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An Assessment of American Plaice in NAFO Divisions 3LNO

by

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Abstract

Catches from this stock were generally in the range of 40,000 to 50,000 tons per year throughout the 1970s and 1980s, before declining to low levels in the early-1990s. There has been no directed fishing on this stock since 1993. The TAC's in 1995-2002 have been set at 0. The catch in 1999 was 2,565 tons, in 2000 it was 5,176 tons and in 2002 5,739 tons. Catch in all three years was mainly taken in the NAFO Regulatory Area (NRA). The Canadian spring surveys show a large decline in abundance and biomass from the mid to late-1980s to the mid-1990s with current biomass being only 26% of that of the mid-1980s. The fall survey has also shown large declines and the biomass is only 36% of that of 1990. There may be a slight increasing trend in both surveys over the last few years. Mortality estimated from the surveys was very high in the mid-1990s but has generally decreased since. The survey indicates no good year-classes since the mid-1980s. VPA analyses showed that population abundance and biomass declined fairly steadily from the mid-1970s to 1995. Biomass and abundance have been relatively stable over the last number of years. Average F on ages 9 to 14 and ages 11 to 14 showed an increasing trend from about 1965 to 1985. F since 1995 has been generally lower than in the earlier period but has been increasing steadily and in 1999 to 2001 average F on ages 9-14 was above 0.2. In 2001, the average F on ages 11-14 was 0.24. Spawning stock biomass declined to a very low level (less than 10,000 tons) in 1994 and 1995. It has increased since then but still remains at a very low level at just over 20,000 tons. This is only 10% of the level in the mid-1960s and 16% of the level in the mid-1980s. Recruitment has been steadily declining since the 1986 year-class and there have been no good year classes since then. Projections estimate that at the current level of F the stock will decline further.

TAC regulation

This stock has been under TAC regulation since 1973 when a TAC of 60,000 tons was established. From 1973-87, the TAC varied from 47,000 tons to 60,000 tons (Table 1) but was lowered to 33,585 tons in 1988. Further reductions followed, bringing the TAC to 10,500 tons in 1993. In 1994, a TAC of 4,800 tons was implemented, but the Fisheries Commission of NAFO stated that no directed fisheries were to take place on this stock. The TAC has been set at 0 since then.

Catch trends

Catches increased from about 20,000 tons in the early-1960s to a peak of 94,000 tons in 1967, were relatively stable around 45,000-50,000 tons in 1973-82, then declined to 39,000 tons in 1984-85 (Table 1, Fig. 1). Catches increased to 65,000 tons in 1986 and then declined rapidly thereafter, to about 7,400 tons in 1994. The catch declined following the moratorium in 1995, but has steadily increased since. Catch in 1999 was 2,565 tons, in 2000 it was 5,176 tons and 5,739 tons in 2001. Most of these catches occurred as by catch in the skate and G. halibut fisheries in the NRA. In 2001, the Canadian catch totalled about 1,620 tons, most of which was taken as by catch in the yellowtail flounder fishery.

From 1977 to 1982, the catch was taken almost exclusively by Canadian vessels, but the catch by other nations increased rapidly from less than 2,000 tons in 1981-82 to over 30,000 tons in 1986 as new fisheries were developed in the Regulatory Area (Tables 1 and 2). Considerable doubts have arisen about some nominal catches in the 1985 to 1994 period, resulting in various catch estimates being used. These include surveillance estimates, breakdowns of unspecified flounder catches by S. Korea prior to 1991 based on reported flounder catches, and any other estimates deemed by Scientific Council to be reliable. There is also some uncertainty regarding catches prior to 1973, when large amounts of unspecified flounder catches from some nations were broken down by species based on estimates of species composition. As well, estimates of discards are not available, and are believed to be substantial during some periods.

Canadian research vessel surveys

Spring

Stratified-random surveys have been carried out on the Grand Bank by Canadian research vessels in the spring (April to June period) of each year from 1971 to 2001, with the exception of 1983. The stratification scheme used is shown in Fig. 2. The data can be split into 3 time periods, based on the trawl used in each period: 1971-82 was Yankee 36, 1983-95 was Engel 145, and 1996-98 was Campelen 1800 (see McCallum and Walsh (1996) for a description of the various trawls). Conversions exist for the first to second series (Gavaris and Brodie, 1984), and from the second to the third (Morgan *et al*., 1998). However, data from the first series have not been converted to be comparable with the third series. Thus comparable data exist for 1971-95, and for 1984 to 2001. A full comparison between the Engel and Campelen data series is given in Brodie *et al*. (1998).

Biomass estimates for each Division by stratum and depth for 1996 to 2001 are given in Tables 3-5. In the spring survey in 2001 the biomass estimates for Div. 3L, 3N and 3O were 28,000, 92,000 and 70,000 tons, respectively. The value for Div. 3N represents a very large increase over the estimate for 2000. From 1996 to 1998 the estimate for Div. 3N biomass was approximately half of the estimate for Div. 3O while from 1999 to 2001 the estimates in the two divisions are similar. Biomass in Div. 3LNO combined has increased somewhat since 1996 but is only 26% of that of the mid-1980s (Fig. 3).

Tables 6-9 and Fig. 4 and 5 show the abundance by Division and for Div. 3LNO combined from 1985 to 2001. The total abundance has fluctuated since 1996 with perhaps a slight increasing trend. Abundance of the oldest ages (12+) has increased since 1996 while the younger ages (0-5) declined from 1996 to 1997 but increased to 1996 levels in 2000 (Table 9). Since 1998, 20-30% of the population was made up of fish age 9+ while this was less than 8% in 1996 and 1997. Ages 1 and 2 in 1999 to 2001 are the highest in the time series but these ages are probably 'under converted' in the 1985 to 1995 data.

American plaice are distributed throughout the Div. 3LNO area but the largest concentration of fish in each year since 1996 has been in the southern portion of Div. 3O extending across the border into Div. 3N (Fig. 6).

Fall

Stratified-random surveys have been conducted in Div. 3L in the fall from 1981 to 2001, usually in October-November. From 1990 to 2001, fall surveys were also carried out in Div. 3NO. Surveys from 1983 to 1994 were done with the Engel trawl and starting in fall 1995, a Campelen 1800 trawl was used.

Biomass estimates by stratum and depth are given for each Division in Tables 10-12. Biomass estimates from the fall survey in 2001 were 50,000, 93,000 and 54,000 tons for Div. 3L, 3N and 3O, respectively. The large biomass estimate in Div. 3N in 2000 is heavily influenced by a single large set in stratum 360. Except for a decline in 2000, biomass in Div. 3L in the fall survey has been fairly stable. During 1995 to 1997, Div. 3N constituted on average 40% of the Div. 3NO total while from 1999 to 2001 it comprised 64% of the Div. 3NO total. The overall biomass for Div. 3LNO has shown a slight increasing trend since 1995 (Fig. 3). The biomass index remains well below that of 1990 with the average of the 2000 and 2001 indices representing only 36% of that of 1990.

Fig. 4 shows the abundance for Div. 3LNO combined from 1990 to 2001. Tables 13-16 show the abundance by age for 1990 to 2000. Abundance in Div. 3L has declined in each year since 1995, while abundance has been increasing in Div. 3N since 1996. Ageing was not available for 2001. Similar to the spring survey older ages have made up a higher

proportion of the abundance in the last few years (Table 16). In 1998-2000, 13-15% of the population was made up of fish ages 9+ compared to less than 5% in 1996 and 1997. Also similar to the spring survey the abundance at ages 1 and 2 in 1999 and 2000 are the highest in the time series.

Plots of distribution by weight (Fig. 7) for the fall surveys in 1995 to 2001 show that American plaice are distributed throughout the Div. 3LNO area. However, the area of highest concentration is southern Div. 3NO, particularly the southern edge of Div. 3O and on the Tail of the Bank in Div. 3N.

Comparison of Spring and Fall Surveys

Biomass and abundance from the spring and fall surveys can be seen in Fig. 3 and 4. Both surveys have shown similar trends in biomass and abundance over the 1990 to 2001 period. Abundance at age in both surveys has shown similar trends. In both surveys the number of fish ages 9+ was higher in 1998-2000 than in the recent past. Numbers at ages 1 and 2 since 1999 have also been higher than in the past in both surveys. Distribution is also similar between the two surveys.

Catch to RV Biomass ratio

In 2000 STACFIS recommended that *in future catch to survey biomass plots be presented.* Therefore, as a proxy for fishing mortality on this stock, the ratio of catch to biomass from spring RV surveys was examined. The catch/biomass ratios from Campelen data from 1985 to 2001 are shown in Fig. 8. The Campelen ratios were highest in the 1991-94 period (similar to 1986), and the most recent values (1995-2001) are much lower, reflecting a period of reduced catches (Table 1). However, catch/biomass ratios have increased substantially over the 1995 to 2001 period

Mortality

Estimates of total mortality (Z) from the Campelen or equivalent, spring and fall survey data were calculated for ages 1 to 16 (Fig. 9 and 10). Mortalities were calculated as $\log(N_t/N_{t+1})$. The y-axes are plotted so that increases on the y-axis indicate increased mortality. Both surveys indicate an increase in mortality up to the mid-1990s. Since that time mortality declined on most ages. In the spring survey, last two estimates on most ages have again increased.

Weights- and lengths-at-age

Mean weights-at-age were calculated for male and female American plaice for Div. 3LNO using spring survey data from 1990 to 2001. Mean lengths-at-age were calculated using data from 1985 to 2001. Means were calculated accounting for the length stratified sampling design. In both mean length and mean weight-at-age there is some indication of a decline from 1996 or 1997 to 2001 in the older ages and an increase at the younger ages (Fig. 11 and 12).

Maturities

Age and length at 50% maturity were produced from spring RV data. Maturity data were collected during research vessel surveys from 1960-2001. Stratified random surveys were used where possible (1971-2001). Data from earlier years came from surveys that were conducted mainly as line transects. The coverage of a stock area would generally not be as complete as the stratified random surveys. For the period of the stratified random surveys, observed proportion mature at age was calculated according to the method of Morgan and Hoenig (1997) to account for the length stratified method of sampling. Prior to this, only data from the aged fish was used without weighting by the length frequencies. This should not have a large impact on the model estimates (Morgan and Hoenig, 1997). Data from 1985-1995 were converted to Campelen equivalents.

Estimates were produced by cohort. For males, A_{50} declined and then showed an increase in both the estimates, although the most recent two cohorts have shown a decline (Fig. 13). For females, estimates of A_{50} have been declining since the beginning of the time series. The A_{50} for males in recent cohorts is about 4 years compared to 6 years at the beginning of the time series. For females the A_{50} for recent cohorts is about 7.5 to 8.0 years compared to 11 years for cohorts at the beginning of the time series.

Estimates of maturity at length were produced using and are presented by cohort in Fig. 14. L_{50} has declined for both sexes but recovered in recent cohorts. The current L_{50} for males of about 20 cm is similar to the earliest cohorts estimated. The L_{50} of most recent cohorts for females is in the range of 34-35 cm, lower than the 38 cm of the earliest cohorts.

Recruitment

A multiplicative model was used to estimate the relative year class strength produced by the spawning stock. Similar approaches have been implemented by Healey *et al*. (2001) for Greenland Halibut in Div. 2GHJ3KLMNO, and by Morgan *et al*. (1999) for American plaice in Div. 3LNO.

On a log-scale the model can be written as follows:

$$\log(I_{s,a,y}) = \mu + Y_y + (SA)_{s,a} + \varepsilon_{s,a,y} ,$$

where: μ = overall mean
s = survey subscript
a = age subscript
y = year class subscript
I = Index (Abundance in 000's)
Y = year class effect
SA = Survey * Age effect, and
ε = error term.

We assume that $\varepsilon_{s,a,y} \sim N(0, \sigma^2_{group})$, (independently and identically) for pre-specified *group*s. Survey observations were considered for fish ages 3 – 5, and only those year-classes that have been observed at least twice were included in the analysis. Likelihood ratio tests (Table 17) indicate that a constant variance model (a general linear model) is not statistically different than the full model which estimates a variance parameter for each survey-age combination. Estimates (Fig. 15a) are back-transformed. The standardized residuals (Fig. 15b) show no systematic patterns indicating violation of model assumptions; however year effects are evident. Predicted year class strength generally declines over time; the estimates indicate no substantial recruitment since 1989. However, the 1997 model estimate of year-class strength shows marginal improvement over the six previous cohorts. In addition, there is some indication of increased year class strength for the 1998-1999 cohorts (which have not yet entered the model) as these have high estimates of abundance in both the spring and fall surveys (Tables 9 and 16).

Catch-at-age

Results of the catch-at-age calculations for American plaice catches in 1993-2000 are given in detail in Morgan *et al*. (1999a, b; and 2001). In 2001, sampling data were available from by-catch of American plaice in Canadian fisheries in Div. 3LNO. As in previous years, much of the Canadian sampling data came from 100% observer coverage in the yellowtail flounder fishery, which took 1411 tons of American plaice by-catch in Div. 3LNO in 2001. Some sampling was also available from the by-catch in the fishery for Greenland halibut (176 tons in Div. 3L). The remaining 33 tons of reported Canadian catch came as by-catch in various other fisheries, e.g. for cod and winter flounder in Div. 3L, and redfish in Div. 3O. Total Canadian catch of American plaice in Div. 3LNO in 2001 was 1,620 tons, which was 1000 tons higher than in 2000. In 2000 and 2001, fishing for yellowtail flounder was permitted in Div. 3L, resulting in some by-catch of American plaice in both years, although the majority of the catch came from Div. 3N in 2001 (Table 18), as in the previous years.

Sampling in 2001 consisted of 59,193 length measurements from all months except July and August, and 2896 otoliths. These sampling levels were about double those for 2000, reflecting the increased catch in 2001. The Canadian catch in 2001 was comprised mainly of fish aged 7 to 11 years, with a peak-at-age 10 (Table 19). This is very similar to the catch at age calculated for 1999-2000, as well as that from the Canadian fishery in the early-1990s (Brodie *et al*., 1994). The mean fish size and weight in 2001 were very similar to the 2000 values (0.68 kg in 2001 compared to 0.67), and individual weights-at-age were also similar in both years. The same weight-length relationship was used as in recent years (see below) and the sum of products check in 2001 was slightly less than the catch, as was the case in 1999 and 2000.

For 2001, length frequency data were also available from Portugal, Russia and Spain. Details on the sampling levels and descriptions of the fisheries are contained in Alpoim *et al.* (MS 2002), del Rio *et al.* (MS 2002) and Vaskov *et al.* (MS 2002). In all cases, age-length keys from the Canadian spring surveys in Div. 3LNO in 2001 were used to derive age compositions, which were then combined and adjusted to the total catch to account for all non-sampled catches. Catch-at-age, weight-at-age (using the weight-length relationship $Log_{10}\ weight = (3.3247 * Log_{10}\ length - 5.553$) used in previous assessments of this stock) and sum of products (SOP) for 2001 are given in Table 20.

In the total international catch-at-age, ages 9 and 10 were predominant in 2001 and there were no major differences in age compositions among countries. Mean lengths and weights-at-age in the Canadian fishery were higher than in international catches, likely a result of larger mesh size used in the Canadian fishery and also the use of research vessel age-length keys for the catches of non-Canadian fleets.

Virtual Population Analysis

Catch-at-age from 1960-1974 was reconstructed from previous assessments. A formulation of ADAPT using the same structure as that used in the accepted virtual population analysis (VPA) from the 2001 assessment (Morgan *et al*., MS 2001), but including catch-at-age from 1960 to 2000, was run. The 2001 assessment included catch-at-age from 1975 to 2000. The estimated population numbers in the overlap period (1975-2001) of these two VPAs were compared. There was very little difference in estimated population size (Table 21) and so it was decided to conduct all VPAs in the current assessment using catch-at-age starting in 1960.

Several formulations of VPA were presented using catch-at-age and survey information up to 2001.

The ADAPT used catch–at-age for ages 5 to 14 with a 15 plus group which included all catch from ages 15 to 21 (Table 22). The ratio of F on the plus group to F on the last true age was set at 1.0. M was set at 0.2 except at 0.53 for all ages from 1989 to 1996. Survey ages 5 to 14 were used in the calibration matrix. Beginning of the year weights-at-age and maturities-at-age are given in Tables 23 and 24.

Length frequencies of American plaice collected during surveys by EU-Spain in the Regulatory Area of Div. 3NO were converted to numbers-at-age using age length keys from Canadian spring surveys. The length frequencies and survey of EU-Spain are described in Gonzalez et al (MS 2002).

Age length keys and frequencies were first combined by sex. Frequencies of unknown sex were applied to keys composed of males plus females. Male, female and unkNown (if any) were then added together to produce total numbers at age. Only age length keys for Div. 3N were used since the majority of the survey by EU-Spain is in that area. Since there was a gear change by Canada in fall of 1996 the spring 1996 key was used for spring 1995. The numbers at length from the survey by EU-Spain are in original Pedreira units and have not been converted. The resulting numbers at age are given in Table 25.

Canadian spring and fall surveys only

The results of an ADAPT run using the formulation described above and the Canadian spring and fall surveys as tuning indices are given in Table 26 and Fig. 16-20. The model provides a good fit to the data. The mean square of the residuals was 0.28. Relative errors on the population estimates ranged from 0.21 to 0.55. The relative errors on the catchabilities were all less than 0.2. The residuals from the spring survey showed little pattern although there was a tendency for them to be larger in more recent years. The residuals from the fall survey seem to display some pattern, which is caused by two almost all negative years in 1996 and 1997. There is some tendency for there to be a lag between the predicted and observed survey estimates at age for the fall survey.

Canadian spring and fall surveys plus survey by EU-Spain

The results of an ADAPT run using the same formulation but including the survey by EU-Spain as well as the two Canadian surveys are given in Table 27 and Fig. 21 to 27. The fit of this model to the data is not as good. The mean square of the residuals is 0.43. Although the relative error on the population numbers is similar to the

previous run, the relative error on the catchabilities is higher, including on the Canadian survey series. Most of the relative errors on the catchabilities are above 0.2. The residuals from the Canadian spring and fall surveys remain similar in pattern to the previous run. There is a clear pattern in the residuals from the EU-Spain survey. This can perhaps be best seen in Fig. 26 and 27.

There were strong patterns in the residuals for the index from the EU-Spain surveys when these were included in the VPA. If self-weighting of the indices was used in XSA very little weight was given to the EU-Spain survey (Darby, MS 2002). Further, this survey covers only a small portion (approx. 11%) of the stock area for Div. 3LNO American plaice and shows a different trajectory than surveys covering the entire stock area (Brodie *et al*., MS 2002). It was decided that the best formulation of the model included both the Canadian spring and autumn surveys but that the survey by EU-Spain should be excluded from the analyses.

Population numbers and F from this run are shown in Table 28. Biomass was calculated by multiplying the population numbers at age by the beginning of the year weights at age. The VPA analyses showed that population abundance and biomass declined fairly steadily from the mid-1970s to 1995. Biomass and abundance have been relatively stable over the last number of years (Table 28, Fig. 28). Average F on ages 9 to 14 and ages 11 to 14 showed an increasing trend from about 1965 to 1985. There was a large peak in F in 1993, which may be an artifact. F since 1995 has been generally lower than in the earlier period but has been increasing steadily and in 1999 to 2001 average F on ages 9-14 was above 0.2. In 2001, the average F on ages 11-14 was 0.24 (Table 28, Fig. 28).

Spawning stock biomass was calculated by multiplying the biomass at age by the female maturity ogive. SSB has shown 2 peaks, one in the mid-1960s and another in the early to mid-1980s. Since then it declined to a very low level (less than 10,000 tons) in 1994 and 1995 (Fig. 29). It has increased since then but still remains at a very low level at just over 20,000 tons. This is only 10% of the level in the mid-1960s and 16% of the level in the mid-1980s. The stock recruit scatter is also shown in Fig. 29. Recruitment has been steadily declining since the 1986 year-class and there have been no good year classes since then. No good recruitment is seen below an SSB of 50,000 tons.

An examination of the stock recruit scatter shows that there has been only good recruitment observed above 155,000 tons and no good recruitment observed at SSB below 50,000 tons (Fig. 30). This 50,000 tons level could serve as a preliminary B_{lim} for this stock. There is also an indication that since the mid-1980s recruitment has been depressed at SSB above this level, which may indicate that the stock has been in a period of low productivity.

A retrospective analysis was conducted by sequentially removing one year of data from 2001 to 1996 for a comparison of 6 years. The results of this analysis are shown in Fig. 31 to 33. There is little evidence of a retrospective pattern when examined for population abundance in total or on an age-by-age basis. There is some pattern in the analysis on average F. In particular, as more data are added the peak in F in 1993 increases.

Simulations were carried out to examine the trajectory of the stock under 4 scenarios of fishing mortality: F = 0, $F = 0.5 \times F_{2001}$, $F = F_{2001}$, and $F = 2 \times F_{2001}$. For these simulations the results of the VPA and the covariance of these population estimates were used. The starting assumptions are given in Table 29. Simulations were carried out over a 10-year period. Recruitment was resampled from three sections of the estimated stock recruit scatter, depending on SSB. The three sections were 50,000 tons of SSB and below (only low recruitment), greater than 50,000 tons to 155 000 tons (low and high recruitment), and greater than 155,000 tons (only high recruitment). The simulations contained a plus group at age 15. At $F = F_{2001}$ or $F = 2 \times F_{2001}$ the population is estimated to decline over the 10 year period. At $F = 0.5 \times F_{2001}$ the population is estimated to grow very slowly. At F = 0 the population is estimated to grow more quickly and could reach B_{lim} before the end of the 10 year time period (Fig. 34). Yield is estimated to increase slightly over the 10-year time period under the scenario of $F = 0.5 \times F_{2001}$, but to decline over the time period at $F = F_{2001}$ or $F = 2 \times F_{2001}$

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Table 1. Nominal catches (t) of American plaice for NAFO Div. 3LNO, 1960-2001 and TACs from 1973 to 2002.

Year	Canada	France	Poland	USSR/Russia	South Korea[a]	Other	Total	TAC
1960	21,352	2,106	-	569	-	20	24,047	-
1961	14,903	1,473	286	1,248	-	3	17,913	-
1962	15,217	973	171	1,841	-	4	18,206	-
1963	24,591	93	457	466	-	112	25,719	-
1964	35,474	1,582	539	680	-	292	38,567	-
1965	45,365	2,056	977	4,544	-	319	53,261	-
1966	51,225	1,246	860	11,484	-	196	65,011	-
1967	54,190	1,326	3,234	35,139	-	524	94,413	-
1968	48,674	406	203	23,751	-	133	73,167	-
1969	64,815	43	34	14,493	-	52	79,437	-
1970	54,929	389	40	10,232	-	1,055	66,645	-
1971	49,394	323	370	17,173	-	628	67,888	-
1972	41,605	322	2,515	14,164	-	755	59,361	-
1973	38,586	310	1,116	12,516	-	315	52,843	60,000
1974	35,101	418	615	10,074	-	89	46,297	60,000
1975	34,015	442	537	7,682	-	545	43,221	60,000
1976	47,806	305	5	3,280	-	429	51,825	47,000
1977	42,579	31	-	1,023	-	348	43,981	47,000
1978	48,634	168	-	1,048	-	178	50,028	47,000
1979	47,131	113	-	1,190	-	135	48,569	47,000
1980	48,296	183	-	336	-	271	49,086	47,000
1981	48,177	210	-	847	-	924	50,158	55,000
1982	49,620	133	-	67	715	517	51,052	55,000
1983	35,907	41	-	170	815	1,602	38,535	55,000
1984	33,756	140	1	360	1,582	3,606[b]	39,445	55,000
1985	40,024	-	4	81	2,483	11,620[b]	54,212	49,000
1986	33,409	46	-	188	3,952	26,975[b]	64,570	55,000
1987	33,967	17	-	47	2,741	18,240	55,012	48,000
1988	26,832	-	-	159	2,522	11,322[b]	40,835	33,585[d]
1989	27,901	92	-	6	725	14,645[b]	43,369	30,300
1990	22,600	-	-	17	1,117	8,767[b]	32,501	24,900
1991	23,240[a]	-	-	60	1,910	9,471[b]	34,681	25,800
1992	10231[a]	-	-	50	518	2,551[b]	13,350	25,800
1993[c]	7,454	-	-	8	13	9,659[b]	17,122	10,500
1994	71	-	-	-	100	7,207[b]	7,378	4,800[f]
1995	59	-	-	-	-	578[b]	637	0
1996	59	-	-	-	-	854[b]	913	0
1997	114	-	-	-	-	1,293[b]	1,401	0
1998	212	-	-	10	-	1,396[b]	1,618	0
1999	316	-	-	147	-	2,102[b]	2,565	0
2000[g,a]	622	-	-	318	-	4,236	5,176	0
2001[a]	1,620	-	1	308	-	3,810	5,739	0
2002								0

[a]Includes a portion of catches reported as unspecified flounder. See text for details.
[b]Includes some catches estimated from surveillance reports.
[c]Catch may have been as high as 19,400.
[d]Effective TAC.
[f]No directed fishing.
[g]STACFIS unable to determine precise estimates because of discrepancies between various sources

Table 2. Breakdown of catches from Table 1 listed as "other" for 1984-2001.

Year	Spain	Portugal	Panama[b]	USA	Caymen Islands[b]	Misc.[a]	Total
1984	1,622	-	1,800	-	-	184	3,606
1985	5,498	27	3,892	1,310	797	96	11,620
1986	11,882	9,240	3,756	1,506	572	19	26,975
1987	14,476	2,516	-	1,248	-	-	18,240
1988	8,956	872	-	1,379	-	115[c]	11,322
1989	10,909	583	-	1,134	-	2,019[c]	14,645
1990	294	356	-	8	-	8,109[c]	8,767
1991	786	187	-	-	-	8,498[c]	9,471
1992	412	139	-	-	-	2,000[c]	2,551
1993	199	92	-	-	-	9,368[c]	9,659
1994	5,476	630	-	575	-	526[c]	7,207
1995	430	148	-	-	-	-	578
1996	554	263	-	-	-	37	854
1997	951	336	-	-	-	6	1,293
1998	999	313	-	-	-	84	1,396
1999	1,242	800	-	-	-	60	2,102
2000	3,522	527	-	-	-	187	4,236
2001	2,627	959	-	-	-	224	3,810

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

Table 3 . Biomass estimates ('000t) of A.plaice, by stratum and depth zone (m), from Canadian spring surveys in Div. 3L in 1996-2001 (Campelen). (+) indicates biomass <50 t, (-) means stratum not surveyed.

		Biomass					
Depth	Stratum	1996	1997	1998	1999	2000	2001
30-56	784	-	-	0.2	+	-	+
	Total	-	-	0.2	+	-	+
57-92	350	0.6	0.3	0.3	6.1	1.8	0.4
	363	2.3	0.8	0.0	3.2	6.2	0.6
	371	0.9	0.2	0.1	2.4	0.9	0.1
	372	1.4	0.8	1.3	2.7	3.7	1.2
	384	0.7	0.9	0.2	0.8	1.2	0.3
	785	-	-	0.2	0.5	-	0.7
	Total	5.9	3.0	2.1	15.7	13.8	3.3
93-183	328	0.5	0.5	0.1	2.4	0.9	1.3
	341	1.8	0.5	0.7	4.5	0.8	1.5
	342	0.1	0.1	0.4	0.4	0.2	0.1
	343	0.3	0.0	+	0.6	0.2	+
	348	1.4	0.8	1.2	2.8	1.5	0.4
	349	0.8	0.3	0.2	4.4	1.3	0.5
	364	2	1.0	0.9	5.6	1.3	1.5
	365	1.1	0.5	0.9	1.4	1.2	0.3
	370	1.3	0.6	1.6	2.4	1.9	0.9
	385	5.6	0.9	0.5	2.5	1.9	1.4
	390	0.6	0.4	0.5	0.3	0.3	0.4
	786	-	-	0.3	0.5	-	0.4
	787	-	-	0.5	0.8	-	0.1
	788	-	-	-	0.3	-	-
	790	-	-	-	+	-	-
	793	-	-	-	+	-	-
	794	-	-	-	+	-	-
	797	-	-	-	+	-	-
	799	-	-	-	-	-	-
	Total	15.5	5.5	7.8	28.9	11.5	8.8
184-274	344	1	0.3	0.8	1.8	0.5	0.3
	347	0.6	0.2	0.6	0.6	0.2	0.4
	366	0.4	0.3	0.3	0.5	0.7	0.7
	369	0.3	0.2	0.2	1.2	0.7	0.9
	386	0.5	0.2	0.4	1.4	1.7	0.4
	389	0.4	0.2	0.4	0.6	0.8	0.8
	391	0.3	0.1	0.2	0.1	+	0.2
	789	-	-	-	0.5	-	-
	791*	-	-	-	0.3	-	-
	795	-	-	-	0.1	-	-
	798	-	-	-	0.1	-	-
	Total	3.5	1.5	2.9	7.2	4.6	3.7
275-366	345	0.5	0.2	0.3	1.5	0.5	0.7
	346	0.4	0.3	0.2	0.2	0.5	0.1
	368	0.3	0.0	0.1	0.3	0.4	0.2
	387	0.6	0.6	0.8	0.4	1.6	0.8
	388	0.6	0.2	0.2	0.8	0.3	0.4
	392	0.5	0.1	0.4	0.2	0.1	0.1
	792	-	-	-	+	-	0.1
	796	-	-	-	0.1	-	-
	800	-	-	-	0.2	-	-
	Total	2.9	1.4	2.0	3.7	3.4	2.4
367-549	729	0.2	0.6	2.2	0.1	1.3	1.1
	731	0.5	0.1	+	0.1	1.2	0.3
	733	0.7	0.0	0.3	1	0.1	2.3
	735	1.4	1.6	1.2	0.6	1.2	2.1
	Total	2.8	2.4	3.7	1.8	3.8	5.8
550-731	730	+	0.0	0.2	+	0.1	0.1
	732	+	0.0	0.0	+	0.3	3.4
	734	+	0.0	0.1	0	0	0.1
	736	+	0.1	0.0	+	+	+
	Total	0.1	0.1	0.3	+	0.4	3.6
732-914	737	-	-	-	-	-	-
	741	-	-	-	-	-	-
	745	-	-	-	-	-	-
	748	-	-	-	-	-	-
	Total	-	-	-	-	-	-
915-1097	738	-	-	-	-	-	-
	742	-	-	-	-	-	-
	746	-	-	-	-	-	-
	749	-	-	-	-	-	-
	Total	-	-	-	-	-	-
1098-1280	739	-	-	-	-	-	-
	743	-	-	-	-	-	-
	747	-	-	-	-	-	-
	750	-	-	-	-	-	-
	Total	-	-	-	-	-	-
1281-1463	740	-	-	-	-	-	-
	744	-	-	-	-	-	-
	751	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Grand Total		30.7	13.8	19.0	57.3	37.5	27.6

* in 1996 had a depth range of 184-366

Table 4. Biomass estimates ('000t) of A.plaice, by stratum and depth zone (m), from Canadian spring surveys in Div. 3N in 1996-2001 (Campelen). (+) indicates biomass <50 t, (-) means stratum not surveyed.

