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An Assessment of the American Plaice Stock on the Grand Bank (NAFO Divisions 3LNO)

by

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INTRODUCTION

TAC regulation

This stock has been under quota regulation since 1973, when a level of 60,000 t was set (Table 1, Fig. 1). Since then, the TAC has fluctuated between that level and 47,000 t, with the 1986 TAC set at 55,000 t. The increase in the TAC from 1985 to 1986 was caused largely by the low catch in 1984 (NAFO, 1985).

Catch trends

The fishery on the offshore segment of this stock essentially began in the late 1940's. The nominal catch peaked in 1967 at 94,000 t (Fig. 1), some 35,000 t of which was taken by USSR trawlers (Table 1). Canada has taken the large majority of the catch since 1976, although landings by non-Canadian countries have been increasing in the past 3 years.

The fishery is conducted mainly by stern otter trawlers, most of which are TC 5. There is a small inshore fishery in Div. 3L, and the 1985 catch of 2,600 t in this segment is within the range of recent catches. Landings in recent years have come primarily from Div. 3L (Table 2), although the catches in Divs. 3L and 3N in 1985 were approximately equal, mainly due to increased catches by foreign vessels outside the Canadian 200 mile economic zone. Landings from Div. 3Ø have averaged about 4,000 t in recent years.

The fishery is usually conducted year-round (Table 3), with peak catches often coming in the spring or fall months. For 1985, no monthly breakdowns of landings were available for over 10,000 t from Divs. 3N and 3Ø.

There are several points worth noting regarding nominal catches in the 1982-85 period:

a) South Korea reported catches of "flounder non-specified" to NAFO In 1982-83. These catches, along with those from the same country in 1984-85, were estimated to contain 60% yellowtail and 40% American plaice, by weight, based on inspections of catch by Canadian authorities.

b) Catches for South Korea 1984-85 and "others" (with the exception of U.S.A. and Spanish catches in 1985) (Table 1), were based on estimates of catch per day and total days fished made by Canadian surveillance officers.

c) The estimated catch of 11,967 t by "other" countries in 1985 (Table 1) is broken down as follows: U.S.A. 1,300 t, Panama 3,760 t, Spain 4,372 t, Portugal 1,785 t, and Cayman Islands, 750 t.

d) South Korean catches, 1982-85 and virtually all the "other" catch in 1985, were taken outside the Canadian 200 mile limit. Ninety percent of these catches were assumed to come from Div. 3N, based on surveillance reports and the amount of suitable fishing grounds located outside the 200 mile limit in Div. 3N, compared to Divs. 3L and 3Ø.

Further assessment of this stock is given in the Appendix

Catch/effort

Catch rate information from Canadian offshore trawlers directing for American plaice in Divs. 3L, 3N is available from 1960 to 1985 (Table 4). Catch rates have increased since the late 1970's, and the 1985 value of 0.66 t/hr is the highest since 1967 (Fig. 2). Noteworthy in the 1985 data was a catch rate of 4.3 t/hr for 2,800 t of catch by Canadian trawlers in March in Div. 3L. While slight increases in catch rates are often observed around that time of year, the value of 4.3 t/hr is much larger than any other previously observed in the series. Although this high level obviously had an effect on the average catch rate for 1985 (0.66 t/hr), it should be noted that CPUE stabilized at around 0.6 t/hr in Divs. 3L and 3N in the latter half of 1985, when most of the catch was taken (Table 3). Preliminary reports for 1986 showed the catch rates of American plaice early in the year to be very poor, but were picking up somewhat in the spring.

STOCK ASSESSMENT

As has been the case in all recent assessments, only the portion of the stock in Divs. 3LN was assessed. In previous years, an amount for Div. 3Ø, usually equal to the average catch, was added to the calculated figure for Divs. 3LN to give a TAC for the stock area.

Sampling

Length frequencies and otoliths were available from the Canadian commercial fishery in 1985. As has been the case in recent years, the sampling level of this portion of the fishery was excellent in 1985 (Table 5). Unfortunately, no sampling data were available from the catch by other countries, with the exception of three length frequencies from U.S.A. landings.

Numbers caught at age

These were determined in the usual manner from quarterly age-length keys and monthly length frequencies (sexes separate). The catch at age for 1985 (Table 6) was obtained by combining male and female numbers at age for Divs. 3LN. Tables 7 and 8 contain the catch numbers at age and corresponding proportions at age respectively for the period 1965-85. It should be noted that the catch at age in 1984 was increased by 11% to reflect landings which were not originally included in calculating these numbers at age.

As was noted in the previous assessment of this stock (Brodie 1985), the catch at ages 6-8 has declined noticeably since 1979-80, with the 1984 and 85 values at ages 6 and 7 being among the lowest in the series since 1965 (Table 8). Although present levels of discarding in this fishery are not available, Stevenson (1983) noticed a significant increase in the discard rate of plaice aged 6-10 from 1980 to 1982. If this increased level continued to the present, the lower numbers at ages 6-8 may be partly explained by this. In any case, all catch at age information used in this assessment does not include discards, and as such, represents only the numbers landed, rather than the numbers actually caught.

It can be seen from Table 7, that the pattern of catch at age in 1985 was considerably different from that which was calculated for 1984. Ages 9-11 formed about 64% of the catch in numbers in 1985, with age 10 contributing about 25% (Table 8). These 3 year-classes made up only 33% of the 1984 catch, and as such were not expected to contribute quite as much to the 1985 catch as actually occurred.

Weights at age

These were calculated for 1985 (Table 6) in the usual manner, using the method described by Brodie, 1985. The weights for all ages were higher than those calculated for 1984, with the values at ages 6-10 being close to the average of recent years (Table 9). The weights for ages 11+ are the highest in the series, but for the ages with reasonable sampling, are still close to previously calculated values.

Table 10 contains the calculated catch biomass for 1965-85. These numbers compare favorably with the nominal catch in Divs. 3L and 3N in most years, with the 1985 values being less than 1% apart.

Natural mortality

The value of 0.2, used in recent assessments, was used in this paper. This value was deemed to be reasonable by Pitt, 1982, from a series of calculations on Grand Bank plaice.

Research vessel survey data

There are three series of Canadian research vessel data which pertain to this stock:

1) Stratified random surveys, conducted in the spring, in Divs. 3LNO, from 1971 to 1986.

2) Stratified random surveys, conducted in the fall, in Div. 3L, from 1981 to 1985.

3) Stratified random surveys, one per quarter, conducted in Div. 3L from winter 1985 to winter 1986.

Brodie, 1985 contains a detailed account of factors affecting series 1 and 2, such as influence of different vessels, gaps in survey coverage, and acceptability of selecting strata common to most years for analysis. Figure 4 shows the stratification scheme used in all Canadian stratified random groundfish surveys on the Grand Bank.

Results from the spring survey series are shown in Tables 12-14 for Div. 3L, 3N, and 3Ø respectively. The biomass estimate for Div. 3L was lower in 1985 and 1986 than at any time in the 1977-82 period (Table 12). Although no data exist for 1983, and the 1984 information was scanty, several of the larger important strata were surveyed in 1984 and these results show that the 1984 estimate of 97.9 thousand tons was very close to the 1985 estimate of 91.8 thousand tons for the same strata. However, this comparison must be viewed cautiously, given the few strata surveyed in 1984. In Div. 3N, the total biomass decreased from 68.4 thousand tons in 1984 to 59.9 and 43.5 thousand tons in 1985 and 1986 respectively. In Div. 3Ø, the biomass estimate increased from 64.5 to 76.6 thousand tons from 1984-85, then declined to 48.1 thousand tons in 1986. It should be noted that the 1984, 1985, 1986 surveys in Divs. 3N and 3Ø were conducted by similar vessel-gear combinations and that coverage was complete down to 200 fathoms in all 3 years.

Analysis of the spring survey data from the 1977-85 period was conducted to determine the proportion of plaice biomass located outside the Canadian 200 mile economic zone (Fig. 4). The analysis assumed homogenous distribution of plaice in the strata partially outside the 200 mile limit, meaning that if 75% of a stratum's area was outside the 200 mile limit, then the same percentage of the biomass was assumed to be outside as well. The results showed between 1.4 and 5.1 percent of the plaice biomass in Div. 3L was outside the 200 mile limit, between 26 and 46% in Div. 3N was outside, and between 1.9 and 5.8% in Div. 3Ø was outside. The analysis was carried out only for years in which the survey coverage was complete.

Tables 15a and 16a contain population numbers at age from the selected strata in Div. 3L and 3N respectively for 1971-85, while Tables 15b and 16b contain the same information, adjusted for differences in the vessel-gear combinations used in the surveys (Gavaris and Brodie, 1984). For Div. 3L, the population estimates were somewhat stable between 1977 and 1982, then declined noticeably in 1985 (Table 15b). Unfortunately, little or no data exist for 1983-84 to corroborate this decline. The estimates for Div. 3N have shown more annual fluctuation, with the 1985 value slightly below that of 1984, and just above the 1982 estimate. Tables 17 and 18 show the mean numbers and weights per tow respectively for plaice caught in the selected strata in Div. 3L and 3N.

Tables 19-21 contain the results of the fall survey series in Div. 3L. Table 19 reveals that survey coverage was relatively good in most years, and excellent in 1984 and 1985. The biomass estimate increased to 313.8 thousand tons in 1984 from 268.0 thousand tons in 1983, then decreased to 220.2 thousand tons in 1985. It should be noted that there was a difference in the timing of the 1984 and 1985 surveys. Tables 20a and 20b contain the population numbers from the selected strata of the fall series in actual and converted forms respectively. These data, as well as those found in Table 21, indicate a relatively stable population size in these strata from 1981 to 1984, followed by a marked decline in 1985. However, it must be noted that in the 1985 survey, only 72% of the estimated biomass was found in these selected strata, compared to 94% in 1984, when survey coverage was virtually identical. Nonetheless, these percentages still do not fully account for the 48% reduction in estimated population size from 1984 to 1985.

Table 22 gives the results from the seasonal surveys in 1985-86 in Div. 3L. The spring 1986 values have been added for comparison. Also, the results from this survey as well as spring 1985 and fall 1985 have been included with the results from the two survey series discussed previously.

The biomass estimates from the four surveys in 1985 ranged from 175,000 t to 220,000 t; in fact 3 of the 4 surveys produced estimates between 215,000 and 220,000 t (Table 22). However, the 1986 winter survey gave a figure of only 46,000 t, a decline of 79% from the survey which ended less than 3 months earlier. This decrease cannot be explained at present, given the minimal commercial landings in the December 1985-January 1986 period and the estimate of 172,000 t from the spring 1986 survey. However, the 202 sets in the winter 1986 survey came at a time when Canadian trawler fishermen complained of extremely poor catch rates

of American plaice on the Grand Banks, so the survey data would appear to at least reflect the "trawlability" of plaice at that time. Given the results of adjacent surveys, it seems likely that the biomass estimate of 46,000 t in winter, 1986 is anomalous, and was probably the result of a catchability or availability problem with plaice.

Table 23 contains the population estimates from the four seasonal surveys in 1985. It is interesting to note that the age compositions are not identical in all four surveys, although they are very close in the summer and fall surveys, as in fact are the total abundances. At the present, little is known of seasonal distributions of plaice on the Grand Banks, so there are no explanations concerning the differences observed in Table 23.

Comparing the winter and fall population sizes in Table 23 allows calculation of total mortalities within a year, given that the commercial fishery took virtually nothing in Div. 3L before the winter survey and probably less than 20% of the total 3L catch after the fall survey. However, given the differences in the age structures of the two population estimates, Z values vary widely, depending on the choice of ages used in the calculations. Ages 8+ indicate a Z of only 0.21, 10+ give Z = 0.84, and 13+ which are fully recruited to both survey and commercial gear, indicate a Z of 0.50. However, it must be noted that such calculations between surveys in successive years often yield unrealistic Z values, as will undoubtedly be the case for 1985 winter vs 1986 winter surveys.

Partial recruitment (PR)

Calculation of PR for this stock in recent years has proved troublesome. For example, in the 1982 and 1983 assessments (Brodie and Pitt, 1982, 1983), PR could not be derived using the usual methods, resulting in changing the PR at ages 6-10, based on ratios of these ages in the commercial catches. In the 1985 assessment, information was presented which suggested that the PR at the younger ages which had been used in recent catch projections was overestimated. Hence the PR used for projecting in 1985 was modified, with Fig. 3 suggesting that the modification was reasonably accurate. Also in 1985, the PR used in SPA was substantially different from any values used in recent years, being significantly lower at ages 7-10. The most likely reasons for this difficulty in calculating PR are the lack of information on changing discard rates, and shifts in effort of the commercial fleet from one area to another between years, resulting in changes in the age structure of the catch. Also, the use of research vessel data in calculating PR has not proven successful in most years for this stock.

For the 1985 catch at age, it became obvious that the PR calculated last year was not suitable, given the significant difference in the catch at age between 1984 and 1985. The use of average fishing mortalities in recent years from a preliminary SPA produced a PR very similar to that calculated for the 1984 catch, and was therefore rejected. To smooth out short-term changes in PR in recent years, fishing mortalities were averaged for 1978-85 from a preliminary SPA run. The resulting values, normalized at age 13, are shown in Table 11 as PR 86, along with various other PR vectors used recently in this stock. It should be noted that PR 86 is close to the PR vector used in the 1984 assessment of this stock, and is not too different from the PR used in projecting the 1985 catch at age in last year's assessments.

Terminal fishing mortality (FT) in 1985

The same two methods used to calibrate the cohort analysis were used in this paper as were used in the 1985 assessment of this stock. In addition to these, the use of population numbers from the spring surveys in Div. 3L and 3N was attempted. The results of the calibrations are found in Table 24 and can be summarized as follows:

1) Exploitable biomass from cohort analysis vs CPUE, 1965-85. These values for biomass were calculated from yearly patterns of selectivity, as determined from the fishing mortality (F) matrix, assuming full recruitment at ages 13+. The CPUE values are those shown in Table 4 from the Canadian offshore trawler fleet. The correlation coefficient (r) decreased from 0.559 for the regression at FT = 0.3 to 0.510 at FT = 0.5. The 1985 residual was lowest for the run at F_T = 0.4 while the 1984 residual retained a large negative value over the range of FT tested.

2) Average exploitable biomass from cohort analysis vs CPUE, 1965-85. As was the case in the 1984 and 1985 assessments, the values for average exploitable biomass were calculated by applying average (over the entire F matrix) selectivity coefficients at age to the biomass estimates from cohort analysis. These were then regressed against the CPUE index noted previously. The maximum value of r was observed at FT = 0.4, and this was also the level of F at which the sum of the 1985 and 1984 residuals was minimized. The 1985 residual alone reached zero at a level of FT between 0.4 and 0.5.

3) Ages 9+ population numbers from cohort analysis vs ages 9+ population numbers from spring

surveys, Div. 3LN, selected strata, for 1971-72, 1974, 1977-82, 1985 (Tables 15b, 16b). In the 1984 assessment of this stock, the use of 8+ survey data in calibration of the cohort analysis gave close agreement with the results produced from the biomass/CPUE relationships. However, the survey data was not used in 1985 because there was insufficient information for 1983 and 1984. With the decline in population size observed from the survey from 1982 to 1985 in Div. 3L, the results indicated in Table 24 are not altogether surprising. The regressions were not significant over the range of F's tried for the other two calibrations, but indicated FT to be close to 0.9. Although this value would seem to be unreasonable, the fact that the surveys indicate a higher value for FT may be significant, given the results of the 1986 surveys to date. However, in light of the high CPUE value for 1985 and the variability observed in some recent survey results, less weight should be given to the survey data in choosing an appropriate FT for 1985.

Based on the results of the first two relationships, FT = 0.4 for 1985 was chosen. The results from the cohort analysis at this level are shown in Table 25. It can be seen from the population numbers section of this table that the values at ages 6 and 7 in 1985 are well below historic levels, the value of age 8 is below recent levels, and the values at ages 9-11 are above the norms. This suggests either rapid changes in year-class strengths have occurred, which is unlikely for this stock, or that age by age adjustments are required for partial recruitment, as was the case in 1985. In any case, the ages 9+ population size looks reasonable at this level of FT when compared to the 1985 cohort estimate and the level of CPUE calculated for the commercial fleet in 1985.

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Table 1. Nominal catches (t) of American plaice for NAFO Divisions 3LNØ, 1960-85 and TAC's from 1973 to 1986.

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	558	72	-	132	25,446	-
1964	35,474	1,582	539	680	-	292	38,567	-
1965	45,365	2,056	977	4,544	-	319	53,261	-
1966	51,225	1,246	860	11,484	-	196	65,011	-
1967	54,190	1,326	3,234	35,139	-	524	94,413	-
1968	48,674	406	203	23,751	-	133	73,167	-
1969	64,815	43	34	14,493	-	52	79,437	-
1970	54,929	389	40	10,232	-	1,055	66,645	-
1971	49,394	323	370	17,173	-	628	67,888	-
1972	41,605	322	2,515	14,164	-	755	59,361	-
1973	38,586	310	1,116	12,516	-	315	52,843	60,000
1974	35,101	418	615	10,074	-	89	46,297	60,000
1975	34,015	442	537	7,682	-	545	43,221	60,000
1976	47,806	305	5	3,280	-	429	51,825	47,000
1977	42,579	31	-	1,023	-	348	43,981	47,000
1978	48,634	168	-	1,048	-	178	50,028	47,000
1979	47,131	113	-	1,190	-	135	48,569	47,000
1980	48,296	183	-	336	-	271	49,086	47,000
1981	48,177	210	-	847	-	924	50,158	55,000
1982	49,620	133	-	67	715	517	51,052	55,000
1983	35,907	41	-	170	815	1,602	38,535	55,000
1984[b]	33,753	140	1	360	1,677	3,593	39,524	55,000
1985[b]	39,963	64	-	81	725	11,967	52,800	49,000
1986	-	-	-	-	-	-	-	55,000

[a]South Korean catches reported to NAFO in 1982-83 as unspecified flounder. The breakdown used for the 1982-85 catches is 60% yellowtail, 40% American plaice.

