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DEPARTMENT OF FISH AND GAME

AGE COMPOSITION OF CALIFORNIA BARRACUDA, *SPHYRAENA ARGENTEA*; PACIFIC BONITO, *SARDA CHILIENSIS*; WHITE SEABASS, *CYNOSCION NOBILIS*; AND YELLOWTAIL, *SERIOLA DORSALIS* FROM SOUTHERN CALIFORNIA PARTYBOATS 1972-1974

by

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ABSTRACT

Partyboats were sampled during the months of May through October 1972-1974 to collect length frequency data for California barracuda, *Sphyraena argentea;* Pacific bonito, *Sarda chiliensis;* white seabass, *Cynoscion nobilis;* and yellowtail, *Seriola dorsalis.* Age-length keys were applied to the data to estimate the age composition of each species and an analysis of variance was performed on the results. Ratio estimates were also computed to examine the variation due to month and port complex. The project provided background data for current stock assessments of these species.

1/ Marine Resources Administrative Report No. 77-3, February 1977.

2/ Operations Research Branch, 350 Golden Shore, Long Beach, California 90802.

INTRODUCTION

The California Department of Fish and Game has been collecting and tabulating partyboat catch logs in an effort to estimate the total yearly catch of this segment of the marine sportfishery since 1935 (Young, 1969). While this effort yielded significant information on species and numbers caught, it has shed little information on size and age composition of the catch.

Age composition of a resource can be an important criterion for management of species. The Department, in an effort to establish the age composition of project species with some degree of reliability, initiated a partyboat sampling program during the spring of 1972. Its basic objective was to estimate the age composition of the California partyboat catch of California barracuda, *Sphyraena argentea*; Pacific bonito, *Sarda chiliensis*; white seabass, *Cynoscion nobilis*; and yellowtail, *Seriola dorsalis*.

METHOD

The investigation initially adopted a stratified random sampling plan with port complex chosen as the primary sampling unit and month as the second stage unit. Port complexes were classified according to the system used by the partyboat log program. Only the months of May through October were sampled.

Port Complex	Ports
A	San Diego, Mission Bay
B	Oceanside, Dana Harbor
C	Huntington Beach, Newport-Balboa
D	Seal Beach, Long Beach-San Pedro
E	Redondo Beach to Paradise Cove

Manpower limitations did not permit the inclusion of landings located between Port Hueneme and Santa Barbara where samples of project species were often small or non-existent. Generally only one sampler was available on a full-time basis during the 3 seasons for which data were collected. A total of 221 partyboat trips was sampled during the course of this program (Table 1).

The sampling effort at each port complex was allocated according to the average proportion of the total southern California barracuda catch made at each port complex during the 7 year period 1963-1970. Once the number of sample days required per month at each port complex had been determined, actual sampling days were selected at random but often were governed by the physical limitations imposed by available manpower. Weekdays only were sampled due to manpower restrictions and the unavailability of space aboard partyboats during busy summer weekends.

All fishes were measured in millimeters total length (white seabass, barracuda) or fork length (yellowtail, bonito) and an age-length key was applied to the data to obtain a monthly age composition for each species at each port complex.

Calculating the Estimates

The initial project goal was to estimate the monthly age composition and variances for each age class at each port complex. However, it became apparent that due to the small number of samples per stratum an alternate approach of analysis needed to be selected. The combined ratio estimate (Cochran, 1963) was chosen.

Sampling unit: partyboat trip

Stratum: number of partyboat trips per month per port complex

TABLE 1. Number of Partyboat Trips Sampled per Month at Each Port Complex, 1972 Through 1974.

1972

Port complex	May	June	July	Aug.	Sept.	Oct.	Total no. sampled
A	0	1	4	3	1	0	9
B	0	1	4	6	4	2	17
C	0	1	2	1	0	1	5
D	0	0	2	6	3	1	12
E	0	0	4	3	1	0	8
	0	3	16	19	9	4	51

1973

Port complex	May	June	July	Aug.	Sept.	Oct.	Total no. sampled
A	2	3	5	5	3	3	21
B	7	7	7	8	4	1	34
C	4	4	3	3	2	1	17
D	5	4	3	3	3	1	19
E	0	2	2	1	1	0	6
	18	20	20	20	13	6	97

1974

Port complex	May	June	July	Aug.	Sept.	Oct.	Total no. sampled
A	2	2	5	4	4	2	19
B	1	6	7	8	2	2	26
C	0	2	3	2	2	0	9
D	1	3	2	2	1	0	9
E	0	2	1	2	4	1	10
	4	15	18	18	13	5	73

Months: $h = 1, 2, \ldots 6$

Port complex: $k = 1, 2, \ldots 5$

N_{hk}: partyboat trips per hk

N: total partyboat trips per season

$$N = \sum_h \sum_k N_{hk}$$

n_{hk}: sample of partyboat trips per hk, $n_{hk} \geq 0$, $n_{hk} \leq 8$

n = total samples per season

$$n = \sum_h \sum_k n_{hk}$$

For each species of fishes:

