

## Threatened fishes of the world: *Carcharodon carcharias* (Linnaeus, 1758) (Lamnidae)

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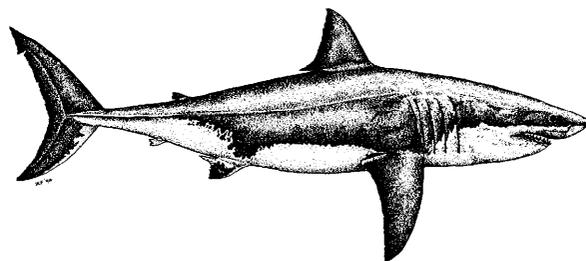
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**Common names:** White shark or great white shark (E), grand requin blanc (Fr), jaquetónblanco (Sp), squalo bianco (It), Weisshai (Ger), white pointer (Aust), hohojirozame (Japan), lamia (G). Also numerous other names.

**Conservation status:** Currently on IUCN Red List in Category K (suspected but not definitely known to be threatened).

**Identification:** A very large stocky, spindle-shaped shark reaching at least 6 m TL. Two spineless dorsal fins and an anal fin; a conical head and moderately long, bluntly conical snout; relatively small conspicuously dark eyes without nictitating eyelids and lateral on head; minute spiracles; five very long gill slits. no nasoral grooves or barbels on nostrils; mouth long, broad, broadly angular, and extending anterior to eyes; massive jaws: no labial furrows; large flat, triangular, serrated bladelike teeth in upper jaw, narrower in lower jaw, tooth row counts 23–28/20–26; first dorsal fin origin over pectoral fin rear tips, a large falcate first dorsal fin, falciform pectoral fins, very small pivot-based second dorsal and anal fins with second dorsal base partly anterior to anal base. upper and lower precaudal pits and strong keels on its caudal peduncle. crescentic caudal fin with an undulated dorsal margin and a long ventral lobe, no interdorsal ridge; dorsal and lateral surface light gray to brownish. bluish or almost blackish, not bright blue but in life sometimes with a coppery sheen, lower flanks and underside abruptly white, usually black spot at axilla and on underside of pectoral fin tips. Drawing by Ian K. Fergusson.



**Distribution:** Wide-ranging in all seas including cold boreal waters in both hemispheres, but most frequently observed and captured in inshore temperate continental waters of the Western North Atlantic, Mediterranean Sea, southern Africa, southern Australia, New Zealand, and the Eastern North Pacific, but occurring elsewhere including other temperate regions, the inshore tropics, the open ocean, and the continental slopes. Apparently can cross ocean basins as with other members of its family and occurs sporadically at oceanic islands such as the Azores archipelago and the Hawaiian islands where it is not known to breed. **Abundance:** Uncommon wherever it occurs compared to other large macropredatory sharks, relatively rare but widely distributed in the tropics. **Habitat and ecology:** The white shark occurs in inshore and offshore waters from the intertidal to the epipelagic zone and the upper slope, from just below the surface (and above it when it occasionally jumps), to just above the bottom. It occurs in the breakers off sandy beaches, off rocky shores, and readily enters enclosed bays, lagoons, harbors, and estuaries, but does not penetrate brackish or fresh water to any extent. It is an active, nomadic, highly maneuverable and agile social animal that shows a wide variety of complex behaviors in interactions between conspecifics and with other marine organisms and humans. It is an apical 'superpredator' with a broad prey spectrum. It prefers marine vertebrates as food, but will also consume larger cephalopods, gastropods, and crustaceans. Bony fish, chondrichthyans, and marine mammals are the chief prey, but it also takes marine birds and reptiles. It will scavenge on fisheries offal, on dead marine mammal carcasses, and on fishes caught in various fishing gear. Larger white sharks tend to consume larger prey, including marine mammals and larger fishes, and smaller sharks tend to take smaller prey. However, white sharks are highly opportunistic feeders and efficient predators and apparently can readily kill and capture a wide variety of prey. Large sharks can and will eat small, relatively helpless prey such as small schooling fishes and benthic invertebrates but they can also chase and capture speedy large preys such as mako sharks, tuna, swordfish, dolphins, and eared seals. White sharks occasionally attack people, but rarely consume them, but the low frequency of attacks on people compared to the abundance of divers and swimmers where they occur, as well as the nature of most attacks, suggest that white shark attacks on people are primarily non-predatory. **Reproduction:** *C. carcharias* is an embryonic cannibal live-bearing shark that produces relatively few large young. Embryos and fetuses are oophagous, eating large numbers of nutritive eggs produced by the mother's ovary. The gestation period is not known for certain, but may be a year or more. There are few records of pregnant females and sparse data on litter sizes (2–11 fetuses). Females mature between four and five meters long and 12–14 years old and may reach an age of about 23 years, while males mature between 3.5 and 4.1 meters long and 9 or 10 years old. Neonates occur in warm temperate coastal areas. **Threats:** These include: (1) Intensified targeted commercial and sports fisheries for trophies (jaws and mounted specimens) and game fish records, fins

