

Isurus oxyrinchus (Shortfin Mako Shark)

Family: Lamnidae (White Sharks)

Order: Lamniformes (Mackerel Sharks)

Class: Chondrichthyes (Cartilaginous Fish)

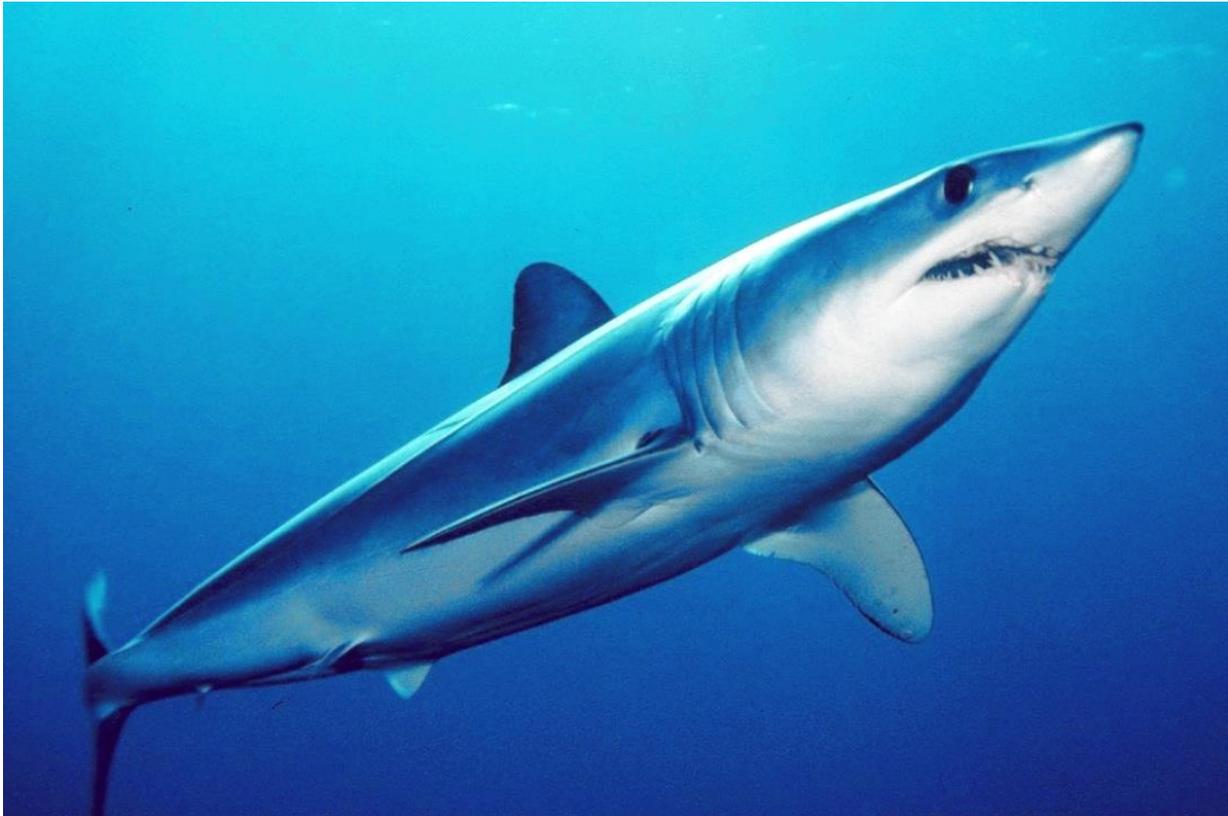


Fig. 1. Shortfin mako shark, *Isurus oxyrinchus*.

[https://en.wikipedia.org/wiki/Shortfin_mako_shark, downloaded 1 March 2016]

TRAITS. *Isurus oxyrinchus* is one of the largest species of sharks (Wikipedia, 2016), with an indigo blue dorsal region, silver sides and white underside which are clearly demarcated (Fig. 1). Juveniles are easily distinguished with a black mark on the tip of the snout. The area surrounding the mouth is white and identifies this species from the longfin mako shark (Passarelli et al., 1995). Sexual dimorphism is observed with males attaining a length of 1.95 m upon maturity and females maturing at a larger size of 2.80 m (Stevens, 1983). Also called the blue pointer, maximum weights of over 500 kg have been recorded but on average, weigh approximately 200 kg (Stevens, 1983). Shortfin mako sharks have large black eyes, five large gill slits, are cylindrically shaped and possess a long, pointed conical snout. Slender, curved, razor-sharp teeth with no lateral cusps are visible when the mouth is closed (MarineBio, 2013). Distinctive features include a crescent shaped caudal fin with a single keel at the base and short pectoral fins. This together with the hydrodynamic and streamline nature of the shark allow for speeds of 30 mph and agility (Passarelli et al., 1995).

