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DATA ON SHARKS IN NAFO DIVISIONS 3LMNO: 1991-1998

by

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ABSTRACT

A review of the species composition, distribution and abundance of sharks in both the Spanish commercial catches (1991-98) and research surveys (1988-98) are carried out. Shark species are by-catches of Greenland halibut fishery. The proportion of shark species in the total catch is small and the main retained species is the black dogfish, whereas the main discard is the boreal shark. Since 1996 the retained proportion of black dogfish increase notably, as well as the proportion of total sharks. In the surveys this shark is the species with the highest biomass index. Black dogfish is found in the deepest waters. The length range of black dogfish is mainly between 50 and 80 cm, with a mode about 62-63 cm. No evident geographic pattern in the length distribution is observed during the studied period.

KEY WORDS: Sharks, black dogfish, boreal shark, length distribution, Grand bank, Flemish Cap.

INTRODUCTION

In recent years the catches of non-traditional resources in NAFO area have been increasingly important (Durán et al., 1997; Junquera and Paz, 1998). Due to their ecological characteristics, Elasmobranchs are species highly sensitive to exploitation. Besides, the incidence of fishing activity on species other than the target ones is an important issue in fisheries management (Saila, 1983). Accordingly, in 1998 NAFO Fisheries Commission recommended the analysis on the distribution and abundance of Elasmobranch species in NAFO area.

In this paper a review of the species composition, distribution and abundance of sharks in both the Spanish commercial catches and surveys are carried out.

MATERIAL AND METHODS

Two sources of information have been used: data recorded by the national scientific observers in the Greenland halibut commercial fishery and research survey data.

Commercial catch data (1991 –1998)

The observers on board the Greenland halibut Spanish fleet provide data on catches/discards by species, depth and position in a haul and year round basis. In addition, length distributions and other biological sampling of the main species are also available. Sharks are measured to the centimetre below (total length) in random samples of the hauls.

Fishing activity of this fleet is performed from 800 to 1800 m. depths. The distribution by depth of the hauls sampled appears in Table 1 and Figure 1. For summarising the results, eight 100 m. depth strata have been defined (from 800 to < 1500 m.). To assess the importance of the main shark species in the catches, the catch rates (Kg /hour fishing) by depth strata and year are presented.

Survey data (1988-98)

The surveys involved in this study appears in Table 2. Surveys characteristics are described in Paz et al. (1995) and Vázquez (1996). For every survey, the biomass index (swept area estimate) by species have been obtained.

RESULTS AND DISCUSSION

Commercial catch

Shark species are by-catches of Greenland halibut fishery. The proportion of shark species in the total catch is small, never exceeding 4.7%, though it increases in the last years (Figure 2). The black dogfish (*Centroscylliumm fabricii*) is the main shark species in the retained catch, whereas the main species in the discard is the boreal shark (*Somniosus microcephalus*) (Figure 3). Since 1996 the retained proportion of black dogfish increase notably, as well as the proportion of total sharks (including both black dogfish and others n.s. species). The catch rates (Kg /hour fishing), by depth strata, year and division appears in Table 3.

The length distribution of black dogfish in the commercial catches are shown in Figure 4. The length range in the catches is mainly between 50 and 80 cm, with a mode about 62-63 cm. No evident geographic pattern in the length distribution is observed during the studied period.

The geographic distribution of the black dogfish and boreal shark appear in Figure 1. Black dogfish is more abundant in the 3NO catches, while boreal shark is in northern 3LM

Survey data

The distribution of the main shark species catches in the Spanish spring bottom trawl surveys in Div. 3NO, is present in Figure 5. Black dogfish constitute largely the main species, followed by the deepsea cat shark (*Apristurus sp*) and the spiny dogfish (*Squalus acanthias*), both much less abundant.

Black dogfish and deepsea cat shark are found in the deepest strata beyond 500 m, while spiny dogfish is caught in shallower waters, mainly 200 and 500 m.

Survey results indicate large concentrations of black dogfish in Div. 3NO, which are consistently detected in the period 1996 – 98.

Biomass indexes by species in the Spanish spring survey in are shown in Table 4. The highest values are observed at depth beyond 900 m in the period 1996-98. Black dogfish and deepsea cat shark biomass indexes increases from 1996 to 1998, though it can be explained by the increase in the surveyed depth. Black dogfish is the species with the highest biomass index.

Biomass indexes by species in the UE summer survey in Div. 3M are shown in Table 5. Biomasses are low for all the species, and the presence is only occasional, because in this survey only depths up to 730 m are surveyed, and according the other results, shark species, except spiny dogfish, mainly distributed in deeper waters. Significant biomass of black dogfish was only observed in 1990.

The length distribution of black dogfish in the Spanish 3NO spring survey (1997-98) appears in Figure 6. Males dominated in the catches for all the length classes. Both length range and modal length coincides with the ones from the commercial catch, mainly between 50 and 80 cm.

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TABLE 1.- Number of commercial hauls sampled by depth strata, month, year and Division. Spanish Greenland halibut fishery (NAFO Divs. 3LMNO): 1991-1998.

