Status of fisheries of billfish in Pakistan with special reference to swordfish (*Xiphias gladius*)

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ABSTRACT

Billfish form important part of the catches of tuna and tuna like fishes from Pakistan. Its landings during 2019 were reported to be about 4,431 m. tons which is about 25.34 % less than 2018. The decrease is attributed to a much longer closed season observed by the tuna gillnet fisheries in 2018. Fishing in 2019 was stopped in the late March and initiated only in last week of August i.e. almost no fishing for five months as against normal 2 month ban of June and July. Environmental conditions including high sea surface temperature during August to October and appearance of jellyfish bloom during October and December has also affected the catches of billfishes in Pakistan.

Government of Pakistan was provided species-wise data of billfishes to IOTC since 2018 which indicated that out of six species of billfishes Indo-Pacific sailfish (*Istiophorus platypterus*) contributed about 2,234 m. tons, black marlin (*Istiompax indica*) 978 m. tons, striped marlin (*Kajikia audax*) 865 m. tons whereas Indo-Pacific blue marlin (*Makaira mazara*) contributed only 374 m. tons. Contribution of shortbill spearfish (*Tetrapturus angustirostris*) and swordfish (*Xiphias gladius*) was insignificant. Billfishes were found in commercial quantities throughout the year however, period between November through May is the peak season of their catches. Billfishes are not locally consumed but transported to neighboring country through land or sea route.

The study further revealed that due to introduction of subsurface gillnetting the catches of billfishes is substantially reduced. Billfishes are known to inhabit surface water and when gillnet is placed 2 meters below the surface, the catches of billfish are reduced. It was observed that on average about 37 % reduction in catches of billfish is observed in subsurface gillnetting.

Swordfish (*Xiphias gladius*) was observed to be one of the rarest billfish being caught by tuna gillnetters in Pakistan. It is interesting that almost all swordfish being caught are juveniles and seldom any adult are caught by tuna vessels.

INTRODUCTION

Pelagic gillnetting is an important component of the coastal and offshore fisheries of Pakistan, as about 700 fishing vessels are engaged in harvesting of tuna and tuna like fishes. Historically pelagic gillnetting is one of the oldest fisheries of the area. Gillnets consisting of multifilament nylon nets are used for catching tunas and other pelagic species which include billfishes. Information about tuna gillnet fisheries of Pakistan is

known through the work of Farhan and Moazzam (2019), Moazzam (2011, 2012, 2014, 2018), Moazzam and Ayub (2015), Moazzam and Nawaz (2014), Moazzam, *et al.* (2016) and Nawaz and Moazzam (2014).

Six species of billfishes belonging to six genera and two families are reported from Pakistan. Of these, only one species i.e. swordfish (*Xiphias gladius*) belongs to family Xiphidae whereas all other species belonged to family Istiophoridae. The species belonging to family Istiophoridae form an important part of the landings of tuna gillnet vessels operating in coastal and offshore waters.

Limited information about the billfish catches of Pakistan was previously available. Some scanty information is available through the work of Moazzam (2011), Moazzam and Usmani ((2004), Osmany *et al.*, (2009) and Rashid (1966). Moazzam (2013), however, provided some details of billfish fisheries of Pakistan including species composition, gears, fishing boats, area of fishing and other aspects of the fisheries. A major part of the information presented by Moazzam (2013, 2018) was based mainly on the fisheries statistical data being published by Marine Fisheries Department. These data, however, do not provide information about species composition of billfishes.

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. WWF-Pakistan crew based programme described in detail in Moazzam (2019) is the major source of the data presented in this paper

RESULTS AND DISCUSSIONS

Billfish Landings

Government of Pakistan publishes a Handbook of Fisheries Statistics of Pakistan (Anonymous, 2013-updated) which contains landing data of commercially important fish species including billfishes (Fig. 1). No information about species composition of billfishes was available in these publications and presented data included pooled data of all the species of billfish. Based on the information generated through this WWF-Pakistan's Crew-based Observer Programme, landing data tuna and tuna like species (including billfishes) was calculated which indicated serious anomalies and in most cases data was found to be under-reported (Farhan and Moazzam, 2019).

