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An assessment of American plaice in NAFO Div. 3LNO

by

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Abstract

Catches from this stock were generally in the range of 40,000 to 50,000 t per year throughout the 1970's and 1980's, before declining to low levels in the early 1990's. There has been no directed fishing on this stock since 1993. The TACs in 1995-2007 have been set at 0. Catch has been lower in the two most recent years than in prior years; in 2005 it was 4100 t and in 2006 it was 2800 t, which was mainly taken in the NAFO regulatory area (NRA). The Canadian spring surveys show a large decline in abundance and biomass from the mid to late 1980's to the mid 1990's with the average biomass index of the last 2 years (expressed as mean weight per tow) being only 30% of that of the mid 1980's. The fall survey has also shown large declines and the biomass index is only 36 % of that of 1990. There may be a slight increase in both surveys since the mid 1990's. By Division, the largest decrease in both surveys for biomass and abundance has been in Div. 3L but there has been a slight increase in biomass in Divs. 3LN in the past two years. Mortality on younger (less than 5) ages has remained high throughout the time series. For older ages mortality declined after the mid 1990's but has increased in the last few years on most ages over 6 in both surveys. The 2007 assessment included the Spanish Div. 3NO survey in the VPA analyses which showed that population abundance and biomass declined fairly steadily from the mid 1970's. Biomass has increased slightly in the past few years. F increased fairly steadily from 1995 to 2000 but has generally been declining since then. Average F on ages 9-14 in 2006 was 0.20, the lowest since 1991. Since 2001 the SSB has increased very slightly to 36, 000 t in the current year. This is still only 18% of the level in the mid 1960's and 26% of the level in the mid-1980s. Recruitment has been steadily declining since the 1989 year-class and there have been no good year classes since then. No good recruitment is seen below an SSB of 50 000 t, the B_{lim} for this stock.

TAC regulation

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

Catch trends

Catches increased from about 20,000 t in the early 1960s to a peak of 94,000 t in 1967, were relatively stable around 45,000-50,000 t in 1973-82, then declined to 39,000 t in 1984-85 (Table 1, Fig. 1). Catches increased to 65,000 t in 1986 and then declined rapidly thereafter, to about 7,400 t in 1994. After a decline in catch following the moratorium

in 1995 the catch declined for a couple of years but then began to increase. However in the most recent years catches are lower (4,100 t in 2005 and 2,800 t in 2006), due mainly to a lack of fishing of yellowtail flounder in 2006. In 2005, the Canadian catch totalled about 1,472 t and in 2006, it was only about 94 t. The remainder of the catch occurred as by-catch in the skate, redfish and Greenland halibut fisheries in the NRA.

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

Canadian research vessel surveys

Poor Survey Coverage

During the course of the 2004 Canadian fall and 2006 Canadian spring multi-species survey, operational difficulties lead to incomplete coverage of the survey in NAFO Divisions 3LNO. In fall 2004, the incomplete coverage of the survey series in Div. 3NO were not problematic (Healey and Dwyer 2005). However, several strata not surveyed from Div. 3L were shown to have importance to American plaice. The proportion of the index originating in the missed Div. 3L strata was relatively high (20-50%) (Healey and Dwyer 2005). For Divs. 3LNO as a whole, the proportion of the biomass index sampled in the strata missed in 2004 has been variable but not insubstantial. For ages 2-11, typically between 20-50% of the index has been observed in these strata. Though the percentage of biomass found in Div. 3L has declined in recent years, it still makes up an average of 22% of the total index since 1995.

In spring 2006, some shallow water strata and most deep water strata in Div. 3NO were not completed in the Canadian RV survey. American plaice are found in high numbers (15-30% of Div. 3NO and 13-25% of total index) in these strata. For ages 2-12 for years 2004 and 2005, about 25% of fish are found in these strata. In addition, despite the large increases in numbers, all survey results for spring 2006 are dubious. It is recommended that abundance at age in Divs. 3NO (and Divs. 3LNO combined) not be used in the 2007 assessment. There was no ageing for the spring 2006 survey.

Therefore it was decided to remove both data points from the 2007 assessment. However, because the proportion of strata in Div. 3L as a percent of the total stock area is relatively small, is it recommended that age by age abundance by strata as a percent of the entire index be examined for the 2004 fall survey for the next assessment in order to determine whether this data point should be included.

In this paper, data is included for both data points in shaded columns in tables, in open symbols in figures, and where it is included in analyses, it is noted in the text or captions.

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 2004, 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 1996-2004 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 2004. 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 2006 are given in Tables 3-5. Please note the shaded columns. In 2005, the spring survey biomass estimates for 3L, 3N and 3O were 38, 000, 114, 000 and

53, 000 t respectively. 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 similar. However, in 2005 the biomass estimate from Div. 3N is almost double the biomass estimate from Div. 3O. The biomass estimates in Div. 3L in 2005 is the highest it has been since 1996 (please note the 2006 data point should not be considered as part of this assessment). Biomass in Div. 3LNO combined was the highest it has been since 1996 but is still only 30% of that of the mid 1980's (Fig. 3).

In Figure 4 and 5 the biomass index is shown as mean weight per tow. In Figure 4 the index is presented by division and in Figure 5 for Div. 3LNO combined. Overall the combined index shows the same trend as the swept area estimate of biomass with a large decline in the late 1980s (which has been greatest in Div. 3L) followed by a slight increase since 1996, especially in the last 2 years. The average mean weight per tow in the last 2 years is 23% of the average of the mid 1980's. The increase in mean weight per tow in the past 2 years has been greatest in Div. 3N (Fig. 4).

Figure 6 shows the abundance for Div. 3LNO combined from 1985 to 2006. The total abundance has fluctuated since 1996 with perhaps an increase over the period, especially in the last 2 years. Mean number per tow for Div. 3LNO combined shows the same trend (Fig. 7). As with the biomass estimate, mean number per tow has shown the greatest decline in Div. 3L (Fig. 8).

Tables 5-8 show the abundance at age from the Canadian spring surveys by division and for Div. 3LNO combined. Ageing was not available for spring 2006, and, as mentioned the survey coverage was not adequate. Although the proportion of fish that are ages 0 to 5 was lower in 2004, in recent years has been amongst the highest in the time series. The abundance estimate in 2005 was the highest since 1991 (Table 8).

Figures 9 and 10 show the distribution plots (kg/tow standardized to tow length) of American plaice for 2003-2006. There appears to be an increase in the concentration of American plaice in Div. 3L in the two most recent years. Although still low compared to historic levels, the increase can be seen in the proportion of fish north of 45^{o}N (Figure 11). The largest concentrations of plaice seem to be in Div. 3N outside the 200-mile limit (Figures 9 and 10). The lack of survey coverage can be noted in the 2006 plot.

Fall

Stratified-random surveys have been conducted in Div. 3L in the fall from 1981 to 2006, usually in October-November, but in recent years this has been occurring later. From 1990 to 2006, fall surveys were also carried out in Div. 3NO. Surveys from 1983 to 1994 were done with the Engel trawl and starting in fall 1995, a Campelen 1800 trawl was used.

Biomass estimates by stratum and depth are given for each Division in Tables 9-11. Biomass estimates from the fall survey in 2005 were 34, 000, 128, 000 and 59, 000 t for Div. 3L, 3N and 3O respectively. In 2006, the biomass estimates for these Divisions were 58, 000, 120, 000 and 56, 000 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). During 1995 to 1997, Div. 3N constituted on average 40% of the Div. 3NO total while the average since 2000 has been more than 70% of the Div. 3NO total.

The overall biomass for Div. 3LNO in the fall has shown a slight increasing trend since 1995, levelling off in the past few years (Fig. 3). The biomass index remains well below that of 1990 with the average of the 2005-06 indices representing only 36% 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 34% of the level of 1990 (Fig. 5). Mean weight per tow has shown the largest decline in Div. 3L (Fig. 12). Mean weight per tow estimates from Div. 3N have increased since 1996, while mean weight per tow in Div. 3O has remained at a low level (Fig. 12).

Figure 6 shows the abundance for Div. 3LNO combined from 1990 to 2006. Abundance showed a substantial decline from 1990 to 1998 but has been stable since 1998. Mean numbers per tow show the same pattern (Fig. 7). By Division, the largest decline was once again in Div. 3L (Fig. 13) but increases were shown in both Division 3N and 3O. There was a large increase in mean numbers per tow in Division 3O; the 2004 value was the highest in the time series (Fig. 13).

Tables 12-15 show the abundance by age for 1990 to 2006. Abundance in Div. 3L declined in each year since 1995 to 2000 but increased in 2001 and has remained at that level ever since (with the exception of 2004, which was poorly covered by the survey). The age composition has seen younger ages making up a higher proportion of the population in the last few years and a small increase in the number of older fish since 1999 (Table 15).

Plots of distribution by weight (Fig. 14) for the fall surveys for 2005-2006 show that A. 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. Note the lack of coverage in Div. 3L in 2004.

Comparison of Spring and Fall Surveys

Biomass and abundance from the spring and fall surveys can be seen in Figures 3 and 6. In the most recent years, abundance in spring and fall show opposing trends (Figure 6), possibly due to survey timing changes and fish moving into and out of the survey area. Historically, both surveys have shown the largest decline in Div. 3L. There are some larger catches off the Grand Banks in Div. 3L in the fall but overall, distribution is also similar between the two surveys, with the majority of the fish being distributed in southern Div. 3NO (Figs. 9, 10 and 14).

Catch to RV Biomass ratio

In 2000 STACFIS recommended that *in future catch to survey biomass plots be presented.* Therefore, as a proxy for fishing mortality on this stock, the ratio of catch to biomass from spring RV surveys was examined. Examination of the catch/biomass ratios from Campelen data from 1985 to 2006 is shown in Figure 15. The Campelen ratios were highest in the 1991-94 period, and were reduced from 1995-1999, reflecting a period of reduced catches (Table 1). The catch/biomass ratios increased substantially over the 1999 to 2004 period, but were lower again in 2005 and 2006.

Mortality

Estimates of total mortality (Z) from the Campelen or equivalent, spring and fall survey data were calculated for ages 1 to 16 (Fig. 16 and 17). A Lowess smoother with a smoothing window is plotted to help illustrate trends. The spring survey indicates an increase in mortality up to the mid 1990's for most ages. This trend is also evident in the fall data but is not as apparent. Mortality declined after the mid 1990's in both surveys but has shown some slight increase in the last few years in the spring survey, although the last estimate is lower in most ages. In the fall, there is a decreasing trend in Z in the last few years which is driven mainly by two lower points in 2004 and 2005 (ie from 2004 to 2005 and 2005 to 2006). There are no estimates for 2005 in the spring due to the incomplete coverage of the 2006 spring survey; however, the fall 2004 survey data is included.

Weights and lengths at age

Mean weights-at-age were calculated for male and female American plaice for Div. 3LNO using spring survey data from 1990 to 2005. Mean lengths-at-age were calculated using data from 1985 to 2005. Means were calculated accounting for the length stratified sampling design. There is little indication of trend over the time period in either mean length or mean weight (Fig. 18 and 19). However, ages 6, 8 and 10 for females have shown some increase in mean length and weight since about 1999.

Maturities

Age and length at 50% maturity were produced from spring RV data. Maturity data were collected during research vessel surveys from 1960-2006. Stratified random surveys were used where possible (1971-2006). 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. 20). 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 about 7 years compared to 11 years for cohorts at the beginning of the time series.

Estimates of maturity at length were produced using the data described above and are presented by cohort in Figure 21. L_{50} declined for both sexes but recovered in recent cohorts. The current L_{50} for males of about 20 cm is similar to the earliest cohorts estimated. The L_{50} of most recent cohorts for females is in the range of 34-36 cm, somewhat lower than the 39 cm of the earliest cohorts.

Spanish Div. 3NO survey

Numbers at Age

Since 1995, Spain has carried out a random stratified spring bottom trawl survey in Div. 3NO of the NAFO Regulatory Area. In 2001, the trawl vessel (C/V *Playa de Menduiña*) and gear (*Pedreira*) were replaced by the R/V *Vizconde de Eza* using a *Campelen* trawl. Canadian spring RV age length keys (for Div. 3N only, as the Survey by Spanish Div. 3NO survey only covers a small portion of Div. 3O) were applied to Spanish length frequency data (separate sexes, mean number per tow) from 1997-2000 converted data and 2001-2006 Campelen data (González Tronosco et al., 2006, 2007). Combined spring Canadian ALKs from 1997-2005 were applied to the 2006 length frequencies. This data is found in Table 25 and was used in the final VPA run of 2007. The age composition for this survey was similar to the Canadian RV spring survey.

Catch at age

Results of the catch at age calculations for American plaice catches in 1993-2006 are given in detail in Morgan et al. (1999a,b; 2001a; 2002, 2003,) and Dwyer et al (2005). In 2005 and 2006, sampling data were available from by-catch of A. plaice in Canadian fisheries targeting other species in Div. 3LNO. As has been the case since it reopened in 1998, much of the Canadian sampling data in 2005 came from observer coverage in the yellowtail fishery. In 2006, there was virtually no fishery for yellowtail, and some sampling was available from the relatively small by-catch in the fishery for 3O redfish.

Total Canadian catch of A. plaice in 3LNO in 2005 was 1464 tons, which was 169 tons higher than in 2004. Ninety-seven percent (97%) of the catch came from the directed fishery for yellowtail flounder in Div. 3LNO. In 2006, the Canadian catch of A. plaice was only 92 (actually 94 tons but calculations made to 92 t) tons, due to an almost complete halt to the Canadian yellowtail flounder fishery due to labour problems in the main harvesting company. This relatively small quantity of A. plaice came mainly as by-catch in the redfish fishery in Div. 3O.

Since the beginning of 2000, fishing for yellowtail has been permitted in Div. 3L, resulting in some by-catch of American plaice there, although most (69%) of the catch in 2005 came from Div. 3N, as in the previous years. In 2005, 53% of the Canadian catch occurred in April to June, compared to about 66% in 2004. By-catch of A.plaice in the yellowtail fishery has usually been higher in this period. Catches are lower during the summer as there has usually been a closure of the yellowtail fishery during mid June to late July, which is intended to cover the spawning period for yellowtail. Most of the small catch of A. plaice in 2006 occurred in Div. 3O in January and February (Tables 16 and 17).

Sampling of the Canadian catch of A. plaice in 2005 consisted of 27,782 length measurements, from all months except July and August, and 2127 otoliths. These sampling levels were lower than 2004 for length data and similar for otoliths, and reflect the first full year where observer coverage < 100% was allowed. (In 2004, 37,140 length measurements were collected, along with 2333 otoliths). In 2006, 1 length frequency, consisting of 282 measurements was collected, and no otoliths were taken.

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 2005 was within 3% of the catch. The Canadian catch in 2005 consisted of about 1.89 million A. plaice, which was in the range of the 2003 and 2004 catch numbers. The catch ranged from age 4 to 20, and was comprised mainly of fish aged 7 to 11 years old, with a peak at age 7. The peak age in the catch numbers has declined from 9 or 10 in 1999-2001 to age 8 in 2002-03 and to age 7 in 2004-05. Age 6 comprised about 7% of the catch numbers in 2004, compared to about 20% for this age in 2004. Overall, the catch at age in 2005 was similar to that calculated for 1999-2004, as well as that from the Canadian fishery for A. plaice on the Grand Bank in the early 1990's (Brodie et al. 1994).

To allow an estimate of catch at age in 2006 to be calculated, an age length key from 2005 was applied to the length frequency data. Catch at age was similar to other years, with most of the numbers occurring at ages 7-11. However, the catch at age and weight at age for 2006 should be treated with caution, and will not be discussed here in detail.

The mean fish weight in the 2005 catch was 0.751 kg., up from 2003 and 2004 (0.713 and 0.716 kg.), and continued the increasing trend in recent years. Individual weights at age in 2005 were within the range of values observed from 2002-2004, but lower in 2005 than in 2004, thus ending an increasing trend in recent years (Tables 18 and 19).

For 2005 length frequency data were available from Russia and Spain and for 2006, length frequency data were available from Portugal, Russia and Spain. Details on the sampling levels and descriptions of the fisheries are contained in Vaskov et al. (2005, 2006), González et al. (2005, 2006) and Vargas et al. (2005, 2006). In all cases, age-length keys from the Canadian spring surveys in Div. 3LNO in 2005 (due to poor coverage from 2006 survey) was 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 2005 and 2006 are given in Table 20 and 21.

In 2005, catch from all countries indicated a large peak at age 7 -11. In 2006, age 7 was still the most abundant age in Russian catch, but there also seemed to be some older fish in the catch, as there were also large catches made up of fish up to age 14 in other countries. Mean lengths and weights at age in the Canadian fishery were slightly higher at younger ages than in international catches, likely a result of larger mesh size used in the Canadian fishery and also the use of research vessel age-length keys for the catches of non-Canadian fleets.

Virtual Population Analysis (VPA)

STACFIS previously recommended that several exploratory analyses of the ADAPT model using alternative datasets and model formulation be evaluated as well as a further comparison of trends between the Canadian spring survey and Spanish Div. 3NO survey (NAFO, 2005). After some exploratory analyses, it was decided that shortening or splitting the tuning index does not improve the residual pattern and concluded that the Spanish Div. 3NO survey would be added to the current ADAPT model with the caveat that the inclusion of this index be examined periodically to ensure it continues to track the index especially if the status of the stock begins to improve in Div. 3L (Dwyer et al., 2007).

Standardized age by age abundance (using mean and standard deviation of each index) was plotted using an exploratory data analysis package, Fisheries Library in R (FLR; www.flr-project.org) for all Canadian surveys (Engels and Campelen) and compared with Spanish Div. 3NO survey (Dwyer et al., 2007; Fig. 22). Surveys seemed to show the same trends in abundance at age, somewhat less at older ages. The Spanish Div. 3NO survey showed slightly higher estimates of the 1998 cohort at ages 5 and 6, relative to estimates of these cohorts in the Canadian surveys at these ages.

A formulation of ADAPT using the same base structure that was used in the accepted VPA since the 2001 assessment (Morgan et al 2001a, 2002, 2003; Dwyer et al., 2005) 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 21 (Table 23). The ratio of F on the plus group to F on the last true age was set at 1.0. M was set at 0.2 except at 0.53 for all ages from 1989 to 1996 (Morgan and Brodie, 2001). Beginning of the year weights-at-age and maturities-at-age are given in Tables 24 and 25. The calibration matrix consisted of the following:

- Canadian spring RV survey (1985-2005) abundance at age (ages 5-14);
- Canadian autumn RV survey (1990-2003) abundance at age (ages 5-14);
- Canadian autumn RV survey (2005-2006) abundance at age (ages 5-14); and
- Spanish Div. 3NO survey (1998-2006) MNPT (ages 5-14) (Table 22a, b, c).

A small error in abundance at age was discovered in the Canadian RV spring 2003 and 2004 estimates for Divs. 3LNO as well as an error in 2003 in Canadian RV fall survey. The errors were slight and when a comparative run (with the 2005 assessment numbers) was attempted with ADAPT differences were minimal. The assessment using the correct numbers gives a somewhat higher estimate of recruitment (36612 vs. 31112 t in most recent year).

The results of an ADAPT run using the formulation described above are given in Table 26 and Figures 23-26. The model provides a good fit to the data. The mean square of the residuals was 0.28. Relative errors on the population estimates ranged from 0.19 to 0.34. The relative errors on the catchabilities (q) were all less than 0.2. The residuals from the Canadian spring survey showed an increasing trend in more recent years; the Canadian fall survey showed no major patterns. The residuals from the Spanish Div. 3NO survey were smaller than the residuals from the other two surveys with little pattern (Fig. 23). There is some tendency for there to be a lag between the predicted and observed survey estimates at age for the fall survey but a better fit for the spring survey. The fit of predicted and observed survey estimates is not a good fit for the Spanish Div. 3NO survey (Fig. 24). Residuals are larger for the older ages in the fall survey but are fairly low overall (Fig 25). Survey qs showed that q is lower for the youngest fish and also older fish but is fairly constant across age (Fig. 26). Qs from the Spanish Div. 3NO survey show a different pattern than the other surveys and may catch a larger proportion of older fish.

Population numbers and F from this run are shown in Tables 27 and 28. Biomass was calculated by multiplying the population numbers at age by the beginning of the year weights at age. The VPA analyses showed that population abundance and biomass declined fairly steadily from the mid 1970's. Biomass has been relatively stable over the last number of years (Fig. 27), increasing slightly in the last three years. Average F on ages 9 to 14 and ages 11 to 14 showed an increasing trend from about 1965 to 1985. There was a large peak in F in 1993, which may be an artifact. F since 1995 has been generally lower than in the earlier period but increased fairly steadily from 1995 to 2000. F has been slightly lower since then. Average F on ages 9-14 in 2005 was 0.32 and in 2006 was 0.24 (Table 28, Fig. 27).

Spawning stock biomass was calculated by multiplying the biomass at age by the female maturity ogive (Table 25). SSB has shown 2 peaks, one in the mid 1960's and another in the early to mid 1980's. Since then it declined to a very low level (less than 10 000 t) in 1994 and 1995 (Figure 28, Table 29). Since 2001 the SSB has increased slightly to 36, 000 t in the current year. This is still only 18% of the level in the mid 1960's and 26% of the level in the mid-1980s. The stock recruit scatter is also shown in Figure 28. Recruitment has been steadily declining since the 1986 year-class and there have been no good year classes since then. An examination of the stock recruit scatter shows that there has been only good recruitment observed above 155 000 t and no good recruitment observed at SSB below 50 000 tons (Fig. 28). This level of 50 000 tons has been taken as a B_{lim} for this stock. The most recent cohort still falls below this level.

A retrospective analysis was conducted by sequentially removing one year of data from the most recent year to 2003 for a comparison of 5 years. The results of this analysis are shown in Figures 29 to 31 and Tables 30 and 31. The magnitude of the retrospective revisions in the current assessments has increased compared to past assessments. There is evidence of a retrospective pattern when examined for population abundance in total (Fig. 29) especially in the younger ages when examined on an age by age basis (Fig. 31). A retrospective pattern is also evident for average F estimates starting in 1995 (Fig. 30). The retrospective pattern may be due in part to higher estimates of the 1998 cohort from the Spanish Div. 3NO survey at ages 5 and 6, relative to estimates of these cohorts in the Canadian surveys at these ages. This can also be seen in the retrospective matrix (Tables 30 and 31) in the ratios for the 1998 cohort that are different than +/- 10%.

Medium Term Projections

Deterministic projections were carried out for 5 years to examine the trajectory of the spawning stock biomass under 2 scenarios of fishing mortality: $F = 0$, $F = F_{current}$. For these deterministic projections the results of the VPA were used. $F_{current}$ was set as the average F on ages 9-14 over the last 3 years and was 0.31. PR and weights

were averaged over the last 3 years. Recruitment was the average R/S for the last 3 year-classes and was equal to 2.43. In addition the following values were used for 2008-2012:

Age	5	6	7	8	9	10	11	12	13	14	15+
M	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
PR	0.01	0.06	0.16	0.34	0.69	0.87	1.00	0.94	0.93	0.85	0.85
Stock Weight	0.15	0.26	0.38	0.48	0.58	0.70	0.86	0.99	1.21	1.50	1.93
Maturities	0.03	0.15	0.46	0.81	0.95	1.00	1.00	1.00	1.00	1.00	1.00

The stock is estimated to increase under both $F = F_{current}$ and $F = 0$, with the increase in SSB at F=0 double that at current F. The increase under current conditions of F is only about 12 000 tons over the 5 year period and the stock does not exceed B_{lim}. The spawning stock reaches the B_{lim} of 50 000 tons by 2009 and 83 000 tons by 2012 with F = 0 (Fig. 32).

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Table 1. Nominal catches (t) of American plaice for NAFO Divisions 3LNO, 1960-2003 and TACs from 1973 to 2006.

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

Values for countries back to 2000 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 1996-2006 (Campelen). (+) indicates biomass <50 t, (-) means stratum not surveyed.

Biomass

Depth	Stratum	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
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
	363	2.3	0.8	0.0	3.2	6.2	0.6	0.1	3.4	2.1	4.1	4.5
	371	0.9	0.2	0.1	2.4	0.9	0.1	+	0.2	0.5	1.3	1.3
	372	1.4	0.8	1.3	2.7	3.7	1.2	0.3	2.2	1.2	1.8	2.5
	384	0.7	0.9	0.2	0.8	1.2	0.3	0.4	0.3	0.5	0.9	1.6
	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
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
	341	1.8	0.5	0.7	4.5	0.8	1.5	0.2	0.6	0.6	2.3	1.7
	342	0.1	0.1	0.4	0.4	0.2	0.1	+	0.1	+	0.1	0.6
	343	0.3	0.0	+	0.6	0.2	+	+	0.1	+	0.1	0.3
	348	1.4	0.8	1.2	2.8	1.5	0.4	0.3	0.4	1.3	1.5	7.0
	349	0.8	0.3	0.2	4.4	1.3	0.5	0.3	0.6	1.1	1.1	3.6
	364	2	1.0	0.9	5.6	1.3	1.5	1.2	0.7	1.7	5.8	7.5
	365	1.1	0.5	0.9	1.4	1.2	0.3	0.6	0.6	0.5	1.3	6.2
	370	1.3	0.6	1.6	2.4	1.9	0.9	0.6	0.5	1.1	4.0	5.1
	385	5.6	0.9	0.5	2.5	1.9	1.4	0.7	0.4	1.4	2.4	4.0
	390	0.6	0.4	0.5	0.3	0.3	0.4	1.0	0.3	0.2	0.9	0.9
	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
184-274	344	1	0.3	0.8	1.8	0.5	0.3	0.2	0.3	0.3	1.7	2.9
	347	0.6	0.2	0.6	0.6	0.2	0.4	0.1	0.5	0.3	1.7	1.7
	366	0.4	0.3	0.3	0.5	0.7	0.7	0.9	0.6	0.6	1.3	3.0
	369	0.3	0.2	0.2	1.2	0.7	0.9	0.8	0.4	0.5	2.8	4.4
	386	0.5	0.2	0.4	1.4	1.7	0.4	0.5	0.4	0.5	2.0	2.6
	389	0.4	0.2	0.4	0.6	0.8	0.8	0.3	0.4	0.7	0.4	1.1
	391	0.3	0.1	0.2	0.1	+	0.2	0.2	0.2	0.1	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
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
	346	0.4	0.3	0.2	0.2	0.5	0.1	0.8	0.8	0.9	1.6	0.7
	368	0.3	0.0	0.1	0.3	0.4	0.2	0.2	0.2	0.2	0.1	0.1
	387	0.6	0.6	0.8	0.4	1.6	0.8	0.1	0.4	0.4	0.7	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
	392	0.5	0.1	0.4	0.2	0.1	0.1	0.3	0.1	0.2	+	0
	792	-	-	-	+	-	0.1	-	0.1	-	-	-
	796	-	-	-	0.1	-	-	-	0.1	-	-	-
	800	-	-	-	0.2	-	-	-	-	0.1	-	-
	Total	2.9	1.4	2.0	3.7	3.4	2.4	2.2	1.8	2.4	5.5	2.9
367-549	729	0.2	0.6	2.2	0.1	1.3	1.1	1.3	1.2	+	+	0.0
	731	0.5	0.1	+	0.1	1.2	0.3	0.2	0.1	0.1	0.0	0.0
	733	0.7	0.0	0.3	1	0.1	2.3	0.5	2.1	0.3	+	0.1
	735	1.4	1.6	1.2	0.6	1.2	2.1	1.2	4.9	-	+	+
	Total	2.8	2.4	3.7	1.8	3.8	5.8	3.2	8.3	0.4	0.0	0.1
550-731	730	+	0.0	0.2	+	0.1	0.1	0.3	+	+	0.0	-
	732	+	0.0	0.0	+	0.3	3.4	0.6	0.6	0.0	0.0	-
	734	+	0.0	0.1	0	0	0.1	0.9	0.5	0.0	0.0	-
	736	+	0.1	0.0	+	+	+	0.5	0.1	+	+	-
	Total	0.1	0.1	0.3	+	0.4	3.6	2.3	1.2	0.0	0.0	0.1
732-914	737	-	-	-	-	-	-	-	-	-	-	-
	741	-	-	-	-	-	-	-	-	-	-	-
	745	-	-	-	-	-	-	-	-	-	-	-
	748	-	-	-	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-	-	-	-
915-1097	738	-	-	-	-	-	-	-	-	-	-	-
	742	-	-	-	-	-	-	-	-	-	-	-
	746	-	-	-	-	-	-	-	-	-	-	-
	749	-	-	-	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-	-	-	-
1098-1280	739	-	-	-	-	-	-	-	-	-	-	-
	743	-	-	-	-	-	-	-	-	-	-	-
	747	-	-	-	-	-	-	-	-	-	-	-
	750	-	-	-	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-	-	-	-
1281-1463	740	-	-	-	-	-	-	-	-	-	-	-
	744	-	-	-	-	-	-	-	-	-	-	-
	751	-	-	-	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-	-	-	-
Grand Total		30.7	13.8	19.0	57.3	37.5	27.6	17.1	25.4	19.3	47.9	68.9

in 1996 had a depth range of 184-366

Table 3. Biomass estimates ('000t) of A.plaice, by stratum and depth zone (m), from Canadian spring surveys in Div. 3N in 1996-2006 (Campelen). (+) indicates biomass <50 t, (-) means stratum not surveyed.

