

An update on the Billfish Landings in Pakistan with Special Reference to the Use of Sub-Surface Gillnetting

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ABSTRACT

Annual landings of billfish are estimated to be about 4,520 m. tons which remained stable during the last 6 years. Of the six species of billfish occurring in Pakistan, Indo-Pacific sailfish (*Istiophorus platypterus*), black marlin (*Istiompax indica*), and striped marlin (*Kajikia audax*) are dominating in the commercial catches contributing about 92.30 % in the total landings of billfish. These three species were found throughout the year, however, the period between September through January is the peak season of their landing. Billfishes are not locally consumed but transported to neighboring country through land or sea routes. The introduction of subsurface gillnetting between 2014 and 2016, led to a major decrease in the landings of billfish in Pakistan. The decrease in billfish catches due to the use of subsurface gillnets is well compensated by the high catches of yellowfin and skipjack tuna.

INTRODUCTION

Pelagic gillnetting is a popular fishing method being used in coastal and offshore waters of Pakistan for targeting tuna and tuna-like fishes including billfish. About 700 large fishing vessels are engaged in harvesting of these fishes in the offshore waters of Pakistan. In addition, there are about 4,000 smaller gillnetters that target neritic tuna in coastal waters and in the continental shelf areas.

Historically pelagic gillnetting is one of the oldest fisheries of the northern Arabian Sea. Gillnets consisting of multifilament nylon nets are used for catching tunas and other pelagic species which include billfishes. Six species of billfishes belonging to six genera and two families are reported from Pakistan. Indo-Pacific sailfish (*Istiophorus platypterus*), black marlin (*Istiompax indica*), striped marlin (*Kajikia audax*), Indo-Pacific blue marlin (*Makaira mazara*) and shortbill spearfish (*Tetrapturus angustirostris*) belonging to family Istiophoridae and swordfish (*Xiphias gladius*) belongs to family Xiphiidae are known to occur in Pakistan. Information about billfishes tuna fisheries of Pakistan is limited. Some scanty information is available through the work of Moazzam (2010), Moazzam and Usmani ((2004), Osmany *et al.*, (2009) and Rashid (1966). Khan and Moazzam (2019) and Moazzam (2013, 2018, 2019, 2020, 2022) provided details of

fisheries of billfish of Pakistan including species composition, gears, fishing boats, area of fishing and other aspects of the fisheries. Khan and Moazzam (2019) provide some information about the impact of subsurface gillnetting on the catches of billfish in Pakistan. A major part of the information presented in these publications was based on the fisheries statistical data published by Marine Fisheries Department, Government of Pakistan and additional information collected through the Crew-based Observer Programme initiated by WWF-Pakistan in 2012. Although this programme was completed in September 2019, however, some fishermen still provide information to WWF-Pakistan on a voluntary basis.

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 is the major source of the data presented in this paper (Moazzam, 2013, 2018, 2019, 2020, 2022).

RESULTS AND DISCUSSIONS

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 is available in these publications and data of all species of billfish is pooled. However, WWF-Pakistan working in collaboration with the captains of the tuna gillnetters started collecting data on species-wise basis since 2018.

