Brown Rockfish

History of the Fishery

Brown rockfish (*Sebastes auriculatus)*, commonly referred to as bolina by fishermen and markets, have long been an important component of the marine recreational fishery and a relatively minor but important component of the nearshore commercial fishery in California, especially north of Point Conception. In the commercial fishery freshly caught whole brown rockfish are sold either dead or alive in the fresh fish markets. Brown rockfish have not been reported separately from other rockfishes in catch statistics, but comprise the majority of the market grouping called bolina, which also includes other similar-looking rockfish species, such as copper or quillback rockfish, that are sold at the same price. In samples obtained from 1999 landings, brown rockfish comprised 70 percent by weight of the bolina category. Brown rockfish are also mixed into other market categories, such as the red rockfish group (19 percent by weight in 1999 landings).

Commercial catches were made in the past with hook-and-line gear and, to a lesser extent, gillnets until gillnets were excluded from state waters in 1991. Today, brown rockfish are primarily taken with hook-and-line gear, which includes mainly rod-and-reel and horizontal longline gear, along with some vertical longline (stick) and troll longline gear. In most port areas of the state, the majority of bolina group catch is made by rod-and-reel, although, in the San Francisco area, the longline fleet accounts for over 70 percent of bolina taken. The species is targeted directly in both nearshore and offshore ocean environments. In the San Francisco area, the brown rockfish was estimated to be the third most common rockfish species landed by weight in the hook-and-line commercial fishery through the 1990s. The 1999 and 2000 catch estimates suggest that they are now equal to line-caught landings of chilipepper and the two are the most common species in nearshore catches. Since the early 1990s, the brown rockfish has been the most common rockfish species sold live in San Francisco markets and comprised nearly 50 percent of the live rockfish catch in 1999.

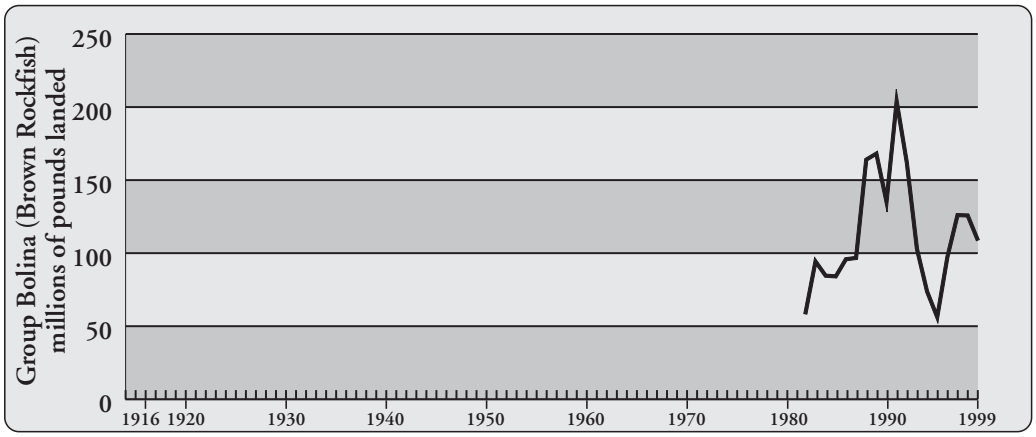
Brown Rockfish, *Sebastes auriculatus*
Credit: DFG

The number of vessels landing brown rockfish peaked in the early 1990s, when over 250 hook-and-line vessels made an average of over 1,300 landings per year statewide, usually ranging from 60 to just over 100 pounds per landing. Total landings of brown rockfish peaked in 1991, decreased through the mid-1990s, and increased again during the late 1990s coincident with an increasingly active nearshore premium and live fish fishery. Though landings have fluctuated over the last two decades, the value of the catch has continued to increase, particularly during the last decade, as rockfish quotas have been reduced and demand has continued to remain high. Markets in areas such as San Francisco (especially those in Chinatown) sell their brown rockfish whole and preferably live. Dead-landed fish obtain an ex-vessel price of $1 to $2 per pound, whereas live brown rockfish have demanded an ex-vessel price from $2 to $4 per pound. With the recent management-related reductions in supply, prices have increased to over $6 to $8 per pound at times in 1999 and 2000.

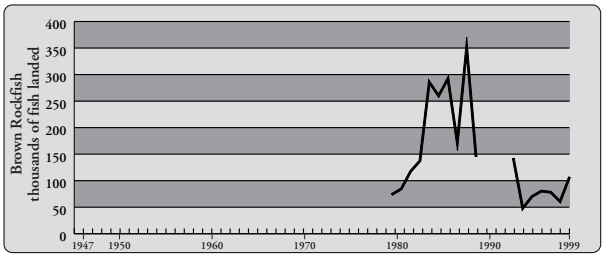
Sport anglers regularly catch brown rockfish with rod-and-reel either from the shore, commercial passenger fishing vessels (CPFVs), or private/rental boats (PRBs), especially in nearshore reef habitats (depths of less than 175 feet). Brown rockfish are most common in sport catches near San Francisco. In a sport fish survey conducted from 1980 through 1986, brown rockfish were among the top five species of rockfish caught and composed up to 6.6 percent of the estimated sport catch. Inside San Francisco Bay, they are the most common sport-caught rockfish species. Although catches south of Point Conception are lower, brown rockfish have comprised up to one percent of rockfish take and have remained among the top 15 species of rockfish caught during the last 20 years. These represent a seven-fold increase by number in statewide take relative to a 1958 to 1961 survey of recreational fishing. Substantial increases in take have occurred in all modes of fishing, especially by shore fishing, pier fishing, and PRBs.

