

California's Living Marine Resources and Their Utilization

Eastern Pacific Skipjack Tuna

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EASTERN PACIFIC SKIPJACK TUNA

HISTORY OF THE FISHERY

Skipjack tuna (*Katsuwonus pelamis*) have been harvested, in the eastern Pacific, by commercial baitboat, purse seine, gillnet, troll fisheries as well as recreational fisheries since the early 1900s. Eastern Pacific skipjack tuna are highly migratory and have been fished by many different countries such as the U.S., Mexico, Ecuador, France and Spain. Landings from these countries are marketed throughout the Pacific Rim, Puerto Rico and the European Community. Fisheries landing skipjack tuna in California operate between 150°W longitude and the coast of the Americas and between 40°N and 20°S latitude. California landings of skipjack tuna are important to both commercial and recreational fisheries.

California commercial landings of skipjack tuna started in 1918, and mainly supplied California canneries where skipjack tuna were processed as light meat tuna. Small quantities of skipjack tuna were also sold to local markets. Prices paid by the canneries for skipjack tuna are based on fish size and market conditions and from 1990 to 1994 varied between \$200 to \$1,000 a short ton (st). California skipjack tuna commercial landings increased from 3 million pounds (lbs.) in 1918 to 156 million lbs in 1954. Landings, while fluctuating considerably, then decreased to a low of 30 million lbs in 1973 before peaking again at its highest level (174 million lbs) in 1980. Since 1976, California skipjack tuna landings declined to average 10 million lbs from 1985 to 1999. Based on a cannery price of \$900 per st, the 1999 California landings of skipjack tuna was worth approximately \$4 million. The decline in commercial landings in California can be attributed to the gradual relocation of cannery operations to American Samoa and Puerto Rico. Currently, only one cannery is still operating in California. The majority of the California commercial skipjack tuna landings are from the purse seine and baitboat fisheries. Some fish are also caught in troll, gillnet, and longline fisheries.

Before the 1960s, baitboats supplied the majority of the commercial skipjack tuna landings in California. The first baitboats operated in coastal waters between southern California and Mexico. They used ice to preserve catches, relied on catching bait close to the coast and offshore islands and could only make short trips. In the 1930s, with the development of new refrigeration techniques and construction of larger vessels, the fishery expanded to areas farther south and offshore. From 1984 to 1999, baitboat landings averaged 12% of the total skipjack tuna landings in California. Vessels ranged in size from 30 short tons (st) carrying capacity to 200 st. The U.S. fleet size decreased from 75 vessels in 1976 to 1 in 1999. While baitboat fisheries were the main gear used in the early days of the eastern Pacific skipjack tuna fishery, catches and effort from this fishery quickly gave way to the more efficient purse seining method.

Purse seiners, based in San Diego, started to replace baitboats in the late 1950s and by 1961 supplied the majority of the California commercial skipjack tuna landings. Purse seiners usually catch skipjack tuna in sets on free-swimming schools or in sets on schools associated with floating objects. Skipjack tuna are usually caught mixed with yellowfin and bigeye tunas. Vessels ranged in size from 150 st to 2000 st carrying capacity. The U.S. fleet size decreased from 141 vessels in 1976 to 9 in

1999. From 1984 to 1999, skipjack tuna purse seine landings accounted for 80% of the total skipjack tuna landings in California.

From 1991 to 1999, other commercial fisheries, troll, longline, and gillnet landed less than 1% of the annual yellowfin tuna landings in California. These gears incidentally catch skipjack tuna inside the 200-mile Exclusive Economic Zone (EEZ) and south of San Francisco.

California recreational fisheries for skipjack tuna typically operate in waters off Southern California and Mexico. The duration of trips is usually 1 to 7 days. The fleet consists mainly of commercial passenger-carrying fishing vessels (CPFV) and some private fishing vessels. Anglers use rod and reel fishing gear. Skipjack tuna landings, from the CPFV fishery, reached highs of 103,000 fish in 1983 and 52,000 fish in 1990. Since 1990, skipjack tuna recreational landings have generally decreased to 14,000 fish in 1998.

U.S. commercial vessels that fish for skipjack tuna in the eastern Pacific must comply with all state and federal regulations and regulations proposed by the Inter-American Tropical Tuna Commission, IATTC, and any other international regulatory agency to which the U.S. is a member. These include compliance with the Marine Mammal Protection Act and a mandatory logbook program under the High-seas Fishing Compliance Act of 1995 that requires a license and submission of the IATTC logbook (required by the IATTC before 1995). U.S. commercial vessels fishing in the eastern Pacific must also pay California license fees and abide by Mexico's EEZ regulations. All large purse seiners (>400 st) must carry observers.

