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Crew based observer programme of WWF-Pakistan – A source of data collection on cetacean bycatch

Muhammad Moazzam

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CREW BASED OBSERVER PROGRAMME OF WWF-PAKISTAN-A SOURCE OF DATA COLLECTION ON CETACEAN BYCATCH

Muhammad Moazzam
WWF-Pakistan, 46-K, PECHS Block 6, Karachi-75400, Pakistan
(mmoazzamkhan@gmail.com)

INTRODUCTION

Provision for an Observer Programme is made in the Deep Sea Policy in Pakistan since 1982 when Federal Government permitted operation of foreign flag vessel in Pakistan under a Joint Venture Programme. Since 1982 various permissions have been granted for both foreign and local fishing vessels of various categories to operate in the Exclusive Economic Zone of Pakistan under various policies and programmes.

A new Deep Sea Fishing Licensing Policy, 2018 was issued by Federal Government in April 2018 (DSFP, 2018). Like all previous policies and programmes it has provision for having an observer on board. Clause 6.2.q. of this Policy states "Scientists/ Researchers will be deputed by MFD (Marine Fisheries Department) on vessels as and when required for collection of fisheries data. Fishing vessels will also carry onboard a representative of MFD as Observer".

More than 100 vessels including stern trawler, pair trawlers and tuna longliners operated between 1982 and 2009 were allowed to operate in the EEZ of Pakistan. During this period, observers (known as inspectors/research assistants/senior research assistants) were posted on each vessel but no reliable data was generated during this period. Since 2015 no trawler was licensed to operate in EEZ whereas last tuna longliner was permitted in 2009. No observer was ever posted on artisanal fishing boats although some of these were operating in EEZ of Pakistan and even beyond. The observers (Inspectors) posted on deep sea fishing vessels were not assigned to collect any information about cetaceans or their interaction with fisheries operations.

WWF-Pakistan initiated a programme where instead of placing external observers onboard tuna gillnet vessels, a crew member (mostly skippers) was assigned to carry out the duties of an observer collecting information about the catch and other information about the fishing operations. These observers were assigned to collect information about entanglement of endangered, threatened and protected (ETP)

species including cetaceans. They were also to record information about free swimming schools of dolphins and any sightings of whales.

GILLNET FISHING OF PAKISTAN

Gillnetting for tuna and tuna like species is an important component of the coastal and offshore fisheries of Pakistan as a major part of the artisanal fleet is engaged in this fishing. Gillnets consisting of monofilament and multifilament are used for catching tuna and tuna like species. Monofilament net is mainly used for catching frigate (*Auxis thazard thazard*) and bullet tunas (*Auxis rochei*) whereas multifilament nylon nets are used for catching longtail tuna (*Thunnus tonggol*), kawakawa (*Euthynnus affinis)*, striped bonito (*Sarda orientalis*), yellowfin tuna (*Thunnus abacares*) and skipjack tuna (*Katsuwonus pelamis*). Bigeye tuna (*Thunnus obesus*) is rarely caught by the gillnet fishing vessels in coastal and offshore waters, therefore, it does not contribute to the tuna landings of Pakistan. There are about 700 tuna longiners based mainly in Karachi along Sindh Coast and Gwadar along Balochistan Coast.

Information about tuna fisheries of Pakistan is known through the work of Khan (2016), Moazzam (2011, 2012a-c, 2014, 2017, 2018a-b), Moazzam and Ayub (2015, 2017), Moazzam *et al.*, (2016, 2017) and Nawaz and Moazzam (2014). These studies were based mainly on the fisheries statistical data being published by Marine Fisheries Department, Government of Pakistan and also some information collected through the Crew-based Observer Programme initiated by WWF-Pakistan in 2012.

CREW BASED OBSERVER PROGRAMME

It was well known that gillnet fisheries is marred with high bycatches which include commercially important species, marine turtles, cetaceans, whale sharks, sharks, mobulids and other non-target species but the extent of bycatch entanglement and mortality in Pakistani tuna gillnet fisheries was not known. In order to gather this information, WWF-Pakistan initiated a study in 2012 with the financial assistance of Indo-Pacific Cetacean Research and Conservation Foundation (IPCRCF), Australian Marine Mammal Center, Australian Antarctic Division, Government of Australia which was aimed to assess the mortality of cetacean and other endangered, threatened and protected (ETP) species in the tuna gillnet fisheries of Pakistan. The project envisages deployment of two observers for data collection on the tuna fishing vessels.

