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**American Plaice in NAFO Division 4T
A Biological Update**

by

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ABSTRACT

Nominal catches of American plaice (7214 tonnes) in NAFO Division 4T during 1986 were lower than the 10 year mean. However, the overall landings of American plaice in the Gulf of St. Lawrence have been around the TAC of 10,000 tonnes since 1979. The available data were not considered sufficient or reliable enough to project the future of the fishery.

RESUME

Les prises nominales de plie canadienne (7 214 tonnes) dans la Division 4T de l'OPANO en 1986 ont été inférieures à la moyenne des 10 dernières années. Toutefois, depuis 1979, les débarquements totaux de plie canadienne dans le golfe du Saint-Laurent se sont maintenus autour du TPA, fixé à 10 000 tonnes. Les données n'ont pas été jugées suffisantes ou assez fiables pour faire des prévisions quant aux conditions futures de la pêche à la plie.

INTRODUCTION

Description of the fishery

A TAC of 10,000 t has been imposed on the 4T American plaice fishery since 1977. Annual landings have been near or below this level. Historically, the American plaice fishery was primarily a by-catch fishery of the southern Gulf of St. Lawrence cod fishery. However, the percentage of catch from the directed plaice fishery has increased from 21% in 1980 to 55% in 1986 (Figure 1). In 1986, the plaice fishery remained open throughout the season for all gear types.

Nominal Catch

The 4T nominal catch of plaice during 1986 was lower than the previous two years and the average catch since 1972 (Table 1). Of the 7213 t caught, 35% was taken by Quebec and 65% by the Maritimes (Table 2). Catches were bimodally distributed with one peak in June and another in September (Table 3). Danish seines, otter trawlers (stern) and otter trawlers (side) accounted for 48%, 27% and 10% of the catch, respectively, while the remaining 15% of the catch came from longliners, gillnetters, shrimp trawlers and handlines (Table 3).

Nominal catch and TAC's (1,000's of tonnes) in recent years are as follows:

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
TAC	10	10	10	10	10	10	10	10	10
Nominal Catch	10	8	8	7	6	10	9*	7*	-

*Preliminary data

Anecdotal Information

Historically, most of the Gulf of St. Lawrence flatfish landings were American plaice from NAFO division 4T. However, in 1986, Greenland halibut landings increased greatly in magnitude to account for 32% of the total flatfish landings in NAFO areas 4R, 4S and 4T. Plaice accounted for 43% of the total (Tables 4 and 5). Increased landings of Greenland halibut are directly related to increased abundance of this species. The price increase for halibut in 1986 may also have contributed to the increase of halibut landings.

Information relevant to the assessment

Several aspects of data collection must be considered when doing an assessment of plaice stock size and mortality rates. Plaice are caught by commercial vessels directing their fishery effort towards plaice and as a by catch of the cod fishery. Thus, catch rates must be split between these two groups. Male and female plaice have different growth rates and so should be sampled separately for age-length keys. In 1986, research vessel sampling did not distinguish between the sexes. A substantial proportion of the commercial catch is discarded because the fish are considered too small for market. Finally, discrepancies between agers over the past four years has led to an unreliable catch-at-age matrix.

INPUT DATA

Commercial catch rates

Two commercial catch rates were calculated and are as follows:

- 1) Commercial catch rates from the plaice directed component of the 4T plaice fishery in the Maritimes-Quebec and Western Newfoundland areas were standardized over 1977 to 1986 using the multiplicative model described by Gavaris (1980). The effort chosen for the model was hours fished. The gear types were otter trawlers (stern), otter trawlers (side), Danish seiners, Scottish seiners and longlines. There has been a decreasing trend in catch rates since 1979 with a slight increase in 1985 and levelling off in 1986 (Table 6, Figures 2 and 3).
- 2) Commercial catch rates from the cod directed component of the 4T plaice fishery in the Maritimes-Quebec and Western Newfoundland areas were standardized over 1966 to 1986 using the multiplicative model. The effort chosen was hours fished. The gear types were as above. There has been a decreasing trend in catch rates since 1977 with a slight increase in 1985 levelling off in 1986 (Table 7, Figures 4 and 5).

Research Vessel Survey

The groundfish research survey was carried out using the RV Lady Hammond in the fall of 1986. The data was analyzed using the computer program RVAN (D. Clay D.F.O. pers com).

Two catch rate indices were calculated from the 1970 to 1986 data: 1) mean weight per standard tow and 2) mean numbers per standard tow (Table 8). Both these indices indicate a sharp decline from the 1979 levels with a slight increase in 1985 and continuing to increase in 1986 (Figures 6a and 6b).

No plaice were caught on the borders of division 4T with divisions 4R and 4S during the survey (Figure 7).

Assessment results

The considerable uncertainty in the data precluded doing an adequate assessment for 1986.

Prognosis

The information available does not allow for prediction of the future of the fishery. There are no grounds for a change in advice from previous years. Therefore, a 10,000 t TAC is recommended once again. However, it should be noted that the TAC was not caught in 1986 even though the price for American plaice increased. The lower reported landings in 1986 may be partly due to better identification of other species of flatfish that had previously been reported as plaice landings. As well, the lucrative 1986 4T herring fishery may have diverted vessels resulting in a reduced fishing effort applied to plaice. Nevertheless all abundance indices indicate that the stock is at a low level compared to the mid to late 1970s.

