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An assessment of American plaice in NAFO Div. 3LNO

by

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Abstract

Catches from this stock were generally in the range of 40,000 to 50,000 t per year throughout the 1970's and 1980's, before declining to low levels in the early 1990's. There has been no directed fishing on this stock since 1993. The TACs in 1995-2009 have been set at 0. Catch has been lower in recent years than in prior years; in 2007 it was 3600 t and in 2008 it was 2500 t, which 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 1980's to the mid 1990's with the average biomass index of the last 2 years (expressed as mean weight per tow) being only 40% of that of the mid 1980's. The fall survey has also shown large declines and the biomass index is only 36 % of that of 1990. There may be a slight increase in both surveys since the mid 1990's. By Division, the largest decrease in both surveys for biomass and abundance has been in Div. 3L but has been stable since the mid-1990s. In general, there has been an increase in biomass in Divs. 3NO since the mid-1990s and abundance in these Divisions may be at or near levels of the late 1980s-early 1990s. Mortality on younger (less than 5) ages has remained high throughout the time series. For older ages mortality was high in the mid-1990s but has been lower since about 2002 in both surveys. Output from a VPA analyses including data from Canadian spring and fall surveys, as well as the Spanish Div. 3NO survey indicated that population abundance and biomass declined fairly steadily from the mid 1970's but have been slowly increasing since the moratorium in 1994. F increased fairly steadily from 1995 to 2000 but has generally been declining since then. Average F on ages 9-14 in 2007 was 0.17 and was lower in 2008, at 0.10. Since 2001 the SSB has been gradually increasing and is 41, 000 t in the current year, and is approaching 50, 000 t, the B_{lim} for this stock. Recruitment has been generally poor since the 1985 year class; however, the 2003 year class is the largest it has been for the past two decades.

TAC regulation

This stock has been under TAC regulation since 1973 when a TAC of 60,000 t was established. From 1973-87, the TAC varied from 47,000 t to 60,000 t (Table 1) but was lowered to 33,585 t in 1988. Further reductions followed, bringing the TAC to 10,500 t in 1993. In 1994, a TAC of 4,800 t 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 t in the early 1960s to a peak of 94,000 t in 1967, were relatively stable around 45,000-50,000 t in 1973-82, then declined to 39,000 t in 1984-85 (Table 1, Fig. 1). Catches increased to 65,000 t in 1986 and then declined rapidly thereafter, to about 7,400 t in 1994. Following the moratorium in 1995, the catch (bycatch in other fisheries, mainly yellowtail flounder) declined for a couple of years but then began to increase. Catches

reached a high of 8 000 t, in 2003, and has been lower since. In 2006, the bycatch value was lower, due mainly to a lack of fishing of yellowtail flounder in that year, but since then bycatch has been gradually rising, reaching a value of 3,607 t in 2007 and 2, 515 t in 2008. In 2007, the Canadian catch totalled about 435 t and in 2008, it was about 878 t. The remainder of the catch occurred as by-catch in the skate, redfish and Greenland halibut fisheries in the NRA.

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 t in 1981-82 to over 30,000 t in 1986 as new fisheries were developed in the Regulatory Area (Table 1). 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. In recent years there have been some problems in resolving catches, resulting in variation in estimates.

The amount of plaice caught as by-catch in the shrimp fishery was reviewed by Orr et al. (2008). The shrimp fishing area corresponding to Div. 3L is shrimp fishing area 7 (very little shrimp fishing occurs in Div. 3NO). For 2004-2007, the average amount of plaice taken annually in this fishery in this area was 3.3 t. It has increased slightly over that time period. There was only one length frequency available from 2004 and there were only 35 fish measured (all fish were less than 31 cm).

Canadian research vessel surveys

Poor Survey Coverage

In recent years there have been several problems with coverage and timing of the Canadian research vessel surveys, which has caused some data points to be excluded from the assessment model. Poor survey coverage has been an issue for the 2004 fall (incomplete coverage in Div. 3L) and the 2006 spring multi-species survey (no otoliths collected and incomplete survey in Div. 3NO) (Healey and Dwyer 2005; Dwyer *et al.* 2007). In 2007, Dwyer *et al.* (2007) removed the Canadian RV Autumn 2004 survey value from the analytical assessment. Although shown to produce very little change in the outcome of the assessment, examination of the age by age abundance indicated that the strata not surveyed significantly changed the age composition for that data point. There have also been years whereby the survey could not be completed in the fall and has run over into January (1995, 2002, 2003, 2004 and 2005). In addition, in fall 2007 and 2008 the number of strata surveyed was substantially reduced, and in 2008 there were no deep strata surveyed in Div. 3L (see Healey and Brodie 2009 for a detailed examination of survey problems). With respect to American plaice, the fall 2008 survey will need to be examined in more detail once the ageing is completed for this survey in order to see whether it can be included in the next assessment.

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 2008, with the exception of 1983. The stratification scheme used is shown in Figure 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 1996-2008 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 2008. 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 2008 are given in Tables 2-4. Please note the shaded columns. In 2007, the spring survey biomass estimates for 3L, 3N and 3O were 46, 300, 140, 400 and 44, 400 t respectively. In 2008, the estimates for 3L, 3N and 3O were 50, 000, 132, 5000 and 51, 600 t. From 1996 to 1998 the estimate for Div. 3N biomass was approximately half of the estimate for Div. 3O while from 1999 to 2004 the estimates in the two divisions are about equal. However, from 2005 onwards the biomass estimate from Div. 3N is at least double the biomass estimate from Div. 3O. The biomass estimates in Div. 3L have generally been higher in recent

years (please note the 2006 data point should not be considered as part of this assessment). Biomass in Div. 3LNO combined was the highest it has been since 1996 but is still only 32% of that of the mid 1980s (Fig. 3).

In Figure 4 and 5 the biomass index is shown as mean weight per tow. In Figure 4 the index is presented by division and in Figure 5 for Div. 3LNO combined (top panel). Overall the combined index shows the same trend as the swept area estimate of biomass with a large decline in the late 1980s (which has been greatest in Div. 3L) followed by a slight increase since 1996. The average mean weight per tow for Div. 3LNO combined in the last 2 years is 40% of the average of the mid 1980's, an increase over the past few years. The mean weight per tow in Div. 3N has increased to the level it was at in the 1980s (Fig. 4).

Figure 6 shows the abundance for Div. 3LNO combined from 1985 to 2008 (top panel). The total abundance has fluctuated since 1996 with a slight increase over the period. Mean number per tow for Div. 3LNO combined shows the same trend (Fig. 7, top panel). As with the biomass estimate, mean number per tow has shown the greatest decline in Div. 3L (Fig. 8), with levels in Div. 3NO in recent years being the same level as in the beginning of the time series.

Tables 5-8 and Figure 9 show the abundance at age from the Canadian spring surveys by division and for Div. 3LNO combined. Although the proportion of fish that are ages 0 to 5 was lower in 2004, in recent years has been consistently above average for the time series. The abundance estimate in 2008 was among the highest estimates since 1991 (Table 8). In addition, the 1998 (somewhat smaller) and 2003 year classes are evident in Figure 9.

Figures 10 and 11 show the distribution plots (kg/tow standardized to tow length) of American plaice for 2005-2008. The largest concentrations of plaice seem to be in Div. 3N, mainly outside the 200-mile limit.

Fall

Stratified-random surveys have been conducted in Div. 3L in the fall from 1981 to 2008, usually in October-November, but in recent years this has been occurring later. From 1990 to 2008, 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 9-11. Biomass estimates from the fall survey in 2007 were 50 900, 125 600 and 65 300 t for Div. 3L, 3N and 3O respectively. In 2008, the biomass estimates for these Divisions were 61 200, 169 000 and 103 100 t. Over the past number of years, there has been a large biomass estimate in Div. 3N fairly consistently, which is heavily influenced by large sets in stratum 360 (Table 10). This is true especially in 2008. In 2008, the estimate for Div. 3O was also very high compared to other years, but this was not due to large sets in any one stratum (though there were some large sets in stratum 353). During 1995 to 1997, Div. 3N constituted on average 40% of the Div. 3NO total while the average since 2000 has been about 70% of the Div. 3NO total.

The overall biomass for Div. 3LNO in the fall has shown a slight increasing trend since 1995 (Fig. 3). The biomass index remains well below that of 1990 with the average of the 2008 index representing only about 50% of that of 1990. The biomass index expressed as mean weight per tow shows the same overall trend with the average of the last 3 years being 39% of the level of 1990 (Fig. 5). Mean weight per tow has shown the largest decline in Div. 3L (Fig. 12). Mean weight per tow estimates from Div. 3N are at or above levels seen in 1996, while mean weight per tow in Div. 3O has not shown any real improvement, though the value in 2008 was higher than that seen for the past 14 years (Fig. 12).

Figure 6 shows the abundance for Div. 3LNO combined from 1990 to 2008. Abundance showed a substantial decline from 1990 to 1998 but has been increasing since 1998. Mean numbers per tow show the same pattern (Fig. 7). By Division, the largest decline was once again in Div. 3L (Fig. 13) but increases were shown in both Division 3N and especially in Div. 3O. The 2008 value was the highest in the time series (Fig. 13).

Tables 12-15 and Figure 14 show the abundance by age for 1990 to 2008. Abundance in Div. 3L declined in each year since 1995 to 2000 but increased in 2001 and has remained at that level ever since (with the exception of 2004, which was poorly covered by the survey). The age composition has seen younger ages making up a higher proportion of the population in the last few years (Table 15). The 2003 year class appears to be large in this survey (Figure 14).

Although there were no ages available at the time of this assessment for fall 2008, length frequency plots (not shown) indicate a peak at about 30-32 cm which may be indicative that this year class will appear in this survey.

Plots of distribution by weight (Fig. 15 and 16) for the fall surveys for 2005-2008 show that American plaice are distributed throughout the Div. 3LNO area. However the area of highest concentration is southern 3NO, particularly 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 Figures 3 and 6. Overall, abundance and biomass estimated from spring and fall surveys show an increasing trend, except in the most recent years, when the autumn survey index has continued to increase while the spring survey was stable (Figure 6), possibly due to survey timing changes and fish moving into and out of the survey area. Historically, both surveys have shown the largest decline in Div. 3L. There are some larger catches off the Grand Banks in Div. 3L in the fall but overall, distribution is also similar between the two surveys, with the majority of the fish being distributed in southern Div. 3NO (Figs. 10, 11, 15 and 16).

Catch to RV Biomass ratio

Examination of the catch/biomass ratios from Campelen data from 1985 to 2008 is shown in Figure 17. The Campelen ratios were highest in the 1991-94 period, and were reduced from 1995-1999, reflecting a period of reduced catches (Table 1). The catch/biomass ratios increased substantially over the 1999 to 2004 period, but were lower since then.

Maturities

Age and length at 50% maturity were produced from spring RV data. Maturity data were collected during research vessel surveys from 1960-2008. Stratified random surveys were used where possible (1971-2008). 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 were 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} were fairly stable for cohorts of the 1960s to mid 1970s, with perhaps a slight increase over that time period (Figure 18). Male A_{50} then began a fairly steady decline to the 1991 cohort which had an A_{50} of just over 3 years. Male A_{50} has increased somewhat but is still below the 1960s and 1970s with an A_{50} of about 4 years compared to 6 years at the beginning of the time series (Fig. 18). For females, estimates of A_{50} have shown a large, almost continuous decline, since the beginning of the time series (Figure 18). For females the A_{50} for recent cohorts is about 7 years compared to 11 years for cohorts at the beginning of the time series.

Estimates of maturity at length were produced using the data described above and are presented by cohort in Figure 19. L_{50} declined for both sexes but recovered in recent cohorts. The current L_{50} for males of 18 to 19 cm is 3 to 4 cm lower than the earliest cohorts estimated. The L_{50} of most recent cohorts for females is in the range of 34-35 cm, somewhat lower than the 39 cm of the earliest cohorts.

Weights and lengths-at -age

Mean weights-at-age and mean lengths-at-age were calculated for male and female American plaice for Div. 3LNO using spring survey data from 1990 to 2008, except for 2006 when survey coverage was too poor to be considered representative. Means were calculated accounting for the length stratified sampling design. Although there is variation in both length and weight-at-age there is little indication of any long-term trend for either males or females (Fig. 20 and 21).

Mortality

Estimates of total mortality (Z) from the Campelen or equivalent, spring and fall survey data were calculated for ages 1 to 16 (Fig. 22 and 23). A Lowess smoother with a smoothing window of 0.5 is plotted to help illustrate trends. The spring survey indicates an increase in mortality up to the mid 1990s for most ages. This trend is also in the fall data but is not as evident. Mortality declined after the mid 1990s in both surveys. This was followed by an increase in the early 2000s. In both surveys, estimates are lower in the last few years for most ages.

Spanish Div. 3NO survey

Numbers at Age

Since 1995, Spain has carried out a stratified random spring bottom trawl survey in Div. 3NO of the NAFO Regulatory Area. In 2001, the trawl vessel (C/V *Playa de Menduiña*) and gear (*Pedreira*) were replaced by the R/V *Vizconde de Eza* using a *Campelen* trawl. Canadian spring RV age length keys (for Div. 3N only, as the Survey by Spanish Div. 3NO survey only covers a small portion of Div. 3O) were applied to Spanish length frequency data (separate sexes, mean number per tow) from 1998-2000 converted data and 2001-2008 Campelen data (González Tronosco et al., 2009). Combined spring Canadian ALKs from 1997-2005 were applied to the 2006 length frequencies, as there were no otoliths collected from the Canadian 2006 spring survey. This data is found in Table 25 and is used as input into the assessment. The 2003 year class is also evident in this survey (Figure 24). Overall, age composition for this survey was similar to the Canadian RV spring survey, except at age 14 (Figure 25).

Catch at age

Results of the catch at age calculations for American plaice catches in 1993-2006 are given in detail in Morgan et al. (1999a, b, 2001, 2002, 2003,) and Dwyer et al (2005, 2007). In 2007 and 2008, sampling data were available from by-catch of A. plaice in Canadian fisheries targeting other species in Div. 3LNO. As has been the case since it reopened in 1998, much of the Canadian sampling data in 2007-08 came from observer coverage in the yellowtail fishery. In 2006, the Canadian catch of A. plaice in Div. 3LNO was only 92 tons, due to corporate restructuring and a labour dispute in the main harvesting company, which practically eliminated the yellowtail fishery in that year. This relatively small quantity of A. plaice came mainly as by-catch in the redfish fishery in Div. 3O.

Total Canadian catches of A. plaice in 3LNO in 2007 and 2008 were 434 and 880 tons. In both years, over 96% of the catch came from the directed fishery for yellowtail flounder in Div. 3LNO. This percentage was similar in 2005.

Since the beginning of 2000, fishing for yellowtail has been permitted in Div. 3L, resulting in some by-catch of American plaice there, although most of the catch in recent years, including 2008 (56%) has come from Division 3N. However, in 2007, 53% of the Canadian catch occurred in Div. 3O. There were also seasonal differences between 2007 and 2008, with most of the catch (62%) in 2007 occurring in the last quarter (Tables 16 and 17). In 2008, catches were more evenly spread throughout the year, with 51% being taken in May to July (Table 17). Annual by-catch rates of A. plaice in the yellowtail fishery have often been highest in this period, although catches usually decline during the summer. This is due to closure of the yellowtail fishery during mid June to late July, which is intended to cover the spawning period for yellowtail, although this closure did not occur during 2008.

Sampling of the Canadian catch of A. plaice in 2007 (434 t) consisted of 9825 length measurements, and 627 otoliths. The corresponding numbers for the 2008 catch of 880 t were 15,497 measurements and 808 otoliths. These sampling levels (measurements/ton) were similar to the 2005 level (2007 was higher and 2008 lower), but lower than 2004, which was the last full year where 100% observer coverage existed in the yellowtail fishery. In 2006, only 1 length frequency, consisting of 282 measurements was collected, and no otoliths were taken, as by-catches of A. plaice totaled only 92 tons (Dwyer et al. 2007), due to the reduction of Canadian fishing operations in 2006 noted above.

The same weight-length relationship was used as in recent years (log weight = 3.3247, log length – 5.553) and the sum of products check in 2007 and 2008 was within 3.7% of the catch. The Canadian catch in 2007 consisted of about 0.59 million A. plaice, compared to 1.38 million for the 2008 catch, which was about double the weight of the

2007 catch (Tables 18 and 19). Ages in the catch ranged from 4 (2007) or 5 (2008) to 22, and catch in both years was comprised mainly of fish aged 7 to 11 years old, with the peak being the 1999 year class in both years. The peak age in the catch numbers declined from 9 or 10 in 1999-2001 to age 8 in 2002-03 and to age 7 in 2004-05, but increased in 2007 (age 8) and 2008 (age 9). Age 6 comprised about 2% of the catch numbers in 2007-08, compared to about 7% for this age in 2005, and almost 20% in 2004 (Tables 18 and 19). Fluctuations such as these are not uncommon, depending on year class strengths as well as the location and timing of the by catches. Overall, the catch at age in 2007-08 was similar to that calculated for 1999-2005, as well as that from the Canadian fishery for A. plaice on the Grand Bank in the early 1990s (Brodie et al. 1994).

The mean fish weight in the 2007 catch (0.749 kg/fish) was almost identical to the 2005 value of 0.751 kg., up from 2003 and 2004 (about 0.715 in both years). The 2008 value of 0.660 kg/fish was lower, but very similar to the values in 2000-01. Individual weights at age in 2007 were within the range of values observed from 2002-2005, but were lower in 2008 than in 2007. The 2008 values were very similar to those observed in 1999-2000. Reasons for the differences between the values for 2007 and 2008 are likely due to the seasonal and temporal differences in the catches in these years, as noted above.

For 2007 length frequency data were available from Portugal, Russia and Spain and for 2008, length frequency data were available from Russia and Spain, while there was only one length frequency sample available from Portugal and Estonia. Details on the sampling levels and descriptions of the fisheries are contained in Vaskov et al. (2008), Skryabin et al. (2009), González et al. (2008, 2009) and Vargas et al. (2008, 2009). In all cases, age-length keys from the Canadian spring surveys in Div. 3LNO in 2007 and 2008 respectively 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 used above) and sum of products (SOP) for 2007 and 2008 are given in Table 20 and 21.

In 2007, catch from all countries indicated a large peak at age 7 -10. In 2007, age 9 (1998 YC) was still the most abundant age in Russian, Spanish and Portuguese catches, but there were also some older fish in the catch especially in the Spanish fleets. In 2008, age 8 was the peak age in the commercial catch. Mean lengths and weights at age in the Canadian fishery were slightly higher at younger ages 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 (VPA)

A formulation of ADAPT using the same base structure that was used in the accepted VPA from the 2007 assessment (Dwyer et al., 2007, 2008) was run. The ADAPT used catch–at-age for ages 5 to 14 with an age 15 plus group which included all catch from ages 15 to 22 (Table 23). 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 (Morgan and Brodie, 2001; Dwyer et al., 2008). Beginning of the year weights-at-age and maturities-at-age are given in Tables 24 and 25. The calibration matrix consisted of the following input data:

- Canadian spring RV survey (1985-2008) (no 2006 data point) abundance at age (ages 5-14);
- Canadian autumn RV survey (1990-2007) (no 2004 data point) abundance at age (ages 5-14); and
- Spanish Div. 3NO survey (1998-2008) MNPT (ages 5-14) (Table 22a, b, c).

Standardized age by age abundance (using mean and standard deviation of each index) was plotted using an exploratory data analysis package, Fisheries Library in R (FLR; www.flr-project.org) for all Canadian surveys (Engels and Campelen) and compared with Spanish Div. 3NO survey (Dwyer et al., 2007; Fig. 25). Surveys seemed to show the same trends in abundance at age, somewhat less at older ages.

The results of an ADAPT run using the formulation described above are given in Table 26 and Figures 26-29. 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 0.16 to 0.38. The relative errors on the catchabilities (q) were all less than 0.2. The residuals from the Canadian spring survey showed an increasing trend over the time series, with more negative residuals at the beginning of the time series; whereas the Canadian fall survey appears to decline slightly over time. The residuals from the Spanish Div. 3NO survey showed very little pattern (Fig. 26). There is some tendency for there to be a lag between the predicted and observed survey estimates at age for the fall survey (especially in recent

years there is not a good fit) but a better fit for the spring survey. The fit of predicted and observed survey estimates is not a good fit for the Spanish Div. 3NO survey (Fig. 27). Residuals are larger for the older ages in the fall survey but are fairly low overall (Fig 28). The value for age 5s in the Spanish Div. 3NO survey is also high. Survey qs showed that q is lower for the youngest fish and also older fish but is fairly constant across age (Fig. 29). Qs from the Spanish Div. 3NO survey show a different pattern than the other surveys and may catch a larger proportion of older fish.

Population numbers and F from this run are shown in Tables 27 and 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 1970's. Biomass has been relatively stable since 1995 (Fig. 30), increasing 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. There was a large peak in F in 1993, which may be an artifact of extremely low catches during the moratorium. F since 1995 has been generally lower than in the earlier period but increased fairly steadily from 1995 to 2000. F has been decreasing since then. Average F on ages 9-14 in 2007 was 0.25 and in 2008 was 0.16 (Table 28, Fig. 30).

Spawning stock biomass was calculated by multiplying the biomass at age by the female maturity ogive (Table 25). SSB has shown 2 peaks, one in the mid 1960s and another in the early to mid 1980s. It declined to a very low level (less than 10 000 t) in 1994 and 1995 (Figure 31, Table 29). Since then the SSB has been increasing, reaching about 41, 000 t in the current year. SSB is approaching 50, 000 t, the B_{lim} for this stock. Recruitment has been poor since the 1984 year-class but the 2003 year class is well above average for the recent time period (Figure 31). An examination of the stock recruit scatter shows that there has been only good recruitment observed above 155 000 t and no good recruitment observed at SSB below 50 000 tons (B_{lim}) (Fig. 32). The strength of the 2003 year class can be seen on this plot.

Retrospective Analysis

A retrospective analysis was conducted by sequentially removing one year of data from the most recent year for a comparison of 6 years. The results of this analysis are shown in Figure 33 and 34 and Tables 30 and 31. There were no major patterns in the retrospective analysis.

Projections

Deterministic projections were carried out for 3 years to examine the trajectory of the spawning stock biomass under 3 scenarios of fishing mortality: F = 0, F = F_{2008} (0.16) and F = $F_{0.1}$ (0.2). F_{max} is difficult to determine for this stock but since STACFIS has been able to determine F_{lim} (0.4), projections were provided for that limit reference point as well. For these deterministic projections the results of the 2009 VPA were used. F_{2008} was set as the average F on ages 9 -14 for 2008 and was 0.16. PR and weights were averaged over the last 3 years. Recruitment was the average R/S for the last 3 year-classes and was equal to 3.21. The average R/S has been considerably higher in recent years (especially for 2008) and thus the assumed recruitment value used in projections is higher than in 2007 projections. In addition the following values were used:

Age		5	6	7	8	9	10	11	12	13	14	15+
M		0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
PR		0.01	0.03	0.14	0.20	0.36	0.54	0.87	1.27	1.40	1.55	1.55
Stock Weight		0.15	0.24	0.35	0.47	0.58	0.68	0.84	1.06	1.22	1.43	1.42
Maturities												
	2010	0.036	0.114	0.317	0.632	0.866	0.985	0.987	0.994	0.999	1.000	1.000
	2011	0.036	0.114	0.317	0.632	0.866	0.960	0.997	0.997	0.998	1.000	1.000
	2012	0.036	0.114	0.317	0.632	0.866	0.960	0.989	0.999	0.999	0.999	1.000

The stock is estimated to increase and will likely surpass B_{lim} by 2010 under all fishing mortality scenarios considered, with the exception of F_{lim} (Table 32; Figure 35).

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Table 1. Nominal catches (t) of American plaice for NAFO Divisions 3LNO, 1960-2003 and TACs from 1973 to 2008.

Year	Canada	Other	Total	STACFIS[a]	TAC
1960	21,353	20	21,373		-
1961	14,897	1,476	16,373		-
1962	15,210	982	16,192		-
1963	24,591	1,594	25,719		-
1964	35,474	3,773	38,567		-
1965	45,365	12,440	53,261		-
1966	51,225	25,270	65,011		-
1967	54,190	75,362	94,413		-
1968	48,674	48,244	73,167		-
1969	64,815	29,115	79,437		-
1970	54,929	21,956	66,653		-
1971	49,394	36,105	67,888		-
1972	41,605	32,175	59,361		-
1973	38,586	26,773	52,843		60,000
1974	35,101	21,270	46,297		60,000
1975	34,015	17,317	43,221		60,000
1976	47,806	7,726	51,824		47,000
1977	42,579	2,700	43,981		47,000
1978	48,634	2,491	50,021		47,000
1979	47,131	2,752	48,568		47,000
1980	48,296	1,391	49,086		47,000
1981	48,177	3,723	50,158		55,000
1982	49,620	1,253	50,337		55,000
1983	35,907	3,582	37,720		55,000
1984	33,756	4,363	36,028		55,000
1985	40,024	13,600	48,018	54,212	49,000
1986	33,409	45,350	57,449	64,570	55,000
1987	33,967	36,529	53,457	55,012	48,000
1988	26,832	22,080	38,925	40,835	33,585[c]
1989	27,901	24,803	41,206	43,369	30,300
1990	22,600	2,073	24,006	32,501	24,900
1991	22,510	4,026	25,503	34,681	25,800
1992	9,663	1,808	10,870	13,350	25,800
1993[b]	7,454	761	7,916	17,122	10,500
1994	73	973	560	7,378	4,800[d]
1995	67	962	548	637	0
1996	49	1,641	875	913	0
1997	75	2,573	1,365	1,401	0
1998	227	2,640	1,560	1,618	0
1999	323	4,203	2,436	2,565	0
2000[e]	623	3,932	2,600	5,176	0
2001	1,618	2,753	2,998	5,739	0
2002	1,343	3,452	3,117	4,870	0
2003[e]	1,607	2,215	3,822	8,727	0
2004	1,295	1,563	2,858	6,158	0
2005	1,472	2,638	4,110	4,110	0
2006	94	2,734	2,828	2,828	0
2007	435	3,172	3,607	3,606	0
2008	874	1,641	2,515	2,515	0
2009					

Values for countries back to 2007 are provisional.

[a] May include some catch estimated from surveillance reports or miscellaneous information. See text for details.

[b] Catch may have been as high as 19,400.

[c] Effective TAC.

d No directed fishing.

[e] STACFIS unable to determine precise estimates because of discrepancies between various sources.

Table 2 . Biomass estimates ('000t) of A.plaice, by stratum and depth zone (m), from Canadian spring surveys in Div. 3L in 1996-2008 (Campelen). (+) indicates biomass <50 t, (-) means stratum not surveyed.

Biomass

Depth	Stratum	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
30-56	784	-	-	0.2	+	-	+	0.0	-	-	-	-	-	-
	Total	-	-	0.2	+	-	+	0.0	-	-	-	-	-	-
57-92	350	0.6	0.3	0.3	6.1	1.8	0.4	0.2	0.7	0.7	1.2	1.7	2.3	3.1
	363	2.3	0.8	0.0	3.2	6.2	0.6	0.1	3.4	2.1	4.1	4.5	4.4	6.0
	371	0.9	0.2	0.1	2.4	0.9	0.1	+	0.2	0.5	1.3	1.3	1.4	1.9
	372	1.4	0.8	1.3	2.7	3.7	1.2	0.3	2.2	1.2	1.8	2.5	1.6	1.8
	384	0.7	0.9	0.2	0.8	1.2	0.3	0.4	0.3	0.5	0.9	1.6	1.6	2.5
	785	-	-	0.2	0.5	-	0.7	+	-	+	-	-	-	-
	Total	5.9	3.0	2.1	15.7	13.8	3.3	1.0	6.9	5.0	9.2	11.5	11.3	15.4
93-183	328	0.5	0.5	0.1	2.4	0.9	1.3	0.5	0.2	0.6	3.6	1.6	1.4	-
	341	1.8	0.5	0.7	4.5	0.8	1.5	0.2	0.6	0.6	2.3	1.7	1.2	4.4
	342	0.1	0.1	0.4	0.4	0.2	0.1	+	0.1	+	0.1	0.6	0.8	0.1
	343	0.3	0.0	+	0.6	0.2	+	+	0.1	+	0.1	0.3	0.1	0.0
	348	1.4	0.8	1.2	2.8	1.5	0.4	0.3	0.4	1.3	1.5	7.0	2.7	0.8
	349	0.8	0.3	0.2	4.4	1.3	0.5	0.3	0.6	1.1	1.1	3.6	1.6	1.8
	364	2	1.0	0.9	5.6	1.3	1.5	1.2	0.7	1.7	5.8	7.5	0.7	3.5
	365	1.1	0.5	0.9	1.4	1.2	0.3	0.6	0.6	0.5	1.3	6.2	2.3	2.5
	370	1.3	0.6	1.6	2.4	1.9	0.9	0.6	0.5	1.1	4.0	5.1	0.8	3.1
	385	5.6	0.9	0.5	2.5	1.9	1.4	0.7	0.4	1.4	2.4	4.0	1.7	3.9
	390	0.6	0.4	0.5	0.3	0.3	0.4	1.0	0.3	0.2	0.9	0.9	1.8	2.6
	786	-	-	0.3	0.5	-	0.4	-	-	0.1	-	-	-	-
	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	5.4	4.5	8.6	23.2	38.5	15.0	22.7
184-274	344	1	0.3	0.8	1.8	0.5	0.3	0.2	0.3	0.3	1.7	2.9	1.7	0.5
	347	0.6	0.2	0.6	0.6	0.2	0.4	0.1	0.5	0.3	1.7	1.7	5.3	0.2
	366	0.4	0.3	0.3	0.5	0.7	0.7	0.9	0.6	0.6	1.3	3.0	3.3	0.7
	369	0.3	0.2	0.2	1.2	0.7	0.9	0.8	0.4	0.5	2.8	4.4	2.0	0.7
	386	0.5	0.2	0.4	1.4	1.7	0.4	0.5	0.4	0.5	2.0	2.6	2.5	0.9
	389	0.4	0.2	0.4	0.6	0.8	0.8	0.3	0.4	0.7	0.4	1.1	0.7	0.7
	391	0.3	0.1	0.2	0.1	+	0.2	0.2	0.2	0.1	0.1	0.1	0.4	0.6
	789	-	-	-	0.5	-	-	-	+	-	-	-	-	-
	791*	-	-	-	0.3	-	-	-	-	0.1	-	-	-	-
	795	-	-	-	0.1	-	-	-	-	-	-	-	-	-
	798	-	-	-	0.1	-	-	-	+	-	-	-	-	-
	Total	3.5	1.5	2.9	7.2	4.6	3.7	3.0	2.8	3.0	10.0	15.8	16.0	4.2
275-366	345	0.5	0.2	0.3	1.5	0.5	0.7	0.7	0.2	0.4	2.9	1.4	1.9	0.7
	346	0.4	0.3	0.2	0.2	0.5	0.1	0.8	0.8	0.9	1.6	0.7	1.2	0.8
	368	0.3	0.0	0.1	0.3	0.4	0.2	0.2	0.2	0.2	0.1	0.1	0.0	0.5
	387	0.6	0.6	0.8	0.4	1.6	0.8	0.1	0.4	0.4	0.7	0.6	0.5	1.8
	388	0.6	0.2	0.2	0.8	0.3	0.4	0.1	0.1	0.1	0.1	0.1	0.2	0.9
	392	0.5	0.1	0.4	0.2	0.1	0.1	0.3	0.1	0.2	+	0	0.0	0.0
	792	-	-	-	+	-	0.1	-	0.1	-	-	-	-	-
	796	-	-	-	0.1	-	-	-	0.1	-	-	-	-	-
	800	-	-	-	0.2	-	-	-	-	0.1	-	-	-	-
	Total	2.9	1.4	2.0	3.7	3.4	2.4	2.2	1.8	2.4	5.5	2.9	3.9	4.6
367-549	729	0.2	0.6	2.2	0.1	1.3	1.1	1.3	1.2	+	+	0.0	0.0	0.0
	731	0.5	0.1	+	0.1	1.2	0.3	0.2	0.1	0.1	0.0	0.0	0.1	0.0
	733	0.7	0.0	0.3	1	0.1	2.3	0.5	2.1	0.3	+	0.1	0.0	0.5
	735	1.4	1.6	1.2	0.6	1.2	2.1	1.2	4.9	-	+	+	0.1	2.3
	Total	2.8	2.4	3.7	1.8	3.8	5.8	3.2	8.3	0.4	0.0	0.1	0.2	2.9
550-731	730	+	0.0	0.2	+	0.1	0.1	0.3	+	+	0.0	-	0.0	0.0
	732	+	0.0	0.0	+	0.3	3.4	0.6	0.6	0.0	0.0	-	0.0	0.0
	734	+	0.0	0.1	0	0	0.1	0.9	0.5	0.0	0.0	-	0.0	-
	736	+	0.1	0.0	+	+	+	0.5	0.1	+	+	-	0.0	0.1
	Total	0.1	0.1	0.3	+	0.4	3.6	2.3	1.2	0.0	0.0	0.0	0.0	0.1
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	17.1	25.4	19.3	47.9	68.8	46.3	50.0

in 1996 had a depth range of 184-366

Table 3. Biomass estimates ('000t) of A.plaice, by stratum and depth zone (m), from Canadian spring surveys in Div. 3N in 1996-2008 (Campelen). (+) indicates biomass <50 t, (-) means stratum not surveyed.

