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An update of Flemish Cap redfish assessment

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Introduction

The status of the Division 3M redfish stock was summarized in 1977 by McKone and Parsons using the general production model as modified by Gulland (1961) to incorporate running averages of effort to better estimate the steady state. This analysis is an update using similar methods to include 1976 data.

Materials and Methods

Prior to 1971 vessels of 151-500 tons were used as the standard effort but since 1971 vessels >1,800 tons have been used as the standard effort by a conversion of 0.33. The total effort for each of those years was estimated in terms of days fished by the standard vessel tonnage category, irrespective of country, using methods to define redfish directed effort from other species outlined by McKone and Parsons (1977). Catch and effort data were compiled from the ICNAF Statistical Bulletin Vol. 26.

The Schaefer (1954) general production model as modified by Gulland (1961) was used to re-evaluate the Division 3M redfish stock taking into consideration data collected since 1971. Running averages of effort for periods of 6, 8 and 10 years were calculated as it best represented the number of years a year-class might be expected to contribute to the fishery. Least squares linear regression relating the catch per unit effort to mean effort was computed for each of the averaged periods (Fig.2).

Apart from length samples supplied by the Spanish observer program, which was under the direction of the Canadian Fisheries and Marine Service, only Canadian samples on lengths have been provided. All the length frequencies are from the commercial fleet but the Canadian samples are from both midwater and bottom trawl, while the Spanish data are from pair trawls.

Results and Discussion

High fluctuations in redfish landings have occurred over the years since the mid-1950's (Fig. 1). The most recent resurgence occurred in 1972 when the total landings increased from 8,000 m t to 42,000 m t. Since 1972, however, landings have decreased mainly because of quota regulations which have restricted the catch to 16,000 m t since 1975 (MSY for the stock). The total landings for 1976 were

16,998 m t, slightly higher than the TAC, but the fishery has changed from 1975 where 18% of the total fish landed was caught by midwater trawl to 70% in 1976. One of the major changes in the fishery is the result of Canada's increased landings from 659 m t in 1975 to 8,368 m t in 1976, of which 6,500 m t are from midwater trawl. Similarly, USSR has redirected its effort on redfish to midwater trawl from 2,400 m t in 1975 to 5,400 m t in 1976.

Even though the fishery for redfish in Division 3M has changed, the same effort standard was used in 1976 by assuming the standard vessels (>1,800 tons) fished as they have in previous years. Of the total fish landed by bottom trawl, the standard vessels caught about 50%. Effort and catch have followed the same trends (Fig. 1) with peaks and troughs occurring in the same years. From 1967 to 1971 effort remained relatively low (av. 1,000 days) but increased to 6,300 days in 1974 and declined under quota restriction to approximately 2,900 days in 1975-76.

Catch per day for redfish in Division 3M was almost zero in 1967 as were the total landings (Fig. 1). Since 1968, however, the catch per day increased from 3.29 tons per day to a high of 7.81 in 1972. By 1974 the catch per day declined to 5.48 tons per day and has remained relatively stable at 5.44 in 1975 and 5.92 in 1976.

Regressions of catch per unit effort on the mean effort during 1956-76 resulted in significant regression coefficients of 0.791, 0.828 and 0.897 for the 6, 8 and 10 year running averaged periods respectively (Fig. 2). The new parabola generated with the additional data has estimated an increase in the maximum sustainable yield (MSY) to 15,500 m t for the 8-year and 10-year periods and 16,500 m t for the 6-year period which is close to the 16,000 m t MSY suggested by Mari and Terre (1977) (Fig. 3). Thus, the total allowable catch set at 16,000 m t for 1977 and 1978 is near the estimated MSY points indicated by the yield curves calculated from the new regressions. The stock appears to be in good shape, however, as both the 1975 and 1976 points are essentially on the equilibrium curve.

An examination of Canadian commercial length frequencies indicates broad size range in 1977 which is similar to that found in previous years by McKone and Parsons (1977) (Fig. 4). The modal size of 31 cm for males and 32 cm for females appears to be the most commonly caught size class by both bottom and midwater trawl in 1977. The evidence of larger fish in each of the frequencies may reflect the presence of a mix of *marinus* and *mentella* species which is known to occur on Flemish Cap. Redfish taken as incidental catch by Spanish pair trawls fishing for cod appears to be of commercial sizes, 35-37 cm for males and 36-38 cm for females (Fig. 5). The catch rate, however, could not be calculated as the data were too scanty.

