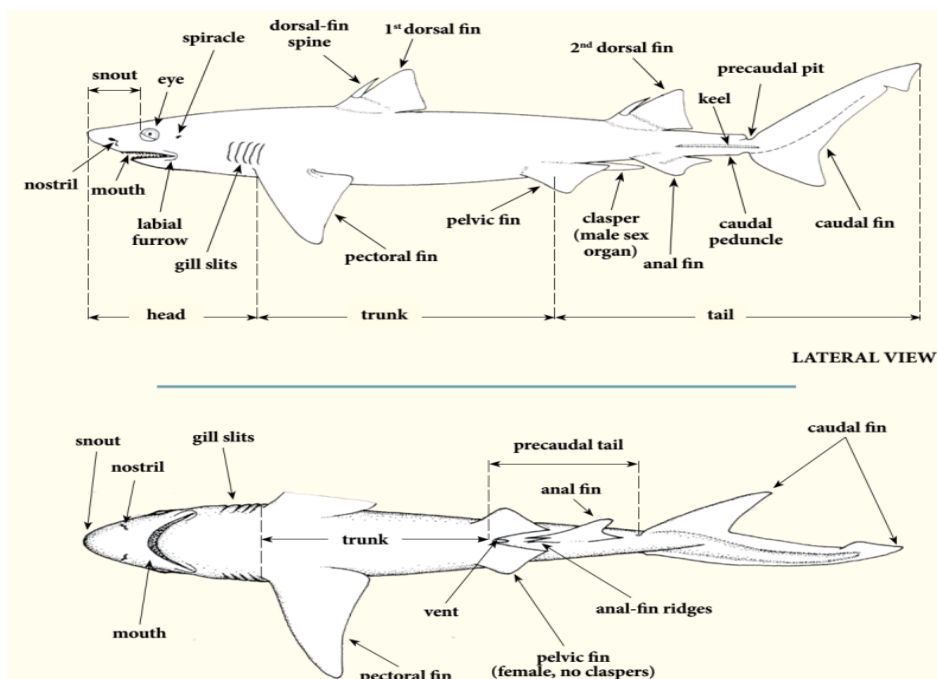


Livi Wilson, T.M. Najmudeen and P.U. Zacharia

*Demersal Fisheries Division
ICAR -Central Marine Fisheries Research Institute, Kochi*

The elasmobranchs are an important group of demersal fishes which are represented by sharks, skates and rays. India is the world's second biggest shark fishing nation next to Indonesia. They belong to the Class Elasmobranchii under the Phylum Chordata. Sharks are caught with various gears like drift gillnets, longlines, hooks and line units and are landed throughout the year. They feed on bony fishes, other sharks, rays, crustaceans and squids.

Shark Morphology

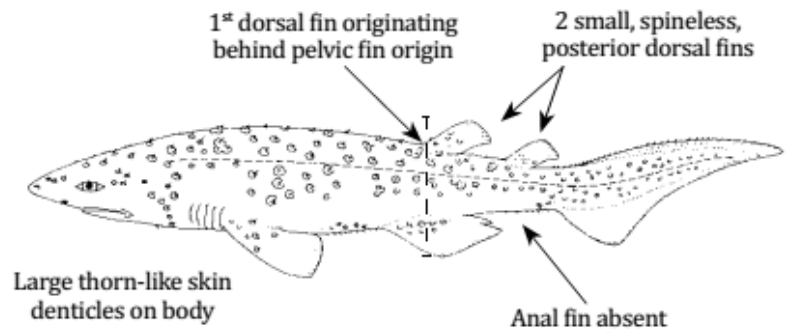


(Source: Ebert, D.A. and Mostarda, E. 2013)

KEY TO SHARK ORDERS AND FAMILIES

1. Order Echinorhiniformes

- gill slits five pairs
 - 2 dorsal fins (without spines)
 - no anal fin
- a. **Family Echinorhinidae:** Bramble sharks

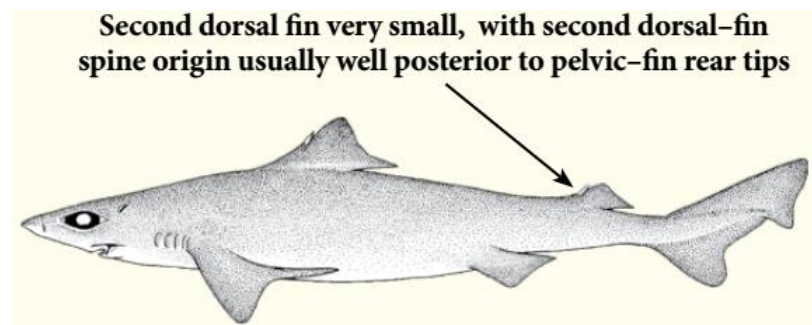


Echinorhinus brucus (Bonnaterre, 1788)

2. Order Squaliformes

- gill slits five pairs
 - no anal fin
 - 2 dorsal fins
 - presence of dorsal fin spines
- a. **Family Centrophoridae : Gulper sharks**
- i. ***Centrophorus moluccensis*** Bleeker, 1860
(Smallfin gulper shark)

- two dorsal fins with large spines
- presence of blade like unicuspidate teeth with lowers much larger than uppers
- wide-spaced, cuspidate lateral denticles
- pectoral fins having rear tips narrowly angular and significantly elongated



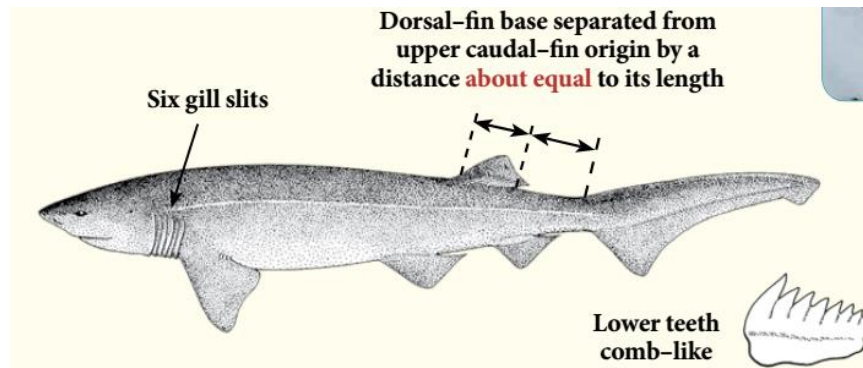
3. Order Hexanchiformes

- presence of 6 or 7 pairs of gill slits
- presence of anal fin
- 1 dorsal fin present

a. **Family Hexanchidae: Cow sharks**

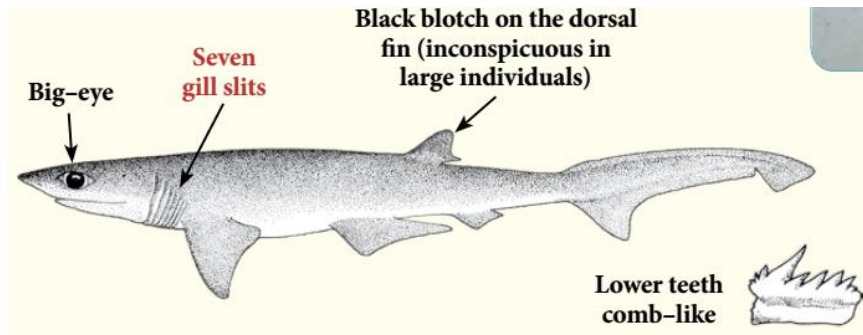
i. ***Hexanchus griseus*** (Bonnaterre, 1788)
(Bluntnose sixgill shark)

- presence of six pairs of gill slits
- bluntly rounded snout
- small eyes
- fluorescent green on fresh condition
- single small dorsal fin; its base separated from upper caudal fin origin by distance almost equal to its length.



ii. ***Heptranchias perlo*** (Bonnaterre, 1788)
(Sharpnose seven gill shark)

- presence of seven large pairs of gill slits
- snout sharply pointed
- large eyes
- fluorescent green colour on fresh condition
- single dorsal fin set back after pelvic fins
- faded dark blotch on dorsal fin, more noticeable in juveniles, may also have black blotch on upper caudal lobe.



