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An Update of the Assessment of American Plaice from ICNAF Subarea 2 and Division 3K

by

T. K. Pitt

Dept. of Fisheries and Environment
Fisheries and Marine Service
Research and Resource Services
St. John's, Newfoundland

Introduction

A Total Allowable Catch from the stock of 8,000 tons was recommended at the 1974 mid-year Assessments Meeting on the basis of average catches for 1968-77. This was accepted by the Commission but did not include approximately 1,500 tons for Canadian inshore landings.

At the 1974 Annual Assessment Subcommittee Meeting an assessment (Pitt 1974) indicated that the average level of total mortality (1964-71) calculated from Polish offshore research data and a combination of Canadian research and inshore gill net data, was close to the $F_{0.1}$ level. This suggested a TAC of 8,000 tons for 1975, including the Canadian inshore catch. It remained at that level in 1976 and 1977.

Materials and Methods

The principle difficulty in assessing this stock is the fact that very little sampling data are available for the otter trawler component of this fishery. This component includes a very substantial proportion of total landings which, at least up to 1976, has been taken almost entirely by the European fleet, principally the USSR (Table 1). The Canadian catch has been almost entirely by gill nets and, as indicated in Figs. 1 and 2, this gear takes older and larger fish than the otter trawl.

The 1976 data from otter trawlers were collected from a commercial trawler chartered by the Fisheries and Marine Service, Canada Department of Environment in November 1976. Standard commercial gear was used with instructions for the vessel to fish in a normal manner, but to cover as much of the probable flatfish areas as possible in Divisions 2J and 3K. The inshore gill net fishery has been sampled annually since 1971 (Fig. 1). A comparison of gill net and otter trawler length frequencies are given in Fig. 2.

Numbers caught at age were calculated using age-length keys for both gears and applied to the respective components (gill nets and otter trawls) of the nominal catch for 1976. These values were used to construct catch curves and calculate total mortality values (Z) (Fig. 3).

Beverton and Holt yield per recruit model was applied to males and females separately using the following parameters

		Males	Females
M	(natural mortality)	0.20 & 0.25	0.15 & 0.20
W_∞	(asymptotic wt)	1.86 kg	3.29 kg
K	(rate of completion of growth curve)	0.14	0.11
t_o	(growth correction factor)	1.77	2.61
t_p	(age of entry into exploited area)	4 yr.	4 yr.
t_p	(age of entry into exploited phase)]	6.87 yr.	8.46 yr.
t_λ	(last age of significant contribution)	14 yr.	20 yr.

Two levels of natural mortality (M) were used for the yield-per-recruit curves (Fig.). However, estimates of M for the Division 3LNØ stock (Pitt 1973) indicate M to be 0.20 and 0.25 for females and males, respectively.

Two different total mortality calculations (Z) were made (Fig. 4) for both males and females. The higher values of Z (M=0.89 for males and M=0.62 for females) probably reflect the selectivity of the gill net segment of the fishery, whereas the lower values (M=0.56 and 0.46 for males and females, respectively) are perhaps more representative of the total stock.

Discussion

The bimodal nature of the catch curves apparently results from the different selectivity pattern of the two gears. Additionally the gill net fishery is confined exclusively to the Notre Dame Bay region of Division 3K and the otter trawler samples were taken from offshore localities to the edge of the shelf and northward into Division 2J. Differences in age composition of the two gears are indicated in Fig. 1. Another difficulty with these catch curves is the fact that a single year's data only are included here and the effects of year classes of relatively different strength could influence the shape of the curve.

The 1974 assessment (Pitt 1974) indicated average fishing mortality values (F) for 1962-71 of approximately 0.4 and 0.3 for males and females respectively. These were just below the $F_{0.1}$ level. The values calculated from the 1976 data (Fig. 3) were approximately at $F_{0.1}$ for the 8-14 age-groups for males and 8-21 age-groups for females and at higher levels for the older age combinations (Fig. 3) reflecting catches averaging around 6,000 tons. The TAC of 8,000 tons has not been taken since the fishery was regulated in 1974 mainly because the Canadian allocations of 3,500 tons (including inshore landings) were not taken. This was because there was no fishing for this stock by the otter trawler fleet and a combination of poor catch rates and adverse ice conditions apparently reduced the gill net landings. However, even with catches below the recommended TAC, F values were around the $F_{0.1}$ level (Fig. 4). This would seem to suggest that probably 8,000 tons is too high a removal level for this stock.

