Not to be cited without permission of the authors¹

Canadian Atlantic Fisheries Scientific Advisory Committee

CAFSAC Research Document 86/52

Ne pas citer sans autorisation des auteurs¹

Comité scientifique consultatif des pêches canadiennes dans l'Atlantique

CSCPCA Document de recherche 86/ 52

The NAFO Division 30 Redfish

bv

D.B. Atkinson and D. Power Fisheries Research Branch Department of Fisheries and Oceans P.O. Box 5667 St. John's, Newfoundland A1C 5X1

¹This series documents the scientific basis for fisheries management advice in Atlantic Canada. As such, it addresses the issues of the day in the time frames required and the Research Documents it contains are not intended as definitive statements on the subjects qu'elle contient ne doivent pas être addressed but rather as progress reports considérés comme des énoncés finals on ongoing investigations.

Research Documents are produced in the official language in which they are provided to the Secretariat by the author.

¹Cette série documente les bases scientifiques des conseils de gestion des pêches sur la côte atlantique du Canada. Comme telle, elle couvre les problèmes actuels selon les échéanciers voulus et les Documents de recherche sur les sujets traités mais plutôt comme des rapports d'étape sur les études en cours.

Les Documents de recherche sont publiés dans la langue officielle utilisée par les auteurs dans le manuscrit envoyé au secrétariat.

Abstract

In 1985, Canada only caught about 1% of its allocation from this stock while 55% of the foreign allocation was taken. There are indications that the biomass of redfish in this area has not changed greatly over the period of the fishery. Therefore, apparant changes in catch rates may be more reflective of variations in other parameters than stock size. The few commercial frequencies available for 1985 indicate that fish 20-30 cm predominated in the catches.

Résumé

En 1985, les pêcheurs canadiens n'ont atteint que 1 % environ du total de leurs prises admissibles de ce stock de poisson, tandis que les pêcheurs étrangers ont atteint 55 % de leur quota. Il semble que la biomasse de sébaste dans cette région n'a pas beaucoup changé au cours de la période de pêche. Par conséquent, les différences marquées dans les taux de prise découlent probablement plus des changements touchant d'autres paramètres que la taille du stock. Selon les quelques données sur les fréquences commerciales disponibles pour 1985, les prises étaient surtout composées de poissons de 20 à 30 cm.

Introduction

Nominal catches have ranged between 7000 and 18,000 t over the past 10 years (Table 1, Fig. 1). The TAC's have not been achieved since their inception in 1974. In 1985, preliminary data suggest that only 37% of the TAC of 20,000 t was caught. Canada only took about 1% of its allocation while about 55% of the foreign allocation was caught. As in past years, the USSR dominated this fishery (Table 1). There has been a shift in the pattern of fishing for redfish in this area with the majority of the catches in 1984 and 1985 being taken in the second half of the year (Table 2).

Methods and Results

Catch and effort data from ICNAF/NAFO Statistical Bulletins for the period 1959-1984 were combined with preliminary Canadian data for 1985. Only data where redfish comprised >50% of the total catch were used. These were analysed using a multiplicative model (Gavaris 1980) to derive a standardized catch rate series. Those country-gear-TC and months with less than 5 data points were deleted as were all catches and effort of less than 10 units in order to eliminate potential biases. The parameter estimates and final groupings used are shown in Table 3 while the regression results are in Tables 4 and 5. Figures 2 and 3 show the standardized effort and catch rate from 1959 to 1985. The catch rates have been showing a steady increase since the early 1970's but effort has been steadily declining over the same period. There are no effort data available for 1968.