Div. 3L

Year 1991

Depth (m)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
801-900							9	175	107	13	4	30
901-1000							14	70	45	60	53	46
1001-1100							45	126	133	190	131	64
1101-1200							13	102	107	129	97	26
1201-1300								3	37	22	34	35
1301-1400								1	2	1	3	20
1401-1500												7
> 1501									1			1

Year 1992

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
103	126	86	223	250	186	139	117	176	67	47	134
34	86	111	172	224	131	121	102	70	45	65	39
62	143	112	249	337	188	83	126	62	84	71	22
27	80	106	141	234	119	33	69	59	43	40	11
10	27	40	161	234	148	8	19	53	22	33	40
4	10	7	39	76	20	2		3			
			17	33	6						
	1	1	4	10	1						

Year 1993

Depth (m)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
801-900	73	86	62	49	27	40		53	109	41	35	97
901-1000	59	71	63	57	24	16	5	29	33	13	36	33
1001-1100	72	70	53	61	66	22		13	22	15	37	36
1101-1200	50	61	78	70	53	22	4	2	4	1	31	26
1201-1300	18	50	44	38	42	30		1		1	50	24
1301-1400	17	41	26	6					1		2	8
1401-1500		9	12						1			
> 1501		2	12			1						

Year 1994

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
49	16	27	28	51	40	31	87	76	59	81	104
57	47	10	16	27	23	16	40	39	18	39	51
48	46	12	28	31	27	10	20	27	23	52	48
8	33	11	31	34	11	11	7	4	27	48	23
4	32	7	24	41	38	4	3	3	31	38	8
2	20	1	5	11	2				1	6	5
2	9			1	1					4	1
	2				1						

Year 1996

Depth (m)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
801-900		1	36	6	15				3	13	13	8
901-1000		10	24	15	5				5	14	14	12
1001-1100		19	26	19	1				6	21	16	16
1101-1200	3	40	21	18					7	16	20	17
1201-1300	8	45	8	1					3	10	10	20
1301-1400	1	15	4							1	6	17
1401-1500		6										1
> 1501		2										

Year 1997

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5	13	2	1	8		6	2		1	9	12
24	15	3	6	10		8	4		1	16	7
13	19	4	5	10		7	6			16	8
20	23	9	6			2	10			11	8
2	11	11				2	11			4	3
1	4	9								1	
1	2	6									

Year 1998

Depth (m)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
801-900	2	1	7	2	8	17	37	40	1	1		
901-1000	1	5	2	3	4	1	13	18		2		
1001-1100	3	16	15	14	8			15	1			
1101-1200				9	2			8		1		
1201-1300					1			3		1		
1301-1400					1							
1401-1500								2				
> 1501												

Div. 3M

Year 1991

Depth (m)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
801-900							4	14	9	4	23	42
901-1000							12	55	50	6	6	8
1001-1100							69	149	155	108	64	24
1101-1200							191	348	310	316	301	58
1201-1300							47	95	110	162	208	51
1301-1400							1	27	43	83	174	32
1401-1500								7	30	62	41	10
> 1501									2	22	9	5

Year 1992

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	6	41	2	6	4	6	3	4	2	4	9
18	86	93	36	48	35	23	22	10	5	7	20
110	214	245	122	88	59	51	63	5	6	10	10
110	316	385	214	116	114	33	60	21	11	9	5
14	121	187	78	64	53	6	1	9	2		1
2	17	45	35	38	33			3	4		
	7	24	11	9	1				1		
1		1		1							

Year 1993

Depth (m)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
801-900							9	15	12	6	23	44
901-1000							19	56	59	10	6	28
1001-1100							84	160	156	112	66	28
1101-1200							204	370	318	323	305	58
1201-1300							47	95	111	162	208	51
1301-1400							1	27	43	83	174	32
1401-1500								7	30	62	41	10
> 1501									2	22	9	5

Year 1994

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
7	3	2	2	1	1		4	2	4	1	
27	20	33	35	14	7	7	9	13	7	8	2
36	74	70	79	61	36	9	13	16	14	13	
24	87	130	50	38	45	9	4	10	16	8	
6	20	47	14	41	28	6	1	4	21	4	
2	2	14	8	11	3				4		
1			1	1					4	1	

Year 1996

Depth (m)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
801-900			4							1		
901-1000			11	4	6				1	1	4	1
1001-1100		3	30	7	11				3	3	2	
1101-1200	2	6	23	19	8				10	10	5	
1201-1300	1	5	7	6					6	8	2	
1301-1400		1										
1401-1500												
> 1501												

Year 1997

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
				1		1					
25		6	2	4		1	2			2	
		9	9			3	6				
		5	10	1		12	6			1	
				2		1	4				
						1					

Year 1998

Depth (m)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
801-900						1	2					
901-1000		4	2		2		6	5				
1001-1100	2	13	9	7	4	1	5	4				
1101-1200	1	11	6	8	4	1						
1201-1300					2		1					
1301-1400					8							
1401-1500					1							
> 1501												

TABLE 1.- (Cont.) Number of commercial hauls sampled by depth strata, month, year and Divs. Spanish Greenland halibut fishery (NAFO Divs. 3LMNO): 1991-1998.

Div. 3NO

Year 1991

Depth (m)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
801-900									1	2		
901-1000										9		
1001-1100									1	3	1	
1101-1200										2		
1201-1300										1		
1301-1400												
1401-1500												
> 1501												

Year 1992

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		1				2	92	122	100	154	2
		1				4	77	150	121	84	5
						1	48	89	117	98	4
		1				1	12	44	76	42	
						1	5	6	9	5	
									2		
									2		
									1	1	

Year 1993

Depth (m)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
801-900			19	79	33	95	145	171	96	110	76	5
901-1000			47	135	125	58	152	93	72	97	92	5
1001-1100		2	30	69	101	55	101	129	72	118	90	18
1101-1200			10	42	56	31	66	98	55	110	115	46
1201-1300				10	3	7	20	87	27	77	165	58
1301-1400				1		1	6	33	11	17	33	29
1401-1500				1			1	4		5	3	2
> 1501								5	1	1	3	2

