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Abundance and Biomass for American Plaice from the Surveys Conducted by Spain in the NAFO Regulatory Area of Divisions 3NO: 1995-2000

by

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Abstract

Since 1995, a stratified random spring bottom trawl survey in the NAFO Regulatory Area of Div. 3NO was conducted by Spain. The depth strata surveyed was extended to 1464 m. The main propose of the surveys was obtain abundance and biomass indices for the commercial species in the area (American plaice, yellowtail flounder, Greenland halibut, cod, witch, roughead grenadier and thorny skate). Following the recommendations of the 2000 Scientific Council Meeting, the entire series of abundance and biomass for American Plaice, the description of the survey design, the specifications and the geometry of the sampling trawl used in the Spanish spring survey in Div. 3NO, are presented for the period 1995-2000. The indices calculated from the survey series, shows an increasing in the American plaice abundance and biomass in the area.

Material and Methods

Survey design and gear used

The surveys on NAFO Regulatory Area of Div. 3NO was initiated by Spain in 1995. The surveys were carried out in spring (May), on board the Spanish vessel *C/V Playa de Menduiña* (338 GT and 800 HP) using bottom trawl net type pedreira. The main specifications and geometry of this gear, as the rigging profile and the net plan are in figure 1. In the table 1 are presented the number of valid tows, the depth strata covered and the dates of the survey series. In the period 1998-2000, the surveyed depth strata were the same (extended to 1464 m) more deeper than in the previous surveys, as show in the cited table (see annexe). In recent years (2000-2001), experiences of comparative fishing between Spain and Canada was conducted also (Paz *et al.*, 2000, Brodie *et al.*, 2000). The survey area was stratified following the standard stratification schemes (Bishop, 1994). Sets was allocated to strata proportionally to their size, with a minimum of two planned hauls per stratum and the trawl positions were chosen at random (Doubleday, 1981). Biomass and abundance indices were calculated by the swept area method (Cochram, 1997), assuming cachability factor of 1. The catch from each haul was sorted by species and weighed. Samples of the main species (American plaice, yellowtail flounder, Greenland halibut, cod, witch, roughhead grenadier, redfish, blackdogfish and thorny skate) were measured at random to the total length at cm below (except grenadier: preanal fin length at 0.5 cm below). Biological samples were made (stratified by length), recording size (cm), weight (g), sex and maturity stage, according with methods of the Instituto Español de Oceanografía. Otoliths were collected

(Greenland halibut, cod, roughhead grenadier). A sheet with the resume of the main technical data of the survey is in table 2.

Stratified mean catches of American plaice

The stratified mean catch is calculated by stratum by the following formula:

$$\overline{Y_i} = \sum_{j=1}^{T} \frac{y_j}{T} \quad , \text{i=1,...,h}$$

where:

y_j is the catch by haul in the stratum
T is the number of hauls in the stratum
h is the total number of strata

and the stratified mean catch is obtained as follow:

$$\widetilde{Y}_i = \overline{Y_i}\, n_i \quad , \text{i=1,...,h}$$

where:

n_i is the area of the stratum i, i=1,...,h

Then the total stratified mean catch by year is calculated according to the formula:

$$\overline{Y} = \sum_{i=1}^{h} \frac{\widetilde{Y}_i}{N}$$

where:

$N = \sum_{i=1}^{h} n_i$ is the total area by year

Results

Catches of American plaice

The American plaice mean catches by stratum are presented in table 3, included swept area, number of hauls and SD. The stratified mean catches of American plaice are presented in table 4. Data from year 1995 are added, although in that year a few sets were made, so it is not representative. The American plaice indices showed an increasing year by year, specially since 1998 (figure 2). The decreasing in the 1997 value should be related to a delayed in the spring migration of the American plaice from the deeper waters to the shallower ones, and also with the advancement in the survey dates (table 1).

Abundance and Biomass of American plaice

Following the recommendations of the 2000 Scientific Council Meeting, the entire time series (1995-2000) of abundance and biomass of American plaice are presented (updated) in table 5 and table 6 respectively. Both tables shows an increasing in the survey estimates through the studied period.

The data analysed from American plaice, suggested a rebuilding of this resource in the surveyed area.

References

BISHOP, C.A. 1994. Revisions and additions to stratification schemes used during research vessel surveys in NAFO subareas 2 and 3. *NAFO SCR Doc*., No 43, Serial No N2413, 23 pp.

BRODIE, W. And J. Morgan. 2000. Preliminary results of comparative fishing between Spaniash an Canadian survey vessels. *NAFO SC Working paper* No 00/8. 2 pp.

COCHRAM, W.G. 1997. Sampling techniques. J. Wiley and Sons, N.Y., 428 pp.

DOUBLEDAY, W.G. 1981. Manual on groundfish surveys in the Northwest Atlantic. *NAFO Sci. Coun. Studies*, **2**, 55.