Biomass

Depth	Stratum	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
≤ 56	375	2.9	2.2	1.1	1.8	5.1	2.1	3.9	2.1	2.3	0.6	4.5
	376	0.8	1.8	2.0	3.2	5.1	9.3	8.6	9.6	11.7	37.2	32.1
	Total	3.7	4.0	3.1	5.0	10.2	11.4	12.5	11.8	14.1	37.8	36.5
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
	361	3.8	1.9	2.0	5.5	4.2	9.0	6.0	9.3	8.3	4.7	3.8
	362	2.8	5.5	4.0	4.6	6.6	7.0	2.7	4.7	2.5	5.7	4.5
	373	1.6	0.5	0.9	8.3	3.2	2.5	0.4	2.7	1.1	2.7	-
	374	1.1	0.4	0.3	1.7	0.9	1.0	0.6	3.2	2.1	3.5	0.1
	383	0.5	0.1	+	1.0	0.2	0.1	+	0.3	0.5	1.8	-
	Total	18.6	17.0	15.1	48.5	37.9	69.9	37.7	49.7	43.7	55.7	62.6
93-183	359	1.1	1.1	1.6	3.3	5.1	5.1	0.6	7.0	3.7	15.3	-
	377	0.2	0.1	+	0.2	+	0.9	0.1	0.2	0.2	0.4	-
	382	0.1	0.1	0.7	0.2	0.4	0.1	0.1	0.1	0.1	3.9	-
	Total	1.4	1.3	2.3	3.7	5.5	6.1	0.8	7.3	4.0	19.6	-
184-274	358	0.1	0.1	1.4	0.3	0.6	0.5	0.1	0.3	0.3	0.4	-
	378	0.1	0.2	0.2	0.9	+	0.1	0.1	0.5	0.4	0.1	-
	381	0.3	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.8	0.1	-
	Total	0.5	0.4	1.7	1.4	0.7	0.7	0.3	1.0	1.5	0.6	-
275-366	357	0.1	0.1	0.1	+	0.1	0.1	0.1	0.1	0.1	0.1	-
	379	+	0.1	0.1	0.1	0.1	0.1	0.1	0.3	+	+	-
	380	0.2	0.8	0.1	0.2	+	0.1	+	0.4	0.2	0.0	-
	Total	0.3	1.0	0.3	0.3	0.2	0.3	0.2	0.9	0.3	0.1	-
367-549	723	0.2	0.4	0.3	+	0.0	0.1	0.3	1.1	0.1	0.1	-
	725	0.1	0.5	0.2	+	0.4	0.1	+	0.3	+	+	-
	727	0.5	2.2	2.0	0.4	1.2	2.5	0.1	0.5	0.4	+	-
	Total	0.8	3.1	2.5	0.4	1.6	2.7	0.4	1.8	0.6	0.1	-
550-731	724	0.2	0.5	0.2	+	0.1	0.1	0.5	0.1	+	0.1	-
	726	+	0.1	+	+	0.1	+	+	+	+	0.0	-
	728	0.5	-	0.3	0.2	0.5	1.0	0.4	0.1	+	0.1	-
	Total	0.7	0.5	0.5	0.2	0.7	1.1	0.9	0.3	+	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

Table 4. Biomass estimates ('000t) of A.plaice, by stratum and depth zone (m), from Canadian spring surveys in Div. 3O in 1996-2004 (Campelen). (+) indicates biomass <50 t, (-) means stratum not surveyed.

Biomass

Depth	Stratum	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
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
	331	1.4	0.3	0.3	2.7	2.3	2.6	2.2	2.6	0.8	0.9	-
	338	6.0	5.7	6.0	4.0	2.3	6.0	3.1	5.0	4.3	4.5	6.4
	340	2.2	1.7	1.8	2.9	1.9	1.7	0.5	1.5	0.7	1.7	1.4
	351	2.9	4.4	3.8	4.6	3.4	6.5	3.2	2.4	3.5	4.5	3.2
	352	9.1	13.8	10.6	14.2	13.4	17.5	18.6	10.1	10.0	13.2	10.7
	353	7.8	8.3	10.9	21.5	21.1	20.6	14.8	25.2	21.2	10.1	15.9
	Total	33.2	34.9	40.3	53.4	50.3	59.1	44.5	48.0	43.4	41.3	42.5
93-183	329	1.6	1.4	4.4	4.7	3.9	1.9	1.4	1.8	3.1	2.3	-
	332	3.9	2.5	3.8	2.2	0.9	2.2	3.1	1.4	1.9	2.2	-
	337	4.6	1.9	3.2	2.7	1.5	1.2	1.4	1.4	1.6	2.5	-
	339	1.4	0.8	0.8	2.1	2.1	2.6	0.9	0.9	0.7	1.7	1.2
	354	1.6	1.1	5.0	9.0	1.3	1.6	6.4	5.3	8.1	1.9	-
	Total	13.1	7.8	17.2	20.7	9.7	9.5	13.2	10.9	15.3	10.7	1.2
184-274	333	+	0.3	0.1	0.1	+	+	0.3	+	+	0.2	-
	336	0.2	0.3	+	0.2	+	0.1	+	+	+	0.1	-
	355	0.5	0.3	0.1	0.1	0.1	0.4	0.4	0.6	0.3	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
275-366	334	0.2	0.8	0.0	0.1	+	+	0.2	0.2	+	+	-
	335	0.2	0.2	0.0	+	+	+	+	+	+	+	-
	356	0.1	+	+	0.1	+	+	+	0.4	+	+	-
	Total	0.5	1.0	+	0.2	+	+	0.2	0.5	+	0.1	0.0
367-549	717	0.2	1.7	+	0.1	0.0	+	0.4	0.2	0.0	0.1	-
	719	0.1	0.5	+	+	0.0	+	+	+	+	+	-
	721	0.2	0.1	+	0.1	+	0.2	+	0.1	0.0	+	-
	Total	0.5	2.2	+	0.2	+	0.2	0.4	0.3	0.0	0.1	
550-731	718	+	0.1	+	+	0.0	+	+	0.3	0.0	0.0	-
	720	+	0.1	+	+	0.0	0.1	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	-
	Total	1.0	4.4	+	0.2	0.1	0.2	0.1	0.2	0.0	0.0	-
732-914	764	-	-	-	-	-	-	-	-	-	-	-
	768	-	-	-	-	-	-	-	-	-	-	-
	772	-	-	-	-	-	-	-	-	-	-	-
											-	-
	Total	-	-	-	-	-	-	-	-	-	-	-
											-	-
915-1097	765	-	-	-	-	-	-	-	-	-	-	-
	769	-	-	-	-	-	-	-	-	-	-	-
	773	-	-	-	-	-	-	-	-	-	-	-
											-	-
	Total	-	-	-	-	-	-	-	-	-	-	-
Grand Total		49.0	51.2	57.7	75.1	60.2	69.5	59.1	60.5	59.0	52.6	43.7

Table 5. Abundance index at age (millions) for American plaice in NAFO Div. 3L from Canadian spring surveys from 1985 to 2005.

Age/Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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

Table 6. Abundance index at age (millions) for American plaice in NAFO Div. 3N from Canadian spring surveys from 1985 to 2005.

Age/Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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

Table 7. Abundance index at age (millions) for American plaice in NAFO Div. 3O from Canadian spring surveys from 1985 to 2005.

Age/Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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

Table 8. Abundance index at age (millions) for American plaice in NAFO Div. 3LNO from Canadian spring surveys from 1985 to 2005.

Age/Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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

Table 9. Biomass estimates ('000t) of A.plaice, by stratum and depth zone (m), from Canadian fall surveys in Div. 3L in 1995-2006 (Campelen). (+) indicates biomass <50 t, (-) means stratum not surveyed.

Biomass

Depth	Stratum	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
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	0.0	0.7
	363	3.1	2.0	1.4	2.1	1.9	2.3	3.7	0.7	0.3	0.5	0.0	2.3
	371	1.2	1.1	0.2	0.5	0.4	0.8	0.8	1.8	0.3	0.2	0.0	0.1
	372	1.4	1.6	1.5	0.3	1.7	0.6	2.5	0.9	1.1	0.4	0.0	0.9
	384	1.6	1.6	0.5	0.2	1.5	0.1	1.3	2.2	0.1	0.1	0.0	0.6
	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	0.3	4.6
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
	341	1.6	2.8	0.8	2.1	0.6	0.7	0.9	0.8	0.4	0.3	2.1	2.2
	342	0.6	+	0.4	0.2	-	0.2	0.1	0.1	0.2	0.1	0.0	0.2
	343	0.7	0.1	0.0	0.1	-	+	0.1	0.1	0.1	+	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
	349	3.4	1.4	1.5	0.8	0.4	0.3	0.6	0.1	0.7	1.3	3.2	2.7
	364	2.8	3.6	2.8	5.2	1.2	1.8	2.9	2.1	1.0	0.7	2.4	5.1
	365	1.7	1.1	1.0	1.4	1.0	-	0.4	0.6	0.5	-	3.2	2.1
	370	2.0	6.3	1.3	4.6	3.9	1.1	2.2	3.7	0.8	-	0.0	2.4
	385	3.9	7.6	1.9	4.0	2.9	0.8	3.5	5.4	3.3	6.5	0.0	3.2
	390	1.7	1.6	2.2	3.3	2.1	0.7	3.1	1.0	0.5	0.6	0.0	0.7
	786	-	0.3	0.1	0.1	-	0.1	0.2	0.1	0.1	0.1	0.3	-
	787	-	0.4	0.5	0.1	-	0.1	0.1	0.1	0.1	0.1	0.2	0.2
	788	-	0.3	0.3	0.1	-	0.1	+	0.3	+	0.2	0.3	0.4
	790	-	0.2	0.2	+	-	+	+	+	+	0.1	+	-
	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	16.7	24.4
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
	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
	366	1.6	1.2	0.5	0.8	1.7	0.5	0.3	0.4	0.7	-	2.9	5.7
	369	1.0	1.6	0.5	1.8	1.6	0.8	2.7	1.1	0.3	-	1.1	2.6
	386	1.8	2.6	1.0	0.9	1.2	0.4	1.3	2.3	0.9	-	0.8	2.5
	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
	391	0.4	0.2	0.2	0.2	0.3	+	0.1	0.1	0.4	0.1	-	0.2
	789	-	0.2	0.2	0.1	-	0.1	0.2	0.1	+	+	0.0	0.1
	791*	-	0.5	0.4	0.1	-	0.3	0.3	0.7	+	0.1	0.5	-
	795	-	+	0.2	0.4	-	+	+	0.1	0.2	0.2	0.2	+
	798	-	0.2	0.7	0.3	-	+	0.2	+	+	0.3	0.1	-
	Total	8.2	8.9	4.6	6.6	6.4	3.3	7.5	6.6	3.6	2.6	10.0	14.5
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
	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
	368	0.2	0.3	0.2	0.4	0.7	0.6	0.3	0.5	0.1	-	0.2	0.4
	387	0.4	0.7	0.7	0.2	1.8	1.0	0.4	0.2	0.5	-	0.3	0.8
	388	0.3	0.1	0.4	+	0.9	0.4	0.1	0.1	0.1	0.1	0.1	0.2
	392	+	+	0.2	0.1	0.5	0.2	0.1	0.1	0.1	+	-	0.3
	796	-	0.6	0.9	0.4	-	-	0.2	0.1	0.1	0.1	0.3	0.2
	800	-	-	-	0.2	-	0.2	0.3	0.3	0.2	0.2	0.2	-
	Total	7.8	5.2	5.5	5.5	6.9	3.4	3.1	3.4	2.2	3.8	4.5	7.6
367-549	729	+	+	0.2	0.1	0.7	1.6	0.4	+	0.1	0.1	-	0.2
	731	0.2	-	0.6	0.1	1.0	1.1	0.1	+	0.1	0.1	+	+
	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
	735	0.7	0.7	0.3	0.8	1.9	2.1	1.6	1.1	0.1	-	+	0.8
	792	-	0.2	1.9	0.3	-	0.2	0.6	0.1	0.2	0.1	+	-
	Total	1.1	1.1	3.6	1.9	3.9	6.0	3.3	1.5	0.9	0.5	0.4	1.7
550-731	730	+	0.0	0.5	0.1	0.2	0.4	0.9	0.1	+	0.5	-	2.1
	732	+	+	1.3	0.2	1.9	0.7	1.3	+	+	0.1	0.1	+
	734	0.0	0.2	0.3	0.1	0.1	0.1	+	+	0.0	-	0.0	0.1
	736	0.2	0.5	0.8	0.6	0.6	1.5	1.3	1.7	0.3	-	0.1	0.9
	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
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
	741	-	1.0	2.3	1.7	0.1	0.0	0.0	0.6	0.1	-	-	0.0
	745	-	0.1	2.2	0.1	0.7	0.0	0.0	0.0	0.3	-	-	0.0
	748	-	1.4	0.7	0.0	1.1	0.0	0.0	+	1.1	-	-	0.5
	Total	0.4	4.0	7.0	5.1	2.7	0.7	1.4	1.6	2.6	-	2.0	1.6
915-1097	738	0.6	0.2	0.0	0.0	0.0	0.0	+	+	2.2	-	-	0.0
	742	-	0.1	0.0	0.0	+	0.0	0.0	0.0	3.5	-	-	0.0
	746	-	0.1	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	+	-	-	-
	Total	0.6	0.4	0.2	+	+	0.0	+	+	5.7	-	-	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
	743	-	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
	750	-	0.1	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
1281-1463	740	-	0.0	0.0	0.0	0.1	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
	751	-	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
Grand Total		50.9	57.5	43.3	48.6	44.8	27.5	51.3	44.3	26.4	21.0	34.1	57.6

Table 10. Biomass estimates ('000t) of A.plaice, by stratum and depth zone (m), from Canadian fall surveys in Div. 3N in 1995-2006 (Campelen). (+) indicates biomass <50 t, (-) means stratum not surveyed.

Biomass

Depth	Stratum	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
≤ 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
	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
	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
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
	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
	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
	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
	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
	383	-	0.3	0.5	0.8	0.8	+	0.5	0.5	0.1	+	0.4	0.3
	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
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
	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
	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
	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
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
	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
	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
	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
275-366	357	0.1	0.1	0.0	+	-	+	+	+	0.0	+	0.2	+
	379	+	0.2	0.1	+	0.3	+	0.1	+	0.0	0.5	+	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
	Total	0.2	0.5	0.2	0.1	1.0	0.3	0.2	+	0.1	0.6	0.1	0.2
367-549	723	+	+	0.0	0.1	+	+	+	0.0	0.0	+	+	0.0
	725	0.1	0.1	0.0	+	0.1	0.2	+	0.0	0.0	-	0.1	+
	727	+	0.1	0.1	0.1	1.5	0.4	0.1	0.3	0.3	0.2	0.2	0.1
	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
550-731	724	0.1	0.3	0.0	0.0	0.1	0.0	0.0	0.0	-	+	+	0.0
	726	+	0.3	0.1	+	+	+	+	0.0	0.0	+	0.0	0.0
	728	+	0.8	0.1	0.1	0.3	0.6	+	0.1	0.0	1.1	0.2	+
	Total	0.1	1.4	0.2	0.1	0.4	0.6	+	0.1	0.0	1.1	0.2	0.0
732-914	752	-	-	-	1.5	-	0.0	0.0	0.0	-	-	-	-
	756	-	-	-	0.1	-	-	0.0	0.0	-	-	0.0	-
	760	-	-	-	0.0	-	-	0.0	0.0	-	-	0.0	-
	Total				0.0	-	0.0	0.0	0.0	-	-	-	-
915-1097	753	-	-	-	+	-	0.0	0.0	0.0	-	-	-	-
	757	-	-	-	0.0	-	-	0.0	0.0	-	-	0.0	-
	761	-	-	-	0.0	-	-	0.0	0.0	-	-	0.0	-
	Total	-	-	-	+	-	0.0	0.0	0.0	-	-	-	-
1098-1280	754	-	-	-	0.0	-	0.0	0.0	0.0	-	-	-	-
	758	-	-	-	0.0	-	0.0	0.0	0.0	-	-	0.0	-
	762	-	-	-	-	-	-	0.0	0.0	-	-	0.0	-
	Total	-	-	-	0.0	-	0.0	0.0	0.0	-	-	-	-
1281-1463	755	-	-	-	0.0	-	0.0	0.0	0.0	-	-	-	-
	759	-	-	-	0.0	-	-	0.0	0.0	-	-	0.0	-
	763	-	-	-	-	-	-	0.0	0.0	-	-	0.0	-
	Total	-	-	-	0.0	-	0.0	0.0	0.0	-	-	-	-
Grand Total		46.0	20.9	61.0	77.3	78.1	180.3	92.9	157.4	127.4	143.4	127.8	119.5

Table 11. Biomass estimates ('000t) of A.plaice, by stratum and depth zone (m), from Canadian fall surveys in Div. 3O in 1995-2006 (Campelen). (+) indicates biomass <50 t, (-) means stratum not surveyed.

Biomass

Depth	Stratum	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
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
	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
	338	6.6	3.3	6.4	3.4	3.8	2.1	4.4	-	6.7	5.3	5.4	2.8
	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
	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
	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
	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
	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
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
	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
	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
	339	6.5	0.9	5.1	1.4	-	3.8	2.4	3.2	3.3	2.2	4.9	1.2
	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
	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
184-274	333	+	-	+	+	0.1	+	0.0	0.1	+	+	+	+
	336	+	0.1	0.1	+	0.1	0.1	+	0.1	+	+	+	0.1
	355	0.2	5.4	0.1	+	0.3	+	0.1	0.1	+	0.1	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
275-366	334	0.0	-	+	+	+	0.0	0.0	0.0	0.0	+	+	+
	335	+	+	+	+	+	+	+	+	+	+	+	+
	356	0.0	0.1	+	+	+	+	0.0	0.0	+	+	+	+
	Total	+	0.1	0.1	+	0.1	0.0	0.0	0.0	0.0	+	+	+
367-549	717	0.0	-	+	0.0	+	+	+	0.0	0.0	0.0	0.0	+
	719	+	0.2	0.0	+	+	+	0.0	0.0	+	+	+	+
	721	+	0.6	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
550-731	718	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	+
	722	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
732-914	764	-	-	-	0.0	-	-	0.0	0.0	-	-	0.0	-
	768	-	-	-	0.0	-	-	0.0	0.0	-	-	0.0	-
	772	-	-	-	0.0	-	-	-	0.0	0.0	-	0.0	-
	Total	-	-	-	0.0	-	-	0.0	0.0	0.0	-	0.0	-
915-1097	765	-	-	-	0.0	-	-	0.0	0.0	-	-	0.0	-
	769	-	-	-	0.0	-	-	0.0	0.0	-	-	0.0	-
	773	-	-	-	0.0	-	-	0.0	0.0	0.0	-	0.0	-
	Total	-	-	-	0.0	-	-	0.0	0.0	0.0	-	0.0	-
1098-1280	766	-	-	-	-	-	0.0	0.0	0.0	-	-	0.0	-
	770	-	-	-	-	-	0.0	0.0	0.0	-	-	0.0	-
	774	-	-	-	-	-	0.0	0.0	0.0	0.0	-	0.0	-
	Total	-	-	-	-	-	0.0	0.0	0.0	0.0	-	0.0	-
1281-1463	767	-	-	-	-	-	0.0	0.0	0.0	-	-	0.0	-
	771	-	-	-	-	-	0.0	0.0	0.0	-	-	0.0	-
	775	-	-	-	-	-	0.0	0.0	0.0	0.0	-	0.0	-
	Total	-	-	-	-	-	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

Table 12. Abundance index (millions) at age for A. plaice in Div. 3L from Canadian fall surveys from 1990 to 2006.

Age/Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
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	0.00	0.05
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
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
3	26.07	14.38	12.54	21.10	0.00	25.11	57.94	21.44	6.89	10.52	26.11	70.83	119.40	79.49	30.78	33.21	42.72
4	309.25	91.21	52.65	71.20	14.48	59.35	170.16	63.91	28.35	7.92	8.33	34.69	35.23	75.44	72.68	54.99	31.70
5	597.38	295.78	171.91	123.36	25.75	198.76	149.44	105.70	64.67	29.39	27.69	20.68	16.94	26.16	42.61	73.06	35.44
6	548.02	372.37	269.73	218.20	42.96	187.22	84.67	84.48	90.34	50.01	34.64	21.12	14.52	9.05	11.30	55.74	72.86
7	303.10	164.87	102.93	138.57	54.51	101.25	31.85	35.87	57.37	46.36	22.80	34.07	21.47	7.52	4.65	21.49	68.18
8	145.95	77.59	32.27	27.74	28.54	36.23	6.04	10.59	25.21	37.97	12.56	31.22	25.94	9.05	3.82	10.85	27.59
9	95.12	43.16	10.42	7.96	8.82	19.26	2.46	5.73	14.46	24.81	8.54	25.12	18.13	5.45	3.95	3.97	5.26
10	36.73	18.31	5.51	2.65	1.88	3.65	0.83	1.27	3.74	8.91	2.73	10.85	10.36	4.75	0.88	4.52	3.53
11	17.48	8.27	1.87	1.13	0.29	0.36	0.14	0.82	1.26	4.64	1.77	8.38	7.94	2.87	0.75	1.52	1.81
12	9.06	5.12	1.63	0.29	0.06	0.10	0.06	0.19	0.41	2.10	0.33	3.24	2.04	0.92	0.12	2.36	3.66
13	5.46	1.95	0.46	0.09	0.02	0.00	0.05	0.14	0.06	0.63	0.12	0.55	0.25	0.53	0.11	1.72	1.47
14	3.94	1.51	0.26	0.07	0.07	0.00	0.00	0.00	0.00	0.22	0.00	0.32	0.05	0.06	0.00	0.73	1.22
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	0.95	1.73
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
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
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	0.12	0.01
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
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
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
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
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
Ages 0+	2103.06	1098.06	663.07	615.76	177.38	644.47	521.37	332.31	299.68	257.85	193.46	373.37	341.93	240.91	184.91	305.20	344.85
Ages 6+	1166.89	694.48	425.23	397.01	137.15	348.06	126.10	139.08	192.86	175.70	83.59	134.94	100.71	40.21	25.57	104.31	188.58
Ages 9+	169.82	79.65	20.29	12.50	11.14	23.36	3.54	8.15	19.94	41.36	13.59	48.53	38.79	14.59	5.81	16.24	19.96
Ages 12+	20.50	9.90	2.49	0.75	0.15	0.10	0.11	0.33	0.48	3.00	0.56	4.17	2.35	1.52	0.23	6.23	9.36

Table 13. Abundance index (millions) at age for A. plaice in Div. 3N from Canadian fall surveys from 1990 to 2006.

Age/Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
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	0.00	0.00
1	2.34	0.82	5.84	0.00	0.00	1.97	0.11	1.81	1.93	46.35	20.47	8.24	1.79	7.76	102.60	5.47	1.04
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
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
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
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
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
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
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
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
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
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
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
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	3.28
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
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
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
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
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
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
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	0.00
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
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
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
Ages 0+	707.62	992.49	722.05	659.24	272.37	175.59	52.65	145.51	160.31	256.19	779.70	317.88	465.01	445.66	546.17	586.86	259.36
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	170.27
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	40.29
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	13.16

Table 14. Abundance index (millions) at age for A. plaice in Div. 3O from Canadian fall surveys from 1990 to 2006.

Age/Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
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	0.00	0.00	0.10
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	52.70	5.38
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
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
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
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
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
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	34.12	34.80
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	8.47	18.15
9	22.78	28.33	17.21	16.26	12.54	14.17	4.54	9.60	16.11	22.84	13.45	11.07	5.70	6.15	7.17	4.22	4.39
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	3.04	1.91
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	2.81	1.60	1.95
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
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	1.37	0.96	1.11
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	0.51	0.57
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
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
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
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
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
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
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
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
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	0.97	0.20	1.51
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	531.79	461.96
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	88.07	110.80	103.78
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	15.44	12.25	14.18
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	3.27	3.39	5.94

Table 15. Abundance index (millions) at age for A. plaice in Div. 3LNO from Canadian fall surveys from 1990 to 2006.

Age/Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
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	0.00	0.00	0.14
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	69.96	17.86
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
3	186.10	264.49	217.71	115.95	19.53	60.55	136.49	101.12	16.78	71.84	415.51	302.51	223.50	177.45	94.50	165.55	265.55
4	705.41	449.84	258.26	497.88	103.74	110.88	227.74	146.72	117.67	23.72	122.87	117.22	295.37	271.68	251.26	114.07	106.89
5	853.10	724.40	367.93	360.45	190.30	295.94	208.29	153.85	121.17	92.46	73.67	53.98	105.56	325.02	251.20	170.52	74.28
6	642.86	578.81	499.19	372.08	151.09	336.35	174.08	159.85	129.09	93.43	132.01	67.18	42.39	85.30	173.88	197.03	141.13
7	369.63	249.38	226.08	316.57	134.91	151.96	82.20	119.98	112.64	79.57	115.59	97.77	72.91	49.33	55.97	132.09	138.30
8	191.67	116.27	76.71	104.12	89.25	61.45	21.37	53.22	83.42	98.92	83.79	63.67	75.89	35.47	25.13	38.10	108.77
9	124.52	81.84	35.65	33.00	28.65	39.52	8.82	23.33	68.42	72.70	61.82	48.71	41.05	19.31	19.45	13.85	26.31
10	55.20	44.30	17.68	15.32	7.82	10.75	3.08	7.30	17.95	33.66	48.92	27.34	26.80	12.57	9.85	13.27	9.19
11	29.20	25.92	8.45	6.80	2.67	1.88	1.78	3.22	6.94	18.85	25.38	26.36	26.98	11.14	5.98	7.28	10.46
12	17.43	13.86	6.85	5.10	1.72	1.31	0.59	1.21	3.63	12.31	7.07	11.69	15.76	6.37	4.16	5.11	9.92
13	12.05	12.21	3.33	3.08	0.92	0.45	0.10	0.85	2.04	4.89	3.09	2.83	7.85	1.99	2.23	4.91	5.87
14	9.32	6.98	3.15	2.38	1.17	0.31	0.12	0.60	0.84	1.08	0.84	1.13	0.99	0.86	1.21	3.34	3.62
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	2.33	4.76
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
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
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	0.12	0.48
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
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
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
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
unk	0.64	1.38	1.86	1.65	0.09	1.77	0.00	1.05	1.20	1.28	0.27	0.74	0.30	0.50	13.13	0.42	2.02
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	1066.49
Ages 6+	1463.58	1137.94	880.27	862.28	418.59	604.02	292.47	370.11	426.03	417.05	479.99	347.97	313.54	223.62	298.48	418.28	462.63
Ages 9+	259.43	193.48	78.29	69.52	43.34	54.26	14.83	37.06	100.88	145.14	148.60	119.34	122.35	53.51	43.50	51.06	74.44
Ages 12+	50.51	41.42	16.50	14.40	4.21	2.12	1.15	3.20	7.57	19.93	12.49	16.93	27.51	10.49	8.22	16.65	28.47
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
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

	3L		3N	3O		3LNO
	OT	Gillnet	OT	OT	Gillnet	Total
Jan			21		2	23
Feb			16			16
Mar			54			54
Apr			159	92		251
May	61		174	96		331
Jun	7		159	21	1	188
Jul						
Aug		13		13		26
Sep		17	64	74		155
Oct			145	18		163
Nov	2		133	41		176
Dec			80	1		81
Total	**70**	**30**	**1005**	**356**	**3**	**1464**

Summaries:

GN=33
OT=1431

3L=100
3N=1005
3O=359

By-catch in directed yellowtail fishery = 1425
By-catch in directed G.halibut fishery = 33
By-catch in other directed fisheries = 6

Table 16. Canadian catches of A. plaice by Division, month and gear during 2005.

