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PRELIMINARY RESULTS FROM THE 1997 BOTTOM TRAWL SURVEY IN THE NAFO
REGULATORY AREA FOR DIVISIONS 3NO.

by

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As the previous years, a stratified-random bottom trawl survey was performed in NAFO Regulatory area (Division 3NO) during 26th April to 17th May. The survey, which covered offshore areas on the Grand Bank, was conducted following the same procedures and the same vessel and gear of the 1995 and 1996 surveys (Paz et al. 1995; 1996). The area and the strata to be covered by the survey were based on the stratification charts and tables in Bishop (1994).

In 1997, the area covered was extended until 700 fathoms including the following new strata: 754, 758, 762 and 766. A total of 128 valid fishing sets were completed, 106 of them in Div. 3N and 22 in Div. 3O (Figure 1).

At touchdown of the net, a standard 30 minutes tow started, at a mean speed of 3 knots. Trawls with net damage were excluded from the analysis. From each set, catch numbers and weights for the main species along with length frequency from American plaice, Greenland halibut, witch flounder, yellowtail flounder and cod have been recorded. Otoliths were collected from American plaice, Greenland halibut and cod.

The catch weight by tow for American plaice, yellowtail flounder, Greenland halibut, witch flounder and cod appears in the figures 2 to 6. The American plaice, yellowtail flounder and cod catches are decreasing this year. In figure 7 and table 11 appear the comparison between abundance and biomass indices of the American plaice, yellowtail flounder, Greenland halibut and witch flounder for the three years considering only the same strata covered in 1995. The abundance and biomass indices by strata for these species and cod are presented in tables 1 to 5 respectively, and their length distribution by sexes in tables 6 to 10 respectively. Cod length distribution (table 10) is given for both sexes combined.

REFERENCES

Bishop, C. A. 1994.- Revision and additions to stratification schemes used during research vessels surveys in NAFO Subareas 2 and 3. *NAFO SCR Doc. 94/43*, Serial N 2413, 23p.

Paz, J.; J. Martinez and E. de Cárdenas 1995.- Preliminary results from the 95 Spanish bottom trawl survey in the NAFO Regulatory Area for Divisions 3NO. *NAFO SCR Doc. 95/55*, Serial N 2568, 9p.

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Table 1.- American plaice

Strata	Area	Number of hauls	Area trawled	Catch (Number)	Catch (Kg)	Abundance (.000)	Biomass (t)
353	269	4	0.05	1764	617.1	9886	3458.3
354	246	2	0.02	790	219.7	8356	2324.6
355	74	2	0.02	284	90.2	904	287.1
356	47	2	0.02	179	52.4	374	109.5
357	164	4	0.04	66	23.9	245	88.5
358	225	5	0.06	272	71.5	1087	285.9
359	421	6	0.07	1938	581.2	11826	3546.2
360	2783	32	0.38	8131	2690.9	60280	19949.7
374	214	3	0.04	299	81.0	1815	491.7
375	271	1	0.01	14	5.9	326	138.5
376	1334	14	0.16	1389	564.3	11706	4757.0
377	100	1	0.01	309	67.4	2661	579.8
378	139	2	0.02	40	12.0	266	79.4
379	106	2	0.02	39	11.4	200	58.7
380	96	2	0.02	37	9.0	168	41.1
381	144	2	0.02	61	10.0	397	64.8
382	343	4	0.05	41	7.6	306	56.4
721	65	2	0.02	261	86.2	768	253.2
722	84	3	0.03	1755	300.1	4625	790.9
723	155	2	0.02	183	56.6	1351	417.4
724	124	2	0.02	252	85.8	1391	472.7
725	105	2	0.02	34	8.5	173	43.0
727	96	1	0.01	145	30.1	1485	308.6
728	78	2	0.02	980	206.4	3575	753.2
752	131	2	0.02	2399	724.9	14447	4366.1
753	138	2	0.02	958	365.2	6186	2357.8
754	180	3	0.03	115	53.0	628	289.3
756	101	1	0.01	685	243.4	6358	2260.5
757	102	3	0.03	15871	6040.4	53296	20283.6
758	99	2	0.02	7	3.9	32	18.0
760	154	1	0.01	114	55.2	1674	809.6
761	171	3	0.03	21	11.7	114	63.4
762	212	3	0.03	0	0.0	0	0.0
764	100	3	0.03	3	1.1	10	3.5
766	144	3	0.03	0	0.0	0	0.0
TOTAL	9215		1.43	39435	13387.7	206915	69807.9
Standard error:						4271	3383

