

FERTILITY, GONAD-SOMATIC INDEX AND CATCHES OF EGGS AND LARVAE OF XIPHIAS GLADIUS L. 1758 IN THE SOUTHERN TYRRHENIAN SEA

*G. Cavallaro, A. Potoschi, A. Cefaili**Dept. of Animal Biology and Marine Ecology, Univ. of Messina, C. da Sperone, 31, Messina, Italy*

SUMMARY

This study, started in 1984 and financed by the Italian Ministry of Merchant Marine, reports the results concerning the count of the mature floating eggs of a female of *X. gladius* ready to spawn.

A gonad-somatic index has also been estimated for all the age classes of this species.

Several eggs and larvae fisheries have been carried out in the Southern Tyrrhenian Sea in order to verify the presence of adult males and females and to follow the phases of breeding. Seventy-three eggs and 38 larvae were sampled in three years.

RESUME

Cette étude, commencée en 1984, et également financée par le Ministère italien de la Marine marchande, fait état des résultats du comptage des oeufs flottants matures d'une femelle de *Xiphias gladius* sur le point de pondre.

Un indice gonado-somatique a également été estimé pour toutes les classes d'âge de l'espèce.

Plusieurs pêches d'oeufs et de larves ont été effectuées dans la partie sud de la Mer Tyrrhénienne pour vérifier la présence de mâles et de femelles adultes et pour suivre les phases de la reproduction. Depuis 3 ans, 73 oeufs et 38 larves ont été échantillonnées.

RESUMEN

Este estudio, financiado por el Ministerio de la Marina Mercante de Italia, se inició en 1984, presenta los resultados del recuento de los huevos flotantes maduros de un *X. gladius* hembra en estado de puesta.

Se estima el índice gonado-somático de todas las clases de edad de esta especie.

Se obtuvieron huevos y larvas en el sur del mar Tirreno con el fin de comprobar la presencia de machos y hembras adultos y observar las etapas de reproducción. En el curso de tres años se han muestreado 73 huevos y 38 larvas.

INTRODUCTION

In different times and for different reasons, the swordfish in the Mediterranean Sea has been studied by many scientists, such as: Sanzo (1909, 1910, 1922, 1930), Sella (1911), Scordia (1933, 1939a, 1939b), Padoa (1956), Cavaliere (1966), Yasuda et al. (1978), Harada et al. (1980), De Metrio et al. (1984, 1987), Megalofonou et al. (1985, 1987), Di Natale et al. (1988), De Metrio et al. (1988), Cavallaro et al. (1988, 1990), Marano et al. (1988).

MATERIALS AND METHODS

This research has started six years ago and it will still continue in the geographical area near the Italian Ionian Sea.

A 27 m. Lft. R/V was used for the ittioplancton fisheries.

The adult specimens of swordfish were collected during a harpoon fishery in the Strait of Messina.

Each individual was sampled referring to its sex, its age and the following parameters: LJFL in cm.; D in kg.; G in KG.

The age of the swordfish was estimated by using transversal sections of spine radius II of the first dorsal fin and by comparing it with the last caudal vertebrae.

The sex was determined either macroscopically during breeding or microscopically during the intergenetic phase.

Eggs and larvae were collected by a Ori-net having the following features: maximum width = 1.60 m.; length = 7.00 m. mesh size = 500 μ .

Eggs and larvae classification was determined according to their size, to their number of myomeres and to their chromatophores spread on the body, as described in details by Sanzo, Sella and other authors already cited.

RESULTS

FERTILITY

A female of swordfish (LJFL = 192 cm. and D = 130 Kg.) having mature floating eggs was collected on July 5th 1985. A cut in its abdominal region showed that the gonads had different sizes: 10.3 Kg. and 5.4 Kg.

After having cut the connective involucre, the eggs were poured into a vessel containing sea water. Their weight was 10.46 Kg.

The count showed that 440,000 eggs weighed 1 Kg., thus the total was 1,602,000 mature floating eggs. In the remaining part of the gonad (5.24 Kg.) were oocytes at various growth stages and a slight non-valuable number of mature eggs.

GONAD-SOMATIC INDEX (GSI)

The estimation of the GSI of the species started on 1985, during the breeding period.

The females' GSI values, which go from 10 to 17.5, are those of the spawning phase (Tab. 2).

The males' GSI values go from 1 to 1.7 (Tab.1).