	3L		3N	3O		3LNO
	OT	Gillnet	OT	OT	Gillnet	Total
Jan			1	29		30
Feb				29		29
Mar			1	3		4
Apr				12	2	14
May						
Jun						
Jul						
Aug		9			2	11
Sep						
Oct			2			2
Nov				2		2
Dec						
Total		**9**	**4**	**75**	**4**	**92**

Summaries:

GN=13
OT=79

3L=9
3N=4
3O=79

By-catch in directed yellowtail fishery = 4
By-catch in directed G.halibut fishery = 11
By-catch in redfish directed fisheries = 75

Table 17. Canadian catches of A. plaice by Division, month and gear during 2006.

Table 18. 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 2005. S.O.P. is catch numbers x mean weights. An asterisk indicates catch of less than 500 fish.

						2005		3LNO
Age	3L	3N	3O	Total	Pctg	Mean len	Mean wgt	S.O.P. (t)
4			*	0.2	0.01	30.5	0.241	0.0
5	3	9	5	17	0.90	32.5	0.308	5.2
6	12	97	27	136	7.19	34.7	0.379	51.5
7	23	299	121	444	23.49	37.2	0.478	212.2
8	30	213	97	340	17.99	39.5	0.580	197.2
9	26	173	90	289	15.29	41.4	0.686	198.3
10	23	110	78	211	11.16	43.7	0.829	174.9
11	23	92	61	177	9.36	45.7	0.950	168.2
12	5	69	28	102	5.40	48.9	1.197	122.1
13	2	44	15	62	3.28	52.0	1.462	90.6
14	3	34	9	47	2.49	52.7	1.552	72.9
15	*	25	10	35	1.85	54.7	1.750	61.3
16	*	13	3	16	0.85	58.9	2.196	35.1
17		4	1	6	0.32	59.5	2.259	13.6
18		5	2	7	0.37	57.5	2.047	14.3
19		1		1	0.05	60.6	2.385	2.4
20		*		0.1	0.01	68.5	3.549	0.4
Total	150	1188	547	1890	100.00			1420
							catch=	1464

Table 19. Catch at age (000 of fish) and mean length (cm) and weights (kg) at age from the Canadian catch of A. plaice in Div. 3LNO in 2006. S.O.P. is catch numbers x mean weights. An asterisk indicates catch of less than 500 fish.

						2006		3LNO
Age	3L	3N	3O	Total	Pctg	Mean len	Mean wgt	S.O.P. (t)
4								
5				1.5	0.95	28.3	0.190	0.3
6				11	6.94	30.1	0.234	2.6
7				34	21.46	33.6	0.341	11.6
8				28	17.68	37.9	0.512	14.3
9				25	15.78	40.3	0.623	15.6
10				22	13.89	41.5	0.694	15.3
11				17	10.73	44.6	0.872	14.8
12				7	4.42	46.5	1.020	7.1
13				4	2.53	47.8	1.119	4.5
14				3	1.89	51.6	1.471	4.4
15				4	2.53	51.9	1.493	6.0
16				1.0	0.63	57.7	2.080	2.1
17				0.3	0.19	54.0	1.613	0.5
18				0.6	0.38	50.9	1.342	0.8
19								
Total				158	100.00			99.8
							catch=	92

Table 20. Catch at age for all fleets Div. 3LNO American plaice for 2005. Note that total catch adjusted for catch with no length frequencies.

	2005																				
	Russia				Spain				Canada				Overall (LF data available)				Portugal	Estonia	Lithuania	France (SP)	Japan	Total (000s)
	3LNO	Mean len	Mean wgt	S.O.P.	3LNO	Mean len	Mean wgt	S.O.P.	3LNO	Mean len	Mean wgt	S.O.P.	3LNO	Mean len	Mean wgt	S.O.P.						
1	0	0.0	0.000	0	0	0.0	0.000	0	0				0	0.0	0.000	0						0
2	0	0.0	0.000	0	2	17.4	0.038	0	0			0	2	17.4	0.038	0						3
3	0	14.5	0.020	0	13	18.4	0.045	1	0			0	13	18.4	0.045	1						18
4	0	23.4	0.100	0	11	19.5	0.055	1	0	30.5	0.241	0	11	19.9	0.058	1						15
5	1	27.3	0.166	0	26	25.0	0.124	3	17	32.5	0.308	5	44	28.6	0.195	9						59
6	5	30.0	0.229	1	79	32.2	0.290	23	136	34.7	0.379	52	219	33.9	0.344	75						291
7	7	33.5	0.328	2	307	36.5	0.439	134	444	37.2	0.478	212	758	37.1	0.461	349						1004
8	4	36.2	0.425	2	295	39.0	0.545	161	340	39.5	0.580	197	639	39.4	0.563	360						847
9	4	38.4	0.519	2	298	40.5	0.619	185	289	41.4	0.686	198	591	41.1	0.651	385						783
10	3	41.6	0.674	2	225	42.4	0.719	162	211	43.7	0.829	175	440	43.3	0.771	339						583
11	3	44.4	0.839	3	226	44.9	0.873	198	177	45.7	0.950	168	407	45.4	0.906	369						539
12	2	46.6	0.986	2	155	47.6	1.059	164	102	48.9	1.197	122	259	48.3	1.113	289						344
13	1	48.3	1.111	1	134	51.3	1.353	182	62	52.0	1.462	91	197	51.6	1.386	273						261
14	0	55.7	1.785	1	88	54.2	1.632	143	47	52.7	1.552	73	135	53.9	1.604	217						179
15	0	58.1	2.057	1	67	58.0	2.042	137	35	54.7	1.750	61	102	57.1	1.942	199						136
16	0	58.4	2.087	0	14	61.8	2.522	34	16	58.9	2.196	35	30	60.5	2.345	70						39
17	0	64.0	2.832	0	8	62.9	2.671	21	6	59.5	2.259	14	14	61.6	2.497	35						19
18	0	64.5	2.907	0	2	64.5	2.907	5	7	57.5	2.047	14	9	59.4	2.213	19						11
19	0	0.0	0.000	0	0	0.0	0.000	0	1	60.6	2.385	2	1	60.8	2.385	2						1
UNK	0	62.8	2.655	0	4	68.7	3.580	15	0	68.5	3.549	0	4	68.6	3.559	16						6
Total SOP (t)				19				1568				1420				3007						1.32
catch																	886	34	14	12	28	

Table 21. Catch at age for all fleets Div. 3LNO American plaice for 2006. Note that total catch adjusted for catch with no length frequencies.

	2006																						
	Russia				Spain				Portugal				Canada				Overall (LF data available)				Estonia	Lithuania	Japan	
	3LNO	Mean len	Mean wgt	S.O.P.	3LNO	Mean len	Mean wgt	S.O.P.	3LNO	Mean len	Mean wgt	S.O.P.	3LNO	Mean len	Mean wgt	S.O.P.	3LNO	Mean len	Mean wgt	S.O.P.				Total (000s)
1	0	0.0	0.000	0	0	0.0	0.000	0	0	0.0	0.000	0	0			0	0	0.0	0.000	0				0
2	0	16.9	0.034	0	0	0.0	0.000	0	0	15.5	0.025	0	0			0	0	15.5	0.025	0				0
3	0	19.5	0.055	0	0	24.5	0.116	0	12	21.4	0.074	1	0			0	12	21.5	0.075	1				13
4	0	21.4	0.074	0	1	26.5	0.150	0	14	23.9	0.107	1	0			0	15	24.2	0.111	2				16
5	1	24.4	0.114	0	16	28.5	0.192	3	55	26.9	0.160	9	2	28.3	0.190	0	74	27.3	0.166	12				76
6	4	28.3	0.187	1	98	32.8	0.308	30	108	30.3	0.235	25	11	30.1	0.234	3	222	31.4	0.266	59				229
7	5	32.8	0.308	2	412	36.4	0.435	179	167	34.9	0.376	63	34	33.6	0.341	12	618	35.9	0.413	255				638
8	4	35.7	0.406	2	412	39.1	0.549	226	98	38.1	0.503	49	28	37.9	0.512	14	542	38.8	0.538	291				559
9	4	37.5	0.479	2	359	40.5	0.618	222	67	39.8	0.581	39	25	40.3	0.623	16	455	40.4	0.612	278				469
10	3	40.1	0.599	2	265	42.5	0.725	192	55	42.8	0.744	41	22	41.5	0.694	15	344	42.5	0.725	249				355
11	2	42.5	0.726	2	222	46.6	0.983	218	61	48.0	1.087	67	17	44.6	0.872	15	302	46.7	0.996	301				312
12	1	46.6	0.983	1	180	47.9	1.080	195	56	48.8	1.153	65	7	46.5	1.020	7	245	48.1	1.095	268				253
13	0	46.8	1.001	0	137	50.7	1.307	180	63	51.1	1.337	84	4	47.8	1.119	4	204	50.8	1.312	268				211
14	0	49.2	1.182	0	109	54.9	1.697	185	38	53.5	1.559	59	3	51.6	1.471	4	150	54.5	1.658	249				155
15	0	53.8	1.586	0	98	57.8	2.012	197	21	55.8	1.797	37	4	51.9	1.493	6	122	57.3	1.959	240				126
16	0	50.5	1.289	0	13	64.4	2.896	38	1	62.5	2.618	1	1	57.7	2.080	2	15	64.0	2.827	42				15
17	0	0.0	0.000	0	25	63.3	2.729	68	2	64.5	2.903	7	0	54.0	1.613	0	28	63.3	2.733	76				29
18	0	0.0	0.000	0	7	64.5	2.907	19	0	64.5	2.907	0	1	50.9	1.342	1	7	63.6	2.779	20				8
19	0	0.0	0.000	0	0	0.0	0.000	0	0	0.0	0.000	0	0			0	0	0.0	0.000	0				0
UNK	0	54.5	1.660	0	4	67.9	3.448	15	0	55.5	1.760	0	0			0	5	67.6	3.389	15				5
Total SOP (t)				11				1969				548				100				2628				1.03
catch																					23	10	15	

Table 22. Numbers at age of American plaice from the Canadian spring RV survey (1985-2005) (a), Canadian fall RV survey (1990- 2003; 2005-6) and Spanish Div. 3NO survey from 1998-2006 (c).

a. Canadian spring survey

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

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	17.43	12.054	9.316
1991.9	724.397	578.812	249.38	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	17.68	8.451	6.848	3.333	3.151
1993.9	360.452	372.076	316.567	104.116	33	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	278.383	322.484	123.253	55.26	26.66	7.981	1.619	1.211	0.452	0.307
1996.9	208.293	174.079	82.201	21.365	8.82	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	129.09	112.639	83.42	68.417	17.949	6.944	3.63	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	170.516	197.026	132.092	38.105	13.853	13.272	7.282	5.112	4.912	3.339
2006.9	74.278	141.128	138.301	108.766	26.315	9.192	10.458	9.922	5.866	3.616

c. Spanish Div. 3NO survey

Age/Year	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	55.020	82.792	99.311	41.064	23.227	7.521	4.912	3.994	2.835	2.207

Table 23. Catch at age used in the virtual population analyses. Age 15 is a plus group.

catch to 60	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	58.9	290.5	1004.2	847.3	782.7	582.7	539.0	343.7	261.3	178.9	206.4
2006	76.1	228.7	638.0	559.2	469.5	354.8	312.1	252.9	211.0	154.7	177.8

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

mid year	5	6	7	8	9	10	11	12	13	14	15+
1960	0.209	0.193	0.274	0.363	0.487	0.594	0.695	0.857	0.903	1.193	1.340
1961	0.209	0.187	0.279	0.373	0.493	0.596	0.741	0.865	0.888	1.199	1.360
1962	0.209	0.177	0.276	0.38	0.522	0.611	0.738	0.885	0.905	1.206	1.369
1963	0.209	0.227	0.297	0.384	0.525	0.621	0.731	0.845	0.867	1.152	1.528
1964	0.209	0.285	0.378	0.491	0.547	0.639	0.76	0.851	0.92	1.208	1.586
1965	0.209	0.289	0.365	0.498	0.625	0.703	0.827	0.869	0.932	1.258	1.669
1966	0.209	0.277	0.369	0.499	0.64	0.788	0.976	0.988	0.984	1.287	1.658
1967	0.209	0.287	0.383	0.469	0.61	0.788	0.847	1.03	1.064	1.369	1.898
1968	0.209	0.276	0.348	0.45	0.602	0.697	0.851	0.991	1.075	1.397	1.898
1969	0.209	0.29	0.332	0.412	0.564	0.67	0.785	0.982	1.05	1.401	1.886
1970	0.209	0.275	0.33	0.397	0.536	0.68	0.795	0.841	1.043	1.166	1.596
1971	0.209	0.259	0.331	0.404	0.494	0.612	0.772	0.909	1.034	1.132	1.572
1972	0.209	0.278	0.372	0.484	0.527	0.629	0.753	0.867	0.935	1.175	1.647
1973	0.209	0.244	0.292	0.38	0.519	0.629	0.816	1.041	1.243	1.334	1.828
1974	0.210	0.252	0.339	0.416	0.568	0.694	0.917	1.108	1.36	1.567	2.178
1975	0.213	0.254	0.348	0.417	0.564	0.692	0.896	1.077	1.318	1.523	2.108
1976	0.207	0.261	0.346	0.414	0.557	0.66	0.829	1.017	1.142	1.347	1.859
1977	0.209	0.264	0.357	0.43	0.614	0.672	0.878	1.018	1.231	1.415	1.976
1978	0.195	0.26	0.353	0.412	0.512	0.614	0.768	0.917	1.184	1.38	1.869
1979	0.209	0.322	0.374	0.453	0.551	0.609	0.702	0.934	1.228	1.688	2.048
1980	0.209	0.328	0.408	0.482	0.541	0.57	0.65	0.739	0.982	1.355	1.830
1981	0.209	0.379	0.406	0.453	0.487	0.536	0.551	0.676	0.792	1.005	1.543
1982	0.256	0.298	0.36	0.427	0.485	0.533	0.596	0.739	0.976	1.275	1.776
1983	0.298	0.382	0.473	0.555	0.658	0.698	0.697	0.756	0.959	1.22	1.768
1984	0.270	0.314	0.382	0.46	0.551	0.563	0.654	0.852	1.128	1.444	2.198
1985	0.212	0.329	0.43	0.473	0.549	0.655	0.82	1.102	1.472	1.898	2.554
1986	0.122	0.194	0.277	0.411	0.548	0.666	0.776	0.989	1.296	1.674	2.284
1987	0.230	0.293	0.398	0.439	0.497	0.655	0.843	1.103	1.395	1.735	2.429
1988	0.170	0.254	0.343	0.446	0.489	0.601	0.774	1.034	1.369	1.745	2.451
1989	0.101	0.186	0.261	0.388	0.488	0.608	0.806	1.068	1.446	1.805	2.455
1990	0.149	0.246	0.345	0.445	0.554	0.704	0.913	1.205	1.624	1.992	2.327
1991	0.200	0.31	0.418	0.483	0.608	0.788	1.014	1.334	1.812	2.177	2.484
1992	0.231	0.284	0.352	0.413	0.548	0.732	0.941	1.184	1.494	1.8	2.488
1993	0.114	0.225	0.275	0.365	0.496	0.589	0.729	0.912	1.227	1.438	2.240
1994	0.119	0.193	0.266	0.374	0.533	0.757	0.897	1.127	1.484	1.701	2.232
1995	0.179	0.237	0.330	0.438	0.709	1.034	1.605	1.676	1.53	2.304	1.855
1996	0.148	0.210	0.296	0.451	0.657	0.918	1.083	1.323	1.576	2.907	2.402
1997	0.164	0.242	0.336	0.486	0.652	0.844	0.990	1.302	1.771	2.349	2.349
1998	0.169	0.167	0.269	0.365	0.504	0.615	0.770	0.980	1.220	1.694	1.727
1999	0.191	0.264	0.308	0.371	0.463	0.607	0.736	0.961	1.155	1.507	1.932
2000	0.166	0.296	0.371	0.420	0.533	0.691	0.845	1.090	1.370	1.593	2.047
2001	0.223	0.321	0.401	0.489	0.520	0.640	0.815	1.028	1.242	1.413	2.010
2002	0.225	0.322	0.395	0.472	0.531	0.650	0.816	1.085	1.237	1.588	2.149
2003	0.242	0.332	0.422	0.498	0.621	0.763	0.889	1.090	1.329	1.600	2.233
2004	0.221	0.324	0.420	0.518	0.652	0.810	0.920	1.073	1.330	1.772	2.444
2005	0.195	0.344	0.461	0.563	0.651	0.771	0.906	1.113	1.386	1.604	2.087
2006	0.166	0.266	0.413	0.538	0.612	0.725	0.996	1.095	1.312	1.658	2.194

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

	5	6	7	8	9	10	11	12	13	14	15
1960	0.002	0.004	0.016	0.040	0.127	0.232	0.561	0.810	0.932	0.977	0.992
1961	0.003	0.005	0.014	0.046	0.105	0.333	0.564	0.810	0.932	0.977	0.992
1962	0.002	0.009	0.013	0.041	0.126	0.250	0.632	0.847	0.932	0.977	0.992
1963	0.001	0.006	0.027	0.037	0.117	0.298	0.486	0.855	0.960	0.977	0.992
1964	0.001	0.002	0.019	0.082	0.100	0.291	0.556	0.728	0.953	0.990	0.992
1965	0.005	0.004	0.009	0.056	0.218	0.240	0.559	0.787	0.884	0.986	0.998
1966	0.013	0.016	0.017	0.038	0.158	0.468	0.474	0.797	0.916	0.956	0.996
1967	0.005	0.033	0.050	0.063	0.141	0.371	0.735	0.720	0.924	0.970	0.984
1968	0.003	0.012	0.082	0.143	0.209	0.404	0.649	0.897	0.880	0.974	0.990
1969	0.003	0.008	0.031	0.190	0.346	0.509	0.737	0.853	0.965	0.955	0.991
1970	0.001	0.009	0.023	0.078	0.381	0.627	0.802	0.921	0.948	0.989	0.984
1971	0.000	0.002	0.025	0.062	0.183	0.618	0.842	0.941	0.980	0.983	0.996
1972	0.000	0.002	0.008	0.065	0.160	0.372	0.809	0.944	0.984	0.995	0.994
1973	0.000	0.001	0.007	0.026	0.158	0.353	0.610	0.918	0.982	0.996	0.999
1974	0.002	0.001	0.006	0.025	0.086	0.338	0.611	0.806	0.967	0.994	0.999
1975	0.002	0.006	0.007	0.025	0.085	0.248	0.581	0.818	0.917	0.987	0.998
1976	0.002	0.007	0.021	0.029	0.108	0.258	0.537	0.790	0.928	0.967	0.995
1977	0.001	0.007	0.023	0.070	0.121	0.359	0.563	0.803	0.911	0.974	0.987
1978	0.000	0.004	0.023	0.073	0.212	0.386	0.723	0.827	0.935	0.965	0.991
1979	0.001	0.001	0.015	0.070	0.209	0.491	0.742	0.924	0.947	0.980	0.987
1980	0.001	0.004	0.008	0.057	0.193	0.469	0.775	0.929	0.983	0.985	0.994
1981	0.002	0.006	0.024	0.047	0.192	0.432	0.747	0.925	0.984	0.996	0.996
1982	0.000	0.010	0.031	0.122	0.224	0.483	0.707	0.908	0.978	0.996	0.999
1983	0.001	0.003	0.051	0.152	0.442	0.628	0.786	0.884	0.971	0.994	0.999
1984	0.000	0.009	0.030	0.229	0.501	0.818	0.908	0.936	0.960	0.991	0.998
1985	0.004	0.005	0.064	0.228	0.620	0.850	0.962	0.983	0.983	0.987	0.997
1986	0.008	0.022	0.055	0.345	0.738	0.900	0.970	0.993	0.997	0.996	0.996
1987	0.004	0.036	0.112	0.424	0.803	0.964	0.980	0.994	0.999	1.000	0.999
1988	0.002	0.018	0.155	0.412	0.904	0.969	0.996	0.996	0.999	1.000	1.000
1989	0.002	0.010	0.077	0.474	0.796	0.992	0.996	1.000	0.999	1.000	1.000
1990	0.003	0.009	0.050	0.272	0.815	0.956	0.999	0.999	1.000	1.000	1.000
1991	0.006	0.013	0.052	0.209	0.626	0.956	0.992	1.000	1.000	1.000	1.000
1992	0.001	0.022	0.059	0.241	0.573	0.883	0.991	0.999	1.000	1.000	1.000
1993	0.005	0.008	0.082	0.232	0.647	0.872	0.971	0.998	1.000	1.000	1.000
1994	0.026	0.034	0.067	0.260	0.595	0.914	0.972	0.993	1.000	1.000	1.000
1995	0.075	0.106	0.195	0.377	0.579	0.877	0.984	0.994	0.999	1.000	1.000
1996	0.009	0.173	0.345	0.627	0.837	0.843	0.972	0.997	0.999	1.000	1.000
1997	0.004	0.040	0.349	0.701	0.921	0.977	0.954	0.994	1.000	1.000	1.000
1998	0.018	0.026	0.159	0.578	0.913	0.988	0.997	0.988	0.999	1.000	1.000
1999	0.016	0.066	0.137	0.463	0.779	0.979	0.998	1.000	0.997	1.000	1.000
2000	0.008	0.065	0.217	0.488	0.797	0.900	0.995	1.000	1.000	0.999	1.000
2001	0.019	0.044	0.234	0.521	0.851	0.947	0.959	0.999	1.000	1.000	1.000
2002	0.031	0.099	0.213	0.574	0.809	0.972	0.988	0.983	1.000	1.000	1.000
2003	0.048	0.132	0.380	0.613	0.856	0.943	0.995	0.997	0.993	1.000	1.000
2004	0.033	0.210	0.416	0.773	0.903	0.963	0.985	0.999	0.999	0.997	1.000
2005	0.033	0.147	0.582	0.771	0.950	0.982	0.991	0.996	1.000	1.000	0.999
2006	0.033	0.147	0.459	0.879	0.941	0.991	0.997	0.998	0.999	1.000	1.000

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

ORTHOGONALITY OFFSET 0.000773
MEAN SQUARE RESIDUALS 0.277037

Parameter	Estimate	Standard Error	Bias	Rel. Err.	Rel.Bias
N[2007 6]	1.953E+04	7.656E+03	1.553E+03	0.392	0.080
N[2007 7]	2.396E+04	5.974E+03	7.990E+02	0.249	0.033
N[2007 8]	2.277E+04	4.893E+03	5.670E+02	0.215	0.025
N[2007 9]	2.200E+04	4.099E+03	4.121E+02	0.186	0.019
N[2007 10]	5.099E+03	9.716E+02	8.986E+01	0.191	0.018
N[2007 11]	1.298E+03	3.109E+02	2.997E+01	0.240	0.023
N[2007 12]	8.940E+02	2.306E+02	2.300E+01	0.258	0.026
N[2007 13]	7.005E+02	1.893E+02	1.968E+01	0.270	0.028
N[2007 14]	4.402E+02	1.255E+02	1.329E+01	0.285	0.030
N[2007 15]	1.076E+03	2.349E+02	1.726E+01	0.218	0.016
q ID#[1]	3.004E-03	3.522E-04	1.575E-05	0.117	0.005
q ID#[2]	4.927E-03	5.739E-04	2.611E-05	0.116	0.005
q ID#[3]	6.240E-03	7.242E-04	3.362E-05	0.116	0.005
q ID#[4]	6.219E-03	7.205E-04	3.394E-05	0.116	0.005
q ID#[5]	5.974E-03	6.924E-04	3.304E-05	0.116	0.006
q ID#[6]	4.792E-03	5.560E-04	2.692E-05	0.116	0.006
q ID#[7]	4.729E-03	5.500E-04	2.718E-05	0.116	0.006
q ID#[8]	5.272E-03	6.163E-04	3.125E-05	0.117	0.006
q ID#[9]	5.046E-03	5.947E-04	3.110E-05	0.118	0.006
q ID#[10]	5.208E-03	6.139E-04	3.197E-05	0.118	0.006
q ID#[11]	7.442E-03	1.019E-03	5.392E-05	0.137	0.007
q ID#[12]	9.533E-03	1.283E-03	6.799E-05	0.135	0.007
q ID#[13]	9.793E-03	1.310E-03	7.075E-05	0.134	0.007
q ID#[14]	8.695E-03	1.161E-03	6.445E-05	0.134	0.007
q ID#[15]	8.141E-03	1.089E-03	6.270E-05	0.134	0.008
q ID#[16]	6.846E-03	9.196E-04	5.620E-05	0.134	0.008
q ID#[17]	7.143E-03	9.651E-04	6.126E-05	0.135	0.009
q ID#[18]	8.066E-03	1.093E-03	6.927E-05	0.135	0.009
q ID#[19]	7.709E-03	1.057E-03	6.998E-05	0.137	0.009
q ID#[20]	7.882E-03	1.096E-03	7.254E-05	0.139	0.009
q ID#[21]	1.274E-03	2.411E-04	1.850E-05	0.189	0.015
q ID#[22]	2.130E-03	3.907E-04	2.902E-05	0.183	0.014
q ID#[23]	3.001E-03	5.439E-04	4.043E-05	0.181	0.013
q ID#[24]	3.310E-03	5.961E-04	4.460E-05	0.180	0.013
q ID#[25]	4.660E-03	8.392E-04	6.433E-05	0.180	0.014
q ID#[26]	4.442E-03	8.037E-04	6.427E-05	0.181	0.014
q ID#[27]	5.002E-03	9.100E-04	7.504E-05	0.182	0.015
q ID#[28]	6.175E-03	1.135E-03	9.691E-05	0.184	0.016
q ID#[29]	5.301E-03	9.917E-04	8.836E-05	0.187	0.017
q ID#[30]	4.912E-03	9.396E-04	8.566E-05	0.191	0.017

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

Pop #s Biased	5	6	7	8	9	10	11	12	13	14	15
1960	299711	215972	141212	120313	90754	59599	48429	34426	21984	16264	29100
1961	283342	245342	176535	114854	97270	72734	46737	37358	25054	15519	30700
1962	265661	231955	200688	144055	92923	77414	56684	36039	28536	17006	30925
1963	270974	217448	189507	163716	116952	75009	61874	44214	27073	21190	30932
1964	260403	221724	177102	153470	132744	94355	59392	47856	32435	18655	34147
1965	288220	212957	179802	140486	122713	103109	69345	42353	33640	23629	35500
1966	250042	235545	171504	140679	106625	94109	77596	51606	29459	22846	38652
1967	223369	203128	187185	131359	105137	78715	70496	57122	37142	18963	38224
1968	176502	182487	163286	143478	100647	77508	52103	45415	33683	21879	29058
1969	174804	144258	147292	129950	108641	72298	52983	35691	24763	19692	28456
1970	164081	142494	115893	113486	93606	72579	47691	31933	19890	13941	27770
1971	204824	134234	114703	92579	83891	64445	49259	28997	18734	11295	21647
1972	242725	166670	108321	86323	66372	54731	40026	30446	15643	10674	17241
1973	292802	198204	134133	86548	63734	44166	33335	21363	15334	6744	12668
1974	280066	239684	161301	104107	61381	40472	27132	18336	11425	6663	6330
1975	293986	228979	190860	122611	76157	43255	25040	15849	10883	5939	6656
1976	276667	239898	184647	149745	91877	54031	28301	15376	8729	5515	5353
1977	232203	225760	192883	143251	105154	60285	33144	15701	7966	4437	4829
1978	218524	189232	178767	150028	106705	73876	39317	21270	9032	4396	4791
1979	200728	177505	150896	138064	113453	75878	47994	23261	11295	4125	3351
1980	193502	163207	139415	111341	96148	79394	50864	31382	15645	7589	4956
1981	188436	158188	130934	105545	79821	66010	52211	31494	18428	9455	7943
1982	191224	154139	129013	105170	82093	58210	43760	30561	15155	7327	5105
1983	189763	156536	125915	103989	81775	59148	36117	21672	12088	5332	3808
1984	191367	155257	127266	100334	79908	59430	41482	21936	11007	5789	3688
1985	186966	156634	126755	102827	79157	60143	39692	22402	9941	4482	4079
1986	159476	152808	127530	101646	79088	55174	35101	19484	10082	4465	3649
1987	141542	126589	116350	93092	71929	52713	32707	15994	6711	2971	2385
1988	161172	113864	99182	88321	66400	44623	27343	16558	6851	2748	2286
1989	185889	129331	90323	76824	65755	45247	27253	14086	8146	3200	2228
1990	181826	99790	67411	44563	37956	28100	17412	9803	4615	3282	1903
1991	90782	95604	52929	36288	22760	15867	10108	5487	3089	1460	1942
1992	60473	48825	47130	25259	14404	7585	4498	2728	1545	1214	1370
1993	51254	35482	27964	25782	12314	5780	2862	1532	957	484	719
1994	56573	29280	18087	9916	6691	3068	973	366	189	182	92
1995	48838	30041	14348	6616	2572	1898	1256	226	96	25	100
1996	33418	28671	17444	8102	3642	1361	1067	729	130	57	74
1997	21900	19533	16314	9531	4427	1984	762	620	423	75	75
1998	19388	17913	15871	12866	7154	3255	1490	539	457	323	120
1999	19630	15864	14616	12747	9841	5132	2255	969	336	312	302
2000	14035	16048	12831	11724	9914	7129	3231	1283	544	163	432
2001	11570	11477	12935	9849	8774	6817	4458	1767	666	270	343
2002	20378	9372	9098	9563	6791	5758	4147	2391	851	337	327
2003	55632	16402	7395	6898	6489	4272	3740	2444	1414	514	433
2004	43317	44453	12542	5060	4113	3524	2419	2164	1213	836	516
2005	36119	35153	34681	9172	3272	2392	1975	1316	1241	705	814
2006	23932	29519	28518	27488	6746	1975	1435	1133	769	781	898
2007	33455	19525	23961	22773	22000	5099	1298	894	700	440	1075

Table 28. Bias adjusted fishing mortalities from VPA.