Table 2.- Yellowtail flounder

Strata	Area	Number of hauls	Area trawled	Catch (Number)	Catch (Kg)	Abundance (,000)	Biomass (t)
353	269	4	0.05	342	150.2	1919	841.5
354	246	2	0.02	17	8.4	180	89.1
355	74	2	0.02	27	13.2	86	41.9
356	47	2	0.02	4	1.9	8	4.0
357	164	4	0.04	0	0.0	0	0.0
358	225	5	0.06	1	0.3	4	1.1
359	421	6	0.07	7	1.5	43	8.8
360	2783	32	0.38	39400	7744.2	292106	57415.1
374	214	3	0.04	0	0.0	0	0.0
375	271	1	0.01	1	0.6	23	14.0
376	1334	14	0.16	40071	6797.5	337785	57301.0
377	100	1	0.01	0	0.0	0	0.0
378	139	2	0.02	0	0.0	0	0.0
379	106	2	0.02	0	0.0	0	0.0
380	96	2	0.02	0	0.0	0	0.0
381	144	2	0.02	0	0.0	0	0.0
382	343	4	0.05	0	0.0	0	0.0
721	65	2	0.02	9	4.5	26	13.2
722	84	3	0.03	0	0.0	0	0.0
723	155	2	0.02	0	0.0	0	0.0
724	124	2	0.02	0	0.0	0	0.0
725	105	2	0.02	0	0.0	0	0.0
727	96	1	0.01	0	0.0	0	0.0
728	78	2	0.02	0	0.0	0	0.0
752	131	2	0.02	0	0.0	0	0.0
753	138	2	0.02	0	0.0	0	0.0
754	180	3	0.03	0	0.0	0	0.0
756	101	1	0.01	0	0.0	0	0.0
757	102	3	0.03	0	0.0	0	0.0
758	99	2	0.02	0	0.0	0	0.0
760	154	1	0.01	0	0.0	0	0.0
761	171	3	0.03	0	0.0	0	0.0
762	212	3	0.03	0	0.0	0	0.0
764	100	3	0.03	0	0.0	0	0.0
766	144	3	0.03	0	0.0	0	0.0
TOTAL	9215		1.43	79879	14722.3	632181	115729.9
Standard error:						17322	9852

Table 3.- Greenland halibut

Strata	Area	Number of hauls	Area trawled	Catch (Number)	Catch (Kg)	Abundance (,000)	Biomass (t)
353	269	4	0.05	16	2.5	89	14.0
354	246	2	0.02	85	15.1	899	159.2
355	74	2	0.02	1032	87.7	3285	279.1
356	47	2	0.02	665	88.5	1389	184.9
357	164	4	0.04	235	46.3	871	171.7
358	225	5	0.06	996	74.3	3983	297.4
359	421	6	0.07	284	42.9	1733	261.9
360	2783	32	0.38	97	14.9	719	110.8
374	214	3	0.04	0	0.0	0	0.0
375	271	1	0.01	0	0.0	0	0.0
376	1334	14	0.16	0	0.0	0	0.0
377	100	1	0.01	0	0.0	0	0.0
378	139	2	0.02	103	16.8	682	111.2
379	106	2	0.02	323	48.1	1661	247.2
380	96	2	0.02	352	57.0	1608	260.4
381	144	2	0.02	20	4.6	130	29.7
382	343	4	0.05	0	0.0	0	0.0
721	65	2	0.02	424	64.2	1246	188.5
722	84	3	0.03	426	305.8	1123	805.7
723	155	2	0.02	523	111.2	3859	820.4
724	124	2	0.02	161	41.3	887	227.6
725	105	2	0.02	823	169.2	4191	861.2
727	96	1	0.01	272	55.6	2787	569.3
728	78	2	0.02	3354	780.9	12238	2849.4
752	131	2	0.02	1546	795.0	9312	4788.3
753	138	2	0.02	1065	698.8	6878	4511.6
754	180	3	0.03	597	604.2	3259	3295.7
756	101	1	0.01	1481	736.4	13757	6839.2
757	102	3	0.03	1476	1121.4	4957	3765.8
758	99	2	0.02	1435	847.9	6649	3927.3
760	154	1	0.01	273	112.5	4001	1650.0
761	171	3	0.03	1857	2000.4	10081	10859.2
762	212	3	0.03	1416	1483.0	9761	10224.2
764	100	3	0.03	1427	935.0	4642	3040.7
766	144	3	0.03	2080	2031.9	9740	9515.0
TOTAL	9215		1.43	24845	13393.2	126418	70866.6
Standard error:						1141	1519