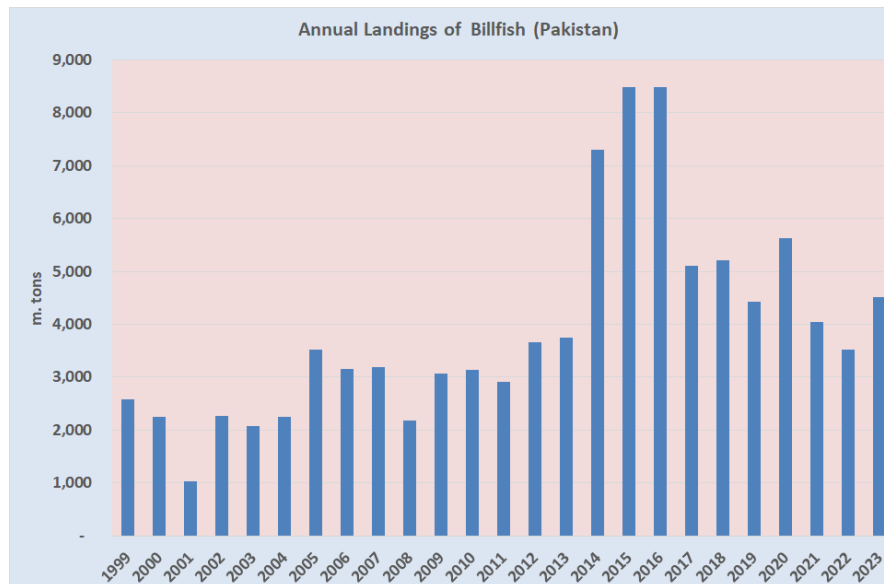


Fig. 1. Billfish landings according to Government Statistics (Anonymous, 2013; updated)

The highest landings of billfish were reported in 2016 and 2017 when a total of 8,297 m. tons was landed but a major decrease was noticed in 2018 when the landings of billfish reached a level of 5,110 m. tons. Since then the landings have had a decreasing trend and landings decreased to 3,514 in 2022. The decrease is attributed to a much longer closed season observed by the tuna gillnet fisheries in 2022. Like in 2021, fishing in 2022 was stopped in the late April or beginning of May and initiated only in the last week of August i.e. almost no fishing for four months as against the normal 2 month ban of June and July. In 2023, billfish landings again increased as about 4,521 m. tons of billfish were caught along the coast and offshore waters of Pakistan.

