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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 and the TAC has been set at 0 since 1995. By-catch of plaice in fisheries directed for other species has been relatively stable over the past five years and was 2, 898 t in 2010. The majority of catch was taken in the NAFO regulatory area (NRA). The Canadian spring surveys show a large decline in abundance and biomass from the mid to late 1980s to the mid 1990s and although there has been an increasing trend since that time, biomass index in 2010 (expressed as mean weight per tow) was only 20% of that of the mid 1980s. The Canadian fall survey biomass has also shown large declines since 1990 and a subsequent slow increasing trend to the present. 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. Output from a VPA analysis including data from Canadian spring and fall surveys, as well as the EU-Spain 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 that time. Average F on ages 9-14 in 2010 was 0.11. The SSB has been gradually increasing since the mid-1990s and is 34, 000 t in the current year, still below the B*lim* of 50, 000 t set for this stock. Recruitment has been generally poor since the 1986 year class. The 2003 year class appeared relatively strong in the 2009 VPA. Although still considered above average, its estimated strength has been less in the 2010 and 2011 assessments.

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 t since that time.

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 have been lower since. Bycatch levels have been relatively steady at ~3000 t in the past five years. Most of the catch was taken as by-catch in the skate, redfish and Greenland halibut fisheries in the NRA, while 1121 t of Canada's landed 1154 t was taken in the Canadian yellowtail flounder fishery (14% of the yellowtail flounder catch).

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).

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 1996-2010 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 2009. 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 2010 are given in Tables 2-4. Please note the shaded columns which represent years that survey coverage was inadequate. In 2009, the spring survey biomass estimates for 3L, 3N and 3O were 20, 600, 61,100 and 41, 000 t, respectively. Biomass estimates for these Divisions in 2010 were 23, 300, 85,900 and 40, 900 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, including 2010, the biomass estimate from Div. 3N is generally at least double the biomass estimate from

Div. 3O. The biomass estimates in Div. 3L in 2005-2008 were generally high relative to most of the time series (please note the 2006 data point should not be considered as part of this assessment) but subsequently declined in 2009. Biomass in 3N was up again slightly in 2010 and there appears to be an overall increasing trend since the mid 1990s in this Division. Biomass in Div. 3LNO combined increased slightly from 2009 to 2010 but is currently only 20% of that of the mid 1980s (Fig. 3).

Mean weight per tow for Divisions 3LNO combined (Fig. 4) 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 2010 is only 20% of the average of the mid 1980s. Mean weight per tow in Div. 3L and Div. 3O (Fig. 4) has remained low relative to levels of the mid 1980s. By 2007-2008, mean weight per tow in Div. 3N (Fig. 4) had increased to levels comparable to those of the mid 1980s but have subsequently declined such that levels in 2009-2010 are 60% of those in 1985-1987.

Total abundance for Div. 3LNO combined has fluctuated since 1996, with a slight increasing trend (Fig. 3). Mean number per tow for Div. 3LNO combined shows the same trend (Fig. 5). As with the biomass estimate, mean number per tow has shown the greatest decline in Div. 3L (Fig. 5) since the beginning of the time series. Mean numbers per tow in Div. 3N declined from 239 in 2007 to 73 in 2009 but increased again to 149 in 2010.

Tables 5-8 and Figure 6 show the abundance at age from the Canadian spring surveys by division and for Div. 3LNO combined. The proportion of fish that are ages 0 to 5 has increased over the time series and has generally been greater than 50% since 2001 (except 2006). The 1998 and 2003 year classes (YC) appear to have been strong and there is some indication that the 2006 YC may be stronger than average.

Distribution plots of catch of American plaice from the Canadian Spring RV Survey (kg/tow standardized to tow length) suggest the largest concentrations of plaice to be in Div. 3N, mainly outside the 200-mile limit (Fig. 7). Catches of American plaice on the shelf of the Grand Bank in 2010 appear similar to 2009.

Fall

Stratified-random surveys have been conducted in Div. 3L in the fall since 1981, usually in October-November, but in recent years this has been occurring later. From 1990 to 2010, 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. In 2009, biomass estimates from the fall survey were 33,500, 141, 200, and 79, 400 t for Div. 3L, 3N and 3O respectively. Biomass estimates from 2010 for these Divisions were 60,100, 162,100, and 59,500 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). The biomass estimate for Div. 3O dropped for the second consecutive year in 2010. 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 current biomass index remains well below that of 1990 with the average of the 2010 index representing only about 44% 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 42% of the level of 1990 (Fig. 8). Mean weight per tow has shown the largest decline in Div. 3L (Fig. 8). Mean weight per tow estimates from Div. 3N are at or above levels seen in the early 1990s, while mean weight per tow in Div. 3O has not shown any real improvement (Fig. 8).

Abundance for Div. 3LNO combined (Fig. 3) showed a substantial decline from 1990 to 1998 but has been increasing since 1998. Mean numbers per tow show the same pattern (Fig. 9). By Division, the largest decline in the time series was once again in Div. 3L (Fig. 9). Mean numbers per tow has increased since the mid 1990s in 3N. In 3O, mean numbers per tow has increased since the early 2000s but has declined now in two consecutive years (Fig. 9).

Tables 12-15 and Figure 10 show the abundance by age for 1990 to 2010. The age composition has seen younger ages making up a higher proportion of the population in recent years, increasing from 55% in 1990 to an

average of 77% in the last three years (Table 15). The 2003 year class appears to be large in this survey (Fig. 10) but has largely dropped out by 2010. The 2006 YC also looks to be stronger than average.

Plots of distribution by weight (Fig. 11) for the fall surveys for 2007-2010 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. There are fewer large catches in Div. 3L.

Comparison of Spring and Fall Surveys

Overall, abundance and biomass estimated from spring and fall surveys show a similar increasing trend since the mid 1990s, although the spring survey indices have levelled off in recent years (Fig. 3). The slight differences in trend may be 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. 7, 11).

Maturities

Age and length at 50% maturity were produced from spring RV data. Maturity data were collected during research vessel surveys from 1960-2010. Stratified random surveys were used where possible (1971-2010, except 2006 when survey coverage was considered too poor to be representative). Data from earlier years came from surveys that were conducted mainly as line transects. The coverage of a stock area would generally not be as complete as the stratified random surveys. For the period of the stratified random surveys, observed proportion mature at age was calculated according to the method of Morgan and Hoenig (1997) to account for the length stratified method of sampling. Prior to this, only data from the aged fish was used without weighting by the length frequencies. This should not have a large impact on the model estimates (Morgan and Hoenig 1997). Data from 1985-1995 were converted to Campelen equivalents.

Estimates were produced by cohort. For males, A_{50} were fairly stable for cohorts of the 1960's to mid 1970's, with perhaps a slight increase over that time period. 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 1960's and 1970's with an A_{50} of about 4 years compared to 6 years at the beginning of the time series (Fig. 12). For females, estimates of A_{50} have shown a large, almost continuous decline, since the beginning of the time series. For females the A_{50} for recent cohorts is less than 8 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 13. L_{50} declined for both sexes but recovered in recent cohorts. The current L_{50} for males of about 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 35-36 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 2010, 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. 14 and 15).

EU-Spain Div. 3NO survey

Abundance and Biomass Trends

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 EU-

Spain Div. 3NO survey only covers a small portion of Div. 3O) were applied to EU-Spain length frequency data (separate sexes, mean number per tow) from 1998-2000 converted data and 2001-2010 Campelen data (González-Troncoso et al., 2011). There has been a general increase in this index for both biomass and abundance since the beginning of the time series. However, estimates of both indices from the EU-Spain survey followed a trend similar to the Canadian Survey estimates with a drop in both biomass and abundance in 2009 and a lesser degree of increase in 2010 (González-Troncoso et al., 2011).

Numbers at Age

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 resulting mean numbers per tow at age data is found in Table 19 and is used as input into the assessment. The 2003 year class (and to a lesser extent the 2006 YC) is also evident in this survey (Fig. 16). Overall, age composition for this survey was similar to the Canadian RV spring survey, except at ages 6 and 7 (Fig. 17).

Catch at age

Catch at age from Canadian fisheries in 2010

Results of the catch at age calculations for American plaice catches in 1993-2009 are given in detail in Morgan et al. (1999a,b; 2001; 2002, 2003,) and Dwyer et al (2005, 2007, 2009, 2010). In 2010, sampling data collected by observers were available from by-catch of A. plaice in Canadian fisheries targeting yellowtail flounder in Div. 3NO. In 2010, the Canadian catch of A. plaice in Div. 3LNO was 1151 tons, and almost all (97.2%) of this catch came from the directed fishery for yellowtail flounder. This percentage was similar in 2007-09, i.e. greater than 96% in all years. The ratio of A. plaice by-catch to the directed species of yellowtail (not the total catch of all species in the yellowtail fishery) was 8.6% in 2008, 19.8% in 2009, and 13.9% in 2010.

Since the beginning of 2000, fishing for yellowtail flounder has been permitted in Div. 3L, resulting in some by-catch of American plaice there, although most of the catch in recent years, including 2009 and 2010 (73 and 71%) has come from Division 3N. There were also seasonal differences in the last four years, with most of the catch in 2007 and 2009 (73% in 2009) occurring in the last 4 months of the year. In 2008, catches were more evenly spread throughout the year, with 51% being taken in May to July. In 2010, 48% of catches occurred in May-June, and 29% in November-December. By-catch rates of A.plaice in the yellowtail fishery have usually been highest in the spring period, but in the first quarter they are generally much lower. Actual by-catches of A. plaice are often lower during the summer as there has usually been a closure of the Canadian yellowtail fishery during mid June to late July, which is intended to cover the spawning period for yellowtail.

Sampling of the Canadian catch of A. plaice in Div. 3NO in 2010 consisted of 3332 length measurements and 331 otoliths. These were similar to the 2009 sampling results (3870 measurements and 240 otoliths from 1076 t catch). However, these levels were considerably lower than the sampling in 2007-08 (2007: 434 t, 9825 length measurements, 627 otoliths; 2008: 880 t, 15,497 measurements, 808 otoliths). The 2007-08 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. The low level of otolith sampling in 2009 and 2010 is a concern, as it was not possible to calculate age compositions by Division in these years.

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 2010 was within 3% of the catch. The Canadian catch in 2010 consisted of about 1.78 million A. plaice, compared to about 1.4 million for the 2008 and 2009 catches. Ages in the 2009 catch ranged from 4 to 19, and catch was comprised mainly of fish aged 6 to 11 years old, with the peak being the 2003 year class (age 7). 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 had increased in 2008 and 2009 to age 9 again, before declining in 2010. Age 6 comprised over 17% of the catch numbers in 2010, compared to less than 3% of the annual catch in numbers during 2007-09. However, almost 20% of the catch numbers in 2004 were age 6, and 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 2010 was similar to that calculated for 1999-2009, as well as that from the Canadian fishery for A. plaice on the Grand Bank in the early 1990's (Brodie et al. 1994).

The mean fish weight in the 2010 catch was 0.673 kg/fish, declining from 2009 (0.802 kg/fish), which was the highest in the recent period, but very close to the 2008 level of 0.663 kg. Individual weights at age in 2010 were generally within the range of values observed recently. Values at ages 5 to 7, and 14 were all above the 2004-09 average, but 2010 values for all other ages were below the recent means. Reasons for the annual fluctuations are most likely due to the seasonal and temporal differences in the catches, as noted above. However, the reduced sampling levels in 2009 and 2010 add uncertainty to the age composition and weights at age.

Catch at age from other fisheries in 2010

For 2010 length frequency data were available from Portugal and Spain (there was only one length frequency from Russia). Details on the sampling levels and descriptions of the fisheries are contained in Vargas et al. (2011), González-Costas et al. (2011) and Skryabin and Pochtar (2011). In all cases, age-length keys from the Canadian spring surveys in Div. 3LNO in 2010 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 2010 are given in Table 18.

In 2010, catch from all countries indicated a peak at age 7. Age 7 (2003 YC) was the most abundant age in the Spanish and Portuguese catches, but there were also a large amount of age 8-11 fish in the catch. Both the Spanish and Portuguese fleets had minor peaks for 12 and 16 year-olds. 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 (Table 17).

Virtual Population Analysis (VPA)

A formulation of ADAPT using the same base structure that was used in the accepted VPA from the 2010 assessment (Dwyer et al., 2007, 2008, 2009, 2010) 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 20). 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, 2009, 2010). Beginning of the year weights-at-age and maturities-at-age are given in Tables 21 and 22. The calibration matrix consisted of the following input data:

- Canadian spring RV survey (1985-2010) (no 2006 data point) abundance at age (ages 5-14);
- Canadian autumn RV survey (1990-2010) (no 2004 data point) abundance at age (ages 5-14); and
- EU-Spain Div. 3NO survey (1998-2010) MNPT (ages 5-14) (Table 19a, b, c).

Standardized age by age abundance (using mean and standard deviation of each index) was plotted. For each survey-age, the survey data are standardized to have a mean of 0 and a variance of 1 (Fig. 17). Surveys seemed to show the same trends in abundance at age, except the EU-Spain survey estimated higher levels of ages 6 and 7s; trends are somewhat less similar at older ages. Appendix A shows some plots which compare ages and surveys over the survey time periods, as well as some internal and between survey correlations. (See section at end of document for information.)

The results of an ADAPT run using the formulation described above are given in Table 23 and Figures 18-21. The model provides a good fit to the data. The mean square of the residuals was 0.29. Relative errors on the population estimates ranged from 0.15 to 0.32. The relative errors on the catchabilities (q) were all less than 0.2. The residuals from the Canadian spring survey showed an increasing trend until around 1994 and no discernable pattern thereafter. Residuals from the Canadian fall survey appear to be lower after about 1996. The residuals from the EU-Spain Div. 3NO survey showed very little pattern (Fig. 18). The fit of predicted and observed survey estimates is relatively good for the Canadian spring and fall survey but not as good for the EU-Spain Div. 3NO survey (Fig. 19). Residuals are larger for the older ages in the fall survey but are fairly low overall (Fig 20). The value for age 5s in the EU-Spain Div. 3NO survey is also high. Survey q's show little variability, perhaps with some tendency for lower q's for the youngest fish (Fig. 21). Fall surveys catch more small fish than spring surveys. Qs from the EU-Spain 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 24 and 25. 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. 22), increasing over the last number of years. Average F on ages 9 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 2010 was 0.11 (Table 25, Fig. 22).

Spawning stock biomass was calculated by multiplying the biomass at age by the female maturity ogive (Table 22). 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 but has been increasing since that time (Fig. 23, Table 26). Recruitment has been poor since the 1986 year-class but the 2003 year class is above average for the recent time period (Fig. 23). An examination of the stock recruit scatter shows that above 155 000 t only good recruitment has been observed and no good recruitment observed at SSB below 50 000 tons (B_{lim}) (Fig. 24). The most recent (2005) year class is in the lower left of the plot.

Comparison to Previous Assessments

The last three assessments on this stock all suggest an increasing trend in SSB but have had different perceptions of SSB values. For example, the 2009 SSB was estimated at 41, 000 t in the 2009 assessment but the subsequent two VPA runs suggest that this value was overestimated and successively lower estimates of the 2009 SSB have been produced in the last two years, with the current estimate being less than 24, 000 t and differing only slightly from the estimate made in the 2010 assessment (Fig. 25). Such changes do not influence the fact that SSB is still in an upward trajectory.

The current assessment estimated the 2010 SSB to be 26 000 t, down 21% from the 33 000 t that was estimated in the 2010 assessment. Differences are in part due to stock weights at age for 2010 being reduced in the 2011 assessment. These differences are linked to the fact that stock weights at age for 2010 could actually be estimated in the 2011 assessment whereas in the 2010 assessment they were based on the assumption that stock weights were equal to the geometric mean of the previous three years. The data now available on the stock weights at age are lower than the assumed values. In addition, numbers at age for most ages in the SSB for 2010 are estimated in the 2011 assessment to be less than they were in the 2010 assessment. The combination of reduced numbers and weights result in the 2010 SSB being lower in the current assessment.

Retrospective Analysis

Retrospective analyses were conducted by sequentially removing one year of data from the most recent year for a comparison of 5 years. For the second consecutive assessment there was a retrospective pattern present (Tables 27-29, Figs 26 and 27) that was more obvious than typically observed in previous assessments.

Stochastic Projections

Simulations were carried out to examine the trajectory of the stock under 3 scenarios of fishing mortality: F = 0, F= F_{2010} (0.11), and $F_{0.1}$ (0.16) (Shelton and Morgan 2011). F_{max} is difficult to determine for this stock and highly labile so estimates were not provided under this scenario. For these simulations the results of the VPA and the covariance of these population estimates were used. The following assumptions were made:

Age	Estimate of 2011 population numbers ('000)	CV on population estimate	Weight-at-age mid-year (avg. 2008-2010)	Weight-at-age beginning of year (avg. 2008-2010)	Maturity-at-age (avg. 2008-2010)	Rescaled PR relative to ages 9-14 (avg. 2008-2010)
5			0.200	0.174	0.013	0.030
6	21469	0.323	0.281	0.239	0.060	0.129
7	22676	0.234	0.361	0.317	0.234	0.281
8	27826	0.194	0.476	0.425	0.554	0.553
9	9347	0.174	0.566	0.532	0.776	0.687
10	4754	0.174	0.723	0.657	0.916	0.638
11	5567	0.163	0.829	0.787	0.979	0.628
12	4467	0.158	1.093	0.978	0.995	1.053
13	3882	0.151	1.279	1.230	0.999	1.291
14	1041	0.169	1.571	1.461	1.000	1.703
15	1142	0.181	1.829	1.673	1.000	1.703

Simulations were limited to a 2-year period. Recruitment was resampled from three sections of the estimated stock recruit scatter, depending on SSB. The three sections were 50 000 tons of SSB and below (only low recruitment), greater than 50 000 tons to 155 000 tons (low and high recruitment), and greater than 155 000 tons (only high recruitment). The simulations contained a plus group at age 15. SSB is projected to have a 50% probability of reaching B_{lim} by the start of 2014 (i.e. end of 2013) when F=0. Although SSB is also projected to increase slowly with $F_{current}$ and $F_{0.1}$ the probability of reaching B_{lim} by the start of 2014 under these scenarios is less than 50% (Table 30). The current projections predict yield to increase slightly from 2011 to 2012 under $F_{current}$ and $F_{0.1}$ followed by little or no increase in yield in 2013.

Appendix A

Some exploratory analyses were conducted to evaluate the internal consistency in each survey index series, the consistency of the contribution of each year-class to the total survey index, and the consistency of the age-specific information across the survey series.

Pair-wise plots of the each of the survey indices (by cohort on the log-scale) are presented in Appendix A.1 – A.3. The data points in the panels below the numbered diagonal compare the logarithm of survey data at different ages for a common cohort. The solid line in each panel is the linear least squares regression line. Numeric values in the panels above the diagonal provide the correlation coefficient between the survey data at these ages. The p-values for testing whether or not the correlation is significantly different in each panel are indicated by the key shown on the right hand side. Regression and correlations are only computed if there are at least 5 points (i.e. cohorts) available for a given pair of ages. The scatter plots reveal that some of the lower correlation values at some of the ages for some of the survey indices are partially due to one or two outlying points; mostly there are high correlations of ages between cohorts for all surveys.

A comparison of standardized indices illustrating the consistency of dataset currently used to calibrate the analytical assessment is presented in Figure Appendix A.4. Note: this is the same as Figure 25. In these figures each survey-age time-series is standardized to have mean 0 and variance 1 and are directly comparable. The survey data used to calibrate the VPA appears to be fairly consistent through time over most age groups, though the number of age 6s in 2004, age 7s in 2005-2007 and age 14s in 2004 are higher than the Canadian surveys, with less consistency overall in the recent period.

Plots of the standardized proportions by age across years (SPAY) provide additional perspective on the cohort consistency within each of the survey indices (Figures A.5). In the SPAY plots, the annual index proportions were standardized at each age to have a mean of 0 and a variance of 1. (Cohorts are identified with text labels in the margin.) Cohorts can be tracked in all surveys, but especially at the youngest ages in the Canadian fall surveys. In the more recent period, both the 1998 and 2003 year classes are strong, but the 1998 cohort appears less strong in the two most recent years in the fall 2008 and 2009 surveys.

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Table 1. Nominal catches (t) of American plaice for NAFO Divisions 3LNO, 1960-2010 and TACs from 1973 to 2010.

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	1,128	25,719		-
1964	35,474	3,093	38,567		-
1965	45,365	7,896	53,261		-
1966	51,225	13,786	65,011		-
1967	54,190	40,223	94,413		-
1968	48,674	24,493	73,167		-
1969	64,815	14,622	79,437		-
1970	54,929	11,724	66,653		-
1971	49,394	18,494	67,888		-
1972	41,605	17,756	59,361		-
1973	38,586	14,257	52,843		60,000
1974	35,101	11,196	46,297		60,000
1975	34,015	9,206	43,221		60,000
1976	47,806	4,019	51,825		47,000
1977	42,579	1,402	43,981		47,000
1978	48,634	1,394	50,028		47,000
1979	47,131	1,438	48,569		47,000
1980	48,296	790	49,086		47,000
1981	48,177	1,981	50,158		55,000
1982	49,620	717	50,337		55,000
1983	35,907	1,813	37,720		55,000
1984	33,756	2,307	36,063		55,000
1985	40,024	8,057	48,081	54,212	49,000
1986	33,409	24,040	57,449	64,570	55,000
1987	33,967	19,490	53,457	55,012	48,000
1988	26,832	12,096	38,928	40,835	33,585[c]
1989	27,901	13,305	41,206	43,369	30,300
1990	22,600	1,406	24,006	32,501	24,900
1991	22,510	2,993	25,503	34,681	25,800
1992	9,663	1,207	10,870	13,350	25,800
1993[b]	7,454	462	7,916	17,122	10,500
1994	73	487	560	7,378	4,800[d]
1995	67	481	548	637	0
1996	49	826	875	913	0
1997	75	1,290	1,365	1,401	0
1998	227	1,333	1,560	1,618	0
1999	323	2,113	2,436	2,565	0
2000[e]	623	2,071	2,694	5,176	0
2001	1,618	1,850	3,468	5,739	0
2002	1,374	1,795	3,169	4,870	0
2003[e]	1,607	2,062	3,669	8,727	0
2004	1,290	1,368	2,658	6,158	0
2005	1,466	889	2,355	4,110	0
2006	90	799	889	2,828	0
2007	430	1,020	1,450	3,606	0
2008	875	1,017	1,892	2,515	0
2009	1,075	695	1,770	3,015	0
2010	1,155	316	1,471	2,898	0

Values for countries back to 2008 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 1996-2010 (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	2009	2010
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	0.6	0.2
	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	1.3	0.4
	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	+	1.0
	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	0.8	2.1
	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	0.1	0.3
	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	2.8	4.0
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	-	2.9	0.9
	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	0.9	0.4
	342	0.1	0.1	0.4	0.4	0.2	0.1	+	0.1	+	0.1	0.6	0.8	0.1	0.1	0.0
	343	0.3	0.0	+	0.6	0.2	+	+	0.1	+	0.1	0.3	0.1	0.0	0.2	-
	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	0.2	0.7
	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	0.3	0.5
	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	0.4	1.1
	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	0.3	1.1
	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	0.4	1.4
	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	0.8	1.5
	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	0.1	0.2
	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	6.5	7.9
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	0.3	0.4
	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	0.5	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	0.7	1.1
	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	0.8	1.3
	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	0.5	1.2
	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	0.2	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	0.1	0.1
	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	3.1	5.0
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	1.2	0.6
	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	1.0	1.1
	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	0.7	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	0.2	0.6
	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	0.2	0.3
	392	0.5	0.1	0.4	0.2	0.1	0.1	0.3	0.1	0.2	+	0	0.0	0.0	0.3	1.1
	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	3.6	4.2
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	1.5	-
	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	0.4	0.1
	733	0.7	0.0	0.3	1	0.1	2.3	0.5	2.1	0.3	+	0.1	0.0	0.5	+	0.7
	735	1.4	1.6	1.2	0.6	1.2	2.1	1.2	4.9	-	+	+	0.1	2.3	0.9	1.3
	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	2.8	2.0
550-731	730	+	0.0	0.2	+	0.1	0.1	0.3	+	+	0.0	-	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	0.2	0.0
	734	+	0.0	0.1	0	0	0.1	0.9	0.5	0.0	0.0	-	0.0	-	1.2	0.1
	736	+	0.1	0.0	+	+	+	0.5	0.1	+	+	-	0.0	0.1	0.5	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	1.9	0.2
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	20.6	23.3

