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An update on the assessment of sea turtle bycatch in tuna gillnet fisheries of Pakistan (Arabian Sea)

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Abstract

Gillnets are commonly used to capture tuna in the continental shelf and oceanic waters off Pakistan. The tuna gillnet fleet consists of about 500 vessels that operate in the offshore waters of Pakistan and beyond its EEZ. Limited information was previously available on the incidence of sea turtle bycatch in the tuna gillnet fishery in this region. In order to assess the magnitude of sea turtle bycatch off Pakistan, four skippers were trained by WWF as observers on four tuna gillnet vessels to document sea turtle bycatch over 30 consecutive months from January 2013 to June 2015. Over the course of the sampling, 600 sea turtle bycatch events were recorded at a rate of 8.44 per km^2 of net over the study duration. Observed mortality (i.e. dead turtles upon hauling) accounted for 10% of the total caught turtles in the four vessels in the reported period. 90% of the turtles were released alive in apparent good condition. The olive ridley sea turtle (*Lepidochelys olivacea*) accounted for 68.8% of captures (n = 178), followed by the green turtle (*Chelonia mydas,* 29.6%, n = 178*)*, and the hawksbill turtle (*Eretmochelys imbricata,* 1.5%, n = 9*)*.

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). Sea turtles are known to be regularly caught as bycatch species in tuna gillnets off Pakistan. However, the magnitude of sea turtle bycatch in gillnet fisheries in Pakistan is unknown. Here, we aimed at documenting sea turtle 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 sea turtles in tuna gillnet operations.

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).

