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An Assessment Update for the American Plaice Stock in Div. 3LNO

by

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TAC regulation

This stock has been under TAC regulation since 1973 when a TAC of 60,000 t was established. From 1973-87, the TAC varied from 47,000 t to 60,000 t (Table 1) but was lowered to 33,585 t in 1988 following a decline in stock abundance. In 1989-91, the TAC was set at 30,300 t, 24,900 t, and 25,800 t respectively.

Catch trends

Catches increased from about 20,000 t in the early 1960s to a peak of 94,000 t in 1967, were relatively stable around 45,000-50,000 t in 1973-82, then declined to 39,000 t in 1984-85 (Table 1). Catches then increased to 65,000 t in 1986 and have subsequently declined, with the 1990 value of 32,000 t being the lowest since 1963.

From 1977 to 1982, the catch was taken almost exclusively by Canadian vessels; but the catch by other nations increased rapidly from less than 2000 t in 1981-82 to over 30,000 t in 1986 as new fisheries were developed in the Regulatory Area. Catches from these fleets have declined in recent years, as has the Canadian catch (Tables 1, 2, and 3). Canada and Spain have taken most of the catch from 1987 to 1990.

Table 4 indicates that the bulk of the catch has usually been taken in Div. 3L. This table also indicates that the increase in catches in the mid-1980s occurred mainly in Div. 3N, with the value in 1986 in this division being the second highest in the time series.

In 1990, the Canadian catch totalled 22,560 t, 60% of which came from Div. 3L (Table 5). The catch by inshore gears, mainly gillnet, was the lowest in the 19-year time series for which catches by inshore gears were available. Most of the remainder of the catch was taken by otter trawl, although about 1800 t was caught by Scottish seiners.

Catch-at-age, mean weights-at-age

Sampling was available from the Canadian (Table 6), Spanish (SCS 91/16), and Portuguese (SCS 91/15) fisheries in 1990. Tables 7-10 show the catch-at-age from the Canadian fishery in Div. 3L (inshore and offshore), 3N, 3Ø, and 3LNO combined. Ages 8-12 comprised the majority of the catch, with the peak being age 10, as was the case in the Canadian fishery in 1989. The mean weights up to age 12 showed little difference in 1989 and 1990, with the weights at the older ages being slightly higher in 1990, continuing the recent trend.

The Spanish catch-at-age was derived by combining the monthly totals at age for Div. 3L and 3N separately and adjusting these totals to represent a total catch in Div. 3LNO of 9095 t. This includes catches by S. Korea, other non-members estimated from surveillance, and other non-reported catches. This catch-at-age is shown in Table 11 and indicates that ages 4-6 dominated the catch. In both 1989 and 1990, the 1985 year-class was predominant. The length frequencies indicated that fish younger than 4 were present in the catch, but no age information was available for A. plaice at these younger ages.

The Portuguese catch-at-age was calculated from the Div. 3N otter trawl and gillnet fleets and is shown in Table 11.

The total catch-at-age for 1990, which is given with the rest of the catch matrix in Table 12, shows the same bimodal pattern as in 1989, with peaks at ages 5-6 and 9-10. It should be noted that there is a substantial number of fish in the catch at ages younger than 5 in both 1989 and 1990.

Canadian catch rates (C/E)

As in all recent assessments of this stock, a multiplicative model was used to analyze the C/E data from the Canadian offshore trawler fleet from 1956-90 (Table 13). These vessels have taken most of the catch from this stock over time; and in the late 1970s and early 1980s, were the only vessels for which a C/E data was available. Results from the model are shown in Table 14 and Figure 1. The C/E declined steadily from 1956 to 1976 and rose gradually to a relatively stable level from 1980-85. The C/E dropped sharply in 1986 and has remained at this relatively low level since then. Anecdotal information for this fleet to date in 1991 indicates a decline in C/E compared to the same period in 1990, although catches were relatively low in the first 5 months of 1990 and 1991.

C/E at age from the Canadian fleet, which uses the catch at age from Canadian vessels and the standardized effort from the multiplicative model using Canadian catches, is shown in Table 15. This index shows a stable but lower stock size in 1986-90 compared to the estimates of the early to mid-1980s. There is a change in the pattern of catch rate at age in the early 1980s with older ages predominating since 1981. The reason for this is not clear at this time.

Research vessel surveys

Spring

Stratified-random surveys have been carried out on the Grand Bank on Canadian vessels in the spring of each year from 1971 to 1991, with the exception of 1983. The stratification scheme used is shown in Figure 2, and the mean weight per tow on a stratified basis is shown in Tables 16-18.

In Div. 3L, the biomass index was highest from 1978-82, declined to a lower but stable level from 1985 to 1988, then declined sharply to a value in 1991 which is only about 20% of the 1985-88 mean value (Table 16). Strata 346, 366, and 368 were not surveyed in 1991 because of ice conditions; but these three strata accounted for only 2.5% of the biomass in the 1990 survey. Strata 729-734 in the deep water, which had not been surveyed in this series since 1985, accounted for about 5% of the 1991 estimate.

In Div. 3N, the biomass index also shows a decline in recent years, with 1991 being the lowest point in the series (Table 17). Table 19 indicates that the biomass has declined in strata both inside and outside the 200-mile limit.

In Div. 3Ø, the biomass index has not shown the same consistent decline, although recent levels are lower than those of the mid-1980s.

To allow comparison of the trends in abundance at age for this stock over the 1971-90 period, a multiplicative analysis of mean catch number per stratum was again carried out, using the same methodology employed in the 1990 assessment of this stock. The resulting series is adjusted for the change in the vessel-gear used for the surveys and accounts for strata not surveyed in each year. Tables 20-22 show the abundance for Div. 3L, 3N, and 3Ø respectively, with Table 23 containing the combined index. It should be noted that the data from the 1991 survey were not available on an age-by-age basis at this time.

Figures 3-6 show the trends in abundance for Div. 3L, 3N, 3Ø, and 3LNO respectively. In all areas, abundance was generally highest in the late 1970s and early 1980s as the strong year-classes of the early 1970s dominated survey catches. Abundance in 1989-90 was lower than any other years, and the 1991 abundance is certain to decline further, based on the biomass index from the 1991 survey. Figures 7-9 give an indication of the precision of the abundance estimates from the three divisions. The values for abundance were prior to adjustment by the multiplicative model for missing strata.

There is some evidence, from the surveys, of improved recruitment to the stock. The 1985 year-class, shown to be strong in juvenile flatfish surveys in Div. 3NO, showed up at ages 4 and 5 in Div. 3N as the largest estimates in the time series (excluding the anomalously high values in the 1978 survey). This year-class also showed up strongly in Div. 3Ø in 1990, but not so in 1989. The 1986 year-class appeared to be above average in Div. 3NO in 1990 at age 4. There is, as yet, no evidence from the spring surveys in Div. 3L that the 1985 or 1986 year-classes are strong.

It has been hypothesized that bottom temperatures may affect the abundance estimates of this stock, either through changing availability, natural mortality, or some other factor. Tables 24-26 show the mean bottom temperature, by depth range, from the fishing stations in the spring surveys from 1971 to 1990 in Div. 3L and 3N, and 1973-90 in Div. 3Ø. In general, the coldest years were 1972-74, 1985-86, and 1990. Most of the A. plaice population is found in Div. 3L, mostly at depths less than 100 fathoms. Temperatures in Div. 3L are lower on average than in Div. 3NO, due to the influence of the Labrador Current. Figure 10 shows the

trend in the mean bottom temperature at the 51-100 fathom range in Div. 3L compared to the total abundance of A. plaice from the spring surveys in this division. Recent experimental work has shown that A. plaice tolerate sudden decreases in water temperature and will survive in water as cold as -1.4 or -1.5. However, the long-term effects of reduced temperature on the species are not known, nor is any relationship known between trawl catchability of A. plaice and bottom temperature. Further work is required to determine if any relationships exist.

Fall

Stratified-random surveys have been conducted in Div. 3L in the fall from 1981 to 1990, usually in October-November and Figures 11-12 show the trends in the biomass and abundance indices for those fall surveys. Multiplicative models were used to adjust for missing strata in both series. The years 1981 and 1982 were not included in the biomass index because no conversion factors exist for catch weights between the r.v. A. T. CAMERON, which did these earlier surveys, and the r.v. W. TEMPLEMAN and A. NEEDLER, which were used for the surveys after 1982. Declines over the time period are apparent in both indices. Table 27 shows the mean catch weights on a stratified basis and Table 28 contains the results on an age-by-age basis. There is some evidence to suggest that the 1985 year-class may be strong, and possibly the 1986 as well.

Figure 13 shows a time series of abundance estimates from all surveys in Div. 3L over the period 1981-90, including the data from the spring and fall surveys discussed above. In 1990, a fall survey was also carried out in Div. 3NO. The following table compares the results from the spring and fall surveys in 1990:

		3L	3N	3Ø	3NO	3LNO
Spring	Abundance (x 10^{-6})	210	65	103	168	378
	Biomass ('000 t)	83	30	53	83	166
Fall	Abundance	357	68	102	170	527
	Biomass	136	25	60	85	221

Figures 14-16 show the mean number per tow at age from the spring and fall surveys in Div. 3L, 3N, and 3Ø respectively. The 1985 and 1986 year-classes dominated the catches in Div. 3N in both surveys. These year-classes were not as dominant in the other two divisions, where catches were generally comprised of older fish. For Div. 3LNO combined, Figure 17 shows that ages 5 and 7-9 were most abundant in the spring survey, compared to ages 5-8 in the fall survey.

Sequential population analysis (ADAPT)

The catch-at-age from 1975-90, the abundance-at-age from the Canadian groundfish surveys, and the C/E at age from the Canadian commercial fishery were used in the same formulation of the Adaptive framework that was employed in the 1990 assessment of this stock. The inadequacies in the catch-at-age for 1990 should be noted, as well as the fact that ages younger than 5 were not present in the catch matrix despite relatively large catches at these ages in recent years in the Regulatory Area. The results of the Adapt (Tables 29-32) indicated a lack of fit to the model, with almost all residuals in recent years in the age-by-age r.v. survey relationships being negative and the converse being true for the residuals in the C/E relationships (Table 31). This pattern has been noticed in previous years but was more pronounced in this assessment, and is the result of divergent indices. The r.v. data indicates a decline in recent years, and the C/E indicates stability, with the population estimates (Table 29) from the model being intermediate between these, generating the patterns of residuals. Some other long-standing difficulties with the SPA still exist for this stock, such as the retrospective pattern in fishing mortality estimates; e.g., population numbers for 1989 from the current assessment which are about 20% lower than those estimated for 1989 in last year's assessment, as well as the pattern of Fs increasing to high values at the older ages in the population. These problems, particularly the uncertainties with the catch-at-age and the lack of fit in the Adaptive framework, are serious enough to reject the results of the SPA.

Assessment results

This assessment indicates the continuing divergence of indices from r.v. surveys versus those from the commercial fishery. The C/E index from the Canadian fishery suggests the stock to be very stable at a relatively low level since 1986. However, ancillary information from the commercial fishery suggests that C/E in 1991 is lower than the C/E for the same period in 1990. Canadian and USSR spring surveys both indicate the stock to be at a relatively low level in recent years, and that the stock may still be declining.

However, there is also some difficulty interpreting recent r.v. survey results, with the stock size from the fall survey in Div. 3LNO in 1990 being about 40% larger than in spring 1990 and about 3 times as large as in spring 1991. If the spring 1991 survey results are an accurate measure of the stock, then the biomass is at a level well below that observed in any other year. There is evidence from most r.v. survey data that the 1985 and 1986 year-classes are strong and dominated the fisheries in the Regulatory Area in Div. 3N in 1990. Recruitment of year-classes prior to these appears to have been well below the levels observed for the year-classes of the early 1970s.

Prognoses

Although the catch was lower in 1988-90 than in the preceding 3 years, the TAC was still exceeded by about 25%-30% in these years. This is of concern, given that some fisheries in the Regulatory Area are catching large quantities of juvenile A. plaice. The current level of non-reported catch with no sampling makes this stock difficult if not impossible to assess.

The indices of abundance indicate that the stock is currently at a relatively low level, although the r.v. surveys indicate some improved recruitment. Continuation of catches above the TACs coupled with increased targeting of the fisheries in the Regulatory Area on young fish will reduce the potential benefits of improved recruitment. The total catch from this stock in 1992 should not exceed the current TAC of 25,800 t.

Table 1. Nominal catches (t) of American plaice for NAFO Divisions 3LNO, 1960-88 and TACs from 1973 to 1991.

Year	Canada	France	Poland	USSR	South Korea[a]	Other	Total	TAC
1960	21,352	2,106	-	569	-	20	24,047	-
1961	14,903	1,473	286	1,248	-	3	17,913	-
1962	15,217	973	171	1,841	-	4	18,206	-
1963	24,591	93	457	466	-	112	25,719	-
1964	35,474	1,582	539	680	-	292	38,567	-
1965	45,365	2,056	977	4,544	-	319	53,261	-
1966	51,225	1,246	860	11,484	-	196	65,011	-
1967	54,190	1,326	3,234	35,139	-	524	94,413	-
1968	48,674	406	203	23,751	-	133	73,167	-
1969	64,815	43	34	14,493	-	52	79,437	-
1970	54,929	389	40	10,232	-	1,055	66,645	-
1971	49,394	323	370	17,173	-	628	67,888	-
1972	41,605	322	2,515	14,164	-	755	59,361	-
1973	38,586	310	1,116	12,516	-	315	52,843	60,000
1974	35,101	418	615	10,074	-	89	46,297	60,000
1975	34,015	442	537	7,682	-	545	43,221	60,000
1976	47,806	305	5	3,280	-	429	51,825	47,000
1977	42,579	31	-	1,023	-	348	43,981	47,000
1978	48,634	168	-	1,048	-	178	50,028	47,000
1979	47,131	113	-	1,190	-	135	48,569	47,000
1980	48,296	183	-	336	-	271	49,086	47,000
1981	48,177	210	-	847	-	924	50,158	55,000
1982	49,620	133	-	67	715	517	51,052	55,000
1983	35,907	41	-	170	815	1,602[b]	38,535	55,000
1984	33,756	140	1	360	1,582	3,606[b]	39,445	55,000
1985	40,024	-	4	81	2,483	11,620[b]	54,212	49,000
1986	33,409	46	-	188	3,952	26,975[b]	64,570	55,000
1987	33,967	17	-	47	2,741	18,240[b]	55,012	48,000
1988[c]	26,832	-	-	159	2,522	11,322[b]	40,835	33,585[d]
1989[c]	-	-	-	-	-	-	-	30,300
1990	-	-	-	-	-	-	-	24,900
1991								25,800

[a] Includes a portion of catches reported as unspecified flounder. See text for details.
[b] Includes some catches estimated from surveillance reports.
[c] See text for details of 1989-90 catches.
[d] Effective TAC.

Table 2. Breakdown of catches from Table 1 listed as "other" for 1984-88.

Year	Spain	Portugal	Panama[b]	USA	Cayman Islands[b]	Other[a]	Total
1984	1,622	-	1,800	-	-	184	3,606
1985	5,498	27	3,892	1,310	797	96	11,620
1986	11,882	9,240	3,756	1,506	572	19	26,975
1987	14,476	2,516	-	1,248	-	-	18,240
1988	8,956	872	-	1,379	-	115[c]	11,322

[a]Countries not in Tables 1 or 2.
[b]Not reported to NAFO. Catches estimated from surveillance reports.
[c]Includes some estimated catches.

Table 3. Catches of American plaice in Divisions 3LNO in 1989 and 1990.

	1989	1990
Canada	27,926	22,560
EEC-Spain	10,909	304
EEC-Portugal	588	357
USA	1,133	10
S. Korea	724	695
France-SP	93	-
Japan	52	-
USSR	6	17
Non-member	1,967	1,900
Other member[1]	-	6,196
Total	43,398	32,039

[1] Estimated

Table 4. Breakdown of plaice nominal catches (t) in Divisions 3LNØ by Division, for the years 1960-88.

Year	Division 3L	Division 3N	Division 3Ø	UNK	Total
1960	19,397	3,912	738	-	24,047
1961	13,398	3,498	1,017	-	17,913
1962	13,584	3,923	699	-	18,206
1963	16,512	7,465	1,742	-	25,719
1964	21,391	14,587	2,589	-	38,567
1965	25,034	26,270	1,957	-	53,261
1966	18,572	34,698	11,741	-	65,011
1967	38,515	24,364	31,534	-	94,413
1968	39,126	20,038	14,003	-	73,167
1969	52,880	14,442	12,115	-	79,437
1970	39,347	21,032	6,266	-	66,645
1971	37,851	22,873	7,164	-	67,888
1972	33,330	17,387	8,644	-	59,361
1973	20,103	20,883	11,857	-	52,843
1974	16,610	21,126	8,561	-	46,297
1975	15,171	21,308	6,742	-	43,221
1976	25,122	18,623	8,080	-	51,825
1977	23,763	16,543	3,675	-	43,981
1978	30,145	13,443	6,440	-	50,028
1979	28,708	14,712	5,149	-	48,569
1980	31,717	15,119	2,250	-	49,086
1981	37,269	10,628	2,261	-	50,158
1982[a]	32,761	13,101	5,190	-	51,052
1983[a]	22,964	11,107	4,464	-	38,535
1984[a,b]	20,307	15,147	3,991	-	39,445
1985[a,b]	23,320	25,806	5,086	-	54,212
1986[a,b]	25,745	34,012	4,813	-	64,570
1987[a]	32,937	16,331	5,744	-	55,012
1988[a,b]	18,425	17,587	4,823	-	40,835

[a]Includes breakdown of unspecified flounder catches by S. Korea.
[b]Includes estimates of non-reported catch on the Tail of the Bank outside Canadian 200-mile limit. These catches are attributed 90%:10% to Divisions 3N:3Ø.

Table 5. Breakdown of Canadian (N+SF) catches by division, month, and gear for A. plaice in Divisions 3LNO in 1990.

	3L						3N						3Ø						
	OT		SS		Misc[a]		OT		SS		Misc[a]		OT		SS		LL		
	(N)	(SF)	(N)	(SF)	(N)	(SF)	(N)	(SF)	(N)	(SF)	(N)	(SF)	(N)	(SF)	(N)	(SF)	(N)	(SF)	Total
Jan	7																		7
Feb	1	5													1		1		8
Mar	63	5											12	5					85
Apr	483	2			6						2		31	2	108		2		636
May	1066	3			122	4	192		8		1	2	605	8	196		3	6	2216
Jun	1918	37			318	5	227	1				4	916	29	179			4	3638
Jul	2003		147		459	3	933		278			12	835		28			9	4707
Aug	1149	1	147		347	11	1427	10	180	6	1	6	379		3	12		5	3684
Sep	1549		85		102	2	880	2	44			1	282	1	10			1	2959
Oct	2365	10	189		32	1	395	6	84			1	174	2	7			3	3269
Nov	709		49		8		147		6				237	5	16		1	1	1179
Dec	40	4	3		6		23		8				67	15	5			1	172
Subtotal	11353	67	620		1400	26	4224	19	608	6	4	26	3538	67	553	12	7	30	22560
Total			Misc[a] GN		1334				Misc GN		1								
			LL		16				LL		3	26							
			Other		50														

Div. Totals	3L	3N	3Ø
	13466	4887	4207

(N) = Canada (Newfoundland)
(SF) = Canada (Scotia-Fundy)
OT = Otter trawl
SS = Scottish seine
Misc = Miscellaneous gears
GN = Gillnet
LL = Longline

Table 6. Samples used to calculate catch at age and mean weights at age for A. plaice in the Canadian fishery in Div. 3LNO in 1990. Numbers in parentheses are the numbers of observations, and n is the number of samples.

Age-length key	Length frequency	n	Catch (t)	Description
Inshore, Q2, 3L (248) GN,	May, 3L (1434)	4	132	Misc gears, 3L, Jan-May
Inshore, Q3, 3L (380) GN,	Jun, 3L (799)	2	323	Jun
	Jul (1421)	5	820	Jul-Aug
Inshore, Q4, 3L (202) GN,	Sep, 3L (1150)	3	151	Sep-Dec
Offshore, Q1, 3L (61) OT, Q2 (747)	Jan, 3L (293)	1	81	OT, 3L, Jan-Mar
Offshore, Q2, 3L (747) OT,	Apr, 3L (1674)	5	485	Apr
	May (2160)	6	1069	May
	Jun (1389)	4	1955	Jun
Offshore, Q3, 3L (752) OT,	Jul, 3L (1409)	4	2003	Jul
	Aug (1068)	3	1150	Aug
	Sep (3583)	10	1549	Sep
SS,	Sep (1041)	3	568	SS, 3L, Jul-Oct
Offshore, Q4, 3L (712) OT,	Oct, 3L (5570)	16	2375	OT, 3L, Oct
	Nov (1666)	5	805	OT+SS, 3L, Nov-Dec
Offshore, Q2, 3N (55) OT, Q3 (642)	May, 3N (285)	1	437	All gears, 3N, Jan-Jun
Offshore, Q3, 3N (642) OT,	Jul, 3N (1163)	3	1223	Jul
	Aug (1382)	4	1630	Aug
	Sep (875)	2	927	Sep
Offshore, Q3, 3N (642) OT, Q4 (90)	Nov, 3N (580)	1	670	Oct-Dec
Offshore, Q2, 3Ø (265) OT,	May, 3Ø (979)	3	675	OT+LL, 3Ø, Jan-May
	Jun (322)	1	949	Jun
SS,	Jun (317)	1	484	SS, 3Ø, Jan-Jun
Offshore, Q3, 3Ø (182) OT,	Jul, 3Ø (649)	2	1565	All gears, 3Ø, Jul-Sep
Offshore, Q4, 3Ø (199) OT,	Oct, 3Ø (413)	1	186	3Ø, Oct
	Nov (330)	1	348	Nov-Dec

Table 7 Catch-at-age & mean weights-at-age from Canadian 3L fishery in 1990.

