



**Handbook**  
**on**  
**Sharks of Indian Waters**

**(Diversity, Fishery status,  
Trade & Conservation)**

**K. Venkataraman  
M.C. John Milton  
K.P. Raghuram**

**ZOOLOGICAL SURVEY OF INDIA**

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*Edited by the Director, Zoological Survey of India, Kolkata*



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# Handbook on Sharks of Indian Waters

## (Diversity, Fishery status, Trade & Conservation)

2003

1-113

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## INTRODUCTION

The sight of triangular fins slicing through the water usually elicits immediate fear, distress or panic in people. Response to such sightings is normally to say that a shark or a school of sharks is nearby, preparing to attack. Sharks the shadows in the sea have long been depicted as evil, sinister culprits inhabiting our ocean and estuaries (Schwartz, 1984). From time immemorial sharks have been the objects of amusement for the sea-faring men and anglers and they were fished for sports. At certain times of history they were dreaded as monsters of the sea because of the ravage they wrought on bathers, fishermen and their boats. Even the very appearance of a heavily built creature with open mouth full of sharp and ferocious teeth and black fins gives a fearsome apparition to unarmed people taking bath in the shallow waters (Devadoss, 1996). Sharks were considered of limited interest from the economic point of view but the increase in the value of its meat and other derivatives in the global market has resulted in the sudden emergence of exclusive shark fishery which has almost resulted in the total depletion of various species of sharks in the world.

Of all the 350 species of sharks inhabiting the seas of the globe, only less than 35 species are aggressive and attack human beings, boats and other objects (Compagno, 1984). In India the exact number of shark species inhabiting the seas is not known clearly till today. The lists put forth by various workers give different numbers of sharks. There are 72 species of sharks enlisted in this work; it is a compilation of lists given by previous workers (Compagno, 1984; Hanfee, 1996a; Savaria *et al.*, 1994; Sivasubramaniam, 1992; Talwar, 1984; Pillai and Parakal, 2000; Raje *et al.*, 2002)

Sharks are cartilaginous fishes. They do not have true bone in the skeleton. Unlike the true bony fishes, they have no overlapping scales but the skin is covered by variously shaped, usually minute bony plates (denticles) which give them the characteristic sand paper like texture (shagreen). There are no sutures in the skull and the skeleton is never ossified. There are 5 to 7 pairs of gill slits, not covered by an operculum and the males have paired copulatory organs (Talwar, 1984).

### Importance in the Ecosystem

At present more and more people are starting to respect and appreciate sharks for what they are : beautiful, graceful, efficient and above all integral members of the ocean food chain (Benchley, 2000). The elasmobranchs as a group occupy the role of top predators in the marine food web (Weber and Fordham, 1997). Sharks are the top predators of the sea. Great white sharks are among the true apex predators in the ocean

being the largest predatory fish in the world and having few natural enemies. And so, in balanced nature, there are not many Great whites and the number grows or shrinks depending on availability of food. Many pups don't survive the first year because of other sharks, including great whites, preying on them. They live in cool to warm waters along the coasts of America, North and South Africa, the Mediterranean, Japan, China, Korea, Australia, Indian Ocean and New Zealand. Great whites play a vital role in maintaining the ecological balance of the marine environment (Macquitty, 1992).

Great whites are often seen near seal colonies, where they prey on both adults and young. Great white sharks eat variety of animals including bony fishes (*i.e. Cabezon*), other sharks (*i.e. Leopard Sharks*), some sea birds, penguins, marine mammals (Seals and porpoises) and occasionally human beings. They are also scavengers and eat whale carcasses and other dead animals. Whale sharks feed on planktons (small animals that drift in the sea), small fishes and squids. They scoop up water into their huge mouths and as water passes over their gills and out through their gill slits, food is strained in filters attached to the gills. They occasionally eat larger fish such as mackerel and tuna (Macquitty, 1992; Stonehouse, 1998; Benchley, 2000).

### Shark attacks

Sharks attack humans occasionally. Host of books, articles, fictions and films are available on shark attacks. In spite of this fanfare there are relatively few dangerous sharks. Although the threat of shark attack is real one, it is frequently over exaggerated. It often seems as though the news media strives to convey the impression that tropical seas are infested with man-eating sharks constantly in search of a meal. Of the approximately 400 known species of the world, only a few, mainly belonging to the families Carcharhinidae and Lamnidae (*i.e. bull sharks, tiger sharks, oceanic white tips and Great whites*) are considered dangerous. Even with dangerous species, attacks are rare and generally occur under unusual circumstances, for example in traumatic situations where human blood is released into the water or if lured by the spear fishing activities of the divers (Compagno, 1984).

Sharks attack about 50 to 75 people each year in the world, but only 5 to 10 of these reported attacks result in death. Attacks may occur when a shark mistakes a person for its normal prey or biting a foot that looks like a fish. A shark may attack if it feels threatened or provoked. Most fatal shark attacks occur where people surf, swim or scuba dive and where there are large sharks like the Great whites swimming close to the shore. Each year the International Shark Attack File (ISAF) records the number of shark attacks reported. According to the ISAF records, in the past hundred years Great white sharks have alone killed roughly about 75 people. The huge majority of shark encounters consists of brief confrontation without attack or injury and go unreported. Nevertheless, there are a few species that have been implicated in a number of attacks over the years

and should be given a wide berth. These include the Great white shark, mako and tiger shark (Stonehouse, 1998).

In Australia between 1876 and 1999, 52 attacks by Great whites were recorded and of them 27 were fatal. In the Mediterranean Sea since 1900 there have been 23 reliably recorded encounters with great whites, including one in 1909 in which the remains of two adults and a child were found inside a single 15 foot long female shark caught off Augusta, Sicily. According to ISAF, number of attacks by great whites has increased worldwide. This is partly because more people (divers, surfers and swimmers) are using the water. Though not fatal, sharks other than Great whites are known to attack human beings for defense or when excited or provoked (Macquitty, 1992). No records are available on the shark attacks in the Indian waters.

Curiously there has been relatively little progress over the past 50 years in the development of shark repellents. Dyes have been tried; so have chemicals and bubble curtain. The current state of the art uses electricity. So far, nothing has been proved to discourage a hungry great white in full attack (Benchley, 2000).

### **Problems in Understanding and assessing the status of shark population**

The knowledge about sharks has gained importance only in the recent past, after the much hyped movie 'Jaws' on the killer white shark. Its trade has also brought economic wealth to the fishermen throughout the world. The scarce knowledge of these vulnerable creatures is due to certain limiting factors. They are as follows :

#### **Lack of Biological Data**

The value of shark meat was greatly exceeded by that of many teleosts like tunas, mackerels, snappers, groupers etc., thus the impetus was on the elucidating the biology of valuable teleosts. Furthermore, prior to the emergence of the commercial shark fisheries of the middle 1980's more ichthyologists and fishery scientists studied teleosts and ignored sharks. Consequently, only a handful of the species of sharks involved in intense fisheries in developed countries were studied. Due to scarce research money and logistical problems, progress in shark biology continues to be slow.

#### **Lack of fisheries data**

Most fisheries don't report shark landings by species. All shark species and often all elasmobranchs are invariably humped together. Lack of catch or landing statistics by species-wise or by higher taxonomic level to quantify fishing mortality of a given species of shark or species complex. In few cases where fisheries departments do have good statistics, they are often reluctant to publish such data because they fear that restrictions will be placed on their fishing activities. The migratory pattern of some targeted shark

species complicate the analysis of fisheries data. They are caught by various fisheries in two or more countries making it often difficult to determine the total catch.

### Lack of suitable models

The scarcity of data on the size of the shark populations or stocks and lack of suitable population models to assess the impact of fishing and trade of sharks are the reasons for not being able to produce the exact numbers of shark species roaring in the Indian waters (Castro *et al.*, 1999).

### List of Sharks in India

According to Hanfee (1996a) literature available on the sharks of the Indian Ocean is scarce; hence the exact number of shark species inhabiting the Indian waters couldn't be determined. Indian sharks come in different sizes. Various researchers have tried to specify the size of shark in catches and that gives us a fair idea about the length of the species inhabiting the Indian waters. More than 50 % of the sharks found in the Indian Ocean are on an average 2 – 4 meters in length. Some like the thresher sharks *Alopias* spp., measure about 3 – 5 meters. On the other hand, the Whale sharks *Rhiniodon typus*, considered to be the largest living fish, attains a length of about 12 meters. Whale sharks, however, are not important from the commercial point of view (Sivasubramaniam, 1991).

### Indian Sharks

Day (1875 – 78; 1889) reported a total of 67 species consisting of 41 sharks (including saw fishes), 19 rays and 7 skates. According to Misra (1969) 78 species of elasmobranchs are known including 51 sharks (including saw fishes), 20 rays and 7 skates in the Indian Seas of which 76 are commercially important. Talwar (1984) reported 76 species of commercially important elasmobranchs. Compagno (1984) listed 55 species of sharks from the Indian Ocean. According to Sivasubramaniam (1992) there are about 40 species of pelagic sharks belonging to five families in the Indian Ocean. Nearly 75 % of these belong to the family Carcharhinidae (requiem sharks). While 25 % of the species are restricted to small pockets, another 30 % are wide spread in the Indian Ocean. The remaining are insular inhabiting the inshore and offshore waters of the Indian Ocean littoral. Hanfee, (1996a) has enlisted nearly 68 species of sharks occurring on the Indian Coast. Pillai and Parakal (2000) prepared a list of 49 species of pelagic sharks inhabiting the Indian coastal waters. Raje *et al.* (2002) have reported 66 species of sharks in the Indian waters. The number of synonyms used for a single species of shark is the main obstacle for the preparation of a standard list of Indian sharks. The list of Indian Sharks given in the present text is the compilation of the previous lists put forth by various workers. According to the available literature on the diversity of sharks, around 72 species of sharks inhabit the Indian waters as detailed below (Annexure 1).

## LIST OF SHARK SPECIES DESCRIBED

- Class CHONDRICHTHYES (Cartilaginous fishes)  
 Subclass ELASMOBRANCHII (Sharks, Skates and Rays)  
 Order HEXANCHIFORMES  
 Family HEXANCHIDAE
- 1) *Heptranchias perlo* Bonnaterre, 1788 (Sharpnose seven gill Shark)  
 Order SQUALIFORMES (Dogfish sharks)  
 Family ECHINORHINIDAE (Bramble shark)
- 2) *Echinorhinus brucus* (Bonnaterre, 1788) (Bramble shark)  
 Family SQUALIDAE (Dogfish sharks)
- 3) *Centroscyllium ornatum* (Alcock, 1889) (Ornate dogfish)  
 4) *Centrophorus granulosus* (Bloch and Schneider, 1801) (Gulper Shark)  
 5) *Centrophorus moluccensis* Bleeker, 1860 (Arrow spine dogfish)  
 6) *Centrophorus uyato* (Rafinesque, 1810) (Little Gulper Shark)  
 7) *Centroscymnus crepidator* Bocage and Capello, 1864 (Longnose velvet dogfish)  
 8) *Squalus mitsukurri* Jordan and Snyder, 1903 (Short spine spur dog)  
 9) *Squalus blainvillei* (Risso, 1826) (Big eye dogfish)  
 Order ORECTOLOBIFORMES (Carpet Sharks)  
 Family HEMISCYLLIIDAE (Bamboo Sharks)
- 10) *Chiloscyllium plagiosum* (Bennett, 1830) (White spotted bamboo shark)  
 11) *Chiloscyllium griseum* Muller and Henle, 1838 (Black banded cat shark)  
 12) *Chiloscyllium indicum* (Gmelin, 1789) (Indian cat shark)  
 13) *Chiloscyllium punctatum* Muller and Henle, 1838 (Brown banded bamboo shark)  
 Family STEGOSTOMATIDAE (Zebra sharks)
- 14) *Stegostoma fasciatum* (Hermann, 1783) (Zebra shark)  
 Family GINGLYMOSTOMATIDAE
- 15) *Nebrius ferrugineus* (Lesson, 1830) (Giant sleepy shark)  
 Family RHINIODONTIDAE (Whale Sharks)
- 16) *Rhiniodon typus* Smith, 1828 (Whale shark)  
 Order LAMNIFORMES  
 Family ODONTASPIDIDAE (Sand tiger sharks)
- 17) *Eugomphodus taurus* (Rafinesque, 1810) (Blue nurse sand tiger)

18) *Eugomphodus tricuspidatus* (Day, 1878) (Indian Sandtiger)

Family PSEUDOCARCHARIDAE

19) *Pseudocarcharias kamoharai* (Matsubara, 1936) (Crocodile shark)

Family ALOPIIDAE (Thresher Sharks)

20) *Alopias superciliosus* (Lowe, 1839) (Bigeye thresher Shark)

21) *Alopias pelagicus* Nakamura, 1935 (Pelagic thresher Shark)

22) *Alopias vulpinus* (Bonnaterre, 1788) (Thresher Shark)

Family LAMNIDAE (Mackerel sharks, Makos)

23) *Carcharodon carcharias* (Linnaeus, 1758) (Great White Shark)

24) *Isurus oxyrinchus* Rafinesque, 1809 (Shartfin mako)

Order CARCHARHINIFORMES (Ground Sharks)

Family SCYLORHINIDAE (Cat sharks)

25) *Apisturus investigatoris* (Misra, 1962) (Broadnose Catshark)

26) *Cephaloscyllium silasi* (Talwar, 1974) (Indian Swellshark)

27) *Scyliorhinus capensis* (Smith, 1838) (Yellow spotted catshark)

28) *Atelomycterus marmoratus* (Bennett, 1830) (Marbled catfish)

29) *Halaclurus hispidus* (Alcock, 1891) (Bristly catshark)

30) *Halaclurus quagga* (Alcock, 1899) (Quagga catshark)

Family PROSCYLLIDAE

31) *Eridacnis radcliffei* Smith, 1913 (Pygmy ribbontail catshark)

Family TRIAKIDAE

32) *Iago omanensis* (Norman, 1939) (Bigeye hound Shark)

33) *Mustelus mosis* Hemprich and Ehrenberg, 1899 (Gummy smooth hound)

Family HEMIGALEIDAE

34) *Hemipristis elongatus* (Klunzinger, 1871) (Fossil shark)

35) *Hemigaleus microstoma* Bleeker, 1852 (Sicklefin Weasel Shark)

36) *Chaenogaleus macrostoma* (Bleeker, 1852) (Balfour's shark)

Family CARCHARHINIDAE (Requiem Sharks)

37) *Carcharhinus albimarginatus* Ruppel, 1837 (Silver tip Shark)

38) *Carcharhinus altimus* (Springer, 1950) (Bignose Shark)

39) *Carcharhinus amblyrhynchoides* (Whitley, 1934) (Graceful Shark)

- 40) *Carcharhinus amblyrhynchos* (Bleeker, 1856) (Grey Reef Shark)
- 41) *Carcharhinus amboinensis* (Muller and Henle, 1839) (Pigeye Shark)
- 42) *Carcharhinus falciformis* (Bibron, 1839) (Silky Shark)
- 43) *Carcharhinus leucas* (Valenciennes, 1839) (Bull Shark)
- 44) *Carcharhinus melonopterus* (Quoy and Gaimard, 1824) (Blacktip Reef Shark)
- 45) *Carcharhinus sealei* (Pietschmann, 1916) (Blackspot Shark)
- 46) *Carcharhinus brevipinna* (Muller and Henle, 1839) (Spinner shark)
- 47) *Carcharhinus dussumieri* (Valenciennes, 1839) (White-cheeked shark)
- 48) *Carcharhinus hemiodon* (Valenciennes, 1839) (Long-nosed shark)
- 49) *Carcharhinus limbatus* (Valenciennes, 1839) (Blacktip shark)
- 50) *Carcharhinus longimanus* (Poey, 1861) (Oceanic whitetip shark)
- 51) *Carcharhinus macloti* (Muller and Henle, 1839) (Maclot's shark)
- 52) *Carcharhinus sorrah* (Valenciennes, 1839) (Sorrah shark)
- 53) *Carcharhinus brachyurus* (Gunther, 1870) (Copper Shark)
- 54) *Carcharhinus cautus* (Whitley, 1945) (Nervous Shark)
- 55) *Carcharhinus obscurus* (Le Sueur, 1822) (Dusky Shark)
- 56) *Carcharhinus plumbeus* (Nardo, 1827) (Sandbar Shark)
- 57) *Carcharhinus wheeleri* Garrick, 1982 (Blacktail Reef Shark)
- 58) *Galeocerdo cuvier* (Peron and Le Sueur, 1822) (Tiger Shark)
- 59) *Lamiopsis temminckii* (Muller and Henle, 1839) (Fawn shark)
- 60) *Loxodon macrorhinus* Muller and Henle, 1839 (Sliteye shark)
- 61) *Negaprion acutidens* (Ruppell, 1837) (Indian Lemon shark)
- 62) *Rhizoprionodon acutus* (Ruppell, 1837) (Milk dog shark)
- 63) *Rhizoprionodon oligolinx* Springer, 1964 (Grey dog shark)
- 64) *Scoliodon laticaudus* (Muller and Henle, 1839) (Indian dog shark)
- 65) *Triacnodon obesus* (Ruppell, 1837) (Whitetip reef shark)
- 66) *Glyphis gangeticus* (Muller and Henle, 1839) (Ganges Shark)
- 67) *Glyphis glyphis* (Muller and Henle, 1839) (Speartooth Shark)
- 68) *Prionace glauca* (Linnaeus, 1758) (Blue Shark)

Family SPHYRNIDAE (Hammer headed sharks)

- 69) *Sphyrna lewini* (Griffith and Smith, 1834) (Scalloped hammerhead)
- 70) *Sphyrna mokarran* (Ruppell, 1837) (Great hammerhead)
- 71) *Sphyrna zygaena* (Linnaeus, 1758) (Round headed hammerhead)
- 72) *Eusphyrna blochii* (Cuvier, 1817) (Winghead Shark)

## SYSTEMATIC ACCOUNTS

1. *Heptranchias perlo* Bonnaterre, 1788  
Sharpnose Sevengill shark

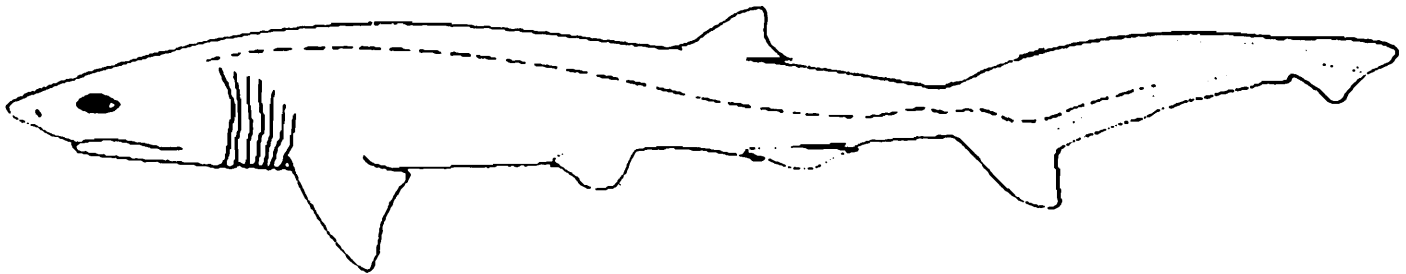


Fig. 1. Lateral view of *Heptranchias perlo*

1788. *Heptranchias perlo* Bonnaterre, *Tabl. Encyclop. method. trios reg. Nat., Ichthyol.*, Paris, 10.

*Synonymy* : *Heptranchias deani*, *Heptranchias dakini*.

*Morphological features* : A small slender shark with 7 gill slits; head and snout very narrow; eyes very large; single dorsal fin, separated from origin of caudal fin by over twice its base length; a shorter caudal fin lobe in adults. Ovoviviparous. Maturity is reached about 85–90 cm. They are usually caught in bottom trawls.

*Geographical Distribution* : Indian Ocean : South western India, South Africa, Western Atlantic and Western Pacific (Compagno, 1984; Talwar, 1984; Talwar and Jhingran, 1991).

*Remarks* : Generally caught in few numbers as a by catch while utilizing bottom trawls and long lines, but of small importance. This species was caught recently off Quilon, Southwestern India and off Bali, Indonesia (Pillai and Parakal, 2000).

2. *Echinorhinus brucus* (Bonnaterre, 1788)  
Bramble shark

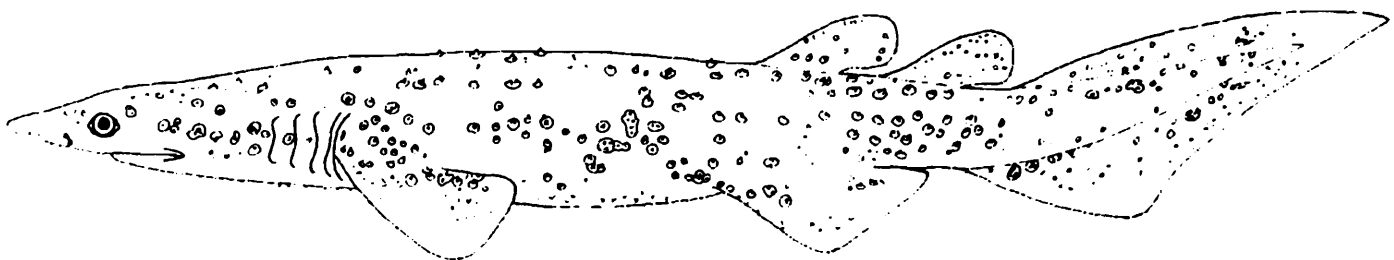


Fig. 2. Lateral view of *Echinorhinus brucus*.

1788. *Squalus brucus* Bonnaterre, *Tabl. Encyclop. Method. trios reg. Nat., Ichthyol.*, Paris, 11.

*Synonymy* : *Squalus spinosus*, *Echinorhinus obesus*, *Echinorhinus (Rubusqualus) mccoysi*.

*Morphological features* : A robust shark with rough spiny skin, the tubercles of radiating body structure. Head moderately depressed with short snout. Teeth alike in both jaws, each tooth with a pointed median cusp flanked by two small cusps on either side; lower jaw with 3 rows and upper jaw with 2 rows of teeth. Two dorsal fins; no spine in fins. Anal fin absent. Dark purplish grey, slightly paler beneath. Reaches upwards of 308 cms.

*Geographical Distribution* : Western Indian Ocean : India, South Africa, Southern Mozambique, Oman, Western Atlantic and Western Pacific.

*Remarks* : It does not command much value in the markets. The oil from the liver of this shark has a reputation as a medicament in South Africa; the oil content of the liver is very high and has lower vitamin A. A large specimen of this species got stranded at Cochin in 1984 (Somasekharan Nair and Thulasidas, 1984). The Bramble shark is known to be a deep-water species but also frequents the shallow waters and the continental slope areas at depths varying from 18 to 900 m. In 1991, 18 Bramble sharks were landed at Tuticorin Fishing Harbour by deep-sea trawlers (Balasubramanian *et al.*, 1997 and 1993b).

3. *Centroscyllium ornatum* (Alcock, 1889)  
Ornate dogfish

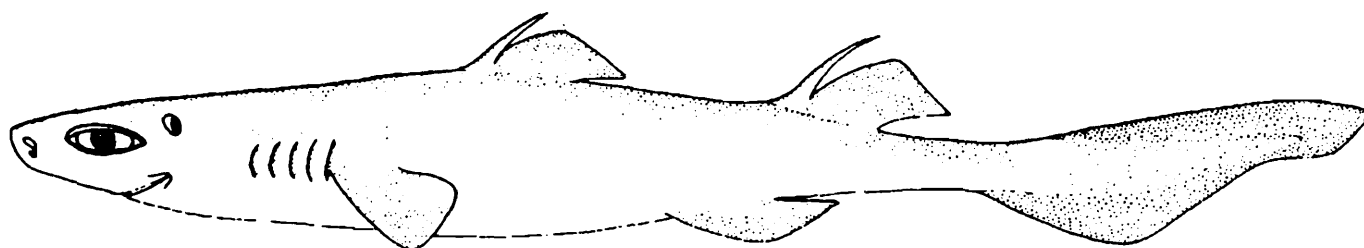


Fig. 3. Lateral view of *Centroscyllium ornatum*

1889. *Paracentroscyllium ornatum* Alcock, *Ann. Mag. nat. Hist.*, (6) 4 : 379.

*Synonymy* : None.

*Morphological features* : Body moderately stout and compressed. Preoral snout moderately long; mouth narrowly arched. Second dorsal fin larger than first. Caudal peduncle moderately long. Colour blackish, without white fin tips or prominent black markings on underside of the body and sides of tail. Size moderate, adults to about 50 cm. Maximum length upto 30 cm.

*Geographical Distribution* : Northern Indian Ocean, Arabian Sea and Bay of Bengal.

*Remarks* : Fishery importance of this species is not known. Two of the syntypes and other material of this species were examined in the Zoological Survey of India, Calcutta, India (Compagno, 1984).

4. *Centrophorus granulosus* (Bloch and Schneider, 1801)  
Gulper Shark

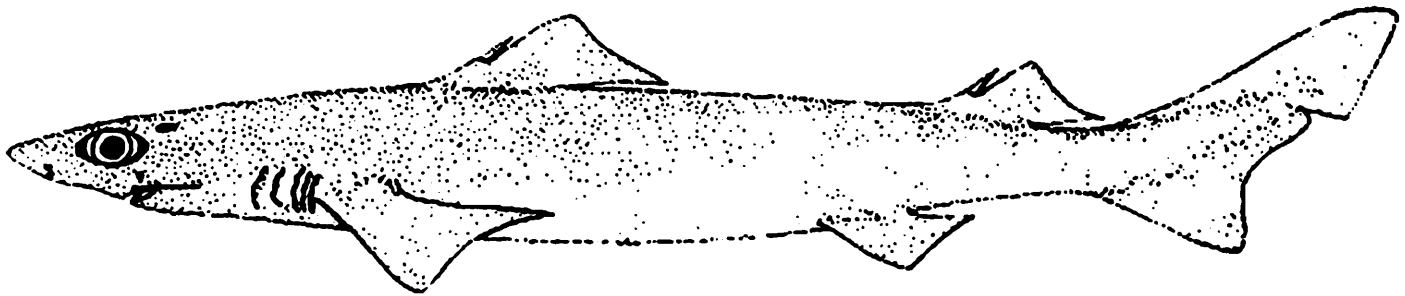


Fig. 4. Lateral view of *Centrophorus granulosus*

1801. *Squalus granulosus* Bloch and Schneider, *Syst. Ichthyol* : 135.

*Synonymy* : *Centrophorus atromarginatus*, *Centrophorus machenquensis*.

*Morphological features* : Moderately long and broad snout. Blade like unicuspidate teeth in upper and lower jaws, with lowers much larger than uppers. Fairly short first dorsal fin and high second dorsal, with large spine like blade, very broad, sessile crowned, wide spaced, acuspitate lateral denticles and rear tips of pectoral fins narrowly angular and strongly extended. No anal fin.

*Geographical Distribution* : Indian Ocean : India, Aldabra Island. Western Pacific : Japan (Compagno; 1984; Raje *et al.*, 2002).

*Remarks* : Primarily fished with bottom trawls, but also caught on hook and line and with pelagic trawls. Smoke and dried salted for human consumption; also processed for fishmeal and liver oil.

5. *Centrophorus moluccensis* Bleeker, 1860  
Arrow spine dogfish

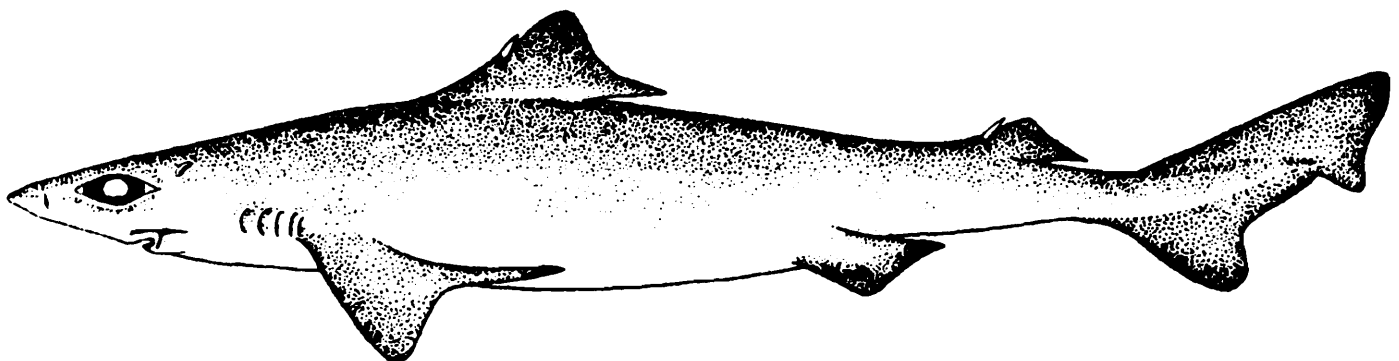


Fig. 5. Lateral view of *Centrophorus moluccensis*

1860. *Centrophorus moluccensis* Bleeker, *Act. Soc. Sci. Indo-Neerl.*, 8 : 3.

*Synonymy* : *Centrophorus scalpratus*, *Atractophorus armatus*.

*Morphological features* : Body elongated and fusiform; snout pointed, teeth markedly unlike in both jaws, small and with a single cusp, lower teeth much larger than uppers. Two dorsal fins; origin of first dorsal fin close behind pectoral fin bases; each dorsal fin with a spine on its anterior margin. Caudal fin with a subterminal notch. Skin with close-set sessile, thorn like denticles. Body grey brown above, paler below; fins slightly darker than back; area above gill-slits darkened, as is a patch above eye extending back to surround spiracle.

*Geographical Distribution* : Western Indian Ocean : India, South Africa, Southern Mozambique, Japan, Taiwan, South East Australia (Compagno, 1984; Talwar and Jhingran, 1991).

*Remarks* : Of minor commercial significance, being very rarely caught by bottom trawlers. Silas recorded the occurrence of this species in the trawl catches from the upper continental slope off the southwest coast of India at depths of 180–450 m. A rare case of landing of this spiny dogfish shark occurred in Veerapandipatnam, Gulf of Mannar in 1990 (Ameer Hamsa *et al.*, 1997).

6. *Centrophorus uyato* (Rafinesque, 1810)  
Little Gulper Shark

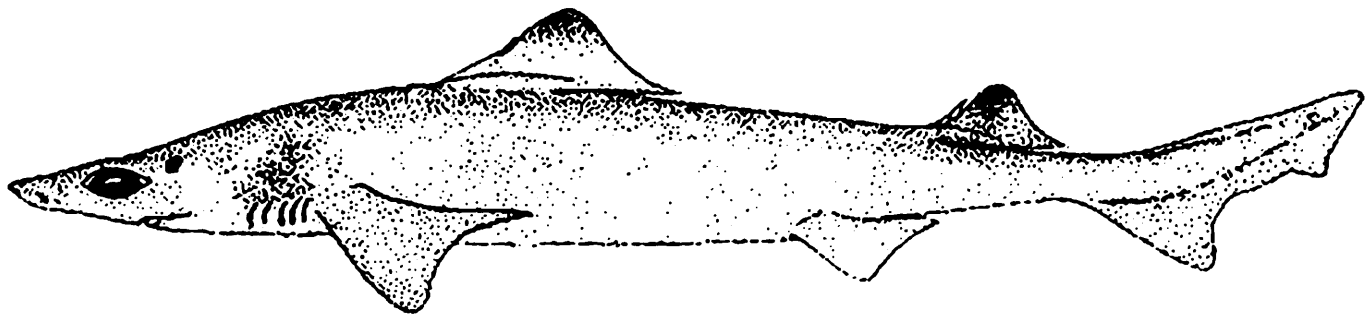


Fig. 6. Lateral view of *Centrophorus uyato*

1810. *Squalus uyato* Rafinesque, *Caratt. Gen. Sp. anim. Piant. Sicilia, Palermo*, pt. 1 : 12, pl. 14, fig. 2.

*Synonymy* : *Centrophorus armatus barbatus*.

*Morphological features* : Blade like unicuspidate teeth in upper teeth upper and lower jaws, with lowers much larger than uppers, a long and narrow snout, fairly short first dorsal fin and high second dorsal, blade like, very broad, sessile crowned, wide spaced, cuspidate lateral denticles and rear tips of pectoral fins narrowly angular and strongly extended. No anal fin, two dorsal fin with large spines (Talwar and Jhingran, 1991).

*Geographical Distribution* : Indian Ocean : India, Mosambique, Western North Pacific : Taiwan Island.

*Remarks* : This species is taken with bottom trawls, line gear, fixed bottom nets and pelagic trawls. It is utilized as dried salted for human consumption, probably also used for fishmeal and liver oil.

7 *Centroscymnus crepidator* Bocage and Capello, 1864  
Longnose velvet dogfish

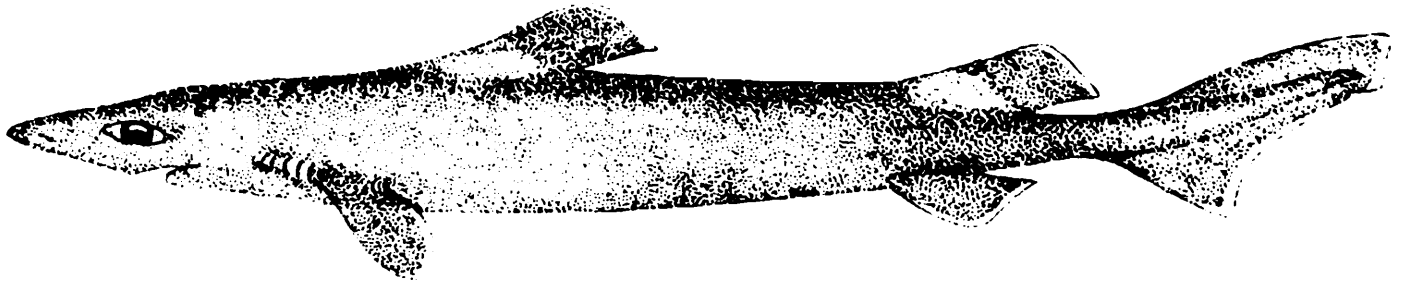


Fig. 7. Lateral view of *Centroscymnus crepidator*

1864. *Centroscymnus crepidator* Bocage and Capello, *Proc. Zool. Soc. Lond.*, 24 : 262, fig. 3.

*Synonymy* : *Centrophorus rossi*, *Centrophorus jonsonii*, *Centroscymnus furvescens*.

*Morphological features* : Very long snout, greatly elongated labial furrows that nearly encircle the mouth. Fairly slender body. Maximum length about 90 cms. Ovoviviparous, number of fetuses four. Females mature at 82 cm. Black or blackish brown colouration, No anal fin, dorsal fins with very small fin spines.

*Geographical Distribution* : Indian Ocean : India, Aldabra Islands, Eastern Atlantic, Eastern and Western Pacific (Compagno, 1984; Talwar and Jhingran, 1991).

*Remarks* : Caught in bottom trawls in the eastern Atlantic and utilized for fishmeal.

8. *Squalus mitsukurri* Jordan and Snyder, 1903  
Short spine spur dog

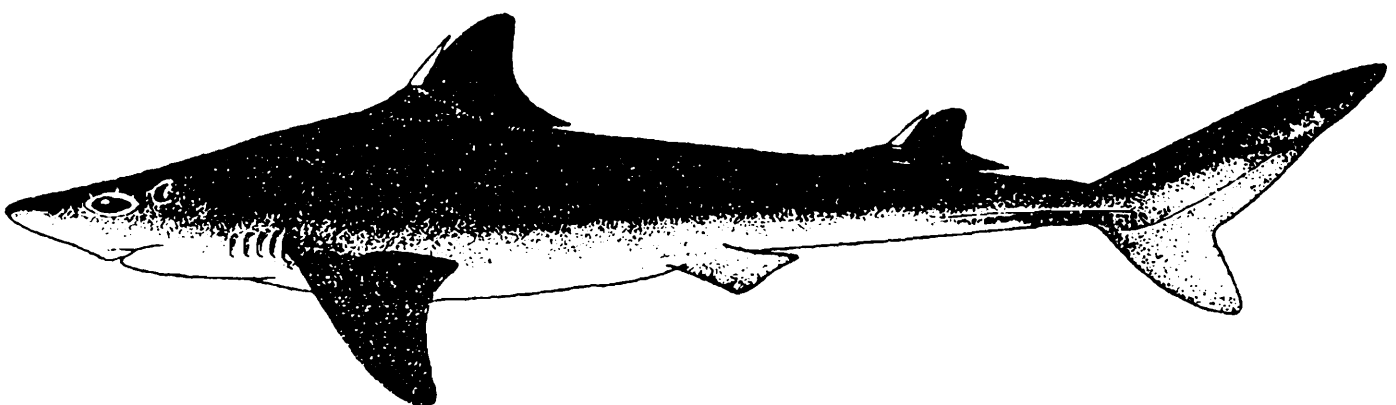


Fig. 8. Lateral view of *Squalus mitsukurri*

1903. *Squalus mitsukuri* Jordan and Snyder, *Annot. Zool. Japan.*, 3 : 129.

*Synonymy* : *Squalus grifini*, *Squalus montalbani*, *Squalus tasmaniensis*.

*Morphological features* : Body moderately elongated and fusiform; denticles of back with broad crown and 3 cusps in adults; nostrils with elongated anterior flaps having short accessory lobes on their medial edges; a strong, moderately long ungrooved spine on both dorsal fins; pectoral fins rather broad, their inner corners narrowly rounded and their posterior margins nearly straight; caudal peduncle with a low lateral keel on each side. Ovoviviparous, number of fetuses 4 to 9, size at birth 22 to 26 cm. Feed on bony fishes, cephalopods and crustaceans. Caught in bottom trawls. Maximum length 110 cm.

*Geographical Distribution* : Western Indian Ocean : India, Mozambique, Tanzania, Madagascar, Western north and south Pacific (Compagno, 1984; Talwar, 1984; Talwar and Jhingran, 1991).

*Remarks* : Minimal fishery importance.

9. *Squalus blainvillei* (Risso, 1826)  
Big eye dogfish

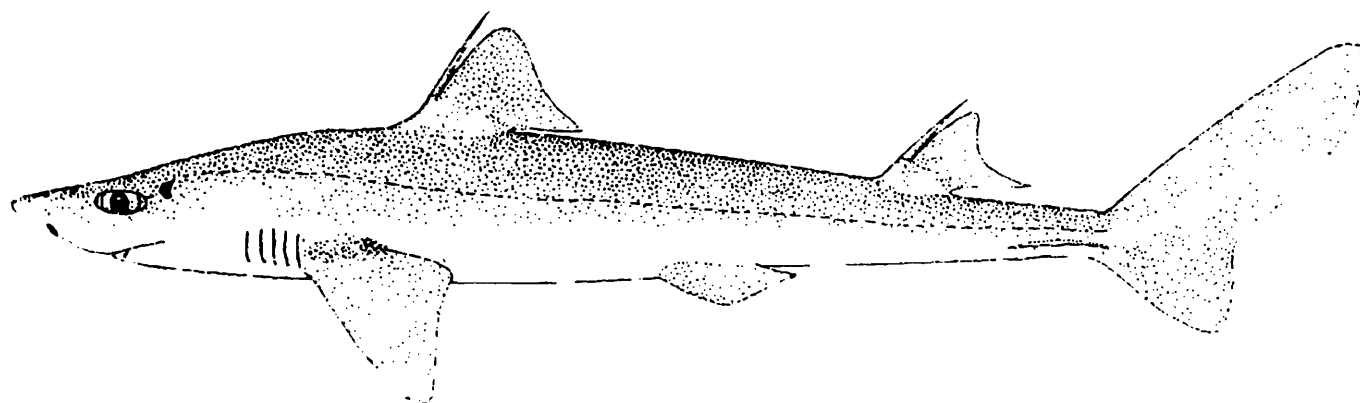


Fig. 9. Lateral view of *Squalus blainvillei*

1826. *Acanthias blainvillei* Risso, *His. Nat. Princip. Prod. Europe Mered.*, Paris, Poissons, 3 : 133, pl. 3, Fig. 6.

*Synonymy* : *Spinax fernandezianus*.

*Morphological features* : Body elongated and fusiform; Head depressed, the snout bluntly pointed, mouth very slightly arched; teeth alike in both jaws, small and compressed. Two dorsal fins; dorsal fin spines fairly prominent, the first spine in front of or over free rear tips of pectoral fins; second dorsal fin markedly smaller than first. Posterior margin of pectoral fin weakly concave, their free tips rounded. Denticles broad and

tricuspidate on sides of body. Uniform dark grey in colour, inner side of claspers and skin around vent pale white. Maximum length 95 cm.

*Geographical Distribution* : Indian Ocean : India, South Africa, Mozambique, Madagascar, Eastern Atlantic and Western Pacific (Compagno, 1984).

*Remarks* : Presently there is only a single record of this species in Indian waters. It is of considerable economic importance. Fished with trawls, gill nets and line gear (Pillai and Parakal, 2000).

