

A General Production Model Assessment of  
Subarea 2 + Division 3K Redfish

by

W.D. McKone  
Department of Fisheries and Environment  
Fisheries and Environment  
Research and Resource Services  
St. John's, Newfoundland

Introduction

The status of redfish in Subarea 2 + Div. 3K was previously analyzed by McKone and Parsons (1977) using the General Production Model as modified by Gulland (1961). This analysis is an update of the assessment to include 1976 data.

Materials and Methods

Since a great many countries have fished redfish in Subarea 2 + Division 3K in different years, it was impossible to standardize fishing effort on the basis of a country. Instead fishing effort was standardized on the basis of vessel tonnage category. The catch per day fished of vessels in tonnage categories 4, 5 and 6 were corrected to class 7 by regression and the resultant summed to give the total number of standard days for the entire fleet. Due to irregularities which existed in the 1975 catch effort data, it was not possible to calculate the effort but catch effort and effort were calculated for 1976. Catch effort and landings available in ICNAF Statistical Bulletin (Vol. 26) were tabulated and effort calculated from catches in which redfish was  $\geq 50\%$  of the total catch for all species.

A few commercial length frequencies available from Canada (Nfld) were plotted for comparison with the size distribution from Division to Division. Research length frequencies for F.R.G. were plotted to compare trends from previous years, and for evidence of new incoming year-classes, and compare to Canadian research survey length frequency data for the same area.

### Results and Discussion

At the inception of the redfish fishery in Subarea 2 + Division 3K, catches increased to a peak of 187,000 tons in 1959, the second year of the fishery (Fig. 1). Succeeding catches have been relatively low with peaks of 56,000 tons in 1964, 39,000 tons in 1973 and lows of 19,000 tons in 1968 and 1971. Since the introduction of a TAC of 30,000 tons for 1975 and 1976, catches have been 26,000 tons.

Catch effort declined from a high of 32.34 tons per day in 1959 to 13.25 tons per day in 1961 (Fig. 1). Subsequently, catch effort increased to 20.09 tons per day in 1963 but again declined to 11.67 tons in 1966. Since 1966 catch effort remained relatively stable at 14.00 tons per day until 1971 when catch dropped to 11.70 tons per day. Some increase in catch effort has occurred in the 1970's from 12.84 tons per day in 1972 to 16.5 in 1973-74 and 17.15 tons per day in 1976.

Effort trends are similar to catch trends, thus a maximum of 5,777 days fished occurred in 1959 (Fig. 1). Other peaks in effort occurred in 1964 (4,205 days), 1966 (2,804 days) and 1973 (2,314 days). Subsequently effort has decreased to 1,840 days in 1974 and 1,514 days in 1976.

The Gulland modified Schaefer yield model was used to derive estimates of MSY and the equilibrium yield at 2/3 effort for Subarea 2 + Division 3K redfish.

Running Average	MSY		2/3 MSY	
	Effort	Yield	Effort	Yield
10 years	2,193	40,000	1,461	35,908
8 years	2,370	44,000	1,580	38,814
6 years	2,899	47,000	1,930	41,819

The TAC was set at 30,000 tons in 1975 and has not been changed as the stock has been in a depressed condition in recent years. Catches in 1966 to 1974 were well below the equilibrium curves (Fig. 2). The 1976 point similarly falls below the curves thus there appears to be little improvement in the stock.

An examination of the Canadian (Nfld) commercial length frequencies available for Subarea 2 + Division 3K for 1977 reveals a broad size range as has been found for other years (Fig. 3 and 4). In Subarea 2 (Fig. 3) most of the fish were between 26 and 38 cm with modes of 30, 31 and 32 cm for males and modes of 26, 27, and 34 cm for females. For Division 3K in February, March and May, modes of 32 and 38 cm for males and 31 and 46 cm for females were the most dominant size groups (Fig. 4). In July a single modal size class of 39 cm for males and 48 cm for females were the most abundant in the landings but in September modal lengths of 32 cm for males and 31 cm for females predominated. The bulk of fish caught by the commercial fishery are large fish which may be a mixture of *marinus* and *mentella*. The size groups centered at the modal lengths in Subarea 2 + Division 3K appear to be approximately of equivalent abundance in terms of numbers with the exception of July and September frequencies in Division 3K which are somewhat dissimilar.

In F.R.G. and Canadian research random-stratified samples in Division 2J and Division 3K the bulk of the redfish were between 24 and 50 cm (Fig. 5 and 6). The size distribution of redfish exhibited a number of modal peaks in the F.R.G. catches but the most common are 32, 35 and 44 cm for males and 32, 33, 35, 40, 44 and 46 cm for females (Fig. 5).

Canadian research frequencies however are unimodal with 29 cm for males and 28 cm for females dominating the size distribution. Few small relatively young fish show up in either the F.R.G. or Canadian length frequencies for the area.