Considering this lacunae, the data collected through WWF-Pakistan's crew based observer programme was reconciled with the landings data available with Marine Fisheries Department, Government of Pakistan which is regularly being communicated to IOTC since 2017. An exercise for reconstruction of landing data for IOTC species since 1987 to 2017 was also carried out. These datasets were already provided to IOTC by Marine Fisheries Department, Government of Pakistan. The reconciled data for billfishes from 1987 to 2019 is presented in Fig. 2.

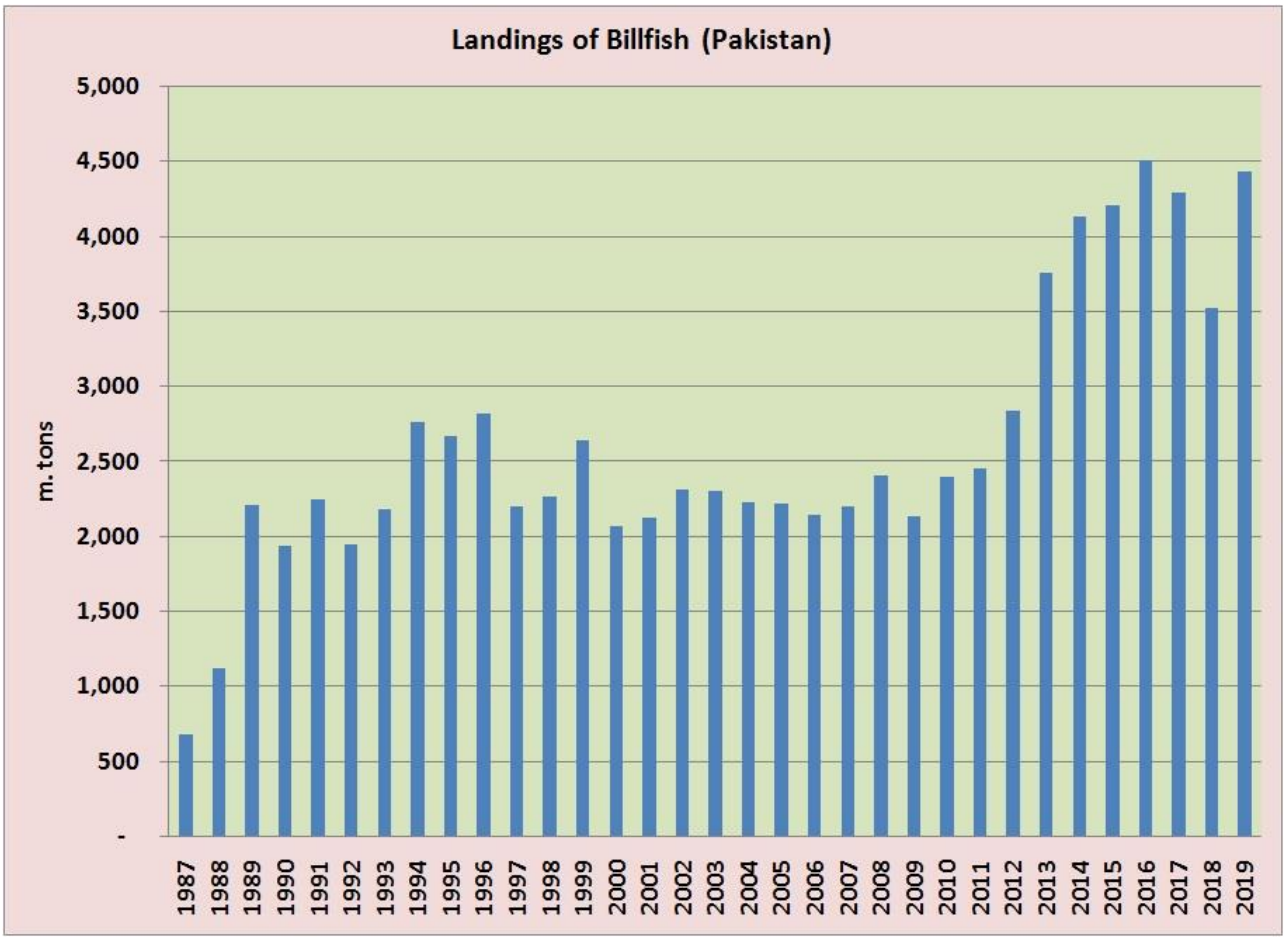

Fig. 1. Billfish landings according to Government Statistics (Anonymous, 2013; updated)

Species Composition

Government of Pakistan used to providing data to IOTC in which data of all billfishes were pooled, however, the data of 2019 communicated to IOTC based on reconciled data generated through WWF-Pakistan's Observer Programme included species composition of billfishes for the first time (Fig. 2). The data indicates that Indo-Pacific sailfish (*Istiophorus platypterus*) is the dominating species in the landings contributing about 50 % of the landings of billfish in 2019. In 2018, its contribution was 61 %. This was followed by black marlin (*Istiompax indica*) contributing about 22 % of the total billfish landings of 2019 (27 % in 2018). Contribution of striped marlin (*Kajikia audax*) was about 20 % in 2019 (only 9 % in 2018) whereas blue marlin (*Makaira mazara*) contributed only 8 % in 2019 (3 % in 2018). Contribution of shortbill spearfish (*Tetrapturus angustirostris*) and swordfish (*Xiphias gladius*) was insignificant, therefore, not represented graphically.

Subsurface Gillnetting

Fishermen in Pakistan have shifted their gillnet operation from surface to subsurface gillnetting since 2015 with the support provided by WWF-Pakistan. With the introduction

of subsurface gillnetting, it was noticed that the catches of all major group of ETP species including cetaceans, sea turtles and sharks are noticeably reduced (WWF-Pakistan, unpublished) Placing gillnet below 2 m proved to a success, as catches of target species of gillnet fisheries including yellowfin, longtail and skipjack tunas increased substantially (Moazzam and Khan, 2019), however, catches billfish were observed to be substantially decreased. High catches of target species i.e. yellowfin, longtail and skipjack tunas compensated for the losses incurred due to decreased catches of billfish.

