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Update of the Cod Stock Assessment for Divisions 3NO

by

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INTRODUCTION

Cod catches in 3NO have varied drastically between 1954 and 1977 from a high of 226,784 tons in 1967 to a low of 17,576 tons in 1977. The Spanish fleet has been the most persistent in the area, with their most common vessel being the pair-trawler. A general production model was used to evaluate the status of the stock.

METHOD

Practically all of the catch effort data available was used by applying a standardization technique similar to the one used for the 3M cod stock. The only difference was that an additional category of "power factors" was used to take into account the division differences, if any. The standardized effort data with the total catch statistics were used in the PRODFIT computer program (Fox, 1975) to obtain a yield curve. Various values for m were explored in the formula

$$C/f = (a + bf)^{\frac{1}{m-1}}$$

RESULTS

The results of the standardization technique showed that the Spanish pair trawls were among the most "powerful" fishing operators (see Table 1). The large Romanian and Bulgarian otter trawls were not as efficient as one might expect for vessels of that tonnage class. This may be due to their unfamiliarity with the area. The Portuguese dory vessel power was low but that is due to effort being measured in dory hours. The fishery in this area does not show a marked seasonality in catch rates as can be seen by the "powers" for the months. The two divisions did not have significantly different catch-rates, so they were grouped together. The regression from which the "power factors" were obtained was highly significant ($p<0.001$) with a multiple correlation of $R = 0.87$.

Figure 1 shows the standardized catch-rate and the Spanish pair-trawl tonnage class 4 catch-rate for 1960-1976. The agreement is very close and the correlation between the two catch-rates is $R = 0.97$.

Use of $m = 5$ in the PRODFIT model gave the most satisfactory fit to the data (See Fig. 2). The MSY obtained from this analysis was 104,768 tons with an error index of 6.9%. The yield at 2/3 effort MSY is approximately 85,000 tons.

The results obtained by using $m = 2$ i.e.: typical Shaeffer curve, were an MSY of 104,868 tons with an error index of 13.7% (see Fig. 3).

CONCLUSIONS

Recent catch-rates have been lower than optimum and indicate that the stock may be depressed. The particular yield curve which fits the data best has a steep right arm, warning that sustained high efforts could lead to very abrupt changes in the catch.

The preliminary standardized catch-rate for 1978 (obtained from foreign fleet observations, FLASH reports, and Newfoundland catch-effort data) was 0.17 tons/hour, lower than ever before (see Fig.2). This would indicate that there may be a danger in increasing or even sustaining current fishing intensity.

REFERENCE

Fox, W. W. 1975. Fitting the generalized stock production model by least squares and equilibrium approximation. Fish. Bul. 73(1): 23-36.

Table 1. Power factors of the country-gear categories and months obtained from a multiplicative model for catch rate.

Country-gear-tonnage			Power factor	Month	Power factor
Canada	OT	150-499		Jan-Mar	
Spain	PT	150-499		Jun-Aug	1.00
Spain	PT	500-999		Nov-Dec	
Spain	PT	1000-1999	1.58		
Portugal	OT	1000-1999			
Portugal	OT	2000+			
USSR	OT	2000+			
Spain	OT	1000-1999			
Bulgaria	OT	2000+		Apr-May	
Canada	OT	50-149		Sep-Oct	0.89
Canada	OT	150-499			
Canada	OT	500-999			
France	OT	1000-1999			
Iceland	OT	500-999			
Romania	OT	2000+	0.72		
UK	OT	500-999			
UK	OT	1000-1999			
USSR	OT	500-999			
USSR	OT	1000-1999			
Norway	LL	500-999			
USSR	OT	150-499	0.15		
Portugal	DV	150-499			
Portugal	DV	500-999	0.055		
Portugal	DV	1000-1999			

