

An overview of the bycatch landed by national and foreign tuna longliners in Mauritius for the period 2009 to 2012.

S. P. Beeharry¹, Z. Dhurmeea² and T. Sooklall³

ABSTRACT

This paper presents by-catch estimates landed by national and foreign longliners fishing inside and outside the EEZ of Mauritius for the period 2009 to 2012. Some 100 licences are issued annually to foreign longliners to fish in the Exclusive economic zone (EEZ) of Mauritius. The average annual landing from these vessels during the period under report amounted to 3 102 tonnes of albacore tuna which is the targeted species followed by 796 tonnes of yellowfin tuna (*Thunnus albacares*), 360 tonnes of big-eye tuna (*Thunnus obesus*) and 1106 tons of by-catch comprising billfish, other tuna-like species and sharks. A total of 21 196 tonnes of tuna and tuna-like species was transhipped in Port-Louis by non-licensed fishing vessels targeting albacore (*Thunnus alalunga*), from 2008 to 2012. The proportion of by-catch landed during this period varied between 28.9% and 39.4%. The total catch landed by non-licensed longliners targeting big-eye tuna has increased over the years from 3495 tonnes in 2008 to 8125 tonnes in 2012. The proportion of by-catch in the total catch seems to be the same (33.1%-47.0%) as compared to the level of by-catch of albacore-targeting fishing vessels (37.9%-39.4 %). The proportion of by-catch landed by longliners targeting swordfish (*Xiphias gladius*) varied between 37.2% to 49.6%. A comparison of shark landings by tuna longliners and swordfish-targeting longliners was carried out: the levels of sharks in the total catch of longliners targeting big-eye tuna are higher (7.9%-20.2%) than those targeting albacore (3.6%-8.03%). However, the catch of sharks was very significant in swordfish-targeting vessels varying between 24.3%-39.1% of the total catch in comparison to albacore-targeting fleets and big-eye targeting fleet. Sharks landed by swordfish-targeting vessels consisted mainly of blue shark (*Prionace glauca*) (74.2-84.2%) followed by moro (*Isurus oxyrinchus*) (7.1-20.0%) and mako shark (*Isurus paucus*) (4.6-9.2%). Moreover, Mauritius has a small number of national boats targeting swordfish that operate in its EEZ. These boats also land a considerable amount of non-targeted tuna and tuna-like species including sharks. The by-catch levels for national boats targeting swordfish was higher (50.8%-52.7% of the total catch) as compared to the FAD fishery whose by-catch varied between 27.9%-42.9%.

1. Divisional Scientific Officer, Ministry of Fisheries, Mauritius: sbeeharry@mail.gov.mu
2. Scientific Officer, Ministry of Fisheries, Mauritius: zdurmeea@mail.gov.mu
3. Technical Officer, Ministry of Fisheries, Mauritius: tsooklall@mail.gov.mu

1. Introduction

Longliners operating in the Indian Ocean has been using Mauritius as a transshipment base for tuna and tuna-like species. Licensed and non-licensed foreign vessels regularly call at Mauritius with an approximate of 500 calls yearly for unloading. An average of 33 000 tonnes of tuna and tuna-like species are transshipped annually through the Port-Louis harbour including some 13 000 tonnes of by-catch. Mauritius issues fishing licences to foreign vessels to fish in its waters against the payment of a licence fee. One of the licence conditions provides that prior to unloading all licensed vessels have to submit their duly filled logbooks and are subject to inspection by the Port State Control Unit. It is mandatory for licensed foreign fishing vessels to land and sell their by-catch in Mauritius. Moreover, Mauritius has four national surface longliners, less than 24 m in length, operating in its EEZ. These vessels target swordfish but also land by-catch comprising yellowfin, bigeye, albacore tunas, billfish and shark while no encounter with seabirds and marine turtles were noted. Around 380 small-scale artisanal fishermen are fishing around anchored Fish Aggregating Devices set around the island. They target mainly albacore tuna but also land yellowfin, common dolphinfish, wahoo and a lesser amount of shark. Catch data retrieved from logbooks and information gathered through inspection of vessels by the Port State Control Unit were compiled from 2009 to 2012 and results of analyses are presented in this paper.

