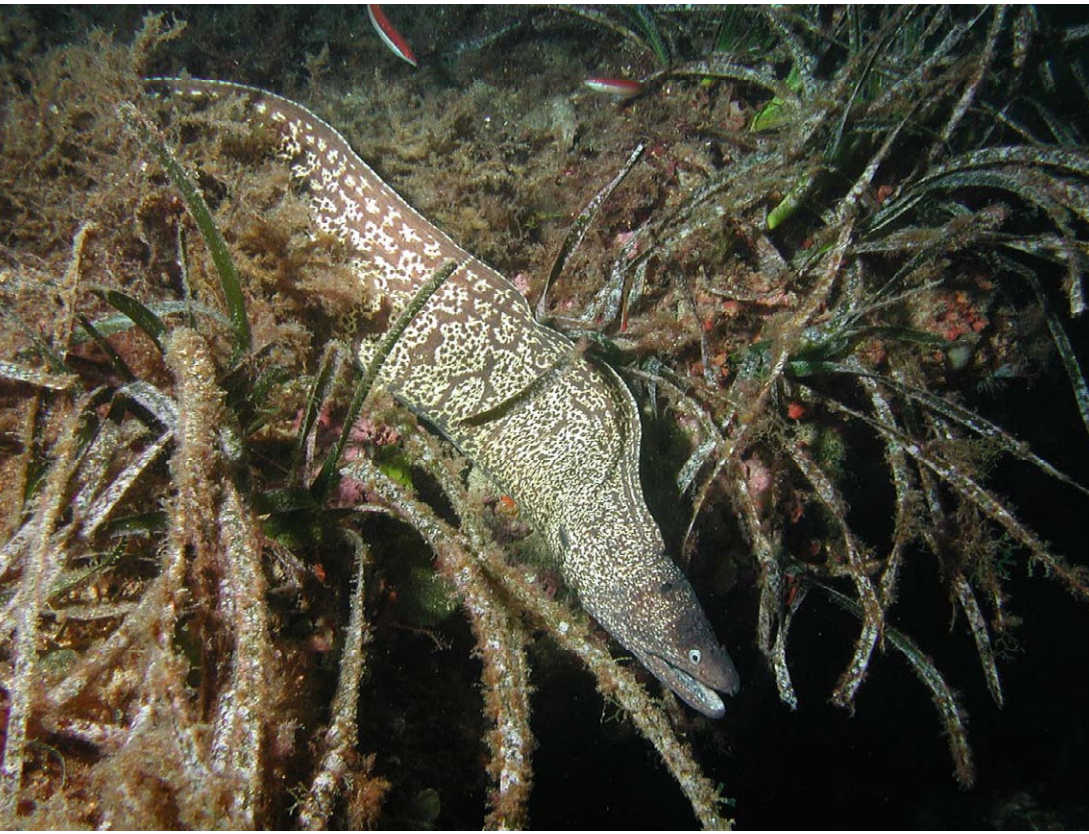

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Preliminary data on horse mackerel (*Trachurus* spp) landings from Mauritanian waters

Índice

Preliminary data on horse mackerel (*Trachurus* spp) landings from Mauritanian waters

A. Jurado-Ruzafa (1), M.N. Carrasco Henarejos (1), V. Duque Nogal (1), A. Sancho Rafel (1), E. Hernández Rodríguez (1), P.J. Pascual Alayón (1) y M.T. García Santamaría (1)

Abstract

European fishery off Mauritania (one of the most productive and most intensively exploited regions in the world) targeted to small pelagic fish accounts for 30% of the total catches in the area. The Instituto Español de Oceanografía (IEO), through its Centro Oceanográfico de Canarias, follows up the activity of these vessels that land at Spanish port (Las Palmas de Gran Canaria, Spain), under the European Project Data Collection (Regulation (EC) 1543/2000). One of the target groups in this fishery is *Trachurus* spp, commercially named “JAX”.

During 2008 and 2009, several samples of this group from these landings were analysed, and *Caranx rhonchus* was the second species of importance. The mixture of these species in the landings of this UE fleet should be determined to improve the data provided to the international Working Groups responsible for assessment of those resources.