[b]Provisional. Catches for S. Korea and other are estimated.

Table 2. Breakdown of plaice nominal catches (t) in Divisions 3LNØ by Division, for the years 1960-85.

Year	Division 3L	Division 3N	Division 3Ø	UNK	Total
1960	19,397	3,912	738	-	24,047
1961	13,398	3,498	1,017	-	17,913
1962	13,584	3,923	699	-	18,206
1963	16,512	7,465	1,469	-	25,446
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]	20,258	13,612	3,824	1,830	39,524
1985[a,b]	22,458	22,295	4,299	3,748	52,800

[a]Includes breakdown of unspecified flounder catches by S. Korea.

[b]Provisional. Includes estimates of non-reported catch outside Canadian 200 mile limit. These catches are attributed 90%:10% to Divisions 3N:3Ø.

Table 3. Breakdown of plaice nominal catches (t) by division and month, for the years 1977-85. Does not include reported monthly catches where division is unknown.

	1977	1978	1979	1980	1981	1982[a]	1983[a]	1984[a,b]	1985[a,b]
					3L				
Jan.	34	247	2,003	2	135	23	529	1,335	-
Feb.	1,140	143	543	658	50	317	166	379	25
Mar.	175	123	1,475	1,056	2,414	578	151	2,719	2,844
Apr.	279	389	1,576	565	5,590	1,627	1,540	2,133	804
May	2,986	3,309	4,110	7,391	8,986	5,228	4,535	2,889	1,676
June	3,899	5,974	4,359	8,632	6,887	5,296	4,207	3,638	2,477
July	3,418	5,775	5,321	2,934	3,104	6,106	2,895	3,912	1,868
Aug.	3,314	4,990	4,080	1,784	2,759	3,142	1,843	1,678	2,306
Sept.	2,465	3,269	2,289	679	2,373	2,948	2,270	531	3,228
Oct.	2,128	2,149	1,146	3,094	1,872	2,765	2,087	223	4,066
Nov.	2,317	1,212	1,117	1,540	2,251	2,877	1,447	380	1,791
Dec.	1,608	2,565	689	3,382	848	1,854	1,294	441	1,373
Unk.	-	-	-	-	-	-	-	-	-
Total	23,763	30,145	28,708	31,717	37,269	32,761	22,964	20,258	22,458
					3N				
Jan.	4	798	510	28	482	16	314	508	-
Feb.	798	268	350	376	105	6	259	153	1,190
Mar.	338	469	135	519	154	42	248	397	225
Apr.	200	525	668	15	406	77	418	1,217	753
May	1,246	502	773	526	880	398	800	1,384	1,260
June	2,416	1,593	1,363	1,836	1,227	641	779	2,443	2,144
July	2,431	1,432	1,947	1,574	2,563	2,681	1,446	2,796	1,795
Aug.	2,418	1,931	2,055	1,641	1,759	2,685	1,202	876	1,701
Sept.	1,659	1,196	1,809	1,349	1,219	1,796	495	296	1,023
Oct.	1,668	2,013	1,259	3,386	1,055	3,132	1,545	471	1,522
Nov.	1,849	1,601	2,516	2,495	679	748	1,039	1,373	1,131
Dec.	1,516	1,115	1,327	1,374	99	235	1,828	189	281
Unk.	-	-	-	-	-	644	734	1,509	9,270
Total	16,543	13,443	14,712	15,119	10,628	13,101	11,107	13,612	22,295
					3Ø				
Jan.	1	274	274	4	188	-	767	98	-
Feb.	359	434	93	17	72	107	147	1,091	562
Mar.	120	216	189	477	214	548	397	524	199
Apr.	118	452	260	23	98	49	452	100	566
May	341	1,223	221	91	64	2,071	687	298	712
June	516	450	339	288	200	1,317	607	210	372
July	494	288	341	95	352	63	263	412	78
Aug.	546	303	270	29	82	123	124	205	123
Sept.	372	322	340	66	204	158	296	293	330
Oct.	331	879	437	335	281	219	234	275	105
Nov.	378	955	1,564	283	354	258	338	105	195
Dec.	99	644	821	542	152	206	71	45	27
Unk.	-	-	-	-	-	71	81	168	1,030
Total	3,675	6,440	5,149	2,250	2,261	5,190	4,464	3,824	4,299

[a]Includes breakdown of unspecified flounder catches by S. Korea.

[b]Provisional. Includes estimates of non-reported catch outside Canadian 200 mile limit. These catches are attributed 90%:10% to Divisions 3N:3Ø.

Table 4. Catch and effort data for American plaice for NAFO Divisions 3L and 3N. Directed catch (Column 2) refers to catch directed for plaice by Canada (N) otter trawls tonnage class 4 and 5.

Year	Directed catch (tons)	CPUE (tons/hr)	Total catch (tons)	Total effort (hours calculated)
1960	12,502	1.067	23,309	21,849
1961	9,301	0.942	16,896	17,928
1962	11,777	0.789	17,507	22,187
1963	17,503	0.914	23,977	26,232
1964	19,359	0.954	35,978	37,729
1965	18,082	0.905	51,304	56,690
1966	29,536	0.876	53,270	60,811
1967	34,416	0.818	62,879	76,869
1968	31,344	0.629	59,164	94,060
1969	39,251	0.548	67,322	122,850
1970	24,020	0.516	60,379	117,014
1971	24,439	0.479	60,724	126,772
1972	23,137	0.481	50,717	105,441
1973	20,027	0.517	40,986	79,277
1974	20,957	0.434	37,736	86,949
1975	27,111	0.416	36,479	87,690
1976	35,710	0.430	43,745	101,733
1977	32,117	0.406	40,306	99,276
1978	33,290	0.460	43,588	94,757
1979	30,763	0.495	43,420	87,717
1980	34,982	0.597	46,836	78,452
1981	34,199	0.570	47,897	84,030
1982	33,052	0.562	45,862	81,605
1983	18,215	0.622	34,071	54,777
1984[a]	16,608	0.647	33,870	52,349
1985[a]	25,534	0.661	44,753	67,705

[a]provisional.

Table 5. List of commercial sampling, by quarter and Division, available for 1985, for American plaice in Divisions 3LNO, provided by the St. John's Commercial Sampling Section.

Division		Quarter 1	2	3	4	Total
3L (offshore)	Can(N) catch (t)	2,869	4,456	5,445	7,136	19,906
	Samples	7	14	15	30	66
	Measured	2,056	5,744	5,922	11,042	24,764
	Otoliths	607	758	735	788	2,888
3L (inshore)	Can(N) catch (t)	0	123	1,926	503	2,552
	Samples	-	10	13	4	27
	Measured	-	4,363	5,153	1,485	11,001
	Otoliths	-	595	884	369	1,848
3N	Can(N) catch (t)	1,415	4,157	4,519	2,934	13,025
	Samples	3	9	11	8	31
	Measured	858	3,328	3,843	2,903	10,932
	Otoliths	283	744	812	507	2,346
3Ø	Can(N) catch (t)	761	1,650	531	327	3,269
	Samples	2	7	-	1	10
	Measured	707	2,232	-	397	3,336
	Otoliths	240	608	-	126	974

Table 6. Average weights and lengths, as well as catch-at-age, for American plaice in the fishery in Div. 3LN in 1985.

	AVERAGE		CATCH		
AGE	WEIGHT	LENGTH	MEAN	STD. ERR.	C. V.
* 5	0.312	32.613	36	14.37	0.40
6	0.396	35.259	254	47.74	0.19
* 7	0.434	36.222	1748	122.59	0.07
* 8	0.476	37.111	5081	210.12	0.04
9	0.561	38.958	10270	302.53	0.03
10	0.669	41.039	15086	364.82	0.02
11	0.829	43.840	13590	352.79	0.03
*12	1.114	47.978	8622	265.45	0.03
*13	1.487	52.403	3759	152.11	0.04
*14	1.921	56.680	1564	76.41	0.05
*15	2.415	60.792	928	50.37	0.05
*16	3.015	65.056	269	27.23	0.10
*17	3.573	68.586	91	17.19	0.19
*18	4.018	71.032	7	5.57	0.79

TABLE 7. AMERICAN PLAICE, DIV 3LN, CATCH MATRIX (NUMBERS X 10^-3)

AGE	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
6	3041	5139	2228	1894	2079	1968	1565	2199	837	5222	2945	3400	6537	3538	6069	2924	538	271	937	99	254
7	6969	8224	7216	3347	6674	2314	7524	2023	4909	7305	6693	7388	8065	7874	12560	9110	2038	1576	2668	511	1748
8	8964	9122	5093	7913	12023	9066	9354	6576	8158	8070	8266	15963	10827	7238	16872	11601	4330	4303	4492	1907	5081
9	6789	7798	6330	9065	15409	12264	13868	9656	10096	6675	7802	15166	12653	11583	13242	13571	7134	7878	6698	4535	10270
10	7285	5954	9133	9405	10830	10225	12670	10907	7789	7741	6445	10772	10303	12370	11329	13735	10761	11345	6399	9141	15086
11	5521	5823	9106	6255	10793	10128	9833	10866	7741	5901	4524	6867	5954	8859	8075	10796	13178	14704	7757	12484	13590
12	5578	4644	9700	11193	8811	7473	8074	9147	5245	3839	3880	4273	3750	5825	3406	7696	11622	13687	7135	8650	8622
13	5023	4696	6324	7098	5978	5034	4647	5796	5111	2940	3110	2415	2014	2977	1640	3385	8553	7418	4428	4900	3759
14	4174	4105	4377	5126	4496	4223	3328	3720	2896	1642	2175	1984	1311	1738	594	1460	5527	3836	2379	2406	1564
15	1773	2959	3615	2558	2955	3851	2920	2151	1560	966	1091	1176	872	1161	294	619	2903	1718	1170	1037	928
16	2054	1626	2501	2075	1586	2176	1753	1806	1828	595	595	448	308	469	148	244	1079	524	354	387	269
17	1270	1037	1314	1230	1051	1236	898	1239	802	187	393	193	161	152	57	79	383	146	122	89	91
18	556	933	1110	615	609	834	447	527	913	65	190	45	93	53	13	25	231	69	43	14	7
19	618	390	283	330	296	315	360	286	337	20	80	20	25	18	5	2	101	8	13	1	1
6+	59615	62450	68330	68104	83590	71107	77241	66899	58222	51060	48189	70110	62873	65855	74304	75247	68398	67483	44595	46161	61270

TABLE 8. AMERICAN PLAICE, DIV 3LN, CATCH AT AGE AS PROPORTIONS OF YEARLY TOTALS

AGE	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
6	0.0510	0.0823	0.0326	0.0278	0.0249	0.0277	0.0203	0.0329	0.0144	0.1023	0.0611	0.0485	0.1040	0.0537	0.0817	0.0389	0.0079	0.0040	0.0210	0.0021	0.0041
7	0.1169	0.1317	0.1056	0.0491	0.0798	0.0325	0.0974	0.0302	0.0843	0.1430	0.1389	0.1054	0.1283	0.1196	0.1690	0.1211	0.0298	0.0234	0.0598	0.0111	0.0285
8	0.1504	0.1461	0.0745	0.1162	0.1438	0.1275	0.1211	0.0983	0.1401	0.1580	0.1715	0.2277	0.1722	0.1403	0.2271	0.1542	0.0633	0.0638	0.1007	0.0413	0.0829
9	0.1139	0.1249	0.0926	0.1331	0.1843	0.1725	0.1795	0.1443	0.1734	0.1307	0.1619	0.2163	0.2012	0.1759	0.1782	0.1804	0.1043	0.1167	0.1502	0.0982	0.1676
10	0.1222	0.0953	0.1337	0.1381	0.1296	0.1438	0.1640	0.1630	0.1338	0.1516	0.1337	0.1536	0.1639	0.1878	0.1525	0.1825	0.1573	0.1681	0.1435	0.1980	0.2462
11	0.0926	0.0932	0.1333	0.0918	0.1291	0.1424	0.1273	0.1624	0.1330	0.1156	0.0939	0.0979	0.0947	0.1345	0.1087	0.1435	0.1927	0.2179	0.1739	0.2704	0.2218
12	0.0936	0.0744	0.1420	0.1614	0.1054	0.1051	0.1045	0.1367	0.0901	0.0752	0.0805	0.0609	0.0596	0.0885	0.0458	0.1023	0.1699	0.2028	0.1600	0.1874	0.1407
13	0.0843	0.0752	0.0926	0.1042	0.0715	0.0708	0.0602	0.0866	0.0878	0.0576	0.0645	0.0344	0.0320	0.0452	0.0221	0.0450	0.1250	0.1099	0.0993	0.1062	0.0614
14	0.0700	0.0657	0.0641	0.0753	0.0538	0.0594	0.0431	0.0556	0.0497	0.0322	0.0451	0.0283	0.0209	0.0264	0.0080	0.0194	0.0808	0.0568	0.0533	0.0521	0.0255
15	0.0297	0.0474	0.0529	0.0376	0.0354	0.0542	0.0378	0.0322	0.0268	0.0170	0.0226	0.0168	0.0139	0.0176	0.0040	0.0082	0.0424	0.0255	0.0262	0.0225	0.0151
16	0.0345	0.0260	0.0366	0.0305	0.0190	0.0306	0.0227	0.0270	0.0314	0.0117	0.0123	0.0064	0.0049	0.0071	0.0020	0.0032	0.0161	0.0078	0.0079	0.0084	0.0044
17	0.0213	0.0166	0.0192	0.0181	0.0126	0.0174	0.0116	0.0185	0.0138	0.0037	0.0082	0.0028	0.0026	0.0023	0.0008	0.0010	0.0056	0.0022	0.0027	0.0019	0.0015
18	0.0093	0.0149	0.0162	0.0090	0.0073	0.0117	0.0058	0.0079	0.0157	0.0013	0.0039	0.0006	0.0015	0.0008	0.0002	0.0003	0.0034	0.0010	0.0010	0.0003	0.0001
19	0.0104	0.0062	0.0041	0.0048	0.0035	0.0044	0.0047	0.0043	0.0058	0.0004	0.0017	0.0003	0.0004	0.0003	0.0001	0.0000	0.0015	0.0001	0.0003	0.0000	0.0000

TABLE 9. AMERICAN PLAICE,DIV 3LN, WEIGHTS AT AGE (KG)

AGE	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
6	0.289	0.277	0.287	0.276	0.290	0.275	0.259	0.278	0.244	0.252	0.248	0.261	0.264	0.266	0.320	0.328	0.381	0.313	0.401	0.309	0.396
7	0.365	0.369	0.383	0.348	0.332	0.330	0.331	0.372	0.292	0.339	0.347	0.345	0.359	0.363	0.374	0.410	0.408	0.375	0.506	0.365	0.434
8	0.498	0.499	0.469	0.450	0.412	0.397	0.404	0.484	0.380	0.416	0.418	0.403	0.431	0.414	0.448	0.483	0.453	0.444	0.589	0.436	0.476
9	0.625	0.640	0.610	0.602	0.564	0.536	0.494	0.527	0.519	0.568	0.578	0.548	0.623	0.515	0.546	0.537	0.480	0.512	0.694	0.523	0.561
10	0.703	0.788	0.788	0.697	0.670	0.680	0.612	0.629	0.629	0.694	0.706	0.658	0.676	0.618	0.594	0.570	0.523	0.550	0.717	0.558	0.669
11	0.827	0.976	0.847	0.851	0.785	0.795	0.772	0.753	0.816	0.917	0.922	0.841	0.884	0.773	0.683	0.653	0.542	0.609	0.698	0.665	0.829
12	0.869	0.938	1.030	0.991	0.982	0.841	0.909	0.867	1.041	1.108	1.099	1.029	1.013	0.928	0.906	0.742	0.670	0.752	0.756	0.873	1.114
13	0.932	0.984	1.064	1.075	1.050	1.043	1.034	0.935	1.243	1.360	1.339	1.152	1.199	1.199	1.188	0.989	0.786	0.995	0.967	1.161	1.487
14	1.258	1.287	1.369	1.397	1.401	1.166	1.132	1.175	1.334	1.567	1.536	1.327	1.389	1.389	1.659	1.352	1.000	1.299	1.219	1.483	1.921
15	1.377	1.413	1.631	1.597	1.602	1.311	1.279	1.380	1.524	1.922	1.813	1.658	1.768	1.768	1.886	1.739	1.300	1.602	1.560	2.042	2.415
16	1.614	1.656	1.890	1.881	1.870	1.673	1.600	1.654	1.816	2.387	2.319	2.137	2.196	2.196	2.118	1.770	1.762	2.054	2.170	2.629	3.015
17	1.905	1.922	2.166	2.197	2.240	1.854	1.911	1.854	1.939	2.458	2.578	2.318	2.324	2.324	2.302	2.140	2.099	2.211	2.423	2.912	3.573
18	1.943	1.917	2.305	2.297	2.348	2.073	2.117	1.915	2.104	2.871	2.880	2.716	2.546	2.546	3.199	2.700	2.368	2.677	2.805	3.839	4.018
19	1.957	2.025	2.527	2.480	2.595	2.283	2.285	2.129	2.294	3.004	2.942	2.864	3.072	3.072	3.243	3.000	2.558	3.437	3.085	3.029	4.018

