SCRS/2019/047 Collect. Vol. Sci. Pap. ICCAT, 76(4): 194-218 (2020)

# UPDATE OF SCIENTIFIC OBSERVATIONS OF WHITE MARLIN (*Kajikia albida*) IN THE SPANISH SURFACE LONGLINE FISHING FLEET TARGETING SWORDFISH IN THE ATLANTIC IN THE PERIOD 1993-2018

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*SUMMARY*

*A description of 1710 individuals recorded as white marlin during the period 1993-2018 is presented. 21% of the fishing sets were positive for the capture of at least one specimen for those areas considered. The overall prevalence of this species over all fish species combined was 0.65% in number and 0.52% in weight. The overall prevalence over Istiophoridae was 25.12% and 12.61% in number and weight, respectively. A discussion on the applicability of these values is included. Sizes were between 95 and 285 cm LJFL but catches of individuals smaller than 145 cm are very rare. The overall sex-ratio of females was 42.5%. Sex-ratio at size indicates an increase in the percentage of females in sizes larger than 165 cm. Only 7 females of the total 170 females with gonads analyzed presented a high gonadosomatic index. Overall nominal CPUE in weight was higher for males (2.70 kg DW/1000 hooks) than females (1.81 kg DW/1000 hooks). For the whole period analyzed, 16.3% of the specimens observed were discarded and 7.5% were released alive, although different patterns can be discerned over time.*

*RÉSUMÉ*

*Une description de 1.710 spécimens déclarés comme makaire blanc au cours de la période 1993-2018 est présentée. 21% des opérations de pêche étaient positives et se sont soldées par la capture d'au moins un spécimen pour les zones considérées. La prévalence globale de cette espèce parmi toutes les espèces de poissons combinées était de 0,65% en nombre et de 0,52% en poids. La prévalence globale de cette espèce parmi les istiophoridae était de 25,12% en nombre et 12,61% en poids. Une discussion sur l'applicabilité de ces valeurs est présentée. Les tailles se situaient entre 95 et 285 cm LJFL, mais les captures de spécimens de moins de 145 cm sont très rares. Le ratio des sexes global des femelles était de 42,5%. Le ratio des sexes par taille indique une augmentation du pourcentage de femelles de taille supérieure à 165 cm. Sur les 170 femelles dont les gonades ont été analysées, seules 7 présentaient un indice gonadosomatique élevé. La CPUE nominale globale en poids était plus élevée chez les mâles (2,70 kg poids DW/ 1000 hameçons) que chez les femelles (1,81 kg poids DW /1.000 hameçons). Pour l'ensemble de la période analysée, 16,3% des spécimens observés ont été rejetés et 7,5% ont été relâchés vivants, bien que différentes tendances puissent être discernées au fil du temps.*

*RESUMEN*

*Se presenta una descripción de 1.710 ejemplares registrados como aguja blanca durante el período 1993-2018. El 21% de los lances de pesca fueron positivos para la captura de al menos un ejemplar para las zonas consideradas. El predominio general de esta especie sobre todas las especies de peces combinadas fue de 0,65% en número y 0,52% en peso. El predominio general sobre Istiophoridae fue de 25,12% y 12,61% en número y peso, respectivamente. Se incluye un debate sobre la aplicabilidad de estos valores. Las tallas se situaron entre 95 y 285 cm LJFL, pero las capturas de ejemplares de menos de 145 cm son muy escasas. La ratio de sextos global de hembras fue 42,5%. La ratio de sexos por talla indica un aumento en el porcentaje de hembras en tallas mayores de 165 cm. Sólo 7 de las 170 hembras con gónadas analizadas presentaron un alto índice gonadosomático. La CPUE nominal total en peso fue mayor para los machos (2,70 kg DW/1000 anzuelos) que para las hembras (1,81 kg DW/1000 anzuelos). Para todo el período analizado, el 16,3% de los ejemplares observados fueron descartados y el 7,5% fueron liberados vivos, aunque se pueden distinguir diferentes patrones a lo largo del tiempo.*

*KEYWORDS*

*White marlin, CPUE, prevalence, discard, releases, size, sex, maturity*

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## Introduction

The white marlin (*Kajikia albida/Tetrapturus albidus*) WHM is a species with a wide pelagic habitat distribution, mainly in tropical and subtropical waters but varying seasonally, some individuals reaching higher latitudes in both the northern and southern hemispheres during the respective warm seasons. This species is frequently taken by artisanal-coastal gears targeting marlins and other fish species, as well as in abundant recreational, game-fishing and charter activity in coastal waters and around the oceanic islands of the tropical and subtropical waters of the Atlantic Ocean, especially in western areas. This species is also observed as bycatch in some coastal driftnets, oceanic purse seines targeting tropical tunas and oceanic longlines targeting tuna and tuna-like species, where the prevalence of the white marlin was regularly reported as low (Mejuto *et al.* 2002).

Since 1997 the International Commission for the Conservation of Atlantic Tunas (ICCAT) has implemented various recommendations on white marlin [e.g. Rec. 2000-13] including annual landing limits and other actions [e.g. Recs. 2011-07, 2012-04, Rec. 2015-05]. The SCRS recommended making estimates of landings, live releases and dead discards to improve stock assessment processes. Historically, catches may not have been reported at all in some cases, such as some coastal and artisanal fisheries or recreational and charter fishing in a large number of countries, so that only the information already provided and the scientific documents regularly submitted by some national scientists were taken into account. Moreover, the white marlin may be a kind of minor bycatch in some of the tuna and tuna-like fisheries, suggesting that catches may have been underreported in some cases or misidentified as other billfish species. It is, therefore, necessary to improve monitoring to determine their destination and the number of dead discards and live releases and to verify current and historical landings in some countries-areas where positive catches would be expected and whenever possible develop relative “indices of abundance” for this species.

The bycatch of white marlin in some tuna and tuna-like fisheries constitutes one of the components of total fishing mortality that can be quantified. Size limitations, the encouragement of catch-and-release sport fishing and some domestic recommendations, such as using circle hooks (C-types) instead of various other types regularly used, are presumably designed to reduce catchability and increase survival in catch-and-release sport fishing (Pine *et al.* 2008, Serafy *et al.* 2009). In this sense, following ICCAT recommendations to determine how this species interacts with the surface longline fishery, several scientific trials were carried out in the EU fleet in different areas-oceans regarding changes in the gear configuration of surface longlines, which included several alternative C hooks and baits to the ones usually used. The results obtained in those experiments did not corroborate some domestic recommendations for the specific use of C-type hooks in this fishery, in which area-time variables were a more significant factor than the other variables tested. In some experiments the use of the alternative C-type hooks and some bait may have led to increases in the catch rates of istiophorids, sea turtles and other species, while some other factors or combinations could increase the mortality of istiophorids and/or sensitive species (Anon. 2008, García-Cortés *et al.* 2009, Mejuto *et al.* 2008, 2010, 2011; Ortiz and Arocha 2004).

More countries have reported data on live releases since 2006. However, despite the low prevalence of this species in the Spanish surface longline fishery, as described in previous papers (Castro *et al.* 2000, Mejuto *et al.*2009), since 1993 the Spanish longline fleet targeting swordfish has assessed the relative importance of discards and other uses of istiophorid catches in this fishery (Mejuto *et al*. 2007). In this sense, previous studies had presented results obtained in various regions of the Atlantic Ocean during the period 1993-2010 (García-Cortés *et al*. 2012).

This document presents a review of the information on WHM collected in some areas of the Atlantic through scientific sampling aboard the Spanish surface longline fishery targeting swordfish during the period 1993-2018. The prevalence of WHM is also estimated within the capture of the istiophorid group and within the set of fish catches obtained in those areas observed. Sex-ratios, size distribution, nominal yields, the different destinations of the catch, etc., are also described. The available observations for this species in the period 1993-2018 are updated and extended using a descriptive method based on redefining zones of the Atlantic Ocean. All size and sex data by square 5ºx5º included in the present paper has been submitted to ICCAT.

## Material and methods

The biological observations of WHM analyzed in the present paper were obtained during the period 1993-2018 through a voluntary program of scientific samplers on board Spanish commercial surface longline vessels, whose main objective is to study Atlantic swordfish. During this period two types of longline styles were used and observed: the traditional Spanish multifilament and the "American style" monofilament. The first was traditionally used by the Spanish fleet, although in the late 1990s it was gradually replaced by the latter (Mejuto and De la Serna 2000, Mejuto *et al*. 2003, 2005, 2011).

The scientific observations were recorded without interfering with or modifying the fishing strategy or the operating protocols of the commercial vessels. Some of the trips analyzed were experimental activities that were also incorporated in the present analysis. A complete census of the entire catch identified as WHM was recorded in all trips observed, regardless of what the capture was used for. The different uses of the individuals caught were recorded and categorized as follows: kept on board-landed, dead discarded, live released, used as bait, tagged-released, consumed on board, eaten by *Pseudorca crassidens*, eaten by sharks and unknown destination. However, for descriptive purposes the observations were finally assigned to four categories: landed (kept on board), alive (live released and tagged-released), discards (dead discarded), others (used as bait, consumed on board, eaten by false killer whale, eaten by sharks, and unknown).

Due to the broad geographical range of fishing activity by the Spanish surface longline fleet in the Atlantic Ocean between 47ºN–34ºS and 53ºW–12ºE, nine spatial strata (zones) were considered: ATL0, ATL1, ATL2, ATL3, ATL4, ATL5, ATL6, ATL7 and ATL8 (**Figure 1**), in which observations were grouped and analyzed.

The standard size lower jaw-fork length (LJFL cm) was measured to the lowest centimeter, grouped into 5 cm size-classes and presented by year, sex and zone. Sex was determined *de visu* and the sex-ratio values expressed as the percentage of females *versus* the total number of males and females combined. The sex-ratio of the females was obtained both for sizes combined –overall sex ratio (SRo)– and for each size-class –sex-ratio at size (SRs)– as well as confidence intervals (90% CI) for the whole Atlantic.

A gonadosomatic index (GSI) was determined for individual females using the formula: $GSI=Ow/LJFL^{b} *10^{4}$, the threshold of GSI $\geq$ 1.50 indicating the presence of ovaries in the process of maturation (Arocha and Bárrios 2009); where Ow is ovary weight in grams and $b$= 3.0694 is the slope of the length-weight relationship for WHM females (Prager *et al*. 1995).

