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Spanish Research Report for 2000

by

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SUBAREA 3

A. Status of the fisheries

The Spanish fleet fishing in NAFO Regulatory Area includes two components: the pair-trawlers, formerly fishing for cod and currently fishing for Greenland halibut, and the trawlers.

· **Pair – trawler fleet.**

In 2000 the activity of this fleet was very limited as only one pair-trawler have been fishing for Greenland halibut in Divisions 3LM between February and March. One scientific observer was on board this pair-trawler, sampling Greenland halibut and by-catch and discard species. The length compositions of the Greenland halibut, roughhead grenadier, redfish and American plaice catches are presented in Tables 1 to 4, respectively. The age composition, mean lengths and mean weights at age of the Greenland halibut and roughhead grenadier pair-trawler catch are presented in Tables 5 and 6, respectively. The Greenland halibut catches are based mainly on ages 5 to 7 and those of roughhead grenadier on ages 6 to 10. Biological sampling including recording weight at length, sex ratio, maturity stages and collecting material for reproductive studies have been carried out on Greenland halibut and roughhead grenadier by the scientific observer.

· **Trawler fleet.**

In 2000 a total of 31 trawlers have been involved in the Greenland halibut fishery, alternating with the skate fishery in the second half of the year. The total fishing effort of this fleet reported by the NAFO observers on board every vessel (Table 7) have been used to estimate the effort proportion directed to each one of those target species. Most part of the effort concentrates in Div. 3LM together, corresponding to the northern Flemish pass fishing area. While in this area it remains almost constant over the year, a remarkable increase in effort occurred in Div. 3NO since late summer and in autumn, decreasing again in December. A Generalized Linear Model have been applied to obtain standardized cpue series for both Greenland halibut and thorny skate, whose results are presented in SCR 01/XX and 01/XX, respectively.

The breakdown of the effort by depth and Division is presented in Table 8. In Div. 3L and 3M the fishing activity has been performed always at depths beyond 700 m, indicating the fleet was targeting Greenland halibut. The same occurred in Div. 3N during the first half of the year, but since July part of the fleet activity moved to depths less than 200 m, where the skate fishery is performed. Fishing activity in Div. 3O was limited and most part of the effort there concentrates at depths between 200-700 m.

In addition to the NAFO observers, 8 scientific observers from the Spanish sampling program were on board this fleet. Besides recording catches, discards and effort those observers carried out biological sampling on Greenland halibut, thorny skate and the respective main by-catch species. This includes recording weight at length, sex ratio, maturity stages and stomach analysis, and collecting material for reproductive studies on Greenland halibut and roughhead grenadier. Otoliths of those two species are also taken for age determination.

(1) Greenland halibut fishery.

It is performed at depths beyond 700 m and most part of the catches are taken at northern Flemish Pass (Div. 3LM). Based on data recorded by both the national scientific observers and the NAFO observers programs, the species composition of the trawl catches in this fishery is presented in Fig. 1. Greenland halibut is largely the dominant species, particularly in Div. 3L. The main by-catches were roughhead grenadier, *Antimora rostrata* and red hake (*Gaidropsarus ensis*). The discard rates by species associated to this fishery, as percentage of their respective catches, are listed in Table 9. While there are no discards of Greenland halibut, the catches of other species related to this fishery are totally discarded, as it is the case of both roundnose (*Coryphaenoides rupestris*) and beaked (*Nezumia bairdii*) grenadiers. The discarding rates are remarkably higher in Div. 3N.

The length composition of the Greenland halibut, roughhead grenadier and witch flounder in the trawl catches for the months with sampling are presented in Tables 10 to 12, respectively. Those length distributions belong to the retained plus discarded catch. The parameters of the species length-weight relationships used are shown in Table 13. The age compositions of the Greenland halibut and roughhead grenadier trawl catches are presented in Tables 14 and 15, respectively. Most part of the Greenland halibut catches are from ages 5 to 8 and the main part of the roughhead ones between 6 to 10.

(2) Skate fishery.

The Spanish thorny skate (*Raja radiata*) fishery in the period 1997 – 00 is described in the document SCR Doc 01/XX. It is performed at depths between 40 to 200 m, mainly from September to December in Div. 3N, and the main by-catches are American plaice and yellowtail flounder. Cod is a secondary by-catch. The length distributions of the American plaice, yellowtail flounder and cod taken in this fishery (retained catch plus discards) are presented in Tables 16 to 18, respectively.

(3) Redfish in Division 3O.

The Spanish redfish catches of the trawlers fleet increased notably in 2000, to about 4700 t. Most part of this catch (85%) have been taken in Div. 3O at intermediate depths between 200 and 700 m, mainly between 350-600 m. It must be considered a separate fishery, as those redfish catches do not overlap significantly with any of the species mentioned above. In Table 19 the species composition and discards reported in this fishery are listed. Redfish (*Sebastes mentella*) largely constitute the main species there, with minor by-catches of cod, American plaice, witch flounder and Greenland halibut. The redfish length composition in the trawl catches in Div. 3O is presented in Table 20.

(B) Research studies

In May 2000, a bottom trawl survey has been conducted in Div. 3NO Regulatory Area. A total of 137 hauls with a stratified design have been performed, to a depth of 1450 meters. In addition, 14 hauls have been made using a Campelen gear, 8 of them fishing in parallel with the Canadian research vessel 'Wilfred Templeman'. The results of this survey have been presented in SCR 00/46, which includes abundance indices and length distributions of American plaice, yellowtail flounder, witch flounder and Greenland halibut, and the results of the comparative hauls between gears and between vessels.

