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Contribution to the Assessment of the Cod Stock in Subdivision 3Ps

by

A. Maucorps

Institut Français de Recherche pour l'Exploitation de la Mer
B.P. 1049 - 44037 Nantes Cédex, France

and

J.C. Poulard

Institut Français de Recherche pour l'exploitation de la Mer
B.P. 4240 - F97500 Saint-Pierre et Miquelon

Nominal catch and catch at age.

Total catches by France from Subdivision 3Ps was 10 770 tons in 1984. Age compositions for the french inshore and offshore fisheries (table 1) were obtained using sampling data as shown in table 2 and research age-length key for the two first quarters.

Survey data.

The abundance of cod in number (in ,000's) is given for the surveys serie (1978-1985) per strata (table 3). The trends (in percentage) of the abundance inside the main depth range are shown in Figure 1. Bio-masses are given in table 4.

In the 1985 survey, the highest percentage (49 %) is found for the range 101-151 fathoms and contrast drastically with the 1984 feature where less than 10 % of the cod (in number) was found at this depth. An almost similar distribution was noticed in 1981 know as a cold winter. Indeed, a very cold water layer (between -0.6° and -1.2° C) was found from surface to bottom over all banks. Slope waters, at about 7° C, steeped only the western part of the St-Pierre bank at depth greater than 200 m. In broad terms, the 1984-85 winter was characterised by much lower temperatures as compared to the 1983-84 winter. Consequently, convenient cod waters were noticed at greater depth than usual causing high catches in the range 101-151 fathoms.

The age composition of the mean number per tow (table 5) confirms the strength of the 1982 year class which as well 2 years old in the 1984 survey as 3 years old in the 1985 one appears to be the strongest of the serie. The drop in the 1985 overall mean number is mainly due to the weak representation of all ages over 4 years old as compared to previous surveys. This could be the consequence of a disturbed distribution of the maturing fishes searching for suitable water temperatures. The length distribution and age composition trends (fig. 2a, b, c and d) confirm the abnormal situation which occurred in 1985 for the maturing fish.

Estimates of age at maturity.

Information relative to the maturity stages of cod has been collected during spring surveys (February to April). Maturity at age estimates for both sexes combined are shown in table 5 along with an average for the period 1978-84 (fig.3).

The age at 50 % maturity as calculated by probit analysis is also shown in table 6.

Table 1 - Cod catch at age (000's) from the French offshore and inshore fisheries in Subdivision 3Ps during 1984.

Age	Offshore fishery	Inshore fishery	Total
3	34	17	51
4	986	336	1322
5	961	104	1065
6	1807	53	1860
7	820	14	834
8	236	4	240
9	236	1	237
10	111		111
11	32		32
12	9		9
13	2		2
14			
15	1		1
Total	5235	529	5763

Table 2 - Commercial sampling for NAFO Subdivision 3Ps cod in 1984.

Quarter	Gear	No. aged	No. measured
1	OT		204
2	OT		886
	HL		666
3	OT	72	499
	HL	145	1204
	LT		200
4	OT	159	1167