In conclusion, Subarea 2 + Division 3K stock has shown little recovery from the depressed condition indicated by the general production model. Effort and catch effort remained low but relatively stable over the years. The catches from commercial sources continue to exhibit high numbers of very large fish compared to what is observed for some other stocks of redfish off Newfoundland. These larger fish, however, may be *marinus* type which are not separated out. Thus, as there is no new evidence of an improved condition to this stock, the TAC should remain at its present level of 30,000 tons for 1979.

#### References

- Gulland, J. A. 1961. Fishing and the stocks of fish of Iceland. Fish. Invest. Long. (2), 23(4): 52 p.
- McKone, W. D. and D. G. Parsons. 1977. An update of the assessment of redfish from Subarea 2 + Div. 3K, Div. 3M, Div. 3LN and Div. 3Ø. Intern. Comm. Northw. Atlant. Fish. Res. Doc. 77/18, Ser. No. 5038.
- Parsons, L.S., A. T. Pinhorn and D. G. Parsons. 1976. An evaluation of the Northern Newfoundland-Labrador and Flemish Cap redfish fisheries. Intern. Comm. Northw. Atlant. Fish. Res. Bull. 12: 38-48.

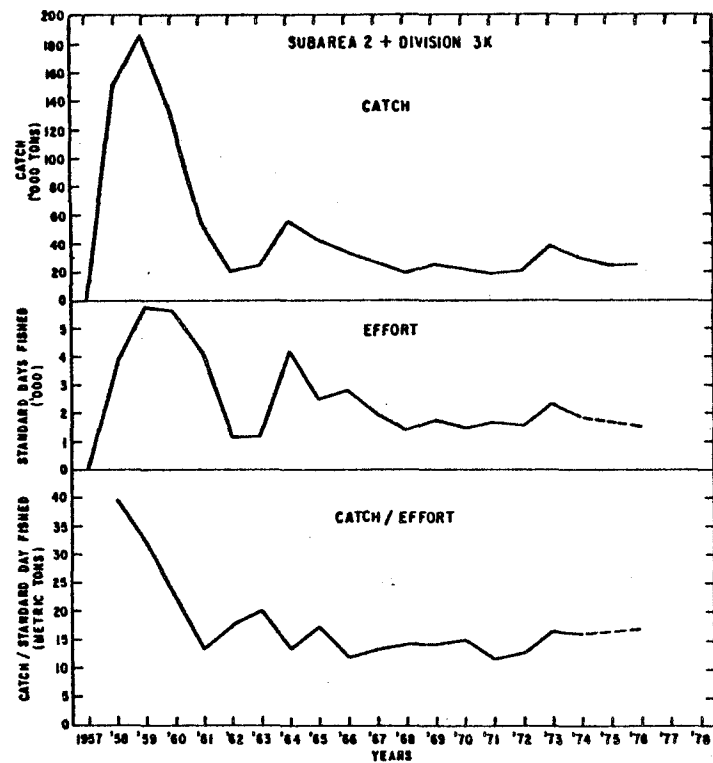


Fig. 1

Trends in nominal redfish catch, effort and catch per unit effort in standardized trawler units following the method of Parsons *et al.* 1976 with 1973-1976 added for Subarea 2 + Div. 3K.

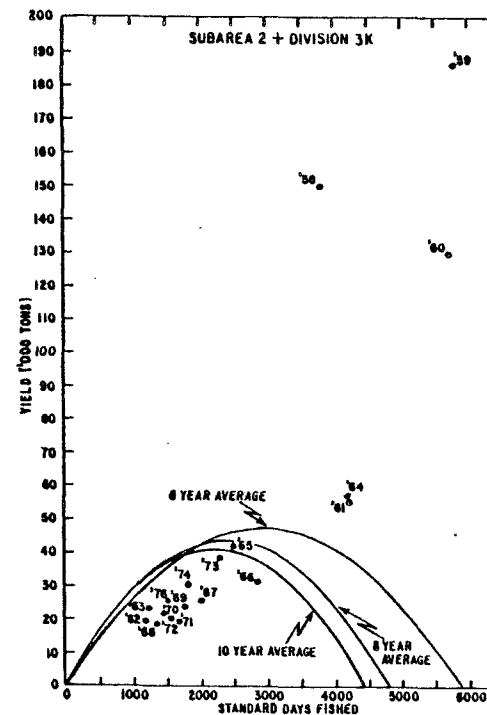


Fig. 2

Yield curves for redfish Subarea 2 + Div. 3K derived from catch per unit effort using 6 year, 8 year and 10 year running averages of standard days fished from Parsons *et al.* 1976 extended to include 1973-1976.