		Biomass												
Depth	Stratum	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
≤ 56	375	2.9	2.2	1.1	1.8	5.1	2.1	3.9	2.1	2.3	0.6	4.5	3.7	6.3
	376	0.8	1.8	2.0	3.2	5.1	9.3	8.6	9.6	11.7	37.2	32.1	7.5	7.9
	Total	3.7	4.0	3.1	5.0	10.2	11.4	12.5	11.8	14.1	37.8	36.5	11.2	14.3
57-92	360	8.8	8.6	7.9	27.4	22.8	50.3	28.0	29.6	29.2	37.5	54.2	100.7	78.3
	361	3.8	1.9	2.0	5.5	4.2	9.0	6.0	9.3	8.3	4.7	3.8	2.8	3.1
	362	2.8	5.5	4.0	4.6	6.6	7.0	2.7	4.7	2.5	5.7	4.5	4.2	4.5
	373	1.6	0.5	0.9	8.3	3.2	2.5	0.4	2.7	1.1	2.7	-	3.0	10.2
	374	1.1	0.4	0.3	1.7	0.9	1.0	0.6	3.2	2.1	3.5	0.1	5.0	5.0
	383	0.5	0.1	+	1.0	0.2	0.1	+	0.3	0.5	1.8	-	2.7	2.6
	Total	18.6	17.0	15.1	48.5	37.9	69.9	37.7	49.7	43.7	55.7	62.6	118.4	103.7
93-183	359	1.1	1.1	1.6	3.3	5.1	5.1	0.6	7.0	3.7	15.3	-	4.1	9.3
	377	0.2	0.1	+	0.2	+	0.9	0.1	0.2	0.2	0.4	-	4.8	2.0
	382	0.1	0.1	0.7	0.2	0.4	0.1	0.1	0.1	0.1	3.9	-	0.1	1.6
	Total	1.4	1.3	2.3	3.7	5.5	6.1	0.8	7.3	4.0	19.6	-	9.0	12.9
184-274	358	0.1	0.1	1.4	0.3	0.6	0.5	0.1	0.3	0.3	0.4	-	0.7	0.5
	378	0.1	0.2	0.2	0.9	+	0.1	0.1	0.5	0.4	0.1	-	0.4	0.3
	381	0.3	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.8	0.1	-	0.7	0.8
	Total	0.5	0.4	1.7	1.4	0.7	0.7	0.3	1.0	1.5	0.6	-	1.8	1.6
275-366	357	0.1	0.1	0.1	+	0.1	0.1	0.1	0.1	0.1	0.1	-	0.1	0.0
	379	+	0.1	0.1	0.1	0.1	0.1	0.1	0.3	+	+	-	0.0	0.0
	380	0.2	0.8	0.1	0.2	+	0.1	+	0.4	0.2	0.0	-	0.0	0.1
	Total	0.3	1.0	0.3	0.3	0.2	0.3	0.2	0.9	0.3	0.1	-	0.1	0.1
367-549	723	0.2	0.4	0.3	+	0.0	0.1	0.3	1.1	0.1	0.1	-	0.0	0.0
	725	0.1	0.5	0.2	+	0.4	0.1	+	0.3	+	+	-	0.0	0.0
	727	0.5	2.2	2.0	0.4	1.2	2.5	0.1	0.5	0.4	+	-	0.0	+
	Total	0.8	3.1	2.5	0.4	1.6	2.7	0.4	1.8	0.6	0.1	-	0.0	0.0
550-731	724	0.2	0.5	0.2	+	0.1	0.1	0.5	0.1	+	0.1	-	0.0	-
	726	+	0.1	+	+	0.1	+	+	+	+	0.0	-	0.0	0.0
	728	0.5	-	0.3	0.2	0.5	1.0	0.4	0.1	+	0.1	-	0.0	0.0
	Total	0.7	0.5	0.5	0.2	0.7	1.1	0.9	0.3	+	0.2	-	0.0	0.0
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	56.8	92.1	52.8	72.7	64.1	114.2	99.1	140.4	132.5

Table 4. Biomass estimates ('000t) of A.plaice, by stratum and depth zone (m), from Canadian spring surveys in Div. 3O in 1996-2008 (Campelen). (+) indicates biomass <50 t, (-) means stratum not surveyed.

Biomass

Depth	Stratum	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
57-92	330	3.8	0.8	6.9	3.5	5.9	4.2	2.1	1.3	2.9	6.5	4.9	4.7	6.5
	331	1.4	0.3	0.3	2.7	2.3	2.6	2.2	2.6	0.8	0.9	-	2.5	1.9
	338	6.0	5.7	6.0	4.0	2.3	6.0	3.1	5.0	4.3	4.5	6.4	3.2	2.5
	340	2.2	1.7	1.8	2.9	1.9	1.7	0.5	1.5	0.7	1.7	1.4	2.4	3.5
	351	2.9	4.4	3.8	4.6	3.4	6.5	3.2	2.4	3.5	4.5	3.2	6.0	4.4
	352	9.1	13.8	10.6	14.2	13.4	17.5	18.6	10.1	10.0	13.2	10.7	8.9	4.9
	353	7.8	8.3	10.9	21.5	21.1	20.6	14.8	25.2	21.2	10.1	15.9	7.8	10.6
	Total	33.2	34.9	40.3	53.4	50.3	59.1	44.5	48.0	43.4	41.3	42.5	35.6	34.3
93-183	329	1.6	1.4	4.4	4.7	3.9	1.9	1.4	1.8	3.1	2.3	-	2.8	3.4
	332	3.9	2.5	3.8	2.2	0.9	2.2	3.1	1.4	1.9	2.2	-	1.0	3.1
	337	4.6	1.9	3.2	2.7	1.5	1.2	1.4	1.4	1.6	2.5	-	0.7	2.5
	339	1.4	0.8	0.8	2.1	2.1	2.6	0.9	0.9	0.7	1.7	1.2	1.0	1.3
	354	1.6	1.1	5.0	9.0	1.3	1.6	6.4	5.3	8.1	1.9	-	2.7	6.9
	Total	13.1	7.8	17.2	20.7	9.7	9.5	13.2	10.9	15.3	10.7	1.2	8.2	17.2
184-274	333	+	0.3	0.1	0.1	+	+	0.3	+	+	0.2	-	0.1	0.0
	336	0.2	0.3	+	0.2	+	0.1	+	+	+	0.1	-	0.2	0.0
	355	0.5	0.3	0.1	0.1	0.1	0.4	0.4	0.6	0.3	0.2	-	0.2	0.0
	Total	0.7	0.9	0.2	0.4	0.1	0.5	0.7	0.6	0.3	0.5	0.0	0.5	0.1
275-366	334	0.2	0.8	0.0	0.1	+	+	0.2	0.2	+	+	-	0.1	0.0
	335	0.2	0.2	0.0	+	+	+	+	+	+	+	-	0.0	0.0
	356	0.1	+	+	0.1	+	+	+	0.4	+	+	-	0.1	0.0
	Total	0.5	1.0	+	0.2	+	+	0.2	0.5	+	0.1	0.0	0.1	0.0
367-549	717	0.2	1.7	+	0.1	0.0	+	0.4	0.2	0.0	0.1	-	0.0	0.0
	719	0.1	0.5	+	+	0.0	+	+	+	+	+	-	0.0	0.0
	721	0.2	0.1	+	0.1	+	0.2	+	0.1	0.0	+	-	0.0	0.0
	Total	0.5	2.2	+	0.2	+	0.2	0.4	0.3	0.0	0.1	-	0.0	
550-731	718	+	0.1	+	+	0.0	+	+	0.3	0.0	0.0	-	0.0	0.0
	720	+	0.1	+	+	0.0	0.1	0.0	+	0.0	0.0	-	0.0	0.0
	722	1.0	4.2	0.0	0.2	0.1	0.2	0.1	0.2	0.0	0.0	-	0.0	0.0
	Total	1.0	4.4	+	0.2	0.1	0.2	0.1	0.2	0.0	0.0	-	-	-
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	59.1	60.5	59.0	52.6	43.7	44.4	51.6

Table 5. Abundance index at age (millions) for American plaice in NAFO Div. 3L from Canadian spring surveys from 1985 to 2008.

Age/Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
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	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	0.00	0.13	0.05	1.42	-	1.64	4.33
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	7.65	1.66	3.76	10.61	-	18.24	27.16
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	34.07	20.64	9.38	31.58	-	28.17	39.19
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	18.24	29.59	24.62	39.64	-	34.52	36.20
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	7.98	17.73	35.53	95.80	-	16.60	35.83
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	5.19	8.55	14.35	72.72	-	19.83	28.83
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	9.46	7.73	8.27	25.87	-	42.04	27.25
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	9.72	11.96	4.93	11.24	-	42.47	30.88
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	8.67	10.35	5.64	9.96	-	17.46	18.93
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	6.50	6.90	4.66	6.98	-	4.56	6.23
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	4.22	4.04	3.62	6.50	-	4.72	4.58
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	1.00	2.42	1.92	2.47	-	1.71	2.48
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	0.35	0.73	0.69	0.99	-	2.00	1.61
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	0.14	0.23	0.21	0.00	-	2.04	0.82
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	0.00	0.00	0.00	0.00	-	1.00	0.11
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	0.00	0.00	0.01	0.04	-	1.42	0.38
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	0.00	0.00	0.00	0.07	-	1.25	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	0.00	0.00	0.00	0.00	-	0.49	0.05
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	0.00	0.00	0.00	0.00	-	0.31	0.00
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	0.00	0.00	0.00	0.00	-	0.11	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	0.16	0.04	0.17	0.00	-	0.34	0.53
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	113.35	122.68	117.81	315.90	-	240.92	265.38
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	45.24	52.90	44.30	136.84	-	141.41	122.14
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	20.87	24.66	16.75	27.01	-	37.07	35.19
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	1.48	3.38	2.83	3.57	-	10.32	5.45

Table 6. Abundance index at age (millions) for American plaice in NAFO Div. 3N from Canadian spring surveys from 1985 to 2008.

Age/Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
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	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	0.00	0.00	3.34	0.44	-	6.23	1.52
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	3.61	1.02	2.68	24.36	-	0.38	24.59
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	15.10	10.97	2.76	46.38	-	8.33	6.41
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	34.75	18.51	11.47	6.71	-	197.39	14.21
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	14.76	75.91	25.09	18.09	-	122.05	112.44
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	7.29	28.56	67.31	47.79	-	43.72	62.05
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	7.95	16.07	18.39	78.87	-	76.16	27.65
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	16.35	16.26	7.18	32.98	-	55.78	59.84
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	10.66	18.41	6.61	15.60	-	47.84	32.54
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	6.91	6.86	6.80	6.62	-	6.47	28.47
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	8.76	6.04	3.22	4.81	-	3.81	8.98
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	6.70	6.37	4.48	4.48	-	1.60	3.94
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	1.82	2.15	2.57	3.81	-	1.14	1.49
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	1.39	1.04	1.93	3.69	-	1.17	2.00
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	0.13	0.54	0.50	3.47	-	0.93	1.54
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	0.26	0.21	0.12	1.71	-	0.39	1.34
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	0.04	0.08	0.00	0.25	-	0.21	0.44
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	0.00	0.04	0.11	0.92	-	0.26	0.00
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	0.04	0.00	0.00	0.12	-	0.00	0.19
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	0.00	0.04	0.00	0.00	-	0.07	0.00
21	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	0.00	0.00	0.00	0.00	-	0.00	0.05
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	0.08	0.54	0.52	0.33	-	0.22	0.05
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	136.60	209.62	165.06	301.42	-	574.14	389.72
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	68.30	102.68	119.20	205.11	-	239.53	230.46
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	36.71	41.79	26.33	45.47	-	63.88	80.92
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	10.38	10.49	9.70	18.45	-	5.76	10.93

Table 7. Abundance index at age (millions) for American plaice in NAFO Div. 3O from Canadian spring surveys from 1985 to 2008.

Age/Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
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	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	0.31	0.10	3.66	3.21	-	9.03	4.86
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	26.61	5.19	11.26	96.22	-	9.14	81.19
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	49.52	42.95	17.01	145.20	-	30.40	52.61
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	97.60	46.99	41.71	32.14	-	88.28	51.28
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	33.76	94.61	35.92	35.77	-	55.20	90.71
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	28.85	35.39	80.28	43.32	-	26.09	25.58
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	34.53	22.26	24.63	39.13	-	26.27	37.05
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	27.75	21.53	17.22	10.88	-	17.24	26.31
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	18.93	11.21	7.67	6.30	-	17.31	18.67
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	11.01	4.32	4.10	2.91	-	5.76	7.89
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	7.05	3.69	2.37	2.37	-	2.40	1.24
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	4.86	2.67	1.80	1.28	-	1.74	0.88
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	1.84	1.62	1.23	1.42	-	1.24	0.70
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	0.48	0.89	0.57	0.97	-	0.62	0.51
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	0.40	0.49	0.29	0.51	-	0.22	0.36
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	0.44	0.34	0.20	0.28	-	0.31	0.48
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	0.17	0.16	0.00	0.22	-	0.20	0.19
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	0.10	0.09	0.01	0.00	-	0.24	0.18
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	0.00	0.19	0.00	0.00	-	0.00	0.00
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	0.00	0.00	0.00	0.00	-	0.08	0.26
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	0.24	0.00	0.29	0.50	-	0.22	0.13
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	344.45	294.69	250.21	422.62	-	292.02	401.08
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	136.41	104.86	140.35	109.60	-	99.74	120.29
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	45.28	25.68	18.23	16.26	-	30.14	31.35
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	8.29	6.46	4.09	4.68	-	4.66	3.55

Table 8. Abundance index at age (millions) for American plaice in NAFO Div. 3LNO from Canadian spring surveys from 1985 to 2008.

Age/Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
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	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	0.31	0.22	7.05	5.07	-	16.91	10.72
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	37.86	7.86	17.71	131.19	-	27.76	132.94
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	98.69	74.56	29.15	223.16	-	66.90	98.21
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	150.59	95.08	77.80	78.49	-	320.19	101.68
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	56.50	188.24	96.53	149.66	-	193.86	238.97
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	41.33	72.50	161.94	163.83	-	89.64	116.46
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	51.94	46.06	51.28	143.87	-	144.47	91.95
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	53.82	49.75	29.34	55.10	-	115.49	117.02
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	38.25	39.97	19.92	31.86	-	82.61	70.14
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	24.42	18.07	15.56	16.51	-	16.80	42.58
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	20.03	13.76	9.21	13.68	-	10.94	14.80
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	12.56	11.46	8.20	8.24	-	5.06	7.29
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	4.01	4.51	4.49	6.22	-	4.37	3.80
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	2.01	2.17	2.71	4.66	-	3.82	3.32
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	0.53	1.03	0.78	3.98	-	2.15	2.01
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	0.70	0.55	0.33	2.03	-	2.12	2.20
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	0.21	0.25	0.00	0.53	-	1.66	0.63
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	0.10	0.13	0.12	0.92	-	0.99	0.23
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	0.04	0.19	0.00	0.12	-	0.31	0.19
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	0.00	0.04	0.00	0.00	-	0.26	0.26
21	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	0.00	0.00	0.00	0.00	-	0.00	0.71
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	0.48	0.58	0.98	0.83	-	0.78	0.71
Ages 0+	2445.43	2264.27	3021.41	2555.32	2542.09	2274.33	1334.39	690.61	767.46	391.30	261.55	699.29	410.29	452.37	724.06	677.09	864.08	594.40	626.99	533.08	1039.95	-	1107.08	1056.84
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	249.95	260.44	303.86	451.55	-	480.68	472.89
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	102.86	92.13	61.31	88.74	-	131.08	147.46
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	20.16	20.33	16.63	26.70	-	20.74	19.94
proportion 0 to 5	0.19	0.18	0.27	0.25	0.34	0.45	0.39	0.30	0.35	0.31	0.21	0.58	0.41	0.32	0.24	0.47	0.61	0.58	0.58	0.43	0.56	-	0.57	0.55
proportion 9+	0.22	0.18	0.13	0.17	0.15	0.13	0.12	0.11	0.09	0.09	0.15	0.04	0.07	0.18	0.31	0.22	0.19	0.17	0.15	0.12	0.09	-	0.12	0.14

Table 9. Biomass estimates ('000t) of A.plaice, by stratum and depth zone (m), from Canadian fall surveys in Div. 3L in 1995-2008 (Campelen). (+) indicates biomass <50 t, (-) means stratum not surveyed.

Biomass

Depth	Stratum	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
30-56	784	-	+	+	0.0	-	+	+	+	+	+	0.0	-	-	-
	Total	-	+	+	0.0	-	+	+	+	+	+	0.0	-	-	-
57-92	350	0.8	0.9	0.5	1.1	1.0	0.5	7.7	0.5	0.2	0.4	0.2	0.7	0.1	0.8
	363	3.1	2.0	1.4	2.1	1.9	2.3	3.7	0.7	0.3	0.5	0.6	2.3	1.1	0.7
	371	1.2	1.1	0.2	0.5	0.4	0.8	0.8	1.8	0.3	0.2	0.3	0.1	1.3	0.7
	372	1.4	1.6	1.5	0.3	1.7	0.6	2.5	0.9	1.1	0.4	0.3	0.9	0.5	0.6
	384	1.6	1.6	0.5	0.2	1.5	0.1	1.3	2.2	0.1	0.1	0.1	0.6	0.1	0.5
	785	-	+	+	+	-	+	0.1	0.1	0.1	+	0.3	-		
	Total	8.1	7.2	4.0	4.2	6.5	4.3	16.1	6.2	2.2	1.5	1.8	4.6	3.1	3.2
93-183	328	3.0	1.6	0.9	0.5	2.0	0.8	1.6	7.3	0.7	1.1	2.5	2.9	0.3	0.6
	341	1.6	2.8	0.8	2.1	0.6	0.7	0.9	0.8	0.4	0.3	1.3	2.2	0.9	2.8
	342	0.6	+	0.4	0.2	-	0.2	0.1	0.1	0.2	0.1	0.2	0.2	0.1	0.0
	343	0.7	0.1	0.0	0.1	-	+	0.1	0.1	0.1	+	0.1	0.1	0.0	0.1
	348	3.1	1.8	1.3	1.5	1.4	0.4	0.6	1.0	0.6	1.0	1.9	2.0	2.3	2.3
	349	3.4	1.4	1.5	0.8	0.4	0.3	0.6	0.1	0.7	1.3	1.6	2.7	0.9	1.2
	364	2.8	3.6	2.8	5.2	1.2	1.8	2.9	2.1	1.0	0.7	2.1	5.1	3.8	6.3
	365	1.7	1.1	1.0	1.4	1.0	-	0.4	0.6	0.5	-	3.2	2.1	1.9	2.4
	370	2.0	6.3	1.3	4.6	3.9	1.1	2.2	3.7	0.8	-	0.8	2.4	2.4	2.0
	385	3.9	7.6	1.9	4.0	2.9	0.8	3.5	5.4	3.3	6.5	1.4	3.2	4.0	4.2
	390	1.7	1.6	2.2	3.3	2.1	0.7	3.1	1.0	0.5	0.6	0.5	0.7	0.5	1.4
	786	-	0.3	0.1	0.1	-	0.1	0.2	0.1	0.1	0.1	0.3	-	-	-
	787	-	0.4	0.5	0.1	-	0.1	0.1	0.1	0.1	0.1	0.2	0.2	-	-
	788	-	0.3	0.3	0.1	-	0.1	+	0.3	+	0.2	0.3	0.4	-	-
	790	-	0.2	0.2	+	-	+	+	+	+	0.1	0.0	-	-	-
	793	-	0.1	0.1	0.1	-	+	0.1	+	+	0.1	0.1	-	-	-
	794	-	+	0.1	+	-	-	+	+	+	+	0.1	0.1	-	-
	797	-	0.1	0.1	+	-	+	+	0.1	+	+	0.1	0.1	-	-
	799	-	0.1	0.1	+	-	+	+	0.4	+	+	0.1	0.1	-	-
	Total	24.5	29.4	15.6	24.1	15.5	7.1	16.4	23.2	9.1	12.1	16.9	24.4	17.2	23.3
184-274	344	1.0	1.1	0.1	0.5	0.5	0.4	0.6	0.7	0.3	0.8	1.8	1.2	1.6	2.3
	347	1.8	0.7	0.3	0.8	0.5	0.4	0.4	0.7	0.2	0.7	2.0	1.5	0.6	4.3
	366	1.6	1.2	0.5	0.8	1.7	0.5	0.3	0.4	0.7	-	2.9	5.7	5.4	7.6
	369	1.0	1.6	0.5	1.8	1.6	0.8	2.7	1.1	0.3	-	1.1	2.6	3.1	4.2
	386	1.8	2.6	1.0	0.9	1.2	0.4	1.3	2.3	0.9	-	0.8	2.5	1.1	2.6
	389	0.6	0.6	0.6	0.7	0.6	0.4	1.4	0.4	0.6	0.4	0.5	0.7	1.0	1.3
	391	0.4	0.2	0.2	0.2	0.3	+	0.1	0.1	0.4	0.1	0.2	0.2	0.4	0.3
	789	-	0.2	0.2	0.1	-	0.1	0.2	0.1	+	+	0.2	0.1	-	-
	791*	-	0.5	0.4	0.1	-	0.3	0.3	0.7	+	0.1	0.5	-	-	-
	795	-	+	0.2	0.4	-	+	+	0.1	0.2	0.2	0.2	+	-	-
	798	-	0.2	0.7	0.3	-	+	0.2	+	+	0.3	0.1	-	-	-
	Total	8.2	8.9	4.6	6.6	6.4	3.3	7.5	6.6	3.6	2.6	10.4	14.5	13.1	22.6
275-366	345	4.1	2.4	0.8	2.5	1.3	0.6	0.8	1.3	0.6	1.9	1.4	3.7	1.8	2.4
	346	2.8	1.1	2.2	1.7	1.7	0.4	0.9	0.8	0.5	1.4	2.1	2.1	4.6	2.4
	368	0.2	0.3	0.2	0.4	0.7	0.6	0.3	0.5	0.1	-	0.2	0.4	0.7	1.2
	387	0.4	0.7	0.7	0.2	1.8	1.0	0.4	0.2	0.5	-	0.3	0.8	2.4	0.9
	388	0.3	0.1	0.4	+	0.9	0.4	0.1	0.1	0.1	0.1	0.1	0.2	0.6	0.7
	392	+	+	0.2	0.1	0.5	0.2	0.1	0.1	0.1	+	0.1	0.3	0.1	0.3
	796	-	0.6	0.9	0.4	-	-	0.2	0.1	0.1	0.1	0.3	0.2	-	-
	800	-	-	-	0.2	-	0.2	0.3	0.3	0.2	0.2	0.2	-	-	-
	Total	7.8	5.2	5.5	5.5	6.9	3.4	3.1	3.4	2.2	3.8	4.6	7.6	10.2	7.9
367-549	729	+	+	0.2	0.1	0.7	1.6	0.4	+	0.1	0.1	+	0.2	0.2	0.6
	731	0.2	-	0.6	0.1	1.0	1.1	0.1	+	0.1	0.1	+	+	0.3	0.2
	733	0.2	0.2	0.5	0.6	0.3	1.0	0.6	0.3	0.4	0.2	0.4	0.6	2.6	0.3
	735	0.7	0.7	0.3	0.8	1.9	2.1	1.6	1.1	0.1	-	0.1	0.8	1.2	1.3
	792	-	0.2	1.9	0.3	-	0.2	0.6	0.1	0.2	0.1	0.1	-	-	-
	Total	1.1	1.1	3.6	1.9	3.9	6.0	3.3	1.5	0.9	0.5	0.5	1.7	4.2	2.4
550-731	730	+	0.0	0.5	0.1	0.2	0.4	0.9	0.1	+	0.5	+	2.1	2.1	1.0
	732	+	+	1.3	0.2	1.9	0.7	1.3	+	+	0.1	0.1	+	0.5	0.5
	734	0.0	0.2	0.3	0.1	0.1	0.1	+	+	0.0	-	0.0	0.1	0.1	0.0
	736	0.2	0.5	0.8	0.6	0.6	1.5	1.3	1.7	0.3	-	0.1	0.9	0.3	0.3
	Total	0.2	0.7	2.8	1.0	2.8	2.7	3.5	1.8	0.3	0.6	0.2	3.1	3.0	1.8
732-914	737	0.4	1.5	1.8	3.3	0.8	0.7	1.4	1.0	1.1	-	2.0	1.1	0.1	-
	741	-	1.0	2.3	1.7	0.1	0.0	0.0	0.6	0.1	-	-	0.0	0.0	-
	745	-	0.1	2.2	0.1	0.7	0.0	0.0	0.0	0.3	-	-	0.0	0.0	-
	748	-	1.4	0.7	0.0	1.1	0.0	0.0	+	1.1	-	-	0.5	0.0	-
	Total	0.4	4.0	7.0	5.1	2.7	0.7	1.4	1.6	2.6	-	2.0	1.6	0.1	-
915-1097	738	0.6	0.2	0.0	0.0	0.0	0.0	+	+	2.2	-	-	0.0	0.0	-
	742	-	0.1	0.0	0.0	+	0.0	0.0	0.0	3.5	-	-	0.0	0.0	-
	746	-	0.1	0.0	+	0.0	0.0	0.0	0.0	0.0	-	-	0.0	0.0	-
	749	-	+	0.2	0.0	-	0.0	0.0	0.0	+	-	-	-	0.0	-
	Total	0.6	0.4	0.2	+	+	0.0	+	+	5.7	-	-	0.0	0.0	-
1098-1280	739	-	0.0	0.0	0.0	0.0	0.0	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	0.0	0.0	-	-	0.0	0.0	-
	747	-	0.0	0.0	0.1	+	0.0	0.0	0.0	0.0	-	-	0.1	0.0	-
	750	-	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	0.0	-
	Total	-	0.1	0.0	0.1	+	0.0	0.0	0.0	0.0	-	-	0.1	0.0	-
1281-1463	740	-	0.0	0.0	0.0	0.1	0.0	0.0	0.0	+	-	0.0	0.0	0.0	-
	744	-	0.5	0.0	0.1	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	-
	751	-	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-	-	0.0	-
	Total	-	0.5	0.0	0.1	0.1	0.0	0.0	0.0	+	-	-	0.0	0.0	-
Grand Total		50.9	57.5	43.3	48.6	44.8	27.5	51.3	44.3	26.4	21.0	36.4	57.6	50.9	61.2

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

Table 10. Biomass estimates ('000t) of A.plaice, by stratum and depth zone (m), from Canadian fall surveys in Div. 3N in 1995-2008 (Campelen). (+) indicates biomass <50 t, (-) means stratum not surveyed.

Biomass

Depth	Stratum	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
≤ 56	375	1.9	1.1	3.9	5.2	0.6	1.7	0.6	9.8	2.3	2.3	3.0	2.2	2.8	7.3
	376	4.7	2.4	7.7	4.4	4.3	35.8	15.4	34.1	6.4	11.1	20.3	16.0	11.0	9.0
	Total	6.6	3.5	11.6	9.6	4.9	37.5	16.0	43.9	8.7	13.4	23.4	18.2	13.8	16.3
57-92	360	22.3	7.4	28.4	39.2	43.4	96.4	46.0	67.4	99.9	105.5	80.6	67.6	65.4	118.5
	361	3.5	4.1	3.3	2.1	1.8	3.9	2.3	9.2	3.1	7.2	2.8	2.9	9.0	1.7
	362	5.0	1.1	5.1	2.9	2.9	2.6	5.3	6.1	2.6	2.2	6.2	3.1	2.4	3.4
	373	1.8	0.2	2.3	1.7	4.2	1.7	6.9	2.9	1.9	0.5	2.6	2.4	1.2	3.7
	374	2.4	0.4	1.8	1.3	2.7	1.7	3.7	0.5	0.6	0.6	4.4	4.0	3.3	9.9
	383	-	0.3	0.5	0.8	0.8	+	0.5	0.5	0.1	+	0.4	0.3	0.7	2.2
	Total	35.0	13.5	41.4	48.0	55.8	106.3	64.7	86.6	108.2	116.0	97.0	80.3	82.0	139.3
93-183	359	2.2	0.3	3.8	11.6	9.8	32.2	4.0	17.5	7.1	9.2	1.2	14.1	3.9	4.4
	377	0.5	0.4	2.3	1.1	0.9	0.7	3.0	6.1	1.9	1.4	3.8	5.0	6.1	2.6
	382	0.3	0.3	0.8	6.1	2.7	1.0	3.5	2.2	0.0	0.2	0.9	0.5	7.8	3.3
	Total	3.0	1.0	6.9	18.8	13.4	33.9	10.5	25.8	9.0	10.9	6.0	19.7	17.8	10.2
184-274	358	0.8	0.2	0.4	0.3	0.3	0.6	1.0	0.2	0.0	0.4	+	0.1	0.5	0.4
	378	0.1	0.2	0.1	0.1	0.4	0.2	0.1	0.4	0.5	0.3	0.2	0.4	0.9	0.5
	381	0.1	0.4	0.2	0.1	0.3	0.3	0.3	0.1	0.5	0.6	0.6	0.6	4.6	0.5
	Total	1.0	0.8	0.7	0.5	1.0	1.1	1.4	0.7	1.0	1.3	0.8	1.1	6.0	1.4
275-366	357	0.1	0.1	0.0	+	-	+	+	+	0.0	+	0.2	+	0.1	0.0
	379	+	0.2	0.1	+	0.3	+	0.1	+	0.0	0.5	+	0.0	0.0	0.4
	380	0.1	0.2	0.1	0.1	0.7	0.3	0.1	+	0.1	0.1	0.1	0.2	4.2	0.0
	Total	0.2	0.5	0.2	0.1	1.0	0.3	0.2	+	0.1	0.6	0.1	0.2	4.2	0.4
367-549	723	+	+	0.0	0.1	+	+	+	0.0	0.0	+	+	0.0	0.0	0.1
	725	0.1	0.1	0.0	+	0.1	0.2	+	0.0	0.0	-	0.1	+	0.0	0.1
	727	+	0.1	0.1	0.1	1.5	0.4	0.1	0.3	0.3	0.2	0.2	0.1	0.1	+
	Total	0.1	0.2	0.2	0.2	1.6	0.6	0.1	0.3	0.3	0.2	0.4	0.1	0.1	0.2
550-731	724	0.1	0.3	0.0	0.0	0.1	0.0	0.0	0.0	-	+	+	0.0	0.0	0.0
	726	+	0.3	0.1	+	+	+	+	0.0	0.0	+	0.0	0.0	0.0	0.0
	728	+	0.8	0.1	0.1	0.3	0.6	+	0.1	0.0	1.1	0.2	+	1.7	1.2
	Total	0.1	1.4	0.2	0.1	0.4	0.6	+	0.1	0.0	1.1	0.2	0.0	1.7	1.2
732-914	752	-	-	-	1.5	-	0.0	0.0	0.0	-	-	-	-	0.0	-
	756	-	-	-	0.1	-	-	0.0	0.0	-	-	0.0	-	0.0	-
	760	-	-	-	0.0	-	-	0.0	0.0	-	-	0.0	-	0.0	-
	Total				0.0	-	0.0	0.0	0.0	-	-	-	-	0.0	-
915-1097	753	-	-	-	+	-	0.0	0.0	0.0	-	-	-	-	0.0	-
	757	-	-	-	0.0	-	-	0.0	0.0	-	-	0.0	-	0.0	-
	761	-	-	-	0.0	-	-	0.0	0.0	-	-	0.0	-	0.0	-
	Total	-	-	-	+	-	0.0	0.0	0.0	-	-	-	-	0.0	-
1098-1280	754	-	-	-	0.0	-	0.0	0.0	0.0	-	-	-	-	0.0	-
	758	-	-	-	0.0	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-
	762	-	-	-	-	-	-	0.0	0.0	-	-	0.0	-	0.0	-
	Total	-	-	-	0.0	-	0.0	0.0	0.0	-	-	-	-	0.0	-
1281-1463	755	-	-	-	0.0	-	0.0	0.0	0.0	-	-	-	-	0.0	-
	759	-	-	-	0.0	-	-	0.0	0.0	-	-	0.0	-	0.0	-
	763	-	-	-	-	-	-	0.0	0.0	-	-	0.0	-	0.0	-
	Total	-	-	-	0.0	-	0.0	0.0	0.0	-	-	-	-	0.0	
Grand Total		46.0	20.9	61.0	77.3	78.1	180.3	92.9	157.4	127.4	143.4	127.8	119.5	125.6	169.0

Table 11. Biomass estimates ('000t) of A.plaice, by stratum and depth zone (m), from Canadian fall surveys in Div. 3O in 1995-2008 (Campelen). (+) indicates biomass <50 t, (-) means stratum not surveyed.

