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Spiny Dogfish (*Squalus acanthias*) and Black Dogfish (*Centroscyllium fabricii*) Spanish
Data (Surveys and Fishery) in NAFO Divisions 3LMNO.

by

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ABSTRACT

The analysis of Spanish survey and fishery data from Divisions 3LMNO show that Spiny dogfish (*Squalus acanthias*) is not abundant and that this species appears in these Divisions sporadically and in depths of less than 500 meters.

Black dogfish (*Centroscyllium fabricii*) data show that this species is present in all Divisions, but is more abundant in Div. 3NO and in depths of more than 900 m. Biomass estimated from the 3NO survey displays an increasing trend over the last three years. Commercial catches of this species are mainly a by-catch of the Greenland halibut fishery in Div. 3LMNO. Size compositions are mainly in between 50 and 70 cm of length, both for commercial and survey catches.

INTRODUCTION

The aim of this paper is to review and present the Spanish information from surveys and commercial data for Spiny dogfish (*Squalus acanthias*) and Black dogfish (*Centroscyllium fabricii*) that were requested to the NAFO Scientific Council, in accord with the recommendation from the 2002 NAFO Symposium on Elasmobranchs Fisheries.

Part of this information had been presented by P. Duran *et al.* in 1999 for the period 1999-1998.

MATERIAL AND METHODS

Two sources of information have been used in this paper, data recorded by the National Scientific Observers and research survey data.

Length distributions samples of dogfish are measured to the centimetre below (total length).

National Scientific Observers Data (1999-2005)

Scientific observers on board collect fishing information (catches, positions, etc.) on a haul basis and carry out length and biological sampling of the main species in the catches. These observers do not cover all Spanish fleet effort, Table 1 shows the percentage of the total effort surveyed by the observers. It is assumed that the behaviour of the total fleet is similar to that of the sampled fleet.

Spiny dogfish (*Squalus acanthias*) data are very poor, probably because catches are very low and sporadic and the observers include all dogfish small catches in a single group. We do not analyse this species in the scientific observers data.

For Black dogfish, we analyse the data in three depth strata, to identify the fishery of which black dogfish is taken as bycatch.

Survey Data

The survey data analysed in this study come from two surveys, the Spanish bottom trawl Survey in 3NO (Platuxa), up to a depth of 1 450 m, and the EU Flemish Cap bottom trawl survey in 3M, up to a depth of 750 m. Characteristics of these surveys are described in González Troncoso *et al.* (2005) and Saborido Rey (2003).

Spanish bottom trawl Survey in 3NO (Platuxa) changed the vessel and gear in 2001. From 1997 to 2000 the vessel used was "*Playa de Menduiña*", with a "Pedreira" gear, whereas since 2001 the vessel is "*Vizconde de Eza*", with a "Campelen" gear. The two periods are not comparable due to these changes.

EU Flemish Cap bottom trawl survey in 3M changed vessels in 2003. From 1988 to 2002 the vessel used was "*Cornide de Saavedra*", whereas since 2003 it is "*Vizconde de Eza*". The two periods are not comparable due to this change.

RESULTS AND DISCUSSION

Commercial data (1999-2005)

The percentage of Black dogfish catches by depth stratum is presented in Table 2 and it shows that almost all the catches in all years were made in the strata of more than 700 meters depth where the Greenland halibut fishery takes place.

Table 3 presents for the period (1999-2005) the catches percentage by species and Division corresponding to all hauls where black dogfish was caught. The most abundant species in these hauls were the species of the Greenland halibut fishery in Div. 3LMN, whereas in Div. 3O those were the species of the Greenland halibut fishery and Redfish fishery.

Table 4 shows the effort in hours observed by Division and year in the strata of more than 700 meters depth and Table 5 presents the Black dogfish yields (Kg/H) by Division and year for these strata. The best yields of Black dogfish in these strata were recorded all years in Div. 3NO mainly in Div. 3O where in the last 3 years the CPUEs were the highest of the all series. In Div. 3LM the yields are lower and more constant.

Figure 1 presents the commercial catches length distribution samples by year, indicating the number of samples and the measured individuals. There were samples in only three years and the number of individuals sampled was very low, except for 2002. Only Div. 3M and 3N were sampled. The catches length range is mainly between 50 and 70 cm with several modes.

