

SHORFIN MAKO (*ISURUS OXYRINCHUS*) BY-CATCH FISHERY IN THE SOUTH OF THE MOROCCAN ATLANTIC WATERS

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SUMMARY

The shortfin mako is a species caught mainly as by-catch by Moroccan longliners targeting swordfish in the south of the Moroccan Atlantic waters. A series of catch and individual weight data were analyzed in order to derive the exploitation indicators for this species.

RÉSUMÉ

Le requin-taupe bleu est une espèce capturée principalement en tant que prise accessoire par les palangriers marocains de surface ciblant l'espadon au Sud des eaux atlantiques marocaines. Une série de données de capture et de poids individuel a été analysée afin de calculer les indicateurs d'exploitation de cette espèce.

RESUMEN

El marrajo dientuso es una especie capturada principalmente como captura fortuita por parte de los palangreros marroquíes de superficie que se dirigen al pez espada en el sur de la costa atlántica marroquí. Se analizó una serie de datos de captura y peso individual el fin de obtener los indicadores de explotación de esta especie.

KEYWORDS

Size distribution, catches, Mean length, Mean weight, Longliners, Shortfin mako

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1. Introduction

Morocco occupies a particular geographical position. It has a double maritime façade: the Atlantic Ocean and the Mediterranean Sea, its coastline extends about 3,500km. The presence of the upwelling phenomenon offers the country a real potential for the production of fishery resources.

In Morocco, the shortfin mako is mainly caught as bycatch by swordfish longline fleet operating in the south of the Atlantic coast (20-26 N°). The vessels have an average overall length of 24 m and an average GRT of 110 tx. These units use exclusively a surface longline as a fishing gear to primarily target swordfish.

With their efficient refrigeration system, these longliners are capable of carrying out trips up to 15 days with an average trip duration of 10 days. For one fishing day, a single fishing operation is carried out by deploying about 1,200 hooks.

Catches of this species have increased steadily over the last year (from 420 T in 2011 to 1050 in 2016), even if it is associated with the swordfish fishery. According to the surveys conducted with the fishing skippers, the fishing strategy is geared towards this species at the time of non-availability of swordfish.

Given the importance of the Shortfin mako fishery both at the national and regional levels, and to better manage the north Atlantic stock of this species within ICCAT, the INRH has set up, starting in 2018, a research program aiming at monitoring the fishing activity and the biology of this species (maturity, growth). The results of this study will be presented in the 2019 assessment for this stock.

The objectives of this paper are the primary analysis of shortfin mako catches in Morocco, the presentation of the research program for this species and the study of some biological aspects related to size frequency.

2. Material and methods

The catch data of the shortfin mako analyzed in this document came from the ICCAT Task I database.

The size data of this species were estimated from individual weights collected from the National Office for fisheries (ONP) in charge of the commercialization of fish (weighing sheets). The individual weights were converted into their corresponding fork length, using the following length-weight relationship published in the ICCAT manual (Kohler et al, 1995):

$$W = 0.0000052432 FL^{3.1407}$$

3. Results

3.1 Catch data analysis

The analysis of the Moroccan shortfin mako T1 data for the period 2011-2016 shows that more than 91% of catches are made as bycatch by the longline fishery targeting swordfish in the Atlantic. Minor catches occurred in the PS fishery (**Figure 1**).

In the North Atlantic, Morocco ranks second in terms of catches after the EU with 19.21% of catches (**Figure 2 & 3**).

3.2 Size structure of catches

The size structure of catches varies according to the year. In 2014, the size frequency distribution of the shortfin mako was bi-modal at 132 and 166 cm. The sizes ranged between 92 and 211 cm with a dominance of sizes between 116 and 166 cm which represent about 87% of total catches in number.

In 2015, the size frequency distribution was also bi-modal, at 157 and 210 cm, with a dominance of sizes between 195 and 218 cm (45%). In 2016, most of sizes ranged from 111 to 170 cm, representing 80% of the total catch in number. For 2017, two modes were observed (147 and 152 cm.) the catches of shortfin mako were dominated by sizes between 144 and 168 cm (63%) (**Figure 4**).

