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Yellowtail Flounder Data from the Surveys Conducted by Spain in the NAFO Regulatory Area of Divisions 3NO, 1995-2001

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. The entire series of abundance and biomass for yellowtail flounder are presented for the period 1995-2001. The indices calculated from the survey series shows an increasing in the yellowtail flounder abundance and biomass and a good recruitment in the area, with a higher proportion of females than males.

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, and a sheet with the resume of the main technical data of the survey are described in previous paper (Durán Muñoz *et. al*., 2001). 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 1998-2001, the surveyed depth strata were the same (extended to 1464 m), more deeper than in the previous surveys, as show in the cited table. The survey area was stratified following the standard stratification schemes (Bishop, 1994). Sets were 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 catchability factor of 1. The catch from each haul was sorted by species and weighed. Samples of Yellowtail flounder were measured at random to the total length at cm below. Length distribution estimated from catches is presented for the period 1995-2001.

Stratified mean catches of Yellowtail flounder

The 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 by stratum is obtained as follow:

$$Y_i = \overline{Y_i}\, n_i \quad , i=1,...,h$$

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:

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

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

Results

Catches of Yellowtail flounder

The yellowtail flounder mean catches by stratum are presented in Table 2, included swept area, number of hauls and SD. The stratified mean catches of yellowtail flounder are presented in Table 3. Data from year 1995 are added, although in that year a few sets were made, so it is not representative. The yellowtail flounder indices show a general increasing across the years (Fig. 1). The high value of the year 1999 may be due to a change of the catchability, so it is a year effect (Walsh *et. al*., 2001).

Abundance and Biomass of Yellowtail flounder

Following the recommendations of the 2000 Scientific Council Meeting, the entire time series (1995-2001) of abundance and biomass estimates of yellowtail flounder are presented (updated) in Table 4 and Table 5, respectively. Although there are some year variations, an increasing general trend in the abundance (Fig. 2) is observed. The biomass (Fig. 3) shows a similar pattern.

Length distribution of Yellowtail flounder

The length distribution of yellowtail flounder is shown in Table 6, and in Fig. 4 we can see its evolution along the years. We can see a good recruitment (individuals between 20 and 26 cm.) in this period, namely in 1996 and in 1997. The presence of the great year-class appears covered by probable changes in catchability.

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TABLE 1. Spanish spring bottom trawl surveys on NAFO Div. 3NO: 1995-2001.

Year	Vessel	Valid tows	Depth strata covered (m)	Dates
1995	C/V Playa de Menduíña	77	>56-731	May 18-May 29
1996	C/V Playa de Menduíña	112	>56-1098	May 07-May 24
1997	C/V Playa de Menduíña	128	>56-1280	April 26-May 18
1998	C/V Playa de Menduíña	124	>56-1463	May 06-May 26
1999	C/V Playa de Menduíña	114	>56-1464	May 07-May 26
2000	C/V Playa de Menduíña	118	>56-1465	May 07-May 28
2001	C/V Playa de Menduíña	130	>56-1466	May 03-May 24

TABLE 2. Swept area, number of hauls and Yellowtail flounder mean catch (kg.) and SD (*) by stratum. Spanish Spring Surveys on NAFO Div. 3NO: 1995-2001. Swept area in square miles. n.s. means stratum not surveyed.