3L-INSHORE

AGE	AVERAGE WEIGHT	AVERAGE LENGTH	CATCH MEAN	CATCH STD. ERR.	CATCH C. V.
8	0.265	31.336	54	10.62	0.20
* 9	0.344	33.890	334	27.88	0.08
10	0.472	37.268	920	41.04	0.04
*11	0.696	41.867	676	35.13	0.05
*12	1.007	46.844	231	16.81	0.07
13	1.333	50.985	68	7.62	0.11
*14	1.759	55.421	23	4.10	0.18
15	2.215	59.377	9	2.48	0.26
*16	2.715	63.120	2	0.86	0.51
*17	3.905	70.500		0.00	0.00

3L-OFFSHORE

AGE	AVERAGE WEIGHT	AVERAGE LENGTH	CATCH MEAN	CATCH STD. ERR.	CATCH C. V.
6	0.228	29.958	13	6.99	0.56
* 7	0.239	30.357	50	14.84	0.30
8	0.292	32.250	1160	73.61	0.06
9	0.399	35.400	4657	147.26	0.03
10	0.549	38.987	5101	158.58	0.03
11	0.767	43.125	3696	116.31	0.03
12	1.059	47.534	2097	82.32	0.04
*13	1.378	51.458	891	49.17	0.06
14	1.783	55.618	334	22.42	0.07
15	2.302	60.057	126	12.62	0.10
16	2.951	64.714	26	5.55	0.21
*17	4.008	71.037	2	1.65	0.86

Table 8 Catch-at-age & mean weights-at-age from Canadian 3N fishery in 1990.

AGE	AVERAGE WEIGHT	AVERAGE LENGTH	CATCH MEAN	CATCH STD. ERR.	CATCH C. V.
* 5	0.205	29.031	25	4.76	0.19
6	0.301	32.507	261	30.60	0.12
7	0.362	34.308	530	47.66	0.09
8	0.478	37.305	907	63.73	0.07
9	0.648	40.916	990	68.06	0.07
10	0.803	43.619	933	67.16	0.07
11	1.027	47.020	730	60.60	0.08
12	1.271	50.180	552	49.36	0.09
*13	1.615	53.975	348	31.65	0.09
14	2.038	57.854	213	20.90	0.10
15	2.594	62.245	109	13.18	0.12
*16	3.298	66.914	26	6.25	0.24
*17	4.324	72.561	4	0.36	0.01

Table 9 Catch-at-age & mean weights-at-age from Canadian 3O fishery in 1990.

AGE	AVERAGE WEIGHT	AVERAGE LENGTH	CATCH MEAN	CATCH STD. ERR.	CATCH C. V.
* 5	0.287	32.121	3	2.15	0.83
* 6	0.355	34.117	77	20.56	0.27
7	0.365	34.387	272	39.47	0.15
8	0.446	36.516	899	77.09	0.09
9	0.589	39.645	1277	107.48	0.08
10	0.738	42.353	946	97.31	0.10
11	0.920	45.315	788	85.15	0.11
12	1.215	49.368	454	54.31	0.12
13	1.648	54.254	192	29.45	0.15
*14	2.030	57.768	195	26.32	0.13
*15	2.783	63.558	81	14.67	0.18
*16	3.323	67.095	26	7.99	0.31
*17	4.819	75.086	2	0.02	0.01

Table 10 Catch-at-age & mean weights-at-age from Canadian 3LNO fishery in 1990.

AGE	AVERAGE WEIGHT	AVERAGE LENGTH	CATCH MEAN	CATCH STD. ERR.	CATCH C. V.
* 5	0.213	29.317	28	5.23	0.19
* 6	0.310	32.770	350	37.52	0.11
* 7	0.356	34.100	853	63.64	0.07
8	0.393	35.022	3019	124.64	0.04
* 9	0.464	36.830	7259	196.58	0.03
10	0.593	39.737	7900	202.02	0.03
*11	0.811	43.755	5889	160.27	0.03
*12	1.112	48.174	3334	111.56	0.03
*13	1.466	52.385	1490	65.91	0.04
*14	1.916	56.783	765	40.60	0.05
*15	2.517	61.645	325	23.23	0.07
*16	3.180	66.171	80	11.59	0.14
*17	4.343	72.680	8	1.65	0.21

Table 11. Catch-at-age of American plaice in Divisions 3LNO in 1990.

Age	Canada	Others[a]	Portugal (3N)
4	0	8,538	11
5	28	14,994	19
6	350	7,282	15
7	853	3,585	23
8	3,019	1,540	17
9	7,259	1,338	16
10	7,900	703	10
11	5,889	514	9
12	3,334	273	4
13	1,490	197	5
14	765	169	5
15	325	121	4
16	80	0	0
17	8	0	4
18	0	0	3
Catch	22,560	9,095[a]	187

[a]Spanish catch-at-age applied to catches form S. Korea and other non-member countries, as well as to some estimated catches.

TABLE 12. A.PLAICE CATCH AT AGE (000) IN DIV. 3LNO.

AGE	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
5	354	883	837	974	1558	1257	263	154	27	119	48	296	4407	2237	2908	12745	15134
6	5955	3128	3907	6723	4467	6551	2977	554	314	991	397	788	9707	4941	3213	11553	7694
7	10475	7220	8781	8743	9195	13532	9531	2248	1814	3053	1516	2362	12556	7691	4853	11432	4489
8	10059	9433	19363	11730	10397	18747	12578	4786	4799	5797	3311	5652	12530	10893	7269	9652	4604
9	7768	9234	16597	13559	12743	14977	14111	7921	8946	8343	5853	10694	13372	15867	10123	14180	8666
10	9004	7903	12338	11157	13881	12506	14212	11425	12836	7707	9958	15741	13874	17640	10325	12387	8666
11	7086	5701	8323	6520	9938	8791	11288	13565	15801	8493	12887	14528	14246	11404	9260	8405	6452
12	4596	4732	5156	4257	6823	3775	8088	11872	14489	7517	8964	9233	10376	6986	6040	4972	3633
13	3809	3788	3024	2369	3655	1843	3732	8693	7942	4588	5072	4108	5947	3076	2692	2029	1702
14	2278	2617	2309	1493	2239	714	1565	5591	4224	2480	2515	1969	2637	1303	1156	1027	945
15	1141	1461	1347	1000	1472	342	645	2938	2000	1219	1090	1235	1416	768	656	550	453
16	651	763	594	342	649	159	265	1119	641	373	404	388	542	247	267	146	80
17	267	475	245	182	212	63	87	394	206	130	93	160	162	27	38	14	12
18	80	234	65	101	107	16	25	246	96	49	15	9	35	4	1	5	3

Table 13. Summary of Canadian directed catch (t) and effort (hrs) used in the multiplicative model, for Divisions 3LNØ A. plaice CPUE calculations.

Year	Division 3L		Division 3N		Division 3Ø	
	Catch	Effort	Catch	Effort	Catch	Effort
1956	3862	3824	2114	2481	8	30
1957	3020	3383	2288	2663	20	36
1958	5095	5154	3098	4435	-	-
1959	5758	6780	3645	4738	31	59
1960	9791	11004	2584	3697	45	124
1961	6930	8790	2328	3615	50	70
1962	8278	12524	3419	6280	4	18
1963	11453	15543	6053	8410	221	503
1964	10277	14401	9082	10737	571	981
1965	11219	14487	18083	23677	962	1806
1966	8542	11560	20947	27769	2994	5220
1967	22106	30236	12262	15830	2193	3071
1968	24582	40128	6744	11389	359	782
1969	32196	59051	7054	14310	1246	2778
1970	19978	39158	3932	8147	3137	5273
1971	19998	41637	4442	9926	1622	3106
1972	17258	35232	5876	13452	874	2245
1973	12548	24721	7479	14354	6362	13137
1974	11278	26781	9609	21436	6722	16568
1975	10267	25395	11769	28294	2585	7929
1976	20132	45254	15569	38003	5151	17091
1977	18027	42580	14085	35295	2559	7738
1978	23687	48906	9961	24719	5067	13477
1979	20518	40603	10095	21629	3595	8536
1980	22639	37118	11930	22841	1446	3362
1981	28058	48719	6069	11741	1330	2917
1982	23503	40865	9541	18585	2928	6420
1983	12172	20711	6072	8739	2851	6102
1984	10318	17130	6368	11532	2191	4894
1985	14930	22476	10594	17641	1993	4666
1986	12665	27235	4969	12109	2167	5802
1987	14358	32956	1835	4874	1896	5505
1988	8385	20492	3359	8360	2857	8413
1989	11334	27512	3371	8699	2720	7325
1990	7556	20258	2846	6703	2942	6891

Table 4 . Results of multiplicative analysis of Canadian C/E data for A.plaice in Div. 3LNO.

REGRESSION OF MULTIPLICATIVE MODEL

MULTIPLE R..... 0.759
MULTIPLE R SQUARED..... 0.577

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DF	SUMS OF SQUARES	MEAN SQUARES	F-VALUE
INTERCEPT	1	3.785E1	3.785E1	
REGRESSION	49	6.019E0	1.229E-1	44.882
TYPE 1	2	9.940E-1	4.970E-1	181.593
TYPE 2	2	2.863E-1	1.431E-1	52.296
TYPE 3	11	1.905E-1	1.731E-2	6.326
TYPE 4	34	5.192E0	1.527E-1	55.797
RESIDUALS	1614	4.418E0	2.737E-3	
TOTAL	1664	4.828E1		

Type 1: Country-Gear-TC
3114=Can(N),OTB1,TC4
3124=Can(N),OTB2,TC4
3125=Can(N),OTB2,TC5

Type 2: Division
32=3L,34=3N,35=3O

Type 3: Month

Type 4: Year

REGRESSION COEFFICIENTS

CATEGORY	CODE	VARIABLE	COEFFICIENT	STD. ERROR	NO. OBS.
1	3125	INTERCEPT	0.351	0.068	1664
2	32				
3	7				
4	56				
1	3114	1	-0.362	0.019	480
	3124	2	-0.111	0.019	383
2	34	3	-0.083	0.014	606
	35	4	-0.166	0.017	435
3	1	5	0.083	0.035	75
	2	6	0.084	0.033	89
	3	7	0.006	0.033	91
	4	8	-0.110	0.030	119
	5	9	-0.113	0.026	155
	6	10	-0.021	0.025	170
	8	11	0.000	0.026	167
	9	12	-0.032	0.026	174
	10	13	-0.060	0.026	154
	11	14	-0.017	0.026	159
	12	15	-0.005	0.028	126
4	57	16	-0.073	0.094	13
	58	17	-0.111	0.085	16
	59	18	-0.126	0.082	17
	60	19	-0.171	0.081	18
	61	20	-0.265	0.083	16
	62	21	-0.438	0.080	19
	63	22	-0.311	0.077	22
	64	23	-0.279	0.076	33
	65	24	-0.324	0.071	55
	66	25	-0.353	0.070	68
	67	26	-0.439	0.070	70
	68	27	-0.741	0.072	59
	69	28	-0.885	0.071	70
	70	29	-0.923	0.072	59
	71	30	-1.011	0.073	59
	72	31	-1.030	0.072	63
	73	32	-0.935	0.072	69
	74	33	-1.154	0.072	63
	75	34	-1.207	0.073	59
	76	35	-1.229	0.071	70
	77	36	-1.191	0.072	59
	78	37	-1.137	0.071	75
	79	38	-1.038	0.072	61
	80	39	-0.881	0.072	60
	81	40	-0.884	0.072	62
	82	41	-0.882	0.072	60
	83	42	-0.807	0.074	52
	84	43	-0.927	0.076	45
	85	44	-0.845	0.074	50
	86	45	-1.149	0.075	48
	87	46	-1.199	0.076	43
	88	47	-1.179	0.076	40
	89	48	-1.179	0.076	43
	90	49	-1.165	0.078	34

Table 4 . Continued.

PREDICTED CATCH RATE

YEAR	LN TRANSFORM MEAN	LN TRANSFORM S.E.	RETRANSFORMED MEAN	RETRANSFORMED S.E.	CATCH	EFFORT
1956	0.3506	0.0047	1.419	0.097	1	1
1957	0.2779	0.0056	1.318	0.099	1	1
1958	0.2397	0.0040	1.270	0.081	1	1
1959	0.2245	0.0036	1.251	0.075	1	1
1960	0.1798	0.0033	1.197	0.069	21352	17843
1961	0.0853	0.0038	1.088	0.067	14903	13692
1962	-0.0876	0.0032	0.916	0.052	15217	16615
1963	0.0394	0.0028	1.040	0.055	24591	23642
1964	0.0717	0.0026	1.074	0.055	35474	33016
1965	0.0261	0.0016	1.027	0.041	45365	44169
1966	-0.0026	0.0014	0.998	0.037	51225	51324
1967	-0.0884	0.0013	0.916	0.033	54190	59158
1968	-0.3904	0.0014	0.677	0.025	48674	71871
1969	-0.5349	0.0013	0.586	0.021	64815	110572
1970	-0.5722	0.0014	0.565	0.021	54929	97275
1971	-0.6608	0.0014	0.517	0.020	49394	95586
1972	-0.6794	0.0014	0.507	0.019	41605	82023
1973	-0.5842	0.0013	0.558	0.020	38586	69158
1974	-0.8032	0.0013	0.448	0.016	35101	78311
1975	-0.8568	0.0014	0.425	0.016	34015	80077
1976	-0.8787	0.0012	0.416	0.014	47806	115019
1977	-0.8407	0.0013	0.432	0.016	42579	98629
1978	-0.7869	0.0012	0.456	0.016	48634	106742
1979	-0.6872	0.0013	0.503	0.018	47131	93634
1980	-0.5308	0.0013	0.589	0.022	48296	82063
1981	-0.5339	0.0014	0.587	0.022	48177	82111
1982	-0.5310	0.0014	0.588	0.022	49620	84325
1983	-0.4562	0.0015	0.634	0.025	35907	56628
1984	-0.5757	0.0018	0.562	0.024	33756	60060
1985	-0.4943	0.0016	0.610	0.024	40024	65575
1986	-0.7980	0.0016	0.450	0.018	33409	74164
1987	-0.8480	0.0019	0.428	0.018	33967	79278
1988	-0.8288	0.0018	0.437	0.018	26832	61433
1989	-0.8281	0.0018	0.437	0.019	27926	63891
1990	-0.8143	0.0020	0.443	0.020	22560	50912

AVERAGE C.V. FOR THE RETRANSFORMED MEAN: 0.044

Table 5. C/E at age from the Canadian fishery for A.plaice in Div.3LNO.

AGE	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
5	3	9	7	10	14	13	3	2	0	2	1	0	1	0	0	0	1
6	58	31	31	66	41	68	36	6	4	16	6	3	7	1	1	2	7
7	101	71	71	86	84	140	114	26	21	50	22	21	25	15	10	18	17
8	97	93	155	115	95	194	151	56	55	95	47	60	48	71	48	77	59
9	75	91	133	133	116	155	169	93	103	137	84	120	78	145	121	147	143
10	87	78	99	110	127	129	171	134	148	127	142	177	106	162	145	154	155
11	69	56	67	64	91	91	135	159	182	140	184	159	129	110	137	110	116
12	44	47	41	42	62	39	97	139	167	124	128	101	90	68	84	65	65
13	37	37	24	23	33	19	45	102	91	76	72	44	46	29	38	28	29
14	22	26	19	15	20	7	19	65	49	41	36	18	20	13	16	13	15
15	11	14	11	10	13	4	8	34	23	20	16	11	9	6	8	7	6
16	6	8	5	3	6	2	3	13	7	6	6	3	3	2	3	2	2
17	3	5	2	2	2	1	1	5	2	2	1	1	1	0	1	0	0
18	1	2	1	1	1	0	0	3	1	1	0	0	0	0	0	0	0

Table 16. Mean weight (kg) of American plaice per tow, by stratum, from R. V. surveys in Division 3L. Numbers in parentheses are the number of successful 30-minute tows in each stratum. The stratified mean weight per tow (kg/30 min.) and the biomass estimates (t x 10^{-3}), are given at the bottom of the table.

			Year - Trip												
Depth (fm)	Stratum	No. of trawlable units	1971 ATC 187	1972 ATC 199	1973 ATC 207, 208 209	1974 ATC 222	1975 ATC 233	1976 ATC 246	1977 ATC 262	1978 ATC 276	1979 ATC 289, 290, 291	1980 ATC 304, 305	1981 ATC 317, 318, 319	1982 ATC 327, 328, 329	1984 AN 28
51-100	328	114,023	-	-	-	-	-	-	26.9(3)	-	27.3(5)	-	52.5(2)	72.8(3)	12.5(2)
51-100	341	118,151	-	-	48.4(3)	-	-	-	94.2(4)	43.8(4)	88.8(6)	47.0(6)	136.5(2)	146.6(5)	69.6(4)
51-100	342	43,913	-	-	-	-	-	-	75.4(2)	72.6(2)	59.5(4)	77.0(4)	-	43.3(3)	60.1(4)
51-100	343	39,409	-	-	-	-	-	-	103.1(2)	112.6(3)	90.2(4)	107.1(4)	177.5(2)	115.8(4)	-
101-150	344	112,146	-	-	-	-	-	92.3(4)	100.5(4)	62.4(4)	28.6(2)	105.5(3)	105.8(5)	58.0(4)	-
151-200	345	107,492	-	-	-	-	-	22.8(4)	27.1(4)	56.3(2)	8.4(4)	10.1(5)	32.5(4)	7.6(4)	-
151-200	346	64,931	-	-	-	-	45.9(2)	22.3(2)	8.4(3)	-	4.8(4)	2.8(3)	29.8(3)	5.3(3)	-
101-150	347	73,788	28.8(2)	-	-	24.5(2)	61.9(2)	151.5(3)	91.1(3)	59.3(4)	58.3(4)	102.3(5)	86.1(4)	93.0(2)	-
51-100	348	159,136	214.4(3)	92.3(3)	-	73.6(6)	47.5(4)	83.7(6)	211.6(6)	232.8(6)	150.2(6)	168.7(7)	89.5(7)	118.3(4)	-
51-100	349	158,686	281.2(3)	46.8(4)	-	17.0(4)	23.6(2)	66.6(3)	124.3(6)	65.1(6)	105.7(7)	110.8(9)	72.8(4)	125.6(6)	89.5(6)
31-50	350	155,458	77.9(3)	56.5(2)	33.5(4)	82.3(3)	78.1(3)	99.0(4)	40.5(4)	44.3(6)	45.5(9)	96.8(10)	114.5(3)	76.6(7)	108.2(6)
31-50	363	133,614	56.3(3)	111.7(3)	50.1(4)	69.8(4)	21.5(3)	90.4(4)	103.1(5)	96.8(5)	88.0(8)	77.2(5)	62.3(3)	168.0(5)	92.2(5)
51-100	364	211,456	155.7(4)	138.8(3)	-	92.3(4)	99.4(2)	164.6(3)	236.1(7)	172.4(6)	195.5(8)	166.9(6)	172.3(3)	195.5(6)	144.4(5)
51-100	365	78,142	192.0(3)	158.5(2)	-	43.1(3)	79.0(2)	62.4(3)	243.7(3)	243.3(2)	161.6(4)	156.1(4)	141.5(2)	88.7(3)	-
101-150	366	104,639	34.4(3)	-	-	63.0(3)	37.6(4)	40.8(4)	76.7(4)	-	7.2(4)	70.5(4)	20.2(3)	8.3(5)	-
151-200	368	25,071	0.0(2)	-	-	4.8(2)	1.1(2)	29.0(3)	0.0(3)	-	0.7(4)	0.8(2)	6.3(2)	0.5(2)	-
101-150	369	72,137	31.8(3)	-	-	14.2(3)	23.8(3)	52.9(4)	51.0(3)	18.6(2)	16.8(4)	13.7(3)	39.8(2)	20.5(2)	-
51-100	370	99,085	44.0(2)	82.5(3)	-	90.5(3)	43.3(3)	93.1(3)	162.1(3)	70.7(3)	211.7(4)	172.2(3)	54.0(2)	133.0(2)	-
31-50	371	84,147	95.8(3)	91.9(2)	-	63.1(3)	-	-	93.4(3)	114.1(3)	175.8(3)	147.0(3)	177.0(2)	102.9(4)	-
31-50	372	184,658	27.1(4)	36.3(3)	124.1(3)	50.4(3)	36.1(3)	47.5(3)	35.0(6)	24.5(7)	38.4(9)	39.7(6)	95.8(4)	50.8(6)	63.7(5)
31-50	384	84,072	87.9(3)	69.5(2)	12.4(3)	26.6(3)	-	-	54.0(2)	54.5(3)	79.0(4)	48.8(2)	60.5(2)	32.3(2)	-
51-100	385	176,851	139.5(4)	84.2(4)	34.5(3)	17.3(2)	72.1(4)	79.5(2)	168.0(6)	135.4(6)	102.2(7)	224.4(4)	87.3(3)	70.8(3)	-
101-150	386	73,788	20.9(2)	-	-	24.1(3)	22.6(3)	51.7(2)	4.8(3)	19.5(3)	11.5(4)	7.2(3)	20.8(2)	9.2(3)	-
151-200	387	53,896	1.2(3)	-	-	0.5(3)	0.0(2)	1.0(3)	2.5(2)	2.7(3)	1.0(4)	0.7(2)	1.0(2)	1.3(3)	-
151-200	388	27,098	1.4(2)	-	12.2(2)	2.6(3)	0.2(2)	13.0(2)	0.7(2)	0.3(2)	0.6(3)	0.1(2)	0.1(2)	0.4(2)	-
101-150	389	61,628	17.4(3)	17.0(2)	13.4(2)	14.5(3)	22.7(2)	38.8(2)	7.0(3)	8.2(3)	2.3(4)	4.8(3)	23.9(2)	4.5(2)	-
51-100	390	111,170	236.2(3)	30.1(3)	9.7(3)	1.6(3)	278.2(3)	-	68.1(2)	66.1(4)	93.8(5)	99.0(3)	18.5(2)	35.8(4)	-
101-150	391	21,168	-	24.1(2)	12.2(2)	43.3(3)	16.8(2)	-	45.4(2)	15.4(2)	17.2(4)	11.0(2)	4.3(2)	10.3(2)	-
151-200	392	10,884	-	-	291.9(3)	1.8(4)	2.4(2)	-	3.1(2)	1.9(3)	4.2(2)	1.5(2)	2.8(2)	0.8(2)	-
201-300	729	13,962	-	-	-	-	-	-	-	-	-	-	-	-	-
301-400	730	12,761	-	-	-	-	-	-	-	-	-	-	-	-	-
201-300	731	16,214	-	-	-	-	-	-	-	-	-	-	-	-	-
301-400	732	17,340	-	-	-	-	-	-	-	-	-	-	-	-	-
201-300	733	35,130	-	-	-	-	-	-	-	-	-	-	-	-	-
301-400	734	17,115	-	-	-	-	-	-	-	-	-	-	-	-	-
201-300	735	20,417	-	-	-	-	-	-	-	-	-	-	0.0(2)	-	-
301-400	736	13,136	-	-	-	-	-	-	-	-	-	-	-	-	-
Mean (#sets)			109.4(58)	79.0(38)	49.2(32)	47.1(70)	60.7(55)	76.8(64)	98.3(102)	87.1(94)	80.9(140)	95.3(115)	80.7(80)	80.4(103)	87.4(37)
Biomass			232.8	135.8	53.3	101.7	124.8	163.9	271.3	213.7	223.4	252.1	221.0	222.0	97.9

Table 16. (Cont'd.)