$y_{\alpha hki}$: the number of age α fish per sample i, $i = 1, 2, \ldots, n_{hk}$

x_{hki}: total number of fish per sample i and $\sum_\alpha y_{\alpha hki} = x_{hki}$

$\hat{R}_c$: combined ratio estimate

$$\hat{R}_c = \frac{\bar{y}_{\alpha st}}{\bar{x}_{st}} = \frac{\sum_h \sum_k N_{hk} \bar{y}_{\alpha hk}}{\sum_h \sum_k N_{hk} \bar{x}_{hk}} = \frac{\sum_h \sum_k N_{hk} \bar{y}_{\alpha hk}/N}{\sum_h \sum_k N_{hk} \bar{x}_{hk}/N}$$

where $\bar{y}_{\alpha st}$ = average catch of age α fish per partyboat trip

$\bar{x}_{st}$ = average catch per partyboat trip

$$\bar{y}_{\alpha hk} = \sum_i^{n_{hk}} y_{\alpha hki}/n_{hk}$$

$$\bar{x}_{hk} = \sum_{i=1}^{n_{hk}} x_{hki}/n_{hk}$$

$\hat{R}_c = \hat{R}_{\alpha c}$ the ratio estimate (percentage estimate) for each age α

The variance of the estimate is defined as:

$$v(\hat{R}_c) = \frac{1}{N^2 \bar{x}_{st}^2} \sum_h \sum_k \frac{N_{hk}(N_{hk} - n_{hk})}{n_{hk}(n_{hk} - 1)} \{ \sum_{i=1}^{n_{hk}} y_{\alpha hki}^2 + \hat{R}_c^2 \sum_{i=1}^{n_{hk}} x_{hki}^2 -$$

$$2\hat{R}_c \sum_{i=1}^{n_{hk}} x_{hki} \cdot y_{\alpha hki} - n_{hk}(\bar{y}_{\alpha hk} - \hat{R}_c \bar{x}_{hk})^2 \}$$

where $\sum_h \sum_k$ is actually equivalent to $\sum_1^{30}$ and $n_{hk} > 1$

Since $N_{hk} - n_{hk} \approx N_{hk}$, we can simplify the variance estimates:

$$v(\hat{R}_c) = \frac{1}{N^2 \bar{x}_{st}^2} \sum_h \sum_k \frac{N_{hk}^2}{n_{hk}(n_{hk}-1)} \{ \sum_{i=1}^{n_{hk}} y_{\alpha hki}^2 + \hat{R}_c^2 \sum_{i=1}^{n_{hk}} x_{hki}^2 -$$

$$2\hat{R}_c \sum_{i=1}^{n_{hk}} x_{hki} \cdot y_{\alpha hki} - n_{hk} [\bar{y}_{\alpha hk} - \hat{R}_c \bar{x}_{hk}]^2 \}$$

Ratio estimates were also computed to examine the variation due to month and port complex.

$$\hat{R}_h = \frac{\sum_k N_{hk} \bar{y}_{\alpha hk}}{\sum_k N_{hk} \bar{x}_{hk}} \text{ ; monthly}$$

$$\hat{R}_k = \frac{\sum_h N_{hk} \bar{y}_{\alpha hk}}{\sum_h N_{hk} \bar{x}_{hk}} \text{ ; port complex}$$

RESULTS

Barracuda

From 1957 to 1970, sportfishing regulations permitted two barracuda under 71.1 cm (28 inches) in the daily bag limit. However, since 1971, sportfishing regulations have prohibited the possession of any barracuda less than 71.1 cm (28 inches) total length. As a result there was a dramatic decrease in the reported annual partyboat catch of this species (from 374,000 in 1970 to less than 51,000 in 1971).

The results of our sampling efforts reflect the high number of sub-legal fish being captured and released by this segment of the sportfishery (Figure 1). Samples collected in 1972 revealed that 88% of the barracuda

