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Status of the redfish fishery in ICNAF Subarea 2 and Division 3K[1]

by

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Introduction

The status of redfish in ICNAF Divisions 3LN, 3O and 3P was summarized by Parsons and Parsons (1973), using the Schaefer yield model to estimate levels of sustainable yield. This type of analysis has been extended to the redfish in Subarea 2 and Division 3K in this paper.

Materials and Methods

Since different countries have fished redfish in Subarea 2 and Division 3K in different years, it was impossible to standardize fishing effort on the basis of country. Instead, tonnage category was used as a basis for standardization. The procedure was as follows: Catch per day fished of vessels in each of tonnage categories 151-500 tons, 501-900 tons and 901-1800 tons, respectively, was plotted against catch per day fished of vessels in tonnage category > 1800 tons, for months in which both categories of vessels fished for at least 15 days (Fig. 1). Straight lines passing through the origin were then fitted to the points for each tonnage category and the slopes of these lines used as conversion factors to convert the days fished in each tonnage category to equivalent days fished by vessels in the standard category > 1800 tons. The equivalent standard days fished in these tonnage categories were then summed to produce total number of standard days for the entire fleet. The catch per standard day fished was then calculated from the total catch and the total standard effort.

In the previous analysis by Parsons and Parsons (1973), the fishing effort in year i and 5 years prior to year i (i.e. a 6-year period) was averaged and plotted against the catch per unit effort in year i to determine equilibrium yields in each year. This period is determined by the mean number of years a year-class contributes to the fishery. Since the fishery which commenced in 1958 was dependent upon an accumulated or virgin stock during 1958-61, some of the fish in the catches were undoubtedly very old and only after the fishery had been underway for several years were the maximum ages in the catches comparable to those in the southern redfish stocks. Hence, a longer averaging period would be appropriate for the northern area. Periods of 6, 8 and 10 years are therefore used to average the effort. Since there was no fishing effort in years prior to 1958, the same number of points could be obtained with any averaging period by considering the effort in years prior to 1958 as zero.

Results

Reported catches of redfish in Subarea 2 and Division 3K were nil prior to 1958. A directed fishery for redfish commenced in 1958 and catches reached 150,000 tons (Fig. 2 and Table 1). This increased to 187,000 tons in 1959 but decreased to 130,000 tons in 1960 and 55,000 tons in 1961. Catches were around 20,000 tons in 1962 and 1963 but increased to 56,000 tons in 1964. There was a steady decrease to 20,000 tons by 1968 and catches since then have remained remarkably stable at about this level.

[1] Presented to the Special Commission Meeting, FAO, Rome, January 1974, as Res.Doc. 74/5.

Trends in fishing effort were similar to catch trends. Catch per day fished was at a high level of 40 tons in 1958 when the fleet fished the accumulated stock of old redfish. However, there was a very sharp decline to 13 tons per day by 1961. Some increase was evident in 1962 and 1963 to 20 tons per day but the catch per unit of effort thereafter decreased and remained stable at 12-15 tons per day during 1966 to 1971.

As previously indicated averaging periods of 6, 8 and 10 years were used to estimate equilibrium effort to cover the likely range of contribution of year-classes to the fishery. Regressions of catch per unit effort on effort resulted in correlation coefficients of 0.59, 0.80 and 0.85 for 6, 8 and 10 year periods, respectively (Fig. 3). Very little improvement in correlation was evident between the 8 and 10 year averaging periods.

Yield curves calculated from these regressions (Fig. 4) resulted in maximum sustainable yield estimates of 40,000 tons for the 10-year period, 44,000 tons for the 8-year period and 47,000 tons for the 6-year period. Regardless of the averaging period, it is obvious that the high catches of 1958-60 were far above any sustainable level and that catches since 1966 have been below the equilibrium curve. Only the catches in 1965 and 1966 were close to the equilibrium curve. Catches in 1962 and 1963 were below the equilibrium curve and those in 1961 and 1964 were above. Fishing effort since 1966 has been relatively stable in the vicinity of 1300-2000 days fished. However, with a slow growing species such as redfish with a relatively large number of years represented in the fishery, the effort has not been stabalized long enough to achieve equilibrium yield. The heavy fishing pressure in the early years of the fishery apparently reduced the stock to a level lower than that necessary to produce equilibrium yield even though the fishing effort has been less in recent years. Thus, although the stock can sustain catches of 40000-45000 tons, it would be wise at present to restrict the level of catch to not more than 25000 tons, the approximate level of recent catches to permit the stock to rebuild.

References

Parsons, L. S. and D. G. Parsons. 1973. An evaluation of the status of ICNAF Divisions 3P, 3O and 3LN redfish. Int. Comm. Northw. Atlant. Fish. Annual Meet. Res. Doc. 73/88. Serial No. 3042.