REFERENCES

Pitt, T.K., 1973. Assessment of American plaice stocks on the Grand Bank ICNAF Divisions 3L and 3N. Bul. Int. Com. NW Atl. No. 10 P63-77.

Pitt, T.K., 1974. Assessment of American plaice Subarea 2 and Divisions 3K ICNAF Res. Doc. 74/69 Ser. No. 3299.

Table 1. Nominal Catches, American Plaice, ICNAF Subarea 2 - Division 3K 1965-76

YEAR	CAN	FRG	GDR	POL	POR	USSR	UK	OTHER	TOTAL
1965	224	-	-	3195	-	2155	14	-	5588
1966	228	-	-	1860	-	765	96	-	2949
1967	395	-	199	1134	-	1701	162	-	3591
1968	1023	-	38	1889	-	2911	90	-	5951
1969	1689	-	214	867	-	4129	-	3	6902
1970	3751	-	104	378	-	8160	-	-	12686
1971	2486	-	19	233	-	2597	2	-	5348
1972	1197	4	169	849	-	6760	42	-	9123
1973	1384	70	138	225	-	3011	76	-	5140
1974	568	223	24	91	-	4643	61	-	5610
1975	859	-	29	95	305	4449	11	1	5662
1976*	782	-	23	118	-	4073	-	26	5027

