	Number fishing in the afternoon

KIND OF FISH CAUGHT	Number of Fish	Total Weight
Striped Bass		
Salmon	8	75
Flounder		
Rockfish		
Cabezone		
Lingcod		
Other Fish, Show Kind		

Kind of Bait or Lure used SPOONS - HERRING

SERIAL Nº 222402

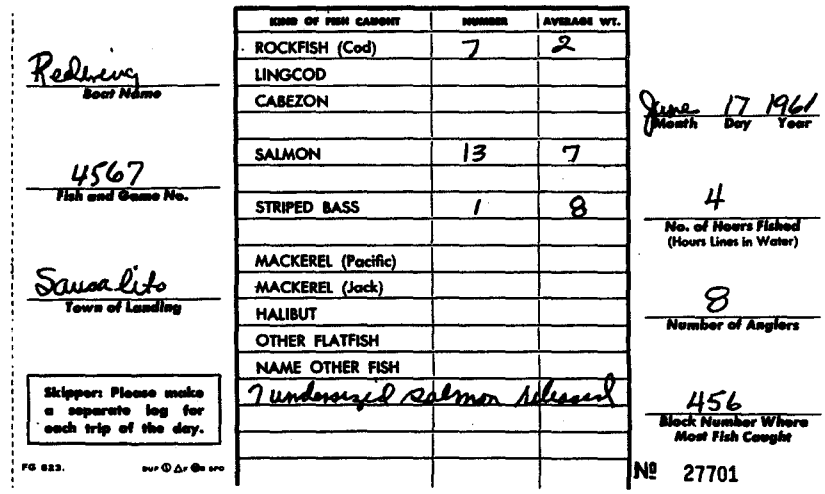
REMARKS: (For convenience of operator. May be left blank if desired.)
17 UNDERSIZED SALMON RETURNED TO WATER

[SIGNED] R Collins

81054 10-51 5M DUP ① SPO

Figure 1. Commercial passenger fishing vessel logbook forms used in northern and central California (A), southern California (B), and in the San Francisco Bay estuarine complex (C) in early 1950's.

A



Redwing
Boat Name

4567
Fish and Game No.

Sausalito
Town of Landing

Skipper: Please make a separate log for each trip of the day.

FG 822.

KIND OF FISH CAUGHT	NUMBER	AVERAGE WT.
ROCKFISH (Cod)	7	2
LINGCOD		
CABEZON		
SALMON	13	7
STRIPED BASS	1	8
MACKEREL (Pacific)		
MACKEREL (Jack)		
HALIBUT		
OTHER FLATFISH		
NAME OTHER FISH		
7 undersized salmon released		

June 17 1961
Month Day Year

4
No. of Hours Fished
(Hours Lines in Water)

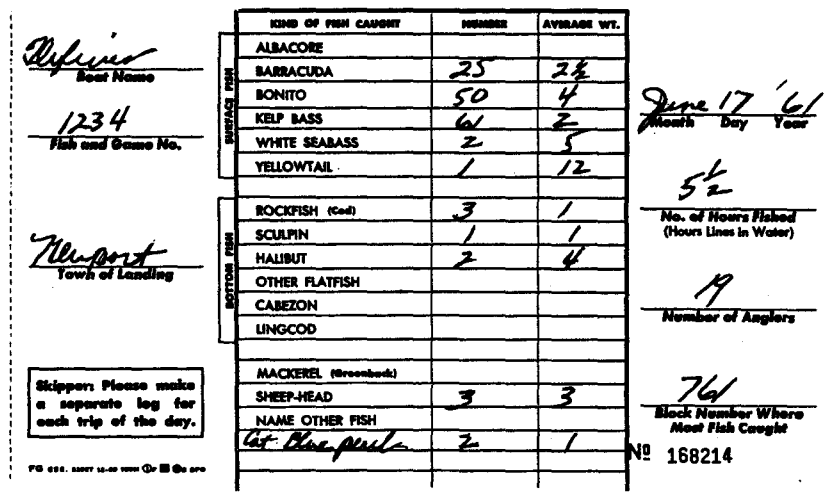
8
Number of Anglers

456
Block Number Where Most Fish Caught

№ 27701

FIGURE 2. An example of a log from a central-northern California partyboat.

B



Skipper: Please make a separate log for each trip of the day.

	KIND OF FISH CAUGHT	NUMBER	AVERAGE WT.
SURFACE FISH	ALBACORE		
	BARRACUDA	25	2½
	BONITO	50	4
	KELP BASS	61	2
	WHITE SEABASS	2	5
	YELLOWTAIL	1	12
BOTTOM FISH	ROCKFISH (Cod)	3	1
	SCULPIN	1	1
	HALIBUT	2	4
	OTHER FLATFISH		
	CABEZON		
	LINGCOD		
	MACKEREL (Greenback)		
	SHEEP-HEAD	3	3
	NAME OTHER FISH		
	Cat Rockfish	2	1

June 17 '61
Month Day Year

5½
No. of Hours Fished
(Hours Lines in Water)

19
Number of Anglers

76
Block Number Where Most Fish Caught

№ 168214

FIGURE 3. An example of a log from a southern California partyboat.

Figure 2. Commercial passenger fishing vessel logbook forms used in northern and central California (A), southern California (B), until 1993.

CENTRAL AND NORTHERN CALIFORNIA

SERIAL #94 N- 252901

VESSEL NAME | PORT OF LANDING

VESSEL ID NUMBER ☐☐☐☐☐

PORT CODE ☐☐☐

MONTH DAY YEAR ☐☐-☐☐-☐☐

TARGET SPECIES

- SALMON ☐
- ROCKFISHES ☐
- LINGCOD ☐
- STRIPED BASS ☐
- STURGEON ☐
- SHARKS ☐
- TUNA ☐
- POTLUCK ☐
- MISC. BAY OR ESTUARY ☐

FISHING METHOD

- TROLLING ☐
- MOOCHING ☐
- ANCHORED ☐
- DRIFTING ☐
- DIVING ☐
- LIGHT TACKLE ☐

BAIT LIVE DEAD

- ANCHOVIES ☐ ☐
- SARDINES ☐ ☐
- SQUID ☐ ☐
- OTHER ☐ ☐

BIRD INTERACTION ☐ YES ☐ NO

☐☐:☐☐ DEPARTURE TIME	☐☐:☐☐ RETURN TIME	☐☐:☐☐ HOURS & MINUTES FISHED	☐☐☐ NUMBER OF ANGLERS	☐☐☐ BLOCK WHERE MOST FISH CAUGHT	☐☐ SURFACE TEMPERATURE

SPECIES	NUMBER KEPT	NUMBER THROWN BACK	LOST TO SEALS
ALBACORE 005	☐☐☐	☐☐☐	☐☐
BARRACUDA 130	☐☐☐	☐☐☐	☐☐
CABEZON 261	☐☐☐	☐☐☐	☐☐
CHINOOK SALMON 302	☐☐☐	☐☐☐	☐☐
COHO 304 SALMON	☐☐☐	☐☐☐	☐☐
HALIBUT, CA 222	☐☐☐	☐☐☐	☐☐
OTHER 230 FLATFISHES	☐☐☐	☐☐☐	☐☐
JACK 055 MACKEREL	☐☐☐	☐☐☐	☐☐
LEOPARD SHARKS 153	☐☐☐	☐☐☐	☐☐
OTHER 150 SHARKS	☐☐☐	☐☐☐	☐☐
LINGCOD 195	☐☐☐	☐☐☐	☐☐
PACIFIC 051 MACKEREL	☐☐☐	☐☐☐	☐☐
ROCKFISHES 250	☐☐☐	☐☐☐	☐☐

SPECIES	NUMBER KEPT	NUMBER THROWN BACK	LOST TO SEALS
STRIPED BASS 335	☐☐☐	☐☐☐	☐☐
STURGEON 470	☐☐☐	☐☐☐	☐☐
WHITE CROAKER 435	☐☐☐	☐☐☐	☐☐
RED ABALONE 702	☐☐☐	☐☐☐	☐☐
ROCK SCALLOP 718	☐☐☐	☐☐☐	☐☐

MISCELLANEOUS

_____	☐☐☐	☐☐☐	☐☐
_____	☐☐☐	☐☐☐	☐☐
_____	☐☐☐	☐☐☐	☐☐
_____	☐☐☐	☐☐☐	☐☐
_____	☐☐☐	☐☐☐	☐☐
_____	☐☐☐	☐☐☐	☐☐
_____	☐☐☐	☐☐☐	☐☐

OPERATOR'S INITIALS _____

F&G 623 (2/94)

Figure 3. Commercial passenger fishing vessel scannable logbook forms used in northern and central California as of 1994.

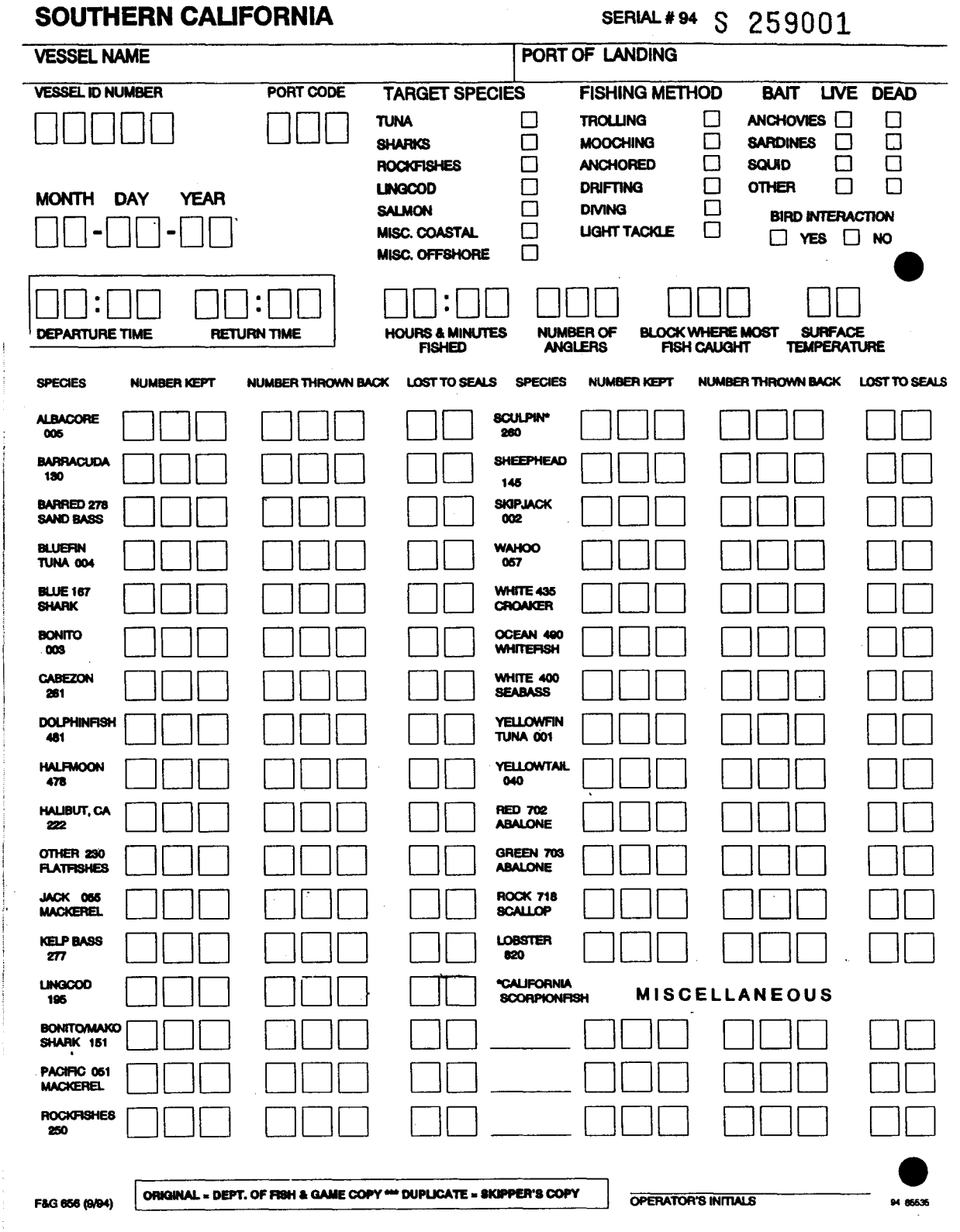


Figure 4. Commercial passenger fishing vessel scannable logbook form used in southern California as of 1994.

Figure 5. Table structure for PMASTER databases (dBASE IV), 1980-94.

Field Name	Type	Width	Dec	Description
SEQUENCE	Numeric	6	0	Unique serial number
BOATNUM	Numeric	5	0	F&G vessel number
YEAR	Numeric	2	0	Year of fishing
MONTH	Numeric	2	0	Month of fishing
DAY	Numeric	2	0	Day of fishing
BLOCK	Numeric	4	0	Fishing block code
PORTCODE	Numeric	4	0	Port code
HOURS	Numeric	6	2	Number of hours spent fishing
NUM_ANGLER	Numeric	3	0	Number of anglers
ANG_HOURS	Numeric	6	0	Product of num_angler and hours
SPECIES	Numeric	3	0	Species code
NUMBER	Numeric	5	0	Number of fish kept by species

Figure 6. Table structures for PMASTER databases (dBASE IV) since 1995.

