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Assessment of American plaice from  
Subarea 2 and Division 3K

by

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Introduction

For management purposes plaice from Subarea 2 and Division 3K are considered as a single stock, since there is no evidence of migration between Division 3K and the Grand Bank (3LN0) at least at the adult stage. At the 1974 Mid-year Meeting a TAC of 8000 tons was recommended by the scientific advisers based on the average catch 1968-72 (Res. Doc. 74/3). This was accepted by the Commission, but it does not include Canadian inshore catch of 1500 tons.

Material and Methods

The Canadian fishery for this stock is conducted almost entirely by gill nets (160-200 mm) and this is practically the only source at present of biological samples from which to determine the age structure of the commercial fishery. The European fleet fish this stock using otter trawls, but the only available data at present are unsexed length frequencies and a small group of age frequencies from research catches by Poland for 1972.

A comparison of the gill net length frequencies with those from Canadian research vessel catches (Fig. 1) indicated that plaice from the latter catches, after applying a 130 mm selection curve, were not too different from the gill net data for the fully recruited fish. Furthermore, a comparison with Canadian commercial otter trawler frequencies for the extreme northern part of Division 3L (Fig. 1), an area with a rate of growth similar to that for Divisions 2J and 3K (Pitt, 1967) also gives a fairly similar length distribution. The similarity between the distribution is especially close in the female fish.

Using an age length key from commercial gill nets and combined commercial and adjusted research length frequencies, catch curves were constructed for 1972-73 giving Z values of 0.67 for males and 0.48 for females (Fig. 2). Catch curves from the 1972 Polish research data gave total mortality estimates of 0.61 for the males and 0.46 for the females (Fig. 3).

Beverton and Holt yield per recruit model was applied to males and females separately using the following parameters (Fig. 4).

	<u>Males</u>	<u>Females</u>
M (natural mortality)	0.25	0.20
$W_{\infty}$ (asymptotic wt)	1.86 kg	3.29 kg
K (rate of completion of growth curve)	0.14	0.11
$\bar{z}_0$ (growth correction factor)	1.77	2.61
$\bar{z}_p$ (age of entry into exploited area)	4 yr	4 yr
$\bar{z}_p'$ (age of entry into exploited phase)	7.6 yr	9.0 yr
$\bar{z}_\lambda$ (last age of significant contribution)	14 yr	20 yr

### Results and Discussion

Yield per recruit curves were flat-topped with  $F_{max}$  occurring at  $F = 1.5$  and  $0.7$  for males and females respectively. Total mortality ( $Z$ ) estimated from Canadian data (Fig. 2) which reflect the average mortality for the 1962-71 period indicated fishing rates of  $0.42$  (males) and  $0.28$  (females) (Fig. 2) and Polish research vessel data (1972) gave corresponding  $F$  values of  $0.36$  and  $0.26$  (Fig. 3), assuming in all cases  $M = 0.25$  for males and  $0.20$  for females (Pitt, 1973). Mean values for the two sets of curves thus indicate a fishing level ( $F$ ) of  $0.39$  (males) and  $0.27$  (females) prevailing from 1962 through 1971.

These are just below the calculated level of  $F_{0.1}$  (Gulland and Boerema, 1973) which occurred at  $F = 0.44$  or 91% of the maximum yield per recruit for the males and  $F = 0.28$  or 92% of the maximum for the females. Catches averaged 5100 tons for 1962-71 and 6200 tons for 1964-71. It would appear that to maintain the fishery at the  $F_{0.1}$  level annual catches in the order of 6000-6500 should not be exceeded (Table 1).

The Canadian fishery for plaice from this stock, as previously mentioned is almost entirely by gill nets and is directed at several species; cod, plaice, witch and Greenland halibut. The pattern of fishing here especially for the flatfish has been to move farther from the coast and the type of vessel used have for all practical purposes reached their limit. From the limited amount of information available (ICNAF Statistical Bull. Vol. 22, 1972) the European fleet, to a large extent take plaice only as a by-catch of the cod fishery, with most of the catch being taken in Divisions 2J and 3K probably depending on the pattern of the cod fishery.

