

California Halibut

History of the Fishery

California halibut (*Paralichthys californicus*) is an important flatfish species in both the commercial and recreational fisheries of central and southern California. The highest recorded commercial landing of halibut was 4.7 million pounds in 1919, which was followed by an overall decline to a low of 950,000 pounds in 1932. Since 1932, the average annual catch has been 910,000 pounds, with five notable peaks in landings: 1936 (1.58 million pounds), 1946 (2.46 million pounds), 1964 (1.28 million pounds), 1981 (1.26 million pounds), and 1997 (1.25 million pounds).

The decline in commercial halibut landings after 1919 has been attributed to increased fishing pressure during World War I and to overfishing. Fishing restraints during World War II may have allowed halibut stocks to increase, resulting in peak landings in the late 1940s, followed by low catches in the 1950s. Increased landings in the mid-1960s followed warm water (El Niño) years in the late 1950s. The lowest landings occurred in the early 1970s, with the lowest recorded catch in 1970 of 257,000 pounds. Landings increased during the late 1970s to a peak again in 1981 and 1997. Since 1980, landings of California halibut have remained relatively constant, averaging more than one million pounds annually.

Historically, halibut have been commercially harvested by three principal gears: otter trawl, set gill and trammel net, and hook-and-line. The California halibut trawl fishery evolved late in the 19th century in the San Francisco Bay area. Since then, the boats used to tow this gear across the ocean bottom have gone from sail to steam to gasoline, and finally to diesel powered engines. Today, trawling is permitted in federal waters (three to 200 nautical miles offshore) using trawl nets with a minimum mesh size of 4.5 inches. Trawling is prohibited within state waters, except in the designated "California halibut trawl grounds," which encompass the area between Point Arguello and Point Mugu in waters greater than one nautical mile from shore. Bottom trawls used in this area must have a minimum mesh size of 7.5 inches, and trawling is closed from March 15 to June 15 to protect spawning adults.

A decade after the introduction of the trawl fishery to San Francisco Bay, set gill and trammel nets were fished statewide along the coast. Historically, set nets have been the gear of choice for commercial halibut fishermen because of the restrictions on bottom trawl gear in state waters. In southern California, gill and trammel nets with 8.5-inch mesh and maximum length of 9,000 feet are the principal type of gear used. Today, gill and trammel net fishing is prohibited in Santa Monica Bay, shallow coastal waters north of Point Sal, and is subject to many other area, depth, and seasonal closures throughout the state. A

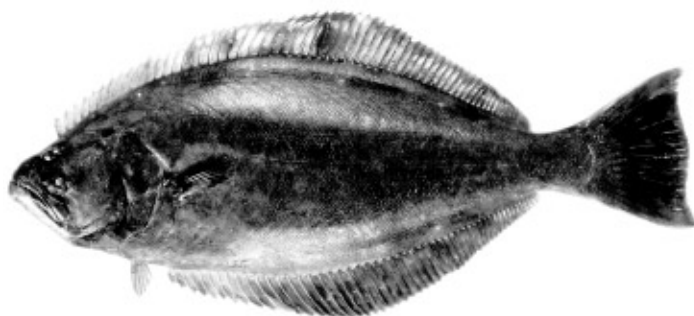
Marine Resources Protection Zone (MRPZ) was established in 1990 extending three miles off the southern California mainland coast from Point Conception to the Mexican border and within one mile or 70 fathoms (whichever is less) around the Channel Islands. Gill and trammel nets have been prohibited in the MRPZ since Jan. 1, 1994.

Historically, commercial catches of halibut by hook-and-line gear have been insignificant when compared to the total pounds landed annually by the trawl and set gillnet fisheries. However, over the last decade, catches of California halibut by hook-and-line have ranged from 11 to 23 percent of the total pounds landed annually. A majority of those landings were made in the San Francisco Bay area by salmon fishermen mooching or trolling slowly over the ocean bottom.

