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An Assessment of 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 and 30,300 t in 1989 following a decline in stock abundance. In 1990-92, the TAC was set at about 25,000 t.

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, Fig.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. The 1991 catch is estimated to be about 39,000 t.

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 and 2). Canada and Spain have taken most of the catch from 1987 to 1989. Considerable doubts have arisen about some nominal catches in recent years, resulting in various catch estimates being used. These include surveillance estimates, breakdowns of unspecified flounder catches by S.Korea based on reported flounder catches, and any other estimates deemed by STACFIS to be reliable. This uncertainty is reflected in the following table, where a large portion of the 1991 catch is estimated:

Canada	22453 t
EC Spain	276
EC Portugal	186
S.Korea	6000
Other	10521
Total	39436

Table 3 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. Recent catches in the Regulatory Area continue to be mainly from Div. 3N.

In 1990 and 1991, the Canadian catch totalled about 22,500 t, most of which came from Div. 3L (Table 4). The 1990 catch by inshore gears, mainly gillnet, was the lowest in the 19-year time series for which catches by inshore gears were available and the 1991 value of 1500 t was only 13% higher. Most of the remainder of the 1991 catch was taken by otter trawl, although about 2000 t was caught by Scottish seiners, which was similar to 1990. One major difference in the Canadian catch in 1991 was the amount taken in Div. 3O. Table 5 shows that the otter trawl catch in Div. 3O in 1991 was the highest by Canada since 1974. The directed fishery was higher in Div. 3O in 1991 than in either Div. 3L or 3N (Table 6), which is the only time that has occurred. This shift in effort also resulted in increased by-catches of yellowtail in Div. 3O (Table 7), and in fact some of the fishery in this area was actually a mixed fishery for both flatfish species.

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

Sampling was available from the Canadian (Table 8), Spanish (SCS 92/13), and Portuguese (SCS 92/14) fisheries in 1991. Table 9 shows the catch-at-age from the Canadian fishery in Div. 3L (inshore and offshore), 3N, 3Ø, and 3LNO combined. Ages 7-11 comprised the majority of the catch, with the peak being age 9; this is one year lower than the modal age in the Canadian fishery in 1990. The mean weights were higher at most ages in 1991 compared to 1990; this continues the trend noted at the older ages in recent years.

The Spanish catch-at-age was combined with the Portuguese catch at age and adjusted to represent a total catch in Div. 3LNO of 16983 t. This includes catches by S. Korea, other non-members estimated from surveillance, and estimates of other non-reported catches. The Spanish and Portuguese catch-at-age are shown in Table 10 and indicate that ages 5-7 comprise 70-80 % of the catch numbers.In each year from 1989 to 1991, the 1985 year-class was predominant in the Spanish catches.

The total catch-at-age for 1991, which is given with the rest of the catch matrix in Table 11, does not show the same bimodal pattern as in 1989 and 1990, as there was less difference in the modal ages in the catch in the regulatory area versus the catch inside the Canadian 200 mile limit. It should be noted that there is still a substantial number of fish in the catch at ages younger than 5 from 1989-1991. The mean weights at age are given in Table 12 and indicate that the weights in 1991 were generally higher. It should be noted that mean weights for 1990 have not been calculated and the average of the 1989 and 1991 values were used for this year. Data for 1990 are available and the weights will be calculated at a later date.

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 1956-91. 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 13 and Figure 2. 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 remained at this relatively low level through 1990. In 1991 the C/E declined a further 37% and is now one-third lower than the previous low value for this stock, observed in 1976. Given that the Canadian catch in 1991 was similar to that of 1990, the drop in C/E meant that standardized effort rose by over 50% in 1991, to about the level seen in 1986-87. These calculations are supported by comparisons of the nominal effort in 1990 and 1991.

An analysis of the same data, but for the NAFO Divisions separately, shows that similar trends in C/E are present in each area. C/E was relatively stable in each Division from 1986 to 1990, then declined sharply in 1991 (Fig.3).

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 trawler catches, is shown in Table 14. This index shows a stable but lower stock size in 1986-90 compared to the estimates of the early to mid-1980s, followed by a decline in 1991, particularly at the older ages. There was a moderate increase in C/E at ages 7 and 8 in 1991, but large decreases at ages 9+. 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 a change in mesh size used by the Canadian fleet to a standard 130 mm in late 1981.

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 1992, with the exception of 1983. The stratification scheme used is shown in Figure 4.

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 15). A preliminary estimate from the 1992 survey was only 8% of the 1989 estimate in Div. 3L (Fig.5). 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. There is no evidence from these surveys that plaice changed their distribution by moving to deeper water, at least in the spring time (Table 16).

In Div. 3N, the biomass index also shows a decline in recent years, with 1992 being the lowest point by far in the series (Table 17,Fig. 5). As in Div. 3L, there is no evidence of a movement of plaice to deeper waters , down to the 400 fm limit covered in the surveys (Table 18).

In Div. 3Ø, the biomass index has not shown the same consistent decline (Fig.5), although the 1992 value is the lowest in the series (Table 19). As in the other Divisions, most of the biomass continues to be found in the shallower strata (Table 20).

Tables 21-23 contain comparisons of biomass estimates on either side of the 200 mile limit in Divisions 3L, 3N, and 3O. In Divs. 3L and 3O, the proportion of the biomass in the regulatory area was generally 5% or less, while in Div. 3N the percentage ranges from 13 to 46 with an average of 26%. For Div. 3LNO combined (Table 24), the percentage from 1985 to 1991 ranged from 2.6 (1988) to 9.7 (1985).

To allow comparison of the trends in abundance at age for this stock over the 1971-91 period, a multiplicative analysis of mean catch number per stratum was again carried out, using the same methodology employed in the 1991 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 25, 26, and 27 show the abundance for Div. 3L, 3N, and 3Ø respectively, with Table 28 containing the combined index. It should be noted that the data from the 1992 survey were not available on an age-by-age basis at this time.

Figure 6 shows the trends in abundance for Div. 3L, 3N, and 3Ø, separately and combined. 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 1990-91 was lower than any other years, and the 1992 abundance is certain to decline further, based on the biomass index from the 1992 survey. The abundance of older fish has been declining rapidly, with the 1991 value for age 8+ abundance being about half the 1990 value and about one-third the estimates for 1986-1988.

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). However the estimate at age 6 in the 1991 survey is no better than average. This year-class also showed up strongly in Div. 3Ø in 1990, but is again about average in 1991. The 1986 year-class appeared to be slightly above average in Div. 3NO in 1990 and 1991. There is, as yet, no evidence from the spring surveys in Div. 3L that the 1985 or 1986 year-classes are strong. In total, the 1985 and 1986 year-classes appear to be below average, although the 1985 year-class is the dominant one in the 1991 survey (Table 28). It should be noted that 1991 is the only year in the series of spring surveys where the dominant age is less than 7.

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 29-31 show the mean bottom temperature, by depth range, from the fishing stations in the spring surveys from 1971 to 1991 in Div. 3L and 3N, and 1973-91 in Div. 3Ø. In general, the coldest years were 1972-74, 1985-86, and 1990-91. 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. Figs. 7-9 show the trends in the mean bottom temperature at the 51-100 fathom range in each Division. Temperatures in the fall surveys in Div. 3LNO in 1990 and 1991 were generally higher than in spring (Table 32), although there was little change from spring to fall in both years in the temperature at the 51-100 fm interval in Div. 3L. The recent declines in abundance as measured by the surveys coincide with very low temperatures on the Grand Bank. Recent experimental work has shown that A. plaice tolerate sudden decreases in water temperature and will survive in water as cold as -1.4°C or -1.5°C. However, the long-term effects of reduced temperature on the species are not known, nor is any relationship known between trawl catchability or increased mortality of A. plaice and bottom temperature. Further work is ongoing to determine if any such relationships exist.

In addition to the declines in abundance noted for A.plaice in Div. 3LNO, reductions in the numbers of this species in adjacent areas have also been observed. In Divs 2J+3K, the biomass index from surveys has decreased from estimates around 100,000 tons in 1980-84 to less than 15,000 tons in 1991 (Fig.10). It is highly unlikely that the fishery played a major role, with catches in this area averaging just 1600 t from 1983-1991. In Subdiv. 3Ps, the biomass of plaice has shown a similar downward trend since the mid-

1980's. These declines suggest that factors other than the fishery have had a substantial impact on the reduction of the A.plaice stocks in the Newfoundland area.

Fall

Stratified-random surveys have been conducted in Div. 3L in the fall from 1981 to 1991, usually in October-November and Figure 11 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 A. T. CAMERON, which did these earlier surveys, and the W. TEMPLEMAN and A. NEEDLER, which were used for the surveys after 1982. Declines over the time period are apparent in both indices (Fig.11). Table 33 shows the mean catch weights on a stratified basis and Table 34 contains the results on an age-by-age basis. The 1985 year-class was dominant in the 1991 survey, but its value at age 6 is the lowest in the time series. Only the 1986 year-class looks anywhere near average in the 1991 results.

Figure 12 shows a time series of abundance estimates from all surveys in Div. 3L over the period 1981-91, including the data from the spring and fall surveys discussed above. In 1990 and 1991, fall surveys were also carried out in Div. 3NO. Table 35 compares the results from the spring and fall surveys in 1990 and there are a number of interesting points here. The indices for 3LNO combined increased between spring and fall in each year (40% for abundance in 1990 and 75% in 1991). This spring to fall increase has not been observed consistently in other years (Fig.12). As well, the estimates of total abundance and biomass dropped sharply from 1990 to 1991 (-44% for abundance in the spring surveys and -30% in the fall surveys). This decline was evident in all 3 areas in the spring surveys but only in Div. 3L in the fall, as both abundance and biomass increased in Div. 3NO from fall 1990 to fall 1991.

Tables 36 to 38 contain biomass estimates by stratum from the fall surveys in 1990 and 1991 Div. 3L, 3N, and 3Ø respectively. As with the spring surveys, there is no evidence to suggest a migration of A.plaice to deeper water. Table 39 shows the estimates of A.plaice biomass in the Regulatory area from the 2 fall surveys and these proportions are similar to those from the spring surveys (Table 24).

Table 40. gives the age compositions of plaice in Div. 3N and 3O in the fall surveys. The 1985 and 1986 year-classes were prominent in the catches in Div. 3N in both surveys, particularly 1991 where they comprised 53% of the total abundance. These year-classes were not as dominant in Div. 3O.

USSR Surveys

Figures 13 and 14 show the estimates of abundance and biomass respectively of plaice from USSR surveys in Div. 3LNO. The results agree with those of the Canadian spring surveys, indicating an increase in stock size in the late 1970's and early 1980's, followed by an almost continuous decline since 1984. Estimates in 1990 and 1991 are the lowest in the time series. Age data are available for only the period 1984-90 and were examined in the most recent assessment of this stock.

Maturity Ogives

To examine possible changes in sexual maturation rates of A.plaice on the Grand Bank, maturity ogives for females from Div. 3L were constructed. Data used came from spring and fall RV surveys done in 1985 and 1991 and probit analysis was used on the percent mature at length and then age. The ogives for length are shown in Figs. 15 to 18, and for age in Fig.19. The following table contains the 50% maturity values, from the probit analyses, for both length and age from the various surveys:

Survey	M_{50} Length	Age
Spring 85	35.0	8.5
Fall 85	33.7	7.9
Spring 91	34.1	8.6
Fall 91	33.5	7.5

The differences between 1985 and 1991 are not large, and are in fact smaller than the differences between spring and fall in either year. This suggests that there has been no significant change in sexual maturation of plaice on the northern Grand Bank from 1985 to 1991, although further work is planned with the data from all surveys to be examined.

Sequential population analysis (ADAPT and Laurec/Shepherd)

The catch-at-age , the abundance at ages 5 to 14 from the Canadian groundfish surveys, and the C/E at ages 9 to 14 from the Canadian commercial

fishery, all for the years from 1975-91 (except for no 1983 RV data) were used in 2 formulations of the Adaptive framework. The first (Tables 41-43) used both indices while the second (Tables 44-46) used only the RV data. In both formulations, all parameter estimate were significant, with most CV's between 0.2 and 0.3. The residual patterns for both indices (Table 40) indicate year effects to be present, with 1991 showing negative residuals at virtually all ages in both indices. As well, the C/E residual matrix shows mostly negative residuals from 1975 to 1981, and positive values after that, indicating lack of fit of the model. Residual patterns are not as pronounced with the RV data in both formulations. Population estimates are similar in both ADAPTs, but are lower at all ages in the formulation with RV data alone.

The Laurec/Shepherd (LS) calibration technique was used with the same input data used in the Adaptive framework, except that the survey data were those for 1984 onward only (there was no survey in 1983). Table 47 contains the results of the calibration with both indices, and the standard error estimates on the q values are generally 2 to 3 times higher in the C/E relationships than for the RV data. Table 48 shows the output for the RV data only. Table 49 contains a comparison of the 4 calibrations (2 ADAPT and 2 LS). The LS indicates a substantially lower population biomass in 1991 relative to ADAPT (Figs. 20 and 21), with the RV only formulation showing slightly lower population estimates than the LS run with both indices, which agrees with the Adaptive framework results. All 4 analyses indicate the 1985 and 1986 year-classes to be larger than those of the previous few years, with LS showing all year-classes from 1981 to 1986 to be smaller than the corresponding values from ADAPT. In general, recent year-classes are smaller than those of the 1960's and early 1970's. Given the problems with the C/E tuning, it was decided to use only the results from the RV-only tuning for catch projections.

Regardless of the analysis used, the conclusions must be basically the same - that the stock has declined substantially from the mid 1980's to the present. SSB is at an extremely low level (17,000 t with LS, 42,000 t with ADAPT). There are likely to be a number of reasons for the decline, including adverse environmental conditions, but a major contributor must be the increased fishing mortality on the younger ages, including those which are not estimated in the VPA. The increase in fishing mortality at the younger ages in the VPA (6-8) is particularly evident in the LS analyses.

Catch projections

Results from both the ADAPT and LS calibrations were used in catch projections for 1993. The population estimates for 1991 were taken from the calibrations with RV data only and the PR values were determined from 1989-1991 mean F's in each analysis. The 1989-91 mean weights at age were used in both projections. The GM estimate (1978-89) of 150 million fish was used for the age 5 population in 1992 and 1993, and the catch in 1992 was assumed to be 30,000 t. The $F_{0.1}$ catch in 1993 is approximately 10,500 t with the LS data and 14,500 t with the ADAPT. Fishing mortality on the stock should be reduced to allow the 1985 and 1986 year-classes to contribute to the SSB.

Table 1. Nominal catches (t) of American plaice for NAFO Divisions 3LNO, 1960-90 and TACs from 1973 to 1992.

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	41	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,e]	27,926	93	-	6	724	14,649[b]	43,398	30,300
1990[e]	22,560	-	-	17	695	8,767[b]	32,039	24,900
1991[e]								25,800
1992								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 1991 catches.
[d] Effective TAC.
[e] Provisional.

Table 2. Breakdown of catches from Table 1 listed as "other" for 1984-90.

Year	Spain	Portugal	Panama[b]	USA	Cayman Islands[b]	Other (NAFO member)	Other (Non-member)[c]	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
1989	10,909	588	-	1,133	-	52	1,967	14,649
1990	304	357	-	10	-	6,196[c]	1,900	8,767

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

Year	Division 3L	Division 3N	Division 3Ø	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 4. Breakdown of Canadian (N+SF) catches by division, month, and gear of A. plaice in Div. 3LNO in 1991.

Month	3L OT	3L SS	3L Misc[a]	3N OT	3N SS	3N Misc	3Ø OT	3Ø SS	3Ø Misc	Total
Jan	27									27
Feb	1						1			2
Mar	10			2			1			13
Apr	85			50	1		73			209
May	277		15	201	56	2	531	144	12	1238
Jun	617	66	301	280	121		1175	72		2632
Jul	1055	191	622	275	215		3246	76		5680
Aug	1187	176	338	964	344		1636	21		4666
Sep	1732	116	152	896	132		477	5		3510
Oct	2253	158	97	202	37		310	9		3066
Nov	620	13	29	58	18		37	23	4	802
Dec	542	7	5	12	7		15	20	3	611
Total	8406	727	1559	2940	931	2	7502	367	19	22453

[a]Misc
GN 1504
Other 55

Div. Totals	3L	3N	3Ø
	10692	3873	7888

3LNO		
Otter Trawl (OT)		18848
Scottish Seine (SS)		2025
Gillnet (GN)		1504
Other		76

Table 5. Canadian catches of A. plaice (otter trawl only), by division, from 1973 to 1991.

Year	3L	3N	3O	3LNO
1973	14367	11575	9966	35908
1974	11745	13741	7895	33381
1975	11356	16306	3859	31521
1976	20648	17171	6383	44202
1977	19493	15536	3528	38557
1978	25574	12527	6242	44343
1979	23698	13923	4665	42286
1980	28083	14786	1893	44762
1981	32297	9308	1810	43415
1982	28204	11971	5043	45218
1983	19091	8677	4324	32092
1984	16784	10950	3312	31046
1985	20210	13327	3935	37472
1986	17461	8066	3867	29394
1987	21511	4396	3843	29750
1988	14126	5195	4441	23762
1989	15755	4665	4024	24444
1990	11465	4181	3611	19257
1991	8406	2940	7502	18848

Table 6. Catches of A. plaice by Canada (N) otter trawls in the directed (main species A. plaice) fishery and their percentage of the total otter trawl catch of A. plaice by Canada.

	3L		3N		3O		3LNO	
Year	Directed	% total	Directed	% total	Directed	% total	Directed	% total
1973	12548	87	7479	65	6362	64	26389	73
1974	11278	96	9609	70	6722	85	27609	83
1975	10267	90	11769	72	2585	67	24621	78
1976	20132	98	15569	91	5151	81	40852	92
1977	18027	92	14085	91	2559	73	34671	90
1978	23687	93	9961	80	5067	81	38715	87
1979	20518	87	10095	73	3595	77	34208	81
1980	22639	81	11930	81	1446	76	36015	80
1981	28058	87	6069	65	1330	73	35457	82
1982	23503	83	9541	80	2928	58	35972	80
1983	12172	64	6072	70	2851	66	21095	66
1984	10318	61	6368	58	2191	66	18877	61
1985	14930	74	10594	79	1993	51	27517	73
1986	12665	73	4969	62	2167	56	19801	67
1987	14358	67	1835	42	1896	49	18089	61
1988	8385	59	3359	65	2857	64	14601	61
1989	11334	72	3371	72	2720	68	17425	71
1990	7556	66	2846	68	2942	81	13344	60
1991	6187	74	2260	77	6290	84	14737	78

Table 7. Catches and by-catches (t) of A. plaice and yellowtail, by division, from 1985-91 for Can(N) TC 5 stern trawlers. Figures in square brackets represent the percentage of directed catch taken by division each year, and the figures in parentheses represent the by-catch rates of one species in the directed fishery for the other.

		Directed plaice fishery		Directed yellowtail fishery	
		Plaice	Yellowtail	Yellowtail	Plaice
1985	3L	14617 [55]	995 (6)	793 [12]	328 (29)
	3N	9978 [38]	1764 (15)	5385 [84]	1439 (21)
	3O	1917 [7]	317 (14)	222 [4]	148 (40)
1986	3L	12410 [64]	890 (7)	619 [7]	319 (34)
	3N	4767 [25]	934 (16)	7632 [88]	1666 (18)
	3O	2128 [11]	375 (15)	450 [5]	241 (35)
1987	3L	14089 [80]	216 (2)	198 [2]	98 (33)
	3N	1774 [10]	357 (17)	7672 [91]	1492 (16)
	3O	1767 [10]	358 (17)	587 [7]	296 (34)
1988	3L	8262 [58]	165 (2)	220 [4]	95 (30)
	3N	3279 [23]	392 (11)	5096 [86]	912 (15)
	3O	2709 [19]	430 (14)	571 [10]	310 (35)
1989	3L	11046 [66]	149 (1)	65 [4]	40 (38)
	3N	3131 [19]	428 (12)	1321 [68]	515 (28)
	3O	2483 [15]	438 (15)	548 [28]	322 (37)
1990	3L	7388 [57]	176 (2)	194 [9]	92 (32)
	3N	2759 [21]	427 (13)	1753 [80]	626 (26)
	3O	2919 [22]	238 (8)	237 [11]	131 (36)
1991	3L	6107 [43]	328 (5)	93 [3]	56 (38)
	3N	2202 [15]	295 (12)	2212 [72]	440 (17)
	3O	6089 [42]	1067 (15)	758 [25]	411 (35)

Table 8 . 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, Q4, 3L (181)	GN, Sep, 3L (851)	2	1559	Misc gears, 3L, Jan-Dec
Offshore, Q2, 3L (249)	OT, Apr, 3L (342)	1	123	OT, 3L, Jan-Apr
	Jun (435)	1	894	May-Jun
	SS, Jun, 3L (316)	1	66	SS, 3L, Jan-Jun
Offshore, Q3, 3L (495)	OT, Aug, 3L (430)	1	2609	OT+SS, 3L, Jul-Aug
	Sep (1872)	5	1848	Sep
Offshore, Q4, 3L (716)	OT, Oct, 3L (5162)	14	2411	OT+SS, 3L, Oct
	Nov (3105)	9	633	Nov
	Dec (317)	1	549	Dec
Offshore, Q2, 3N (85)	OT, May, 3N (264)	1	713	All gears, 3N, Jan-Jun
Q3 (171)	OT, Sep, 3N (723)	2	3160	All gears, 3N, Jul-Dec
Offshore, Q2, 3O (344)	OT, Apr, 3O (312)	1	75	All gears, 3O, Jan-Apr
	Jun, (1054)	3	1718	OT+Misc, 3O, May-Jun
	SS, Jun, 3O (325)	1	213	SS, 3O, May-Jun
Offshore, Q3, 3O (292)	OT, Jul, 3O (1014)	3	3246	OT, 3O, Jul
	Aug (349)	1	2482	OT+Misc, 3O, Aug-Dec
	SS, Jul, 3O (342)	1	154	SS, 3O, Jul-Dec

Table 9 . Catch at age and mean weights at age from the Canadian fishery for A.plaice in Div. 3LNO in 1991.