PAZ, X., E. ROMÁN and P. DURÁN MUÑOZ. 2000. An exercise of comparative fishing between the R/V Wilfred Templeman ant the B/C Playa de Menduiña in NAFO Div. 3N in May 2000. *NAFO SC Working paper* No 00/19.12 pp.

TABLE 1.- Spanish spring bottom trawl surveys on NAFO Div. 3NO: 1995-2000.

Year	Vessel	Valid tows	Depth strata covered (m)	Dates
1995	C/V Playa de Menduiña	77	>56-731	May 18 - May 29
1996	C/V Playa de Menduiña	112	>56-1097	May 07 - May 24
1997	C/V Playa de Menduiña	128	>56-1280	April 26 - May 18
1998	C/V Playa de Menduiña	124	>56-1463	May 06 - May 26
1999	C/V Playa de Menduiña	114	>56-1463	May 07 - May 26
2000	C/V Playa de Menduiña	118	>56-1463	May 07 - May 28

TABLE 2 .- Technical data of the Spanish spring bottom trawl survey on NAFO Divs. 3NO.

Name of the vessel:	C/V Playa de Menduiña		
Type of vessel:	Stern freezer trawler		
GT:	338 t		
Power:	800 HP		
Mean trawl speed:	3 knots		
Trawling time:	30 minutes effective time		
Fishing gear used type "Pedreira"			
Headline:	39.9 m		
Groundrope:	53.1 m		
Type of groundrope:	Ruber discs and steel spacers (150 mm)		
Stimated vertical opening (FURUNO):	2.9 m		
Bridles:	250 m, 50 mm		
Trawl doors:	Oval polyvalent 800 kg		
Warp:	22 mm		
Mesh size in the codend:	35 mm		
Type of survey:	Stratified random bottom trawl survey		
Sets selection:	Random		
Citerion to change position of a set:	Unsuitable bottom to trawling or previous information on gear damage		
Citerion to reject data from set:	Damage on codend, severe damage on gear, bad behaviour of the gear, less of 20 minutes tow		
Fishing daily period	6.00 - 21.00 hours		
Main sampled species:	Greenland halibut	cod	thorny skate
	American plaice	roughead grenadier	redfish
	yelowtail flounder	witch flounder	blackdogfish

TABLE 3.- Swept Area, number of hauls and American plaice mean catch (Kg) and SD by stratum. Spanish Spring Survey on NAFO Div. 3NO: 1995-2000. Swept area in square miles

