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Scientific Note

BILLFISH CATCHES FROM OCEANIC RECREATIONAL FISHING IN THE ROYAL CHARLOTTE BANK, BAHIA, BRAZIL*

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ABSTRACT

The aim of this study was to analyze the oceanic recreational fishing in the Royal Charlotte Bank, state of Bahia, Brazil. Only data from an oceanic recreational fishing operator based in the municipality of Canavieiras, southern Bahia, were used, from 2012 to 2017. Overall, 103 fish specimens were caught and released, during this period, belonging to the following species: *Makaira nigricans, Kajikia albida,* and *Istiophorus platypterus*. Fishery operations occurred from October to March, with the highest catch in number in December (56.3%). The largest annual catch was recorded in 2013, with 39 individuals. The catch per unit effort ranged from 1.0 to 1.4 fishes per trip, with the highest value in December. Even though data presented here are partial, they can help to establish a strategic scenario for the fishing sector in Bahia, along with data from other fishing sectors (artisanal, industrial, subsistence and scientific).

Keywords: blue marlin; white marlin; sailfish; sport fishery; offshore fishery.

CAPTURA DE AGULHÕES PELA PESCA ESPORTIVA OCEÂNICA NO BANCO ROYAL CHARLOTTE, BAHIA, BRASIL

RESUMO

O objetivo deste estudo foi analisar a pesca esportiva oceânica no Banco Royal Charlotte, no estado da Bahia. Foram utilizados apenas os dados de uma operadora de pesca esportiva oceânica sediada no município de Canavieiras, no sul da Bahia, para o período de 2012 a 2017. Ao todo, 103 exemplares de peixes foram capturados e devolvidos ao mar durante este período, pertencendo às seguintes espécies: *Makaira nigricans, Kajikia albida* e *Istiophorus platypterus*. As operações de pesca ocorreram de outubro a março, com a maior captura em número em dezembro (56,3%). A maior captura foi registrada em 2013, com 39 indivíduos. A captura por unidade de esforço variou de 1,0 a 1,4 peixes por saída, com o maior valor observado em dezembro. Os dados aqui apresentados, embora parciais, podem ajudar a criar um cenário estratégico para o setor, juntamente com dados de outros setores da pesca (artesanal, industrial, de subsistência e científica).

Palavras-chaves: marlin azul; marlin branco; agulhão vela; pesca amadora; pesca oceânica.

INTRODUCTION

Istiophorus platypterus (sailfish), *Kajikia albida* (white marlin), and *Makaira nigricans* (blue marlin), widely known as billfishes, belong to the family Istiophoridae. According to Froese and Pauly (2019), *Istiophorus platypterus* has a circumglobal distribution, while the other two species occur mainly in the Atlantic Ocean, with only a few records of *M. nigricans* in the Indian and Pacific oceans. All three species occur in tropical and subtropical regions and may occasionally reach temperate waters. Sailfishes are associated with the seasonal movement of the 28ºC isotherm, being close to the surface (10-20 m) most of the time, with frequent short dives down to depths of 100-200 m (Arocha and Ortiz, 2006a). White marlins are found in the epipelagic zone most of the time, at temperatures ranging from 24ºC to 29ºC, also close to the surface (<25 m) and making short descents at depths greater than 300 m (Hooligan, 2013). Blue marlins are associated with the epipelagic zone, spending 80% of the time closer to the surface

(<25 m), in temperatures of 26ºC - 31ºC, but diving occasionally to depths greater than 300 m as well (Arocha and Ortiz, 2006a).

Brazil is located in a region of large concentration of sailfishes, and blue and white marlins, mainly off the states of Bahia, Espírito Santo, Rio de Janeiro, São Paulo, and Santa Catarina (Carrião, 2015). Freire et al. (2018) also recorded the capture of *I. platypterus* by oceanic recreational fishers in Fernando de Noronha, Rio Grande do Norte, and Paraíba. Even though Freire et al. (2018) reported the occurrence of oceanic competitive fishing events in Bahia, they were unable to have access to catch data.

Despite the increasing importance of oceanic fishery and the awareness that this activity can reduce the size of target populations (Carrião, 2015), there are only a few cases where catch records from recreational fisheries are available to assess their impact more realistically, and hence to guide the adoption of management strategies capable of ensuring the sustainability of exploited stocks. In addition to the pressure suffered by recreational fisheries, billfishes are also caught, in much larger numbers, as bycatch in commercial pelagic longline fisheries, negatively impacting their populations (Amorim and Arfelli, 2003; Kitchell et al., 2006).

