Distribution and abundance of sunfish (Family Molidae) in the Northern Arabian Sea based on data collected through the Observer Programme of WWF-Pakistan

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ABSTRACT

Sunfish are among the important bycatch species of the tuna gillnet fisheries of Pakistan. Three species *Mola alexandrini*. *Mola mola* and *Ranzania laevis* are known from Pakistan, however, bumphead sunfish (*M. alexandrini*) seems to be the dominating species. High incidences of entanglements were reported during 2018 and 2019 in the tuna gillnet fisheries of Pakistan which is attributed to increase frequency of blooms of jellyfish and gelatinous material along the coast of Pakistan. Sunfish are known to feed on jellyfish, siphonophoes and salpids which are now frequently found along Pakistan coast. Major entanglements of sunfishes were reported from the continental margin along Sindh and Balochistan coast. No mortality of sunfish was reported and all entangled sunfishes were safely released by WWF-Pakistan's trained observers. A guideline for safe release of bycatch species including sunfish is being published.

INTRODUCTION

Sunfish belonging to family Molidae) are known to be inhabiting pelagic ecosystem globally in tropical to temperate seas. The member of this family are slow-swimming and epipelagic plankton feeders. They mainly feed on jellyfishes but sometimes also consume algae, crustaceans and fishes. Two species belonging to this family can grow to very large size attaining a length up to 3 m and weighing 1.t m. tons They can grow to large size. Sunfish are an important bycatch species of the tuna gillnet fishing, at least in the northern Arabian Sea. Of the 5 specie of the family Molidae, 3 species are known to occur in the northern Arabian Sea. These include *Mola alexandrini* (Ranzani, 1839), *Mola mola* (Linnaeus, 1758) and *Ranzania laevis* (Pennant, 1776). Sunfishes, being an important component of the pelagic ecosystem interacts with tuna and its fisheries, however, very few studies are focus on this aspect. Sunfishes from Pakistan has been previously reported by Jalil and Khalil (1972, 1981), Moazzam and Osmany (2014) and Psomadakis *et al.* (2015) Although not very abundant, these species

because of their large size get entangled in the gillnets quite frequently. Disentanglement of sunfish from the gillnet is a tedious process because of massive size of the fish and its constant struggle, making the process quite complicated and time consuming. Interaction of sunfish with tuna fisheries is not well studied, however, Clarke *et al*. (2014) have reviewed studied the interaction of bycatch species including sunfish with longline fisheries whereas Duffy *et al.* (2019) and Lezama-Ochoa *et al.* (2017) have studied interaction of sunfish with purse seine fisheries. Sunfish interactions with gillnet fisheries were studied by Hahlbeck *et al.* (2017). Mangel *et al.* (2019) have studied the effect of Peruvian small-scale fisheries on sunfishes (Molidae) including gillnet and longline fisheries.

The interaction of sunfishes with tuna gillnet fisheries of the northern Arabian Sea has not been studied. Present paper deals with distribution and abundance of sunfish (Family Molidae) in the northern Arabian Sea based on data collected through the Observer Programme of WWF-Pakistan.

MATERIALS AND METHODS

The information presented in the present study is based on the interaction with fishermen that are engaged in gillnet fishing for tuna and tuna like species in coastal and offshore waters of Pakistan. Almost all of the fishermen who provided the information for this study have adopted subsurface gillnetting as a result of the conversion programme initiated by WWF-Pakistan in 2014 (Moazzam and Nawaz, 2017).

WWF-Pakistan has initiated a Crew Based Observer Programme since 2012 to 2019 (Moazzam, 2019; Moazzam and Nawaz, 2017) which is the main source of information presented in this paper. Although no specific format was used for collection of information about sunfishes, however, in case of entanglement of sunfishes in the tuna gillnets, photographic evidences are recorded. Based on this information, distribution and abundance of sunfish species were analyzed in the northern Arabian Sea.

RESULTS AND DISCUSSIONS

Sunfish is represented by 3 species belonging to 2 genera i.e. *Ranzania* and *Mola* in Pakistan. Sunfish are of rare occurrence and since there is no commercial importance, therefore, seldom seen landed in various fish harbours along the coast of Pakistan.

Identification of Sunfish

Ranzania laevis (Pennant, 1776) Slender sunfish (Fig. 1) is rarest of the sunfish reported from Pakistan. In the tuna gillnet operation monitored through onboard observers, it was entangled in the tuna gillnet at offshore waters at Malan coast

(Balochistan) in January 2016. The specimens has a length of 85 cm and released after capture.

