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OCCASIONAL PAPER **18**

**ACTIVITIES CARRIED OUT BY COPEMED ON
COMMON SPINY LOBSTER (*Palinurus elephas*)
MEDITERRANEAN FISHERIES IN SPAIN AND
TUNISIA**

A CopeMed II contribution to the:

**Workshop on Fisheries and appraisal of *Palinurus elephas* in
the south-central and western Mediterranean Sea.**

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Activities carried out by COPEMED on Common spiny lobster (*Palinurus elephas*) Mediterranean fisheries in Spain and Tunisia

1. Summary

This report summarizes the work, carried out by the FAO-COPEMED project, of the exploitation models of the Common spiny lobster (*Palinurus elephas*) Mediterranean fisheries in Spain and Tunisia. The objective of the Spanish-Tunisian project was to carry out a comparative study on *Palinurus elephas* fisheries in the Western (Balearic Islands, Spain) and the Central (Tunisia) Mediterranean Sea, with special attention to the exploitation models of the Common spiny lobster fisheries of the two countries.

Improvement of biological information of the species was also included in the study as an important objective, in particular of the biological parameters relevant for fisheries management. Specific objectives were the collection of information on the *Palinurus elephas* fisheries (fishing gears used, catches, fishing effort, main landing fishing ports, etc.) and the estimation of yields and length-size structure of the populations.

The study length was from April 2001 to November 2002. It kept on running in 2004 in five fishing areas of Tunisia. Three experimental surveys were carried out to test different selectivity indices between entangling nets and traps aiming at recommending eventual management options.

2. Participants

The *Palinurus elephas* project was conducted by a team of scientists from Spain and Tunisia. The team leaders and main experts involved were:

- Spanish experts: Raquel Goñi¹ (Project Coordinator), Antoni Quetglas¹ and Olga Reñones¹.
- Tunisian team: Adel Gaamour², Tijani Zarrouk² and Hechmi Missaoui³.

3. Work plan

The experience of the Spanish team, involved in a project on the biology and fisheries of the Common spiny lobster in the Spanish Mediterranean since 1997, as well as the financial support of the CopeMed project, contributed to the standardization of the sampling methodology and to a joint comparative analysis of the results.

- April 2001: workshop in Balearic Islands, including the organization of the project and demonstration of the sampling methodology for the Tunisian team (field sampling, laboratory analysis and visit of fish market).
- May 2001: workshop in Tunisia, including presentation of the project to the fishermen and on-board data collection.
- October 2001: experimental fishing survey with trammel-nets and traps in Tunisia.
- November 2001: experimental fishing with trammel-nets in the Balearic Islands.
- November 2002: project meeting to elaborate the final report.

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³ Institut National des Sciences et Technologies de la Mer (INSTM).

Two study areas were considered in this project:

- Fishing grounds off the Balearic and Columbretes islands (western Spanish Mediterranean),
- Fishing grounds off off La Galite and the Esquerquis islands (northern Tunisia).

The Columbretes and La Galite Islands are marine reserves where lobster fishing is forbidden and fisheries occur in the boundaries and nearby areas.