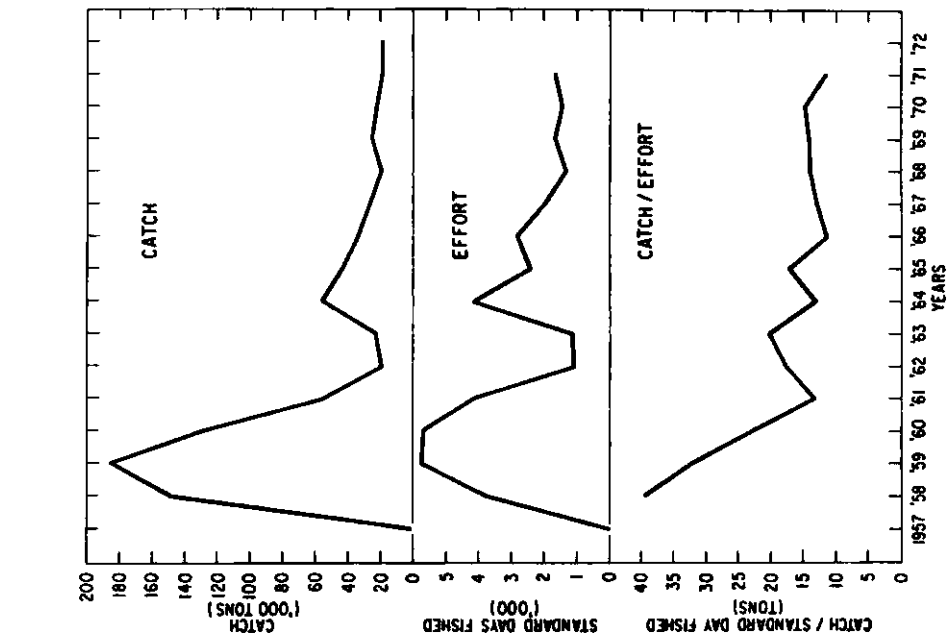

Fig. 2. Trends in redfish catch, effort and catch per unit effort, Subarea 2 + Division 3K.

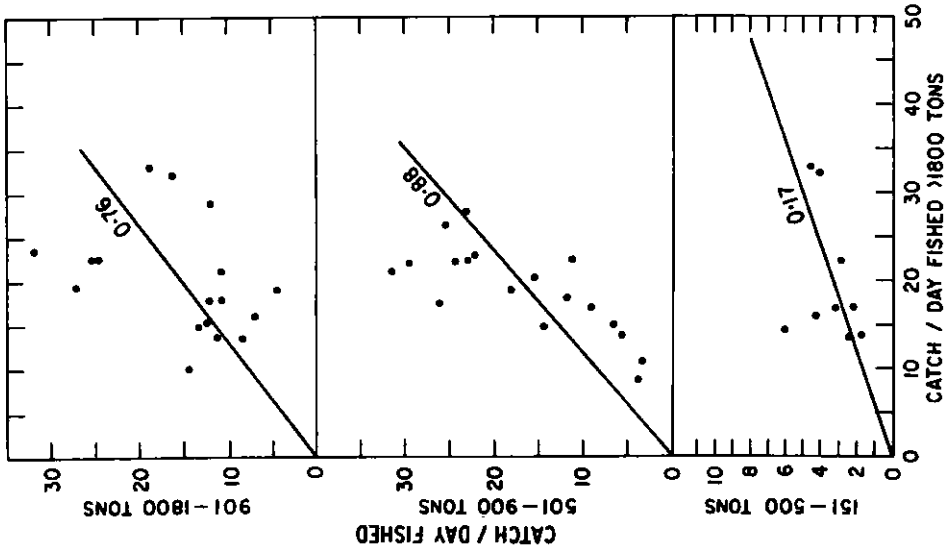

Fig. 1. Catch per day fished of various tonnage categories of vessels versus catch per day fished of vessels in tonnage category > 1800 tons, redfish, Subarea 2 + Division 3K.

Table 1. Nominal catches (metric tons) of redfish by country from Subarea 2 + Div. 3K 1958-71

Year	Canada	Fr (M)	Germ (Fed)	Iceland	Japan	Norway	Poland	Romania	UK	USA	USSR	Italy	Non-Mem	Total
1958	4052		22909	77081						2291	42037		2058	150428
1959			34604	64294			230		44	6	80074		7585	186837
1960	1		29636	10964					118		85315	12	3727	129773
1961	2		12762	4236			214		15		38226			55455
1962			3298	2106			1188		65		12999			19656
1963	1		1366	4405			11066		18		6788			23644
1964	13		6333	2373			20578		12		10794		16075	56178
1965	266		3440	1895		4	21678		63		7355		7956	42657
1966	54	8	2822	1899			11643		46		5256		11002	32730
1967	29		848	1937			6292		51		6102		10903	26162
1968	183	18	354	328		15	6902		16		5304		5761	18881
1969	6	34	147	294		25	5752	145		7	13458		4723	24591
1970	63		439		10		5223	845	11		10379		4827	21797
1971	153		94	209	44	3	6188	168			9785		2662	19306
1972	48	5	470	295	3 (Spain)	4	2036	329	226		13481		2402	19299