For each zone, the prevalence of WHM in number of individuals and in weight was obtained, expressed as the percentage of WHM in relation to total fish species captured, and in relation to the total of istiophorid individuals. The nominal CPUE of WHM was calculated for every one thousand hooks, in kg of dressed weight (CPUEw) (DW= gutted, without head and fins) and in number of individuals (CPUE#), by sex, combined sexes, and for four LJFL size categories (50-120 cm; 125-165 cm; 170-200 cm and 205-285 cm), by zone and for the Atlantic as a whole.

## Results

A total of 4,126 sets (7,514,309 hooks) were observed on board vessels of the Spanish surface longline fleet in some areas of the Atlantic Ocean during the period 1993-2018. At least one specimen of WHM was captured in 21% of these sets observed (869 positive sets) but no WHM specimen was recorded in 2016 or in zone ATL0 (no positive sets).

A total of 1,710 individuals were identified as WHM and sampled during this whole period in all zones combined, with a total of 437 females, 591 males and 682 individuals of undetermined sex. **Table 1** summarizes the number and weight (DW kg) of WHM specimens observed by zone. The results confirm that positive catches of WHM are relatively rare events or show very low prevalence in most fishing operations. Most of the positive observations tended to occur in the inter-tropical and southern zones, mostly in the western areas of the Atlantic Ocean (zones ATL5-8), where the sea temperature at 50 m deep is warmer, between 22-27ºC (**Figure 1**).

Size frequency by year is presented in **Tables 2** and **3.** The total size and size-sex frequencies are shown in **Figure 2**. They are also summarized by zone in **Table 4**. Size intervals ranged from 120 to 280 cm LJFL for females and 95 to 285 cm LJFL for males (**Table 5**). For the whole Atlantic and the combined period, the average LJFL sizes obtained were 165 cm, 157 cm and 159 cm for females, males and both sexes combined with undetermined specimens, respectively. Minor differences in average sizes between zones and sexes were obtained within a narrow range of averages. The highest average size for females (172 cm) and males (169 cm) was observed in ATL3. In all zones considered, the average size reached by females has been slightly larger than for males (**Figure 3**). For the whole period considered, a simple comparison of the size distributions in cumulative percentage of specimens by zone for females does not suggest striking differences between zones and this also applies to males, except for zone ATL3, where sea temperature is higher, although the number of individuals observed in this zone was small and the available observations were taken east of 50ºW. The cumulative percentage for all zones combined shows that 57% of all the individuals measured were equal to or smaller than size-class 160 cm (females 48% and males 74%)(**Figure 4**). The data also suggest that fish smaller than 145 cm are highly unlikely to be caught in these fishery-zones.

Some differences by zones were observed when comparing the cumulative percentage between females and males. Males present a higher percentage for individuals LJFL≤160 cm in all the areas considered, except in ATL3 (**Figure 5**). These cumulative percentages, their size distributions and the average sizes suggest slight differences between both sexes by zones and also for the Atlantic zones combined. The data indicate that males reach smaller sizes than females, probably due to differential growth between sexes and/or because large males are not present or are less accessible in the fishing zones observed. However, in all cases the factors of availability and/or selectivity mean that there are few catches of fish smaller than 150 cm LJFL, with a similar selectivity pattern between sexes and zones.

Sex identification was recorded in 1,028 individuals. The overall sex-ratio (SRo) of females was 42.5% for all zones and years combined. The SRo of females by zones oscillated between values of 29% in warmer sea temperatures at 50 m (ATL7) and 74% in colder waters (ATL4) (**Table 6**, **Figure 6**). These SRo values should be interpreted with caution, as they may be affected by the size intervals considered in each zone.

The mean SRs patterns and the 90% CI for the whole Atlantic also show a high degree of variability among sizes. Lower SRs values are obtained in females for sizes smaller than 165 cm in most of the zones. However, this result must be taken with caution given that sex identification could be very uncertain in smaller sizes, due to possible systematic bias in favor of males and a lack of training of scientific samplers on a species with low prevalence. The erratic SRs values in females for the largest sizes are affected by the scant number of observations (**Figure 7**). The SRs obtained indicate that the ratio of 50% of females is only exceeded for sizes larger than 175 cm in zones ATL4, ATL7 and ATL8, for sizes larger than 165 cm in ATL6 and for sizes larger than 150-155 cm in the remaining zones.

The weight of the ovaries of 170 females (size range: 120-275 cm LJFL) was obtained, having been sampled in all the months of the year throughout the combined period. The range of the resulting GSI values was between 0.06 and 3.77. **Table 7** shows the number of females with ovaries sampled, the range of sizes and the average GSI obtained by zone. Only seven females showed a GSI higher than the threshold considered indicative of maturation processes. One of them belonged to zone ATL7 with a GSI of 2.19 for a female of 165 cm (December), while the other six females, ranging from 165-175 cm, were obtained in zone ATL5, their average GSI being 2.3 within a range of 2.37 to 3.77 (January-February). The rest of the females sampled had GSI values of less than 1.18. The GSI values indicate that the oceanic areas observed in the present paper do not appear to be frequent spawning grounds for white marlin, or that mature females are rarely accessible with this gear.

During the whole period analyzed, the mean nominal CPUE in weight (sizes combined) per 1,000 hooks for all the individuals caught in the Atlantic Ocean was 5.83 kg DW (LCI90%: 3.73; UCI90%: 7.92). The mean nominal CPUE in number as a whole was 0.29 fish per 1,000 hooks (LCI90%: 0.18; UCI90%: 0.41). The highest nominal CPUE in weight was observed in zones ATL7 (10.49 kg), ATL8 (9.62 kg) and ATL6 (7.37 kg). Average yields in dressed weight by sex were 1.81 kg and 2.27 kg for females and males, respectively. Yields by zone and by zone-sex for the total individuals caught are also given (**Table 8**, **Figure 9**).

Nominal CPUE in number of fish for size-sex categories showed differences among zones. The data correspond to a greater number of males, especially for the size category 125-165 cm in zone ATL7 (0.32 individuals), which quadruples the abundance of females (0.08 individuals) for the same size category and zone. Zone ATL6 also suggests a higher abundance of both males and females in the 125-165 cm size category. Male and female individuals in the 205+ size category seem to be most prevalent in zone ATL3, although the limited number of specimens of these largest sizes does not allow a clear comparison between zones (**Figure 10**).

In the Atlantic Ocean as a whole and for the combined period analyzed, the overall prevalence in number of WHM in relation to the total number of individuals of fish species combined (target fish species + other fish) was 0.65%. By zones, it may be pointed out that the south Atlantic zones ATL5 (0.22%) and ATL8 (0.21%) make the largest partial contribution to this overall percentage, while the north Atlantic zone ATL2 (0.01%) shows the lowest contribution in number. If we examine individual zones, the south Atlantic zones such as ATL8 (1.95%) showed the highest prevalence in number of WHM compared with the total catch in number of all fish species in the zone, followed by zones ATL7 (1.41%), ATL6 (1.30%) and ATL5 (1.1%). The average prevalence in number in north Atlantic zones (ATL1, ATL2, ATL3) only reaches 0.47% of the total number of fish caught within those zones (**Figure 11**).

For the combined zones and years analyzed the overall prevalence in number of WHM in relation to istiophorids in the whole Atlantic was 25.12%. Zones ATL5 and ATL8 (8.46% and 8.32%, respectively) presented the largest partial contribution to this overall percentage, while zone ATL2 presents the lowest contribution (0.47%). The prevalence in number of WHM in relation to all istiophorids obtained within each of the zones considered was high for ATL1 (55.76%) and also for zone ATL8 (50.22%) and lowest for ATL2 (10.30%) and ATL4 (9.60%) (**Figure 12**).

In the Atlantic Ocean as a whole and for the combined period analyzed, the overall prevalence in weight of WHM in relation to the total weight of all fish species combined (target fish species + other fish) was 0.52%. Prevalence in weight by zone also showed a larger partial contribution from zones ATL8 (0.18%) and ATL5 (0.17%) and a smaller contribution from ATL2 (0.01%). Considering individual zones, we find that the prevalence of WHM in weight, compared with the total catch of all species in each zone, is highest in ATL8 (1.15%) and lowest in ATL4 (0.04%) (**Table 9, Figure 13**).

However, if we consider the total catch by weight of istiophorids for the whole Atlantic during the combined period, the overall prevalence in weight of WHM was 12.16%. As regard prevalence by number, the largest partial contribution came from zones ATL8 (4.31%) and ATL5 (4.18%) and the smallest came from ATL2 (0.22%). The prevalence of WHM in weight compared with the total weight of istiophorids for each area was highest in zones ATL1 (73.38%) and ATL8 (59.69%) and lowest in ATL4 (2.86%) (**Table 10, Figure 14**).

Previous studies of the Spanish surface longline fleet targeting swordfish indicated relatively minor incidental bycatches of istiophorids (Mejuto *et al*. 2005). For the oceans as a whole, the percentage of istiophorids landed relative to total fish species combined landed was usually considered to be around 1% or less by weight and they would make up roughly 1.5% of the total weight of the bycatch fish species landed (García-Cortés and Mejuto 2001, 2005; Mejuto *et al*. 2000, 2002, 2006, 2009). So, the prevalence of istiophorids was generally found to be very low in this fishery relative to other species such as swordfish, blue shark or shortfin mako, which regularly represented in most studies more than 90% of the total catch in weight. Within the istiophorids group, previous studies also indicated that 68.4% of the captured weight corresponded to individuals identified as sailfish, 12.7% to white marlin and 12.4% to blue marlin (Mejuto *et al*. 2009). In this sense, the results obtained in the present document corroborate previous estimates of the WHM component at around 0.5% of the catch in weight of all fish species combined and around 12% of all istiophorids combined, for the whole areas analyzed in the present paper and when weight units are considered. However, important differences can be seen between zones.

Despite the long time period analyzed in the present paper, the number of WHM observations was relatively small due to the low presence of the species. However, the prevalence of WHM observed in this fishery could have varied over the years, not only due to changes in the abundance of different species but perhaps due to the effect of regulations on the operations of this and other fleets, including area selection, the release of live specimens, the non-retention on board of this species and, after the most recent assessment, the scientific recommendations of ICCAT and domestic regulations on this species, including very restrictive catch limitations implemented in some domestic cases[2]. It is not easy to elucidate what the effect has been of all management recommendations implemented on the general behavior of this and other fleets in relation to this species.

