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Developments in the East African Billfish Conservation and Research programme

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Abstract

The African Billfish Foundation (ABF) have continued to develop the East African Billfish Conservation and Research programme over the past two years taking into account those recommendations emphasised at the Working Party on Billfish 10th Session. A total of 8,369 Billfish have been tagged and released and a further 1,086 released without tags over the past three fishing seasons off the coast of East Africa. The African Billfish Foundation has also received 117 Billfish recapture reports during this time. A recent recapture of a Black Marlin off Mandapam, India expanded the recognised international boundaries of Billfish caught off East Africa, with this being ABF's first billfish recapture off India. In the coming season the ABF, in collaboration with Kenyan sport fishing anglers, hope to compliment the existing data from the conventional tagging programme with the deployment of 5 satellite tags in Marlin. These tags should help yield a greater insight into the movements of Marlin caught in this area. This report reviews data from the year 2000 including data obtained over the last two years, and Tanzanian recaptures. Developments in local education, tagging zone expansion and data collection are addressed. Highlighted within the report are the challenges faced in the conservation and management of the billfish species in East African waters, with a focus on the artisanal fishery. Limitations to recapture data collection are discussed with suggested solutions. As a conclusion the paper reiterates the different ways to address the threats facing the billfish species.

Table of Contents

List of Tables

List of Figures

1.0. Introduction

In our previous report (9th session IOTC WPB, July 2011) we provided a background to the tag and recapture programme. Outlining materials and methods used, an overview of our data from 1990, recaptures we have had as well as recapture rates, and threats facing billfish in the Indian Ocean, as well as the challenges we face in billfish conservation and promising solutions. Here we address the progress in the various programs conducted by the African Billfish Foundation (ABF) and developments towards the solutions discussed in the last report. We address the recommendation for ABF at WPB session 10: "to continue its important work, particularly in area of collaborative research aimed at obtaining more information on movements of billfishes, via both conventional and archival tagging programmes that will allow the collection of information on both horizontal and vertical movements as well as population dynamics" (IOTC 2012). Thanks to the donation of five satellite tags by IGFA we now have the chance of coupling information from our conventional tagging programme with data obtained from archival tags, obtaining more information on billfish movements. Over the past 3 fishing seasons, since 2010, we have had a total of 8,369 Billfish tagged and released, and a further 1,086 released without tags and one Black Marlin (*Istiompax indica)* tagged with a satellite tag off the coast of East Africa. During this time the ABF have also received 117 Billfish recapture reports, bring total figures so far to 45,266 tagged billfish, 3634 released without tags and 1352 tag recaptures. With the increasing popularity of recreational fishing and tag and release in the Western Indian Ocean we look at ways to promote sustainable, ethical and conservation minded fishing practices. Catch and release science has revealed that one of the strongest correlates of mortality for fishes is the deep hooking in areas such as the oesophagus, gills, or stomach, which is largely influenced by gear choice and angler behaviour (Cooke, J.S. et.al. 2012) In the recreational fishery for billfishes, which is primarily a catch-and-release fishery, studies have demonstrated that circle hooks result in higher rates of external hooking and post-release survival than standard 'J' hooks (Graves, J.E. et. al.) Hence the launch of our Circle Hooks Awareness project, in collaboration with Costa, presidential Challenge, IGFA and Eagle Claw, to promote the use of circle hooks in the billfish fishery in the Western Indian Ocean.