According to these values it can be stated that, in the Southern Tyrrhenian Sea, during these years of research, the spawning period had a peak in the months of June and July.

This, however, couldn't exclude the presence of individuals which breed in different periods.

The sex ratio provided different data concerning various age classes. Table 3 reports the percentage values of 371 specimens.

EGGS AND LARVAE

Every year, from 1986 to 1988, during the breeding period, we organized several fisheries to catch eggs and larvae, collected by a plancton net.

Fisheries were limited to that geographical area where it was known the presence of couples of swordfish.

Thus, respecting the information on the breeding period, the sampling started in June and continued till August.

Fig.1 reports the fishery area, the sampling points and the dates when the eggs or the larvae of *X. gladius* were caught.

Every year, the maximum frequency of catches, both of eggs and larvae, was in July from 10th to 30th.

This datum is perfectly related to the presence of adult males and females of swordfish and to the stratified variations in water temperatures, a typical feature of summer waters in the Southern Tyrrhenian Sea.

On June 8th 1986, the collection of some larvae at five days of life showed that, in that area, breeding started nearly at the end of May.

Every year, the maximum frequency of catches, both of eggs and larvae (the plancton fisheries, carried out at the end of August, were unsuccessful); in fact, at that time, neither eggs nor larvae were collected.

This confirmed the end of the breeding period.

Thus, it can be supposed that in our area of research, breeding takes place nearly within 100 days.

Our results also confirmed that the Northern and Southern areas of the Eolian Isles and of the Strait of Messina are good breeding areas for swordfishes.

Table 3 reports the data concerning the collections of eggs and larvae of X. gladius.

