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The Red seabream (*Pagellus bogaraveo*) fishery in the Strait of Gibraltar: Data updated for assessment of the ICES Subarea IX.

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Abstract

This paper presents the available information of the Red seabrem fishery in the Strait of Gibraltar and updates the documents presented in previous years with the information from the last analyzed year, 2008. The document presents data about landings, LPUE, length frequencies and also biological information for Pagellus bogaraveo which should be used for its assessment.

1. Introduction and fishery description

Since the earlies 1980´s an artisanal fishery targeted to the red seabream (*Pagellus bogaraveo*, namely "*voraz*") have been developing along the Strait of Gibraltar area (ICES IXa south). This fishery has already been broadly described in previous Working Documents presented to the ICES WGDEEP (Gil *et al*., 2000; Gil & Sobrino, 2001, 2002 and 2004; Gil *et al*., 2003, 2005, 2006, 2007 and 2008) and also in Silva *et al*.(2002).

The Instituto Español de Oceanografía (IEO) began the study and the fishery monitoring following the request from the Fishermen Corporations. In 2006 and 2008, assessment trials were attempted within the ICES WGDEEP (ICES, 2006, 2008).

The main objective of this paper is provide an updated summary of the current status of knowledge on the fishery and biology of this deep-water species in the area which allows a new assessment exercise in ICES area IX at the 2009 ICES WGDEEP meeting.

2. Material and methods

Fishery information was gathered for the period 1983-2008 from the sale sheets: monthly landings, monthly number of sales and the number of days in which those sales were carried out. Moreover, from the beginning of the IEO monitoring, June 1997, an *ad hoc* monthly length samplings from the different commercial sizes are carrying out to estimate the landings length distribution (Gil *et al*., 2000).

Growth was studied throughout monthly samples from "*voracera*" fleet landings in the from 2003 onwards Whole otoliths (*sagitta*) were read under a light microscope to record the number of rings and their edge type. January 1st was assigned as birth date. From at least three agree readings were created one unique (combined) ALK.

3. Results and discussion

3.1. Fishery data

- Landings data: Figure 1 shows a continuous increase of the landings to a maximum in 1994. Since 1994 landings have gone decreasing, except in 1996 and 1997, till arise the lowest value of the recent years in 2002. Then, from 2003 onwards it shows an increasing trend till reached the highest value of the last years in 2008.

- LPUEs: Fishing effort increases too (Figure 2). It is important to emphasize that the effort unit chosen cannot be too appropriate as do not consider the missing effort. Thus, in the recent years this missing effort increases substantially (fishing vessels with no catches and precisely why with no sale sheet to be recorded). This way it is advisable to interpret with caution the LPUE trend in the last years because it cannot be a real image of the resource abundance.

- Landings length frequencies:

The fishery resource suffers a decrease of the landed mean length (Figure 3) mainly from 1995 to 1998. It is necessary to point out that species probably does not have a homogeneous geographic and bathymetric distribution related to their length. This fact could explain the different landed mean length between ports (Tarifa and Algeciras). The mean length of the landings gets progressively increasing from 1999 onwards, but along the last years the trend varies increasing again from 2006 on in both ports. However the median value from these years remains under the mean in every case and close to the minimum landing size in Algeciras.

3.2. Biological data

- Age and growth: Red (blackspot) seabream is considered a slow growing species. Gueguen (1969) reported a maximum age of 20 years. In the Azores Islands a maximum age of 15 years was observed in a 56 cm length fish (Krug, 1994).

An ALK was obtained by 1497 three agreed readings from otoliths collected from 2003 onwards. It covers lengths from 24 to 54 cm (Figure 4). ALK comprises ages between 3 and 10. Younger ages are well sampled while the older groups are susceptible to poorer estimates. Von Bertalanffy growth parameters estimates from this combined ALK are: L_{∞}= 62 cm (fixed from the largest observed sample), k= 0.162 and t_0= -0.337 (r^2=0.94).

From 1041 samples (r^2=0.99), the relationship between the length of the individuals and its respective weight are:

$$\text{Total Weight (g)} = 0{,}014*[\text{Total Length (cm)}]^{3{,}014}$$

-Natural mortality (M): The natural mortality of *Pagellus bogaraveo* is uncertain because there is no data available to estimate M directly. A mortality rate of 0.2 $year^{-1}$ has been adopted by several authors in several studies in the Azores Islands (Silva, 1987; Silva *et al*., 1994; Krug, 1994, Pinho *et al*., 1999, Pinho, 2003).

- Maturity: An annual reproductive cycle is defined for the species by Gil and Sobrino in 2001: The spawning season seems to take place during the first quarter of the year. The smallest specimina are mainly males, maturing at a L_{50}=30.1 cm. Around 32-33 cm length an important part of individuals suffers a sexual inversion. Females maturing at L_{50}=35.1 cm. Thus, from age 5 all individuals could be considered mature ones.