Through our recapture studies it has become clear that there is interaction between artisanal fishermen and Billfish stocks in the Western Indian Ocean however more studies need to be carried out on the significance of these interactions. Brinson highlights the fact that on the whole there has been little to no research on artisanal fisheries that target billfish (Brinson et. al. 2006). There is a growing need to complete social and economic studies of the users of billfish resources as data obtained from such studies can be linked to each management objective, whether it be biological, social or economic, and can be used to evaluate the performance of management strategies. (Brinson, A. A. 2008) However

Brinson also states that “socioeconomic issues are much more polarized and salient in developing countries, where widespread poverty among artisanal fishers coexists with fishing enterprises that attract wealthy foreign tourists” (Brinson, A. A. 2008). Hence in these countries it is evident that fisheries management may need to take a broader scope and include strategies that better understand and address poverty alleviation and the interaction with fisheries, one method suggested is through the use of sustainable livelihoods approach (Allison and Ellis, 2001, Allison and Horemans, 2006, Ellis, 2000). It is clear that human dimensions of fisheries (Ditton 2004) and conservation social science are now regarded as critical components of fisheries management and conservation. (Cook, J. S. et. al. 2012) With these views it is clear that in order to progress with billfish management in East Africa socioeconomic studies need to be carried out in order to assess the value of this species to the different fisheries operating in this region. The overall aim of this presentation is to update the Working Party on Billfish on data obtained by the African Billfish Foundation through its conventional tagging programme over the past 3 years, integrating it with data collected since the year 2000. We also aim to inform on current community education programmes and tagging expansion developments undertaken by the ABF, as well as challenges encountered. We also look at possible future plans and matters that need to be addressed.

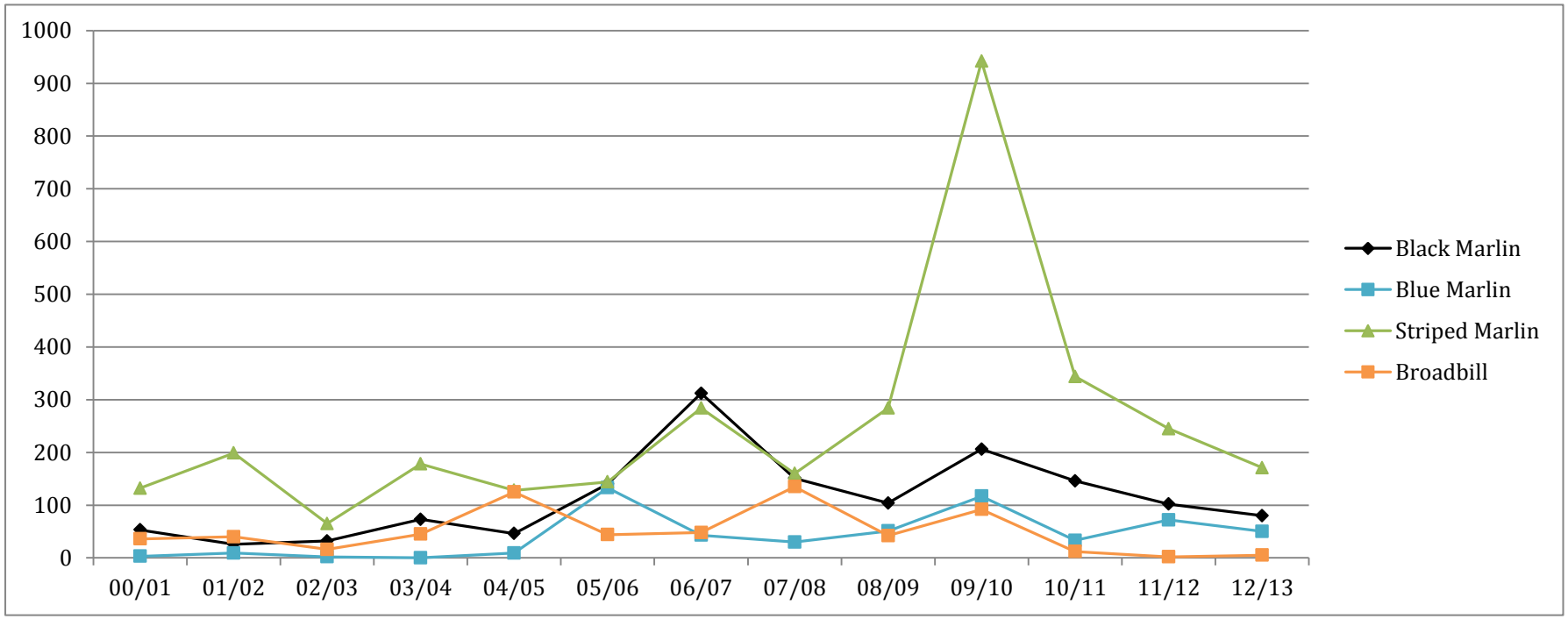
“The value of goodwill generated by such programmes, both within the angling community and the community at large, should not be underestimated” (Pepperell, J. G).