Biomass

Depth	Stratum	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
57-92	330	7.7	0.8	5.5	5.9	5.4	5.3	5.9	4.5	4.0	5.6	4.5	6.6	4.2	8.4
	331	1.2	0.3	0.9	1.8	1.0	1.0	1.1	1.2	1.5	1.0	1.6	1.0	2.0	0.6
	338	6.6	3.3	6.4	3.4	3.8	2.1	4.4	-	6.7	5.3	5.4	2.8	2.8	10.6
	340	7.2	0.4	3.2	1.1	2.8	2.2	1.7	3.7	0.9	2.6	2.6	1.7	5.5	11.1
	351	1.7	0.9	5.2	3.3	2.9	6.4	4.3	2.9	3.7	3.9	2.2	3.5	6.2	4.2
	352	4.6	9.1	6.9	8.4	3.2	8.4	8.0	6.7	7.7	10.9	11.3	6.9	3.6	11.2
	353	5.6	14.4	14.8	19.3	10.3	14.5	13.9	11.2	14.4	24.6	15.6	21.0	27.9	29.1
	Total	34.6	29.2	42.9	43.2	29.4	39.9	39.3	30.2	38.8	54.0	43.2	43.4	52.2	75.2
93-183	329	3.2	1.5	2.7	5.0	6.6	8.0	7.6	3.7	1.6	5.2	3.6	2.5	2.0	9.3
	332	3.5	3.9	1.6	3.9	1.9	2.8	1.3	2.5	3.0	3.7	4.1	4.7	2.1	5.2
	337	2.4	25.3	2.5	1.5	1.4	1.8	0.5	1.3	0.6	1.1	2.2	1.7	2.2	6.6
	339	6.5	0.9	5.1	1.4	-	3.8	2.4	3.2	3.3	2.2	4.9	1.2	2.9	3.8
	354	4.5	8.0	2.4	3.7	27.0	3.8	2.7	3.0	21.1	1.9	0.8	2.1	3.4	2.6
	Total	20.1	39.6	14.4	15.5	36.9	20.2	14.5	13.7	29.6	14.1	15.6	12.0	12.6	27.6
184-274	333	+	-	+	+	0.1	+	0.0	0.1	+	+	+	+	0.0	0.0
	336	+	0.1	0.1	+	0.1	0.1	+	0.1	+	+	+	0.1	0.3	0.1
	355	0.2	5.4	0.1	+	0.3	+	0.1	0.1	+	0.1	0.1	0.1	0.2	0.3
	Total	0.2	5.5	0.2	+	0.5	0.1	0.1	0.3	+	0.1	0.1	0.2	0.5	0.4
275-366	334	0.0	-	+	+	+	0.0	0.0	0.0	0.0	+	+	+	+	+
	335	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	356	0.0	0.1	+	+	+	+	0.0	0.0	+	+	+	+	+	+
	Total	+	0.1	0.1	+	0.1	0.0	0.0	0.0	0.0	+	+	+	0.0	0.0
367-549	717	0.0	-	+	0.0	+	+	+	0.0	0.0	0.0	0.0	+	+	+
	719	+	0.2	0.0	+	+	+	0.0	0.0	+	+	+	+	+	0.0
	721	+	0.6	0.0	0.0	+	+	0.0	0.0	0.0	0.0	0.0	+	+	0.0
	Total	+	0.8	+	+	+	+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
550-731	718	0.0	-	0.0	+	0.0	0.0	0.0	0.0	0.0	0.0	+	-	0.0	+
	720	0.0	+	-	+	+	+	0.0	0.0	0.0	0.0	0.0	+	0.0	0.0
	722	0.0	+	0.0	0.0	+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	0.0	+	0.0	+	+	+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
732-914	764	-	-	-	0.0	-	-	0.0	0.0	-	-	0.0	-	0.0	-
	768	-	-	-	0.0	-	-	0.0	0.0	-	-	0.0	-	0.0	-
	772	-	-	-	0.0	-	-	-	0.0	0.0	-	0.0	-	0.0	-
	Total	-	-	-	0.0	-	-	0.0	0.0	0.0	-	0.0	-	0.0	-
915-1097	765	-	-	-	0.0	-	-	0.0	0.0	-	-	0.0	-	0.0	-
	769	-	-	-	0.0	-	-	0.0	0.0	-	-	0.0	-	0.0	-
	773	-	-	-	0.0	-	-	0.0	0.0	0.0	-	0.0	-	0.0	-
	Total	-	-	-	0.0	-	-	0.0	0.0	0.0	-	0.0	-	0.0	-
1098-1280	766	-	-	-	-	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-
	770	-	-	-	-	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-
	774	-	-	-	-	-	0.0	0.0	0.0	0.0	-	0.0	-	0.0	-
	Total	-	-	-	-	-	0.0	0.0	0.0	0.0	-	0.0	-	0.0	-
1281-1463	767	-	-	-	-	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-
	771	-	-	-	-	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-
	775	-	-	-	-	-	0.0	0.0	0.0	0.0	-	0.0	-	0.0	-
	Total	-	-	-	-	-	0.0	0.0	0.0	0.0	-	0.0	-	0.0	-
Grand Total		54.9	75.2	57.5	58.7	66.9	60.2	53.9	44.2	68.4	68.1	58.8	55.6	65.3	103.1

Table 12. Abundance index (millions) at age for A. plaice in Div. 3L from Canadian fall surveys from 1990 to 2007.

Age/Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.34	0.00	0.00	0.00	0.00	0.00	0.51	0.05	0.04
1	0.78	0.12	0.00	0.00	0.00	0.45	1.12	0.17	2.71	14.04	16.17	8.93	3.06	1.22	3.53	11.78	11.44	22.61
2	2.39	2.09	0.75	3.10	0.00	11.05	16.62	1.52	3.84	19.86	31.38	102.85	66.37	18.37	9.68	27.80	34.76	60.08
3	26.07	14.38	12.54	21.10	0.00	25.11	57.94	21.44	6.89	10.52	26.11	70.83	119.40	79.49	30.78	33.21	42.72	61.53
4	309.25	91.21	52.65	71.20	14.48	59.35	170.16	63.91	28.35	7.92	8.33	34.69	35.23	75.44	72.68	54.99	31.70	52.93
5	597.38	295.78	171.91	123.36	25.75	198.76	149.44	105.70	64.67	29.39	27.69	20.68	16.94	26.16	42.61	73.01	35.44	31.14
6	548.02	372.37	269.73	218.20	42.96	187.22	84.67	84.48	90.34	50.01	34.64	21.12	14.52	9.05	11.30	55.65	72.86	31.96
7	303.10	164.87	102.93	138.57	54.51	101.25	31.85	35.87	57.37	46.36	22.80	34.07	21.47	7.52	4.65	21.36	68.18	45.03
8	145.95	77.59	32.27	27.74	28.54	36.23	6.04	10.59	25.21	37.97	12.56	31.22	25.94	9.05	3.82	10.80	27.59	35.87
9	95.12	43.16	10.42	7.96	8.82	19.26	2.46	5.73	14.46	24.81	8.54	25.12	18.13	5.45	3.95	3.94	5.26	10.21
10	36.73	18.31	5.51	2.65	1.88	3.65	0.83	1.27	3.74	8.91	2.73	10.85	10.36	4.75	0.88	4.49	3.53	5.10
11	17.48	8.27	1.87	1.13	0.29	0.36	0.14	0.82	1.26	4.64	1.77	8.38	7.94	2.87	0.75	1.52	1.81	1.94
12	9.06	5.12	1.63	0.29	0.06	0.10	0.06	0.19	0.41	2.10	0.33	3.24	2.04	0.92	0.12	2.35	3.66	1.43
13	5.46	1.95	0.46	0.09	0.02	0.00	0.05	0.14	0.06	0.63	0.12	0.55	0.25	0.53	0.11	1.64	1.47	0.43
14	3.94	1.51	0.26	0.07	0.07	0.00	0.00	0.00	0.00	0.22	0.00	0.32	0.05	0.06	0.00	0.72	1.22	1.13
15	1.52	0.88	0.12	0.24	0.00	0.00	0.00	0.01	0.00	0.03	0.05	0.07	0.00	0.00	0.00	0.93	1.73	0.43
16	0.51	0.23	0.04	0.06	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.00	0.00	0.00	0.00	0.30	1.13	0.50
17	0.00	0.19	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	0.05	0.15	0.52
18	0.00	0.01	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	0.11	0.01	0.44
19	0.00	0.01	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	0.33
20	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	0.24
21	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	0.00
22	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	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	0.46	0.22	0.02	0.05	0.04	0.18	1.04
Ages 0+	2103.06	1098.06	663.07	615.76	177.38	644.47	521.37	332.31	299.68	257.85	193.46	373.37	341.93	240.91	184.91	305.20	344.85	364.91
Ages 6+	1166.89	694.48	425.23	397.01	137.15	348.06	126.10	139.08	192.86	175.70	83.59	134.94	100.71	40.21	25.57	103.85	188.58	135.55
Ages 9+	169.82	79.65	20.29	12.50	11.14	23.36	3.54	8.15	19.94	41.36	13.59	48.53	38.79	14.59	5.81	16.05	19.96	22.69
Ages 12+	20.50	9.90	2.49	0.75	0.15	0.10	0.11	0.33	0.48	3.00	0.56	4.17	2.35	1.52	0.23	6.10	9.36	5.44

Table 13. Abundance index (millions) at age for A. plaice in Div. 3N from Canadian fall surveys from 1990 to 2007.

Age/Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
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	0.05	0.00	0.12	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	8.24	1.79	7.76	102.60	5.35	1.04	30.08
2	40.24	84.64	78.12	1.90	0.00	17.53	1.70	1.34	1.38	69.91	158.97	19.95	25.17	6.13	16.43	257.10	4.64	14.88
3	134.78	193.91	161.07	52.32	16.51	15.09	4.08	8.06	0.86	11.42	264.89	130.79	50.82	41.45	13.52	61.80	47.24	27.72
4	295.80	284.75	130.72	283.60	65.29	16.40	3.31	14.95	11.62	2.61	53.91	42.75	190.06	95.11	100.92	12.17	21.36	128.44
5	169.59	288.82	130.17	135.26	96.33	27.70	9.34	8.33	18.51	7.83	22.80	5.07	63.36	196.95	127.87	47.15	14.79	31.08
6	30.73	72.35	131.01	67.76	43.86	62.43	13.60	29.97	11.44	12.62	38.99	17.05	11.46	39.70	118.56	85.32	31.63	14.95
7	9.34	19.55	53.35	74.65	23.60	15.42	12.65	41.44	25.97	12.16	59.27	27.83	26.02	19.89	34.00	76.49	35.33	31.80
8	3.83	10.86	12.33	23.64	14.33	9.03	4.55	24.91	35.67	29.10	53.08	22.08	29.25	13.36	10.03	18.79	63.03	42.04
9	6.62	10.35	8.02	8.78	7.29	6.09	1.82	8.00	37.85	25.04	39.83	12.52	17.22	7.71	8.34	5.66	16.67	45.05
10	3.31	7.24	3.71	4.70	1.97	2.21	0.79	3.60	8.76	18.08	39.29	9.91	13.31	6.11	6.79	5.71	3.76	17.24
11	2.53	5.98	2.20	2.20	0.78	0.72	0.36	1.64	3.54	9.46	19.14	13.06	16.11	5.38	2.41	4.17	6.70	5.82
12	1.71	3.26	1.74	1.65	1.00	0.71	0.27	0.43	1.21	7.39	5.20	6.16	11.43	4.00	2.72	1.50	4.16	5.75
13	1.60	4.31	1.45	0.88	0.42	0.25	0.00	0.49	0.61	2.75	2.49	1.39	6.35	1.25	0.74	2.23	3.01	0.32
14	1.53	2.50	1.23	0.78	0.69	0.02	0.00	0.34	0.52	0.58	0.68	0.58	0.54	0.33	0.94	2.10	1.83	3.12
15	1.49	1.45	0.33	0.66	0.29	0.00	0.06	0.15	0.08	0.06	0.34	0.27	1.05	0.27	0.17	0.77	2.22	3.72
16	1.59	1.05	0.46	0.34	0.00	0.00	0.00	0.04	0.24	0.36	0.00	0.11	1.06	0.18	0.14	0.29	0.74	2.32
17	0.47	0.48	0.29	0.10	0.00	0.00	0.00	0.00	0.13	0.30	0.34	0.12	0.00	0.00	0.00	0.15	0.70	1.34
18	0.13	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.40
19	0.00	0.04	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31
20	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	0.05	0.00	0.00	0.05	0.00
21	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	0.00
22	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	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	0.18	0.08	0.23	12.11	0.17	0.32	0.43
Ages 0+	707.78	992.55	723.78	659.44	272.46	175.66	52.65	145.70	160.43	256.19	779.70	318.07	465.09	445.89	558.28	587.03	259.45	406.83
Ages 6+	64.87	139.55	216.12	186.17	94.24	96.89	34.10	111.02	126.02	118.06	258.66	111.09	133.81	98.22	184.84	203.17	170.05	174.18
Ages 9+	20.97	36.80	19.43	20.11	12.44	10.01	3.30	14.70	52.93	64.19	107.32	44.12	67.08	25.27	22.25	22.57	40.07	85.39
Ages 12+	8.51	13.22	5.50	4.43	2.40	0.98	0.33	1.45	2.79	11.60	9.07	8.63	20.44	6.08	4.72	7.03	12.94	17.28

Table 14. Abundance index (millions) at age for A. plaice in Div. 3O from Canadian fall surveys from 1990 to 2007.

Age/Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.61	1.38	0.00	0.00	0.08	0.05	0.15	0.27	0.10	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	28.67	5.95	8.76	411.47	52.52	5.38	151.39
2	10.51	12.10	2.58	5.10	0.00	97.32	80.15	16.68	21.30	80.38	139.26	61.24	58.23	22.83	101.14	200.34	97.71	66.49
3	25.25	56.20	44.10	42.54	3.02	20.35	74.47	71.61	9.03	49.89	124.51	100.89	53.27	56.51	50.20	70.54	175.59	88.31
4	100.36	73.88	74.88	143.08	23.98	35.12	54.27	67.87	77.71	13.19	60.63	39.78	70.08	101.12	77.66	46.91	53.84	147.13
5	86.13	139.80	65.85	101.84	68.22	69.48	49.52	39.82	37.99	55.24	23.18	28.22	25.26	101.92	80.72	50.30	24.05	55.84
6	64.11	134.09	98.45	86.11	64.26	86.70	75.81	45.40	27.31	30.79	58.38	29.01	16.41	36.55	44.02	55.96	36.64	21.07
7	57.19	64.96	69.79	103.34	56.80	35.29	37.70	42.67	29.30	21.05	33.52	35.87	25.42	21.92	17.32	34.11	34.80	51.60
8	41.89	27.82	32.12	52.74	46.38	16.19	10.77	17.73	22.54	31.85	18.15	10.36	20.70	13.07	11.28	8.45	18.15	43.26
9	22.78	28.33	17.21	16.26	12.54	14.17	4.54	9.60	16.11	22.84	13.45	11.07	5.70	6.15	7.17	4.21	4.39	18.84
10	15.16	18.75	8.47	7.97	3.97	4.89	1.46	2.43	5.45	6.67	6.91	6.58	3.13	1.72	2.18	3.02	1.91	2.07
11	9.19	11.66	4.38	3.47	1.60	0.80	1.29	0.76	2.14	4.75	4.47	4.91	2.93	2.89	2.78	1.58	1.95	1.29
12	6.66	5.48	3.48	3.15	0.67	0.50	0.26	0.59	2.01	2.82	1.53	2.29	2.28	1.45	1.32	1.25	2.11	1.45
13	4.99	5.96	1.43	2.11	0.48	0.20	0.05	0.22	1.37	1.51	0.48	0.90	1.24	0.21	1.30	0.96	1.11	1.98
14	3.85	2.96	1.67	1.53	0.41	0.28	0.12	0.26	0.32	0.27	0.16	0.23	0.40	0.47	0.28	0.50	0.57	0.62
15	2.41	2.12	0.70	0.79	0.10	0.05	0.28	0.31	0.10	0.08	0.13	0.16	0.31	0.30	0.11	0.62	0.81	0.69
16	2.36	1.05	0.67	0.96	0.00	0.00	0.00	0.03	0.14	0.32	0.19	0.27	0.27	0.34	0.20	0.05	0.55	0.25
17	1.17	0.33	0.24	0.18	0.00	0.00	0.00	0.00	0.31	0.28	0.37	0.11	0.18	0.00	0.00	0.00	0.27	0.18
18	0.08	0.28	0.27	0.31	0.00	0.00	0.00	0.00	0.05	0.05	0.00	0.16	0.00	0.13	0.00	0.00	0.24	0.14
19	0.00	0.11	0.06	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.13	0.03
20	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	0.05	0.03
21	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	0.07	0.00
22	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	0.04	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	0.10	0.00	0.25	0.92	0.20	1.51	0.54
Ages 0+	462.49	587.83	426.46	573.11	282.41	417.10	392.95	317.68	273.20	417.77	539.57	360.85	291.88	376.63	810.23	531.80	461.96	653.20
Ages 6+	231.82	303.91	238.92	279.10	187.20	159.07	132.27	120.01	107.15	123.29	137.74	101.94	79.02	85.20	87.97	110.71	103.78	143.51
Ages 9+	68.64	77.04	38.57	36.91	19.77	20.90	7.99	14.21	28.00	39.59	27.69	26.69	16.48	13.65	15.34	12.19	14.18	27.58
Ages 12+	21.51	18.30	8.51	9.22	1.65	1.04	0.71	1.42	4.31	5.33	2.86	4.12	4.73	2.89	3.21	3.38	5.94	5.38

Table 15. Abundance index (millions) at age for A. plaice in Div. 3LNO from Canadian fall surveys from 1990 to 2007.

Age/Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.70	1.72	0.00	0.00	0.08	0.10	0.15	0.91	0.14	0.04
1	11.36	1.56	5.84	0.00	0.00	38.19	3.52	3.30	22.23	153.58	90.79	45.83	10.80	17.74	517.61	69.65	17.86	204.09
2	53.13	98.83	81.45	10.10	0.00	125.90	98.46	19.54	26.52	170.15	329.62	184.04	149.76	47.32	127.24	485.24	137.11	141.45
3	186.10	264.49	217.71	115.95	19.53	60.55	136.49	101.12	16.78	71.84	415.51	302.51	223.50	177.45	94.50	165.55	265.55	177.56
4	705.41	449.84	258.26	497.88	103.74	110.88	227.74	146.72	117.67	23.72	122.87	117.22	295.37	271.68	251.26	114.07	106.89	328.50
5	853.10	724.40	367.93	360.45	190.30	295.94	208.29	153.85	121.17	92.46	73.67	53.98	105.56	325.02	251.20	170.46	74.28	118.06
6	642.86	578.81	499.19	372.08	151.09	336.35	174.08	159.85	129.09	93.43	132.01	67.18	42.39	85.30	173.88	196.94	141.13	67.98
7	369.63	249.38	226.08	316.57	134.91	151.96	82.20	119.98	112.64	79.57	115.59	97.77	72.91	49.33	55.97	131.95	138.30	128.43
8	191.67	116.27	76.71	104.12	89.25	61.45	21.37	53.22	83.42	98.92	83.79	63.67	75.89	35.47	25.13	38.04	108.77	121.17
9	124.52	81.84	35.65	33.00	28.65	39.52	8.82	23.33	68.42	72.70	61.82	48.71	41.05	19.31	19.45	13.81	26.31	74.10
10	55.20	44.30	17.68	15.32	7.82	10.75	3.08	7.30	17.95	33.66	48.92	27.34	26.80	12.57	9.85	13.23	9.19	24.41
11	29.20	25.92	8.45	6.80	2.67	1.88	1.78	3.22	6.94	18.85	25.38	26.36	26.98	11.14	5.94	7.26	10.46	9.05
12	17.43	13.86	6.85	5.10	1.72	1.31	0.59	1.21	3.63	12.31	7.07	11.69	15.76	6.37	4.16	5.10	9.92	8.62
13	12.05	12.21	3.33	3.08	0.92	0.45	0.10	0.85	2.04	4.89	3.09	2.83	7.85	1.99	2.16	4.83	5.59	2.72
14	9.32	6.98	3.15	2.38	1.17	0.31	0.12	0.60	0.84	1.08	0.84	1.13	0.99	0.86	1.21	3.32	3.62	4.87
15	5.42	4.45	1.15	1.68	0.40	0.05	0.35	0.48	0.18	0.16	0.53	0.50	1.36	0.57	0.28	2.31	4.76	4.84
16	4.45	2.34	1.17	1.36	0.00	0.00	0.00	0.08	0.38	0.71	0.24	0.38	1.33	0.52	0.33	0.64	2.42	3.07
17	1.64	1.00	0.52	0.27	0.00	0.00	0.00	0.00	0.45	0.58	0.71	0.23	0.18	0.00	0.00	0.20	1.11	2.04
18	0.21	0.42	0.27	0.31	0.00	0.00	0.00	0.00	0.05	0.12	0.00	0.16	0.00	0.13	0.00	0.11	0.48	0.98
19	0.00	0.17	0.06	0.22	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.04	0.00	0.00	0.00	0.13	0.67
20	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	0.05	0.00	0.00	0.10	0.28
21	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	0.07	0.00
22	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	0.04	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	0.74	0.30	0.50	13.08	0.42	2.02	2.01
Ages 0+	3273.32	2678.44	1813.31	1848.32	732.25	1237.23	966.97	795.69	733.31	931.81	1512.72	1052.28	1098.91	1063.43	1553.42	1424.03	1066.26	1424.94
Ages 6+	1463.58	1137.94	880.27	862.28	418.59	604.02	292.47	370.11	426.03	417.05	479.99	347.97	313.54	223.62	298.38	417.74	462.41	453.23
Ages 9+	259.43	193.48	78.29	69.52	43.34	54.26	14.83	37.06	100.88	145.14	148.60	119.34	122.35	53.51	43.40	50.81	74.21	135.66
Ages 12+	50.51	41.42	16.50	14.40	4.21	2.12	1.15	3.20	7.57	19.93	12.49	16.93	27.51	10.49	8.16	16.51	28.25	28.10
proportion 0 to 5	0.55	0.57	0.51	0.53	0.43	0.51	0.70	0.53	0.42	0.55	0.68	0.67	0.71	0.79	0.80	0.71	0.56	0.68
proportion 9+	0.08	0.07	0.04	0.04	0.06	0.04	0.02	0.05	0.14	0.16	0.10	0.11	0.11	0.05	0.03	0.04	0.07	0.10

Table 16. Canadian catches of A. plaice by Division, month and gear during 2007.

	3L		3N	3O	3LNO
	OT	Gillnet	OT	OT	Total
Jan					
Feb					
Mar					
Apr			10		10
May			9		9
Jun					
Jul		1	47	6	54
Aug	1	12	54		67
Sep			23	3	26
Oct			11	76	87
Nov			10	144	154
Dec			24	3	27
Total	**1**	**13**	**188**	**232**	**434**

Summaries:

GN=13
OT=421

3L=14
3N=188
3O=232

By-catch in directed yellowtail fishery = 420
By-catch in directed G.halibut fishery = 11
By-catch in other directed fisheries = 3

Table 17. Canadian catches of A. plaice by Division, month and gear during 2008.

	3L		3N	3O		3LNO
	OT	Gillnet	OT	OT	GN	Total
Jan			47			47
Feb			29			29
Mar			19	1		20
Apr			36	21		57
May	14		100	94		208
Jun	88		67	1		156
Jul	21	1	65		1	88
Aug	1	3	31	46		81
Sep			18	52		70
Oct			31	38		69
Nov			30	8		38
Dec			16	1		17
Total	**124**	**4**	**489**	**262**	**1**	**880**

Summaries:

GN=5
OT=875

3L=128
3N=489
3O=263

By-catch in directed yellowtail fishery = 876
By-catch in directed G.halibut fishery = 2
By-catch in other directed fisheries = 2

Table 18. Catch at age (000 of fish) and mean length (cm) and weights (kg) at age from
Canadian catch of A. plaice in Div. 3LNO in 2007. S.O.P. is catch numbers x mean weigh
An asterisk indicates catch of less than 500 fish.

						2007		3LNO
Age	3L[1]	3N	3O	Total	Pctg	Mean len	Mean wgt	S.O.P. (t)
4	`	*	1	1	0.17	31.5	0.287	0.3
5		3	1	5	0.85	33.7	0.351	1.8
6		9	2	11	1.87	33.2	0.325	3.6
7		37	25	64	10.89	36.3	0.439	28.1
8		123	54	183	31.15	39.7	0.588	107.6
9		104	55	164	27.92	41.6	0.688	112.8
10		21	15	38	6.47	44.2	0.857	32.6
11		31	11	44	7.49	44.6	0.882	38.8
12		11	13	24	4.09	47.9	1.113	26.7
13		7	7	15	2.55	51.6	1.423	21.3
14		7	12	19	3.23	53.6	1.613	30.6
15		4	5	9	1.53	54.2	1.685	15.2
16		3	3	6	1.02	54.6	1.740	10.4
17		*	2	3	0.51	59.4	2.237	6.7
18		*	1	0.9	0.15	56.8	1.988	1.8
19			*	0.21	0.04	62.1	2.574	0.5
20			*	0.17	0.03	67.3	3.349	0.6
21			*	0.16	0.03	63.6	2.774	0.4
22			*	0.05	0.01	68.5	3.549	0.2
Total		360	206	587	100.00			440
							catch=	434

[1] 3NO total age composition adjusted to total 3LNO catch
to account for 14 t of unsampled 3L catch

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 2008. S.O.P. is catch numbers x mean weights. An asterisk indicates catch of less than 500 fish.

						2008		3LNO
Age	3L	3N	3O	Total	Pctg	Mean len	Mean wgt	S.O.P. (t)
4	0	0	0	0	0.00			0.0
5	1	6	4	9	0.65	29.4	0.222	2.0
6	1	10	9	27	1.96	34.7	0.375	10.1
7	12	72	30	128	9.30	35.9	0.420	53.8
8	46	203	97	331	24.04	37.8	0.501	165.8
9	57	228	136	406	29.49	39.9	0.602	244.4
10	39	130	81	228	16.56	41.7	0.703	160.3
11	12	54	25	87	6.32	44.0	0.834	72.6
12	9	27	17	56	4.07	47.1	1.046	58.6
13	7	20	9	36	2.61	48.6	1.150	41.4
14	7	16	8	28	2.03	50.1	1.291	36.1
15	3	10	3	19	1.38	51.7	1.410	26.8
16	2	5	2	9	0.65	54.9	1.783	16.0
17	1	4	1	6	0.44	56.3	1.858	11.1
18	1	3	1	5	0.36	55.6	1.801	9.0
19	*	*	0	0.4	0.03	64.5	2.906	1.2
20	*	1	*	1	0.07	58.5	2.100	2.1
21	0	0	0	0.18	0.01	64.5	2.906	0.5
22	0	*	0	0.19	0.01	70.5	3.905	0.7
Total	198	789	423	1377	100.00			913
							catch=	880

Table 20. Catch at age for all fleets Div. 3LNO American plaice for 2007. Note that total catch adjusted for catch with no length frequencies.

	2007																						
	Russia				Spain				Portugal				Canada				Overall (LF data available)				Estonia	Lithuania	Japan	
	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.				Total (000s)
1	0	0.0	0.000	0	0	0.0	0.000	0	0	0.0	0.000	0					0.0	0.0	0.000	0				0
2	0	0.0	0.000	0	0	0.0	0.000	0	0	0.0	0.000	0					0.0	0.0	0.000	0				0
3	16	18.9	0.049	1	273	19.7	0.057	16	47	21.0	0.069	3					337	19.9	0.058	20				0
4	861	26.7	0.155	133	13597	25.7	0.136	1853	9440	27.2	0.164	1550	1000	31.5	0.287	287	24897	26.6	0.154	3823				26
5	2546	31.5	0.269	684	24783	29.6	0.219	5422	20373	29.9	0.226	4600	5000	33.7	0.351	1755	52702	30.3	0.236	12461				54
6	2500	33.2	0.321	802	35115	32.7	0.303	10641	23007	32.4	0.295	6789	11000	33.2	0.325	3575	71622	32.7	0.304	21808				74
7	12763	36.1	0.421	5369	204312	36.6	0.441	90059	85519	34.7	0.371	31733	64000	36.3	0.439	28096	366594	36.1	0.424	155257				379
8	17076	38.8	0.538	9184	322747	38.5	0.524	169267	90558	36.8	0.450	40770	183000	39.7	0.588	107604	613382	38.7	0.533	326825				634
9	24921	40.7	0.630	15703	423551	40.5	0.619	262319	109571	39.3	0.558	61106	164000	41.6	0.688	112832	722043	40.6	0.626	451961				746
10	10808	43.5	0.784	8478	260051	42.7	0.736	191474	49120	43.2	0.765	37560	38000	44.2	0.857	32566	357979	43.0	0.754	270078				370
11	5517	46.0	0.943	5204	193416	45.9	0.938	181387	33972	43.6	0.792	26904	44000	44.6	0.882	38808	276906	45.5	0.911	252304				286
12	5834	50.3	1.270	7408	187290	50.6	1.298	243152	26816	45.8	0.932	24990	24000	47.9	1.113	26712	243940	49.9	1.239	302261				252
13	5237	52.2	1.441	7547	197863	51.3	1.359	268807	24057	48.1	1.099	26439	15000	51.6	1.423	21345	242157	51.1	1.339	324138				250
14	4897	52.4	1.458	7141	199198	52.3	1.450	288879	18557	51.5	1.371	25445	19000	53.6	1.613	30647	241652	52.4	1.457	352111				250
15	4138	55.2	1.735	7182	175924	55.2	1.729	304149	11330	54.2	1.632	18486	9000	54.2	1.685	15165	200392	55.1	1.722	344982				207
16	2591	58.7	2.128	5513	125862	55.4	1.748	219958	5439	55.0	1.709	9298	6000	54.6	1.740	10440	139892	55.4	1.753	245209				145
17	1686	57.8	2.021	3407	83013	54.4	1.654	137327	2741	54.0	1.611	4416	3000	59.4	2.237	6711	90440	54.7	1.679	151861				93
18	1601	57.0	1.922	3077	81973	55.5	1.765	144675	4274	56.1	1.830	7820	900	56.8	1.988	1789	88748	55.6	1.773	157361				92
19	82	44.5	0.846	69	8917	44.5	0.846	7546	292	44.5	0.846	247	210	62.1	2.574	541	9501	45.1	0.884	8402				10
20	615	63.6	2.776	1707	21692	63.6	2.769	60070	98	50.6	1.298	127	170	67.3	3.349	569	22575	63.6	2.767	62473				23
21													160	63.6	2.774	444	160.0	63.6	2.774	444				0
22													50	68.5	3.549	177	50.0	68.5	3.549	177				0
UNK	1417	65.8	3.100	4391	0	0.0	0.000	0	128106	40.8	0.636	81516					129522.1	41.4	0.663	85907				134
Total SOP				93000				2587000				409800				439776				3529863				1.03
																					29000	25000	28000	

Table 21. Catch at age for all fleets Div. 3LNO American plaice for 2008. Note that total catch adjusted for catch with no length frequencies.

	2008																						
	Russia				Spain				Portugal				Canada				Overall (LF data available)				Estonia	Lithuania	Japan	Total (000s)
	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.				
1	0	0.0	0.000	0	4	10.5	0.007	0	0	0.0	0.000	0					3.9	10.5	0.007	0				0
2	3	14.5	0.020	0	152	13.6	0.016	2	43	14.5	0.020	1					198.6	13.8	0.017	3				0
3	163	17.1	0.035	6	979	18.4	0.045	44	2151	17.3	0.036	78					3294	17.6	0.039	128				3
4	592	21.0	0.070	41	3696	22.5	0.088	326	8669	21.2	0.072	621	0			0	12956	21.6	0.076	988				13
5	2454	26.5	0.150	368	37480	28.4	0.190	7116	41794	26.2	0.146	6081	9000	29.4	0.222	1998	90728	27.5	0.172	15564				94
6	3753	31.5	0.269	1011	70928	32.0	0.283	20083	40641	29.6	0.218	8867	27000	34.7	0.375	10125	142322	32.0	0.282	40086				148
7	8634	35.1	0.384	3316	83818	34.7	0.371	31125	123841	33.9	0.341	42237	128000	35.9	0.420	53760	344293	34.9	0.379	130438				359
8	25168	37.8	0.492	12388	234943	38.1	0.505	118595	284345	37.0	0.460	130762	331000	37.8	0.501	165831	875456	37.7	0.488	427575				912
9	21956	39.7	0.577	12674	192836	40.4	0.614	118338	266009	39.2	0.554	147472	406000	39.9	0.602	244412	886802	39.9	0.590	522896				924
10	13925	42.5	0.726	10103	174274	44.0	0.817	142461	154392	42.1	0.703	108557	228000	41.7	0.703	160284	570591	42.7	0.739	421405				594
11	7679	45.3	0.897	6890	95726	46.7	0.996	95372	86327	45.4	0.902	77842	87000	44.0	0.834	72558	276733	45.5	0.913	252662				288
12	4930	48.4	1.122	5530	110490	52.4	1.459	161217	53795	47.9	1.082	58210	56000	47.1	1.046	58576	225216	50.2	1.259	283533				235
13	2917	48.9	1.160	3384	53199	52.0	1.421	75592	38823	48.6	1.136	44087	36000	48.6	1.150	41400	130938	50.1	1.256	164464				136
14	2043	49.1	1.175	2400	55635	54.5	1.664	92569	24041	49.4	1.198	28790	28000	50.1	1.291	36148	109719	52.4	1.457	159908				114
15	1776	58.1	2.050	3639	52480	54.8	1.690	88703	16156	56.7	1.891	30557	19000	51.7	1.410	26790	89411	54.6	1.674	149689				93
16	1222	52.9	1.501	1833	58636	56.6	1.877	110073	16112	53.4	1.546	24915	9000	54.9	1.783	16047	84969	55.8	1.799	152869				88
17	202	52.8	1.491	302	11850	56.5	1.871	22167	1671	53.7	1.580	2641	6000	56.3	1.858	11148	19723	56.2	1.838	36258				21
18	50	62.6	2.630	132	0	0.0	0.000	0	1405	58.4	2.090	2936	5000	55.6	1.801	9005	6455	56.5	1.870	12073				7
19	85	54.5	1.660	142	7122	54.5	1.660	11824	335	54.5	1.660	557	400	64.5	2.906	1162	7943	55.1	1.723	13685				8
20	33	58.5	2.101	70	0	0.0	0.000	0	2760	58.5	2.101	5799	1000	58.5	2.100	2100	3793	58.5	2.101	7969				4
21	0	0.0	0.000	0	3014	62.5	2.618	7890	0	0.0	0.000	0	180	64.5	2.906	523	3194.0	62.6	2.634	8413				3
22													190	70.5	3.905	742	190.0	70.5	3.905	742				0
UNK	1238	19.7	0.057	70	5815	69.3	3.697	21501	5532	66.5	3.216	17791					12585.4	65.9	3.128	39362				13
Total SOP				64299				1125000				738800				912609				2840709				1.04
																					29000	25000	28000	

Table 22. Numbers at age of American plaice from the Canadian spring RV survey (1985-2008 (no 2006)) (a), Canadian fall RV survey (1990-2007) (no 2004) (b) and Spanish Div. 3NO survey from 1998-2008 (c).

