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An assessment update of American plaice in ICNAF Subarea 2 and Division 3K

by

T.K. Pitt
Department of Fisheries & Oceans
P.O. Box 5667
St. John's, Newfoundland
A1C 5X1

Abstract

Because of the limited amount of data it was not possible to do a cohort analyses. Survival rates 1978-79 for research and commercial data gave inconsistant results. Catch curves utilizing 1976-79 catch per unit effort at age data indicated removals averaging around 6,000 t had produced a fishing mortality close to the $F_{0.1}$ level.

Résumé

A cause du volume limité de données, il a été impossible de procéder à l'analyses des cohortes. Les taux de survie de 1978-79, déduits des relevés et des opérations commerciales, donnent des résultats contradictoires. Des courbes de capture établies à partir des prises par unité d'effort à l'âge en 1976-79 indiquent que des prélèvements d'environ 6 000 t en moyenne ont produit une mortalité par pêche proche du niveau de $F_{0.1}$.

INTRODUCTION

This stock has been under catch quota management since 1974. The highest recorded catch from this stock was in 1970 when approximately 12,700 t were reported, (Table 1). However, 8,600 t of this was reported by the USSR and there were problems prior to 1973 in separating the various flatfish species in the ICNAF statistical bulletins. Catches since 1974 have averaged around 5,300 t with the fishery in recent years being primarily by Canada. Up to 1976 nearly all the Canadian catch was by inshore (gillnet) gear. TAC since regulations began are as follows:

	1974	1975	1976	1977	1978	1979	1980
TAC	10.0	8.0	8.0	8.0	6.0	6.0	6.0

ASSESSMENT

Numbers at age are available from this stock for 1976 to 1979,(Table 2). The 1979 numbers at age were calculated from data collected by the Canadian Commercial sampling group at St. John's (Table 3). It should be pointed out that although sampling in 1978 and 1979 was satisfactory the 1976 and 1977 data were very sparce with only one sample from the offshore component in 1976.

Records of directed catch and effort data by the Canadian offshore fleet is available since 1976;(Table 4) the first year that there was a significant otter trawler fishery on this stock. Effort data in 1978 and 1979 is calculated from relatively small amounts of directed fishing on the stock by the Canada (N) otter trawler fleet.

Four years data was insufficient to run a cohort analysis especially since sampling in one or two years was minimal.

Survival rates between 1978 and 1979 for both commercial and research vessel data were calculated (Table 5). Both sets of data gave unrealistic values for F_1 i.e. 0.075 and 0.087 for males and females respectively for the commercial data and 1.39 and 1.00 for the research data.

Catch curves utilizing combined catch data for 1976-79 (Fig. 1) indicate total fishing mortality of 0.73 (F=0.48) for males ages 9-13 and for females a total mortality of 0.53 (F=0.33) for ages 12-17 and 0.46 (F=0.26) for ages 11-17 (Fig. 1). These rates apparently reflect removal levels averaging around 6,000 t with the fishing mortality values produced being close to the $F_{0.1}$ level (Fig. 2).

Research vessel catches (Tables 6 & 7) indicate a decline in abundance in Division 2J with a lesser decline apparent in Div. 3K. However, it should be pointed out that there are very large variances associated with these data and it would not be prudent to put very much credence in such a short series of data.

DISCUSSION

As compared to Grand Bank (3LNO) American plaice, this is a relatively small stock although it is probable that Div. 3K could support a fairly substantial population and it is possible that a reduction in foreign fishing, especially the pair trawler fishery, could result in an increase in abundance in this division, similar to what appears to be occurring in Div. 3L.

The data available for assessment purposes prior to 1976 was from the Canadian inshore gillnet fishery only and represented for the most part only a fraction of the total fishery (Table 1). Additionally gillnet generally removed only the larger fish, hence the samples were not representative of the stock and could not be used in this assessment.