Stratum	1985 WT 28, 29, 30	1986 WT 48	1987 WT 58, 59, 60	1988 WT 70, 71	1989 WT 82, 83	1990 WT 96	1991[a] WT 106, 107
	Year - Trip						
328	51.6(4)	51.2(9)	85.9(7)	23.3(2)	22.9(8)	71.0(7)	14.2(6)
341	40.3(9)	43.7(9)	82.5(6)	50.8(6)	31.4(8)	111.0(4)	8.5(6)
342	35.2(3)	53.5(3)	91.8(2)	94.0(2)	39.6(3)	32.5(2)	3.6(2)
343	12.7(3)	48.0(4)	111.5(3)	67.0(3)	135.3(3)	27.4(3)	5.3(2)
344	41.6(5)	80.3(8)	51.1(4)	83.2(6)	145.6(7)	24.4(6)	2.0(5)
345	23.3(5)	16.3(7)	11.0(4)	12.9(8)	7.6(9)	6.3(4)	10.7(3)
346	26.3(2)	33.1(5)	7.3(5)	8.8(4)	6.4(4)	9.4(4)	-
347	42.1(5)	50.4(5)	43.5(3)	50.5(5)	63.3(6)	43.9(4)	4.1(4)
348	65.1(18)	104.9(12)	130.1(8)	142.3(11)	79.2(9)	44.5(11)	7.7(8)
349	49.8(14)	58.3(14)	105.1(11)	135.9(8)	45.7(11)	29.4(9)	9.4(9)
350	98.5(12)	99.5(11)	68.7(11)	86.1(8)	61.7(11)	30.6(7)	30.8(8)
363	107.8(8)	138.4(10)	68.6(9)	97.0(7)	53.6(9)	36.1(7)	23.4(7)
364	102.3(17)	87.4(17)	164.0(15)	136.1(10)	94.4(16)	50.0(12)	18.4(11)
365	54.1(7)	68.5(5)	107.9(5)	82.5(4)	88.0(6)	13.6(4)	27.8(4)
366	37.6(6)	21.4(8)	14.5(7)	18.8(6)	15.3(8)	12.2(6)	-
368	30.5(2)	16.5(2)	1.7(3)	2.0(2)	1.6(3)	7.6(2)	-
369	71.7(5)	16.1(6)	8.4(5)	6.3(4)	12.5(6)	7.5(5)	5.0(2)
370	56.6(8)	96.6(8)	69.8(7)	129.5(5)	77.3(8)	26.8(7)	22.9(6)
371	107.5(7)	68.0(6)	58.3(7)	147.8(5)	108.3(6)	63.3(6)	19.8(5)
372	109.9(12)	69.6(14)	30.1(13)	58.3(11)	52.7(13)	22.8(7)	12.6(10)
384	100.3(6)	114.0(6)	56.4(7)	53.9(5)	102.0(6)	8.7(4)	6.1(4)
385	48.8(15)	62.8(13)	74.1(11)	46.3(10)	73.3(12)	8.5(11)	16.2(8)
386	26.0(5)	9.7(6)	7.5(5)	32.5(4)	12.7(6)	14.2(5)	14.4(3)
387	20.8(6)	3.0(4)	0.0(4)	1.2(4)	2.5(5)	2.1(4)	8.1(3)
388	25.5(2)	11.5(2)	1.4(2)	0.9(2)	2.0(3)	0.5(2)	5.5(3)
389	27.2(5)	27.7(5)	10.6(6)	19.7(3)	14.6(5)	4.8(4)	7.2(3)
390	15.0(9)	14.5(8)	28.0(7)	11.1(5)	9.4(8)	6.1(5)	4.9(5)
391	9.5(2)	61.0(2)	12.5(2)	27.8(2)	7.4(3)	4.8(2)	13.3(2)
392	13.8(2)	9.5(2)	0.6(2)	0.9(2)	1.5(3)	3.2(2)	5.8(2)
729	0.5(2)	-	-	-	-	-	3.1(3)
730	0.3(2)	-	-	-	-	-	0.1(2)
731	326.0(2)	-	-	-	-	-	3.4(2)
732	0.3(2)	-	-	-	-	-	0.9(2)
733	21.4(3)	-	-	-	-	-	0.5(2)
734	1.5(3)	-	-	-	-	-	3.2(2)
735	57.0(2)	-	-	-	-	-	-
736	5.0(2)	-	-	-	-	-	-
Mean (#sets)	60.3(221)	63.1(211)	65.5(181)	69.9(154)	55.4(205)	29.9(156)	- (144)
Biomass	175.1	174.1	180.9	193.0	153.0	82.6	36.1

[a]Preliminary analysis

Table 17. Mean weight (kg) of American plaice per tow, by stratum, from R. V. surveys in Division 3N. Numbers in parentheses are the number of successful 30-minute tows in each stratum. The stratified mean weight per tow (kg/30 min.) and the biomass estimates (t x 10^{-3}) are given at the bottom of the table.

Depth (fm)	Stratum	No. of trawlable units	1971 ATC 187	1972 ATC 199	1973 ATC 208, 209	1974 ATC 222	1975 ATC 233	1976 ATC 245	1977 ATC 263	1978 ATC 277, 278	1979 ATC 289	1980 ATC 304	1981 ATC 319	1982 ATC 328, 329	1984 AN 27	1985 WT 29 AN 43
151–200	357	12,317	–	–	0.0(2)	–	–	–	5.5(2)	–	2.4(3)	0.5(3)	0.0(2)	0.8(2)	0.0(2)	22.3(2)
101–150	358	16,899	–	2.4(4)	6.5(3)	–	–	–	20.0(2)	–	2.1(2)	1.8(3)	0.0(3)	3.5(2)	3.5(2)	180.5(2)
51–100	359	31,620	–	46.3(3)	31.3(3)	–	–	66.3(3)	114.4(2)	–	60.3(4)	36.0(4)	25.4(3)	28.5(2)	51.8(2)	28.0(2)
31–50	360	224,717	–	34.1(4)	–	–	23.5(4)	44.3(4)	58.8(4)	106.7(4)	60.4(9)	39.9(11)	43.3(6)	37.8(7)	47.3(7)	38.2(16)
31–50	361	139,171	17.3(2)	49.2(3)	25.2(4)	37.2(4)	46.3(4)	21.1(5)	22.1(3)	17.5(4)	20.3(8)	33.7(7)	–	45.5(6)	39.0(5)	47.0(7)
31–50	362	189,267	89.0(2)	110.4(4)	58.0(5)	40.8(4)	18.6(3)	38.7(5)	27.4(5)	27.6(4)	37.3(12)	46.5(11)	75.8(5)	46.8(8)	89.9(7)	66.9(11)
31–50	373	189,267	93.1(4)	55.6(4)	27.6(4)	12.1(4)	–	75.5(5)	70.5(4)	70.3(5)	35.2(11)	33.6(8)	83.4(5)	31.8(5)	66.1(7)	67.3(9)
31–50	374	69,924	64.7(2)	66.7(2)	45.1(4)	30.4(2)	21.3(2)	–	68.1(3)	89.9(3)	46.3(4)	54.7(3)	170.0(3)	12.4(4)	112.1(3)	49.5(4)
≤30	375	119,644	17.3(3)	15.7(3)	41.5(3)	35.6(3)	14.6(3)	–	61.3(4)	39.1(5)	17.7(5)	16.8(4)	10.5(4)	18.5(5)	46.2(5)	32.8(8)
≥30	376	112,584	–	16.3(2)	22.3(3)	–	23.6(2)	33.0(3)	59.0(3)	240.3(2)	25.4(4)	71.3(3)	22.0(4)	22.9(7)	10.6(4)	21.7(7)
51–100	377	7,511	–	24.5(2)	52.2(2)	19.7(3)	165.3(2)	–	236.1(2)	28.6(2)	15.9(3)	36.1(4)	215.3(3)	62.0(2)	319.5(2)	37.3(2)
101–150	378	10,440	23.2(2)	22.3(2)	42.7(2)	21.0(3)	–	–	7.8(2)	10.0(2)	6.9(3)	10.0(2)	3.8(2)	6.5(2)	21.5(2)	36.5(2)
151–200	379	7,961	–	–	0.5(2)	12.0(3)	–	–	0.2(2)	0.3(2)	4.7(3)	9.7(3)	3.5(3)	2.0(2)	4.5(2)	5.8(2)
151–200	380	8,712	–	0.9(2)	15.7(3)	3.4(2)	–	–	2.3(2)	–	1.5(2)	2.7(3)	0.3(3)	–	1.3(2)	10.8(2)
101–150	381	13,669	22.1(4)	3.6(4)	144.1(3)	19.5(4)	15.6(2)	–	15.3(2)	7.6(3)	19.1(3)	13.1(4)	5.8(3)	5.6(2)	53.8(2)	26.3(2)
51–100	382	48,594	23.5(3)	4.5(4)	15.4(3)	6.1(3)	–	45.6(2)	39.0(3)	32.4(3)	174.9(3)	25.5(4)	103.5(2)	56.8(2)	2.8(3)	63.4(4)
31–50	383	50,621	69.0(2)	59.9(2)	0.1(2)	51.8(2)	–	14.5(3)	62.7(3)	87.7(2)	25.6(3)	33.0(4)	241.7(3)	19.8(2)	61.5(3)	22.2(3)
201–300	723	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
301–400	724	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
201–300	725	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
301–400	726	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
201–300	727	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
301–400	728	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Mean (#sets)			58.5(24)	48.3(45)	34.2(48)	29.5(37)	25.8(22)	43.9(30)	51.7(48)	75.6(41)	40.4(82)	37.8(81)	67.6(54)	32.7(60)	54.7(60)	47.8(85)
Biomass			48.6	59.5	35.1	25.2	22.6	43.1	64.5	89.4	50.6	40.7	68.4	59.9	47.4	75.3

Table 1. (Cont'd.)

Stratum	1986 WT 47	1987 WT 58, 59, 60	1988 WT 70	1989 WT 82	1990 WT 95, 96	1991 WT 105
357	0.0(2)	-	0.0(2)	0.0(2)	0.5(2)	0.4(2)
358	2.8(2)	1.5(2)	1.9(2)	0.8(2)	5.6(2)	11.6(2)
359	27.0(2)	5.9(2)	3.9(2)	17.5(2)	12.9(2)	10.4(2)
360	32.5(13)	15.3(15)	10.4(12)	22.2(15)	18.3(15)	15.6(12)
361	22.7(10)	36.9(8)	26.5(7)	39.6(10)	39.0(9)	11.7(8)
362	82.6(14)	55.4(13)	50.6(10)	56.9(13)	49.9(10)	29.8(10)
373	26.4(14)	78.6(13)	44.1(10)	60.5(13)	9.5(10)	25.9(11)
374	15.0(6)	36.5(5)	20.2(5)	30.8(5)	10.4(5)	15.6(5)
375	45.6(8)	69.4(8)	36.8(6)	23.4(8)	24.9(8)	4.8(6)
376	22.4(9)	27.4(8)	6.0(6)	19.8(8)	6.3(7)	10.9(7)
377	34.0(2)	32.8(2)	26.8(2)	36.9(2)	56.3(2)	27.2(3)
378	68.1(2)	7.0(2)	10.5(2)	2.1(2)	45.2(2)	11.7(3)
379	1.0(2)	7.8(2)	0.1(2)	0.0(2)	0.9(2)	3.0(2)
380	3.6(3)	0.0(2)	0.0(2)	2.6(2)	6.0(2)	3.7(2)
381	15.3(3)	2.4(2)	5.8(2)	7.6(2)	15.7(2)	7.2(2)
382	6.5(4)	50.3(3)	5.5(2)	15.7(3)	7.5(3)	1.4(2)
383	19.9(4)	36.3(3)	24.0(3)	22.0(3)	56.4(2)	3.5(3)
723	-	-	-	-	-	0.1(2)
724	-	-	-	-	-	0.0(2)
725	-	-	-	-	-	0.2(2)
726	-	-	-	-	-	0.9(2)
727	-	-	-	-	-	2.8(2)
728	-	-	-	-	-	1.1(2)
Mean (#sets)	35.0(101)	42.6(91)	25.9(77)	34.1(94)	24.0(85)	15.2(93)
Biomass	43.8	52.8	32.4	42.8	30.1	19.9

Table 19. Mean weight (kg) of American plaice per tow, by stratum, from R. V. surveys in Division 3O. Numbers in parentheses are the number of successful 30-minute tows in each stratum. The stratified mean weight per tow (kg/30 min.) and the biomass estimates ($t \times 10^{-3}$), are given at the bottom of the table.

			Year - Trip														Year - Trip		
Depth (fm)	Stratum	No. of trawlable units	1973 ATC 207, 208, 209	1975 ATC 233	1976 ATC 245	1977 ATC 263	1978 ATC 276, 277	1979 ATC 289, 290, 291	1980 ATC 303	1981 ATC 318, 319	1982 ATC 327, 328, 329	1984 AN 27	1985 AN 43	1986 WT 47	1987 WT 58, 59, 60	1988 WT 70	1989 WT 82	1990 WT 94, 95	1991 WT 106, 107
51-100	329	129,257	7.8(2)	-	91.7(2)	80.2(3)	16.6(5)	61.6(6)	45.8(2)	157.0(2)	54.9(6)	25.7(5)	30.5(8)	23.4(8)	49.3(9)	8.2(7)	30.2(9)	19.4(7)	13.0(9)
31-50	330	156,896	47.6(6)	25.7(3)	26.9(3)	101.1(3)	40.0(6)	78.4(7)	22.0(2)	54.6(4)	24.2(7)	48.0(4)	118.4(10)	44.5(9)	56.1(11)	29.6(9)	40.1(11)	33.2(10)	29.4(11)
31-50	331	34,248	28.6(2)	6.4(2)	41.2(2)	-	6.8(2)	28.9(3)	28.3(2)	-	24.0(4)	80.2(3)	98.8(3)	11.4(4)	46.8(2)	43.8(2)	10.7(2)	-	36.5(2)
51-100	332	78,636	-	23.6(2)	13.5(3)	10.3(3)	14.9(3)	12.9(4)	18.9(2)	-	16.3(4)	6.0(2)	24.3(5)	38.8(6)	59.4(5)	5.5(4)	16.8(5)	16.9(5)	25.2(6)
101-150	333	11,341	-	5.7(2)	1.6(2)	4.3(2)	2.3(3)	5.3(2)	0.1(2)	-	1.3(4)	0.0(2)	0.0(2)	0.0(3)	0.4(2)	1.3(2)	0.2(2)	2.4(2)	1.0(2)
151-200	334	6,910	-	-	0.0(2)	0.0(2)	0.0(3)	0.6(3)	0.0(2)	-	0.1(4)	0.0(2)	1.5(2)	0.4(2)	0.8(2)	0.1(2)	0.4(2)	3.9(2)	0.9(2)
151-200	335	4,356	0.5(2)	-	13.3(3)	-	7.1(2)	4.1(2)	1.5(3)	-	0.7(2)	0.4(2)	0.7(2)	0.1(2)	0.4(2)	1.8(2)	0.1(2)	0.0(2)	3.0(3)
101-150	336	9,088	4.8(3)	7.6(2)	30.9(2)	10.4(2)	6.8(2)	8.1(4)	0.3(2)	-	2.5(2)	0.0(2)	1.3(2)	0.3(2)	0.0(2)	1.8(2)	0.5(2)	0.6(2)	4.1(2)
51-100	337	71,200	16.3(3)	3.0(3)	16.3(2)	21.8(2)	30.5(2)	1.3(4)	6.5(3)	-	22.3(3)	7.0(2)	15.8(5)	12.4(5)	14.3(6)	6.3(4)	10.5(5)	13.3(5)	17.5(5)
31-50	338	142,551	38.8(5)	20.0(2)	62.7(3)	22.9(4)	7.6(5)	19.9(7)	30.2(5)	-	13.2(5)	60.1(5)	59.6(9)	28.5(9)	26.7(9)	50.3(8)	21.3(10)	35.9(8)	29.2(10)
51-100	339	43,937	152.4(2)	47.2(2)	-	-	65.5(2)	262.4(3)	-	96.5(2)	27.0(4)	160.0(2)	13.9(3)	5.5(3)	68.5(3)	29.2(3)	84.0(3)	78.6(3)	30.5(3)
31-50	340	128,882	-	20.0(3)	81.2(6)	52.1(3)	18.0(3)	59.2(7)	85.8(2)	97.3(3)	35.3(6)	49.5(4)	43.9(9)	35.9(7)	93.7(9)	56.1(7)	26.3(9)	55.1(9)	31.3(9)
31-50	351	189,267	65.7(5)	73.5(4)	56.3(4)	62.7(5)	18.5(6)	46.8(11)	76.3(10)	180.0(4)	46.3(9)	92.9(6)	73.3(9)	80.3(14)	71.1(13)	76.9(10)	57.5(13)	78.6(12)	43.0(12)
31-50	352	193,773	25.8(5)	77.9(4)	61.1(4)	17.1(5)	8.4(4)	25.5(12)	38.0(11)	-	36.6(7)	27.0(7)	56.5(11)	34.2(14)	63.5(13)	52.2(11)	35.1(13)	47.4(13)	23.0(14)
31-50	353	96,286	42.0(3)	72.0(3)	46.3(2)	42.4(3)	41.5(3)	36.0(5)	75.9(4)	-	35.0(3)	48.5(2)	55.5(6)	29.2(7)	44.4(6)	21.0(5)	28.7(7)	28.3(6)	8.3(7)
51-100	354	35,600	49.0(3)	-	32.4(3)	34.5(2)	-	17.7(4)	101.8(3)	10.8(2)	34.8(2)	11.8(2)	73.2(3)	9.8(3)	17.3(2)	6.0(2)	14.0(2)	10.4(2)	15.9(3)
101-150	355	7,736	0.5(2)	3.6(2)	7.3(2)	-	-	16.8(4)	8.5(2)	28.5(2)	14.0(2)	4.8(2)	20.3(2)	1.0(2)	1.8(2)	0.4(2)	13.0(2)	7.1(2)	14.8(2)
151-200	356	4,581	0.9(2)	-	-	-	-	11.6(2)	4.8(2)	30.5(2)	-	4.3(2)	7.0(2)	0.0(2)	1.2(2)	1.0(2)	0.0(2)	0.5(2)	2.7(2)
201-300	717	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0(2)
301-400	718	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0(2)
201-300	719	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1(2)
301-400	720	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0(2)
201-300	721	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9(2)
301-400	722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6(2)
Mean (#sets)			41.2(45)	42.9(34)	52.2(45)	47.4(39)	21.2(51)	46.5(90)	46.5(59)	115.1(21)	31.8(74)	48.0(56)	57.0(93)	35.9(102)	53.4(100)	37.7(84)			
Biomass			46.1	49.1	67.6	59.2	27.5	62.5	60.1	79.2	42.4	64.5	48.2	71.7	50.7	76.6	32.6(101) 43.8	40.4(92) 52.9	24.9(116) 34.5

Table 19. Biomass (000 t) of A. plaice in strata in Div. 3N, 1984-90.

