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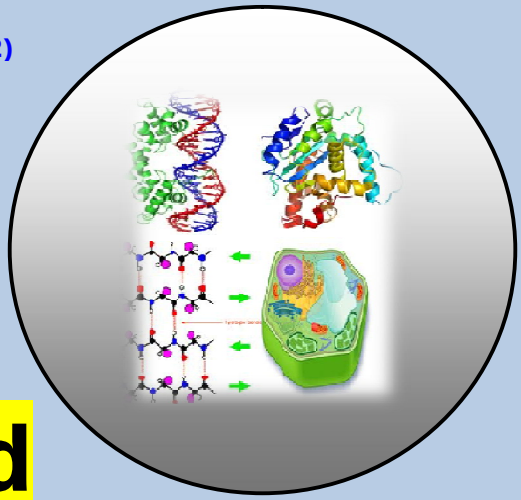
ISSN 0970-4973 (Print)
ISSN 2319-3077 (Online/Electronic)

Index Copernicus International Value
IC Value of Journal 4.21 (Poland, Europe) (2012)
Global Impact factor of Journal: 0.587 (2012)



J. Biol. Chem. Research
Volume 31 (1) 2014 Pages No. 309-316

Journal of Biological and Chemical Research

(An International Journal of Life Sciences and Chemistry)

Published by Society for Advancement of Sciences®

J. Biol. Chem. Research. Vol. 31, No. 1: 309-316 (2014)
(An International Journal of Life Sciences and Chemistry)
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ISSN 0970-4973 (Print)
ISSN 2319-3077 (Online/Electronic)

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RESEARCH PAPER
Received: 24/11/2013 Revised: 22/02/2014 Accepted: 23/02/2014

Abundance of Vulnerable Ray Species *Himantura undulata* in the Bay of Bengal

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ABSTRACT

The study was carried out during July, 2009 to June.2013 continually on the vulnerable ray species, Leopard whip ray- Himantura undulata (Bleeker, P, 1852) and its total landing, total landed number and parentage contribution were recorded from the selected two fish landing centers at BFDC Fish harbour, Cox's Bazar and Fishery ghat, Chittagong district. A highest landing volume was recorded 0.420 MT in the month of March, 2010 and lowest was 0.112 MT in August, 2011 periods. And average highest and lowest landing of H. undulata were 52.5 kg and 2.88 kg in the month of November, 2012 and in March,2009 period respectively.

During 2009-2010 H. undulata contributed only 0.560 MT (0.33 %) followed by 2010-2011, 2011-2012 and 2012-2013 period were 0.893 MT (0.28%), 0.882 MT (0.23%) and 0.434MT (0.12%) of the year wise total landing volume of sharks and rays respectively.

Month wise maximum and minimum recorded numbers of landed H. undulata were 59 and 4 in the month of November, 2012 and July, 2009 respectively. The highest and lowest percentage contribution were analyzed 2.54% and 0.28% in July, 2009 and March, 2013 respectively in the month wise total landing amounts of sharks and rays. For its commercial importance and fishing pressure is now in vulnerable position by the IUCN.

Key words: Abundance, Total Landing, Percentage Contribution, Commercial Importance and IUCN.

INTRODUCTION

The shark fisheries (shark and ray species) in Bangladesh are mostly artisanal, sharks are harvest as target species mainly by shark net (modified gill net) and hook and lines and as a by catch in other commercial fishing; rays are captured only as by catch in hook and lines and sometimes exploits in trammel net and set bag net also (Roy, J.R & et. al, 2007). Only 80-100 numbers of mechanized boats are engaged in commercial fishing for sharks and rays at Cox's Bazar and Chittagong districts, the fishing are took place in the east and west part of the Bay of Bengal in Bangladesh region. A large numbers of small size juveniles or new born sharks and rays are caught by shrimp and fish trawlers , which were not recorded or reported, for small size and low market value and discarded it as a trash (Roy, J.R & et. al. 2007).

The multi species coastal fisheries, at both artisanal and commercial levels, comprise of 56 species of sharks and rays (Day, F. 1969) and Roy (2011) recorded 35 species of sharks (11 species) and rays (24 species) in our marine territory.

Rays are caught and sold at a reasonable price; rays appear predominantly in the shallower strata up to 50 m depth (Malaysia, NOPA- Shark, 2006). Rays are not homogeneously distributed over the whole area but mainly found in two zones, one is near Elephant point and the other in the center of the middle ground area (near Mohipur) (Lamboeuf, M,1987).