10. *Chiloscyllium plagiosum* (Bennett, 1830)

White spotted bamboo shark

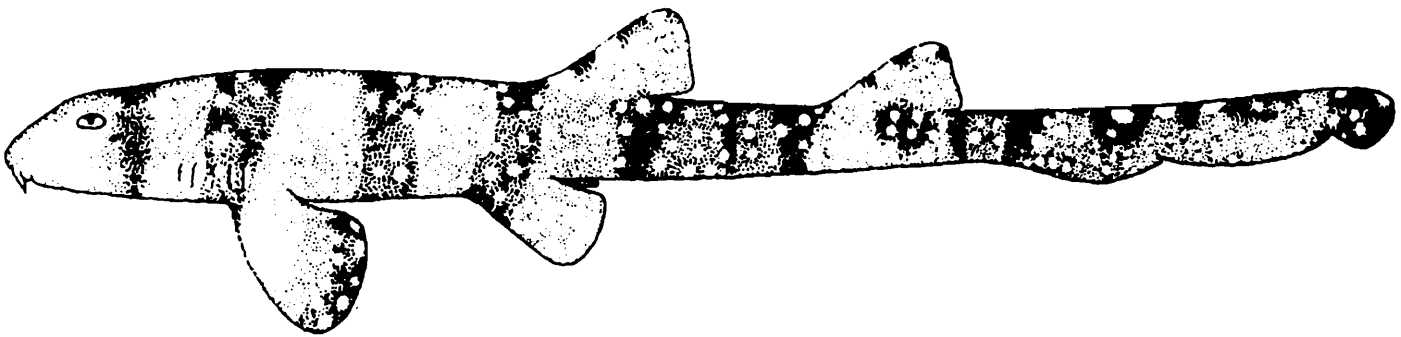


Fig. 10. Lateral view of *Chiloscyllium plagiosum*

1830. *Scyllium plagiosum* Bennett, *Mem. life serv. Sir Stamford Raffles*, Fishes, 694.

*Synonymy* : *Scyllium ornatum*, *Chiloscyllium interruptum*.

*Morphological features* : Mouth well in front of eyes; spineless dorsal fins far posterior on tail ; greatly elongated thick precaudal tail, long and low anal fin just anterior to caudal fin, lateral ridges on trunk, dorsal fins without elongated free rear tips, first dorsal origin opposite or just behind pelvic insertions, colour pattern of numerous white spots and transverse a bands on a dark background. Males 67 to 69 cm, female 95 cm.

*Geographical Distribution* : Indo West Pacific : India, Sri Lanka, Malaysia, Singapore, Thailand, Indonesia, Vietnam, China, Japan and Philippines (Compagno, 1984; Talwar, 1984; Talwar and Jhingran, 1991).

*Remarks* : Regularly taken in inshore fisheries in India, Taiwan, Japan and Phillipines and utilized for human consumption.

11. *Chiloscyllium griseum* Muller and Henle, 1838  
Black banded cat shark

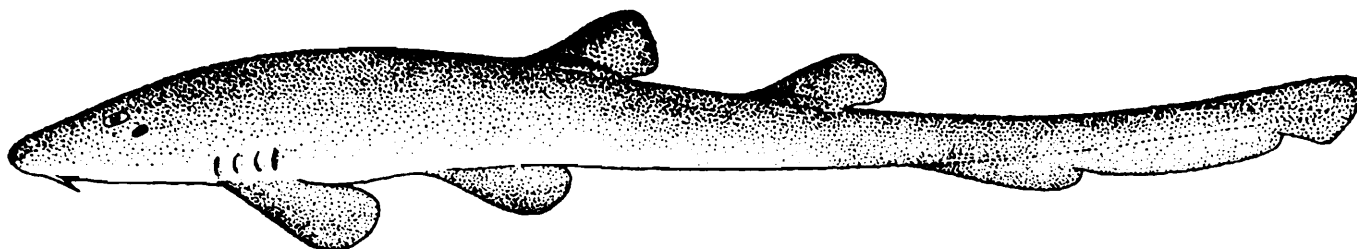


Fig. 11. Lateral view of *Chiloscyllium griseum*

1838. *Chiloscyllium griseum* Muller and Henle, *Syst. Besch. Plagiost.*, pt. 1 : 19, pl. 4.

*Synonymy* : *Scyllium griseum*, *Chiloscyllium obscurum*, *Chiloscyllium hasseltii*.

*Morphological features* : Body slender. Mouth slightly arched; short labial grooves in both jaws. Gill opening narrow, the 4<sup>th</sup> and 5<sup>th</sup> slits very close together, the last three over pectoral fin bases. Origin of first dorsal fin above ends of pelvic fin bases. A dermal ridge along middle of back of body. Pale brown in colour. Young with 10 to 12 transverse bands on back; two large dark blotches on dorsal fins. Maximum length 74 cm.

*Geographical Distribution* : Indo West Pacific : India, Malaysia, Thailand, Indonesia, China, Japan, the Philippines and the gulf between Iran and the Arabian Peninsula (Compagno, 1984).

*Remarks* : Common in the commercial catches along both the east and west coast of India (Talwar, 1984; Talwar and Jhingran, 1991)

12. *Chiloscyllium indicum* (Gmelin, 1789)

Indian cat Shark

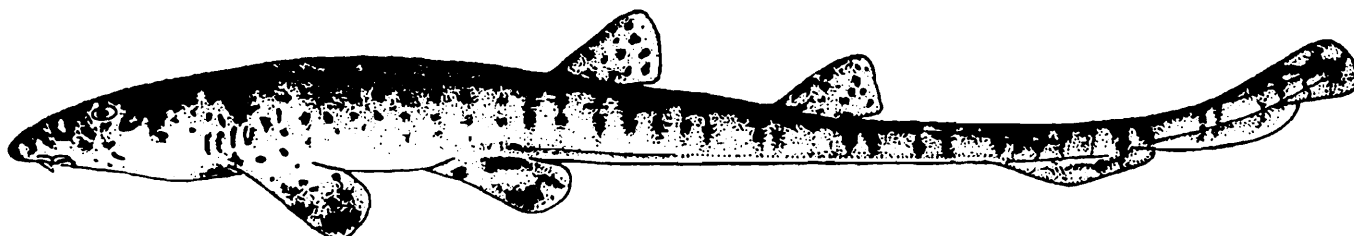


Fig. 12. Lateral view of *Chiloscyllium indicum*

1789. *Squalus indicus* Gmelin, Caroli Linnaei Syst. Nat., 1 (13) : 1503.

*Synonymy* : *Squalus tuberculatus*, *Squalus gronovianus*, *Squalus dentatus*, *Chiloscyllium phymatodes*, *Squalus caudatus*.

*Morphological features* : Body slender. Mouth slightly arched: short labial grooves in both jaws. Gill openings narrow, the 4<sup>th</sup> and 5<sup>th</sup> slits very close. First dorsal fin above ends of pelvic fin bases. Three rough dermal ridges on back of the body. Pale brown in colour with 11 or 12 dark brown transverse bands on body, each dark band with a few pale spots and obscure darker ones.

*Geographical Distribution* : Indo West Pacific : India, Sri Lanka Singapore, Thailand, Vietnam, Indonesia, Japan and Solomon Islands (Compagno, 1984; Talwar and Jhingran, 1991).

*Remarks* : Of minor fishery importance in Indian region. Regularly taken in inshore fisheries in India, Sri Lanka and Thailand and utilized for human food.

13. *Chiloscyllium punctatum* Muller and Henle, 1838  
Brown Banded Bamboo Shark

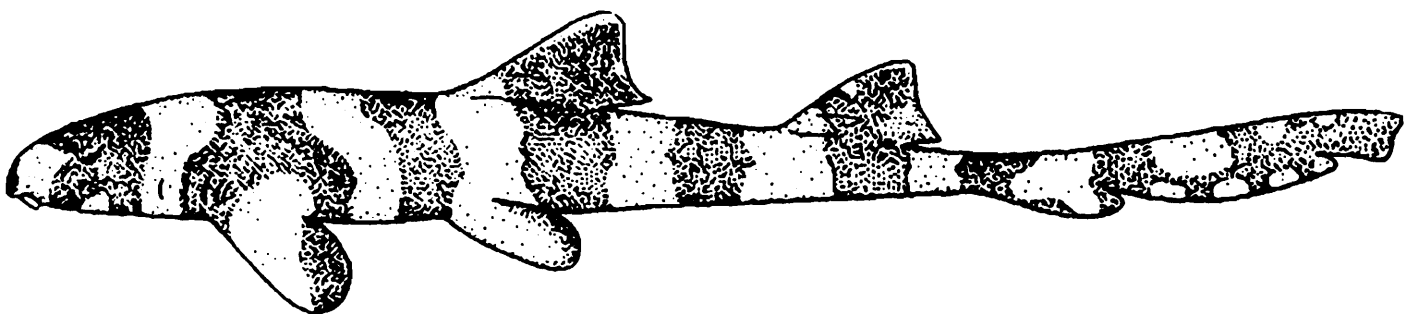


Fig. 13. Lateral view of *Chiloscyllium punctatum*

1838. *Chiloscyllium punctatum* Muller and Henle, Syst. Besch. Plagiost., pt. 1 : 19, pl. 4.

*Synonymy* : *Chiloscyllium margaritiferum*.

*Morphological features* : Mouth well in front of eyes; spineless dorsal fins far posterior on tail, greatly elongated thick precaudal tail, long and low anal fin just anterior to caudal fin, no lateral ridges on trunk, dorsal fins with elongated free rear tips, first dorsal origin opposite anterior halves of pelvic bases, usually no colour pattern in adults but young with transverse bands and a few dark spots.

*Geographical Distribution* : Indo West Pacific : India, Malaysia, Singapore, Thailand,

Indonesia, Vietnam, China, Japan, Philippines and Australia (Compagno, 1984; Talwar and Jhingran, 1991).

*Remarks* : Regularly taken in inshore fisheries in India, Thailand and utilized for human food. In Australia it is taken in beach seines and on hook and line and is said to prefer squid bait.

14. *Stegostoma fasciatum* (Hermann, 1783)

Zebra Shark

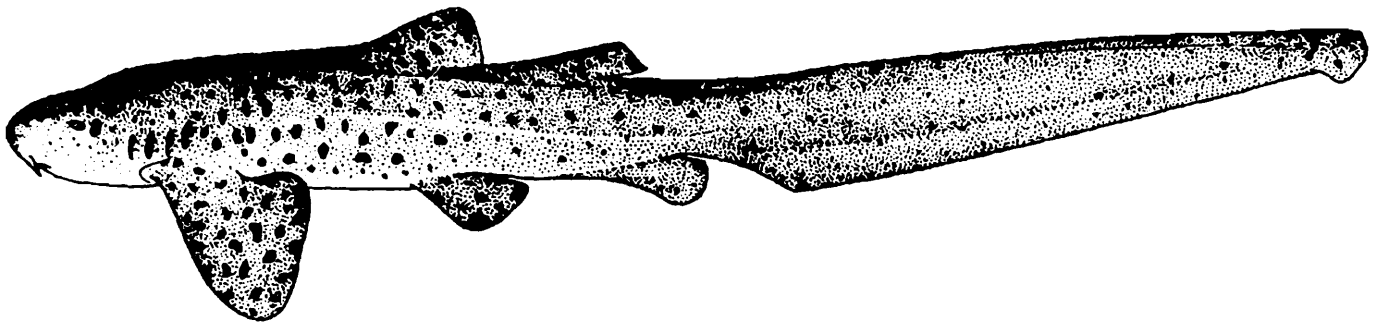


Fig. 14. Lateral view of *Stegostoma fasciatum*

1783. *Squalus fasciatus* Hermann, *Tabl. Aff.*, 302.

*Synonymy* : *Stegostoma varium*, *Stegostomma tigrinum*.

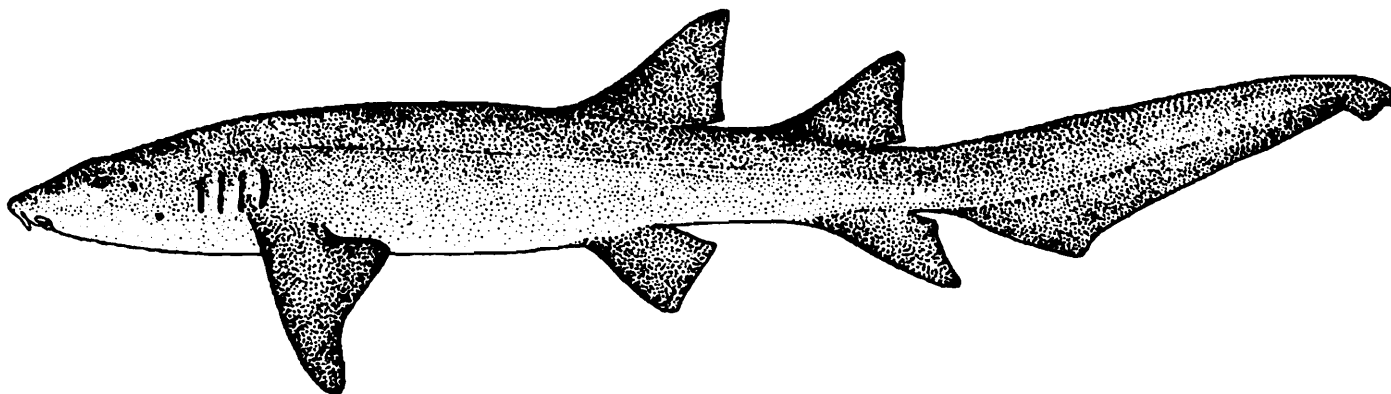
*Morphological features* : Body elongated, with a long tail. Second dorsal fin very small. A prominent dorsal ridge present. Lower caudal fin virtually absent. Young white or buff, with narrow white cross bars on head and body between which are white spots; adult with transverse bands or large rounded black or brown spots. Maximum size 350 cm in total length.

*Geographical Distribution* : Indo West Pacific : India, Sri Lanka, Bangladesh, Indonesia, Thailand, Vietnam, China, Japan and Australia (Compagno, 1984; Pillai and Parakal, 2000).

*Remarks* : A common shark in the Indo West Pacific, regularly taken in inshore fisheries in India, Pakistan, Thailand, Malaysia and Taiwan. Fairly common at Chennai, India. It is of minor fishery value. A large adult Zebra Shark landed at Pamban in the Gulf of Mannar in 1987 (Krishna Pillai, 1988; Krishna Pillai and Kasinathan, 1988). Landings of Zebra Shark are not uncommon along the Indian coast. Occasionally they form one of the constituents of the elasmobranch catch exploited by hooks and line. When two female zebra sharks caught at Tuticorin in 1991 were cut open for salting, six egg cases were noticed (Balasubramanian *et al.*, 1993a).

15. *Nebrius ferrugineus* (Lesson, 1830)

## Giant sleepy Shark

Fig. 15. Lateral view of *Nebrius ferrugineus*

1830. *Scyllium ferrugineum* Lesson, *Voy.aut.monde corv. La Coquille 2*, 1822 - 1825, *Zoologie*, 2 (1) : 95.

*Synonymy* : *Nebrius concolor*, *Ginglymostoma rueppellii*, *Ginglymostoma muelleri*, *Scymnus porosus*, *Nebrodes macrurus*, *Nebrodes concolor*, *Nebrius doildi*.

*Morphological features* : Body moderately elongated. Mouth wide; labial folds well developed in both jaws. Teeth with a large central cusp and 4 to 6 slightly smaller cusps on each side. Gill slits narrow. Tail long, prominently notched near apex. Body is sandy brown and rusty brown, light below, with the fins slightly darkened particularly near the tips.

*Geographical Distribution* : Indo West and Central Pacific : India, South Africa, Mauritius, Madagascar, Malaysia, Indonesia, China and Australia (Compagno, 1984).

*Remarks* : Of minor fishery value in India. It is a common shark and caught inshore by fishermen in India, Pakistan and Thailand. Utilised fresh, salted and dried salted for human consumption. Its liver is rendered for oil and vitamins, fins are used in the oriental shark fin trade. It has been fished as a big game shark and large individuals are prized as powerful fighters (Talwar, 1984; Talwar and Jhingran, 1991).

16. *Rhiniodon typus* Smith, 1828  
Whale Shark

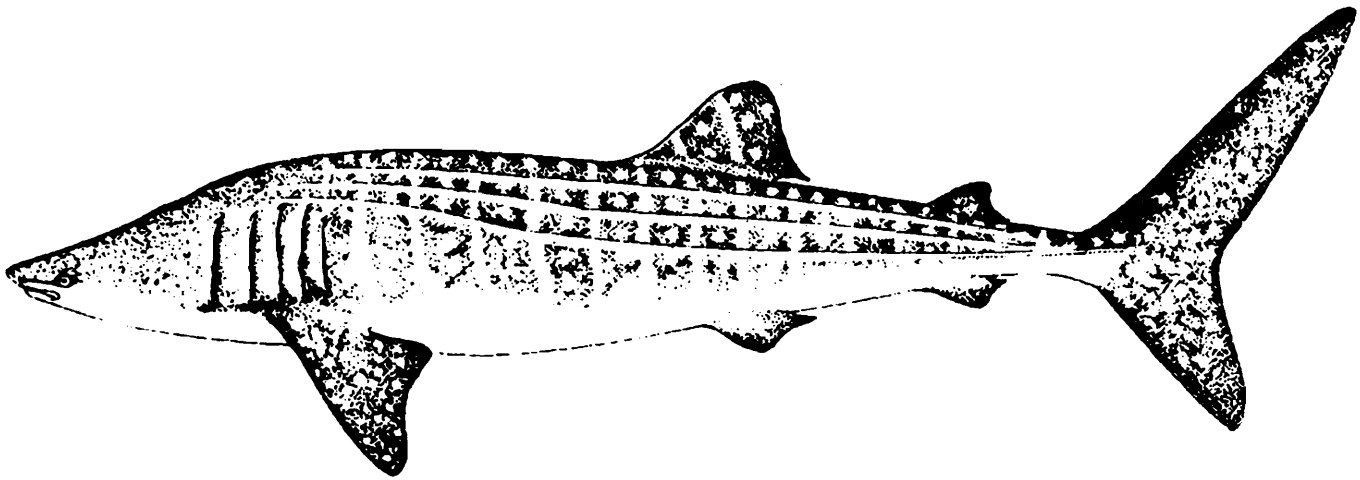


Fig. 16. Lateral view of *Rhiniodon typus*

1828. *Rhiniodon typus* Smith, *S. African Comm. Advertiser*, 3 (145) : 2.

*Synonymy* : *Rhinodon typicus*, *Micristodus punctatus* and *Rhinidon pentalinetus*.

*Morphological features* : It is very large with enormous body and blunt snout. Mouth very wide and terminal. Eyes very small. Teeth very small and weak. Caudal peduncle depressed. Body dark grey, reddish or greenish grey above, with white or yellow spots and transverse stripes; white or yellowish below. It attains about 15 m or more in length.

*Geographical Distribution* : Indo West and Central Pacific : India, South Africa, Pakistan, Sri Lanka, Malaysia, Thailand, China, Japan, Philippines, Indonesia and Australia. It occurs throughout the tropical parts of the Indian, Pacific and Atlantic oceans, occasionally straying into higher latitudes (Compagno, 1984).

*Remarks* : Apparently of relatively limited interest for fisheries. Small harpoon fisheries exist in India and Pakistan. It is eaten by people either fresh or dried salted and also used to treat boat hulls in Pakistan. It produces large quantity of liver oil. Frequently caught in Indian waters. More than 97 instances of stranding of this species have been recorded along the Indian Coast alone between 1929 and 1958. A series of Whale shark landings have been recorded from Pondichery, Goa, Adiramapatnam, Bombay, Madras, Dhakshin kannada, Cochin and Veraval in 1986 (Chidambaram, 1986; Doiphoide, 1986; Ganapathy, 1986; Karbhari and Josekutty, 1986; Silas, 1986; Karbhari, 1986; James *et al.*, 1986; Nammalwar, 1986; Sathyanarayana Rao, 1986; Somasekaran *et al.*, 1986; Sudhakara Rao, 1986; Devadoss *et al.*, 1989a&b and Shriram, 1986). A group of five Whale sharks landed along the Trivandrum and Kanyakumari coast and a gigantic Whale shark landed at Pudumanaikuppam, Madras (Lazarus *et al.*, 1988 and Subramani, 1988). A Whale shark landed at Dakshin Kannada and Calicut in 1991 (Alli *et al.*, 1991 and Sivadas, 1991). In 1992 Whale sharks landings have been recorded from Malvan coast, Maharashtra and

Kakinada coast by Mainkar, 1992; Seshagiri Rao, 1992 and Nammalwar *et al.*, 1992. Landing of Whale sharks along the south Andhra coast and Vizakhakapatnam in 1993 has been recorded by Seshagiri Rao and Narayana Rao, 1993 and Ramalingam *et al.*, 1993. In 1993 a female whale shark, which got entangled in a monofilament gill net was landed alive at Cooperage landing centre, Bombay in 1993 (Shriram *et al.*, 1994). A juvenile whale shark was caught at Kayalpatinam, Gulf of Mannar in 1993 by drift net (Rajapackiam *et al.*, 1994a; Sethuraman, 1998). A whale shark accompanied by 16 juvenile sharks of about 1 m length was seen near a vessel at Vizhinjam in 1996 (Krishna Pillai, 1998; Atçhutha Rao, 1998 and Kemparaju *et al.*, 1998). A huge female whale shark landed at Paradeep, Orissa in 1997 (Sukdev Bar, 1998). A stray whale shark was caught accidentally from the Gulf of Mannar in 1997 (Pon Siraimetan, 1998). A whale shark caught by a trawler was landed at Digha Mohana Centre in 1998 (Swapan Kumar, 1998).

17. *Eugomphodus taurus* (Rafinesque, 1810)  
Blue nurse sand tiger

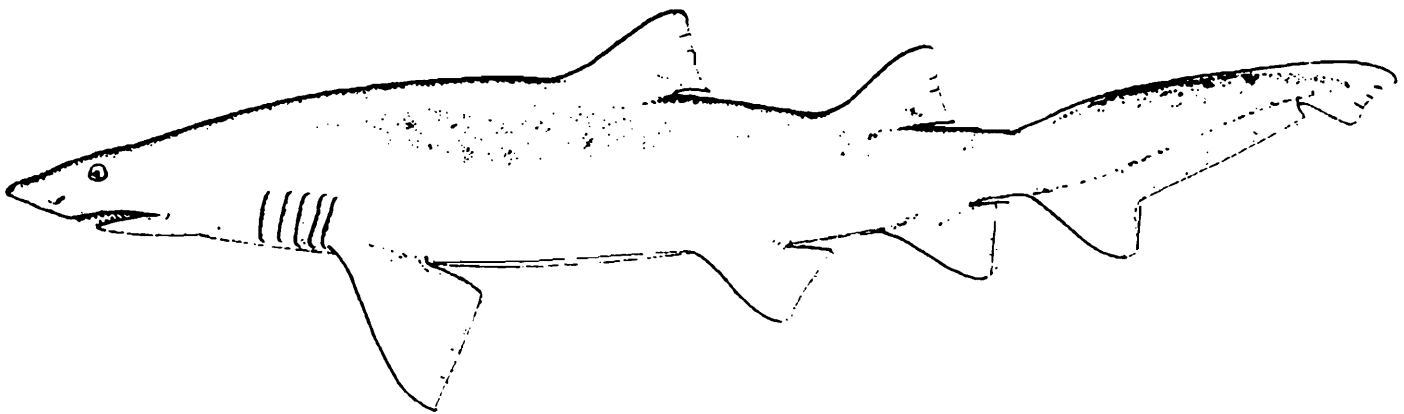


Fig. 17. Lateral view of *Eugomphodus taurus*

1810. *Carcharias taurus* Rafinesque, *Caratt. gen. sp. anim. piant. Sicilia, Palermo*, pt. 1 : 10, pl. 14, fig. 1.

*Synonymy* : *Carcharias owstoni*, *Squalus lixa*, *Odontaspis platensis*.

*Morphological features* : A large shark. Body fusiform with a flattened snout. Mouth large, extending well behind eyes; distinct labial furrows in both jaws. Spiracles small and difficult to distinguish. Two equally large dorsal fins. Caudal fin not lunate, shorter than half the total length. Body light gery above, dull white below, often with yellow or yellow brown spots. This species grows to about 60 cms in length.

*Geographical Distribution* : Western Indian Ocean : India, South Africa, Pakistan Red Sea, Mozambique, Western and Eastern Atlantic (Compagno, 1984).

*Remarks* : It is fairly common on the Bombay Gujarat coast. The fins are valued and the liver oil is extracted for vitamins. It is highly regarded for food in Japan. The meat is utilized fresh, frozen, smoked and dried salted for human consumption. It is caught with line gear and bottom gill nets (Pillai and Parakal, 2000).

18. *Eugomphodus tricuspidatus* (Day, 1878)  
Indian Sandtiger

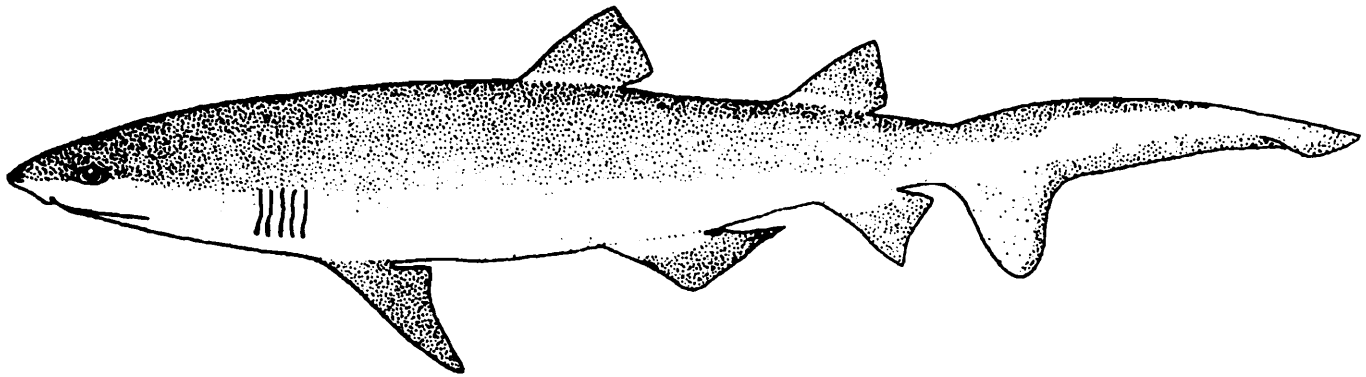


Fig. 18. Lateral view of *Eugomphodus tricuspidatus*

1878. *Carcharias tricuspidatus* Day, *Fish. India* : 713, pl. 186, fig. 1.

*Synonymy* : *Carcharias cuspidatus*.

*Morphological features* : Almost like *Eugomphodus taurus* except with rounded snout and absence of labial furrows.

*Geographical Distribution* : Indo West Pacific : India, Pakistan, Indonesia, Australia, the Phillipines and Northern China.

*Remarks* : Apparently fished in India and Pakistan (Compagno, 1984).

19. *Pseudocarcharias kamoharai* (Matsubara, 1936)  
Crocodile shark

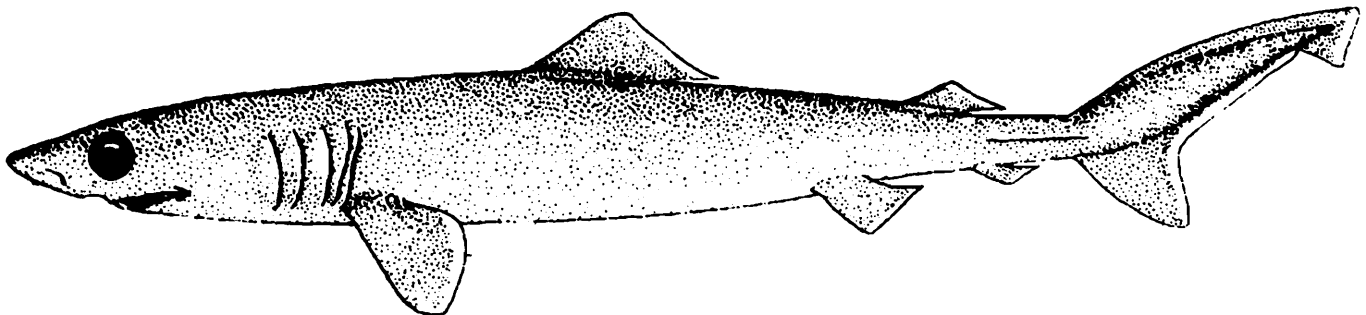


Fig. 19. Lateral view of *Pseudocarcharias kamoharai*

1936. *Carcharias komoharai* Matsubara, *Zool. Mag. Tokyo*, 48 (7) : 380.

*Synonymy* : *Carcharias yangi*, *Pseudocarcharias pelagicus*.

*Morphological features* : Small and relatively slender shark; head with 5 large gill slits all in front of pectoral fin bases; no gill rakers; eyes very large without nictitating eyelids; mouth very long and angular, extending well behind eyes; caudal fin short, strongly asymmetrical with a pronounced subterminal notch and a short ventral lobe. Ovoviviparous. Feed on small oceanic fishes and squids. Jaws can be protruded to a considerable distance forward from mouth.

*Geographical Distribution* : Eastern Indian Ocean : enormous in Bay of Bengal, Western Indian Ocean : Mozambique, Central and Eastern Pacific.

*Remarks* : Caught in pelagic longlines. Often caught on tuna long lines. The liver of this species is very large and very high in squalene, and hence is of potential value (Compagno, 1984).

20. *Alopias superciliosus* (Lowe, 1839)  
Bigeye thresher shark

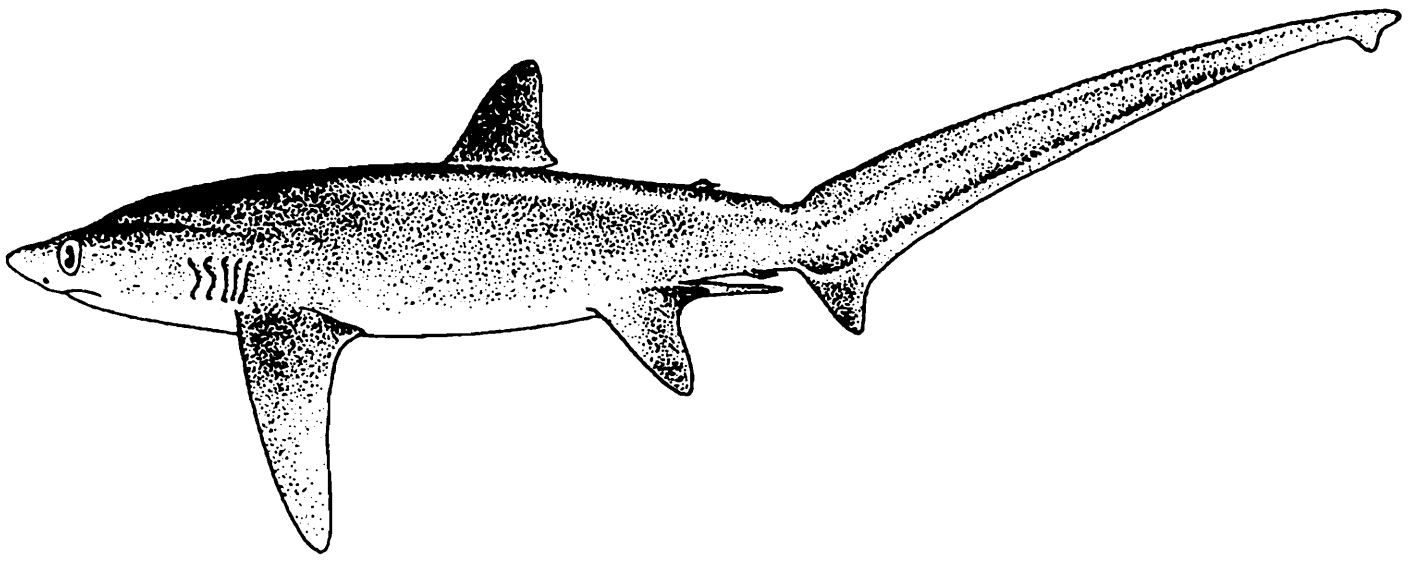


Fig. 20. Lateral view of *Alopias superciliosus*

1839. *Alopecias superciliosus* Lowe, *Trans. Zool. Soc. London*, 3 (1) : 18.

*Synonymy* : *Alopias profundus*.

*Morphological features* : A large shark; head with 5 medium sized gill slits, the last two above pectoral fin bases; a deep horizontal groove on nape on each side; snout moderately long and conical; eyes large, expanding on to dorsal surface of head; long curving asymmetrical caudal fin; first dorsal locate just in front of the pelvic fin origins. Ovoviviparous, usually with only two young ones. Males mature at 270–288 cm and female at 332–341 cm. It feeds on squids and small schooling fishes, which it stuns with blows from its tail.

*Geographical Distribution* : Indian Ocean : India (Arabian Sea), South Africa and Madagascar, Western and Eastern Pacific.

*Remarks* : Generally caught in Oceanic long line fisheries. Its meat is utilized fresh, smoked and dried salted for human consumption, its liver is processed for vitamins, skin is for leather and fins for shark fin soup (Compagno, 1984).

21. *Alopias pelagicus* Nakamura, 1935  
Pelagic thresher shark

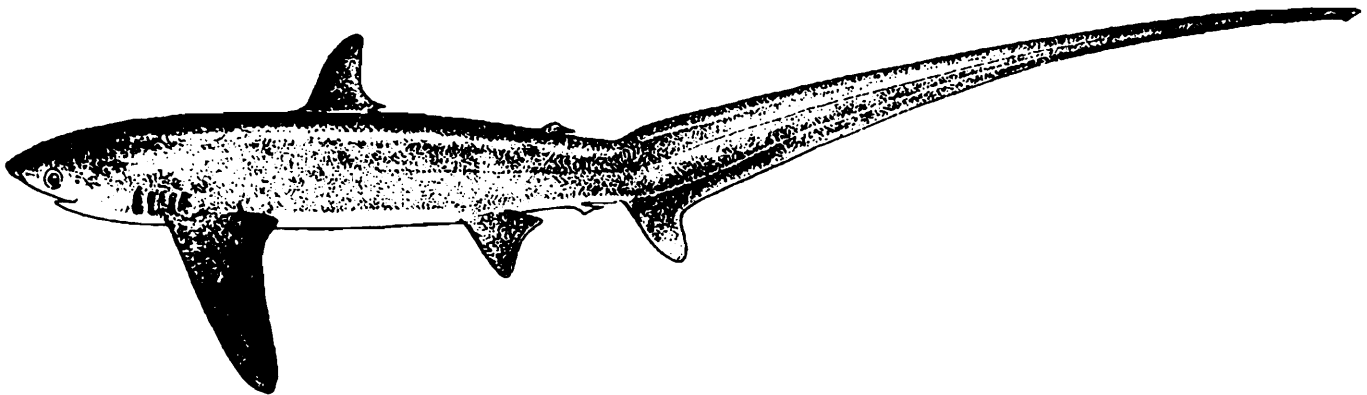


Fig. 21. Lateral view of *Alopias pelagicus*

1935. *Alopias pelagicus* Nakamura, *Mem. Fac. Sci. Agric. Taihoku Imp. Univ.*, 14 (1) : 2, 3, pl. 1, fig. 2.

*Synonymy* : None.

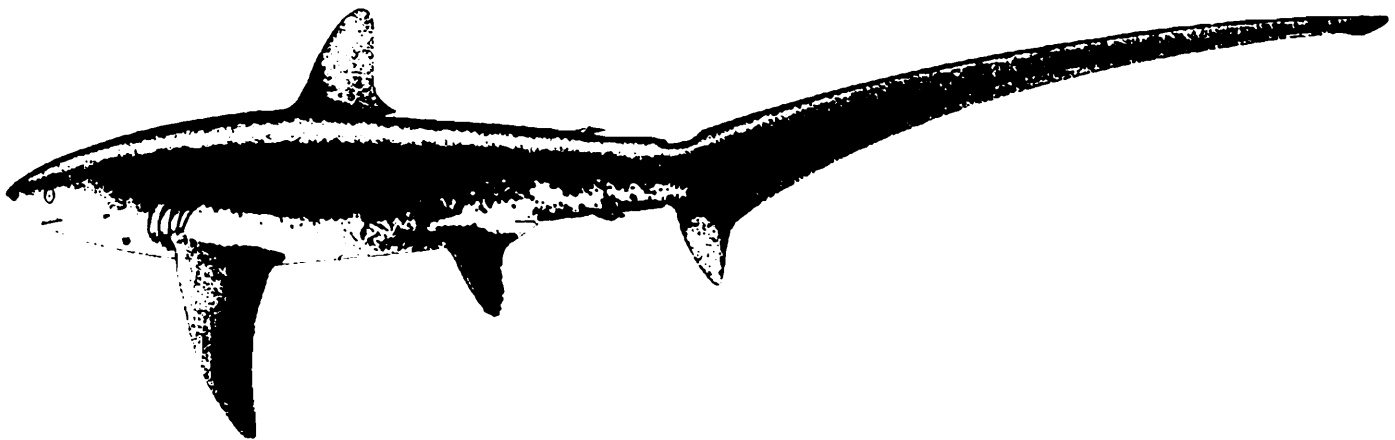
*Morphological features* : A large shark; head with 5 medium sized gill slits, the last two above pectoral fin bases; forehead nearly straight in lateral view, broadly arched between eyes; snout moderately long and conical; pectoral fins narrow, long and nearly straight broad tipped and not falcate; upper lobe of caudal fin very long and strap like, about as long as rest of the shark; lower lobe short and strong; a white colour from belly not expanded over pectoral fin bases. Ovoviviparous, with two young born at a length greater than 96 cm. They feed on small fishes and pelagic invertebrates.

*Geographical Distribution* : Indian Ocean : India, South Africa, Red Sea, Arabian Sea, western north and south Pacific (Compagno, 1984; Talwar and Jhingran, 1991).

*Remarks* : Pelagic threshers are caught using tuna longlines. Utilized for its meat, liver oil, leather and shark fin soup. A pelagic thresher *Alopias vulpinus* was caught by Fishery Survey of India vessel M.F.V. Matsya Darshini in 1990 (Vijayakumaran, 1994).

22. *Alopias vulpinus* (Bonnaterre, 1788)

## Thresher Shark

Fig. 22. Lateral view of *Alopias vulpinus*

1788. *Squalus vulpinus* Bonnaterre, *Tabl. Encyclop. Method. Trios Reg. Nat., Ichthyol.*, Paris : 9.

*Synonymy* : *Vulpicula marina*, *Alopias caudatus*, *Alopias greyi*.

*Morphological features* : Body torpedo shaped with the caudal fin greatly enlarged, about as long as rest of body. Mouth short and semicircular beneath eyes, with short lower labial furrows. Two dorsal fins, the first moderately large, with its base well ahead of pelvic fins; the second fin minute and positioned just in front of small anal fin. Upper lobe of caudal fin very long and strap like, about as long or longer than rest of sharks; lower lobe short but well developed. Purplish, bluish-grey or blackish on back and underside of snout, lighter on sides, and abruptly white below; a white area extends from the abdomen over the pectoral fin bases. Pectoral, pelvic and dorsal fins blackish, purplish or bluish grey. Attains a total length of over 20 feet.

*Geographical Distribution* : Indo West Pacific : India, South Africa, Tanzania, Somalia, Pakistan, Sri Lanka, Japan, China and Australia (Compagno, 1984).

*Remarks* : Of minor fishery value, being taken rather infrequently in India. The fresh meat is highly priced for human consumption and also eaten smoked, salt dried. Skin is used for leather, fins for shark fin soup and liver oil for vitamin extraction.

23. *Carcharodon carcharius* (Linnaeus, 1758)  
Great white shark

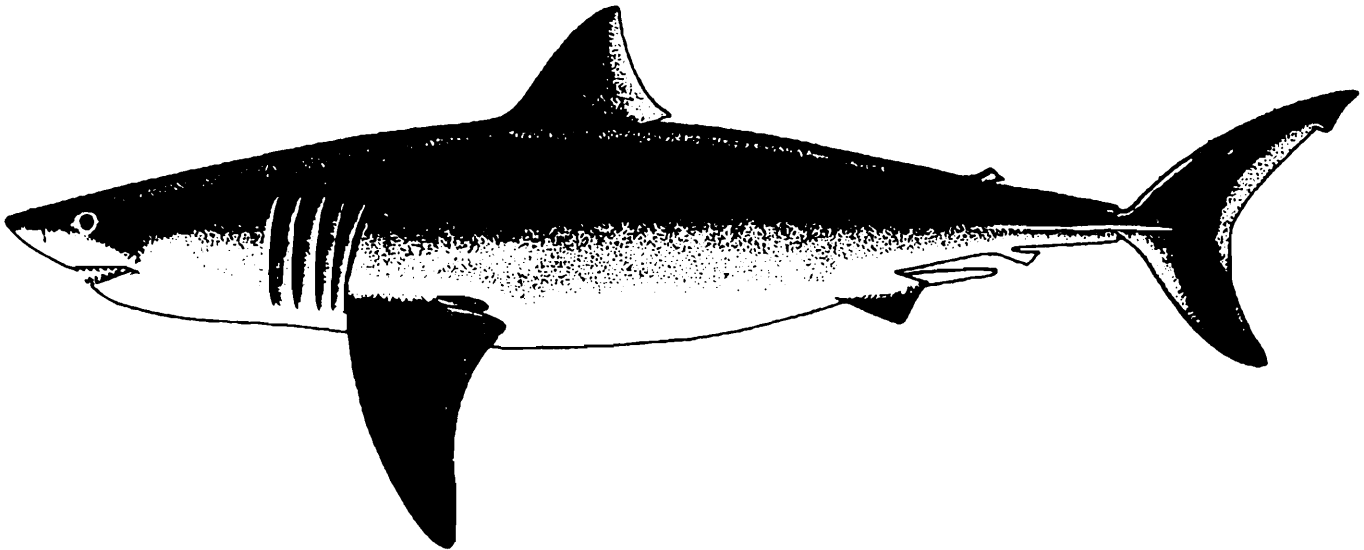


Fig. 23. Lateral view of *Carcharodon carcharius*

1758. *Squalus carcharias* Linnaeus, *Sys. Nat.*, ed. 10, 1 : 235.

*Synonymy* : *Carcharias maou*, *Carcharodon albimors*.