	1995				1996				1997			
Stratum	Swept Area	Tow number	A. plaice Mean catch	A. plaice SD	Swept Area	Tow number	A. plaice Mean catch	A. plaice SD	Swept Area	Tow number	A. plaice Mean catch	A. plaice SD
353	0.0353	3	228.43	134.801	0.03712	3	695.00	101.180	0.04800	4	154.27	80.671
354	0.0353	3	400.93	213.469	0.03187	3	417.02	133.936	0.02325	2	109.85	59.326
355	n. s.	n. s.	n. s.	n. s.	0.02212	2	177.50	79.903	0.02326	2	45.10	14.849
356	n. s.	n. s.	n. s.	n. s.	0.02025	2	24.90	2.121	0.02326	2	26.20	13.294
357	0.0109	1	28.35	-	0.02175	2	20.63	20.683	0.04424	4	5.97	3.379
358	0.0319	3	72.05	42.721	0.03187	3	23.45	14.726	0.05625	5	14.29	14.199
359	0.0345	3	184.03	202.625	0.05475	5	144.86	71.296	0.05625	6	96.87	50.727
360	0.3563	31	113.41	91.025	0.37609	31	231.59	139.386	0.37543	32	84.09	57.373
374	0.0225	2	10.58	9.581	0.02325	2	37.30	5.374	0.03526	3	27.00	10.195
375	0.0225	2	6.85	4.101	0.02288	2	81.30	83.439	0.01163	1	5.94	-
376	0.1729	15	17.91	5.542	0.165	14	97.33	78.161	0.01163	14	40.31	28.112
377	0.0221	2	25.55	13.294	0.02288	2	75.80	27.294	0.01163	1	67.40	-
378	0.0435	4	35.86	2.182	0.033	3	31.50	9.824	0.02100	2	6.00	5.091
379	0.0221	2	42.13	40.906	0.01125	1	22.10	-	0.02063	2	5.72	5.042
380	n. s.	n. s.	n. s.	n. s.	0.02212	2	22.05	7.707	0.02100	2	4.52	0.255
381	n. s.	n. s.	n. s.	n. s.	0.02287	2	21.20	10.324	0.02212	2	4.98	2.878
382	n. s.	n. s.	n. s.	n. s.	0.03375	3	28.63	20.270	0.04613	4	1.90	1.092
721	n. s.	n. s.	n. s.	n. s.	0.02138	2	47.52	24.720	0.02212	2	43.10	39.315
722	n. s.	n. s.	n. s.	n. s.	0.02063	2	23.40	26.446	0.02138	2	150.05	211.778
723	n. s.	n. s.	n. s.	n. s.	0.01087	1	8.90	-	0.02100	2	28.28	17.572
724	0.0105	1	33.70	-	0.02025	2	30.30	15.698	0.02250	2	42.89	54.751
725	0.0334	3	44.25	66.484	0.0225	2	2.65	1.768	0.02063	2	4.23	2.835
726	0.0214	2	8.43	8.238	0.02175	2	7.55	1.626	n. s.	n. s.	n. s.	n. s.
727	n. s.	n. s.	n. s.	n. s.	0.021	2	19.38	10.783	0.00938	1	30.14	-
728	n. s.	n. s.	n. s.	n. s.	0.02175	2	163.80	167.867	0.02137	2	103.20	77.075
752	n. s.	n. s.	n. s.	n. s.	0.01087	1	93.30	-	0.02174	2	362.45	411.890
753	n. s.	n. s.	n. s.	n. s.	0.01988	2	701.10	739.917	0.02137	2	182.60	133.926
754	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	0.03299	3	17.68	20.735
755	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.
756	n. s.	n. s.	n. s.	n. s.	0.021	2	70.80	1.697	0.01087	1	243.40	-
757	n. s.	n. s.	n. s.	n. s.	0.01875	2	272.60	381.413	0.03038	3	2013.45	-
758	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	0.02137	2	1.95	1.435
759	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.
760	n. s.	n. s.	n. s.	n. s.	0.021	2	49.15	7.425	0.01050	1	55.20	-
761	n. s.	n. s.	n. s.	n. s.	0.01988	2	0.00	0.000	0.03150	3	3.89	6.284
762	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.		3	0.00	0.000
763	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.
764	n. s.	n. s.	n. s.	n. s.	0.0210	2	1.45	0.778		2	0.54	0.757
765	n. s.	n. s.	n. s.	n. s.	0.01988	2	0.00	0.000	0.02063	2	0.00	0.000
766	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	0.03075	3	0.00	0.000
767	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.	n.s.	n.s.	n.s.	n.s.

TABLE 3 (Cont.).- Swept Area, number of hauls and American plaice mean catch (Kg) and SD by stratum. Spanish Spring Survey on NAFO Div. 3NO: 1995-2000. Swept area in square miles