3L INSHORE

AGE	AVERAGE WEIGHT	AVERAGE LENGTH	CATCH MEAN	CATCH STD. ERR.	CATCH C. V.
6	0.221	29.670	12	9.50	0.76
7	0.266	31.335	404	60.82	0.15
8	0.342	33.798	587	79.96	0.14
9	0.487	37.542	676	81.85	0.12
*10	0.667	41.373	525	72.57	0.14
*11	0.867	44.744	383	62.45	0.16
12	1.143	48.682	146	27.31	0.19
13	1.466	52.500	36	10.70	0.30
14	1.660	54.500	2	2.27	1.42
15	2.186	59.081	7	6.34	0.94
16	2.349	60.500	5	5.92	1.15

3N

AGE	AVERAGE WEIGHT	AVERAGE LENGTH	CATCH MEAN	CATCH STD. ERR.	CATCH C. V.
5	0.192	28.350	36	17.30	0.47
* 6	0.276	31.632	244	43.37	0.18
7	0.374	34.667	407	58.37	0.14
8	0.514	38.164	576	81.59	0.14
9	0.726	42.318	909	107.58	0.12
10	0.896	45.095	753	99.32	0.13
11	1.153	48.578	612	81.67	0.13
*12	1.460	52.302	291	52.16	0.18
13	1.961	57.092	166	35.06	0.21
14	2.292	59.852	111	25.78	0.23
15	2.613	62.282	51	15.21	0.30
16	3.204	66.386	39	13.11	0.34
*17	3.864	70.239	13	4.99	0.40

3L-OFFSHORE

AGE	AVERAGE WEIGHT	AVERAGE LENGTH	CATCH MEAN	CATCH STD. ERR.	CATCH C. V.
5	0.204	28.954	13	8.77	0.67
6	0.277	31.654	232	50.43	0.22
* 7	0.324	33.190	1690	126.83	0.08
* 8	0.429	36.097	3941	184.08	0.05
9	0.559	39.139	3267	171.65	0.05
*10	0.756	42.852	2397	136.32	0.06
*11	0.956	45.948	1408	106.91	0.08
12	1.217	49.459	759	69.05	0.09
*13	1.560	53.376	229	27.69	0.12
*14	1.855	56.202	100	15.38	0.15
15	2.241	59.556	73	11.84	0.16
*16	2.764	63.425	72	10.68	0.15
17	3.123	65.801	13	6.15	0.47
18	3.395	67.574	8	4.06	0.48

3O

AGE	AVERAGE WEIGHT	AVERAGE LENGTH	CATCH MEAN	CATCH STD. ERR.	CATCH C. V.
5	0.262	31.260	14	8.01	0.56
6	0.319	33.138	67	21.07	0.31
* 7	0.341	33.680	443	57.54	0.13
8	0.433	36.167	1605	145.52	0.09
9	0.589	39.679	2118	201.81	0.10
10	0.752	42.721	2216	218.35	0.10
11	1.016	46.808	1738	186.14	0.11
12	1.386	51.422	953	120.59	0.13
13	2.030	57.614	303	42.33	0.14
14	2.410	60.611	80	18.95	0.24
*15	2.174	58.959	54	14.11	0.26
*16	2.836	63.854	16	5.89	0.36
*17	3.344	67.028	7	3.77	0.50
18	3.549	68.500	1	1.59	1.17

3LNO-TOTAL

AGE	AVERAGE WEIGHT	AVERAGE LENGTH	CATCH MEAN	CATCH STD. ERR.	CATCH C. V.
5	0.210	29.129	64	20.99	0.33
* 6	0.281	31.780	555	70.42	0.13
* 7	0.325	33.213	2945	162.79	0.06
* 8	0.429	36.090	6709	260.99	0.04
9	0.583	39.562	6970	297.43	0.04
*10	0.764	42.958	5092	285.28	0.05
*11	1.002	46.586	4141	238.01	0.06
*12	1.320	50.661	2149	150.92	0.07
*13	1.840	55.924	733	62.46	0.09
*14	2.171	58.782	293	35.57	0.12
*15	2.372	60.114	186	24.71	0.13
*16	2.886	64.235	133	18.86	0.14
*17	3.456	67.778	33	8.77	0.27
18	3.416	67.703	10	4.36	0.45

Table 10. Per mille age compositions from the commercial fishery, during 1991, of American Plaice in Divisions 3LNO for Canada, Spain and Portugal along with the total removals at age for all countries.

	CANADA		SPAIN		PORTUGAL		TOTAL CATCH AT AGE	
AGE	NO.	WT.	NO.	WT.	NO.	WT.	NO.	WT.
2					1	0.046	17	0.046
3			7	0.076	25	0.085	405	0.084
4			24	0.122	76	0.124	1760	0.123
5	7	0.210	214	0.189	200	0.214	9089	0.197
6	18	0.281	479	0.298	344	0.329	17886	0.306
7	96	0.325	173	0.458	163	0.506	10269	0.430
8	218	0.479	93	0.604	86	0.680	10627	0.502
9	226	0.583	32	0.802	29	0.844	8294	0.620
10	191	0.764	19	0.997	35	0.998	6933	0.799
11	134	1.002	8	1.271	10	1.161	4519	1.021
12	70	1.320	4	1.541	7	1.597	2365	1.343
13	24	1.840	1	1.824	7	1.515	849	1.803
14	10	2.171	7	2.703	4	1.720	399	2.178
15	6	2.322	0	1.899	6	1.795	275	2.153
16	4	2.886	0	1.817	4	1.897	191	2.583
17	1	3.456			3	2.488	68	2.960
18	0	3.416			0		10	3.416
19					0			
20					1	2.425	13	2.425
Total	1000		1000		1000		73963	

NOTE - Age compositions for Spain and Portugal were used to adjust the catch by non-contracting parties and others (8700t) in the NAFO Regulatory Area.

TABLE 11. CATCH AT AGE (000s) FOR AMERICAN PLAICE IN DIVISIONS 3LNO FOR THE PERIOD 1974-1991.

AGE	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
5	354	883	837	974	1558	1237	263	154	27	119	48	296	4407	2237	2908	12745	15134	9089
6	5955	3128	3907	6723	4467	6551	2977	554	314	991	397	788	9707	4941	3213	11553	7694	17886
7	10475	7220	8781	8743	9195	13532	9331	3248	1814	3053	1516	2362	12556	7691	4853	11432	4489	10269
8	10069	9433	19363	11730	10397	18747	12578	4786	4799	5797	3311	3652	12530	10893	7269	9652	4604	10627
9	7768	9234	16597	13559	12743	14977	14111	7921	8946	8343	5853	10694	13372	13867	10123	14180	8666	8294
10	9004	7903	12338	11157	13881	12506	14212	11425	12836	7707	9958	15741	13874	17640	10325	12387	8666	6933
11	7086	5701	8323	6520	9938	8791	11288	13563	15801	8493	12887	14529	14246	11404	9260	8405	6452	4519
12	4596	4732	5156	4257	6823	3775	8088	11872	14489	7517	8964	9233	10376	6986	6040	4972	3633	2365
13	3809	3788	3024	2369	3655	1843	3732	8593	7942	4588	5072	4108	5947	3076	2692	2029	1702	849
14	2278	2617	2309	1493	2239	714	1565	5591	4224	2480	2515	1969	2637	1303	1156	1027	945	399
15	1141	1461	1347	1000	1472	342	645	2938	2000	1219	1090	1235	1416	768	656	550	453	275
16	651	763	584	342	649	159	265	1119	641	373	404	388	542	247	267	146	80	191
17	267	475	245	182	212	63	87	394	206	130	93	160	162	27	38	14	12	68
18	80	234	65	101	107	16	25	246	96	49	15	9	35	4	1	5	3	10
5+	63533	57572	82876	69150	77336	83273	79367	71506	74135	50859	52123	67162	101807	83085	58801	89097	62535	71774
6+	63179	56689	82039	68176	75778	82016	79104	71352	74108	50740	52075	66867	97399	80848	55893	76352	47400	62685
7+	57224	53561	78132	61453	71311	75465	76127	70798	73794	49749	51678	66078	87693	75906	52680	64799	39706	44799
8+	46749	46341	69351	52710	62116	61933	66596	68550	71980	46696	50162	63716	75136	68216	47827	53367	35218	34530

TABLE 12. WEIGHT AT AGE (kg) FOR AMERICAN PLAICE IN DIVISIONS 3LNO FOR THE PERIOD 1974-1991.

AGE	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
5	0.210	0.213	0.207	0.209	0.195	0.209	0.209	0.209	0.256	0.298
6	0.256	0.254	0.261	0.264	0.260	0.322	0.328	0.379	0.298	0.382
7	0.339	0.348	0.346	0.357	0.353	0.374	0.408	0.406	0.360	0.473
8	0.424	0.417	0.414	0.430	0.412	0.453	0.482	0.453	0.427	0.555
9	0.578	0.564	0.557	0.614	0.512	0.551	0.541	0.487	0.485	0.658
10	0.706	0.692	0.660	0.672	0.614	0.609	0.570	0.536	0.533	0.698
11	0.912	0.896	0.829	0.878	0.768	0.702	0.650	0.551	0.596	0.697
12	1.125	1.077	1.017	1.018	0.917	0.934	0.739	0.676	0.739	0.756
13	1.372	1.318	1.142	1.231	1.184	1.228	0.982	0.792	0.976	0.959
14	1.579	1.523	1.347	1.415	1.380	1.688	1.355	1.005	1.275	1.220
15	1.975	1.777	1.661	1.782	1.694	1.910	1.758	1.305	1.594	1.551
16	2.411	2.254	2.050	2.191	2.066	2.117	1.793	1.772	2.028	2.132
17	2.647	2.538	2.263	2.323	2.276	2.336	2.224	2.116	2.322	2.370
18	2.944	2.821	2.718	2.541	2.274	3.194	2.689	2.431	2.705	2.809

AGE	1984	1985	1986	1987	1988	1989	1990	1991
5	0.270	0.212	0.122	0.230	0.170	0.101	0.149	0.197
6	0.314	0.329	0.194	0.293	0.254	0.186	0.246	0.306
7	0.382	0.430	0.277	0.398	0.343	0.261	0.345	0.430
8	0.460	0.473	0.411	0.439	0.446	0.388	0.445	0.502
9	0.551	0.549	0.548	0.497	0.489	0.488	0.554	0.620
10	0.563	0.655	0.666	0.655	0.601	0.608	0.704	0.799
11	0.654	0.820	0.776	0.843	0.774	0.806	0.913	1.021
12	0.852	1.102	0.989	1.103	1.034	1.068	1.205	1.343
13	1.128	1.472	1.296	1.395	1.369	1.446	1.624	1.803
14	1.444	1.898	1.674	1.735	1.745	1.805	1.992	2.178
15	1.987	2.341	2.065	2.221	2.226	2.259	2.206	2.153
16	2.561	2.904	2.518	2.952	2.825	2.992	2.788	2.583
17	2.851	3.270	3.030	3.345	3.645	3.885	3.422	2.960
18	3.713	4.056	4.040	3.979	4.692	4.286	3.851	3.416

NOTE - WEIGHTS FOR 1990 WERE DERIVED AS THE AVERAGE OF 1989 AND 1991

Table 13. Results of a multiplicative analysis of Canadian C/E data for A.plaice in Div. 3LNO.

REGRESSION OF MULTIPLICATIVE MODEL

MULTIPLE R..... 0.768
MULTIPLE R SQUARED..... 0.590

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DF	SUMS OF SQUARES	MEAN SQUARES	F-VALUE
INTERCEPT	1	4.216E1	4.216E1	
REGRESSION	50	7.073E0	1.415E-1	47.424
TYPE 1	2	1.049E0	5.244E-1	175.806
TYPE 2	2	2.563E-1	1.281E-1	42.961
TYPE 3	11	2.286E-1	2.078E-2	6.966
TYPE 4	35	6.116E0	1.747E-1	58.583
RESIDUALS	1647	4.913E0	2.983E-3	
TOTAL	1698	5.414E1		

REGRESSION COEFFICIENTS

CATEGORY	CODE	VARIABLE	COEFFICIENT	STD. ERROR	NO. OBS.
1	3125	INTERCEPT	0.356	0.070	1698
2	32				
3	7				
4	56				
1	3114	1	-0.363	0.019	480
	3124	2	-0.107	0.019	393
2	34	3	-0.078	0.014	615
	35	4	-0.150	0.017	448
3	1	5	0.072	0.036	75
	2	6	0.072	0.034	89
	3	7	-0.004	0.034	91
	4	8	-0.130	0.031	121
	5	9	-0.132	0.027	158
	6	10	-0.035	0.026	175
	8	11	-0.000	0.026	173
	9	12	-0.037	0.026	179
	10	13	-0.070	0.026	159
	11	14	-0.034	0.026	162
	12	15	-0.016	0.029	127
4	57	16	-0.072	0.096	13
	58	17	-0.108	0.087	16
	59	18	-0.123	0.084	17
	60	19	-0.168	0.082	18
	61	20	-0.262	0.085	16
	62	21	-0.436	0.082	19
	63	22	-0.309	0.079	22
	64	23	-0.278	0.078	33
	65	24	-0.324	0.073	55
	66	25	-0.354	0.071	68
	67	26	-0.438	0.071	70
	68	27	-0.740	0.073	59
	69	28	-0.885	0.072	70
	70	29	-0.922	0.073	59
	71	30	-1.011	0.074	59
	72	31	-1.031	0.074	63
	73	32	-0.937	0.073	69
	74	33	-1.156	0.074	63
	75	34	-1.209	0.074	59
	76	35	-1.232	0.072	70
	77	36	-1.193	0.074	59
	78	37	-1.140	0.072	75
	79	38	-1.040	0.073	61
	80	39	-0.882	0.073	60
	81	40	-0.884	0.074	62
	82	41	-0.883	0.074	60
	83	42	-0.809	0.075	52
	84	43	-0.928	0.078	45
	85	44	-0.845	0.076	50
	86	45	-1.150	0.076	48
	87	46	-1.201	0.078	43
	88	47	-1.183	0.077	40
	89	48	-1.183	0.077	43
	90	49	-1.167	0.079	34
	91	50	-1.631	0.079	34

Type 1 : Country-Gear-Tonnage class
  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

Table 13. Continued.

PREDICTED CATCH RATE

YEAR	LN TRANSFORM MEAN	LN TRANSFORM S.E.	RETRANSFORMED MEAN	RETRANSFORMED S.E.	CATCH	EFFORT
1956	0.3562	0.0048	1.427	0.099	10	7
1957	0.2841	0.0058	1.327	0.101	10	8
1958	0.2481	0.0042	1.281	0.083	10	8
1959	0.2336	0.0038	1.263	0.078	10	8
1960	0.1885	0.0035	1.207	0.071	21352	17689
1961	0.0939	0.0040	1.098	0.069	14903	13574
1962	-0.0795	0.0034	0.923	0.054	15217	16479
1963	0.0471	0.0029	1.048	0.056	24591	23458
1964	0.0778	0.0027	1.081	0.056	35474	32816
1965	0.0323	0.0016	1.033	0.042	45365	43895
1966	0.0024	0.0014	1.003	0.038	51225	51065
1967	-0.0819	0.0013	0.922	0.034	54190	58767
1968	-0.3839	0.0015	0.682	0.026	48674	71398
1969	-0.5287	0.0013	0.590	0.021	64815	109880
1970	-0.5659	0.0014	0.568	0.021	54929	96656
1971	-0.6545	0.0015	0.520	0.020	49394	94974
1972	-0.6744	0.0015	0.510	0.019	41605	81605
1973	-0.5811	0.0013	0.560	0.021	35908	64150
1974	-0.8002	0.0014	0.450	0.017	33381	74246
1975	-0.8530	0.0015	0.426	0.016	31521	73910
1976	-0.8759	0.0012	0.417	0.014	44202	106032
1977	-0.8371	0.0014	0.433	0.016	38557	88986
1978	-0.7838	0.0012	0.457	0.016	44348	97017
1979	-0.6834	0.0013	0.505	0.018	42286	83681
1980	-0.5258	0.0014	0.592	0.022	44762	75668
1981	-0.5282	0.0014	0.590	0.022	43415	73568
1982	-0.5264	0.0014	0.591	0.022	45218	76488
1983	-0.4525	0.0016	0.636	0.025	32092	50421
1984	-0.5719	0.0019	0.565	0.024	31046	54971
1985	-0.4893	0.0016	0.613	0.025	37472	61079
1986	-0.7937	0.0017	0.452	0.019	29394	64966
1987	-0.8450	0.0019	0.430	0.019	29750	69221
1988	-0.8267	0.0018	0.438	0.019	23762	54281
1989	-0.8266	0.0019	0.438	0.019	24444	55837
1990	-0.8105	0.0021	0.445	0.020	19257	43292
1991	-1.2743	0.0021	0.280	0.013	18848	67379

AVERAGE C.V. FOR THE RETRANSFORMED MEAN: 0.045

Notes: 1) Total catch from 1956-1960 not available.
2) Catch from 1961-1972 is Canadian total catch.
3) Catch from 1973-1991 is Canadian otter trawl catch.

TABLE 14. C/E AT AGE FROM THE CANADIAN FISHERY FOR PLAICE IN 3LNO.

AGE	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
5	4	9	7	11	16	15	3	2	0	2	1	0	1	0	0	0	1	1
6	61	33	34	73	45	76	39	7	4	18	6	3	8	2	1	3	8	8
7	107	77	76	95	92	157	124	29	23	56	24	22	28	17	11	21	20	44
8	103	100	169	128	104	217	164	62	61	107	52	64	55	81	55	89	70	100
9	79	98	144	148	128	173	183	103	114	154	91	129	89	166	137	168	168	103
10	92	84	107	121	139	145	185	149	163	143	155	190	121	186	164	176	182	87
11	72	61	72	71	100	102	147	177	201	157	201	171	147	126	155	126	136	61
12	47	50	45	46	68	44	105	155	184	139	140	109	102	78	95	75	77	32
13	39	40	26	26	37	21	49	113	101	85	79	47	53	34	42	32	34	11
14	23	28	20	16	22	8	20	73	54	46	39	20	22	14	18	15	18	4
15	12	16	12	11	15	4	8	38	25	23	17	12	10	7	10	8	8	3
16	7	8	5	4	7	2	3	15	8	7	6	3	4	2	3	2	2	2
17	3	5	2	2	2	1	1	5	3	2	1	1	1	0	1	0	0	0
18	1	2	1	1	1	0	0	3	1	1	0	0	0	0	0	0	0	0

Table 15. 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 ($t \times 10^{-3}$), 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 AR 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 15. (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 WT 106, 107	1992[a]
			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 16 Biomass estimates (000 t) of A. plaice, by stratum and depth zone, from Canadian spring surveys in Div. 3L from 1985-1992.

