

## SWORDFISH (*XIPHIAS GLADIUS* L.) DRIFTNET FISHERY IN THE TYRRHENIAN SEA: 1992 REPORT

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### SUMMARY

The swordfish driftnet fishery in the Tyrrhenian Sea has been continuously monitored by our Institute in the last 10 years, usually with the purpose to provide reliable catch and effort data to the Italian Government.

CPUE and CPU values have been collected from several sampling harbours, as well as swordfish length and weight (GGW) frequencies. Mean values were particularly important in 1992, because this was the first regular fishing season, after two years of problems in this sector.

CPUE and CPU values are considerably higher than in the previous two years and, at the same time, mean weight and length show a clear increase.

### RESUME

La pêche à l'espadon à l'aide de filets dérivants dans la mer Tyrrhénienne est suivie en permanence par notre institut depuis dix ans, généralement pour fournir au gouvernement italien des données fiables de capture et d'effort.

Des valeurs CPUE et CPU ont été recueillies dans plusieurs ports d'échantillonnage, ainsi que les fréquences longueur et poids (GGW) de l'espadon. Les valeurs moyennes ont été particulièrement importantes en 1992 car il s'agissait de la première saison de pêche régulière après deux années difficiles dans ce secteur.

Les valeurs CPUE et CPU sont beaucoup plus élevées que celles des années précédentes et la longueur et le poids moyens ont également légèrement augmenté.

### RESUMEN

La pesquería de pez espada con redes de enmalle a la deriva en el Mar Tirreno ha sido supervisada de forma continua por nuestro Instituto en el curso de los últimos diez años, al objeto de facilitar datos fiables de captura y esfuerzo al Gobierno de Italia.

Se han recogido valores de CPUE y CPU de varios puertos muestreados, así como frecuencias de tallas y pesos (GGW) de pez espada. Los valores medios fueron particularmente importantes en 1992, ya que fue la primera temporada regular de pesca tras dos años durante los cuales se habían producido problemas en el sector.

Los valores de CPUE y CPU son mucho más altos que en los dos años previos y, al propio tiempo, el peso y la talla media presentan un claro incremento.

### INTRODUCTION

Italian swordfish driftnet fishery is still one of the most important in the Mediterranean, both for the number of boats (over 600) and the total amount of catches, as previously reported (Di Natale, 1991a; Di Natale *et al.*, 1992, 1993a, 1993b, 1994).

This particular activity has been strongly troubled in the previous four years, due to the impact on non-target and sensible species and to several changes in the Italian and EU regulation (Di Natale, 1991b; Di Natale *et al.*, 1992; Di Natale & Notarbartolo di Sciara, in press, Northridge *et al.*, 1991). These facts clearly altered the yearly driftnet production in the previous years and only in 1992 the fishing season could be considered as a regular one.

Driftnet fishing has been permitted again after a sentence by the Regional Administrative Tribunal of Lazio (March 6, 1992) and the enforcement of the EEC regulation (June 1, 1992), permitting a maximum length of 2.5 km of net per boat, but it seems that the regulation is not totally enforced, because the fishermen believe such length limitation as a non-economical measure.

## METHODS

The most important source of data has been a landing control programme, carried out by our Institute with a grant funded by the Ministry of Merchant Marine (now Ministry of Agriculture, Alimentary and Forestry Resources), from November 1990 to January 1993 in the Tyrrhenian Sea and in the Strait of Sicily.

Landings were sampled twice a week in 3 ports (2 in the Southern Tyrrhenian Sea and 1 in the Central Tyrrhenian Sea, plus some additional size data collection in one additional harbour), during the whole 1992 fishing seasons, on regular basis. The Northern Tyrrhenian Sea is not included in the sample, because the driftnet fishing is marginal and occasional in that area.

Landing catch data have been integrated using correction parameters from the observation on board carried out in the previous two years.

CPUE parameters are the following: C = swordfish catches in kg (GGW); U = single vessel; E = 1 km net length used at sea.