F Biased	5	6	7	8	9	10	11	12	13	14	15	Mean (9-14
1960	0.000	0.002	0.007	0.013	0.021	0.043	0.060	0.118	0.148	0.190	0.190	0.097
1961	0.000	0.001	0.003	0.012	0.028	0.049	0.060	0.069	0.187	0.202	0.202	0.099
1962	0.000	0.002	0.004	0.008	0.014	0.024	0.048	0.086	0.098	0.238	0.238	0.085
1963	0.001	0.005	0.011	0.010	0.015	0.033	0.057	0.110	0.172	0.223	0.223	0.102
1964	0.001	0.010	0.032	0.024	0.053	0.108	0.138	0.152	0.117	0.197	0.197	0.127
1965	0.002	0.016	0.045	0.076	0.065	0.084	0.095	0.163	0.187	0.225	0.225	0.137
1966	0.008	0.030	0.067	0.091	0.103	0.089	0.106	0.129	0.241	0.276	0.276	0.157
1967	0.002	0.018	0.066	0.066	0.105	0.213	0.240	0.328	0.329	0.477	0.477	0.282
1968	0.002	0.014	0.028	0.078	0.131	0.180	0.178	0.407	0.337	0.382	0.382	0.269
1969	0.004	0.019	0.061	0.128	0.203	0.216	0.306	0.385	0.374	0.350	0.350	0.306
1970	0.001	0.017	0.025	0.102	0.173	0.188	0.298	0.333	0.366	0.456	0.456	0.302
1971	0.006	0.014	0.084	0.133	0.227	0.276	0.281	0.417	0.363	0.447	0.447	0.335
1972	0.003	0.017	0.024	0.103	0.207	0.296	0.428	0.486	0.641	0.590	0.590	0.441
1973	0.000	0.006	0.053	0.144	0.254	0.287	0.398	0.426	0.633	0.921	0.921	0.487
1974	0.001	0.028	0.074	0.113	0.150	0.280	0.338	0.322	0.454	0.469	0.469	0.335
1975	0.003	0.015	0.043	0.089	0.143	0.224	0.288	0.396	0.480	0.656	0.656	0.364
1976	0.003	0.018	0.054	0.154	0.221	0.289	0.389	0.458	0.477	0.611	0.611	0.407
1977	0.005	0.033	0.051	0.095	0.153	0.227	0.244	0.353	0.394	0.460	0.460	0.305
1978	0.008	0.026	0.058	0.079	0.141	0.231	0.325	0.433	0.584	0.809	0.809	0.420
1979	0.007	0.042	0.104	0.162	0.157	0.200	0.225	0.197	0.198	0.211	0.211	0.198
1980	0.002	0.020	0.078	0.133	0.176	0.219	0.279	0.332	0.304	0.257	0.257	0.261
1981	0.001	0.004	0.019	0.051	0.116	0.211	0.336	0.531	0.722	1.026	1.026	0.490
1982	0.000	0.002	0.016	0.052	0.128	0.277	0.503	0.727	0.845	0.983	0.983	0.577
1983	0.001	0.007	0.027	0.063	0.119	0.155	0.299	0.478	0.536	0.708	0.708	0.382
1984	0.000	0.003	0.013	0.037	0.084	0.204	0.416	0.591	0.698	0.643	0.643	0.439
1985	0.002	0.006	0.021	0.062	0.161	0.338	0.512	0.598	0.600	0.653	0.653	0.477
1986	0.031	0.073	0.115	0.146	0.206	0.323	0.586	0.866	1.022	1.024	1.024	0.671
1987	0.018	0.044	0.076	0.138	0.277	0.456	0.481	0.648	0.693	0.651	0.651	0.534
1988	0.020	0.032	0.055	0.095	0.184	0.293	0.463	0.509	0.561	0.615	0.615	0.438
1989	0.092	0.122	0.176	0.175	0.320	0.425	0.492	0.586	0.379	0.518	0.518	0.453
1990	0.113	0.104	0.089	0.142	0.342	0.492	0.625	0.625	0.621	0.452	0.452	0.526
1991	0.090	0.177	0.210	0.394	0.569	0.731	0.780	0.738	0.404	0.380	0.380	0.600
1992	0.003	0.027	0.073	0.188	0.383	0.444	0.547	0.518	0.630	0.749	0.749	0.545
1993	0.030	0.144	0.507	0.819	0.860	1.252	1.527	1.562	1.128	2.037	2.037	1.394
1994	0.103	0.183	0.476	0.819	0.730	0.363	0.929	0.806	1.489	0.476	0.476	0.799
1995	0.003	0.014	0.041	0.067	0.107	0.045	0.014	0.024	0.001	0.005	0.005	0.033
1996	0.007	0.034	0.074	0.074	0.077	0.050	0.013	0.014	0.023	0.023	0.023	0.033
1997	0.001	0.008	0.037	0.087	0.107	0.087	0.145	0.106	0.071	0.021	0.021	0.089
1998	0.001	0.003	0.019	0.068	0.132	0.167	0.230	0.273	0.182	0.184	0.184	0.195
1999	0.001	0.012	0.020	0.051	0.122	0.263	0.364	0.378	0.526	0.151	0.151	0.301
2000	0.001	0.016	0.064	0.090	0.174	0.269	0.404	0.456	0.499	0.351	0.351	0.359
2001	0.011	0.032	0.102	0.172	0.221	0.297	0.423	0.531	0.482	0.429	0.429	0.397
2002	0.017	0.037	0.077	0.188	0.263	0.231	0.329	0.325	0.305	0.228	0.228	0.280
2003	0.024	0.068	0.180	0.317	0.410	0.369	0.347	0.501	0.326	0.406	0.406	0.393
2004	0.009	0.048	0.113	0.236	0.342	0.379	0.408	0.356	0.342	0.307	0.307	0.356
2005	0.002	0.009	0.032	0.107	0.305	0.311	0.356	0.337	0.263	0.326	0.326	0.316
2006	0.004	0.009	0.025	0.023	0.080	0.220	0.273	0.281	0.358	0.245	0.245	0.243

Table 29. Spawning stock biomass from VPA output.

	5	6	7	8	9	10	11	12	13	14	15
1960	114	190	532	1528	4864	7455	18016	21629	17877	16539	36787
1961	183	230	558	1707	4321	13049	17502	23471	20374	15781	38809
1962	103	396	611	1923	5158	10610	23763	24732	23535	17199	39328
1963	27	286	1191	1991	6105	12732	20081	29864	22759	21145	41669
1964	51	125	971	4777	6068	15880	22698	27483	27258	18906	45816
1965	274	228	550	3442	14844	15363	28181	27097	26474	25062	50291
1966	569	929	945	2286	9515	30903	30497	37174	24957	23912	55593
1967	184	1632	3058	3445	8164	20721	42310	41263	35185	21347	58774
1968	87	521	4221	8537	11165	20415	27685	37325	31202	25983	46357
1969	110	283	1377	9330	18961	23351	28888	27827	24371	23068	45793
1970	19	317	808	3207	16744	28173	27925	23887	19080	15249	40849
1971	18	67	859	2100	6786	22793	30045	23193	17114	12062	29198
1972	12	73	254	2234	4894	11342	21987	23514	14194	11706	23411
1973	18	53	257	847	5050	8983	14578	17356	15626	7501	18545
1974	87	79	257	890	2448	8205	12583	14049	13145	9245	10779
1975	119	307	371	1164	3151	6724	11469	12888	12054	8438	12074
1976	120	397	1122	1665	4765	8492	11502	11597	8986	7104	8962
1977	43	394	1360	3855	6423	13259	14210	11577	8119	5492	7777
1978	8	170	1270	4216	10607	17528	20426	15790	9267	5531	7718
1979	25	64	708	3880	11304	20790	23382	18204	11349	5717	5560
1980	30	183	423	2685	9205	20879	24815	21005	14724	9643	8659
1981	59	250	1140	2137	7416	15355	21864	19316	13867	9358	11440
1982	14	373	1466	5345	8631	14329	17485	17710	12038	7336	6815
1983	63	158	2415	7047	19144	21629	17313	12866	9878	5782	5713
1984	17	417	1459	10694	22159	29596	25455	15814	9762	6752	6028
1985	168	211	2979	9967	24650	30708	25955	18695	10941	6474	7814
1986	95	686	2106	14755	29724	30014	24264	17427	12014	6977	7565
1987	127	863	3617	13778	26098	30450	24020	14715	7873	4453	4805
1988	53	500	4873	15332	27807	23636	19393	15402	8410	4286	4715
1989	20	235	1784	13272	24414	24467	18890	12802	9954	5029	4610
1990	50	148	847	4129	14346	15745	12964	9656	6078	5569	3900
1991	89	261	884	3098	7417	10021	8470	6055	4564	2746	4319
1992	14	262	915	2530	4243	4467	3837	2984	2181	2192	3188
1993	23	68	644	2146	3607	2861	2031	1416	1153	710	1444
1994	123	146	295	826	1753	1718	687	330	220	263	165
1995	609	534	705	851	766	1235	1362	276	126	46	178
1996	35	961	1597	1960	1636	925	1098	1059	211	119	173
1997	15	148	1512	2536	2210	1445	693	732	647	144	196
1998	47	76	646	2608	3231	2035	1197	525	575	559	242
1999	47	223	453	1866	3152	2777	1514	833	356	423	546
2000	13	248	873	2059	3513	3630	2302	1149	624	220	759
2001	42	117	1046	2183	3493	3770	3207	1645	774	376	613
2002	117	249	691	2389	2802	3253	2960	2211	959	473	570
2003	561	589	1035	1877	3006	2566	2829	2299	1686	723	815
2004	253	2607	1949	1828	2115	2407	1995	2112	1459	1279	1021
2005	199	1423	7786	3434	1805	1666	1678	1327	1513	1030	1563
2006	84	989	4934	12027	3722	1344	1254	1127	928	1184	1684
2007	166	749	4167	8895	12414	3531	1110	889	848	662	2071

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

2007/2006 Retro Matrix	5	6	7	8	9	10	11	12	13	14	15
1960	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1961	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1962	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1963	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1964	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1965	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1966	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1967	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1968	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1969	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1970	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1971	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1972	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1973	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1974	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1975	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1976	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1977	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1978	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1979	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1980	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1981	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1982	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1983	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1984	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1985	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1986	1.000	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1987	0.999	1.000	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1988	0.998	0.999	1.000	0.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1989	0.993	0.998	0.999	1.000	0.999	1.000	1.000	1.000	0.999	0.999	0.999
1990	0.994	0.993	0.998	0.999	1.000	0.998	0.999	0.999	0.999	0.999	0.999
1991	0.995	0.994	0.992	0.998	0.998	0.999	0.997	0.999	0.999	0.999	0.999
1992	0.988	0.995	0.992	0.990	0.997	0.997	0.999	0.995	0.998	0.998	0.998
1993	0.980	0.988	0.994	0.992	0.988	0.995	0.995	0.998	0.991	0.996	0.996
1994	0.976	0.980	0.986	0.991	0.982	0.973	0.984	0.981	0.990	0.975	0.975
1995	0.952	0.973	0.976	0.978	0.980	0.964	0.962	0.961	0.960	0.960	0.960
1996	0.943	0.952	0.973	0.975	0.976	0.978	0.963	0.961	0.960	0.960	0.960
1997	1.049	0.942	0.950	0.971	0.973	0.974	0.977	0.962	0.961	0.959	0.959
1998	1.018	1.049	0.942	0.949	0.968	0.970	0.972	0.973	0.958	0.958	0.958
1999	1.008	1.018	1.049	0.941	0.945	0.964	0.965	0.965	0.965	0.950	0.950
2000	1.019	1.008	1.018	1.050	0.938	0.939	0.954	0.950	0.950	0.942	0.942
2001	0.996	1.019	1.009	1.019	1.055	0.927	0.921	0.932	0.924	0.920	0.920
2002	0.918	0.996	1.019	1.010	1.023	1.070	0.904	0.885	0.891	0.883	0.883
2003	0.814	0.917	0.996	1.021	1.012	1.030	1.090	0.872	0.847	0.857	0.857
2004	0.903	0.811	0.911	0.995	1.029	1.017	1.044	1.131	0.806	0.801	0.801
2005	0.910	0.902	0.803	0.902	0.994	1.041	1.026	1.068	1.198	0.747	0.747
2006		0.910	0.901	0.798	0.892	0.992	1.057	1.037	1.097	1.274	0.681

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

2007/2006 Retro Matrix	5	6	7	8	9	10	11	12	13	14	15
1960	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1961	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1962	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1963	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1964	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1965	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1966	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1967	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1968	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1969	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1970	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1971	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1972	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1973	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1974	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1975	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1976	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1977	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1978	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1979	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1980	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1981	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1982	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1983	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1984	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1985	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1986	1.000	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1987	1.001	1.000	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1988	1.002	1.001	1.000	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1989	1.007	1.002	1.001	1.000	1.001	1.000	1.001	1.001	1.001	1.001	1.001
1990	1.006	1.008	1.002	1.002	1.001	1.002	1.001	1.001	1.001	1.001	1.001
1991	1.005	1.007	1.009	1.003	1.002	1.001	1.004	1.002	1.002	1.002	1.002
1992	1.012	1.006	1.008	1.011	1.004	1.004	1.002	1.007	1.003	1.003	1.003
1993	1.020	1.013	1.007	1.012	1.018	1.009	1.010	1.005	1.015	1.011	1.011
1994	1.026	1.022	1.018	1.014	1.026	1.033	1.026	1.028	1.021	1.033	1.033
1995	1.050	1.028	1.025	1.024	1.021	1.038	1.040	1.041	1.042	1.042	1.042
1996	1.061	1.051	1.029	1.027	1.025	1.023	1.039	1.040	1.042	1.042	1.042
1997	0.953	1.061	1.053	1.031	1.029	1.028	1.026	1.042	1.042	1.043	1.043
1998	0.982	0.953	1.062	1.056	1.035	1.033	1.032	1.032	1.048	1.048	1.048
1999	0.992	0.982	0.953	1.064	1.061	1.043	1.044	1.044	1.047	1.057	1.057
2000	0.982	0.992	0.982	0.950	1.072	1.075	1.059	1.066	1.068	1.073	1.073
2001	1.004	0.981	0.991	0.979	0.942	1.091	1.105	1.094	1.104	1.107	1.107
2002	1.090	1.004	0.980	0.990	0.974	0.927	1.124	1.153	1.143	1.148	1.148
2003	1.230	1.094	1.004	0.976	0.986	0.965	0.902	1.188	1.211	1.203	1.203
2004	1.108	1.239	1.103	1.005	0.967	0.979	0.948	0.861	1.285	1.290	1.290
2005	1.099	1.109	1.249	1.115	1.007	0.954	0.970	0.925	0.811	1.397	1.397

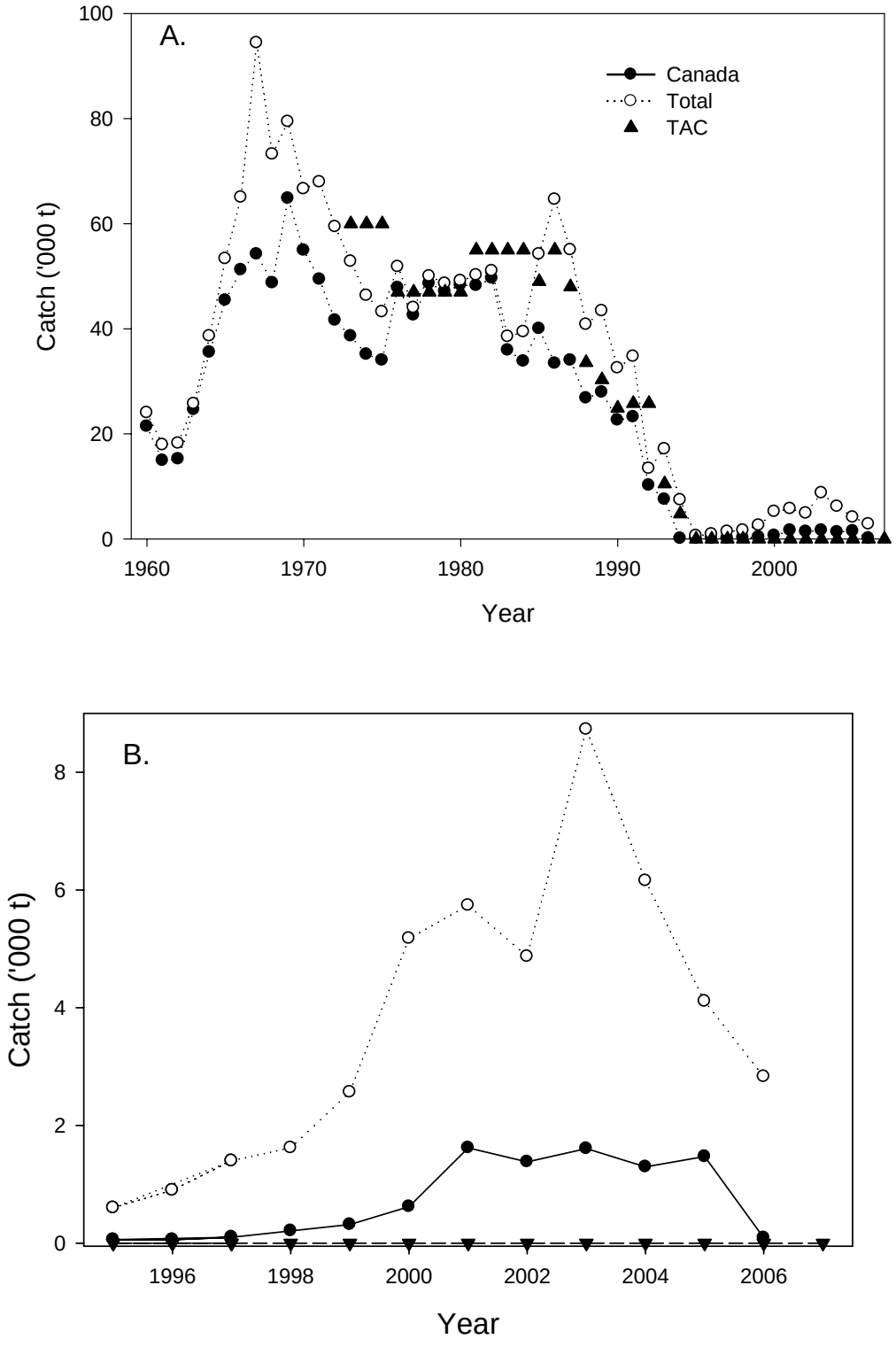


Figure 1. American plaice catches ('000 tons) from 1960 – 2006 (A) and since the moratorium (1995-2006) (B).

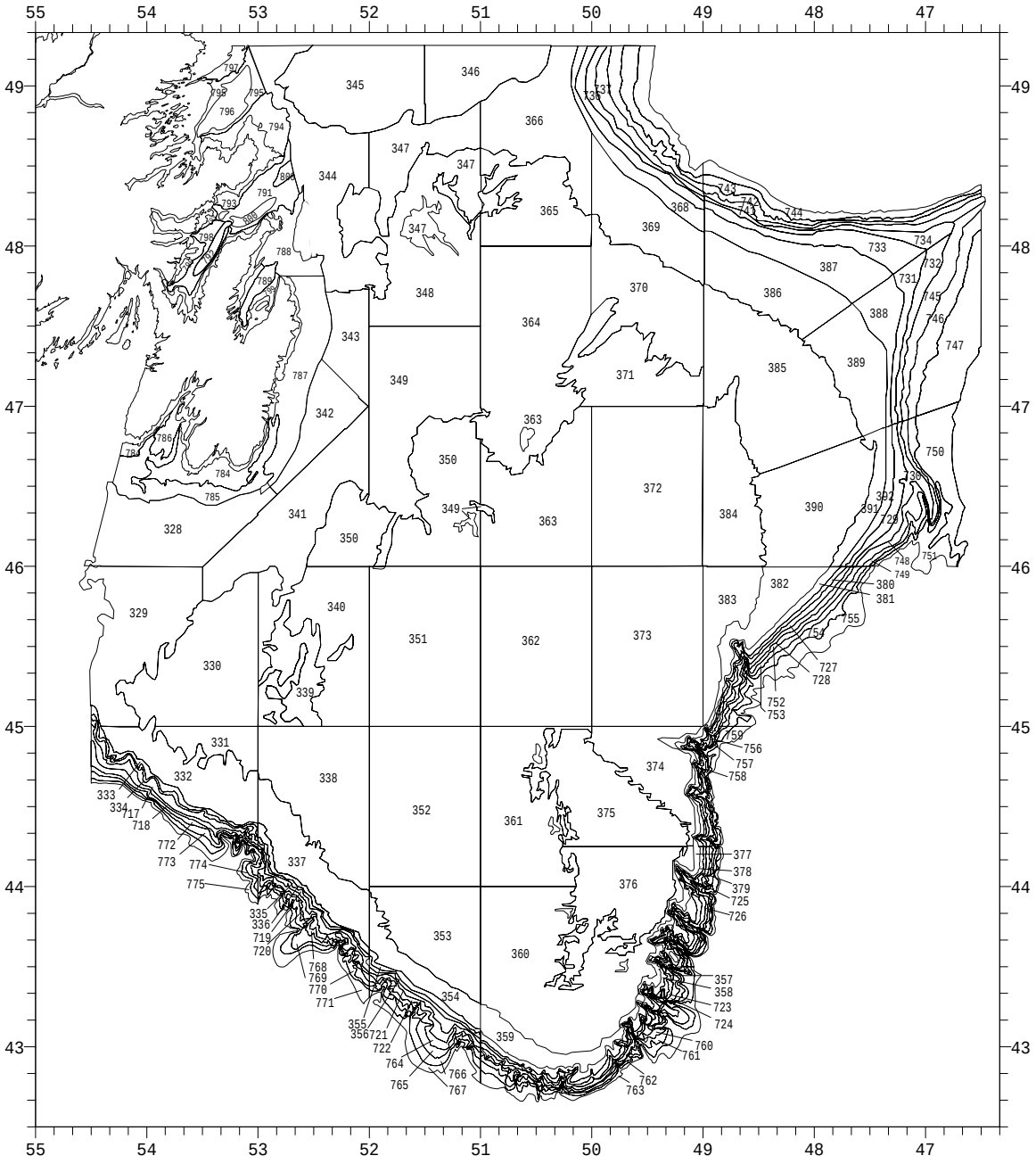


Figure 2. Stratification scheme used in Canadian research vessel surveys of Div. 3LNO.

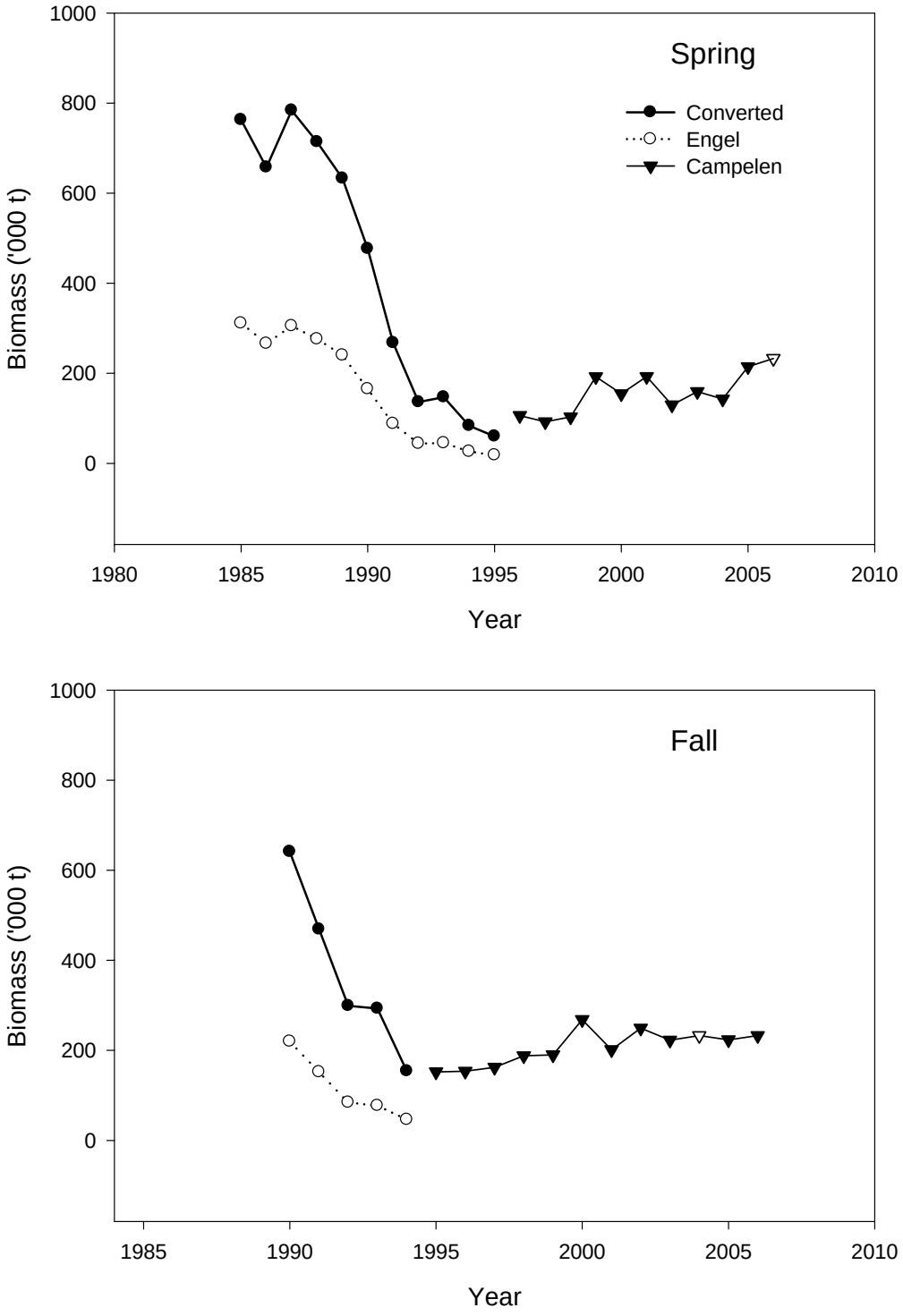


Figure 3. Biomass ('000 tons) of American plaice from spring and fall Canadian surveys in Div. 3LNO combined. Note that open symbol represents years when survey coverage was poor and are not included in 2007 assessment.