Stratum	1995				1996				1997				1998			
	Swept area	Tow number	Y. flounder Mean catch	Y. flounder SD	Swept area	Tow number	Y. flounder Mean catch	Y. flounder SD	Swept area	Tow number	Y. flounder Mean catch	Y. flounder SD	Swept area	Tow number	Y. flounder Mean catch	Y. flounder SD
353	0.0353	3	17.40	12.277	0.0371	3	223.93	282.967	0.0480	4	37.54	42.637	0.0465	4	36.56	60.305
354	0.0353	3	5.33	9.238	0.0319	3	3.32	2.526	0.0233	2	4.21	4.667	0.0356	3	3.64	0.719
355	n.s.	n.s.	n.s.	n.s.	0.0221	2	0.75	1.061	0.0233	2	6.59	0.933	0.0221	2	0.38	0.534
356	n.s.	n.s.	n.s.	n.s.	0.0203	2	0.00	0.000	0.0225	2	0.97	1.372	0.0221	2	0.00	0.000
357	0.0109	1	0.00	-	0.0218	2	0.00	0.000	0.0443	4	0.00	0.000	0.0240	2	0.00	0.000
358	0.0319	3	0.00	0.000	0.0319	3	0.40	0.693	0.0563	5	0.06	0.125	0.0236	3	0.00	0.000
359	0.0345	3	4.03	6.986	0.0548	5	2.74	2.476	0.0690	6	0.24	0.412	0.0698	6	0.52	0.649
360	0.3563	31	61.13	121.742	0.3761	31	424.96	385.368	0.3754	32	242.01	465.329	0.2561	25	1118.21	1883.650
374	0.0225	2	0.00	0.000	0.0233	2	0.00	0.000	0.0353	3	0.00	0.000	0.0353	3	0.13	0.058
375	0.0225	2	4.44	5.607	0.0229	2	123.80	175.080	0.0116	1	0.60	-	0.0345	3	37.00	63.913
376	0.1729	15	104.86	175.526	0.1650	14	213.53	260.009	0.1583	14	485.54	537.804	0.0930	10	835.21	542.184
377	0.0221	2	0.00	0.000	0.0229	2	0.00	0.000	0.0116	1	0.00	-	0.0229	2	0.00	0.000
378	0.0435	4	0.00	0.000	0.0330	3	0.17	0.289	0.0210	2	0.00	0.000	0.0120	2	0.00	0.000
379	0.0221	2	0.00	0.000	0.0113	1	0.00	-	0.0206	2	0.00	0.000	0.0356	3	0.00	0.000
380	n.s.	n.s.	n.s.	n.s.	0.0221	2	0.00	0.000	0.0210	2	0.00	0.000	0.0113	2	0.00	0.000
381	n.s.	n.s.	n.s.	n.s.	0.0229	2	0.00	0.000	0.0221	2	0.00	0.000	0.0229	2	0.00	0.000
382	n.s.	n.s.	n.s.	n.s.	0.0338	3	0.00	0.000	0.0461	4	0.00	0.000	0.0229	3	0.00	0.000
721	n.s.	n.s.	n.s.	n.s.	0.0214	2	0.10	0.141	0.0221	2	2.25	3.182	0.0203	2	0.00	0.000
722	n.s.	n.s.	n.s.	n.s.	0.0206	2	0.00	0.000	0.0214	2	0.00	0.000	0.0101	2	0.00	0.000
723	n.s.	n.s.	n.s.	n.s.	0.0109	1	0.00	-	0.0210	2	0.00	0.000	0.0233	2	0.00	0.000
724	0.0105	1	0.00	-	0.0203	2	0.00	0.000	0.0225	2	0.00	0.000	0.0206	2	0.00	0.000
725	0.0334	3	0.00	0.000	0.0225	2	0.00	0.000	0.0206	2	0.00	0.000	0.0086	1	0.00	-
726	0.0214	2	0.00	0.000	0.0218	2	0.00	0.000	n.s.	n.s.	n.s.	n.s.	0.0094	2	0.00	0.000
727	n.s.	n.s.	n.s.	n.s.	0.0210	2	0.00	0.000	0.0094	1	0.00	-	0.0233	2	0.00	0.000
728	n.s.	n.s.	n.s.	n.s.	0.0218	2	0.00	0.000	0.0214	2	0.00	0.000	0.0206	2	0.00	0.000
752	n.s.	n.s.	n.s.	n.s.	0.0109	1	0.00	-	0.0218	2	0.00	0.000	0.0229	2	0.00	0.000
753	n.s.	n.s.	n.s.	n.s.	0.0199	2	0.00	0.000	0.0214	2	0.00	0.000	0.0218	2	0.00	0.000
754	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0330	3	0.00	0.000	0.0210	2	0.00	0.000
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.	0.0206	2	0.00	0.000
756	n.s.	n.s.	n.s.	n.s.	0.0210	2	0.00	0.000	0.0109	1	0.00	-	0.0225	2	0.00	0.000
757	n.s.	n.s.	n.s.	n.s.	0.0188	2	0.00	0.000	0.0304	3	0.00	0.000	0.0206	2	0.00	0.000
758	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0214	2	0.00	0.000	0.0105	2	0.00	0.000
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.	0.0214	2	0.00	0.000
760	n.s.	n.s.	n.s.	n.s.	0.0210	2	0.00	0.000	0.0105	1	0.00	-	0.0214	2	0.00	0.000
761	n.s.	n.s.	n.s.	n.s.	0.0199	2	0.00	0.000	0.0315	3	0.00	0.000	0.0206	2	0.00	0.000
762	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0308	3	0.00	0.000	0.0094	2	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.	0.0218	2	0.00	0.000
764	n.s.	n.s.	n.s.	n.s.	0.0210	2	0.00	0.000	0.0206	2	0.00	0.000	0.0218	2	0.00	0.000
765	n.s.	n.s.	n.s.	n.s.	0.0199	2	0.00	0.000	0.0206	2	0.00	0.000	0.0098	2	0.00	0.000
766	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0308	3	0.00	0.000	0.0191	2	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.	0.0109	2	0.00	0.000

TABLE 2 (cont.). Swept area, number of hauls and Yellowtail flounder mean catch (kg.) and SD (formula in previous sheet) by stratum. Spanish Spring Surveys on NAFO Div. 3NO: 1995-2001. Swept area in square miles. n.s. means stratum not surveyed.

