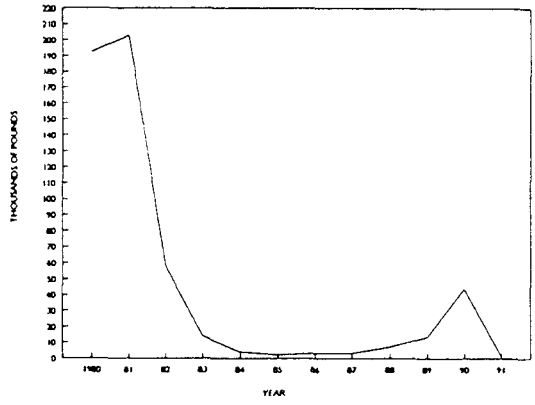
## BLUE SHARK

### History of the Fishery

Until recently blue sharks (*Prionace glauca*) were not a major target of California's recreational or commercial fisheries. Urea stored in their blood system quickly turns to ammonia when the shark dies, thus rendering the meat unpalatable. Development of a quality meat product has been the limiting factor in creating commercial interest. Only two serious attempts at developing a quality food product in California have occurred. The first took place in 1979 and 1980 when one vessel fished blue sharks experimentally with longline gear. Product quality was judged to be good enough to establish blue shark as a viable alternate fishery, and 150,000 pounds dressed meat were sold at about $0.25 per pound. Although market interest developed in several western states, a steady demand could not be assured and the fishery was discontinued.

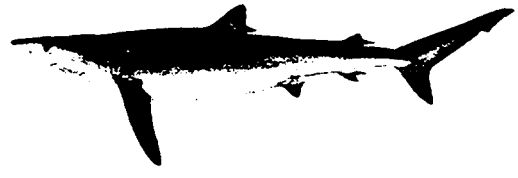
The second attempt at developing a food product began in 1988 with an experimental longline fishery directed at shortfin mako (*Isurus oxyrinchus*) and blue shark. Participants in the fishery were required to develop a market for human consumption with the bycatch of blue sharks which were not released alive. In 1989 and 1990, a total of 54,000 pounds of blue shark was sold for making jerky and "fish and chips." It was clear from these attempts however that a quality food product and related market had not been achieved. Participants in the fishery substantially reduced the incidental mortality of blue sharks by developing a hook removal tool which allowed up to 88 percent of the blue shark catch to be released unharmed. As a result, the requirement to develop a wholesale market for blue sharks was dropped in 1991.

The recreational catch of blue sharks has grown tremendously in recent years. Estimated annual catch increased 10-fold between 1981 and 1988 with over 400,000 angler-trips on private boats which had "sharks" (including mako sharks) as the primary or secondary target species. Most southern California sport fishing areas offer shark fishing trips aboard charter boats from two to seven nights per week. Catches average 10 to 40 blue sharks per trip, although this varies throughout year.




Commercial landings of blue shark, 1980-91.

The greatest source of fishing mortality for southern California blue sharks over the past two decades probably occurred as a result of their incidental capture during the developing years of the drift gill net fishery for swordfish and thresher sharks. Annual estimated bycatch in the late 1970's and early 1980's was between 15,000 and 20,000 blue sharks. Changes in season length, fleet size, time-area closures and the use of large mesh nets substantially reduced blue shark mortality, although there are no reported estimates of current mortality in this fishery.



Blue shark, *Prionace glauca*.

### Status of Biological Knowledge

The blue shark is circumglobal in tropical and temperate waters. It is epipelagic and generally considered abundant in the coastal and offshore waters of the western United States and Mexico. In the north Pacific, seasonal migrations occur between 20° and 50° N latitude. The northward movement extends into the Gulf of Alaska as waters warm in the summer months, reversing southward during winter. A seasonal segregation by sex may be influenced by water temperature. Mature females tend to start their northward journey as warmer water moves northward while juveniles of both sexes follow close behind. Large males start later and tend to stay further offshore.

Blue sharks are viviparous. As such, developing embryos are nourished initially from a yolk sac. Once the yolk sac is exhausted, developing young obtain nourishment and oxygen from the maternal blood stream through a placenta. Blue sharks

are released fully formed and independent at birth. Gestation is nine to 12 months. Brood size varies considerably depending on the females size and condition, with over 100 young in a single brood reported, although 20 to 40 young are more typical. Off California, mating occurs in late spring to early winter. The Southern California Bight (SCB) is a major birthing area and is generally considered a nursery area for immature blue sharks, where they are often seen cruising slowly with their dorsal fin and dorsal tail lobe sticking out of the water. Females mature at five to six years and males mature a year earlier. Maximum age is estimated to be at least 20 years.

Blue sharks feed opportunistically on small pelagic fishes including jack mackerel, northern anchovy, Pacific herring, market squid, and red crab. Juveniles make shoreward movements at night to feed in shallow water especially in the SCB, where numerous islands and submerged banks provide ample prey. They also feed on marine mammal carrion but are not known to attack healthy individuals.

## Status of Population

The size of California's blue shark stock is unknown. Local abundance undergoes major seasonal fluctuations with juveniles to three year-olds most abundant in the coastal waters from early spring to early winter. Mature adults are uncommon in coastal waters.

Fishery-dependent data needed for determining abundance, mortality, etc. are lacking because blue sharks are usually discarded at sea and the catch often goes undocumented. Local abundance depends on recruitment of juveniles and immigration of individuals from Mexico and offshore into California waters. Although there are no abundance estimates (local or Pacific-wide), some fishermen and field biologists speculate that there are fewer blue sharks than there were 10 years ago. The combined mortality from recreational anglers, commercial set net and drift net fisheries, Mexican fisheries and foreign high-seas fisheries undoubtedly has the potential to impact the population and the local blue shark stock to an unknown extent.

David B. Holts
National Marine Fisheries Service

## References

Harvey, J.T., 1989. Food habits, seasonal abundance, size, and sex of the blue shark, *Prionace glauca*, in Monterey Bay, California. Calif. Fish and Game. 75(1):33-44.

National Marine Fisheries Service. 1991. Marine Recreational Fishing Statistical Survey. Pacific Coast. (in Press) Current Fishery statistics number XXXX. NOAA, NMFS.

Tricas, T.C., 1979. Relationships of the blue shark, *Prionace glauca*, and its prey species near Santa Catalina Island, California. Fishery Bull. 77(1):175-182.

West Coast Fishery Development Foundation. 1981. A report on the development of the Pacific blue shark as a commercial fishery. NMFS, S-K Contract No: 80-ABH-00052. 255p.