a. Canadian spring survey

Spring	5	6	7	8	9	10	11	12	13	14
1985.5	263.811	454.551	595.652	389.798	208.007	140.238	84.297	45.199	22.716	13.977
1986.5	256.002	561.361	577.156	307.058	193.651	98.117	45.955	34.378	21.735	8.903
1987.5	460.214	747.454	656.206	398.314	184.639	101.101	41.829	33.798	19.928	11.136
1988.5	368.612	616.621	543.875	314.972	217.849	85.292	48.628	32.575	18.745	11.969
1989.5	336.143	551.765	470.169	273.725	187.637	74.679	39.843	27.071	16.825	9.650
1990.5	618.749	377.901	371.001	200.264	130.479	77.524	32.385	21.463	14.428	8.809
1991.5	398.190	364.155	180.205	112.916	67.544	35.190	22.260	13.356	7.224	5.529
1992.5	110.276	190.141	150.915	63.403	34.120	17.503	9.447	5.402	3.343	1.767
1993.5	138.054	180.137	160.064	89.449	32.226	16.510	7.626	4.264	1.783	1.325
1994.5	99.220	106.040	85.372	43.270	19.992	5.397	3.952	1.396	1.241	0.996
1995.5	41.914	57.524	59.883	49.937	27.484	8.339	2.664	0.539	0.093	0.035
1996.5	133.678	130.513	97.122	39.511	16.189	4.502	1.942	2.233	0.518	0.250
1997.5	65.278	84.402	79.311	48.718	18.944	6.047	2.678	1.819	0.562	0.174
1998.5	69.797	69.196	76.743	79.391	47.909	19.560	9.928	3.281	1.624	0.445
1999.5	66.741	104.510	104.869	111.518	107.309	65.322	30.521	13.021	6.508	1.894
2000.5	34.977	67.015	78.009	64.565	59.164	47.188	27.929	9.536	4.042	0.900
2001.5	28.853	36.351	73.856	62.438	58.427	45.042	34.569	16.018	5.541	2.771
2002.5	56.503	41.334	51.938	53.824	38.253	24.420	20.028	12.561	4.006	2.010
2003.5	188.242	72.503	46.058	49.745	39.965	18.074	13.764	11.463	4.506	2.168
2004.5	96.532	161.935	51.282	29.336	19.920	15.555	9.207	8.200	4.490	2.707
2005.5	149.659	163.831	143.874	55.103	31.863	16.505	13.679	8.236	6.219	4.662
2007.5	193.863	89.640	144.469	115.486	82.606	16.796	10.938	5.057	4.373	3.821
2008.5	238.975	116.455	91.953	117.024	70.142	42.584	14.799	7.295	3.804	3.320

b. Canadian fall survey

Fall	5	6	7	8	9	10	11	12	13	14
1990.9	853.098	642.862	369.626	191.668	124.519	55.198	29.201	17.430	12.054	9.316
1991.9	724.397	578.812	249.380	116.271	81.837	44.303	25.916	13.857	12.207	6.977
1992.9	367.927	499.192	226.077	76.712	35.653	17.680	8.451	6.848	3.333	3.151
1993.9	360.452	372.076	316.567	104.116	33.000	15.316	6.798	5.095	3.077	2.383
1994.9	190.297	151.085	134.913	89.251	28.649	7.822	2.667	1.723	0.919	1.168
1995.9	295.940	336.345	151.960	61.447	39.520	10.745	1.880	1.308	0.452	0.307
1996.9	208.293	174.079	82.201	21.365	8.820	3.077	1.781	0.587	0.098	0.116
1997.9	153.853	159.848	119.979	53.224	23.331	7.304	3.217	1.208	0.849	0.595
1998.9	121.174	129.090	112.639	83.420	68.417	17.949	6.944	3.630	2.041	0.844
1999.9	92.461	93.426	79.565	98.916	72.701	33.661	18.853	12.311	4.889	1.076
2000.9	73.671	132.006	115.595	83.788	61.816	48.924	25.380	7.069	3.091	0.843
2001.9	53.977	67.182	97.770	63.670	48.712	27.344	26.360	11.691	2.834	1.128
2002.9	105.561	42.394	72.913	75.893	41.055	26.800	26.982	15.759	7.846	0.989
2003.9	325.025	85.303	49.333	35.469	19.314	12.574	11.135	6.373	1.987	0.857
2005.9	170.458	196.940	131.951	38.038	13.807	13.226	7.264	5.099	4.833	3.319
2006.9	74.278	141.128	138.301	108.766	26.315	9.192	10.458	9.922	5.594	3.616
2007.9	118.060	67.983	128.426	121.169	74.096	24.413	9.052	8.624	2.724	4.867

c. Spanish Div. 3NO survey

	5	6	7	8	9	10	11	12	13	14
1998.5	8.582	14.252	29.988	48.494	33.834	13.683	5.388	1.968	0.950	1.028
1999.5	12.890	37.921	32.147	42.532	60.516	50.117	20.463	9.189	5.005	1.871
2000.5	10.996	19.645	49.713	39.491	51.904	46.981	29.088	13.556	6.375	0.973
2001.5	4.815	11.438	30.592	28.505	27.167	20.443	21.202	8.264	2.273	0.962
2002.5	38.405	11.404	10.045	18.840	14.277	8.863	10.671	7.449	1.841	1.030
2003.5	235.167	56.430	22.530	16.910	19.425	8.112	8.500	10.412	3.875	1.732
2004.5	76.802	204.706	47.136	12.832	11.172	11.953	6.443	7.897	4.393	3.803
2005.5	40.627	91.456	121.134	42.371	17.815	6.106	4.385	4.292	3.295	2.381
2006.5	105.848	85.837	92.851	78.663	57.880	25.601	11.867	6.464	3.468	2.280
2007.5	97.644	33.625	61.137	45.089	56.795	10.917	3.752	3.071	2.240	2.266
2008.5	282.606	121.995	36.946	75.106	38.907	32.571	8.910	4.688	1.692	2.441

Table 23. 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	1029.9	1079.4	627.4	278.1	125.6	39.6	38.3
2000	15.2	226.3	726.8	915.1	1442.7	1532.7	979.1	429.1	195.2	43.9	116.6
2001	111.0	331.5	1139.1	1413.3	1583.8	1595.5	1403.9	665.1	232.4	86.1	109.1
2002	312.2	308.3	609.9	1488.3	1431.7	1082.1	1059.3	605.2	203.5	62.4	60.6
2003	1212.4	983.0	1104.7	1707.9	1993.6	1201.8	999.9	879.7	358.2	156.5	131.8
2004	346.2	1898.8	1215.9	967.5	1086.1	1013.6	739.9	591.1	320.1	201.4	124.4
2005	58.6	289.0	999.0	842.9	778.7	579.7	536.2	341.9	260.0	178.0	250.4
2006	76.1	228.4	637.2	558.5	469.0	354.4	311.7	252.7	210.7	154.5	238.8
2007	54.5	74.0	378.8	633.9	746.2	369.9	286.2	252.1	250.3	249.7	570.2
2008	94.5	148.2	358.6	911.8	923.6	594.3	288.2	234.6	136.4	114.3	224.6

Table 24. Commercial weight-at-age for Div. 3LNO American plaice (Jan. 1).

beg of year	5	6	7	8	9	10	11	12	13	14	15+
1960	0.227	0.198	0.232	0.320	0.423	0.539	0.663	0.775	0.872	1.041	1.274
1961	0.227	0.198	0.232	0.320	0.423	0.539	0.663	0.775	0.872	1.041	1.274
1962	0.201	0.192	0.227	0.326	0.441	0.549	0.663	0.810	0.885	1.035	1.281
1963	0.179	0.218	0.229	0.326	0.447	0.569	0.668	0.790	0.876	1.021	1.357
1964	0.178	0.244	0.293	0.382	0.458	0.579	0.687	0.789	0.882	1.023	1.352
1965	0.182	0.246	0.323	0.434	0.554	0.620	0.727	0.813	0.891	1.076	1.420
1966	0.178	0.241	0.327	0.427	0.565	0.702	0.828	0.904	0.925	1.095	1.444
1967	0.182	0.245	0.326	0.416	0.552	0.710	0.817	1.003	1.025	1.161	1.563
1968	0.177	0.240	0.316	0.415	0.531	0.652	0.819	0.916	1.052	1.219	1.612
1969	0.182	0.246	0.303	0.379	0.504	0.635	0.740	0.914	1.020	1.227	1.623
1970	0.188	0.240	0.309	0.363	0.470	0.619	0.730	0.813	1.012	1.106	1.495
1971	0.181	0.233	0.302	0.365	0.443	0.573	0.725	0.850	0.933	1.087	1.354
1972	0.193	0.241	0.310	0.400	0.461	0.557	0.679	0.818	0.922	1.102	1.365
1973	0.190	0.226	0.285	0.376	0.501	0.576	0.716	0.885	1.038	1.117	1.466
1974	0.191	0.229	0.288	0.349	0.465	0.600	0.759	0.951	1.190	1.396	1.705
1975	0.192	0.231	0.296	0.376	0.484	0.627	0.789	0.994	1.208	1.439	1.817
1976	0.183	0.236	0.296	0.380	0.482	0.610	0.757	0.955	1.109	1.332	1.683
1977	0.187	0.234	0.305	0.386	0.504	0.612	0.761	0.919	1.119	1.271	1.631
1978	0.152	0.233	0.305	0.384	0.469	0.614	0.718	0.897	1.098	1.303	1.626
1979	0.167	0.251	0.312	0.400	0.476	0.558	0.657	0.847	1.061	1.414	1.681
1980	0.155	0.262	0.362	0.425	0.495	0.560	0.629	0.720	0.958	1.290	1.757
1981	0.175	0.281	0.365	0.430	0.484	0.538	0.560	0.663	0.765	0.993	1.446
1982	0.210	0.250	0.369	0.416	0.469	0.509	0.565	0.638	0.812	1.005	1.336
1983	0.290	0.313	0.375	0.447	0.530	0.582	0.610	0.671	0.842	1.091	1.502
1984	0.245	0.306	0.382	0.466	0.553	0.609	0.676	0.771	0.923	1.177	1.638
1985	0.222	0.298	0.367	0.425	0.503	0.601	0.679	0.849	1.120	1.463	1.921
1986	0.079	0.203	0.302	0.420	0.509	0.605	0.713	0.901	1.195	1.570	2.082
1987	0.219	0.189	0.278	0.349	0.452	0.599	0.749	0.925	1.175	1.500	2.017
1988	0.163	0.242	0.317	0.421	0.463	0.547	0.712	0.934	1.229	1.560	2.062
1989	0.065	0.178	0.257	0.365	0.467	0.545	0.696	0.909	1.223	1.572	2.070
1990	0.103	0.158	0.253	0.341	0.464	0.586	0.745	0.986	1.317	1.697	2.049
1991	0.168	0.215	0.321	0.408	0.520	0.661	0.845	1.104	1.478	1.880	2.224
1992	0.234	0.238	0.330	0.415	0.514	0.667	0.861	1.096	1.412	1.806	2.327
1993	0.088	0.228	0.279	0.358	0.453	0.568	0.730	0.926	1.205	1.466	2.008
1994	0.084	0.148	0.244	0.320	0.441	0.613	0.727	0.906	1.163	1.444	1.792
1995	0.166	0.168	0.252	0.341	0.515	0.742	1.102	1.226	1.313	1.849	1.776
1996	0.116	0.194	0.265	0.386	0.537	0.807	1.058	1.457	1.625	2.109	2.353
1997	0.162	0.189	0.266	0.379	0.542	0.745	0.953	1.187	1.531	1.924	2.613
1998	0.136	0.165	0.255	0.350	0.495	0.633	0.806	0.985	1.260	1.732	2.014
1999	0.153	0.212	0.227	0.316	0.411	0.553	0.673	0.860	1.064	1.356	1.809
2000	0.119	0.238	0.313	0.360	0.445	0.566	0.716	0.896	1.147	1.356	1.756
2001	0.185	0.231	0.345	0.426	0.468	0.584	0.750	0.932	1.164	1.391	1.789
2002	0.185	0.268	0.356	0.435	0.510	0.581	0.723	0.940	1.128	1.404	1.742
2003	0.209	0.273	0.369	0.444	0.541	0.637	0.760	0.943	1.201	1.407	1.883
2004	0.177	0.280	0.373	0.468	0.570	0.709	0.838	0.976	1.204	1.535	1.978
2005	0.167	0.276	0.386	0.486	0.581	0.709	0.857	1.012	1.220	1.461	1.931
2006	0.123	0.228	0.377	0.498	0.587	0.687	0.876	0.996	1.208	1.516	1.861
2007	0.217	0.225	0.336	0.469	0.580	0.679	0.813	1.111	1.211	1.382	1.711
2008	0.124	0.258	0.340	0.455	0.561	0.680	0.830	1.071	1.248	1.397	1.599
2009	0.155	0.237	0.351	0.474	0.576	0.682	0.840	1.059	1.222	1.432	1.724

Table 25. Estimated proportion mature-at-age for Div. 3LNO American plaice.

	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	0.075	0.106	0.195	0.377	0.579	0.877	0.984	0.994	0.999	1.000	1.000
1996	0.009	0.173	0.345	0.627	0.837	0.843	0.972	0.997	0.999	1.000	1.000
1997	0.004	0.040	0.349	0.701	0.921	0.977	0.954	0.994	1.000	1.000	1.000
1998	0.018	0.026	0.159	0.578	0.913	0.988	0.997	0.988	0.999	1.000	1.000
1999	0.016	0.066	0.137	0.463	0.779	0.979	0.998	1.000	0.997	1.000	1.000
2000	0.008	0.065	0.217	0.488	0.797	0.900	0.995	1.000	1.000	0.999	1.000
2001	0.034	0.044	0.234	0.521	0.851	0.947	0.959	0.999	1.000	1.000	1.000
2002	0.043	0.128	0.213	0.574	0.810	0.972	0.988	0.983	1.000	1.000	1.000
2003	0.076	0.145	0.379	0.614	0.856	0.943	0.995	0.997	0.993	1.000	1.000
2004	0.012	0.197	0.390	0.717	0.903	0.963	0.985	0.999	0.999	0.997	1.000
2005	0.021	0.049	0.423	0.707	0.913	0.982	0.991	0.996	1.000	1.000	0.999
2006	0.036	0.096	0.182	0.686	0.901	0.978	0.997	0.998	0.999	1.000	1.000
2007	0.036	0.114	0.346	0.486	0.867	0.972	0.995	0.999	1.000	1.000	1.000
2008	0.036	0.114	0.317	0.725	0.801	0.951	0.992	0.999	1.000	1.000	1.000
2009	0.036	0.114	0.317	0.632	0.929	0.945	0.983	0.998	1.000	1.000	1.000

Table 26. Results of ADAPT for Div. 3LNO American plaice using Canadian spring and fall surveys and Spanish Div. 3NO survey.

ORTHOGONALITY OFFSET 0.000027
MEAN SQUARE RESIDUALS 0.271592

Parameter	Estimate	Standard Error	Bias	Rel. Err.	Rel.Bias
N[2009 6]	1.120E+05	4.292E+04	8.390E+03	0.383	0.075
N[2009 7]	3.234E+04	7.887E+03	1.005E+03	0.244	0.031
N[2009 8]	1.214E+04	2.564E+03	2.818E+02	0.211	0.023
N[2009 9]	1.518E+04	2.785E+03	2.623E+02	0.183	0.017
N[2009 10]	1.197E+04	2.089E+03	1.822E+02	0.174	0.015
N[2009 11]	1.185E+04	1.878E+03	1.499E+02	0.159	0.013
N[2009 12]	2.836E+03	4.861E+02	3.728E+01	0.171	0.013
N[2009 13]	7.696E+02	1.734E+02	1.436E+01	0.225	0.019
N[2009 14]	4.609E+02	1.119E+02	9.907E+00	0.243	0.021
N[2009 15]	1.012E+03	2.255E+02	1.564E+01	0.223	0.015
Fall Age 5	6.884E-03	8.923E-04	4.876E-05	0.130	0.007
Fall Age 6	8.858E-03	1.140E-03	6.261E-05	0.129	0.007
Fall Age 7	9.418E-03	1.208E-03	6.728E-05	0.128	0.007
Fall Age 8	8.412E-03	1.077E-03	6.107E-05	0.128	0.007
Fall Age 9	7.624E-03	9.766E-04	5.591E-05	0.128	0.007
Fall Age 10	6.417E-03	8.220E-04	4.684E-05	0.128	0.007
Fall Age 11	6.653E-03	8.564E-04	4.941E-05	0.129	0.007
Fall Age 12	7.459E-03	9.662E-04	5.648E-05	0.130	0.008
Fall Age 13	6.658E-03	8.714E-04	5.157E-05	0.131	0.008
Fall Age 14	7.286E-03	9.535E-04	5.636E-05	0.131	0.008
Spr Age 5	2.948E-03	3.303E-04	1.537E-05	0.112	0.005
Spr Age 6	4.776E-03	5.287E-04	2.460E-05	0.111	0.005
Spr Age 7	6.129E-03	6.754E-04	3.179E-05	0.110	0.005
Spr Age 8	6.045E-03	6.644E-04	3.154E-05	0.110	0.005
Spr Age 9	5.625E-03	6.177E-04	2.951E-05	0.110	0.005
Spr Age 10	4.456E-03	4.898E-04	2.376E-05	0.110	0.005
Spr Age 11	4.572E-03	5.041E-04	2.508E-05	0.110	0.005
Spr Age 12	5.053E-03	5.584E-04	2.830E-05	0.110	0.006
Spr Age 13	4.809E-03	5.356E-04	2.772E-05	0.111	0.006
Spr Age 14	4.964E-03	5.588E-04	2.942E-05	0.113	0.006
Span Age 5	1.495E-03	2.515E-04	1.823E-05	0.168	0.012
Span Age 6	2.195E-03	3.600E-04	2.542E-05	0.164	0.012
Span Age 7	2.895E-03	4.700E-04	3.316E-05	0.162	0.011
Span Age 8	3.374E-03	5.446E-04	3.853E-05	0.161	0.011
Span Age 9	4.369E-03	7.036E-04	5.009E-05	0.161	0.011
Span Age 10	4.037E-03	6.508E-04	4.670E-05	0.161	0.012
Span Age 11	4.341E-03	7.036E-04	5.161E-05	0.162	0.012
Span Age 12	5.274E-03	8.643E-04	6.602E-05	0.164	0.013
Span Age 13	4.199E-03	6.985E-04	5.467E-05	0.166	0.013
Span Age 14	4.228E-03	7.192E-04	5.803E-05	0.170	0.014

Table 27. Bias adjusted population numbers (000 t) from VPA.

Pop #s Bias Adj(a	5	6	7	8	9	10	11	12	13	14	15
1960	299711	215972	141212	120313	90754	59599	48429	34426	21984	16264	29100
1961	283342	245342	176535	114854	97270	72734	46737	37358	25054	15519	30700
1962	265661	231955	200688	144055	92923	77414	56684	36039	28536	17006	30925
1963	270974	217448	189507	163716	116952	75009	61874	44214	27073	21190	30932
1964	260403	221724	177102	153470	132744	94355	59392	47856	32435	18655	34147
1965	288220	212957	179802	140486	122713	103109	69345	42353	33640	23629	35500
1966	250042	235545	171504	140679	106625	94109	77596	51606	29459	22846	38652
1967	223369	203128	187185	131359	105137	78715	70496	57122	37142	18963	38224
1968	176502	182487	163286	143478	100647	77508	52103	45415	33683	21879	29058
1969	174804	144258	147292	129950	108641	72298	52983	35691	24763	19692	28456
1970	164081	142494	115893	113486	93606	72579	47691	31933	19890	13941	27770
1971	204824	134234	114703	92579	83891	64445	49259	28997	18734	11295	21647
1972	242725	166670	108321	86323	66372	54731	40026	30446	15643	10674	17241
1973	292802	198204	134133	86548	63734	44166	33335	21363	15334	6744	12668
1974	280066	239684	161301	104107	61381	40472	27132	18336	11425	6663	6330
1975	293987	228979	190860	122612	76157	43255	25040	15849	10883	5939	6656
1976	276668	239898	184647	149745	91877	54031	28301	15376	8729	5515	5353
1977	232205	225761	192884	143251	105154	60285	33145	15701	7966	4437	4829
1978	218528	189234	178768	150029	106705	73876	39317	21271	9032	4396	4791
1979	200736	177509	150898	138065	113454	75878	47994	23261	11295	4125	3351
1980	193519	163214	139418	111342	96148	79394	50864	31382	15646	7589	4956
1981	188476	158202	130940	105547	79822	66010	52211	31495	18428	9455	7943
1982	191263	154172	129024	105174	82095	58211	43760	30561	15155	7327	5105
1983	189829	156569	125942	103998	81778	59150	36118	21672	12089	5332	3808
1984	191445	155311	127292	100356	79915	59433	41484	21937	11007	5789	3688
1985	187240	156698	126800	102849	79175	60149	39694	22403	9941	4482	4080
1986	159572	153032	127582	101682	79105	55189	35106	19486	10083	4465	3649
1987	141816	126667	116534	93135	71959	52728	32719	15998	6713	2972	2386
1988	161672	114089	99246	88471	66435	44648	27355	16568	6854	2749	2288
1989	187934	129740	90508	76876	65878	45276	27273	14096	8154	3202	2230
1990	183554	100993	67652	44671	37986	28172	17429	9814	4621	3286	1906
1991	91529	96621	53637	36429	22824	15885	10150	5497	3095	1463	1946
1992	61705	49265	47727	25675	14487	7622	4508	2752	1550	1218	1374
1993	52932	36208	28223	26134	12559	5829	2884	1538	971	487	724
1994	58881	30268	18514	10067	6892	3208	1000	378	192	190	96
1995	52868	31399	14929	6865	2659	2014	1338	241	103	27	107
1996	35072	31043	18243	8444	3789	1411	1136	777	139	60	79
1997	22607	20506	17710	10001	4628	2071	791	661	451	80	80
1998	20750	18491	16667	14009	7539	3420	1561	564	490	346	129
1999	20761	16979	15090	13400	10777	5447	2390	1027	356	339	328
2000	14999	16974	13744	12112	10448	7895	3489	1393	591	179	475
2001	13085	12266	13693	10596	9091	7254	5085	1977	755	309	391
2002	20018	10613	9743	10183	7402	6018	4505	2902	1023	410	398
2003	49107	16107	8411	7427	6997	4772	3953	2736	1832	654	551
2004	37414	39111	12301	5891	4545	3939	2827	2338	1451	1178	727
2005	36024	30320	30308	8975	3952	2745	2314	1650	1383	900	1266
2006	22379	29441	24563	23912	6588	2535	1726	1413	1044	898	1389
2007	47001	18254	23898	19535	19073	4971	1756	1133	929	665	1518
2008	126619	38432	14878	19224	15422	14942	3736	1180	701	536	1053
2009	51068	103581	31332	11857	14916	11793	11697	2799	755	451	996

Table 28. Bias adjusted fishing mortalities from VPA.

F Bias Adj(analyt	5	6	7	8	9	10	11	12	13	14	15
1960	0.000	0.002	0.007	0.013	0.021	0.043	0.060	0.118	0.148	0.190	0.190
1961	0.000	0.001	0.003	0.012	0.028	0.049	0.060	0.069	0.187	0.202	0.202
1962	0.000	0.002	0.004	0.008	0.014	0.024	0.048	0.086	0.098	0.238	0.238
1963	0.001	0.005	0.011	0.010	0.015	0.033	0.057	0.110	0.172	0.223	0.223
1964	0.001	0.010	0.032	0.024	0.053	0.108	0.138	0.152	0.117	0.197	0.197
1965	0.002	0.016	0.045	0.076	0.065	0.084	0.095	0.163	0.187	0.225	0.225
1966	0.008	0.030	0.067	0.091	0.103	0.089	0.106	0.129	0.241	0.276	0.276
1967	0.002	0.018	0.066	0.066	0.105	0.213	0.240	0.328	0.329	0.477	0.477
1968	0.002	0.014	0.028	0.078	0.131	0.180	0.178	0.407	0.337	0.382	0.382
1969	0.004	0.019	0.061	0.128	0.203	0.216	0.306	0.385	0.374	0.350	0.350
1970	0.001	0.017	0.025	0.102	0.173	0.188	0.298	0.333	0.366	0.456	0.456
1971	0.006	0.014	0.084	0.133	0.227	0.276	0.281	0.417	0.363	0.447	0.447
1972	0.003	0.017	0.024	0.103	0.207	0.296	0.428	0.486	0.641	0.590	0.590
1973	0.000	0.006	0.053	0.144	0.254	0.287	0.398	0.426	0.633	0.921	0.921
1974	0.001	0.028	0.074	0.113	0.150	0.280	0.338	0.322	0.454	0.469	0.469
1975	0.003	0.015	0.043	0.089	0.143	0.224	0.288	0.396	0.480	0.656	0.656
1976	0.003	0.018	0.054	0.154	0.221	0.289	0.389	0.458	0.477	0.611	0.611
1977	0.005	0.033	0.051	0.095	0.153	0.227	0.244	0.353	0.394	0.460	0.460
1978	0.008	0.026	0.058	0.079	0.141	0.231	0.325	0.433	0.584	0.809	0.809
1979	0.007	0.042	0.104	0.162	0.157	0.200	0.225	0.197	0.198	0.211	0.211
1980	0.002	0.020	0.078	0.133	0.176	0.219	0.279	0.332	0.304	0.257	0.257
1981	0.001	0.004	0.019	0.051	0.116	0.211	0.336	0.531	0.722	1.026	1.026
1982	0.000	0.002	0.016	0.052	0.128	0.277	0.503	0.727	0.845	0.983	0.983
1983	0.001	0.007	0.027	0.063	0.119	0.155	0.299	0.478	0.536	0.708	0.708
1984	0.000	0.003	0.013	0.037	0.084	0.204	0.416	0.591	0.698	0.643	0.643
1985	0.002	0.006	0.021	0.062	0.161	0.338	0.512	0.598	0.600	0.653	0.653
1986	0.031	0.072	0.115	0.146	0.206	0.323	0.586	0.866	1.022	1.024	1.024
1987	0.018	0.044	0.076	0.138	0.277	0.456	0.480	0.648	0.693	0.651	0.651
1988	0.020	0.032	0.055	0.095	0.183	0.293	0.463	0.509	0.561	0.615	0.615
1989	0.091	0.121	0.176	0.175	0.319	0.425	0.492	0.585	0.379	0.517	0.517
1990	0.112	0.103	0.089	0.142	0.342	0.491	0.624	0.624	0.620	0.451	0.451
1991	0.089	0.175	0.207	0.392	0.567	0.729	0.775	0.736	0.403	0.379	0.379
1992	0.003	0.027	0.072	0.185	0.380	0.442	0.546	0.512	0.627	0.746	0.746
1993	0.029	0.141	0.501	0.803	0.835	1.233	1.503	1.549	1.100	2.002	2.002
1994	0.099	0.177	0.462	0.802	0.700	0.345	0.891	0.771	1.439	0.452	0.452
1995	0.002	0.013	0.040	0.064	0.103	0.043	0.013	0.022	0.001	0.005	0.005
1996	0.007	0.031	0.071	0.071	0.074	0.048	0.012	0.014	0.022	0.022	0.022
1997	0.001	0.007	0.034	0.083	0.103	0.083	0.139	0.100	0.066	0.019	0.019
1998	0.001	0.003	0.018	0.062	0.125	0.158	0.218	0.260	0.168	0.170	0.170
1999	0.001	0.011	0.020	0.049	0.111	0.246	0.340	0.352	0.488	0.138	0.138
2000	0.001	0.015	0.060	0.087	0.165	0.240	0.368	0.412	0.449	0.314	0.314
2001	0.009	0.030	0.096	0.159	0.213	0.276	0.361	0.459	0.411	0.365	0.365
2002	0.017	0.033	0.071	0.175	0.239	0.220	0.299	0.260	0.247	0.183	0.183
2003	0.028	0.070	0.156	0.291	0.375	0.323	0.325	0.434	0.242	0.305	0.305
2004	0.010	0.055	0.115	0.199	0.304	0.332	0.338	0.325	0.277	0.208	0.208
2005	0.002	0.011	0.037	0.109	0.244	0.264	0.294	0.258	0.231	0.245	0.245
2006	0.004	0.009	0.029	0.026	0.082	0.167	0.221	0.219	0.251	0.210	0.210
2007	0.001	0.004	0.018	0.036	0.044	0.086	0.197	0.280	0.350	0.529	0.529
2008	0.001	0.004	0.027	0.054	0.068	0.045	0.089	0.246	0.241	0.267	0.267

Table 29. Spawning stock biomass from VPA output.

	5	6	7	8	9	10	11	12	13	14	15
1960	114	190	532	1528	4864	7455	18016	21629	17877	16539	36787
1961	183	230	558	1707	4321	13049	17502	23471	20374	15781	38809
1962	103	396	611	1923	5158	10610	23763	24732	23535	17199	39328
1963	27	286	1191	1991	6105	12732	20081	29864	22759	21145	41669
1964	51	125	971	4777	6068	15880	22698	27483	27258	18906	45816
1965	274	228	550	3442	14844	15363	28181	27097	26474	25062	50291
1966	569	929	945	2286	9515	30903	30497	37174	24957	23912	55593
1967	184	1632	3058	3445	8164	20721	42310	41263	35185	21347	58774
1968	87	521	4221	8537	11165	20415	27685	37325	31202	25983	46357
1969	110	283	1377	9330	18961	23351	28888	27827	24371	23068	45793
1970	19	317	808	3207	16744	28173	27925	23887	19080	15249	40849
1971	18	67	859	2100	6786	22793	30045	23193	17114	12062	29198
1972	12	73	254	2234	4894	11342	21987	23514	14194	11706	23411
1973	18	53	257	847	5050	8983	14578	17356	15626	7501	18545
1974	87	79	257	890	2448	8205	12583	14049	13145	9245	10779
1975	119	307	371	1164	3151	6724	11469	12888	12054	8438	12074
1976	120	397	1122	1665	4765	8492	11502	11597	8986	7104	8962
1977	43	394	1360	3855	6423	13259	14210	11577	8119	5492	7777
1978	8	170	1270	4216	10607	17528	20426	15790	9267	5531	7718
1979	25	64	708	3880	11304	20790	23382	18204	11349	5717	5560
1980	30	183	423	2685	9205	20879	24815	21005	14724	9643	8659
1981	59	250	1140	2137	7416	15355	21864	19316	13867	9358	11440
1982	14	373	1466	5345	8631	14329	17485	17710	12039	7337	6815
1983	63	158	2416	7048	19145	21629	17313	12866	9878	5782	5713
1984	17	417	1460	10696	22161	29598	25456	15815	9762	6752	6028
1985	168	211	2981	9970	24655	30711	25957	18696	10942	6475	7814
1986	95	687	2106	14760	29731	30022	24267	17428	12015	6978	7565
1987	127	863	3623	13785	26108	30459	24029	14719	7875	4455	4806
1988	53	501	4876	15358	27821	23649	19402	15412	8414	4288	4717
1989	20	235	1788	13281	24459	24483	18904	12810	9964	5033	4614
1990	50	150	850	4139	14358	15785	12977	9667	6085	5577	3905
1991	90	264	896	3110	7437	10032	8505	6066	4573	2752	4329
1992	14	264	927	2571	4267	4489	3846	3011	2188	2199	3199
1993	23	69	650	2175	3678	2885	2046	1422	1170	714	1453
1994	128	151	302	839	1806	1796	706	340	224	275	172
1995	659	558	734	883	792	1310	1451	294	135	50	191
1996	37	1041	1670	2043	1702	960	1168	1129	226	127	185
1997	16	155	1642	2661	2310	1507	720	780	690	154	209
1998	50	78	679	2840	3405	2138	1254	549	616	599	259
1999	49	238	468	1962	3452	2948	1605	883	378	459	593
2000	14	262	935	2127	3702	4020	2486	1247	678	243	835
2001	83	125	1107	2349	3619	4011	3658	1841	879	430	700
2002	160	365	740	2544	3054	3400	3215	2684	1153	576	694
2003	781	639	1177	2022	3242	2866	2990	2573	2185	920	1037
2004	80	2158	1792	1976	2338	2691	2333	2281	1746	1803	1439
2005	126	413	4948	3081	2097	1912	1966	1663	1686	1315	2444
2006	100	645	1681	8163	3481	1703	1508	1405	1259	1362	2584
2007	370	469	2777	4455	9592	3280	1420	1258	1124	919	2598
2008	572	1133	1601	6338	6928	9662	3077	1262	874	749	1684
2009	287	2806	3482	3553	7980	7602	9655	2959	923	646	1717

Table 30. Retrospective comparison (one year) of SSB at age estimated from ADAPT. Table entries provide the ratio of the estimated numbers from the current assessment to those estimated in the previous assessment (model formulation unchanged). Shaded entries highlight changes in excess of +/- 10%.

2009/2008 Retro Matrix	5	6	7	8	9	10	11	12	13	14	15
1960	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1961	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1962	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1963	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1964	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1965	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1966	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1967	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1968	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1969	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1970	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1971	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1972	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1973	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1974	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1975	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1976	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1977	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1978	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1979	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1980	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1981	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1982	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1983	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1984	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1985	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1986	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1987	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1988	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1989	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1990	1.001	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1991	1.001	1.001	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1992	1.001	1.001	1.001	1.001	1.000	1.000	1.000	1.001	1.000	1.000	1.000
1993	1.002	1.001	1.001	1.001	1.001	1.001	1.000	1.000	1.001	1.000	1.000
1994	1.002	1.002	1.001	1.001	1.002	1.003	1.002	1.002	1.001	1.003	1.003
1995	1.005	1.003	1.002	1.002	1.002	1.004	1.004	1.004	1.004	1.004	1.004
1996	1.005	1.005	1.003	1.003	1.002	1.002	1.004	1.004	1.004	1.004	1.004
1997	1.007	1.005	1.005	1.003	1.003	1.003	1.002	1.004	1.004	1.004	1.004
1998	1.007	1.007	1.005	1.005	1.003	1.003	1.003	1.003	1.004	1.004	1.004
1999	1.027	1.007	1.007	1.005	1.005	1.004	1.004	1.004	1.004	1.005	1.005
2000	1.004	1.027	1.007	1.007	1.005	1.006	1.005	1.005	1.005	1.006	1.006
2001	1.026	1.004	1.028	1.007	1.008	1.006	1.008	1.007	1.007	1.008	1.008
2002	0.972	1.026	1.004	1.031	1.009	1.010	1.008	1.011	1.011	1.011	1.011
2003	0.933	0.972	1.027	1.005	1.037	1.011	1.012	1.011	1.014	1.014	1.014
2004	0.939	0.931	0.970	1.032	1.006	1.054	1.015	1.017	1.017	1.018	1.018
2005	1.043	0.938	0.928	0.966	1.039	1.008	1.077	1.022	1.023	1.023	1.023
2006	1.000	1.043	0.937	0.925	0.962	1.050	1.011	1.106	1.028	1.029	1.029
2007	1.030	1.000	1.043	0.936	0.923	0.959	1.060	1.014	1.135	1.036	1.036
2008		1.030	1.000	1.044	0.933	0.920	0.956	1.074	1.018	1.203	1.063

Table 31. Retrospective comparison (one year) of fishing mortality (F on ages 9-14) estimated from ADAPT. Table entries provide the ratio of the estimated fishing mortality from the current assessment to those estimated in the previous assessment (model formulation unchanged). Shaded entries highlight changes in excess of +/- 10%.

