



SCIENTIFIC COUNCIL MEETING – JUNE 2005

Results of the 2004 Spanish Experimental Fishing in NAFO Subarea 1

by

J. L. del Rio, C. González, A. Gago and F. González.

Instituto Español de Oceanografía, Apdo. 1552, 36200 Vigo, Spain

e-mail: joseluis.delrio@vi.ieo.es

Abstract

An experimental fishing was carried out with three bottom trawlers commercial Spanish vessels from July to December of the year 2004 in the Subarea 1. The main objective of the experimental fishing was to search for cephalopods species concentrations inside the territorial waters of Greenland. During the experimental fishing a scientific observer stayed on board each vessel to collect effort data, catches and yields by haul and Division. The observers carried out length distribution samplings of the following species: *Reinhardtius hippoglossoides*, *Pandalus borealis*, *Gadus morhua*, *Sebastes spp.*, *Hippoglossoides platessoides* and *Macrourus berglax*. Biological samplings of *R. hippoglossoides*, *P. borealis*, *H. platessoides*, *G. morhua* and *M. berglax* were also carried out. Otoliths of Greenland halibut (1 356) and Atlantic cod (739) were collected for age determination. Greenland halibut was the main species caught and the cephalopods, target species, have not been found in the experimental fishing.

Introduction

The aim of this exploratory fishing was the localization of cephalopods species concentrations in order to allow a potential cephalopods fishery in Greenland Western waters. *Gonatus fabricii* (Lichtenstein, 1818) is the most abundant squid of the arctic and subarctic waters of the North Atlantic and has been intensively studied by Nesis (1965) and Kristensen (1984). Piatkowski and Wieland (1993) based on the high occurrences of early life stages indicated that this species has a remarkable fishery potential in West Greenland waters.

Materials and Methods

The experimental fishing was carried out from July 4th to December 6th in 2004 (Del Río *et al.*, 2004). The area covered was NAFO Subarea 1 (Div. 1ABCDEF) inside the Economic Exclusive Zone of West Greenland at depths between 28 to 1 463 m. The fishing was conducted by the bottom trawlers *C/V Villa de Hío*, *C/V Farruco* and *C/V Villa Nores*. The gear used was a bottom trawl with a mesh size between 42 and 60 mm cod-end. Towing trawl was usually one hour and the towing average speed was 3.0 kn. After each haul the catch was sorted by species and weighed. Due to difficulties in identification of species, redfishes were classified as *Sebastes* spp. Greenland halibut, Atlantic cod, redfish and American plaice were sexed and measured to the total length (TL) and to the nearest lower cm. Northern shrimp was measured to the oblique carapace length (CL), the distance from the base of the eye to the posterior dorsal edge and to the nearest lower 0.5 mm.

Results

The number of valid hauls by month and Division is given in Table 1. The distribution of the fishing effort (hours) by month and Division in the experimental fishing is presented in Table 2. Table 3 shows total catches for the main species

by Division. The unstandardized catch rates (kg/hour) by Division for Greenland halibut, northern shrimp and Atlantic cod are presented in Table 4.

Length distributions of total catches for Greenland halibut, northern shrimp, Atlantic cod, American plaice and redfish by Division are shown in Tables 5 to 9, respectively.

The positions of the hauls carried out in the experimental fishing are shown in Fig. 1.

References

DEL RIO, J. L., C. GONZÁLEZ, and S. IGLESIAS. 2005. Memoria Final de la Acción Piloto de Pesca Experimental en aguas de Groenlandia dirigida a la pesca de cefalópodos en 2004. RAI-AP-2/2004. Instituto Español de Oceanografía. Vigo.

Table 1. Fishing effort in number of valid hauls by month and Division in the experimental fishing in the SA 1.

Division	Jul	Jun	Aug	Oct	Nov	Dec	TOTAL
1A	64	99	43	-	-	-	206
1B	35	52	52	47	23	1	210
1C	45	40	7	-	-	-	92
1D	27	25	62	71	59	-	244
1E	-	-	21	37	15	-	73
1F	-	-	1	-	-	-	1
TOTAL	171	216	186	155	97	1	826

Table 2. Fishing effort in hours by month and Division in the experimental fishing in the SA 1.

Division	Units	Jul	Jun	Aug	Oct	Nov	Dec	TOTAL
1A	Hours	108	104	42	-	-	-	253
1B	Hours	47	50	49	47	35	1	229
1C	Hours	44	40	9	-	-	-	92
1D	Hours	26	25	60	72	77	-	259
1E	Hours	-	-	22	37	15	-	74
1F	Hours	-	-	1	-	-	-	1
Total		224	218	183	155	127	1	908

Table 3. Total catches (kg) by Division in the experimental fishing in SA1.