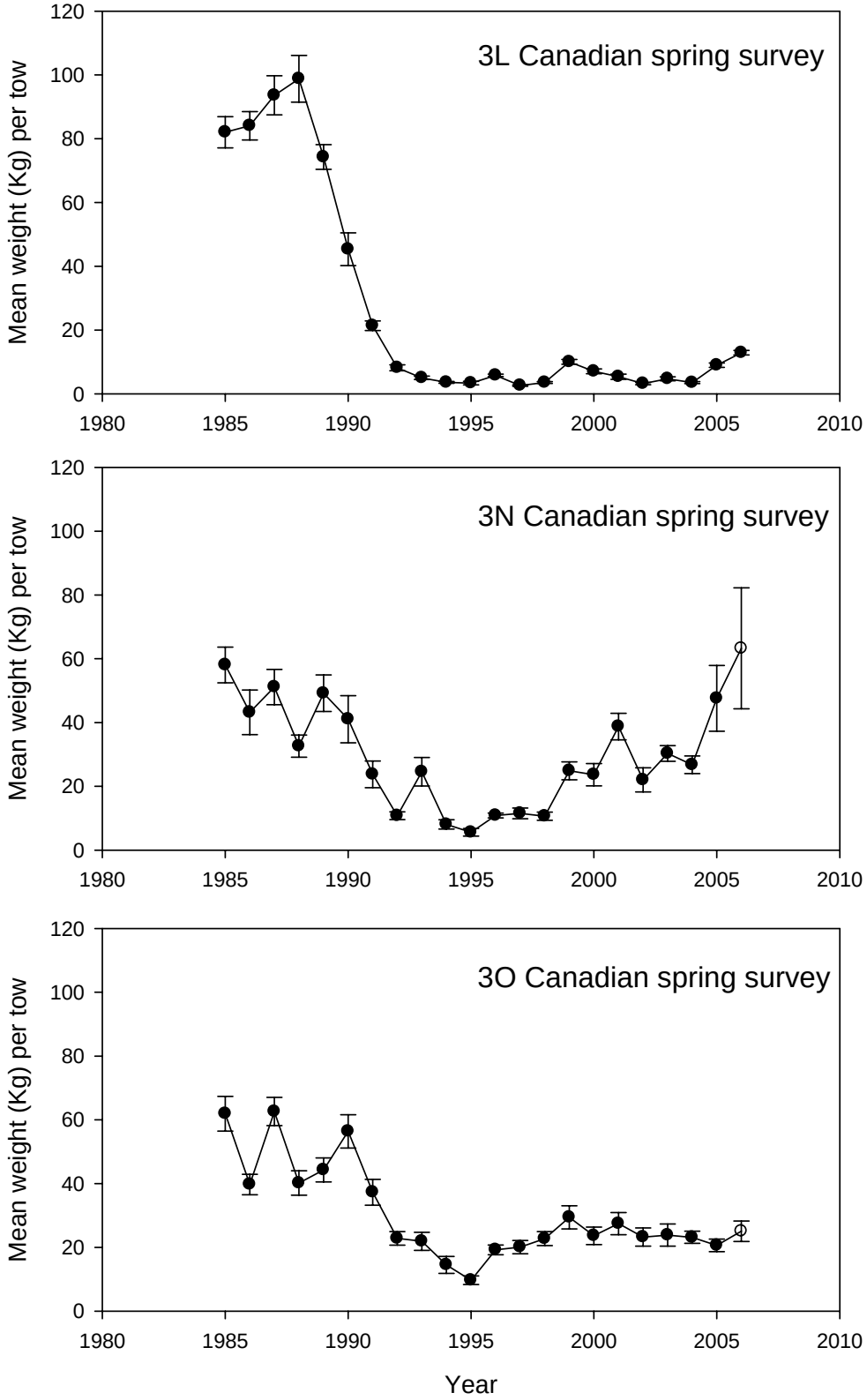
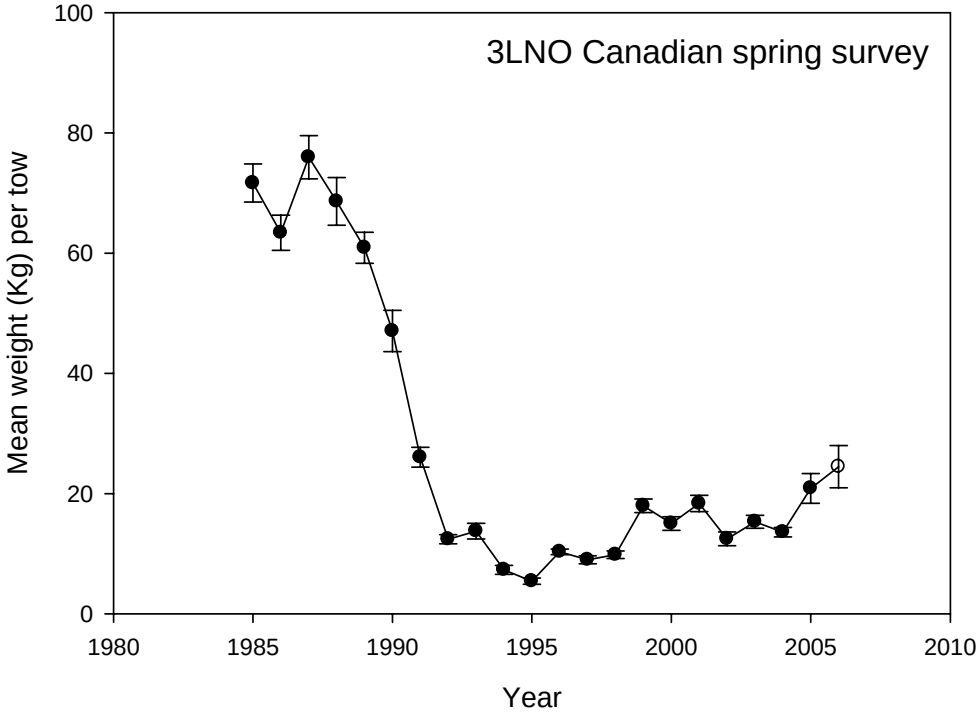


Figure 4. Mean (± 1 Std. dev.) weight per tow (Kg) of American plaice from Canadian spring surveys inDiv. 3L, 3N and 3O. Note that open symbol represents years when survey coverage was poor and are not included in 2007 assessment.



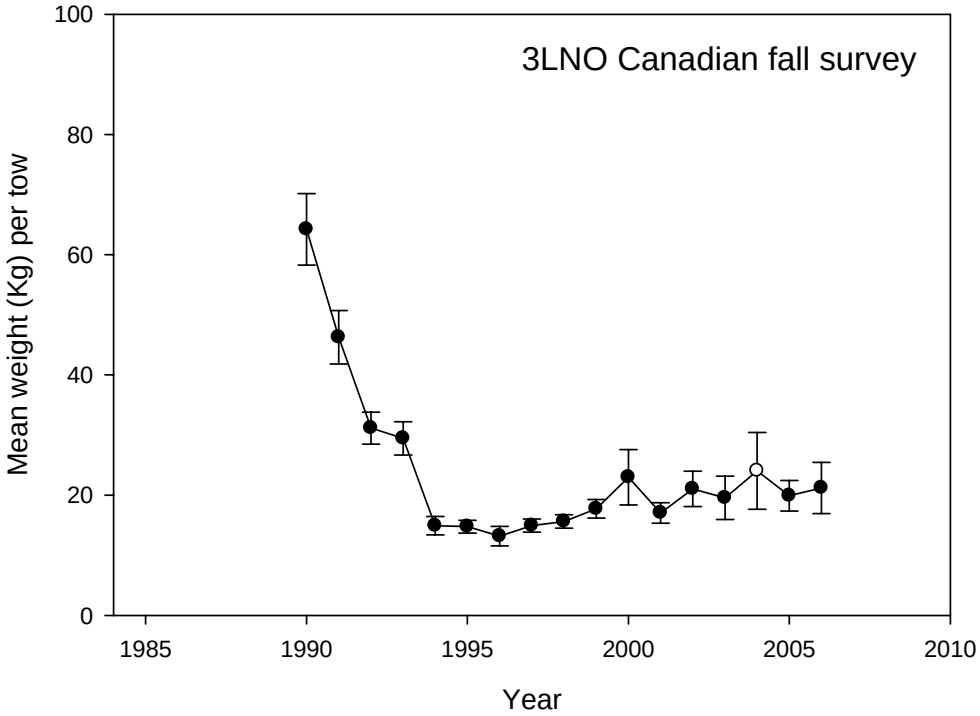
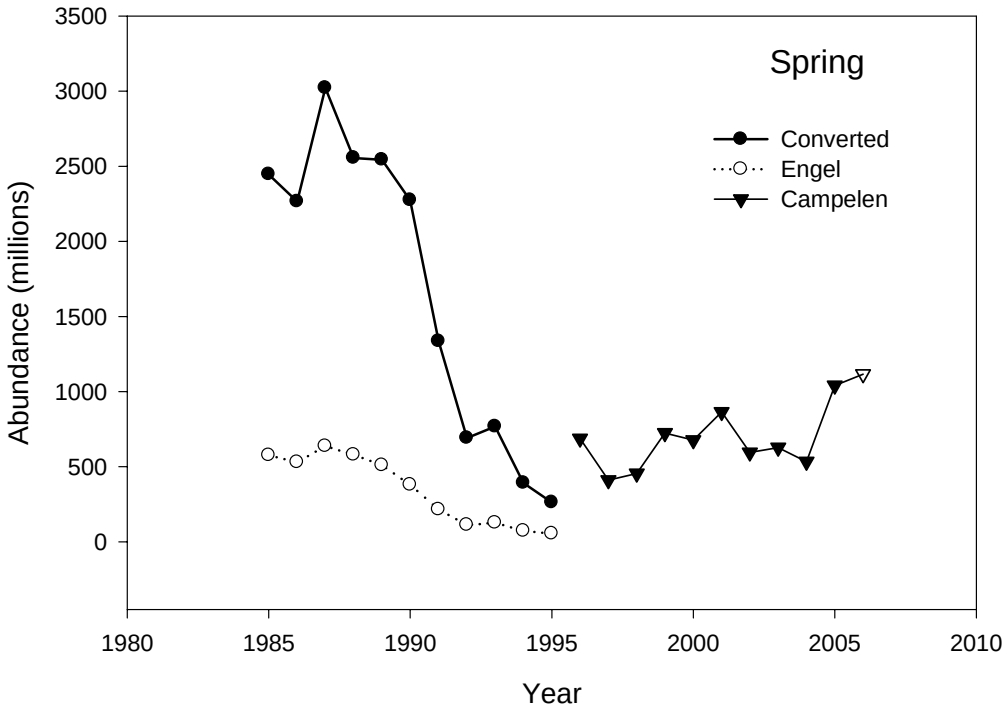


Figure 5. Mean weight per tow (± 1 Std. dev.) of American plaice from Canadian spring and fall surveys of Div. 3LNO combined. Note that open symbol represents years when survey coverage was poor and are not included in 2007 assessment.



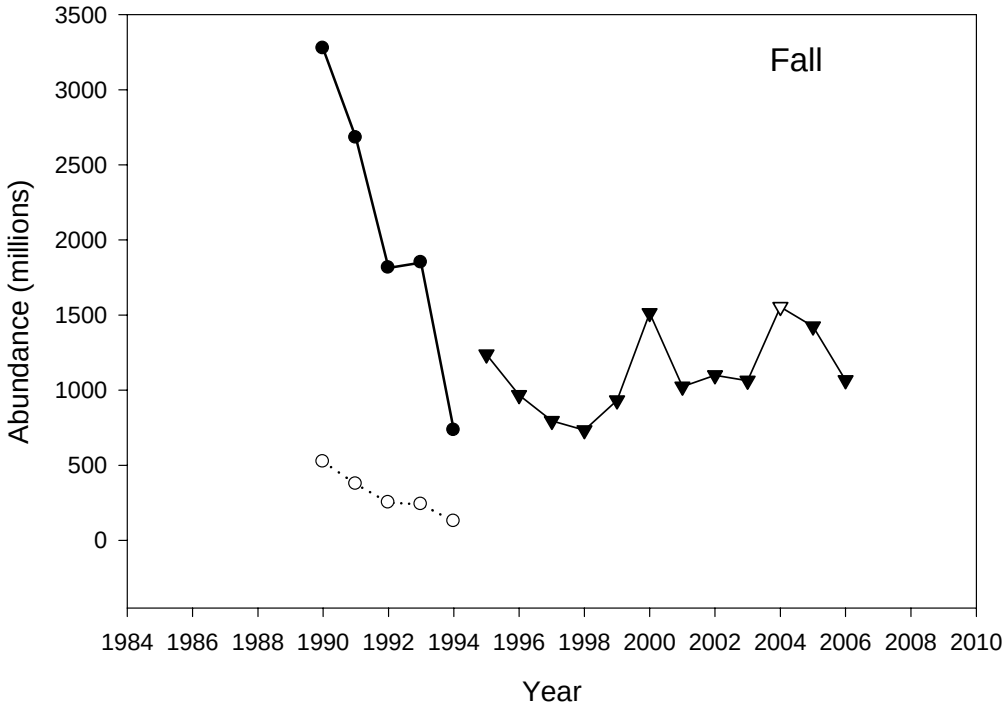


Figure 6. Abundance (millions) of American plaice from spring and fall Canadian surveys in Div. 3LNO combined. Note that open symbol represents years when survey coverage was poor and are not included in 2007 assessment.

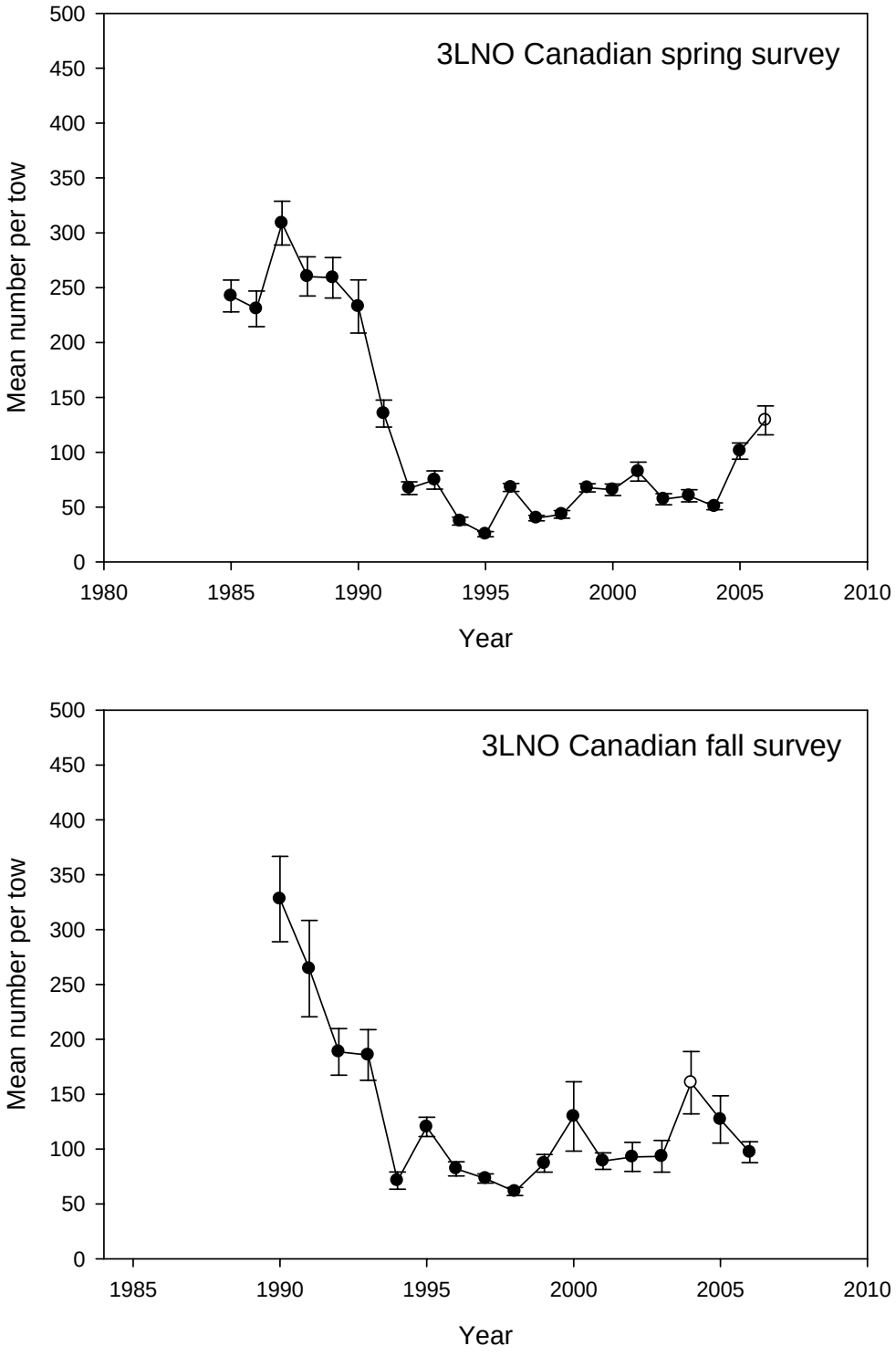


Figure 7. Mean (± 1 Std. Dev.) number per tow of American plaice from Canadian spring and fall surveys of Div. 3LNO combined. Note that open symbol represents years when survey coverage was poor and are not included in 2007 assessment.

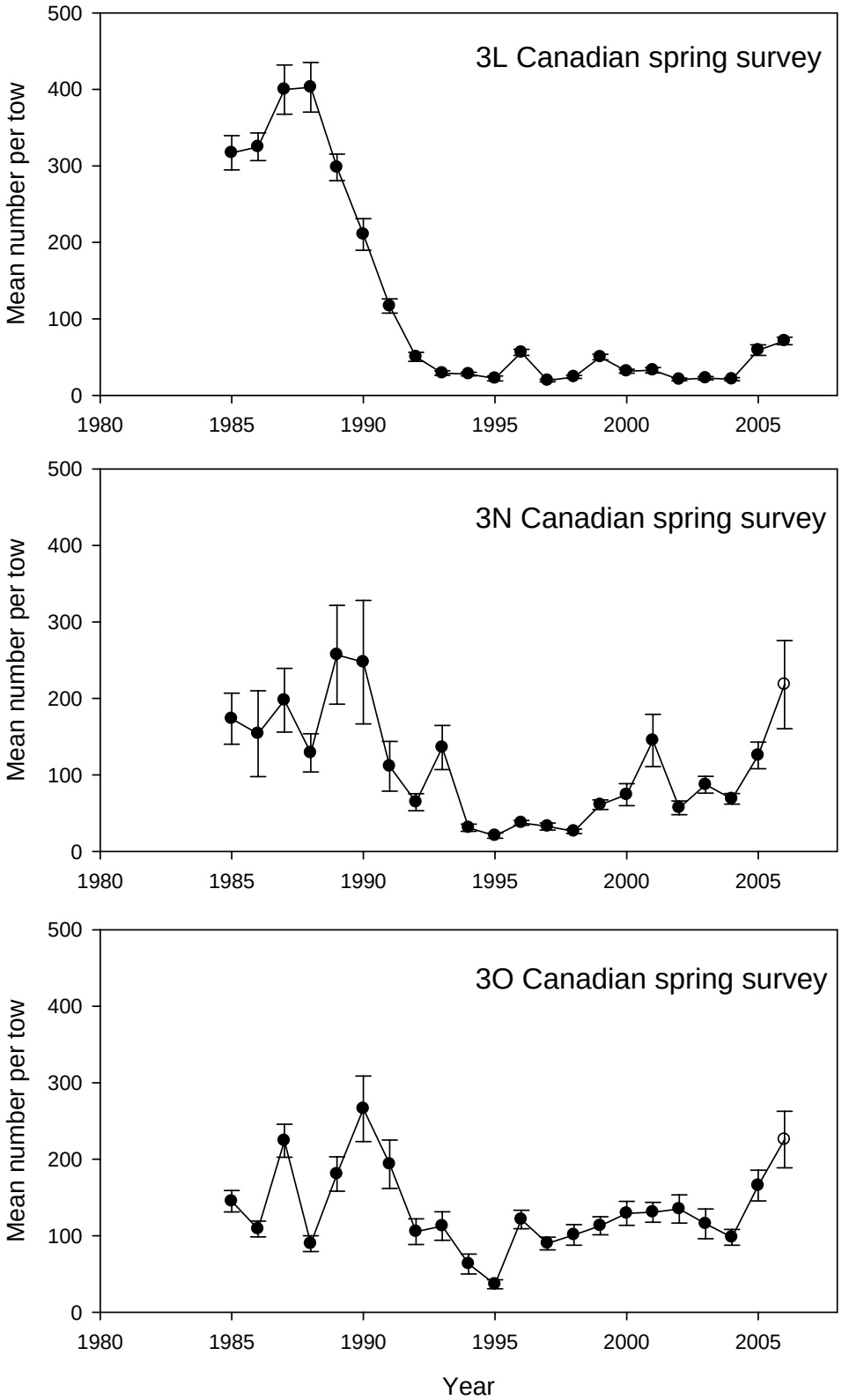


Figure 8. Mean (± 1 Std. Dev.) number per tow of American plaice from Canadian spring surveys of Div. 3L, 3N and 3O. Note that open symbol represents years when survey coverage was poor and are not included in 2007 assessment.

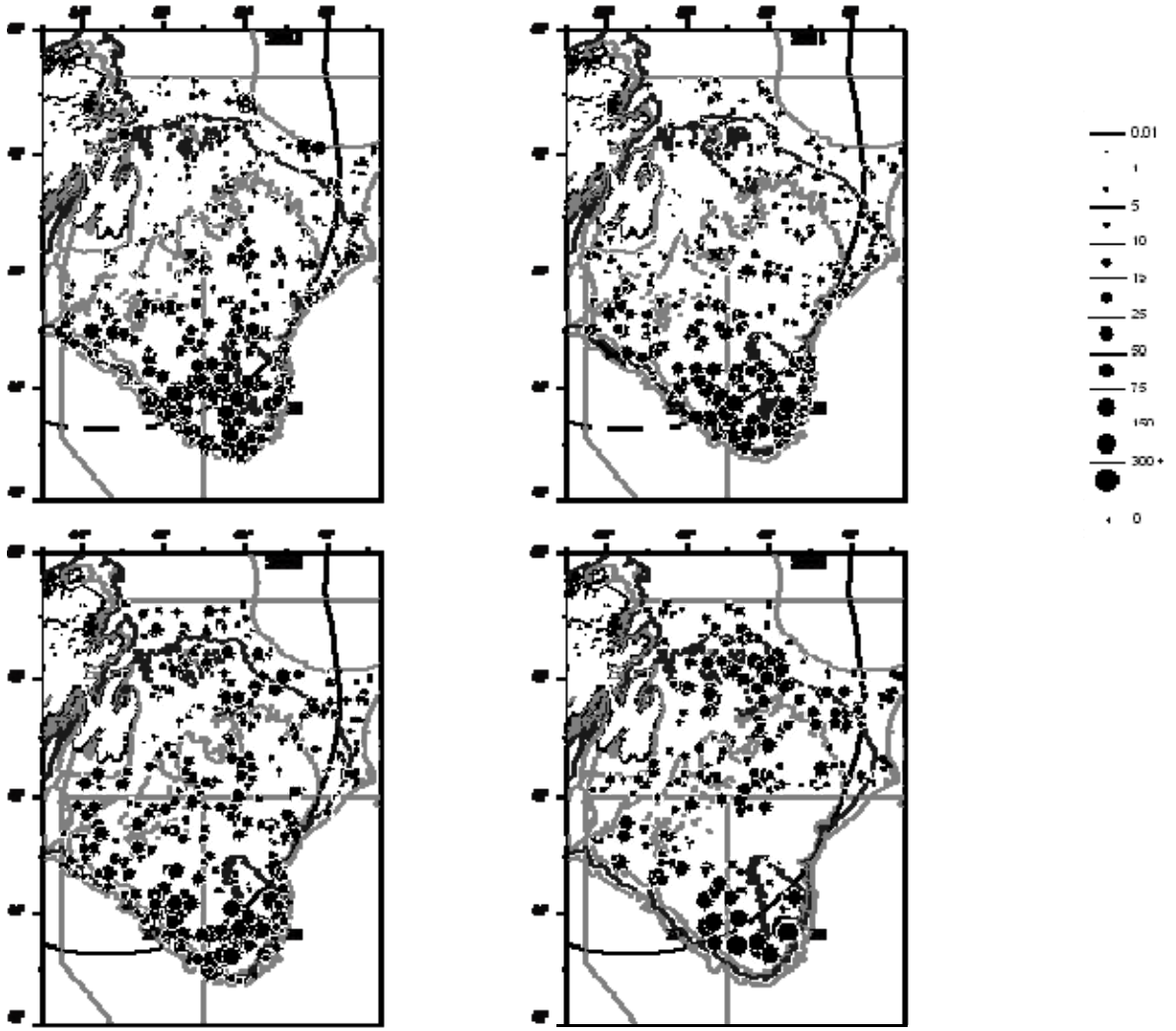


Figure 9. Distribution of American plaice (kg per tow) from Canadian spring surveys in NAFO Divisions 3LNO from 2003-2006. Note survey coverage in 2006 in Div. 3NO.

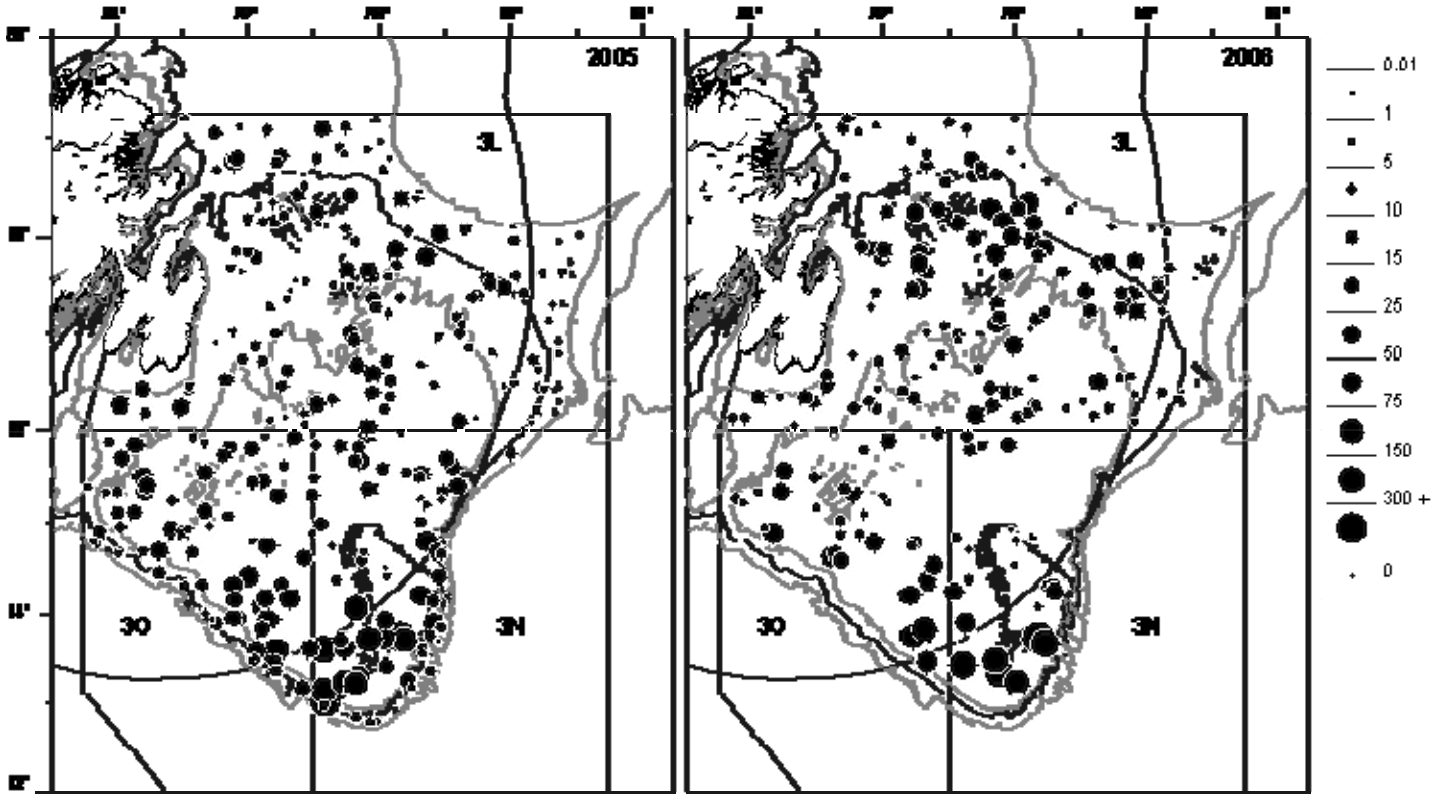


Figure 10. Distribution of American plaice (kg per tow) from Canadian spring surveys in NAFO Divisions 3LNO in 2005 and 2006. Note survey coverage in Div. 3NO.