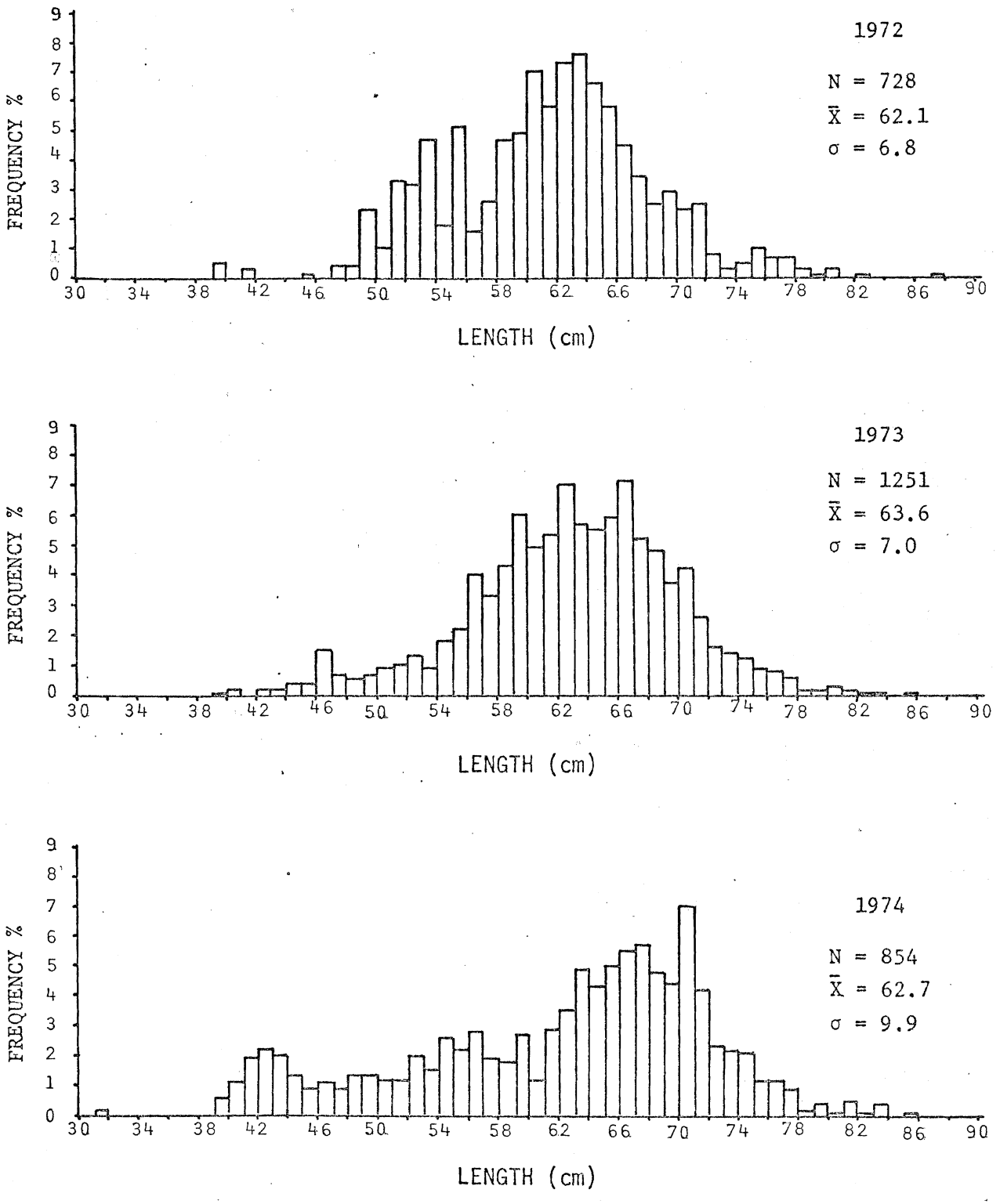

FIGURE 1. Length frequencies of California barracuda, *Sphyraena argentea*, from southern California partyboats for 1972 through 1974.

brought aboard partyboats were under 71.1 cm (28 inches) total length. In 1973 over 86% caught were sub-legal in size while in 1974 the figure dropped to approximately 74%. The majority of fish hooked (80-95%) were 2 to 5 years of age (Tables 2-4). Ages were assigned from an age-length key developed from data collected by Pinkas (1966). The commercial catch as well as the "legal" fish reported by the partyboat fleet consists of 5-7 year old fish with few exceeding 7 years of age.

It appears that in the years immediately preceding the 1971 season, the partyboat fishery depended heavily on sub-legal, immature fish. It is the Department's contention that the previous allowance of fish shorter than 71.1 cm (28 inches) in daily bag limits contributed to a depleting spawning stock and, consequently, reduced recruitment. With strict enforcement of the 71.1-cm (28-inch) minimum length requirement now in effect the fishery should have an opportunity to rehabilitate itself.

Pacific bonito

Bonito are considered one of the most important species to the southern California partyboat fishery. During the 3 seasons data were collected, bonito ranked third in total number landed for each year. However, the bonito catch experienced a sharp decline in 1975, and its total was the lowest recorded by partyboat logs in the last 20 years.

The yearly partyboat catch for the past 5 seasons in southern California has been well below the average annual catch for 1957 through 1970.

Presently, the only regulation governing the take of bonito by sport anglers is a limit of 10 fish in possession per day.

The southern California partyboat fishery essentially exploits fish less than 3 years of age (Tables 5-7). Sampling data showed that 99%

TABLE 2. Age Composition (%) of Southern California Partyboat Catch of Barracuda, 1972 Through 1974.

1972

Age class	I	II	III	IV	V	VI	VII	VIII
Age composition estimate (%)	0.9	16.6	32.5	32.4	13.2	4.0	0.3	0.0
Variance of the estimate (%)	1.0	9.3	9.4	5.7	8.4	3.7	0.2	0.0
Std. error of the estimate (%)	1.0	3.1	3.1	2.4	2.9	1.9	0.4	0.0

1973

Age class	I	II	III	IV	V	VI	VII	VIII
Age composition estimate (%)	0.4	13.8	28.1	34.8	17.3	5.3	0.4	0.0
Variance of the estimate (%)	0.1	3.0	2.8	1.2	2.3	0.7	0.1	0.0
Std. error of the estimate (%)	0.2	1.7	1.7	1.1	1.5	0.8	0.2	0.0

1974

Age class	I	II	III	IV	V	VI	VII	VIII
Age composition estimate (%)	7.2	16.6	19.8	28.3	19.5	7.6	0.8	0.4
Variance of the estimate (%)	9.8	12.0	7.8	8.7	5.0	0.9	0.1	0.0
Std. error of the estimate (%)	3.1	3.5	2.8	2.9	2.3	1.0	0.3	0.1

TABLE 3. Age Composition (%) of Barracuda by Month, 1972 Through 1974.