		Biomass					
Depth	Stratum	1996	1997	1998	1999	2000	2001
≤ 56	375	2.9	2.2	1.1	1.8	5.1	2.1
	376	0.8	1.8	2.0	3.2	5.1	9.3
	Total	3.7	4.0	3.1	5.0	10.2	11.4
57-92	360	8.8	8.6	7.9	27.4	22.8	50.3
	361	3.8	1.9	2.0	5.5	4.2	9.0
	362	2.8	5.5	4.0	4.6	6.6	7.0
	373	1.6	0.5	0.9	8.3	3.2	2.5
	374	1.1	0.4	0.3	1.7	0.9	1.0
	383	0.5	0.1	+	1.0	0.2	0.1
	Total	18.6	17.0	15.1	48.5	37.9	69.9
93-183	359	1.1	1.1	1.6	3.3	5.1	5.1
	377	0.2	0.1	+	0.2	+	0.9
	382	0.1	0.1	0.7	0.2	0.4	0.1
	Total	1.4	1.3	2.3	3.7	5.5	6.1
184-274	358	0.1	0.1	1.4	0.3	0.6	0.5
	378	0.1	0.2	0.2	0.9	+	0.1
	381	0.3	0.1	0.1	0.2	0.1	0.1
	Total	0.5	0.4	1.7	1.4	0.7	0.7
275-366	357	0.1	0.1	0.1	+	0.1	0.1
	379	+	0.1	0.1	0.1	0.1	0.1
	380	0.2	0.8	0.1	0.2	+	0.1
	Total	0.3	1.0	0.3	0.3	0.1	0.2
367-549	723	0.2	0.4	0.3	+	0.0	0.1
	725	0.1	0.5	0.2	+	0.4	0.1
	727	0.5	2.2	2.0	0.4	1.2	2.5
	Total	0.8	3.1	2.5	0.4	1.2	2.5
550-731	724	0.2	0.5	0.2	+	0.1	0.1
	726	+	0.1	+	+	0.1	+
	728	0.5	-	0.3	0.2	0.5	1.0
	Total	0.7	0.5	0.5	0.2	0.5	1.0
732-914	752	-	-	-	-	-	-
	756	-	-	-	-	-	-
	760	-	-	-	-	-	-
	Total			-	-	-	-
915-1097	753	-	-	-	-	-	-
	757	-	-	-	-	-	-
	761	-	-	-	-	-	-
	Total	-	-	-	-	-	-
1098-1280	754	-	-	-	-	-	-
	758	-	-	-	-	-	-
	Total	-	-	-	-	-	-
1281-1463	755	-	-	-	-	-	-
	759	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Grand Total		26.0	27.4	25.5	59.5	56.1	91.8

Table 5. Biomass estimates ('000t) of A.plaice, by stratum and depth zone (m), from Canadian spring surveys in Div. 3O in 1996-2001 (Campelen). (+) indicates biomass <50 t, (-) means stratum not surveyed.

		Biomass					
Depth	Stratum	1996	1997	1998	1999	2000	2001
57-92	330	3.8	0.8	6.9	3.5	5.9	4.2
	331	1.4	0.3	0.3	2.7	2.3	2.6
	338	6.0	5.7	6.0	4.0	2.3	6.0
	340	2.2	1.7	1.8	2.9	1.9	1.7
	351	2.9	4.4	3.8	4.6	3.4	6.5
	352	9.1	13.8	10.6	14.2	13.4	17.5
	353	7.8	8.3	10.9	21.5	21.1	20.6
	Total	33.2	34.9	40.3	53.4	50.3	59.1
93-183	329	1.6	1.4	4.4	4.7	3.9	1.9
	332	3.9	2.5	3.8	2.2	0.9	2.2
	337	4.6	1.9	3.2	2.7	1.5	1.2
	339	1.4	0.8	0.8	2.1	2.1	2.6
	354	1.6	1.1	5.0	9.0	1.3	1.6
	Total	13.1	7.8	17.2	20.7	9.7	9.5
184-274	333	+	0.3	0.1	0.1	+	+
	336	0.2	0.3	+	0.2	+	0.1
	355	0.5	0.3	0.1	0.1	0.1	0.4
	Total	0.7	0.9	0.2	0.4	0.1	0.5
275-366	334	0.2	0.8	0.0	0.1	+	+
	335	0.2	0.2	0.0	+	+	+
	356	0.1	+	+	0.1	+	+
	Total	0.5	1.0	+	0.2	+	+
367-549	717	0.2	1.7	+	0.1	0.0	+
	719	0.1	0.5	+	+	0.0	+
	721	0.2	0.1	+	0.1	+	0.2
	Total	0.5	2.2	+	0.2	+	0.2
550-731	718	+	0.1	+	+	0.0	+
	720	+	0.1	+	+	0.0	0.1
	722	1.0	4.2	0.0	0.2	0.1	0.2
	Total	1.0	4.4	+	0.2	0.1	0.2
732-914	764	-	-	-	-	-	-
	768	-	-	-	-	-	-
	772	-	-	-	-	-	-
	Total	-	-	-	-	-	-
915-1097	765	-	-	-	-	-	-
	769	-	-	-	-	-	-
	773	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Grand Total		49.0	51.2	57.7	75.1	60.2	69.5

Table 6 . Abundance index (millions) at age of A. plaice in spring surveys in Div. 3L.

Age/Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.00	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.11	0.00	2.29	1.15
2	0.00	1.32	5.23	4.10	1.86	0.00	1.32	0.00	0.30	0.00	0.00	8.40	0.63	0.68	1.89	17.73	37.91
3	8.11	4.55	11.39	18.84	17.35	5.24	3.23	1.74	2.26	0.36	0.40	29.93	5.44	3.14	5.42	12.32	32.83
4	25.76	23.56	50.30	80.86	80.96	70.17	14.00	5.14	5.75	7.48	0.82	91.96	14.04	10.24	6.59	4.94	15.63
5	146.34	115.41	242.76	279.24	174.03	137.97	110.19	46.07	22.68	31.03	11.84	82.54	31.70	21.10	25.82	8.95	5.95
6	349.77	451.71	566.10	554.37	416.73	231.75	178.00	61.69	59.15	46.46	17.43	48.50	26.57	36.67	42.99	29.81	9.41
7	513.51	496.70	553.70	501.15	351.42	277.32	102.04	89.33	37.42	44.40	31.75	26.16	14.58	30.44	66.66	28.55	18.61
8	317.45	260.25	333.72	277.15	208.59	152.33	79.23	33.11	16.71	13.72	31.28	8.01	6.83	19.43	65.01	27.47	16.40
9	152.45	156.89	132.67	188.17	143.33	94.21	43.70	18.53	5.56	6.13	17.63	3.62	2.42	6.38	39.59	18.83	17.27
10	85.19	66.89	65.65	60.04	52.54	55.70	19.02	7.07	2.96	1.38	5.28	0.64	0.69	2.90	19.36	10.78	15.22
11	44.66	27.01	22.24	32.65	26.90	18.40	10.45	2.88	1.23	0.83	1.14	0.09	0.39	1.60	10.42	5.46	7.50
12	22.13	18.07	19.32	20.02	14.77	9.59	6.61	1.44	0.43	0.14	0.21	0.03	0.09	0.64	3.36	1.31	2.97
13	12.34	11.84	9.13	10.11	8.57	6.33	2.57	0.64	0.29	0.15	0.06	0.03	0.02	0.17	1.34	0.25	0.81
14	5.99	4.40	3.93	5.87	4.85	2.40	1.39	0.38	0.13	0.05	0.00	0.00	0.00	0.00	0.18	0.09	0.13
15	2.99	2.64	2.00	3.27	3.36	1.57	0.99	0.19	0.03	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.05
16	1.91	1.58	0.74	1.54	1.07	1.04	0.48	0.06	0.03	0.00	0.00	0.00	0.00	0.02	0.09	0.07	0.10
17	0.39	0.44	0.24	0.36	0.43	0.58	0.18	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.03	0.22	0.02	0.00	0.09	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.03	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
20	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unk1	0.23	0.51	0.00	0.45	0.05	3.04	0.03	0.01	0.69	0.00	0.00	0.00	0.00	0.12	0.04	0.01	0.05
Ages 0+	1689.25	1643.96	2019.37	2038.19	1506.93	1067.63	573.54	268.29	155.67	152.11	117.84	300.15	103.40	133.65	288.81	168.87	182.03
Ages 6+	1508.82	1498.62	1709.47	1654.71	1232.68	851.22	444.78	215.33	123.99	113.25	104.78	87.08	51.60	98.26	249.04	122.63	88.51
Ages 9+	328.09	289.97	255.94	322.03	255.94	189.82	85.51	31.20	10.71	8.67	24.32	4.41	3.61	11.72	74.38	36.80	44.09
Ages 12+	45.79	39.19	35.39	41.18	33.17	21.50	12.34	2.72	0.95	0.33	0.27	0.06	0.11	0.84	5.01	1.72	4.10

Table 7. Abundance index at age (millions) for American plaice in NAFO Div. 3N from Canadian spring surveys from 1985 to 2001

Age/Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.26	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.71	0.46	1.31
2	2.33	2.52	17.27	3.67	4.37	4.30	0.43	0.41	0.78	0.00	0.00	2.06	0.15	0.24	17.60	12.74	16.04
3	33.52	13.39	72.32	45.69	49.06	29.60	2.54	3.15	3.84	1.24	0.74	6.01	1.51	0.24	6.98	44.81	155.19
4	109.11	46.72	113.73	87.97	312.98	165.10	30.46	24.50	74.10	4.10	4.08	6.01	4.28	3.00	1.78	20.53	47.80
5	60.97	106.13	84.60	62.94	106.44	282.87	117.51	38.48	75.44	29.51	14.99	15.58	5.46	3.99	4.19	3.95	4.18
6	60.72	72.84	57.12	27.63	38.68	35.98	75.70	51.69	68.23	12.91	13.29	26.37	16.84	6.12	12.40	6.59	7.98
7	30.06	41.09	32.02	17.23	17.28	11.61	12.85	22.66	54.04	12.31	8.39	20.45	24.42	11.92	12.19	17.71	22.99
8	25.11	17.90	18.64	13.31	18.09	8.03	5.62	5.58	30.27	7.68	4.62	6.89	15.66	19.74	17.65	15.26	21.47
9	20.17	14.53	16.04	11.16	14.71	8.86	5.64	2.67	9.35	4.18	2.45	3.88	5.92	12.52	27.81	21.08	23.17
10	20.35	13.21	11.42	8.69	6.77	5.09	5.47	1.25	4.18	1.30	0.81	0.84	1.70	4.96	24.97	16.79	17.00
11	15.38	7.30	6.89	4.90	5.23	4.00	3.41	1.04	2.68	1.02	0.28	0.54	0.86	2.07	11.01	9.95	18.15
12	9.12	6.11	5.35	3.57	4.34	2.64	1.97	0.72	1.41	0.22	0.05	0.87	0.52	0.80	5.01	4.75	7.67
13	4.80	4.16	4.46	2.95	3.70	2.24	1.77	0.27	0.51	0.45	0.00	0.14	0.20	0.45	2.59	2.08	2.28
14	2.93	2.17	3.36	2.00	2.69	2.21	1.16	0.33	0.52	0.60	0.00	0.07	0.04	0.18	0.78	0.33	1.17
15	2.39	2.13	3.00	1.92	2.96	2.34	1.18	0.45	0.16	0.34	0.00	0.11	0.04	0.06	0.38	0.59	0.82
16	0.71	1.27	1.67	0.91	1.11	1.43	0.67	0.30	0.25	0.17	0.00	0.00	0.00	0.06	0.19	0.37	0.35
17	0.19	0.98	0.66	0.79	0.96	0.79	0.53	0.03	0.18	0.00	0.00	0.00	0.00	0.00	0.19	0.10	0.34
18	0.00	0.18	0.38	0.29	0.43	0.37	0.23	0.03	0.05	0.00	0.00	0.00	0.00	0.00	0.17	0.05	0.22
19	0.00	0.05	0.05	0.06	0.11	0.09	0.09	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
20	0.00	0.00	0.03	0.00	0.00	0.10	0.11	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00
unk1	0.26	0.23	0.88	0.07	0.03	0.46	0.00	0.32	0.14	0.00	0.00	0.11	0.00	0.00	0.04	0.00	0.08
Ages 0+	398.36	352.91	449.91	295.75	589.93	568.36	267.31	153.98	326.18	76.04	49.70	89.93	77.59	66.41	146.71	178.15	348.31
Ages 6+	191.92	183.91	161.11	95.41	117.04	85.75	116.37	87.12	171.87	41.19	29.89	60.16	66.19	58.88	115.41	95.66	123.71
Ages 9+	76.02	52.08	53.32	37.24	42.99	30.14	22.21	7.19	19.34	8.28	3.59	6.44	9.27	21.10	73.18	56.10	71.26
Ages 12+	20.13	17.05	18.97	12.49	16.29	12.21	7.69	2.23	3.14	1.78	0.05	1.19	0.79	1.56	9.38	8.28	12.93

Table 8. Abundance index at age (millions) for American plaice in NAFO Div. 3O from Canadian spring surveys from 1985 to 2001.

Age/Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.08	0.37	7.72	2.00	2.76
2	0.00	0.58	5.38	0.69	0.00	5.45	0.00	4.09	1.30	0.00	0.00	35.87	5.79	8.83	22.96	24.10	47.02
3	8.60	13.38	16.95	15.85	20.37	10.62	24.86	28.66	3.39	0.94	0.89	63.90	33.35	7.29	22.70	92.19	87.85
4	24.12	39.55	57.58	22.47	51.19	113.04	39.65	30.20	40.67	9.53	6.22	27.81	36.80	39.43	14.11	47.07	49.56
5	56.50	34.46	132.85	26.43	55.67	197.91	170.49	25.73	39.93	38.68	15.08	35.55	28.12	44.71	36.73	22.08	18.72
6	44.06	36.82	124.23	34.62	96.36	110.17	110.46	76.76	52.76	46.67	26.80	55.64	40.99	26.40	49.12	30.61	18.95
7	52.08	39.37	70.48	25.50	101.47	82.08	65.32	38.93	68.61	28.66	19.75	50.51	40.32	34.39	26.02	31.75	32.26
8	47.24	28.92	45.95	24.51	47.05	39.90	28.07	24.72	42.46	21.87	14.04	24.61	26.23	40.22	28.86	21.84	24.57
9	35.38	22.23	35.93	18.52	29.60	27.41	18.21	12.92	17.32	9.69	7.40	8.69	10.60	29.01	39.91	19.25	17.98
10	34.70	18.02	24.03	16.56	15.36	16.74	10.70	9.18	9.37	2.72	2.25	3.02	3.66	11.70	20.99	19.62	12.82
11	24.27	11.65	12.70	11.09	7.72	9.99	8.40	5.53	3.72	2.10	1.25	1.32	1.42	6.26	9.09	12.52	8.91
12	13.96	10.20	9.14	8.99	7.96	9.23	4.78	3.24	2.42	1.04	0.28	1.33	1.22	1.84	4.65	3.47	5.37
13	5.58	5.74	6.33	5.68	4.56	5.87	2.89	2.43	0.98	0.64	0.03	0.35	0.34	1.00	2.58	1.70	2.45
14	5.06	2.33	3.84	4.10	2.11	4.20	2.98	1.06	0.68	0.35	0.04	0.18	0.14	0.27	0.93	0.48	1.47
15	4.00	2.30	3.03	2.36	2.19	2.04	1.89	1.78	0.49	0.13	0.00	0.10	0.13	0.41	0.74	0.63	1.10
16	1.59	0.92	1.83	2.31	1.82	1.71	1.03	1.25	0.55	0.09	0.00	0.17	0.13	0.05	0.59	0.19	0.61
17	0.31	0.72	0.97	0.48	1.07	1.22	0.58	0.24	0.36	0.00	0.00	0.00	0.00	0.00	0.32	0.29	0.38
18	0.03	0.18	0.46	0.51	0.43	0.55	0.44	0.51	0.09	0.00	0.00	0.00	0.00	0.00	0.25	0.14	0.15
19	0.00	0.05	0.20	0.03	0.03	0.22	0.24	0.13	0.08	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.04
20	0.29	0.00	0.00	0.03	0.03	0.00	0.08	0.13	0.05	0.00	0.00	0.00	0.00	0.00	0.04	0.11	0.04
unk1	0.06	0.00	0.00	0.66	0.27	0.00	2.46	0.87	0.39	0.04	0.00	0.05	0.00	0.14	0.03	0.04	0.71
Ages 0+	357.82	267.40	552.13	221.37	445.23	638.34	493.54	268.34	285.62	163.15	94.01	309.22	229.31	252.31	288.54	330.07	333.74
Ages 6+	268.54	179.43	339.10	155.28	317.74	311.33	256.07	178.79	199.94	113.96	71.83	145.93	125.16	151.55	184.28	142.60	127.12
Ages 9+	125.16	74.34	98.45	70.65	72.87	79.17	52.23	38.39	36.10	16.76	11.24	15.17	17.63	50.53	80.28	58.40	51.34
Ages 12+	30.81	22.43	25.79	24.48	20.19	25.03	14.91	10.77	5.70	2.26	0.35	2.13	1.95	3.57	10.29	7.01	11.62

Table 9. Abundance at age (millions) for American plaice in NAFO Div. 3LNO from Canadian spring surveys from 1985 to 2001.

Age/Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.26	0.00	0.48	0.00	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.35	0.08	0.54	8.43	4.76	5.22
2	2.33	4.42	27.88	8.47	6.23	9.74	1.75	4.50	2.38	0.00	0.00	46.33	6.57	9.75	42.46	54.56	100.97
3	50.22	31.32	100.65	80.37	86.77	45.46	30.62	33.55	9.50	2.54	2.02	99.84	40.30	10.67	35.10	149.32	275.88
4	158.99	109.83	221.62	191.29	445.13	348.31	84.11	59.84	120.53	21.11	11.12	125.79	55.12	52.67	22.49	72.54	112.98
5	263.81	256.00	460.21	368.61	336.14	618.75	398.19	110.28	138.05	99.22	41.91	133.68	65.28	69.80	66.74	34.98	28.85
6	454.55	561.36	747.45	616.62	551.77	377.90	364.16	190.14	180.14	106.04	57.52	130.51	84.40	69.20	104.51	67.01	36.35
7	595.65	577.16	656.21	543.88	470.17	371.00	180.21	150.92	160.06	85.37	59.88	97.12	79.31	76.74	104.87	78.01	73.86
8	389.80	307.06	398.31	314.97	273.73	200.26	112.92	63.40	89.45	43.27	49.94	39.51	48.72	79.39	111.52	64.57	62.44
9	208.01	193.65	184.64	217.85	187.64	130.48	67.54	34.12	32.23	19.99	27.48	16.19	18.94	47.91	107.31	59.16	58.43
10	140.24	98.12	101.10	85.29	74.68	77.52	35.19	17.50	16.51	5.40	8.34	4.50	6.05	19.56	65.32	47.19	45.04
11	84.30	45.96	41.83	48.63	39.84	32.39	22.26	9.45	7.63	3.95	2.66	1.94	2.68	9.93	30.52	27.93	34.57
12	45.20	34.38	33.80	32.58	27.07	21.46	13.36	5.40	4.26	1.40	0.54	2.23	1.82	3.28	13.02	9.54	16.02
13	22.72	21.74	19.93	18.75	16.83	14.43	7.22	3.34	1.78	1.24	0.09	0.52	0.56	1.62	6.51	4.04	5.54
14	13.98	8.90	11.14	11.97	9.65	8.81	5.53	1.77	1.33	1.00	0.04	0.25	0.17	0.45	1.89	0.90	2.77
15	9.37	7.07	8.03	7.56	8.51	5.95	4.05	2.42	0.67	0.47	0.00	0.21	0.16	0.47	1.16	1.22	1.96
16	4.20	3.76	4.24	4.76	3.99	4.17	2.18	1.61	0.84	0.26	0.00	0.17	0.13	0.14	0.88	0.63	1.05
17	0.89	2.14	1.87	1.63	2.45	2.60	1.28	0.27	0.59	0.00	0.00	0.00	0.00	0.00	0.51	0.39	0.72
18	0.06	0.58	0.86	0.79	0.94	0.92	0.70	0.54	0.14	0.00	0.00	0.00	0.00	0.00	0.42	0.19	0.37
19	0.03	0.10	0.25	0.10	0.18	0.31	0.33	0.13	0.13	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.18
20	0.29	0.00	0.03	0.03	0.03	0.10	0.29	0.22	0.05	0.00	0.00	0.00	0.00	0.00	0.11	0.11	0.04
unk1	0.55	0.74	0.88	1.19	0.35	3.50	2.50	1.20	1.22	0.04	0.00	0.16	0.00	0.26	0.10	0.05	0.83
Ages 0+	2444.88	2263.53	3020.53	2554.13	2541.74	2270.83	1331.89	689.41	766.25	391.26	261.55	699.14	410.29	452.11	723.96	677.04	863.24
Ages 6+	1969.28	1861.97	2209.69	1905.39	1667.46	1248.30	817.22	481.25	495.80	268.39	206.50	293.16	242.94	308.69	548.73	360.89	339.33
Ages 9+	529.27	416.39	407.71	429.92	371.80	299.13	159.94	76.79	66.15	33.71	39.15	26.02	30.51	83.36	227.84	151.30	166.69
Ages 12+	96.73	78.67	80.14	78.15	69.64	58.74	34.95	15.72	9.79	4.37	0.67	3.38	2.84	5.96	24.69	17.02	28.65

Table 10 . Biomass estimates ('000t) of A.plaice, by stratum and depth zone (m), from Canadian fall surveys in Div. 3L in 1995-2001 (Campelen).
(+) indicates biomass <50 t, (-) means stratum not surveyed.

		Biomass						
Depth	Stratum	1995	1996	1997	1998	1999	2000	2001
30-56	784	-	+	+	0.0	-	+	+
	Total	-	+	+	0.0	-	+	+
57-92	350	0.8	0.9	0.5	1.1	1.0	0.5	7.7
	363	3.1	2.0	1.4	2.1	1.9	2.3	3.7
	371	1.2	1.1	0.2	0.5	0.4	0.8	0.8
	372	1.4	1.6	1.5	0.3	1.7	0.6	2.5
	384	1.6	1.6	0.5	0.2	1.5	0.1	1.3
	785	-	+	+	+	-	+	0.1
	Total	8.1	7.2	4.0	4.2	6.5	4.3	16.1
93-183	328	3.0	1.6	0.9	0.5	2.0	0.8	1.6
	341	1.6	2.8	0.8	2.1	0.6	0.7	0.9
	342	0.6	+	0.4	0.2	-	0.2	0.1
	343	0.7	0.1	0.0	0.1	-	+	0.1
	348	3.1	1.8	1.3	1.5	1.4	0.4	0.6
	349	3.4	1.4	1.5	0.8	0.4	0.3	0.6
	364	2.8	3.6	2.8	5.2	1.2	1.8	2.9
	365	1.7	1.1	1.0	1.4	1.0	-	0.4
	370	2.0	6.3	1.3	4.6	3.9	1.1	2.2
	385	3.9	7.6	1.9	4.0	2.9	0.8	3.5
	390	1.7	1.6	2.2	3.3	2.1	0.7	3.1
	786	-	0.3	0.1	0.1	-	0.1	0.2
	787	-	0.4	0.5	0.1	-	0.1	0.1
	788	-	0.3	0.3	0.1	-	0.1	+
	790	-	0.2	0.2	+	-	+	+
	793	-	0.1	0.1	0.1	-	+	0.1
	794	-	+	0.1	+	-	-	+
	797	-	0.1	0.1	+	-	+	+
	799	-	0.1	0.1	+	-	+	+
	Total	24.5	29.4	15.6	24.1	15.5	7.1	16.4
184-274	344	1.0	1.1	0.1	0.5	0.5	0.4	0.6
	347	1.8	0.7	0.3	0.8	0.5	0.4	0.4
	366	1.6	1.2	0.5	0.8	1.7	0.5	0.3
	369	1.0	1.6	0.5	1.8	1.6	0.8	2.7
	386	1.8	2.6	1.0	0.9	1.2	0.4	1.3
	389	0.6	0.6	0.6	0.7	0.6	0.4	1.4
	391	0.4	0.2	0.2	0.2	0.3	+	0.1
	789	-	0.2	0.2	0.1	-	0.1	0.2
	791*	-	0.5	0.4	0.1	-	0.3	0.3
	795	-	+	0.2	0.4	-	+	+
	798	-	0.2	0.7	0.3	-	+	0.2
	Total	8.2	8.9	4.6	6.6	6.4	3.3	7.5
275-366	345	4.1	2.4	0.8	2.5	1.3	0.6	0.8
	346	2.8	1.1	2.2	1.7	1.7	0.4	0.9
	368	0.2	0.3	0.2	0.4	0.7	0.6	0.3
	387	0.4	0.7	0.7	0.2	1.8	1.0	0.4
	388	0.3	0.1	0.4	+	0.9	0.4	0.1
	392	+	+	0.2	0.1	0.5	0.2	0.1
	796	-	0.6	0.9	0.4	-	-	0.2
	800	-	-	-	0.2	-	0.2	0.3
	Total	7.8	5.2	5.5	5.5	6.9	3.4	3.1
367-549	729	+	+	0.2	0.1	0.7	1.6	0.4
	731	0.2	-	0.6	0.1	1.0	1.1	0.1
	733	0.2	0.2	0.5	0.6	0.3	1.0	0.6
	735	0.7	0.7	0.3	0.8	1.9	2.1	1.6
	792	-	0.2	1.9	0.3	-	0.2	0.6
	Total	1.1	1.1	3.6	1.9	3.9	6.0	3.3
550-731	730	+	0.0	0.5	0.1	0.2	0.4	0.9
	732	+	+	1.3	0.2	1.9	0.7	1.3
	734	0.0	0.2	0.3	0.1	0.1	0.1	
	736	0.2	0.5	0.8	0.6	0.6	1.5	+
	Total	0.2	0.7	2.8	1.0	2.8	2.7	2.2
732-914	737	0.4	1.5	1.8	3.3	0.8	0.7	1.3
	741	-	1.0	2.3	1.7	0.1	0.0	0.0
	745	-	0.1	2.2	0.1	0.7	0.0	0.0
	748	-	1.4	0.7	0.0	1.1	0.0	0.0
	Total	0.4	4.0	7.0	5.1	2.7	0.7	1.3
915-1097	738	0.6	0.2	0.0	0.0	0.0	0.0	+
	742	-	0.1	0.0	0.0	+	0.0	0.0
	746	-	0.1	0.0	+	0.0	0.0	0.0
	749	-	+	0.2	0.0	-	0.0	0.0
	Total	0.6	0.4	0.2	+	+	0.0	+
1098-1280	739	-	0.0	0.0	0.0	0.0	0.0	0.0
	743	-	0.0	0.0	0.0	0.0	0.0	0.0
	747	-	0.0	0.0	0.1	+	0.0	0.0
	750	-	0.1	0.0	0.0	0.0	0.0	0.0
	Total	-	0.1	0.0	0.1	+	0.0	0.0
1281-1463	740	-	0.0	0.0	0.0	0.1	0.0	0.0
	744	-	0.5	0.0	0.1	-	0.0	0.0
	751	-	0.0	0.0	0.0	-	0.0	0.0
	Total	-	0.5	0.0	0.1	0.1	0.0	0.0
Grand Total		50.9	57.5	43.3	48.6	44.8	27.5	49.9

* in 1996 stratum 791 covered a depth range of 184-366 m

Table 11. Biomass estimates ('000t) of A.plaice, by stratum and depth zone (m), from Canadian fall surveys in Div. 3N in 1995-2001 (Campelen). (+) indicates biomass <50 t, (-) means stratum not surveyed.

		Biomass						
Depth	Stratum	1995	1996	1997	1998	1999	2000	2001
≤ 56	375	1.9	1.1	3.9	5.2	0.6	1.7	0.6
	376	4.7	2.4	7.7	4.4	4.3	35.8	15.4
	Total	6.6	3.5	11.6	9.6	4.9	37.5	16.0
57-92	360	22.3	7.4	28.4	39.2	43.4	96.4	46.0
	361	3.5	4.1	3.3	2.1	1.8	3.9	2.3
	362	5.0	1.1	5.1	2.9	2.9	2.6	5.3
	373	1.8	0.2	2.3	1.7	4.2	1.7	6.9
	374	2.4	0.4	1.8	1.3	2.7	1.7	3.7
	383	-	0.3	0.5	0.8	0.8	+	0.5
	Total	35.0	13.5	41.4	48.0	55.8	106.3	64.7
93-183	359	2.2	0.3	3.8	11.6	9.8	32.2	4.0
	377	0.5	0.4	2.3	1.1	0.9	0.7	3.0
	382	0.3	0.3	0.8	6.1	2.7	1.0	3.5
	Total	3.0	1.0	6.9	18.8	13.4	33.9	10.5
184-274	358	0.8	0.2	0.4	0.3	0.3	0.6	1.0
	378	0.1	0.2	0.1	0.1	0.4	0.2	0.1
	381	0.1	0.4	0.2	0.1	0.3	0.3	0.3
	Total	1.0	0.8	0.7	0.5	1.0	1.1	1.4
275-366	357	0.1	0.1	0.0	+	-	+	+
	379	+	0.2	0.1	+	0.3	+	0.1
	380	0.1	0.2	0.1	0.1	0.7	0.3	0.1
	Total	0.2	0.5	0.2	0.1	1.0	0.3	0.2
367-549	723	+	+	0.0	0.1	+	+	+
	725	0.1	0.1	0.0	+	0.1	0.2	+
	727	+	0.1	0.1	0.1	1.5	0.4	0.1
	Total	0.1	0.2	0.2	0.2	1.6	0.6	0.1
550-731	724	0.1	0.3	0.0	0.0	0.1	0.0	0.0
	726	+	0.3	0.1	+	+	+	+
	728	+	0.8	0.1	0.1	0.3	0.6	+
	Total	0.1	1.4	0.2	0.1	0.4	0.6	+
732-914	752	-	-	-	1.5	-	0.0	0.0
	756	-	-	-	0.1	-	-	0.0
	760	-	-	-	0.0	-	-	0.0
	Total				0.0	-	0.0	0.0
915-1097	753	-	-	-	+	-	0.0	0.0
	757	-	-	-	0.0	-	-	0.0
	761	-	-	-	0.0	-	-	0.0
	Total	-	-	-	+	-	0.0	0.0
1098-1280	754	-	-	-	0.0	-	0.0	0.0
	758	-	-	-	0.0	-	0.0	0.0
	762	-	-	-	-	-	-	0.0
	Total	-	-	-	0.0	-	0.0	0.0
1281-1463	755	-	-	-	0.0	-	0.0	0.0
	759	-	-	-	0.0	-	-	0.0
	763	-	-	-	-	-	-	0.0
	Total	-	-	-	0.0	-	0.0	0.0
Grand Total		46.0	20.9	61.0	77.3	78.1	180.3	92.9

Table 12. Biomass estimates ('000t) of A.plaice, by stratum and depth zone (m), from Canadian fall surveys in Div. 3O in 1995-2001 (Campelen). (+) indicates biomass <50 t, (-) means stratum not surveyed.

		Biomass						
Depth	Stratum	1995	1996	1997	1998	1999	2000	2001
57-92	330	7.7	0.8	5.5	5.9	5.4	5.3	5.9
	331	1.2	0.3	0.9	1.8	1.0	1.0	1.1
	338	6.6	3.3	6.4	3.4	3.8	2.1	4.4
	340	7.2	0.4	3.2	1.1	2.8	2.2	1.7
	351	1.7	0.9	5.2	3.3	2.9	6.4	4.3
	352	4.6	9.1	6.9	8.4	3.2	8.4	8.0
	353	5.6	14.4	14.8	19.3	10.3	14.5	13.9
	Total	34.6	29.2	42.9	43.2	29.4	39.9	39.3
93-183	329	3.2	1.5	2.7	5.0	6.6	8.0	7.6
	332	3.5	3.9	1.6	3.9	1.9	2.8	1.3
	337	2.4	25.3	2.5	1.5	1.4	1.8	0.5
	339	6.5	0.9	5.1	1.4	-	3.8	2.4
	354	4.5	8.0	2.4	3.7	27.0	3.8	2.7
	Total	20.1	39.6	14.4	15.5	36.9	20.2	14.5
184-274	333	+	-	+	+	0.1	+	0.0
	336	+	0.1	0.1	+	0.1	0.1	+
	355	0.2	5.4	0.1	+	0.3	+	0.1
	Total	0.2	5.5	0.2	+	0.5	0.1	0.1
275-366	334	0.0	-	+	+	+	0.0	0.0
	335	+	+	+	+	+	+	+
	356	0.0	0.1	+	+	+	+	0.0
	Total	+	0.1	0.1	+	0.1	0.0	0.0
367-549	717	0.0	-	+	0.0	+	+	+
	719	+	0.2	0.0	+	+	+	0.0
	721	+	0.6	0.0	0.0	+	+	0.0
	Total	+	0.8	+	+	+	+	0.0
550-731	718	0.0	-	0.0	+	0.0	0.0	0.0
	720	0.0	+	-	+	+	+	0.0
	722	0.0	+	0.0	0.0	+	0.0	0.0
	Total	0.0	+	0.0	+	+	+	0.0
732-914	764	-	-	-	0.0	-	-	0.0
	768	-	-	-	0.0	-	-	0.0
	772	-	-	-	0.0	-	-	-
	Total	-	-	-	0.0	-	-	0.0
915-1097	765	-	-	-	0.0	-	-	0.0
	769	-	-	-	0.0	-	-	0.0
	773	-	-	-	0.0	-	-	0.0
	Total	-	-	-	0.0	-	-	0.0
1098-1280	766	-	-	-	-	-	0.0	0.0
	770	-	-	-	-	-	0.0	0.0
	774	-	-	-	-	-	0.0	0.0
	Total	-	-	-	-	-	0.0	0.0
1281-1463	767	-	-	-	-	-	0.0	0.0
	771	-	-	-	-	-	0.0	0.0
	775	-	-	-	-	-	0.0	0.0
	Total	-	-	-	-	-	0.0	0.0
Grand Total		54.9	75.2	57.5	58.7	66.9	60.2	53.9

Table 13. Abundance index (millions) at age for A. plaice in Div. 3L from Canadian fall surveys from 1990 to 2000.