Catches by commercial passenger fishing vessels (CPFV) displayed trends similar to the commercial landings from 1947 through 1974, with two peaks in 1948 (143,000 halibut) and 1964 (141,000 halibut). Following the 1948 peak, annual landings plummeted below 11,000 fish by 1957. The expansion of the CPFV fleet and no size limit restriction for the take of California halibut can be attributed to the 13-fold decrease in landings between 1948 and 1958. While the commercial catch increased in the late 1970s and steadied in the 1980s, the recreational catch remained low and variable with an average annual catch of 8,600 fish from 1971 to 1989. By 1995, CPFV landings surged to a 26-year high of 19,600 fish, declining to 14,200 fish in 1999. Since 1994, CPFVs operating in the San Francisco Bay area have landed a majority of the halibut statewide.

To assist with the restoration of the California halibut resource through the protection of sub-adult fish, a regulation was adopted in 1971 that set a minimum size limit of 22 inches for sport-caught California halibut. Commercial landings increased slowly after this legislation, whereas recreational landings remained low and did not recover to former catch levels.

Although California halibut range from the Quillayute River, Washington to Almejas Bay, Baja California, the



California Halibut, *Paralichthys californicus*
Credit: DFG

commercial fishery is concentrated from Bodega Bay in the north to San Diego in southern California, and across the international border with Mexico. The contribution to California landings of halibut captured in Mexican waters has varied but has generally been insignificant since 1966. Historically, the fishery was centered off southern California and Baja California, but over the past twenty years, the greatest landings have oscillated between ports in southern and central California. A majority of the halibut landings made in central California occurred in the San Francisco Bay area. A limited amount of fishing occurs around the Channel Islands of southern California, with a catch of substantially larger halibut (average length = 27 inches) than those caught in the nearshore mainland fishery (average length = 24 inches).

Commercial fishing laws prohibit the sale of California halibut less than 22 inches in total length, unless the weight is at least four pounds whole, 3.5 pounds dressed with the head on, or 3 pounds dressed with the head off. Four halibut less than the legal minimum size may be retained for personal use.

Recreational regulations also require a minimum size limit of 22 inches, in addition to a daily bag limit of five California halibut when fishing south of Point Sur, Monterey County, and only three halibut per day when fishing north of Point Sur. Halibut can be taken in recreational fisheries using hook-and-line, spear, or hand.

Status of Biological Knowledge

Adult California halibut inhabit soft bottom habitats in coastal waters generally less than 300 feet deep, with greatest abundance at depths of less than 100 feet. Adults spawn throughout the year with peak spawning in winter and spring. Pelagic eggs and larvae occur over the shelf, with greatest densities in water less than 250 feet deep and within four miles of shore. Halibut larvae appear to move inshore as they approach metamorphosis. Early larval stages (about 0.1 to 0.3 inches) occur in midwater more than one mile offshore, whereas transforming larvae occur within 0.6 mile of shore and occupy the neuston (surface zone) at night and the bottom during the day. California halibut have a relatively short pelagic larval stage (less than 30 days), transforming and settling to the bottom at a small size (0.35 to 0.5 inches). Newly settled and larger juvenile halibut are frequently taken in unvegetated shallow-water embayments and infrequently on the open coast, suggesting that embayments are the important nursery habitats. However, settlement either in bays or along the open coast varies yearly and may reflect variability in nearshore currents that influence the onshore transport of larvae. The advantages of bays as nursery areas are probably a decrease in the risk of

mortality of newly-settled juveniles and an increase in the growth rate of larger juveniles that feed upon the abundant small fishes in the bays. Juveniles emigrate from the bays to the coast at about one year of age and 6.9 to 8.7 inches in length.

Tagging studies have indicated that California halibut do not tend to move extensively. Most sublegal halibut tagged and released from CPFVs in southern California were recovered within five miles from their tag sites; only 12 percent were found 10 miles or more from where they were tagged. Larger halibut appear to travel the greatest distances. One large tagged halibut (33 inches) was recovered 64 miles away 39 days after release.

