

Sphyrna mokarran (Great Hammerhead Shark)

Family: Sphyrnidae (Hammerhead Sharks)

Order: Carcharhiniformes (Ground Sharks)

Class: Chondrichthyes (Cartilaginous Fish)



Fig. 1 Great hammerhead shark, *Sphyrna mokarran*.

[<http://carnivoraforum.com/topic/9333395/1/>, downloaded 10 March 2015]

TRAITS. There are eight species of shark in the genus *Sphyrna*. Of all eight species, the great hammerhead shark is the most massive in size. A mature male ranges from 2.2-2.7m and a mature female 2.5-3m (Bester, 2012). In adult great hammerheads, the broad area of the head is called the cephalofoil, which features a straight front margin with a shallow notch in the centre, distinguishing it from other hammerheads. The fins are sickle shaped. The anal fin has a deeply notched posterior edge. Dark brown to light grey or olive hues are found on the posterior side on the back the great hammerhead, fading to white on the underside (Bester, 2012). The great hammerhead has teeth that are highly adapted for slicing though prey, they are sharp triangular teeth, which are sharply angled, pointing in the direction of the edge of the mouth. The great hammerhead shark is a pelagic shark so must continue to swim in order to breathe, and stay alive. The cephalofoil serves as a lift to keep the shark suspended above the ocean floor (Bester, 2012).

DISTRIBUTION. The great hammerhead shark is widely distributed in pelagic and coastal waters, of the western Atlantic Ocean, in the Caribbean, mainly over continental and island shelves and the Gulf of Mexico and off the coast of Southern Florida. They have been found as far south as Uruguay (Hammerschlag et al., 2011). The shark can be found in waters ranging far offshore, as well as in shallow coastal habitats and near surface waters to depths of over 80m. Some populations of the great hammerhead move polewards to the cooler oceanic waters during the summer, while some populations choose not to make open ocean transoceanic movements (Compagno, 1984). Following their prey is part of the reason why they migrate (Hammerschlag et al., 2011). Studies by Hammerschlag et al. (2011) show that the sharks remained in the southwestern part of the Atlantic Ocean for about one month during February, then migrated further north as the summer months neared. The hammerhead therefore appeared to follow the northeastern pathway of the warm Gulf Stream, and their movements were related to the tracking of their prey (Hammerschlag et al., 2011).

HABITAT AND ACTIVITY. Great hammerhead sharks are coastal, often inhabiting warm coastal waters of the Caribbean generally in semi-oceanic waters near continental shelves (Compagno, 1984). In the Atlantic Ocean they can be found as far offshore as 300m and in shallow waters such as continental shelves and lagoons of coral atolls. They feed mostly at dawn and dusk and are therefore crepuscular.

FOOD AND FEEDING. The great hammerhead shark is an apex predator; it therefore occupies the top of the marine food chain (Bester, 2012). They feed on the seafloor at dusk or dawn foraging for food (Bester, 2012). The cephalofoil provides lift and mass at the head for the shark, so the pectoral fins can be smaller, thus making the hammerhead shark move with great agility, and maneuverability for its large size to capture prey, capturing prey with sharp, quick movements (Compagno, 1984). They have a varied diet, including other smaller sharks, bony fish including grunts, groupers, jacks and catfish and marine invertebrate such as octopus, crab or squid. The meal they favour the most however are stingrays and skates. Great hammerhead sharks were entangled in fishing nets off the coast of South Africa (Ruppell, 1995). Elasmobranchs (cartilaginous fish) were found in most of the non-empty stomachs of the sharks, and there was a great number of bottom dwelling fish such as stingrays and guitarfish present in the diet (Ruppell, 1995).