Depth (fm)	Stratum	1985	1986	1987	1988	1989	1990	1991	1992
		Year							
31-50	350	15.3	15.5	10.7	13.4	9.6	4.8	4.8	
	363	14.4	18.5	9.2	13.0	7.2	4.8	3.1	
	371	9.0	5.7	4.9	12.4	9.1	5.3	1.7	
	372	20.3	12.8	5.6	10.8	9.7	4.2	2.3	
	384	8.4	9.6	4.7	4.5	8.6	0.7	0.5	
	Total	67.4	62.1	35.1	54.1	44.2	19.8	12.4	
51-100	328	5.9	5.8	9.8	2.6	2.6	8.1	1.7	
	341	4.8	5.2	9.7	6.0	3.7	13.1	1.0	
	342	1.5	2.3	4.0	4.1	1.7	1.4	0.2	
	343	0.5	1.9	4.4	2.6	5.3	1.1	0.2	
	348	10.4	16.7	20.7	22.6	12.6	7.1	1.2	
	349	7.9	9.2	16.7	21.6	7.3	4.7	1.5	
	364	21.6	18.5	34.7	28.8	20.0	10.6	3.9	
	365	4.2	5.4	8.4	6.4	6.9	1.1	2.2	
	370	5.6	9.6	6.9	12.9	7.7	2.7	2.3	
	385	8.6	11.1	13.1	8.2	13.0	1.5	2.9	
	390	1.7	1.6	3.1	1.2	1.0	0.7	0.5	
	Total	72.7	87.3	131.2	117.0	81.8	52.1	17.6	
101-150	344	4.7	9.0	5.7	9.3	16.3	2.7	0.2	
	347	3.1	3.7	3.2	3.7	4.7	3.2	0.3	
	366	3.9	2.2	1.5	2.0	1.6	1.3	-	
	369	5.2	1.2	0.6	0.4	0.9	0.5	0.4	
	386	1.9	0.7	0.6	2.4	0.9	1.0	1.1	
	389	1.7	1.7	0.6	1.2	0.9	0.3	0.4	
	391	0.2	1.3	0.3	0.6	0.2	0.1	0.3	
	Total	20.7	19.8	12.5	19.6	25.5	9.1	2.7	
151-200	345	2.5	1.8	1.2	1.4	0.8	0.7	1.1	
	346	1.7	2.1	0.5	0.6	0.4	0.6	-	
	368	0.8	0.4	+	+	+	0.2	-	
	387	1.1	0.2	+	+	0.1	0.1	0.4	
	388	0.7	0.3	+	+	+	+	0.1	
	392	0.1	0.1	+	+	+	+	0.0	
	Total	6.9	4.9	1.7	2.0	1.3	1.6	1.6	
201-300	729	+	-	-	-	-	-	+	
	731	5.3	-	-	-	-	-	+	
	733	0.8	-	-	-	-	-	+	
	735	1.2	-	-	-	-	-	-	
	Total	7.3	-	-	-	-	-	+	
301-400	730	+	-	-	-	-	-	+	
	732	+	-	-	-	-	-	+	
	734	+	-	-	-	-	-	+	
	736	+	-	-	-	-	-	-	
	Total	+	-	-	-	-	-	+	
Grand Total		175.0	174.1	180.5	192.7	152.8	82.6	34.3	

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	12,311	-	-	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	16,869	-	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	31,602	-	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	224,592	-	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	138,094	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	189,162	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	189,162	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	69,885	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	119,577	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	112,521	-	16.3(2)	22.3(3)	-	23.6(2)	33.0(3)	59.0(3)	240.3(2)	25.4(6)	71.3(3)	22.0(4)	22.9(7)	10.6(4)	21.7(7)
51-100	377	7,506	-	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)*	*328.5(2)*	*37.3(2)*
101-150	378	10,434	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	7,957	-	-	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	8,707	-	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	13,662	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	48,567	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	50,593	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	11,635	-	-	-	-	-	-	-	-	-	-	-	-	-	-
301-400	724	9,308	-	-	-	-	-	-	-	-	-	-	-	-	-	-
201-300	725	7,882	-	-	-	-	-	-	-	-	-	-	-	-	-	-
301-400	726	5,405	-	-	-	-	-	-	-	-	-	-	-	-	-	-
201-300	727	12,010	-	-	-	-	-	-	-	-	-	-	-	-	-	-
301-400	728	11,710	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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	69.4	50.6	47.4	75.3	40.7	68.4	59.8

Table 17 (Cont'd.)

Stratum	1986 WT 47	1987 WT 58, 59, 60	1988 WT 70	1989 WT 82	1990 WT 95, 96	1991 WT 105	1992[A] WT 119, 120
357	0.0(2)	-	0.0(2)	0.0(2)	0.5(2)	0.4(2)	1.5(2)
358	2.8(2)	1.5(2)	1.9(2)	0.8(2)	5.6(2)	11.6(2)	30.0(2)
359	27.0(2)	5.9(2)	3.9(2)	17.5(2)	12.9(2)	10.4(2)	17.8(2)
360	32.5(13)	15.3(15)	10.4(12)	22.2(15)	18.3(15)	15.6(12)	5.8(14)
361	22.7(10)	36.9(8)	26.5(7)	39.6(10)	39.0(9)	11.7(8)	3.3(8)
362	*82.6(24)*	55.4(13)	50.6(10)	56.9(13)	48.9(10)	29.8(10)	6.1(12)
373	26.4(14)	78.6(13)	44.1(10)	60.5(13)	9.5(10)	25.9(11)	3.7(10)
374	15.0(6)	36.5(5)	20.2(5)	30.8(5)	10.4(5)	15.6(5)	2.7(5)
375	45.6(8)	69.4(8)	36.8(6)	23.4(8)	24.9(8)	4.8(6)	11.9(6)
376	22.4(9)	27.4(8)	6.0(6)	19.8(8)	6.3(7)	10.9(7)	1.8(7)
377	34.0(2)	32.8(2)	26.8(2)	36.9(2)	56.3(2)	27.2(3)	19.8(2)
378	68.1(2)	7.0(2)	10.5(2)	2.1(2)	45.2(2)	11.7(3)	24.8(2)
379	1.0(2)	7.8(2)	0.1(2)	0.0(2)	0.9(2)	3.0(2)	13.0(2)
380	3.6(3)	0.0(2)	0.0(2)	2.6(2)	6.0(2)	3.7(2)	10.5(2)
381	*15.3(3)*	*2.4(2)*	*5.8(2)*	*7.6(2)*	*15.7(2)*	*7.2(2)*	*30.0(2)*
382	6.5(4)	50.3(3)	5.5(2)	15.7(3)	7.5(3)	1.4(2)	2.6(3)
383	19.9(4)	36.3(3)	24.0(3)	22.0(3)	56.4(2)	3.5(3)	2.0(2)
723	-	-	-	-	-	0.1(2)	3.0(2)
724	-	-	-	-	-	0.0(2)	3.9(2)
725	-	-	-	-	-	0.2(2)	-
726	-	-	-	-	-	0.9(2)	1.9(2)
727	-	-	-	-	-	2.8(2)	7.6(2)
728	-	-	-	-	-	1.1(2)	12.8(2)
Mean (#sets)	35.0(101)	42.6(91)	25.9(77)	34.1(94)	24.0(85)	15.2(93)	- (93)
Biomass	43.8	52.8	32.4	42.8	30.1	19.9	7.8

[A] Preliminary analysis.

Table 18 Biomass estimates (000 t) of A. plaice, by stratum and depth zone, from Canadian spring surveys in Div. 3N from 1985-1992.

Depth (fm)	Stratum	Year							
		1985	1986	1987	1988	1989	1990	1991	1992
≤ 30	375	3.9	5.5	8.3	4.4	2.8	3.0	0.6	1.4
	376	2.4	2.6	3.1	0.7	2.2	0.7	1.2	0.2
	Total	**6.3**	**8.1**	**11.4**	**5.1**	**5.0**	**3.7**	**1.8**	**1.6**
31-50	360	8.6	7.3	3.4	2.3	5.0	4.1	3.5	1.3
	361	6.5	3.2	5.1	3.7	5.5	5.4	1.6	0.4
	362	12.7	15.6	10.5	9.6	10.8	9.4	5.6	1.2
	373	12.7	5.0	14.9	8.3	11.4	1.8	4.9	0.7
	374	3.5	1.3	2.6	1.4	2.2	0.7	1.1	0.2
	383	1.1	1.0	1.8	1.2	1.1	2.8	0.2	0.1
	Total	**45.1**	**33.4**	**38.3**	**26.5**	**36.0**	**24.2**	**16.9**	**3.9**
51-100	359	0.9	0.8	0.2	0.1	0.6	0.4	0.3	0.6
	377	0.3	0.3	0.3	0.2	0.3	0.4	0.2	0.1
	382	3.1	0.3	2.4	0.3	0.8	0.4	+	0.1
	Total	**4.3**	**1.4**	**2.9**	**0.6**	**1.7**	**1.2**	**0.5**	**0.8**
101-150	358	3.0	+	+	+	+	+	0.2	0.5
	378	0.4	0.7	+	0.1	+	0.5	0.1	0.3
	381	0.4	0.2	+	+	0.1	0.2	0.1	0.4
	Total	**3.8**	**0.9**	**+**	**0.1**	**0.1**	**0.7**	**0.4**	**1.2**
151-200	357	0.3	0.0	-	0.0	0.0	+	+	+
	379	+	+	+	+	0.0	+	+	0.1
	380	+	+	0.0	0.0	+	+	+	+
	Total	**0.3**	**+**	**+**	**+**	**+**	**+**	**+**	**0.1**
201-300	723	-	-	-	-	-	-	+	+
	725	-	-	-	-	-	-	+	+
	727	-	-	-	-	-	-	+	+
	Total	**-**	**-**	**-**	**-**	**-**	**-**	**+**	**+**
301-400	724	-	-	-	-	-	-	0.0	+
	726	-	-	-	-	-	-	+	+
	728	-	-	-	-	-	-	+	0.1
	Total	**-**	**-**	**-**	**-**	**-**	**-**	**+**	**0.1**
Grand Total		59.8	43.8	52.6	32.3	42.8	29.8	19.6	7.7

Table 19 Mean weight (kg) of American plaice per tow, by stratum, from R. V. surveys in Division 3Ø. 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	Year - Trip 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	1992[a] WT 119, 120
51–100	329	129,185	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)	3.0(8)
31–50	330	156,809	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)	2.4(10)
31–50	331	34,229	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)	10.3(2)
51–100	332	78,592	–	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)	20.4(5)
101–150	333	11,335	–	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)	0.4(2)
151–200	334	6,906	–	–	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)	2.0(2)
151–200	335	4,354	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)	4.0(3)
101–150	336	9,083	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)	17.5(2)
51–100	337	71,161	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)	14.5(4)
31–50	338	142,472	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)	19.0(6)
51–100	339	43,913	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)	55.0(2)
31–50	340	128,810	–	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)	16.5(5)
31–50	351	189,162	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)	14.4(10)
31–50	352	193,666	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)	30.6(8)
31–50	353	96,232	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)	26.2(4)
51–100	354	35,580	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)	22.7(2)
101–150	355	7,732	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)	13.6(2)
151–200	356	4,579	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)	12.6(2)
201–300	717	6,981	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.0(2)	0.0(2)
301–400	718	8,332	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.0(2)	0.0(2)
201–300	719	5,705	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.1(2)	1.0(2)
301–400	720	7,882	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.0(2)	0.2(2)
201–300	721	5,705	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.9(2)	1.6(2)
301–400	722	6,981	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.6(2)	1.8(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)	32.6(101)	40.4(92)	24.9(116)	– (91)
Biomass			46.1	49.1	67.6	59.2	27.5	62.5	60.1	79.2	42.4	64.5	76.6	48.2	71.7	50.7	43.8	52.9	34.5	23.4

[a]Preliminary analysis.

Table 20. Biomass estimates (000 t) of A. plaice, by stratum and depth zone, from Canadian spring surveys in Div. 3O from 1985-1992.

Depth (fm)	Stratum	Year 1985	1986	1987	1988	1989	1990	1991	1992
31-50	330	18.6	7.0	8.8	4.6	6.3	5.2	4.6	0.4
	331	3.4	0.4	1.6	1.5	0.4	-	1.2	0.4
	338	8.5	4.1	3.8	7.2	3.0	5.1	4.2	2.7
	340	5.6	4.6	12.0	7.2	3.4	7.1	4.0	2.1
	351	13.9	15.2	13.2	14.5	10.9	14.9	8.1	2.7
	352	10.9	6.6	12.3	10.1	6.8	9.2	4.4	5.9
	353	5.3	2.8	4.3	2.0	2.8	2.7	0.8	2.5
	Total	66.2	40.7	56.0	47.1	33.6	44.2	27.3	16.7
51-100	329	3.9	3.0	6.4	1.1	3.9	2.5	1.7	0.4
	332	1.9	3.0	4.7	0.4	1.3	1.3	2.0	1.6
	337	1.1	0.9	1.0	0.4	0.7	0.9	1.2	1.0
	339	0.6	0.2	3.0	1.3	3.7	3.4	1.3	2.4
	354	2.6	0.3	0.6	0.2	0.5	0.4	0.6	0.8
	Total	10.1	7.4	15.7	3.4	10.1	8.5	6.8	6.2
101-150	333	0.0	0.0	+	+	+	+	+	+
	336	+	+	+	+	+	+	+	0.2
	355	0.2	+	+	+	0.1	+	0.1	0.1
	Total	0.2	+	+	+	0.1	+	0.1	0.3
151-200	334	+	+	+	+	+	+	+	+
	335	+	+	+	+	+	0.0	+	+
	356	+	0.0	+	+	0.0	+	+	+
	Total	+	+	+	+	+	+	+	+
201-300	717	-	-	-	-	-	-	+	0.0
	719	-	-	-	-	-	-	+	+
	721	-	-	-	-	-	-	+	+
	Total	-	-	-	-	-	-	+	+
301-400	718	-	-	-	-	-	-	0.0	0.0
	720	-	-	-	-	-	-	0.0	+
	722	-	-	-	-	-	-	+	+
	Total	-	-	-	-	-	-	+	+
Grand Total		76.5	48.1	71.7	50.5	43.8	52.7	34.2	23.2

Table 21. Biomass ('000 t) of A. plaice outside the 200-mile limit in Div. 3L, as estimated by Canadian spring surveys, 1985-92.

Stratum	% Outside	1985	1986	1987	1988	1989	1990	1991	1992
385	5	0.4	0.6	0.7	0.4	0.6	+	0.1	
390	55	0.9	0.9	1.7	0.7	0.6	0.4	0.3	
389	62	1.0	1.0	0.4	0.7	0.6	0.2	0.2	
391	100	0.2	1.3	0.3	0.6	0.2	0.1	0.3	
387	37	0.4	+	+	+	+	+	0.1	
388	99	0.7	0.3	+	+	+	+	0.1	
392	100	0.1	0.1	+	+	+	+	0.0	
729	100	+	-	-	-	-	-	+	
731	100	5.3	-	-	-	-	-	+	
733	50	0.4	-	-	-	-	-	+	
730	100	+	-	-	-	-	-	+	
732	100	+	-	-	-	-	-	+	
734	67	+	-	-	-	-	-	+	
Biomass outside		9.4	4.2	3.1	2.4	2.0	0.7	1.1	
Total 3L Biomass		175.0	174.1	180.5	192.7	152.8	82.6	34.3	
% Biomass outside		5.4	2.4	1.7	1.2	1.3	0.8	3.2	

Table 22 Biomass ('000 t) of A. plaice outside the 200-mile limit in Div. 3N, as estimated by Canadian spring surveys, 1985-92.

Stratum	% Outside	1985	1986	1987	1988	1989	1990	1991	1992
357	100	0.3	0.0	+	0.0	0.0	+	+	+
358	100	3.0	+	+	+	+	+	0.2	0.5
359	100	0.9	0.8	0.2	0.1	0.6	0.4	0.3	0.6
360	93	8.0	6.8	3.2	2.1	4.6	3.8	3.3	1.2
374	23	0.8	0.3	0.6	0.3	0.5	0.2	0.2	+
375	17	0.7	0.9	1.4	0.7	0.5	0.5	0.1	0.2
376	89	2.1	2.3	2.8	0.6	2.0	0.6	1.1	0.2
377	100	0.3	0.3	0.3	0.2	0.3	0.4	0.2	0.1
378	100	0.4	0.7	+	0.1	+	0.5	0.1	0.3
379	100	+	+	+	+	0.0	+	+	0.1
380	83	+	+	0.0	0.0	+	+	+	+
381	79	0.3	0.2	+	+	+	0.2	+	0.3
382	53	1.6	0.2	1.3	0.2	0.4	0.2	+	+
Biomass outside		18.4	12.5	9.8	4.3	8.9	6.8	5.5	3.5
Total 3N biomass		59.8	43.8	52.6	32.3	42.8	29.8	19.6	7.7
% Biomass outside		30.8	28.5	18.6	13.3	20.8	22.8	28.1	45.5

Table 23 Biomass ('000 t) of A. plaice outside the 200-mile limit in Div. 3O, as estimated by Canadian spring surveys, 1985-92.

Stratum	% Outside	1985	1986	1987	1988	1989	1990	1991	1992
353	21	1.1	0.6	0.9	0.4	0.6	0.6	0.2	0.5
354	52	1.3	0.2	0.3	0.1	0.3	0.2	0.3	0.4
355	72	0.1	+	+	+	+	+	+	+
356	77	+	0.0	+	+	0.0	+	+	+
Biomass outside		2.5	0.8	1.2	0.5	0.9	0.8	0.5	0.9
Total 3O biomass		76.5	48.1	71.7	50.5	43.8	52.7	34.2	23.2
% Biomass outside		3.3	1.7	1.7	1.0	2.1	1.5	1.5	3.9

Table 24. Summary of A. plaice biomass estimates outside 200-mile limit, from Canadian spring surveys, 1985-92.

		Biomass outside	Biomass total	% Outside
1985	3L	9.4	175.0	5.4
	3N	18.4	59.8	30.8
	3Ø	2.5	76.5	3.3
	3LNO	30.3	311.3	9.7
1986	3L	4.2	174.1	2.4
	3N	12.5	43.8	28.5
	3Ø	0.8	48.1	1.7
	3LNO	17.5	266.0	6.6
1987	3L	3.1	180.5	1.7
	3N	9.8	52.6	18.6
	3Ø	1.2	71.7	1.7
	3LNO	14.1	304.8	4.6
1988	3L	2.4	192.7	1.2
	3N	4.3	32.3	13.3
	3Ø	0.5	50.5	1.0
	3LNO	7.2	275.5	2.6
1989	3L	2.0	152.8	1.3
	3N	8.9	42.8	20.8
	3Ø	0.9	43.8	2.1
	3LNO	11.8	239.4	4.9
1990	3L	0.7	82.6	0.8
	3N	6.8	29.8	22.8
	3Ø	0.8	52.7	1.5
	3LNO	8.3	165.1	5.0
1991	3L	1.1	34.3	3.2
	3N	5.5	19.6	28.1
	3Ø	0.5	34.2	1.5
	3LNO	7.1	88.1	8.1
1992	3L			
	3N	3.5	7.7	45.5
	3Ø	0.9	23.2	3.9
	3LNO			

Table 25 ABUNDANCE (MILLIONS) OF A.PLAICE FROM SPRING SURVEYS IN DIV. 3L.