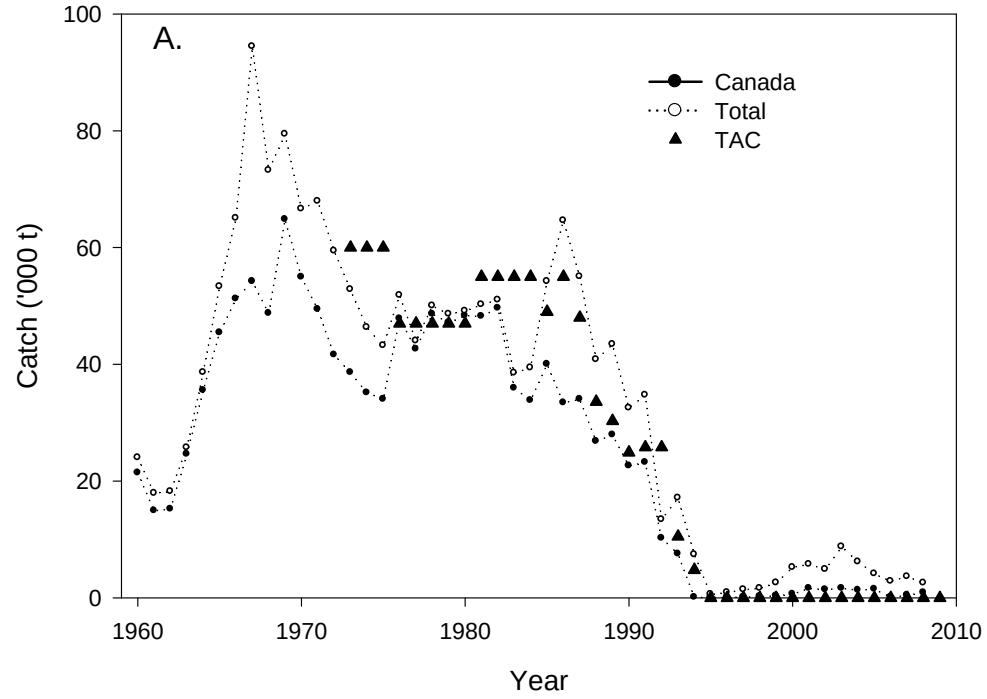
2009/2008 Retro Matrix	5	6	7	8	9	10	11	12	13	14	15
1960	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1961	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1962	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1963	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1964	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1965	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1966	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1967	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1968	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1969	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1970	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1971	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1972	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1973	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1974	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1975	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1976	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1977	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1978	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1979	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1980	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1981	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1982	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1983	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1984	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1985	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1986	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1987	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1988	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1989	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1990	0.999	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1991	0.999	0.999	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1992	0.999	0.999	0.999	0.999	1.000	1.000	1.000	0.999	1.000	1.000	1.000
1993	0.998	0.999	0.999	0.999	0.998	0.999	0.999	0.999	0.998	0.999	0.999
1994	0.997	0.998	0.998	0.999	0.997	0.997	0.997	0.997	0.998	0.997	0.997
1995	0.995	0.997	0.998	0.998	0.998	0.996	0.996	0.996	0.996	0.996	0.996
1996	0.995	0.995	0.997	0.997	0.998	0.998	0.996	0.996	0.996	0.996	0.996
1997	0.993	0.995	0.995	0.997	0.997	0.997	0.997	0.996	0.996	0.996	0.996
1998	0.993	0.993	0.995	0.995	0.997	0.997	0.997	0.997	0.995	0.995	0.995
1999	0.973	0.993	0.993	0.995	0.994	0.996	0.996	0.996	0.996	0.995	0.995
2000	0.996	0.973	0.993	0.993	0.994	0.993	0.994	0.994	0.994	0.993	0.993
2001	0.975	0.996	0.972	0.992	0.991	0.993	0.991	0.992	0.991	0.991	0.991
2002	1.029	0.974	0.996	0.968	0.990	0.989	0.991	0.988	0.988	0.988	0.988
2003	1.073	1.030	0.972	0.995	0.957	0.987	0.986	0.986	0.984	0.984	0.984
2004	1.066	1.076	1.033	0.966	0.993	0.939	0.982	0.981	0.981	0.980	0.980
2005	0.959	1.066	1.079	1.037	0.958	0.990	0.917	0.976	0.975	0.975	0.975
2006	1.000	0.959	1.068	1.082	1.041	0.948	0.988	0.893	0.969	0.969	0.969
2007	0.971	1.000	0.958	1.070	1.085	1.044	0.938	0.984	0.858	0.954	0.954

Table 32. Estimated spawning stock biomass, biomass and catch using 3 year deterministic projections under four fishing mortality scenarios.

	SSB ('000 t)			
Year	F=0	F_{2008} = 0.16	$F_{0.1}$ = 0.2	F_{lim} = 0.4
2009	41	41	41	41
2010	55	52	51	47
2011	74	65	63	55
2012	91	76	73	61

	Biomass ('000 t)			
Year	F=0	F_{2008} = 0.16	$F_{0.1}$ = 0.2	F_{lim} = 0.4
2009	81	81	81	81
2010	100	96	95	91
2011	119	110	108	99
2012	139	123	120	108

	Catch (t)			
Year	F=0	F_{2008} = 0.16	$F_{0.1}$ = 0.2	F_{lim} = 0.4
2009	0	4242	5219	9671
2010	0	5640	6756	11058
2011	0	6657	7795	11611
2012	0	7857	9050	12746



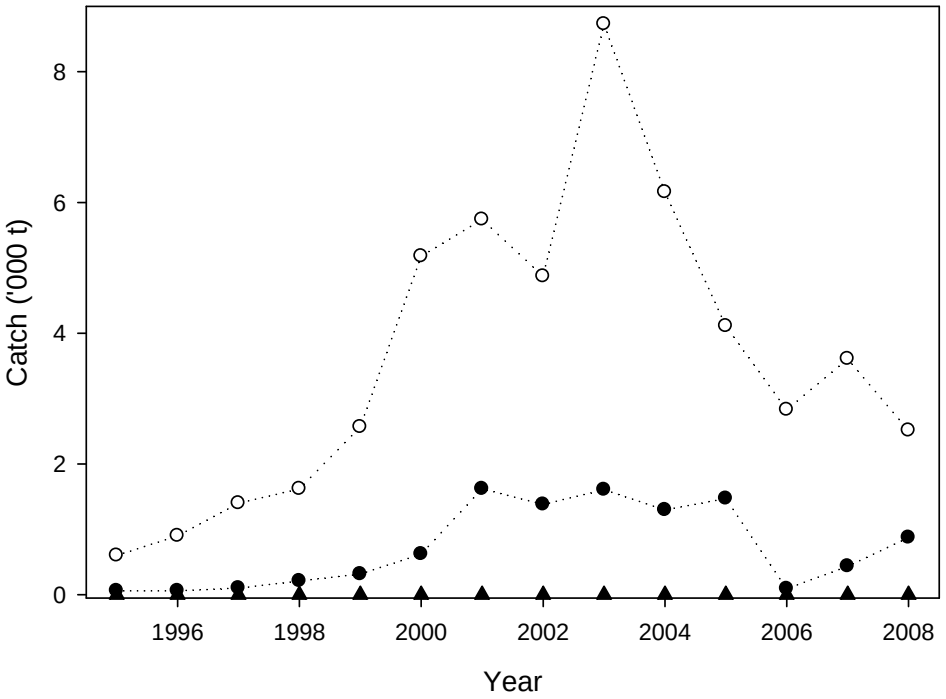


Figure 1. American plaice catches (‘000 tons) from 1960 – 2008 (A) and since the moratorium (1995-2008) (B).

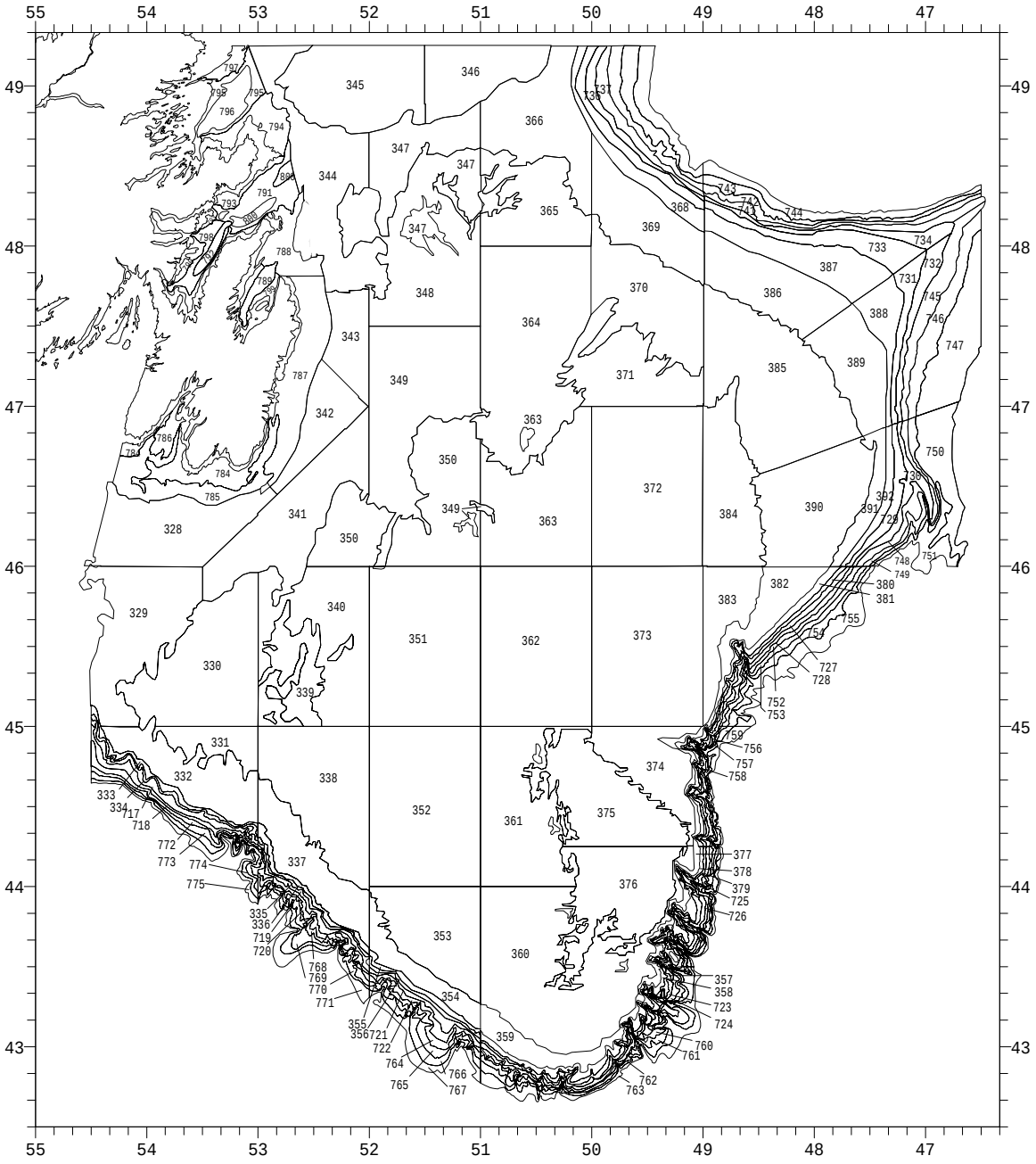


Figure 2. Stratification scheme used in Canadian research vessel surveys of Div. 3LNO.

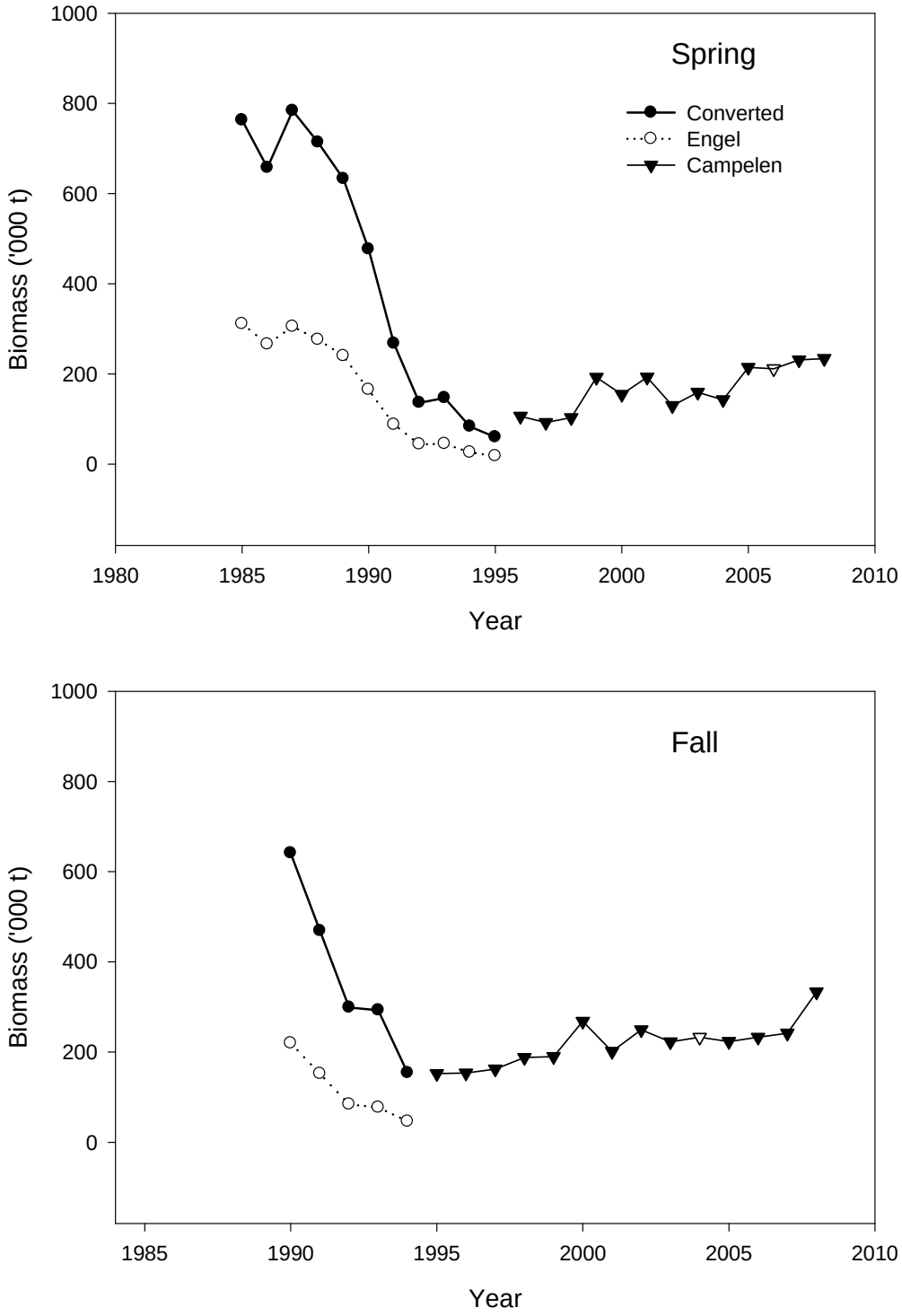


Figure 3. Biomass ('000 tons) of American plaice from spring and fall Canadian surveys in Div. 3LNO combined. Note that open symbol represents years when survey coverage was poor.

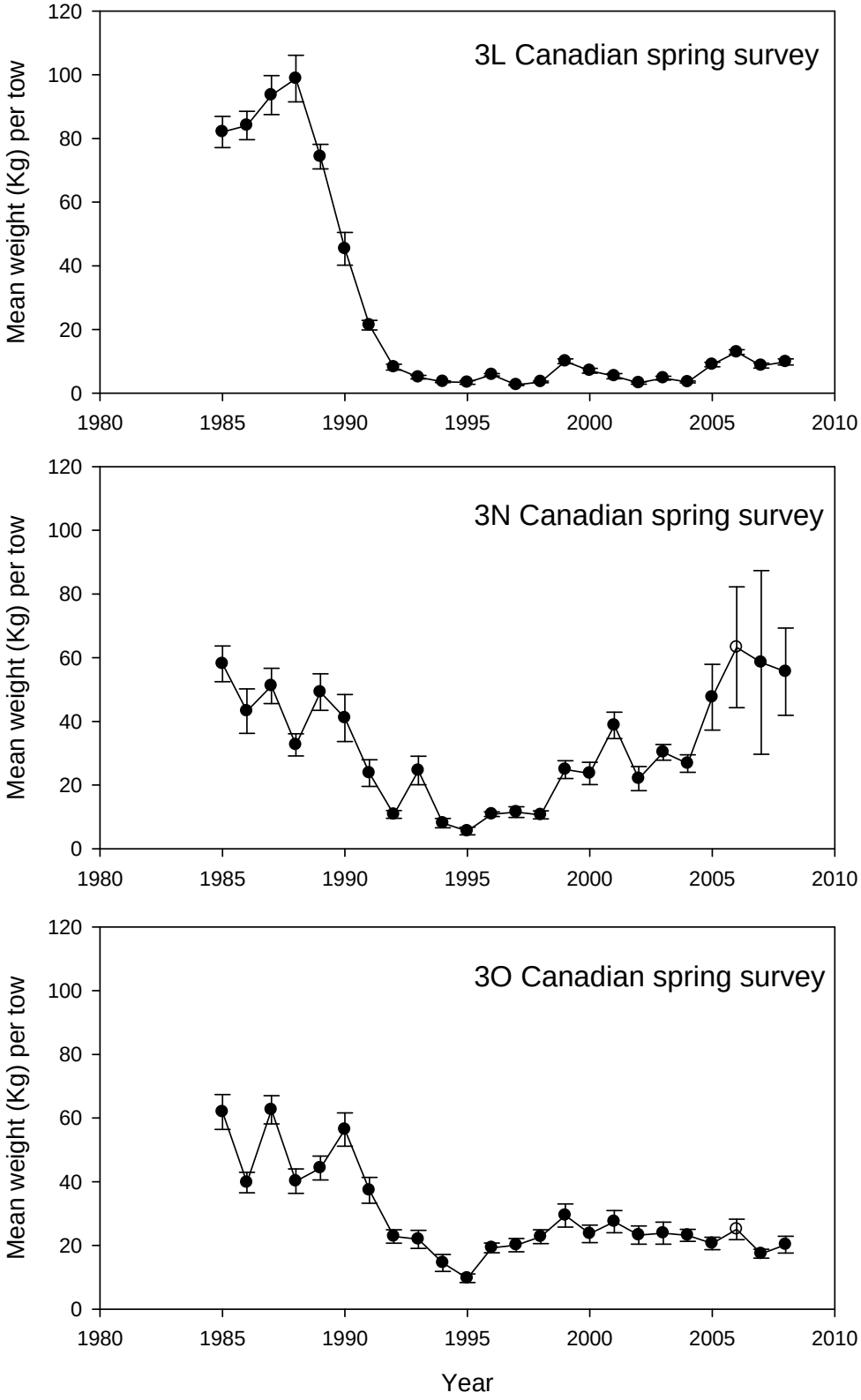
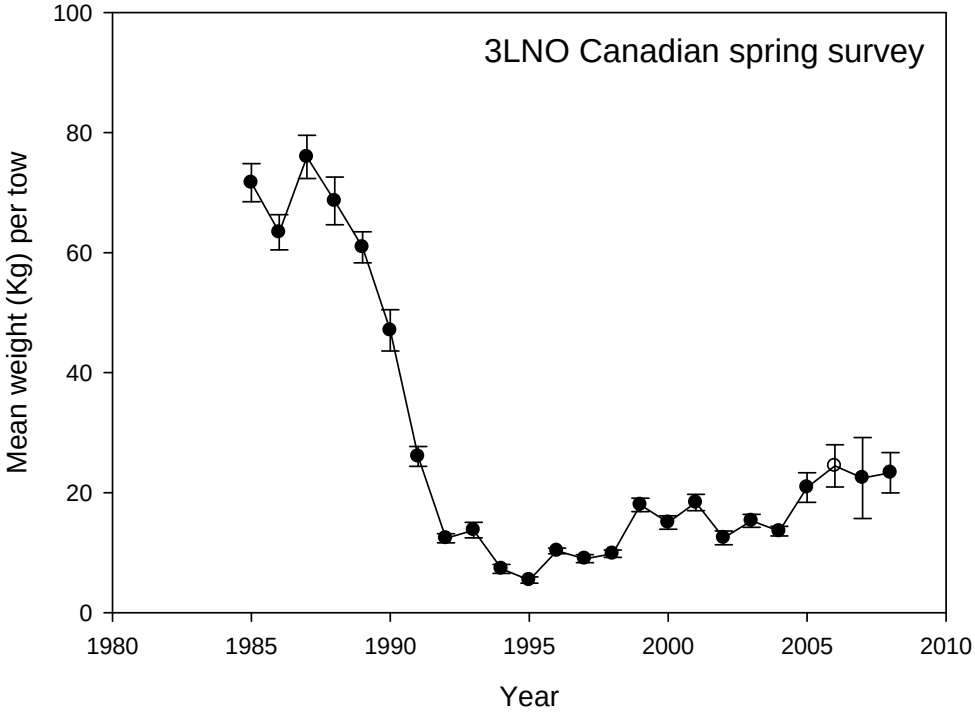


Figure 4. Mean (± 1 Std. dev.) weight per tow (Kg) of American plaice from Canadian spring surveys inDiv. 3L, 3N and 3O. Note that open symbol represents years when survey coverage was poor.



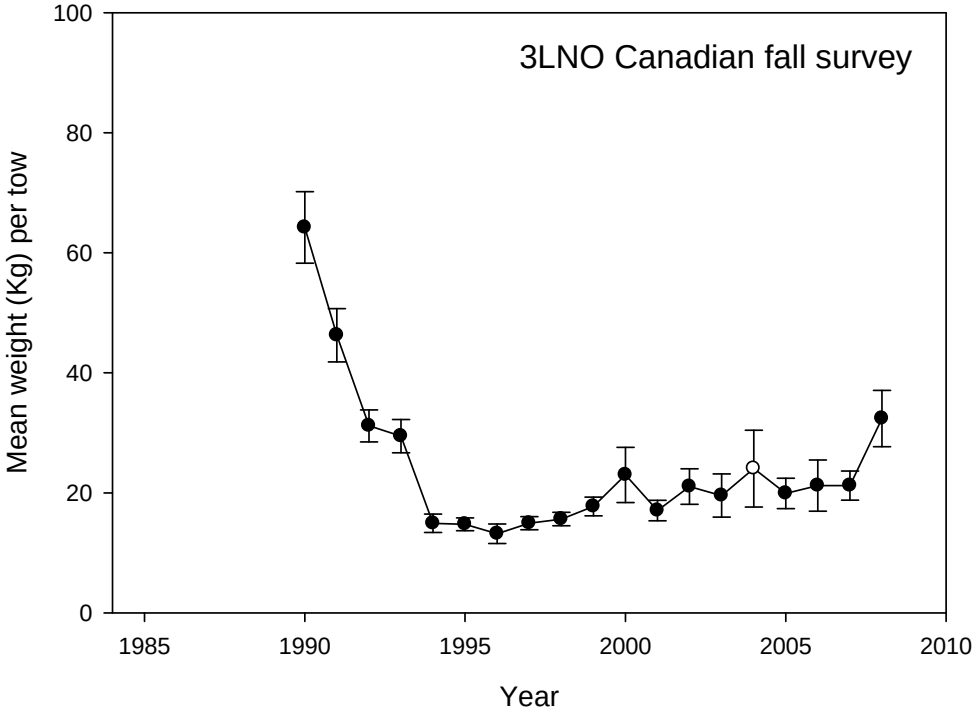
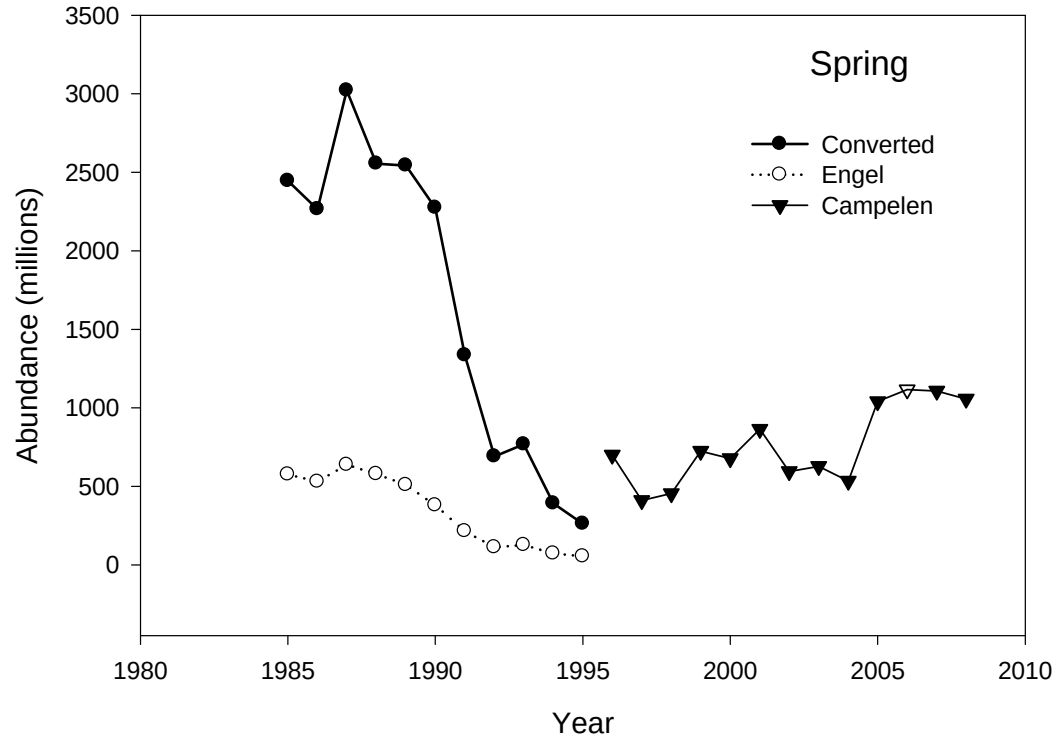


Figure 5. Mean weight per tow (± 1 Std. dev.) of American plaice from Canadian spring and fall surveys of Div. 3LNO combined. Note that open symbol represents years when survey coverage was poor.



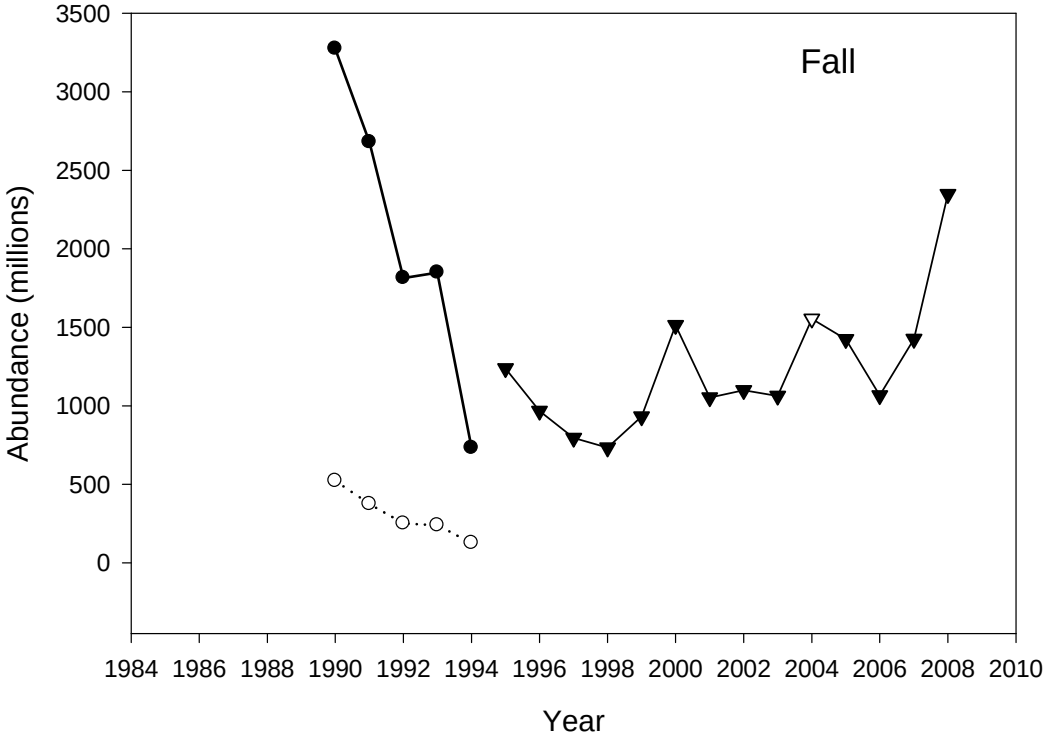
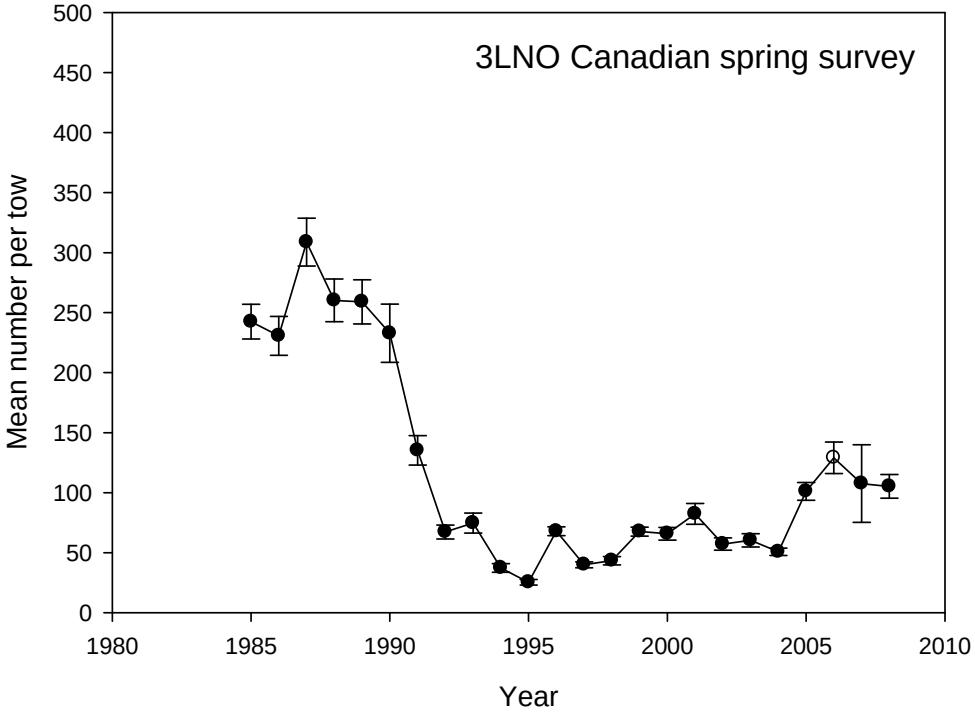


Figure 6. Abundance (millions) of American plaice from spring and fall Canadian surveys in Div. 3LNO combined. Note that open symbol represents years when survey coverage was poor.



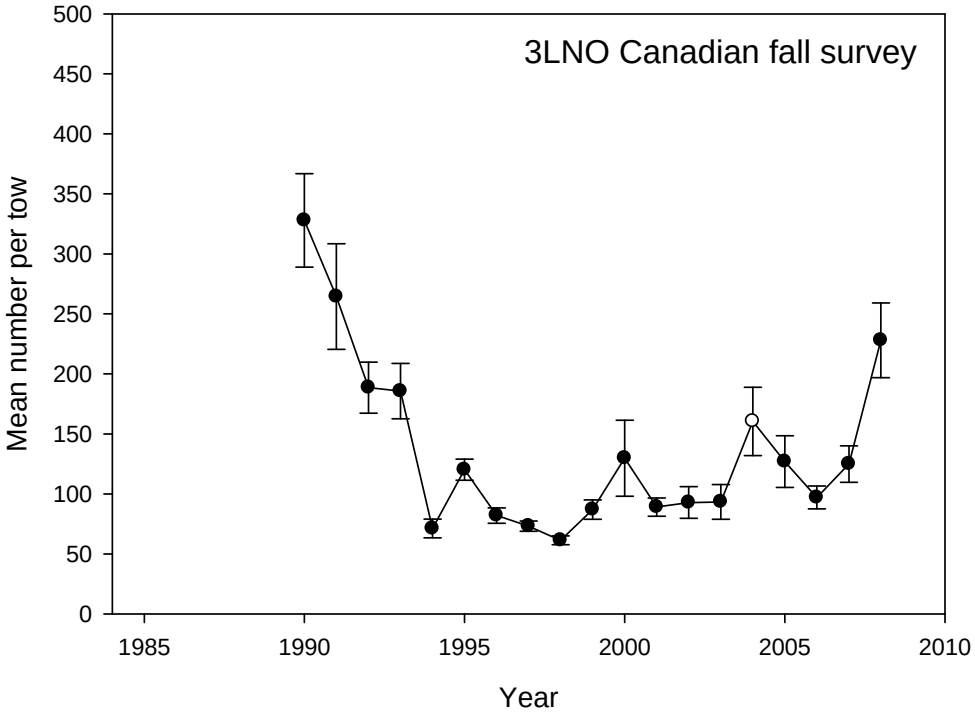


Figure 7. Mean (± 1 Std. Dev.) number per tow of American plaice from Canadian spring and fall surveys of Div. 3LNO combined. Note that open symbol represents years when survey coverage was poor.

