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An Evaluation of the Status of ICNAF Division 3M Redfish

by

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Abstract

The status of the ICNAF Div. 3M redfish fishery is evaluated utilizing a modified production model. Values of 23,680 tons of maximum sustainable yield sere obtained for the stock. A TAC of 24,000 tons is suggested, supported by the increasing trend in CPUE.

Introduction

The state of Flemish Cap redfish fisheries has been analyzed by Mari and Terre (1977) using a modified production model. The present paper presents an analysis of the fishery from 1956 to 1976 using a modified production model to estimate sustainable yield at different exploitation levels, by considering the three species comprising the catch as a single stock.

Materials and Methods

Since about 1956, different countries, members of ICNAF, have operated on Flemish Cap and in adjacent waters, fishing redfish. The catch and effort data used were obtained from the ICNAF Statistical Bulletins for the period 1956-1976 for each country, month, tonnage class and species.

Standardization of Fishing Effort

The effort was standardized in agreement with catch and effort data taking into account the different tonnage class referred to a standard one. In our case the vessel tonnage class was over 1800 GRT. For the tonnage class 4, 5 and 6, the conversion factor found by Mari and Terre (1977) was used (Fig. 1).

The analysis of the data so treated showed that for the first eleven years in the history of the fishery, the dominant tonnage class was 151-500 tons, while the bulk of the catch in the period 1956-1958 and 1972-1976 was taken by vessels of >1800 and 2000 tons respectively.

The days fished for each category were added to find the total number of standard days fished. Redfish catches in each category were then added to find the catch per standard days fished.

Trends in Catch, Effort and Catch per Unit Effort

The redfish fishery on Flemish Cap began in the year 1956 when a catch of 13,000 tons was reported. The fishery reached its maximum in 1958 when more than 54,000 tons were taken (Fig. 2). There were two other high values in 1972 and 1974 when 41,946 and 34,671 tons respectively were taken. The lowest catches

recorded in the historical series were taken in 1967 when the catch dropped down to 700 tons. In the 1968-71 period the catch remained around the average of 5,000 tons, rising abruptly in 1972 and 1974 to over 41,900 and 34,600 tons respectively. In 1975 and 1976 the catch remained around 16,000 tons under quota regulation.

The trends in fishing effort, expressed in days fished, are similar to those for the catch. The two maxima in fishing effort were in 1959 and 1965, with 3,203 and 3,556 days fished for the >1800 tonnage class, in coincidence with the peak catch values.

The high redfish catches reached in these years were due to the considerable fishing effort at that time. This probably caused a decrease in the abundance and hence the following values of CPUE.

The two peaks in CPUE were in 1958 and 1976 in coincidence with maximum catche in the first case. In the years analyzed from the 70's decade, the catch per unit effort ranged from 11.1 and 28.3 tons per day fished, and its lowest values were not preceded by a maximum in fishing effort.

Yield-Effort Relationship

The Schaefer (1954) model with Gulland (1961) modification was used to obtain the estimates of maximum sustainable yield. Regressions of catch per unit effort against mean effort during 1957-1971 resulted in correlation coefficients of 0.73, 0.76 and 0.81 for the 6, 8 and 10 year averaging periods respectively (Table 1 and Fig. 3). The improvement in correlation between the 6, 8 and 10 years running averages were very little. The Walter (1975) method was applied to correct errors introduced by not taking into consideration the non-equilibrium state of the fishery.

Results and Discussion

From the model in 1958, 1959, 1972, 1973 and 1974 the redfish catch was considerably higher than the equilibrium values, ranging from a maximum of 54,500 tons in 1958 to a minimum of 22,350 in 1973 (Fig. 2). The highest correlation coefficient was 0.88 for the model used for the 10 year running averages and the Walter (1975) method.

Taking into account the trends in CPUE, standard effort and catch during the last years, it is considered that a TAC around 24,000 tons in Div. 3M will not affect the recovery of the redfish stock as is shown by the CPUE values.

References

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Table 1. Summary of determined parameters of the production model.