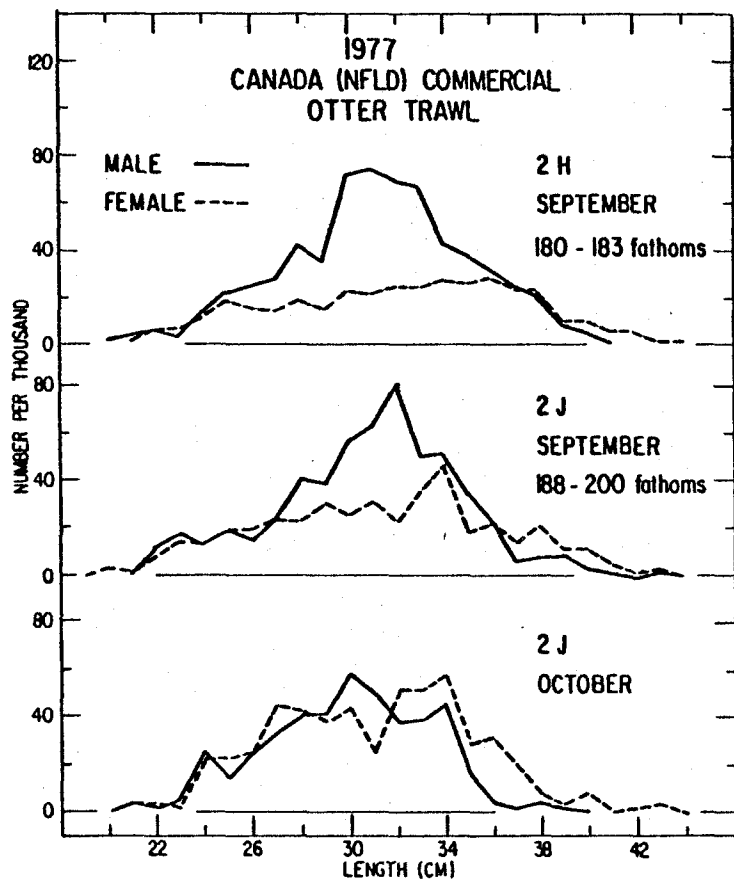


Fig. 3. Commercial redfish otter trawl length frequencies for Canada (Nfld) from Subarea 2.

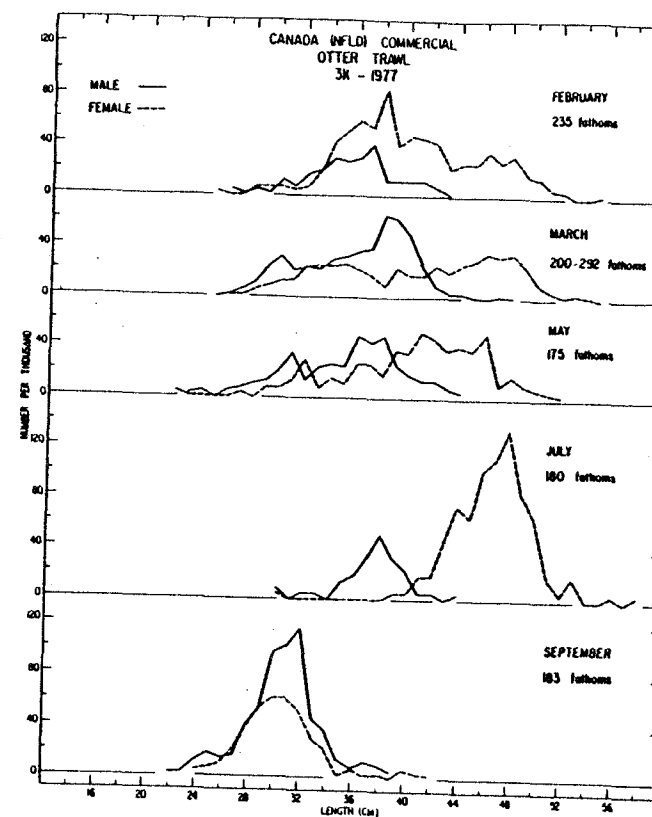


Fig. 4. Commercial redfish otter trawl length frequencies for Canada (Nfld) from Division 3K