Stratum	1999				2000				2001			
	Swept area	Tow number	Y. flounder Mean catch	Y. flounder SD	Swept area	Tow number	Y. flounder Mean catch	Y. flounder SD	Swept area	Tow number	Y. flounder Mean catch	Y. flounder SD
353	0.0360	3	449.15	545.604	0.0356	3	202.96	273.265	0.0341	3	263.30	431.032
354	0.0218	2	0.25	0.354	0.0356	3	5.34	5.766	0.0338	3	0.35	0.350
355	0.0229	2	0.00	0.000	0.0233	2	0.00	0.000	0.0199	2	0.00	0.000
356	0.0229	2	0.00	0.000	0.0225	2	0.00	0.000	0.0244	2	0.00	0.000
357	0.0236	2	0.00	0.000	0.0124	1	0.00	-	0.0233	2	0.00	0.000
358	0.0349	3	0.00	0.000	0.0341	3	0.00	0.000	0.0349	3	0.00	0.000
359	0.0364	3	1.02	1.413	0.0469	4	7.07	8.762	0.0825	7	0.20	0.304
360	0.2325	19	1630.45	1269.161	0.2396	20	1169.88	991.825	0.2381	20	1681.46	1457.579
374	0.0244	2	221.80	308.581	0.0240	2	61.21	70.421	0.0240	2	884.24	426.336
375	0.0236	2	1038.20	503.177	0.0244	2	458.65	6.152	0.0240	2	510.40	367.130
376	0.1219	10	1649.66	495.276	0.1200	10	1301.76	707.591	0.1193	10	1525.29	383.127
377	0.0240	2	0.00	0.000	0.0229	2	0.14	0.191	0.0229	2	0.18	0.255
378	0.0229	2	0.00	0.000	0.0233	2	0.00	0.000	0.0233	2	0.40	0.559
379	0.0236	2	0.00	0.000	0.0225	2	0.00	0.000	0.0214	2	0.00	0.000
380	0.0236	2	0.00	0.000	0.0236	2	0.00	0.000	0.0206	2	0.00	0.000
381	0.0229	2	0.00	0.000	0.0236	2	0.00	0.000	0.0236	2	0.00	0.000
382	0.0484	4	0.00	0.000	0.0499	4	0.00	0.000	0.0469	4	0.05	0.090
721	0.0244	2	0.00	0.000	0.0236	2	0.00	0.000	0.0248	2	0.00	0.000
722	0.0229	2	0.00	0.000	0.0218	2	0.00	0.000	0.0263	2	0.00	0.000
723	0.0229	2	0.00	0.000	0.0248	2	0.00	0.000	0.0229	2	0.00	0.000
724	0.0225	2	0.00	0.000	0.0233	2	0.00	0.000	0.0233	2	0.00	0.000
725	0.0229	2	0.00	0.000	0.0210	2	0.00	0.000	0.0221	2	0.00	0.000
726	0.0225	2	0.00	0.000	0.0221	2	0.00	0.000	0.0236	2	0.00	0.000
727	0.0236	2	0.00	0.000	0.0210	2	0.00	0.000	0.0225	2	0.00	0.000
728	0.0233	2	0.00	0.000	0.0210	2	0.00	0.000	0.0229	2	0.00	0.000
752	0.0233	2	0.00	0.000	0.0206	2	0.00	0.000	0.0210	2	0.18	0.247
753	0.0229	2	0.00	0.000	0.0218	2	0.00	0.000	0.0214	2	0.00	0.000
754	0.0206	2	0.00	0.000	0.0195	2	0.00	0.000	0.0195	2	0.00	0.000
755	0.0311	3	0.00	0.000	0.0431	4	0.00	0.000	0.0416	4	0.00	0.000
756	0.0225	2	0.00	0.000	0.0203	2	0.00	0.000	0.0233	2	0.00	0.000
757	0.0233	2	0.00	0.000	0.0214	2	0.00	0.000	0.0233	2	0.00	0.000
758	0.0214	2	0.00	0.000	0.0210	2	0.00	0.000	0.0218	2	0.00	0.000
759	0.0218	2	0.00	0.000	0.0210	2	0.00	0.000	0.0221	2	0.00	0.000
760	0.0225	2	0.00	0.000	0.0210	2	0.00	0.000	0.0240	2	0.00	0.000
761	0.0210	2	0.00	0.000	0.0221	2	0.00	0.000	0.0225	2	0.00	0.000
762	0.0210	2	0.00	0.000	0.0203	2	0.00	0.000	0.0225	2	0.00	0.000
763	0.0311	3	0.00	0.000	0.0416	4	0.00	0.000	0.0330	3	0.00	0.000
764	0.0225	2	0.00	0.000	0.0218	2	0.00	0.000	0.0225	2	0.00	0.000
765	0.0221	2	0.00	0.000	0.0203	2	0.00	0.000	0.0218	2	0.00	0.000
766	0.0218	2	0.00	0.000	0.0214	2	0.00	0.000	0.0203	2	0.00	0.000
767	0.0214	2	0.00	0.000	0.0210	2	0.00	0.000	0.0218	2	0.00	0.000

