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A preliminary assessment of shark bycatch in tuna gillnet fisheries of Pakistan (Arabian Sea)

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Abstract

There are about 500 tuna gillnet vessels targeting tuna and tuna like species off Pakistan. In order to assess the shark bycatch in tuna gillnet fisheries of Pakistan, skippers trained by WWF were charged to record catch and bycatch data on four gillnet vessels from a period of January 2013 to June 2015. This report provides information on shark bycatch. A total of 4,537 sharks with a catch rate of 33.31 per km^2 of net over the study period was recorded.. The most common species was *Rhizoprionodon acutus* (41.3%, capture rate 15.99 per km^2 of net), *Carcharhinus falciformis* (25.08%, capture rate 6.15 per km^2 of net), and *Isurus oxyrinchus* (25.03%, capture rate 8.17 per km^2 of net) were found in four boats. Other species caught included *Carcharhinus amblyrhynchos* (n=136), *Alopias pelagicus* (n=112), *Carcharhinus sorrah* (n=83), *Sphyrna* spp. (n=27), oceanic whitetip (n=19), whale shark (n=1) and 1 unidentified species (n=7).

Introduction

The incidental catch of sea turtles in passive net fisheries is one of the main threats for these species at the global scale (Price and Van Salisbury 2007). In Pakistan, gillnets are used in continental shelf and open-ocean waters (beyond the EEZ) to catch tuna and other large pelagic fishes (IOTC, 2013). Sharks are considered important bycatch of tuna gillnet operations for its meat. A a number of shark species inhabits pelagic ecosystems. A list of shark species was shared with Working Party on Ecosystem and Bycatch (IOTC, 2012). However, the species composition of sharks has not been reported in previous studies and is based on observations from the landing sites. Here, we aimed at documenting sharks bycatch using observer data (trained skippers) on-board tuna gillnet vessels from January 2013 to June 2015. Additionally, this report highlights an ongoing program that is being implemented to ensure the safe release of entangled Whale sharks in tuna gillnet operations.

Methodology

Materials and Methods

Fishery description
Off Pakistan, tuna are mainly caught using gillnets. It is estimated that more than 500 fishing boats are exclusively engaged in tuna fishing. Most of these vessels operate from Karachi harbor; whereas some gillnet vessels operate on the west coast from Gwadar. In this study we sampled four vessels operating from Karachi harbor. These boats are entirely made of wood. The size of these boats range from 15 to 20 m. The net lengths of the sampled vessels ranged from 4000 to 7000 m in length. They

are made of monofilament nylon and/or multifilament nylon. These nets are placed at the surface (pelagic gillnets) and have a height of 10 – 14 m from the surface with a stretched mesh size of 13 to 17 cm. The net is usually set in early morning and hauling starts after 12 hours, and it takes about 2-3 hours on average to haul the net. Sampled vessels mostly operate in the north-eastern Arabian Sea. Fishing operations were confined to the continental shelf waters of the Indus canyon area (Fig. 1).