[2] Regulations UE 2015/1281, 2016/470, 2017/643, 2018/525

However, in view of the fact that the data analyzed in this document come from scientific samplers on board, might lead to presuppose that these estimates could be mechanically applied to this or other fleets with regard to the prevalence of WHM, both in relation to unidentified istiophorids (BILunk) and to all fish that can be caught using this gear. It is thus tempting to apply this approach in a mechanical and simplistic way to other fleets for which catch data (Task I) have not been reported or when it is necessary to break down by species landings reported as unidentified istiophorids (BILunk). However, we must consider certain limitations before making Task I estimates by indirect mechanisms.

(a) Firstly, the overall prevalence data provided in this document are from specific zones-areas covered by observations at sea which are not necessarily representative or proportional for the fleet as a whole. The mechanical application to this fleet of the overall or area prevalences obtained in this study is not a satisfactory procedure, as a large part of the fishing activity is done by the home-based fleet in temperate water-areas of the North Atlantic where there was less cover by samplers on board and where the occurrence and prevalence of WHM in comparison to other fish species is lowest. The routine scientific estimates for Task I by species reported for this fleet are considered better scientific approximations than those that could be obtained through indirect mechanical methods of estimation using data for other fish species or through other indirect procedures. (b) Secondly, it must be borne in mind that the prevalences recorded in number of fish and in weight differ from each other because of the different sizes and weights of the respective species. Given that nominal Task I is regularly reported, estimated and used in units of round weight, it is useful in all cases to apply prevalences or ratios between species which are defined using the same criterion. Otherwise, in the case of WHM and other species, we could obtain incorrect results for Task I estimated indirectly for scientific purposes. The application of ratios obtained for number of fish but applied to captures in weight of other species can lead to incorrect indirect estimates, especially if the average weight between the species is very different. (c) We must also consider some additional limitations. Recently bias has been detected in the taxonomic identification of this species as distinct from other morphologically similar species. In a preliminary study to determine the frequency of errors in species identification, a figure of 38.5% was obtained using a sample of 26 istiophorids which were then subjected to genetic analysis (M. Shivji Lab per. com.). Despite the low number of samples genetically analyzed, this relatively high proportion shows the complexity in practice of correctly cataloguing some species of istiophorids on board, even for scientific personnel, suggesting the likelihood of greater uncertainty or bias in mandatory reports on species submitted by fishermen, including logbooks and other systems.

The SCRS has also reported the growing presence of data referring to "unidentified istiophorids" (BILunk) in the case of some fleets and CPCs. If these reports of BILunk are not broken down into the relevant species, this could affect Task I estimates of WHM for these fleets and possible indicators of abundance that could be calculated based on those data. The most satisfactory way to obtain a breakdown by species for this family may be to use the results of genetic analysis of individuals reported as BILunk.

In some fleets it has been possible to estimate –either by direct observation or modelling– the use or destination of the istiophorids captured, the number retained on board, their discard levels (dead discards), releases (live releases) and other possible uses (Amorín and Arfelli 2001, García-Cortés *et al.* 2010, Mejuto *et al.* 2007). In terms of the whole period analyzed in the present paper for the Atlantic as a whole and categorizing the different destinations or uses of the catch of this species, the overall average value obtained was that 74% of the WHM individuals observed were landed, 16% were dead discards, 7% live releases and 3% other uses (**Table 11**). The average size of WHM individuals discarded dead and released alive was 165.3 and 162.2 cm, respectively. Size frequencies of those individuals are shown in **Table 12** and **Figure 15**.

However, these patterns appear to be very different over the years analyzed. A year-by-year analysis of the data (**Table 13**, **Figure 16**) shows that in boats observed during the first years of the series a higher percentage of individuals were released alive and a smaller percentage were retained compared with dead discards. Later in the series we find an increase in the percentage retained on board these trips observed. From the years in which the regulations on this species were more actively implemented (Rec 2000-13 and subsequently) we see a general decline in the proportion of live releases and in dead discards. However, we cannot assume that this behavior observed in the vessels analyzed in this document is typical of all vessels in this or other fleets-CPCs, while the different regulations implemented over the years and affecting different fleets also have to be taken into account. For this reason, data obtained in the present paper should probably not be extrapolated mechanically to the complete fleet or other fleets using different or similar longline gear types, with different fishing patterns or with other target species, since this may greatly bias the catch-by-species matrix, owing to the application of inappropriate assumptions.

**Acknowledgements**

We would like to thank the scientific samplers on board and the skippers of the Spanish longliners who made it possible for us to work on board. We are especially grateful to F. González and I. González-González for reviewing and entering the information into the data bases.

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**Table 1.** Number (#) and kg (DW: dressed weight) of WHM (*Kajikia albida*) observed by sex (F= females, M= male, U= undetermined sex) and by zone.

| ZONE | F# | M# | U# | Tot.# | F kg | M kg | U kg | Tot. DW kg |
|---|---|---|---|---|---|---|---|---|
| ATL0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ATL1 | 50 | 60 | 13 | 123 | 1105 | 1043 | 214 | 2362 |
| ATL2 | 9 | 11 | 12 | 32 | 196 | 201 | 205 | 602 |
| ATL3 | 32 | 43 | 9 | 84 | 914 | 1116 | 213 | 2243 |
| ATL4 | 43 | 15 | 23 | 81 | 908 | 319 | 439 | 1666 |
| ATL5 | 107 | 218 | 251 | 576 | 2257 | 3996 | 5314 | 11567 |
| ATL6 | 54 | 66 | 25 | 145 | 1084 | 1156 | 462 | 2702 |
| ATL7 | 24 | 59 | 20 | 103 | 479 | 928 | 407 | 1814 |
| ATL8 | 118 | 119 | 329 | 566 | 2698 | 2241 | 6998 | 11937 |
| *Tot. ATL* | *437* | *591* | *682* | *1710* | *9641* | *11000* | *14252* | *34893* |

**Table 2.** Size-class frequency (LJFL cm) of WHM (*Kajikia albida*) observed in the Atlantic Ocean as a whole, by year, during the period 1993-2005.

| Size/Year | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S050 | | | | | | | | | | | | | |
| S055 | | | | | | | | | | | | | |
| S060 | | | | | | | | | | | | | |
| S065 | | | | | | | | | | | | | |
| S070 | | | | | | | | | | | | | |
| S075 | | | | | | | | | | | | | |
| S080 | | | | | | | | | | | | | |
| S085 | | | | | | | | | | | | | |
| S090 | | | | | | | | | | | | | |
| S095 | | | | | | | | | 2 | | | | |
| S100 | | | | | | | | | 1 | | | | |
| S105 | | | | | | | | | 1 | | | | |
| S110 | | | | | | | | | | | | | |
| S115 | | | | | | | | | 1 | | | | |
| S120 | 6 | | | | | 3 | | | | | | | 1 |
| S125 | | | | | | | | | 1 | | | 1 | |
| S130 | | 1 | | | | 1 | 3 | | 2 | | | | |
| S135 | | | | | 1 | 3 | 1 | 1 | | 1 | | | 2 |
| S140 | 2 | 1 | 1 | | 1 | 6 | 2 | 10 | 2 | | 5 | 3 | 8 |
| S145 | 1 | | | 2 | 4 | 5 | 6 | 12 | 6 | | 2 | 5 | 7 |
| S150 | 2 | 19 | 2 | 4 | 13 | 2 | 12 | 20 | 8 | | 8 | 26 | 26 |
| S155 | | 2 | 4 | 4 | 7 | 2 | 19 | 33 | 14 | 1 | 10 | 20 | 15 |
| S160 | | 3 | 13 | 5 | 8 | 3 | 18 | 36 | 17 | | 21 | 33 | 31 |
| S165 | 1 | 11 | 14 | 5 | 6 | | 18 | 30 | 20 | 1 | 6 | 32 | 22 |
| S170 | | 6 | 18 | 7 | 1 | 2 | 9 | 25 | 6 | | 5 | 51 | 36 |
| S175 | | 2 | 12 | 3 | | | 9 | 9 | 4 | | 2 | 9 | 10 |
| S180 | | 2 | 10 | 3 | 2 | | 9 | 6 | 3 | | 2 | 21 | 28 |
| S185 | | 3 | 2 | 2 | 2 | 1 | 5 | 4 | 1 | | | 4 | 7 |
| S190 | | 1 | 2 | 5 | | 1 | 1 | 1 | | | | 2 | 6 |
| S195 | | 1 | 3 | | | | | 1 | 1 | | | 2 | 1 |
| S200 | | 3 | 4 | 1 | | | | 1 | 1 | | | | 2 |
| S205 | | | 2 | | | | 2 | | 3 | | | 3 | |
| S210 | | | | | | | 1 | | 1 | | | | |
| S215 | | 1 | | | | | | | 2 | | | | |
| S220 | | | | | | | | | 1 | | | | |
| S225 | | | | | | | | | | | | | |
| S230 | | | | | | | 2 | | 1 | | | | |
| S235 | | | | | | | 1 | | 1 | | | | |
| S240 | | | | | | | | | 1 | | | | |
| S245 | | | | | | | 1 | | | | | | |
| S250 | | | | | | | | | | | | | 1 |
| S255 | | | | | | | | | | | | | |
| S260 | | | | | | | | | | | | | |
| S265 | | | | | | | | | | | | | |
| S270 | | | | | | | | | | | | | |
| S275 | | | | | | | 1 | | | | | | |
| S280 | | | | | | | | | 1 | | 1 | | |
| S285 | | | | | | | | | 1 | | | | |
| *TOTAL#* | *12* | *56* | *87* | *41* | *45* | *29* | *120* | *189* | *103* | *3* | *62* | *212* | *203* |

**Table 3.** Size-class frequency (LJFL cm) of WHM (*Kajikia albida*) observed in the Atlantic Ocean as a whole, by year, during the period 2006-2018.