*Morphological features* : Heavy spindle shaped body, moderately long conical snout, huge, flat, triangular, serrated blade like teeth, long gill slits, large first dorsal fin with light free rear tip, minute, pivoting second dorsal and anal fins, strong keels on caudal peduncle, no secondary keels on caudal base, crescentic caudal fin, ventral surface of body white.

*Geographical Distribution* : Indian Ocean and Western Pacific : Siberia, Japan, Korea, China, Philippines and Indonesia (Sivasubramaniam, 1992).

*Remarks* : Mostly taken as a bycatch of fisheries of other sharks and other fishes, by long lines, hook and line, fixed bottom gill nets, fish traps, herring weirs and harpoons. Utilized fresh, dried, salted and smoked for human consumption; the liver oil is extracted for vitamins; the carcass used for fishmeal; the skin for leather; the fins for shark fin soup (Compagno, 1984).

24. *Isurus oxyrinchus* Rafinesque, 1809  
Shartfin mako

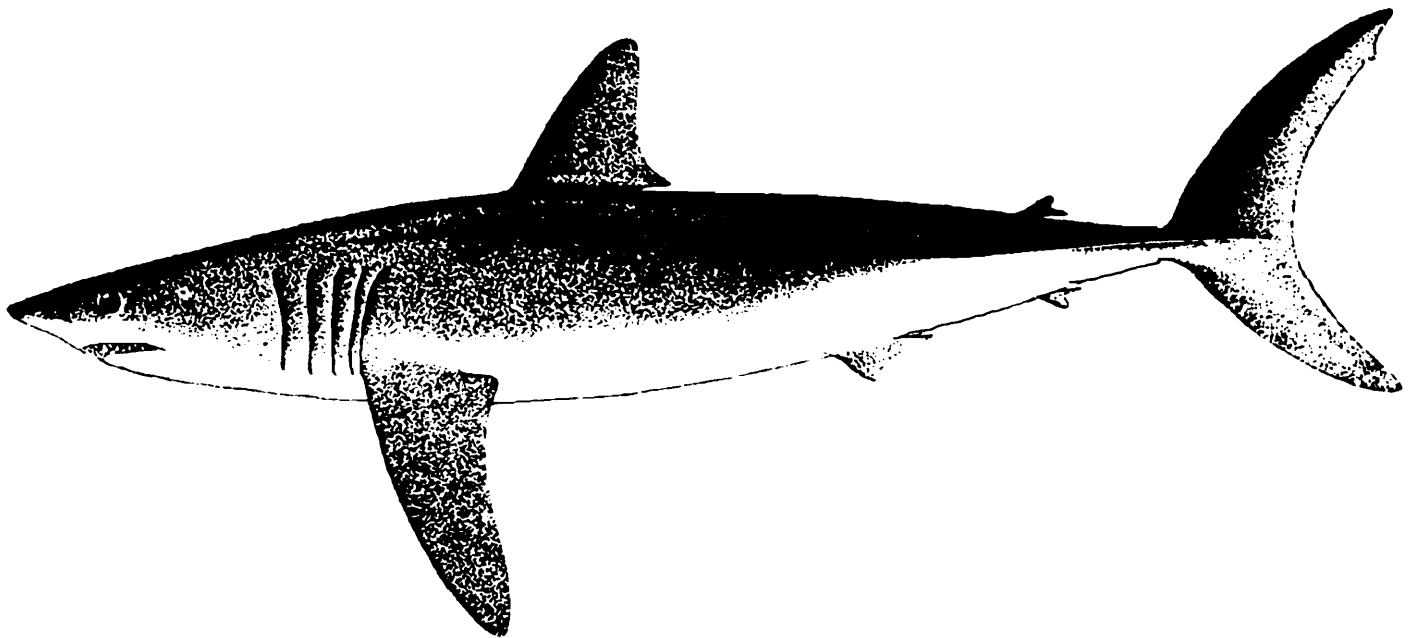


Fig. 24. Lateral view of *Isurus oxyrinchus*

1809. *Isurus oxyrinchus* Rafinesque, *Caratt. Gen. Sp. Anim. Pinat. Sicilia, Pallermo*, pt. 1 : 12, pl. 12, fig. 1.

*Synonymy* : *Isurus mako*, *Isurus bideni*, *Isurus tigris arficanus*.

*Morphological features* : Torpedo-shaped, stoutly built, with a long and actually pointed snout. Spiracles minute, often invisible. Mouth broadly rounded in front and notably long. Teeth strong and relatively few in number, alike in both jaws, backward pointing, smooth edged, with a single cusp. Two strongly unequal dorsal fins. Pectoral fins moderately long and falcate. Caudal fin lunate. Dark metallic blue back and white belly.

*Geographical Distribution* : Indo West Pacific : India, South Africa, Indonesia, Pakistan Red Sea, the Koreas, Japan and Australia. Eastern and western Atlantic, Central and eastern Pacific and throughout all tropical and warm temperate seas (Compagno, 1984).

*Remarks* : Of minor fishery importance in our seas; usually caught offshore. Grows to a large size. The meat is utilised fresh, dried and salted for human consumption. Fins and livers are used for shark fin soup and vitamins respectively.

25. *Apisturus investigatoris* (Misra, 1962)  
Broadnose catshark

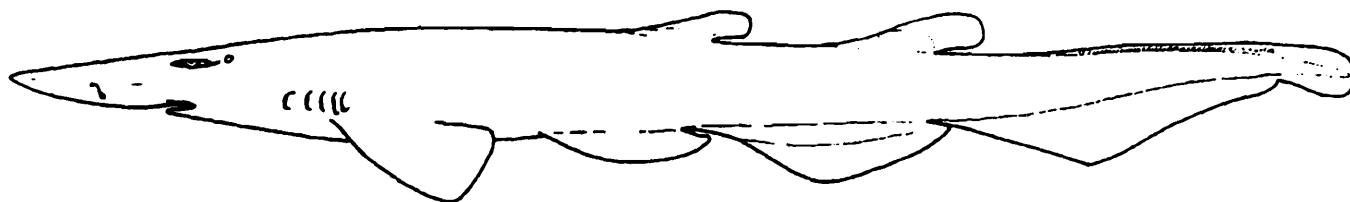


Fig. 25. Lateral view of *Apisturus investigatoris*

1962. *Pentanchus (Parapristurus) investigatoris* Misra, *Proc. All-India Congr. Zool.*, 1 (2) : 636, pl. 1.

*Synonymy* : None.

*Morphological features* : Body relatively slender, trunk slightly tapering toward head. Snout, long, broad and bell shaped; gill slits small, about half of the eye length; gill septa incised; eyes small; nostrils very broad; anterior nasal flaps very low and rounded; mouth short and moderately large and very broadly arched with dental bands. Mouth and labial furrows extending slightly in front of the eyes. Anal fin long rather high and rounded angular. Caudal fin rather broad, with a well developed crest of enlarged denticles on dorsal margin. Colour medium brown. Size more than 26 cm.

*Geographical Distribution* : Known only from the type locality, in the Andaman Sea. A deep water bottom shark, from the eastern Indian Ocean continental slope at 1040 m depth.

*Remarks* : It is of minor fishery value (Compagno, 1984).

26. *Cephaloscyllium silasi* (Talwar, 1974)  
Indian swellshark

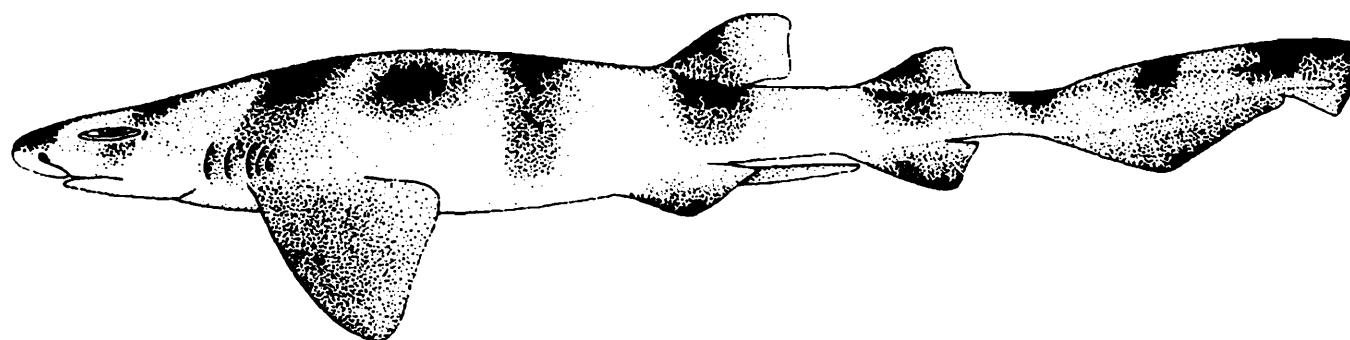


Fig. 26. Lateral view of *Cephaloscyllium silasi*

1974. *Scliorhinus (Halaelurus) silasi* Talwar, 1984 *J. mar. biol. Assoc. India*, 14 (1) : 779, fig. 1.

*Synonymy* : *Scyliorhinus natalensis* (nec Regan) Rama Rao.

*Morphological features* : A small catshark with a stout body, no labial furrows, and with a simple colour pattern of dark saddles, head extremely broad, snout obtusely wedge shaped, anterior nasal flaps elongate, lobate and overlapping mouth posteriorly.

*Geographical Distribution* : Known only from the vicinity of Quilon, India where it is relatively common; bathypelagic.

*Remarks* : A little known bottom dwelling shark (Compagno, 1984; Talwar and Jhingran, 1991).

27. *Scyliorhinus capensis* (Smith, 1838)  
Yellowspotted catshark

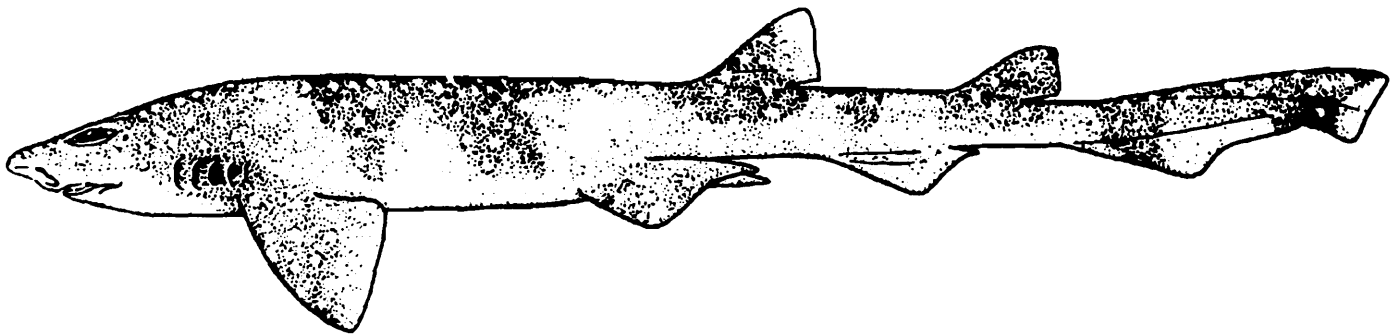


Fig. 27. Lateral view of *Scyliorhinus capensis*

1838. *Scyllium capensis* Smith, *Proc. Zool. Soc. Lond.*, 5 : 85.

*Synonymy* : None.

*Morphological features* : A fairly large and slender, bright yellow spotted and grey saddled catshark with small anterior nasal flaps that do not reach mouth, no nasoral grooves, labial furrows on lower jaw only, second dorsal fin much smaller than first. Colour pattern of numerous small bright yellow spots about size of eye pupil or more; 8 or 9 dusky grey saddle marks on back; no dark spots. Size large, to 1.2 m. Oviparous. Feeds commonly on small bony fishes and crustaceans, also cephalopods. Males maturing at 95 cm, females at 85 cm.

*Geographical Distribution* : Eastern south Atlantic and Western Indian Ocean (Compagno, 1984).

*Remarks* : No fishery value, taken by commercial bottom trawls.

28. *Atelomycterus marmoratus* (Bennett, 1830)  
Marbled catshark

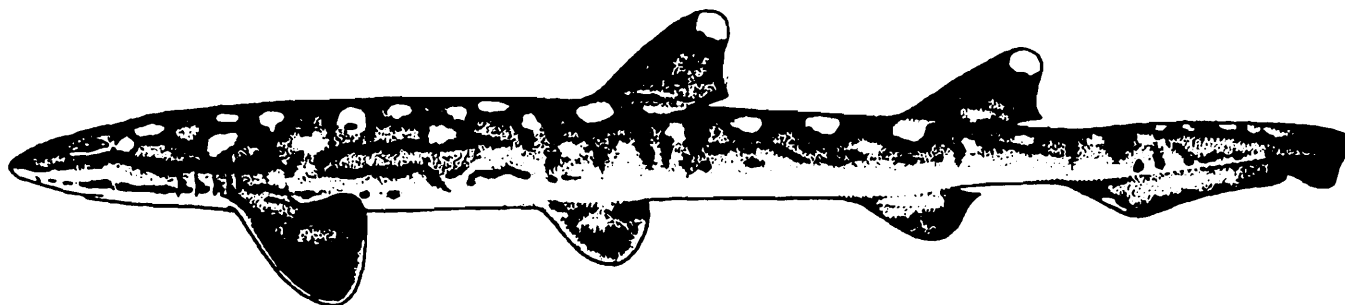


Fig. 28. Lateral view of *Atelomycterus marmoratus*

1830. *Scyllium marmoratum* Bennett, *Mem. Life Pub. Ser. Sir Stamford Raffles*, : 693.

*Synonymy* : *Scyllium maculatum*, *Scyllium pardus*

*Morphological features* : Body elongate and subcylindrical. Head moderately flattened. Mouth fairly arched; nasal flaps large and long, entirely covering posterior openings of nasal apertures and extending past upper lip. Teeth small, numerous usually tridentate. Two dorsal fins; first fin over middle of pelvic fin base. Anal fin base equal to second dorsal fin base, the rear end of its base under midpoint of latter. Body colour is variable light brownish becoming whitish below; young with 12 transverse brown bands, separated by pairs of white spots; adults irregularly blotched with brown.

*Geographical Distribution* : Indo West Pacific : India, Sri Lanka, Malaysia, Singapore, Indonesia, Thailand, Vietnam, Philippines and southern China (Compagno, 1984).

*Remarks* : Of minor fishery value, being taken rather infrequently in India (Talwar, 1984; Pillai and Parakal, 2000).

29. *Halaelurus hispidus* (Alcock, 1891)  
Bristly Catshark

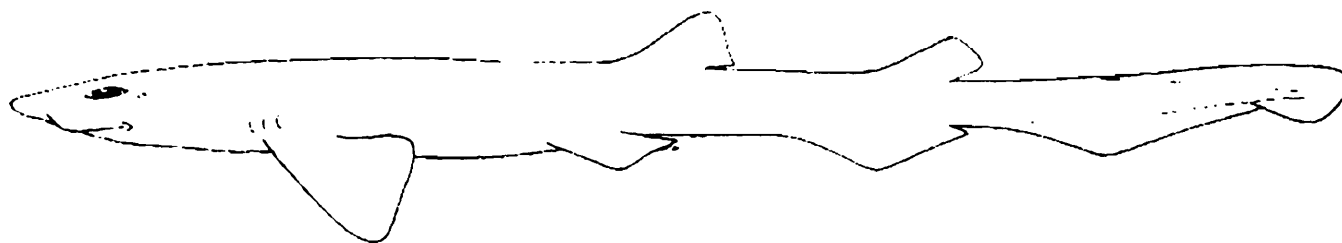


Fig. 29. Lateral view of *Halaelurus hispidus*

1891. *Scyllium hispidum* Alcock, *Ann. Mag. nat. His.* (Ser. 6), 8 : 21.

*Synonymy* : None.

*Morphological features* : A small species with a rounded snout; long abdomen and short anal base; snout tip knoblike, broadly parabolic; anterior nasal flaps sub triangular; labial furrows rather short; mouth moderately large; first dorsal origin over last third of pelvic bases, second dorsal slightly smaller than first, its origin over or slightly in front of anal mid base. Colour pale brown or whitish. Adult males 24 - 26 cm, adult females about 22 to 29 cm.

*Geographical Distribution* : Indian Ocean : Southeastern India, Andaman Islands (Compagno, 1984; Talwar and Jhingran, 1991).

*Remarks* : It is of minor fishery value. The holotype of this species was examined in the Zoological Survey of India, Calcutta by Compagno (1984).

30. *Halaelurus quagga* (Alcock, 1899)

Quagga catshark

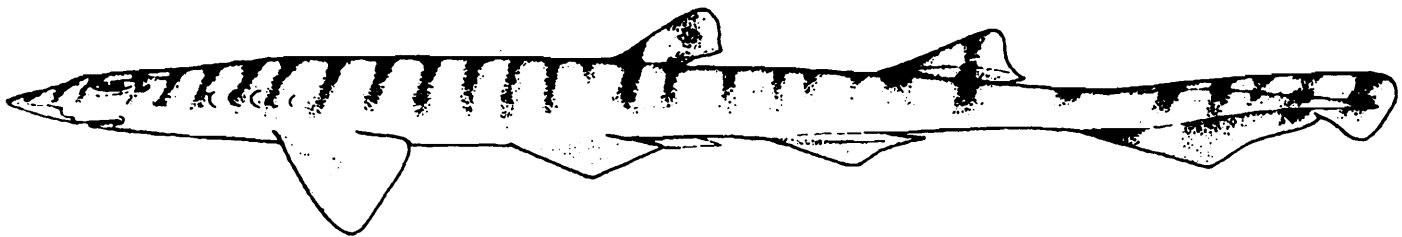


Fig. 30. Lateral view of *Halaelurus quagga*

1899. *Scyllium quagga* Alcock, *Descr. Cat. Indian Deep-sea fish. Indian Mus.*, : 17.

*Synonymy* : None.

*Morphological features* : Snout tip pointed; eyes in adults 12 to 13 times in distances from snout to first dorsal origin; anterior nasal flaps subtriangular; labial furrows rather short; mouth moderately large; first dorsal origin about opposite or slightly behind anal insertion; abdomen short in adults; colour light below, with over 20 dark brown narrow vertical bars. Adult males 28 - 35 cm and size at hatching about 8 cm.

*Geographical Distribution* : Indian Ocean : India, Somalia (Compagno, 1984).

*Remarks* : Of minor fishery value, being taken rather infrequently in India (Pillai and Parakal, 2000).

31. *Eridacnis radcliffei* Smith, 1913  
Pygmy ribbontail catshark

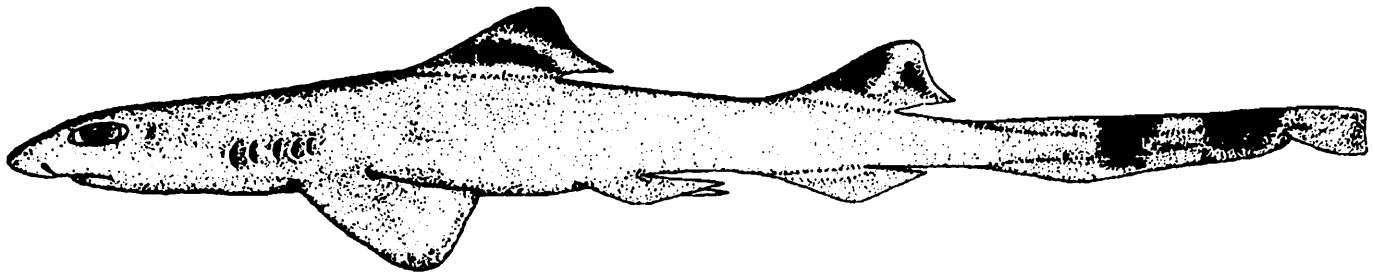


Fig. 31. Lateral view of *Eridacnis radcliffei*

1913. *Eridacnis radcliffei* Smith, *Proc. U. S. natl. Mus.*, 45 (2003) : 599, fig. 1 3, pl. 47.

*Synonymy* : *Proscyllium alcocki*.

*Morphological features* : Shark having two equal sized spineless dorsal fins, first dorsal fin over abdomen and slightly closer to pelvic fins than pectorals; nictitating eyelids; a triangular mouth; a narrow ribbon like caudal fin with prominent dark bandings; dark markings on dorsal fins and brown coloration. Ovoviviparous. Females mature at small size of 16.6 cm and males at 18 to 19 cm. Feed on small bony fishes and crustaceans. Caught usually by bottom trawls.

*Geographical Distribution* : Indo West Pacific : India (Gulf of Mannar, Bay of Bengal and Andaman Islands), Vietnam and Philippines (Compagno, 1984).

*Remarks* : Minimal fishery value, often taken in commercial bottom trawls.

32. *Iago omanensis* (Norman, 1939)  
Bigeye hound shark

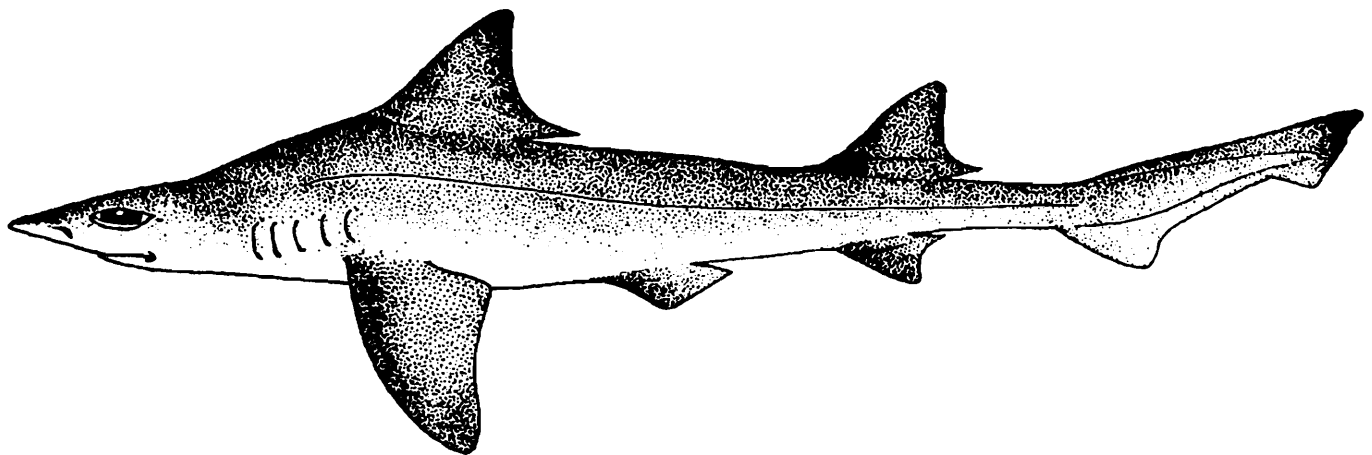


Fig. 32. Lateral view of *Iago omanensis*

1939. *Eugaleus omanensis* Norman, *John Murray Exped. Sci. Rep.*, & (1) : 11, fig 3.

*Synonymy* : None.

*Morphological features* : A small, slender shark with a snout, humpbacked trunk; nostrils with small nasal flaps; nasal grooves absent; eyes horizontally oval on sides of the head; teeth small, compressed, blade like, lateral teeth with short oblique cusps but without cusplets; caudal fin with lower lobe hardly indicated. They are viviparous, with a yolk sac placenta. Males mature between 30 to 36 cm. Females mature at 40 to 45 cm. They feed on small fishes and crustaceans.

*Geographical Distribution* : India (Bay of Bengal), Pakistan, Red Sea, Gulf of Oman.

*Remarks* : Limited fishery value, taken in gillnet fisheries in Southern India. In India, utilized fresh for human consumption (Compagno, 1984).

33. *Mustelus mosis* Hemprich and Ehrenberg, 1899  
Gummy smooth hound

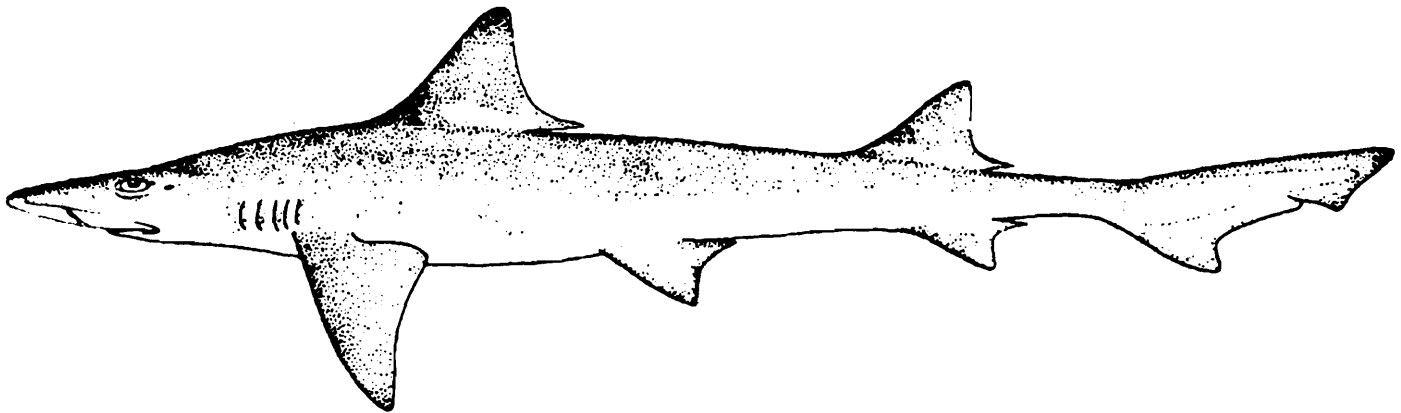


Fig. 33. Lateral view of *Mustelus mosis*

1899. *Mustelus mosis* Hemprich and Ehrenberg, *Symbol. Physic. Icones Ined.*, Zool., pl. &, fig. 3.

*Synonymy* : *Mustelus manazo*.

*Morphological features* : A small shark, with an elongate and slender body; snout markedly pointed and long. Mouth triangular, with well developed labial folds. Skin fairly smooth. Body reddish grey above, dull white ventrally.

*Geographical Distribution* : Western Indian Ocean : India, Pakistan, Sri Lanka, South Africa and Red Sea (Compagno, 1984).

*Remarks* : Of minor fishery importance in India. Apparently regularly fished off India and Pakistan. Freshly used for human consumption (Pillai and Parakal, 2000).

34. *Hemipristis elongatus* (Klunzinger, 1871)  
Fossil shark

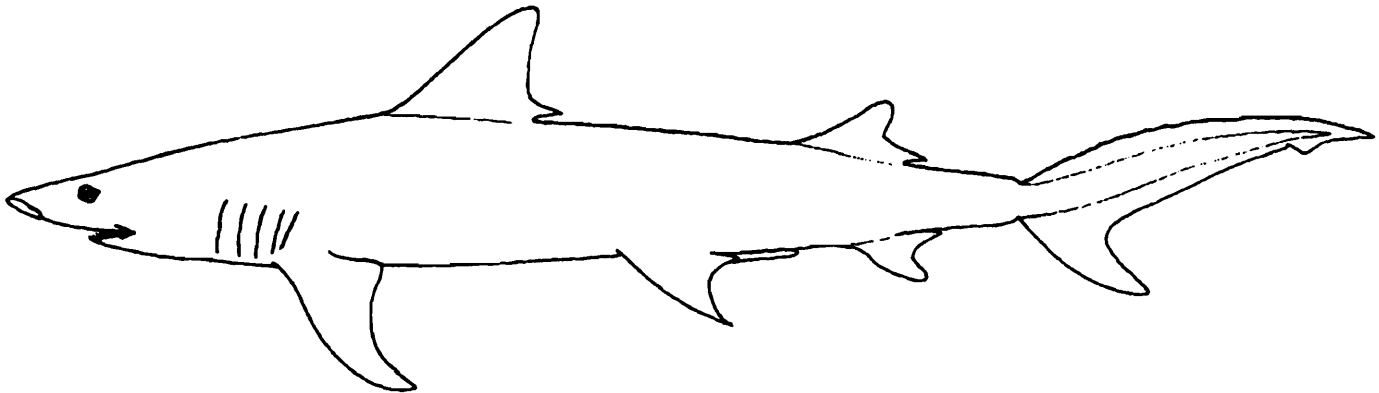


Fig. 34. Lateral view of *Hemipristis elongatus*

1871. *Dirrhizodon elongates* Klunzinger, *Verh. K.K. Zool. Bot. Ges. Wien*, 21 : 665.

*Synonymy* : *Hemipristis pingali*, *Paragaleus acutiventralis*, *Heterogaleus ghardaguensis*

*Morphological features* : Body slender and fusiform. Head moderately depressed, with a rounded snout. Mouth with definite labial furrows in both jaws. Spiracles very small, 1/5 of mouth diameter. Fins strongly falcate; pelvic fins notably long. Body colour light ashy-brown above, dull white on sides and belly

*Geographical Distribution* : Indo West Pacific : India, Red Sea, east coast of Africa, Pakistan, Sri Lanka, Gulf of Thailand and Vietnam (Compagno, 1984).

*Remarks* : Of minor fishery value in India. Regularly taken in artisanal fisheries in the Indian Ocean and western Pacific, especially off India, Pakistan and Thailand. Meat utilized fresh for human consumption. In India it is considered one of the best sharks for food; liver processed for vitamins; fins used in the oriental shark fin trade. It is considered to be a only living species under the genus *Dirrhizodon*. 14 sharks including 6 males and 8 females were collected from gill net catches off Madras Coast over a period of one year in 1991 (Devadoss and Chandrasekar, 1991).

35. *Hemigaleus microstoma* Bleeker, 1852  
Sicklefin weasel shark

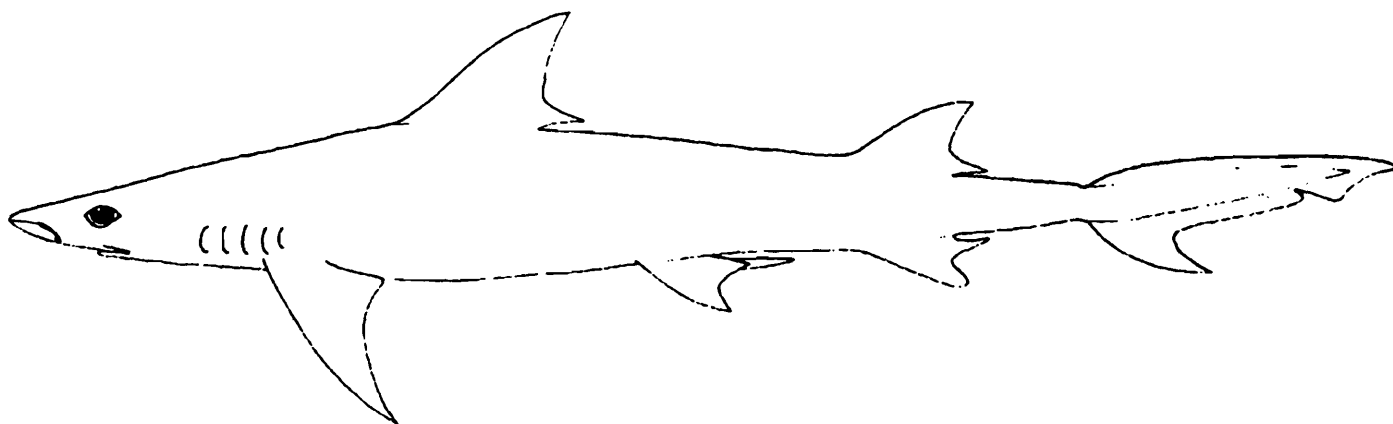


Fig. 35. Lateral view of *Hemigaleus microstoma*

1852. *Hemigaleus microstoma* Bleeker, *Verh. Batav. Genoot. Kunst. Wet.*, 24 : 46, pl. 2, fig. 9.

*Synonymy* : *Hemigaleus machlani*, *Negogaleus brachygnathus*.

*Morphological features* : Long snout, its length somewhat greater than mouth width; labial furrows moderately long and easily seen; mouth very short and broadly arched; spiracles present and small; gill openings short; pectoral and pelvic fins strongly falcate; anal fin slightly smaller than second dorsal fin, without preanal ridges. Viviparous, grow to a maximum length of at least 91 cm. Feed on small fishes and cephalopods.

*Geographical Distribution* : Indo West Pacific : Southern India, Sri Lanka, Thailand, Singapore, Java, China, Philippines and Australia.

*Remarks* : Caught with floating and bottom gillnets, long lines and hook and lines. Utilized fresh for human consumption (Compagno, 1984).

36. *Chaenogaleus macrostoma* (Bleeker, 1852)  
Balfour's shark

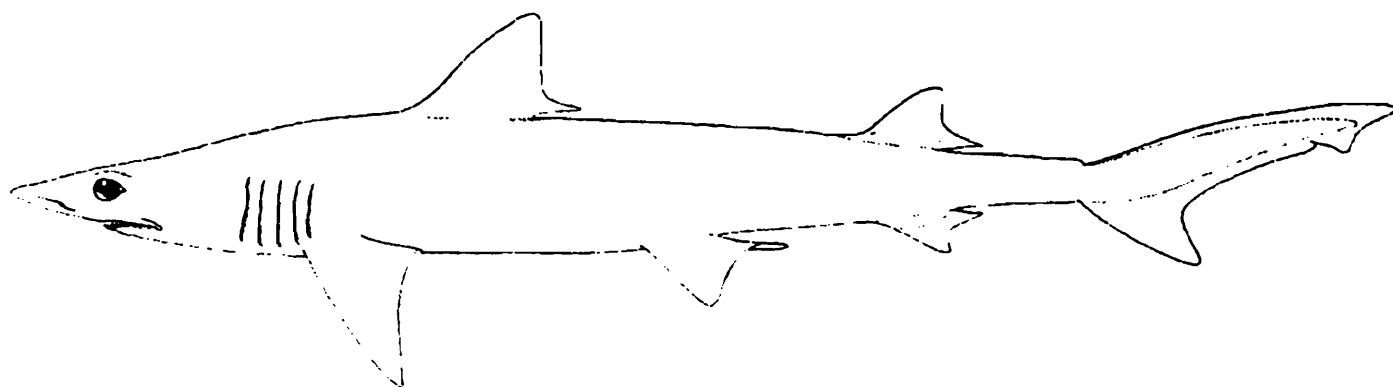


Fig. 36. Lateral view of *Chaenogaleus macrostoma*

1852. *Hemigaleus macrostoma* Bleeker, *Verh. Batav. Genoot. Kunst. Wet.*, 24 : 46, pl. 2, fig. 10.

*Synonymy* : *Hemigaleus balfouri*.

*Morphological features* : Body slender and elongate. Spiracles minute. Last two gill slits above pectoral fin base. First dorsal fin larger than second dorsal fin, its origin midway between pectoral and pelvic fins. Body is dark greyish brown in colour. Fins grey second dorsal fin dusky distally. Maximum size 100 cm.

*Geographical Distribution* : Indo West Pacific : India, Pakistan, Sri Lanka, Singapore, Thailand, Vietnam, China and Java (Compagno, 1984).

*Remarks* : Of minor fishery value in India; a regular item in the fishery at Cochin, Trivandrum and Tuticorin. Caught in drifting and bottom gillnets and on longlines and other line gear. Utilized fresh for human consumption (Pillai and Parakal, 2000).

37. *Carcharhinus albimarginatus* Ruppell, 1837  
Silver tip Shark

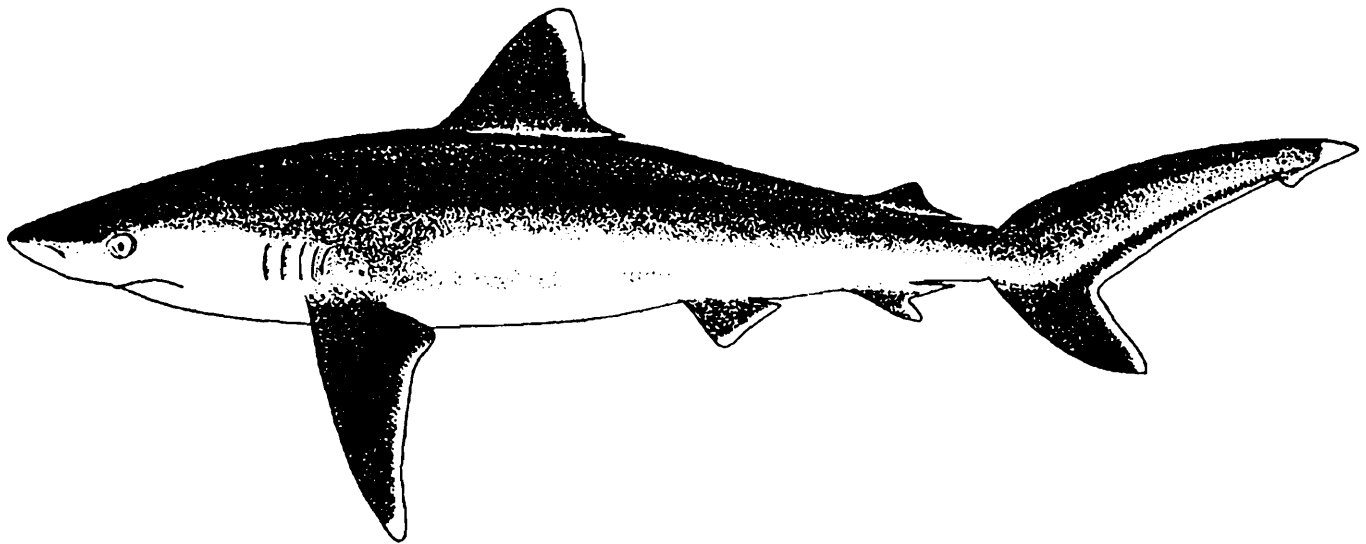


Fig. 37. Lateral view of *Carcharhinus albimarginatus*

1837. *Carcharhinus albimarginatus* Ruppell, *Neues wirbel. Fauna Abyssinien, Fische Rothen Meeres*, (11) : 64, pl. 18, fig 1.

*Synonymy* : *Eulamia (Platypodon) platyrhynchus*.

*Morphological features* : Body large and slender; snout moderately long and broadly parabolic; conspicuous white tips at posterior margins on all fins; black saddles absent on the caudal peduncle; pectoral fin narrow tipped; first dorsal apex narrowly rounded

or pointed; dermal ridge present between dorsal fins; teeth with serrated edges, upper teeth broadly triangular and erect in front of the month. Males mature at about 180 cm.

*Geographical Distribution* : Western Indian Ocean : India, South Africa, Mozambique, Madagascar, Kenya, eastern Pacific and Western North Atlantic.

*Remarks* : Usually caught with long lines and gill nets. Widely used for human consumption (Compagno, 1984).

38. *Carcharhinus altimus* (Springer, 1950)  
Bignose Shark

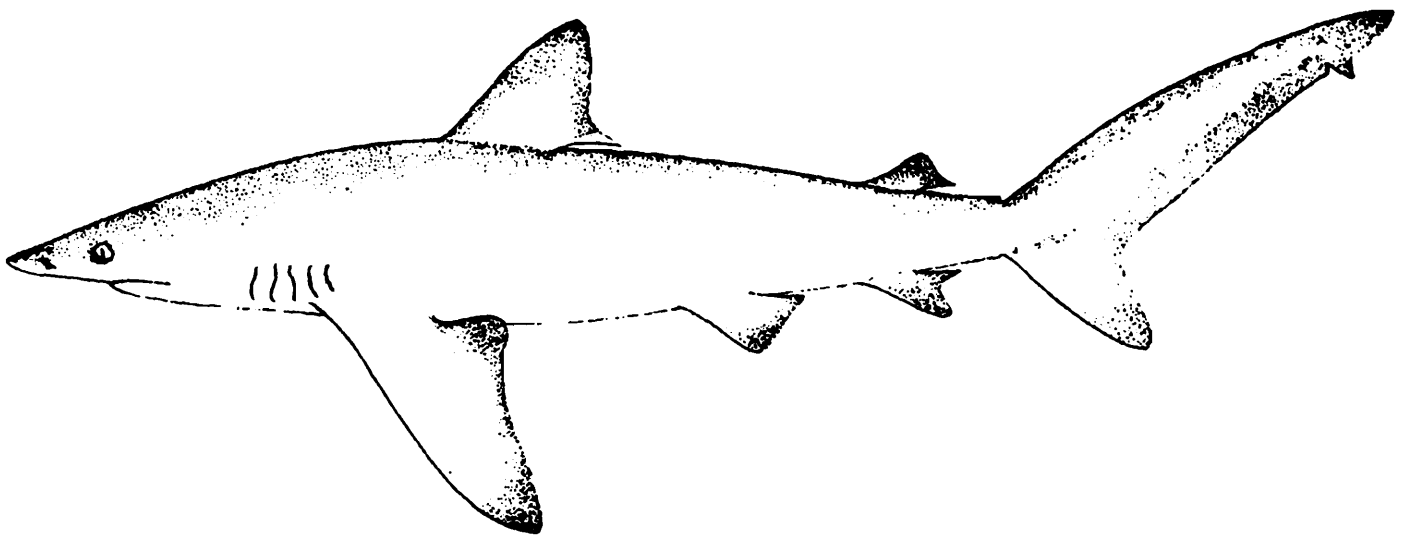


Fig. 38. Lateral view of *Carcharhinus altimus*

1950. *Eulamia altima* Springer, *Am. Mus. Novit.*, (1451) : 9.

*Synonymy* : *Carcharhinus radamae*.

*Morphological features* : Body slender; snout rounded and rather long; anterior nasal flaps expanded as low, with broadly triangular lobes; first dorsal fin moderately high with narrow rounded apex, its origin over inner margins of pectoral fins; pectoral fins long and not strongly falcate; a high dermal ridge present between dorsal fins. Males mature about 213 cm and females about 221 cm. They feed mainly on fishes and cephalopods.