Thus although it is not possible at this time to associate catch levels with particular fishing mortality levels it would appear that average removals of about 6,000 t have probably produced fishing mortalities at the $F_{0.1}$ level.

Hopefully, as the data series from both the inshore and offshore components is extended a proper analytical assessment will become available in the future.

Table 1. Nominal catches, American plaice, ICNAF Subarea 2-Division 3K, 1967-78

Year	Canada	FRG	GRD	Poland	USSR	U.K.	Other	Total
1967	395		195	1,134	1,701	162	4	3,591
1968	1,023		38	1,889	2,911	90		5,951
1969	1,689		214	867	4,129		3	6,902
1970	3,751		104	378	8,160		293	12,686
1971	2,486		19	233	2,597	2	11	5,348
1972	1,197	4	169	849	6,760	42	102	9,123
1973	1,384	70	138	225	3,011	76	236	5,140
1974	568	223	24	91	4,643	61		5,610
1975	859		29	95	4,449	11	305	5,748
1976	2,477	29	23	118	3,373		87	6,107
1977	6,616	10	89	27	702		63	7,507
1978	3,175	55	6	138	123		25	3,522
1979*	2,986*	2*		13*	25*			3,026

* Provisional

Table 2. Numbers at age of American plaice in 2J+3K 1976-79.

MALE

AGE \ KNOWN CATCHES YEAR	1976	1977	1978	1979
6	332.	105.	7.	14.
7	698.	292.	124.	102.
8	664.	719.	141.	488.
9	353.	751.	298.	864.
10	594.	471.	432.	495.
11	347.	154.	324.	67.
12	198.	56.	162.	10.
13	80.	13.	37.	1.
14	14.	1.	9.	1.

FEMALE

AGE \ KNOWN CATCHES YEAR	1976	1977	1978	1979
6	183.	26.	4.	13.
7	514.	111.	8.	99.
8	797.	307.	136.	370.
9	681.	730.	202.	927.
10	577.	1186.	398.	972.
11	691.	1276.	829.	834.
12	775.	1379.	972.	379.
13	677.	898.	937.	218.
14	189.	676.	465.	91.
15	108.	430.	259.	21.
16	42.	319.	186.	6.
17	31.	140.	65.	10.
18	21.	84.	57.	1.
19	10.	17.	9.	1.

Table 3. Listing of data used to calculate numbers at age for NAFO Divs. 2J+3K Am. Plaice (OT=Otter trawl GN=Gillnet)

Div.	Month	Gear	No. Measured Male, Female		Av. Length M+F	Av. Wt. M+F(kg)	Nominal Catch(T)	Catch Numbers
2J	May	OT	17	361	37.47	0.50	182.5	365
3K	Apr	OT	107	204	39.83	0.61	396.0	649
3K	May	OT	50	255	42.78	0.82	296.6	320
3K	July	GN	914	1463	36.73	0.45	1782.0	3960
3K	Dec.	OT	243	617	40.62	0.73	86.7	119

Table 4. Directed catch per unit effort and effort

American plaice 2+3K. Canada (N) O.T.5 used as effort standard.

Year	Catch (Tons)	CPUE (Tons)	Directed Effort(hr)	Catch with Directed effort
1976	6707	0.394	17,022	1797
1977	7507	0.402	18,674	3628
1978	3522	0.376	9,447	652
1979	3018	0.467	6,463	315

Table 5 Calculation of survival rates from commercial catch per 100 hours fishing and from estimation of total numbers from research vessel surveys (Div. 2J+3K)

(a) Commercial

MALE

Age	1978 No/100 hours	1979 No/100 hours
6	228	45
7	895	446
8	3847	802
9	4333	9269
10	2771	4901
11	800	623
12	171	267
13	76	45
14		
Effort	5250	2244

$Z = \sum \frac{10-13}{9-12} = 0.325$

F=.075

FEMALE

Age	1978 No/100 hours	1979 No/100 hours
7	171	478
8	514	6016
9	1561	8333
10	4761	10606
11	9002	11275
12	7100	8779
13	6010	5660
14	3820	1560
15	2028	535
16	2499	45
17	701	45
18	841	
19	198	