*Preliminary

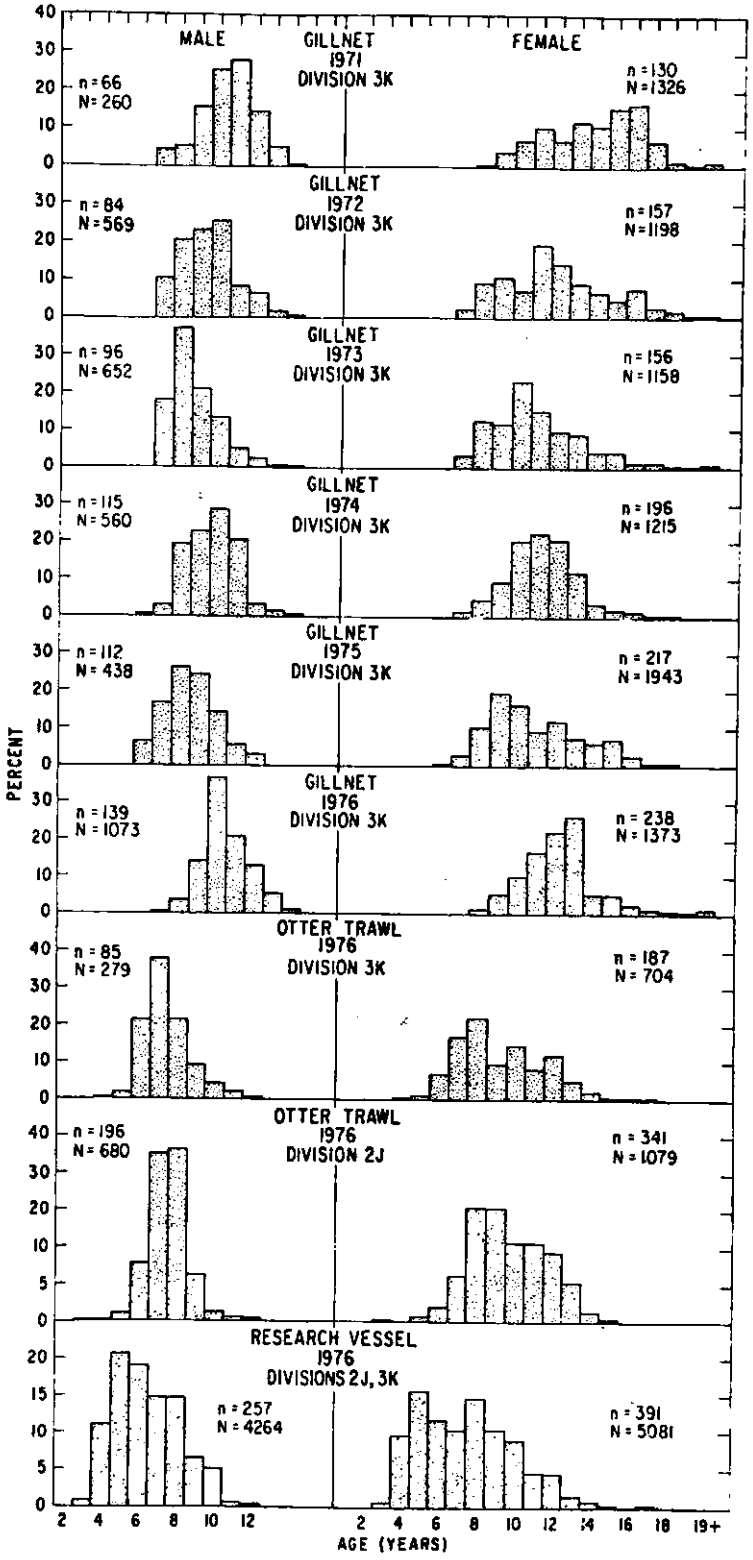

Fig. 1. Age distribution of American plaice for ICNAF Subarea 2 - Division 3K from Canada Commercial Catches 1971-76 and research vessel data 1976. For 1971 to 1975 gill net data only were available (n = number of fish aged. N = number measured).