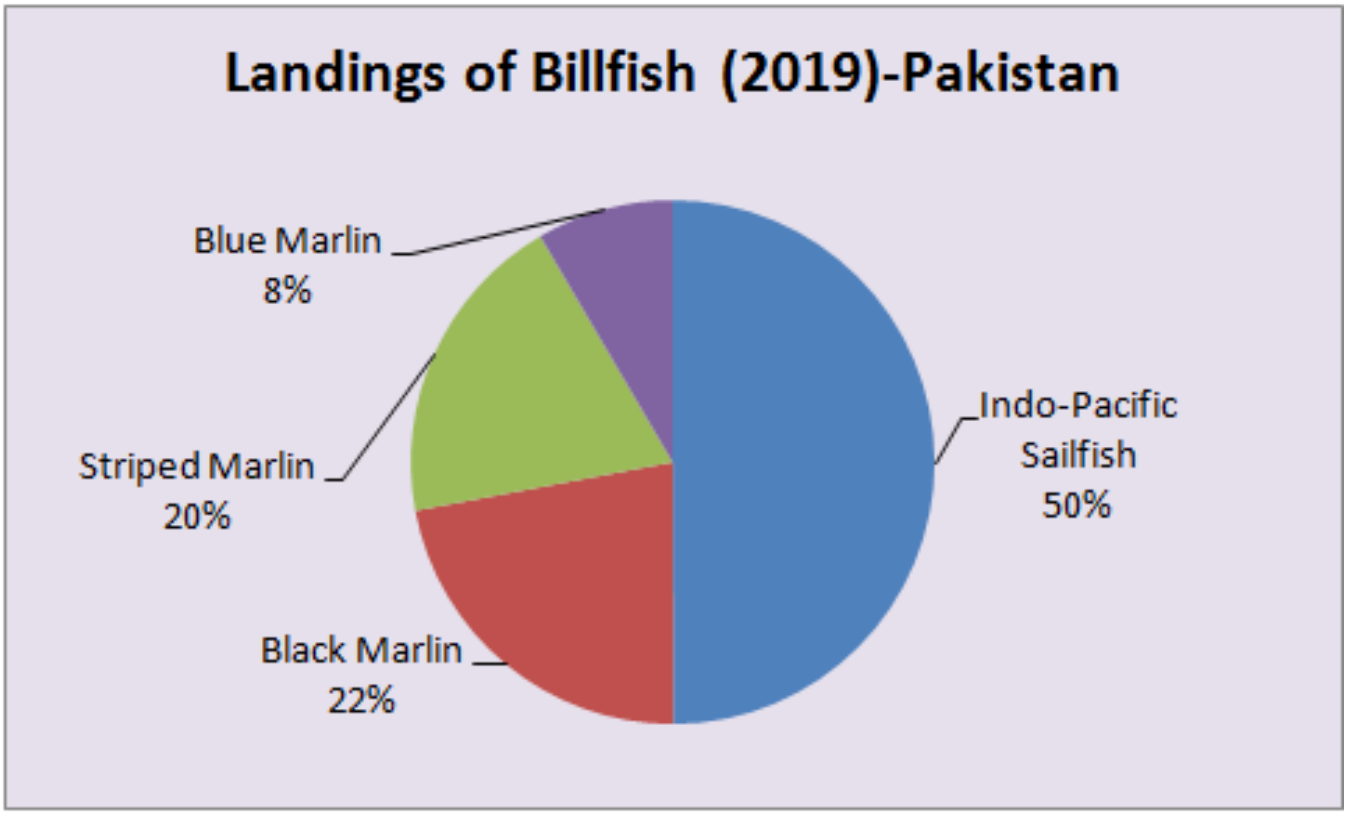

Fig. 2. Billfish Species-wise landings for year 2019

Present study revealed that there average CPUE (kg per month) of billfish decreases from 6,107 kg/month in 2013 to only 2,750 kg/month in 2019, therefore, a reduction 54.97 % was noticed in the catches of billfish in subsurface gillnet as compared to catches of surface gillnets (Fig. 3). Month-wise changes in the CPUE billfish is given in Fig. 3 which reveals that the catches of billfish were higher in surface gillnets during February to April and in November December whereas the catches of billfish were higher in subsurface gillnets during August and September. No catches of billfish were recorded in surface gear in January and October and no billfish catches were recorded in subsurface gear in May. Tuna gillnet operations are stopped during June to August, due to voluntary close season, therefore, no data for these three months is available.