Key words: *Trachurus* spp, *Caranx rhonchus*, small pelagic fishes, Mauritania, mixed fisheries.

Résumé

La pêcherie européenne au long de côte de la Mauritanie (l'une des régions les plus productives et les plus intensément exploitées du monde) dirigée aux petits poissons pélagiques forme le 30% des captures totales dans la région. L'Institut Espagnol d'Océanographie (IEO), par son Centro Oceanográfico de Canarias, suit l'activité de ces navires qui déchargent dans port espagnol (Las Palmas de Gran Canaria, Espagne), sous le projet européen de collecte de données (règlement (EC) 1543 / 2000).

L'un des groupes objectif de cette pêcherie est *Trachurus spp*, commercialement appelé **«**JAX**»**. En 2008 et 2009, on a analysé plusieurs échantillons de ce groupe à partir de ces débarquements, et *Caranx rhonchus* était la deuxième espèce

en importance. Le mélange de cette espèce dans les débarquements de cette flotte de l'UE devrait être déterminée, pour améliorer les données offertes aux groupes de travail internationaux, responsables de l'évaluation de ces ressources.

Mots-clés: *Trachurus* spp, *Caranx rhonchus*, petits poissons pélagiques, Mauritanie, pêcheries mixtes.

Introduction

The Northwest African shelf is considered as one of the most productive and most intensively fished areas in the world (Zeeberg et al., 2006; Fréon et al., 2008; Arkhipov, 2009; Fischer et al., 2009; Lidvanov et al., 2010; Meiners et al., 2010). The special environment conditions support important fish resources (among which the small pelagic are the most abundant), and the fishery sector plays an important role in the economies of the different countries of the region.

Small pelagic resources are exploited not only by artisanal fishing (canoes, open boats powered by outboard engines with less than 100 hp or sailing boats (Campredon and Cuq, 2001)), but also by great pelagic trawlers (almost exclusively foreign) (FAO, 2008). Despite their relatively low commercial value, the small pelagic fish are dominating the catches

and are important to both the industrial and artisanal sectors (Samb, 2002).

European fisheries off Mauritania are possible through international access agreements and private arrangements, which enable foreign trawlers to exploit the potential of this highly productive upwelling system (ter Hofstede and Dickey-Collas, 2006). Dutch and Irish boats are amongst the largest fishing vessels in the world; in the Mauritanian Exclusive Economic Zone, they operate within miles of each other and are often accompanied by dozens of Russian, Lithuanian, and Icelandic trawlers (Zeeberg et al., 2006).

Although the Spanish fleet does not operate this fishery, it is considered to be of great interest in the UE for monitoring and sampling because it is a European Community fleet with a high catch volume (30% of the total in the area). Since 2003, the Instituto Español de Oceanografía (IEO), through its Centro Oceanográfico de Canarias (COC, in Tenerife, Canary Islands), follows up the activity of the vessels that land at Spanish port (Las Palmas de Gran Canaria, Spain), under the European Project Data Collection (Regulation (EC) 1543/2000).

The European pelagic fleet fishing in Mauritania targets mainly five species: sardine (*Sardina pilchardus* (Walbaum, 1792)),

round sardinella (*Sardinella aurita* Valenciennes, 1847), flat sardinella (*Sardinella maderensis* (Lowe, 1838)), mackerel (*Scomber colias* Gmelin, 1789) and horse mackerels (*Trachurus* spp). Some of these vessels land the most catches in the Puerto de la Luz (Las Palmas de Gran Canaria, Spain). These pelagic freezer-trawlers consisted of 5 vessels in 2008 and 7 in 2009, from The Netherlands, France, England and Ireland, having engine powers ranging from 3,000 and 8,000 hp and equipped to sort and process fish into deep-frozen packages (García Santamaría et al., 2010). In addition to the biological information obtained from other target species, in 2008 the COC began the study of horse mackerel (*Trachurus* spp) under the commercial codification "JAX".

In the last decade, the Food and Agriculture Organization of the United Nations (FAO) has hosted the annual International Working Group Resources Assessment of Small Pelagic distributed in Northwest Africa, whose final aim is to determine the operational status of such management and make assessment proposals to ensure the conservation and sustainability of the fisheries involved.