The broad region of the cephalofoil expands the surface area of the region containing the Ampullae of Lorenzini which are electroreceptive sensory organs (Bester, 2012). These are receptors below the shark's skin, used to detect electrical impulses of prey species, such as the ray buried on the ocean floor (Compagno, 1984). The expanded surface area for sensory organs serves as an effective hunting tool to allow the great hammerhead to locate rays effectively (Compagno, 1984). Studies of the morphology of the hammerhead shark show that they use their cephalofoil in prey handling for stingrays and skates as observed in the Bahamas. The great hammerhead shark uses its broad cephalofoil to thrust it into the stingray's middorsum, sending the ray to the bottom of the ocean floor with great force. The stingray may try to rebound, but has little luck as the great hammerhead shark tend to hit it with a second blow, pushing the ray's body to the sand bottom of the ocean's floor and taking a crescent-shaped bite out of the ray or skate. Eyes spread far apart on the cephalofoil is also thought to give the shark a wider field of vision to locate prey with more ease. The great hammerhead shark is also thought to be cannibalistic, and may eat each other if food is scarce. They occupy a special niche in

maintaining the long term health of the coastal marine ecosystems as apex predators (Myers et al., 2007).

POPULATION ECOLOGY. The great hammerhead shark is a generally solitary, nomadic species hunting for food on its own unlike its cousin, the scalloped hammerhead shark, which prefers to hunt in schools. The shark is long lived, with an average life span of approximately 32-39 years with females living seven years longer than males (Hammerschlag et al., 2011). Since they are solitary species, they are unlikely to be abundant wherever they occur.

REPRODUCTION. The great hammerhead shark is viviparous, the young develop inside of the body of the shark, and nutrition to the young is provided through a yolk sac called the placenta. The great hammerhead reproduces every two years (Bester, 2012) Birth of these sharks occurs in the Northern Hemisphere during the time periods of summer or spring after a gestation stage of 11 months (Bester, 2012). From 6-42 pups can be found in litters, and they can measure between 60-70cm in length (Bester, 2012). As the pup is young, the cartilaginous head is still soft and the head margin is curved. It straightens up as the shark approaches maturity (Bester, 2012). The mating site for these sharks are near the surface of the water, a case of this mating scenario has been observed in the Bahamas (Bester, 2012).

BEHAVIOUR. Antipredator behaviour: The great hammerhead shark is an apex predator so is not fed upon by other marine animals, although larger bull sharks will prey on juvenile great hammerheads (Bester, 2012). Communication: The male great hammerhead sharks often display aggression to one another, may bite and attack one another to mate with a female. Juvenile behaviour: after the pups are born, they are abandoned and move as solitary sharks which do not communicate with family or work with other great hammerhead sharks to defend territory after their abandonment at birth.

APPLIED ECOLOGY. The great hammerhead shark is on the IUCN's list for an endangered species throughout its geographic range (Bester, 2012). Conservation threats and actions: In 2013 a petition was made by the Natural Resource Defense Counsel to list the Northwest Atlantic distinct population of great hammerhead sharks as threatened by overfishing under the endangered species act, based on a suspected decline of 50% over the past 10 years caused by overfishing. Utilization by harvesting and hunting: The great hammerhead shark is fished recreationally and commercially for sport and their fins are highly prized on the Asian market for shark fin soup. They are also fished for their liver oil which is used in vitamins (Bester, 2012). They are also valued for their hides which provide leather.

REFERENCES

- Bester, C. (2012). Ichthyology at the Florida Museum of Natural History: Great Hammerhead. Available at: <http://www.flmnh.ufl.edu/fish/gallery/descript/greathammerhead/ghammerhead.html>. Downloaded 9th March, 2015.
- Compagno, L.J.V. (1984). FAO species catalog. Sharks of the world. An annotated and illustrated catalog of shark species known to date. Part 2. Carcharhiniformes. *FAO Fisheries* **125**:251-655
- Hammerschlag et al. (2011). Range extension of the Endangered Great hammerhead shark *Sphyrna mokarran* in the Northwest Atlantic: *Preliminary data and significance of conservation. Endangered Species Research*.**13**: 111-116
- Myers, R.A., Baum, J.K., Shepherd, T.D., Powers, S.P. and C.H. Peterson. (2007). Cascading Effects of the Loss of Apex Predatory Sharks from a Coastal Ocean. *Science* **315**: 1846-1850.