Table 3 - Cod, 3Ps, abundance (,000's) from groundfish surveys 1978-1985

Depth Range (fath)	Strata	1978	1979	1980	1981	1982	1983	1984	1985
0-30	314	33	0		266	22	133		33
	320	36	241		783	90	572	663	135
	Total	69	241		1049	112	705	663	168
31-50	308	53	11	34	34	161	46	157	49
	312	605	105	27	676	433	99	7247	155
	315	368	56	142	269	113	84	3596	28
	321	20	895	325	502	386	190	146	16
	Total	1046	1067	528	1481	1093	419	11146	248
51-100	307	1934	1154	3075	640	4644	2985	2615	784
	311	401	1621	1150	4356	3511	4174	15263	1954
	317	0	132		720	4939	1687	16365	1308
	319	1051	4515	1123	3248	3504	7641	5445	3358
	322	939	617	5742	1149	4915	5642	2602	4239
	323	349	226	317	1156	572	3670	3670	2669
Total	4674	8265	11407	11269	22085	25799	45960	14312	
101-150	306	755	870	660	9690	2841	6332	947	277
	309	101	1621	263	1452	594	1500	1588	871
	310	395	178	15	489	870	869	104	9454
	313	129	323	17	858	813	678	82	2370
	316	78	90	525	155	422	30	172	3827
	318	21	8		247	209	1179	603	575
Total	1479	3090	1480	12871	5749	10588	3496	17374	
151-200	705	247	941	33	422	3281	672	854	69
	706	21	0	82	671	3053	179	358	130
	715	913	592	890	628	2472	587	1216	916
	716	166	356	886	455	1772	1196	1058	24
Total	1347	1889	1891	2176	10578	2634	3486	1139	
0-200	Total	8615	14552	15306	28846	39617	40145	64751	33241

Table 4 - Cod biomass (metric tons) from stratified random surveys in Subdivision 3Ps.

Depth Range (fth)	Strata	1978	1979	1980	1981	1982	1983	1984	1985
0-30	314	16	0		1389	111	0	0	6
	320	108	813		3797	512	2802	3526	90
	Total	124	813		5186	623	2802	3526	96
31-50	308	153	7	149	88	299	149	111	65
	312	819	267	111	2303	395	633	1484	142
	315	764	849	1418	1076	821	325	16908	8
	321	183	4784	3746	2198	3746	1520	1009	3
	Total	1919	5907	5424	5665	5261	2627	19512	218
51-100	307	3517	2714	4427	1875	9911	6267	5383	2976
	311	86	3198	1136	5797	7979	3571	19398	1275
	317	0	259		812	533	418	21353	3082
	319	997	5809	1303	4434	4077	11348	8101	2628
	322	603	1945	3380	1793	2404	950	1073	2384
	323	92	572	858	822	47	786	798	512
Total	5295	14497	5541	15533	24951	23340	56306	12857	
101-150	306	3061	3616	2161	12196	3716	11967	2295	803
	309	87	2743	804	2176	1121	3318	3852	1581
	310	411	190	19	481	1414	655	228	4674
	313	113	331	16	1099	1283	832	169	1751
	316	84	120	519	281	543	34	332	37103
	318	42	25		592	266	5282	786	1828
	Total	3798	7025	3519	16825	8343	22088	7662	47740
151-200	705	313	1115	67	574	4549	983	1660	98
	706	10	0	163	951	4010	293	733	220
	715	836	831	1564	827	4158	1261	2974	2281
	716	258	455	1169	553	2104	1934	2325	86
	Total	1417	2401	2963	2905	14821	4471	7692	2685
0-200	Total	12553	30643	17447	46114	53999	55328	94698	63596

Table 5 - Mean number of cod per tow from research trips in Subdivision 3Ps.

Age	1978	1979	1980	1981	1982	1983	1984	1985
1		0.08		0.09	1.04	4.84	0.03	
2	0.76	0.46	8.14	0.20	12.07	11.09	12.50	5.79
3	1.49	0.42	1.91	5.64	1.91	5.64	8.24	18.53
4	3.07	2.17	0.54	5.59	7.87	3.17	16.25	10.33
5	2.08	7.55	2.92	5.85	7.38	7.70	9.45	4.77
6	1.22	3.35	4.92	8.46	5.35	6.52	20.53	1.19
7	0.89	1.87	1.80	6.39	3.97	4.82	6.03	2.11
8	0.54	1.01	0.74	1.80	4.59	2.96	2.30	1.30
9	0.32	0.39	0.35	1.35	1.40	2.22	3.31	0.83
10	0.23	0.25	0.25	0.53	0.80	0.81	2.34	0.95
11	0.02	0.30	0.20	0.18	0.39	0.27	0.64	1.15
12+	0.12	0.46	0.43	0.43	0.43	0.37	0.44	1.49
Total	10.74	18.31	22.20	36.51	47.20	50.41	82.06	48.44
Standard error	1.48	3.81	2.16	7.77	8.01	5.60	28.37	7.56
Sets	67	64	40	83	74	88	74	84
Surveys, dates	Mar 8-23	Feb 2 Mar 19	Mar. 4-11	Feb 24 Mar 31	Mar 5 Apr 2	Feb 10 Mar 14	Feb 15 Mar 18	Feb 10 Mar 10

