

SOME DATA OF THE SPANISH SWORDFISH (XIPHIAS GLADIUS) FISHERY

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SUMMARY

In this paper the Spanish swordfish fishery is described briefly and total catch data from 1939 and monthly catch, effort and CPUE from 1975 to 1980 are presented. Quarterly samples between 1975 and 1980 are also presented.

RESUME

Le présent document fournit une brève description de la pêche espagnole à l'espadon, ainsi que les données dont on dispose actuellement sur la prise globale, à partir de 1939, et sur la capture, l'effort et la CPUE par mois, de 1975 à 1980. Des échantillons trimestriels pour 1975 à 1980 sont également présentés.

RESUMEN

En este documento se hace una breve descripción de la pesquería española de pez espada, y se presentan datos acerca de la captura total desde 1939 y captura mensual, esfuerzo y CPUE desde 1975 hasta 1980. Asimismo, se presentan muestras trimestrales entre 1975 y 1980.

Introduction.

Spanish swordfish fishery has been carried out for many years. In this century surface longline fishery, not very large in size, began, and this is the technique still used today. The fleet which fishes swordfish is composed of 300 ships, approximately 45 of which are more than 50 G.R.T. Some 250 consist of between 50 and 200 G.R.T. , and a few have more than 200 G.R.T. This data is estimated. Of this group of ships only a small part devotes itself to swordfish fishery during the whole year. Most of them fish this species during only one quarter (the 4th of the year), or two, (the 3rd and 4th quarters), devoting the rest of the year to albacore. (*Thunnus alalunga*), anchovy, (*Engraulis encrasicolus*) hake, (*Merluccius merluccius*) or other species.

The longlines used by the Spanish fleet are of the surface type, and each ship drops between 800 and 1.200 hooks into the sea. The fishery zones used in recent years are approximately those shown in fig. 1.

Data presented.

In table 1 the Spanish catch can be seen in metric tons of swordfish from 1939 to 1980. Where possible, we have made the distinction between Atlantic catches and Mediterranean catches.

In table 2 monthly data of Spanish fishery in the Atlantic between 1975 and 1980 is presented. In this table we show catches in weight expressed in metric tons, catches in number of individuals, effort in $\frac{\text{fishing days} \times \text{no. of hooks}}{1.000}$, and the CPUE expressed in t.

Table 3 is a summary of annual data of Spanish Atlantic fishery. We can observe annual catches in t. , in number of individuals, the average weight of individuals in kgs, the fishery effort, and the CPUE from 1975 to 1980.

Table 4 presents catches in t. and number of annual individuals caught by the Spanish fleet in the Mediterranean. Also included are average weights of individuals expressed in Kgs.

Table 5 shows the distributions of the Spanish swordfish catches in the Atlantic, by sizes quarterly, from 1975 to 1980, except 1977. Measurement is taken of the lower jaw, to the fork in size classes of 5 cm.

Table 6 shows the distributions of Spanish swordfish catches in the Atlantic by sizes, annually, from 1975 to 1980 without exception. Measurement is taken of the lower jaw to the fork in size classes of 5 cm.

Table 7 shows the distributions of Spanish swordfish catches in the Mediterranean annually from 1976 to 1980 except 1977. Measurement is taken of the lower jaw to the fork in size classes of 5 cm.

Analysis of data.

The Spanish swordfish fishery, both Atlantic and Mediterranean, reached catches at a level of between 1.000 and 1.500 t. from 1939 to 1964, with only two peaks in this period. After 1965 the catch level rises clearly, fig. 2, to between 3.000 and 5.000 t. due in part to the increase in the Mediterranean catch level and the exploitation of a new fishing zone to the north of the Iberian peninsula beginning in 1968.

From 1975 to 1978 the monthly catches in weight as well as in number of individuals, effort, and CPUE are known. In fig. 3 we can observe the evolution of the average monthly catches from 1975 to 1978. It is clear from this figure that the last four months of the year are the most important in total catch. The CPUE's remain at the same levels during the whole year, with a tendency to be greater in the 5th, 6th, 7th months of the year.

The series of annual catch data, effort, and CPUE are too short, (6 years), to detect trends. Similarly the variations in effort during this time period are small and have no clear influence on the CPUE.

In the distributions by size of the Atlantic and Mediterranean catches, fig. 4-7, we can appreciate that the Atlantic range is clearly greater than that of the Mediterranean, (60-280 maximum range in the Atlantic, 60-230 maximum range in the Mediterranean). We can also note that the modes are clearly different, being higher in the Atlantic than in the Mediterranean, (average modes in the Atlantic 180 cm, average modes in the Mediterranean 115 cm).

TABLE 1. Spanish catches of swordfish in Atlantic and Mediterranean seas from 1939 to 1980. (Gear, longline)

Year	Atlantic	Medit.	Total	Year	Atlantic	Medit.	Total
1939	-	-	1.477	1960	722	-	722
1940	-	-	1.087	1961	1.700	-	1.700
1941	-	-	303	1962	2.300	-	2.300
1942	-	-	1.041	1963	1.000	-	1.000
1943	?	?	?	1964	1.800	-	1.800
1944	-	-	1.216	1965	1.433	1.200	2.633
1945	-	-	1.304	1966	2.999	1.000	3.999
1946	-	-	1.406	1967	2.690	700	3.390
1947	-	-	1.407	1968	3.551	1.000	4.551
1948	-	-	1.908	1969	3.502	1.100	4.602
1949	-	-	3.659	1970	3.160	900	4.060
1950	1.445	586	2.031	1971	3.384	1.100	4.484
1951	966	580	1.546	1972	3.210	1.300	4.510
1952	966	337	1.303	1973	3.833	1.105	4.938
1953	1.203	-	1.203	1974	2.893	700	3.593
1954	305	452	757	1975	3.747	89	3.836
1955	619	340	959	1976	2.816	89	2.905
1956	374	393	767	1977	3.309	667	3.976
1957	1.000	-	1.000	1978	3.611	720	4.331
1958	832	414	1.246	1979	2.582	800	3.382
1959	1.100	-	1.100	1980	3.810	750	4.560

