

Thresher Shark

History of the Fishery

The common thresher shark (*Alopias vulpinus*) is the leading commercial shark in California, although landings are much less than they were during the first decade of the drift gillnet fishery. In the early years, from 1977 through 1989, annual commercial landings averaged 1.1 million pounds dressed weight (dw) per year, ranging from 0.1 million pounds in 1977 to a peak of 2.3 million pounds in 1982. More recently, catches from 1990 through 1998 have averaged about 0.4 million pounds with a low of 0.3 million in 1995 and a high of 0.8 million pounds in 1991, remaining at 0.4 million pounds over the past three years. In 1998, the average ex-vessel price was \$1.36 per pound. Fish are taken primarily by drift gillnets (78 percent) followed by set gillnets (18 percent), and other assorted gears (4 percent). Two other species of thresher shark, the pelagic (*A. pelagicus*) and the bigeye thresher (*A. superciliosus*) also occur off California, but these species are much less common, averaging only about one and nine percent, respectively, of the total drift net thresher catch in the 1990s.

The early thresher shark drift net fishery began in southern California and expanded rapidly, reaching a peak in 1982 when 225 vessels were permitted in the fishery. Fishing then expanded northward first to Morro Bay and then to Monterey and San Francisco. By 1987, experimental fishing was being conducted off Oregon and Washington. The drift net fishery was initially developed to target common thresher, but emphasis later shifted to broadbill swordfish, with thresher and shortfin mako shark being secondary market species. Also, catches of threshers off California soon began to decline, and some of the most heavily exploited size classes were observed to disappear from the catches after the mid-1980s. These size/age classes were thought at the time to be all immature fish approximately three to six years old, but more recent maturity data suggest that many may also have been mature individuals four to seven years old. Regulatory measures in California, particularly area and season closures imposed after the mid-1980s, were instituted to address swordfish user conflicts (gill-netters versus harpooners versus recreational anglers), to protect marine mammals, and to protect thresher shark. In 1990, a California state voter initiative banned gillnetting within three miles and completely prohibited drift net fishing on threshers during peak seasons and in nearshore areas. Since January 1996, the landing of shark fins detached from any carcass has been prohibited, except for threshers, which can be landed with the fins and tails removed providing that a corresponding carcass is also landed.

Currently, the fishery is under a non-transferable permit system and takes place from the Mexican border north

to central Oregon in waters up to 200 miles offshore in depths from 30 to 2,000 fathoms over banks, escarpments and canyons. Up until recently, because of various time/area closures and seasonal availability of swordfish, most of the annual fishing effort occurred between mid-August through January outside of state waters to about 150 miles offshore. In addition to various existing time/area closures, beginning August 15, 2001, the area between Point Conception and 45 degrees north latitude will be closed to drift gillnet fishing through October 31 to reduce interactions with leatherback sea turtles. If an El Niño condition is predicted, or is occurring, the area south of Point Conception will be closed to drift gillnet fishing from August 15 to August 31, and during the month of January, to reduce loggerhead sea turtle impacts through recreational angling for thresher sharks, especially from private boats and skiffs, which have become increasingly popular in recent decades in coastal waters between San Diego and Santa Barbara, California. Currently, there are about eight shark fishing tournaments held annually in southern California. Party boat catches, which are thought to represent a relatively small portion of the total sport catch, have averaged about 55 fish per year, with a peak of 163 fish taken in the 1993 El Niño year. Title 14 of the California Fish and Game Code limits the take of thresher sharks to two per day, but sport anglers may possess more than this limit depending on the length of the fishing trip. A one-inch square of skin must be left on each fillet, if filleted at sea.

