

Updated systemic account of skate fauna observed in landing at the Karachi Fish Harbour, Pakistan

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Abstract: This paper presents the update and a brief account of indigenous skate fauna landed in the Karachi fish Harbour (KFH) which is the country's largest landing site (24.8491° N, 66.9761° E) situated at West Wharf, Karachi. During field observations on catches at the Karachi Fish Harbour (KFH) a total of ten (10) species of skates were found during March 2014 to April 2019. Identified species are *Glaucostegus cemiculus*, *G. granulatus*, *Rhina ancylostoma*, *Rhinobatos horkelii*, *R. punctifer*, *R. annandalei*, *R. halavi*, *R. obtusus*, *R. typus* and *Rhynchobatos djiddensis*. Among these *Glaucostegus granulatus* was the species which found constantly and in larger quantity comparatively. Besides during studies Endangered or Threatened, Nearly Threatened (NT) and Critically Endangered (CE) species have been observed at harbour. Thirty seven (37) males and twenty eight (28) females of this species were observed.

Keywords: Skates, Karachi Fishing Harbour, East coast, Pakistan

Introduction

Elasmobranchs are widely distributed in three (3) different groups like sharks, rays and skates. Sharks have the different body shape whereas as compare to skates and ray species which are very difficult to recognize and have different physical characters similar to each other. The skates have both eyes on the dorsal surface whereas the mouth along with labial furrows and teeth, nostrils and gill opening are on the ventral side of the body. But instead of all similar characters of skates and ray species they have different patterns of thorns/spines, body coloration, different disc shape and size and many more characters like these which are very much helpful in the identification of different species of rays and skates. The chondrichthyan group of fishes which includes sharks, skates and rays plays an important role in the group of gnathostomas or jawed vertebrates (Carroll, 1988). These elasmobranch species are not only important just because they are sister group of bony fishes but also they have important genetic architecture which is more similar to the teleosts model systems (Venkatesh *et al.*, 2007).

The skates have relatively broad tail with two small dorsal fins near its tip. The skates do not have stinging barb on it. Their pelvic fins mostly have two lobes (Corke, 2012). The skates and rays both have dorsoventrally flattened body which helps them in

gliding near the bottom sediments in search of the prey and its body type allows them to take water inside the body for the gill ventilation or respiration when they are partially buried in the sand in search of their prey. Large marine species are the first species to be effected by the increase in fishing as they are large marine species and can be caught easily by the fishermen (Temple *et al.*, 2019). The skates belonging from the family Rajidae are vulnerable to the over fishing because they are slow growing animals as they live so long and have slow maturity process. They have protracted breeding cycles and they produce few young throughout their life span (ICES, 2010; Ellis *et al.*, 2010).

Reports on species of skates their taxonomy, reproduction and distribution are available globally (Last *et al.*, 2016) but from Pakistan only taxonomic work has been carried out (Psomadakis *et al.*, 2015) besides detailed work on biology and reproduction has not been done.

Materials and Methods

Species of skates observed at the Karachi Fish Harbour. Specimen of varying size and weight observed and biometric data was recorded on spot by the help of measuring tape. As well as digital specimen photographs were also taken for thorough

taxonomic studies. Smaller specimen were brought to the laboratory for further examination. Taxonomic identifications were made through published books, articles, different identification guides and available online web content i.e., Compagno 1984; Compagno 1999; Psomadakis *et al.*, 2015; Compagno and Marshall, 2019; Froese and Pauly 2019 etc.

Results

A total of 192 specimens of skate species belonging to three families (Rhinidae, Rhynobatidae and

Glaucostegidae) were identified and during KFH visits from March 2014 to April 2019 (Tabs. 1 and 2). Taxonomic identifications were made by the help of different identification guides already published or content available online in digital libraries (Figure 1 and 2) as mentioned above in the materials and method section. Systemic account of ten (10) observed skates species is provided below.

Locality: Karachi Fish Harbour (KFH) (24.8491° N, 66.9761° E)

Tab. 1: Skate species according to their observed months at KFH.