Stratum	% Area outside 200-mi. limit	Biomass 1984	1985	1986	1987	1988	1989	1990	1991
357	100	0	0.3	0	-	0	0	0.01	0.01
358	100	0.06	3.0	0.05	0.03	0.03	0.01	0.09	0.2
359	100	1.6	0.9	0.9	0.2	0.1	0.6	0.4	0.3
360	93	10.6	8.6	7.3	3.4	2.3	5.0	4.1	3.5
376	89	1.2	2.4	2.6	3.1	0.7	2.2	0.7	1.2
377	100	2.4	0.3	0.3	0.2	0.2	0.3	0.4	0.2
378	100	0.2	0.4	0.7	0.07	0.1	0.02	0.5	0.1
379	100	0.04	0.05	0.01	0.06	0.01	0	0.01	0.02
380	83	0.01	0.09	0.03	0	0	0.02	0.05	0.03
381	79	0.7	0.4	0.2	0.03	0.08	0.1	0.2	0.1
Total	above strata	16.8	16.4	12.1	7.1	3.5	8.3	6.5	5.7
Total	all other strata	51.6	43.5	31.7	45.7	28.9	34.5	23.6	14.2
Total	Div. 3N	68.4	59.9	43.8	52.8	32.4	42.8	30.1	19.9

Table 26 Abundance (millions) of A. plaice at age, as measured by Canadian Spring groundfish surveys in NAFO Div. 3L.

AGE	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1984	1985	1986	1987	1988	1989	1990
1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
2	0.0	0.1	0.0	0.0	0.6	0.5	0.3	0.5	0.4	1.3	0.4	0.1	0.0	0.0	0.1	0.3	0.2	0.1	0.0
3	1.6	0.3	1.1	0.2	2.3	7.5	2.4	10.7	0.9	4.1	4.1	2.6	0.0	0.5	0.2	0.6	1.0	1.0	0.2
4	9.5	10.7	8.5	3.6	3.7	14.2	10.6	15.9	12.9	7.3	4.4	9.6	0.4	1.7	1.5	2.7	4.7	4.7	3.7
5	39.1	22.4	40.4	5.6	9.9	15.1	34.5	60.9	42.0	39.8	15.8	10.6	1.5	9.2	6.5	13.2	19.2	12.3	9.6
6	58.9	50.9	46.7	21.2	27.3	16.6	70.8	70.8	71.0	77.3	45.6	30.1	16.6	29.5	40.0	50.6	58.7	49.1	18.5
7	118.0	75.2	63.9	35.0	50.2	52.5	131.4	111.6	105.3	100.6	66.3	56.5	64.9	83.2	101.2	119.5	108.9	76.4	41.3
8	62.8	78.6	39.3	49.9	92.6	117.1	207.0	170.4	167.9	200.3	178.8	120.5	98.1	97.3	94.2	124.8	104.8	83.3	45.8
9	116.9	50.4	31.0	55.5	100.3	138.1	151.1	137.4	139.7	172.6	173.4	186.8	108.3	66.5	74.5	65.0	90.8	63.6	41.0
10	53.1	54.4	41.3	58.1	87.8	145.4	155.7	105.5	123.7	112.9	106.9	152.9	60.7	42.0	35.9	35.9	32.6	26.1	28.7
11	48.2	32.7	35.4	32.7	44.9	92.8	68.0	36.3	62.6	50.1	57.8	90.5	27.8	22.9	14.7	12.1	17.8	13.4	10.0
12	45.0	34.5	30.5	28.9	32.9	54.4	45.8	25.3	27.0	32.1	23.2	39.8	17.4	11.6	9.9	10.5	10.9	7.7	5.2
13	33.9	16.2	16.6	17.1	15.9	25.9	19.0	11.2	9.9	16.5	10.6	21.5	6.5	6.7	6.4	5.0	5.5	4.3	3.3
14	23.5	13.0	11.6	9.3	8.9	7.4	7.2	7.2	5.3	6.3	3.7	10.4	3.9	3.3	2.4	2.1	3.2	2.6	1.3
15	11.8	10.6	4.4	5.5	4.0	5.7	5.4	3.0	3.3	3.7	2.9	3.3	1.6	1.8	1.4	1.1	1.8	1.8	0.9
16	8.1	7.4	2.6	2.0	3.4	2.7	3.1	1.5	1.6	2.9	2.0	2.5	0.8	1.3	0.9	0.4	0.8	0.6	0.6
17	4.6	2.4	0.5	0.3	0.9	1.9	1.4	0.8	0.7	0.8	1.1	1.3	0.4	0.3	0.2	0.1	0.2	0.2	0.3
18	2.6	0.7	1.4	0.0	0.3	0.6	0.9	0.2	0.2	0.4	0.2	0.1	0.2	0.1	0.1	0.1	0.0	0.1	0.0
19	0.5	0.3	0.0	0.1	0.0	0.2	0.2	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
1+	638.1	460.9	375.3	325.0	485.9	698.5	914.8	769.2	774.8	829.1	697.4	739.2	409.1	378.1	390.2	444.2	461.2	347.3	210.4
2+	638.1	460.8	375.3	325.0	485.9	698.5	914.8	769.2	774.6	829.0	697.2	739.2	409.1	378.1	390.2	444.1	461.2	347.3	210.4
3+	638.1	460.7	375.3	325.0	485.3	698.0	914.5	768.7	774.2	827.7	696.8	739.1	409.1	378.1	390.1	443.8	461.0	347.2	210.4
4+	636.5	460.4	374.2	324.8	483.0	690.5	912.1	758.0	773.3	823.6	692.7	736.5	409.1	377.6	389.9	443.2	460.0	346.2	210.2
5+	627.0	449.7	365.8	321.2	479.3	676.4	901.5	742.1	760.4	816.4	688.3	726.9	408.7	375.9	388.4	440.5	455.3	341.5	206.5
6+	588.0	427.2	325.4	315.6	469.4	661.2	867.0	681.2	718.4	776.5	672.5	716.3	407.1	366.7	381.9	427.3	436.1	329.2	196.9
7+	529.1	376.3	278.6	294.4	442.1	644.6	796.2	610.4	647.4	699.2	626.9	686.2	390.6	337.2	341.9	376.7	377.4	280.1	178.3
8+	411.0	301.1	214.7	259.4	391.9	592.1	664.8	498.9	542.1	598.6	560.6	629.7	325.7	254.0	240.7	257.1	268.5	203.7	137.1
9+	348.2	222.6	175.4	209.5	299.3	475.0	457.8	328.4	374.1	398.4	381.8	509.2	227.6	156.6	146.5	132.4	163.7	120.4	91.3
10+	231.4	172.1	144.4	153.9	199.1	336.9	306.7	191.0	234.4	225.8	208.4	322.3	119.3	90.1	71.9	67.3	72.9	56.8	50.3
11+	178.3	117.8	103.1	95.9	111.2	191.5	151.0	85.4	110.7	112.8	101.5	169.4	58.6	48.1	36.0	31.5	40.2	30.8	21.6
12+	130.1	85.1	67.7	63.1	66.3	98.7	83.0	49.2	48.1	62.7	43.7	78.9	30.8	25.2	21.3	19.3	22.4	17.4	11.6

Table 4 Abundance (millions) of A. plaice at age, as measured by Canadian Spring groundfish surveys in NAFO Div. 3N.

AGE	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1984	1985	1986	1987	1988	1989	1990
1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.3	0.0	0.1	0.0	0.0	0.0	0.0	0.0
2	0.0	0.2	0.1	0.0	0.9	0.2	0.1	0.4	0.4	0.1	1.0	0.6	0.1	0.1	0.1	0.9	0.2	0.3	0.1
3	2.8	0.4	0.4	0.9	4.9	3.1	1.6	5.1	1.2	0.7	5.0	1.8	1.0	1.8	0.7	3.9	2.4	2.7	1.6
4	2.9	2.3	1.0	2.6	9.7	5.6	9.5	13.9	2.8	2.1	7.5	6.6	2.5	8.2	2.9	7.2	5.5	18.6	9.6
5	4.8	5.6	5.3	5.3	8.3	12.0	14.4	42.8	11.0	6.1	5.2	7.5	5.8	8.6	7.8	7.0	6.0	10.0	24.2
6	3.1	8.6	9.4	10.1	7.6	12.0	28.7	61.0	18.5	13.0	12.2	7.9	11.3	11.3	10.3	10.5	5.4	7.9	6.2
7	11.6	5.0	10.9	11.2	13.6	11.9	25.3	69.5	29.4	26.4	41.2	8.8	13.9	9.6	9.7	10.4	5.7	6.7	3.7
8	7.9	8.4	8.1	10.6	9.3	14.9	22.3	38.2	33.2	22.2	41.9	15.8	13.2	10.7	7.6	8.7	6.2	8.6	3.4
9	13.6	10.2	5.3	7.0	5.3	9.7	18.3	17.4	18.0	17.1	30.8	17.7	14.8	10.3	7.6	8.6	5.9	8.0	4.6
10	13.6	13.7	7.8	7.2	3.0	8.9	11.8	17.8	13.7	9.5	20.3	11.4	16.7	11.0	7.2	6.2	4.7	3.5	2.8
11	12.4	8.9	9.0	5.1	2.7	4.7	9.1	7.7	5.7	4.8	8.9	6.4	7.9	8.4	4.0	3.8	2.7	2.6	2.2
12	9.2	6.5	6.3	3.2	1.5	5.0	5.2	5.1	3.0	3.4	5.3	3.7	5.2	5.0	3.3	2.9	1.9	2.2	1.4
13	4.4	4.3	4.5	3.2	1.8	3.4	2.9	2.5	1.2	1.7	3.0	1.2	3.2	2.6	2.3	2.4	1.6	1.8	1.1
14	3.0	3.2	1.3	1.2	0.8	1.7	2.1	1.3	1.0	1.2	1.0	1.7	1.8	1.6	1.2	1.8	1.1	1.4	1.2
15	1.9	1.2	1.1	1.3	0.7	2.2	1.0	1.1	0.9	0.9	1.9	0.9	1.5	1.3	1.2	1.6	1.1	1.6	1.3
16	1.9	0.9	1.0	0.5	0.5	1.3	0.7	0.3	0.4	0.7	0.9	0.9	1.4	0.4	0.7	0.9	0.5	0.6	0.8
17	0.7	0.2	1.0	0.2	0.1	0.7	0.2	0.2	0.1	0.8	0.5	0.8	0.7	0.1	0.5	0.4	0.4	0.5	0.4
18	1.6	0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.0	0.2	0.4	0.4	0.3	0.0	0.1	0.2	0.2	0.2	0.2
19	0.6	0.2	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.0
1+	96.1	80.3	73.1	69.6	70.9	97.5	153.3	284.5	140.7	111.3	187.1	94.6	101.5	90.9	67.5	77.7	51.6	77.2	65.0
2+	96.1	80.2	73.1	69.6	70.9	97.4	153.3	284.4	140.6	111.2	187.0	94.3	101.5	90.8	67.5	77.7	51.6	77.2	65.0
3+	96.1	80.0	73.0	69.6	70.0	97.2	153.2	284.0	140.2	111.1	186.0	93.7	101.4	90.7	67.4	76.8	51.4	76.9	64.9
4+	93.3	79.6	72.6	68.7	65.1	94.1	151.6	278.9	139.0	110.4	181.1	91.9	100.4	88.9	66.7	72.9	49.0	74.2	63.3
5+	90.5	77.3	71.7	66.1	55.4	88.5	142.1	265.0	136.2	108.3	173.5	85.3	97.9	80.7	63.8	65.7	43.5	55.6	53.7
6+	85.7	71.7	66.3	60.8	47.1	76.5	127.7	222.2	125.2	102.2	168.3	77.8	92.1	72.1	55.9	58.7	37.5	45.6	29.5
7+	82.5	63.0	56.9	50.6	39.5	64.5	99.0	161.2	106.7	89.2	156.1	69.9	80.8	60.9	45.7	48.1	32.1	37.8	23.3
8+	71.0	58.0	46.0	39.4	25.9	52.6	73.7	91.7	77.3	62.7	114.9	61.1	66.9	51.3	36.0	37.7	26.4	31.1	19.6
9+	63.0	49.6	37.9	28.9	16.5	37.7	51.4	53.5	44.0	40.5	73.0	45.2	53.6	40.6	28.4	29.0	20.2	22.5	16.1
10+	49.4	39.3	32.6	21.9	11.3	28.1	33.1	36.1	26.0	23.3	42.2	27.5	38.8	30.3	20.7	20.4	14.3	14.5	11.5
11+	35.9	25.7	24.7	14.7	8.3	19.2	21.3	18.3	12.3	13.8	21.9	16.1	22.1	19.4	13.5	14.1	9.6	11.0	8.7
12+	23.5	16.8	15.7	9.7	5.6	14.4	12.2	10.6	6.6	9.0	13.0	9.7	14.2	11.0	9.5	10.3	6.9	8.4	6.5

Table 2. Abundance (millions) of A. plaice at age, as measured by Canadian Spring groundfish surveys in NAFO Div. 3O.

AGE	1973	1975	1976	1977	1978	1979	1980	1981	1982	1984	1985	1986	1987	1988	1989	1990
1	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.4	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
2	1.3	0.1	0.2	0.4	0.3	0.9	0.8	2.5	0.7	0.1	0.0	0.1	0.3	0.1	0.0	0.2
3	9.0	2.2	2.4	1.9	1.5	4.6	2.2	11.9	1.9	0.1	0.4	0.7	0.9	0.8	1.1	0.5
4	5.3	5.4	3.9	9.8	4.3	9.8	5.4	7.9	3.9	0.4	1.3	2.4	3.1	1.4	2.8	6.3
5	12.8	7.8	12.3	28.3	8.1	18.1	4.7	18.5	4.2	2.7	4.3	3.2	8.3	2.2	4.2	14.5
6	16.7	12.0	22.0	37.3	12.3	21.8	8.7	25.0	6.1	8.0	4.7	5.3	13.1	5.3	11.6	10.9
7	21.6	23.8	30.3	39.9	16.5	36.9	46.4	49.6	15.6	15.7	11.1	9.4	17.2	7.1	15.7	15.2
8	13.1	13.3	43.4	19.8	16.0	39.0	48.6	90.8	26.3	24.5	17.7	11.4	18.8	10.6	14.0	14.1
9	11.6	14.7	26.0	19.5	8.7	28.5	29.0	91.2	23.6	19.1	17.3	10.9	18.6	9.8	13.0	13.8
10	11.4	15.0	18.9	11.7	7.4	19.3	18.9	46.2	20.1	16.2	18.9	9.7	13.2	9.1	8.1	9.2
11	8.0	13.5	11.0	8.8	3.5	7.8	9.7	17.3	8.8	7.2	13.3	6.4	6.9	6.1	4.0	5.6
12	7.2	8.6	9.2	6.5	2.3	5.9	5.5	9.2	6.2	4.5	7.6	5.6	5.0	4.9	4.1	5.1
13	4.1	5.7	7.2	2.7	2.1	2.4	2.5	3.2	2.5	2.7	3.1	3.1	3.4	3.1	2.3	3.2
14	3.1	3.5	4.4	1.6	0.9	1.4	1.0	2.1	0.9	1.9	2.8	1.3	2.1	2.2	1.1	2.2
15	2.1	2.8	3.8	1.1	0.5	0.9	1.2	1.2	0.9	2.3	2.2	1.3	1.7	1.3	1.2	1.1
16	1.3	0.6	2.1	0.4	0.4	0.8	1.0	0.9	0.7	1.3	0.9	0.5	1.0	1.3	1.0	0.9
17	1.1	0.2	1.6	0.1	0.0	0.3	0.4	0.7	0.4	0.7	0.2	0.4	0.5	0.3	0.6	0.7
18	0.7	0.0	0.3	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.1	0.1	0.3	0.3	0.2	0.3
19	0.2	0.0	0.4	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1
1+	130.6	129.2	199.3	189.8	84.9	198.5	186.1	378.6	123.0	107.6	105.9	71.9	114.3	65.7	85.0	104.0
2+	130.5	129.2	199.2	189.8	84.9	198.4	186.1	378.2	122.9	107.6	105.9	71.9	114.2	65.7	85.0	104.0
3+	129.2	129.1	199.0	189.4	84.6	197.5	185.3	375.8	122.2	107.5	105.9	71.8	113.9	65.6	85.0	103.8
4+	120.2	126.9	196.6	187.5	83.1	192.9	183.1	363.8	120.3	107.4	105.5	71.1	113.0	64.8	83.9	103.3
5+	114.9	121.5	192.7	177.7	78.8	183.1	177.7	356.0	116.4	107.0	104.2	68.7	109.9	63.4	81.1	97.0
6+	102.0	113.6	180.4	149.4	70.8	165.0	173.1	337.5	112.2	104.3	99.9	65.5	101.6	61.2	76.9	82.5
7+	85.3	101.6	158.4	112.1	58.4	143.3	164.4	312.5	106.1	96.3	95.2	60.2	88.6	55.9	65.3	71.6
8+	63.7	77.8	128.1	72.2	41.9	106.4	118.0	262.9	90.5	80.6	84.1	50.8	71.4	48.9	49.6	56.4
9+	50.6	64.6	84.7	52.4	25.9	67.4	69.4	172.2	64.2	56.0	66.4	39.4	52.7	38.3	35.6	42.3
10+	39.1	49.8	58.7	33.0	17.2	39.0	40.4	80.9	40.7	37.0	49.1	28.5	34.1	28.6	22.6	28.5
11+	27.7	34.8	39.8	21.3	9.9	19.7	21.5	34.7	20.6	20.8	30.2	18.8	20.9	19.5	14.5	19.3
12+	19.7	21.4	28.9	12.5	6.4	11.9	11.8	17.4	11.8	13.6	16.9	12.4	14.1	13.4	10.5	13.7

Table 23 Abundance (millions) of A. plaice at age, as measured by Canadian Spring groundfish surveys in NAFO Div. 3LNO.

AGE	1973	1975	1976	1977	1978	1979	1980	1981	1982	1984	1985	1986	1987	1988	1989	1990
1	0.1	0.0	0.2	0.0	0.1	0.4	0.2	0.7	0.4	0.0	0.1	0.0	0.2	0.0	0.0	0.0
2	1.4	1.6	0.9	0.8	1.2	1.7	2.2	3.9	1.4	0.2	0.1	0.3	1.5	0.5	0.4	0.3
3	10.5	9.5	13.0	5.9	17.3	6.7	7.0	21.0	6.3	1.1	2.7	1.6	5.4	4.2	4.8	2.3
4	14.8	18.8	23.7	29.9	34.0	25.5	14.8	19.8	20.1	3.4	11.2	6.8	13.0	11.6	26.1	19.6
5	58.6	26.1	39.5	77.2	111.9	71.1	50.6	39.5	22.3	10.0	22.1	17.5	28.5	27.4	26.5	48.3
6	72.9	46.9	50.6	136.8	144.1	111.3	99.0	82.8	44.1	35.9	45.5	55.6	74.2	69.3	68.6	35.6
7	96.4	87.6	94.7	196.6	197.6	171.6	173.4	157.1	80.9	94.6	103.9	120.2	147.1	121.7	98.8	60.2
8	60.6	115.2	175.4	249.1	224.7	240.1	271.1	311.5	162.6	135.9	125.7	113.3	152.2	121.6	105.9	63.3
9	47.9	120.2	173.8	188.9	163.5	186.2	218.7	295.4	228.1	142.2	94.1	93.1	92.2	106.5	84.6	59.4
10	60.5	105.8	173.2	179.2	130.7	156.7	141.4	173.4	184.4	93.5	71.9	52.9	55.3	46.4	37.7	40.7
11	52.4	61.1	108.5	85.9	47.5	76.1	64.6	84.0	105.7	42.9	44.6	25.1	22.8	26.6	20.0	17.8
12	44.0	43.0	68.6	57.5	32.7	35.9	41.0	37.7	49.7	27.0	24.2	18.8	18.4	17.7	14.0	11.7
13	25.2	23.5	36.4	24.6	15.8	13.5	20.7	16.8	25.2	12.4	12.4	11.8	10.8	10.2	8.4	7.7
14	16.0	13.2	13.5	10.9	9.4	7.7	8.5	6.8	13.0	7.6	7.7	4.9	6.0	6.5	5.1	4.7
15	7.6	7.5	11.7	7.5	4.6	5.1	5.8	6.0	5.1	5.4	5.3	3.9	4.4	4.2	4.6	3.3
16	4.8	4.4	6.0	4.2	2.2	2.8	4.6	3.8	4.1	3.6	2.6	2.1	2.3	2.6	2.2	2.3
17	2.6	1.2	4.2	1.7	1.0	1.1	2.0	2.3	2.5	1.8	0.6	1.1	1.0	0.9	1.3	1.4
18	2.4	0.4	1.0	1.1	0.4	0.3	0.8	0.7	0.7	0.7	0.2	0.3	0.6	0.5	0.5	0.5
19	0.5	0.1	0.6	0.2	0.1	0.2	0.3	0.1	0.1	0.2	0.1	0.2	0.2	0.2	0.1	0.1
1+	579.0	686.0	995.3	1257.9	1138.6	1114.0	1126.5	1263.1	956.8	618.2	574.9	529.6	636.2	578.5	509.5	379.4
2+	578.9	686.0	995.1	1257.9	1138.5	1113.6	1126.3	1262.4	956.4	618.2	574.8	529.6	636.0	578.5	509.5	379.4
3+	577.5	684.4	994.2	1257.1	1137.3	1111.9	1124.1	1258.6	955.0	618.0	574.7	529.3	634.5	578.0	509.1	379.1
4+	567.1	674.9	981.3	1251.2	1120.0	1105.2	1117.1	1237.6	948.7	616.9	572.0	527.7	629.1	573.8	504.3	376.8
5+	552.3	656.1	957.6	1221.3	1086.0	1079.7	1102.4	1217.8	928.6	613.5	560.8	520.9	616.1	562.2	478.2	357.2
6+	493.7	630.1	918.1	1144.1	974.1	1008.6	1051.8	1178.3	906.3	603.5	538.7	503.3	587.5	534.8	451.7	308.9
7+	420.9	583.2	867.5	1007.3	830.1	897.3	952.8	1095.6	862.2	567.7	493.3	447.7	513.4	465.5	383.1	273.2
8+	324.4	495.6	772.9	810.7	632.5	725.7	779.4	938.5	781.3	473.1	389.4	327.5	366.2	343.8	284.4	213.0
9+	263.9	380.4	597.4	561.6	407.8	485.6	508.2	627.0	618.7	337.2	263.7	214.2	214.0	222.2	178.5	149.7
10+	216.0	260.2	423.7	372.8	244.3	299.4	289.5	331.6	390.5	195.1	169.6	121.2	121.8	115.7	93.9	90.3
11+	155.5	154.4	250.5	193.6	113.6	142.7	148.2	158.2	206.1	101.6	97.7	68.3	66.5	69.4	56.3	49.6
12+	103.1	93.3	142.0	107.7	66.1	66.6	83.6	74.1	100.4	58.6	53.1	43.2	43.7	42.8	36.3	31.8

Table 24 Mean bottom temperature by depth ranges in NAFO Div. 3L from sets in Spring groundfish surveys.