A general production analysis was done on the standardized catch rate and effort data using unlagged effort data and with the effort data lagged 6, 8 and 10 years (Gulland 1961). All regressions were significant. The results of each were checked for serial correlation by determining if a significant correlation existed between the standardized residuals and these same residuals shifted ahead by 1 year (Draper and Smith 1982). This was done because use of the Durbin Watson statistic often gives inconclusive results. It was anticipated that serial correlation would exist for the unlagged data but would diminish or disappear with application of an appropriate lag period. This was not the case as indicated:

LAG	<u>df</u>	<u> </u>
nil	23	0.217
6	18	0.065
8	16	0.267
10	14	0.118

These results were unexpected and did not follow trends seen in the examination of other data sets. They suggest that the effort being exerted is having only a minimum effect on the stock and that the biomass levels have not changed significantly. If this is the case, then the significant relationships observed between catch rate and effort may only be fortuitous.

The few commercial frequencies available (Fig. 4) indicate fish 20-30 cm predominating. This is in keeping with historic trends which show smaller fish

taken from this stock than from neighboring areas. This trend results from the fact that, due to bad bottom, the larger fish, which are found in deeper water, are not caught. Also, this indicates that the fishery is conducted in the same area each year.

There are no research data available for this stock.

Conclusions

The catch rates have shown a continuing increase for a number of years and this would suggest that the stock is in good condition. The bad bottom in the area insures a reserve of mature fish. The results of the analyses of serial correlation would suggest that the present fishing pressure is not having much effect on the stock. In this regard it should be reiterated that the TAC's have never been achieved. The results of these analyses also bring into question the validity of the use of the general production model for this stock under the present conditions. There is no evidence to suggest a change in the TAC from the present level of 20,000 t which was first established in 1978 based upon the results of an unlagged general production analysis.

References

- Draper ,N. and H. Smith. 1982. Applied Regression analysis, Second Edition.John Wiley and Sons, Inc. New York.
- Gavaris, S. 1980. Use of a multiplicative model to estimate catch rate and effort from commercial data. Can. J. Fish. Aquat. Sci. 37: 2272-2275.
- Gulland, J.A. 1961. Fishing and stocks of fish at Iceland. U.K. Min. Agric. Fish. Food, Fish. Invest. (Ser. 2) 23(4):52p.

Country	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984*	1985*
reserves means	42222222 ?4		EEEEEEEE 6 10	655	2222222 381	1 557	122222222 565	4 17	17 EZZERE 17	12222222 4	1222222222 70	22222222 47
Canada (N)	57	103	3.054	2.317	1.460	4.847	976	2, 160	444	3	137	56
France (M)	-		1		-	-	-			-	-	
France (SP)	31	-	15	2	-	-	-		-	-	-	-
France	-	-	-	-		-	-	-	-	2	-	-
Japan	44	7	4	-	3	2	-		496	1	1,258	429
Portugal	-	-	1	-	-	134	59	-	5		-	-
Romania	-		-		-	664		-	-			
Spain	~	-	-	-	1	8		-	-		25	
UK	13	-	-		-				-			-
USSR	12,747	15,000	11,663	7,376	4,647	8,008	14,219	8,659	8,717	5,670	7,262	5,905
Cuba	-	-	-	500	368	2,517	1,487	1,368	1,651	1,460	1,316	806
USA	198	-	-		-	-	-	-	-	-		104
TOTAL	13, 124	15, 1 10	15,348	10,850	6,860	17,737	17,306	12,604	11,360	7, 140	10,027	7,347

Table 1: Nominal catches (t) of redfish in Division 30 by country and year.

* Provisional.

+ Maritimes and Quebec were combined prior to 1979.