Status of Biological Knowledge

The common thresher shark is a large pelagic shark with a long scythe-like tail, which makes up nearly half of its total body length. Its body is white below and blue-gray to gray above with a slight wash of bronze. It is generally distinguished from other species of thresher sharks by the white of the abdomen that extends in a splotchy pattern above the base of the pectoral fins;

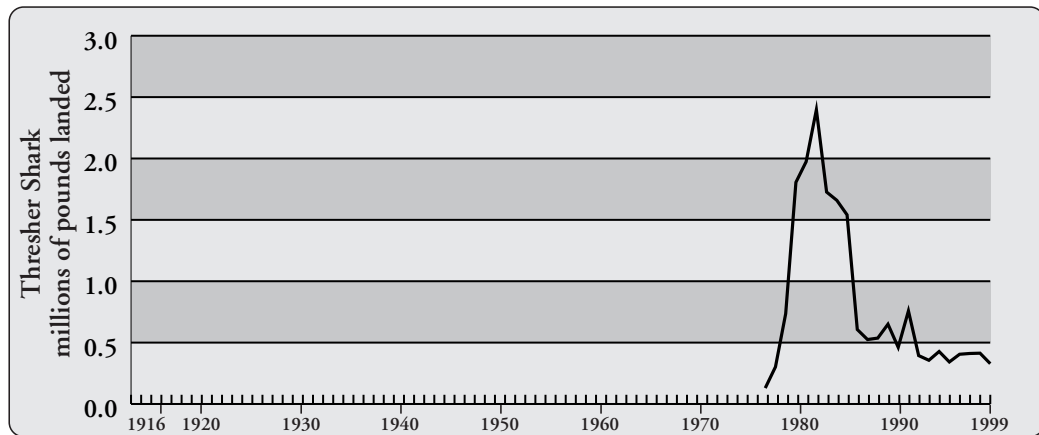


Thresher Shark, *Alopias vulpinus*
Credit: DFG

**Commercial Landings
1916-1999, Thresher Shark**

Data Source: DFG Catch Bulletins
and commercial landing receipts.

All shark landings were
aggregated until 1977.



unlike the bigeye and pelagic thresher, which are uniformly pigmented blue-gray to gray above the pectoral fins. The common thresher also does not possess the large eyes distinctive of the bigeye thresher or the deep lateral grooves on the sides of the head.

The distribution of the common thresher shark is circum-global. In the eastern Pacific, it occurs from Goose Bay, British Columbia south to off Baja California, and off Panama and Chile. Abundance in the Pacific Ocean is thought to decrease rapidly beyond 40 miles from the coast, although catches off California and Oregon do occur as far as 100 miles offshore and sometimes beyond. It is found in temperate and warm oceans penetrating into tropical waters, seeming to prefer areas characterized by high biological productivity, the presence of strong frontal zones separating regions of upwelling and adjacent waters, and strong horizontal and vertical mixing of surface and subsurface waters. Such habitats are conducive to production and maintenance of schooling pelagic prey upon which it feeds. Adults, juveniles, and post-partum pups occur within California waters.

After parturition and during their first few years of life, the young occur close to shore off beaches and in shallow bays, often near the surface of the water. During most years, concentrations of young threshers may be found within two to three miles off the beaches from Santa Monica Bay into Santa Barbara County, and as far north as Monterey Bay and San Francisco Bay during warm water years. One young thresher was tracked in Morro Bay for 18 hours where it spent 70 percent of the time in shallow water over mudflats, increasing its activity at the onset of darkness and during high tide periods. Larger mature individuals over 10 feet in total length tend to show a greater range of habitat and more offshore distribution.