AGE	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1984	1985	1986	1987	1988	1989	1990	1991
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	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	0.1
3	1.6	0.3	1.0	0.2	2.3	7.4	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	0.2
4	9.4	10.7	8.2	3.6	3.7	14.1	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	0.8
5	38.7	22.3	39.4	5.5	9.8	15.0	34.5	61.0	42.0	39.9	15.7	10.6	1.5	9.2	6.5	13.2	19.2	12.3	9.6	7.1
6	58.4	50.5	45.6	21.0	27.0	16.5	70.8	70.8	71.0	77.4	45.5	30.1	16.5	29.5	40.0	50.6	58.6	49.1	18.5	16.1
7	117.1	74.6	62.3	34.7	49.7	52.1	131.4	111.7	105.3	100.7	66.2	56.5	64.5	83.2	101.1	119.5	108.9	76.3	41.2	14.7
8	62.3	77.9	38.4	49.5	91.7	116.2	207.0	170.6	168.0	200.5	178.4	120.5	97.6	97.3	94.2	124.7	104.8	83.2	45.7	19.0
9	115.9	50.0	30.2	55.0	99.3	137.0	151.1	137.6	139.8	172.8	173.1	186.8	107.7	66.5	74.5	65.0	90.8	63.5	40.9	17.9
10	52.7	53.9	40.3	57.5	87.0	144.2	155.7	105.6	123.7	113.1	106.7	152.9	60.4	42.0	35.9	35.9	32.6	26.0	28.6	9.7
11	47.8	32.4	34.6	32.4	44.5	92.0	68.0	36.3	62.6	50.1	57.7	90.5	27.7	22.9	14.7	12.1	17.8	13.4	10.0	5.7
12	44.7	34.3	29.8	28.7	32.6	54.0	45.8	25.3	27.0	32.1	23.1	39.8	17.3	11.6	9.9	10.5	10.9	7.7	5.2	3.6
13	33.6	16.0	16.2	16.9	15.8	25.7	19.0	11.2	9.9	16.6	10.6	21.5	6.5	6.7	6.4	5.0	5.5	4.3	3.3	1.4
14	23.4	12.9	11.3	9.2	8.8	7.3	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	0.8
15	11.7	10.6	4.3	5.4	3.9	5.6	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	0.5
16	8.1	7.3	2.5	1.9	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	0.3
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	0.1
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	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	0.0
1+	633.0	457.0	366.0	322.0	481.0	693.0	915.0	770.0	775.0	830.0	696.0	739.0	407.0	378.0	390.0	444.0	461.0	347.0	210.0	98.0
2+	633.0	456.9	366.0	322.0	481.0	693.0	915.0	770.0	774.8	829.9	695.8	739.0	407.0	378.0	390.0	443.9	461.0	347.0	210.0	98.0
3+	633.0	456.8	366.0	322.0	480.4	692.5	914.7	769.5	774.4	828.6	695.4	738.9	407.0	378.0	389.9	443.6	460.8	346.9	210.0	97.9
4+	631.4	456.5	365.0	321.8	478.1	685.1	912.3	758.8	773.5	824.5	691.3	736.3	407.0	377.5	389.7	443.0	459.8	345.9	209.8	97.7
5+	622.0	445.9	356.7	318.2	474.5	671.0	901.7	742.9	760.6	817.2	686.9	726.7	406.6	375.8	388.2	440.3	455.1	341.2	206.1	96.9
6+	583.3	423.6	317.3	312.7	464.7	656.0	867.2	681.9	718.6	777.4	671.2	716.1	405.0	366.6	381.7	427.1	435.9	328.9	196.5	89.8
7+	524.9	373.1	271.7	291.7	437.7	639.6	796.4	611.1	647.6	700.0	625.7	686.0	388.6	337.1	341.7	376.5	377.2	279.9	178.0	73.7
8+	407.8	298.6	209.4	257.0	388.0	587.5	664.9	499.4	542.2	599.3	559.5	629.5	324.0	253.9	240.6	257.0	268.4	203.6	136.8	59.1
9+	345.5	220.7	171.0	207.5	296.3	471.3	457.9	328.8	374.2	398.8	381.1	509.0	226.4	156.6	146.4	132.3	163.6	120.3	91.1	40.1
10+	229.5	170.7	140.8	152.5	197.1	334.2	306.8	191.2	234.5	226.0	208.0	322.3	118.7	90.1	71.9	67.3	72.8	56.8	50.2	22.2
11+	176.9	116.8	100.5	95.0	110.1	190.0	151.0	85.5	110.7	113.0	101.3	169.4	58.3	48.1	36.0	31.4	40.2	30.8	21.6	12.5
12+	129.1	84.3	66.0	62.6	65.6	97.9	83.0	49.2	48.1	62.8	43.6	78.9	30.7	25.2	21.3	19.3	22.4	17.4	11.6	6.8

TABLE 26 .ABUNDANCE (MILLIONS) OF A.PLAICE FROM SPRING SURVEYS IN DIV. 3N.

AGE	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1984	1985	1986	1987	1988	1989	1990	1991
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	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	0.0
3	2.8	0.4	0.4	0.9	4.9	3.1	1.6	5.2	1.2	0.7	4.9	1.8	1.0	1.8	0.7	3.9	2.4	2.7	1.6	0.2
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	18.5	9.6	1.8
5	4.9	5.6	5.4	5.4	8.3	12.1	14.4	42.9	11.0	6.1	5.2	7.5	5.8	8.6	7.8	7.0	6.0	10.0	24.2	9.1
6	3.2	8.6	9.5	10.2	7.6	12.1	28.6	61.1	18.6	13.0	12.2	7.9	11.4	11.3	10.2	10.6	5.4	7.9	6.2	11.4
7	11.7	5.0	11.1	11.3	13.6	12.0	25.3	69.6	29.5	26.4	41.2	8.8	14.0	9.6	9.6	10.5	5.7	6.7	3.7	3.9
8	8.0	8.4	8.2	10.6	9.3	15.0	22.3	38.3	33.3	22.2	41.9	15.9	13.3	10.7	7.6	8.8	6.2	8.6	3.4	2.6
9	13.7	10.2	5.4	7.0	5.3	9.7	18.3	17.4	18.1	17.1	30.8	17.8	14.9	10.3	7.6	8.7	5.9	8.0	4.6	2.8
10	13.7	13.6	7.9	7.3	3.0	8.9	11.8	17.8	13.7	9.5	20.3	11.5	16.7	11.0	7.2	6.2	4.7	3.5	2.8	3.0
11	12.5	8.9	9.2	5.1	2.7	4.8	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	1.9
12	9.3	6.5	6.4	3.3	1.5	5.1	5.2	5.2	3.0	3.4	5.3	3.7	5.2	5.0	3.3	2.9	1.9	2.2	1.4	1.1
13	4.5	4.3	4.5	3.2	1.9	5.4	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	1.0
14	3.0	3.2	1.3	1.2	0.8	1.8	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	0.6
15	2.0	1.2	1.2	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	0.6
16	2.0	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	0.4
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	0.3
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	0.1
19	0.7	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	0.1
1+	97.0	80.0	74.0	70.0	71.0	98.0	153.0	285.0	141.0	111.0	187.0	95.0	102.0	91.0	67.0	78.0	52.0	77.0	65.0	41.0
2+	97.0	79.9	74.0	70.0	71.0	97.9	153.0	284.9	140.9	110.9	186.9	94.7	102.0	90.9	67.0	78.0	52.0	77.0	65.0	41.0
3+	97.0	79.7	73.9	70.0	70.1	97.7	152.9	284.5	140.5	110.8	185.9	94.1	101.9	90.8	66.9	77.1	51.8	76.7	64.9	41.0
4+	94.2	79.3	73.5	69.1	65.2	94.6	151.3	279.3	139.3	110.1	181.0	92.3	100.9	89.0	66.2	73.2	49.4	74.0	63.3	40.8
5+	91.3	77.0	72.6	66.5	55.4	89.0	141.8	265.5	136.5	108.0	173.4	85.7	98.3	80.8	63.3	65.9	43.8	55.5	53.7	39.0
6+	86.5	71.4	67.2	61.1	47.1	76.9	127.5	222.5	125.5	101.9	168.2	78.1	92.6	72.2	55.5	58.9	37.8	45.5	29.5	29.9
7+	83.3	62.8	57.6	50.9	39.5	64.8	98.8	161.5	106.9	88.9	156.0	70.2	81.2	60.9	45.3	48.3	32.3	37.7	23.3	18.5
8+	71.6	57.8	46.5	39.7	25.9	52.9	73.6	91.9	77.4	62.5	114.8	61.3	67.2	51.3	35.7	37.8	26.6	31.0	19.6	14.6
9+	63.6	49.4	38.3	29.1	16.6	37.9	51.3	53.6	44.1	40.4	73.0	45.4	53.9	40.7	28.2	29.1	20.4	22.4	16.1	12.0
10+	49.9	39.2	33.0	22.1	11.3	28.2	33.0	36.2	26.1	23.3	42.2	27.6	39.0	30.4	20.6	20.4	14.4	14.4	11.5	9.2
11+	36.2	25.6	25.1	14.8	8.3	19.3	21.3	18.3	12.3	13.8	21.9	16.2	22.2	19.4	13.4	14.2	9.7	11.0	8.7	6.1
12+	23.7	16.7	15.9	9.7	5.6	14.5	12.2	10.6	6.6	9.0	13.0	9.8	14.3	11.0	9.4	10.4	7.0	8.4	6.5	4.2

TABLE 27 .ABUNDANCE (MILLIONS) OF A.PLAICE FROM SPRING SURVEYS IN DIV. 3O.

AGE	1973	1975	1976	1977	1978	1979	1980	1981	1982	1984	1985	1986	1987	1988	1989	1990	1991
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	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	0.0
3	9.1	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	1.3
4	5.4	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	2.2
5	12.9	7.8	12.3	28.2	8.1	18.1	4.7	18.5	4.2	2.7	4.3	3.2	8.3	2.2	4.2	14.5	11.0
6	16.8	12.0	22.0	37.1	12.4	21.8	8.7	25.0	6.1	8.0	4.7	5.3	13.0	5.3	11.6	10.9	12.3
7	21.6	23.8	30.2	39.7	16.5	37.0	46.4	49.6	15.6	15.8	11.1	9.4	17.1	7.1	15.7	15.2	11.9
8	13.2	13.2	43.3	19.7	16.0	39.1	48.6	90.9	26.3	24.6	17.7	11.4	18.7	10.6	14.0	14.1	9.3
9	11.6	14.7	25.9	19.4	8.7	28.5	29.0	91.3	23.6	19.1	17.3	10.9	18.5	9.8	13.0	13.8	8.7
10	11.4	15.0	18.9	11.6	7.4	19.3	18.9	46.2	20.1	16.2	18.9	9.7	13.1	9.1	8.1	9.2	5.7
11	8.0	13.4	10.9	8.8	3.5	7.8	9.7	17.3	8.8	7.3	13.3	6.4	6.9	6.1	4.0	5.6	4.6
12	7.2	8.6	9.1	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	2.6
13	4.1	5.7	7.2	2.7	2.1	2.4	2.5	5.2	2.5	2.7	3.1	3.1	3.4	3.1	2.3	3.2	1.6
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	1.6
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	1.0
16	1.3	0.6	2.1	0.4	0.4	0.8	1.0	0.9	0.7	1.4	0.9	0.5	1.0	1.3	1.0	0.9	0.6
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	0.3
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	0.2
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	0.1
1+	131.0	129.0	199.0	189.0	85.0	199.0	186.0	379.0	123.0	108.0	106.0	72.0	114.0	66.0	85.0	104.0	75.0
2+	130.9	129.0	198.9	189.0	85.0	198.9	186.0	378.6	122.9	108.0	106.0	72.0	113.9	66.0	85.0	104.0	75.0
3+	129.6	128.9	198.7	188.6	84.7	198.0	185.2	376.2	122.2	107.9	106.0	71.9	113.6	65.9	85.0	103.8	75.0
4+	120.6	126.7	196.3	186.7	83.2	193.4	183.0	364.2	120.3	107.8	105.6	71.2	112.7	65.1	83.9	103.3	73.7
5+	115.2	121.3	192.4	177.0	78.9	183.6	177.6	356.4	116.4	107.4	104.3	68.8	109.6	63.7	81.1	97.0	71.5
6+	102.3	113.4	180.1	148.8	70.8	165.4	173.0	337.9	112.2	104.7	100.0	65.6	101.4	61.5	76.9	82.5	60.5
7+	85.6	101.5	158.1	111.6	58.5	143.6	164.3	312.9	106.1	96.7	95.3	60.3	88.3	56.2	65.3	71.6	48.2
8+	63.9	77.7	127.9	71.9	42.0	106.7	117.9	263.2	90.5	80.9	84.2	50.9	71.2	49.1	49.6	56.4	36.3
9+	50.8	64.5	84.6	52.2	25.9	67.6	69.4	172.4	64.2	56.2	66.5	39.5	52.5	38.5	35.6	42.3	27.1
10+	39.2	49.8	58.6	32.8	17.2	39.1	40.4	81.0	40.7	37.1	49.1	28.5	34.0	28.7	22.6	28.5	18.4
11+	27.8	34.8	39.8	21.2	9.9	19.7	21.5	34.8	20.6	20.9	30.2	18.8	20.9	19.6	14.5	19.3	12.7
12+	19.8	21.4	28.8	12.4	6.4	11.9	11.8	17.4	11.8	13.6	16.9	12.4	14.0	13.5	10.5	13.7	8.1

TABLE 28 .ABUNDANCE (MILLIONS) OF A.PLAICE FROM SPRING SURVEYS IN DIV. 3LNO.

AGE	1973	1975	1976	1977	1978	1979	1980	1981	1982	1984	1985	1986	1987	1988	1989	1990	1991
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	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	0.1
3	10.5	9.4	12.9	5.9	17.4	6.7	7.0	21.0	6.3	1.1	2.7	1.6	5.4	4.2	4.8	2.3	1.7
4	14.6	18.8	23.6	29.8	34.0	25.5	14.8	19.8	20.1	3.4	11.2	6.8	13.0	11.6	26.1	19.6	4.8
5	57.7	26.0	39.4	77.1	112.0	71.2	50.7	39.5	22.3	10.0	22.1	17.5	28.5	27.5	26.4	48.3	27.1
6	71.9	46.6	50.5	136.6	144.3	111.4	99.0	82.7	44.1	35.9	45.5	55.5	74.2	69.4	68.5	35.6	39.7
7	95.1	87.1	94.3	196.4	197.8	171.8	173.4	157.0	80.9	94.3	103.9	120.1	147.1	121.7	98.7	60.1	30.5
8	59.7	114.3	174.5	249.0	224.9	240.3	271.2	311.2	162.6	135.5	125.7	113.2	152.2	121.6	105.8	63.2	30.9
9	47.2	119.2	172.7	188.8	163.7	186.3	218.8	295.2	228.1	141.8	94.1	93.0	92.2	106.5	84.5	59.3	29.4
10	59.6	104.9	172.1	179.1	130.9	156.8	141.5	173.2	184.4	93.3	71.9	52.8	55.2	46.5	37.6	40.7	18.5
11	51.7	60.6	107.7	85.9	47.5	76.2	64.6	83.9	105.7	42.9	44.6	25.1	22.8	26.6	20.0	17.8	12.2
12	43.3	42.7	68.2	57.5	32.7	35.9	41.0	37.7	49.7	26.9	24.2	18.8	18.4	17.7	14.0	11.7	7.4
13	24.9	23.3	36.2	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	4.0
14	15.8	13.2	13.4	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	3.0
15	7.6	7.5	11.6	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	2.1
16	4.7	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	1.5
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	0.7
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	0.3
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	0.2
1+	571.0	681.0	990.0	1257.0	1140.0	1115.0	1127.0	1262.0	957.0	617.0	575.0	529.0	636.0	579.0	509.0	379.0	214.0
2+	570.9	681.0	989.8	1257.0	1139.9	1114.6	1126.8	1261.3	956.6	617.0	574.9	529.0	635.8	579.0	509.0	379.0	214.0
3+	569.5	679.4	988.9	1256.2	1138.7	1112.9	1124.6	1257.5	955.2	616.8	574.8	528.7	634.3	578.5	508.6	378.7	213.9
4+	559.0	670.0	976.0	1250.3	1121.3	1106.2	1117.6	1236.5	948.9	615.7	572.1	527.1	628.9	574.3	503.8	376.4	212.2
5+	544.5	651.2	952.4	1220.5	1087.3	1080.7	1102.9	1216.7	928.8	612.3	560.9	520.3	615.8	562.6	477.8	356.8	207.3
6+	486.8	625.2	913.0	1143.4	975.3	1009.5	1052.2	1177.3	906.4	602.3	538.8	502.8	587.3	535.2	451.3	308.5	180.2
7+	414.9	578.7	862.6	1006.8	831.1	898.1	953.2	1094.5	862.3	566.4	493.3	447.3	513.1	465.8	382.8	272.9	140.5
8+	319.9	491.6	768.3	810.4	633.2	726.3	779.8	937.6	781.4	472.1	389.4	327.2	366.1	344.1	284.1	212.7	110.0
9+	260.2	377.3	593.8	561.4	408.3	486.0	508.5	626.4	618.7	336.5	263.7	214.0	213.9	222.5	178.3	149.5	79.1
10+	212.9	258.1	421.1	372.6	244.6	299.6	289.7	331.2	390.6	194.8	169.6	121.0	121.8	116.0	93.8	90.2	49.7
11+	153.4	153.2	249.0	193.5	113.7	142.8	148.2	158.0	206.1	101.5	97.7	68.2	66.5	69.5	56.2	49.5	31.3
12+	101.7	92.6	141.3	107.6	66.2	66.7	83.6	74.0	100.4	58.6	53.1	43.1	43.7	42.9	36.3	31.7	19.1

Table 29 SPRING SURVEY TEMPERATURE (deg C) FOR 3LNO
DIVISION 3L

	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
	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN N
YEAR							
1971	0.49	-0.15	1.65	3.69	.	.	0.91 59
1972	-0.30	-1.01	0.37	.	.	.	-0.64 38
1973	-1.13	-1.38	-0.05	3.28	.	.	-0.26 33
1974	-0.79	-1.22	0.14	2.35	.	.	-0.18 70
1975	-0.16	-0.65	0.86	2.49	.	.	0.44 55
1976	0.53	-0.53	0.53	1.72	.	.	0.46 64
1977	-0.26	-0.65	0.98	2.47	.	.	0.27 102
1978	1.17	0.46	1.33	1.60	.	.	0.95 93
1979	0.96	-0.08	1.28	2.83	.	.	0.88 140
1980	0.38	-0.57	1.41	2.71	.	.	0.50 115
1981	0.45	-0.37	1.17	2.65	3.35	.	0.82 78
1982	-0.08	-0.46	1.12	2.28	.	.	0.38 101
1985	-0.53	-1.16	0.07	1.65	2.83	3.69	-0.28 217
1986	-0.71	-1.05	0.39	2.27	.	.	-0.37 209
1987	-0.00	-0.48	1.20	2.64	.	.	0.29 179
1988	-0.31	-0.68	0.74	2.28	.	.	0.11 151
1989	-0.43	-0.84	0.19	2.26	.	.	-0.14 200
1990	0.20	-1.11	0.11	1.90	.	.	-0.25 156
1991	-0.86	-1.08	-0.56	1.70	2.85	3.32	-0.40 143
1971-1991	-0.12	-0.73	0.67	2.32	2.90	3.52	0.12 2203

Table 30 SPRING SURVEY TEMPERATURE (deg C) FOR 3LNO
DIVISION 3N

	DIVISION							
	3N							
	DEPTH RANGE (fm)							ALL DEPTHS
	.LE. 30	31-50	51-100	101-150	151-200	201-300	301-400	0-400
	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP
	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN N
YEAR								
1971	1.67	0.62	-0.05	1.52	4.10	.	.	0.96 25
1972	0.60	-0.01	0.89	2.23	1.00	.	.	0.78 45
1973	-0.10	-0.68	-0.41	0.45	1.71	.	.	-0.04 49
1974	1.60	0.39	-1.27	0.06	1.38	.	.	0.29 37
1975	3.18	1.44	-0.60	0.20	.	.	.	1.48 23
1976	1.53	0.80	5.06	-0.40	.	.	.	1.52 32
1977	1.73	0.49	0.16	1.40	2.37	.	.	0.97 48
1978	2.56	1.45	0.28	1.55	2.43	.	.	1.48 86
1979	1.80	1.13	3.19	3.96	4.18	.	.	2.03 82
1980	2.00	0.96	-0.17	1.24	2.57	.	.	1.09 81
1981	2.96	1.49	2.12	3.78	5.03	.	.	2.60 54
1982	1.43	0.86	0.82	0.70	1.78	.	.	1.03 61
1984	2.61	1.26	-0.39	2.80	3.08	.	.	1.61 60
1985	0.64	0.22	-1.06	1.18	1.32	.	.	0.32 85
1986	0.78	0.24	1.24	3.20	2.55	.	.	0.80 101
1987	1.43	1.23	2.60	4.43	3.34	.	.	1.70 91
1988	1.76	0.63	1.63	3.48	3.87	.	.	1.36 77
1989	1.46	0.86	2.34	4.53	4.28	.	.	1.53 94
1990	1.24	0.51	-0.98	-0.20	1.23	.	.	0.54 84
1991	0.75	0.10	-0.82	-0.03	0.85	2.52	3.10	0.52 93
1971-1991	1.51	0.71	0.75	1.95	2.66	2.52	3.10	1.13 1308

