WHITE SEABASS, *ATRACTOSCION NOBILIS*, IN CALIFORNIA-MEXICAN WATERS: STATUS OF THE FISHERY

MARIJA VOJKOVICH AND RHONDA J. REED
Marine Resources Branch
California Department of Fish and Game
1301 West 12th Street
Long Beach, California 90813

ABSTRACT

Past efforts to restore and enhance the white seabass resource in California waters have been unsuccessful. A review of the history of the fishery, catches, and management indicates that the resource continues to decline. Information on early life history, fecundity, and migration are definitely needed, as is an assessment of recent management regulations.

RESUMEN

Los esfuerzos para restaurar y mejorar las poblaciones de corvina (*Atractoscion nobilis*) en aguas de California no han tenido éxito. Una revisión de la historia de la pesquería, capturas y reglamentación, indican que este recurso pesquero continúa disminuyendo. Se precisa obtener más información sobre el ciclo de vida, larvas, fecundidad y migraciones, así como un análisis y estimación de las regulaciones que se han establecido recientemente en esta pesquería.

INTRODUCTION

White seabass (*Atractoscion nobilis*) has long been an important sport and commercial fish in southern California because it is an excellent food fish and an angling challenge.

The total commercial catch has decreased slowly since the early 1900s (Skogsberg 1939), and the sport catch has declined since its peak in 1949 (Thomas 1968). The fish were once abundant as far north as San Francisco, but few are now caught north of Point Conception. This indicates that a constriction of range has taken place.

Various management regimes designed to enhance the white seabass resource have been established since 1931, when declining catches of this desirable species were first noted. This synopsis of the white seabass fishery in California provides a background for future management considerations. Information from Department of Fish and Game catch statistics, white seabass fishing logbooks, current literature, and personal communications were used in this analysis.

[Manuscript received February 2, 1983.]

THE FISH

The white seabass is the largest of the croaker family (Sciaenidae) on the U.S. Pacific coast. The largest recorded weight is 37.7 kg (83 lbs), but few attain weights of over 27 kg (60 lbs) (Thomas 1968). They have a recorded range from Magdalena Bay, Baja California, to Juneau, Alaska. Today the economic range is from Point Conception to Punta Abreojos, Baja California. White seabass are found in schools and also occur as solitary individuals (Skogsberg 1939; Squire 1972).

Market samples indicate that white seabass spawn between the months of March and July, with peak spawning from April to June (Skogsberg 1925). There is some question about the age at which they mature. Clark (1930) found that 50% of the males over 60 cm in length (TL) were mature, but that 50% of the females had not yet matured at 70 cm (TL). Her conclusion was that all white seabass are mature at 80 cm (TL). The eggs are pelagic, and juveniles are believed to rely on kelp canopy for cover (Feder et al. 1974). The fish are carnivorous, feeding on anchovies, herring, sardines, squid, and pelagic crabs. Migration or fish movement has not been proven, but has been deduced from the appearance and disappearance of the white seabass at various locations along the coast in different seasons.

THE SPORT FISHERY

Sportfishermen have been using hook and line to catch white seabass from piers, jetties, private boats, and commercial passenger fishing vessels (CPFVs) for over 100 years. A variety of baited and nonbaited lures have also been used successfully. Catch records from the CPFV fleet collected by the Department of Fish and Game from 1947 to the present provide an index of the recreational take. This catch peaked in 1949, with 64,000 fish being caught, and has steadily declined (Figure 1). The CPFV catch for California in 1978 hit a record low of 284 fish. The relative angler success (RAS)[1] for that same fishery shows an identical decline (Figure 2) from a high of 0.13 fish/angler

[1]Relative angler success (RAS), the ratio of total white seabass caught to the total number of anglers, is a less rigid measure of CPUE, since white seabass is rarely a target species.

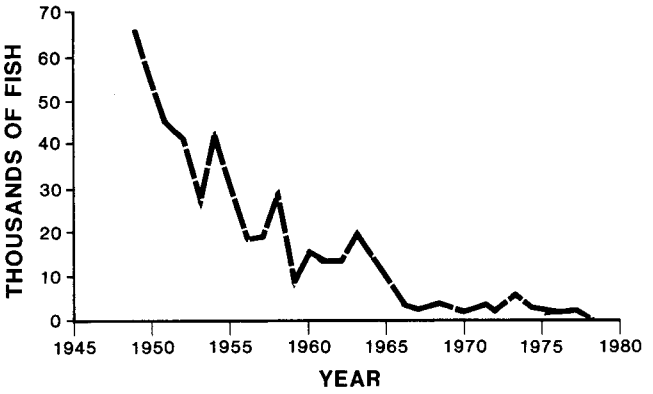

Figure 1. White seabass catch (in thousands of fish) from commercial passenger fishing vessels in California waters from 1949 to 1978. (The 1978 value is 284 fish).

in 1949 to less than 0.001 fish/angler in 1978. Since 1965 the angler success has been below 0.01 fish/angler.

