



Serial No. N2589

NAFO SCR Doc. 95/72

SCIENTIFIC COUNCIL MEETING - JUNE 1995

An Assessment of American Plaice Stock in Division 3M (1994)

by

E. de Cárdenas<sup>1</sup> and M.L. Godinho<sup>2</sup>

<sup>1</sup> Inst. Esp. de Oceanografía P.O.Box 240 Santander Spain.

<sup>2</sup> Inst. Portugues de Investigacao Maritima, Lisboa, Portugal.

Ref. SCR. Doc. 95/26, 94/61; SCS Doc. 95/15.

Introduction

Since 1974, when this stock started to be regulated, officially reported catches ranged from 600 tons in 1981 to the highest value of 5 600 tons in 1987. After that catches declined drastically to 275 tons by 1993. Nominal catches for 1994 are 253 tons, but estimates by national experts and from other sources suggested 699 tons as a more realistic value.

The observed reduction in the level of the catches in the last three years is partly due to the shift in the target species to Greenland halibut for the Spanish fleet.

From 1979 to 1993 a TAC of 2 000 tons has been agreed for this stock. Since 1994 a reduction to 1 000 tons was agreed (Fig. 1).

Recent TAC and Catches ('000) are as follows:

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	2	2	2	2	2	2	2	2	2	1	1
Catch	1.7	3.8	5.6	2.8	3.5	0.8	1.6	0.8	0.3	0.7 <sup>1</sup>	

<sup>1</sup> Provisional.

Input Data

Commercial fishery data

Length compositions of the catch were derived from a limited sample (122 fishes in April) obtained from the Spanish large-freezers' catch, which took only 2% of the total catch. Compared to the length composition derived from the July research survey, one can observe a predominance of smaller fish in the commercial catches. This can be attributed to the fact that the catch composition from this fleet reflects the length composition of the American plaice by-catch in the Greenland halibut fishery in this Division. For this reason it is only considered adequate to extrapolate this length composition for the that 2% catch. For the remaining catch the length composition of the research survey was used. Age-length key from the survey has being used to obtain the age composition of the catch. The corresponding results are presented in Table 1.

Mean weights-at-age in the catch (Table 2) do not indicate any trend.

Table 1. Catch-at-age for the period 1988-93

Ages	Catch-at-age matrix						
	1988	1989	1990	1991	1992	1993	1994
3	34	188	11	14	15	27	5
4	204	150	184	102	30	30	222
5	642	507	57	545	86	70	94
6	1 161	998	95	288	282	86	77
7	790	1 041	169	412	73	79	82
8	1 003	499	229	363	148	39	289
9	289	446	156	222	133	23	28
10	93	213	69	63	62	19	55
11	24	169	10	7	36	2	19
12	52	40	2	3	19	0	19
13	55	20	2	0	22	0	22
14	14	8	1	0	0	0	46
15+	27	0	0	0	0	0	46
C.(t)	2800	3500	800	1600	800	275	669

Table 2. Mean weight-at-age in the catch for the period 1988-90.

Ages	Mean weight-at-age in the catch							Mean***
	1988	1989	1990	1991	1992	1993	1994**	
3	0.181	0.247	0.237	0.117	0.201	0.145	0.144	0.188
4	0.264	0.371	0.358	0.304	0.292	0.271	0.282	0.310
5	0.293	0.449	0.488	0.472	0.456	0.377	0.436	0.422
6	0.445	0.681	0.579	0.619	0.649	0.611	0.510	0.597
7	0.619	0.867	0.845	0.873	0.754	0.915	0.594	0.812
8	0.864	0.960	0.992	1.064	0.978	1.303	0.752	1.027
9	1.001	1.156	1.101	1.282	1.183	1.265	0.895	1.165
10	1.198	0.975	1.125	1.380	1.271	1.468	0.868	1.236
11	1.233	1.588	2.006	1.477	1.491	1.731	0.976	1.588
12	1.504	1.677*	1.887	1.671	1.645		0.976	1.677
13	1.806	1.843*	1.726		1.997		1.215	1.843
14	1.674	1.716*	1.758				1.500	1.716
15+	1.755							1.755

\* Estimated as a mean from the remaining years

\*\* Obtain from the survey of July

\*\*\* Without 1994

### Research survey data

The series of research surveys conducted by the EU since 1988 was continued in July 1994. The Russian survey series that commenced in 1983 was interrupted in 1994. From the EU survey, the continued decrease observed in the biomass since the start of the series, was reversed in 1994 (6 173 tons against 5 949 tons in 1993). This change in the decreasing trend was already detected by the 1993 Russian survey (Table 3, Fig 2). The abundance did not follow the same trend as it continued to decrease from 1993 (9 268) to 1994 (8538). The 1986 year-class (age 8 in 1994) remains the most abundant cohort of recent years. The 1990 year-class, the second in abundance at age 4, appears about average, while the 1991 and 1992 year-classes appear to be very weak (Table 4).