1972

Age class	I	II	III	IV	V	VI	VII	VIII
May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
June	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
July	0.1	14.5	29.8	33.1	15.5	6.1	0.7	0.0
Aug.	2.9	17.4	32.0	34.5	11.5	1.7	0.0	0.0
Sept.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oct.	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0

1973

Age class	I	II	III	IV	V	VI	VII	VIII
May	1.0	30.6	35.9	21.7	6.8	4.0	0.0	0.0
June	0.0	15.5	28.7	33.0	16.5	5.9	0.4	0.0
July	0.5	9.4	29.8	37.1	18.3	5.0	0.0	0.0
Aug.	0.2	11.7	17.5	35.5	25.6	8.1	1.4	0.0
Sept.	0.0	73.1	8.9	18.0	0.0	0.0	0.0	0.0
Oct.	0.0	9.9	34.2	37.9	14.3	3.1	0.6	0.0

1974

Age class	I	II	III	IV	V	VI	VII	VIII
May	0.0	10.6	31.2	35.3	16.6	6.2	0.0	0.0
June	0.3	2.2	14.2	33.2	33.4	14.8	2.0	0.0
July	0.1	15.2	20.5	31.3	22.0	8.6	1.2	1.0
Aug.	8.9	39.4	20.9	17.9	9.7	3.2	0.0	0.0
Sept.	16.8	21.2	21.5	25.1	12.5	2.9	0.0	0.0
Oct.	49.3	37.9	1.1	4.6	3.6	3.6	0.0	0.0

TABLE 4. Age Composition (%) of Barracuda by Port Complex, 1972 Through 1974.

1972

Age class	I	II	III	IV	V	VI	VII	VIII
A	1.5	12.8	27.6	34.9	17.1	5.6	0.6	0.0
B	0.5	22.1	35.9	31.3	7.9	2.3	0.3	0.0
C	0.0	0.0	50.0	50.0	0.0	0.0	0.0	0.0
D	0.0	37.6	50.4	0.0	12.8	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

1973

Age class	I	II	III	IV	V	VI	VII	VIII
A	0.3	12.0	28.7	36.2	17.6	4.7	0.5	0.0
B	1.0	25.2	33.3	29.2	8.8	2.5	0.0	0.0
C	0.0	4.8	25.6	39.4	21.6	8.1	0.6	0.0
D	0.0	8.7	25.0	38.4	23.0	5.0	0.0	0.0
E	0.0	0.0	5.6	27.7	44.6	22.1	0.0	0.0

1974

Age class	I	II	III	IV	V	VI	VII	VIII
A	2.9	12.5	22.1	31.9	21.5	8.5	0.5	0.0
B	20.4	25.9	15.7	20.5	12.8	4.2	0.4	0.0
C	0.0	10.3	23.9	32.7	22.4	10.3	0.0	0.0
D	0.0	24.2	8.8	26.3	32.6	8.8	0.0	0.0
E	0.0	16.2	17.2	26.5	21.6	10.2	4.1	4.1

TABLE 5. Composition of Southern California Partyboat Catch of Pacific Bonito by Year-Class, 1972 Through 1974.

1972

Year class	1970	1971	1972
Year-class estimate (%)	1.3	20.5	77.5
Variance of the estimate (%)	0.1	164.0	172.0
Std. error of the estimate (%)	0.4	12.8	13.1

1973

Year class	1970	1971	1972	1973
Year-class estimate (%)	0.0	1.0	98.8	0.1
Variance of the estimate (%)	0.0	0.1	0.2	0.0
Std. error of the estimate (%)	0.0	0.4	0.5	0.0

1974

Year class	1970	1971	1972	1973	1974
Year-class estimate (%)	0.1	4.1	43.3	16.1	36.1
Variance of the estimate (%)	0.0	2.5	129.6	18.6	216.5
Std. error of the estimate (%)	0.1	1.6	11.4	4.3	14.7

TABLE 6. Year-class Composition (%) of Bonito by Month, 1972 Through 1974.

1972

Year class	1970	1971	1972
May	0.0	0.0	0.0
June	0.0	0.0	0.0
July	8.3	91.7	0.0
Aug.	0.0	25.3	74.7
Sept.	0.0	23.8	76.2
Oct.	0.0	35.0	65.0

1973

Year class	1970	1971	1972	1973
May	1.3	0.7	98.0	0.0
June	0.0	0.0	100.0	0.0
July	0.0	0.0	100.0	0.0
Aug.	0.0	1.9	98.1	0.0
Sept.	0.0	2.4	97.6	0.0
Oct.	0.0	15.8	78.9	5.3

1974

Year class	1970	1971	1972	1973	1974
May	0.0	12.5	75.0	12.5	0.0
June	20.0	0.0	80.0	0.0	0.0
July	0.0	7.1	64.5	28.4	0.0
Aug.	2.2	3.3	47.3	46.3	1.1
Sept.	0.0	2.3	24.9	2.8	70.0
Oct.	0.0	2.9	14.4	3.6	79.1

TABLE 7. Year-class Composition (%) of Pacific Bonito by Port Complex, 1972 Through 1974.

