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BILLFISH: AN IMPORTANT PART OF THE PELAGIC GILLNET FISHERIES OF PAKISTAN

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ABSTRACT

INTRODUCTION

Billfish is a group of marine fishes belonging to families Istiophoridae and Xiphidae mainly found in the offshore waters. These large sized fishes support substantially large and important commercial and recreational fisheries in many parts of the world. In Pakistan, there is no aimed fishery for billfishes and these are landed as components of the catch of pelagic gillnet fisheries. There are other gillnet fisheries in Pakistan which are mainly based in coastal areas. Some of these are species specific like monofilament gillnet fishery for Indian mackerel and bottom set gillnet fisheries for stingrays etc.

Historically billfishes used to be exported to Sri Lanka in salted-dried form fetching higher prices than all other salted products. However, from the last decade, almost entire catches of billfish are traded in chilled form with Iran.

Billfishes are not well studied in Pakistan.With the exception of Osmany*et al*. (2009) and Rashid (1966) no work on the billfish was dedicatedly carried out. Rashid (1966) described species of family Istiophoridae from Pakistan whereas Osmany*et al.* (2009) described abundance and distribution of billfishes from Pakistan. In addition, Moazzam and Usmani (2004) has published a map showing distribution of billfishes in the Arabian Sea along the coast of Pakistan. Present paper describes details of the billfish fisheries of Pakistan including fishing methods (boats and gears), fishing operations, species composition, commercial landings, disposition and marketing. The landing data presented in this paper obtained from Anonymous (2013) and pertains to two maritime provinces of Pakistan i.e. Sindh and Balochistan as well as some information from Exclusive Economic Zone of Pakistan.

Fishing Boats

Billfish is harvested in Pakistan by pelagic gillnetters that operate in the offshore waters. Tuna is the main target species of these gillnetters, however, fishermen also consider billfish as an important target species. The gillnet fleet consists entirely of locally made wooden boats. Moazzam (2010) gave details of the fishing boats which shows that that majority of the gillnet boats operating from Karachi (Fig. 1a) exceed more than 15 m LOA whereas dominating tuna fleet operating from Balochistan coast (Fig. 1b)consists of comparatively smaller boats of less than 15 m (Fig. 2).

(a) (b)

Fig. 1.Gillnet fishing boats (a) Smaller Tuna Gillnetter ('hora'/'rachin') (b) Large Tuna Gillnetter

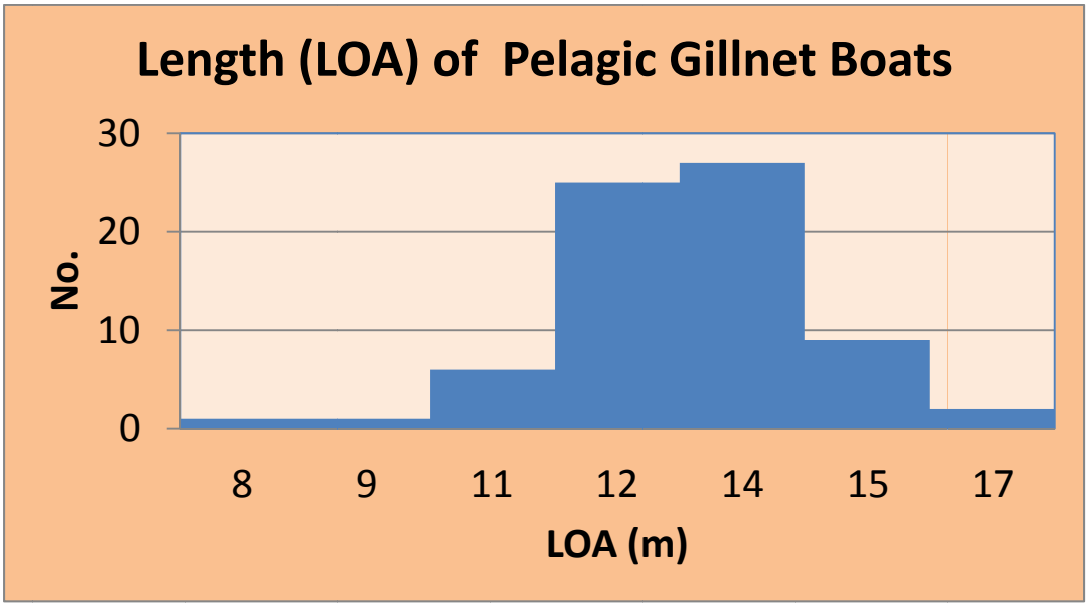


Fig. 3 Length (LOA) of local tuna boats operating from Karachi

There are about 300 large boats (Fig. 3) which have on board freezing facilities are comparatively larger in length (ranging between 20 to 30 m LOA. These boats which have dual registration both in Pakistan and Iran, mostly ply from Iranian fish harbours and procure tuna, billfish and narrow-barred Spanish mackerels from Pakistani boats operating in the offshore waters and at the high seas as well as from landing centers at Gwader and Jiwani. These vessels are also engaged in smuggling of diesel from Iran to Pakistan.