Data from a survey of private-boat fishermen (Wine 1978, 1979, 1982) shows that the number of white seabass caught by anglers fishing from private, trailerable boats has declined since 1976, as has the angler success (Table 1). The survey also found that the vast majority of fish taken from this fishery were smaller than the minimum legal size, 71 cm (28 in). The survey in 1976 revealed that only 6.6% of the white seabass sampled were of legal size or above. However, the percentage of legal fish slowly increased to 16% by the end of 1981. A 1978 angler survey indicated that many recreational fishermen could not separate juvenile white seabass from a number of other commonly caught croakers (Hartmann 1980). This fact, coupled with a widespread ignorance of regulations applying to white seabass, may account for the high percentage of undersized fish being kept. The fact that the percentage of legal fish has slowly increased may indicate better compliance with regulations and some success in educating the angler in species identification. It is unlikely that more legal-sized fish have become available to the anglers on private boats, because the total number of white seabass caught by all sectors of the fishery has continued to decline.

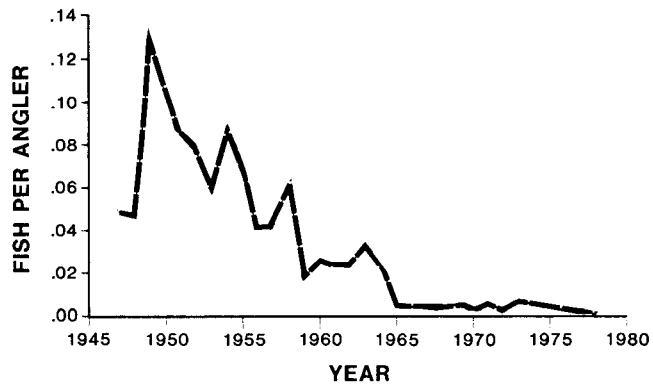

Figure 2. Catch of white seabass per angler in the California commercial passenger fishing vessel fishery from 1947 to 1978.

TABLE 1
Estimated White Seabass Catches and Angler Success from the Private Trailerable Boat Survey

Year	Estimated catch	Actual # sampled	% legal	Angler success
1976-77	2,649	473	6.6	0.0087
1977-78	1,977	497	11.2	0.0074
1981	1,750	394	16.0	0.0052

The survey was not conducted in 1979 and 1980.

THE COMMERCIAL FISHERY

Nets have always been the most important gear in the commercial white seabass fishery. In the early 1920s gill nets were fished from 8-9-meter (25-30-ft) boats (Whitehead 1930). Purse seines were also used on schooling fish until the late 1920s, when catches began to decline, and use of this gear became uneconomical. Today in California waters white seabass are caught almost exclusively with set gill nets. The nets are now fished with a mechanized reel and are approximately three times longer than those used 50 years ago. The size of boat (9-12 m) in today's fishery has not changed significantly. The nets are generally constructed of multifilament nylon webbing, although monofilament nylon webbing is gaining acceptance.

Drift gill nets were used in the U.S. fishery in Mexican waters, although some set nets were also employed. Historically, this fishery involved between 12 and 20 southern California vessels that entered Mexican waters (with authorization) to harvest white seabass. The fish were off-loaded in California ports and have always been included in the California catch records. Between the early 1950s and 1981 the percentage of California white seabass landings taken in Mexican waters increased substantially (Figure 3). However, in January 1982 Mexico began denying permits to U.S. commercial fishermen. This action has cut the total U.S. commercial catch by more than 80% and entirely eliminated catches by U.S. vessels in Mexican waters.

The number of boats landing white seabass each year in the California fishery has remained fairly constant, but both the kg/landing and total catch have declined (Figure 4). Commercial landings were under 45 MT (100,000 lbs) in 1981, the lowest level on record.