and meat. (2) 'Anti-shark measures' including beach meshing operations to protect beaches. (3) Campaigns to kill white sharks after a shark attack occurs. (4) Long-term increases in use and increasing efficiency of a wide variety of commercial and artisanal fishing gear that target other marine organisms but which capture white sharks as a mostly unlisted bycatch. (5) Degradation of inshore habitats used by white sharks for reproduction and feeding due to increasing human pressure. (6) Increasing demand for shark products in general and for white shark products in particular. with fins, jaws and teeth having inflated value and jaws from large white sharks (mostly adults) being sought by collectors that are willing to pay thousands of US dollars per jaw. (7) High capture stress and mortality of white sharks from fishing gear. (8) Lack of knowledge on many and crucial aspects of white shark biology. including population dynamics and reproduction. (9) The negative, largely spurious 'jaws image' associated with the white shark, which invites neglect and atavistic killing of these sharks, as well as disregard of protective measures. (10) Possibly an unusually low fecundity rate for elasmobranchs, with few mature females and very few pregnant females in existence at any time as a function of being a very large apical predator with few natural enemies. (11) The proximity of concentrations of white sharks and breeding areas to highly developed coastal areas (such as California, the Mid-Atlantic Bight, and the Mediterranean Sea), which promotes problems through targeted and bycatch fisheries and habitat degradation. (12) Limited and inadequate, or nonexistent data on white shark catches for most countries where the white shark occurs. (13) Inadequate protective legislation and local enforcement, allowing exploitation and harm to sharks under the guise of science, ecotourism and education, as well as encouragement of an underground sales network ('black market') for highly lucrative white shark products. **Conservation action:** Specifically protected off South Africa, Namibia, and California and Florida in the U.S.A. Protective laws are strict, with bans on trade and molesting of white sharks and heavy fines, but loopholes exist that may partly or completely neutralize existing protective measures. **Conservation recommendations:** (1) CITES listing in support of a worldwide ban in trading in white shark parts to supplement and strengthen local protection and discourage targeted white shark catches. (2) Closing of white shark catch categories on international game angling record lists, to eliminate the status of the white shark as the 'ultimate sports fish'. (3) Educational efforts to supplant the horrific 'Jaws' image with the rather more mundane and more complex behavioral reality of the white shark, much as has been done with terrestrial apical predators that previously had bad reputations as fearsome 'man-eaters'. (4) A major international effort to fund and coordinate research on white sharks, particularly on their behavioral ecology and population biology, comparable to the efforts with tigers and other terrestrial predators. Bona fide white shark research is at present ridiculously underfunded, and very little funding has been allocated compared to profits made from white shark exploitation (including film-making and cage-diving).

**Remarks:** The authors express their concern that protective legislation, including CITES trade bans, may be inadequate to conserve the white shark. Private collectors of white shark parts, big-game sports anglers, some fisheries biologists, and other groups interested in white shark exploitation can be expected to oppose or circumvent protection, while protective legislation cannot prevent white sharks being caught and killed as a bycatch of expanding fisheries for other species. Due to the value of white shark products (including the 'sport' of fishing for them) capture of white sharks will continue, possibly increase, and most likely will go partially underground as countries with concentrations of white sharks continue to outlaw such enterprise. There are a number of nations that have participated in illegal trade in terrestrial species protected by CITES that can be expected to serve as trading-posts in the sale of white shark body-parts despite a possible CITES ban as well as locales where this animal can be fished. Although white sharks were sought as game fishes before the Jaws motion picture, the aftermath of *Jaws* saw the white shark cast as the ultimate monster that quickly attracted all manner of atavistic 'shark hunters' and entrepreneurs that were quick to exploit the animal but which did little to benefit it. The *Jaws* image is virtually archetypal and is almost impervious to rationality. The unknown, solitary, anthropophagous marine monster is so chillingly appealing to the general public (and massively lucrative to exploiters) that the realities of white shark behavior have effectively hidden behind the image for the past few decades and influenced scientific opinion on the behavior of this animal.

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