4. Conclusions

Useful data for the assessment by age structured models, at least as an attempt. Catch-at-age fishery landings could be derived by the application of the combined ALK for the period 1990-2008. Mean weight of the catch could be estimated according to the ALK and the length-weight relationship proposed in this paper. Mean weight at age in the stock was considered equal to the mean weight at age in the catch. 0.2 $year^{-1}$ could be adopted as a natural mortality value and considered it the same for all ages along the period studied. Female maturity ogive estimated by Gil and Sobrino in 2001 could be used and considered the same over time. Proportion of F and M before spawning could be considered 0 because the spawning season takes place in the first quarter of the year. The oldest age group (10) should be consider as plus group (10+) because at least one sample is recaptured 10 years later from its tagging. From this information Lowestoft software required files could be created to attempt VPA exploratory runs. Without tuning fleet information, Separable VPA could be used in order to define terminal F of the analysis.

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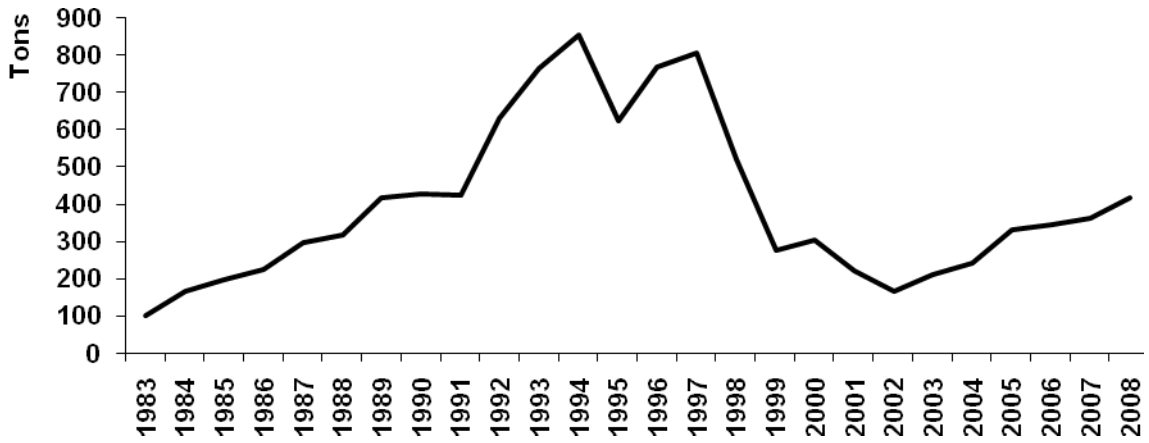

Figure 1. *Pagellus bogaraveo* of the Strait of Gibraltar: Landings (1983-2008).

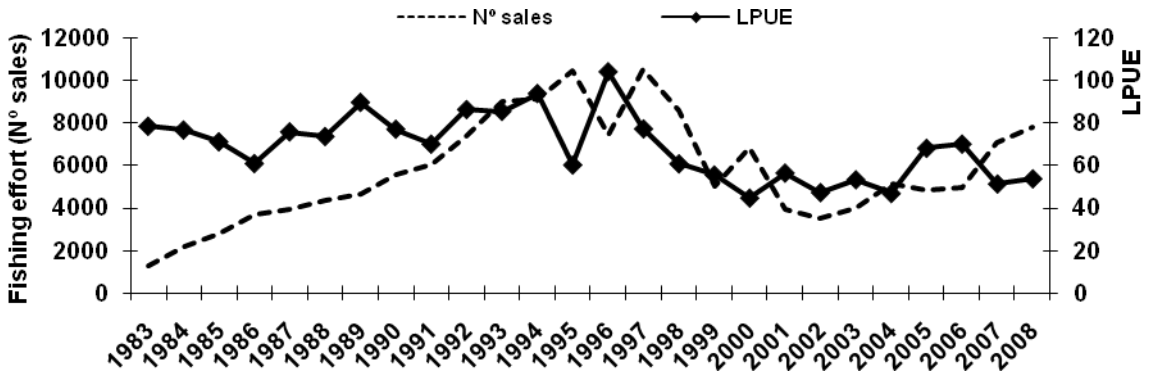

Figure 2. *Pagellus bogaraveo* of the Strait of Gibraltar: Evolution of the chosen effort unit and estimated LPUE (1983-2008).