Table 3. Biomass estimates ('000t) of A.plaice, by stratum and depth zone (m), from Canadian spring surveys in Div. 3N in 1996-2010 (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	2009	2010
≤ 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	2.2	2.6
	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	9.7	3.3
	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	11.9	5.9
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	17.8	47.1
	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	2.1	1.2
	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	2.4	2.7
	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	1.5	4.9
	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	2.9	7.4
	383	0.5	0.1	+	1.0	0.2	0.1	+	0.3	0.5	1.8	-	2.7	2.6	0.2	0.4
	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	26.8	63.8
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	4.5	11.7
	377	0.2	0.1	+	0.2	+	0.9	0.1	0.2	0.2	0.4	-	4.8	2.0	0.8	0.6
	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	+	0.5
	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	5.3	12.8
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	1.5	0.7
	378	0.1	0.2	0.2	0.9	+	0.1	0.1	0.5	0.4	0.1	-	0.4	0.3	9.0	1.1
	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	0.2	1.0
	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	10.7	2.7
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	0.4	0.0
	379	+	0.1	0.1	0.1	0.1	0.1	0.1	0.3	+	+	-	+	0.0	0.2	+
	380	0.2	0.8	0.1	0.2	+	0.1	+	0.4	0.2	0.0	-	0.0	0.1	0.3	0.3
	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	0.9	0.3
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	0.0	0.0
	727	0.5	2.2	2.0	0.4	1.2	2.5	0.1	0.5	0.4	+	-	+	+	1.7	0.1
	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	1.7	0.1
550-731	724	0.2	0.5	0.2	+	0.1	0.1	0.5	0.1	+	0.1	-	0.0	-	0.0	+
	726	+	0.1	+	+	0.1	+	+	+	+	0.0	-	0.0	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	3.8	0.2
	Total	0.7	0.5	0.5	0.2	0.7	1.1	0.9	0.3	+	0.2	-	0.0	0.0	3.8	0.2
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	61.1	85.9

Table 4. Biomass estimates ('000t) of A.plaice, by stratum and depth zone (m), from Canadian spring surveys in Div. 3O in 1996-2010 (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	2009	2010
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	3.2	3.7
	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	0.4	1.2
	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	3.2	3.3
	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	1.4	3.0
	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	0.6	3.0
	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	2.0	9.1
	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	15.7	9.6
	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	26.5	32.8
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	2.2	4.5
	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	3.6	1.7
	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	1.1	0.4
	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	2.3	0.3
	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	5.1	1.0
	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	14.3	8.1
184-274	333	+	0.3	0.1	0.1	+	+	0.3	+	+	0.2	-	0.1	+	+	+
	336	0.2	0.3	+	0.2	+	0.1	+	+	+	0.1	-	0.2	+	+	+
	355	0.5	0.3	0.1	0.1	0.1	0.4	0.4	0.6	0.3	0.2	-	0.2	+	0.2	+
	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	0.0	0.2	0.0
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	+	+	+
	356	0.1	+	+	0.1	+	+	+	0.4	+	+	-	0.1	+	0.1	+
	Total	0.5	1.0	+	0.2	+	+	0.2	0.5	+	0.1	0.0	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	0.0	+
	719	0.1	0.5	+	+	0.0	+	+	+	+	+	-	0.0	0.0	0.0	0.0
	721	0.2	0.1	+	0.1	+	0.2	+	0.1	0.0	+	-	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	0.0	0.0	0.0
550-731	718	+	0.1	+	+	0.0	+	+	0.3	0.0	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	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	0.0
	Total	1.0	4.4	+	0.2	0.1	0.2	0.1	0.2	0.0	0.0	-	0.0	0.0	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	51.5	41.0	40.9

Table 5. Abundance index at age (millions) for American plaice in NAFO Div. 3L from Canadian spring surveys from 1985 to 2010.

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	2009	2010
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	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	0.63	3.13
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	79.34	21.21
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	71.37	72.35
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	28.94	58.97
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	21.11	20.65
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	14.26	19.52
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	8.24	14.03
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	7.44	6.86
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	9.55	7.87
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	5.99	6.82
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	2.26	3.30
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	0.49	0.94
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	0.12	0.57
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	0.76	0.38
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	0.17	0.48
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	0.76	0.26
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	0.07	0.54
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	0.14	0.11
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	0.00	0.07
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	0.00	0.00
unk1	0.23	0.51	0.00	0.45	0.05	3.04	0.03	0.01	0.69	0.00	0.00	0.00	0.00	0.12	0.04	0.01	0.05	0.16	0.04	0.17	0.00	-	0.34	0.53	5.24	0.00
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	256.87	238.06
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	50.24	61.76
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	20.30	21.34
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	2.51	3.35

Table 6. Abundance index at age (millions) for American plaice in NAFO Div. 3N from Canadian spring surveys from 1985 to 2010.

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	2009	2010
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	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	1.79	0.00
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	2.74	27.44
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	18.24	23.92
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	5.50	45.73
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	26.39	28.25
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	43.70	74.73
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	18.94	97.08
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	12.71	23.37
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	10.67	11.32
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	12.21	7.43
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	10.68	6.21
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	4.49	6.82
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	1.16	2.18
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	1.02	0.57
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	1.59	0.74
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	1.64	1.53
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	1.29	0.65
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	0.87	0.30
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	0.28	0.37
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	0.12	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	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	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00
23	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	0.00	0.08
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	0.06	0.02
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	176.09	358.73
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	121.37	233.37
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	46.02	38.19
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	12.46	13.23

Table 7. Abundance index at age (millions) for American plaice in NAFO Div. 3O from Canadian spring surveys from 1985 to 2010.

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	2009	2010
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	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	5.08	0.43
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	33.30	76.55
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	100.11	69.32
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	47.76	86.49
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	24.80	36.46
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	72.19	52.65
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	17.55	27.04
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	13.87	10.37
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	16.50	8.88
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	6.78	4.11
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	3.18	2.60
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	1.10	1.15
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	0.46	0.51
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	0.16	0.28
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	0.55	0.30
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	0.29	0.17
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	0.10	0.26
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	0.23	0.11
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	0.11	0.07
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	0.00	0.00
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	0.04	0.03
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	344.18	377.78
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	133.08	108.50
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	29.47	18.43
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	3.00	2.84

Table 8. Abundance index at age (millions) for American plaice in NAFO Div. 3LNO from Canadian spring surveys from 1985 to 2010.

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	2009	2010
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	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	7.50	3.56
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	115.38	125.19
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	189.72	165.59
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	82.20	191.19
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	72.30	85.36
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	130.15	146.91
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	44.73	138.16
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	34.02	40.60
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	36.72	28.07
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	24.99	18.36
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	16.12	12.12
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	6.08	8.91
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	1.74	3.26
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	1.93	1.23
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	2.32	1.51
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	2.69	1.96
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	1.45	1.45
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	1.24	0.52
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	0.39	0.50
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	0.12	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	0.71	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	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00
23	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	0.00	0.08
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	5.34	0.05
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	777.21	974.57
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	304.69	403.63
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	95.79	77.97
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	17.97	19.34
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	0.60	0.59
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	0.12	0.08

Table 9. Biomass estimates ('000t) of A.plaice, by stratum and depth zone (m), from Canadian fall surveys in Div. 3L in 1995-2010 (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	2009	2010
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	0.3	1.4
	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	1.5	2.2
	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	0.8	0.2
	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	0.6	1.2
	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	0.9	0.8
	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	4.2	5.7
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	0.8	4.1
	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	0.3	0.8
	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	0.0	0.1
	343	0.7	0.1	0.0	0.1	-	+	0.1	0.1	0.1	+	0.1	0.1	0.0	0.1	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	0.9	2.4
	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	0.7	1.7
	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	0.8	3.9
	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	0.4	1.4
	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	0.8	4.8
	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	3.5	4.8
	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	2.2	2.6
	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	-	-	-	0.1
	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	10.5	26.6
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	0.7	0.7
	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	0.4	0.7
	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	0.5	2.6
	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	1.4	2.2
	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	1.1	2.0
	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	1.7	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	0.2	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	-	-	-	-	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	6.1	9.8
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	1.1	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	1.1	1.1
	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	1.2	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	0.8	0.7
	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	0.7	0.3
	392	+	+	0.2	0.1	0.5	0.2	0.1	0.1	0.1	+	0.1	0.3	0.1	0.3	+	0.1
	796	-	0.6	0.9	0.4	-	-	0.2	0.1	0.1	0.1	0.3	0.2	-	-	-	0.2
	800	-	-	-	0.2	-	0.2	0.3	0.3	0.2	0.2	0.2	-	-	-	0.1	0.1
	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	4.9	6.1
367-549	729	+	+	0.2	0.1	0.7	1.6	0.4	+	0.1	0.1	+	0.2	0.2	0.6	0.4	0.1
	731	0.2	-	0.6	0.1	1.0	1.1	0.1	+	0.1	0.1	+	+	0.3	0.2	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	0.4	+
	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	2.9	8.3
	792	-	0.2	1.9	0.3	-	0.2	0.6	0.1	0.2	0.1	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	3.9	8.7
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	1.8	0.2
	732	+	+	1.3	0.2	1.9	0.7	1.3	+	+	0.1	0.1	+	0.5	0.5	0.2	0.1
	734	0.0	0.2	0.3	0.1	0.1	0.1	+	+	0.0	-	0.0	0.1	0.1	0.0	0.6	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	0.5	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	3.1	0.6
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	-	+	2.1
	741	-	1.0	2.3	1.7	0.1	0.0	0.0	0.6	0.1	-	-	0.0	0.0	-	0.8	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	-	+	0.4
	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	-	0.8	2.5
915-1097	738	0.6	0.2	0.0	0.0	0.0	0.0	+	+	2.2	-	-	0.0	0.0	-	0.0	0.0
	742	-	0.1	0.0	0.0	+	0.0	0.0	0.0	3.5	-	-	0.0	0.0	-	0.0	0.0
	746	-	0.1	0.0	+	0.0	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	-	0.0	0.0
	Total	0.6	0.4	0.2	+	+	0.0	+	+	5.7	-	-	0.0	0.0	-	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	-	0.0	+
	743	-	0.0	0.0	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	-	0.0	0.0
	750	-	0.1	0.0	0.0	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	-	0.0	0.0
	744	-	0.5	0.0	0.1	-	0.0	0.0	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	-	0.0	0.0
	Total	-	0.5	0.0	0.1	0.1	0.0	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	33.5	60.0

Table 10. Biomass estimates ('000t) of A.plaice, by stratum and depth zone (m), from Canadian fall surveys in Div. 3N in 1995-2009 (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	2009	2010
≤ 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	3.4	0.9
	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	1.8	14.0
	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	5.2	14.9
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	105.7	118.8
	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	2.2	1.2
	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	2.5	3.8
	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	1.0	7.5
	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	7.6	3.8
	383	-	0.3	0.5	0.8	0.8	+	0.5	0.5	0.1	+	0.4	0.3	0.7	2.2	1.4	1.1
	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	120.3	136.2
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	6.0	6.6
	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	2.3	2.0
	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	4.5	1.9
	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	12.9	10.6
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	1.2	0.1
	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	0.6	-
	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	0.3	0.1
	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	2.1	0.2
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	+	0.4	+	0.0
	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	+	0.2	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	0.2	0.0
367-549	723	+	+	0.0	0.1	+	+	+	0.0	+	+	+	0.0	+	0.1	0.0	0.0
	725	0.1	0.1	0.0	+	0.1	0.2	+	0.0	+	-	0.1	+	0.0	0.1	0.0	-
	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	+	+	0.0
	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	0.0	0.0
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	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	+	1.1	0.2	+	1.7	1.2	0.5	0.1
	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	0.5	0.1
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	-	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	-	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	-	0.0	-
	Total	-	-	-	0.0	-	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	-	0.0	-
	Total	-	-	-	0.0	-	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	127.3	143.4	127.8	119.5	125.6	169.0	141.2	162.1

Table 11. Biomass estimates ('000t) of A.plaice, by stratum and depth zone (m), from Canadian fall surveys in Div. 3O in 1995-2009 (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	2009	2010
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	9.2	6.3
	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	1.2	1.7
	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	6.5	3.4
	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	6.3	2.1
	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	1.9	3.8
	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	10.2	3.1
	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	29.3	11.6
	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	64.5	32.1
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	4.3	15.4
	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	0.8	2.1
	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	1.3	1.9
	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	2.7	4.0
	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	5.8	4.0
	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	14.8	27.3
184-274	333	+	-	+	+	0.1	+	0.0	0.1	+	+	+	+	+	+	+	+
	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	0.1	0.1
	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	0.1	0.1
275-366	334	0.0	-	+	+	+	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	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	+	+	+	0.0	0.0
	719	+	0.2	0.0	+	+	+	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	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	+	0.0	0.0
	720	0.0	+	-	+	+	+	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	0.0	+
	Total	0.0	+	0.0	+	+	+	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	-	0.0	-
	768	-	-	-	0.0	-	-	0.0	0.0	-	-	0.0	-	0.0	-	0.0	-
	772	-	-	-	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	-
915-1097	765	-	-	-	0.0	-	-	0.0	0.0	-	-	0.0	-	0.0	-	0.0	-
	769	-	-	-	0.0	-	-	0.0	0.0	-	-	0.0	-	0.0	-	0.0	-
	773	-	-	-	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	-
1098-1280	766	-	-	-	-	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-	0.0	-
	770	-	-	-	-	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-	0.0	-
	774	-	-	-	-	-	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	-
1281-1463	767	-	-	-	-	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-	0.0	-
	771	-	-	-	-	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-	0.0	-
	775	-	-	-	-	-	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	-
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	79.4	59.5

Table 12. Abundance index (millions) at age for A. plaice in Div. 3L from Canadian fall surveys from 1990 to 2010.

Age/Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
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	0.72	2.09	0.42
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	41.78	20.02	63.32
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	107.63	133.02	109.37
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	78.66	30.78	33.21	42.72	61.53	73.96	96.84	183.30
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	77.90	72.68	54.99	31.70	52.93	51.83	50.36	146.09
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	26.20	42.61	73.01	35.44	31.14	61.54	30.54	60.64
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	9.13	11.30	55.65	72.86	31.96	35.06	30.19	47.83
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	7.27	4.65	21.36	68.18	45.03	32.66	10.55	22.05
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	8.56	3.82	10.80	27.59	35.87	41.08	8.49	12.63
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	5.09	3.95	3.94	5.26	10.21	28.36	8.67	8.11
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	4.51	0.88	4.49	3.53	5.10	7.15	4.05	16.05
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	2.73	0.75	1.52	1.81	1.94	1.91	1.60	4.79
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	0.87	0.12	2.35	3.66	1.43	1.33	1.06	1.91
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	0.33	0.11	1.64	1.47	0.43	0.93	0.73	1.19
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	0.04	0.00	0.72	1.22	1.13	0.44	0.41	1.38
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	0.52	0.23	0.36
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	0.32	0.09	0.72
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	0.13	0.15	0.36
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	0.43	0.02	0.38
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	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.06	0.00	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
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	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	0.24	2.17	0.32
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	240.92	184.91	305.20	344.85	364.91	488.08	401.29	681.23
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	38.54	25.57	103.85	188.58	135.55	150.38	66.25	117.77
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	13.57	5.81	16.05	19.96	22.69	41.58	17.02	35.26
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	1.24	0.23	6.10	9.36	5.44	4.15	2.70	6.30

Table 13. Abundance index (millions) at age for A. plaice in Div. 3N from Canadian fall surveys from 1990 to 2010.

Age/Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
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	0.00	0.07	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	28.54	59.96	3.89
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	135.89	64.49	118.38
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	37.39	92.21	94.09
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	137.17	68.40	217.26
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	260.68	112.38	94.18
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	62.42	109.10	165.54
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	41.76	40.02	93.85
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	34.70	20.98	27.14
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	28.03	14.02	14.25
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	14.65	12.14	14.20
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	5.22	8.03	3.88
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	2.64	2.21	1.42
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	1.10	1.59	1.23
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	1.77	1.67	0.94
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	1.13	1.40	0.34
16	1.59	1.05	0.46	0.34	0.00	0.00	0.00	0.04	0.24	0.36	0.00	0.11	1.06	0.18	0.14	0.29	0.74	2.32	0.46	2.07	0.91
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	0.44	0.55	0.58
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	0.26	0.55	0.19
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	0.23	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.05	0.00	0.06	0.00	0.29
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
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	0.06	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	1.15	3.20	0.03
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	795.75	615.03	852.60
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	194.94	214.32	324.76
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	56.06	44.22	38.24
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	8.16	10.03	5.91

Table 14. Abundance index (millions) at age for A. plaice in Div. 3O from Canadian fall surveys from 1990 to 2010.

Age/Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
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	0.00	0.00	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	99.68	139.86	20.11
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	375.72	122.36	204.61
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	81.82	274.80	115.28
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	167.21	54.22	158.28
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	193.42	86.29	44.19
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	48.93	91.38	41.13
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	43.09	27.79	18.97
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	27.88	22.71	6.81
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	12.73	18.88	5.80
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	6.41	5.12	6.28
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	1.14	4.78	2.95
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	0.69	0.47	1.28
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	0.56	0.75	0.98
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	0.48	0.27	0.64
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	0.73	0.31	1.13
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	0.77	0.54	0.00
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	0.08	0.53	0.00
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	0.00	0.16	0.49
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	0.00	0.09	0.51
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	0.04	0.00	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	0.07	0.00	0.00	0.08	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	0.00	0.00	0.00
unk	0.17	1.31	0.13	1.45	0.00	0.00	0.00	0.37	0.81	1.20	0.09	0.10	0.00	0.25	0.92	0.20	1.51	0.54	1.76	4.46	0.77
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	1063.15	855.87	630.21
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	143.53	173.87	86.96
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	23.63	31.99	20.05
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	3.35	3.21	5.02

Table 15. Abundance index (millions) at age for A. plaice in Div. 3LNO from Canadian fall surveys from 1990 to 2010.

Age/Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
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	0.72	2.16	0.42
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	170.00	219.84	87.32
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	619.24	319.87	432.36
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	176.62	94.50	165.55	265.55	177.56	193.18	463.85	392.66
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	274.14	251.26	114.07	106.89	328.50	356.21	172.98	521.64
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	325.07	251.20	170.46	74.28	118.06	515.63	229.21	199.02
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	85.38	173.88	196.94	141.13	67.98	146.42	230.66	254.50
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	49.09	55.97	131.95	138.30	128.43	117.52	78.37	134.87
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	34.99	25.13	38.04	108.77	121.17	103.65	52.18	46.58
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	18.96	19.45	13.81	26.31	74.10	69.11	41.57	28.16
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	12.33	9.85	13.23	9.19	24.41	28.22	21.31	36.53
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	11.00	5.94	7.26	10.46	9.05	8.28	14.41	11.62
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	6.32	4.16	5.10	9.92	8.62	4.66	3.75	4.61
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	1.79	2.16	4.83	5.59	2.72	2.59	3.08	3.41
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	0.83	1.21	3.32	3.62	4.87	2.69	2.35	2.95
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	2.38	1.93	1.83
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	1.55	2.71	1.63
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	0.65	1.23	0.94
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	0.70	0.73	1.06
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	0.23	0.09	0.51
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	0.10	0.28	0.16	0.00	0.29
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	0.05	0.00	0.00	0.07	0.00	0.00	0.08	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	0.06	0.00	0.00
unk	0.64	1.38	1.86	1.65	0.09	1.77	0.00	1.05	1.20	1.28	0.27	0.74	0.30	0.49	13.08	0.42	2.02	2.01	3.15	9.83	1.11
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	2346.98	1871.71	2164.03
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	221.95	298.38	417.74	462.41	453.23	488.86	454.44	529.50
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	52.50	43.40	50.81	74.21	135.66	121.27	93.23	93.55
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	10.21	8.16	16.51	28.25	28.10	15.66	15.95	17.23
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	0.79	0.75	0.76
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	0.05	0.05	0.04

Table 16. Canadian catches of A. plaice by Division, month, and gear during 2010.

	3L		3N	3O	3LNO
	OT	Gillnet	OT	OT	Total
Jan			14	1	15
Feb			24		24
Mar	3		19		22
Apr			86		86
May	8		358	19	385
Jun	6		47	111	164
Jul					
Aug		1		8	9
Sep			64	11	75
Oct			38	5	43
Nov			52	64	116
Dec	23		111	78	212
Total	**40**	**1**	**813**	**297**	**1151**

Summaries:

GN=1
OT=1150

3L=41
3N=813
3O=297

By-catch in directed yellowtail fishery = 1119
By-catch in directed G.halibut fishery = 31
By-catch in other directed fisheries = 1

Table 17. 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 2010. S.O.P. is sum of products of catch numbers x mean weights.

					2010			3LNO	
Age	3L	3N	3O	Total	Pctg	Mean len	Mean wgt	S.O.P. (t)	
4				11	0.62	29.7	0.224	2.5	
5				43	2.41	33.2	0.330	0.1	
6				309	17.34	35.9	0.426	131.6	
7				370	20.76	37.6	0.496	183.5	
8	Sampling data not			255	14.31	38.4	0.529	134.9	
9	adequate to allow			181	10.16	41.0	0.655	118.6	
10	catch at age to be			263	14.76	42.1	0.720	189.4	
11	calced by Division in			120	6.73	43.4	0.795	95.4	
12	2010			67	3.76	47.8	1.091	73.1	
13				50	2.81	49.6	1.244	62.2	
14				38	2.13	53.7	1.614	61.3	
15				36	2.02	52.6	1.492	53.7	
16				20	1.12	56.1	1.865	37.3	
17				8	0.45	58.4	2.104	16.8	
18				6	0.34	59.1	2.176	13.1	
19				5	0.28	60.8	2.427	12.1	
Total				1782	100.00			1186	**1.03 SOP/catch**
							catch=	1151	

Table 18. Catch at age for all fleets Div. 3LNO American plaice for 2010. Note that total catch adjusted for catch with no length frequencies.

	2010																				
	Spain				Portugal				Canada				Overall (LF data available)				Russia	Estonia	Lithuania	France (SP)	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.					
1	0	0.0	0.000	0	0	0.0	0.000	0					0	0.0	0.000	0					0
2	1630	15.6	0.026	42	0	0.0	0.000	0					1630	15.6	0.026	42					2
3	6374	18.2	0.043	276	354	23.7	0.105	37					6727	18.6	0.047	313					7
4	53594	24.9	0.122	6544	9919	26.6	0.153	1521	11000	29.7	0.224	2464	74513	26.0	0.141	10529					78
5	60282	26.9	0.158	9509	14193	28.0	0.182	2579	43000	33.2	0.330	14190	117475	29.8	0.224	26278					123
6	280511	29.2	0.210	58772	132123	31.2	0.259	34281	309000	35.9	0.426	131634	721634	32.9	0.311	224686					756
7	370113	31.5	0.269	99425	309835	33.6	0.332	102904	370000	37.6	0.496	183520	1049948	34.6	0.367	385849					1099
8	145017	35.0	0.381	55266	150849	35.9	0.414	62384	255000	38.4	0.529	134895	550867	37.0	0.458	252545					577
9	129749	36.0	0.417	54059	125985	37.2	0.468	58945	181000	41.0	0.655	118555	436735	38.7	0.530	231559					457
10	115974	40.8	0.636	73797	101844	40.4	0.612	62315	263000	42.1	0.720	189360	480818	41.6	0.677	325473					503
11	91734	43.3	0.770	70609	77675	42.2	0.709	55108	120000	43.4	0.795	95400	289409	43.2	0.764	221117					303
12	115534	45.7	0.927	107141	76201	45.7	0.923	70317	67000	47.8	1.091	73097	258735	46.3	0.968	250554					271
13	42583	46.9	1.004	42772	26257	46.3	0.965	25335	50000	49.6	1.244	62200	118840	48.1	1.096	130307					124
14	23125	54.1	1.622	37502	10372	51.1	1.344	13937	38000	53.7	1.614	61332	71497	53.7	1.577	112771					75
15	27719	54.9	1.697	47031	9839	52.9	1.499	14751	36000	52.6	1.492	53712	73559	53.6	1.570	115495					77
16	68748	57.3	1.963	134980	17020	52.0	1.416	24107	20000	56.1	1.865	37300	105768	56.4	1.857	196387					111
17	44329	58.7	2.129	94396	4563	54.3	1.641	7488	8000	58.4	2.104	16832	56892	58.4	2.087	118715					60
18	15457	57.8	2.020	31228	2412	54.3	1.642	3960	6000	59.1	2.176	13056	23868	57.8	2.021	48244					25
19	14393	58.0	2.039	29345	2722	52.6	1.472	4008	5000	60.8	2.427	12135	22115	58.1	2.057	45488					23
20	0	0.0	0.000	0	0	0.0	0.000	0					0	0.0	0.000	0					0
21	0	0.0	0.000	0	0	0.0	0.000	0					0	0.0	0.000	0					0
22	0	0.0	0.000	0	0	0.0	0.000	0					0	0.0	0.000	0					0
23	5908	58.5	2.101	12412	11	58.5	2.101	23					5919	58.5	2.101	12436					6
UNK	45218	59.8	2.253	101894	0	0.0	0.000	0					45218	59.8	2.253	101894					47
Total SOP				1067000				544000				1199682				2810682					1.05
Catch				1067000				544000				1155000					41000	5000	6000	80000	

Table 19. Numbers at age of American plaice from the (a) Canadian spring RV survey (1985-2010; no 2006), (b) Canadian fall RV survey (1990-2010; no 2004) and (c) EU-Spain Div. 3NO survey (1998-2010).