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1974	1	12	585	1,523	3,380	1,678	1,298	218	26			4,402	13, 124
1975		2	1,926	1,313	2, 186	3,680	723	897	3, 123	1, 159	-	101	15, 1 10
1976	352	452	399	857	1,477	1,497	3,119	1,440	2,221	2,540	40	954	15,348
1977	553	36	1,047	1,736	987	1,865	1,580	1, 113	1,032	828	63	10	10,850
1978	48	102	1,478	1,326	1,216	930	656	353	433	155	158	5	5,860
1979	35	844	2,464	2,072	87	1,997	739	692	1,235	1,320	3,594	2,658	17,737
1980	612	1,250	855	3,698	1, 145	858	143	2,395	1,860	149	986	3,354	17,306
1981	991	3,735	1,444	1,601	621	1,467	773	584	510	873	5		12,604
1982		1	1, 121	1,258	545	652	4,555	2,245	66 1	233	89		11,360
1983	254	355	2,904	1,227	71	156	576	938	319	1	73	266	7,140
1984*	219	155	2	32	85	257	445	3,210	2,799	1,882	435	506	10,027
1985*	1		453	190	4	84	213	2,243	2,579	244	20	1,316	7,347

4

Table 2: Nominal catches (t) of redfish in Division 30 by month and year.

* Provisional.

Country-Gear-TC	Estimate	Month	Estimate

FR(SP) OTB 4	-0.826	Apr.	-0.509
USSR OTB 4	-0.778	Jan.	
		Feb.	-0.266
CAN(M) OTB 4	-0.398	Oct.	
		No∨.	
CAN(N) OTB 5	-0.132		
		Mar.	
CAN(N) OTB 4		May	-0.145
CAN(MQ) OTB 4	0.000	Jul.	
CAN(M) OTB 5		Dec.	
JPN OTB 6	0.294	Jun.	
		Aug.	0.000
POL OTB 7	0.439	Sep.	
JPN OTB 7	0.716		
CUBA OTM 7			
CUBA OTB 7	0.877		
USSR OTB 7			

Table 3: Parameter estimates from the analysis of catch/effort for redfish in Division 30 using a multiplicative model.

Table 4: Regression of multiplicative model for redfish in Division 30.

multiple r.....0.844 multiple r squared.....0.713

analysis of variance

source of variation	df	sums of squares	mean squares 	f-value
intercept	1	2.297e0	2.297e0	
regress i on	36	1.394e2	3.872e0	22.624
type 1	8	6.311e1	7.889e0	46.092
type 2	3	6. 102e0	2.034e0	11.884
type 3	25	1.486e1	5.945e ⁻ 1	3.473
residuals	328	5.614e1	1.712e ⁻¹	
total	365	1.978e2		

Table 5: The predicted catch rate for redfish in Division 30.

	total	catel		
year	catch	mean	s.e.	effort

1959	9268	0.945	0.128	9809
1960	5030	0.959	0.259	5245
1961	11394	1.104	0.197	10324
1962	7557	0.911	0.121	8293
1963	9 194	0.998	0.137	92 15
1964	20232	0.838	0.139	24137
1965	22438	0.620	0.102	36206
1966	15305	0.860	0.292	17789
1967	19037	1.323	0.240	14386
1969	15878	0.735	0.103	21603
1970	13 192	0.757	0.099	17422
1971	19792	0.957	0.116	20674
1972	16117	0.733	0.085	21975
1973	8797	1.062	0.156	8285
1974	13124	0.704	0.101	18649
1975	15110	0.684	0.117	22100
1976	15348	1.050	0.104	146 15
1977	10850	0.934	0.088	11611
1978	6860	0.865	0.086	7926
1979	17737	1.368	0.122	12965
1980	17306	1.114	0.108	15528
1981	12604	1.366	0.136	9229
1982	11360	1.381	0.149	8229
1983	7140	1.172	0.147	6095
1984	10027	1.200	0.129	8357
1985	7347	1.857	0.519	3957



Fig. 1: Nominal catches of redfish from Division 30, 1959-1985. (1984 and 1985 are provisional)



Fig. 2: Standardized effort for redfish in Division 30,1959-1985. (1984 and 1985 are provisional)



Fig. 3: Standardized CPUE (t/hr) for redfish in Division 30, 1959-1985. (1984 and 1985 Provisional)



Fig. 4: Commercial frequencies from the foreign otter trawl fisheries for redfish in Division 30, 1985 (sea sampling).