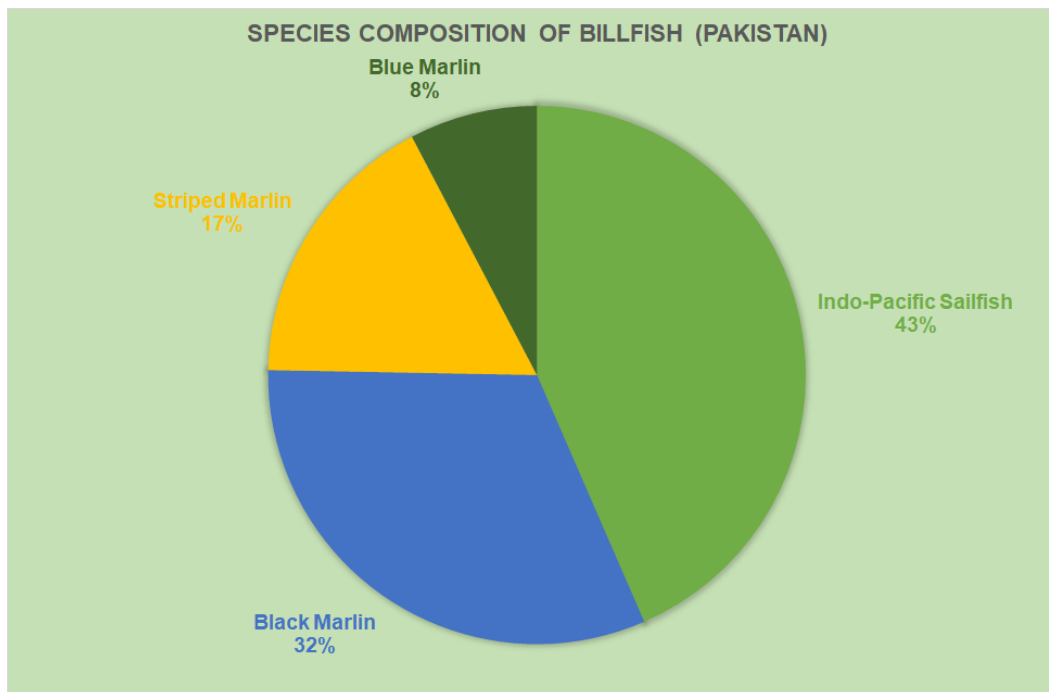


Fig. 2. Billfish Species-wise landings for year 2023

SPECIES COMPOSITION

Limited or no information was available on the species composition of billfish landed in Pakistan before 2018. However, WWF-Pakistan started to collect information about landings of billfish species based on the data collected through Crew-Based Observer Programme supplemented with the information collected from Karachi Fish Harbour which is the main fish landing centre in Pakistan. Fig. 2 presents a pie diagram showing landings of billfish species during 2023. The data indicates that Indo-Pacific sailfish (*Istiophorus platypterus*) is the dominating species in the landings contributing about 43 % of the landings of billfish in 2023. This was followed by black marlin (*Istiompax indica*) contributing about 32 % of the total billfish landings of 2023. The contribution of striped marlin (*Kajikia audax*) was about 17 % in 2023 whereas blue marlin (*Makaira mazara*) contributed only 8 %. It is evident that , Indo-Pacific sailfish, black marlin, and striped marlin are dominating in the commercial catches contributing about 92.30 % in the total

landings of billfish. The contribution of shortbill spearfish (*Tetrapturus angustirostris*) and swordfish (*Xiphias gladius*) was insignificant, therefore, not represented graphically.

The data of landings of bill species for the period 2018 to 2023 is presented in Table-I which reveals that the general trend of the dominance by Indo-Pacific sailfish (*Istiophorus platypterus*) prevails during the period of study which was followed by black marlin (*Istiompax indica*), striped marlin (*Kajikia audax*) and blue marlin (*Makaira mazara*). Although variations in the commercial catches were recorded by overall trend in the composition of various species remain almost similar.

Table-I. Species composition of billfish during 2018-2023.

Species	2018	2019	2020	2021	2022	2023
Indo-Pacific Sailfish	2,154	2,214	1,980	1892	1674	1965
Black Marlin	943	978	1,013	983	1009	1439
Striped Marlin	328	865	912	845	654	769
Blue Marlin	96	374	359	305	277	348
Sub-total	3,521	4,431	4,264	4,025	3,614	4,521

Through WWF-Pakistan's Crew-based Observer Programme of WWF-Pakistan information about catches of tuna and tuna-like species (including billfish) was collected between 2012 and 2019. Average monthly catches of billfishes including Indo-Pacific sailfish and black marlin obtained through this Observer Programme was reported by Moazzam (2018) and reproduced here as Fig. 3 which reveals that both species are found throughout the year. *Istiophorus platypterus* has two peaks of abundance; the first during March and April with maxima in April whereas the second peak was observed during October and January with maxima in October.

In case of *Istiompax indica* also there are two peaks of abundance; the first during March whereas the second peak was observed during October and January with maxima in November (Fig.3). It was also observed that Indo-Pacific sailfish is the dominating species throughout the year except during September when the catches of black marlin were observed to be higher.