The monthly distribution of size frequency for 2014-2017 is shown by the **Figure 5**. The large individuals were observed during the months of December, January, February and March.

3.3 The Mean size and mean weight

The **Figure 6** shows that there is not a clear trend of the mean size according to the month.

The annual evolution of size indicates that the maximum size and weight of shortfin mako was recorded in 2015 (205 cm FL) (**Figure 7**). The mean weight follows the same trend as the mean size (**Figure 8**).

3.4 Shortfin mako research program

In order to study the exploitation of shortfin mako in Moroccan waters and also to understand the life cycle of this species, a research program has been set up for this purpose.

This program is divided into two parts:

- ✓ Biological sampling: which consists in carrying out weekly sampling operations of catches in the ports.
- ✓ Observation on Commercial Fishing Vessels: This is a monthly observer program on board the fishing vessels. The information collected within this program are: the fishing effort (number of hooks per fishing operation, fishing duration, geographical position of the fishing area, depth, discards ...) and also the size and maturity data of the captured individuals.

It should be noted that the ongoing research program has started in April 2018 (46 individuals has been collected), and the results will be presented in 2019.

References

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- Francis, M. P. and Duffy, C., 2005. Length at maturity in three pelagic sharks (*Lamna nasus*, *Isurus oxyrinchus* and *Prionace glauca*) from New Zealand. *Fishery Bulletin* 103, 489–500.

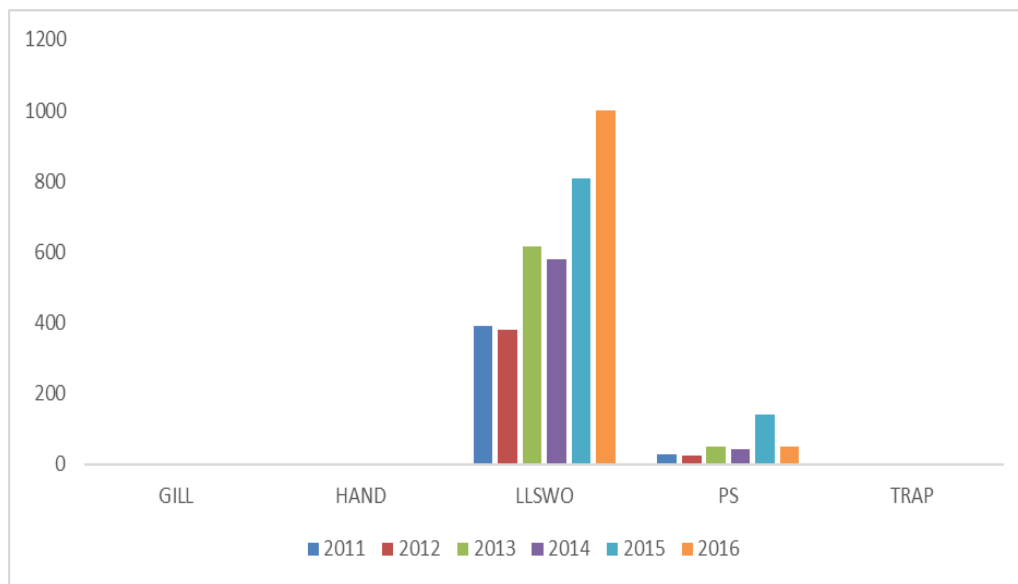


Figure 1. Annual evolution of Moroccan SMA catches (TM) by gear during 2011-2016 period.