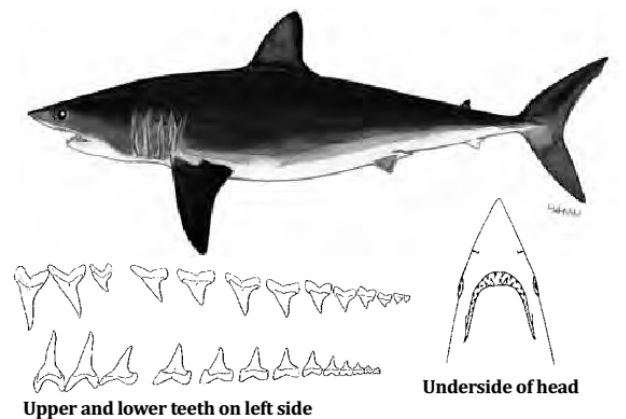
4. **Order Lamniformes**

- presence of 5 pairs of gill slits
- anal fin present
- 2 dorsal fins
- mouth after front of eyes
- absence of nictitating eyelids

a. **Family Lamnidae: Mackerel sharks**

i. ***Isurus oxyrinchus*** Rafinesque, 1810

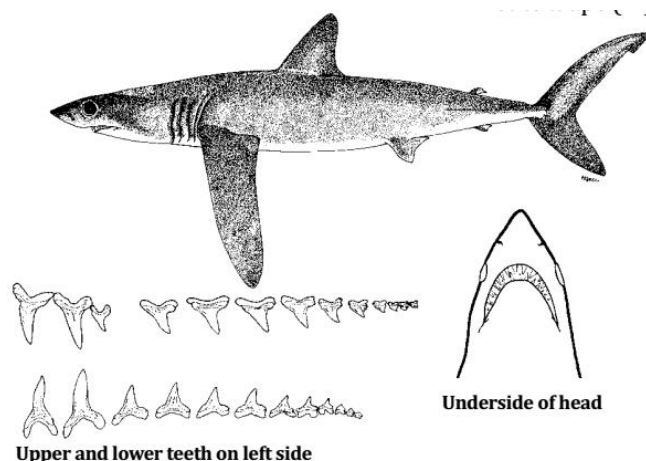
- acutely pointed snout
- pectoral fins shorter than head
- cusps of upper and lower anterior teeth arched having reversed tips



Size: To 400 cm, common 150 cm (TL)

ii. *Isurus paucus* Guitart Manday, 1966

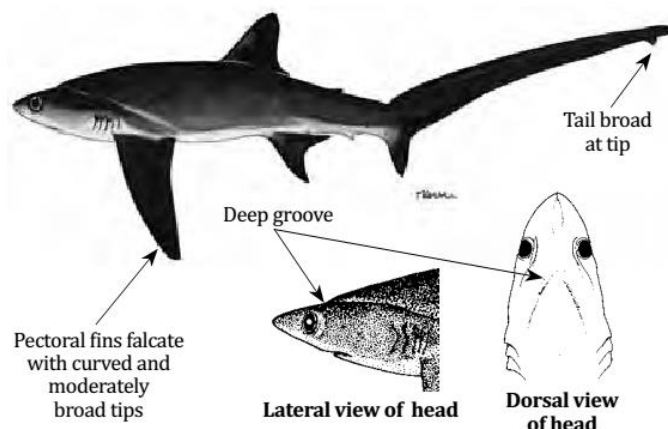
- narrowly to bluntly pointed snout
- pectoral fins about as long as head or longer
- cusps of upper and lower anterior teeth straight, having tips not reversed



b. Family Alopiidae: Thresher sharks

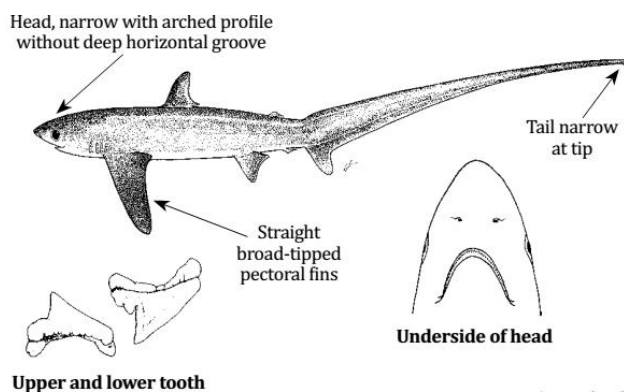
i. *Alopias superciliosus* Lowe, 1841

- short snout having exceptionally large eyes outspreading onto dorsal surface of head
- intense horizontal lateral grooves directly above gills on head
- skin just above pectoral and pelvic fins origin dark in color with no white patches



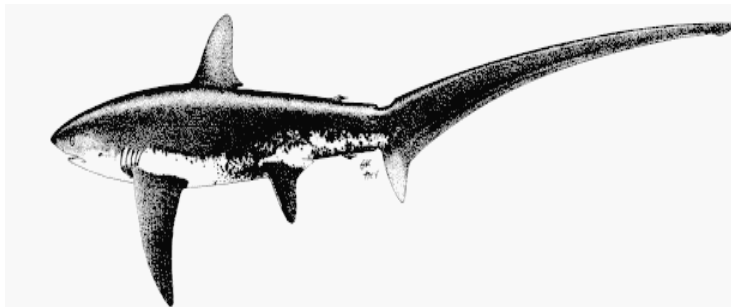
ii. *Alopias pelagicus* Nakamura, 1935

- short snout with moderately large eyes
- absence of labial furrows
- first dorsal origin closer to pectoral fin rear tip than pelvic fin base
- pectoral fins narrow, straight and long
- upper caudal lobe almost as long as rest of body
- skin just above pectoral and pelvic fins origin dark in color with no white patches.



iii. ***Alopias vulpinus*** (Bonnaterre, 1788)

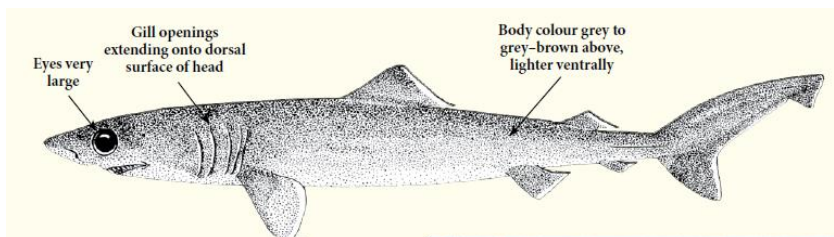
- snout short and pointed with small eyes
- arched mouth having labial furrows
- first dorsal fin almost midway between pectoral and pelvic fins having free rear tip over pelvic fins origin
- pectoral fins softly curved
- upper caudal lobe almost as long as rest of body
- presence of white spots occasionally on pectoral fin tips
- skin just above pectoral and pelvic fins origin dark in color having white patches



Family Pseudocarchariidae: Crocodile sharks

i. ***Pseudocarcharias kamoharai*** (Matsubara, 1936)

- small shark having big eyes
- nictitating eyelids absent
- gill slits long
- slender, spindle-shaped body
- long-cusped, prominent teeth with greatly protrusible jaws
- two small, dorsal fins without spines and an anal fin
- presence of fragile keels and precaudal pits



5. Order Orectolobiformes

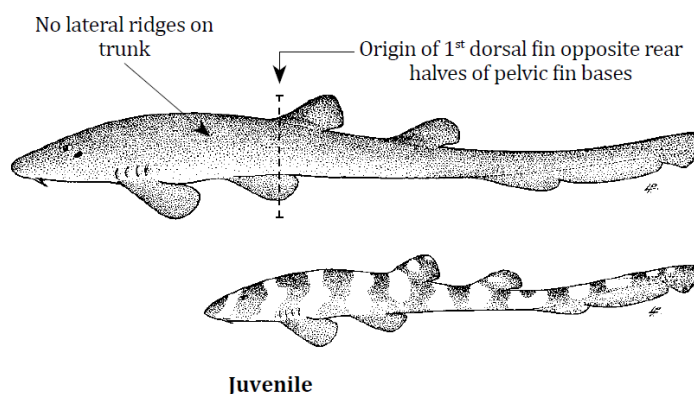
- presence of five gill slits
- 2 dorsal fins and anal fin
- mouth well before eyes

a. **Family Hemiscylliidae: Longtailed Carpetsharks**

i. ***Chiloscyllium griseum*** Müller & Henle, 1838

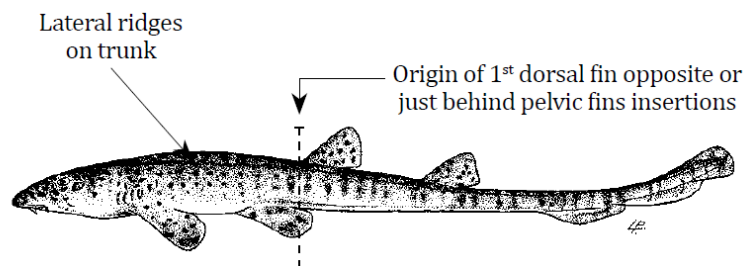
(Grey Bamboo shark)

- rounded snout with small transverse mouth
- barbels present well before eyes
- body ridges absent
- juveniles with conspicuous dark saddle marks and transverse bands



ii. ***Chiloscyllium indicum*** (Gmelin, 1789)