2. By-catch from foreign fishing vessels

2.1. By-catch levels from licensed longliners

An average of 100 licenses was issued yearly to foreign longliners targeting albacore tuna in the EEZ of Mauritius. 753 logbooks were received from 2009 to 2012 and the catch of tuna and tuna-like species recorded averaged to 5 364 tonnes per year, out of which 82.2% were caught in the waters of Mauritius. Fishing zones varied between latitudes 02° N - 39° S and longitudes 50° E - 70° E with most of the effort being distributed between latitudes 10° S - 19° S and longitudes 55° E - 64° E as well as between latitudes 20° S -24 °S and longitudes 55 ° E-64 ° E (Fig 1).

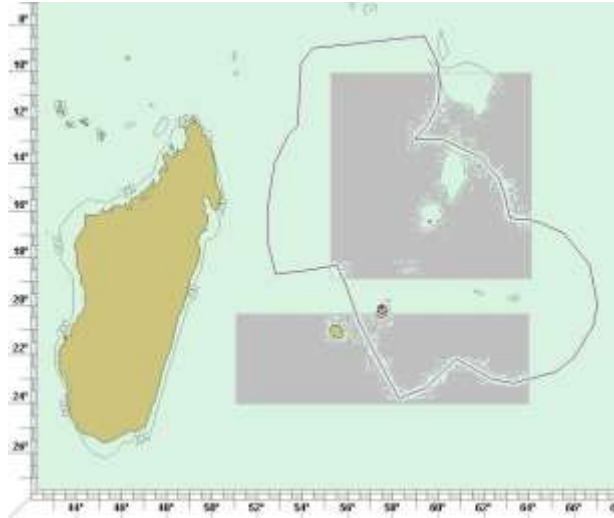


Fig. 1: Main fishing zones of foreign licensed longliners

Annual trends have shown a considerable decrease in the total catch landed by licensed longliners in the past four years with a lowest catch of 3 646 tonnes obtained in 2012 (Fig. 2). This is mainly attributed to a decrease in the number of fishing trips and eventually leading to a reduction in effort, from 207×10^5 hooks in 2010 to 83×10^5 hooks in 2012. Moreover, the number of licensed longliners calling at the port has decreased by 31 % from 2011 to 2012, such that a total of 97 port visits were registered last year.

Despite the decrease in the amount of total catch landed by licensed longliners, the proportion of by-catch in the total catch has remained fairly constant (39.1-40.9%) over the years with the exception of 2012 where the proportion of by-catch reached 51.0% of the total catch (Fig 2).

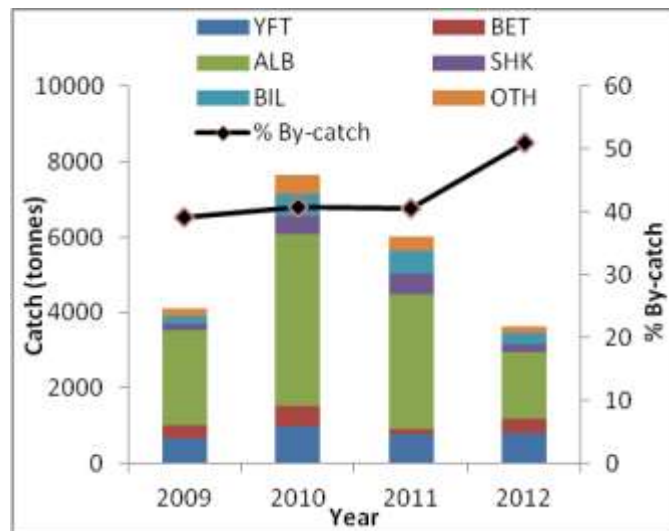


Fig. 2: Species composition and proportion of major by-catch of licensed longliners from 2009 to 2012

Between 2009 and 2012, the average annual landing of yellowfin tuna, which was the main species caught as by-catch, was 796 tonnes accounting for 14.8% of the total catch landed. The average landing of billfishes was 426 tonnes per year (7.9%). The amount of big-eye tuna and sharks landed yearly seems to be relatively the same with average landings reaching 359 tonnes (6.7%) and 351 tonnes (6.5%) respectively. Finally, the group of species (OTH) with the lowest economic value represented around 6.1 % of the total annual landings, reaching 328 tonnes on average, per annum. This group consisted mainly of wahoo (*Acanthocibium solandri*), oilfish (*Ruvetus pretiosus*), common dolphinfish (*Coryphaeana hippurus*) and moonfish (*Lampris guttatus*). Other species like the spanish mackerel (*Comberomorous commerson*) and angelfish (*Lepidotus brama*) are found in small amounts in this group with an average catch varying between 1.2 and 4.9 tonnes yearly.