	1998				1999				2000			
Stratum	Swept Area	Tow number	A. plaice Mean catch	A. plaice SD	Swept Area	Tow number	A. plaice Mean catch	A. plaice SD	Swept Area	Tow number	A. plaice Mean catch	A. plaice SD
353	0.0465	4	861.75	333.925	0.0360	3	1250.95	121.001	0.0356	3	1370.12	677.434
354	0.0356	3	1226.90	470.858	0.0217	2	592.15	321.663	0.0356	3	474.17	272.659
355	0.0221	2	433.10	427.517	0.0229	2	195.60	96.874	0.0233	2	193.00	4.950
356	0.0221	2	45.75	17.183	0.0229	2	101.20	76.792	0.0225	2	90.42	78.369
357	0.0240	2	7.50	1.556	0.0236	2	9.85	6.152	0.0124	1	1.78	-
358	0.0236	3	21.64	4.069	0.0349	3	29.12	48.392	0.0341	3	960.47	1407.386
359	0.0698	6	638.70	642.382	0.0364	3	1559.40	272.198	0.0469	4	2121.83	447.704
360	0.2562	25	345.82	208.587	0.2324	19	848.30	294.671	0.2396	20	1044.45	865.893
374	0.0353	3	12.87	2.914	0.0244	2	141.50	4.808	0.0240	2	18.00	1.414
375	0.0345	3	19.07	11.418	0.0236	2	135.75	49.992	0.0244	2	96.85	29.911
376	0.0930	10	266.69	235.685	0.1219	10	385.60	201.803	0.1200	10	807.18	576.609
377	0.0229	2	151.75	191.979	0.0240	2	277.10	377.312	0.0229	2	86.91	93.472
378	0.0120	2	16.80	7.071	0.0229	2	22.95	13.506	0.0233	2	63.50	72.832
379	0.0356	3	8.53	5.800	0.0236	2	2.50	0.990	0.0225	2	7.40	3.684
380	0.0113	2	5.45	3.041	0.0236	2	7.15	0.212	0.0236	2	5.61	1.294
381	0.0229	2	27.05	35.143	0.0229	2	1.90	0.742	0.0236	2	6.52	4.080
382	0.0229	3	14.00	9.702	0.0484	4	7.23	1.962	0.0499	4	6.16	1.806
721	0.0203	2	24.70	20.789	0.0244	2	64.50	33.375	0.0236	2	13.56	15.196
722	0.0101	2	6.40	7.637	0.0229	2	7.80	2.263	0.0218	2	3.90	5.515
723	0.0233	2	32.30	27.719	0.0229	2	109.50	96.308	0.0248	2	34.30	23.617
724	0.0206	2	34.85	8.132	0.0225	2	31.80	33.658	0.0233	2	39.60	5.798
725	0.0086	1	2.00	-	0.0229	2	7.97	0.233	0.0210	2	27.80	28.001
726	0.0094	2	9.50	8.768	0.0225	2	128.50	151.321	0.0221	2	26.50	13.435
727	0.0233	2	29.00	12.162	0.0236	2	24.30	24.607	0.0210	2	14.75	6.718
728	0.0206	2	50.10	14.849	0.0233	2	122.00	71.701	0.0210	2	73.41	0.573
752	0.0229	2	160.65	22.840	0.0233	2	114.75	35.143	0.0206	2	412.10	82.590
753	0.0218	2	472.70	42.709	0.0229	2	47.40	15.981	0.0218	2	546.60	697.773
754	0.0210	2	8.60	12.162	0.0206	2	0.00	0.000	0.0195	2	0.00	0.000
755	0.0206	2	1.25	1.768	0.0311	3	0.17	0.289	0.0431	4	0.00	0.000
756	0.0225	2	642.45	830.355	0.0225	2	399.90	142.977	0.0203	2	101.90	38.042
757	0.0206	2	264.50	324.562	0.0233	2	54.90	12.162	0.0214	2	16.48	21.956
758	0.0105	2	12.95	18.314	0.0214	2	1.00	1.407	0.0210	2	4.25	5.303
759	0.0214	2	0.00	0.000	0.0218	2	1.10	1.556	0.0210	2	6.40	9.051
760	0.0214	2	25.85	17.748	0.0225	2	65.30	90.934	0.0210	2	140.20	187.808
761	0.0206	2	11.15	5.162	0.0210	2	0.00	0.000	0.0221	2	0.60	0.849
762	0.0094	2	0.00	0.000	0.0210	2	59.45	84.075	0.0203	2	0.00	0.000
763	0.0218	2	0.25	0.354	0.0311	3	0.00	0.000	0.0416	4	0.98	1.950
764	0.0217	2	0.80	1.131	0.0225	2	0.00	0.000	0.0217	2	0.00	0.000
765	0.0098	2	0.00	0.000	0.0221	2	0.00	0.000	0.0203	2	0.00	0.000
766	0.0191	2	0.00	0.000	0.0218	2	0.00	0.000	0.0214	2	0.00	0.000
767	0.0109	2	0.00	0.000	0.0214	2	0.00	0.000	0.0210	2	0.36	0.502

TABLE 4.- Stratified mean catches of American plaice by stratum ($\tilde{\bar{Y}}_i$) and year ($\bar{Y}_i$).
n.s. means stratum not surveyed.