| Size/Year | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S050 | | | | | | | | | | | | | |
| S055 | | | | | | | | | | | | | |
| S060 | | | | | | | | | | | | | |
| S065 | | | | | | | | | | | | | |
| S070 | | | | | | | | | | | | | |
| S075 | | | | | | | | | | | | | |
| S080 | | | | | | | | | | | | | |
| S085 | | | | | | | | | | | | | |
| S090 | | | | | | | | | | | | | |
| S095 | | | | | | | | | | | | | |
| S100 | | | | | | | | | | | | | |
| S105 | | | | | | | | | | | | | |
| S110 | | | | | | | | | | | | | |
| S115 | | | | | | | | | 1 | | | 1 | |
| S120 | | | | | | | 1 | 2 | 1 | | | | 1 |
| S125 | | | 1 | | | | | 4 | 1 | | | | |
| S130 | 6 | | | | 1 | | | 7 | 1 | | | 1 | |
| S135 | 2 | | 3 | | 1 | | | 4 | | | | | |
| S140 | 7 | | 4 | 1 | 1 | | 4 | 4 | 4 | | | 2 | |
| S145 | 4 | 2 | 3 | 1 | | | 3 | 20 | 8 | 1 | | 3 | 3 |
| S150 | 15 | 5 | 9 | 1 | 1 | | 15 | 33 | 18 | | | 5 | 2 |
| S155 | 18 | 6 | 6 | 1 | 1 | 1 | 11 | 31 | 14 | | | 4 | 8 |
| S160 | 16 | 5 | 7 | 1 | 4 | | 14 | 15 | 10 | 1 | | 4 | 3 |
| S165 | 7 | 5 | 9 | 1 | 5 | | 4 | 11 | 4 | 2 | | 3 | 3 |
| S170 | 19 | 4 | 3 | | | | 3 | 1 | 2 | | | 6 | 1 |
| S175 | 2 | 1 | | | 1 | | 1 | 4 | 1 | | | 1 | 2 |
| S180 | 21 | 1 | | 1 | | | | 2 | 1 | | | 1 | 1 |
| S185 | 2 | | 1 | | | | | | | | | | |
| S190 | 4 | | | | | | | | | | | 2 | 2 |
| S195 | 1 | | | | | | | | | | | | |
| S200 | | | | | | | | | | | | | |
| S205 | | | | | | | | | | | | 1 | |
| S210 | | | | | | | | | | | | | |
| S215 | 1 | | | | | | | | | | | | |
| S220 | | | | | | | | | | | | | |
| S225 | | | | | | | | | | | | | |
| S230 | | | | | | | | | | | | | |
| S235 | | | | | | | | | | | | | |
| S240 | | | | | | | | | | | | | |
| S245 | | | | | | | | | | | | | |
| S250 | | | | | | | | | | | | | |
| S255 | | | | | | | | | | | | | |
| S260 | | | 1 | | | | | | | | | | |
| S265 | | | | | | | | | | | | | |
| S270 | | | | | | | | | | | | | |
| S275 | | | | | | | | | | | | | |
| S280 | | | | | | | | | | | | | |
| S285 | | | | | | | | | | | | | |
| *TOTAL#* | *125* | *29* | *47* | *7* | *15* | *1* | *56* | *138* | *66* | *4* | *0* | *34* | *26* |

**Table 4.** Size-class frequency (LJFL cm) by sex of WHM (*Kajikia albida*) observed in the Atlantic Ocean, by zone, during the combined period 1993-2018.

| Sex | FEMALE | | | | | | | | MALE | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Size/Zone | ATL1 | ATL2 | ATL3 | ATL4 | ATL5 | ATL6 | ATL7 | ATL8 | ATL1 | ATL2 | ATL3 | ATL4 | ATL5 | ATL6 | ATL7 | ATL8 |
| S050 | | | | | | | | | | | | | | | | |
| S055 | | | | | | | | | | | | | | | | |
| S060 | | | | | | | | | | | | | | | | |
| S065 | | | | | | | | | | | | | | | | |
| S070 | | | | | | | | | | | | | | | | |
| S075 | | | | | | | | | | | | | | | | |
| S080 | | | | | | | | | | | | | | | | |
| S085 | | | | | | | | | | | | | | | | |
| S090 | | | | | | | | | | | | | | | | |
| S095 | | | | | | | | | | | | | | | 1 | |
| S100 | | | | | | | | | | | | | | | 1 | |
| S105 | | | | | | | | | | | | | | | | |
| S110 | | | | | | | | | | | | | | | | |
| S115 | | | | | | | | | | | | | | 1 | | |
| S120 | | | | 1 | 1 | | | | | | | | 2 | | | |
| S125 | | | | | 1 | | | | | | 1 | | 3 | 1 | | |
| S130 | | | 2 | | 4 | 1 | | | | | 3 | | 3 | 2 | | 1 |
| S135 | | | | 1 | 2 | | | 2 | 1 | 1 | 2 | | 3 | 3 | | |
| S140 | 2 | | 1 | | | 4 | 1 | 1 | 8 | 1 | 3 | 1 | 2 | 2 | 1 | 7 |
| S145 | 2 | 2 | 1 | 1 | 1 | | | 4 | 8 | 3 | 3 | 5 | 15 | 10 | 3 | 16 |
| S150 | 4 | | 4 | 2 | 8 | 6 | 1 | 20 | 11 | 1 | 5 | 2 | 48 | 9 | 13 | 19 |
| S155 | 7 | 2 | 6 | 12 | 18 | 8 | 1 | 6 | 12 | | 5 | 2 | 40 | 13 | 15 | 23 |
| S160 | 8 | 1 | 7 | 6 | 21 | 10 | 5 | 14 | 10 | 3 | 3 | | 44 | 11 | 12 | 19 |
| S165 | 7 | 1 | 3 | 7 | 21 | 11 | 6 | 18 | 5 | | 1 | | 33 | 8 | 11 | 13 |
| S170 | 10 | 1 | 3 | 2 | 11 | 7 | 5 | 13 | 5 | | | | 17 | | 1 | 11 |
| S175 | 4 | | | 2 | 5 | 3 | 1 | 10 | | | 3 | 1 | 3 | 4 | 1 | 5 |
| S180 | 3 | | | 6 | 4 | 1 | 3 | 14 | | 1 | 2 | 3 | 3 | | | 3 |
| S185 | 2 | 1 | | 1 | 5 | 2 | | 2 | | | 2 | | 2 | 1 | | 1 |
| S190 | | 1 | | 2 | | | | 4 | | 1 | | | | | | |
| S195 | | | | | 1 | 1 | | 3 | | | 1 | | | | | |
| S200 | | | | | 1 | | 1 | 5 | | | | | | | | |
| S205 | | | | | 1 | | | 2 | | | 3 | | | | | 1 |
| S210 | | | | | 1 | | | | | | 1 | | | | | |
| S215 | | | | | | | | | | | 1 | | | 1 | | |
| S220 | | | | | | | | | | | 1 | | | | | |
| S225 | | | | | | | | | | | | | | | | |
| S230 | | | 1 | | | | | | | | 1 | 1 | | | | |
| S235 | | | 1 | | | | | | | | | | | | | |
| S240 | | | | | | | | | | | 1 | | | | | |
| S245 | 1 | | | | | | | | | | | | | | | |
| S250 | | | | | | | | | | | | | | | | |
| S255 | | | | | | | | | | | | | | | | |
| S260 | | | | | 1 | | | | | | | | | | | |
| S265 | | | | | | | | | | | | | | | | |
| S270 | | | | | | | | | | | | | | | | |
| S275 | | | 1 | | | | | | | | | | | | | |
| S280 | | | 2 | | | | | | | | | | | | | |
| S285 | | | | | | | | | | | 1 | | | | | |
| *TOTAL#* | *50* | *9* | *32* | *43* | *107* | *54* | *24* | *118* | *60* | *11* | *43* | *15* | *218* | *66* | *59* | *119* |

**Table 5**. Number of observations (n), size intervals (LJFL cm) and average size (avg.) of WHM (*Kajikia albida*), by sex, sexes combined with undetermined individuals, and by zone.

| | FEMALES | | | MALES | | | F+M+U | | |
|---|---|---|---|---|---|---|---|---|---|
| ZONE | n | Interval LJFL cm | avg. | n | Interval LJFL cm | avg. | n | Interval LJFL cm | avg. |
| ATL0 | 0 | - | - | 0 | - | - | 0 | - | - |
| ATL1 | 50 | 140-245 | 165 | 60 | 135-170 | 153 | 123 | 120-245 | 153 |
| ATL2 | 9 | 145-190 | 163 | 11 | 135-190 | 155 | 32 | 120-215 | 152 |
| ATL3 | 32 | 130-280 | 172 | 43 | 125-285 | 169 | 84 | 125-285 | 168 |
| ATL4 | 43 | 120-190 | 163 | 15 | 140-230 | 161 | 81 | 120-230 | 159 |
| ATL5 | 107 | 120-260 | 163 | 218 | 120-185 | 156 | 576 | 115-260 | 160 |
| ATL6 | 54 | 130-195 | 161 | 66 | 115-215 | 154 | 145 | 115-215 | 157 |
| ATL7 | 24 | 140-200 | 167 | 59 | 95-175 | 155 | 103 | 95-215 | 158 |
| ATL8 | 118 | 135-205 | 167 | 119 | 130-205 | 157 | 566 | 115-205 | 163 |

**Table 6.** Overall sex-ratio (SRo) and number of WHM (*Kajikia albida*) sexed, by zone and total Atlantic.

| ZONE | (F+M)# | SRo |
|---|---|---|
| ATL0 | 0 | - |
| ATL1 | 110 | 45.5 |
| ATL2 | 20 | 45.0 |
| ATL3 | 75 | 43.7 |
| ATL4 | 58 | 74.1 |
| ATL5 | 325 | 32.9 |
| ATL6 | 120 | 45.0 |
| ATL7 | 83 | 28.9 |
| ATL8 | 237 | 49.8 |
| *tot. ATL* | *1028* | *42.5* |

**Table 7.** Number (n) and range of size of female WHM (*Kajikia albida*) with ovaries sampled, and average GSI obtained by zone, in the Atlantic Ocean.

| Zone | n | Range of size | avg GSI |
|---|---|---|---|
| ATL0 | 0 | - | - |
| ATL1 | 0 | - | - |
| ATL2 | 3 | 145-190 | 0.24 |
| ATL3 | 8 | 130-275 | 0.29 |
| ATL4 | 36 | 120-190 | 0.31 |
| ATL5 | 77 | 120-210 | 0.60 |
| ATL6 | 3 | 160-170 | 0.30 |
| ATL7 | 17 | 155-200 | 0.44 |
| ATL8 | 26 | 140-205 | 0.40 |