2.2. By catch levels from non-licensed longliners

2.2.1. Albacore-targeting fishing vessels

An average of 400 non-licensed fishing vessels targeting albacore were registered for the transshipment of a total of 21 196 tonnes of tuna and tuna-like species in Port-Louis, from 2008 to 2012. During this period, a decline of 26.7% in total catch landed was noted (Fig. 3). The least proportion of by-catch was landed in 2009 (28.9%), and was subsequently found to remain fairly constant during the following years, varying between 37.9% and 39.4% from 2010 to 2012. The species comprising the by-catch landed by these non-licensed longliners is similar to that of the licensed longliners.

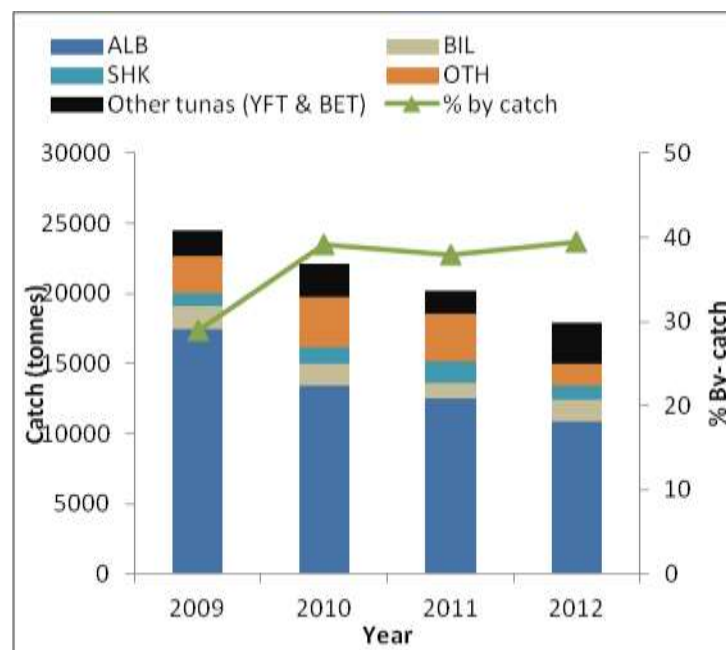


Fig. 3: Species composition and proportion of major by-catch from non-licensed longliners targeting albacore from 2009 to 2012

2.2.2. Non-licensed vessels targeting big-eye tuna

The total catch landed by non-licensed longliners targeting big-eye tuna has increased over the years from 3495 tonnes in 2008 to 8125 tonnes in 2012 (Fig. 4). The proportion of by-catch in the total catch seems to be the same (33.1-47.0%) as compared to the level of by-catch of albacore-targeting fishing vessels (37.9-39.4 %).

Yellowfin tuna was the main species caught as by-catch (20.8% of total catch) with an average of 880.5 tonnes landed per year. The average annual landing of billfish was 664.3 tonnes (15.7% of total catch) followed by shark (484.5 tonnes; 11.5% of total catch). The group OTH which represented 8.7% (371 tonnes/ year) of the total catch landed consisted of the same species landed by the fishing vessels targeting albacore. The catch of albacore was the lowest amounting to 250.8 tonnes/ year (5.9%).

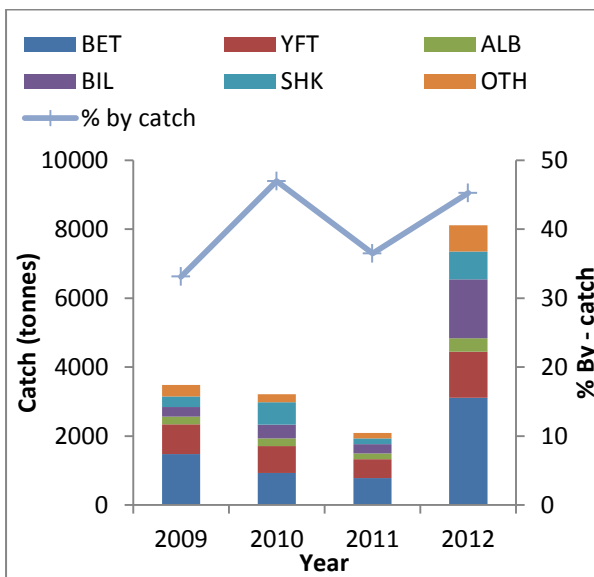


Fig. 4: Species composition and proportion of major by-catch from non-licensed longliners targeting big-eye from 2009 to 2012