### References

- Gulland, J. A., and L. K. Boerema. 1973. Scientific advice on catch levels. Fishery Bulletin Vol. 71 (2): 325-335.
- Pitt, T. K. 1967. Age and growth of American plaice Hippoglossoides platessoides in the Newfoundland area of the Northwest Atlantic. J. Fish. Res. Bd. Canada 24: 1077-1099.
1973. Assessment of American plaice stocks on the Grand Bank ICNAF Divisions 3L and 3N. Intern. Comm. Northw. Atlant. Fish. Res. Bull. No. 10: 63-77.

Table 1. Plaice Subarea 2 and 3K (Nominal Catches).

Year	Canada		FRG	Poland <sup>b</sup>	Rom	Spain	USSR	UK	GDR	Non-Member	Total Stock
	Inshore	Total									
1962	54	60		7			222	1			290
1963	104	116		675			346	3		16	1155
1964	86	95		1678			642	27		115	2557
1965	167	222		2195			2100	8		50	4575
1966	171	228		1860			1330	10		213	3641
1967	230	384		1134			1893	23		199	3633
1968	562	1023		1889			5142			38	8092
1969	760	1689		867			6645		214		9415
1970	1688	3751		378	293		8160		104		12686
1971	1199	2486		233	5	6	2597	2	19		5348
1972	538	1197	4	852	97	5	6760	23	135		9070
1973(a)	1018	1440		225			2770	71	138		4547

(a) 1973 catches are preliminary

(b) revised Polish catches from new figures supplied to the ICNAF Secretariat.