TABLE 10. AMERICAN PLAICE, DIV 3LN, CALCULATED CATCH BIOMASS(T) = NOS AT AGE x WTS AT AGE

AGE	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
6	879	1424	639	523	603	541	405	611	204	1316	730	887	1726	941	1942	959	205	85	376	31	101
7	2544	3035	2764	1165	2216	764	2490	753	1433	2476	2322	2549	2895	2858	4697	3735	832	591	1350	187	759
8	4464	4552	2389	3561	4953	3599	3779	3183	3100	3357	3455	6433	4666	3825	7559	5603	1961	1911	2646	831	2419
9	4243	4991	3861	5457	8691	6574	6851	5089	5240	3791	4510	8311	7883	5965	7230	7288	3424	4034	4648	2372	5761
10	5121	4692	7197	6555	7256	6953	7754	6861	4899	5372	4350	7088	6965	7645	6729	7829	5628	6240	4588	5101	10093
11	4566	5683	7713	5323	8473	8052	7591	8182	6317	5411	4171	5775	5243	6848	5515	7050	7142	8955	5414	8302	11266
12	4847	4588	9991	11092	8652	6285	7339	7930	5460	4254	4264	4397	3799	5404	3086	5710	7787	10293	5394	7551	9605
13	4681	4621	6729	7630	6277	5250	4805	5419	6353	3998	4164	2782	2415	3569	1948	3348	6723	7381	4287	5689	5590
14	5231	5283	5992	7161	6299	4924	3767	4371	3863	2573	3341	2633	1821	2414	985	1974	5527	4983	2900	3568	3004
15	2441	4181	5896	4085	4734	5049	3735	2968	2377	1664	1978	1950	1542	2053	554	1076	3774	2752	1825	2118	2241
16	3315	2693	4727	3903	2966	3640	2805	2987	3320	1420	1380	957	676	1030	313	432	1936	1076	768	1017	811
17	2419	1993	2846	2702	2354	2292	1716	2297	1555	460	1013	447	374	353	131	169	804	323	296	259	325
18	1080	1789	2559	1413	1430	1729	946	1009	1921	187	547	122	237	135	42	67	547	185	121	54	28
19	1209	790	715	821	768	719	823	609	773	60	235	57	77	55	16	6	258	27	40	3	4
6+	47062	50313	64017	61392	65672	56370	54807	52269	46816	36340	36662	44389	40339	43097	40750	45247	46549	48834	34648	37082	52006

Table 11. Comparison of various partial recruitment vectors for Divisions 3LN American plaice.

Age	PR84	PR85	PR86	PRPROJ
6	.014	.006	.021	.025
7	.068	.016	.067	.100
8	.130	.039	.122	.220
9	.240	.096	.200	.300
10	.391	.222	.344	.470
11	.625	.705	.580	.580[a]
12	.897	.790	.835	.730
13-19	1.000	1.000	1.000	1.000

PR84, 85, 86 - Partial recruitment vectors used in the 1984, 1985, and 1986 SPA runs respectively.

PRPROJ - PR used in the 1985 catch projections, and the SPA run in the appendix of this paper.

Table 12. 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 ($t \times 10^{-3}$), along with their approximate 95% confidence limits are given at the bottom of the table. Strata marked with an asterisk were used in the calculations of abundance and biomass in Tables 15-18.

		Year - Trip														
Depth (fm)	Stratum	1971 ATC 187	1972 ATC 199	1973 ATC 207, 208 209	1974 ATC 222	1975 ATC 233	1976 ATC 246	1977 ATC 262	1978 ATC 276	1979 ATC 289, 290, 291	1980 ATC 304, 305	1981 ATC 317 318, 319	1982 ATC 327 328, 329	1984 AN 28	1985 WT 28, 29, 30	1986[a] WT 47
51-100	328	-	-	-	-	-	-	26.9(3)	-	27.3(5)	-	52.5(2)	72.8(3)	12.5(2)	51.6(4)	51.2(9)
51-100	341	-	-	48.4(3)	-	-	-	94.2(4)	43.8(4)	88.8(6)	47.0(6)	136.5(2)	146.6(5)	69.6(4)	40.3(9)	43.7(9)
51-100	342	-	-	-	-	-	-	75.4(2)	72.6(2)	59.5(4)	77.0(4)	-	43.3(3)	60.1(4)	35.2(3)	53.5(3)
51-100	343	-	-	-	-	-	-	103.1(2)	112.6(3)	90.2(4)	107.1(4)	177.5(2)	115.8(4)	-	12.7(3)	48.0(4)
101-150	344	-	-	-	-	-	92.3(4)	100.5(4)	62.4(4)	28.6(2)	105.5(3)	105.8(5)	58.0(4)	-	41.6(5)	77.0(8)
151-200	345	-	-	-	-	-	22.8(4)	27.1(4)	56.3(2)	8.4(4)	10.1(5)	32.5(4)	7.6(4)	-	23.3(5)	16.3(7)
151-200	346	-	-	-	-	45.9(2)	22.3(2)	8.4(3)	-	4.8(4)	2.8(3)	29.8(3)	5.3(3)	-	26.3(2)	33.0(5)
101-150	347	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)	-	42.1(5)	50.4(5)
51-100	348*	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)	-	65.1(18)	104.0(12)
51-100	349*	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)	49.8(14)	58.5(13)
31-50	350*	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)	98.5(12)	94.0(12)
31-50	363*	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)	107.8(8)	136.9(10)
51-100	364*	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)	102.3(17)	87.9(17)
51-100	365	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)	-	54.1(7)	68.5(5)
101-150	366	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)	-	37.6(6)	21.4(8)
151-200	368	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)	-	30.5(2)	16.5(2)
101-150	369	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)	-	71.7(5)	16.1(6)
51-100	370*	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)	-	56.6(8)	96.6(8)
31-50	371	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)	-	107.5(7)	63.0(6)
31-50	372*	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)	109.9(12)	65.8(14)
31-50	384	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)	-	100.3(6)	114.0(6)
51-100	385*	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)	-	48.8(15)	62.8(13)
101-150	386	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)	-	26.0(5)	9.7(6)
151-200	387	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)	-	20.8(6)	3.0(4)
151-200	388	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)	-	25.5(2)	11.5(2)
101-150	389*	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)	-	27.2(5)	27.7(5)
51-100	390	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)	-	15.0(9)	14.5(8)
101-150	391	-	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)	-	9.5(2)	61.0(2)
151-200	392	-	-	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)	-	13.8(2)	9.5(2)
201-300	729	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5(2)	-
301-400	730	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3(2)	-
201-300	731	-	-	-	-	-	-	-	-	-	-	-	-	-	326.0(2)	-
301-400	732	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3(2)	-
201-300	733	-	-	-	-	-	-	-	-	-	-	-	-	-	21.4(3)	-
301-400	734	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5(3)	-
201-300	735	-	-	-	-	-	-	-	-	-	-	0.0(2)	-	-	57.0(2)	-
301-400	736	-	-	-	-	-	-	-	-	-	-	-	-	-	5.0(2)	-
Upper		154.2	112.8	64.4	60.5	91.3	87.9	111.3	101.6	95.5	125.1	94.9	97.5	108.0	67.9	-
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)	60.3(221)	-(211)
Lower		64.5	45.2	33.9	33.7	30.0	65.8	85.3	72.7	66.4	65.4	66.6	63.4	66.9	52.6	-
Upper		328.2	193.9	69.9	130.6	187.9	187.6	307.1	249.1	263.6	331.1	259.6	269.0	120.9	197.5	-
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	175.1	171.6
Lower		137.4	77.7	36.8	72.8	61.7	140.3	235.4	178.2	183.2	173.2	183.2	175.0	75.0	152.8	-

[a] Preliminary analysis.

Table 13. 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 ($tx10^{-3}$), along with their approximate 95% confidence limits are given at the bottom of the table. Strata marked with an asterisk were used in the calculations of abundance and biomass in Tables 15-18.

		Year - Trip														
		1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1984	1985	1986[a]
Depth (fm)	Stratum	ATC 187	ATC 199	208 ATC 209	ATC 222	ATC 233	ATC 245	ATC 263	276 ATC 277	ATC 289	ATC 304	318 ATC 319	327 ATC 328 329	AN 27	WT 29 AN 43	WT 47
151-200	357	-	-	0.0(2)	-	-	-	5.5(2)	-	2.4(3)	0.5(3)	0.0(2)	0.8(2)	0.0(2)	22.3(2)	0.0(2)
101-150	358	-	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)	2.8(2)
51-100	359	-	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)	27.0(2)
31-50	360	-	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)	32.5(13)
31-50	361*	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)	22.7(10)
31-50	362*	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)	82.6(14)
31-50	373*	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)	26.4(14)
31-50	374*	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)	15.0(6)
< 30	375*	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)	45.6(8)
< 30	376	-	16.3(2)	22.3(3)	-	23.6(2)	33.0(3)	59.0(3)	240.3(2)	25.4(4)	71.3(3)	22.0(4)	22.9(7)	10.6(4)	21.7(7)	22.4(9)
51-100	377	-	24.5(2)	52.2(2)	19.7(3)	165.3(2)	-	236.1(2)	28.6(2)	15.9(3)	36.1(4)	215.3(3)	62.0(2)	319.5(2)	37.3(2)	34.0(2)
101-150	378*	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)	68.1(2)
151-200	379	-	-	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)	1.0(2)
151-200	380	-	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)	3.6(3)
101-150	381*	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)	15.3(3)
51-100	382*	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)	6.5(4)
31-50	383*	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)	19.9(4)
201-300	723	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
301-400	724	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
201-300	725	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
301-400	726	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
201-300	727	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
301-400	728	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Upper		104.2	60.4	48.3	38.6	30.3	53.2	65.9	394.5	57.7	44.9	92.4	39.7	66.2	56.3	-
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)	-(100)
Lower		12.8	36.2	20.1	20.5	21.3	34.7	37.6	-243.7	23.1	30.8	42.9	25.7	43.2	39.3	-
Upper		86.5	74.4	49.6	32.9	26.5	52.2	82.1	467.3	72.2	56.2	102.8	49.4	82.9	70.5	-
Biomass		48.6	59.5	35.1	25.2	22.6	43.1	64.5	89.4	50.6	47.4	75.3	40.7	68.4	59.9	43.5
Lower		10.7	44.6	20.6	17.5	18.7	34.0	46.8	-288.3	28.9	38.5	47.7	31.9	54.0	49.3	-

[a]Preliminary analysis.

Table 14. 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 ($t \times 10^{-3}$), along with their approximate 95% confidence limits are given at the bottom of the table.

		Year - Trip											
		1973	1975	1976	1977	1978	1979	1980	1981	1982	1984	1985	1986[a]
		207					289			327			
Depth		ATC 208				276	ATC 290		318	ATC 328			
(fm)	Stratum	209	ATC 233	ATC 245	ATC 263	ATC 277	291	ATC 303	ATC 319	329	AN 27	AN 43	WT 47
51-100	329	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)
31-50	330	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)	44.6(9)
31-50	331	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)
51-100	332	-	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)
101-150	333	-	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)
151-200	334	-	-	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)
151-200	335	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)
101-150	336	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)	0.0(2)
51-100	337	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)
31-50	338	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)
51-100	339	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)
31-50	340	-	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)	35.2(8)
31-50	351	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)
31-50	352	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)
31-50	353	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)
51-100	354	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)
101-150	355	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)
151-200	356	0.9(2)	-	-	-	-	11.6(2)	4.8(2)	30.5(2)	-	4.3(2)	7.0(2)	0.0(2)
201-300	717	-	-	-	-	-	-	-	-	-	-	-	-
301-400	718	-	-	-	-	-	-	-	-	-	-	-	-
201-300	719	-	-	-	-	-	-	-	-	-	-	-	-
301-400	720	-	-	-	-	-	-	-	-	-	-	-	-
201-300	721	-	-	-	-	-	-	-	-	-	-	-	-
301-400	722	-	-	-	-	-	-	-	-	-	-	-	-
Upper		54.0	54.7	88.9	57.8	27.4	58.1	58.8	182.0	38.9	58.3	67.5	-
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)	-(103)
Lower		28.5	31.1	15.4	36.9	15.1	35.0	34.2	48.3	24.8	37.6	46.5	-
Upper		60.3	63.6	115.2	72.2	35.5	78.1	76.0	125.3	51.7	78.4	90.7	-
Biomass		46.1	49.1	67.6	59.2	27.5	62.5	60.1	79.2	42.4	64.5	76.6	48.1
Lower		31.9	36.2	20.0	46.1	19.6	47.0	44.2	33.2	33.0	50.6	62.5	-

[a] Preliminary analysis.

Table 15a. American plaice population numbers ($\times 10^{-3}$) estimated from research vessel surveys in NAFO Division 3L (selected strata).

	Year - Trip											
	1971	1972	1974	1975	1976	1977	1978	1979	1980	1981	1982	1985
									304	317	327	28
Age (years)	ATC 187	ATC 199	ATC 222	ATC 233	ATC 246	ATC 262	ATC 276	ATC 290	ATC 305	ATC 318 319	ATC 328 329	WT 29 30
1	0.0	57.8	0.0	0.0	0.0	0.0	0.0	240.3	188.7	239.6	0.0	0.0
2	0.0	72.3	0.0	546.8	486.0	355.1	574.3	531.0	1,782.9	428.2	134.0	0.0
3	1,957.9	351.1	197.3	2,151.0	8,245.1	3,042.8	13,375.9	1,247.6	5,421.4	4,580.4	3,570.1	321.9
4	12,128.6	13,168.8	4,375.9	3,376.6	15,644.5	13,392.9	19,820.8	17,009.6	9,791.4	4,900.5	12,946.5	1,053.2
5	49,026.1	27,599.0	6,777.0	8,997.8	16,611.4	43,428.3	75,997.6	55,552.4	53,295.4	17,719.3	13,206.7	5,816.0
6	65,897.8	51,732.1	23,736.9	24,837.0	18,176.5	85,776.6	80,647.6	87,857.4	92,502.0	48,158.8	36,035.6	18,697.9
7	84,752.0	54,566.8	30,945.7	39,750.3	54,403.9	143,571.4	103,411.2	89,021.1	95,635.7	56,019.0	58,229.7	52,741.1
8	34,224.0	41,036.3	32,361.9	51,781.1	99,786.9	137,116.0	101,981.5	104,585.9	118,313.5	91,522.1	89,308.9	61,648.2
9	59,060.1	23,830.3	28,902.3	39,241.6	76,831.2	83,797.7	69,455.3	75,187.1	91,217.1	77,025.8	108,946.1	42,174.2
10	26,039.5	25,690.5	28,951.7	32,455.5	64,863.3	78,632.1	50,693.8	63,745.4	58,101.7	46,524.6	80,780.0	26,633.3
11	23,624.6	15,466.2	15,205.8	16,076.2	39,214.0	32,917.7	17,449.8	32,670.3	25,795.3	24,897.3	47,137.3	14,496.5
12	22,088.2	16,332.2	13,421.7	11,556.3	23,009.0	22,177.5	12,127.5	13,675.7	16,480.7	9,987.6	20,727.2	7,368.5
13	16,605.4	7,643.9	7,944.9	5,580.2	10,934.7	9,176.3	5,387.2	5,015.1	8,528.1	4,547.6	11,194.1	4,219.8
14	11,554.3	6,127.8	4,285.0	3,133.8	3,119.4	3,474.2	3,464.9	2,674.6	3,225.8	1,592.8	5,388.8	2,079.7
15	5,776.0	5,045.9	2,521.6	1,412.1	2,399.7	2,593.3	1,436.2	1,682.8	1,881.7	1,262.6	1,710.8	1,123.9
16	4,002.2	3,454.5	895.9	1,180.8	1,117.2	1,476.0	728.2	792.5	1,483.0	851.0	1,295.2	805.4
17	2,260.8	1,153.6	142.7	316.3	817.3	690.7	393.4	338.0	423.6	469.8	655.3	187.9
18	1,291.1	318.7	0.0	104.4	258.3	440.1	85.2	90.3	220.9	67.6	55.5	15.4
19	223.6	119.0	38.9	-	92.4	74.8	-	17.3	48.2	25.3	-	15.4
20	177.3	100.4	-	-	-	-	-	-	-	-	-	-
21	111.8	-	-	-	-	-	-	-	-	-	-	-
22	88.6	-	-	-	-	-	-	-	-	-	-	-
Unknown	366.8	-	-	720.2	-	-	70.5	59.2	38.0	142.6	101.8	32.5
Total	421,256.7	293,867.2	200,705.2	243,218.0	436,010.8	662,133.5	557,100.9	551,993.6	584,375.1	390,962.5	491,423.6	239,430.8
2+	420,889.9	293,809.4	200,705.2	242,497.8	436,010.8	662,133.5	557,030.4	551,694.1	584,148.4	390,580.3	491,321.8	239,398.3
4+	418,932.0	293,386.0	200,507.9	239,800.0	427,279.7	658,735.6	543,080.2	549,915.5	576,944.1	385,571.7	487,617.7	239,076.4
6+	357,777.3	252,618.2	189,355.0	227,425.6	395,023.8	601,914.4	447,261.8	477,353.5	513,857.3	362,951.9	461,464.5	232,207.2
8+	207,127.5	146,319.3	134,672.4	162,838.3	322,443.4	372,566.4	263,203.0	300,475.0	325,719.6	258,774.1	367,199.2	160,768.2
12+	64,179.3	40,296.0	29,250.7	23,283.9	41,748.0	40,102.9	23,622.6	24,286.3	32,292.0	18,804.3	41,026.9	15,816.0

Table 15b. American plaice population numbers ($x10^{-3}$) estimated from research vessel surveys in Division 3L (selected strata). Values for the trips by the A. T. CAMERON were adjusted by the appropriate conversion factors to make these estimates comparable with those from the W. TEMPLEMAN and the A. NEEDLER surveys.

