

Sphyrna tiburo (Shovelhead or Bonnethead)

Family: Sphyrnidae (Hammerhead Sharks)

Order: Carcharhiniformes (Ground Sharks)

Class: Chondrichthyes (Cartilaginous Fish)



Fig. 1. Shovelhead, *Sphyrna tiburo*.

[http://tiburonesengalicia.blogspot.com/2014_05_01_archive.html, downloaded 2 April 2015]

TRAITS. *Sphyrna tiburo*, known locally as shovelhead, also called bonnethead, is distinct from the other nine hammerheads (Sphyrnidae) by being the smallest and possessing a characteristic spade-shaped head. Dorsal: small, dark spots on grey/brown, smooth skin (Fig. 1); lighter grey/white ventrally. The maximum published weight for *S. tiburo* is 10.8 kg. At birth, the young shovelhead is 30-32cm long (Kajiura et al., 2003). Sexual dimorphism is also evident: females (larger) grow to length of 140cm compared to males: 100cm (Lombardi-Carlson et al., 2003). On achieving sexual maturity, males develop a prominent bulge on their cephalofoil (anterior margin of the hammer); females have evenly rounded margins; males possess claspers to clutch females during reproductive activities; absent in females. It has a compressed head with eyes to the side of the margin (enhances field of vision); nasal grooves are anterior to the eyes. It has a ventral, arched mouth, with additional rows of teeth which replace older, worn teeth and flattened molars to crush prey items (Kajiura et al., 2003). The animal's body structure is relatively compact: the first dorsal fin (tallest fin), begins just above the termination point of the two short pectoral fins; second dorsal fin is considerably smaller, situated above the even smaller anal fin. The caudal (tail) fin has a lower lobe that is just about one third the size of the upper lobe.

DISTRIBUTION. *S. tiburo* prefer coastal tropical and subtropical waters (10-15m in depth), favoring the northern hemisphere of the West Atlantic and East Pacific. On the Atlantic coast, they range from New England (North America) to Brazil in the south. They inhabit the Caribbean Sea, and on the Pacific Coast, they are limited to the waters between Southern California and Ecuador (Fig. 2). During the colder months of winter, spring and autumn, the shovelheads migrate from the northern locations such as Georgia and California to warmer equatorial waters, such as the Gulf of Mexico and Florida. The species is native to Trinidad and Tobago (Cortés, 2005).

HABITAT AND ACTIVITY. Shovelheads inhabit warm shallow bays, estuaries, continental shelves and coral reefs (Fig. 3). They prefer waters of 21°C. The combination of shallow and warm water limits their habitat range, and consequently, they inhabit waters disturbed by human activities (since these locations are also favoured by fisher-folk and recreational users). *S. tiburo* is continuously active during the day and night (a requirement, since they are 'ram positive' meaning that they must move to replenish gills with fresh, oxygenated water) (Lombarde-Carlson et al., 2003). However, they conduct most of their activities such as competition for prey (patrolling and hunting), avoiding predators, migration, courtship and copulation during the day and late afternoon- diurnal (Myrberg and Gruber, 1974).

FOOD AND FEEDING. Different *S. tiburo* populations feed on similar prey but the quantities of each varies with season and geographic location (Cortés et al., 2006). However, a strong predator-prey relationship exists between *S. tiburo* and the crustacean *Callinectes sapidus* (blue crab) - its primary prey - while subsequent prey may include but not be limited to molluscs, small fish, and shrimp. Sea grass has been found in the stomach contents of populations worldwide and may be ingested accidentally, or be used to move food along the intestinal tract (Cortés et al, 2006). Populations which live in bays have a less diverse diet as compared to those which live in the open oceans near beaches (the species exhibit dietary shifts depending on habitat and season). Within the food chain, *S. tiburo* is a predator, however its trophic level (feeding level/position) is not at the top because it falls prey to larger shark species. *S. tiburo* hunt by slowly approaching the unsuspecting animal and upon reaching an ideal distance, they rapidly accelerate just before attack. They also burrow beneath corals to intensify their search which effectively utilizes electroreceptors on their rostrum (nose) by back and forth sweeping head movements to detect electrical signals emitted from prey organisms (for example heart beats), alongside excellent hearing and vision (Kajiura et al., 2003). The amount of ingested food is correlated to size and maturity, with larger, more mature individuals consuming more than smaller immature ones. The sexual dimorphism in the species also implies that females consume more than their smaller male counterparts. Also, females ingest more since they give birth to live young (viviparous) which obtain their nutrition from the mother (Cortés and Parsons, 1996).

POPULATION ECOLOGY. Schools of *S. tiburo* typically contain about 15 unrelated individuals but large groups of hundreds or thousands are common during migratory periods due to converging populations (large abundance of individuals). High population growth rates (up to 28% per year) and low generation cycling times (4-5 years on average) were observed off Florida's west coast in 1996 when Cortés and Parsons conducted studies on two populations of *S. tiburo*, comparing their demography (study of populations). The annual survivorship range for individuals within any population is between 55-81%. The average life expectancy for an individual is 5-6 years (males) and 6-7 years (females).

