

SIZE FREQUENCY COMPOSITION OF THE MEDITERRANEAN SPEARFISH CATCHES IN THE TYRRHENIAN SEA AND IN THE STRAIT OF MESSINA IN THE PERIOD 1994-2002.

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SUMMARY

The Mediterranean spearfish is slowly increasing in its importance on the market, in parallel with the difficulties encountered by some sectors of the swordfish fishery and with the decreasing availability of the latter species on the local market. Data have been collected by Aquastudio during the landing control carried out in recent years, particularly in the coastal areas of the central and southern Tyrrhenian Sea and in the Strait of Messina, between 1994 and 2002. Trends in mean LJFL and mean RW are slightly different, possibly due to higher number of weight samples. A preliminary estimate of the Mediterranean catches is also presented.

RÉSUMÉ

Le marlin de la Méditerranée est de plus en plus important sur le marché, parallèlement aux difficultés rencontrées par certains secteurs de la pêche de l'espadon et à la disponibilité décroissante de ce dernier sur le marché local. Des données ont été collectées par Aquastudio lors du contrôle des débarquements réalisés ces dernières années, et notamment dans les régions côtières du centre et du sud de la mer Tyrrhénienne et dans le Déroit de Messine entre 1994 et 2002. Les tendances de la LJFL (longueur maxillaire inférieur-fourche) moyenne et du RW (poids brut) moyen sont légèrement différentes, possiblement en raison du nombre élevé d'échantillons mesurés en poids. Une estimation préliminaire des prises de la Méditerranée est également présentée.

RESUMEN

El Tetrapturus pfluegeri + T. belone mediterráneo está adquiriendo una importancia creciente en el mercado, y esto de forma paralela a las dificultades encontradas por algunos sectores de la pesquería de pez espada y a la disponibilidad decreciente de esta última especie en el mercado local. Aquastudio ha recopilado datos durante el control de los desembarques que se ha llevado a cabo en los últimos años, en particular en las zonas costeras del mar Tirreno central y meridional y en el Estrecho de Messina, entre 1994 y 2002. Las tendencias en la LJFL media y RW medio presentan ligeras diferencias, que probablemente se deban a un mayor número de muestras analizadas en términos de peso. También se presenta una estimación preliminar de las capturas mediterráneas.

KEYWORDS

Tetrapturus belone, Mediterranean spearfish, Mediterranean fishery

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1. INTRODUCTION

The Mediterranean spearfish, *Tetrapturus belone* Rafinesque, 1810, is the only spearfish known to have only a limited regional distribution. According to the current knowledge, this species lives only inside the Mediterranean sea (Anonymous, 1973; Bini, 1968; Nakamura, 1985; Postel, 1964; Rodriguez Roda & Howard, 1962; Tortonese, 1961, 1975), even if it was considered distributed even in the tropical Atlantic ocean till the '60s (Robins & De Sylva, 1960). Later, the specimens from the Atlantic were attributed to another species, *Tetrapturus pfluegeri* by Robins & De Sylva (1963).

Eggs were reported in May in the Strait of Messina (Spartà, 1953), descriptions of post-larval stages are from the same samples (Spartà, 1961), while a juvenile of 37 cm were found in the same area in October (Cavaliere, 1962).

In general term, this species is not a target species, except for the traditional harpoon fishery in the Strait of Messina, particularly at the end of the fishing season (late July, August and September). For all the other fisheries, it is a by-catch component.

Catches were reported by the driftnet fishery, the surface long-line fishery, the tuna trap fishery and more occasionally by trolling lines and game fishery, but usually these catches are not reported in any paper.

As a matter of fact, only observers on board or a strict landing control, spending a lot of efforts, can collect data on this species, because it is often landed at the end of each landing, for the use on the local market.

The progressive adoption of the driftnet ban (fully enforced by Italy since January 1st, 2002) reduced in a significant manner the good quality data coming from this fishery.

In parallel, even the data from the long-line fishery became more difficult to collect, due to the adoption of different strategies to land tunas or swordfish by some important fleets (adoption of "collective carrying vessels", new landing places to minimize controls, etc.), while the movements of the fleets increased a lot compared to the past, sometimes including foreign landing ports.

As well as it happens in other cases, to face these difficult problems, Aquastudio increased his capacity to collect data on other fisheries (like the traditional harpoon fishery in the Strait of Messina), and the results are included in this paper.

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2. METHODS

The methodology adopted to collect the size frequencies of the Mediterranean spearfish (*Tetrapturus belone*) along all the coasts of the southern and central Tyrrhenian Sea (Italian Regions: Sicily, Calabria, Basilicata, Campania and Lazio) and in the Strait of Messina was basically the same adopted in the past in various projects (Di Natale *et al.*, 1992, 1995b, 1998; Di Natale, 1999).

The basic structure of the landing ports was kept in the same manner (Ponza in the Central Tyrrhenian Sea, Lipari and Milazzo in the Southern Tyrrhenian Sea). In addition to these traditional landing points used for sampling, Aquastudio decided to include the Straits on Messina, with a landing point in the small fishermen village of Ganzirri, where the traditional harpoon fishery is still practiced.

In most of the places, the landing control was carried out regularly (two weeks per month), while in another place (Ganzirri) it was on opportunistic basis, trying to cover all the positive fishing days.

The lower jaw fork length (LJFL) measure was used as a standard length, because sometimes the short bill could be damaged or broken, while the round weight (RW) was used as a standard weight measure, thanks to the habit to land these fishes fresh and ungutted.

The data were grouped together for all the drifting gears (driftnets and longlines), showing the harpoon data on separate columns, due to possible differences.

3. THE DATA

In the period between 1994 to 2002 it was possible to collect a total of 1605 data on *Tetrapturus belone*: 287 were length data (LJFL), while 1318 were weight (RW) data. Between 1994 and 1998 all the data came from surface drifting gears, mostly from driftnets, carried out in the central and southern Tyrrhenian sea by the Italian fleet. From 1999 it was possible to collect data also from the traditional harpoon fishery in the Strait of Messina. No catches have been reported in the last 10 years by tuna traps, even several authors reported them in the past to (Anonymous, 1973, Bini, 1968 and Nakamura, 1985).

The number of specimens in the samples was variable from year to year, according to the real landings, which usually shows the various catch rates of this species. One of the most important limiting factor was the usual timing of the driftnet fishing, that usually closed the activity at the end of August, when the presence of the Mediterranean spearfish in the upper level of the sea is higher. At the same time, the very limited activity of drifting long-lines in the Tyrrhenian sea was another limiting factor for the data collection.

The length data (LJFL) are presented in **Table 1 to 8**, showing the length frequencies by classes of 2 cm and the related graphs. They have been collected exclusively from surface drifting gears.

No mode was evident in 1994 and 1997, possibly due to the very small number of data. In 1995 the mode was between 124 and 125.9 cm; in 1996 was at 112-113.9 cm and at 170-171.9 cm; in 1998 was at 154-155.9 cm; in 1999 and 2000 at 156-157.9 cm; in 2001 it was at 98-99.9 cm, 106.107.9 cm and at 112-113.9 cm.

The minimum LJFL recorded was 78 cm in 1994, while the maximum was 193 in 2001. This maximum length, recorded in the isle of Ponza (Central Tyrrhenian sea) on 16 June 2001, caught by a swordfish driftnet, is higher than the maximum known for this species (200 cm UJFL), according to Anonymous, 1973, Bini, 1968, Tortonese, 1975 and Costa (1991). On the contrary, Nakamura (1985) reports a maximum length of 240 cm (without specify the type of measurement).

The weight data (RW) are presented on **Tables 9 to 17**, showing the weight frequencies by classes of 1 kg and the related graphs. They have been collected exclusively from surface drifting gears till 1998 and mostly from the harpoon fishery from 1999 to 2002.

The mode was at 5-5.9 kg in 1994; in 1995 it was at 9-9.9 kg; in 1996 was at 16-16.9 kg; in 1997, on the smallest sample, was at 11-11.9 kg, 12-12.9 kg and 20-20.9 kg; in 1998 was at 10-10.9 kg; in 1999 was at 10-10.9 kg (at 10-10.9 kg for drifting gears and at 11-11.9 kg for the harpoon fishery); in 2000 was at 16-16.9 kg (at 18-18.9 kg for drifting gears and 9-9.9 kg for the harpoon fishery); in 2001 was at 8-8.9 kg (only at 3-3.9 kg for drifting gears and 8-8.9 kg for the harpoon fishery); in the last year, 2002, the mode was at 13-13.9 kg, but related only to the harpoon fishery, due to important budget reductions in the last two years.