*Geographical Distribution* : Western Indian Ocean : India, South Africa, Madagascar, Red sea, western, central and eastern Pacific.

*Remarks* : These sharks are caught on longlines and with floating gill nets. Their flesh and fins are useful (Compagno, 1984).

39. *Carcharhinus amblyrhynchoides* (Whitley, 1934)  
Graceful Shark

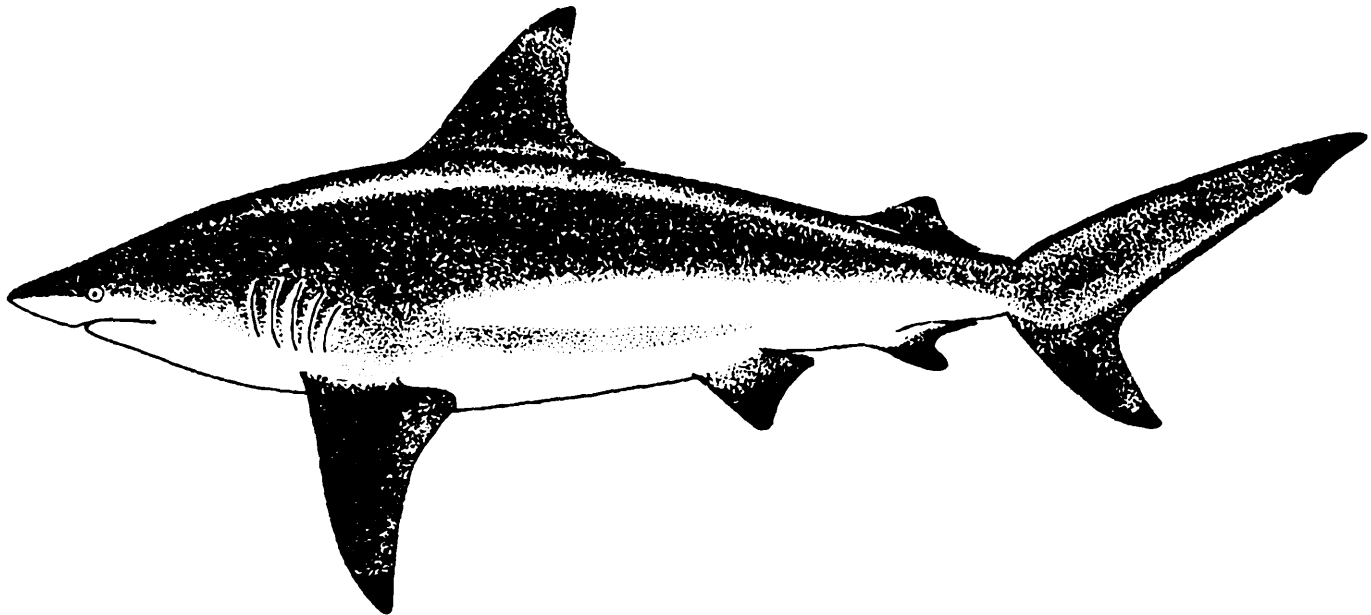


Fig. 39. Lateral view of *Carcharhinus amblyrhynchoides*

1934. *Gillisqualus amblyrhynchoides* Whitley, *Mem. Queensl. Mus.*, 10 (4) : 189, fig. 4.

*Synonymy* : None.

*Morphological features* : A medium sized shark; snout short and pointed and its length is less than mouth width; pectoral fins moderately long and falcate with narrow pointed tips; dermal ridge is absent between dorsal fins; pectoral, dorsal, pelvic and ventral lobe of caudal fin is black or dusky tipped. Viviparous with 1 to 6 embryos and size at birth is about 52 to 60 cm. Male mature about 108 cm and females at 115 cm. Food is chiefly fishes.

*Geographical Distribution* : Indo West Pacific : India, Sri Lanka, Gulf of Thailand, Philippines, Vietnam, Java and Australia (Compagno, 1984).

*Remarks* : They are taken on long lines and drift gillnets. Flesh, fin and liver are useful.

40. *Carcharhinus amblyrnychos* (Bleeker, 1856)  
Grey reef Shark

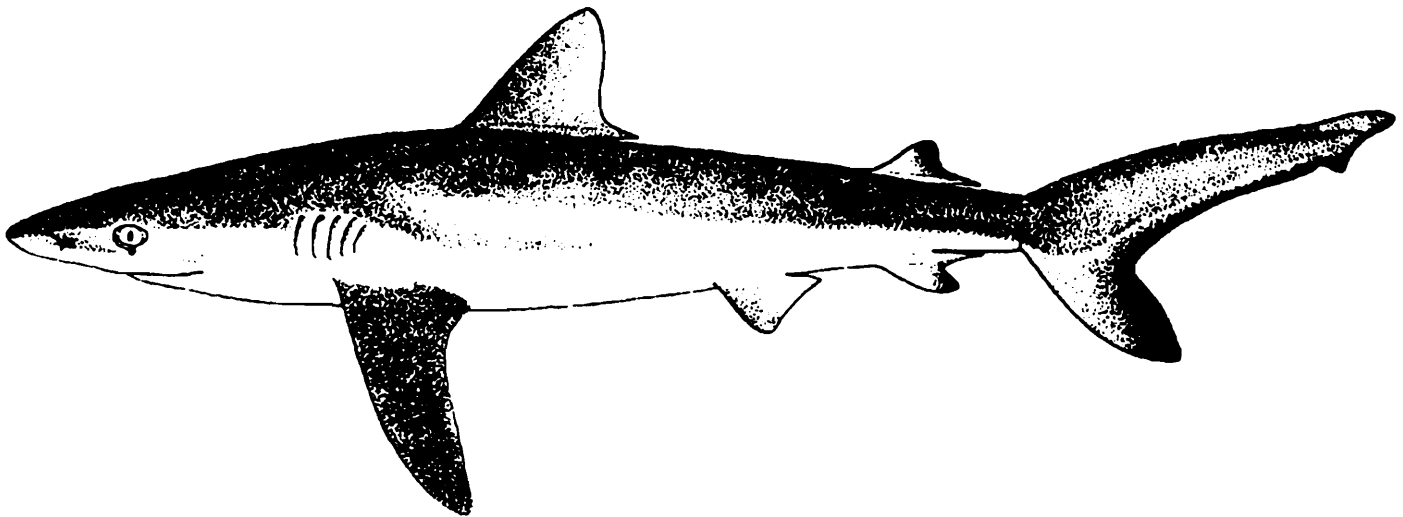


Fig. 40. Lateral view of *Carcharhinus amblyrnychos*.

1856. *Carcharias (Prionodon) amblyrnychos* Bleeker, *Natuur. Tijdschr. Ned. Indie*, 6 : 467.

*Synonymy* : *Galeolama fowleri*, *Galeolama tufiensis*, *Galeolama coongoola*.

*Morphological features* : A medium sized shark; body stout; snout broadly rounded; anterior nasal flaps very low; teeth narrowly triangular, high, moderately narrow and erect-cusped in front of the mouth; a weak interdorsal ridge present between dorsal fins or no ridge; caudal fin with a conspicuous wide black posterior margin. Viviparous, size at birth about 50 to 60 cm. It is a bottom feeding shark, eating small reef fishes and octopus.

*Geographical Distribution* : Indian Ocean : India and Madagascar. Western Central Pacific : Singapore, Thailand, Vietnam, China and Philippines.

*Remarks* : The grey reef shark forms a major part of catches by bottom set gill nets, bottom set long lines and hand lines in the Maldiv Islands (Compagno, 1984).

41. *Carcharhinus amboinensis* (Muller and Henle, 1839)  
Pigeye Shark

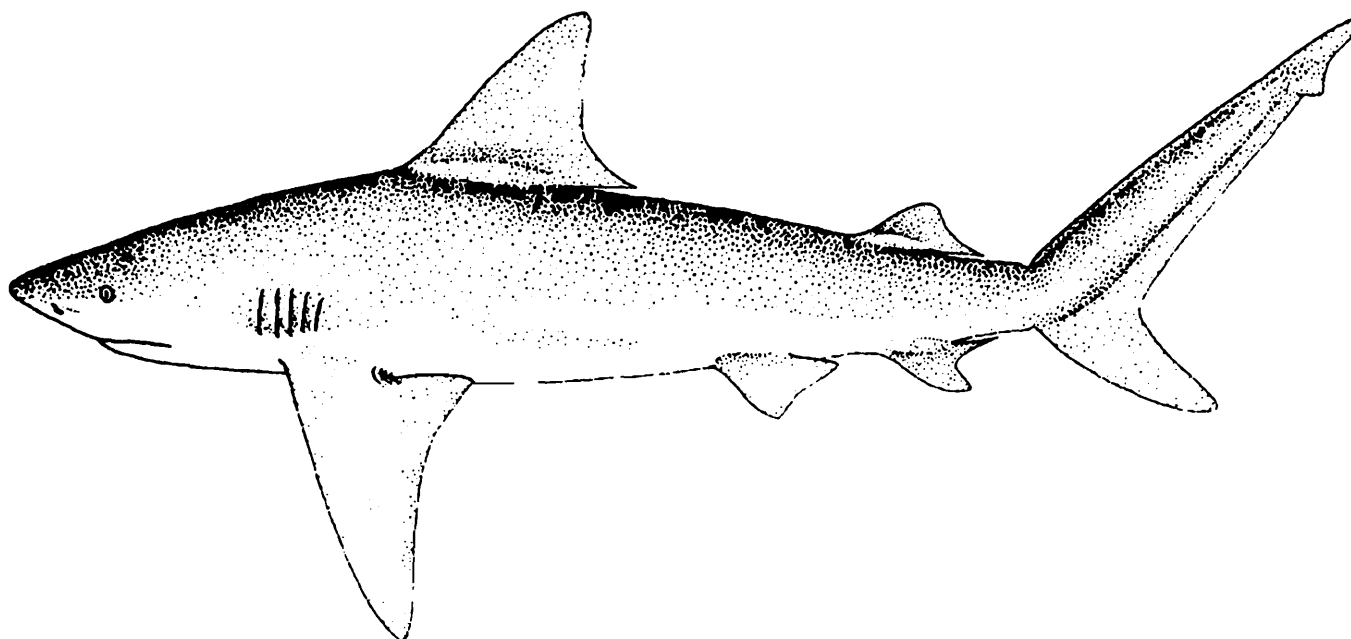


Fig. 41. Lateral view of *Carcharhinus amboinensis*

1839. *Carcharias (Prionodon) amboinensis* Muller and Henle, *Syst. Besch. Plagiost.*, (2) : 40, pl. 19.

Synonymy : *Carcharias (Prionodon) brachyrhynchos*, *Triaenodon obtusus*.

*Morphological features* : A medium sized shark; body stout; snout short; teeth in upper jaw are triangular with broad serrated cusps; first dorsal fin very high and second dorsal fin very low; large angular pectoral fins; no dermal ridge between dorsal fins. Viviparous, size at birth about 195 cm; Males mature at about 195 cm and females at about 198 to 223 cm. Preys primarily on bottom fishes, small sharks, skates and shrimps. Maximum length 70 cm (Compagno, 1984; Talwar and Jhingran, 1991).

*Geographical Distribution* : Indo West Pacific : India, Sri Lanka, Gulf of Thailand, Philippines, Vietnam, Java and Australia.

*Remarks* : Apparently taken by longlines in the western Indian Ocean. Utilized fresh for human consumption (Compagno, 1984; Talwar and Jhingran, 1991).

42. *Carcharhinus falciformis* (Bibron, 1839)  
Silky Shark

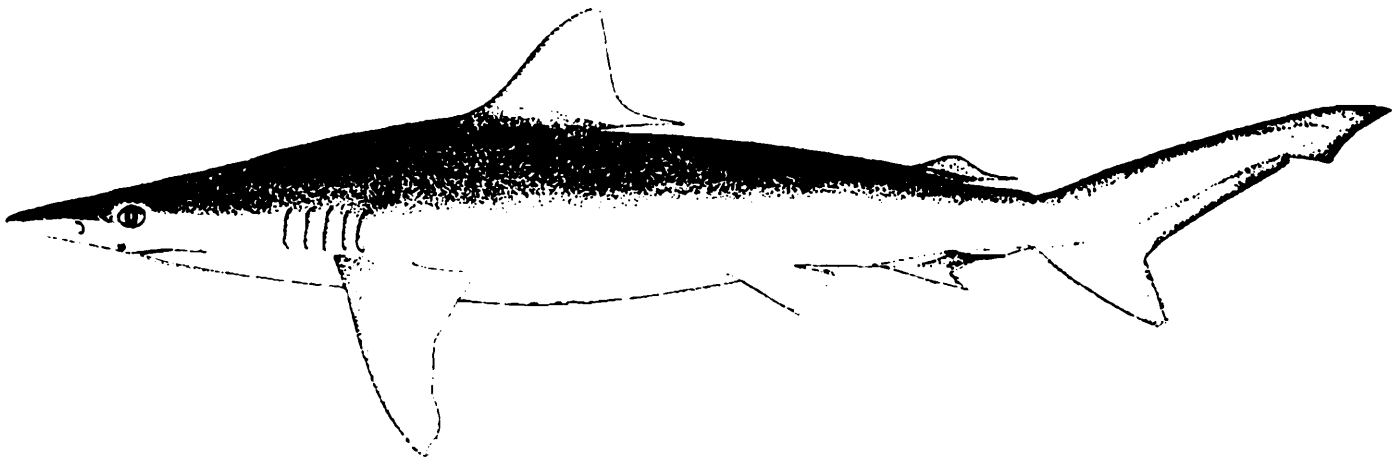


Fig. 42. Lateral view of *Carcharhinus falciformis*

1839. *Carcharias (Prionodon) falciformis* Bibron, *Syst. Besch. Plagiost.*, (2) : 47.

*Synonymy* : *Carcharhinus floridanus*, *Eulamia malpeloensis*, *Carcharhinus atrodorsus*.

*Morphological features* : A large shark having an elongate and slender body; snout narrowly rounded, moderately long; upper teeth with relatively narrow cusps, well delimited from the heavy, serrated bases, their outer ridges notched; the first dorsal origin behind the free rear tips of pectoral fins; latter long and falcate; a dermal ridge present between dorsal fins. Viviparous, Size at birth is 70–80 cm. Males mature at 225 cm and females mature at 232–245 cm. The maximum size is 350 cm. It feeds on fishes, squids and pelagic octopus.

*Geographical Distribution* : Indian Ocean : India, Sri Lanka, Madagascar, Mozambique, Red Sea. Central and eastern Pacific.

*Remarks* : Caught mainly by floating longlines. This is the most abundant shark caught in tuna fisheries. Its meat is utilized fresh and dried for human consumption; its skin for leather; its fin for shark fin soup and its liver for oil extraction (Compagno, 1984).

43. *Carcharhinus leucas* (Valenciennes, 1839)  
Bull shark

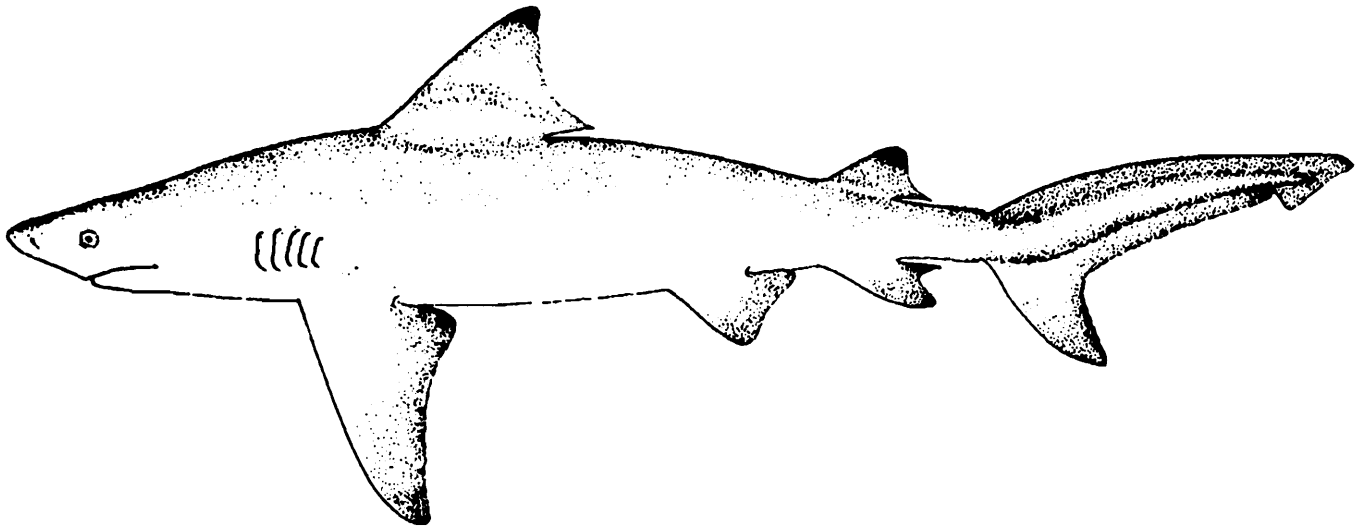


Fig. 43. Lateral view of *Carcharhinus leucas*

1839. *Carcharias (Prionodon) leucas* Valenciennes, *Syst. Besch. Plagiost.*, (2) : 42.

*Synonymy* : *Galeolamna (Bogimba) bogimba*, *Galeolamna greyi mckaii*, *Carcharhinus vanrooyeni*.

*Morphological features* : A large stout shark; snout very broadly rounded and extremely short; teeth in upper jaw triangular, with broad heavy serrated cusps; pectoral fin broad with narrow pointed tips; no dermal ridge between dorsal fins. Oviparous. Males mature at 210–220 cm and females mature at 225 cm feed on fishes including mackerel, tuna, small sharks, rays and invertebrates.

*Geographical Distribution* : Widespread along the continental coasts of all tropical and subtropical seas and traveling far up warm rivers and into fresh water lakes. Western Indian Ocean: India, including Bombay, Cochin and the Hoogly river, where it occurs along with *Glyphis gangeticus*.

*Remarks* : Caught mainly with longlines and gillnets. Dangerous due to its habitat. Flesh and fin useful and liver used for extraction of oil. An important fisheries species, because of its abundance and ready availability to inshore artisanal and commercial fisheries (Compagno, 1984).

44. *Carcharhinus melanopterus* (Quoy and Gaimard, 1824)  
Blacktip reef shark

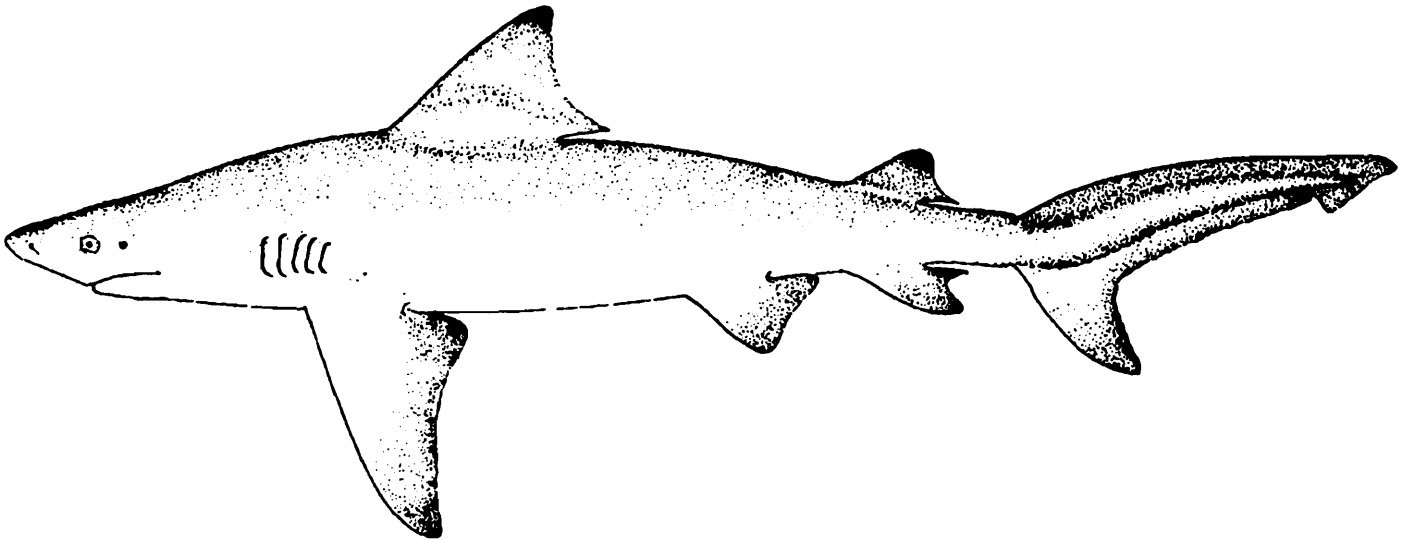


Fig. 44. Lateral view of *Carcharhinus melanopterus*

1824. *Carcharias melonopterus* Quoy and Gaimard, *Zoologie, Voy. Uranie et Physicienne*, 1877 - 20 : 194, pl. 43, fig 1-2.

*Synonymy* : *Carcharias elegans*, *Carcharias marianensis*.

*Morphological features* : Body slender. Snout very short and bluntly rounded, its length about two thirds of width of mouth; labial folds short. Teeth in upper jaw in 11 to 13 rows; anterolateral teeth with oblique cusps. Gill openings relatively short. First dorsal fin with narrow distally pointed tips, its origin above or slightly behind pectoral insertions; second dorsal fin high, its inner margin less than twice height of fin. No dermal ridge between dorsal fins. Colour on dorsal surface of body is a distinctive lemon brown contrasting with the white ventral surface. Prominent black tip on first dorsal fin; caudal fin with distinct wide black margin along its entire trailing edge. This shark grows to about 240 cm.

*Geographical Distribution* : Indian Ocean : India, Sri Lanka, South Africa, Madagascar, Red Sea, Pakistan, Andamans and Maldiv Islands (Compagno, 1984; Talwar and Jhingran, 1991).

*Remarks* : The liver weighs up to about 20 % of total weight of fish; female possess larger liver and yield large quantities of oil. This shark is caught on bottom lines from April to July on the east coast of India; common off Vishakapattinam, Nagapattinam and Periathalai (Pillai and Parakal, 2000).

45. *Carcharhinus sealei* (Pietschmann, 1916)  
Blackspot Shark

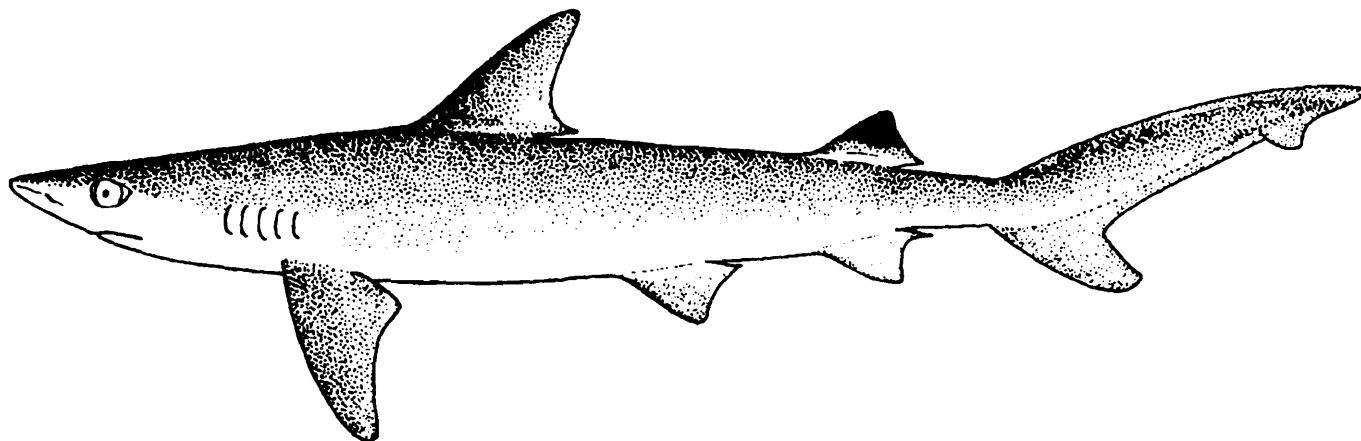


Fig. 45. Lateral view of *Carcharhinus sealei*

1916. *Carcharias sealei* Pietschmann, *Jahrb. Nassau. Ver. Nat.*, 172, pl. 1.

*Synonymy* : *Carcharias borneensis*, *Carcharias (Prionodon) borneensis*, *Platypodon coatesi*.

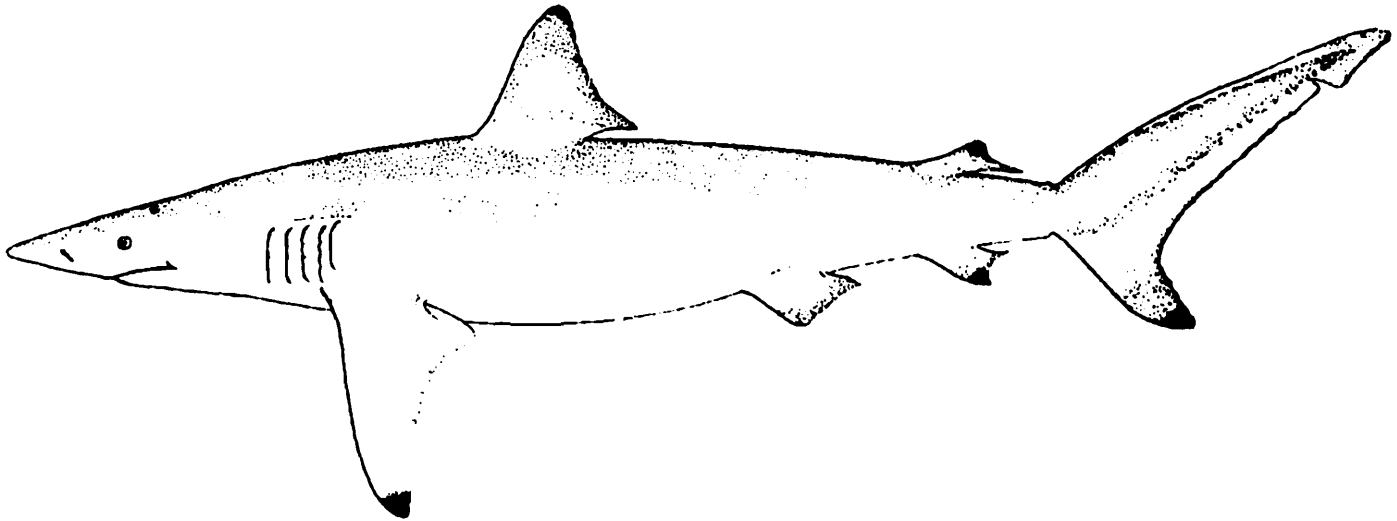
*Morphological features* : A small, stout to slender bodied shark; snout rather long and narrowly parabolic or wedge shaped; anterior nasal flaps expanded; teeth with serrated edges, upper teeth with narrow based, strong oblique serrated cusps and strong cusplets; first dorsal fin moderately high with an angular apex, notched posterior margin and short inner margin strongly falcate; second dorsal fin high; a black spot on the second dorsal fin. Viviparous. Maturity reaches at 65 to 75 cm. Feed on small fishes, prawn and squids.

*Geographical Distribution* : Indo West Pacific : India, Sri Lanka, Madagascar, Thailand, Vietnam, Andaman Islands, Java and Australia (Compagno, 1984).

*Remarks* : Taken by drift gillnets and hook and line fishery. A common inshore shark utilized for human consumption.

46. *Carcharhinus brevipinna* (Muller and Henle, 1839)

## Spinner shark

Fig. 46. Lateral view of *Carcharhinus brevipinna*

1839. *Carcharias (Aprion) brevipinna* Muller and Henle, *Syst. Besch. Plagiost.* (2) : 31, pl 9.

*Synonymy* : *Longmania calamaria*, *Aprionodon caparti*, *Carcharhinus johnsoni*.

*Morphological features* : Body slender. Snout rather pointed and long, its length equal to or greater than width of mouth and greater than internarial distance; labial folds short but uppers rather long and conspicuous; anterior nasal flaps rudimentary. Upper and lower teeth nearly symmetrical and very similar, with mostly erect, very narrow cusps; uppers with entirely or partly serrated cusps. Gill openings relatively long. First dorsal fin with a narrowly rounded apex, its height over 2.2 times space between dorsal fin bases, its origin over or just behind free rear tips of pectoral fins; origin of second dorsal fin about over anal-fin region; second dorsal fin high; its inner margin less than twice the height of fin. Pectoral fins falcate and with pointed tips. No dermal ridge between dorsal fins. Grey on back, white below, with a conspicuous white band on sides. Second dorsal, anal, undersides of pectorals, and lower caudal fin lobe black or dark ray tipped in adults, but unmarked or early so in small individuals. Attains 60 cm in length.

*Geographical Distribution* : Indo West Pacific : India, Sri Lanka, Madagascar, Thailand, Vietnam, Andaman Islands, Java and Australia (Compagno, 1984).

*Remarks* : The species is fairly common in the catches in India (Pillai and Parakal, 2000).

47. *Carcharhinus dussumieri* (Valenciennes, 1839)  
Whitecheeked shark

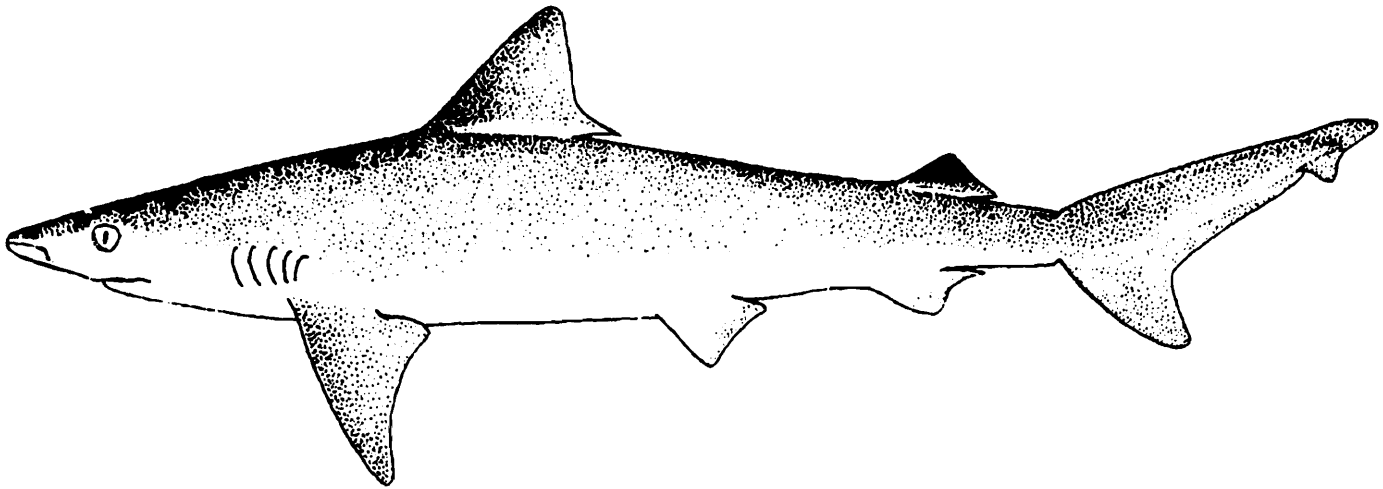


Fig. 47. Lateral view of *Carcharhinus dussumieri*

1839. *Carcharias* (*Prionodon*) *dussumieri* Valenciennes, *Syst. Besch. Plagiost.*, (2) : 47, pl. 19.

*Synonymy* : *Carcharias* (*Prionodon*) *javanicus*, *Carcharias malabaricus*.

*Morphological features* : Body elongate and slender. Snout narrowly rounded, moderately long, equal to mouth width; labial folds very short; anterior nasal flaps very low and rudimentary. Teeth usually 13 or 14 rows on either side of small medial or alternate teeth with large serrated cusps, well delimited from bases; teeth in lower jaw erect, their edges only slightly serrated. First dorsal fin broadly triangular; not falcate; its origin behind the free rear tips of pectoral fins; second dorsal fin very low; Pectoral fins long and triangular, falcate; No dermal ridges between dorsal fins. Dark gray back; belly greyish or white; second dorsal fin with a conspicuous black tip.

*Geographical Distribution* : Indo West Pacific : India, Sri Lanka, Madagascar, Thailand, Vietnam, Andaman Islands, Java and Australia (Compagno, 1984).

*Remarks* : One of the sharks most commonly seen in the catches of the west coast of India, especially the Kerala coast. The liver oil is rich in Vitamin A. Reported to be dangerous to man.

48. *Carcharhinus hemiodon* (Valenciennes, 1839)  
Longnosed Shark

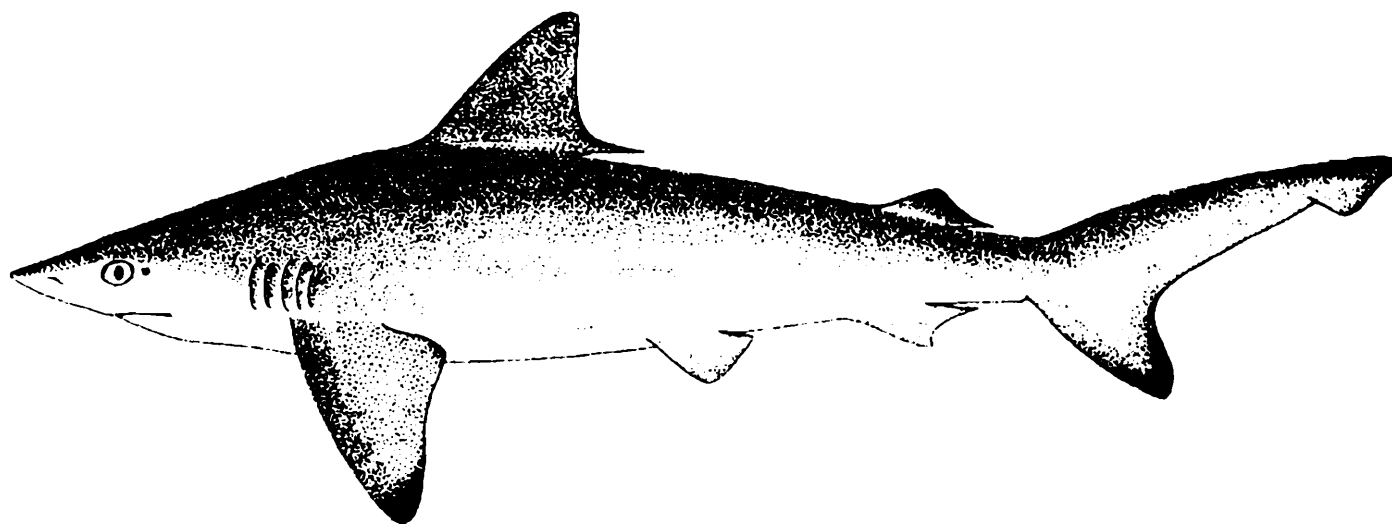


Fig. 48. Lateral view of *Carcharhinus hemiodon*

1839. *Carcharias (Hypoprion) hemiodon* Valenciennes, in Muller & Henle, 1839, *Syst. Besch. Plagiost.*, (2) : 35, pl. 19, fig. 2.

*Synonymy* : *Carcharias wattu*, *Hypoprion atripinna*

*Morphological features* : Body slender and fusiform; Snout short and broadly rounded; labial folds rudimentary or absent. Teeth in numerous rows, upper teeth triangular, slightly oblique, cusps of upper lateral teeth smooth-edged or weakly serrated; upper anterior teeth with narrow cusps and well delimited from bases; teeth in lower jaw with erect and narrow cusps either smooth edged or weakly serrated on outer basal portion. First dorsal fin with narrow distally pointed or rounded tips, its origin over pectoral insertions; second dorsal fin high, inner margin less than twice the fin height; pectoral fins falcate; A dermal ridge present between dorsal fins. Colour dark grey, belly white.

*Geographical Distribution* : Indo West Pacific : India, Sri Lanka, Madagascar, Thailand, Vietnam, Andaman Islands, Java and Australia.

*Remarks* : This species contributes a good fishery on the East Coast of India (Compagno, 1984), partially on the Tamil Nadu coast (Talwar, 1984; Talwar and Jhingran, 1991).

49. *Carcharhinus limbatus* (Valenciennes, 1839)  
Blacktip shark

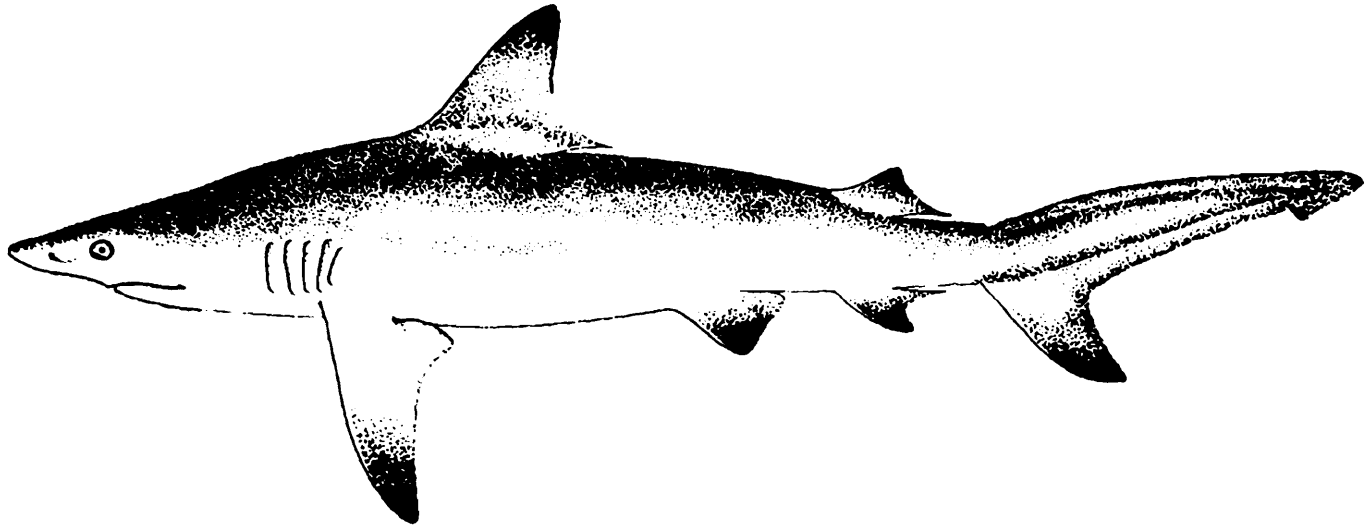


Fig. 49. Lateral view of *Carcharhinus limbatus*

1839. *Carcharias (Prionodon) limbatus* Valenciennes, in Muller & Henle, 1839, *Syst. Besch. Plagiost.*, (2) : 49, pl. 19, fig. 9.

*Synonymy* : *Carcharias phorcys*, *Carcharhinus natator*, *Galeolamna pleurotaenia tilsoni*

*Morphological features* : Body fusiform and moderately slender. Snout long, about equal to, or slightly less than mouth width, greater than the distance between nostrils, its tip narrowly rounded to pointed; labial folds short, the upper inconspicuous. Teeth in 14 to 16 rows; the upper and lower teeth nearly symmetrical and similar, with erect, narrow cusps and serrated edges. Gill openings moderately long. First dorsal fin with a pointed or narrowly rounded apex, its height less than 2.2 times in space between dorsal-fin bases; its origin above, or just behind pectoral insertions; second dorsal fin high, its inner margin less than 2 times fin height, its origin over or slightly in front of anal fin origin. Pectoral fins falcate. No dermal ridge between dorsal fins. Colour dark grey; ashy blue or dusky bronze; belly white or yellowish white. Tips of pelvic fins with a persistent black spot; tip of dorsals, anal, pectorals and lower lobe of caudal fin usually dusky in juveniles, but these marks fade with growth. This shark grows to about 240 cm.

*Geographical Distribution* : Indo West Pacific : India, Sri Lanka, Madagascar, Thailand, Vietnam, Andaman Islands, Java and Australia. Widespread in the tropical Atlantic; Pacific and Indian Oceans. Inhabits coastal as well as offshore waters (Compagno, 1984).

*Remarks* : The liver is reported to be of high potency. One of the sharks, most commonly seen in the catches of our region and forms a regular fishery on the Tamil Nadu coast. A huge black tip shark landed at Calicut in 1988 (Ferozkhan and Nandakumaran, 1989). A single purse seine boat landed approximately 3.5 tonnes of sharks at Malpe on the Dakshina Kannada coast in Karnataka in 1990 (Sunilkumar Mohamed *et al.*, 1993).