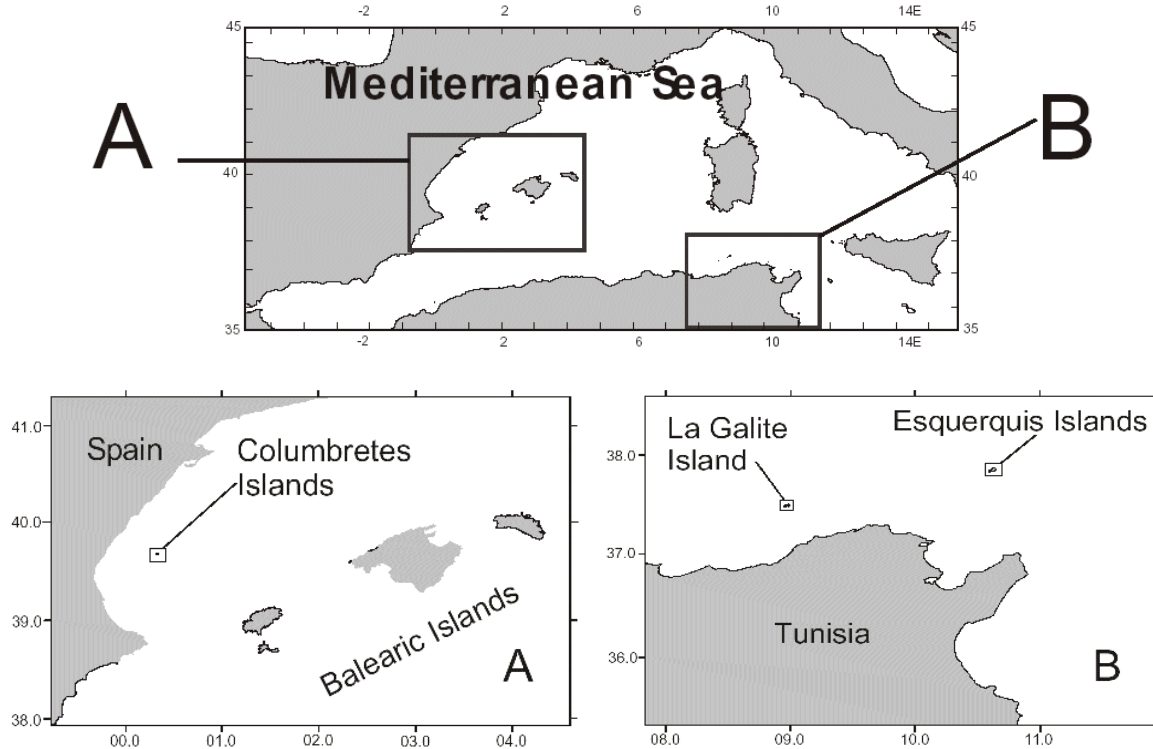


Figure 1. *Palinurus elephas* project's study areas.

4. Collection of data

- Sampling program on commercial boats: a total of 130 hauls (87 from Spain, 43 from Tunisia) were sampled in 2001, during the spring and fall seasons. The data collected were hauls characteristics, catches (including by-catch), sex and size of all specimens and individual size of the non-lobster catch. Due to the impossibility of having precise individual weights on board commercial boats, length-weight relationships were calculated from research surveys conducted in the Columbretes Islands (Spanish data) and from Tunisian *P. elephas* pond (Tunisian data).
- Laboratory sampling: In the laboratory, the following biological data/samples were collected: length, weight, maturity stage, gonad weight and color, gonad samples, diet information, moult stage and samples for genetic analyses.
- Logbook data covering the 2002 fishing season: 1149 hauls (468 from Spain, 681 from Tunisia) were registered. Data collected were haul characteristics (as above) and number/weight of specimens caught for each fishing set.

Lobster landings from 1990 to 2002 were also collected from official Spanish and Tunisian fishery statistics.

Statistical tests were used for a spatio-temporal analysis of the 2 fisheries. Non-lobster catches were used to estimate by-catch and discards.

5. Results

5.1. Fleets Characteristics and Fishing Grounds

The fleets from Spain and Tunisia are artisanal boats with technical characteristics closely related to the distance from their home fishing ports to the fishing ground. While in Tunisia there are around 60 fishing units of medium to large size (14-16 m) targeting *P. elephas* during the fishing season, in the Spanish Mediterranean a much larger number (> 250) of small artisanal vessels fish *P. elephas* during the main part of the fishing season. The reason for this is that in Tunisia most of the productive fishing grounds are at distances from the coast over 60 nm while in Spain they are within 30 nm from the coast. The landing strategies also differ. While in Tunisia most of the catches are landed in two ports (Bizert and Tabarka) and are bought by “viveros” to be exported to the European markets, in Spain *P. elephas* is landed in a myriad of small ports where it is partially sold for fresh locally consumption.