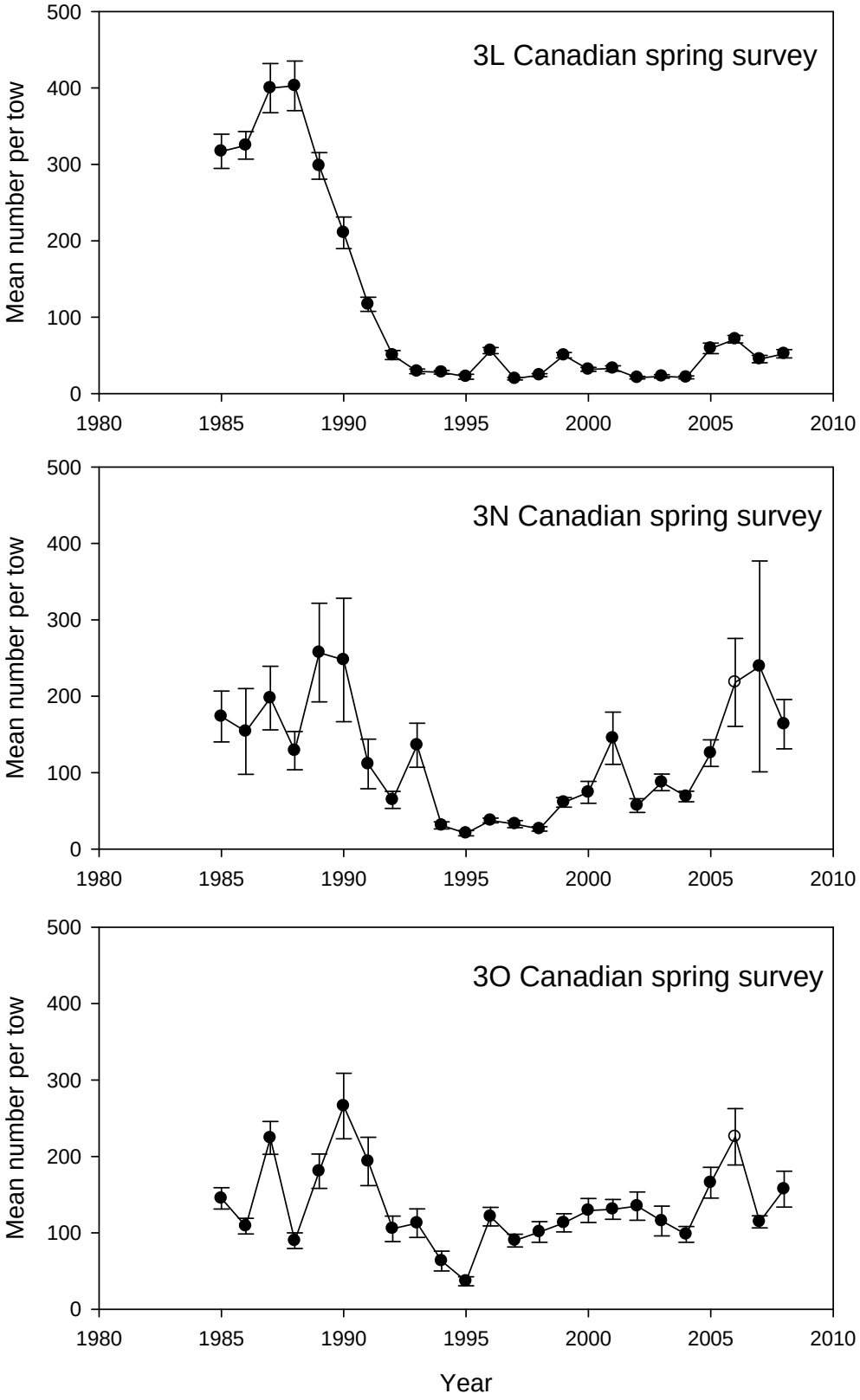


Figure 8. Mean (± 1 Std. Dev.) number per tow of American plaice from Canadian spring surveys of Div. 3L, 3N and 3O. Note that open symbol represents years when survey coverage was poor.

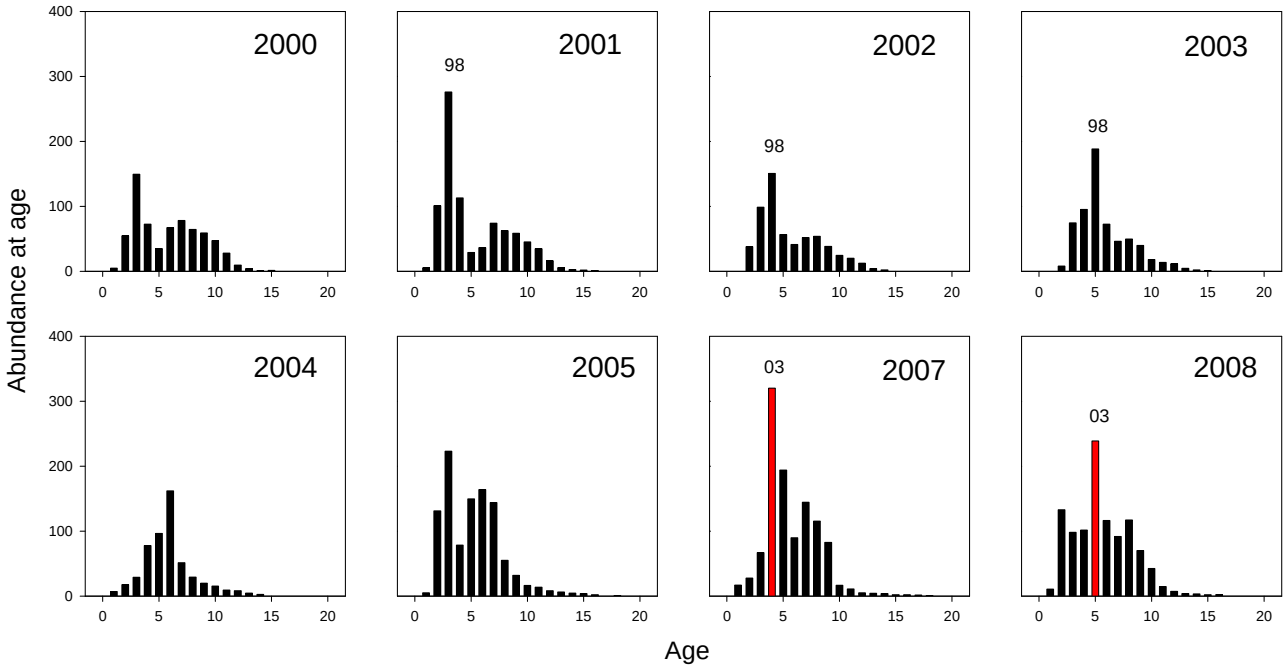


Figure 9. Abundance at age (millions of fish) from 2000 – 2008 in the Canadian spring surveys. Note the survey from 2006 is not present. The 1998 and 2003 year classes are labelled.

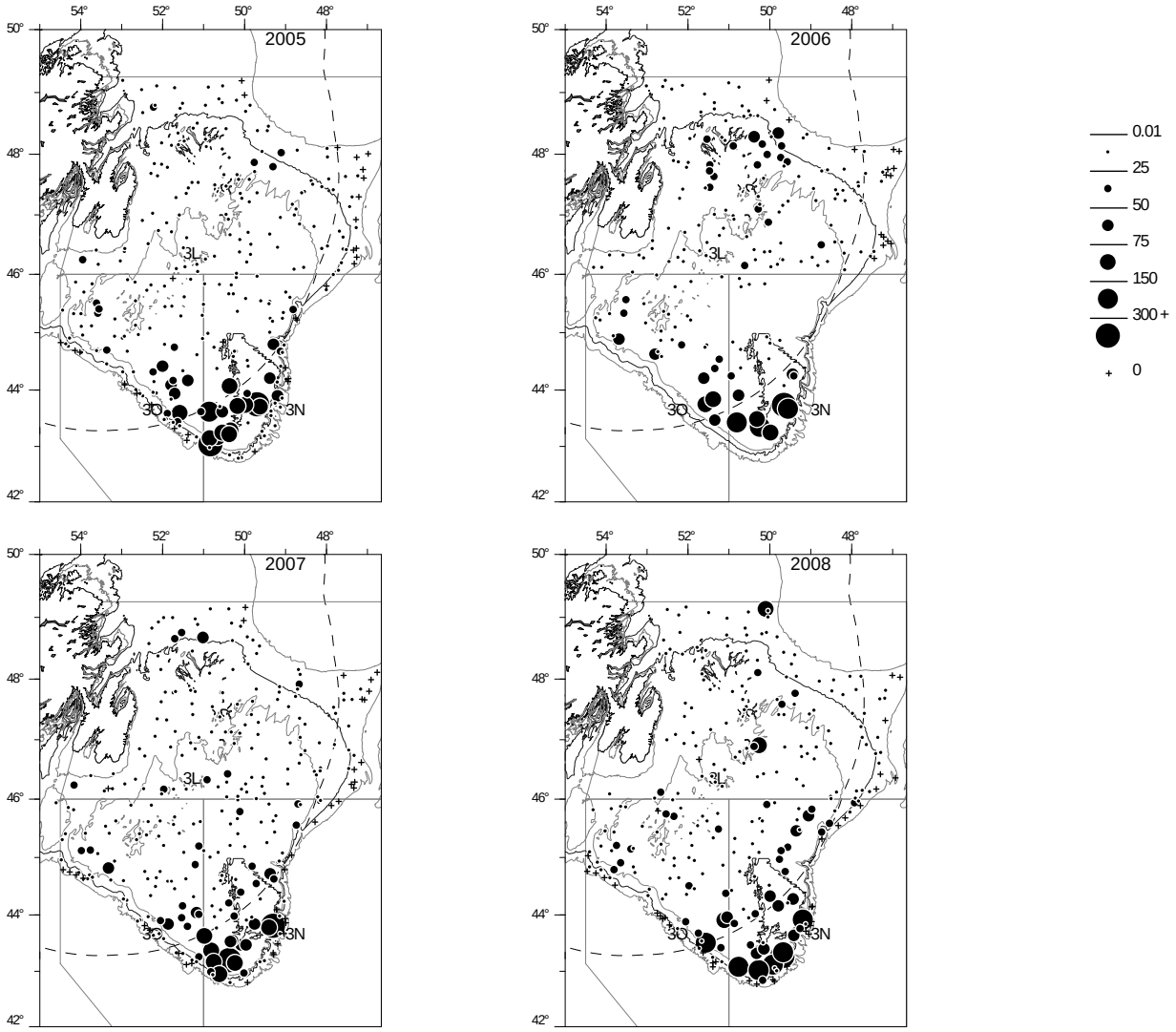


Figure 10. Distribution of American plaice (kg per tow) from Canadian spring surveys in NAFO Divisions 3LNO from 2005-2008. Note survey coverage in 2006 in Div. 3NO.

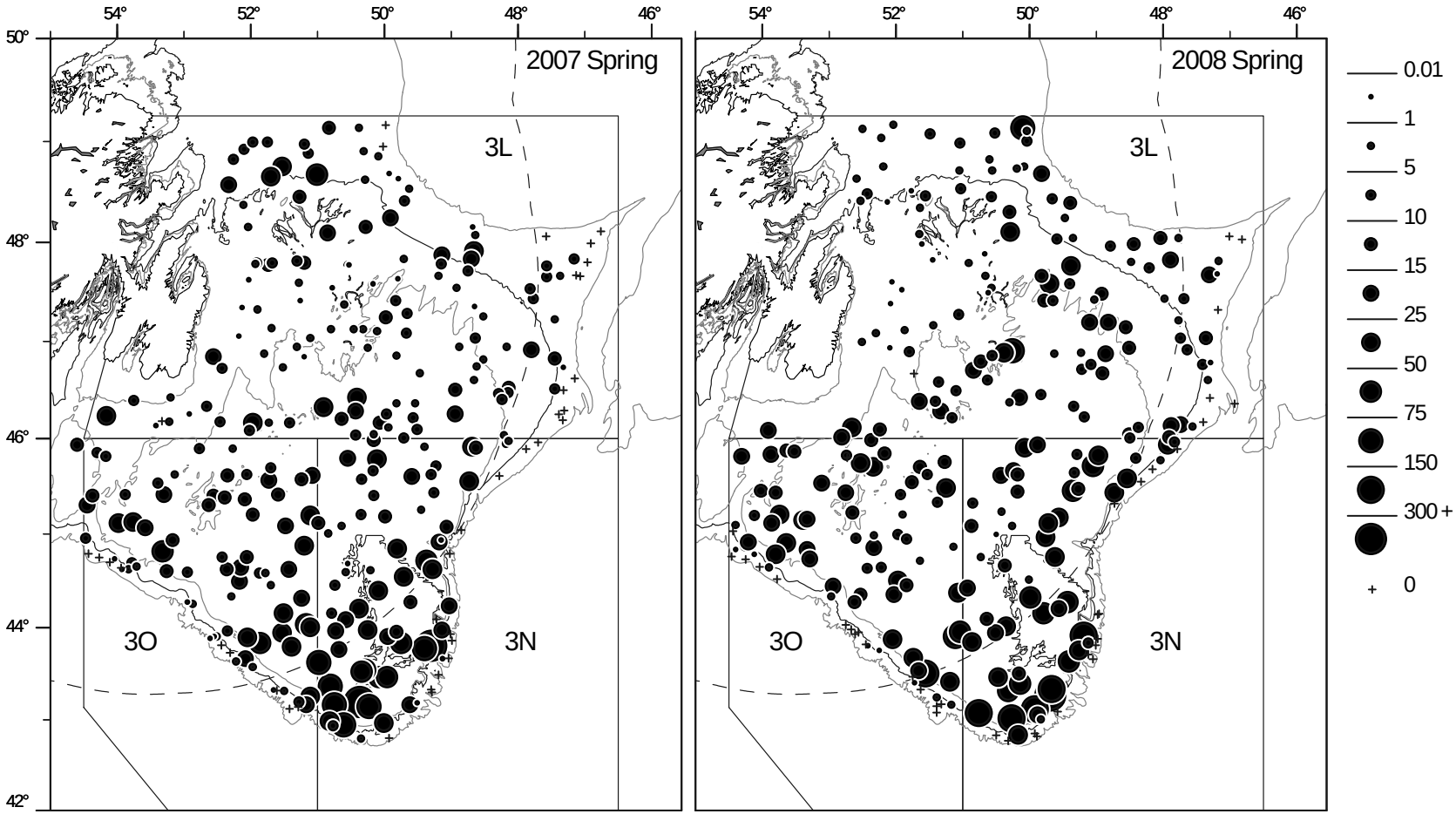


Figure 11. Distribution of American plaice (kg per tow) from Canadian spring surveys in NAFO Divisions 3LNO in 2005 and 2006. Note survey coverage in Div. 3NO.

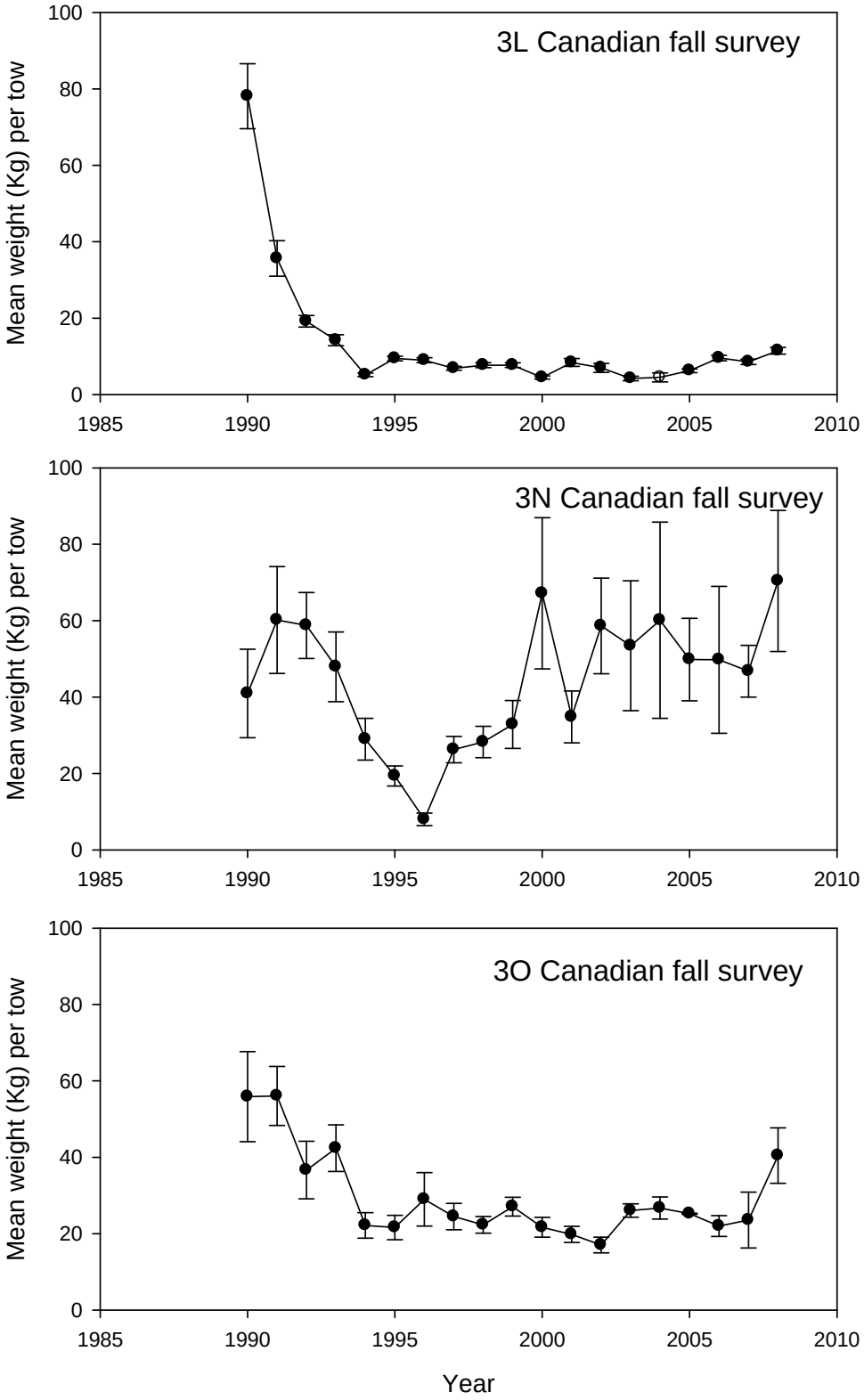


Figure 12. Mean (± 1 Std. Dev.) weight (Kg) per tow of American plaice from Canadian fall surveys in Div. 3L, 3N and 3O. Note that open symbol represents years when survey coverage was poor.

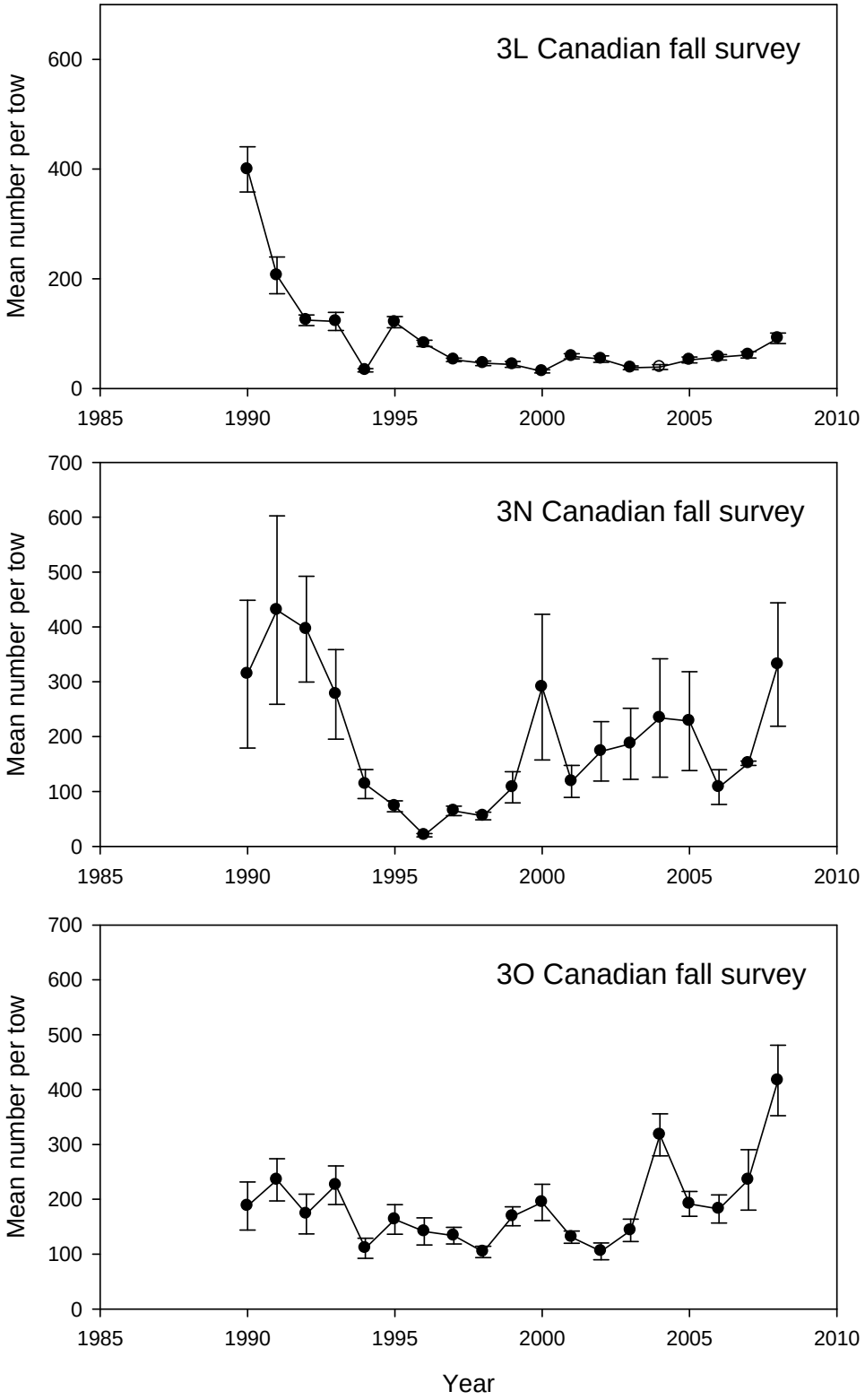


Figure 13. Mean (± 1 Std. Dev.) number per tow of American plaice from Canadian fall surveys of Div. 3L, 3N and 3O. Note that open symbol represents years when survey coverage was poor and are not included in 2009 assessment.

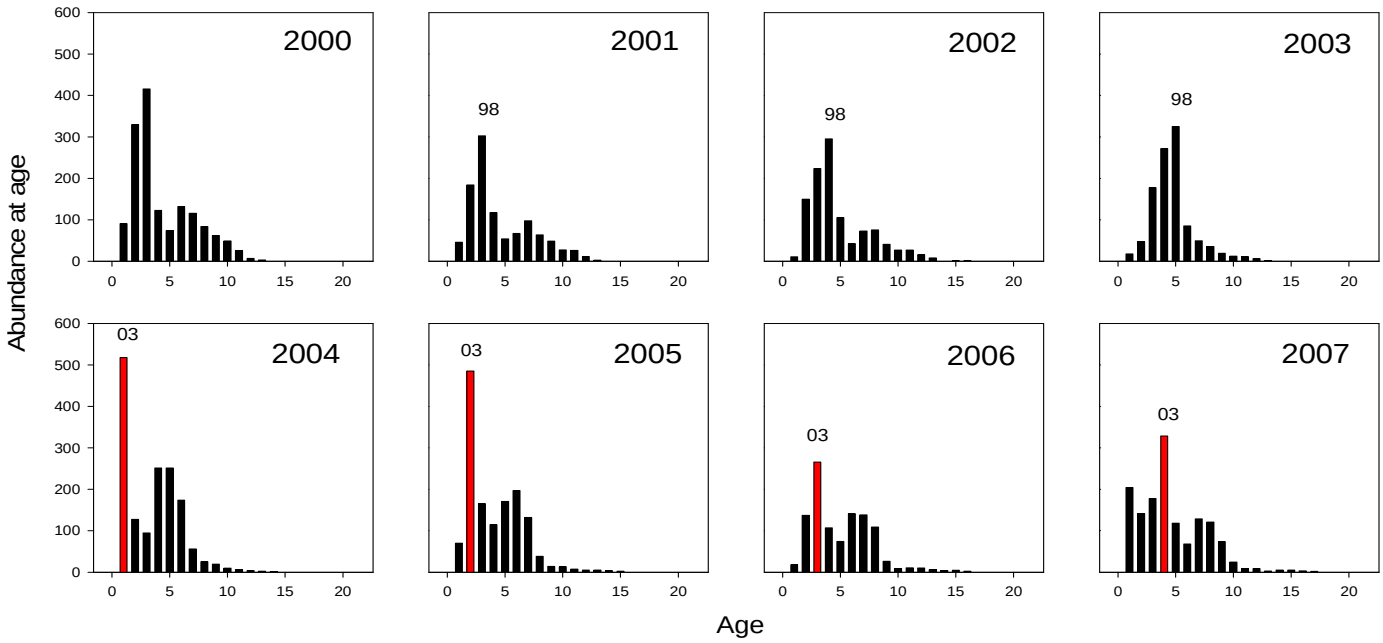


Figure 14. Abundance at age (millions of fish) from 2000 – 2007 in the Canadian fall surveys. The 1998 and 2003 year classes are labelled.

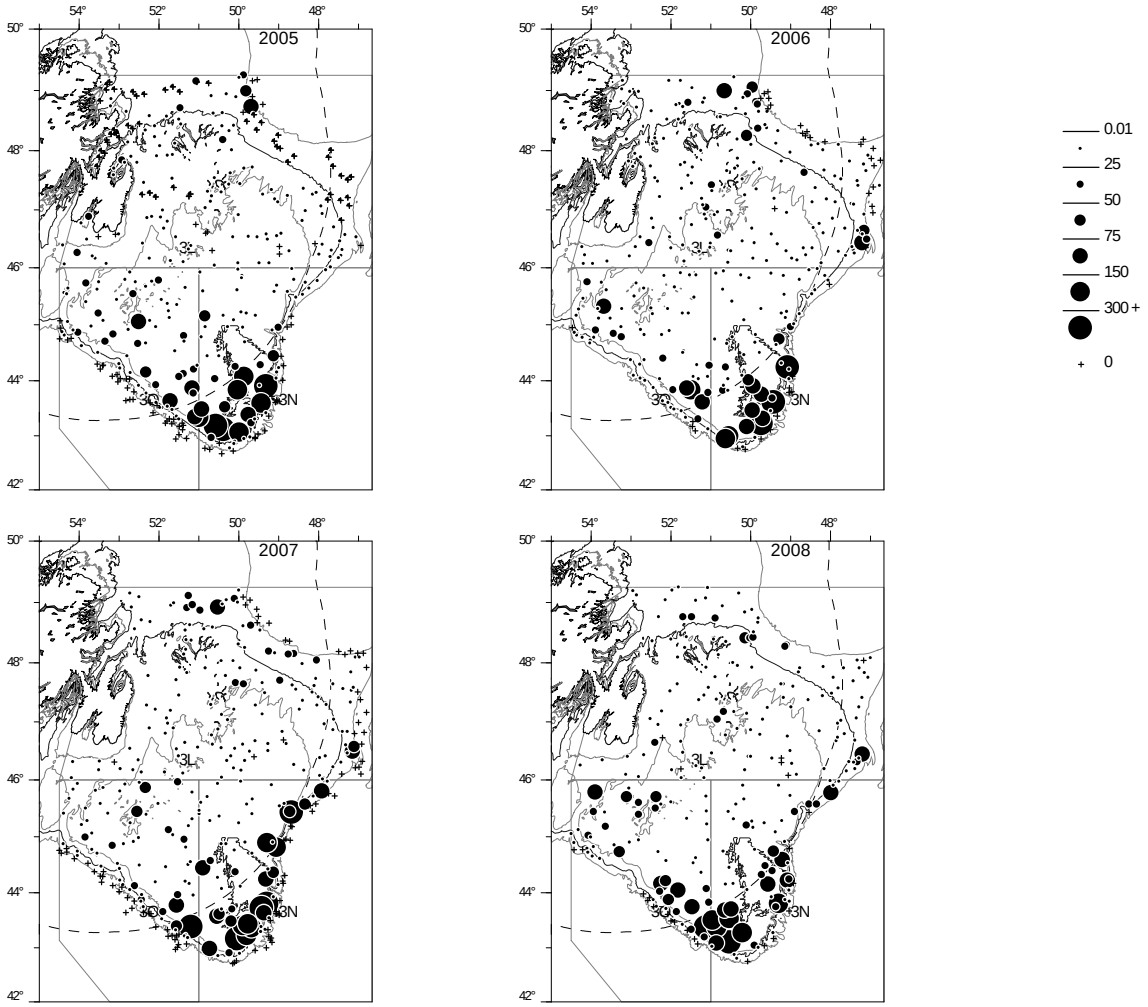


Figure 15. Distribution of American plaice (kg per tow) from Canadian spring surveys in NAFO Divisions 3LNO from 2005-2008.

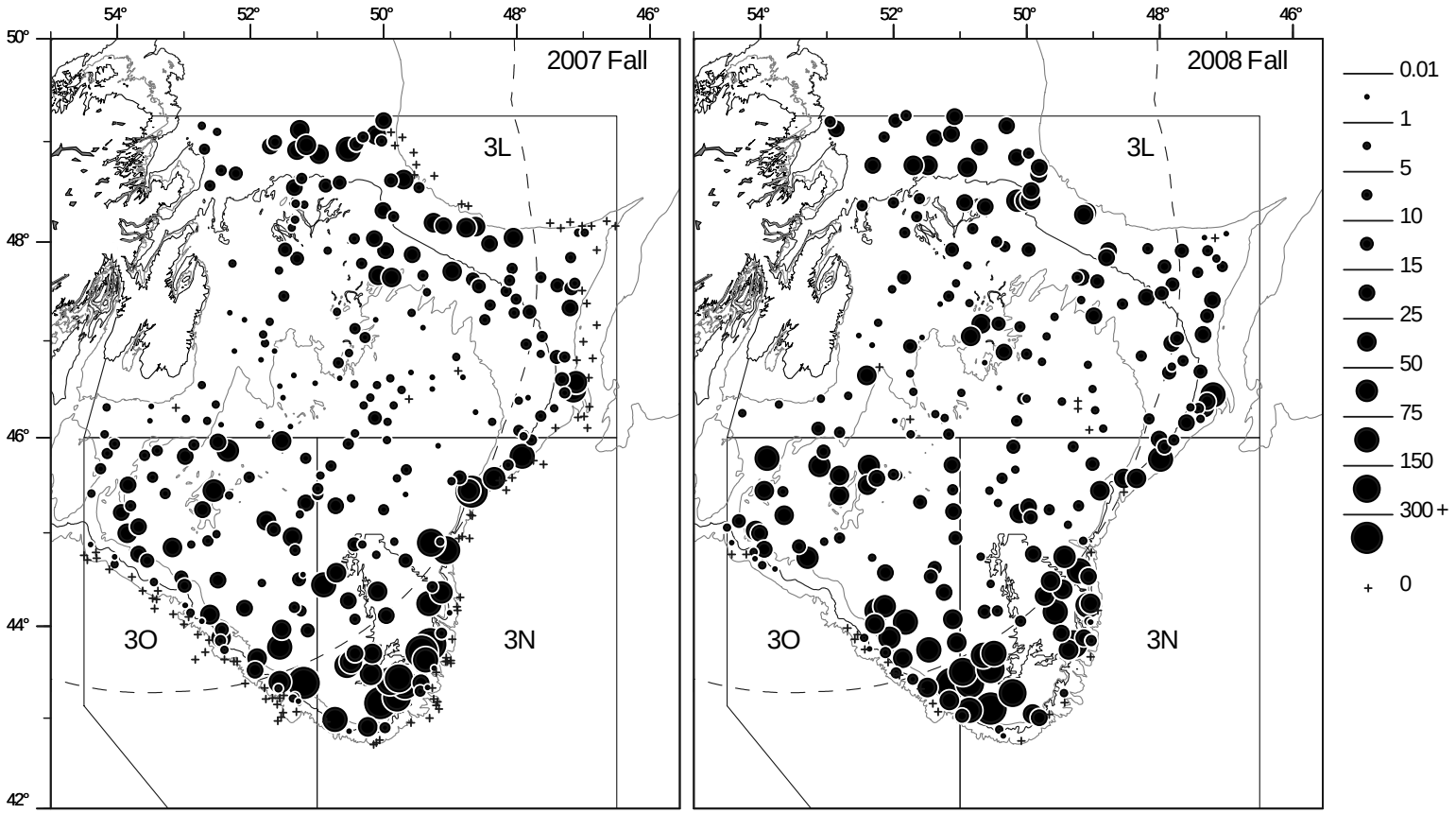


Figure 16. Distribution of American plaice (kg per tow) from Canadian fall surveys in NAFO Divisions 3LNO for 2007 and 2008.

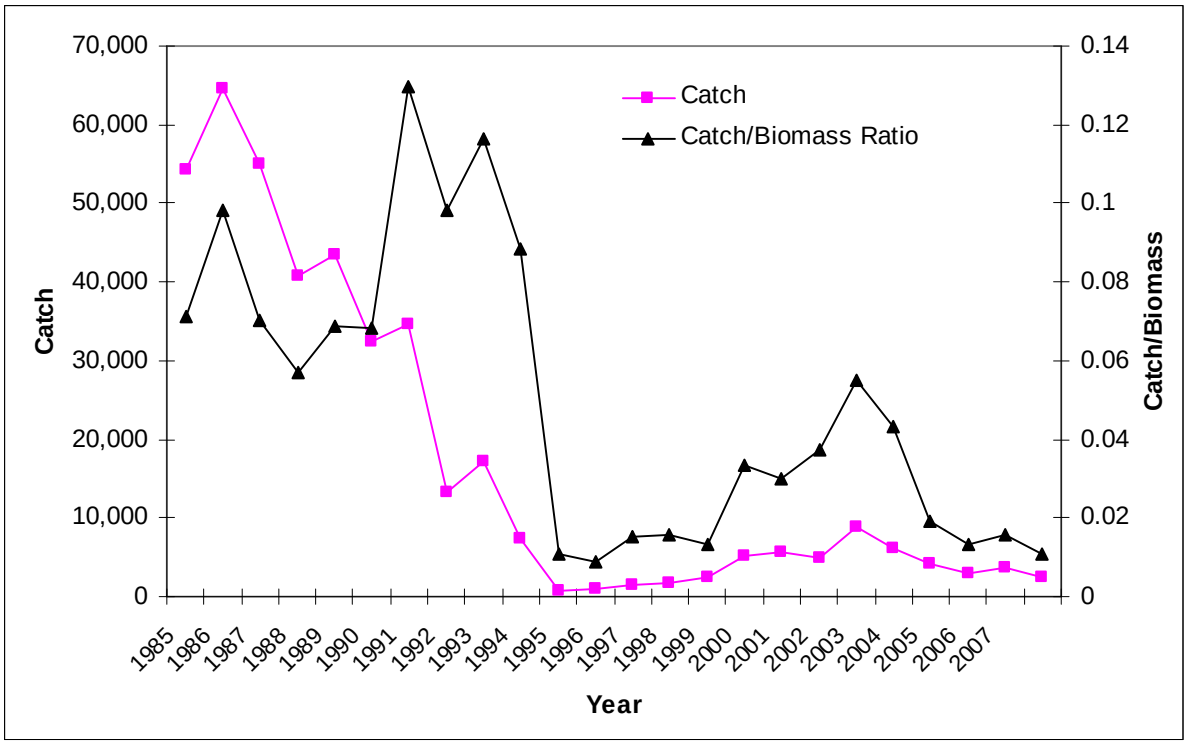


Figure 17. Total catch from 1985 to 2008 and the catch/biomass ratio for the same period.