YEAR 1975					YEAR 1976				
Month	Catch		Effort	C.P.U.E.	Month	Catch		Effort	C.P.U.E.
	in weight	in number				in weight	in number		
1	86	1,896	215	0.408	1	119	3,145	443	0.269
2	148	3,348	380	0.393	2	235	4,067	757	0.310
3	254	5,518	962	0.264	3	169	3,664	867	0.195
4	186	4,315	450	0.414	4	158	2,347	654	0.241
5	231	5,025	558	0.415	5	201	3,203	642	0.314
6	178	3,476	390	0.456	6	151	1,199	271	0.558
7	251	5,930	631	0.397	7	88	1,027	140	0.630
8	481	8,127	1,207	0.398	8	150	2,542	350	0.427
9	486	8,650	1,377	0.353	9	397	7,804	971	0.409
10	501	15,098	1,785	0.281	10	500	12,106	1,620	0.308
11	605	14,919	1,966	0.308	11	440	7,633	1,102	0.389
12	337	6,752	1,023	0.329	12	208	8,241	959	0.217
Total	3,747	83,054	10,944	0.342	Total	2,816	56,978	8,776	0.321

Year	Catch (W)	Catch (N)	\bar{W}	Effort	C.P.U.E.
1975	3,747	83,054	45.12	10,944	0.342
1976	2,810	56,978	49.42	8,776	0.321
1977	3,309	66,231	49.96	9,074	0.365
1978	3,611	104,238	34.64	12,844	0.281
1979	2,582	57,366	45.01	7,108	0.363
1980	3,810	85,373	44.63	10,506	0.363

YEAR 1977					YEAR 1978				
Month	Catch		Effort	C.P.U.E.	Month	Catch		Effort	C.P.U.E.
	in weight	in number				in weight	in number		
1	95	1,519	207	0.459	1	18	595	89	0.201
2	179	3,775	647	0.276	2	175	4,875	986	0.178
3	271	3,401	691	0.391	3	482	14,383	1,856	0.259
4	221	4,165	731	0.302	4	172	4,475	1,163	0.148
5	252	4,833	782	0.323	5	153	3,327	566	0.270
6	93	2,051	297	0.313	6	70	1,503	199	0.351
7	194	4,134	556	0.348	7	117	3,379	431	0.272
8	224	5,303	630	0.356	8	125	6,750	833	0.144
9	397	8,697	1,035	0.384	9	587	10,918	1,439	0.408
10	764	14,694	1,717	0.445	10	709	16,515	1,786	0.357
11	225	5,367	917	0.246	11	607	19,908	2,129	0.285
12	394	8,292	864	0.456	12	391	17,508	1,327	0.295
Total	3,309	66,231	9,074	0.365	Total	3,611	104,238	12,844	0.281

TABLE 3.- Atlantic Spanish catches of swordfish in metric tons (W) number of fishes (N), average weight of fishes in kg (\bar{W}) effort in $\frac{n^{\circ} \text{ of days} \times n^{\circ} \text{ of hooks}}{1,000}$ and CPUE in t.

Year	Catch (W)	Catch (N)	\bar{W}
1976	89	3,249	27.39
1977	667	21,865	30.51
1978	720	23,849	30.19
1979	800	24,657	32.45
1980	750	23,447	31.09

Month	Catch		Effort	C.P.U.E.	Month	Catch		Effort	C.P.U.E.
	in weight	in number				in weight	in number		
1	63	2,293	234	0.267	1	140	3,720	455	0.305
2	116	2,737	359	0.323	2	123	7,275	630	0.195
3	105	4,005	337	0.311	3	262	6,721	885	0.295
4	114	2,149	302	0.376	4	322	6,725	777	0.415
5	116	2,472	349	0.332	5	253	4,522	523	0.484
6	99	1,617	231	0.428	6	153	3,100	409	0.373
7	115	3,160	292	0.394	7	171	3,116	322	0.532
8	231	4,845	701	0.330	8	204	4,739	701	0.291
9	372	7,953	979	0.380	9	578	12,348	1,412	0.409
10	426	8,570	1,211	0.352	10	658	13,350	1,686	0.390
11	512	10,763	1,283	0.399	11	466	9,712	1,371	0.340
12	313	6,562	830	0.377	12	480	10,006	1,330	0.361
Total	2,582	57,366	7,108	0.363	Total	3,810	85,373	10,506	0.363

TABLE 4.- Mediterranean Spanish catches of swordfish, in t.(W) in number of fishes(N) and average weight of fishes in kg (\bar{W}).

Table 2.- Spanish catch in weight, catch in number, effort in $\frac{\text{number of days} \times n^{\circ} \text{ of hooks}}{1,000}$ and CPUE by month of swordfish in the Atlantic Sea.

Length	1975				1976			
	I	II	III	IV	I	II	III	IV
50	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0	0
60	0	0	61	0	0	0	0	0
65	0	0	0	0	0	0	0	0
70	0	0	184	0	15	0	0	0
75	0	0	0	0	0	0	0	0
80	0	0	245	0	15	0	0	66
85	0	0	122	244	30	0	9	132
90	0	0	0	163	74	18	13	429
95	0	0	61	651	297	18	70	198
100	0	0	184	732	252	64	30	198
105	0	0	184	813	148	83	114	396
110	0	0	184	651	148	74	136	496
115	56	0	306	1,546	148	73	193	198
120	0	0	61	732	223	147	118	297
125	168	0	367	1,871	134	110	132	661
130	224	142	428	1,058	193	156	149	529
135	112	0	428	976	282	230	254	496
140	112	142	551	1,546	430	257	210	562
145	280	142	367	1,139	594	211	210	760
150	280	142	857	2,034	415	239	303	760
155	448	285	490	1,708	579	377	324	925
160	392	712	612	1,302	504	377	359	661
165	448	854	796	1,708	534	560	526	1,057
170	1,009	712	1,285	1,627	490	404	543	1,090
175	1,289	712	1,163	1,464	564	450	626	1,024
180	1,345	285	1,653	1,790	579	450	464	958
185	953	570	1,897	1,546	638	432	600	1,321
190	392	570	1,040	2,115	668	211	770	1,803
195	392	427	1,040	1,646	504	404	574	1,420
200	392	427	979	2,034	594	340	578	1,387
205	785	712	1,408	1,383	549	312	635	1,553
210	168	570	1,591	895	252	230	687	1,652
215	392	1,424	979	488	312	184	477	1,420
220	280	1,282	673	651	104	128	447	925
225	504	712	490	1,058	193	55	556	1,487
230	168	427	367	732	74	55	346	595
235	0	427	367	163	45	28	258	595
240	0	285	367	0	341	28	145	661
245	0	427	245	0	45	0	166	595
250	56	0	61	0	15	18	97	132
255	56	142	61	244	15	0	92	198
260	56	142	245	81	0	18	44	132
265	0	0	61	81	15	0	39	33
270	0	0	61	0	0	9	30	0
275	0	142	61	81	15	0	30	33
280	0	0	122	0	0	0	9	0
285	0	0	0	0	0	0	9	33
290	0	0	0	0	0	0	0	33
295	0	0	0	0	0	0	0	0
300	0	0	0	0	0	0	0	0
Total	10,762	12,816	22,707	36,769	10,876	6,749	11,373	27,980