	Spain		Tunisia
	Balearic Islands	Columbretes Islands	La Galite & Esquerquis Islands.
Number of ports	16	4	2
Number of boats	257	5	56
Gross tonnage (GT)	2.0 ± 1.5 (0.2–11.2)	10.7 ± 3.4 (7.6–15.1)	18.9 ± 8.6 (6.8–47.0)
Horse power (HP)	37.5 ± 31.8 (3–261)	119.0 ± 35.1 (85–170)	149.4 ± 73.1 (45–330)
Boat length (m)	7.2 ± 1.7 (3.2–12.8)	12.9 ± 1.3 (11.2–14.6)	14.0 ± 2.1 (10.6–18.8)
Boat age (years)	34.8 ± 21.1 (1–98)	16.8 ± 14.1 (3–37)	13.4 ± 5.0 (2–28)
N° fishermen/boat	2.0 ± 0.8 (1–3)	3.2 ± 0.4 (3–4)	6.1 ± 0.9 (4–7)
Soak time (days)	2.3 ± 0.9 (2–5)	4.5 ± 2.6 (2–14)	2.5±2.4 (2–10)
Trammel net length (m)	662 ± 147 (450–1250)	726 ± 234 (350–1900)	653±99 (300–850)
Mesh size (mm)	71 ± 11 (40–100)	69 ± 12 (40–80)	79 ± 3 (70–80)
Depth (m)	74.3 ± 26.9 (15.0–170.0)	79.3 ± 19.0 (26.0–172.0)	78.1±37.2 (23.0–185.0)

Table 1. Characteristics of the fleets and fishing operations in Spanish and Tunisian *P. elephas* fisheries studied. Values are means, standard deviations and ranges.

	Spain		Tunisia
	Balearic Islands	Columbretes Islands	La Galite & Esquerquis Islands
Distance from homeport (nm)	2-3	30-40	40-60
Trip duration (days)	daily	2-3	5-6

Table 2. Fishing ground location of the Spanish and Tunisian fisheries targeting *P. elephas*.

5.2. Regulation

P. elephas fisheries are regulated in the Tunisia and Spain by minimum landing sizes (80 mm CL) and closed seasons (September to February). However, in Tunisia there is the possibility of closing certain fishing areas before the end of the season if there is evidence that the stock abundance is low. It is unclear whether this measure is applied.

5.3. Habitat

Mainly in maërl substrates (free living coralline algae and associated zoobenthos) often associated with the brown algae *Laminaria rodriguezii*.

5.4. Catches

		Spain	Tunisia	Student's t-test
Total	F	94.2	72.1	
	N	749	172	
	W	408431.9	161312.9	
	%N total catch	47.75 ± 2.50	41.44 ± 5.34	NS (p=0.230)
	%W total catch	41.32 ± 2.63	47.44 ± 5.80	NS (p=0.277)
	Commercial catch	N / haul	5.87 ± 0.67	2.84 ± 0.49
W / haul		3873.7 ± 422.9	2846.6 ± 625.7	NS (p=0.149)
%N lobster catch		70.93 ± 2.87	69.71 ± 4.80	NS (p=0.846)
%W lobster catch		81.40 ± 2.39	72.89 ± 4.95	NS (p=0.560)
'Rotten'	N / haul	0.77 ± 0.15	1.02 ± 0.19	NS (p=0.313)
	W / haul	400.4 ± 83.2	879.6 ± 209.2	** (p=0.006)
	%N lobster catch	7.53 ± 1.43	24.18 ± 4.29	** (p<0.001)

	%W lobster catch	7.15 ± 1.41	23.29 ± 4.42	** (p<0.001)
Undersized	N / haul	1.97 ± 0.29	0.14 ± 0.05	** (p<0.001)
	W / haul	420.5 ± 65.4	26.6 ± 12.21	** (p<0.001)
	%N lobster catch	21.54 ± 2.47	6.11 ± 3.35	** (p<0.001)
	%W lobster catch	11.45 ± 1.81	3.82 ± 3.22	* (p=0.030)

Table 3. Summary of *P. elephas* catches statistics (total and by categories) from fishing sets sampled in May and August-October 2001 in Spanish (N=87 hauls) and Tunisian (N=43 hauls) fisheries. F: frequency of appearance (%); N, W: total number and weight; %N, %W: percentage in number and in weight referred to the total catch or to the total lobster catch; N/haul, W/haul: number and weight per standardized haul.