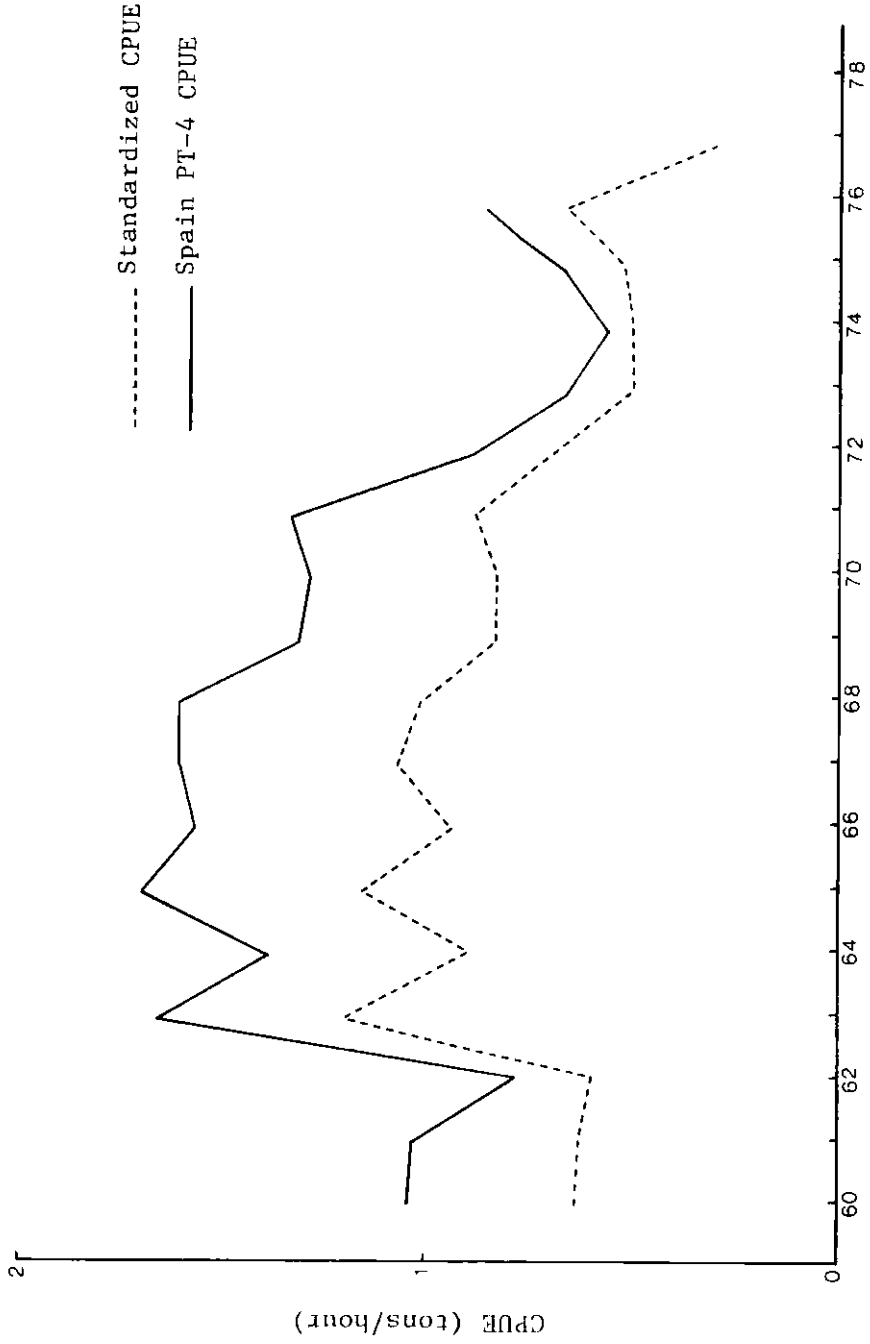

Fig. 1. Comparison of standardized catch-rate with catch-rate for Spanish pair trawlers of tonnage class 4.

