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ON THE CEPHALOPOD FISHERY OFF THE SOUTHWEST OF GRAN CANARIA (CANARY ISLANDS, SPAIN).

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ABSTRACT

In the Canary Islands waters there exist an artisanal fishery composed of many benthic species developed by small boats (4 to 12 m length). The target species of the fishery are the seabreams. However, among the species landed, there are substantial quantities of cephalopods, specially *Octopus vulgaris*, *Sepia officinalis* and in lesser importance *Loligo* spp.

In this paper we report fishing data of the cephalopods landed in the port of Mogán (Southwest of Gran Canaria) from 1989 to 1995. The landed catches of *Octopus vulgaris* increased continuosly from 1989 to 1994, rising from 7 to 26 mt; nevertheless, in 1995 the value fell to the level found in 1989. Fishing records of *Sepia officinalis* show a very similar pattern, increasing from 500 kg in 1989 to almost 2000 kg in 1994 though falling down 1995 to the level obtained in 1989. The catches on *Loligo* spp. decreased continuosly from 1989 to nowadays.

In this paper we also describe the fishing methods and the seasonal variations of the catch records and fishing effort in relation to years and market strategies.

KEY WORDS: cephalopods, artisanal fishery, Gran Canaria.

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INTRODUCTION.

In the Canary Islands there are not landing statistics that could reflect the evolution of the artisanal fishery developed on the insular shelves. Due to the complex morphology of the coasts of these islands, the artisanal fleet lands the catches in a great variety of ports and beaches. This makes very difficult to obtain the total catch data in all the archipelago. However, in some ports, and due to the commercial network, there are catch data bases about a decade old.

The artisanal cephalopods fishery in the Canary Islands is based on two species: *Octopus vulgaris* and *Sepia officinalis*. There are also seasonal fisheries on pelagic species like *Loligo* spp. in the winter, and *Ommastrephes bartramii* and *Sthenoteuthis pteropus* in the summer, being the catch figures anecdotical. *O. vulgaris* is also the target species of the industrial fishery developed on the African shelf (García-Cabrera 1968, Guerra & Pérez-Gándaras 1983, Hernández & Bas 1993) with a volume of catches that has surpassed 200.000 mt in some years (Guerra & Pérez-Gándaras 1983, Bravo de Laguna 1985, FAO 1988, FAO 1991).

Octopus vulgaris and *Sepia officinalis* are caught in the Canary Islands with fish traps directed to demersal fishes, i.e. there are not specific gears to catch these species of cephalopods. Thus, the seasonal variations of the landing figures are not only conditioned by the biological cycle of the species, but by the fishing gear used at each moment. This last aspect is specially relevant when the fishery on demersal species becomes postponed to a second order, favouring the tuna fishery developed by the same fleet (Bas et al. 1995). On the other hand, the pelagic species are caught by hand-jigging, which is considered of little importance and largely unknown. Catches are not recorded in the landing statistics, unknowing the actual level of exploitation. However, Hernández-García (1995) suspects that the productive potential of these species, specially the ommastrephids, could be of great economical importance.

METHODS.

In order to evaluate the actual level of exploitation of the cephalopod species in the Canary Islands, we have used the port of Mogán as the main basis of the study. This port is considered representative of the fishing activity developed in Gran Canaria, and together with the port of Arguineguín, represent over the 80% of the catch landed by the artisanal fleet in the Island. Mogán is located at the Southwest of Gran Canaria, being one of the most important fishing ports of the archipelago in fishing power and level of catches landed. However, the election of this fishing port is not only due to these characteristics, but also because the whole catches obtained during the last decade have been recorded by a trade merchant. This has permitted to make the landing statistics for this port. The fishing data from 1980 to 1988 have been obtained from the literature (González et al. 1991) but there is a lack of information about catches of *Sepia officinalis* and *Loligo* spp and of fishing days by month and year.

We have been able to obtain the catch data (in kg) by species and day from 1989 to 1995. We have also obtained the number of boats and the fishing days of each one by month and year, divided in the fishery of benthic species and in the tuna fishery.