In July 2000, an EU (Spain and Portugal) stratified bottom trawl survey have been made in Flemish Cap (Div. 3M). A total of 120 valid hauls with the 'Lofoten' gear, and 20 with the 'Campelen' have been carried out to a depth of 703 meters. The results of this survey including abundance indices of the main commercial species and age distributions for cod, the three species of *Sebastes*, American plaice, Greenland halibut and roughhead grenadier, are

presented in the SCR 01/22. Data on shrimp from this survey are presented in SCR 00/71. The results regarding the hydrographic conditions during the survey are presented in SCR 01/24. Feeding studies on the main species and collection of data and material for histological assessment of sexual maturity of cod, redfish, Greenland halibut and roughhead grenadier have also been carried out in this survey.

REFERENCES

- Bruno, I. (2000).- Northern shrimp (*Pandalus borealis*) on Flemish cap in July 2000. *NAFO SCR Doc. 00/71*.
- Del Río, J. L. and S. Junquera (2001).- Spanish skate fishery (*Raja radiata* Donovan, 1808) fishery in the Grand Bank (NAFO Div. 3N): 1997 – 2000. *NAFO SCR Doc 01/XX*
- Cerviño, S. (2001).- Hydrographic conditions on Flemish Cap in July 2000 and comparison with those observed in 1999. *NAFO SCR Doc. 01/25*.
- Junquera, S. (2001).- Standardized catch rates for Greenland halibut from the Spanish trawl fishery in NAFO Div. 3LMNO from 1990 – 2000, using a Generalized Linear Model. *NAFO SCR Doc. 01/XX*.
- Paz, X, E. Román and P. Durán-Muñoz (2000).- Results from the 2000 Spanish bottom trawl survey in the NAFO Regulatory Area for Divisions 3NO. *NAFO SCR Doc. 00/46*.
- Saborido, F. and A. Vazquez (2001).- Results from the bottom trawl survey on Flemish Cap of July 2000. *NAFO SCR Doc. 01/22*.

Table 1.- Greenland halibut length composition (0/00) of the Spanish pair trawlers catch.

Div. 3L				Div. 3M			
LENGTH (cm.)	Feb.	March	Total	LENGTH (cm.)	Feb.	March	Total
30 - 31	3	4	4	30 - 31	0	5	3
32 - 33	11	20	17	32 - 33	6	17	13
34 - 35	26	84	67	34 - 35	20	32	28
36 - 37	67	145	122	36 - 37	61	111	93
38 - 39	118	215	187	38 - 39	160	190	180
40 - 41	138	199	181	40 - 41	211	189	197
42 - 43	135	148	144	42 - 43	137	155	149
44 - 45	75	74	74	44 - 45	72	90	84
46 - 47	71	40	49	46 - 47	92	56	69
48 - 49	36	26	29	48 - 49	66	35	46
50 - 51	47	12	22	50 - 51	47	25	33
52 - 53	45	7	18	52 - 53	27	24	25
54 - 55	48	6	18	54 - 55	39	19	26
56 - 57	40	6	16	56 - 57	27	19	22
58 - 59	36	4	14	58 - 59	12	11	12
60 - 61	30	4	11	60 - 61	14	2	6
62 - 63	24	1	8	62 - 63	2	5	4
64 - 65	16	3	7	64 - 65	2	2	2
66 - 67	9	0	3	66 - 67	2	1	1
68 - 69	10	0	3	68 - 69	0	2	1
70 - 71	5	0	1	70 - 71	0	0	0
72 - 73	4	0	1	72 - 73	0	2	1
74 - 75	4	1	2	74 - 75	0	1	1
Total	1000	1000	1000	Total	1000	1000	1000
Fish measured	1366	1120	2486	Fish measured	513	916	1429
N° of samples	14	8	22	N° of samples	4	7	11
Sample weight (kg)	1328	664	1992	Sample weight (kg)	396	738	1134
Depth range (m.)	790 - 1012			Depth range (m.)	790 - 1012		

Table 2.- Roughhead grenadier length composition (0/00) of the Spanish pair trawlers catch.

Div. 3L				Div. 3M			
LENGTH (cm)	Feb.	March	Total	LENGTH (cm)	Feb.	March	total
10,5-12	18	9	14	10,5-12			
12,5-14	85	127	106	12,5-14	74	68	70
14,5-16	135	303	218	14,5-16	238	285	272
16,5-18	274	421	347	16,5-18	426	323	351
18,5-20	229	86	158	18,5-20	180	217	207
20,5-22	126	14	70	20,5-22	49	74	68
22,5-24	72	18	45	22,5-24	8	21	17
24,5-26	36	14	25	24,5-26	8	9	9
26,5-28	4		2	26,5-28	8		2
28,5-30	9	5	7	28,5-30	8	3	4
30,5-32	4	5	5	30,5-32			
32,5-34	9		5	32,5-34			
Total	1000	1000	1000	Total	1000	1000	1000
Fish measured	223	221	444	Fish measured	122	337	459
N° of samples	13	8	21	N° of samples	4	7	11
Sample weight (kg)	153	105	258	Sample weight (kg)	64	179	243
Depth range	790 - 1012			Depth range	79 - 1012		

Table 3.- Redfish length composition (0/00) of the Spanish pair trawlers catch.