$Z \sum \frac{12-17}{11-18} = 0.287$

F=0.087

Research vessels surveys

MALE (000)

6	16476	12001
7	22383	17368
8	15607	13864
9	14920	7158
10	8218	2477
11	1268	332
12	898	191
13	56	62

$Z = \sum \frac{10-13}{9-12} = 2.114$

$Z = \sum \frac{9-13}{8-12} = 1.387$

6	17737	6201
7	17731	12144
8	22293	16622
9	15286	13553
10	13425	10294
11	11351	5656
12	9713	7786
13	9000	4352
14	4438	1336
15	3292	381
16	1639	171
17	580	11
18	96	
19	17	

$Z = \sum \frac{12-17}{11-16} = 1.050$

$Z = \sum \frac{11-17}{10-16} = 1.000$

Table 6. Average no & weight (kg) per set for strata surveyed 1977, 1978, 1979, 101-400 M
a. Division 2J b. Division 3K

Strat. No.	Area Sq.Mi.	Depth M	1977 Avg. No/Set	1977 Avg. Wt/Set Kg	1978 Avg. No/Set	1978 Avg. Wt/Set Kg	1979 Avg. No/Set	1979 Avg. Wt/Set Kg
201	1427	101-200	74	52.7	119	56.5	145	69.4
205	1823	"	177	75.3	43	13.7	133	51.7
206	2583	"	534	253.3	235	129.4	75	31.0
207	2246	"	156	72.6	75	21.9	75	30.0
202	440	201-300	71	45.9	78	14.5	15	7.0
209	1608	"	107	54.1	65	20.5	64	21.9
210	774	"	54	12.8	144	40.9	107	18.8
213	330	"	151	61.8	126	48.4	32	17.9
214	1171	"	42	23.6	50	25.6	27	11.7
215	1270	"	54	27.8	189	59.0	56	26.8
228	1428	"	102	21.9	-	-	56	8.3
234	508	"	70	23.6	34	9.7	24	6.3
203	480	301-400	16	7.4	-	-	-	-
208	448	"	31	16.9	55	15.3	61	25.4
222	441	"	8	3.2	12	2.7	11	4.1
229	567	"	23	7.0	3	0.5	7	1.6
Total Area	17544		169	80.5	107	44.5	75	29.8

Table 6 continued

(b)

Strat.	Area Sq.N.Mi.	Depth M	1978 Average No/Set	1978 Average Wt/Set kg.	1979 Average No/Set	1979 Average Wt/Set kg.
620	2709	201-300	113	29.9	50	29.5
621	2859	"	135	46.7	126	64.3
624	668	"	70	20.1	44	11.3
632	447	"	23	6.4	37	14.1
634	1618	"	262	38.0	15	4.3
635	1274	"	153	23.1	32	7.5
636	1455	"	81	20.1	18	7.0
637	1132	"	18	5.7	14	7.0
623	1027	301-400	39	12.6	34	16.0
625	850	"	47	6.7	24	7.7
626	919	"	47	17.8	36	21.2
628	1085	"	55	17.9	65	22.2
629	495	"	141	24.7	19	6.6
630	544	"	81	11.3	19	5.4
633	2179	"	45	8.0	14	4.8
638	2059	"	88	19.4	21	10.1
639	1463	"	14	2.6	3	1.0
Total	22783		93	21.6	40	18.3

Table 7. Biomass estimates from survey data Plaice 2J+3K

	1977	1978	1979
Division 2J			
Numbers $X10^{-6}$	198.7	125.8	88.2
Weight (T)	94,645	51,731	35,271
Division 3K			
Numbers $X10^{-6}$		159.0	68.4
Weight (T)		36,938	31,295