WWF-Pakistan selected a few candidates (mainly fresh science graduates, master degree holder students mainly belonging to fishermen families) and conducted exhaustive training for data collection. However, after training these candidates refused to work as an observer because of long fishing trips (upto 45 days), improper accommodation facilities, unhygienic food and presence of pests on the fishing vessels.

Tuna boats like other fishing vessels are known to be infested with roaches, scorpions, centipedes and rodents, mainly Norwegian rats (Fig. 1-2).

After several failed attempts to post observers onboard, WWF-Pakistan decided to assign the data collection on cetacean mortality to skipper of one of the tuna vessel. This turned out to a major breakthrough as that skipper provided much needed data of catches of tuna and tuna like species, bycatch species and other information about the fishing operations. The skipper was provided with a template (Fig. 3) to record the data and also collect photographic record of the catch for daily fishing operations. It is pointed out that one tuna gillnet operation is carried out each day during a fishing trip. The net is laid down in the evening and after an average soak time of 12 hours net is leaved in the morning. No fishing operation is carried out during the day time. No tuna gillnet operation is carried out during monsoon months (June and July) which is voluntarily observed as close season. In some years (like in 2018) the close season was observed for 90 days (mid May to mid August) because it coincided with religious holidays.

Fig. 1. Tuna fishing vessel is infested with scorpion

Fig. 2 Norwegian rat entrapped on board tuna fishing vessel.

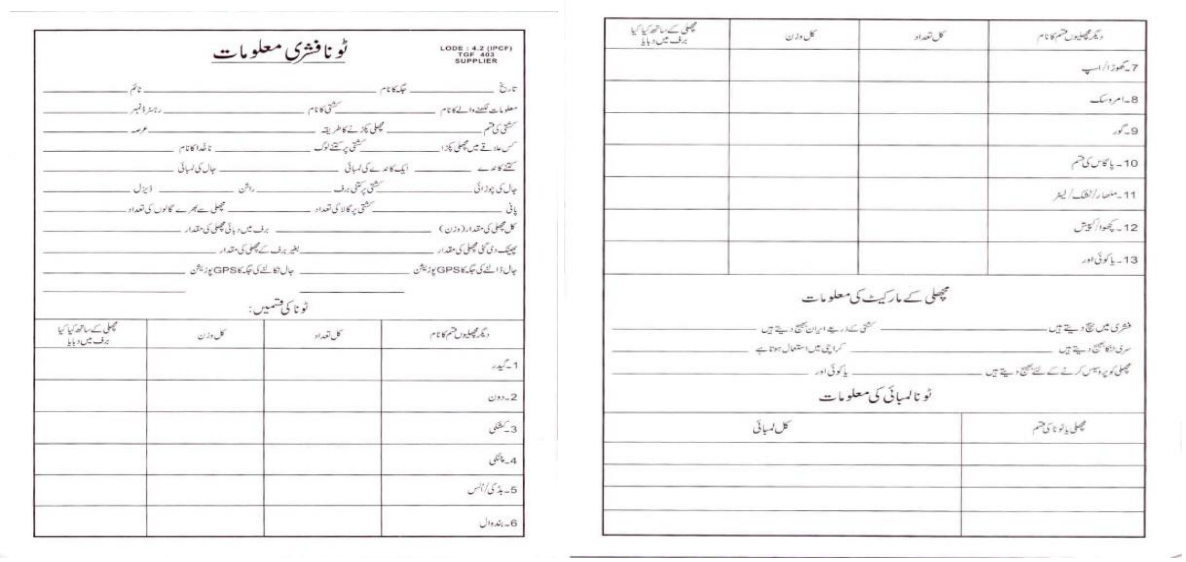

Fig. 3. Template being used by Crew-based Observers

Considering the quality and diversity of the information generated through this programme the number of observers was increased to four during 2013 and 2014 and gradually increased to 85 observers in 2018 (Fig. 4). Now this crew observer programme is funded through FAO/GEF/Common Oceans ABNJ project. The observers were paid Rs 18,000 (US $ 140) per month for the collection of information.

