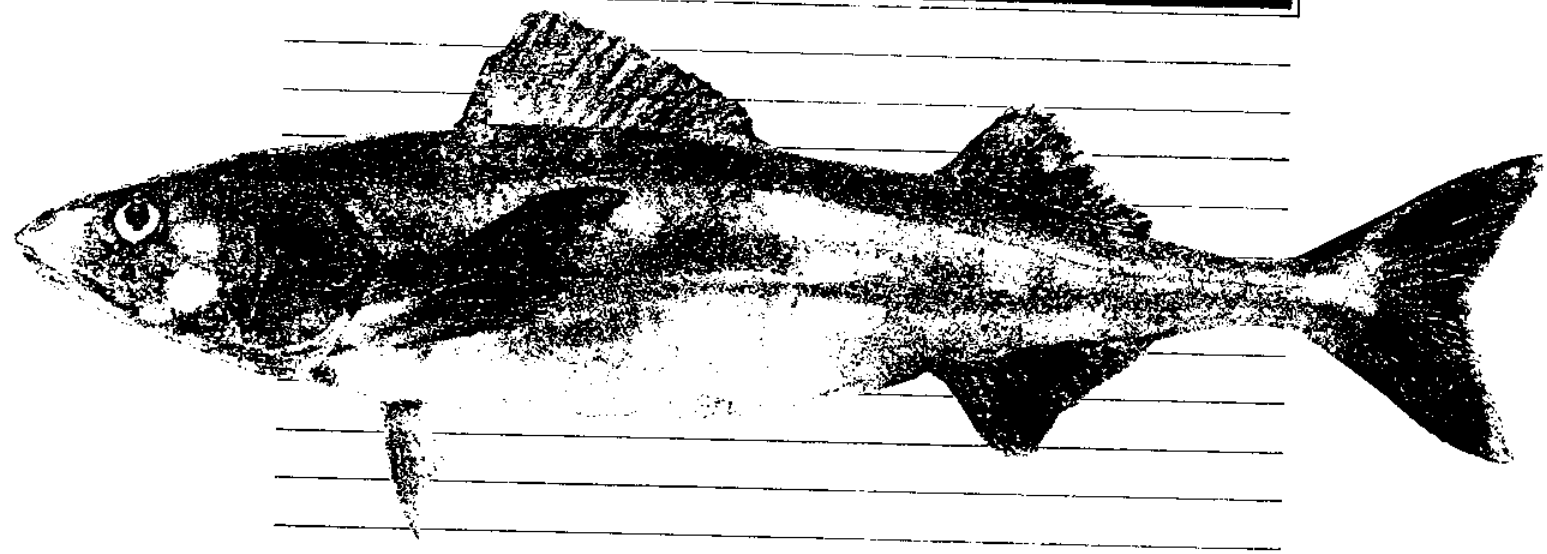
THE SABLEFISH FISHERY



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Cover photo: Sablefish or blackcod, *Anoplopoma fimbria*. (Photo courtesy of the California Department of Fish and Game.)

THE SABLEFISH FISHERY

The sablefish (*Anoplopoma fimbria*), known as blackcod to the fishing industry and butterfish in filleted form to the consumer, is the object of an expanding Pacific Coast commercial fishery. The reasons for the recent expansion of the fishery include: restriction of the foreign fishery for blackcod within the United States' 200 mile fisheries economic zone; a greatly improved export market; and the conversion of vessels from other fisheries to the sablefish fishery. This publication is designed to give you an overview of the fishery. If you are interested in more detailed information, refer to the sources listed in the annotated bibliography.

SABLEFISH LIFE HISTORY

Sablefish range from Baja California north to the Bering Sea and southwest to the coast of Japan. National Marine Fisheries Service surveys indicate that the bulk of the sablefish population is located in the Gulf of Alaska (Phillips 1954; Low, Tanonaka, and Shippen 1976; Osada and Cailliet 1975). Sablefish are most abundant at depths of more than 200 fathoms on blue clay and hard mud bottoms in or near submarine canyons and gullies. The fish are less abundant in areas that have sandy and rocky bottoms. In general, sablefish dwell on the sea bottom, but, when young, they are found feeding well off the bottom.