The aim of this study was, therefore, to characterize the billfish recreational fishery in the Royal Charlotte Bank. This bank is located 18 miles from the municipality of Canavieiras, in the state of Bahia, and it is considered one of the best regions to catch billfishes, especially *K. albida* and *M. nigricans* (Amorim et al., 2006). This study will provide additional knowledge to better understand the oceanic recreational fishery in Brazil.

MATERIAL AND METHODS

The study area, Royal Charlotte Bank (15º59'53"S - 38º00'18"W), is located close to the municipality of Canavieiras, in southern Bahia, with a population of 32,336 inhabitants (IBGE, 2010). Its climate is tropical with high temperature and high precipitation rate (SEI, 2012). The Royal Charlotte Bank is near the Canavieiras Extractive Reserve (RESEX Canavieiras), the RESEX Corumbau and, further south, the Abrolhos Marine National Park.

The present study was conducted using data on billfish catches from fishing operations taking place from 2012 to 2017 and reported by the fishery operator called Bahia Sportfishing Ltda., located in the municipality of Canavieiras. Data were obtained from the operator's logbook, which contained information on all fishing trips by day, month, and year, name of the boat and recreational fishers, weight (kg) per species caught, and whether fishes were tagged or not before releasing. Additionally, the average weight of each species was calculated, as well as the percentage of tags deployed before releasing. The catch per unit of effort (CPUE) was estimated in number of fishes caught per trip.

RESULTS AND DISCUSSION

Eleven operators of oceanic recreational fishing were identified in Bahia (Table 1), four of which in the municipality of Canavieiras. The operator Bahia Sportfishing Ltda. was the only one willing to provide fishing records. Its activities began in 2009, but the operator recorded catches only from 2012 to 2017, with the activities ending in 2018.

A total of 103 billfishes were caught during fishing trips to the Royal Charlotte Bank that took place in 2012-2017 (Table 2). All billfishes were released, 54.4% of them after receiving a tag. Unfortunately, 79 of the captured specimens were not identified by species by the operator and were reported as unidentified billfishes. A total of 24 individuals were identified, which were captured in 2016 and 2017. Of these individuals, 67% were blue marlins, 25% white marlins, and 8% sailfishes. This proportion confirms findings from a study conducted by Amorim et al. (2006) indicating that the highest catches of blue and white marlins are reported off the states of Bahia and Espírito Santo, respectively. On the other hand, the coast of the states of São Paulo and Rio de Janeiro has the highest catches of sailfishes (Mourato et al., 2018).

Only seven out of the 16 blue marlins were weighed, with minimum and maximum weight of 100 kg and 500 kg, respectively (mean weight: 314 kg). Blue marlin (*M. nigricans*) is a large fish that reaches a maximum length of 375 cm and has a common standard

Table 1. Oceanic recreational fishing operators in the state of Bahia, Brazil, year of establishment, and office location. ─ indicates cases where we did not find information on year of establishment.

Fishing operators	Establishment	Office
Charlote Fishing	─	Canavieiras
Coconut	─	Santa Cruz Cabrália
Ilhéus Pesca Oceânica	─	Ilhéus
Majestic Marlin	─	Canavieiras
DelPesca	─	Itacaré
Yacht Clube da Bahia	1970	Salvador
Portomar	2001	Praia do Forte
Sportfishing Ceminha	2005	Salvador
Adrenalina Fishing	2007	Canavieiras
Bahia Sportfishing Ltda.	2009	Canavieiras
Base Náutica	2011	Praia do Forte

Table 2. Logbook of the recreational fishing operator Bahia Sportfishing Ltda. containing number of fishing trips, speedboats, billfishes captured and tagged, and the weight range of all billfishes caught each year.