DISTRIBUTION. *Isurus* is found in the Atlantic, Indian, Pacific and Mediterranean oceans (Fig. 2). Gulf and Caribbean Fisheries Institute report that shortfin mako sharks were sighted and examined in Trinidad and Tobago (Chang A Shing, 2016). Thus, this species is not native to one area but is found widespread in tropical and temperate regions with blue water (Cailliet et al., 2009). This is due to long distance travelling undertaken to find adequate food supply and compatible mates (Martin, 2003).

HABITAT AND ACTIVITY. Given that *Isurus* is a migratory species, areas defended by the organisms (territories) are unknown. Studies off the coast of Chile determined that sharks migrated on average 27km per day. This pelagic (open-water) species occupies water from the surface to depths of 900m at which diurnal foraging is observed (Abascal et al., 2011). Generally the blue pointer inhabits water far out at sea but have been seen near the shore (Cailliet et al., 2009). Optimum habitat temperatures range from 17-20°C but the sharks maintain body temperatures slightly higher than in their environment to facilitate higher levels of activity (Passarelli et al., 1995). Pregnant females migrate to the warm waters near San Diego to deliver pups. Hence, from spring to autumn there are increased numbers of juveniles surrounding the California Bight. Another core area for birth, mating and development is off the coast of Brazil (Cailliet et al., 2009).

FOOD AND FEEDING. This apex (top) predator consumes 3% of its body weight daily and the diet includes: tuna, mackerel, bluefish (bony fish) in a high proportion and other small sharks including grey and blue sharks. Cephalopods, porpoises and sea turtles constitute a smaller percent of the diet (Stillwell and Kohler, 1982). Switching between prey types may stabilise prey numbers that fall too low (Bridge et al., 2013). The strategy employed by this predator entails swimming below the prey and thrusting out to the surface before the prey has time to react. The lateral line found along the body and the Ampullae of Lorenzini aid in sensing prey due to water pressure differences (Bridge et al., 2013). The specialised design of the mouth and teeth allow for effective predation. By removing caudal fins of unsuspected prey it results in immobility. Though renowned for speed and agility, *Isurus oxyrinchus* suffers from external injuries inflicted oftentimes by the broadbill swordfish, another of its prey. These injuries include: losing the tip of the clasper in males and bite marks or scars (Cliff et al., 1990).

POPULATION ECOLOGY. Shortfin mako sharks are typically solitary (Bridge et al., 2013). Pregnant females are well dispersed, to increase the survival rates of pups that are preyed upon by other oceanic predators like the white shark or adult shortfin mako sharks. At nurseries off Brazil and San Diego, small groups of unrelated juveniles are observed (Cailliet et al., 2009). Age is estimated by the vertebral growth bands, as one ring is produced annually. The blue pointer has an average lifespan of 29-32 years with females possessing higher life expectancy (Passarelli et al., 1995).

REPRODUCTION. Very little information has been published about reproduction in this species because once captured females abort embryos (Passarelli et al., 1995). Courtship, mating and breeding all occur in late summer. It is promiscuous as no bonds are formed between the pair. Based on scars inflicted by males on female bodies, the mating process is violent and aggressive (Mucientes et al., 2009). Gestational periods last on average 9 months and the reproductive cycle occurs every 2-3 years with females afforded an 18 month break in between.

The litter size ranges from 4-25 but not all survive as some eggs are devoured by babies in the mother's womb (Fig. 3) (Stevens, 1983). This ovoviviparous species (no placental connection) deliver pups that are miniature adults of 70 cm in length (Fig 3). There is no paternal investment and maternal care ceases once pups are born (Passarelli et al., 1995).

