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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 | | | | | |

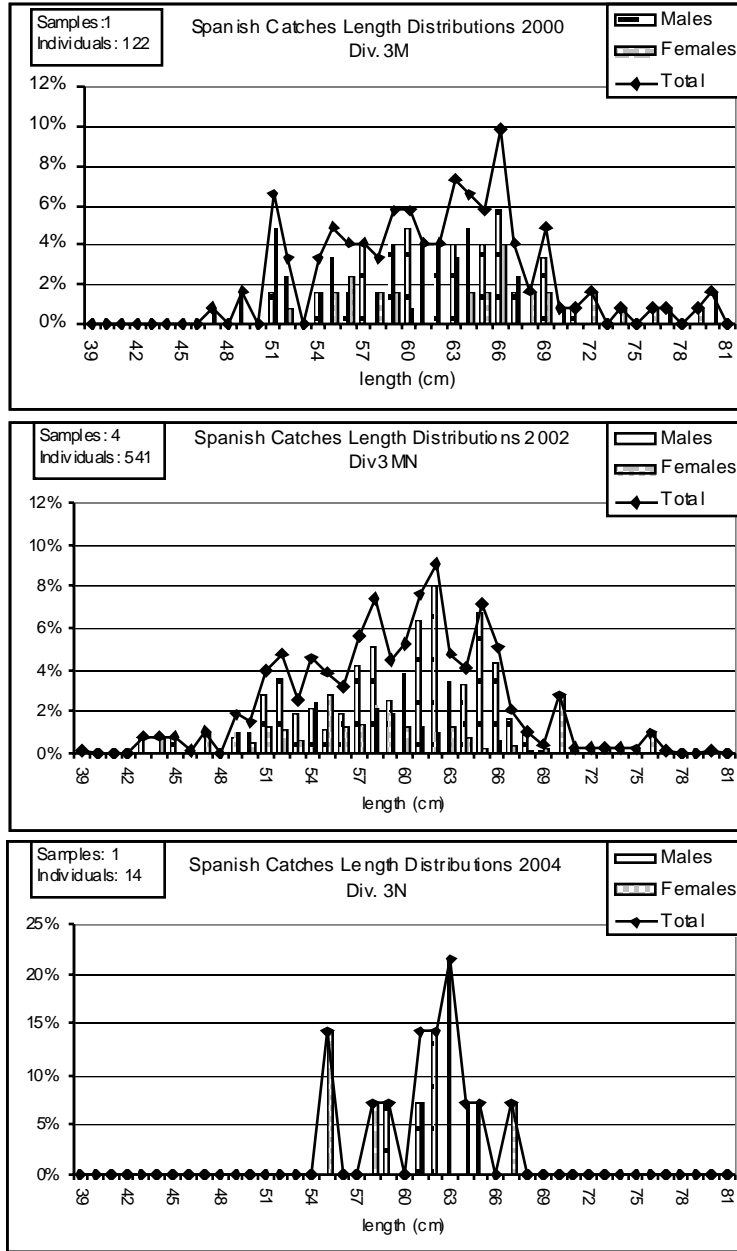


Fig. 1.- Black dogfish commercial catches length distribution samples, by year and sex.

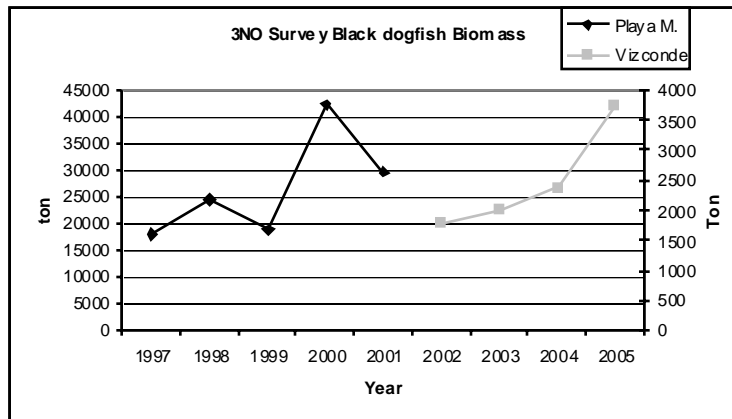


Fig. 2.- Spanish 3NO Survey estimates (by the swept area method) of Black dogfish biomass (t) by year. 1997-2001 are original data from C/V *Playa de Menduña*. 2002-2005 are original data from R/V *Vizconde de Eza*.