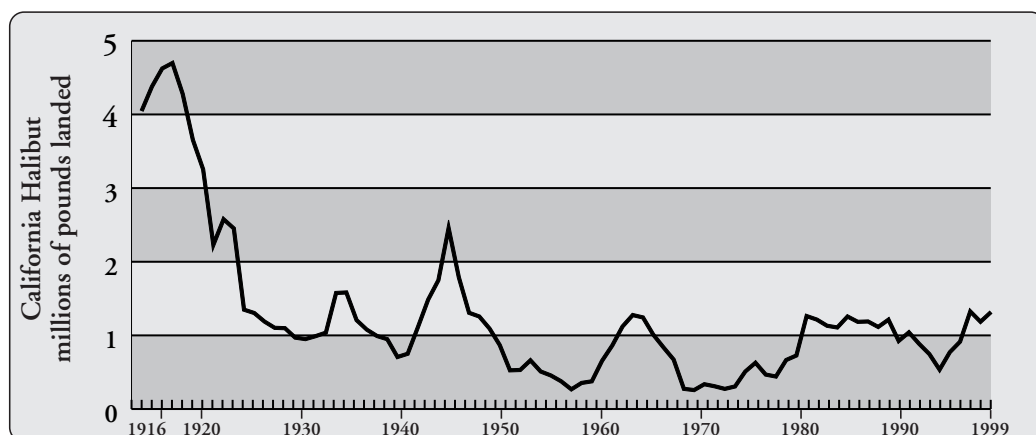
California halibut may live to 30 years and reach 60 inches in length. The maximum-recorded weight is 72 pounds. Male halibut mature at one to three years and eight to twelve inches, whereas females mature at four to five years and 15 to 17 inches. Female halibut attain larger sizes at age than males and represent a greater fraction of the commercial landings (60 to 80 percent). Female halibut reach legal size (22 inches) at five to six years of age, about a year before males.

California halibut are ambushing predators. Adults prey primarily upon Pacific sardine, northern anchovies, squid, and other nektonic nearshore fish species. Small juvenile halibut in bays primarily eat crustaceans, including copepods and amphipods, until they reach about 2.5 inches. They are then large enough to eat gobies that are found commonly in bays but not on the open coast. Juvenile halibut become increasingly piscivorous with size. On the coast, adult halibut feed primarily on Pacific sardine, anchovies, and white croaker.

Status of the Population

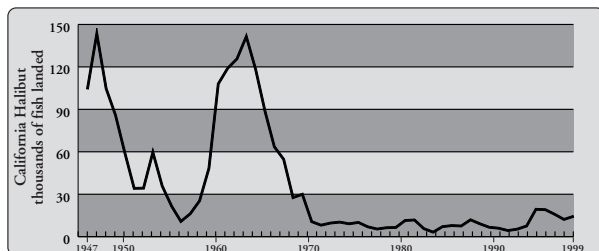
Abundance of larval California halibut in plankton surveys is correlated with commercial landings of halibut, suggesting that this species has a cycle of abundance approximately 20 years in length. However, the size of the halibut population may be limited by the amount of available nursery habitat, as juvenile halibut appear to be dependent on shallow water embayments as nursery areas. The overall decline in California halibut landings corresponds to a decline in shallow water habitats in southern California associated with dredging and filling of bays and wetlands.

Recreational and commercial fishermen are in conflict over the California halibut resource in southern California. A differential minimum size limit of 22 inches for the recreational fishery and 26 inches for the commercial fishery was investigated as a possible management tool. This strategy would allow recreational anglers to harvest



halibut between 22 and 26 inches in length before fish had grown large enough to recruit to the commercial fishery. Yield-per-recruit (Y/R) analysis indicated that: 1) differential size limits would provide an increased Y/R for the recreational fishery, whereas the commercial fishery would experience a loss; 2) overall fishing effort was about twice the optimum level; and 3) Y/R would probably increase with diminished fishing effort.

The total California biomass of the halibut resource obtained from virtual population analysis (VPA) estimates



Recreational Catch 1947-1999, California Halibut

CPFV = commercial passenger fishing vessel (party boat); Recreational catch as reported by CPFV logbooks, logbooks not reported prior to 1947.

in the late 1980s was 5.7 to 13.2 million pounds, with annual recruitment of fish at age one estimated to be between 0.45 and 1.0 million fish. The number of juvenile halibut emigrating from southern California bays to the open coast (age one) estimated from beam trawl surveys ranged between 250,000 and 400,000 in the late 1980s.

In the early 1990s, a swept-area trawl survey was conducted to better understand California halibut population dynamics. This fishery-independent survey produced a biomass and population estimate for halibut in southern and central California. The survey results indicated a halibut biomass of 6.9 million pounds for southern California and 2.3 million pounds for central California, while the

population estimate was 3.9 million halibut for southern California, and 700,000 halibut for central California.

Management Considerations

See the Management Considerations Appendix A for further information.

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