REPRODUCTION. Shovelheads are viviparous (Fig. 4) and exhibit seasonal reproductive patterns/cycles (Gelsleichter et al., 2003). Typically, *Sphyrna tiburo* mate during spring or autumn. Female shovelheads have the capability to store sperm up to four months after mating, which gives them control of fertilization, so the offspring can be born during conditions optimum for survival. There have been reports of offseason breeding. Furthermore geographical variations in reproductive behaviour are evident as two populations of shovelheads in Tampa Bay and Florida Bay demonstrated different size/age of maturation, fertilization/embryonic development periods, birth size, gestation periods and infertility prevalence rates. However, gestation periods are still the shortest among shark species, being only 4-5 months long. In shallow, grassy nursery grounds (Fig. 5), females give birth to an estimate of 12 pups (Kajiura et al., 2003) during late summer or early fall. Juveniles within the population risk falling prey to adults upon birth due to their vulnerability and small size, since there is a lack of parental care (Kajiura et al., 2003). Their survivorship rate is increased by the mothers losing their desire to feed after giving birth and males moving away from the offspring/ nursery grounds) (Cortés and Parsons, 1996). Shovelheads achieve sexual maturity between 2-3 years after birth, depending on their geographical location (Kajiura et al., 2003).

BEHAVIOUR. Shovelheads use unique body movements and swimming patterns to conduct social activities within a school which may include coordinated swimming in lines of about five individuals, physical contact, in which an individual hits another between the dorsal fins with its snout, snapping of jaws and back hunching. Even though the shovelhead has the smallest ‘hammer’ in the Sphyrnidae family which can potentially influence their detection and perception of smell, experiments suggest that their response to chemical odour changes are as good as the other members of Sphyrnidae. Juveniles and younger individuals have been observed to be more erratic in their behaviors towards patrolling/hunting as compared to the adults (Myrberg and Gruber, 1974).

APPLIED ECOLOGY. *S. tiburo* is hunted by man for the production of fishmeal and as a food source. Approximately 22,000 shovelheads were captured annually between 1996 and 1999 for recreation and commercial use, but the species is still ranked as ‘least concern’ on the IUCN Red list due to its high reproductive vigour, large litter size, short generation cycling periods, short lifespan and early maturation age (Cortez and Parsons, 1996). In the USA, *S. tiburo* is classified as a ‘small coastal species’ which gives it protection under fishing regulations controlling overexploitation (Cortez and Parsons, 1996).

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Fig. 2. *Sphyrna tiburo* geographical distribution.

[<https://sites.google.com/site/islandecology2011/bonnethead-shark>, downloaded 2 April, 2015]



Fig. 3. *Sphyrna tiburo* patrolling in a coral reef habitat.

[<http://carlostepape.photoshelter.com/image/I00001bZv5BXQ3ns>, downloaded 2 April, 2015]

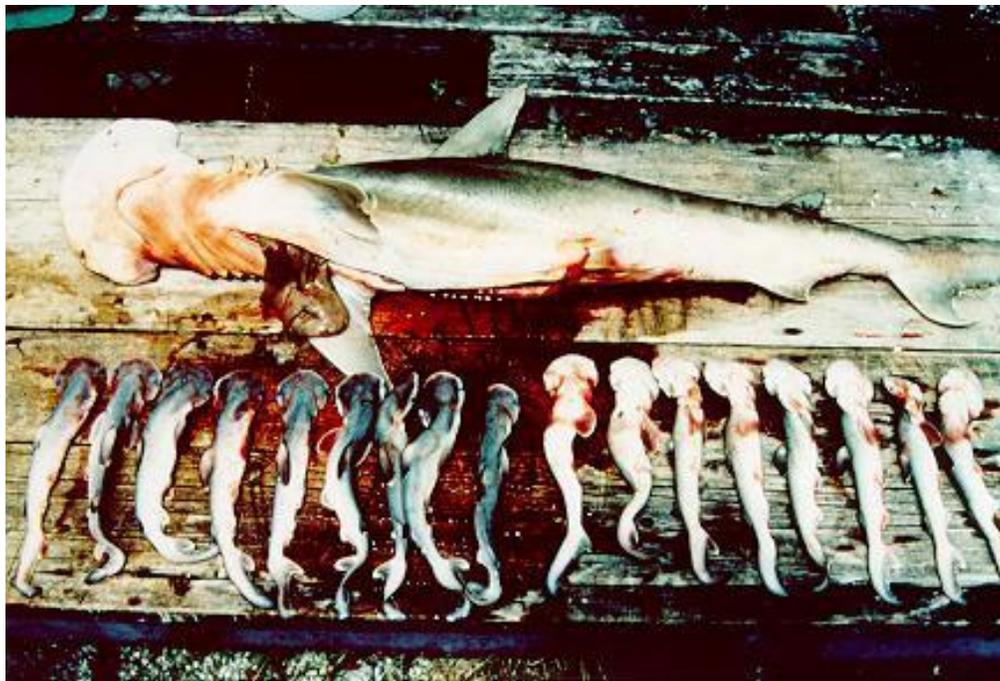


Fig. 4. Deceased female *Sphyrna tiburo* with seventeen stillborn offspring.

[<http://www.flmnh.ufl.edu/fish/gallery/descript/bonnethead/bonnethead.html>, downloaded 2 April, 2015]



Fig. 5. *Sphyrna tiburo* swimming over shallow nursery grounds with seagrass.

[http://www.dep.state.fl.us/coastal/habitats/seagrass/images/Seagrass_Shark2.jpg, downloaded 2 April, 2015]

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