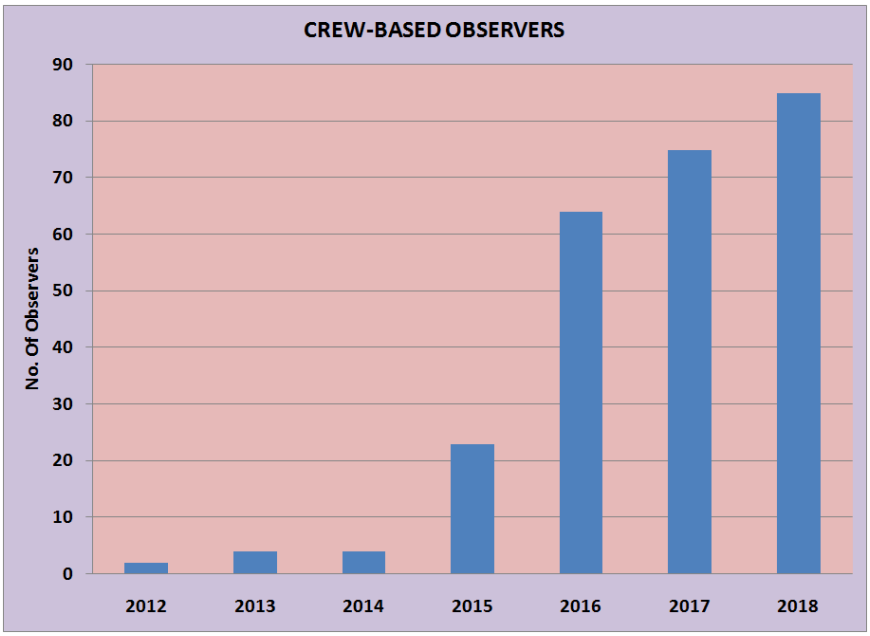

Fig. 4. Number of Crew Based Observer Programme (2012-2018)

Crew Based Observer Programme is considered by WWF-Pakistan as successful because crew of tuna gillnet vessels are well trained and accustomed to work in high

seas. Observers from outsides needs to be trained require to develop capabilities to work in harsh offshore conditions. For the crew based observers no additional facilities are required. Since gillnet operation is not done during the day time, therefore, the observers have adequate spare time to record the collected data without affecting their own work. Crew based observers can identify fishes to species level using traditional knowledge (folk taxonomy). External observers have to be trained to identify fish species.

DATA COLLECTED THROUGH CREW BASED OBSERVER PROGRAMME

All crew based observers are required to collect and record following information for each hauls on the template:

1. Quantity and estimated weight of all tuna species
2. Quantity and estimated weight of all tuna like species
3. Quantity and estimated weight of all bycatch fish species including sharks, rays, queenfish, trevallies, leatherskin and other fish and shellfish species
4. Quantity and estimated weight of all ETP species (including cetaceans, sea turtles, whale sharks, mobulids, queenfish, sunfish and other similar species.
5. Measure the length (fork length) of 3 specimens of dominant tuna and tuna like species (Fig. 5-6)
6. Measure the length of each specimens of ETP species
7. GPS location of the net deployment and net retrieval area.
8. Date and time of net placement and retrieval
9. Photograph of the catch and selected specimens using digital camera.
10. Photograph of free swimming schools of tuna, dolphins and whales

These observers were assigned specifically to collect information about entanglement of endangered, threatened and protected (ETP) species including cetaceans. They were also to record information about free swimming schools of dolphins and any sightings of whales. In addition, at the start of each fishing voyage, the crew based observer is required to record:

1. Date of departure
2. Quantity of ice, ration, water and fuel
3. Number of panels of the gillnets
4. Length of each panel
5. Possible fishing ground
6. Other details of vessel
7. Any important event or observation (such as HAB blooms, water spout)

After the completion of each trip, observer in interviewed in a debriefing session during which details of the fishing trips, species composition and other information about

fishing trip is obtained. The collected data is stored in WWF-Office (Fig. 7) whereas all information collected by the observers in stored in especially designed software.