Survey Data

3NO Survey (1997-2005)

Table 6 and Fig. 2 present the Spanish 3NO survey estimate of Black dogfish biomass (t). It can be observed that this species only appears in strata deeper than 900 meters, and the main concentrations were found in strata of more than 1 100 meters.

There was an increasing trend from 2002 to 2005, with biomass estimates doubling in that period.

Figure 3 shows length distributions of survey catches. Most of the catches are in the range of 40-75 cm. Length distributions remain similar throughout the studied period.

Table 7 presents the Spanish 3NO survey estimate of Spiny dogfish biomass (t). The presence of this species in the survey catches has been sporadic and when it has appeared it has always been in strata of less than 500 m. of depth.

Flemish Cap Survey (1988-2005)

Table 8 presents the EU Flemish Cap Survey Black dogfish biomass. This species only appears occasionally, in three of the deepest strata of the survey.

Table 9 presents spiny dogfish biomass, which is very low. This species normally appears in strata of less than 500 m. of depth. Since 2001 (included), there have been no catches of this species in the Flemish Cap survey.

The number of individuals measured in length distributions samples of both species is very low and we believe that sampling sizes are not representative.

CONCLUSIONS

The analysis of Spiny dogfish (*Squalus acanthias*) Spanish survey and fishery data in Div. 3LMNO shows that biomass is not large and that this species appears sporadically, mainly in depths of less than 500 meters.

The analysis of Black dogfish (*Centroscyllium fabricii*) data shows that biomass of this species is present in all Divisions, but is more abundant in Div. 3NO and at depths of more than 900 m. In these Divisions, biomass displays an increasing trend over the last three years. Commercial catches of this species are mainly by-catch of the Greenland halibut fishery and, to a lesser extent, of the Redfish fishery in Div. 3O. Size compositions are mainly in between 50 and 70 cm of length, both in commercial and survey catches.

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Table 1.- Total Spanish fleet effort (days), effort with scientific observers (days) and percentage of coverage in NAFO by year.

Year	Total Effort (Days)	Obs. Effort (Days)	% Covert
1999	3967	340	8.57%
2000	5389	628	11.65%
2001	6181	494	7.99%
2002	5903	428	7.25%
2003	6873	248	3.61%
2004	5123	544	10.62%
2005	4015	615	15.32%

Table 2.- Percentage of Black dogfish (*Centroscyllium fabricii*) catches by year and depth stratum

Stratum	1999	2000	2001	2002	2003	2004	2005	Total
<200	0%	0%	0%	0%	0%	0%	0%	0%
200-700	2%	0%	0%	0%	0%	0%	0%	1%
>700	98%	100%	100%	100%	100%	100%	100%	99%

Table 3.- Percentage of catches for hauls where black dogfish was present, by species and Division for the period 1999-2005.

Species	3L	3M	3N	3O	Total
Greenland Halibut	82%	53%	56%	55%	61%
Roughhead grenadiers	7%	10%	11%	6%	10%
Antimora Rostrata	1%	12%	1%	1%	7%
Roundnose grenadiers	1%	11%	1%	1%	6%
Redfish	0%	1%	3%	11%	1%
Black dogfish	1%	2%	5%	8%	3%
Others	7%	11%	23%	18%	12%

Table 4.- Effort (hours) surveyed by Observers in strata deeper than 700 meters, by Division and year.

Division	1999	2000	2001	2002	2003	2004	2005	Total
3L	1837	2926	3993	2887	2515	5319	3353	22829
3M	2806	3066	1935	2096	827	1290	2823	14843
3N	287	1715	1234	1007	297	1226	840	6606
3O	15	73	22	70	10	50	37	277
Total	4944	7780	7184	6059	3650	7885	7053	44556

Table 5.- Black dogfish yields (Kg/h) in strata deeper than 700 meters, by Division and year.

Division	1999	2000	2001	2002	2003	2004	2005	Total
3L	0.8	0.1	0.6	0.7	0.3	0.5	0.2	0.4
3M	8.7	1.0	1.3	2.1	0.8	2.2	1.0	2.7
3N	8.0	4.1	0.6	6.7	9.6	2.0	3.5	3.8
3O	12.7	5.4	0.0	11.2	26.4	17.1	23.4	12.1
Total	5.7	1.4	0.8	2.3	1.3	1.1	1.1	1.8

Table 6 Spanish 3NO Survey estimates (by the swept area method) of Black dogfish biomass (t) by stratum and year. 1997-2001 are data from C/V *Playa de Menduña*. 2002-2005 are data from R/V *Vizconde de Eza*.