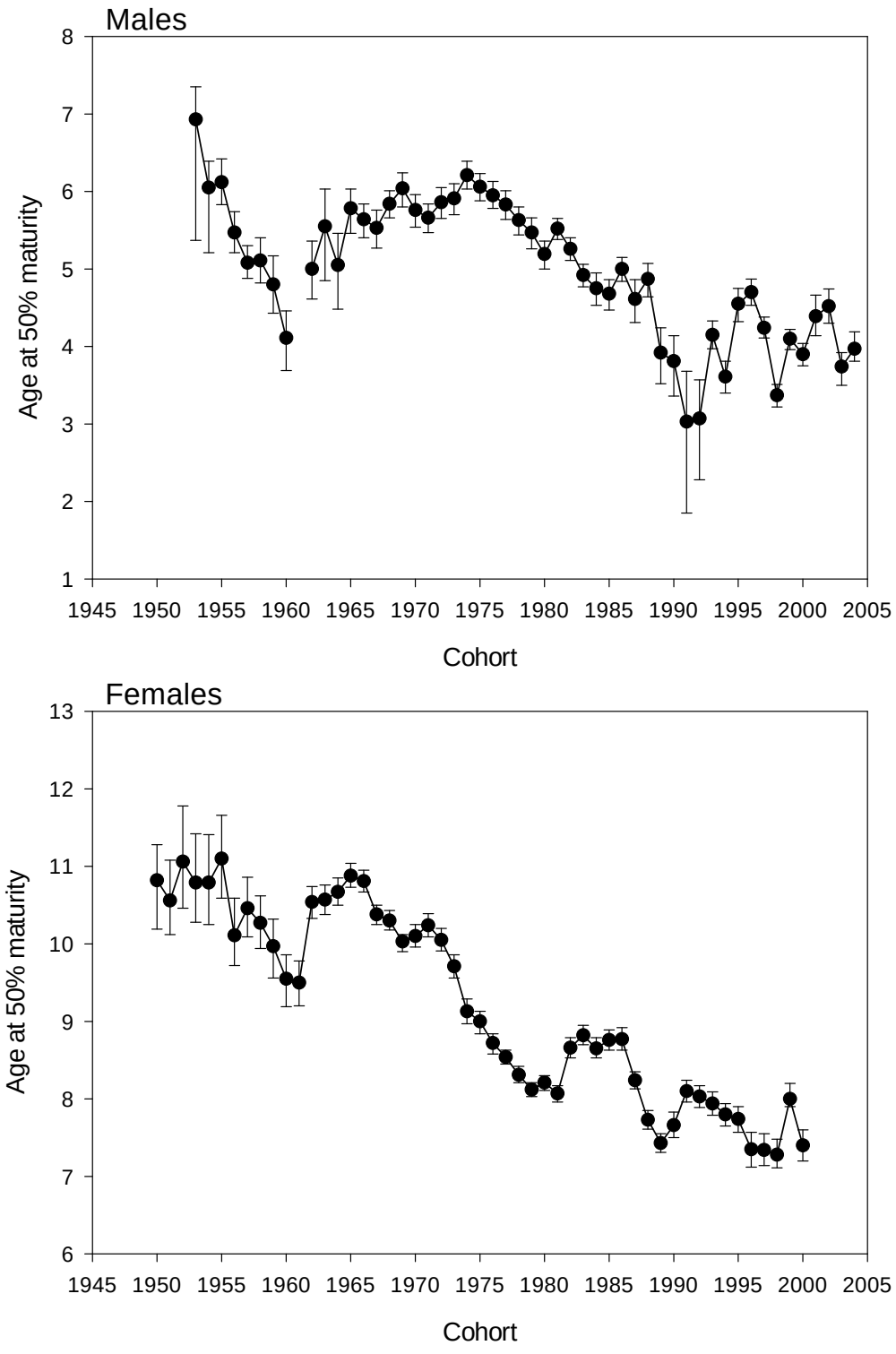


Figure 18. Age at 50% maturity (± 95% fiducial limits) by cohort for male and female American plaice in NAFO Div. 3LNO.

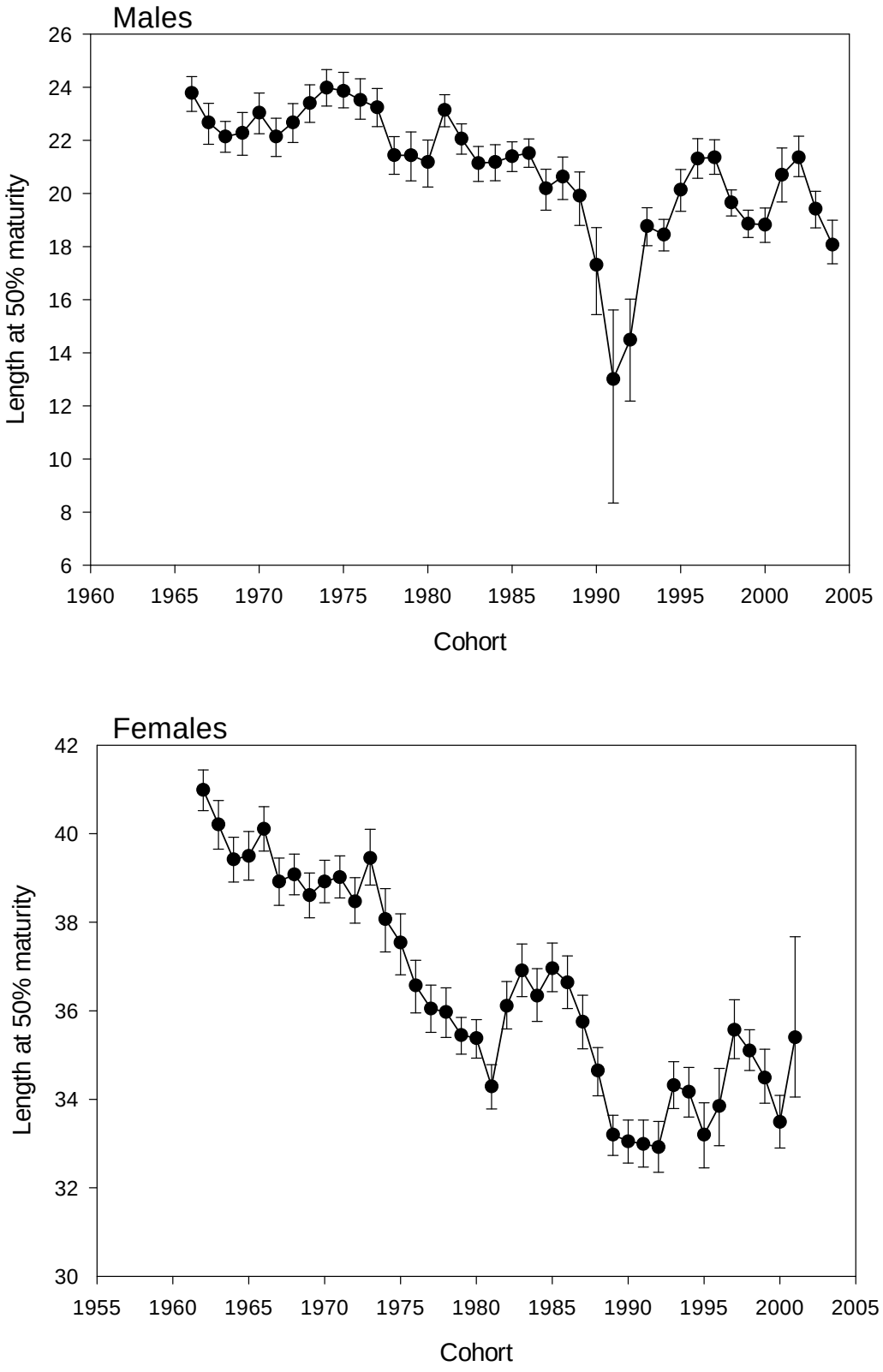


Figure 19. Length at 50% maturity (± 95% fiducial limits) by cohort for male and female American plaice in NAFO Div. 3LNO.

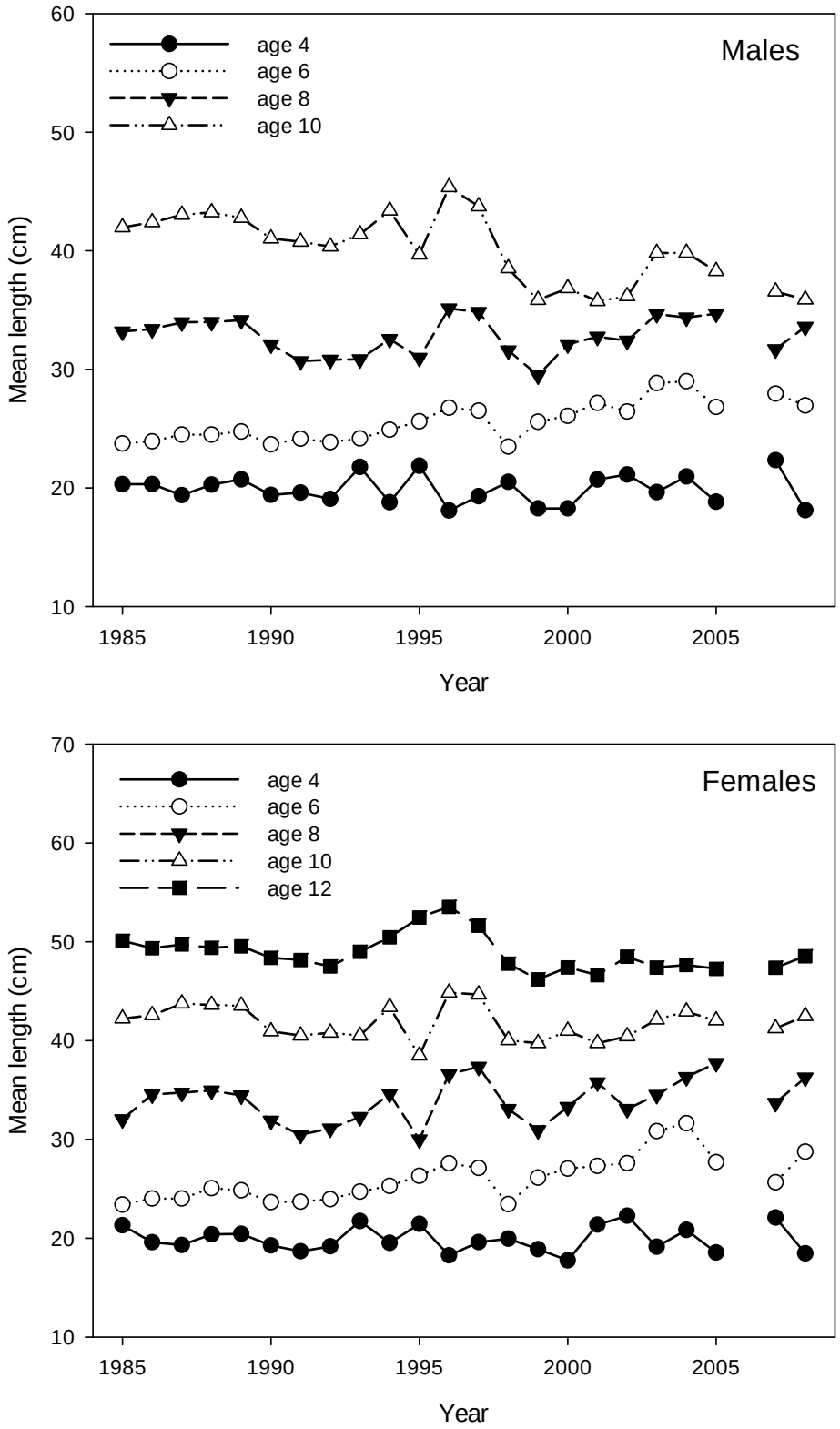


Figure 20. Mean length-at-age for selected ages of Div. 3LNO American plaice from Canadian spring RV surveys.

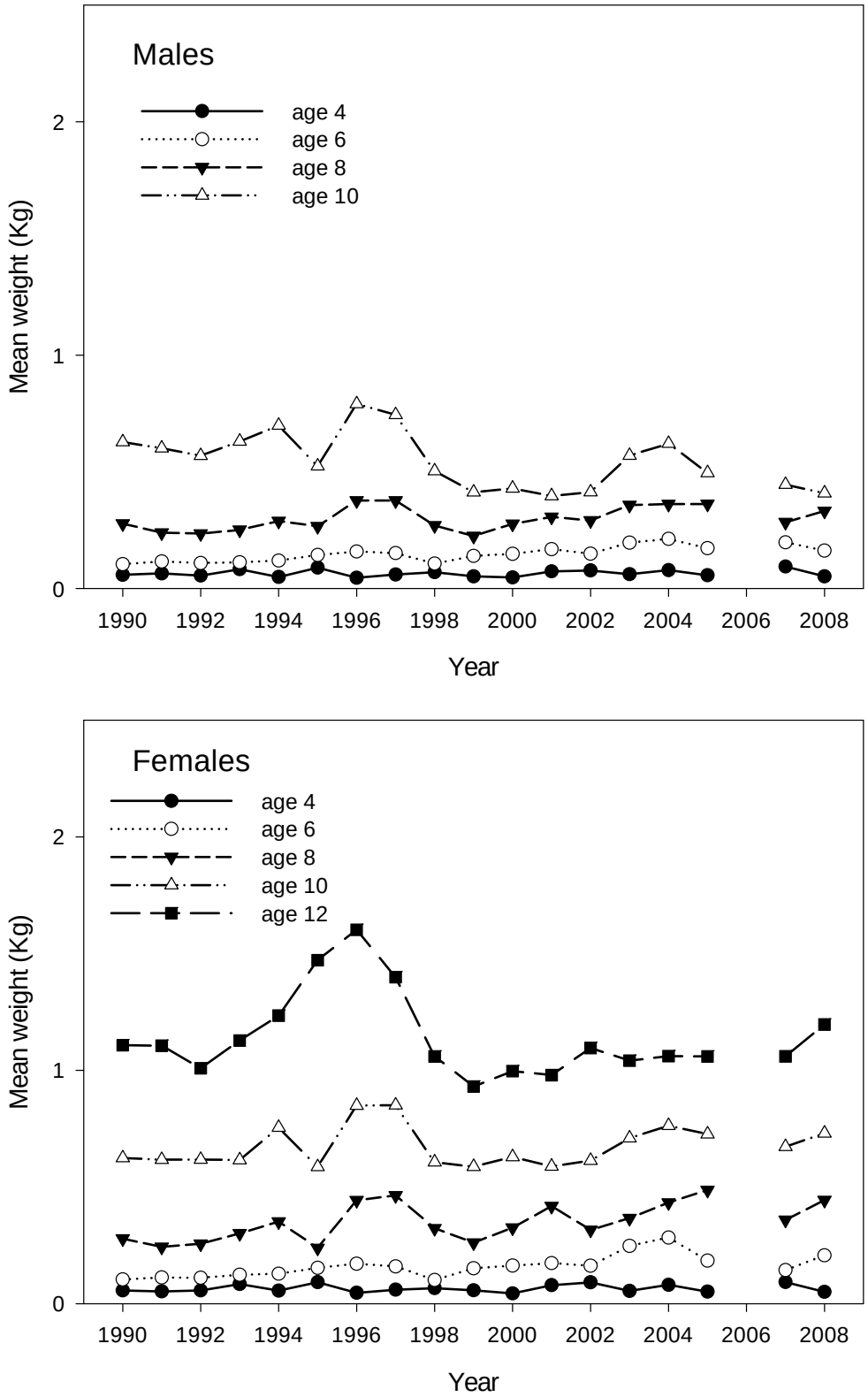


Figure 21. Mean weight-at-age for selected ages of Div. 3LNO American plaice from Canadian spring RV surveys.

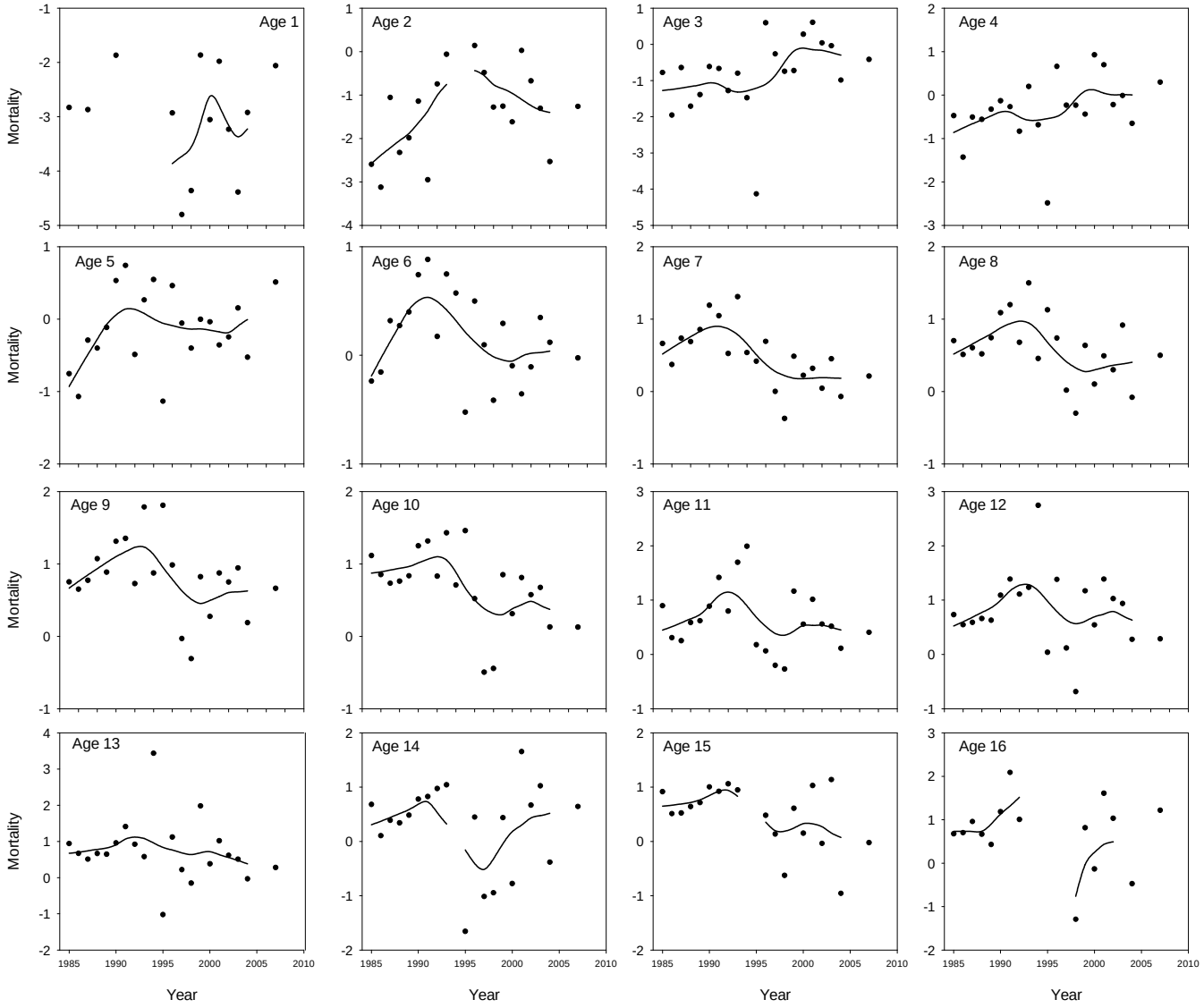


Figure 22. Estimates of mortality for ages 1 to 16 from Canadian spring surveys from 1985 to 2008.

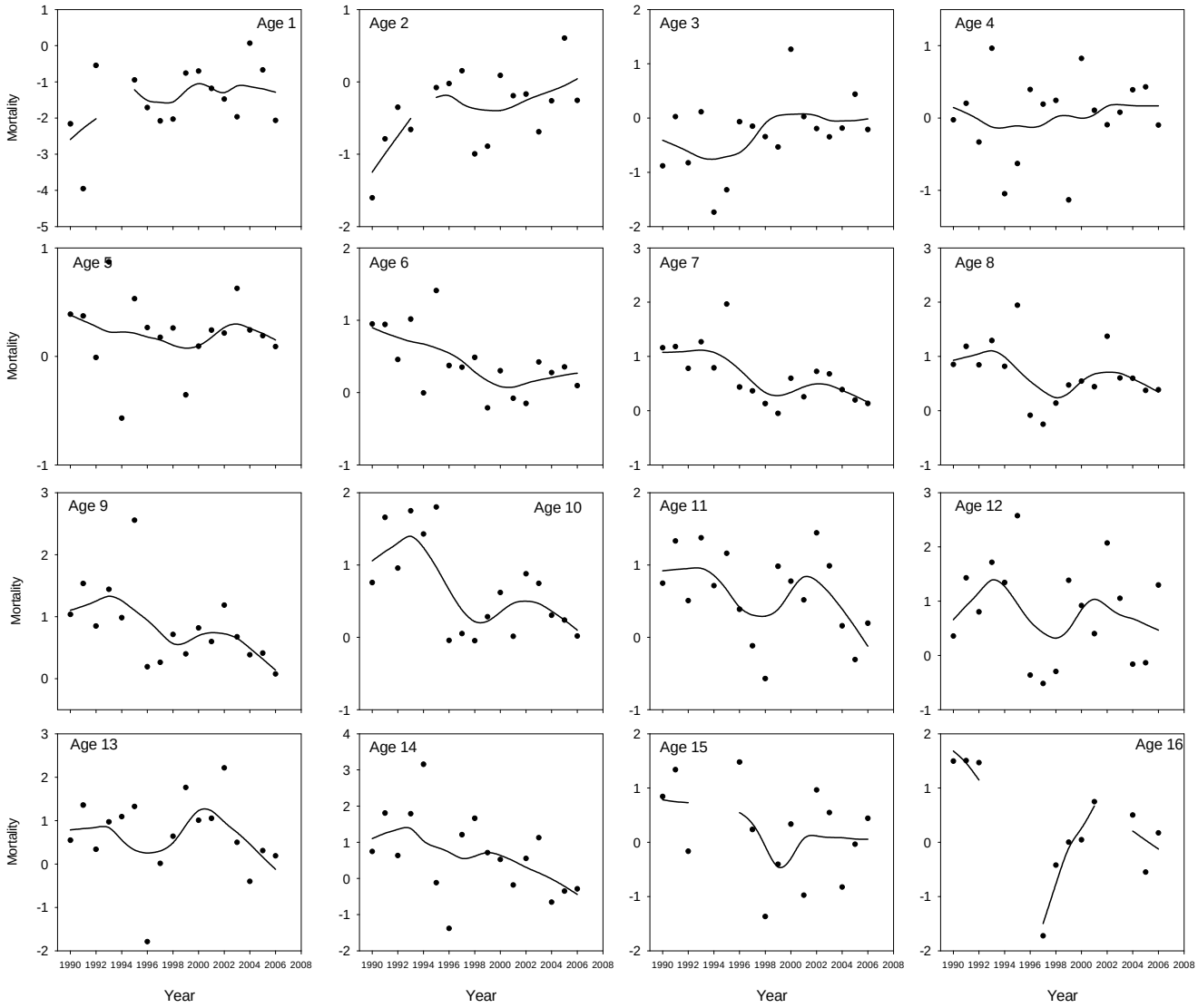


Figure 23. Estimates of mortality for ages 1 to 16 from Canadian fall surveys from 1990 to 2007.

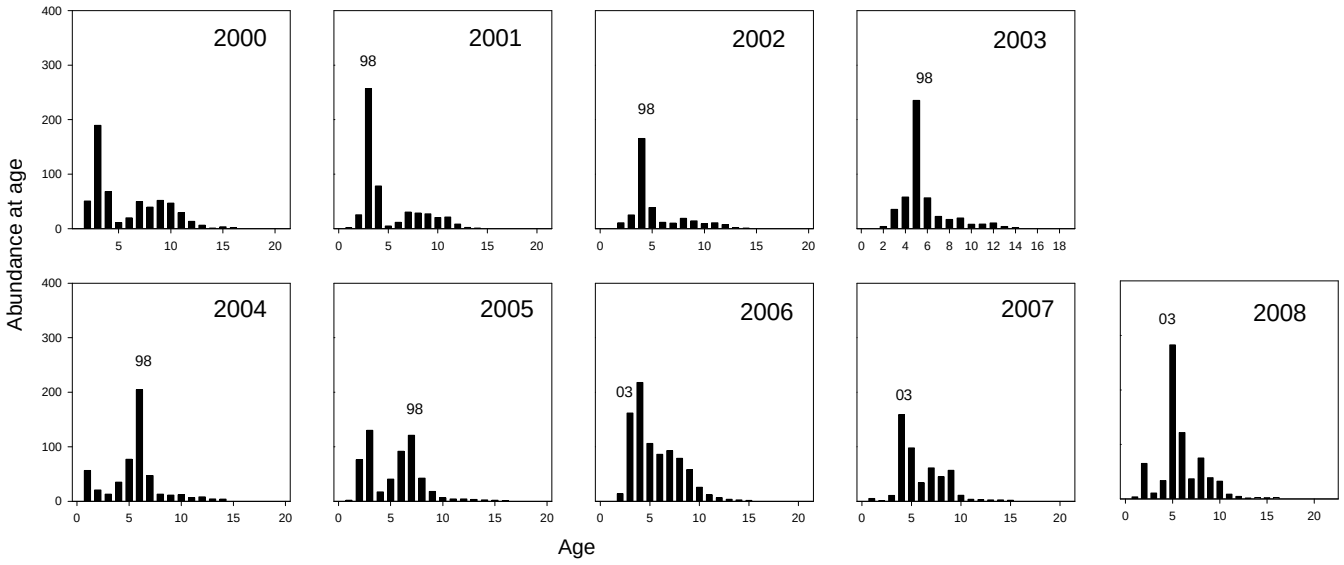


Figure 24. Abundance at age (millions of fish) from 2000 – 2008 in the Spanish Div. 3NO spring surveys. The 1998 and 2003 year classes are labelled.

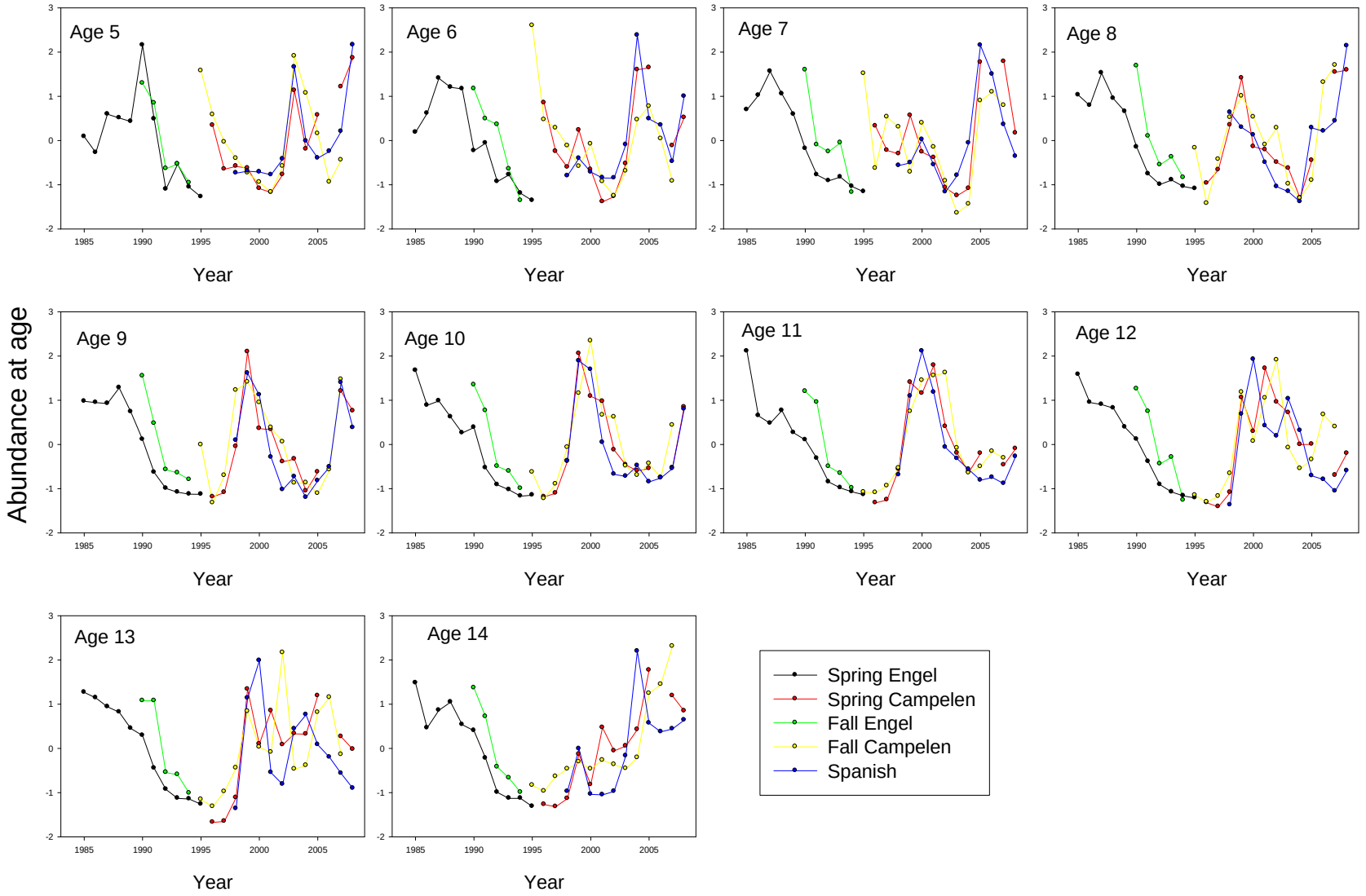


Figure 25. Standardized age by age abundance between surveys (FLR).

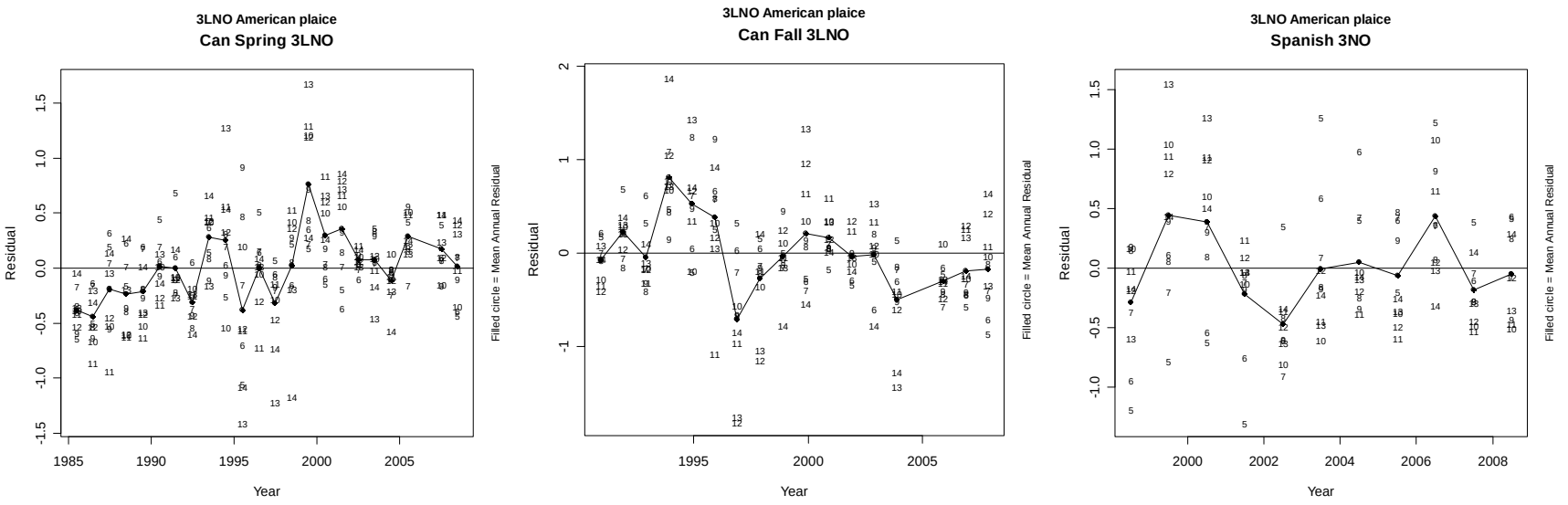


Figure 26. Residuals by year and month (numbers represent ages) for Canadian fall survey (top left), spring survey (top right) and Spanish Div. 3NO survey (bottom). Filled circle is the mean annual residual. Note the scales are different for each plot.