Year 1994

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	15	70	82	47	80	13	46	96	112	24	23
1	40	81	65	66	68	12	49	59	44	27	27
	42	52	89	70	36	23	36	23	31	49	10
	24	57	64	82	23	19	14	25	24	61	8
	14	43	60	88	17	9	18	9	31	45	13
	5	21	21	52	3	1	19	1	5	29	8
	3	3	2	15	9					9	2
		1	2	4				1	8	1	3

Year 1996

Depth (m)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
801-900									9			
901-1000		2							8			
1001-1100		1							7			
1101-1200		6							3			
1201-1300		1										
1301-1400									1			
1401-1500												
> 1501												

Year 1997

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
				1		6	7	5			
						5	16	6	1		
				1		5	9	5			
						2	7	3			
						1	2				
							1				

Year 1998

Depth (m)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
801-900						11	13	14	17	3		
901-1000						18	11		27	12		
1001-1100						14	6		1	6		
1101-1200								2	5	3		
1201-1300								1	3			
1301-1400												
1401-1500												
> 1501												

TOTAL all Divs.

Year 1991

Depth (m)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
801-900							13	189	117	19	27	72
901-1000							26	125	95	75	59	54
1001-1100							114	275	289	301	196	88
1101-1200							204	450	417	447	398	84
1201-1300							47	98	147	185	242	86
1301-1400							1	28	45	84	177	52
1401-1500								7	30	62	41	17
> 1501									3	22	9	6

Year 1992

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
103	132	128	225	256	190	127	186	232	145	200	71
52	172	205	208	272	166	93	175	182	157	156	27
172	357	357	371	425	247	89	196	147	193	176	28
137	396	492	355	350	233	48	89	93	107	86	15
24	148	227	239	298	201	15	22	66	31	35	37
6	27	52	74	114	53	2		6	6		
	7	24	28	42	7				3		
1	1	2	4	11	1				1	1	

Year 1993

Depth (m)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
801-900	60	86	80	138	60	132	145	212	208	152	111	98
901-1000	55	87	123	229	150	75	152	129	99	111	129	38
1001-1100	76	90	161	199	168	78	101	147	87	139	127	61
1101-1200	53	80	158	165	124	70	68	101	60	125	147	77
1201-1300	18	50	65	52	56	37	20	88	27	93	215	81
1301-1400	17	41	29	12	16	7	6	33	12	17	35	37
1401-1500		9	12	1	3		1	4	1	6	3	2
> 1501		2	12					5	1	2	3	2

Year 1994

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
56	34	99	112	99	121	44	137	174	175	106	127
85	107	124	116	107	98	35	98	111	69	74	80
84	162	134	196	162	99	42	69	66	68	114	58
32	144	198	145	154	79	39	25	39	67	117	31
10	66	97	98	170	83	19	22	16	83	87	21
4	27	36	34	74	8	1	19	1	10	35	13
3	12	3	3	17	10				4	14	3
	2	1	2	4	1			1	8	1	3

Year 1996

Depth (m)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
801-900		1	40	6	15				12	14	13	8
901-1000		12	35	19	11				14	15	18	13
1001-1100		23	56	26	12				16	24	18	16
1101-1200	5	52	44	37	8				20	26	25	17
1201-1300	9	51	15	7					9	18	12	20
1301-1400	1	16	4						1	1	6	17
1401-1500		6										1
> 1501		2										

Year 1997

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5	13	2	1	10		13	9	5	1	9	12
49	15	9	8	14		14	22	6	2	18	7
13	19	13	14	11		15	21	5		16	8
20	23	14	16	1		16	23	3		12	8
2	11	11		2		4	17			4	3
1	4	9				1	1			1	
1	2	6									

Year 1998

Depth (m)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
801-900	2	1	7	2	8	29	52	54	18	4		
901-1000	1	9	4	3	6	19	30	23	27	14		
1001-1100	5	29	24	21	12	15	11	19	2	6		
1101-1200	1	11	6	17	6	1		10	5	4		
1201-1300					3		1	4	3	1		
1301-1400					9							
1401-1500					1			2				
> 1501												

TABLE 2.- Description of the research surveys involved in this study.

A.- Spanish spring bottom trawl surveys for NAFO Divs. 3NO

Year	Period	Depth strata (m)	Vessel	Valid tows
1995	May	>56 - 731	C/V Playa de Menduiña	77
1996	May	>56 - 1097	C/V Playa de Menduiña	112
1997	April-May	>56 - 1280	C/V Playa de Menduiña	128
1998	May	>56 - 1463	C/V Playa de Menduiña	124

Number of Valid tows sampled by depth strata and year

Depth strata (m)	1995 Survey	1996 Survey	1997 Survey	1998 Survey
>56 -274	69	76	77	68
274-549	5	14	15	17
550-731	3	6	9	7
732-914	-	8	5	8
915-1097	-	8	9	8
1098-1280	-	-	13	8
1281-1463	-	-	-	8
TOTAL	77	112	128	124

B.- UE summer bottom trawl surveys for NAFO Div. 3M

Year	Period	Depth strata (m)	Vessel	Valid tows
1988	July	120 - 730	R/V Cornide de Saavedra	115
1989	July	120 - 730	R/V Cryos	116
1990	July- Aug	120 - 730	R/V Ignat Pavlyuchenkov	113
1991	June- July	120 - 730	R/V Cornide de Saavedra	117
1992	July	120 - 730	R/V Cornide de Saavedra	117
1993	June- July	120 - 730	R/V Cornide de Saavedra	101
1994	July	120 - 730	R/V Cornide de Saavedra	116
1995	July	120 - 730	R/V Cornide de Saavedra	121
1996	July	120 - 730	R/V Cornide de Saavedra	117
1997	July	120 - 730	R/V Cornide de Saavedra	117
1998	July	120 - 730	R/V Cornide de Saavedra	119

TABLE 3.- Catch ratio (Kr/hr) of the main sharks species by depth strata and year. Spanish Greenland halibut fishery (NAFO Divs. 3LMNO):1991-98. Depth strata (m): A = 801-900; B = 901-1000; C = 1001-1100; D = 1101-1200; E = 1201-1300; F = 1301-1400; G = 1401-1500; H >1500.

