International Commission for ▢ the Northwest Atlantic Fisheries

ANNUAL MEETING – JUNE 1978

An update of Flemish Cap cod assessment

by

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Please change the scale of catch/day fished (tons) on the catch/effort portion of Fig. 1

to read 15, 20, 25, 30, 35, 40, 45 instead of 10, 15, 20, 25, 30, 35, 40.

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Abstract

    The state of the cod fishery in Division 3M (Flemish Cap) is assessed using a production model.
Values of 39,000 tons of maximum sustainable yield were obtained for the stock. Recent levels of cod
catches from their stock have been below the maximum sustainable yield level. The Flemish Cap cod fishery
was at a very low level during 1973-77.

Introduction

    The present paper gives an assessment of the cod fishery using a production model to obtain estimates
of sustainable yield at different exploitation levels. The most recent assessment of Division 3M cod was
made by Mari and Terré (1977) with data from 1957 to 1975.

Materials and Methods

    Since 1956, approximately, different countries, members of ICNAF, have operated on the Flemish Cap
ground, fishing the predominant species in the division and among them the cod.

    Catch and effort data were obtained from the ICNAF Statistical Bulletin for the 1956-1976 period,
broken down by country, month and vessel tonnage class.

    In some cases there were no data on hours fished or days fished in the Statistical Bulletin with the
consequent loss of useful information. To overcome this problem, the conversion factors estimated by Mari
and Terré (1977) were used.

    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. The
analysis of the data showed that vessels over 1800 tons, fished more frequently in the years 1957, 1960-62,
1965, 1970, 1975 and 1976, while in the intervening years fishing activity was practically constant but
also considerable. For each of the tonnage class the conversion factor found by Mari and Terré (1977)
was used.

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

    To take into account the appreciable increase in fishing efficiency, a factor described by Brennan *et
al* (1975) was applied to correct the fishing effort with changes in efficiency. The catch per unit of
adjusted effort was then computed with the new values found.

Trends in Catch, Effort and Catch per Unit Effort

    The cod fishery in the Flemish Cap grounds reached significant proportions in 1957 when a total catch
of 17,800 tons was reported by the vessels fishing on the grounds. The catch reached its maximum in 1965
when more than 60,000 tons were taken (Fig. 1). There was another high value of 57,000 tons in 1972, which
decreased to values between 22,000-25,000 tons after the 1973-1975 period.

The two maxima in fishing effort in 1964 and 1972 had values of standard days fished for vessels over 1800 tons of 3085 and 3872 days fished respectively, in agreement with catch peaks observed in the historical series. In the years analyzed from the "70" decade, the fishing effort in standard days fished ranged from 1240 to 3872.

The catch per unit effort was highest in 1963 and 1969 at 37.3 and 35.1 tons per day fished and its lowest value was not preceded by a maximum in fishing effort.

Yield - Effort - Relationship

The Schaefer (1954) production model which assumes an equilibrium state in the fishery, was applied using the modification of Gulland (1961). This modification consists in averaging the fishing effort over a series of years equal to the number of fully recruited year-classes in the fishery, because in practice the fisheries are established and developed in conditions far from equilibrium due to changes in the level of fishing effort and particular conditions of each exploited fish stock.

The linear regression technique was used to relate the catch per days fished and 3, 4 and 5 year running averages of standard days fished for the cod in Division 3M (Fig. 2). The parameters of the above-mentioned regressions were converted to those of the equilibrium yield versus effort curves which are depicted in Fig. 3. The results of these computations are shown in Table 1.

Table 1. MSY catch and effort for cod based on different averaging periods and 3% increase in efficiency giving the best correlation (r) of CPUE versus effort (Standard days fished).

Averaging Period (yrs)	MSY Catch	MSY Effort	CPUE (tons/day)	r
3	39720	1600	26.5	0.69
4	38558	1300	29.7	0.75
5	37050	1300	28.5	0.69

Results and Discussion

The catch values for the last four years used in this paper have not been very close to the theoretical equilibrium values predicted by the model used, and with the exception of 1972 no values have been over the curves in the last six years.

The highest correlation coefficient (r = 0.75) for the models used was obtained for the case of 4 year running averages using 3% of increment in efficiency.

Taking into account the behaviour of the catch per standard days fished, standard effort and catch during the last four years, it would seem that a TAC of between 20-25,000 tons would not affect the rebuilding of the stock in Division 3M.

References

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GULLAND, J. A. 1961. Fishing and the stocks of fish at Iceland. Fish. Invest. Lond. (2), 23 (4): 52 p.

MARI, A., and J. J. TERRÉ. 1977. An evaluation of the status of Flemish Cap cod fishery. ICNAF Res. Doc. 77/VI/28, Serial No. 5053.