The minimum RW recorded was only 1.4 cm in 2001 (specimen caught by a drifting longline in the Eolian Islands, measured at landing in Milazzo on 11 November 2001), while the maximum was 36 kg in 1995 (caught by a swordfish driftnet in the Isle of Ponza on 20 May 1995) and another specimen of 36 kg in 2000 (caught by harpoon fishery in the Strait of Messina on 2 August 2000). This maximum weight is again higher than the maximum known for this species (30 kg), according to Tortonese, 1975. On the contrary, Nakamura (1985) reports a maximum weight of 70 kg.

4. DISCUSSION

From the above-mentioned data sets it was possible to obtain a summary **Table (Table 18)** showing the most important reference points in each year (number of samples, minimum maximum and mean values, standard deviations). Considering the mean values as the most reliable reference points, the last two graphs show some trends for the period 1994 to 2002.

As concerns the mean length (LJFL), there is a double-dome pattern, with a decreasing in 1998 and in 2001 (no data are available for 2002). The limited size of the sample clearly affects the reliability of the general figure, but the length data are quite difficult to collect for landing operational reasons. The general trend, showed by the linear regression, is slightly positive ($r^2= 0.035$).

The graph showing the trend of the mean weight values is possibly less clear, even if the sample was more than four times the previous one and quite significant. As concerns this parameter, the general trend, showed by the linear regression, is slightly negative ($r^2= 0.007$).

The interpretation of the above reported data is not easy, because it is strongly suspected that they are biased by the following factors:

- Non-target species;
- Important reduction of the driftnet landings;
- Driftnet ban in the year 2002;
- Major importance of the harpoon catches in the last three years data;
- Solitary behaviour of the species;
- Significant reduction of research funding with a consequent limitation of the landing control effort.

Furthermore, there is the strong suspect that some specimens should belong to another spearfish species, previously reported only one time in the Mediterranean sea (Di Natale *et al.*, 1995a, 1995b): the shortbill spearfish (*Tetrapturus angustirostris* Tanaka, 1915). As a matter of fact, the two species are quite similar in the general shape and they might be confused at landing, particularly at night. The very short bill of some specimens pose well-based doubts about the possible presence of this species among the majority of the Mediterranean spearfish catches.

Very little is known about the distribution and the natural habits of the Mediterranean spearfish in winter time and about its movements inside the Mediterranean sea.

Its importance on the market is increasing quite quickly, due to the good taste of the fish and to the less availability of fresh swordfish on the local Mediterranean market, as a consequence of the driftnet ban.

According to some speculative estimates made in the past (Di Natale *et al.*, 1995b) for the catches obtained in the Tyrrhenian Sea and in the Strait of Sicily by the Italian fleet, it was possible to try a first estimate with the purpose to get a rough Mediterranean figure of the hypothetical level of catches for the Mediterranean spearfish. The standard deviation for the years 1994 and 1995 was 0.23987 in

average, only for the Italian area. This could be reasonably assumed as a preliminary variation coefficient for the catch assessment.

According to the landing reports and to the fishermen's reports, it seems that the presence of this species in the last five years is gradually growing in the Tyrrhenian sea and in the Strait of Messina, possibly due to the parallel reduction and the more recent ban of the driftnet fishery.

Due to the poor little knowledge on this species and to the possibility that the stock might be not very consistent, it should be useful to better follow the landings, with the purpose to have a much more detailed figure of the Mediterranean spearfish situation.

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Table 1 - length frequency (LJFL) of Mediterranean spearfish (*Tetrapturus belone*) caught by drifting gears in the year 1994 in the southern and central Tyrrhenian Sea.

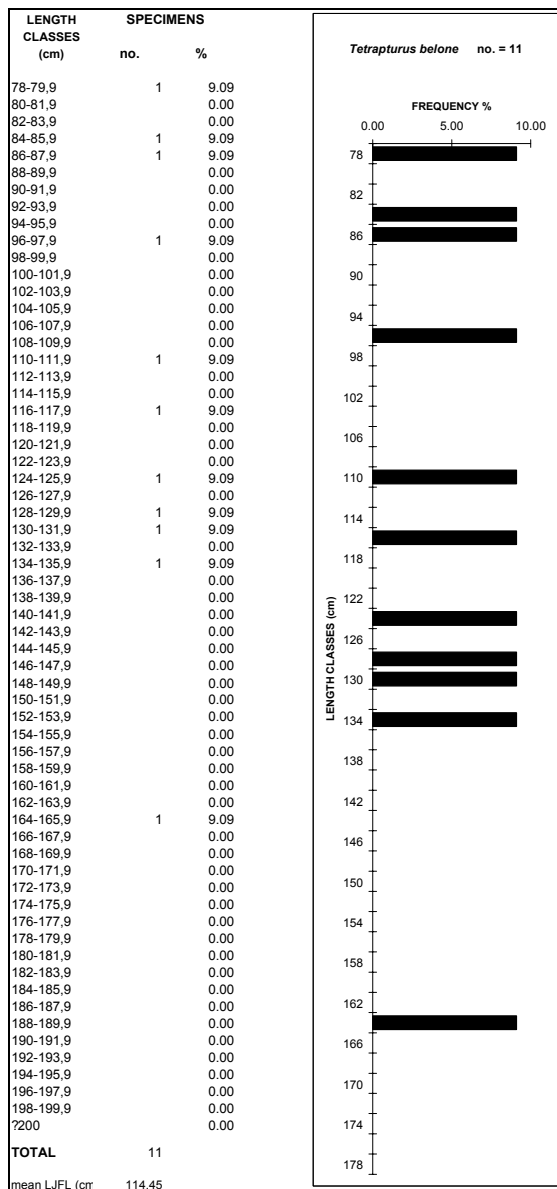


Table 2 - length frequency (LJFL) of Mediterranean spearfish (*Tetrapturus belone*) caught by drifting gears in the year 1995 in the southern and central Tyrrhenian Sea.

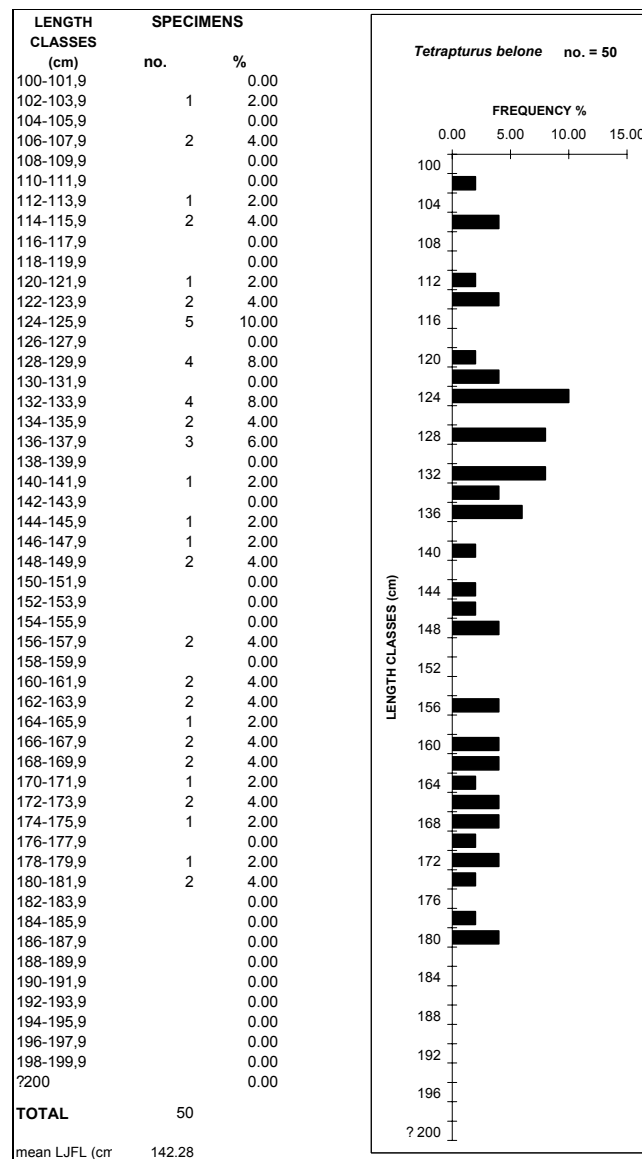


Table 3 - length frequency (LJFL) of Mediterranean spearfish (*Tetrapturus belone*) caught by drifting gears in the year 1996 in the central Tyrrhenian Sea.

