

History of the Fishery

Cowcod (*Sebastes levis*) are important to commercial and recreational fisheries in California. Estimated total catch peaked in 1976 at 213 tons, and then trended downward to 14 tons in 1999. Recreational catch of cowcod exceeded commercial landings between 1959 and 1980 but commercial catch has been larger since. Recreational landings peaked in 1976 at 154 tons, and then declined to less than two tons from 1997 through 1999. Commercial landings reached a record 155 tons in 1984. Fishing grounds nearest to major ports have been progressively exploited. Most of the remaining productive cowcod fishing grounds in the Southern California Bight are found well offshore, out-of-range for many private skiffs.

Cowcod reach the largest size of any rockfish in central and southern California, and are a highly prized trophy in the recreational fishery. The official California record for sport caught cowcod is 21 pounds 14 ounces, but the recreational fishery has produced confirmed specimens as large as 34 pounds in recent years.

Cowcod are caught along with other species of rockfish by the recreational fishery. Recreational effort is directed at cowcod from private fishing boats and commercial passenger fishing vessels (CPFVs). CPFVs include both charter boats (carrying a prearranged or closed group of anglers), and party boats (generally open to the general public, without prior reservation). The CPFV industry began in southern California around 1919, and by 1939 the fleet consisted of over 200 boats. CPFV operators targeted numerous species prior to 1950, such as tuna, giant sea bass, marlin, swordfish, mackerel, California halibut, kelp and sand bass, bonito, barracuda, and yellowtail. However, early reports do not list rockfish as a CPFV target group during the first half of the century.

Following World War II, there was a notable expansion of the CPFV fleet, and in 1953 it totaled about 590 boats. By 1963, the statewide CPFV fleet had declined to 476 vessels, 450 of which operated out of central and southern California ports. The majority of the 1963 CPFV fleet (256 vessels) was based in the Southern California Bight. Species of preference for the southern California CPFV fleet in 1963 did not include *Sebastes*, although rockfish were listed as an important part of the catch. As recently as 1969, there were reports that "some [CPFV] fishermen would rather fish for yellowtail, and catch little or nothing, than to take home a sack of rockfish. Those who prefer rockfish to yellowtail are in a minority." However, by 1974 attitudes of the typical CPFV fisherman had changed, and there was increased effort directed toward rockfish. With the decline in availability of "traditional" sportfish in the 1960-1970s, less lively "food" fish

such as *Sebastes* were sought in order to maintain angler satisfaction.

Although highly sought in recent decades, cowcod have consistently composed a very small fraction of the recreational rockfish catch. Cowcod were estimated to comprise greater than one percent of the CPFV rockfish catch in 1961, 0.4 percent of total rockfish during the 1970s, and only 0.3 percent from 1985 through 1987. Cowcod seasonal catch in the sport fishery tends to peak in late autumn through early spring, which is the time of year when southern California CPFVs normally target bottom fishes.

Historically, commercial landings were highest in the Southern California Bight but landings in the Monterey area have been larger during most recent years. Hook-and-line and set net gear fished in deep water on rocky bottom accounts for the bulk of historical landings in the commercial fishery. Set net catches declined after 1989, but hook-and-line has remained important. Trawling accounts for most cowcod landings in northern areas. Trawls tend to take cowcod that are smaller and more often immature than fish taken by hook-and-line. Prior to 2000, discard of cowcod in commercial and recreational fisheries was probably insignificant. Beginning in 2000, new regulations limited commercial landings to one fish per trip, which may have resulted in increased discards.

Fourteen species of rockfish have been landed in the cowcod market category; of these, the bronzespotted rockfish is the most common. Species associated with cowcod vary by gear type. In the trawl fishery, which is primarily in the Monterey management area, the main species taken with cowcod are chilipepper, bocaccio, and widow rockfish. In the hook-and-line and set net fishery, which is primarily in the Conception management area, bronzespotted rockfish, bocaccio, and vermilion rockfish are most important.

