

First Incidence of Three Sharks off Andaman Islands, India

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Abstract

The paper reports occurrence of *Rhincodon typus* Smith (Rhincodontidae), *Hemigaleus microstoma* Bleeker (Hemigaleidae) for the first time from Andaman and Nicobar Islands. It also confirms first record of *Carcharhinus plumbeus* (Nardo) (Carcharhinidae) from Andaman Islands as well as from Indian waters. A list of shark species known from Andaman and Nicobar Islands are provided with their conservation status, which indicates 39% of sharks occur in Andaman Islands are threatened and 41.5% are Near Threatened which need conservation measures.

Introduction

Fishing sharks in the surrounding waters of the Andaman and Nicobar Islands has become a sporting activity through the ages. Apart from long-line sport-fishing, there were targeted shark fishing as well. Sharks are also incidentally caught as by-catch through tuna long-line, trawl net, purse seine etc. Fishing of sharks for their fins gained momentum in this group of islands from 1990 onwards as the demand for shark fin increased in the international market. After a short-lived blanket ban on shark fishing from July 2001, the Andaman and Nicobar Administration granted license for fishing of sharks and rays in the Andaman waters during October 2002 excluding a few rare species included in Schedule-I of the Wildlife Protection Act of 1972 of the Government of India. Since August 2013, Govt. of India introduced prohibition of shark fins in seas and accordingly, 'sharks must be landed with their fins attached to their bodies'. And, the same notification declares that 'any possession of shark fins that are not naturally attached to the body of a shark would amount to "hunting" of a Schedule-I species'. Further, there is prohibition of 'export of shark fins of all species of sharks' from India since February 2015. But that does not bar shark fishing around Andaman and Nicobar group of Islands, although there is no knowledge on consumption of shark meat in Andaman Islands. Whatsoever the interest of the fishing industries

have, the taxonomists continue study and explore their catches to document biodiversity of the region.

Akhilesh *et al.* (2014) listed 111 species of sharks known from India including several species of questionable and unconfirmed distributional record. Recording shark diversity around Andaman and Nicobar group of Islands was initiated with the documentation by Day (1871). Although, Day (1871) reported only three shark species, *Carcharias melanopterus*, *Carcharias walbeehmii* and *Zygaena blochii*, from Andaman waters, through the years several authors contributed to our knowledge on distribution of different shark species around these islands. Rajan *et al.* (2012) listed 39 species of sharks in 4 orders and 11 families from Andaman and Nicobar Islands including two species of doubtful distributional record, *Glyphis gangeticus* and *Sphyrna tudes*. Kumar *et al.* (2015) added occurrence of one more species, *Proscyllium magnificum* Last and Vongpanich, to the list.

Recently, three more species have been sighted from Andaman Islands by the first author. The present paper records occurrence of these three species, *Rhincodon typus* Smith, *Hemigaleus microstoma* Bleeker and *Carcharhinus plumbeus* (Nardo) for the first time from Andaman waters, whereas the last species forms the first record from Indian waters.

Material and Methods

During a dive near Havelock Island (coordinate 11°58.456'N, 93°07.617'E) on 17-10-2014 the first author encountered an unmistakably identifiable large shark at a distance. The underwater photograph of this shark, *Rhincodon typus*, is presented here. It was about 4.5m long. The second species, *Hemigaleus microstoma* Bleeker, was landed at Junglighat fish market, South Andaman, on 11-04-2015 measured as 95 cm in total length. Fishermen opined that the said shark was caught near Rutland Island, South Andaman. Similarly, the third species included here, *Carcharhinus plumbeus* (Nardo), was observed at Monsson fish processing unit at Dhanikari, South Andaman, on 02.08.2011. There were two specimens measuring 145 and 137 cm in total length. The first species, being included in Schedule I of Wildlife Protection Act (1972) of Govt. of India, was left untouched in wild and only underwater photograph was taken. Other two species were in commercial catches and of large size, so voucher specimens could not be collected. The characters of the specimens are noted in the field and photographed. Standard literatures (Compagno 1984 a & b; Compagno and Niem, 1998; Compagno 1998, 2001) and web based identification guides (Foerco and Pauly 2016) were consulted for identification. Conservation status of IUCN (2015) is taken in to consideration for all shark species from Andaman Islands including these three sharks.