Header Table:

Field Name	Type	Width	Dec	Description
SER_NUM	Character	7	0	Unique log serial number
BOATNUM	Character	5	0	F&G vessel number
PORT	Character	3	0	Port code
DATE	Date	8	0	Date of fishing
DEPRT_TIME	Numeric	4	0	Trip departure time
RETRN_TIME	Numeric	4	0	Trip return time
HRS_FISHED	Numeric	4	0	Number of hours spent fishing
NUM_ANGLER	Numeric	3	0	Number of anglers
BLOCK	Character	4	0	Fishing block code
BIRD_INTER	Character	1	0	Bird interactions (Y/N)
OPERATOR	Character	1	0	Operator
BAIT1L	Character	1	0	Anchovies-live
BAIT1D	Character	1	0	Anchovies-dead
BAIT2L	Character	1	0	Sardines-live
BAIT2D	Character	1	0	Sardines-dead
BAIT3L	Character	1	0	Squid-live
BAIT3D	Character	1	0	Squid-dead
BAIT4L	Character	1	0	Other bait-live
BAIT4D	Character	1	0	Other bait-dead
TARGETF1	Character	1	0	Salmon (N); Tuna (S)
TARGETF2	Character	1	0	Rockfishes (N); Sharks (S)
TARGETF3	Character	1	0	Lingcod (N); Rockfishes (S)
TARGETF4	Character	1	0	Striped Bass (N); Lingcod (S)
TARGETF5	Character	1	0	Sturgeon (N); Salmon (S)
TARGETF6	Character	1	0	Sharks (N); Misc. Coastal (S)
TARGETF7	Character	1	0	Tuna (N); Misc. Offshore (S)
TARGETF8	Character	1	0	Potluck (N)
TARGETF9	Character	1	0	Misc. Bay or Estuary (N)
FMETHOD1	Character	1	0	Trolling
FMETHOD2	Character	1	0	Mooching
FMETHOD3	Character	1	0	Anchored
FMETHOD4	Character	1	0	Drifting
FMETHOD5	Character	1	0	Diving
FMETHOD6	Character	1	0	Light Tackle
TEMPRTR	Numeric	2	0	Sea surface temperature
VALIDITY	Character	2	0	Validity report status
OCRSTATUS	Character	2	0	OCR status

Species Table:

Field Name	Type	Width	Dec	Description
SER_NUM	Character	7	0	Unique log serial number
SPECIE	Character	3	0	Species code (ext.)
LANDED	Numeric	3	0	Number of fish kept
BACK	Numeric	3	0	Number of fish thrown back
SEALS	Numeric	2	0	Number of fish lost to seals

SPORTCATCH ANALYSIS YEAR 1936 ORGIN 720

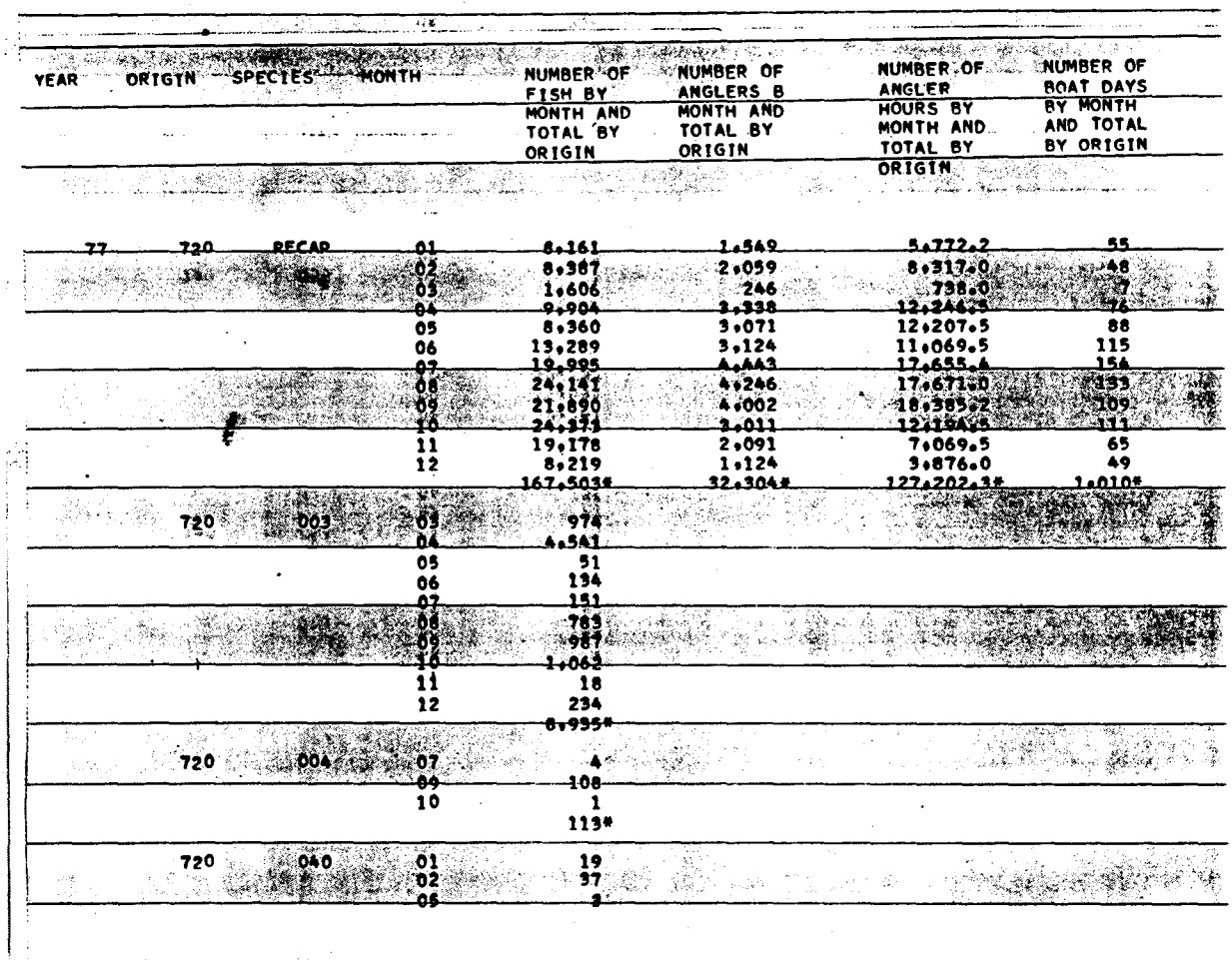
Number of Fish by Species

Month	Angler Days	Total Fish	Bonito	Bluefin	Albacore	Yellow-tail	Pacific Mackerel	Jack Mackerel	Barra-cuda	Sheep-head
1	5	207	7							
2	39	755	6				31			
3	27	245								31
4	90	839					3			29
5	45	6								
6	505	7857	3			61	26		3511	158
7	572	8774	27			4	268		5618	168
8	496	7718	136			17	74	25	4991	154
9	228	1524	9				249		250	35
10	363	3769	94				268		86	64
11	16	71					29			6
12										
Total	2386	31765							14456	

	Shark	Smelt	Lingcod	Halibut	Flatfish	Rockfish	Sculpin	Cabezon	Kelp Bass	W.Seabs
1						200				
2					179	512				
3							4		210	
4				25	39	49	61	11	612	
5				1			1		4	
6				124	2		230	12	3712	10
7				37		20	167	11	2405	33
8				238		9	167	14	1712	36
9				389		60	25	12	285	6
10				599	2		93	18	2356	80
11								1	35	
12										
Total				1413		850				

	White Croaker	Ocean Whitefish	Misc.
1			
2	15		12
3			
4	10		
5			
6	8		
7		14	2
8	136	36	3
9	189	15	
10	69	40	
11			
12			
Total		105	

Figure 7. Sample of commercial passenger fishing vessel archival data (Report VI; 1936-1957) summarizing species catch and effort by month and origin.



YEAR	ORIGIN	SPECIES	MONTH	NUMBER OF FISH BY MONTH AND TOTAL BY ORIGIN	NUMBER OF ANGLERS B MONTH AND TOTAL BY ORIGIN	NUMBER OF ANGLER HOURS BY MONTH AND TOTAL BY ORIGIN	NUMBER OF BOAT DAYS BY MONTH AND TOTAL BY ORIGIN
77	720	RECAP	01	8,161	1,549	5,772.2	55
			02	8,387	2,059	8,317.0	48
			03	1,606	246	738.0	7
			04	9,904	2,238	12,244.5	76
			05	8,360	3,071	12,207.5	88
			06	13,289	3,124	11,069.5	115
			07	19,995	4,443	17,655.4	154
			08	24,141	4,246	17,671.0	133
			09	21,890	4,002	18,385.2	109
			10	24,371	3,011	12,194.5	111
			11	19,178	2,091	7,069.5	65
			12	8,219	1,124	3,876.0	49
				167,503*	32,304*	127,202.3*	1,010*
	720	003	03	974			
			04	4,541			
			05	51			
			06	194			
			07	151			
			08	783			
			09	987			
			10	1,062			
			11	18			
			12	234			
				8,995*			
	720	004	07	4			
			09	108			
			10	1			
				113*			
	720	040	01	19			
			02	97			
			05	3			

Figure 8. Sample of commercial passenger fishing vessel archival data (Report VI; 1957-1978) summarizing species catch and effort by month and origin. RECAP summarizes effort information for entire month by block.

STATEWIDE

RECEIPTS FOR PERIOD
JUNE 1957

REPORT II

	Port	Species	Month	No. of Fish by Species & Port *	Angler Days by Port *	Boats by Port *
MONTEREY	550					
	550	195	04	142		
	550	222	04	10		
	550	230	04	13		
	550	250	04	355		
	550	252	04	785		
	550	259	04	562		
	550	261	04	60		
	550	300	04	14		
				1941*	146*	1*
				1941*	146*	1*
CRESCENT CITY	201					
	201	195	06	36		
	201	250	06	18		
	201	252	06	462		
	201	261	06	5		
	201	265	06	35		
	201	300	06	145		
				701*	146*	2*
ALBION	211					
	211	300	06	8		
				8*	5*	1*
EUREKA	220					
	220	250	06	3		
	220	252	06	95		
	220	300	06	355		
				453*	263*	3*
FORT BRAGG	223					
	223	195	06	27		
	223	250	06	6		
	223	252	06	40		
	223	259	06	63		
	223	300	06	376		
				512*	232*	7*

Figure 9. Sample of commercial passenger fishing vessel archival data (Report II; 1957-1978) summarizing species catch and effort by month and port.

Fish Reports

SAN DIEGO (Pt. Loma, H.&M. and Fishermen's Landings)—15 boats, 191 anglers: 102 yellowtail, 57 white sea bass, two black sea bass, 30 barracuda, 225 bonito, 471 log barracuda.

BALBOA PAVILION—One boat, 27 anglers fishing Huntington Flats: 38 yellowtail, 120 barracuda, 60 bonito, five halibut, 12 miscellaneous.

NEWPORT (Davey's Locker) — Six boats, 130 anglers: 322 barracuda, 495 bonito, 209 calico bass, 168 yellowtail, 19 halibut.

SAN PEDRO (22nd Street Landing)—Five boats, 98 anglers: fishing Catalina, Huntington Flats: 276 yellowtail, 584 barracuda, 200 bass, 225 miscellaneous. Derby prize is $273.

SAN PEDRO (Norm's Landing)—Eight boats, 179 anglers fishing Catalina and Horseshoe Kelp: 657 barracuda, 277 yellowtail, 327 bonito, 12 white sea bass, four halibut, 683 calico bass, 79 miscellaneous. Al Herenden won the jackpot with a 10-lb. yellowtail.

LONG BEACH (Pacific Sportfishing Landing)—Five boats, 114 anglers: 146 yellowtail, 351 barracuda, 25 halibut, 177 calico bass, 69 bonito.

REDONDO BEACH — Four boats, 101 anglers: 502 barracuda, 237 bonito, 103 calico bass, five yellowtail. Barge: mackerel, bonito, sablefish, sand dabs, halibut.

SANTA MONICA SPORTFISHING—80 anglers: 403 barracuda, 99 bass, five halibut, 150 bonito, two white sea bass.

MALIBU PIER—Two boats, 40 anglers: 89 halibut, 161 calico and bull bass, 135 bonito, 297 barracuda. Barge: limits of barracuda; some halibut, sole. Pier: halibut and bonito.

PARADISE COVE—Three boats, 57 anglers: 398 barracuda, 79 bonito, 224 calico and bull bass, six halibut, 146 rockfish. Barge: limits of barracuda.

PORT HUENEME—Five boats, 52 anglers: 232 yellowtail (to 27 lb.), 73 barracuda, 86 calico bass, eight halibut.

SAN CLEMENTE—Four boats, 71 all-day, 62 half-day anglers: 330 barracuda, 264 bonito, 90 kelp bass, seven white sea bass, 159 yellowtail, eight halibut, 74 miscellaneous.

NEWPORT (Sea Sport Landing)—Two boats, 49 anglers: 167 barracuda, 13 bonito, 160 bass, one white sea bass, 124 yellowtail, 17 halibut, five miscellaneous.

MISSION BAY—Three boats, 120 anglers: 267 barracuda, 240 bonito, 65 bass, 74 yellowtail, 25 miscellaneous.

LONG BEACH (Pierpoint Landing) — Five boats, 219 anglers: 758 barracuda, 302 calico bass, 334 bonito, 32 halibut, 89 yellowtail, 19 miscellaneous.

Figure 10. Sample of daily *Los Angeles Times* fish report from 1960.

Figure 11. Table structure for *Los Angeles Times* fish report files (dBASE IV).