REFERENCES

Gavaris, S. 1980. Use of a multiplicative model to estimate catch rate and effort from commercial data. C.J.F.A.S. 37 (12): 2215-2275

Landry, T. 1985. 1986 Stock Assessment of American Plaice in NAFO Division 4T. CAFSAC Research Document 86/91.

Table 1. Nominal catches (t) of 4T American plaice from 1972-1986 by major gear types.

Year	OTB	OTB-1	OTB-2	SNU	GN	LL	LHP	Others	Total
1972*	14	4275	860	2576	286	73	11	199	8294
1973	20	3087	471	2748	241	73	1	406	7047
1974	-	3556	585	3719	250	6	5	364	8485
1975	1	3207	795	3897	217	14	18	294	8443
1976	41	4097	2864	3395	225	2	6	562	11193
1977	35	4261	375	4015	242	16	17	359	9320
1978	58	3651	889	3495	379	42	38	479	9031
1979	83	3415	961	3719	721	9	17	1161	10086
1980	1485	1809	558	3500	717	55	5	163	8292
1981	1022	1311	290	3575	1084	98	2	452	7834
1982	742	580	137	4124	805	94	5	55	6542
1983	821	479	102	4095	494	76	10	17	6094
1984	235	601	2582	3702	1905	386	25	191	9627
1985**	31	894	2928	3833	994	387	27	335	9429
1986	-	704	1925	3462	609	317	45	151	7213
Average:	306	2395	1081	3590	611	110	15	346	8495

*(1972 to 1984 values are from NAFO data files)

** (1985 to 1986 provisional data)

Table 2. The 1986 provisional Gulf flatfish nominal catches (t) by NAFO division and province.

		Yellowtail	Atlantic Halibut	Greenland Halibut	Witch	Winter Flounder	American Plaice
4R	CAN-M	-	4	12	18	5	598
	CAN-Q	-	14	0	1	-	2
	CAN-N	10	12	119	504	1774	4
		10	30	131	523	1779	604
4S	CAN-M	16	2	168	9	2	73
	CAN-Q	8	25	1931	-	-	1005
	CAN-N	-	88	-	-	-	2
		24	115	2099	9	2	1080
4T	CAN-M	318	13	12	607	1363	4686
	CAN-Q	57	279	4290	-	-	2527
	CAN-N	-	-	-	-	-	-
		375	292	4302	607	1363	7213

Table 3. The 1986 4T American plaice nominal catches by gear and month (provisional data).

Gear/month	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	%
SNU	114	546	655	606	271	513	346	396	16	3462	48
OTB-2	41	362	423	331	260	270	203	35	-	1925	27
OTB-1	25	211	80	16	17	170	93	92	-	704	10
Shrimp trawl	-	-	3	-	1	29	13	32	-	78	1
GN	5	96	77	173	88	106	48	16	-	609	8
LL	1	42	41	60	79	55	22	17	-	317	4
HL	-	5	4	9	10	8	9	-	-	45	1
PTB	13	8	7	7	27	11	-	-	-	73	1
Total	199	1270	1290	1202	752	1162	734	588	16	7213	

Table 4. Commercial flatfish nominal catches (t) in NAFO Division 4RST from 1963 to 1986.

YEAR	YELLOW TAIL	ATLANTIC HALIBUT	GREEN. HALIBUT	WITCH	WINTER FLOUNDER	PLAICE	UNSPEC FLOUNDER	TOTAL FLATFISH
*1963	107	537	-	4250	3165	8470	-	16529
1964	65	615	-	3350	3014	8803	9	15856
**1965	53	693	24	3608	4419	11098	5	19900
1966	157	612	365	3712	3136	12720	-	20702
1967	79	460	365	2714	2454	10497	24	16593
1968	12	444	689	3390	551	11932	-	17018
1969	268	510	802	4763	1710	10978	-	19031
1970	59	509	1112	4805	2694	13234	-	22413
1971	40	454	954	3821	2842	11770	-	19881
1972	3	310	683	2001	1911	9724	1373	16005
1973	6	385	763	2224	2384	8149	2426	16337
1974	27	418	1011	3247	1976	11261	999	18939
1975	3	272	1544	2722	2050	10177	3951	20719
1976	37	196	2019	6875	2471	14265	1785	27648
1977	30	150	3961	3036	1358	12755	1995	23285
1978	13	135	6247	4510	1236	12375	1196	25712
1979	69	132	8791	4561	1722	12933	894	29102
1980	46	202	7006	3527	2053	11115	1163	25112
1981	14	95	3176	1912	2013	10210	532	17952
1982	6	91	2269	1282	2339	8092	479	14558
1983	50	174	1105	1177	1799	8382	792	13479
1984	82	176	2126	1107	178	11790	65	15524
***1985	212	164	2364	1824	1883	11366	2	17815
1986	409	437	6533	1139	3144	8897	-	20559
AVERAGE	77	340	2246	3148	2188	10875	737	19611

*(1963 to 1964 values are from Landry, 1986)
 **(1965 to 1984 values are from NAFO data files)
 ***(1985 to 1986 provisional data)

Table 5. 1983-1986 percent species composition of the flatfish nominal catches (t) in NAFO 4RST.