Table 31 SPRING SURVEY TEMPERATURE (deg C) FOR 3LNO
DIVISION 3O

	DIVISION							
	3O							
	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	TEMP
	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN N
YEAR								
1973	-1.50	0.41	1.82	6.72	5.20	.	.	1.75 47
1975	.	0.37	2.27	6.52	.	.	.	1.86 35
1976	.	0.42	6.03	8.58	8.10	.	.	3.71 46
1977	.	0.51	0.11	2.00	3.40	.	.	0.78 40
1978	-0.50	0.93	4.08	8.16	8.30	.	.	2.96 84
1979	.	1.71	3.08	6.51	5.66	.	.	2.87 90
1980	.	1.19	1.18	4.40	3.63	.	.	1.80 59
1981	.	1.46	3.15	8.25	6.55	.	.	3.00 22
1982	.	-0.09	0.43	5.01	3.89	.	.	1.05 77
1984	.	1.40	1.18	6.13	5.87	.	.	2.33 56
1985	.	-0.16	-0.33	7.78	6.57	.	.	0.74 93
1986	.	-0.03	0.63	6.36	5.45	.	.	0.89 102
1987	.	0.16	1.56	4.97	4.40	.	.	1.05 100
1988	.	1.16	4.68	7.18	5.97	.	.	2.77 84
1989	.	0.34	0.49	4.97	4.23	.	.	0.88 101
1990	.	-0.66	-0.22	4.62	3.80	.	.	-0.01 91
1991	.	0.14	-0.28	3.63	3.27	4.18	3.92	0.81 114
1971-1991	-1.00	0.44	1.56	6.01	5.23	4.18	3.92	1.55 1245

Table 32 FALL SURVEY TEMPERATURE (deg C) FOR 3LNO

DIVISION 3L

	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	
	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	N
YEAR								
1990	0.43	-1.20	-0.79	1.69	3.29	3.79	-0.06	161
1991	-0.42	-1.19	0.06	2.46	3.76	3.63	0.39	216
1990-1991	-0.16	-1.20	-0.26	2.21	3.58	3.70	0.20	377

DIVISION 3N

	DIVISION								
	3N								
	DEPTH RANGE (fm)							ALL DEPTHS	
	LE. 30	31-50	51-100	101-150	151-200	201-300	301-400	0-400	
	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	
	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	N
YEAR									
1990	3.64	2.78	-0.27	-0.35	1.48	.	.	2.43	80
1991	1.99	0.41	-0.52	1.13	1.56	3.23	3.70	0.96	67
1990-1991	2.96	1.82	-0.38	0.54	1.52	3.23	3.70	1.76	147

DIVISION 3O

	DIVISION							
	3O							
	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	
	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	N
YEAR								
1990	1.55	0.11	4.74	5.35	4.93	.	1.61	89
1991	1.25	0.06	4.72	4.72	4.40	4.25	1.81	84
1990-1991	1.41	0.09	4.73	4.97	4.60	4.25	1.71	173

Table 33 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^{-3}) 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	1991 WT 113-115
328	-	-	-	50.1(4)	99.5(8)	90.1(6)	15.5(4)	153.0(7)	15.2(7)	9.4(5)	1.0(3)
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)	3.0(3)
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)	0.3(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)	0.3(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)	0.9(2)
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)	2.4(4)
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)	16.1(15)
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)	2.9(4)
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)	0.8(4)
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)	8.3(5)
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)	12.4(16)
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)	23.8(17)
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)	51.9(4)
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)	12.0(3)
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)	15.1(21)
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)	39.5(6)
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)	176.2(9)
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)	13.9(3)
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)	16.7(3)
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)	28.5(26)
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)	40.2(18)
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)	11.4(5)
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)	43.2(3)
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)	11.2(5)
388	-	0.0(3)	-	0.0(2)	14.0(2)	-	2.0(2)	10.0(2)	2.5(2)	2.0(2)	1.6(3)
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)	14.3(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)	19.6(3)
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)	43.7(3)
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)	9.1(3)
729	-	-	-	3.3(2)	4.5(2)	0.0(2)	-	-	-	3.2(2)	1.5(3)
730	-	-	-	0.0(2)	0.0(2)	-	-	-	-	-	0.0(2)
731	-	-	-	0.0(2)	1.0(2)	-	-	-	-	0.1(2)	+ (3)
732	-	-	-	0.0(2)	0.0(2)	-	-	-	-	0.0(2)	0.2(2)
733	-	-	-	0.0(4)	0.7(3)	-	-	-	-	0.3(2)	0.3(3)
734	-	-	-	0.0(3)	0.0(2)	-	-	-	-	0.0(2)	0.0(2)
735	-	2.3(2)	-	0.0(3)	0.2(2)	20.6(2)	-	-	-	-	14.4(3)
736	-	-	0.0(2)	-	6.8(2)	2.1(2)	-	-	-	6.4(2)	17.5(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)	19.9(219)
Biomass (Total)	273.3	206.4	268.0	313.8	219.2	146.7	168.7	189.5	92.9	135.3	57.8
Biomass (multiplicative model)	-	-	289.6	313.8	219.9	146.8	168.7	189.5	91.9	135.7	57.8

TABLE 34 ABUNDANCE (MILLIONS) OF A.PLAICE FROM FALL SURVEYS IN 3L.

AGE	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1	0.9	0.1	0.0	0.0	0.0	0.1	0.0	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	0.1
3	8.3	5.7	2.6	0.1	0.3	1.9	2.0	3.1	1.4	1.4	0.8
4	12.4	19.6	9.8	2.9	1.6	10.5	5.1	8.1	13.2	18.1	5.4
5	22.2	35.7	52.9	18.7	14.3	33.3	24.3	30.4	23.1	47.1	23.6
6	45.0	80.2	120.9	66.0	69.2	92.6	65.9	81.1	54.6	67.8	37.2
7	176.2	142.7	218.3	181.5	170.3	92.9	100.8	110.1	64.4	78.1	30.2
8	163.7	189.9	185.7	207.4	134.2	91.8	87.8	108.7	55.2	57.4	26.9
9	139.4	110.9	89.7	122.5	93.9	53.6	62.3	66.1	24.0	46.9	20.2
10	136.4	61.1	49.8	81.2	37.3	22.6	20.2	25.8	9.3	19.7	9.7
11	58.3	30.9	20.9	32.0	16.2	9.0	11.0	10.1	5.3	9.5	4.5
12	42.2	13.6	15.2	18.8	11.2	4.8	5.6	6.0	1.9	4.8	2.8
13	16.1	4.9	9.0	9.1	5.9	2.4	3.0	3.1	1.7	3.0	1.1
14	4.5	1.9	1.4	4.3	1.9	1.1	1.4	1.6	0.6	2.1	0.8
15	1.2	2.0	1.4	2.8	1.2	0.4	0.9	1.0	0.2	0.8	0.5
16	0.3	0.8	0.8	1.2	0.5	0.1	0.2	0.3	0.2	0.3	0.1
17	0.0	0.3	0.2	0.3	0.1	0.1	0.2	0.1	0.0	0.0	0.1
1+	828.0	702.0	779.0	749.0	558.0	418.0	392.0	456.0	255.0	357.0	164.0
2+	827.1	701.9	779.0	749.0	558.0	417.9	392.0	456.0	255.0	357.0	164.0
3+	826.0	700.1	778.8	749.0	558.0	417.1	390.6	455.7	255.0	356.9	163.9
4+	817.8	694.5	776.2	748.9	557.7	415.2	388.6	452.6	253.6	355.5	163.1
5+	805.3	674.8	766.5	746.0	556.1	404.7	383.5	444.5	240.4	337.4	157.7
6+	783.1	639.1	713.6	727.3	541.8	371.4	359.2	414.1	217.3	290.3	134.1
7+	738.2	558.9	592.7	661.3	472.6	278.8	293.3	333.0	162.7	222.5	96.9
8+	562.0	416.2	374.4	479.8	302.3	185.9	192.6	222.8	98.4	144.5	66.7
9+	398.3	226.3	188.6	272.3	168.1	94.1	104.8	114.1	43.2	87.1	39.8
10+	259.0	115.4	98.9	149.8	74.3	40.5	42.4	48.0	19.2	40.2	19.5
11+	122.6	54.3	49.1	68.6	37.0	17.9	22.3	22.2	9.9	20.5	9.9
12+	64.3	23.4	28.2	36.5	20.8	8.9	11.3	12.1	4.6	11.0	5.4

Table 35 Comparison of abundance (A) and biomass (B) estimates of A. plaice from spring and fall r.v. surveys in Div. 3LNO in 1990 and 1991.

		3L	3N	3O	3NO	3LNO
Spring 1990	A (millions)	210	65	103	168	378
	B (000 t)	83	30	53	83	166
Fall 1990	A	362	67	102	169	531
	B	135	25	60	85	220
Spring 1991	A	97	41	75	116	213
	B	35	20	34	54	89
Fall 1991	A	164	103	107	210	374
	B	58	40	54	94	152

Table 36 Biomass estimates ('000 t) of A. plaice, by stratum and depth zone, from Canadian fall surveys in Div. 3L in 1990 and 1991.

Depth	Stratum	1990	1991
31-50	350	7.4	1.9
	363	3.8	3.2
	371	3.4	1.4
	377	9.8	5.3
	384	9.5	3.4
	Total	33.9	15.2
51-100	328	1.1	0.1
	341	2.6	0.4
	342	8.5	+
	343	0.3	+
	348	6.9	0.1
	349	2.5	1.3
	364	22.8	11.0
	365	4.4	0.9
	370	2.8	1.4
	385	5.4	2.0
	390	1.9	2.2
	Total	59.2	19.4
101-150	344	1.7	0.1
	347	6.9	0.2
	366	14.7	1.6
	369	11.3	12.7
	386	2.7	3.2
	389	1.3	0.9
	391	0.2	0.9
	Total	38.8	19.6
151-200	345	1.8	0.3
	346	1.1	1.0
	368	+	1.0
	387	+	0.6
	388	0.1	+
	392	0.1	0.1
	Total	3.1	3.0
201-300	729	+	+
	731	+	+
	733	+	+
	735	-	0.3
	Total	+	0.3
301-400	730	-	0.0
	732	0.0	+
	734	0.0	0.0
	736	0.1	0.2
	Total	0.1	0.2
Grand Total		135.1	57.7

Table 37 Biomass estimates ('000 t) of A. plaice, by stratum and depth zone, from Canadian fall surveys in Div. 3N in 1990 and 1991.

Depth	Stratum	1990	1991
≤ 30	375	1.0	3.5
	376	1.9	1.3
	Total	2.9	4.8
31-50	360	2.9	7.0
	361	0.9	3.4
	362	5.9	10.3
	373	4.2	8.0
	374	1.4	3.3
	383	0.7	0.3
	Total	16.0	32.3
51-100	359	2.8	0.8
	377	0.2	-
	382	2.2	1.0
	Total	5.2	1.8
101-150	358	0.1	0.4
	378	0.5	0.4
	381	-	0.2
	Total	0.6	1.0
151-200	357	0.4	+
	379	+	-
	380	-	+
	Total	0.4	+
201-300	723	-	+
	725	-	-
	727	-	-
	Total	-	+
301-400	724	-	+
	726	-	-
	728	-	-
	Total	-	+
Grand Total		25.1	39.9

Table 38 Biomass estimates ('000 t) of A. plaice, by stratum and depth zone, from Canadian fall surveys in Div. 3O in 1990 and 1991.

Depth	Stratum	1990	1991
31-50	330	11.0	7.7
	331	0.9	1.4
	338	4.9	2.6
	340	1.6	19.8
	351	11.1	5.3
	352	4.2	5.4
	353	1.3	2.0
	Total	35.0	44.2
51-100	329	13.8	3.4
	332	2.3	0.5
	337	1.9	1.7
	339	2.7	3.1
	354	3.9	0.9
	Total	24.6	9.6
101-150	333	+	+
	336	+	0.1
	355	-	0.2
	Total	+	0.3
151-200	334	+	0.0
	335	+	+
	356	-	+
	Total	+	+
201-300	717	0.0	-
	719	0.0	0.0
	721	-	+
	Total	0.0	+
301-400	718	-	-
	720	-	-
	722	-	0.0
	Total	-	0.0
Grand Total		59.6	54.1

Table 39 . Summary of A. plaice biomass estimates outside 200-mile limit, from Canadian fall surveys.

		Biomass outside	Biomass total	% Outside
1990	3L	2.5	135.1	1.8
	3N	10.1	25.1	40.2
	3Ø	2.3	59.6	3.9
	3LNO	14.9	219.8	6.8
1991	3L	3.1	57.7	5.4
	3N	11.4	39.9	28.6
	3Ø	1.0	54.1	1.8
	3LNO	15.5	151.7	10.2

Table 40. Abundance (millions) at age of A.plaice from Canadian fall surveys in Divs 3N and 3O in 1990 and 1991.

	3N		3O	
Age	1990	1991	1990	1991
1	0.1	0.1	0.4	*
2	2.2	4.6	0.5	0.7
3	7.5	10.5	1.4	3.2
4	18.4	17.1	6.3	4.4
5	17.0	25.4	8.8	13.9
6	5.2	13.7	12.1	17.6
7	3.4	6.9	16.3	17.6
8	1.9	5.1	16.6	10.8
9	3.5	5.5	11.4	13.4
10	1.8	4.0	8.2	9.7
11	1.3	3.3	5.0	6.4
12	0.9	1.8	3.7	3.0
13	0.9	2.3	2.8	3.2
14	0.8	1.4	2.1	1.6
15	0.8	0.8	1.3	1.2
16	0.9	0.6	1.3	0.6
17	0.3	0.3	0.6	0.2
18	0.1	0.1	0.1	0.2
19	-	*	-	0.1
Total	67.1	103.5	99.0	108.0

Table 41 RESULTS FROM ADAPT USING RV AND COMMERCIAL C/E: PARAMETER ESTIMATES AND CVs.

APPROXIMATE STATISTICS ASSUMING LINEARITY NEAR SOLUTION

ORTHOGONALITY OFFSET..... 0.000076
MEAN SQUARE RESIDUALS 0.198611

PARAMETER	AGE	ESTIMATE	STD. ERR.	T-STAT	C.V.
NUMBERS					
	5	141935	63027	2.252	0.444
	6	130842	41701	3.138	0.319
	7	51640	14076	3.669	0.273
	8	45365	10988	4.129	0.242
	9	40600	8106	5.008	0.200
	10	28214	5299	5.325	0.188
	11	18512	3530	5.244	0.191
	12	8130	1617	5.028	0.199
	13	3469	750	4.623	0.216
	14	1752	388	4.519	0.221
INDEX 1: RV2					
	5	2.20E-4	2.64E-5	8.333	0.120
	6	5.07E-4	5.94E-5	8.549	0.117
	7	1.08E-3	1.25E-4	8.658	0.115
	8	1.74E-3	1.99E-4	8.746	0.114
	9	2.05E-3	2.32E-4	8.819	0.113
	10	2.13E-3	2.42E-4	8.836	0.113
	11	1.84E-3	2.08E-4	8.834	0.113
	12	2.21E-3	2.52E-4	8.798	0.114
	13	2.33E-3	2.66E-4	8.771	0.114
	14	2.58E-3	2.94E-4	8.783	0.114
INDEX 2: CE					
	9	2.16E-3	2.37E-4	9.099	0.110
	10	3.53E-3	3.88E-4	9.116	0.110
	11	5.11E-3	5.61E-4	9.115	0.110
	12	6.57E-3	7.24E-4	9.079	0.110
	13	6.84E-3	7.56E-4	9.053	0.110
	14	7.27E-3	8.03E-4	9.064	0.110

TABLE 42 . RESULTS FROM ADAPT USING RV AND COMMERCIAL C/E: RESIDUALS.

LOG RESIDUALS FROM RV2 10/ 6/92

	1975	1976	1977	1978	1979	1980	1981	1982	1984	1985
5	-0.809	-0.341	0.509	0.953	0.577	0.278	0.129	-0.456	-1.171	-0.380
6	-0.814	-0.771	0.283	0.514	0.335	0.283	0.134	-0.395	-0.540	-0.290
7	-0.752	-0.628	0.068	0.144	0.200	0.284	0.210	-0.432	-0.191	-0.016
8	-0.497	-0.238	0.138	-0.009	0.169	0.496	0.655	0.001	-0.055	-0.142
9	-0.093	0.106	0.030	-0.127	-0.041	0.281	0.742	0.472	0.001	-0.274
10	0.329	0.652	0.523	0.013	0.159	0.032	0.398	0.627	-0.111	-0.305
11	0.477	1.010	0.576	-0.183	0.046	-0.140	0.140	0.608	-0.260	-0.141
12	0.472	0.966	0.765	-0.027	-0.193	-0.286	-0.260	0.175	-0.199	-0.297
13	0.236	0.888	0.494	0.087	-0.438	-0.351	-0.513	0.179	-0.303	-0.224
14	0.225	0.321	0.238	0.174	-0.139	-0.571	-0.737	0.158	-0.157	-0.023

	1986	1987	1988	1989	1990	1991
5	-0.420	0.150	0.258	0.349	0.374	-0.000
6	-0.053	0.431	0.430	0.631	0.149	-0.327
7	0.199	0.454	0.431	0.333	0.070	-0.374
8	-0.111	0.310	0.086	0.136	-0.255	-0.683
9	-0.259	-0.021	0.194	-0.016	-0.190	-0.807
10	-0.421	-0.243	-0.178	-0.316	-0.242	-0.917
11	-0.536	-0.435	-0.063	-0.149	-0.189	-0.761
12	-0.292	-0.190	-0.018	-0.018	-0.008	-0.591
13	0.001	0.104	0.017	0.036	0.219	-0.430
14	-0.220	0.379	0.385	-0.019	0.138	-0.151

SUM OF RV RESIDUALS : -6.175836731E-9 MEAN RESIDUAL : -3.859897818E-11

LOG RESIDUALS FROM CE 10/ 6/92

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
9	-0.336	-0.123	-0.268	-0.427	-0.164	0.053	-0.358	-0.277	0.020	-0.490
10	-0.396	-0.324	-0.370	-0.431	-0.425	-0.206	-0.256	-0.002	-0.202	-0.106
11	-0.544	-0.409	-0.637	-0.466	-0.686	-0.342	-0.136	0.226	0.081	0.264
12	-0.450	-0.542	-0.539	-0.379	-1.085	-0.432	0.066	0.395	0.294	0.360
13	-0.294	-0.510	-0.535	-0.149	-1.059	-0.579	0.322	0.487	0.440	0.471
14	-0.060	-0.313	-0.397	0.005	-1.105	-0.731	0.606	0.538	0.624	0.449

	1985	1986	1987	1988	1989	1990	1991
9	-0.007	-0.352	0.516	0.394	0.620	0.797	0.401
10	0.163	-0.097	0.465	0.376	0.721	0.755	0.134
11	0.182	0.207	0.254	0.677	0.674	0.822	-0.167
12	0.117	0.312	0.167	0.574	0.568	0.789	-0.214
13	0.039	0.425	0.159	0.365	0.288	0.644	-0.515
14	-0.120	0.264	0.223	0.380	0.043	0.417	-0.824

SUM OF RV RESIDUALS : -0.0000016925988866 MEAN RESIDUAL : -1.659410653E-8

TABLE 43 . RESULTS OF ADAPT USING RV AND COMMERCIAL C/E: POPULATION ABUNDANCE AND FISHING MORTALITY.