Results

The photographed sharks, based on field notes, were identified as the following three species. Systematic accounts of these three sharks are presented here under.

Order: Orectolobiformes

Family: Rhincodontidae

Rhincodon typus Smith 1828 (Whale Shark)

1828. *Rhincodon typus* Smith, *South African Commercial Advertiser*, 3 (145): 2 (Type Locality: Table Bay, South Africa, south-eastern Atlantic).

Diagnosis: A huge shark with a broad, flat head and truncated snout; transverse, terminal mouth in front of eyes; teeth minute, extremely numerous; unique filter screens on its internal gill slits. Prominent ridges on sides of body, with the lowermost one expanding into a prominent keel on each side of the caudal peduncle. First dorsal fin large; second dorsal and anal fins small; caudal fin lunate or semilunate without a prominent subterminal notch. A unique checkerboard pattern of light spots, horizontal and vertical stripes on a dark background. Attains 16 m (male) to 20 m (female).

Distribution: Circumglobal in tropical and warm temperate seas.



Order: Carcharhiniformes

Family: Hemigaleidae

Hemigaleus microstoma Bleeker, 1852 (Sicklefin Weasel Shark)

1852. *Hemigaleus microstoma* Bleeker, *Verh. Batav. Genoot. Kunst. Wet.*, 24: 46, pl. 2, fig. 9. (Type Locality: Batavia, Java, Indonesia).

Diagnosis: A small slender shark with a rounded, moderately long snout; eyes large, laterally placed and with nictitating eyelids; gill slits short, mouth broadly arched and very short, lower jaw rounded at symphysis; ends of upper labial furrows extend in front of rear corners of eyes; lower teeth not protruding when mouth is closed. Dorsal and pelvic fins and ventral caudal lobe strongly falcate; second dorsal fin about $\frac{2}{3}$ size of first, its origin slightly before anal fin origin; anal fin shorter than second dorsal fin, without preanal ridge. Precaudal pit crescentic. Colour light grey or bronze with white fin tips and white spots on sides. Attains more than 100 cm.

Distribution: Indo-West Pacific - Southern India, Sri Lanka, Myanmar, Thailand, Singapore, Java, Philippines, China, and probably from Red Sea.



Order: Carcharhiniformes

Family: Carcharhinidae

Carcharhinus plumbeus (Nardo, 1827) (Sandbar Shark)

1827. *Squalus plumbeus* Nardo, *Isis (Oken)*, 20 (6): 477, 483 (Type Locality: Adriatic Sea).

1984. *Carcharhinus plumbeus*: Compagno, *FAO Fish Synop.*, (125) 4 (2): 493.

Diagnosis: A medium-sized grey shark with short, broadly rounded or broadly parabolic snout. Upper teeth broad- and high-cusped, triangular, serrated, without cusplets, usually 14/13-14 rows of anterolateral teeth. Upper labial furrows short and inconspicuous. A narrow interdorsal ridge present. First dorsal fin extremely large, triangular, semifalcate with tip narrowly rounded and its origin over or anterior to the pectoral insertions. Pectoral fins large. Second dorsal fin moderately large with a short rear tip, its origin over or slightly anterior to anal origin.

Precaudal pit crescentic. Colour grey-brown above, white below, without any prominent marking; tips and posterior edges of fins often dusky, but no conspicuous markings on fins; an inconspicuous white band on flank. Attains

Distribution: Circumglobal in all tropical warm temperate seas, with patchy distribution in Indian Ocean.