Year 1991

Black dogfish

Divs.	A	B	C	D	E	F	G	H	TOTAL
	Depth strata								
3L		0.1							0.0
3M		0.6	0.2	0.0		0.0			0.1
3NO									
ALL DIVS.		0.3	0.1	0.0		0.0			0.1

Boreal shark

Divs.	A	B	C	D	E	F	G	H	TOTAL
	Depth strata								
3L		2.7	1.2	0.6					1.0
3M		0.7	0.8	1.0	0.6	0.5	2.1		0.9
3NO									
ALL DIVS.	0.0	2.0	1.0	0.9	0.5	0.5	2.0	0.0	0.9

Year 1992

Black dogfish

Divs.	A	B	C	D	E	F	G	H	TOTAL
	Depth strata								
3L	0.5	0.7	0.7	0.8	1.1	5.9	15.1		0.9
3M	1.7	2.6	3.2	1.8	1.3	5.3	5.7	5.6	2.4
3NO	1.1	0.8	0.4	0.4	1.0				0.7
ALL DIVS.	0.6	1.1	1.5	1.4	1.2	5.5	9.5	0.9	1.4

Boreal shark

Divs.	A	B	C	D	E	F	G	H	TOTAL
	Depth strata								
3L	0.3	0.5	0.4	2.3	1.5	3.3			0.9
3M	4.8	0.5	0.8	0.9	0.5	3.2	3.5		1.0
3NO			0.8	1.7					0.5
ALL DIVS.	0.5	0.4	0.6	1.4	1.0	3.2	2.0		0.9

Year 1993

Black dogfish

Divs.	A	B	C	D	E	F	G	H	TOTAL
	Depth strata								
3L	0.2	0.7	1.3	1.7	1.9	8.4	5.8	8.8	1.2
3M	1.2	3.7	3.9	3.0	0.5				3.1
3NO	1.2	3.3	8.4	10.7	14.0	11.8	3.0	2.4	6.8
ALL DIVS.	0.3	0.5	0.9	1.1	1.3	4.6	3.9	6.1	0.9

Boreal shark

Divs.	A	B	C	D	E	F	G	H	TOTAL
	Depth strata								
3L	0.1	0.3	0.3	1.9	0.4				0.5
3M		0.2	0.4	0.4	4.2				0.6
3NO	0.6	1.2	0.3	3.0	2.0	2.1	0.1		1.3
ALL DIVS.	0.1	0.0	0.1	0.9	0.9	0.6			0.3

Year 1996

Black dogfish

Divs.	A	B	C	D	E	F	G	H	TOTAL
	Depth strata								
3L	0.4	0.4	1.2	1.7	2.5	2.9	12.4	17.9	1.6
3M		2.4	3.6	1.5	1.3	3.8			2.2
3NO		1.1	3.1	11.7	24.8				4.0
ALL DIVS.	0.3	0.9	2.1	1.9	2.4	2.8	12.4	17.9	1.8

Boreal shark

Divs.	A	B	C	D	E	F	G	H	TOTAL
	Depth strata								
3L	4.1	4.0	7.3	6.4	13.4	25.5	25.1		8.5
3M			8.3	3.1					3.6
3NO						116.3			2.9
ALL DIVS.	3.5	2.9	7.4	4.9	9.8	26.6	25.1		7.0

Year 1997

Black dogfish

Divs.	A	B	C	D	E	F	G	H	TOTAL
	Depth strata								
3L	0.1	1.7	2.3	5.8	1.2	3.4	2.3		2.5
3M		0.9	0.3	1.1	4.0				1.0
3NO									
ALL DIVS.	0.1	1.3	1.6	3.8	1.6	3.0	2.3		1.9

Boreal shark

Divs.	A	B	C	D	E	F	G	H	TOTAL
	Depth strata								
3L	20.2	7.2	12.7	6.5	9.3	12.2	36.1		11.1
3M		8.2		2.4					3.2
3NO		23.1	14.2	19.6					14.0
ALL DIVS.	14.7	9.8	9.8	6.2	7.3	11.0	36.1		9.7

Year 1998

Black dogfish

Divs.	A	B	C	D	E	F	G	H	TOTAL
	Depth strata								
3L	0.8	1.7	3.1	2.4	0.3				1.9
3M		1.1	1.3	2.1					1.4
3NO	2.3	3.1	5.3	4.4	2.0				3.2
ALL DIVS.	1.3	2.2	2.8	2.4	0.8				2.1

Boreal shark

Divs.	A	B	C	D	E	F	G	H	TOTAL
	Depth strata								
3L	1.4	4.6	11.1	11.8					6.0
3M		7.0		10.4					4.5
3NO		7.8		8.5					3.8
ALL DIVS.	0.9	6.5	5.8	10.6					5.1

TABLE 4 .- Biomass indexes (tonnes) of sharks by depth strata and year. Spanish spring bottom trawl surveys for NAFO Divs. 3NO: 1996-98.