These Working Groups have considered, in the monitoring of horse mackerel fisheries, that "Exploitation is geared towards three species: the Atlantic horse mackerel (*Trachurus trachu-*

rus (Linnaeus, 1758)), the Cunene horse mackerel (*Trachurus trecae* Cadenat, 1950) and the false scad (*Caranx rhonchus* Geoffroy Saint-Hilaire, 1817). The two main species in terms of the assessment are *Trachurus trachurus* and *Trachurus trecae*, while the third species is caught as bycatch. Therefore, for this species (*Caranx rhonchus*), only data on catch and abundance indices obtained during acoustic surveys will be given" (FAO, 2008).

The present study aims to highlight the noticeable presence of one species of another genus (*Caranx*) in the reported information of *Trachurus* spp landed by this UE fleet, in order to ameliorate the quality of data used in the assessments and in the establishment of their levels of exploitation.

Material and methods

Fishing area

This study considers catches and UE fleet monitored from Mauritanian waters, covering the FAO subdivisions 34.1.32 and 34.3.11 (Fig. 1).

Control of landings and collection of samples

Since January 2008 to December 2009, catch declarations at the port of Las Palmas de Gran Canaria by species and com-

mercial category, and fishing effort data were provided by the fishing inspection office (belonging to the Spanish Ministry of Agriculture, Fisheries and Food).

Samples were selected and provided frozen in boxes that are identified by an alphanumerical code: letters identify the spe-

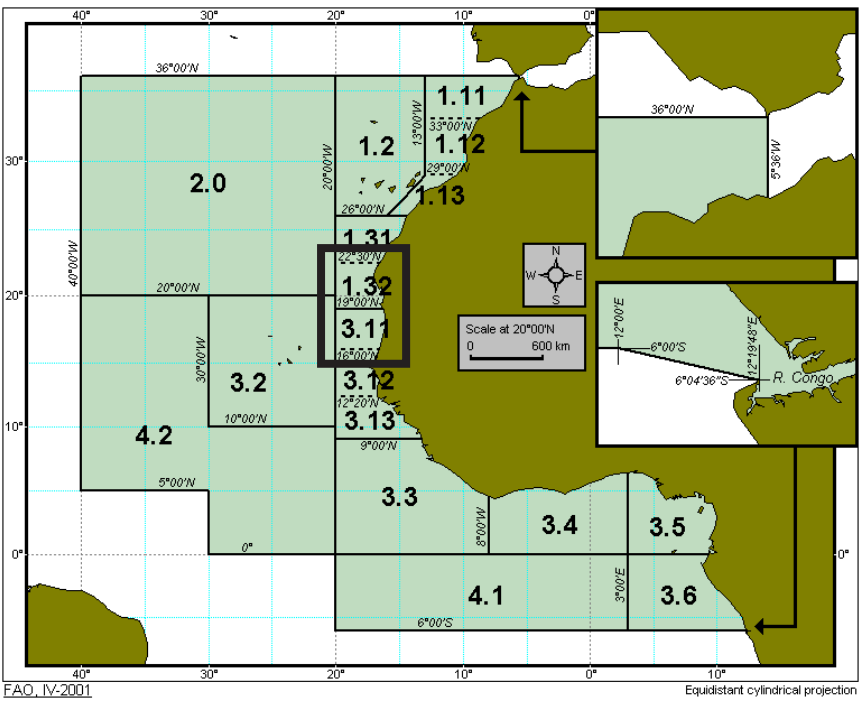

Figure 1. Major Fishing Area 34 (FAO, 1990-2011). The studied area (rectangle) covers the Mauritanian waters.

cies contained (SAA is *S. aurita*; SAE is *S. maderensis*; PIL is *S. pilchardus*; MAS is *S. japonicus*; JAX is *Trachurus* spp), and the number corresponds to the commercial categories, number of fishing trips and the code of the vessel.

Biological data

During the studied period, 5,105 specimens of "JAX" from commercial catches were analysed.

Firstly, all the fishes were sorted by species. Then, they were measured using an ichthyometer for total length (TL, precision 0.1 cm), and weighed using a precision balance for total weight (TW, precision 0.1 g). Length frequency distributions by species were analysed.