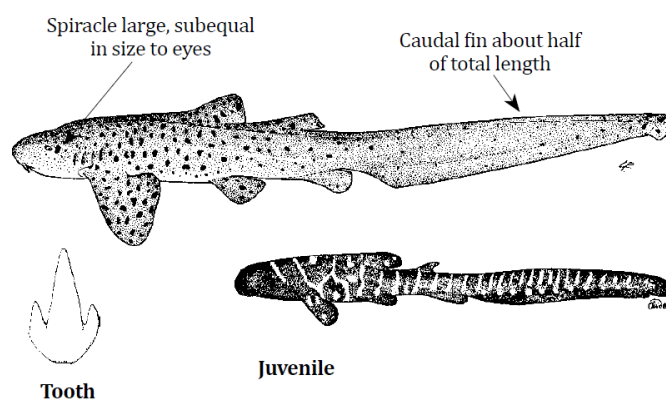
- very slender body and tail
- presence of lateral ridges on trunk
- several dark brown or blackish spots, dashes and bars on light brown background present in juveniles and adults



b. **Family Stegostomatidae : Zebra sharks**

i. ***Stegostoma fasciatum*** (Hermann, 1783)

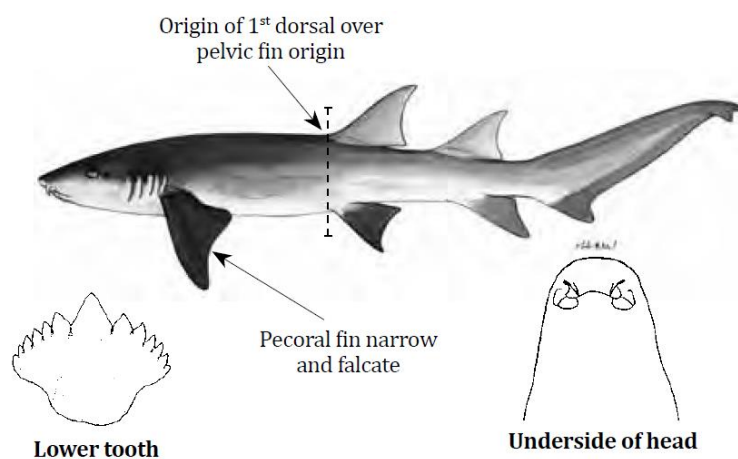
- moderately firm body with conspicuous ridges on dorsal surface and sides
- small transverse mouth before eyes
- small barbules present
- caudal fin lower lobe hardly developed
- lateral keels absent
- caudal fin about half of total length



c. **Family Ginglymostomatidae- Nurse sharks**

i. ***Nebrius ferrugineus*** (Lesson, 1831)

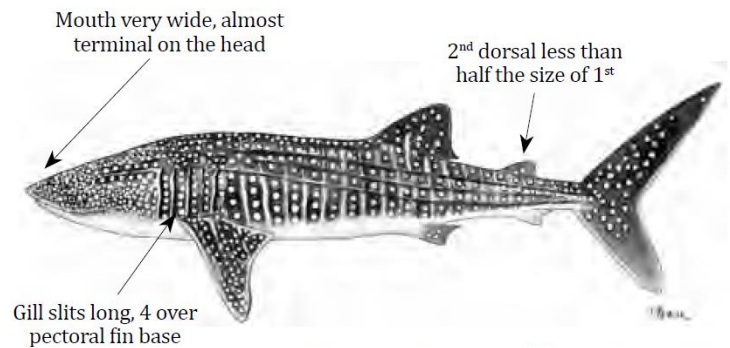
- presence of long barbels
- mouth before laterally positioned eyes
- minute spiracles present
- 1st dorsal fin larger than 2nd dorsal and anal fins
- pectoral, dorsal and anal fins apically angular
- absence of circumnarial grooves and body lateral ridges.



d. Family Rhincodontidae: Whale shark

i. *Rhincodon typus* Smith, 1828

- very wide and compressed head
- minute teeth present
- caudal peduncle depressed with a strong keel on both side
- upper precaudal pit exist
- presence of white or yellow spots and transverse stripes

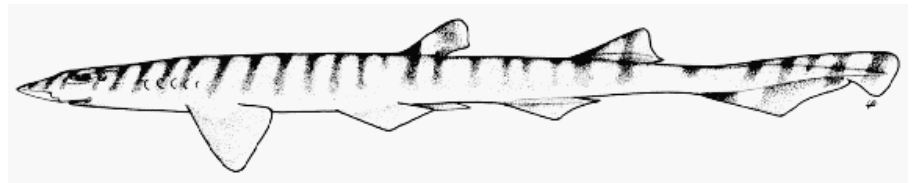


6. Order Carcharhiniformes

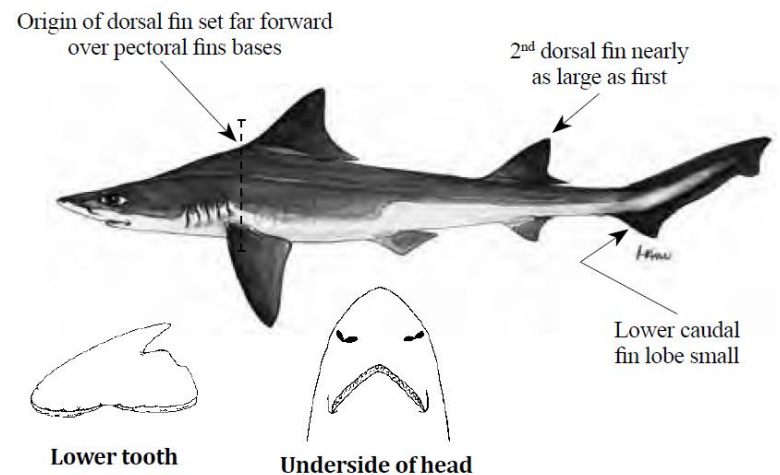
- presence of 5 pairs of gill slits
- anal fin present
- 2 dorsal fins
- mouth behind front of eyes
- nictitating eyelids exist

a. Family Scyliorhinidae: Catsharks

i. *Halaelurus quagga* (Alcock, 1899) (Quagga Catshark)



- pointed snout
- eyes raised above head
- mouth moderately large having small labial furrows
- about twenty narrow, dark vertical bars on body making saddles near dorsal fins
- gills on upper surface of head above level of mouth
- first dorsal fin origin over pelvic fin insertions



b. Family Triakidae: Houndsharks

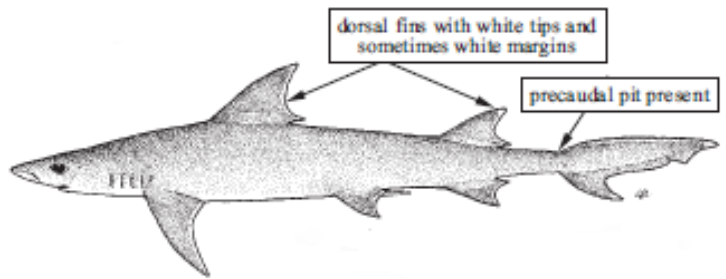
i. *Iago omanensis* (Norman, 1939) (Bigeye Houndshark)

- short snout and slender body
- big eyes on lateral side
- large gill slits and small blade-like teeth present

c. Family Hemigaleidae: Weasel sharks

**i. *Hemigaleus microstoma* Bleeker, 1852
(Sickelfin Weasel Shark)**

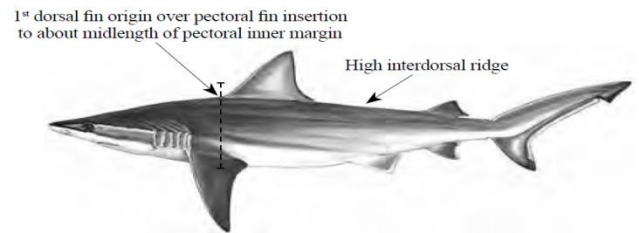
- long and rounded snout
- mouth curved and short, teeth covered once closed
- short gill slits
- dorsal fins, pelvic fins and lower caudal lobe deeply curved
- side of body often with white spots



d. Family Carcharhinidae: Requiem sharks

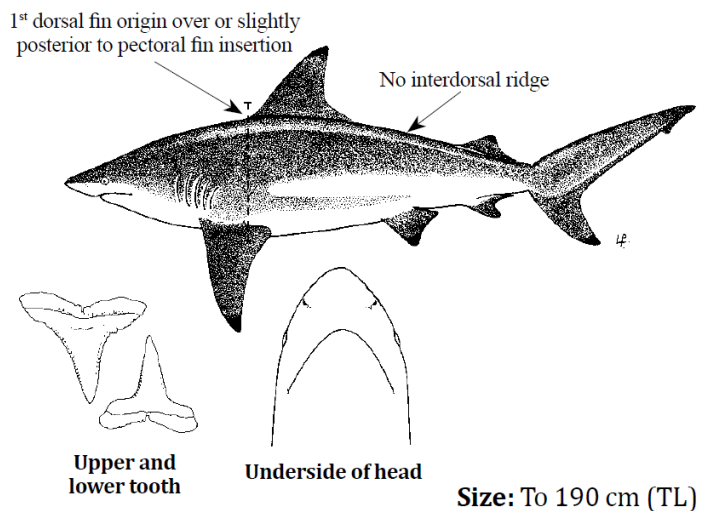
**i. *Carcharhinus altimus* (Springer, 1950)
(Bignose shark)**