5.5. Size and sex structure of Common spiny lobster catches

P. elephas Tunisian exploited populations have a greater proportion of large specimens than populations exploited by the Spanish fleets. This could indicate higher levels of exploitation in the Spanish fishery than in Tunisia.

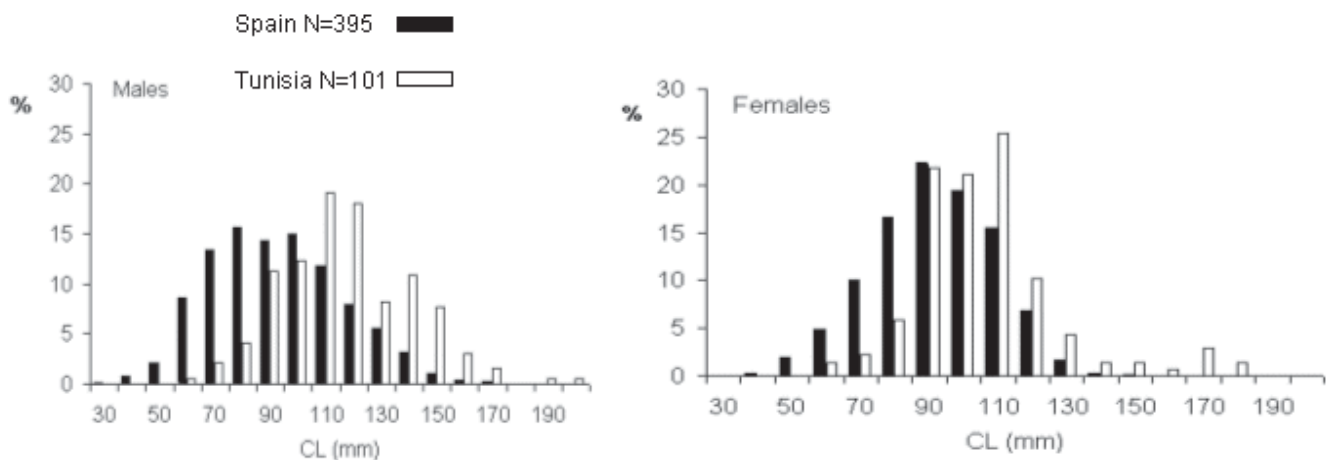


Figure 2a. *P. elephas* size-frequency distributions (males and females) of the catches from the Spanish and Tunisian fisheries.

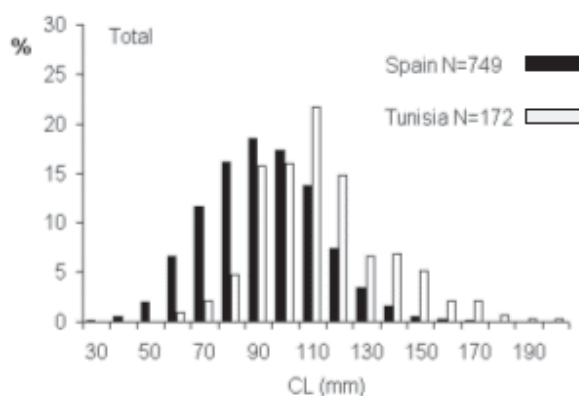


Figure 2b. *P. elephas* size-frequency distributions (total) of the catches from the Spanish and Tunisian fisheries.