Table 4.- Witch flounder

Strata	Area	Number of hauls	Area trawled	Catch (Number)	Catch (Kg)	Abundance (,000)	Biomass (t)
353	269	4	0.05	4	4.2	22	23.4
354	246	2	0.02	6	3.9	63	41.3
355	74	2	0.02	171	82.7	544	263.2
356	47	2	0.02	69	28.6	144	59.7
357	164	4	0.04	9	3.4	33	12.4
358	225	5	0.06	54	28.4	216	113.6
359	421	6	0.07	43	31.2	262	190.2
360	2783	32	0.38	29	25.7	215	190.4
374	214	3	0.04	0	0.0	0	0.0
375	271	1	0.01	0	0.0	0	0.0
376	1334	14	0.16	0	0.0	0	0.0
377	100	1	0.01	0	0.0	0	0.0
378	139	2	0.02	2	0.7	14	4.6
379	106	2	0.02	8	2.7	41	13.8
380	96	2	0.02	0	0.0	0	0.0
381	144	2	0.02	0	0.0	0	0.0
382	343	4	0.05	0	0.0	0	0.0
721	65	2	0.02	104	38.9	305	114.3
722	84	3	0.03	466	170.1	1228	448.3
723	155	2	0.02	65	32.0	480	236.3
724	124	2	0.02	25	9.0	138	49.4
725	105	2	0.02	9	2.2	46	11.1
727	96	1	0.01	0	0.0	0	0.0
728	78	2	0.02	18	1.2	65	4.5
752	131	2	0.02	58	14.4	349	86.5
753	138	2	0.02	139	49.8	896	321.8
754	180	3	0.03	13	5.0	71	27.3
756	101	1	0.01	25	7.1	233	65.9
757	102	3	0.03	95	39.3	319	132.1
758	99	2	0.02	49	23.3	227	107.7
760	154	1	0.01	31	14.1	455	206.8
761	171	3	0.03	580	224.6	3150	1219.0
762	212	3	0.03	20	8.0	138	55.3
764	100	3	0.03	1125	326.3	3658	1061.1
766	144	3	0.03	95	26.5	444	124.1
TOTAL	9215		1.43	3311	1203.2	13756	5184.2
Standard error:						228	282

Table 5.- Cod

Strata	Area	Number of hauls	Area trawled	Catch (Number)	Catch (Kg)	Abundance (,000)	Biomass (t)
353	269	4	0.05	0	0	0	0.0
354	246	2	0.02	0	0	0	0.0
355	74	2	0.02	4	24.5	13	78.0
356	47	2	0.02	27	44.6	56	93.2
357	164	4	0.04	683	1046.5	2532	3878.7
358	225	5	0.06	25	25.3	100	101.0
359	421	6	0.07	8	19.3	51	117.8
360	2783	32	0.38	13	9.9	96	73.5
374	214	3	0.04	1	0.5	6	3.0
375	271	1	0.01	0	0.0	0	0.0
376	1334	14	0.16	0	0.0	0	0.0
377	100	1	0.01	1	0.8	9	6.5
378	139	2	0.02	22	13.4	146	88.7
379	106	2	0.02	26	21.0	134	108.1
380	96	2	0.02	2	2.1	9	9.5
381	144	2	0.02	1	0.4	7	2.6
382	343	4	0.05	0	0.0	0	0.0
721	65	2	0.02	187	119.9	549	352.2
722	84	3	0.03	3	1.8	8	4.7
723	155	2	0.02	65	56.6	480	417.8
724	124	2	0.02	9	7.4	50	40.9
725	105	2	0.02	295	134.3	1503	683.9
727	96	1	0.01	2	0.3	20	3.5
728	78	2	0.02	4	6.7	16	24.5
752	131	2	0.02	0	0.0	0	0.0
753	138	2	0.02	0	0.0	0	0.0
754	180	3	0.03	0	0.0	0	0.0
756	101	1	0.01	0	0.0	0	0.0
757	102	3	0.03	0	0.0	0	0.0
758	99	2	0.02	0	0.0	0	0.0
760	154	1	0.01	0	0.0	0	0.0
761	171	3	0.03	0	0.0	0	0.0
762	212	3	0.03	0	0.0	0	0.0
764	100	3	0.03	0	0.0	0	0.0
766	144	3	0.03	0	0.0	0	0.0
TOTAL	9215		1.43	1380	1535.4	6	6.1
Standard error:						270	428

Table 8.- Length distribution of Greenland Halibut.