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
2009.5	72.302	130.149	44.734	34.017	36.716	24.987	16.124	6.078	1.739	1.933
2010.5	85.360	146.905	138.157	40.600	28.065	18.356	12.122	8.913	3.263	1.226

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
2008.9	515.631	146.418	117.517	103.649	69.111	28.220	8.278	4.662	2.591	2.692
2009.9	229.210	230.664	78.367	52.176	41.569	21.308	14.410	3.746	3.075	2.354
2010.9	199.016	254.503	134.868	46.580	28.162	36.532	11.623	4.611	3.405	2.951

c. EU-Spain Div. 3NO survey

Span	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
2009.5	50.506	97.163	35.078	19.649	17.171	23.130	20.538	8.018	1.498	1.107
2010.5	43.498	108.879	141.001	29.712	13.661	9.556	9.441	11.109	3.499	1.338

Table 20. Catch at age used in the virtual population analyses. Age 15 is a plus group. Please note there have been some corrections to the catch at age in the most recent years.

Catch	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	53.9	73.3	375.1	627.6	738.8	366.3	283.3	249.6	247.8	247.3	564.6
2008	82.3	136.2	292.8	722.4	736.4	511.0	226.9	198.8	111.5	101.3	227.8
2009	189.3	689.5	544.6	691.0	787.2	645.5	472.2	214.3	88.4	87.3	356.0
2010	123.0	755.5	1099.3	576.7	457.2	503.4	303.0	270.9	124.4	74.9	301.7

Table 21. Stock 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	1.862
2007	0.215	0.225	0.336	0.469	0.580	0.679	0.813	1.111	1.211	1.382	1.708
2008	0.171	0.260	0.344	0.476	0.587	0.718	0.841	1.097	1.315	1.476	1.629
2009	0.141	0.218	0.306	0.411	0.528	0.658	0.804	0.964	1.332	1.452	1.713
2010	0.209	0.239	0.301	0.387	0.480	0.594	0.715	0.872	1.042	1.456	1.677
2011	0.174	0.239	0.317	0.425	0.532	0.657	0.787	0.978	1.230	1.461	1.673

Table 22. 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	0.020	0.066	0.137	0.463	0.779	0.979	0.998	1.000	0.997	1.000	1.000
2000	0.008	0.074	0.217	0.488	0.797	0.900	0.995	1.000	1.000	0.999	1.000
2001	0.045	0.044	0.245	0.521	0.851	0.947	0.959	0.999	1.000	1.000	1.000
2002	0.052	0.145	0.213	0.567	0.810	0.972	0.988	0.983	1.000	1.000	1.000
2003	0.081	0.155	0.382	0.614	0.841	0.943	0.995	0.997	0.993	1.000	1.000
2004	0.018	0.198	0.379	0.692	0.903	0.955	0.985	0.999	0.999	0.997	1.000
2005	0.054	0.060	0.409	0.669	0.891	0.982	0.989	0.996	1.000	1.000	0.999
2006	0.013	0.135	0.185	0.660	0.870	0.967	0.997	0.997	0.999	1.000	1.000
2007	0.010	0.054	0.301	0.445	0.845	0.957	0.991	0.999	0.999	1.000	1.000
2008	0.015	0.050	0.199	0.543	0.739	0.939	0.987	0.997	1.000	1.000	1.000
2009	0.013	0.072	0.220	0.517	0.766	0.909	0.977	0.996	0.999	1.000	1.000
2010	0.013	0.059	0.284	0.602	0.822	0.900	0.973	0.992	0.999	1.000	1.000
2011	0.013	0.059	0.234	0.670	0.890	0.952	0.961	0.992	0.997	1.000	1.000

Table 23. Results of ADAPT for Div. 3LNO American plaice using Canadian Div. 3LNO spring and fall surveys and EU-Spain Div. 3NO survey.

ORTHOGONALITY OFFSET 0.000307
MEAN SQUARE RESIDUALS 0.292907

Parameter	Estimate	Standard Error	Bias	Rel. Err.	Rel.Bias
N[2011 6]	2.268E+04	7.335E+03	1.208E+03	0.323	0.053
N[2011 7]	2.333E+04	5.453E+03	6.490E+02	0.234	0.028
N[2011 8]	2.837E+04	5.505E+03	5.448E+02	0.194	0.019
N[2011 9]	9.491E+03	1.655E+03	1.443E+02	0.174	0.015
N[2011 10]	4.822E+03	8.367E+02	6.850E+01	0.174	0.014
N[2011 11]	5.636E+03	9.166E+02	6.926E+01	0.163	0.012
N[2011 12]	4.519E+03	7.125E+02	5.164E+01	0.158	0.011
N[2011 13]	3.923E+03	5.943E+02	4.095E+01	0.151	0.010
N[2011 14]	1.053E+03	1.782E+02	1.251E+01	0.169	0.012
N[2011 15]	1.154E+03	2.090E+02	1.201E+01	0.181	0.010
q ID#[1]	7.862E-03	9.824E-04	5.366E-05	0.125	0.007
q ID#[2]	9.276E-03	1.148E-03	6.294E-05	0.124	0.007
q ID#[3]	9.515E-03	1.173E-03	6.517E-05	0.123	0.007
q ID#[4]	8.516E-03	1.048E-03	5.866E-05	0.123	0.007
q ID#[5]	7.568E-03	9.320E-04	5.284E-05	0.123	0.007
q ID#[6]	6.061E-03	7.471E-04	4.262E-05	0.123	0.007
q ID#[7]	5.734E-03	7.096E-04	4.061E-05	0.124	0.007
q ID#[8]	6.065E-03	7.562E-04	4.388E-05	0.125	0.007
q ID#[9]	5.857E-03	7.381E-04	4.380E-05	0.126	0.007
q ID#[10]	6.650E-03	8.509E-04	5.242E-05	0.128	0.008
q ID#[11]	3.274E-03	3.633E-04	1.751E-05	0.111	0.005
q ID#[12]	5.090E-03	5.606E-04	2.714E-05	0.110	0.005
q ID#[13]	6.171E-03	6.773E-04	3.312E-05	0.110	0.005
q ID#[14]	6.043E-03	6.621E-04	3.274E-05	0.110	0.005
q ID#[15]	5.656E-03	6.198E-04	3.117E-05	0.110	0.006
q ID#[16]	4.364E-03	4.783E-04	2.413E-05	0.110	0.006
q ID#[17]	4.289E-03	4.710E-04	2.385E-05	0.110	0.006
q ID#[18]	4.659E-03	5.138E-04	2.618E-05	0.110	0.006
q ID#[19]	4.386E-03	4.874E-04	2.528E-05	0.111	0.006
q ID#[20]	4.548E-03	5.105E-04	2.711E-05	0.112	0.006
q ID#[21]	1.966E-03	3.097E-04	2.159E-05	0.158	0.011
q ID#[22]	2.800E-03	4.349E-04	3.003E-05	0.155	0.011
q ID#[23]	3.377E-03	5.211E-04	3.606E-05	0.154	0.011
q ID#[24]	3.629E-03	5.582E-04	3.896E-05	0.154	0.011
q ID#[25]	4.243E-03	6.524E-04	4.612E-05	0.154	0.011
q ID#[26]	3.834E-03	5.904E-04	4.206E-05	0.154	0.011
q ID#[27]	3.932E-03	6.079E-04	4.359E-05	0.155	0.011
q ID#[28]	4.630E-03	7.221E-04	5.245E-05	0.156	0.011
q ID#[29]	3.539E-03	5.597E-04	4.165E-05	0.158	0.012
q ID#[30]	3.502E-03	5.640E-04	4.337E-05	0.161	0.012

Table 24. Bias adjusted population numbers (000 t) from VPA.

Pop #s Bias Adj(	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	134134	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	276669	239899	184647	149745	91877	54031	28301	15376	8729	5515	5353
1977	232207	225762	192884	143251	105155	60285	33145	15701	7966	4437	4829
1978	218531	189235	178768	150029	106705	73876	39317	21271	9032	4396	4791
1979	200742	177511	150899	138065	113454	75878	47994	23261	11295	4125	3351
1980	193531	163218	139420	111343	96149	79394	50864	31382	15646	7589	4956
1981	188504	158212	130944	105549	79823	66010	52211	31495	18428	9455	7943
1982	191291	154195	129033	105178	82097	58212	43760	30561	15155	7327	5105
1983	189876	156592	125961	104005	81781	59151	36118	21673	12089	5332	3808
1984	191500	155350	127311	100371	79921	59435	41485	21937	11007	5790	3688
1985	187436	156744	126831	102864	79188	60154	39696	22404	9942	4483	4080
1986	159640	153192	127619	101708	79118	55199	35110	19487	10084	4465	3649
1987	142013	126723	116665	93165	71980	52738	32727	16001	6714	2973	2386
1988	162031	114250	99292	88578	66460	44665	27364	16575	6857	2750	2288
1989	189402	130034	90639	76913	65966	45296	27287	14102	8160	3204	2231
1990	184794	101857	67824	44749	38008	28224	17441	9823	4625	3290	1908
1991	92066	97350	54145	36531	22870	15898	10180	5503	3100	1466	1949
1992	62591	49581	48156	25973	14546	7648	4516	2769	1554	1220	1377
1993	54138	36729	28409	26386	12734	5863	2899	1542	981	490	727
1994	60540	30978	18821	10176	7037	3308	1019	386	195	196	99
1995	55768	32375	15346	7044	2721	2097	1396	252	108	28	112
1996	37037	32750	18818	8690	3894	1448	1185	812	145	63	82
1997	24403	21663	18714	10339	4773	2133	813	689	472	84	84
1998	22392	19962	17614	14831	7816	3538	1611	581	513	362	135
1999	22313	18323	16294	14175	11450	5674	2486	1068	370	358	346
2000	14812	18245	14844	13098	11083	8446	3674	1472	625	191	506
2001	11827	12113	14733	11497	9898	7774	5536	2129	820	337	427
2002	16360	9583	9618	11035	8140	6678	4930	3271	1146	463	449
2003	32167	13113	7567	7324	7694	5375	4493	3083	2133	755	636
2004	26042	25242	9849	5201	4461	4508	3321	2780	1735	1424	880
2005	24360	21009	18953	6968	3387	2677	2780	2053	1744	1132	1593
2006	16094	19892	16940	14616	4945	2073	1670	1793	1373	1194	1845
2007	23100	13108	16080	13294	11463	3626	1378	1087	1241	935	2134
2008	53530	18864	10666	12826	10318	8718	2638	874	665	793	1783
2009	35055	43752	15321	8468	9849	7783	6677	1956	537	444	1812
2010	26358	28530	35199	12052	6310	7354	5790	5041	1408	360	1449
2011	36708	21469	22676	27826	9347	4754	5567	4467	3882	1041	1142

Table 25. 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	0.511	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	1.021	1.024	1.024
1987	0.018	0.044	0.075	0.138	0.277	0.456	0.480	0.647	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	0.090	0.121	0.176	0.175	0.319	0.424	0.492	0.585	0.378	0.517	0.517
1990	0.111	0.102	0.089	0.141	0.342	0.490	0.623	0.623	0.619	0.451	0.451
1991	0.089	0.174	0.205	0.391	0.565	0.729	0.772	0.734	0.402	0.378	0.378
1992	0.003	0.027	0.072	0.183	0.379	0.440	0.545	0.508	0.625	0.743	0.743
1993	0.028	0.139	0.497	0.792	0.818	1.220	1.487	1.540	1.082	1.978	1.978
1994	0.096	0.172	0.453	0.789	0.681	0.332	0.866	0.747	1.406	0.436	0.436
1995	0.002	0.013	0.039	0.063	0.101	0.041	0.013	0.021	0.001	0.005	0.005
1996	0.006	0.030	0.069	0.069	0.072	0.047	0.011	0.013	0.021	0.021	0.021
1997	0.001	0.007	0.033	0.080	0.099	0.080	0.135	0.095	0.063	0.019	0.019
1998	0.001	0.003	0.017	0.059	0.120	0.153	0.211	0.251	0.160	0.162	0.162
1999	0.001	0.011	0.018	0.046	0.104	0.235	0.324	0.336	0.464	0.130	0.130
2000	0.001	0.014	0.055	0.080	0.155	0.222	0.346	0.385	0.419	0.291	0.291
2001	0.010	0.031	0.089	0.145	0.194	0.256	0.326	0.419	0.372	0.329	0.329
2002	0.021	0.036	0.072	0.161	0.215	0.196	0.269	0.227	0.217	0.161	0.161
2003	0.042	0.086	0.175	0.296	0.335	0.282	0.280	0.375	0.204	0.258	0.258
2004	0.015	0.087	0.146	0.229	0.311	0.284	0.281	0.266	0.227	0.169	0.169
2005	0.003	0.015	0.060	0.143	0.291	0.272	0.238	0.202	0.179	0.190	0.190
2006	0.005	0.013	0.042	0.043	0.110	0.208	0.230	0.168	0.185	0.154	0.154
2007	0.003	0.006	0.026	0.053	0.074	0.118	0.256	0.291	0.248	0.343	0.343
2008	0.002	0.008	0.031	0.064	0.082	0.067	0.100	0.288	0.204	0.152	0.152
2009	0.006	0.018	0.040	0.094	0.092	0.096	0.081	0.129	0.200	0.243	0.243
2010	0.005	0.030	0.035	0.054	0.083	0.078	0.059	0.061	0.102	0.260	0.260

Table 26. 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	1467	5345	8631	14329	17485	17710	12039	7337	6815
1983	63	158	2416	7048	19146	21630	17314	12866	9878	5782	5713
1984	17	417	1460	10698	22163	29599	25457	15815	9762	6752	6029
1985	168	211	2981	9971	24659	30713	25958	18696	10942	6475	7814
1986	95	688	2107	14764	29736	30027	24270	17430	12016	6978	7566
1987	127	863	3627	13789	26116	30465	24035	14721	7877	4455	4807
1988	53	502	4878	15377	27832	23658	19408	15418	8417	4289	4718
1989	20	236	1791	13287	24492	24494	18913	12817	9971	5036	4617
1990	51	151	853	4146	14366	15814	12986	9675	6091	5582	3909
1991	90	266	905	3119	7452	10040	8530	6073	4581	2756	4335
1992	15	266	935	2601	4285	4505	3852	3030	2194	2204	3206
1993	24	70	655	2196	3730	2903	2057	1426	1182	718	1460
1994	132	155	307	848	1844	1852	720	347	226	283	178
1995	695	576	754	906	810	1364	1515	308	141	52	199
1996	39	1098	1722	2102	1749	984	1218	1179	236	133	193
1997	17	164	1735	2751	2382	1552	740	814	721	161	219
1998	54	85	717	3007	3530	2212	1295	566	646	628	272
1999	67	257	505	2075	3668	3070	1670	919	393	485	627
2000	14	322	1010	2300	3927	4301	2618	1318	717	258	889
2001	98	123	1244	2548	3940	4299	3982	1982	954	468	763
2002	158	372	730	2722	3358	3773	3518	3025	1292	650	783
2003	543	555	1065	1994	3502	3228	3398	2900	2545	1063	1197
2004	82	1397	1392	1683	2295	3054	2739	2712	2087	2180	1740
2005	218	348	2993	2265	1753	1864	2354	2069	2127	1654	3073
2006	26	612	1178	4801	2525	1378	1459	1782	1657	1810	3435
2007	49	160	1624	2772	5618	2357	1110	1207	1501	1292	3644
2008	136	246	730	3310	4478	5875	2189	956	875	1170	2904
2009	62	685	1033	1800	3981	4656	5249	1877	714	645	3105
2010	69	401	3008	2809	2490	3933	4026	4361	1466	524	2429
2011	80	302	1684	7921	4423	2972	4211	4333	4761	1520	1910

Table 27. Retrospective comparison (one year) of bias adjusted N at age from ADAPT. Table entries indicate the percent change from the current assessment to values obtained by running the assessment with the most recent year removed (model formulation unchanged). Changes of greater than 10% are highlighted.

Retro Matrix	5	6	7	8	9	10	11	12	13	14	15
1960	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1961	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1962	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1963	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1964	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1965	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1966	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1967	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1968	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1969	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1970	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1971	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1972	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1973	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1974	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1975	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1976	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1977	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1978	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1979	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1980	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1981	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1982	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1983	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1984	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1985	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1986	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1987	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1988	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1989	0.003	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
1990	0.003	0.004	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000
1991	0.003	0.003	0.004	0.001	0.001	0.000	0.001	0.001	0.001	0.001	0.001
1992	0.006	0.003	0.004	0.005	0.002	0.001	0.001	0.003	0.001	0.001	0.001
1993	0.010	0.006	0.003	0.004	0.006	0.003	0.002	0.001	0.004	0.002	0.002
1994	0.012	0.010	0.007	0.005	0.009	0.013	0.008	0.009	0.005	0.012	0.012
1995	0.022	0.013	0.012	0.011	0.010	0.017	0.018	0.019	0.019	0.019	0.019
1996	0.023	0.022	0.013	0.012	0.012	0.011	0.018	0.018	0.019	0.019	0.019
1997	0.032	0.023	0.023	0.014	0.013	0.013	0.011	0.018	0.019	0.019	0.019
1998	0.032	0.032	0.023	0.024	0.015	0.014	0.014	0.013	0.020	0.020	0.020
1999	0.038	0.032	0.032	0.024	0.025	0.017	0.017	0.017	0.017	0.023	0.023
2000	0.037	0.038	0.032	0.032	0.025	0.028	0.022	0.023	0.023	0.026	0.026
2001	-0.062	0.037	0.038	0.034	0.035	0.029	0.035	0.031	0.034	0.035	0.035
2002	-0.059	-0.063	0.038	0.042	0.039	0.043	0.037	0.048	0.046	0.049	0.049
2003	-0.206	-0.060	-0.065	0.041	0.049	0.048	0.052	0.048	0.061	0.058	0.058
2004	-0.190	-0.215	-0.066	-0.078	0.055	0.069	0.064	0.068	0.070	0.075	0.075
2005	-0.146	-0.193	-0.235	-0.076	-0.098	0.075	0.091	0.084	0.089	0.088	0.088
2006	-0.140	-0.147	-0.196	-0.249	-0.088	-0.131	0.099	0.115	0.103	0.107	0.107
2007	-0.222	-0.141	-0.148	-0.204	-0.260	-0.098	-0.161	0.124	0.136	0.124	0.124
2008	-0.204	-0.223	-0.141	-0.152	-0.216	-0.280	-0.110	-0.208	0.166	0.175	0.175
2009	0.180	-0.205	-0.225	-0.146	-0.162	-0.234	-0.300	-0.122	-0.276	0.203	0.203
2010	-0.419	0.181	-0.208	-0.234	-0.160	-0.178	-0.257	-0.325	-0.138	-0.338	0.259

Table 28. Retrospective comparison (one year) of bias adjusted F at age from ADAPT. Table entries indicate the percent change from the current assessment to values obtained by running the assessment with the most recent year removed (model formulation unchanged). Changes of greater than 10% are highlighted.

Retro Matrix	5	6	7	8	9	10	11	12	13	14	15
1960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1961	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1962	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1963	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1964	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1965	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1966	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1967	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1968	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1969	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1970	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1971	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1972	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1973	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1974	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1975	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1976	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1979	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1981	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1984	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1985	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1986	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1987	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1988	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1989	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1991	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1992	-0.01	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1993	-0.01	-0.01	0.00	-0.01	-0.01	0.00	0.00	0.00	-0.01	-0.01	-0.01
1994	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.01	-0.01	-0.01	-0.02	-0.02
1995	-0.02	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
1996	-0.02	-0.02	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02	-0.02	-0.02	-0.02
1997	-0.03	-0.02	-0.02	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02	-0.02	-0.02
1998	-0.03	-0.03	-0.02	-0.03	-0.02	-0.02	-0.02	-0.01	-0.02	-0.02	-0.02
1999	-0.04	-0.03	-0.03	-0.02	-0.03	-0.02	-0.02	-0.02	-0.02	-0.03	-0.03
2000	-0.04	-0.04	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
2001	0.06	-0.04	-0.04	-0.04	-0.04	-0.03	-0.04	-0.04	-0.04	-0.04	-0.04
2002	0.06	0.06	-0.04	-0.05	-0.05	-0.05	-0.04	-0.06	-0.05	-0.06	-0.06
2003	0.17	0.06	0.07	-0.05	-0.06	-0.06	-0.06	-0.06	-0.07	-0.07	-0.07
2004	0.16	0.18	0.07	0.08	-0.07	-0.09	-0.08	-0.08	-0.09	-0.09	-0.09
2005	0.13	0.16	0.19	0.08	0.10	-0.09	-0.11	-0.10	-0.11	-0.11	-0.11
2006	0.12	0.13	0.17	0.20	0.08	0.13	-0.12	-0.14	-0.13	-0.13	-0.13
2007	0.18	0.12	0.13	0.17	0.21	0.09	0.15	-0.17	-0.18	-0.17	-0.17
2008	0.17	0.18	0.13	0.14	0.18	0.22	0.10	0.19	-0.22	-0.23	-0.23
2009	-0.22	0.17	0.19	0.13	0.15	0.20	0.24	0.11	0.23	-0.30	-0.30

Table 29. Retrospective comparison of 2011 and 2010 maturity ogives. Table entries indicate the percent change from the current assessment to the previous assessment. Changes of greater than 10% are highlighted.

Retro Matrix	5	6	7	8	9	10	11	12	13	14	15
1960	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1961	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1962	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1963	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1964	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1965	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1966	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1967	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1968	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1969	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1970	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1971	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1972	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1973	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1974	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1975	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1976	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1977	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1978	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1979	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1980	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1981	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1982	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1983	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1984	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1985	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1986	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1987	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1988	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1989	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1990	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1991	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1992	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1993	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1994	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1995	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1996	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1997	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1998	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1999	0.204	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2000	0.000	0.126	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2001	-0.011	0.003	0.044	-0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000
2002	-0.011	0.000	0.000	-0.012	-0.001	0.000	0.000	0.000	0.000	0.000	0.000
2003	0.023	0.001	-0.001	-0.001	-0.018	0.000	0.000	0.000	0.000	0.000	0.000
2004	-0.126	0.005	0.001	0.000	0.000	-0.008	0.000	0.000	0.000	0.000	0.000
2005	-0.102	-0.065	-0.012	0.001	0.000	0.000	-0.002	0.000	0.000	0.000	0.000
2006	-0.140	-0.037	-0.013	-0.017	0.000	0.000	0.000	-0.001	0.000	0.000	0.000
2007	-0.224	-0.048	0.009	0.015	-0.011	0.000	0.000	0.000	-0.001	0.000	0.000
2008	-0.934	-0.035	0.004	0.031	0.018	-0.006	0.000	0.000	0.000	0.000	0.000
2009	-1.276	-0.158	0.093	0.029	0.029	0.010	-0.003	0.000	0.000	0.000	0.000
2010	-1.276	-0.412	0.182	0.116	0.022	0.018	0.005	-0.001	0.000	0.000	0.000

Table 30. American plaice in Div. 3LNO: Results of stochastic projections under various fishing mortality options. Labels p5, p50 and p95 refer to 5th, 50th and 95th percentiles of each quantity.