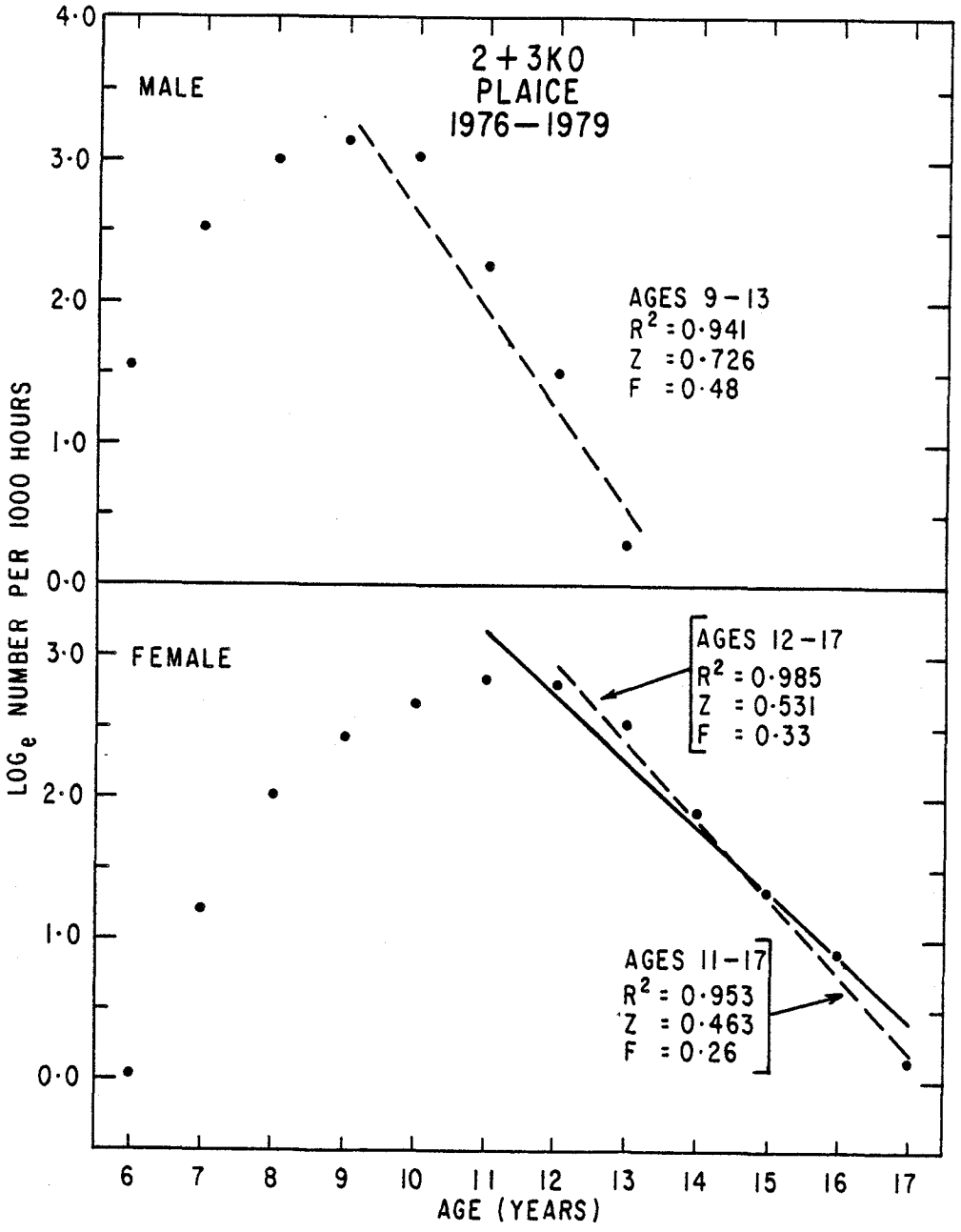

Fig. 1. Catch curves of male and female plaice using average no caught per 1000 hours by otter trawler, 1976-79.