Some anecdotal evidence and patterns of observed catches suggest seasonal north-south migration of this species between San Diego and Baja California, Mexico,

and Oregon and Washington. This migration hypothesis is derived from patterns of early catches in the drift gillnet fishery prior to seasonal and area restrictions, and the incidence in the 1980s of thresher sharks taken off California carrying Japanese longline hooks, indicating an origin outside the U.S. EEZ. It has been proposed that large adult common thresher sharks pass through southern California waters in early spring of the year, remaining in offshore waters from one to two months during which time pupping occurs. Pups are then thought to move into shallow coastal waters. The adults then continue to follow warming water and perhaps schools of bait northward, and by late summer, arrive off Oregon and Washington. Sub-adult individuals appear to arrive in southern California waters in early summer, and as summer progresses they move up the coast as far north as San Francisco. In fall, these sub-adults are thought to move south again. Little is known about the presumed southward migration of the large adults, which do not appear along the coast until the following spring. Recent satellite pop-up tagging by NMFS has confirmed active transboundary migration in this species. Two common thresher sharks tagged in June off Laguna Beach and Santa Monica Bay, California, were relocated off Baja California, Mexico, and 540 miles southwest of La Paz, Mexico, within 120 and 210 days of tagging. Recent genetic analyses of tissue biopsies collected off the U.S. West Coast and Mexico (with samples from off Oregon-Washington grouped together and compared to samples collected off California and Baja California, Mexico) showed no significant differences in haplotypic frequencies, indicating a single homogenous West Coast population.

Reproduction is ovoviviparous; normal brood size appears to be two to four fetuses. Brood sizes of up to seven fetuses have been recorded off Spain, indicating there may be some plasticity in this trait. The developing fetuses are oophagous. Mating presumably takes place in

midsummer along U.S. West Coast EEZ with a gestation period of about nine months. Parturition is thought to occur in the spring months off California, judging from the number of post-partum-sized pups that have been taken in the catch at this time.

Maximum size reported is 20 feet total length, but off California the largest ever recorded was 18 feet long. Size at first maturity has been variously estimated and interpreted. A re-examination of male and female maturity data suggests that off the U.S. West Coast, size and age at first maturity is about 10 feet in total length and about five years old.

Size at birth varies considerably, ranging from 45 to 61 inches long, with only slight variation among geographical regions around the world. The species has been variously estimated to reach a maximum age of from 19 to 50 years.

Feeding is primarily on small to medium-sized schooling fishes and pelagic invertebrates. Prey items include anchovy, Pacific sardine, herring, mackerel, Pacific hake, lancetfish, lanternfish, Pacific salmon, squid, octopus, pelagic red crab, and shrimp. A recent study of the diet of fish taken in the drift gillnet fishery found in addition, Pacific and jack mackerel, shortbelly rockfish, louvar, grunion, white croaker, queenfish, and Pacific sanddab. Thresher sharks have been observed to use their long caudal fin to bunch up, disorient and stun prey at or near the surface and are often caught tail-hooked by longlines. Predation on this species, other than by man, has not been documented.

Status of the Population

In 1990, this species came under the oversight of the Pacific States Marine Fisheries Commission, which has provided a general forum for coordinating thresher shark management among the states of California, Oregon and Washington, guided by an interjurisdictional fishery management plan for thresher shark. No quotas were ever established, but the three states did agree to an annual coastwide landings guideline of 750,000 pounds dressed weight of thresher shark, which since 1991 has never been approached. A stock assessment of this species is currently underway, and it has been included as a management unit species within the Pacific Fisheries Management Council's fishery management plan for highly migratory species, currently being drafted.

There are indications that management actions taken after the mid-1980s and resulting reduction in fishing pressure may have contributed to a rebuilding in the stock over the last decade. In the early-1990s, some mid-sized fish were beginning to reappear in wholesale market samples in California. More recently, an increase in average

size of fish and in catch-per-unit of effort has been noted in the thresher shark catch off Point Conception - an area that historically has had the most consistent and highest thresher catches. It is not known, however, to what extent environmental changes and shifts in distribution might influence these observations, since this area is but a small portion of the total coastal range of the species. The potential annual rate of population increase for the common thresher shark at the maximum sustainable yield population level has been estimated at four to seven percent per year.

Susan E. Smith

National Marine Fisheries Service

Debbie Aseltine-Neilson

California Department of Fish and Game

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