Year	Fishing trips	Speedboats	Billfishes captured	Billfishes tagged	Weigtht range (kg)
2012	11	2	14	5	120 – 250
2013	32	2	39	27	100 – 500
2014	15	2	19	15	100 – 400
2015	5	2	7	2	150 – 150
2016	5	2	6	3	100 – 500
2017	15	2	18	4	350 – 350

length of 180-300 cm (Arocha and Ortiz, 2006b), weighing up to 580 kg (Pinheiro, 2010). However, according to the International Game Fishing Association (IGFA), an individual of 636 kg was caught off the coast of Espírito Santo, in 1992, currently considered the world record for this species. White marlin (*K. albida*), in turn, is considered a medium-sized species, with a maximum length of 280 cm, maximum weight of 82 kg, and common standard length between 150 cm and 180 cm (Goodyear et al., 2003). The most common standard length for saifish (*I. platypterus*) ranges between 160 cm and 180 cm, with a maximum recorded total length of 315 cm (Arocha and Ortiz, 2006a). No white marlin or sailfish caught in the fishing trips of Bahia Sportfishing Ltda. taking place in 2012-2017 was weighed or measured. Although these species have an important ecological role, as top predators, and an important socioeconomic role, as a fishery target, there is little information on their sexual maturation, fecundity, and spawning (Punt et al., 2015).

Annual catch in number of individuals varied from 14 to 39 (Figure 1B). CPUE was stable throughout the period (1.3 fishes/trip on average), except in 2016 when it decreased to 0.8 fishes per trip (Figure 1A). Fishing trips to the Royal Charlotte Bank were restricted to October until March, with most catches being recorded in December, which corresponds to school holidays in Brazil (Figure 1B), accounting for 56.3% of the total catch in number, and to the largest catch of billfishes (39 individuals in 2013) (Figure 1A). Similarly, Mourato et al. (2016) found that December and January are the most productive months for competitive fishing events targeting billfishes off São Paulo and Rio de Janeiro. When analyzed monthly, CPUE ranged from 1.0 to 1.4 fishes caught per trip (Figure 1B). The largest catches and number of fishing trips targeting blue and white marlins, as well as the period of billfish fishing tournaments in southeastern Brazil (Mourato et al., 2018), coincide with the period when the Brazil Current, which occurs throughout most of the east coast of Brazil, has a mean water temperature of approximately 24ºC. This would justify the presence of these billfish species at this time of the year, as they prefer water temperatures ranging from 22ºC to 31ºC (Pinheiro, 2010), which is also related to the spawning period for the Brazilian coast, when the aggregation of individuals is expected (Arocha and Ortiz, 2006a; Hooligan, 2013).

Amorim et al. (2012) sought to raise awareness among oceanic recreational fishers regarding the decline of billfish populations using historical CPUE series (1969-2010). Based on the catches of oceanic competitive events from 1996 to 2014, Mourato et al. (2016) noted a slight decline in the population from 2009 to 2014 using standardized catch rate, while previous analysis had indicated stability in CPUE during that period. Pimenta (2011) also revealed declining catches of blue and white marlins, and sailfishes in competitive events off southeastern Brazil from 7.7 fishes/boat in 1975-1976 to 1.7 fishes/boat in 2001-2002 and delivered a warning message for recreational fishers and researchers, which later resulted in the introduction of control measures. Similarly, Carrião (2015) observed an abrupt decrease of blue marlin catches in tournaments in the states of Bahia, Espírito Santo, Rio de Janeiro, and São Paulo in 2004-2005, with zero catches in 2006 and 2007. Only in 2013 their catches reached a high number again, with a total of thirty nine individuals caught.

In Brazil, the capture and marketing of billfishes are regulated by the Executive Order N. 12 SEAP/PR of July 14th, 2005 (*Instrução Normativa*) (Brasil, 2005), which establishes rules and procedures in the case of capturing billfishes, including *I. platypterus* (sailfish), *K. albida* (white marlin), and *M. nigricans* (blue marlin), as well as *Tetrapturus pfluegeri* (longbill spearfish). Furthermore, the Executive Order establishes that individuals of *K. albida* and *M. nigricans,* if alive upon gear retrieval, must be immediately returned to the sea. Although blue and white marlins are not target species of commercial fisheries, they are often captured as bycatch by tuna fleets (Pinheiro, 2010). This fact, combined with the appreciation of these species by recreational fishers, may have been causing the decline of their populations, especially considering an 122% increase in the number of recreational fishers practicing billfishes recreational fishery in