	F = 0		
	SSB ('000 t)		
	p5	p50	p95
2011	29	33	38
2012	36	41	47
2013	42	48	56
2014	46	53	64

	F_{2010} = 0.11					
	SSB ('000 t)			Yield ('000 t)		
	p5	p50	p95	p5	p50	p95
2011	29	33	37	3.2	3.6	4.1
2012	33	37	43	3.7	4.1	4.7
2013	36	41	47	3.9	4.3	4.9
2014	37	42	49			

	$F_{0.1}$ = 0.16					
	SSB ('000 t)			Yield ('000 t)		
	p5	p50	p95	p5	p50	p95
2011	29	33	37	4.5	5.1	5.8
2012	32	36	42	5.0	5.7	6.5
2013	33	38	44	5.1	5.7	6.5
2014	33	38	45			

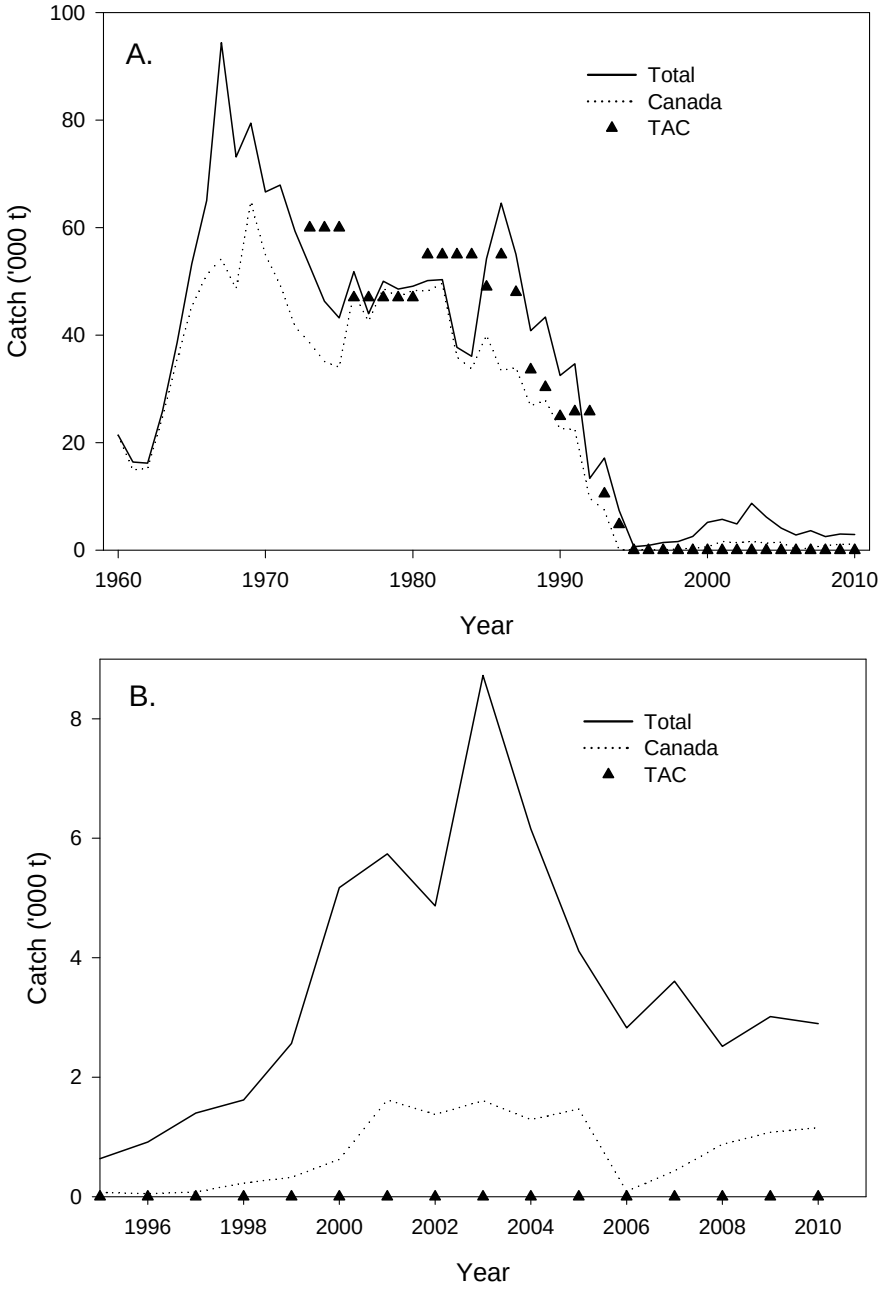


Figure 1. American plaice catches ('000 tons) from 1960 – 2010 (A) and since the moratorium (1995-2010) (B).

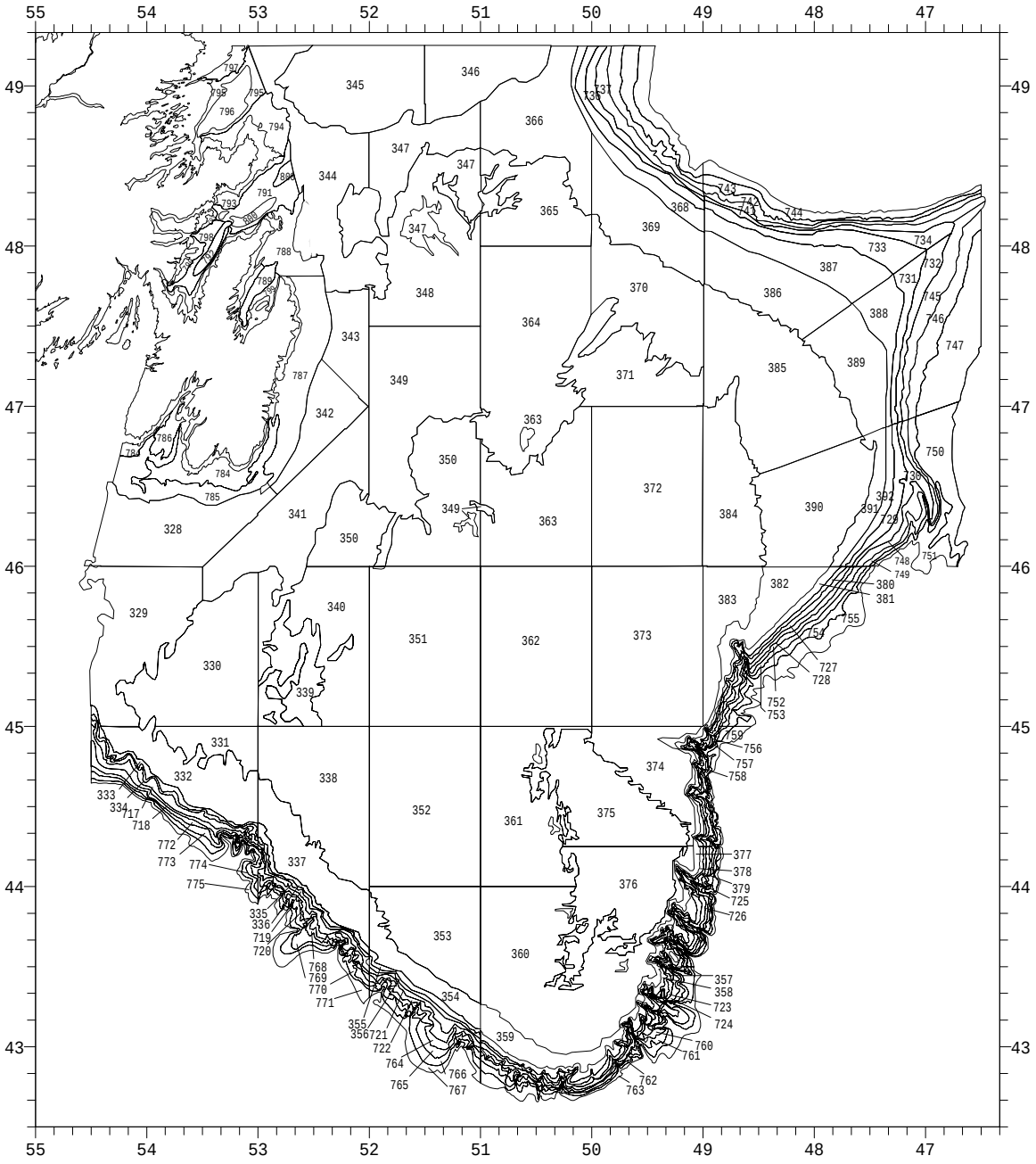


Figure 2. Stratification scheme used in Canadian research vessel surveys of Div. 3LNO.

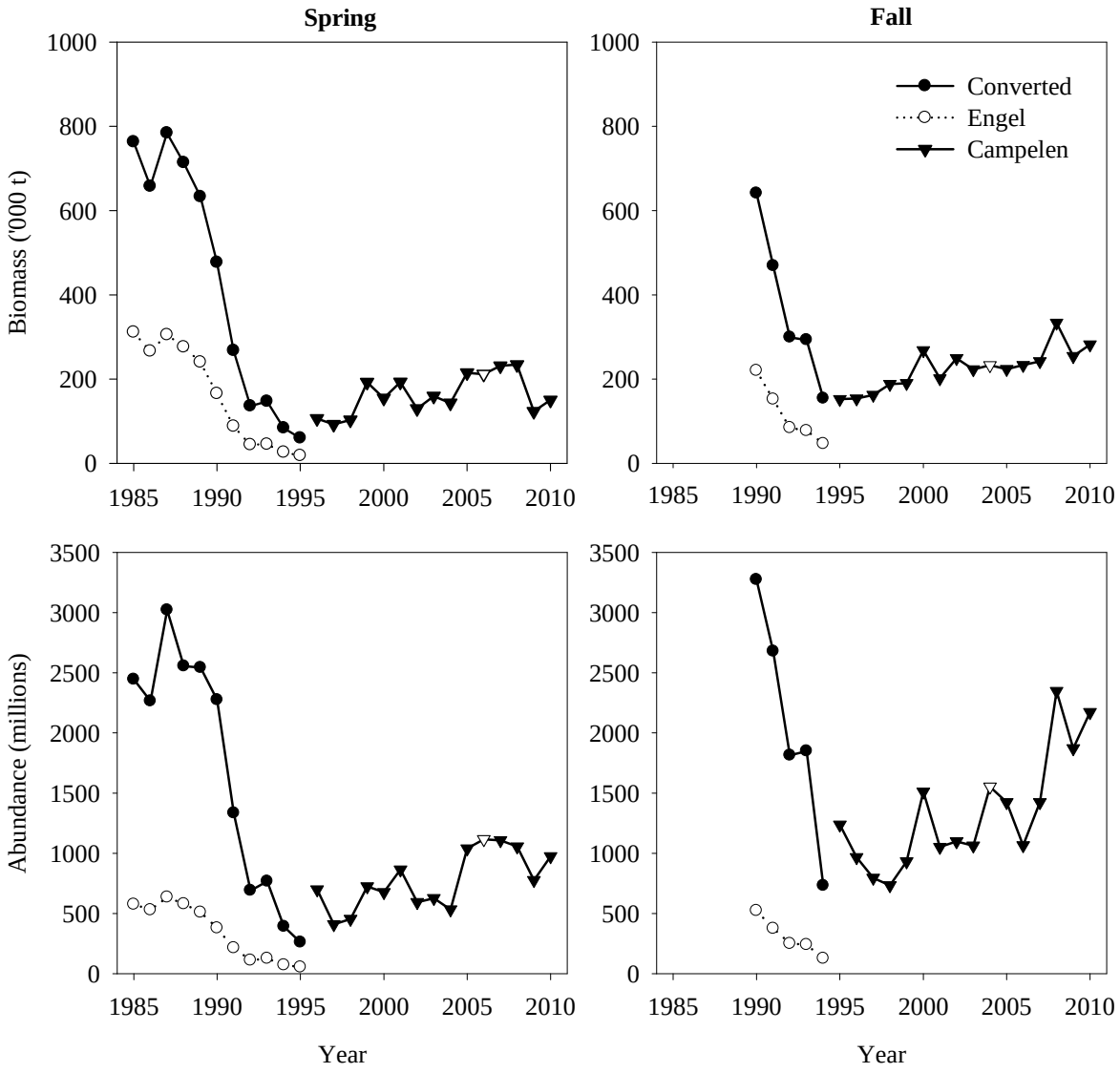


Figure 3. Biomass (top) and abundance (bottom) of American plaice from spring (left) and fall (right) Canadian surveys in Div. 3LNO combined. Note that open symbol represents years when survey coverage was poor.

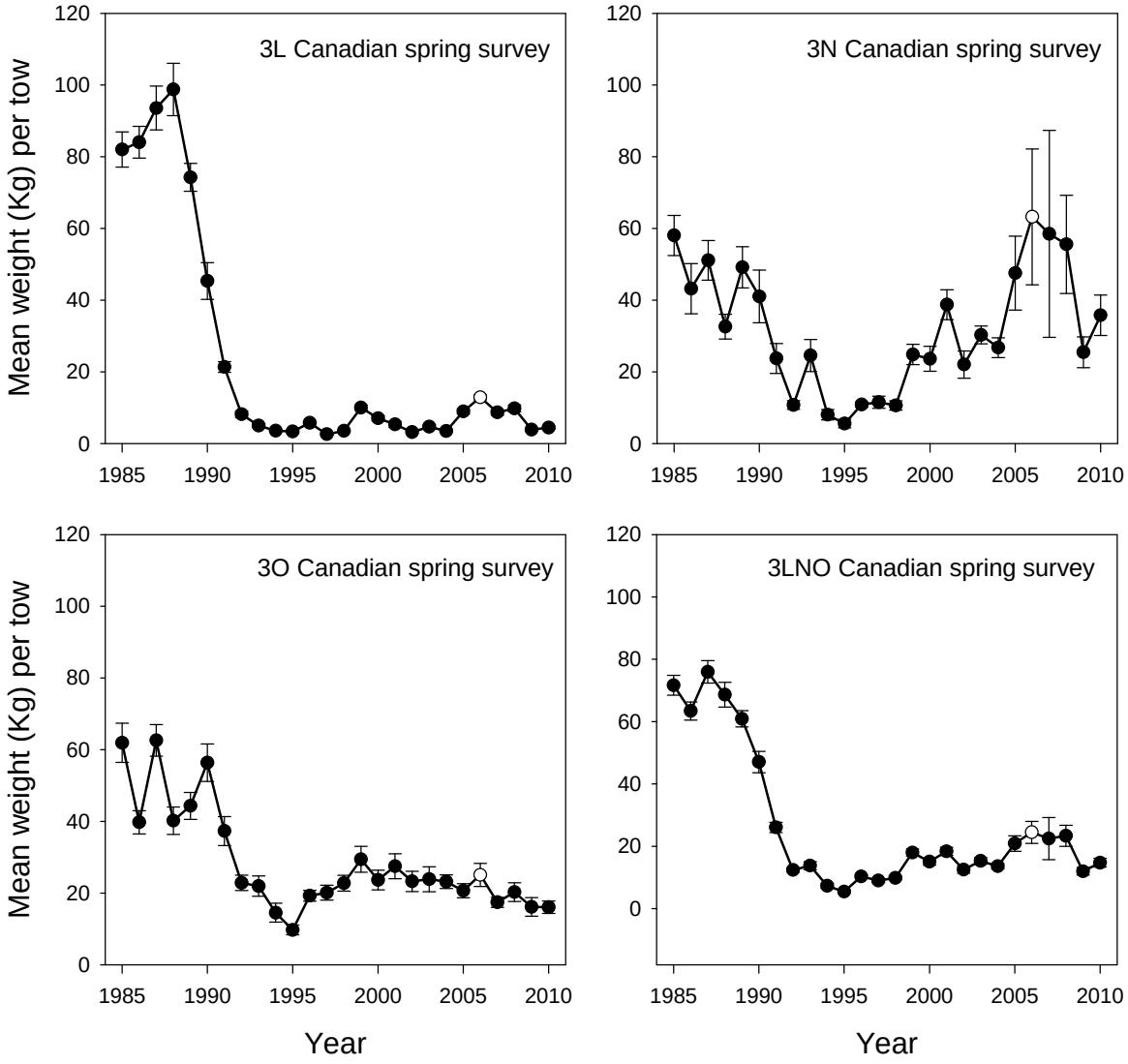


Figure 4. Mean (± 1 Std. dev.) weight per tow (Kg) of American plaice from Canadian spring surveys inDiv. 3L, 3N, 3O and 3LNO combined. Note that open symbol represents years when survey coverage was poor.

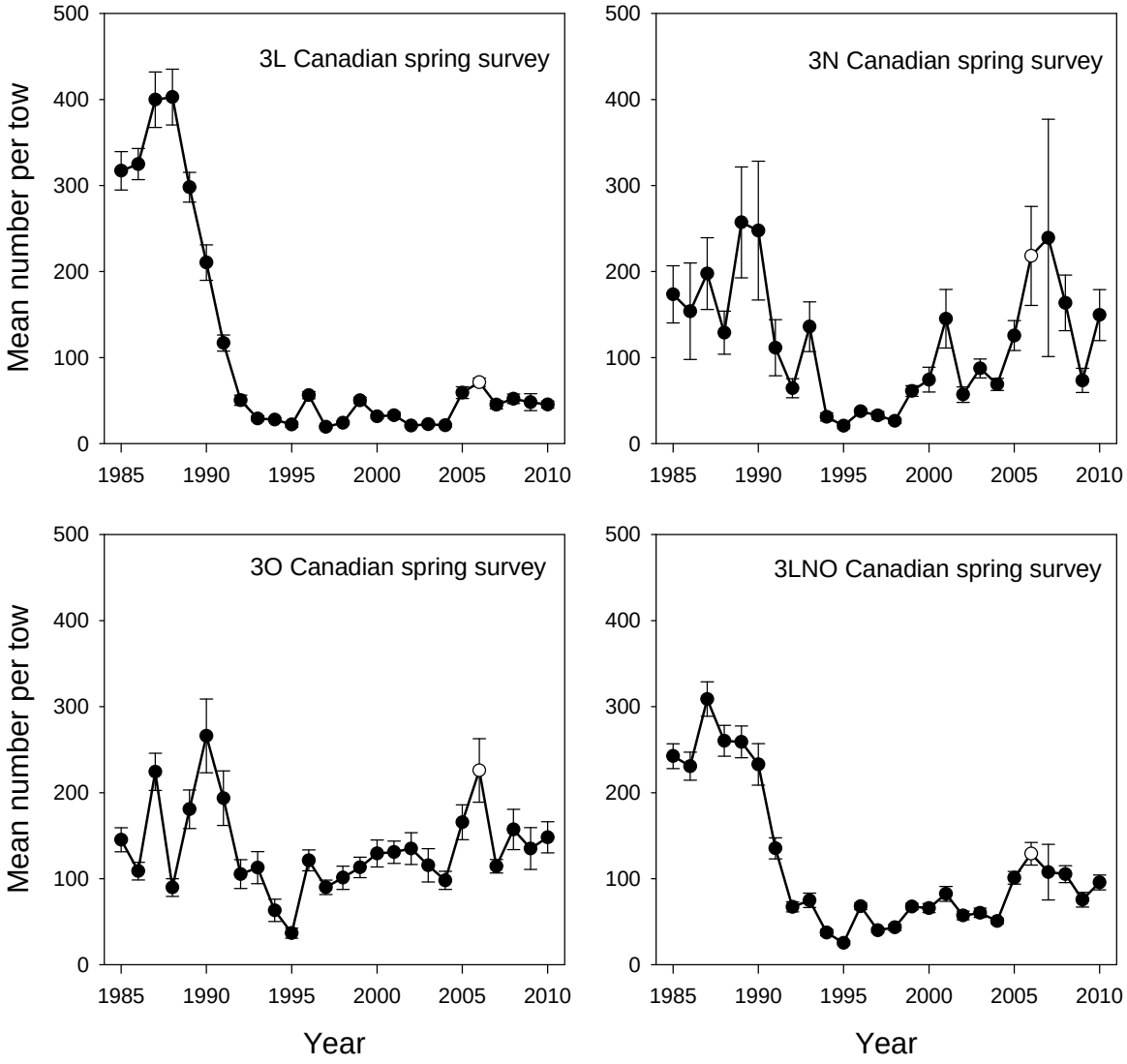


Figure 5. Mean (± 1 Std. Dev.) number per tow of American plaice from Canadian spring surveys of Div. 3L, 3N, 3O and 3LNO combined. Note that open symbol represents years when survey coverage was poor.

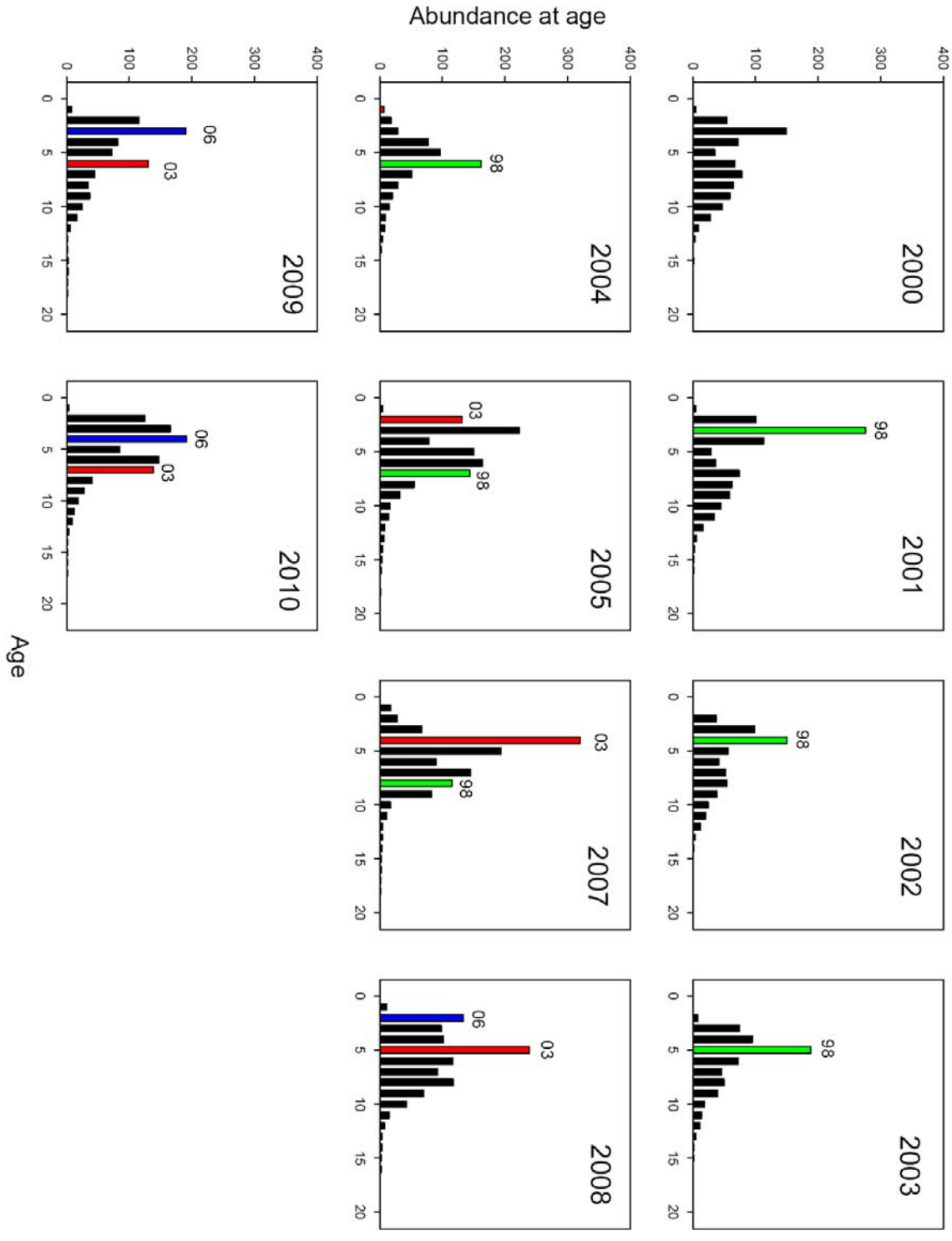


Figure 6. Abundance at age (millions of fish) from 2000 – 2010 in the Canadian spring surveys. Note the survey from 2006 is not present. The 1998, 2003 and 2006 year classes are labelled.