Fig. 2. Iranian gillnet boat at Jiwani

Almost all Pakistani gillnet fishing boats operating from Karachi have a transom at the stern whereas boats of Balochistan are mostly double keeled. Gillnet boats including both operating from Karachi or from Balochistan coast have inboard engine with a power range from 50 hp to 500 hp. These gillnets boats have a hydraulically operated net hauler whereas on some smaller boats nets are hauled manually. Previously no navigational and communication devices were used on these boats but now most pelagic gillnet boats carry fish finders, GPS, GPS plotters and satellite phones. Some boats also have VFH and short-wave radios for communication purposes.

For the storage of the catch, these boats have fish hold consisting of 8 compartments (larger boats have 12) each having capacity to hold about 2.5 to 3.0 ton of fish. The storage capacity in these boats ranges from 20 to 40 m. tons. Ice is carried on fishing trips and prime catch is placed with ice. A fishing trip may last 10 days but those fishing in offshore waters and in the high sea may undertake longer fishing trips (35 days to 60 days). During these longer trips, salt is also taken and all major species of fish are eviscerated and cut open and then salt is sprinkled and fish is allowed to drain excess water. Such wet salted catch is piled on deck. All pelagic gillnetters which have double registration have on board freezing facilities; having a blast tunnel of 1 ton and storage of about 50 to 100 m. tons. The fish hold in these boats is not divided into compartments.

Fishing Gears

Surface gillnetsmade up of polyamide are used for catching large pelagic including billfish in Pakistan. It has stretched mesh size ranging between 8 cm to 18 cm (average 15 cm) with a hanging ratio of 0.5 (Fig. 4). Both stone and lead weights are used as sinkers whereas various types of floats are used in the head rope.

The length of the net varies from 5 to 30 km. In most cases the length of the net ranges between 5 and 10 km in inshore fisheries and between 10 and 25 km in offshore fisheries. In some boats which have onboard freezing system, the length of the gillnets can be up to 35 km. There are variation in the length and specification of net. A recent survey of fishing gears carried out by WWF-Pakistan revealed that the length of gillnet varies between 4.83 km and 11.27 km (Fig. 5) in boats operated from Karachi. The breath of the net is most cases wasreported to be 14 m. Some of those boats which have dual registration in Iran and Pakistan may have gillnets with a breadth of 45 m and may have trammel arrangements.

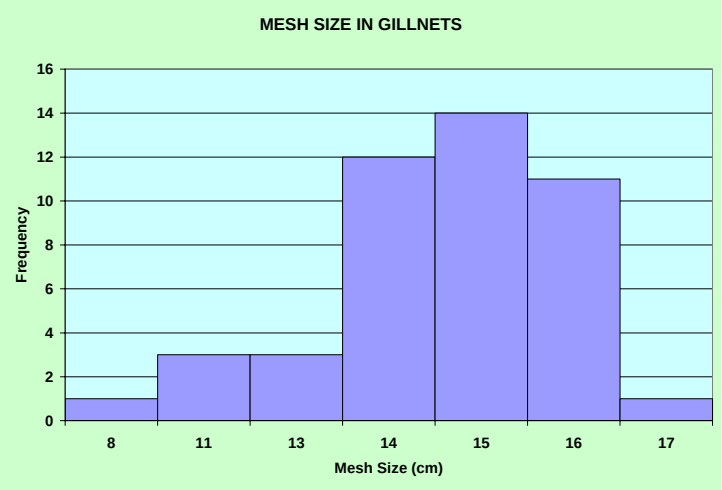


Fig.4. Stretched mesh size of pelagic gillnet (data collected by WWF-Pakistan)