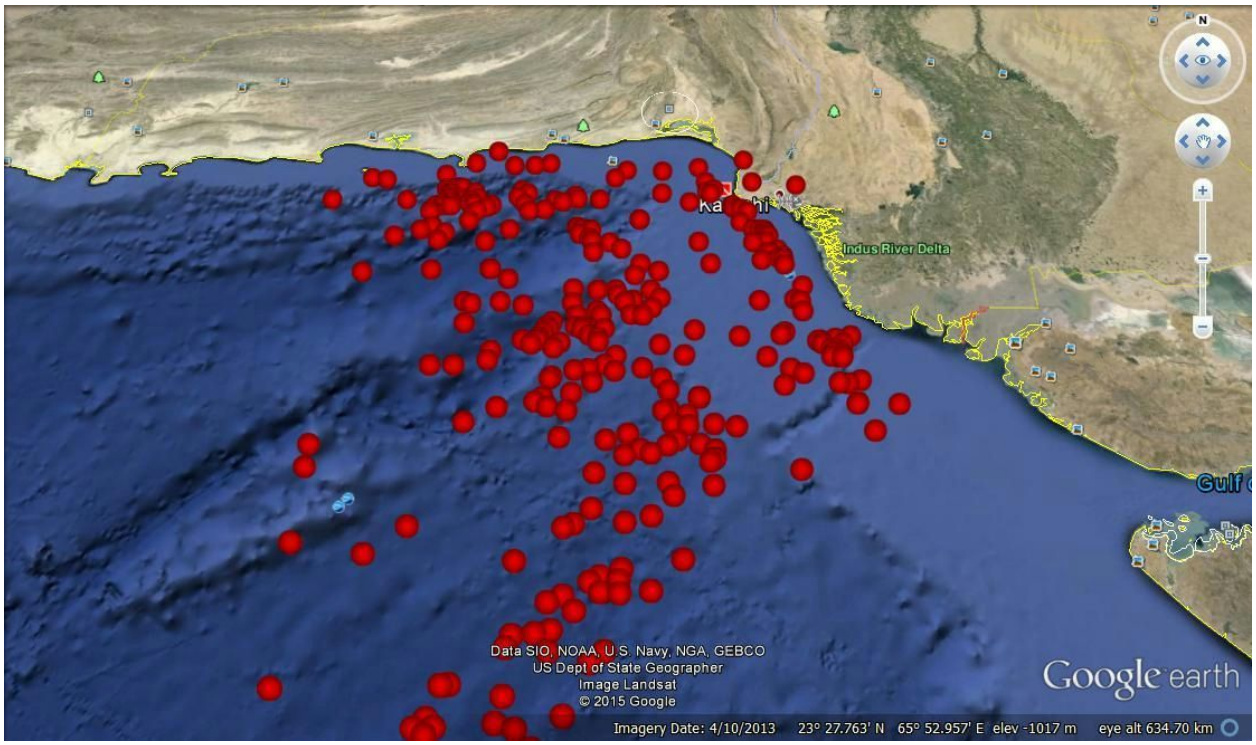

Figure 1: Location of fishing operations of the four sampled vessels in the Arabian Sea.

Data Collection and observer training

Training of the four tuna gillnets fisheries bycatch surveyors was a very important matter for the success of the study. The four skippers account for 0.8% coverage of the total tuna gillnet vessel operating in Pakistan. Emphasis was given on learning from fisher experiences and understanding their concepts on target and non-target species. Species identification guides for sharks prepared by Indian Ocean Tuna Commission were designed and printed in local language (Urdu) and comprised of shark species names in Sindhi and Balochi. These were important as fishers would generally categorize different species of sharks as 'sharks' or 'mangra' more commonly in local language. General guidelines were developed to ensure identification and measurements are properly recorded, and that data is consistently reported. The trained skippers acting as observers of the tuna gillnet vessels were trained to document all the fish catch on a daily basis. They recorded the fishing hours, documented the number of days fished, length of net to estimate the effort. We trained the skippers to record data for all shark species including their lengths and weight. However in some instances it is missing as the skippers once busy in hauling the net get busy in sorting the catch. The four observers on their individual vessels recorded catch (tuna and tuna like species) and bycatch (sharks, turtles, cetaceans) data from January 2013 to June 2015. The observers were provided digital cameras (to

confirm doubtful species identifications), global position system (GPS) devices and data recording templates based on Indian Ocean Tuna Commission (IOTC) requirements.