Length Groups (cm)	Frequency %			Indeterm.
	Males	Females		
10	0.0	0.1		0.4
12	1.0	2.9		2.1
14	0.6	1.7		1.0
16	0.5	0.5		0.0
18	9.3	10.0		0.0
20	24.2	30.9		0.1
22	20.1	22.7		0.0
24	11.1	11.3		0.0
26	21.6	28.0		0.0
28	36.0	37.1		0.0
30	23.8	42.5		0.0
32	19.6	27.8		0.0
34	20.4	32.9		0.0
36	20.7	41.5		0.0
38	19.8	43.6		0.0
40	24.7	46.3		0.0
42	24.3	39.7		0.0
44	20.1	40.1		0.0
46	18.5	36.9		0.0
48	11.8	33.7		0.0
50	10.9	24.6		0.0
52	7.4	17.6		0.0
54	6.4	12.6		0.0
56	4.1	10.0		0.0
58	2.8	7.5		0.0
60	2.7	6.7		0.0
62	0.5	4.0		0.0
64	0.3	4.7		0.0
66	0.3	3.8		0.0
68	0.0	2.2		0.0
70	0.1	1.8		0.0
72	0.0	2.3		0.0
74	0.0	0.8		0.0
76	0.0	0.8		0.0
78	0.0	0.9		0.0
80	0.0	0.9		0.0
82	0.0	0.3		0.0
84	0.0	0.0		0.0
86	0.0	0.0		0.0
88	0.0	0.3		0.0
90	0.0	0.3		0.0
92	0.0	0.3		0.0
TOTAL	363.6	632.7		3.7
N° Sampled	3444	5550		55
N° Samples	75			
Total catch	13393			
Sampled catch	13393			
N° of Hauls	139			

Table 7.- Length distribution of Yellowtail Flounder.

Length Groups (cm)	Frequency %	
	Males	Females
12	0.6	0.3
14	0.1	0.7
16	5.6	3.5
18	12.2	10.7
20	39.1	42.6
22	89.9	73.8
24	110.7	99.0
26	91.1	102.5
28	55.1	84.8
30	26.1	43.6
32	16.9	22.4
34	8.8	12.8
36	5.7	12.4
38	2.3	11.0
40	1.1	8.0
42	0.4	3.7
44	0.2	1.3
46	0.0	0.2
48	0.0	0.2
50	0.0	0.1
52	0.0	0.1
54	0.0	0.1
TOTAL	466.2	533.8
N° Sampled	3635	4469
N° Samples	54	
Total catch	14722	
Sampled catch	14659	
N° of Hauls	139	

Table 6.- Length distribution of American Plaice.

Length Groups (cm)	Frequency %		Indeterm.
	Males	Females	
14	0.2	0.1	0.0
16	0.6	1.1	0.0
18	3.1	3.7	0.1
20	7.2	4.7	0.0
22	17.5	11.4	0.0
24	21.1	20.0	0.0
26	43.6	33.3	0.0
28	102.1	30.4	0.0
30	79.3	59.6	0.0
32	70.6	67.6	0.0
34	51.5	70.4	0.0
36	23.5	73.3	0.0
38	14.5	62.5	0.0
40	5.2	44.8	0.0
42	2.9	29.9	0.0
44	3.1	16.3	0.0
46	0.4	9.3	0.0
48	0.1	5.6	0.0
50	0.0	5.2	0.0
52	0.0	1.5	0.0
54	0.0	1.0	0.0
56	0.0	0.4	0.0
58	0.0	0.3	0.0
60	0.0	0.3	0.0
62	0.0	0.3	0.0
64	0.0	0.3	0.0
66	0.0	0.0	0.0
68	0.0	0.1	0.0
TOTAL	446.5	553.4	0.1
N° Sampled	8297	5729	3
N° Samples	116		
Total catch	13388		
Sampled catch	13387		
N° of Hauls	139		

Table 9.- Length distribution of Witch Flounder.

Length Groups (cm)	Frequency %	
	Males	Females Indeterm.
20	0.7	0.3
22	0.3	3.0
24	5.1	5.5
26	9.5	15.3
28	14.8	18.0
30	34.4	43.7
32	56.2	50.0
34	60.1	51.6
36	73.4	85.7
38	54.1	79.4
40	34.8	60.1
42	30.1	57.7
44	15.8	43.4
46	8.7	24.9
48	7.1	17.9
50	1.5	16.1
52	0.6	9.6
54	0.3	4.2
56	0.3	3.7
58	0.0	0.6
60	0.3	0.0
62	0.0	0.6
TOTAL	408.2	591.2
N° Sampled	856	1154
N° Samples	67	
Total catch	1203	
Sampled catch	1198	
N° of Hauls	139	

Table 10.- Length distribution of Cod.