5.6. *Palinurus elephas* yields

- Seasonal evolution

The seasonal evolution of *P. elephas* yields showed opposite trends in the two national fisheries. The reason is that while Spanish vessels fish on the same ground the entire season, the Tunisian fleet fish close to the home fishing ports at the beginning of the season and moves offshore as the weather improves.

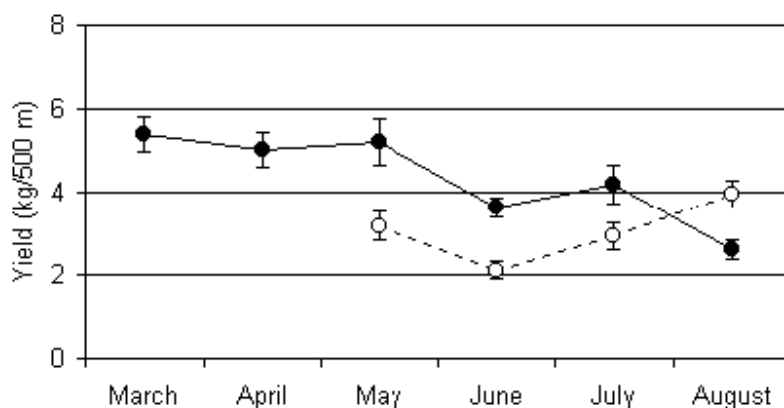


Figure 3a. Monthly *P. elephas* yields (weight) from the Spanish (black dots) and Tunisian (white dots) fisheries.

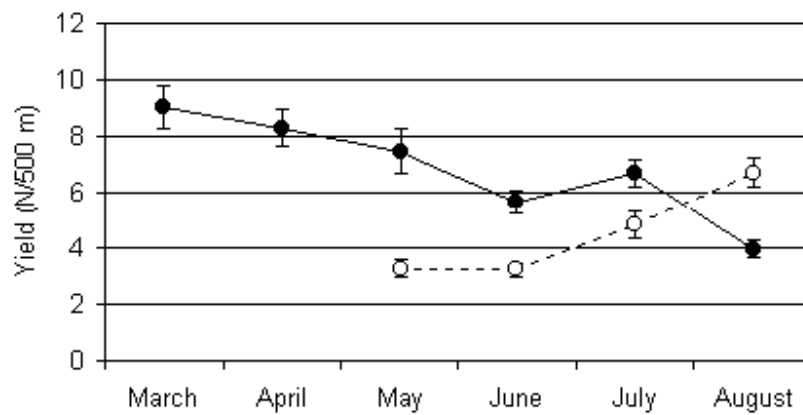


Figure 3b. Monthly *P. elephas* yields (number) from the Spanish (black dots) and Tunisian (white dots) fisheries.

- Time series

Tunisian total landings showed an abrupt increase from 1990 to 1993, due to several factors, such as the growth of the fleet and unusually good weather conditions, but mainly to the discovery of new fishing grounds (Esquerquis Islands).