Fig. 1 Slender sunfish (*Ranzania laevis*)

Mola mola (Linnaeus, 1758)- Ocean sunfish. This species has global distribution in temperate and tropical waters. According to Sawai *et al.* (2017) *M. mola* prefers to colder waters as compared to *Mola alexandrini* and though considered to a global distribution in temperate and tropical waters but not well represented in the Indian Ocean. Previously most of the specimens caught from Pakistan and northern Arabian sea were referred to be *Mola mola* (Moazzam and Osmany, 2014), however, as pointed out by Sawai *et al.* (2017), majority of these belong to *Mola alexandrini.* With still some doubt a few specimens that were entangled in the tuna gillnets can be referred to *Mola mola* (Fig. 2), however, further examination of the specimens are required to verify the identification. It may be pointed out that all sunfish specimens caught by observers were safely released and their identification is based on photographs only.

Fig. 2 Ocean sunfish (*Mola mola*) caught in tuna gillnet in November 2018

Mola alexandrini (Ranzani, 1839)-Bumphead sunfish is possibly the most dominating species of genus *Mola* in the Indian Ocean (Sawai *et al.*, 2017). Previously most of the *Mola alexandrini* were either referred as *M. ramsayi* (which is a synonym of *M. alexandrini*) or misidentified as *Mola mola. Mola alexandrini* can be distinguished from its congeners in have head profile with bump; chin with bump; body scales rectangular; clavus rounded, supported by 14–24 clavus fin rays and 8–15 ossicles on the rear margin. During present study most of the specimens that were entangled in the tuna gillnets were identified as *Mola alexandrini* having a size range from 1.1 m to 2.7 m. Since all the entangled specimens were safely released, therefore, the identification is based on photographs or movie clips. Careful examination of the specimens to confirm identification is necessarily required to ascertain identification.

Fig. 3. Bumphead sunfish (*Mola alexandrini*) caught in tuna gillnet in April 2018

Distribution and Abundance

Sunfish were reported to be entangled in the tuna gillnets on 82 occasions since the start of the Crew Based Observer Programme in October 2012, however, WWF-Pakistan's trained observers have safely released all the entangled specimens and no mortality was ever observed/reported. Fig. 4 shows the number of entanglements during 2016 to 2019 whereas data for 2012 to 2015 was not taken into consideration because till 2014, there were only 4 observers on board tuna gillnet vessels whereas in 2015, the number of observers were increased but the mode of operation of gillnet from surface to subsurface were in process therefore, the data was not included in this paper. However, the number of entanglements of sunfish during 2012 to 2015 was insignificant (total only 6).

It can be seen that number of entanglements is increasing since 2016 when total entanglements were 15 which increased to 24 in 2019. It is also pointed out that during 2018 and 2019 fishing period was about 6 months whereas during 2015 and 2017 tuna gillnet operation continued for more than 9 months (Moazzam *et al.*, 2019). It may be pointed out that jellyfish blooms are ever increasing in the northern Arabian Sea since

2016 (2020). Since October 2019 to May 2020, massive bloom of jellyfish *Crambionella orsini* occupied major part of the Arabian Sea including Pakistan, Iran, Oman and India. Additionally blooms of gelatinous biomass including siphonophores and salpids have been of frequent occurrence in the area (Moazzam, unpublished work). Fraser-Brunner (1951), Nakamura *et al*. (2015) and Pope *et al.*, (2010) have reported that sunfishes feed primarily on gelatinous biomass. The increase in the number of entanglements since 2016 to 2019 in the Pakistani waters can be attributed to increase in frequency of blooms of jellyfish and other gelatinous material. This, however, require further investigation for verification.