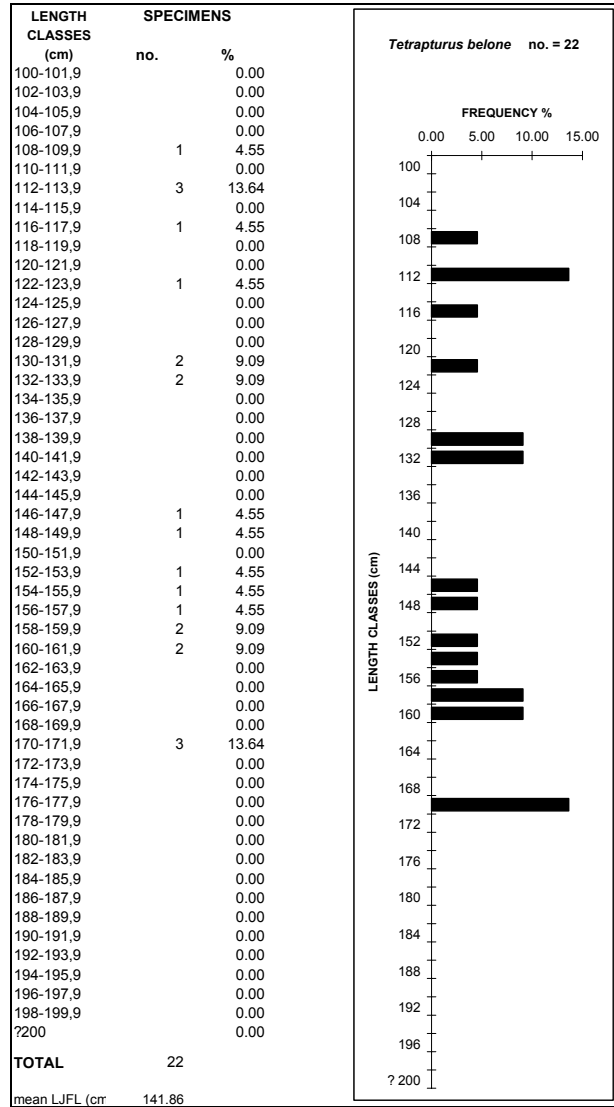


Table 4 - length frequency (LJFL) of Mediterranean spearfish (*Tetrapturus belone*) caught by drifting gears in the year 1997 in the central Tyrrhenian Sea.

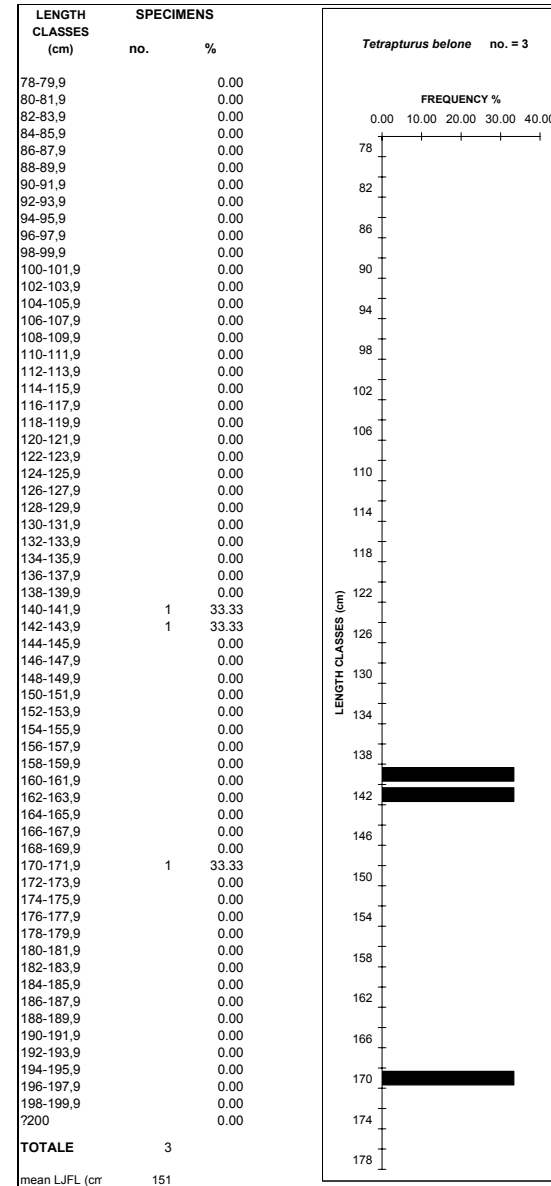


Table 5 - length frequency (LJFL) of Mediterranean spearfish (*Tetrapturus belone*) caught by drifting gears in the year 1998 in the southern and central Tyrrhenian Sea.

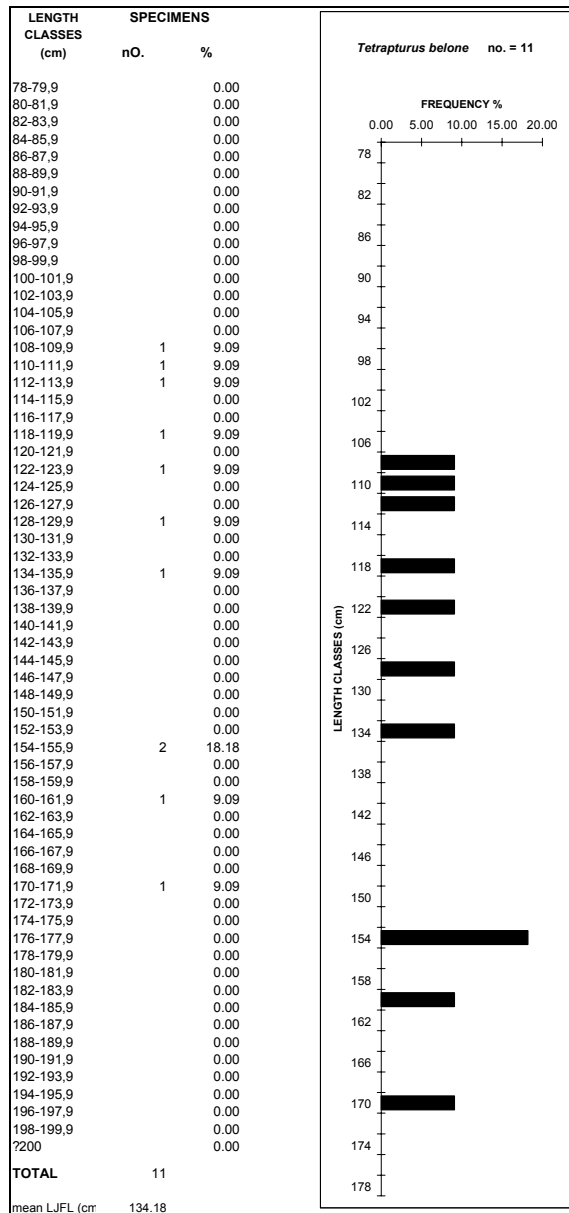


Table 6 - length frequency (LJFL) of Mediterranean spearfish (*Tetrapturus belone*) caught by drifting gears in the year 1999 in the central Tyrrhenian Sea.

