First report of the crocodile shark
*Pseudocarcharias kamoharai*
(Matsubara,1936) from Chennai, southeast coast of India

Shoba Joe Kizhakudan* and S. Rajapackiam
Madras Research Centre of Central Marine Fisheries Research Institute, Chennai -600028, Tamil Nadu, India.

*Correspondence e-mail: shobajoe@rediffmail.com

Received: 27 Jul 2012, Accepted: 30 Mar 2013, Published: 30 Apr 2013

Abstract
This paper reports the occurrence of the crocodile shark *Pseudocarcharias kamoharai* in the waters off Chennai in the south-east coast of India and is a new locality record for the species, confirming its distribution in the Bay of Bengal. *P. kamoharai* is the only representative of the family Pseudocarchariidae and is the smallest known living mackerel shark (Order: Lamniformes). A single adult male specimen measuring 91 cm in total length and weighing 2.2 kg weight was collected from the landings by a deep sea trawler at Chennai Fisheries Harbour, caught in hook and line operations for yellow-fin tuna in the waters off the Chennai – Puducherry coast, at a depth of 300 m. Reported to occur as by-catch in Japanese yellow fin tuna long line fishery and Australian swordfish fishery, both in the Indian Ocean, it has been classified as "Near Threatened" by IUCN.

Keywords: Bay of Bengal, Chennai, crocodile shark, *Pseudocarcharias kamoharai*, South-east India.

Introduction
The crocodile shark *Pseudocarcharias kamoharai* (Matsubara, 1936) is the only representative of the family Pseudocarchariidae and is the smallest known living mackerel shark (Order: Lamniformes). Known to be circumtropical in distribution, with its range extending from Eastern Atlantic Ocean to the Pacific Ocean, its occurrence in the Indian Ocean has been reported from the Mozambique Channel, southwest of southern Madagascar while its distribution in the Bay of Bengal has been reported as doubtful (D’ Aubrey 1964; Long and Seigel, 1997).

There is no known fishery for the species and it does not find much commercial significance on account of its rare abundance in well-exploited fishing grounds, small-size and low quality of meat. No data is available on the population status of this species and its abundance has been reported only in the Mozambique Channel in the Western Indian Ocean in the 1960s (Compagno, 2001). The present report records the occurrence of *P. kamoharai* in the waters off Chennai in the south-east coast of India and is a new locality record for the species, confirming its distribution in the Bay of Bengal.

Material and methods
On February 10, 2011, a single specimen of the crocodile shark *P. kamoharai* was collected from the landings by a deep sea trawler at Chennai Fisheries Harbour. The specimen had been caught by hook and line operated for yellow-fin tuna in the waters off the Chennai – Puducherry coast, at a depth of 300 m. The specimen was identified and photographed and morphometric measurements were recorded. The liver was
First report of crocodile shark from Chennai

First report of crocodile shark from Chennai

Results and discussion

Pseudocarcharias kamoharai (Matsubara, 1936) (Fig. 1)

Order : Lamniformes
Family : Pseudocarchariidae
Material examined: male (adult), 91 cm TL, 2.2 kg whole body weight

Diagnosis: A slender-bodied shark with a cylindrical trunk. Head short with moderately long bluntly pointed snout. Eyes large, nictitating eyelids absent. Five pairs of gill slits placed before pectoral fins, all gill slits highly elongate, extending onto dorsal surface of head. Gill rakers absent on internal gill slits. Large mouth placed ventrally on head and bearing large awl-like narrow teeth (Fig. 2); first dorsal fin small, low and angular, placed almost midway between snout and caudal tip; nonpivoting second dorsal fin placed far back near caudal peduncle, smaller than first dorsal but larger than anal fin; anal fin pivotable; pectoral fins small and broad; pelvic fins smaller than first dorsal fin and pectoral fins; caudal fin asymmetrical, not lunate, with moderately long upper lobe and short but strong lower lobe. Caudal peduncle slightly depressed; pre-caudal pits present; lateral keels on caudal peduncle low. SL 77.5% of TL; HL 18.1% of TL; eye diameter 20% of HL; second dorsal fin height only 48% of first dorsal fin height. Detailed morphometric measurements are given in Table 1.

The large liver is known to be rich in squalene and is of potential value. The liver in the specimen described here was very oily in touch and gave off a pungent odour. It measured 42 cm in length (60% in the SL) and weighed 0.5 kg, accounting for 22.7% of the total body weight of the shark and occupying almost the entire body cavity (Fig. 3).