Div. 3L				Div. 3M			
Length (cm)	Feb.	March	total	Length (cm)	Feb.	March	total
16	6		4	16			
18	3		2	18			
19	23		15	19			
20	23		15	20			
21	12		8	21			
22	9		6	22			
23	9		6	23			
24	12	11	11	24	13		9
25	17	22	19	25	13		9
26	17	67	34	26	100	65	90
27	49	101	67	27	75	32	63
28	154	163	157	28	138	129	135
29	166	174	169	29	225	258	234
30	166	135	155	30	100	226	135
31	76	90	80	31	38	65	45
32	55	73	61	32	75	65	72
33	64	56	61	33	63	32	54
34	70	73	71	34	88	32	72
35	26	6	19	35	25	32	27
36	17	11	15	36	13		9
37	6	17	10	37	13	32	18
38	6		4	38	25		18
40	6		4	40		32	9
42	9		6	42			
Total	1000	1000	1000	Total	1000	1000	1000
Fish measured	344	178	522	Fish measured	80	31	111
N° of samples	11	6	17	N° of samples	3	3	6
Sample weight (kg)	131	67	198	Sample weight (kg)	31	12	44
Depth range (m)	785 – 890			Depth range (m)	785 - 890		

Table 4.- American plaice length composition (0/00) of the Spanish pair trawlers catch

Length (cm)	Div. 3L
26-27	32
28-29	65
30-31	97
32-33	118
34-35	151
36-37	151
38-39	129
40-41	140
42-43	54
44-45	43
46-47	11
48-50	11
Total	1000
Fish measured	93
N° of samples	3
Sample weight (kg)	48
Depth range (m)	790 – 980

Table 5.- Greenland halibut age composition (0/00), mean length (M.L.- cm) and mean weight (M.W. - kg) at age in the Spanish pair - trawlers catch.

<i>Div. 3L</i>				<i>Div. 3M</i>			
Age	M. L.	M. W.		Age	M. L.	M. W.	
3	6	32	0,3	3	4	32	0,2
4	78	36	0,4	4	56	36	0,4
5	313	38	0,4	5	273	39	0,5
6	374	41	0,6	6	393	42	0,6
7	106	46	0,8	7	140	46	0,8
8	57	53	1,1	8	80	52	1,1
9	25	56	1,4	9	30	56	1,4
10	14	60	1,7	10	10	59	1,6
11	8	63	2,0	11	4	63	1,9
12	6	65	2,2	12	2	64	2,1
13	5	69	2,6	13	2	68	2,5
14	4	71	2,8	14	2	70	2,8
15	2	74	3,3	15	1	79	3,9
16	1	84	4,8	16	3	83	4,6
17				17	1	86	5,1
	1000				1000		

Table 6.- Roughhead grenadier age composition (0/00), mean length (M.L.- cm) and mean weight (M.W. - kg) at age in the Spanish pair - trawlers catch.

Div 3L				Div. 3M			
Age	M. L.	M. W.		Age	M. L.	M. W.	
4	4	12	0,2	4	1	13	0,2
5	29	13	0,2	5	18	13	0,2
6	103	14	0,3	6	82	14	0,3
7	130	15	0,3	7	140	15	0,4
8	191	16	0,4	8	229	16	0,4
9	228	18	0,5	9	257	18	0,5
10	128	19	0,6	10	141	19	0,6
11	57	20	0,8	11	54	20	0,8
12	52	21	0,9	12	44	21	0,8
13	30	23	1,1	13	17	22	1,0
14	23	24	1,3	14	8	24	1,2
15	11	26	1,5	15	4	25	1,4
16	5	27	1,8	16	2	28	1,8
17	2	29	2,2	17	1	28	2,0
18	3	32	2,7	18	1	30	2,2
19	2	32	2,8	19	1	30	2,2
20	1	33	3,0	20			
1000				1000			

Table 7.- Fishing effort (hours fishing) of the Spanish trawler fleet in NAFO Regulatory Area in 2000, proportion of effort by Division and proportion directed to the main target species (Greenland halibut-GHL, and skate-RJR).

Div.	J	F	M	A	MY	J	JL	AG	S	O	N	D	TOTAL	% Div	% GHL	% RJR	Div.
3L	3599	2995	2689	1248	1607	1982	2193	2457	3469	3247	3488	3179	32153	39	100	0	3L
3M	2161	3489	4254	3126	3328	1652	1489	1872	2363	1131	1458	656	26979	33	100	0	3M
3N	483	847	1363	1353	455	1190	1630	2063	3526	4515	3211	841	21477	26	72	28	3N
3O	81	79	22	216	78	58	403	178	210	215	188	45	1773	2	88	12	3O
Total	6324	7410	8328	5943	5468	4882	5715	6570	9568	9108	8345	4721	82382				Total

Table 8.- Breakdown (%) of the Spanish trawler fleet total fishing effort by depth intervals (in meters) and by Division in 2000.

	3L		3M		3N		3O	
	< 200	200 - 700 > 700	< 200	200 - 700 > 700	< 200	200 - 700 > 700	< 200	200 - 700 > 700
J	100		100		100			
F	100		100		7	93	100	
M	100		100			100		
A	100		100			100	100	
MY	100		100			100	54	46
J	100		100			100		
JL	100		100		66	34	2	86
AG	100		100		55	2	43	100
S	100		100		57	4	39	20
O	100		100		12	3	85	100
N	100		100		73	27	63	37
D	100		100		18	82	10	62

Table 9.- Percentages over the respective species catch discarded in the Greenland halibut Spanish trawl fishery in 2000.

	Div. 3L	Div. 3M	Div. 3N
<i>Reinhardtius hippoglossoides</i>	0	0	0
<i>Macrourus berglax</i>	23	7	44
<i>Antimora rostrata</i>	11	3	47
<i>Gaidopsarus ensis</i>	5	3	17
<i>Glyptocephalus cynoglossus</i>	5	4	19
<i>Sebastes mentella</i>	9	14	10
<i>Coryphaenoides rupestris</i>	100	65	100
<i>Nezumia bairdii</i>	100	100	100

Table 10a.- Greenland halibut length composition (0/00) in the trawl catches in Div. 3L, 2000.