	DIVISION						
	3L						
	DEPTH RANGE (fm)						ALL DEPTHS
	31-50	51-100	101-150	151-200	201-300	301-400	0-400
	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP
YEAR	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN
1971	0.49	-0.15	1.65	3.69	.	.	0.91
1972	-0.30	-1.01	0.37	.	.	.	-0.64
1973	-1.13	-1.38	-0.05	3.28	.	.	-0.26
1974	-0.79	-1.22	0.14	2.35	.	.	-0.18
1975	-0.16	-0.65	0.86	2.49	.	.	0.44
1976	0.53	-0.53	0.53	1.72	.	.	0.46
1977	-0.26	-0.65	0.98	2.47	.	.	0.27
1978	1.17	0.46	1.33	1.60	.	.	0.95
1979	0.96	-0.08	1.28	2.83	.	.	0.88
1980	0.38	-0.57	1.41	2.71	.	.	0.50
1981	0.45	-0.37	1.17	2.65	3.35	.	0.82
1982	-0.08	-0.46	1.12	2.28	.	.	0.38
1985	-0.53	-1.16	0.07	1.65	2.83	3.69	-0.28
1986	-0.71	-1.05	0.39	2.27	.	.	-0.37
1987	-0.00	-0.48	1.20	2.64	.	.	0.29
1988	-0.31	-0.68	0.74	2.28	.	.	0.11
1989	-0.43	-0.84	0.19	2.26	.	.	-0.44
1990	0.20	-1.11	0.11	1.90	.	.	-0.25
TOTAL	-0.07	-0.71	0.73	2.35	2.93	3.69	0.46

Table 25 Mean bottom temperatures by depth ranges in NAFO Div. 3N from sets in the Spring groundfish surveys.

	DIVISION					
	3N					
	DEPTH RANGE (fm)					ALL DEPTHS
	.LE. 30	31-50	51-100	101-150	151-200	0-400
	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP
YEAR	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN
1971	1.67	0.62	-0.05	1.52	4.10	0.96
1972	0.60	-0.01	0.89	2.23	1.00	0.78
1973	-0.10	-0.68	-0.41	0.45	1.71	-0.04
1974	1.60	0.39	-1.27	0.06	1.38	0.29
1975	3.18	1.44	-0.60	0.20	.	1.48
1976	1.53	0.80	5.06	-0.40	.	1.52
1977	1.73	0.49	0.16	1.40	2.37	0.97
1978	2.56	1.45	0.28	1.55	2.43	1.48
1979	1.80	1.13	3.19	3.96	4.18	2.03
1980	2.00	0.96	-0.17	1.24	2.57	1.09
1981	2.96	1.49	2.12	3.78	5.03	2.60
1982	1.43	0.86	0.82	0.70	1.78	1.03
1984	2.61	1.26	-0.39	2.80	3.08	1.61
1985	0.64	0.22	-1.06	1.18	1.32	0.32
1986	0.78	0.24	1.24	3.20	2.55	0.80
1987	1.43	1.23	2.60	4.43	3.34	1.70
1988	1.76	0.63	1.63	3.48	3.87	1.36
1989	1.46	0.86	2.34	4.53	4.28	1.53
1990	1.24	0.51	-0.98	-0.20	1.23	0.54
TOTAL	1.56	0.76	0.81	2.07	2.78	1.18

Table 26 Mean bottom temperatures by depth ranges in NAFO Div. 30 from sets in the Spring groundfish surveys.

	DIVISION					
	30					
	DEPTH RANGE (fm)					ALL DEPTHS
	.	31-50	51-100	101-150	151-200	0-400
	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP
YEAR	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN
1973	-1.50	0.41	1.82	6.72	5.20	1.75
1975	.	0.37	2.27	6.52	.	1.86
1976	.	0.42	6.03	8.58	8.10	3.71
1977	.	0.51	0.11	2.00	3.40	0.78
1978	-0.50	0.93	4.08	8.16	8.30	2.96
1979	.	1.71	3.08	6.51	5.66	2.87
1980	.	1.19	1.18	4.40	3.63	1.80
1981	.	1.46	3.15	8.25	6.55	3.00
1982	.	-0.09	0.43	5.01	3.89	1.05
1984	.	1.40	1.18	6.13	5.87	2.33
1985	.	-0.16	-0.33	7.78	6.57	0.74
1986	.	-0.03	0.63	6.36	5.45	0.89
1987	.	0.16	1.56	4.97	4.40	1.05
1988	.	1.16	4.68	7.18	5.97	2.77
1989	.	0.34	0.49	4.97	4.23	0.88
1990	.	-0.66	-0.22	4.62	3.80	-0.01
TOTAL	-1.00	0.47	1.73	6.15	5.37	1.62

Table 27. Mean weight (kg) of American plaice per tow, by stratum, from R. V. surveys (fall) in Division 3L. Numbers in parentheses are the number of successful 30-minute tows in each stratum. The stratified mean weight per tow (kg/30 min.) and the biomass estimates (t x 10^{-1}) are given at the bottom of the table.

Stratum	1981 ATC 323 324, 325	1982 ATC 333, 334	1983 WT 7, 8, 9	1984 WT 16, 17, 18	1985 WT 37, 38, 39	1986 AN 72	1987 WT 65	1988 WT 78	1989 WT 87	1990 WT 101
328	–	–	–	50.1(4)	99.5(8)	90.1(6)	15.5(4)	153.0(7)	15.2(7)	9.4(5)
341	8.2(3)	18.2(4)	121.3(4)	110.8(5)	21.6(7)	16.7(7)	262.4(9)	127.2(8)	113.1(8)	21.7(6)
342	109.7(3)	44.8(3)	19.5(4)	162.5(2)	84.7(3)	4.4(3)	30.6(3)	19.2(3)	26.3(3)	194.6(2)
343	50.9(4)	–	483.2(3)	53.3(4)	932.5(3)	17.2(3)	15.7(3)	28.5(3)	1.3(3)	8.7(3)
344	227.3(4)	106.2(3)	70.7(6)	193.0(6)	93.8(9)	28.2(7)	46.3(4)	23.6(7)	124.6(7)	15.4(6)
345	10.5(4)	17.4(6)	13.6(8)	48.4(7)	24.4(9)	12.5(4)	14.8(2)	24.1(7)	21.0(7)	16.9(5)
346	13.0(3)	4.3(4)	10.8(5)	11.5(6)	6.5(5)	20.9(3)	4.3(4)	8.7(5)	11.5(4)	17.5(3)
347	324.3(3)	235.9(4)	134.7(6)	216.5(6)	52.1(4)	30.7(4)	40.3(2)	191.5(5)	70.5(5)	93.2(2)
348	114.1(6)	126.8(5)	112.3(11)	201.4(11)	43.4(14)	64.1(5)	46.7(9)	101.2(10)	45.3(9)	43.6(11)
349	20.1(7)	27.5(5)	113.1(9)	81.7(14)	21.3(10)	16.8(9)	45.8(10)	77.1(9)	15.4(10)	15.5(7)
350	8.3(6)	4.3(2)	72.1(8)	128.9(12)	57.7(9)	11.5(11)	15.0(9)	56.4(10)	18.0(10)	47.4(8)
363	65.5(4)	34.3(3)	253.7(3)	54.9(8)	48.0(10)	44.3(7)	45.0(9)	37.0(10)	29.8(9)	28.5(8)
364	254.2(9)	114.7(11)	95.2(11)	254.6(10)	114.4(18)	86.0(5)	104.1(14)	87.5(14)	41.4(11)	108.0(12)
365	242.8(4)	284.0(4)	198.7(5)	67.9(4)	136.6(8)	123.5(5)	98.2(6)	91.6(5)	30.3(4)	56.3(4)
366	318.3(3)	19.3(6)	50.8(4)	39.7(11)	62.4(9)	205.5(4)	10.1(7)	67.8(7)	27.8(7)	140.4(6)
368	0.0(2)	1.5(2)	–	0.0(2)	1.4(2)	5.9(2)	2.8(2)	0.4(2)	5.3(2)	0.6(2)
369	218.5(2)	27.9(4)	129.4(6)	76.4(7)	67.3(6)	19.4(3)	35.5(4)	121.1(5)	44.3(5)	157.1(4)
370	121.0(4)	88.2(6)	121.0(6)	145.8(7)	34.3(9)	145.3(2)	61.4(6)	23.6(7)	19.5(6)	28.1(5)
371	149.9(4)	97.3(5)	180.4(5)	110.7(7)	156.9(7)	26.3(3)	61.4(5)	53.6(6)	12.6(4)	40.3(5)
372	20.3(5)	79.9(7)	102.5(4)	74.0(13)	68.3(17)	37.5(9)	58.4(13)	43.0(13)	13.9(12)	53.0(10)
384	63.2(3)	176.9(4)	105.0(3)	210.8(6)	92.6(8)	100.0(5)	111.8(6)	48.9(6)	36.8(5)	113.4(4)
385	78.5(8)	128.4(8)	107.1(5)	96.5(12)	30.0(12)	86.1(8)	127.9(9)	61.7(13)	10.4(11)	30.6(7)
386	121.8(3)	123.0(4)	–	99.0(8)	123.6(5)	31.4(4)	41.3(4)	209.5(5)	41.8(5)	36.1(4)
387	2.3(2)	0.3(3)	–	0.7(3)	0.7(4)	0.9(2)	0.7(3)	4.0(4)	0.5(3)	0.4(3)
388	–	0.0(3)	–	0.0(2)	14.0(2)	–	2.0(2)	10.0(2)	2.5(2)	2.0(2)
389	–	25.1(4)	–	103.1(6)	183.0(5)	3.9(4)	82.0(4)	49.6(4)	93.3(4)	21.7(3)
390	38.5(3)	87.8(4)	72.7(3)	89.5(3)	97.2(7)	26.8(6)	42.0(8)	18.6(8)	7.7(7)	17.5(6)
391	–	37.0(2)	25.0(2)	233.8(2)	105.8(2)	37.3(2)	24.5(2)	27.5(2)	15.5(2)	7.6(2)
392	–	5.1(2)	4.7(2)	10.5(2)	6.8(2)	0.9(2)	11.0(2)	9.0(2)	8.0(2)	13.3(2)
729	–	–	–	3.3(2)	4.5(2)	0.0(2)	–	–	–	3.2(2)
730	–	–	–	0.0(2)	0.0(2)	–	–	–	–	–
731	–	–	–	0.0(2)	1.0(2)	–	–	–	–	0.1(2)
732	–	–	–	0.0(2)	0.0(2)	–	–	–	–	0.0(2)
733	–	–	–	0.0(4)	0.7(3)	–	–	–	–	0.3(2)
734	–	–	–	0.0(3)	0.0(2)	–	–	–	–	0.0(2)
735	–	2.3(2)	–	0.0(3)	0.2(2)	20.6(2)	–	–	–	–
736	–	–	0.0(2)	–	6.8(2)	2.1(2)	–	–	–	6.4(2)
Mean (#sets)	108.2(99)	78.6(120)	110.8(125)	108.4(208)	75.7(231)	52.7(141)	61.1(165)	68.6(189)	33.7(174)	47.1(161)
Biomass (Total)	273.3	206.4	268.0	313.8	220.2	146.7	168.7	189.5	92.9	135.3
Biomass (multiplicative model)	–	–	290.2	313.8	219.9	146.8	168.7	189.5	91.9	135.7

TABLE 28. ABUNDANCE (MILLIONS) OF A.PLAICE FROM FALL SURVEYS IN DIV.3L

AGE	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
1	0.9	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
2	1.1	1.8	0.2	0.0	0.0	0.8	1.4	0.3	0.0	0.1
3	8.3	5.7	2.6	0.1	0.3	1.9	2.0	3.1	1.4	1.4
4	12.5	19.8	9.8	2.9	1.6	10.5	5.1	8.1	13.2	18.1
5	22.3	36.0	53.1	18.7	14.3	33.3	24.3	30.4	23.1	47.0
6	45.2	80.9	121.4	65.9	69.2	92.6	66.0	81.1	54.6	67.7
7	177.1	143.9	219.2	181.3	170.4	92.9	100.9	110.1	64.4	78.0
8	164.5	191.5	186.5	207.2	134.2	91.8	87.9	108.7	55.2	57.3
9	140.1	111.8	90.1	122.4	93.9	53.6	62.4	66.1	24.0	46.8
10	137.1	61.6	50.0	81.1	37.3	22.6	20.2	25.8	9.3	19.7
11	58.6	31.2	21.0	32.0	16.2	9.0	11.0	10.1	5.3	9.5
12	42.4	13.7	15.3	18.8	11.2	4.8	5.6	6.0	1.9	4.8
13	16.2	4.9	9.0	9.1	5.9	2.4	3.0	3.1	1.7	3.0
14	4.5	1.9	1.4	4.3	1.9	1.1	1.4	1.6	0.6	2.1
15	1.2	2.0	1.6	2.8	1.2	0.4	0.9	1.0	0.2	0.8
16	0.3	0.8	0.8	1.2	0.5	0.1	0.2	0.3	0.2	0.3
17	0.0	0.3	0.2	0.3	0.1	0.0	0.2	0.1	0.0	0.0
1+	832.3	707.9	782.2	748.1	558.2	417.9	392.5	455.9	255.1	356.6

TABLE 29. JANUARY 1 POPULATION NUMBERS AND FISHING MORTALITY FROM ADAPT USING RV AGES 6-14 AND C/E AGES 9-14 FOR AMERICAN PLAICE IN DIVISIONS 3LNO.

POPULATION NUMBERS (000S)

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
5	293630	279207	233475	218244	200426	193372	177522	185793	178120	182648	193226	179968	147821	153778	120982	410747
6	229866	239605	227838	190271	177273	162957	158082	145204	152090	145724	149496	157933	143357	119002	123271	87519
7	192401	185368	192637	180455	151739	139212	130724	128925	118599	123624	118950	121684	120521	112900	94523	90472
8	124027	150991	143821	149807	139424	111989	105353	104994	103914	94338	99843	95251	88265	91716	88043	67045
9	75158	93009	106101	107137	113244	97188	80308	81925	81619	79832	74241	76630	66647	62408	68513	63349
10	43707	53179	61132	74599	76186	79164	66802	58583	58980	59275	60065	51107	50640	48209	41936	43264
11	25516	28634	32375	39955	48517	51060	51955	44355	36350	41315	39520	34934	29289	25500	23578	23127
12	17214	15732	15912	20607	23720	31768	31590	30263	22018	22076	22165	19211	15711	13661	12498	11698
13	10691	9812	8215	9176	10698	16005	18691	15122	11667	11225	9963	9793	6340	6542	5719	5734
14	5917	5326	5297	4582	4205	7091	9727	7437	5194	5401	4601	4440	2637	2407	2921	2847
15	3220	2477	2271	2986	1726	2797	4390	2905	2267	2009	2146	1986	1250	980	925	1461
16	1716	1314	809	955	1113	1103	1706	936	568	753	658	639	344	328	209	260
17	755	714	548	353	194	767	664	385	186	128	251	188	33	58	27	39
18	697	189	363	284	97	102	549	187	128	35	21	60	8	2	13	10
5+	1024514	1065557	1030794	999411	948562	894576	838064	807013	771700	768382	775147	753824	672864	629491	583159	807572

FISHING MORTALITY

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
5	0.003	0.003	0.005	0.008	0.007	0.002	0.001	0.000	0.001	0.000	0.002	0.027	0.017	0.021	0.124	0.041
6	0.015	0.018	0.033	0.026	0.042	0.020	0.004	0.002	0.007	0.003	0.006	0.070	0.039	0.030	0.109	0.102
7	0.042	0.054	0.051	0.058	0.104	0.079	0.019	0.016	0.029	0.014	0.022	0.121	0.073	0.049	0.143	0.056
8	0.088	0.153	0.094	0.080	0.161	0.133	0.052	0.052	0.064	0.040	0.065	0.157	0.147	0.092	0.129	0.079
9	0.146	0.220	0.152	0.141	0.158	0.175	0.115	0.129	0.120	0.084	0.173	0.214	0.305	0.198	0.260	0.163
10	0.223	0.296	0.225	0.230	0.200	0.221	0.210	0.277	0.156	0.205	0.342	0.357	0.486	0.334	0.395	0.249
11	0.284	0.387	0.252	0.321	0.223	0.280	0.340	0.500	0.299	0.423	0.521	0.599	0.563	0.513	0.501	0.365
12	0.362	0.450	0.351	0.456	0.193	0.330	0.537	0.753	0.474	0.596	0.617	0.909	0.676	0.671	0.579	0.416
13	0.497	0.416	0.384	0.580	0.211	0.298	0.722	0.869	0.570	0.692	0.608	1.112	0.768	0.606	0.498	0.394
14	0.671	0.652	0.373	0.777	0.208	0.280	1.009	0.988	0.750	0.723	0.640	1.068	0.790	0.757	0.492	0.452
15	0.696	0.919	0.667	0.787	0.247	0.294	1.346	1.431	0.902	0.915	1.011	1.552	1.138	1.347	1.070	0.415
16	0.675	0.675	0.630	1.392	0.172	0.308	1.290	1.416	1.291	0.899	1.051	2.774	1.575	2.284	1.477	0.415
17	1.188	0.476	0.458	1.090	0.444	0.134	1.067	0.896	1.482	1.627	1.226	2.966	2.473	1.301	0.833	0.415
18	0.459	0.474	0.364	0.532	0.200	0.314	0.671	0.819	0.540	0.641	0.617	0.989	0.712	0.661	0.545	0.415

TABLE 30. PARAMETER ESTIMATES FROM ADAPT USING RV AGES 6-14 AND C/E AGES 9-14 FOR AMERICAN PLAICE IN DIVISIONS 3LNO.

APPROXIMATE STATISTICS ASSUMING LINEARITY NEAR SOLUTION

ORTHOGONALITY OFFSET..... 0.030506
MEAN SQUARE RESIDUALS 0.168974

AGE	PARAMETER	ESTIMATE	STD. ERR.	T-STATISTIC	C.V.
6	ABUNDANCE	8.78139E4	3.58119E4	2.45208E0	0.41
7	ABUNDANCE	9.07080E4	2.78766E4	3.25391E0	0.31
8	ABUNDANCE	6.72453E4	1.76658E4	3.80653E0	0.26
9	ABUNDANCE	6.36275E4	1.26023E4	5.04888E0	0.20
10	ABUNDANCE	4.35151E4	7.85149E3	5.54227E0	0.18
11	ABUNDANCE	2.33059E4	4.11543E3	5.66305E0	0.18
12	ABUNDANCE	1.17990E4	2.02326E3	5.83168E0	0.17
13	ABUNDANCE	5.78097E3	1.08876E3	5.30967E0	0.19
14	ABUNDANCE	2.87278E3	5.32321E2	5.39671E0	0.19
6	RV SLOPE	4.61791E-4	5.29592E-5	8.71975E0	0.11
7	RV SLOPE	9.88966E-4	1.09963E-4	8.99363E0	0.11
8	RV SLOPE	1.65813E-3	1.81363E-4	9.14260E0	0.11
9	RV SLOPE	1.95952E-3	2.12037E-4	9.24138E0	0.11
10	RV SLOPE	2.06192E-3	2.22389E-4	9.27170E0	0.11
11	RV SLOPE	1.74634E-3	1.88334E-4	9.27257E0	0.11
12	RV SLOPE	2.05677E-3	2.22256E-4	9.25407E0	0.11
13	RV SLOPE	2.17373E-3	2.35240E-4	9.24047E0	0.11
14	RV SLOPE	2.43737E-3	2.63003E-4	9.26746E0	0.11
9	C/E SLOPE	1.82786E-3	1.91533E-4	9.54329E0	0.10
10	C/E SLOPE	3.10560E-3	3.24526E-4	9.56965E0	0.10
11	C/E SLOPE	4.63837E-3	4.84952E-4	9.56461E0	0.10
12	C/E SLOPE	6.04486E-3	6.33681E-4	9.53928E0	0.10
13	C/E SLOPE	6.56001E-3	6.88541E-4	9.52741E0	0.10
14	C/E SLOPE	7.43374E-3	7.77896E-4	9.55621E0	0.10

TABLE 31. RESIDUALS FROM ADAPT USING RV AGES 6-14 AND C/E AGES 9-14 FOR AMERICAN PLAICE IN DIVISIONS 3LNO.