Field Name	Type	Width	Dec	Description
L_ABBREV	Character	10	0	Location abbreviation
LOCATION	Character	38	0	Landing location
SN	Numeric	4	1	Location code
MONTH	Numeric	2	0	Month
DAY	Numeric	2	0	Day of newspaper report (day after fishing)
YEAR	Numeric	2	0	Year
ANGLERS	Numeric	5	0	Number of anglers from landing
BOATS	Numeric	5	0	Number of boats
CAUGHT	Numeric	5	0	Number of fish caught by species
F_ABBREV	Character	4	0	Fish name abbreviation
LA_TIMES_N	Character	29	0	Fish name as appears in newspaper
RECOGNIZED	Character	25	0	Assigned recognized common name
SCIENTIFIC	Character	29	0	Scientific name
CPUE	Character	4	0	Catch per angler

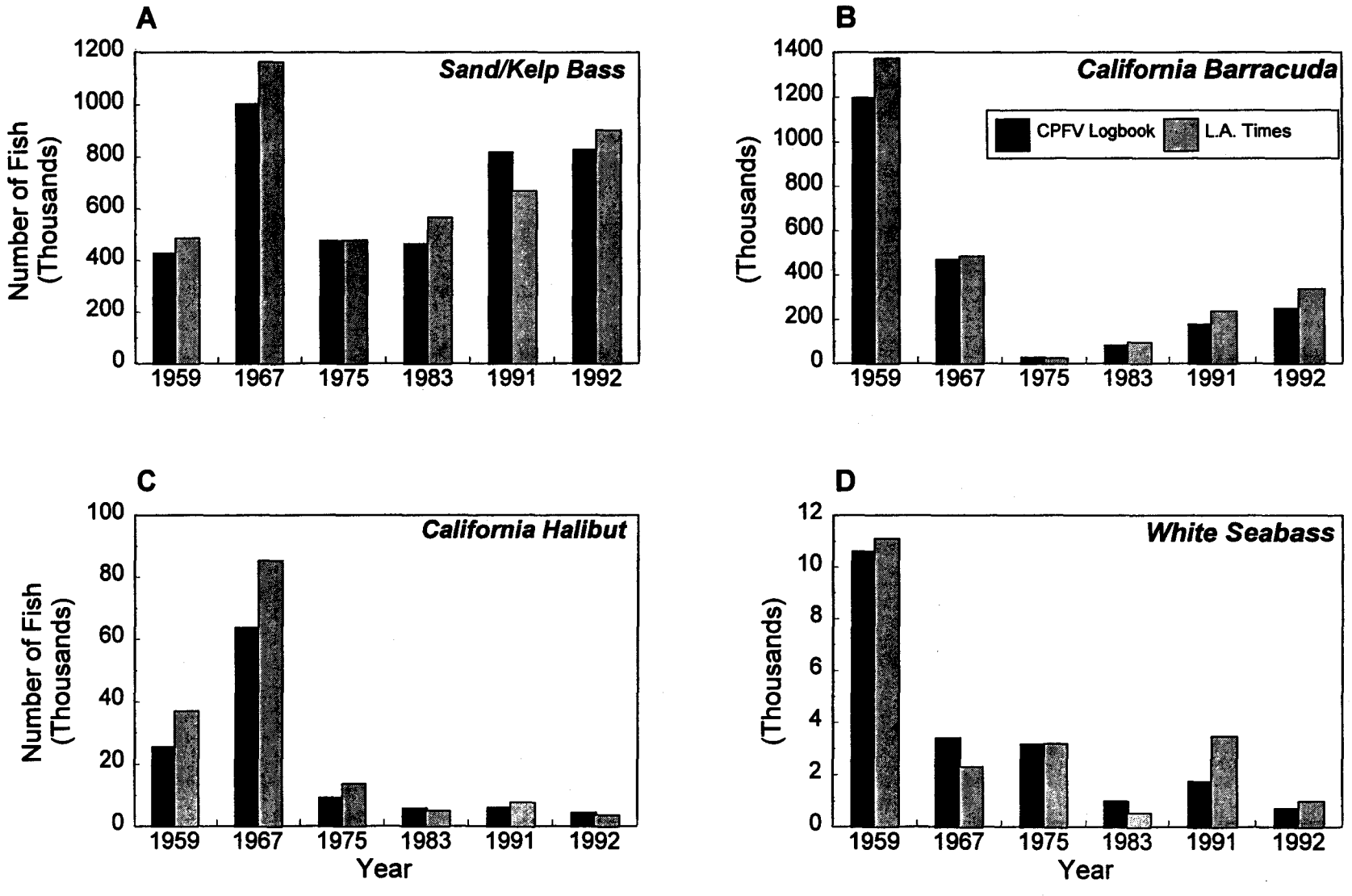


Figure 12. Southern California annual landings of sand/kelp bass (A), California barracuda (B), California halibut (C), and white seabass (D) as reported in CPFV logbooks and *Los Angeles Times* for selected years.

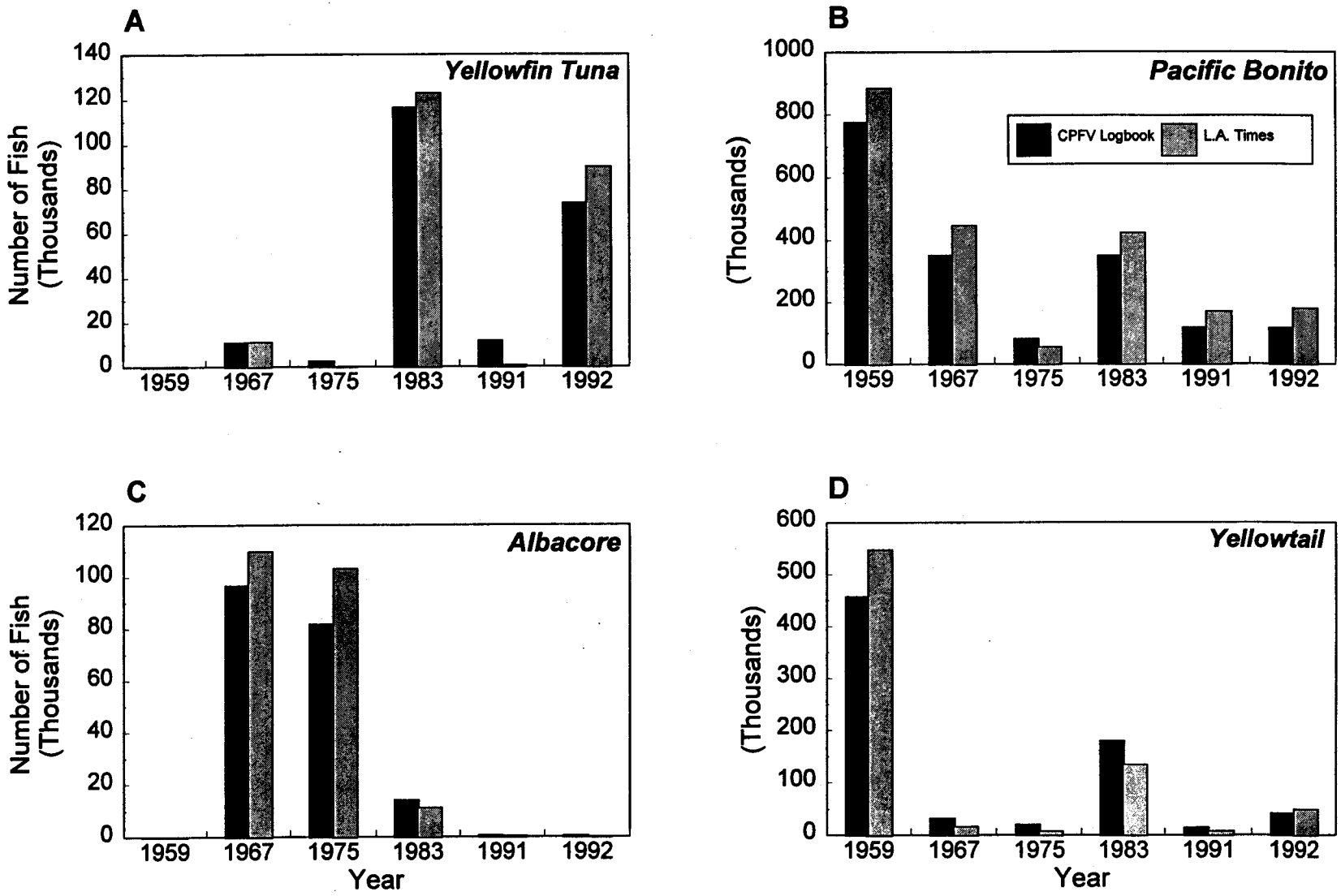


Figure 13. Southern California annual landings of yellowfin tuna (A), Pacific bonito (B), albacore (C), and yellowtail (D) as reported in CPFV logbooks and *Los Angeles Times* for selected years.

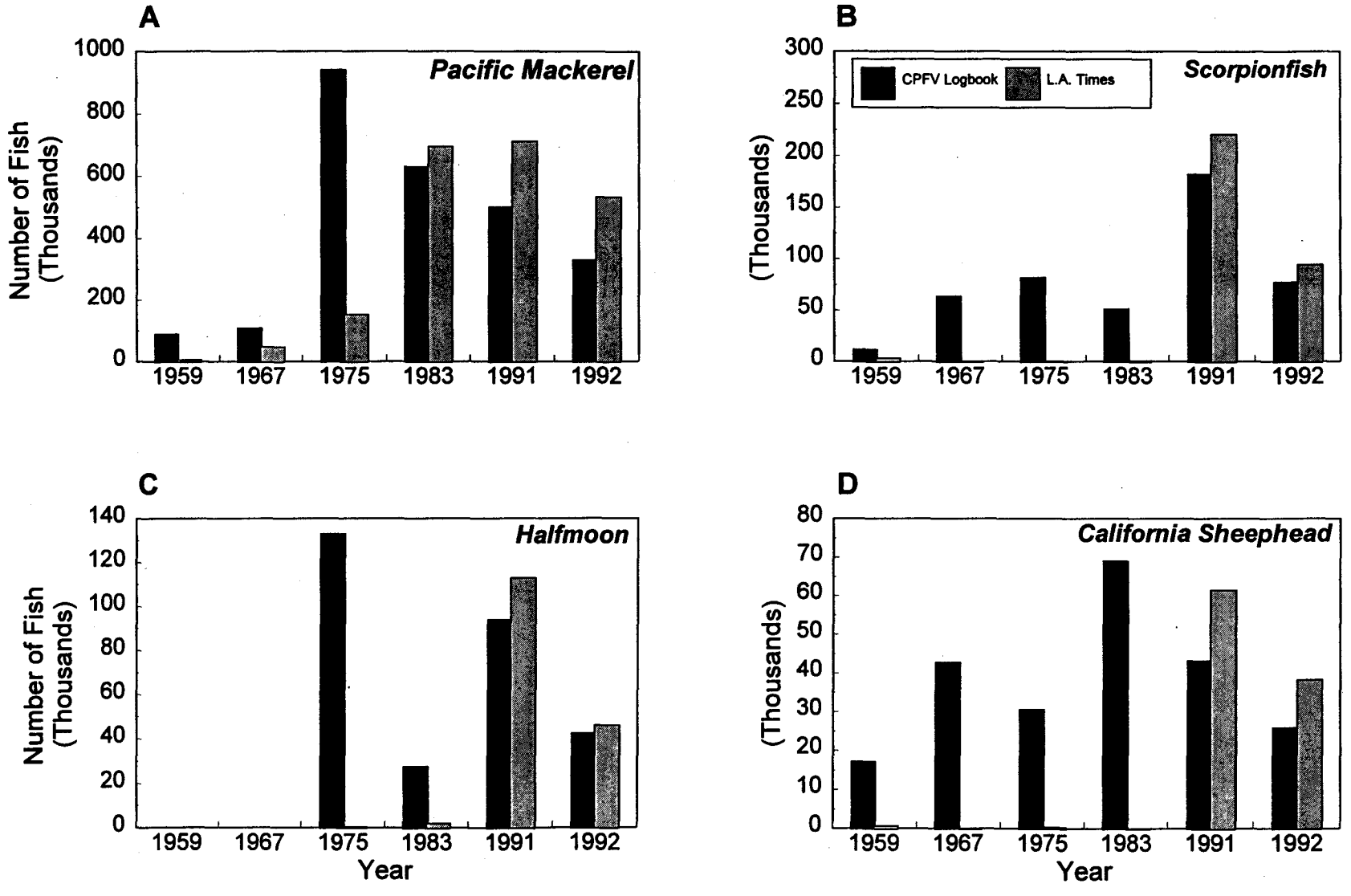


Figure 14. Southern California annual landings of Pacific mackerel (A), spotted scorpionfish (B), halfmoon (C), and California sheephead (D) as reported in CPFV logbooks and *Los Angeles Times* for selected years.