Div. 3L											
LENGTH (cm.)	Feb.	March	April	May	June	Aug.	Sept.	Oct.	Nov.	Dec.	Total
26 - 27					5						
28 - 29			2		2	8		1			1
30 - 31			3		2	7				1	1
32 - 33	7	10			8	13		4	3	4	4
34 - 35	18	21			18	12	7	50	5	8	13
36 - 37	70	42	13	70	37	25	31	17	25	41	37
38 - 39	106	119	108	120	50	46	70	34	60	93	80
40 - 41	179	163	204	205	89	112	95	98	117	141	135
42 - 43	207	167	306	202	158	152	139	140	197	191	187
44 - 45	172	115	166	128	158	171	162	165	211	201	187
46 - 47	100	102	122	96	129	165	120	173	164	160	151
48 - 49	40	58	29	44	91	122	74	118	97	80	83
50 - 51	25	48	22	26	81	63	80	79	45	36	44
52 - 53	19	36	10	18	42	35	44	46	24	16	24
54 - 55	9	30	5	9	23	29	31	35	14	7	14
56 - 57	9	18	7	8	16	16	28	24	9	5	10
58 - 59	10	16	3	8	23	6	2	14	6	3	7
60 - 61	8	13	1	12	16	7	18	14	5	2	6
62 - 63	5	10	1	6	8	7	29	8	3	1	4
64 - 65	5	5	3	4	5		2	7	3	1	3
66 - 67	3	4		6	6	9	18	3	2	1	2
68 - 69	4	2		1	7		2	2	1		1
70 - 71		3			2	4	2	2	2		1
72 - 73	3	1			4	4		2	2		1
74 - 75		2			1	4		3			1
76 - 77		2			3	9	2	2	1		1
78 - 79		2			2			1	1		
80 - 81		2		1	3	4		1			1
82 - 83		1		2	1						
84 - 85	1	1		1	1			1			
86 - 87		1						1			
88 - 89		1		1							
90 - 91				1							
Total	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Fish measured	970	1588	615	1049	844	280	249	2897	4642	8682	21816
N° of samples	5	9	3	6	5	2	2	19	24	41	116
Sample weight (kg)	690,4	1292,6	415,7	754,0	737,6	247,1	215,5	2588,4	3576,4	6153,1	16520,2
Depth range (m.)	700 - 1700										

Table 10b.- Greenland halibut length composition (0/00) in the trawl catches in Div. 3M, 2000.

Div. 3M												
LENGTH (cm.)	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
30 - 31					9		1					
32 - 33			1	2	1	6		4	6		3	2
34 - 35	6	4	7	2	3		8	24		11		6
36 - 37	18	13	21	15	6		30	38		22	16	18
38 - 39	45	42	59	42	28	35	55	67	17	52	67	49
40 - 41	156	95	135	120	92	105	112	104	19	113	135	114
42 - 43	208	153	202	162	124	70	157	148	44	182	161	170
44 - 45	178	160	187	143	172	140	167	157	106	206	197	174
46 - 47	145	149	131	118	126	114	151	158	159	176	212	149
48 - 49	75	114	87	85	123	61	143	124	119	105	114	103
50 - 51	46	86	52	75	62	18	74	63	89	56	47	65
52 - 53	22	56	34	40	50	114	38	25	48	29	10	40
54 - 55	26	41	23	37	26	53	24	31	46	15	21	29
56 - 57	12	29	12	37	44	97	16	16	56	10	10	21
58 - 59	16	16	8	23	30	44	6	15	51	8	10	14
60 - 61	12	16	9	22	27	35	5	8	48	5		13
62 - 63	4	7	9	18	18	35	1	7	47	3		8
64 - 65	5	5	4	15	24	35	3	5	44	1		6
66 - 67	3	2	4	14	12		2	3	14	1		4
68 - 69	3	3	2	8	12	9		2	14			3
70 - 71	3	2	1	7	3	35			21			2
72 - 73	3	2	2	4			1		16			2
74 - 75	1	1	2	1			1		16	1		1
76 - 77	1	1	2	3			1		6			1
78 - 79	3	2	1						8			1
80 - 81	1	1	1	3	3				4			1
82 - 83	2		1						2			
84 - 85	1			1								
86 - 87	1		1	1								
88 - 89	2								6			
90 - 91	1		1									
Total	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Fish measured	1441	4715	2556	1174	333	114	1171	809	309	2041	193	14856
N° of samples	7	24	12	7	2	1	6	4	2	11	1	77
Sample weight (kg)	12244	4228	2093	1150	325	128	934	645	420	1568	145	12795
Depth range (m.)	700 - 1700											

Table 10c.- Greenland halibut length composition (0/00) in the trawl catches in Div. 3N, 2000.