We looked at the bycatch data from four gillnet vessels *(listed in results as 1, 2, 3, and 4)*, and focused on the shark catches. Once data were recorded, we defined safe-release practices for bycaught species, such as whale sharks, whales, dolphins, sea turtles and sea birds. These included, i)handling while hauling of the net *i.e. to lift the net when a species if confirmed to be entangled alive,* ii) handling in the water while entangled, *i.e. fishers being in the water trying to release or untangle the bycaught species,* and iii) release back in the sea *i.e. when fully untangled from the net.*

Data Analysis

Capture rates of sharks and species wise composition have been reported as the number of individuals caught per kilometer of net in the four observed vessels. As the net height (depth) was found to be inconsistent (10 – 14 m), we took the measure of length and height (depth) in square kilometer and took its relationship with number of fishing days to account the capture rates per square kilometers of length deployed during the study period. This was helpful in determining the capture rate for sharks for the four boats (N=number of turtles caught /total square kilometers of net deployed).

Preliminary Results

During the study period, and 526 fishing days, 4,537 sharks were captured from January 2013 to June 2015: the CPUE was calculated as 33.31 sharks caught per sq. Km of net for the study period i.e. 30 months and fishing days. *R. acutus (number caught* 1,878, 41.39% occurrence, capture rate 15.99), *C. falciformis* (number caught 1,138*, occurrence 25.08%,* capture rate 6.15), *I. oxyrinchus* (number caught 1,136*,* occurrence 25.03%, capture rate 8.17), *C. amblyrhynchos* (number caught 136, occurrence 2.99%, capture rate 0.84), *A. pelagicus* (number caught 112, occurrence 2.46%, capture rate 0.88), *C. sorrah* (number caught 83, occurrence 1.82%, capture rate 0.61), *Sphyrna spp.* (number caught 27, occurrence 0.59, capture rate 0.16), *C. longimanus* (number caught 19, occurrence 0.41%, capture rate 0.15), unidentified spp. (number caught 7, occurrence 0.15, capture rate 0.04) and *R. typhus* (number caught 1, occurrence 0.02%, capture rate 0.005). All sharks hauled on-board vessels were landed at Karachi fish harbor and auctioned. During the study period 12 whale sharks (*R. typhus)* were released alive. One of the reasons why the whale shark entanglement is so low is because of the training program for observers. Only 1 whale shark was hauled on the boat.

The bycatch of sharks is an important component of the fishery of Pakistan. Shark meat is locally consumed in Pakistan. The skin and other waste materials end up in poultry feed industries. Historically sharks were exported to Sri Lanka, as salted-dried form. However, due to decline in large populations of sharks in the past decade sharks are no longer exported to Sri Lanka in salted-dried form. The data from the four observed fleets from January 2013 to February 2015 indicates a large portion of the tuna gillnet fisheries of Pakistan. With 500 tuna gillnet vessels operating in the Pakistan waters, and with similar fishery type as observed in this study, it is perceived that sharks need serious attention for robust management measures to be put in place.

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References

Moazzam, M., 2012. Status of fisheries of neritic tuna in Pakistan. Second Session of the Working Party on Neritic Tuna on Neritic Tuna (WPNT) 19-21 September, 2012, Penang, Malaysia. IOTC-2012-WPNT02-13. 1-11.

Moazzam. M. 2013. An update on the neritic tuna fisheries of Pakistan, third session of the Working Party on Neritic Tuna (WPNT), 2 – 5 July 2013, Bali, Indonesia

Moazzam. M. 2012. Status report on bycatch of tuna gillnet operations in Pakistan, Eighth session of the Working Party on Ecosystem and By Catch (WPEB), 17 – 19 September 2012, Cape Town South Africa

Shahid. U, Moazzam. M. 2012 An overview of shark fishing in Pakistan; Interaction with Tuna Fisheries, Eighth session of the Working Party on Ecosystem and By Catch (WPEB), 17 0 19 September 2012, Cape Town, South Africa

Walsh. W. 2005 Preliminary Compilation and Analysis of Shark Catch Data from the Hawaii-based Pelagic Longline Fishery

Michael R. Heithaus, Alejandro Frid, Aaron J. Wirsing and Boris Worm, Predicting ecological consequences of marine top predator declines