A monthly estimation of the CPUE from 1989 to 1995 was calculated from the total weight in kilograms of cephalopods caught per month (Cm), using as effort unit the number of

fishing days of the benthic fishery exerted by the whole fleet each month (Fd), according to the following equation: CPUE= Cm/Fd

CPUE was estimated per each cephalopod species and also for tuna (using as unit of effort the fishing days dedicated to fishing tuna), in order to check how the changes in the fishing strategy could affect the estimations in the CPUE of the cephalopod fisheries.

RESULTS.

1. Description of the fishery.

The cephalopods fishery in the Canary Islands can be divided into two sub-fisheries. The first one is based on *Octopus vulgaris* and *Sepia officinalis* while the second one, that is seasonal, is directed towards pelagic species, specially *Loligo* spp. in the winter, and *Sthenoteuthis pteropus* and *Ommastrephes bartramii* in the summer. The first one is the most important as shown by the catch figures, and is developed along the whole year.

The artisanal fishing fleet based in the port of Mogán is composed by 25 wooden boats ranging in length from 3 to 14 meters. These boats catch demersal fishes most of the year using traps, line or longline (15 boats). A great part of these boats (23 boats) give up this fishing to fish tuna in the summer and fall (Bas et al. 1995). The crew of this artisanal fleet was composed by 94 men in December 1994 (González et al. 1991).

Octopus vulgaris and *Sepia officinalis* are caught with fish traps. These traps are made of iron, are circular shaped and covered with metalic mesh. There are two types of traps: the small ones used for fishing in the littoral (mainly directed to *Mullus surmuletus*, *Sparisoma cretense*, middle-sized sparids and many other fish species (almost one hundred)), and the big traps with bigger mesh size and used for fishing in deep waters (big-sized sparids, *Conger conger*, *Muraena* spp. and *Seriola* spp.) (González et al. 1991). These gears are used the whole year, although during the tuna season the number of boats dedicated to fish with traps is very low (2 to 4 boats).

On the other hand, *Loligo* spp., *Sthenoteuthis pteropus* and *Ommastrephes bartramii* are caught by hand-jig, being this type of fishing generally carried out by small boats (4-7 m) manned by two-three fishermen. The length of the fishing season varies according to the species and the meteorological conditions. The fishing of *Loligo* spp. is generally carried out in November and December, while that *S. pteropus* and *O. bartramii* are fished between July to September. These species are always caught during night luring squids with light. During the full moon there are not fishing activity on these species.

2. Catches evolution from 1980 to 1995.

Table 1 shows the evolution of catches of *Octopus vulgaris* from 1980 to 1995, and of *Sepia officinalis* and *Loligo* spp. from 1989 to 1995. The catch records of *O. vulgaris* and *S. officinalis* illustrate a progressive increase in landed records from 1989 to 1994. The catches of octopus rise from 7 to 26 mt in this period, although the CPUE slightly decreased in 1993 (table 2). In 1995 the catch fell to the level of 1989 though the CPUE was lower. The CPUE of cuttlefish suffer a similar evolution than for the octopus (table 3), although it declined in 1992, recovered in 1994 and decreased in 1995 to a level lower than the one recorded in 1989.

The catches of *Loligo* spp decreased progressively from 1989 to 1995; however, this

fishing records are not reliable because most of catches are consumed fresh by the fishermen. On the other hand, there are not fishing records of ommastrephids, although we believe that the exploitation level is higher than in loliginids.

3. Monthly evolution of catches.

The values of octopus catches show two peaks of maximal catch, the first one is found between April and May, and the second is observed from September to November. The lower catch number is focused in July and August and it is coincidental with the maximum of tuna catches.

The fishing effort exerted by the fleet (table 1), measured in fishing days, increased gradually from 1989 to 1995 with the mean number of fishing days per month ranging from 219 in 1992 to 317 in 1995. The number of fishing days per month of the fleet increases significantly during the tuna season, doubling and sometimes even being three times the fishing effort achived in the other periods of the year.