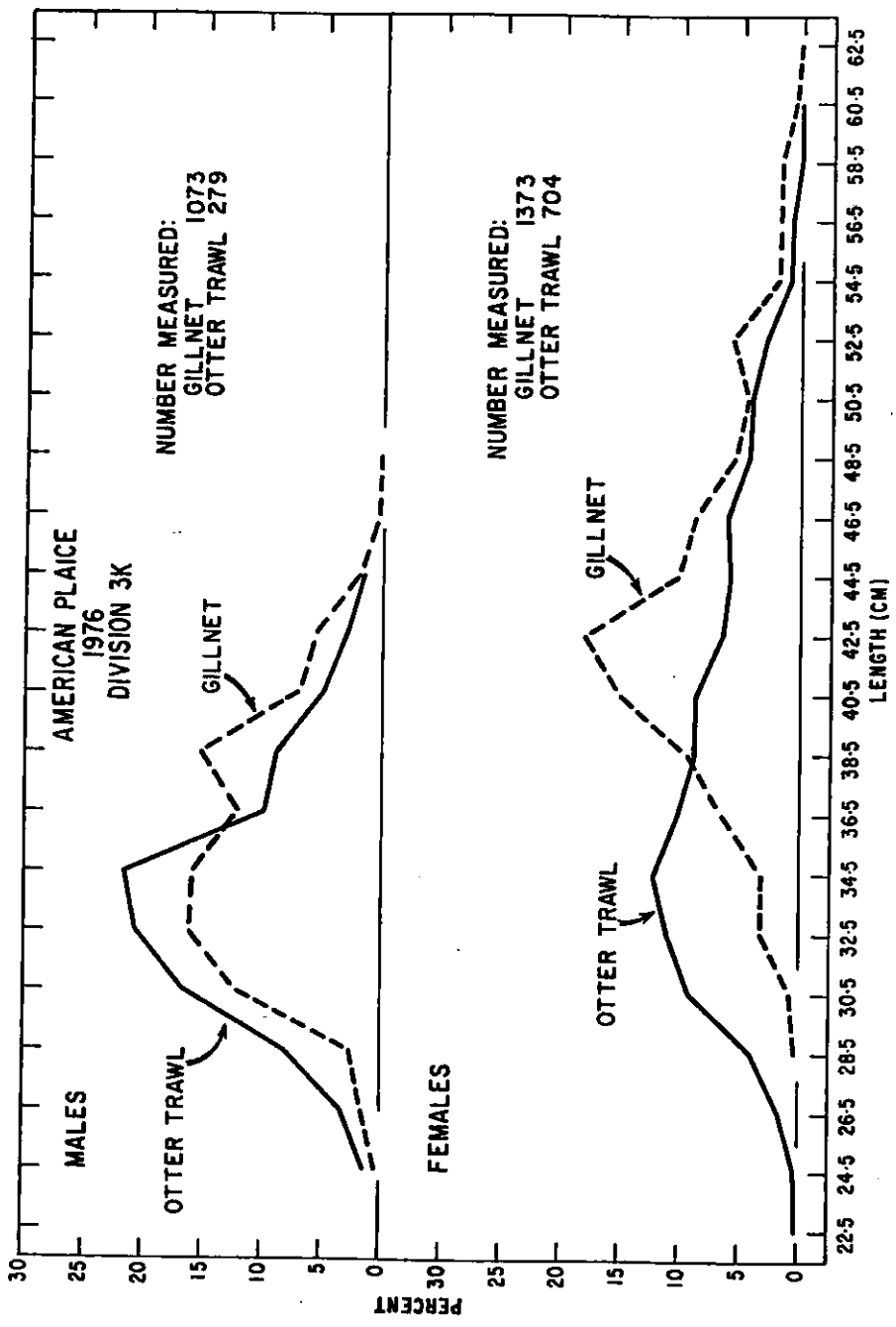

Fig. 2. Comparison of length figures of American plaice for gill nets and otter trawler Division 3K 1976

