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# The 2007 interim monitoring report of yellowtail flounder stock status on the Grand Bank, NAFO Divisions 3LNO.

by

Stephen J. Walsh, Michael F. Veitch, Eugene B. Colbourne and William B. Brodie

Northwest Atlantic Fisheries Center, Science Branch, Department of Fisheries and Oceans, Canada. P. O. Box 5667, St. John's, Newfoundland Canada, AlC 5Xl.

## Abstract

A full assessment of the Grand Bank yellowtail flounder (*Limanda ferruginea*) stock, NAFO Divisions 3LNO, using the ASPIC surplus production model, was completed within Scientific Council in 2006, and the TAC advice was provided for the years 2007 and 2008. This document updates some of the indices of stock size since that assessment. The low estimated catch from the 2006 fishery, totalling about 902 tons, was due to the large reduction in effort by the Canadian fleet. In 2006, the Canadian spring survey index was the highest in the time series at 504 000 mt, while the fall index showed a modest decrease when compared to 2005. The anomalously high spring estimate, which also saw the biomass in each division being the highest in their respective time series, may be indicative of a year effect. Spatial analysis of catch distribution in the 2006 Canadian and spring surveys showed little change when compared to 2005. The spring survey by Spain in the NRA of Div. 3NO showed little change in the estimates of biomass from 2005 to 2005

Based on the Canadian fall and Spanish spring surveys, there is no major change indicated in stock status.

## Fishery and management

A. TAC regulation

The stock has been under TAC regulation since 1973 (Table 1). Beginning on January 1, 1994, no directed fishing moratorium for yellowtail flounder was announced and the TAC was set at zero. Following an increasing trend in survey biomass indices during the 1995 to 1997 period the fishery was reopened on August 1, 1998, with a TAC of 4,000 tons. Since then, the TAC has increased steadily, and in 2006, SC recommended a TAC of 15,500 tons for the years 2007 and 2008, up from the TAC of 15,000 tons for the 2005 and 2006 fisheries.

B. Catch trends

During the moratorium (1994-97), nominal landings decreased from approximately 2 000 tons in 1994 to around 300 - 800 tons per year, as by-catch in other fisheries (Table 1; Fig. 1). Since the fishery re-opened in August 1998, catches have increased from 4,400 tons to 14,000 tons in 2005. From 1985 to 1993 and again from 1998 to 2001 fisheries, catches exceeded the TACs by about 10%. Since 2002 the catches have been consistently below the TAC (Fig 1). In the 2006 fishery, the catch estimate of 930 tons was well below the allocated TAC of 15,000 tons because of the absence of the Newfoundland based offshore Canadian fleet taking part in the fishery due to labour problems

within the industry. In 2006, Canada caught 177 tons, the lowest reported catch since the moratorium, and the rest was of the catch taken in the NRA of Div. 3NO.

Table 2 shows a breakdown of the Canadian catches by year, division and gear. With the exception of the 1991-1993 period, when Canadian vessels pursued a mixed fishery for plaice and yellowtail flounder in Div 3O, the majority of catches have been taken in Div. 3N. The most important gear used is the otter trawl. In 2006 the Canadian otter trawl catch was 176 tons by otter trawl, and 1 ton was taken by gillnet in Div. 3L.

**C. Canadian stratified-random research survey data**

*Abundance and biomass trends*

Canadian Surveys in Div. 3LNO

Table 3 and 4 compares indices of biomass of yellowtail flounder from the Canadian spring and fall Campelen trawl surveys in Div. 3LNO and Figures 2 and 3 show the graphical breakdown by division and for the combined 3LNO estimates. Detailed descriptions of the surveys and trends are contained in Walsh et al. (2006). In Div 3LNO, the survey indices show similar trends in biomass in both series, and with the exception of 1996, 1999 and 2006 surveys, the fall estimates have generally been higher than the spring series since 1992. The fall 3LNO surveys indicated that the upward trend in stock size started in 1993 while the spring surveys showed the trend starting in 1995 (Figs. 2 and 3).