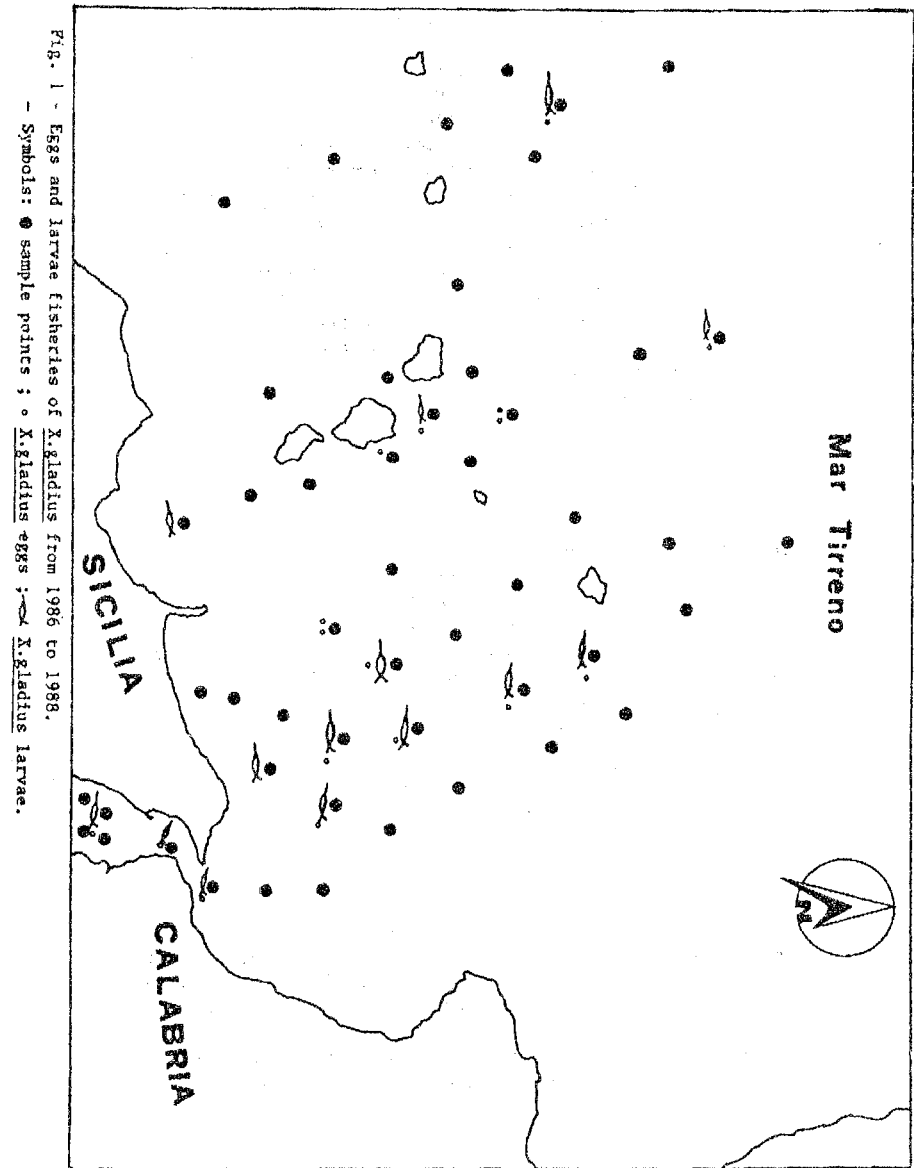


TABLE 1

Variation in the males gonad-somatic index					
Age	month	med.	min.	max.	n'
1	5	0.179	0.178	0.180	2
1	6	0.392	0.262	0.603	7
1	7	0.377	0.225	0.800	12
1	8	0.597	0.281	1.259	4
2	5	0.555	0.198	0.930	6
2	6	0.417	0.121	1.690	33
2	7	0.368	0.130	0.702	14
2	8	0.366	0.129	0.631	8
3	5	0.289	0.160	0.543	9
3	6	0.395	0.159	0.630	16
3	7	0.575	0.176	1.143	16
3	8	0.404	0.109	0.741	8
4	5	0.299	0.211	0.395	5
4	6	0.697	0.173	1.481	11
4	7	0.395	0.192	0.667	9
4	8	0.404	0.223	0.515	7
5	6	0.505	0.332	0.706	4
6	7	0.457	0.333	0.772	6
6	8	0.201	0.195	0.208	2
7	6	1.485	-	-	1
7	7	1.717	-	-	1
8	8	0.288	0.204	0.354	4

TABLE 2

Variation in the females gonad-somatic index					
Age	month	med.	min.	max.	n'
1	6	1.024	0.418	1.630	2
1	7	0.367	-	-	1
1	8	0.154	-	-	1
2	5	0.569	0.133	1.356	3
2	6	1.934	0.448	3.421	2
2	7	0.876	0.212	2.317	4
2	8	0.341	0.342	5.000	2
3	5	1.488	-	-	1
3	6	4.147	0.455	13.846	6
3	7	4.632	0.435	22.917	14
3	8	2.187	0.457	5.102	8
4	4	1.599	1.060	2.137	2
4	5	1.191	0.786	1.594	3
4	6	3.488	1.257	9.042	15
4	7	5.494	1.250	28.750	26
4	8	2.400	1.250	4.878	9
5	4	1.572	1.439	1.705	2
5	5	2.339	0.580	3.902	5
5	6	4.720	1.227	10.304	16
5	7	3.673	0.976	16.286	17
5	8	3.582	1.037	9.836	10
6	4	2.674	-	-	1
6	5	1.556	1.360	1.753	2
6	6	3.582	0.976	6.322	7
6	7	4.879	1.053	19.012	12
6	8	2.059	1.484	2.634	2
6	9	1.879	-	-	1
7	7	1.280	1.057	1.527	4

TABLE 3

Percentage values of sex-ratio in age classes			
Age-years	n'	females	males
1	12	16,67	83,33
2	83	13,25	86,75
3	100	41,12	58,88
4	89	66,29	33,71
5	56	89,29	10,71
6	24	87,51	12,49
7	6	66,67	33,33
8	1	-----	100,00

TABLE 4

Date	fisheries	n'	depth m.	eggs n.	larvae n.
08.06.86	3		6	2	3
23.06.86	4		3	1	2
04.07.86	3		4	4	1
12.07.86	4		5	5	2
15.07.86	3		6	7	3
29.07.86	4		3	5	1
15.07.87	2		4	4	2
17.07.87	4		8	3	1
20.07.87	2		5	6	2
21.07.87	1		8	8	3
23.07.87	3		7	4	1
10.07.88	1		4	4	2
17.07.88	2		6	2	3
20.07.88	2		9	4	3
21.07.88	2		4	4	3
24.07.88	3		5	2	2
25.07.88	3		13	2	-
26.07.88	2		10	2	1
27.07.88	2		4	4	3

BIBLIOGRAPHY

CAVALIERE A. 1966. Studi sulla biologia e pesca di Xiphias gladius L. Nota IV. Boll. Pesca Piscic. Idrobiol. 21 n.s.; 299-303.

