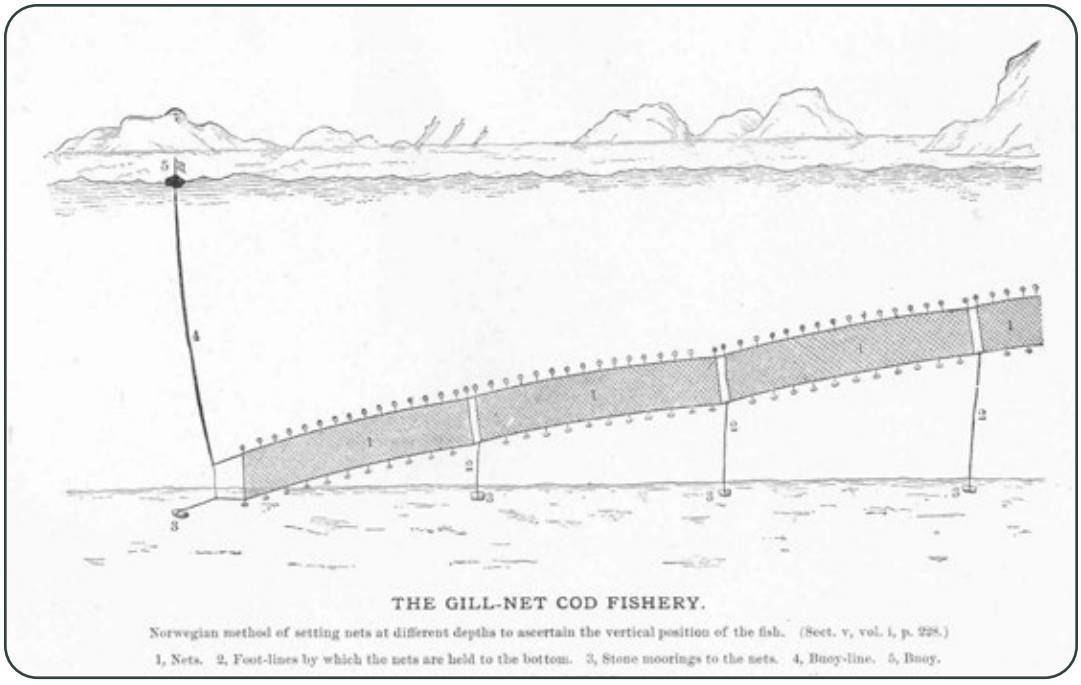
Fishery Logs 1930–2010

Events affecting fisheries:

- ❑ The U.S. Marine Mammal Protection Act of 1972 protects all marine mammals, including cetaceans (whales, dolphins, and porpoises), pinnipeds (seals and sea lions), sirenians (manatees and dugongs), sea otters, and polar bears within the waters of the United States making it illegal to harass, feed, hunt, capture, collect, or kill any marine mammal. [Marine Mammal Center, 2020]
- ❑ The U.S. Endangered Species Act of 1973 provides for the conservation of species that are threatened throughout all or a big part of their range, and protects the ecosystems they depend on. It made people aware that some species need protection from people hunting them or from destroying their habitats. [EPA, 2019]
- ❑ The movie *Jaws*®, in 1975, made sharks look like killing machines. Thousands of fishers set out to catch sharks after seeing Jaws, causing U.S. populations of sharks to decrease. But the movie also increased interest in sharks, resulting in more sightings and funding for shark research.
- ❑ Fish populations decreased in the 1980s and 1990s in part because of fishing gear, such as gill nets, that made it easier to catch more fish than ever before. Gill nets caught fish to be sold as food, but also caught other animals. This bycatch included sharks, rays, sea turtles, and dolphins and led to the California Gill Net Ban of 1994. It made gill nets illegal to use within 3 miles of shore in central and southern California.
- ❑ In 1994, white sharks became protected within three miles of California's coast. White sharks can not be hunted and, if accidently caught, must be immediately released.



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Fishery Logs 1930–2010 (continued)

Researchers studied fishery logs collected between Santa Barbara and San Diego, California. Many researchers have considered this area a "shark nursery" because young-of-the-year (YOY) white sharks were 60% of the reported catches. Juveniles made up 32% and subadult/adults made up only 8% of the reported catches. Data gathered more recently from shark tags confirm these percentages. In fact, data from tags show that YOY and juvenile white sharks often swim close to shore—within 100 meters!

The logs showed white sharks were captured by many methods—becoming entangled in nets, or caught with set lines, harpoons, and lines with hooks. But most shark captures (81%) came from entangling nets like gillnets. Modern data from satellite images support these records. They give us data from tags, satellite images, and "caught" sharks, confirming this area is a nursery for white sharks.

While young sharks were caught close to shore, adults were caught mostly offshore or near islands. Almost no YOY or juvenile sharks were caught there. Present-day visual sightings of adult white sharks offshore support this. Some researchers hypothesize that white sharks go to islands where seals and sea lions breed. Others disagree because there have been white sharks caught near islands where no seals or sea lions breed.

The time of year white sharks were caught show another pattern. Logs show more YOY and juveniles were caught in summer. There may be several reasons for this. There is more fishing near shore during the summer months when young white sharks could be caught as bycatch. Recently, satellite-tagging data seem to show the YOY white sharks migrate to Mexican waters during winter months. If this is true, then young white sharks would be in southern California during the summer months. Adult white sharks do not appear to migrate, as logs show adults were caught in all seasons.

Very few white shark captures were logged before the 1980s in southern California. This could be because people were not interested in white sharks. It could be because there were fewer sharks in fisheries. Or, it could be because of a lower white shark population. One hypothesis is because marine mammal (seal and sea lion) populations were lower before the 1980s, there was less food available for sharks. This decreased the white shark population. Although the Marine Mammal Protection Act went into effect in 1972, it took almost 10 years for marine mammal populations to recover. This may explain the sharp increase in white shark captures in 1985. Many researchers believe the 1975 movie Jaws increased the public's awareness of white sharks. Because people were more aware of white sharks, they were more likely to report sightings and captures.

The 2009 increase in shark captures could be due to the Monterey Bay Aquarium's White Shark Program, which started in 2002. The Aquarium paid commercial fishers to tag and release sharks that were bycatch. Before this, sharks caught as bycatch may have been released and not recorded in logbooks. Another reason for the 2009 increase may be that the white shark population is increasing. The first year that YOY and juvenile sharks were not caught in gillnets was 1994. It takes 25–35 years for white sharks to reach maturity and reproduce. Perhaps those first YOY and juvenile sharks are now able to reproduce resulting in more sharks.

There are many problems with using fishery data to estimate population trends. Old records may not be accurate or complete. More modern methods such as tagging, aerial surveys, and observations provide more accurate data, but they have not been used long enough to show long-term trends. However, data shows growing marine mammal populations. The gill net ban protects YOY and juvenile white sharks so they can mature. It also protects the fish that YOY and juveniles eat. More food for young and adult sharks and more protection for the sharks themselves have probably led to the white shark population increasing in California in recent years.

Note: Adapted from "Historic Fishery Interactions with White Sharks in the Southern California Bight" by C. Lowe, M. Blasius, E. Jarvis, T. Mason, G. Goodman-Lowe and J. O'Sullivan. 2012. *Global Perspectives on the Biology and Life History of the White Shark*, Chapter 14. Taylor and Francis Group, LLC, a division of Informa plc. Adapted with permission.