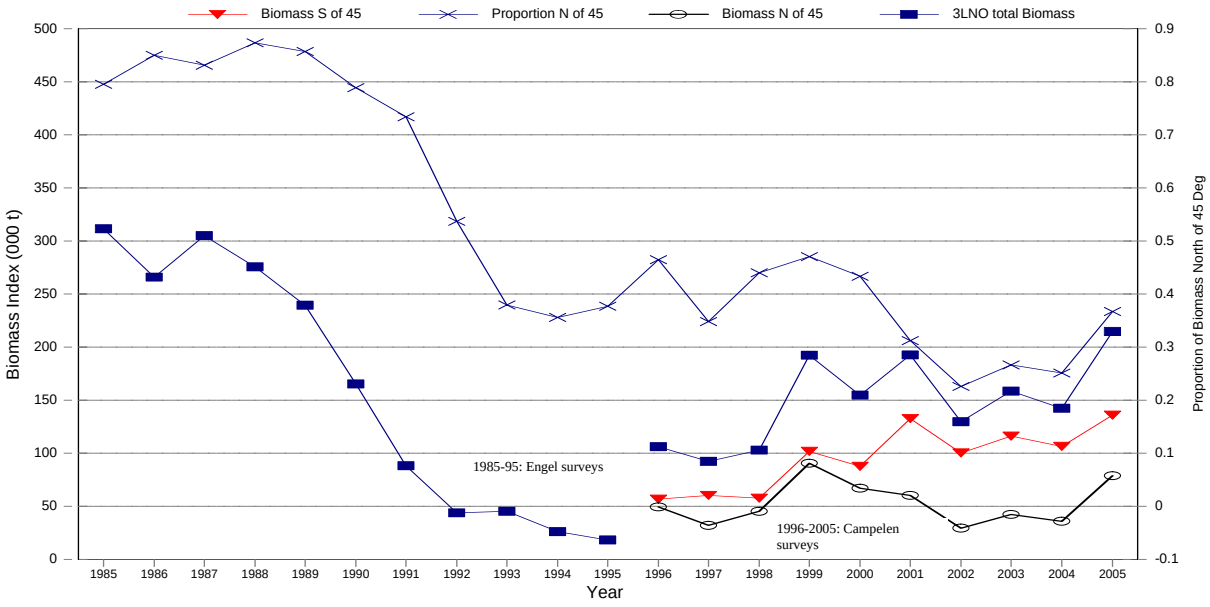


Figure 11. Biomass estimates of American plaice, from Canadian spring surveys in Div. 3LNO. Data are shown in relation to 45 degrees North latitude.

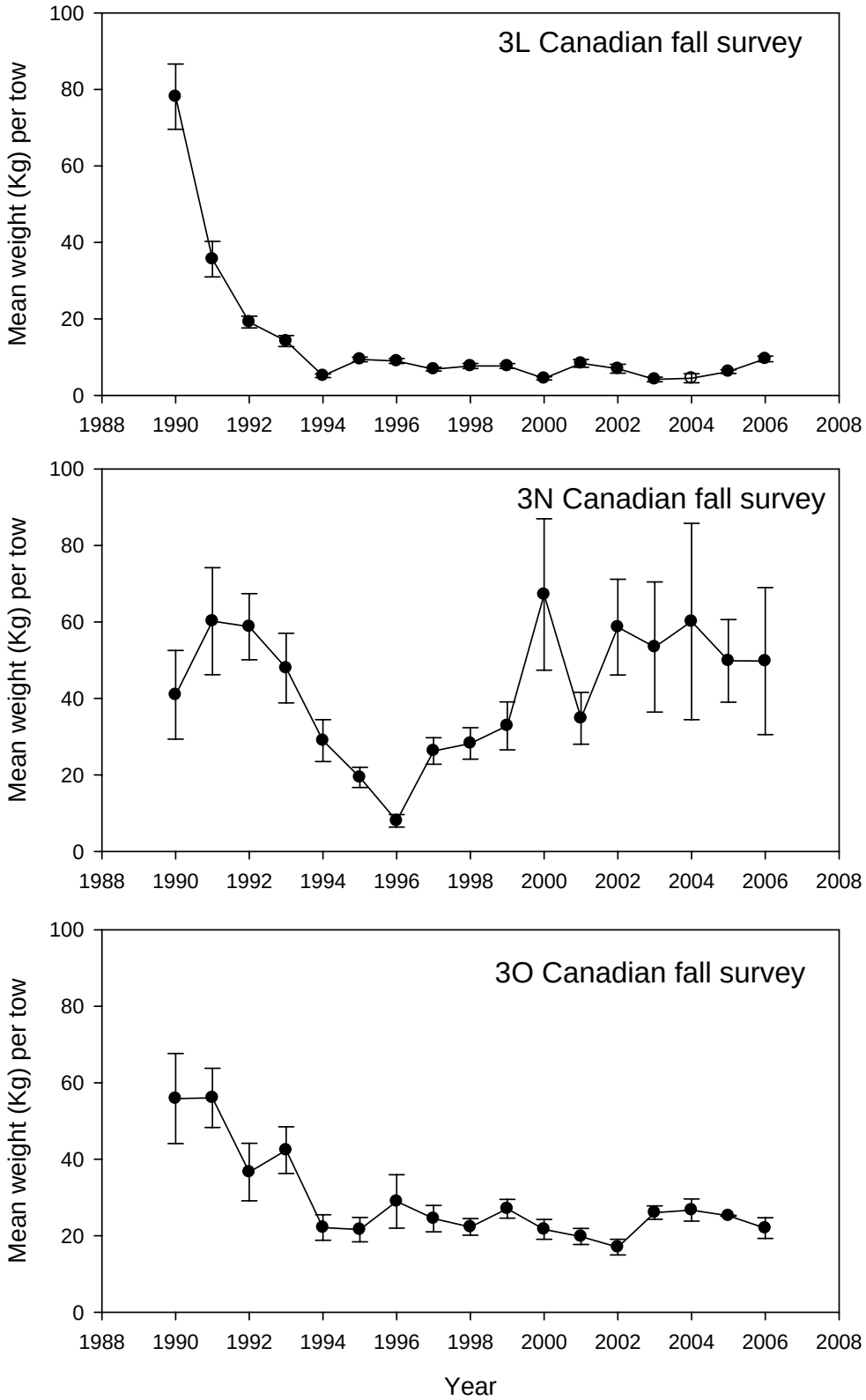


Figure 12. Mean (± 1 Std. Dev.) weight (Kg) per tow of American plaice from Canadian fall surveys in Div. 3L, 3N and 3O. Note that open symbol represents years when survey coverage was poor and are not included in 2007 assessment.

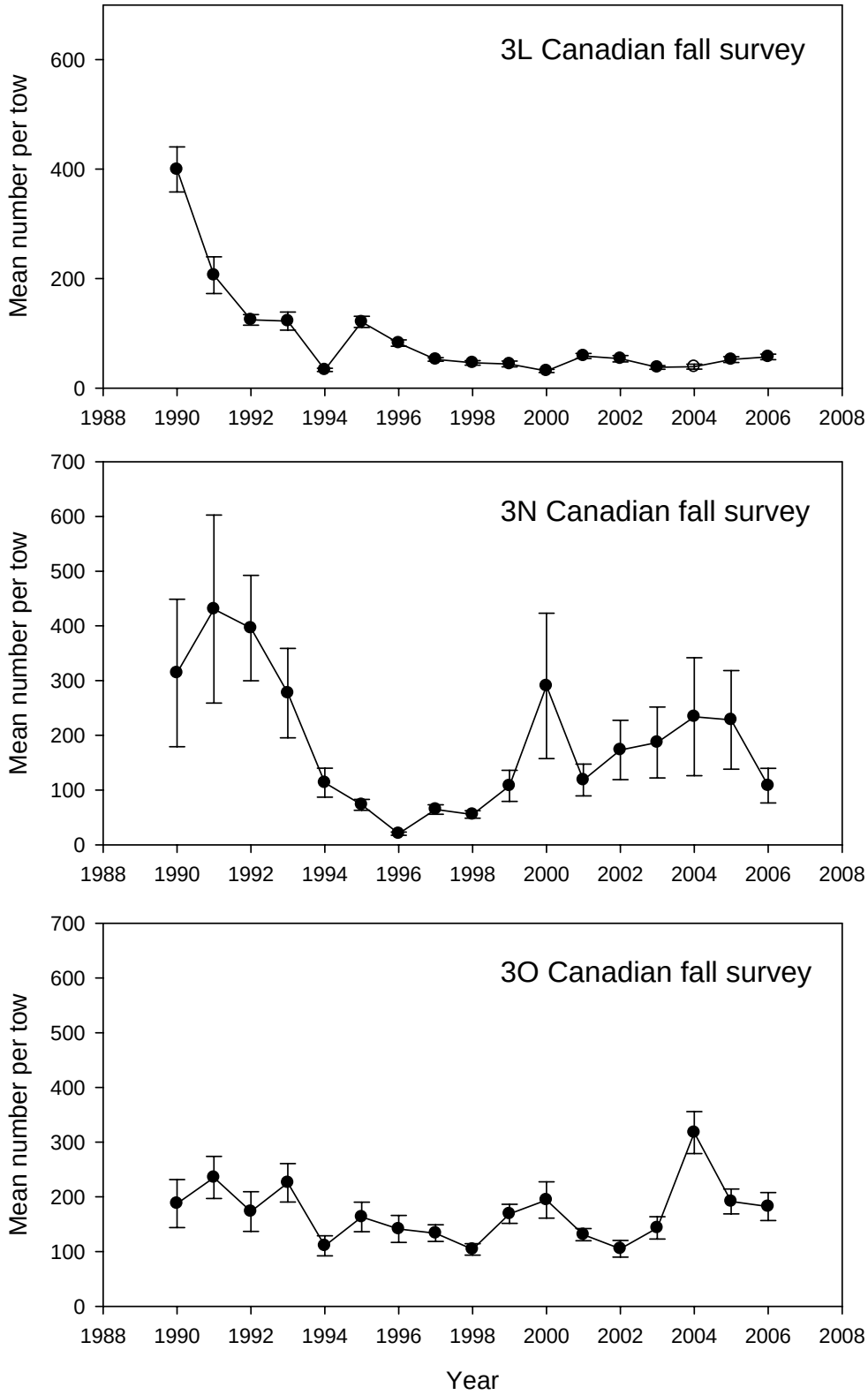


Figure 13. Mean (± 1 Std. Dev.) number per tow of American plaice from Canadian fall surveys of Div. 3L, 3N and 3O. Note that open symbol represents years when survey coverage was poor and are not included in 2007 assessment.

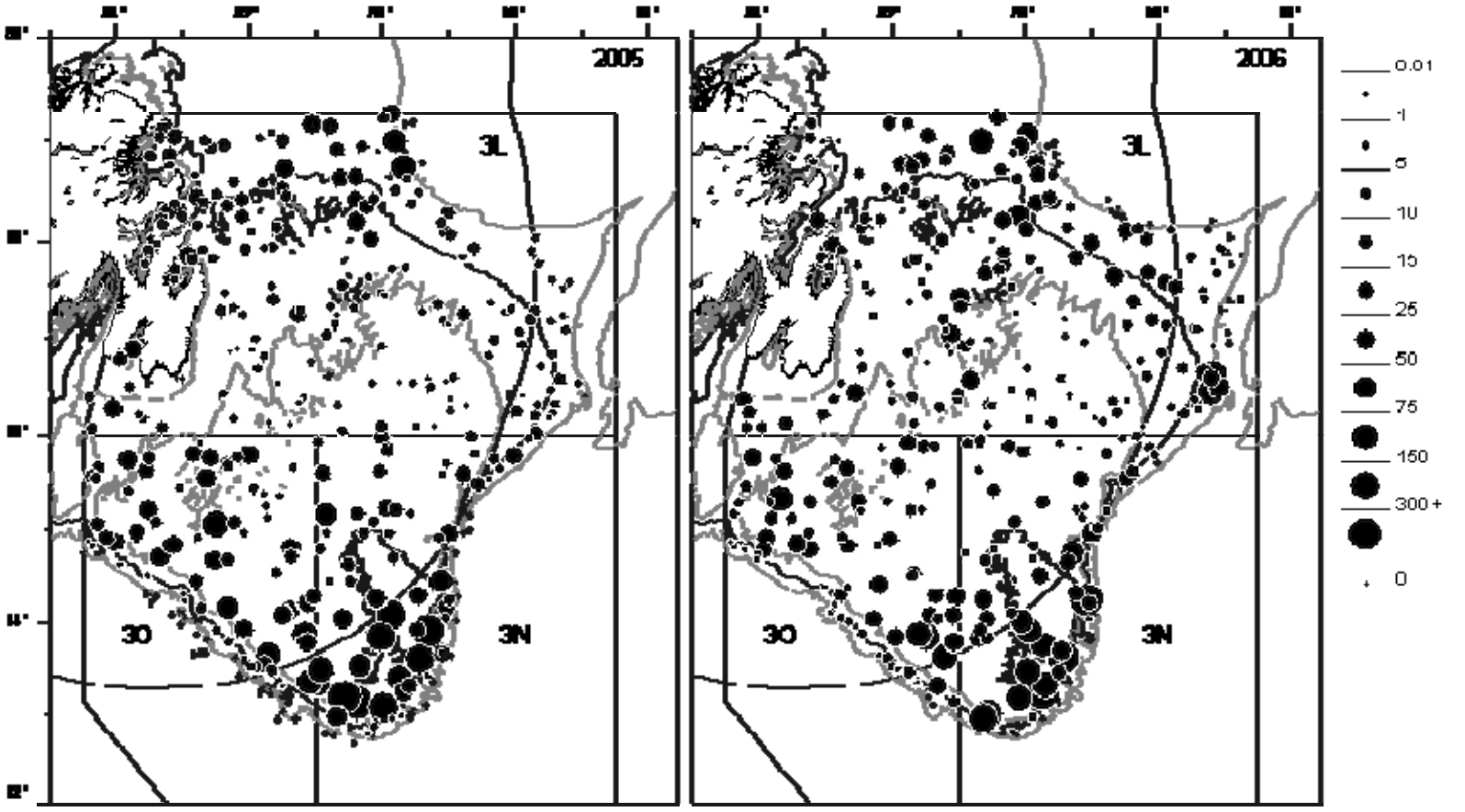


Figure 14. Distribution of American plaice (kg per tow) from Canadian fall surveys in NAFO Divisions 3LNO for 2005 and 2006.

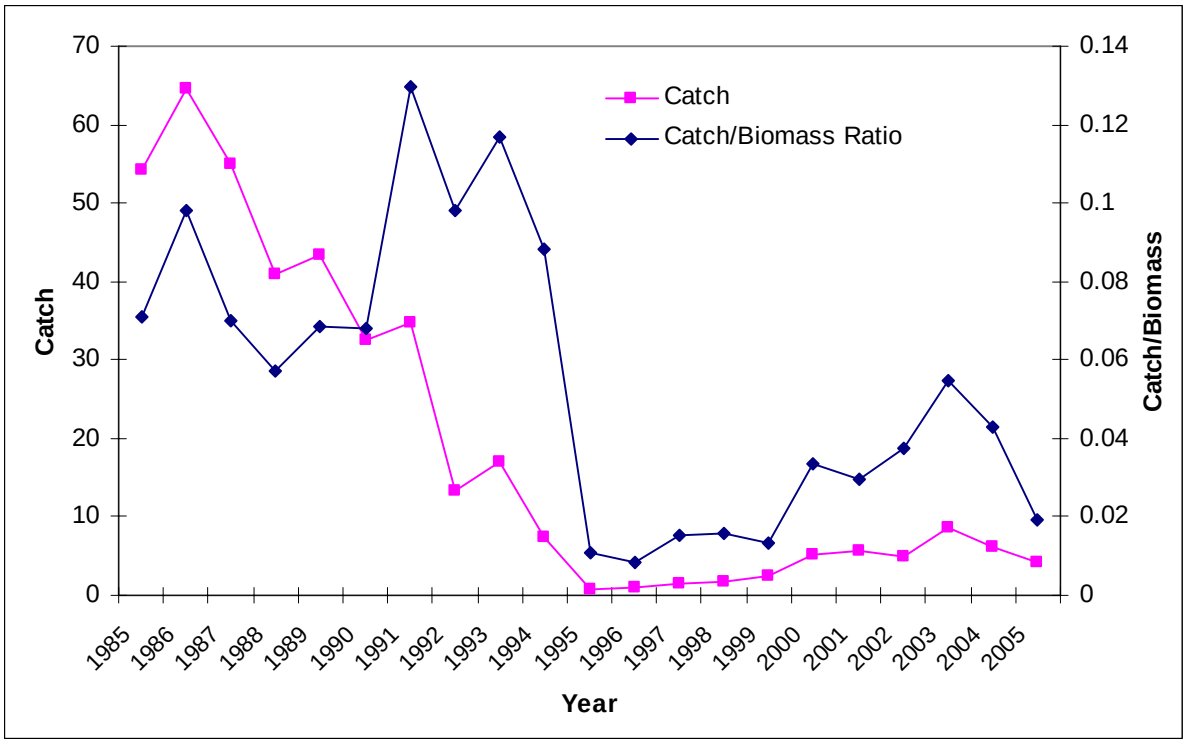


Figure 15. Total catch from 1985 to 2005 and the catch/biomass ratio for the same period.

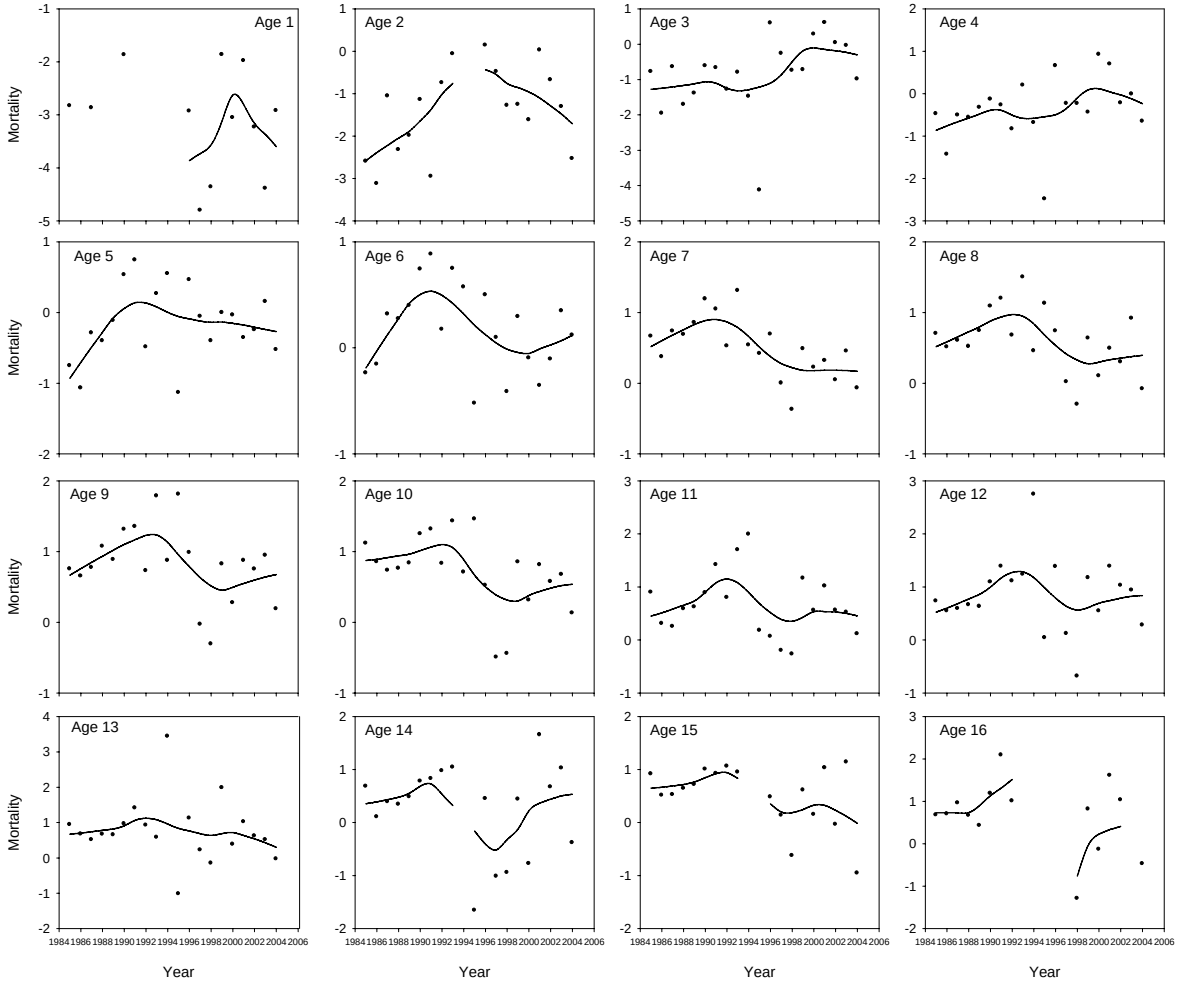


Figure 16. Estimates of mortality for ages 1 to 16 from Canadian spring surveys from 1985 to 2005.

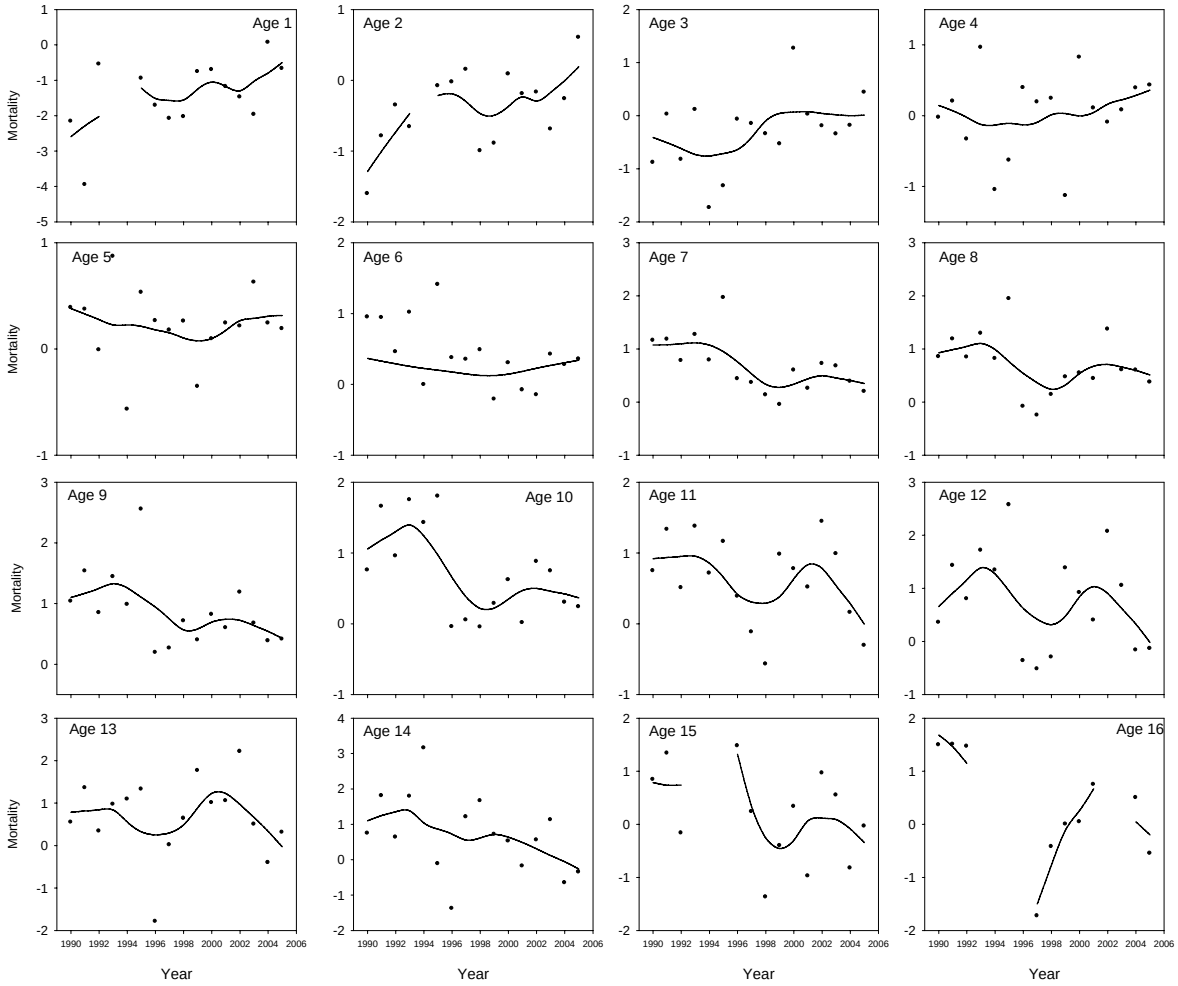


Figure 17. Estimates of mortality for ages 1 to 16 from Canadian fall surveys from 1990 to 2006. Note that fall 2004 is included.