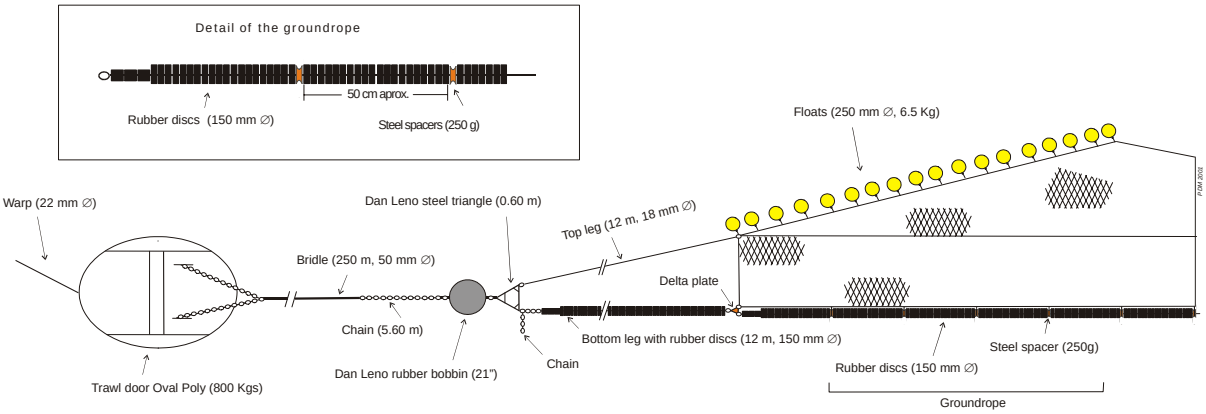
Strata	1995	1996	Survey 1997	1998	1999	2000
353	61448.57	186955.00	41499.30	231810.75	336506.45	368562.28
354	98629.60	1.70	27023.10	301817.40	145668.90	116645.82
355	n.s.	2.40	3337.40	32049.40	14474.40	14282.00
356	n.s.	0.53	1231.40	2150.25	4756.40	4249.51
357	4649.40	3382.50	979.45	1230.00	1615.40	291.92
358	16211.25	5276.25	3215.70	4868.25	6552.75	216105.00
359	77478.03	60986.06	40780.87	268892.70	656507.40	893288.33
360	315623.62	644506.89	234021.60	962405.93	2360818.90	2906690.44
374	2263.05	7982.20	5778.00	2753.47	30281.00	3852.00
375	1856.35	22032.30	1609.74	5167.07	36788.25	26246.35
376	23887.49	129836.31	53770.68	355764.46	514389.07	1076778.12
377	2555.00	7580.00	6740.00	15175.00	27710.00	8690.50
378	4984.89	4378.50	834.00	2335.20	3190.05	8826.50
379	4465.25	2342.60	605.79	904.53	265.00	783.87
380	n.s.	2116.80	433.92	523.20	686.40	538.08
381	n.s.	3052.80	716.40	3895.20	272.88	938.16
382	n.s.	9821.23	651.70	4802.00	2478.18	2113.74
721	n.s.	3088.80	2801.50	1605.50	4192.50	881.08
722	n.s.	1965.60	12604.20	537.60	655.20	327.60
723	n.s.	1379.50	4382.63	5006.50	16972.50	5316.50
724	4178.80	3757.20	5317.74	4321.40	3943.20	4910.40
725	0.42	278.25	443.63	210.00	836.33	2919.00
726	606.60	543.60	n.s.	684.00	9252.00	1908.00
727	n.s.	1860.00	2893.44	2784.00	2332.80	1416.00
728	n.s.	327.60	8049.60	3907.80	9516.00	5725.59
752	n.s.	12222.30	47480.95	21045.15	15032.25	53985.10
753	n.s.	96751.80	25198.80	65232.60	6541.20	75430.80
754	n.s.	n.s.	3181.80	1548.00	0.00	0.00
755	n.s.	n.s.	n.s.	481.25	64.17	0.00
756	n.s.	7150.80	24583.40	64887.45	40389.90	10291.90
757	n.s.	27805.20	205371.90	26979.00	5599.80	1680.45
758	n.s.	n.s.	192.36	1282.05	98.51	420.75
759	n.s.	n.s.	n.s.	0.00	139.70	812.80
760	n.s.	7569.10	8500.80	3980.90	10056.20	21590.80
761	n.s.	0.00	665.19	1906.65	0.00	102.60
762	n.s.	n.s.	0.00	0.00	12603.40	0.00
763	n.s.	n.s.	n.s.	65.25	0.00	254.48
764	n.s.	145.00	53.75	80.00	0.00	0.00
765	n.s.	0.00	0.00	0.00	0.00	0.00
766	n.s.	n.s.	0.00	0.00	0.00	0.00
767	n.s.	n.s.	n.s.	0.00	0.00	56.09
($\bar{Y}_i$)	94.15	143.01	82.98	232.36	413.96	564.39

TABLE 5.- Survey estimates (by the swept area method) of American plaice abundance (,000) by strata on NAFO Division 3NO. Strata not surveyed = n.s.