Code	Scientific name	DIVISION						Total
		1A	1B	1C	1D	1E	1F	
GHL	<i>Reinhardtius hippoglossoides</i>	82,831	57,740	44,845	85,034	671	0	271,120
PRA	<i>Pandalus borealis</i>	2,654	28,742	1,237	940	92	0	33,664
COD	<i>Gadus morhua</i>	1	246	37	10,429	7,945	0	18,658
PLA	<i>Hippoglossoides platessoides</i>	51	1,566	49	1,964	1,783	1	5,415
RED	<i>Sebastes spp</i>	894	1,563	145	647	1,531	29	4,809
HAL	<i>Hippoglossus hippoglossus</i>	9	380	73	2,871	439	0	3,771
RHG	<i>Macrourus berglax</i>	315	121	420	1,542	3	3	2,404
RJG	<i>Amblyraja hyperborea</i>	1,789	336	3	49	0	0	2,176
ANT	<i>Antimora rostrata</i>	0	0	242	1,291	0	0	1,532
POC	<i>Boreogadus saida</i>	452	941	11	25	2	0	1,432
GDE	<i>Gaidropsarus ensis</i>	14	234	928	173	0	0	1,349
RJR	<i>Amblyraja radiata</i>	99	280	1	517	433	0	1,330
CRQ	<i>Chionoectes opilio</i>	0	2	3	1,074	129	1	1,207
CFB	<i>Centroscyllium fabricii</i>	20	0	240	835	0	0	1,095
Others	Others species (131)	2,341	5,921	589	11,816	843	22	21,531
TOTAL		91,470	98,072	48,822	119,207	13,869	55	371,494

Table 4. Yields (kg/h) of the main species caught in the experimental fishing by month and Division.

Specie	Month	1A	1B	1C	1D	1E
<i>Reinhardtius hippoglossoides</i>	Jul	260.4	387.9	429.4	441.6	-
	Aug	426.4	280.1	618.9	292.2	-
	Sep	206.9	145.9	115.5	342.8	-
	Oct	-	224.2	-	321.0	-
	Nov	-	194.0	-	271.9	-
	Dec	-	-	-	-	-
TOTAL		319.5	247.9	482.3	320.6	
<i>Pandalus borealis</i>	Jul	1.1	12.8	-	-	-
	Aug	8.4	173.1	25.1	-	-
	Sep	8.7	114.8	-	-	-
	Oct	-	258.8	-	-	-
	Nov	-	-	-	-	-
	Dec	-	-	-	-	-
TOTAL		5.3	117.9	10.9		
<i>Gadus morhua</i>	Jul	-	-	-	-	-
	Aug	-	-	-	-	-
	Sept	-	-	-	5.8	74.5
	Oct	-	-	-	90.4	95.0
	Nov	-	-	-	28.3	74.7
	Dec	-	-	-	-	-
TOTAL				34.7	84.9	

Table 5. Greenland halibut length distributions samplings by Division in SA 1.

<u>Greenland halibut</u> Length (TL) cm	DIVISION				TOTAL
	1A	1B	1C	1D	
12-13	0	8	0	0	8
14-15	0	99	0	0	99
16-17	79	146	0	0	225
18-19	80	169	0	0	249
20-21	715	515	0	0	1230
22-23	1550	999	0	0	2549
24-25	2924	1694	0	0	4618
26-27	2375	2614	0	0	4989
28-29	5681	4983	0	0	10664
30-31	8934	6477	0	7	15418
32-33	9127	9371	0	34	18532
34-35	11346	9982	123	106	21557
36-37	9342	10602	275	402	20621
38-39	9186	8040	303	905	18434
40-41	9250	9439	1548	2917	23154
42-43	10261	9241	2874	5067	27443
44-45	10765	7693	6125	11188	35771
46-47	10657	6660	7864	13559	38740
48-49	8625	3793	7521	16207	36146
50-51	6932	4158	6899	13421	31410
52-53	5579	3789	4980	9786	24134
54-55	4206	1401	2807	6473	14887
56-57	2713	1055	1712	2967	8447
58-59	1295	1300	921	2244	5760
60-61	973	788	297	994	3052
62-63	486	996	883	1017	3382
64-65	865	138	536	605	2144
66-67	428	302	148	820	1698
68-69	332	20	154	458	964
70-71	678	17	30	410	1135
72-73	507	17	15	470	1009
74-75	589	0	15	97	701
76-77	142	0	0	122	264
78-79	100	0	0	117	217
80-81	26	0	0	63	89
82-83	43	0	0	39	82
84-85	104	0	0	74	178
86-87	142	0	0	74	216
88-89	127	0	0	79	206
90-91	24	0	0	54	78
92-93	0	0	0	16	16
94-95	0	0	0	34	34
96-97	0	0	0	82	82
98-99	0	0	0	87	87
100-101	0	192	0	7	199
102-103	0	0	0	0	0
104-105	0	0	0	10	10
TOTAL	137187	106693	46030	91013	380923
Samples	41	28	25	58	152
Fish Measured	2489	4788	2411	6336	16024
Total Catches (Kg)	82831	57740	44845	85034	270450

Table 6. Northern shrimp length distributions samplings by Division in SA 1.