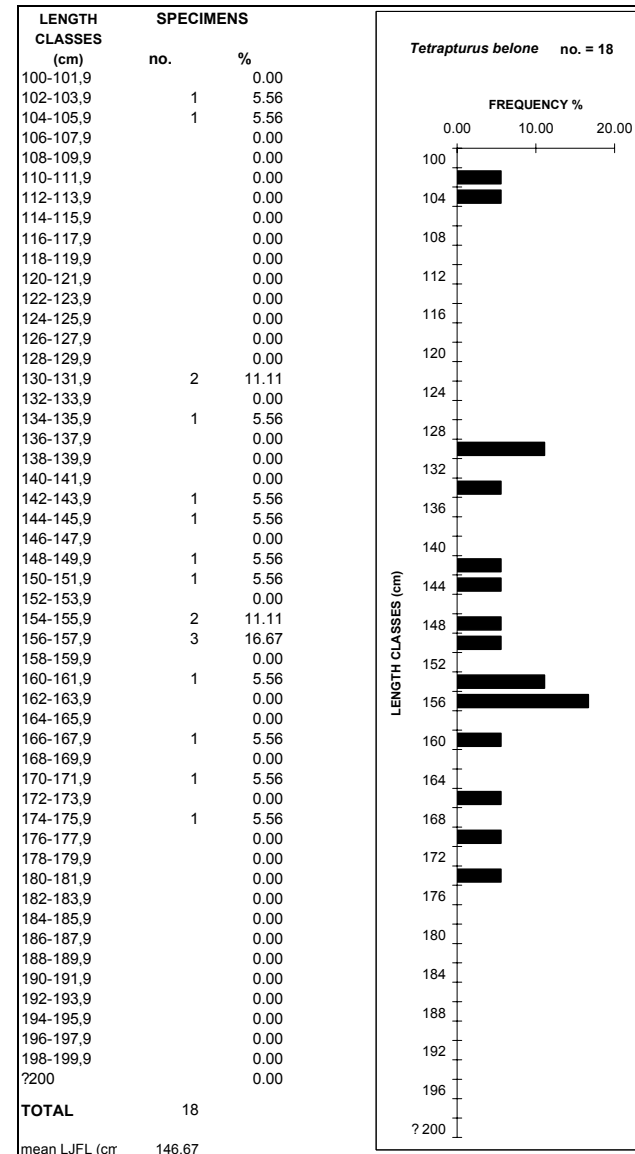


Table 7 - length frequency (LJFL) of Mediterranean spearfish (*Tetrapturus belone*) caught by drifting gears in the year 2000 in the central and southern Tyrrhenian Sea.

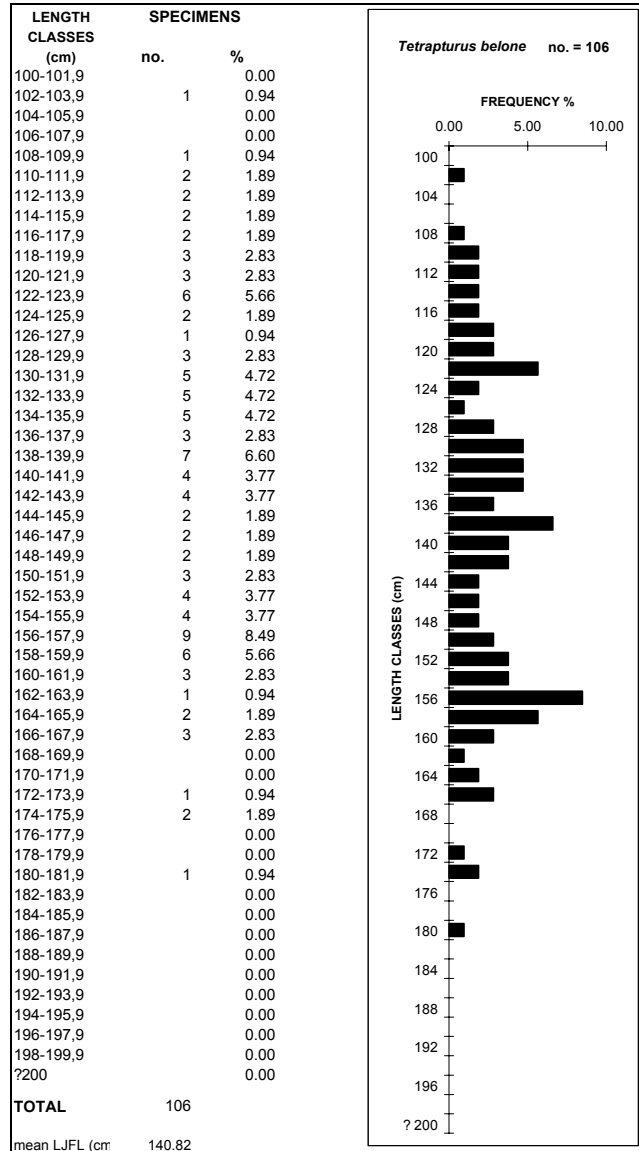


Table 8 - length frequency (LJFL) of Mediterranean spearfish (*Tetrapturus belone*) caught by drifting gears in the year 2001 in the central and southern Tyrrhenian Sea.

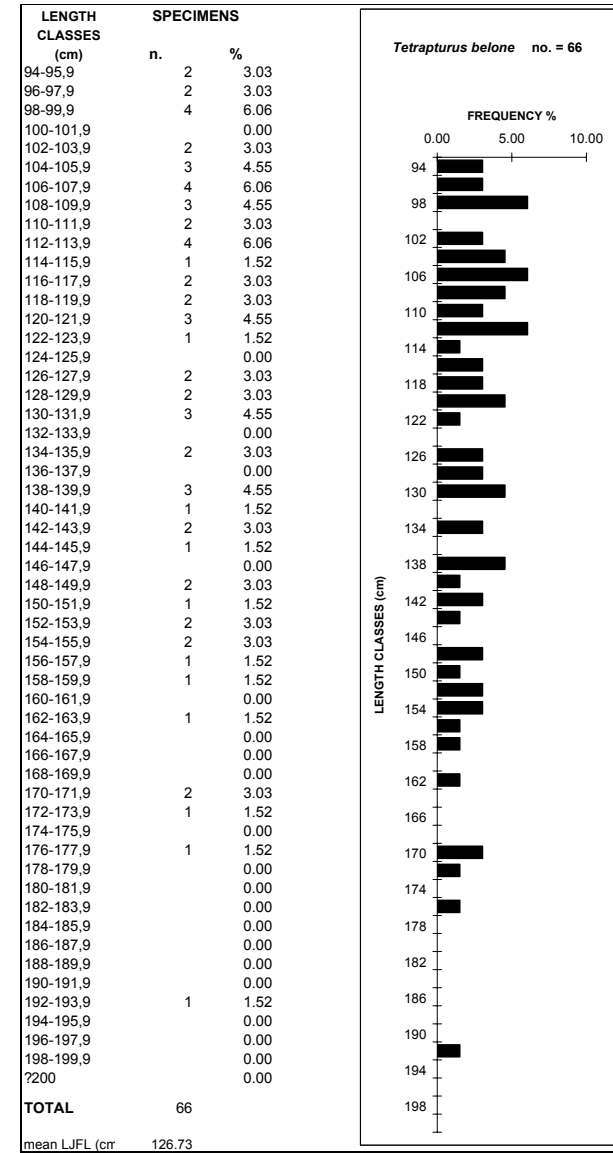


Table 9 - Weight frequency (RW) of Mediterranean spearfish (*Tetrapturus belone*) caught by drifting gears in the year 1994 in the central and southern Tyrrhenian Sea.