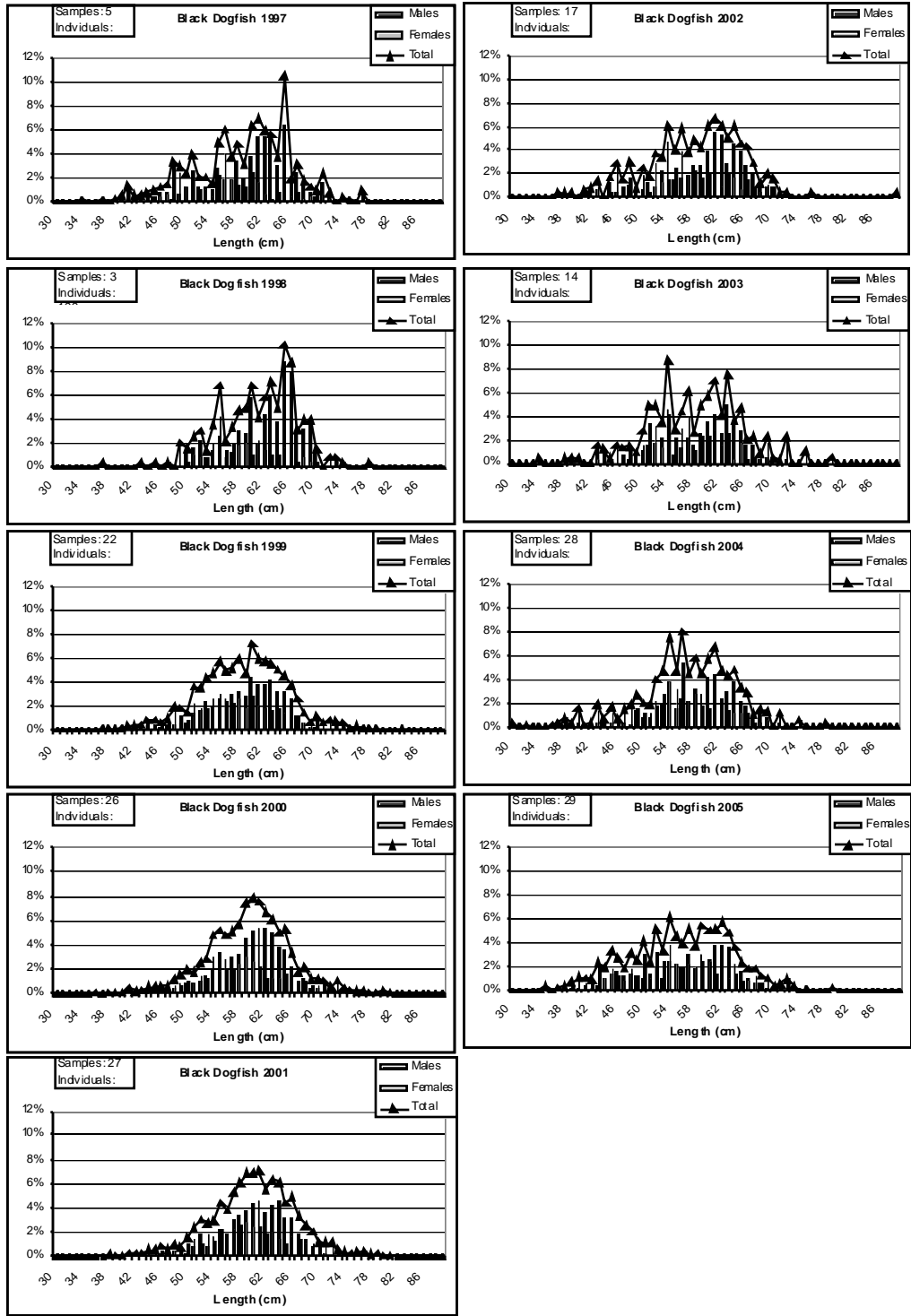


Fig. 3.- Spanish 3NO survey Black dogfish length frequencies by year and sex.