TABLE 5 - Atlantic sea. Catches by quarter by length class of 5 cm. of the Spanish swordfish fishery. Years 1975, 1976, 1978, 1979 and 1980.

Length	1978				1979				1980			
	I	II	III	IV	I	II	III	IV	I	II	III	IV
50	0	0	0	0	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0
65	0	0	0	0	0	0	0	14	0	0	0	0
70	0	0	0	0	38	0	0	0	0	14	0	0
75	52	37	15	19	76	20	0	0	43	41	22	0
80	52	0	0	151	101	0	34	0	29	41	22	54
85	52	0	44	208	63	10	80	57	71	54	65	135
90	468	111	117	208	240	0	69	14	214	54	98	404
95	572	74	131	302	240	40	229	342	485	136	250	579
100	208	111	204	340	240	50	354	413	585	177	229	1,132
105	624	297	248	264	416	90	377	313	414	231	109	929
110	468	297	248	283	467	60	263	270	471	299	185	1,145
115	520	260	306	623	391	50	251	299	485	313	283	1,091
120	1,039	445	379	774	278	110	583	769	642	435	631	795
125	1,091	260	481	831	644	160	503	783	657	435	544	1,266
130	1,091	408	525	1,095	379	280	594	683	842	531	838	1,819
135	1,091	408	627	1,227	328	290	686	854	757	599	795	1,751
140	1,403	482	569	1,963	416	410	697	797	1,328	830	795	1,132
145	1,039	408	758	2,076	530	380	800	883	914	1,170	980	1,684
150	935	482	729	2,133	315	400	1,029	883	1,071	939	860	1,266
155	1,039	371	831	2,095	379	510	777	868	871	830	947	1,253
160	1,299	408	1,050	2,341	404	500	1,269	1,110	1,213	912	1,078	1,778
165	1,559	519	1,204	4,304	467	440	937	1,352	942	844	1,230	2,034
170	1,299	408	992	2,888	480	570	1,200	1,409	985	1,184	1,012	1,603
175	935	408	1,415	2,888	442	480	1,006	1,267	557	830	980	1,751
180	675	445	1,284	2,945	391	350	857	1,281	1,071	735	1,088	1,536
185	572	371	1,692	5,153	341	330	834	1,950	614	735	947	1,832
190	416	519	1,327	3,284	278	280	491	1,139	642	435	795	1,010
195	468	408	1,240	2,171	164	200	480	1,338	542	340	871	929
200	156	371	1,400	2,907	164	130	297	1,722	371	367	947	970
205	312	185	788	2,473	101	60	274	1,039	328	327	620	795
210	312	185	590	2,171	126	120	286	911	257	191	555	754
215	52	74	321	1,397	88	50	274	783	200	136	588	350
220	52	74	496	1,435	13	20	171	826	29	54	631	445
225	52	111	423	1,208	0	20	34	427	29	41	283	269
230	52	37	190	680	25	20	149	327	14	27	305	202
235	0	0	160	340	0	0	46	242	29	14	185	202
240	0	111	73	396	0	0	34	157	14	27	207	81
245	0	37	73	151	13	0	57	71	0	27	98	40
250	0	111	0	151	0	0	11	100	0	0	54	54
255	0	37	29	0	0	0	23	100	0	0	0	0
260	0	0	0	19	0	0	0	14	0	0	0	0
265	0	0	0	19	0	0	0	14	0	0	0	0
270	0	37	0	19	0	10	0	14	0	0	11	0
275	0	0	0	0	0	0	0	0	0	0	0	13
280	0	0	0	0	0	0	0	0	0	0	0	13
285	0	0	0	0	0	0	0	0	0	0	0	0
290	0	0	0	0	0	0	0	0	0	0	0	0
295	0	0	0	0	0	0	0	0	0	0	0	0
300	0	0	0	0	0	0	0	0	0	0	0	0
Total	19,953	9,309	21,047	53,929	9,035	5,438	16,058	25,835	17,716	14,357	20,202	33,098

TABLE 5 .- (Cont.)