Strata	MinDepth	Max Depth	Division	1997	1998	1999	2000	2001	2002	2003	2004	2005
353	57	91	3O	0	0	0	0	0	0	0	0	0
354	93	183	3O	0	0	0	0	0	0	0	0	0
355	185	274	3O	0	0	0	0	0	0	0	0	0
356	275	366	3O	0	0	0	2	0	0	6	0	0
357	275	366	3N	0	0	0	0	0	0	0	0	0
358	185	274	3N	0	0	0	0	0	0	0	0	0
359	93	183	3N	0	0	0	0	0	0	0	0	0
360	57	91	3N	0	0	0	0	0	0	0	0	0
374	57	91	3N	0	0	0	0	0	0	0	0	0
375	0	56	3N	0	0	0	0	0	0	0	0	0
376	0	56	3N	0	0	0	0	0	0	0	0	0
377	93	183	3N	0	0	0	0	0	0	0	0	0
378	185	274	3N	0	0	0	0	0	0	0	0	0
379	275	366	3N	0	0	0	0	0	0	0	0	0
380	275	366	3N	39	0	0	0	0	0	0	0	0
381	185	274	3N	0	0	0	0	0	0	0	0	0
382	93	183	3N	0	0	0	0	0	0	0	0	0
721	367	549	3O	0	0	0	0	0	0	0	4	0
722	550	731	3O	0	3	0	0	0	22	0	15	0
723	367	549	3N	0	0	0	0	0	0	0	0	0
724	550	731	3N	0	0	0	0	0	0	6	11	3
725	367	549	3N	0	0	0	0	0	0	0	4	0
726	550	731	3N	0	0	0	0	3	0	0	0	8
727	367	549	3N	0	0	0	0	0	0	0	0	0
728	550	731	3N	0	0	0	0	0	0	0	0	0
752	732	914	3N	6	0	15	0	7	0	0	17	0
753	915	1097	3N	12	0	0	9	0	0	0	130	450
754	1098	1280	3N	662	3871	2112	10717	4273	721	277	138	112
755	1281	1463	3N	0	2324	4952	7227	10340	35	270	24	222
756	732	914	3N	0	0	4	0	0	0	0	0	0
757	915	1097	3N	227	0	0	106	23	23	0	0	45
758	1098	1280	3N	144	2436	71	5893	262	58	76	23	121
759	1281	1463	3N	0	2571	556	2130	2099	5	144	73	44
760	732	914	3N	0	7	0	0	0	9	0	217	332
761	915	1097	3N	190	0	769	282	768	8	0	260	343
762	1098	1280	3N	6295	3766	1161	3157	1919	36	449	503	475
763	1281	1463	3N	0	4330	3241	5770	3420	0	0	257	253
764	732	914	3O	0	18	5	195	16	20	0	123	0
765	915	1097	3O	1193	154	41	947	2027	14	20	123	602
766	1098	1280	3O	9185	4297	3311	3008	2737	682	360	254	146
767	1281	1463	3O	0	757	2518	2907	1836	147	394	199	590
TOTAL				17954	24534	18756	42351	29732	1780	2002	2373	3750
S.D.				5230	5264	3841	8989	6896	669	535	417	610

Table 7. Spanish 3NO Survey estimates (by the swept area method) of Spiny dogfish biomass (t) by stratum and year. 1997-2001 are data from C/V *Playa de Menduña*. 2001-2005 are data from R/V *Vizconde de Eza*.