Table 3. American plaice: abundance and biomass in the surveys.

Year	EEC		Survey data		Russia	
	Number	Biomass	Number	Biomass	Number	Biomass
1983			8 900			
1984			7 500			
1985			7 800			
1986			20 200			
1987			9 300			
1988	21 219	11 868	10 000			6 500
1989	20 500	10 533	8 300			5 000
1990	16 631	9 101	2 600			1 200
1991	13 932	7 565	12 700			14 400
1992	10 363	6 492	1 900			1 000
1993	9 268	5 949	3 600			2 700
1994	8 538	6 173				

Table 4. Abundance by age group in the EEC survey series.

Age	1988	1989	1990	1991	1992	1993	1994
2	2 284	454	359	309	736	9	34
3	625	6 847	775	911	679	1 365	40
4	3 040	1 500	7 083	1 877	910	969	789
5	1 975	3 238	897	4 461	1 471	643	782
6	3 020	3 006	2 475	1 836	3 423	320	651
7	4 154	2 868	1 717	2 009	913	3 110	703
8	4 258	1 691	1 657	1 566	1 090	339	2487
9	1 492	587	1 030	675	624	592	243
10	207	261	485	232	289	286	480
11	109	34	90	8	138	198	166
12	61	14	15	48	74	229	164
13			31		16	280	195
14			17			865	398
15						28	397
16						35	9

The spawning stock biomass (50% of age 5 and 100% of age 6+), as estimated from the EU surveys, increased in 1993 to a value close to the 1990-91 value, and remained stable at this level in 1994, due to the recruitment of the 1986 year-class:

Year	1988	1989	1990	1991	1992	1993	1994
S.S.B.	8.5	5.8	5.3	5.7	3.6*	5.0	5.0

\* Estimated using mean weight at age in the catch.

#### Estimation of Parameters

Taking into account the deficiencies in the data base, for the estimation of annual F, only a crude approximation could be used.

Using last year's method, which provides moderately-biased estimates when the catchability of the survey changes with age (Lassen, 1994), we obtain a value of  $F = 0.22$  for 1994.

Table 6. Catchability (q) of the survey estimated from ages 8-11 for the period 1988-90 and annual F's for the period 1988-93.

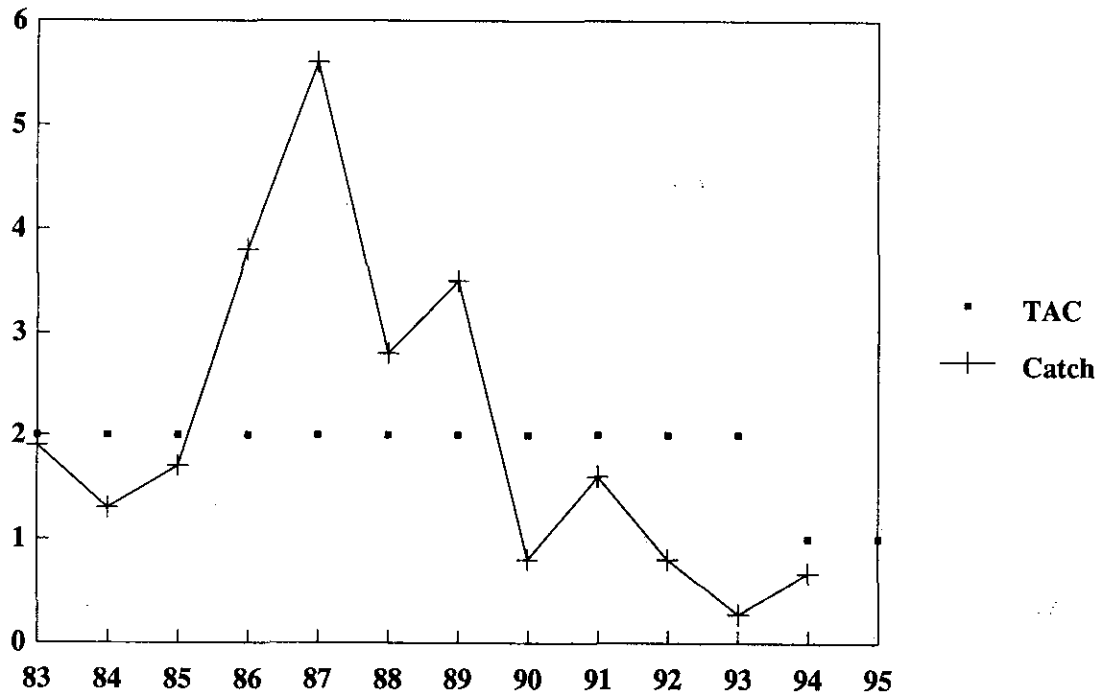
Year	Survey	Biomass 8-11		F
		Catch	C/B	
1988	6 066	1 298	0.21	0.41
1989	2 573	1 470	0.57	1.10
1990	3 262	497	0.15	0.29
1991	2 481	768	0.31	0.60
1992	2 141	435	0.20	0.39
1993	1 075	111	0.10	0.20
1994	2 666	309	0.12	0.22
1988-90	11901	3265	0.27	0.53