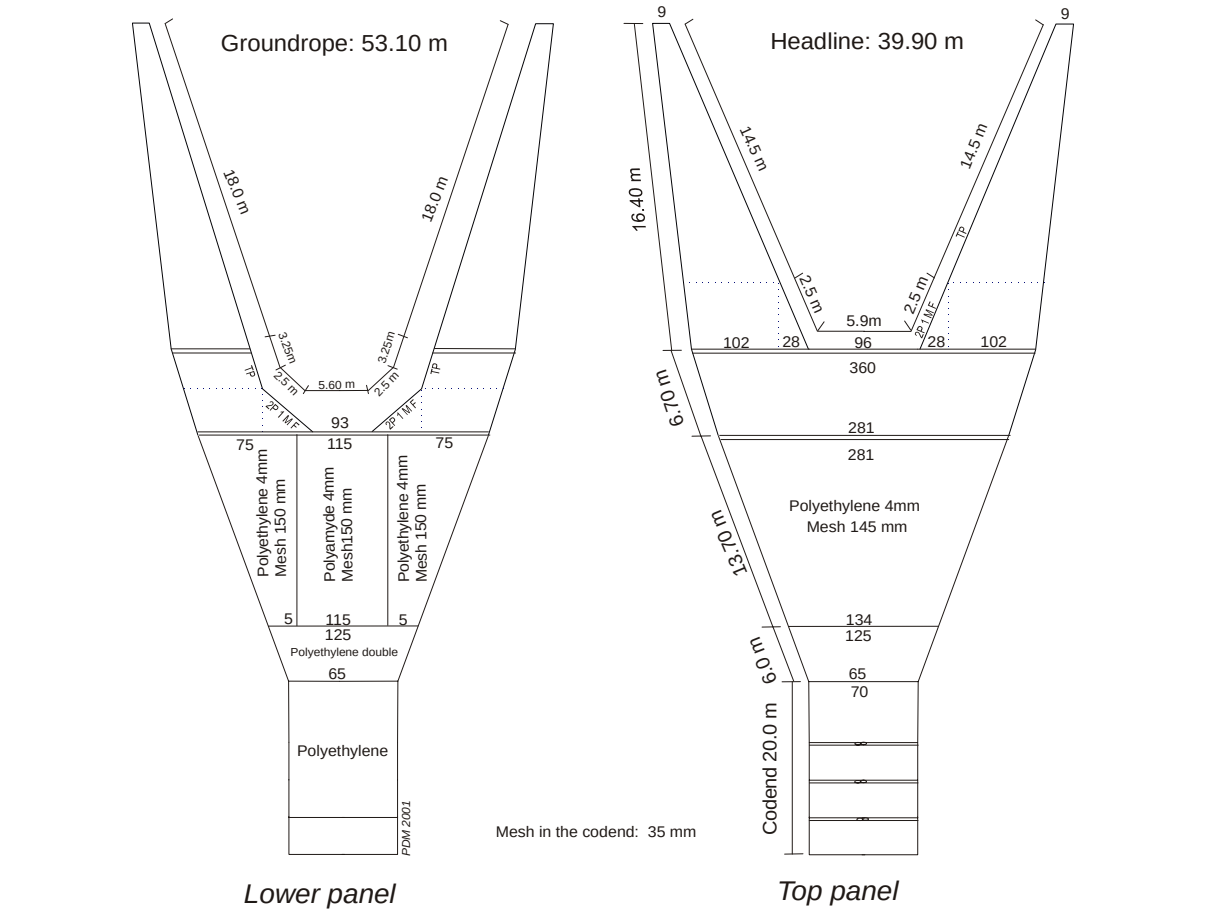
	Survey					
Estrata	1995	1996	1997	1998	1999	2000
353	19049	57734	9909	45219	67332	114514
354	31583	35491	8378	60908	34706	20765
355	n.s.	4003	904	6257	1484	2687
356	n.s.	459	384	457	850	624
357	1523	875	248	226	199	66
358	5640	2104	1098	1429	939	26317
359	43984	22674	11800	54100	119923	162321
360	134416	179032	59743	207258	382612	601212
374	808	2705	1815	547	5309	704
375	554	3505	326	941	5830	3497
376	7947	26694	11723	66322	72665	147335
377	1193	3006	2661	2541	7795	1632
378	2518	1898	266	985	638	1370
379	1554	1119	200	255	49	137
380	n.s.	1002	239	350	130	118
381	n.s.	1998	397	1624	120	439
382	n.s.	5356	321	2414	982	619
721	n.s.	1012	771	328	779	143
722	n.s.	592	6897	267	81	42
723	n.s.	499	1351	884	2932	745
724	1098	1078	1391	932	607	608
725	1207	103	173	47	188	680
726	135	149	n.s.	377	1813	417
727	n.s.	896	1485	718	532	1975
728	n.s.	5461	3575	1448	2210	1281
752	n.s.	3239	14454	5861	4034	12635
753	n.s.	26344	6186	16478	1345	15708
754	n.s.	n.s.	628	351	0	0
755	n.s.	n.s.	n.s.	148	0	0
756	n.s.	1904	6358	13012	8138	2155
757	n.s.	8238	53379	6544	1134	229
758	n.s.	n.s.	32	443	23	61
759	n.s.	n.s.	n.s.	0	29	163
760	n.s.	2853	1674	635	1570	2885
761	n.s.	0	119	373	0	0
762	n.s.	n.s.	0	0	1916	0
763	n.s.	n.s.	n.s.	13	0	31
764	n.s.	0	15	18	0	0
765	n.s.	0	0	0	0	0
766	n.s.	n.s.	0	0	0	0
767	n.s.	n.s.	n.s.	0	0	8
TOTAL	253210	402023	208900	500711	728894	1124124

TABLE 6.- Survey estimates (by the swept area method) of American plaice biomass (t.) by strata on NAFO Division 3NO. Strata not surveyed = n.s.