From 1996-2004 the 3LNO spring survey index has shown an annual variation in stock size and since has shown an increasing trend up to 2006 when the highest stock size biomass of 504 000 t was recorded. Although the 2006 coverage in Div 3N and 3O was lower than the expected coverage (only 28% and 41%, respectively) due to mechanical problems with the survey vessel, *CCG Wilfred Templeman*, the overall biomass still showed an increase of 30% since 2005. In addition, in each division the biomass estimate was the highest in their respective time series. Noteworthy is that in Div 3L the 2006 biomass estimate of 85 7000 t was a 97% increase over the 2005 estimate. Average weights per tow for the 1984-2006 period are shown in Table 5 and also showed large increases from 2005 to 2006 (Table 5). With the exception of Div 3N, the confidence intervals around Div 3L, 3O and the combined 3LNO biomass estimates are the largest in their respective time series; they are the second largest intervals for Div 3N ( Fig 2).

In the fall surveys the overall biomass trend has shown an increase for the time period 1992-2001, the highest estimate in the time series, followed by a decrease in 2002 ( Table 4; Fig 3). Since 2004 the stock has shown a slight decreasing trend with the 2006 estimate of 305 500 t being 11% lower than the 2005 estimate (Fig 3). A similar trend was also seen in the average weights per tow (Table 5). Most of this decrease in the 2006 biomass was seen in the lower estimates for both Div 3N and 3O. Only Div 3L showed an increase in stock size from 2005 to 2006 (Fig. 3).

Timing of the 2006 Canadian surveys.

*Spring*: With the exception of Div 3L, the start dates for the survey of Div 3N and 3O were almost 1 month later that in 2005 because of mechanical problems with survey vessel, *CCG Wilfred Templeman* (Table 6). Survey coverage in Div. 3L on the Grand Bank was completed as expected, however only minimal coverage in Div. 3N and 3O was possible with some sets being made only in the shallowest strata (Table 6). The *W. Templeman's* sister ship, *CCG Alfred Needler*, was used in conducting 47 out of the 52 sets in Div. 3NO.

*Fall*: Although some survey vessel mechanical problems were encountered the survey started on time, survey coverage of the yellowtail flounder habitat areas were completed and comparable to other years (see Brodie and Stansbury 2007).

Spanish Surveys in the NRA of Div 3NO ( SCR Doc 07/36).

In the spring surveys in the NRA both the average weight per tow and the biomass showed an increase from 2005 to 2006. Figure 4 shows a comparison between the catch rates for the Canadian and Spanish surveys for the time period 1995-2006. There is general agreement in the trends in the stock but a noticeable difference in catch rates. Since the adoption of the Campelen survey trawl in 2002 the Spanish catch rates have been 3- 5 times higher than that seen in the Canadian surveys. This difference may be due to density dependent catchability. The overall biomass increased by 2% from 2005 to 2006.

*Stock distribution*

Analysis of the 2006 Canadian spring and fall surveys showed the stock was widely distributed in all three divisions (Figs. 5 & 6). The spring survey coverage of Div 3NO was minimal, however, the fall survey coverage of strata less than 100 m was comparable to other years. Similar to all survey years, the majority of the stock was concentrated in Div. 3N in and around the area of the Southeast Shoal. In both 2006 surveys we see that the distribution of yellowtail flounder covers Div 3L in larger numbers than seen in 1990s. This trend has been particularly evident in the recent 2003-2005 surveys (Walsh et al. 2006; Colbourne and Walsh 2006).

In all survey years, almost 100% of the stock occupies depths less than 100 m. Similar to the 2005 spring survey the incidence of catches of yellowtail flounder in Div. 3L taken in the depth strata ranging from 93-183 m was higher than that seen in any year of the time series. Thirty-nine tows had catches of yellowtail flounder ranging from <10 kg to 70 kg, of which 20 tows were <10 kg (Table 3). The largest catch was found adjacent to a shallow stratum (<93 m) (see Figs 5 and 6 for spatial pattern). Bottom temperatures in this area of Div. 3L are within the $1^0$ C contour as seen in Figures 5 & 6. In the 2006 fall survey there was only one catch deeper than 93 m (Fig 5). Walsh et al. (2006) reported that catches were also taken regularly in the spring surveys of Div 3O. These catches were in strata with a depth range of 93 to 183 m and located along the southwest slope of the bank. However, in 2006 there were no survey sets in this area. In the 2006 fall survey there were no catches of yellowtail flounder taken in the deep waters sets of Div 30 (Fig. 5 & 6). These small catches in water depths greater than 91 m contribute little to the overall abundance and biomass estimates for the 3LNO stock, and appear to be more prevalent during the spring surveys than during the fall surveys. This reduction in the frequency of small catches in deep water from spring to fall could indicate either seasonal movements, but there is no annual pattern to the data, or it could indicate fringe areas of the stock.