CAVALLARO G., A. CEFALI, M.F. FARANDA, A. POTOSCHI, S. SOTIRIADIS. 1988. Rilevazioni e studi biologici per la valutazione dello stock di pesc spada (Xiphias gladius L. 1758) nei mari meridionali italiani. Atti Seminari delle U.O. responsabili dei progetti di ricerca promossi nell'ambito dello schema preliminare di piano per la pesca e l'acquacoltura. Vol.I; 259-270

DE METRIO G., A. TURSI, G. PETROSINO, A. MATARRESE. 1984. Catture di giovani esemplari di pesce-spada (Xiphias gladius L.) nelle acque dello Ionio. Nova Thalassia. 6; 511-516.

DE METRIO G., P. MEGALOFONO. 1987. Catch, size distribution, growth and sex ratio swordfish (Xiphias gladius L.) in the Gulf of Taranto. Tec.Consul.Adriatic Sea, FAO C.G.P.M. Bari.

DI NATALE A., E. D'ORAZIO, G. LEONARDI, A. MANGANO, N. MENTO, S.PRESTIPINO GIARRITTA, M.C.SCUDERI, M. SARA'. 1988. Rilevazioni delle quantità pescate e dello sforzo di pesca esercitato nei confronti delle principali specie di scombroidi. Atti Seminari delle U. O. responsabili dei progetti di ricerca promossi nell'ambito dello schema preliminare di piano per la pesca e l'acquacoltura M.M.M., C.N.R. Vol I; 301-317.

MARADA T., O. MURATA, P. ARENA, F. LI GRECI, A. CAVALIERE. 1980. Artificial fertilization and hatching of the Mediterranean swordfish, Xiphias gladius. Mem.Fac.Agric.Kinki Univ. 13,25-28.

MARANO G., L. ROSITANI, N. UNGARO, V. DE ZIO. 1988. Attività di pesca con long-line nel Basso Adriatico: Grandi Scombroidi. Atti Seminari delle U.O. Responsabili dei Progetti di ricerca promossi nell'ambito dello schema preliminare di piano per la pesca e l'acquacoltura. M.M.M., C.N.R. vol.I; 191-216.

MEGALOFONO P., G. DE METRIO, T. FILANTI, G. PETROSINO. 1985. Osservazione sulle dimensioni di prima maturità sessuale di Xiphias gladius L.. Atti S.I.S. Vet..39.

- MEGALOFONOU P., G. DE METRIO, M.C. LENTI. 1987. Età e dimensioni di prima maturità sessuale del pesce-spada (Xiphias gladius L.). Atti S.I.S. Vet. Copanello, 23/25 settembre.
- PADOA E. 1956. Fauna e flora del Golfo di Napoli. 38. Uova, larve di Teleostei. Scombriformes. 471-521.
- SANZO L. 1909. Uova e larve di Auxis bisus. Mon. Zool. Ital. 20; 79-80.
- SANZO L. 1910. Uovo e larva di Pesce-spada (Xiphias gladius L.). Riv. Mens. Pesca Idrobiol. 12; 206-209.
- SANZO L. 1922. Uova e larve di Xiphias gladius L. R. Com. Talassogr. Ital. Mem. 79; 1-17.
- SANZO L. 1930. Giovanissimo stadio larvale di Xiphias gladius L. di mm. 6.4. R. Com. Talassogr. Ital. Mem. 170; 1-8.
- SCORDIA C. 1933. La pesca del pescespada nello Stretto di Messina nel quinquennio 1929-1933. Boll. Ist. Zool. R. Univ. Messina. 9; 3-7.
- SCORDIA C. 1939. Contribuzioni alla conoscenza della biologia del pescespada (Xiphias gladius L.). Boll. Ist. Zool. R. Univ. Messina. 15; 1-9.
- SCORDIA C. 1939. Ulteriori osservazioni sulle fluttuazioni del prodotto della pesca del pescespada (Xiphias gladius L.). Boll. Ist. Zool. R. Univ. Messina. 19; 1-3.
- SELLA M. 1911. Contributo alla conoscenza della riproduzione e dello sviluppo del pesce-spada (Xiphias gladius L.). R. Com. Talassogr. Ital. Mem. 2; 1-16.
- YASUDA F., H. KOHNO, A. YATSU, H. IDA, P. ARENA, F. LI GRECI, Y. TAKI. 1978. Embryonic and early larval stages of the swordfish, Xiphias gladius, from the Mediterranean. J. Tokyo Univ. Fish. 65; 91-97.