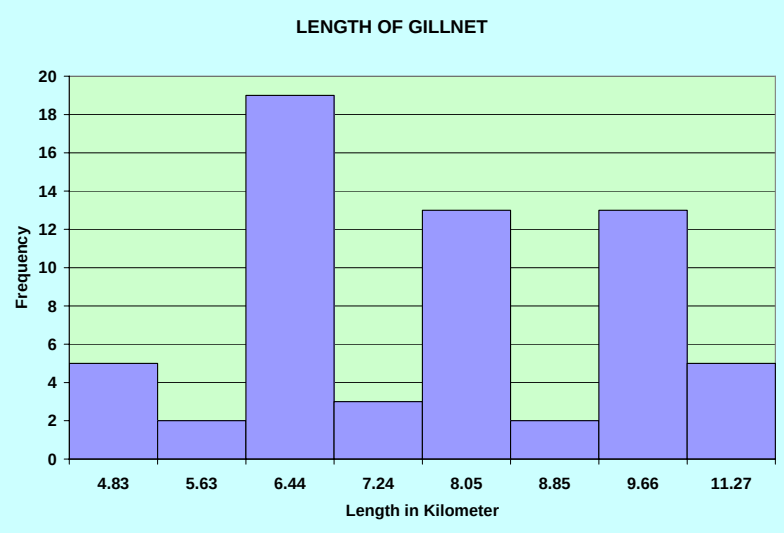


Fig.5. Length of pelagic gillnet of the boats operated from Karachi (data collected by WWF-Pakistan)

Fishing Area

Fishing boats engaged in pelagic gillnet fishing including those targeting billfishes are presently based in Karachi along Sindh coast and Gwadar along Balochistan coast. In addition, there are few such boats are being operated from Pasni, Sur and Pushukan along Balochistan coast. The fishing boats from these coastal towns/cities operates within 40 to 50 km radius from their bases, however, boats based in Karachi have wider area of operation; some of the operating as far as 400 miles from the base station. Larger fishing boats also operate in high seas i.e. beyond the Exclusive Economic Zone of Pakistan. Gillnet nets are set in the late afternoon and retrieval is started in early morning. Fish is removed from the net immediately as it is landed in the fishing boats.

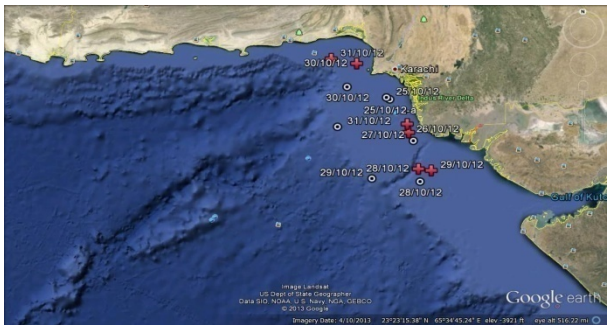
WWF-Pakistan is collecting information about operational areas of the large pelagic gillnetters since October 2012 which revealed that the pelagic gillnetters are being operated on the continental shelf and deep oceanic waters depending on season (Fig. 6). It was observed that change in fishing grounds coincided with Oxygen Minimum Zone (OMZ) which is an important oceanographic feature of the Arabian Sea. Billfishes which are fast moving and large bodied fish avoid low oxygen zone.

Previously about 150 to 200 large boats based mainly in Karachi, Gwadar and Jiwani used to catch large pelagics from beyond Pakistan territory. The most important destination for these gillneters used to be Somali water, however, a few boats used to operate in Omani and Yemeni waters, as well. Because of Somali piracy, now none of these boat from Pakistan operates in these waters. There have been instances when Pakistani boats were apprehended by Somali pirates and used these boats as mother vessels for hijacking other commercial vessel. Last such event was reported to have taken place in November, 2011.

Large pelagic species including tuna and billfishes are harvested throughout the year, however, because of intensive wave action during southwest monsoon (June to September) pelagic fishing activities are reduced which results in decreased landings. There is strong seasonality in catch quantity and catch composition.Billfish landings were observed to be highest during October to December whereas lowest catch was observed during monsoon (June to August).

Species Involved

Six species belonging to six genera and two families of billfishes are reported from Pakistan. Of these, one species i.e. *Xiphias gladius* belongs to family Xiphidae whereas all other species belonged to family Istiophoridae.