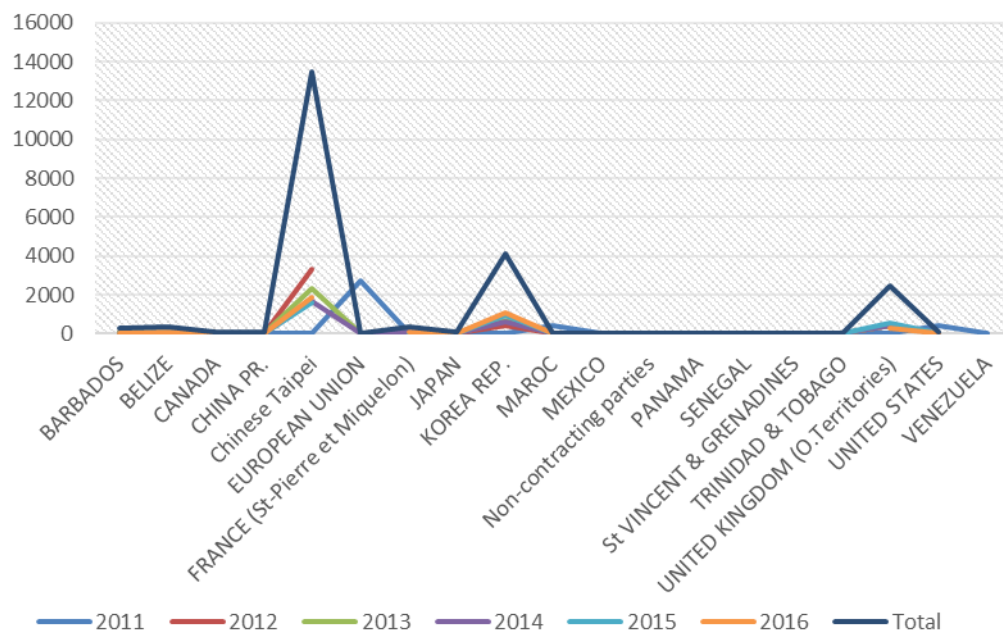


Figure 2. Annual evolution of SMA catches (TM) by country in the North Atlantic during 2011-2016 period.

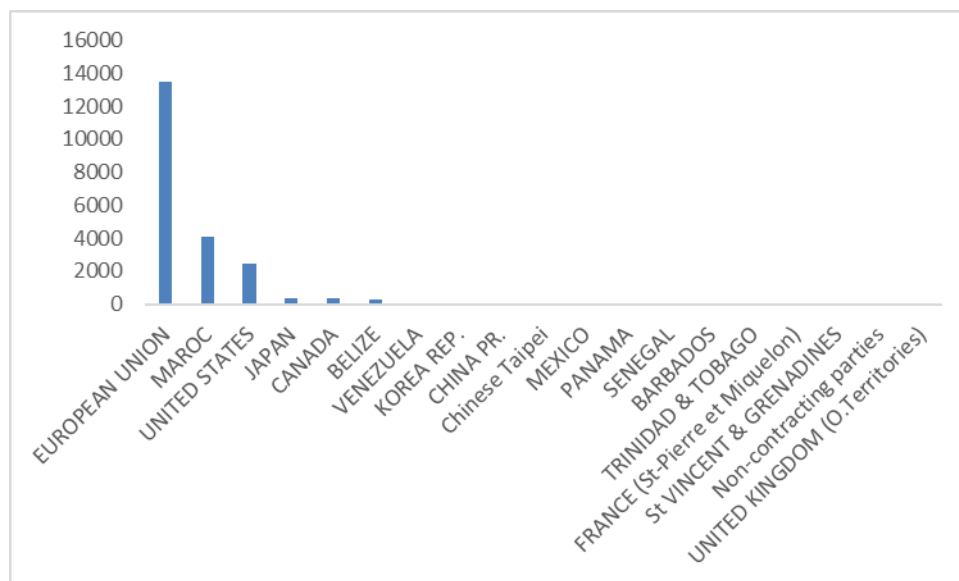


Figure 3. The total SMA catches (TM) by country during 2011-2016 period.