**Table 8.** Number of fish, kg dressed weight, nominal CPUE#(number) and CPUEw(kg DW) per thousand hooks, for WHM (*Kajikia albida*), by sex (F= female, M= male), combined sexes with undetermined individuals (F+M+U), and by zone.

| | | | CPUE# | CPUEw (DW) | | |
|---|---|---|---|---|---|---|
| ZONE | # fish | kg DW | F+M+U | F+M+U | F | M |
| ATL0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ATL1 | 123 | 2362 | 0.21 | 3.94 | 1.84 | 1.74 |
| ATL2 | 32 | 602 | 0.07 | 1.28 | 0.42 | 0.43 |
| ATL3 | 84 | 2243 | 0.25 | 6.56 | 2.67 | 3.26 |
| ATL4 | 81 | 1666 | 0.03 | 0.64 | 0.35 | 0.12 |
| ATL5 | 576 | 11567 | 0.33 | 6.72 | 1.31 | 2.32 |
| ATL6 | 145 | 2702 | 0.40 | 7.37 | 2.96 | 3.15 |
| ATL7 | 103 | 1814 | 0.60 | 10.49 | 2.77 | 5.36 |
| ATL8 | 566 | 11937 | 0.46 | 9.62 | 2.17 | 1.81 |

**Table 9**. Prevalence (%) in weight of WHM (*Kajikia albida*) compared with all species in the whole Atlantic (% WHM/ATL Spp) and with all species within each zone (% WHM/Zone Spp), during the period 1993-2018.

| Zone | % WHMw/ATL Spp | % WHMw/Zone Spp |
|---|---|---|
| ATL0 | 0 | 0 |
| ATL1 | 0.03 | 0.39 |
| ATL2 | 0.01 | 0.14 |
| ATL3 | 0.03 | 0.62 |
| ATL4 | 0.02 | 0.07 |
| ATL5 | 0.17 | 0.75 |
| ATL6 | 0.04 | 0.91 |
| ATL7 | 0.03 | 0.80 |
| ATL8 | 0.18 | 1.15 |

**Table 10**. Prevalence (%) in weight of WHM (*Kajikia albida*) compared with total istiophorids in the whole Atlantic (% WHM/ATL Istioph.) and with total istiophorids within each zone (% WHM/Zone Istioph.), during the period 1993-2018.

| Zone | % WHMw/ATL Istioph. | % WHMw/Zone Istioph. |
|---|---|---|
| ATL0 | 0 | 0 |
| ATL1 | 0.85 | 73.38 |
| ATL2 | 0.22 | 3.53 |
| ATL3 | 0.81 | 20.87 |
| ATL4 | 0.60 | 2.86 |
| ATL5 | 4.18 | 8.57 |
| ATL6 | 0.98 | 18.40 |
| ATL7 | 0.66 | 10.28 |
| ATL8 | 4.31 | 59.69 |

**Table 11.** Destination summary (%) of WHM (*Kajikia albida*) for the combined period 1993-2018, by zone.

| Zone | %Landed | %Dead | %Alive | %Other |
|---|---|---|---|---|
| ATL1 | 88.6 | 2.4 | 7.3 | 1.6 |
| ATL2 | 37.5 | 34.4 | 25.0 | 3.1 |
| ATL3 | 96.4 | 0.0 | 1.2 | 2.4 |
| ATL4 | 71.6 | 18.5 | 2.5 | 7.4 |
| ATL5 | 61.1 | 25.2 | 12.0 | 1.7 |
| ATL6 | 97.2 | 2.1 | 0.0 | 0.7 |
| ATL7 | 82.5 | 11.7 | 4.9 | 1.0 |
| ATL8 | 75.4 | 15.7 | 6.0 | 2.8 |
| *TOTAL* | *74.0* | *16.3* | *7.5* | *2.2* |

**Table 12**. Number of individuals of WHM (*Kajikia albida*) discarded and released alive observed in the whole Atlantic Ocean by size-class, during the period 1993-2018.

| LJFL cm | Dead | Alive |
|---|---|---|
| S095 | 2 | |
| S100 | 1 | |
| S105 | | 1 |
| S110 | | |
| S115 | | |
| S120 | 3 | 7 |
| S125 | | |
| S130 | 2 | 2 |
| S135 | 2 | 2 |
| S140 | 13 | 9 |
| S145 | 9 | 4 |
| S150 | 28 | 21 |
| S155 | 22 | 2 |
| S160 | 46 | 11 |
| S165 | 34 | 6 |
| S170 | 38 | 27 |
| S175 | 15 | 4 |
| S180 | 31 | 21 |
| S185 | 8 | 4 |
| S190 | 13 | 5 |
| S195 | 3 | |
| S200 | 6 | |
| S205 | | |
| S210 | | |
| S215 | 1 | 1 |
| S220 | | |
| S225 | | |
| S230 | 1 | |
| S235 | | |
| S240 | | |
| S245 | | |
| S250 | | 1 |

**Table 13**. Summary of the main destinations (%) of WHM (*Kajikia albida*) by year and combined zones.

| Year | %Landed | %Dead | %Alive |
|---|---|---|---|
| 1993 | 0.0 | 41.7 | 41.7 |
| 1994 | 8.9 | 71.4 | 17.9 |
| 1995 | 58.6 | 23.0 | 9.2 |
| 1996 | 4.9 | 65.9 | 29.3 |
| 1997 | 37.8 | 46.7 | 11.1 |
| 1998 | 0.0 | 48.3 | 48.3 |
| 1999 | 88.3 | 10.0 | 0.0 |
| 2000 | 77.2 | 17.5 | 4.2 |
| 2001 | 95.1 | 2.9 | 1.0 |
| 2002 | 66.7 | 0.0 | 0.0 |
| 2003 | 98.4 | 0.0 | 0.0 |
| 2004 | 98.1 | 1.9 | 0.0 |
| 2005 | 56.7 | 22.7 | 19.2 |
| 2006 | 52.8 | 25.6 | 20.0 |
| 2007 | 89.7 | 10.3 | 0.0 |
| 2008 | 100.0 | 0.0 | 0.0 |
| 2009 | 14.3 | 85.7 | 0.0 |
| 2010 | 40.0 | 60.0 | 0.0 |
| 2011 | 100.0 | 0.0 | 0.0 |
| 2012 | 98.2 | 0.0 | 1.8 |
| 2013 | 90.6 | 0.7 | 0.0 |
| 2014 | 100.0 | 0.0 | 0.0 |
| 2015 | 100.0 | 0.0 | 0.0 |
| 2017 | 100.0 | 0.0 | 0.0 |
| 2018 | 88.5 | 7.7 | 0.0 |

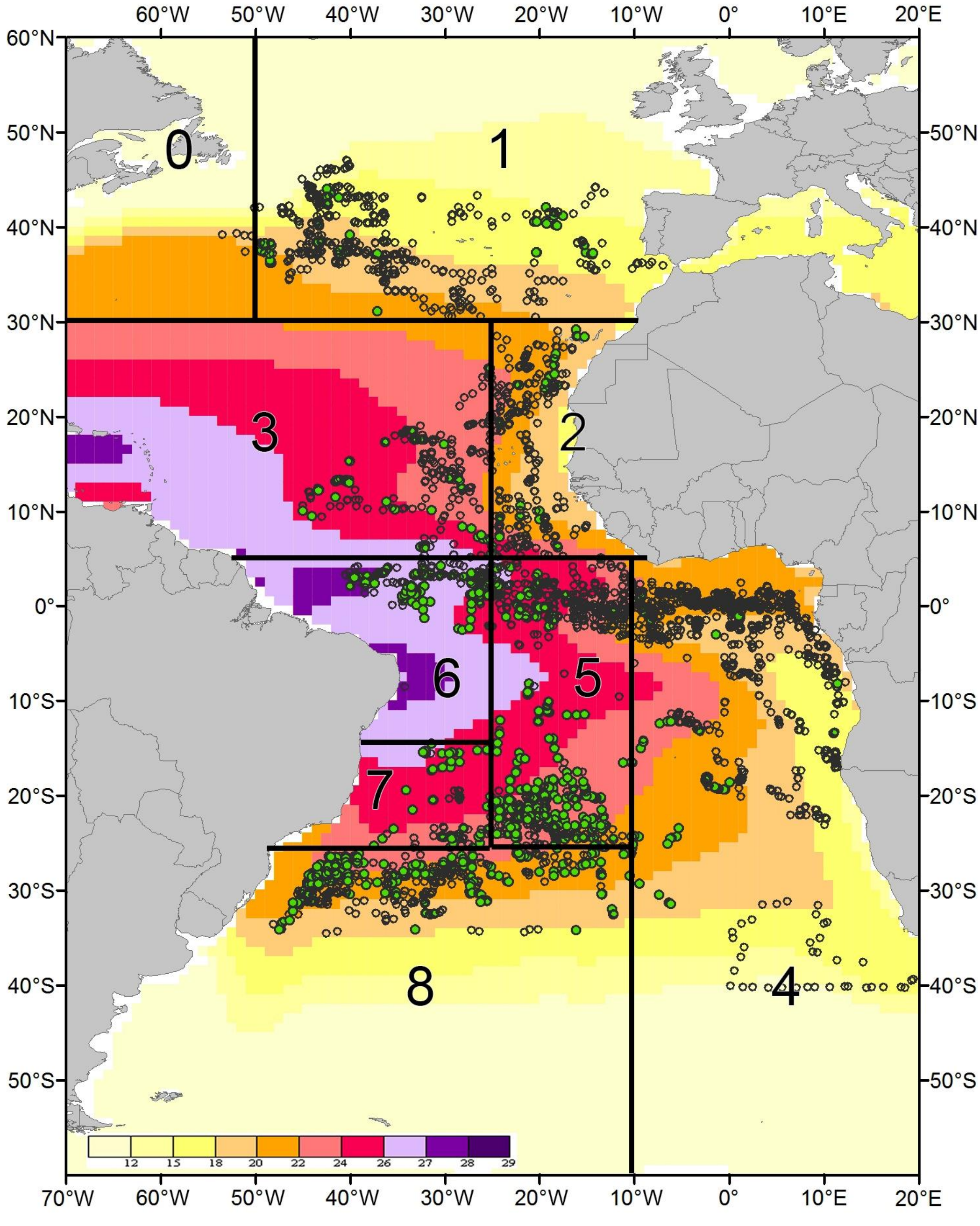


**Figure 1.** Sets observed and sets with positive catches (green) of WHM (*Kajikia albida*) by zones in the Atlantic Ocean, in the period 1993-2018.