Age (years)	1971 ATC 187	1972 ATC 199	1974 ATC 222	1975 ATC 233	1976 ATC 246	1977 ATC 262	1978 ATC 276	1979 ATC 290	1980 304 ATC 305	1981 317 ATC 318 319	1982 327 ATC 328 329	1985 28 WT 29 30
1	0.0	28.9	0.0	0.0	0.0	0.0	0.0	120.5	94.4	119.8	0.0	0.0
2	0.0	36.1	0.0	273.4	243.0	177.7	282.2	269.2	891.4	214.1	67.0	0.0
3	978.9	175.6	98.6	1,075.6	4,122.5	1,532.2	6,669.2	619.4	2,710.6	2,290.2	1,785.0	321.9
4	6,064.3	6,584.5	2,190.6	1,688.3	7,822.2	6,710.1	9,896.0	8,515.0	4,895.7	2,450.2	6,473.1	1,053.2
5	24,901.2	13,799.5	3,394.7	4,498.9	8,305.7	21,758.5	37,990.9	27,779.6	26,647.7	8,859.6	7,196.7	5,816.0
6	37,562.4	31,252.0	12,843.3	12,418.4	9,088.3	44,584.0	44,155.2	47,015.9	51,690.9	25,555.5	20,362.2	18,697.9
7	75,394.5	46,174.5	21,174.2	22,881.5	28,866.0	82,778.4	69,573.7	69,693.6	67,331.5	37,153.4	38,260.8	52,741.1
8	40,057.4	48,148.5	30,218.1	42,217.9	64,397.0	130,367.3	106,241.8	111,200.9	133,955.9	100,240.2	81,576.0	61,648.2
9	74,642.7	30,979.4	33,593.2	45,709.4	75,925.8	95,242.1	85,721.8	92,502.0	115,494.3	97,163.3	126,390.0	42,174.2
10	33,851.3	33,397.6	35,230.2	40,065.0	79,930.3	98,128.5	65,847.8	81,838.0	75,532.3	59,910.6	103,503.1	26,633.3
11	30,712.0	20,106.1	19,827.0	20,490.7	50,978.1	42,849.3	22,636.1	41,442.9	33,534.4	32,366.5	61,278.2	14,496.5
12	28,714.7	21,231.9	17,509.3	15,023.2	29,911.8	28,873.5	15,744.8	17,834.3	21,425.5	12,983.9	26,945.2	7,368.5
13	21,587.1	9,937.1	10,371.2	7,254.3	14,215.0	11,969.1	6,995.6	6,539.5	11,087.1	5,911.9	14,552.3	4,219.8
14	15,020.5	7,966.1	5,609.8	4,073.9	4,055.2	4,530.9	4,498.5	3,483.6	4,193.5	2,070.7	7,005.4	2,079.7
15	7,508.8	6,559.7	3,309.2	1,835.7	3,119.6	3,389.3	1,878.1	2,189.3	2,446.1	1,641.4	2,224.1	1,123.9
16	5,202.9	4,490.9	1,179.6	1,535.0	1,452.4	1,947.0	950.5	1,030.4	1,927.8	1,106.3	1,683.7	805.4
17	2,938.9	1,499.7	185.6	411.2	1,062.5	913.6	514.9	437.2	550.6	610.7	851.9	187.9
18	1,678.4	414.3	0.0	135.7	335.8	586.8	109.4	116.7	287.1	87.9	72.1	15.4
19	290.7	154.7	50.6	-	120.2	102.3	-	22.5	62.6	32.9	-	15.4
20	230.5	130.5	-	-	-	-	-	-	-	-	-	-
21	145.3	-	-	-	-	-	-	-	-	-	-	-
22	115.2	-	-	-	-	-	-	-	-	-	-	-
Unknown	434.5	0.0	0.0	360.1	0.0	0.0	84.9	77.0	18.9	185.3	68.7	32.5
Total	408,032.2	283,067.6	196,785.2	221,948.2	383,951.4	576,440.6	479,791.4	512,727.5	554,778.3	390,954.4	500,295.5	239,430.8
2+	407,597.7	283,038.7	196,785.2	221,588.1	383,951.4	576,440.6	479,706.5	512,530.0	554,665.0	390,649.3	500,226.8	239,398.3
4+	406,618.8	282,827.0	196,686.6	220,239.1	379,585.9	574,730.7	472,755.1	511,641.4	551,063.0	388,145.0	498,374.8	239,076.4
6+	375,653.3	262,443.0	191,101.3	214,051.9	363,458.0	546,262.1	424,868.2	475,346.8	519,519.6	376,835.2	484,705.0	232,207.2
8+	262,696.4	185,016.5	157,083.8	178,752.0	325,503.7	418,899.7	311,139.3	358,637.3	400,497.2	314,126.3	426,082.0	160,768.2
12+	83,433.0	52,384.9	38,215.3	30,269.0	54,272.5	52,312.5	30,691.8	31,653.5	41,980.3	24,445.7	53,334.7	15,816.0

Table 16a. American plaice population numbers ($x10^{-3}$) estimated from research vessel surveys in NAFO Division 3N (selected strata).

	Year - Trip											
Age (years)	1971 ATC 187	1972 ATC 199	1973 208 ATC 209	1974 ATC 222	1977 ATC 263	1978 276 ATC 277	1979 ATC 289	1980 304 ATC 305	1981 318 ATC 319	1982 327 ATC 328 329	1984 AN 27	1985 AN 43 WT 29
1	0.0	50.6	0.0	0.0	0.0	18.0	39.9	0.0	232.9	35.3	0.0	0.0
2	0.0	327.7	12.1	0.0	50.2	174.5	145.7	62.5	531.0	403.6	27.4	3.5
3	3,539.4	542.9	202.1	1,033.3	811.9	5,937.9	564.4	509.1	3,610.2	1,062.2	147.8	139.0
4	3,720.4	2,731.7	976.4	3,157.9	7,137.5	11,253.3	2,642.3	1,931.4	6,106.9	3,613.0	556.7	1,655.9
5	3,697.7	3,696.8	4,730.9	4,683.5	11,644.7	19,522.8	9,616.8	4,780.2	4,346.1	3,084.7	1,593.2	3,436.0
6	2,068.4	5,053.4	5,394.1	7,419.1	15,312.3	14,878.0	13,418.5	8,473.6	11,509.8	2,746.9	3,691.3	5,480.1
7	5,789.1	2,517.4	5,320.6	5,910.5	11,773.4	14,957.1	14,399.9	11,370.4	29,428.5	2,954.6	6,034.1	5,885.8
8	3,928.9	4,561.2	3,960.8	5,241.5	10,207.5	9,090.6	14,249.9	9,180.3	24,581.4	6,060.4	8,701.5	7,294.1
9	6,749.9	6,255.4	2,692.4	3,302.1	8,947.8	5,796.8	8,622.6	7,744.9	17,807.8	6,882.1	11,209.2	7,565.3
10	6,745.2	8,703.7	4,076.0	3,426.6	5,787.6	6,104.5	7,318.5	4,764.2	12,241.9	5,267.5	13,792.8	8,534.0
11	6,140.3	5,801.8	4,893.9	2,409.6	4,513.2	3,734.0	3,262.6	2,620.3	5,624.9	3,405.5	6,362.8	6,493.2
12	4,576.3	4,334.6	3,385.1	1,536.7	2,811.0	2,506.4	1,731.9	1,970.0	3,438.9	2,163.1	4,010.9	3,904.6
13	2,180.0	2,788.8	2,421.7	1,517.8	1,640.2	1,511.6	681.8	910.9	1,907.3	611.1	2,634.1	2,126.1
14	1,468.2	2,212.5	720.4	577.8	1,126.0	917.5	586.0	663.7	598.4	851.7	1,506.6	1,385.6
15	972.3	767.4	601.2	604.6	565.6	785.2	558.1	443.7	1,224.3	491.5	1,256.4	1,136.7
16	982.4	566.7	445.3	206.5	364.5	217.0	275.6	389.5	599.5	523.7	1,199.9	354.7
17	380.1	122.2	518.1	88.1	112.2	175.9	61.4	452.6	309.3	484.1	609.1	94.5
18	786.4	131.1	138.0	43.2	-	30.9	-	93.6	249.6	317.2	303.9	-
19	337.3	122.2	117.4	36.3	-	0.0	-	31.7	-	23.7	96.2	-
20	141.9	173.8	82.4	-	-	69.6	-	15.8	-	-	23.9	-
21	0.0	-	-	-	-	-	-	-	-	-	-	-
22	72.0	-	-	-	-	-	-	-	-	-	-	-
Unknown	1,028.0	46.4	-	47.3	-	37.8	0.0	40.8	84.4	-	-	0.0
Total	55,304.2	51,508.3	40,688.9	41,242.4	82,805.6	97,719.4	78,175.9	56,449.2	124,433.1	40,981.9	63,757.8	55,489.1
2+	54,276.2	51,411.3	40,688.9	41,195.1	82,805.6	97,663.6	78,136.0	56,408.4	124,115.8	40,946.6	63,757.8	55,489.1
4+	50,736.8	50,540.7	40,474.7	40,161.8	81,943.5	91,551.2	77,425.9	55,836.8	119,974.6	39,480.8	63,582.6	55,346.6
6+	43,318.7	44,112.2	34,767.4	32,320.4	63,161.3	60,775.1	65,166.8	49,125.2	109,521.6	32,783.1	61,432.7	50,254.7
8+	35,461.2	36,541.4	24,052.7	18,990.8	36,075.6	30,940.0	37,348.4	29,281.2	68,583.3	27,081.6	51,707.3	38,888.8
12+	11,896.9	11,219.3	8,429.6	4,611.0	6,619.5	6,214.1	3,894.8	4,971.5	8,327.3	5,466.1	11,641.0	9,002.2

Table 16b. American plaice population numbers ($x10^{-3}$) estimated from research vessel surveys in Division 3N (selected strata). Values for the trips by the A. T. CAMERON were adjusted by the appropriate conversion factors to make these estimates comparable with those from the W. TEMPLEMAN and the A. NEEDLER surveys.

Age (years)	1971 ATC 187	1972 ATC 199	1973 208 ATC 209	1974 ATC 222	1977 ATC 263	1978 276 ATC 277	1979 ATC 289	1980 304 ATC 305	1981 318 ATC 319	1982 327 ATC 328 329	1984 AN 27	1985 AN 43 WT 29
1	0.0	25.2	0.0	0.0	0.0	9.0	20.0	0.0	116.4	17.7	0.0	0.0
2	0.0	163.9	6.1	0.0	31.2	87.2	71.1	31.2	265.5	203.0	27.4	3.5
3	1,769.7	271.5	101.1	516.6	427.6	2,969.0	283.8	254.6	1,805.0	551.8	147.8	139.0
4	1,860.2	1,481.2	488.2	1,631.1	3,703.7	5,804.7	1,321.6	1,058.4	3,053.3	1,967.5	556.7	1,655.9
5	3,104.0	3,041.7	3,078.5	3,250.0	6,285.4	11,899.5	5,424.2	3,386.6	3,001.6	2,573.5	1,593.2	3,436.0
6	2,006.5	5,305.9	5,395.9	6,235.1	14,577.3	14,015.9	9,433.1	7,284.5	8,439.7	3,265.4	3,691.3	5,480.1
7	7,464.0	3,215.2	6,566.9	6,951.7	13,429.7	17,675.4	14,588.2	13,968.9	31,082.7	3,793.3	6,034.1	5,885.8
8	5,107.6	5,865.2	5,148.9	6,588.2	12,719.2	11,817.7	17,878.0	11,934.4	31,254.7	8,319.5	8,701.5	7,294.1
9	8,774.9	8,132.0	3,500.2	4,292.7	11,292.5	7,535.9	11,214.3	10,068.4	23,058.8	9,540.0	11,209.2	7,565.3
10	8,768.7	11,314.8	5,298.8	4,454.5	7,512.6	7,935.8	9,516.7	6,193.5	15,914.3	7,301.3	13,792.8	8,534.0
11	7,982.4	7,542.3	6,362.1	3,132.4	5,860.0	4,854.1	4,240.1	3,406.4	7,312.2	4,715.0	6,362.8	6,493.2
12	5,949.1	5,635.0	4,400.6	1,997.7	3,647.0	3,258.3	2,247.6	2,561.0	4,470.6	3,000.5	4,010.9	3,904.6
13	2,834.0	3,625.5	3,148.2	1,973.2	2,137.6	1,965.0	880.6	1,184.2	2,479.5	912.5	2,634.1	2,126.1
14	1,908.6	2,876.3	936.5	751.1	1,469.7	1,192.7	749.8	862.8	778.0	1,233.1	1,506.6	1,385.6
15	1,264.1	997.6	781.6	786.0	739.3	1,020.8	711.6	576.9	1,591.6	695.3	1,256.4	1,136.7
16	1,277.2	736.7	578.9	268.4	477.0	282.1	350.9	506.3	779.3	714.5	1,199.9	354.7
17	494.2	158.9	673.6	114.6	145.4	228.6	79.9	588.3	402.1	671.9	609.1	94.5
18	1,022.3	170.4	179.4	56.1	-	40.1	-	121.7	324.5	416.0	303.9	-
19	438.5	158.9	152.6	47.2	-	0.0	-	41.2	-	36.8	96.2	-
20	184.4	226.0	107.1	-	-	90.5	-	20.5	-	-	23.9	-
21	0.0	-	-	-	-	-	-	-	-	-	-	-
22	93.6	-	-	-	-	-	-	-	-	-	-	-
Unknown	731.1	60.3	0.0	23.6	0.0	18.9	0.0	53.1	91.1	0.0	-	0.0
Total	63,035.1	61,004.5	46,905.2	43,070.2	84,455.2	92,701.2	79,011.5	64,102.9	136,220.9	49,928.6	63,757.8	55,489.1
2+	62,304.0	60,919.0	46,905.2	43,046.6	84,455.2	92,673.3	78,991.5	64,049.8	136,013.4	49,910.9	63,757.8	55,489.1
4+	60,534.3	60,483.6	46,798.0	42,530.0	83,996.4	89,617.1	78,636.6	63,764.0	133,942.9	49,156.1	63,582.6	55,346.6
6+	55,570.1	55,960.7	43,231.3	37,648.9	74,007.3	71,912.9	71,890.8	59,319.0	127,888.0	44,615.1	61,432.7	50,254.7
8+	46,099.6	47,439.6	31,268.5	24,462.1	46,000.3	40,221.6	47,869.5	38,065.6	88,365.6	37,556.4	51,707.3	38,888.8
12+	15,466.0	14,585.3	10,958.5	5,994.3	8,616.0	8,078.1	5,020.4	6,462.9	10,825.6	7,680.6	11,641.0	9,002.2

Table 17. Mean numbers per tow (with upper and lower 95% confidence limits) from research vessel surveys (spring) in NAFO Divisions 3L and 3N. Estimates are for the same strata each year.

Year	3L Upper	3L Mean	3L Lower	3N Upper	3N Mean	3N Lower
1971	(441.8)	297.6	(153.4)	(112.7)	67.8	(22.9)
1972	(418.1)	213.8	(9.6)	(72.4)	62.3	(52.2)
1973[a]	-	-	-	(68.4)	49.0	(29.7)
1974	(177.0)	136.3	(95.6)	(69.9)	49.5	(29.0)
1975[b]	(387.1)	228.1	(69.0)	-	-	-
1976[b]	(477.1)	325.3	(173.6)	-	-	-
1977	(609.2)	495.2	(381.1)	(176.1)	99.8	(23.5)
1978	(515.3)	397.2	(279.1)	(179.5)	117.7	(56.0)
1979	(494.4)	393.8	(293.1)	(164.2)	94.0	(23.7)
1980	(582.9)	411.4	(239.8)	(88.6)	68.0	(47.4)
1981[c]	(384.2)	291.7	(199.2)	(257.5)	180.1	(102.8)
1982	(529.1)	365.7	(202.4)	(68.8)	52.3	(35.8)
1984[a,d]	-	-	-	(98.7)	77.2	(55.7)
1985	(206.3)	178.5	(150.7)	(86.4)	66.8	(47.3)

Table 18. Mean weight caught (kg) per tow (with upper and lower 95% confidence limits) for research vessel surveys (spring) in NAFO Divisions 3L and 3N. Estimates are for the same strata each year.