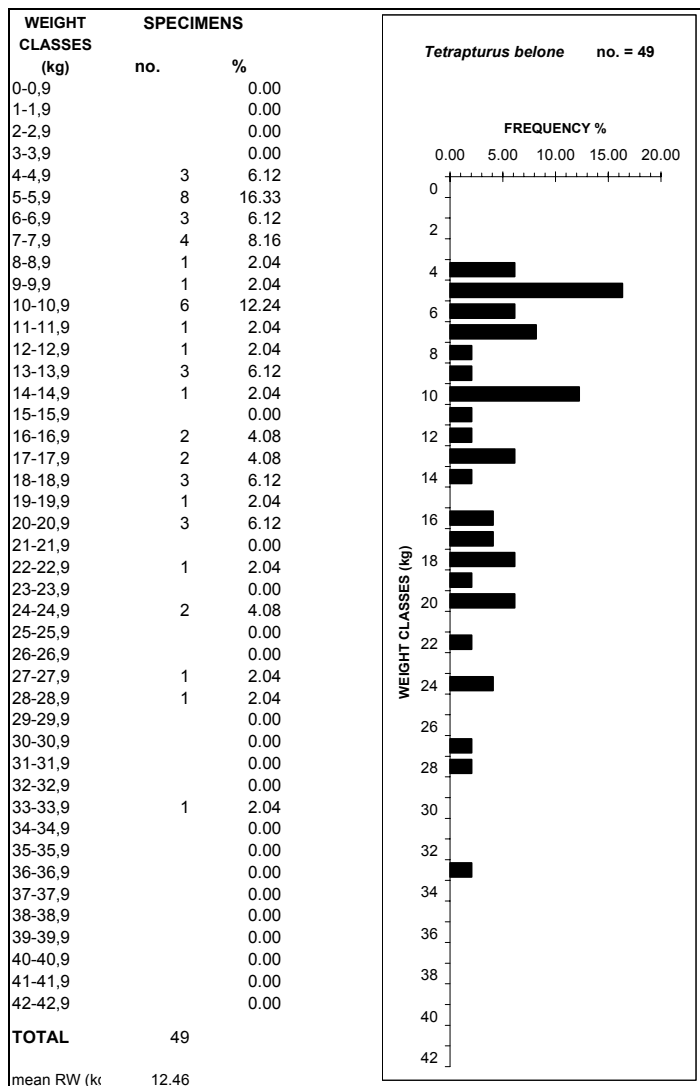


Table 10 - Weight frequency (RW) of Mediterranean spearfish (*Tetrapturus belone*) caught by drifting gears in the year 1995 in the central and southern Tyrrhenian Sea.

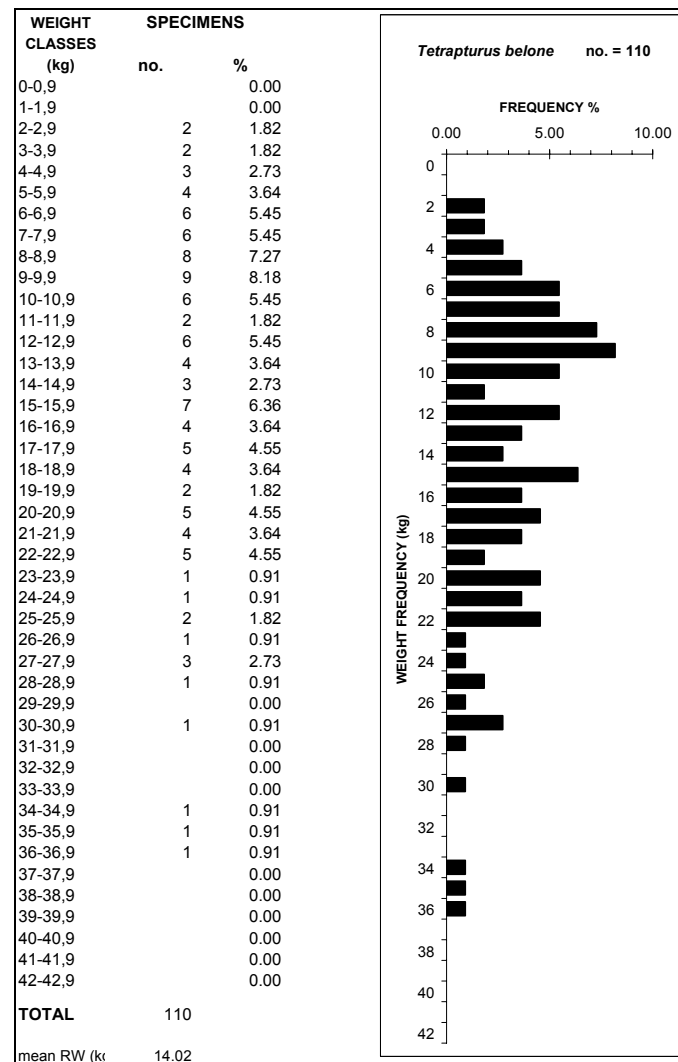


Table 11 - Weight frequency (RW) of Mediterranean spearfish (*Tetrapturus belone*) caught by drifting gears in the year 1996 in the central and southern Tyrrhenian Sea.

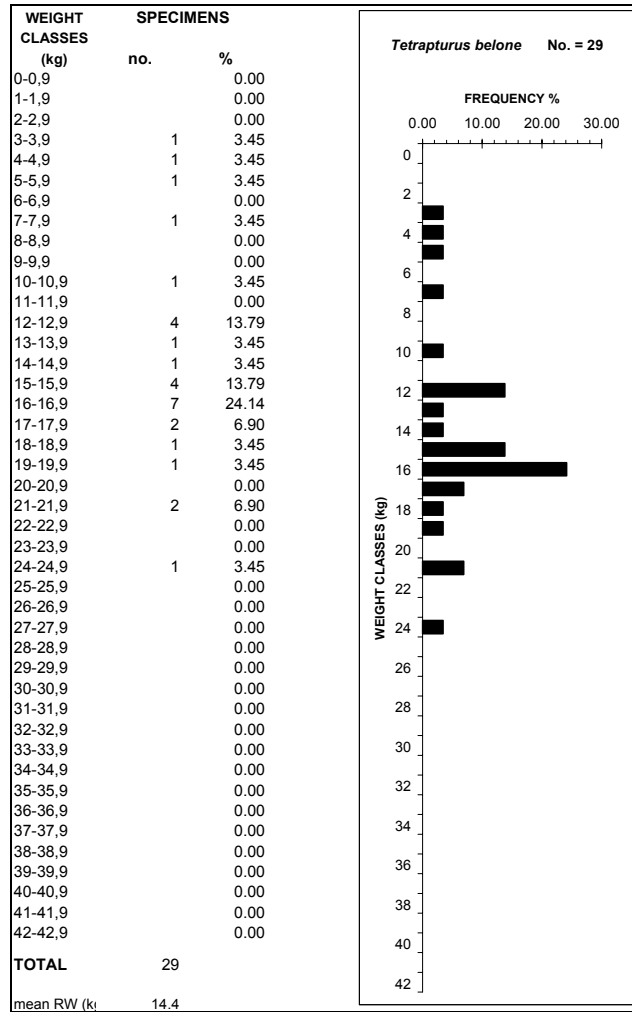


Table 12 - Weight frequency (RW) of Mediterranean spearfish (*Tetrapturus belone*) caught by drifting gears in the year 1997 in the central Tyrrhenian Sea.

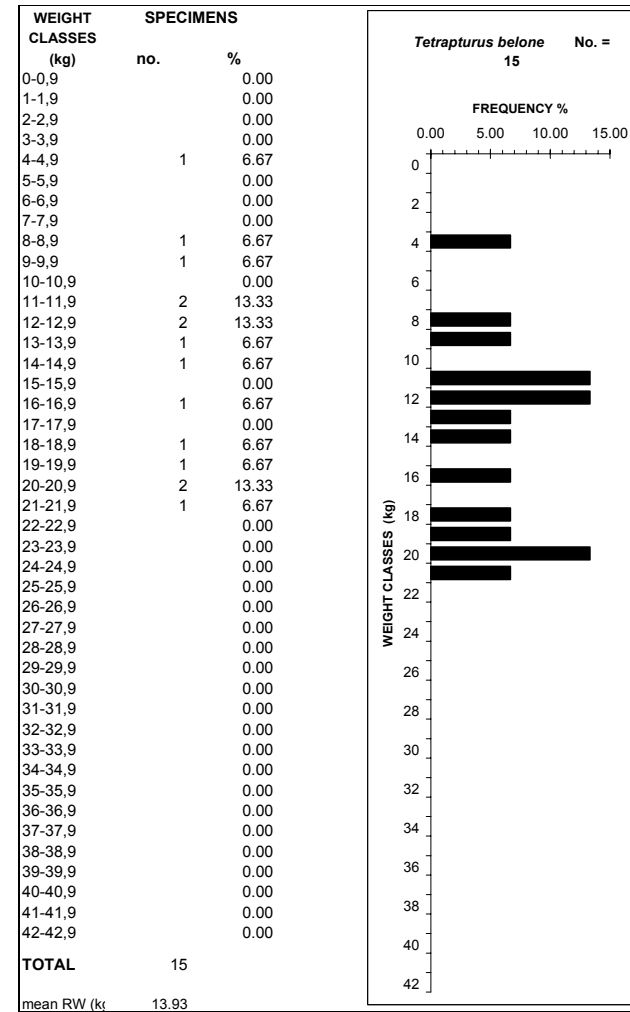


Table 13 - Weight frequency (RW) of Mediterranean spearfish (*Tetrapturus belone*) caught by drifting gears in the year 1998 in the central and southern Tyrrhenian Sea.