SCHAEFER, M. B. 1954. Some aspects of the dynamics of population important to the managements of the commercial marine fisheries. Bull. Inter-Amer. Trap. Tuna. Comm., No. 1, p. 26-56.
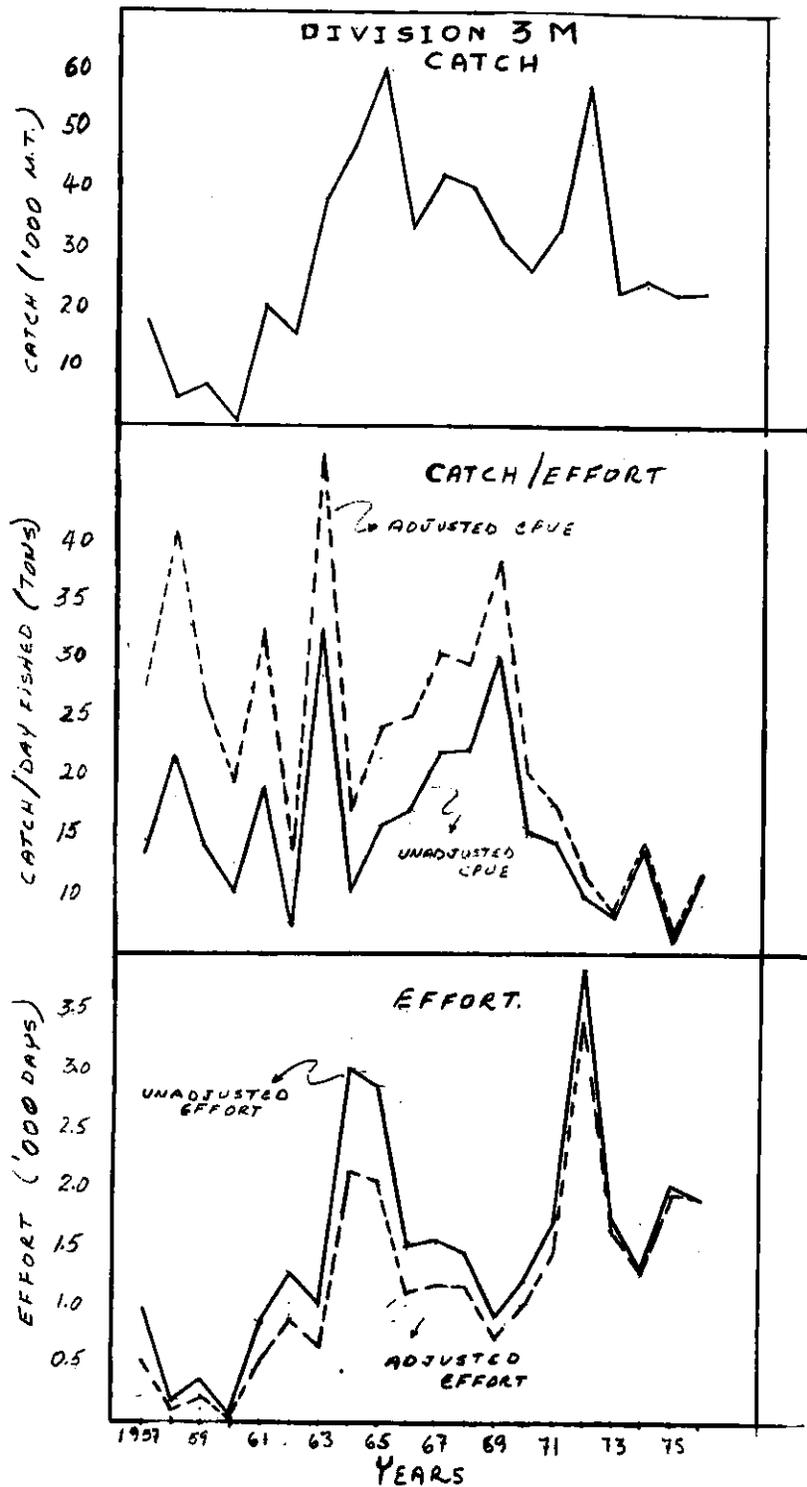
Fig. 1.   Trends in nominal catches, effort, and catch per unit
effort in standard trawler units - vessels of tonnage
class 7 - for cod in Div. 3M during 1957-75.   Broken
lines represent the effort and catch-per-unit-effort
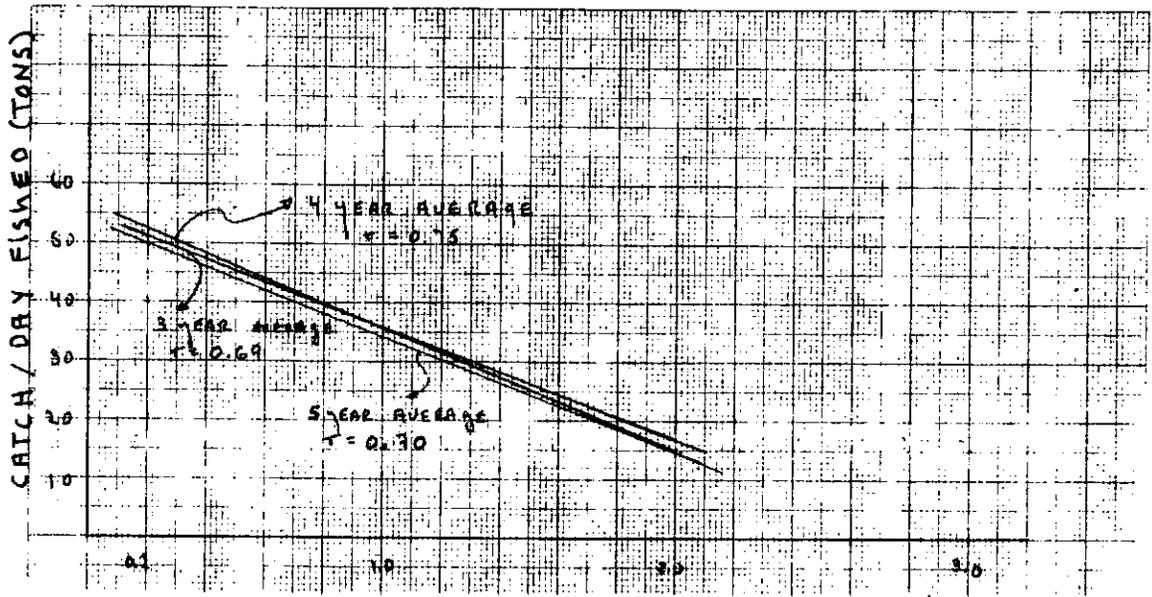adjusted for an efficiency factor K = -0.03.