Year	3L Upper	3L Mean	3L Lower	3N Upper	3N Mean	3N Lower
1971	(196.0)	130.2	(64.4)	(104.2)	58.5	(12.8)
1972	(127.9)	75.3	(22.6)	(76.1)	58.2	(40.2)
1973[a]	-	-	-	(54.9)	37.3	(19.6)
1974	(73.9)	53.1	(32.2)	(39.7)	30.0	(20.4)
1975[b]	(117.1)	69.8	(22.6)	-	-	-
1976[b]	(105.6)	89.9	(74.2)	-	-	-
1977	(145.8)	124.1	(102.3)	(64.3)	47.0	(29.7)
1978	(120.1)	99.5	(78.9)	(62.9)	45.9	(28.9)
1979	(130.7)	106.5	(82.4)	(73.3)	38.6	(3.9)
1980	(173.8)	122.0	(70.3)	(44.7)	34.7	(24.8)
1981[c]	(123.1)	95.7	(68.3)	(127.3)	87.7	(48.2)
1982	(145.9)	111.7	(77.6)	(43.2)	33.9	(24.7)
1984[a,d]	-	-	-	(80.0)	63.2	(46.4)
1985	(89.7)	78.9	(68.2)	(62.7)	53.3	(43.8)

[a]Coverage for 3L very poor. [b]Coverage for 3N very poor. [c]Stratum 361 (Div. 3N) omitted.

[d]No 1983 survey. Different vessel - gear combination used in surveys from 1984 onward.

Table 19. 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.), the biomass estimates ($tx10^{-3}$), along with their approximate 95% confidence limits, are given at the bottom of the table. Strata marked with a plus sign were omitted from the calculations in Tables 20-21.

Stratum	1981	1982	1983	1984	1985
	323		7	16	37
	ATC 324	333	WT 8	WT 17	WT 38
	325	ATC 334	9	18	39
328+	-	-	-	50.1(4)	99.5(8)
341	8.2(3)	18.2(4)	121.3(4)	110.8(5)	21.6(7)
342	109.7(3)	44.8(3)	19.5(4)	162.5(2)	84.7(3)
343+	50.9(4)	-	483.2(3)	53.3(4)	932.5(3)
344	227.3(4)	106.2(3)	70.7(6)	193.0(6)	93.8(9)
345	10.5(4)	17.4(6)	13.6(8)	48.4(7)	24.4(9)
346	13.0(3)	4.3(4)	10.8(5)	11.5(6)	6.5(5)
347	324.3(3)	235.9(4)	134.7(6)	216.5(6)	52.1(4)
348	114.1(6)	126.8(5)	112.3(11)	201.4(11)	43.4(14)
349	20.1(7)	27.5(5)	113.1(9)	81.7(14)	21.3(10)
350	8.3(6)	4.3(2)	72.1(8)	128.9(12)	57.7(9)
363	65.5(4)	34.3(3)	253.7(3)	54.9(8)	48.0(10)
364	254.2(9)	114.7(11)	95.2(11)	254.6(10)	114.4(18)
365	242.8(4)	284.0(4)	198.7(5)	67.9(4)	136.6(8)
366	318.3(3)	19.3(6)	50.8(4)	39.7(11)	62.4(9)
368	0.0(2)	1.5(2)	-	0.0(2)	1.4(2)
369	218.5(2)	27.9(4)	129.4(6)	76.4(7)	67.3(6)
370	121.0(4)	88.2(6)	121.0(6)	145.8(7)	34.3(9)
371	149.9(4)	97.3(5)	180.4(5)	110.7(7)	156.9(7)
372	20.3(5)	79.9(7)	102.5(4)	74.0(13)	68.3(17)
384	63.2(3)	176.9(4)	105.0(3)	210.8(6)	92.6(8)
385	78.5(8)	128.4(8)	107.1(5)	96.5(12)	30.0(12)
386	121.8(3)	123.0(4)	-	99.0(8)	123.6(5)
387	2.3(2)	0.3(3)	-	0.7(3)	0.7(4)
388+	-	0.0(3)	-	0.0(2)	14.0(2)
389+	-	25.1(4)	-	103.1(6)	183.0(5)
390	38.5(3)	87.8(4)	72.7(3)	89.5(3)	97.2(7)
391+	-	37.0(2)	25.0(2)	233.8(2)	105.8(2)
392+	-	5.1(2)	4.7(2)	10.5(2)	6.8(2)
729+	-	-	-	3.3(2)	4.5(2)
730+	-	-	-	0.0(2)	0.0(2)
731+	-	-	-	0.0(2)	1.0(2)
732+	-	-	-	0.0(2)	0.0(2)
733+	-	-	-	0.0(4)	0.7(3)
734+	-	-	-	0.0(3)	0.0(2)
735+	-	2.3(2)	-	0.0(3)	0.2(2)
736+	-	-	0.0(2)	-	6.8(2)
Upper	150.3	94.9	140.4	122.2	135.1
Mean (#sets)	108.2(99)	78.6(120)	110.8(125)	108.4(208)	75.7(231)
Lower	66.1	62.2	81.2	94.7	16.3
Upper	379.7	249.4	339.6	353.6	392.8
Biomass	273.3	206.4	268.0	313.8	220.2
Lower	166.9	163.4	196.4	273.9	47.5

Table 20a. American plaice population numbers (x 10^{-5}) estimated from research vessel surveys (fall) in NAFO Division 3L. Estimates in each year are for the same strata.[a] Biomass (t x 10^{-3}) estimates and their 95% confidence intervals are included at the bottom of the table.

	Survey-Year				
Age	ATC 323, 324, 325 Sept.-Nov. 1981	ATC 333, 334 Oct.-Dec. 1982	WT 7, 8, 9 Oct.-Nov. 1983	WT 16, 17, 18 July-Sept. 1984	WT 37, 38, 39 Oct. Nov. 1985
1	16.6	2.6	0.0	0.0	0.0
2	22.1	33.6	2.0	0.0	1.3
3	160.0	106.3	22.8	2.4	1.9
4	239.8	374.3	89.2	27.7	13.8
5	428.4	686.2	474.7	175.7	108.4
6	598.8	1235.2	1024.5	617.6	480.2
7	1621.7	1550.2	1732.6	1683.8	921.9
8	1400.5	1526.3	1535.7	1943.7	807.0
9	1176.0	829.3	784.2	1155.5	683.8
10	1059.9	452.6	436.2	772.3	305.3
11	429.1	228.6	187.2	306.6	139.1
12	311.2	100.5	140.2	178.0	99.0
13	119.4	36.3	83.2	84.6	51.3
14	32.9	13.4	12.8	40.4	15.3
15	9.2	14.7	14.9	26.4	9.2
16	2.2	5.8	6.9	10.6	4.5
17	-	2.4	2.0	2.9	0.8
18	-	0.3	-	-	0.3
UNK	-	-	-	-	0.2
Totals:					
2+	7611.1	7196.1	6549.1	7028.2	3,643.1
4+	7429.0	7056.2	6524.3	7025.8	3,639.9
6+	6760.8	5995.7	5960.4	6822.4	3,517.7
8+	4540.3	3210.3	3203.3	4521.0	2,115.6
12+	474.8	173.5	260.0	342.9	180.4
Upper	377.7	246.9	311.8	333.1	188.5
Biomass	271.3	204.0	248.4	294.5	157.9
Lower	164.9	161.1	184.9	255.9	127.3
No. sets	95	107	116	170	192

[a] 3 out of 23 strata not surveyed in 1983.

Table 20b. American plaice population numbers (x10^{-5}) estimated from research vessel surveys (fall) in NAFO Division 3L. Estimates in each year are for the same strata[a]. Values for the trips by the A. T. Cameron were adjusted by the appropriate conversion factors to make these estimates comparable with those from the W. Templeman surveys.

	Survey-Year				
Age	ATC 323, 324, 325 Sept.-Nov. 1981	ATC 333, 334 Oct.-Dec. 1982	WT 7, 8, 9 Oct.-Nov. 1983	WT 16, 17, 18 July-Sept. 1984	WT 37, 38, 39 Oct. Nov. 1985
1	8.3	1.3	0.0	0.0	0.0
2	11.0	16.8	2.0	0.0	1.3
3	80.0	53.1	22.8	2.4	1.9
4	119.9	187.1	89.2	27.7	13.8
5	214.2	343.0	474.7	175.7	108.4
6	431.1	771.0	1,024.5	617.6	480.2
7	1,682.7	1,370.6	1,732.6	1,683.8	921.9
8	1,567.7	1,826.6	1,535.7	1,943.7	807.0
9	1,333.3	1,067.9	784.2	1,155.5	683.8
10	1,303.1	588.5	436.2	772.3	305.3
11	557.8	297.2	187.2	306.6	139.1
12	404.5	130.6	140.2	178.0	99.0
13	155.1	47.3	83.2	84.6	51.3
14	42.7	17.5	12.8	40.4	9.2
15	11.9	19.1	14.9	26.4	4.5
16	2.8	7.6	6.9	10.6	0.8
17	-	3.2	2.0	2.9	0.3
18	-	0.4	-	-	0.3
UNK	-	-	-	-	0.2
Totals					
2+	7,917.8	6,747.5	6,549.1	7,028.2	3,643.1
4+	7,826.8	6,677.6	6,524.3	7,025.8	3,639.9
6+	7,492.7	6,147.5	5,960.4	6,822.4	3,517.7
8+	5,378.9	4,005.9	3,203.3	4,521.0	2,115.6
12+	617.0	225.7	260.0	342.9	180.4

[a] 3 out of 23 strata not surveyed in 1983.

Table 21. Mean numbers and weights (kg) caught per tow (with upper and lower 95% confidence limits) from research vessel surveys (fall) in NAFO Division 3L. Estimates in each year are for the same strata.[a]

Year	Numbers			Weights		
	Upper	Mean	Lower	Upper	Mean	Lower
1981	(395.5)	306.2	(216.9)	(151.9)	109.1	(66.3)
1982	(355.7)	289.2	(222.6)	(99.3)	82.0	(64.8)
1983	(349.6)	280.4	(211.2)	(133.6)	106.4	(79.2)
1984	(321.8)	282.5	(243.2)	(134.0)	118.4	(102.9)
1985	(172.1)	146.7	(121.4)	(75.8)	63.5	(51.2)

[a]3 out of 23 strata not surveyed in 1983.

Table 22. Mean weight (kg) of American plaice per tow, by stratum, from R.V. surveys in Division 3L in 1985-86. Numbers in parentheses are the number of successful 30 minute tows in each stratum. The stratified mean weight per tow (kg/30 min.), the biomass estimates ($tx10^{-3}$), along with their approximate 95% confidence limits, are given at the bottom of the table.

Stratum	1985 (Winter) WT 22, 23, 24	1985 (Spring) WT 28, 29, 30	1985 (Summer) WT 32, 33, 34	1985 (Fall) WT 37, 38, 39	1986 (Winter) WT 42, 43 44	1986[a] (Spring) WT 47
328	14.33(6)	51.63(4)	47.88(4)	99.50(8)	21.98(12)	51.2(9)
341	3.59(8)	40.33(9)	48.00(4)	21.64(7)	13.40(9)	43.7(9)
342	1.57(3)	35.17(3)	90.25(2)	84.67(3)	0.00(2)	53.5(3)
343	4.83(3)	12.67(3)	60.25(2)	932.50(3)	0.15(2)	48.0(4)
344	75.64(7)	41.60(5)	116.87(4)	93.78(9)	0.68(5)	77.0(8)
345	19.50(3)	23.30(5)	28.07(7)	24.44(9)	1.13(3)	16.3(7)
346	24.63(4)	26.25(2)	1.00(3)	6.50(5)	0.75(4)	33.0(5)
347	13.26(5)	42.10(5)	197.50(3)	52.13(4)	0.62(4)	50.4(5)
348	118.31(8)	65.14(18)	99.18(13)	43.39(14)	1.32(12)	104.0(12)
349	6.60(10)	49.80(14)	64.19(7)	21.30(10)	16.41(9)	58.5(13)
350	11.58(9)	98.46(12)	87.75(11)	57.67(9)	4.67(9)	94.0(12)
363	83.81(8)	107.81(8)	84.20(10)	48.00(10)	30.61(14)	136.9(10)
364	419.03(12)	102.29(17)	188.65(12)	114.43(18)	35.44(8)	87.9(17)
365	247.11(4)	54.07(7)	115.14(7)	136.56(8)	0.55(2)	68.5(5)
366	21.50(5)	37.58(6)	91.00(5)	62.39(9)	4.00(2)	21.4(8)
368	5.25(2)	30.50(2)	5.50(2)	1.38(2)	-	16.5(2)
369	11.86(5)	71.70(5)	59.67(6)	67.25(6)	2.43(3)	16.1(6)
370	33.57(7)	56.56(8)	56.00(6)	34.28(9)	23.50(4)	96.6(8)
371	98.83(6)	107.49(7)	73.33(6)	156.93(7)	39.50(8)	63.0(6)
372	60.45(11)	109.92(12)	39.96(10)	68.26(17)	36.29(19)	65.8(14)
384	53.63(4)	100.33(6)	69.00(2)	92.63(8)	47.50(9)	114.0(6)
385	23.45(11)	48.83(15)	97.06(8)	30.04(12)	18.77(16)	62.8(13)
386	44.90(5)	26.00(5)	34.80(5)	123.60(5)	8.11(7)	9.7(6)
387	3.88(4)	20.75(6)	2.57(3)	0.69(4)	22.63(4)	3.0(4)
388	19.83(3)	25.50(2)	0.00(2)	14.00(2)	40.17(3)	11.5(2)
389	194.25(4)	27.20(5)	60.63(4)	183.00(5)	21.00(4)	27.7(5)
390	27.12(5)	15.03(9)	67.50(7)	97.21(7)	4.57(11	14.5(8)
391	141.00(2)	9.50(2)	18.00(2)	105.75(2)	7.10(3)	61.0(2)
392	153.75(2)	13.75(2)	6.00(2)	6.75(2)	44.73(3)	9.5(2)
729	13.00(2)	0.50(2)	0.00(2)	4.50(2)	35.50(2)	-
730	15.15(2)	0.25(2)	4.00(2)	0.00(2)	-	-
731	2.92(3)	326.00(2)	0.00(2)	1.00(2)	-	-
732	0.65(2)	0.30(2)	0.00(2)	0.00(2)	-	-
733	0.30(3)	21.37(3)	1.50(2)	0.67(3)	5.07(2)	-
734	1.27(2)	1.50(2)	0.00(2)	0.00(2)	3.00(2)	-
735	1.50(2)	57.00(2)	7.50(2)	0.20(2)	-	-
736	-	5.00(2)	0.00(2)	6.75(2)	-	-
Upper	114.20	67.94	87.85	135.14	20.43	-
Mean (# sets))	74.36(182)	60.25(221)	75.22(175)	75.74(231)	16.38(202)	-(211)
Lower	34.52	52.56	62.60	16.34	12.33	-
Upper	330.5	197.5	255.4	392.8	57.2	-
Biomass (000 t)	215.2	175.1	218.7	220.2	45.9	171.6
Lower	99.9	152.8	182.0	47.5	34.5	-

[a]Preliminary analysis.

Table 23. American plaice population numbers ($x10^{-3}$) from research vessel surveys in 1985 in Division 3L.

Age (years)	1985 (Winter) WT 22, 23, 24	1985 (Sring) WT 28, 29, 30	1985 (Summer) WT 32, 33, 34	1985 (Fall) WT 37, 38, 39
1	0.0	0.0	0.0	0.0
2	0.0	0.0	31.2	148.7
3	133.8	433.5	506.0	257.0
4	808.0	1,405.7	3,573.5	1,672.1
5	5,470.7	8,570.0	14,768.6	14,268.3
6	16,637.5	28,497.3	62,699.4	69,233.4
7	68,038.1	84,508.3	159,409.8	170,545.4
8	99,895.8	102,402.7	147,995.8	134,131.3
9	97,996.9	71,465.8	87,625.5	93,886.1
10	100,671.0	45,078.4	33,890.6	37,312.8
11	40,345.2	24,369.1	13,758.4	16,226.3
12	17,711.3	12,066.6	10,344.3	11,257.8
13	10,008.7	6,716.9	5,654.5	5,931.1
14	2,785.0	3,250.2	1,955.2	1,889.6
15	1,549.2	1,632.7	925.0	1,180.6
16	741.5	1,040.0	446.5	537.1
17	292.1	213.4	269.8	104.5
18	73.1	15.4	39.6	37.6
19	16.8	15.4	-	-
20	-	-	-	-
21	-	-	-	-
22	-	-	-	-
Unknown	0.0	44.5	0.0	16.9
Total	463,174.7	391,725.9	543,893.7	558,636.6
2+	463,174.7	391,681.4	543,893.7	558,619.7
4+	463,040.9	391,247.9	543,356.5	558,214.0
6+	456,762.2	381,272.2	525,014.4	542,273.6
8+	372,086.6	268,266.6	302,905.2	302,494.8
12+	33,177.7	24,950.6	19,634.9	20,938.3

Table 24. Results of cohort analysis calibration for Divisions 3LN American plaice.