Discussion

Day (1871) was first to record three sharks from Andaman, i.e. *Carcharias melanopterus* (= *Carcharhinus melanopterus*), *Carcharias walbeehmii* (= *Rhizoprionodon acutus*) and *Zygaena blochii* (= *Eusphyra blochii*). *Scyllium hispidum* (= *Bathaelurus hispidus*) and Herre (1941) reported *Carcharhinus dussumieri*. Further, *Proscyllium alcocki* (= *Eridacnis redcliffei*) and *Pentanchus (Parapristurus) investigatoris* (= *Apristurus investigatoris*) were described by Misra (1950) and Misra (1962) respectively. Talwar (1990) added seven more species, namely, *Carcharias wheeleri* (= *Carcharhinus amblyrhynchos*), *Carcharhinus macloti*, *C. sealei*, *C. sorrah*, *Loxodon macrorhinus*, *Prionace glauca* and *Rhizoprionodon oligolinx* to the list of sharks from Andamans. *Chylloscyllium punctatum* was recorded by Rajan et al. (1993); *Triaenodon obesus* by Rao et al. (1997); *Stegostoma fasciatum* by Rao et al. (2000) and *Sphyrna zygaena* by Kamla Devi and Rao (2003). While Rajan (2003) included four species, i.e., *Alopias vulpinus*, *Isurus oxyrinchus*, *Carcharhinus albimarginatus* and *Sphyrna lewini*, as food fishes of Andaman and Nicobar Islands. Rao (2003) added seven more species of sharks, i.e., *Chiloscyllium griseum*, *C. indicum*, *Carcharhinus*

limbatus, *C. longimanus*, *Galeocerdo cuvier*, *Scoliodon laticaudus* and *Sphyrna mokarran*, as reef fishes from these islands. Soundarajan and Dam Ray (2009) reported occurrence of *Centrophorus acus* and *Squalus megalops* from Andaman waters. In a checklist of fishes from Andamans, Rao (2009) listed *Carcharhinus brevipinna* and *Negaprion acutidens* along with *Glyphis gangeticus* and *Sphyrna tudes*, whereas the last two are unlikely to occur and there is no material evidence. Possibilities are more for inclusion of the name *Glyphis gangeticus* in the list is due to misidentification of some other shark, and as indicated by Talwar and Kacker (1984), the name *Sphyrna tudes* is misapplied to *Sphyrna lewini* specimens in Indian waters. Further, Rajaram and Nedumaran (2009) reported *Carcharhinus hemiodon* from Great Nicobar Biosphere Reserve. Rajan et al. (2012) included two more species, *Alopias pelagicus* and *A. superciliosus*, in the list of sharks. Kumar et al. (2015) provided first record of *Proscyllium magnificum* from off Andaman Islands as well as from Indian waters. This amounts to record of 39 sharks belonging to 11 families in 4 orders from Andaman and Nicobar Islands. And, the present paper records three more species, *Rhincodon typus*, *Hemigaleus microstoma* and *Carcharhinus plumbeus* from Andaman Islands, while the last one forms first record from India.

Rhincodon typus has a wide range of distribution in all tropical and warm temperate seas, but this is for the first time it is seen near Andaman coast and photographed. Truncated snout, transverse mouth, ridged skin and white spots all over makes it clearly distinguishable among all sharks. This shark is usually seen in offshore region, but also known to enter shallow inshore areas. All parts of this shark is utilized: flesh as fresh, frozen, dried and salted for human consumption, liver processed for oil, fins used for shark-fin soup, cartilage for health supplements, skin for leather products and also used in Chinese medicine. However, this one is included in Schedule I of Wildlife Protection Act (1972) of the Govt. of India and so, it's killing and trading in India is prohibited. This is also placed in Appendix-II of CITES and its international trade is monitored. As per IUCN Red List the conservation status of this shark is vulnerable.

Hemigaleus microstoma was earlier recorded from southern India and Sri Lanka in Indian Ocean. It was previously considered to occur in Australian waters, but the Australian specimens were recently described as a distinct species owing to lower vertebral counts, much higher tooth counts in lower jaw, and black-tip to second dorsal fin (White et al. 2005). White (2009) indicated its occurrence in Myanmar coast, north to Andaman and opined that Red Sea specimens need to be critically examined. *H. microstoma*, seems to be a naturally uncommon species in catches, occurs in inshore and offshore waters in tropical region. This shark is utilized for human consumption, fins in shark-fin trade and offal for fishmeal. There is no restriction of fishing this shark. But a notification from the Ministry of Environment and Forests of Govt. of India in August 2013 prohibits Finning of shark in the sea. According to this notification sharks must be landed with their fins attached to their bodies and any possession of shark fins that are not naturally attached to shark body would amount to hunting of a Schedule-I species and thereby attracting penal provisions.