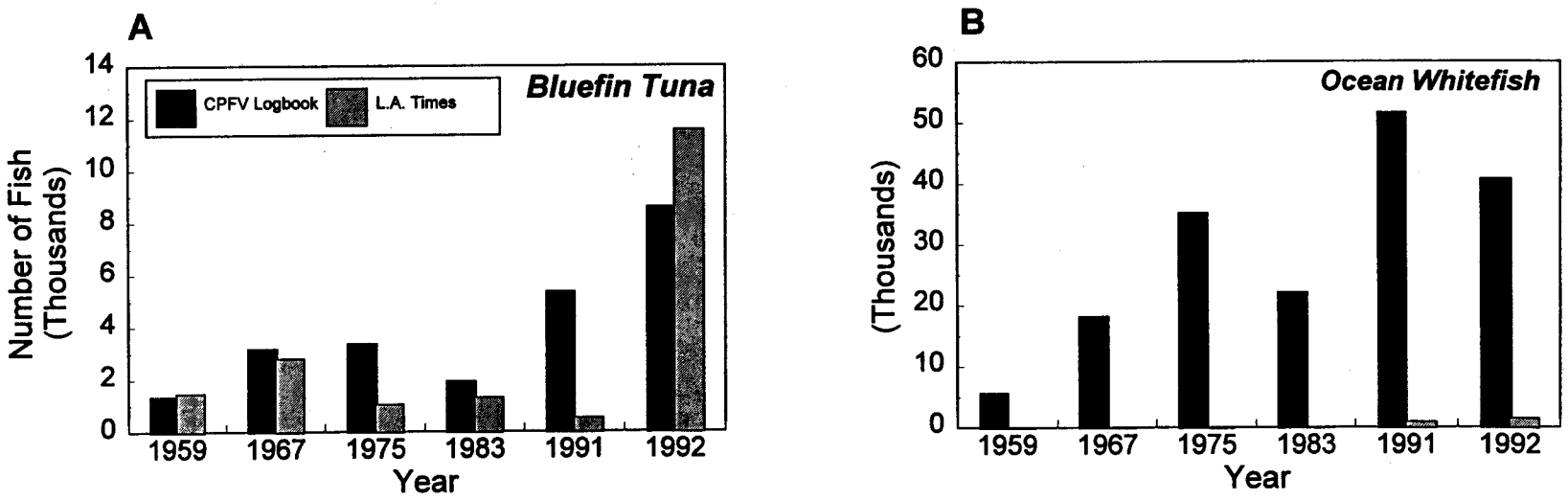


Figure 15. Southern California annual landings of bluefin tuna (A) and ocean whitefish (B) as reported in CPFV logbooks and *Los Angeles Times* for selected years.

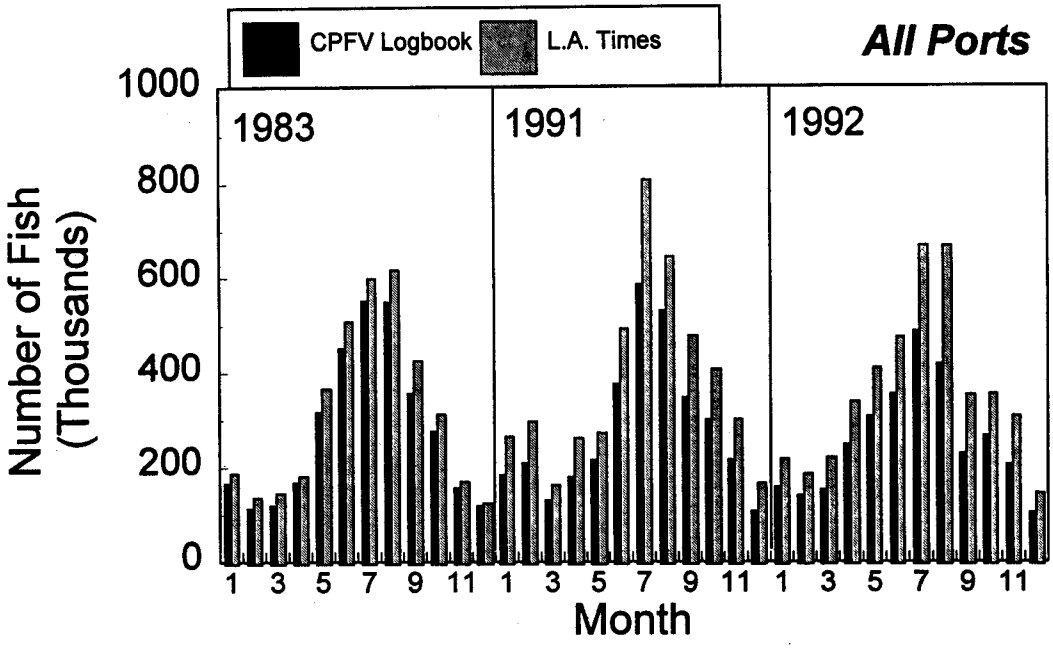


Figure 16a. Total monthly landings of fish in southern California ports as reported in CPFV logbooks and *Los Angeles Times* in 1983, 1991, and 1992.

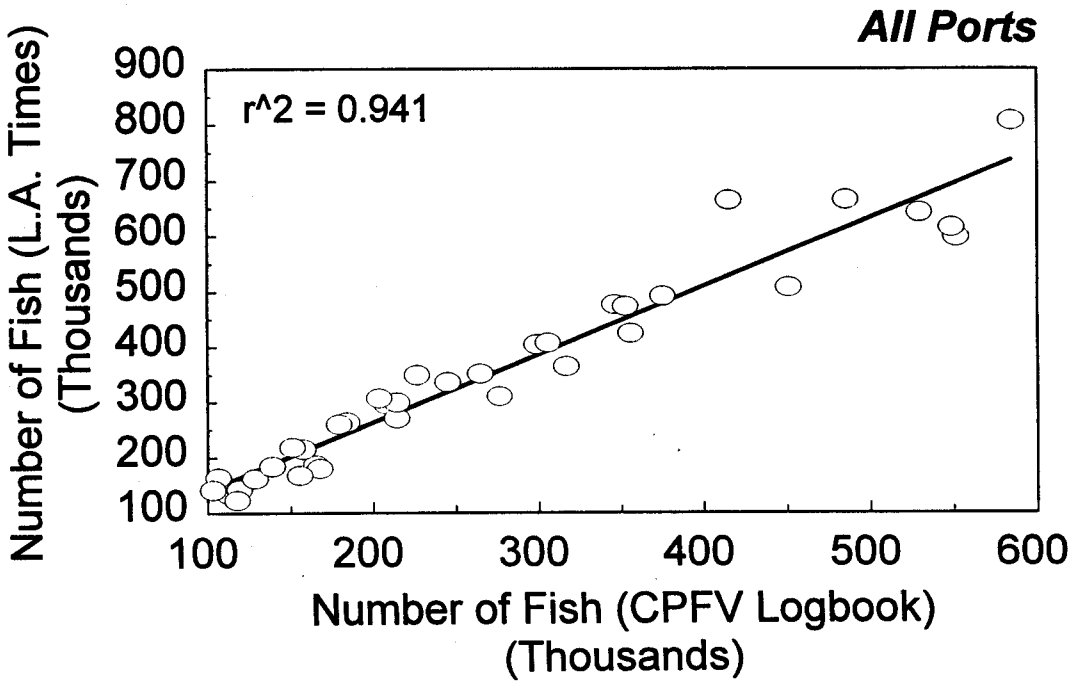


Figure 16b. Correlation between total monthly landings reported in CPFV logbooks and *Los Angeles Times* in 1983, 1991, and 1992.

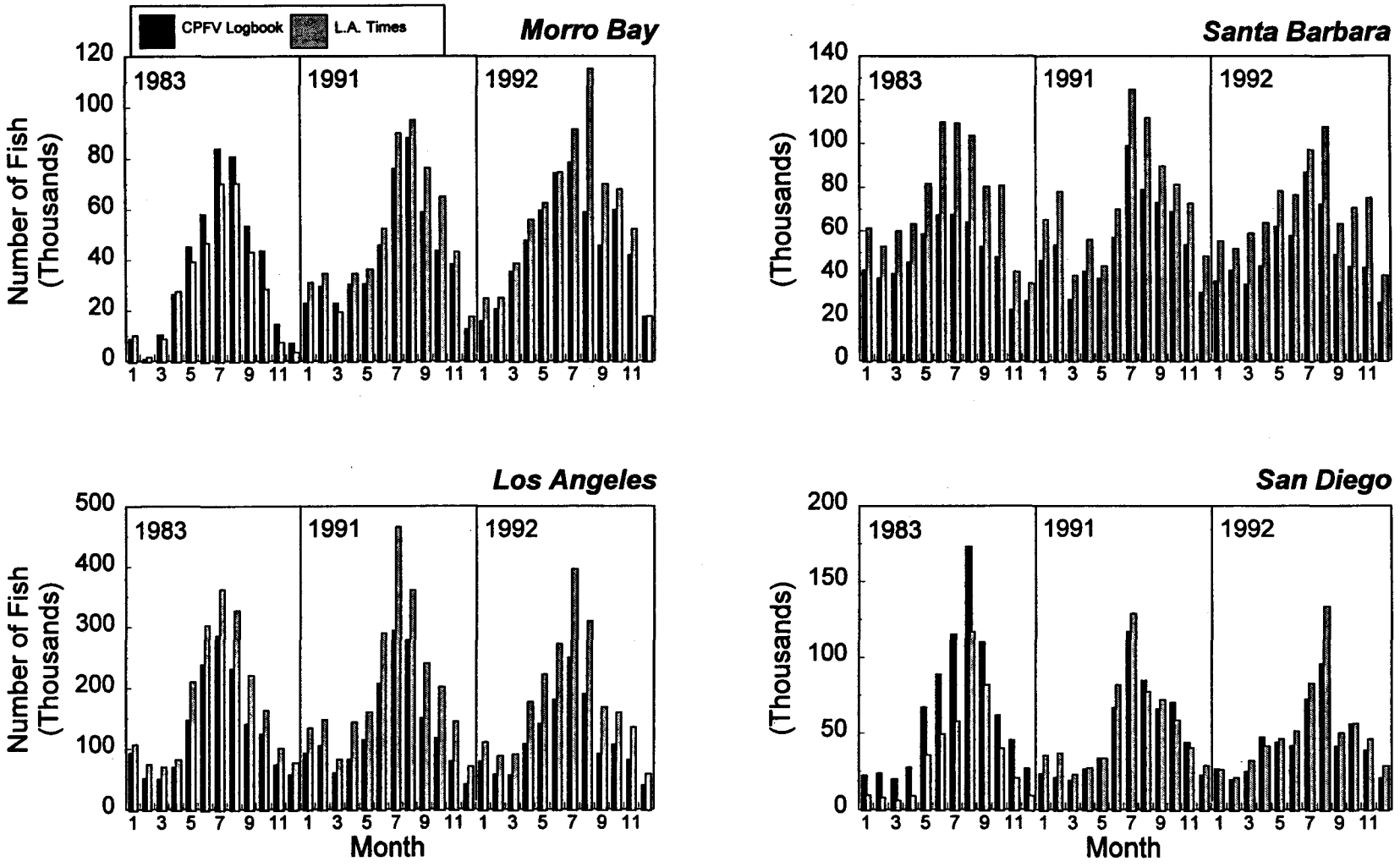


Figure 17. Total monthly landings of fish in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times* in 1983, 1991, and 1992.

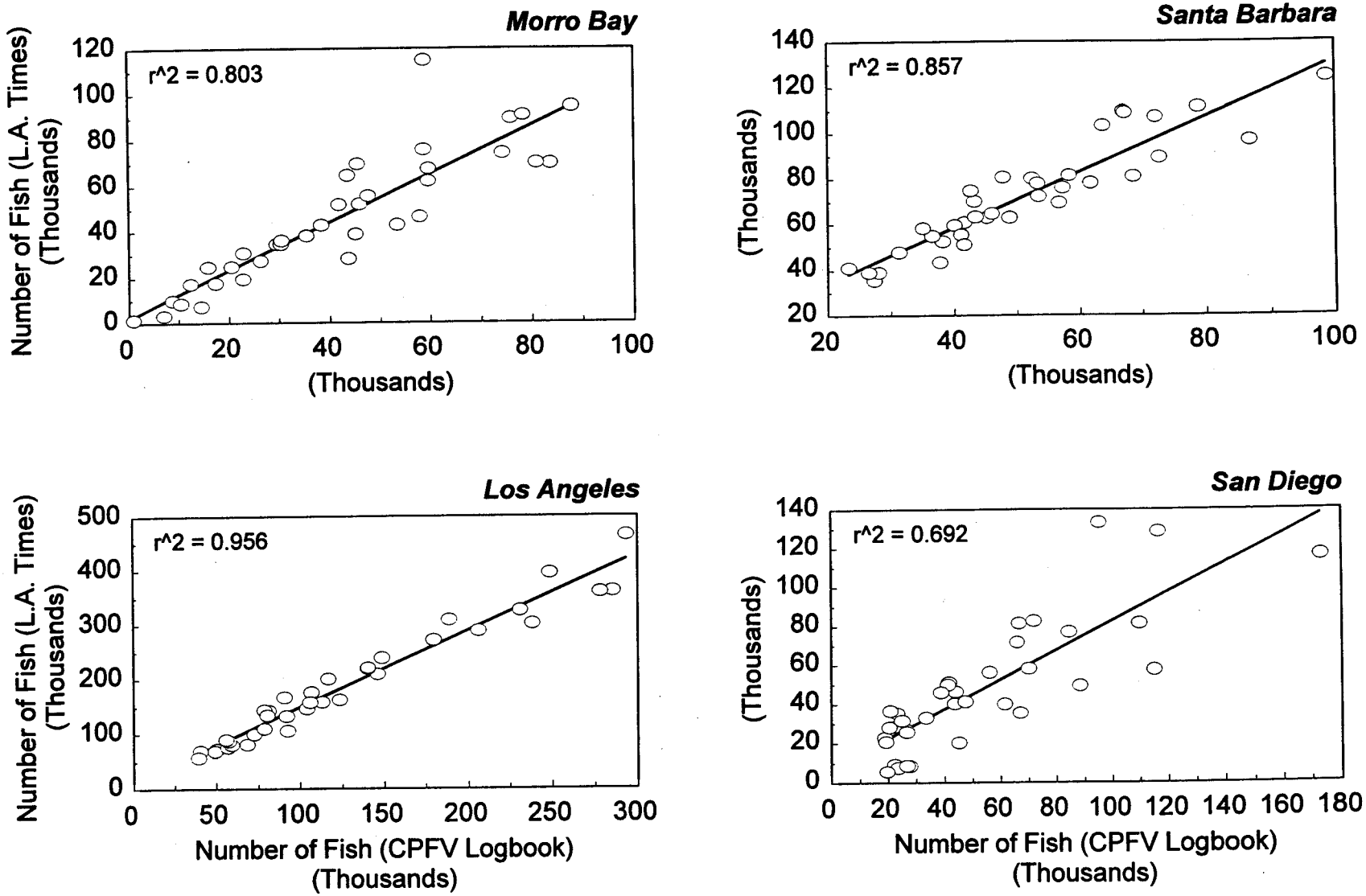


Figure 18. Correlations between total portwide monthly landings reported in CPFV logbooks and *Los Angeles Times* in 1983, 1991, and 1992.