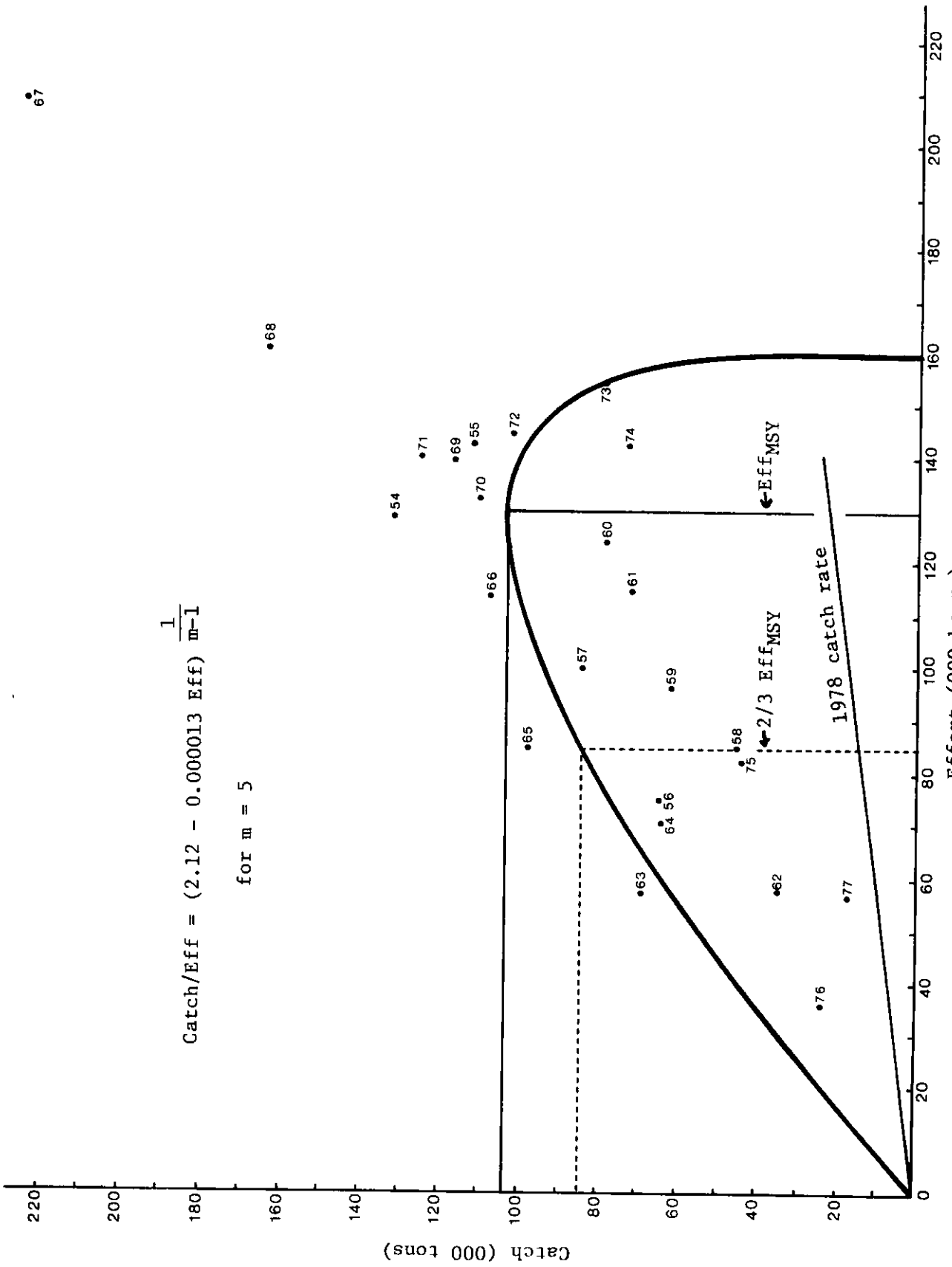

Fig. 2. Yield curve for Divisions 3NO cod with M = 5.