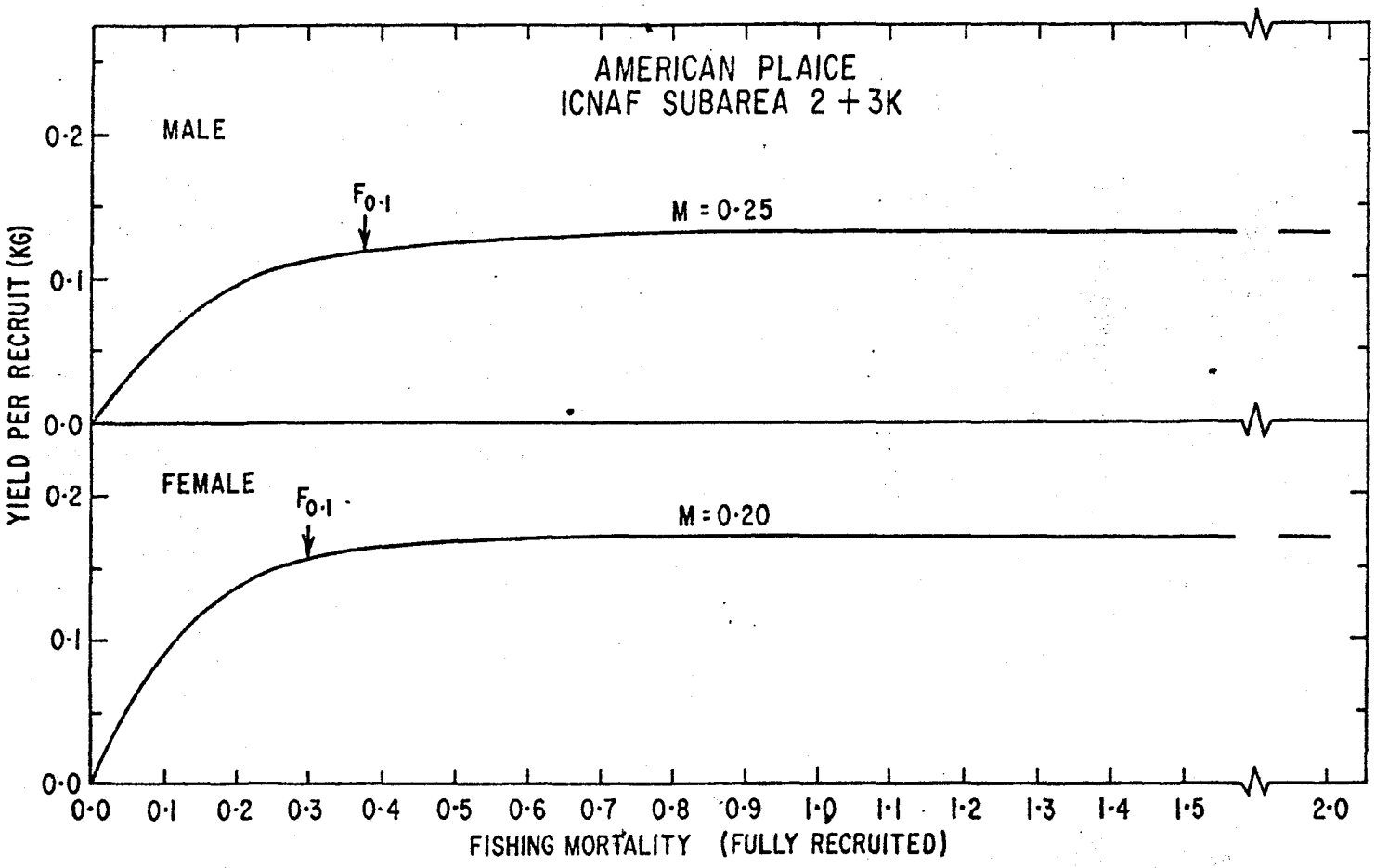

Fig. 2 Yield per recurit of American plaice in S a2+3K.