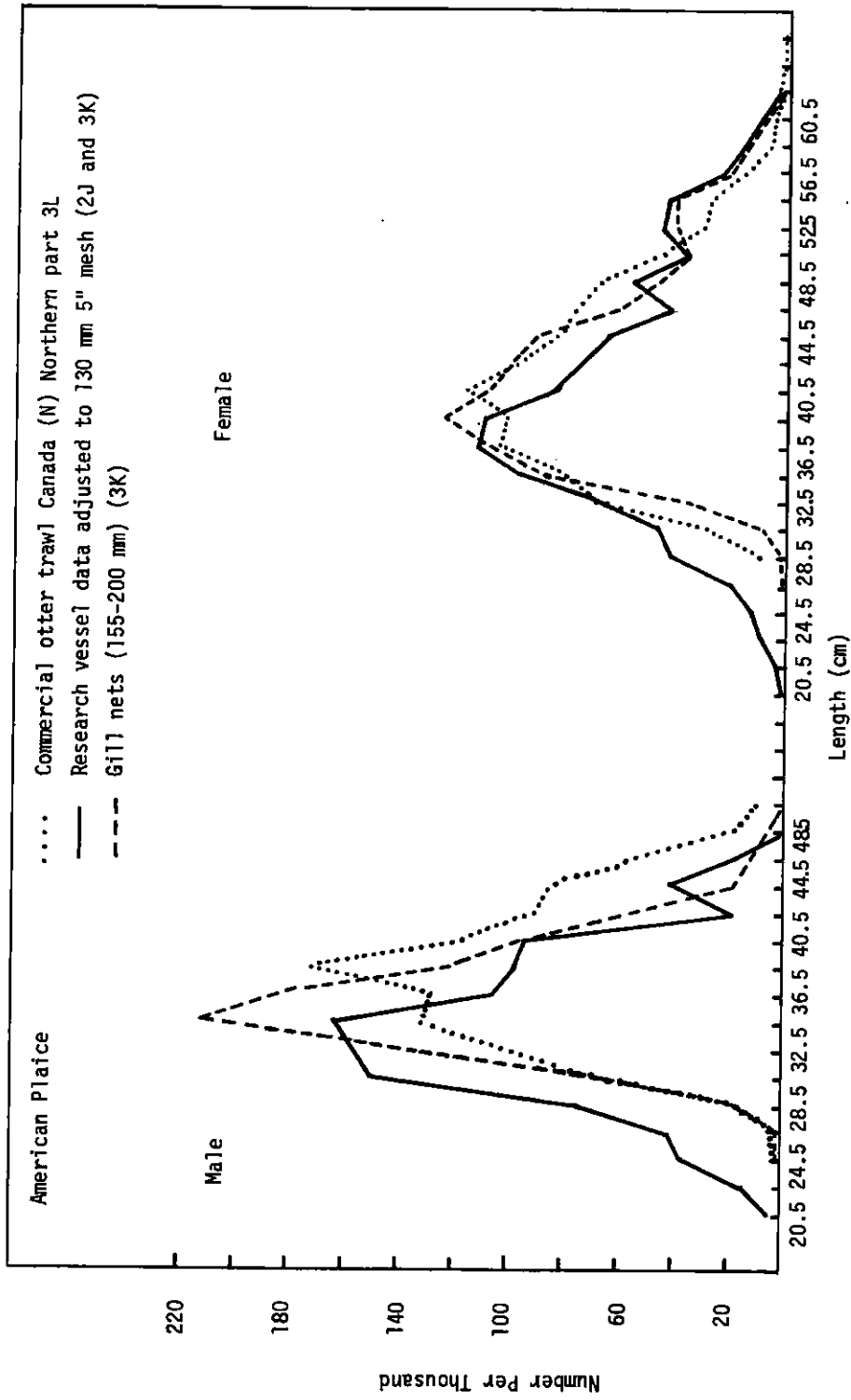


Fig. 1. Length frequencies of male and female plaice from (a) Canadian gill net fishery in Division 3K (b) Canadian research vessels (adjusted) and (c) commercial otter trawl frequencies from the northern half of Division 3L.

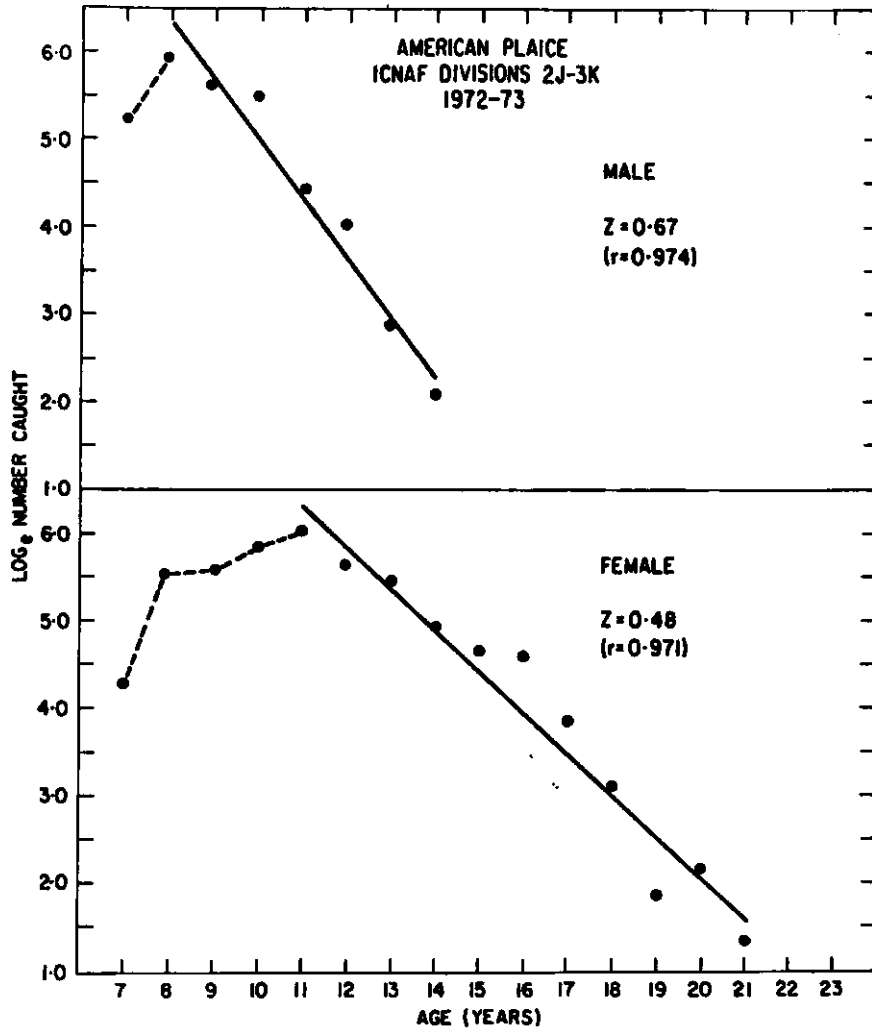


Fig. 2. Catch curves from a combination of Canadian gill net and research vessel data.