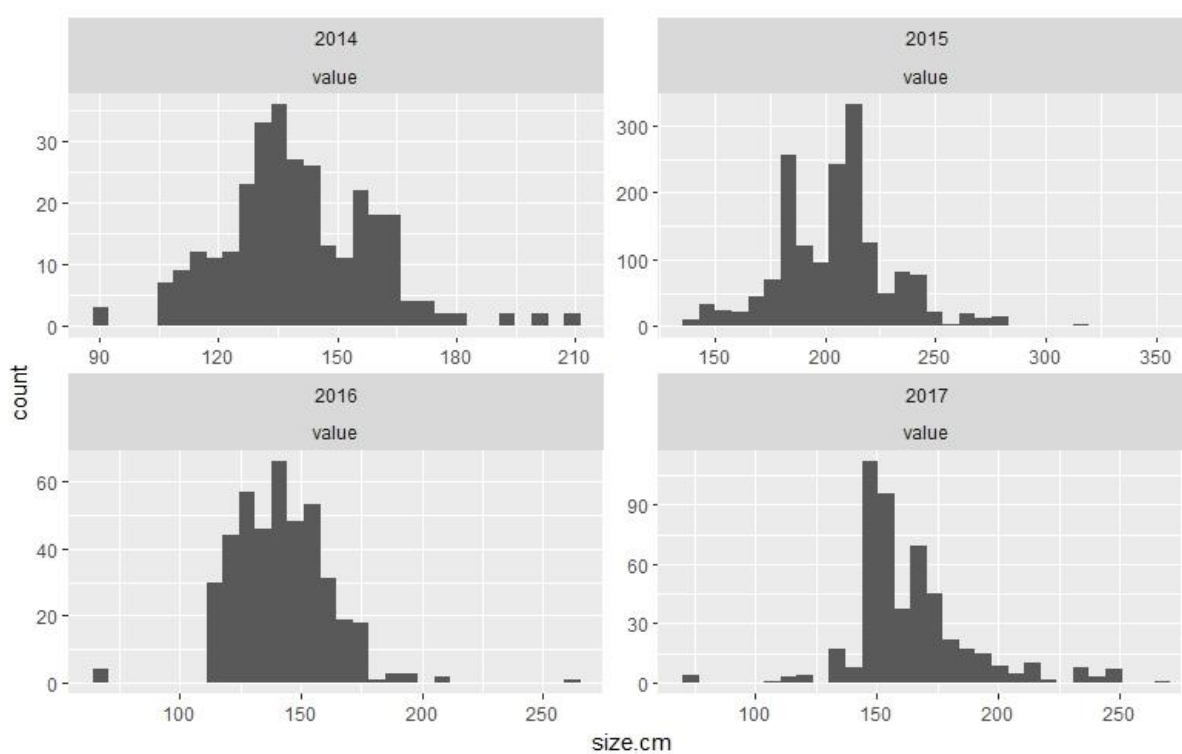


Figure 4. Annual size frequency distribution of the shortfin mako caught by the Moroccan swordfish LL fleet in 2014, 2015, 2016 and 2017.