Length	1975	1976	1977	1978	1979	1980
50	0	0	0	0	0	0
55	0	0	0	0	0	0
60	61	0	0	0	0	0
65	0	15	0	0	14	0
70	184	66	0	0	38	24
75	0	156	0	123	96	105
80	245	491	264	203	135	145
85	366	360	792	303	210	326
90	163	590	2,111	903	323	771
95	712	845	4,222	1,079	850	1,451
100	916	853	2,639	863	1,057	2,122
105	997	613	792	1,432	1,197	1,684
110	834	785	1,847	1,295	1,060	2,101
115	1,908	1,036	1,847	1,708	992	2,173
120	793	1,027	1,583	2,637	1,739	2,504
125	2,406	1,261	2,639	2,663	2,089	2,903
130	1,853	1,459	2,111	3,119	1,936	4,030
135	1,517	1,775	1,583	3,353	2,158	3,901
140	2,351	1,716	2,111	4,417	2,321	4,084
145	1,929	2,204	3,958	4,282	2,592	4,747
150	3,313	1,901	3,430	4,280	2,626	4,136
155	2,931	2,677	3,694	4,337	2,534	3,901
160	3,018	2,527	2,375	5,098	3,263	4,981
165	3,807	2,664	4,222	7,665	3,196	5,050
170	4,633	2,451	4,750	5,587	3,659	4,784
175	4,628	2,991	5,805	5,646	3,194	4,118
180	5,072	3,532	3,166	5,349	2,879	4,430
185	4,965	2,902	2,903	7,788	3,455	4,128
190	4,117	2,899	2,375	5,547	2,188	2,893
195	3,324	3,049	1,847	4,286	2,182	2,683
200	3,833	2,821	792	4,834	2,313	2,655
205	4,287	2,393	1,319	3,758	1,474	2,070
210	3,224	1,604	528	3,266	1,443	1,757
215	3,284	2,291	0	1,844	1,195	1,274
220	2,886	1,070	0	2,057	1,030	1,159
225	2,764	925	0	1,794	481	622
230	1,695	1,174	264	958	521	548
235	652	605	0	500	268	429
240	672	262	264	561	191	329
245	361	305	0	261	141	166
250	341	194	0	262	111	108
255	525	67	0	62	122	54
260	61	40	0	19	14	0
265	143	78	0	19	14	11
270	204	9	0	56	24	13
275	122	42	0	0	0	13
280	0	33	0	0	0	0
285	0	0	0	0	0	0
290	0	0	0	0	0	0
295	0	0	0	0	0	0
300	0	0	0	0	0	0
Total	83,054	56,976	66,231	104,238	57,366	85,373

TABLE 6.- Atlantic annual catches by length class of 5 cm of the Spanish swordfish fishery. Years 1975 to 1980.

Length	1976	1977	1978	1979	1980
50	0	-	0	0	0
55	0	-	0	0	0
60	0	-	133	0	149
65	0	-	0	111	50
70	0	-	133	0	100
75	0	-	133	111	199
80	35	-	400	221	199
85	35	-	133	2,433	398
90	122	-	1,066	1,327	597
95	486	-	1,599	663	1,045
100	313	-	533	885	747
105	156	-	799	1,106	647
110	191	-	1,732	1,216	846
115	295	-	1,732	3,428	1,941
120	295	-	3,464	2,764	3,286
125	156	-	2,398	2,211	2,489
130	139	-	1,732	774	2,240
135	139	-	1,865	1,327	2,439
140	87	-	533	1,106	1,095
145	174	-	400	442	597
150	226	-	933	553	747
155	104	-	1,066	663	747
160	87	-	933	995	398
165	52	-	533	553	348
170	52	-	400	553	647
175	35	-	266	442	299
180	17	-	533	0	398
185	35	-	266	221	299
190	0	-	0	111	100
195	0	-	0	111	50
200	0	-	0	0	100
205	0	-	0	0	0
210	0	-	0	111	149
215	0	-	0	111	0
220	0	-	133	111	50
225	17	-	0	0	0
230	0	-	0	0	0
235	0	-	0	0	50
240	0	-	0	0	0
245	0	-	0	0	0
250	0	-	0	0	0
255	0	-	0	0	0
260	0	-	0	0	0
265	0	-	0	0	0
270	0	-	0	0	0
275	0	-	0	0	0
280	0	-	0	0	0
285	0	-	0	0	0
290	0	-	0	0	0
295	0	-	0	0	0
300	0	-	0	0	0
Total	3,249	21,865	23,849	24,657	23,447

TABLE 7.- Mediterranean annual catches by length class of 5cm of the Spanish swordfish fishery. Years 1976 to 1980.

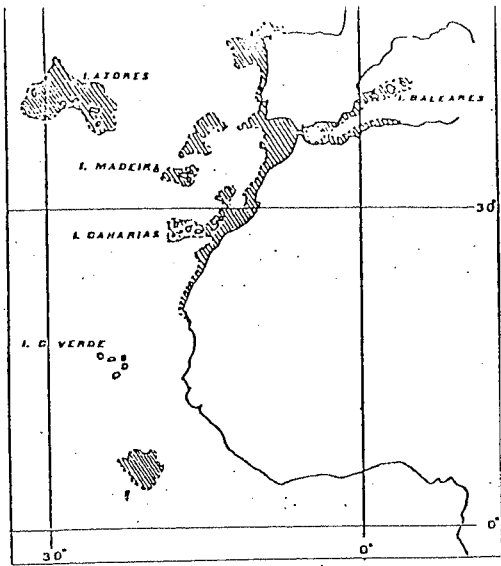


Figure 1.- Fishing Spanish areas of swordfish

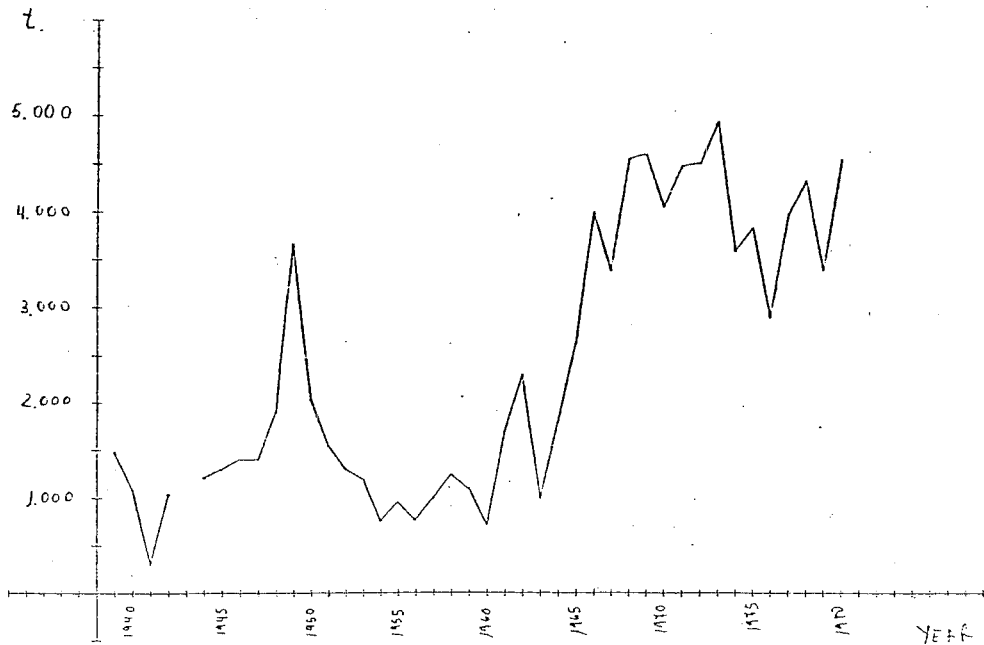


Figure 2.- Total Spanish catches (Atlantic + Mediterranean seas) from 1929 to 1980. Swordfish. Longline.