2.2.3. Non-licensed vessels targeting swordfish

During the period under review, a total of 71 fishing longliners targeting swordfish, mostly of Spanish origin, visited the Port-Louis harbour for transshipment. Their proportion of by-catch landed varied between 37.2% to 49.6% and a decrease of 12.4% was noted from 2011 to 2012 (Fig 5). The amount of sharks landed was more dominant compared to the other groups of species caught as by-catch, representing 31.3% (786 tonnes/year) of the average total landings during the period 2009 to 2012. The group OTH (wahoo, oilfish, common dolphinfish, moonfish) represented 4.6% (114 tonnes/year) of average total catch followed by the group TUNA (3.4%, 86 tonnes/year) which consisted of albacore, yellowfin and bigeye tunas. The

catch of the group BIL (marlins and sailfish) was the lowest with 2.7% (67 tonnes/year) of the average total catch.

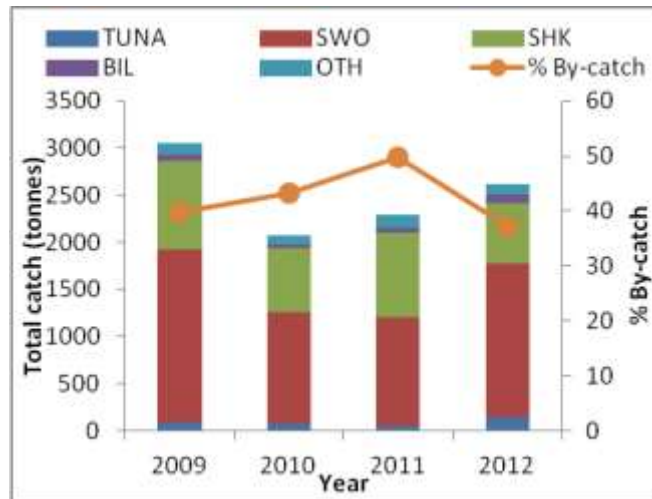


Fig. 5: Species composition and proportion of major by-catch from non-licensed longliners targeting swordfish from 2009-2012

2.3. Sharks

2.3.1. Species composition of shark landed by swordfish targeting longliners

The species composition of sharks (SHK) landed by non-licensed longliners targeting swordfish from 2009 to 2012 was analysed. The SHK group consisted mainly of blue shark (*Prionace glauca*) varying between 74.2-84.2% (Fig 7) followed by moro (*Isurus oxyrinchus*) (7.1-20.0%) and mako shark (*Isurus paucus*) (4.6-9.2%). In 2009 and 2011, blue shark accounted for 84.2% and 82.8% of the SHK group respectively. These results are similar to that to that observed for the Spanish surface longliners operating in the Indian Ocean for the period 2004-2006 where blue shark accounted for 84.4% within the shark group (Ramos-Cartelle *et al.*, 2008). Moreover, the result obtained for blue shark is very similar to that observed for the Spanish surface longliners in different oceans, where the prevalence of blue shark is clearly predominant.

Other sharks, which consisted of silky shark (*Carcharhinus falciformis*) and hammerhead shark (*Sphyrna* spp.), accounted for 1.2-1.8% of the SHK group.

The catch of sharks (65.3%-78.7%) in the total by-catch landed by the swordfish-targeting vessels seems to be lower as compared to that observed in the landings of vessels operating in the Atlantic, where the SHK group represented between 94% and 99% of the total by-catch (Castro *et al.*, 2000; Mejuto *et al.*, 2002b).