- bluntly pointed to rounded snout
- nasal flaps long
- nearly straight pectoral fins
- high interdorsal ridge



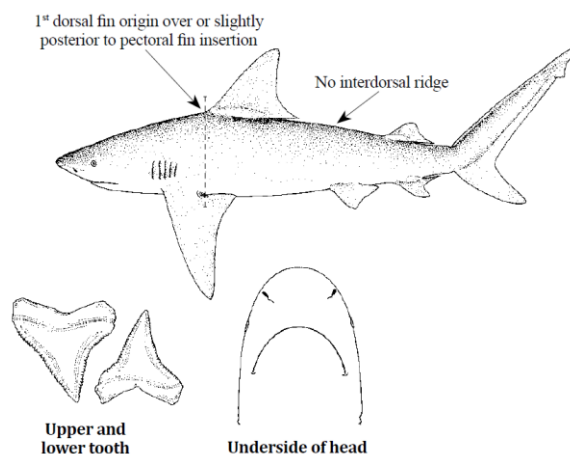
**ii. *Carcharhinus amblyrhynchoides*
(Whitley, 1934)
(Graceful shark)**

- short snout
- absence of interdorsal ridge
- moderately large falcate pectoral fins



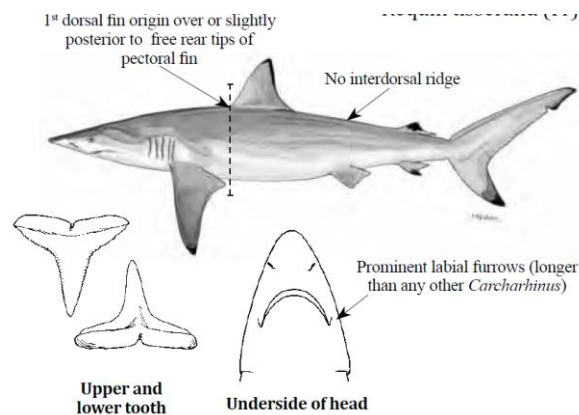
iii. ***Carcharhinus amboinensis* (Müller & Henle, 1839)**
(Pigeye shark)

- very short and bluntly rounded snout
- small eyes
- large triangular 1st dorsal fin (above 3 times 2nd dorsal height)
- large angular pectoral fins
- absence of interdorsal ridge



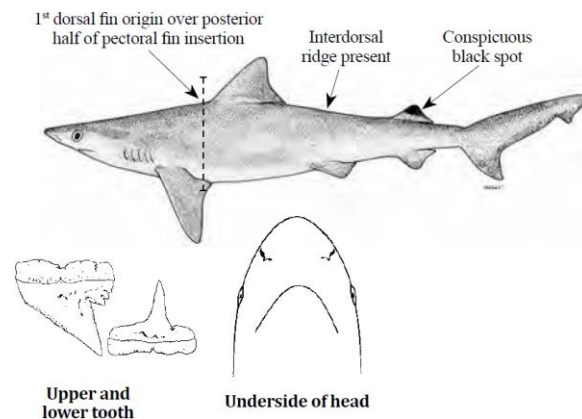
iv. ***Carcharhinus brevipinna* (Müller & Henle, 1839)**
(Spinner shark)

- pointed and long snout
- pectoral fins small and falcate
- prominent labial furrows
- 2nd dorsal, anal, bases of pectorals and lower caudal fin lobe black or dark grey-tipped in adults, but unmarked in small individuals below 1 m in length



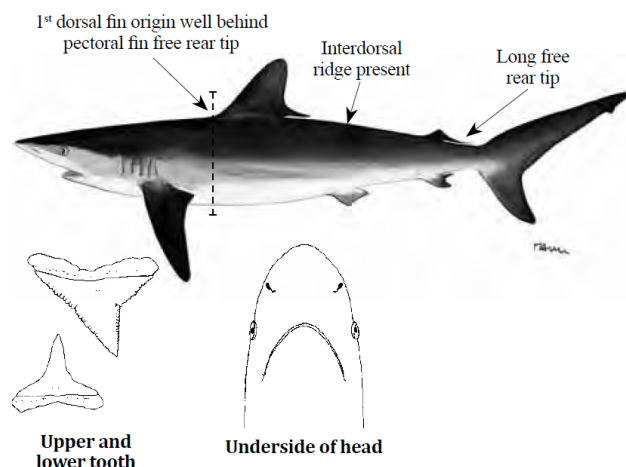
v. ***Carcharhinus dussumieri* (Müller & Henle, 1839)**
(Whitecheek shark)

- moderately long and rounded snout
- eyes large and horizontally-oval
- pectoral fins small and semifalcate
- black spot present on 2nd dorsal fin only
- interdorsal ridge present



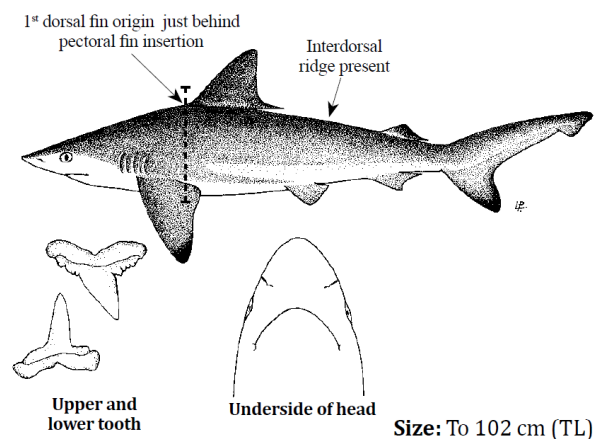
vi. ***Carcharhinus falciformis* (Müller & Henle, 1839)**
(Silky shark)

- narrowly rounded snout
- long free rear tip on 2nd dorsal fin
- pectoral fins long and narrow



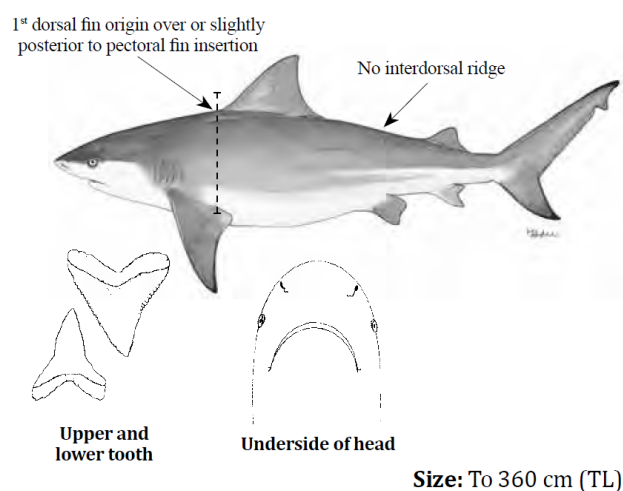
vii. ***Carcharhinus hemiodon* (Müller & Henle, 1839)**
(Pondicherry shark)

- long and pointed snout
- pectoral fins small
- upper teeth weakly serrated with strong cusplets
- lower teeth without serrations
- conspicuous black tips present on pectorals, 2nd dorsal, dorsal and ventral caudal lobes



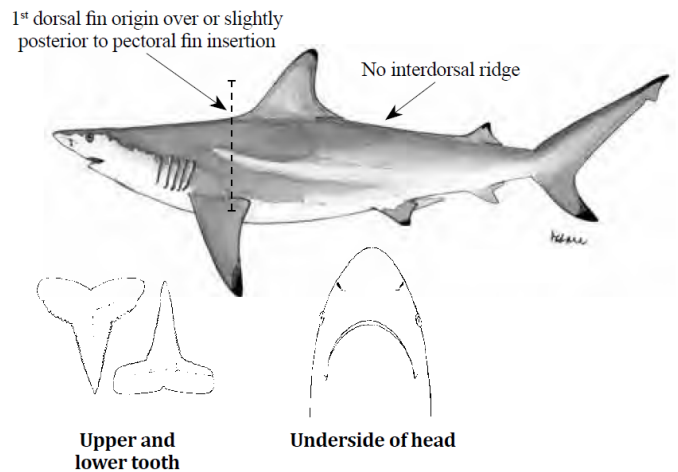
viii. ***Carcharhinus leucas* (Müller & Henle, 1839)**
(Bull shark)

- short snout, curved/ rounded with small eyes
- 1st dorsal fin triangular shaped
- upper jaw with serrated teeth while cusped teeth with arched roots in lower jaw
- a white band present on side