Age/Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.34	0.00
1	0.78	0.12	0.00	0.00	0.00	0.45	1.12	0.17	2.71	14.04	16.17
2	2.39	2.09	0.75	3.10	0.00	11.05	16.62	1.52	3.84	19.86	31.38
3	26.07	14.38	12.54	21.10	0.00	25.11	57.94	21.44	6.89	10.52	26.11
4	309.25	91.21	52.65	71.20	14.48	59.35	170.16	63.91	28.35	7.92	8.33
5	597.38	295.78	171.91	123.36	25.75	198.76	149.44	105.70	64.67	29.39	27.69
6	548.02	372.37	269.73	218.20	42.96	187.22	84.67	84.48	90.34	50.01	34.64
7	303.10	164.87	102.93	138.57	54.51	101.25	31.85	35.87	57.37	46.36	22.80
8	145.95	77.59	32.27	27.74	28.54	36.23	6.04	10.59	25.21	37.97	12.56
9	95.12	43.16	10.42	7.96	8.82	19.26	2.46	5.73	14.46	24.81	8.54
10	36.73	18.31	5.51	2.65	1.88	3.65	0.83	1.27	3.74	8.91	2.73
11	17.48	8.27	1.87	1.13	0.29	0.36	0.14	0.82	1.26	4.64	1.77
12	9.06	5.12	1.63	0.29	0.06	0.10	0.06	0.19	0.41	2.10	0.33
13	5.46	1.95	0.46	0.09	0.02	0.00	0.05	0.14	0.06	0.63	0.12
14	3.94	1.51	0.26	0.07	0.07	0.00	0.00	0.00	0.00	0.22	0.00
15	1.52	0.88	0.12	0.24	0.00	0.00	0.00	0.01	0.00	0.03	0.05
16	0.51	0.23	0.04	0.06	0.00	0.00	0.00	0.00	0.00	0.03	0.05
17	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unk	0.31	0.01	0.00	0.00	0.00	1.69	0.00	0.50	0.27	0.08	0.17
Ages 0+	2103.06	1098.06	663.07	615.76	177.38	644.47	521.37	332.31	299.68	257.85	193.46
Ages 6+	1166.89	694.48	425.23	397.01	137.15	348.06	126.10	139.08	192.86	175.70	83.59
Ages 9+	169.82	79.65	20.29	12.50	11.14	23.36	3.54	8.15	19.94	41.36	13.59
Ages 12+	20.50	9.90	2.49	0.75	0.15	0.10	0.11	0.33	0.48	3.00	0.56

Table 14. Abundance index (millions) at age for American plaice in Div. 3N from Canadian fall surveys from 1990 to 2000.

Age/Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	2.34	0.82	5.84	0.00	0.00	1.97	0.11	1.81	1.93	46.35	20.47
2	40.24	84.64	78.12	1.90	0.00	17.53	1.70	1.34	1.38	69.91	158.97
3	134.78	193.91	161.07	52.32	16.51	15.09	4.08	8.06	0.86	11.42	264.89
4	295.80	284.75	130.72	283.60	65.29	16.40	3.31	14.95	11.62	2.61	53.91
5	169.59	288.82	130.17	135.26	96.33	27.70	9.34	8.33	18.51	7.83	22.80
6	30.73	72.35	131.01	67.76	43.86	62.43	13.60	29.97	11.44	12.62	38.99
7	9.34	19.55	53.35	74.65	23.60	15.42	12.65	41.44	25.97	12.16	59.27
8	3.83	10.86	12.33	23.64	14.33	9.03	4.55	24.91	35.67	29.10	53.08
9	6.62	10.35	8.02	8.78	7.29	6.09	1.82	8.00	37.85	25.04	39.83
10	3.31	7.24	3.71	4.70	1.97	2.21	0.79	3.60	8.76	18.08	39.29
11	2.53	5.98	2.20	2.20	0.78	0.72	0.36	1.64	3.54	9.46	19.14
12	1.71	3.26	1.74	1.65	1.00	0.71	0.27	0.43	1.21	7.39	5.20
13	1.60	4.31	1.45	0.88	0.42	0.25	0.00	0.49	0.61	2.75	2.49
14	1.53	2.50	1.23	0.78	0.69	0.02	0.00	0.34	0.52	0.58	0.68
15	1.49	1.45	0.33	0.66	0.29	0.00	0.06	0.15	0.08	0.06	0.34
16	1.59	1.05	0.46	0.34	0.00	0.00	0.00	0.04	0.24	0.36	0.00
17	0.47	0.48	0.29	0.10	0.00	0.00	0.00	0.00	0.13	0.30	0.34
18	0.13	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00
19	0.00	0.04	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.08	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unk	0.16	0.06	1.73	0.21	0.09	0.07	0.00	0.19	0.12	0.00	0.00
Ages 0+	707.78	992.55	723.78	659.44	272.46	175.66	52.65	145.70	160.43	256.19	779.70
Ages 6+	64.87	139.55	216.12	186.17	94.24	96.89	34.10	111.02	126.02	118.06	258.66
Ages 9+	20.97	36.80	19.43	20.11	12.44	10.01	3.30	14.70	52.93	64.19	107.32
Ages 12+	8.51	13.22	5.50	4.43	2.40	0.98	0.33	1.45	2.79	11.60	9.07

Table 15. Abundance index (millions) at age for American plaice in Div. 3O from Canadian fall surveys from 1990 to 2000.

Age/Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.61	1.38	0.00
1	8.24	0.63	0.00	0.00	0.00	35.77	2.28	1.32	17.60	93.19	54.15
2	10.51	12.10	2.58	5.10	0.00	97.32	80.15	16.68	21.30	80.38	139.26
3	25.25	56.20	44.10	42.54	3.02	20.35	74.47	71.61	9.03	49.89	124.51
4	100.36	73.88	74.88	143.08	23.98	35.12	54.27	67.87	77.71	13.19	60.63
5	86.13	139.80	65.85	101.84	68.22	69.48	49.52	39.82	37.99	55.24	23.18
6	64.11	134.09	98.45	86.11	64.26	86.70	75.81	45.40	27.31	30.79	58.38
7	57.19	64.96	69.79	103.34	56.80	35.29	37.70	42.67	29.30	21.05	33.52
8	41.89	27.82	32.12	52.74	46.38	16.19	10.77	17.73	22.54	31.85	18.15
9	22.78	28.33	17.21	16.26	12.54	14.17	4.54	9.60	16.11	22.84	13.45
10	15.16	18.75	8.47	7.97	3.97	4.89	1.46	2.43	5.45	6.67	6.91
11	9.19	11.66	4.38	3.47	1.60	0.80	1.29	0.76	2.14	4.75	4.47
12	6.66	5.48	3.48	3.15	0.67	0.50	0.26	0.59	2.01	2.82	1.53
13	4.99	5.96	1.43	2.11	0.48	0.20	0.05	0.22	1.37	1.51	0.48
14	3.85	2.96	1.67	1.53	0.41	0.28	0.12	0.26	0.32	0.27	0.16
15	2.41	2.12	0.70	0.79	0.10	0.05	0.28	0.31	0.10	0.08	0.13
16	2.36	1.05	0.67	0.96	0.00	0.00	0.00	0.03	0.14	0.32	0.19
17	1.17	0.33	0.24	0.18	0.00	0.00	0.00	0.00	0.31	0.28	0.37
18	0.08	0.28	0.27	0.31	0.00	0.00	0.00	0.00	0.05	0.05	0.00
19	0.00	0.11	0.06	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unk	0.17	1.31	0.13	1.45	0.00	0.00	0.00	0.37	0.81	1.20	0.09
Ages 0+	462.49	587.83	426.46	573.11	282.41	417.10	392.95	317.68	273.20	417.77	539.57
Ages 6+	231.82	303.91	238.92	279.10	187.20	159.07	132.27	120.01	107.15	123.29	137.74
Ages 9+	68.64	77.04	38.57	36.91	19.77	20.90	7.99	14.21	28.00	39.59	27.69
Ages 12+	21.51	18.30	8.51	9.22	1.65	1.04	0.71	1.42	4.31	5.33	2.86

Table 16. Abundance index (millions) at age for American plaice in Div. 3LNO from Canadian fall surveys from 1990 to 2000.

Age/Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.70	1.72	0.00
1	11.36	1.56	5.84	0.00	0.00	38.19	3.52	3.30	22.23	153.58	90.79
2	53.13	98.83	81.45	10.10	0.00	125.90	98.46	19.54	26.52	170.15	329.62
3	186.10	264.49	217.71	115.95	19.53	60.55	136.49	101.12	16.78	71.84	415.51
4	705.41	449.84	258.26	497.88	103.74	110.88	227.74	146.72	117.67	23.72	122.87
5	853.10	724.40	367.93	360.45	190.30	295.94	208.29	153.85	121.17	92.46	73.67
6	642.86	578.81	499.19	372.08	151.09	336.35	174.08	159.85	129.09	93.43	132.01
7	369.63	249.38	226.08	316.57	134.91	151.96	82.20	119.98	112.64	79.57	115.59
8	191.67	116.27	76.71	104.12	89.25	61.45	21.37	53.22	83.42	98.92	83.79
9	124.52	81.84	35.65	33.00	28.65	39.52	8.82	23.33	68.42	72.70	61.82
10	55.20	44.30	17.68	15.32	7.82	10.75	3.08	7.30	17.95	33.66	48.92
11	29.20	25.92	8.45	6.80	2.67	1.88	1.78	3.22	6.94	18.85	25.38
12	17.43	13.86	6.85	5.10	1.72	1.31	0.59	1.21	3.63	12.31	7.07
13	12.05	12.21	3.33	3.08	0.92	0.45	0.10	0.85	2.04	4.89	3.09
14	9.32	6.98	3.15	2.38	1.17	0.31	0.12	0.60	0.84	1.08	0.84
15	5.42	4.45	1.15	1.68	0.40	0.05	0.35	0.48	0.18	0.16	0.53
16	4.45	2.34	1.17	1.36	0.00	0.00	0.00	0.08	0.38	0.71	0.24
17	1.64	1.00	0.52	0.27	0.00	0.00	0.00	0.00	0.45	0.58	0.71
18	0.21	0.42	0.27	0.31	0.00	0.00	0.00	0.00	0.05	0.12	0.00
19	0.00	0.17	0.06	0.22	0.00	0.00	0.00	0.00	0.00	0.08	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unk	0.64	1.38	1.86	1.65	0.09	1.77	0.00	1.05	1.20	1.28	0.27
Ages 0+	3272.68	2677.06	1811.45	1846.66	732.15	1235.46	966.97	794.63	732.11	930.53	1512.46
Ages 6+	1463.58	1137.94	880.27	862.28	418.59	604.02	292.47	370.11	426.03	417.05	479.99
Ages 9+	259.43	193.48	78.29	69.52	43.34	54.26	14.83	37.06	100.88	145.14	148.60
Ages 12+	50.51	41.42	16.50	14.40	4.21	2.12	1.15	3.20	7.57	19.93	12.49

Table 17. Likelihood Ratio Test to evaluate effect of reducing the number of variance parameters estimated. The alternate model is one with variance parameters estimated for each survey*age combination (12 variance parameters), with (restricted) Loglikelihood=-63.84.

Null Model	Test Statistic	df	p-val
FALL_CAMP[1]	0.7462	2	0.6886
FALL_ENGL[1]	0.8300	2	0.6604
SPR_ENGL[1]	0.7614	2	0.6834
SPR_CAMP[1]	0.3397	2	0.8438
Survey vp[2]	2.0501	8	0.9794
Common vp[3]	4.1901	11	0.9640

[1] Survey for which survey*age variance parameters are collapsed to a survey variance parameter.
[2] Survey variance parameter estimated for each survey.
[3] One variance parameter estimated (i.e. a GLM).

Table 18. Canadian catches of A. plaice by Division, month, and gear during 2001.

	3L		3N		3O			3LNO
	OT	Gillnet	OT	Seine	OT	Gillnet	Seine	Total
Jan	13		22			5		40
Feb	4		30			6		40
Mar	30		8		1	1		40
Apr	60		144	1	2			207
May	59		253	6	27			345
Jun	3				158			161
Jul	2	11	8		3			24
Aug	8	22	41		2			73
Sep	9	15	23		99			146
Oct		1	76	7	138		32	254
Nov		1	181		27			209
Dec			75		6			81
Total	**188**	**50**	**861**	**14**	**463**	**12**	**32**	**1620**

Summaries:

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GN=62      3L=238      Can (N)= 1595
OT=1512    3N=875      Can (S)= 25
Seine=46   3O=507

By-catch in directed yellowtail fishery = 1411
By-catch in directed G.halibut fishery = 176
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Table 19. Catch at age (000 of fish) and mean length (cm) and weights (kg) at age from the Canadian catch of A. plaice in Div. 3LNO in 2001. S.O.P. is catch numbers x mean weights. An asterisk indicates catch of less than 500 fish.

					2001	3LNO			
Age	*3L* [1]	*3L* [2]	3L	3N [3]	3O	Total	Mean len	Mean wgt	S.O.P.
3				*	*	0.2	22.9	0.093	0.02
4				*	*	0.5	24.8	0.126	0.06
5				4	5	9	33.1	0.325	2.93
6	*1*		1	57	65	124	35.8	0.418	51.83
7	*6*	*11*	18	212	131	364	37.6	0.497	180.91
8	*13*	*32*	47	238	117	404	39.0	0.562	227.05
9	*14*	*79*	99	185	142	429	39.7	0.598	256.54
10	*17*	*113*	138	208	107	456	41.7	0.713	325.13
11	*10*	*85*	101	165	69	337	44.0	0.842	283.75
12	*5*	*26*	33	65	33	132	47.1	1.052	138.86
13	*1*	*7*	9	31	5	45	50.4	1.306	58.77
14	*	*1*	1	12	4	18	53.7	1.617	29.11
15	*	*	*	5	1	6	57.9	2.051	12.31
16				2	*	3	61.7	2.547	7.64
17				1	*	0.8	63.9	2.830	2.26
18				1		0.6	64.8	2.972	1.78
19				*		0.2	67.1	3.312	0.66
Total	*67*	*354*	447	1186	679	2329			1580
								catch=	1620

[1] catch in fishery directed for yellowtail
[2] catch in fishery directed for Greenland halibut
[3] Includes 32 t of Seine catch reported from Div. 3O.

Table 20. Catch at age for all fleets, Div. 3LNO American plaice, 2001.

		Portugal				Russia				Spain				Canada				Overall (LF data available)				Japan	Estonia	Poland	Lithuania	Total 3LNO Numbers@age ('000s)	Total SOP
	Age	3LNO	Mean len	Mean wgt	S.O.P.	3LNO	Mean len	Mean wgt	S.O.P.	3LNO	Mean len	Mean wgt	S.O.P.	3LNO	Mean len	Mean wgt	S.O.P.	3LNO	Mean len	Mean wgt	S.O.P.	3LNO	3LNO	3LNO	3LNO	3LNO	
2001	1	0	0.0	0.000	0	0	0.0	0.000	0	0	0.0	0.000	0	0	0	0	0	0	0.0	0.000	0					0	0
	2	1	16.5	0.031	0	0	0.0	0.000	0	2	15.4	0.025	0	0	0	0	0	3	15.7	0.027	0					3	0
	3	65	22.7	0.091	6	2	23.6	0.102	0	137	22.1	0.082	11	0	22.9	0.093	0	204	22.3	0.085	17					212	18
	4	44	25.5	0.133	6	2	25.7	0.136	0	107	24.3	0.114	12	1	24.8	0.126	0	153	24.7	0.120	18					160	19
	5	32	29.7	0.220	7	3	29.7	0.219	1	62	29.3	0.211	13	9	33.1	0.325	3	106	29.6	0.223	24					110	25
	6	59	31.3	0.261	16	12	30.4	0.239	3	122	31.2	0.261	32	124	35.8	0.418	52	317	33.3	0.322	102					331	106
	7	197	33.6	0.332	65	46	31.9	0.280	13	484	34.7	0.370	179	364	37.6	0.497	181	1091	35.6	0.402	438					1137	457
	8	220	36.2	0.424	93	74	34.3	0.356	27	656	37.5	0.481	315	404	39.0	0.562	227	1354	37.7	0.489	662					1411	690
	9	247	37.1	0.464	115	91	35.5	0.397	36	751	38.2	0.509	383	429	39.7	0.598	257	1518	38.4	0.520	790					1582	823
	10	240	39.8	0.584	140	91	38.3	0.514	47	743	40.7	0.628	467	456	41.7	0.713	325	1530	40.9	0.640	978					1594	1019
	11	219	43.3	0.774	170	73	43.7	0.786	59	716	44.0	0.817	586	337	44.0	0.842	284	1346	44.0	0.815	1096					1402	1143
	12	127	46.7	0.991	126	48	47.7	1.066	51	331	47.2	1.027	340	132	47.1	1.052	139	637	47.2	1.028	655					664	682
	13	46	49.0	1.165	54	21	51.8	1.401	29	110	49.7	1.218	135	45	50.4	1.306	59	223	50.0	1.242	276					232	288
	14	15	51.4	1.368	21	8	52.6	1.475	12	41	51.0	1.328	54	18	53.7	1.617	29	82	51.9	1.413	116					86	121
	15	13	55.7	1.787	24	13	57.4	1.974	25	28	56.2	1.843	52	6	57.9	2.051	12	60	56.6	1.880	113					63	118
	16	7	56.6	1.885	14	5	59.1	2.168	10	7	58.3	2.075	14	3	61.7	2.547	8	22	58.5	2.096	46					23	48
	17	3	58.1	2.057	6	3	58.0	2.038	6	6	57.0	1.930	11	1	63.9	2.830	2	12	58.0	2.042	25					13	26
	18	2	61.0	2.416	4	2	61.0	2.420	6	3	60.9	2.402	6	1	64.8	2.972	2	7	61.3	2.457	18					6	19
	19	0	63.7	2.780	1	1	64.5	2.907	3	1	64.5	2.907	3	0	67.1	3.312	1	3	64.6	2.921	7					3	8
	20	0	0.0	0.000	0	0	0.0	0.000	0	0	0.0	0.000	0	0	0	0	0	0	0.0	0.000	0					0	0
	Unk	4	41.9	0.692	3	2	68.6	3.574	8	6	59.6	2.235	14	0	0	0	0	12	56.8	1.908	23					13	24
Total					869				333				2627				1580				5409						5635
Catch (t)					959				308				2627				1620					169	54	1	3		

Table 21. Difference in estimated population numbers (‘000s) for two formulations of ADAPT, one using catch-at-age from 1960 to 2001 and the other using catch-at-age from 1975 to 2001.

	5	6	7	8	9	10	11	12	13	14	15
1975	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1976	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1979	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1981	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1983	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1984	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1985	-0.03	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1986	-0.01	-0.03	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1987	-0.03	-0.01	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1988	-0.05	-0.02	-0.01	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1989	-0.20	-0.04	-0.02	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
1990	-0.27	-0.12	-0.02	-0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.00
1991	-0.09	-0.16	-0.07	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
1992	-0.07	-0.05	-0.09	-0.04	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
1993	-0.05	-0.04	-0.03	-0.06	-0.02	0.00	0.00	0.00	0.00	0.00	0.00
1994	-0.05	-0.03	-0.02	-0.02	-0.03	-0.01	0.00	0.00	0.00	0.00	0.00
1995	-0.05	-0.03	-0.02	-0.01	-0.01	-0.02	-0.01	0.00	0.00	0.00	0.00
1996	-0.04	-0.03	-0.02	-0.01	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.00
1997	-0.02	-0.02	-0.02	-0.02	-0.01	-0.01	0.00	-0.01	0.00	0.00	0.00
1998	-0.02	-0.02	-0.02	-0.02	-0.01	-0.01	0.00	0.00	-0.01	0.00	0.00
1999	-0.02	-0.02	-0.01	-0.02	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.00
2000	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.00	0.00	0.00	-0.01
2001		-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.00	0.00	-0.01

Table 22. Catch-at-age used in the virtual population analyses. Age 15 is a plus group.

	5	6	7	8	9	10	11	12	13	14	15
1960	44.7	318.8	841.8	1365.9	1738.3	2280.0	2540.0	3473.6	2752.5	2564.7	4588.8
1961	28.1	200.4	531.2	1230.9	2463.9	3174.2	2467.1	2272.0	3894.1	2579.4	5102.7
1962	62.4	445.1	657.2	1096.1	1184.5	1669.1	2432.4	2697.6	2409.5	3276.8	5958.8
1963	144.3	1029.7	1866.4	1434.1	1546.8	2237.6	3104.3	4174.8	3896.9	3851.9	5622.8
1964	268.6	1916.7	4997.5	3253.4	6174.5	8768.6	6960.2	6149.8	3245.9	3033.6	5552.8
1965	475.5	3157.0	7234.8	9305.9	7048.0	7562.9	5731.6	5790.8	5214.6	4333.2	6510.2
1966	1759.8	6271.7	10036.6	11132.5	9516.7	7266.3	7106.4	5667.6	5731.0	5009.8	8475.7
1967	433.9	3345.3	10834.8	7647.2	9504.5	13713.2	13672.7	14564.6	9495.5	6572.1	13247.8
1968	275.8	2342.3	4139.2	9785.9	11210.5	11631.0	7735.4	13842.2	8778.0	6339.2	8419.3
1969	690.3	2453.1	7875.0	14186.6	18181.9	12778.9	12735.3	10396.6	7053.8	5305.1	7666.2
1970	115.9	2172.2	2554.1	10006.8	13536.7	11286.1	11179.1	8248.5	5556.4	4661.3	9285.0
1971	1135.9	1749.6	8411.7	10457.6	15504.1	14164.8	10993.1	9026.5	5195.2	3720.6	7130.5
1972	578.2	2573.8	2367.8	7696.8	11301.7	12765.9	12718.0	10706.0	6783.8	4354.0	7033.1
1973	46.4	1079.1	6329.1	10518.1	13016.7	10042.3	9980.4	6762.3	6589.6	3733.8	7013.8
1974	354.0	5955.0	10475.0	10069.0	7768.0	9004.0	7086.0	4596.0	3809.0	2278.0	2164.0
1975	883.0	3128.0	7220.0	9433.0	9234.0	7903.0	5701.0	4732.0	3788.0	2617.0	2933.0
1976	837.0	3907.0	8781.0	19363.0	16597.0	12338.0	8323.0	5156.0	3024.0	2309.0	2241.0
1977	974.0	6723.0	8743.0	11730.0	13559.0	11157.0	6520.0	4257.0	2369.0	1493.0	1625.0
1978	1558.0	4467.0	9195.0	10397.0	12743.0	13881.0	9938.0	6823.0	3655.0	2239.0	2440.0
1979	1257.0	6551.0	13532.0	18747.0	14977.0	12506.0	8791.0	3775.0	1843.0	714.0	580.0
1980	263.0	2977.0	9531.0	12578.0	14111.0	14212.0	11288.0	8088.0	3732.0	1565.0	1022.0
1981	154.0	554.0	2248.0	4786.0	7921.0	11425.0	13565.0	11872.0	8693.0	5591.0	4697.0
1982	27.0	314.0	1814.0	4799.0	8946.0	12836.0	15801.0	14489.0	7942.0	4224.0	2943.0
1983	119.0	991.0	3053.0	5797.0	8343.0	7707.0	8493.0	7517.0	4588.0	2480.0	1771.0
1984	48.0	397.0	1516.0	3311.0	5853.0	9958.0	12887.0	8964.0	5072.0	2515.0	1602.0
1985	296.0	788.0	2362.0	5652.0	10694.0	15741.0	14528.0	9233.0	4108.0	1969.0	1792.0
1986	4407.0	9707.0	12556.0	12530.0	13372.0	13874.0	14246.0	10376.0	5947.0	2637.0	2155.0
1987	2237.0	4941.0	7691.0	10893.0	15867.0	17640.0	11404.0	6986.0	3076.0	1303.0	1046.0
1988	2908.0	3213.0	4853.0	7269.0	10123.0	10325.0	9260.0	6040.0	2692.0	1156.0	962.0
1989	12745.0	11553.0	11432.0	9652.0	14180.0	12387.0	8405.0	4972.0	2029.0	1027.0	715.0
1990	15134.0	7694.0	4489.0	4604.0	8666.0	8666.0	6452.0	3633.0	1702.0	945.0	548.0
1991	6103.0	12152.0	7846.0	9331.0	7856.0	6589.0	4394.0	2294.0	811.0	364.0	484.0
1992	148.0	1023.0	2591.0	3395.0	3618.0	2154.0	1507.0	875.0	576.0	513.0	579.0
1993	1172.4	3712.9	8820.9	11590.5	5720.0	3376.9	1853.1	1002.5	526.9	354.7	526.8
1994	4316.3	3837.1	5426.1	4459.7	2777.0	736.9	475.6	162.8	120.9	54.7	27.7
1995	99.2	313.9	453.2	333.0	203.3	65.5	13.6	4.1	0.1	0.1	0.4
1996	180.9	742.8	975.0	452.7	211.1	51.9	10.4	8.1	2.3	1.0	1.3
1997	19.4	134.9	543.7	719.4	409.4	149.3	93.5	56.8	26.2	1.4	1.4
1998	10.6	54.8	272.7	767.1	804.9	455.5	278.5	117.3	69.0	49.2	18.3
1999	26.0	174.5	268.4	579.2	1030.0	1079.5	627.5	278.6	126.0	45.1	27.5
2000	24.6	318.7	953.5	1380.5	1943.3	1773.3	1095.7	449.9	194.9	43.6	114.8
2001	110.2	330.6	1136.8	1410.6	1581.9	1593.6	1402.1	663.9	231.8	85.8	109.0
2002											

Table 23. Commercial weights-at-age for Div. 3LNO American plaice.

	5	6	7	8	9	10	11	12	13	14	15+
1960	0.209	0.193	0.274	0.363	0.487	0.594	0.695	0.857	0.903	1.193	1.340
1961	0.209	0.187	0.279	0.373	0.493	0.596	0.741	0.865	0.888	1.199	1.360
1962	0.209	0.177	0.276	0.38	0.522	0.611	0.738	0.885	0.905	1.206	1.369
1963	0.209	0.227	0.297	0.384	0.525	0.621	0.731	0.845	0.867	1.152	1.528
1964	0.209	0.285	0.378	0.491	0.547	0.639	0.76	0.851	0.92	1.208	1.586
1965	0.209	0.289	0.365	0.498	0.625	0.703	0.827	0.869	0.932	1.258	1.669
1966	0.209	0.277	0.369	0.499	0.64	0.788	0.976	0.988	0.984	1.287	1.658
1967	0.209	0.287	0.383	0.469	0.61	0.788	0.847	1.03	1.064	1.369	1.898
1968	0.209	0.276	0.348	0.45	0.602	0.697	0.851	0.991	1.075	1.397	1.898
1969	0.209	0.29	0.332	0.412	0.564	0.67	0.785	0.982	1.05	1.401	1.886
1970	0.209	0.275	0.33	0.397	0.536	0.68	0.795	0.841	1.043	1.166	1.596
1971	0.209	0.259	0.331	0.404	0.494	0.612	0.772	0.909	1.034	1.132	1.572
1972	0.209	0.278	0.372	0.484	0.527	0.629	0.753	0.867	0.935	1.175	1.647
1973	0.209	0.244	0.292	0.38	0.519	0.629	0.816	1.041	1.243	1.334	1.828
1974	0.210	0.252	0.339	0.416	0.568	0.694	0.917	1.108	1.36	1.567	2.178
1975	0.213	0.254	0.348	0.417	0.564	0.692	0.896	1.077	1.318	1.523	2.108
1976	0.207	0.261	0.346	0.414	0.557	0.66	0.829	1.017	1.142	1.347	1.859
1977	0.209	0.264	0.357	0.43	0.614	0.672	0.878	1.018	1.231	1.415	1.976
1978	0.195	0.26	0.353	0.412	0.512	0.614	0.768	0.917	1.184	1.38	1.869
1979	0.209	0.322	0.374	0.453	0.551	0.609	0.702	0.934	1.228	1.688	2.048
1980	0.209	0.328	0.408	0.482	0.541	0.57	0.65	0.739	0.982	1.355	1.830
1981	0.209	0.379	0.406	0.453	0.487	0.536	0.551	0.676	0.792	1.005	1.543
1982	0.256	0.298	0.36	0.427	0.485	0.533	0.596	0.739	0.976	1.275	1.776
1983	0.298	0.382	0.473	0.555	0.658	0.698	0.697	0.756	0.959	1.22	1.768
1984	0.270	0.314	0.382	0.46	0.551	0.563	0.654	0.852	1.128	1.444	2.198
1985	0.212	0.329	0.43	0.473	0.549	0.655	0.82	1.102	1.472	1.898	2.554
1986	0.122	0.194	0.277	0.411	0.548	0.666	0.776	0.989	1.296	1.674	2.284
1987	0.230	0.293	0.398	0.439	0.497	0.655	0.843	1.103	1.395	1.735	2.429
1988	0.170	0.254	0.343	0.446	0.489	0.601	0.774	1.034	1.369	1.745	2.451
1989	0.101	0.186	0.261	0.388	0.488	0.608	0.806	1.068	1.446	1.805	2.455
1990	0.149	0.246	0.345	0.445	0.554	0.704	0.913	1.205	1.624	1.992	2.327
1991	0.200	0.31	0.418	0.483	0.608	0.788	1.014	1.334	1.812	2.177	2.484
1992	0.231	0.284	0.352	0.413	0.548	0.732	0.941	1.184	1.494	1.8	2.488
1993	0.114	0.225	0.275	0.365	0.496	0.589	0.729	0.912	1.227	1.438	2.240
1994	0.119	0.193	0.266	0.374	0.533	0.757	0.897	1.127	1.484	1.701	2.232
1995	0.179	0.237	0.330	0.438	0.709	1.034	1.605	1.676	1.53	2.304	1.855
1996	0.148	0.210	0.296	0.451	0.657	0.918	1.083	1.323	1.576	2.907	2.402
1997	0.164	0.242	0.336	0.486	0.652	0.844	0.990	1.302	1.771	2.349	2.349
1998	0.169	0.167	0.269	0.365	0.504	0.615	0.770	0.980	1.220	1.694	1.727
1999	0.191	0.265	0.309	0.371	0.463	0.607	0.736	0.962	1.156	1.577	1.801
2000	0.183	0.274	0.341	0.388	0.511	0.673	0.843	1.085	1.367	1.592	2.033
2001	0.223	0.322	0.402	0.489	0.520	0.640	0.815	1.028	1.242	1.413	2.010

Table 24. Estimated proportion mature-at-age for Div. 3LNO American plaice.