Length-Weight relationships were obtained for each species by the adjustment of an exponential curve to the data $W = a \cdot L^b$ (a and b were estimated by linear regression of logarithmically transformed length-weight data) (Ricker, 1973). To establish the nature of the allometric length-weight relationships, modified t-Student tests were calculated from the b estimates (Pauly, 1984). In addition, an analysis of covariance (ANCOVA) was applied for analysis of statistical differences between the length-weight relationships, using the software GraphPad Prism® 4.

Results

Discharges of "JAX" were about 1,500 tons in 2008 (22 fishing trips) and 2,000 tons in 2009 (29 fishing trips) (Fig. 2).

Fishing effort was higher during spring and summer in both years, with a drop in April to June. A total stop occurred in September 2008 and February 2009. The highest catches were obtained in May and in the last months of monitored years, being less important in the second period.

Proportions of identified species in analysed "JAX" samples (in order of importance: *Trachurus trecae*, *Caranx rhonchus*,

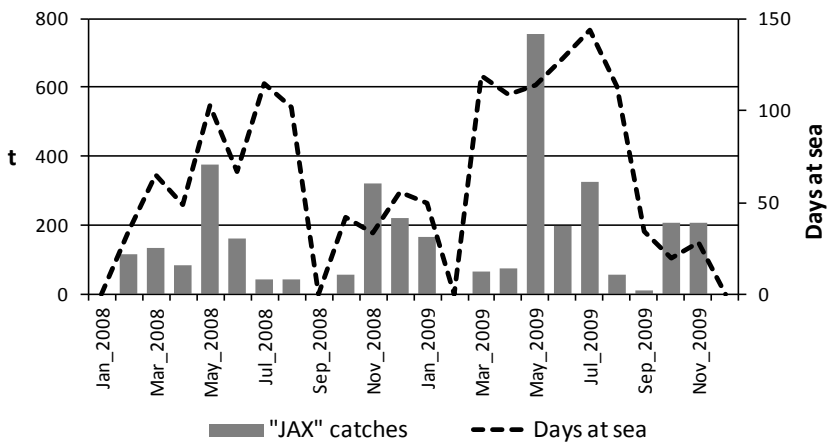

Figure 2. Monthly "JAX" landings (t) and fishing effort (days at sea) of the UE fleet monitored fishing off Mauritania, during 2008 and 2009.

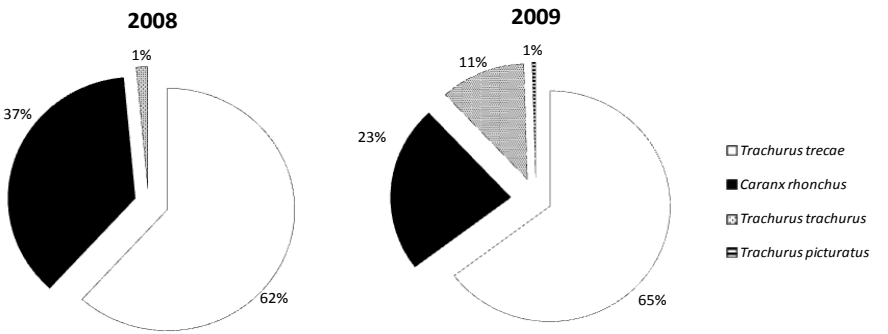

Figure 3. Percentages for species found in samples commercialised as *Trachurus* spp (or "JAX") analysed between 2008 and 2009, from EU Fleet landings fished off Mauritania.

Trachurus trachurus and *Trachurus picturatus* (Bowdich, 1825)), are shown on Figure 3:

The most abundant species was *Trachurus trecae*, with a similar percentage in both years (>60%) and *C. rhonchus* was the second one in commercial landings analysed under "JAX" codification (37% in 2008 and 23% in 2009). *Trachurus trachurus* augmented from 1% in 2008 to 11% in 2009. Finally, some specimens of *Trachurus picturatus* were found in the analysed samples corresponding to 2009.

The length range analysed, length means and dominant length classes were very different for each species (Table I).

	N	Length range (cm)	Length mean (cm)	Dominant length class (cm)
T. trecae	3,336	17.6-49.5	27.1	22 and 27
C. rhonchus	1,242	21.0-45.4	29.4	28
T. trachurus	509	19.7-30.6	23.2	22
T. picturatus	18	20.2-28.7	23.5	23

Table I. Summary of length sampling data obtained during 2008 and 2009 for "JAX" samples.