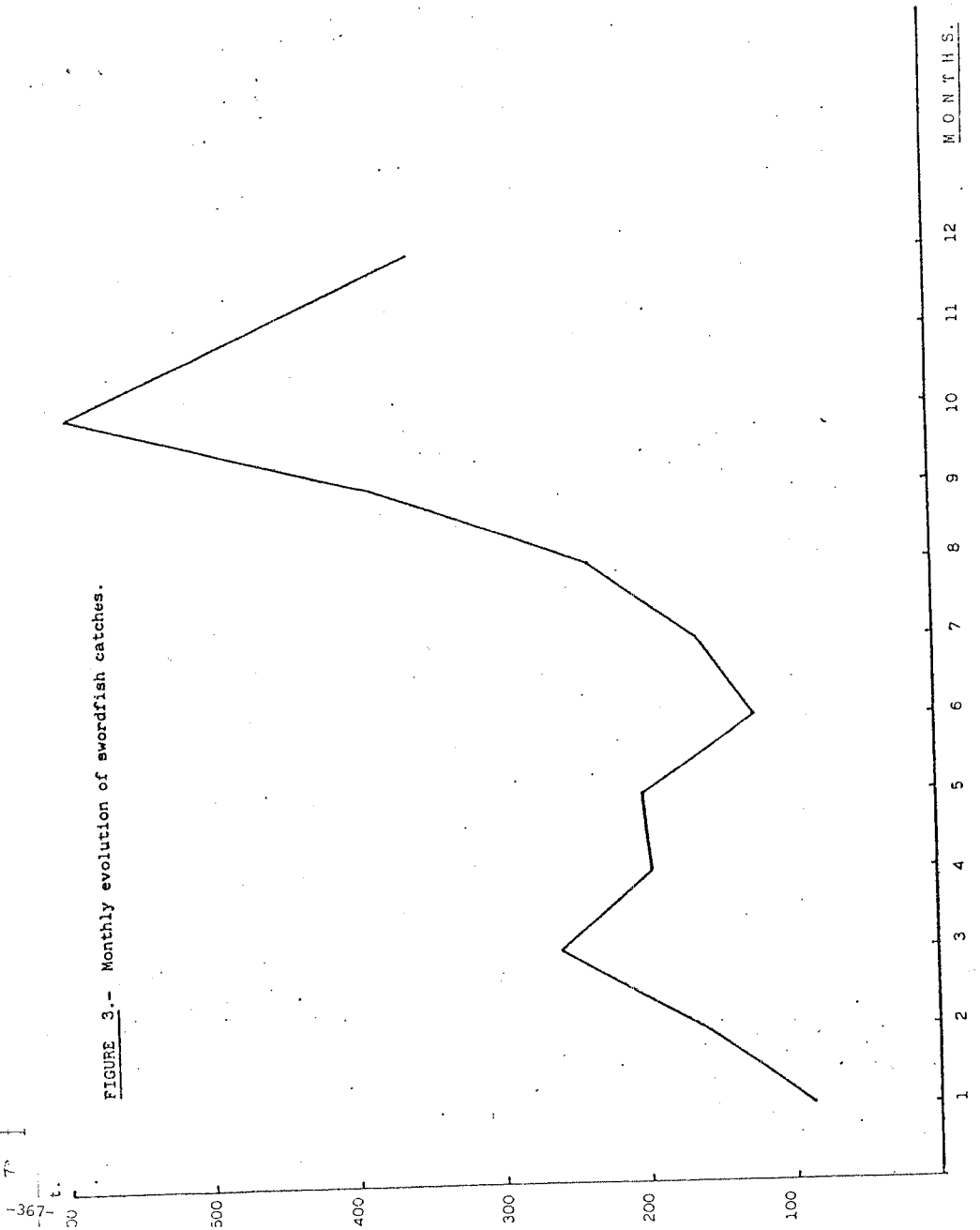


FIGURE 3.- Monthly evolution of swordfish catches.

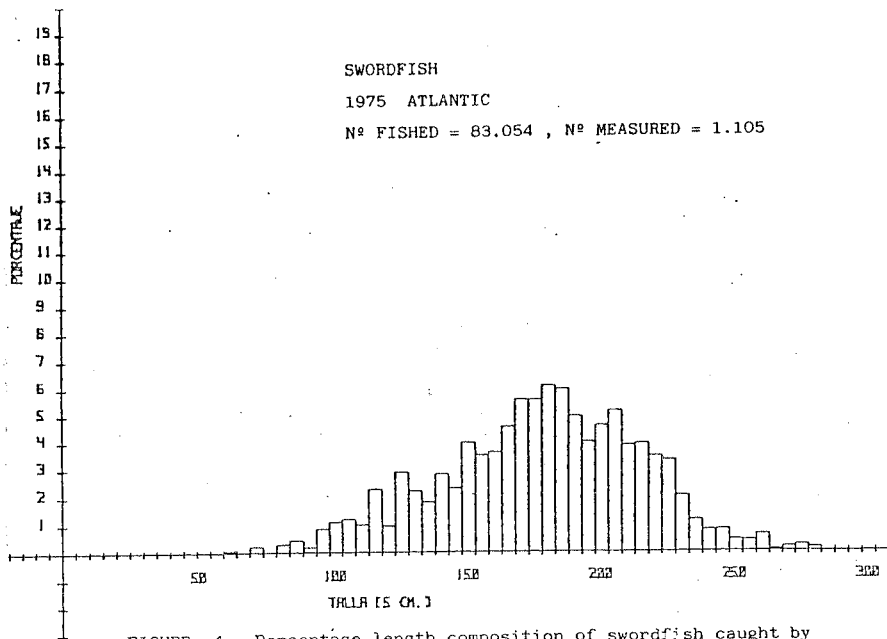


FIGURE 4.- Percentage length composition of swordfish caught by Spanish longline fishery in the Atlantic Ocean. 1975.