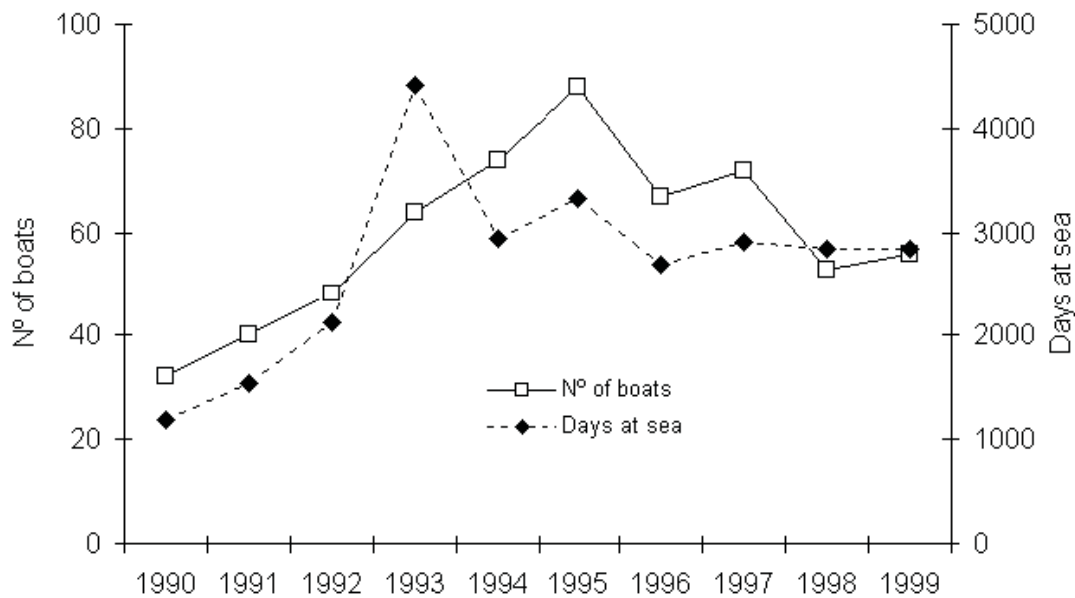


Figure 4. Evolution of the number of boats (solid line) and number of days at sea (broken line) for *P. elephas* fleet in Tunisia.

The depletion of both Spanish and Tunisian fisheries in the period 1999-2000 reflects an intense exploitation.

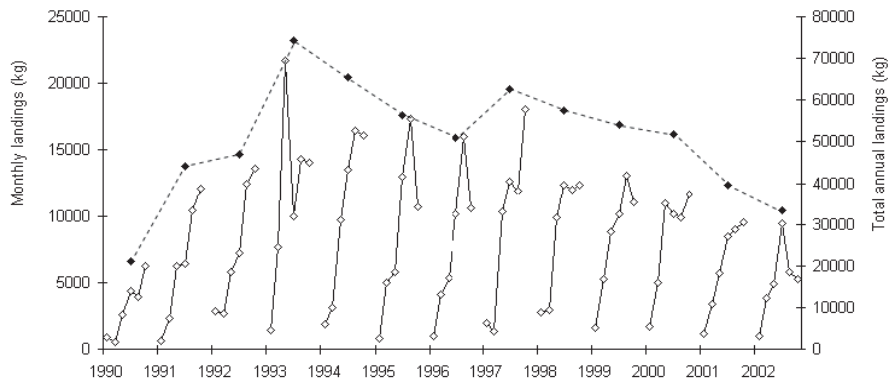


Figure 5a. Monthly (solid line) and annual landings (broken line) of *P. elephas* for the Tunisian fishery during 1990-2002.

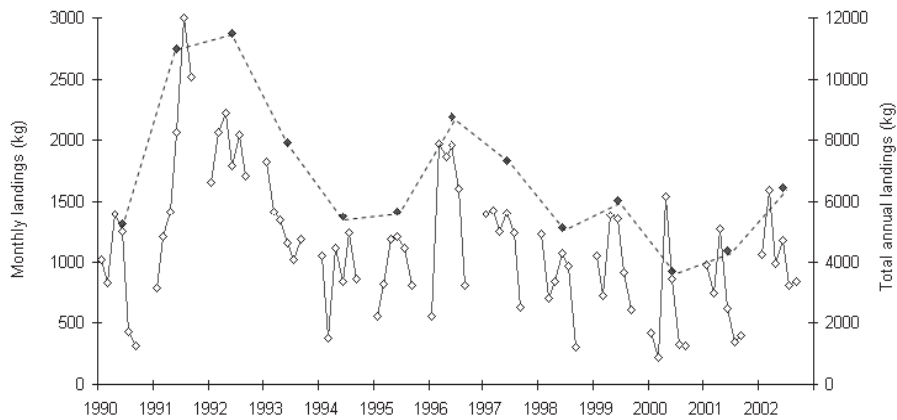


Figure 5b. Monthly (solid line) and annual landings (broken line) of *P. elephas* in the Columbretes Islands (Spain) fishery in the period 1990-2002.