Year	Yellowtail	Atlantic Halibut	Greenland Halibut	Witch	Winter Flounder	American Plaice	Unspec. Flounder	Total landing
1983	0.4	1.3	8.2	8.7	13.4	62.2	5.9	13479
1984	0.5	1.1	13.7	7.3	1.2	76.0	0.4	15524
1985*	1.2	0.9	13.3	10.2	10.6	63.8	0.0	17815
1986	2.0	2.0	32.0	6.0	15.0	43.0	0.0	20559

* (1985 to 1986 Provisional data)

Table 6. Predicted catch rates from the multiplicative model for the plaice directed 4T American plaice fishery.

PREDICTED CATCH RATE

STANDARDS USED VARIABLE NUMBERS: 2112 5

<u>YEAR</u>	<u>TOTAL CATCH</u>	<u>PROP.*</u>	<u>CATCH RATE</u>		<u>EFFORT</u>
			<u>MEAN</u>	<u>S.E.</u>	
77	9320	0.446	0.104	0.015	89851
78	9031	0.361	0.115	0.018	78475
79	10086	0.279	0.135	0.021	74472
80	8292	0.206	0.123	0.020	67537
81	7834	0.190	0.129	0.021	60876
82	6542	0.264	0.107	0.019	61394
83	6094	0.291	0.105	0.019	58085
84	9627	0.147	0.077	0.012	125189
85**	9429	0.092	0.087	0.015	108549
86	7213	0.112	0.084	0.014	85660

AVERAGE C.V. FOR THE MEAN: .163

* PROP. = Proportion of total catch for which effort values were available.

** (1985 to 1986 Provisional data).

Table 7. Predicted catch rates from the multiplicative model for the cod directed 4T American plaice fishery.

PREDICTED CATCH RATE

STANDARDS USED VARIABLE NUMBERS: 2112 5

<u>YEAR</u>	<u>TOTAL CATCH</u>	<u>PROP.</u>	<u>CATCH RATE</u>		<u>EFFORT</u>
			<u>MEAN</u>	<u>S.E.</u>	
66	11780	0.233	0.029	0.005	404903
67	9351	0.297	0.022	0.003	418373
68	9568	0.326	0.028	0.004	337560
69	8192	0.296	0.025	0.003	323273
70	9300	0.279	0.024	0.003	392539
71	9513	0.311	0.022	0.003	440657
72	8294	0.333	0.019	0.002	437542
73	7047	0.252	0.018	0.002	395596
74	8485	0.169	0.019	0.003	457885
75	8443	0.133	0.013	0.002	627400
76	11193	0.094	0.020	0.003	546312
77	9320	0.291	0.029	0.004	325318
78	9031	0.329	0.026	0.003	342844
79	10086	0.333	0.022	0.002	466705
80	8292	0.365	0.023	0.003	359212
81	7834	0.297	0.017	0.002	454010
82	6542	0.292	0.012	0.001	565308
83	6094	0.283	0.014	0.002	427446
84	9627	0.093	0.007	0.001	1340324
85*	9429	0.144	0.010	0.001	908156
86	7213	0.100	0.010	0.001	719961

AVERAGE C.V. FOR THE MEAN: .131

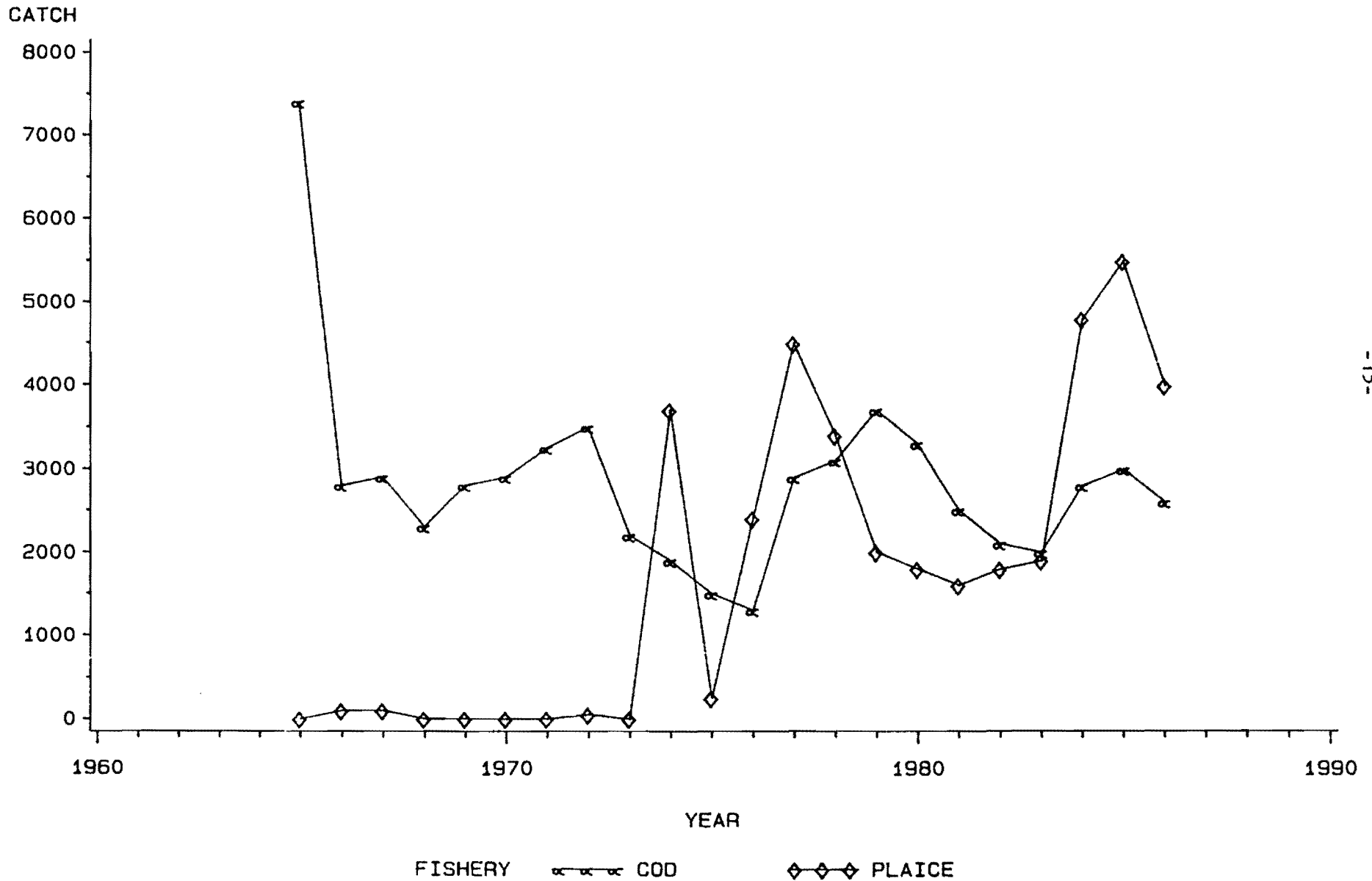
* (1985 to 1986 Provisional data).