Table 6 - Cod maturity at age (%) (sexes combined) from research vessel surveys in Subdivision 3Ps.

Age	1978	1979	1980	1981	1982	1983	1984	Average
3	0	1	0	1	0	0	1	1
4	4	8	7	13	5	3	8	7
5	31	40	40	49	36	30	35	39
6	78	81	84	86	82	81	73	81
7	98	98	99	99	98	99	95	98
8	100	100	100	100	100	100	100	100
9	100	100	100	100	100	100	100	100
Sample size	629	733	443	768	869	547	385	4374
Sampling period	Mar. 8-23	Feb. 2 Mar. 19	Mar. 4-11	Feb. 24 Mar. 31	Mar. 5 Apr. 2	Feb. 10 Mar. 14	Feb. 15 Mar. 18	
<u>Age at 50 % maturity</u>								
Males	5.0	5.0	4.8	5.1	5.4	5.4	5.1	5.2
Females	5.7	5.3	5.3	5.0	5.2	5.4	5.6	5.4
Males & females	5.4	5.2	5.2	5.0	5.3	5.4	5.4	5.3

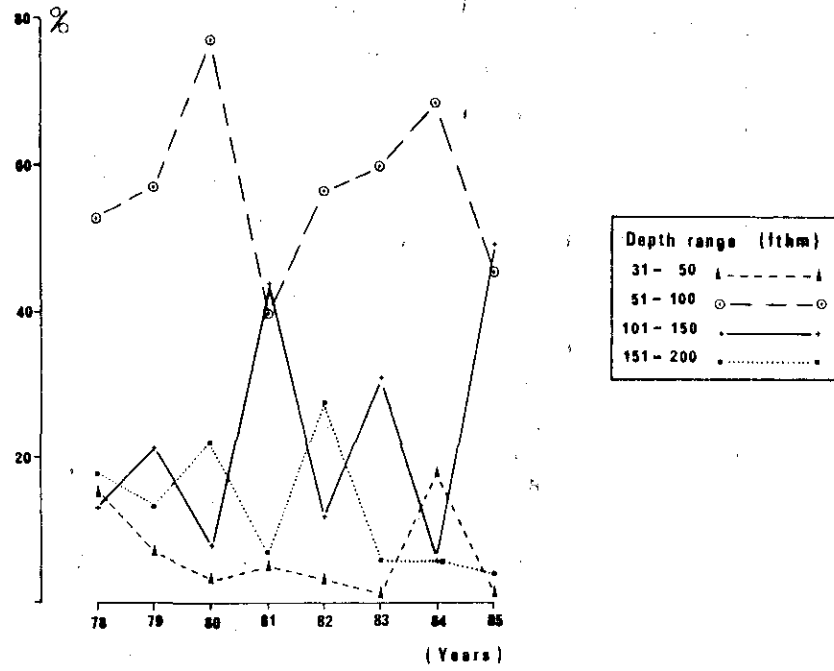


Fig. 1 - Cod distribution (in %), by depth range, observed during the surveys from 1978 to 1985.