2.0. Data Review

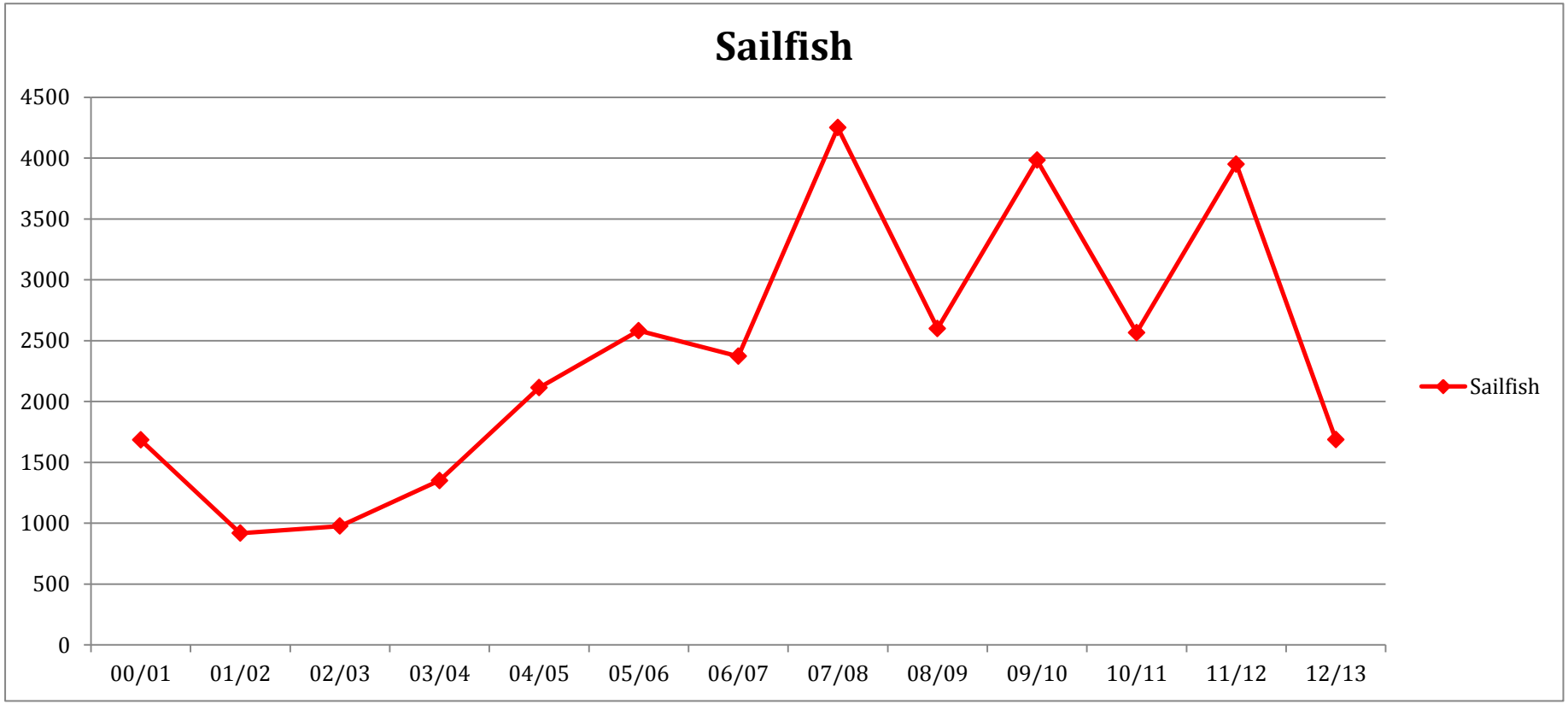
Table 1: Number of billfish species tagged and released per season since 2010:

Season	Sailfish		Black Marlin		Blue Marlin		Striped Marlin		Broadbill		Spearfish		Total
	T/R	Released	T/R	Released	T/R	Released	T/R	Released	T/R	Released	T/R	Released	
10/11	2289	277	133	13	29	4	319	25	10	2	1	2	3104
11/12	3333	483	88	12	68	4	227	18	2	0	0	0	4236
12/13	1463	229	64	17	49	1	160	11	5	0	1	0	1999
Total	7085	989	285	42	146	9	706	54	17	2	2	2	9339

Graph 1:Total number of Marlin species marked per season from 2000-2013:

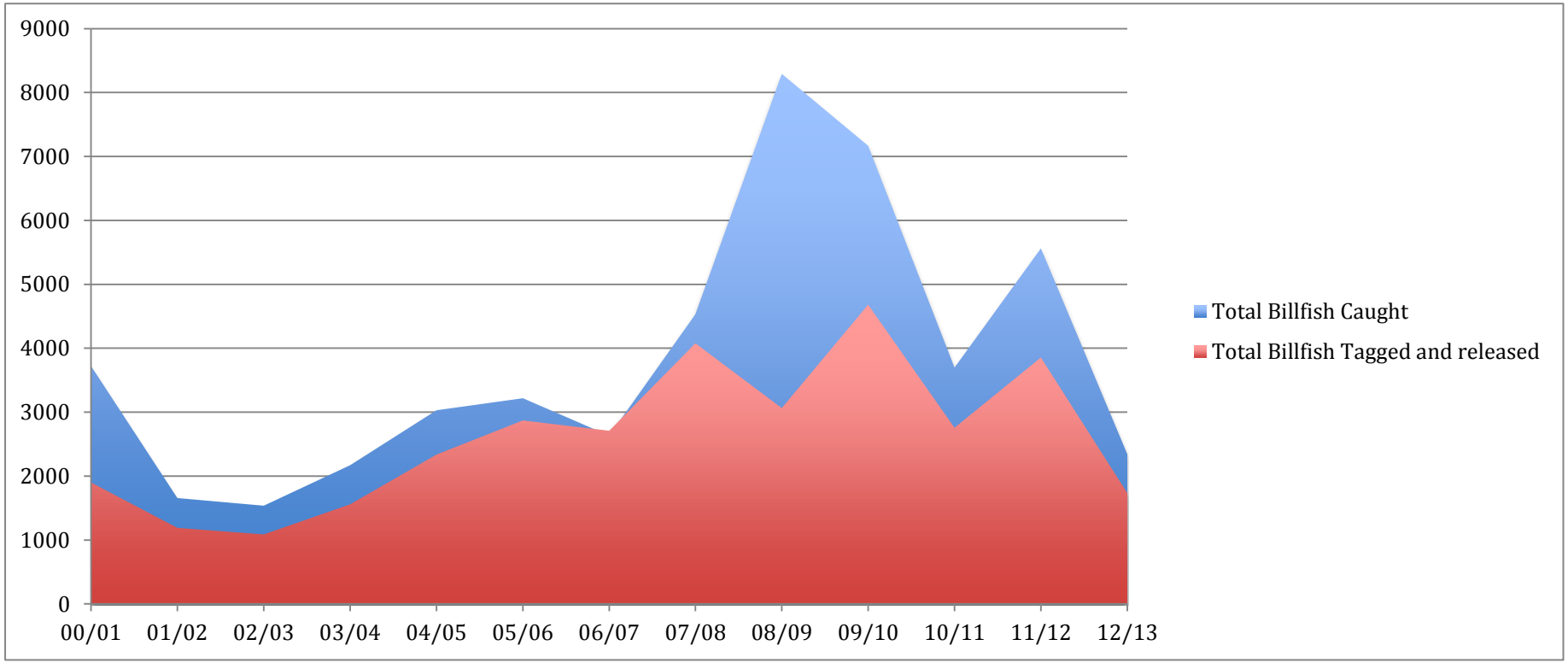


Graph 2: Total Number of Sailfish marked per season from 2000-2013:



Graph 1 and 2 show the seasonal variation in Billfish Numbers from 2000 to 2013. Both Graphs show the decrease in numbers of Billfish tagged and released in the last 3 seasons compared to previous seasons. Despite the seemingly cyclical pattern of the Sailfish over the seasons, numbers for season 12/13 are considerably lower than previous years where there have been troughs. Factors affecting this decrease in numbers is not fully known, however fishing effort and the tourist industry greatly affect the number of days fished per season and therefore the number of fish caught per season.

Graph 3: Total billfish caught vs. total billfish tagged per season:



Graph 3 displays the total number of billfish caught each season since 2000 against the total number of billfish tagged and released. Between season 07/08 and 08/09 there is a significant drop in the tagging effort compared to the total number of billfish caught. In these seasons tags were not offered free and therefore fewer people tagged, as they did not want to pay. This has to be considered as a factor when looking at these seasons.

2.1. International Recaptures:

Map 1

Key:

- Blue Marlin
- Black Marlin
- Striped Marlin
- Sailfish
- Broadbill
- Shark
- Big Eye Tuna
- Yellowfin Tuna

2.3. Tanzania Recaptures

Map 2: Recaptures in Tanzania since 1991

2.4. Tanzania Data Review

Number of billfish species marked per season in Tanzanian waters:

Tag Season	Sailfish	Black Marlin	Blue Marlin	Striped Marlin	Broadbill	Total
91/92	13			1		14
92/93	68	1		22		91
93/94	31	1		15		47
94/95	90			19	1	110
95/96	124	12	3	72		211
96/97	48	1		12	7	68
97/98	17			87	1	105
98/99	39	1	1	33	1	75
99/00	31	2		34		67
00/01	46	1	5	46		98
01/02	11	1	1	16	2	31
02/03	22	2		52		76
03/04	22	2		52	1	77
04/05	57	3	1	53	1	115
05/06	52	3	9	45	2	111
06/07	74	5	8	86		173
07/08	186	3	4	41	1	235
08/09	136	4	11	28	2	181
09/10	86	3	5	67		161
10/11	85	4	6	53		148
11/12	167	3	7	57		234
12/13	46	4	5	44		99
Total	1451	56	66	935	19	2527

Table 2 shows the total tag and release effort in Tanzania since 1991, with the total number of billfish tagged and released in Tanzania since 1991 coming to 2527. There are plans to expand our tagging programme further into Tanzania and address the mass killing of billfish by artisanal fishermen from some areas of Tanzania in the near future.

3.0. Current Developments

Looking at the promising solutions identified in our last report we take each in turn and assess the developments made so far.

1. Training, enhanced research, education and awareness and regional cooperation. Education and awareness at both local and regional levels for both artisanal and large-scale fisheries.

As of September 2012 the ABF initiated an Education Programme focusing on Artisanal and Recreational fishermen, and School Children. The Programme aims to inform coastal communities and those involved in fishery activities that encounter billfish on this species and the importance of sustainable fishing. With this programme we aim to establish a section of marine education that is rarely taught in schools in this area, that of the pelagic environment and species such as the billfish. As part of the programme we work closely with artisanal fishermen on data collection and awareness for sustainable fishing. However with a lack of socioeconomic studies developing management plans with the various fisheries is limited.