POPULATION NUMBERS (000S) 10/ 6/92

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
5	293869	279404	233523	218148	201833	193054	174615	177242	164026	162241	162698
6	230622	239801	228000	190312	177195	164110	157822	142823	145089	134186	132788
7	193190	185987	192797	180587	151772	139147	131668	128712	116649	117892	109503
8	124537	151638	144328	149938	139532	112016	105300	105767	103739	92742	95150
9	75850	93427	106630	107552	113351	97276	80330	81882	82252	79689	72935
10	43710	53745	61474	75033	76526	79252	66875	58601	58945	59793	59948
11	25997	28636	32839	40235	48872	51338	52027	44415	36364	41286	39944
12	16153	16126	15914	20987	23950	32058	31818	30322	22066	22088	22142
13	11079	8943	8537	9178	11009	16193	18929	15308	11715	11265	9973
14	6170	5643	4586	4846	4207	7346	9880	7632	5347	5440	4634
15	3312	2683	2531	2404	1942	2798	4598	3030	2426	2134	2178
16	1628	1390	978	1167	636	1280	1707	1106	671	884	761
17	1347	643	610	491	369	377	809	385	326	212	358
5+	1027465	1068067	1032748	1000878	951193	896246	836378	797226	749617	729852	713011

	1986	1987	1988	1989	1990	1991
5	136461	124752	108323	101064	175837	141526
6	132938	107737	100114	86056	71212	130269
7	108005	100058	83736	79059	60003	51342
8	87516	77065	74961	64166	54384	45065
9	72788	60315	53239	54796	43801	40360
10	50037	47495	35025	34429	32033	28019
11	34839	28413	22924	19333	16980	18385
12	19558	15633	12944	10390	8223	8065
13	9773	6624	6478	5132	4007	3445
14	4448	2621	2640	2868	2366	1741
15	2012	1256	967	1115	1418	1082
16	666	366	333	198	416	752
17	272	54	76	32	30	268
5+	659314	572389	501760	458639	470711	470316

FISHING MORTALITY 10/ 6/92

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
5	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02	0.03	0.15	0.10	0.07
6	0.02	0.02	0.03	0.03	0.04	0.02	0.00	0.00	0.01	0.00	0.01	0.08	0.05	0.04	0.16	0.13	0.16
7	0.04	0.05	0.05	0.06	0.10	0.08	0.02	0.02	0.03	0.01	0.02	0.14	0.09	0.07	0.17	0.09	0.25
8	0.09	0.15	0.09	0.08	0.16	0.13	0.05	0.05	0.06	0.04	0.07	0.17	0.17	0.11	0.18	0.10	0.30
9	0.14	0.22	0.15	0.14	0.16	0.17	0.12	0.13	0.12	0.08	0.18	0.23	0.34	0.24	0.34	0.25	0.26
10	0.22	0.29	0.22	0.23	0.20	0.22	0.21	0.28	0.16	0.20	0.34	0.37	0.53	0.39	0.51	0.36	0.32
11	0.28	0.39	0.25	0.32	0.22	0.28	0.34	0.50	0.30	0.42	0.51	0.60	0.59	0.59	0.65	0.54	0.31
12	0.39	0.44	0.35	0.45	0.19	0.33	0.53	0.75	0.47	0.60	0.62	0.88	0.68	0.73	0.75	0.67	0.39
13	0.47	0.47	0.37	0.58	0.20	0.29	0.71	0.85	0.57	0.69	0.61	1.12	0.72	0.61	0.57	0.63	0.32
14	0.63	0.60	0.45	0.71	0.21	0.27	0.98	0.95	0.72	0.72	0.63	1.06	0.80	0.66	0.50	0.58	0.29
15	0.67	0.81	0.57	1.13	0.22	0.29	1.22	1.31	0.91	0.83	0.99	1.50	1.13	1.39	0.79	0.44	0.33
16	0.73	0.62	0.49	0.95	0.32	0.26	1.29	1.02	0.95	0.70	0.83	2.31	1.37	2.15	1.68	0.24	0.33
17	0.49	0.54	0.40	0.64	0.21	0.29	0.76	0.87	0.57	0.65	0.67	1.03	0.78	0.80	0.65	0.57	0.33

TABLE 44 . RESULTS FROM ADAPT USING RV ONLY: PARAMETER ESTIMATES AND CVs.

APPROXIMATE STATISTICS ASSUMING LINEARITY NEAR SOLUTION

ORTHOGONALITY OFFSET..... 0.000180
MEAN SQUARE RESIDUALS 0.171415

PARAMETER	AGE	ESTIMATE	STD. ERR.	T-STAT	C.V.
NUMBERS					
	5	135765	55909	2.428	0.412
	6	124886	36916	3.383	0.296
	7	49128	12432	3.952	0.253
	8	42967	9668	4.444	0.225
	9	33661	7260	4.637	0.216
	10	20026	4460	4.490	0.223
	11	12113	2885	4.199	0.238
	12	5197	1233	4.214	0.237
	13	2475	681	3.635	0.275
	14	1589	461	3.445	0.290
INDEX 1: RV2					
	5	2.30E-4	2.57E-5	8.960	0.112
	6	5.32E-4	5.79E-5	9.187	0.109
	7	1.13E-3	1.22E-4	9.297	0.108
	8	1.83E-3	1.95E-4	9.379	0.107
	9	2.18E-3	2.31E-4	9.428	0.106
	10	2.28E-3	2.43E-4	9.409	0.106
	11	1.97E-3	2.10E-4	9.378	0.107
	12	2.36E-3	2.54E-4	9.283	0.108
	13	2.45E-3	2.64E-4	9.253	0.108
	14	2.69E-3	2.89E-4	9.313	0.107

TABLE 45 . RESULTS FROM ADAPT USING RV ONLY! RESIDUALS.

LOG RESIDUALS FROM RV2 10/ 6/92

	1975	1976	1977	1978	1979	1980	1981	1982	1984	1985	1986	1987	1988
5	¯0.856	¯0.388	0.463	0.907	0.535	0.243	0.097	¯0.496	¯1.141	¯0.286	¯0.285	0.237	0.254
6	¯0.861	¯0.818	0.235	0.467	0.288	0.240	0.098	¯0.428	¯0.556	¯0.260	0.046	0.575	0.520
7	¯0.800	¯0.676	0.021	0.097	0.152	0.236	0.166	¯0.469	¯0.234	¯0.033	0.234	0.567	0.587
8	¯0.548	¯0.289	0.087	¯0.060	0.118	0.445	0.604	¯0.045	¯0.092	¯0.187	¯0.128	0.357	0.215
9	¯0.153	0.047	¯0.030	¯0.187	¯0.101	0.221	0.682	0.412	¯0.047	¯0.317	¯0.312	¯0.036	0.255
10	0.261	0.584	0.455	¯0.055	0.091	¯0.036	0.331	0.559	¯0.173	¯0.358	¯0.467	¯0.301	¯0.180
11	0.408	0.942	0.508	¯0.251	¯0.022	¯0.208	0.072	0.540	¯0.328	¯0.200	¯0.578	¯0.467	¯0.113
12	0.407	0.901	0.700	¯0.092	¯0.258	¯0.350	¯0.325	0.111	¯0.263	¯0.361	¯0.338	¯0.206	¯0.009
13	0.187	0.839	0.445	0.038	¯0.487	¯0.400	¯0.562	0.131	¯0.351	¯0.272	¯0.045	0.098	0.065
14	0.183	0.280	0.197	0.133	¯0.180	¯0.612	¯0.778	0.117	¯0.197	¯0.063	¯0.256	0.344	0.430

	1989	1990	1991
5	0.344	0.372	0.000
6	0.630	0.148	¯0.323
7	0.440	0.074	¯0.364
8	0.320	¯0.127	¯0.669
9	0.160	0.052	¯0.647
10	¯0.197	0.043	¯0.556
11	¯0.098	0.087	¯0.293
12	¯0.045	0.177	¯0.048
13	0.130	0.244	¯0.058
14	0.112	0.369	¯0.076

SUM OF RV RESIDUALS : ¯0.000001567519729 MEAN RESIDUAL : ¯9.796998303E¯9

TABLE 46 . RESULTS OF ADAPT USING RV ONLY!
POPULATION ABUNDANCE AND FISHING MORTALITY.

POPULATION NUMBERS (000S) 10/ 6/92

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
5	293859	279377	233494	218096	200943	191006	172200	176257	159108	150339	141457
6	230611	239793	227977	190287	177152	163380	156144	140846	144283	130159	123043
7	193187	185978	192791	180569	151752	139112	131071	127339	115031	117232	106206
8	124537	151635	144321	149939	139517	112000	105272	105278	102615	91417	94610
9	75850	93427	106628	107546	113347	97264	80317	81858	81852	78769	71850
10	43713	53746	61474	75031	76521	79249	66865	58590	58925	59465	59194
11	26002	28638	32839	40235	48870	51334	52024	44407	36355	41270	39676
12	16154	16130	15916	20987	23950	32057	31815	30319	22060	22080	22129
13	11081	8944	8541	9179	11009	16193	18928	15306	11713	11259	9967
14	6172	5644	4587	4849	4208	7346	9880	7631	5345	5439	4629
15	3316	2686	2532	2404	1944	2799	4598	3031	2426	2132	2177
16	1627	1393	980	1168	637	1282	1708	1106	671	883	759
17	1340	642	612	493	369	377	810	386	326	212	357
5+	1027450	1068033	1032691	1000777	950218	893399	831631	792354	740709	710656	676054

	1986	1987	1988	1989	1990	1991
5	114209	109325	103957	97322	168572	135366
6	115548	89518	87483	82482	68148	124322
7	100026	85820	68820	66718	57076	48833
8	84816	70533	63304	51954	45918	42669
9	72346	58105	47891	45252	33802	33428
10	49149	47132	33215	30051	24219	19833
11	34222	27686	22628	17851	13395	11987
12	19338	15128	12348	10147	7010	5129
13	9763	6444	6064	4645	3809	2452
14	4444	2612	2493	2529	1967	1578
15	2009	1252	960	995	1141	755
16	665	363	330	192	317	525
17	271	53	74	29	26	187
5+	606805	513972	449567	412166	425400	427063

FISHING MORTALITY 10/ 6/92

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
5	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02	0.03	0.16	0.10	0.08
6	0.02	0.02	0.03	0.03	0.04	0.02	0.00	0.00	0.01	0.00	0.01	0.10	0.06	0.04	0.17	0.13	0.17
7	0.04	0.05	0.05	0.06	0.10	0.08	0.02	0.02	0.03	0.01	0.02	0.15	0.10	0.08	0.20	0.09	0.26
8	0.09	0.15	0.09	0.08	0.16	0.13	0.05	0.05	0.06	0.04	0.07	0.18	0.19	0.14	0.23	0.12	0.32
9	0.14	0.22	0.15	0.14	0.16	0.17	0.12	0.13	0.12	0.09	0.18	0.23	0.36	0.27	0.43	0.33	0.32
10	0.22	0.29	0.22	0.23	0.20	0.22	0.21	0.28	0.16	0.20	0.35	0.37	0.53	0.42	0.61	0.50	0.48
11	0.28	0.39	0.25	0.32	0.22	0.28	0.34	0.50	0.30	0.42	0.52	0.62	0.61	0.60	0.73	0.76	0.53
12	0.39	0.44	0.35	0.45	0.19	0.33	0.53	0.75	0.47	0.60	0.62	0.90	0.71	0.78	0.78	0.85	0.70
13	0.47	0.47	0.37	0.58	0.20	0.29	0.71	0.85	0.57	0.69	0.61	1.12	0.75	0.67	0.66	0.68	0.48
14	0.63	0.60	0.45	0.71	0.21	0.27	0.98	0.95	0.72	0.72	0.63	1.07	0.80	0.72	0.60	0.76	0.33
15	0.67	0.81	0.57	1.13	0.22	0.29	1.22	1.31	0.81	0.83	0.99	1.51	1.13	1.41	0.94	0.58	0.51
16	0.73	0.62	0.49	0.95	0.32	0.26	1.29	1.02	0.95	0.70	0.83	2.32	1.39	2.23	1.82	0.33	0.51
17	0.49	0.54	0.39	0.63	0.21	0.29	0.76	0.87	0.57	0.65	0.67	1.04	0.80	0.84	0.74	0.73	0.51

Table 47. Results of Laurec-Shepherd for 3LNO Am. Plaice using RV and C/E.

AMERICAN PLAICE 3LNO 1975-91 AGES 5-18
with cpue data from file AP.DOS
DISAGGREGATED Qs
LOG TRANSFORMATION
NO explanatory variate (Mean used)
Fleet 1: fleet is Canadian RV has terminal q estimated as the mean
Fleet 2: fleet is Canadian co has terminal q estimated as the mean
FLEETS COMBINED by ** VARIANCE **
Terminal Fs estimated using Laurec/Shepherd method
Regression Weights
, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000

Oldest age F = 1.00* average of 5 younger ages.

Fishing mortalities

Age,	1975,	1976,	1977,	1978,	1979,	1980,	1981,	1982,	1983,	1984,	1985,	1986,	1987,	1988,	1989,	1990,	1991
5,	.003,	.003,	.005,	.008,	.007,	.002,	.001,	.000,	.001,	.000,	.002,	.048,	.029,	.049,	.249,	.184,	.093
6,	.015,	.018,	.033,	.026,	.042,	.021,	.004,	.003,	.008,	.003,	.007,	.098,	.070,	.053,	.276,	.234,	.344
7,	.042,	.054,	.052,	.058,	.104,	.079,	.019,	.016,	.030,	.015,	.025,	.148,	.105,	.090,	.271,	.164,	.557
8,	.088,	.153,	.095,	.080,	.162,	.133,	.052,	.052,	.066,	.042,	.070,	.181,	.196,	.137,	.260,	.167,	.715
9,	.146,	.220,	.152,	.141,	.159,	.176,	.116,	.130,	.121,	.088,	.183,	.234,	.364,	.263,	.426,	.393,	.506
10,	.225,	.295,	.225,	.230,	.201,	.222,	.211,	.279,	.157,	.207,	.356,	.381,	.551,	.429,	.593,	.505,	.633
11,	.283,	.390,	.251,	.321,	.224,	.281,	.342,	.502,	.301,	.426,	.524,	.634,	.624,	.635,	.754,	.721,	.541
12,	.393,	.447,	.354,	.451,	.194,	.330,	.536,	.753,	.476,	.598,	.622,	.908,	.754,	.818,	.867,	.898,	.841
13,	.480,	.470,	.381,	.587,	.209,	.298,	.713,	.859,	.572,	.695,	.613,	1.119,	.770,	.755,	.735,	.859,	.541
14,	.650,	.613,	.450,	.758,	.213,	.275,	.988,	.954,	.733,	.724,	.647,	1.075,	.808,	.759,	.745,	.954,	.498
15,	.698,	.853,	.593,	1.129,	.240,	.303,	1.259,	1.320,	.830,	.867,	1.006,	1.549,	1.156,	1.417,	1.071,	.903,	.841
16,	.772,	.679,	.544,	1.013,	.328,	.296,	1.334,	1.118,	.988,	.743,	.914,	2.419,	1.557,	2.397,	1.861,	.423,	1.387
17,	.599,	.612,	.464,	.788,	.237,	.300,	.966,	1.001,	.720,	.725,	.760,	1.414,	1.009,	1.229,	1.056,	.807,	.781

Log catchability estimates

Age 5

Fleet,	1975,	1976,	1977,	1978,	1979,	1980,	1981,	1982,	1983,	1984,	1985,	1986,	1987,	1988,	1989,	1990,	1991
1,	,	,	,	,	,	,	,	,	,	,	-9.52,	-8.66,	-8.57,	-7.89,	-7.68,	-7.57,	-7.44,	-8.19

2, No data for this fleet at this age

SUMMARY STATISTICS

Fleet ,	Pred. , q	SE(q),	Partial, F	Raised, F	SLOPE ,	SE Slope ,	INTRCPT,	SE Intrcpt
1 ,	-8.19 ,	.742,	.0003 ,	.0929,	.000E+00,	.000E+00,	-8.190,	.247
2 , No data for this fleet at this age								

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
.093	.742	0.000	.742	0.000

Age 6

Fleet,	1975,	1976,	1977,	1978,	1979,	1980,	1981,	1982,	1983,	1984,	1985,	1986,	1987,	1988,	1989,	1990,	1991
1,	,	,	,	,	,	,	,	,	,	,	-8.08,	-7.80,	-7.49,	-6.86,	-6.76,	-6.41,	-6.83,	-7.18

2, No data for this fleet at this age

SUMMARY STATISTICS

Fleet ,	Pred. , q	SE(q),	Partial, F	Raised, F	SLOPE ,	SE Slope ,	INTRCPT,	SE Intrcpt
1 ,	-7.18 ,	.605,	.0008 ,	.3437,	.000E+00,	.000E+00,	-7.177,	.202
2 , No data for this fleet at this age								

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
.344	.605	0.000	.605	0.000

Age 7

Fleet,	1975,	1976,	1977,	1978,	1979,	1980,	1981,	1982,	1983,	1984,	1985,	1986,	1987,	1988,	1989,	1990,	1991
1,	,	,	,	,	,	,	,	,	,	,	-6.99,	-6.80,	-6.56,	-6.21,	-6.09,	-6.06,	-6.12,	-6.40

2, No data for this fleet at this age

Table 47 Continued.

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-6.40	.373	.0017	.5575	.000E+00	.000E+00	-6.404	.124
2	No data for this fleet at this age							

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
.557	.373	0.000	.373	0.000

Age 8

Fleet	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1											-6.38	-6.47	-6.42	-5.95	-6.08	-5.86	-6.08	-6.18
2	No data for this fleet at this age																	

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-6.18	.237	.0021	.7150	.000E+00	.000E+00	-6.176	.079
2	No data for this fleet at this age							

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
.715	.237	0.000	.237	0.000

Age 9

Fleet	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1											-6.16	-6.43	-6.42	-6.16	-5.89	-5.98	-5.92	-6.32
2	-6.47	-6.26	-6.40	-6.56	-6.30	-6.08	-6.49	-6.41	-6.10	-6.60	-6.11	-6.46	-5.57	-5.64	-5.29	-4.88	-5.07	

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-6.16	.232	.0021	.5970	.000E+00	.000E+00	-6.159	.077
2	-6.04	.563	.0024	.1909	.000E+00	.000E+00	-6.040	.133

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
.506	.214	.401	.401	3.512

Age 10

Fleet	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1											-6.25	-6.42	-6.54	-6.36	-6.25	-6.32	-6.05	-6.39
2	-6.04	-5.96	-6.01	-6.07	-6.06	-5.85	-5.90	-5.64	-5.84	-5.74	-5.45	-5.71	-5.15	-4.99	-4.78	-4.54	-4.83	

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-6.32	.155	.0018	.6750	.000E+00	.000E+00	-6.321	.052
2	-5.56	.522	.0038	.3045	.000E+00	.000E+00	-5.562	.123

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
.633	.148	.217	.217	2.138

Age 11

Fleet	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1											-6.56	-6.43	-6.80	-6.69	-6.31	-6.33	-6.22	-6.53
2	-5.80	-5.69	-5.90	-5.74	-5.96	-5.61	-5.41	-5.06	-5.19	-5.01	-5.09	-5.03	-4.97	-4.54	-4.48	-4.19	-4.91	

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-6.48	.210	.0015	.5667	.000E+00	.000E+00	-6.482	.070
2	-5.21	.539	.0055	.4011	.000E+00	.000E+00	-5.211	.127

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
.541	.196	.117	.196	.357

Table 47 Continued.

Age 12

Fleet	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1												-6.32	-6.42	-6.41	-6.22	-6.03	-6.01	-5.85	-6.22
2	-5.48	-5.55	-5.56	-5.40	-6.10	-5.45	-4.96	-4.65	-4.73	-4.67	-4.92	-4.72	-4.77	-4.35	-4.34	-3.96	-4.75		

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT Intrcpt	SE
1	-6.19	.217	.0021	.6619	.000E+00	.000E+00	-6.185	.072
2	-4.96	.565	.0070	.5186	.000E+00	.000E+00	-4.963	.133

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
.641	.203	.816E-01	.203	.162

Age 13

Fleet	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1												-6.38	-6.29	-6.11	-5.91	-5.85	-5.79	-5.56	-5.97
2	-5.28	-5.50	-5.49	-5.14	-6.02	-5.55	-4.68	-4.52	-4.55	-4.52	-4.95	-4.61	-4.78	-4.43	-4.46	-4.05	-4.97		

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT Intrcpt	SE
1	-5.98	.285	.0025	.5313	.000E+00	.000E+00	-5.983	.095
2	-4.91	.532	.0074	.5741	.000E+00	.000E+00	-4.912	.125

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
.541	.251	.322E-01	.251	.016

Age 14

Fleet	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1												-6.13	-5.98	-6.22	-5.59	-5.45	-5.60	-5.34	-5.58
2	-4.97	-5.23	-5.32	-4.88	-6.01	-5.63	-4.35	-4.41	-4.30	-4.48	-5.04	-4.70	-4.71	-4.42	-4.50	-4.03	-5.22		

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT Intrcpt	SE
1	-5.74	.345	.0032	.4263	.000E+00	.000E+00	-5.736	.115
2	-4.84	.540	.0079	.7283	.000E+00	.000E+00	-4.836	.127

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
.498	.290	.243	.290	.699

Age 15

Fleet	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1												-5.45	-5.45	-5.46	-5.02	-4.70	-4.72	-5.01	-5.04
2	-4.90	-4.90	-5.04	-4.48	-5.89	-5.54	-4.11	-4.09	-4.18	-4.30	-4.65	-4.52	-4.49	-3.88	-4.17	-4.20	-4.78		

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT Intrcpt	SE
1	-5.10	.334	.0061	.7870	.000E+00	.000E+00	-5.105	.111
2	-4.60	.552	.0101	1.0053	.000E+00	.000E+00	-4.596	.130

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
.841	.286	.109	.286	.144

Age 16

Fleet	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1												-5.03	-5.09	-4.67	-4.23	-3.76	-3.57	-4.40	-4.66
2	-4.80	-5.13	-5.13	-4.59	-5.57	-5.56	-4.05	-4.26	-4.00	-4.46	-4.83	-4.05	-4.31	-3.49	-3.58	-4.63	-4.25		

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT Intrcpt	SE
1	-4.43	.585	.0120	1.7428	.000E+00	.000E+00	-4.427	.195
2	-4.51	.629	.0110	1.0650	.000E+00	.000E+00	-4.511	.148

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
1.387	.428	.246	.428	.329

POPULATION NUMBERS (000S)

AGE	1975	1976	1977	1978	1979	1980	1981	1982	1983
5	293780	279212	233429	218076	200390	188750	170506	173446	157969
6	230245	239727	227842	190235	177136	162928	154298	139459	141981
7	192973	185678	192737	180458	151709	139099	130700	125827	113896
8	124442	151460	144075	149089	139426	111965	105261	104974	101377
9	75605	93349	106484	107345	113311	97190	80288	81850	81603
10	43581	53545	61410	74913	76356	79219	66804	58567	58918
11	25606	28530	32675	40183	48774	51199	52000	44357	36336
12	16130	15806	15828	20852	23907	31978	31705	30300	22019
13	10989	8925	8276	9107	10899	16158	18863	15215	11697
14	6046	5570	4571	4632	4149	7256	9852	7578	5271
15	3204	2582	2471	2391	1766	2751	4524	3007	2382
16	1557	1301	895	1118	626	1137	1668	1046	652
17	1152	585	537	423	328	369	691	354	276
5+	1025310	1066270	1031230	999623	948777	889998	827160	785980	734378

AGE	1984	1985	1986	1987	1988	1989	1990	1991
5	151663	140924	104171	85788	67545	63687	99064	112747
6	129226	124128	115112	81300	68213	52670	40610	67413
7	115348	105442	100914	85462	62092	52941	32669	26287
8	90487	93067	84192	71260	63012	46445	33001	22686
9	77755	71089	71083	57593	48486	45012	29292	22853
10	59262	58365	48526	46098	32796	30538	24023	16140
11	41265	39509	33542	27176	21781	17508	13794	11827
12	22065	22124	19202	14571	11931	9454	6729	5456
13	11226	9954	9759	6333	5609	4303	3241	2222
14	5425	4602	4433	2609	2401	2157	1687	1113
15	2072	2166	1986	1244	957	920	836	526
16	848	710	656	345	323	190	256	275
17	197	328	230	46	59	23	24	137
5+	706838	672408	593905	479825	385204	325848	285225	289680

Table 48 Results of Laurec-Shepherd for 3LNO AM. Plaice using RV only.