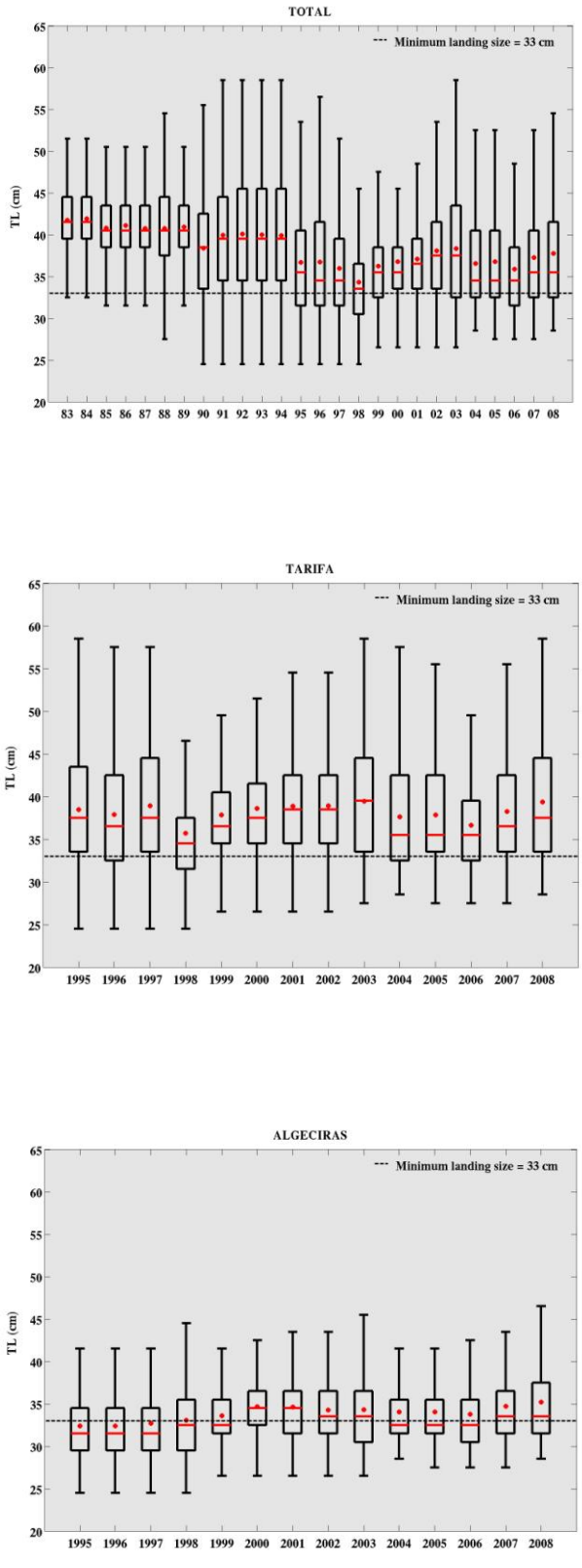

Figure 3. *Pagellus bogaraveo* of the Strait of Gibraltar: Evolution of the landings length distribution descriptive statistics.

Length/Age	3	4	5	6	7	8	9	10	Total
24	5	0	0	0	0	0	0	0	5
25	5	0	0	0	0	0	0	0	5
26	7	0	0	0	0	0	0	0	7
27	8	1	0	0	0	0	0	0	9
28	14	5	0	0	0	0	0	0	19
29	30	26	1	0	0	0	0	0	57
30	59	54	6	0	0	0	0	0	119
31	48	74	3	0	0	0	0	0	125
32	33	88	21	0	0	0	0	0	142
33	21	92	24	0	0	0	0	0	137
34	20	69	39	4	0	0	0	0	132
35	9	38	52	1	1	0	0	0	101
36	6	34	54	5	0	0	0	0	99
37	4	22	33	19	2	0	0	0	80
38	2	10	35	38	2	0	0	0	87
39	0	10	26	39	8	0	0	0	83
40	0	4	16	20	11	0	0	0	51
41	0	0	9	14	12	0	0	0	35
42	0	1	5	19	26	2	0	0	53
43	0	0	2	13	9	2	1	0	27
44	0	0	0	6	16	2	0	0	24
45	0	0	0	1	12	6	1	0	20
46	0	0	0	0	3	9	2	0	14
47	0	0	0	0	0	8	3	0	11
48	0	0	0	0	1	8	2	0	11
49	0	0	0	0	1	6	4	0	11
50	0	0	0	0	0	4	5	2	11
51	0	0	0	0	0	1	4	3	8
52	0	0	0	0	0	0	2	4	6
53	0	0	0	0	0	0	4	3	7
54	0	0	0	0	0	0	0	1	1

Figure 4. *Pagellus bogaraveo* of the Strait of Gibraltar: ALK obtained by means of at least agreed readings (otoliths from 2003 to 2008 samples).