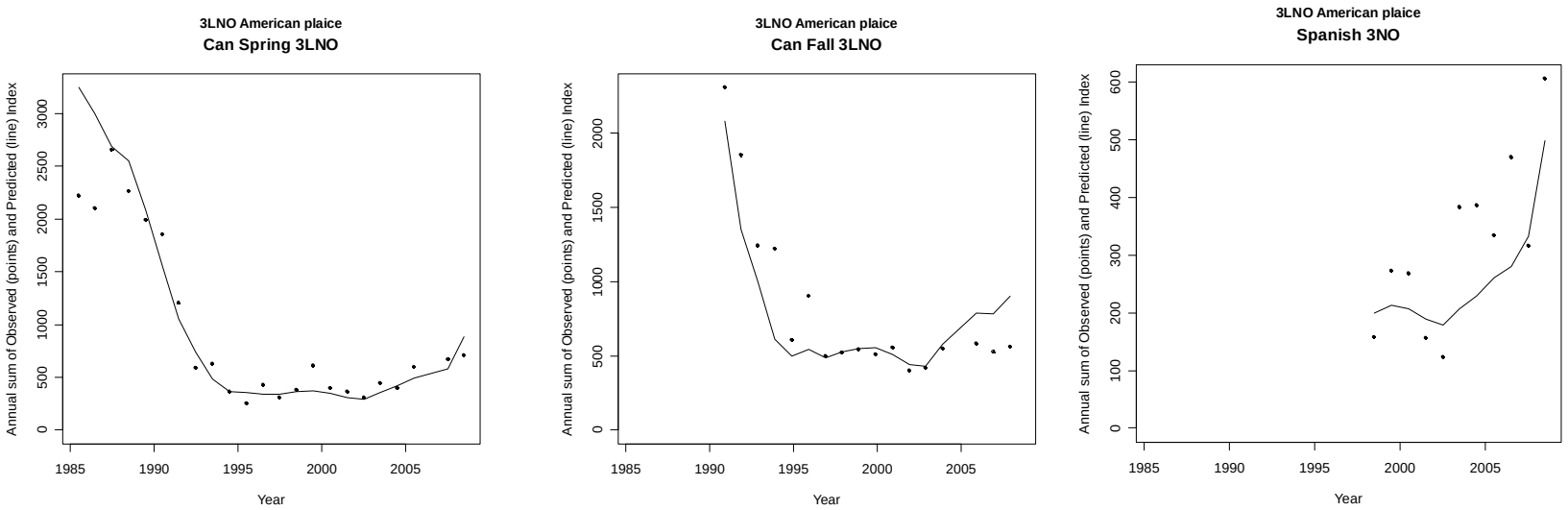


Figure 27. Observed versus predicted abundance for fall and spring indices over time.

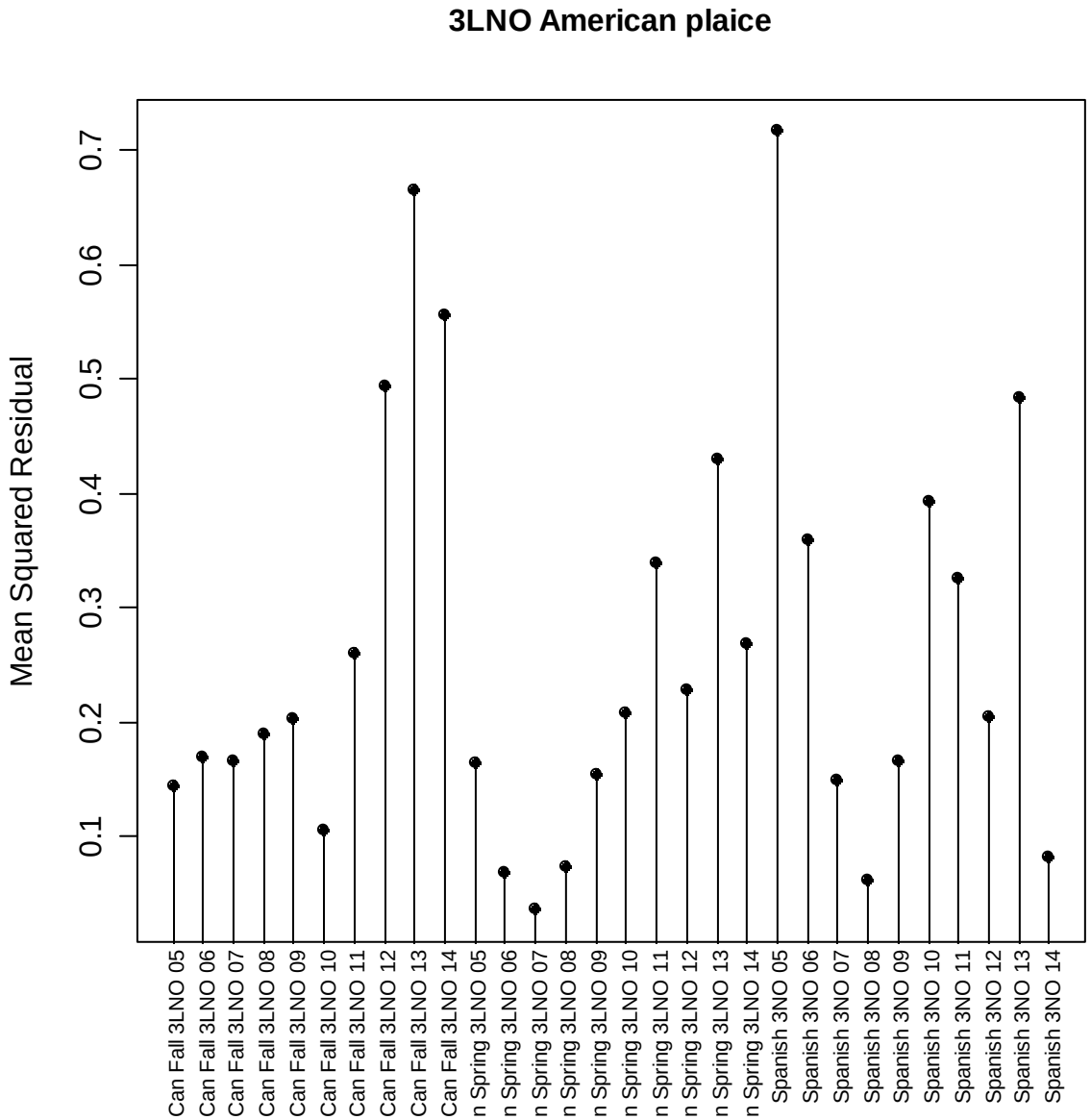


Figure 28. Mean squared residuals by age for fall, spring and Spanish Div. 3NO surveys.

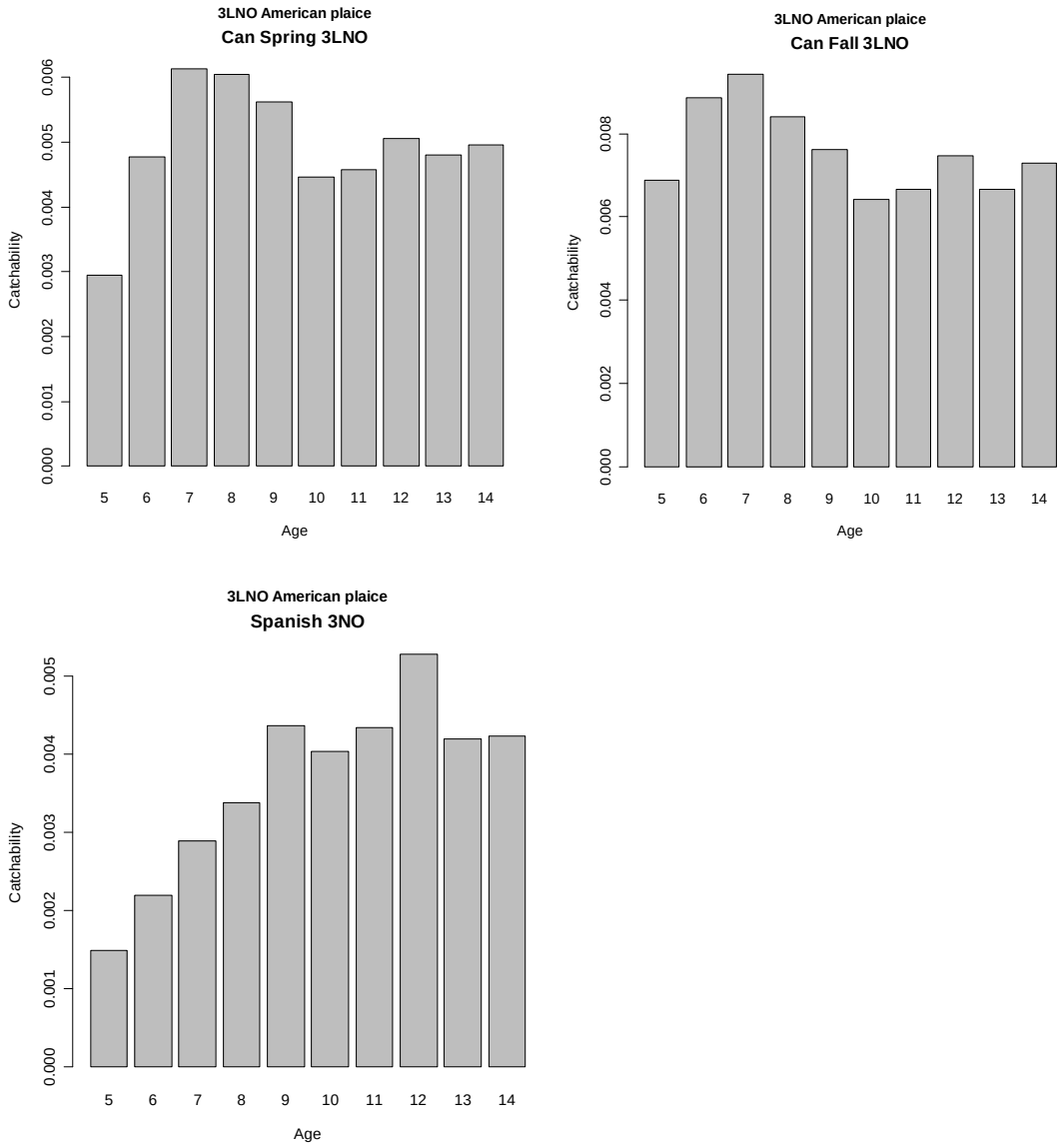
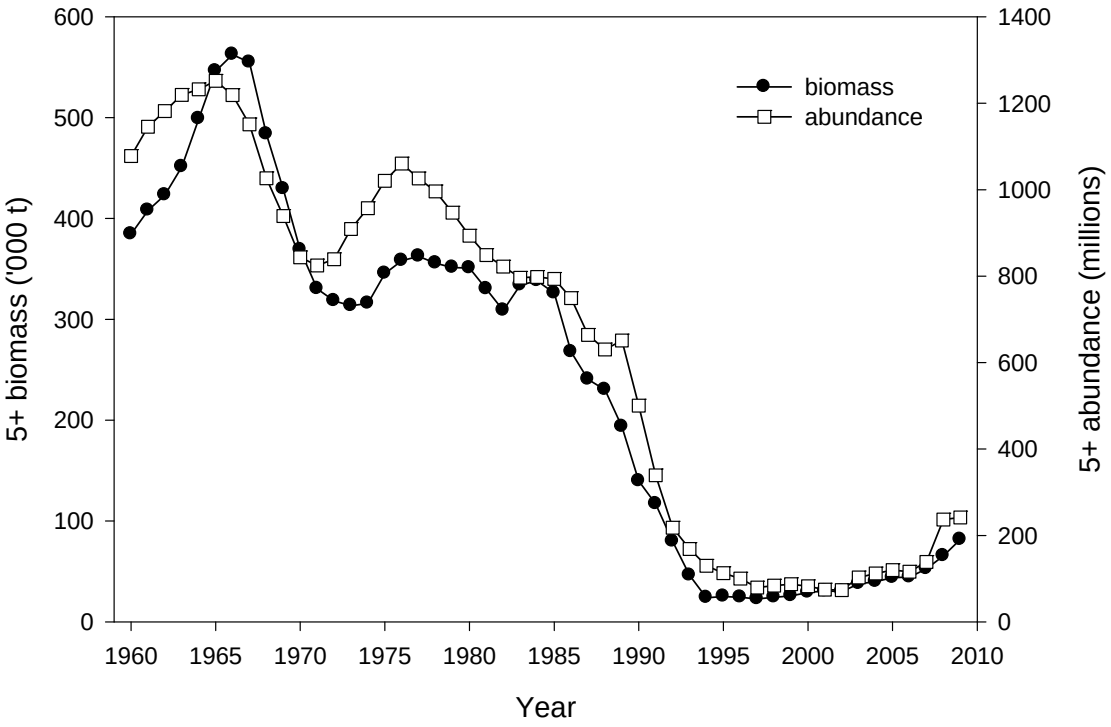


Figure 29. Bottom panel shows the survey catchabilities (q) for each survey by age. Please note Spanish Div. 3NO survey in mean numbers per tow at age, other surveys abundance at age.



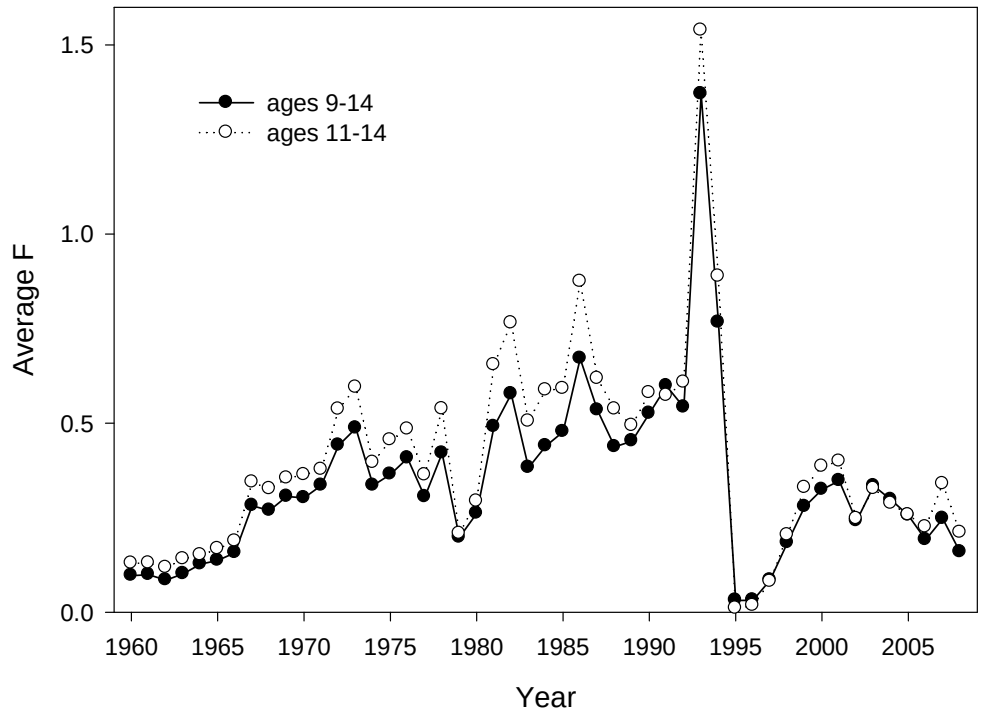
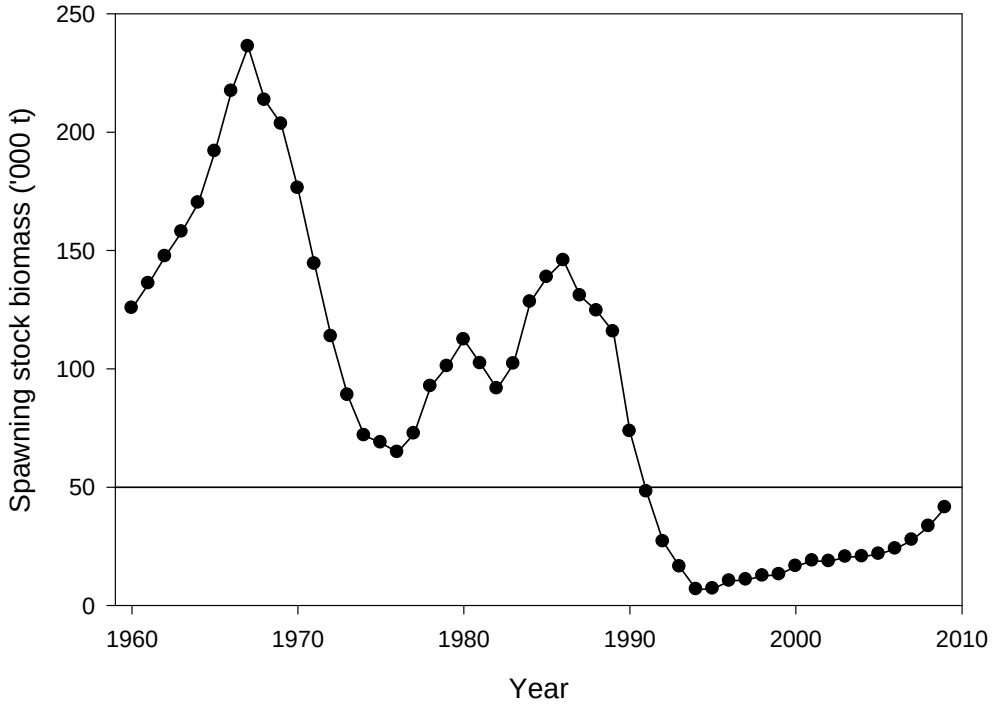


Figure 30. 5+ biomass and abundance (top) and average fishing mortality on ages 9 to 14 and ages 11 to 14 (bottom) from VPA.



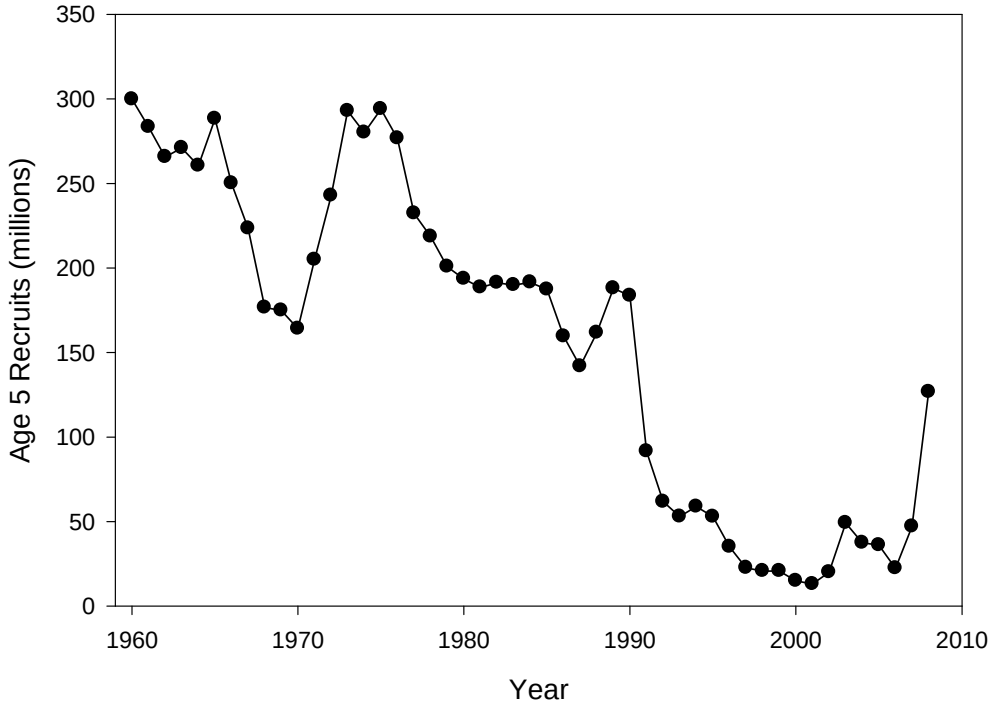


Figure 31. Spawning stock biomass ('000 t) (top panel) and age 5 recruits (bottom panel) from VPA. Horizontal line represents B_{lim}.

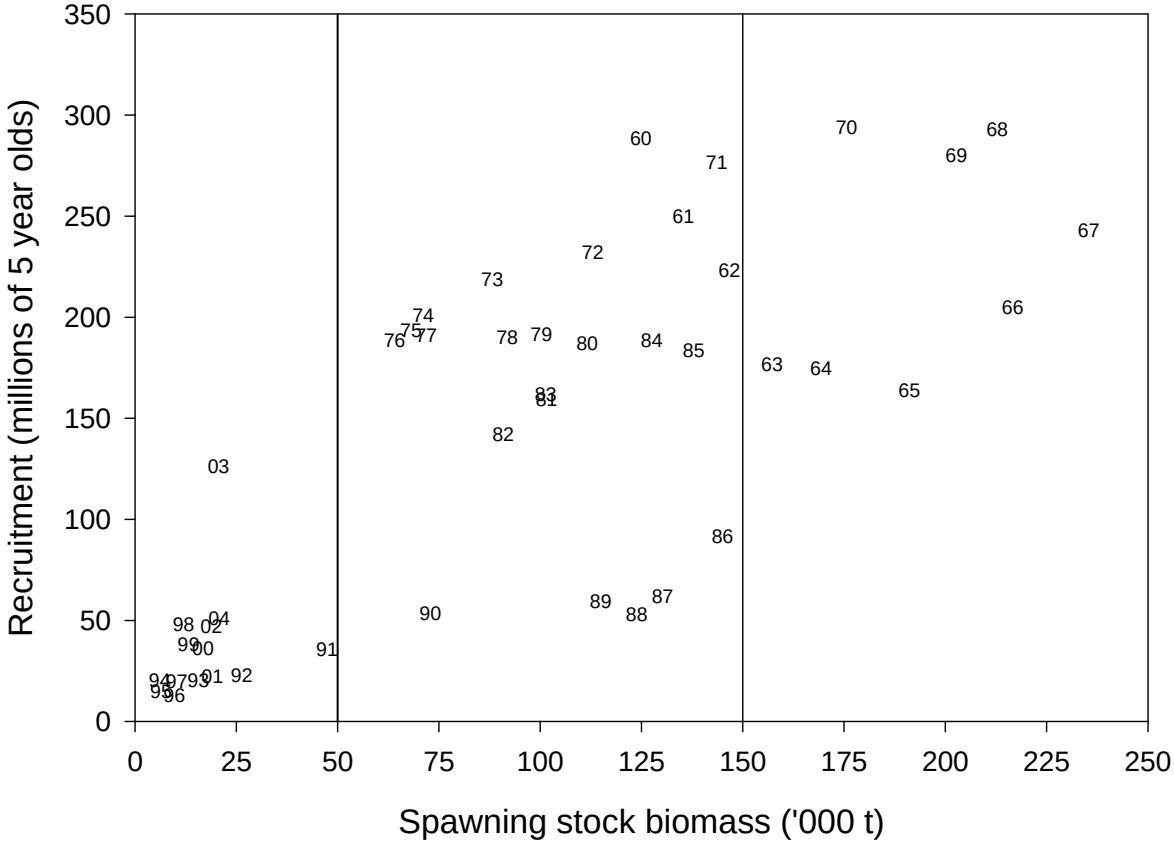


Figure 32. Observed stock recruit scatter. Vertical line at 50, 000 t illustrates B_{lim}, vertical line at 150, 000 t indicates SSB above which recruitment has been very good.

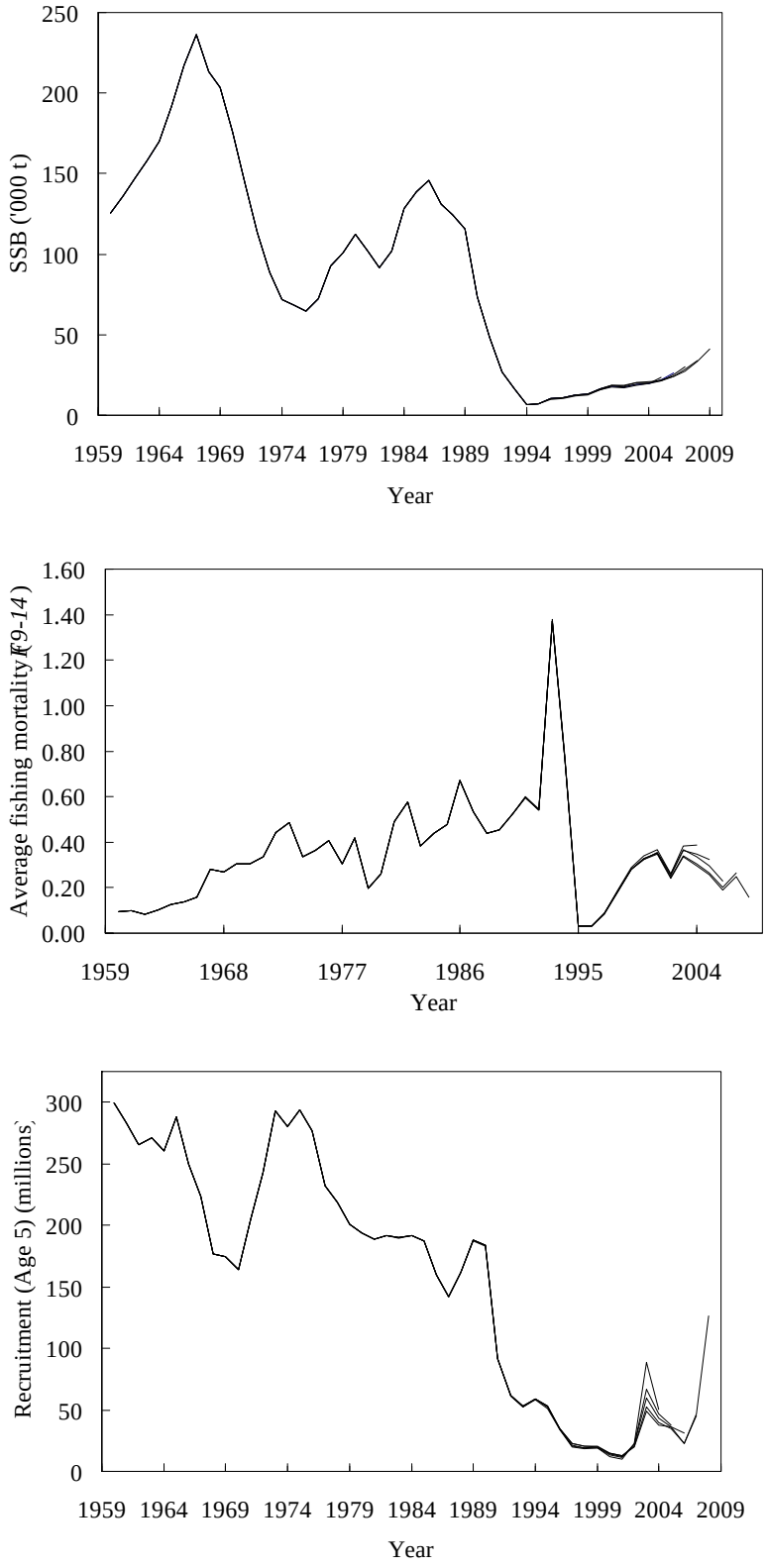


Figure 33. Results of retrospective analysis for Div. 3LNO American plaice. Top panel shows SSB, middle panel shows fishing mortality on ages 9-14 and bottom panel shows recruitment (age 5).

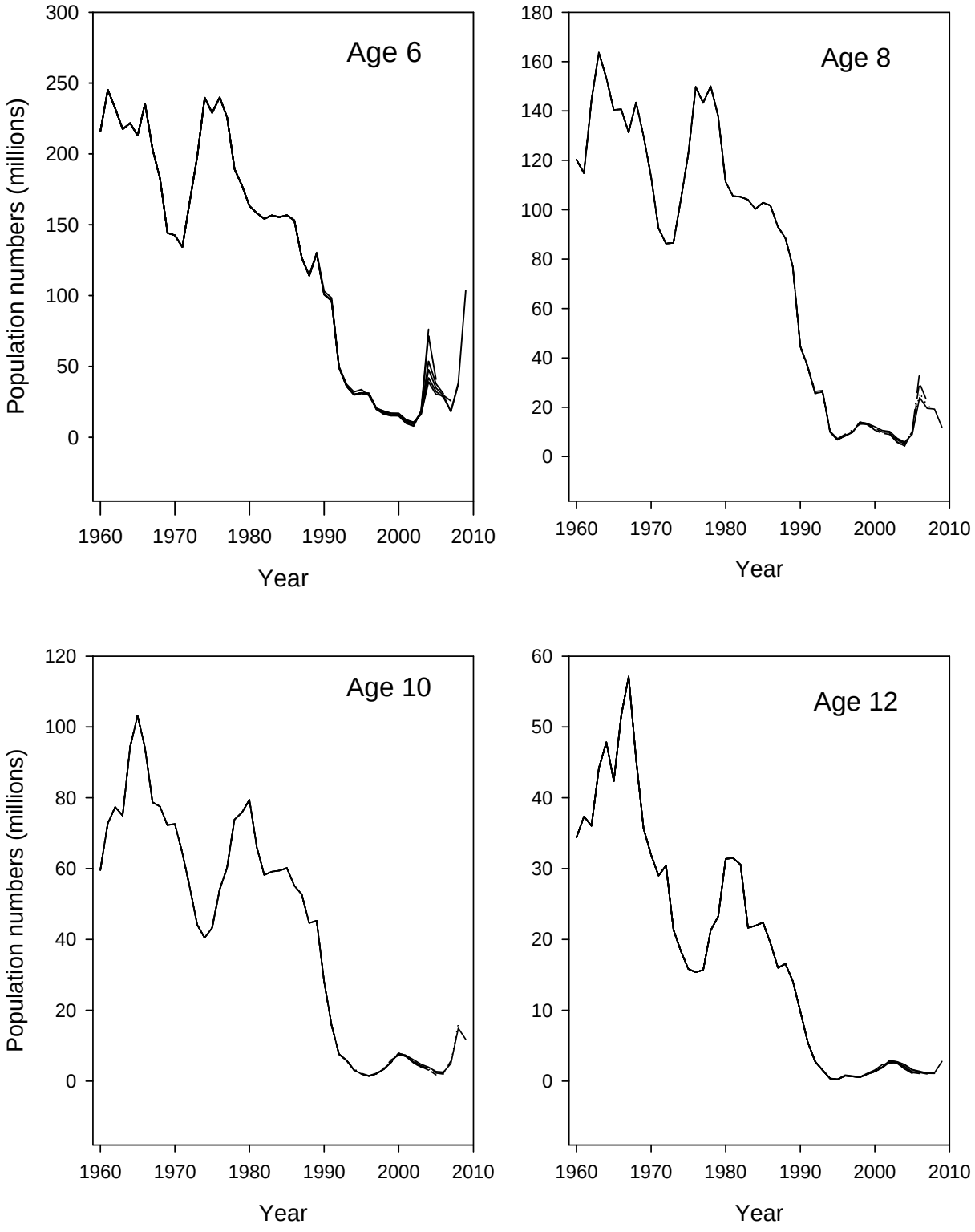


Figure 34. Results of retrospective analysis for Div. 3LNO American plaice. Population numbers (millions) for selected ages.

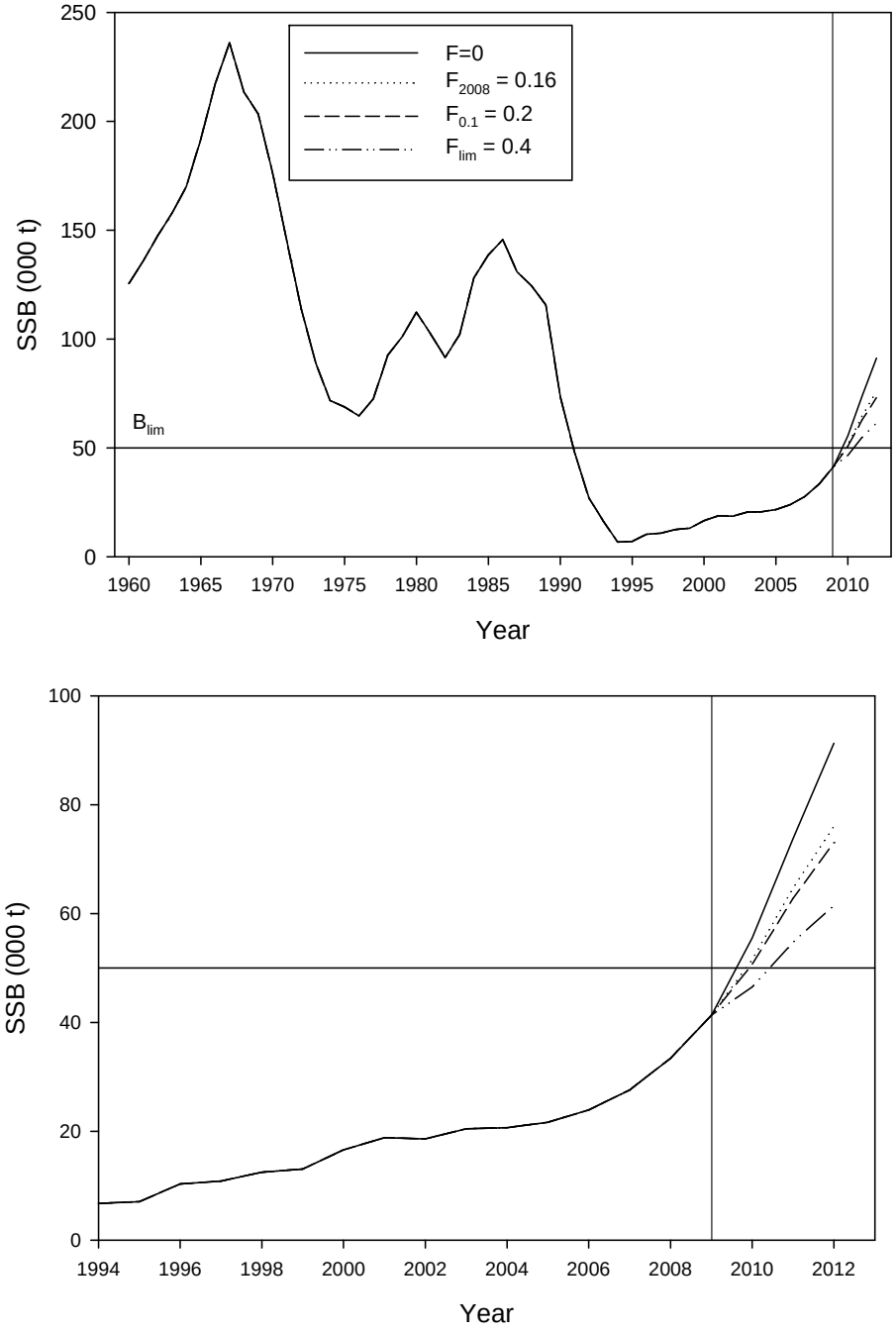


Figure 35. Estimated spawning stock biomass in medium term projections under 4 fishing mortality scenarios. The vertical line indicates the start of the projection period. The horizontal line gives the B_{lim} of 50 000 tons, the vertical line the point at which projections begin. The top panel shows the period of the projection along with the historic time series, the bottom panel shows only since 1994.