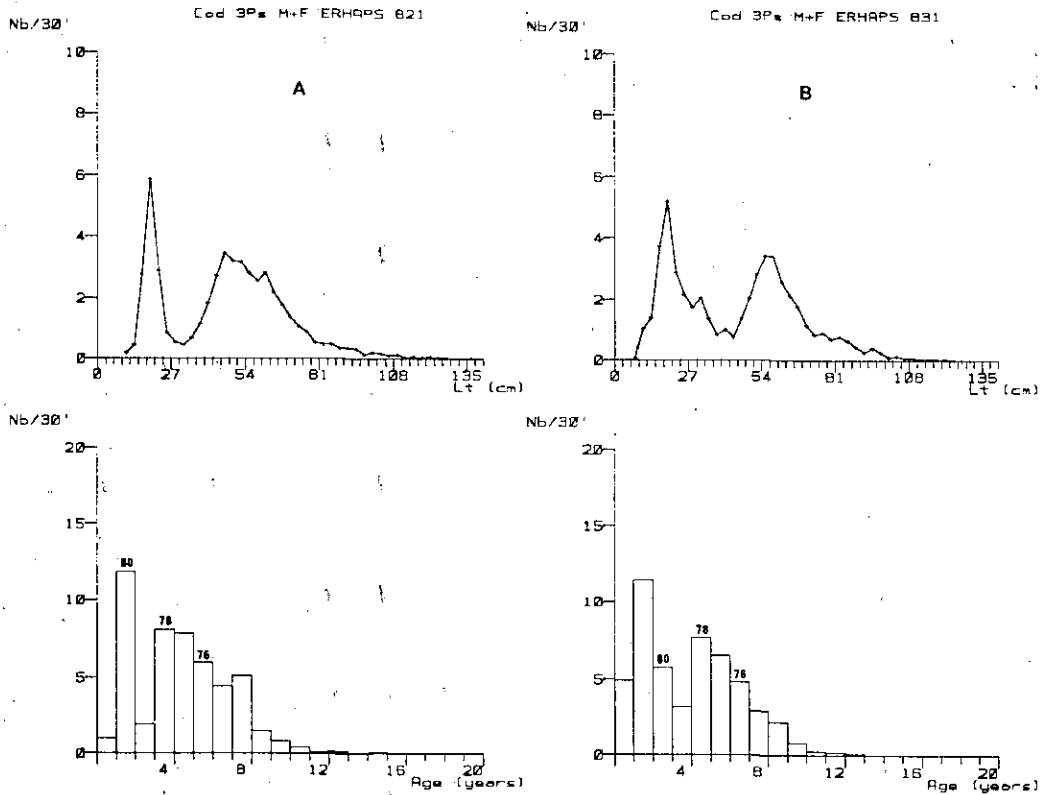


Fig. 2a - Length distribution and age composition for cod in 3Ps: from the spring groundfish surveys. a - 1982 b - 1983