Lower jaw fork length (LJFL) and gilled and gutted weight (GGW) have been used for size frequency analysis, without any separation per sex, because the swordfish is usually gutted before landing.

A total number of 159 days were directly monitored and 1992 landings were personally checked by our staff.

### CPUE AND CPU

Daily CPUE tables have been edited in detail for fishery management uses by the Ministry (Di Natale *et al.*, 1993a), but only monthly mean values are here reported (tab. 1), both for space problems and practical reasons.

Swordfish CPUE values (as GGW) are extremely variable, depending on environmental factors, availability and abundance of the species, interference by other vessels and capacity of the fisherman, showing values from a minimum of 0 (S. Agata Militello, April 25, 1992) up to a maximum of 39.862 (Ponza, July 9, 1992).

1992 CPUE values are higher in the Central Tyrrhenian Sea (20.394) than those in the Southern Tyrrhenian Sea (11.134), due to the bad weather conditions in that late area and the consequent reduced number of fishing days. Mean daily CPUE value in 1992 was 14.075 (table 1). The total number of landings in sample was 1992.

As usual, the highest mean CPUE values (calculated over a monthly base) have been recorded in June (17.437) and July (17.955), with a maximum in the Central Tyrrhenian Sea in July (23.508). The lowest mean CPUE value was in April (1.793).

Also daily swordfish CPU values reflect the same situation, with a minimum of 0 (S. Agata Militello, April 25, 1992) up to a maximum of 329.109 (Ponza, July 9, 1992).

The highest CPU value (204.789 calculated on a monthly base) has been recorded in the Central Tyrrhenian Sea in July, while the lowest value was in the Southern Tyrrhenian Sea in April (21.142).

These CPUE and CPU values are quite higher than the values reported in the previous year in the same area (Di Natale *et al.*, 1993, 1994).

Table 1 - Mean daily swordfish CPUE (kg/km) and CPU values in large mesh driftnet fisheries in 1992. Data were collected at landings in several Italian sampling ports.

Sampling port: PONZA (Central Tyrrhenian Sea)							
	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	TOTAL 1992
CPUE		8,509	22,149	23,508	8,756	6,536	20,394
CPU		70,627	194,932	204,789	77,385	53,550	177,432

Sampling port: LIPARI (Southern Tyrrhenian Sea)							
	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	TOTAL 1992
CPUE		5,801	15,238	11,666	4,979		11,983
CPU		56,736	149,024	113,281	48,700		116,703

Sampling port: S. AGATA MILITELLO (Southern Tyrrhenian Sea)							
	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	TOTAL 1992
CPUE	1,793	4,961	13,038	10,195	2,886		9,206
CPU	21,142	68,559	168,826	130,998	39,170		120,457

TYRRHENIAN SEA							
	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	TOTAL 1992
CPUE	1,793	6,504	17,437	17,955	5,920	6,536	14,075
CPU	21,142	69,063	170,860	144,918	57,859	53,550	139,281