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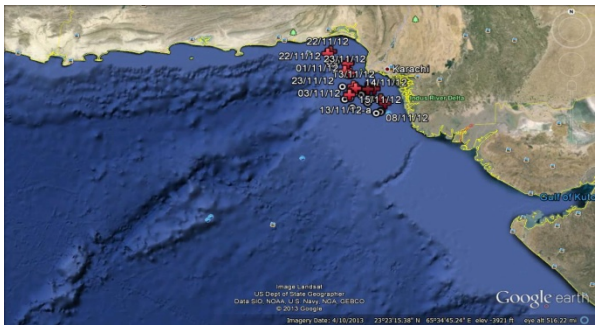

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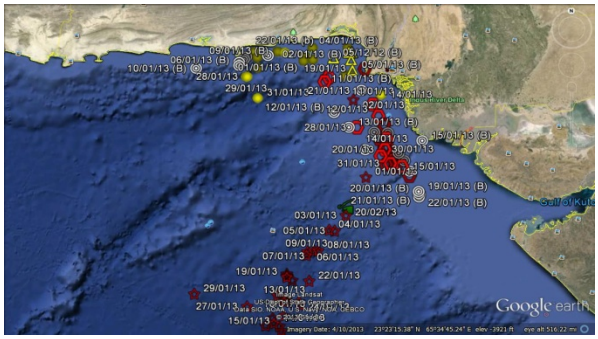

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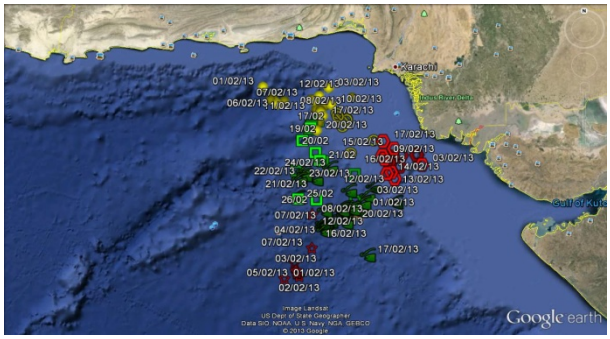

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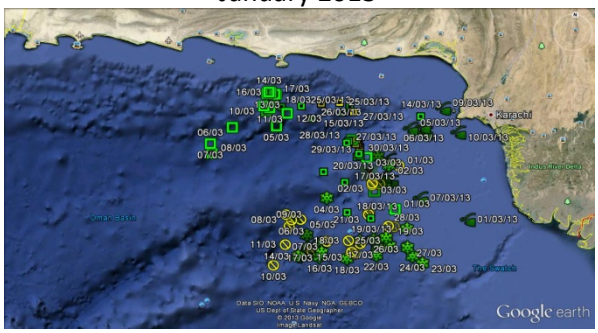

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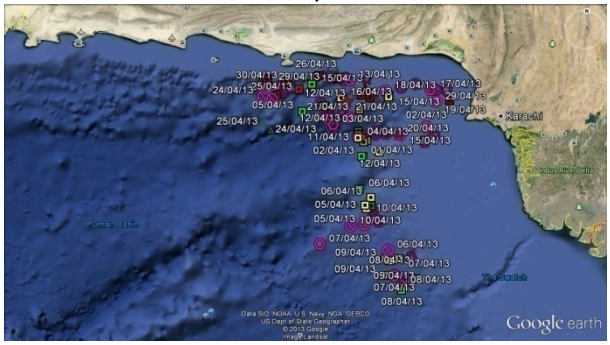

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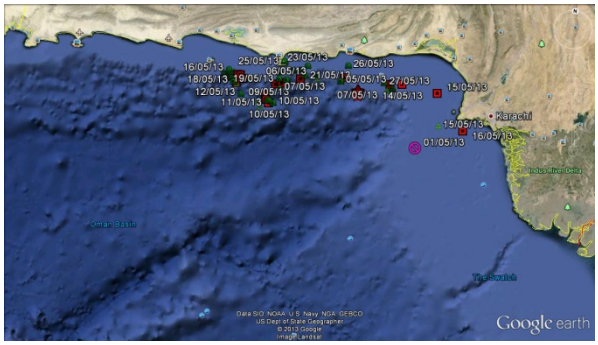

May 2013

Fig. 6. Fishing grounds of pelagic gillnetters

***Xiphias gladius* Linnaeus, 1758**

Swordfish isthe rarest of the billfish found in Pakistan (Fig. 7). It is mainly found in August to October and April and May. This species is locally known as Somali Asp or Ghora because of their abundance along Somali coast and around Socotra Island (Yemen). Their landing in Pakistan is insignificant as it is seldom caught in commercial quantities.

Fig. 7.*Xiphias gladius* caught off Malan Balochistan in May, 2013

It was observed that mainly juveniles reaching a length of about 1.2 m (inclusive of the prolonged beak) were caught during March to May whereas large specimens (reaching upto 3.2 m inclusive of the beak) are caught during August to October. *Xiphias* although has a cosmopolitan distribution intropical, temperate and sometimes cold waters of alloceans but it is of very rare occurrence in the Northern Arabian Sea.