Length Groups (cm)	Frequency %
	Combinated
24	1.5
27	6.7
30	23.9
33	66.0
36	143.7
39	104.3
42	70.1
45	57.0
48	54.1
51	46.8
54	53.9
57	85.9
60	126.4
63	59.3
66	65.2
69	17.3
72	7.6
75	2.9
78	0.7
81	3.8
84	0.7
87	0.7
90	0.7
93	0.0
96	0.0
99	0.0
102	0.0
105	0.0
108	0.0
111	0.0
114	0.7
TOTAL	1000.0
N° Sampled	758
N° Samples	38
Total catch	1535
Sampled catch	1514
N° of Hauls	139

Table 11.- Biomass and abundance of the American plaice, yellowtail flounder, Greenland halibut and witch flounder from the 3NO 1995 to 1997 bottom trawl surveys. Only the common strata in the three years have been computed.

American plaice	BIOMASS (t)	ABUNDANCE (,000)	Yellowtail flounder	BIOMASS (t)	ABUNDANCE (,000)
1995	54179.3	249762	1995	27704.5	120500
1996	102844	363451	1996	129642.0	529338
1997	38357.7	119224.5	1997	115728.1	634034.3

Greenland halibut	BIOMASS (t)	ABUNDANCE (,000)	Witch flounder	BIOMASS (t)	ABUNDANCE (,000)
1995	2821.6	10506	1995	3585.4	7038
1996	6130.0	44613	1996	4444	3434
1997	18186.8	40206.1	1997	2991	6771.1

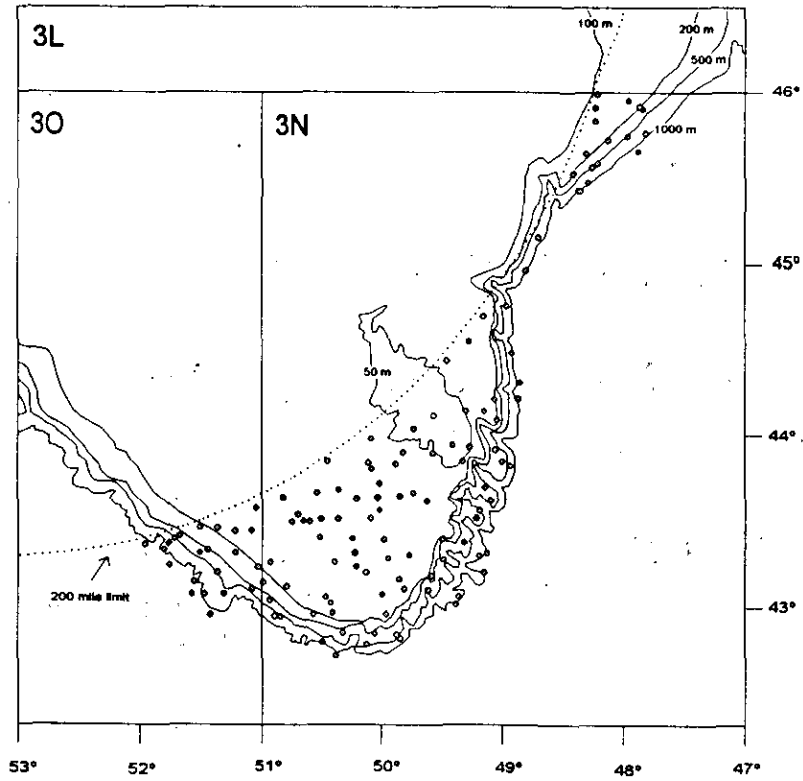


Fig 1.- Distribution of fishing stations during 1997 Spanish Bottom Trawl Survey in NAFO Divs. 3NO.