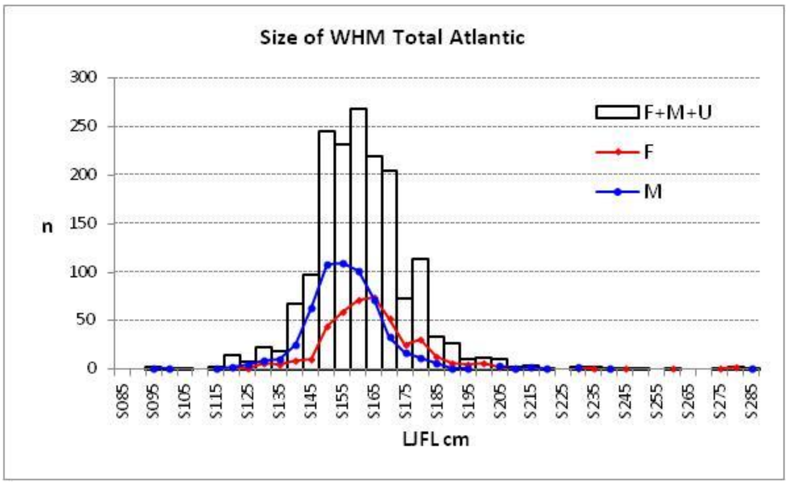


**Figure 2**. Size frequency for females (F), males (M) and sexes combined with undetermined individuals sampled (F+M+U) of WHM (*Kajikia albida*) for all years and Atlantic zones combined.

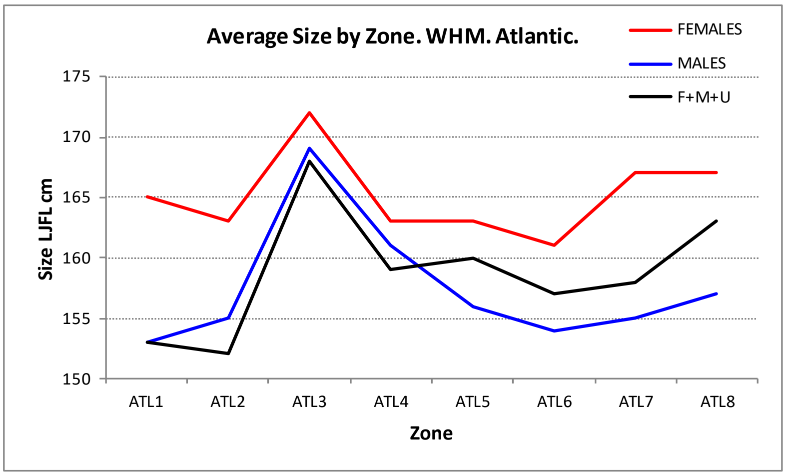


**Figure 3.** Average size of WHM (*Kajikia albida*) for females (F), males (M) and sexes combined with undetermined individuals (F+M+U), for all years, by zone, in the Atlantic Ocean.

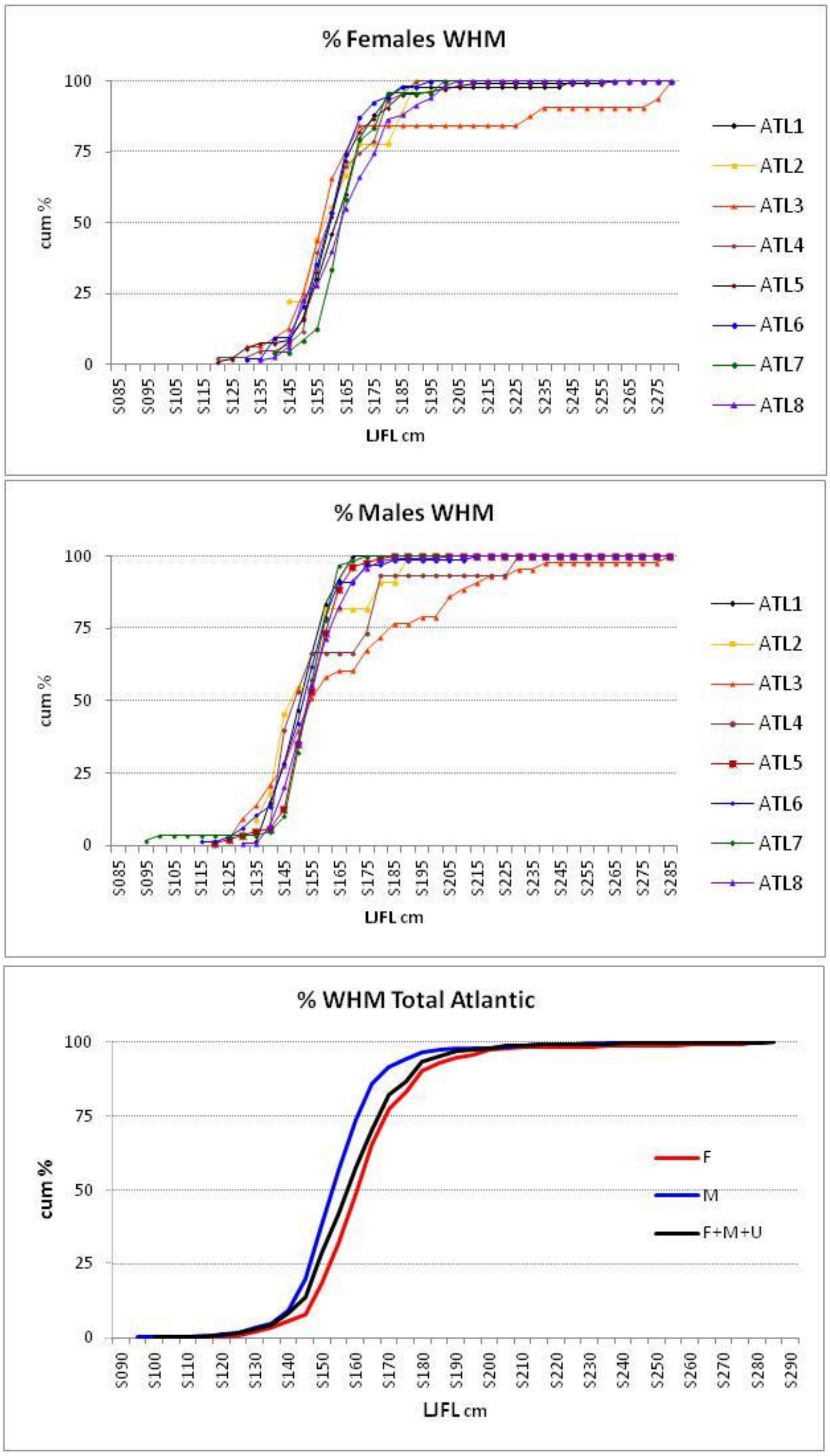


**Figure 4.** Cumulative percentage of size-class (LJFL cm) of WHM (*Kajikia albida*), for female (F), male (M) and sexes combined with undetermined individuals (F+M+U), by zone and in the Atlantic as a whole.

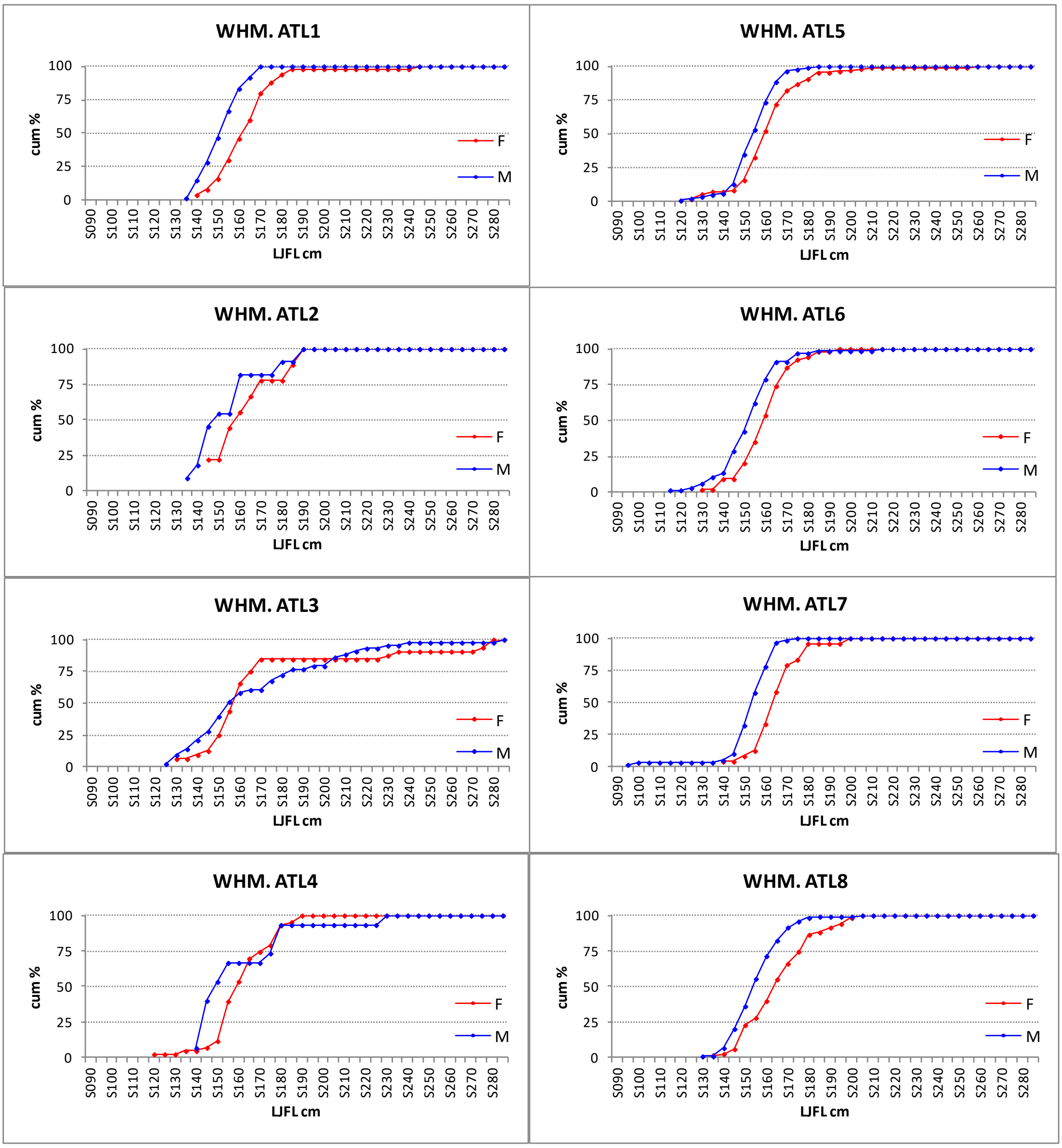


**Figure 5.** Cumulative percentage of size-class (LJFL cm) of female (F) *versus* male (M) WHM (*Kajikia albida*), by zone of the Atlantic Ocean.