In conclusion, the equilibrium approximation method of fitting the general production curves indicates the stock might be in a relatively healthy condition as the points for 1975 and 1976 are essentially on the curves (Fig. 3). These findings do not preclude that the equilibrium approximation method only considers the effects of fishing on the fully recruited year-classes which are being exploited by the fishery. The model does not take into consideration variations in recruitment and we have no estimates of recruitment in 1977. Thus, it is difficult to set catch quotas each year and every attempt should be made to upgrade the data base so analytical models can be used. For these reasons, it is concluded that the TAC for the redfish on Flemish Cap should remain at 16,000 m.t. for 1979.

#### References

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- Schaefer, M. B. 1954. Some aspects of the dynamics of populations important to the management of the commercial marine fisheries. *Bull. Inter-Amer. Trop. Tuna Comm.* No. 1, p. 26/56.

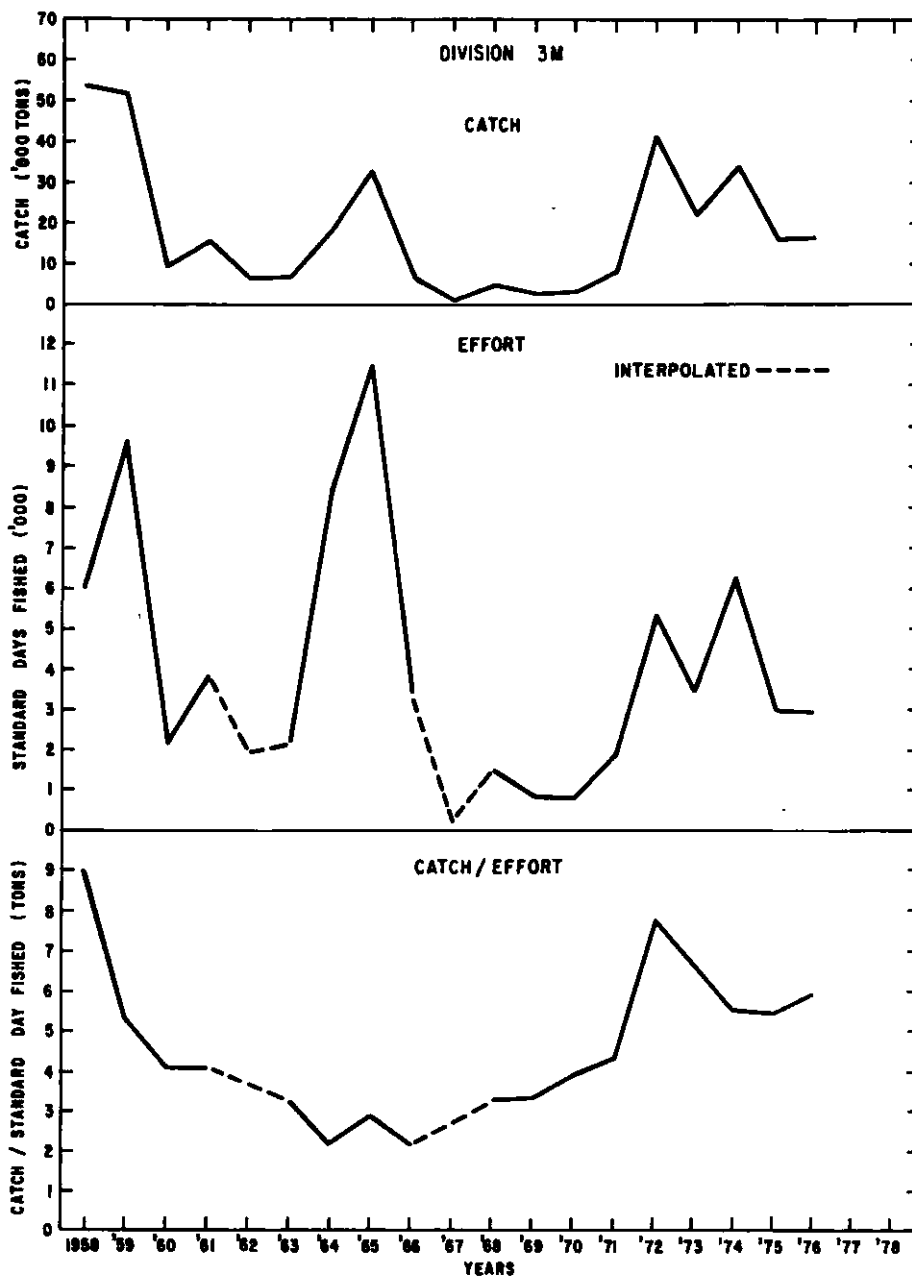


Fig. 1. Trends in nominal redfish catch, effort and catch per unit effort in standardized trawler units following the method of Parsons *et. al.* 1976 with 1973-1976 added for Div. 3M.