Table 8. 1971 to 1986 4T research vessel estimates of mean number per tow and mean weight (kg) per tow for American Plaice.

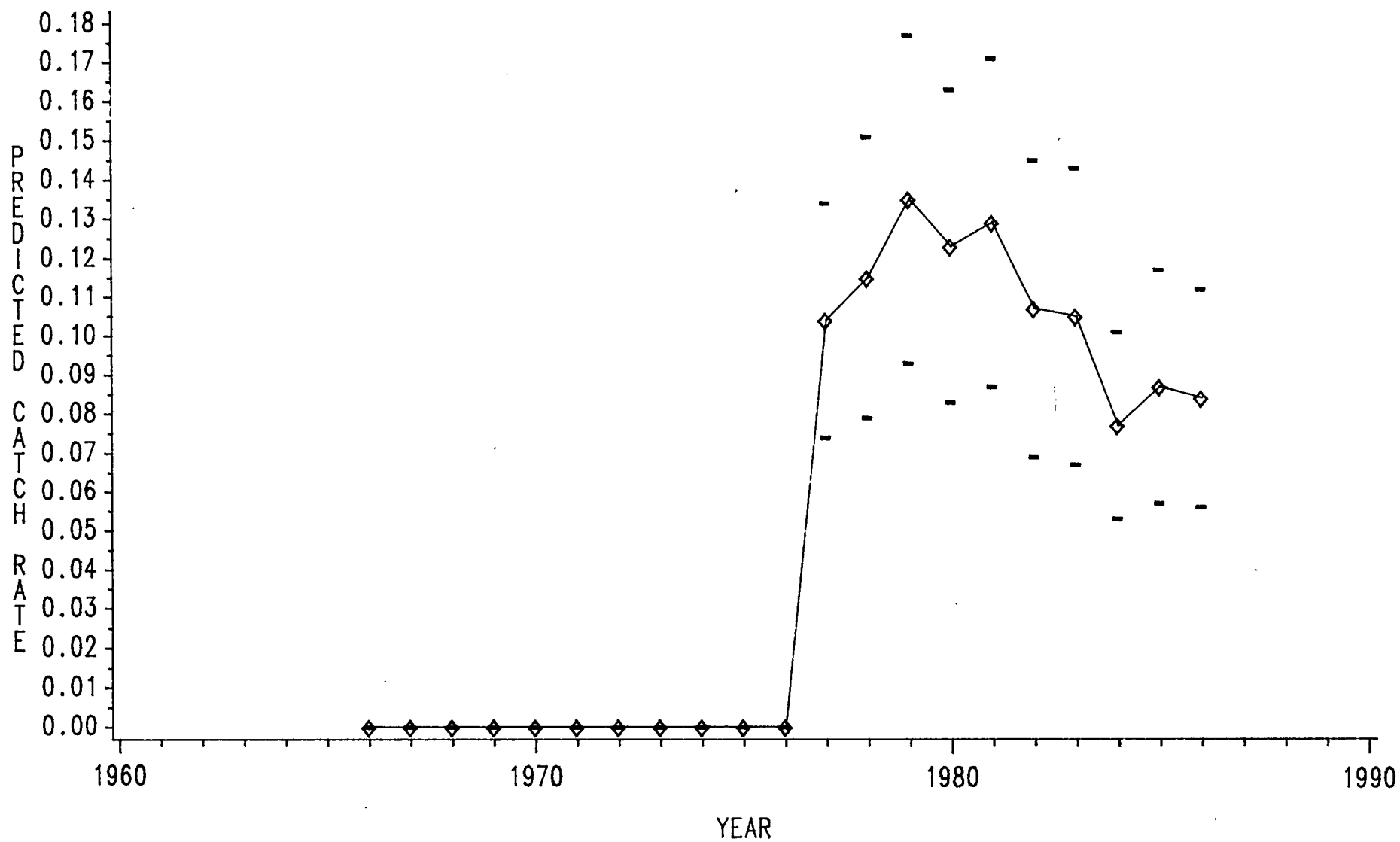
YEAR	MEAN NO./TOW	MEAN WT/TOW (kg)
1971	152	29
1972	128	31
1973	132	37
1974	313	58
1975	295	59
1976	523	95
1977	602	86
1978	321	62
1979	492	93
1980	304	56
1981	352	57
1982	164	35
1983	211	39
1984	157	33
1985	131	28
*1986	231	46