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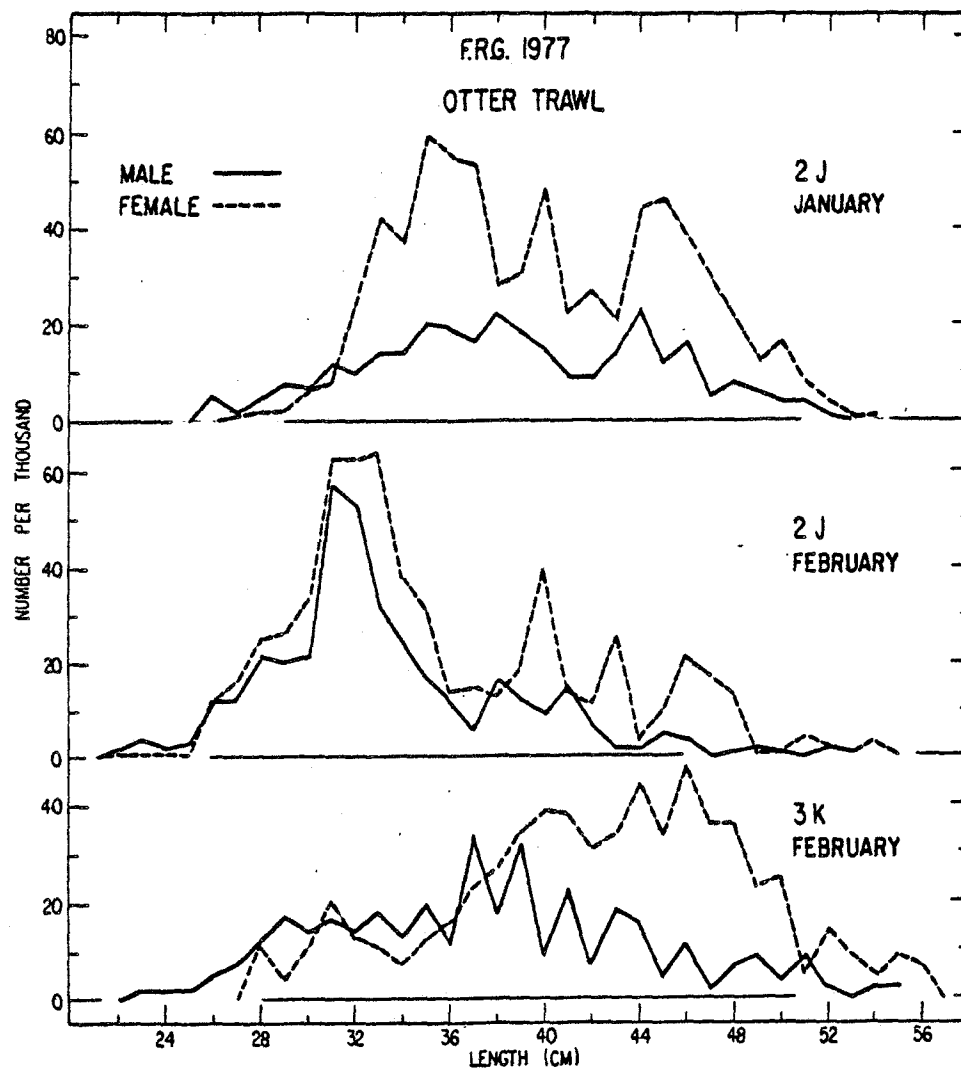


Fig. 5. Research otter trawl length frequencies for F.R.G. from Division 2J and Division 3K, 1977.

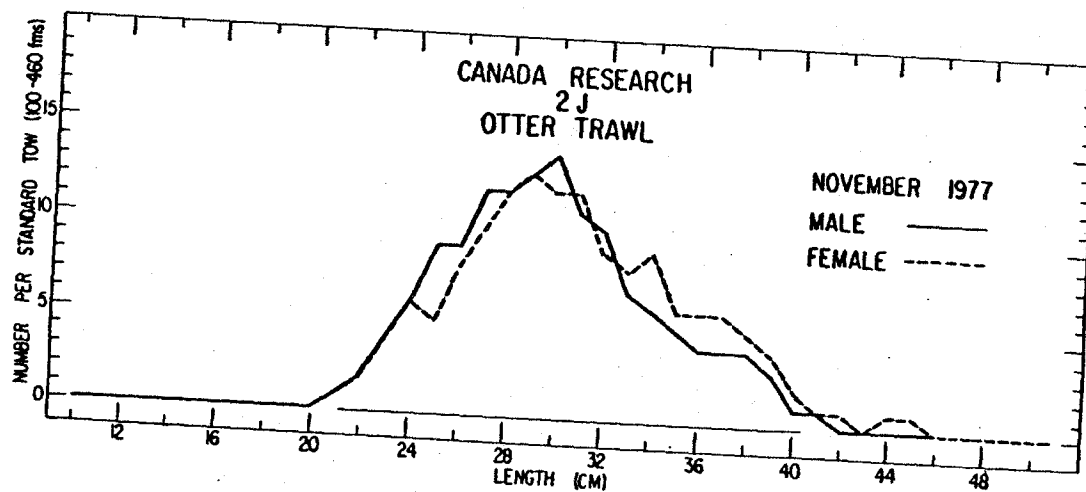


Fig. 6. Research redfish otter trawl numbers per standard tow (1/2 hour) at length for Canada (NF1d) from Division 2J.

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