Fig. 2. Relation between standardized catch per day fished and 3, 4 and 5
year running averages of standard days fished - cod - Div. 3M.
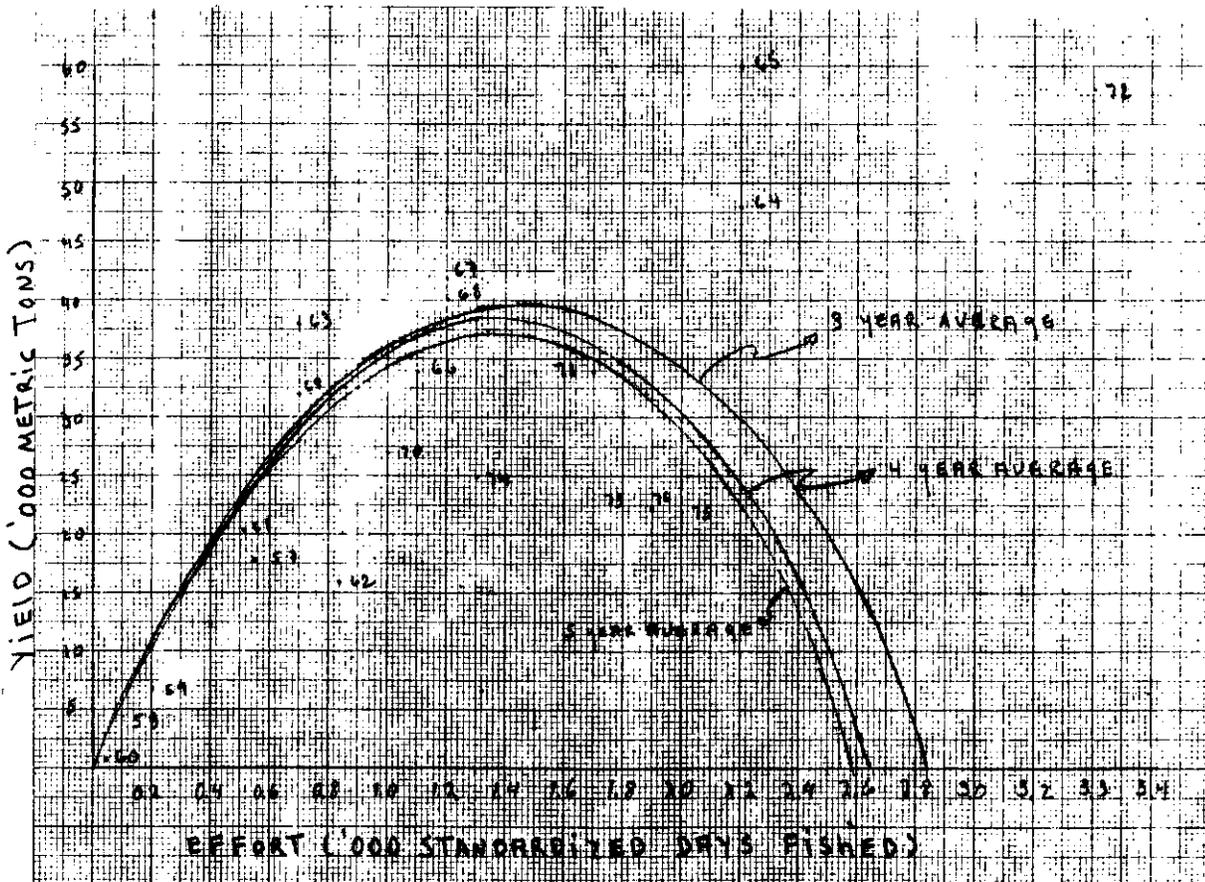

Fig. 3. Yield curves derived from the catch-per-unit-effort/effort relation for Div. 3M cod.