TABLE 3. Yellowtail flounder stratified mean catches by stratum and year. n.s. means stratum not surveyed.

Strata	1995	1996	Survey 1997	1998	1999	2000	2001
353	4680.60	60238.07	10098.26	9833.63	120820.45	54597.14	70827.70
354	1312.00	0.01	1035.66	894.21	61.50	1314.46	86.10
355	n.s.	0.01	487.66	27.94	0.00	0.00	0.00
356	n.s.	0.00	45.59	0.00	0.00	0.00	0.00
357	0.00	0.00	0.00	0.00	0.00	0.00	0.00
358	0.00	90.00	12.60	0.00	0.00	0.00	0.00
359	1698.03	1153.54	101.67	217.52	428.02	2975.42	83.60
360	170123.89	1182653.80	673507.66	3111972.86	4537533.56	3255780.21	4679494.83
374	0.00	0.00	0.00	28.53	47465.20	13097.87	189226.29
375	1201.89	33549.80	162.60	10027.00	281352.20	124294.15	138318.40
376	139887.69	284851.88	647706.55	1114170.14	2200639.77	1736541.17	2034736.86
377	0.00	0.00	0.00	0.00	0.00	13.50	18.00
378	0.00	23.17	0.00	0.00	0.00	0.00	54.91
379	0.00	0.00	0.00	0.00	0.00	0.00	0.00
380	n.s.	0.00	0.00	0.00	0.00	0.00	0.00
381	n.s.	0.00	0.00	0.00	0.00	0.00	0.00
382	n.s.	0.00	0.00	0.00	0.00	0.00	15.44
721	n.s.	6.50	146.25	0.00	0.00	0.00	0.00
722	n.s.	0.00	0.00	0.00	0.00	0.00	0.00
723	n.s.	0.00	0.00	0.00	0.00	0.00	0.00
724	0.00	0.00	0.00	0.00	0.00	0.00	0.00
725	0.00	0.00	0.00	0.00	0.00	0.00	0.00
726	0.00	0.00	n.s.	0.00	0.00	0.00	0.00
727	n.s.	0.00	0.00	0.00	0.00	0.00	0.00
728	n.s.	0.00	0.00	0.00	0.00	0.00	0.00
752	n.s.	0.00	0.00	0.00	0.00	0.00	22.93
753	n.s.	0.00	0.00	0.00	0.00	0.00	0.00
754	n.s.	n.s.	0.00	0.00	0.00	0.00	0.00
755	n.s.	n.s.	n.s.	0.00	0.00	0.00	0.00
756	n.s.	0.00	0.00	0.00	0.00	0.00	0.00
757	n.s.	0.00	0.00	0.00	0.00	0.00	0.00
758	n.s.	n.s.	0.00	0.00	0.00	0.00	0.00
759	n.s.	n.s.	n.s.	0.00	0.00	0.00	0.00
760	n.s.	0.00	0.00	0.00	0.00	0.00	0.00
761	n.s.	0.00	0.00	0.00	0.00	0.00	0.00
762	n.s.	n.s.	0.00	0.00	0.00	0.00	0.00
763	n.s.	n.s.	n.s.	0.00	0.00	0.00	0.00
764	n.s.	0.00	0.00	0.00	0.00	0.00	0.00
765	n.s.	0.00	0.00	0.00	0.00	0.00	0.00
766	n.s.	n.s.	0.00	0.00	0.00	0.00	0.00
767	n.s.	n.s.	n.s.	0.00	0.00	0.00	0.00
$(\bar{Y})$	48.52	178.05	142.77	410.67	695.06	501.70	687.77

TABLE 4. Survey estimates (by the swept area method) of Yellowtail flounder abundance (,000) by stratum on NAFO Div. 3NO. n.s. means stratum not surveyed.