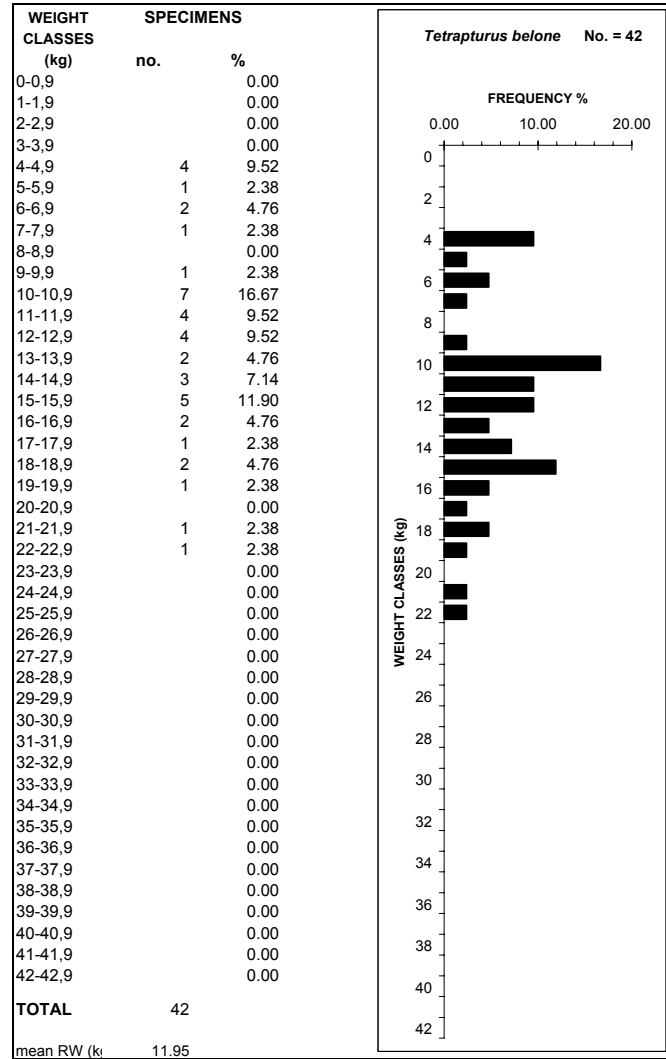


Table 14a - Weight frequency (RW) of Mediterranean spearfish (*Tetrapturus belone*) caught by all gears in the central and southern Tyrrhenian Sea and in the Strait of Messina in the year 1999.

CLASSES (kg)						
	no.	%	no.	%	no.	%
0-0,9		0.00		0.00	0	0.00
1-1,9		0.00		0.00	0	0.00
2-2,9		0.00		0.00	0	0.00
3-3,9	1	1.49		0.00	1	0.86
4-4,9		0.00		0.00	0	0.00
5-5,9		0.00	1	2.04	1	0.86
6-6,9	1	1.49	1	2.04	2	1.72
7-7,9	1	1.49		0.00	1	0.86
8-8,9		0.00	5	10.20	5	4.31
9-9,9		0.00	2	4.08	2	1.72
10-10,9	12	17.91	4	8.16	16	13.79
11-11,9	4	5.97	8	16.33	12	10.34
12-12,9	6	8.96	4	8.16	10	8.62
13-13,9	3	4.48	2	4.08	5	4.31
14-14,9	5	7.46	4	8.16	9	7.76
15-15,9	8	11.94	6	12.24	14	12.07
16-16,9	6	8.96	4	8.16	10	8.62
17-17,9	4	5.97	3	6.12	7	6.03
18-18,9	3	4.48	3	6.12	6	5.17
19-19,9		0.00	1	2.04	1	0.86
20-20,9	6	8.96		0.00	6	5.17
21-21,9	3	4.48		0.00	3	2.59
22-22,9	2	2.99		0.00	2	1.72
23-23,9		0.00		0.00	0	0.00
24-24,9		0.00	1	2.04	1	0.86
25-25,9	1	1.49		0.00	1	0.86
26-26,9		0.00		0.00	0	0.00
27-27,9		0.00		0.00	0	0.00
28-28,9		0.00		0.00	0	0.00
29-29,9		0.00		0.00	0	0.00
30-30,9	1	1.49		0.00	1	0.86
31-31,9		0.00		0.00	0	0.00
32-32,9		0.00		0.00	0	0.00
33-33,9		0.00		0.00	0	0.00
34-34,9		0.00		0.00	0	0.00
35-35,9		0.00		0.00	0	0.00
36-36,9		0.00		0.00	0	0.00
37-37,9		0.00		0.00	0	0.00
38-38,9		0.00		0.00	0	0.00
39-39,9		0.00		0.00	0	0.00
40-40,9		0.00		0.00	0	0.00
41-41,9		0.00		0.00	0	0.00
42-42,9		0.00		0.00	0	0.00
TOTAL	67		49		116	
mean RW (kg)	14.65		12.84		13.88	

Table 14b - Weight frequency (RW) of Mediterranean spearfish (*Tetrapturus belone*) caught by various gears in the central and southern Tyrrhenian sea in the year 1999.

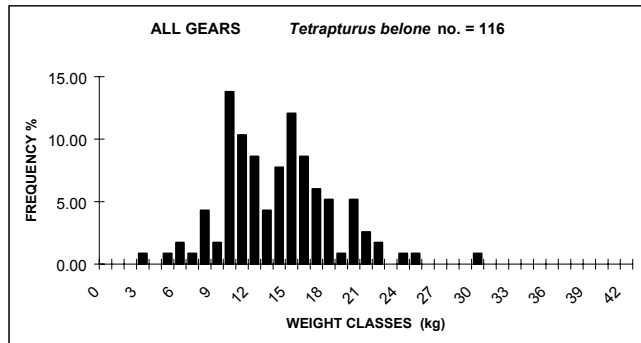
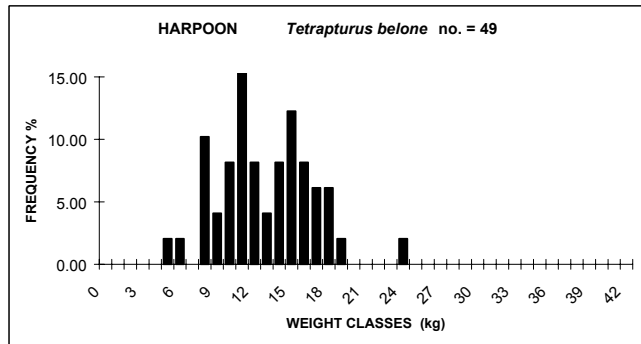
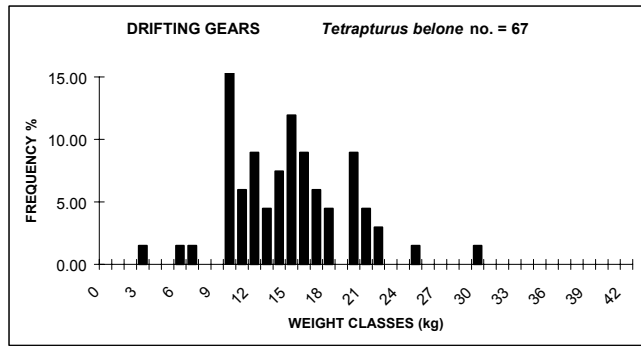


Table 15a - Weight frequency (RW) of Mediterranean spearfish (*Tetrapturus belone*) caught by all gears in the central and southern Tyrrhenian Sea and in the Strait of Messina in the year 2000.