Regression	Parameter	F_T .30	.40	.50	.90
Exploitable biomass vs CPUE, 1965-85	r	0.559	0.534	.510	
	intercept	-5836	-2202	-18	
	slope	208017	196295	189257	
	'85 residual	+41691	+2466	-21068	
	'84 residual	-55593	-63959	-69005	
Avg. exploitable biomass vs CPUE, 1965-85	r	0.863	0.884	0.854	
	intercept	-29289	-25321	-22876	
	slope	258076	241593	231642	
	'85 residual	+56778	+15323	-9836	
	'84 residual	+7882	-14988	-28952	
9+ pop. nos. from SPA vs 9+ pop. nos. from spring r.v. surveys, 1971-72, 1974, 1977-82, 1985	r			0.255	.701
	intercept				141754
	slope				181
	'85 residual				+10430

Table 25. Results of cohort analysis at FT=0.4 for American plaice in Div. 3LN.

POPULATION NUMBERS ($\times 10^{-3}$)

AGE	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
6	183764	193171	171798	155330	122140	119280	113308	144291	180354	222570	217155	231814	217535	187982	205868	245141	306762	275234	177176	89149	33498
7	148866	147702	153505	138640	125460	98119	95878	91353	116146	146904	177500	175127	186717	172187	150705	163059	198059	250668	225097	144211	72900
8	119861	115575	113486	119150	110480	96679	78239	71690	72963	90650	113665	139269	136697	145573	133850	112022	125259	160313	203804	181880	117608
9	105190	90023	86371	88306	90392	79575	70951	55593	52745	52355	66916	85582	99580	102121	110826	94321	81219	98635	127360	162796	147185
10	66119	79980	66648	64957	64097	60064	54053	45541	36778	34048	36825	47727	56346	70080	73129	78755	64944	60041	73627	98213	129183
11	55241	63917	60054	46303	44697	42679	39924	32791	27417	23064	20872	24318	29328	36809	46184	49622	52051	43435	38892	54491	72139
12	36723	40232	47062	40962	32250	26829	25778	23790	17015	15443	13544	12995	13697	18625	22121	30506	30858	30692	22257	24824	33317
13	29552	25019	26737	29754	23409	18432	15204	13800	11201	9185	9170	7578	6773	7821	9978	15029	18012	14749	12744	11766	12497
14	18915	19650	16235	17306	17936	13756	10536	8243	6054	4546	4860	4693	4019	3723	3709	6685	9242	7008	5363	6427	5200
15	9737	11709	12374	9339	9940	10618	7442	5615	3383	2336	2236	2011	2048	2104	1476	2499	4152	2566	2267	2238	3085
16	7475	6368	6909	6860	5325	5464	5209	3451	2650	1358	1129	844	582	887	672	942	1486	773	546	797	894
17	3916	4262	3742	3394	3739	2925	2505	2679	1191	516	573	386	285	198	302	417	551	222	159	127	303
18	2374	2057	2551	1875	1666	2110	1276	1238	1072	249	253	114	141	88	25	176	270	104	50	20	23
19	2552	1441	840	1084	978	813	973	641	537	52	145	35	53	32	24	8	138	12	23	2	3
6+	810285	801104	770352	723782	652511	577342	521276	500714	529505	603277	664844	732492	753799	748231	758870	799203	893002	944452	889364	776941	627834
7+	626521	607933	598554	568452	530371	458062	407967	356423	349151	380706	447689	500678	536265	560249	553002	554062	586241	669218	712188	687791	594336
8+	477655	460231	445050	429812	404911	359943	312089	265070	233006	233802	270189	325551	349548	388061	402296	391003	388182	418550	487091	543580	521437
9+	357794	344656	331563	310662	294431	263265	233850	193380	160043	143152	156524	186283	212851	242488	268446	279980	262923	258237	283287	361700	403829
10+	252604	254634	245192	222356	204039	183690	162900	137787	107298	90797	89608	100701	113272	140367	157619	184659	181704	159602	155928	198904	256644
11+	186484	174654	178544	157369	139942	123626	108846	92246	70520	56748	52782	52974	56926	70287	84491	105904	116760	99560	82301	100692	127461
12+	111243	110737	118449	111066	95245	80947	68922	59455	43103	33684	31910	28656	27598	33477	38307	56282	64709	56126	43408	46201	55323
13+	74520	70505	71388	70104	62995	54118	43144	35665	26088	18242	18367	15661	13901	14853	16186	25777	33851	25434	21152	21377	22005

POPULATION BIOMASS (TONS)

AGE	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
6	47707	47804	44378	38602	31811	29467	26402	36059	39786	50195	48456	54406	51210	44863	58763	72411	105831	78039	64211	24952	11974
7	48004	47912	51936	45162	36668	28975	27539	30435	30039	43926	54691	53516	59340	55254	48773	58765	72837	84911	102577	47617	28307
8	51707	50032	47074	46849	38804	33011	26774	29879	33594	32524	41365	47682	51164	52748	50595	46270	50472	63583	107512	71470	49561
9	57506	49761	45855	45485	41647	35573	28311	23999	22170	25069	32820	38332	52312	44712	51258	42273	37647	43788	77336	76014	72016
10	52351	54816	44017	37785	35225	32531	26035	22465	18486	18686	21279	24862	31019	35414	36067	38756	27965	25787	45587	47154	73347
11	37151	53739	42281	33065	27480	26649	24059	18107	17022	16379	16327	15560	20636	22297	25820	25794	21916	19290	21371	28621	48561
12	26503	33753	38881	31089	24255	17214	17425	14490	13221	13335	11291	9826	10422	12857	16623	17595	14620	15356	12442	15680	26757
13	22615	19986	24299	25101	19065	14725	11757	8790	9173	9240	8949	6465	6111	6609	9768	11771	9162	9232	8924	9335	13974
14	18902	20248	17066	18849	19558	11784	8851	6412	5208	5101	4959	4233	4110	3373	5084	7191	9210	5457	4359	6753	7511
15	10924	12857	15245	11406	11983	9957	6642	5449	3351	3191	2590	1911	2453	2219	2242	3390	2613	2091	2194	2992	5603
16	9230	8179	9346	9673	7491	6348	6087	3513	2369	2172	1605	1101	782	1193	1132	1290	1172	797	623	1342	2026
17	5530	6407	5853	5335	6578	3686	3436	3252	1168	707	733	565	390	193	564	723	563	256	161	178	813
18	3631	3604	3951	3156	2791	3045	1952	1607	707	553	319	215	187	125	48	446	194	144	42	35	70
19	3914	2241	1553	2023	1907	1305	1586	912	679	109	258	60	105	57	62	20	166	20	42	4	10
6+	397844	410340	391735	351590	305322	255270	216854	205370	187003	221408	244644	258732	290584	281914	306739	324693	346369	349749	448380	332148	342534
7+	350137	362536	347357	312987	273512	225803	190452	169311	147217	171213	196187	204326	239373	237051	247977	252282	240538	271710	384169	307195	330560
8+	302132	314624	295421	267826	236844	196828	162914	138876	117178	127288	141496	150810	180033	181797	199204	193517	167701	186799	281592	259578	302253
9+	250226	264591	248348	222976	198040	163816	136140	108997	93584	94763	100131	103128	128930	129049	148609	147247	117229	123216	174080	188169	252692
10+	192719	214831	202492	177491	156193	128444	107688	84798	71414	69694	67311	64797	76618	84337	97351	104974	83562	89428	96244	112095	180674
11+	140367	160014	158475	139707	120908	94913	81794	66533	52928	51008	46631	39935	45598	48923	61344	68218	55617	52641	50657	64940	107327
12+	101218	106276	116194	106642	93423	66263	57735	44425	35906	34609	30704	24375	24760	26626	35523	42425	33701	33351	28787	36319	58766
13+	74715	72523	77312	75553	69173	51049	40310	29936	22685	21274	19413	14549	14138	13769	18901	24830	19081	17996	16345	20639	30009

Table 25.....continued.

EXPLOITABLE BIOMASS

AGE	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
6	3402	5059	1786	1472	1713	1216	889	934	244	2736	1194	1520	3621	1407	9359	3351	216	94	640	50	251
7	9853	10791	7724	3280	6301	1716	5469	1150	1716	5151	3799	4369	6076	4275	22660	13063	878	653	2301	306	1897
8	17301	16193	6676	10034	14101	8099	8306	4872	3717	6988	5656	11042	9800	5723	36495	19616	2072	2112	4511	1365	6046
9	16441	17757	10798	15389	24773	14810	15082	7803	6294	7899	7388	14285	16571	8935	34904	25534	3620	4464	7931	3896	14404
10	19852	16689	20152	18503	20683	15671	17087	10536	5888	11218	7464	12197	14659	11466	32512	27449	5960	6922	7633	8390	25231
11	17705	20223	21603	15021	24192	18176	16733	12596	7605	11307	6849	9952	11083	10287	25820	24743	7580	9972	9266	13697	28165
12	18317	16335	23019	31089	24255	14202	16206	12229	6578	8887	7014	7587	8013	8136	14908	17595	8292	11501	9260	12499	24012
13	22615	19986	24299	25101	19065	14725	11757	8790	9173	9240	8949	6465	6111	6609	9768	11771	9162	9232	8924	9335	13974
14	18902	20248	17066	18849	19558	11984	8851	6412	5208	5101	4959	4233	4110	3373	5084	7191	5210	5457	4359	6753	7511
15	10924	12857	15245	11406	11983	9957	6642	5449	3381	3191	2590	1911	2453	2219	2242	3390	2613	2091	2194	2992	5603
16	9230	8179	9346	9673	7491	6348	6087	3513	2369	2172	1605	1101	782	1193	1132	1290	1172	797	623	1342	2028
17	5500	6407	5852	5335	6378	3686	3436	3252	1168	907	733	565	390	193	564	723	563	256	161	178	813
18	3631	2604	3951	3166	2791	3045	1952	1607	707	553	319	215	187	125	48	446	194	144	42	35	70
19	3914	2241	1553	2023	1907	1305	1586	912	679	109	258	60	105	57	62	20	166	20	42	4	10
6+	178087	175568	174070	170341	185190	124939	120082	80056	54729	75460	58777	75500	83962	63998	195558	156181	47699	53714	58088	60842	130016

AVERAGE EXPLOITABLE BIOMASS

AGE	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
6	1970	1974	1833	1594	1314	1217	1090	1489	1643	2073	2001	2247	2115	1853	2427	2990	4371	3223	2652	1031	495
7	5556	5545	6011	4995	4244	3353	3187	3522	3476	5084	6330	6194	5868	6395	5645	6801	8430	9827	11872	5511	3276
8	11218	10813	10174	10125	8386	7134	5798	6457	5099	7029	8740	10305	11044	11400	10935	10000	10908	13742	23235	15446	10711
9	18200	15748	14512	14395	13244	11195	8960	7595	7016	7934	10387	12131	16556	14151	16222	13379	10649	13858	24634	24057	22793
10	22889	23967	19245	16520	15427	14660	11383	9822	8082	8170	9304	10870	13562	15484	15743	16070	12227	11712	19931	20617	32069
11	22871	21393	24699	19315	16053	15568	14054	10578	9944	9560	6954	9090	12173	13025	15084	15068	12903	11268	12776	16720	28368
12	20252	25793	29712	23757	18535	13155	13316	11073	10103	10190	8628	7508	8117	9825	12702	13446	11172	11734	9508	11982	21975
13	22615	19986	24299	25101	19065	14725	11757	8790	9173	9240	8949	6465	6111	6609	9768	11771	9162	9232	8924	9335	13974
14	18902	20249	17066	18849	19558	11984	8851	6412	5208	5101	4959	4233	4110	3373	5084	7191	5210	5457	4359	6753	7511
15	10924	12857	15245	11406	11983	9957	6642	5449	3381	3191	2590	1911	2453	2219	2242	3390	2613	2091	2194	2992	5603
16	9230	8179	9346	9673	7491	6348	6087	3513	2369	2172	1605	1101	782	1193	1132	1290	1172	797	623	1342	2028
17	5500	6407	5852	5335	6378	3686	3436	3252	1168	907	733	565	390	193	564	723	563	256	161	178	813
18	3631	2604	3951	3166	2791	3045	1952	1607	707	553	319	215	187	125	48	446	194	144	42	35	70
19	3914	2241	1553	2023	1907	1305	1586	912	679	109	258	60	105	57	62	20	166	20	42	4	10
6+	177671	187756	183498	166256	146376	117331	98087	80472	68049	71334	73956	72894	84573	85901	97658	102583	89640	93360	120952	116002	149695

FISHING MORTALITY

AGE	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
6	0.016	0.030	0.014	0.014	0.019	0.018	0.015	0.017	0.005	0.026	0.015	0.016	0.034	0.021	0.033	0.013	0.002	0.001	0.006	0.001	0.008
7	0.053	0.064	0.053	0.027	0.061	0.026	0.091	0.025	0.048	0.057	0.043	0.048	0.049	0.052	0.097	0.064	0.011	0.007	0.013	0.004	0.027
8	0.086	0.091	0.051	0.076	0.128	0.109	0.142	0.107	0.132	0.104	0.084	0.135	0.092	0.073	0.150	0.122	0.039	0.030	0.025	0.012	0.049
9	0.074	0.101	0.084	0.120	0.209	0.137	0.243	0.213	0.238	0.152	0.138	0.218	0.151	0.134	0.142	0.173	0.102	0.092	0.060	0.031	0.080
10	0.098	0.088	0.164	0.174	0.207	0.208	0.300	0.307	0.267	0.289	0.215	0.297	0.226	0.217	0.188	0.214	0.202	0.234	0.101	0.109	0.138
11	0.117	0.108	0.183	0.162	0.310	0.304	0.318	0.456	0.374	0.332	0.274	0.374	0.254	0.309	0.215	0.275	0.328	0.469	0.249	0.292	0.232
12	0.184	0.136	0.258	0.360	0.359	0.368	0.425	0.553	0.417	0.321	0.381	0.452	0.360	0.424	0.187	0.327	0.538	0.679	0.437	0.486	0.334
13	0.208	0.232	0.279	0.306	0.332	0.359	0.412	0.624	0.702	0.437	0.470	0.434	0.398	0.546	0.200	0.286	0.744	0.612	0.485	0.617	0.400
14	0.280	0.263	0.354	0.383	0.324	0.414	0.429	0.691	0.752	0.509	0.630	0.447	0.725	0.195	0.276	1.082	0.929	0.674	0.534	0.400	
15	0.225	0.328	0.390	0.361	0.398	0.512	0.569	0.551	0.713	0.527	0.775	1.039	0.636	0.941	0.249	0.320	1.481	1.347	0.845	0.717	0.400
16	0.362	0.332	0.511	0.407	0.399	0.580	0.465	0.864	1.436	0.662	0.873	0.884	0.879	0.877	0.279	0.337	1.699	1.383	1.260	0.769	0.400
17	0.444	0.313	0.491	0.512	0.372	0.629	0.505	0.716	1.364	0.512	1.416	0.804	0.777	1.888	0.234	0.235	1.465	1.292	1.895	1.495	0.400
18	0.300	0.696	0.656	0.450	0.518	0.574	0.489	0.636	2.336	0.340	1.767	0.574	1.298	1.097	0.881	0.152	2.940	1.316	2.992	1.571	0.400
19	0.309	0.352	0.469	0.406	0.403	0.551	0.519	0.668	1.139	0.553	0.912	0.951	0.731	0.964	0.260	0.306	1.559	1.349	0.961	0.755	0.400

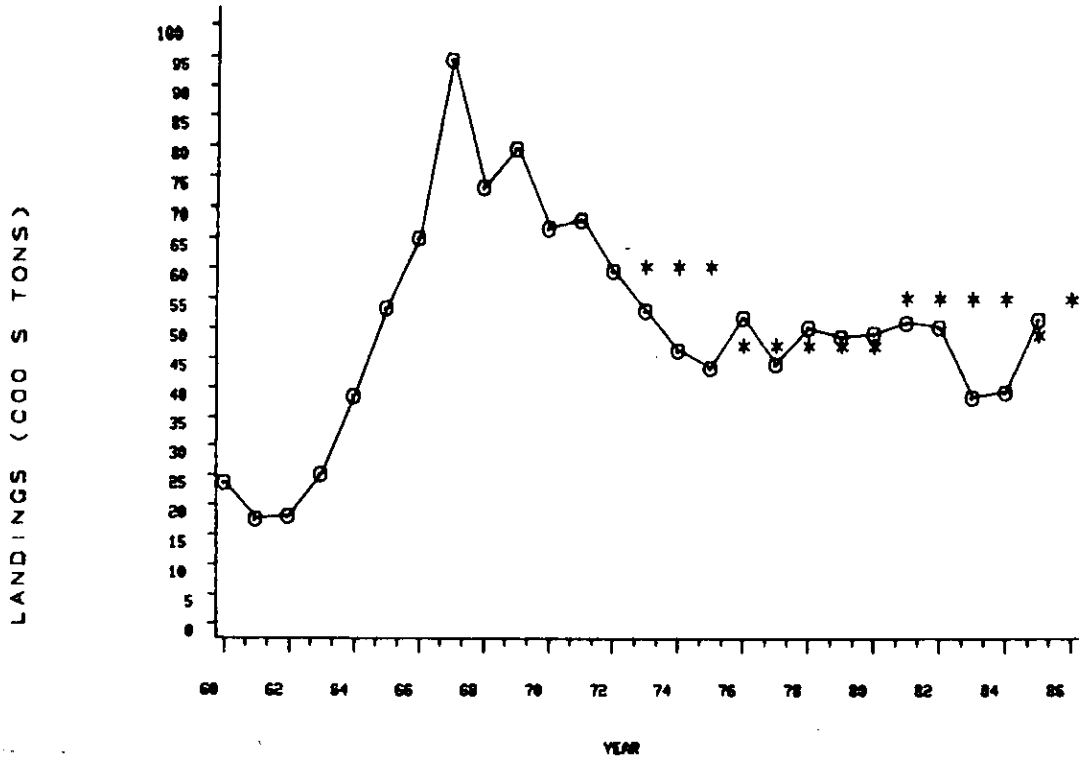

Fig. 1. Landings of American plaice in Div. 3LNO for the years 1960-85 and TACs for 1973-86 (denoted by asterisks).