			Survey				
Strata	1995	1996	1997	1998	1999	2000	2001
353	763	9145	1919	1813	20852	8839	14065
354	0	0	180	201	12	268	15
355	n.s.	0	86	3	0	0	0
356	n.s.	0	8	0	0	0	0
357	0	0	0	0	0	0	0
358	0	0	4	0	0	0	0
359	244	181	43	54	81	734	26
360	53415	360289	292106	1345060	1439644	903540	1423860
374	0	0	0	16	14037	2824	34833
375	277	7298	23	2401	89049	37922	36250
376	65262	152761	337785	598447	871188	654521	826829
377	0	0	0	0	0	4	4
378	0	0	0	0	0	0	12
379	0	0	0	0	0	0	0
380	n.s.	0	0	0	0	0	0
381	n.s.	0	0	0	0	0	0
382	n.s.	0	0	0	0	0	7
721	n.s.	0	26	0	0	0	0
722	n.s.	0	0	0	0	0	0
723	n.s.	0	0	0	0	0	0
724	0	0	0	0	0	0	0
725	0	0	0	0	0	0	0
726	0	0	n.s.	0	0	0	0
727	n.s.	0	0	0	0	0	0
728	n.s.	0	0	0	0	0	0
752	n.s.	0	0	0	0	0	6
753	n.s.	0	0	0	0	0	0
754	n.s.	n.s.	0	0	0	0	0
755	n.s.	n.s.	n.s.	0	0	0	0
756	n.s.	0	0	0	0	0	0
757	n.s.	0	0	0	0	0	0
758	n.s.	n.s.	0	0	0	0	0
759	n.s.	n.s.	n.s.	0	0	0	0
760	n.s.	0	0	0	0	0	0
761	n.s.	0	0	0	0	0	0
762	n.s.	n.s.	0	0	0	0	0
763	n.s.	n.s.	n.s.	0	0	0	0
764	n.s.	0	0	0	0	0	0
765	n.s.	0	0	0	0	0	0
766	n.s.	n.s.	0	0	0	0	0
767	n.s.	n.s.	n.s.	0	0	0	0
TOTAL	119.96	529.67	632.18	1948.00	2434.86	1608.65	2335.91

TABLE 5. Survey estimates (by the swept area method) of Yellowtail flounder biomass (t.) by stratum on NAFO Div. 3NO. n.s. means stratum not surveyed.

			Survey				
Strata	1995	1996	1997	1998	1999	2000	2001
353	398	4868	842	846	10068	4598	6227
354	112	77	89	75	6	111	8
355	n.s.	5	42	3	0	0	0
356	n.s.	0	4	0	0	0	0
357	0	0	0	0	0	0	0
358	0	8	1	0	0	0	0
359	148	105	9	19	35	254	7
360	14804	97474	57415	303755	370809	271740	393029
374	0	0	0	2	3895	1091	15769
375	107	2933	14	872	23818	10198	11527
376	12138	24169	57301	119803	180565	144712	170628
377	0	0	0	0	0	1	2
378	0	2	0	0	0	0	5
379	0	0	0	0	0	0	0
380	n.s.	0	0	0	0	0	0
381	n.s.	0	0	0	0	0	0
382	n.s.	0	0	0	0	0	1
721	n.s.	1	13	0	0	0	0
722	n.s.	0	0	0	0	0	0
723	n.s.	0	0	0	0	0	0
724	0	0	0	0	0	0	0
725	0	0	0	0	0	0	0
726	0	0	n.s.	0	0	0	0
727	n.s.	0	0	0	0	0	0
728	n.s.	0	0	0	0	0	0
752	n.s.	0	0	0	0	0	2
753	n.s.	0	0	0	0	0	0
754	n.s.	n.s.	0	0	0	0	0
755	n.s.	n.s.	n.s.	0	0	0	0
756	n.s.	0	0	0	0	0	0
757	n.s.	0	0	0	0	0	0
758	n.s.	n.s.	0	0	0	0	0
759	n.s.	n.s.	n.s.	0	0	0	0
760	n.s.	0	0	0	0	0	0
761	n.s.	0	0	0	0	0	0
762	n.s.	n.s.	0	0	0	0	0
763	n.s.	n.s.	n.s.	0	0	0	0
764	n.s.	0	0	0	0	0	0
765	n.s.	0	0	0	0	0	0
766	n.s.	n.s.	0	0	0	0	0
767	n.s.	n.s.	n.s.	0	0	0	0
TOTAL	27.71	129.64	115.73	425.38	589.20	432.70	597.20

TABLE 6. Yellowtail flounder length distribution in NAFO 3NO 1995-2001 in frequency in ‰. Indet. means indeterminates.