No.	Species	Months/ (March 2014 to April 2019)
1	<i>Glaucostegus cemiculus</i>	January, November
2	<i>Glaucostegus granulatus</i>	January, March, April, May
3	<i>Rhina ancylostoma</i>	March, April, May, June, November, December
4	<i>Rhinobatos horkelii</i>	August, September, December
5	<i>Rhinobatos punctifer</i>	February
6	<i>Rhinobatos annandalei</i>	May, September
7	<i>Rhinobatos halavi</i>	March, October
8	<i>Rhinobatos obtusus</i>	September
9	<i>Rhinobatos typus</i>	August
10	<i>Rhynchobatos djiddensis</i>	May

Tab. 2: Pooled biometric data of skates found at Karachi Fish Harbor during March 2014 to April 2019.

No.	Species	N	Male	Female	% age	length ± SD
1	<i>Glaucostegus cemiculus</i>	11	7	4	5.73	102.3±67.1
2	<i>Glaucostegus granulatus</i>	65	37	28	33.85	103.1±63.6
3	<i>Rhina ancylostoma</i>	44	19	25	22.92	102.8±64.0
4	<i>Rhinobatos horkelii</i>	33	13	20	17.19	100.5±65.9
5	<i>Rhinobatos punctifer</i>	1	0	1	0.52	97±0.0
6	<i>Rhinobatos annandalei</i>	8	4	4	4.17	88.3±52.3
7	<i>Rhinobatos halavi</i>	25	10	15	13.02	100.7±63.7
8	<i>Rhinobatos obtusus</i>	2	1	1	1.04	61±2.8
9	<i>Rhinobatos typus</i>	1	1	0	0.52	132±0.0
10	<i>Rhynchobatos djiddensis</i>	2	2	0	1.04	98.2±6.9

Kingdom Animalia
Phylum Chordata
Subphylum Vertebrata
Super class Gnathostomata
Class Chondrichthyes
Sub class Elasmobranchii
Super order Batomorphii
Order Rajiformes

Family Rhinidae
Genus *Rhina*
Species *Rhina ancylostoma* (Bloch and Schneider, 1801)

1. *Rhina ancylostoma* (Bloch and Schneider, 1801)
 Synonyms: *Rhina ancylostoma* (Swainson, 1839)

Recorded size range: 132–162 cm

It is considered as one of the largest species of elasmobranch family which has rounded snout. On the back side of the specimen and on the eyes and on the spiracles there are heavy ridges with greatly enlarged denticles. The colour of the body is greyish or brownish from the dorsal side of the body whereas the ventral part of the body is white in colour. Black spots are present on all over the body; on eyes, fins, shoulders as well as on the tail (Psomadakis, 2015).

Remarks: Reports of occurrence available from Pakistan. Well known species called as Bhuth–khair in local Sindhi language which is locally consumed and meat exported from Pakistan in dried and salted form as well as fins exported in dried form (Psomadakis *et al.*, 2015).

Family Glaucostegidae (Last, Séret and Naylor, 2016)

Genus *Glaucostegus* (Bonaparte, 1846)

Species *Glaucostegus halavi* (Forsskål, 1775)

2. *Glaucostegus halavi* (Forsskål, 1775)

Synonyms: *Rhinobatos halavi* (Forsskal, 1775), *Raja halavi* (Forsskal, 1775), *Scobatus halavi* (Forsskål, 1775), *Rhinobatus halavi* (Forsskal, 1775).

Size range: 52–102 cm

The body is slender like with a moderate snout which is bluntly pointed, its lateral margins are nearly straight. The body is uniformly tan from the dorsal surface except for the large translucent area on the snout whereas the ventral part of the body is white. The preorbital length is about 7.0-7.4 in the total length of the body 1-2 thorns are present on each shoulder. The rostral ridges close together for most their length, diverging a little anteriorly and posteriorly. 2 cutaneous folds are present on the posterior edge of the spiracles but only the 2nd one is well developed (Psomadakis, 2015).

Remarks: It is less known species which is found inshore waters (Compagno *et al.*, 1999). Reports of occurrence from neighboring countries like India and Oman are available on Fish Base (Compagno, 1999).

3. *Glaucostegus granulatus* (Sharpnose Guitar Fish)

Cuvier, 1829

Synonyms: *Rhinobatos granulatus* (Cuvier, 1829)

Size range: 15.5–83 cm

The body is slender shaped with a long snout. On the snout the rostral ridges joins together with the thorns on it. Its lateral margins are straight and rather concave and the preorbital length is about 4.7-4.9 in the total length (Bianchi, 1985). The body is grey-brown from the dorsal view whereas whitish from the below. There are 2 to 3 thorns on each shoulder of the specimen whereas a series of thorns is present on the central dorsal part of the body. The anterior nasal flaps are inserted at the nostril margin (Psomadakis, 2015).