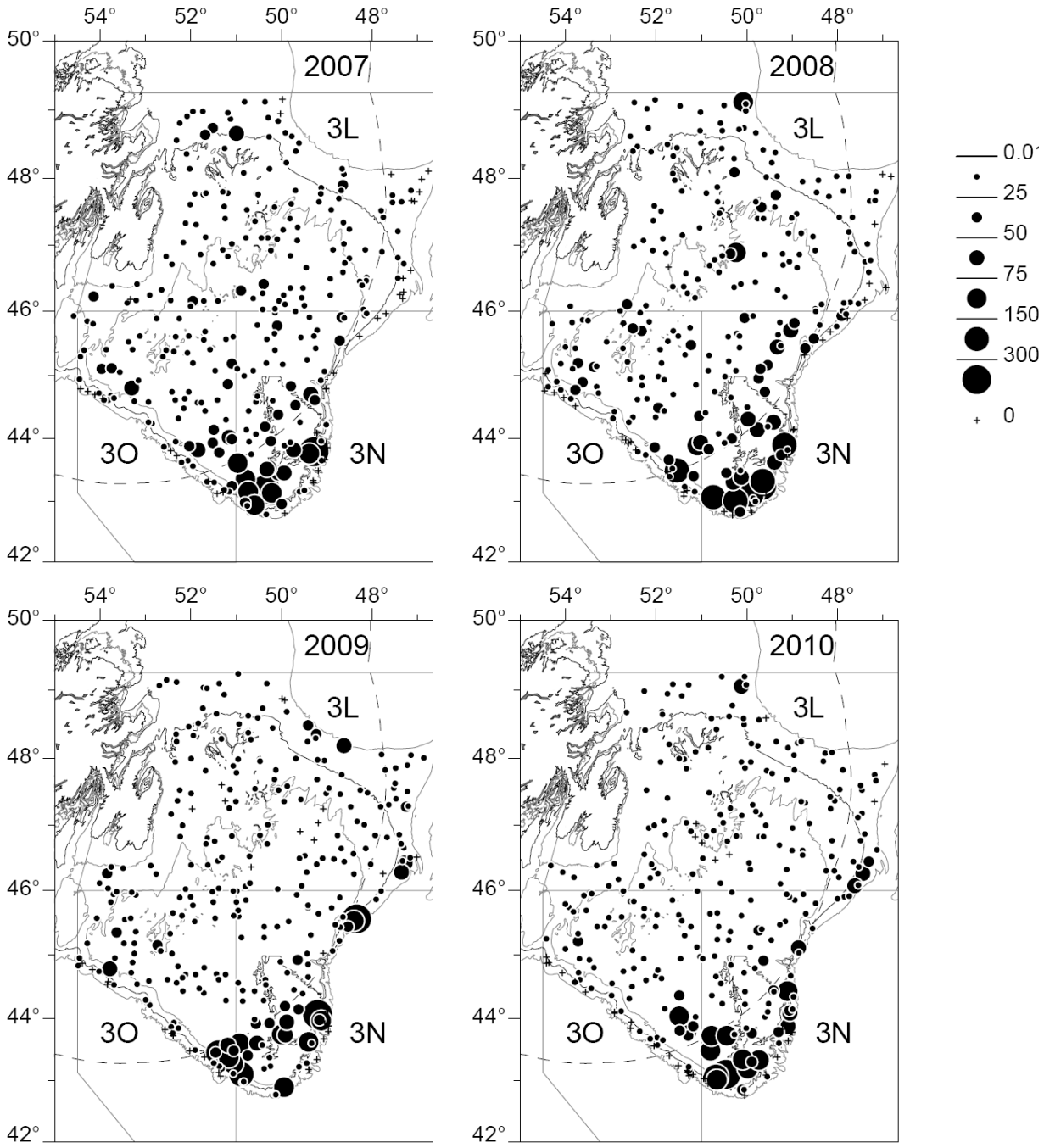


Figure 7. Distribution of American plaice (kg per tow) from Canadian spring surveys in NAFO Divisions 3LNO from 2007-2010. Note survey coverage in 2006 in Div. 3NO.

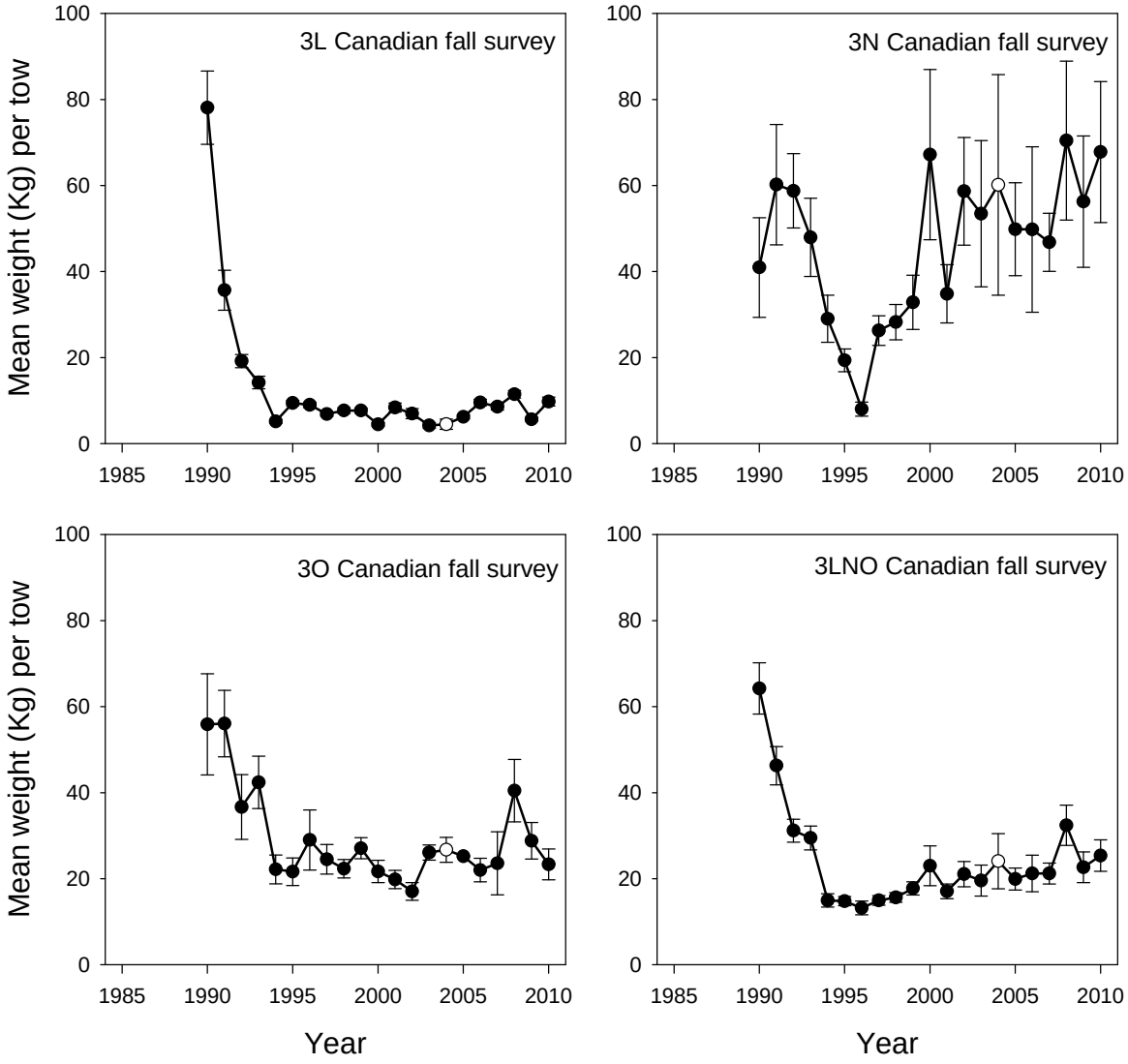


Figure 8. Mean (± 1 Std. Dev.) weight (Kg) per tow of American plaice from Canadian fall surveys in Div. 3L, 3N, 3O and 3LNO combined. Note that open symbol represents years when survey coverage was poor.

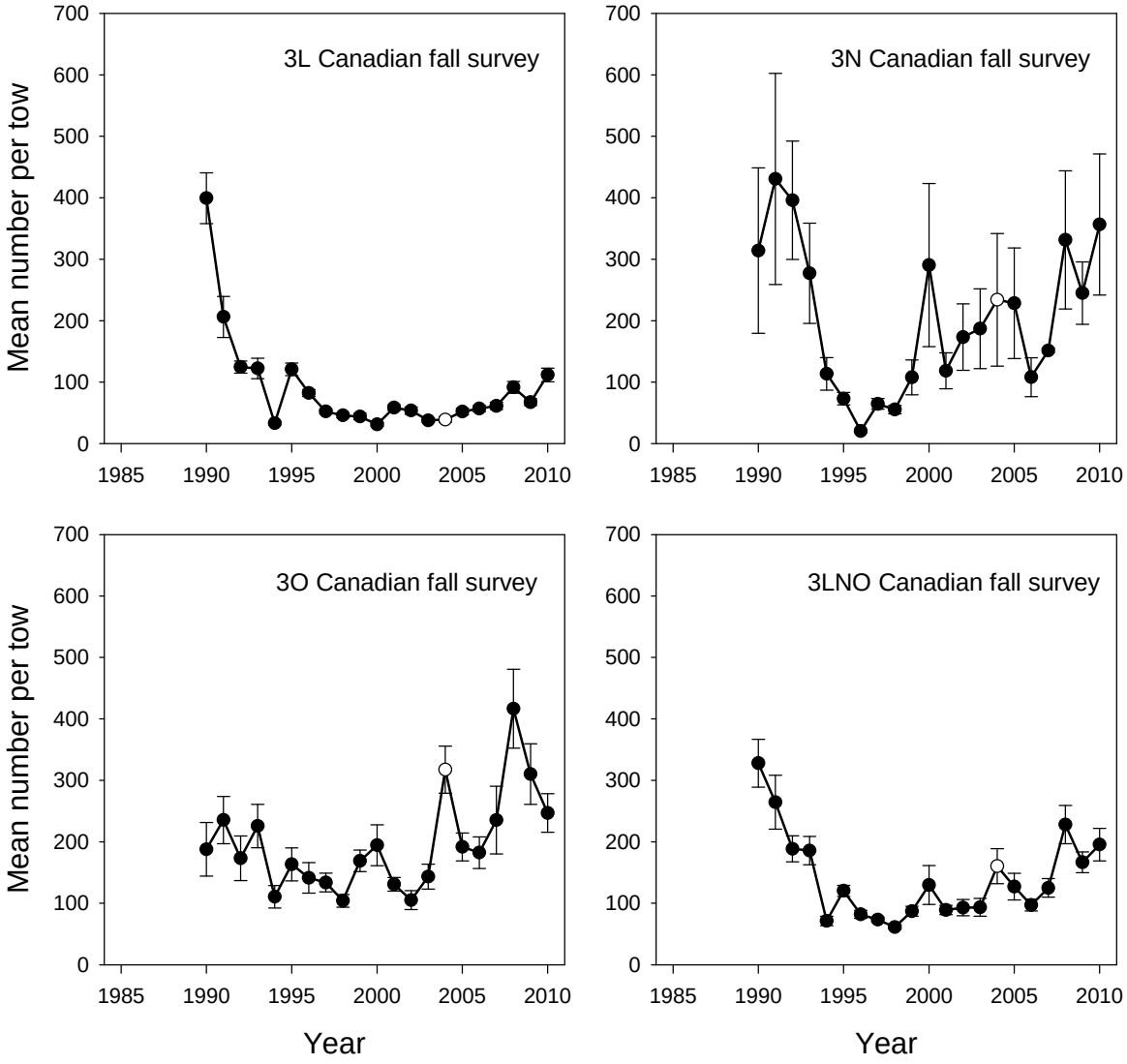


Figure 9. Mean (± 1 Std. Dev.) number per tow of American plaice from Canadian fall surveys of Div. 3L, 3N, 3O and 3LNO combined. Note that open symbol represents years when survey coverage was poor and are not included in 2007 assessment.

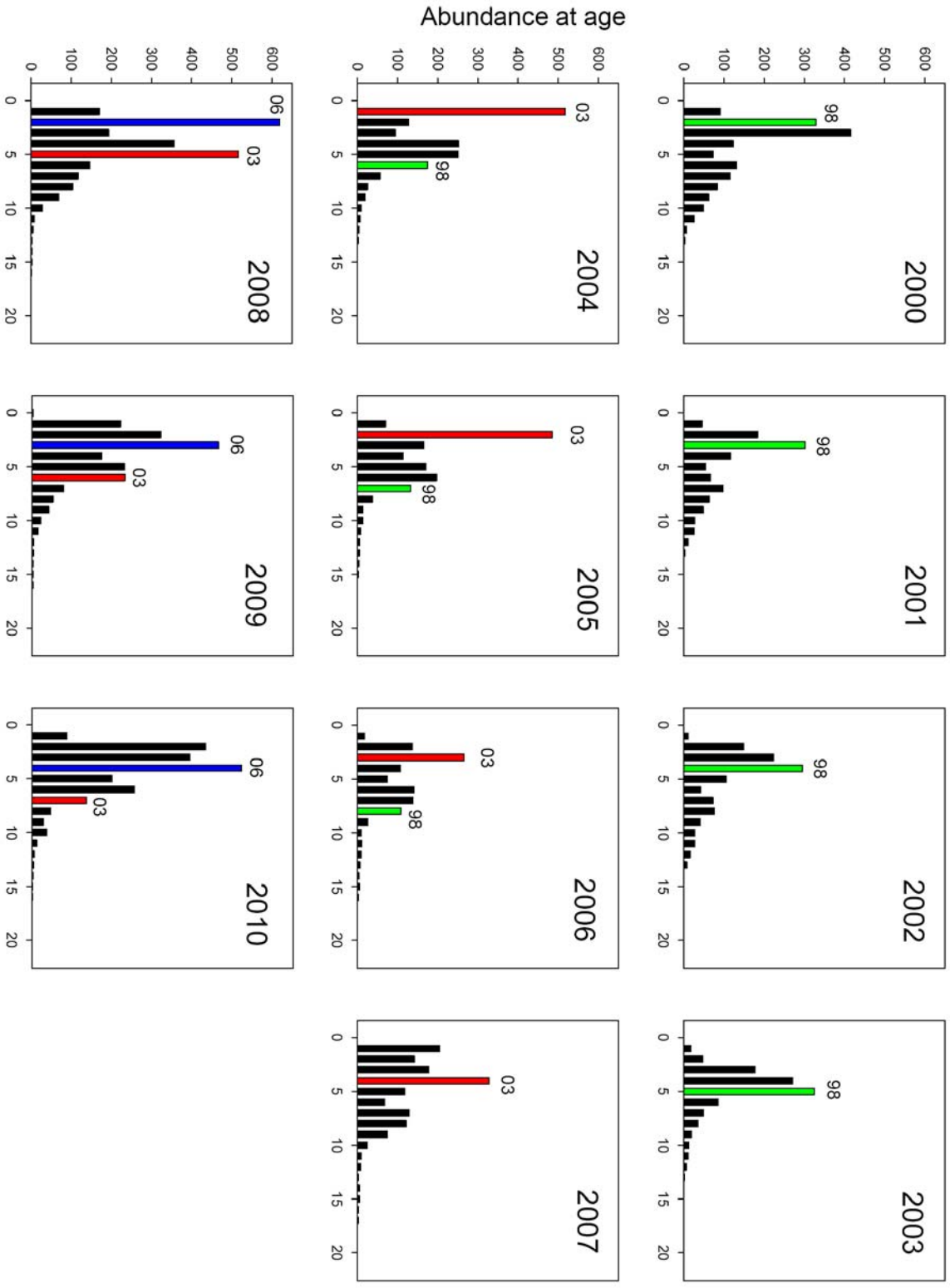


Figure 10. Abundance at age (millions of fish) from 2000 – 2010 in the Canadian fall surveys. The 1998, 2003 and 2006 year classes are labelled.

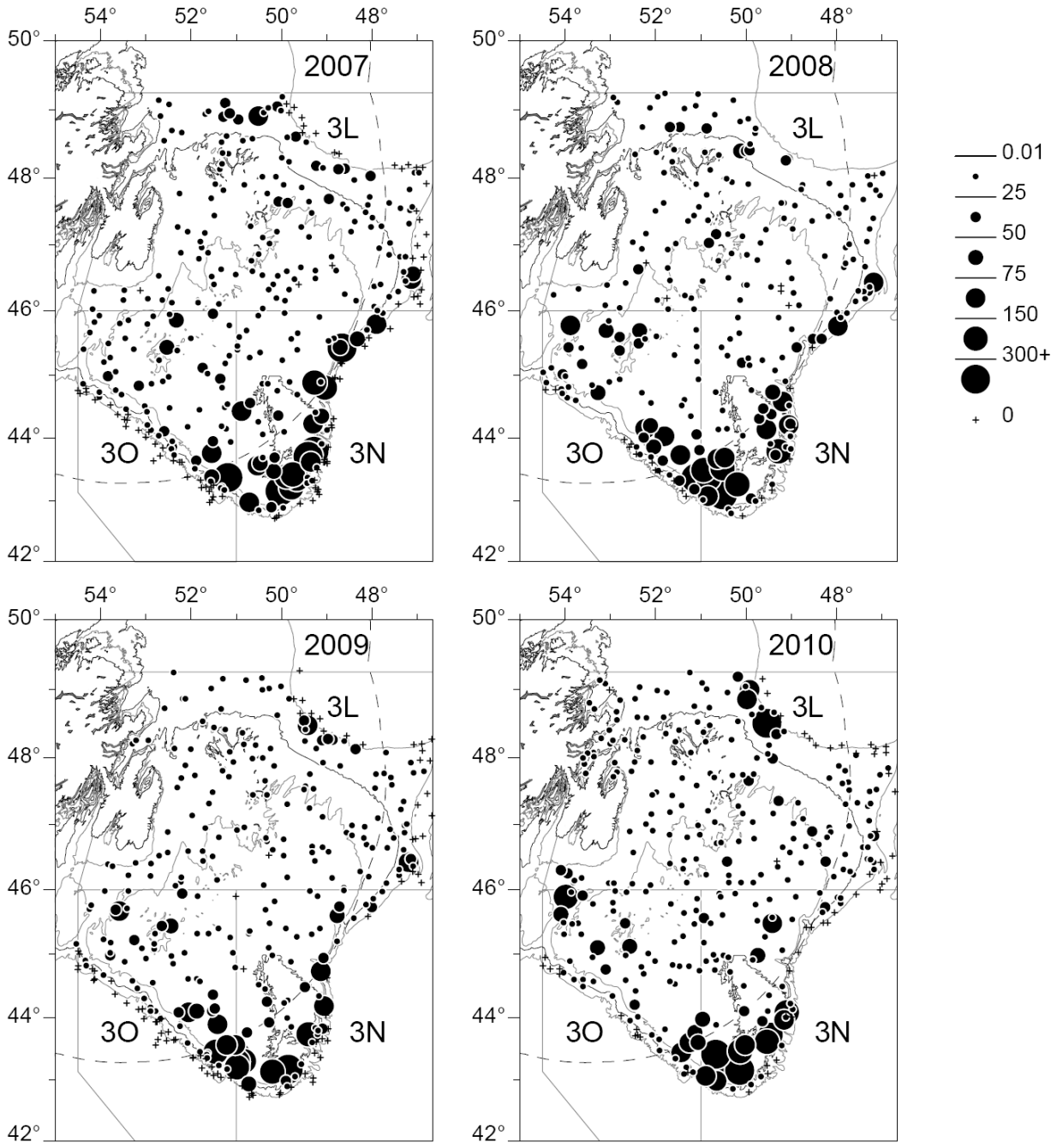


Figure 11. Distribution of American plaice (kg per tow) from Canadian spring surveys in NAFO Divisions 3LNO from 2007-2010.

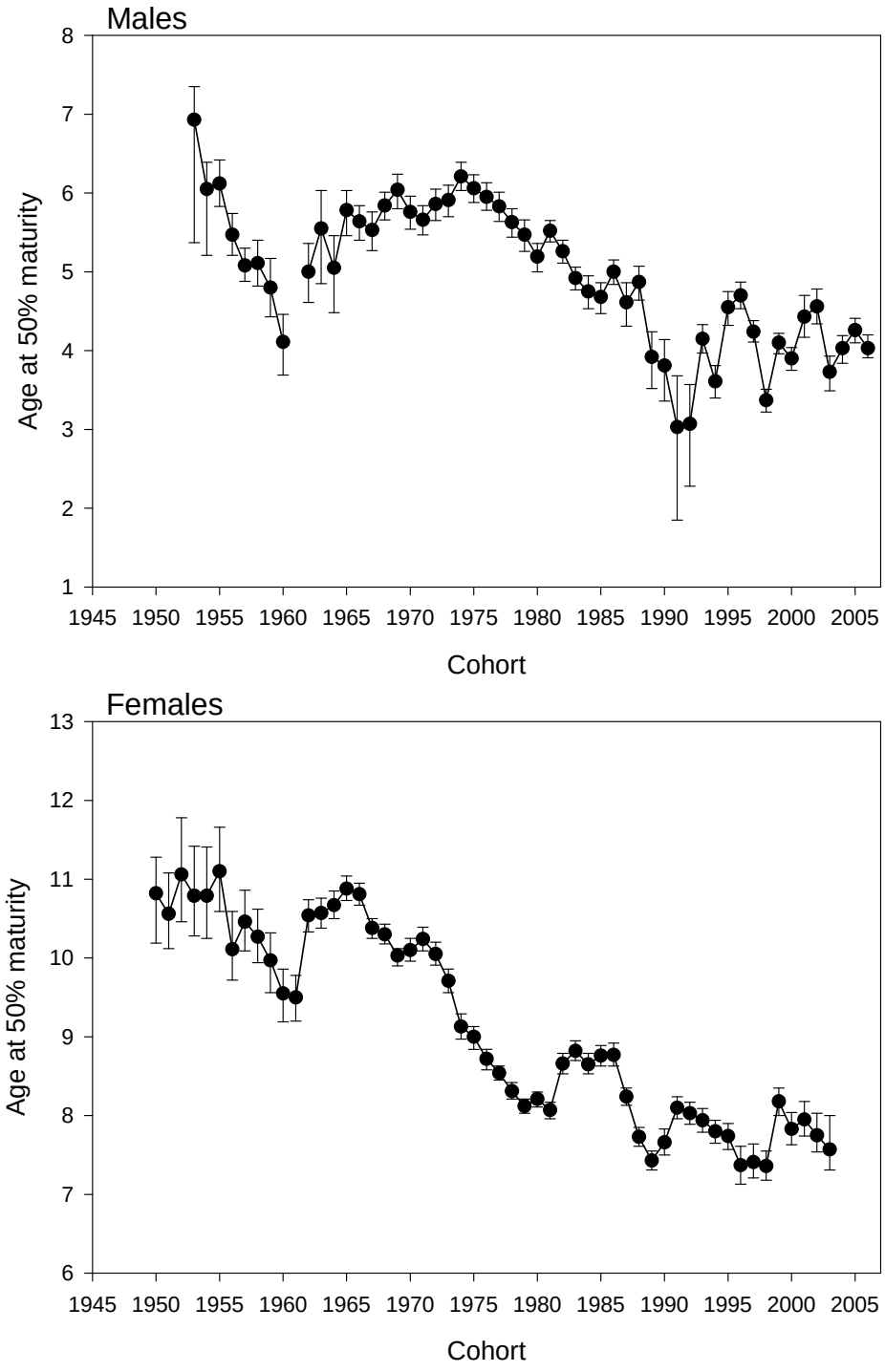


Figure 12. Age at 50% maturity (± 95% fiducial limits) by cohort for male and female American plaice in NAFO Div. 3LNO.