	1995			1996			1997			1998		
Lenght (cm.)	Males	Females	Indet.	Males	Females	Indet.	Males	Females	Indet.	Males	Females	Indet.
8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	0.000	0.000	0.585	0.000	0.000	0.015	0.000	0.000	0.000	0.000	0.000	0.000
12	0.000	0.000	1.234	0.000	0.000	0.378	0.075	0.075	0.000	0.000	0.000	0.325
14	1.364	3.053	7.016	0.000	0.000	0.923	0.566	0.453	0.000	0.000	0.000	0.000
16	11.564	13.578	5.587	0.272	0.817	6.629	2.490	2.188	0.000	0.355	0.638	0.000
18	20.334	32.222	1.299	2.119	20.857	12.593	7.647	4.188	0.000	3.232	2.275	0.000
20	25.271	30.728	0.000	11.397	61.633	3.209	23.619	27.178	0.000	10.971	8.137	0.000
22	42.552	42.877	0.000	20.297	90.466	0.621	65.009	49.753	0.000	17.928	15.587	0.000
24	68.473	86.338	0.000	36.946	116.848	0.000	104.588	95.093	0.000	44.679	37.493	0.000
26	45.085	59.118	0.000	38.142	95.370	0.000	100.236	102.488	0.000	95.514	74.282	0.000
28	33.392	29.624	0.000	37.052	47.783	0.000	78.693	97.922	0.000	108.923	110.054	0.000
30	39.044	56.389	0.000	35.266	49.615	0.000	38.535	64.883	0.000	82.304	106.329	0.000
32	33.587	74.125	0.000	27.517	34.767	0.000	18.614	29.103	0.000	41.712	76.491	0.000
34	26.895	64.705	0.000	31.452	26.669	0.000	13.180	17.482	0.000	14.131	50.336	0.000
36	14.942	36.055	0.000	22.673	41.124	0.000	6.439	12.929	0.000	8.437	32.955	0.000
38	8.510	23.777	0.000	12.744	38.732	0.000	3.987	10.552	0.000	5.248	17.573	0.000
40	8.380	20.139	0.000	7.144	25.610	0.000	1.635	10.275	0.000	2.257	14.835	0.000
42	2.599	13.383	0.000	2.089	18.693	0.000	0.465	5.559	0.000	1.318	8.660	0.000
44	0.130	8.121	0.000	2.225	9.793	0.000	0.327	2.578	0.000	0.120	4.411	0.000
46	0.130	3.183	0.000	0.454	6.357	0.000	0.025	0.704	0.000	0.006	1.252	0.000
48	0.000	2.079	0.000	0.091	1.347	0.000	0.000	0.126	0.000	0.006	1.023	0.000
50	0.000	1.559	0.000	0.000	0.908	0.000	0.000	0.264	0.000	0.000	0.205	0.000
52	0.000	0.650	0.000	0.000	0.227	0.000	0.000	0.000	0.000	0.000	0.000	0.000
54	0.000	0.260	0.000	0.000	0.000	0.000	0.000	0.075	0.000	0.000	0.000	0.000
56	0.000	0.065	0.000	0.000	0.136	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	382.252	602.027	15.721	287.881	687.751	24.368	466.131	533.869	0.000	437.140	562.535	0.325
Nº Ind.:	1876	3003	81	1837	4584	249	3635	4469	0	2848	3693	3
Nº samples:		43			33			54			48	
Range:		9-56			10-55			12-53			11-49	
Total catch:		3557			17110			14722			36580	
Sampled catch:		1122.79			1591.03			1748.76			1601.63	
		0			0			8			0	
Total hauls:		84			120			139			136	

TABLE 6 (cont.). Yellowtail flounder length distribution in NAFO 3NO 1995-2001 in frequency in ‰. Indet. means indeterminates.

