

Red mullet is mainly fished in the Southern part of Majorca Island between 25 and 50 m deep. The total Island catch varies yearly, the minimum registered was 132 t on 1970 and the maximum 400 t on 1961. In recent years the catches have oscillated around 200 t (213 t on 1989). As a part of the Island fishery study carried out by the Centre Oceanografic de Balears (IEO), the biology of red mullet was studied on 1989.

The length, weight, sex, maturity and age of 1092 red mullet were determined. The length range of the studied fish was comprised between 10 and 27 cm total length.

The catches were composed mainly by females, small immature fish appeared in early fall (figure 1). First maturing fish were 11 cm in length, while 50 % of maturity was reached at 15 cm by the females and at 17 cm by the males. The spawning season was limited to April-May.

The length-weight relationship determined is as follows :

	a	b	r
males	0.031742	2.66867	0.9591
females	0.016003	2.91282	0.9717
total	0.016003	2.91282	0.9748

The otoliths showed a concentric pattern of rings with abundant false rings. The evolution along the year of the opaque rings in the otolith margin (figure 2) showed the formation of a ring per year. Once the annual periodicity of the rings was validated, the age length key was determined using 1st July as birthdate. The fishes were from age Class 0 to age Class IV. The von Bertalanffy growth parameters were determined by means of FISHPARM programme. The values of the von Bertalanffy parameters were:

	L. cm	K	t	W. g
population	29.76	0.2376	-2.0649	310.74
males	23.39	0.2882	-3.3250	137.32
females	34.53	0.1364	-3.8210	505.75

The females showed a higher maximum length, while males had a bigger growth rate. These values are higher than the growth parameters reported from other Spanish areas (MORALES-NIN, 1986), probably due to the small age range present in the fishery.

Due to the bathymetric distribution of red mullet, the bigger (and older) fish are not available to the fishery and appear occasionally in the fishery directed to hake.

Figure 1.- Monthly proportion of males (Black bar), females (stripped bar) and indetermined fish (dotted bar).

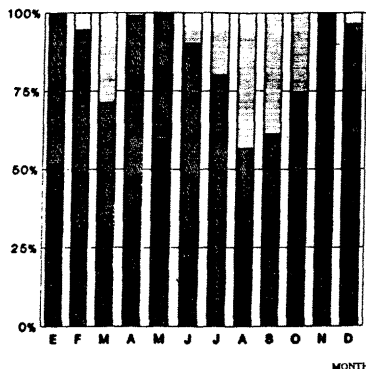
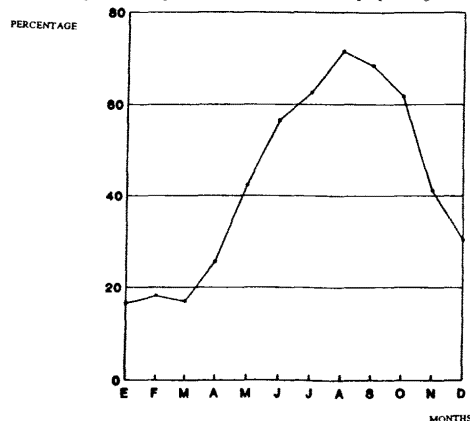


Figure 2.- Proportion of otoliths with an opaque ring in the edge.



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Dolphin-fish is an oceanic epipelagic species, distributed worldwide in tropical and subtropical waters (PALKO *et al.*, 1982) and limited by the 20°C isotherm (GIBBS & COLLETTE, 1959). It is found in the Mediterranean, where is captured occasionally on the littoral areas. However, dolphin-fish is the objective of a fishery on Malta (GALEA, 1961), Tunisia (J. ZAOUALL, com. pers.) and Mallorca (MASSUTI & MORALES-NIN, 1991). The fishing methods employed are very similar and based on the aggregatory behaviour of the species under floating devices.

Dolphin-fish is found off Majorca Island from spring to fall. On 1990, the fish appeared on May when the surface water temperature was 18°C, and disappeared in December when the surface water temperature was 16-17°C. During this time this resource was exploited by two different fisheries :

\*Adult dolphin-fish are caught as a by-catch of the *Xiphias gladius* fishery using drifting loglines. The length range of the fishes captured from May to November 1990 (N=62) was from 60 to 117 cm fork length.

\*From the second fortnight of August to the first days of December, the juvenile fish are caught by an artisanal and traditional fishery based in his aggregatory behaviour under floating devices. The floats are moored in waters from 70 to 500 m deep and mainly at 7 to 11 miles off the coast. The floats are visited daily at sunrise and dawn. The presence of fish under the floats are detected visually and with trolling line, and then fishermen deploy an special surrounding net without purse line around the float. In 1990, 48 fishing boats (the 12% of the artisanal fleet) were directed to this fishery. The catches (96.6 tons) represented the 3.9% of the total annual catch registered in the Majorca Central Fish Market and the 3.10% of his value. However, 30-40% of the fish is sold outside the market, making the real catch much more important.

Age was determined by means of scale interpretation (N=52). Four age classes were found, recruits of age 0 with a fork length range comprised between 19 to 70 cm, age 1 with a length range comprised between 62 and 101 cm, age 2 corresponding to 78 to 115 cm, and age 3 with a length range comprised between 95 and 118 cm. The von Bertalanffy growth parameters determined were :

$$L_{\infty} = 97.22 \text{ cm}, W_{\infty} = 8509 \text{ g}, K = 1.92, t_0 = 0.04$$

Recruit fishes growth actively during their exploitation phase. The mean monthly length of the fishes sampled on 1990 (N=2635) doubled on the studied period (Table I).

On 1990, the gonadosomatic index in adult female fishes showed that the spawning period started on June and continued until August (Table II). To determine the birth date of the recruits, a small sample of otoliths (N=14) was studied. The fish age was determined by means of daily growth increments and the corresponding birthdates were backcalculated from the date of capture. The growth increments found in dolphin-fish otoliths are laid down with daily periodicity (UCHIYAMA *et al.*, 1986), allowing to determine the age in days with great precision. The analysis of the studied otoliths showed that the birth date period was from June to September with a maximum in July (Table II). This data are in accordance with the maturity stages in adult fish and suggest the presence of a spawning area near Majorca Island.

Table I: Recruit fishes growth during his exploitation on 1990 (Fork Length in cm).

	Aug	Sep	Oct	Nov	Dec
N	389	922	404	904	16
Range	21-34	23-52	28-58	37-70	43-56
x	24.1	35.3	40.7	46.0	48.9
S	2.1	5.1	4.6	4.2	3.8

Table II: Gonadosomatic index (G.S.I.) in adult female fishes and percentages of recruit birthdates on 1990.

	May	Jun	Jul	Aug	Sep	Oct	Nov
G.S.I.	2.6	11.3	9.2	8.9	---	5.0	0.9
% Birthdates	---	7.1	57.1	28.6	7.1	---	---

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