Sablefish live at least 20 years, but most of the fish caught are 3 to 8 years old (2.2 to 6.4 pounds). About half the sablefish males begin spawning by age 5 (24 inches) and about half the females begin spawning by age 7 (28 inches). Spawning takes place during the winter at depths of 125 to 600 fathoms. Females produce 100 thousand to 1 million eggs; larger fish produce more eggs. The larvae develop in surface waters. Juvenile sablefish spend several years in shallow water (less than 80 fathoms) and enter the trawl and pot fishery at the end of their second year at a length of 17 inches.

In Monterey Bay, sablefish are most abundant at depths of 500 to 650 fathoms (Osada and Cailliet 1975). Off the coasts of Oregon and Washington, sablefish abundance peaks at 200 to 450 fathoms (Heyamoto and Alton 1965). Tagging studies have indicated that sablefish populations may be localized; only a few individuals make long migrations and intermingle with other sablefish stocks.

Sablefish are top carnivores and appear to be opportunistic feeders. Studies in Alaskan waters show that their diet includes: pollock, flatfish, saury, rockfish, shrimp, small sablefish, and herring. Their diet depends on life stage, location, season, and availability of prey.

THE FISHERY

This section briefly discusses the sablefish fishery. The fishery is described in greater detail by Phillips (1954), Browning (1974), Hipkins (1974), Osada and Cailliet (1975), Low, Tanonaka, and Shippen (1976), Dewees (1978), and Phelan and Gregory (1978).

For centuries, the Indians living along the Pacific Coast caught sablefish for food. The commercial fishery began in the middle of the 19th century. However, until 1905, most of the sablefish were caught incidentally by fishermen in search of halibut off the coasts of Washington and British Columbia. Until 1958, fishermen from Canada and the United States were responsible for landing nearly all the sablefish. Landings ranged from 4.4 to 21 million pounds, with the largest catches made during World War II. The market demand for fish livers in the 1930s and 1940s helped spur the development of the fishery.

During the 1960s, Russia and Japan began fishing for sablefish. The landings peaked at 144.2 million pounds in 1972, with Japan landing 70 to 80 percent of the fish. In 1973 and 1974, the Republic of Korea and the Republic of China (Taiwan) began to catch significant numbers of sablefish. However, the passage of the 1976 Fishery Conservation and Management Act greatly reduced the catches of sablefish by foreign vessels within the 200 mile fisheries economic zone. The reduction of foreign catches has led to even more development of the fishery by American fishermen.

Historically, the major ports in California have been Eureka, Fort Bragg, San Francisco, and Monterey. Until the 1970s, otter trawls and longlines were the major types of gear used (Phillips 1954; Parrish 1973).

In the 1970s, California became the dominant Pacific Coast state for sablefish landings (average of 5,671 metric tons from 1973 to 1977). The reasons for this dominance have been two new trends in the fishery: an increased use of traps; and the shifting of the fishery southward and into deeper water. Monterey has become the main port for sablefish landings. The fishery is developing rapidly off southern California south of Point Conception where landings have increased from 250 thousand pounds in 1976 to over 5 million pounds in 1978.

Gear

The major types of gear used in the sablefish fishery are trawls, longlines, and traps. In the early years of the fishery, longlines were the principal type of gear used. Most longlines originally used were modified from halibut longlines, which have size 6/0 and 8/0 hooks spaced 36 inches apart. Longlines are described by Jensen and Brigham (1963), Browning (1974), and several manufacturers.

As trawling moved into deeper water in the 1960s and 1970s, and, as the Japanese began to dominate the fishery, bottom trawls became the major type of gear used. American fishermen often land significant amounts of sablefish taken incidentally in their bottom trawls.

In 1969 to 1970, a sablefish trapping system was developed (High 1971; Hipkins 1974). These rigid, steel-framed, rectangular traps measure approximately 3 feet by 3 feet by 8 feet and are usually fished on longlines. Some traps are designed to be collapsible. Tests of these traps by Osada and Cailliet (1975) and others have shown that they are quite effective and selective for sablefish in depths greater than 200 fathoms.