***Istiophorus platypterus* (Shaw, 1792)**

Indo-Pacific sailfish which is locally known as Ghora or Asp is one of the common species of billfish found in shelf and offshore waters of Pakistan (Fig. 8). This species is one of the commonest of the all the billfishes found in Pakistan. Recent studies carried out WWF-Pakistan revealed that it contributes to about 34 % of total landings of the billfishes. It was observed to have a distribution more close to coast as compared to other congeners. In addition to gillnets, it is also sometimes caught with troll lines especially along Balochistan coast.

Makaira indica (Cuvier, 1832) (= *Istiompax indica*)

Black marlin also known locally as Qatil (large specimens) and Ghora or Asp (Fig. 9) is caught throughout the year along both Sindh and Balochistan coast. It is another of the billfish which is found more abundant near the coast as compare to offshore areas. Typified by its rigid pectoral fins which cannot able to be folded back against sides of body, this species was observed to attain a total length of 4 m (with beak) and a weight of about 600 kg . It is estimated to contribute for about 30 % of the total billfish landings of Pakistan. It is found through throughout the year with peak season during November December and March to April.

Fig. 8.*Istiophorus platypterus* caught off Sonminai, Balochistan

Fig.9 *Makaira indica* caught offshore Ormara along Balochistan coast

Kajikia audax (Philippi, 1887) (=*Tetrapturus audax*)

Striped marlin locally known as Qatil is the third most dominating species of billfish 9Fig. 10) found in Pakistan contributing about 28 % of total landings. It is found have a distribution more oceanic and caught more abundantly during January and April when most of the pelagic gillnetters operates in comparatively deeper oceanic waters. It was observed to grow to large size attaining a length of about 3.5 m and a weight upto 200 kg.

Fig. 10.*Kajikiaaudax*caught in the off Swatch area, Sindh coast.

Makaira nigricans Lacepede, 1802

Blue marlin(Fig. 11) also known as Qatil is also a oceanic species which is caught mainly during January and April. Previously mainly referred as *Makaira mazara* (Indo-Pacific blue marlin) is comparatively rare occurrence in Pakistan but still very large specimens of this species can be seen at landing centers. It is estimated to contributed to about 6 % in the total landings of billfish. It can attain a length of 3.5 m with a weight of about 650 kg.

Fig. 11*Makaira nigricans* caught off Phor, Balochistan coast.

Tetrapturus angustirostris Tanaka, 1915

Shortbill spearfish(Fig. 12) locally known as Ghora or Asp are of rare occurrence along the coast of Pakistan. It is rarest of the commercial species found in Pakistan contributing about 2 % in the total landings. Found mainly in oceanic waters it is seldom caught in coastal waters.

Fig. 12*Tetrapturusangustirostris* from off Malan, Balochistan coast

Billfish Production

Present billfish annual production is estimated to be about 3,700 m. tons and showing a trend on increase in past two decades (Fig. 13). The data between year 1995 and 2004 has shown landings to range between 2,300 and 2,600 m. tons thereafter the landings of billfish is increasing steadily attaining a level of about 3,700 m. tons in 2012. This is attributed to increase in pelagic gillnetting fleet since 2003 which is still continuing. An increase in the landings of billfishes can be observed during 1991and 1994 which is because of operation of 50 Taiwanese tuna longliners in the Exclusive Economic Zone of Pakistan (separately shown in Fig. 14) which resulted an increase in catches of billfish during this period.

A comparison of data from two maritime provinces of Pakistan indicates that the landings of billfish In Sindh are steadily increasing the past twenty years (Fig. 14). The increase may be attributed to conversion of large number of shrimp trawlers into pelagic gillnetters as well as addition of new boats into this fishery. The landings of billfish almost remain steady during the same period in Balochistan. The landings of billfish in Balochistan decreased from 2,159 in 1996 to 991 m. tons in 1999, thereafter it remains stable for five years. An increase was observed in 2005 when it reached to 2,083 m. tons. Since then it fluctuated between 1,500 and 2,000 m. tons.

It may be mentioned that species-wise data of billfish is not recorded in Pakistan, therefore, it is not possible to determine the dominant species through the available landings data. WWF-Pakistan has recently started collected information about landings of large pelagic including billfish which reveals that Indo-Pacific sailfish is the most dominating species of billfish found in Pakistan followed by black marlin and striped marlin. Swordfish is the rarest of all the billfishes which is seldom caught by pelagic gillnetters.