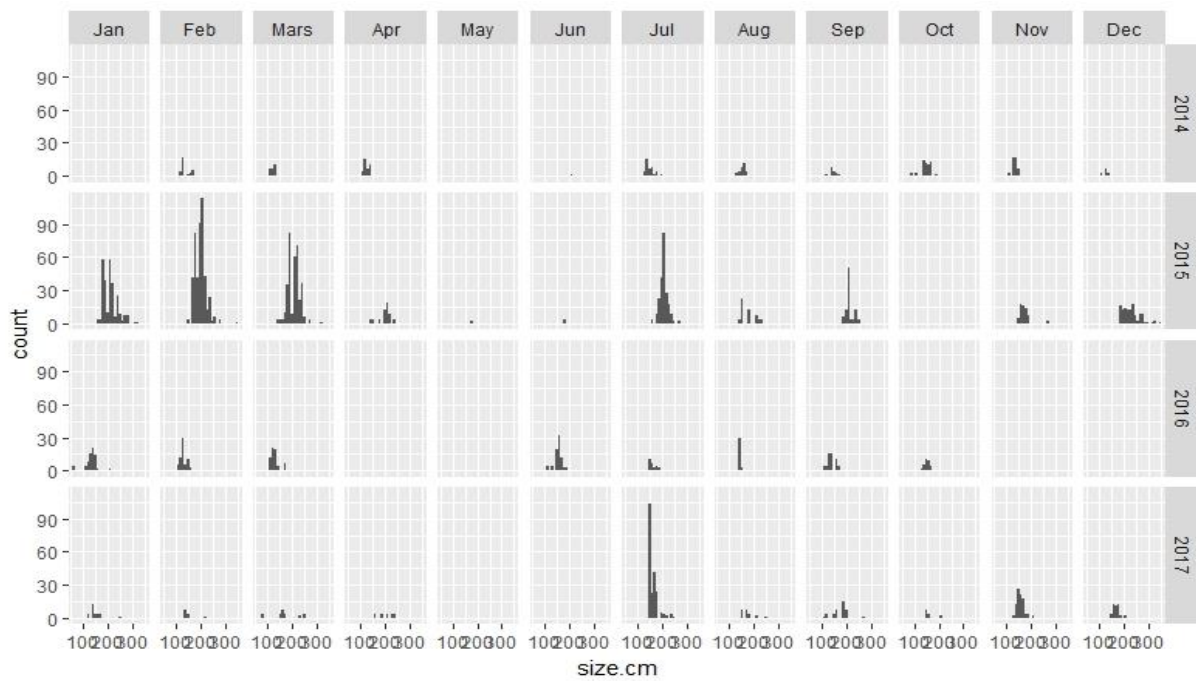


Figure 5. Monthly size frequency distribution of the shortfin mako caught by the Moroccan swordfish LL fleet in 2014, 2015, 2016 and 2017.

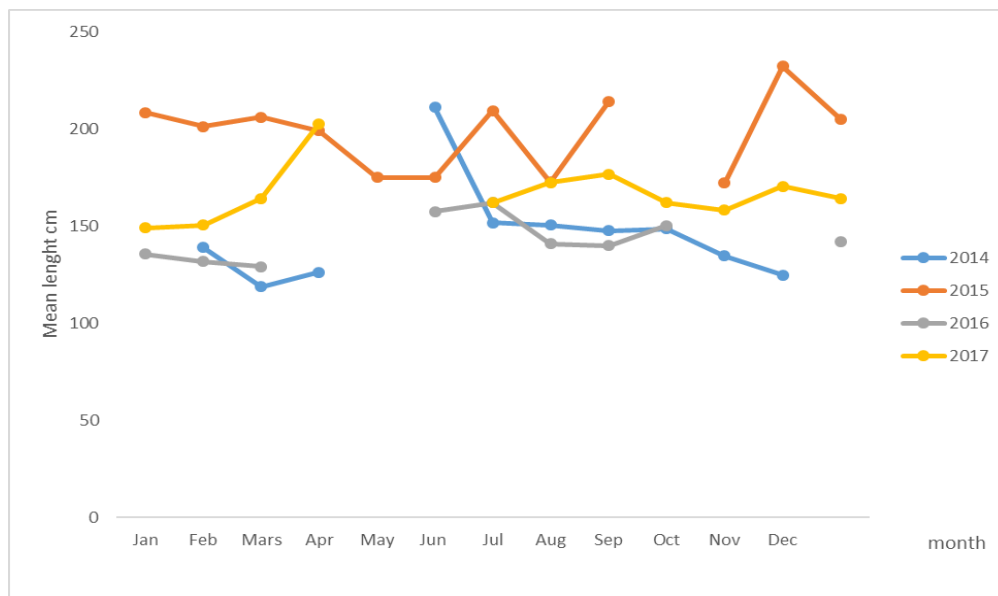


Figure 6. The monthly evolution of the mean size of the shortfin mako caught by the Moroccan swordfish LL fleet in 2014, 2015, 2016 and 2017.