LOG RESIDUALS FOR RV SURVEY INDEX

	1975	1976	1977	1978	1979	1980	1981	1982	1984	1985	1986	1987	1988	1989	1990
6	-0.73	-0.69	0.36	0.59	0.41	0.37	0.21	-0.33	-0.54	-0.33	-0.16	0.21	0.33	0.32	0.00
7	-0.67	-0.55	0.14	0.21	0.26	0.35	0.29	-0.37	-0.17	-0.03	0.13	0.32	0.19	0.20	-0.29
8	-0.46	-0.21	0.17	0.02	0.19	0.52	0.68	0.04	-0.04	-0.17	-0.18	0.18	-0.10	-0.18	-0.45
9	-0.06	0.13	0.05	-0.11	-0.03	0.29	0.76	0.49	0.02	-0.28	-0.31	-0.14	0.03	-0.27	-0.59
10	0.34	0.66	0.53	0.02	0.16	0.03	0.40	0.62	-0.10	-0.32	-0.46	-0.35	-0.36	-0.58	-0.60
11	0.52	1.02	0.61	-0.17	0.07	-0.12	0.15	0.60	-0.26	-0.14	-0.55	-0.49	-0.22	-0.43	-0.58
12	0.43	1.02	0.79	0.01	-0.14	-0.25	-0.24	0.17	-0.19	-0.29	-0.28	-0.20	-0.10	-0.28	-0.47
13	0.30	0.79	0.56	0.09	-0.37	-0.31	-0.50	0.18	-0.30	-0.22	-0.04	0.16	0.00	-0.10	-0.24
14	0.28	0.39	0.07	0.24	-0.12	-0.51	-0.75	0.16	-0.16	-0.03	-0.26	0.34	0.50	-0.04	-0.11

SUM OF RV RESIDUALS : 0.0005533836 MEAN RESIDUAL : 0.0000040991

LOG RESIDUALS FOR COMMERCIAL C/E INDEX

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
9	-0.21	0.00	-0.17	-0.32	-0.08	0.17	-0.28	-0.18	0.10	-0.39	0.10	-0.34	0.47	0.29	0.43	0.42
10	-0.31	-0.22	-0.30	-0.35	-0.37	-0.12	-0.20	0.07	-0.16	-0.02	0.26	-0.08	0.43	0.46	0.51	0.41
11	-0.47	-0.34	-0.59	-0.41	-0.66	-0.28	-0.10	0.28	0.10	0.32	0.28	0.23	0.24	0.56	0.42	0.40
12	-0.48	-0.45	-0.51	-0.31	-1.07	-0.37	0.11	0.46	0.32	0.42	0.20	0.39	0.18	0.53	0.31	0.28
13	-0.23	-0.62	-0.50	-0.14	-1.06	-0.56	0.35	0.54	0.44	0.50	0.08	0.44	0.21	0.34	0.11	0.10
14	-0.03	-0.26	-0.65	0.06	-1.21	-0.75	0.60	0.56	0.61	0.43	-0.13	0.22	0.14	0.45	-0.08	0.04

SUM OF C/E RESIDUALS : 0.0003362523 MEAN RESIDUAL : 0.0000035026

TABLE 32. PARAMETER CORRELATION MATRIX FROM ADAPT USING RV AGES 6-14 AND C/E AGES 9-14 FOR AMERICAN PLAICE IN DIVISIONS 3LNO.

	1	2	3	4	5	6	7	8	9	10	11	12
1	1.00	0.05	0.04	0.03	0.03	0.02	0.01	0.00	0.00	-0.27	-0.02	-0.01
2	0.05	1.00	0.06	0.05	0.04	0.02	0.02	0.01	0.00	-0.20	-0.21	-0.02
3	0.04	0.06	1.00	0.06	0.04	0.03	0.02	0.01	0.01	-0.16	-0.17	-0.18
4	0.03	0.05	0.06	1.00	0.06	0.04	0.03	0.01	0.01	-0.12	-0.13	-0.13
5	0.03	0.04	0.04	0.06	1.00	0.05	0.04	0.02	0.01	-0.09	-0.10	-0.10
6	0.02	0.02	0.03	0.04	0.05	1.00	0.05	0.03	0.02	-0.07	-0.07	-0.07
7	0.01	0.02	0.02	0.03	0.04	0.05	1.00	0.01	0.03	-0.05	-0.05	-0.04
8	0.00	0.01	0.01	0.01	0.02	0.03	0.01	1.00	0.05	-0.01	-0.03	-0.03
9	0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.05	1.00	-0.02	-0.01	-0.02
10	-0.27	-0.20	-0.16	-0.12	-0.09	-0.07	-0.05	-0.01	-0.02	1.00	0.09	0.05
11	-0.02	-0.21	-0.17	-0.13	-0.10	-0.07	-0.05	-0.03	-0.01	0.09	1.00	0.06
12	-0.01	-0.02	-0.18	-0.13	-0.10	-0.07	-0.04	-0.03	-0.02	0.05	0.06	1.00
13	-0.01	-0.01	-0.02	-0.14	-0.11	-0.08	-0.05	-0.03	-0.02	0.03	0.03	0.03
14	-0.01	-0.01	-0.01	-0.01	-0.13	-0.10	-0.07	-0.04	-0.03	0.02	0.02	0.02
15	-0.00	-0.01	-0.01	-0.01	-0.01	-0.14	-0.10	-0.06	-0.04	0.01	0.01	0.02
16	-0.00	-0.00	-0.00	-0.01	-0.01	-0.01	-0.15	-0.10	-0.06	0.01	0.01	0.01
17	-0.00	-0.00	-0.00	-0.00	-0.01	-0.01	-0.04	-0.16	-0.11	0.01	0.01	0.01
18	-0.00	-0.00	-0.00	-0.00	-0.01	-0.01	-0.07	-0.04	-0.16	0.01	0.01	0.01
19	-0.01	-0.01	-0.02	-0.14	-0.11	-0.08	-0.06	-0.03	-0.02	0.03	0.03	0.03
20	-0.01	-0.01	-0.01	-0.01	-0.13	-0.10	-0.07	-0.04	-0.03	0.02	0.02	0.02
21	-0.00	-0.01	-0.01	-0.01	-0.01	-0.14	-0.10	-0.06	-0.04	0.01	0.02	0.02
22	-0.00	-0.00	-0.00	-0.01	-0.01	-0.01	-0.16	-0.11	-0.07	0.01	0.01	0.01
23	-0.00	-0.00	-0.00	-0.00	-0.01	-0.01	-0.04	-0.17	-0.11	0.01	0.01	0.01
24	-0.00	-0.00	-0.00	-0.00	-0.01	-0.01	-0.07	-0.05	-0.17	0.01	0.01	0.01

	13	14	15	16	17	18	19	20	21	22	23	24
1	-0.01	-0.01	-0.00	-0.00	-0.00	-0.00	-0.01	-0.01	-0.00	-0.00	-0.00	-0.00
2	-0.01	-0.01	-0.01	-0.00	-0.00	-0.00	-0.01	-0.01	-0.01	-0.00	-0.00	-0.00
3	-0.02	-0.01	-0.01	-0.00	-0.00	-0.00	-0.02	-0.01	-0.01	-0.00	-0.00	-0.00
4	-0.14	-0.01	-0.01	-0.01	-0.00	-0.00	-0.14	-0.01	-0.01	-0.01	-0.00	-0.00
5	-0.11	-0.13	-0.01	-0.01	-0.01	-0.01	-0.11	-0.13	-0.01	-0.01	-0.01	-0.01
6	-0.08	-0.10	-0.14	-0.01	-0.01	-0.01	-0.08	-0.10	-0.14	-0.01	-0.01	-0.01
7	-0.05	-0.07	-0.10	-0.15	-0.04	-0.07	-0.06	-0.07	-0.10	-0.16	-0.04	-0.07
8	-0.03	-0.04	-0.06	-0.10	-0.16	-0.04	-0.03	-0.04	-0.06	-0.11	-0.17	-0.05
9	-0.02	-0.03	-0.04	-0.06	-0.11	-0.16	-0.02	-0.03	-0.04	-0.07	-0.11	-0.17
10	0.03	0.02	0.01	0.01	0.01	0.01	0.03	0.02	0.01	0.01	0.01	0.01
11	0.03	0.02	0.01	0.01	0.01	0.01	0.03	0.02	0.02	0.01	0.01	0.01
12	0.03	0.02	0.02	0.01	0.01	0.01	0.03	0.02	0.02	0.01	0.01	0.01
13	1.00	0.03	0.02	0.01	0.01	0.01	0.04	0.03	0.02	0.01	0.01	0.01
14	0.03	1.00	0.02	0.02	0.01	0.01	0.03	0.03	0.02	0.02	0.01	0.01
15	0.02	0.02	1.00	0.02	0.02	0.01	0.02	0.02	0.03	0.02	0.02	0.02
16	0.01	0.02	0.02	1.00	0.03	0.02	0.01	0.02	0.02	0.04	0.03	0.02
17	0.01	0.01	0.02	0.03	1.00	0.03	0.01	0.01	0.02	0.03	0.04	0.03
18	0.01	0.01	0.01	0.02	0.03	1.00	0.01	0.01	0.02	0.02	0.03	0.03
19	0.04	0.03	0.02	0.01	0.01	0.01	1.00	0.03	0.02	0.01	0.01	0.01
20	0.03	0.03	0.02	0.02	0.01	0.01	0.03	1.00	0.02	0.02	0.01	0.01
21	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	1.00	0.03	0.02	0.02
22	0.01	0.02	0.02	0.04	0.03	0.02	0.01	0.02	0.03	1.00	0.03	0.03
23	0.01	0.01	0.02	0.03	0.04	0.03	0.01	0.01	0.02	0.03	1.00	0.03
24	0.01	0.01	0.02	0.02	0.03	0.03	0.01	0.01	0.02	0.03	0.03	1.00

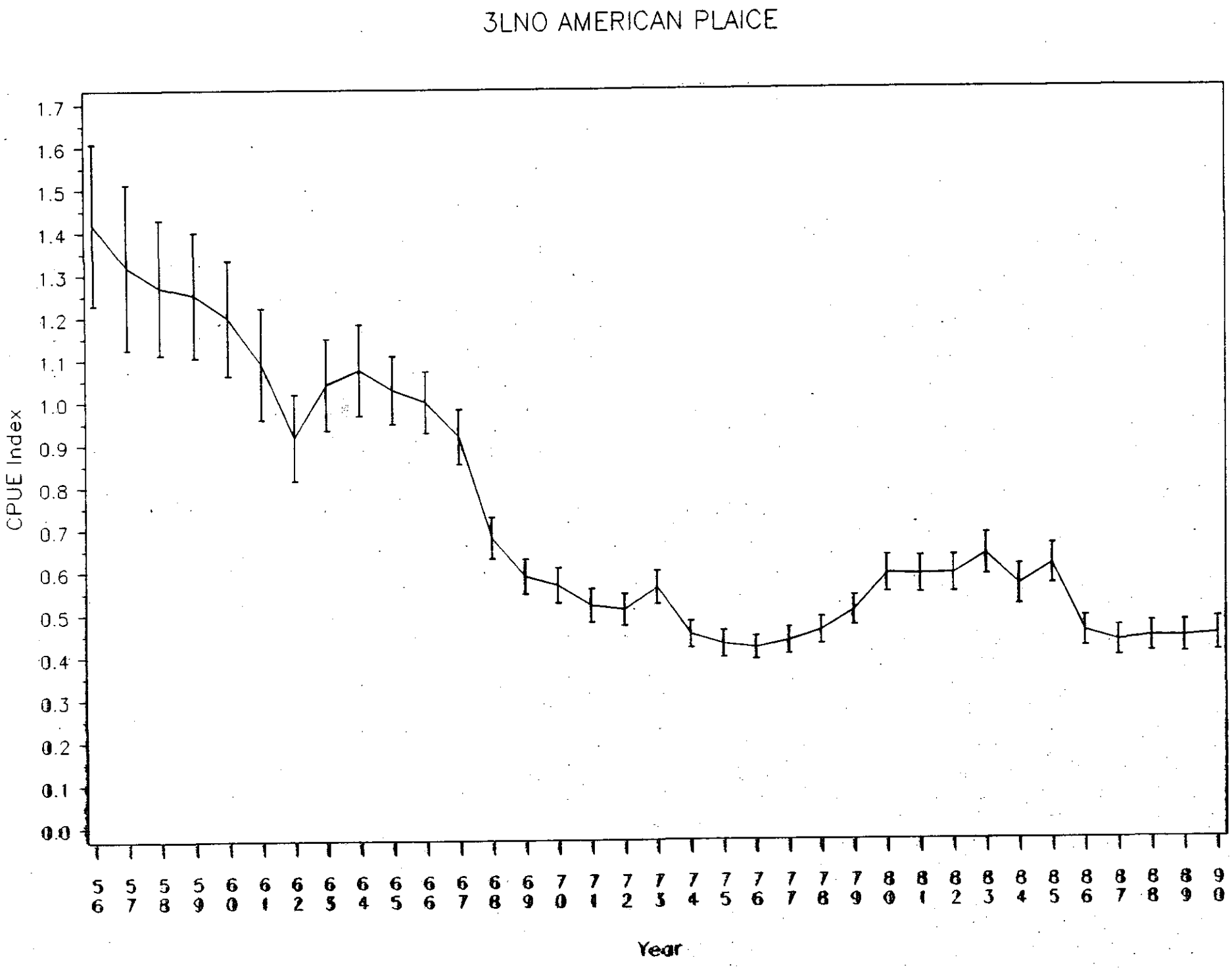

Fig.4 Trends in C/E from the Canadian directed fishery for A. plaice in Div.3LNO.

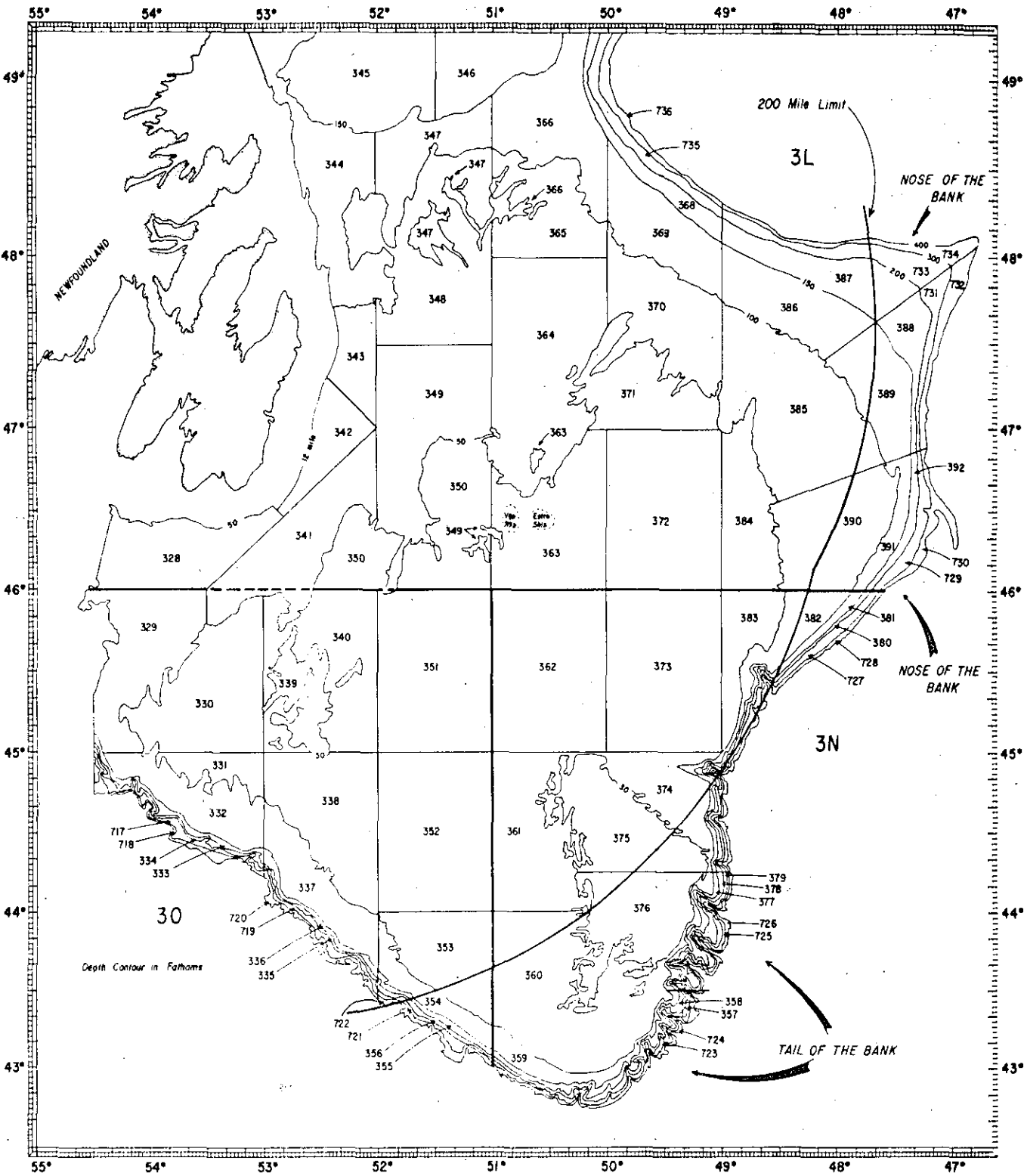

Fig. 1 Stratification chart of the Grand Bank, NAFO Div. 3LNO.

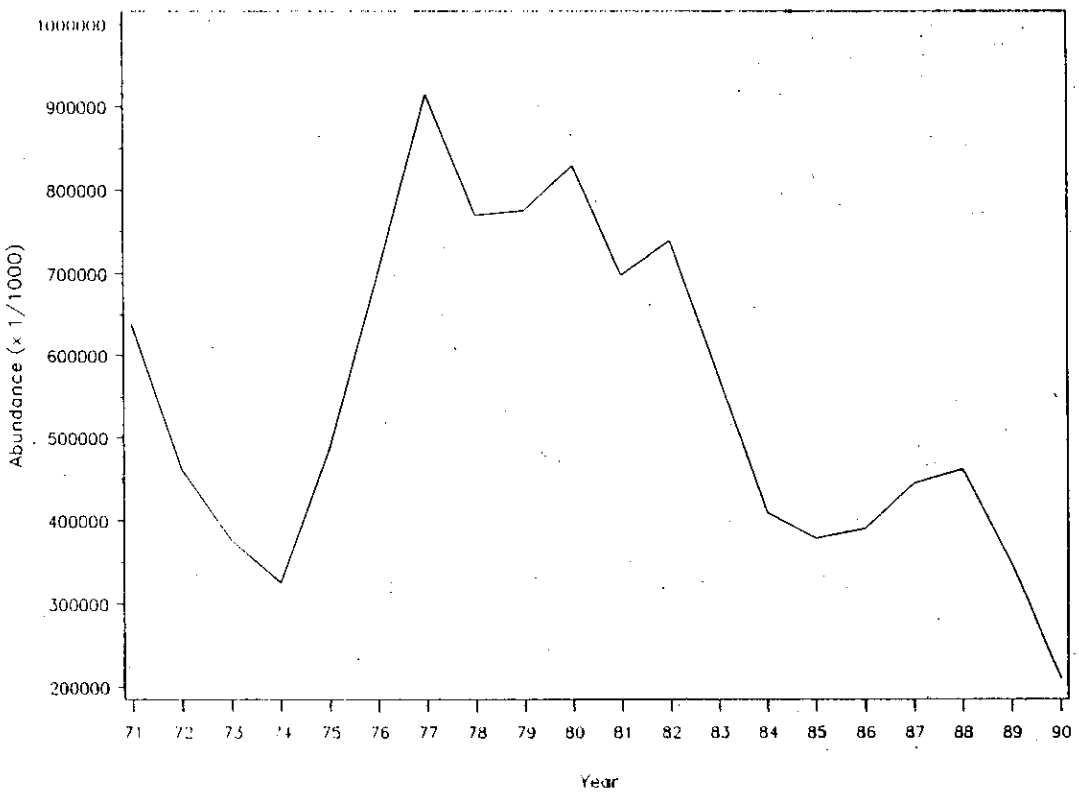

Fig. 3 Abundance estimates of plaice derived from the Spring RV surveys in Div. 3L

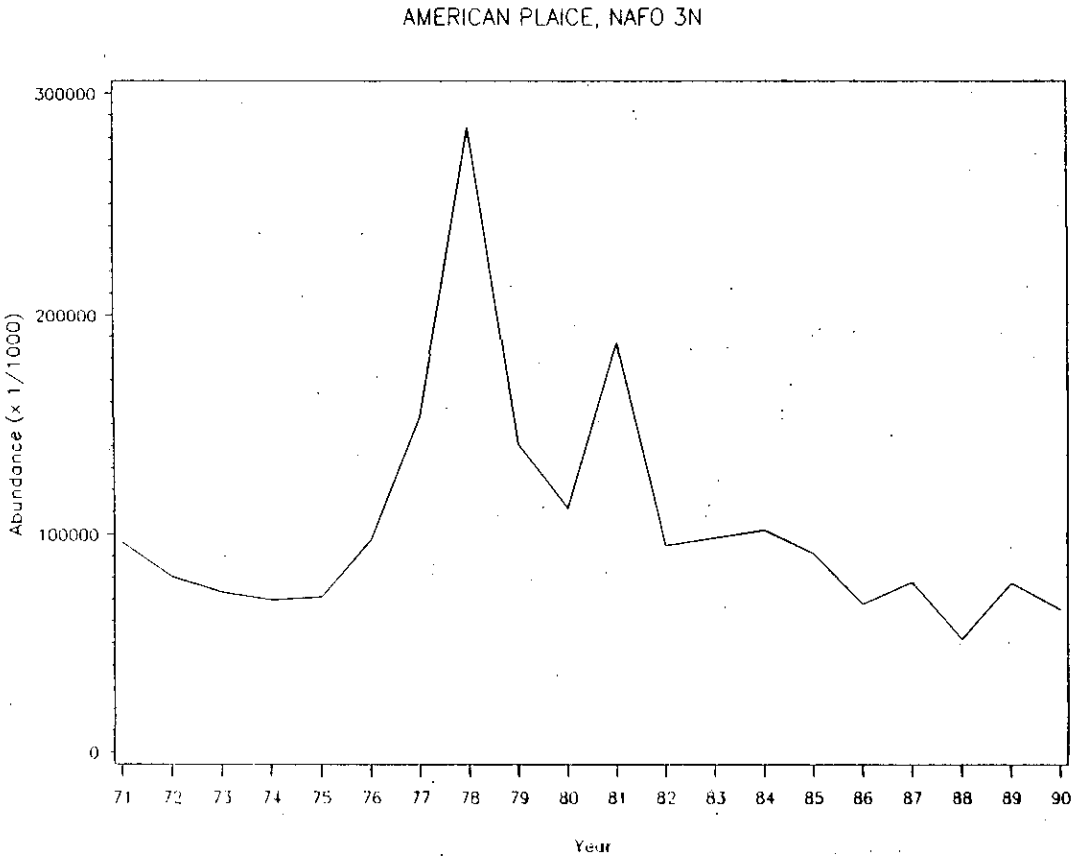

Fig. 4 Abundance estimates of plaice derived from the Spring RV surveys in Div. 3N.