(*Preliminary data)

*FIGURE 1 : Catch of American Plaice
by Cod Directed and Plaice Directed Fisheries in Area 4T*



*FIGURE 2 : Predicted Catch Rates
of the Plaice Directed Component
of the American Plaice Fishery in Area 4T*



*FIGURE 3 : Residuals of Multiplicative Model
For the Plaice Directed 4T American Plaice Fishery*

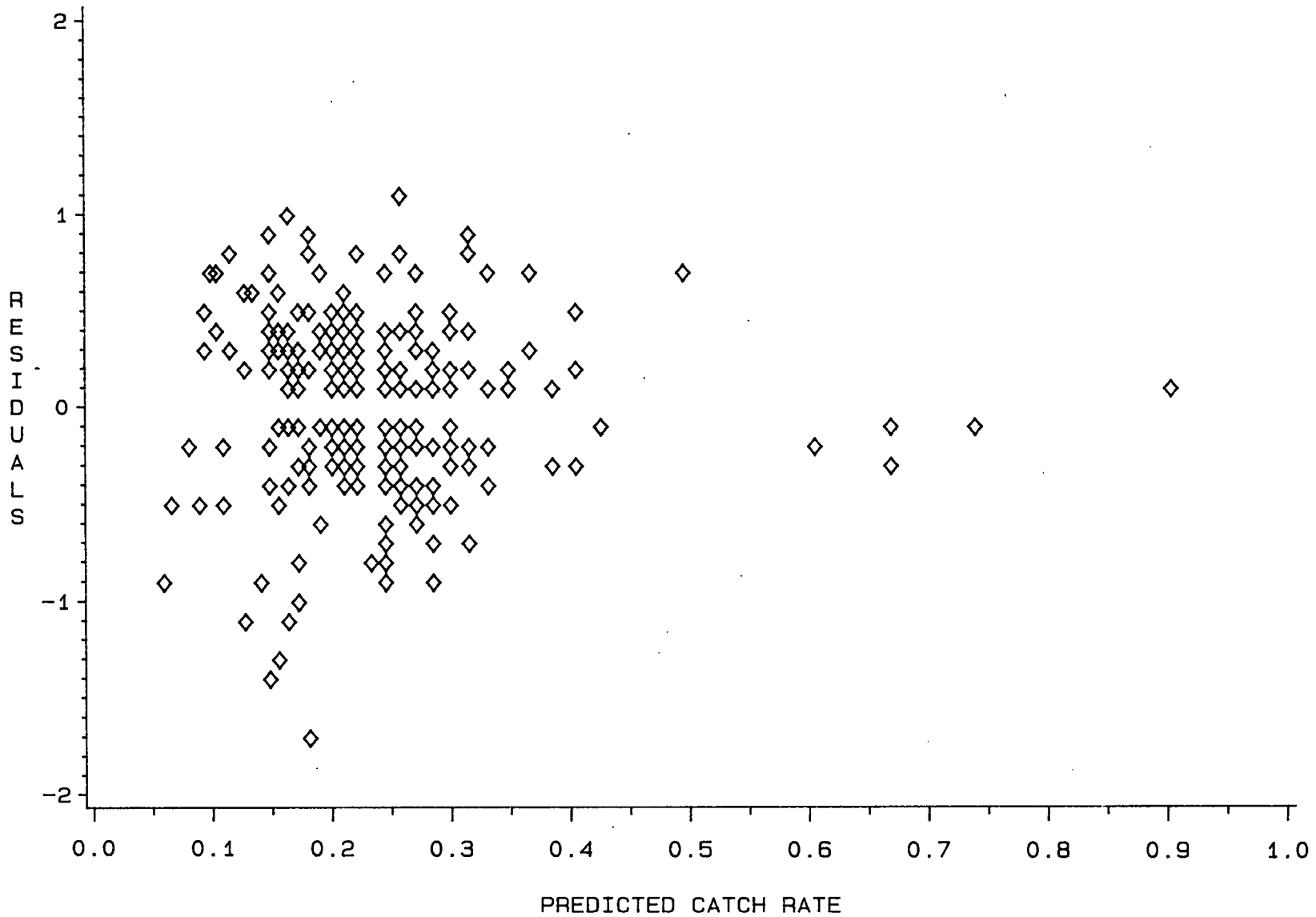
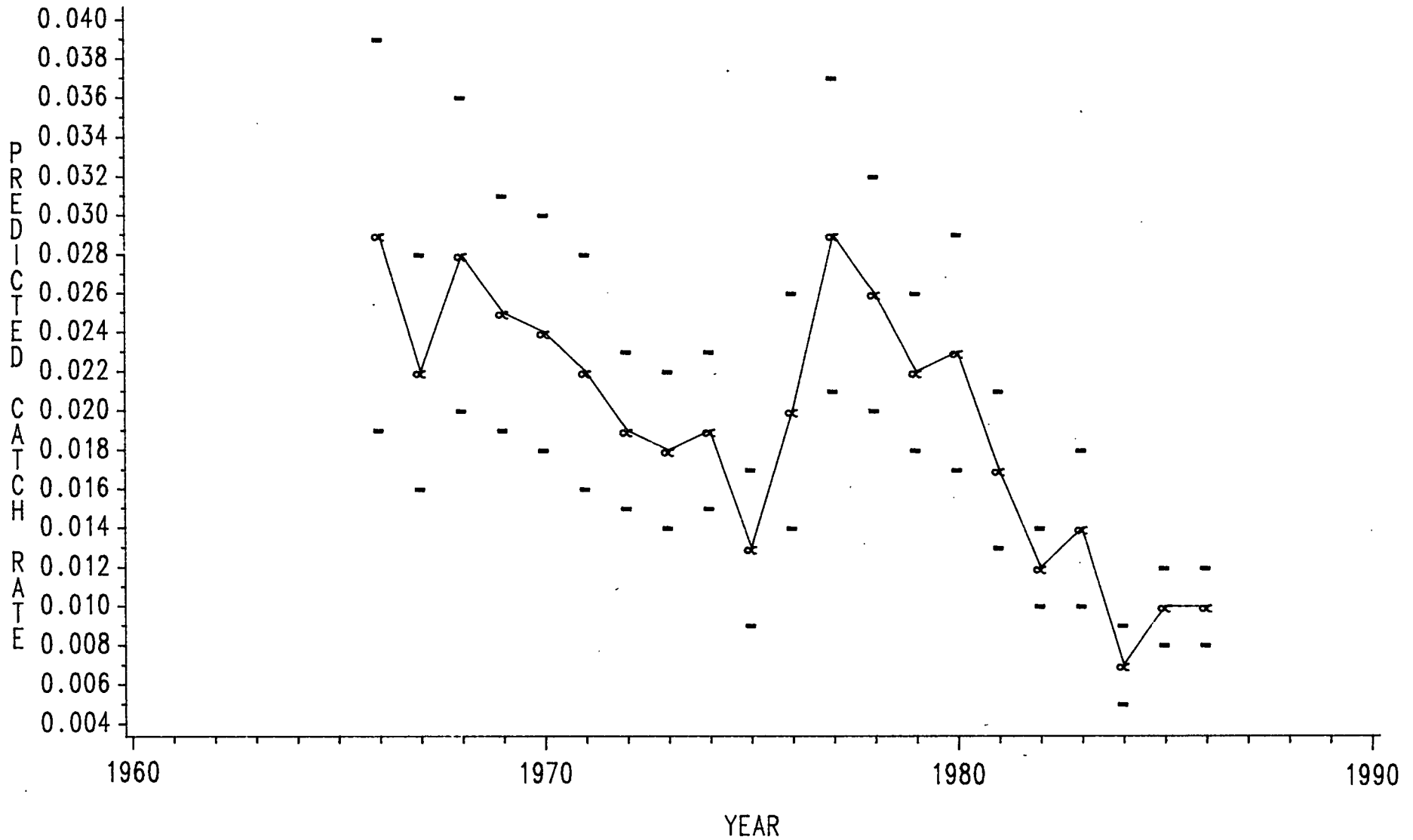
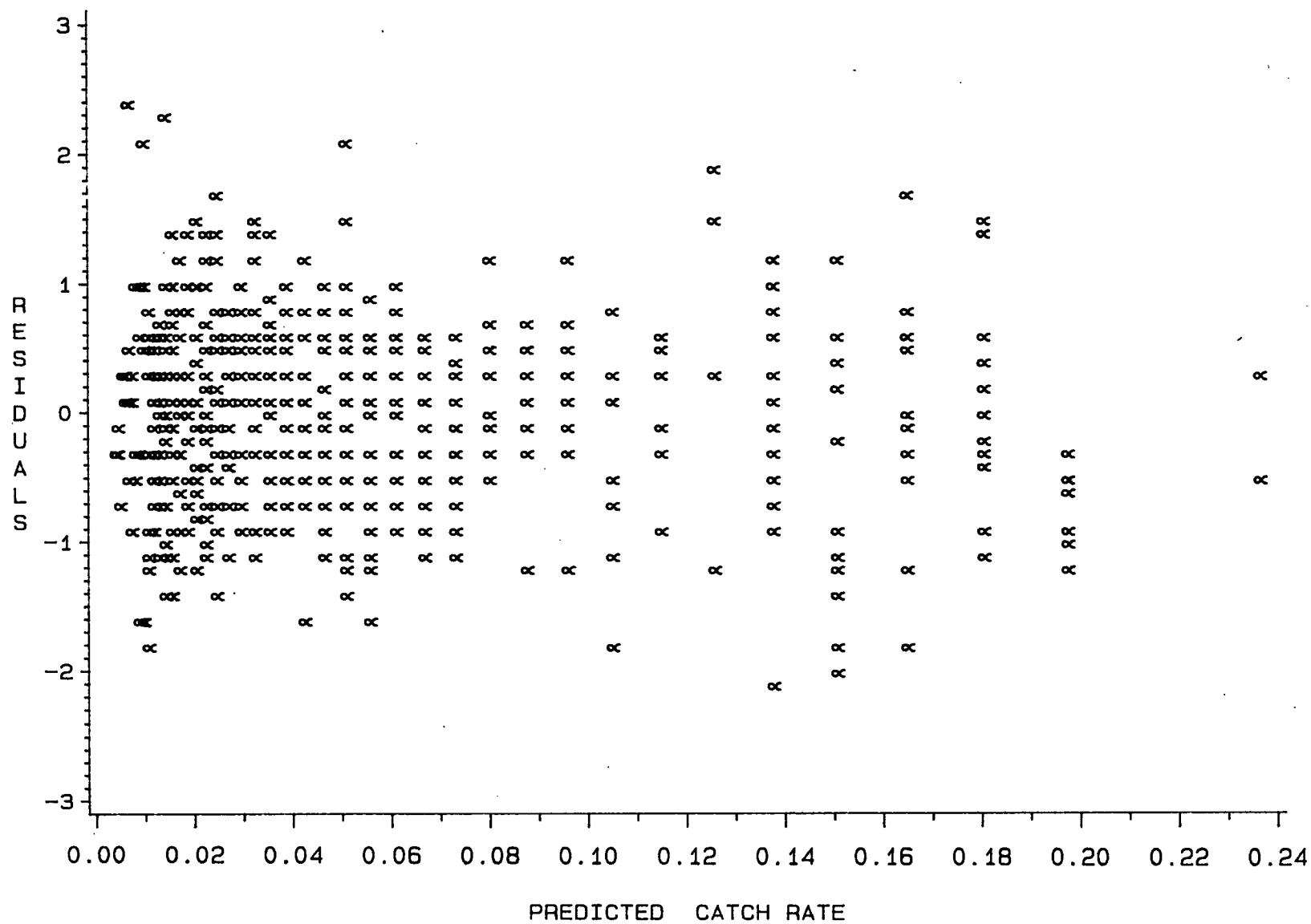