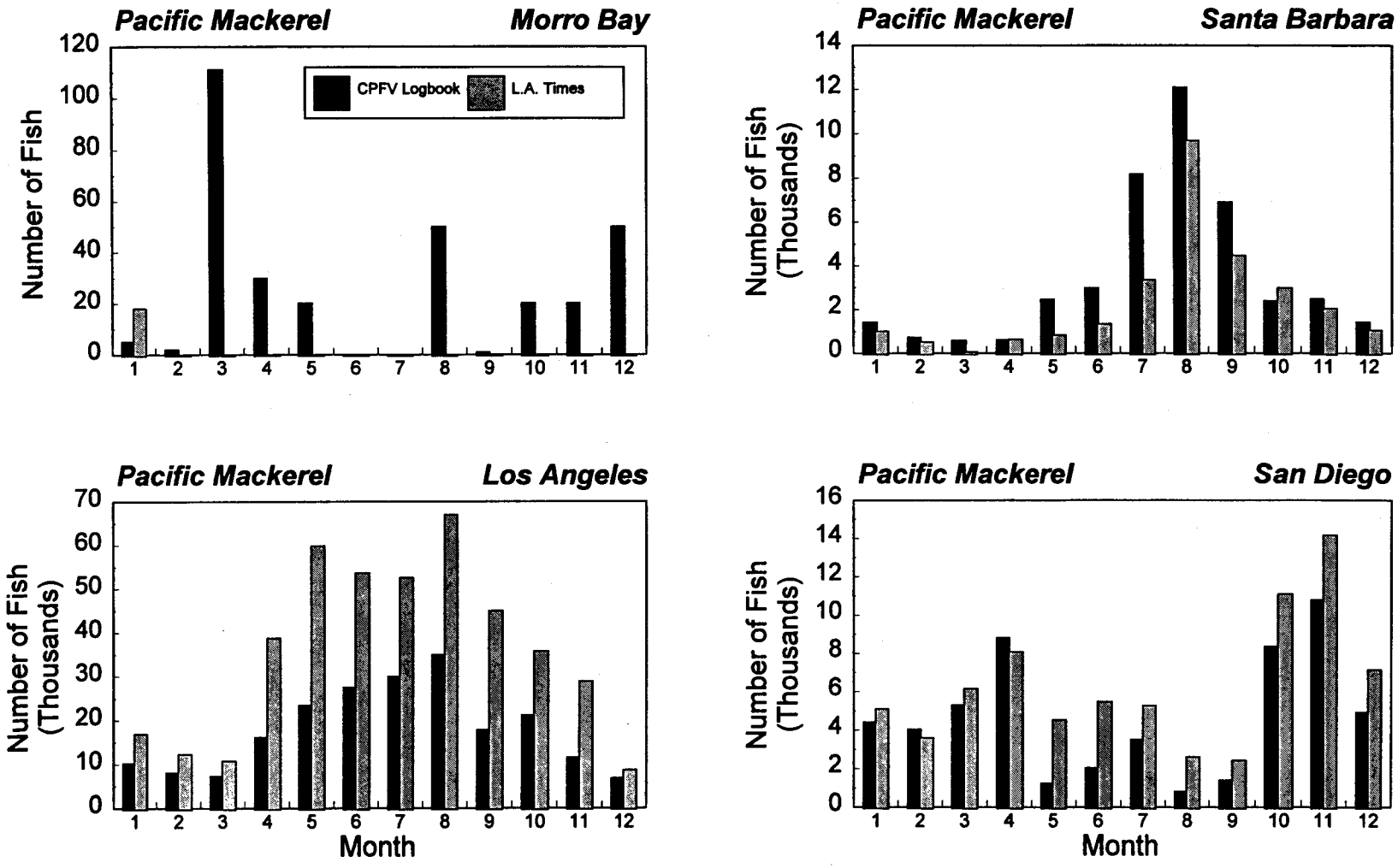


Figure 19. Total 1992 landings of Pacific mackerel in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times*.

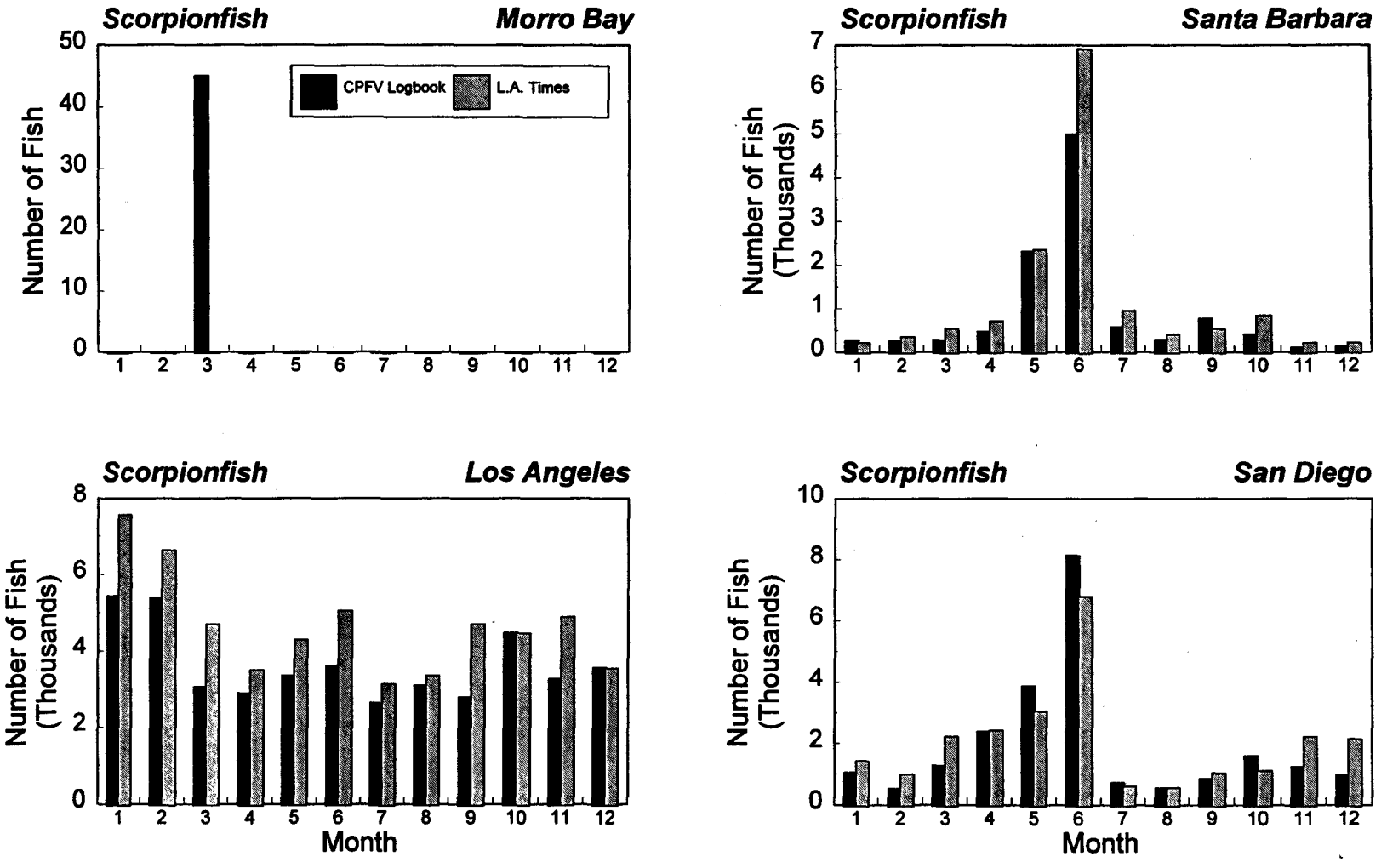


Figure 20. Total 1992 landings of spotted scorpionfish in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times*.

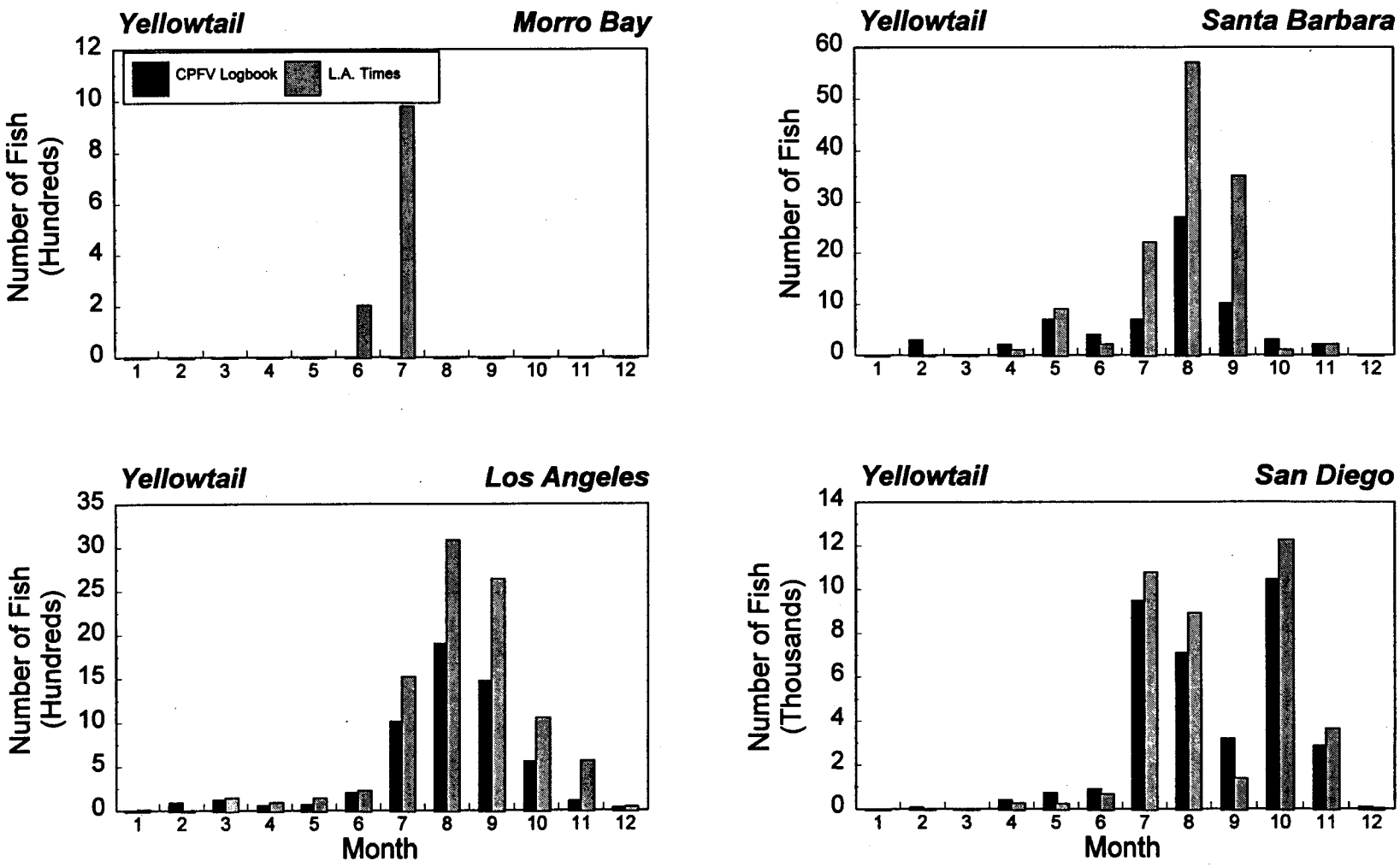


Figure 21. Total 1992 landings of yellowtail in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times*.