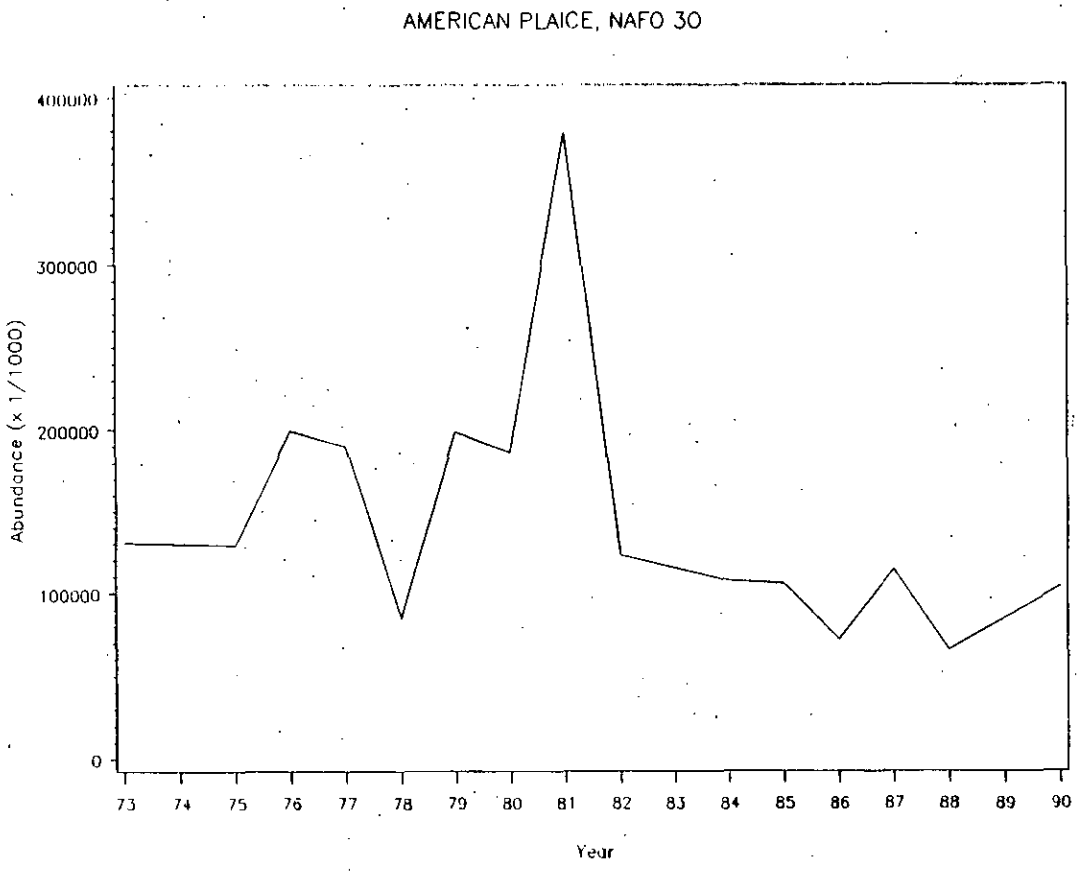

Fig. 5 Abundance estimates of plaice derived from the Spring RV surveys in Div. 3O

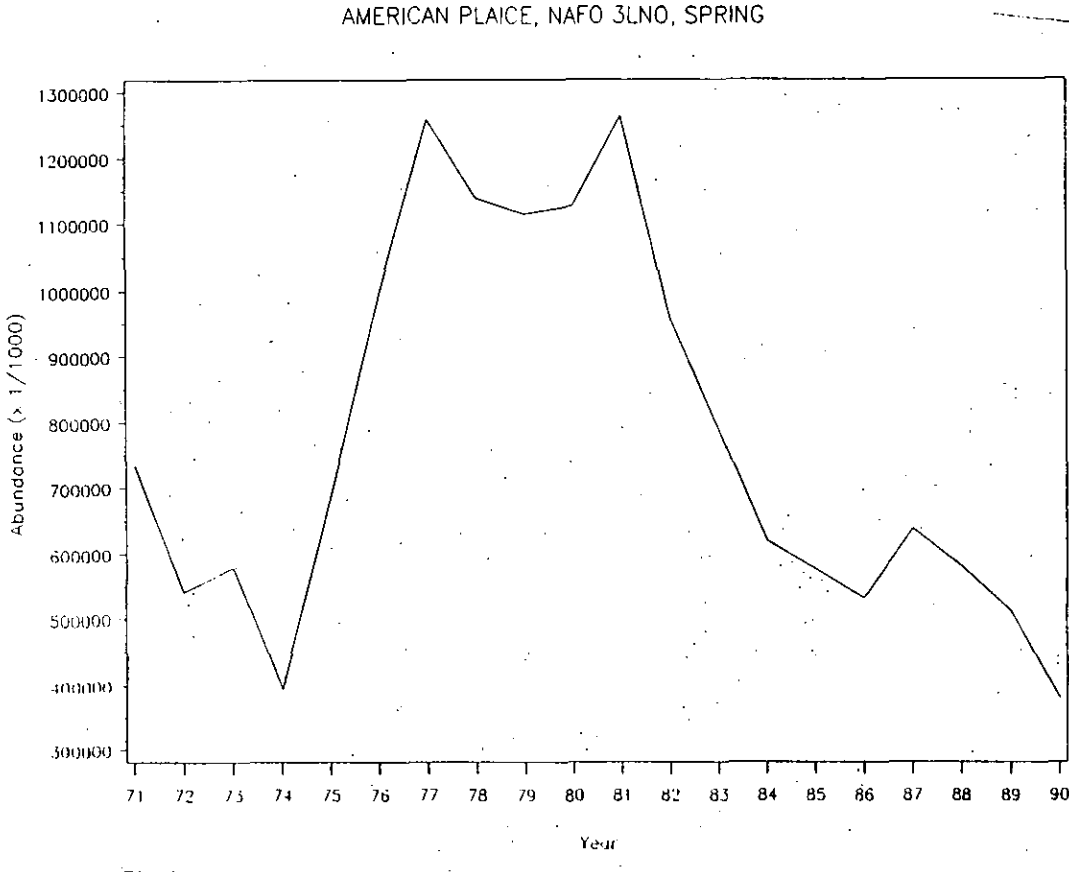

Fig. 6 Abundance estimates of plaice derived from the Spring RV surveys in Div. 3LNO.

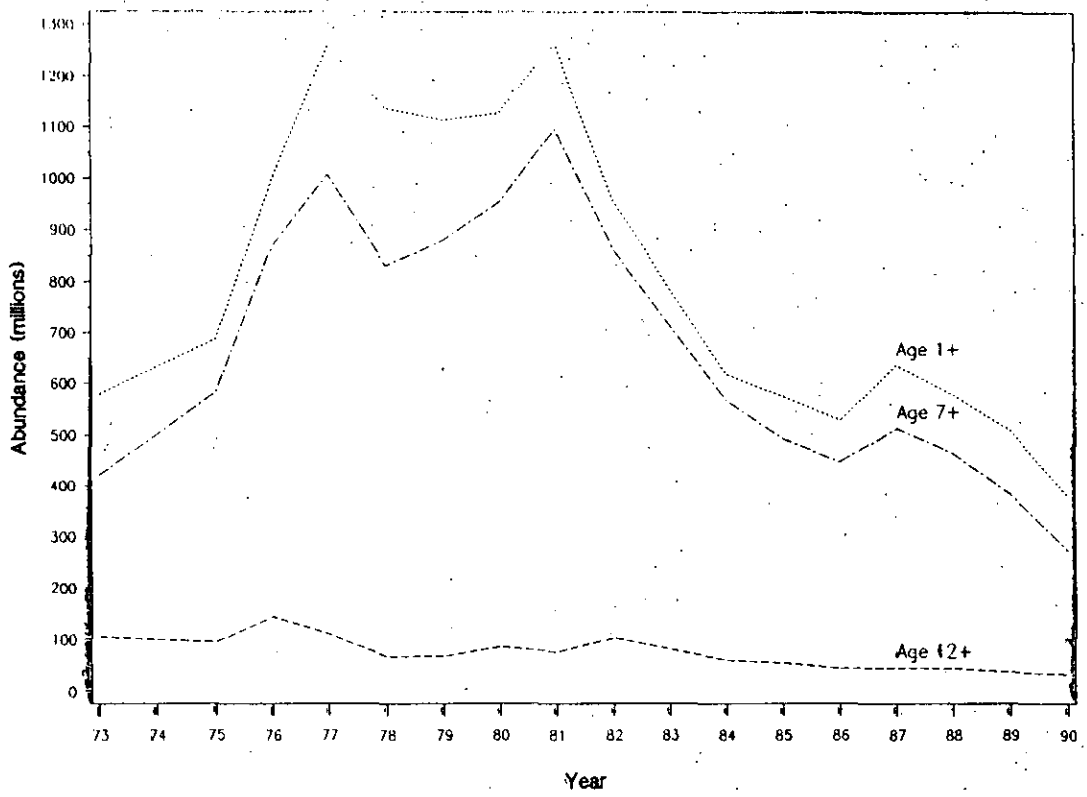

Figure 6b. Abundance of American Plaice from Canadian Spring Surveys in Divisions 3LNO

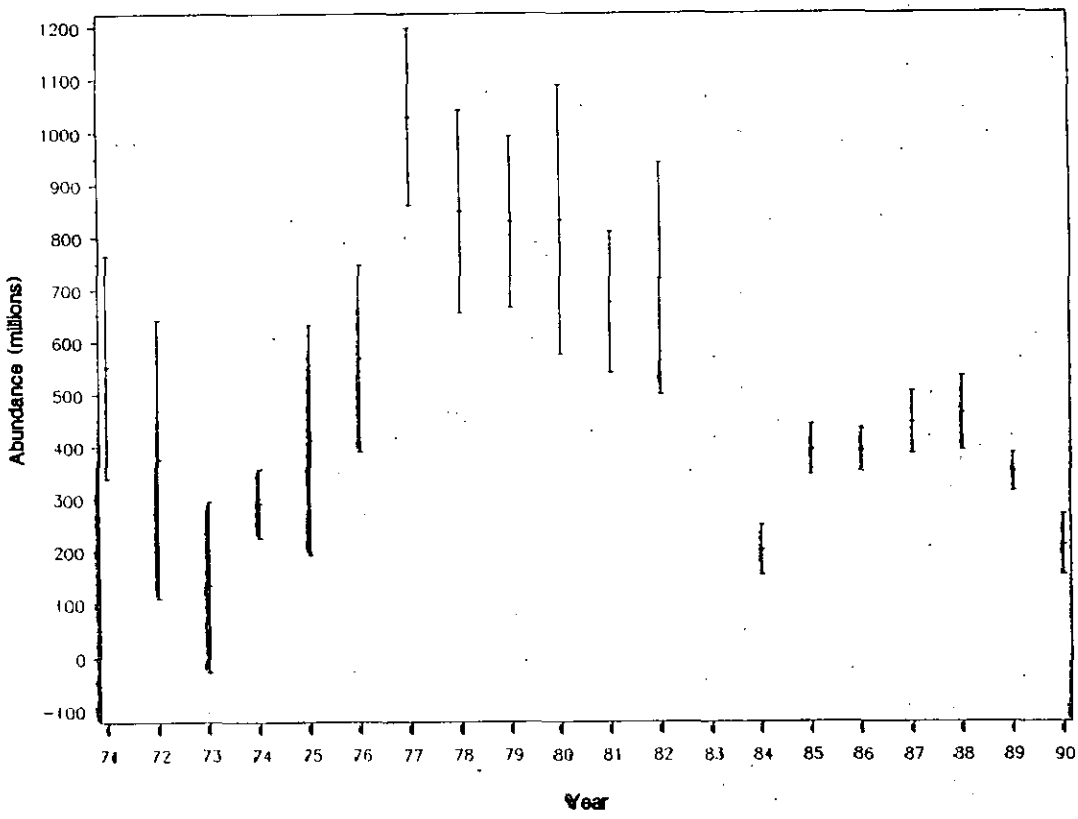

Figure 7 Abundance and 95% Confidence Limits of American Plaice in Division 3L from Canadian Spring Surveys

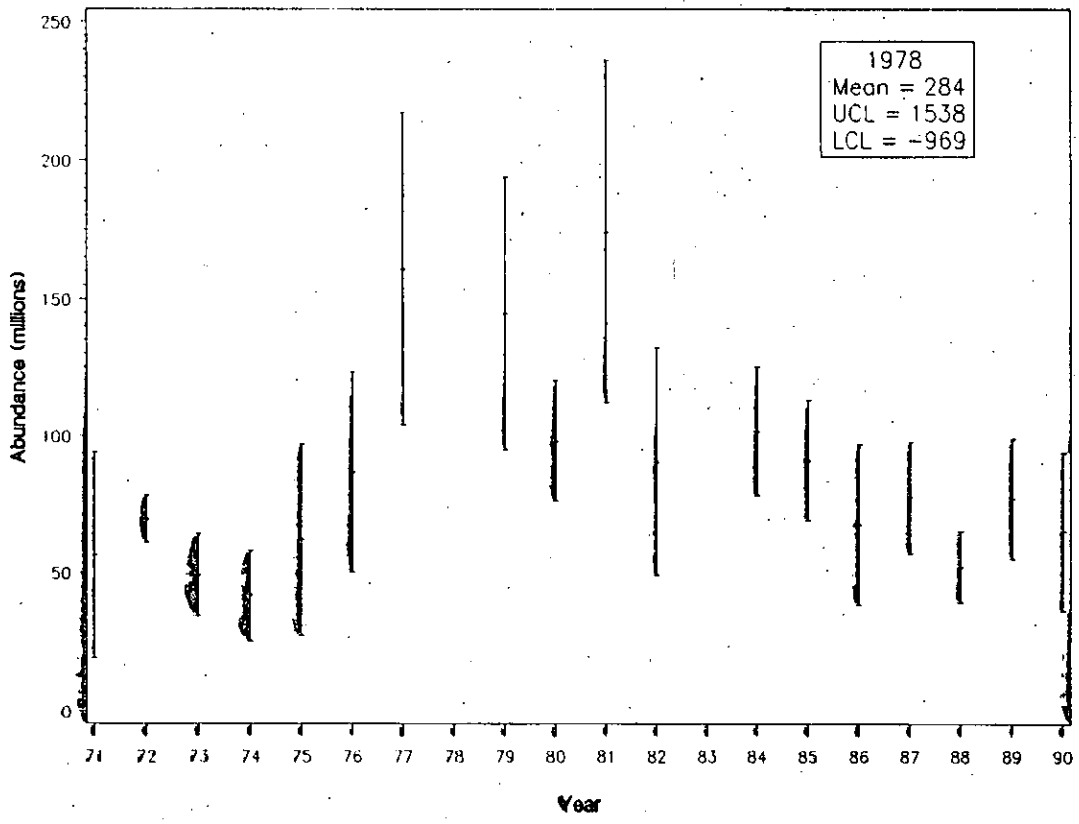

Figure 9 Abundance and 95% Confidence Limits of American Plaice in Division 3N from Canadian Spring Surveys

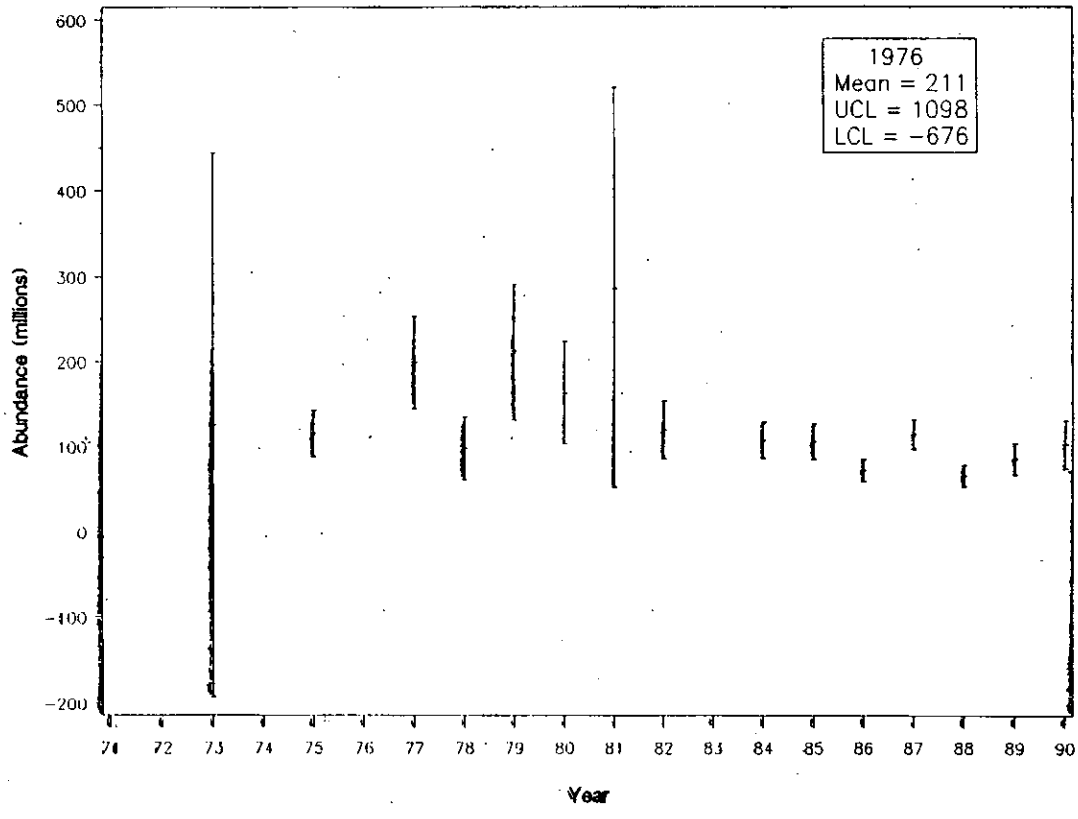

Figure 9 Abundance and 95% Confidence Limits of American Plaice in Division 3O from Canadian Spring Surveys

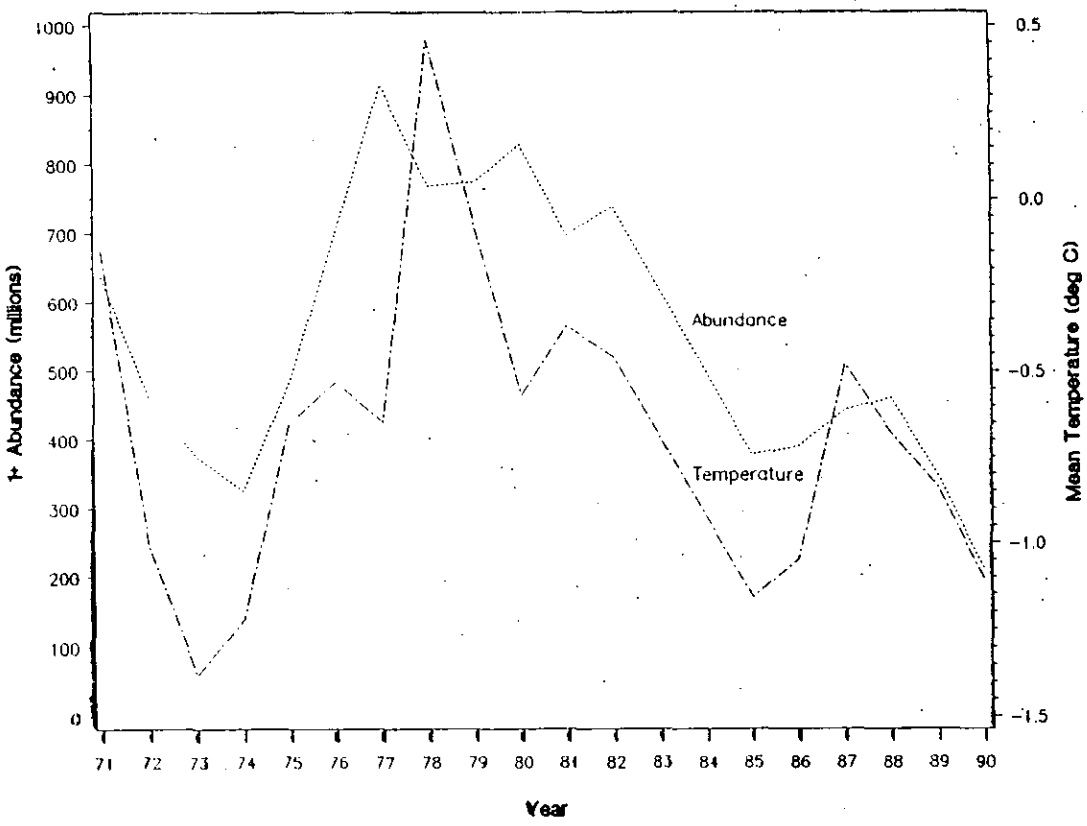

Figure 10. Age 4+ Abundance (Division 3L Total) and Mean Bottom Temperature at 51-100 m Intervals from Spring Surveys