In Bangladesh, there are only a few small shark fisheries processing plants in the form of cottage industry operate mostly by fisher flocks due to the irregular supply of shark and ray species (Roy, 2007). Rays are mostly consuming as a fresh meat, some are process as salted fish and dried form. During 2011-12 the total marine fish production was 578,620 MT of which shark fishery contributed only 0.80% (4205 MT) (DoF, 2011-2012).). The International Union for conservation of Nature (ICUN, 2009) has assessed the Leopard whip ray as vulnerable, as it faces heavy fishing pressure and habitat degradation across much of its range (Internet, July,2011). So the study was under taken to know the present status of the species in Bangladesh.

MATERIAL AND METHODS

The field study was conducted from July, 2009 to June, 2013 in two shark and ray fish landing centers at BFDC Fish harbour, Cox's Bazar and Fishery ghat fish landing center, Chittagong district. These sampling centers selected in order to cover a wide range of the most landing centers, retail and whole sale markets, target and incidental catches of the species, from the Bay of Bengal of Bangladesh region.

Month wise total landing data, total numbers were recorded both at landing stations and formal face to face interview of boat owners/divers of commercial fishing vessels by Scientific Officer (total five) and field stuff (ten) alternately. The data were collected in new-moon, full-moon, first quarter, last quarter and other days of the moon month from the landing centers. Sampling days are 8 in each month of the year continuously by the Marine Fisheries Survey Management Unit, Chittagong. Data processing and analyzing has done by manually and using computer.

RESULTS AND DISCUSSION

Species description and Distribution

The Leopard whip ray- *Himantura undulata* (Bleeker, 1852) is a species of sting ray in the family Dasyatidae, distributed widely in the shallow waters near the shore, close to land than the breaking waves and in Indo-pacific region from Bay of Bengal to Northern Australia. It is not found at all in the western Indian Ocean (Internet, July, 2011). Distribution by depth strata rays 10-20 m-899, 20-50 m-71, 50-80m 08, 80-100 m-2, Av 10-100-214. According to the F/V Jalwa survey the most however this was not confirmed by any of the other surveys (Lambeouf, M, 1987).

The species attain 140cm (disc width); size at birth is 20 cm DW (White, W.T & et. al, 2006) across and has a diamond-shaped disc with rounded corners and a projecting, pointed snout. Its tail is long and whip like without fin folds. Adults have a striking dorsal color pattern consisting of large, dark brown rings and reticulations delineated by thin yellow lines, while juveniles have a pattern of large dark spots. Mating season occurs in the winter. In the year 2009-2010, 2010-2011, 2011-2012 and 2012-2013 total 158 numbers of *H. undulata* were landed and their total weight were recorded 2769.0 kg from these landing centers. In this study period, recorded highest length and weight of *H. undulata* were 110 cm (DW) and 55.0 kg respectively. During these periods, just born small size of *H. undulata* was recorded in 22 cm (DW) and weight was 170 gm; where mother's body weight was 0.132 kg and DW 110cm in the month of March, 2010 which is nearly similar to the White, 2006 report. During the study period abundance of *H. undulata* was very rare. It was found only in 12 months out of 60 months (5 years study period) from selected two lading centers and it's contributed less than 3.0 % of the total month wise catch of sharks and rays landing volumes. So, for the vulnerable elasmobranches species need proper management plan. Roy, 2011 reported that, 'the very rare ray's species were *H. undulata* contributed 1.54% and 2.17%, which found in the month of July, 2009 and March, 2010 respectively. In the study period observe that, in immature stage of *Himantura undulata* was seen many black spot to the dorsal view of the whole body and in virtual side dark line present to the anterior lobe and in mature stage reticulate dark brown rings present in the dorsal side of the body (Fig-2).

Most rays are viviparous, bearing live young in "litters" of five to ten. It is listed as vulnerable on the IUCN Red List due to over harvesting and loss of its preferred shallow water inshore habitats near mangrove (Wild Fact sheet, 2013).

Landing

Year wise: In the year 2009-2010 total 172.266 MT of exploiting sharks and rays were recorded, among them *H. undulata* contributed only 0.33 % (0.560 MT). During 2010-11 total landing of *H. undulata* was recorded 0.893 MT (0.28%), where landing volume of total sharks and rays was 314.367 MT. In 2011-12 periods *H. undulata* contributed 0.23% (0.882 MT) of the total landed (382.670MT) shark and ray species. During 2012-2013 total landing of sharks and rays was 362.406 MT; on which landing amounts of *H. undulata* was 0.434 MT or 0.12% (Table, 1).