Year/Age	5	6	7	8	9	10	11	12	13	14	15
1960	0.002	0.004	0.016	0.040	0.127	0.232	0.561	0.810	0.932	0.977	0.992
1961	0.003	0.005	0.014	0.046	0.105	0.333	0.564	0.810	0.932	0.977	0.992
1962	0.002	0.009	0.013	0.041	0.126	0.250	0.632	0.847	0.932	0.977	0.992
1963	0.001	0.006	0.027	0.037	0.117	0.298	0.486	0.855	0.960	0.977	0.992
1964	0.001	0.002	0.019	0.082	0.100	0.291	0.556	0.728	0.953	0.990	0.992
1965	0.005	0.004	0.009	0.056	0.218	0.240	0.559	0.787	0.884	0.986	0.998
1966	0.013	0.016	0.017	0.038	0.158	0.468	0.474	0.797	0.916	0.956	0.996
1967	0.005	0.033	0.050	0.063	0.141	0.371	0.735	0.720	0.924	0.970	0.984
1968	0.003	0.012	0.082	0.143	0.209	0.404	0.649	0.897	0.880	0.974	0.990
1969	0.003	0.008	0.031	0.190	0.346	0.509	0.737	0.853	0.965	0.955	0.991
1970	0.001	0.009	0.023	0.078	0.381	0.627	0.802	0.921	0.948	0.989	0.984
1971	0.000	0.002	0.025	0.062	0.183	0.618	0.842	0.941	0.980	0.983	0.996
1972	0.000	0.002	0.008	0.065	0.160	0.372	0.809	0.944	0.984	0.995	0.994
1973	0.000	0.001	0.007	0.026	0.158	0.353	0.610	0.918	0.982	0.996	0.999
1974	0.002	0.001	0.006	0.025	0.086	0.338	0.611	0.806	0.967	0.994	0.999
1975	0.002	0.006	0.007	0.025	0.085	0.248	0.581	0.818	0.917	0.987	0.998
1976	0.002	0.007	0.021	0.029	0.108	0.258	0.537	0.790	0.928	0.967	0.995
1977	0.001	0.007	0.023	0.070	0.121	0.359	0.563	0.803	0.911	0.974	0.987
1978	0.000	0.004	0.023	0.073	0.212	0.386	0.723	0.827	0.935	0.965	0.991
1979	0.001	0.001	0.015	0.070	0.209	0.491	0.742	0.924	0.947	0.980	0.987
1980	0.001	0.004	0.008	0.057	0.193	0.469	0.775	0.929	0.983	0.985	0.994
1981	0.002	0.006	0.024	0.047	0.192	0.432	0.747	0.925	0.984	0.996	0.996
1982	0.000	0.010	0.031	0.122	0.224	0.483	0.707	0.908	0.978	0.996	0.999
1983	0.001	0.003	0.051	0.152	0.442	0.628	0.786	0.884	0.971	0.994	0.999
1984	0.000	0.009	0.030	0.229	0.501	0.818	0.908	0.936	0.960	0.991	0.998
1985	0.004	0.005	0.064	0.228	0.620	0.850	0.962	0.983	0.983	0.987	0.997
1986	0.008	0.022	0.055	0.345	0.738	0.900	0.970	0.993	0.997	0.996	0.996
1987	0.004	0.036	0.112	0.424	0.803	0.964	0.980	0.994	0.999	1.000	0.999
1988	0.002	0.018	0.155	0.412	0.904	0.969	0.996	0.996	0.999	1.000	1.000
1989	0.002	0.010	0.077	0.474	0.796	0.992	0.996	1.000	0.999	1.000	1.000
1990	0.003	0.009	0.050	0.272	0.815	0.956	0.999	0.999	1.000	1.000	1.000
1991	0.006	0.013	0.052	0.209	0.626	0.956	0.992	1.000	1.000	1.000	1.000
1992	0.001	0.022	0.059	0.241	0.573	0.883	0.991	0.999	1.000	1.000	1.000
1993	0.005	0.008	0.082	0.232	0.647	0.872	0.971	0.998	1.000	1.000	1.000
1994	0.026	0.034	0.067	0.260	0.595	0.914	0.972	0.993	1.000	1.000	1.000
1995	0.080	0.106	0.195	0.377	0.579	0.877	0.984	0.994	0.999	1.000	1.000
1996	0.007	0.179	0.345	0.627	0.837	0.843	0.972	0.997	0.999	1.000	1.000
1997	0.004	0.034	0.351	0.701	0.921	0.977	0.954	0.994	1.000	1.000	1.000
1998	0.007	0.024	0.151	0.573	0.913	0.988	0.997	0.988	0.999	1.000	1.000
1999	0.009	0.042	0.134	0.475	0.769	0.979	0.998	1.000	0.997	1.000	1.000
2000	0.007	0.062	0.227	0.495	0.821	0.892	0.995	1.000	1.000	0.999	1.000
2001	0.007	0.043	0.318	0.661	0.861	0.959	0.954	0.999	1.000	1.000	1.000
2002	0.007	0.043	0.226	0.769	0.928	0.975	0.992	0.981	1.000	1.000	1.000

Table 25 Abundance at age ('000) of 3LNO American plaice from survey conducted by EU-Spain

Age/Year	1995	1996	1997	1998	1999	2000	2001
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	1064.4	1080.5	5.5	145.1	464.0	33269.3	11984.7
3	17257.5	8553.1	1415.2	294.2	3914.9	144838.3	645120.2
4	23176.5	13964.5	6218.4	9903.1	5023.0	121768.9	207204.2
5	71769.8	53157.2	10237.9	17181.9	21479.5	23718.9	18604.8
6	74829.2	143169.1	20353.4	32426.5	79590.0	44659.9	31045.2
7	41873.8	114163.2	73701.8	83161.2	80182.8	131857.5	97945.0
8	12296.7	39111.4	48755.3	155994.0	107827.5	113351.4	97766.4
9	6897.6	18253.4	17372.8	118840.8	167643.6	167628.6	103162.9
10	1518.9	3931.7	4778.9	49265.8	144966.7	157788.3	78091.1
11	787.6	1839.6	1920.6	19817.8	62634.3	99278.5	90816.1
12	1169.0	3269.0	1297.6	7024.3	28921.1	48187.1	40386.8
13	174.2	511.4	287.0	3184.5	15398.2	19250.7	11362.3
14	8.0	309.7	24.8	2259.3	4979.2	3521.7	5482.6
15	143.0	163.6	24.8	451.4	3071.1	7561.4	2982.1
16	0.0	0.0	0.0	107.6	1214.4	4350.0	636.4
17	0.0	0.0	0.0	0.0	913.8	886.6	837.7
18	0.0	0.0	0.0	0.0	521.2	0.0	451.2
19	0.0	0.0	0.0	0.0	0.0	0.0	37.7
20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ages 1+	252965.9	401477.5	186394.1	500057.5	728745.5	1121917.2	1443917.3
Ages 6+	139697.8	324722.2	168517.1	472533.3	697864.0	798321.7	561003.4
Ages 9+	10698.2	28278.4	25706.6	200951.6	430263.7	508453.0	334246.8
Ages 12+	1494.2	4253.6	1634.3	13027.1	55019.0	83757.5	62176.8

Table 26. Results of ADAPT for Div. 3LNO American plaice using Canadian spring and fall surveys.

ORTHOGONALITY OFFSET..... 0.000219
MEAN SQUARE RESIDUALS 0.282900

	Parameter	Est.	Std. Err.	Rel. Err.	Bias	Rel. Bias
	N[2002 6]	9.82E+03	5.43E+03	0.553	1.51E+03	0.154
	N[2002 7]	8.09E+03	2.68E+03	0.331	4.47E+02	0.055
	N[2002 8]	1.02E+04	2.82E+03	0.276	3.75E+02	0.037
	N[2002 9]	8.57E+03	2.17E+03	0.253	2.50E+02	0.029
	N[2002 10]	6.61E+03	1.63E+03	0.247	1.70E+02	0.026
	N[2002 11]	6.16E+03	1.49E+03	0.242	1.44E+02	0.023
	N[2002 12]	4.20E+03	1.08E+03	0.258	9.95E+01	0.024
	N[2002 13]	2.34E+03	6.09E+02	0.26	5.44E+01	0.023
	N[2002 14]	9.49E+02	2.49E+02	0.263	2.20E+01	0.023
	N[2002 15]	6.19E+02	1.28E+02	0.207	7.28E+00	0.012
SPRING	q 5	2.65E-03	3.70E-04	0.14	2.12E-05	0.008
	q 6	4.48E-03	6.07E-04	0.135	3.41E-05	0.008
	q 7	5.68E-03	7.61E-04	0.134	4.33E-05	0.008
	q 8	5.27E-03	7.02E-04	0.133	4.09E-05	0.008
	q 9	4.88E-03	6.50E-04	0.133	3.93E-05	0.008
	q 10	3.92E-03	5.24E-04	0.134	3.29E-05	0.008
	q 11	3.86E-03	5.19E-04	0.134	3.42E-05	0.009
	q 12	4.33E-03	5.89E-04	0.136	4.02E-05	0.009
	q 13	4.41E-03	6.09E-04	0.138	4.30E-05	0.01
	q 14	4.54E-03	6.40E-04	0.141	4.60E-05	0.01
FALL	q 5	7.31E-03	1.26E-03	0.172	9.02E-05	0.012
	q 6	9.69E-03	1.64E-03	0.169	1.16E-04	0.012
	q 7	9.20E-03	1.54E-03	0.167	1.11E-04	0.012
	q 8	7.86E-03	1.31E-03	0.167	9.58E-05	0.012
	q 9	7.36E-03	1.23E-03	0.167	9.32E-05	0.013
	q 10	5.75E-03	9.66E-04	0.168	7.57E-05	0.013
	q 11	5.58E-03	9.48E-04	0.17	7.74E-05	0.014
	q 12	6.57E-03	1.13E-03	0.172	9.58E-05	0.015
	q 13	7.01E-03	1.24E-03	0.177	1.09E-04	0.016
	q 14	8.41E-03	1.49E-03	0.178	1.31E-04	0.016

Table 27. Results of ADAPT for Div. 3LNO American plaice using Canadian spring, fall and EU-Spain surveys.

ORTHOGONALITY OFFSET..... 0.001647
MEAN SQUARE RESIDUALS 0.434859

	Parameter	Est.	Std. Err.	Rel. Err.	Bias	Rel. Bias
	N[2002 6]	1.39E+04	6.93E+03	0.5	1.77E+03	0.127
	N[2002 7]	1.12E+04	3.65E+03	0.326	6.13E+02	0.055
	N[2002 8]	1.27E+04	3.50E+03	0.275	4.82E+02	0.038
	N[2002 9]	1.13E+04	2.83E+03	0.25	3.43E+02	0.03
	N[2002 10]	7.47E+03	1.86E+03	0.248	2.06E+02	0.028
	N[2002 11]	7.40E+03	1.77E+03	0.24	1.83E+02	0.025
	N[2002 12]	6.54E+03	1.53E+03	0.234	1.49E+02	0.023
	N[2002 13]	3.37E+03	8.18E+02	0.243	7.75E+01	0.023
	N[2002 14]	1.24E+03	3.16E+02	0.255	2.98E+01	0.024
	N[2002 15]	5.60E+02	1.44E+02	0.257	1.00E+01	0.018
SPRING	q 5	2.38E-03	4.07E-04	0.171	2.95E-05	0.012
	q 6	4.12E-03	6.88E-04	0.167	4.94E-05	0.012
	q 7	5.31E-03	8.78E-04	0.165	6.36E-05	0.012
	q 8	4.97E-03	8.19E-04	0.165	6.01E-05	0.012
	q 9	4.67E-03	7.70E-04	0.165	5.79E-05	0.012
	q 10	3.76E-03	6.21E-04	0.165	4.79E-05	0.013
	q 11	3.72E-03	6.17E-04	0.166	4.88E-05	0.013
	q 12	4.27E-03	7.14E-04	0.167	5.82E-05	0.014
	q 13	4.44E-03	7.55E-04	0.17	6.39E-05	0.014
	q 14	4.66E-03	8.10E-04	0.174	7.16E-05	0.015
FALL	q 5	6.42E-03	1.36E-03	0.212	1.25E-04	0.019
	q 6	8.74E-03	1.82E-03	0.208	1.66E-04	0.019
	q 7	8.43E-03	1.74E-03	0.207	1.60E-04	0.019
	q 8	7.36E-03	1.52E-03	0.206	1.40E-04	0.019
	q 9	6.94E-03	1.43E-03	0.207	1.36E-04	0.02
	q 10	5.46E-03	1.13E-03	0.207	1.10E-04	0.02
	q 11	5.45E-03	1.14E-03	0.21	1.14E-04	0.021
	q 12	6.61E-03	1.40E-03	0.212	1.44E-04	0.022
	q 13	7.26E-03	1.59E-03	0.218	1.71E-04	0.023
	q 14	8.72E-03	1.90E-03	0.218	2.05E-04	0.024
EU	q 5	9.52E-04	2.68E-04	0.281	3.46E-05	0.036
	q 6	2.13E-03	5.76E-04	0.271	7.11E-05	0.033
	q 7	4.49E-03	1.20E-03	0.266	1.45E-04	0.032
	q 8	5.19E-03	1.37E-03	0.263	1.66E-04	0.032
	q 9	7.15E-03	1.87E-03	0.262	2.31E-04	0.032
	q 10	5.45E-03	1.43E-03	0.263	1.80E-04	0.033
	q 11	5.66E-03	1.50E-03	0.266	1.94E-04	0.034
	q 12	9.52E-03	2.57E-03	0.27	3.45E-04	0.036
	q 13	7.00E-03	1.94E-03	0.278	2.73E-04	0.039
	q 14	4.61E-03	1.33E-03	0.288	1.97E-04	0.043

Table 28. Bias adjusted population numbers ('000) and fishing mortalities from final VPA.

Bias adjusted population numbers ('000)

	5	6	7	8	9	10	11	12	13	14	15+	5+ millions
1960	299710.8	215972.3	141212.2	120313.0	90754.3	59598.9	48428.5	34426.1	21984.2	16264.4	29100.5	1077.765
1961	283342.1	245342.0	176535.2	114854.5	97270.3	72733.6	46737.3	37357.7	25054.0	15518.8	30700.1	1145.446
1962	265660.8	231955.5	200688.1	144055.0	92923.2	77413.5	56684.3	36038.9	28535.9	17005.8	30924.7	1181.886
1963	270974.1	217448.3	189507.0	163715.8	116952.2	75009.3	61873.7	44213.7	27072.8	21190.2	30932.3	1218.89
1964	260403.1	221724.5	177101.5	153469.6	132743.9	94355.5	59392.3	47856.3	32434.7	18655.2	34147.2	1232.284
1965	288220.0	212957.4	179801.5	140486.4	122712.5	103108.8	69345.0	42353.3	33640.2	23628.9	35500.1	1251.754
1966	250041.9	235545.1	171503.8	140678.5	106624.9	94108.8	77596.1	51605.6	29459.1	22846.4	38652.1	1218.662
1967	223368.9	203127.5	187185.4	131359.1	105136.8	78715.1	70495.6	57122.3	37142.3	18962.8	38224.5	1150.84
1968	176501.7	182487.0	163285.8	143477.8	100647.4	77508.0	52102.6	45415.0	33682.6	21878.7	29057.8	1026.044
1969	174804.4	144258.2	147292.4	129949.8	108641.2	72298.3	52983.0	35691.1	24762.6	19691.7	28455.8	938.8284
1970	164081.1	142494.2	115893.4	113486.2	93606.0	72579.1	47690.7	31933.0	19889.6	13941.4	27770.3	843.3649
1971	204824.2	134233.5	114702.7	92579.2	83890.6	64445.1	49259.4	28997.2	18734.5	11295.3	21647.3	824.6091
1972	242725.0	166669.9	108321.0	86322.7	66371.6	54731.2	40026.3	30446.0	15643.1	10673.7	17241.4	839.1721
1973	292801.6	198204.1	134133.5	86547.7	63734.3	44166.5	33334.8	21363.4	15333.5	6744.0	12668.3	909.0316
1974	280065.7	239683.7	161301.1	104107.0	61380.6	40472.4	27132.1	18335.9	11425.2	6663.3	6329.8	956.8969
1975	293986.1	228978.6	190859.6	122611.5	76157.0	43254.6	25040.1	15848.6	10882.6	5939.2	6656.3	1020.214
1976	276667.5	239897.9	184646.9	149745.2	91877.2	54030.6	28301.4	15375.8	8729.2	5515.1	5352.7	1060.14
1977	232203.4	225760.2	192883.5	143251.1	105154.4	60285.2	33144.5	15701.2	7966.2	4436.7	4828.9	1025.615
1978	218525.0	189232.3	178767.1	150028.6	106704.6	73876.0	39316.9	21270.5	9032.0	4396.1	4790.8	995.94
1979	200730.7	177505.9	150896.9	138064.0	113453.5	75878.2	47993.6	23260.9	11295.4	4124.8	3350.7	946.5546
1980	193506.5	163209.1	139415.9	111341.2	96148.1	79394.0	50864.2	31382.2	15645.5	7588.5	4955.6	893.4508
1981	188447.2	158192.1	130936.0	105545.7	79821.4	66009.7	52210.8	31494.5	18427.7	9455.2	7943.3	848.4837
1982	191234.8	154148.4	129016.4	105171.3	82093.8	58210.8	43759.8	30561.0	15155.0	7327.4	5105.2	821.7839
1983	189781.7	156545.4	125922.4	103991.4	81775.6	59148.7	36117.1	21672.2	12088.5	5332.3	3807.8	796.1832
1984	191388.8	155272.6	127273.5	100339.9	79909.9	59430.6	41482.8	21936.1	11006.8	5789.4	3687.7	797.5182
1985	187043.9	156652.6	126767.9	102833.5	79162.3	60144.9	39692.7	22402.0	9941.0	4482.3	4079.4	793.2025
1986	159503.4	152871.2	127544.5	101655.8	79092.7	55178.2	35102.8	19484.6	10082.8	4464.7	3648.6	748.6294
1987	141619.7	126611.4	116402.3	93104.0	71937.4	52717.5	32710.3	15994.8	6711.7	2971.6	2385.5	663.1664
1988	161314.3	113928.2	99200.6	88363.4	66409.7	44630.1	27346.6	16561.0	6851.8	2748.0	2286.8	629.6405
1989	186468.9	129446.9	90375.7	76838.7	65789.9	45255.1	27258.4	14088.6	8148.6	3200.5	2228.2	649.0995
1990	194246.9	100130.9	67479.0	44593.5	37964.5	28120.9	17416.7	9806.0	4616.9	3283.0	1903.8	509.562
1991	93819.3	102911.5	53129.7	36327.8	22778.4	15872.1	10119.8	5489.6	3090.5	1461.2	1942.9	346.9428
1992	65367.9	50612.3	51425.3	25377.0	14427.4	7595.4	4501.0	2734.5	1546.1	1214.9	1371.2	226.173
1993	65039.8	38363.7	29015.8	28310.2	12383.6	5793.9	2868.6	1533.4	960.8	485.0	720.4	185.4752
1994	76935.2	37394.6	19781.9	10529.3	8142.1	3107.6	980.8	369.3	190.0	184.5	93.4	157.7088
1995	63701.8	42022.1	19118.9	7604.8	2923.6	2737.3	1279.0	230.6	98.1	25.6	102.4	139.8442
1996	43738.3	37420.0	24496.5	10910.3	4224.3	1567.3	1561.6	742.5	132.6	57.7	75.0	124.9261
1997	24696.5	25607.5	21462.9	13681.1	6079.4	2326.9	883.3	911.3	430.9	76.3	76.3	96.2324
1998	23160.6	20202.3	20843.8	17081.5	10551.9	4608.0	1770.4	638.9	694.8	329.2	122.4	100.0038
1999	20285.4	18952.8	16490.7	16819.1	13292.8	7913.2	3362.1	1198.7	417.5	506.7	308.9	99.54785
2000	11867.8	16584.8	15359.6	13259.1	13247.5	9954.1	5506.2	2187.9	730.9	228.8	602.3	89.52909
2001	10271.3	9694.3	13290.7	11715.1	9611.1	9095.8	6553.7	3522.4	1386.7	423.4	537.9	76.10231
2002	13522.6	8309.9	7638.6	9856.3	8320.3	6444.7	6012.6	4104.8	2286.5	926.6	611.8	68.03452

geometric mean of 1999 to 2001

Bias ajusted Fishing mortalities

	5	6	7	8	9	10	11	12	13	14	15	avg 9-14	avg 11-14
1960	0.000	0.002	0.007	0.013	0.021	0.043	0.060	0.118	0.148	0.190	0.190	0.097	0.129
1961	0.000	0.001	0.003	0.012	0.028	0.049	0.060	0.069	0.187	0.202	0.202	0.099	0.130
1962	0.000	0.002	0.004	0.008	0.014	0.024	0.048	0.086	0.098	0.238	0.238	0.085	0.118
1963	0.001	0.005	0.011	0.010	0.015	0.033	0.057	0.110	0.172	0.223	0.223	0.102	0.141
1964	0.001	0.010	0.032	0.024	0.053	0.108	0.138	0.152	0.117	0.197	0.197	0.127	0.151
1965	0.002	0.016	0.045	0.076	0.065	0.084	0.095	0.163	0.187	0.225	0.225	0.137	0.168
1966	0.008	0.030	0.067	0.091	0.103	0.089	0.106	0.129	0.241	0.276	0.276	0.157	0.188
1967	0.002	0.018	0.066	0.066	0.105	0.213	0.240	0.328	0.329	0.477	0.477	0.282	0.344
1968	0.002	0.014	0.028	0.078	0.131	0.180	0.178	0.407	0.337	0.382	0.382	0.269	0.326
1969	0.004	0.019	0.061	0.128	0.203	0.216	0.306	0.385	0.374	0.350	0.350	0.306	0.354
1970	0.001	0.017	0.025	0.102	0.173	0.188	0.298	0.333	0.366	0.456	0.456	0.302	0.363
1971	0.006	0.014	0.084	0.133	0.227	0.276	0.281	0.417	0.363	0.447	0.447	0.335	0.377
1972	0.003	0.017	0.024	0.103	0.207	0.296	0.428	0.486	0.641	0.590	0.590	0.441	0.536
1973	0.000	0.006	0.053	0.144	0.254	0.287	0.398	0.426	0.633	0.921	0.921	0.487	0.594
1974	0.001	0.028	0.074	0.113	0.150	0.280	0.338	0.322	0.454	0.469	0.469	0.335	0.396
1975	0.003	0.015	0.043	0.089	0.143	0.224	0.288	0.396	0.480	0.656	0.656	0.364	0.455
1976	0.003	0.018	0.054	0.154	0.221	0.289	0.389	0.458	0.477	0.611	0.611	0.407	0.484
1977	0.005	0.033	0.051	0.095	0.153	0.227	0.244	0.353	0.394	0.460	0.460	0.305	0.363
1978	0.008	0.026	0.058	0.079	0.141	0.231	0.325	0.433	0.584	0.809	0.809	0.420	0.538
1979	0.007	0.042	0.104	0.162	0.157	0.200	0.225	0.197	0.198	0.211	0.211	0.198	0.208
1980	0.002	0.020	0.078	0.133	0.176	0.219	0.279	0.332	0.304	0.257	0.257	0.261	0.293
1981	0.001	0.004	0.019	0.051	0.116	0.211	0.336	0.531	0.722	1.026	1.026	0.490	0.654
1982	0.000	0.002	0.016	0.052	0.128	0.277	0.503	0.727	0.845	0.983	0.983	0.577	0.764
1983	0.001	0.007	0.027	0.063	0.119	0.155	0.299	0.478	0.536	0.708	0.708	0.382	0.505
1984	0.000	0.003	0.013	0.037	0.084	0.204	0.416	0.591	0.698	0.643	0.643	0.439	0.587
1985	0.002	0.006	0.021	0.062	0.161	0.338	0.512	0.598	0.600	0.653	0.653	0.477	0.591
1986	0.031	0.073	0.115	0.146	0.206	0.323	0.586	0.866	1.022	1.024	1.024	0.671	0.874
1987	0.018	0.044	0.076	0.138	0.277	0.456	0.481	0.648	0.693	0.651	0.651	0.534	0.618
1988	0.020	0.032	0.055	0.095	0.184	0.293	0.463	0.509	0.561	0.615	0.615	0.438	0.537
1989	0.092	0.121	0.176	0.175	0.320	0.425	0.492	0.586	0.379	0.518	0.518	0.453	0.494
1990	0.105	0.104	0.089	0.142	0.342	0.492	0.625	0.625	0.620	0.452	0.452	0.526	0.580
1991	0.087	0.164	0.209	0.393	0.568	0.730	0.779	0.737	0.404	0.379	0.379	0.600	0.575
1992	0.003	0.026	0.067	0.187	0.382	0.444	0.547	0.516	0.629	0.748	0.748	0.544	0.610
1993	0.023	0.132	0.484	0.716	0.853	1.246	1.520	1.558	1.120	2.027	2.027	1.387	1.556
1994	0.075	0.141	0.426	0.751	0.560	0.358	0.918	0.796	1.474	0.469	0.469	0.762	0.914
1995	0.002	0.010	0.031	0.058	0.093	0.031	0.014	0.023	0.001	0.005	0.005	0.028	0.011
1996	0.005	0.026	0.053	0.055	0.066	0.044	0.009	0.014	0.023	0.023	0.023	0.030	0.017
1997	0.001	0.006	0.028	0.060	0.077	0.073	0.124	0.071	0.069	0.020	0.020	0.073	0.071
1998	0.001	0.003	0.015	0.051	0.088	0.115	0.190	0.225	0.116	0.180	0.180	0.152	0.178
1999	0.001	0.010	0.018	0.039	0.089	0.163	0.230	0.295	0.402	0.103	0.103	0.213	0.257
2000	0.002	0.021	0.071	0.122	0.176	0.218	0.247	0.256	0.346	0.235	0.235	0.246	0.271
2001	0.012	0.038	0.099	0.142	0.200	0.214	0.268	0.232	0.203	0.252	0.252	0.228	0.239

Table 29. Starting assumptions for projections.

	Age										
	5	6	7	8	9	10	11	12	13	14	15
1. Population Weights	0.176316	0.232857	0.306206	0.37037	0.43891	0.563788	0.722002	0.906461	1.143842	1.375074	1.785141
2. Catch Weights	0.198931	0.286791	0.350379	0.415993	0.4982	0.639918	0.79827	1.024656	1.255431	1.527405	1.948346
3. Female Maturities	0.007407	0.048857	0.226347	0.543287	0.817293	0.943447	0.98238	0.999443	0.998933	0.99965	0.999913
4. Projection Partial Recruitment (PR)	0.020353	0.091213	0.245033	0.39461	0.606132	0.775205	1	1	1	1	1

Population Estimates/Standard Errors

Age	Estimate	SE
6	9.025206	0.553
7	8.940964	0.331
8	9.195866	0.276
9	9.026448	0.253
10	8.771007	0.247
11	8.701609	0.242
12	8.319903	0.258
13	7.734773	0.26
14	6.831535	0.263
15	6.416403	0.207

Natural Mortality

M=0.2

Recruitment Generation

Recruits randomly selected from one of the three recruitment regimes

Regime 1 SSB<50,000

Regime 2 50,000<=SSB<=155,000

Regime 3 SSB>155,000

back

go to second part of ducment

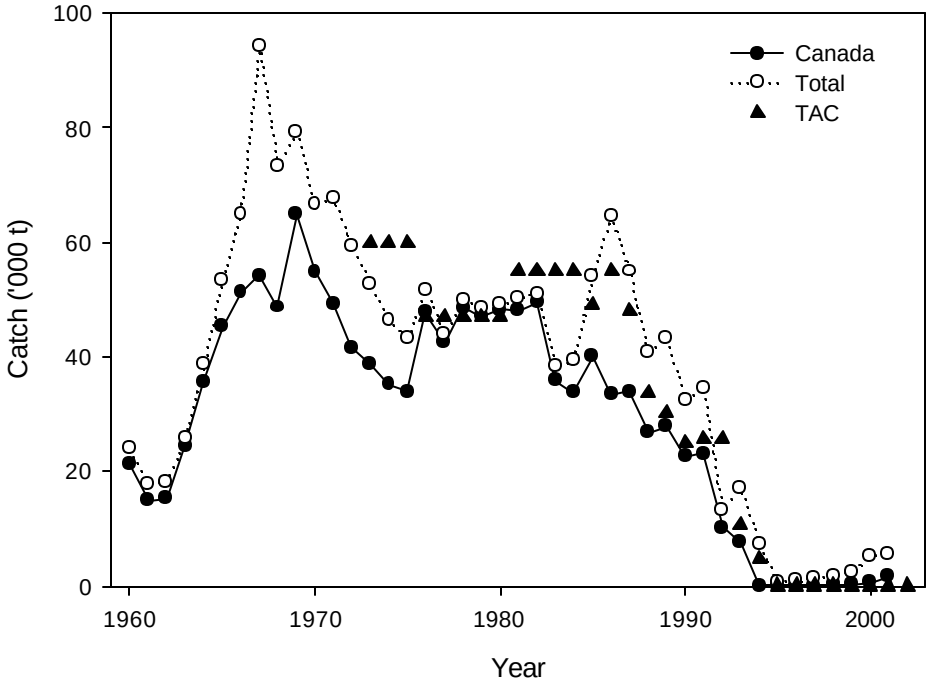


Figure 1. Catches and TAC's of American plaice in Div. 3LNO.

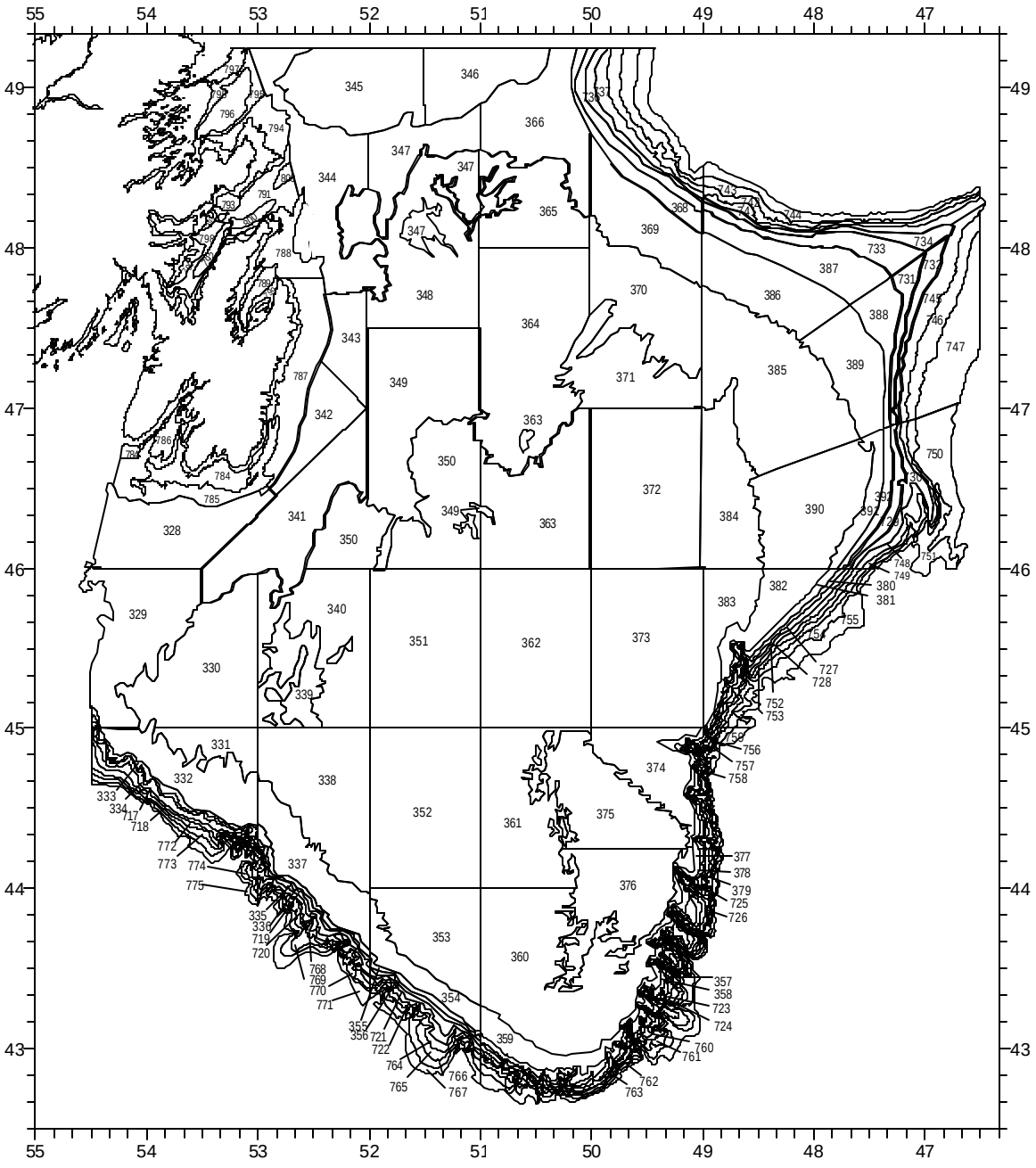


Figure 2. Stratification scheme used in Canadian research vessel surveys of Div. 3LNO.