The CPUE of the cephalopods fishery undergoes a decline for the period of the tuna season when the greater part of the fleet is devoted to fishing tuna (tables 2,3 y 4).

DISCUSSION.

The attention paid up to nowadays to the cephalopods in the Canary Islands has been scarce; it can be considered that it has not been in agreement with its importance in the catches of the artisanal fleet. However, its economical value is over 16 times higher than tuna fish, although caught in much lower quantities. On the other hand, it would not be appropriated to undervalue its ecological role, especially when the artisanal fishery is based on benthic species (fishes and cephalopods) living on a very narrow shelf. This is specially important for the adequate management of this multispecies fishery, composed of more than a hundred species (not taking into account the pelagic ones).

We have observed two peaks of maximal catch of octopus and cuttlefish, the first one along April and May, and the second one from September to November. The lower catches are obtained in the summer and it is due to the displacement of most of the fleet to the tuna fishery.

The variations of the catch numbers along the year for the fishery of octopus are a consequence of the combination of the fishing strategy and the species life cycle. However, we tend to think that the evolution of the CPUE along the year indicates that the most important factor for the seasonal fluctuations is the life cycle of the species. In the Sahara Bank, the most important fishing grounds close to the Islands, the reproductive cycle of the octopus presents a spawning maximum in spring, generating a peak of recruitment in fall. Hatanaka (quoted in FAO, 1982) pointed out the existence of a second spawning in autumn, weaker than in the spring that generates individuals that will be part of the reproductive stock next fall. Similar results were obtained by Nigmatullin and Ostapenko (1977) and Nigmatullin and Barkovsky (1990) in the Cape Blank area. In agreement with these studies, we have found that in Mogán along June and July 1996, the catches have been composed of octopus of big size and weight (800-2500 g), and we have obtained spent specimens. The decline of the CPUE in the summer, despite that fishing effort for these species is reduced, indicates a lower abundance of octopus in the fishing area along this period, probably as a result of the withdrawal of the population to deeper areas

(Mangold, 1983).

The fishing strategy developed each year season affects cuttlefish in the same way as octopus. However, this species has a different ecology and behaviour. Although it is of benthic habits like octopus, it spawns in shallow waters never deeper than 30-40 m (Boletzky, 1983). The concentration of individuals for spawning would probably give local and high catches of this species. Octopus, though also spawning in shallow waters presents a wider interval of depth than cuttlefish, reaching 100 m depth (Mangold, 1983). Whatever the case, the narrow shelves of the islands produce the concentration of these species in very small areas during spawning and fishermen take advantage of this behaviour.

As table 1 illustrates, there was a gradual increase in the catches of *Octopus vulgaris* from 1985 to 1994 (from 4 to 26 mt). In 1995 the catch dropped to the level of 1989, although with a lower CPUE. Catches of cuttlefish evolved in a similar way than octopus. It is of great concern to find a decline of the CPUEs in 1995, despite that fishing effort was similar to previous years. This result, if the unit of effort used is approximately correct, implies a dramatic decline in the abundance of the octopus and cuttlefish populations. Nonetheless, the catch of 1982 is similar to that of 1994, and after this first catch maximum the records declined up to 2/3 of the catch, remaining at lower values during the following years. Even knowing that these species, and specially octopus, respond well to the fishing pressure (C. Bas comm. pers.), the sudden decline in abundance could imply that we have reach a dangerous level of overfishing, not only for the cephalopods species but for all the benthic species, specially fishes, targets of the artisanal fishery. Based on the analysed data we can not reject the idea that the evolution of catches could point out to a cyclic variation in the abundance of octopus. The lack of fishing effort data previous to 1989 does not permit to reach final conclusions about the real behaviour of this fishery. We need to check these results with the catch of 1996, and to analyse the evolution of the catches of demersal fishes from 1989 to 1996.