	1995 Survey			1996 Survey			1997 Survey			1998 Survey		
Depth strata(m)	Black dogfish	Sharks n.s.	Total sharks	Black dogfish	Sharks n.s.	Total sharks	Black dogfish	Sharks n.s.	Total sharks	Black dogfish	Sharks n.s.	Total sharks
0-274	-	-	-	-	20.7	20.7	-	-	-	-	51.1	51.1
275-549	-	-	-	-	-	-	39.5	-	39.5	-	21.0	21.0
550-731	-	-	-	11.3	-	11.3	-	-	-	5.4	25.1	30.4
732-914	-	-	-	-	-	-	6.0	16.0	22.0	24.7	45.0	69.6
915-1097	-	-	-	365.5	56.3	421.8	1621.6	65.8	1687.4	331.9	63.2	395.1
1098-1280	-	-	-	-	-	-	16286.4	179.6	16466.0	21499.6	88.0	21587.6
1281-1463	-	-	-	-	-	-	-	-	-	10765.1	2526.0	13291.1
TOTAL	-	-	-	376.8	77.0	453.8	17953.5	261.4	18214.9	32626.6	2819.3	35445.9

TABLE 5.- Biomass indexes (tonnes) of the sharks caught in the EU summer surveys in Div. 3M.

	1988	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
Squalidae n.s.	19	-	-	-	-	-	-	-	-	-	-
Spiny dogfish	14	-	-	11	10	14	17	-	11	23	28
Great lanternshark	38	-	-	11	82	-	31	22	-	-	-
Black dogfish	-	-	239	7	-	-	33	-	-	6	61

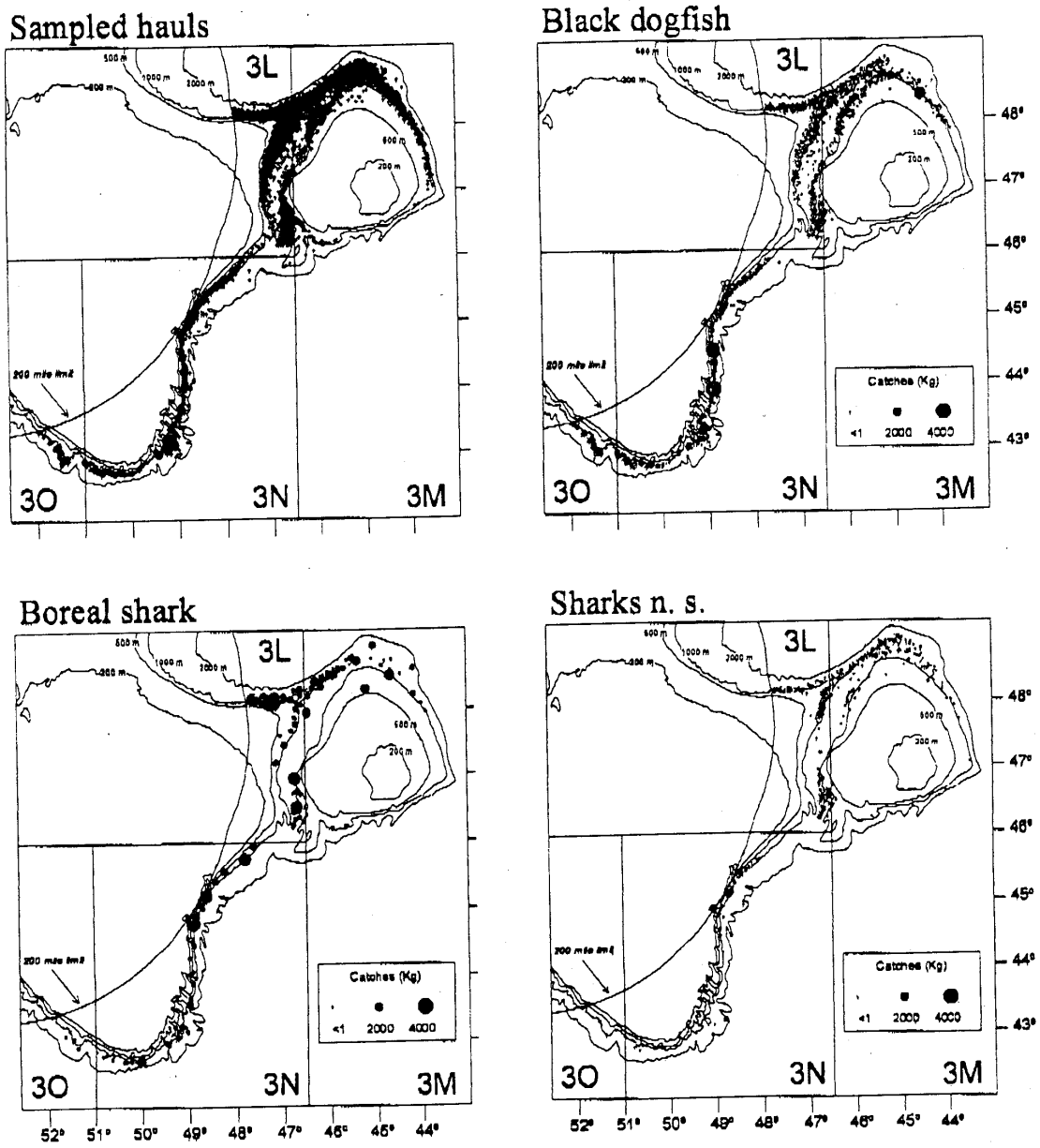

Fig. 1.- Maps showing the distribution of the sampled hauls and main shark catches from the Spanish Greenland Halibut Fishery (NAFO Divs. 3LMNO): 1991-98. Symbols represent catch in weigth (Kg) per tow.