Div. 3N												
LENGTH (cm.)	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
26 - 27							2		1	1		
28 - 29							1		4	2		1
30 - 31			4			2	4	2	8	3		3
32 - 33	5	3				4	7	14	16	12	3	8
34 - 35	25	5				11	31	21	32	17	12	21
36 - 37	104	27	39	5	8	12	47	49	44	25	28	45
38 - 39	139	79	92	103	39	29	102	97	78	70	67	89
40 - 41	201	105	214	212	77	44	154	178	128	131	125	148
42 - 43	161	116	214	227	85	100	172	166	154	164	170	161
44 - 45	117	138	150	187	93	152	171	162	161	182	183	162
46 - 47	77	116	97	84	108	137	106	104	131	152	163	122
48 - 49	47	86	58	49	171	102	77	85	103	85	94	83
50 - 51	30	71	14	44	101	98	46	45	51	45	55	49
52 - 53	19	46	24	34	39	53	23	22	27	31	30	28
54 - 55	13	30	5	10	47	70	19	15	17	19	17	18
56 - 57	16	32	14	25	23	54	8	11	12	16	13	15
58 - 59	9	28			62	34	6	7	14	13	12	12
60 - 61	6	29	14		31	36	5	7	6	10	3	8
62 - 63	3	20	14	5	39	8	3	2	4	7	6	6
64 - 65	5	11	10	5	8	10	2	3	2	4	4	4
66 - 67	1	8	5	10	16	20	4	3	2	4	2	4
68 - 69	2	5	5		8	5	2	1	1	3	2	2
70 - 71	2	6	5		8	6	1	3	0	2	4	2
72 - 73	6	8	5		16		1	1	2		2	2
74 - 75	2	6				2	2			2		1
76 - 77	2	1				7	0				1	1
78 - 79	1	1	5		16		1	1		1		1
80 - 81	2	4	10			3		1			1	1
82 - 83	2	1						1			1	1
84 - 85	0	3			8		1					
86 - 87	1	3									1	1
88 - 89	1	2										
90 - 91												
92 - 93	1		5									
94 - 95		1										
96 - 97		2										
98 - 99		2										
Total	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Fish measured	1258	1104	206	203	129	577	2629	1841	2829	1731	2577	15084
N° of samples	8	5	1	1	1	3	12	9	14	9	14	77
Sample weight (kg)	929	1148	173	149	149	603	1937	1348	2108	1366	2057	11842
Depth range (m.)							700 - 1700					

Table 10d.- Greenland halibut length composition (0/00) in the trawl catches in Div. 30, 2000.

Div. 30						
LENGTH (cm.)	May	July	Oct.	Nov.	Dec.	Total
28 - 29		24				6
30 - 31		30	10			9
32 - 33		92	34	5	9	29
34 - 35	10	76	34	0	13	29
36 - 37	15	53	54	20	53	36
38 - 39	68	173	64	55	110	102
40 - 41	78	130	186	90	154	118
42 - 43	180	129	225	145	203	171
44 - 45	136	116	162	160	136	135
46 - 47	121	64	83	140	110	103
48 - 49	112	42	54	95	66	78
50 - 51	92	27	39	105	62	66
52 - 53	49	11	10	25	26	28
54 - 55	58	12	19	45	9	32
56 - 57	19	11	10	30	9	15
58 - 59	19	4	5	30	13	14
60 - 61	5	5	5	15		5
62 - 63	24			15	9	12
64 - 65	5			5	4	3
66 - 67		1		5	9	3
68 - 69			5			
70 - 71				10		1
72 - 73				5		1
76 - 77					4	1
78 - 79	5					2
82 - 83	5					2
Total	1000	1000	1000	1000	1000	1000
Fish measured	206	394	204	200	227	1231
N° of samples	1	4	1	1	1	8
Sample weight (kg)	184,4	229,3	137,4	181,7	169,3	942,0
Depth range (m.)	700 – 1100					

Table 11 a.- Roughhead grenadier length composition (0/00) in the trawl catches in Div. 3L, 2000.

Div. 3L									
LENGTH (cm.)	Feb.	March	June	Aug.	Sept.	Oct.	Nov.	Dec.	Total
7 - 8							1		
8,5 - 9,5						4	6	1	3
10 - 11	6	11	8			14	26	15	16
11,5 - 12,5	41	21		8	39	58	77	47	49
13 - 14	104	117	106	25	133	204	161	135	151
14,5 - 15,5	173	138	129	87	180	253	190	149	182
16 - 17	295	202	197	173	211	191	159	173	183
17,5 - 18,5	185	223	205	311	203	135	154	206	177
19 - 20	98	117	189	156	156	63	111	144	120
20,5 - 21,5	29	43	61	43	39	26	54	65	49
22 - 23	29	53	15	35	16	18	16	18	20
23,5 - 24,5	12	21	15	8	16	7	9	14	12
25 - 26	12	21	15	35	8	5	7	9	9
26,5 - 27,5	6	32		17		14	8	6	9
28 - 29	6		30	43		2	6	9	9
29,5 - 30,5			8			1	3	3	3
31 - 32				17		1	6	4	3
32,5 - 33,5			8				2		2
34 - 35				25		2	3	1	2
35,5 - 36,5	6		8				1		2
37 - 38			8	8		1			1
38,5 - 39,5				8					
Total	1000	1000	1000	1000	1000	1000	1000	1000	1000
Fish measured	173	94	132	116	128	873	863	800	3179
N° of samples	1	1	1	1	1	6	5	5	21
Sample weight (kg)	89,4	54,0	88,8	98,9	62,7	391,6	434,4	427,8	1683,8
Depth range (m)	700 - 1700								

Table 11 b.- Roughhead grenadier length composition (0/00) in the trawl catches in Div. 3M, 2000.