WEIGHT CLASSES (kg)	DRIFTING GEARS		HARPOON		TOTAL 2000	
	no.	%	no.	%	no.	%
0-0,9		0.00		0.00	0	0.00
1-1,9		0.00		0.00	0	0.00
2-2,9		0.00		0.00	0	0.00
3-3,9	1	1.01		0.00	1	0.38
4-4,9	1	1.01	1	0.60	2	0.75
5-5,9	1	1.01	2	1.20	3	1.13
6-6,9		0.00	13	7.83	13	4.91
7-7,9	9	9.09	13	7.83	22	8.30
8-8,9	8	8.08	12	7.23	20	7.55
9-9,9	4	4.04	18	10.84	22	8.30
10-10,9	7	7.07	14	8.43	21	7.92
11-11,9	2	2.02	3	1.81	5	1.89
12-12,9	6	6.06	3	1.81	9	3.40
13-13,9	1	1.01	11	6.63	12	4.53
14-14,9	7	7.07	11	6.63	18	6.79
15-15,9	7	7.07	12	7.23	19	7.17
16-16,9	7	7.07	17	10.24	24	9.06
17-17,9	7	7.07	13	7.83	20	7.55
18-18,9	10	10.10	8	4.82	18	6.79
19-19,9	3	3.03	3	1.81	6	2.26
20-20,9	7	7.07	1	0.60	8	3.02
21-21,9	3	3.03	3	1.81	6	2.26
22-22,9	4	4.04	2	1.20	6	2.26
23-23,9		0.00	1	0.60	1	0.38
24-24,9		0.00	1	0.60	1	0.38
25-25,9	2	2.02	1	0.60	3	1.13
26-26,9		0.00		0.00	0	0.00
27-27,9		0.00		0.00	0	0.00
28-28,9	1	1.01		0.00	1	0.38
29-29,9		0.00	2	1.20	2	0.75
30-30,9	1	1.01		0.00	1	0.38
31-31,9		0.00		0.00	0	0.00
32-32,9		0.00		0.00	0	0.00
33-33,9		0.00		0.00	0	0.00
34-34,9		0.00		0.00	0	0.00
35-35,9		0.00		0.00	0	0.00
36-36,9		0.00	1	0.60	1	0.38
37-37,9		0.00		0.00	0	0.00
38-38,9		0.00		0.00	0	0.00
39-39,9		0.00		0.00	0	0.00
40-40,9		0.00		0.00	0	0.00
41-41,9		0.00		0.00	0	0.00
42-42,9		0.00		0.00	0	0.00
TOTAL	99		166		265	
mean RW (kg)	14.42		12.75		13.38	

Table 15b - Weight frequency (RW) of Mediterranean spearfish (*Tetrapturus belone*) caught by various gears in the central and southern Tyrrhenian sea in the year 2000.

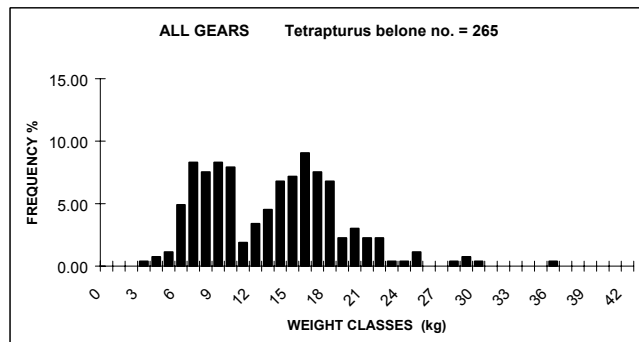
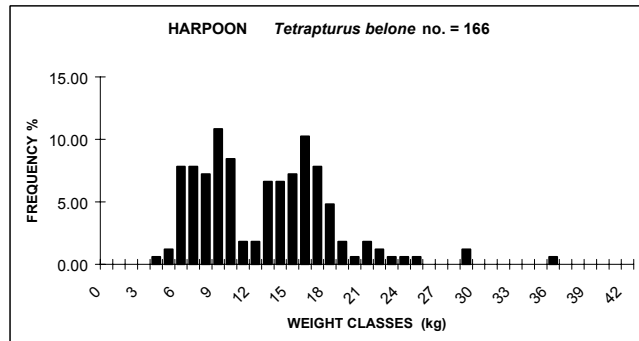
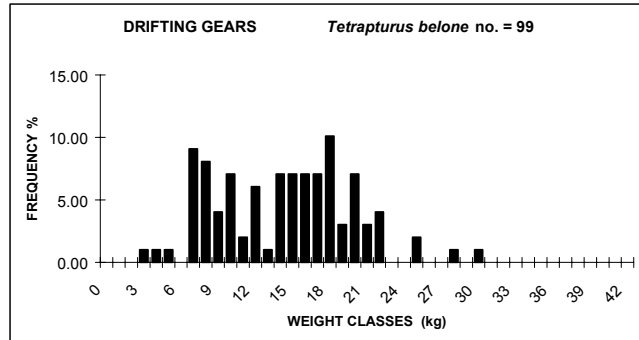


Table 16a - Weight frequency (RW) of Mediterranean spearfish (*Tetrapturus belone*) caught by all gears in the central and southern Tyrrhenian Sea and in the Strait of Messina in the year 2001.

CLASSES (kg)						
	no.	%	no.	%	no.	%
0-0,9		0.00		0.00	0	0.00
1-1,9	3	2.83		0.00	3	0.64
2-2,9	10	9.43		0.00	10	2.15
3-3,9	11	10.38		0.00	11	2.36
4-4,9	3	2.83		0.00	3	0.64
5-5,9	6	5.66		0.00	6	1.29
6-6,9	4	3.77	11	3.06	15	3.22
7-7,9	4	3.77	29	8.06	33	7.08
8-8,9	3	2.83	40	11.11	43	9.23
9-9,9	2	1.89	38	10.56	40	8.58
10-10,9	9	8.49	20	5.56	29	6.22
11-11,9	2	1.89	24	6.67	26	5.58
12-12,9	3	2.83	26	7.22	29	6.22
13-13,9	7	6.60	32	8.89	39	8.37
14-14,9	6	5.66	17	4.72	23	4.94
15-15,9	6	5.66	18	5.00	24	5.15
16-16,9		0.00	23	6.39	23	4.94
17-17,9	3	2.83	22	6.11	25	5.36
18-18,9		0.00	18	5.00	18	3.86
19-19,9	3	2.83	9	2.50	12	2.58
20-20,9	5	4.72	9	2.50	14	3.00
21-21,9	2	1.89	4	1.11	6	1.29
22-22,9	2	1.89	4	1.11	6	1.29
23-23,9	2	1.89	3	0.83	5	1.07
24-24,9	1	0.94	1	0.28	2	0.43
25-25,9	4	3.77	5	1.39	9	1.93
26-26,9		0.00	1	0.28	1	0.21
27-27,9		0.00	2	0.56	2	0.43
28-28,9		0.00	2	0.56	2	0.43
29-29,9	1	0.94		0.00	1	0.21
30-30,9		0.00	1	0.28	1	0.21
31-31,9		0.00	1	0.28	1	0.21
32-32,9		0.00		0.00	0	0.00
33-33,9		0.00		0.00	0	0.00
34-34,9		0.00		0.00	0	0.00
35-35,9	4	3.77		0.00	4	0.86
36-36,9		0.00		0.00	0	0.00
37-37,9		0.00		0.00	0	0.00
38-38,9		0.00		0.00	0	0.00
39-39,9		0.00		0.00	0	0.00
40-40,9		0.00		0.00	0	0.00
41-41,9		0.00		0.00	0	0.00
42-42,9		0.00		0.00	0	0.00
TOTAL	106		360		466	
mean RW (kg)	11.76		12.89		12.63	

Table 16b - Weight frequency (RW) of Mediterranean spearfish (*Tetrapturus belone*) caught by various gears in the central and southern Tyrrhenian sea in the year 2001.