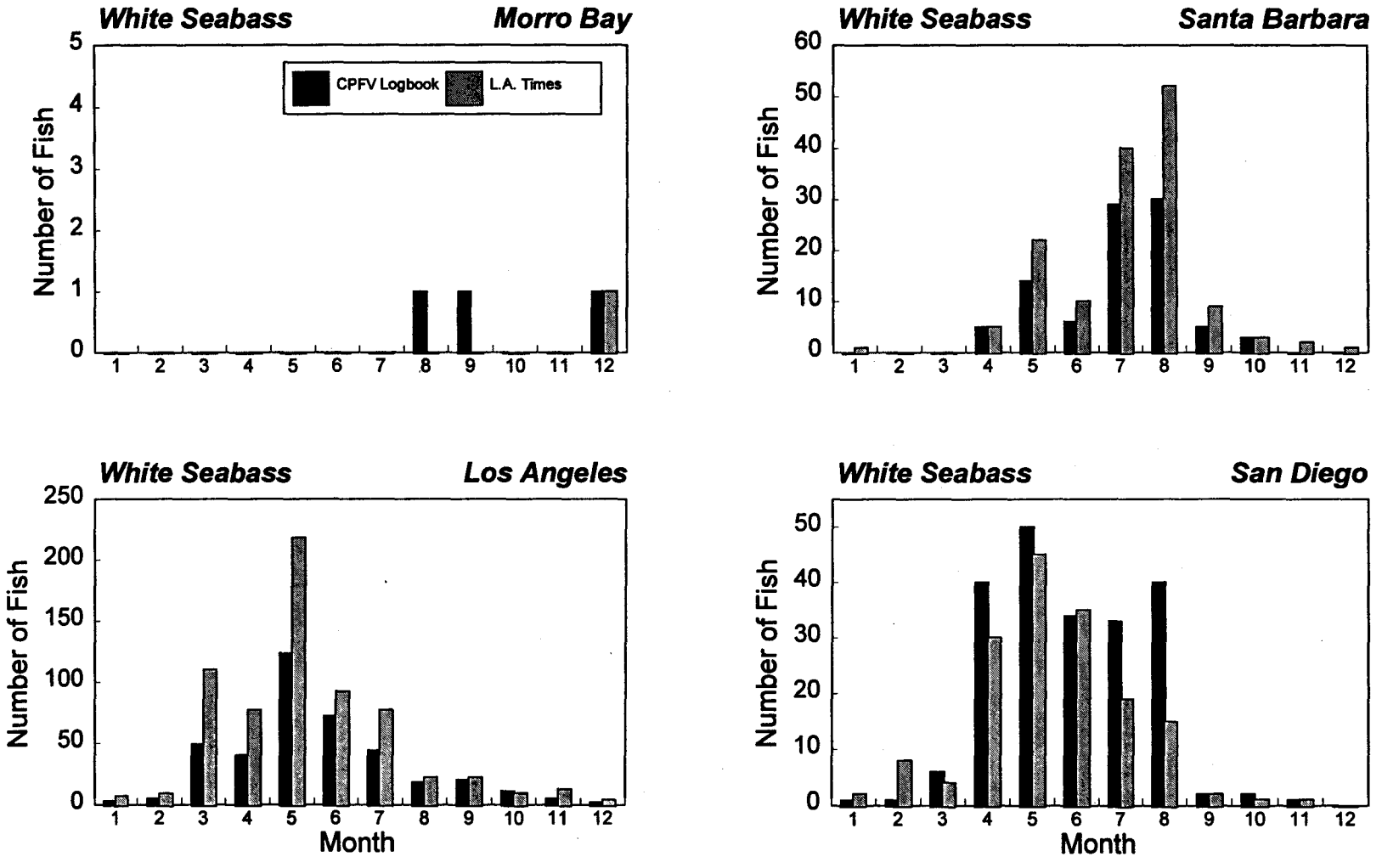


Figure 22. Total 1992 landings of white seabass in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times*.

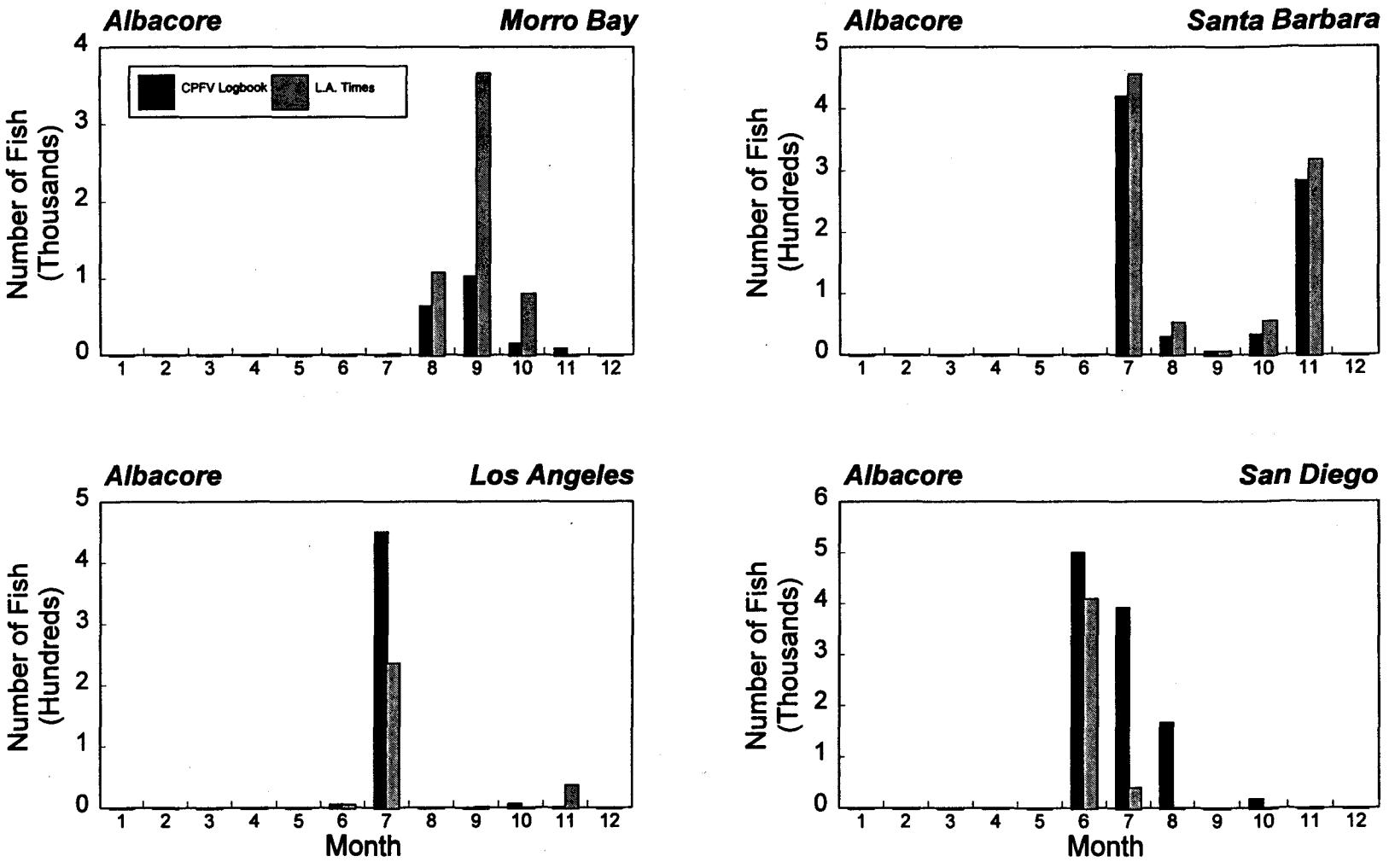


Figure 23. Total 1992 landings of albacore in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times*.

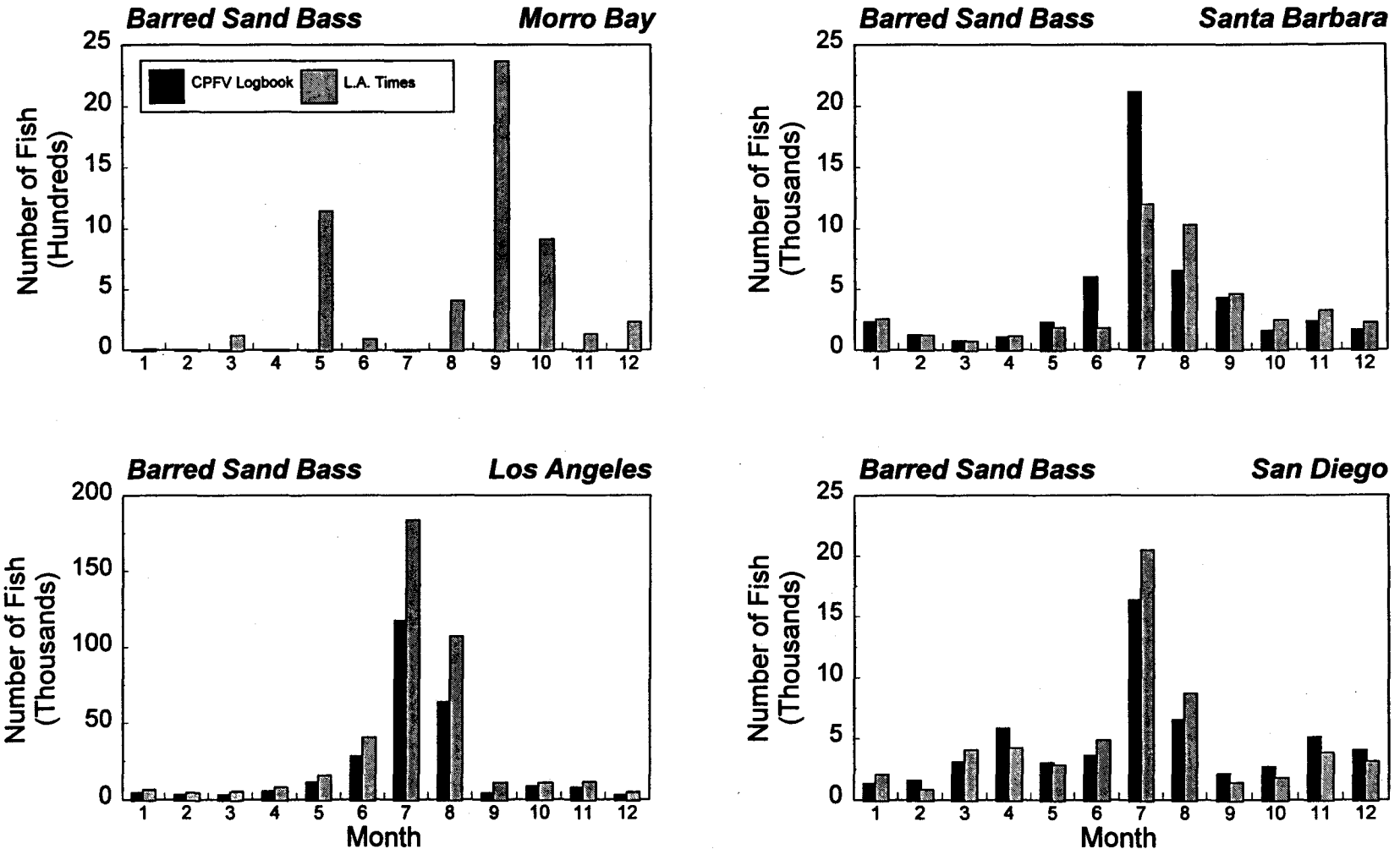


Figure 24. Total 1992 landings of barred sand bass in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times*.

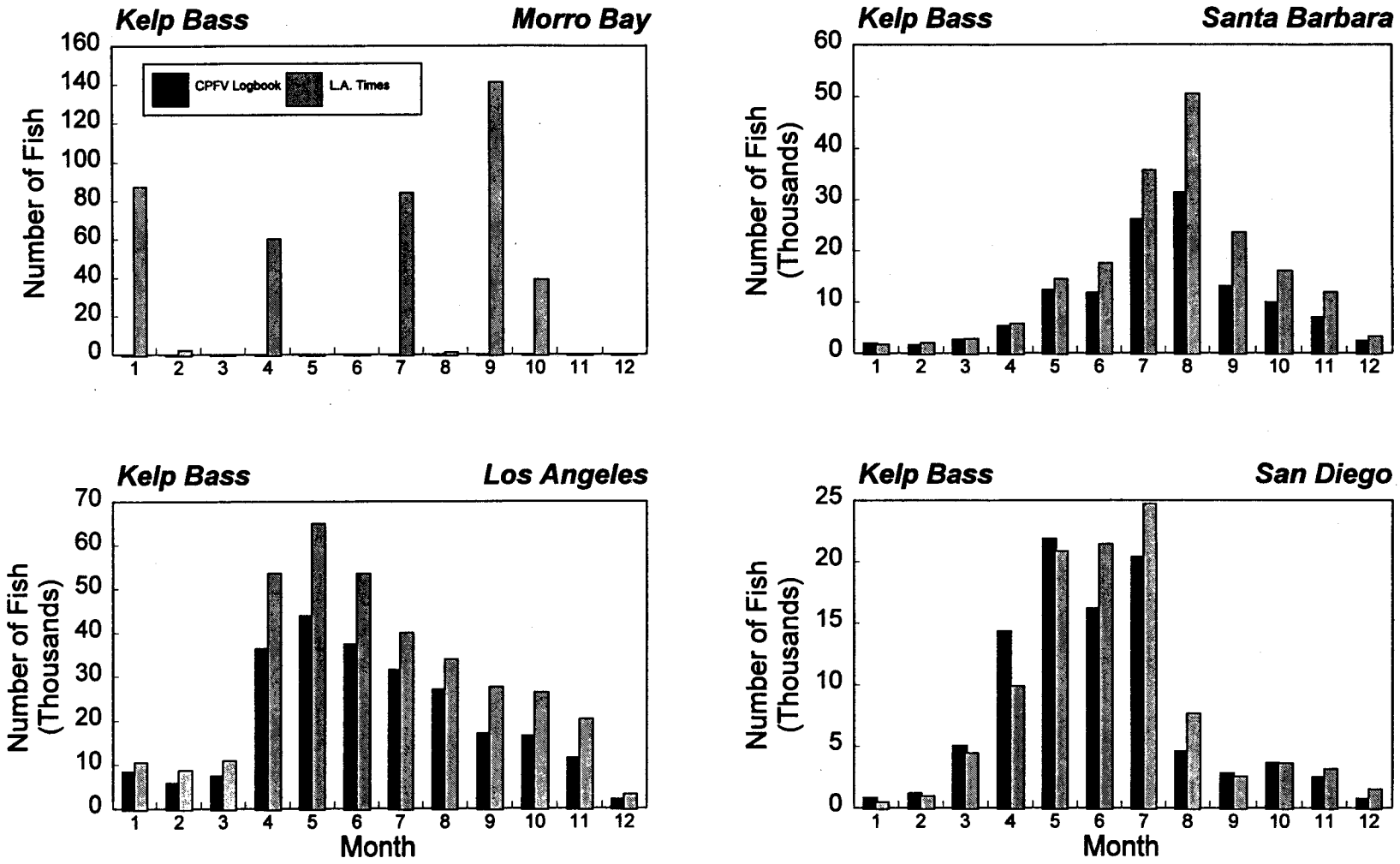


Figure 25. Total 1992 landings of kelp bass in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times*.