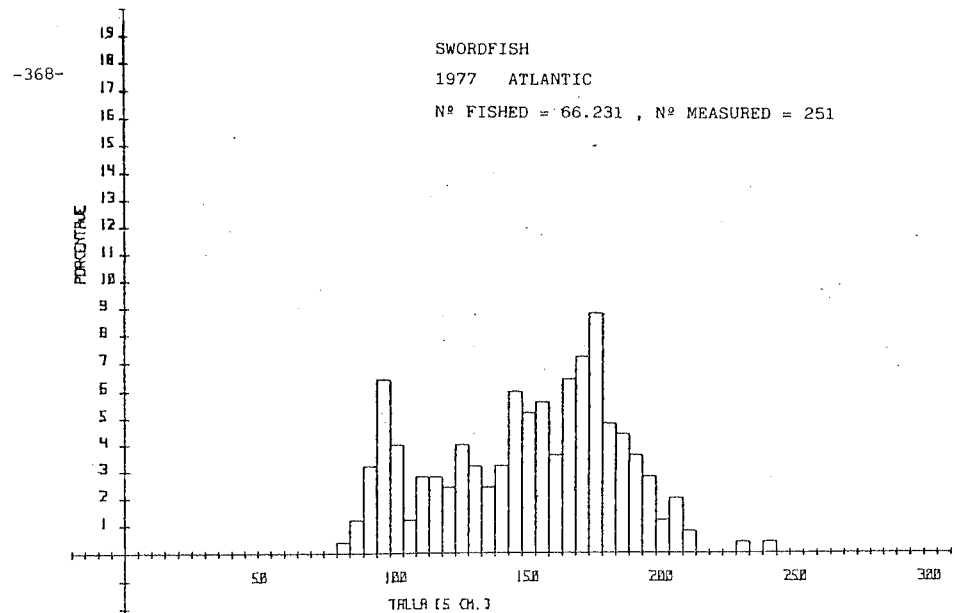


FIGURE 6.- Percentage length composition of swordfish caught by Spanish longline fishery in the Atlantic Ocean. 1977.

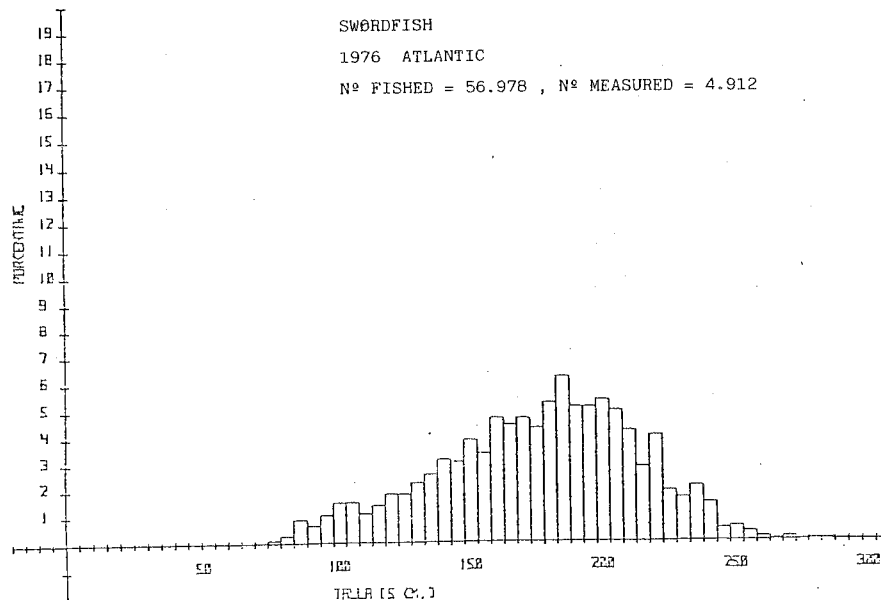


FIGURE 5.- Percentage length composition of swordfish caught by Spanish longline fishery in the Atlantic Ocean. 1976.

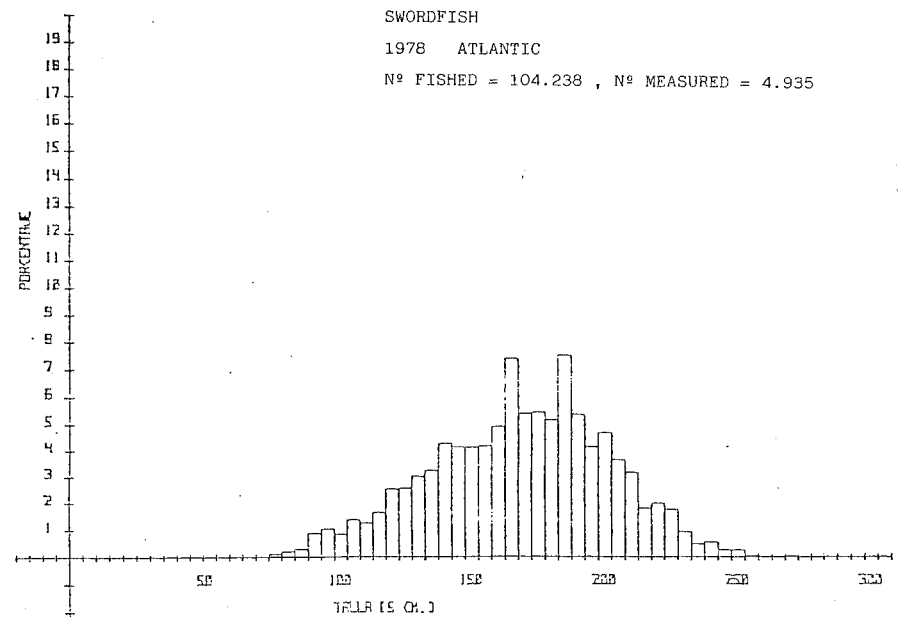


FIGURE 7.- Percentage length composition of swordfish caught by Spanish longline fishery in the Atlantic Ocean. 1978.