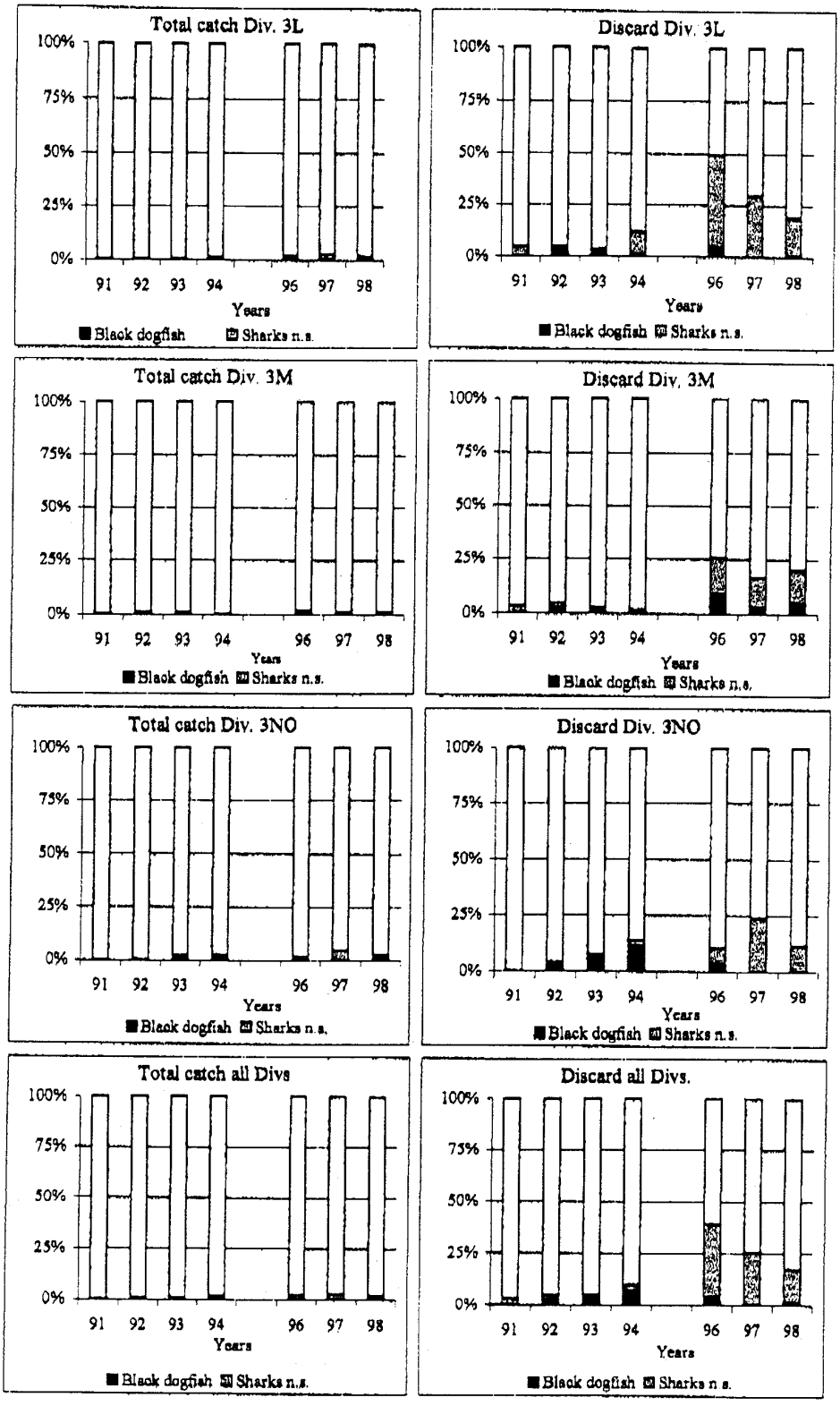

Fig. 2.- Proportion of sharks species in the total catches and discards. Spanish Greenland halibut fishery (NAFO Divs. 3LMNO): 1991-98.