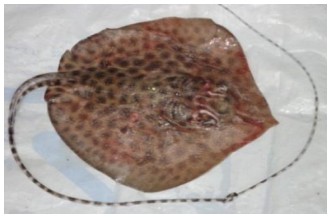

Fig: *H. undulata* (Dorsal view-Immature stage)

Fig: *H. undulata* (Ventral view-Immature stage)

Fig: *H. undulata* (Dorsal view-Mature stage)

Fig: *H. undulata* (Ventral view-Mature stage)

Fig 1. 2 Immature and Mature stage of *Himautura undulate.*

Month wise

During July, 2009 to June, 2010 month wise total landing volume of *H. undulata* was recorded 0.140 MT in the month of July, 2009 and in March, 2010 total landing was 0.420 MT. In July,2010 to June,2011 period total landing amounts was 0.218 MT in the month of November,2010 followed by 0.400 MT and 0.275 MT were in January,2011 and May,2011 respectively. During July,2011 to June,2012 total landing was 0.350 MT in the month of July,2011 followed by 0.112 MT, 0.195 MT and 0.225 MT were in August, 2011, April, 2012 and May, 2012 respectively. In July,2012 to June, 2013 total catch was 0.170 MT in the month of November,2012, 0.141 MT in March, 2013 and 0.123 MT in May,2013 period (Table, 1 & Fig, 1).

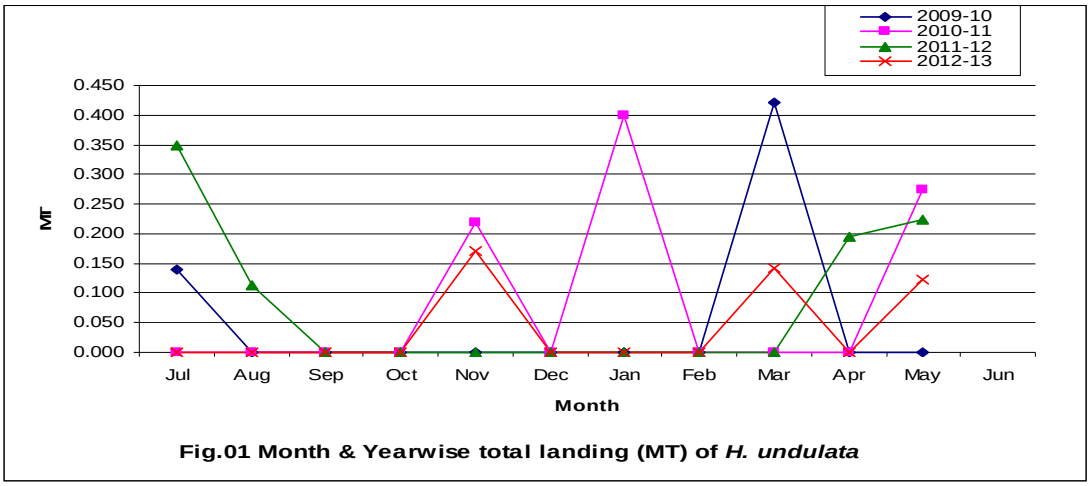

Fig.01 Month & Yearwise total landing (MT) of *H. undulata*

Total Numbers

Month wise total landed numbers of *Himantura undulata* were recorded during the study period, during July, 2009 to June, 2010, a total 12 numbers were landed, of which 4 numbers was landed in the month of July, 2009 and 8 was in March,2010 period.

In July2010 to June2011 total 6 numbers were recorded in November, 2010, followed by 8 and 13 numbers in January, 2011 and May, 2011 respectively.

During July,2011 to June,2012 total 10 numbers were landed in July,2011, followed by 14, 12 and 9 numbers were recorded in August 2011, April, 2012 and May, 2012 respectively.