TAB.2 - LENGTH FREQUENCY (LJFL) OF SWORDFISH ( <i>Xiphias gladius</i> )						
DRIFTNET CATCHES IN THE TYRRHENIAN SEA IN 1992						
ICCAT CODES: Area BIL 95; Species SWO; Gear GILL						
LENGTH CLASSES	SOUTHERN TYRRHENIAN SEA		CENTRAL TYRRHENIAN SEA		TOTAL TYRRHENIAN SEA	
	no	%	no	%	no	%
44-44,9	0	0,00	0	0,00	0	0,00
45-49,9	0	0,00	0	0,00	0	0,00
50-54,9	0	0,00	0	0,00	0	0,00
55-59,9	0	0,00	0	0,00	0	0,00
60-64,9	0	0,00	0	0,00	0	0,00
65-69,9	0	0,00	0	0,00	0	0,00
70-74,9	0	0,00	2	0,09	2	0,05
75-79,9	0	0,00	3	0,13	3	0,08
80-84,9	0	0,00	2	0,09	2	0,05
85-89,9	2	0,13	7	0,30	9	0,23
90-94,9	10	0,64	14	0,60	24	0,61
95-99,9	10	0,64	7	0,30	17	0,43
100-104,9	27	1,72	23	0,98	50	1,28
105-109,9	35	2,22	150	6,42	185	4,73
110-114,9	115	7,31	279	11,94	394	10,08
115-119,9	118	7,50	350	14,98	468	11,97
120-124,9	180	11,44	355	15,20	535	13,68
125-129,9	154	9,78	214	9,16	368	9,41
130-134,9	167	10,61	228	9,76	395	10,10
135-139,9	123	7,81	68	2,91	191	4,88
140-144,9	129	8,20	100	4,28	229	5,86
145-149,9	73	4,64	94	4,02	167	4,27
150-154,9	89	5,65	125	5,35	214	5,47
155-159,9	55	3,49	90	3,85	145	3,71
160-164,9	77	4,89	63	2,70	140	3,58
165-169,9	52	3,30	20	0,86	72	1,84
170-174,9	50	3,18	24	1,03	74	1,89
175-179,9	33	2,10	31	1,33	64	1,64
180-184,9	31	1,97	28	1,20	59	1,51
185-189,9	12	0,76	18	0,77	30	0,77
190-194,9	13	0,83	13	0,56	26	0,66
195-199,9	7	0,44	17	0,73	24	0,61
200-204,9	6	0,38	3	0,13	9	0,23
205-209,9	1	0,06	2	0,09	3	0,08
210-214,9	2	0,13	1	0,04	3	0,08
215-219,9	0	0,00	1	0,04	1	0,03
220-224,9	2	0,13	0	0,00	2	0,05
225-229,9	0	0,00	2	0,09	2	0,05
230-234,9	1	0,06	1	0,04	2	0,05
235-239,9	0	0,00	1	0,04	1	0,03
240-244,9	0	0,00	0	0,00	0	0,00
245-249,9	0	0,00	0	0,00	0	0,00
no. in sample	1574	100,00	2336	100,00	3910	100,00
mean length cm	130,22		137,42		133,12	