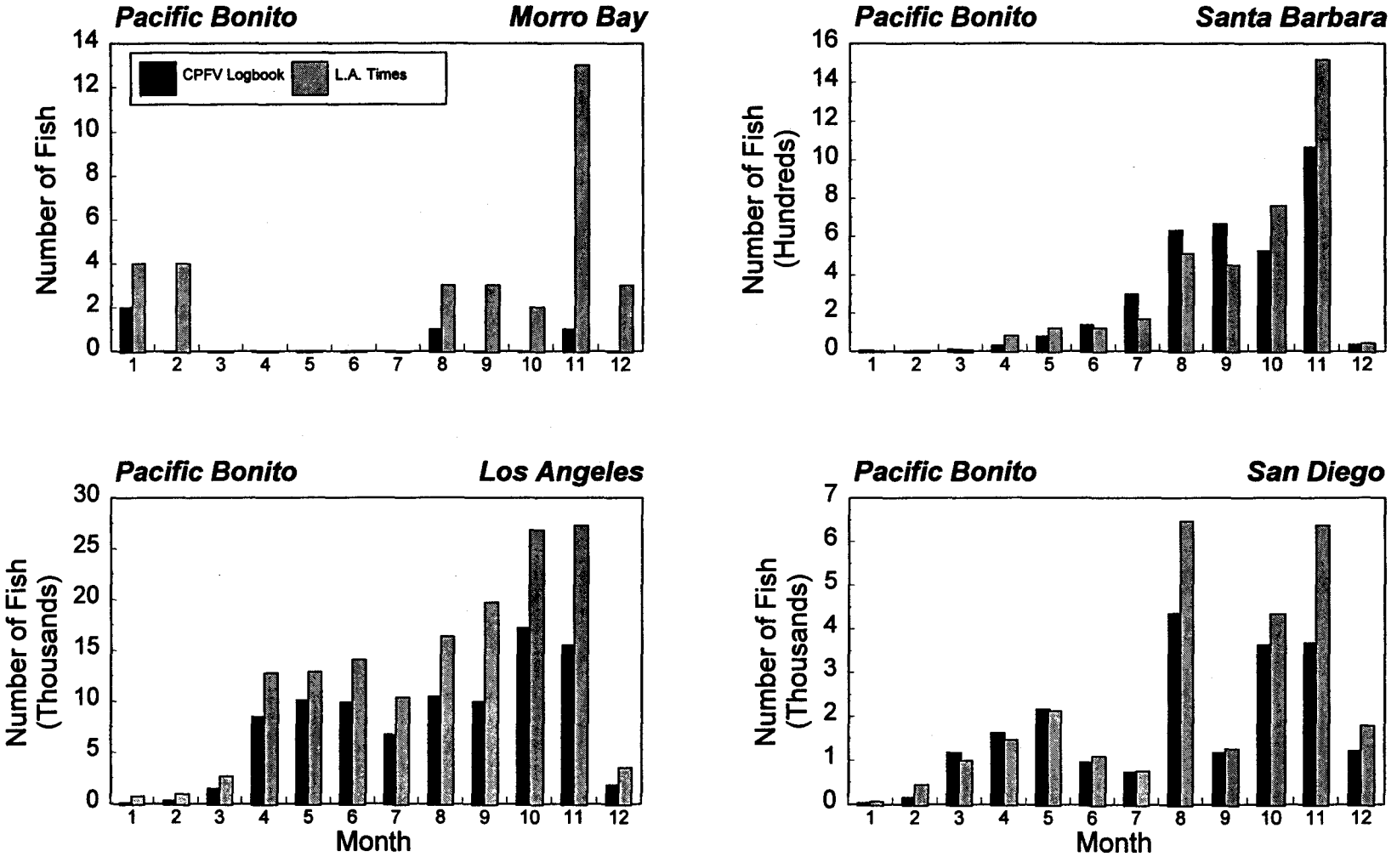


Figure 26. Total 1992 landings of Pacific bonito in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times*.

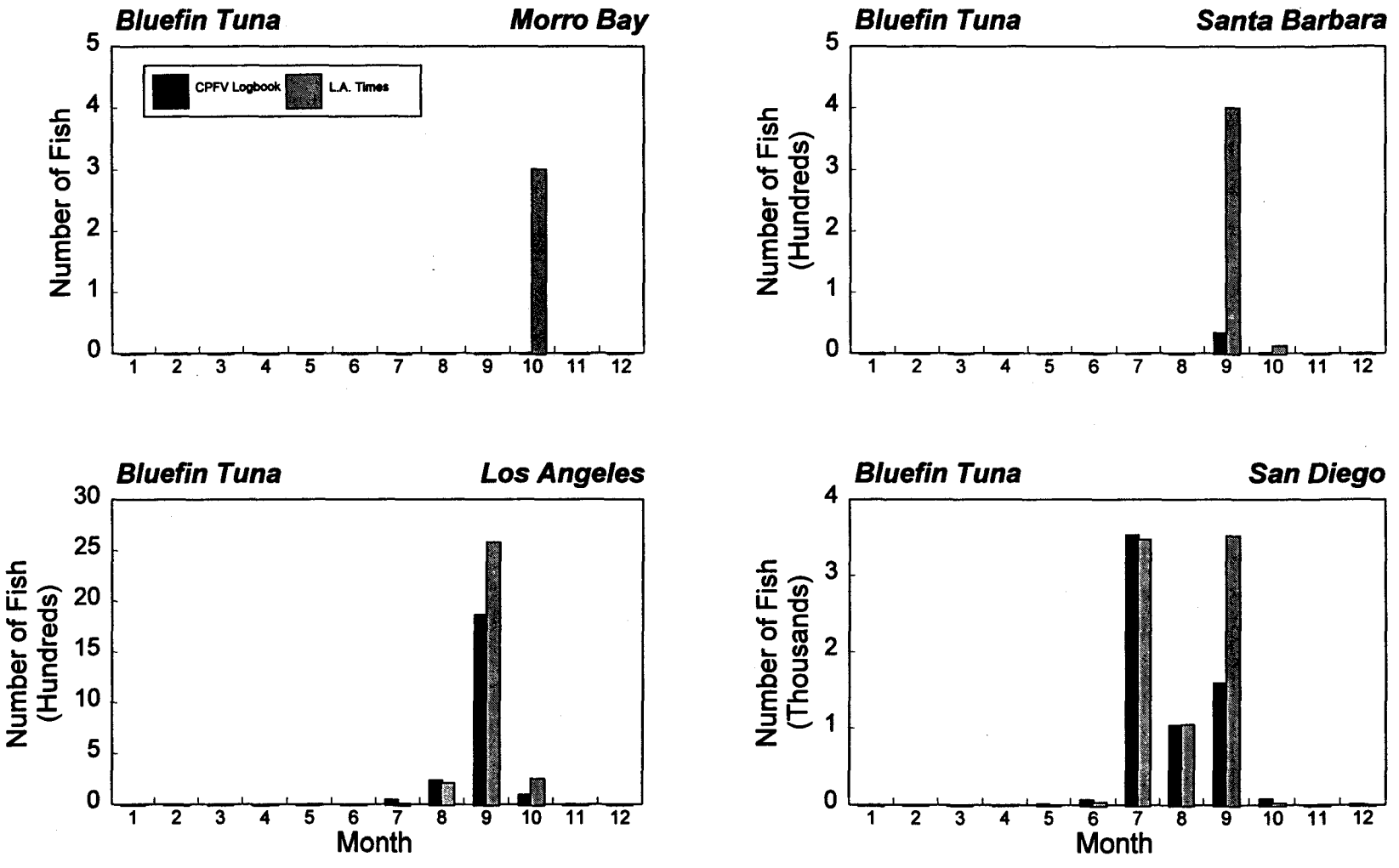


Figure 27. Total 1992 landings of bluefin tuna in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times*.

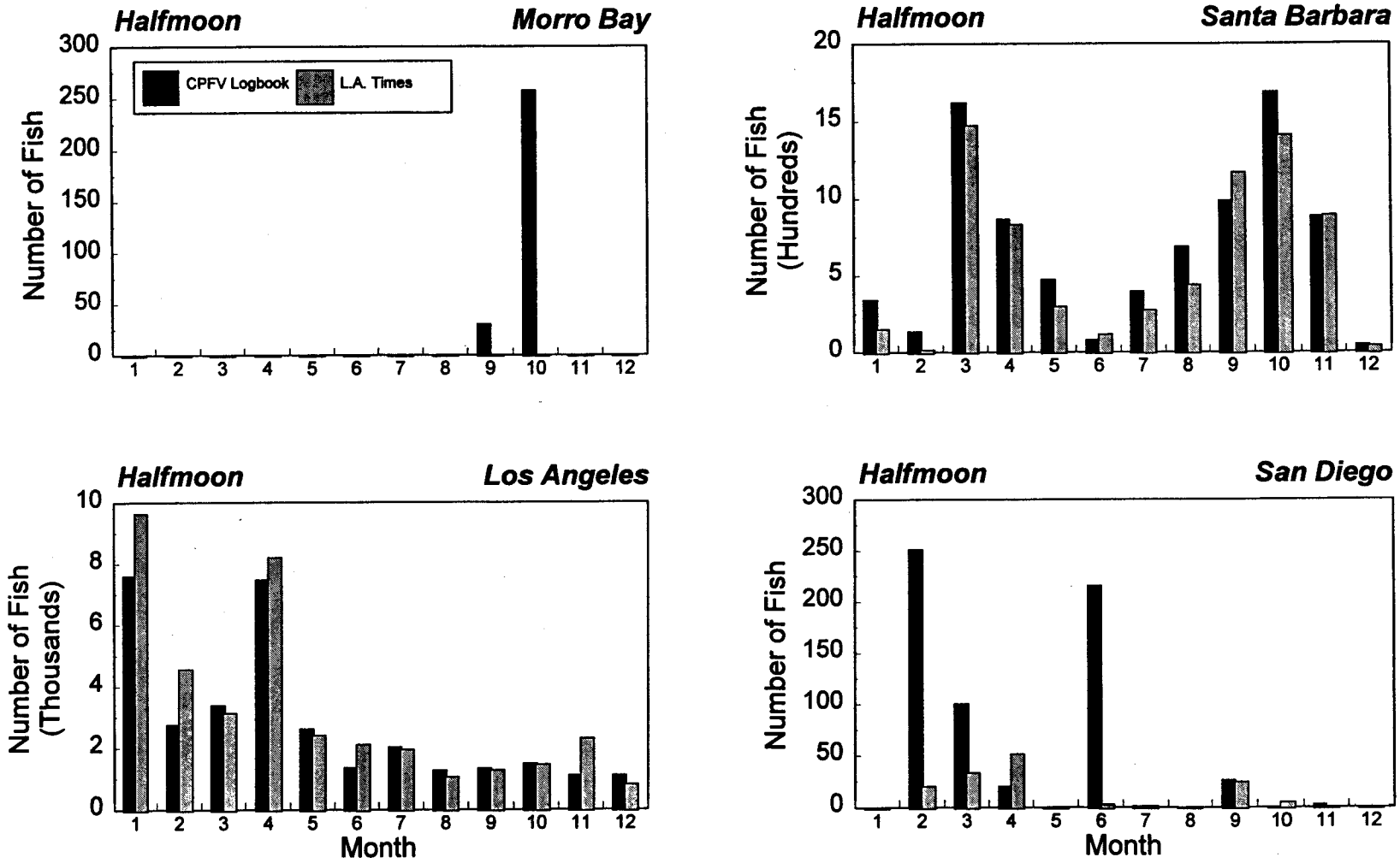


Figure 28. Total 1992 landings of halfmoon in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times*.