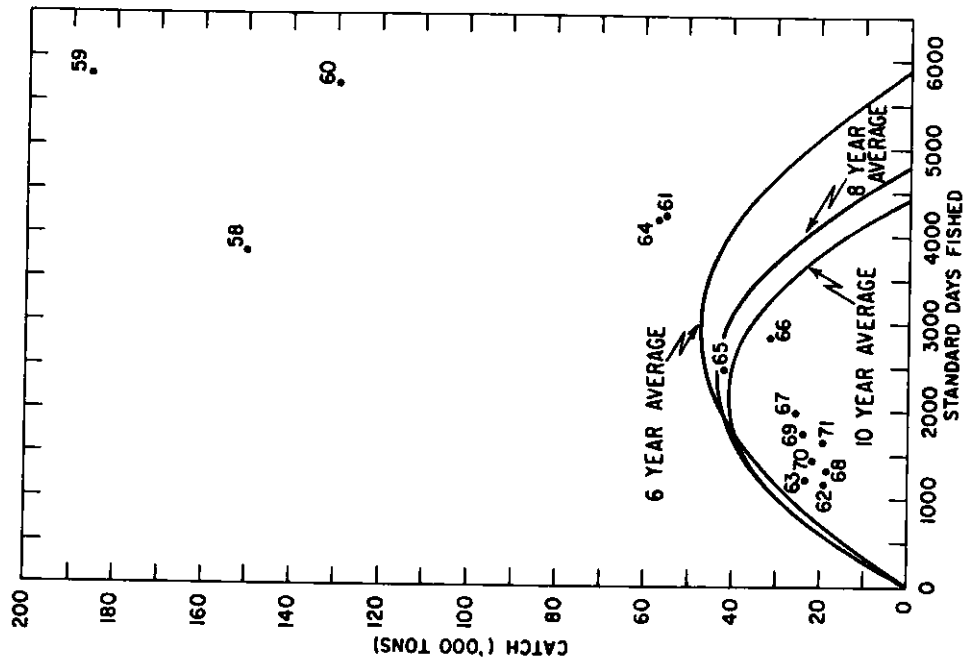

Fig. 4. Yield curves derived from the catch per unit effort/effort relation using 6-year, 8-year, and 10-year running averages of standard days fished, redfish, Subarea 2 + Division 3K.

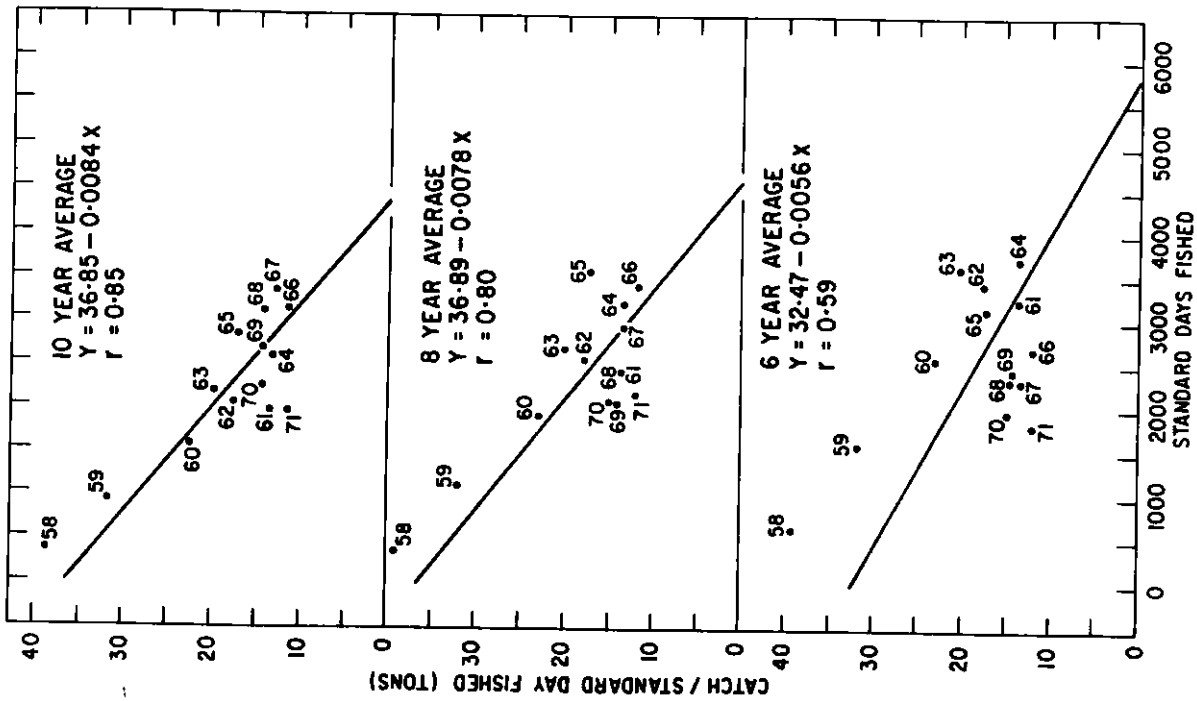

Fig. 3. Catch per standard day fished versus 6-year, 8-year, and 10-year running averages of standard days fished, redfish, Subarea 2 + Division 3K.