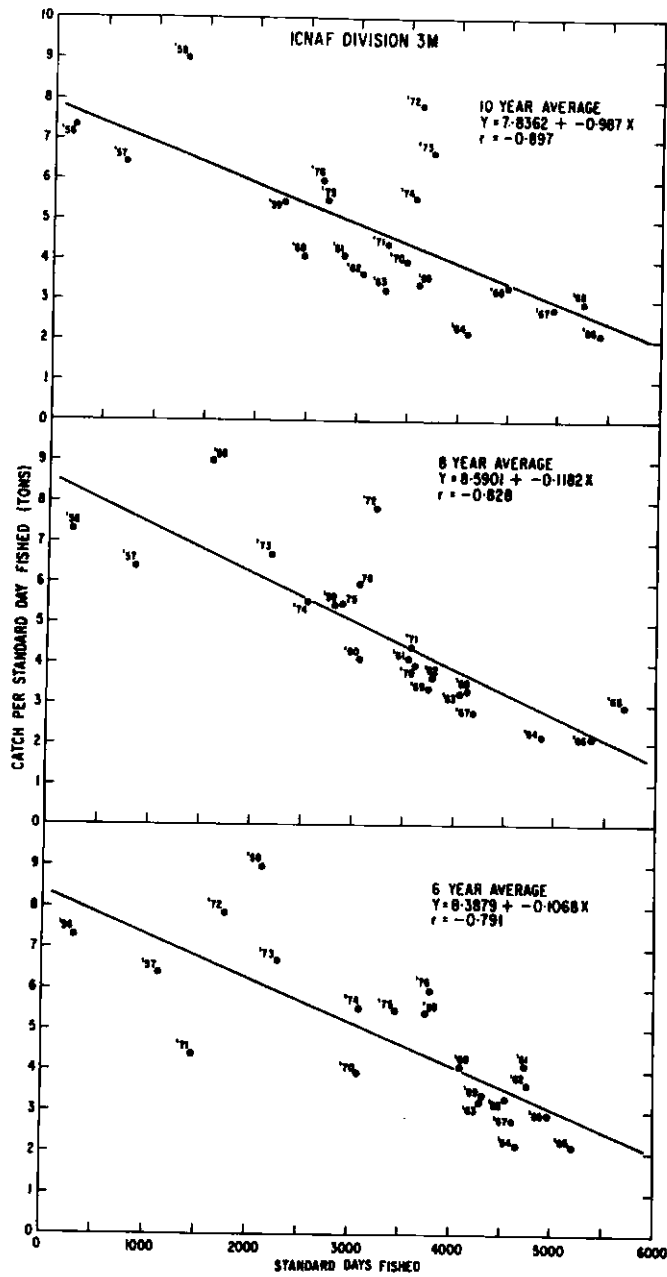


Fig. 2. Least squares fit of catch per standard day fished versus 6-year, 8-year and 10-year running averages of standard days fished for redfish in Division 3M.