**ix. *Carcharhinus limbatus* (Müller & Henle, 1839)
(Blacktip shark)**

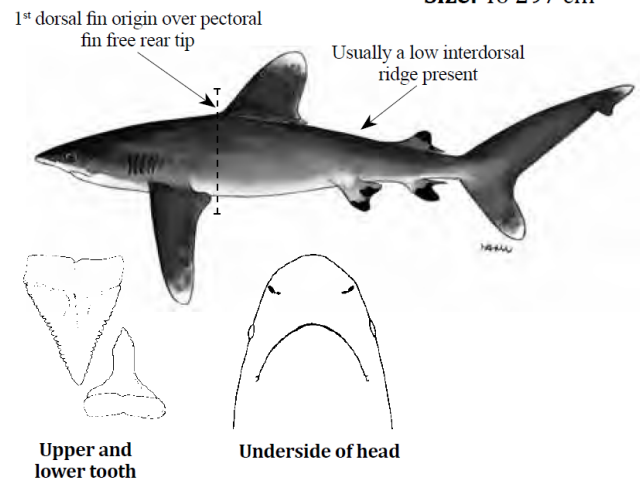
- long and pointed snout
- short rear tips in both 1st and 2nd dorsal fins
- narrow-cusped serrated teeth in both jaws



Size: To 297 cm

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

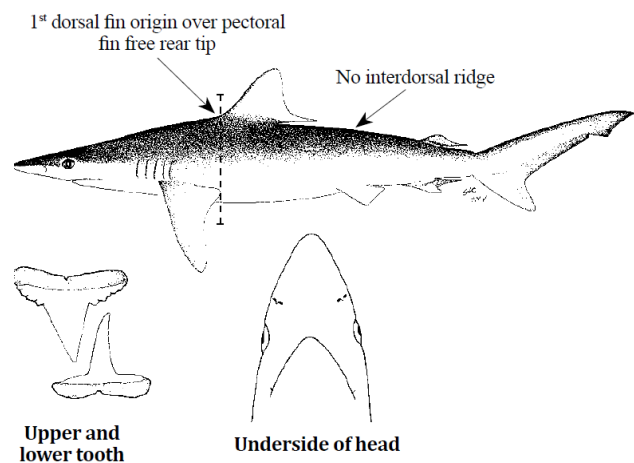
- short snout
- 1st dorsal fin conspicuously large with a rounded apex
- pectoral fins paddle-shaped
- spotted white fin tips on 1st dorsal, pectoral, pelvic, upper and lower caudal fin lobes
- black saddle-marks present on caudal peduncle



Size: To 350 cm (TL)

**xi. *Carcharhinus macloti* (Müller & Henle, 1839)
(Hardnose shark)**

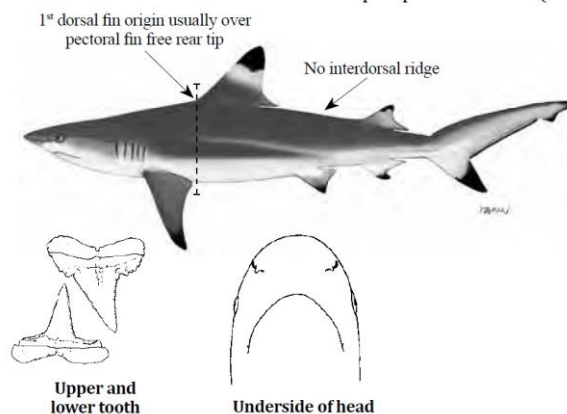
- pointed snout with a hypercalcified rostrum which can be felt by pinching its snout
- upper teeth oblique-cusped and smooth-edged



Size: To 100 cm (TL)

**xii. *Carcharhinus melanopterus* (Quoy & Gaimard, 1824)
(Blacktip reef shark)**

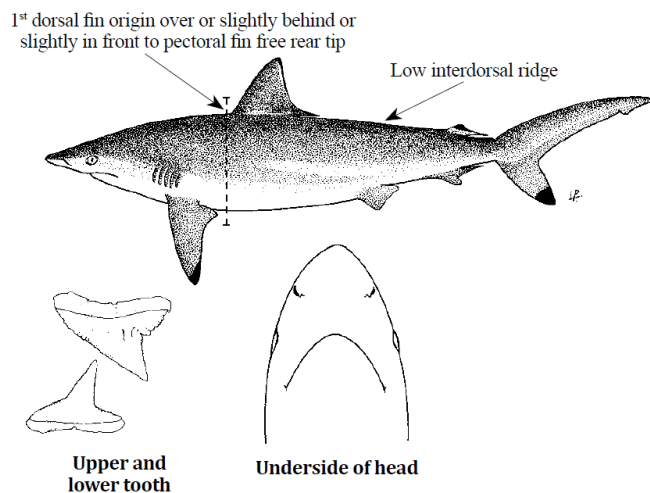
- striking black apical mark on the ventral caudal lobe, other fins, usually with less prominent black fin tips
- noticeable white band on side



Size: To 200 cm (TL)

**xiii. *Carcharhinus sorrah* (Müller & Henle, 1839)
(Spot-tail shark)**

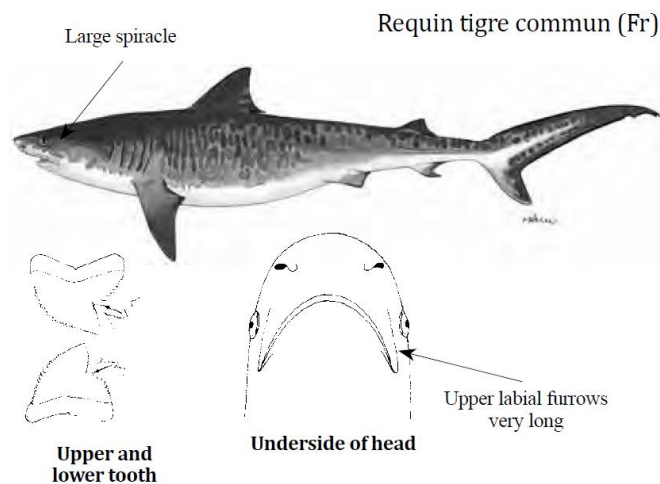
- long and pointed snout
- prominent black tip on the pectorals, 2nd dorsal, and ventral caudal lobe
- 1st dorsal fin with black border
- a conspicuous white band on side



Size: To 160 cm (TL)

**xiv. *Galeocerdo cuvier* (Péron & Lesueur, 1822)
(Tiger shark)**

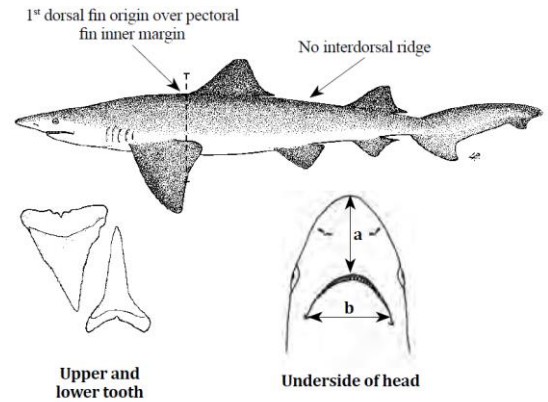
- blunt and short snout
- long upper labial furrows extending to the front of eye
- spiracles are present
- a rounded keel present on both sides of the caudal peduncle curved teeth with cocks comb-shape and heavy serrations as well as distal cusplets



Size: To 550 cm, common 400 cm (TL)

xv. *Lamiopsis temminckii* (Müller & Henle, 1839)
(Broadfin shark)

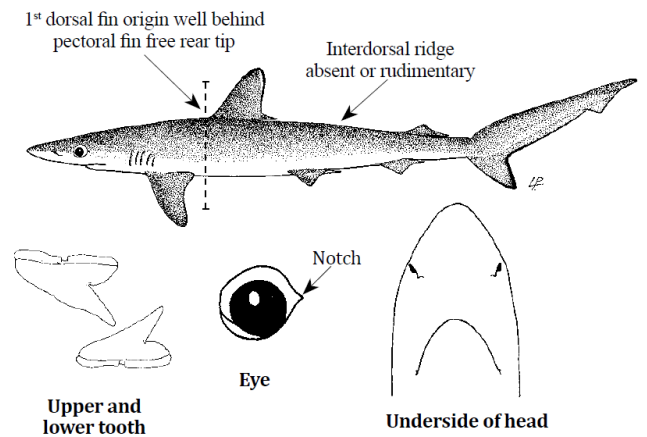
- snout length almost comparable to that of mouth width
- 2nd dorsal fin large as 1st
- longitudinal upper precaudal pit
- broad and triangular pectoral fin



Size: To 168 cm (TL)

xvi. *Loxodon macrorhinus* Müller & Henle, 1839
(Sliteye shark)