Recreational fishermen must carry California State fishing licenses, comply with state regulations and purchase Mexican fishing licenses while fishing in the EEZ of Mexico. Currently, California limits the recreational take of skipjack tuna to 10 fish a day.

STATUS OF BIOLOGICAL KNOWLEDGE

Skipjack tuna occur throughout the tropical, subtropical waters and warm temperate waters of all Oceans. There are two stock structures hypothesized for Pacific skipjack tuna, a single stock with isolated subgroups or 2 or more different stocks. This description considers skipjack tuna in the eastern Pacific east of 150° W longitude.

Eastern Pacific skipjack tuna are generally distributed in areas between 40°N and 40°S latitude and 150°W longitude and the coastlines of the U.S., Mexico, Central America and South America. Eastern Pacific skipjack tuna may be found, at times, such as during El Niño events, in areas as far north as 50°N along the U.S. west coast. Skipjack tuna in the eastern Pacific are in two migrating groups, one migrating to Baja California fishing grounds and the other to Central and South American fishing grounds. The groups remain on the fishing grounds for several months before returning to the Equatorial spawning grounds. Concentrations are located in the northeastern Pacific near Baja California, the Revillagigedo Islands, and Clipperton Island and in the southeastern Pacific near Central America, northern South America, Cocos Island-Brito Bank, and the Galapagos Islands and offshore south of

10°N.

Skipjack tuna typically prefer sea surface temperatures between 15°C to 30°C. Aggregations of skipjack tuna tend to be associated with convergence zones, boundaries between cold and warm water masses (i.e. the polar front), up welling and other hydro graphical discontinuities. Skipjack tuna are found in surface waters and to depths of 260 meters during the day, but seem to stay near the surface at night. Eastern Pacific skipjack tuna is most frequently found in surface schools aggregated around floating objects. The larger fish are found in free-swimming unassociated schools. Smaller yellowfin and bigeye tunas (<100 cm) are frequently found in schools mixed with skipjack tuna.

Skipjack tuna in the eastern Pacific spawn throughout the year in equatorial waters, and from spring to early fall in subtropical waters. The spawning season is abbreviated as distance from the equator increases. Females mature at about 40 cm. However, in some areas of the eastern Pacific, minimum size at maturity has been noted at 50 to 55 cm. Egg production is estimated between 0.1 to 2.0 million eggs per spawning.

Skipjack tuna can grow to approximately 108 cm or 35 kg. They have dark purplish-blue backs and, silvery sides with 4 to 6 longitudinal dark bands. They have a strong keel on each side of the caudal fin base between two smaller keels. Skipjack tuna enter surface fisheries at approximately 25 cm (0.2 kg) and commonly reach lengths up to 80 cm (12 kg). Some longline fisheries also catch large skipjack tuna. Skipjack tuna growth is rapid and approximate sizes at age are: 1 yr - 31 cm, 0.5 kg; 2 yr - 51 cm, 2.7 kg; 3 yr - 64 cm, 5.8 kg; 4 yr - 72 cm, 8.7 kg. Maximum age is probably around 7 years. Instantaneous rate of natural mortality is probably the highest of all tunas, between 1.0 and 2.0, and depends on estimated rates of emigration.

Skipjack tuna feeding is opportunistic on piscivorous, crustaceans and cephalopods. Analyzed stomachs of skipjack tuna in the eastern Pacific contained 59% pelagic crabs, 37% fish and 3% squids. Larger fish tend to have higher percentages of crustaceans and lower percentages of fish in their stomachs. Predators of skipjack tuna include billfish, sharks and other large tunas, including skipjack tuna.

STATUS OF POPULATION

In general, the population of skipjack tuna in the eastern Pacific is under utilized by fisheries operating in the area and is well above levels that are needed to produce maximum sustainable yield. The apparent abundance of eastern Pacific skipjack tuna is highly variable. This variability is caused more by effects of environmental conditions than by the effects of the fishery. The simplest estimate of abundance can be obtained for trends in catches. Catches peaked at 169,800 metric tons (mt) in 1978, decreased to 49,500 mt in 1985. During the period 1986 to 1994, catches varied between 63,000 mt and 92,000 mt before increasing to 242,000 mt in 1999. Another skipjack tuna abundance estimate of standardized catch per days fishing (CPDF) has been developed by the IATTC. However, these estimates are not considered satisfactory and indicate that further studies are needed. In general, the estimates show CPDF in the 1960s between 8 and 14 mt per day fished and in 1972 to 1996,

fluctuating between 2 and 6 mt per day fished.