Except for *T. picturatus* (owing to the few specimens found in landings), length frequency distributions are presented in Fig. 4. The most remarkable is that *T. trecae* showed a bimodal distribution.

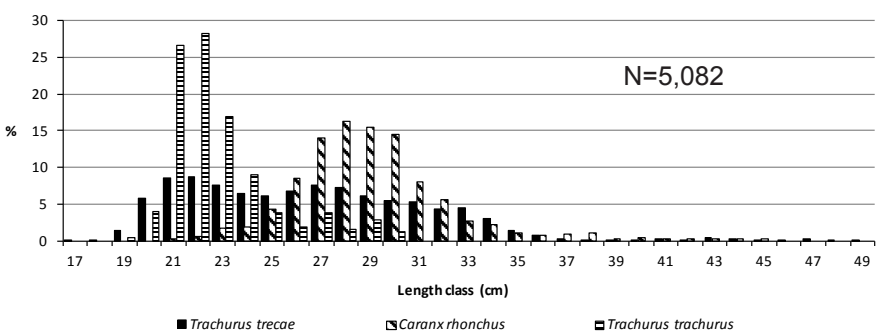

Figure 4. Length frequency distributions for the four species, from length sampling data of "JAX" samples analysed between 2008 and 2009.

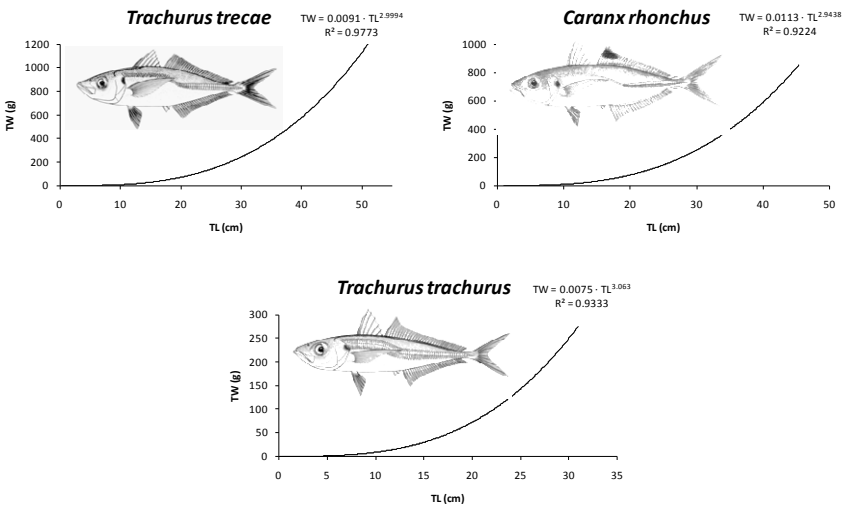

Figure 5. Length-Weight relationships estimated for *Trachurus trecae*, *Caranx rhonchus* and *Trachurus trachurus*. TW = Total Weight; TL = Total Length. (Illustrations from Fischer *et al*., 1981).

Length-Weight relationships are shown in Figure 5. Because the number of samples of *T. picturatus* is insufficient (n=18), its parameters were not estimated.

Summary of results obtained from the t-Student tests are shown on Table II. Each species showed different kinds of allometric Length-Weight relationships.

All cross ANCOVA analyses conclude that the differences between the slopes are significant ($p<0.01$).

	^t	Conclusion
T. trecae	0.0758	=3: isometric growth*
T. trachurus	17.324	>3: positive allometry**
C. rhonchus	23.177	<3: negative allometry***

*not significantly different from 3 ($p<0.4$)

**significantly different from 3 ($p<0.05$)

***significantly different from 3 ($p<0.025$)

Table II. Results of the t-Student test (modified by Pauly, 1984).

Graphical results of applying the percentages of each species to total catches (Fig. 2) are represented on Figure 6.