Fig. 5. Recording the length of tuna species

Fig. 6. Recording the weight of bycatch species (mako shark)

Fig. 7. In addition to digital record, hard copies of the original data sheet is systematically stored

The data is analyzed for recording monthly catch of each tuna and tuna like species, bycatch species and ETP species. Through each data sheet information about catch of each species is recorded (Fig. 8).

Location		Date	19/3/17
Fishing Vessel Data			
Time	-	Name of Sampler	
Fishing Boat		Type of fishing	
Duration of fishing trip		Area of fishing	
No of crew on board		Name of Nakhuda	
No of Net Panels (Kandas)		Length of one kanda (m)	
Length of Net (km)		Width of Net (m)	
Ration (Rs)		Fuel (Rs)	
Water (tanks)		Ice (Ladi)	
No of Galas		No of filled Galas	
Total Catch (kg)			
GPS Location	24.16.624 N	65.38.249 E	
Remarks			
TRIP NO.			
Tuna Catch Data			
Species	No of Specimens	Total Weight	Remarks
Gayder/Zardum	13	85	
Dawan			
Kishki	6	18	
Chunki			
Budki/Bindol/frigate			
Bullet			
Dantani			
Total	19	103	
Bycatch Data			
Species	No of Specimens	Total Weight	Remarks
Ghora			
Qatil			
Amrusk	7	28	
Gore			
Kund			
Duther			
Khagha			
Kakawan			
Sangra			
Baam			
Sunaf			
Hira			
Sapna	1	1	
Ar manger			
Mangra 1			
Mangra 2			
Other Species			
Other Species			
Other Species			
Other Species			
Malhar/Dolphin			
Kachwa/Turtle			
Andhi mangar			
Weesar			
Pakhi			
Total	8	29	
TOTAL	27	132	
Length Frequency Data			
Gayder/Zardum	109,114,112,60,67,71,76,81		
Dawan			
Kishki	60,61,56		
Chunki			
Budki/Bindol			
Bullet			
Dantani			
Ghora			
Qatil			
Amrusk	70,89,94,63,77		
Gore			
Kund			
Duther			
Khagha			
Kakawan			
Sangrah			
Baam			
Sunaf			
Hira			
Sapna	40,36		
Ar manger			
Mangra 1			
Mangra 2			
Other Species			
Other Species			
Other Species			
Other Species			
Malhar/Dolphin			
Kachwa/Turtle			
Andhi mangar			
Weesar			
Pakhi			

Fig. 8. Data sheet of each fishing day is digitized

Tuna Catch Data			
Species	No of Specimens	Total Weight	Remarks
Gayder/Zardum	366	1,969	
Dawan	46	159	
Kishki	72	221	
Chunki	50	129	
Budki/Bindol/frigate	-	-	
Bullet	-	-	
Dantani	8	20	
Total	542	2,498	
Bycatch Data			
Species	No of Specimens	Total Weight	Remarks
Ghora	4	123	
Qatil	-	-	
Amrusk	134	488	
Gore	-	-	
Kund	-	-	
Duther	-	-	
Khagha	-	-	
Kakawan	-	-	
Sangra	-	-	
Baam	-	-	
Sunaf	-	-	
Hira	-	-	
Sapna	19	16	
Ar manger	-	-	
Mangra 1	4	5	
Mangra 2	2	35	
Other Species	-	-	
Other Species	-	-	
Other Species	-	-	
Other Species	-	-	
Malhar/Dolphin	-	-	
Kachwa/Turtle	-	-	
Andhi mangar	-	-	
Weesar	-	-	
Pakhi	-	-	
Total	163	667	
TOTAL	705	3,165	

Fig. 9. Data sheet of monthly catch of one observer

A summary of monthly catch of each species is generated (Fig. 9) for each observer which is compiled for a complete year (Fig. 10).