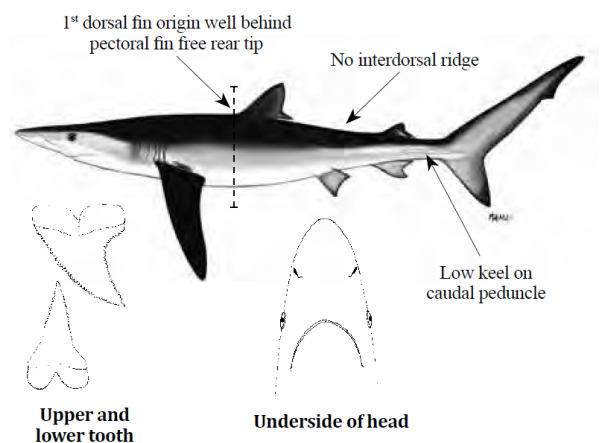
- long snout
- labial furrows short
- 2nd dorsal fin originates behind origin of anal fin
- very long preanal ridges on anal fin
- a slender dark margin on 1st dorsal fin



Size: To 98 cm (TL)

xvii. *Prionace glauca* (Linnaeus, 1758)
(Blue shark)

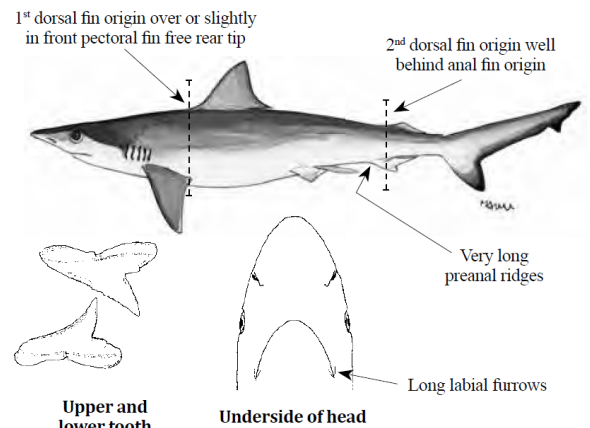
- long and pointed pectoral fins
- dark blue colour on back, bright blue shade on either sides, white tint underneath, fading to purple blackish hue following death
- tips of pectoral and anal fins dusky



Size: To 385 cm (TL)

**xviii. *Rhizoprionodon acutus* (Rüppell, 1837)
(Milk shark)**

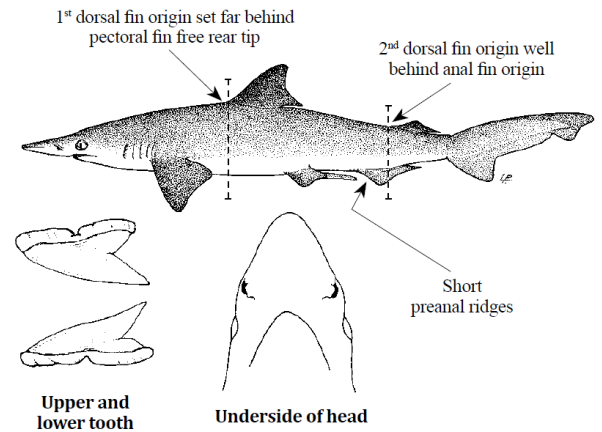
- elongated upper and lower labial furrows
- 2nd dorsal fin smaller as compared to anal fin
- inter dorsal ridge not present or rudimentary
- greyish brown on top, white underneath
- dorsal and anal fins somewhat darker than backside



Size: To 180 cm, common 70 cm (TL)

**xix. *Scoliodon laticaudus* Müller & Henle, 1838
(Spadenose shark)**

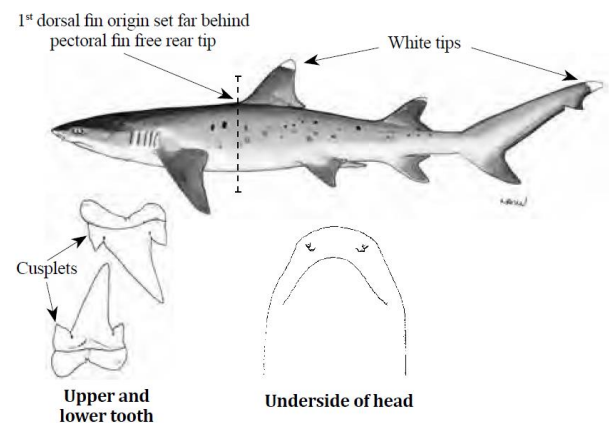
- elongated flattened/ compressed, spade-like snout
- pectoral fins wide triangular shaped interdorsal ridge not present
- greyish-brown colour on top, light hue underneath
- light borders present on all fins



Size: To 74 cm (TL)

**xx. *Triaenodon obesus* (Rüppell, 1837)
(Whitetip reef shark)**

- short and broadly rounded snout
- posterior notches on horizontally oval eyes
- down slanted mouth and prominent tubular anterior nasal flaps
- no interdorsal ridge
- 1st dorsal and caudal lobes with conspicuous white tips
- 2nd dorsal and caudal lobes sometimes white-tipped

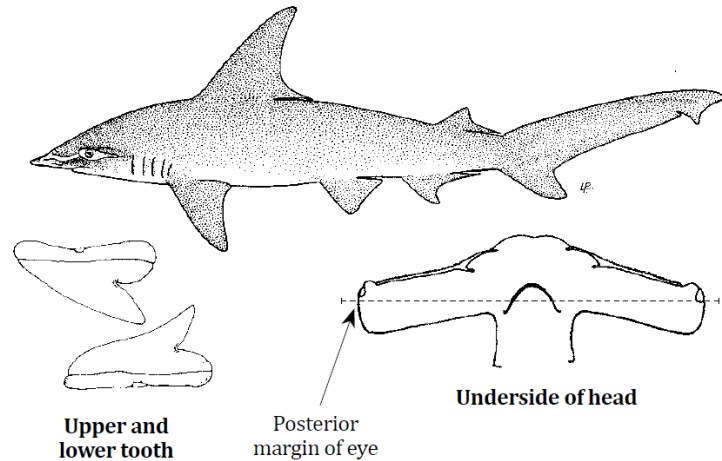


Size: To 215 cm, common 160 cm (TL)

e. Family Sphyrnidae: Hammerhead sharks

**i. *Eusphyra blochii* (Cuvier, 1816)
(Winghead shark)**

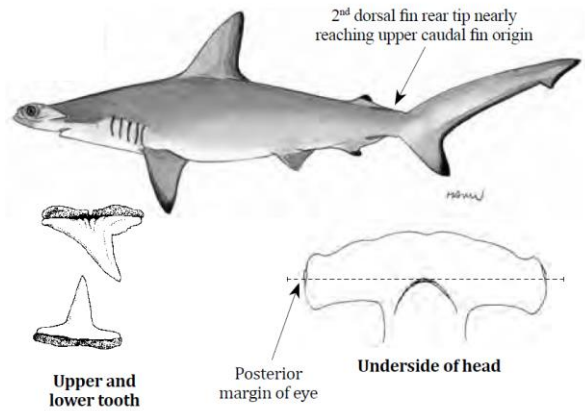
- head broad and wing-shaped with narrow blades almost or quite half the shark's length
- posterior margin of eyes below level of front of mouth
- upper precaudal pit longitudinal



Size: To 180 cm (TL)

**ii. *Sphyrna lewini* (Griffith & Smith, 1834)
(Scalloped hammerhead)**

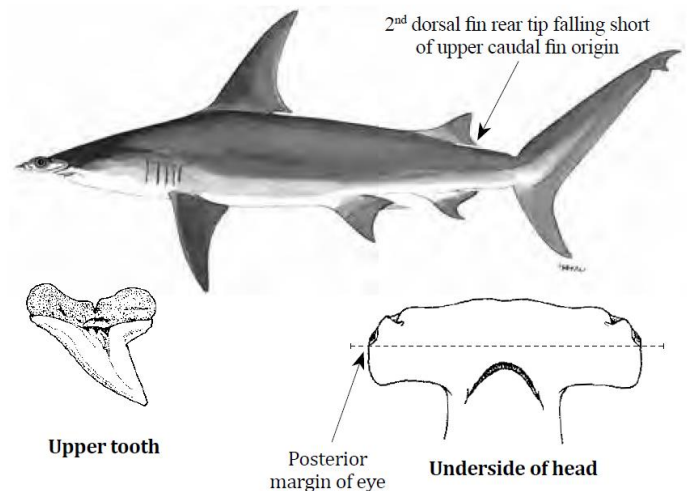
- anterior margin of head having a middle notch and two smaller lateral indentations
- moderately falcate 1st dorsal fin



Size: To 420 cm, common 370 cm (TL)