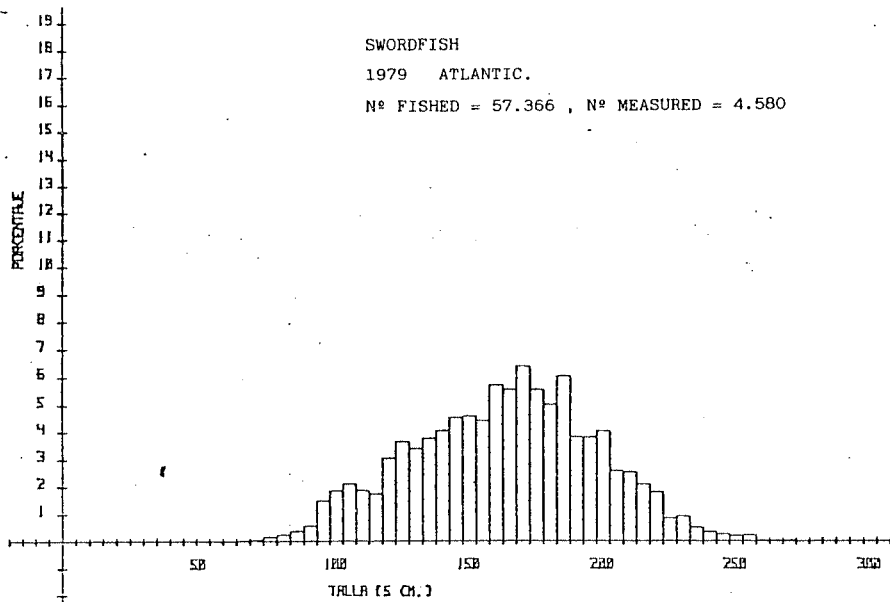


FIGURE 8.- Percentage length composition of swordfish caught by Spanish longline fishery in the Atlantic Ocean. 1979.

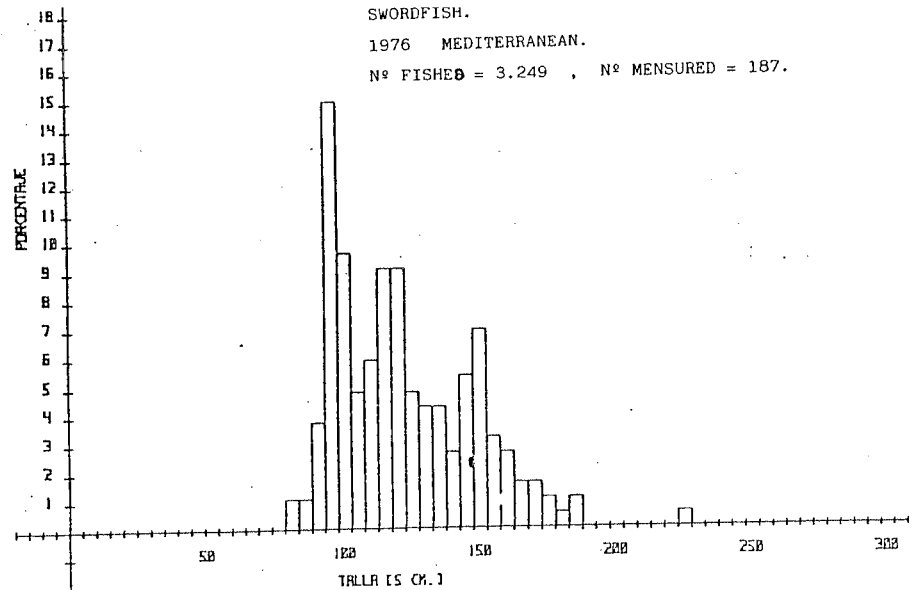


FIGURE 10.- Percentage length composition of swordfish caught by Spanish longline fishery in the Mediterranean Sea. 1976.

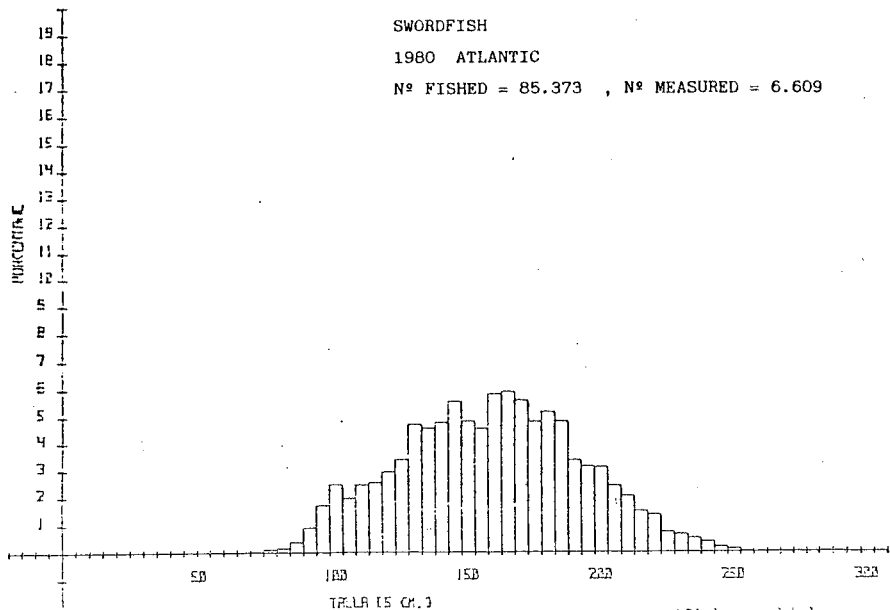


FIGURE 9.- Percentage length composition of swordfish caught by Spanish longline fishery in the Atlantic Ocean. 1980.