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Tuna Species													
Gayder/Zardum	1,078	1,688	1,969	1,270	222				3,347	8,896	3,095	200	21,765
Dawan	265	276	159	975	285					4,700	280	660	7,600
Kishki	522	821	221	178	33				189	294	1,029	321	3,608
Chunki	285	168	129	345	15						14	142	1,098
Budki/Bindol/frigate	0							-					-
Bullet	0							-					-
Dantani	0		20					-					20
Subtotal	2,150	2,953	2,498	2,768	555	0	0	0	3,536	13,890	4,418	1,323	34,091
Bycatch													-
Ghora	480	125	123	675	75				210	349	1,075	225	3,337
Qatil	0							-					-
Amrusk	486	481	488	424	140				182	634	756	268	3,859
Gore	11	4		104				-		39		60	218
Kund	0							-					-
Duther	0							-					-
Khagha	0			122				-		69			191
Kakawan	0							-					-
Sangra	0	6						-					6
Baam	0							-					-
Sunaf	0							-					-
Hira	0							-					-
Sapna	6	24	16	4	1					2	1		54
Ar manger	0	18		70	22								110
Mangra 1	113	64	5					-		252		97	531
Mangra 2	0		35					-		8		22	65
Other Species	0			259				-		1,881			2,140
Other Species	0			2				-		12			14
Other Species	0							-					-
Other Species	0							-					-
Malhar/Dolphin	0							-					-
Kachwa/Turtle	0							-					-
Andhi mangar	0							-					-
Weesar	0							-					-
Pakhi	0							-					-
Total	3,246	3,675	3,165	4,428	793	0	0	0	3,928	17,136	6,250	1,995	44,616

Fig.10. Data sheet of catch of one observer for a complete calendar year

Year-wise data for all observers is compiled in form of an average summary sheet and estimated landings of the fleet engaged in catching tuna is generated (Fig.11).

	Iqrar	Shah Zamin	Saeed Zaman	Ismail	Noor Khan	Badsha Nawab	Nisar Hasan	Falak Naz	Saeed Badsha	Subtotal	Average	Landings of fleet
Tuna Species												
Gayder/Zardum	21,765	32,632	22,835	21,196	29,043	30,176	23,456	21,345	29,876	210,559	26,320	23,688
Dawan	7,600	15,711	21,087	10,501	16,112	16,543	8,734	20,932	17,653	127,273	15,909	14,318
Kishki	3,608	2,881	3,765	3,424	2,712	3,002	4,323	2,489	2,993	25,589	3,199	2,879
Chunki	1,098	2,572	3,834	2,099	2,600	2,134	2,871	3,217	2,345	21,672	2,709	2,438
Budki/Bindol/frigate	-	4,038	484	10,103	4,091	3,298	9,876	421	2,310	34,621	4,328	3,895
Bullet	-	15	-	-	-	-	-	-	-	15	2	2
Dantani	15	-	-	15	-	-	-	-	-	15	2	2
Subtotal	34,086	57,849	52,005	47,338	54,558	55,153	49,260	48,404	55,177	419,744	52,468	47,221
Bycatch		-	-	-	-	-	-	-	-	-	-	-
Ghora	3,337	4,154	1,249	1,231	2,134	1,324	2,137	2,195	1,675	16,099	2,012	1,811
Qatil	-	2,680	-	512	1,211	1,321	290	380	450	6,844	856	770
Amrusk	3,859	4,380	4,367	4,939	3,599	4,598	4,143	4,328	4,876	35,230	4,404	3,963
Gore	218	1,560	1,385	2,316	1,100	1,543	3,212	1,212	1,342	13,670	1,709	1,538
Kund	-	17	-	-	44	-	32	54	98	245	31	28
Duther	-	6	45	-	1	-	-	-	43	95	12	11
Khagha	191	395	833	460	878	-	-	32	876	3,474	434	391
Kakawan	-	-	515	-	-	-	324	412	-	1,251	156	141
Sangra	6	60	50	-	78	78	432	321	-	1,019	127	115
Baam	-	-	-	-	9	-	-	-	-	9	1	1
Sunaf	-	-	-	-	-	21	21	-	-	42	5	5
Hira	-	21	-	-	21	29	-	-	321	392	49	44
Sapna	54	23	-	-	11	11	34	-	124	203	25	23
Ar manger	110	15	14	-	9	-	54	432	-	524	66	59
Mangra 1	531	1,290	-	-	1,180	1,342	32	65	1,234	5,143	643	579
Mangra 2	65	90	-	-	88	27	-	-	21	226	28	25
Other Species	2,147	2,732	3,998	1,480	2,912	2,196	2,134	321	2,312	18,085	2,261	2,035
Other Species	12	414	16	-	432	321	43	16	213	1,455	182	164
Other Species	-	23	1	11	-	34	453	1	-	523	65	59
Other Species	-	-	-	-	-	-	-	-	-	-	-	-
Malhar/Dolphin	-		-	-			-	-		-	-	-
Kachwa/Turtle	-									-	-	-
Andhi mangar	-	-	-	-	-	-	-	-	-	-	-	-
Weesar	-	-	-	-	-	-	-	-	-	-	-	-
Pakhi	-	-	-	-	-	-	-	-	-	-	-	-
Total	44,616	75,709	64,478	58,287	68,265	67,998	62,601	58,173	68,762	524,273	65,534	58,981