The status of eastern Pacific skipjack tuna is monitored by the IATTC. They are reasonably certain that eastern Pacific skipjack tuna stocks are under fished. Traditional age-based analyses and production models cannot be used to verify this conclusion due to the violation of the unit stock concept. However, skipjack tuna catches in the western Pacific are near 1 million tons and tagging studies there showed that catches could easily double without adversely affecting the stock. Based on this, it seems that further increases in the eastern Pacific skipjack catch could be attained. However, caution should be exercised until the exchange between the eastern and western Pacific is fully understood. The IATTC also points out that their assessment of eastern Pacific skipjack tuna as under fished could change and studies to learn more about this species and its relationships to the environment are needed.

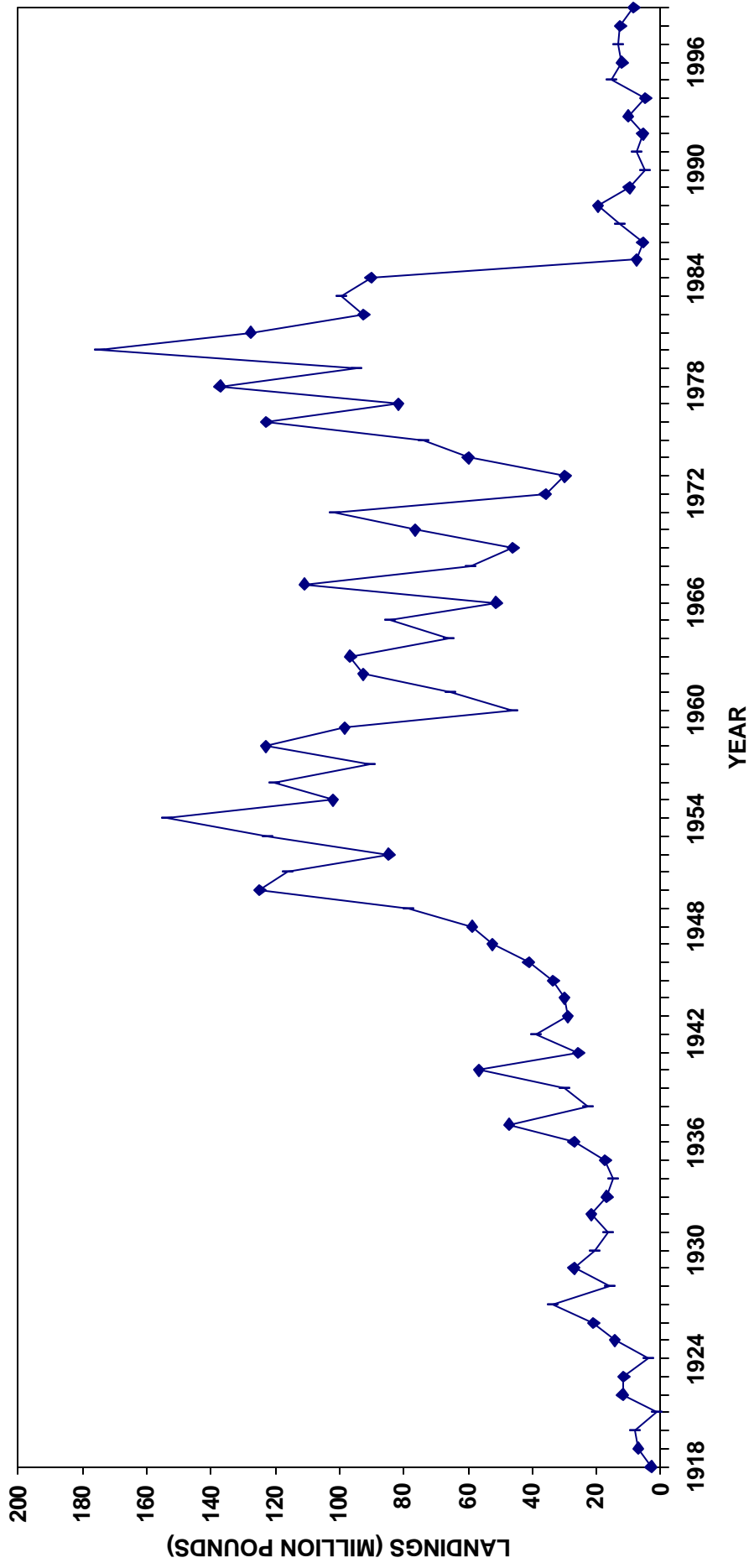
MANAGEMENT RECOMENDATIONS

Since skipjack tuna in the Pacific are considered under fished, management is not being considered. However, since skipjack tuna in the eastern Pacific are caught with yellowfin tuna, many of the recommended management that is applied to yellowfin tuna may impact skipjack tuna. Some of these include management to reduce effort levels and to reduce fishing on drifting objects to minimize the catches of small fish and by-catch.

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CALIFORNIA COMMERCIAL SKIPJACK TUNA LANDINGS



CALIFORNIA RECREATIONAL SKIPJACK TUNA CATCH