			Survey			
Strata	1995	1996	1997	1998	1999	2000
353	5230	15107	3458	19941	28042	31037
354	8394	9655	2325	25416	13395	9823
355	n.s.	1187	287	2897	1266	1229
356	n.s.	116	109	194	416	378
357	428	311	89	103	137	24
358	1526	497	286	618	564	18998
359	6737	5570	3546	23131	54145	76227
360	27465	53120	19950	93939	192927	242603
374	201	687	492	234	2485	321
375	165	1926	138	449	3114	2154
376	2073	11016	4757	38254	42206	89732
377	231	663	580	1327	2309	760
378	458	398	79	389	279	759
379	404	208	59	76	22	70
380	n.s.	191	41	93	58	46
381	n.s.	267	65	341	24	79
382	n.s.	873	57	630	205	170
721	n.s.	289	253	159	344	75
722	n.s.	191	1179	106	57	30
723	n.s.	127	417	431	1484	430
724	398	371	473	419	351	422
725	418	25	43	24	73	278
726	57	50	n.s.	146	822	172
727	n.s.	177	309	239	197	135
728	n.s.	1175	753	379	819	545
752	n.s.	1124	4366	1840	1293	5235
753	n.s.	9736	2358	5998	572	6936
754	n.s.	n.s.	289	147	0	0
755	n.s.	n.s.	n.s.	47	6	0
756	n.s.	681	2261	5768	3590	1016
757	n.s.	2966	20284	2616	482	157
758	n.s.	n.s.	18	244	9	40
759	n.s.	n.s.	n.s.	0	13	77
760	n.s.	721	810	372	894	2056
761	n.s.	0	63	185	0	9
762	n.s.	n.s.	0	0	1200	0
763	n.s.	n.s.	n.s.	6	0	24
764	n.s.	14	5	7	0	0
765	n.s.	0	0	0	0	0
766	n.s.	n.s.	0	0	0	0
767	n.s.	n.s.	n.s.	0	0	5
TOTAL	54183	119438	70199	227167	353800	492053



Rigging Profile



Net Plan

Figure 1.- Specifications and the geometry of the sampling trawl. Spanish spring survey in Div. 3NO.

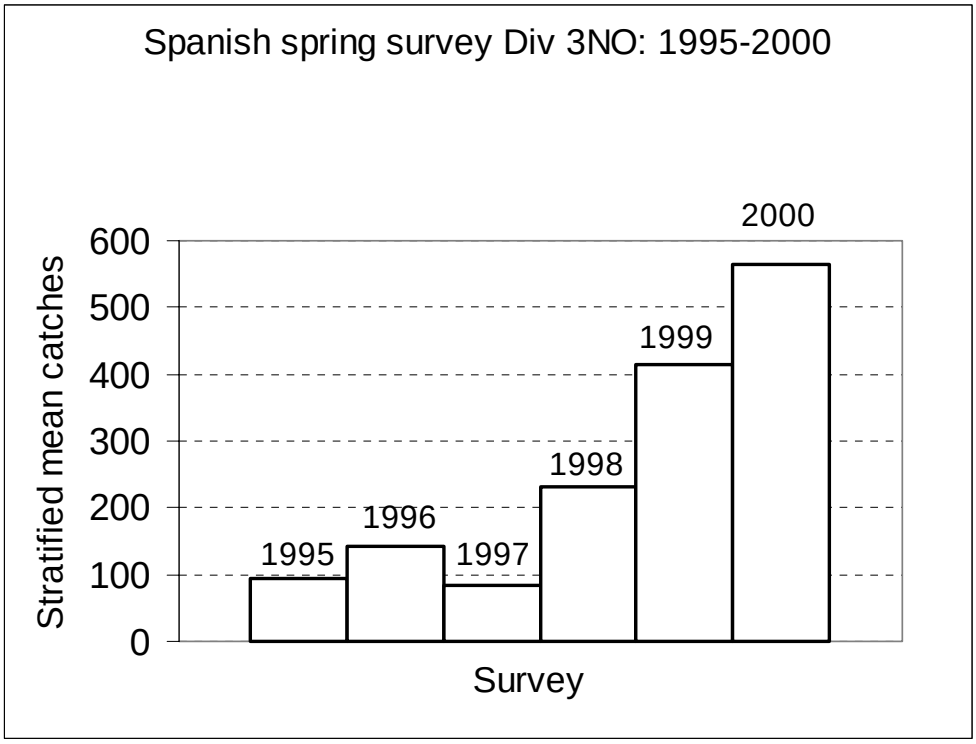


Figure 2.- Stratified mean catches of American plaice by year. Spanish spring surveys in NAFO Division 3NO: 1995 –2000

ANNEXE: Depth strata surveyed in 3NO Spanish spring survey series and depth range.