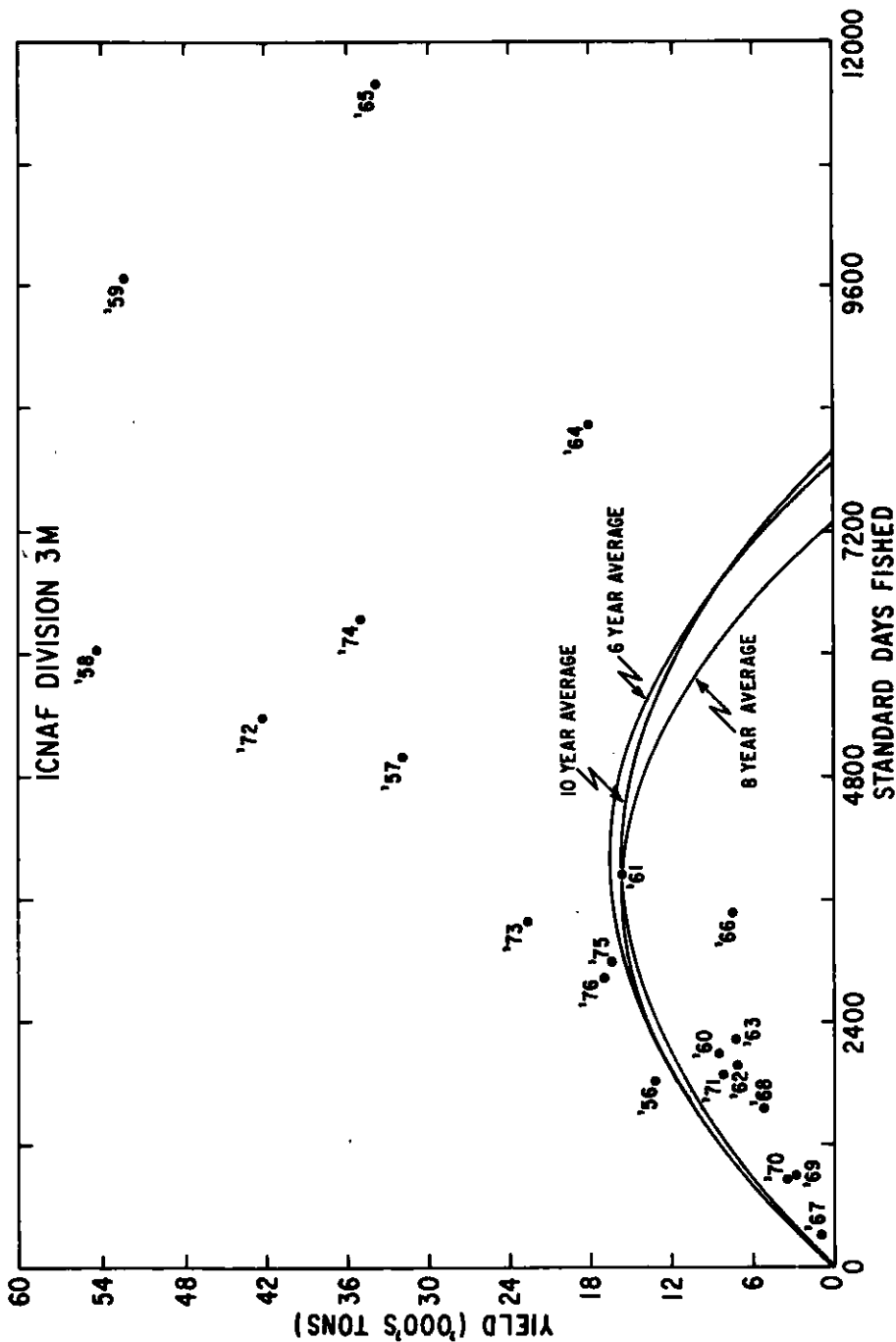


Fig. 3. Yield curve derived from catch per unit effort and effort using 6-year, 8-year and 10-year running averages of standard days fished for redfish in Division 3M.