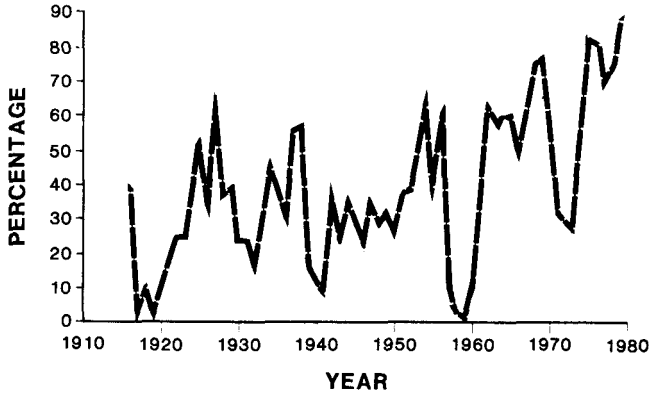

Figure 3. The percentage of California commercial white seabass landings taken in Mexican waters from 1916 to 1979.

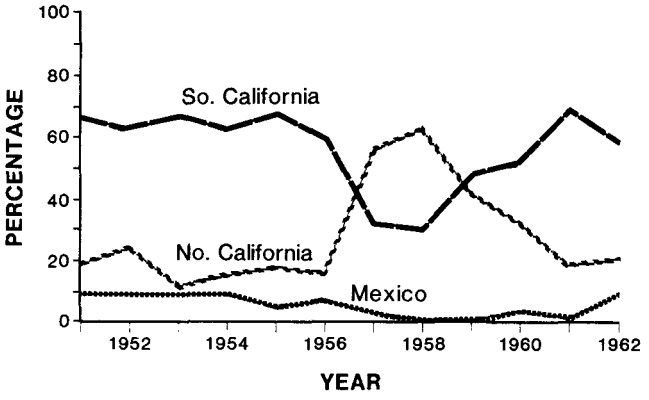

Figure 5. The percentage of the California commercial white seabass fishing fleet landing white seabass from north of Point Conception, southern California, and Mexico from 1951 to 1962.

FISHERY ANALYSIS

An analysis of catch trends for the U.S. commercial catch and recreational white seabass fisheries from 1951-72 indicated that sport angler success had declined, while the commercial success rate had remained relatively stable (MacCall et al. 1976). However, this analysis combined U.S. commercial catches from California and Mexican waters. Reanalysis of the California recreational and commercial catches for 1951 to 1981, excluding fish from Mexico, indicates a significant decline in both fisheries except during the years 1957-61 (Figure 4). It has been postulated that increased catches during these years resulted from white seabass moving up the coast with the unusually warm water from areas farther south (Radovich 1961). From 1957-61, the number of boats landing white seabass increased, and a shift in fishing areas occurred (Figure 5). Fish caught in Mexico by the U.S. fleet contributed only 3% of the total catch, while landings from waters north of Point Conception represented as much as 36% in 1960. When the ocean water temperatures returned to normal levels, so did the catch figures from north of Point Conception. Presently, landings from this area contribute approximately 1% of the total U.S. catch.

Gill nets are commonly set near rocky headlands to target on white seabass, but catches are more typical of an incidental fishery. Of the 131 boats landing white seabass from California waters in 1981, only 20 (15%) landed more than 455 kg (1000 lbs). Generally, white seabass constituted considerably less than 17% by weight of the total 1981 catch of all species by these boats.

Comparison of the size-frequency distribution of white seabass caught from CPFVs and by commercial boats shows the two groups harvesting different age groups of the stock (Figure 6). Recreational fishermen typically catch juveniles, especially in and around kelp beds. Commercial gill nets set in the same areas capture larger adult fish. Although the net mesh size can select for larger fish, if the larger fish are present in the area they should also be available to sportfishermen. Adult white seabass may be nocturnal feeders

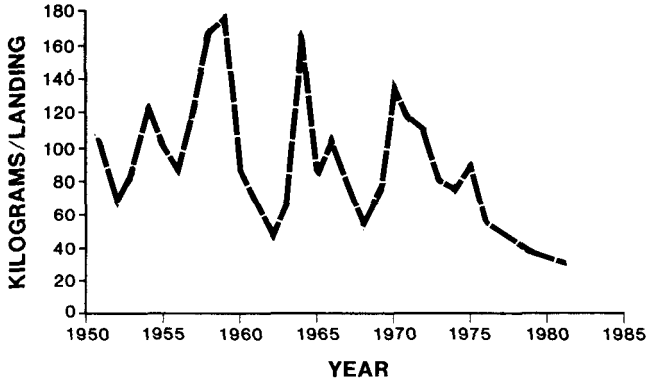

Figure 4. Average kilograms of white seabass per landing by the California commercial fleet from 1951 to 1981.