Method	Year average	(r)	MSY tons	f(MSY) days fished	CPUE(MSY) tons per days fished
Schaefer-Gulland	6	0.73	16,699	1,100	15.18
Schaefer-Gulland	8	0.76	18,090	1,000	18.09
Scahefer-Gulland & Walter's method	10	0.88	23,680	1,000	23,68
Schaefer-Gulland	10	0.81	20.610	1,000	20.61

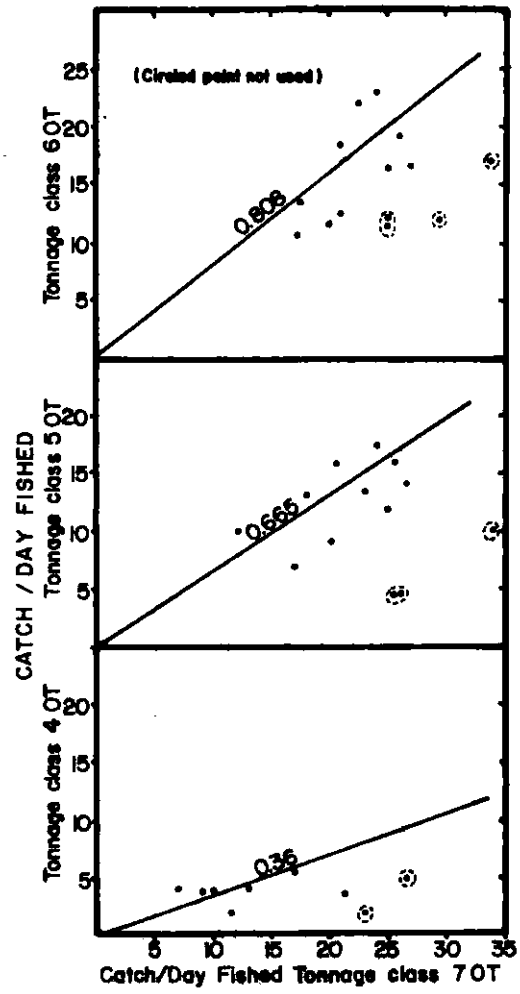

Fig. 1. Relation of catch per day fished by vessels in tonnage classes 5, 6 *vs* 7. Relation of redfish catches per day fished by tonnage class 4 and the corresponding catches per fished of tonnage class 7 trawlers.

