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General production assessment of the cod stock in ICNAF Division 3M

by

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Introduction

The most recent cod assessment in Div. 3M (ICNAF) was that of Wells (1973), using data from the 60's. At the 1973 ICNAF Meeting the recommended TAC was based on an estimate of long-term average yield (MSY). The purpose of this paper is to assess the cod using existing data to 1974.

Materials and Methods

Portugal and Spain catch and effort data were found to have the most consistent fisheries activities in Div. 3M and were selected as the standard for estimation of the total effective effort. These data were taken from the Statistical Bulletin and Summary Documents.

A conversion factor was estimated for both fleets in the last three years when the gross tonnage was changed in the statistical data collection.

The models applied were the general production models of Fox (1970), Schaefer (1957), with Gulland's (1961, 1969) modification and the Gulland's trace.

These simple models always implicate the treatment of data of CPUE vs effort throughout the fishery life. This line or curve represents the equilibrium locus of fishing effort and CPUE, or the stock biomass when it is assumed as proportional to the abundance index.

Results and Discussion

During the period 1963-1974 cod catches in Div. 3M oscillated within 23,109 and 60,313 metric tons, reaching the highest levels in 1965 and 1972 (Fig. 1). This figure represents the CPUE expressed in tons per day fished for the combined data of Portuguese and Spanish fleets in the 901-1800 gross tonnage category.

For the last three years these data were reported in the 1000-1999.9 gross tonnage category by the two countries, so it was necessary to find a conversion factor (C.F. = 0.92).

In the above figure there is a definite trend in catch, standardized efforts and CPUE. This trend is caused by the increasing efforts, which yielded higher catches and a lower CPUE, around 1965. Later on, there was some stability in effort and CPUE with a decreasing trend in catch up to 1970. At the beginning of the 70's, catches increased considerably again by increasing the effort, but kept much the same in CPUE, and in 1974 catch and CPUE increased still further together with a lowering of effort levels.

The results of the models applied, together with the conversion factor used are shown in Table 1. The plotting of Schaefer's and Fox's curves are shown in Fig. 2 and 3.

It was observed that the best correlation coefficients (r) were those of the running 4 years, being the CPUE computed in levels similar to the last year for both fleets.

In Gulland's trace (Fig. 4) the CPUE and effort of the running 4 years average for them gave the best plotting equilibrium CPUE curve.

In all the average years were obtained approximate (MSY) values of 40,000 tons (Table 1).

Optimum efforts oscillated within 1,790 and 3,066 days fished and optimum CPUE within 13.8 and 22.3 tons per day fished. For the running 3 years the correlation coefficient was the smallest and gave the most illogical results. Taking the 4 years averaged the most realistic values we can place the MSY at approximately 40,000 tons per year.

References

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Table 1. Summary of determined parameters of the General Production Model.

| Methods | Years (\bar{y}) | (r) | (MSY) MT | f(opt) Days fished | CPUE (opt) Tons per day fished | (CF) |
|-----------------|------------------------|------|-------------|-----------------------|--------------------------------------|------|
| Schaefer | 3 | 0.63 | 43,550 | 2,840 | 15.3 | 0.92 |
| | 4 | 0.70 | 41,110 | 2,370 | 17.3 | 0.92 |
| | 5 | 0.68 | 40,500 | 2,200 | 18.3 | 0.92 |
| | 6 | 0.66 | 40,510 | 2,030 | 19.8 | 0.92 |
| Fox | 3 | 0.67 | 42,200 | 3,060 | 13.8 | 0.92 |
| | 4 | 0.73 | 39,780 | 2,340 | 17.0 | 0.92 |
| | 5 | 0.70 | 39,330 | 2,130 | 18.4 | 0.92 |
| | 6 | 0.69 | 39,980 | 1,790 | 22.3 | 0.92 |
| Gulland's Trace | 4 | - | 39,100 | 2,400 | 16.1 | - |