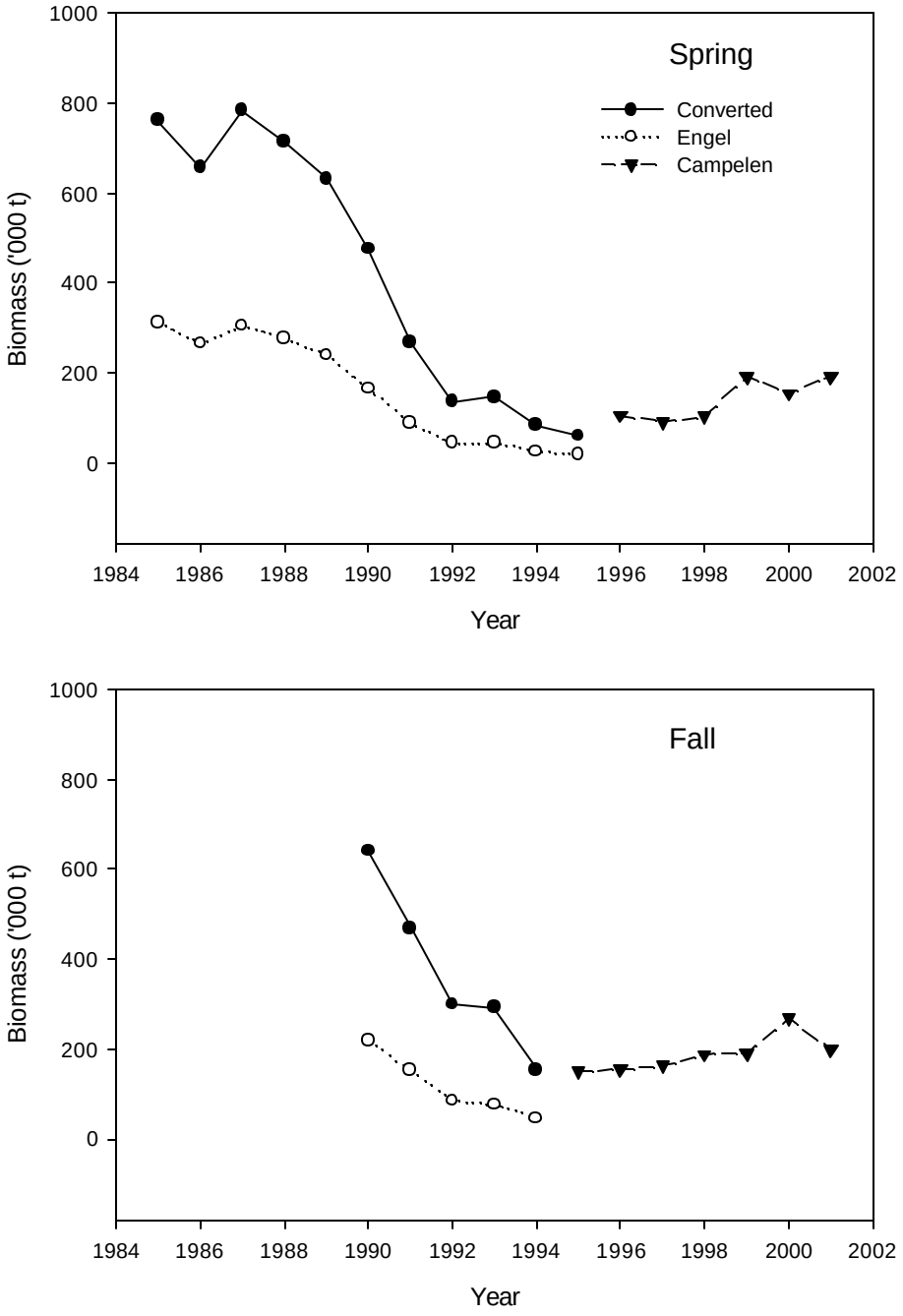
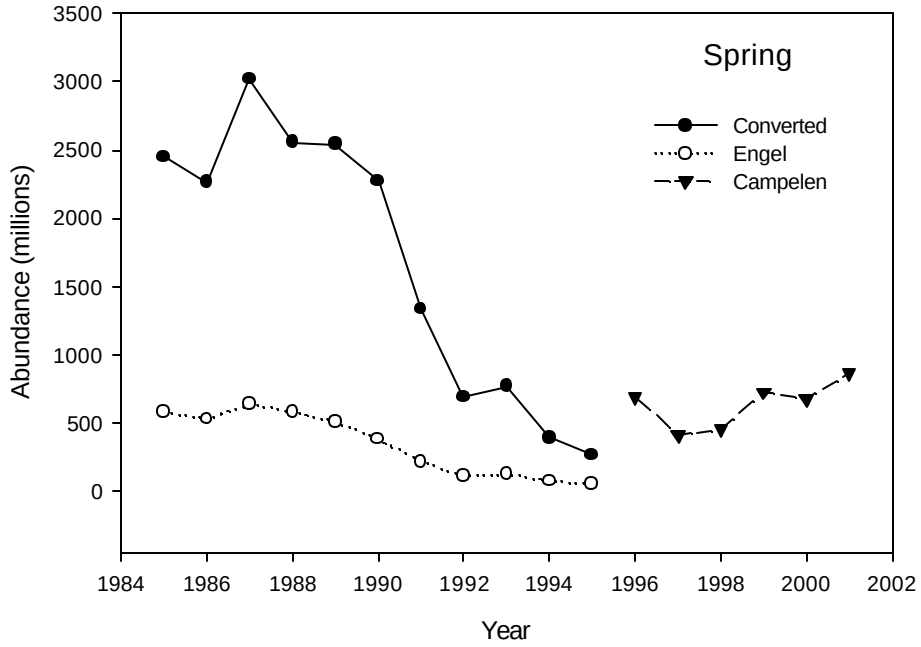


Figure 3. Biomass ('000 tons) of American plaice from spring and fall Canadian surveys in Div. 3LNO combined.



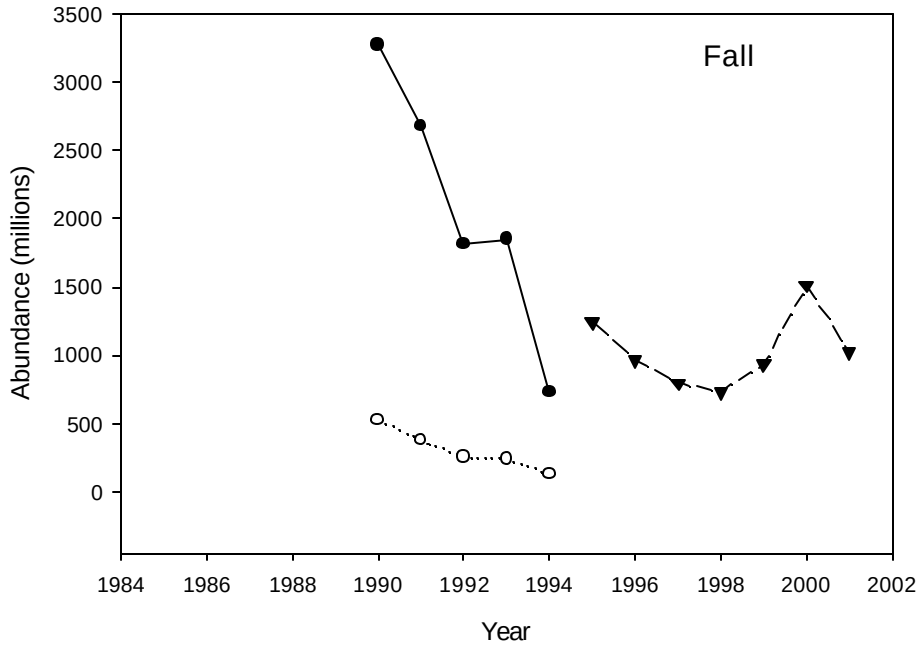


Figure 4. Abundance (millions) of American plaice from spring and fall Canadian surveys in Div. 3LNO combined.

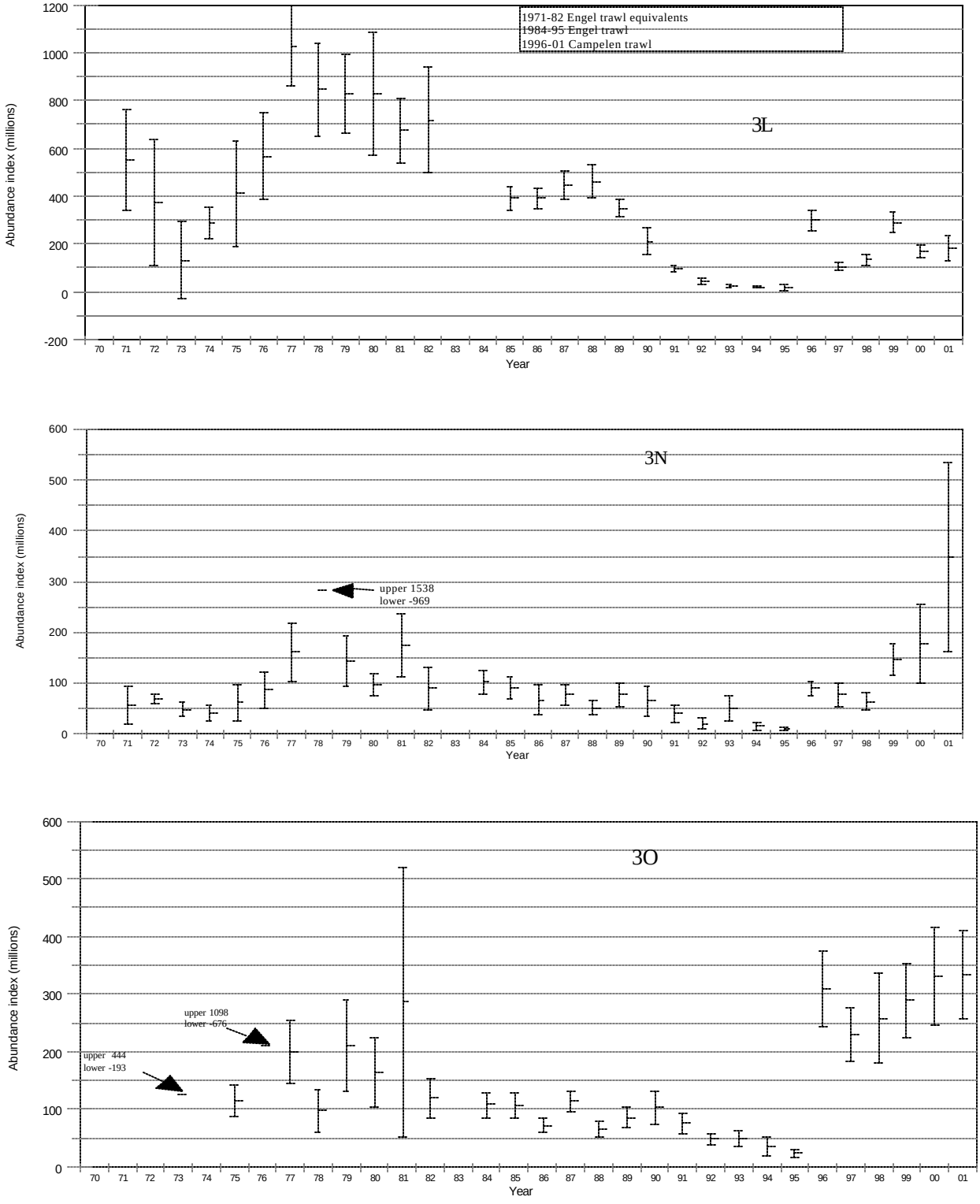


Figure 5. Abundance estimates of American plaice, with approx. 95% confidence intervals, from spring surveys in Div. 3LNO.

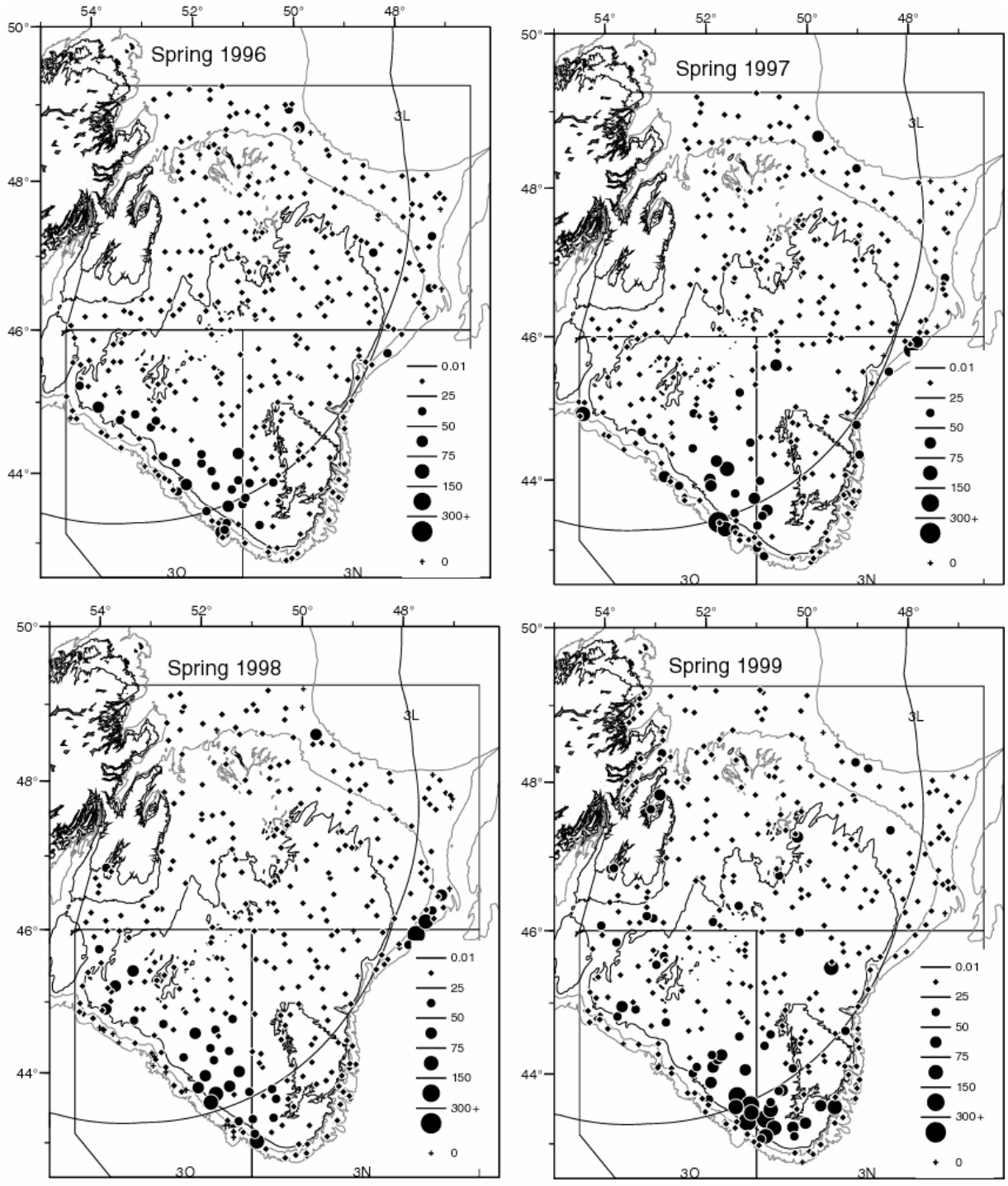


Figure 6. Distribution of American plaice (Kg) from Canadian spring surveys in NAFO Divisions 3LNO from 1996 to 2001.

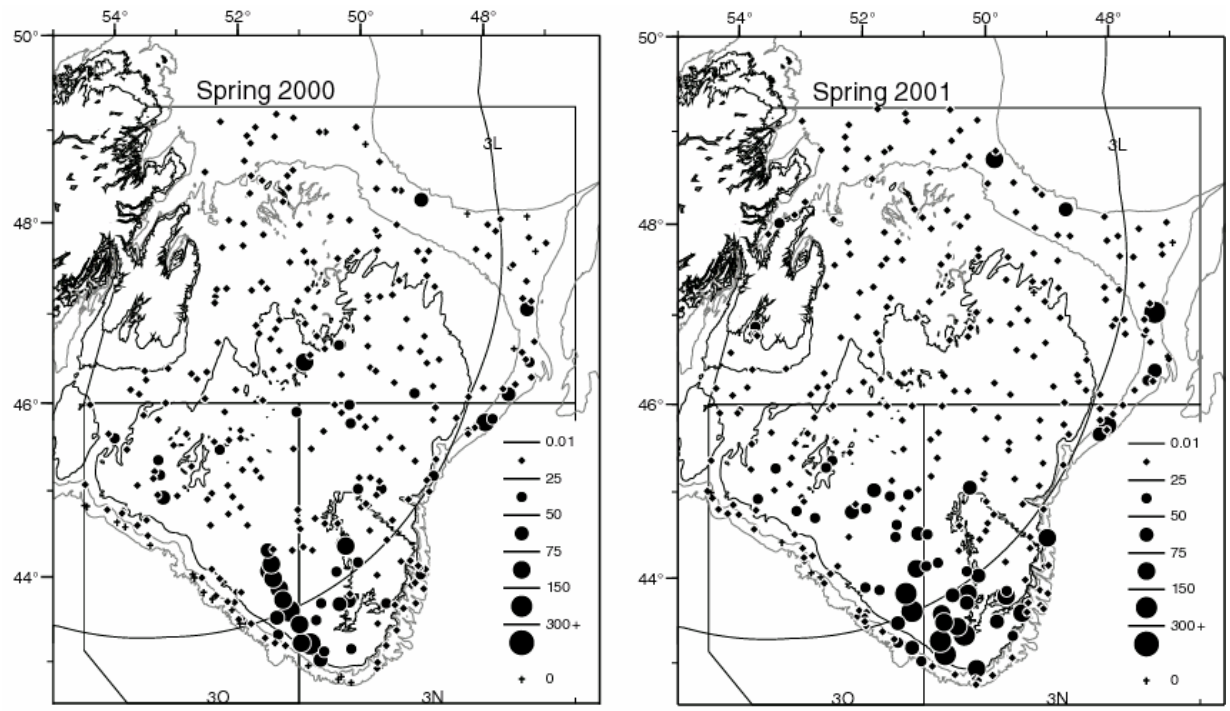


Figure 6. Continued

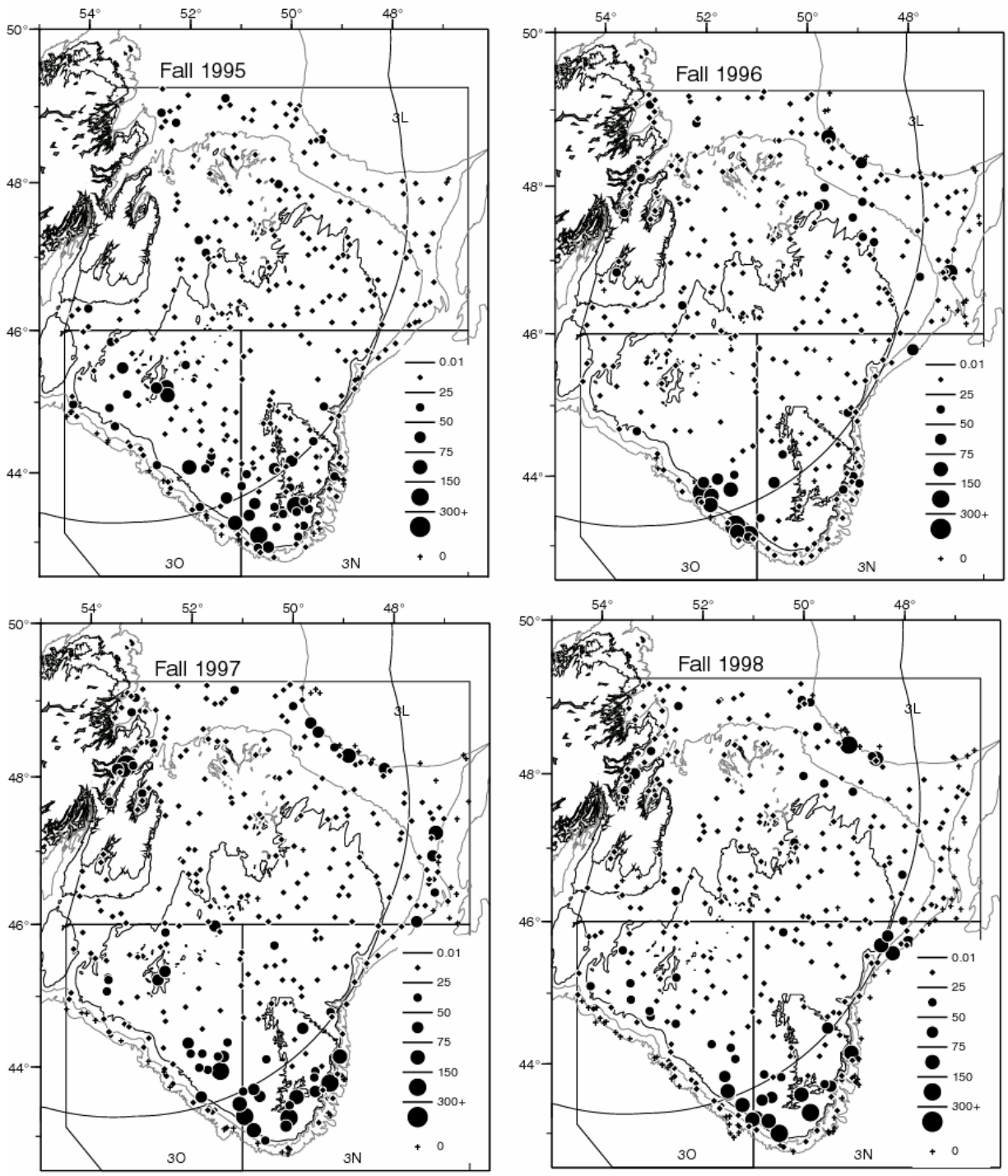


Figure 7. Distribution of American plaice (Kg) from Canadian fall surveys in NAFO Divisions 3LNO from 1995 to 2001.

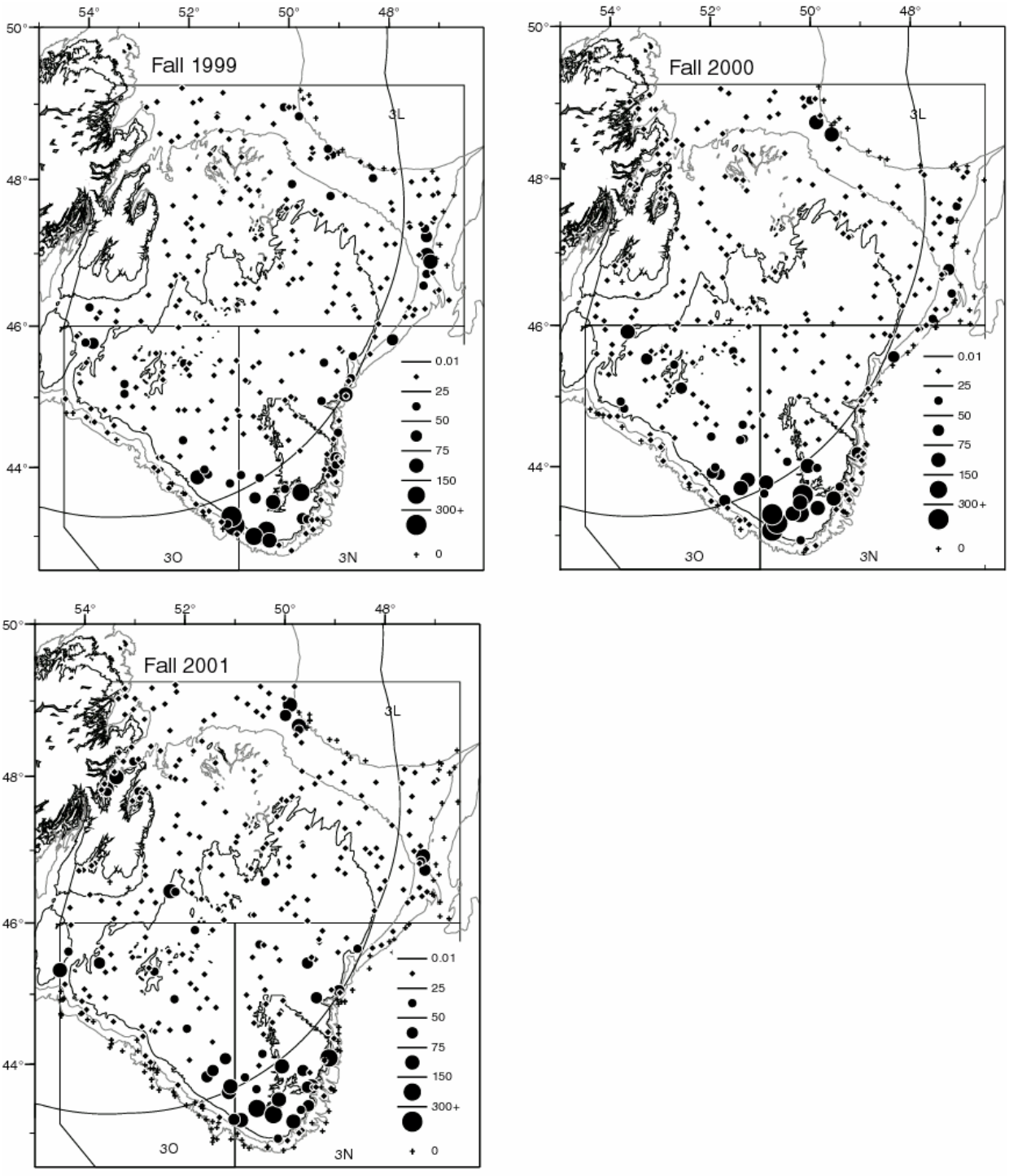


Figure 7. Continued

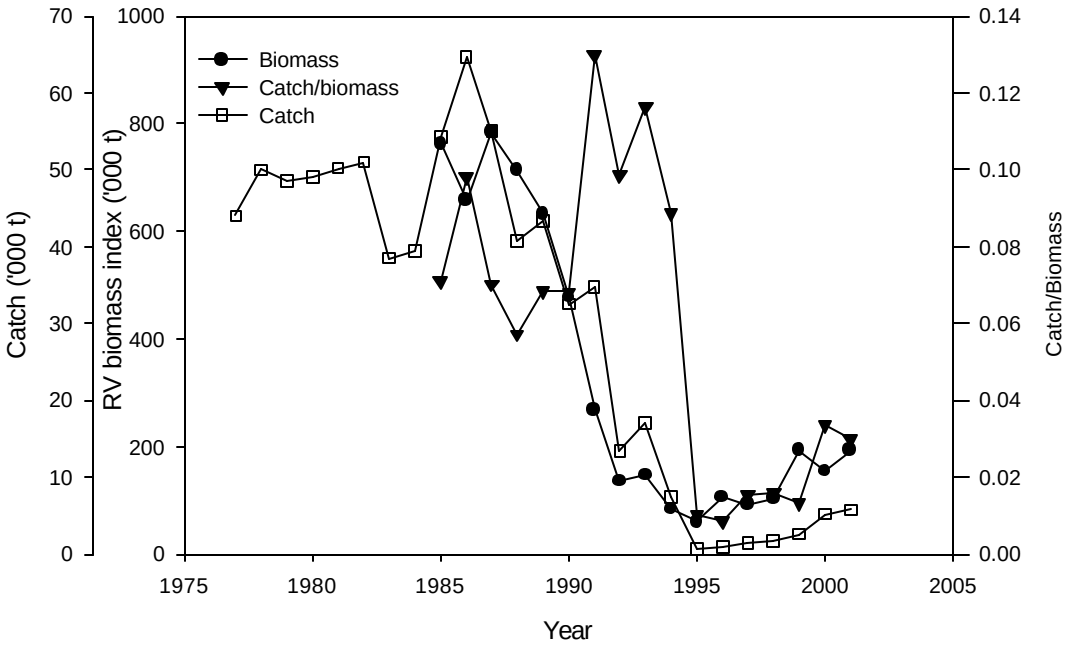


Figure 8. Total catch from 1977 to 2001 and RV biomass index from 1985 to 2001. Also shown is the catch/biomass ratio. Biomass is Campelen or equivalent.

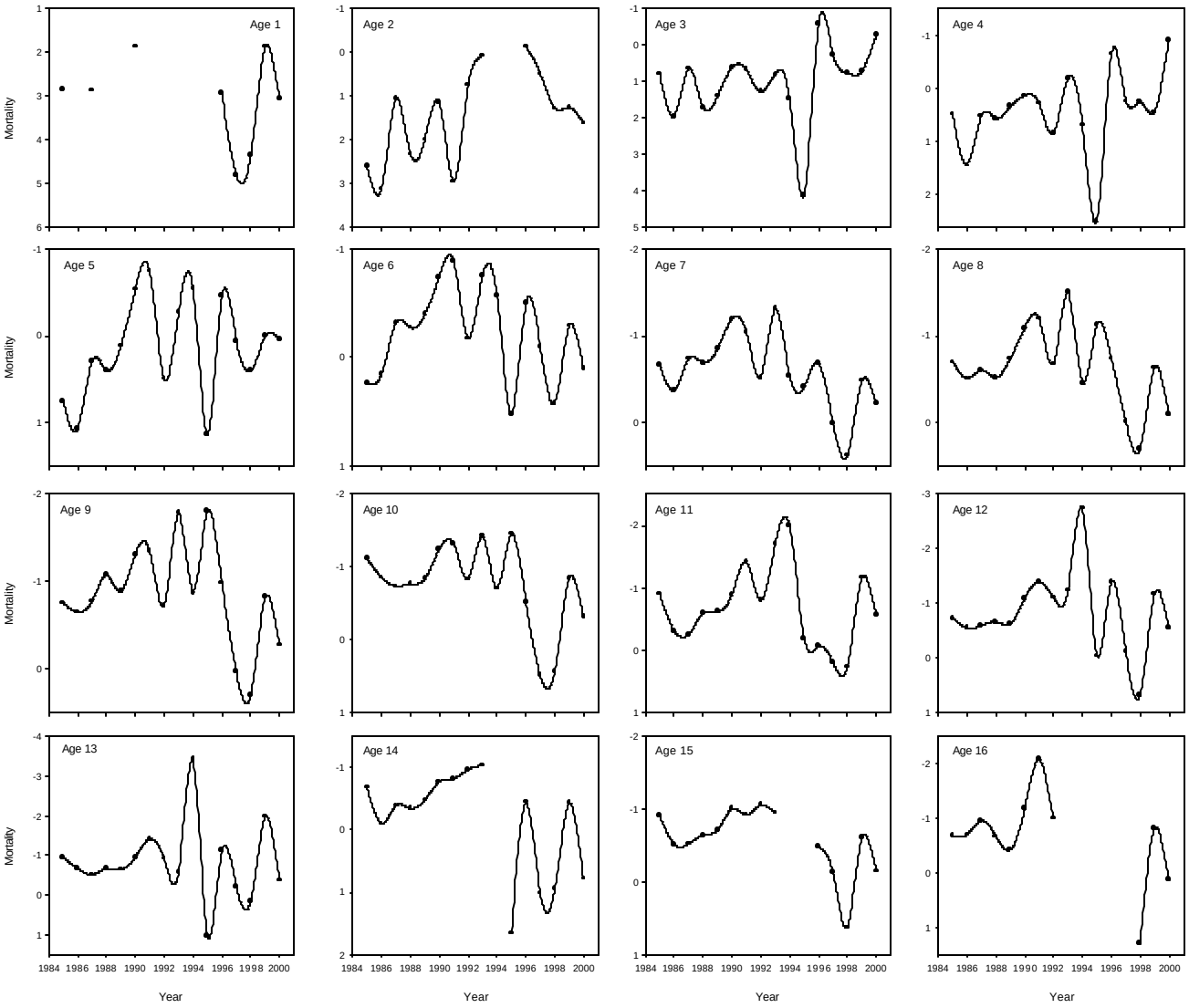


Figure 9. Estimates of mortality for ages 1 to 16 from Canadian spring surveys from 1985 to 2001.