<u>Northern shrimp</u> Length (CL) mm	DIVISION					TOTAL
	1A	1B	1C	1D	1E	
9	0	269	0	0	0	269
9.5	0	0	0	0	0	0
10	0	329	0	0	0	329
10.5	0	157	0	0	0	157
11	601	1261	0	0	0	1862
11.5	1642	4120	0	0	0	5762
12	548	3742	0	0	0	4290
12.5	1971	3431	0	0	0	5402
13	961	3034	0	0	0	3995
13.5	502	7306	0	0	0	7808
14	1195	9255	0	0	0	10450
14.5	380	12255	0	0	0	12635
15	1634	12519	0	176	0	14329
15.5	2114	21125	0	526	0	23765
16	5404	34665	0	370	0	40439
16.5	7359	53565	0	597	0	61521
17	12733	96335	0	772	0	109840
17.5	10926	129206	0	1430	101	141663
18	25348	162691	139	1032	299	189509
18.5	26534	197238	117	2195	279	226363
19	24141	262290	6861	2007	324	295623
19.5	29177	250988	3694	1569	381	285809
20	32605	293137	7149	2924	583	336398
20.5	36980	243436	3446	2385	758	287005
21	36590	247241	6401	1725	800	292757
21.5	31447	246557	6648	2797	781	288230
22	19155	306872	10227	2471	670	339395
22.5	15438	230554	12593	2503	453	261541
23	26657	300852	8659	4414	505	341087
23.5	14456	265403	15281	5927	612	301679
24	19853	267497	15790	5298	392	308830
24.5	14118	196677	19450	8533	544	239322
25	12795	140785	7801	7890	903	170174
25.5	9706	113384	13276	10009	1068	147443
26	9328	79147	8103	8110	534	105222
26.5	4223	40576	8028	4159	570	57556
27	4727	16758	4203	3381	368	29437
27.5	4275	8010	2793	5806	354	21238
28	2256	5426	2340	4214	226	14462
28.5	2345	3069	15	203	277	5909
29	867	478	49	231	74	1699
29.5	1009	380	5	1501	13	2908
30	1282	147	10	0	0	1439
30.5	129	49	5	736	0	919
31	168	0	0	0	0	168
31.5	84	0	0	0	0	84
TOTAL	453663	4272216	163083	95891	11869	4996722
Samples	21	50	5	10	5	91
Fish Measured	2235	7048	699	1180	520	11682
Total Catches (Kg)	2654	28742	1237	940	92	33665

Table 7. Atlantic cod length distributions samplings by Division in SA 1.

<u>Atlantic cod</u>	DIVISION				
	Length (TL) cm	1B	1C	1D	1E
14-15	0	0	0	41	41
16-17	0	0	14	38	52
18-19	0	0	14	92	106
20-21	0	0	18	118	136
22-23	0	0	343	169	512
24-25	0	0	560	301	861
26-27	0	0	12267	1001	13268
28-29	6	0	36241	2215	38462
30-31	12	0	50513	4663	55188
32-33	6	4	19667	4997	24674
34-35	9	6	3456	3667	7138
36-37	15	6	1882	1989	3892
38-39	18	2	1617	748	2385
40-41	52	8	195	300	555
42-43	40	6	609	267	922
44-45	18	4	716	228	966
46-47	15	2	771	192	980
48-49	12	0	353	156	521
50-51	6	0	329	130	465
52-53	9	0	143	121	273
54-55	0	0	168	79	247
56-57	9	0	57	55	121
58-59	3	0	39	32	74
60-61	9	0	23	69	101
62-63	3	0	3	17	23
64-65	3	0	0	13	16
66-67	0	0	11	14	25
68-69	0	0	25	11	36
70-71	6	0	16	1	23
72-73	0	0	1	5	6
74-75	0	0	0	14	14
76-77	0	0	0	6	6
78-79	0	0	0	0	0
80-81	0	0	0	0	0
82-83	0	0	1	0	1
TOTAL	254	37	130054	21749	152094
Samples	3	1	19	40	63
Fish Measured	83	19	1680	5429	7211
Total Catches (Kg)	246	37	10429	7945	18657

Table 8. American plaice length distributions samplings by Division in SA 1.