**Figure 6**. Overall sex ratio (SRo) of female WHM (*Kajikia albida*) for the Atlantic zones defined.

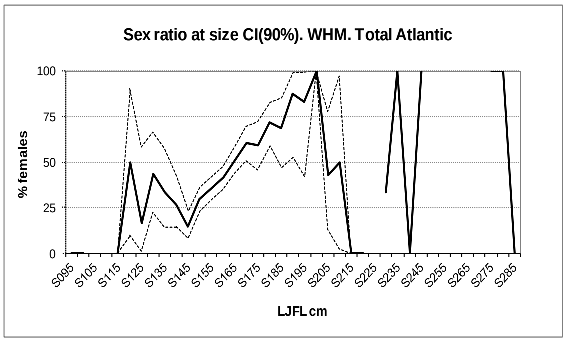


**Figure 7.** Sex ratio at size (SRs) (90%CI) of female WHM (*Kajikia albida*) in the whole Atlantic.

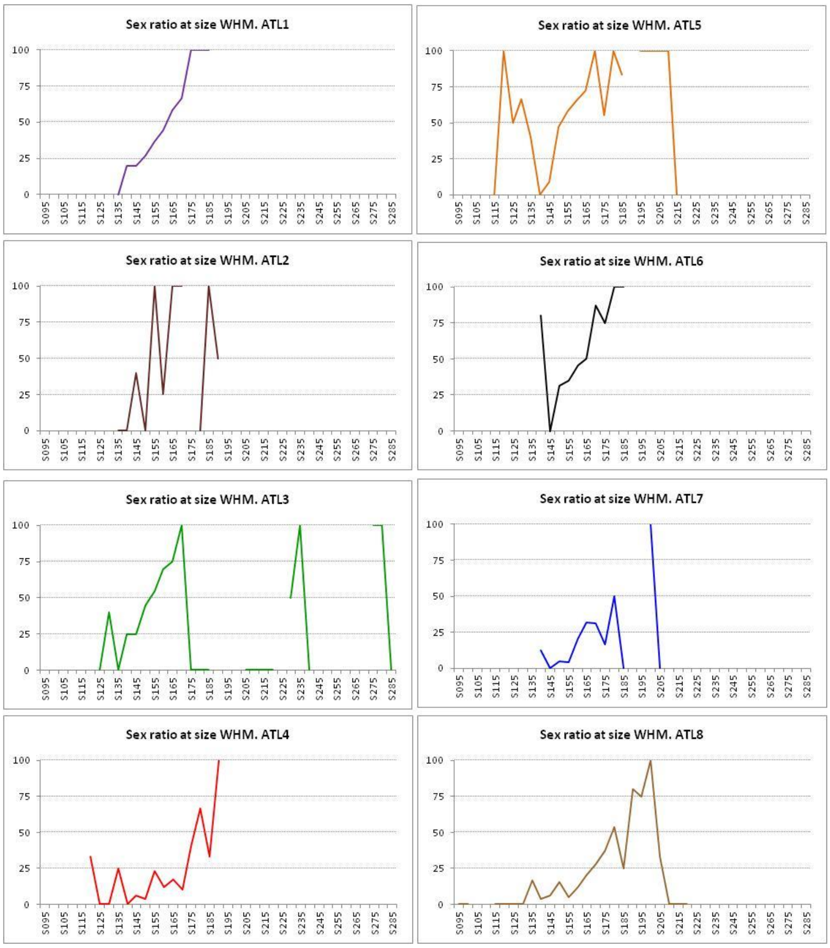


**Figure 8**. Sex ratio at size (SRs) of female WHM (*Kajikia albida*), by zone, in the whole Atlantic Ocean.

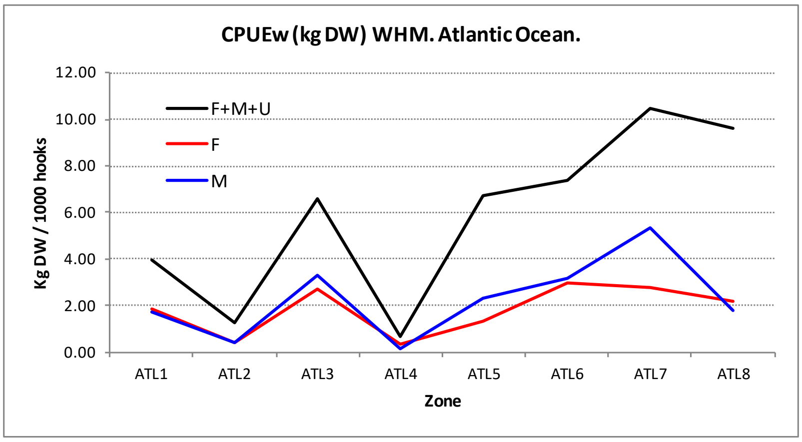


**Figure 9.** Nominal CPUE in weight (kg dressed weight/1000 hooks) of WHM (*Kajikia albida*) by sex and for sexes combined (including undetermined individuals), by zone, in the Atlantic Ocean.

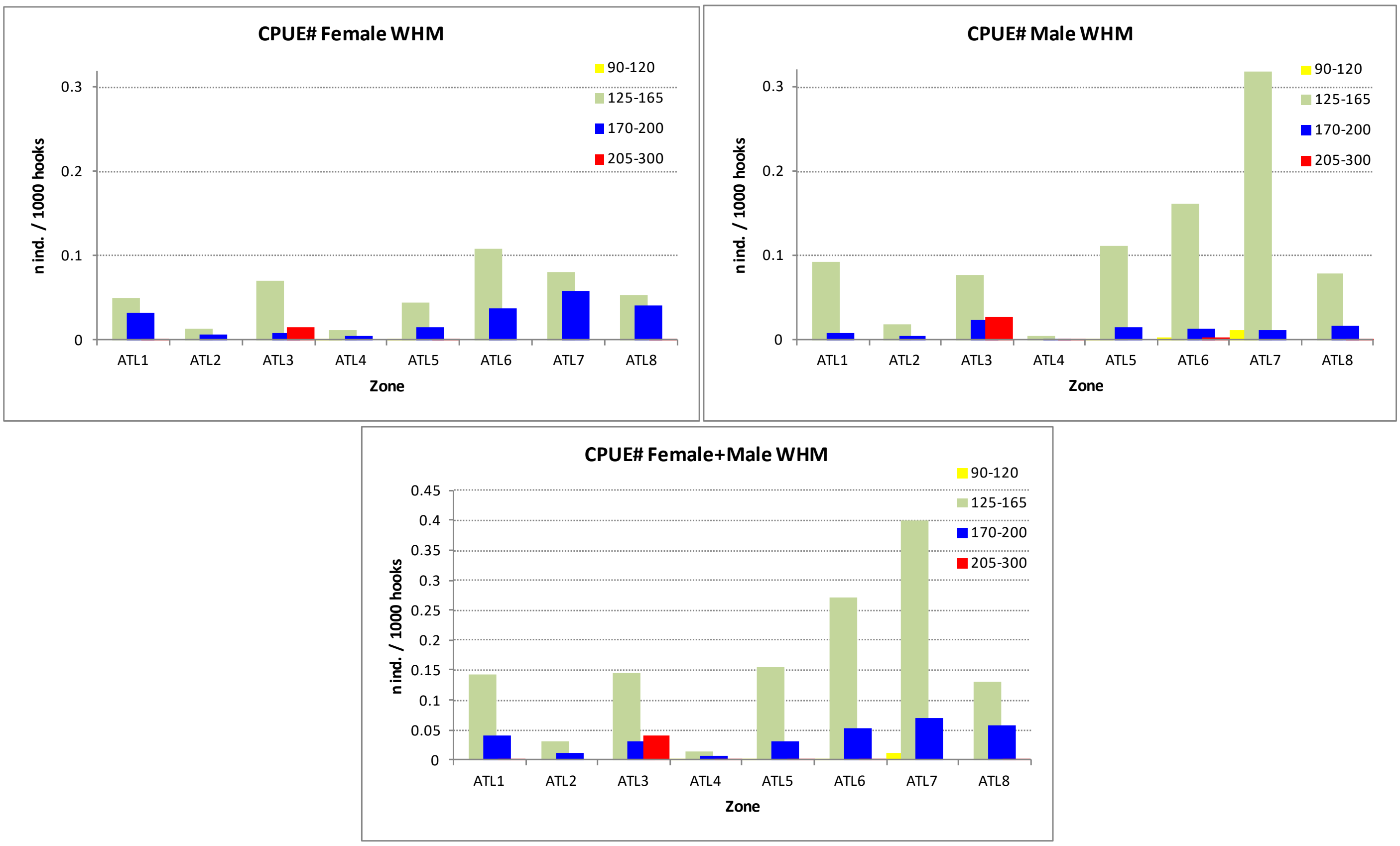


**Figure 10**. Nominal CPUE in number of individuals of WHM (*Kajikia albida*) for females, males and both sexes combined, by size categories and by zone in the Atlantic Ocean.