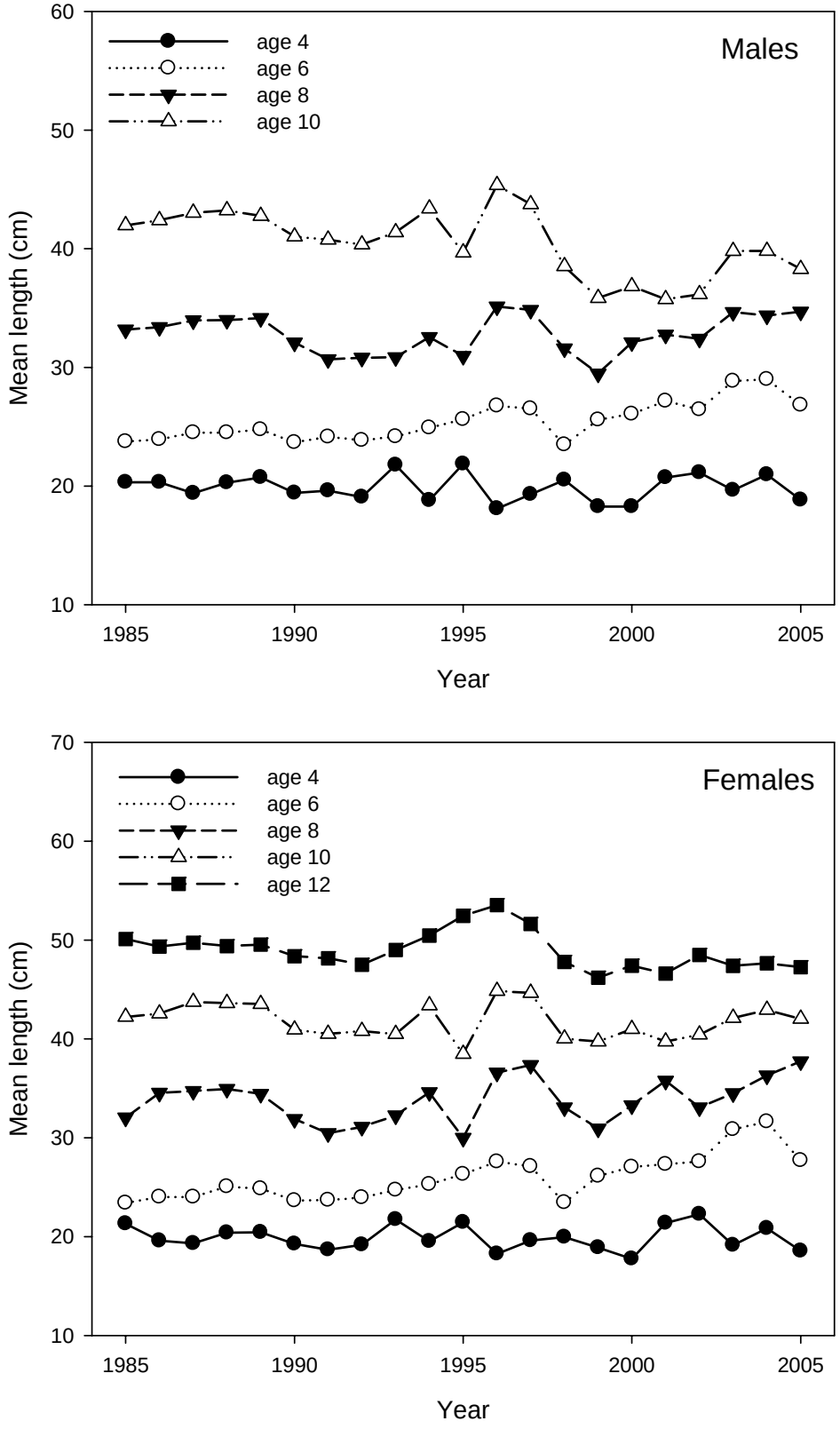


Figure 18. Mean length at age for selected ages of Div. 3LNO American plaice from Canadian spring RV surveys.

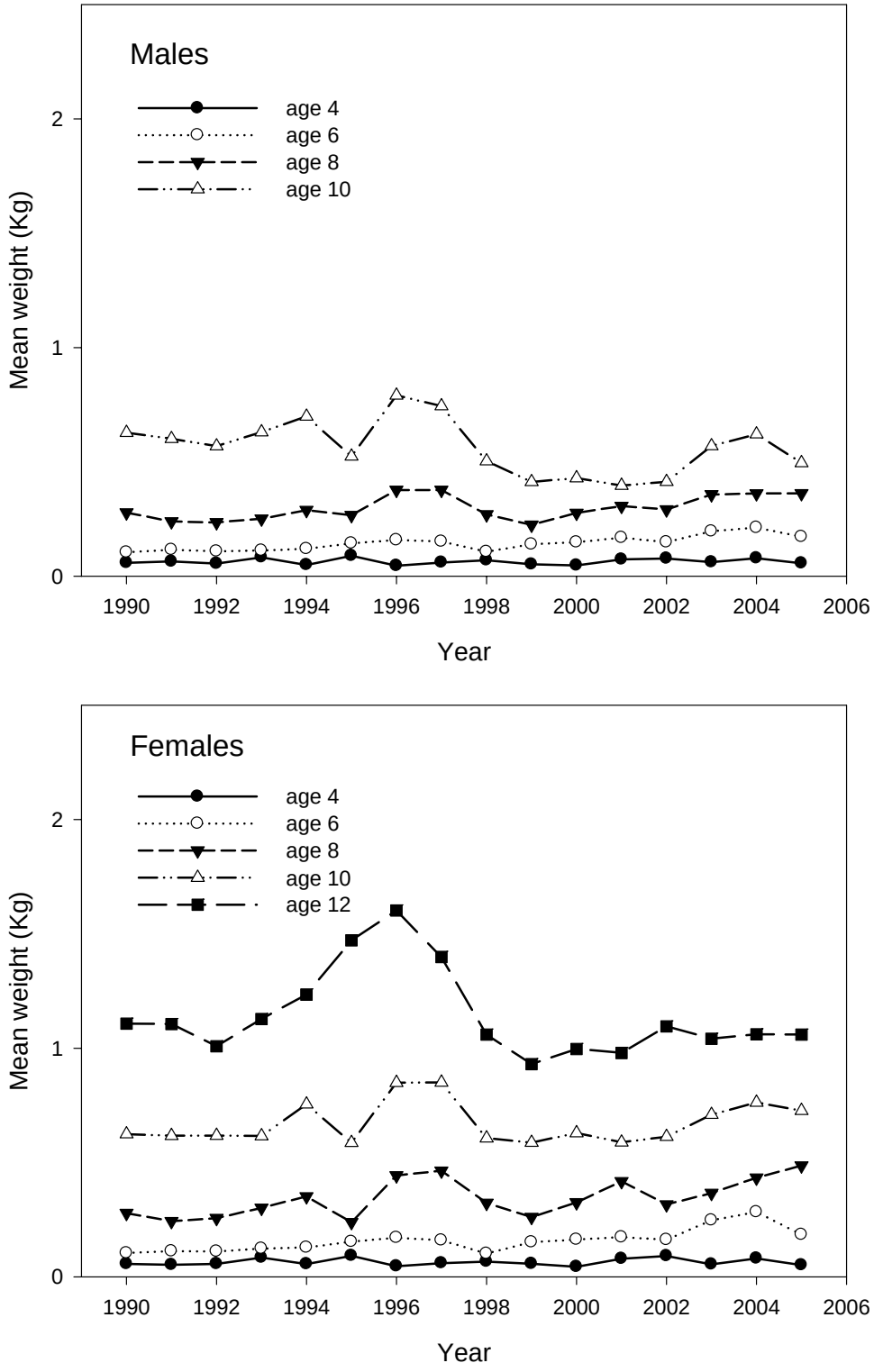


Figure 19. Mean weight at age for selected ages for male and female American plaice in Div. 3LNO from Canadian spring RV surveys.

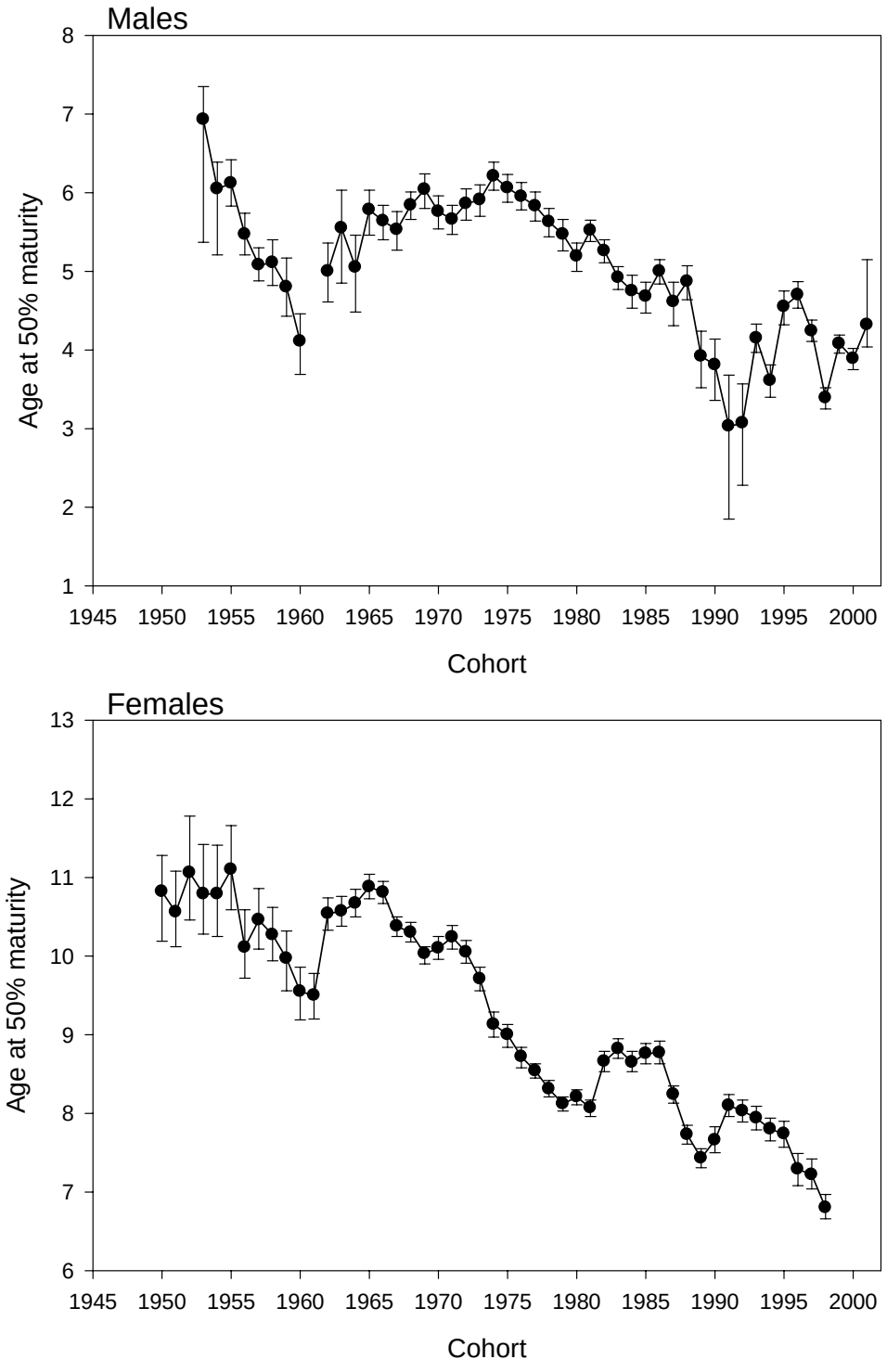


Figure 20. Age at 50% maturity (± 95% fiducial limits) by cohort for male and female American plaice in NAFO Divs. 3LNO.

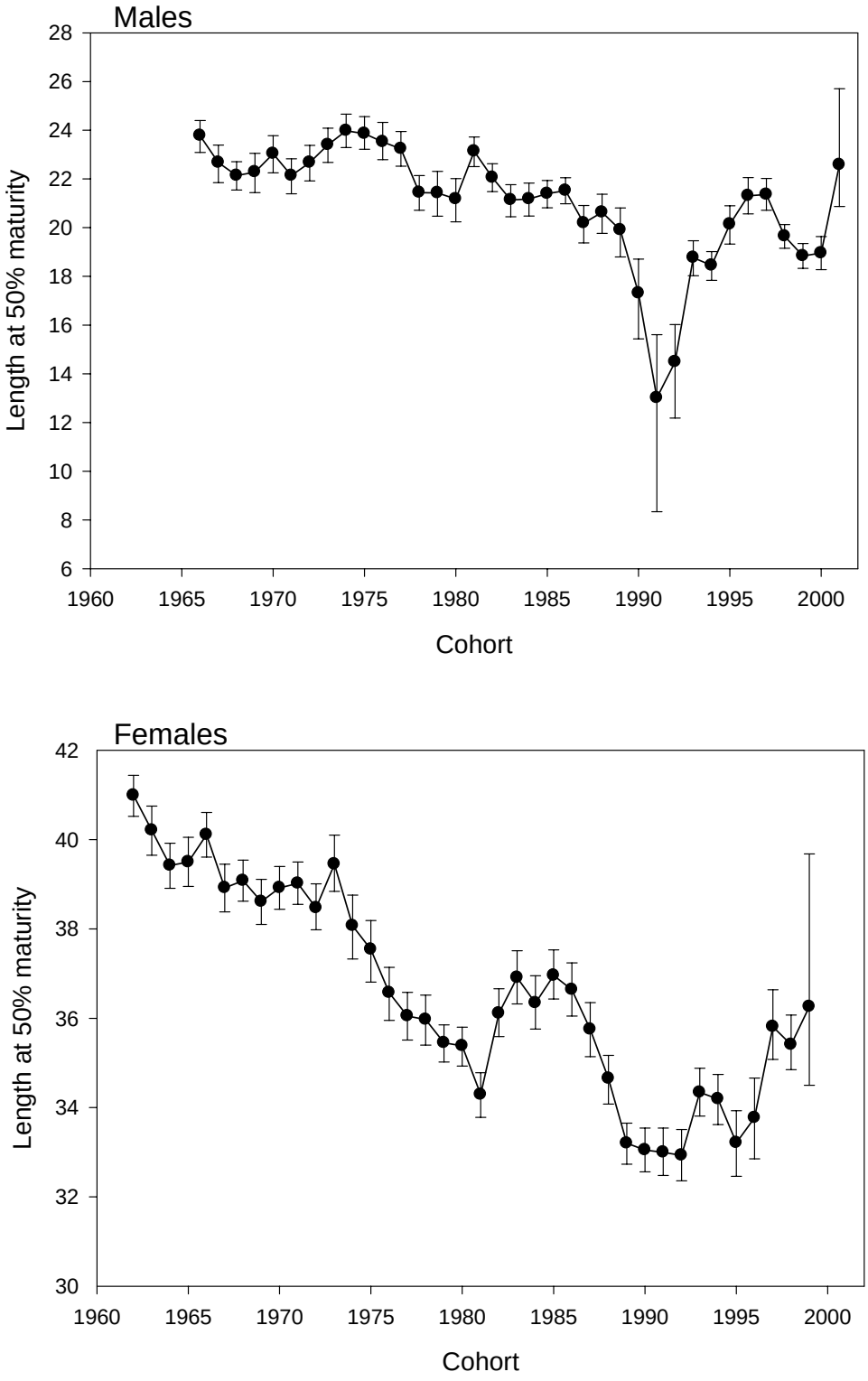


Figure 21. Length at 50% maturity (± 95% fiducial limits) by cohort for male and female American plaice in NAFO Divs. 3LNO.

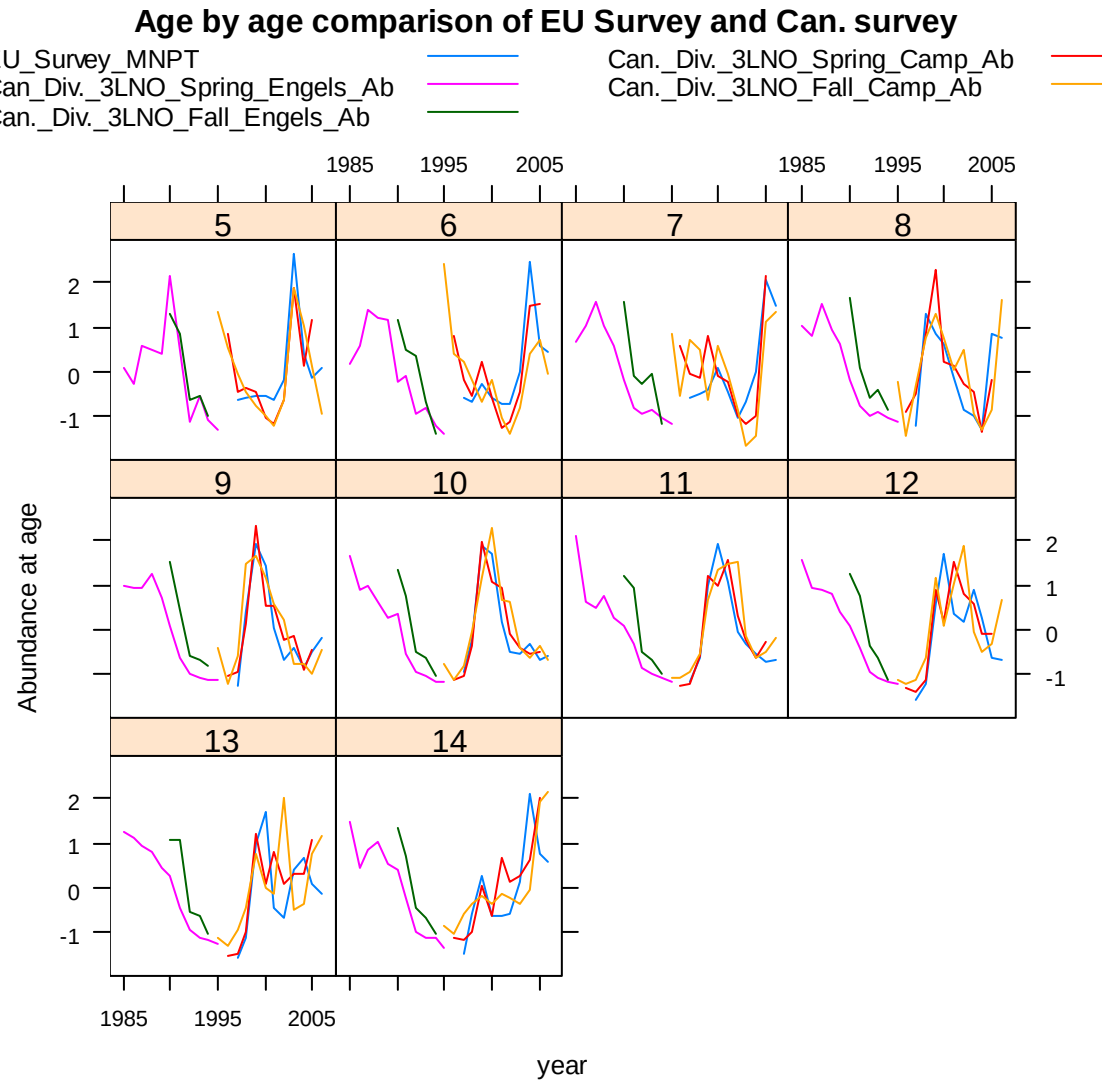


Figure 22. Standardized age by age abundance between surveys (FLR). Note data from Canadian Fall RV survey 2004 is included.

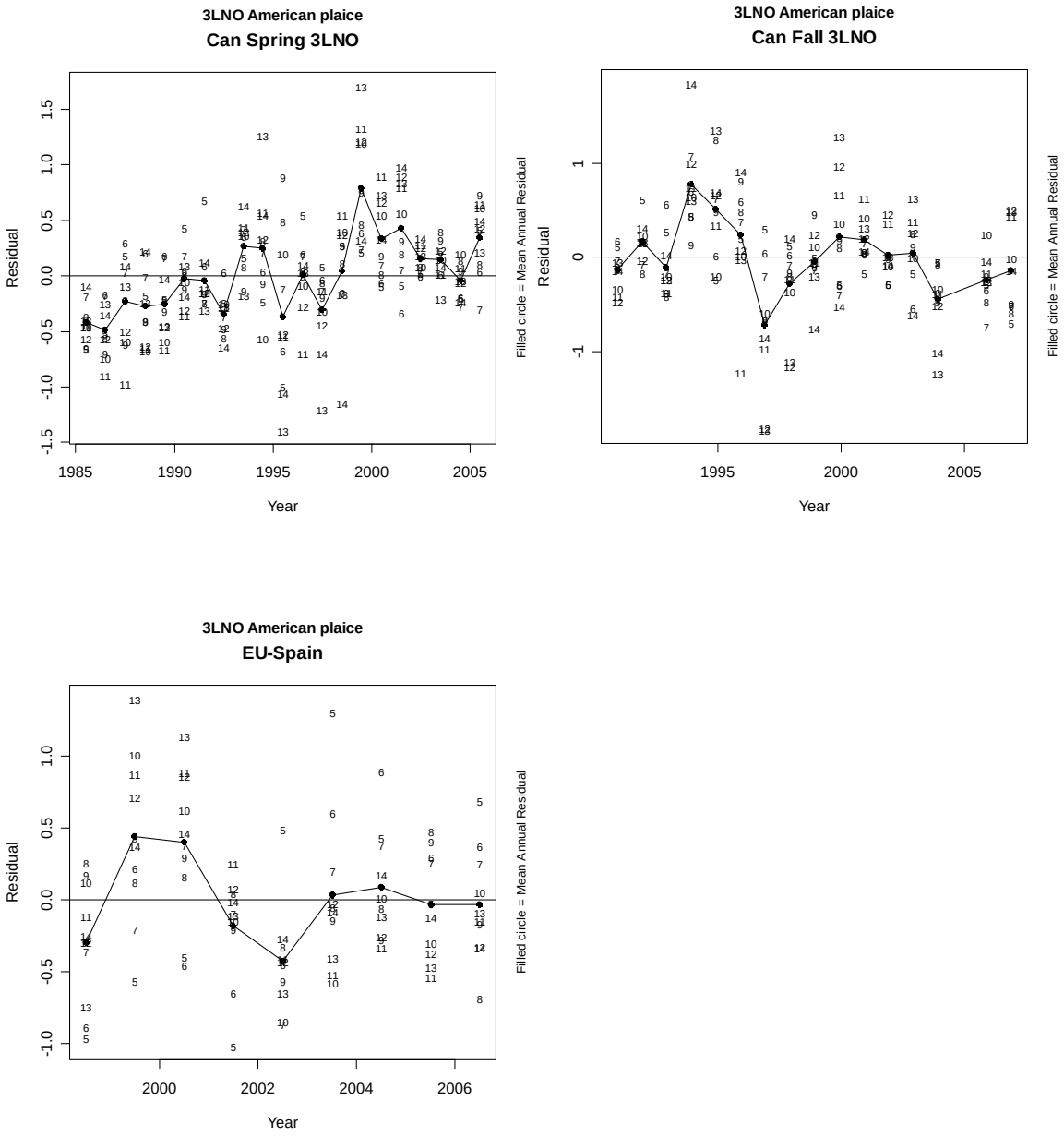


Figure 23. Residuals by year and month (numbers represent ages) for Canadian fall survey (top left), spring survey (top right) and Spanish Div. 3NO survey (bottom). Filled circle is the mean annual residual. Note the scales are different for each plot.

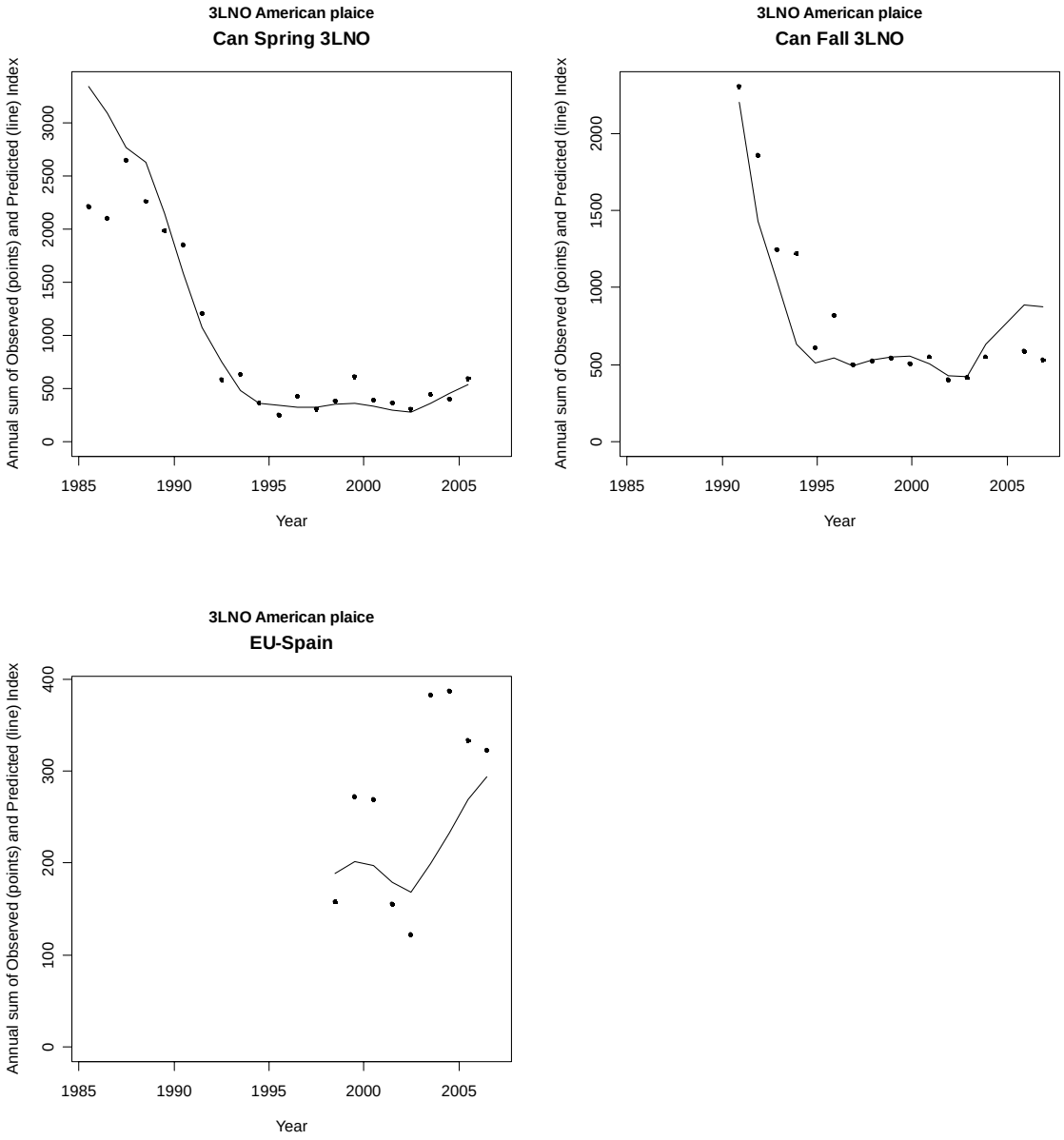


Figure 24. Observed versus predicted abundance for fall and spring indices over time.

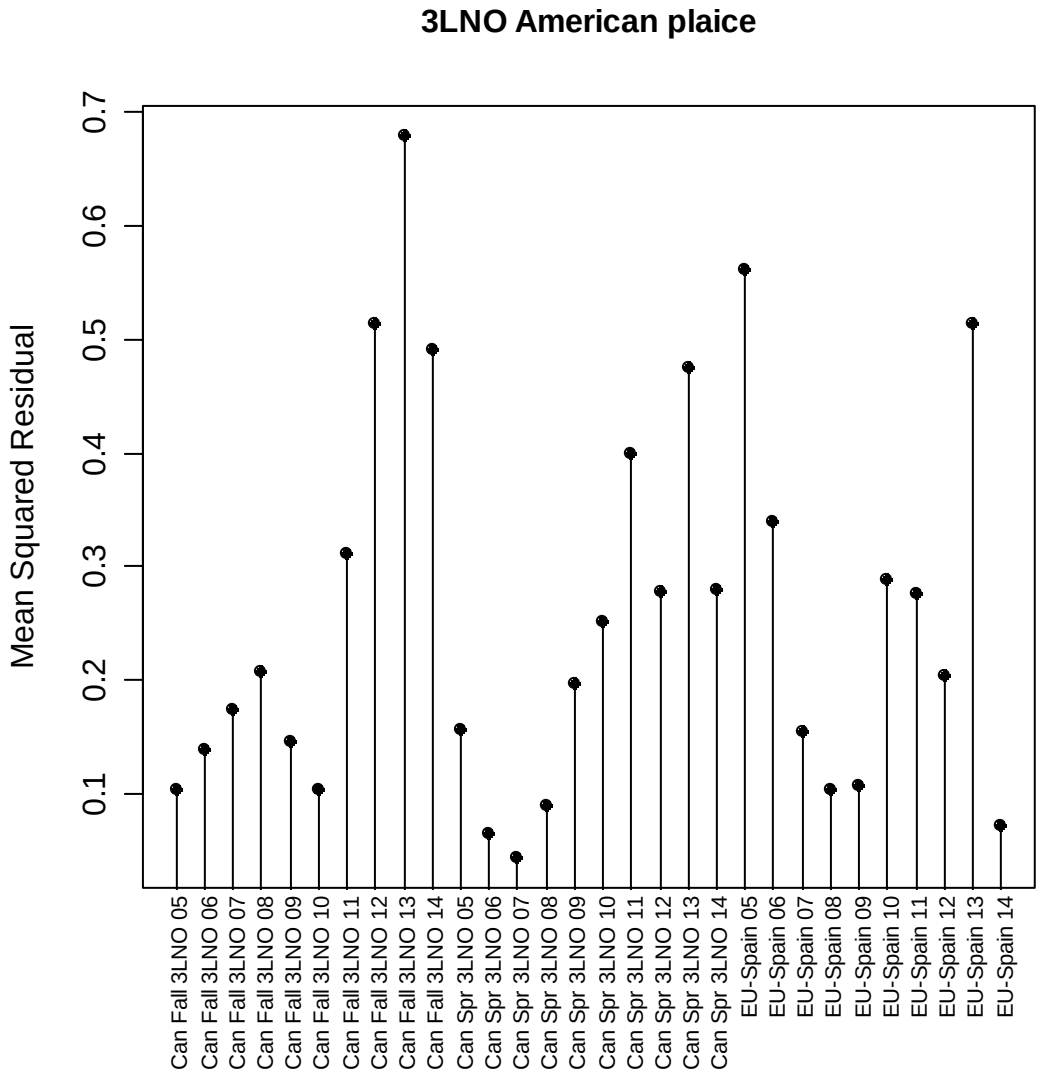


Figure 25. Mean squared residuals by age for fall, spring and Spanish Div. 3NO surveys.