**iii. *Sphyrna mokarran* (Rüppell, 1837)
(Great hammerhead)**

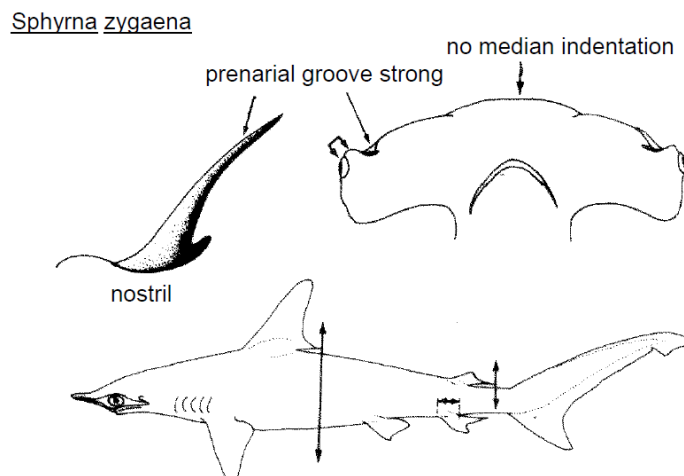
- anterior margin of head almost straight having a notch at the middle
- posterior margin of eyes well anterior to front of mouth
- very high and strongly falcate 1st dorsal fin
- long and arched pectoral fins



Size: To 600 cm (TL)

iv. ***Sphyrna zygaena* (Linnaeus, 1758)**
(Smooth Hammerhead)

- curved and broad head
- central notch absent
- no median indentation
- first dorsal fin free rear tip prior to pelvic fin origin
- short and broad pectoral fins, having dusky edges underneath



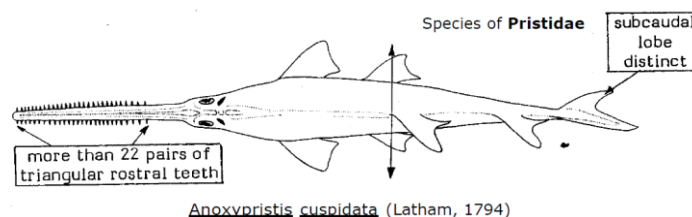
7. Order Pristioforiformes

- body shark-like
- a saw-like elongated snout bearing a row of strong lateral teeth on each side is present

a. **Family Pristiophoridae :Sawsharks**

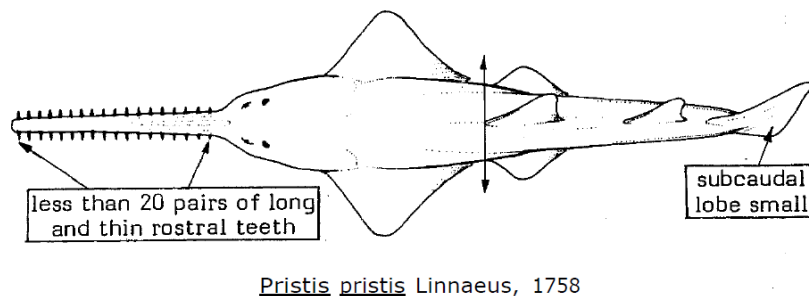
i. ***Anoxypristis cuspidata* (Latham, 1794)**

- no rostral teeth on basal quarter of saw
- caudal fin lunate with distinctive subterminal projection on upper lobe
- lower lobe well developed

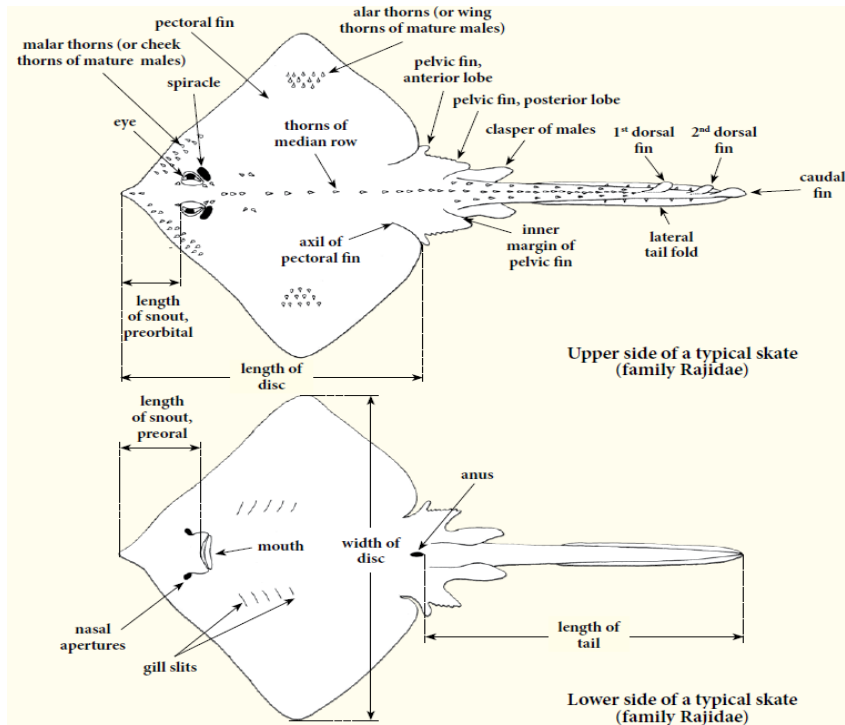


ii. ***Pristis pristis* (Linnaeus, 1758)**
(Common sawfish, earlier *Pristis microdon*)

- rostral teeth present on basal quarter of saw
- pectoral fin bases broad
- caudal fin without a subterminal notch but with a short ventral lobe



MORPHOLOGY- SKATES AND RAYS

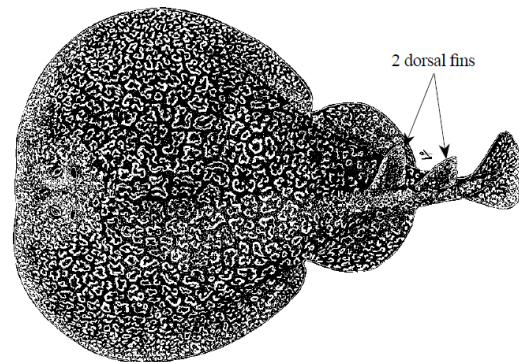


(Source: Ebert, D.A. and Mostarda, E. 2013)

Family Torpedinidae: Torpedos

i. *Torpedo sinuspersici* Olfers, 1831

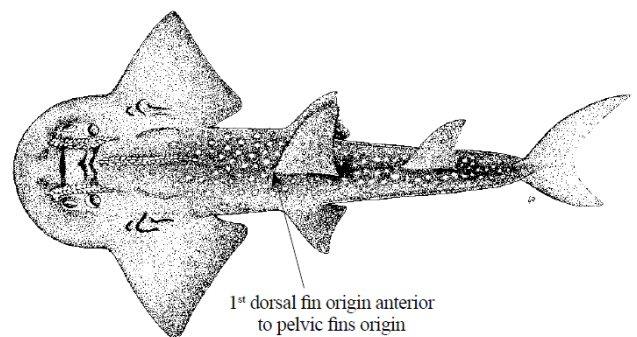
- spiracles having margin with small tentacles
- height of tail fin is lesser than distance from upper tail fin origin to 1st dorsal fin



a. Family Rhinidae: Bowmouth guitarfish

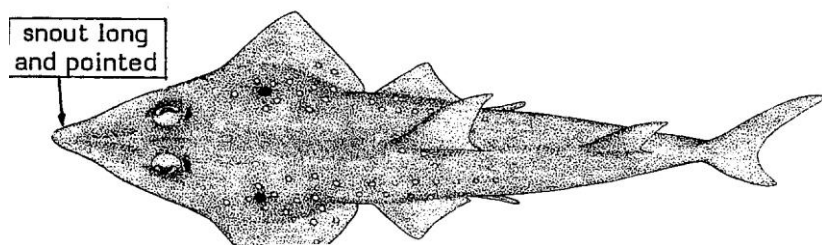
i. *Rhina ancylostoma* Bloch & Schneider, 1801

- rounded snout
- thick ridges with expanded denticles on back, over eyes and spiracles
- nearly symmetrical lunate caudal fin



ii. *Rhynchobatus djeddensis*

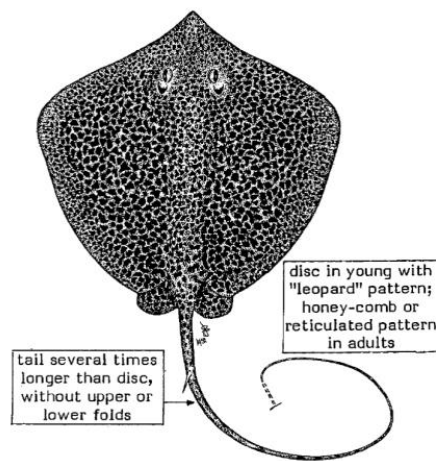
- snout long and pointed
- lower caudal lobe short
- white spots on dorsal surface



b. Family Dasyatidae

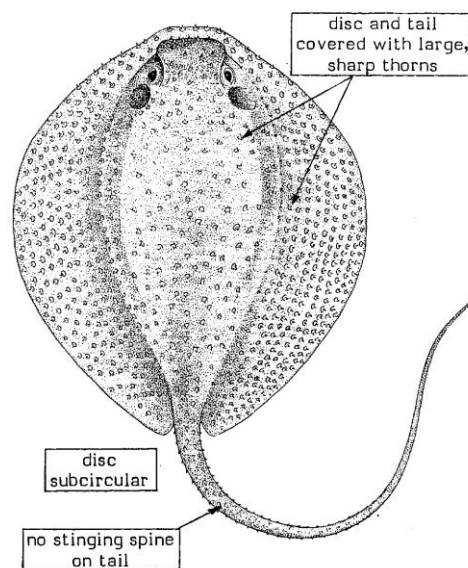
i. *Himantura uarnak* (Gmelin, 1789)
(Reticulate whipray)