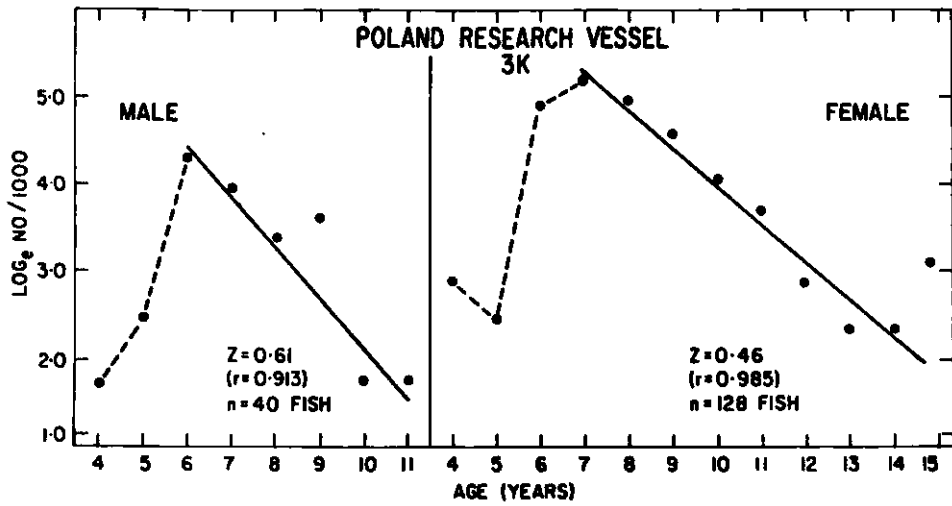


Fig. 3. Catch curves from Polish research vessel catches 1972 (ICNAF 1972 Sampling Yearbook).

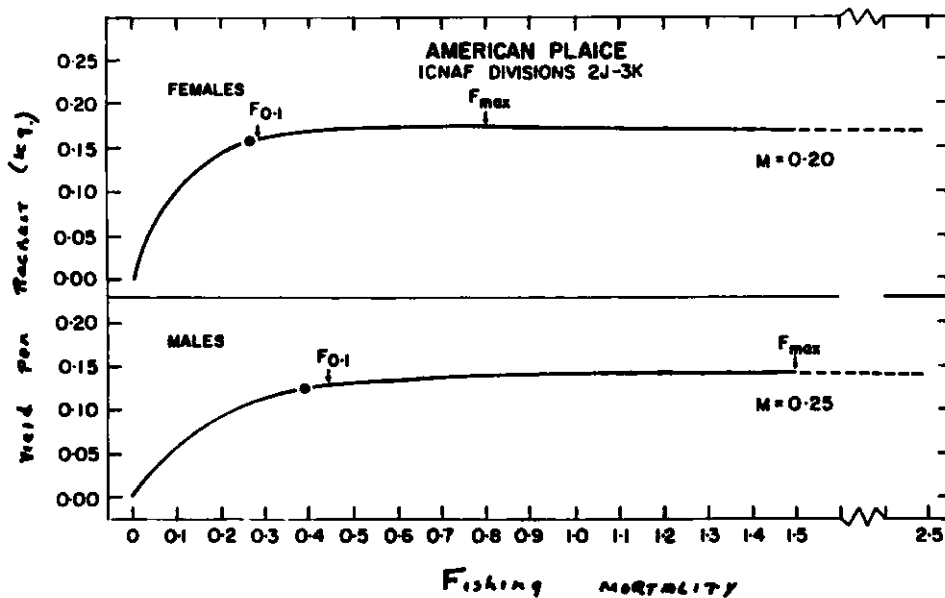


Fig. 4. Yield per recruit curves for male and female plaice. Points on the curves indicate level of fishing as indicated by the catch curves in Figures 2 and 3.