$$q = 0.518830$$

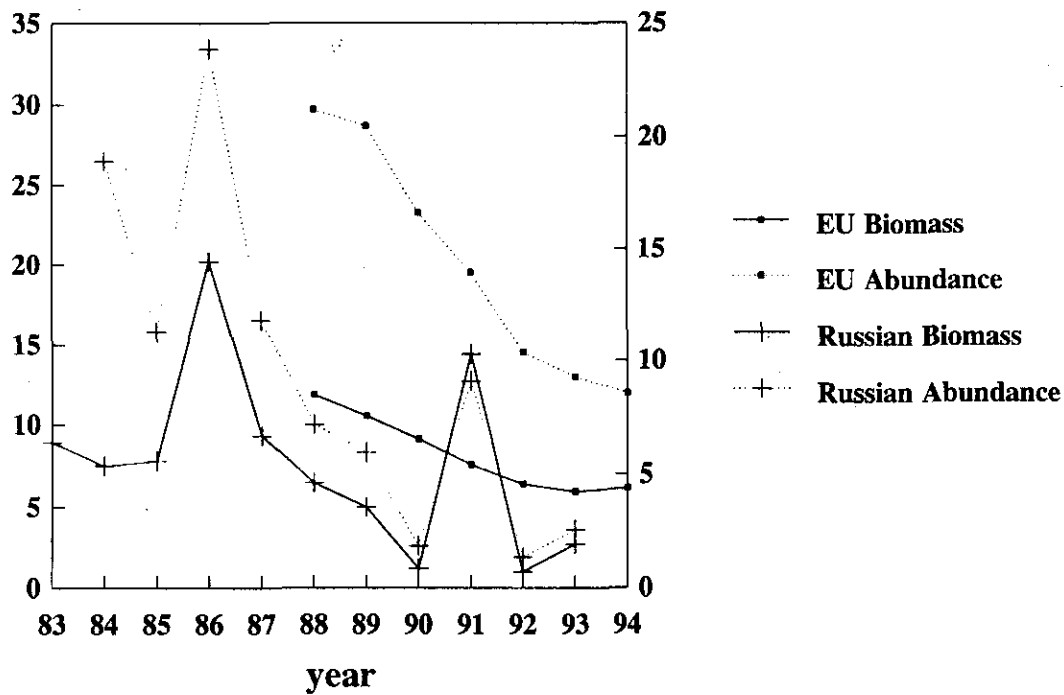
Although the value of F for 1994 could be an overestimate due to the fact that ages 8-11 appear to be distributed over a wider range of ages in the 1994 survey than in the period 1988-1990, fishing mortality in 1994 remains at about the same level as in 1993, which is not far from the level of natural mortality for this species.

#### Prognosis

The stock seems to be stable at a low level during the past three years and the two most recent recruiting year-classes (1991 and 1992) appear to be very poor. In order to try to rebuild this stock, only a non-directed fishery should be permitted.



**Fig. 1.- American plaice in Div. 3M: catches and TACs.**



**Fig. 2.- Abundance and biomass in the E.U. and Russian surveys.**