1995	m	Div	1996	m	Div	1997	m	Div	1998	m	Div	1999	m	Div	2000	m	Div
353	57-91	3O	353	57-91	3O	353	57-91	3O	353	57-91	3O	353	57-91	3O	353	57-91	3O
354	93-183	3O	354	93-183	3O	354	93-183	3O	354	93-183	3O	354	93-183	3O	354	93-183	3O
			355	185-274	3O	355	185-274	3O	355	185-274	3O	355	185-274	3O	355	185-274	3O
			356	276-366	3O	356	276-366	3O	356	276-366	3O	356	276-366	3O	356	276-366	3O
357	275-366	3N	357	275-366	3N	357	275-366	3N	357	275-366	3N	357	275-366	3N	357	275-366	3N
358	185-274	3N	358	185-274	3N	358	185-274	3N	358	185-274	3N	358	185-274	3N	358	185-274	3N
359	93-183	3N	359	93-183	3N	359	93-183	3N	359	93-183	3N	359	93-183	3N	359	93-183	3N
360	57-91	3N	360	57-91	3N	360	57-91	3N	360	57-91	3N	360	57-91	3N	360	57-91	3N
374	57-91	3N	374	57-91	3N	374	57-91	3N	374	57-91	3N	374	57-91	3N	374	57-91	3N
375	<56	3N	375	<56	3N	375	<56	3N	375	<56	3N	375	<56	3N	375	<56	3N
376	<56	3N	376	<56	3N	376	<56	3N	376	<56	3N	376	<56	3N	376	<56	3N
377	93-183	3N	377	93-183	3N	377	93-183	3N	377	93-183	3N	377	93-183	3N	377	93-183	3N
378	185-274	3N	378	185-274	3N	378	185-274	3N	378	185-274	3N	378	185-274	3N	378	185-274	3N
379	275-366	3N	379	275-366	3N	379	275-366	3N	379	275-366	3N	379	275-366	3N	379	275-366	3N
			380	275-366	3N	380	275-366	3N	380	275-366	3N	380	275-366	3N	380	275-366	3N
			381	185-274	3N	381	185-274	3N	381	185-274	3N	381	185-274	3N	381	185-274	3N
			382	93-183	3N	382	93-183	3N	382	93-183	3N	382	93-183	3N	382	93-183	3N
			721	367-549	3O	721	367-549	3O	721	367-549	3O	721	367-549	3O	721	367-549	3O
			722	550-731	3O	722	550-731	3O	722	550-731	3O	722	550-731	3O	722	550-731	3O
			723	367-549	3N	723	367-549	3N	723	367-549	3N	723	367-549	3N	723	367-549	3N
724	550-731	3N	724	550-731	3N	724	550-731	3N	724	550-731	3N	724	550-731	3N	724	550-731	3N
725	367-549	3N	725	367-549	3N	725	367-549	3N	725	367-549	3N	725	367-549	3N	725	367-549	3N
726	550-731	3N	726	550-731	3N				726	550-731	3N	726	550-731	3N	726	550-731	3N
			727	367-549	3N	727	367-549	3N	727	367-549	3N	727	367-549	3N	727	367-549	3N
			728	550-731	3N	728	550-731	3N	728	550-731	3N	728	550-731	3N	728	550-731	3N
			752	732-914	3N	752	732-914	3N	752	732-914	3N	752	732-914	3N	752	732-914	3N
			753	915-1097	3N	753	915-1097	3N	753	915-1097	3N	753	915-1097	3N	753	915-1097	3N
						754	1098-1280	3N	754	1098-1280	3N	754	1098-1280	3N	754	1098-1280	3N
									755	1281-1463	3N	755	1281-1463	3N	755	1281-1463	3N
			756	732-914	3N	756	732-914	3N	756	732-914	3N	756	732-914	3N	756	732-914	3N
			757	917-1097	3N	757	917-1097	3N	757	917-1097	3N	757	917-1097	3N	757	917-1097	3N
						758	1098-1280	3N	758	1098-1280	3N	758	1098-1280	3N	758	1098-1280	3N
									759	1281-1463	3N	759	1281-1463	3N	759	1281-1463	3N
			760	732-914	3N	760	732-914	3N	760	732-914	3N	760	732-914	3N	760	732-914	3N
			761	915-1097	3N	761	915-1097	3N	761	915-1097	3N	761	915-1097	3N	761	915-1097	3N
						762	1098-1280	3N	762	1098-1280	3N	762	1098-1280	3N	762	1098-1280	3N
									763	1281-1463	3N	763	1281-1463	3N	763	1281-1463	3N
			764	732-914	3O	764	732-914	3O	764	732-914	3O	764	732-914	3O	764	732-914	3O
			765	915-1097	3O	765	915-1097	3O	765	915-1097	3O	765	915-1097	3O	765	915-1097	3O
						766	1098-1280	3O	766	1098-1280	3O	766	1098-1280	3O	766	1098-1280	3O
									767	1281-1463	3O	767	1281-1463	3O	767	1281-1463	3O