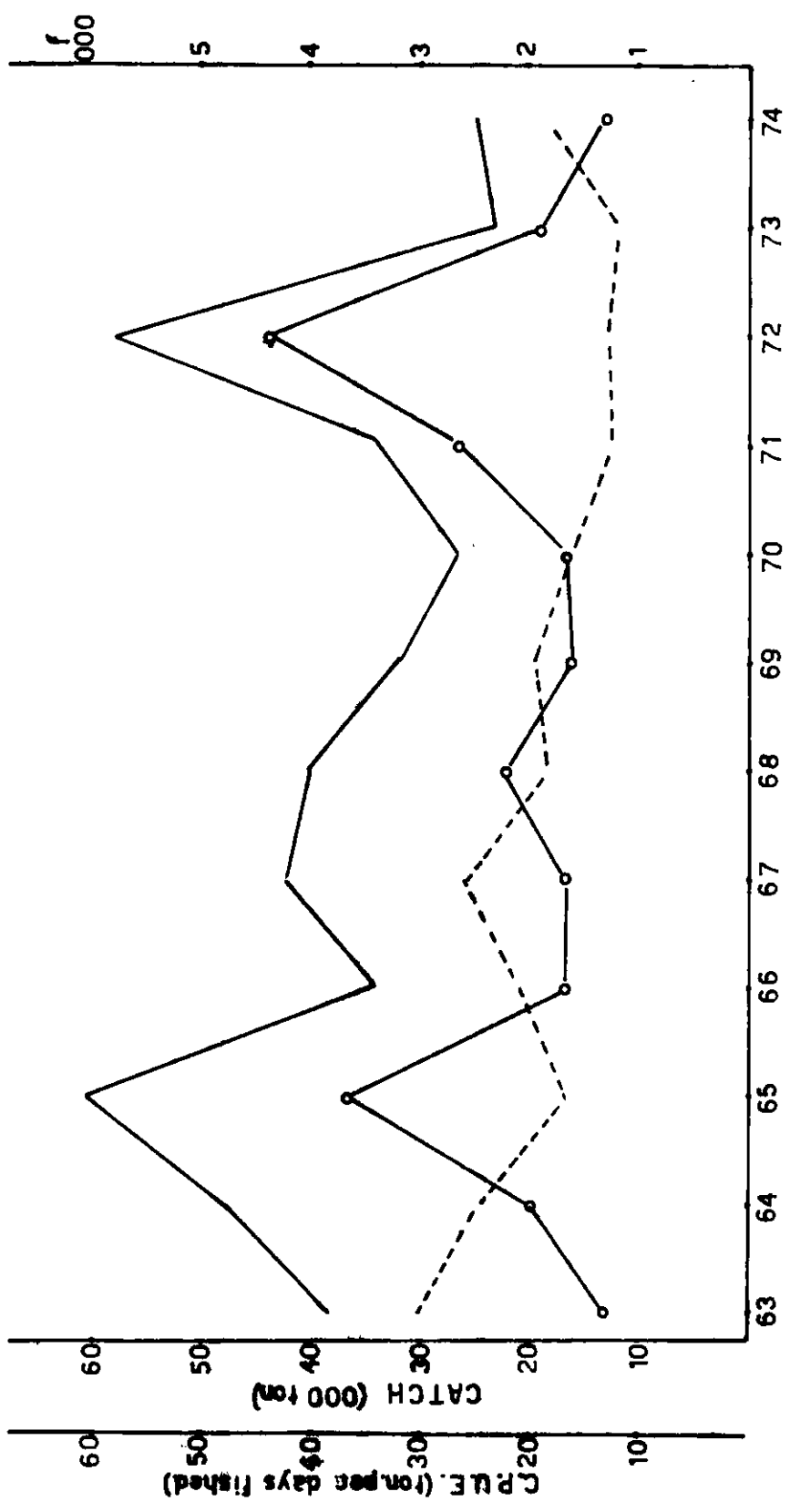


FIG. 1. Catches, Effort (f) and C.P.U.E. during the period.