LENGTH (cm.)	Div. 3M										Total
	Feb.	March	Apr.	May	June	Aug.	Sept.	Oct.	Nov.	Dec.	
8,5 - 9,5	3	1	0	2	0	2	7	2	3		1
10 - 11	10	13	0	2	0	6	8	29	16	14	5
11,5 - 12,5	39	42	7	15	18	36	34	129	46	75	24
13 - 14	105	93	56	33	197	86	51	226	99	123	95
14,5 - 15,5	190	193	178	118	110	95	114	202	129	155	139
16 - 17	259	257	307	258	216	216	178	207	173	159	245
17,5 - 18,5	189	172	221	224	220	268	227	123	262	169	219
19 - 20	87	89	124	156	142	159	189	46	151	143	136
20,5 - 21,5	45	46	46	59	69	63	81	16	62	73	57
22 - 23	27	29	23	42	14	18	35	6	24	33	28
23,5 - 24,5	15	20	10	33	9	21	29	3	10	18	18
25 - 26	11	16	8	21	0	8	9	1	9	16	11
26,5 - 27,5	5	9	5	11	0	6	15	7	5	11	6
28 - 29	6	5	5	9	0	4	11	1	4	5	5
29,5 - 30,5	0	3	1	7	5	3	7	1	3	5	4
31 - 32	4	5	4	5		4	5		1		3
32,5 - 33,5	1	3	2	3		1	1				2
34 - 35	2	1	1	2							1
35,5 - 36,5	2	2	1	0		1					
37 - 38				2							1
Total	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Fish measured	911	2622	1652	1106	218	796	760	662	2109	370	11206
N° of samples	5	14	8	6	1	5	4	4	11	2	60
Sample weight (kg)	478,6	1435,7	916,0	717,1	107,9	466,1	476,2	249,8	1122,4	200,3	6319,7
Depth range (m)	700 - 1700										

Table 11 c.- Roughhead grenadier length composition (0/00) in the trawl catches in Div. 3N, 2000.

LENGTH (cm.)	Div. 3N						
	Feb.	March	Aug.	Sept.	Oct.	Dec.	Total
8,5 - 9,5		1,6	9,0	12,3	3,4	4,1	5,6
10 - 11	18,7	17,6	31,1	58,4	24,1	15,4	27,9
11,5 -12,5	78,9	97,9	93,0	158,7	60,7	80,7	96,0
13 - 14	187,1	254,2	323,6	241,3	150,1	170,0	229,0
14,5 - 15,5	172,2	145,2	190,6	149,5	196,0	188,7	175,6
16 - 17	189,5	169,8	147,2	94,8	138,9	122,2	141,2
17,5 - 18,5	137,8	125,0	89,3	117,0	167,2	179,6	133,6
19 - 20	76,7	64,3	43,7	80,5	109,7	105,6	77,9
20,5 - 21,5	39,0	23,8	8,9	33,6	60,4	66,9	37,4
22 - 23	33,1	29,7	8,9	11,8	26,0	21,1	20,1
23,5 - 24,5	16,2	19,8	10,8	11,0	13,6	7,2	12,3
25 - 26	19,4	17,8	11,0	5,9	10,6	8,0	11,5
26,5 - 27,5	6,5	12,0	8,6	8,2	9,6	10,0	9,1
28 - 29	12,0	4,7	4,4	5,2	7,9	5,4	6,3
29,5 - 30,5	6,0	4,6	6,6	3,0	8,5	3,2	5,2
31 - 32	1,4	6,1	4,4	3,0	8,2	6,5	4,9
32,5 - 33,5		4,0	4,4	1,8	3,6	3,9	3,1
34 - 35	1,4	2,0	2,3	1,8	1,0	1,4	1,7
Total	1000	1000	1000	1000	1000	1000	1000
Fish measured	454	1156	458	1463	1685	556	5772
N° of samples	3	6	2	8	9	3	31
Sample weight (kg)	237,5	571,5	198,2	621,5	915,2	285,9	2784,2
Depth range (m)	700 - 1700						

Table 12.- Witch flounder length composition (0/00) in the trawl catches in Div. 3L, 3M, 3N and 3O in 2000.

LENGTH (cm.)	3L	3M	3N	3O
28 - 29				4,0
30 - 31			11,8	21,8
32 - 33	12,8		40,5	42,5
34 - 35	66,3	19,0	119,8	68,5
36 - 37	92,0	114,2	204,0	150,1
38 - 39	223,5	166,7	209,3	203,3
40 - 41	118,7	185,7	158,8	198,8
42 - 43	197,9	200,0	109,3	142,3
44 - 45	144,4	95,2	57,2	65,9
46 - 47	79,1	100,1	38,6	38,5
48 - 49	52,4	61,9	14,9	38,0
50 - 51	12,8	33,3	13,7	8,2
52 - 53		4,7	13,2	8,9
54 - 55		4,7	4,3	0,9
Total	1000	1000	1000	1000
Fish measured	76	210	1749	445
N° of samples	1	1	13	2
Sample weight (kg)	55,7	167,2	1123,1	294,0
Depth range (m)	700 - 1700			

Table 13.- Parameters of the species length – weight relationship.

Species	a	b
<i>Greenland halibut</i>	0.007	3.031
<i>Roughhead grenadier</i>	0.150	2.840
<i>Witch flounder</i>	0,004	3,240
<i>American plaice</i>	0.004	3.186
<i>Yellowtail flounder</i>	0.007	3.090
<i>Cod</i>	0.008	3.040
<i>Thorny skate</i>	0.011	2.947
<i>Redfish</i>	0,019	2,906

Table 14.- Greenland halibut age composition (0/00), mean length (M.L.- cm) and mean weight (M.W. - kg) at age in the Spanish trawlers catch in 2000.