In 1973 to 1974, Korean vessels started using a different style of trap for sablefish. The Korean style trap is a truncated cone 28 inches high and shaped like a shallow, inverted flower pot (Phelan and Gregory 1978). The lower diameter of the trap is 54 inches and the upper diameter is 34 inches. The framework consists of material similar to concrete reinforcing rods. The framework is covered by a 1½- to 4-inch mesh nylon webbing. A webbing funnel at one side starts at full trap height, tapers to about a 10-inch opening, and extends one-half to three-quarters the way into the trap. The floor of the trap is closed by a pucker string similar to a purse string arrangement. This pucker string makes it possible to open the traps to remove the fish and to stack the traps efficiently on deck.

TABLE 1. California Sablefish Landings by Region.

Region	1960	1964	1970	1973	1975	1977*
	pounds					
Eureka	1,158,537	1,092,471	2,673,605	5,086,054	5,240,373	3,869,486
San Francisco	848,224	826,330	347,762	1,590,033	926,750	1,113,043
Monterey	199,027	410,717	1,220,107	888,403	6,949,187	4,912,404
Santa Barbara	22,398	88,215	—	15,766	168,055	866,034
Los Angeles †	546	926	–	27,423	16,870	1,671,321
San Diego	—	532	1,041	1,197	17,564	7,903

SOURCE: California Department of Fish and Game.

* Preliminary data.

† 1978 landings have been estimated at 5,107,671 pounds.

American fishermen in southern California are currently using the Korean style trap. California fishermen planning to use the traps must obtain a permit from the California Department of Fish and Game. A plastic food jar, perforated with 1/32 inch holes, is used as a bait container. Squid is the preferred bait, although herring and anchovies are also used.

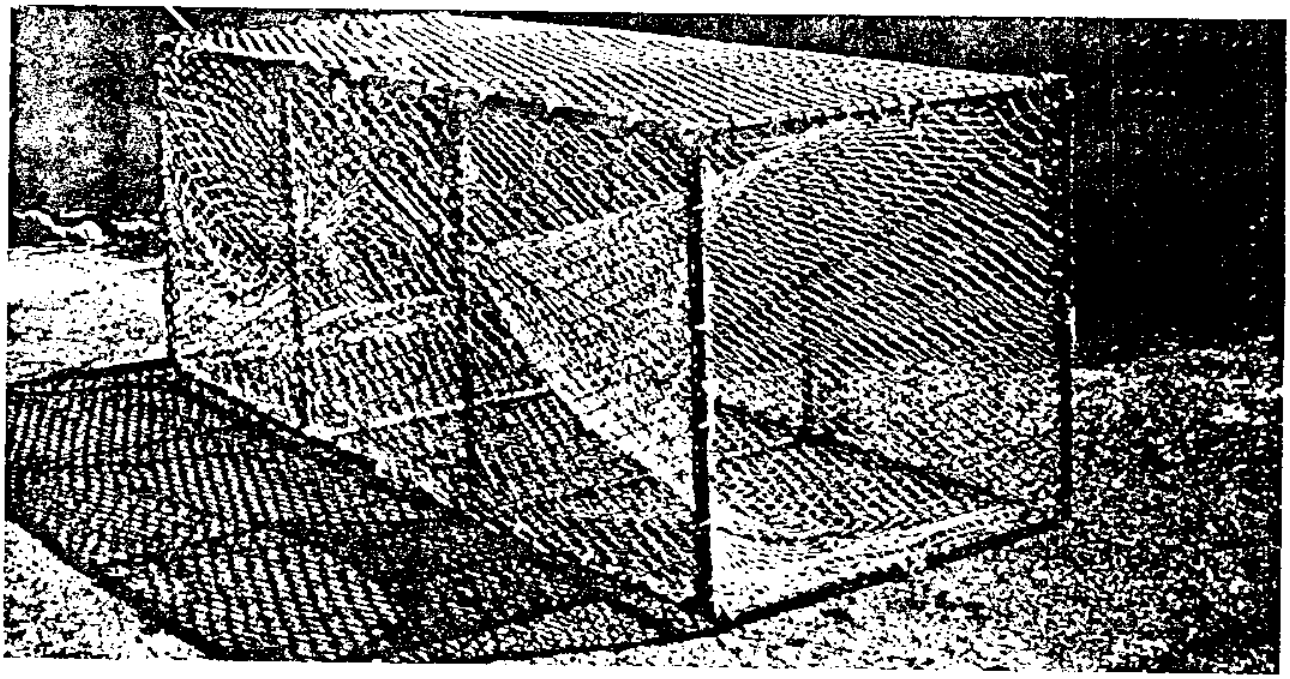

Figure 1. American style trap.