— Catches
—o— Effort
--- C.P.U.E

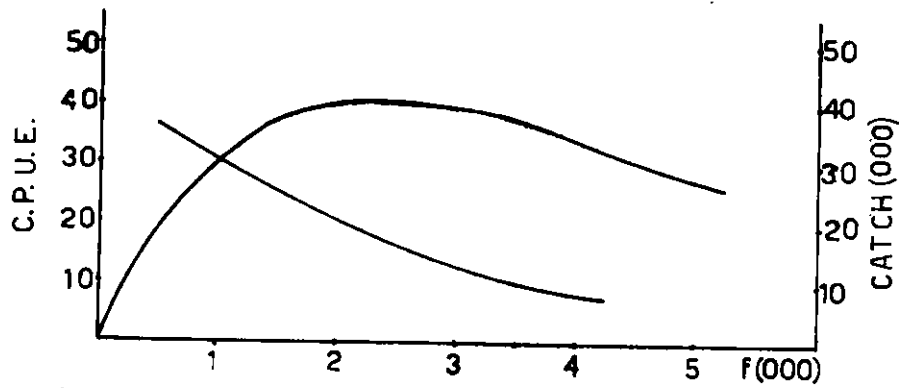


FIG. 3. Catches (000MT), effort (days fished) and C.P.U.E. (MT per days fished).

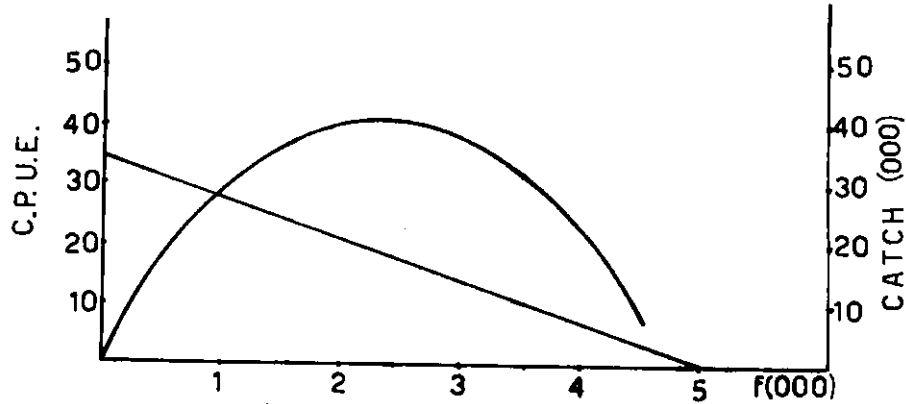


FIG. 2. Catches (000MT) effort (days fished) and C.P.U.E. (MT per days fished).

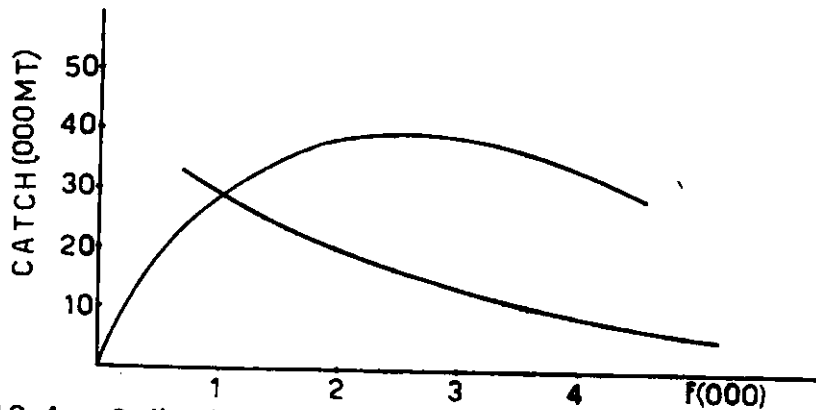


FIG. 4 Gulland's Trace 4 years average for the COD (Div.3M)