Carcharhinus plumbeus usually found in both inshore and offshore region over continental and insular shelves and adjacent deep water, but known to avoid coral reef area, shallow rocky and surf zone. In some parts of its range, it is known to make extended seasonal migrations. There are scattered records of this shark in Indo-Pacific, possibly due to confusion with other related shark. But the combination of characters such as the large size and forward-position of first dorsal fin, the short posterior lobe of second dorsal fin, the broadly triangular upper teeth, the vestigial anterior nasal flaps, the presence of a mid-dorsal ridge and the widely spaced dermal denticles readily distinguishes this species from other carcharhinid sharks occurring in the area (Compagno, 1984b). As per IUCN (2015) the conservation status of this species is assessed as Vulnerable. Based on all available Indian literature Akhilesh et al. (2014) listed 111 species of sharks from India, but *C. Plumbeus* is not included. We confirmed that there was no record of *C. Plumbeus* in Indian waters till date. This forms the first record from Andaman Islands as well as from Indian waters.

Conservation status of all sharks from Andaman Islands (41 species) as per IUCN (2015) are considered to assess the viability of shark fishery in Andaman and Nicobar Islands. Only one species, *Carcharhinus hemiodon*, is assessed as Critically Endangered and two species, *Sphyrna lewini* and *S. mokarran*, as Endangered. But 13 species (31.7%) of sharks are assessed as vulnerable. Thus, 39% of sharks occur in Andaman are threatened and 41.5% (17 species) are Near Threatened which need conservation measures. Only 4 species, assessed Least Concerned, can be exploited. With ban on shark fin export from India (vide February 2015 notification of Govt. of India) and August 2013 notification prohibiting Finning of shark in sea (stated above), surely shark fishing in Andaman waters would have affected and catches might have reduced. But certainly there is no restriction in catching sharks for other products from shark, such as meat, liver oil, skin, cartilage, fishmeal production etc. An interception with fishers reveals that shark meat, captured as bycatch, is consumed locally by a certain community in Andaman Islands, while targeted fishery is intended to ship them to Kerala in mainland. However, considering low fecundity of sharks and increased pressure from overexploitation, it is essentially needed to restrict exploitation of sharks in regular basis.

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APPENDIX - I

Shark species recorded from Andaman and Nicobar Islands with IUCN status and first report references.

Order: ORECTOLOBIFORMES

Family: HEMISCYLLIDAE

- | | | |
|--|-----------------|-------------------|
| 1. <i>Chiloscyllium griseum</i> Muller & Henle, 1838 | Near Threatened | Rao 2003 |
| 2. <i>Chiloscyllium indicum</i> (Gmelin, 1789) | Near Threatened | Rao 2003 |
| 3. <i>Chiloscyllium punctatum</i> Muller & Henle, 1837 | Near Threatened | Rajan et al. 1993 |

Family: Stegostomatidae

- | | | |
|--|------------|-----------------|
| 4. <i>Stegostoma fasciatum</i> (Hermann, 1783) | Vulnerable | Rao et al. 2000 |
|--|------------|-----------------|

Family: Scyliorhinidae

- | | | |
|---|----------------|------------------|
| 5. <i>Cephaloscyllium silasi</i> (Talwar, 1974) | Data Deficient | Ravi et al. 2016 |
|---|----------------|------------------|

Family: Rhincodontidae

- | | | |
|--|------------|---------------|
| 6. <i>Rhincodon typus</i> Smith 1828 (New Record) | Vulnerable | Present study |
|--|------------|---------------|

Order: LAMNIFORMES

Family: Alopiidae

- | | | |
|--|------------|-------------------|
| 7. <i>Alopias pelagicus</i> Nakamura, 1935 | Vulnerable | Rajan et al. 2012 |
| 8. <i>Alopias superciliosus</i> (Lowe, 1840) | Vulnerable | Rajan et al. 2012 |
| 9. <i>Alopias vulpinus</i> (Bonaterre, 1788) | Vulnerable | Rajan 2003 |

Family: Laminidae

- | | | |
|--|------------|------------|
| 10. <i>Isurus oxyrinchus</i> Rafineque, 1810 | Vulnerable | Rajan 2003 |
|--|------------|------------|

Order: CARCHARHINIFORMES

Family: Pentanchidae (catsharks)

- | | | |
|--|----------------|-------------|
| 11. <i>Apristurus investigatoris</i> (Misra, 1962) | Data Deficient | Misra 1962 |
| 12. <i>Bythaelurus hispidus</i> (Alcock, 1891) | | Alcock 1891 |