Table 1. Month wise and Year wise Total landing, Percentage contribution and Total number of *H. undulate.*

Month	July,09- June,10				July,10-June,11				July,11- June,12				July,12- June,13			
	TL (MT)	HU(MT)	%	TN	TL(MT)	HU(MT)	%	TN	TL(MT)	HU(MT)	%	TN	TL(MT)	HU(MT)	%	TN
July	172.266 MT	0.140	2.54	4	314.367 MT	-	-	-	382.670 MT	0.350	2.35	10	362.406 MT	-	-	-
August		-	-	-		-	-	-		0.112	0.63	14		-	-	-
September		-	-	-		-	-	-		-	-	-		-	-	-
October		-	-	-		-	-	-		-	-	-		-	-	-
November		-	-	-		0.218	1.15	6		-	-	-		0.170	0.41	59
December		-	-	-						-	-	-		-	-	-
January		-	-	-		0.400	0.91	8		-	-	-		-	-	-
February		-	-	-		-	-	-		-	-	-		-	-	-
March		0.420	2.17	8		-	-	-		-	-	-		0.141	0.28	5
April		-	-	-		-	-	-		0.195	0.84	12		-	-	-
May		-	-	-		0.275	1.80	13		0.225	1.76	9		0.123	0.59	10
June		-	-	-		-	-	-		-	-	-		-	-	-

 # TL= Year wise Total landing of shark & rays; HU =Total landing of *H. undulata;* TN= Total number, %= Percentage contribution.

In the period July,2012 to June,2013 total 71 number of species were recorded, among them 59 number of species was landed in the month of November,2012, 5 in March,2013 and 10 in May,2013 respectively (Table, 1).

Percentage contribution

Month wise percentage contribution by weight of *H. undulata* was analyzed, during July, 2009 to June, 2010 percentage composition of *H. undulata* was 2.54 in the month of July, 2009 and 2.17% in March, 2010. In July,2010 to June,2011 period total percentage contribution was found 1.15% in the month of November,2010 followed by 0.91% and 1.80 % were in the month of Jannuary,2011 and May,2011 respectively.

During July, 2011 to June,2012 percentage contribution was analyzed 2.35% in the month of July,2011 followed by 0.63%, 0.84%, 1.76% were in August,2011, April,2012 and May,2012 respectively. In July, 2012 to June, 2013 period percentage composition was found 0.41 in the month of November,2012, 0.28% in March,2013 and 0.59% in May, 2013 of the month wise total catch of shark and ray species(Table,1).

Rays contributes approximately 1% (22,204.80 tons) in the total marine landing in India, most of them are sting ray. The following sting ray species are available in Parangipettai coast, Tamil Nadu, India -*Dasatis sephen, D. imbricata, D. benneti, D. jenkensi, Himantura walga, H. uarnak, H. bleekeri, H. undulata, H. gerradi, Mobula diabolus, Aetabatus narinari, A. flagellum*, but *Himantura undulata* are rare in position in the same coast (Rojesh, K,R, 2010).

Utilization

Small size of shark and ray used to produce fish meal and fertilizer if markets of human consumption are not available (Compagno, L.J.V, 1984). In Bangladesh, small size and less weight of *H. undulata* used as dried form for human consumption, fish meal for fish cultural pond and used in poultry industry as poultry feed which are related to the Compagno, 1984 reference. The flesh of *H. undulata* used in the local market at some non-Muslim people, tail used locally as whip, bones use in medicine and cosmetics industry and dorsal view of skin export as dried formed in China, Korea, Hong Kong, Singapore, UAE and Dubai to made ladies bags, money bags and ladies shoes. This species is commercially valuable, with most specimens caught as by catch landed and sold. Bleeker's Variegated Whip ray is important in the gill and tangle net fisheries in Indonesian waters, which likely also includes adjacent waters (White, W.T, 2006 and Last, P.R, 2010).

The exploitation of vulnerable ray species *H. undulata* is as by catch and rare; its abundance of small size increase with the decrease of large size, which is now in vulnerable position by the IUCN for its economic importance. The threats to Bleeker's variegated whip ray are many of those faced by other *Himantura* species within its range. Bleeker's variegated Whip ray may be more vulnerable than some of its congeners due to its large size at maturity and maximum size and its preference for inshore coastal waters that are heavily fished and degraded in many parts of its range (Manijaji, B.M & et. al, 2004).

It has been observed that, during 2009-2010 total landed numbers and average weight of *H. undulata* were 12 numbers & 46.66 kg in each, followed by 27 num. & 33.07 kg, 45 num. & 19.60 kg and 74 num. & 5.86 kg in the year 2010-11, 2011-12 and 2012-13 respectively and analyzed that landed total numbers of *H. undulata* was gradually increased but average landing weight was gradually decrease. So it is clear that, in before exploitation of Leopard whip ray were large in size and weight but now days it is captured small in size & weight. For the fishing pressure, it is now in vulnerable position, same as by the IUCN, 2009 report.

ACKNOWLEDGEMENTS

Many thanks to Mr. Kabiruddain Bhoywa, Administrative Officer, Marine Fisheries Surve Management Unit to help all graphic design.

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