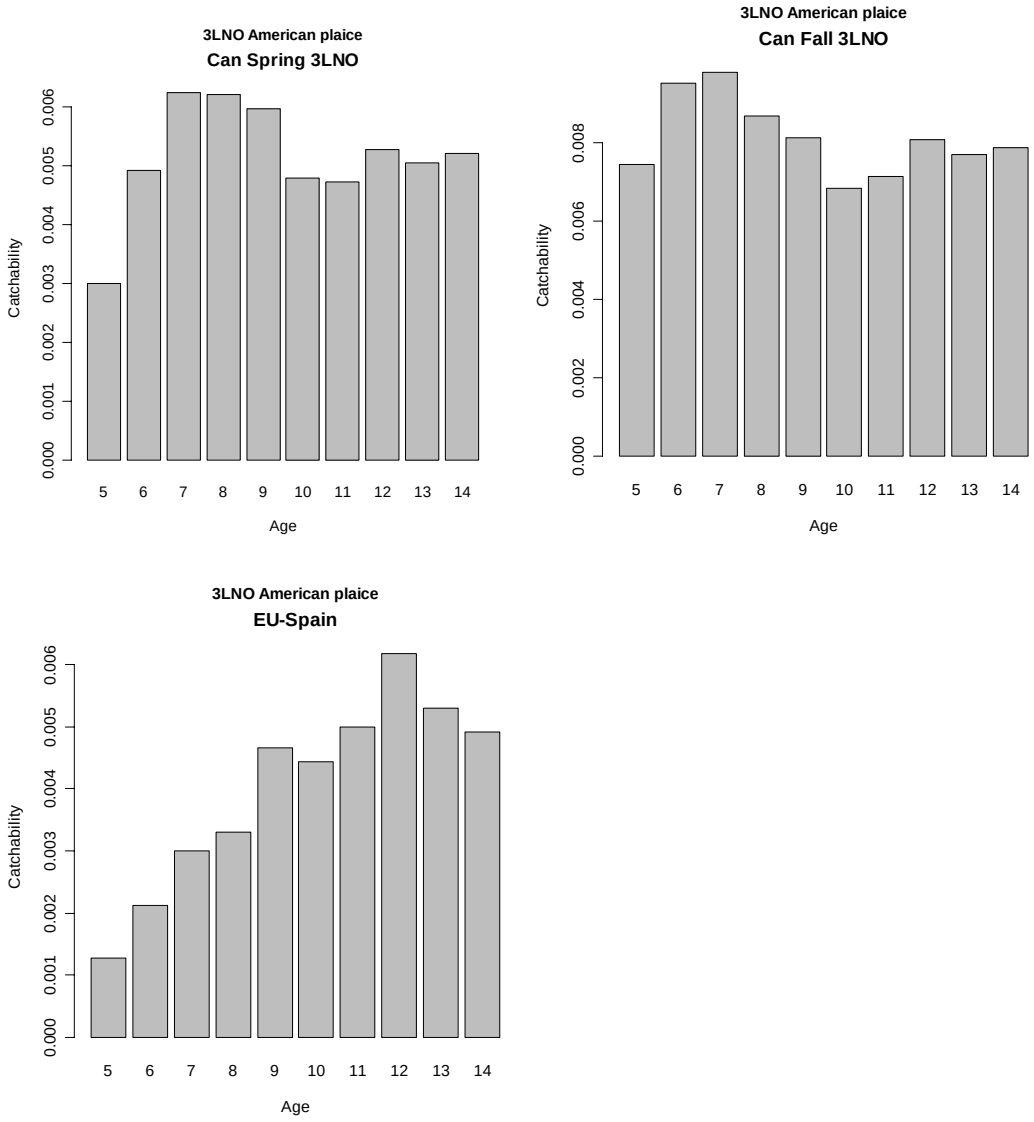


Figure 26. Bottom panel shows the survey catchabilities (q) for each survey by age. Please note Spanish Div. 3NO survey in mean numbers per tow at age, other surveys abundance at age.

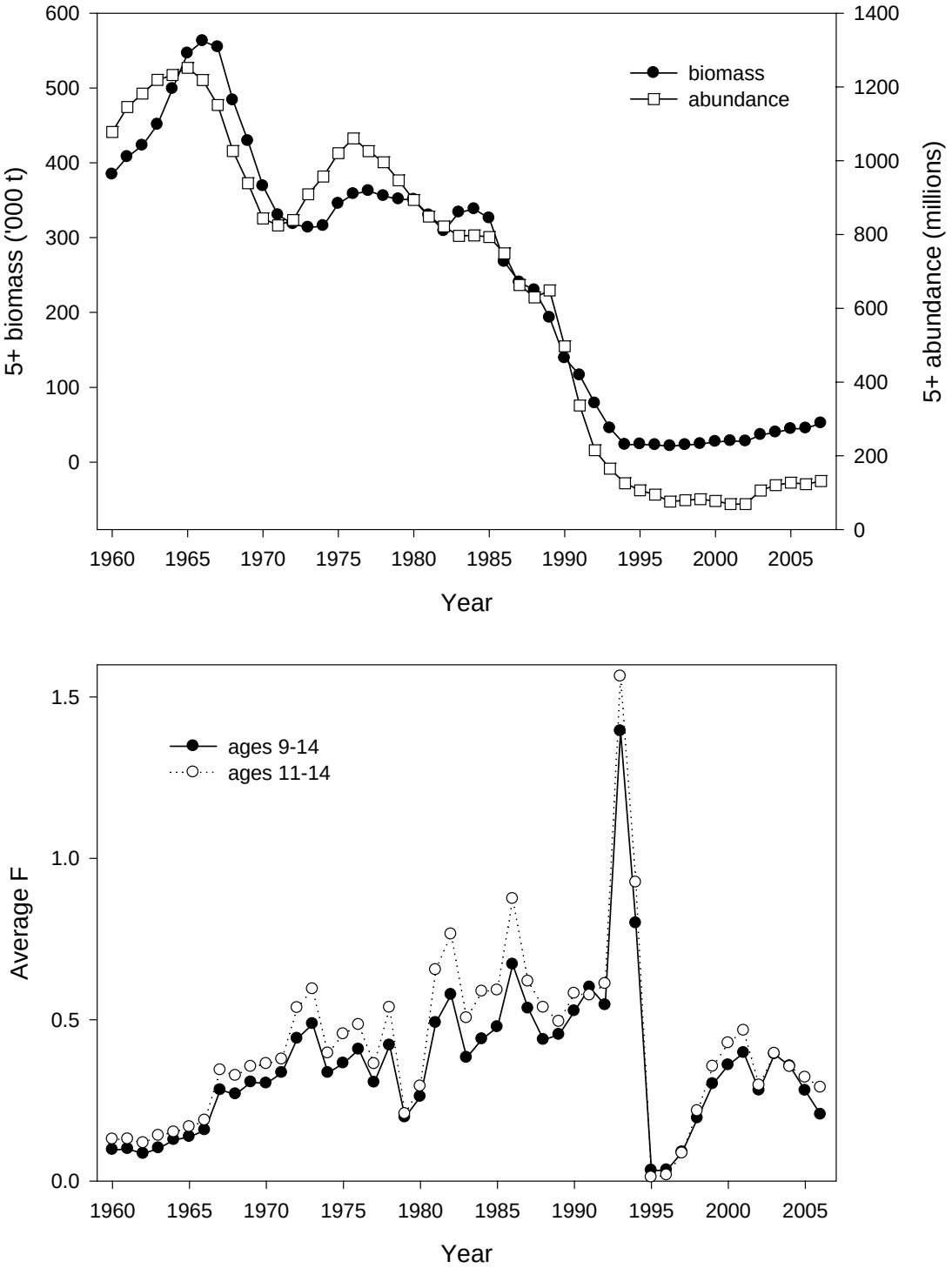
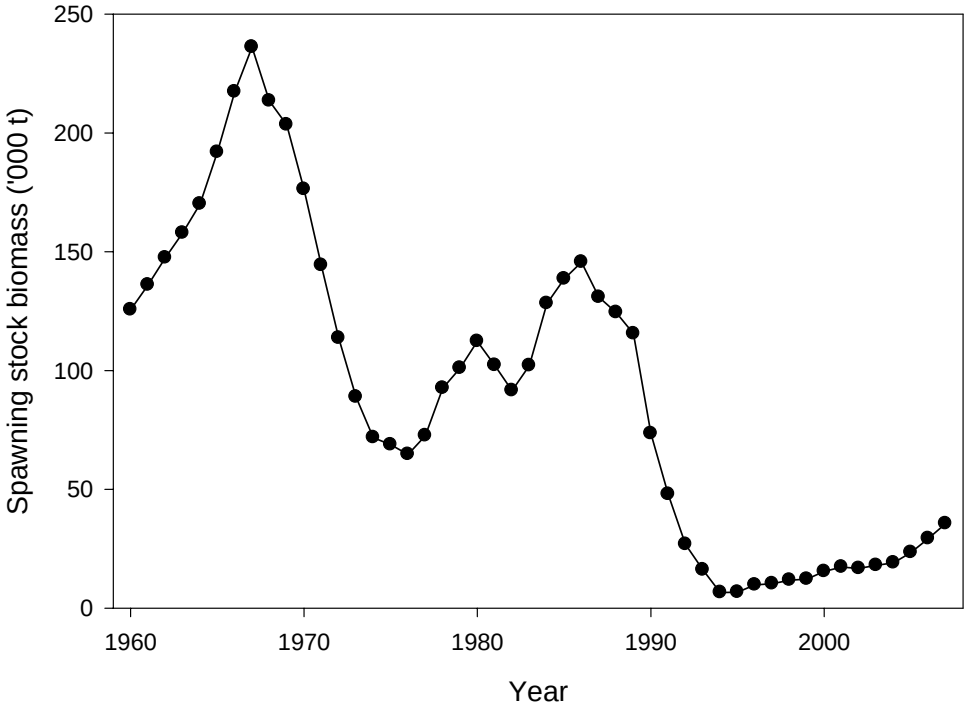


Figure 27. 5+ biomass and abundance (top) and average fishing mortality on ages 9 to 14 and ages 11 to 14 (bottom) from VPA.



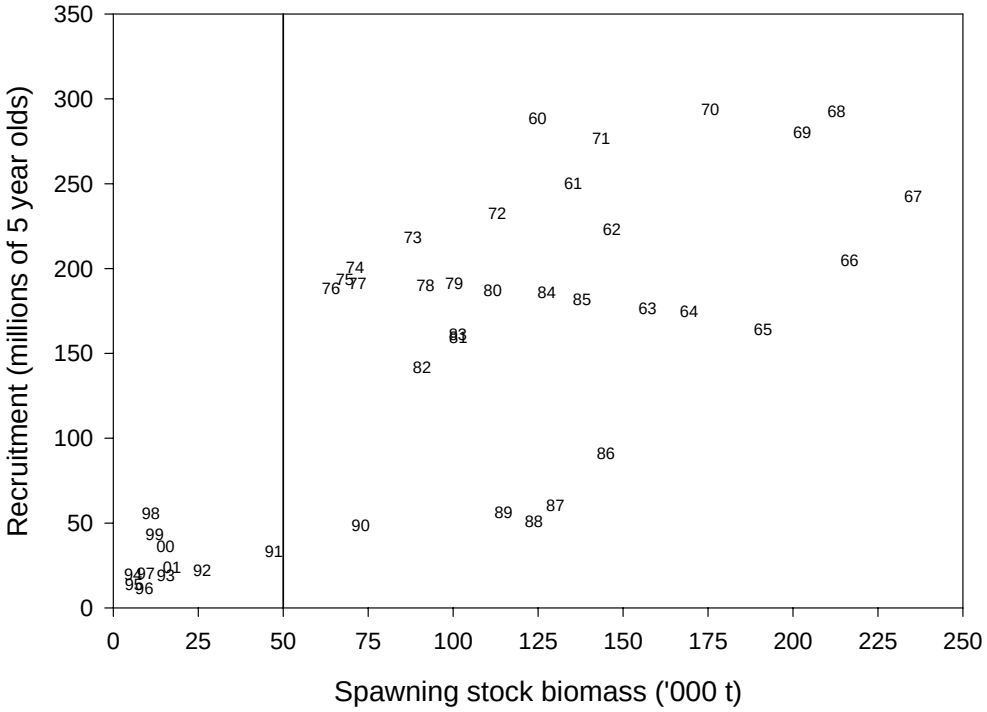


Figure 28. Observed stock recruit scatter. Vertical line illustrates Blim.

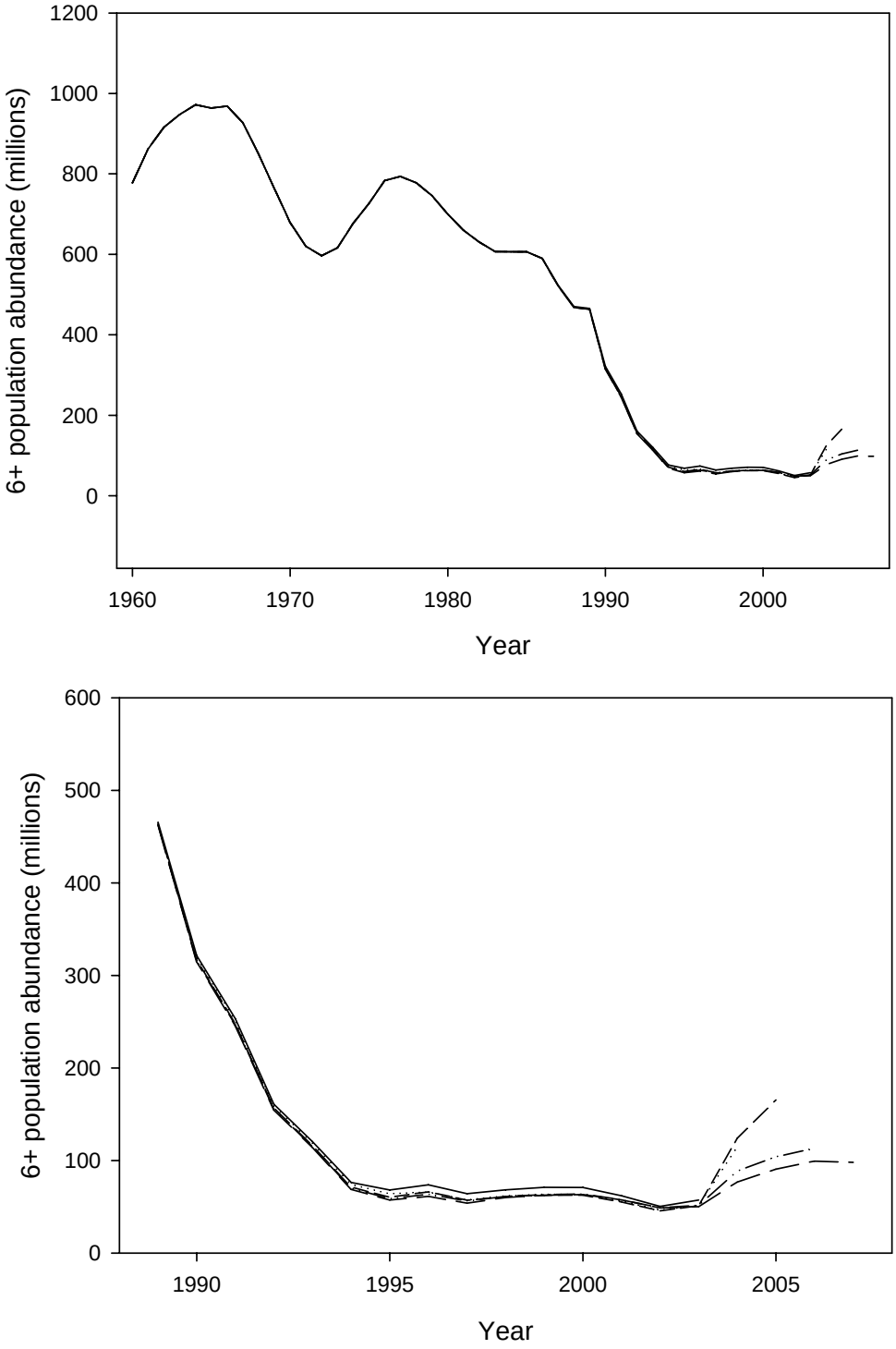


Figure 29. Results of retrospective analysis for Div. 3LNO American plaice. Top panel shows 6+ population abundance for the whole time period while the bottom panel shows only the time period from 1989.

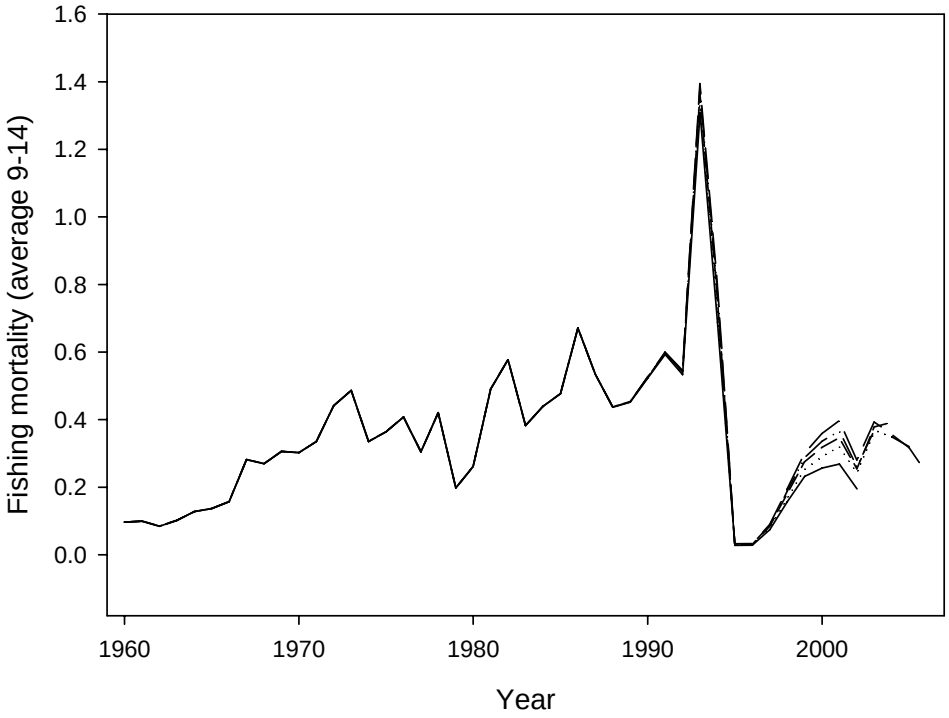


Figure 30. Results of retrospective analysis for Div. 3LNO American plaice. Average fishing mortality over ages 9 to 14.

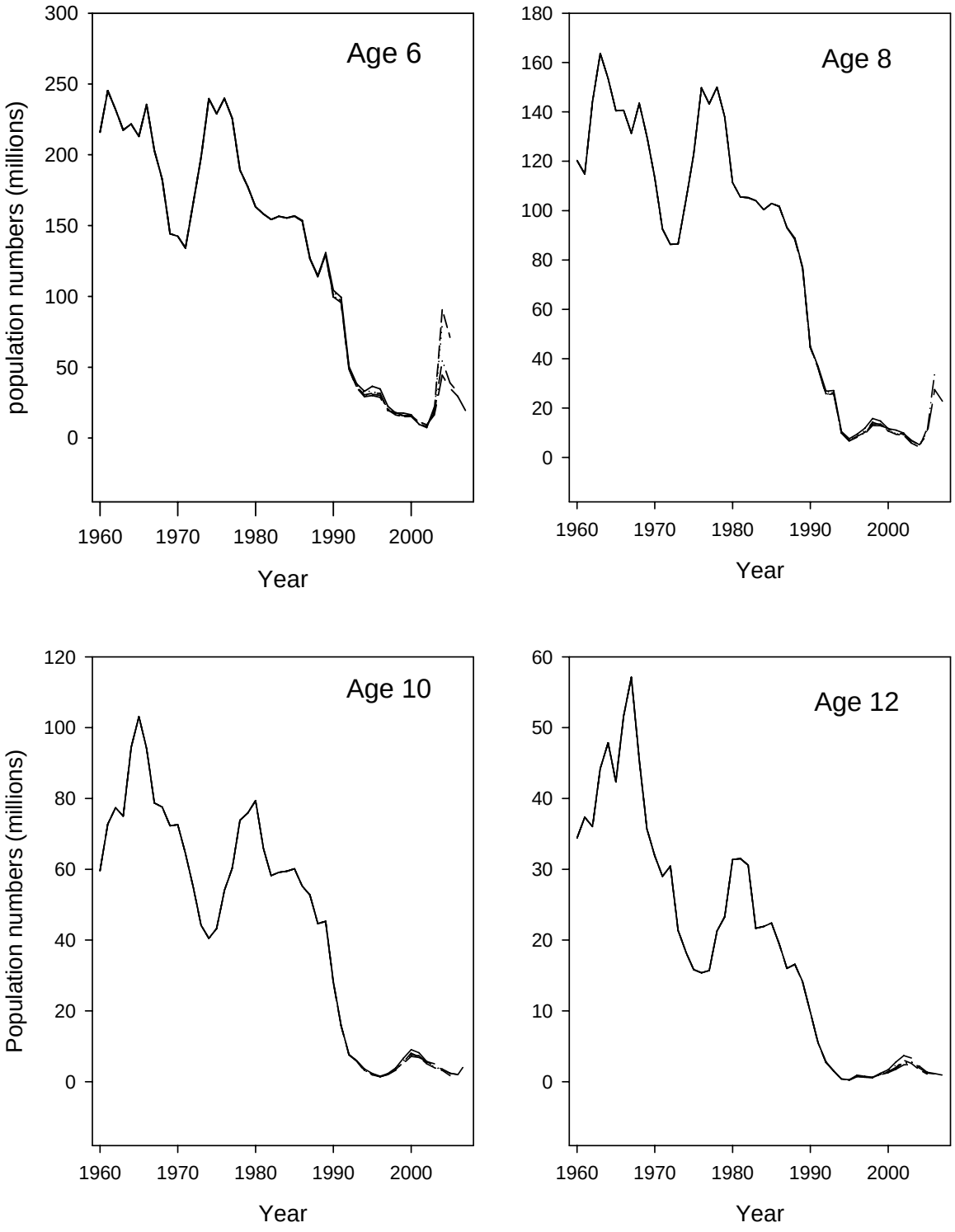


Figure 31. Results of retrospective analysis for Div. 3LNO American plaice. Population numbers (millions) for selected ages.

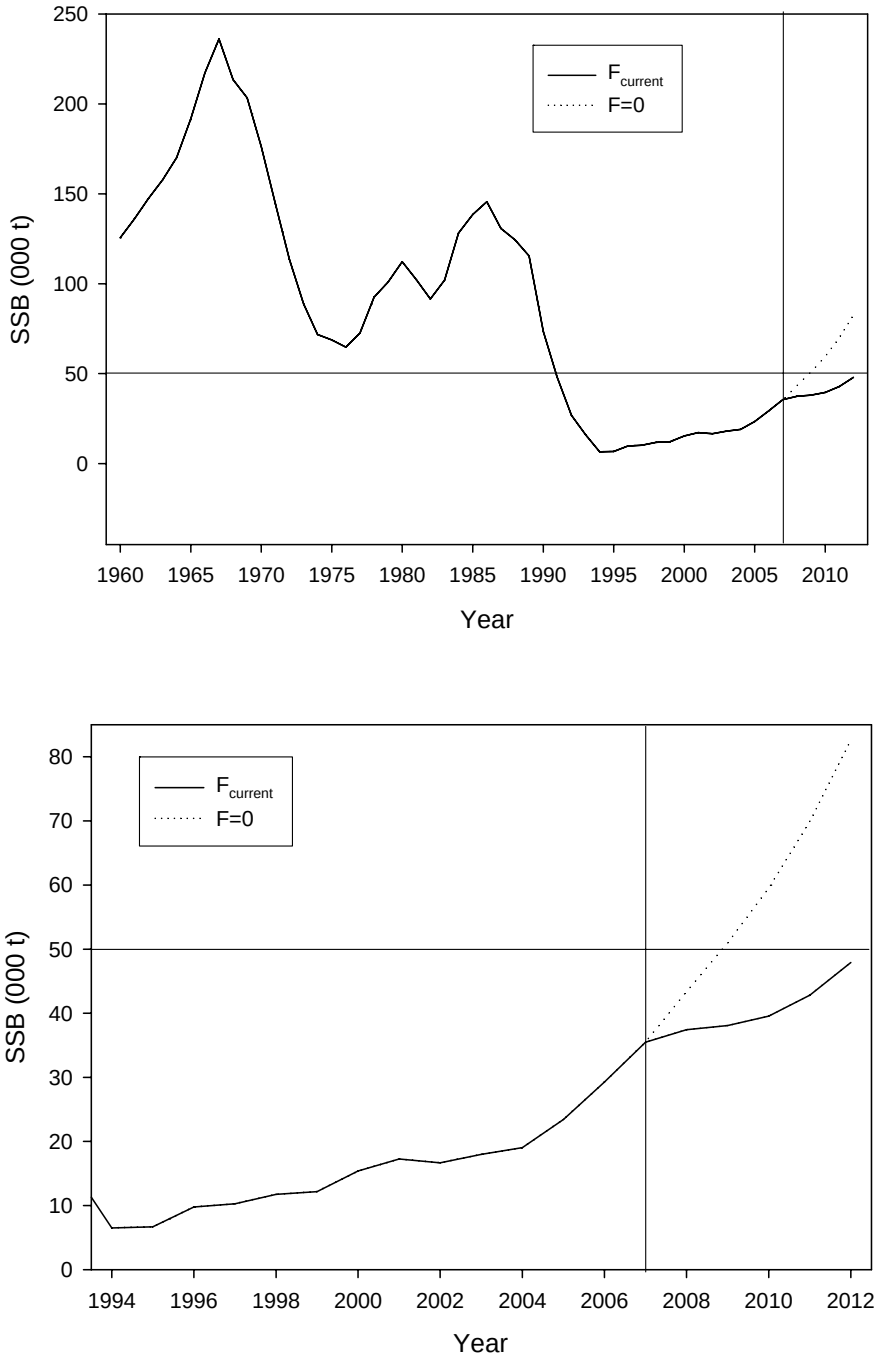


Figure 32. Estimated spawning stock biomass in medium term projections at current F=0. The vertical line indicates the start of the projection period. The horizontal line in the top panel gives the B_{lim} of 50 000 tons. The top panel shows the period of the projection along with the historic time series, the bottom panel shows only since 1994.