Fig. 11. Summary Sheet for all observers (9 shown here) and total catch of tuna vessels

DATA GENERATED THROUGH CREW BASED OBSERVER PROGRAMME

In addition to catch data of tuna and tuna like species, crew based observer programme became a major source for determining the seasonal changes in the quantity of bycatch species (Fig. 12). The data reveals that quantity of bycatch species is more than tuna species during September, November to January 2013) whereas in the remaining months tuna quantities are more than bycatch species.

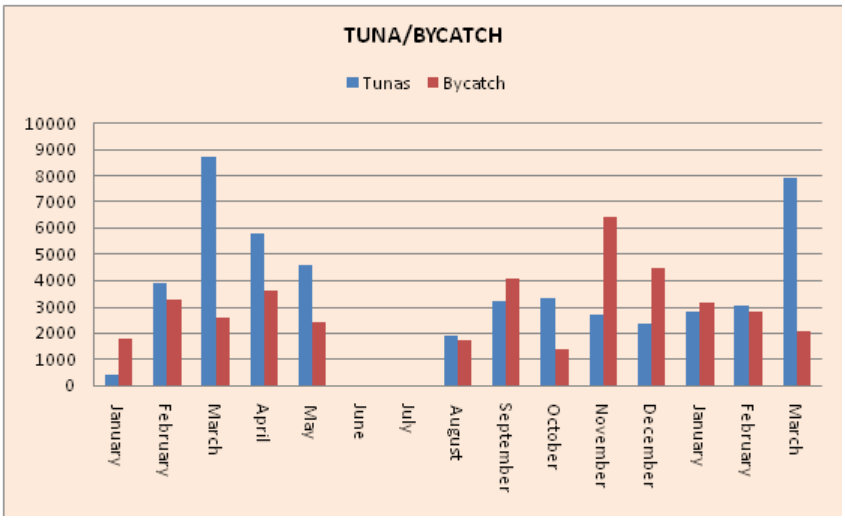

Fig. 12 . Tuna catch and bycatch (2013-14)

The data also indicates that sharks and dolphinfish are dominating among bycatch followed by sailfish and queenfishes (Fig. 13). Among ETP species, cetaceans contribute about 1 % and turtles contribute 2 %.