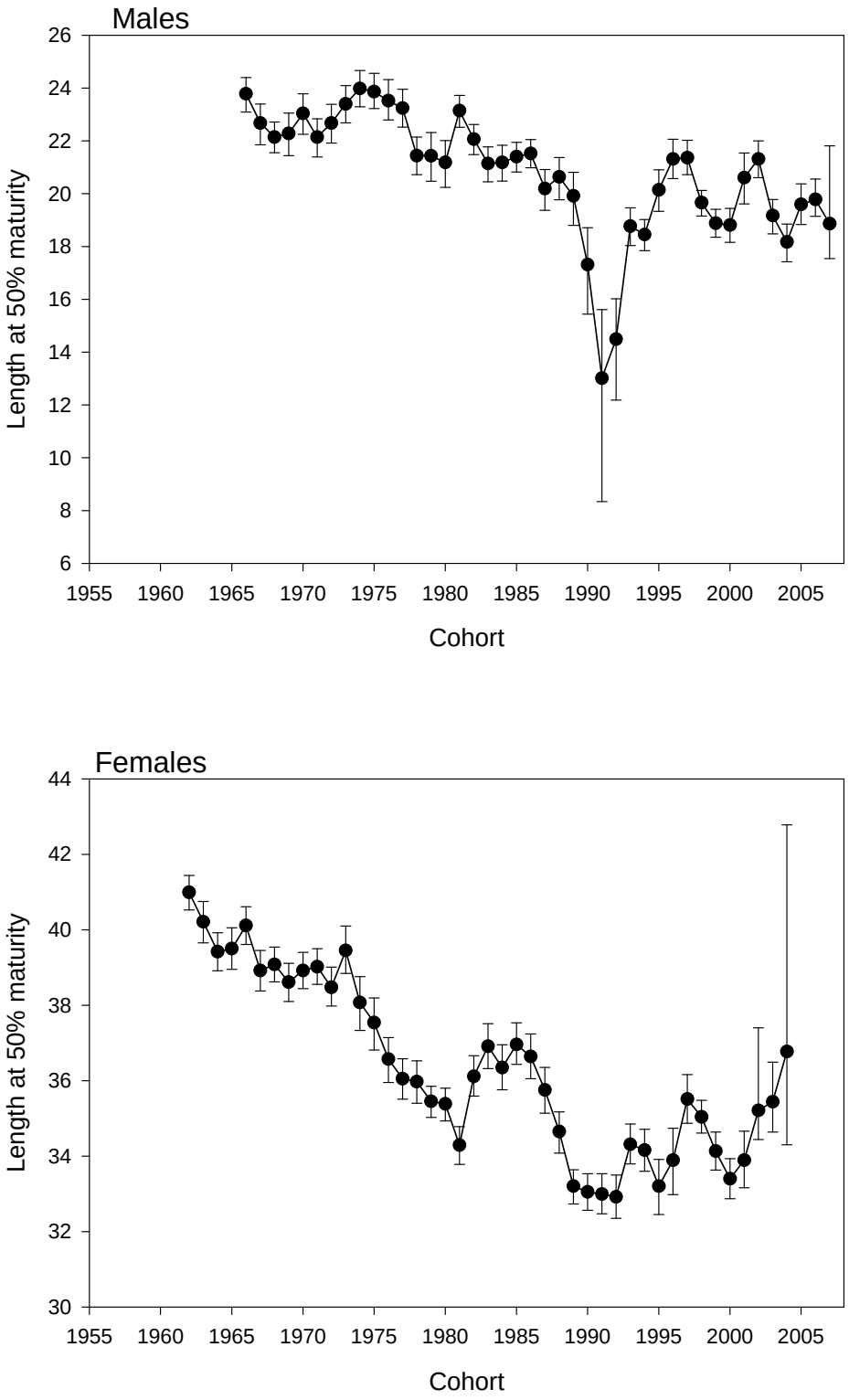


Figure 13. Length at 50% maturity (± 95% fiducial limits) by cohort for male and female American plaice in NAFO Div. 3LNO.

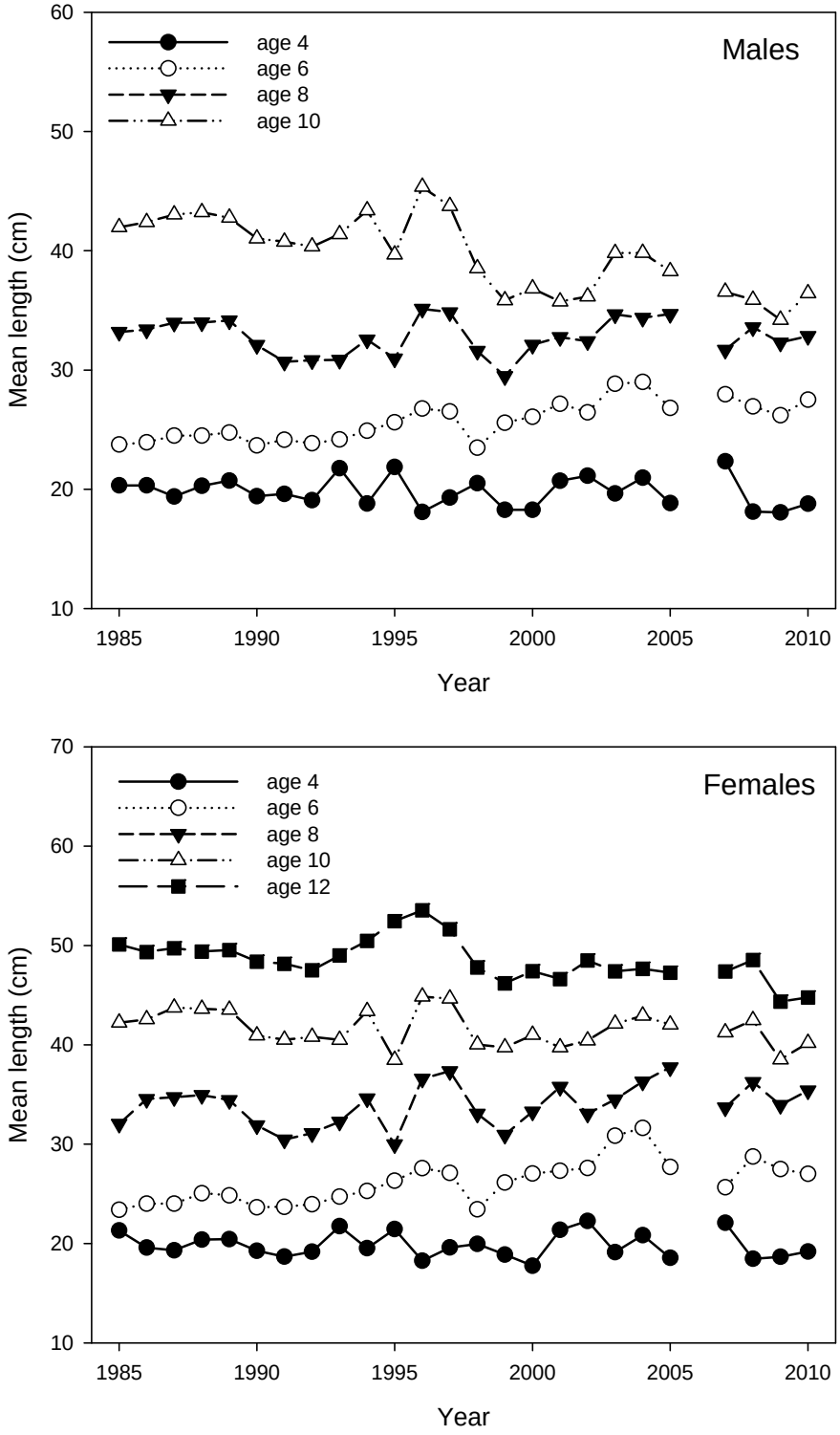


Figure 14. Mean length-at-age for selected ages of Div. 3LNO American plaice from Canadian spring RV surveys.

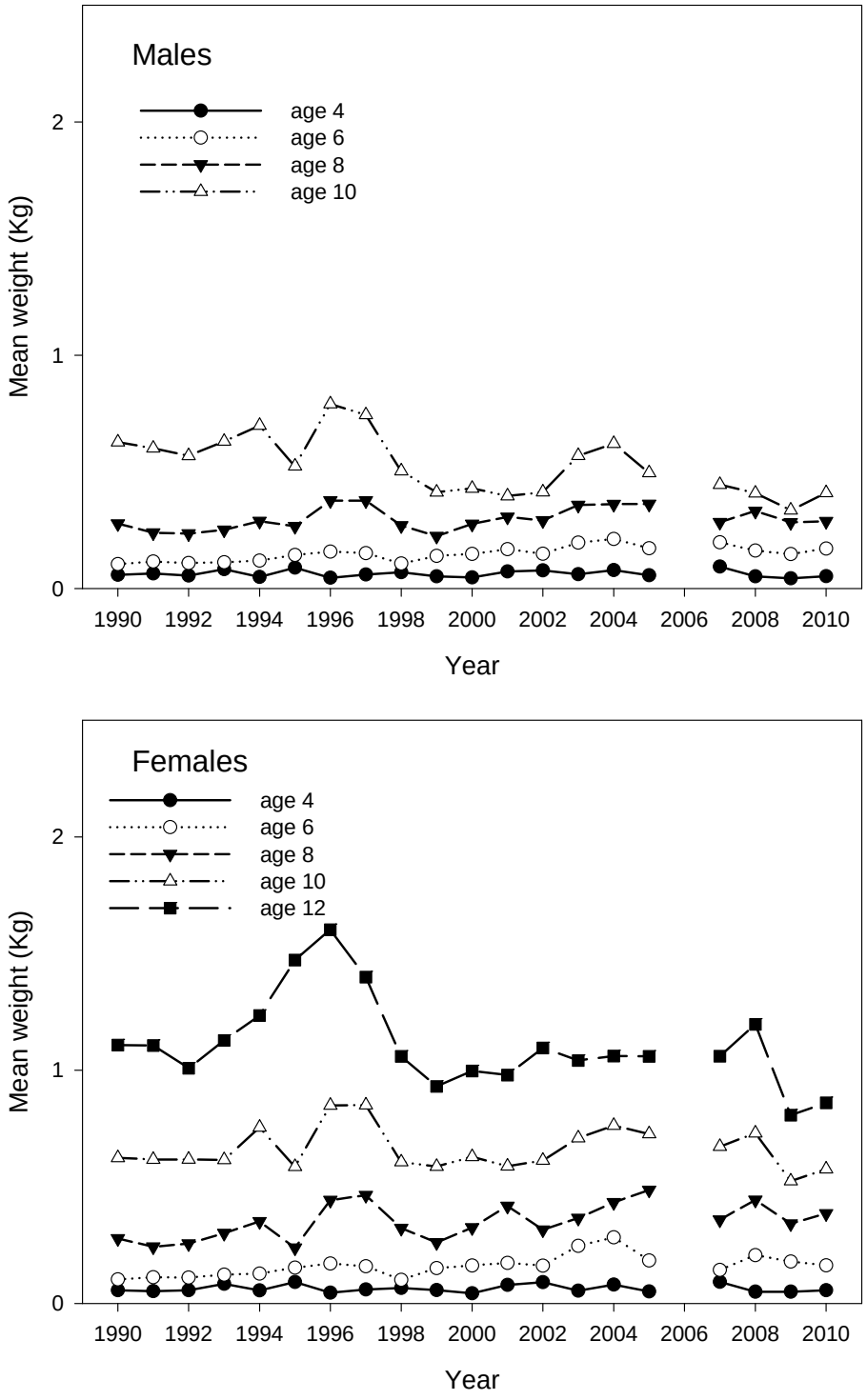


Figure 15. Mean weight-at-age for selected ages of Div. 3LNO American plaice from Canadian spring RV surveys.

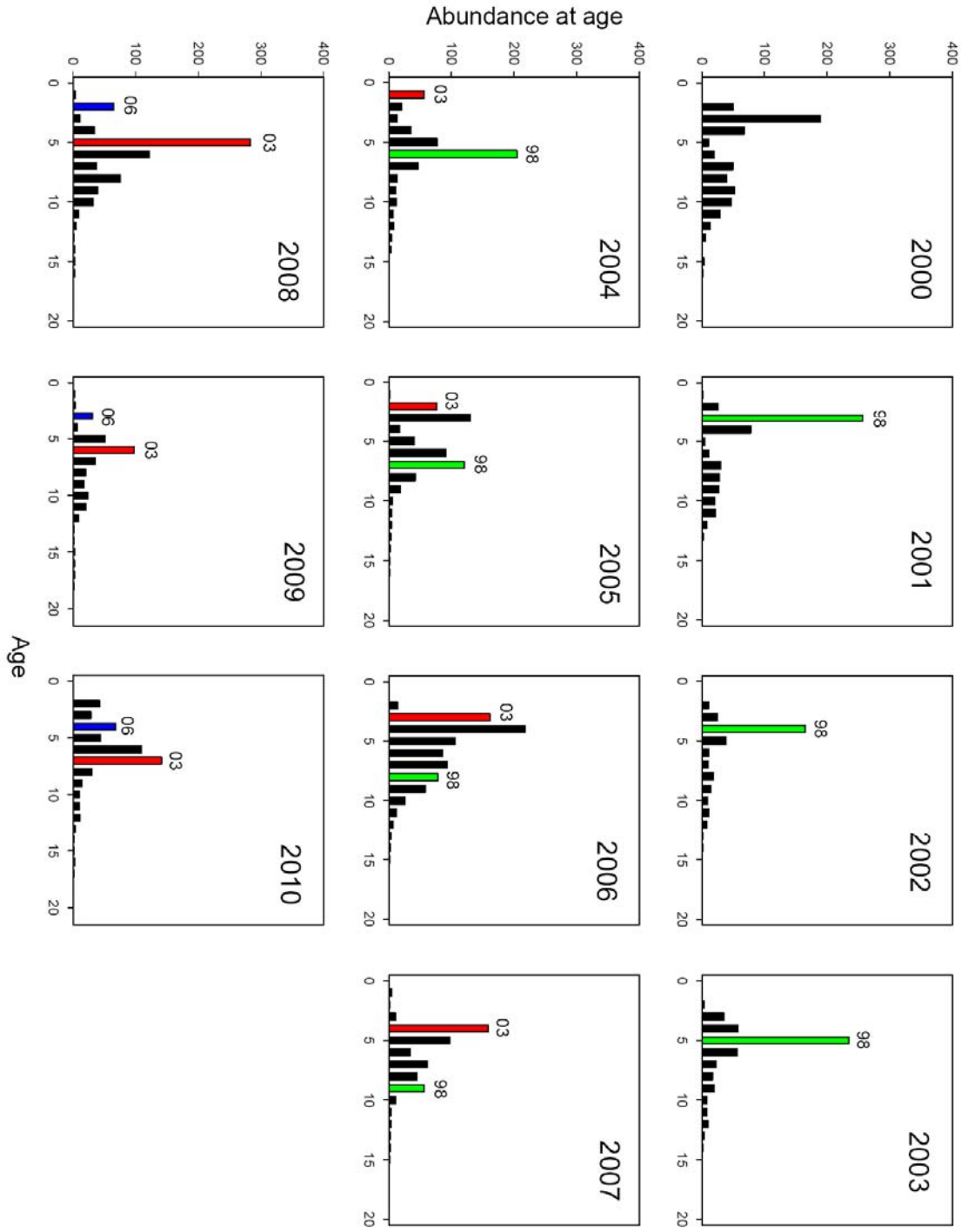


Figure 16. Abundance at age (millions of fish) from 2000 – 2010 in the EU-Spain Div. 3NO spring surveys. The 1998, 2003 and 2006 year classes are labelled.

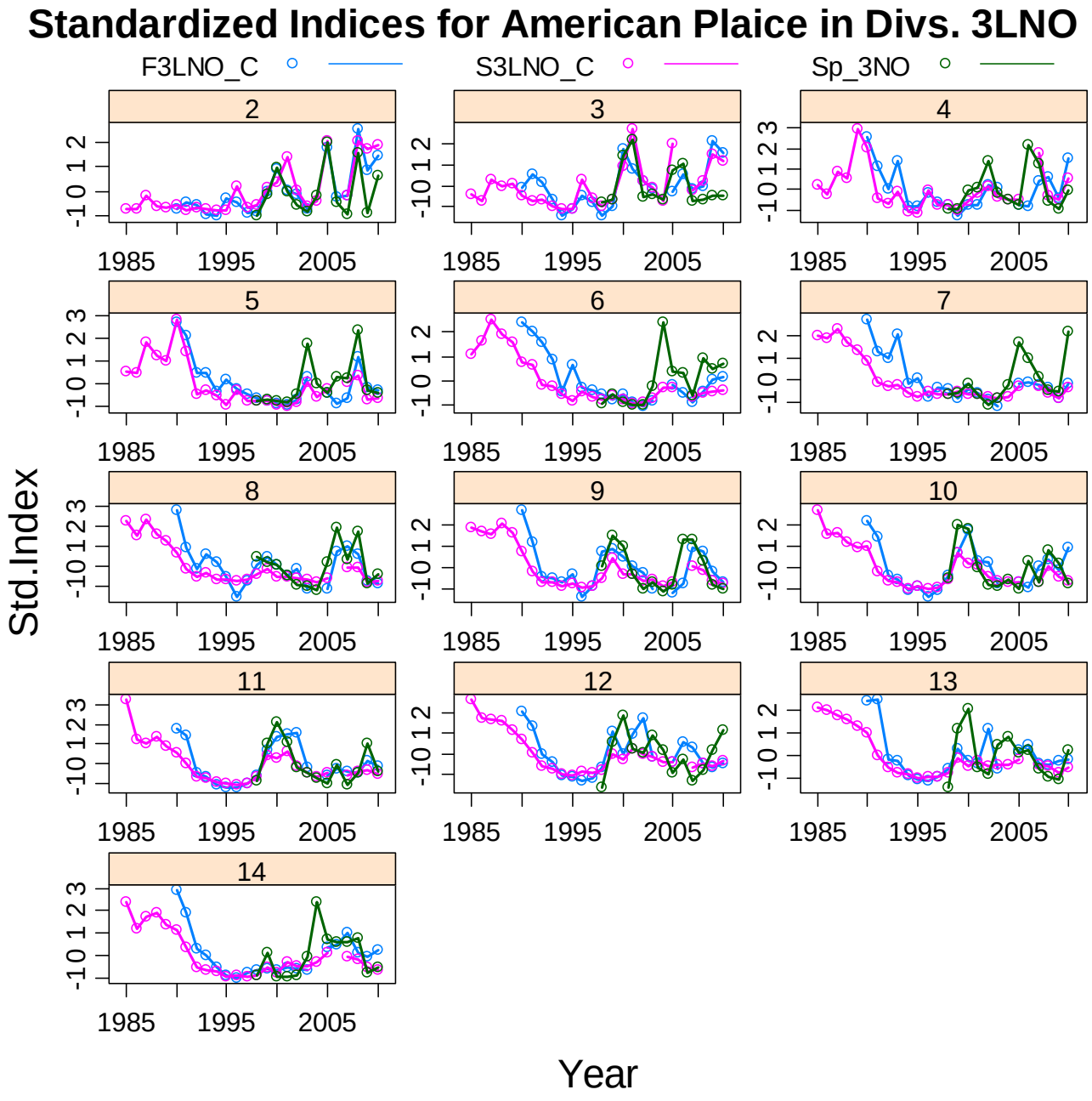


Figure 17. Standardized age by age abundance between surveys. Only the surveys used to calibrate the VPA are included.

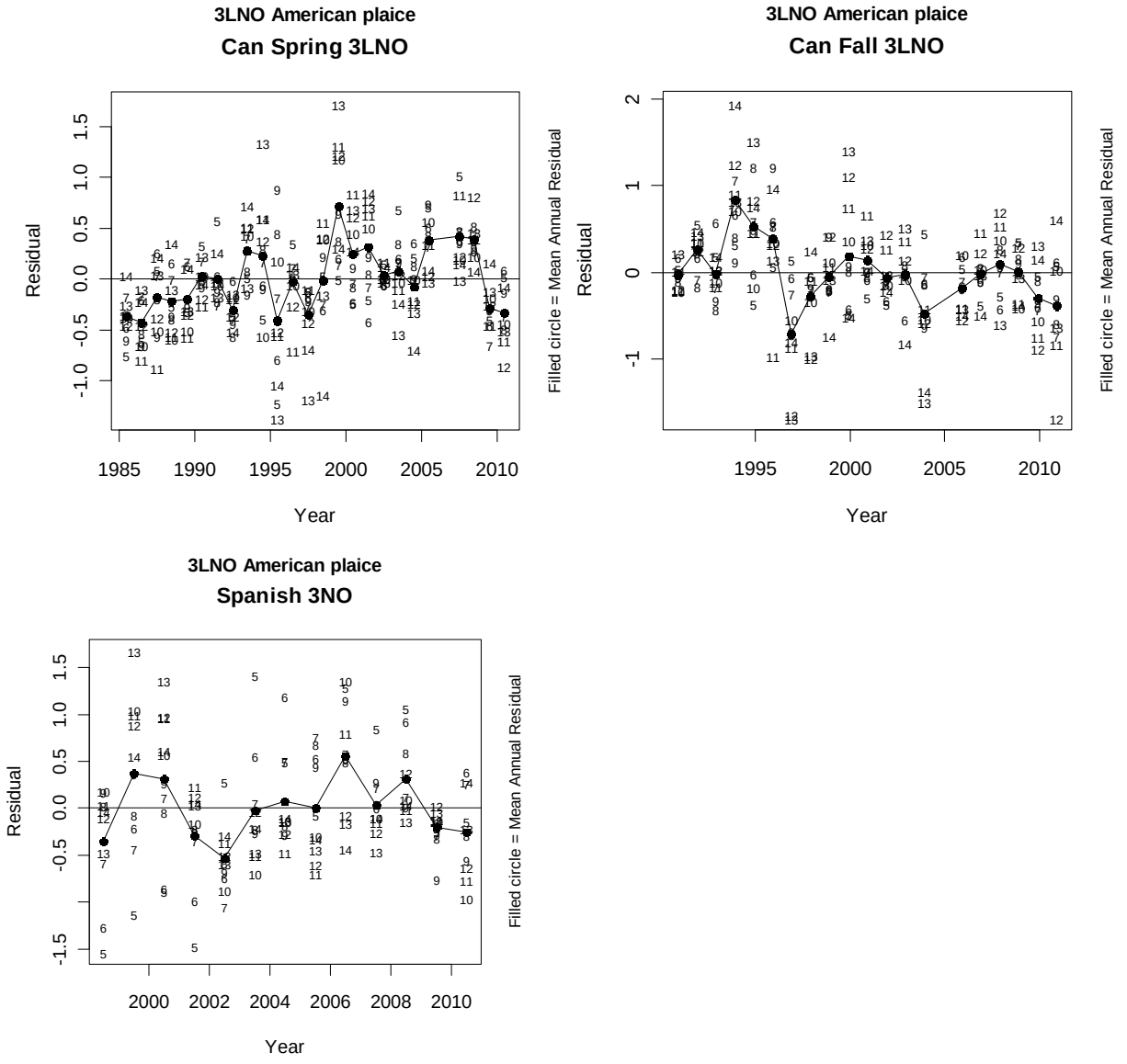


Figure 18. Residuals by year and month (numbers represent ages) for Canadian spring survey (top left), fall survey (middle) and EU-Spain Div. 3NO survey (right). Filled circle is the mean annual residual. Note the scales are different for each plot.