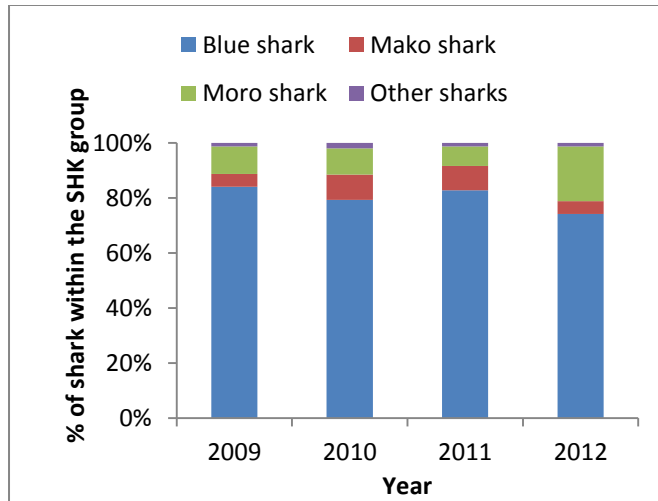


Fig. 6: Species composition of shark landings from swordfish targeting vessels

2.3.2. Comparison of shark landings by tuna longliners and swordfish-targeting longliners

The amount of sharks landed by licensed longliners targeting albacore varied between 4.3-8.9% of the total catch, from 2009 to 2012. This result is similar to that obtained in non-licensed albacore-targeting fishing vessels where the SHK group represented between 3.6-7.8% of the total catch. Blue shark was the predominant species in the SHK group with an average of 68.7 % followed by moro shark (31.0%) for the period 2010 and 2011. The level of mako shark landed was very low representing only 0.3% of the total average shark landings.

The amount of sharks landed by the vessels targeting big-eye tuna varied considerably between 2008 and 2012 such that in 2009, the highest percentage of 20.2% was noted (Fig. 7). In addition, the levels of sharks in the total catch of the longliners targeting big-eye are higher (7.9%-20.2%) than those targeting albacore (3.6%-8.03%) with the exception of year 2011.

The catch of sharks was very significant in swordfish-targeting vessels varying between 24.3%-39.1% of the total catch (Fig. 7) in comparison to albacore-targeting fleets (3.7%-8.0%) and big-eye targeting fleet (7.9%-20.2%).

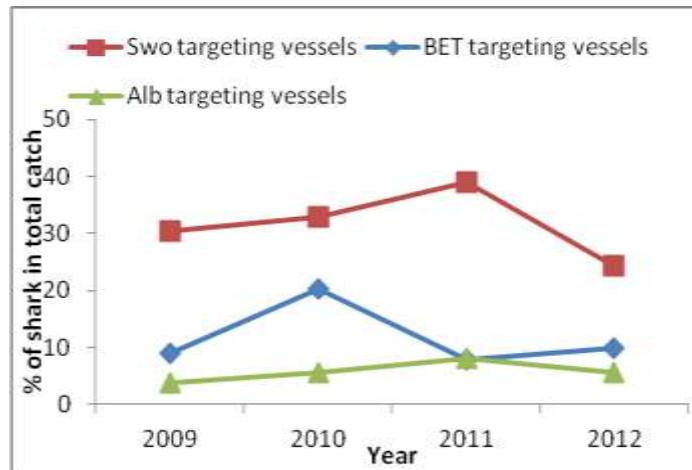


Fig. 7: Percentage shark landings in swordfish targeting vessels and tuna targeting vessels

3. By-catch from national fishing boats

3.1. Semi-industrial surface longline fishery

The national semi-industrial surface longline fishery targets swordfish but a large amount of tunas are frequently caught as by-catch. This fishery consisted of boats less than 24 metres long operating in the EEZ of Mauritius between latitudes 15°-20° S and longitudes 55°-60° E (Fig. 8). The fishing gear consisted of a monofilament mainline on which snoots mounted and spaced at about 40 m. A total of 144 trips were carried out during the four-year period under review, amounting to a total catch of 159 tonnes of tuna and tuna-like species, with a total effort of 493,280 hooks.



Fig. 8: Main fishing zones of national licensed longliners

In 2009, the catch was nil as the boats targeting swordfish ceased fishing due to a problem in exportation of swordfish on the EU market. Although there was much variation in the total catch

from 2010 to 2012, the level of by-catch has remained the same lying between 50.8%-52.7% (Fig. 9). Yellowfin tuna was the main species of by-catch for the year 2010 and 2011 representing 23.01% and 18.4% respectively. However in 2012, the amount of yellowfin and albacore was the same with landings reaching 15.8% and 15.4% respectively. The catch of shark, mainly moro shark, is not considerable with landings varying between 0.8%-1.7% of the total catch. The group OTH which accounted for 6.04%-6.6% of the total catch consisted of wahoo, common dolphinfish and oilfish.