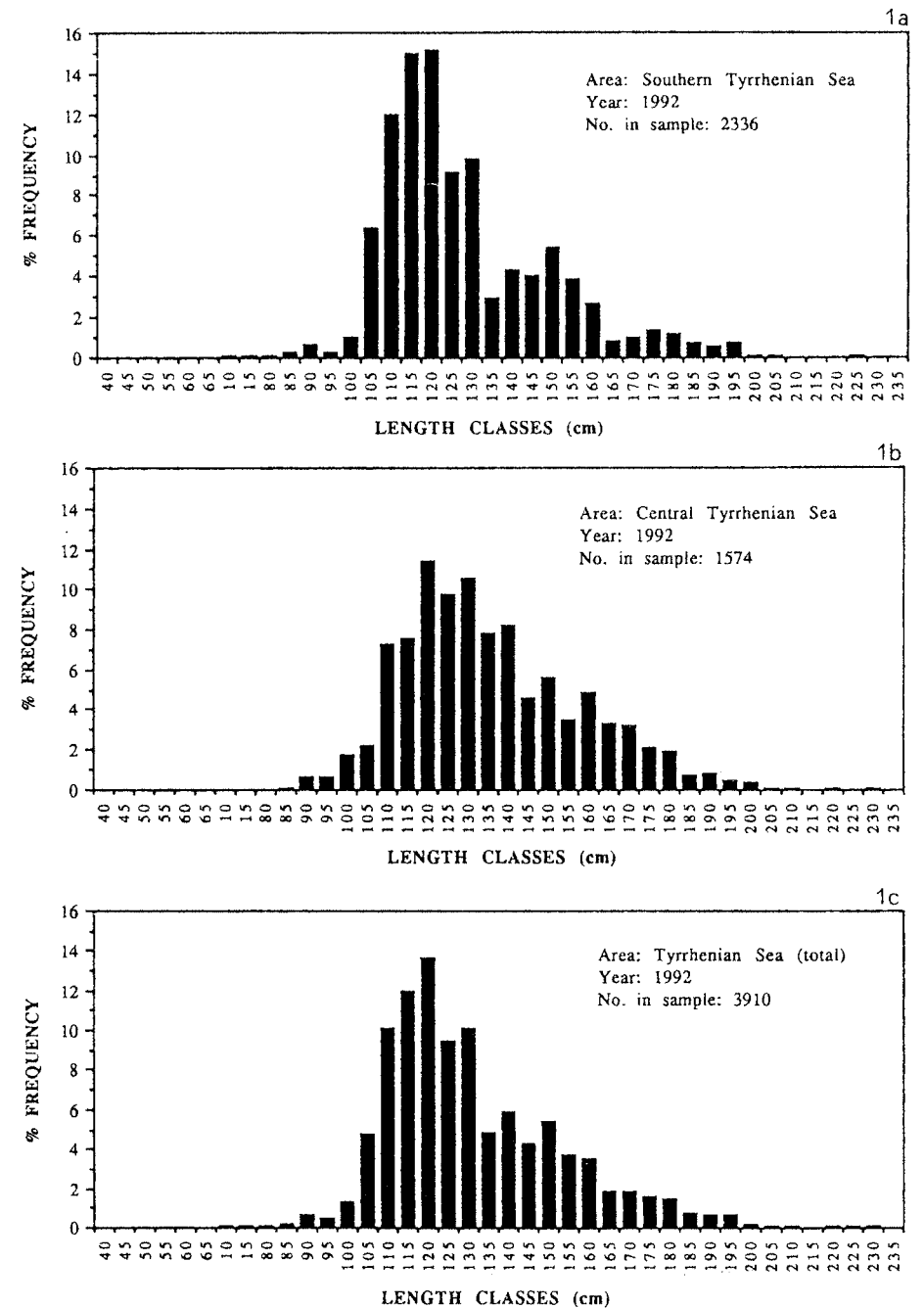


Figure 1 - Length (LJFL) frequencies distribution of Swordfish (*Xiphias gladius*, L.) caught by the Italian driftnet fleet in the Tyrrhenian Sea in 1992.  
1a: Southern Tyrrhenian Sea; 1b: Central Tyrrhenian Sea; 1c: Tyrrhenian Sea (total).

## LENGTH FREQUENCY

Following the method established since 1985, swordfish (*Xiphias gladius* L.) length samplings have been carried out in the Southern Tyrrhenian Sea, in order to allow a yearly length-frequency analysis of the stock, separated per gear used.

In 1992 a total number of 3,910 swordfishes were measured at landings in the harbours of Milazzo, Lipari and S. Agata Militello (Southern Tyrrhenian Sea) and Ponza (Central Tyrrhenian Sea).

1992's length frequency (LJFL) distribution is shown in figure 1 and detailed on table 2. Peaks occurs at 120 cm in the Southern Tyrrhenian Sea and in the Central Tyrrhenian Sea. Of course, the mode is on the length class 120-124,9 cm in the Tyrrhenian Sea, following the same pattern of the previous two years.

Weighted mean length was 133,12 cm in 1992, with a mean value of 130,22 in the Central Tyrrhenian Sea and 137,42 cm in the Southern Tyrrhenian Sea. These data show a clear occurrence of bigger specimens in that area than in the past, mainly due to a broad fishing season but, also, to the increase of large swordfish in the fishing area.

The higher mean length value become particularly evident plotting all the mean values of the last eight years (1985-1992) for the Southern Tyrrhenian Sea (fig. 3), where the 1992's value is higher than the highest previous mean value (137.30 in 1986). In spite of the latest mean value, the general trend of swordfish length is still decreasing in that area, even if the situation appears certainly most agreeable after 1992.