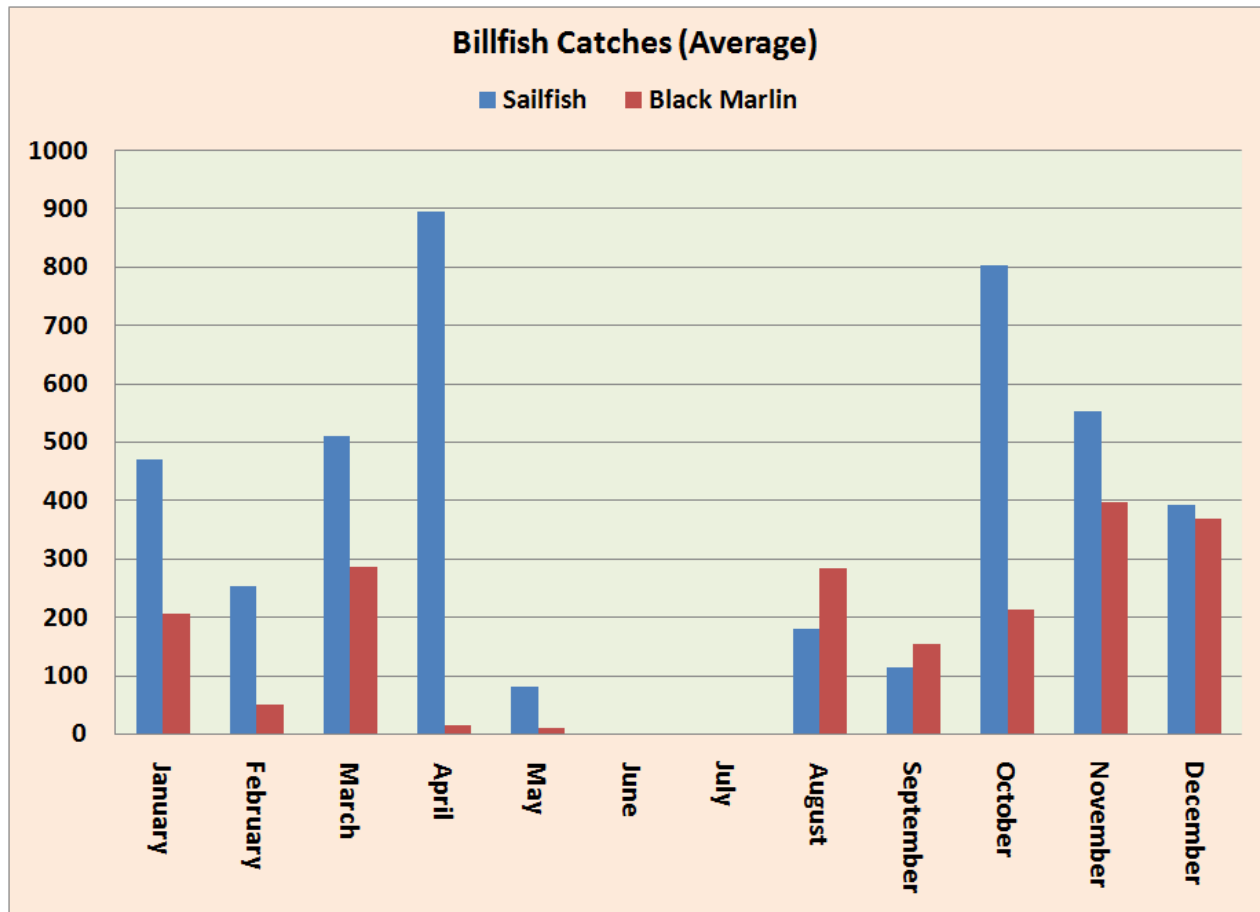


Fig. 3. Average monthly catches (in kg/month) of billfishes (Moazzam, 2018)

Other species of family Istiophoridae including striped marlin (*Kajikia audax*), Indo-Pacific blue marlin (*Makaira mazara*) and shortbill spearfish (*Tetrapturus angustirostris*) are also caught by the Pakistani tuna gillnetters, however, these are of rare occurrence and no marked seasonality was also noticed. Swordfish (*Xiphias gladius*) are also rarely caught by these vessels but most of them were observed to be juveniles or subadults (between 100 and 120 cm)(Moazzam, 2020)

There is a voluntary two-month close season observed during June and July by the tuna gillnet fishermen mainly because of extremely rough weather and intensive wave action due to summer monsoon. During these two months no billfish are landed at any of the fish harbours in Pakistan.

Subsurface Gillnetting

Gillnets are known for extremely high bycatch which includes not only commercially important fish species but also a large number of non-target endangered, threatened and protected (ETP) species. Information generated through WWF-Pakistan's Crew Based Programme revealed that more than 12,000 cetaceans and 29,000 sea turtles used to be

annually entangled in the gillnet fisheries of Pakistan alone (Moazzam, 2021; Moazzam and Nawaz, 2014). Considering high bycatch of ETP species, WWF-Pakistan designed, developed, and introduced subsurface gillnetting in Pakistan as a means for reducing rather eliminating entanglement and mortality of, at least, cetaceans and turtles. Placing gillnet below 2 m proved to be a success, as catches of target species of gillnet fisheries including yellowfin and skipjack tunas increased substantially whereas catches of some important species such as billfish and dolphinfish substantially decreased. However, high catches of target species i.e. yellowfin, longtail and skipjack tunas compensate for the losses incurred due to decreased catches of these two species groups.