BEHAVIOUR. Juveniles are left to defend themselves against predators hence survival rates are low. An anti-predatory mechanism is countershading, the dark coloration of the skin, so light rays reflected on *Isurus* results in self-shading and less detection by predators (Passarelli et al., 1995). Coloration intensifies with age so juveniles are not as dark on the dorsal surface as compared to adults. Owing to solitary lifestyles, little information is known about communication among individuals (Bridge et al., 2013). Attributed to these fast swimmers is a keen sense of smell as neurosensory cells are located in the lamellae behind the nares (nostrils). Vision is precise even in low light conditions as millions of rod cells comprise the eye. The ability to feel around the environment is a result of nerve endings in the skin and mouth. These factors influence predatory behaviour.

APPLIED ECOLOGY. *Isurus* is listed as being vulnerable by the IUCN (Cailliet et al., 2009). Juvenile sharks are prey for other fish but the adults are apex predators who face little rivalry. Humans pose the greatest threat to *Isurus* stemming from overexploitation. In Ecuador, catches of *Isurus* have declined from 2,000 tonnes in 1994 to lows of 100 tonnes in 2000 and 2001 (Cailliet et al., 2009). The blue pointers are poached as high quality meat, the hides for leather, oil for vitamins and fins for shark-fin soup. In fishing tournaments the shortfin mako sharks are sought after as big catches (Cailliet et al., 2009). Longline fisheries exist in Italy, off Africa, Cuba, Mexico and southern California (Martin, 2003). The U.S. National Marine Fisheries Service attempts to manage population numbers by reducing commercial and recreational catches by half (Passarelli et al., 1995). Currently fish are unmanaged in Trinidad and Tobago with legislation only limiting mesh size and the length of nets used (Fisheries Act. Act 39 of 1916 cited by Chan A Shing, 2016). Amendments are to be made in collaboration with the United Nations Development Programme.

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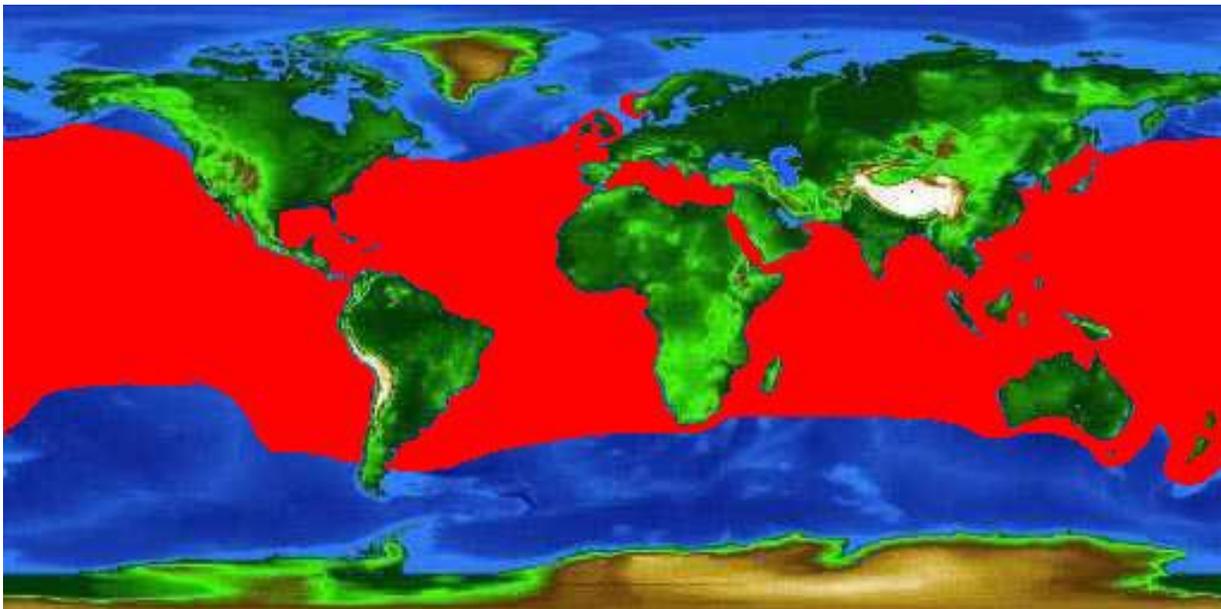


Fig. 2. Shortfin mako shark geographic distribution (red).

[<https://www.flmnh.ufl.edu/fish/discover/species-profiles/isurus-oxyrinchus>, downloaded 29 January 2016]



Fig. 3. Ovophagous (egg-eating) baby shortfin mako shark.

[<http://australianmuseum.net.au/oophagous-sharks>, downloaded 11 March 2016]

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