Colour: Dark greyish-brown dorsally, fading towards the ventral portion. Fins with dark margins lined thinly with

Table 1. Morphometric details of the crocodile shark Pseudocarcharias kamoharai (male) landed at Chennai

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Measurements (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total length</td>
<td>910</td>
</tr>
<tr>
<td>Standard length</td>
<td>705</td>
</tr>
<tr>
<td>Distance from snout to origin of first dorsal fin</td>
<td>350</td>
</tr>
<tr>
<td>Distance from snout to origin of second dorsal fin</td>
<td>585</td>
</tr>
<tr>
<td>Distance from snout to origin of pectoral fin</td>
<td>210</td>
</tr>
<tr>
<td>Distance from snout to origin of pelvic fin</td>
<td>510</td>
</tr>
<tr>
<td>Distance from snout to origin of ventral fin</td>
<td>560</td>
</tr>
<tr>
<td>Distance from snout to first gill opening</td>
<td>165</td>
</tr>
<tr>
<td>Distance from snout to second gill opening</td>
<td>180</td>
</tr>
<tr>
<td>Distance from snout to third gill opening</td>
<td>193</td>
</tr>
<tr>
<td>Distance from snout to fourth gill opening</td>
<td>206</td>
</tr>
<tr>
<td>Distance from snout to fifth gill opening</td>
<td>216</td>
</tr>
<tr>
<td>Base of first dorsal</td>
<td>65</td>
</tr>
<tr>
<td>Height of first dorsal</td>
<td>58</td>
</tr>
<tr>
<td>Base of second dorsal</td>
<td>30</td>
</tr>
<tr>
<td>Height of second dorsal</td>
<td>28</td>
</tr>
<tr>
<td>Base of pectoral fin</td>
<td>40</td>
</tr>
<tr>
<td>Height of pectoral fin</td>
<td>32</td>
</tr>
<tr>
<td>Base of pelvic fin</td>
<td>45</td>
</tr>
<tr>
<td>Height of pelvic fin</td>
<td>45</td>
</tr>
<tr>
<td>Base of ventral fin</td>
<td>15</td>
</tr>
<tr>
<td>Height of ventral fin</td>
<td>24</td>
</tr>
<tr>
<td>Distance from snout to eye</td>
<td>65</td>
</tr>
<tr>
<td>Eye diameter</td>
<td>33</td>
</tr>
<tr>
<td>Distance from snout to mouth</td>
<td>45</td>
</tr>
<tr>
<td>Distance from snout to nostril</td>
<td>70</td>
</tr>
<tr>
<td>Internarial distance</td>
<td>28</td>
</tr>
<tr>
<td>Length of upper jaw</td>
<td>140</td>
</tr>
<tr>
<td>Length of lower jaw</td>
<td>105</td>
</tr>
<tr>
<td>Length of claspers</td>
<td>80</td>
</tr>
<tr>
<td>Length of gonad</td>
<td>85</td>
</tr>
<tr>
<td>Length of liver</td>
<td>420</td>
</tr>
</tbody>
</table>
whitish edge. A large whitish blotch present between corner
of jaw and first gill slit.

Although no fishery importance is accorded to the crocodile
shark, some of their life history characteristics like small litter
size of four pups per litter (Fujita, 1981; White, 2007) and
a tendency for in-utero oophagy (Fujita, 1981; Compagno,
2001) give reason for concern in the light of increasing reports
of crocodile shark landing as by-catch of pelagic longline
fishery in the south-western Indian Ocean, off Australia (Ariz
et al., 2006; Hender et al., 2007). In spite of the distribution
range attributed to the species, it has been reported to occur
mostly from waters falling within the 20°C mean annual sea
surface temperature isotherm, and seldom from the higher
latitudes in the Indian Ocean (Romanov et al., 2008). The
present report thus confirms the occurrence of _P. kamoharai_ in
warmer waters of the Indian subcontinent.

Conservation status: _P. kamoharai_ has been classified as Near
threatened (NT) by International Union for Conservation of
Nature (IUCN) (Compagno and Musick. 2000)

Acknowledgements

We are thankful to Dr. G. Syda Rao, Director, CMFRI, Dr. E.
Vivekanandanan, Scientist-in-charge, Madras Research Centre
of CMFRI and Dr. P.U. Zacharia, Head, Demersal Fisheries
Division, CMFRI for the encouragement given. We sincerely
thank Dr. Douglas J. Long, Chief Curator, Department of Natural
Sciences, Oakland Museum of California, for confirming the
identification of the specimen.

References

catch rate data by hook type and bait for bycatch species caught by Spanish
Paper presented at IOTC Working Party on Bycatch, 31 July and 1 August 2006,

of shark species known to date. Volume 2. Bullhead, mackerel and carpet sharks
Heterodontiformes, Lamniformes and Orectolobiformes). FAO Species Catalogue
for Fishery Purposes. Rome (Italy), FAO, 2[1], 269 p.

IUCN Red List of Threatened Species. www.iucnredlist.org


Fujita, K. 1981. Oviphagous embryos of the pseudocarcharid shark, _Pseudocarcharias

Hender J. P. Ward, E. Knight and R. Darbyshire. 2007. Pilot Scientific Monitoring
Program for the Western Tuna and Billfish Fishery. Final Report (2003–06). BRS,
Canberra, Australia. 42 p.

(Selachii: Lamnidae) from pelagic waters off Baja California, Mexico. _Oceanides _
12: 60-63.

Matsubara, K. 1936. A new carcharoid shark found in Japan. _Zooligical Magazine
(Tokyo) 48(7): 380-382._

crocodile shark (_Pseudocarcharias kamoharai_) distribution and abundance trends
in pelagic longline fisheries. Paper presented at IOTC Working Party on
Environment and Bycatch (WPEB) Bangkok, Thailand 20-22 October, 2008 (draft).