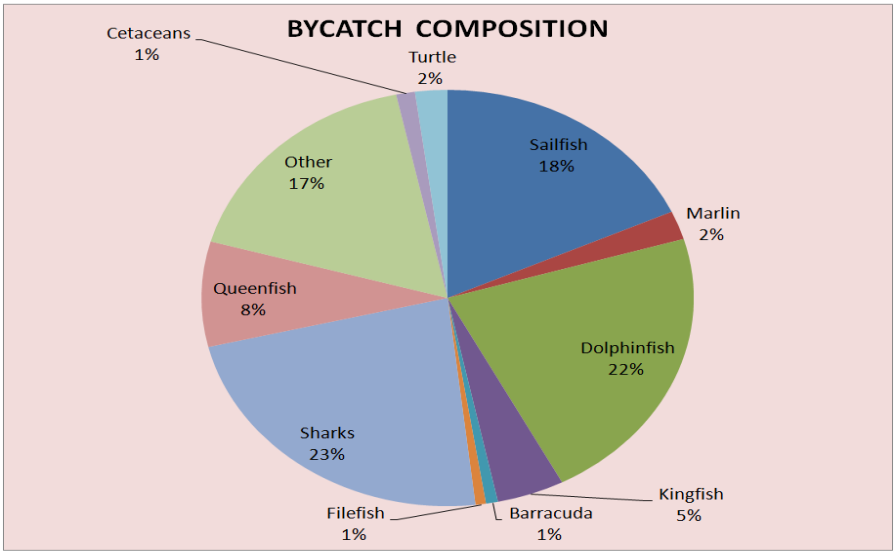

Fig. 13. Composition of bycatch (2014)

The study further revealed marked seasonality in the entanglement of turtles (Fig. 14) and cetaceans (Fig. 15). It was surprising that more than 28,000 marine turtles are entangled annually whereas numbers of dolphins annually entangled are about 12,000. It was also noticed that almost all dolphins die during entanglement whereas almost all turtle survive entanglement.

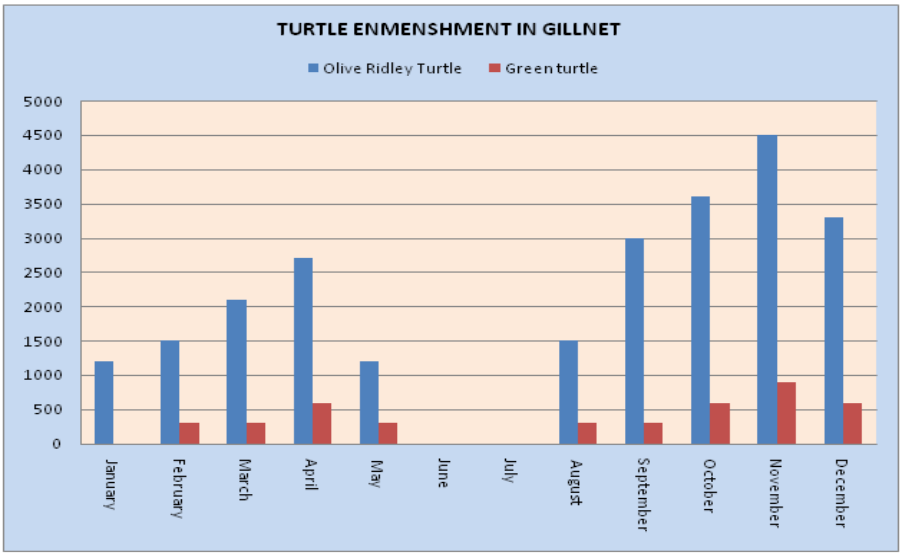

Fig. 14. Entanglement of marine turtles in gillnet (2014)

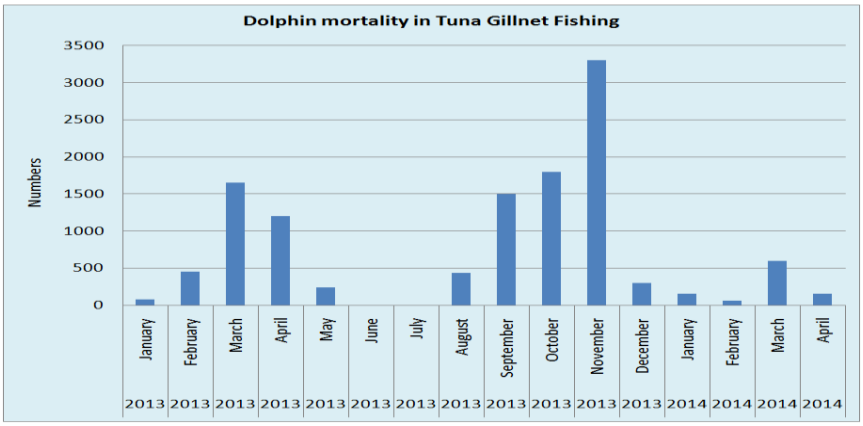

Fig. 15. Entanglement and mortality of dolphins in tuna gillnetting (2013-14)