	1999			2000			2001		
Lenght (cm.)	Males	Females	Indet.	Males	Females	Indet.	Males	Females	Indet.
8	0.000	0.000	0.099	0.000	0.000	0.000	0.000	0.000	0.000
10	0.085	0.085	0.264	0.000	0.000	0.000	0.000	0.000	0.000
12	1.438	0.594	0.198	0.184	0.134	0.000	0.000	0.215	0.000
14	2.254	2.320	0.000	1.024	1.504	0.000	0.000	0.518	0.000
16	6.131	5.315	0.000	5.812	6.271	0.000	0.963	0.645	0.000
18	6.867	8.414	0.000	11.489	11.150	0.000	5.951	4.490	0.000
20	6.419	6.051	0.000	13.615	16.263	0.000	18.768	17.923	0.000
22	20.125	11.975	0.000	18.169	24.405	0.000	32.963	27.930	0.000
24	38.613	27.294	0.000	23.918	24.151	0.000	35.357	31.311	0.000
26	76.269	45.018	0.000	46.374	37.052	0.000	34.042	26.664	0.000
28	114.500	78.297	0.000	88.093	52.376	0.000	66.189	32.083	0.000
30	97.780	91.592	0.000	110.027	60.906	0.000	95.575	49.214	0.000
32	51.890	98.289	0.000	77.247	83.856	0.000	96.269	72.414	0.000
34	22.643	65.322	0.000	39.086	79.916	0.000	42.124	93.894	0.000
36	14.588	36.533	0.000	13.240	53.421	0.000	19.350	80.731	0.000
38	7.315	23.205	0.000	7.761	34.729	0.000	7.833	50.157	0.147
40	2.486	12.635	0.000	4.802	20.585	0.000	5.038	21.622	0.000
42	0.712	8.824	0.000	1.391	14.681	0.000	1.632	12.602	0.000
44	0.406	4.094	0.000	0.219	9.244	0.000	0.151	7.901	0.000
46	0.038	1.613	0.000	0.007	4.350	0.000	0.176	4.476	0.000
48	0.094	0.901	0.000	0.007	1.539	0.000	0.293	1.593	0.000
50	0.000	0.377	0.000	0.000	0.720	0.000	0.000	0.474	0.000
52	0.000	0.038	0.000	0.000	0.240	0.000	0.000	0.064	0.000
54	0.000	0.000	0.000	0.000	0.042	0.000	0.000	0.073	0.000
56	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.186	0.000
Total	470.652	528.786	0.561	462.464	537.536	0.000	462.674	537.179	0.147
Nº Ind.:	4616	5076	6	3323	4100	0	3160	3971	1
Nº samples:		39			42			45	
Range:		8-52			11-54			12-56	
Total catch:		51346			38108			52465	
Sampled catch:		2381.485			2144.295			2021.620	
Total hauls:		117			123			124	

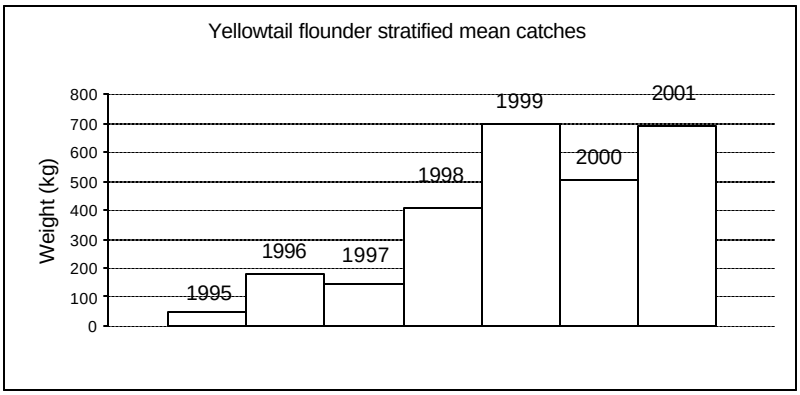

Fig. 1. Yellowtail flounder stratified mean catches by year. Spanish Spring Surveys on NAFO Div. 3NO: 1995-2001.

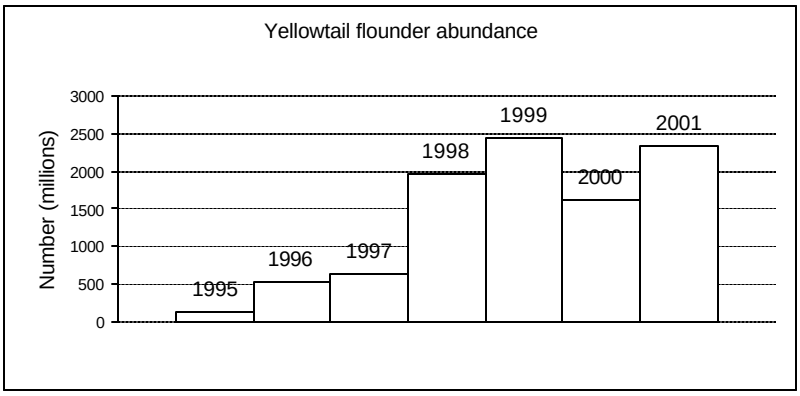

Fig. 2. Yellowtail flounder abundance by year. Spanish Spring Surveys on NAFO Div. 3NO: 1995-2001.