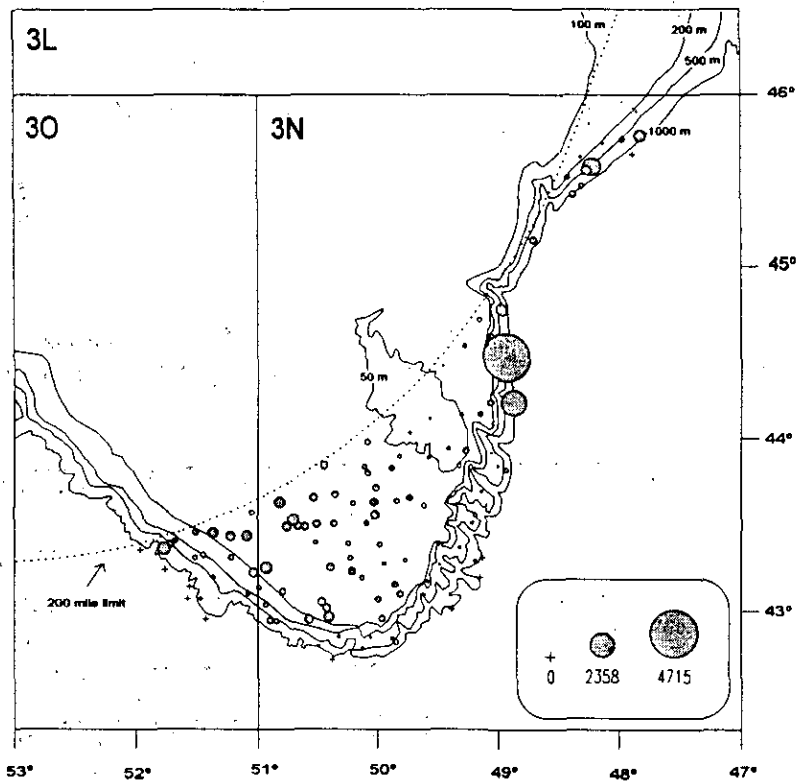


Fig 2.- Distribution of American Plaice catches from the 1997 Spanish Bottom Trawl Survey of NAFO Divs. 3NO. Symbols represent catch in weight (Kg) per tow (Square root scale).

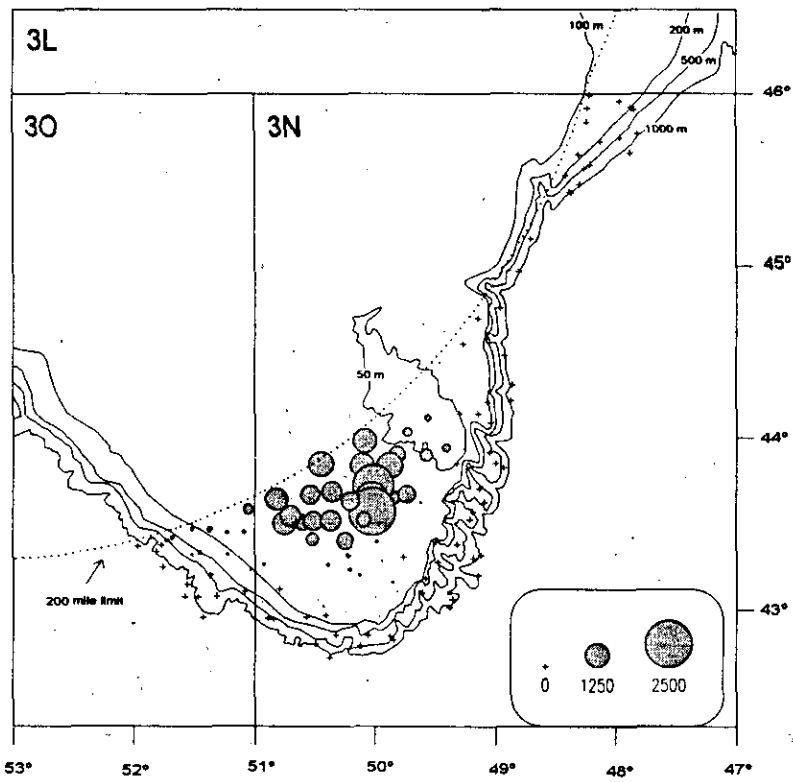


Fig 3.- Distribution of Yellowtail Flounder catches from the 1997 Spanish Bottom Trawl Survey of NAFO Divs. 3NO. Symbols represent catch in weight (Kg) per tow (Square root scale).