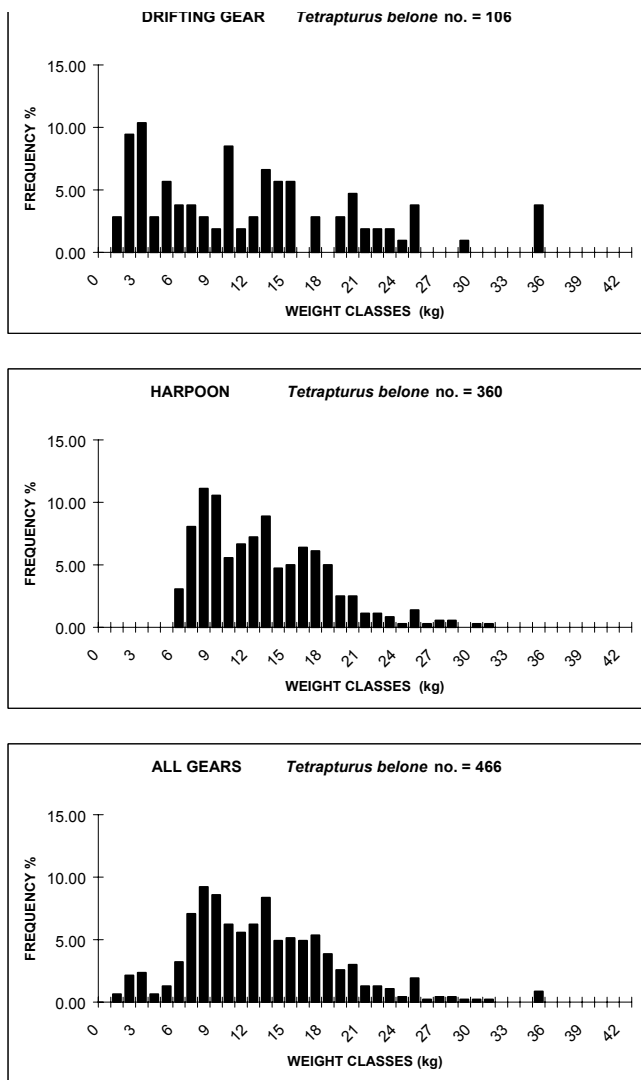


Table 17 - Weight frequency (Rw) of Mediterranean spearfish (*Tetrapturus belone*) caught by harpoon in the Strait of Messina in the year 2002

CLASSES (kg)	no.	%
0-0,9		0.00
1-1,9		0.00
2-2,9		0.00
3-3,9		0.00
4-4,9		0.00
5-5,9	1	0.44
6-6,9	4	1.77
7-7,9	10	4.42
8-8,9	6	2.65
9-9,9	14	6.19
10-10,9	20	8.85
11-11,9	19	8.41
12-12,9	15	6.64
13-13,9	26	11.50
14-14,9	20	8.85
15-15,9	22	9.73
16-16,9	19	8.41
17-17,9	14	6.19
18-18,9	9	3.98
19-19,9	9	3.98
20-20,9	9	3.98
21-21,9	2	0.88
22-22,9	1	0.44
23-23,9	4	1.77
24-24,9		0.00
25-25,9		0.00
26-26,9		0.00
27-27,9		0.00
28-28,9		0.00
29-29,9		0.00
30-30,9	2	0.88
31-31,9		0.00
32-32,9		0.00
33-33,9		0.00
34-34,9		0.00
35-35,9		0.00
36-36,9		0.00
37-37,9		0.00
38-38,9		0.00
39-39,9		0.00
40-40,9		0.00
41-41,9		0.00
42-42,9		0.00
TOTAL	226	
mean RW (kg)	13.64	

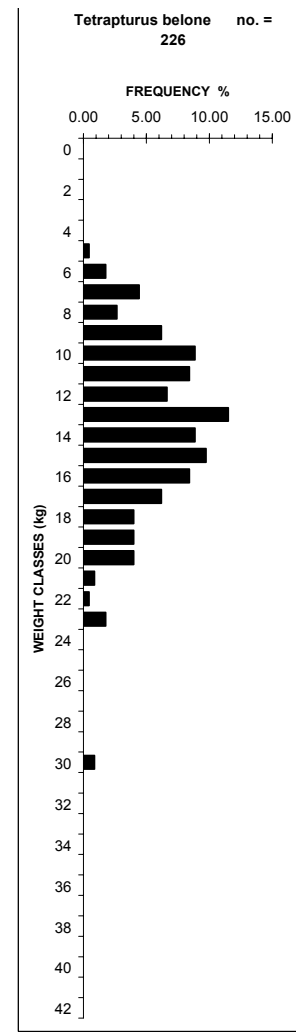


Table 18 - Trends in various parametres of Mediterranean spearfish (*Tetrapturus belone*) caught by various gears in the central and southern Tyrrhenian sea and in the Strait of Messina between 1994 and 2002.

	1994	1995	1996	1997	1998	1999	1999 drift. gear	1999 harpoon	2000	2000 drift. gear	2000 harpoon	2001	2001 drift. gear	2001 harpoon	2002 harpoon
no. LJFL	11	50	22	3	11	18	18	0	106	106	0	66	66	0	0
mean LJFL	114.45	142.28	141.86	151	134.18	146.67	146.67		140.82	140.82		126.73	126.73		
min LJFL	78	102	109	141	109	102	102		102	102		95	95		
max LJFL	165	181	171	170	170	174	174		181	181		193	193		
St.Dev.LJFL	26.1127	22.0297	21.004	16.462	22.1035	20.0088	20.0088		17.2184	17.2184		23.6952	23.6952		
no. RW	49	110	29	15	42	116	67	49	265	99	166	466	106	360	226
mean RW	12.46	14.02	14.4	13.93	11.95	13.88	14.65	12.84	13.38	14.42	12.75	12.63	11.76	12.89	13.64
min RW	4	2	3	4	4	3	3	5	3	3	4	1.4	1.4	6	5
max RW	33	36	24	21	22	30	30	24	36	30	36	35	35	31	30
St.Dev.RW	7.2914	7.5232	4.924	4.9959	4.5596	4.3924	4.6726	3.7768	5.3798	5.4541	5.2523	5.9001	8.3794	4.9257	4.1335

708

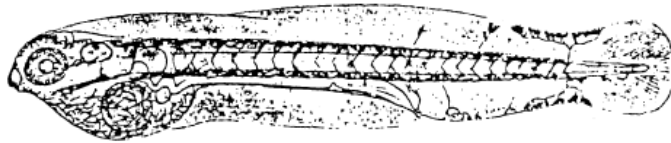
Table 19 - Estimated possible level of catches of *Tetrapturus belone* in the whole Mediterranean sea, in the period 1994 to 2000.

YEAR	1994	1995	1996	1997	1998	1999	2000
ESTIMATE CATCH IN TONS	74	99	81	98	95	91	102

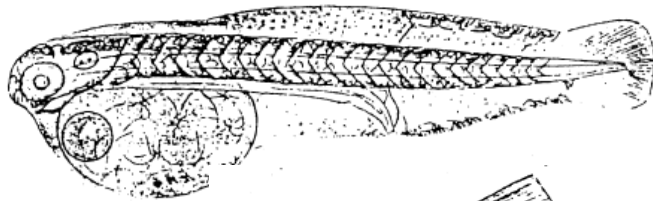
Table off text. Drawings from Spartà, 1953, 1961



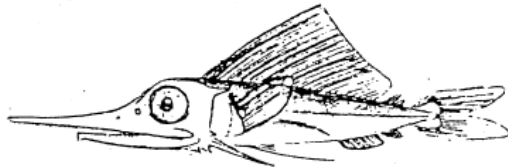
Eggs of *Tetrapturus belone* collected in the Strait of Meddina on May 1952



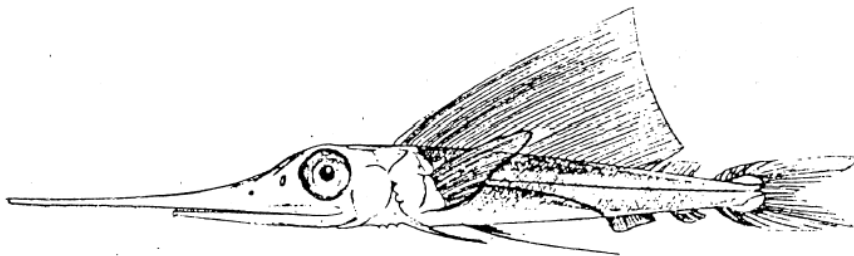
Newborn larvae of *Tetrapturus belone*



Larvae of *Tetrapturus belone* on the second day of life.



Post-larval (29 mm) specimen of *Tetrapturus belone* found stranded along the beach of Torre Faro (Strait of Messina).



Post-larval (54 mm) specimen of *Tetrapturus belone*.