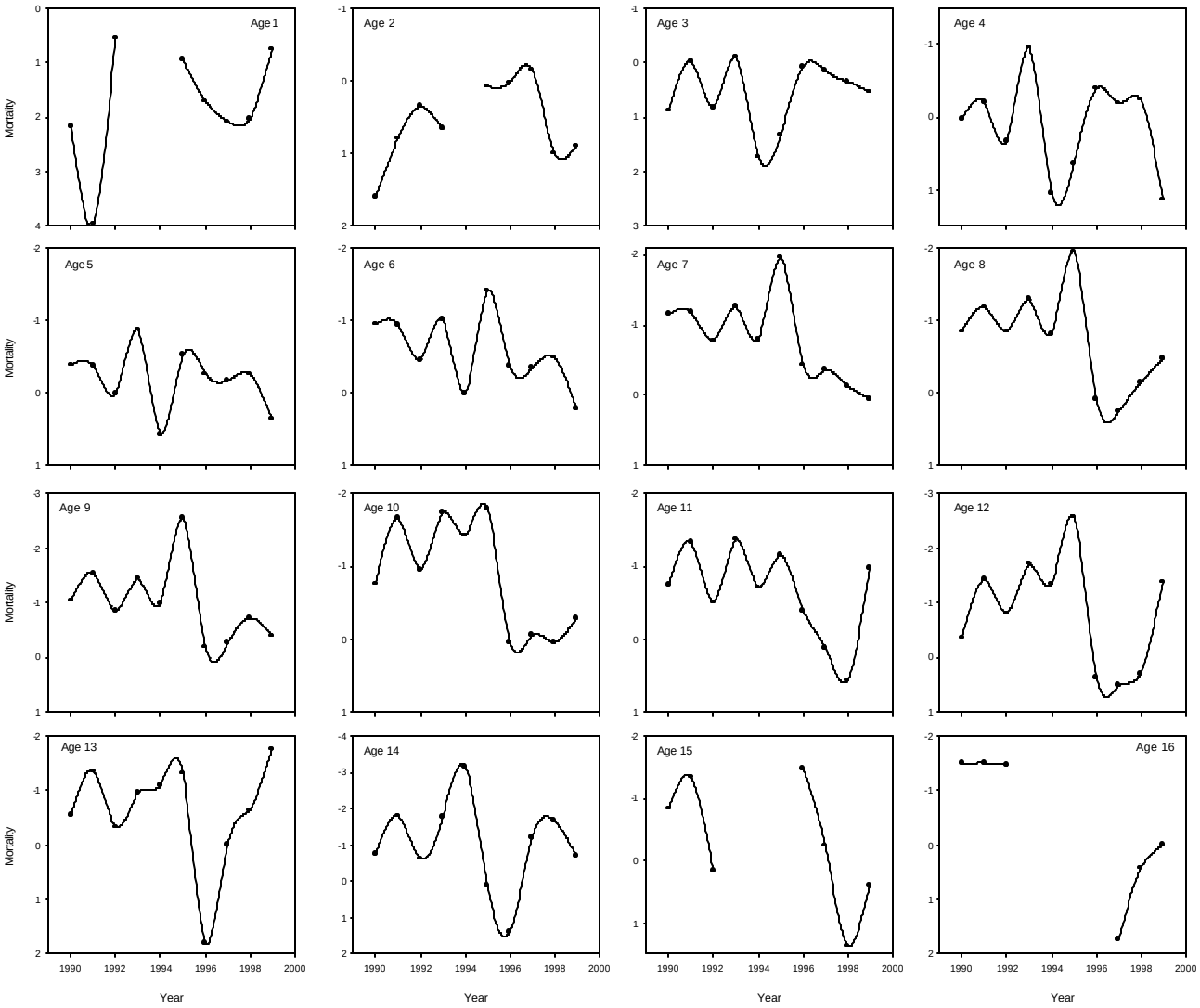
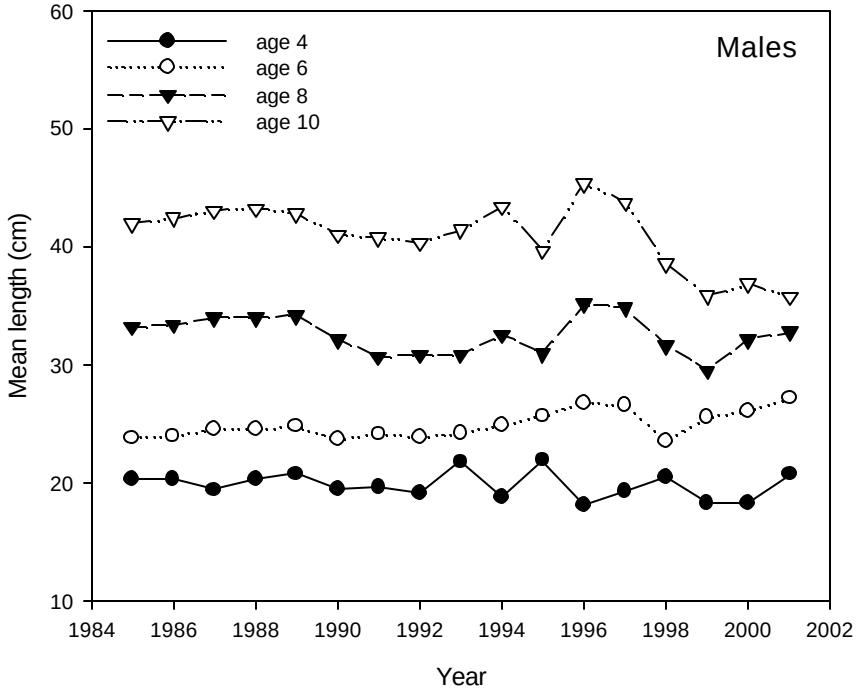


Figure 10. Estimates of mortality for ages 1 to 16 from Canadian fall surveys from 1990 to 2000.



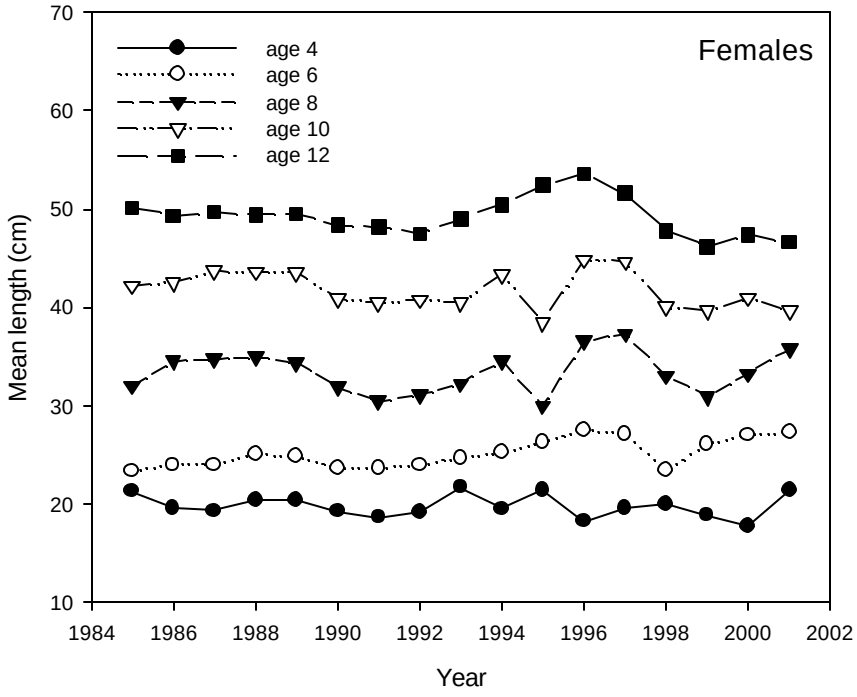


Figure 11. Mean length at age for selected ages of Div. 3LNO American plaice from Canadian spring RV surveys.

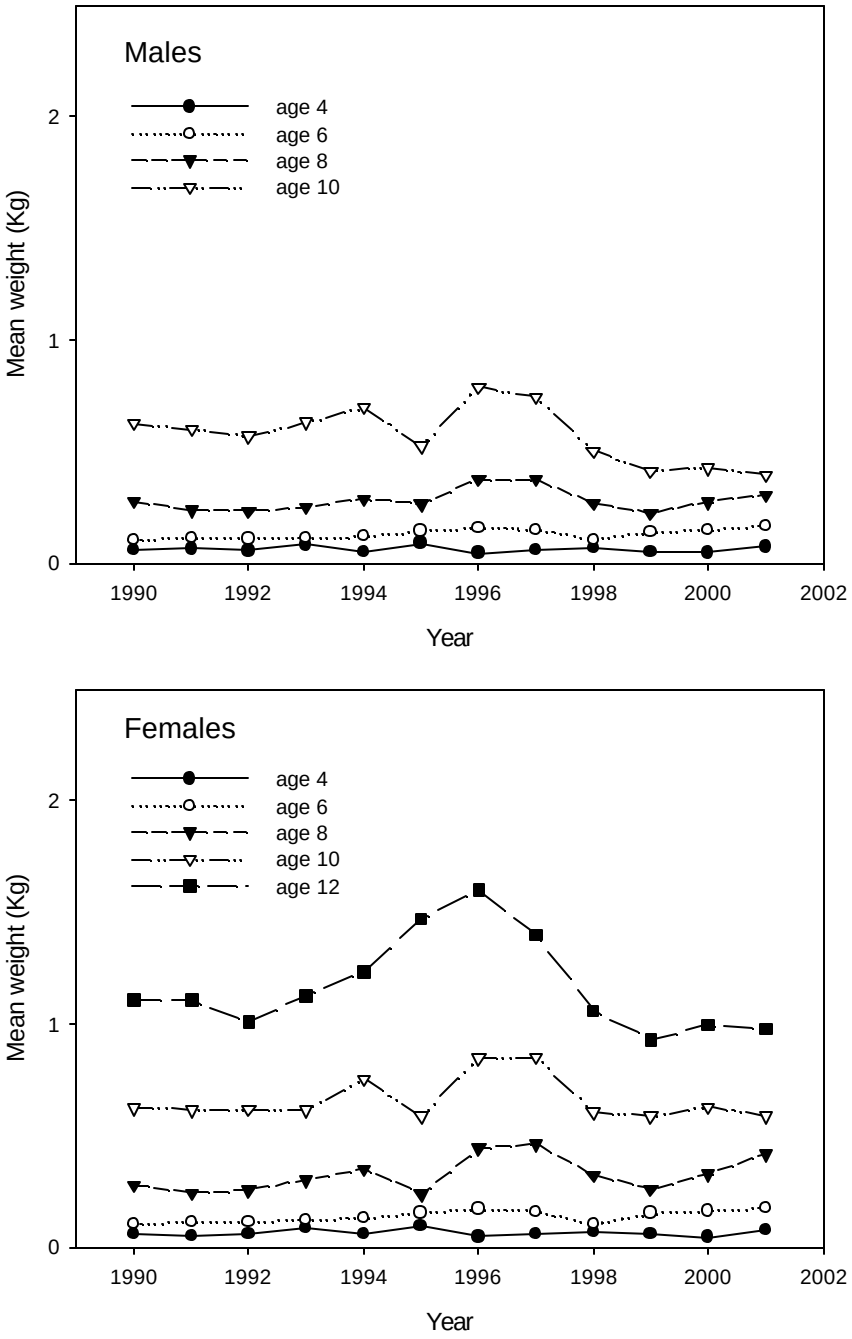


Figure 12. Mean weight at age for selected ages for male and female American plaice in Div. 3LNO from Canadian spring RV surveys.

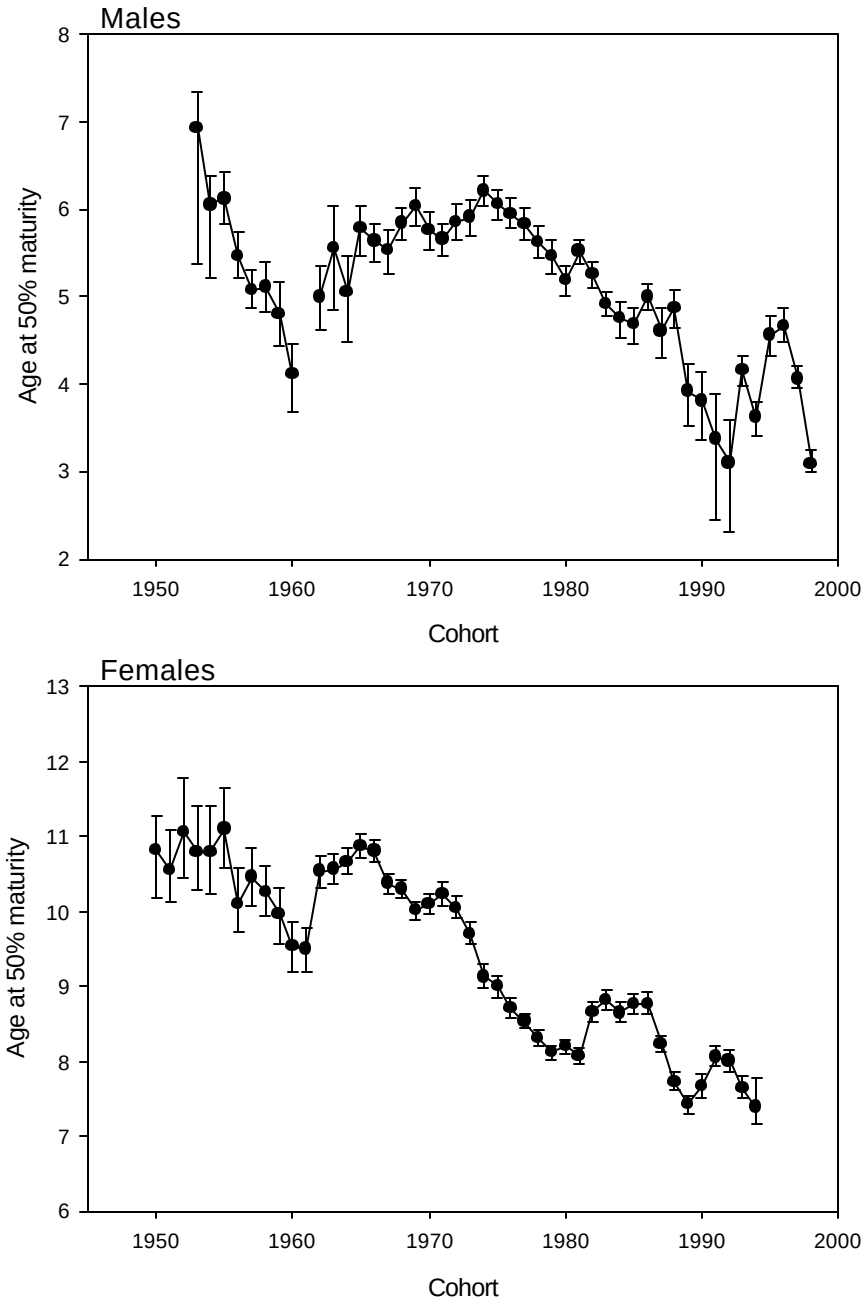


Figure 13. Age at 50% maturity (± 95% fiducial limits) by cohort for male and female American plaice in NAFO Divs. 3LNO.

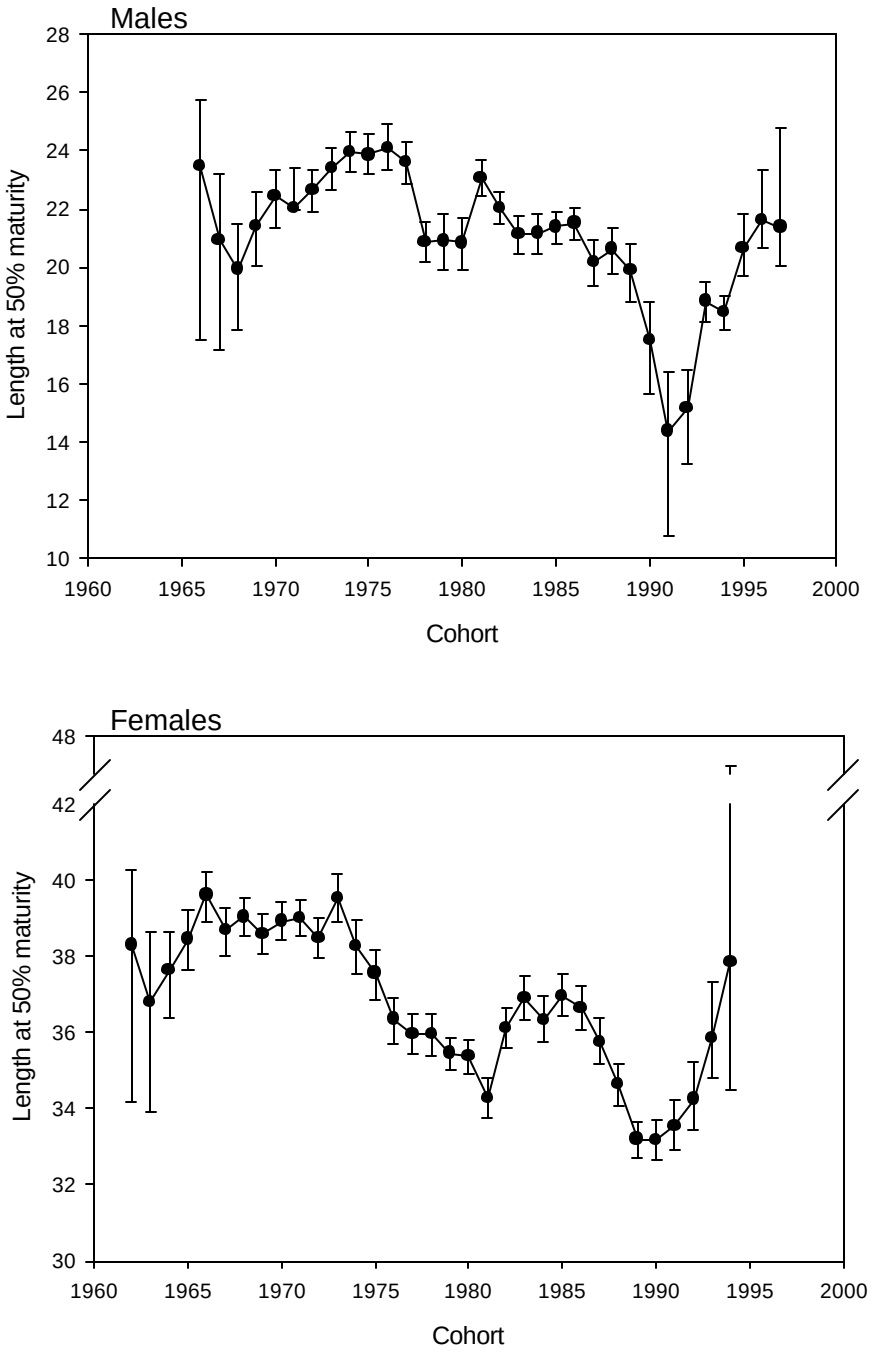


Figure 14. Length at 50% maturity (± 95% fiducial limits) by cohort for male and female American plaice in NAFO Divs. 3LNO.

Figure 15a: Estimates of Relative YC strength.

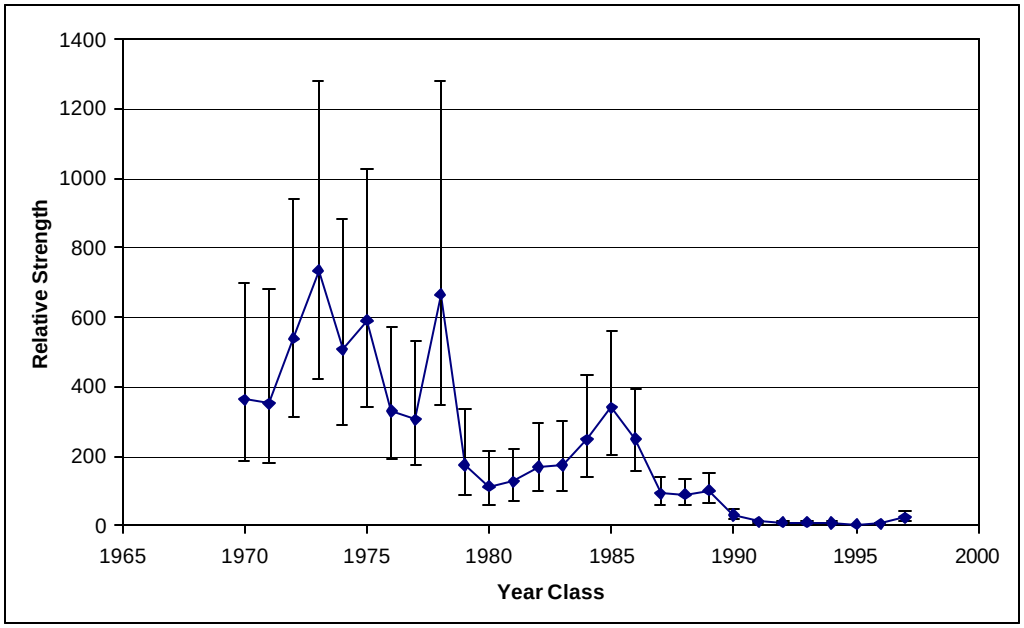
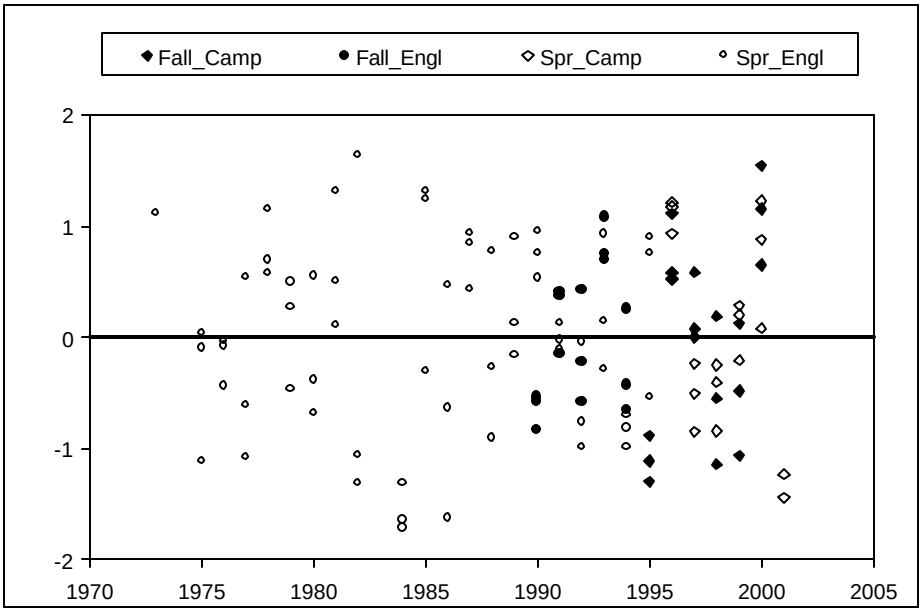


Figure 15b: Standardized Residuals from log-additive model.



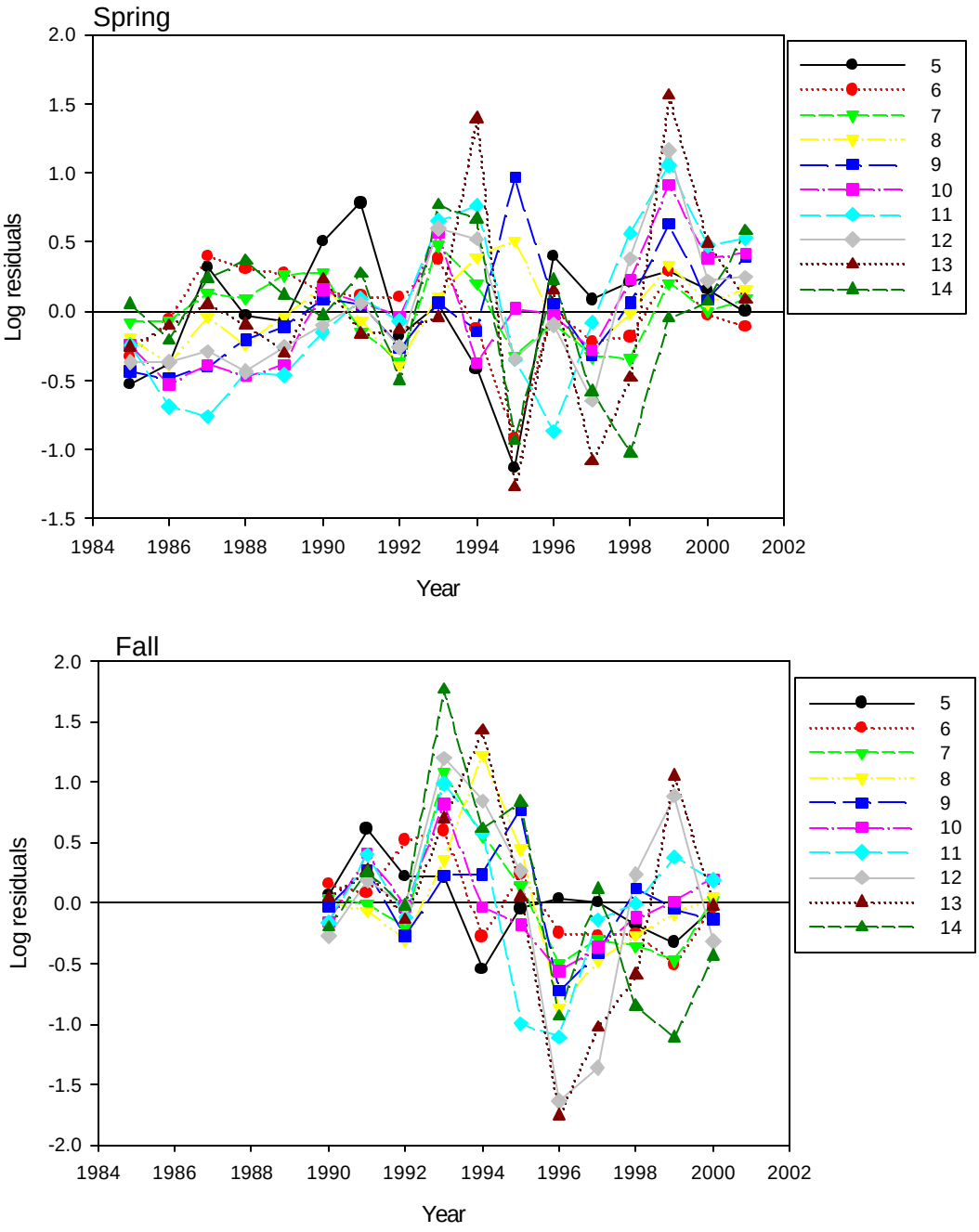


Figure 16. Log residuals from ADAPT for Canadian spring and fall research vessel surveys. Run with both spring and fall indices.

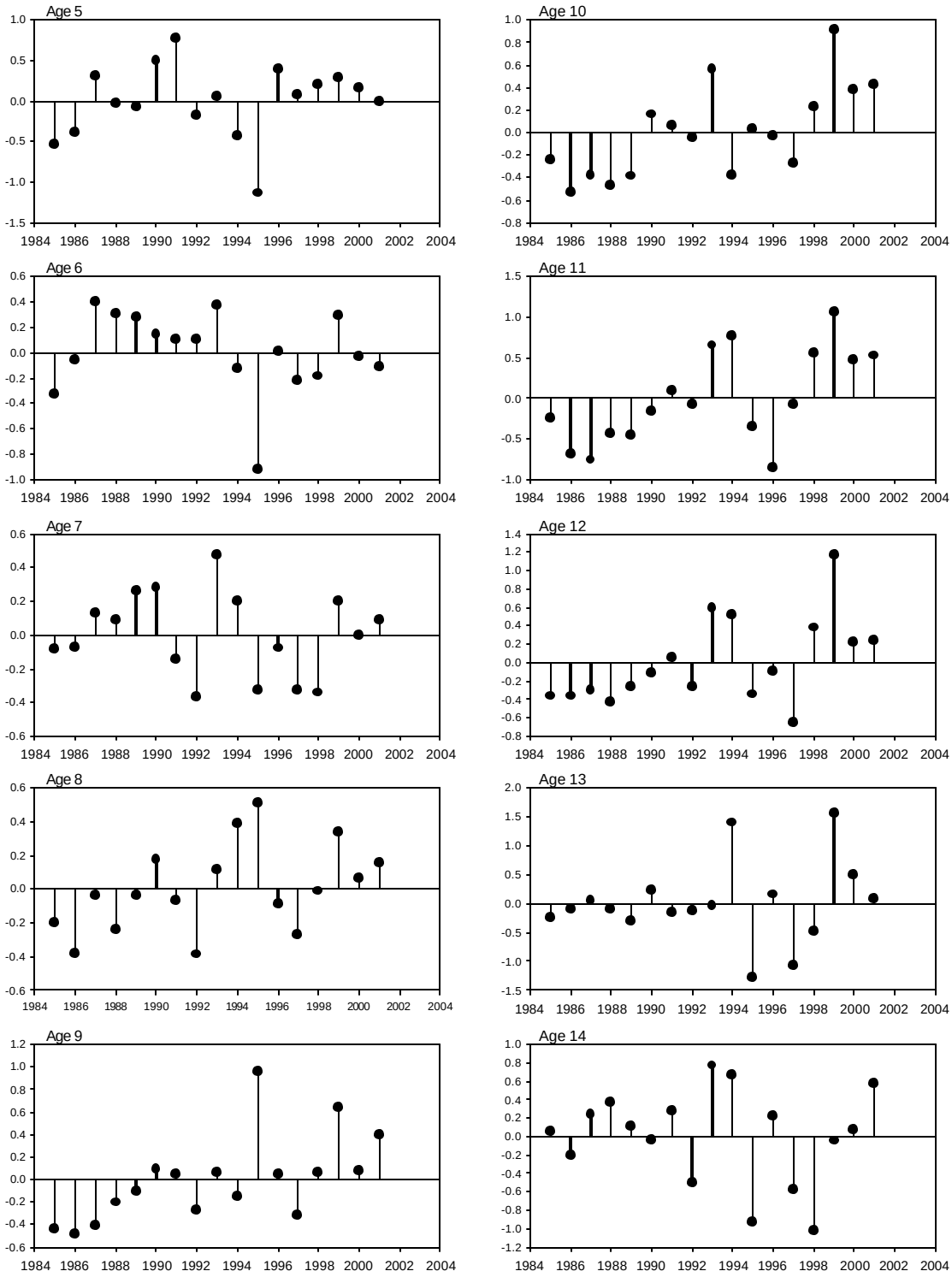


Figure 17. Age by age log residuals from Canadian spring surveys. Run with both spring and fall indices.