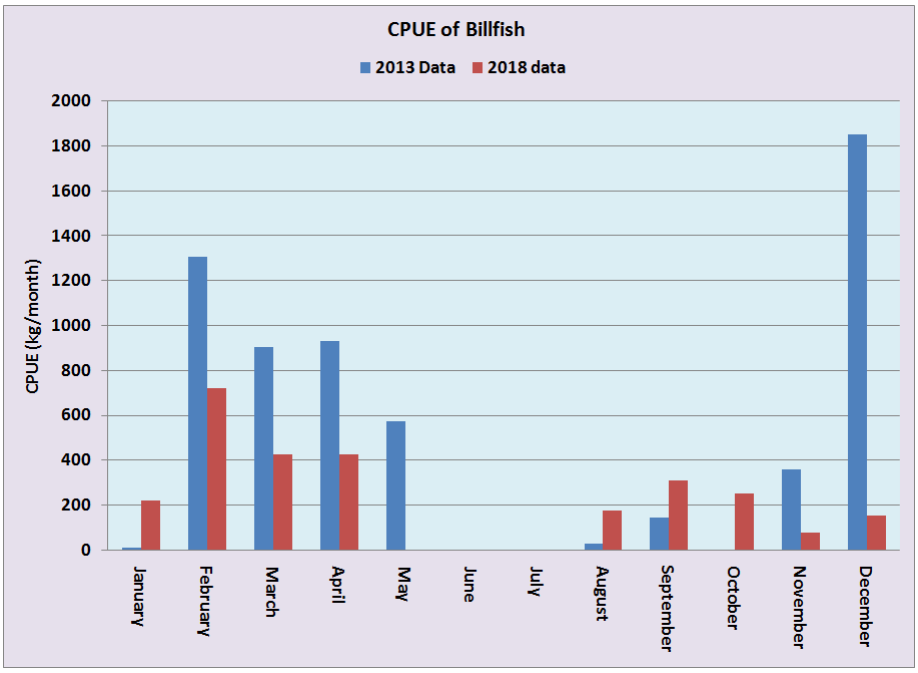

Fig. 3. Catch Per Unit Effort of Billfish in 2013 and 2018

Catches of Swordfish

Swordfish (*Xiphias gladius*) is one of the rarest billfish species found along the coastal and offshore waters of Pakistan. Since 2012 to 2019, only 27 specimens were caught and reported by gillnet fishermen. It is interesting that almost all of them were observed to be juveniles (Fig. 4-6) having a length (lower jaw fork length) between 54 to 120 cm). Very rarely adult having a lower jaw fork length of more than 200 cm were caught, that too mostly in the area beyond national jurisdiction (ABNJ), Varghese *et al.* (2013) have studies swordfish distribution along Indian Coast based on the data collected from longlining. They have also observed preponderance of juveniles in the catches (ref. Fig. 2 of Varghese *et al.*, 2013) There was no marked seasonality in the occurrence of swordfish was noticed. This requires further studies to understand the life cycle of swordfish to determine their dominance of juvenile swordfish in the Arabian Sea.

Fig. 4. Swordfish (*Xiphias gladius*) caught in offshore waters with lower jaw fork length to be 66 cm.

Fig. 5. Swordfish (*Xiphias gladius*) caught in offshore waters with lower jaw fork length to be 97 cm

Fig. 6. Swordfish (*Xiphias gladius*) caught in offshore waters with lower jaw fork length to be 115 cm

CONCLUSION

Adoption of subsurface gillnet operation by Pakistani fishermen since 2014 has shown promising results as far as catches of ETP species such as dolphins and sea turtles is concerned which were observed to be much lower in subsurface gillnet than in surface operations. Billfish on the other hand whose catches were substantially dropped in subsurface gillnet. It was observed that overall billfish catches were 54.97 % lower in the subsurface gillnet operation as compared to surface placement of gillnets. A marked seasonality was observed in case of billfish catches with peak in surface gear in December (2013) and in subsurface gear in February (2018).

Billfishes are among the species of large pelagic that fetch very high prices in the target market in neighbouring country, therefore, according to fishermen it is one of the major loss while using subsurface gear. However, increase of catches of yellowfin, longtail and skipjack tunas in subsurface gillnet which also fetches equally good prices in target market, the loss due to reduction in billfish catches is well compensated. In addition,

hassle free operation of subsurface gillnet is another attraction for popularity of its use by Pakistani gillnet fleet (Moazzam and Khan, 2019).

Presence of juveniles of swordfish in the coastal and offshore waters of Pakistan is interesting and needs further investigations. Although a few adult swordfish were caught in the ABNJ area but even those fishermen that operate their vessels in Somali waters do not get many swordfish. This requires further studies to understand the life cycle of swordfish to determine their dominance of juvenile swordfish in the Arabian Sea.

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