Strata	Min Depth	Max Depth	Division	1997	1998	1999	2000	2001M	2001V	2002	2003	2004	2005
353	57	91	3O	0	0	0	64	0	0	8	0	0	0
354	93	183	3O	0	0	0	51	0	28	0	0	0	0
355	185	274	3O	0	0	0	5	0	0	0	0	0	0
356	275	366	3O	0	0	0	0	3	15	0	0	0	0
357	275	366	3N	0	0	0	221	21	0	0	0	0	0
358	185	274	3N	0	0	0	0	0	0	0	0	0	15
359	93	183	3N	0	0	0	0	0	0	0	0	0	0
360	57	91	3N	0	0	0	0	0	0	0	0	0	0
374	57	91	3N	0	0	0	0	0	0	0	0	0	0
375	0	56	3N	0	0	0	0	0	0	0	0	0	0
376	0	56	3N	0	0	0	0	0	26	0	0	0	0
377	93	183	3N	0	0	0	0	0	0	0	0	0	0
378	185	274	3N	0	0	0	0	0	0	0	0	0	0
379	275	366	3N	0	0	0	8	0	0	0	0	0	0
380	275	366	3N	0	0	0	0	0	0	0	0	0	0
381	185	274	3N	0	0	0	0	0	0	0	0	0	0
382	93	183	3N	0	0	0	0	0	0	0	0	0	0
721	367	549	3O	0	0	0	0	0	5	0	0	0	0
722	550	731	3O	0	0	0	0	0	0	0	0	0	0
723	367	549	3N	0	0	0	55	0	0	9	0	0	0
724	550	731	3N	0	0	0	0	0	0	0	0	0	0
725	367	549	3N	0	0	0	0	0	0	0	0	0	0
726	550	731	3N	n.s.	0	0	0	0	0	0	0	0	0
727	367	549	3N	0	0	0	0	0	0	0	0	0	0
728	550	731	3N	0	0	0	0	0	0	0	0	0	0
752	732	914	3N	0	0	0	0	0	0	0	0	0	0
753	915	1097	3N	0	0	0	0	0	0	0	0	0	0
754	1098	1280	3N	0	0	0	0	0	0	0	0	0	0
755	1281	1463	3N	n.s.	0	0	0	0	0	0	0	0	0
756	732	914	3N	0	0	0	0	0	0	0	0	0	0
757	915	1097	3N	0	0	0	0	0	0	0	0	0	0
758	1098	1280	3N	0	0	0	0	0	0	0	0	0	0
759	1281	1463	3N	n.s.	0	0	0	0	0	0	0	0	0
760	732	914	3N	0	0	0	0	0	0	0	0	0	0
761	915	1097	3N	0	0	0	0	0	0	0	0	0	0
762	1098	1280	3N	0	0	0	0	0	0	0	0	0	0
763	1281	1463	3N	n.s.	0	0	0	0	0	0	0	0	0
764	732	914	3O	0	0	0	0	0	0	0	0	0	0
765	915	1097	3O	0	0	0	0	0	0	0	0	0	0
766	1098	1280	3O	0	0	0	0	0	0	0	0	0	0
767	1281	1463	3O	n.s.	0	0	0	0	0	0	0	0	0
TOTAL				0	0	0	405	23	74	18	0	0	15
S.D.				0	0	0	77	34	28	13	0	0	14

Table 8 EU Flenish Cap Survey estimates (by the swept area method) of Black dogfish biomass (t) by stratum and year. 1988-2003 are original data from R/V *Cornide de Saavedra*. 2004-2005 are original data from R/V *Vizconde de Eza*.

Strata	Min Depth	Max Depth	Division	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1		144	3M																		
2	145	181	3M																		
3	182	254	3M																		
4	182	254	3M																		
5	182	254	3M																		
6	182	254	3M																		
7	255	365	3M				7														
8	255	365	3M																		
9	255	365	3M																		
10	255	365	3M																		
11	255	365	3M																		
12	366	547	3M																		
13	366	547	3M																		
14	366	547	3M																		
15	366	547	3M																		
16	548	730	3M			6				33			6	43					69	49	
17	548	730	3M											17			4	79	470	9	
18	548	730	3M			260										13			86		
19	548	730	3M																		
Total						266	7			33			6	60		17	79		625	58	

Table 9. EU Flenish Cap Survey estimates (by the swept area method) of Spiny dogfish biomass (t.) by stratum and year. 1988-2003 are original data from R/V *Cornide de Saavedra*. 2004-2005 are original data from R/V *Vizconde de Eza*.