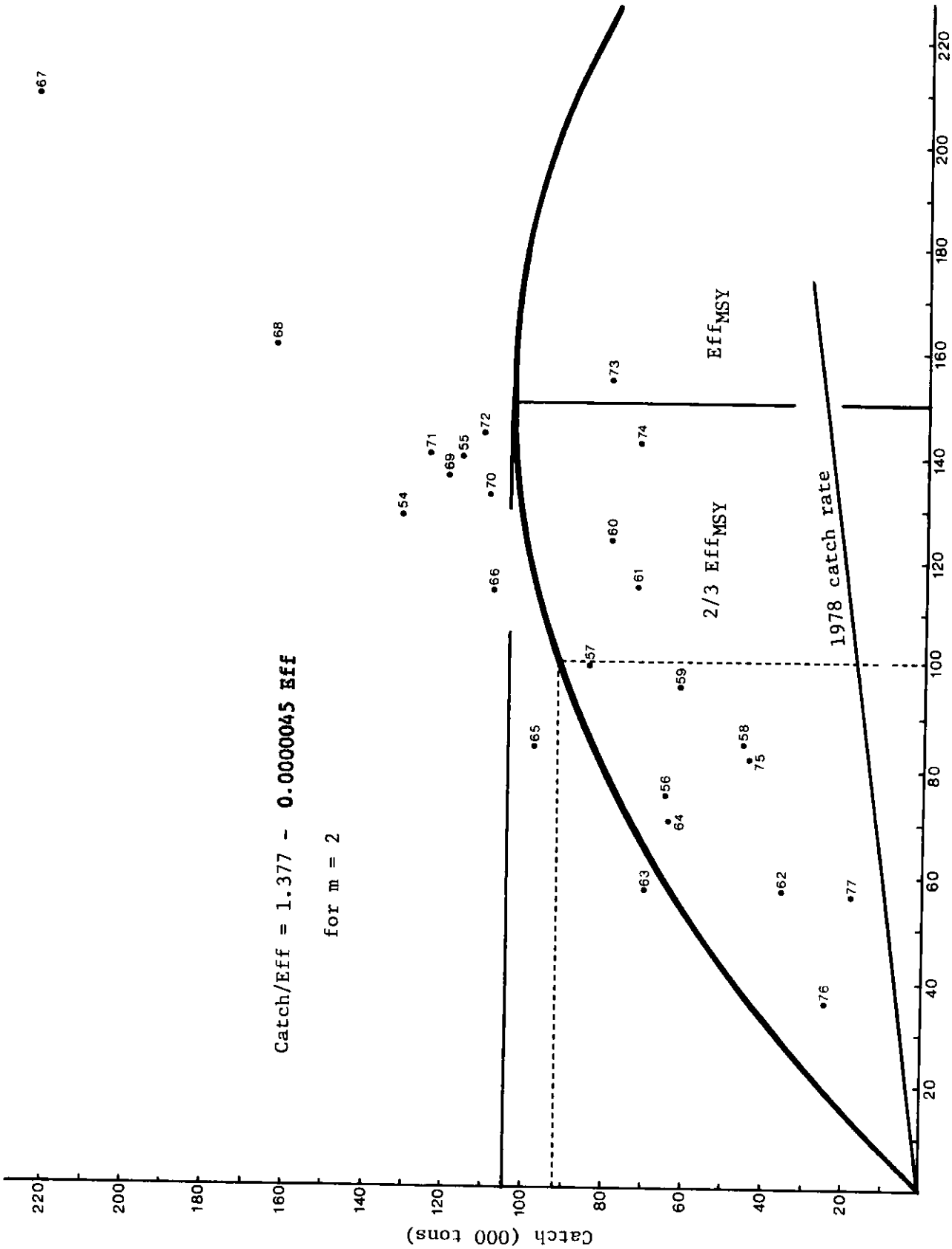

Fig. 3. Yield curve for Divisions 3NO cod with M = 2.