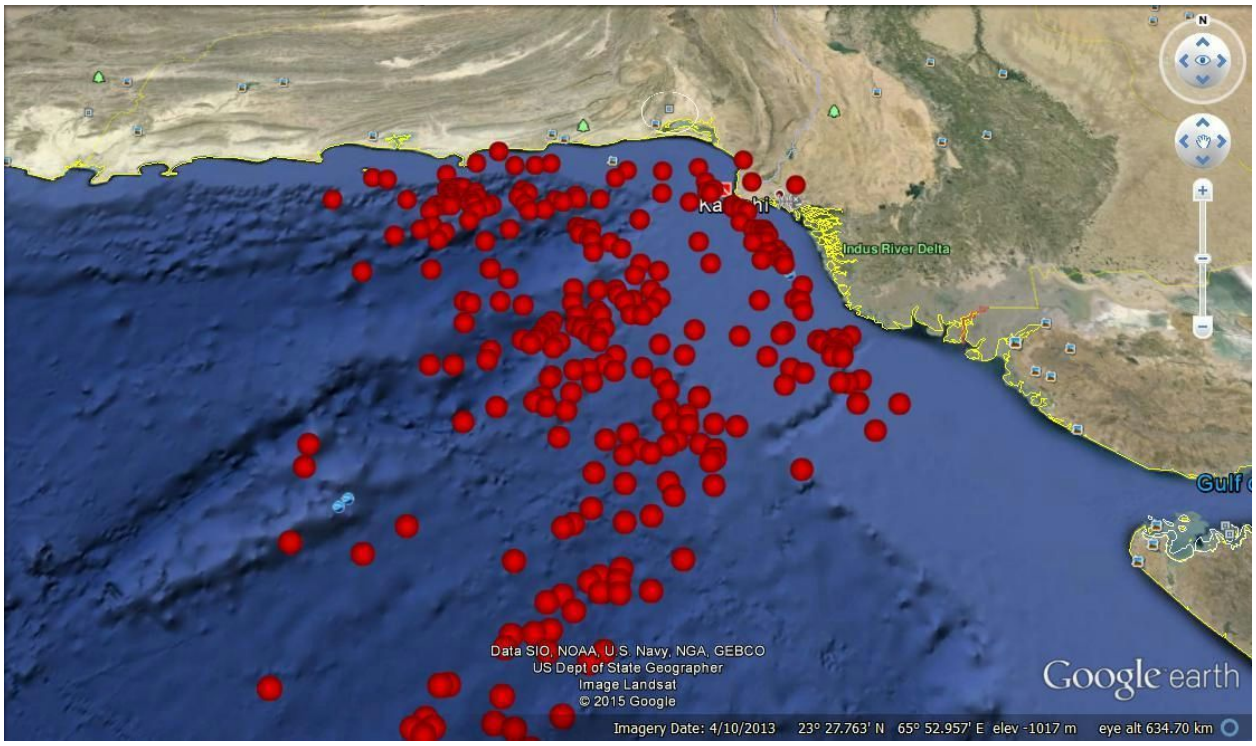

Figure 1: Location of fishing operations of the four sampled vessels in the Arabian Sea.

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. Emphasis was given on learning from fishers their concepts on target and non-target species, and on the importance to document sea turtle and other megafauna' bycatch. Species identification guides prepared by Indian Ocean Tuna Commission were designed and printed in local language (Urdu). These were important as fishers would generally categorize species of sea turtles as "turtles". General guidelines were developed to ensure identification and measurements are properly recorded. The trained skippers acting as observers of the tuna gillnet vessels were also trained to document fish catches on a daily basis. They recorded fishing hours, the number of days fished, and the length of net deployed to estimate fishing effort. The length of the net used varied among the four vessels and ranged from 4,000 to 7,000 meters, whereas the height of the net ranged from 10 to 14 meters. All the nets that were set remained in the water for an average of 12 hours. The effort was thus determined by area of net and number of sets (ranging from 465 to 526) i.e. number of times the net was set in the reporting period. For sea turtles, fishers were trained to record the curved carapace length (CCL) and identify signs of injury related to the capture. For each vessel, the observer also recorded catch of targeted species (tuna and tuna-like species) and other bycatch species (elasmobranchs, cetaceans). 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.

Once data were recorded by the observer, we defined safe-release practices for bycaught sea turtles. These included, i) handling while hauling of the net i.e. to lift the net when a turtle is confirmed to be entangled, ii) handling while on-board i.e. take careful measurements (if possible), hold the specimen from the both sides of the carapace, and lift it, and iii) release back in the ocean i.e. lean towards the side of the vessel while handling the turtle, bending as much as one can, stretching and releasing the turtle face down in the water reducing impact as far as possible.

Data Analysis

Capture rates of sea turtles have been reported as the number of individuals caught per square 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 total square kilometers of length deployed during the study period. This was helpful in determining the capture rate for sea turtles 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, 600 sea turtles were captured from January 2013 to June 2015 with a CPUe value of 8.44 turtles caught per sq Km of net for all fishing trips: 413 *L. olivacea* (68.8%, capture rate 11.69 per km of net), 178 *C. mydas* (29.6%, capture rate 5.03 per km of net), and 9 *E. imbricata* (1.5%, capture rate 0.25 per km of net). A total of 60 turtles were found dead in the nets during hauling, including 37 *L. olivacea* (9% mortality) and 23 *C. mydas* (12.9% mortality). Most turtles (n = 540) were released alive in good apparent condition.

Recent studies indicate that large populations of marine megafauna including sea turtles are regularly captured in gillnet fisheries (e.g. Moazzam & Rab Nawaz 2014). The assessment provided by IPCRCF and the information paper to IOTC (Working Party on Ecosystem and Bycatch, 2014) suggest interaction of 30,000 sea turtles in gillnet fisheries annually in the northern Arabian Sea. Although, the present study has its limitations (data recorded by fishers themselves), it is likely that gillnets pose a serious threat to sea turtles off the coast of Pakistan, despite relatively low mortality rates observed. During this study, the observed mortality was relatively low: *L. olivacea* (9%) and *C. mydas* (12.9%). The overall extent of sea turtle mortality in tuna gillnets off Pakistan will be further investigated in the near future.

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