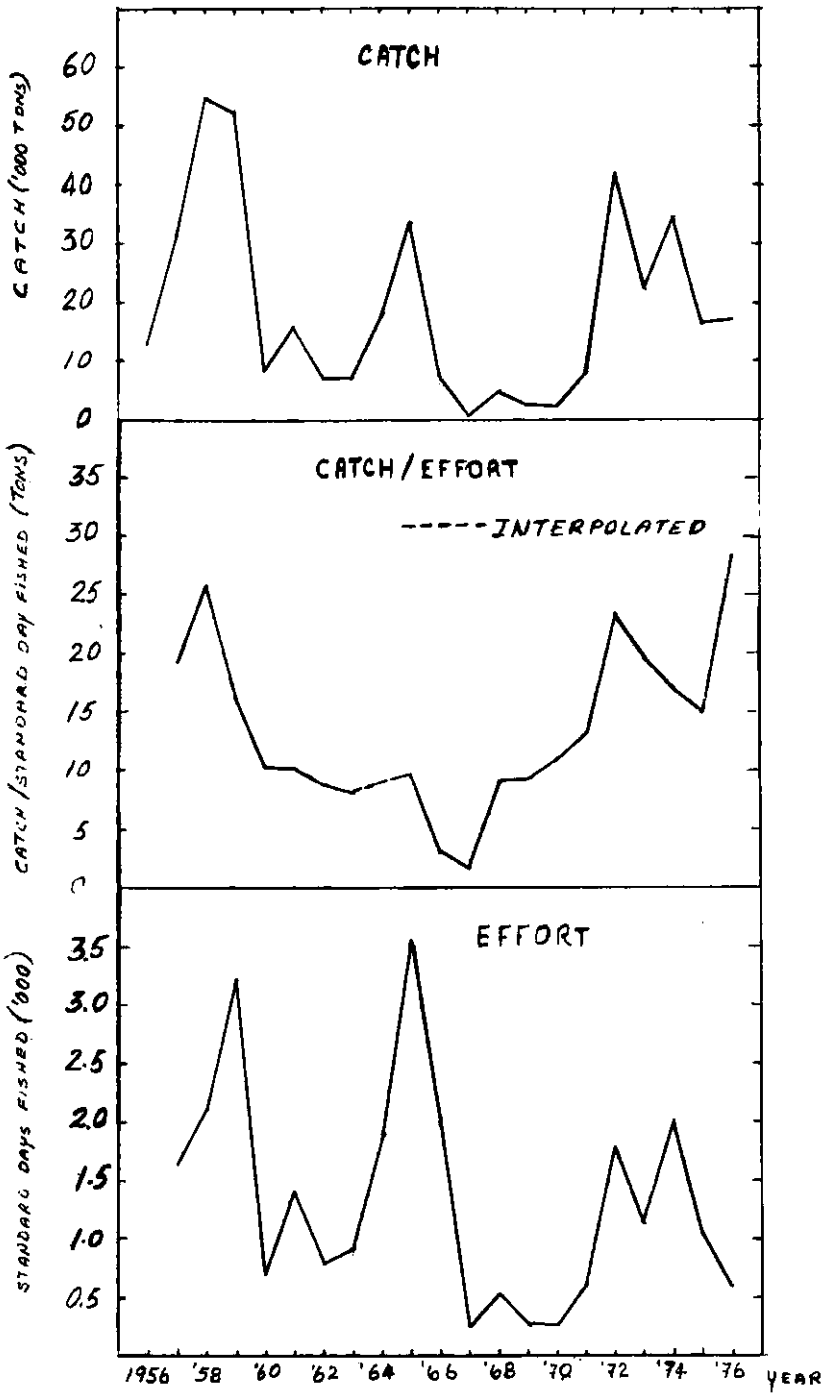

Fig. 2. Trends in nominal catch, effort and catch per unit effort in standard trawler units - vessels over 1800 tons - for redfish in Div. 3M.

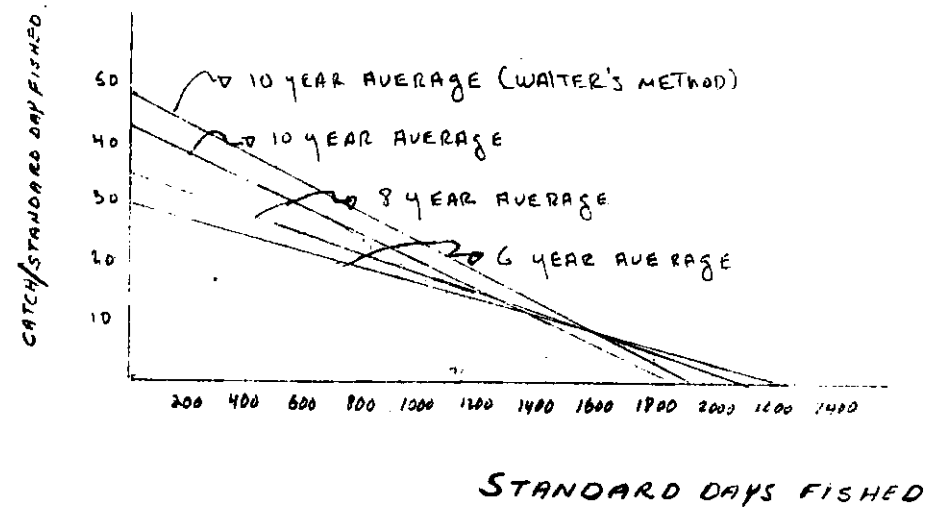

Fig. 3. Catch per standard day fished *versus* 6, 8, 10 and 10 year running averages (Walter's method) of standard days fished.

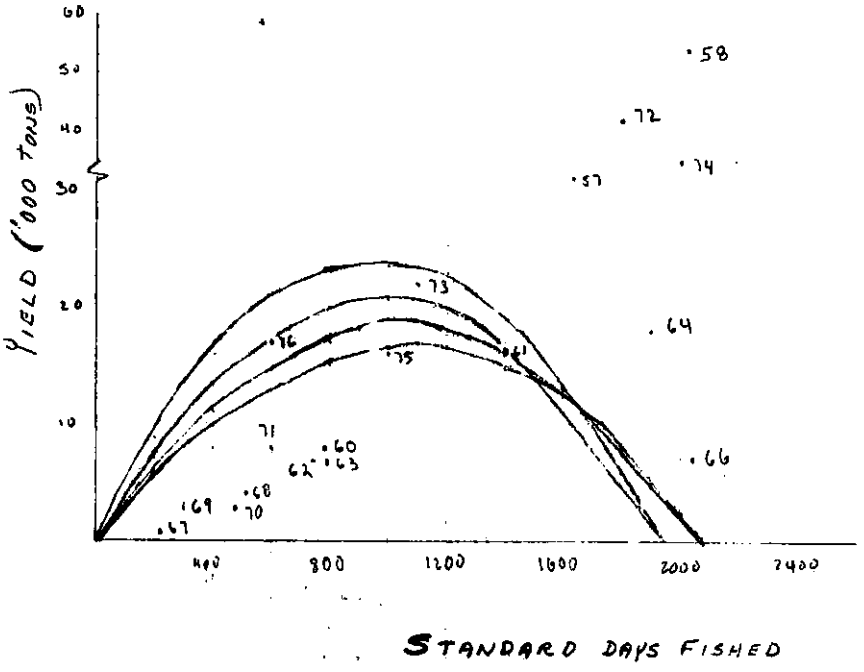

Fig. 4. Yield curves derived from the catch per unit effort/effort relationship, using 6, 8, 10 year Walter's method and 10 year running averages of standard days fished.