Assessment of the cod stock in Divisions 2GH

by

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Abstract

The standard error of the standardized catch rate was large for most years, precluding any meaningful interpretation of trend. The surplus production model did not fit the catch and standardized effort data. Comparison of the 1979 commercial catch at age with 1978 gave anomalous survival rates. Some data from research surveys in 1978 and 79 are presented which indicated a predominance of the 1973 year-class.

Résumé

L'erreur type du taux de capture normalisé est grand la plupart des années, ce qui empêche d'interpréter d'une manière significative toute tendance. Le modèle de production excédentaire ne s'accorde pas avec les données de prises et d'effort normalisé. La comparaison des prises commerciales, par âge, en 1979 avec celles de 1978 donne des taux de survie anormaux. Nous présentons quelques données recueillies par des navires de recherche en 1978 et 1979: elles indiquent une prédominance de la classe d'âge de 1973.

Using catch and effort data for 1959-78 from NAFO records and for 1979-80 from FLASH reports a standardized catch rate series was computed. To convert days fished to hours fished for the Flash reports the factors shown in Table 1 were applied.

A multiplicative model was used to incorporate as much of the catch and effort data as possible. An unweighted model was postulated for a preliminary run but after examination of the residuals vs catch, effort and catch X effort the weighting factor catch X effort was selected. The subsequent regression indicated that catch rates in 2G and 2H were not significantly different. The two divisions were therefore lumped into one category as were some country-gear types and months (Table 2). The regression was significant and accounted for 75% of the variation in the data, however, the sample size for many years was very small resulting in large confidence intervals for the estimate of catch rate (Fig. 1).

The historical catch and the proportion of the catch used in the computations are listed in Table 3 along with the estimated standardized catch rate and effort. The standards used were USSR OT-7 for country-gears

and March for months. Attempts to fit this data to a non-equilibrium surplus production model did not produce satisfactory results.

A catch at age vector was computed using age length keys and length frequencies submitted by Poland for the 1st, 3rd and 4th quarters (Table 4). Attempts to compute survival rates by taking the ratio of catch rates at age for 1978 and 1979 gave anomalously low values (0.04) for fully recruited ages. This is probably due to the lack of sufficient data for computing both effort and catch at age. It appears that fewer older fish were caught in 1979 as compared to 1978 but as mentioned this is very possibly due to sampling.

Table 5 indicates per mille age compositions of the catch from fall research cruises in 2GH and 2J in 1978 and 79. The number of sets are shown along with average numbers and average weights per set. The age composition of the research catch in 2GH in 1979 was similar to the commercial age composition for 1979 (Table 4) in that the 1973 year class was dominant.

Table 1. Conversion factors for days to hours fished.

Country-gear	hrs/day
FRG OT-6	11.631
FRG OT-7	13.942
Pold OT-7	14.515
Port OT-6(side)	13.318
Port OT-7	16.389
UK OT-6	18.949
USSR OT-7	7.605

Table 2. Regression coefficients for grouped categories and the analysis of variance from the regression of ln catch rate.

Country-gear	ln power	Month	ln power
Norw OT-6		Jan	
Port OT-7	0.430	Apr	0.000
FRG OT-7	0.131	Feb	-0.049
FRG OT-6	0.000	May	-0.249
Span PT-5	-0.162	Mar	-0.417
Norm OT-6	-0.279	Dec	-0.462
Norw OT-5	-0.286	Jul	
UK OT-6	-0.289	Sep	-1.089
		Oct	
Norm OT-7		Nov	-1.151
USSR OT-5	-0.304		
Norm OT-5		Jun	
Pold OT-7	-0.376	Aug	-1.287
Port OT-6			
USSR OT-6	-0.455	Div	ln power
USSR OT-7	-0.593		
Span OT-6	-0.796	2G	0.000
		2H	

REGRESSION OF MULTIPLICATIVE MODEL

MULTIPLE R............. 0.865
MULTIPLE R SQUARED..... 0.748

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DF	SUMS OF SQUARES	MEAN SQUARES	F-VALUE
TYPE 1	11	$1.44611E1$	$1.31465E0$	18.838
TYPE 2	7	$1.36769E1$	$1.95385E0$	27.998
TYPE 3	20	$1.63693E1$	$8.18466E{-}1$	11.728
REGRESSION	38	$5.88779E1$	$1.54941E0$	22.203
RESIDUALS	283	$1.97487E1$	$6.97837E{-}2$	
TOTAL	321	$7.86267E1$		

Table 3. Historical catch and standardized effort and catch rate for 1959-80. The proportion indicates that part of the catch which was used in estimating catch rate.

YEAR	CATCH	PROP.	CATCH RATE MEAN	STD ERR	EFFORT
1959	2994	0.053	0.421	0.382	7111
1960	8377	0.385	3.653	0.995	2286
1961	4295	0.133	5.434	3.007	790
1962	5451	0.675	4.357	0.568	1248
1963	4014	0.740	2.215	0.442	1812
1964	9161	0.674	4.198	0.621	2182
1965	54929	0.553	2.750	0.167	19974
1966	94189	0.596	1.949	0.150	48326
1967	56110	0.565	1.530	0.110	36673
1968	84148	0.107	1.203	0.144	69948
1969	60571	0.166	1.133	0.145	53460
1970	17787	0.215	0.977	0.192	18187
1971	12643	0.515	0.676	0.103	18139
1972	13690	0.050	0.614	0.375	22296
1973	297	0.404	0.005	0.005	59400
1974	4070	0.000			
1975	6959	0.573	1.073	0.329	6485
1976	5929	0.533	0.883	0.231	6707
1977	3658	0.265	1.579	0.663	2316
1978	4858	0.734	0.712	0.199	6823
1979	1967	0.990	0.715	0.163	2751
1980			0.131	0.113	