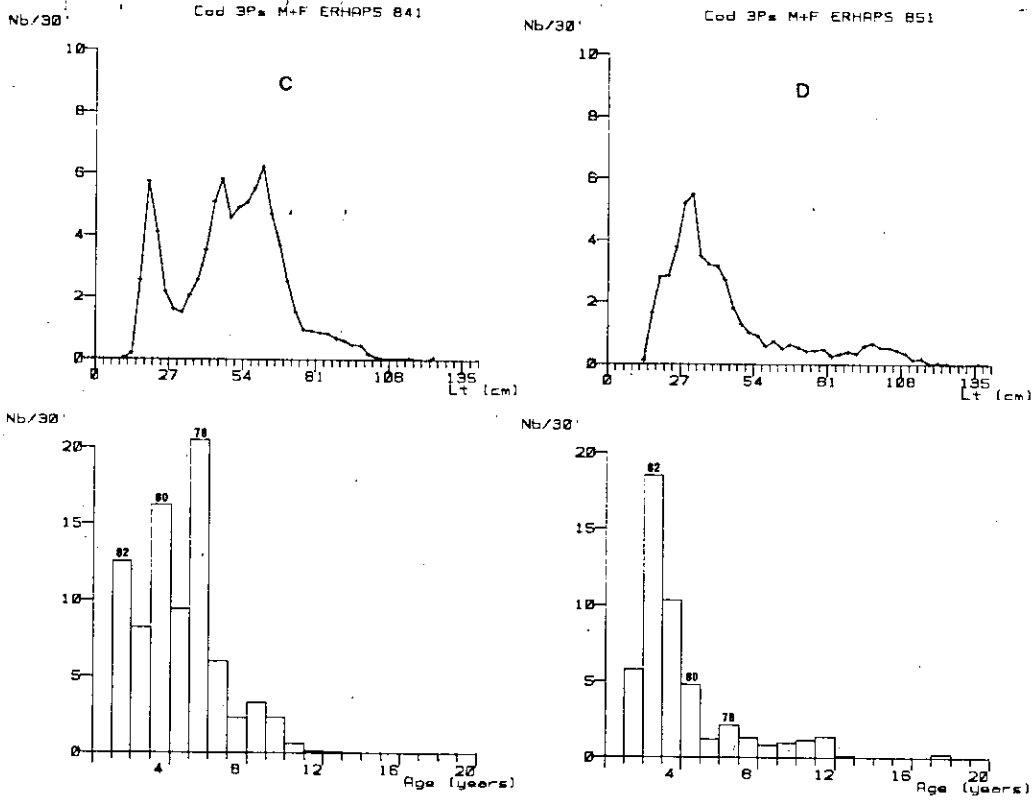


Fig. 2 continued - c - 1984
d - 1985

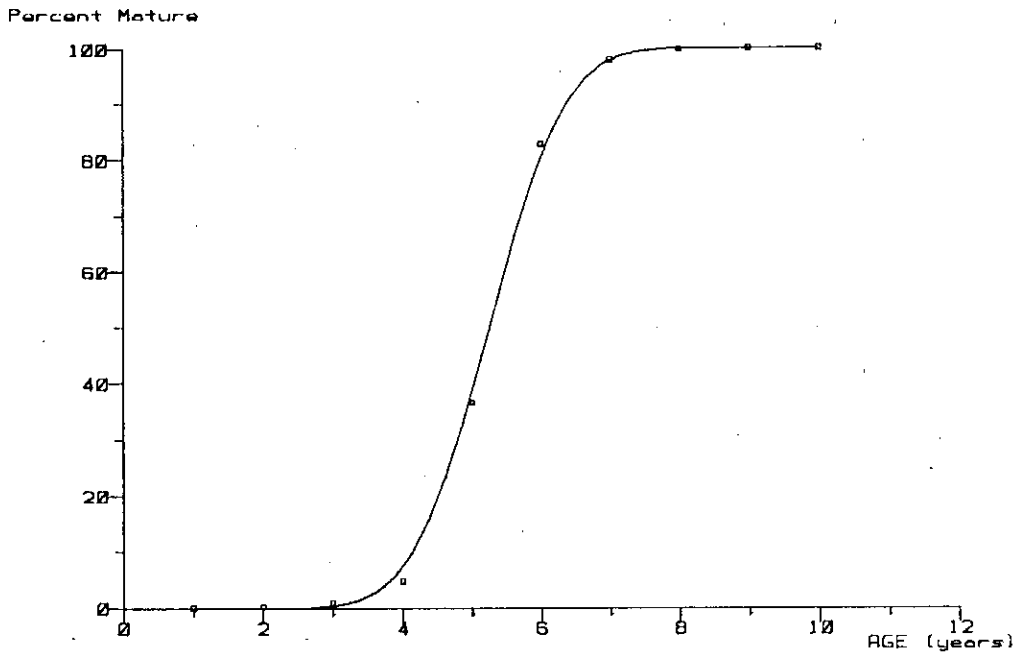


Fig. 3 - Percent maturity at age for cod from Subdivision 3Ps.