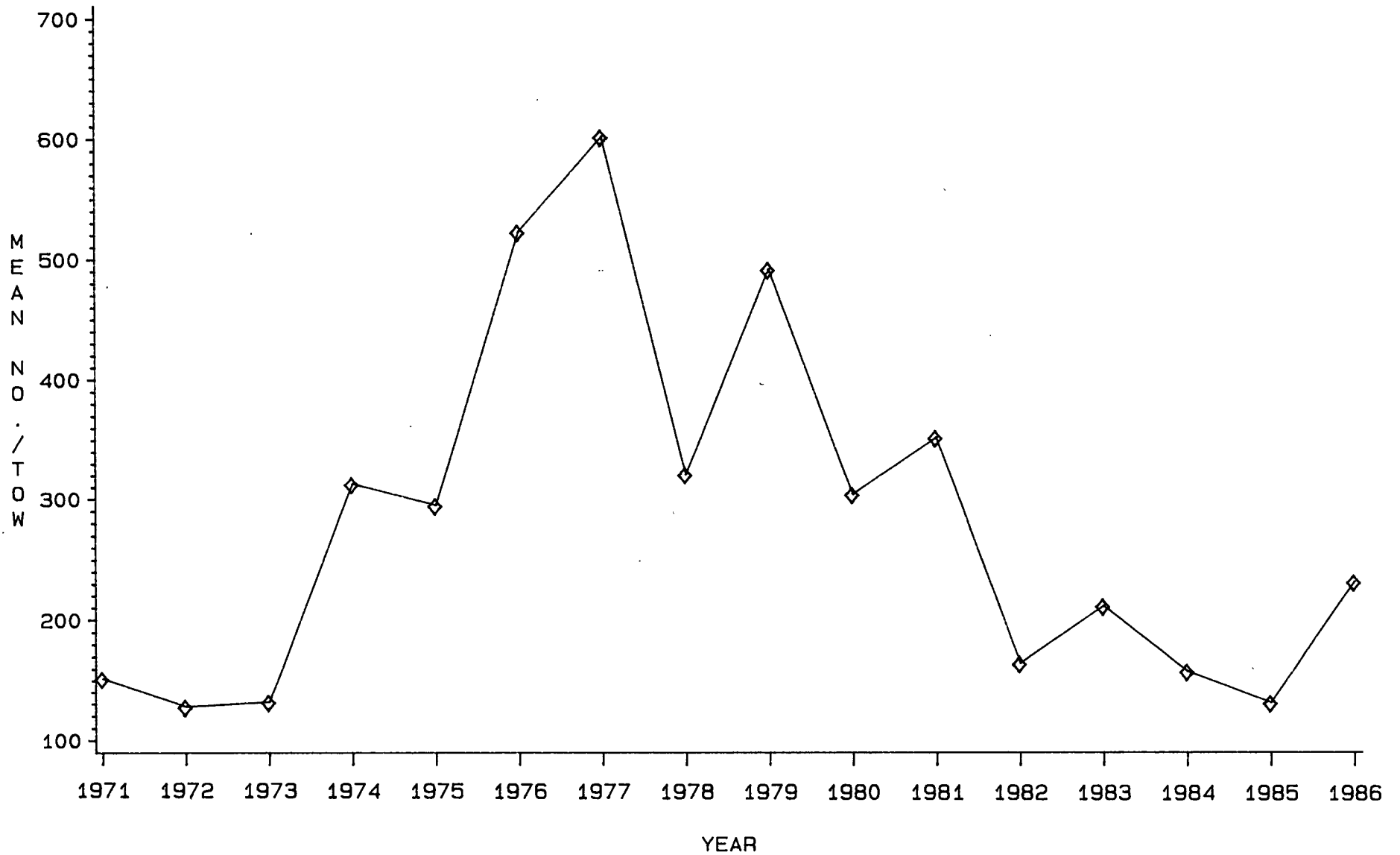
FIGURE 4 : Predicted Catch Rates
of the Cod Directed Component
of the American Plaice Fishery in Area 4T