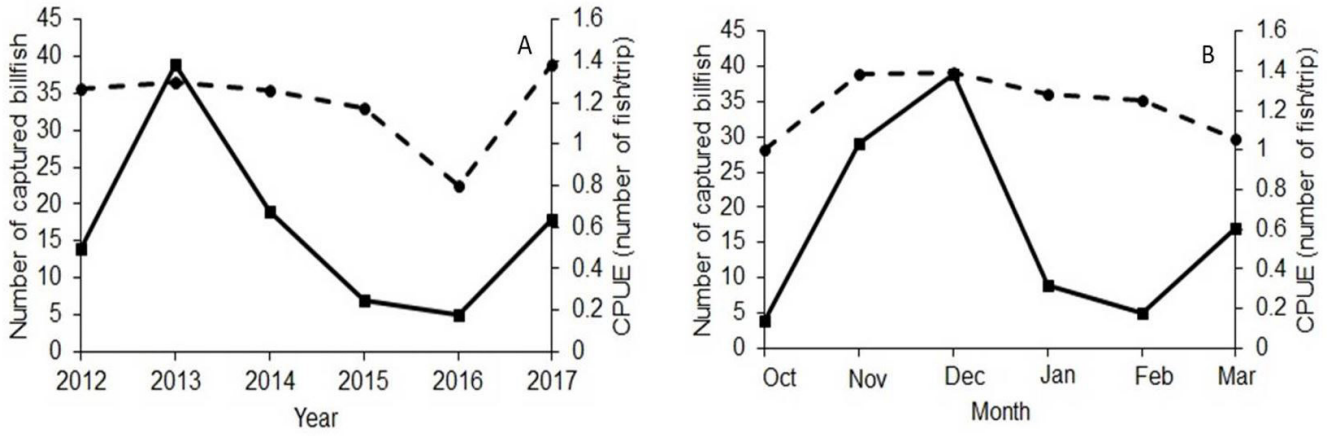

Figure 1. Catch per unit of effort (CPUE) (dashed line) and number of billfishes caught (continuous line) per trip per year (A) and per month (B) in the Royal Charlotte Bank by the fishery operator Bahia Sportfishing Ltda., located in the municipality of Canavieiras, state of Bahia, Brazil, between 2012 and 2017.

Brazil since 1999 (Abreu et al., 2016). Although recreational fishery is practiced in a much smaller scale than commercial fisheries, it can also impact the ecosystem (Cooke and Cowx, 2006) and intensify the overexploitation of fishery resources (Font and Lloret, 2014). In 2018, the United States amended the Billfish Conservation Act (BCA), sanctioned in 2012, to prohibit anyone from selling billfishes or billfish products or to have custody, control or possession of them for sale in mainland. The measure was taken due to the state of overexploitation of sailfish populations globally (NOAA, 2019). Overfishing can affect marine biodiversity directly by reducing populations and indirectly by altering processes of unintentional natural selection, causing a reduction in the average size of individuals and the age of sexual maturity (Venerus and Cedrola, 2017).

The latest reports of the International Commission for the Conservation of Atlantic Tunas (ICCAT), which is responsible for the conservation and management of tuna and tuna-like species in the Atlantic Ocean and adjacent seas, concluded that *M. nigricans* and *K. albida* populations did not recover after being considered severely overexploited in 2011-2012, as catches surpassed the quota established at that time for their recovery (ICCAT, 2018, 2019). According to the International Union for Conservation of Nature (IUCN), *I. platypterus* is globally classified as low concern (LC) and *K. albida* and *M. nigricans* are classified as vulnerable (VU). The Chico Mendes Institute for Biodiversity Conservation included the first two species in the same category defined by IUCN, but classified *M. nigricans* as endangered (EN) in Brazil (ICMBio, 2018). Because of the wide distribution area of these three species, their populations should be monitored jointly by all countries involved (Punt et al., 2014), which would ensure they receive the same conservation status and are managed accordingly.

The existing pressure on billfish populations is caused by accidental fishing by the commercial tuna fleets, increased oceanic recreational fishery, and degradation of the marine ecosystem by humans (Pauly et al., 2002; Hilborn et al., 2003; Lotze et al., 2006). Although activities such as recreational fisheries, which gradually gain more supporters in Brazil, generate significant economic return (Freire and Sumaila, 2019), protective regulations must be created and monitored to keep this practice sustainable.

CONCLUSION

The present study reported the capture of 103 billfishes in the Royal Charlotte Bank, off southern Bahia, in 2012-2017. This region has great potential for the practice of oceanic recreational fishery as three billfish species are found there (but with predominance of *M. nigricans*). It should be noted that the results shown here for the region are underestimated, as did not include catches by all operators established in the state of Bahia and did not consider results from fishing competitive events. Although preliminary, the information presented here may serve for managers to start collecting information on catches originating from recreational fisheries, a sector that has been overlooked, assuming their catch is always smaller than those from commercial fisheries, which is not always true.

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