Table 4. Age composition of the catch for 1979

Age	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	TOTAL
3				293	293
4	6544	8252	2229	54875	71900
5	4064	5124	19537	178766	207491
6	35889	45251	130048	403405	614593
7	5806	7320	14721	50713	78560
8	369	466	1325	4914	7074
9			168	989	1157
10			168	989	1157
11			147	512	659
12				585	585
13				293	293
TOTAL	52672	66413	168343	696334	983762
Av. Wt. (kg.)	1.31	1.31	2.06	2.09	

Table 5. Age compositions of the research vessel catches in 2GH and 2J in 1978 and 1979.

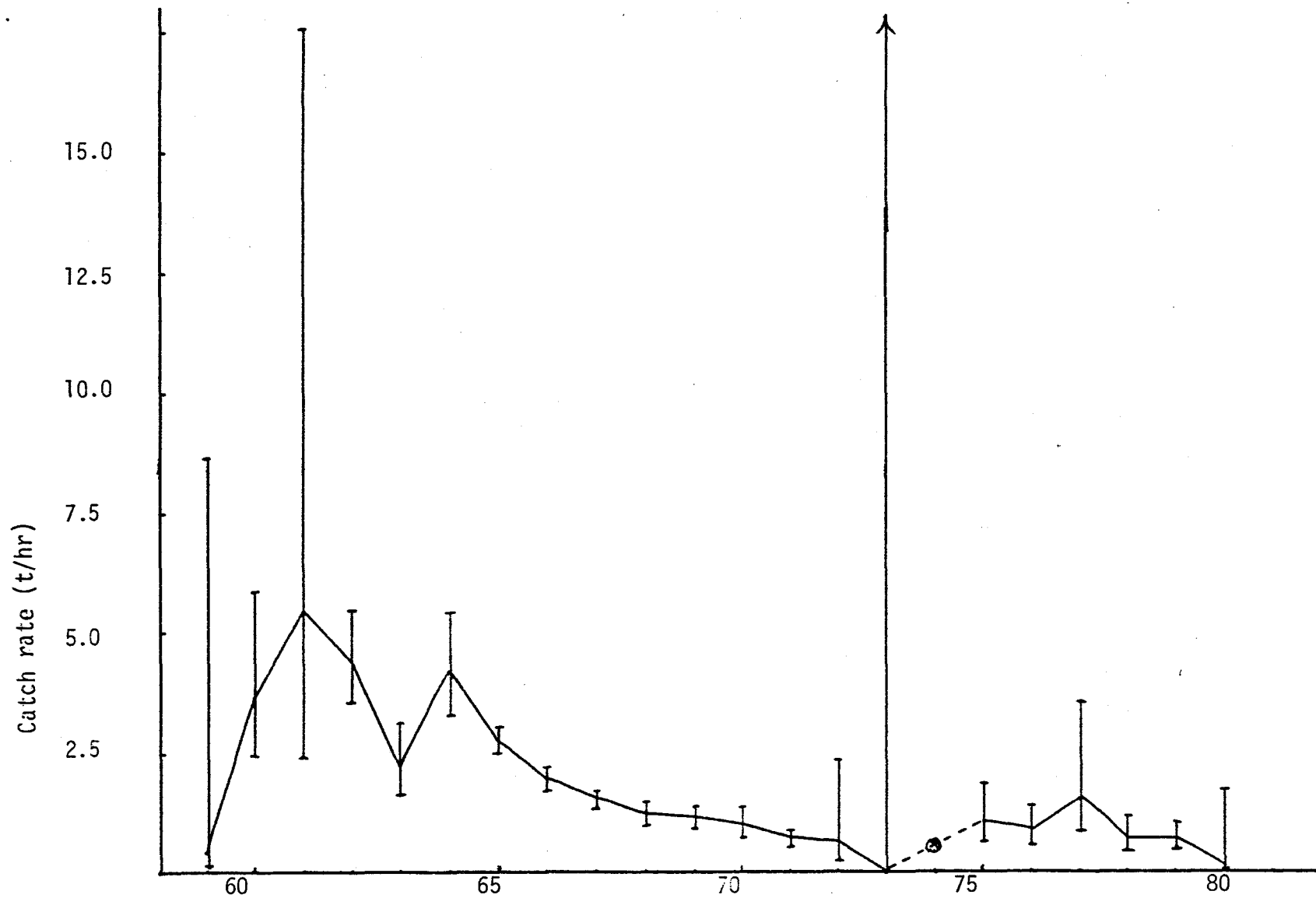| Age	1978		1979	
	2GH	2J	2GH	2J
2	1	6		6
3	34	102	8	27
4	91	209	111	221
5	585	455	171	326
6	242	158	625	327
7	23	33	63	49
8	6	12	8	16
9	4	9	3	10
10	6	7	6	6
11	4	3		6
12	1	1	4	2
13		2		1
14	1	1	1	1
15				
	998	998	1001	998
# sets	96	55	132	55
Av.No. per tow	14.20	82.07	11.54	55.20
Av.Wt. per tow	23.66	137.05	19.27	108.88

Fig. 1. Standardized catch rates for the cod stock in Divisions 2GH for the years 1959-80