50. *Carcharhinus longimanus* (Poey, 1861)  
Oceanic whitetip shark

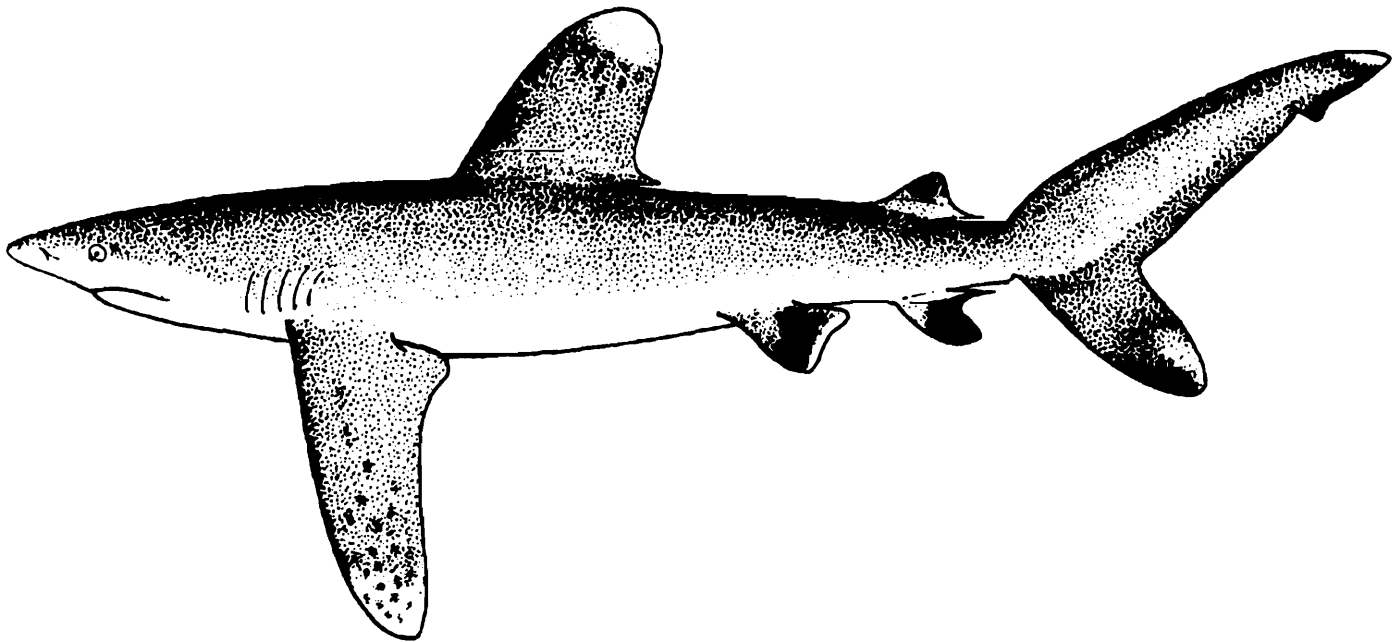


Fig. 50. Lateral view of *Carcharhinus longimanus*

1861. *Squalus longimanus* Poey, *Memorias*, 2 : 338, pl. 19, figs 9 10.

*Synonymy* : *Carcharias insularum*, *Pterolamiops magnipinnis*, *Pterolamiops budkeri*

**Morphological features** : Body moderately stout. Snout short and broadly rounded, its length equal to, or somewhat less than, mouth-width, and greater than mouth-width, and greater than distance between nostrils; labial folds very short; anterior nasal flaps very low, rudimentary. Teeth in numerous rows with serrated edges, those in upper jaw broadly triangular with broad heavy cusps nearly symmetrical anteriorly. Pectoral fins very long, with broadly rounded wide tips. A dermal ridge present between dorsal fins. Body colour is dark grey with slight bronze on the dorsal surface and whitish belly. Pectoral, pelvic and caudal fins are mottled white colour; anal fin with a distinct black tip, tips of second dorsal fin may be dusky.

**Geographical Distribution** : Indian Ocean : India, South Africa, Madagascar, Mozambique, Red Sea. Cosmopolitan in all warm waters.

**Remarks** : This is one of the abundant sharks in oceanic waters and occasionally enters coastal waters of India. In view of its abundance it is considered to be a potential resource, especially for the production of liver oil. Reported to be dangerous to man (Compagno, 1984).

51. *Carcharhinus macloti* (Muller and Henle, 1839)  
Maclot's shark

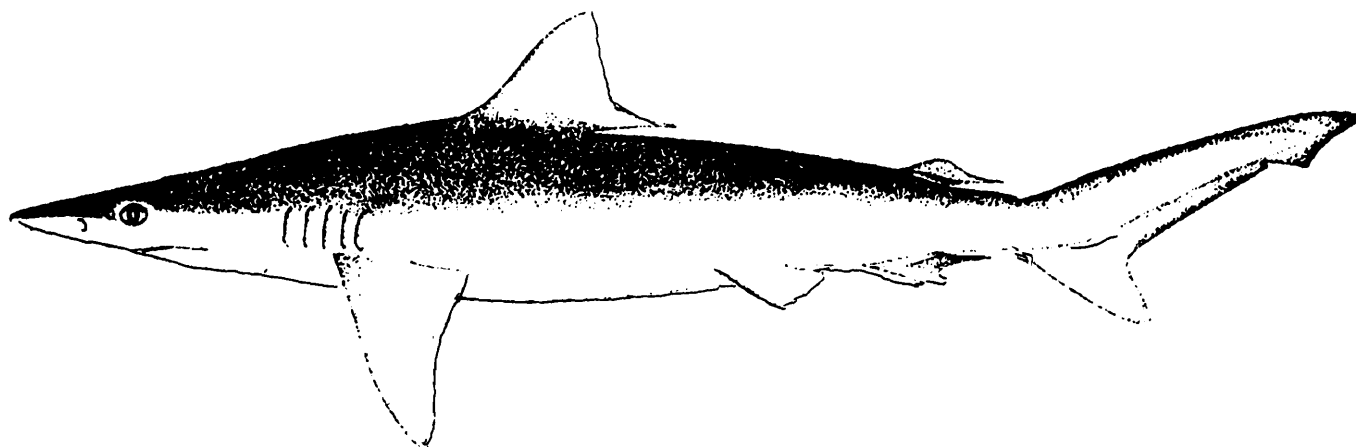


Fig. 51. Lateral view of *Carcharhinus macloti*

1839. *Carcharias (Hypoprion) macloti* Muller and Henle, *Syst. Besch. Plagiost.*, (2) : 34, pl. 10.

*Synonymy* : None.

*Morphological features* : Body slender and fusiform. Snout very long and narrow, its length greater than width of mouth and narrowly rounded and pointed; labial folds short. Teeth in numerous rows, with smooth edged cusps, upper anterior teeth with narrow cusps and well delimited from bases. First dorsal fin with pointed or narrowly rounded apex, its inner margin greatly elongated, its origin over insertion of pectoral fin bases; second dorsal fin very low, with greatly enlarged inner margin 2 to 3 times fin height; pectoral fins falcate. No dermal ridge between dorsal fins. Body colour is black greyish and whitish belly; outer half of first dorsal fin rather dark, caudal fin dark in its posterior half.

*Geographical Distribution* : Indo West Pacific : India, Pakistan, Sri Lanka, Masdagaskar, Kenya, Tanzania, Andaman Islands, Burma, Vietnam and China (Compagno, 1984).

*Remarks* : This species is fairly common in the catches of the Kerala coast. Attains 60 cm in length. Caught by gillnets and by line gear and utilized fresh and probably dried and salted for human consumption (Pillai and Parakal, 2000).

52. *Carcharhinus sorrah* (Valenciennes, 1839)  
Sorrah shark

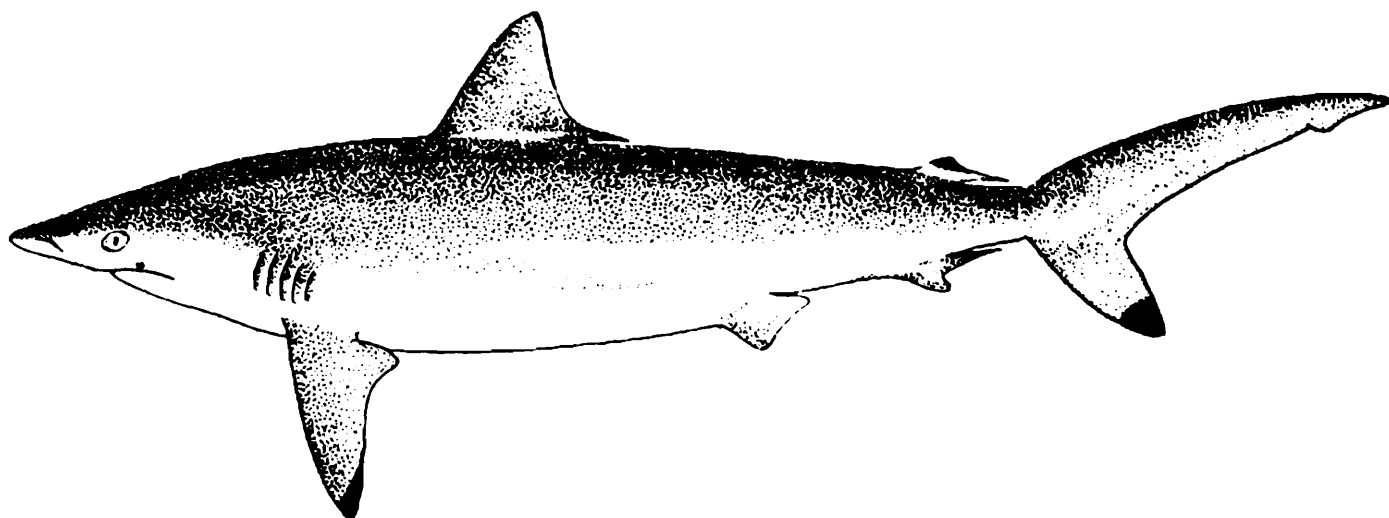


Fig. 52. Lateral view of *Carcharhinus sorrah*.

1839. *Carcharias (Prionodon) sorrah* Valenciennes, in Muller and Henle, 1839, *Syst. Besch. Plagiost.*, (2) : 45, pl. 16.

*Synonymy* : *Carcharias taeniatus*, *Gelelamna isobel*.

*Morphological features* : Body relatively slender. Snout short and moderately broad, its length equal to mouth width; labial folds rudimentary. Upper and lower teeth nearly symmetrical and very similar, with oblique and narrow cusps, well delimited from bases; cusps of upper of upper and lower teeth serrated. First dorsal fin with a narrowly rounded or pointed apex, its origin over pectoral insertions, inner margin of first dorsal fin moderately elongated; second dorsal fin very low, with greatly enlarged inner margin 2 to 3 times fin height; pectoral fins falcate. A huge dermal ridge present between dorsal fins. Body dark grey black on back, belly whitish; conspicuous black tips on pectorals, second dorsal and lower caudal lobe.

*Geographical Distribution* : Indo West Pacific : India, Sri Lanka, Madagascar, Thailand, Vietnam, Andaman Islands, Java and Australia (Compagno, 1984).

*Remarks* : One of the sharks most commonly seen in the commercial catches of the Tamil Nadu and Kerala coast. It is caught with line gear and gill nets and utilized for human consumption (Talwar, 1984; Pillai and Parakal, 2000).

53. *Carcharhinus brachyurus* (Gunther, 1870)  
Copper shark

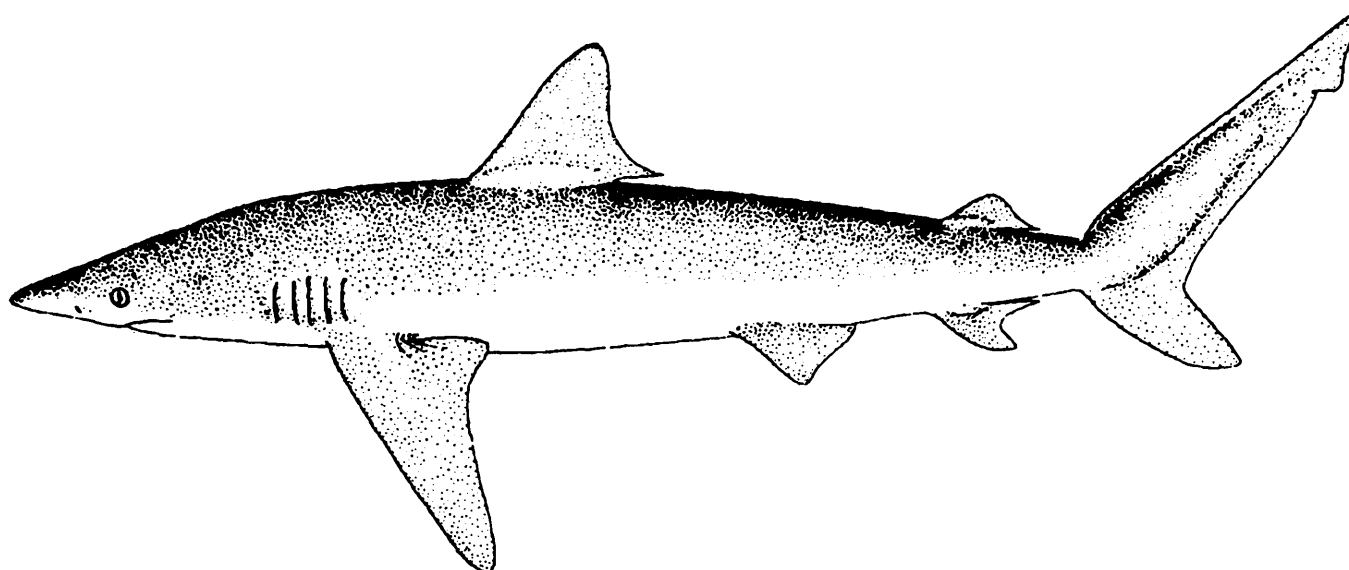


Fig. 53. Lateral view of *Carcharhinus brachyurus*

1870. *Carcharias brachyurus* Gunther, *Cat. Fish. British Mus.*, 8 : 369.

*Synonymy* : *Carcharhinus rochensis*, *Carcharhinus remotus*.

*Morphological features* : A large, often bronzy grey shark with a moderately long narrowly rounded or pointed snout, narrow and bent cusped serrated anterolateral teeth without cusplets in the upper jaw, usually 15 to 16 rows of anteroposterior teeth, usually no interdorsal ridge, long pectoral fins, a small first dorsal with a short rear tip and no conspicuous markings on the fins.

*Geographical Distribution* : Western Indian Ocean : India, South Africa. Western Pacific: Japan, Korea, China and Australia.

*Remarks* : It is used for human consumption. It is taken in bottom trawls, by line gear and by sports anglers (Compagno, 1984; Talwar and Jhingran, 1991).

54. *Carcharhinus cautus* (Whitley, 1945)  
Nervous shark

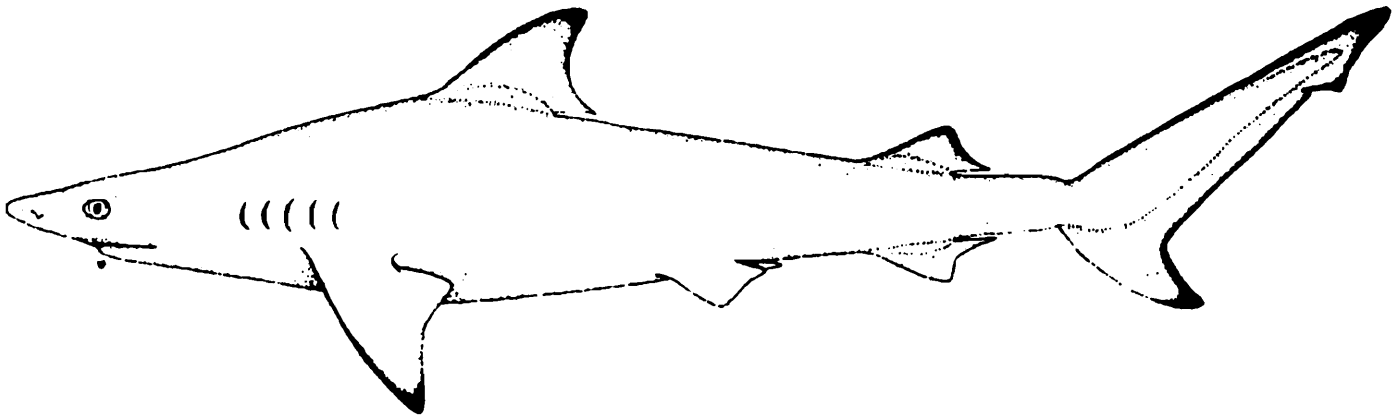


Fig. 54. Lateral view of *Carcharhinus cautus*

1945. *Galeolamna greyi cauta* Whitley, *Aust. Zool.*, 11 (1) : 2, fig 2.

*Synonymy* : None.

*Morphological features* : A moderate sized, greyish or brownish grey shark with a short bluntly rounded snout, horizontally oval eyes, anteroposterior tooth rows usually 12 to 13 in each jaw half, no interdorsal ridge, a moderately large second dorsal with a rear tip on the upper and lower caudal lobe and pectoral fin. Maximum length about 150 cm.

*Geographical Distribution* : Eastern Indian Ocean and Western South Pacific : India, South Africa, Australia and Solomon Islands.

*Remarks* : No fishery value.

55. *Carcharhinus obscurus* (LeSueur, 1818)  
Dusky shark

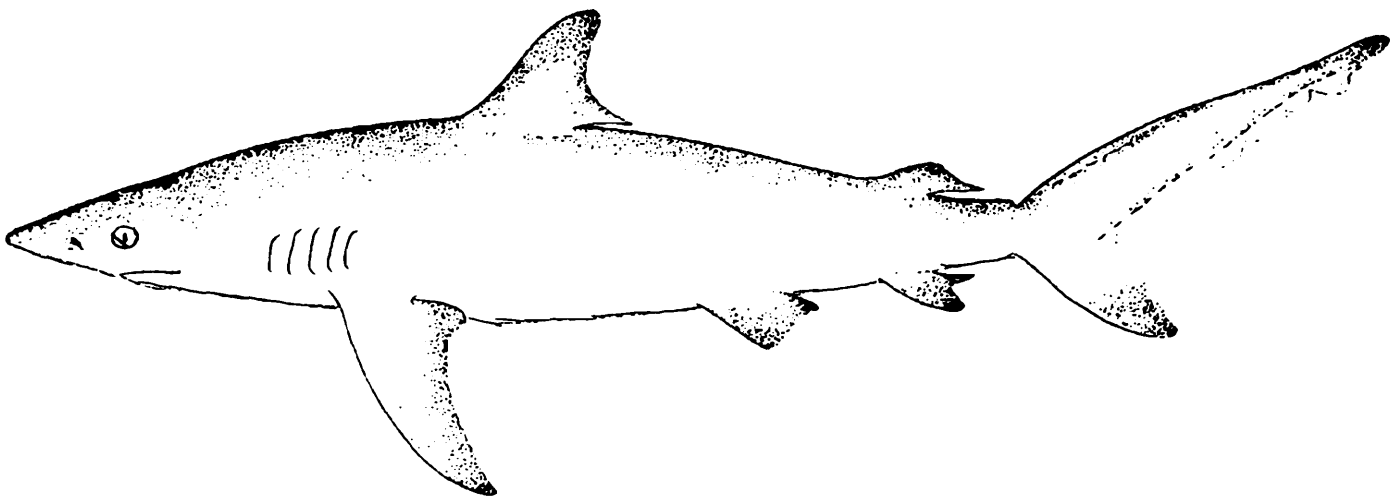


Fig. 55. Lateral view of *Carcharhinus obscurus*

1818. *Squalus obscurus* LeSueur, *J. Acad. Nat. Sci. Philad.*, 1 (2) : 223, pl. 9.

*Synonymy* : *Galeolamna (Galeolamnoides) eblis*, *Carcharhinus iranxae*, *Carcharhinus obscurella*

*Morphological features* : A large grey shark with a fairly short, broadly rounded snout, low anterior nasal flaps, fairly large eyes, broad, triangular, rather low, erect and semioblique cusped serrated anterolateral teeth without cusplets in upper jaw, lower teeth erect and narrow cusped, usually 14 rows of anteroposterior teeth, a low interdorsal ridge, large falcate pectoral fins. A moderate sized first dorsal with a short rear tips of pectoral fins, a small, low second dorsal and no conspicuous markings on the fins (Compagno, 1984; Mathew *et al.*, 1987)

*Geographical Distribution* : Western Indian Ocean and western Pacific : India, South Africa, Mozambique, Madagascar, Japan, China and Australia (Compagno, 1984).

*Remarks* : A common offshore shark regularly caught with long lines, also hook and line and set bottom nets. It is utilized fresh, dried salted, frozen and smoked for human consumption. Liver oil extracted for vitamins. Hides and fins for leather and soup respectively. A large dusky shark got stranded at Veraval in 1987 (Lipton *et al.*, 1987).

56. *Carcharhinus plumbeus* (Nardo, 1827)  
Sandbar shark

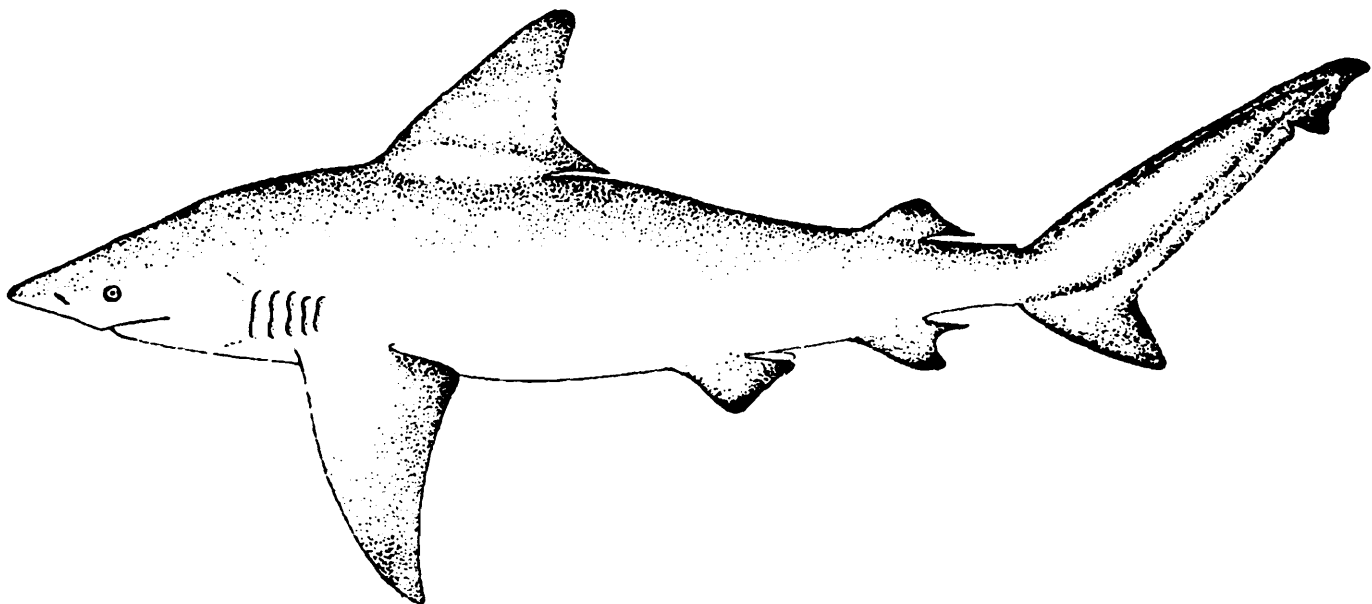


Fig. 56. Lateral view of *Carcharhinus plumbeus*

1827. *Squalus plumbeus* Nardo, *Isis*, 20 (6) : 477, 483.

*Synonymy* : *Carcharias stevensi*, *Carcharias latistomus*, *Galeolamna dorsalis*

*Morphological features* : A medium sized grey shark with short rounded snout, an extremely

tall triangular first dorsal fin with its origin over or anterior to the pectoral insertions, broad and high cusped triangular serrated upper teeth without cusplets, usually 14 rows of anterolateral teeth, an interdorsal ridge, large pectoral fins, a moderately large second dorsal with a short rear tip and no conspicuous markings on fins.

*Geographical Distribution* : Western and Eastern Atlantic, Western Indian Ocean : India, South Africa, Mozambique, China, Red Sea, Vietnam, Madagascar and Indonesia (Compagno, 1984; Talwar and Jhingran, 1991).

*Remarks* : This is an abundant inshore and off shore species and forms an important object of fisheries. It is caught with long lines, hook and line and set bottom nets. It is utilized fresh, frozen, smoked and dried salted for human consumption (Sivasubramaniam, 1992).

57. *Carcharhinus wheeleri* Garrick, 1982  
Blacktail reef shark

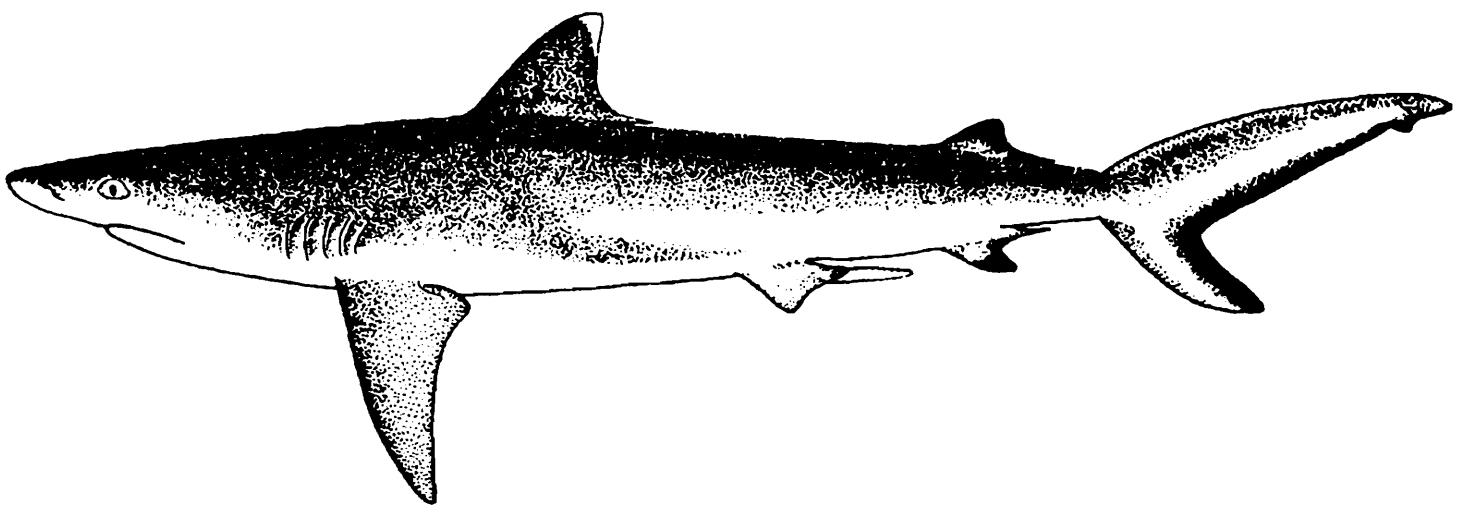


Fig. 57. Lateral view of *Carcharhinus wheeleri*

1982. *Carcharhinus wheeleri* Garrick, *U.S. Dept. Commerce, Nat. Mar. Fish. Serv. Circ.*, (445) : 111, figs. 50-51.

*Synonymy* : None.

*Morphological features* : A medium sized grey shark with a moderately long, broadly rounded snout, usually round eyes, no inter dorsal ridge, narrow cusped, serrated upper anteroposterior teeth, usually 13/13 on each side, white tipped first dorsal fin, large second dorsal fin with a short rear tip, and a broad black band on the posterior margin of the caudal fin.

*Geographical Distribution* : Apparently confined to the western Indian Ocean: India, South Africa, Mozambique, Madagascar, Kenya and Red Sea (Compagno, 1984).

*Remarks* : Probably relatively important to fisheries in some areas where it occurs. Used fresh and dried salted for human consumption and also for fishmeal and other shark products (Sivasubramaniam, 1992).

58. *Galeocerdo cuvier* (Peron and LeSueur, 1822)  
Tiger Shark

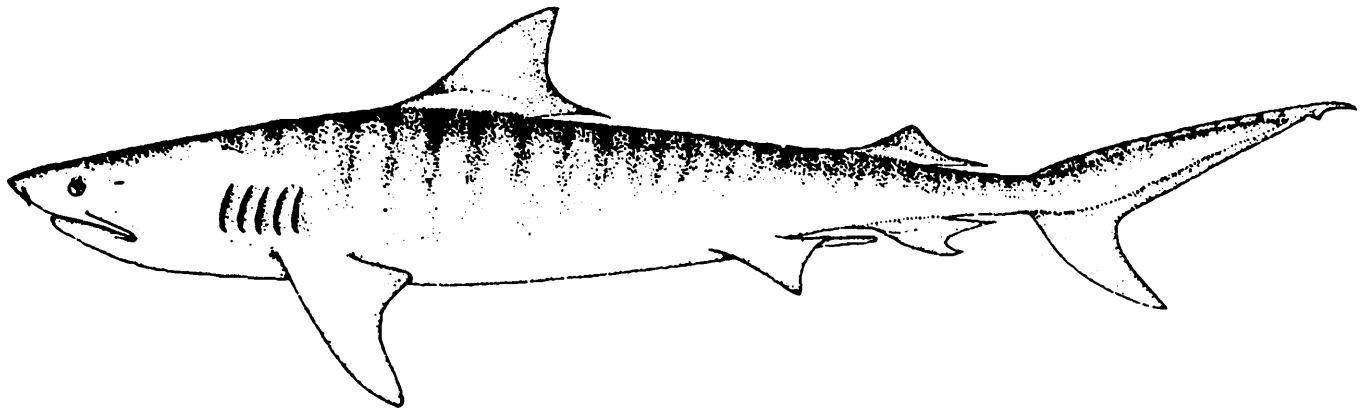


Fig. 58. Lateral view of *Galeocerdo cuvier*

1822. *Squalus cuvier* Peron and LeSueur, in LeSueur, 1822, *J. Acad. Nat. Sci. Philad.*, 2 (2) : 351.

*Synonymy* : *Galeocerdo rayneri*, *Galeocerdo obtusus*, *Carcharias hemprichii*.

*Morphological features* : Body fusiform. Short and broadly rounded snout, its length much less than width of mouth. Origin of first dorsal fin over pectoral fin axil or its inner edge. Body colour is salty grey, paler below with numerous dark or brown variegated spots or vertical bars on body, pectoral, dorsal and caudal fins but fading with growth. The common name of "tiger shark" comes from the striped markings visible on juveniles but fading in adult.

*Geographical Distribution* : All tropical oceans, Indo West Pacific : South Africa, Mozambique, China, Red Sea, Vietnam, Madagascar and Indonesia (Compagno, 1984; Talwar and Jhingran, 1991).

*Remarks* : The large size, shallow water habit and all embracing appetite make it one of the most dangerous species of sharks as far as man is concerned. It is reported to attain a length of 550 cm and a weight of about 1016 kgs; it yields good liver oil having a fairly high potency of vitamin A. A bulk landing of this species was recorded in Maharashtra Coast in 1988 (Aravindakshan, 1988). A tagged Tiger Shark got stranded at Tuticorin in 1989 (Sam Bennet *et al.*, 1990). In 1994 a Tiger shark landed at Digha, West Bengal (Krishna Burman, 1994).

59. *Lamiopsis temminckii* (Muller and Henle, 1839)  
Fawn Shark

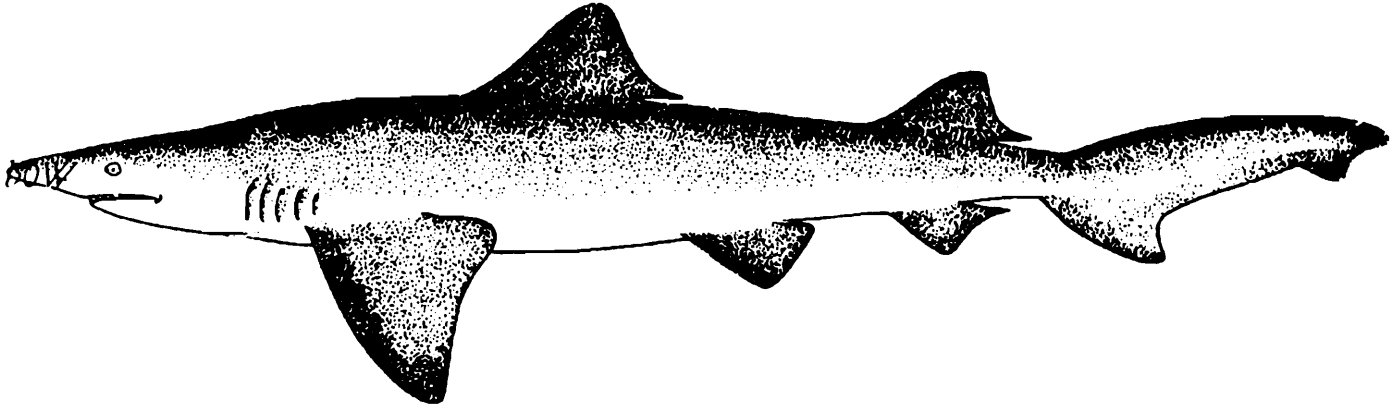


Fig. 59. Lateral view of *Lamiopsis temminckii*

1839. *Carcharias (Prionodon) temminckii* Muller and Henle, *Syst. Besch. Plagiost.*, (2) : 48, Pl. 18.

*Synonymy* : *Carcharias tephrodes*, *Carcharhinus microphthalmus*.

*Morphological features* : Body moderately slender and fusiform. Snout long; about equal to width of mouth; Origin of first dorsal fin behind inner angle of depressed pectoral fin; second dorsal fin distinctly larger than anal fin. Colour back fawn, belly white; fins largely grey terminally. This shark grows to about 240 cm.

*Geographical Distribution* : This species has a scattered distribution in the Indian Ocean and Western Pacific : India, Pakistan, Burma and Indonesia (Compagno, 1984).

*Remarks* : The liver oil of this species is reported to be of high potency. One of the sharks most commonly seen in the commercial catches on the east of India (Talwar, 1984).

60. *Loxodon macrorhinus* Muller and Henle, 1839  
Sliteye Shark

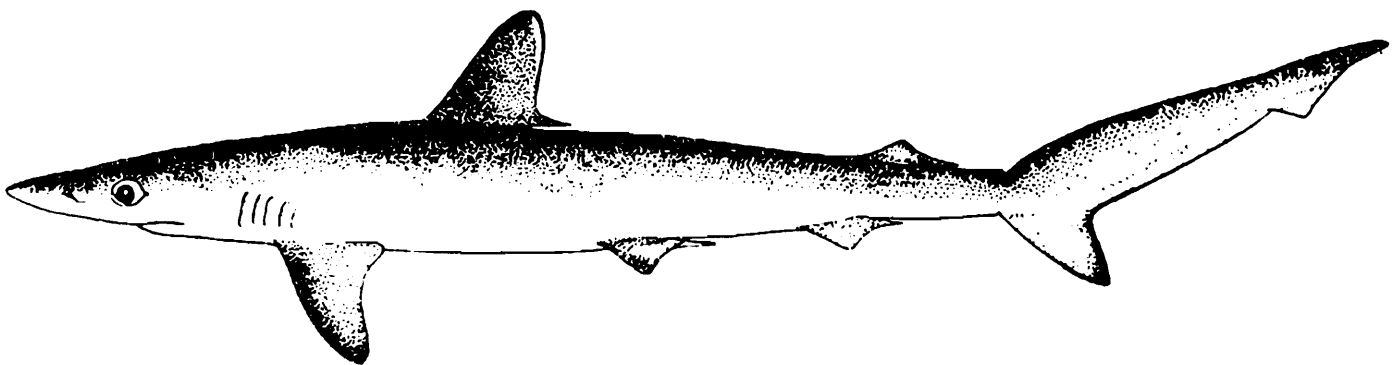


Fig. 60. Lateral view of *Loxodon macrorhinus*

1839. *Loxodon macrorhinus* Muller and Henle, *Syst. Besch.* Plagiost., (2) : 61, pl. 25.

*Synonymy* : *Carcharias (Scoliodon) umerili*, *Carcharias albomarginatus*, *Scoliodon ceylonensis*.

*Morphological features* : Body slender, the head long and rather pointed. Teeth in rows; cusps of teeth smooth and obliquely directed rearward. Head with 5 gill slits, the 3<sup>rd</sup> or 4<sup>th</sup> over pectoral-fin origin. Colour body greyish dorsally, fading towards sides to become whitish ventrally; posterior margin of upper caudal-fin lobe blackish.

*Geographical Distribution* : Indo West Pacific : India, Sri Lanka, Madagascar, Thailand, Vietnam, Andaman Islands, Java and Australia.

*Remarks* : This shark contributes a good fishery along the south east coast of India, usually between 30 to 70 m depth on sandy and muddy bottoms. Caught with gill nets and bottom longlines. Utilized fresh for human consumption (Compagno, 1984).

61. *Negaprion acutidens* (Ruppell, 1837)  
Indian Lemon shark

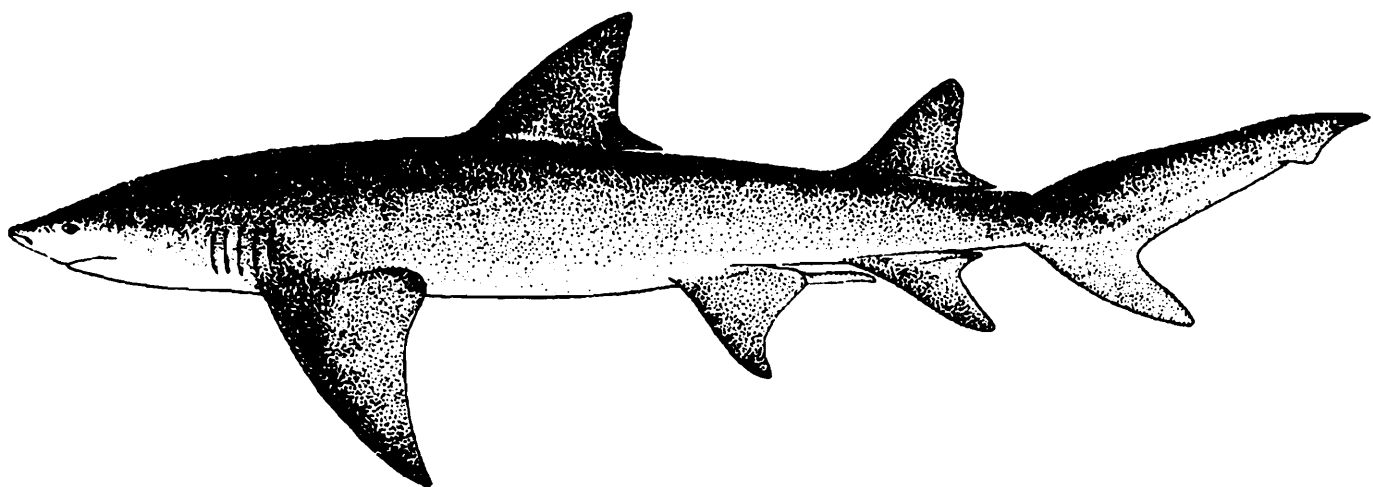


Fig. 61. Lateral view of *Negaprion acutidens*

1837. *Carcharias acutidens* Ruppell, *Neue Wirbel. Faun. Abyssinien. Fische Rothen Meeres*, (11) : 65, pl. 18, fig. 3.

*Synonymy* : *Mystidens innominatus*, *Hemigaleops forsteri*, *Odontaspis madagascariensis*.

*Morphological features* : Body stout. Snout short and broader than width of mouth; labial folds minute at mouth corners. Spiracles absent. Teeth in a single row, narrow, their cusps smooth-edged and erect. Origin of first dorsal fin behind free rear tips of pectoral fins nearly as large as first. Pectoral fins broad and slightly falcate. Colour body olive grey or yellowish brown; but often darker; belly yellowish or whitish.

*Geographical Distribution* : Indo West and central Pacific : India, Pakistan, Sri Lanka,

Madagascar, Thailand, Vietnam, Andaman Islands, Java , Australia, Philippines and Marshall Islands (Compagno, 1984; Talwar and Jhingran, 1991).

*Remarks* : Fairly common in the catches of India and is specially prized for its fins; the liver is used in the production of oil and fins for gelatine. Meat is used fresh, dried salted for human consumption, liver is used for extracting vitamins and fins are processed for shark fin soup.

62. *Rhizoprionodon acutus* (Ruppell, 1837)  
Milk dog shark

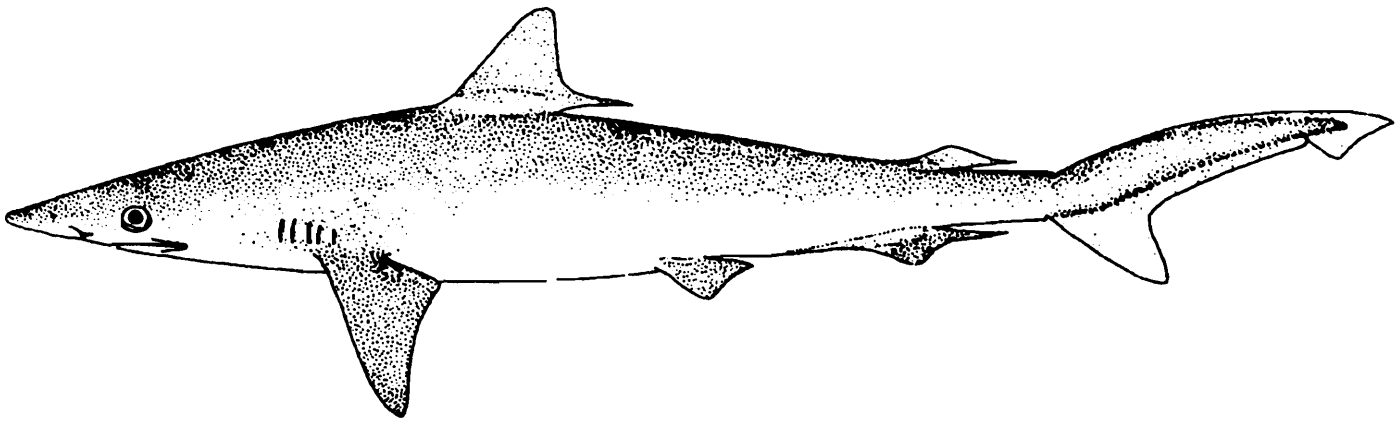


Fig. 62. Lateral view of *Rhizoprionodon acutus*

1837. *Carcharias acutuss* Ruppell *Neue Wirbel. Faun. Abyssinien. Fische Rothen Meeres*, (11) : 65, pl. 18, fig. 4.