AMERICAN PLAICE 3LNO 1975-91 AGES 5-18
with cpue data from file AP.DOS
DISAGGREGATED Qs
LOG TRANSFORMATION
NO explanatory variate (Mean used)
Fleet 1: fleet is Canadian RV has terminal q estimated as the mean
FLEETS COMBINED by ** VARIANCE **
Terminal Fs estimated using Laurec/Shepherd method
Regression Weights
, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000

Oldest age F = 1.00* average of 5 younger ages.

Fishing mortalities

Age,	1984,	1985,	1986,	1987,	1988,	1989,	1990,	1991
5,	.000,	.002,	.049,	.032,	.049,	.252,	.187,	.095
6,	.003,	.007,	.099,	.071,	.059,	.280,	.238,	.351
7,	.015,	.025,	.149,	.106,	.093,	.302,	.167,	.570
8,	.042,	.070,	.180,	.186,	.139,	.269,	.191,	.733
9,	.088,	.183,	.233,	.363,	.264,	.436,	.411,	.616
10,	.207,	.356,	.381,	.544,	.427,	.597,	.520,	.683
11,	.426,	.524,	.637,	.622,	.623,	.748,	.731,	.569
12,	.598,	.622,	.909,	.760,	.814,	.831,	.884,	.660
13,	.695,	.613, 1.119,	.772,	.766,	.726,	.782,	.523
14,	.724,	.647, 1.075,	.808,	.765,	.769,	.930,	.418
15,	.867, 1.006, 1.549, 1.156, 1.417, 1.092,	.973,	.790
16,	.743,	.915, 2.420, 1.558, 2.397, 1.857,	.439, 1.810
17,	.725,	.760, 1.414, 1.011, 1.232, 1.055,	.801,	.840

Log catchability estimates

Age 5

Fleet,	1984,	1985,	1986,	1987,	1988,	1989,	1990,	1991
1 ,	-9.52,	-8.65,	-8.54,	-7.81,	-7.67,	-7.56,	-7.42,	-8.17

SUMMARY STATISTICS

Fleet ,	Pred. q ,	SE(q),	Partial, F ,	Raised, F ,	SLOPE ,	SE Slope ,	INTRCPT,	SE Intrcpt
1 ,	-8.17 ,	.750,	.0003 ,	.0951,	.000E+00,	.000E+00,	-8.167,	.250

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
.095	.750	0.000	.750	0.000

Age 6

Fleet	1984	1985	1986	1987	1988	1989	1990	1991
1	-8.08	-7.80	-7.48	-6.84	-6.67	-6.40	-6.81	-7.16

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-7.16	.620	.0008	.3515	.000E+00	.000E+00	-7.155	.207

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
.351	.620	0.000	.620	0.000

Age 7

Fleet	1984	1985	1986	1987	1988	1989	1990	1991
1	-7.00	-6.80	-6.55	-6.20	-6.06	-5.95	-6.10	-6.38

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-6.38	.399	.0017	.5703	.000E+00	.000E+00	-6.382	.133

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
.570	.399	0.000	.399	0.000

Age 8

Fleet	1984	1985	1986	1987	1988	1989	1990	1991
1	-6.38	-6.47	-6.42	-5.95	-6.07	-5.83	-5.94	-6.15

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-6.15	.260	.0021	.7333	.000E+00	.000E+00	-6.151	.087

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
.733	.260	0.000	.260	0.000

Age 9

Fleet	1984	1985	1986	1987	1988	1989	1990	1991
1	-6.15	-6.43	-6.43	-6.16	-5.89	-5.96	-5.87	-6.13

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-6.13	.233	.0022	.6165	.000E+00	.000E+00	-6.127	.078

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
.616	.233	0.000	.233	0.000

Age 10

Fleet	1984	1985	1986	1987	1988	1989	1990	1991
1	-6.24	-6.42	-6.54	-6.37	-6.25	-6.31	-6.02	-6.31

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-6.31	.161	.0018	.6835	.000E+00	.000E+00	-6.308	.054

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
.683	.161	0.000	.161	0.000

Age 11

Fleet	1984	1985	1986	1987	1988	1989	1990	1991
1	-6.56	-6.43	-6.79	-6.69	-6.33	-6.33	-6.21	-6.48

Table 48 Continued.

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-6.48	.209	.0015	.5695	.000E+00	.000E+00	-6.477	.070

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
.569	.209	0.000	.209	0.000

Age 12

Fleet	1984	1985	1986	1987	1988	1989	1990	1991
1	-6.32	-6.42	-6.41	-6.21	-6.04	-6.06	-5.86	-6.19

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-6.19	.207	.8021	.6597	.000E+00	.000E+00	-6.188	.069

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
.660	.207	0.000	.207	0.000

Age 13

Fleet	1984	1985	1986	1987	1988	1989	1990	1991
1	-6.38	-6.29	-6.11	-5.91	-5.84	-5.80	-5.65	-6.00

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-6.00	.264	.0025	.5234	.000E+00	.000E+00	-5.998	.088

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
.523	.264	0.000	.264	0.000

Age 14

Fleet	1984	1985	1986	1987	1988	1989	1990	1991
1	-6.13	-5.98	-6.22	-5.59	-5.45	-5.57	-5.37	-5.76

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-5.76	.337	.0032	.4177	.000E+00	.000E+00	-5.757	.112

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
.418	.337	0.000	.337	0.000

Age 15

Fleet	1984	1985	1986	1987	1988	1989	1990	1991
1	-5.45	-5.45	-5.46	-5.02	-4.70	-4.70	-4.94	-5.10

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-5.10	.341	.0061	.7901	.000E+00	.000E+00	-5.101	.114

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
.790	.341	0.000	.341	0.000

Age 16

Fleet	1984	1985	1986	1987	1988	1989	1990	1991
1	-5.03	-5.09	-4.67	-4.23	-3.76	-3.58	-4.36	-4.39

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-4.39	.576	.0124	1.8103	.000E+00	.000E+00	-4.389	.192

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
1.810	.576	0.000	.576	0.000

TABLE 48 . CONTINUED.

POPULATION NUMBERS (000S)

AGE	1984	1985	1986	1987	1988	1989	1990	1991
5	151202	139453	101841	78764	66839	63011	97679	110478
6	129463	123750	113906	79393	62462	52092	40056	66279
7	116023	105636	100605	84476	60530	48233	32195	25833
8	90577	93620	84350	71007	62204	45166	29146	22298
9	77634	71163	71536	57723	48279	44351	28245	19697
10	59236	58266	48586	46469	32903	30368	23481	15284
11	41265	39488	33461	27225	22084	17596	13655	11383
12	22065	22124	19185	14505	11971	9702	6801	5342
13	11226	9954	9759	6319	5554	4336	3445	2280
14	5425	4601	4433	2609	2390	2112	1714	1280
15	2072	2166	1986	1244	957	910	800	548
16	848	710	656	345	323	190	248	245
17	197	328	230	46	59	23	24	130
5+	707232	671259	590535	470124	376556	318091	277489	281078

Table 49 Results of various calibration analyses for American Plaice in Divisions 3LNO.

FORM.	3+ BIO	3+ POP	AGE 11-15 F	YEARCLASSES 86	85	84	83	82	81
AD1	160	470	0.33	142	176	101	108	125	136
AD2	135	427	0.51	135	169	97	104	109	114
LS1	94	290	0.61	113	99	64	68	86	104
LS2	91	281	0.59	110	98	63	67	79	102

Description of analysis

AD1	ADAPT using RV and commercial C/E
AD2	ADAPT using RV only
LS1	Laurec-Shepherd using RV and commercial C/E
LS2	Laurec-Shepherd using RV and commercial C/E

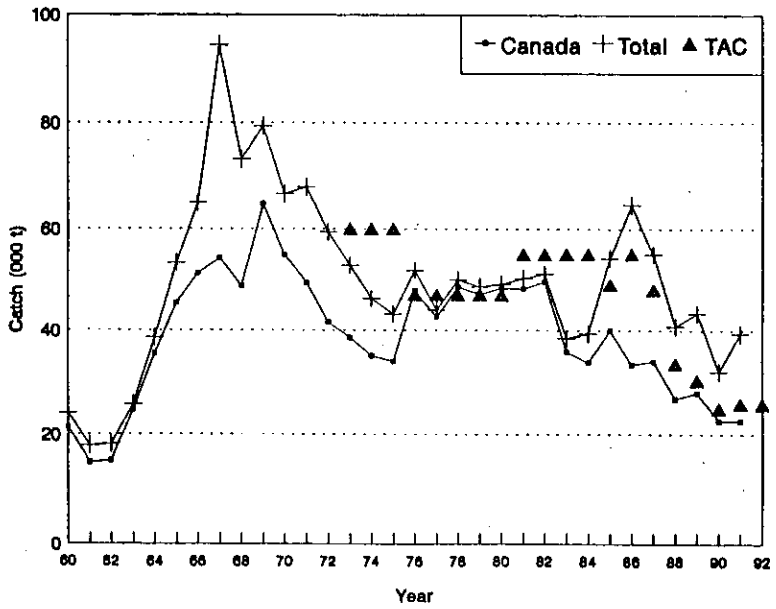

Fig.1. Catches and TAC's of American plaice in Div. 3LNO.

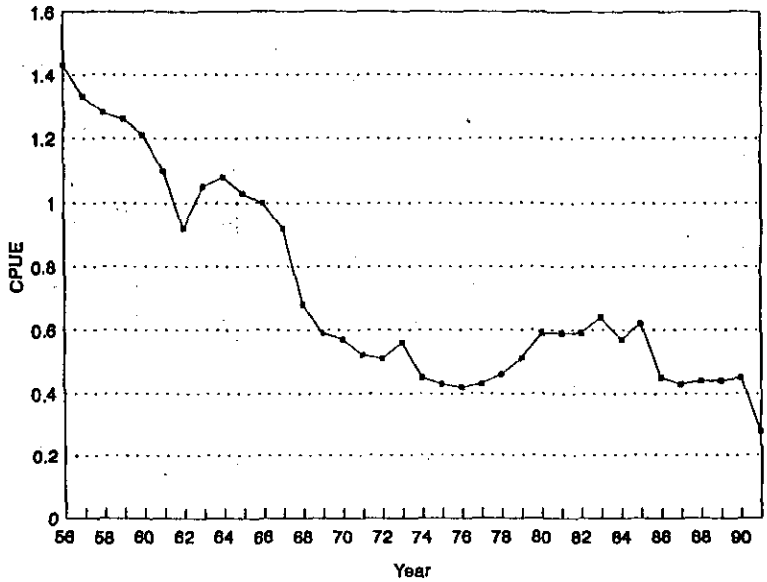

Fig. 2. CPUE of A. plaice from the directed Canadian fishery in Div. 3LNO.

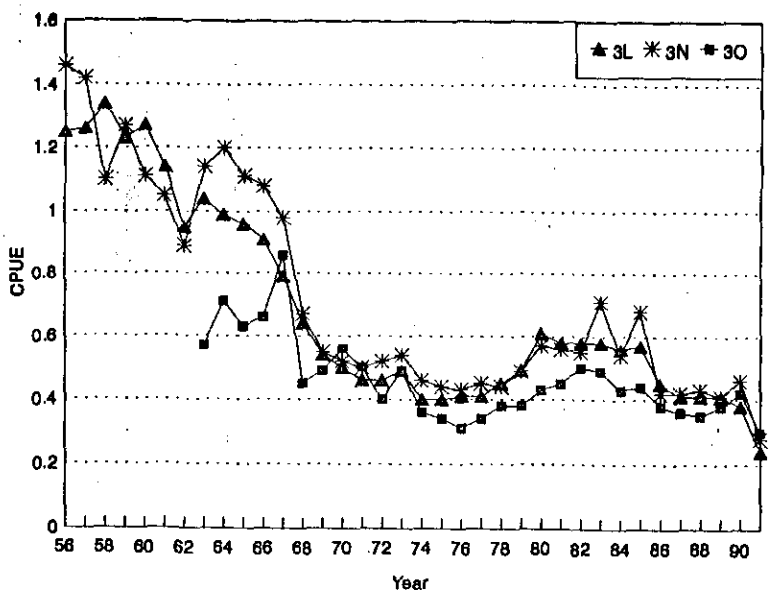

Fig. 3. CPUE of A. plaice from the directed Canadian fishery in Div. 3L, 3N and 3O.

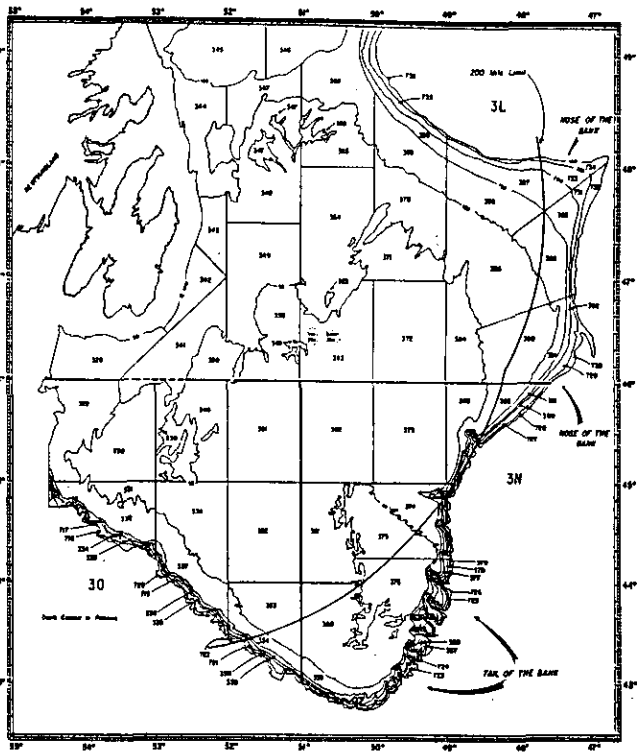

Fig 4 Depth stratification chart of the Grand Bank, NAFO Div. 3LNO

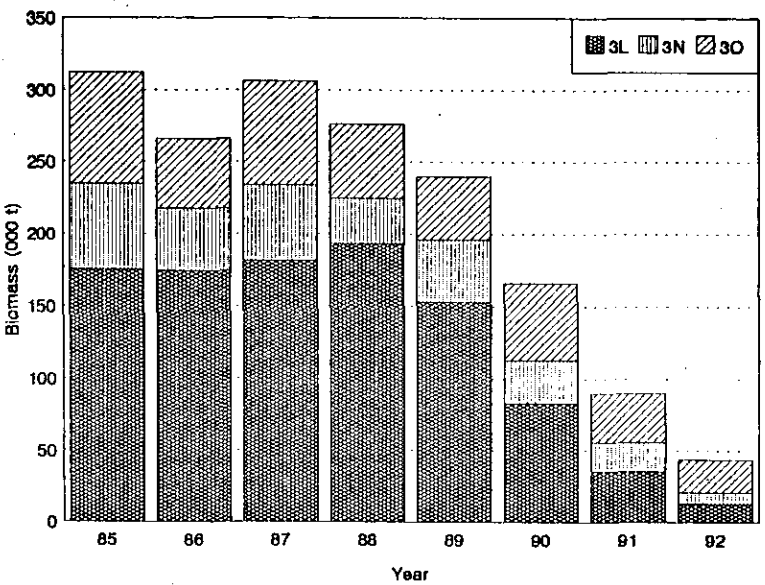

Fig. 5 Biomass indices of A.plaice from spring surveys in Divisions 3L, 3N, 3O

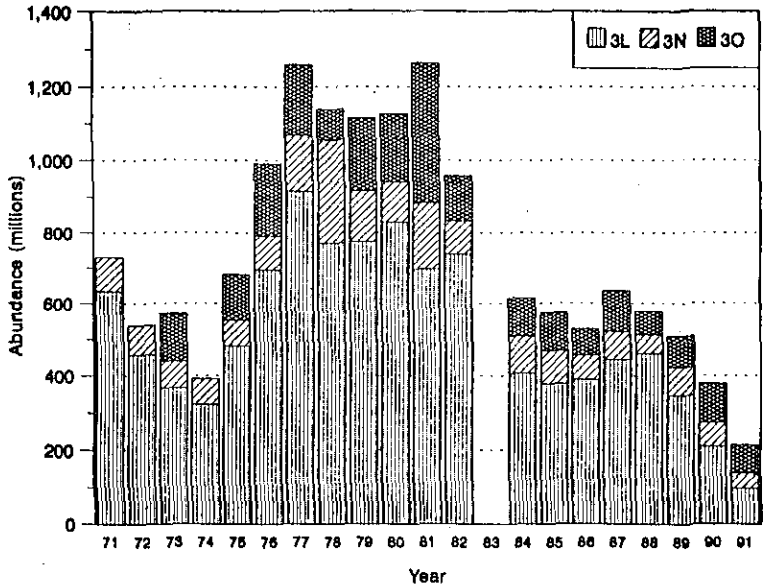

Fig. 6 . Abundance of A.plaice from spring RV surveys conducted by Canada in Div. 3LNO.

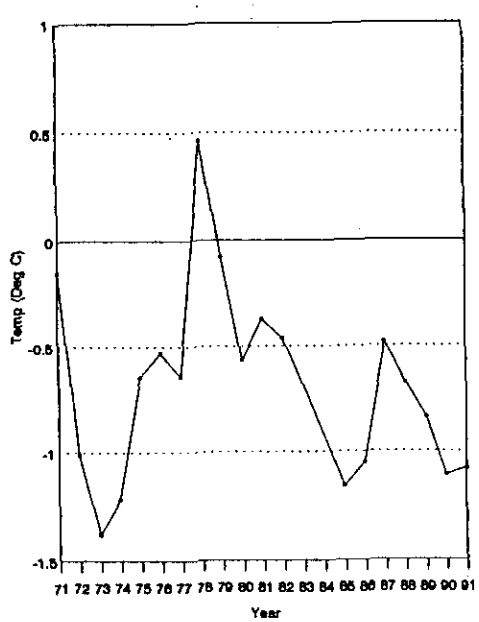

Fig. 7 . Mean temperature at the 51-100 fm depth range from spring RV surveys in Div.3L.

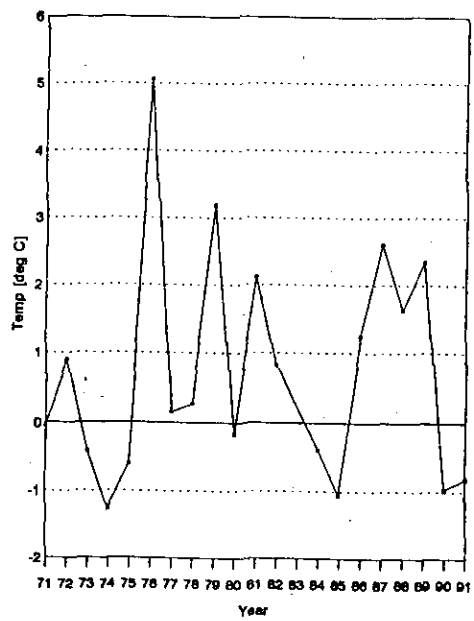

Fig. 8 . Mean temperature at the 51-100 fm depth range from spring RV surveys in 3N.