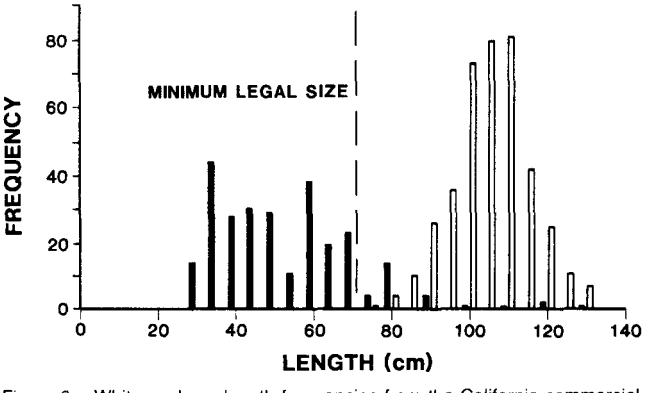

Figure 6. White seabass length frequencies from the California commercial passenger fishing vessels catch (solid bars), $N = 254$, and the California commercial catch (open bars), $N = 396$, from 1975 to 1976.

(or spawners), coming inshore only at night when commercial nets are fishing and most sportsmen are home asleep. It may be that white seabass prefer live squid, which are seldom available to sportsmen. The factors responsible for the size difference between recreationally caught and commercially caught fish are not yet understood.

Various factors may be contributing to the decline of the white seabass fishery off California. Thomas (1968) calculated the instantaneous total mortality (Z) to be 0.89 in 1958, with fishing mortality (F) to be 0.59. Therefore, white seabass have, at times, been heavily exploited, and overfishing has probably contributed to the decline of the population. The large number of juvenile fish in the sport take also reduces recruitment. If, as Parrish, Nelson, and Bakun (1981) hypothesize, surface currents act to entrain larvae nearshore, then environmental degradation caused by human activities may have impacted reproductive success in the Southern California Bight. Unfavorable oceanographic conditions and changes in the availability of forage species may also influence the distribution of this species.

REGULATIONS

Since 1931, white seabass regulations have been enacted and frequently changed. These attempts at management have included various licenses, permits, bag limits, seasonal and gear restrictions, and size limits (Table 2). Regulations in effect as of January 1, 1983, include a strict 71-cm TL size limit for both sport and commercially caught white seabass. There is a three-fish-per-day bag limit for the recreational fisherman. A permit and logbook reporting system are still in effect for those commercial fishermen employing a gill or trammel net to capture white seabass. A closed season also exists from March 15 to June 15 south of Point Conception.

Two management options that have been considered, but are not yet employed, are an 81-cm (32 in) TL size limit for all sectors of the fishery, and a complete moratorium on white seabass fishing in Califor-

TABLE 2
Summary of White Seabass Regulations from 1931 to the Present

Date (lic. req.)	Season length	Size limit	Bag limit	Gear and area restrictions	Special conditions
1931-33 (commercial lic. req.)	July 1-Apr. 30	≥28″	None	No nets within 4-mile radius of San Juan Pt. in Orange County; bait nets only in Santa Monica Bay.	5 fish any size with hook and line, but may not be sold.
1933-35 (same)	Hook & line all year	Same	May 1-June 30 (5 per day—hook & line)	Same	After Oct. 25, 1933, no fish may be sold from May 1-June 30. Rest of reg. same as above.
1935-37 (same)	Same as above. No net fishing May 1-Aug. 31.	Same	May 1-Aug. 31: 500 lbs/person; 2500 lbs/boat.	No nets in any Orange County waters (later rescinded)	Same
1937-39 (sportfishing lic. req.)	Same	Same	Sportfishing limit (15/day) for anyone on sportfish boat.	Same	Sport-caught fish may not be sold.
1939-41 (same)	Net fishing permitted year round.	Same	Same	No purse seines in Calif. Gill net mesh ≥3½″	Same
1941-49 (same)	Same	Same	Same	Same	Same
1949-53 (same)	Same	Sportfish bag not more than 5 fish, <28″	Sportfish: 10/day	Same	Same
1953-57 (same)	Same	Same	Commercial: 1000 lbs/person/day; 5000 lbs/boat/day.	Same	Same
1957-71 (same)	Same	Sportfish: 2 of 10/day under 28″	Same	Same	Same
1971-73 (same)	Same	No fish <28″	Same	Same	Same
1973-78 (same)	Same	One fish <28″	Same	Same	Same
1978 (same)	Same	No fish <28″	Same	Same	Same
1980-81 (same)	Season closed Mar. 15-June 15	Same	Sportfish: 3/day/person.	Same	Logs required. Permits required.
1982 (same)	Same	Same	Same	Certain area closures for nets with mesh less than 6″.	Permits no longer required.