On the other hand, the pelagic fisheries on loliginids and ommastrephids are very irregular and strongly dependent on the meteorological conditions, because they are developed in open waters. The lack of reliable landing statistics impede to reach any conclusions about the level of exploitation of these species.

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Table 1. Fishing days and total catch (in kg) of cephalopods and tuna landed in the port of Mogán, Gran Canaria (1980-1995).

	Octopus	Cuttlefish	Squid	Tuna	days fishing cephalopods	days fishing tuna
1980	2181			149552		
1981	9884			188473		
1982	21472			374580		
1983	8340			133102		
1984	5217			166951		
1985	3136			413724		
1986	3541			214394		
1987	6045			730412		
1988	4936			116965		
1989	7280	527	1268	339259	1506	
1990	6945	654	164	491495	1711	1080
1991	11454	1776	461	627441	1916	919
1992	15955	988	22	1310949	1398	1235
1993	18269	1037	13	569758	2148	834
1994	26134	1958	34	585197	2282	842
1995	7364	463		1421675	1956	1867

Table 2. CPUE by month of the *Octopus vulgaris* fishery in the port of Mogán, Gran Canaria (1989-1995).

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOT. L
1989	1.51	2.23	4.45	7.99	5.20	4.70	4.87	1.72	9.75	13.47	3.71	2.25	4.:
1990	3.43	3.18	4.91	8.40	14.30	7.21	0.82	0.65	1.50	1.67	0.89	2.94	4.(
1991	2.54	3.35	5.02	4.99	6.36	2.05	1.58	3.31	8.87	13.68	7.35	9.78	5.:
1992	9.59	8.21	10.47	19.54	22.41	9.49	2.63	5.27	12.71	30.17	0.00	0.40	11.-
1993	1.49	1.50	6.64	10.80	12.60	9.15	6.52	8.65	16.10	7.25	6.31	9.53	8.:
1994	11.65	12.68	12.38	26.73	23.79	11.10	5.20	6.67	5.83	5.62	3.38	2.00	11.-
1995	1.98	1.65	4.05	9.91	9.94	5.07	2.03	2.02	1.36	1.35	2.10	1.54	3.'

Table 3. CPUE by month of the *Sepia officinalis* fishery in the port of Mogán, Gran Canaria (1989-1995).

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1989	0.14	0.17	0.26	1.09	0.41	0.71	0.44	0.00	0.03	0.15	0.63	0.29	0.35
1990	0.88	0.19	0.38	0.69	0.69	0.49	0.00	0.00	0.00	0.01	0.10	0.61	0.38
1991	1.38	1.14	1.43	1.51	1.09	0.86	0.47	0.37	0.00	0.19	0.58	0.73	0.92
1992	0.64	1.48	1.50	1.72	0.78	1.22	0.44	0.04	0.00	0.00	0.00	0.00	0.71
1993	0.51	0.17	0.82	1.47	0.76	0.52	0.03	0.00	0.00	0.00	0.21	0.52	0.48
1994	1.54	1.15	0.83	0.98	1.50	2.16	0.49	0.11	0.11	0.06	0.24	0.28	0.86
1995	0.26	0.18	0.27	0.53	0.66	0.18	0.00	0.04	0.00	0.00	0.00	0.06	0.24

Table 4. CPUE by month of the tuna fishery in the port of Mogán, Gran Canaria (1990-1995).

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1990				408.5	502.2	585.5	328.3	526.6	320.1	390.1	331.3	402.5	455.1
1991	318.2					581.7	647.9	606.6	908.4	737.8	405.6	1388.3	682.7
1992		939.1	838.8	693.6	1339.7	2457.0	834.6	1029.7	1713.9	1075.8	886.8		1061.5
1993	1033.3						513.4	682.9	734.6	672.2	421.5	528.3	683.2
1994	280.1					429.3	775.8	653.7	896.7	805.1	657.2	711.8	695.0
1995	922.1	1257.0	205.7			688.5	763.5	789.5	975.7	668.9	614.3	526.6	761.5