INFORMATION ABOUT CETACEANS

For the estimation of entanglement/mortality, number of dolphins killed on the tuna vessels on which observers were deputed during a month was recorded which is multiplied by number of vessels engaged in tuna gillnetting. The study revealed that 2013, high mortality of dolphins (about 12,000) was observed in the tuna gillnet operation along the Pakistan coast. However, in the subsequent year the level of entanglement and mortality of dolphin started to decline mainly because of gradual shifting from surface to subsurface gillnetting. Prior to 2014, entire tuna gillnet fleet of Pakistan used surface gillnets, however, persuasion of WWF-Pakistan, fishermen started using gillnets that are placed about 2 m below the surface. By using of this mode of operation, the catch of yellowfin and skipjack tunas which are the main target species increases substantially whereas entanglement of protected, endangered and threatened (ETP) species including cetaceans and turtles decreases. By 2016, almost entire fleet shifted to subsurface gillnetting which resulted in substantial decrease in dolphin entanglement from annual about 12,000 in 2013 to mere 186 in 2018 (Fig.16)

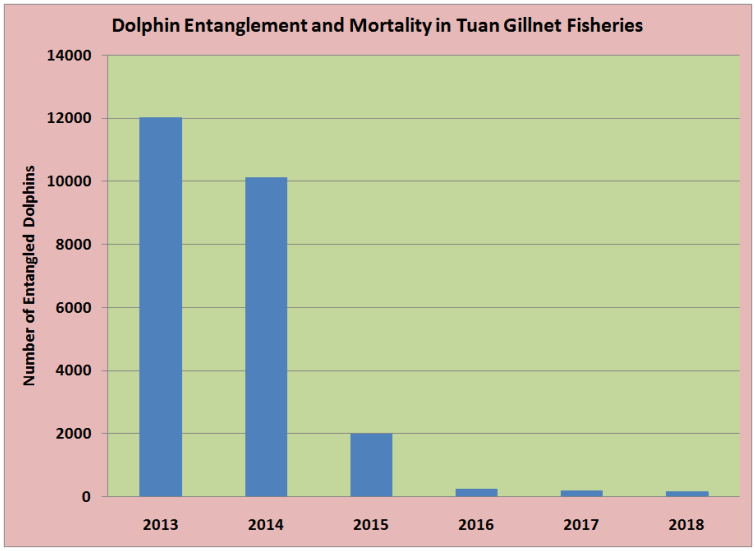

Fig. 16. Entanglement and Mortality of Dolphins in Tuna Gillnet Fisheries of Pakistan

In 2013, maximum entanglement and mortality of dolphins was observed to be during April and November 2013 (Fig. 15) when a total of 2,700 and 2450 dolphins were estimated to be killed in tuna gillnet operation respectively. This may be attributed to operation of tuna gillnet vessels in comparatively shallower waters along the coastline. The study further reveals that there are two peaks of dolphin mortalities. First peak was observed in March and May and other between September and November. During June and July no mortality was reported because there is two month of voluntary close season for tuna gillnet fishing. The information generated about distribution of whales has been presented in International Whaling Commission Scientific Committee Meetings (Moazzam and Nawa, 2017, 2018).

CONCLUSION

Crew based observer programme implemented by WWF-Pakistan seems to a major source of data collection from the gillnet fleet operating in coastal and offshore waters of Pakistan. Government of Pakistan could not start a credible observer programme because of a number of reasons including willingness of the observers to work on tuna gillnet vessels which have inadequate and improper facilities. In most cases vessels are too small to accommodate an additional person onboard. There are other administrative reasons which are barriers in initiating a Observer Scheme comparable to such programmes being implemented in some other Indian Ocean countries and fisheries.

There is no doubt that crew based observer programme has provided substantial information about ETP species. Previously extent of mortality in gillnet fisheries of the Northern Indian Ocean especially about Arabian Sea was not available. Crew based observer programme which now have endorsement of the Government of Pakistan has provided much needed information about cetaceans including mortality of dolphins, distribution of large whales (baleen and toothed whales) as well as about distribution of small cetaceans along the coast of Pakistan. Based on the extremely high mortality of dolphins, provincial governments of two maritime provinces have enacted law which ban catching of cetaceans .

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