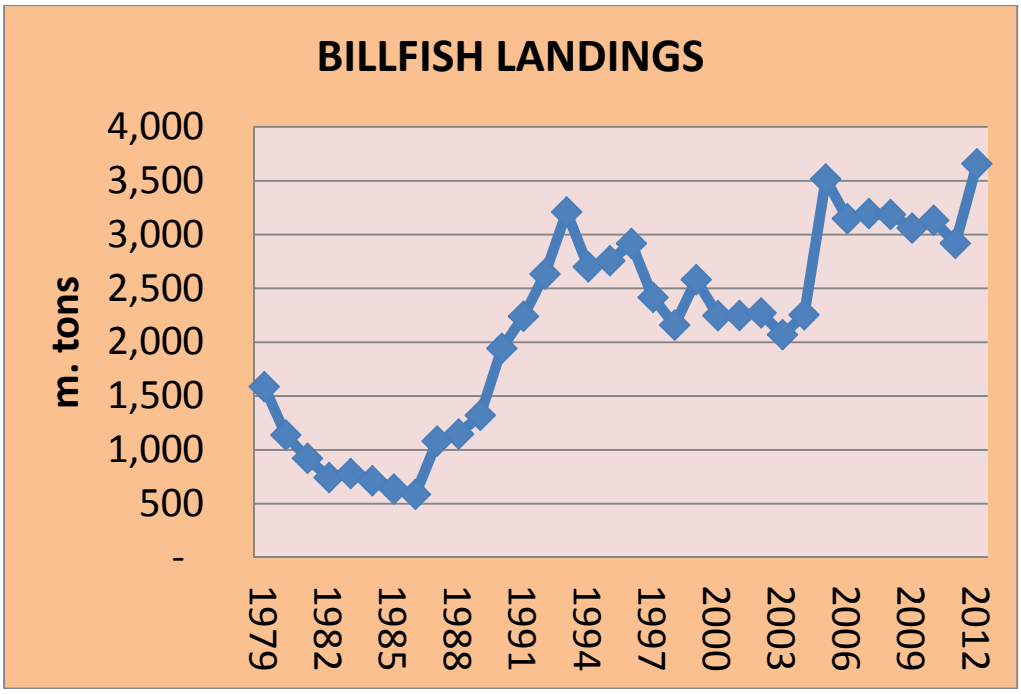

Fig. 13. Billfish landing in Pakistan

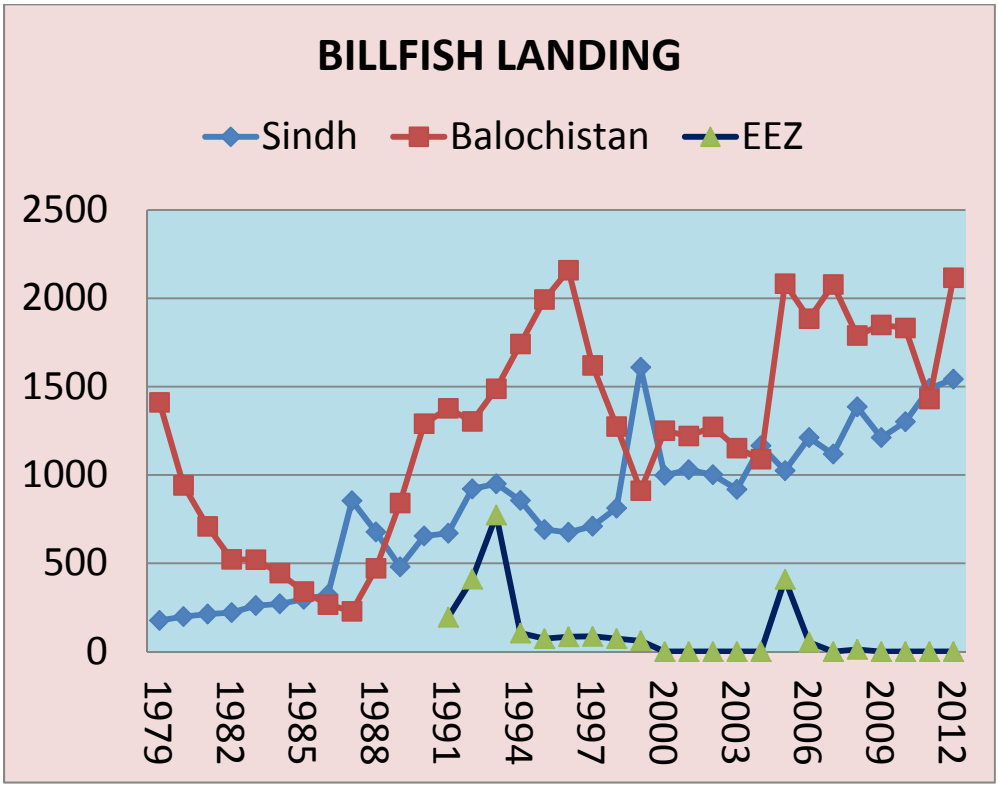

Fig. 14. Province-wise landings of billfish

Billfish in Longlining

In 1991, Government of Pakistan allowed operation of tuna longliners from Taiwan to operate in its Exclusive Economic Zone between 35 and 200 n. miles. By year 1993, 50 such tuna lonliners were operating in Pakistan. The data of catch rates of billfishes collected during the 1991 to 1994 by these vessels is presented in Fig. 15 which indicates high catch rates during October to December 1991 and 1994. Catch rates of marlins (including both black and blue marlins) were highest during October and November. Catch rates of sailfish were observed to be high in August and December, 1991 whereas in rest of the study period there was no catches or insignificant. Sworfish was observed during August and September, 1992. Insignificant catch rates during 1994 may be attributed to overfishing of billfish during 1991 and 1992 which led to decreased cache in subsequent years.

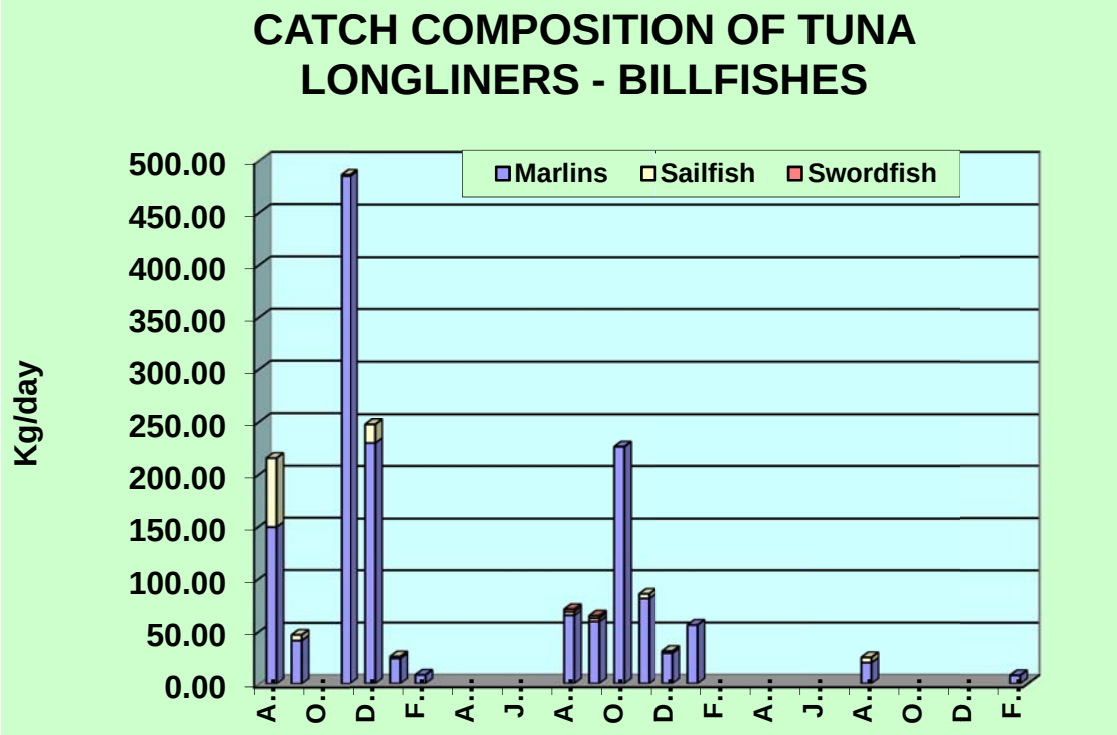

Fig. 15. Billfish catch rate on board Taiwanese longliners during 1991 to 1994

Moazzzam and Usmani (2004) prepared a distribution map of billfishes in the northern Arabian Sea based on the data collected on board tuna longliners during 1991-1994 which indicates that most billfish species are caught along the continental margin along Pakistan coast (Fig. 16). In addition, in the area of Murray Ridge which increased to comparatively shallower waters billfish especially striped marlin and black marlins are abundantly found.

Population Parameters

Because billfishes are dressed on board (Fig. 17) and landed mostly with head and tail removed, therefore, it was not possible to collect size frequency data on regular basis. The population parameters, therefore, were not determined in the past. However, WWF-Pakistan has now posted some observers onboard a few pelagic gillnetters, therefore, data of length frequency and other parameters of billfishes will be collected. Analysis of this data will be carried out and will be presented in future meeting of the Working Party on Billfish.