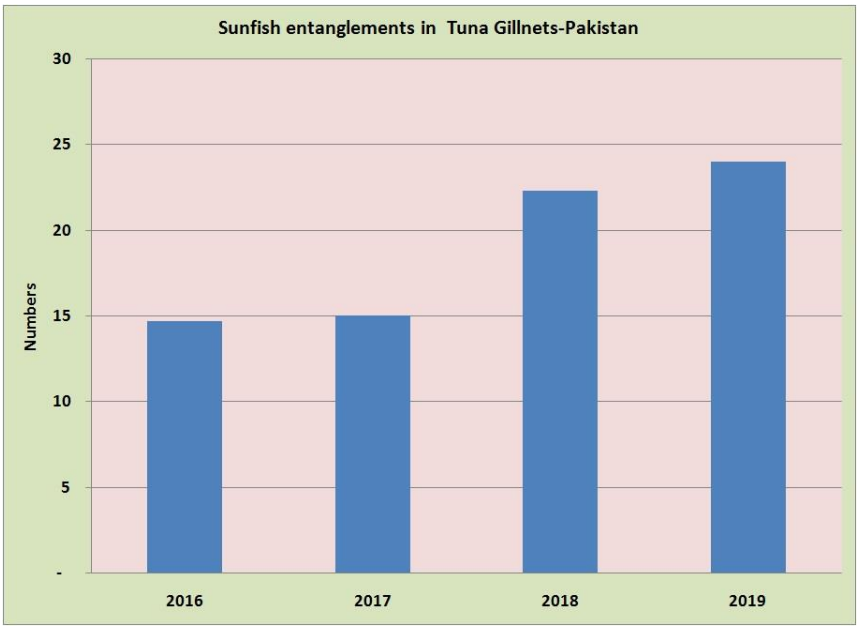

Fig. 4. Number of entanglements of sunfish in the tuna gillnets

Fig. 5 shows the spatial distribution of entanglement of sunfish based on pooled data from 2012 to 2019 which indicates that most of the entanglements were recorded from continental margin area. Although sunfish were observed in the coastal waters where these were observed to bask especially in area behind Churna Island (Moazzam, unpublished), but major sites of entanglements were observed to be along margin of continental shelf along Sindh and Balochistan coast.

Interaction with Fisheries

Although no direct relationship between abundance of sunfishes and tuna species was observed, however, oceanographic factors which determine distribution of tuna species may also influence the distribution of sunfishes as observed by Hahlbeck *et al.* (2017). Additionally sunfishes are considered as bycatch of the tuna gillnet, longline and purse seine fisheries (Clarke *et al.,* 2014; Duffy *et al.*, 2019; Hahlbeck *et al.,* 2017; Lezama-Ochoa *et al.,* 2017; Mangel *et al*., 2019).

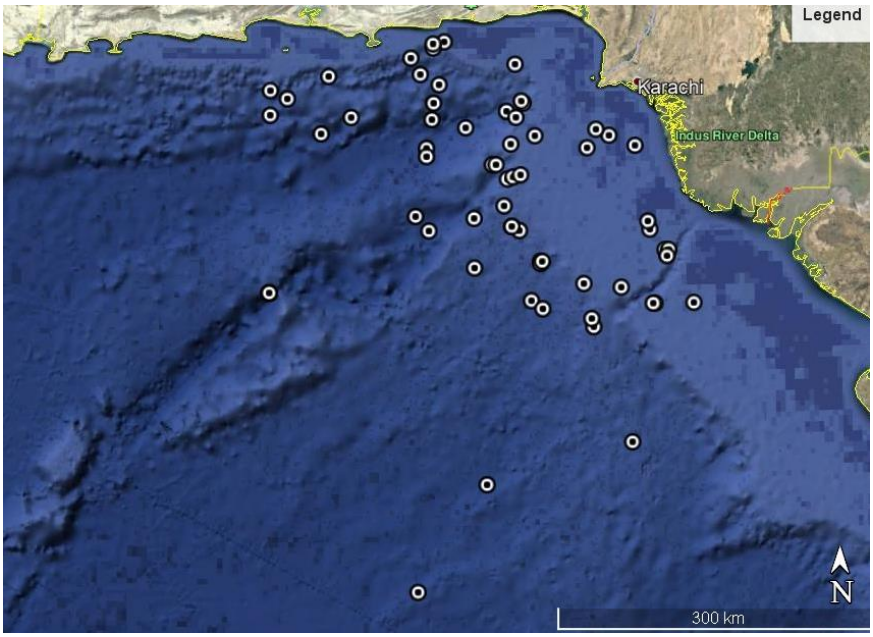

Fig. 5. Spatial distribution of the incidences of entanglements of sunfish in the tuna gillnets along Pakistan coast.

Fig. 6. A page dealing with sunfish of draft guideline for safe release of Endangered, Threatened and Protected Marine Species.

Mangel *et al.* (2109) estimated sunfish (family Molidae) by-catch rates in Peruvian small-scale fisheries using data from shore-based and onboard monitoring programmes reported. They observed a total of 114 sunfishes in the longline and gillnet fisheries along the Peru coast from 2005 to 2017. They suggested that actual number of sunfish

captured by the Peruvian gillnet fleet may be in the thousands of individuals therefore, Peruvian small-scale fisheries may be potentially affect populations of sunfishes in the area. Although it is difficult to compare the observations made by Mangel *et al.* (2109) with those from Pakistani waters, however, observations made from landing centers and interview with fishermen engaged in various small scale fisheries along the coast of Pakistan suggest that sunfishes are extremely rare and their seldom interact with fishing operation. However, still considering that entanglements in gillnet fisheries may be a potential threat to the population of sunfish, WWF-Pakistan is in process of publishing a guideline for safe release of major bycatch with a separate chapter for sunfish (Fig. 6).

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