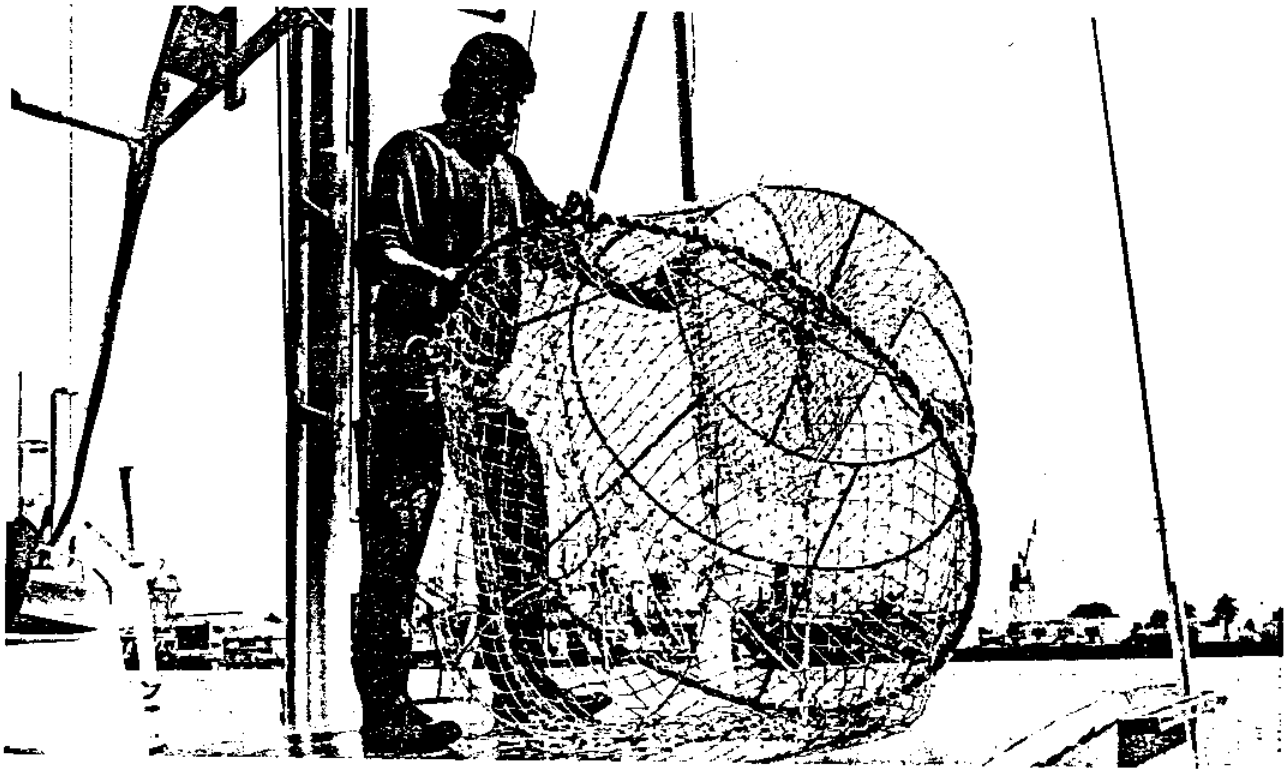

Figure 2. Korean style trap. (Photo courtesy of the California Department of Fish and Game.)

Fishing Methods

Fishing methods vary with each fisherman and each fishing ground. One trap fishing method is described by Hipkins (1974).