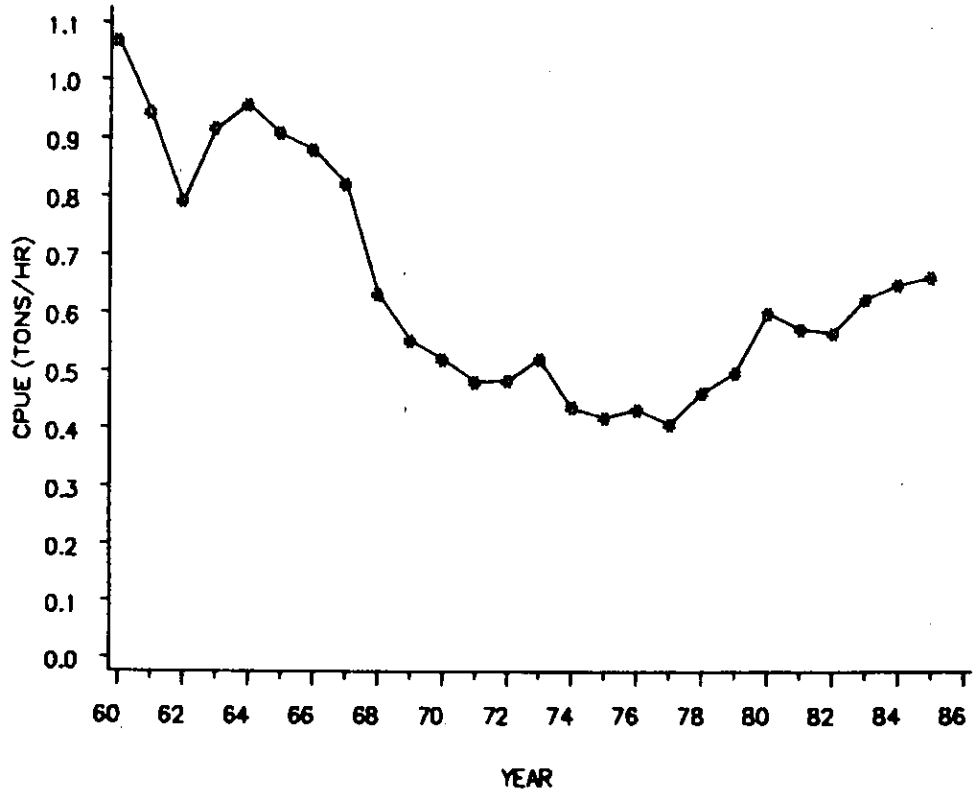

Fig. 2. Catch rates of plaice by Can(N) trawlers in Div. 3LN for 1968-85.

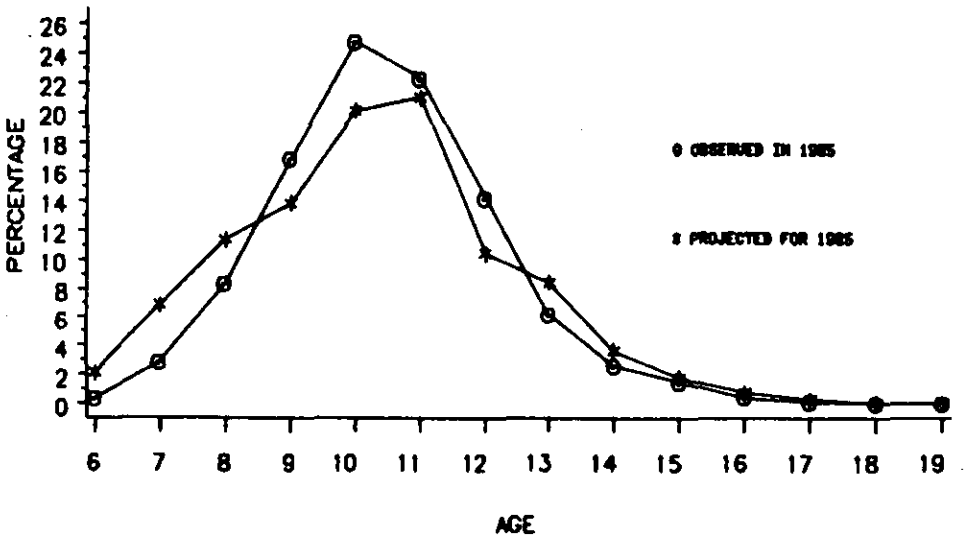

Fig. 3. Comparison of observed catch-at-age in 1985 with catch-at-age for 1985 projected in the 1985 assessment, Div. 3LN plaice.

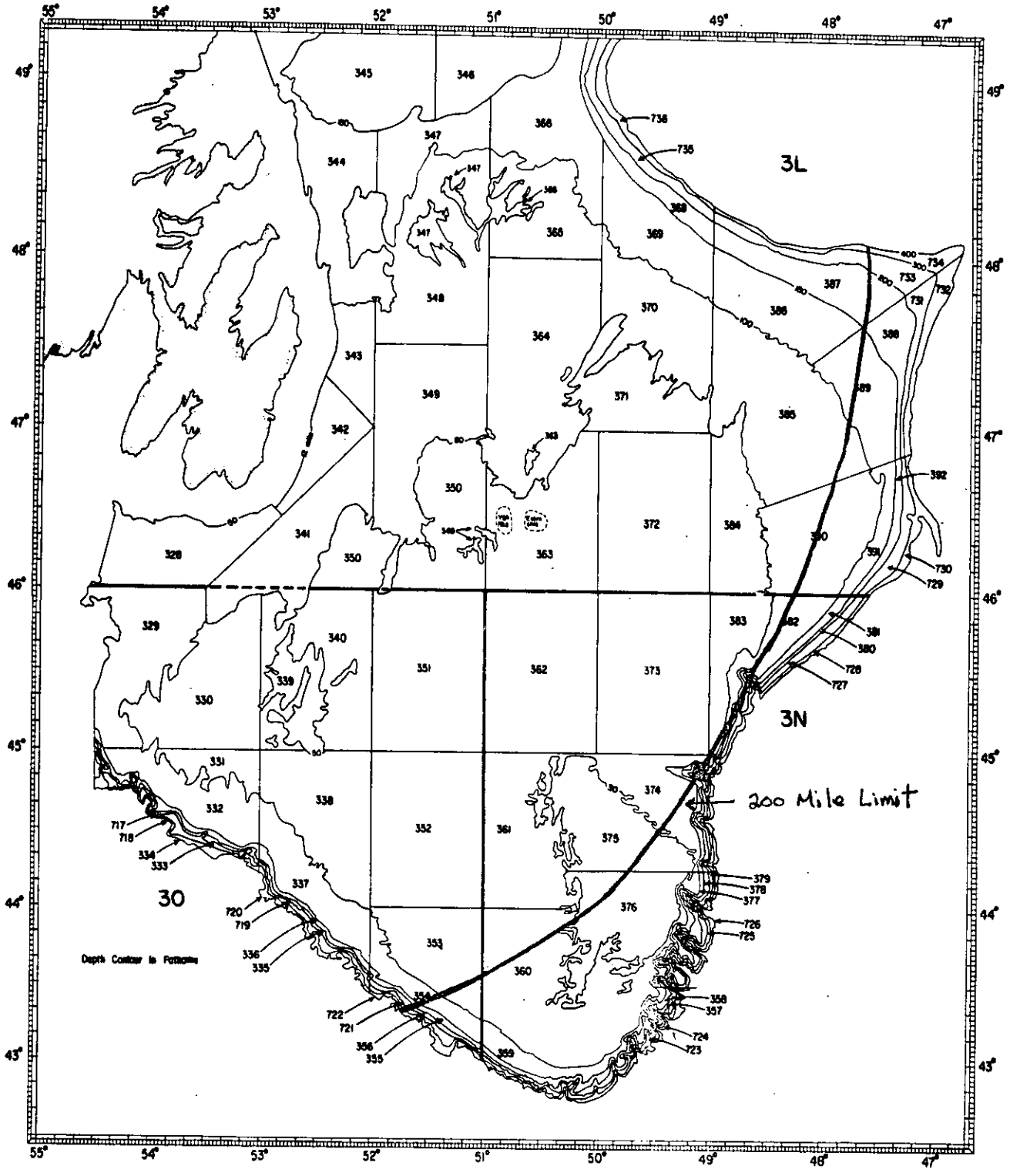

Fig. 4. Stratification scheme used for stratified random groundfish surveys in Div. 3LNO. Map also shows approximate location of Canadian 200 mile economic zone.

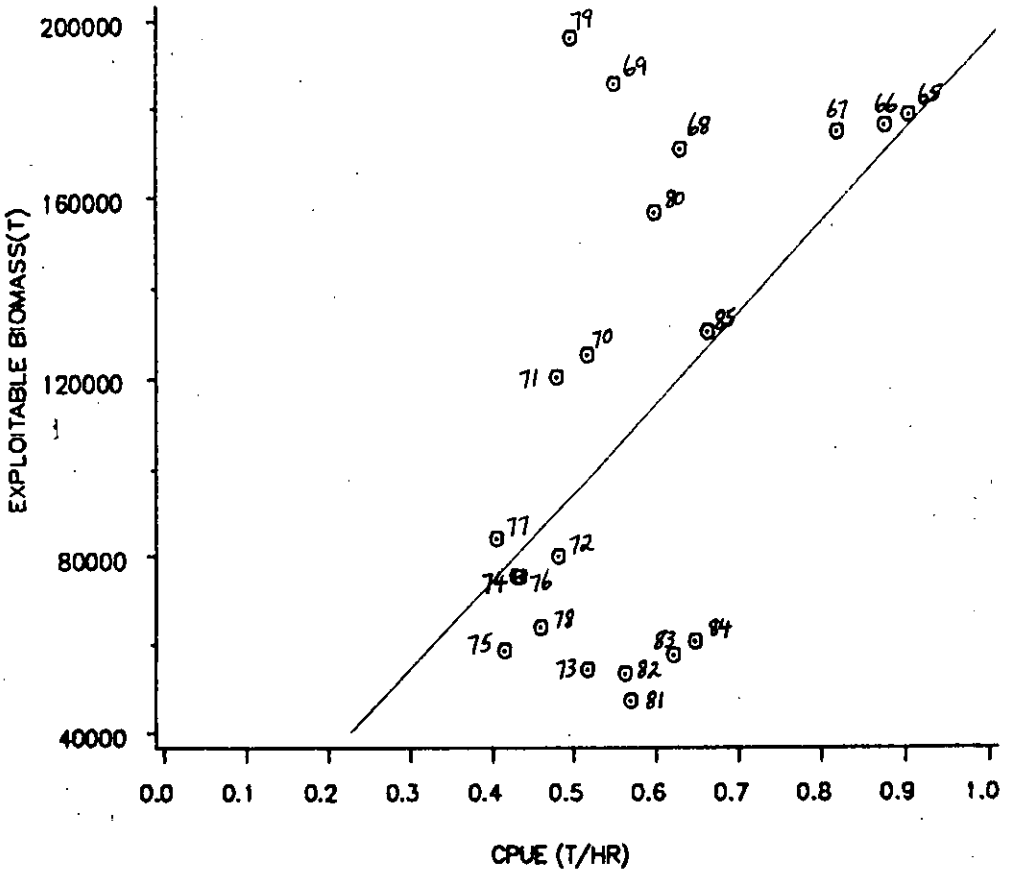

Fig. 5. Plot of exploitable biomass from cohort run at FT=0.4 vs. CPUE, Div. 3LN plaice.

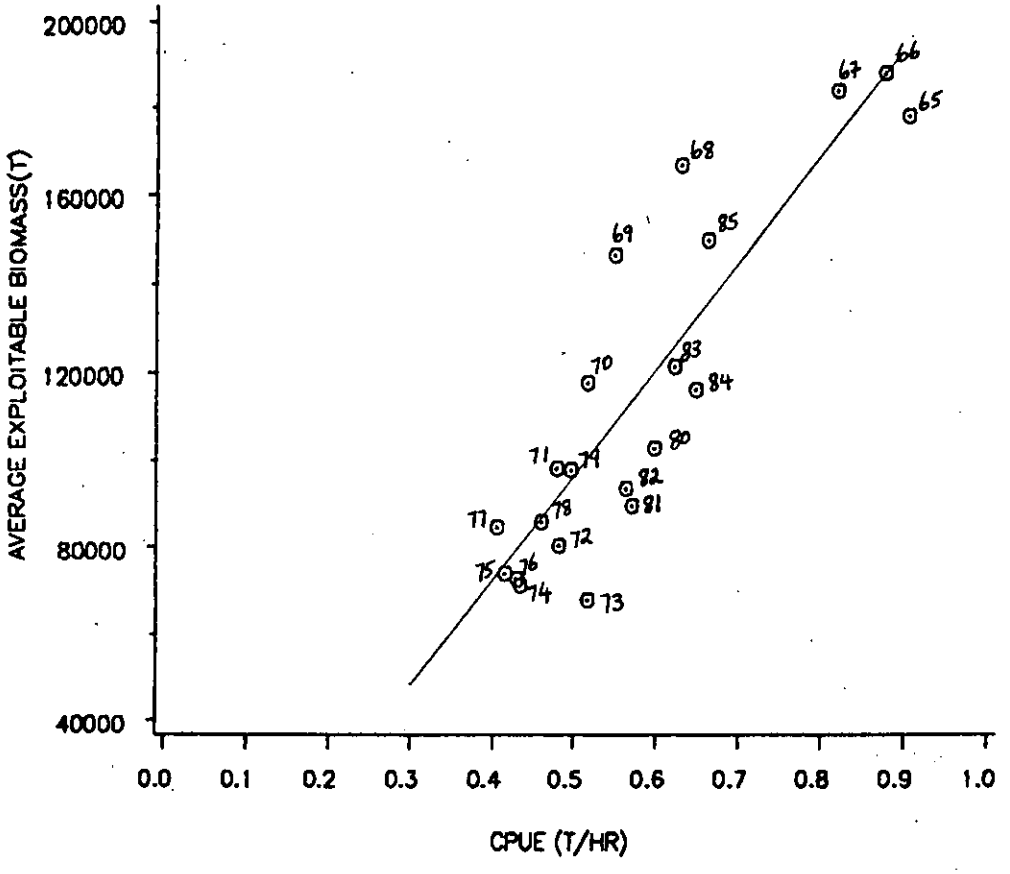

Fig. 6. Plot of average exploitable biomass from cohort run at FT=0.4 vs. CPUE, Div. 3LN plaice.

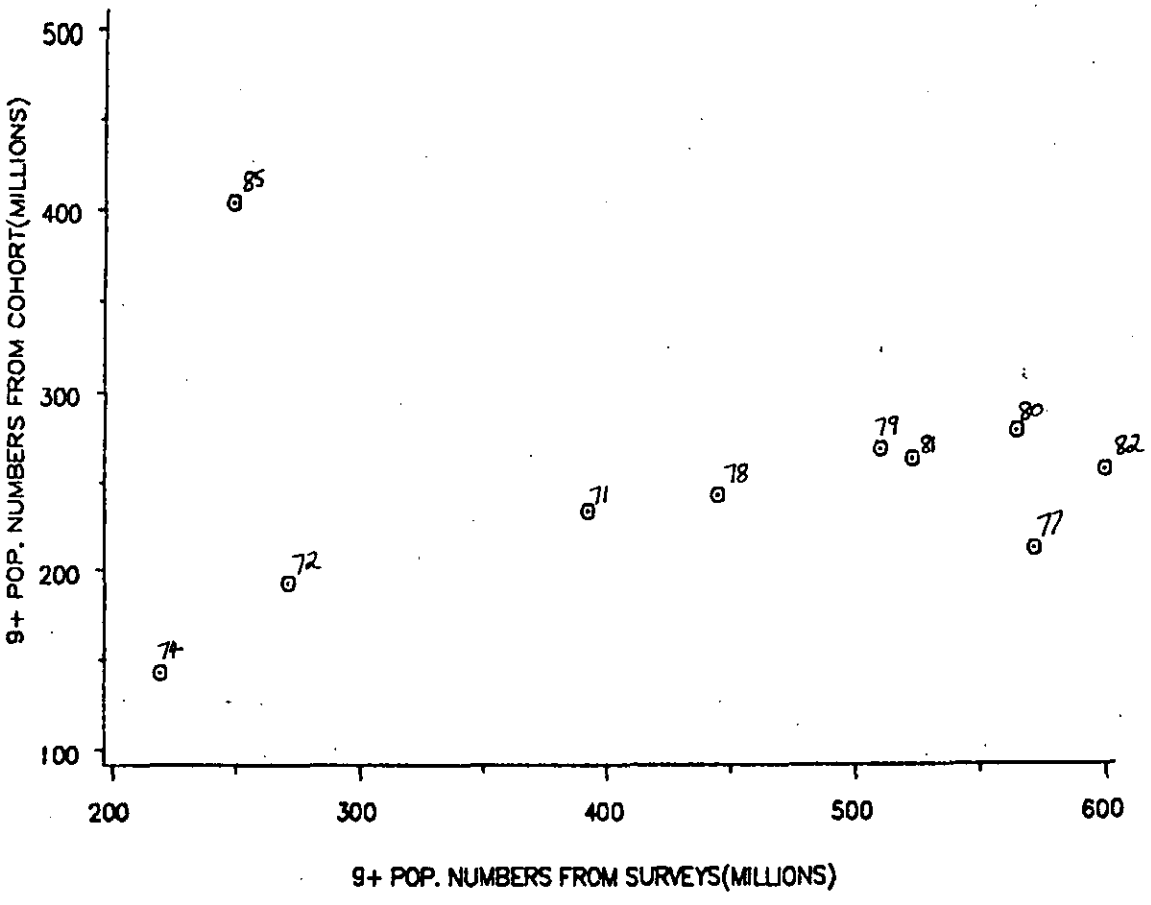

Fig. 7. Plot of ages 9+ population numbers from cohort run at FT=0.4 vs. 9+ population numbers from selected strata surveyed in Div. 3LN.