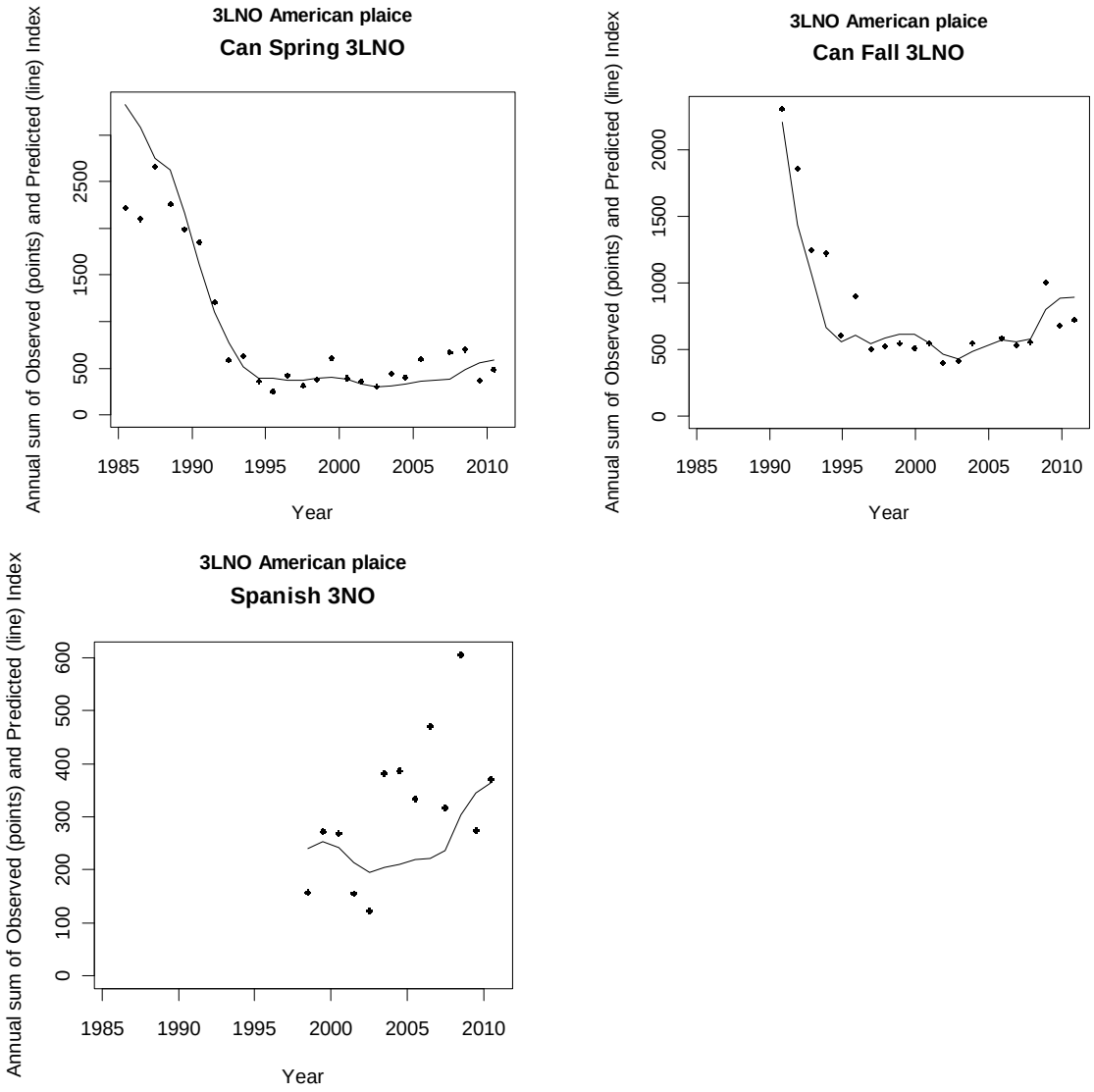


Figure 19. Observed versus predicted abundance for Canadian Div. 3LNO fall and spring and EU-Spain Div. 3NO indices over time.

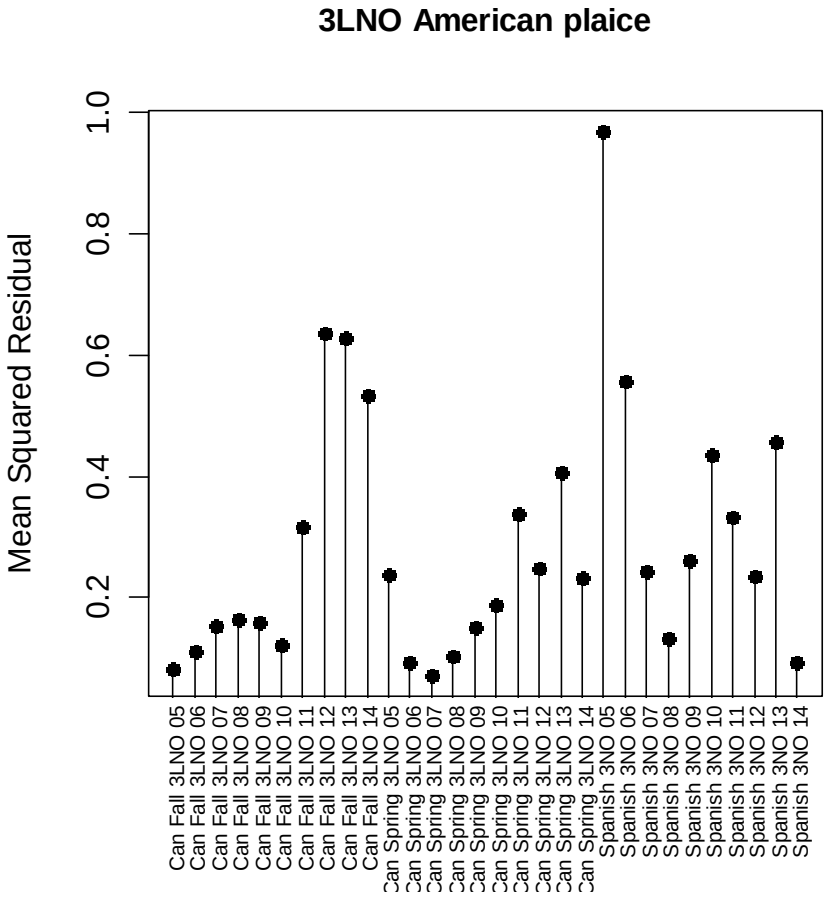


Figure 20. Mean squared residuals by age for fall, spring and EU-Spain Div. 3NO surveys.

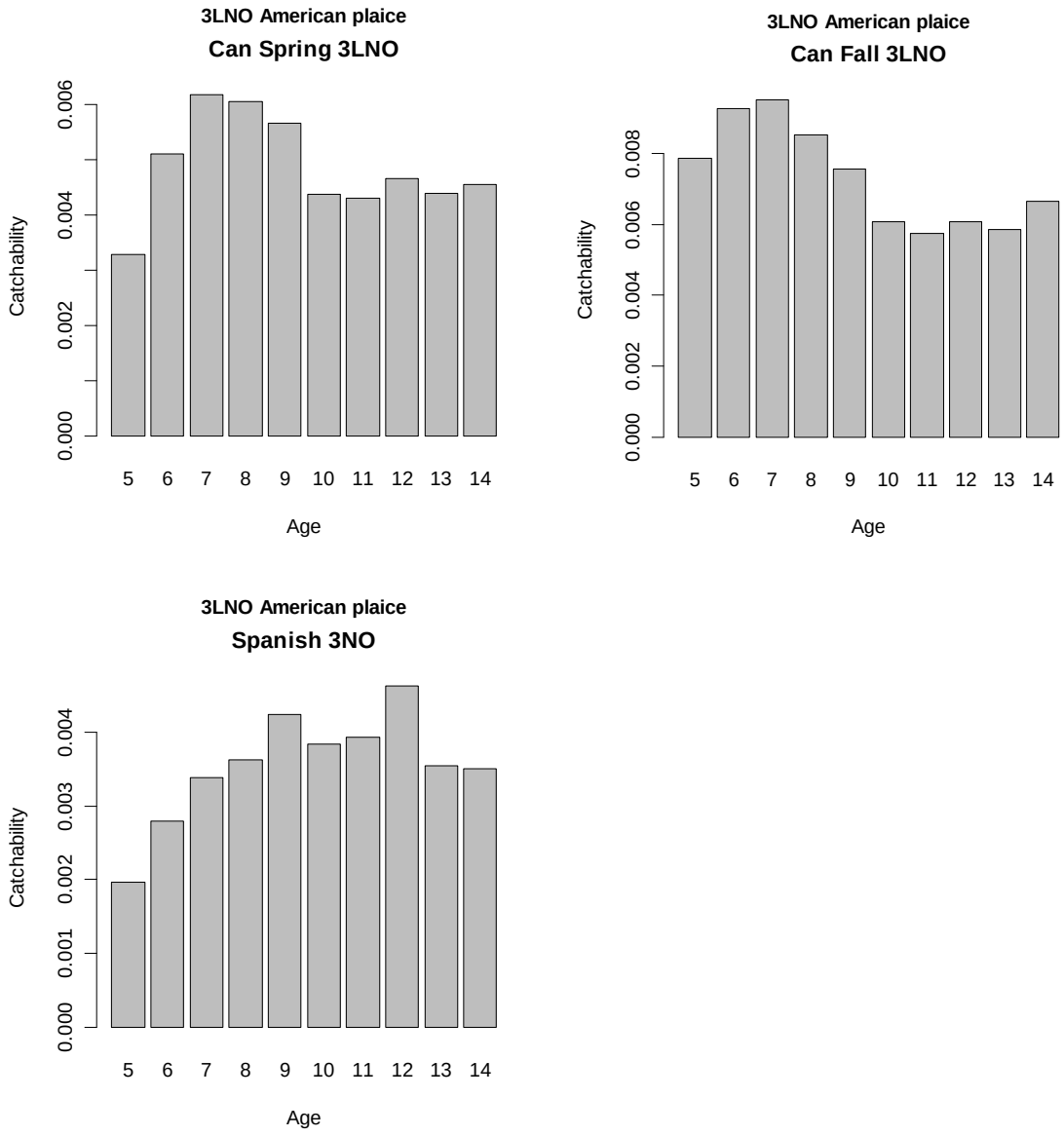


Figure 21. Bottom panel shows the survey catchabilities (q) for each survey by age. Please note EU-Spain Div. 3NO survey in mean numbers per tow at age, other surveys abundance at age.

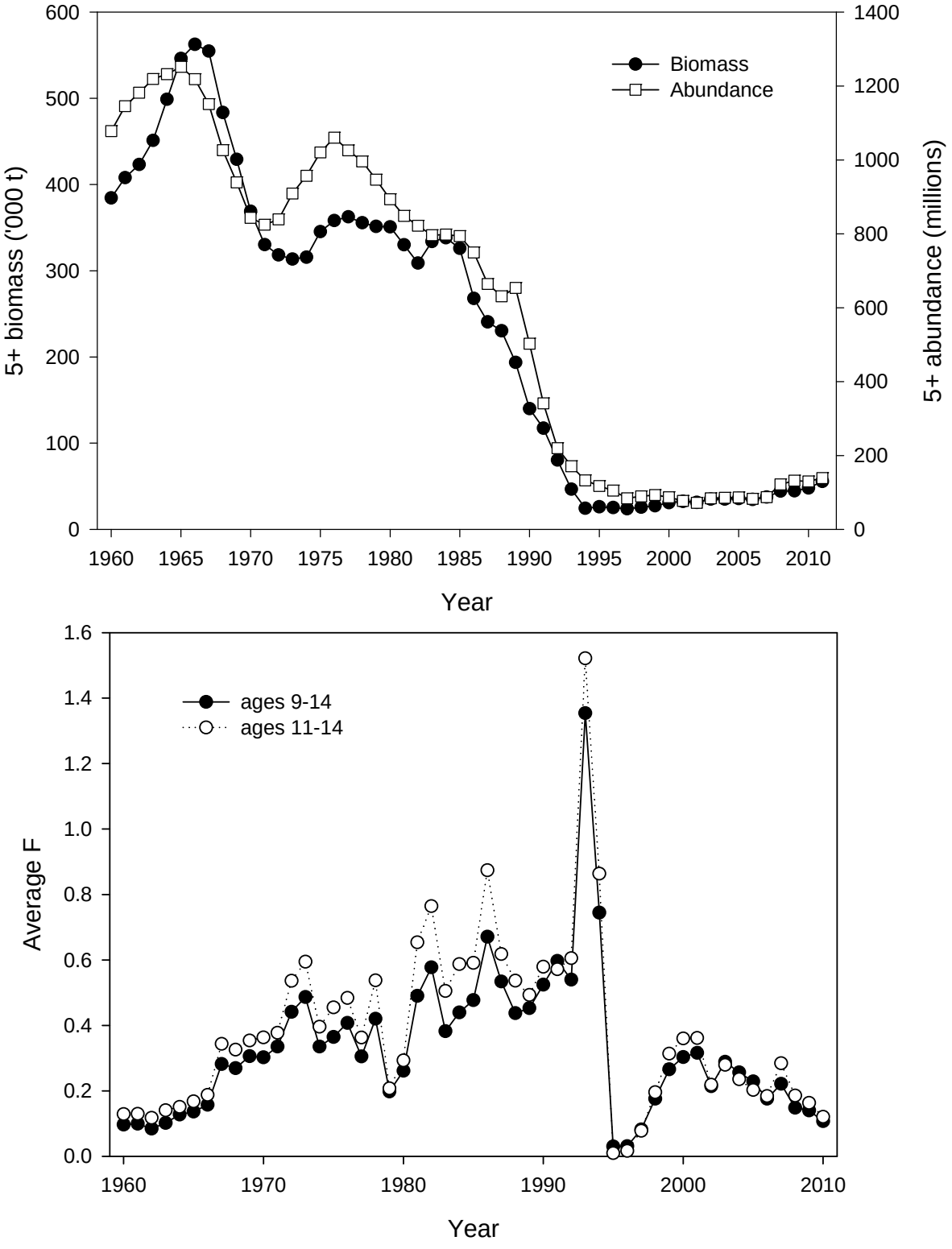


Figure 22. 5+ biomass and abundance (top) and average fishing mortality on ages 9 to 14 and ages 11 to 14 (bottom) from VPA.

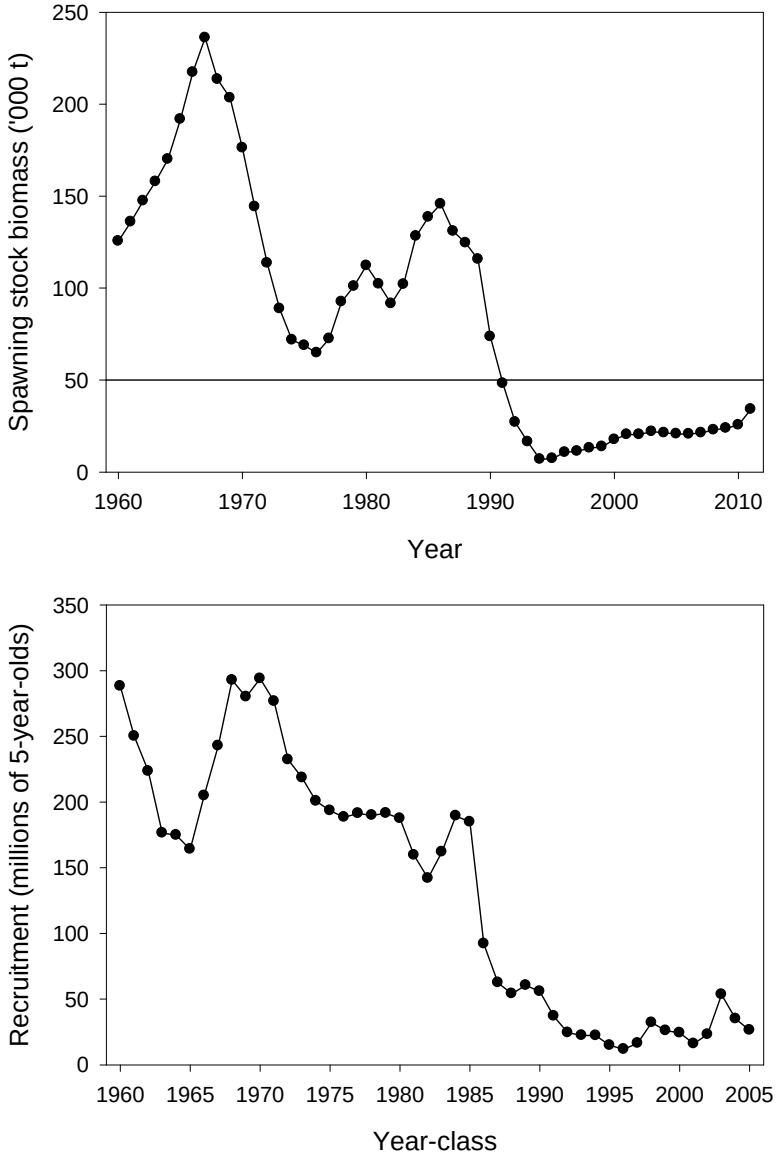


Figure 23. Spawning stock biomass ('000 t) (top panel) and age 5 recruits (year-class) (bottom panel) from VPA. Horizontal line represents B_{lim}.(50 000 t).

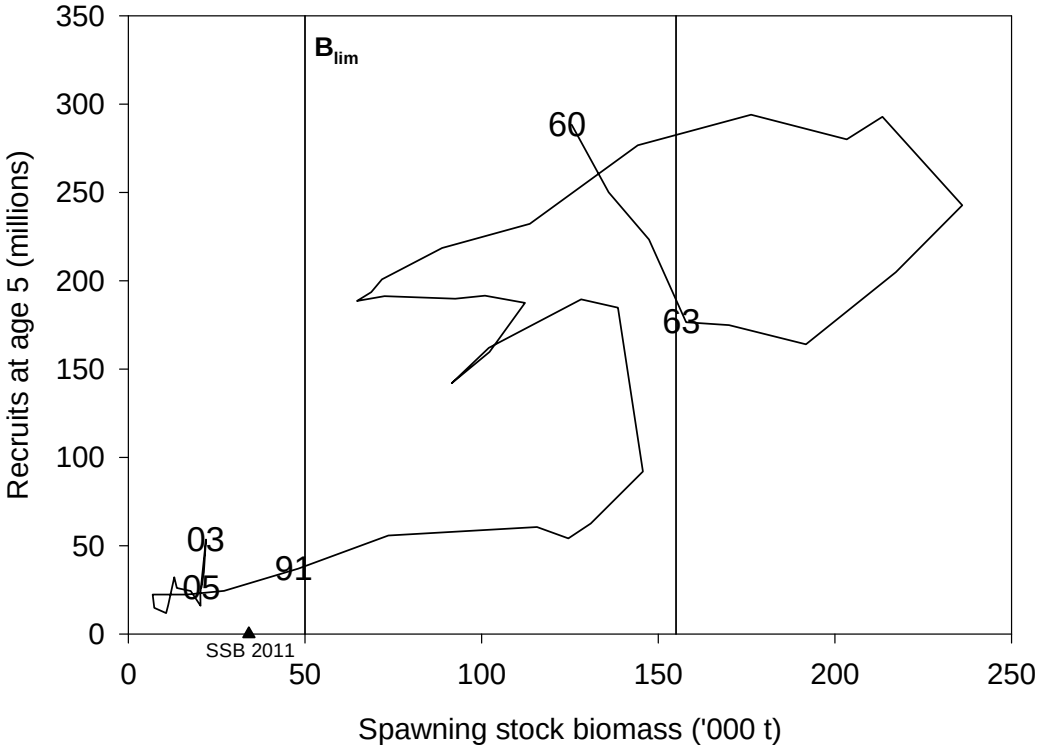


Figure 24. Observed stock recruit trajectory. Vertical line at 50, 000 t illustrates Blim, vertical line at 155, 000 t indicates SSB above which recruitment has been very good.

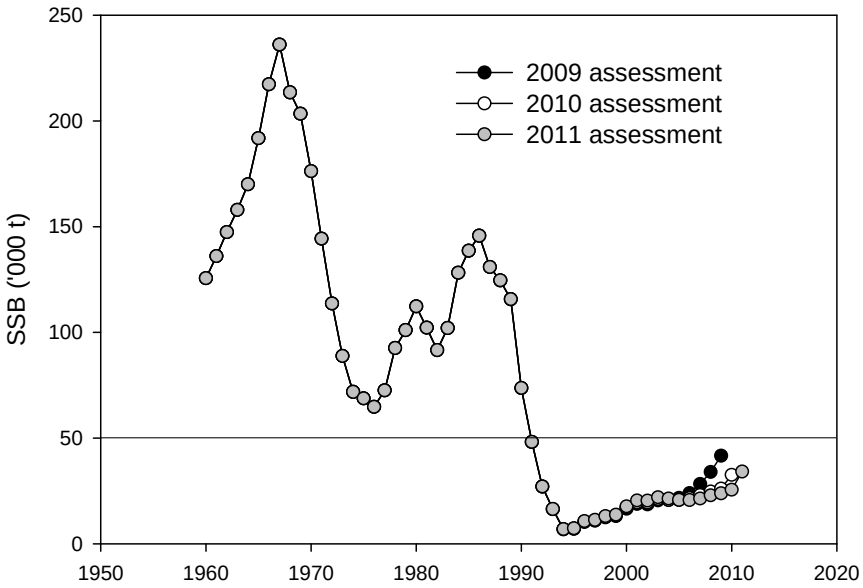


Figure 25. Comparison of estimate of spawning stock biomass from the 2009, 2010 and 2011 assessment.

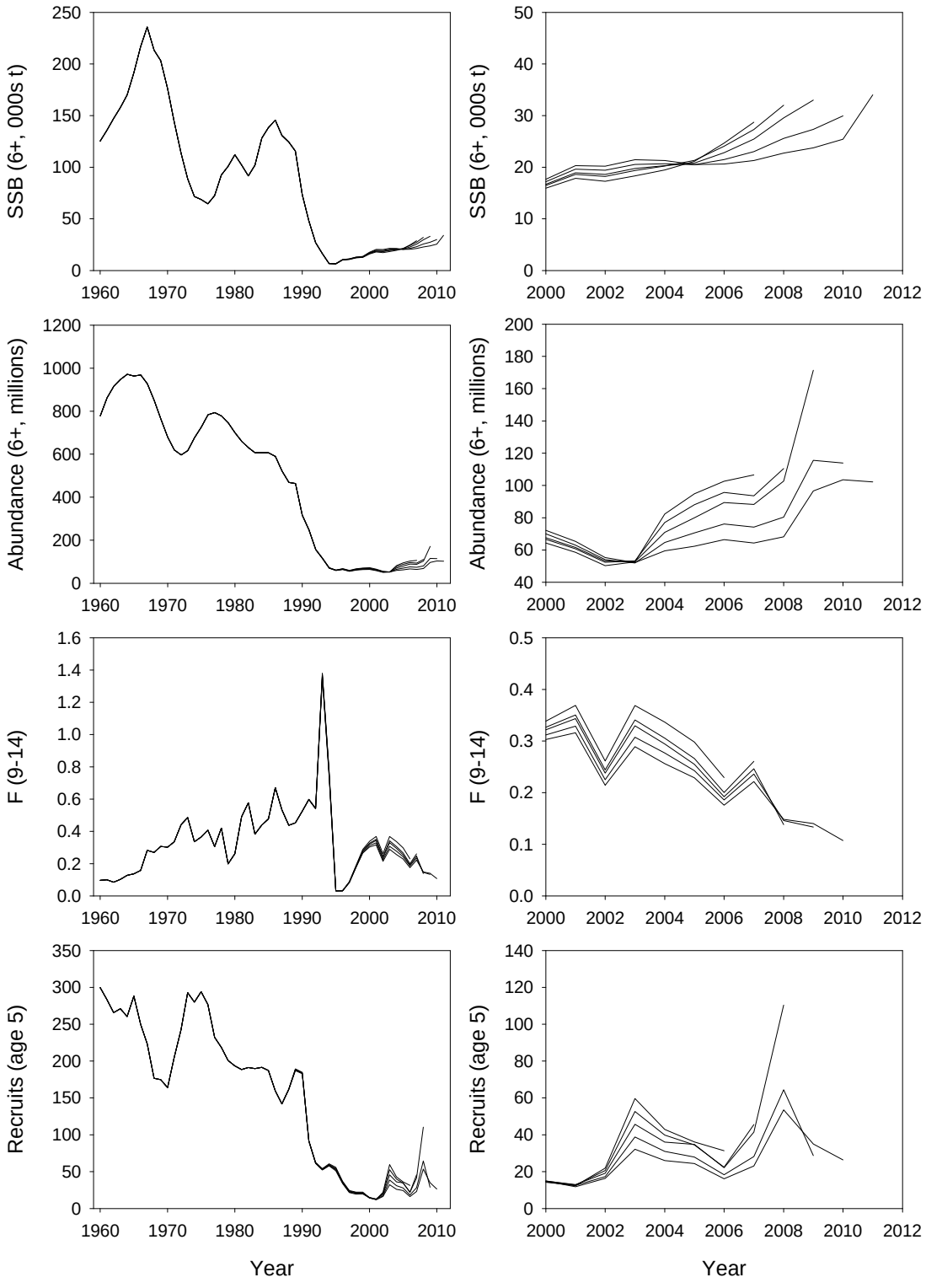


Figure 26. Results of retrospective analysis for Div. 3LNO American plaice.