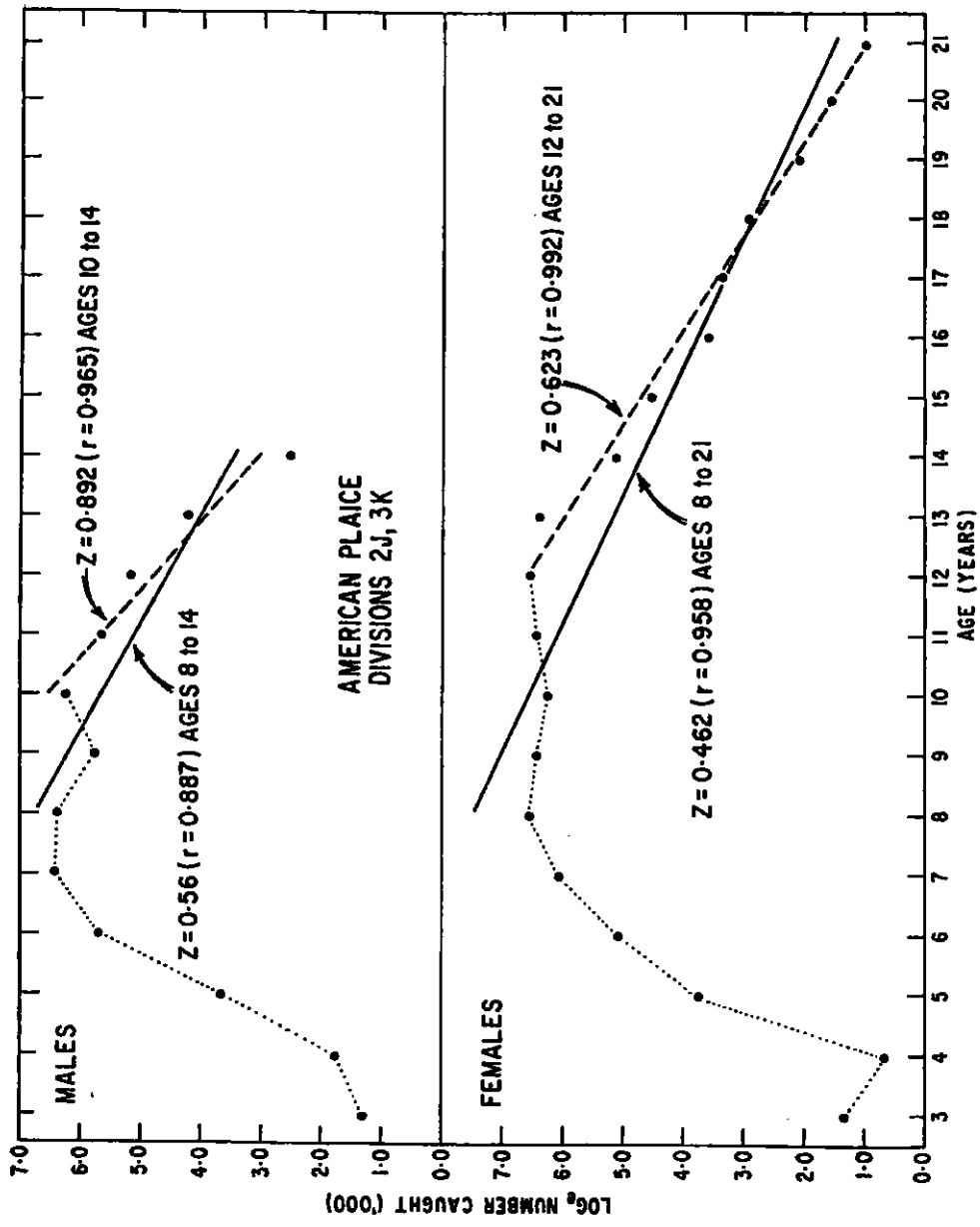

Fig. 3. Catch curves and estimates of Z from numbers caught at age from combined gill net and otter trawler data 1976.

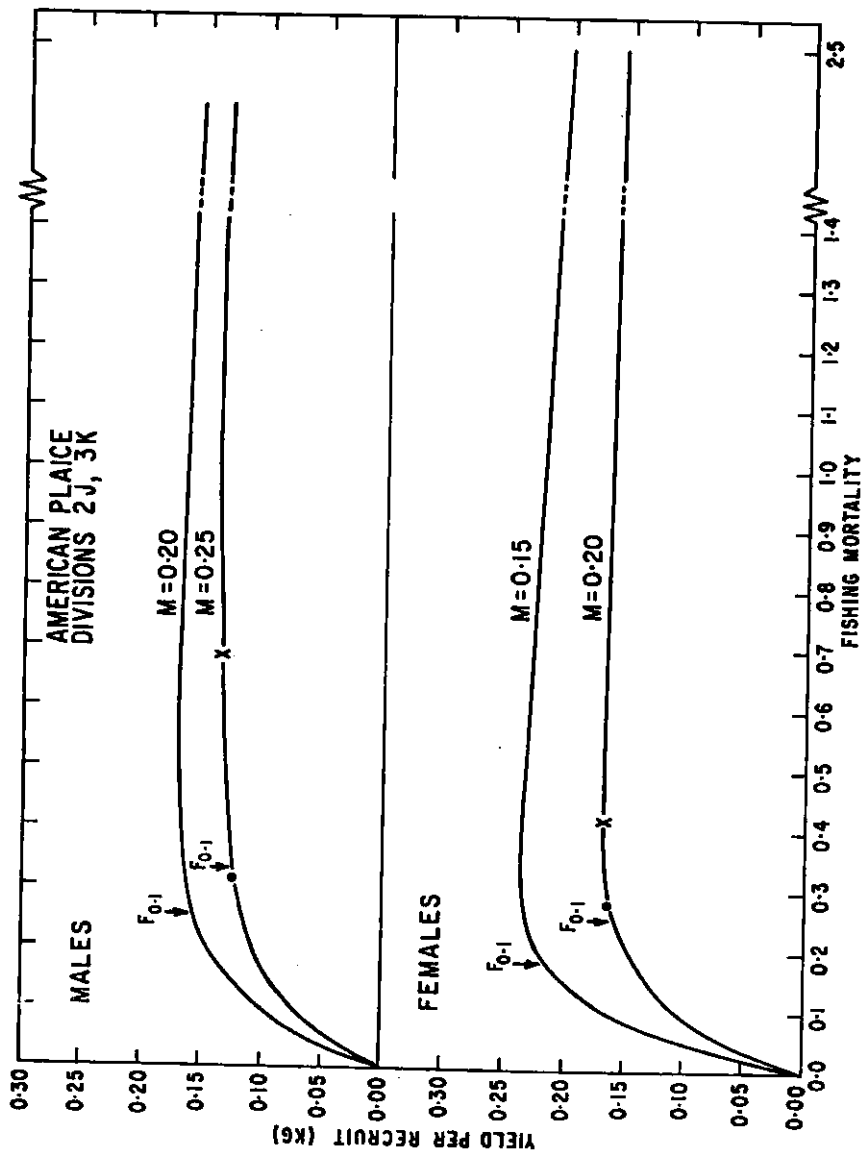

Fig. 4. Yield per recruit curves for male and female plaice. ( ) indicates F values for ages 8-14 for males and 8-21 for females (Fig. 3). (X) indicates F values for ages 10-14 and 12-21 for males and females respectively.