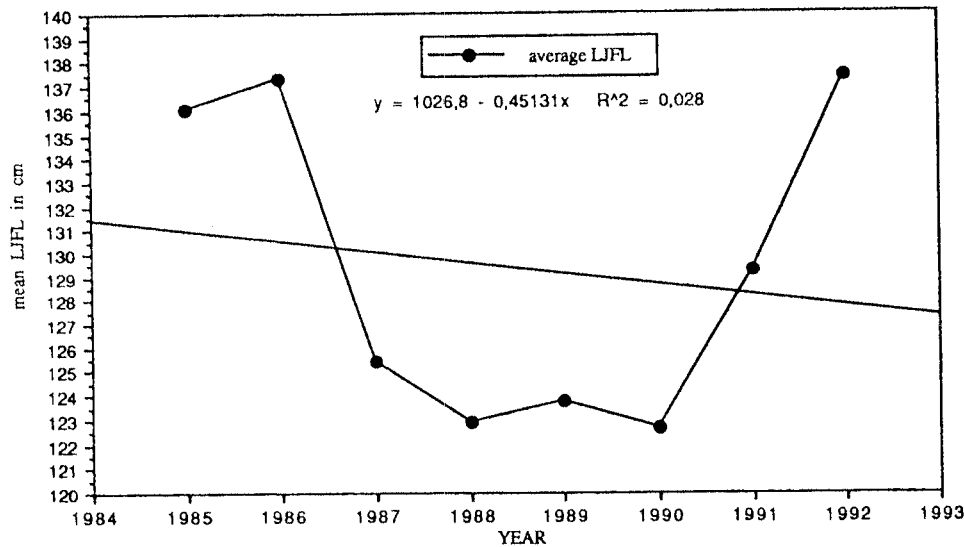


Fig. 2 - Yearly average length (LJFL) of swordfish caught by driftnets in the Southern Tyrrhenian Sea, in the period between 1985 and 1992.

TAB.3 - WEIGHT FREQUENCY (GGW) OF SWORDFISH ( <i>Xiphias gladius</i> )						
DRIFTNET CATCHES IN THE TYRRHENIAN SEA IN 1992						
ICCAT CODES: Area BIL 95; Species SWO; Gear GILL						
WEIGHT CLASSES	SOUTHERN TYRRHENIAN SEA		CENTRAL TYRRHENIAN SEA		TOTAL TYRRHENIAN SEA	
	no	%	no	%	no	%
0,1-4,9	5	0,18	3	0,12	8	0,15
5,0-9,9	21	0,75	45	1,75	66	1,23
10,0-14,9	76	2,72	184	7,16	260	4,85
15,0-19,9	542	19,43	368	14,32	910	16,98
20,0-24,9	698	25,02	403	15,69	1101	20,54
25,0-29,9	403	14,44	371	14,44	774	14,44
30,0-34,9	240	8,60	246	9,58	486	9,07
35,0-39,9	164	5,88	201	7,82	365	6,81
40,0-44,9	131	4,70	148	5,76	279	5,21
45,0-49,9	110	3,94	132	5,14	242	4,52
50,0-54,9	81	2,90	101	3,93	182	3,40
55,0-59,9	79	2,83	81	3,15	160	2,99
60,0-64,9	55	1,97	73	2,84	128	2,39
65,0-69,9	51	1,83	51	1,99	102	1,90
70,0-74,9	34	1,22	43	1,67	77	1,44
75,0-79,9	32	1,15	30	1,17	62	1,16
80,0-84,9	16	0,57	21	0,82	37	0,69
85,0-89,9	14	0,50	15	0,58	29	0,54
90,0-94,9	11	0,39	15	0,58	26	0,49
95,0-99,9	9	0,32	11	0,43	20	0,37
100-104,9	3	0,11	8	0,31	11	0,21
105-109,9	4	0,14	4	0,16	8	0,15
110-114,9	1	0,04	4	0,16	5	0,09
115-119,9	1	0,04	1	0,04	2	0,04
120-124,9	2	0,07	3	0,12	5	0,09
125-129,9	0	0,00	0	0,00	0	0,00
130-134,9	0	0,00	1	0,04	1	0,02
135-139,9	1	0,04	0	0,00	1	0,02
140-144,9	0	0,00	3	0,12	3	0,06
145-149,9	1	0,04	0	0,00	1	0,02
150-154,9	2	0,07	1	0,04	3	0,06
155-159,9	1	0,04	1	0,04	2	0,04
160-164,9	0	0,00	0	0,00	0	0,00
165-169,9	1	0,04	0	0,00	1	0,02
170-174,9	0	0,00	0	0,00	0	0,00
175-179,9	0	0,00	0	0,00	0	0,00
180-184,9	0	0,00	1	0,04	1	0,02
185-189,9	1	0,04	0	0,00	1	0,02
190-194,9	0	0,00	0	0,00	0	0,00
195-199,9	0	0,00	0	0,00	0	0,00
200-204,9	0	0,00	0	0,00	0	0,00
205-209,9	0	0,00	0	0,00	0	0,00
no in sample	2790	100,00	2569	100,00	5359	100,00
mean weight kg	31,53		34,10		32,76	