Strata	Min Depth	Max Depth	Division	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1		144	3M																		
2	145	181	3M																		
3	182	254	3M																		
4	182	254	3M																		
5	182	254	3M	14												13					
6	182	254	3M				11		13												
7	255	365	3M																		
8	255	365	3M							17				12		19					
9	255	365	3M																		
10	255	365	3M											9		9					
11	255	365	3M												16						
12	366	547	3M					10													
13	366	547	3M																		
14	366	547	3M											11		10					
15	366	547	3M																		
16	548	730	3M																		
17	548	730	3M																		
18	548	730	3M																		
19	548	730	3M																		
Total				14			11	10	13	17		11	23	28	16	46					

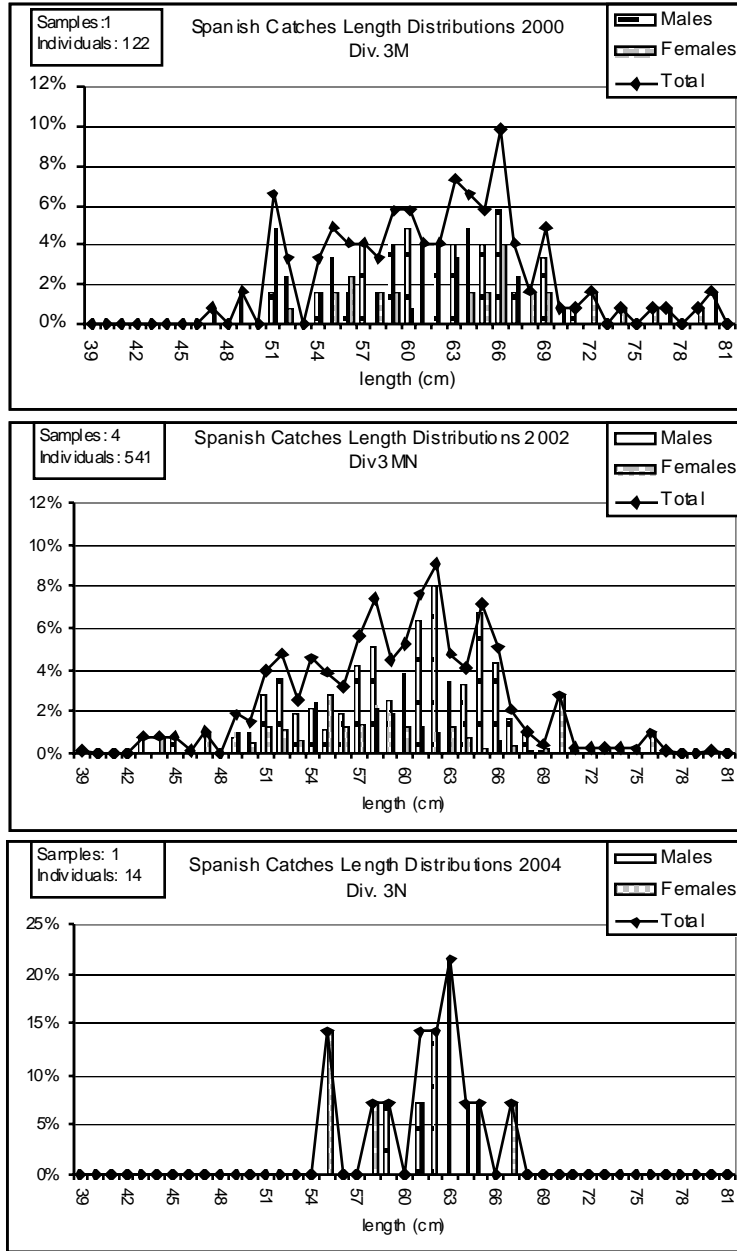


Fig. 1.- Black dogfish commercial catches length distribution samples, by year and sex.

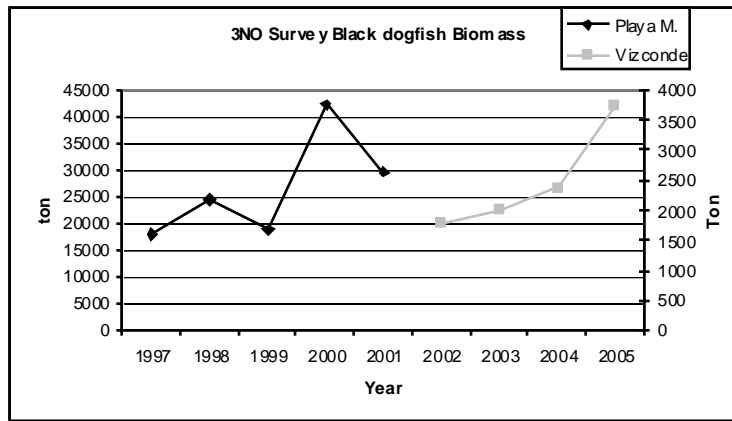


Fig. 2.- Spanish 3NO Survey estimates (by the swept area method) of Black dogfish biomass (t) by year. 1997-2001 are original data from C/V *Playa de Menduña*. 2002-2005 are original data from R/V *Vizconde de Eza*.