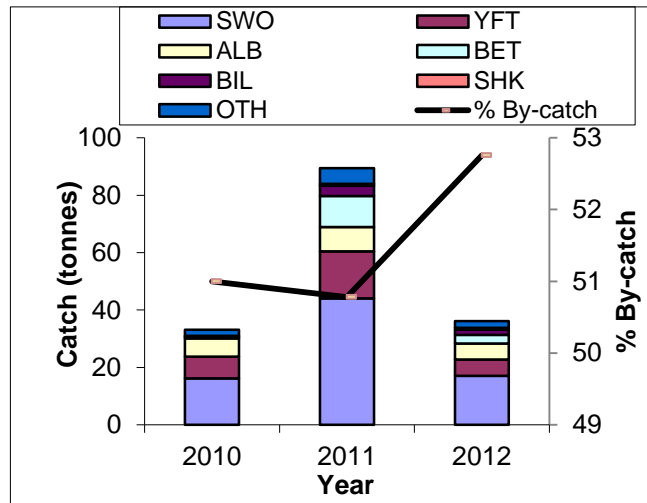


Fig. 9: Species composition and proportion of by-catch from national licensed longliners from 2009-2012

3.2. FAD fishery

An artisanal tuna fishery has been developed around anchored FADs (AFADs) in Mauritius since 1985. The AFADs are set at distances from 2-12 nautical miles from the coast and in 2011, 26 FADs were active. There are approximately 380 registered fishermen engaged in the FAD fishery. They use boats 7-8 m in length propelled by outboard motors and the common gear used is handline, trolling and vertical longline. The species targeted in this fishery is albacore tuna and fishermen mostly use vertical longline targeting this species, at depth down to 300 m. Catch estimates are produced based on regular sampling carried out at fish landing stations.

Catch were landed at 61 prescribed fish landing stations scattered around the island and the average annual catch was 274 tonnes. The by-catch in the FAD fishery varied between 27.9%-42.9% from 2009-2012. Yellowfin tuna was the main species caught as by-catch followed by skipjack tuna, common dolphinfish, wahoo and a lesser amount of other species (Fig.10). The latter includes sailfish, big-eye tuna and shark.

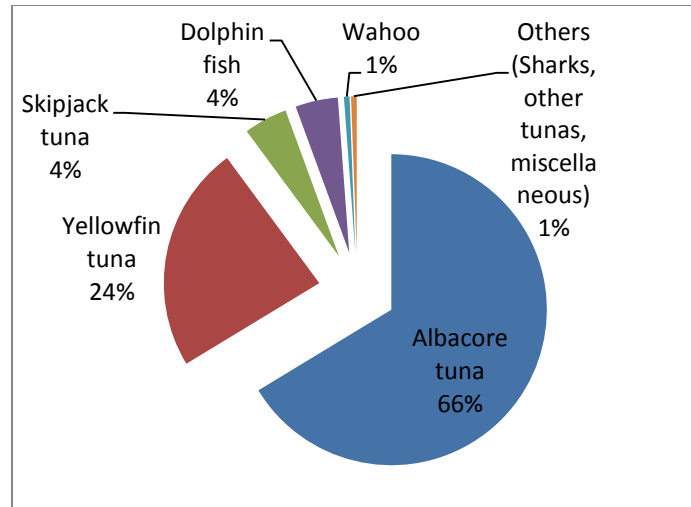


Fig. 10: Species composition of catch around AFADs based on 2009 to 2012 data

Reference:

- Castro, J. M., de la Serna, D. Macías and J. Mejuto, 2000. Estimaciones científicas preliminares de los desembarcos de especies asociadas realizadas por la flota española de palangre de superficie en 1997 y 1998. *Col. Vol. Sci. Pap. ICCAT*. 51:1882-1984.
- Mejuto, J., B. García-Cortés, J.M. de la Serna, 2002. Preliminary scientific estimations of by-catches landed by the Spanish surface longline fleet in 1999 in the Atlantic Ocean and Mediterranean Sea. *Col. Vol. Sci. Pap. ICCAT*. 54:1150-1163.
- Ramos-Cartelle, A., García-Cortés B., Mejuto J., 2003. Scientific estimates of bycatch landed by the Spanish surface longline fleet targeting swordfish (*Xiphias gladius*) in the Indian Ocean with special reference to the 2004-2006 period. *IOTC-2008-WPEB-03*.