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 (Moazzam, 2021)

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. 4).

Table-II. Catch per unit effort (kg/day) of major species caught by tuna gillnetting

Species	Pre-Subsurface (catch per unit effort) kg/day	Subsurface (catch per unit effort) kg/day	Remarks
Yellowfin tuna	72.21	112.36	Major increase
Longtail tuna	23	24.16	Minor increase
Skipjack Tuna	6.65	35.21	Major increase
Sailfish	34.33	0.54	Major decrease
Marlin	0.59	0	Major decrease
Dolphinfish	39.17	4.96	Major decrease
Spanish Mackerel	7.06	1.41	Major decrease

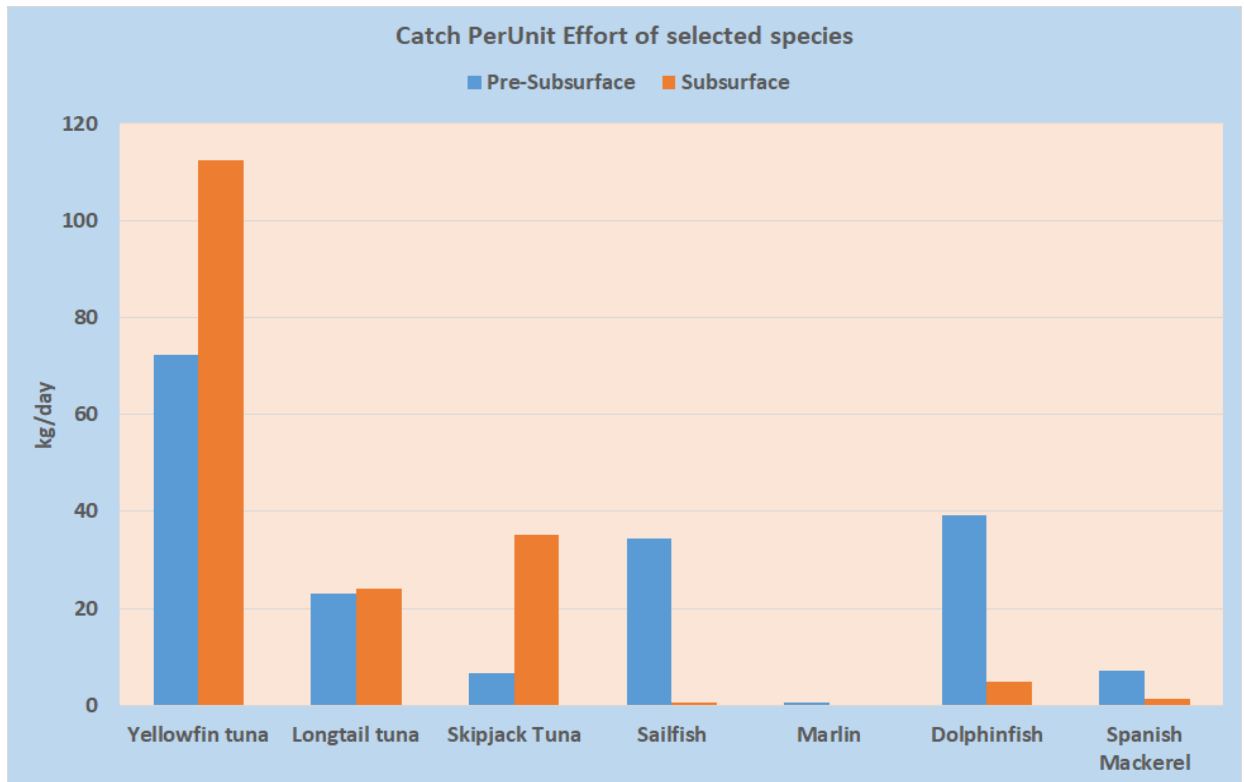


Fig. 4. Catch per unit effort (kg/day) of major species caught by tuna gillnetting