*FIGURE 5 : Residuals of Multiplicative Model
For the Cod Directed 4T American Plaice Fishery*



*FIGURE 6a : Catch Rate of American Plaice
in Terms of Numbers per Tow in Area 4T*



*FIGURE 6b : Catch Rate of American Plaice
in Terms of Weight per Tow in Area 4T*



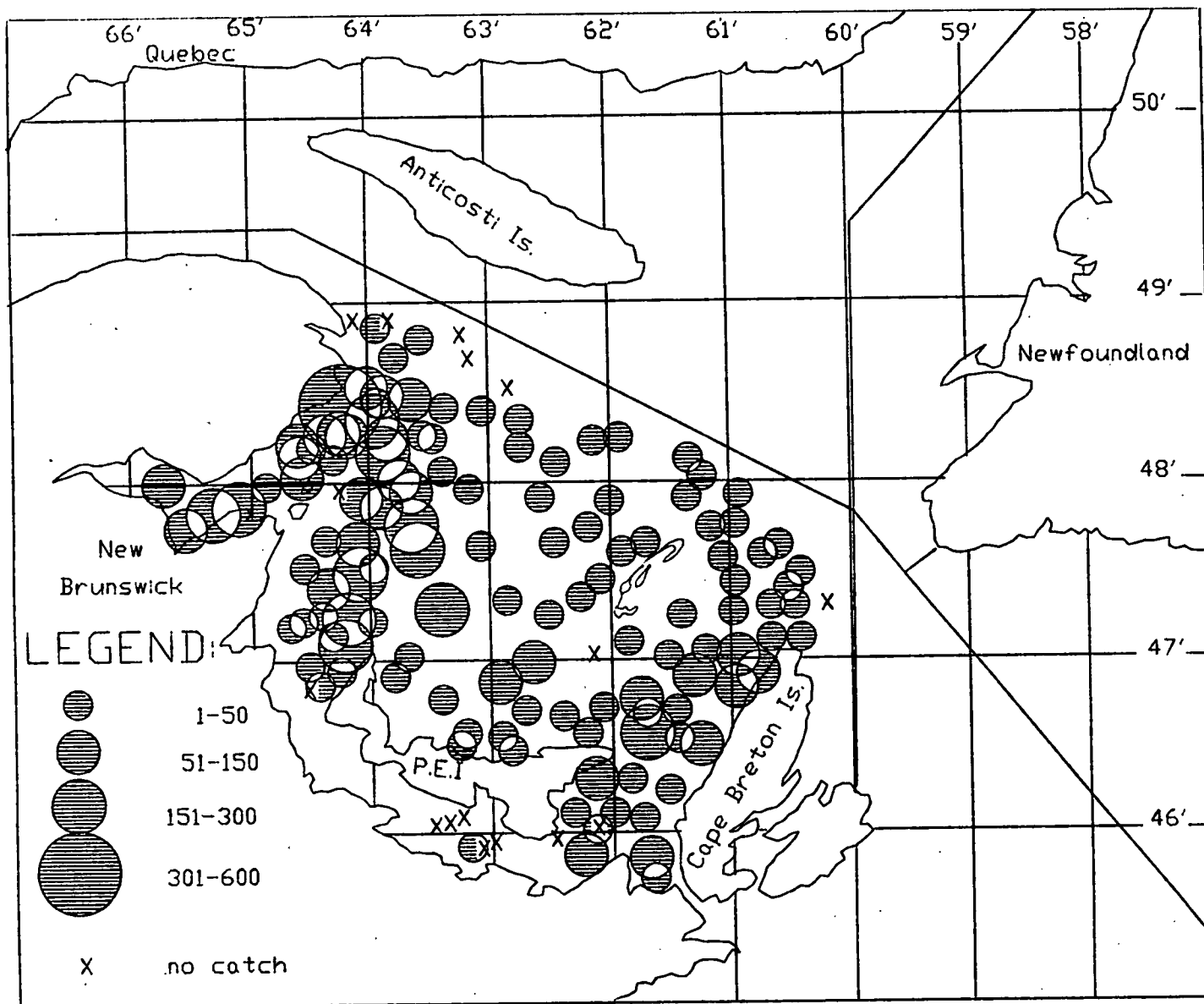


Figure 7. 1986 4T LADY HAMMOND Survey 159 - American Plaice Kg/St.Tow