Family: Proscylliidae

- | | | |
|---|---------------|-------------------|
| 13. <i>Eridacnis radcliffei</i> Smith, 1913 | Least Concern | Misra 1950 |
| 14. <i>Proscyllium magnificum</i> Last & Vongpanich, 2004 | Not Evaluated | Kumar et al. 2015 |

Family: Hemigaleidae

- | | | |
|--|------------|---------------|
| 15. <i>Chaenogaleus macrostoma</i> (Bleeker, 1852) | Vulnerable | Rao 2009 |
| 16. <i>Hemigaleus microstoma</i> (Bleeker, 1852) (New Record) | Vulnerable | Present study |

Family: Carcharhinidae

- | | | |
|---|-----------------------|--------------------------|
| 17. <i>Carcharhinus albimarginatus</i> (Ruppell, 1837) | Near Threatened | Rajan 2003 |
| 18. <i>Carcharhinus amblyrhynchos</i> (Bleeker, 1856) | Near Threatened | Talwar 1990 |
| 19. <i>Carcharhinus brevipinna</i> (Muller & Henle, 1839) | Near Threatened | Rao 2009 |
| 20. <i>Carcharhinus dussumieri</i> (Muller & Henle, 1839) | | Herre 1941 |
| 21. <i>Carcharhinus hemiodon</i> (Valenciennes, 1939) | Critically Endangered | Rajaram & Nedumaran 2009 |
| 22. <i>Carcharhinus limbatus</i> (Muller & Henle, 1839) | Near Threatened | Rao 2003 |
| 23. <i>Carcharhinus longimanus</i> (Poey, 1861) | Vulnerable | Rao 2003 |
| 24. <i>Carcharhinus macloti</i> (Muller & Henle, 1839) | Near Threatened | Talwar 1990 |
| 25. <i>Carcharhinus melanopterus</i> (Quoy & Gaimard, 1824) | Near Threatened | Day 1871 |
| 26. <i>Carcharhinus plumbeus</i> (Nardo 1827) (New Record) | Vulnerable | Present study |
| 27. <i>Carcharhinus sealei</i> (Pietschmann, 1913) | Near Threatened | Talwar 1990 |
| 28. <i>Carcharhinus sorrah</i> (Valenciennes, 1839) | Near Threatened | Talwar 1990 |
| 29. <i>Galeocerdo cuvier</i> (Peron & Le Sueur, 1822) | Near Threatened | Rao 2003 |
| 30. <i>Loxodon macrorhinus</i> Muller & Henle, 1839 | Least Concern | Talwar 1990 |
| 31. <i>Negaprion acutidens</i> (Ruppell, 1837) | Vulnerable | Rao 2009 |
| 32. <i>Prionace glauca</i> (Linnaeus, 1758) | Near Threatened | Talwar 1990 |
| 33. <i>Rhizoprionodon acutus</i> (Ruppell, 1837) | Least Concern | Day 1871 |
| 34. <i>Rhizoprionodon oligolinx</i> Springer, 1964 | Least Concern | Talwar 1990 |
| 35. <i>Scoliodon laticaudus</i> (Muller & Henle, 1838) | Near Threatened | Rao 2003 |
| 36. <i>Triaenodon obesus</i> (Ruppell, 1837) | Near Threatened | Rao et al. 1997 |

Family: Sphyrnidae (Hammerhead Sharks)

- | | | |
|--|-----------------|------------|
| 37. <i>Eusphyrna blochii</i> (Cuvier, 1817) | Near Threatened | Day 1871 |
| 38. <i>Sphyrna lewini</i> (Griffith & Smith, 1834) | Endangered | Rajan 2003 |

39.	<i>Sphyrna mokarran</i> (Ruppell, 1837)	Endangered	Rao 2003
40.	<i>Sphyrna zygaena</i> (Linnaeus, 1758)	Vulnerable	Devi & Rao 2003
Order: SQUALIFORMES			
Family: Squalidae			
41.	<i>Squalus megalops</i> (Macleay, 1881)	Data Deficient	Soundarajan & Dom Ray 2005
Family: Centrophoridae			
42.	<i>Centrophorus acus</i> Garman, 1906	Vulnerable	Soundarajan & Dom Ray 2005