= Longfin mako shark =

The longfin mako shark (Isurus paucus) is a species of mackerel shark in the family Lamnidae , with a probable worldwide distribution in temperate and tropical waters . An uncommon species , it is typically lumped together under the name " mako " with its better @-@ known relative , the shortfin mako shark (I. oxyrinchus) . The longfin mako is a pelagic species found in moderately deep water , having been reported to a depth of 220 m (720 ft) . Growing to a maximum length of 4 @.@ 3 m (14 ft) , the slimmer build and long , broad pectoral fins of this shark suggest that it is a slower and less active swimmer than the shortfin mako .

Longfin mako sharks are predators that feed on small schooling bony fishes and cephalopods . It is uncertain whether this shark is capable of elevating its body temperature above that of the surrounding water like the other members of its family , though it possesses the requisite physiological adaptations . Reproduction in this species is aplacental viviparous , meaning that the embryos hatch from eggs inside the uterus . In the latter stages of development , the unborn young are fed non @-@ viable eggs by the mother (oophagy) . The litter size is typically two but may be as many as eight . The longfin mako is of limited commercial value as its meat and fins are of lower quality than those of other pelagic sharks ; it is caught unintentionally in low numbers across its range . The International Union for Conservation of Nature (IUCN) has assessed this species as Vulnerable due to its rarity , low reproductive rate , and continuing bycatch mortality .

= = Taxonomy and phylogeny = =

The original description of the longfin mako was published in 1966 by Cuban marine scientist Darío Guitart @-@ Manday , in the scientific journal Poeyana , based on three adult specimens from the Caribbean Sea . An earlier synonym of this species may be Lamiostoma belyaevi , described by Glückman in 1964 . However , the type specimen designated by Glückman consists of a set of fossil teeth that could not be confirmed as belonging to the longfin mako , and thus the name paucus took precedence over belyaevi despite being published later . The specific epithet paucus is Latin for " few " , referring to the rarity of this species relative to the shortfin mako .

The sister species relationship between the longfin and shortfin makos has been confirmed by several phylogenetic studies based on mitochondrial DNA . In turn , the closest relative of the two mako sharks is the great white shark (Carcharodon carcharias) . Fossil teeth belonging to the longfin mako have been recovered from the Muddy Creek Marl of the Grange Burn formation , south of Hamilton , Australia , and from Mizumani Group in Gifu Prefecture , Japan . Both deposits date to the Middle Miocene epoch (15 ? 11 Ma) .

= = Distribution and habitat = =

Widely scattered records suggest that the longfin mako shark has a worldwide distribution in tropical and warm @-@ temperate oceans ; the extent of its range is difficult to determine due to confusion with the shortfin mako . In the Atlantic Ocean , it is known from the Gulf Stream off the east coast of the United States , Cuba , and southern Brazil in the west , and from the Iberian Peninsula to Ghana in the east , possibly including the Mediterranean Sea and Cape Verde . In the Indian Ocean , it has been reported from the Mozambique Channel . In the Pacific Ocean , it occurs off Japan and Taiwan , northeastern Australia , a number of islands in the Central Pacific northeast of Micronesia , and southern California .

An inhabitant of the open ocean , the longfin mako generally remains in the upper mesopelagic zone during the day and ascends into the epipelagic zone at night . Off Cuba , it is most frequently caught at a depth of 110 ? 220 m (360 ? 720 ft) and is rare at depths above 90 m (300 ft) . Off New South Wales , Australia , most catches occur at a depth of 50 ? 190 m (160 ? 620 ft) , in areas with a surface temperature around 20 ? 24 ° C (68 ? 75 ° F) .

= = Description = =

The longfin mako is the larger of the two makos and the second @-@ largest species in its family (after the great white) , reaching upwards of 2 @.@ 5 m (8 @.@ 2 ft) in length and weighing over 70 kg (150 lb) ; females grow larger than males . The largest reported longfin mako was a 4 @.@ 3 m (14 ft) long female caught off Pompano Beach , Florida , in February 1984 . This species has a slim , fusiform shape with a long pointed snout and large eyes that lack nictating membranes (protective third eyelids) . There are 12 ? 13 tooth rows on either side of the upper jaw and 11 ? 13 tooth rows on either side of the lower jaw . The teeth are large and knife @-@ shaped , without serrations or secondary cusps ; the outermost teeth in the lower jaw protrude prominently from the mouth . The gill slits are long and extend onto the top of head .