Remarks: Reports of occurrence from Pakistan available in published literature. locally consumed and meat exported from Pakistan in dried and salted form as well as fins exported in dried form (Psomadakis *et al.*, 2015).

4. *Glaucostegus typus* (Anonymous [Bennett], 1830)
(Giant Shovel Nose Fish)

Synonyms: *Rhinobatus typus* Anonymous [Bennett], 1830; *Rhinobatos typus* Anonymous [Bennett], 1830; *Rhinobatos armatus* (Gray, 1834); *Rhinobatos batillium* Whitley, 1939.

Size: 132 cm

The body is slender like with a moderate snout which is long and sharply pointed from its tip having the cartilaginous part more than other species. The body is uniformly pale brown in color from the dorsal side whereas the ventral side of the body is white in color. The dorsal side of the body have white spots uniformly distributed on the whole body. The eyes are present behind the pointed snout which have spiracles behind it. This species can grow up to the length of 2.7m (Last and Steven, 2009).

Remarks: Found in marine, brakish and fresh water environment (Froese and Pauly, 2019). Reports of occurrence are available from Thailand to New Guinea, Solomon Islands, south to Australia. Whereas uncertain records from the south coast of India, Sri Lanka, Bangladesh, and Myanmar are also present; but from Pakistani waters this species has not been documented yet Moreover species known as critically endangered (CITES, 2015; IUCN, 2019).

5. *Glaucostegus cemiculus* (Blackchin Guitar Fish)

Geoffroy Saint Hilaire, 1817

Synonyms: *Rhinobatos cemiculus rasmus* (Garman, 1908); *Rhinobatus cemiculus* (Geoffroy Saint Hilaire, 1817); *Rhinobatos rasmus* (Garman, 1908); *Rhinobatos congolensis* (Gilktay, 1928).

Size range: 42–82 cm

This species is considered as one of the largest specie among the skate species which has a plain beige or sometimes brownish wedge-shaped disc. The disc is thick from centre. They have long, broad and triangular snout and on the tip of the snout there is a broadly rounded cartilage which has wide oblique nostrils with narrow opening. Very few thorns are present in between the dorsal fins, tail is long (Last *et al.*, 2016).

Remarks: Dwells in marine and brakish environment (Froese and Pauly 2019). Species is listed in the red list of threatened species (IUCN, 2018) besides this species is native to Atlantic and Mediterranean Sea. Occurrence in the Northern Arabian Sea is not known so far.

Family Rhinobatidae (Bonaparte, 1835)

Genus *Rhinobatos* (Linck, 1790)

Species *Rhinobatos obtusus* (Grey Guitar Fish)

Muller and Henle, 1841

6. *Rhinobatos obtusus* (Grey Guitar Fish) Muller and Henle, 1841

Synonyms: *Glaucostegus obtusus* (Muller and Henle, 1841)

Recorded size range: 59–63 cm

This type of species can easily be recognized by its physical character as they have shovel shaped disc with short and broadly triangular snout which has broad oblique nostrils with an oval anterior opening (Last *et al.*, 2016). The length of the nostril is almost have the twice length of its mouth and approximately equal to the internarial space. Their body is grey to brownish in color with white belly. Most of the adults have black blotches on its back (Raje *et al.*, 2007).

Remarks: Previous record of presence from Pakistani coastal waters is not available in published literature. However, species has been listed in the IUCN Red List of Threatened Species (Compagno and Marshall 2019). They can be easily found from both inshore and offshore demersal habitats (Compagno *et al.*, 1999). Species distribution according to available data is in Indo-West Pacific region off Pakistan to the "Malay Archipelago" (Froese and Pauly, 2019).

7. *Rhinobatos punctifer* (Spotted Guitar Fish) Compagno and Randall, 1987

Synonyms: *Rhinobatos punctifer* (Compagno and Randall, 1987).