- disc with a rhomboidal shape having narrowly rounded apices (mostly rounded in juveniles)
- mostly triangular snout having pointed tip
- longer and slender tail, whip-like beyond sting
- cutaneous folds on tail absent
- a broad median denticle band from interorbit, outspreading along center of disc and onto upper tail



ii. *Urogymnus asperrimus* (Bloch & Schneider, 1801)
(Porcupine ray)

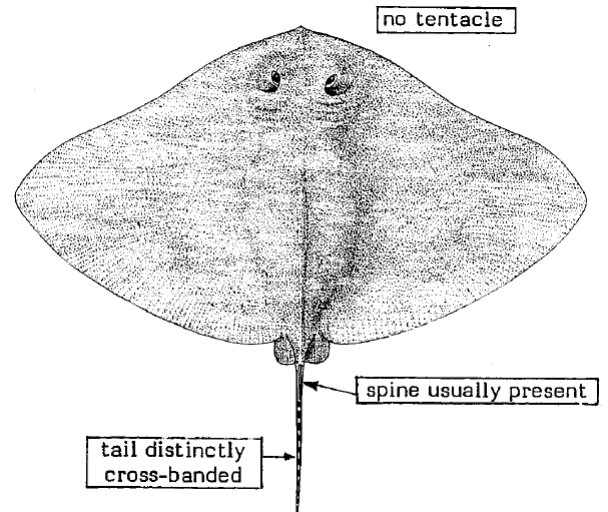
- heavily armored stingray without a venomous spine on tail
- young ones with large, flat denticles on upper surface
- larger juveniles and adults having sharp conical thorns and minor sharp denticles
- disc light grey and blackish tail tip
-



d) Family Gymnuridae : Butterfly rays

i. *Gymnura poecilura* (Shaw, 1804)

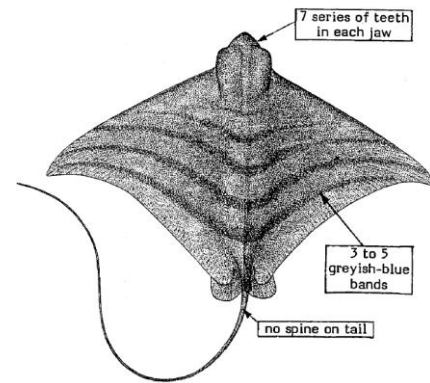
- disc lozenge shaped with at least twice as broad as long
- no dorsal fin
- tentacle absent on posterior margin of spiracle
- small venomous spine is present on tail base
- cross-banded black and white pattern in tail



e. Family Myliobatidae Eagle rays

i. *Aetomylaeus nichofii* (Bloch & Schneider, 1801)

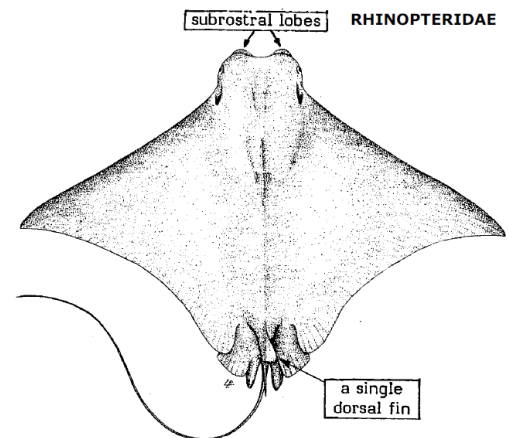
- disc much wider than long
- head with a prominent rostral lobe
- teeth present in 7 rows in both jaws
- stinging spine absent
- disc with 3 to 5 greyish pale blue cross bands



f. Family Rhinopteridae: Cownose rays

i. *Rhinoptera javanica* Müller & Henle, 1841

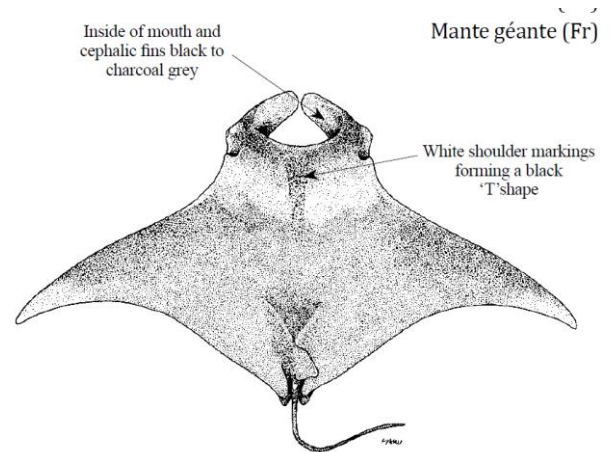
- snout strongly notched medially to form two lobes
- relatively narrow head
- fleshy posterior edge of rostral flap not (or just) reaching mouth
- length of tail is about 2.6–3.4 in disc length
- posterior margin of dorsal fin strongly concave sting (when present) behind dorsal fin free rear tip
- conspicuous markings absent



g. Family MOBULIDAE: Manta rays – Devil rays

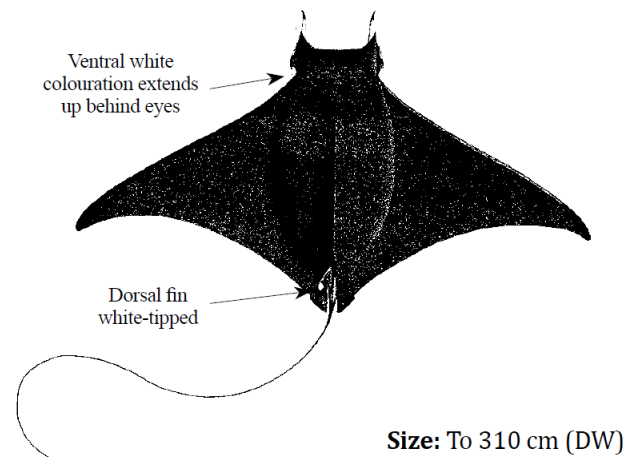
i. *Mobula birostris* (Walbaum, 1792) Earlier *Manta birostris*

- giant ray with a very broad head having anterior flaps
- terminal mouth which is in front of head
- whip-like slender tail
- stinging spine mostly encased in a calcified mass on tail base
- presence of noticeable white shoulder patches
- gill slits posterior commonly with black flaring
- cephalic fins and inside of mouth black in colour



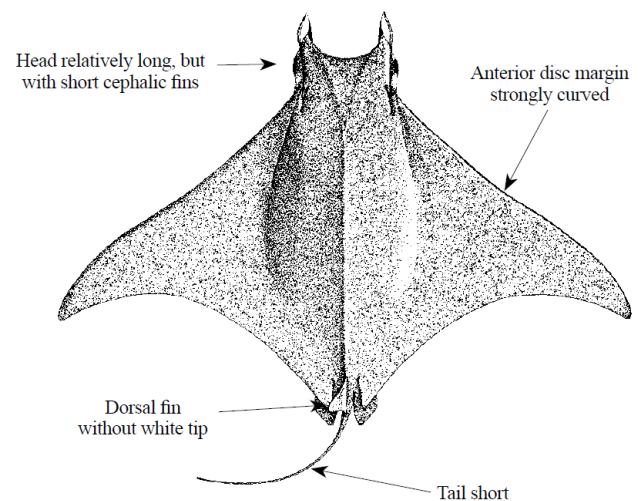
ii. *Mobula mobular* (Bonnaterre, 1788) (Earlier *Mobula japonica*)

- ray with a short head and cephalic fins
- spiracles are slitlike and present above disc edge
- wing tips sharply pointed
- tail very long mostly equal or longer than disc width
- a short and serrated stinging spine is present on tail
- white tipped dorsal fin
- white colouration extends up behind eyes in ventral side



iii. *Mobula tarapacana* (Philippi, 1892)

- large devil ray having a long head and short cephalic fins
- strongly curved anterior disc margins
- short tail without a stinging spine
- dark area outspreading from cephalic fins posteriorly along the gill areas



References and picture credits

- Bianchi, G., FAO species identification sheets for fishery purposes. Field guide to the commercial marine and 1985 brackish-water species of Pakistan. Prepared with the support of PAK/77/033 and FAO (FIRM) Regular Programme. Rome, FAO, 200 p.
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