2. More training required on tagging in order to obtain data and results that can guide management decisions for reducing billfish by catch and enhance developments in fishing technologies in both recreational and commercial fisheries therefore minimising billfish by catch and mitigating post-release mortality.

The ABF are in the process of developing an experimental design. We are redesigning our tag data report cards to collect more specific data that will be helpful in biological research and stock assessments. Along with enhancing tag data obtained, crews and captains will be informed about data collection through our education programme and with funding we hope to provide the proper tools, such as measuring sticks, to recreational boats along the coast. In the mean time we are addressing post-release mortality of billfish through our Circle Hooks Awareness programme. This programme aims to raise awareness of circle hooks and their conservation benefit to the recreational billfish fishery. Through this programme we will encourage all sport-fishing boats to use circle hooks in billfishing. With this we hope to reduce the post-release mortality rates that are so commonly seen with 'J' hooks through deep or foul hooking.

3. Multi-stakeholders approach on collaborative research to obtain adequate data that will be vital in understanding the status of the fisheries as well as their biology and ecology. Obtain data through conventional tagging studies as well as via satellite tagging. Further extensive tagging of billfish would allow the estimation of mortality rates.

Collaboration with IGFA on the International Great Marlin Race saw the IGFA donate 5 Satellite tags as a trial run. These tags are to be deployed in Marlin of the Kenya coast. We have already had one deployed due to pop-up in mid-November. The data obtained from satellite tag deployment will compliment data from our conventional tagging programme, enabling us greater insight into the exact movements of the marlin tagged off East Africa. Along with renewed tag data report cards and Satellite tags, we are continually expanding our tagging ranges. Many of our international and regional tagging zones are on a small scale, we hope in the future we will be able to expand these zones.

4.0. Challenges Encountered

Over the past 3 years we have encountered a couple of main challenges. The first is that recaptures of our tags are rarely reported from commercial fishing vessels. Here we look to raise awareness of the need to report recaptures and perhaps develop an easier way for these commercial vessels to report recaptures. Awareness also needs to be raised on the data needed from recaptures, as it is often the case that not enough data is reported. The second is the lack of socioeconomic studies, which would help in assessing the value of this species to each fishery. This in turn would enable the development of management plans for the billfish species, which are presently lacking. This issue is discussed further in the next section.

5.0. Future Plan

With the listing of the Striped Marlin (*Kajikia audax)* as near threatened and the Blue Marlin (*Makaira nigricans*) as Vulnerable on the IUCN red list there is a growing concern and need for management of the fisheries that encounter the Billfish species. Over the past year and a half members of the ABF team have taken part in a Conservation Leadership Project. This project has provided a pilot study for further in depth Socioeconomic studies along the East African Seaboard. With the development and completion of such studies, different fisheries will be better understood and management plans can be suited to each individual fishery, to benefit both the fisheries status and the conservation status of the Billfish species. Table 3 indicates that a high majority of the programmes tagged fish are recaptured in nets by the Artisanal fishery. With figures as high as 77.8% recapture in nets it is important to look into this fishery in more detail to assess the impact it may be having on the Billfish Species in East African waters, and further into the Western Indian Ocean.

Table 3: Percentage of recaptures caught by different fisheries.

Method of recapture	**Percentage**
Nets	77.8%
Rod and Line	17.6%
Commercial Trawlers	2.7%
Picked up dead	1.6%
Unknown	0.3%

6.0 Acknowledgements

We thank the sport fishing fraternity, and particularly the boat captains, the anglers and crews for their relentless efforts in providing information and partaking in the voluntary tag and release of Billfish. We also thank all our sponsors who have enabled us to start the community education and awareness programme last year. Thanks to IGFA for donating 5 satellite tags to be deployed in Marlin off Kenya, allowing us to build on our conventional tagging data. And finally thanks to the sponsors of the Circle Hooks awareness programme, Presidential Challenge, Costa, Eagle Claw and IGFA, for helping to promote ethical and sustainable fishing among the recreational Billfish anglers in the Western Indian Ocean.

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