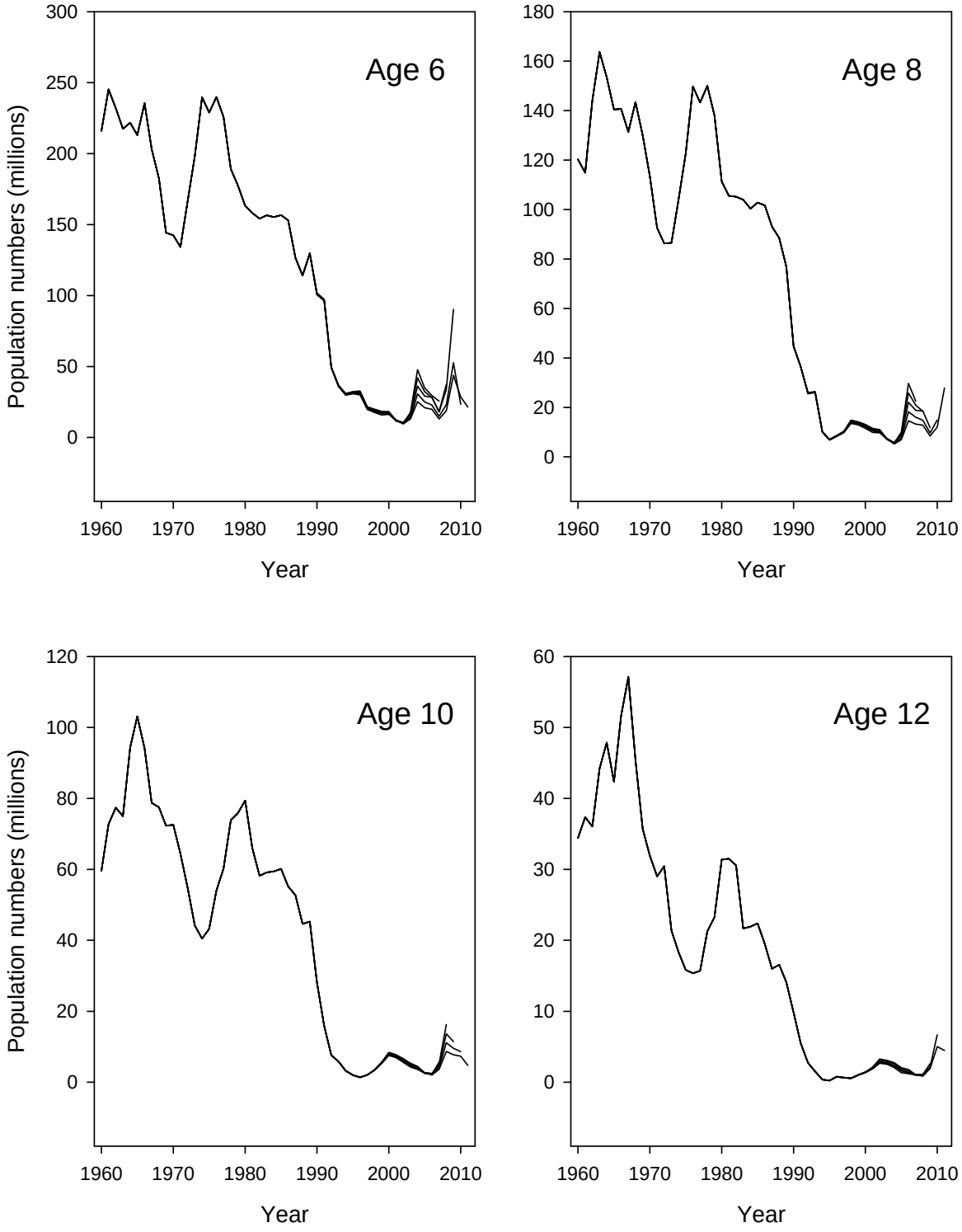


Figure 27. Results of retrospective analysis for Div. 3LNO American plaice population numbers (millions).

Appendix A – Analysis of surveys used to calibrate data

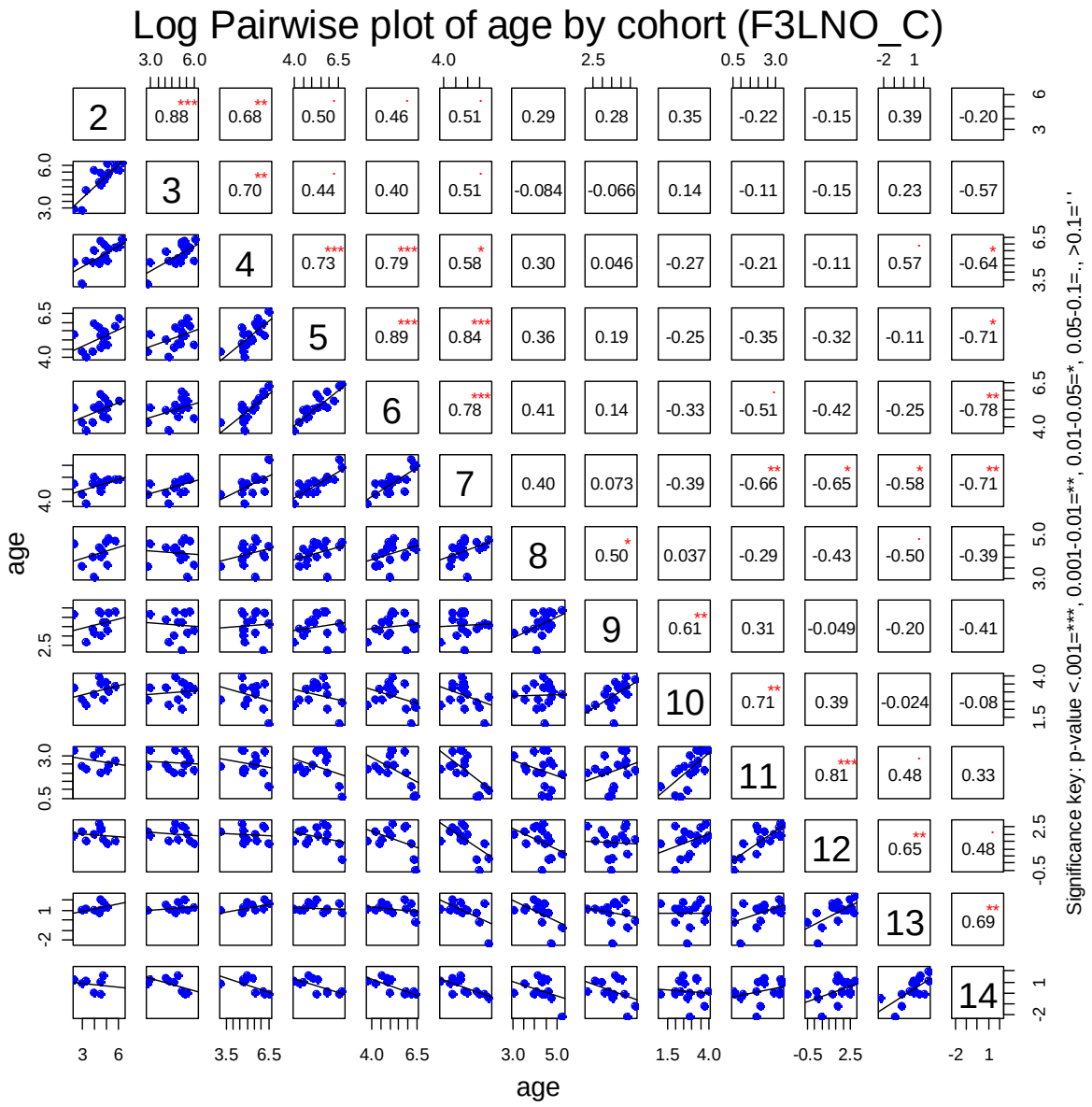


Figure A.1 Pairwise plots of each of the survey indices (Canadian fall survey) by cohort on the log scale.

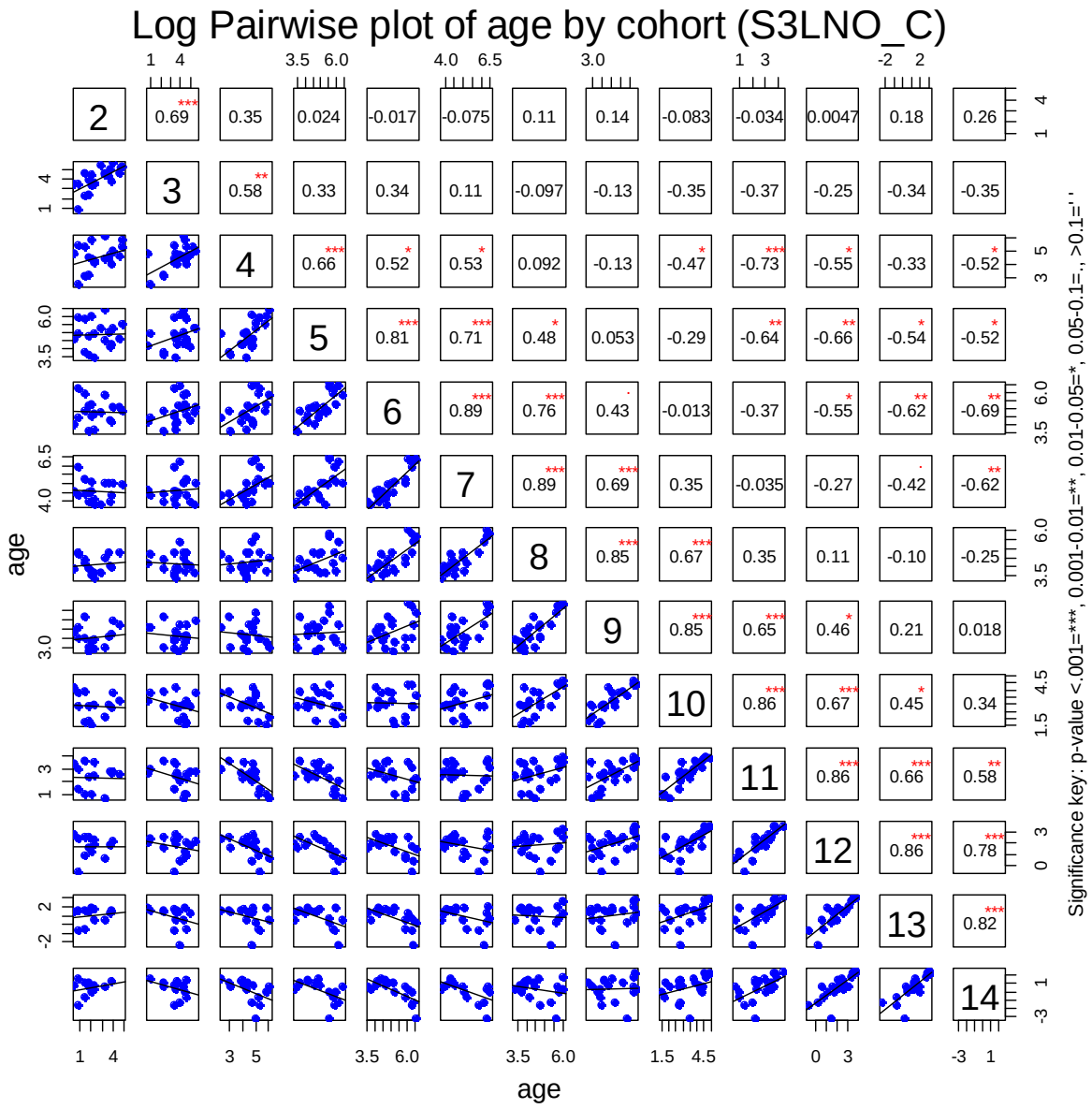


Figure A.2 Pairwise plots of each of the survey indices (Canadian spring survey) by cohort on the log scale.

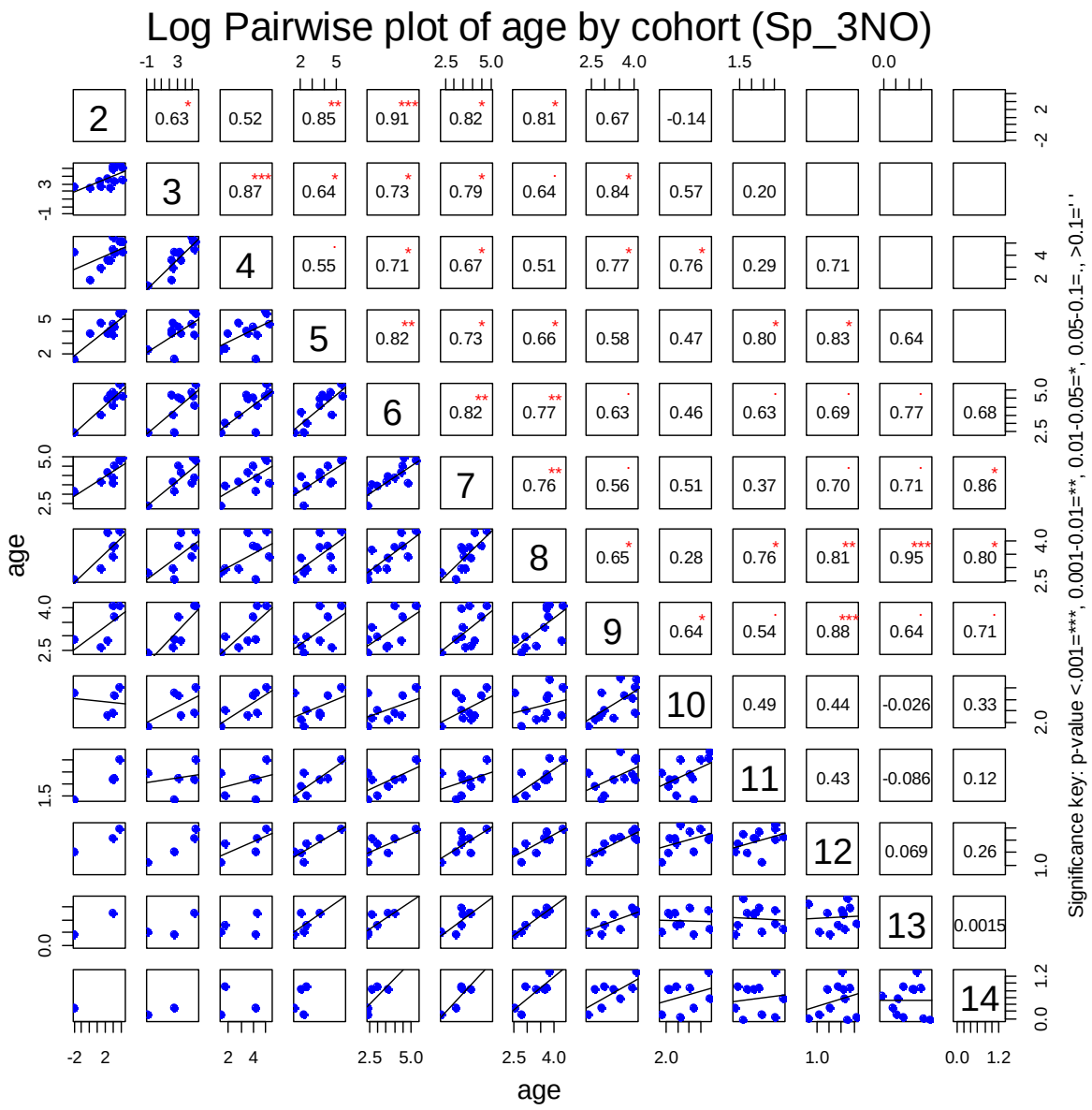
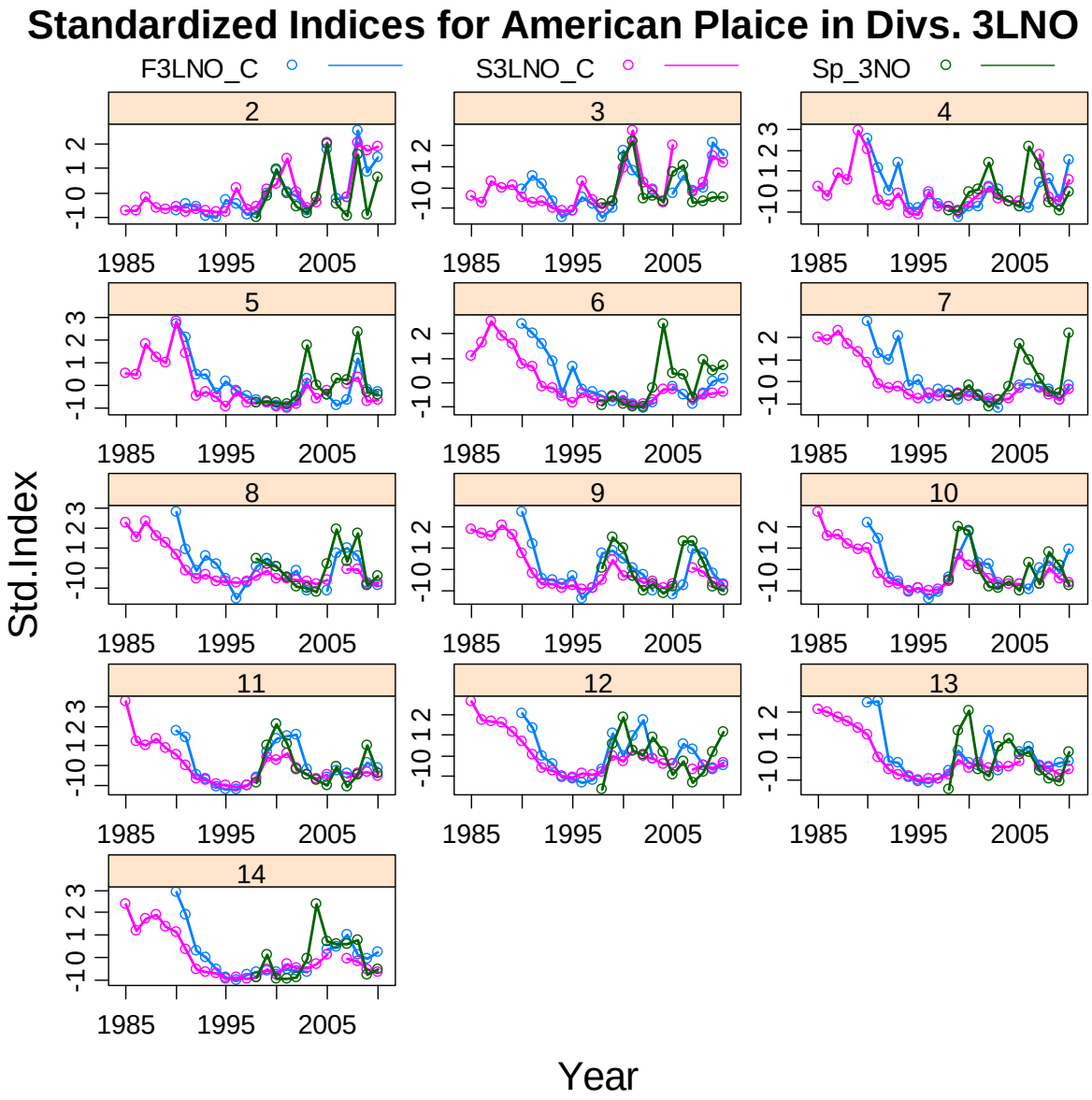
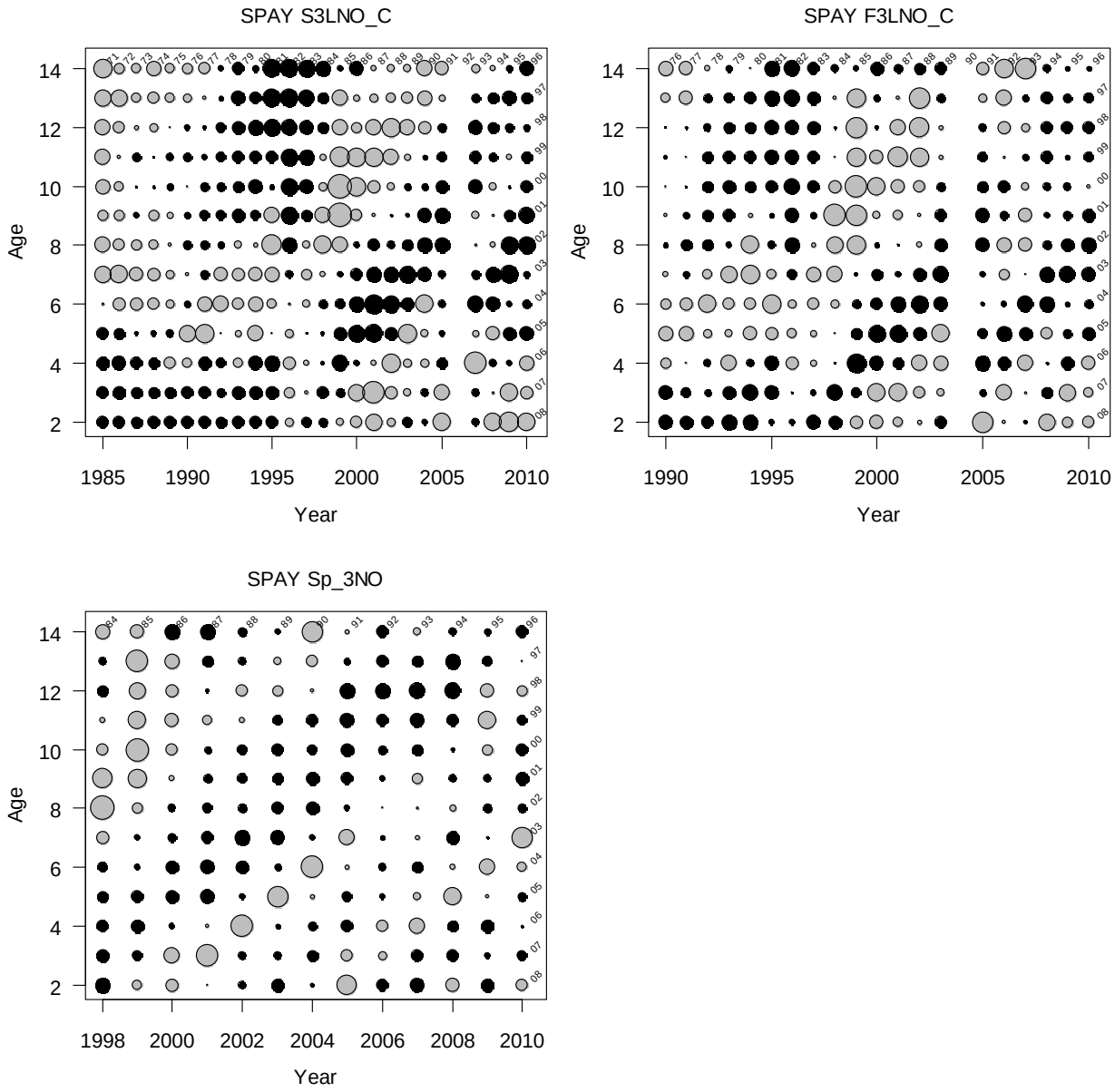


Figure A.3 Pairwise plots of each of the survey indices (EU-Spain survey) by cohort on the log scale.



Appendix A.4 Standardized age by age abundance between surveys. Only the surveys used to calibrate the VPA are included.



Appendix A.5 Plots of standardized proportions by age across years (SPAY) for Can. Fall, Can. Spring and EU-Spain surveys.