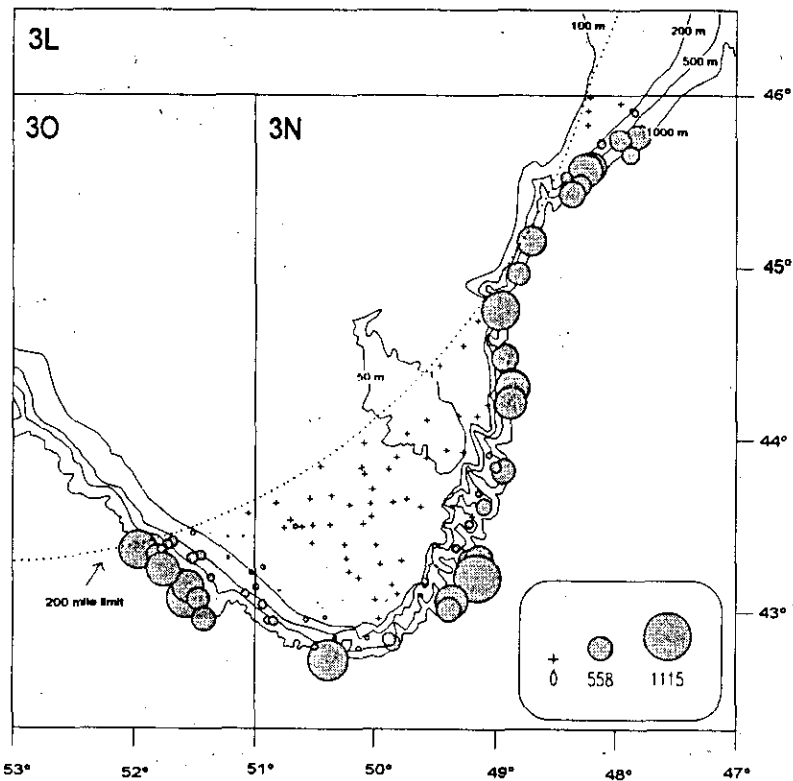


Fig 4.- Distribution of Greenland Halibut catches from the 1997 Spanish Bottom Trawl Survey of NAFO Divs. 3NO. Symbols represent catch in weight (Kg) per tow (Square root scale).

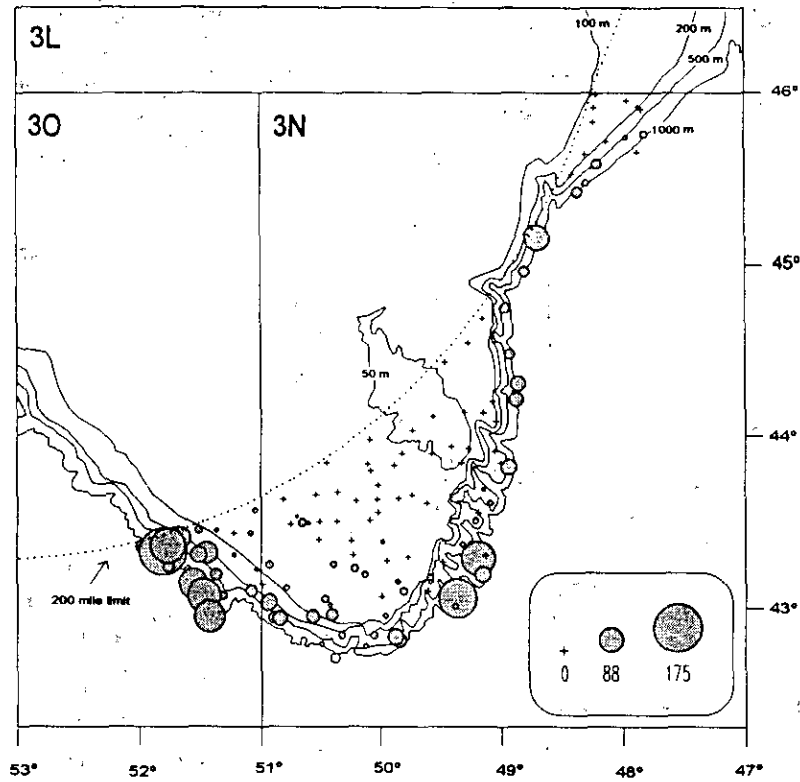


Fig 5.- Distribution of Witch Flounder catches from the 1997 Spanish Bottom Trawl Survey of NAFO Divs. 3NO. Symbols represent catch in weight (Kg) per tow (Square root scale).