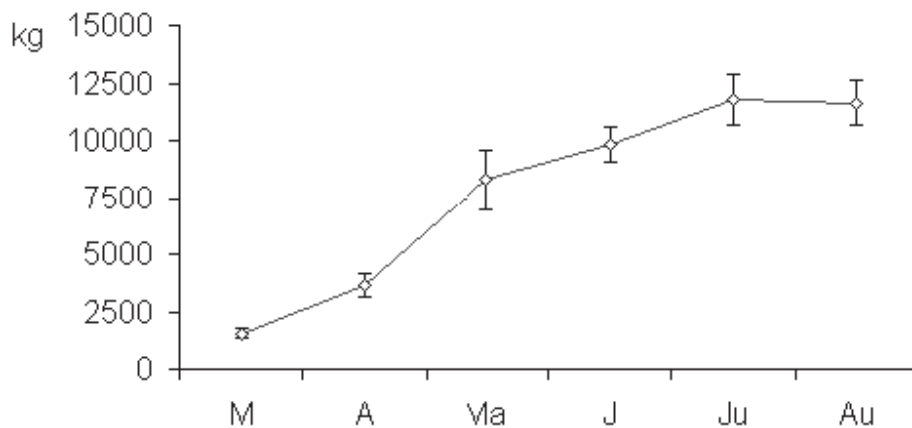


Figure 6a. Mean monthly evolution (mean and standard error) of *P. elephas* landings for the Tunisian fishery in the period 1990-2002.

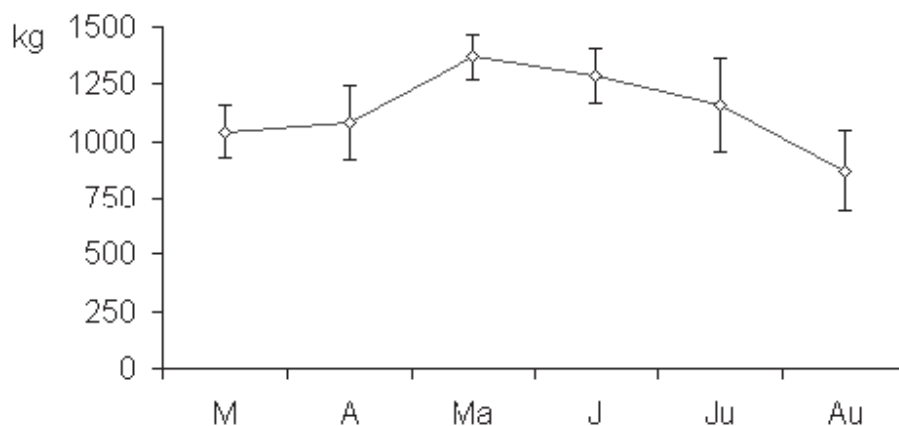


Figure 6b. Mean monthly evolution (mean and standard error) of *P. elephas* landings in the Columbretes Islands (Spain) in the period 1990–2002.

6. Related documents

- Rapport préliminaire des campagnes de pêche expérimentale réalisées à la Galite dans le cadre du projet Tunisio-Espagnol sur la Langouste Rouge *Palinurus elephas* (2001) - A. Gaamour, H. Missaoui, A. Quetglas, O. Reñones Pérez, R. Goñi Beltrán De Garizurieta, T. Zarrouk
- Spiny lobster (*Palinurus elephas Fabricius 1787*) fishery in the western Mediterranean: A comparison of Spanish and Tunisian fisheries - Submitted to the Journal Aquatic Living Resources (May 2003) - A. Quetglas, A. Gaamour, O. Reñones, H. Missaoui, T. Zarrouk, A. Elabed, and R. Goñi.
- Rapport Final du projet: Les Pêcheries de la langouste rouge *Palinurus elephas* de la Région Nord de la Tunisie : Engin de pêche, éléments biologiques et gestion. - Gaamour Adel, Rjeibi Okbi, Bdioui Marouène, Missaoui Hechmi, Youssef Zaraa et Jaziri Sabri.

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