*Synonymy* : *Scoliodon longmani*, *Scoliodon vagatus*, *Carcharias eumeces*.

*Morphological features* : Body slender and fusiform. Snout long and pointed; labial folds well developed, the lower shorter than upper, equal to width of first gill-slit. Origin of first dorsal fin usually slightly in advance of inner corner of pectoral fin; origin of second dorsal fin usually slightly in advance of inner corner of pectoral fin; origin of second dorsal fin over posterior third of anal-fin base to over anal-fin axil. Colour back slimy grey, belly white; fins dark, with light margin; upper caudal fin black. Attains 45cms in length.

*Geographical Distribution* : Indo West Pacific : India, Sri Lanka, Madagascar, Thailand, Vietnam, Andaman Islands, Java and Australia (Compagno, 1984).

*Remarks* : A good fishery exists along the Tamil Nadu coast and also at Cochin (Kerala). Inhabits shallow coastal waters, usually between 30 and 75m, depth, on sand and muddy bottoms (Pillai and Parakal, 2000).

63. *Rhizoprionodon oligolinx* Springer, 1964  
Grey dog shark

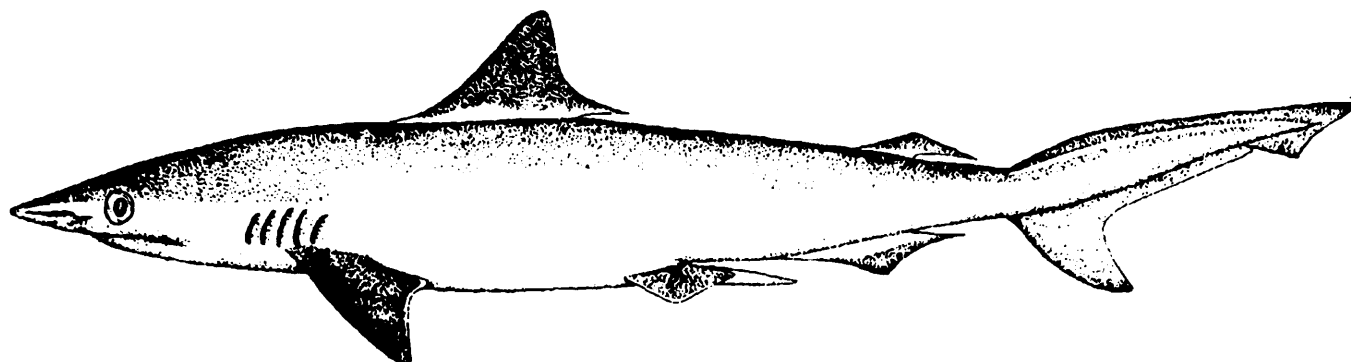


Fig. 63. Lateral view of *Rhizoprionodon oligolinx*

1964. *Rhizoprionodon oligolinx* Springer, *Proc. U.S. natl. Mus.*, 115 (3493) : 621, figs 12-23, pl. 2C.

*Synonymy* : None.

*Morphological features* : Body slender and fusiform. Snout long and pointed; upper labial folds very short, lower confined to corners of mouth. Origin of first dorsal fin over inner corner of pectoral fin; origin of second dorsal fin slightly in front of end of anal fin base. Body colour is grey dorsally gradually fading towards the ventral side, belly whitish; fins yellowish, upper caudal fin dusky. Attains 53 cm in length.

*Geographical Distribution* : Indo West Pacific : India, Sri Lanka, Madagascar, Thailand, Vietnam, Andaman Islands, Java and Australia (Compagno, 1984).

*Remarks* : Contributes to commercial fishery along the Orissa Coast and in the Gulf of Mannar (Pillai and Parakal, 2000).

64. *Scoliodon laticaudus* (Muller and Henle 1839)  
Indian dog shark

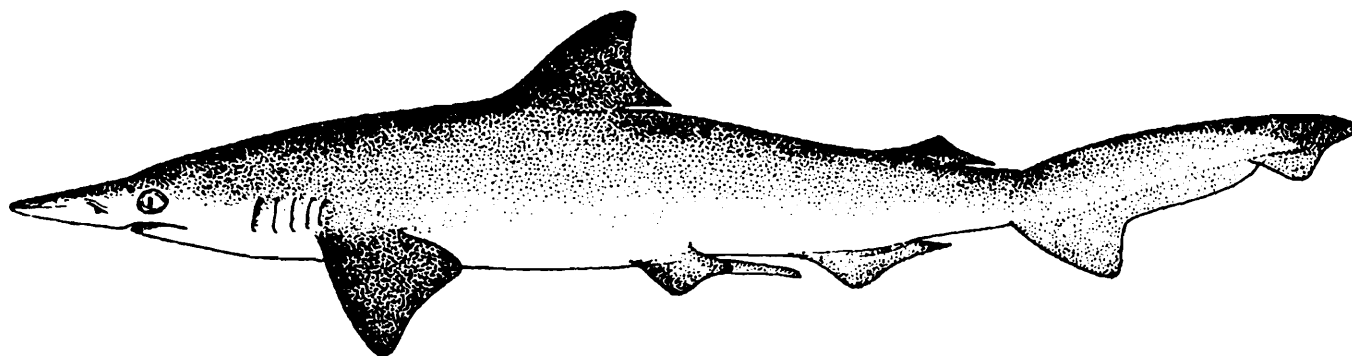


Fig. 64. Lateral view of *Scoliodon laticaudus*

1839. *Carcharias laticaudus* Muller and Henle, *Syst. Besch. Plagiost.*, (1) : 27.

*Synonymy* : *Carcharias (Scoliodon) macrorhynchus*, *Carcharias (Prionodon) palasorra*.

*Morphological features* : Body slender and fusiform. Snout is long and depressed. Upper labial furrow poorly developed. No interdorsal ridge. Lower precaudal pit indistinct. Body colour is pale greyish above, dull white at sides; fins darker than body. Small sharks ranging from 330 to 590 mm in total length.

*Geographical Distribution* : Indo West Pacific : India, Sri Lanka, Madagascar, Thailand, Vietnam, Andaman Islands, Java and Australia (Compagno, 1984).

*Remarks* : It constitutes a good fishery along the west and the south east of India, particularly in the nearshore waters (Pillai and Parakal, 2000; Kasim, 1991).

65. *Triaenodon obesus* (Ruppell, 1837)  
Whitetip reef shark

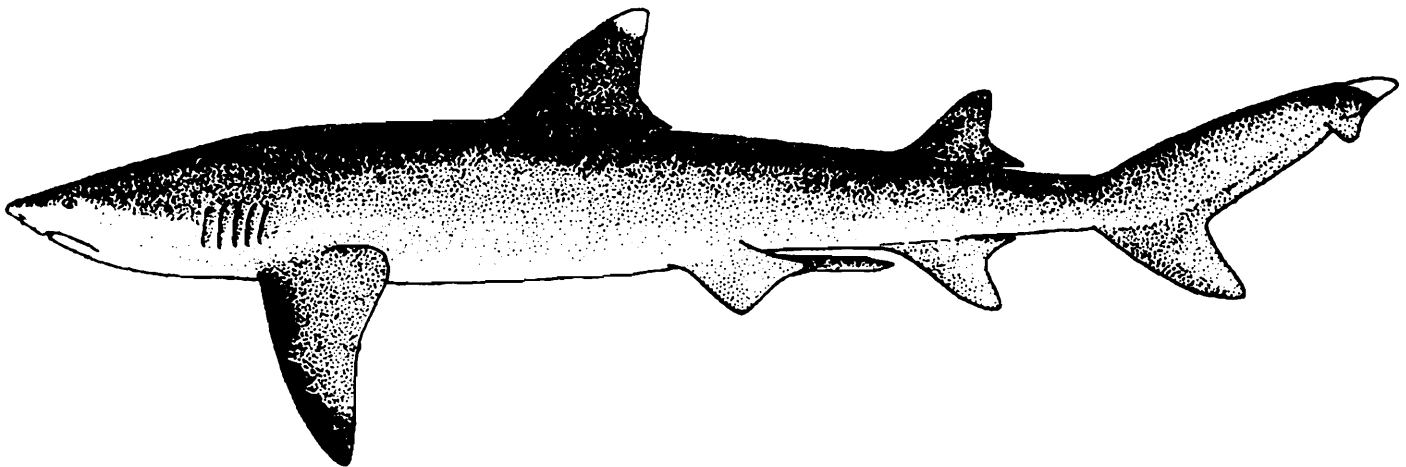


Fig. 65. Lateral view of *Triaenodon obesus*

1837. *Carcharias obesus* Ruppell, *Neue Wirbel. Faun. Abyssinien. Fische Rothen Meeres*, (11) : 64, pl. 18, fig. 2.

*Synonymy* : *Triaenodon apicalis*.

*Morphological features* : Body elongates; head flat and depressed, blunt snout. Mouth wide with hardly any labial folds. Two dorsal fins, origin of first fin about midway between pectoral fin axil and pelvic fin base. Second dorsal fin large, almost equal to first dorsal fin. Body colour greyish brown darker on the head region and creamy ventrally. Dorsal and upper caudal fins are white tipped; second and lower caudal fin lobe are often white tipped.

*Geographical Distribution* : Indo West and central Pacific : India, Sri Lanka, Madagascar, Thailand, Vietnam, Andaman Islands, Java and Australia Red Sea, East Coast of Africa and India (Compagno, 1984; Talwar and Jhingran, 1991).

*Remarks* : Of minor fishery value in India. Meat is used fresh, dried and salted for human consumption, liver is used for extracting vitamins and fins are processed for shark fin soup (Talwar, 1984).

66. *Glyphis gangeticus* (Muller and Henle, 1839)  
Ganges Shark

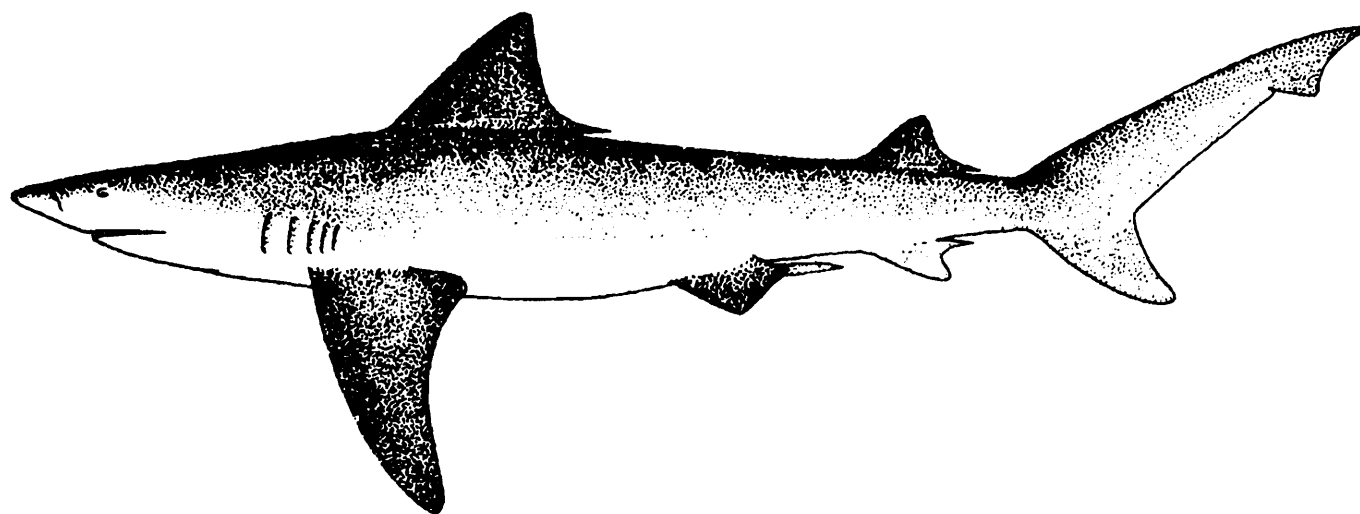


Fig. 66. Lateral view of *Glyphis gangeticus*

1839. *Carcharias (Prionodon) gangeticus* Muller and Henle, *Syst. Besch. Plagiost.*, (2) : 39, pl. 13.

*Synonymy* : *Carcharias murrayi*.

*Morphological features* : Body moderately stout; snout short; its length about equal to distance between nostrils and less than mouth width; teeth in upper jaw triangular, with broad high serrated cusps; cusps of lower teeth narrow, tall, erect and strongly hooked, conspicuously protruding when mouth closed; upper precaudal pit in the form of a shallow. Longitudinal depression on the dorsal surface of the caudal peduncle. They are viviparous, size at birth probably about 60 cm with a prominent umbilical scale. Gear and forms of utilization is little known (Compagno, 1997).

*Geographical Distribution* : Indo West Pacific : India, Sri Lanka, Madagascar, Thailand, Vietnam, Andaman Islands, Java and Australia Red Sea, East Coast of Africa and India (Compagno, 1984).

*Remarks* : Probably fished in the Ganges Hoogly system (Pillai and Parakal, 2000).

67. *Glyphis glyphis* (Muller and Henle, 1839)  
Spear-tooth Shark

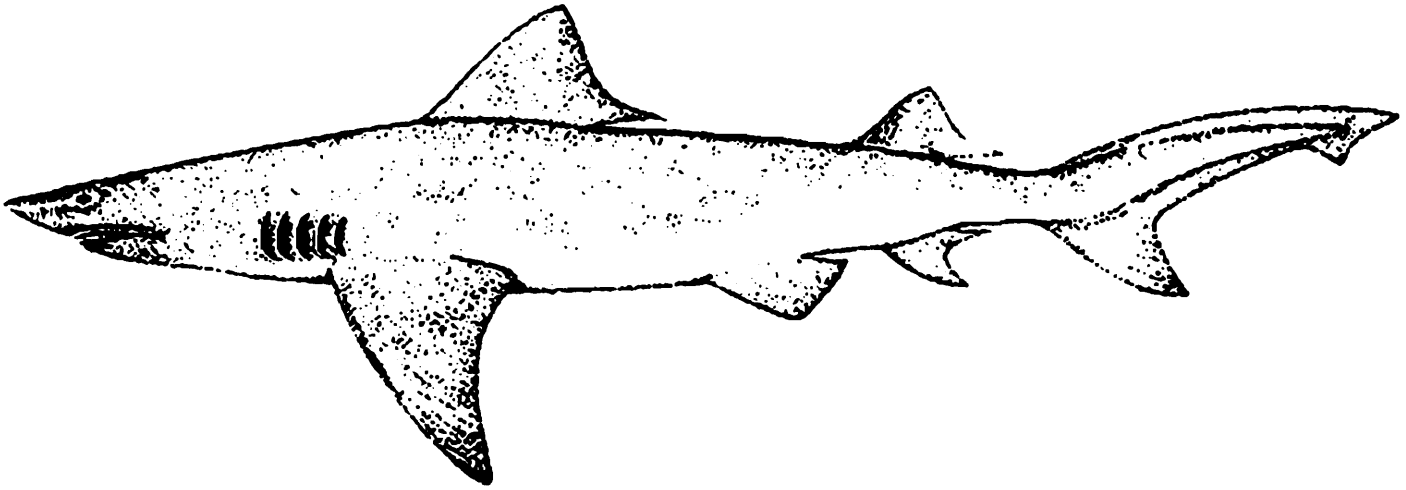


Fig. 67. Lateral view of *Glyphis glyphis*

1839. *Carcharias (Prionodon) glyphis* Muller and Henle, *Syst. Besch. Plagiost.*, (2) : 40, pl. 14.

*Synonymy* : None.

*Morphological features* : A stocky requiem shark with a broadly rounded short snout, preoral snout much shorter than mouth width but preorbital snout rather long, minute eyes, first dorsal origin over rear ends of pectoral bases, second dorsal rather large, about 3/5 height of first dorsal, upper teeth with high, broad, serrated triangular cusps, lower anterior teeth with long, hooked, protruding cusps with unserrated cutting edges confined to slightly expanded spear like tips, no interdorsal ridge, upper precaudal pit longitudinal, no conspicuous markings.

*Geographical Distribution* : India, New Guinea, Queensland and Australia (Compagno, 1984; Talwar and Jhingran, 1991).

*Remarks* : This rare shark was long known only from Muller and Henle's (1839) original account.

68. *Prionace glauca* (Linnaeus, 1758)  
Blue Shark

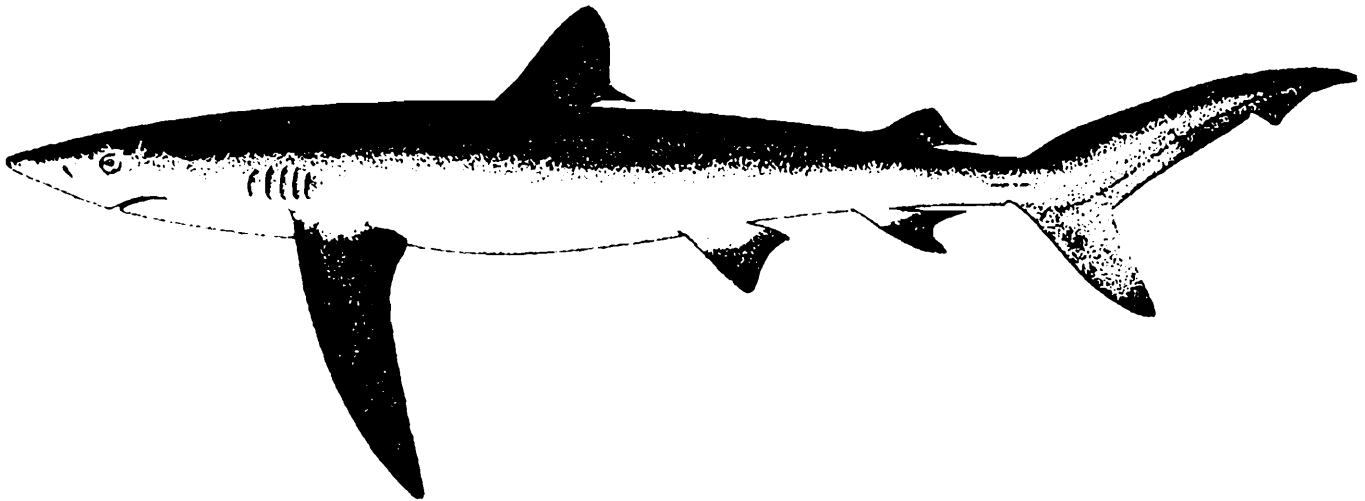


Fig. 68. Lateral view of *Prionace glauca*

1758. *Squalus glaucus* Linnaeus, *Syst. Nat.*, (10) 1 : 235.

*Synonymy* : *Hypoprion/Hemigaleus isodus, Carcharias aethiops, Prionace macki.*

*Morphological features* : A slender fusiform shark; snout long; large eyes; long narrow pointed pectoral fins; first dorsal fin close to pelvic base than pectorals; weak keel is present on sides of caudal peduncle; a narrow lobed caudal fin with long ventral lobe. Dark blue colour on dorsal side, bright blue on sides and white on the undersides. Viviparous Males mature at 160–191 cm and females at about 166–191 cm. They feed on bony fishes, small sharks, squids, pelagic crustaceans etc.,

*Geographical Distribution* : Indo West Pacific : India, Sri Lanka, Madagascar, Thailand, Vietnam, Andaman Islands, Java and Australia Red Sea, East Coast of Africa and India.

*Remarks* : They are caught mainly with pelagic longlines (Compagno, 1984; Talwar and Jhingran, 1991).

69. *Sphyrna lewini* (Griffith and Smith, 1834)  
Scalloped hammerhead

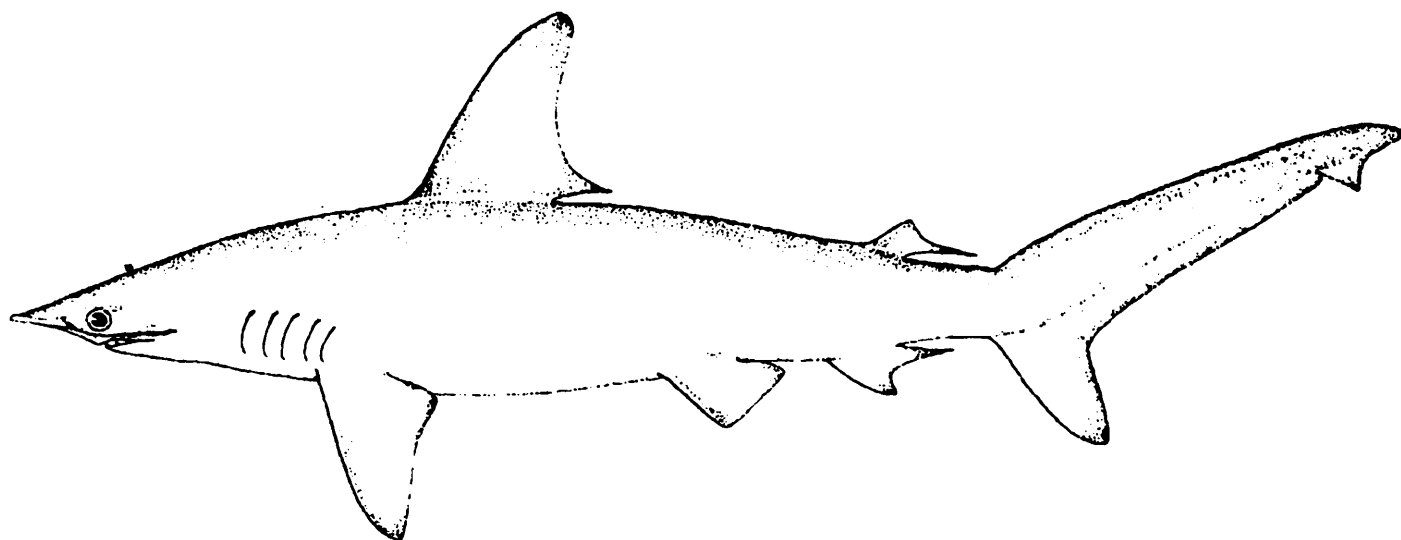


Fig. 69. Lateral view of *Sphyrna lewini*

1834. *Zygaena lewini* Griffith and Smith, in Cuvier, Griffith and Smith, 1834, *Anim. Kingd.*, 10 : 640, pl. 50.

*Synonymy* : *Zygaena erythraea*, *Cestracion oceanica*, *Zygaena tudes*.

*Morphological features* : Body elongate and laterally compressed. Head hammer shaped, its greatest width 27 to 29 % of total body length. Its anterior contour slightly convex with a shallow, but distinct indentation at midline; eyes large. Teeth triangular, usually with smooth edged cusps. First dorsal fin high, falcate; second dorsal fin small, its base noticeably smaller than anal fin base. Pelvic fins low, with a nearly straight hind margin. Body uniform grey, greyish brown or olivaceous above, shading to white below; pectoral fins tipped grey or black ventrally.

*Geographical Distribution* : Circumtropical in distribution; Indo-west Pacific: India, Sri Lanka, Madagascar, Thailand, Vietnam, Andaman Islands, Java and Australia Red Sea, East Coast of Africa and India (Compagno, 1984; Talwar and Jhingran, 1991).

*Remarks* : Constitutes an important component in the drift gill net catches of the Orissa coast and the species is also caught at Kilakarai (Gulf of Mannar). Good liver oil of high vitamin A potency is obtained from this species. Very common at Cochin and perhaps the most abundant shark during certain months. A large sized female *S. lewini* was caught by hooks and line at Tuticorin in 1994 (Rajapackiam *et al.*, 1994 b).

70. *Sphyrna mokarran* (Ruppell, 1837)  
Great hammerhead

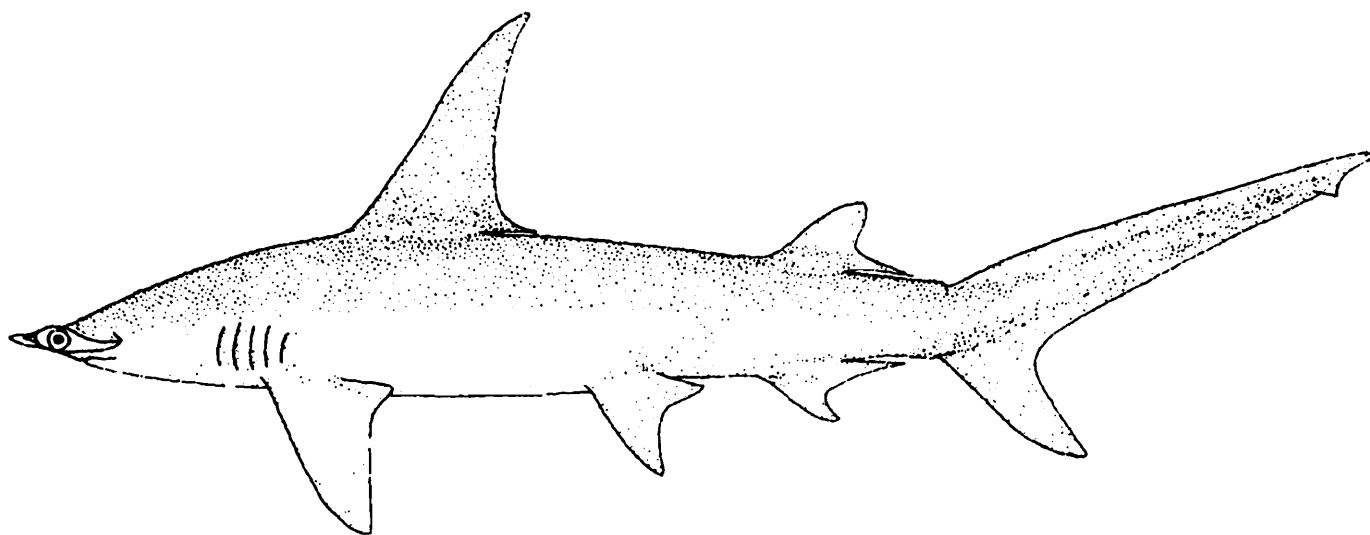


Fig. 70. Lateral view of *Sphyrna mokarran*

1837. *Zygaena mokarran* Ruppell, *Neue Wirbel. Faun. Abyssinien. Fische Rothen Meeres*, (11) : 64, pl. 18, fig. 1.

*Synonymy* : *Zygaena dissimilis*, *Sphyrna ligo*.

*Morphological features* : Body elongate and laterally compressed. Head hammer shaped, its greatest width 23 to 31 % of total body length. Its anterior contour with a deep median indentation. Eyes and nostrils close together. Second dorsal fin very high. Pelvic fins high and deeply falcate. Teeth strongly serrated. Body grey or greyish brown dorsally, becoming pale below; no markings on the fins.

*Geographical Distribution* : Warm tropical waters throughout the World. Indo - West Pacific : India, Sri Lanka, Madagascar, Thailand, Vietnam, Andaman Islands, Java and Australia Red Sea, East Coast of Africa and India (Compagno, 1984).

*Remarks* : Not taken in large quantities along the Indian coast except at portnovo where it forms a regular fishery. Maximum size 500 cm in length.

71. *Sphyrna zygaena* (Linnaeus 1758)  
Round headed hammerhead

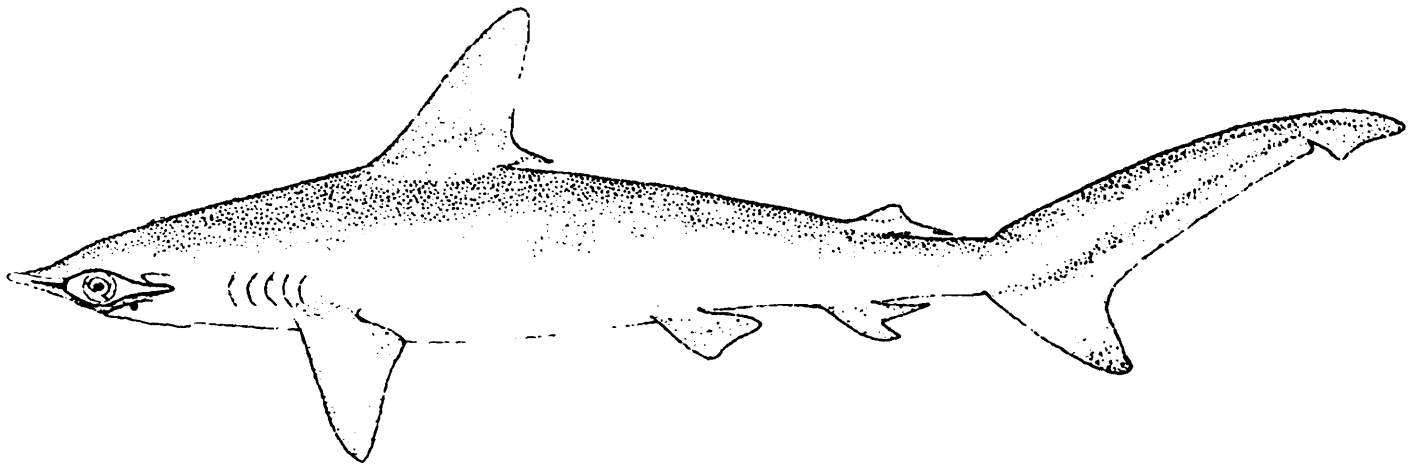


Fig. 71. Lateral view of *Sphyrna zygaena*

1758. *Squalus zygaena* Linnaeus, *Syst., Nat.*, ed. 10, 1 : 234.

*Synonymy* : *Zygaena vulgaris*, *Zygaena subarcuata*.

*Morphological features* : Body elongate and laterally compressed. Head hammer shaped, extremely wide, its greatest width 26 to 29 % of total body length. Its anterior contour not indented at midline. Nares present near eyes. Teeth smooth edged, weakly serrated in large individuals. Second dorsal fin low with a long inner margin and a shallowly concave posterior margin. Pelvic fins low with a nearly straight hind margin. Body colour is deep olive to brownish grey dorsally, shading to white ventrally; tip of ventral surface of pectoral fin sometimes faintly grey black.

*Geographical Distribution* : Western Indian Ocean : India, Sri Lanka, Mozambique, Western Pacific : Vietnam, Japan, Australia and New Zealand (Compagno, 1984).

*Remarks* : At Portnovno it forms a regular fishery and perhaps also at Kilakarai. Meat is used fresh, dried salted for human consumption, liver is used for extracting vitamins and fins are processed for shark fin soup. In 1997 a trawler landed a gigantic female hammerhead shark *S. zygaena* at Therkuvadi landing centre of Gulf of Mannar (Gandhi, 1998).

72. *Eusphyrna blochii* (Cuvier, 1817)  
Winghead Shark

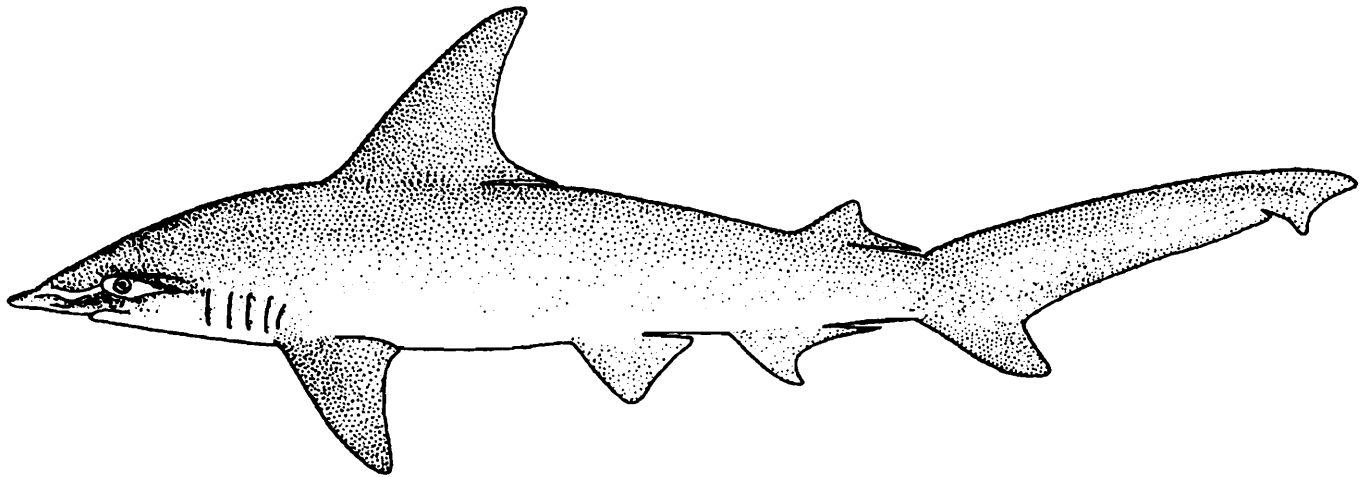


Fig. 72. Lateral view of *Eusphyrna blochii*

1817. *Zygaena nob. blochii* Cuvier, *Reg. Anim.*, 2 : 127, fig. 3.

*Synonymy* : *Zygaena latycephala*, *Sphyrna blochi*.

*Morphological features* : Body elongate and compressed; head shaped like a broad arrowhead, a pair of aircraft wings in dorsal and ventral view; a shallow, but distinct indentation at the midline of head and very broad, shallow indentation opposite to each nostril; nostrils are greatly elongated, wider than mouth; first dorsal fin very high, strongly falcate. Viviparous. Gestation period is about 10-11 months. Feed on small fishes, crustaceans and cephalopods.

*Geographical Distribution* : Indo West Pacific : India, Sri Lanka, Madagascar, Thailand, Vietnam, Andaman Islands, Java and Australia Red Sea, East Coast of Africa

*Remarks* : Caught in gill nets, long lines and hook & lines. Utilized fresh for human consumption, liver yield high protein, vitamin, oil and often used for fishmeal (Compagno, 1984).

## SHARK FISHING IN INDIA

The sharks form one of the important commercial fisheries in India. Although not very popular, the elasmobranchs are widely used either in fresh or preserved condition. They are also used for making fish meal and fish manure. Shark liver oil is considered to be a good source of vitamins and as such it has huge quantities of oil, which, though not utilized for medicinal purpose is used to a large extent in the leather industry for tanning etc. Dried fins and jaws of sharks are exported to some of the far eastern countries; the exporting centers being located at Bombay, Chennai and Nagapattinam (Devadoss, 1996). In the mid 1980's long liners were used to catch tunas and these pelagic longlines catch a large proportion of sharks as by catch. In the early years when the sharks were not considered as an important fishery, the sharks were released or discarded. But later on, the bycatch sharks were retained for finning, and it is this bycatch that form a significant portion of the shark catch today. The works of Chidambaram and Menon (1946); Sivasubramaniam (1963, 1991, 1992); James (1963); Devadoss (1977, 1978, 1983, 1984, 1989); Devadoss *et al.* (1985, 1989, 2000); Krishna Moorthi and Jagadish (1986); Silas (1986); Appukuttan and Prabhakaran (1988); Kasim (1991); Mathew *et al.* (1997); Bonfil (1994); Devadoss *et al.* (2000); Pillai and Parakal (2000) and Raje *et al.*, (2002) elaborate the elasmobranch resources and fishery in India.

There are about 65 - 75 species of sharks occurring in Indian waters of which 50 % belong to minor category having only very limited occurrence and less value, 40 % of moderate category and only 10 % of major category and are economically important. The requiem sharks of the family Carcharhinidae are the largest and most important sharks abundantly fished in India and all tropical seas. The hammerhead sharks with a highly developed sensory system form an important coastal fishery. Some sharks like white tip sharks, blue sharks, mako sharks, thresher sharks, tiger sharks etc. are truly oceanic in habitat. Some are deep water forms like squalids and scyliorhinids occurring up to 200 m (Sivasuramaniam, 1992, Devadoss, 1996; Hanfee, 1996a).

Exploratory surveys by the Government of India indicate that the sharks constitute 42% of the total longline catch in the Arabian Sea, 32 % in Bay of Bengal, 43 % in the Andaman Sea and 31 % in equatorial areas. The species that occur in the long line catches are *Carcharhinus albimarginatus*, *Carcharhinus dussumieri*, *Carcharhinus limbatus*, *Carcharhinus longimanus*, *Carcharhinus macloti*, *Carcharhinus melanopterus*, *Carcharhinus sorrah*, *Galeocerdo curvieri*, *Prionace glauca*, *Rhizoprionodon acutus*, *Scoliodon laticaudus*, *Stegostoma fasciatum*, *Alopias spp.*, *Isurus oxyrinchus* and *Sphyrna spp.* The catches of tuna long line vessels from the offshore and oceanic waters include *Carcharhinus melanopterus*, *Carcharhinus limbatus*, *Carcharhinus plumbeus*, *Alopias vulpinus*, *Alopias pelagicus*, *Isurus oxyrinchus* and *Sphyrna zygaena* (Hanfee, 1996a).

Up to early sixties, Indian fishermen followed traditional methods for fishing. Due to mechanization of fishing industry and the availability of shore based infrastructure facilities since the seventies, there has been a tremendous improvement in the marine catches including sharks. There is no specific gear exclusively for shark fishing. Elasmobranchs as a group are landed by various gears like trawl, hook and line, drift gill net, set net, long lines, surface trolling etc. But long line is the most effective gear in which sharks form around 80% of the catch, drift gill net which is operated at the surface, lands fairly good number of sharks. Elasmobranchs including sharks are landed by trawlers as a by catch. The whale shark fishery at veraval is a viable industry where the annual value of liver alone was estimated at around Rs 11.11 lakhs during 1991. (Vivekanandan and Zala, 1994; Sukumaran *et al.*, 1989).

The landing of sharks, rays and skates increased steadily over the years and reached the peak of 69.2 thousand tones in 1983. The production has been on increase over the three decades from 35.5 thousand tones during 1960's to 53.9 thousand tones during 70's and 57.1 thousand tones during 80's. The increase during seventies has been very prominent and the extent of mechanization of fishing helping the industry in increasing the production was very much evident during the period. On the east coast of India the southeastern region comprising of Andhra Pradesh and Tamil Nadu accounts for one fourth of the total production in India. Fairly good fishing ground exists off Andhra coast along 14 - 18° N (Devadoss, 1996; FAO/DANIDA/ICAR, 1983; Anon, 1986; Anon, 1989 and Sunilkumar Mohamed *et al.*, 1993).

The commercial catches landed by the traditional gears like the gill netters, trawlers, hook and line etc. are mostly from the narrow coastal zone. Beyond the shelf area is a vast stretch of untapped rich resource of sharks, and other fishes. In addition to the Fishery Survey of India and CIFNET vessels, there are a number of chartered vessels of private agencies operating long liners in the outer waters for pelagic sharks and tunas. The percentage of incidence of sharks is as high as 70 - 75% of the long line catches (Ramnesh Rao, 1988).

The average annual landings of sharks, skates and rays till 1973 was 33,442 tones. Of these 15,537 tones were landed along the east coast and 17,605 tones along the west coast, and the rest at Andaman and Nicobar and Lakshadweep islands (James, 1963).

## CURRENT STATUS OF INDIAN SHARK FISHERY

Shark fishery assumed importance in the late 80's and from then on the sharks have been fished indiscriminately. This has brought tremendous wealth in the market. Now, there are exclusive devices and fishing gears to catch sharks. Prior to 1960's, the shore seines, boat seines and gill nets were employed to catch sharks, which landed mostly

small sharks such as *Scoliodon laticaudus* and *Chiloscyllium indicus* and young hammerhead sharks. Troll, long line and drift gill nets landed mostly larger sharks such as *Carcharhinus* spp., *Galeocerdo cuvier* and seasonally the whale shark. With the introduction of motorisation of the country crafts and mechanized trawlers during the 60's and 70's, the fishing pattern of sharks changed and the trawlers landed more small sized shark. Presently the sharks are caught with hook and line, gill nets and trawls. An improved version of hooks on long liners using mechanized gears has proved effective in capturing larger fishes including sharks. Gill nets with large mesh size of more than 45 mm and upto 500 mm and total length ranging between 500 m to 2500 m with the depth of 3 to 15 m are used to capture large pelagics including sharks (Devadoss, 1996; Hanfee, 1996a).

Although catch composition data is not readily available, the multi species nature of these fisheries is evident from the published materials. Among the 20 most common species harvested are the *Carcharhinus* spp. *Sphyrnids* spp., (Appukuttan and Prabhakaran, 1988). Their data also show that *Rhizoprionodon acutus*, *Rhizoprionodon oligolinx*, *Carcharhinus limbatus*, *Carcharhinus sorrah*, *Carcharhinus hemiodon*, *Sphyrna lewini* and *Eusphyrna blochi* are the other important species. Among the remaining important species reported from catches are *Carcharhinus melonopterus* and *Scoliodon laticaudus* (Devadoss, 1983).

Indian sharks and rays represent 8.78 % of the global elasmobranch catches (Bonfil, 1994). Before 1991, perhaps due to large freshwater yields, elasmobranches comprised only 1.72 % of the total national catch. Earlier studies show that between 1983 - 1985, sharks comprised 55 % of the elasmobranch catch in the country (Appukuttan and Prabhakaran, 1988). Data from statewide landings of the sharks for the year 1995 - 1999 by Marine Products Export Development Authority reveal the tremendous increase in the shark meat and other shark products in the last five years (Anon, 1999).

Shark fishery in India is multispecies and no species dominant, along the coasts of India, neither a single species nor a group of species synoptically, dominates in any of the state. Some regions are excessively exploited and some are totally unexploited. *Scoliodon* spp dominates the fishery in the Gujarat and Bombay regions and grey sharks and hammerhead sharks dominate the catch in Kerala and Karnataka states. The whale shark has become the target fishery at Veraval on the Gujarat coast and *Carcharhinus* spp. are targeted and fished for their liver and fins (Devadoss *et al.*, 1985 and Jhingran, 1991).