<u>American plaice</u>	<u>DIVISION</u>			
	Length (TL) cm	1B	1D	1E
7-8	440	0	0	440
9-10	1425	0	0	1425
11-12	9048	0	0	9048
13-14	7986	0	0	7986
15-16	4647	38	902	5587
17-18	3587	541	4364	8492
19-20	3324	473	2185	5982
21-22	2513	417	1181	4111
23-24	2084	989	951	4024
25-26	1391	1853	1061	4305
27-28	794	1806	748	3348
29-30	400	1747	664	2811
31-32	340	764	1046	2150
33-34	245	332	331	908
35-36	30	38	210	278
37-38	0	0	0	0
39-40	0	0	30	30
TOTAL	38255	8997	13673	60925
Samples	12	4	5	21
Fish Measured	1754	232	346	2332
Total Catches (Kg)	1566	1964	1783	5313

Table 9. Redfish length distributions samplings by Division in SA 1.

Redfish Length (TL) cm	DIVISION						TOTAL
	1A	1B	1C	1D	1E	1F	
7-8	0	608	0	0	0	0	608
9-10	0	13872	0	0	0	0	13872
11-12	9	18735	0	0	0	0	18744
13-14	78	2032	0	0	0	1	2111
15-16	466	3648	0	0	0	5	4119
17-18	293	2491	3	0	0	14	2801
19-20	178	1311	3	21	0	25	1538
21-22	370	322	43	39	68	13	855
23-24	223	295	76	198	524	19	1335
25-26	141	293	163	240	759	20	1616
27-28	91	165	162	184	578	5	1185
29-30	130	64	89	180	502	0	965
31-32	18	132	9	268	431	0	858
33-34	30	187	12	54	77	0	360
35-36	21	0	15	126	114	0	276
37-38	0	0	18	146	339	0	503
39-40	0	0	3	37	132	0	172
41-42	0	0	3	115	33	0	151
43-44	0	0	0	15	43	0	58
45-46	0	0	0	12	78	0	90
47-48	0	0	0	4	0	0	4
49-50	0	0	0	0	0	0	0
51-52	0	0	0	0	68	0	68
53-54	0	0	0	0	0	0	0
55-56	7	0	0	0	0	0	7
TOTAL	2054	44155	598	1638	3745	102	52292
Samples	7	8	5	7	8	1	36
Fish Measured	453	1191	69	167	106	102	2088
Total Catches (Kg)	894	1563	145	647	1531	29	4809

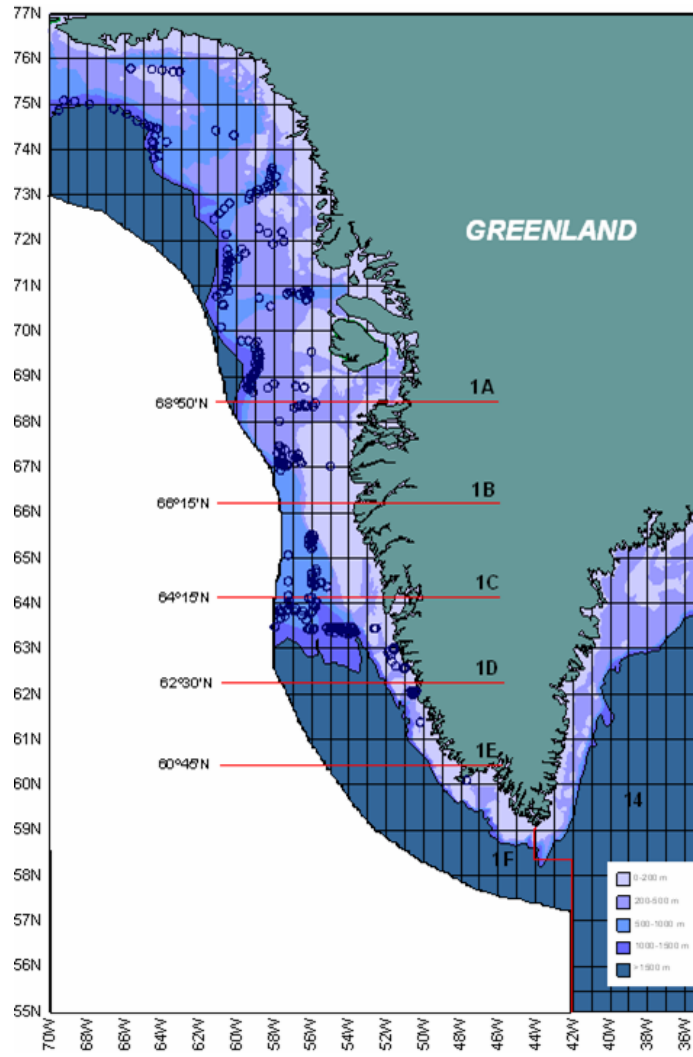


Fig. 1. Positions of hauls in the experimental fishing in NAFO Div. 1ABCDEF.