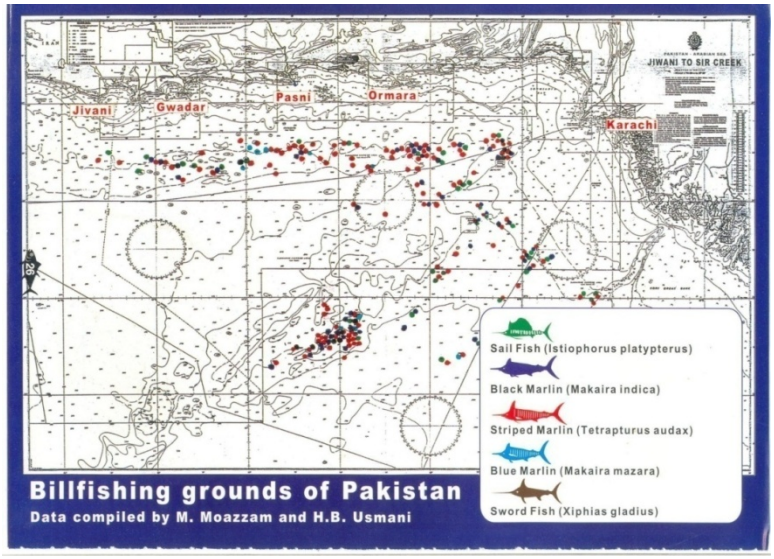

Fig.16. Main fishing grounds for billfish by Taiwanese tuna longliners during 1991-1994.

Fig. 17. Billfish dressed on board prior to landings

Quality Control Issues

Onboard handling practices are very poor in Pakistan. Billfishes are eviscerated and cut into large pieces for keeping it in the fish hold compartments with ice. During the process of making pieces and their storage, hygienic conditions are not maintained affecting the quality of fish.

The pieces of billfish are landed in the fish harbours mainly located at Karachi and Gwader. No care has been taken to ensure hygienic handling and auction of billfish. In most cases billfish chunks and pieces are piled on the floor of the auction hall for sale with little or no ice (Fig. 18). Small quantities of whole billfish are also landed which consists of smaller specimens of sailfish and black marlins.

In fishing trips of longer duration some billfish are eviscerated, cut open and salt is applied (Fig. 19). Such fish are usually stored on the deck of the pelagic gillnetters. In most cases such fish are not cut into pieces. These are also landed in the landing centers and auctioned. Quantities of wet salted billfish have substantially been reduced because of high prices being offered for chilled form.

Fig. 18. Billfish pieces are piled on floor in Karachi Fish harbour center for auction

Fig. 19. Billfish landed in wet salted form and displayed for auction.

Billfish Marketing:

Billfishes are not consumed in Pakistan, therefore, all landed material is sent to other countries. Traditionally dried salted billfish used to be exported form to Sri Lanka, however, because of increased demand of chilled billfish, nowadays insignificant quantities of billfish in salted dried form is processed and exported to Sri Lanka. Since last ten years almost entire catch of billfish is smuggled to Iran in chilled form either through road transport or through fishing vessels that operate between Gwader/Jiwani and Iran. Substantial quantity of billfish also transshipped at high seas to Iranian boats. Quantitative data billfish trade with Iran is not available/recorded.

Future Plans.

Consider serious lacunae in the information pertaining to billfish fisheries of Pakistan and a similar paucity in other regional countries of the Northern Indian Ocean (mainly Iran and Oman), WWF-Pakistan has prepared a plan to develop a database for the purpose whereby Marine fisheries Department which is the federal fisheries organization, will be provided assistance to collect data of pelagic gillnetters from all major landing centers. Provincial fisheries departments will also be a part of this programme. WWF-Pakistan has already started collection of information pertaining to species composition, length-frequency parameters and other biological data about billfishes in Pakistan and now plan is being developed to seek similar information from Iran and Oman. Billfishes are considered as top predators, therefore, playing an important role in the pelagic (epipelagic!) ecosystem. In addition all billfish species are regarded as oceanodromous and highly migratory as designed by Annex I of the 1982 Convention on the Law of the Sea, therefore, it is necessary that information about billfishes may be obtained from regional countries. Since the disposal and marketing of billfishes is also a serious issue in most regional countries, therefore, it is planned to develop a programme for improve handling and processing of billfish in Pakistan and other regional countries.

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