Size range: 97cm

This species is considered as the similar specie to *Rhinobatos annandalei* but the disc of this is narrower than the *R. annandalei*. The eyes are reduced and sometimes in Pakistani species they are absent in adult specimen. There are spines on shoulders and in the mid of the specimen extending towards the spiracle. This specie can be easily rectified from the other species as they have very prominent wavy lines on the dorsal greyish surface of the body as well as they also have widely scattered spots on the entire specimen body (Psomadakis *et al.*, 2015).

Remarks: Well recognized species found in Western Indian Ocean. Reports of occurrence pertain records of presence from Gulf of Aqaba, Gulf of Suez, Red Sea, Muscat (Oman) to Pakistan (Last *et al.*, 2016). This species is recognized as nearly threatened (NT) (Ebert *et al.*, 2017).

8. *Rhinobatos annandalei* (Bengal Guitar Fish)

Norman, 1926

Synonyms: *Rhinobatos annandalei* (Norman, 1926)

Recorded size range: 63–95 cm

This Bengal Guitar Fish have moderate snout which is bluntly pointed. Their anterior nasal flaps falling well short of each other. The rostral ridges present on the snout are more or less separated throughout their length but are anteriorly parallel and posteriorly diverging little. On the dorsal side of specimen, a media band of fairly small close-set of spines are present. There are 2 cutaneous folds are present on the posterior edge of the spiracles, the inner one fold is shortest. It is a less known specie but when collected from Pakistan they were dorsally brownish in colour (Psodomadakis *et al.*, 2015).

Remarks: Species was listed in IUCN red list of threatened species (Valenti, 2009). This demersal fish dwells in marine and brakish environment (Last *et al.*, 2016) and distribution has been described from Oman to India and Sri Lanka in the Indian Ocean.

Genus *Rhynchobatus* Müller and Henle, 1837

Species *Rhynchobatus djiddensis* (Frosskal, 1775)

9. *Rhynchobatus djiddensis* White spotted wedge fish (Frosskal, 1775)

Synonyms: *Raja djiddensis* Forsskål, 1775, *Rhinobatus maculata* Ehrenberg, 1829, *Rhynchobatus djiddensis* (Forsskål, 1775), *Rynchobatus djiddensis australiae* Whitley, 1939.

Recorded size: 167 cm

These species of elasmobranchs are also known as the giant guitar fish which have long and pointed snout with large black eyespots on the dorsal surface of the head. The body of this specie can be easily distinguished by the prominent rows of white spots on the upper body which covers the whole body till the tail (Compagno *et al.*, 1989). The body is olive green from the upper side whereas it is whitish in colour from the lower portion.

Remarks: Carpenter *et al.* (1997) reported the species from Persian Gulf. However, according to previous reports distribution is confined to the Red Sea and tropical waters of western Indian Ocean to South Africa. Misidentified with closely resembling northern and eastern Indian Ocean species. Previous record of occurrence from Pakistan is not available.

Genus *Pseudobatos* (Last, Séret and Naylor, 2016)

Species *Rhinobatos horkelii* (Brazilian Guitar Fish) Muller and Henle, 1841

10. *Pseudobatos horkelii* (Brazilian Guitar Fish)

Muller and Henle, 1841

Synonyms: *Rhinobatus horkeli* (Muller and Henle, 1841); *Rhinobatos horkelii* Müller and Henle, 1841.

Size range: 29–84 cm

The upper surface of the body is uniformly olive grey or chocolate brown and there are no specific markings on the body of this specimen. The crown of the body is flat which is transversely convex and the origin of the 1st dorsal fin is posterior to the pelvic fin. The thorn like tubercles are arranged in median row (Bigelow and Schroeder, 1953).

Remarks: Species is well known critically endangered species (CE) species (Lessa and Voren, 2016; CITES, UNEP-WCMC 2017; IUCN, 2018). Species distribution is limited to Western South Atlantic Ocean from Rio de Janeiro to Argentina. Therefore presence in Pakistani waters is uncertain which needs thorough investigation.

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Plate 1: Dorsal and ventral view of -*Rhinobatus obtusus*.



Plate 2: Skates species found at Karachi Fish Harbour during 2014-2019.

A-*Glaucostegus cemiculus*, B-*Glaucostegus granulatus*, C-*Rhina ancylostoma*, D-*Rhinobatos punctifer*, E-*Rhinobatos halavi*, F-*Rhinobatos obtusus*, G- *Rhynchobatos djiddensis* H- *Rhinobatos horkelii*.