Catch rates, as they relate to the length of trap soaking time, appear to depend on fish density. When fish are numerous, a 24-hour soak produces large catches. However, when fish are not as plentiful, soaks of up to 72 hours may be necessary for good results. Under most conditions, little additional catch is realized by soaking the gear longer than 48 hours. For most vessels, optimum fishing can best be accomplished by twelve strings of gear, working six strings each day.

Fishermen should avoid setting gear in shipping lanes where passing ships may cut buoy lines. Fishing vessels should also stay away from trawling grounds where losses may occur due to entanglement with trawling gear.

The gear is set with the drift of the vessel. Before setting, a string of buoy and set lines is connected. Then, as the vessel moves slowly ahead, the first buoy assembly is set and the buoy line is played out by hand until the set line is reached. The set line is then put into the hauling block, the anchor[1] connected, and set.

As the vessel moves ahead, the block is operated in the setting direction at a speed that keeps the set line and the buoy lines tight. The baited traps are connected after the set line gangion has passed through the block. When the second anchor has been set, the buoy line is set through the block, which keeps it taut until the sinker line is reached. The sinker line is then removed and the buoys are set. It is important to keep the line taut while setting because it reduces the tendency of the string to sag while settling to the bottom. Sagging allows the traps to become grouped relatively close together, reducing the total effective area fished.

The gear is hauled either against the wind

[1]When fishing with Korean style traps, anchors *are not* usually set.