1972

Year class	1970	1971	1972
A	0.4	63.5	36.1
B	0.5	62.8	36.7
C	3.3	27.8	68.9
D	2.4	94.0	3.6
E	0.0	58.2	41.8

1973

Year class	1970	1971	1972	1973
A	0.3	0.0	99.7	0.0
B	0.0	0.7	99.3	0.0
C	0.6	1.8	97.0	0.6
D	0.0	4.4	95.7	0.0
E	0.0	0.0	100.0	0.0

1974

Year class	1970	1971	1972	1973	1974
A	0.3	4.1	27.3	9.3	59.0
B	0.5	5.3	58.2	34.4	1.6
C	0.0	2.1	6.3	2.1	89.6
D	0.0	0.0	0.0	0.0	0.0
E	0.0	1.9	77.8	20.4	0.0

of the partyboat catch in 1972-73 and 96% in 1974 consisted of fish 2 years old or younger. Fish were assigned to year classes on the basis of length according to data derived by Campbell and Collins (1975).

In some years the partyboat fishery exploits essentially a single year-class. This occurred in 1972 (Figure 2) when the catch (>77%) was dominated by fish of the year. The 1972 year-class appeared to be the strongest one recruited to the fishery during the past 5 seasons as demonstrated by its major contribution to the partyboat catch during the subsequent 2 seasons.

Yellowtail

The yellowtail is one of the most sought after sportfish by anglers in southern California. Recreational fishing for yellowtail is almost entirely dependent upon a yearly influx of fish from central and northern Baja California waters. As a result, the sport catch fluctuates widely from year to year in response to their availability on local fishing grounds. Yellowtail normally move north into southern California in the early spring and south again in the fall. This annual migration is generally in response to water temperatures. A definite relationship between the magnitude of the sport catch and the average ocean temperature off Baja California during the first 6 months of the year has been demonstrated (Radovich, 1961).

The sportfishery takes place almost exclusively from Santa Monica south with the Coronado Islands consistently providing the best fishing.

Yellowtail fishing during the 1972 season was generally poor and few samples were collected. Consequently, it was not possible to accurately estimate the age composition or determine variances of the estimates. However, the 1973 catch proved to be the fourth highest on