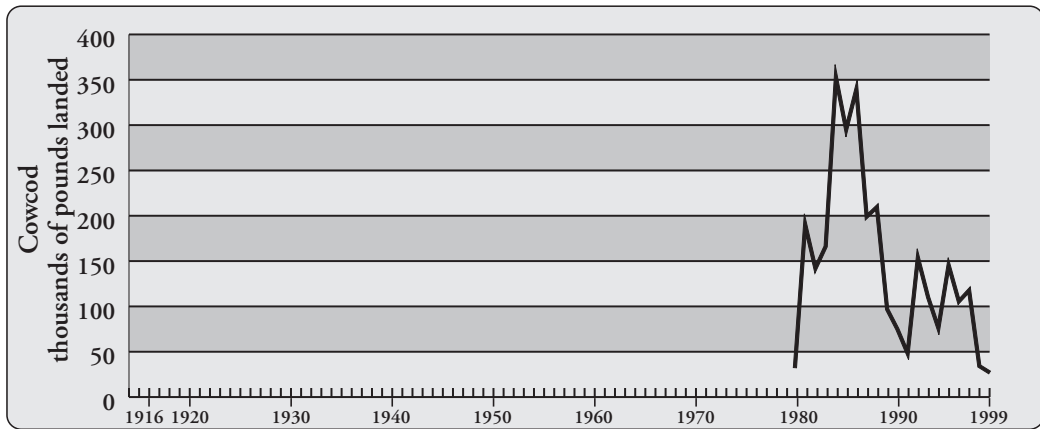
Cowcod are valuable in the commercial fishery. Fishermen received \$1.37 per pound for cowcod in 1998, more than



Cowcod, *Sebastes levis*
Credit: DFG

**Commercial Landings
1916-1999, Cowcod**

Data Source: CalCom, a cooperative survey with input from Pacific Fisheries Information Network (PacFin), National Marine Fishery Service (NMFS), and California Department of Fish and Game (DFG). Data are derived from DFG commercial landing receipts with expansions based on port samples collected by PacFin samplers. Cowcod landings expansion data not available for 1979 and years prior to 1978.



cowcod landed by hook-and-line command higher prices than those landed by set net or by trawl.

Prior to 2000, the Pacific Fishery Management Council managed cowcod under regulations established annually for commercial groundfish, the *Sebastes* complex and remaining rockfish. Remaining rockfish were managed as a group without specific allowable biological catch or optimum yield levels for individual species. During those years, *Sebastes* complex cumulative trip limits were high relative to landings of cowcod, and it is unlikely that the regulations had affected commercial fishing for cowcod. Specific regulations to limit the commercial and recreational take of cowcod were first established in 2000. In order to achieve an optimum yield of 5.5 tons for recreational and commercial landings combined, the recreational bag limit in 2000 was reduced to one cowcod (with a maximum of two cowcod per boat), and commercial regulations allowed only one cowcod to be landed per fishing trip.

Status of Biological Knowledge

Cowcod range from central Oregon to central Baja California, and offshore to Guadalupe Island. The geographic center of distribution is the southern California Bight. They are uncommon off Oregon and northern California. Adult cowcod habitat is primarily rocky reefs from 165 to 1,000 feet, most of which are found in the vicinity of offshore banks and islands in the Southern California Bight. Smaller fish generally occur at the shallower end of the depth range.

As with other species of *Sebastes*, fertilization is internal and females give birth to first-feeding stage planktonic larvae during the winter. Gonad-somatic indices of females are highest from November through April. Peak abundance of cowcod larvae is January through April,

with some larvae present from November through August. Larvae spend about 100 days in the plankton and settle to the bottom as juveniles at about two to 2.4 inches in length. In Monterey Bay, juveniles recruit to fine sand and clay sediments at depths of 130 to 330 feet during the months of March through September. Adults are found at depths of 300 to 1,680 feet usually on high relief rocky bottom. Cowcod reach 37 inches FL and 33 pounds.

Cowcod have been aged by counting annuli in sectioned and polished otoliths. Although age determinations have not been validated, there was good agreement among independent readers. Based on a sample of 259 specimens collected in the 1970s and 1980s, the youngest fish in the landings was age seven, and the oldest was age 55. Cowcod are thought to become fully recruited to recreational and commercial fisheries at age 17, which is similar to the age at which all females become mature.

The approximate length (inches) and age of first, 50 percent and 100 percent maturity is as follows:

	Male		Female	
Maturity	Length (in)	Age	Length (in)	Age
First	13.5	8	16.5	11
50%	17.5	12	17	11
100%	19	14	20	16

Status of the Population

Cowcod were reported to be abundant off southern California in the 1890s. However, the first formal stock assessment of cowcod was in 1999. Results of the assessment suggest that spawning biomass in 1916 was near the

virgin level and it remained stable through a rather long historical period (1916-1950). Biomass began to decline slowly in the 1950s and accelerated through the 1970s. Recruitment declined dramatically and biomass continued to decline after the early 1980s. The best estimate of cowcod spawning biomass in the Southern California Bight during 1998 is 262 tons, which is about seven percent of the estimated unfished stock size.

Based on the results of the 1999 stock assessment, cowcod were formally declared overfished by the National Marine Fisheries Service in 2000. A rebuilding plan will be adopted to provide assurance that abundance will be restored to 40 percent of the unfished stock size in a minimal length of time. However, due to the unproductive nature of the stock, it is likely that rebuilding will require many decades.

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