Rüppell (1995). Sharks caught in the protective gill nets off KwaZulu-Natal, South Africa. The Great hammerhead shark *Sphyrna mokarran*. *South African journal of Marine Science* **15**

Wesley R. Strong, Jr., Franklin F. Snelson, Jr. and Samuel H. Gruber (1990). Hammerhead Shark Predation on Stingrays in *An Observation of Prey Handling by Sphyrna mokarran* **3**: 836-840

Author: Kristen Gomes

Posted online: 2015

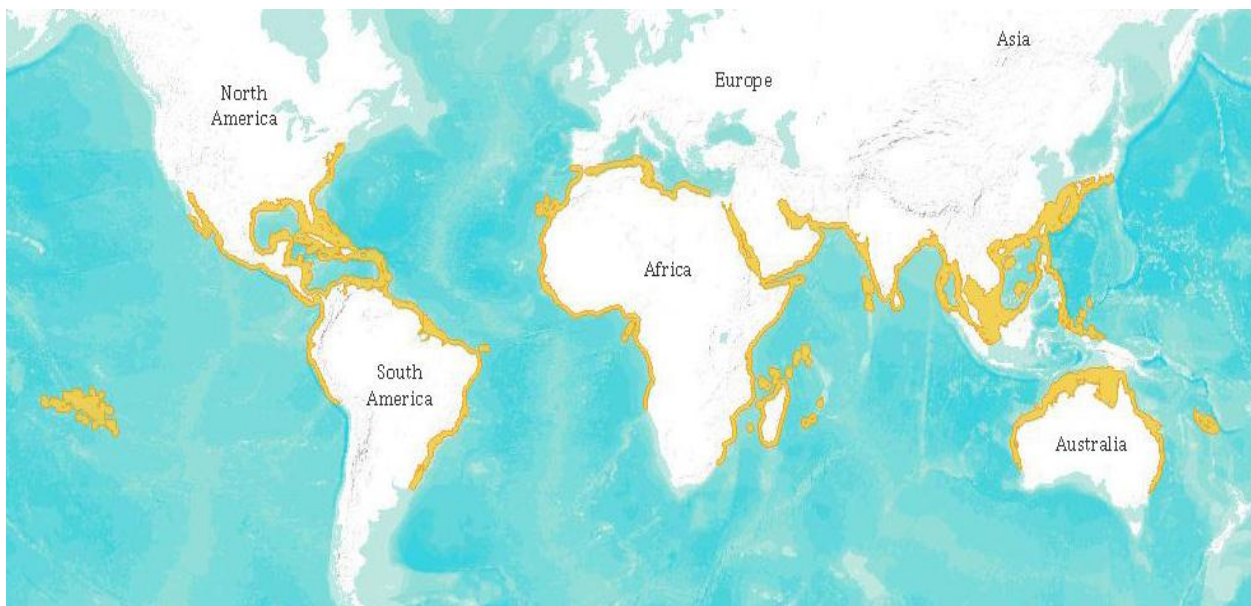


Fig. 2. The great hammerhead shark geographic distribution.

[<http://maps.iucnredlist.org/map.html?id=39386>, downloaded 28 March, 2015]



Fig. 3. A great hammerhead shark feeding on a small bony fish.

[<http://www.discoveryuk.com/dni-media/mu-72/media-97736-346406.jpg>, downloaded 28 March, 2015]



Fig. 4. A great hammerhead shark swimming close to the seafloor in search of prey.

[<http://www.arkive.org/great-hammerhead/sphyrna-mokarran/image-G13075.html>, downloaded 28 March, 2015]