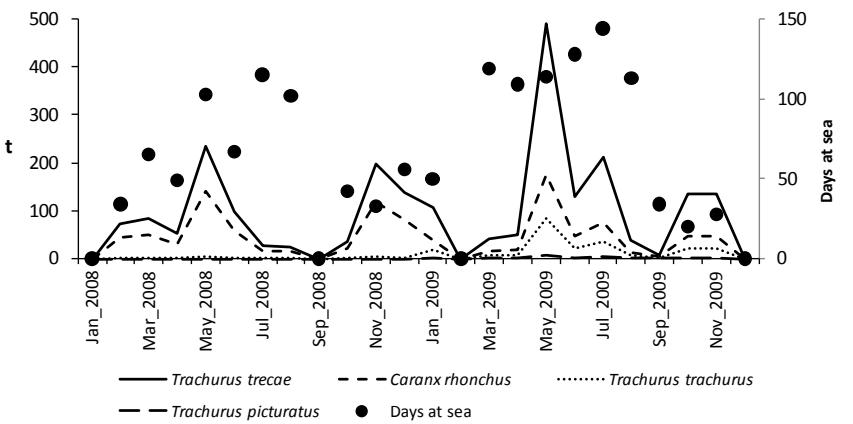

Figure 6. Total "JAX" catches by species, based on percentages estimated from length-weight samplings.

Discussion

The population parameters Length-Weight relationships showed important differences between the analysed species. Also, literature provides radical differences between their reproduction and spawning areas and seasons (Garcia, 1982; Abaunza *et al.*, 2008; Froese and Pauly, 2011), and about other ecological aspects on the biology of these species (Blackburn and Nellen, 1976; Kompowski, 1976; Lloris and Moreno, 1995). The scarce number of specimens of *T. picturatus* found in samples could be due to the low presence of this species in the studied area.

No correlation between fishing effort and "JAX" catches would be explained by the characteristics of this fleet. On one hand, these vessels target a considerable number of species, where *Trachurus* spp, although its commercial value is higher than for the other species, is the less abundant in landings (Ould *et al.*, 1999; ter Hofstede and Dickey-Collas, 2006). On the other hand, this fleet is able to quickly move their effort to a more abundant species (Maxim, 1995). Therefore, total catches (including all the species) could be increased when fishing effort rose.

The assessments of the status of these resources from Northwest African waters are focused on *T. trecae* and *T. trachurus*,

the most common species in the area (Blackburn and Nellen, 1976). Previous studies of the area had not considered this mixture and deal with *Trachurus* spp (Ould *et al.*, 1999; ter Hofstede and Dickey-Collas, 2006). Data from vessels (e.g. landing reports) are a very important source of information for evaluations and the fisheries management whom consider *Trachurus* spp as a mixture of species of the genus. *Trachurus trecae* is the most important species among the *Trachurus* spp catches, being *T. trachurus* the second one (FAO, 2008). However, during this work, an extreme presence of *Caranx rhonchus* was found in samples from these catches.

Theoretically, the three species are independently assessed (FAO, 2008) but, in fact, at least this fleet declares the three species as *Trachurus* spp catches. This is a new challenge in assessing the stocks of those fishes where many difficulties have been described by other authors (Maxim, 1995; Ould *et al.*, 1999; Samb, 2002; ter Hofstede and Dickey-Collas, 2006). Although data provided by Spanish researchers to FAO Working Groups are sorted by species, data supplied by ship owners about catches and effort are confused and insufficient.

Other fishing methods (i.e. fisheries that use Fish Aggregating Devices) have similar problems to produce independent spe-

cies assessment. But a lot of studies have used techniques to get better knowledge about mixed resources, mainly through acoustic technologies (Massé *et al.*, 1996; Scalabrin *et al.*, 1996; Lawson *et al.*, 2001; Mackinson *et al.*, 2004; Doray *et al.*, 2007; Llambrich and Alvarez, 2009). In other cases, important commercial fisheries occur in mixed shoals, and they are managed together (De Oliveira and Butterworth, 2004).

In the present case, where fisheries with multispecific landings reported by groups of species *Trachurus* spp are being considered, it is necessary to maintain a sampling program in the landings and follow up interannual fluctuations in the proportion of each species, because each one fluctuates independently. Therefore, to achieve a better assessment and management of fisheries, it would be necessary disaggregate data on landings by species.

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Notas

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