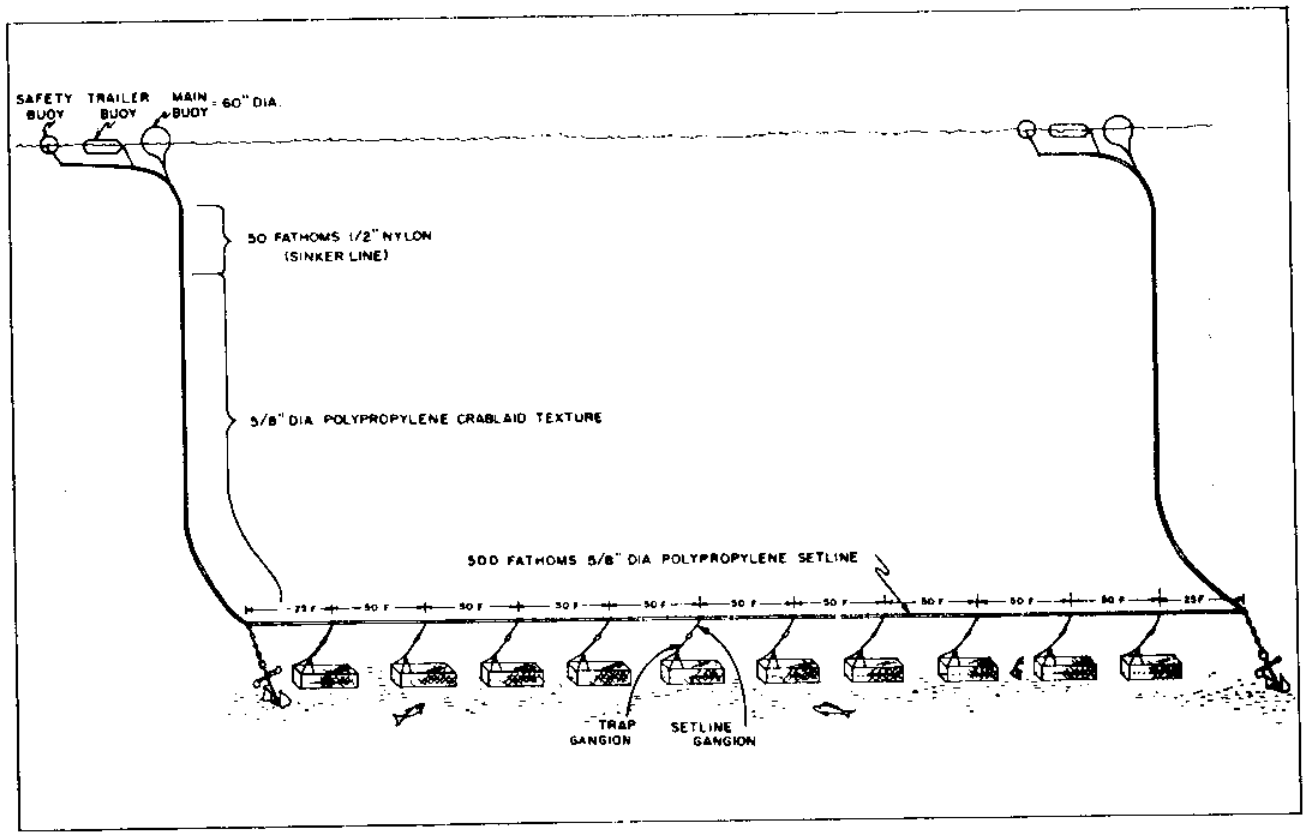

Figure 3. A pictorial view of a string of sablefish traps.

or current -- whichever most affects the vessel. The vessel slowly moves alongside the buoys and a grapnel is used to retrieve the surface line. The buoys are pulled aboard and the buoy line is put into the hauling block and coiled as it comes aboard. When the anchor gangion is reached, the block is stopped. The anchor is pulled aboard, disconnected, and stowed; then hauling is resumed.

When a trap approaches, a hook on the boom-mounted hoist is used to snag the trap bridle. The hoist is attached to the trap bridle to take the strain of the filled traps. Then the gangions are disconnected and the trap is lifted aboard the vessel. The same procedure follows until all traps and the end anchor are aboard. If fishing is productive, the gear is re-set without bringing in the end buoy line. If the gear is moved only a short distance, the buoy line is towed. It is important to take good care of the catch. Vessels on extended trips generally use a spray-brine refrigeration system. Some vessels on shorter trips (1 to 3 days) use ice to keep the catch cold.

MANAGEMENT

Until the 1970s, there was little direct management of the fishery because of the low catch levels. However, the intensive development of the fishery by foreign nations during the 1970s made direct management necessary. Bilateral agreements were made with Japan, Russia, and Poland to restrict foreign catch.

The Pacific Fisheries Management Council is now in the process of developing management plans for the sablefish fishery along the coasts of Washington, Oregon, and California. In general, these plans will continue to restrict foreign catches of sablefish and will encourage the development of the domestic industry.

There is some concern that heavy fishing of localized stocks of sablefish may exceed the sustainable yield. Studies by Osada and Cailliet (1975) and Hardwick (1978) indicate that the intensive trap fishery in the Monterey Bay is having a significant impact on the stocks. Both the fish size and the catch per unit effort have decreased significantly. Some form of catch limit may have to be instigated to ensure a sustained yield from the local fishery. As fishing pressure increases, some form of direct management may become necessary.

A problem that the fishermen and the fishery managers need to resolve is the conflict between the different types of gear used on the fishing grounds. Problems occur because trawls, longlines, and traps are often used in the same area.

CONSUMER INFORMATION

In 1973, the United States processed sablefish in five forms: smoked (77 percent); fillets and steaks (16 percent); salted (6 percent); animal food (3 percent); and pickled (1 percent) (Low, Tanonaka, and Shippen 1976). Due to the rapidly changing sablefish market, the product mix is probably significantly different today. Often a large percentage of the catch is exported. Sablefish has several market names in its different processed forms. The consumer often sees smoked sablefish as smoked Alaskan cod and fresh and frozen fillets as butterfish.

Sablefish is usually landed in the round (whole). The fish are graded by size into small (less than 4¼ or 5 pounds), medium (4¼ or 5 to 7 pounds), and large (over 7 pounds). Higher prices per pound are paid for larger sablefish. The smoked fish market prefers fish over 5 pounds, while small fish are usually processed into fillets and sold in the market as butterfish.

The most outstanding characteristic of sablefish flesh is its oiliness. Sablefish has a fat content of about 14 percent as compared with chinook salmon, which contains 11.5 percent fat, and halibut, about 1.1 percent (Sidwell, Foncannon, Moore, and Bonnet 1974). The oily flesh makes sablefish ideal for smoking, but difficult to freeze for long periods. Sablefish flesh is about 13 percent protein (oysters, 8 percent; salmon, 16 percent) and 71.5 percent moisture (oysters, 85 percent; salmon, 68 percent).

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