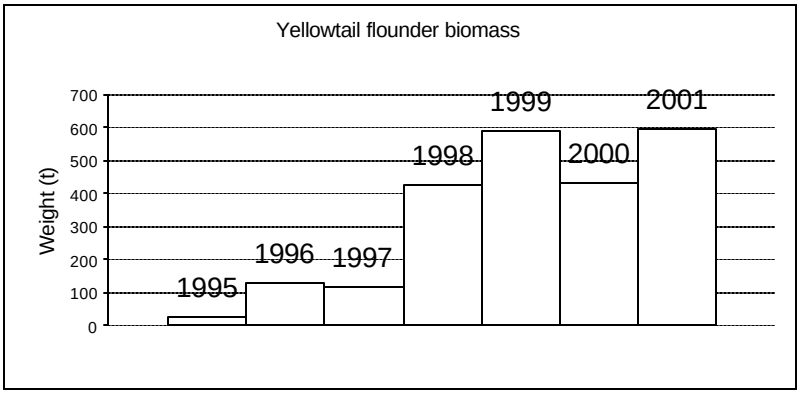

Fig. 3. Yellowtail flounder bio mass by year. Spanish Spring Surveys on NAFO Div. 3NO: 1995-2001.

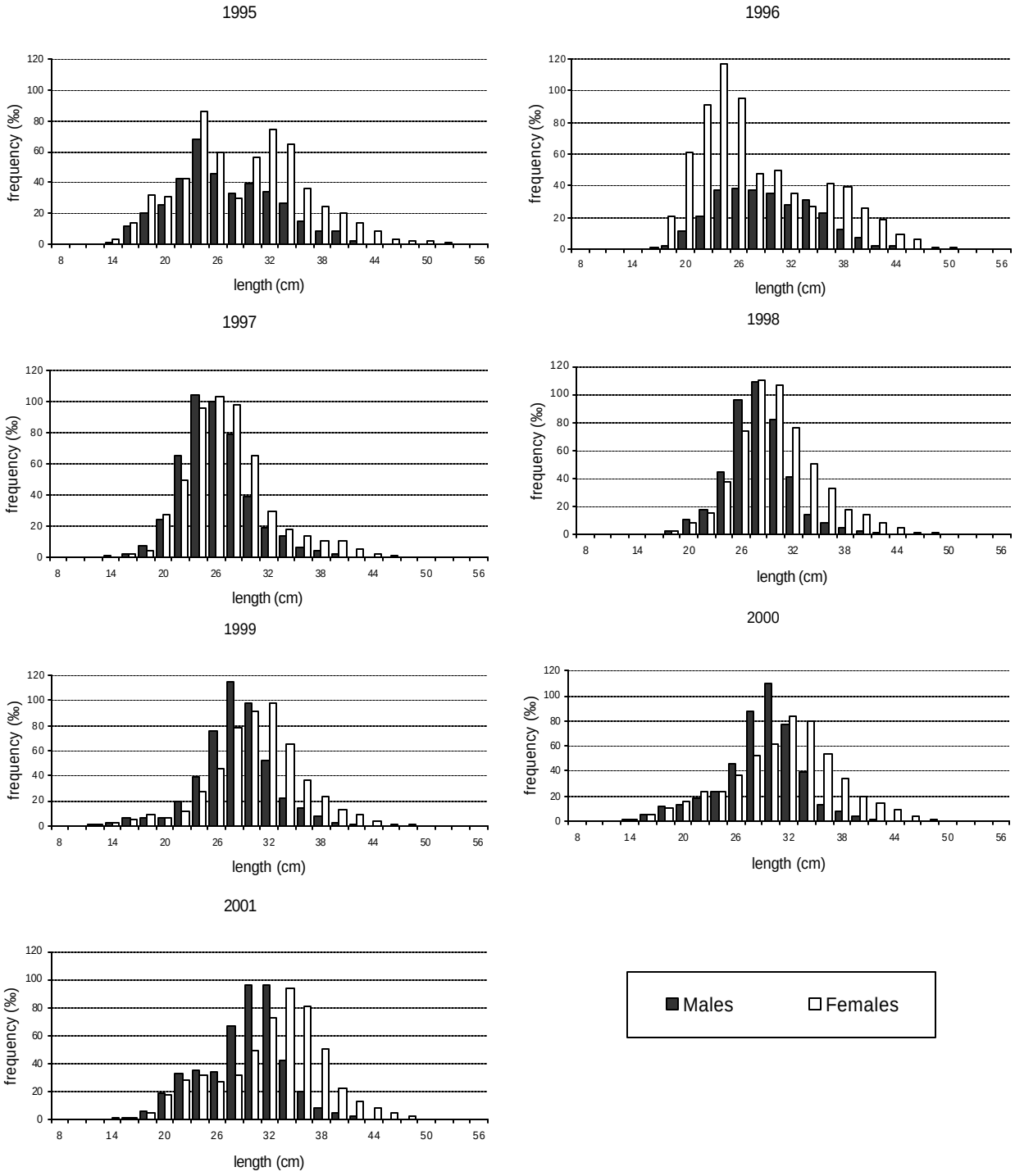

Fig. 4. Yellowtail flounder length distribution (cm) on NAFO 3NO: 1995-2001. Frequency in ‰.