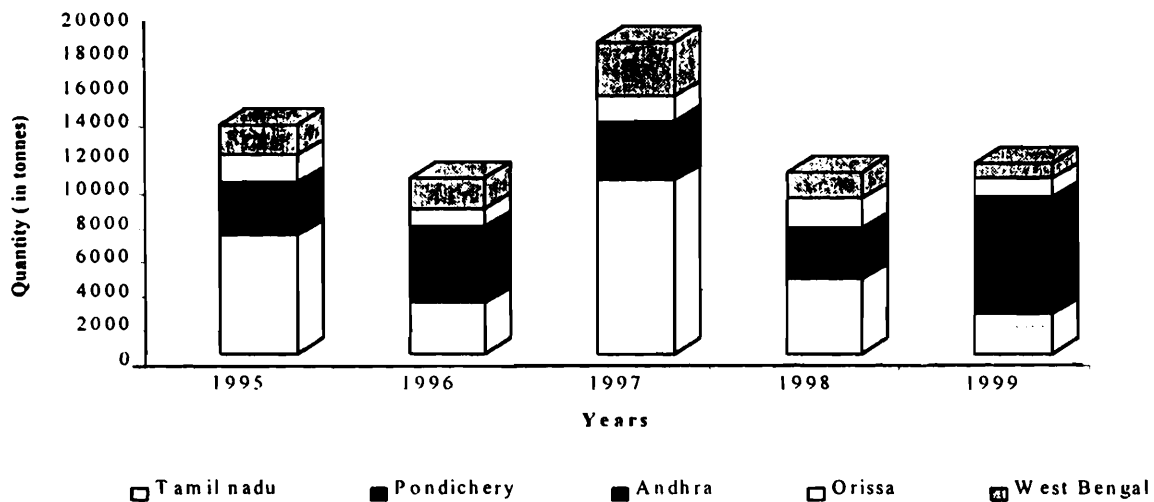
While forage items are abundant in the bottom waters, large concentrations of adults and juveniles of *Scoliodon laticaudus* are recorded in the benthic area. Adults of *Scoliodon* sp., feed on pelagics while juveniles prefer crabs, squilla and small prawns as forage. The adults of these species are taken by drift gill nets and juveniles by bottom trawlers. Along the South West Coast (Kerala and Karnataka) pelagic shark fishery is at its peak when shoals of oil sardine and mackerel occur at the surface. Shark fishery in India is more or less neglected and the resources not estimated systematically, it is a known fact that there is ample scope for development of this fishery if proper attention is paid. It has been found that shark meat is not inferior to other meat in nutritive value (James, 1963).

There is a tremendous increase in the export of shark meat and other shark products from India to various Asian and European countries. Japan, Taiwan, Singapore, Malaysia, China, Hong Kong and Thailand are the main consumers of shark meat and shark related products (Anon, 1999).

Our knowledge of sharks and other elasmobranch groups is based on the species caught within the narrow belt of coastal zone upto 70 m or so. Beyond this there may be many more species about which we have no knowledge. Till 1996 the level of fishing elasmobranchs account for an annual average catch of 55 thousand tones of which sharks 35 thousand tones (65 %). The projected potential yield of this group is about 0.18 million tones, leaving a large gap. This group is very much under exploitation (Devadoss, 1996).

### SHARK LANDINGS IN DIFFERENT STATES

National Marine Living Resource Data Centre (NMLRDC) at the CMFRI, maintains not only the data on catch and effort of different marine fishery resources, but also the data on the biology and length frequencies of different dominant species comprising the fishery resources (Raje *et al.*, 2002).



Source : CMFRI 2000

Fig. 73. State wise landing of sharks in the East Coast (1995 - 1999)

### EAST COAST

#### West Bengal

West Bengal has a coastline of 65 km, constituting 1 % of the country’s coastline. Traditionally, fish is an important part of the Bengali diet and, therefore, fisheries play

an important role in food security in West Bengal.

Total number of mechanized boats operating	: 1054
Gillnetters	: 73%
Carrier boats	: 27%
Total number of non mechanised crafts	: 4,100 approx.(98% Plank-built boats and 2% dugout canoes)
Gears used	: Drift/gill nets, fixed bagnets, hooks and lines, shore seines, traps and scoop nets.
Total number of Fishing villages	: 303
District with largest number of fishing villages	: Midnapore (148)
District with less number of fishing villages	: Murshidabad, Nadia and Hooghly (18)
Fishermen Population	: 0.84 lakhs

West Bengal contributed to 1.4 % of the all India elasmobranch landings and 3.8 % of the catch from the east coast in 2000, indicating an increase over the last two decade. Sharks formed 54 % of the total elasmobranch catch (Raje *et al.*, 2002). The total catch of sharks between 1995 and 1999 in West Bengal is illustrated in Fig. 73.

The major species landed are *Carcharhinus leucas*, *Carcharhinus melanopterus*, *Carcharhinus sorrah*, *Glyphis gangeticus*, *Lamiopsis temminckii*, *Sphyrna blochii* and *Centroscyllium ornatum* (Table 1).

### Orissa

Orissa has a coastline of 480 km, constituting 8% of the coastline of India. By introducing large number of mechanized boats and improving techniques of fishing Orissa is emerging fast on the fisheries scene.

Total number of mechanized boats operating	: 745
Trawlers	: 470
Gillnetters	: 275
Total number of non mechanised crafts	: 10,550
Gears used	: Trawl nets, Drift/gill nets, fixed bagnets, hooks and lines, shore seines, small purse

	seines and boat seines.
Total number of Fishing villages	: 236
District with largest number of fishing villages	: Balasore (169)
District with less number of fishing villages	: Cuttack (12)
Total number of Landing Centres	: 68
Fishermen Population	: 1.17 lakhs

The contribution of Orissa, to the all India elasmobranch landing in 2000 was 3.8% and 8.9% of the catch from the east coast. Sharks constituted 42% of the total elasmobranchs landed in Orissa. Around 2.4% of the total national shark landings is from Orissa. Sharks were exploited by gill nets in all the four quarters of a year (Raje *et al.*, 2002). The total catch of sharks between 1995 and 1999 in Orissa is illustrated in Fig. 73.

The major species landed are *Carcharhinus dussumieri*, *Carcharhinus limbatus*, *Chaenogaleus macrostoma*, *Sphyrna lewini* and *Eusphyrna blochii* (Table 1).

### Andhra Pradesh

The state has a coastline of about 980 km, it has a rich marine fishery resource making it rank fifth among the maritime states of India.

Major craft	: Catamaran
Total number of trawlers	: 580
Total number of non mechanised boats	: 36,0000
Total number of trawlnets	: 800
Gears used	: Drift/gill nets, fixed bagnets, hooks and lines, shore seines, traps and scoop nets.
Total number of Fishing villages	: 453
District with largest number of fishing villages	: Srikakulam
District with less number of fishing villages	: Vizianagaram and West Godavari
Total number of Landing Centres	: 280
Fishermen Population	: 3.30 lakhs

Approximately 12% of the total national elasmobranch production comes from the

seas around Andhra Pradesh, which is 29 % of that caught from the east coast of India. Sharks constitute 55% of the elasmobranch catch in Andhra Pradesh. Hooks and lines are effectively used to exploit sharks in the state. The total catch of sharks between 1995 and 1999 in Andhra Pradesh is illustrated in Fig. 73.

The major shark species landed along the coasts of Andhra Pradesh are *Rhizoprionodon acutus*, *Carcharhinus sorrah*, *Carcharhinus melanopterus*, *Carcharhinus limbatus*, *Scoliodon laticaudus*, *Sphyrna lewini*, *Sphyrna zygaena* and *Loxodon macrorhinus* (Raje et al., 2002) (Table 1).

### Tamil Nadu

Tamil Nadu and Pondicherry have a combined coastline of about 1000 km. Tamil Nadu has the unique advantage of facing three major bodies of water- Indian Ocean, the Arabian Sea, and the Bay of Bengal. It is perhaps for this reason that the state has a long tradition of maritime activity. Some of the fishermen own mechanized fishing craft in Tamil Nadu.

Common non mechanised crafts	:	Catamaran (73%), Plankbuilt boats (21%) and dugout canoes (5%)
Gears used	:	trawl nets, drift/set gill nets, boat seines, Shore seines, fixed bagnets, hooks and lines, traps and scoop nets.
Total number of Fishing villages	:	422
District with largest number of fishing villages	:	Ramanathapuram (180)
District with less number of fishing villages	:	Pudukottai (20)
Total number of Landing Centres	:	352
Fishermen Population	:	3.96 lakhs

Tamil Nadu is quite rich in elasmobranch fauna. The percentage contribution of elasmobranchs from Tamil Nadu coast to the all India catch is 23 % and to the catch from the east coast is 54 %; occupying the second place after Gujarat. In 2000, sharks formed 12 % of the total all India shark production and 34 % of the states elasmobranch production. The total catch of sharks between 1995 and 1999 in Tamil Nadu is illustrated in Fig. 73

The major shark species landed in Tamil Nadu are *Rhizoprionodon acutus* (9 %), *Rhizoprionodon oligolinx*, *Carcharhinus sorrah*, *Carcharhinus leucas*, *Carcharhinus melanopterus* (41 %), *Carcharhinus limbatus* (3 %), *Carcharhinus hemiodon*, *Carcharhinus dussumieri*, *Carcharhinus macloti*, *Scoliodon laticaudus*,

*Sphyrna lewini* (12 %), *Eusphyrna blochii*, *Sphyrna zygaena*, *Loxodon macrorhinus*, *Echinorhinus brucus*, *Chaenogaleus macrostoma*, *Chiloscyllium indicum* and *Chiloscyllium griseum* (Raje *et al.*, 2002) (Table 1).

### Pondicherry

The contribution of Pondicherry to the all India elasmobranch landing is only 0.8%. Sharks contributed 40% of the total landings of elasmobranchs in the state. Gill nets are the main gear used in the exploitation of sharks and are caught mainly during the first three quarters (Raje *et al.*, 2002). The total catch of sharks between 1995 and 1999 in Pondicherry is illustrated in Fig. 73. East coast contributed 52, 49, 62, 44 and 50% in the total catch of sharks from 1995 to 1999 (Fig. 75).

The major species of sharks landed are *Carcharhinus dussumieri*, *Carcharhinus hemiodon*, *Carcharhinus leucas*, *Carcharhinus melanopterus*, *Carcharhinus macloti*, *Carcharhinus sorrah*, *Chaenogaleus macrostoma*, *Chiloscyllium indicum*, *Chiloscyllium griseum*, *Echinorhinus brucus*, *Mustelus mosis* and *Rhizoprionodon oligolinx* (Hanfee, 1999; Raje *et al.*, 2002) (Table 1).

## WEST COAST

### Gujarat

This state on the west coast has the longest coastline of about 1640 kms. It also has excellent estuarine potentials. Mechanised boats were first introduced in 1956, first at Veraval, one of the most important fisheries harbour of the state, though a few country craft fitted with outboard engines had been in operation since 1953.

Total number of mechanized boats operating	: 2900
Trawlers	: 1450 approx.
Total number of non mechanised crafts	: 4100
Total number of trawlnets	: 2700
Gears used	: fixed bagnets
Total number of Fishing villages	: 179
District with largest number of fishing villages	: Kutch
District with less number of fishing villages	: Surat
Total number of Landing Centres	: 173
Fishermen Population	: 1.52 lakhs

Gujarat bounded by the northwest Arabian Sea, and the Gulf of Kutch is well known for its rich elasmobranch resources. In 2000, 24,185 tones of sharks landed in Gujarat. Sharks constitute 86 % of the total elasmobranchs exploited in the state. On an average, gill nets contributed the maximum catch of sharks (29.4 %) followed by trawl nets (25.8%), hooks and lines (21.1 %); and the rest from other gears together. The most important species among sharks caught along the coast of Gujarat from both gill nets and trawl nets are *Scoliodon laticaudus* (81 %). *Carcharhinus melanopterus* (10 %), *Carcharhinus limbatus* (4.4 %), *Rhizoprionodon acutus* (2 %), *Carcharhinus leucas*, *Rhizoprionodon oligolinx*, *Sphyrna zygaena* (2 %) are the other important species landed in gill nets and trawlers. *Carcharhinus longimanus*, *Carcharhinus macloti*, *Carcharhinus sorrah*, *Galeocerdo cuvier*, *Chiloscyllium indicum*, *Alopias vulpinus*, *Mustelus mosis*, *Sphyrna mokarran* and *Sphyrna lewini* are the other species landed occasionally in the state (Raje *et al.*, 2002) (Table 1). The total catch of sharks between 1995 and 1999 in Gujarat is illustrated in Fig. 74.

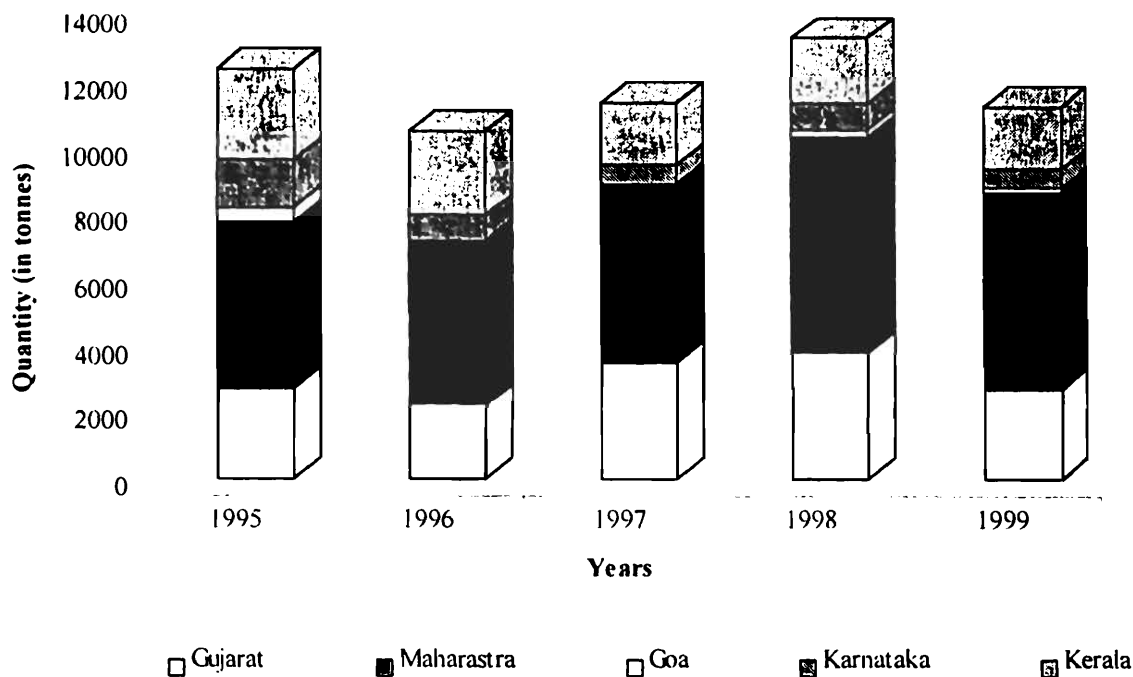
### Goa

This state is on the west coast of India has a coastline of 153 km.

Trawlers	: 494
Gillnetters	: 274
Purse seiners	: 66
Others	: 74
Total number of non-mechanised crafts	: 2066
Gears used	: Drift/set gillnets, rampani, shore seines and boat Seines.

The elasmobranch contribution of Goa to the all India catch is 0.04 % and 0.07 % to that of the west coast. From 1981 onwards the shark fishery showed decline. In 2000, 22 tones of sharks landed in the state (Raje *et al.*, 2002). The total catch of sharks between 1995 and 1999 in Goa is illustrated in Fig. 74.

The most important shark species landed are *Carcharhinus dussumieri*, *Carcharhinus limbatus*, *Carcharhinus macloti*, *Carcharhinus sorrah*, *Mustelus mosis* and *Scoliodon laticaudus* (Table 1).



Source : CMFRI 2002

Fig. 74. State wise landing of sharks in the West Coast (1995 - 1999)

### Maharashtra

It has a coastline of 720 km, Maharashtra ranks second among the maritime states of India in respect of marine fish landings.

Total number of mechanized

boats operating : 12485

Bagnetters : 46 %

Trawlnetters : 29 %

Gillnetters : 25 %

Gears used : Gillnets, bag nets, trawl nets, rampani, hook and Lines.

Total number of Landing Centres : 152

Fishermen Population : 2.32 lakhs

Shark landing in the Maharashtra coasts are more and frequent. In the year 2000 Maharashtra contributed 3.1 % of the total elasmobranch catch in India and sharks formed the major share of the elasmobranch catch (85.2 %). The shark landings of this state were almost constant form 1981 to 2000. Trawl nets landed 65.6%, gill nets contributed 25.4 % and dol nets 8.2 %. Trawlers landed sharks throughout the year, with peak landings during first and fourth quarters of a year. *Scoliodon laticaudus* (72 %),

*Rhizoprionodon acutus* (3 %), *Rhizoprionodon oligolinx* (4 %), *Carcharhinus sorrah* (11 %), *Carcharhinus limbatus* and *Lamiopsis temminckii* are the major species of sharks landed in the state (Raje *et al.*, 2002) (Table 1). The total catch of sharks between 1995 and 1999 in Maharashtra is illustrated in Fig. 74.

### Karnataka

The state has a coastline of nearly 300 km. In the fisheries atlas, this coast is often designated as the “mackerel coast” As the name suggests, mackerel is an important fish of this region.

Mechanised crafts	:	Plank-built boats and dugout canoes
Gears used	:	Gill nets, line gears and cast nets.
Total number of Fishing villages	:	147
District with largest number of fishing villages	:	Dakshin Kannada (77)
District with less number of fishing villages	:	Uttar Kannada (70)
Total number of Landing Centres	:	105
Fishermen Population	:	1.13 lakhs

This state shares 1.5 % of all India elasmobranch catch and 3.2 % of the elasmobranch production from the west coast. The total catch from trawl nets, gill nets, hook and lines, seines and few dol nets produced 43.5 %. The average annual landing of sharks from the coasts of Karnataka was around 1500 tonnes. The total catch of sharks between 1995 and 1999 in Karnataka is illustrated in Fig. 74. Trawl nets landed more sharks than other gears. *Carcharhinus melanopterus*, *Carcharhinus limbatus*, *Carcharhinus sorrah*, *Galeocerdo cuvier*, *Sphyrna zygaena* and *Scoliodon laticaudus* are the major sharks landed in the state (Raje *et al.*, 2002) (Table 1).

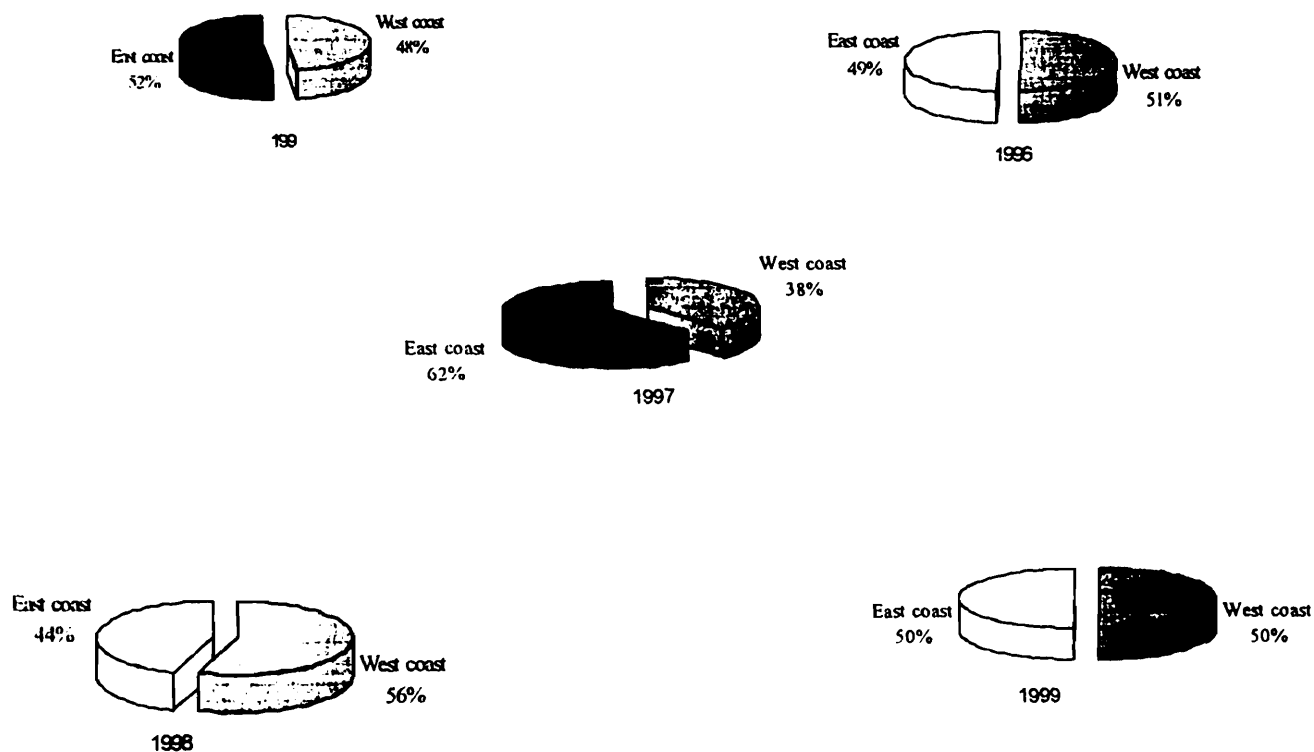
### Kerala

This state is on the west coast, has coast line extending to 590 km, almost one – tenth of the Indian Coast line. Mechanization began in the late 1950s. During the late 1970s commercial purseseining started and in the early 1980s began the process of large-scale motorization of the country crafts.

Total number of mechanized boats operating	:	980
Trawlers	:	76 %
Total number of non-mechanised crafts	:	26000

Total number of trawlnets	:	4000
Gears used	:	Hooks and lines, traps and scoop nets
Total number of Fishing villages	:	304
District with largest number of fishing villages	:	Cannanore (65)
District with less number of fishing villages	:	Malappuram (18)
Total number of Landing Centres	:	222
Fishermen Population	:	6.4 lakhs

This state contributed 3.9 % to the all India elasmobranch catch and 6.8 % to the catch from west coast. Around 2832 tonnes of sharks landed in this state in the year 2000. The maximum landing was 7747 tonnes in 1983. 47.3 % of the sharks are caught by the gill nets, 32.9 % by the trawl nets and 14.7 % by hook and lines. *Rhizoprionodon acutus* (28 %), *Carcharhinus melanopterus* (38 %), *Carcharhinus leucas*, *Carcharhinus limbatus*, *Carcharhinus longimanus*, *Carcharhinus sorrah*, *Carcharhinus macloti* (8 %), *Sphyrna mokarran* (4 %), *Rhizoprionodon oligolinx* (13 %), *Sphyrna zygaena* (6 %), *Scoliodon laticaudus* and *Galeocerdo cuvier* are the dominant species of sharks landed in Kerala (Raje *et al.*, 2000) (Table 1). The total catch of sharks between 1995 and 1999 is illustrated in Fig. 74. West coast contributed 48, 51, 38, 56 and 50 % of the total catch of sharks from 1995 to 1999 (Hanfee, 1999; Raje *et al.*, 2002) (Fig. 75).



Source : MPEDA, 1999

Fig. 75. Coast wise landing of sharks in India from 1995 - 1999.

Table. 1 : Major species of sharks landed along the Indian Coasts

Shark species	West Coast					East Coast				
	Gujarat	Maharashtra	Goa	Karnataka	Kerala	Tamil Nadu	Pondy	Andhra	Orissa	West Bengal
<i>Alopias vulpinus</i>										
<i>Carcharhinus dussumieri</i>										
<i>Carcharhinus falciformis</i>										
<i>Carcharhinus hemiodon</i>										
<i>Carcharhinus limbatus</i>	.	.	.	.	.	.		.	.	
<i>Carcharhinus longimanus</i>										
<i>Carcharhinus leucas</i>										
<i>Carcharhinus macloti</i>	.		.		.	.	.			
<i>Carcharhinus melanopterus</i>										
<i>Carcharhinus sorrah</i>	.	.	.	.	.	.	.	.		.
<i>Centroscyllium ornatum</i>										
<i>Centrophorus moluccensis</i>										
<i>Cephaloscyllium silasi</i>										
<i>Chaenogaleus macrostoma</i>										
<i>Chiloscyllium griseum</i>										
<i>Chiloscyllium indicum</i>										
<i>Echinorhinus brucus</i>										
<i>Eridacnis radcliffei</i>										
<i>Eugomphodus taurus</i>										
<i>Eusphyra blochii</i>										
<i>Galeocerdo cuvier</i>										
<i>Glyphis gangeticus</i>										
<i>Heptranchias perlo</i>										
<i>Lamiopsis temminckii</i>										
<i>Loxodon macrorhinus</i>								.		

Shark species	West Coast					East Coast				
	Gujarat	Maharashtra	Goa	Karnataka	Kerala	Tamil Nadu	Pondy	Andhra	Orissa	West Bengal
<i>Mustelus mosis</i>										
<i>Rhizoprionodon acutus</i>										
<i>Rhizoprionodon oligolinx</i>										
<i>Scoliodon laticaudus</i>										
<i>Eusphyrna blochii</i>										
<i>Sphyrna lewini</i>										
<i>Sphyrna mokarran</i>										
<i>Sphyrna zygaena</i>										
<i>Stegostoma fasciatum</i>										

## TRADE IN SHARK AND SHARK PRODUCTS

The export of marine products has a long history in India. The dry fish trade with neighbouring countries of South Asia has existed for a long time. Much of it was confined to shellfish, fin-fish and fishery products. During the period 1968-1977, Indian marine products were marketed in 93 countries. Marine exports were on decline and in 1978, only 35 countries imported from India (Jhingran, 1991). Subsequently over the years, India has initiated several measures to diversify trade in marine products export, largely through the efforts of Marine Products Export development Authority (MPEDA).

Sharks have always contributed to the marine fish trade. Initially, sharks were not a preferred species, often being a byproduct. However, with the advent and the expansion of bottom trawl fisheries in most of the countries along the Bay of Bengal and in the Indian Ocean, except Maldives, a significant increase in shark catch was observed. At the same time, large mesh driftnetting and hook and line fishing also caught small quantities of coastal/inshore sharks (Sivasubramaniam, 1992).

The widespread introduction of synthetic gillnets in the 1960s increased the large mesh driftnetting for large pelagic sharks expanding beyond the coastal waters towards the edge of the continental shelf (Sivasubramaniam, 1992). Consequently the foundation for pelagic shark fishery was laid in the east coast of India.

Elasmobranch fishing has become an important commercial enterprise on either side of the Indian coastline. Shark catches continued to rise with the average annual production between 1976 and 1985 increasing to 58,862 tonnes. Shark catch would have been much higher if the fishermen had access to different types of gear that are required to harvest big sharks (Devadoss *et al.*, 1985).

From 1959-1960 several incentive schemes were initiated by the government aiming at the development of marine fisheries on more professional lines. In 1961 MPEDA was constituted, with enlarged autonomy and executive powers. A noticeable feature of the establishment of the authority was that the term "marine products" was used to imply aquatic products from fresh, brackish and seawaters (Hanfee, 1996b).

Trade in sharks and shark products gained importance in the late 80's due to the increased utilization of shark meat for domestic consumption along with the reduction of tariff rates on the import of shark fins etc.

The shark fishery has become more lucrative one in view of the great demand for their fins and flesh. The major products of sharks are such as fins, meat, liver oil, stearin, liver meal, cartilage, skin and teeth.

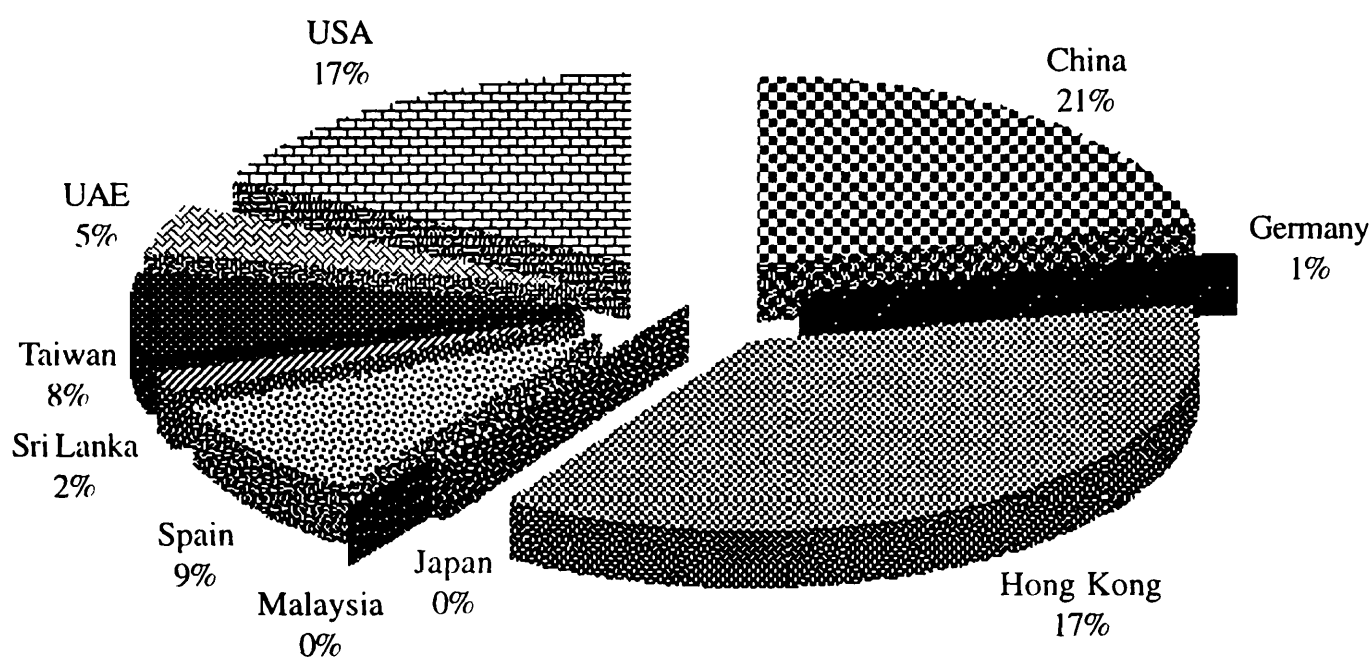
### Fins

Shark fin soup is a fine delicacy relished by the Chinese and many other easterners. China is the biggest buyer of shark fins and until recently it was an important export

item from this country to China. There are hundreds of people who visit Chinese restaurants all over the world and taste the delicacy of shark fin. It is not only a good drinking but highly nutritious too. It is very rich in Calcium and phosphorus, and even in rare elements, which are essential for our body's metabolism. As the shark skeleton is made of soft cartilage, the entire fins dissolve in the soup, becoming money's real worth (Ummerkutty, 1967).

Trade in shark fins is fast growing. Thailand, Malaysia and Singapore are re-exporting unprocessed and processed fins in various forms to the western countries. Hong Kong, Japan, Europe and the United States have emerged as the major buyers of shark products (Hanfee, 1996b; Pillai and Parakal, 2000).

Dried shark fin is a valuable export product in India. A major portion of export takes place from Bombay and Chennai. Geographically, Chennai is centrally located on the shark-landing belt of the Indian East Coast. On the other hand, inland transportation



*Source : MPEDA, 1999*

**Fig. 76.** Export of Dried Shark fin from India to other countries (1995 - 1999)

good and allows fins from the west coast to easily reach Chennai. Moreover, Chennai has a large commercial port and a well connected airport.

The fins are exported to Singapore, Hong Kong, Malaysia, UK and Australia. Fins from several varieties of sharks are exported. Usually the first dorsal, pectoral and the

lower lobe of the caudal fins are highly valued in the foreign market. The fins of certain sharks like *Alopias spp.*, *Centrophorus spp.* and *Echinorhinus spp.*, are of no economic value, but their flesh or liver oil, and in some cases both, are made use of. Fins of whale shark are also of not much value but still it is traded mainly from Gujarat.

According to Marine Products Export Development Authority (MPEDA), fins of the following shark species are exported from India :

1. *Sphyrna zygaena*
2. *Rhizoprionodon acutus*
3. *Scoliodon laticaudatus*
4. *Carcharhinus melanopterus*
5. *Rhincibatus djeddensis*
6. *Negaprion acutidens*
7. *Rhiniodon typus*

India, Sri Lanka, Bangladesh and Maldives are the main exporters of the fins. The main consumer countries are Thailand, Malaysia and Singapore.

Between 1995-1999, India has exported 543.48 tones of dried shark fins worth of 1234.2 lakhs to Hong Kong alone. The other countries which imported dried shark fins from India were China, Germany, Japan, Malaysia, Spain, Sri Lanka, Taiwan, UAE and USA. The total export of dried shark fin from India to countries other than Hong Kong was 91.93 tonnes worth of 150.49 lakhs (Anon, 1999) (Fig. 76).

### Meat

Shark meat is consumed locally, mainly in dried (Salt cured) form. It is very popular on the west coast, especially in Kerala and Goa. In Tamil Nadu, shark meat is less popular. In Calicut region, shark meat is preferred in wedding parties. Gujarat is the only state exporting shark meat at present. Its export depends upon the demand. The whale shark meat is exported afresh in frozen form to mainly Taiwan, Korea and Singapore. Relatively high urea content and the odour of ammonia in the shark flesh is the main inhibiting factor encountered in the commercial utilization of the shark flesh in fresh form or processed products (Hanfee, 1996b; Pillai and Parakal, 2000). About 50% of the landings of the elasmobranchs in India are consumed in a fresh condition and the rest is cured in several ways mostly by traditional methods (Bal and Virabhatra Rao, 1990).

After the liver is extracted the shark meat is usually discarded. Processing of shark meat for later human consumption is not attempted mainly because of the quickness with which it decays. The shark's body contains large quantity of urea, which turns into obnoxious chemicals shortly after its death. Shark's meat must therefore, be frozen or processed immediately after its capture. One great advantage of sharks, over other fishes, however is that it takes long hours for them to die after their capture, thus compensating the quickness of decay afterwards.

Japanese are the only people who probably make the maximum use of shark meat. In their global meanderings in the oceans with their long lines in search of tunas, they often get more sharks than tunas. Japanese fishermen care for the shark meat as carefully as they do for any other meat. When it is a question of pertinacious food they do not hesitate in breaking prejudices.

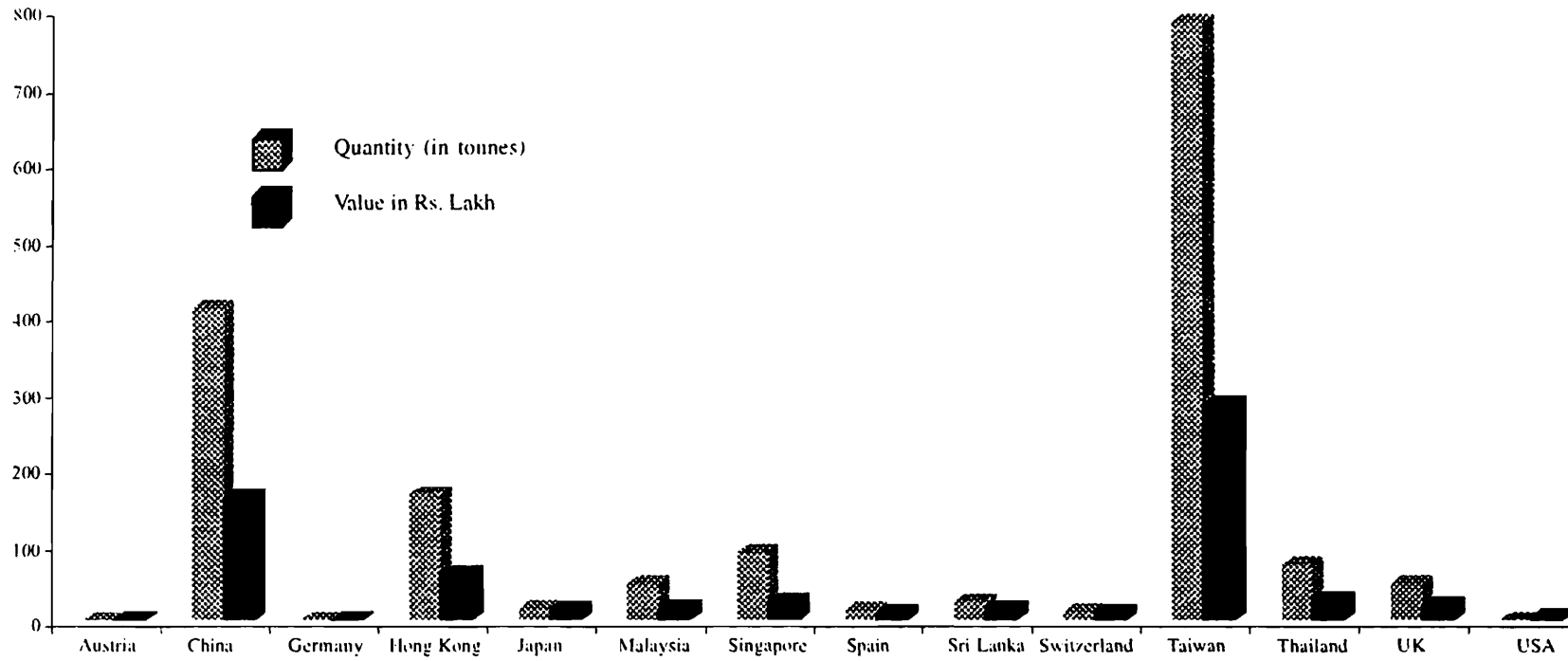
India has exported 784.63 tones of frozen shark meat worth of 282.49 lakhs to Taiwan from 1995–1999. The second largest export of frozen shark meat from India was to China (408.88 tonnes worth of 160.59 lakhs). The total amount of frozen shark meat imported from India by countries like Austria, Germany, Hong Kong, Japan, Malaysia, Singapore, Spain, Srilanka, Switzerland, Thailand, UK and USA was 491.68 tones worth of 198.81 lakhs (Anon, 1999) (Fig. 77).

In general, the export of dried shark was low when compared to export of dried shark fin and frozen shark meat. From 1995–1999 India has exported 79.67 tones of dried shark to China, 22.43 tones to Hong Kong, 0.12 tones to Germany, 1 tone to Maldives and 29.26 tones to Srilanka worth of 96.94, 14.08, 0.10, 3.48 and 19.64 lakhs respectively (Anon, 1999) (Fig. 78).

### Liver Oil

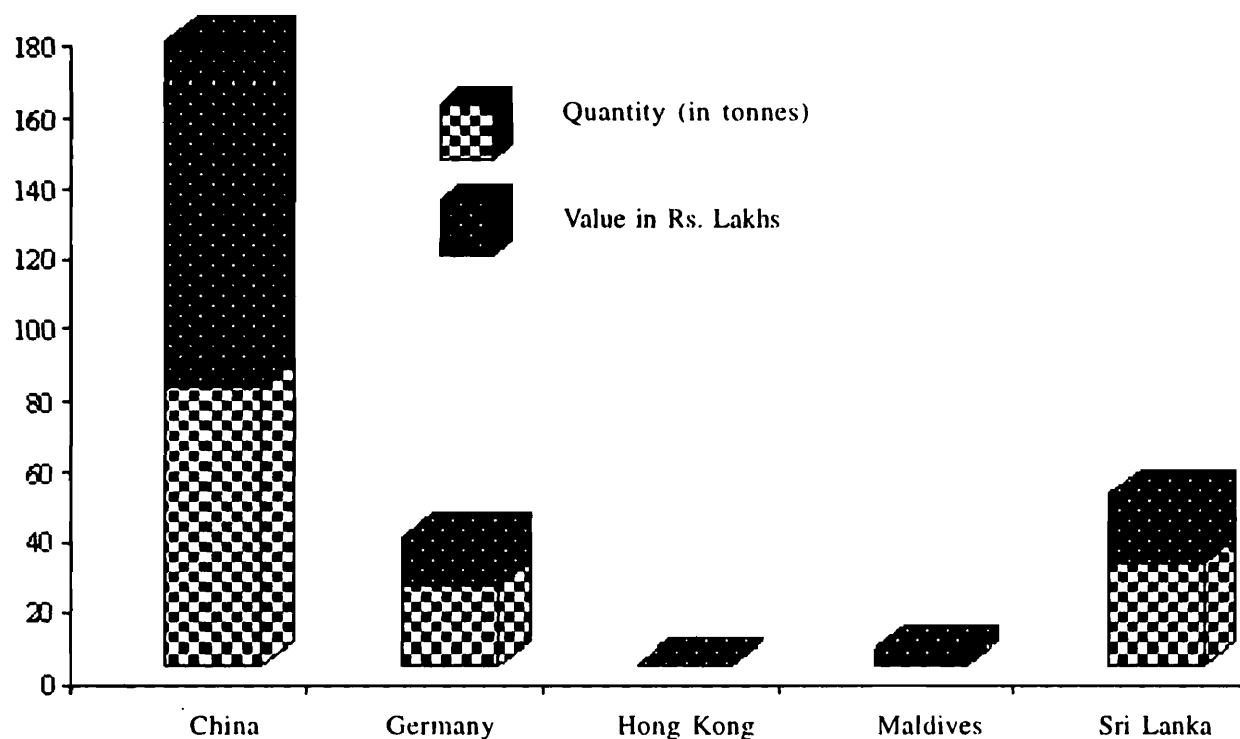
A very important use to which the elasmobranch fishes are put to is for the extraction of liver oils having a medicinal value. The livers of most of the species have a high percentage of oil with high vitamin A content. Indigenous production of shark liver oil has replaced the imports of cod liver oil for medicinal purposes since the Second World War period (Bal and Virabhatra Rao, 1990).