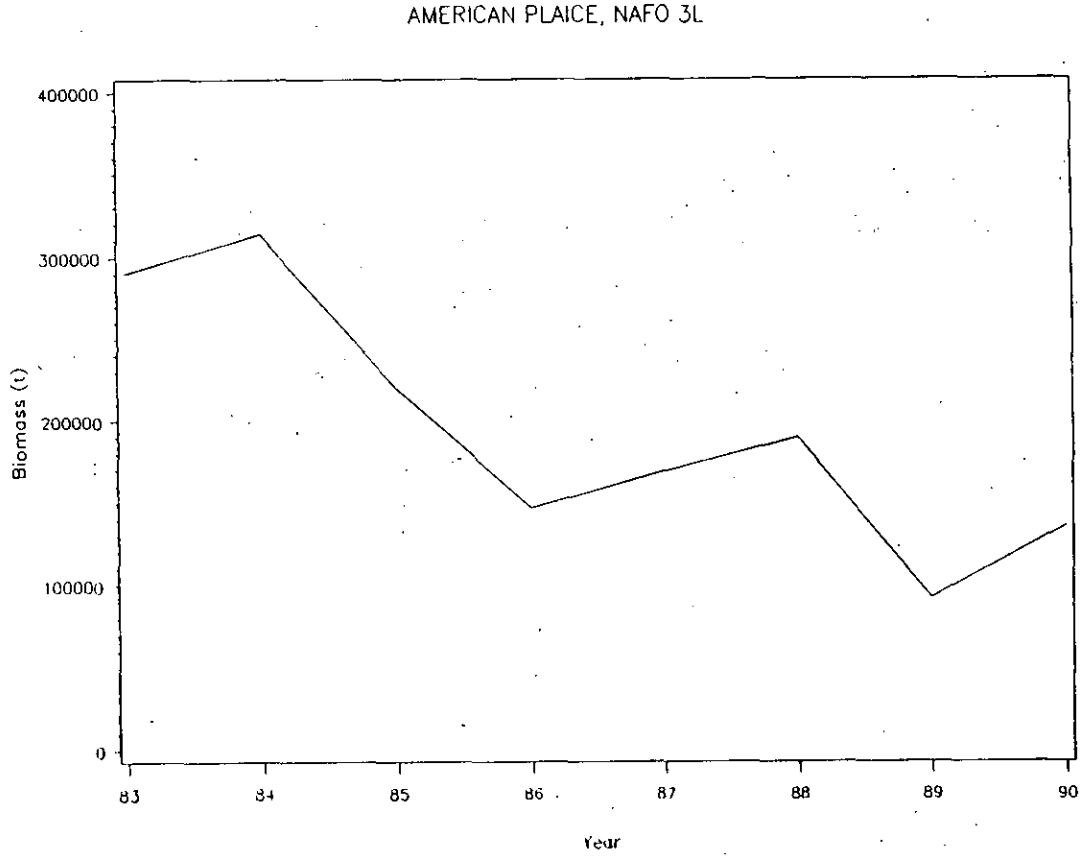

Fig.11 Biomass estimates of plaice derived from the Fall RV surveys in Div. 3L

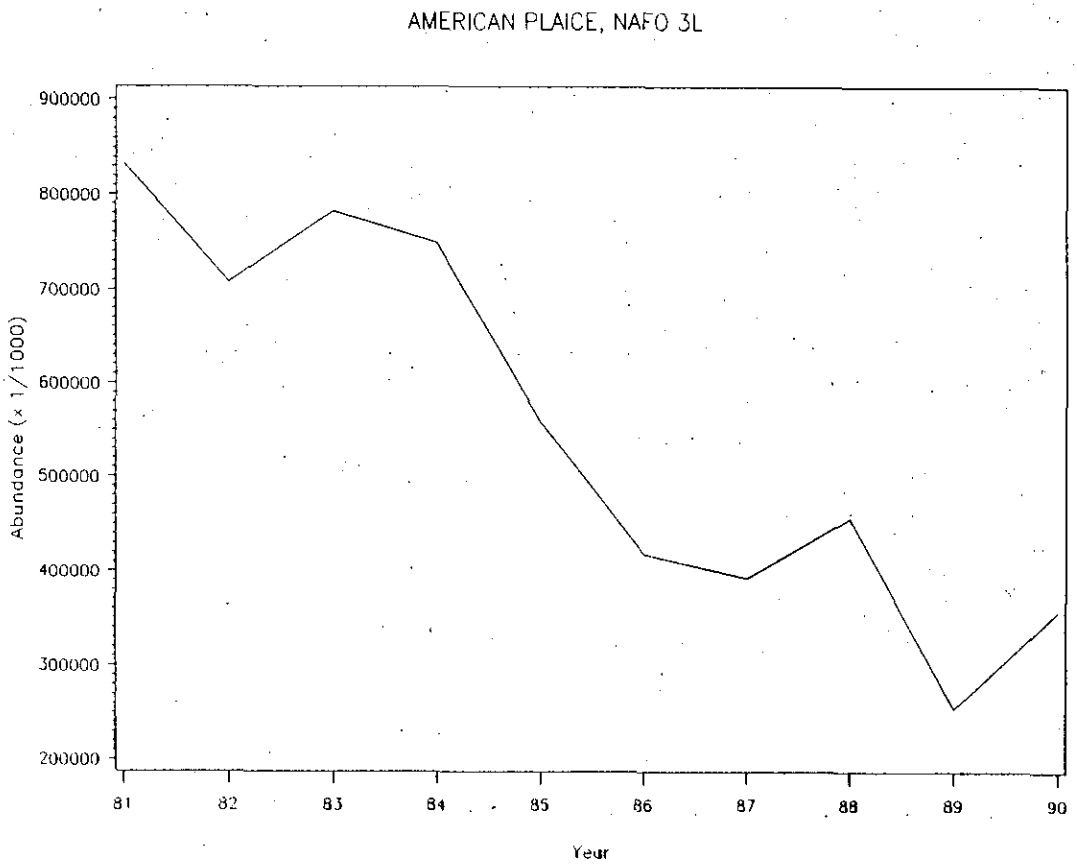

Fig.12 Abundance estimates of plaice derived from the Fall RV surveys in Div. 3L

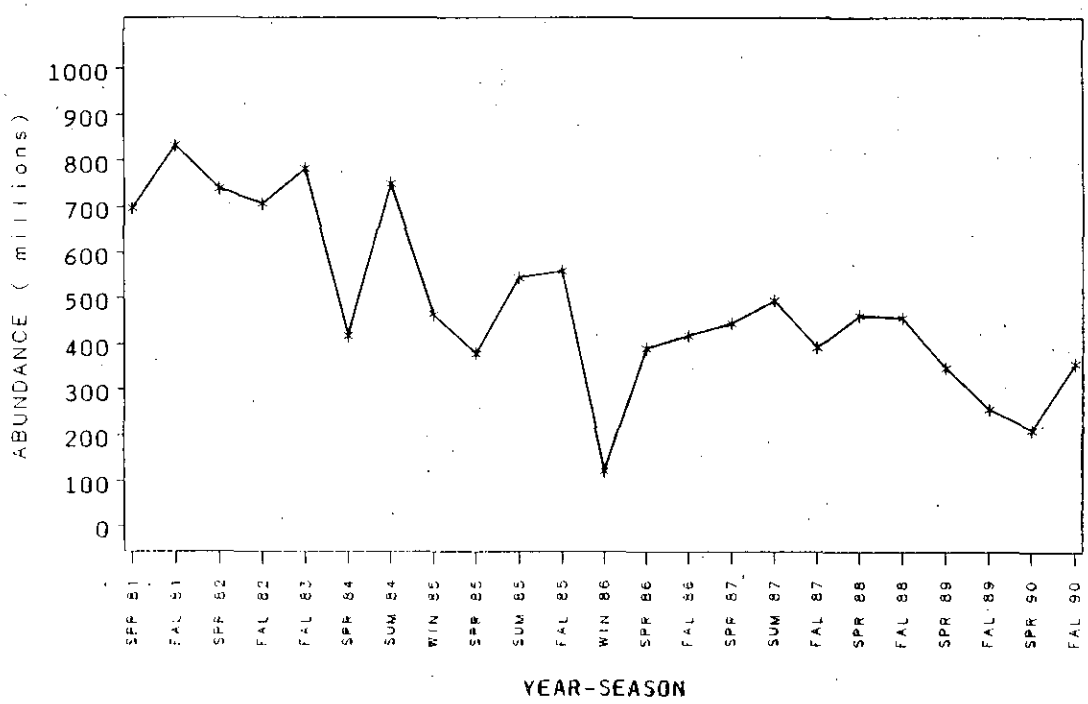

FIG.13. ABUNDANCE OF A.PLAICE IN DIV.3L FROM SURVEYS CONDUCTED IN DIV.3L AT VARIOUS TIMES FROM 1981-1990.

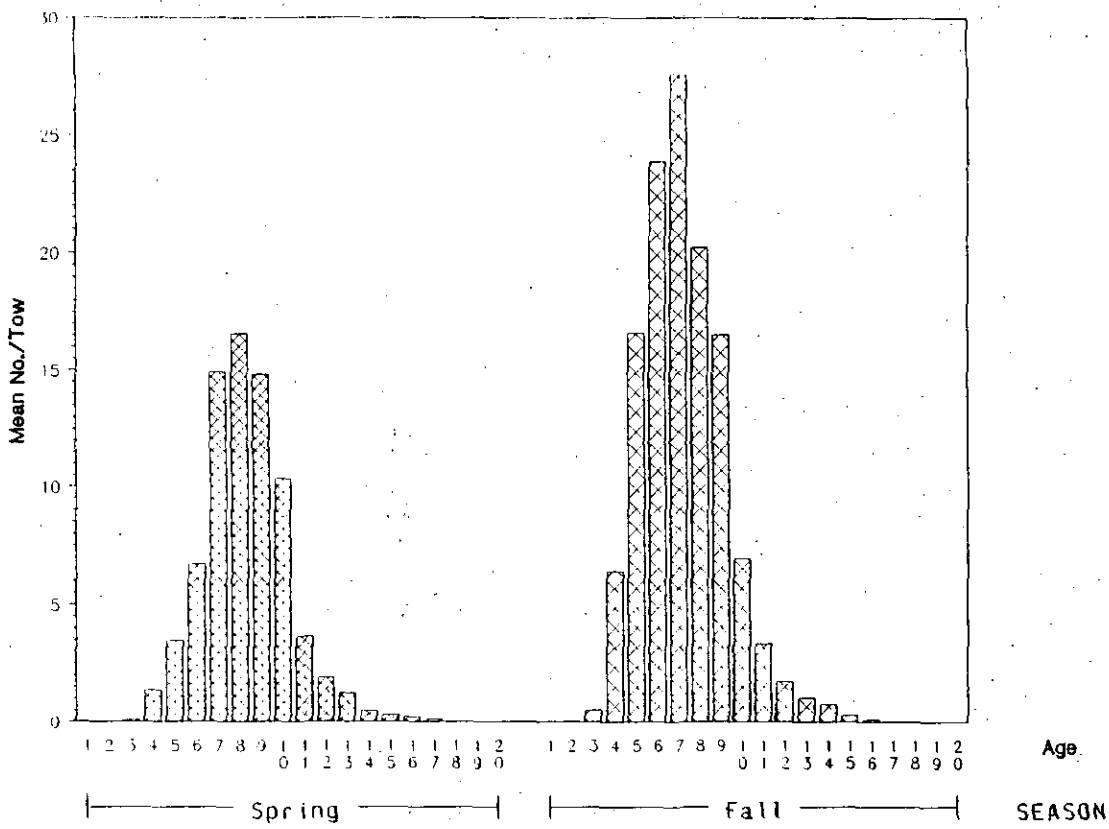

Figure 14 American Plaice Mean Numbers Per Tow At Age from Spring and Fall RV Surveys in 1990 in 3L

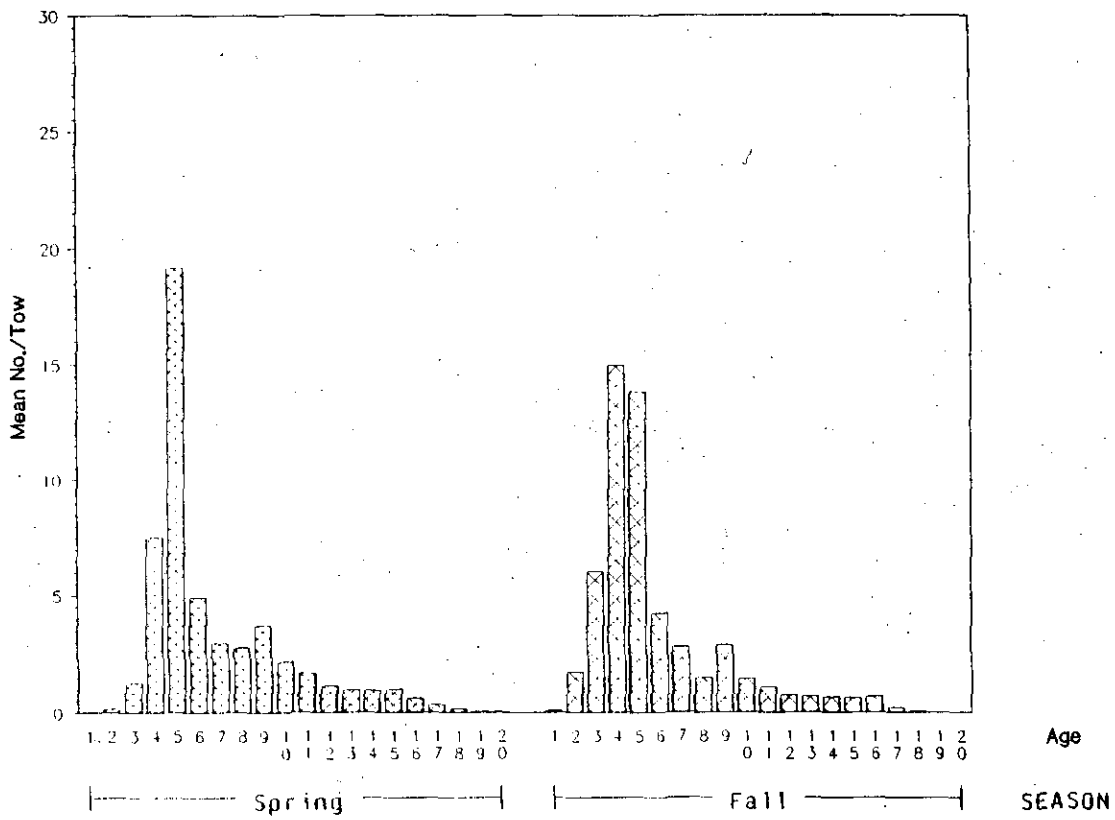

Figure 15 American Plaice Mean Numbers Per Tow At Age from Spring and Fall RV Surveys in 1990 in 3N

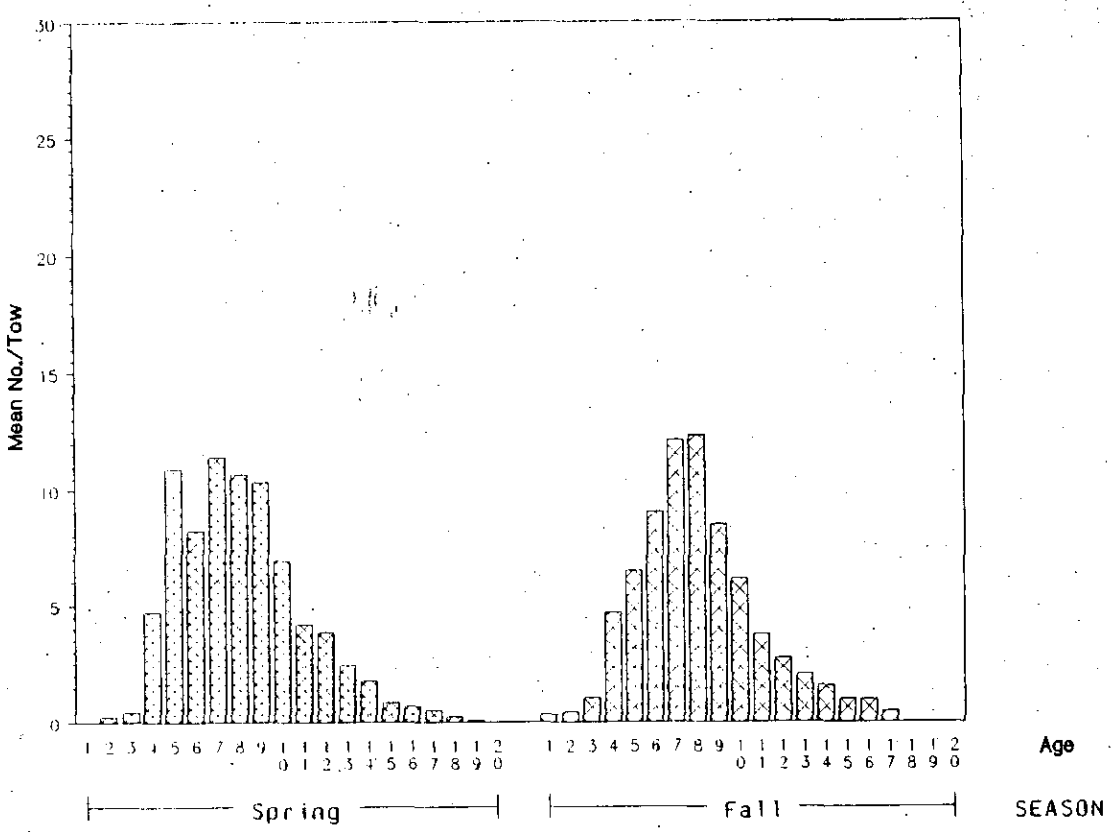

Figure 16 American Plaice Mean Numbers Per Tow At Age from Spring and Fall RV Surveys in 1990 in 3O

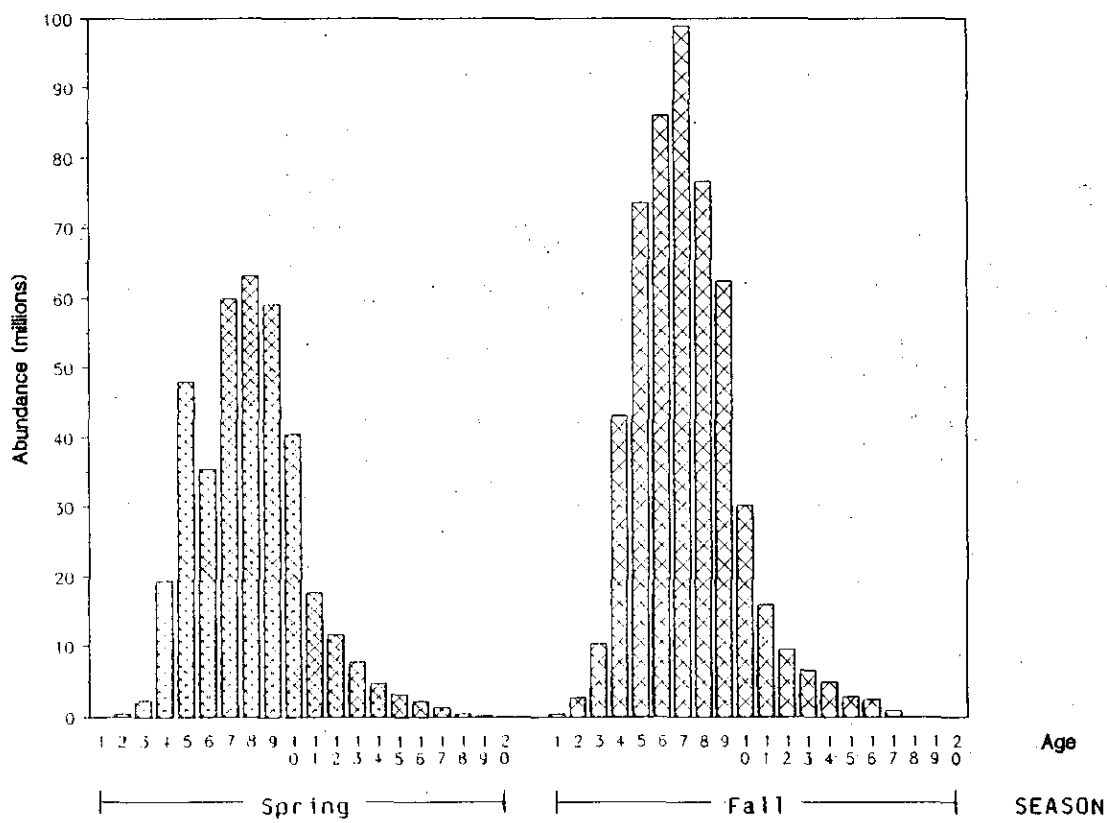

Figure 17 Abundance of American Plaice from Spring and Fall RV Surveys in 1990 in 3LNO