nia. Either of these options would need to be in effect for at least five years before an assessment of their impact could be made. There is no guarantee, of course, that either regimen would achieve the desired effect of enhancing the white seabass population.

RECENT STUDIES

In 1975 the Department of Fish and Game initiated a study of white seabass to provide information concerning fecundity, fish movement, and stock definition. The project failed to produce any answers because of the lack of specimens (Maxwell 1977).

Recently, the National Marine Fisheries Service successfully induced spawning in captive white seabass (press release dated April 21, 1982, U.S. National Marine Fisheries Service, Southwest Fisheries Center, La Jolla, CA). Continued research in this endeavor may produce much-needed fecundity and early-life-history information. Obtaining this information is critical, considering the depressed status of the white seabass fishery in California.

SUMMARY

Despite various management actions, the white seabass fishery in California waters continues to decline. Many factors may be responsible for this decline. Isolating the actual causes, however, is becoming increasingly difficult because fewer and fewer specimens are available for study. Perhaps with persistent efforts to utilize the limited material available, additional information on fecundity, movement, and reproductive requirements may be obtained and may lead to a management regime that facilitates the recovery of white seabass off California.

LITERATURE CITED

Clark, F. N. 1930. Size at first maturity of the white seabass (*Cynoscion nobilis*). Calif. Fish Game 16(4):319-323.

Feder, H. M., C. H. Turner, and C. Limbaugh. 1974. Observations on fishes associated with kelp beds in southern California. Calif. Dept. Fish Game, Fish Bull. (160), 144 p.

Hartmann, A. R. 1980. Southern California partyboat angler survey. Calif. Dept. of Fish and Game, Mar. Res. Admin. Rep. (80-7), 33 p.

MacCall, A. D., G. D. Stauffer, and J. P. Troadec. 1976. Southern California recreational and commercial marine fisheries. Mar. Fish. Rev. 38(1):1-32.

Maxwell, W. D. 1977. Progress report of research on white seabass, *Cynoscion nobilis*. Calif. Dept. Fish Game, Mar. Res. Admin. Rep. (77-14), 14 p.

Parrish, R. H., C. S. Nelson, and A. Bakun. 1981. Transport mechanisms and reproductive success of fishes in the California current. Bio. Ocean. 1(2):175-203.

Radovich, J. 1961. Relationships of some marine organisms of the northeast Pacific to water temperatures, particularly during 1957 through 1959. Calif. Dept. Fish Game, Fish Bull. (112), 62 p.

Skogsberg, T. 1925. White seabass. *In* Preliminary investigations of the purse seine industry of southern California. Calif. Div. Fish Game, Fish Bull. (9):53-63.

———. 1939. The fishes of the family Sciaenidae (croakers) of California. Calif. Div. Fish Game, Fish Bull. (54), 62 p.

Squire, J. L., Jr. 1972. Apparent abundance of some pelagic marine fishes off the southern and central California coast as surveyed by an airborne monitoring program. U.S. Fish. Bull 70(3):1005-1019.

Thomas, J. C. 1968. Management of the white seabass (*Cynoscion nobilis*) in California waters. Calif. Dept. Fish Game, Fish Bull. (142), 34 p.

Whitehead, S. S. 1930. Analysis of boat catches of white seabass (*Cynoscion nobilis*) at San Pedro, California. Calif. Div. Fish Game, Fish Bull. (21), 27 p.

Wine, V. 1978. Southern California independent sport fishing survey annual report No. 2. Calif. Dept. Fish Game, Mar. Res. Admin. Rep. (78-2), 79 p.

———. 1979. Southern California independent sport fishing survey annual report No. 3. Calif. Dept. Fish Game, Mar. Res. Admin. Rep. (79-3), 100 p.

———. 1982. Southern California marine sport fishing: private-boat catch and effort during 1981. Calif. Dept. Fish Game, Mar. Res. Admin. Rep. (82-7), 78 p.