Appendix

After further analysis, it was decided to use the long-term average partial recruitment for SPA. This vector is listed in Table 11 as PRPROJ, and is the PR which was used for catch projections in the 1985 assessment of this stock. This vector is reasonably close to PR86, a short-term average, and should be acceptable as the PR for SPA, given that the same PR predicted a catch at age in 1985 which generally agreed with that observed (Fig. 3).

SPA calibration was carried out using the methods described previously, and these results are shown in Table 26. These results are very similar to those obtained originally (Table 24), from the SPA runs using PR86. From these, it was determined that the best estimate of F_T in 1985 was 0.35. The cohort analysis at this level of F_T is shown in Table 27.

The parameters used for catch projections are given in Table 28 and the projections are shown in Table 29. The TAC recommended for the stock in 1987 is 48,000 tonnes, 44,000 t from the projection for Divs. 3LNL and 4,000 t (average catch level) for Div. 30.

Table. 26. Results of SPA calibrations. SPA runs used long-term average PR (PRPROJ in Table 11).

Regression	Parameter	F_T 0.30	0.35	0.40	0.60	0.75
Exploitable biomass vs CPUE, 1965-85	r	0.559	0.547	0.534		
	intercept	- 5836	- 3759	- 2201		
	slope	208016	201319	196294		
	'85 res	+41691	+19277	+ 2467		
	'84 res	-55598	-60372	-63964		
Avg. exploitable biomass vs CPUE, 1965-85	r	0.887	0.889	0.873		
	intercept	-26267	-24363	-22913		
	slope	249450	241209	235014		
	'85 res	+35155	+14407	- 1248		
	'84 res	- 4062	-15542	-24235		
9+ pop. nos. from SPA vs 9+ R.V. nos. from spring surveys 1971-72, 74, 77-82, 85	r				0.681	0.758
	intercept				150196	133855
	slope				178	201
	'85 res				+34823	+ 5912

Table 27. Results of SPA at F_T = 0.35, using the partial recruitment vector PRPROJ in 1985.

POPULATION NUMBERS

AGE	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
6	183744	193171	171798	155330	122140	119286	113310	144296	180384	222891	217930	234003	220556	193926	234738	270151	262813	213824	114429	68558	32164
7	148866	147702	153505	136640	125460	98119	95883	91354	116150	146929	177762	175761	188509	174661	155572	186695	218535	214686	174819	92637	56041
8	119561	115575	113486	119150	110481	96679	78239	71694	72964	90654	113685	139483	137216	147041	135675	116007	144610	177677	174344	140715	75548
9	105199	90623	86371	88307	90392	79575	70951	55593	52748	52356	66919	85598	99755	102546	112028	95279	84481	114479	141085	139876	113203
10	86119	79580	66646	64987	64097	60064	54054	45541	36779	34051	36826	47729	56359	70224	73477	79739	66301	82712	86599	109459	109488
11	55241	63917	60094	46303	44697	42679	39924	32791	27417	23064	20874	24319	29330	36820	46302	49907	52857	44546	41079	65111	81339
12	36723	40232	47062	40962	32250	26829	25778	23790	17015	15443	13544	12997	13697	18626	22130	30692	31092	31351	33166	26614	40213
13	29552	25819	28737	29754	23409	18432	15204	13800	11201	9185	9170	7578	6775	7821	9979	15037	18091	14240	13284	13511	13593
14	18915	19650	16235	17806	17938	13756	10536	8243	6054	4546	4860	4694	4019	3724	3710	6686	9246	7073	5520	6869	7316
15	9737	11709	12374	9332	9940	10618	7442	5615	3383	2336	2236	2011	2048	2104	1477	2500	4153	2571	2320	2366	3447
16	7475	6368	6909	6860	5325	5464	5209	3451	2650	1358	1129	844	582	867	672	943	1487	774	550	841	999
17	3916	4262	3742	3394	3739	2925	2505	2679	1191	516	573	386	285	198	302	417	551	223	159	130	239
18	2374	2057	2551	1875	1666	2110	1276	1238	1022	249	253	114	141	88	25	196	220	105	50	40	58
19	2552	1441	840	1084	978	813	973	641	537	52	145	35	53	32	24	8	138	12	23	9	4
6+	810285	801104	770352	723782	652511	577349	521283	500725	529544	603629	665907	735552	759326	758699	796310	854866	894627	884372	777428	664703	534608
7+	626521	607933	598555	568452	530371	458062	407973	356429	349160	380738	447977	501549	538770	564773	561573	584716	631814	670548	662999	596146	502444
8+	477655	460231	445050	429812	404911	359944	312090	265074	233010	233810	270215	325788	350261	390112	406001	398020	413279	455962	488180	503307	446402
9+	357794	344656	331563	310662	294431	263265	233851	193380	160046	143156	156530	186304	213045	243071	270125	282013	268669	278785	313836	362591	370358
10+	252604	254634	245192	222356	204039	183690	162900	137787	107298	90800	89611	100706	113289	140525	158097	186034	184187	164306	172751	223915	257155
11+	166484	174654	178544	157369	139942	123626	108846	92246	70520	56748	52785	52977	56930	70301	84620	106295	117886	101593	86152	114465	147938
12+	111243	110737	118449	111066	95245	80947	68922	59455	43103	33684	31910	28658	27600	33481	38318	56388	65029	57047	45073	49354	66599
13+	74520	70505	71388	70104	62995	54118	43144	35665	26088	18242	18367	15661	13903	14855	16188	25786	33937	25696	21966	22749	24386

POPULATION BIOMASS

AGE	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
6	47707	47804	44378	38602	31811	29469	26402	36061	39793	50268	48630	54924	51933	46296	67136	79846	90655	60618	41406	19186	11495
7	48004	47912	51936	43162	36668	29875	27540	30435	30040	43933	54774	53715	59933	56048	50424	67551	80409	72681	79518	39422	21670
8	51907	50032	47074	48649	38804	33012	26774	29881	23595	32522	41373	49758	51367	53599	51319	48016	58418	70330	61764	50225	31519
9	57506	49761	45855	45485	41847	35373	28311	24000	22172	25070	32821	38340	52411	44911	51854	43092	35067	51144	86472	64580	54071
10	52351	54816	44017	37785	35285	33531	26035	22465	18486	18688	21280	24863	31027	35495	36195	37266	28611	28125	54022	52843	61353
11	39151	53739	42281	33065	27460	26649	24059	18107	17022	16399	15329	15561	20840	22305	25894	25963	22315	19914	23261	35980	55498
12	26503	33753	38881	31089	24255	17514	17425	14490	13221	13335	11291	9827	10622	12858	16830	17660	14766	15822	13075	17122	37593
13	22615	19986	24299	25101	19065	14725	11757	8790	9173	9240	8949	6465	6113	6609	9769	11778	9221	9413	9406	10143	15970
14	18702	20248	17066	18849	19558	11984	8851	6412	5208	5102	4959	4233	4110	3375	5085	7192	5216	5538	4539	7360	8584
15	10824	12857	15245	11406	11983	9957	6642	5449	3381	3191	2590	1911	2453	2219	2244	3390	2614	2100	2273	3238	6103
16	9230	8179	9346	9673	7491	6348	6087	3513	2349	2172	1605	1101	782	1193	1132	1291	1173	798	632	1450	2317
17	5500	6407	5852	5335	6378	3686	3436	3252	1168	907	733	565	390	193	564	723	564	256	163	188	929
18	3631	2604	3951	3166	2791	3045	1952	1607	707	553	319	215	187	125	48	446	195	145	43	37	98
19	3914	2241	1553	2023	1907	1305	1586	912	679	109	258	60	105	57	62	20	166	20	43	4	11
6+	397844	410340	391735	351590	305322	255272	216856	205374	187013	221493	244912	259539	292204	285003	318456	344224	349389	336985	406637	297036	308191
7+	350137	362536	347357	312987	273512	225803	190454	169313	147220	171225	196281	204615	240271	238707	251319	264379	258735	276287	365231	277850	296695
8+	302133	314624	295421	269826	236844	196828	162914	136978	117180	127291	141508	150900	180348	182639	200896	196828	178326	203606	285712	242228	275025
9+	250226	264591	248348	232976	198040	163816	136140	108997	93586	94766	100135	103140	129641	129340	149477	148812	119908	133276	193928	192050	243506
10+	192719	214831	202492	177491	156193	128444	107829	84998	71414	69696	67313	64800	76630	84429	97623	105730	84840	82132	107457	127446	188739
11+	140369	160014	158475	139707	120908	94913	81794	62533	52928	51008	46033	39937	45602	48934	61428	68463	56230	54008	53434	74603	127386
12+	101218	106276	116194	106642	93428	68263	57735	44425	35906	34609	30704	24376	24762	26630	35534	42500	33914	34093	30173	39543	71888
13+	74715	72523	77312	75553	69173	51049	40310	29936	22685	21274	19414	14549	14140	13771	18904	24839	19149	18271	17098	22421	34296

FISHING MORTALITY

AGE	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
6	0.018	0.030	0.014	0.014	0.019	0.018	0.015	0.017	0.005	0.026	0.015	0.016	0.033	0.020	0.029	0.012	0.002	0.001	0.009	0.002	0.009
7	0.053	0.064	0.053	0.027	0.061	0.026	0.091	0.025	0.048	0.057	0.043	0.048	0.048	0.051	0.093	0.055	0.010	0.008	0.017	0.006	0.035
8	0.086	0.091	0.051	0.076	0.128	0.109	0.142	0.107	0.132	0.104	0.084	0.135	0.091	0.072	0.148	0.117	0.034	0.027	0.029	0.015	0.077
9	0.074	0.101	0.084	0.120	0.209	0.187	0.243	0.213	0.238	0.152	0.138	0.218	0.151	0.133	0.140	0.170	0.098	0.079	0.054	0.037	0.105
10	0.098	0.086	0.164	0.174	0.207	0.208	0.300	0.307	0.267	0.289	0.215	0.287	0.226	0.217	0.187	0.211	0.198	0.223	0.085	0.097	0.164
11	0.117	0.106	0.183	0.162	0.310	0.304	0.318	0.456	0.374	0.332	0.274	0.374	0.254	0.309	0.214	0.273	0.322	0.454	0.234	0.238	0.203
12	0.184	0.136	0.258	0.360	0.359	0.368	0.425	0.553	0.417	0.321	0.381	0.452	0.360	0.424	0.186	0.326	0.533	0.659	0.416	0.445	0.255
13	0.208	0.232	0.279	0.306	0.332	0.359	0.412	0.624	0.702	0.437	0.470	0.434	0.398	0.546	0.200	0.286	0.739	0.796	0.459	0.567	0.350
14	0.280	0.263	0.354	0.383	0.324	0.414	0.429	0.691	0.752	0.509	0.682	0.630	0.447	0.725	0.195	0.276	1.080	0.915	0.647	0.490	0.350
15	0.225	0.328	0.390	0.361	0.398	0.512	0.569	0.551	0.713	0.527	0.775	1.039	0.636	0.941	0.249	0.320	1.481	1.342	0.815	0.662	0.350
16	0.362	0.332	0.511	0.407	0.399	0.580	0.465	0.864	1.436	0.662	0.873	0.884	0.879	0.877	0.279	0.337	1.699	1.381	1.242	0.711	0.350
17	0.444	0.313	0.491	0.512	0.372	0.629	0.505	0.716	1.363	0.512	1.416	0.804	0.977	1.888	0.234	0.235	1.461	1.290	1.874	1.410	0.350
18	0.300	0.696	0.656	0.459	0.518	0.574	0.489	0.636	2.836	0.340	1.767	0.574	1.298	1.097	0.880	0.152	2.939	1.302	2.941	1.484	0.350
19	0.309	0.352	0.460	0.406	0.403	0.551	0.519	0.668	1.139	0.553	0.912	0.951	0.731	0.964	0.260	0.306	1.558	1.345	0.931	0.698	0.350

Table 28. Parameters for catch projections for plaice in Div. 3LN.

Age	Population in 1985 (000)	Catch in 1985 (000)	Mean wt. kg	PR
6	114,000[1]	254	0.369	.025
7	180,000[1]	1,748	0.435	.100
8	75,448	5,081	0.500	.220
9	113,483	10,270	0.593	.300
10	109,435	15,086	0.648	.470
11	81,339	13,590	0.731	.580
12	42,013	8,622	0.914	.730
13	13,963	3,759	1.205	1.000
14	5,810	1,564	1.541	1.000
15	3,447	928	2.006	1.000
16	999	269	2.605	1.000
17	338	91	2.969	1.000
18	26	7	3.554	1.000
19	4	1	3.377	1.000

[1] Geometric mean (1974-83)

Table 29. Results of catch projections for Div. 3LN plaice.

CATCH NUMBERS

AGE	1985	1986	1987
6	254	1594	1266
7	1748	3151	4075
8	5081	9264	7043
9	10270	4894	7615
10	15086	10921	4462
11	13598	12938	7513
12	8622	10579	8134
13	3759	6824	7337
14	1564	2064	3290
15	928	899	995
16	269	509	414
17	91	148	246
18	7	50	71
19	1	4	24
6+	61270	64909	62487
7+	61016	63315	61221
8+	59268	58164	57146
9+	54187	48900	49103

POPULATION NUMBERS

AGE	1985	1986	1987
6	214000	214000	214000
7	180000	174979	173769
8	79448	145778	138610
9	113483	57128	111006
10	109430	83651	42408
11	81337	76007	58648
12	48013	54369	51387
13	13963	26842	34978
14	5810	8056	15662
15	3447	3352	4742
16	999	1989	1973
17	338	576	1171
18	26	190	337
19	4	15	115
6+	849300	846803	848830
7+	635300	632803	634830
8+	455305	457824	461062
9+	376857	312031	322451

CATCH BIOMASS

AGE	1985	1986	1987
6	94	588	467
7	760	2241	1770
8	2542	4635	3524
9	6087	2900	4513
10	9776	7077	2892
11	9930	8796	5489
12	7883	9683	7437
13	4530	8223	8843
14	2410	3180	5070
15	1861	1722	1995
16	701	1327	1078
17	270	436	729
18	25	178	253
19	3	13	81
6+	46872	51000	44146
7+	46778	50412	43679
8+	46018	48172	41906
9+	43476	43537	38382

POPULATION BIOMASS (AVERAGE)

AGE	1985	1986	1987
6	71460,61	71221,52	71279,99
7	70578,77	67898,74	67650,94
8	32778,21	63847,69	61137,79
9	57768,70	29295,61	57420,19
10	58426,83	45626,47	23482,41
11	48715,97	45957,10	36123,13
12	30650,20	34478,19	32885,14
13	10941,83	24719,23	33753,54
14	6856,76	9436,18	19351,97
15	5317,74	5219,62	7616,16
16	2001,39	4020,79	4110,67
17	771,97	1328,34	2763,51
18	71,07	537,93	965,48
19	10,53	39,32	310,44
6+	400196,63	409741,18	424875,42
7+	328736,02	338519,66	353595,43
8+	258157,25	270620,92	285745,39
9+	225166,94	206773,23	224607,60

FISHING MORTALITY

AGE	1985	1986	1987
6	0,001	0,008	0,007
7	0,011	0,033	0,026
8	0,077	0,073	0,058
9	0,105	0,099	0,079
10	0,165	0,159	0,123
11	0,203	0,191	0,152
12	0,255	0,241	0,191
13	0,350	0,330	0,262
14	0,350	0,330	0,262
15	0,350	0,330	0,262
16	0,350	0,330	0,262
17	0,350	0,330	0,262
18	0,350	0,330	0,262
19	0,321	0,330	0,262
6+	0,088	0,092	0,073