Billfishes are known to be surface dwelling, therefore, as expected their catch rate was observed to be substantially reduced in subsurface gillnet operation (Fig. 4-Table-II). Billfishes, like yellowfin and skipjack fetch high prices in the local market, therefore, reduction in the catches of billfishes is one of the major issues with subsurface gillnetting. Higher catches of yellowfin and skipjack as well as prevailing high process for these two species, compensated for loss incurred because of low catches of billfishes. Despite decrease in the catches of species like billfishes and dolphinfish, fishermen shifted from surface gillnetting to subsurface gillnetting because of a number of additional benefits which include:

- According to fishermen, chances of subsurface nets getting entangled in fishing operations is less as compared to surface gillnets. This greatly helps in the fishing operation especially entanglements in net loft during storage are minimized.
- The operation of subsurface gillnetting is comparatively hassle-free as compared to surface gillnetting because the chances of fouling during deployment and retrieval are reduced. The number of floats in subsurface gillnets is reduced and these floats are placed in pairs attached to 2 m rope which make their entanglement rare as compared to surface gillnetting in which floats are placed every 4.5 m on headline and their chances of getting snagged are much higher.

- Previously gillnets used to be placed on the sea surface, therefore, in case of high winds, laid down net is drifted to very long distances which is now practically eliminated because surface winds do not affect the subsurface nets and its drift is avoided.
- In case of rough seas coupled with high winds, the surface gill net gets rolled down and sometimes fishing operations have to be stopped. Straightening of such nets sometimes requires many days during which fishing operation has to be stopped. The chances of subsurface gillnet getting rolled down are minimal, therefore, the time loss because of such snags is minimized now.
- Loss of net in fishing operations are also minimized in case of subsurface net as compared to surface net, which is a great savings for the fishermen.
- Subsurface gillnets are cheaper because use of only a few floats, as compared to surface gillnets which have a float after every 4.5 meters.



Fig. 5. Beheaded, eviscerated and chunks of billfish for onward transportation to neighbouring country

A survey has recently been carried out in April 2024 to determine the adherence of the fishermen to the use of subsurface gillnet after a period of 10 years (initial experiments on subsurface gears were conducted in 2014). The survey revealed that the entire fleet of tuna gillnetters of Pakistan is using subsurface gillnetting because of high catches of

yellowfin and skipjack tuna and because of additional benefits, mainly smooth operation. It was also learnt that fishermen use handline and troll gears to catch dolphinfish during the daytime when gillnet is not used. The prices of dolphinfish have increased in the local market during the last few years and handline and troll caught dolphinfish fetch comparatively higher prices. The fishermen do not target billfish in troll and handline operations because of the long time which is lost in bringing billfish after it is hooked.

CONCLUSION

Billfishes are commercially important fish species which are caught by the Pakistani tuna gillnetters that operate in neritic and offshore waters (Exclusive Economic Zone-EEZ and Area Beyond National Jurisdiction-ABNJ). Although billfishes may be regarded as bycatch of gillnet fisheries, however, because of their high prices sometimes fishermen specifically target them even preferring them over tuna species.

Billfishes are not consumed locally and almost entirely sent to neighboring country. Those caught by gillnet vessels are beheaded, eviscerated and cut into large pieces (usually in two) on board the fishing vessels (Fig. 5). These are either landed at the fish harbors (mainly Karachi and Gwadar) or transshipped at high seas to fishing/carrier vessels from neighboring country. Landed billfish is transported by either land route or by sea to neighboring country. It is ironic that the billfish caught by Pakistani vessels is recorded in the landings of Pakistan, but it is also again reflected in the landings of the neighboring country.

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