Of more than 70 species of sharks available in Indian waters, only certain are commercially important. The introduction of synthetic vitamin A resulted in the closure of the only shark liver oil factory existed at Calicut in 1940. Presently oil is extracted crudely at some places in the unrecognized sector. An oil refinery plant at Kakinada in collaboration with a company in Bombay converts refined oil into capsules of Vitamin A and D. The natural vitamin content of the purchased liver is considered to be low and surprisingly some synthetic vitamin A and D are added. The end products are small droplets like capsules.



Source : MPEDA 1999

Fig. 77. Export of Frozen Shark Meat from India to other countries (1995 - 1999)



*Source : MPEDA, 1999*

**Fig. 78.** Export of Dried Shark from India to other countries (1995 - 1999)

At present, Government owned shark liver oil factories are functioning on scientific lines in Tamil Nadu, Kerala, Karnataka, Maharashtra, Gujarat, Orissa and West Bengal. Livers are pulped and alkali digested and the resultant mass is centrifuged for separating the oil, which is dehydrated and purified. The vitamin content is ascertained and then standardized by the addition of an edible oil to obtain the required vitamin potency. For consumer acceptance the oil is sold in the form of capsules or as sweetened palatable products. The amount of oil and vitamin content are known to vary much in some species, with the different growth stages. The crude oil with poor vitamin content are used for lubricating machinery, tanning leather and for painting the fishing craft to prevent settlement of fouling organisms and wood borers (Bal and Virabhatra Rao, 1990). *Glyphyus gangeticus*, *Carcharbinus melanopterus*, *Carcharbinus limbatus*, *Scoliodon sorrakowah*, *Scoliodon palasorrah*, *Scoliodon walbeehmi*, *Sphyrna zygaena*, *Pristis microdon*, *Pristis cuspidatus* and *Galacercdo curier* are much sought after extraction of liver oil (Anon, 1962; Samuel, 1968).

### Stearin

It is preserved in crude liver oil as a fatty matter. It is separated by chilling the crude liver oil in a cooler temperature before centrifuging. Crude liver oil contains about 20 - 30 percent stearin, which is used in the manufacture of candles, soaps and paints. It is also used as an anti fouling agent for fishing craft (Pillai and Parakal, 2000).

### Liver Meal

Fresh livers are minced and vigorously boiled for two hours. On boiling, water and

liver settle at the bottom and the oil floats on the surface. The oil is carefully separated using a filter cloth and the liver meal is dried and powdered for mixing in poultry feed (Hanfee, 1996b; Pillai and Parakal, 2000).

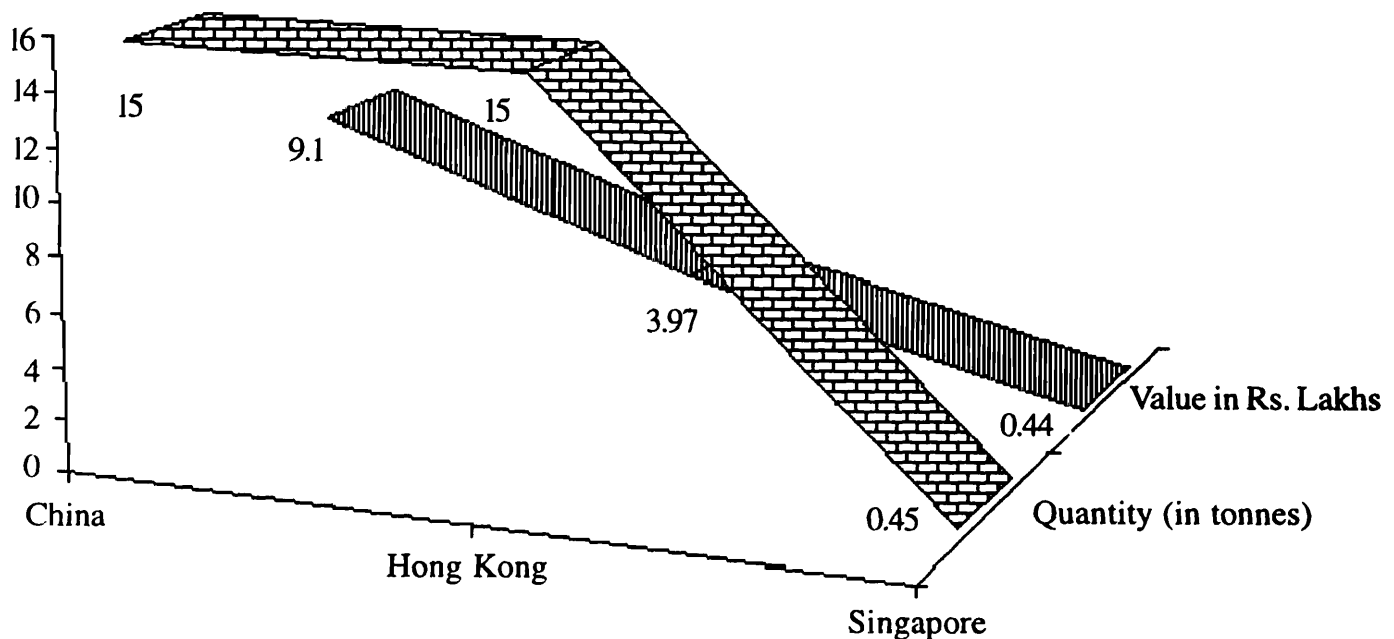
### Cartilage

Shark bones are powdered and made into tablets. Heart patients in the European countries use these tablets. According to the recent reports cartilage extracts are used specifically for carcinoma and tumors. India has exported 15 tonnes of shark bones to China, 0.45 tonnes to Singapore and 15 tonnes to Hong Kong worth of 9.10, 0.44 and 3.97 lakhs respectively in the last five years from 1995 – 1999 (Anon, 1999; Hanfee, 1996b; Pillai and Parakal, 2000) (Fig. 79).

### Skin

Sharkskin can be processed into quality leather. Nothing is wasted in an elasmobranch body. Not only the meat and liver oil, but every other part of the organism is made use of. Sharkskin leather and valuable drugs like insulin and pancreatin and squalene are few among them. The last one is an invaluable tool for the medical research in studies on heart diseases and cancer.

Sharkskin leather is a luxury, which can be afforded only by the rich. Shagreen-Shark or ray skin with the denticles still in it – is a leather of lasting beauty. Denticles are ground by mechanical means. Ocean Leather Corporation of U.S.A is the largest sharkskin tannery in the world and has been marketing excellent quality shark leather. Shark leather is used for a variety of luxury articles, men's shoes, belts, wallets, watchstraps and other fine leather goods (Ummerkutty, 1967).



Source : MPEDA, 1999

Fig. 79. Export of sharkbones from India (1995 – 1999)

## Teeth

Shark teeth also have commercial utility. In the absence of any internal demand, trade is highly unorganized. Jaws are very rarely sold as curios and the teeth are sometimes used as beads in artificial jewellery (Hanfee, 1996b; Pillai and Parakal, 2000).

## PORTWISE EXPORT OF SHARK PRODUCTS

India occupies second place in the export of shark related products next to Bangladesh. In India shark fishery is active both in the east and west coast. The major ports of India are Calcutta, Chennai, Goa, Kandla, Cochin, Mumbai, Porbander, Trivandrum and Tuticorin. The contribution of these ports to the Indian shark fishery is immense. Almost all Indian ports are exporting sharks and shark products. Chennai port is in the first place in exporting dried shark fins. From 1995-99 it has exported 555.10 tonnes of dried shark fins both of 362 millions to various countries. Mumbai port has exported 298.69 tones of dried shark fins worth of 43.7 millions.

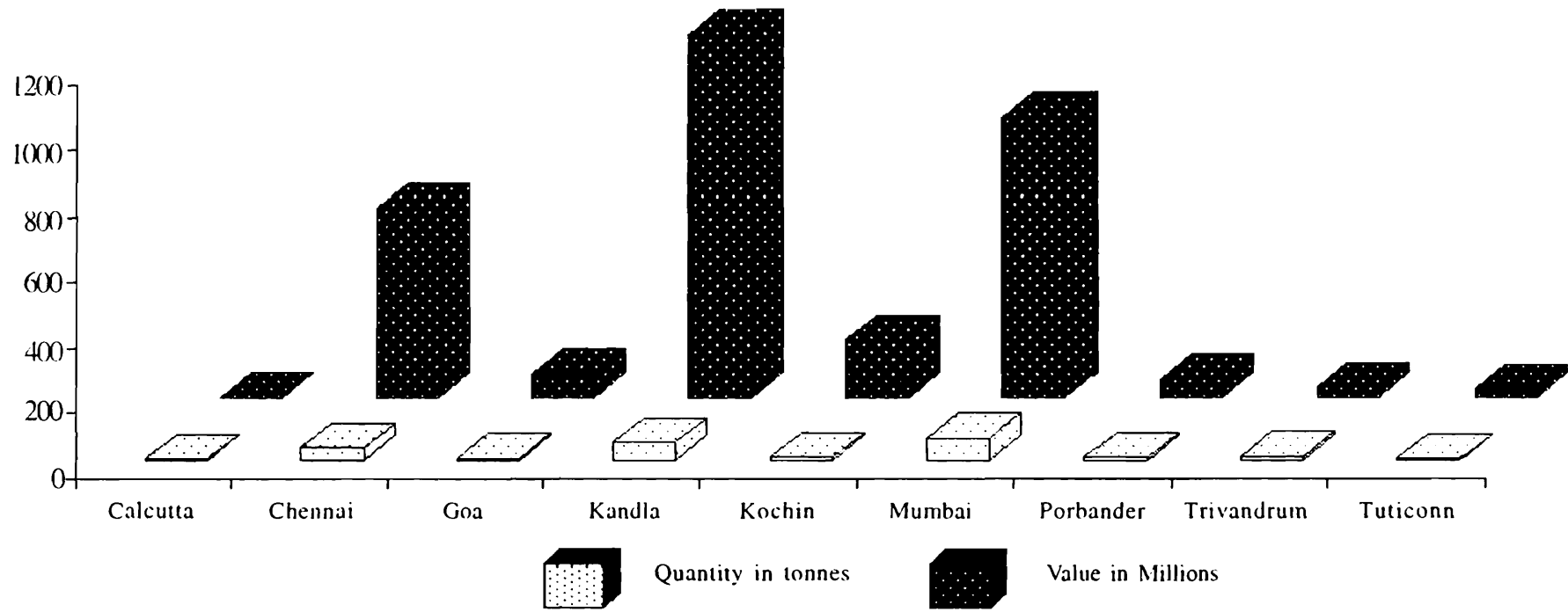
Kandla port of the west coast has exported 1002.75 tonnes of frozen shark meat worth of 39 millions to various countries from 1995-99 and remains first in frozen shark meat export in India. Porbander port has exported 519.86 tones of frozen shark meat worth of 19.1 millions. It exported 43.02 tones of dried sharks worth of 7.13 millions between 1995 and 1999. Mumbai port was in the second place in exporting dried sharks. Its export was 29.26 tones worth of 1.9 millions.

From 1995-1999 Kandla port exported huge quantities of shark bones to various countries. Its export was 30 times worth of 1.3 millions. Trivandrum port was the second one to export huge quantity of shark bones. It exported 22.43 tonnes of shark bones worth of 6.9 millions. Apart from these ports Calcutta, Goa, Cochin and Tuticorin ports have also exported considerable amount of sharks and shark products to various countries (Anon, 1999) (Fig. 80).

## CONSERVATION OF SHARKS

Shark meat is gaining popularity in both domestic and international market. Sharks are being increasingly harvested all along the Indian Coast. In many regions, growing trade in shark products like fins, liver oils, cartilage and skin has played a significant role in increased shark harvests. Such has been the rush in catching sharks, especially during the last five years; over exploitation is now beginning to threaten the very survival of the species (Hanfee, 1996b).

There has been no public outcry to save the sharks, as there has been for whales and



Source : MPLDA, 1999

Fig. 80. Shark products exported from different ports of India and the total value from 1995 - 1999.

dolphins. One problem of course is that unlike whales and dolphins, sharks aren't cute, they don't nurse their young, they don't appear to talk to one another and consequently they are hard to anthropomorphize. More practically, unlike whales and dolphins, which are mammals, sharks don't breathe air, so they don't surface at regular intervals and then are not easy to track and count. The present effort in the conservation of sharks is due to television programmes and the abundance of films documenting not only the glories of sharks but also the dangers to them from longlines, nets and the odious practice of finning- slicing the fins off sharks to sell in Asian markets and then tossing the living animals overboard to die. A dead shark may bring ten or twenty or even fifty dollars to a single fisherman, a live shark can be worth thousands of dollars more as tourist revenue to a community (Benchley, 2000).

## CONSERVATION AND MANAGEMENT MEASURES AROUND THE WORLD

Since the shark products fetched good market world over, their exploitation is indiscriminate. In order to prevent and restrict their extinction, strict fishery policies have been proposed by various countries. These restrictions are implemented with the constitutional powers provided by the concerned authorities. Some of the measures adopted by some countries are detailed below.

**Australia :** Seas around Australia are infested with various species of sharks. Due to the presence of the vast reef belts, the reef-based sharks are predominant. The number of shark attacks is more in Australia than any other country in the world. Australia has had a shark fishery since the turn of the century, and it imposed restrictions on licenses and fishing methods in 1988 (Stevens, 1993). The sand tiger shark, *Charcharias Taurus*, received protected status in the Australian state of New South Whales in 1984 (Pollard, 1996).

**New Zealand :** In New Zealand, shark management started in 1986 consequent concerns of declining catches per unit effort (CPUE).

**South Africa :** In South Africa, the great white shark has been protected since 1991 (Compagno, 1991).

**United States :** In the United States, concerns about a rapidly growing fishery and over fishing led to a fishery management plan for the Atlantic Coast in 1993. Protected status was been given in April 1997 to five species in the United States on the Atlantic Coast: the great white shark, the whale shark, the basking shark, the sand tiger shark and the big eye sand tiger shark. Shark fisheries along the western coast of the United States for thresher sharks have been regulated by state agencies for many years. In 1989, the states of California, Oregon and Washington enacted an inter-jurisdictional fishery-monitoring plan for thresher sharks (Hanan *et al.*, 1993).

**International Commission for Conservation of the Atlantic Tunas :** This commission has taken concern over conservation of sharks and has started monitoring the shark by catch data from member countries.

**Convention of International Trade in Endangered Species of the Fauna and Flora (CITES) :** In 1994 CITES expressed concern over the unmanaged exploitation of the cartilaginous fishes and requested the FAO and other international organizations to collect and assemble the necessary biological and trade data on sharks (Weber and Fordham, 1997).

**International Union for Conservation of Nature (IUCN) :** The IUCN has prepared an action plan for the conservation of sharks.

**World Wild Life Fund (WWF) :** WWF presented a preliminary report on the world trade in sharks.

**United Nations Convention on the Law of the Sea (UNCLOS) :** In August, 1995 the UNCLOS in it's agreement in Article 2, expressed views to ensure the long term conservation and sustainable use of straddling and highly migratory fish stocks. This UN agreement is the most recent statement of management principles and measures and is binding upon the ratifying countries. It will also be used as a frame work in evaluating several existing international regimes and also provide a framework for initiating or improving the conservation of sharks (Weber and Fordham, 1997).

## CONSERVATION AND MANAGEMENT OF FISHERY REGULATIONS IN INDIA

The fishery is a common property and as such is open to all. Anyone can fish for shark at any time using any kind of fishing effort method except poison and dynamite. At present fishery managers are not equipped with any legal powers to manage the shark fishery. The authority to regulate the fishery rests with the government. In accordance with the principles laid down in clause (b) and (c) of Article 39 of the constitution, the states are free to enact laws to regulate fishing along their coasts, e.g. The Tamil Nadu Marine Fishing Regulation Act 1983 confers the powers on an officer of the rank of Assistant Director of fisheries to regulate and restrict, or prohibit, fishing; to issue licences to the owners of the vessel; to suspend and/or cancel such licences on the issue of non-compliance of regulations. Registration of vessels is mandatory under Section 11 of the MPEDA Act 1972.

Although there are no clear restrictions or regulations on shark fishing in India, there are several pieces of legislation relating to it, by virtue of it being a part of our natural environment. The Constitution of India places a duty on the States to direct its policies

to “protect and improve the environment”, which would include fisheries and therefore shark fisheries (Hanfee, 1999).

**Constitution of India 1950, Art. 48-A** : “The State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country”

**Constitution of India 1950, Art. 51-A (g)** : It shall be fundamental duty of every citizen “to protect and improve the natural environment including forests, lakes, rivers and wildlife, and to have compassion for living creatures...”

**The Indian Fisheries Act 1897** : In 1897 the British enacted the Indian Fisheries Act. This Act was broadly based, and legislated to “provide for certain matters relating to fisheries” Section 5 of this act prohibits destruction of fish by poisoning and Section 6 ensures protection of fish in certain areas. Several states have adopted the Act with modifications.

However, it is felt that this Act has little relevance to today’s situation. After Independence, competence to legislate on “Fisheries” was vested with the State under Entry 21 of List II of the Seventh Schedule to the Constitution, while competence to legislate on “fisheries beyond territorial waters” was vested with the Union Parliament under Entry 57 of List 1. The State Legislature has thus exclusive competence over fisheries situated within the territory of its State, including those within its adjoining territorial waters.

However, the Indian Fisheries Act of 1897 continues to be the basis of laws relating to fisheries in India and most States have made this Act applicable to their States or have based their local laws on it. The Act seeks to protect fish by prohibiting certain activities - for instance, Section 4 prohibits the destruction of fish by explosives in inland waters and along coasts and Section 5 prohibits the destruction of fish by poisoning waters. Violations of these provisions of the Act are met with penal action and therefore all dispute settlement powers lay with the criminal courts.

As in other enabling legislation, the power of the Indian Fisheries Act is in the delegated regulations or the rule making. The Act allows for the protection of fish in selected waters by the framing of Rules by the concerned States Governments. These rules may prohibit or regulate specific matters for fixed periods of time, including (i) the erection and use of fixed engines; (ii) the construction of weirs; and (iii) the dimension and kind of nets and modes of using them. It may also provide for the prohibition of all fishing in specified areas for a period not exceeding two years.

In its application to the State of Tamil Nadu, (as framed by the State) the Rules may prohibit or regulate the above subject matters “permanently or for a specified period of

time” This means that certain areas, or activities, could be permanently prohibited. It also expands the rule creating power to cover the dimension and kind of the contrivances to be used for taking fish generally, or any specified kind of fish, and the modes of using such contrivances” This would make the protection of certain fish, including the shark, feasible either by prohibiting the taking of the species or the prohibition of certain methods of fishing (Hanfee, 1999).

**Wild Life Protection Act 1972 :** In 1972, the Wildlife Protection Act was legislated for the protection and conservation of wildlife and their habitat. However, neither the shark nor any other species of fish has been identified for exclusive protection under this Act, though fish habitats have been so protected. This protection has been through the provisions of Chapter IV of the Wildlife Protection Act, which allows for the declaration of such habitat as Marine National parks or Sanctuaries within which entry and activities (including fishing) are prohibited or severely restricted. In India, the following Marine National Parks/Sanctuaries/Marine protected Areas exist under chapter - IV of this Act.

**Table. 2 : Category-I Marine Protected Areas (National Parks and Sanctuaries)**  
(MPAs having entire areas in intertidal/subtidal or sea water-mangroves, coral reefs, lagoons, estuaries, beaches etc.,) (Singh, 2002)

S. No	Name of the MPA (District) State/UT	Declaration	Area (Sq. km)	Ecosystem
1.	Mahathma Gandhi Marine NP, Wandoor (South Andaman) Andaman	1983	281.50	Tropical evergreen forest, mangroves, Coral reefs, creeks and seawater.
2.	Rani Jhansi Marine NP (Richies Archipelago) Andaman	1996	256.14	Evergreen forest, mangroves and Coral reefs.
3.	Lahabarrack (Salt water crocodile) Sanctuary (South Andaman) Andaman	1987	100.00	Dense mangroves (tidal forest), littoral forest, creeks, marine water and tropical evergreen forest.
4.	Gulf of Kachchh Marine (Jamnagar) Gujarat	1982	162.89	Mangroves, coral reefs, NP mudflats, creeks, beaches and scrub forest.
5.	Marine Sanctuary Gulf of Kutchchh (Jamnagar) Gujarat	1980	295.03	Mangroves, intertidal mudflats, beaches and coral reefs.
6.	Malvan Marine Sanctuary (Sindhudurg) Maharashtra	1987	29.12	Inter tidal area, marine water, coral patches and sandy beach.
7.	Bhitar Kanika NP (Cuttak) Orissa	1988	145.00	Estuary, delta and mangroves.
8.	Bhitar Kanika Sanctuary (Kendrapara) Orissa	1975	672.00	Estuary, mangroves, terrestrial forest and ecotone with marine environment.
9.	Gahirmatha Marine Sanctuary (Kendrapara) Orissa	1997	1,435.00	Sea water, sandy beach, estuary mangroves and ecotone with marine environment.
10.	Chilka (Nalabund) WLS (Khundra, Puri, Ganjam) Orissa	1987	15.50	Island, Iagoon and brackish water.

S. No	Name of the MPA (District) State/UT	Declaration	Area (Sq. km)	Ecosystem
11.	Gulf of Mannar NP (Ramanathapuram/ Tuticorin) Tamil Nadu	1980	6.23	21 islands, coral reefs, mangroves, sea grass beds and beaches.
12.	Pulicat Lake (Bird) Sanctuary Tiruvellore, Tamil Nadu	1980	153.67	Lake of brakish water of rain and seawater, mangrove and estuarine environment.
13.	Point Calimere Sanctuary (Nagapattinam) Tamil Nadu	1967	17.26	Tidal swamp, mangroves, creek and evergreen forests.
14.	Coringa Wildlife Sanctuary (East Godavary) Andhra Pradesh	1978	235.70	Mangroves, estuary, back water, creek and mud flats.
15.	Krishna Wildlife Sanctuary (Krishna/Guntur) Andhra Pradesh	1999	194.81	Mangroves, back water, creeks and mud flats.
16.	Pulicat Lake Bird Sanctuary (Nellore) Andhra Pradesh	1976	500.00	Brackish water of rain and seawater, mangroves, estuarine and algal beds.
17.	Sundarbans National Park- Tiger Reserve (North & South 24-Pargana) West Bengal	1973/1984	1,330.10	Mangroves, estuarine, creeks, swampy islands and mud flats.
18.	Halliday Sanctuary (South 24-Pargana) West Bengal	1976	5.95	Mangroves, estuaries, swampy islands and mudflats.
19.	Lothian Island Sanctuary (South 24-Pargana) West Bengal	1998	38.00	Mangroves, estuaries, creeks, swampy islands and mudflats.
20.	Sajnakhali Sanctuary (South 24-Pargana) West Bengal	1976	362.4	Mangroves, estuaries, creeks, swampy islands and mudflats.

**Category II : Marine Protected Areas**

(Islands MPAs in Andaman and Nicobar and Lakshadweep Islands, which have major parts in marine ecosystem and some part in terrestrial ecosystem)

S. No	Name of the MPA (District) State/UT	Year of Declaration	Area (Sq. km)	Ecosystem
1.	North Buttan NP (Middle Andaman) Andaman	1987	0.44	Evergreen forest, littoral forest, mangroves, beach and coral reefs.
2.	South Buttan NP (Middle Andaman) Andaman	1987	0.03	Evergreen forest, littoral forest, mangroves and beach.
3.	North Reef Island Sanctuary (North Andaman) Andaman	1987	3.48	Evergreen forest, littoral forest, mangroves and beach.
4.	South Reef Island Sanctuary (Middle Andaman) Andaman	1987	1.17	Beach and Coral reefs.
5.	Cuthbert Bay Sanctuary (Middle Andaman) Andaman	1987	5.82	Splendid beach and creek.
6.	Cingue Sanctuary (South Andaman) Andaman	1987	9.51	Evergreen forest, coral reef and beach.
7.	Galathea Bay Sanctuary Great Nicobar	1997	11.44	Evergreen forest and mangroves.
8.	Parkinson Island Sanctuary Middle Andaman	1987	0.34	Evergreen and littoral forest and mangroves.
9.	Mangrove Island Sanctuary Middle Andaman	1987	0.39	Mangroves and marine life
10.	Blister Island Sanctuary North Andaman	1987	0.26	Mangroves and beach.

S. No	Name of the MPA (District) State/UT	Year of Declaration	Area (Sq. km)	Ecosystem
11.	Sandy Island Sanctuary South Andaman	1987	1.58	Sandy islands.
12.	Pitti wildlife Sanctuary Lakshadweep	2000	0.01	A small sandy island surrounded by sea.

Table-3 : Biosphere Reserves in Marine Areas

Name	State	Year of notification	Area (Sq. km)
Sundarbans	West Bengal	1989	9630
Gulf of Mannar	Tamil Nadu	1989	10500
Great Nicobar	Andaman and Nicobar	1989	885

In exercise of the powers conferred by sub section (1) of section 61 of the Wild Life Protection Act, 1972 (53 of 1072), the Central Government included the sharks- *Carcharhinus hemiodon*, *Glyphius gangeticus*, *Glyphius glyphius*, Saw fishes- *Anoxypristis cuspidate*, *Pristis microdon*, *Pristis zijsch*, Guitar fish - *Rhyncobatus djiddensis* and Ray *Urogymnus asperrimus* in Schedule I of the said Act from 5.12.2001.

**Maritime Zones of India Act, 1981 :** In exercise of the powers conferred by the section 25 of this act, the Central Government made some rules. The relevant rule is given below:

Rule 5.1h (i) and (ii)

i) The crew of the vessel shall fish only for the stocks described in the licence.

ii) The crew of the vessel shall not catch any fish by species, size or age set out in the licence as prohibited catches, that are covered under the Wild Life (Protection) Act, 1972 (53 of 1972) and where such fish are caught they shall be retained and preserved on board the vessel, accounted for in Form C and shall be surrendered at such places as may be directed by the authorized officer.

**Marine Fishing Act (1981) :** The main management measure adopted in this Act is that the restriction of trawling during monsoon period may be beneficial to juvenile sharks landed by trawlers. However, the banning of the fishing by mechanized trawlers during the Southwest monsoon period has only limited application to shark fishery, as *Scoliodon* are taken as by catch in the trawl fishery. There is no regulation, prohibiting catch of immature sharks of minimum sized sharks in the dol nets and trawls.

**The Deep Sea Fishing Policy :** This was constituted by “The Murari Committee” in 1984, headed by Mr. P. Murari, former Secretary to the Government of India. Unfortunately with respect to which no action has been taken up by the Government. Some of the recommendations of this committee are given below:

- Government should setup a fishery authority of India bringing all types of marine fisheries under its umbrella to formulate policy for the industry as well as to ensure its implementation.
- All deep-sea regulations should be enacted by the parliament after consulting the fishing community to avoid conflicts among fishermen.
- Up gradation of the technical skill of the fishermen and equipments should be done and fuel subsidy should be given to the fishermen.
- Government should provide infrastructure facilities like cold storage, ice factories and fish processing facilities to prevent wastage of fishery resources.
- The Coast Guard has to be strengthened, expanded and upgraded technically with adequate navigational and surveillance equipment and weaponry to prevent poaching by foreign vessels.

This committee further recommended certain restrictions to deep-sea fishing. They are as follows :

- No renewal of licenses should be issued in future to joint ventures, leased or test fishing vessels;
- Foreign vessels which are more than 20 meters in size, should not be permitted to exploit areas where fishermen in traditional crafts or small mechanized vessels ply their trade.

The fleet size for different fishing grounds may be fixed taking into account the maximum sustainable yield and the need for conservation of resources.

**Wild Life Protection Act, 1986 :** Under this act, the Central Government issued a notification in 1991 declaring coastal stretches as Coastal Regulation Zone (CRZ) and regulating activities in the CRZ. In the CRZ there are restrictions on the setting up and expansion of industry, operation or processes.

**The Environment (Protection) Act 1986 :** Makes it obligatory for the Government to take necessary steps for the protection of the environment. Under this Act, the Central Government issued a notification in February 1991 declaring coastal stretches up to 500m from the High Tide Line as Coastal Regulation Zones (CRZ) and regulating industrial and other activities in the CRZ. However, the thrust of this law is protection of the land and not the seas and therefore it does not directly affect shark fisheries.

### **Enforcement problems**

Mortality of undersized individuals is a major problem in almost all the fisheries that target large-sized species. Hence, to increase the age at first capture, mesh size regulation

is one of the important modalities. This may be possible to some extent, for gillnet fisheries where the mesh size can be regulated by fixing different mesh sizes of gillnets for different fishing areas, e.g. the sardine gillnets which use small mesh may be used only in shallow waters; gillnets with slightly bigger meshes may only be used in deeper waters, and those with the largest mesh sizes may only be used in oceanic waters. But trawls cannot be regulated in this manner and it is this gear that lands most of the juveniles of the bigger fishes such as sharks and this is a serious problem. Second, fishing during off-season is banned along the west coast. Other regulations, such as mesh size and area clauses for different fishing sectors, cannot be enforced due to a lack of marine patrolling capacity.

### (1) Surveillance

Since there are no regulations to enforce there is no surveillance of shark fisheries in India. In general, surveillance of fishing vessels is not done by the authorities but a maximum fine by the State Government of Rs. 1000 is provided in the regulation Act for vessels with a fish catch of value exceeding Rs. 5000 (Hanfee, 1999).

### (2) The legal process

There is no legal basis for the enforcement of fishing regulations with regard to the shark fishery, but fisheries departments are responsible for enforcement of fishing regulations in general. So far, the disputes, which arise, are mostly due to operational losses by fishermen (e.g. lost stationary gear because of trawlers) and are solved through arbitration in meetings convened by the Regional Assistant Director of Fisheries with the participation of the Head of Fisheries Societies and Associations. This results mostly in monetary fines. The adjudication officer above the rank of Assistant Director of Fisheries determines culpability and is deemed to have the power of a civil court. The officer has power to enter, search, seize and fine any vessel for non-compliance of the regulation.

## CONCLUSION AND RECOMMENDATIONS

It is true that the elasmobranch fishery in India has increased over the years the steady decrease in the length of the sharks at the same time is a clear indication that over-exploitation is beginning to leave a telling effect. Also, as trade in shark products is fast multiplying and the populations are attracting major concerns; it is a matter of urgency and utmost importance that efforts be made to regulate the harvests without upsetting the marine environmental balance. Moreover, collapse of the elasmobranch fisheries in neighbouring Pakistan in 1983 (Bonfil 1994) is a pointer to the need for future catch reductions in the Indian elasmobranch fisheries.

A critical analysis and evaluation of the results of frequent exploratory surveys would provide a clear picture of the productive areas, seasons and species composition of sharks in the Indian waters.

In general, sharks grow slowly, mature late, have small numbers of young and live for long years. As a result, there is a direct relationship between stock size and recruitment, with population replacement rates being very low. All these factors indicate that shark stocks are vulnerable to over fishing. These factors also establish that shark stocks once over fished, takes years, even decades, to recover. Hence, Indian shark fishery requires careful monitoring, stern fishery policies, restrictions and species management.

Though the shark fin trade brings more and more foreign exchange to India, it is essential to regulate and monitor the issue of licenses for the fishing vessels. Restrictions and various acts prevent and control the exclusive shark fishing to certain extent, but small sized sharks which come as a by catch in the trawlers do not get the attention of the conservationists. Such, frequent by catches may slowly decrease the population of the sharks as they take long time to mature. So, if no management measures are taken, the depletion in the shark population may result in an imbalance of marine ecosystem, as the sharks are the top predators assigned with the duty to maintain the ecological balance. The following recommendations may be thought of avoid the emerging crisis,

- Information on size, shark stock, their basic biology and distribution has to be made available.
- By catch level of sharks has to be monitored and assed periodically.
- Fishery authorities should undertake Exclusive exploratory surveys to ascertain the real stock status in Indian waters.
- Extensive study should be undertaken at the fish landing centers to determine the exact catch composition.
- Protection of sharks should begin with education and awareness.
- Apart from promoting shark products export, the concerned authorities should also involve in the conservation.
- Commercial fishing boats should be encouraged to maintain a log book to report the catch of sharks.
- Awareness should be given to the public through colourful illustrations, books, pamphlets and information brochures.
- The existing fishery laws, amendments and regulations have to be strictly enforced and revised whenever a need arises.

### ACKNOWLEDGEMENTS

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**ANNEXURE : 1**  
**A Check List of Sharks in the Indian Waters**  
 (Based on the available literature)

Shark species	Common Name	Habitat
Class CHONDRICHTHYES		
Order HEXANCHIFORMES		
Family HEXANCHIDAE		
1. <i>Heptranchias perlo</i> Bonnaterre, 1788	Sharptnose sevengill shark	O, DW
Order SQUALIFORMES		
Family ECHINORHINIDAE		
2. <i>Echinorhinus brucus</i> (Bonnaterre, 1788) *	Bramble shark	C,O, DW
Family SQUALIDAE		
3. <i>Centroscyllium ornatum</i> (Alcock, 1889)	Ornate dogfish	DW
4. <i>Centrophorus granulosus</i> (Bloch and Schneider, 1801)	Gulper shark	DW
5. <i>Centrophorus moluccensis</i> Bleeker, 1860	Arrow spine dogfish	DW
6. <i>Centrophorus uyato</i> (Rafinesque, 1810)	Little Gulper shark	DW
7. <i>Centroscymus crepidator</i> Bocage and Capello, 1864	Longnose velvet dogfish	O, DW
8. <i>Squalus mitsukurri</i> Jordan and Snyder, 1903	Short spine spur dog	O, P
9. <i>Squalus blainvillei</i> (Risso, 1826)	Big eye dogfish	DW
Order ORECTOLOBIFORMES		
Family HEMISCYLLIIDAE		
10. <i>Chiloscyllium plagiosum</i> (Bennett, 1830)	White spotted bamboo shark	BD

Shark species	Common Name	Habitat
11. <i>Chiloscyllium griseum</i> Muller and Henle, 1838 *	Black banded cat shark	BD
12. <i>Chiloscyllium indicum</i> (Gmelin, 1789) *	Indian cat shark	BD
13. <i>Chiloscyllium punctatum</i> Muller and Henle, 1838	Brown banded bamboo shark	BD
Family STEGOSTOMATIDAE		
14. <i>Stegostoma fasciatum</i> (Hermann, 1783) *	Zebra shark	C, P
Family GINGLYMOSTOMATIDAE		
15. <i>Nebrius ferrugineus</i> (Lesson, 1830)	Giant sleepy shark	BD
Family RHINIODONTIDAE		
16. <i>Rhiniodon typus</i> Smith, 1828 *	Whale shark	C, O, P
Order LAMNIFORMES		
Family ODONTASPIDIDAE		
17. <i>Eugomphodus taurus</i> (Rafinesque, 1810)	Blue nurse sand tiger	P
18. <i>Eugomphodus tricuspidatus</i> (Day, 1878)	Indian sandtiger	P
Family PSEUDOCARCHARIDAE		
19. <i>Pseudocarcharias kamoharai</i> (Matsubara, 1936)	Crocodile shark	O, P
Family ALOPIIDAE		
20. <i>Alopias superciliosus</i> (Lowe, 1839)	Bigeye thresher shark	O, DW
21. <i>Alopias pelagicus</i> Nakamura, 1935	Pelagic thresher shark	O, P
22. <i>Alopias vulpinus</i> (Bonnaterre, 1788)	Thresher shark	C, O, P
Family LAMNIDAE		
23. <i>Carcharodon carcharias</i> (Linnaeus, 1758) *	Great White shark	C, O, P

Shark species	Common Name	Habitat
24. <i>Isurus oxyrinchus</i> Rafinesque, 1809 *	Shartfin mako	C, O, P
Order CARCHARHINIFORMES		
Family SCYLORHINIDAE		
25. <i>Apisturus investigatoris</i> (Misra, 1962)	Broadnose catshark	DW
26. <i>Cephaloscyllium silasi</i> (Talwar, 1974)	Indian swellshark	BD
27. <i>Scyliorhinus capensis</i> (Smith, 1838)	Yellowspotted catshark	P, C
28. <i>Atelomycterus marmoratus</i> (Bennett, 1830)	Marbled catfish	O, BD
29. <i>Halaelurus hispidus</i> (Alcock, 1891)	Bristly catshark	O, BD
30. <i>Halaelurus quagga</i> (Alcock, 1899)	Quagga catshark	C, BD
Family PROSCYLLIDAE		
31. <i>Eridacnis radcliffei</i> Smith, 1913 *	Pygmy ribbontail catshark	O, BD
Family TRIAKIDAE		
32. <i>Iago omanensis</i> (Norman, 1939) *	Bigeye hound shark	O, DW
33. <i>Mustelus mosis</i> Hemprich & Ehrenberg, 1899	Gummy smooth hound	O, DW
Family HEMIGALEIDAE		
34. <i>Hemipristis elongatus</i> (Klunzinger, 1871) *	Fossil shark	C, O, P
35. <i>Hemigaleus microstoma</i> Bleeker, 1852	Sicklefin Weasel shark	C, P
36. <i>Chaenogaleus macrostoma</i> (Bleeker, 1852)	Balfour's shark	C, P
Family CARCHARHINIDAE		
37. <i>Carcharhinus albimarginatus</i> Ruppell, 1837 *	Silver tip shark	C, P
38. <i>Carcharhinus altimus</i> (Springer, 1950) *	Bignose shark	O, P

Shark species	Common Name	Habitat
39. <i>Carcharhinus amblyrhynchoides</i> (Whitley, 1934) *	Graceful shark	C, P
40. <i>Carcharhinus amblyrhynchos</i> (Bleeker, 1856) *	Grey reef shark	C, P
41. <i>Carcharhinus amboinensis</i> (Muller & Henle, 1839) *	Pigeye shark	C, O, P
42. <i>Carcharhinus falciformis</i> (Bibron, 1839)	Silky shark	C, O, P
43. <i>Carcharhinus leucas</i> (Valenciennes, 1839) *	Bull shark	C, P
44. <i>Carcharhinus melonopterus</i> (Quoy & Gaimard, 1824) *	Blackfin reef shark	C, P
45. <i>Carcharhinus sealei</i> (Pietschmann, 1916) *	Blackspot shark	C, P
46. <i>Carcharhinus brevipinna</i> (Muller and Henle, 1839) *	Spinner shark	C, O, P
47. <i>Carcharhinus dussumieri</i> (Valenciennes, 1839) *	White-cheeked shark	C, O, P
48. <i>Carcharhinus hemiodon</i> (Valenciennes, 1839) *	Long-nosed shark	C, P
49. <i>Carcharhinus limbatus</i> (Valenciennes, 1841) *	Blacktip shark	C, O, P
50. <i>Carcharhinus longimanus</i> (Poey, 1861)	Oceanic whitetip shark	O, P
51. <i>Carcharhinus macloti</i> (Muller and Henle, 1839) *	Maclot's shark	C, P
52. <i>Carcharhinus sorrah</i> (Valenciennes, 1839) *	Sorrah shark	C, P
53. <i>Carcharhinus brachyurus</i> (Gunther, 1870)	Copper shark	P, C
54. <i>Carcharhinus cautus</i> (Whitley, 1945)	Nervous shark	P, O
55. <i>Carcharhinus obscurus</i> (Le Sueur, 1822)	Dusky shark	C, P
56. <i>Carcharhinus plumbeus</i> (Nardo, 1827)	Sandbar shark	C, P
57. <i>Carcharhinus wheeleri</i> Garrick, 1982	Blacktail reef shark	C, P
58. <i>Galeocerdo cuvier</i> (Peron and Le Sueur, 1822) *	Tiger shark	C, P
59. <i>Lamiopsis temminckii</i> (Muller and Henle, 1839) *	Fawn shark	C, P

Shark species	Common Name	Habitat
60. <i>Loxodon macrorhinus</i> Muller and Henle, 1839 *	Sliteye shark	C, O, P
61. <i>Negaprion acutidens</i> (Ruppell, 1837)	Indian lemon shark	C, O, P
62. <i>Rhizoprionodon acutus</i> (Ruppell, 1837) *	Milk dog shark	C, P
63. <i>Rhizoprionodon oligolinx</i> Springer, 1964 *	Grey dog shark	C, P
64. <i>Scoliodon laticaudus</i> (Muller and Henle, 1839) *	Indian dog shark	C, P
65. <i>Triaenodon obesus</i> (Ruppell, 1837) *	Whitetip reef shark	C, P
66. <i>Glyphis gangeticus</i> (Muller & Henle, 1839)	Ganges shark	C, P
67. <i>Glyphis glyphis</i> (Muller and Henle, 1839)	Speartooth shark	C, P
68. <i>Prionace glauca</i> (Linnaeus, 1758)	Blue shark	O, P
Family SPHYRNIDAE		
69. <i>Sphyrna lewini</i> (Griffith and Smith, 1834) *	Scalloped hammerhead	C, O, P
70. <i>Sphyrna mokarran</i> (Ruppell, 1837) *	Great hammerhead	C, O, P
71. <i>Sphyrna zygaena</i> (Linnaeus, 1758) *	Round headed hammerhead	C, P
72. <i>Eusphyra blochii</i> (Cuvier 1817) *	Winghead shark	C, P

\* Economically Important

C- Coastal O- Oceanic DW- Deep Water P- Pelagic BD- Bottom Dwelling