Age	3L			3M			3N			3O			All Divisions		
	M. L.	M. W.		M. L.	M. W.		M. L.	M. W.		M. L.	M. W.		M. L.	M. W.	
3	15	31	0,2	1	33	0,3	4	33	0,3	13	32	0,3	6	32	0,3
4	55	35	0,3	13	37	0,4	31	36	0,4	51	35	0,3	51	36	0,4
5	185	40	0,5	124	41	0,5	156	40	0,5	155	39	0,5	230	39	0,5
6	368	43	0,6	392	44	0,7	345	43	0,6	320	43	0,6	408	43	0,6
7	203	47	0,8	255	47	0,8	306	46	0,8	289	47	0,8	200	46	0,8
8	110	52	1,1	130	52	1,1	94	51	1,0	104	51	1,1	65	51	1,1
9	32	55	1,3	37	56	1,4	27	56	1,4	33	56	1,4	16	55	1,3
10	11	60	1,7	16	60	1,7	10	60	1,8	10	61	1,8	6	60	1,8
11	8	63	2,0	9	63	2,0	6	63	2,0	8	63	2,0	4	63	2,0
12	5	64	2,1	7	65	2,2	6	66	2,2	5	65	2,2	4	65	2,2
13	3	68	2,5	6	69	2,7	5	69	2,6	3	67	2,4	3	69	2,6
14	2	70	2,8	5	71	2,9	6	72	3,0	3	72	3,0	3	72	2,9
15	2	78	3,8	3	77	3,7	3	79	3,9	2	79	4,0	1	75	3,4
16	2	82	4,4	1	83	4,7	1	81	4,2	1	81	4,3			
17				1	86	5,1	1	85	4,9						
	1000			1000			1000			1000			1000		

Table 15.- Roughhead grenadier age composition (0/00), mean length (M.L.- cm) and mean weight (M.W. - kg) at age in the Spanish trawlers catch in 2000.

Age	<i>Div. 3L</i>			<i>Div. 3M</i>			<i>Div. 3N</i>			<i>All Divisions</i>		
	<i>M. L.</i>	<i>M. W.</i>		<i>M. L.</i>	<i>M. W.</i>		<i>M. L.</i>	<i>M. W.</i>		<i>M. L.</i>	<i>M. W.</i>	
2	2	9	0,1			0,1	2	10	0,1	2	9	0,1
3	7	10	0,1	2	10	0,1	13	10	0,1	10	10	0,1
4	19	11	0,1	7	11	0,2	35	11	0,1	29	11	0,1
5	58	13	0,2	32	13	0,2	99	13	0,2	79	13	0,2
6	151	14	0,3	98	14	0,3	211	14	0,2	178	14	0,3
7	134	15	0,3	118	15	0,4	136	15	0,3	145	15	0,3
8	163	16	0,4	182	16	0,4	138	16	0,4	165	16	0,4
9	193	18	0,5	240	18	0,5	144	18	0,5	168	18	0,5
10	117	19	0,6	142	19	0,6	86	19	0,6	94	19	0,6
11	53	20	0,7	63	20	0,7	38	20	0,8	40	20	0,8
12	39	21	0,8	48	21	0,9	31	21	0,9	32	21	0,9
13	19	23	1,0	24	23	1,1	18	23	1,1	17	23	1,1
14	16	25	1,4	18	24	1,3	16	25	1,4	14	25	1,4
15	10	26	1,6	10	26	1,6	11	26	1,6	9	26	1,6
16	6	28	1,9	5	27	1,8	6	28	2,0	5	28	1,9
17	3	29	2,1	2	29	2,1	3	29	2,2	2	29	2,1
18	2	30	2,5	2	31	2,5	3	31	2,6	2	31	2,5
19	3	32	2,8	3	31	2,7	4	31	2,7	3	32	2,7
20	2	34	3,3	1	33	3,0	2	33	3,1	2	33	3,2
21	2	35	3,8	1	35	3,6	1	34	3,5	1	35	3,6
22	1	36	3,8				1	35	3,6	1	35	3,6
23	1	37	4,2									
	1000			1000			1000			1000		

Table 16a.- American plaice length composition (0/00) in the trawl catches in Div. 3N in 2000.

LENGTH (cm)	Div. 3N									
	Feb.	March	April	May	July	Aug.	Sep.	Nov.	Dec.	Total
28-29	23		9			3	5	1	9	5
30-31	47		17	39	58	20	13	5	25	25
32-33	74	9	35	151	88	62	38	35	39	51
34-35	144	65	74	224	137	88	67	46	96	82
36-37	151	68	100	127	121	79	75	54	100	84
38-39	172	148	164	215	89	105	74	66	115	96
40-41	133	133	190	107	130	117	121	85	157	125
42-43	99	150	160	63	133	149	165	110	209	150
44-45	70	191	147	59	116	107	128	124	136	130
46-47	35	114	65		69	85	91	137	53	83
48-49	18	61	22	15	33	57	61	138	26	51
50-51	17	23	13		15	44	54	57	14	42
52-53	5	23	4		5	24	39	52	4	25
54-55		7			2	19	31	30	5	19
56-57	3				2	14	13	22		11
58-59	2	7			2	6	8	14		5
60-61						8	8	6	1	5
62-63						4	5	4		3
64-65						4	2	2		2
Total	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Fish measured	805	170	231	205	590	1399	2530	3496	733	10159
N° of samples	4	2	1	1	3	8	13	20	4	56
Sample weight (kg)	399,6	112,9	131,3	88,79	317,2	954	1848	2402,4	414,6	6734,7
Depth range (m.)	40-200									

Table 16b.- American plaice length composition (0/00) in the trawl catches in Div. 3O in 2000.