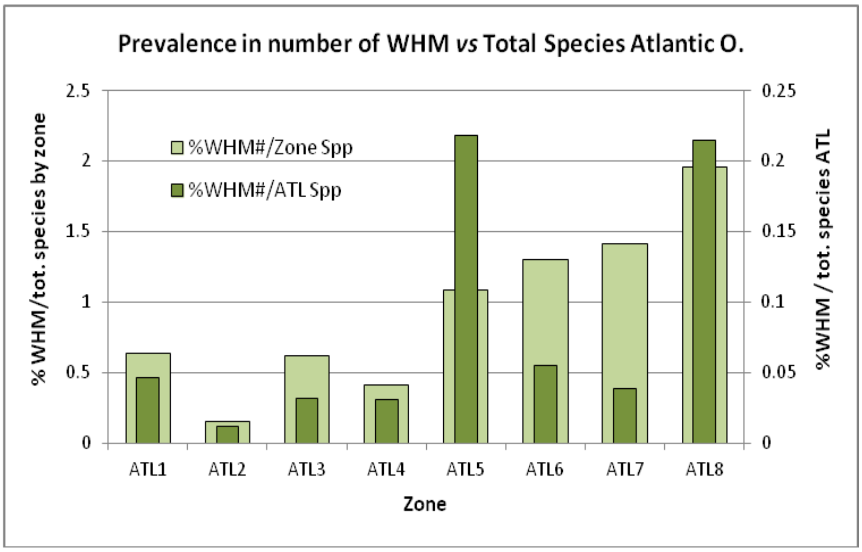


**Figure 11**. Prevalence in number of WHM (*Kajikia albida*) in relation to the total number of individuals of fish species caught in the whole Atlantic and in relation to the total number of individuals of the fish species caught within each zone, during the combined period 1993-2018.

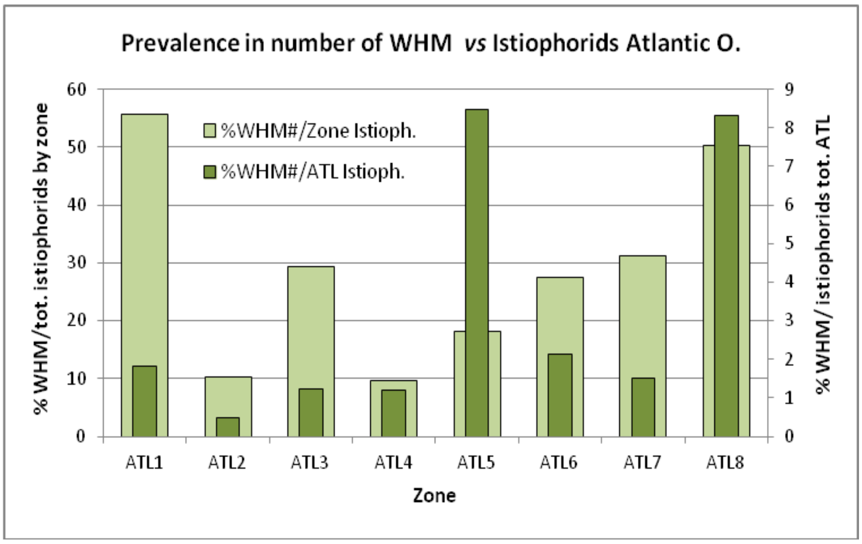


**Figure 12**. Prevalence in number of WHM (*Kajikia albida*) in relation to the total number of individual istiophorids caught in the whole Atlantic and in relation to the total number of individual istiophorids caught within each zone, during the combined period1993-2018.

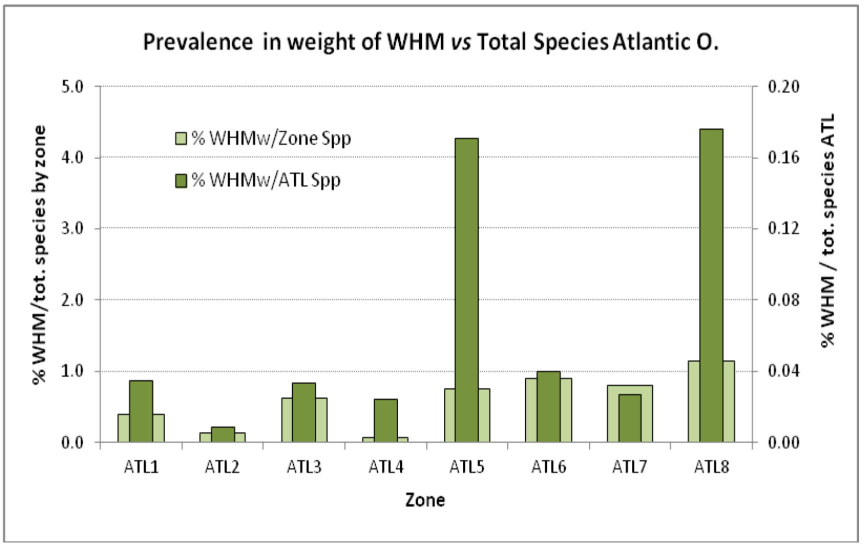


**Figure 13.** Prevalence in weight of WHM (*Kajikia albida*) in relation to the total weight of the fish species caught in the whole Atlantic and in relation to the total weight of the fish caught within each zone, during the combined period 1993-2018.

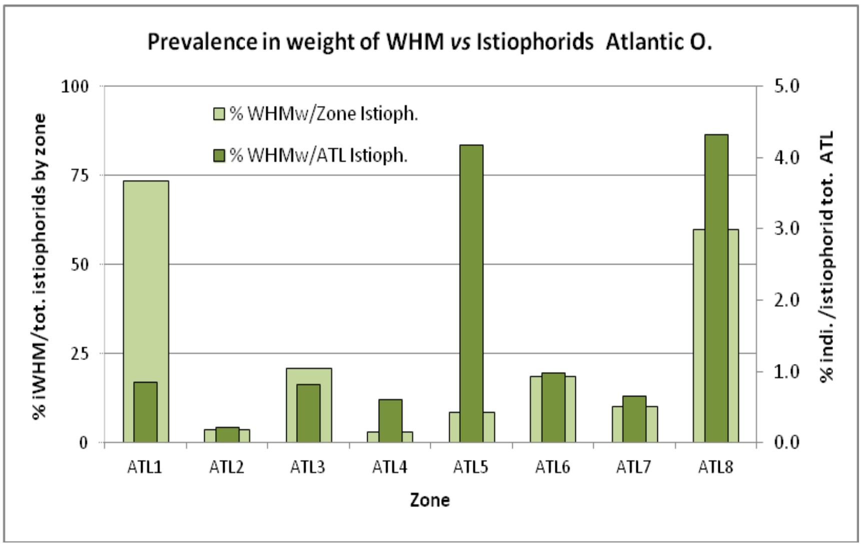


**Figure 14**. Prevalence in weight of WHM (*Kajikia albida*) in relation to the total weight of istiophorids caught in the whole Atlantic and in relation to the total weight of istiophorids caught within each zone, during the combined period 1993-2018.

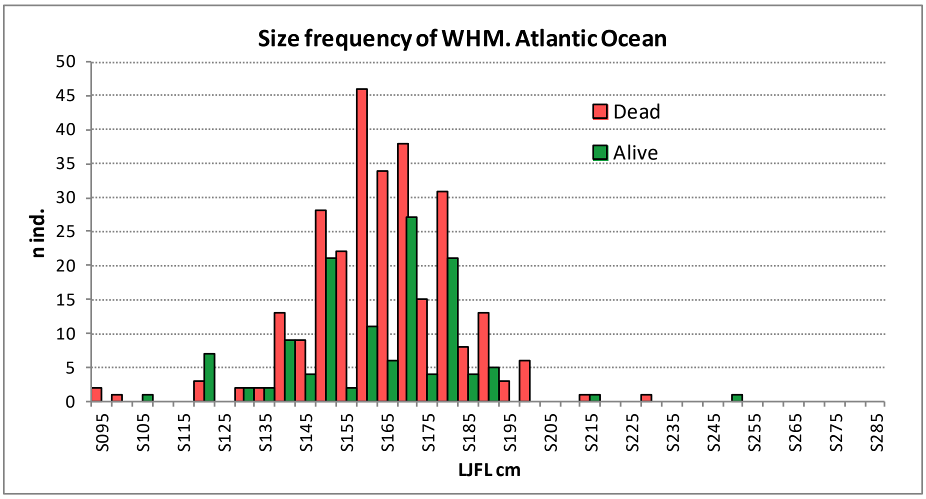


**Figure 15.** Number of individuals discarded dead or released alive of WHM (*Kajikia albida*) by size-class, observed in the Atlantic Ocean as a whole during the combined period 1993-2018.

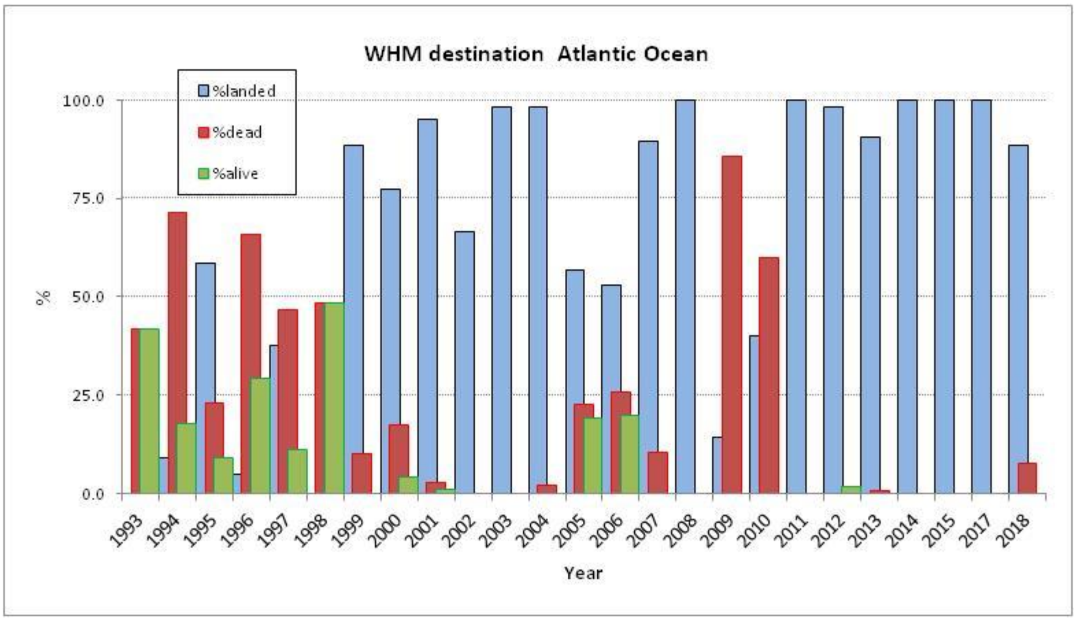


**Figure 16**. Percentage of main destinations of WHM (*Kajikia albida*) observed by year in the whole Atlantic Ocean.