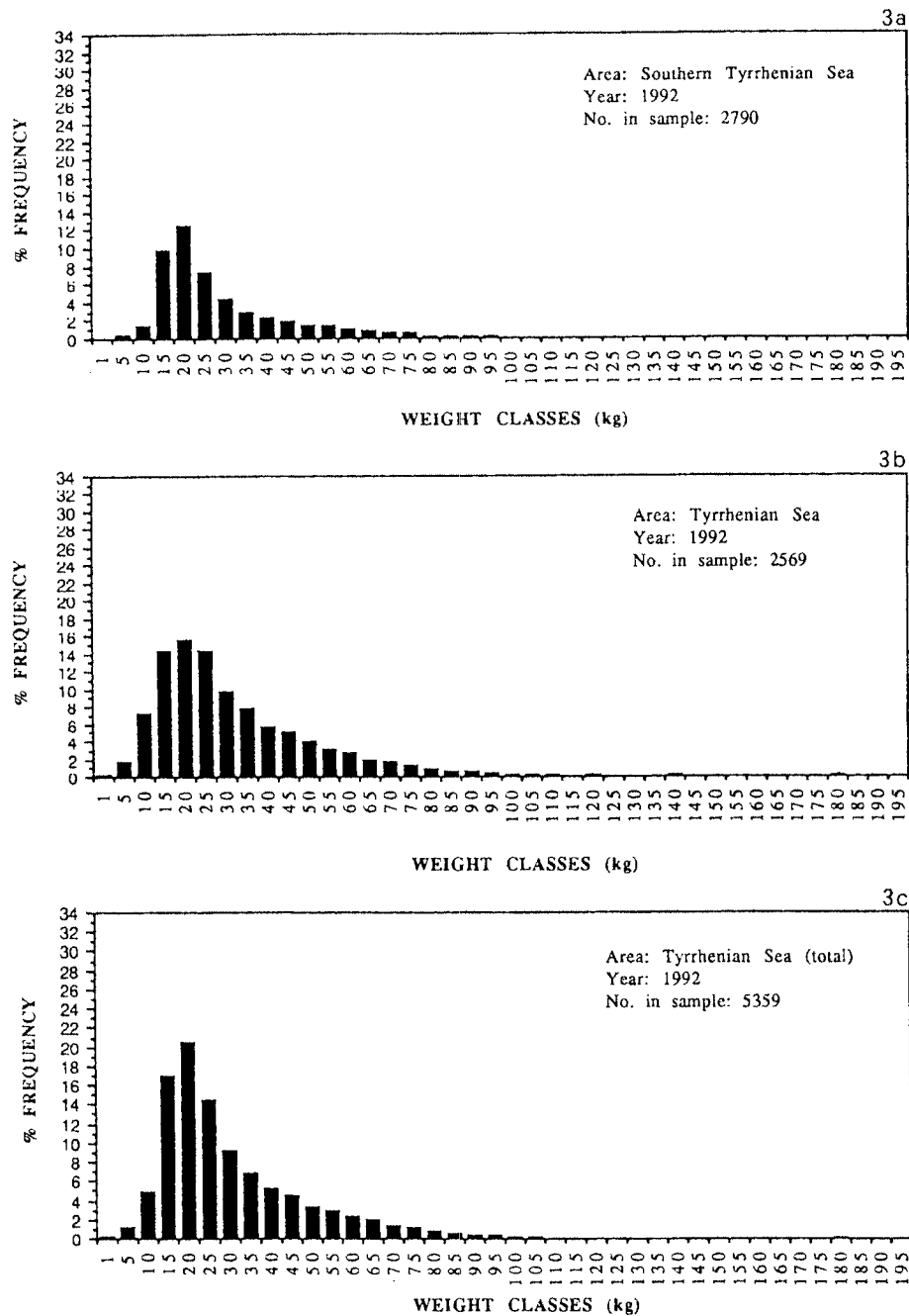


Figure 3- Weight (GGW) frequencies distribution of Swordfish (*Xiphias gladius*, L.) caught by the Italian driftnet fleet in the Tyrrhenian Sea in 1992.

3a: Southern Tyrrhenian Sea; 3b: Central Tyrrhenian Sea; 3c: Tyrrhenian Sea (total).

## WEIGHT FREQUENCY

As happened in the previous years, swordfish weight frequency analysis has been conducted on a partially-different sample (5,359 specimens) in the same harbours reported before, due to the fact that sometimes it was more easy to collect weight data instead of length measures, mostly at the landing points. Of course, there is a large overlapping between length and weight samples.

All samples are still reported as "gilled and gutted" weight (GGW) because of the commercial tradition of the local fishermen.

1992's weight frequency (GGW) distribution is shown on figure 3 and given in detail on table 3. Confirming the previous data (Di Natale *et al.*, 1993b, 1994), peaks occur at 20 kg in the Southern and Central Tyrrhenian Sea. The graphs have, more or less, the same shape of that obtained in 1991.

Weighted mean weight (GGW) was 34.1 kg in the Central Tyrrhenian Sea and 31.53 kg in the Southern Tyrrhenian Sea, with an average value of 32.76 kg in the Tyrrhenian Sea, with an increase of 5.07% on 1991's mean value and 23,48% on 1990's value.

## CONCLUSIONS

CPUE and CPU driftnet data from the Tyrrhenian Sea in the last three years apparently show a stable increasing pattern compared to 1985's and 1986's data. Even if in 1990 and 1991 the data were biased by "external" factors (strikes, bans, etc.), the increasing tendency appears stable, also because of the high reliability of the data collection, carried out with a strong effort.

The inversion of the marked decreasing trend in mean length data reported from 1985 to 1990, noted in 1991, is now confirmed by the 1992's mean length data and by a correlated increase of the mean weight values.

It appears now much more reliable that the positive effect on the swordfish population appears both partially due to 1990's and 1991's driftnets temporary bans by the Italian Government and to a reduced coastal long-lines fishing activity (which has usually a dramatic effect on a large number of juvenile swordfishes).

But, confirming the speculation supposed in the previous report (Di Natale *et al.*, 1993, 1994), it seems much more reliable that the swordfish stock has been partially implemented by a certain percentage of larger specimens, possibly migrating into the Mediterranean from the Atlantic or moving from other areas or depths, even if the first hypothesis appears more acceptable.

More studies on intra-Mediterranean movements of the swordfish population and migration from the Atlantic should be still extremely useful to understand these yearly changes, as well as a larger collection of size frequency data all around the Mediterranean basins.

Without these additional information (also correlated to genetic studies), any management of the swordfish stock appears unreliable and difficult to reach.

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