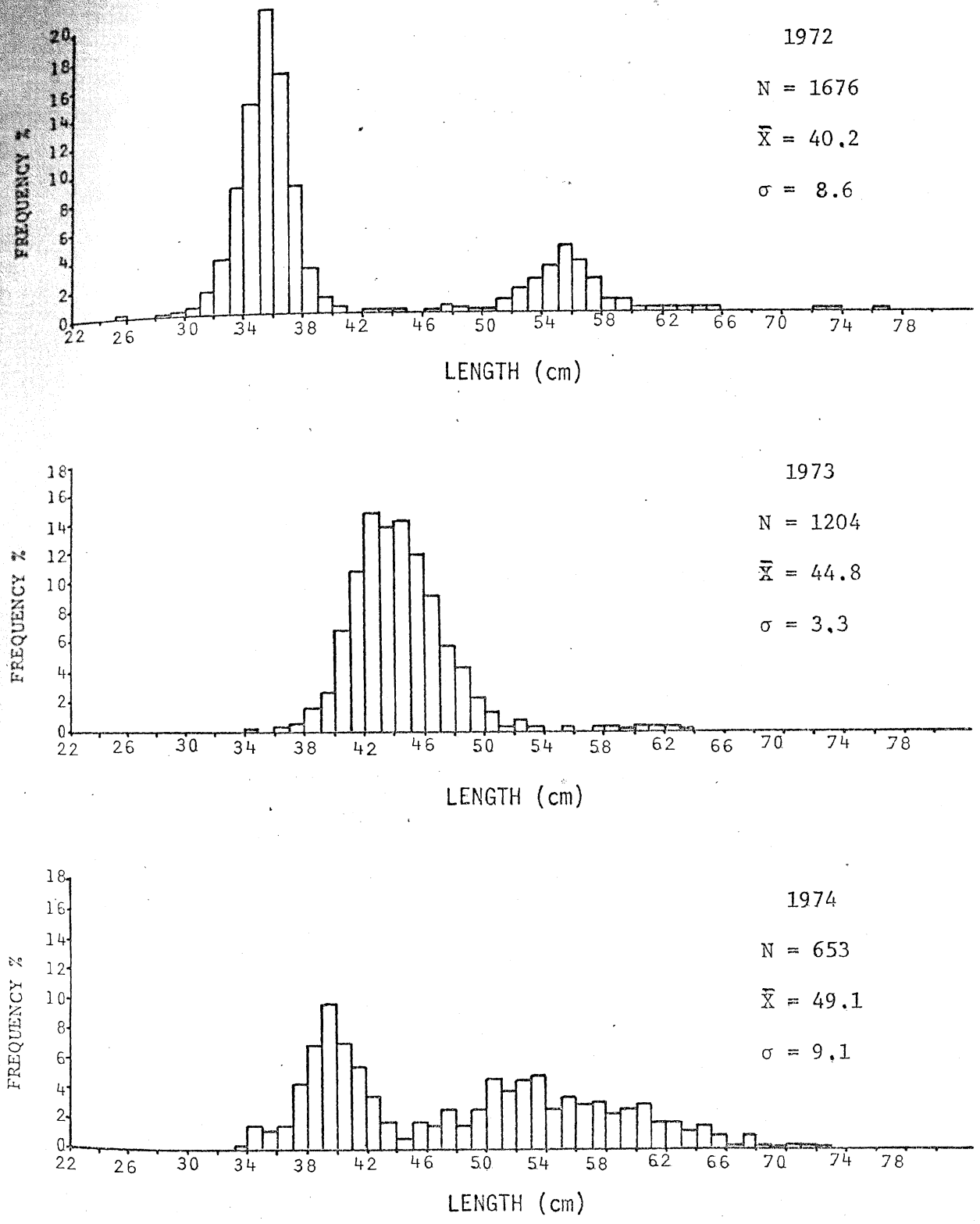

FIGURE 2. Length frequencies of Pacific bonito, *Sarda chiliensis*, from southern California partyboats for 1972 through 1974.

record. Age data (Tables 8-10) indicated that the sportfishery exploited 1 to 8 year old fish with 99% of the catch consisting of fish between 1 and 6 years of age. Fish were assigned an age according to length-age data developed by Baxter, et al. (1960). Data for the 1974 season was comparable to that obtained in 1973 (Figure 3).

At the present time all indications suggest that the yellowtail stock is in a healthy condition and no changes in current regulations are needed.

White Seabass

The white seabass is also one of the most prized sportfish of California anglers. Historically, the sportfishery has been cyclic, widely fluctuating, and sporadic. However, recent downward trends in the catch and their scarcity on local fishing grounds has given rise to concern over the status of the stock. There has been a steady decline in the number of fish in the partyboat catch from a high of 65,000 in 1949 to a low of 3,158 in 1975. The last 10-year period (1966-1975) has been the poorest on record, averaging only 4,331 fish per year.

There is presently a minimum size limit of 71.1 cm (28 inches) for the sportfishery; however, the daily bag limit includes one undersized individual per angler. Due to the low catch rate, this one undersized fish essentially eliminates the minimum size requirement and its allowance should be rescinded from the present regulations.

During the 3 seasons for which data were collected, only 118 fish were measured (Figure 4). Fish were aged according to Thomas (1968) and the catch consisted almost entirely of 2 to 4 year old fish with only four individuals exceeding the 71.1 cm (28-inch) minimum size limit (Table 11). No variances of the age estimates were computed because of the small sample sizes.

TABLE 8. Age Composition (%) of Southern California Partyboat Catch of Yellowtail, 1972 Through 1974.

1972

Age class	I	II	III	IV	V	VI	VII	VIII
Age composition estimate (%)	29.3	35.6	14.5	0.8	15.7	4.0	0.0	0.0
Variance of the estimate (%)	-	-	-	-	-	-	-	-
Std. error of the estimate (%)	-	-	-	-	-	-	-	-

1973

Age class	I	II	III	IV	V	VI	VII	VIII
Age composition estimate (%)	9.1	36.6	29.1	5.5	7.7	10.7	0.8	0.3
Variance of the estimate (%)	17.5	80.0	30.8	1.5	40.5	60.5	57.8	0.1
Std. error of the estimate (%)	4.2	8.9	5.5	1.2	6.4	7.8	7.6	0.3

1974

Age class	I	II	III	IV	V	VI	VII	VIII
Age composition estimate (%)	8.7	50.0	34.7	2.8	1.3	1.1	1.5	0.0
Variance of the estimate (%)	48.1	29.2	12.5	1.7	0.1	0.3	2.9	0.0
Std. error of the estimate (%)	6.9	5.4	3.5	1.3	3.5	5.8	1.7	0.0

TABLE 9. Age Composition (%) of Yellowtail by Month, 1973 and 1974.

1973

Year class	I	II	III	IV	V	VI	VII	VIII
May	42.1	18.1	27.2	10.9	1.8	-	-	-
June	3.7	49.2	38.0	7.4	1.0	0.6	-	-
July	49.4	45.1	5.5	-	-	-	-	-
Aug.	52.6	20.9	19.8	-	-	6.6	-	-
Sept.	2.6	2.8	7.0	2.8	36.2	43.1	4.2	1.4
Oct.	-	-	-	-	-	-	-	-

1974

Year class	I	II	III	IV	V	VI	VII	VIII
May	-	-	-	-	-	-	-	-
June	-	51.4	42.4	4.1	2.1	-	-	-
July	3.5	60.0	34.1	0.3	1.1	1.1	-	-
Aug.	12.2	32.8	49.7	2.7	-	2.7	-	-
Sept.	52.3	29.5	13.6	2.3	-	2.3	-	-
Oct.	-	-	-	25.0	-	12.5	62.5	-

TABLE 10. Age Composition (%) of Yellowtail by Port Complex, 1973 and 1974.