LENGTH (cm)	Div. 3O					Total
	April	May	Sept.	Nov.	Dec.	
20-21				15		3
22-23				28		6
24-25				15	4	5
26-27				14		3
28-29				2	2	1
30-31	4		15	4	2	5
32-33	18	9	65	24	4	22
34-35	44	27	60	111	9	46
36-37	102	49	121	64	45	69
38-39	111	102	161	123	80	110
40-41	124	125	146	61	102	106
42-43	177	178	161	87	139	139
44-45	137	178	126	171	175	161
46-47	133	131	70	38	143	104
48-49	66	58	35	48	125	79
50-51	27	59	25	17	78	48
52-53	40	39	15	18	39	30
54-55	13	23		39	20	20
56-57	4	8		45	18	18
58-59		8		18	7	8
60-61		2		17	2	5
62-63		2		15	2	4
64-65				5	4	3
Total	1000	1000	1000	1000	1000	1000
Fish measured	226	409	199	567	366	1767
N° of samples	1	2	1	4	2	10
Sample weight (kg)	132,2	265,4	99,1	377,5	254,7	1125,1
Depth range (m.)	40-200					

Table 17.- Yellowtail flounder length composition (0/00) in the trawl catches in Div. 3NO in 2000.

LENGTH (cm)	Div. 3N					Div. 3O	
	July	Aug.	Sep.	Nov.	Dec.	Total	Total
18-19		3	4	1	0	2	
20-21	4	12	7	3	4	5	
22-23	11	6	15	3	6	8	
24-25	18	18	20	12	10	15	
26-27	31	36	36	27	23	30	10
28-29	100	68	84	71	84	79	25
30-31	127	134	131	130	167	136	76
32-33	156	169	188	157	204	175	152
34-35	175	191	197	192	214	196	187
36-37	143	150	154	129	118	137	172
38-39	77	100	73	106	84	91	147
40-41	74	60	43	76	48	61	111
42-43	44	35	26	41	29	35	76
44-45	23	8	11	26	8	17	35
46-47	12	6	2	13	0	7	10
48-49	3	2	3	9	0	5	
TOTAL	1000	1000	1000	1000	1000	1000	1000
Fish measured	636	1033	1754	2481	793	6697	198
N ^a of samples	3	5	9	14	4	35	1
Sample weight (kg)	275,7	432,1	703,2	1129	318,9	2857	99,72
Depth range (m.)	40-200						

Table 18.- Cod length composition (0/00) in the trawl catches in Div. 3NO in 2000.

LENGTH (cm.)	3N	3O
30 - 32	7	
33 - 35	52	
36 - 38	88	
39 - 41	170	
42 - 44	225	
45 - 47	256	
48 - 50	132	
51 - 53	41	
54 - 56	13	
57 - 59	3	
60 - 62		45
63 - 65	1	45
66 - 68	2	91
69 - 71		136
72 - 74	2	182
75 - 77		91
78 - 80		45
81 - 83		45
84 - 86		136
87 - 89	1	45
90 - 92		91
99 - 101	1	45
Total	1000	1000
Fish measured	956	22
N° of samples	6	1
Sample weight (kg)	909,6	105
Depth range (m)	40 - 200	

Table 19.- Species composition in the Spanish trawl catches in Div. 3O (percentages over the total catch in Div. 3O) and respective proportion discarded in 2000.

	% in the catch	% discarded
<i>Redfish</i>	79	2
<i>Cod</i>	7	74
<i>American plaice</i>	5	5
<i>Witch flounder</i>	3	3
<i>Yellowtail flounder</i>	2	6
<i>Greenland halibut</i>	2	1
<i>Rest of species</i>	2	

Table 20.- Redfish (*Sebastes mentella*) length composition (0/00) in the trawl catches in Div. 3NO in 2000.

LENGTH (cm.)	Div. 3O						Total
	April	May	July	Aug.	Sept.	Oct.	
12 - 13	7						
14 - 15	9		1				
16 - 17	27		3		2	5	3
18 - 19	109	10	25	10	43	39	31
20 - 21	214	125	140	186	125	162	142
22 - 23	274	472	328	343	293	311	339
24 - 25	189	262	307	319	310	319	300
26 - 27	124	90	122	88	142	111	117
28 - 29	42	30	46	44	57	35	42
30 - 31	3	5	20	10	22	9	14
32 - 33		3	5		4	10	5
34 - 35	1	2	2		4	1	2
Total	1000	1000	1000	1000	1000	1000	1000
Fish measured	523	721	1840	204	609	611	4508
Nº of samples	2	3	9	1	3	3	21
Sample weight (kg)	94,6	141,4	380,8	40,3	128,0	122,2	907,2
Depth range (m)							350 - 600

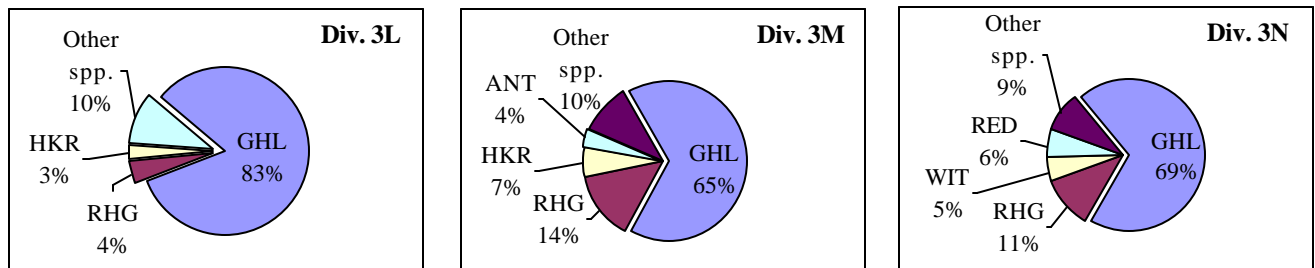


Fig. 1. Species composition (percentages over the total Division catch) in the Spanish Greenland halibut trawl fishery in 2000. GHL = *Reinhardtius hippoglossoides*; RHG = *Macrourus berglax*; HKR = *Gaidopsarus ensis*; ANT = *Antimora rostrata*; WIT = *Glyptocephalus cynoglossus*; RED = *Sebastes mentella*.