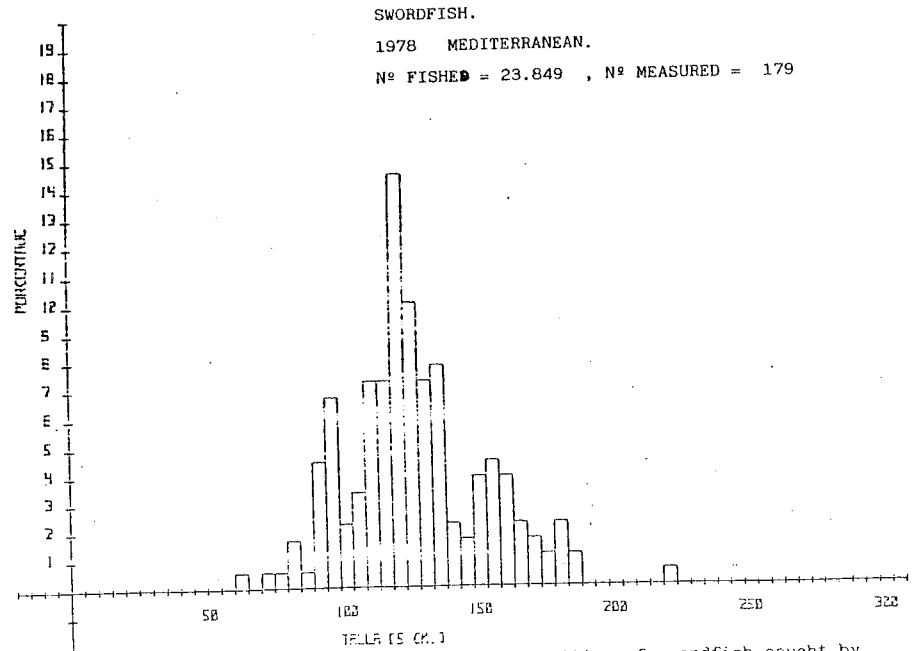


FIGURE 11.- Percentage length composition of swordfish caught by Spanish longline fishery in the Mediterranean Sea. 1978.

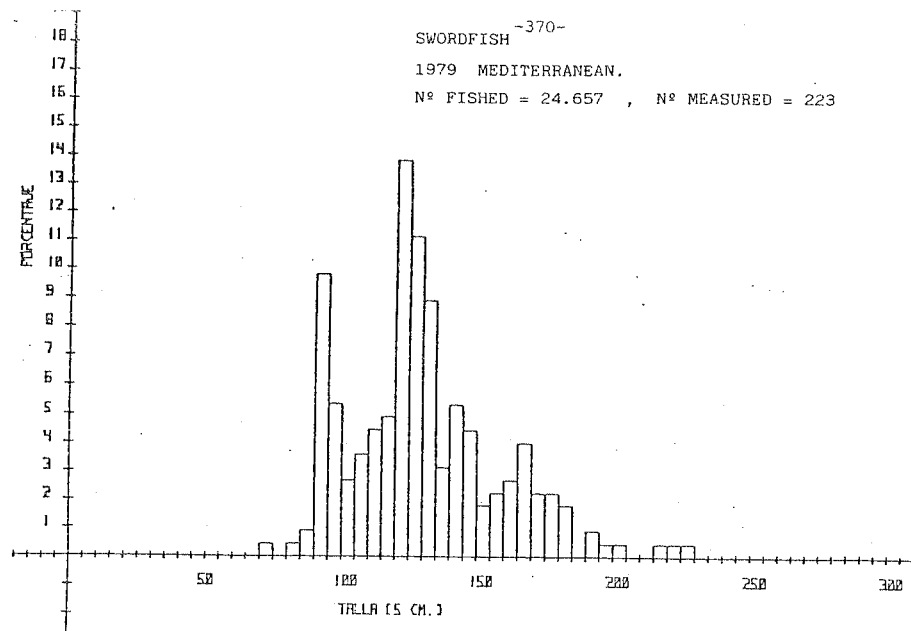


FIGURE 12.- Percentage length composition of swordfish caught by Spanish longline fishery in the Mediterranean Sea. 1979.

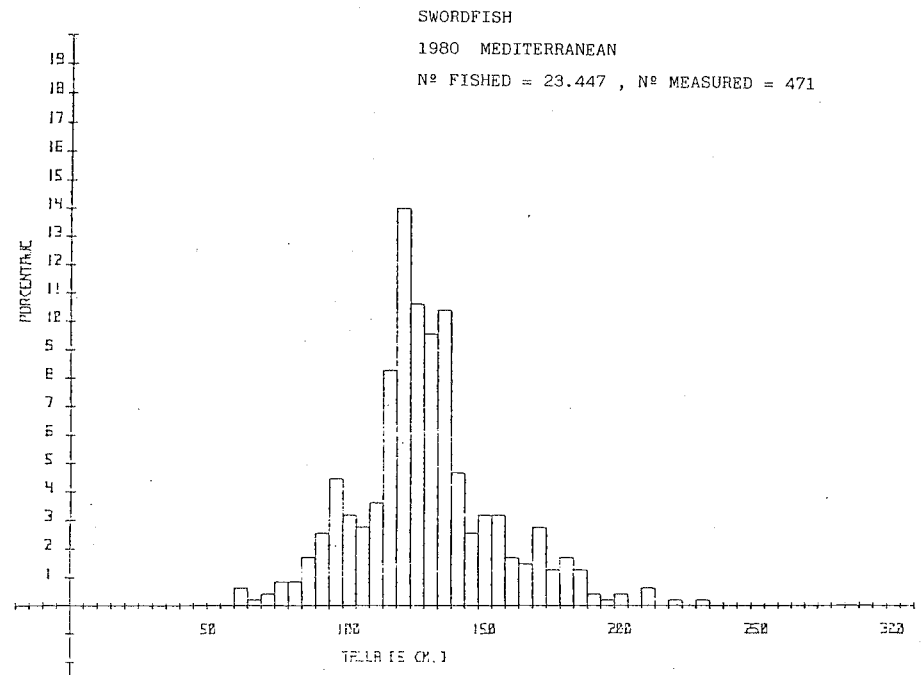


FIGURE 13.- Percentage length composition of swordfish caught by Spanish longline fishery in the Mediterranean Sea. 1980.