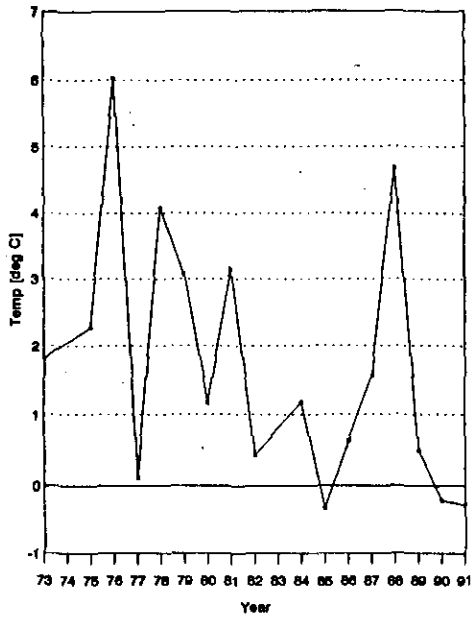

Fig. 9 Mean temperature at the 51-100 fm depth range from spring RV surveys in Div. 3O.

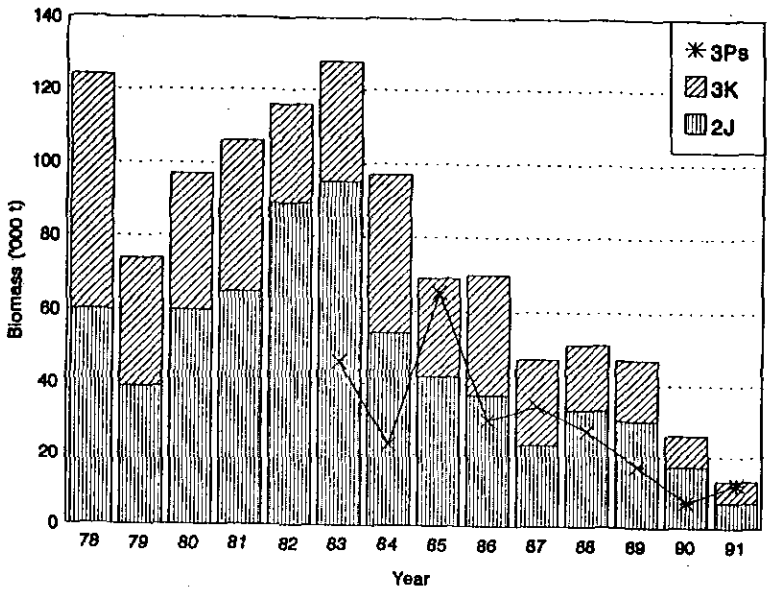

Fig. 10. Biomass of A.plaice from RV surveys in Divs. 2J, 3K, and 3Ps.

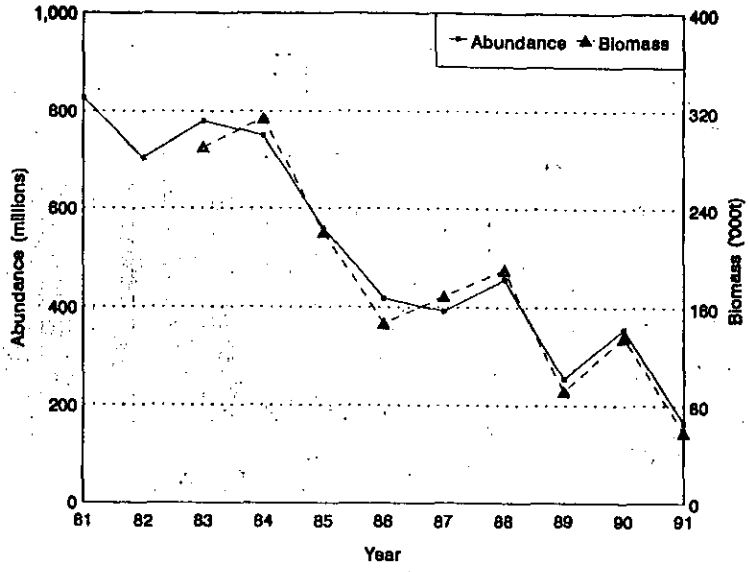

Fig. 11 Abundance and biomass estimates of A.plaice from fall RV surveys in Div. 3L.

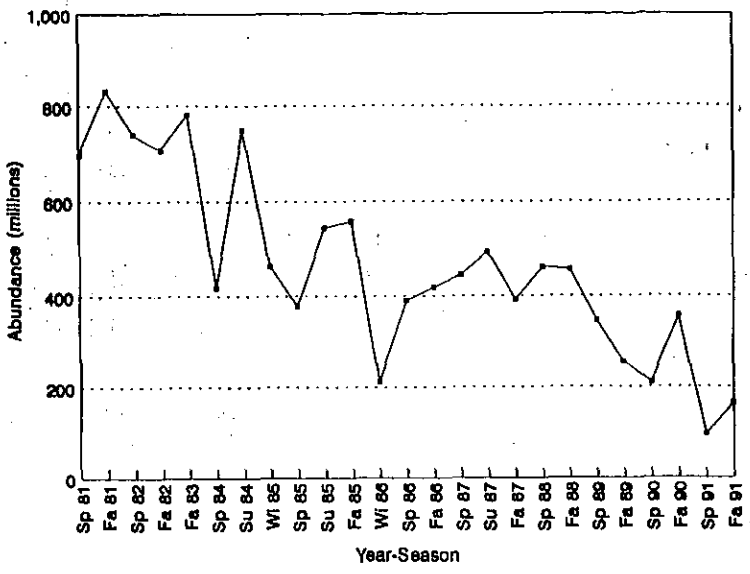

Fig. 12 Abundance of A. plaice from surveys conducted at various times in Div. 3L.

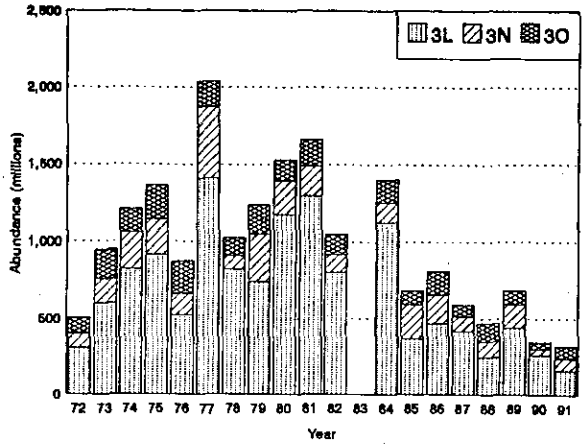

Fig 13 Estimates of abundance of A.plaice from USSR RV surveys in Div. 3LNO.

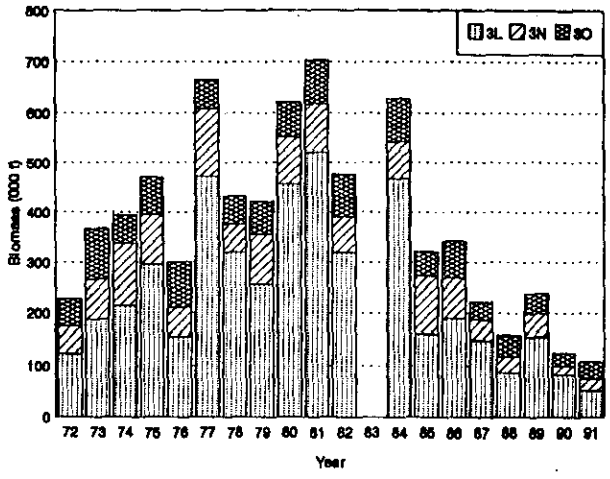

Fig 14 Estimates of biomass of A.plaice from USSR RV surveys in Div. 3LNO.

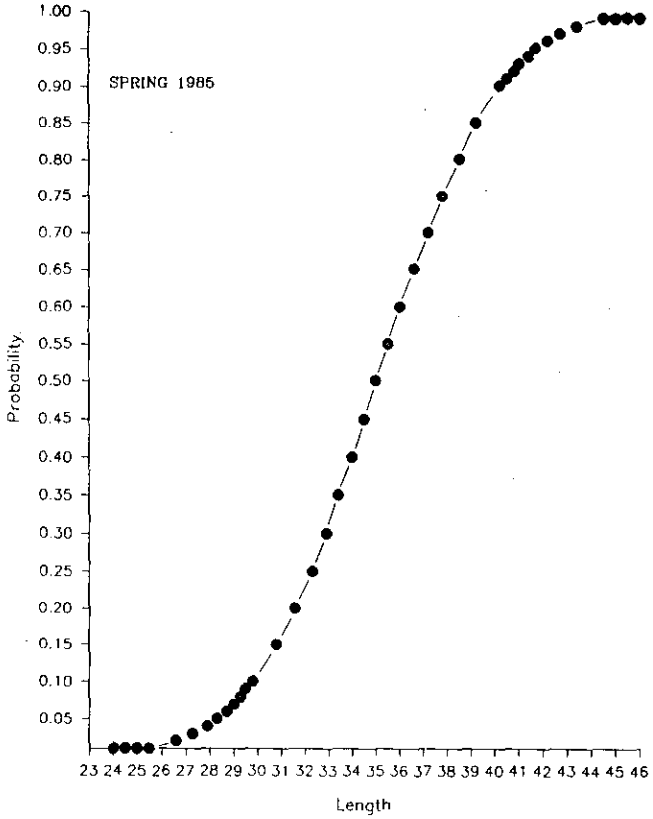

Fig. 15. Maturity ogive for female A.plaice from the spring survey in Div. 3L in 1985.

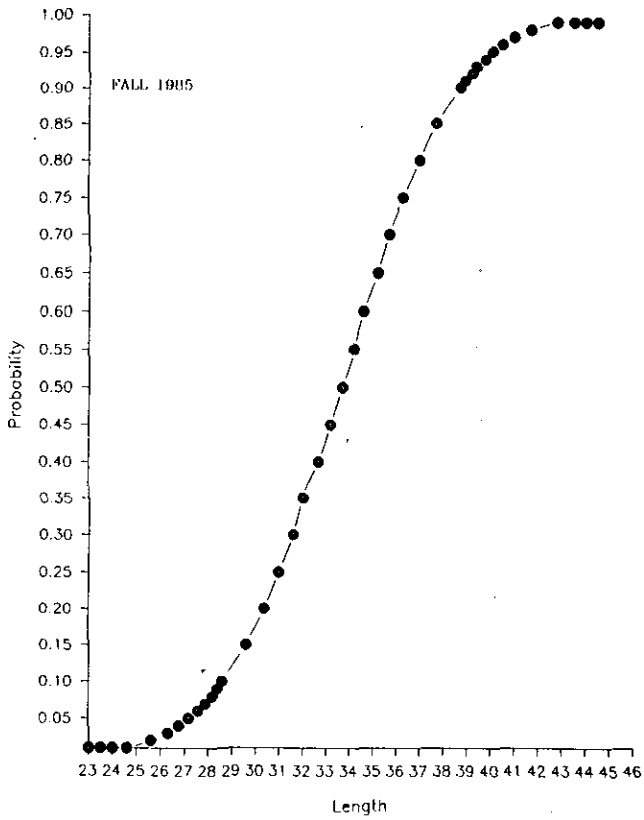

Fig. 16. Maturity ogive for female A.plaice from the fall survey in Div. 3L in 1985.

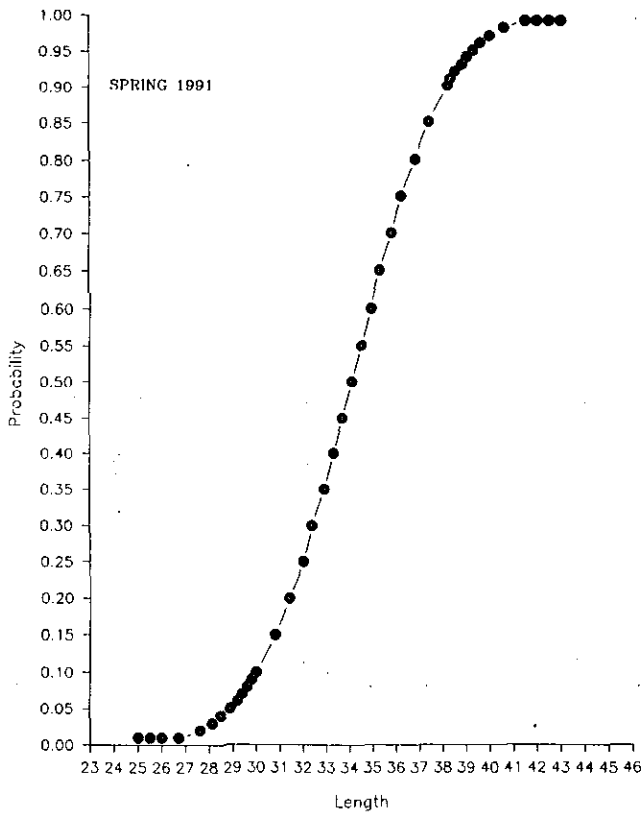

Fig. 17. Maturity ogive for female A.plaice from the spring survey in Div. 3L in 1991.

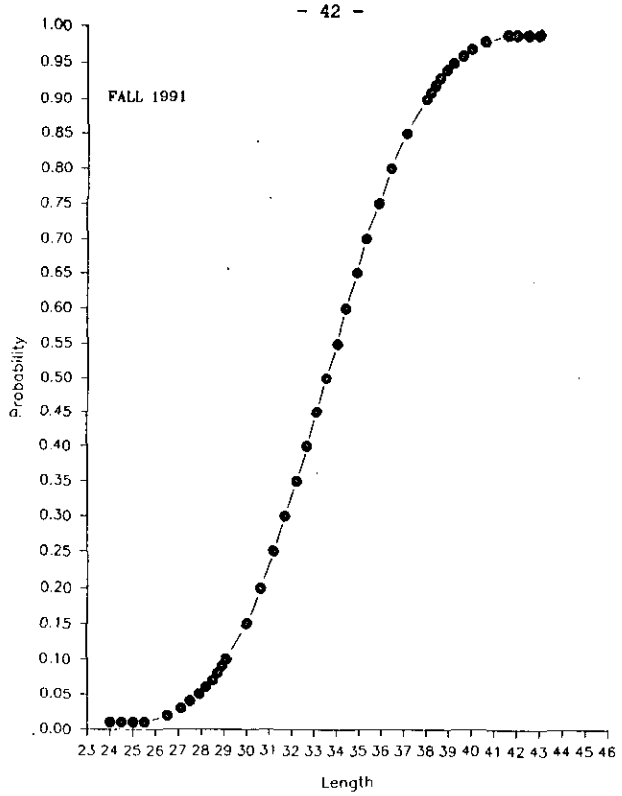

Fig. 18. Maturity ogive for female A.plaice from the fall survey in Div. 3L in 1991.

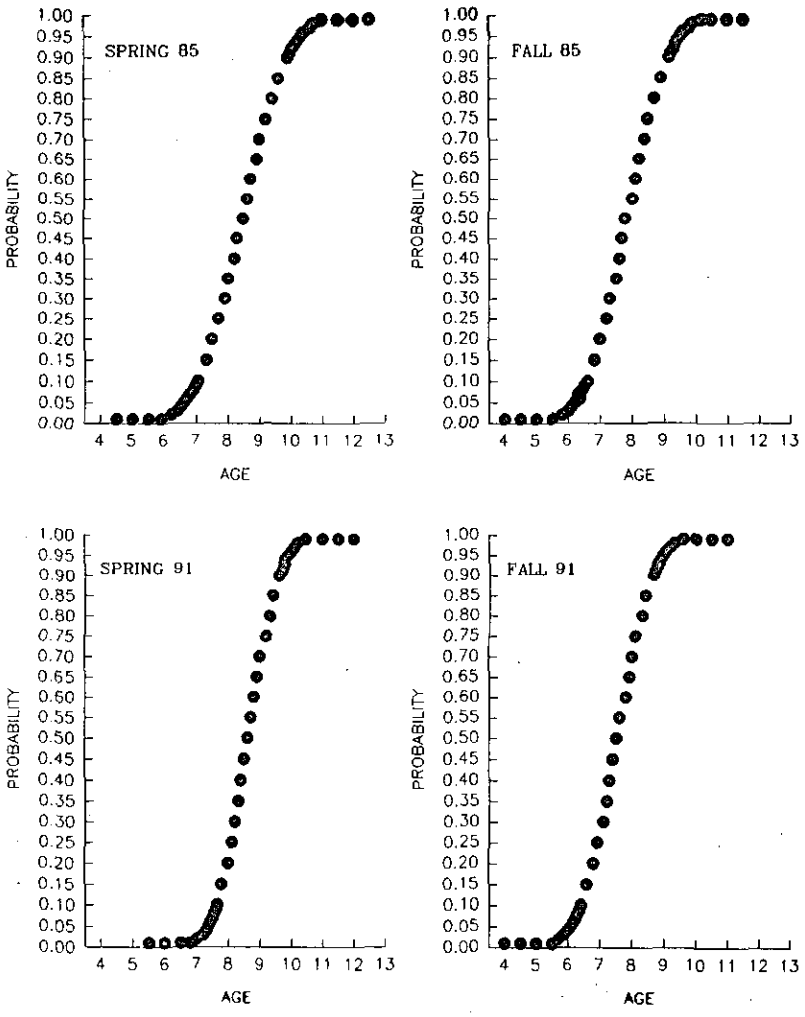

Fig. 19. Maturity ogives (for age) of A.plaice from spring and fall surveys in Div. 3L in 1985 and 1991.

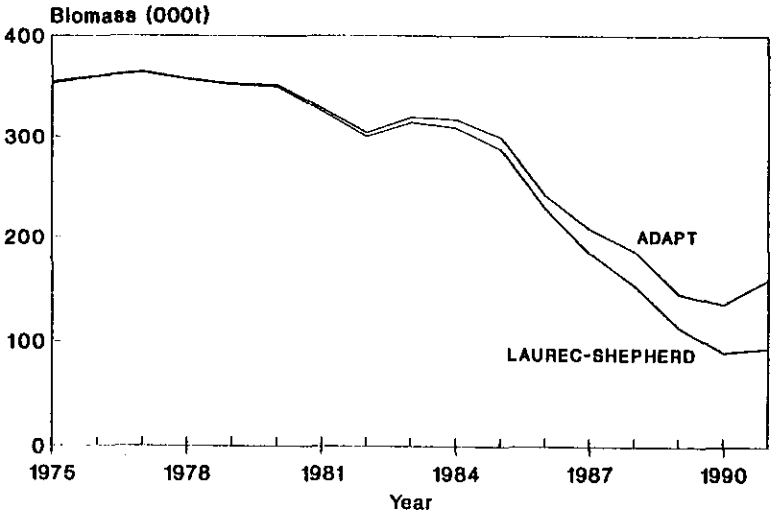

Figure 20. Age 5+ biomass from ADAPT and L/S using RV and commercial C/E.

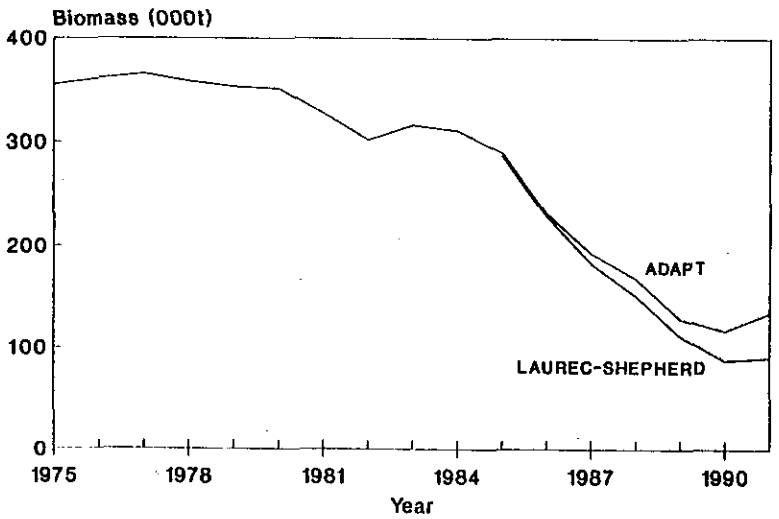

Figure 21. Age 5+ biomass from ADAPT and L/S using RV only.