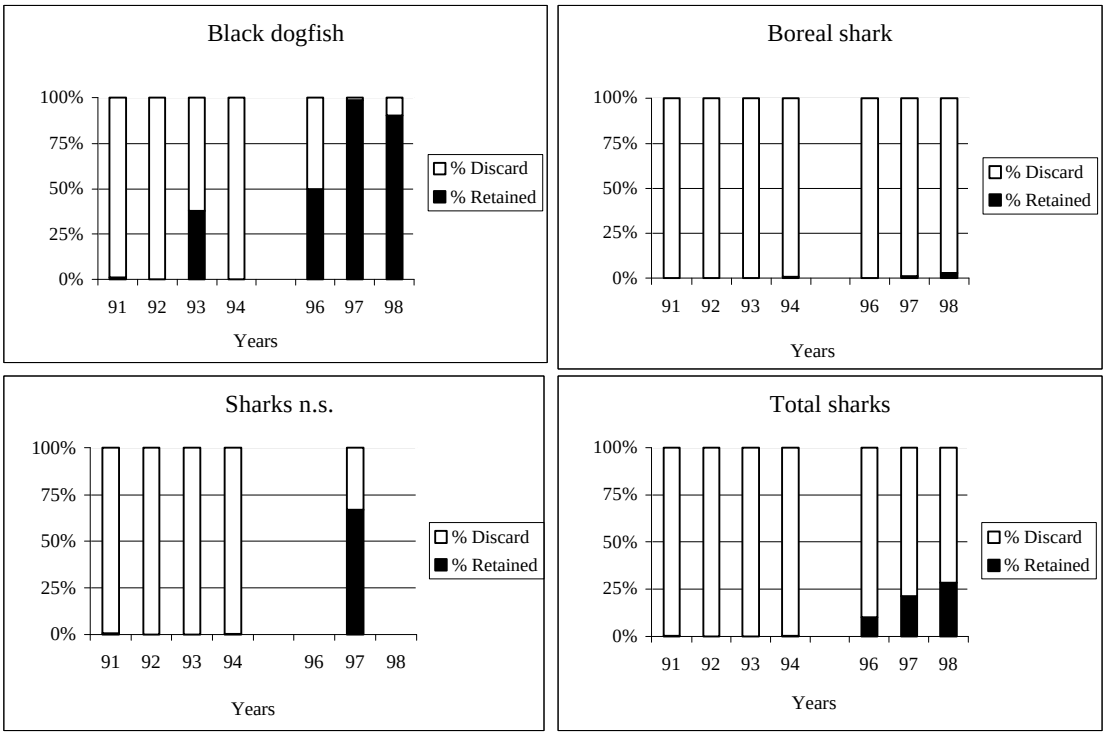

Fig. 3.- Retained catch and discard ratio (%) for main sharks species by year. Spanish Greenland Halibut Fishery (NAFO Divs. 3LMNO): 1991-98.

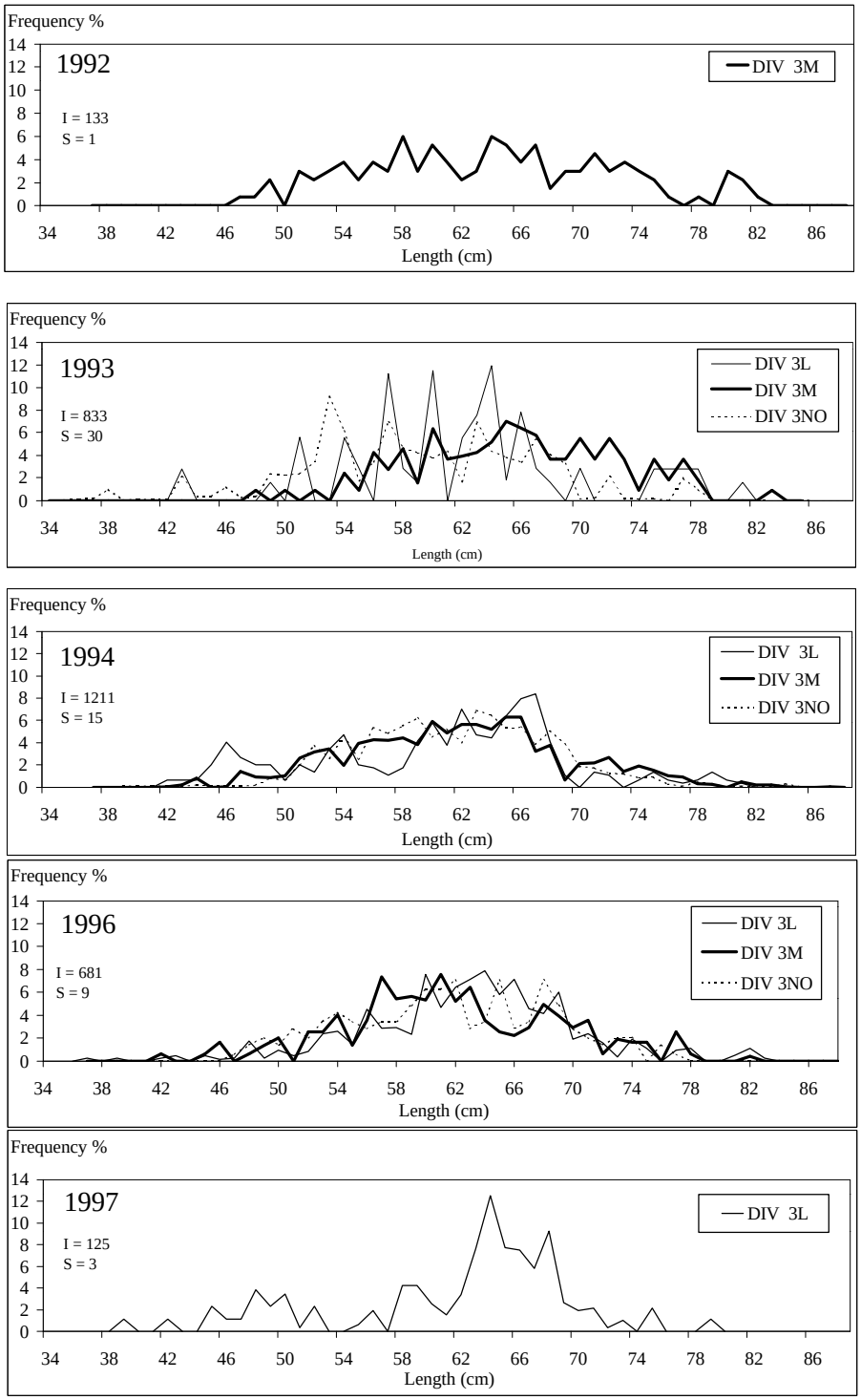

Fig.4.- Length distribution of Black dogfish (total length), by year and División. Spanish Greenland halibut fishery (NAFO Divs. 3LMNO): 1992-96. I = Individuals; S = Samples.