Status of Biological Knowledge

Brown rockfish are found along the Pacific Coast of North America from the northern Gulf of Alaska to central Baja California. They live in shallow subtidal waters and bays, and have been found at depths of just over 400 feet, although they most commonly reside above 175 feet. Brown rockfish are typically found associated with sand-rock interfaces and rocky bottoms of artificial and natural reefs. In shallow waters, they may be found in small aggregations associated with rocky areas and kelp



Commercial Landings 1916-1999, Brown Rockfish
Group Bolina (Brown) rockfish landings were aggregated as rockfish prior to 1979. DFG market sampling indicates that 75 percent of the Group Bolina rockfish market category is made up of brown rockfish, the remaining 25 percent consists primarily of widow rockfish. Data Source: DFG Catch Bulletins and commercial landing receipts.



Recreational Catch 1947-1999, Brown Rockfish
Data Source: RecFin data base for all gear types; data not available for 1990-1992

beds, whereas they stay near the rocky bottom when in deeper waters. The sub-adults migrate into both high and low relief reefs and are strongly residential to their home sites.

Distinguishing characteristics of brown rockfish include orange-brown or dark brown mottling, especially on the back, and a prominent dark brown blotch on the gill cover. Little sexual dimorphism is evident between male and female brown rockfish in relation to growth or maturity rates. Recent studies found maturity as early as three years, and 100 percent maturity at six years, or roughly 12.2 inches total length (TL). Half of the population was mature at 3.9 and 4.2 years of age, measuring 9.8 and 10.4 inches TL in males and females, respectively. Brown rockfish grow to a maximum size of 22 inches, and live less than 25 years. This is a relatively short life span compared with most offshore rockfish species, though many nearshore rockfish species have a similar or shorter lifespan.

As with all members of the genus *Sebastes*, brown rockfish are ovoviviparous. A 12-inch TL female may produce approximately 42,500 eggs, while an 18-inch TL female may produce as many as 266,000 eggs. Peaks in larval release occur in the pelagic environment in both December-January and May-June. Larvae live in the upper zooplankton layer for approximately a month before metamorphosing into pelagic juveniles as part of the plankton and micronekton, and subsequently settling out into shallow nearshore waters. Although brown rockfish reproduce on the open coast, young-of-the-year fish commonly migrate into bays and estuaries for use as nursery habitat, which is an uncommon practice for rockfish species. They may remain in the bay around rubble, piers and other structures in areas of higher salinity for one to two years before returning to the open coast.

Brown rockfish feed on increasingly larger prey as they grow. They shift from small crustaceans, amphipods, and copepods as juveniles, to an adult diet of crabs and fish. Little is known about predation on brown rockfish, but it is thought to be similar to that of other nearshore rockfish species: Most predation on the brown rockfish presumably occurs during the larval and juvenile stages, with less predation occurring on the adults.

Status of the Population

While there have been studies of local abundance in certain coastal areas and within bays, the population size and structure of this species has not been comprehensively assessed. Evidence of stress on brown rockfish stocks in California exists, however, and some relative changes in the population have been identified. Commercial and recreational catches have steadily increased during the last 40 years, while the average length and weight of brown rockfish in landings have declined. When recreational statistics collected during the last 20 years were compared to results from a 1958 through 1961 recreational survey, brown rockfish showed a 49 percent decrease in average weight per fish over 30 years. Mean length of brown rockfish obtained from CPFVs and PRBs in northern California declined by 18 percent and 21 percent respectively over 40 years. In southern California, mean

length in the CPFV catches declined by 31 percent during the same period. In relation to the length at which 50 percent of males and females are mature, recreational landings data indicate that from 1958 to 1961, most brown rockfish taken had reached sexual maturity. By the 1980s, however, few fish taken from shore or from the bays, and about half taken from PRBs were sexually mature. Lengths of brown rockfish sampled from commercial landings during the last decade also reflect that half of the fish were at or below the size at which 50 percent of the population is sexually mature, and few larger adult fish are being landed compared to historic values. The decline in size of fish in these fisheries does not seem to be associated with incoming year classes, but instead with a depletion of larger adults due to fishing pressure. Although nearly half of the fish landed statewide are adults that can replenish the population, there are now few large adults above the length of the median-sized fish recorded in the 1958 through 1961 survey. The brown rockfish has been identified as a species vulnerable to severe localized depletions in other geographic areas; in Washington state, the Puget Sound stock of brown rockfish was recommended for listing as a threatened species in 1999.

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