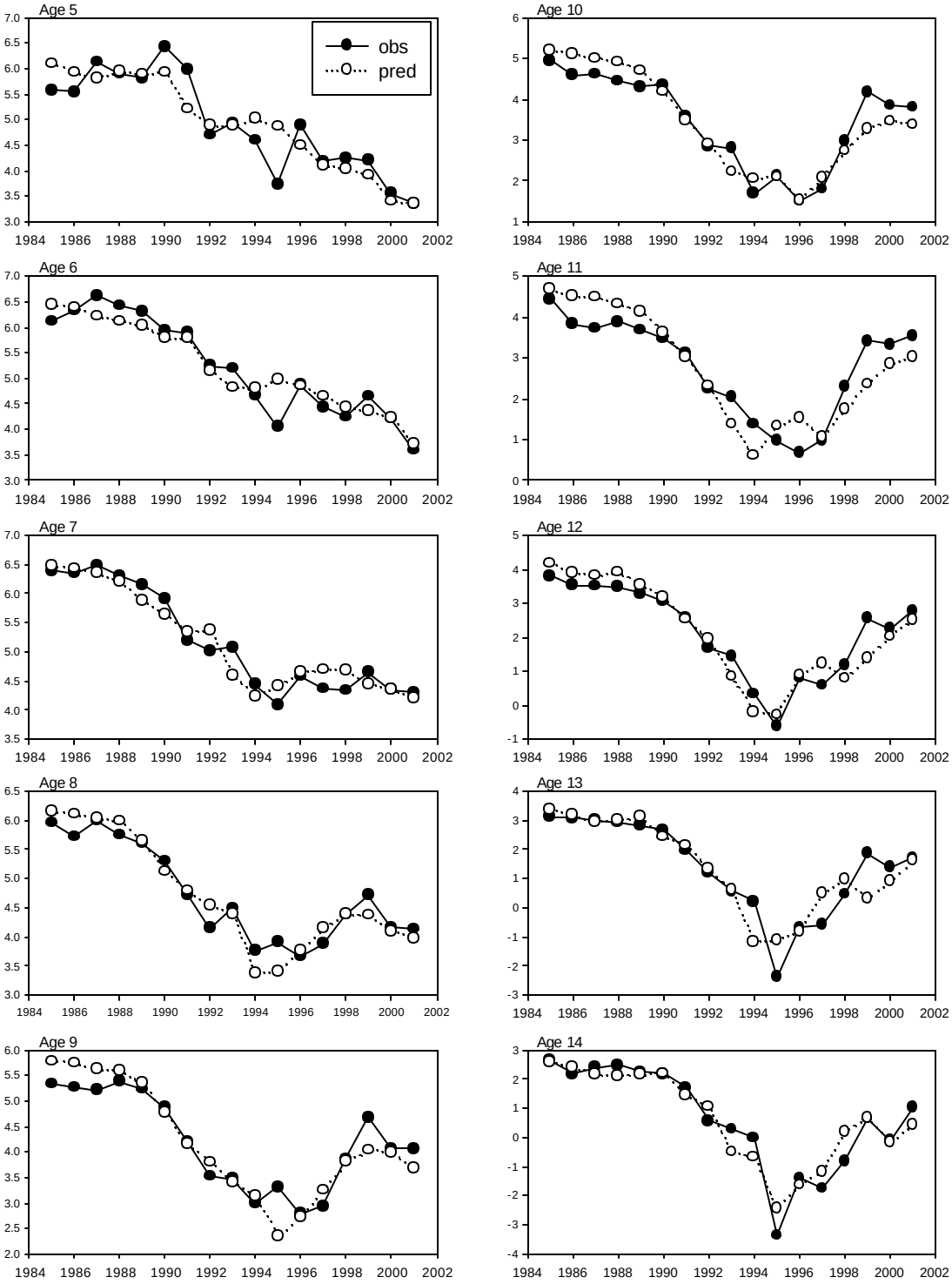


Figure 18. Age by age observed and predicted log abundance index over time from Canadian spring surveys. Run with both spring and fall indices.

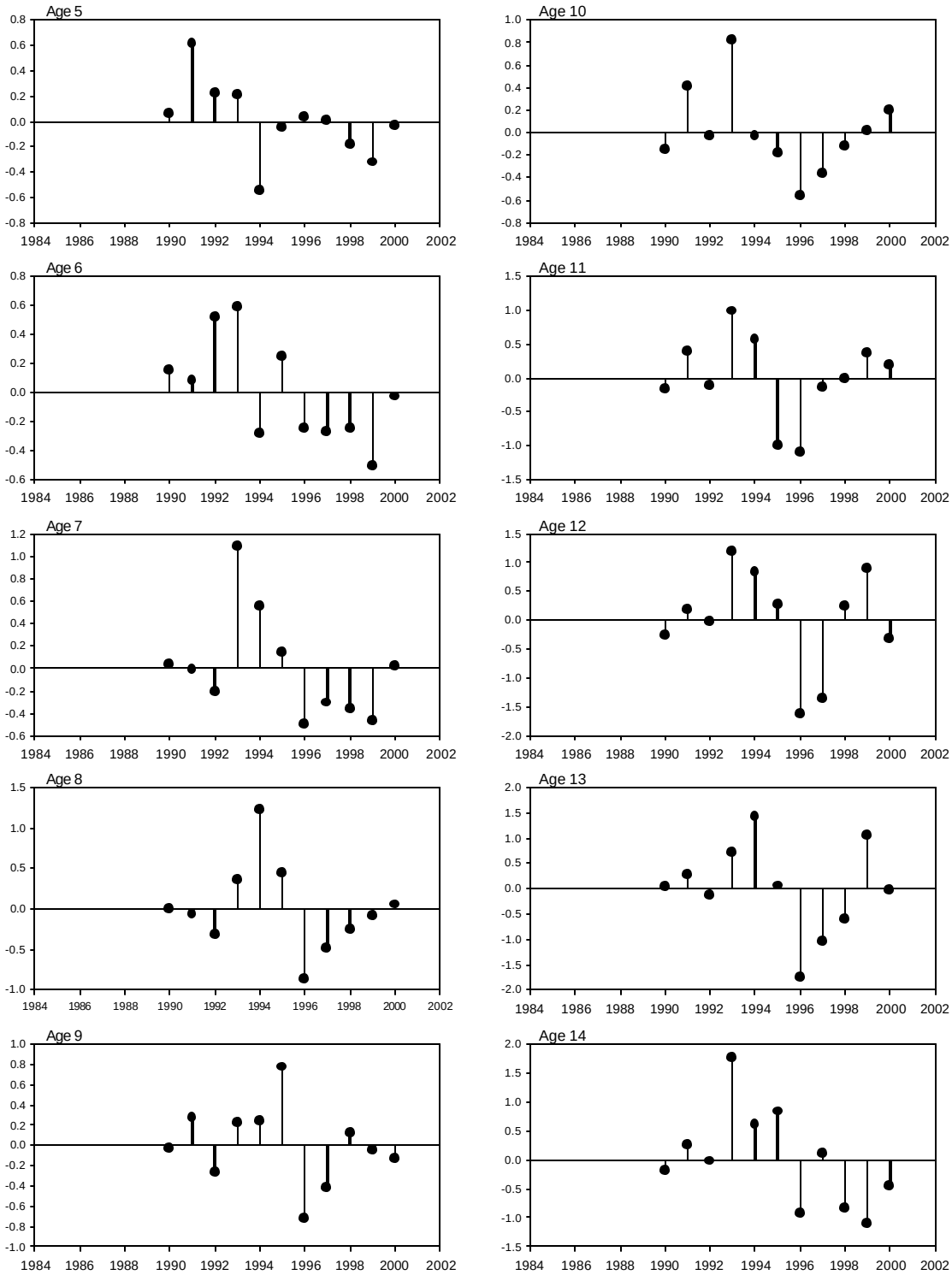


Figure 19. Age by age log residuals from Canadian fall surveys. Run with both spring and fall indices.

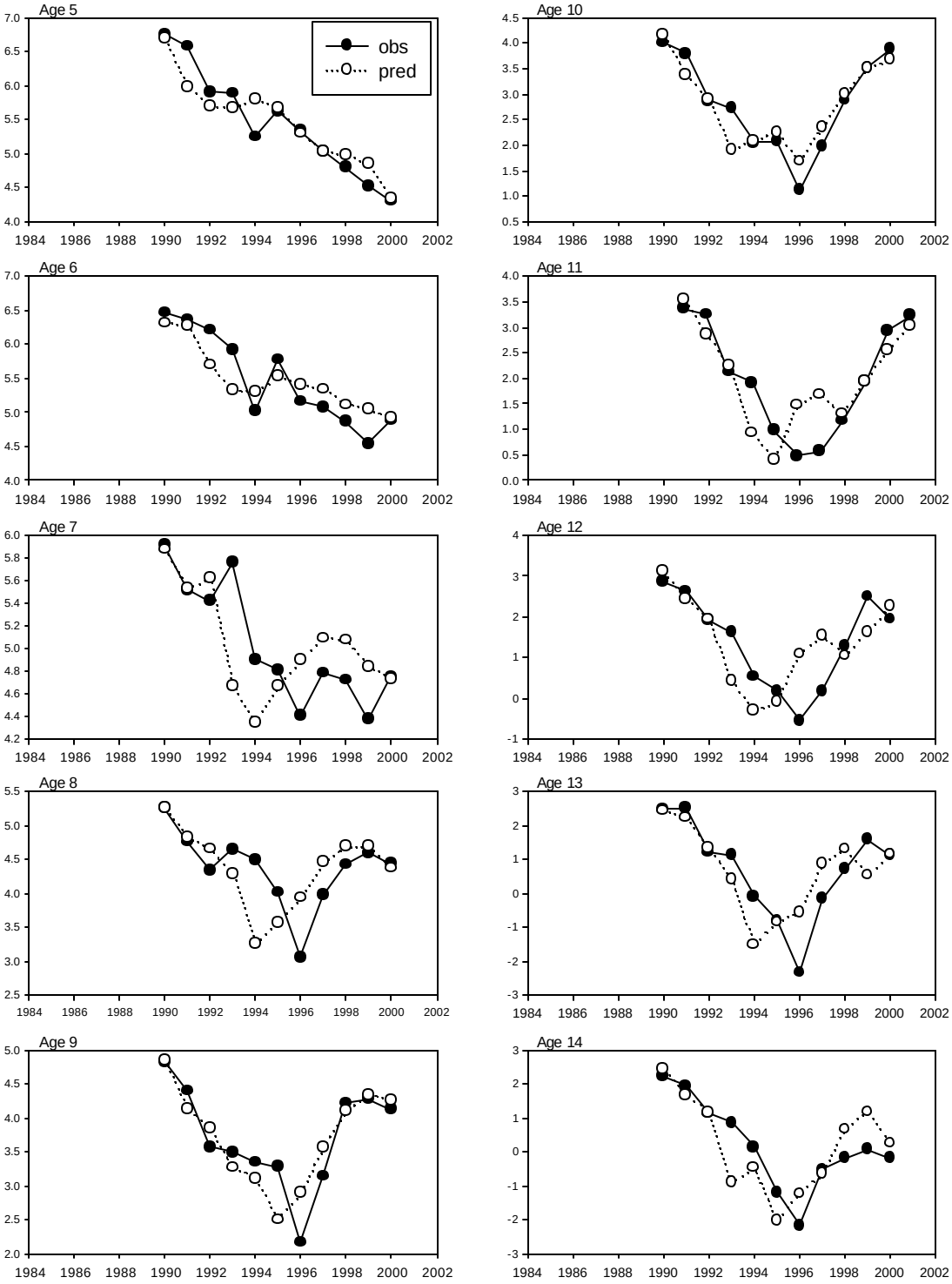


Figure 20. Age by age observed and predicted log abundance index over time from Canadian fall surveys. Run with both spring and fall indices.

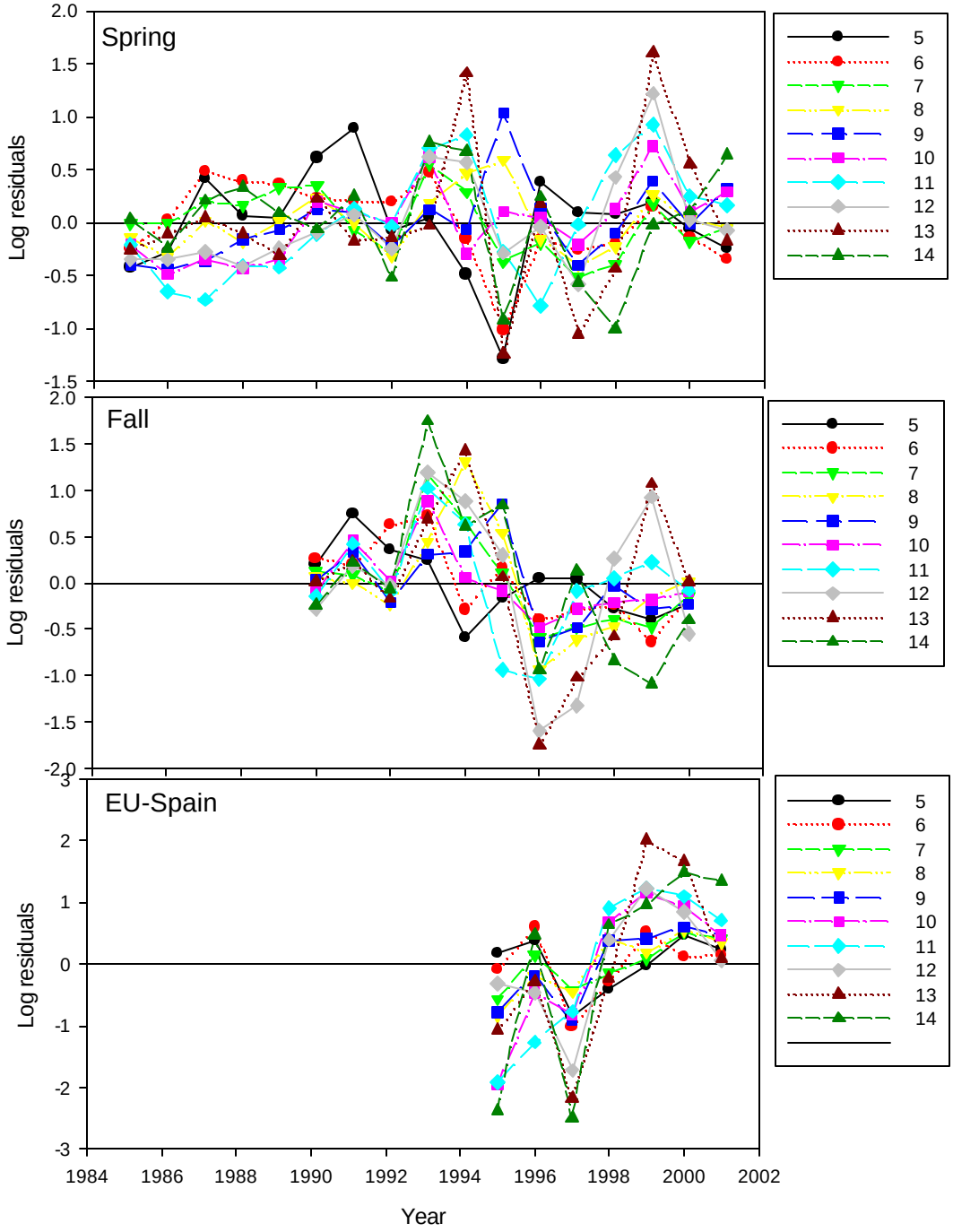


Figure 21. Log residuals from ADAPT for Canadian spring and fall and EU-Spain research vessel surveys. Run with Canadian spring and fall indices and EU-Spain.

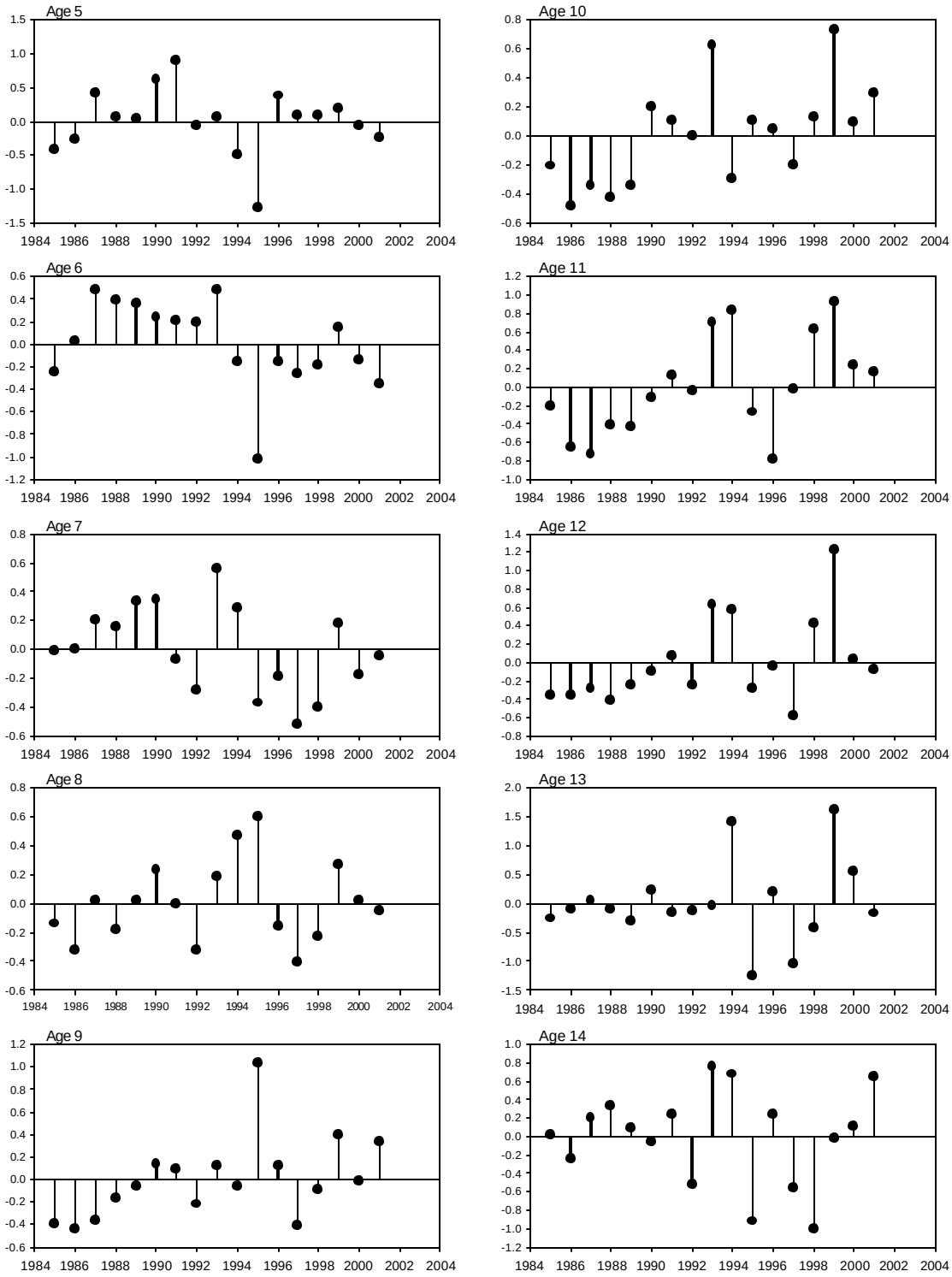


Figure 22. Age by age log residuals from Canadian spring surveys. Run with both spring and fall indices and EU-Spain.

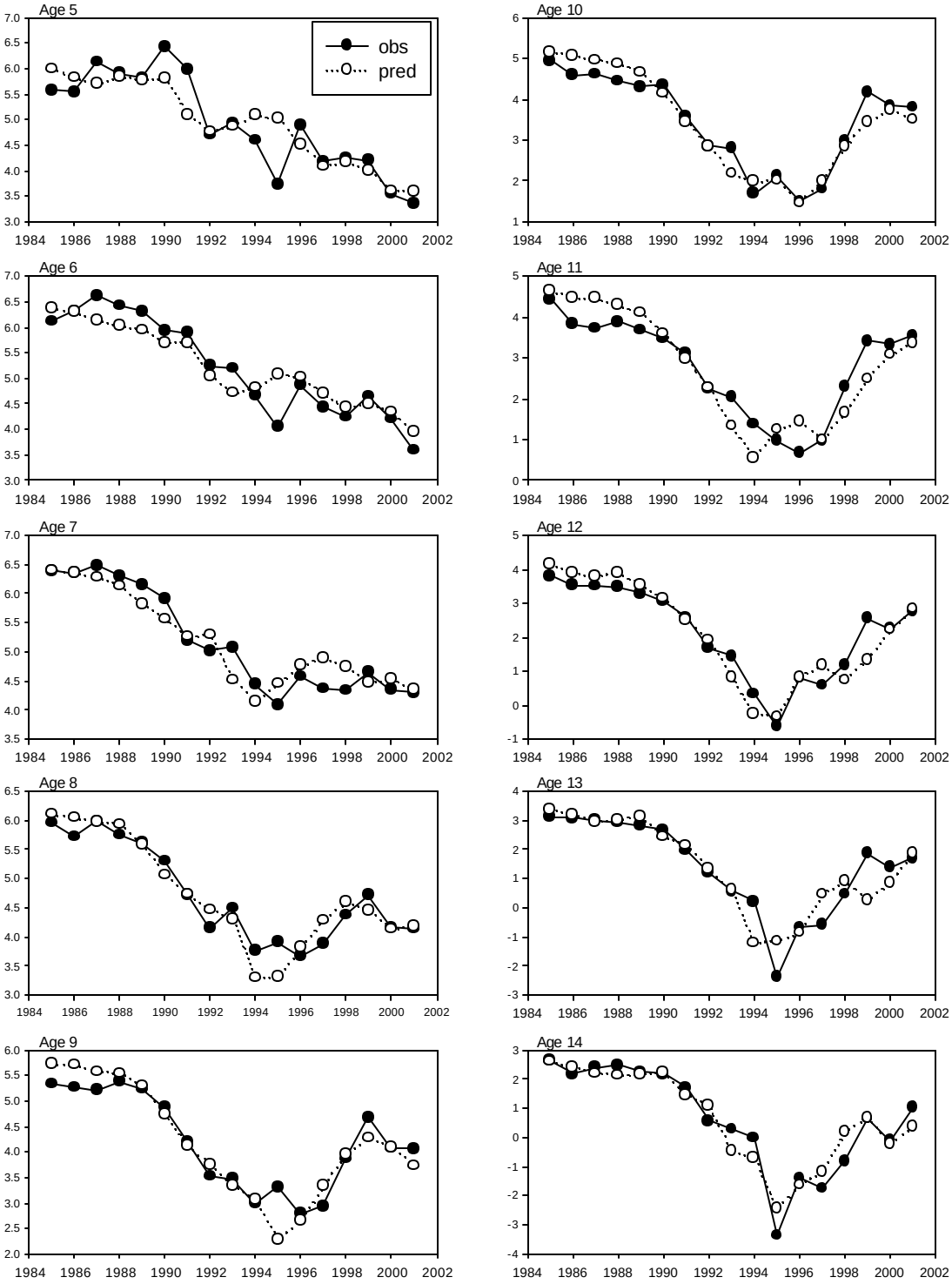


Figure 23. Age by age observed and predicted log abundance index over time from Canadian spring surveys. Run with both spring and fall indices and EU-Spain.

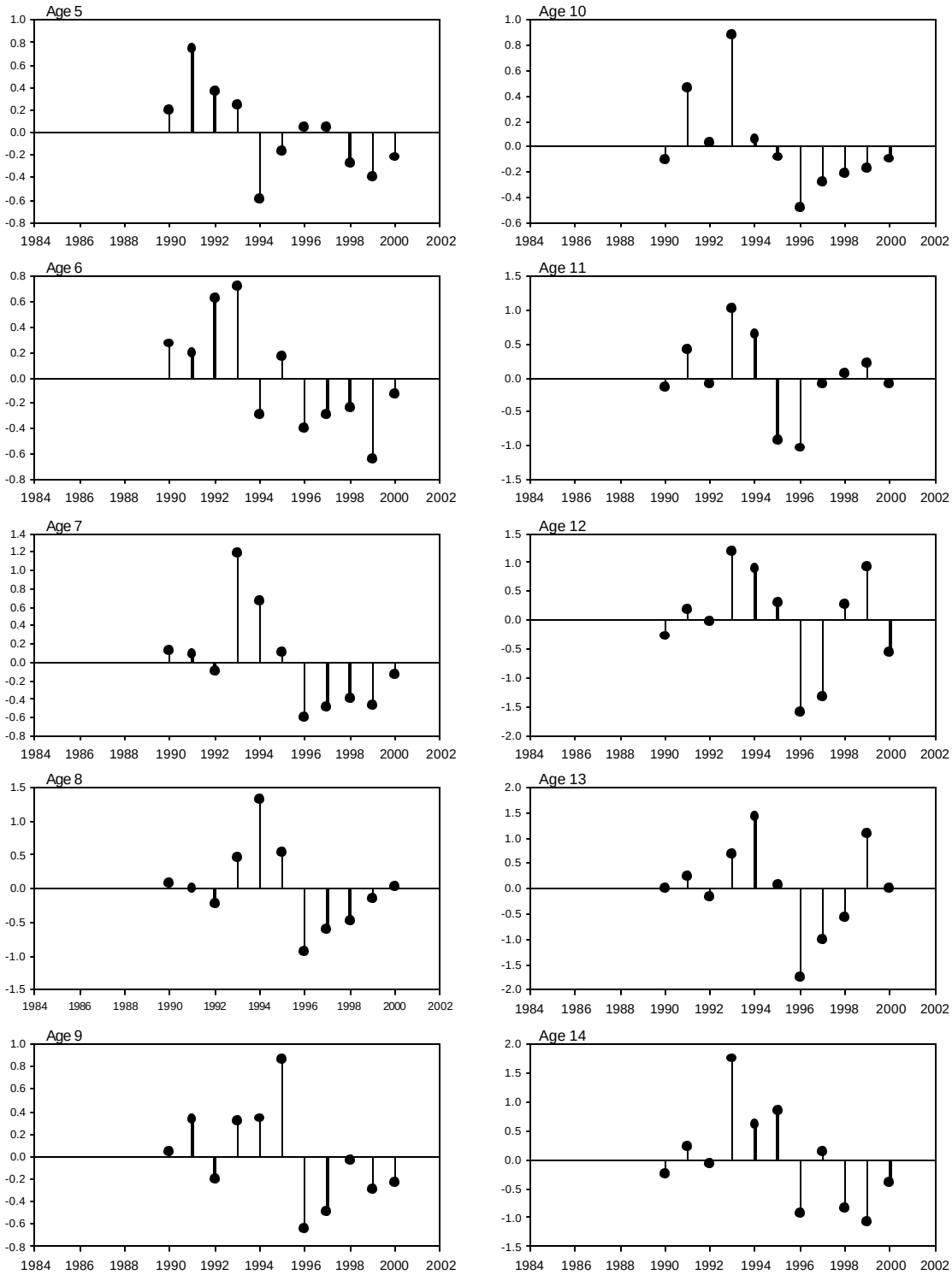


Figure 24. Age by age log residuals from Canadian fall surveys. Run with both spring and fall indices and EU-Spain.

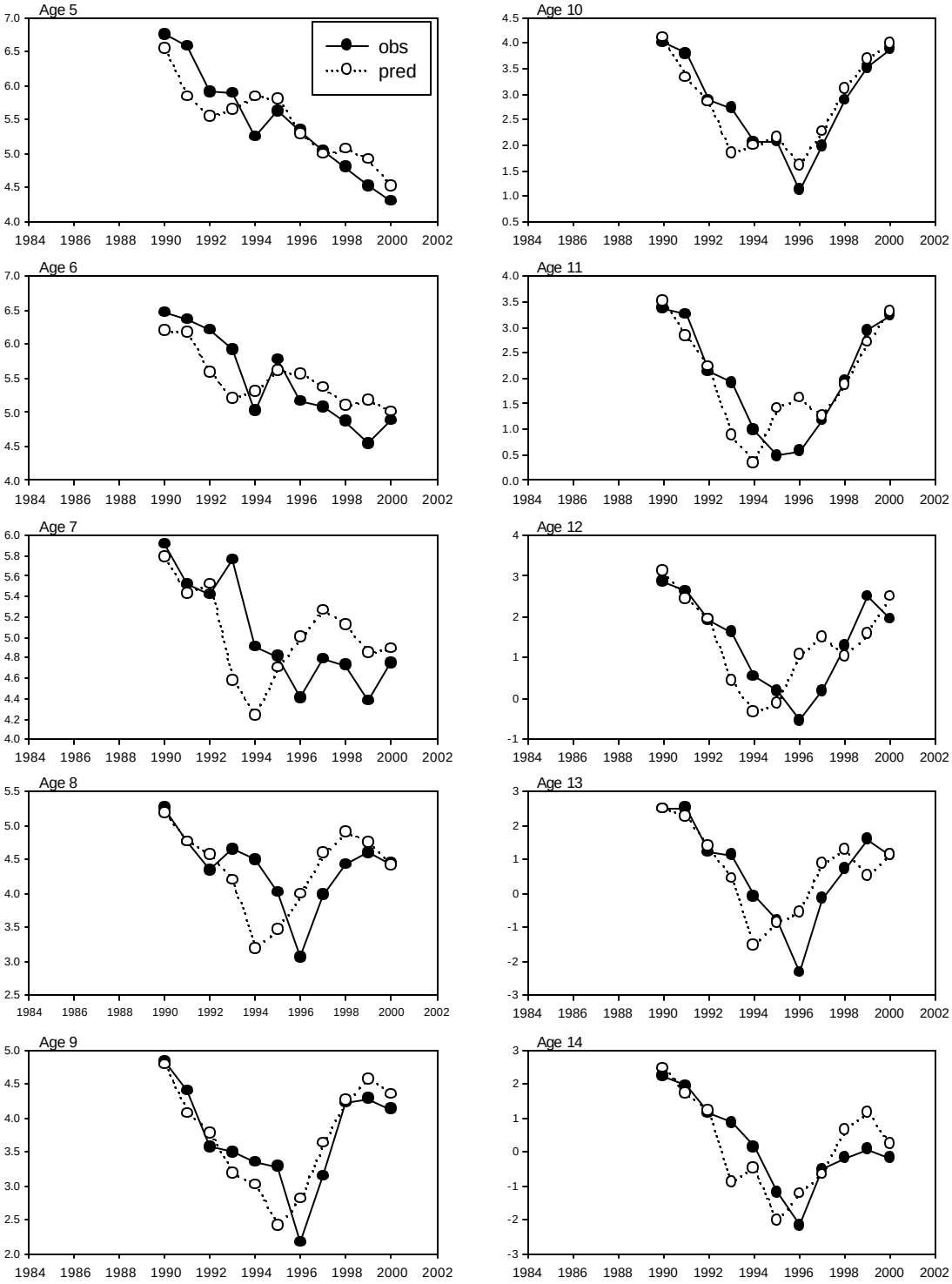


Figure 25. Age by age observed and predicted log abundance index over time from Canadian fall surveys. Run with both spring and fall indices and EU-Spain

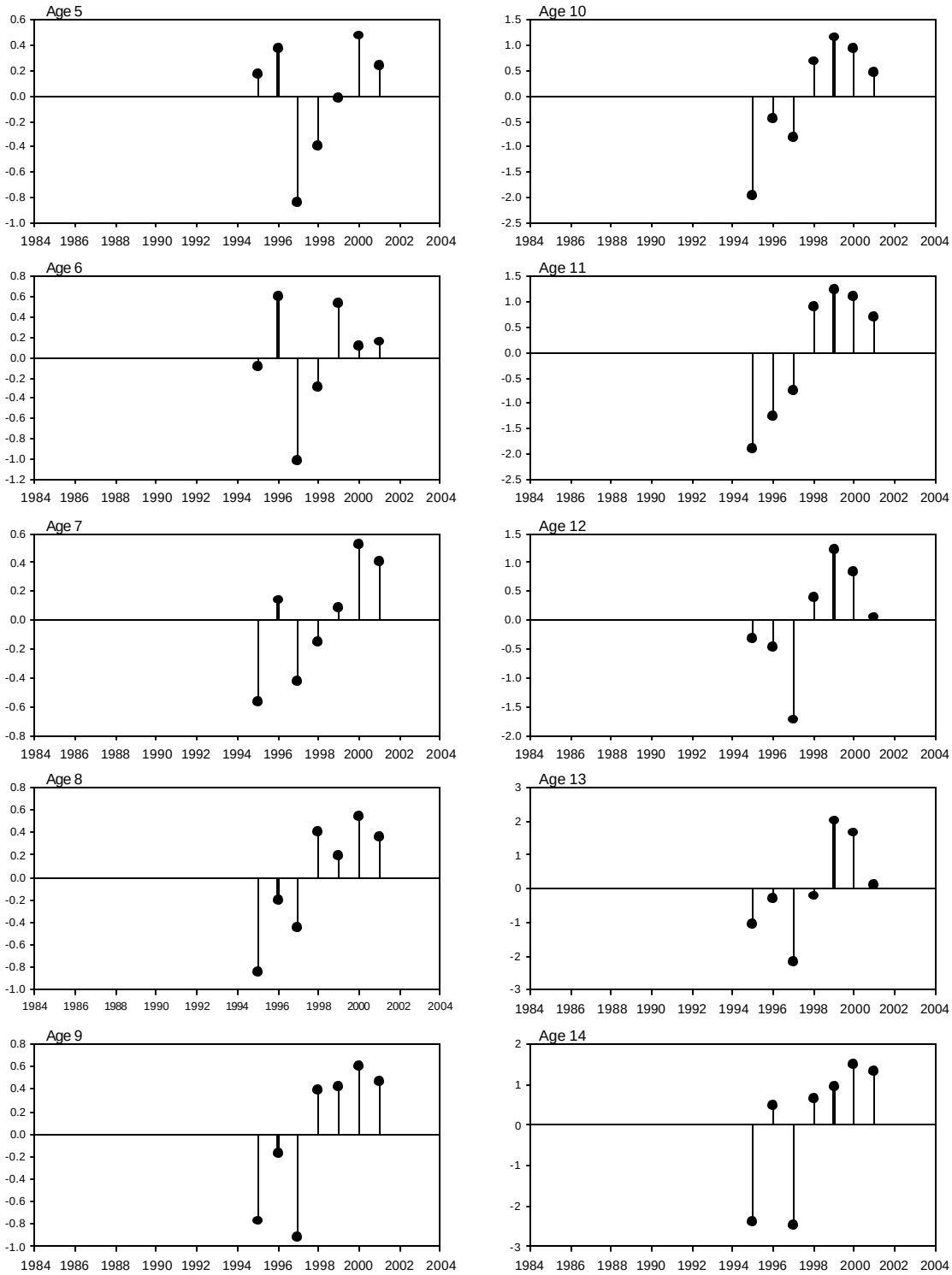


Figure 26. Age by age log residuals from EU-Spain surveys. Run with Canadian spring and fall indices and EU-Spain.