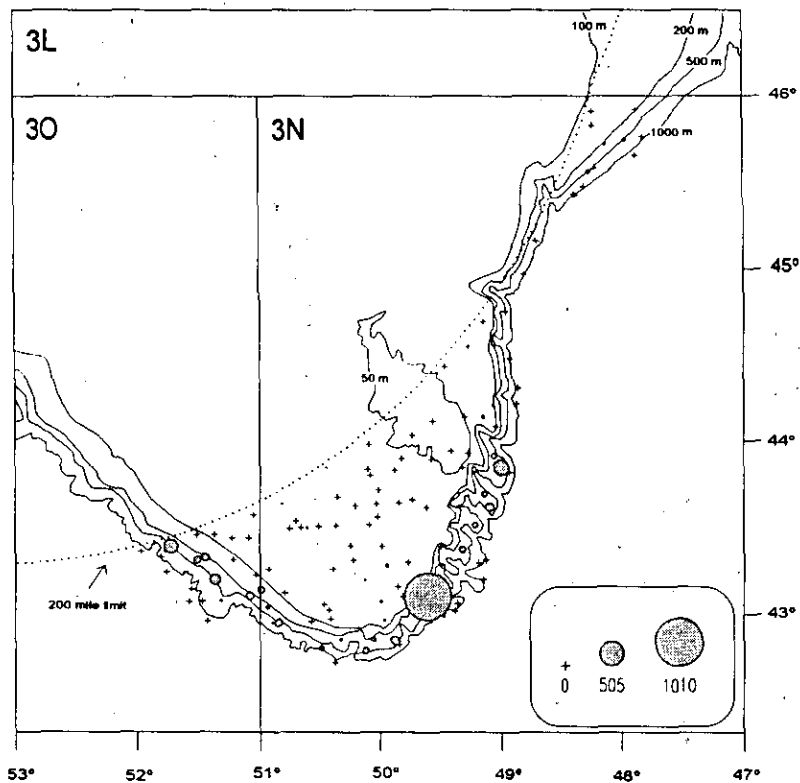


Fig 6.- Distribution of Cod catches from the 1997 Spanish Bottom Trawl Survey of NAFO Divs. 3NO. Symbols represent catch in weight (Kg) per tow (Square root scale).

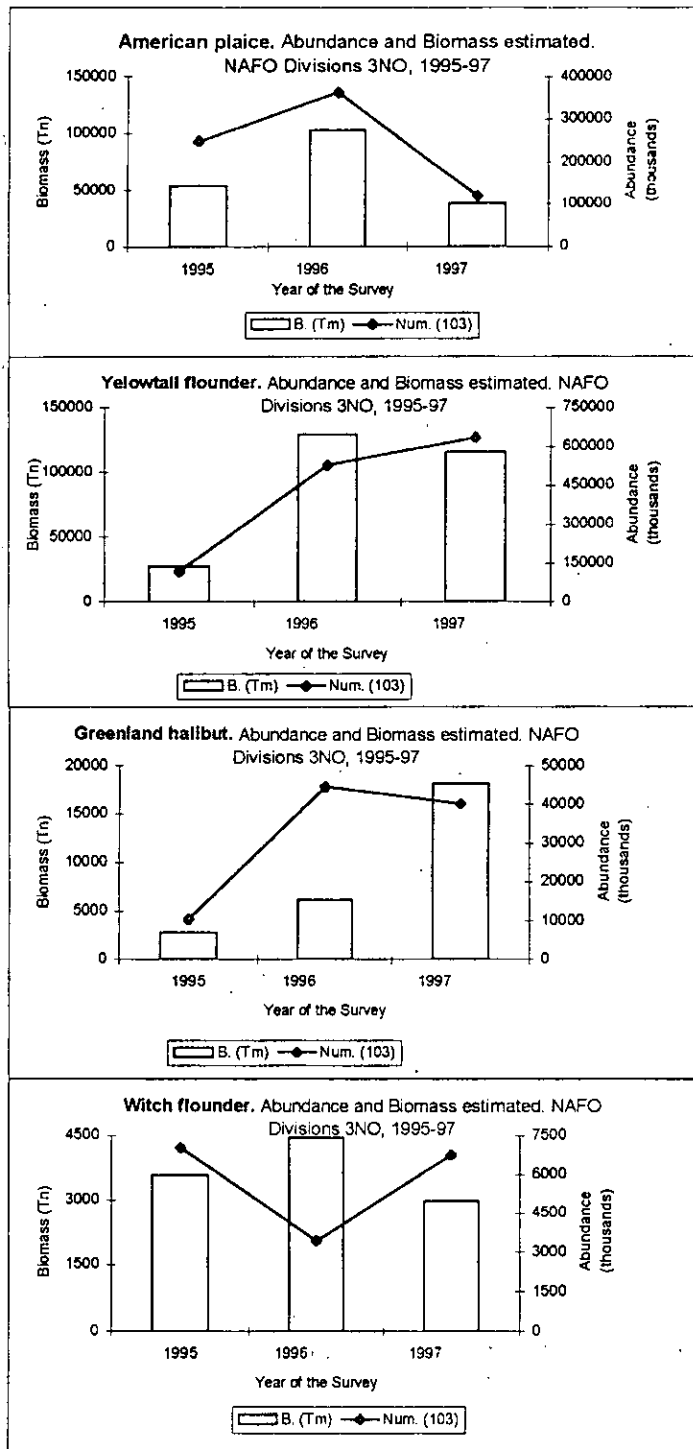


Figure 7.- Abundance and biomass indices from Spanish survey for the main commercial species, considering only the strata covered in 1995. NAFO Divisions 3NO, 1995-1997.