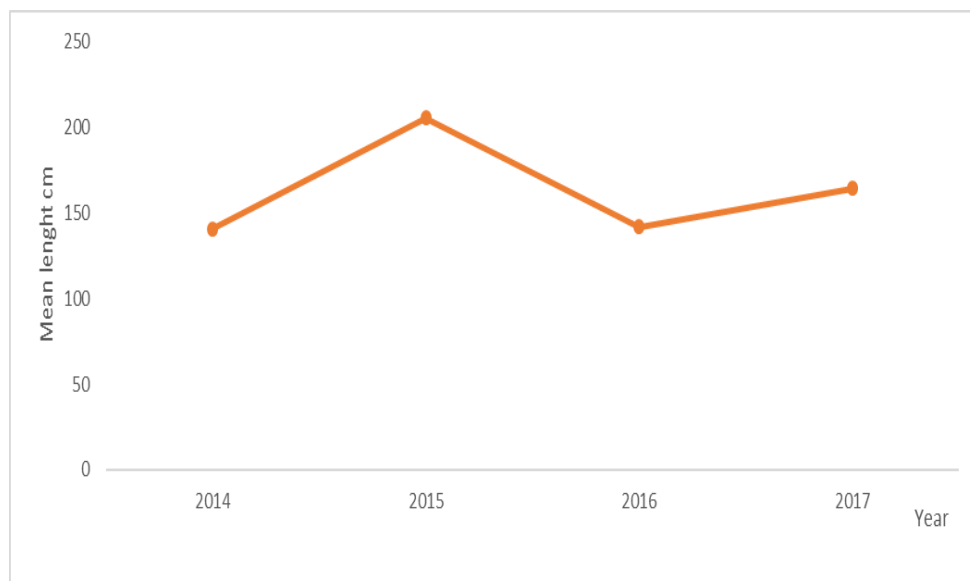


Figure 7. The annual evolution of the mean size of the shortfin mako caught by the Moroccan swordfish LL fleet in 2014, 2015, 2016 and 2017.

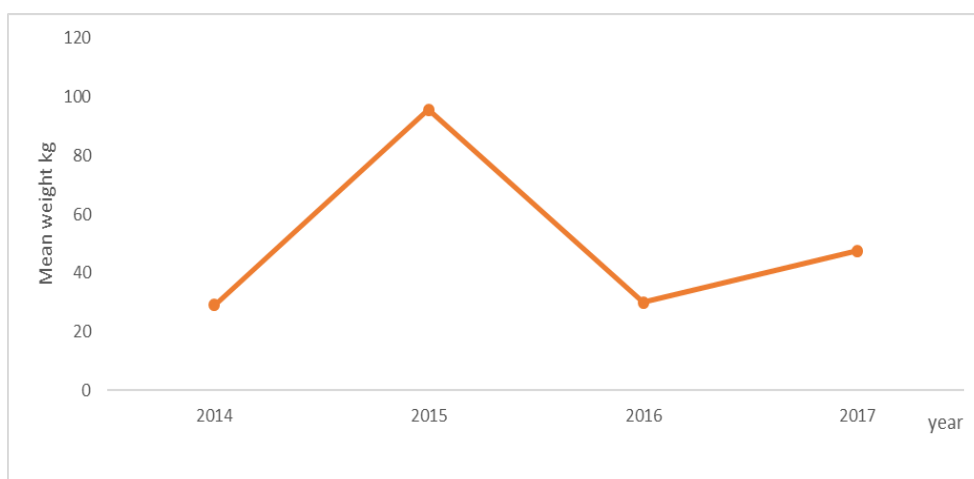


Figure 8. The annual evolution of the mean weight of the shortfin mako caught by the Moroccan swordfish LL fleet in 2014, 2015, 2016 and 2017.