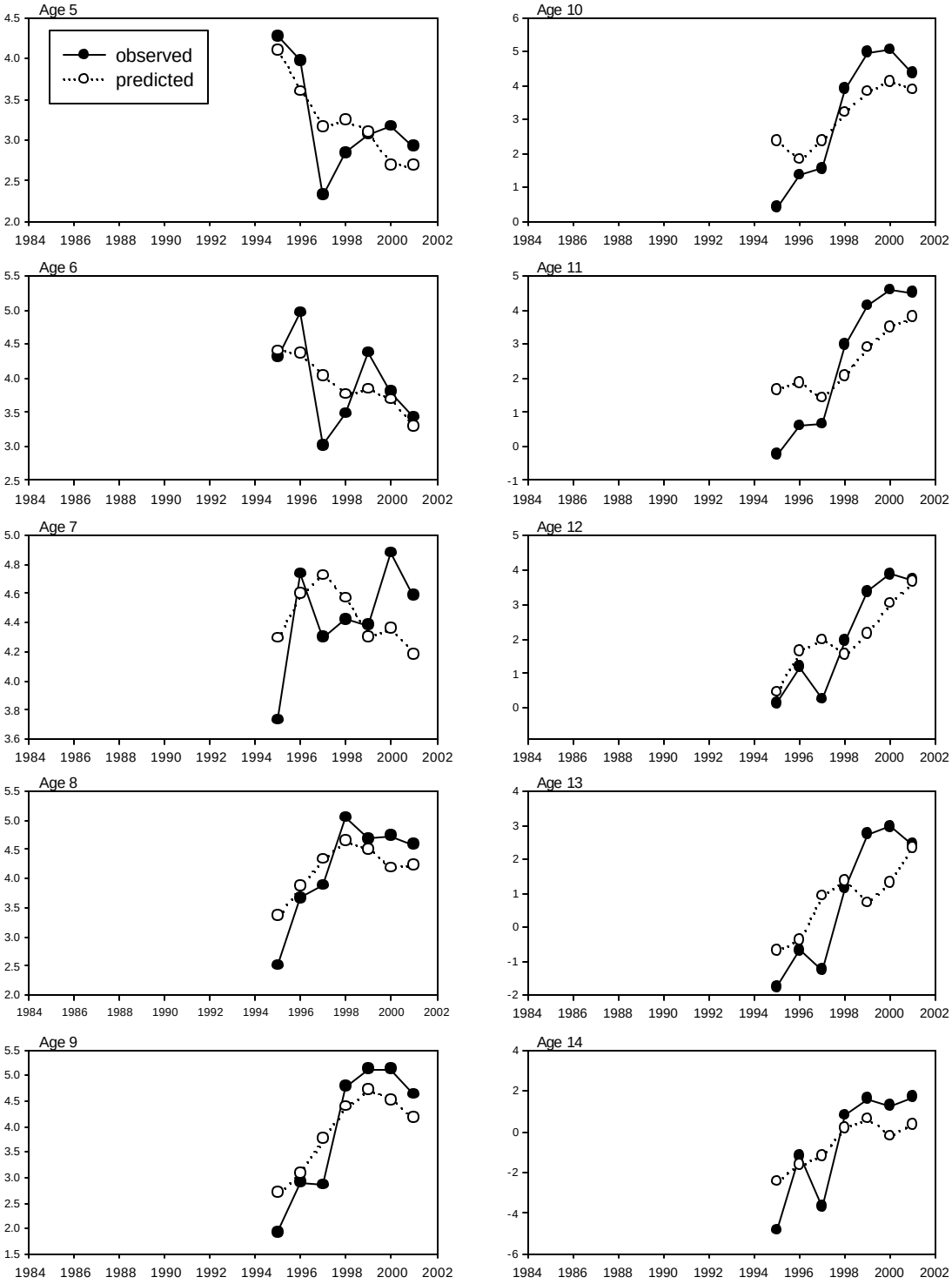


Figure 27. Age by age observed and predicted log abundance index over time from EU-Spain surveys. Run with Canadian spring and fall indices and EU-Spain

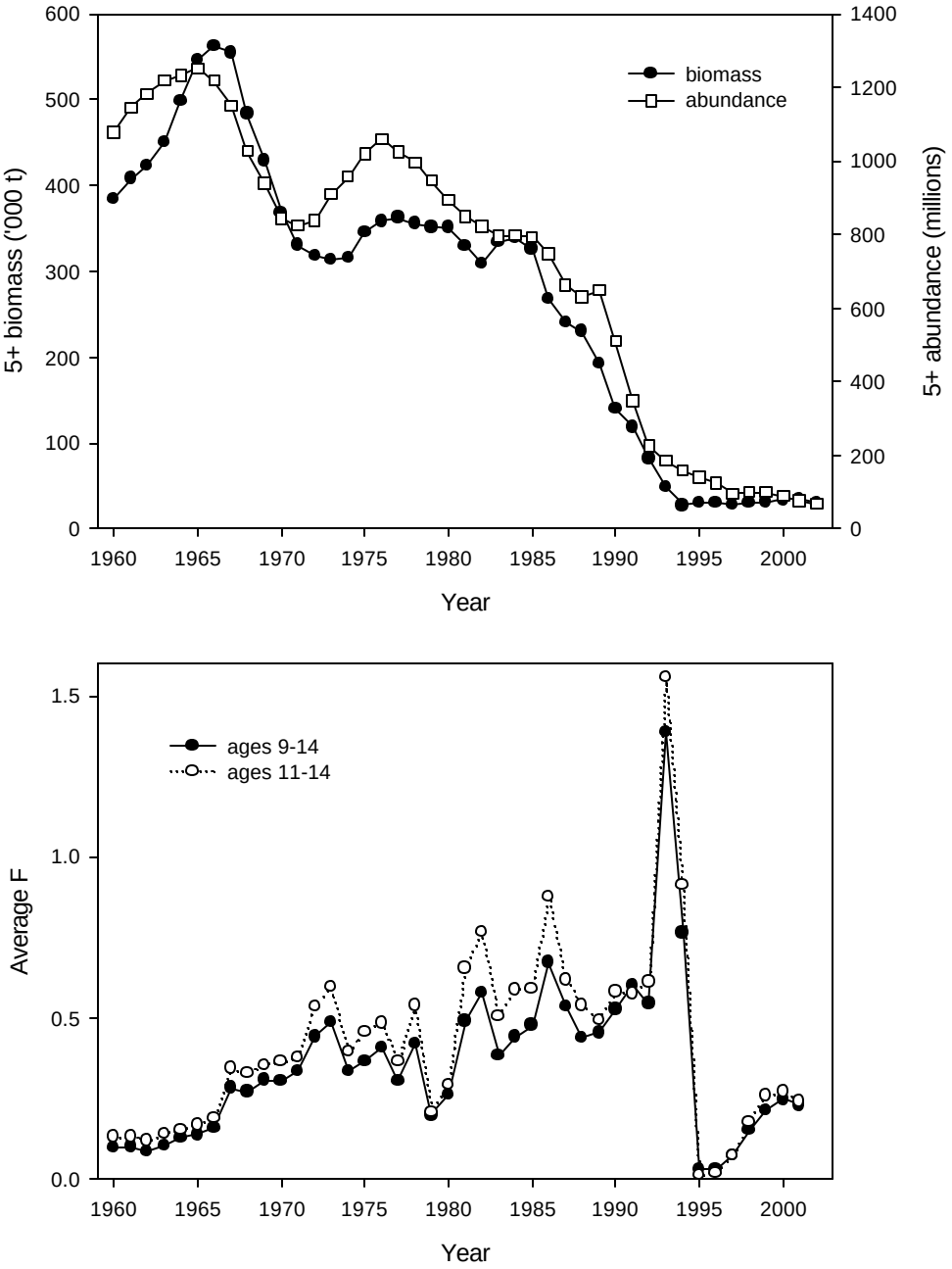


Figure 28. 5+ biomass and abundance (top) and average fishing mortality on ages 9 to 14 and ages 11 to 14 (bottom) from VPA.

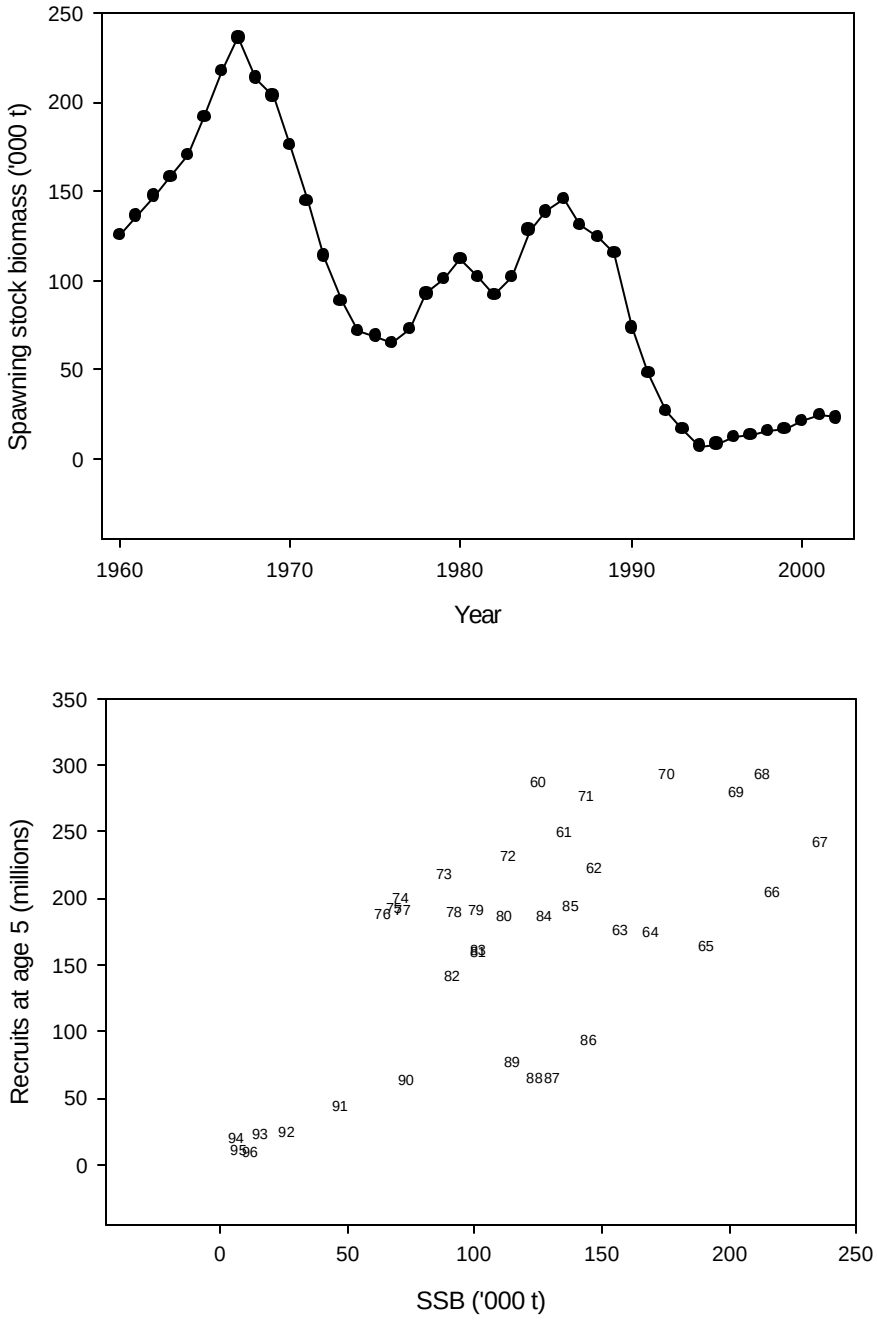


Figure 29. Spawning stock biomass from 1960 to 2002 (top). Spawning stock biomass ('000 t) and recruitment at age 5 (millions) from VPA. The symbols represent the year class.

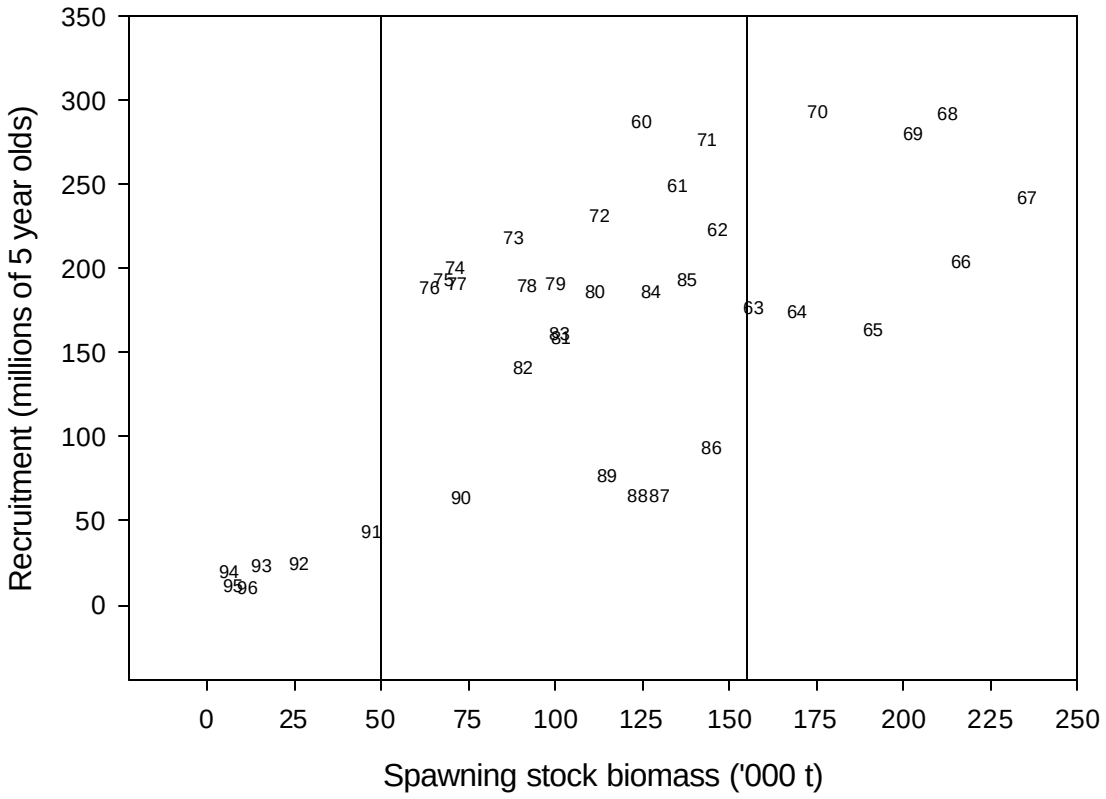


Figure 30. Observed stock recruit scatter. Vertical lines illustrate the 3 levels of recruitment.

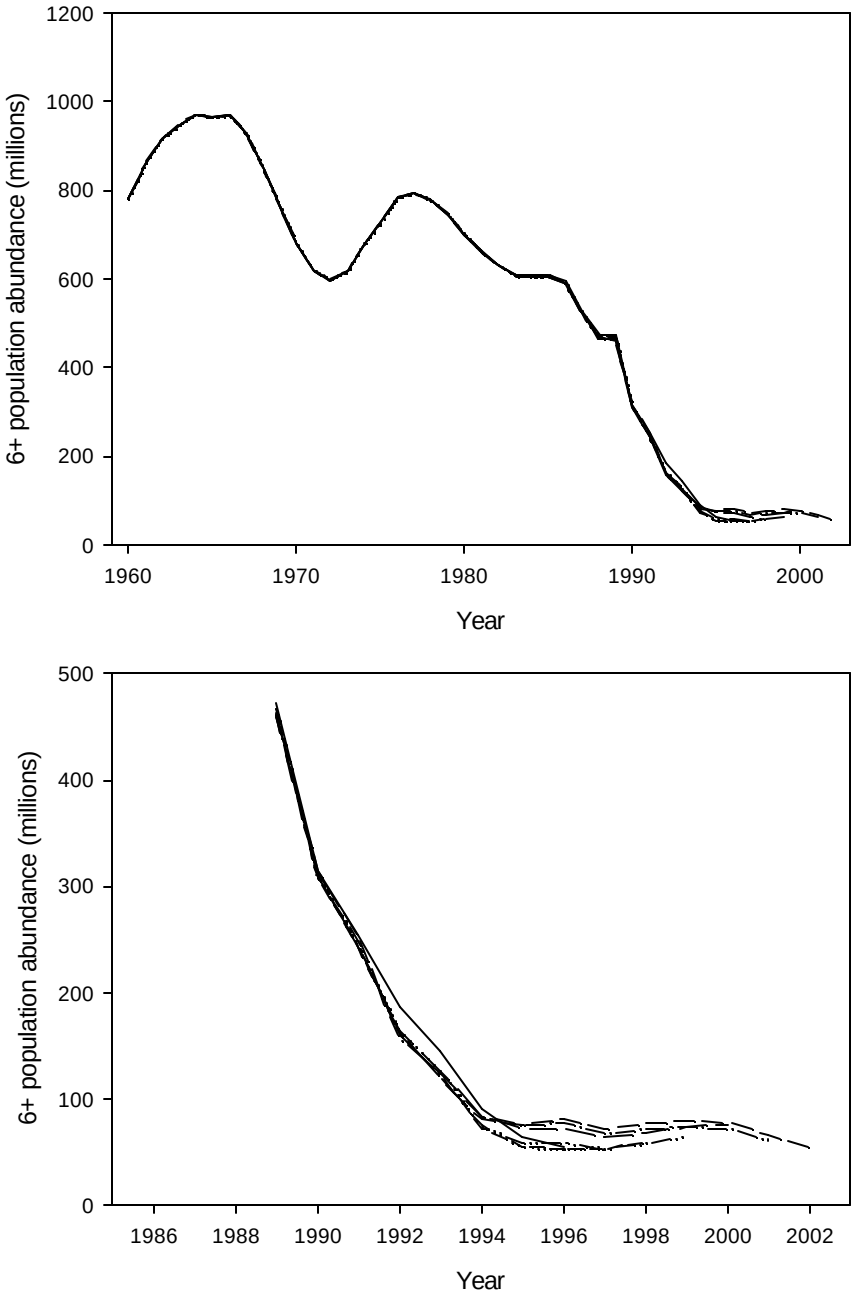


Figure 31. Results of retrospective analysis for Div. 3LNO American plaice. Top panel shows 6+ population abundance for the whole time period while the bottom panel shows only the time period from 1989.

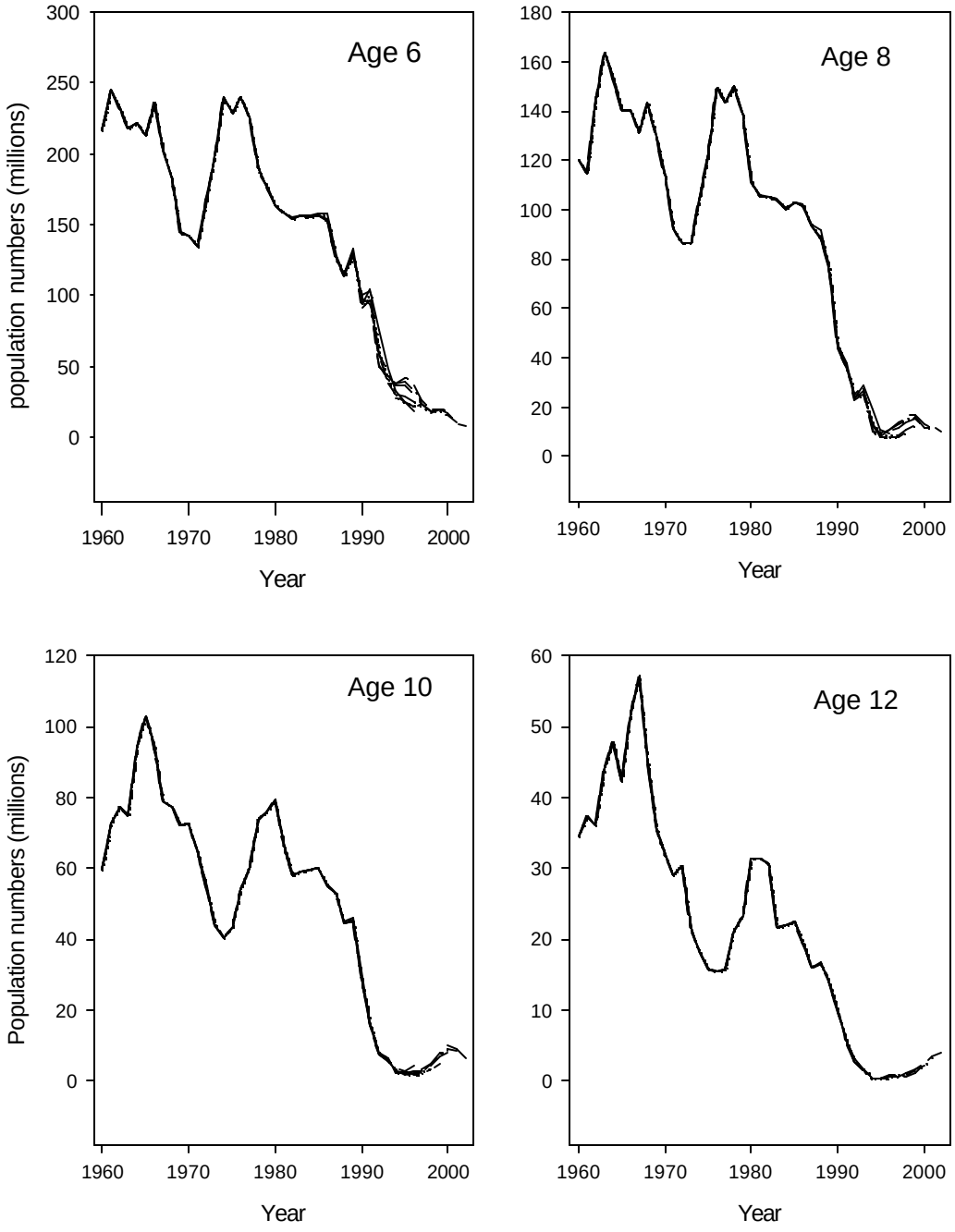


Figure 32. Results of retrospective analysis for Div. 3LNO American plaice. Population numbers (millions) for selected ages.

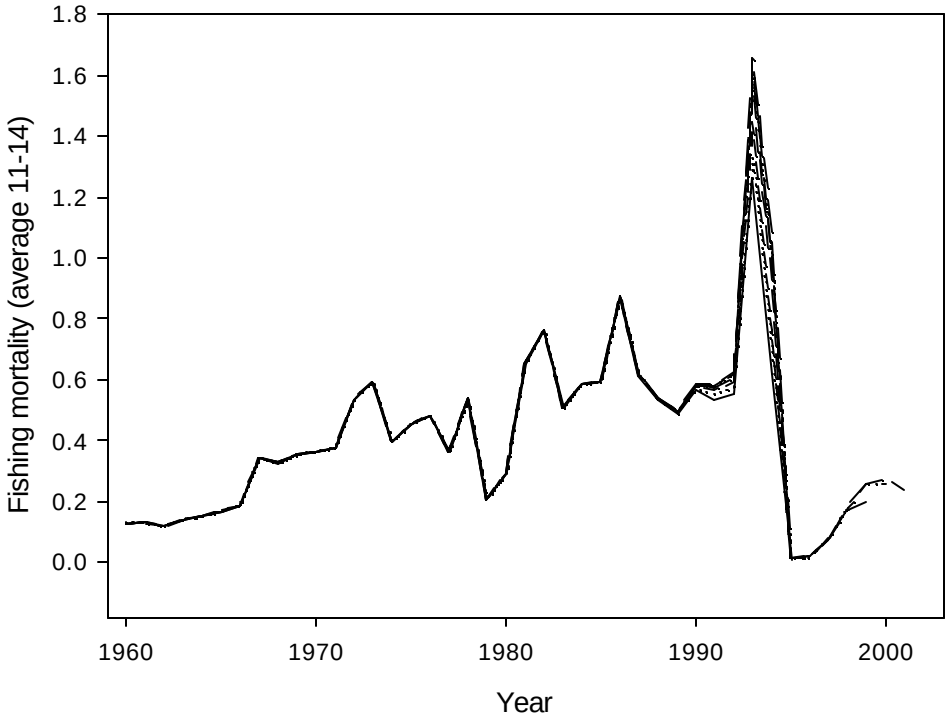


Figure 33. Results of retrospective analysis for Div. 3LNO American plaice. Average fishing mortality over ages 11 to 14.

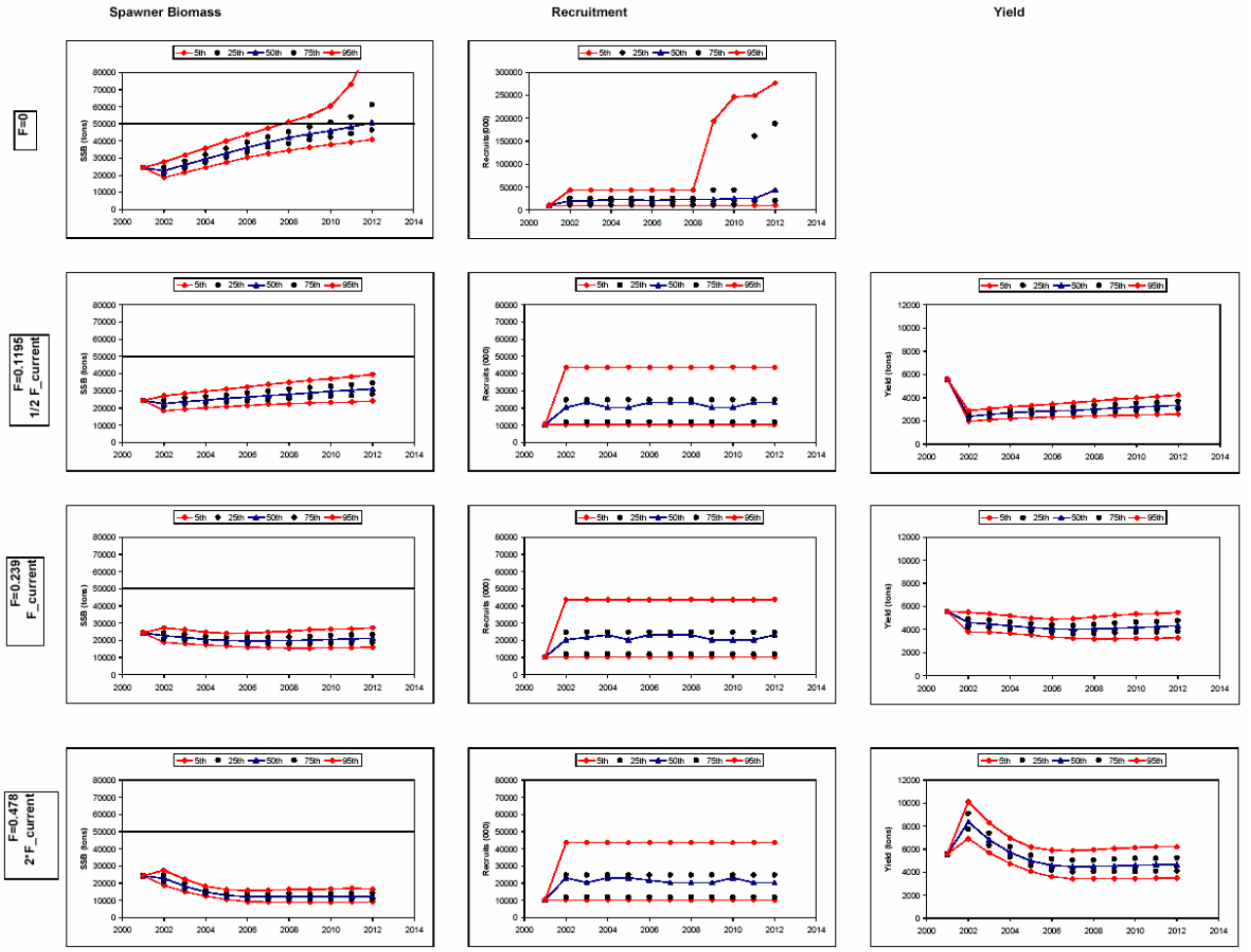


Figure 34. Results of projections for Div. 3LNO American plaice. The 5th, 25th, 50th, 75th, and 95th, percentiles are shown for spawning stock biomass, recruitment and yield (projected catch).