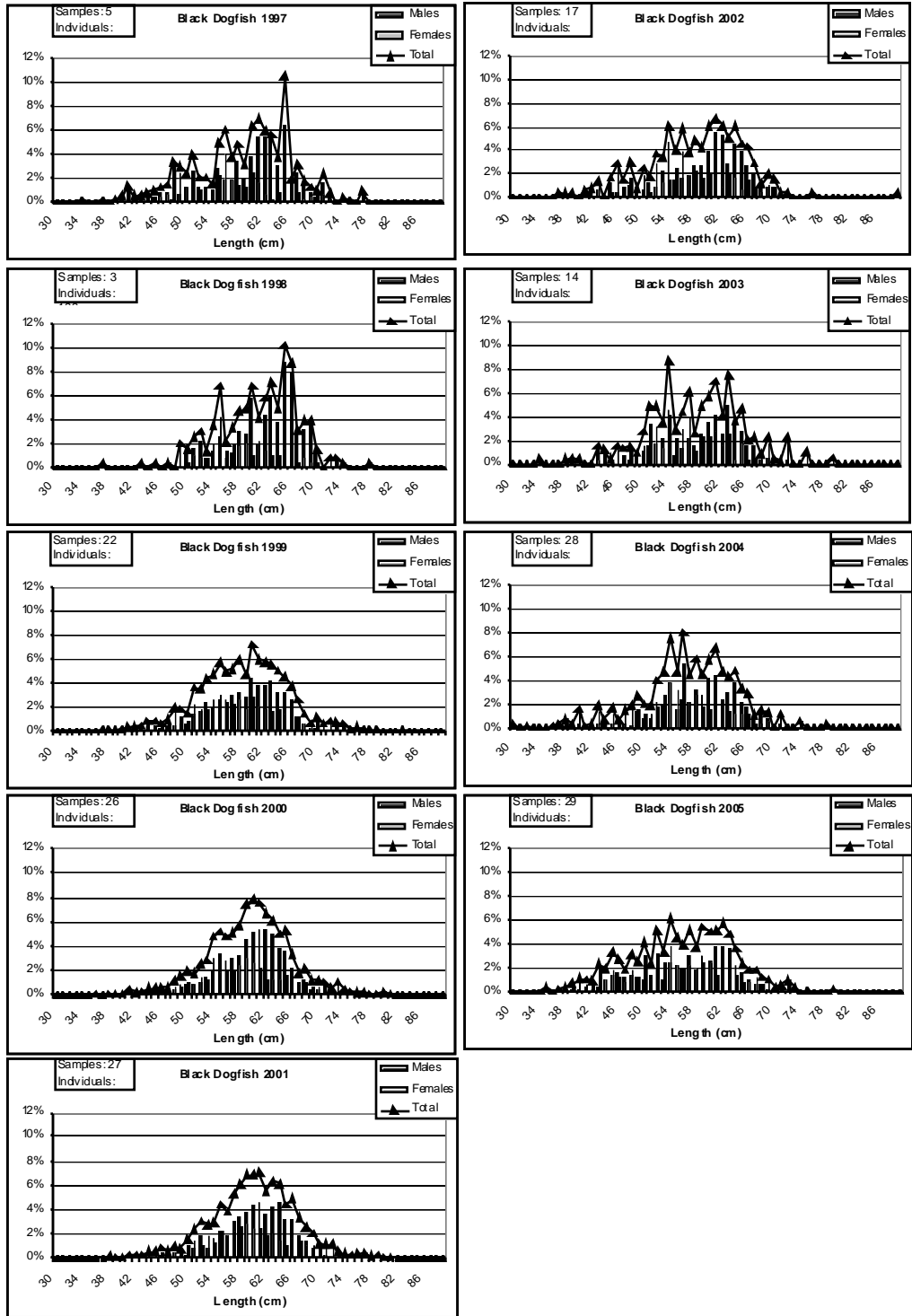


Fig. 3.- Spanish 3NO survey Black dogfish length frequencies by year and sex.