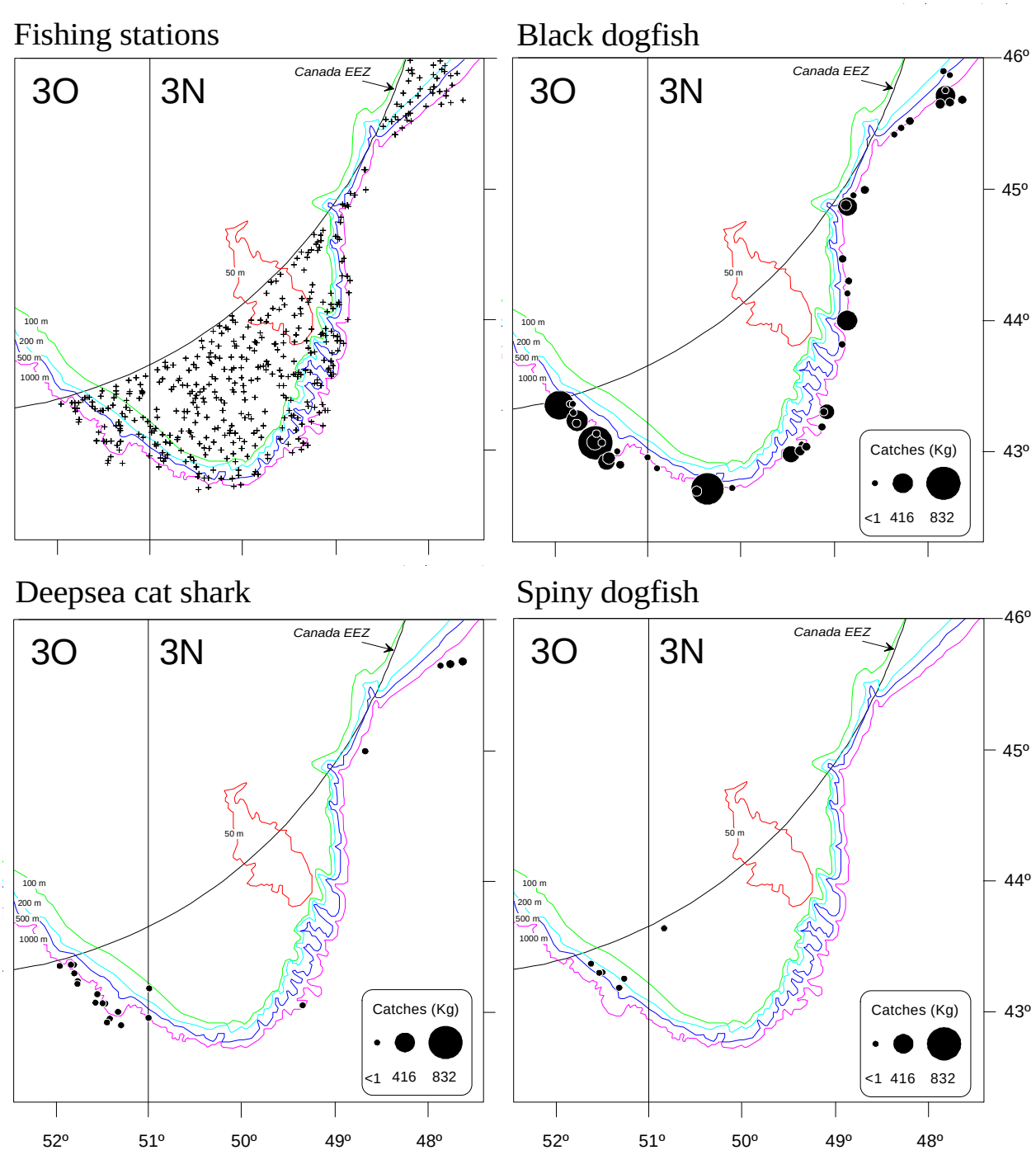

Fig. 5.- Maps showing the distribution of fishing stations and main sharks catches from the Spanish spring bottom trawl surveys in NAFO Divs 3NO: 1995-98. Symbols represent catch in weigth (Kg) per tow.

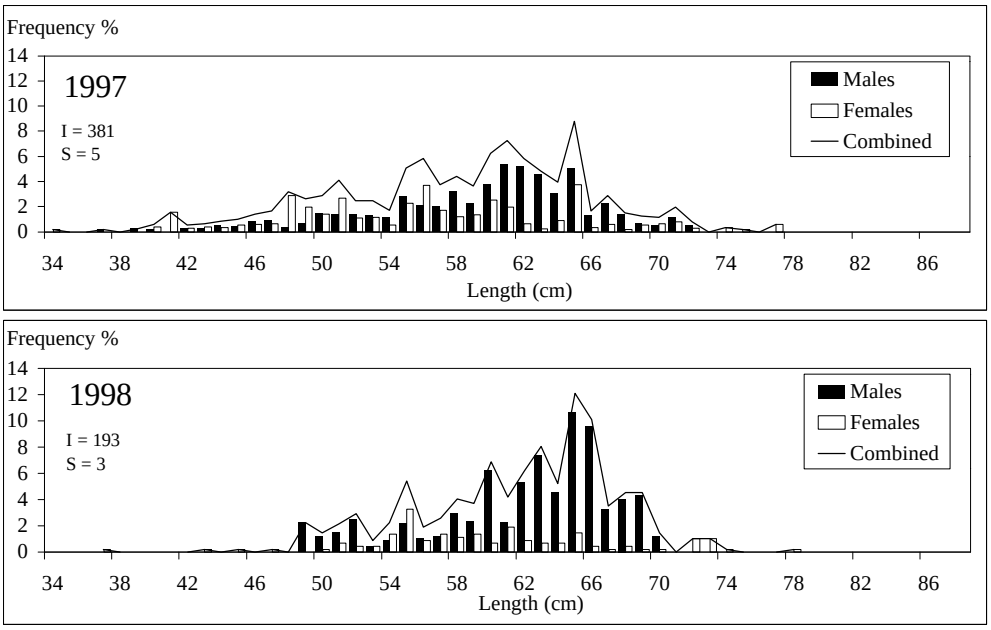

Fig. 6.- Length distribution of black dogfish (total length). Spanish spring bottom trawl surveys for NAFO Divs. 3NO: 1997-98. I = Individuals; S = Samples.