1973

Year class	I	II	III	IV	V	VI	VII	VIII
A	7.3	36.2	23.8	5.1	11.7	14.2	1.3	0.4
B	39.2	33.9	20.6	5.6	0.8	-	-	-
C	100.0	-	-	-	-	-	-	-
D	5.4	41.7	43.8	7.9	1.1	-	-	-
E	-	-	-	-	-	-	-	-

1974

Year class	I	II	III	IV	V	VI	VII	VIII
A	8.8	49.2	35.1	2.8	1.4	1.1	1.6	-
B	1.5	62.3	31.8	3.0	-	1.4	-	-
C	-	-	-	-	-	-	-	-
D	-	-	-	-	-	-	-	-
E	100.0	-	-	-	-	-	-	-

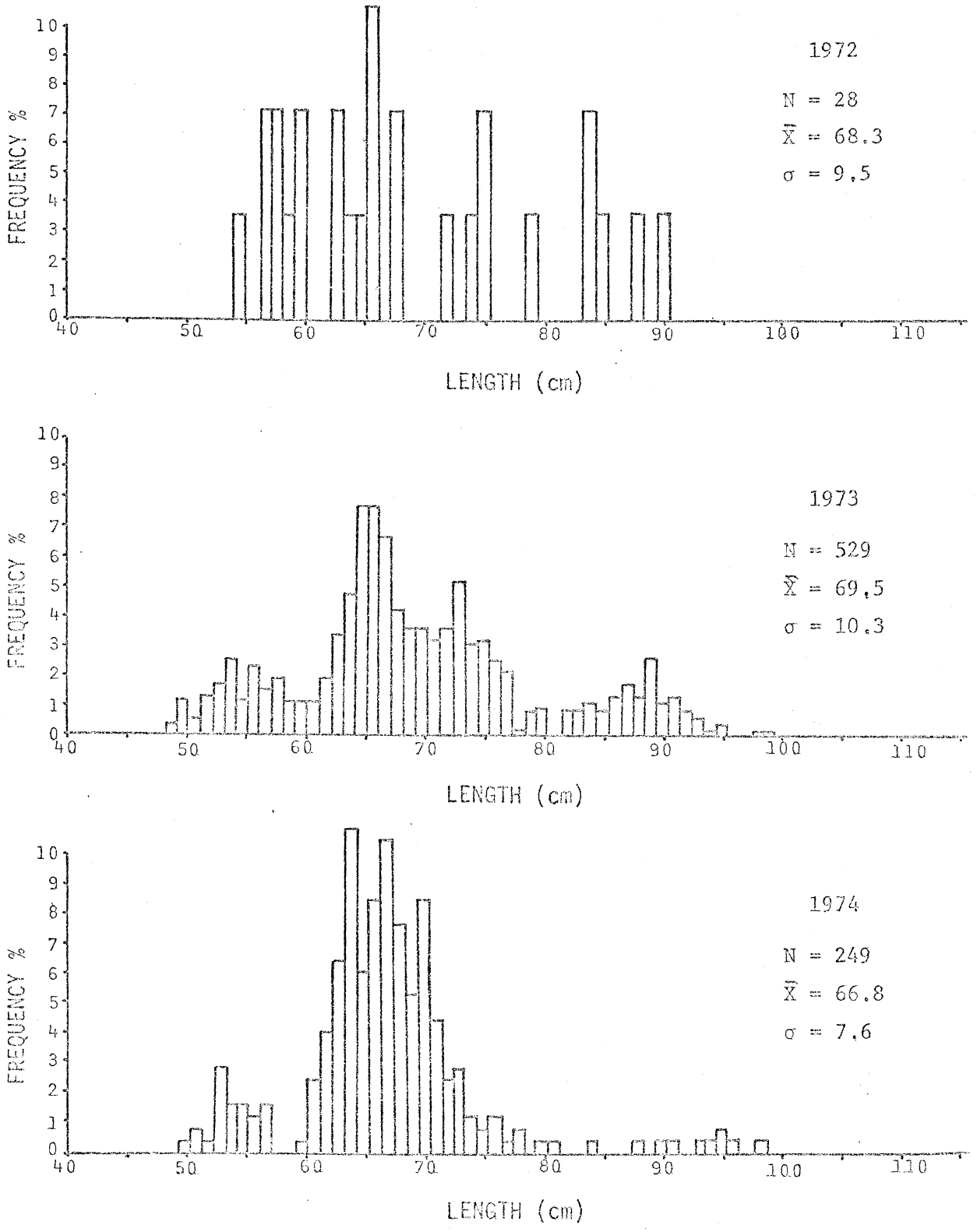

FIGURE 3. Length frequencies of yellowtail, *Seriola dorsalis*, from southern California partyboats for 1972 through 1974.