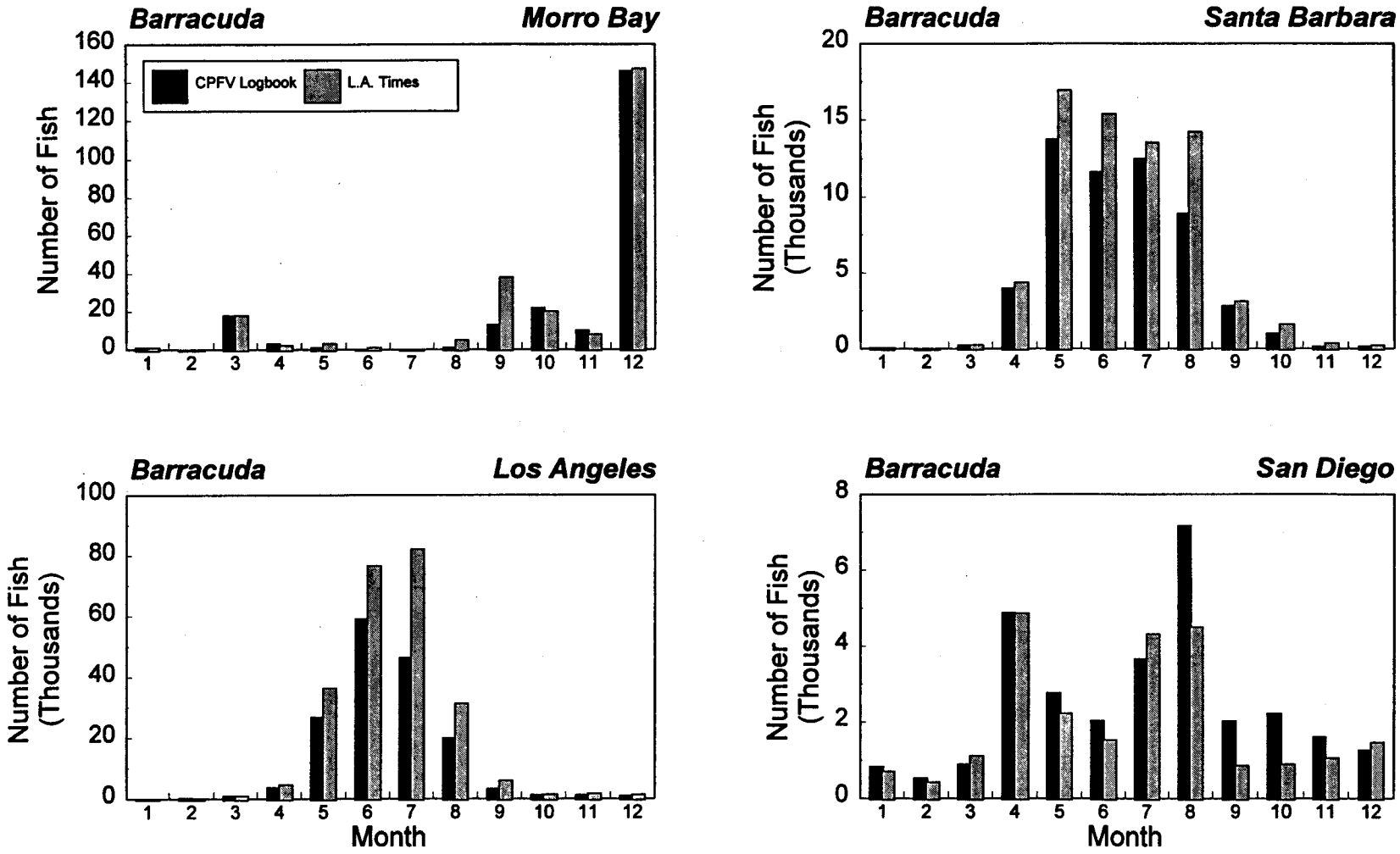


Figure 29. Total 1992 landings of California barracuda in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times*.

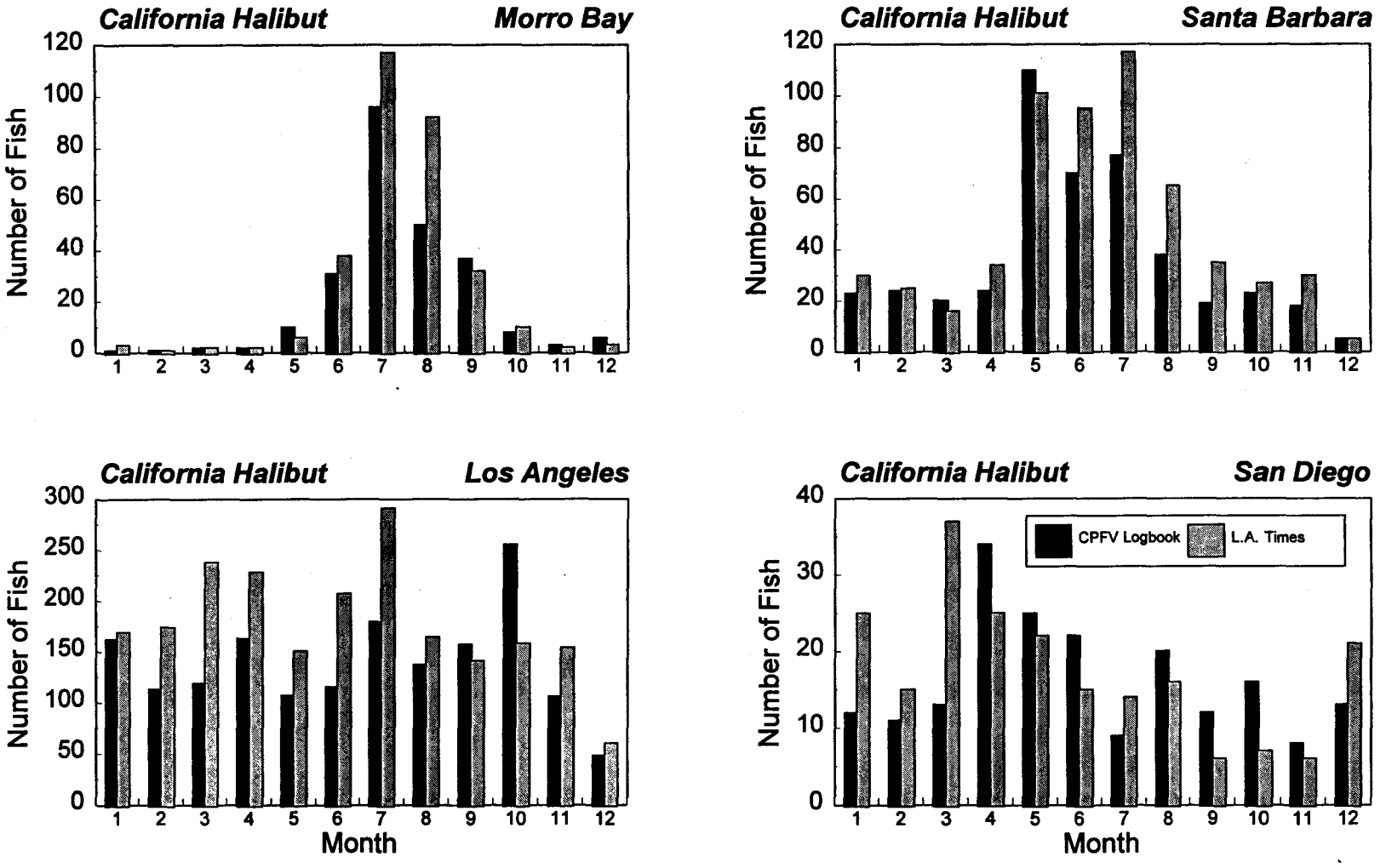


Figure 30. Total 1992 landings of California halibut in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times*.

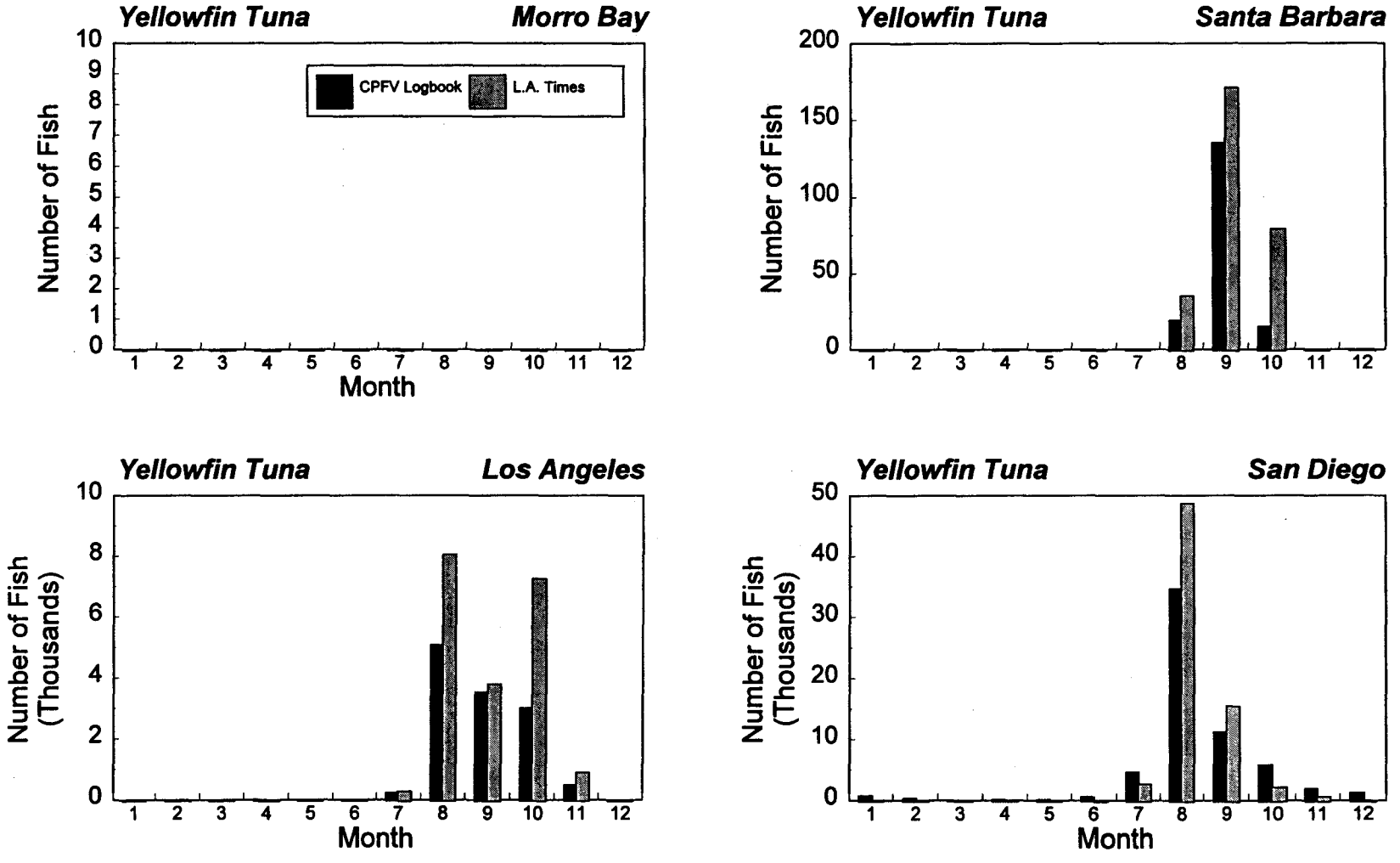


Figure 31. Total 1992 landings of yellowfin tuna in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times*.

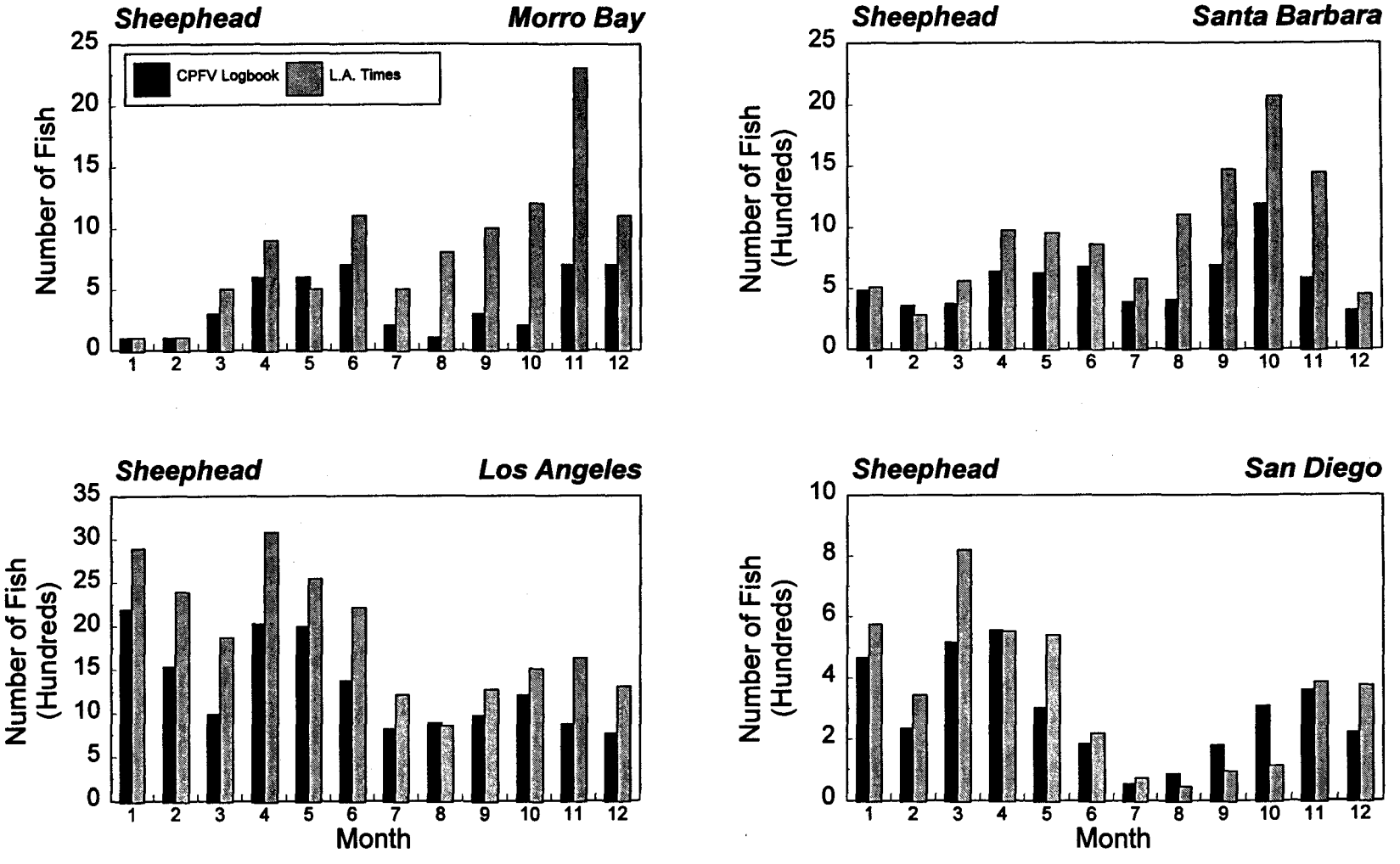


Figure 32. Total 1992 landings of California sheephead in Morro Bay, Santa Barbara, Los Angeles, and San Diego ports as reported in CPFV logbooks and *Los Angeles Times*.