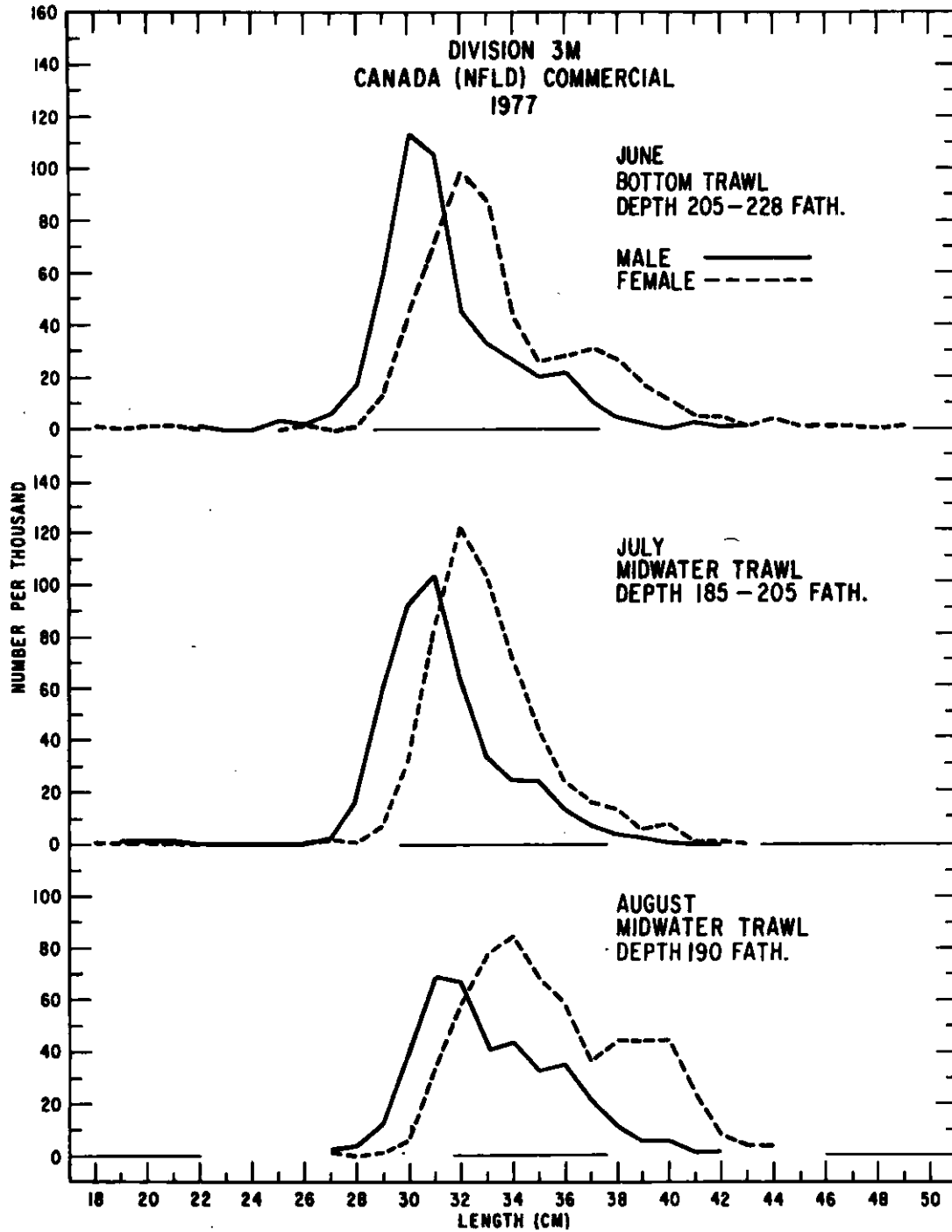


Fig. 4. Canadian commercial bottom and midwater trawl length frequencies for Division 3M.

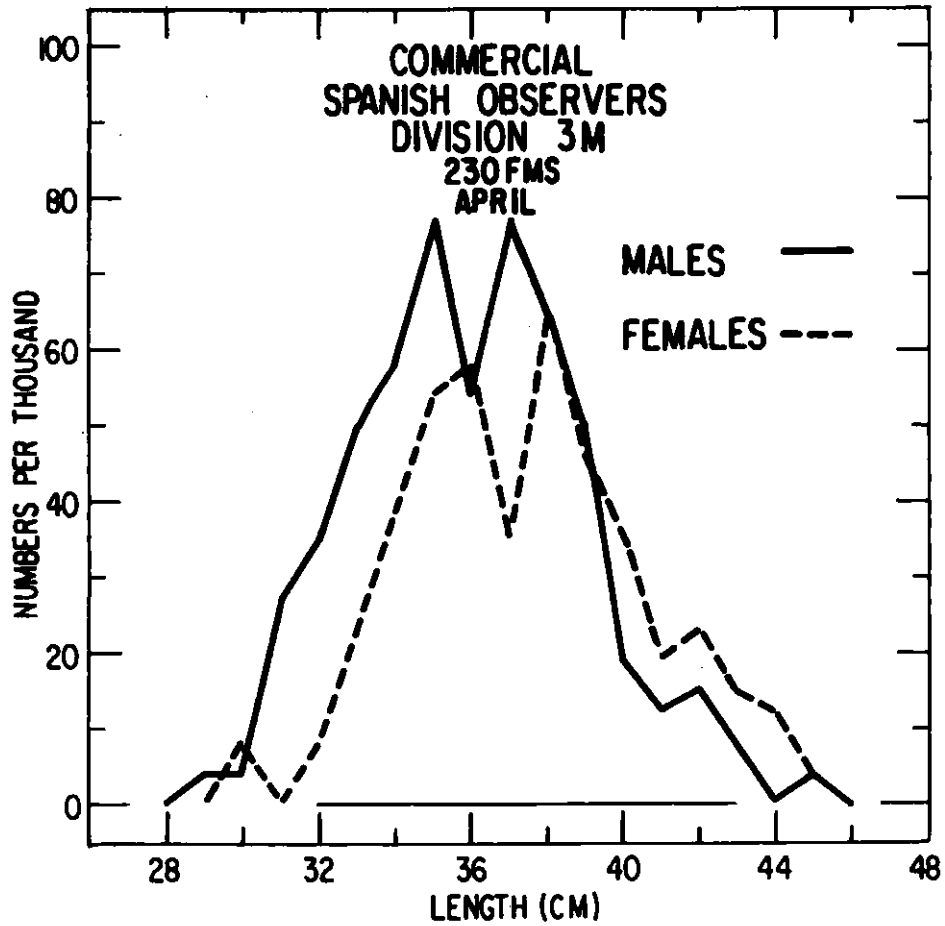


Fig. 5. Spanish commercial pair trawl length frequencies of redfish caught while fishing for cod in Division 3M.