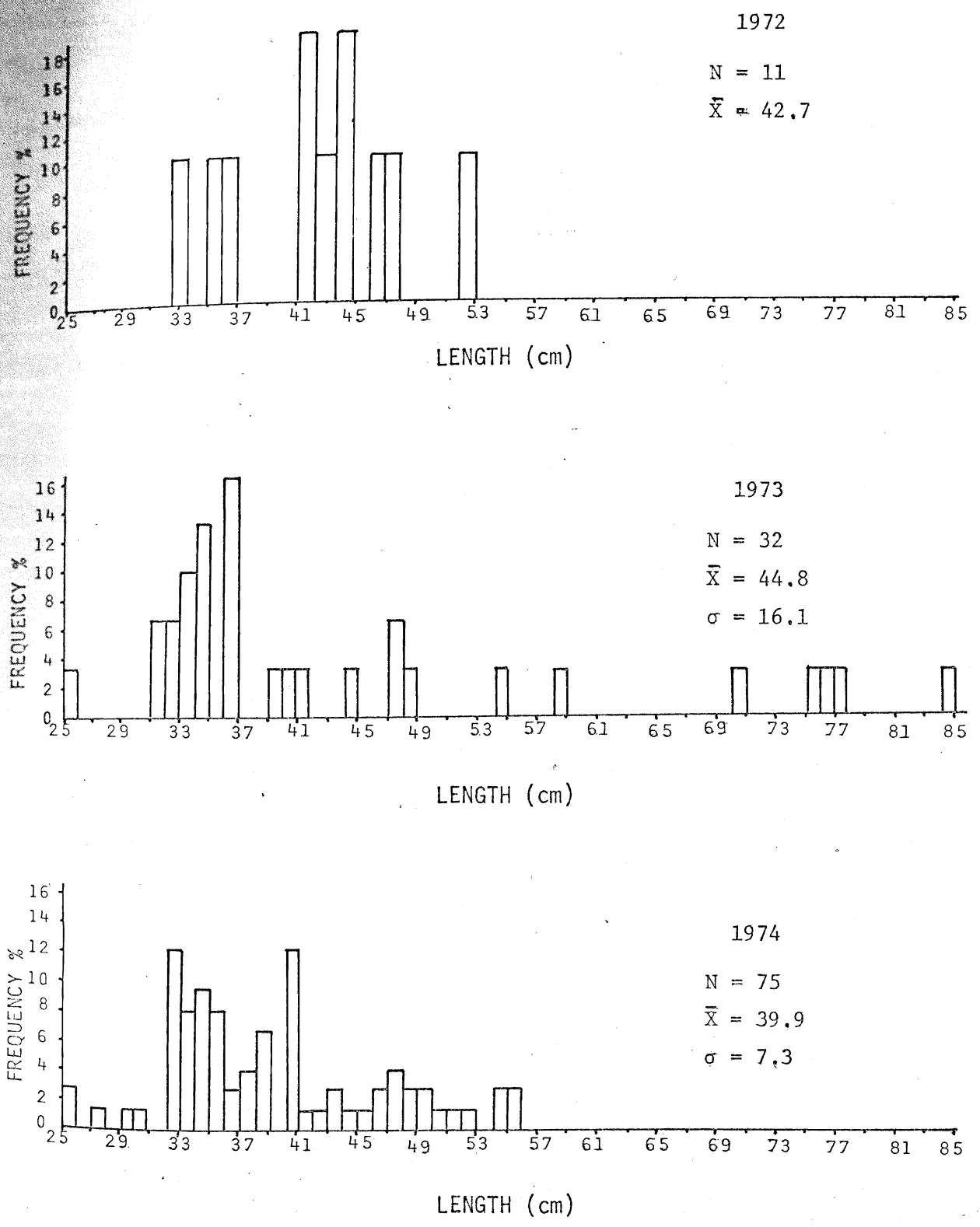

FIGURE 4. Length frequencies of white seabass, *Cynoscion nobilis*, from southern California partyboats for 1972 through 1974.

TABLE 11. Age Composition (%) of Southern California Partyboat Catch of White Seabass, 1972 Through 1974.

Age class	I	II	III	IV	V	VI	VII	VIII
1972	0.0	27.3	54.5	18.2	0.0	0.0	0.0	0.0
1973	0.0	53.1	25.0	9.4	6.25	3.1	3.1	0.0
1974	0.0	21.3	69.3	9.3	0.0	0.0	0.0	0.0

SUMMARY

The level of sampling in this study was much less than desirable for this type of investigation, but it was restricted by available manpower. Furthermore, the small number and size of the samples yielded large variances in some cases and results should be viewed with some caution. Regardless, the data collected by the program filled a much needed gap in our data base and was beneficial in the current stock assessments of these species. However, the limited nature of the survey does not allow for any rigorous analysis.

Beginning in April 1975, a new partyboat sampling study was initiated. Its primary objective is to collect length-frequency data for all species caught by this segment of the sportfishery at all ports between San Diego and Santa Barbara. Data from the current investigation should allow for a more quantitative analysis than that permitted in the study reported herein.

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