The pectoral fins are as long or longer than the head , with a nearly straight front margin and broad tips . The first dorsal fin is large with a rounded apex , and is placed behind the pectoral fins . The second dorsal and anal fins are tiny . The caudal peduncle is expanded laterally into strong keels . The caudal fin is crescent @-@ shaped , with a small notch near the tip of the upper lobe . The dermal denticles are elliptical , longer than wide , with 3 ? 7 horizontal ridges leading to a toothed posterior margin . The coloration is dark blue to grayish black above and white below . The unpaired fins are dark except for a white rear margin on the anal fin ; the pectoral and pelvic fins are dark above and white below with sharp gray posterior margins . In adults and large juveniles , the area beneath the snout , around the jaw , and the origin of the pectoral fins have dusky mottling .

= = Biology and ecology = =

The biology of the longfin mako is little @-@ known ; it is somewhat common in the western Atlantic and possibly the central Pacific , while in the eastern Atlantic it is rare and outnumbered over a thousandfold by the shortfin mako in fishery landings . The longfin mako 's slender body and long , broad pectoral fins evoke the oceanic whitetip shark (Carcharhinus longimanus) and the blue shark (Prionace glauca) , both slow @-@ cruising sharks of upper oceanic waters . This morphological similarity suggests that the longfin mako is less active than the shortfin mako , one of the fastest and most energetic sharks . Like the other members of its family , this species possesses blood vessel countercurrent exchange systems called the rete mirabilia (Latin for " wonderful net " , singular rete mirabile) in its trunk musculature and around its eyes and brain . This system enables other mackerel sharks to conserve metabolic heat and maintain a higher body temperature than their environment , though it is uncertain whether the longfin mako is capable of the same .

The longfin mako has large eyes and is attracted to cyalume sticks (chemical lights) , implying that it is a visual hunter . Its diet consists mainly of small , schooling bony fishes and squids . In October 1972 , a 3 @.@ 4 m (11 ft) long female with the broken bill from a swordfish (Xiphius gladias) lodged in her abdomen was caught in the northeastern Indian Ocean ; it is unknown whether the shark was preying on swordfish as the shortfin mako does , or encountered the swordfish in some other aggressive context . Adult longfin makos likely have no natural predators , while young individuals may fall prey to larger sharks .

As in other mackerel sharks , the longfin mako is aplacental viviparous and typically gives birth to two pups at a time (one inside each uterus) , though a 3 @.@ 3 m (11 ft) long female pregnant with eight well @-@ developed embryos was caught in the Mona Passage near Puerto Rico in January 1983 . The developing embryos are oophagous : once they deplete their supply of yolk , they sustain themselves by consuming large quantities of non @-@ viable eggs ovulated by their mother . There is no evidence of sibling cannibalism as in the sand tiger shark (Carcharias taurus) . The pups measure 97 ? 120 cm (3 @.@ 18 ? 3 @.@ 94 ft) long at birth , relatively larger than the young of the shortfin mako , and have proportionally longer heads and pectoral fins than the adults . Capture records off Florida suggest that during the winter , females swim into shallow coastal waters to give birth . Male and female sharks reach sexual maturity at lengths of about 2 m (6 @.@ 6 ft) and 2 @.@ 5 m (8 @.@ 2 ft) respectively .

= = Human interactions = =

No attacks on humans have been attributed to the longfin mako shark . Nevertheless , its large size and teeth make it potentially dangerous . This shark is caught , generally in low numbers , as bycatch on longlines intended for tuna , swordfish , and other pelagic sharks , as well as in anchored gillnets and on hook @-@ and @-@ line . The meat is marketed fresh , frozen , or dried and salted , though it is considered to be of poor quality due to its mushy texture . The fins are also considered to be of lower quality for use in shark fin soup , though are valuable enough that captured sharks are often finned at sea . The carcasses may be processed into animal feed and fishmeal , while the skin , cartilage , and jaws are also of value .

The most significant longfin mako catches are by Japanese tropical longline fisheries , and those sharks occasionally enter Tokyo markets . From 1987 to 1994 , United States fisheries reported catches (discarded , as this species is worthless on the North American market) of 2 ? 12 tons per year . Since 1999 , retention of this species has been prohibited by the U.S. National Marine Fisheries Service (NMFS) Fishery Management Plan (FMP) for Atlantic sharks . Longfin makos were once significant in the Cuban longline fishery , comprising a sixth of the shark landings from 1971 to 1972 ; more recent data from this fishery is not available . The International Union for Conservation of Nature (IUCN) has assessed this species as Vulnerable due to its uncommonness , low reproductive rate , and susceptibility to shark fishing gear . It has also been listed under Annex I of the Convention on Migratory Species (CMS) Migratory Shark Memorandum of Understanding . In the North Atlantic , stocks of the shortfin mako have declined 40 % or more since the late 1980s , and there are concerns that populations of the longfin mako are following the same trend .