The changes in spatial pattern of the stock were further investigated by calculating the proportion of biomass north of $45^0$ N for the entire Canadian survey time series. There is a definite seasonal pattern in recent years in the proportion of biomass north of $45^0$ N, i.e. north of the Southeast Shoal (Fig. 7). With the exception of 2002 and 2004 fall surveys, a higher proportion of yellowtail flounder was found in the north during the spring surveys when compared with the fall surveys for the 1996-2006 period. In 2006, the proportion of fish north of $45^0$ N was lower in the spring and higher in the fall when compared to the 2005 surveys. Poor coverage in the 2006 spring survey of Div. 3NO would affect this spatial analysis.

**D. Conclusions**

The 2006 Canadian fall survey of Div. 3LNO and the Spanish spring survey in the NRA of Div. 3O showed no major differences in biomass trends and stock distribution patterns since the 2005 surveys on which the last full assessment of stock status was conducted by Scientific Council (NAFO 2006; Walsh et al. 2006). Noteworthy is that, although the survey spatial coverage in the 2006 Canadian spring survey of Divisions 3NO was limited, started late and covered only shallow water strata (yellowtail flounder habitat) the catch rate and subsequent biomass estimates were the highest in the time series for all 3 divisions singularly and combined. The lateness of the surveys (almost one month in Div 3NO) and limited coverage in Div. 3NO may have contributed to these large biomass estimates seen in each division. Both the 2006 Canadian fall survey and Spanish spring surveys, with regular spatial coverage, showed a comparable trend with their respective recent estimates with no large increases seen. This anomalous Canadian spring estimate for 2006 may be indicative of a “year effect” and should be investigated further.

There is no requirement to revise the advice given by Scientific Council in 2006, which was for a TAC of 15 500 tons in 2007 and 2008 fisheries for yellowtail flounder on the Grand Bank.

**E. References**

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Table 1. Nominal catches by country and TACs (tons) of yellowtail in NAFO Divisions 3LNO.

| Year | Canada | France | USSR/Rus. | S.Korea[a] | Other [b] | Total | TAC |
|---|---|---|---|---|---|---|---|
| 1960 | 7 | - | - | - | - | 7 | |
| 1961 | 100 | - | - | - | - | 100 | |
| 1962 | 67 | - | - | - | - | 67 | |
| 1963 | 138 | - | 380 | - | - | 518 | |
| 1964 | 126 | - | 21 | - | - | 147 | |
| 1965 | 3,075 | - | 55 | - | - | 3,130 | |
| 1966 | 4,185 | - | 2,834 | - | 7 | 7,026 | |
| 1967 | 2,122 | - | 6,736 | - | 20 | 8,878 | |
| 1968 | 4,180 | 14 | 9,146 | - | - | 13,340 | |
| 1969 | 10,494 | 1 | 5,207 | - | 6 | 15,708 | |
| 1970 | 22,814 | 17 | 3,426 | - | 169 | 26,426 | |
| 1971 | 24,206 | 49 | 13,087 | - | - | 37,342 | |
| 1972 | 26,939 | 358 | 11,929 | - | 33 | 39,259 | |
| 1973 | 28,492 | 368 | 3,545 | - | 410 | 32,815 | 50,000 |
| 1974 | 17,053 | 60 | 6,952 | - | 248 | 24,313 | 40,000 |
| 1975 | 18,458 | 15 | 4,076 | - | 345 | 22,894 | 35,000 |
| 1976 | 7,910 | 31 | 57 | - | 59 | 8,057 | 9,000 |
| 1977 | 11,295 | 245 | 97 | - | 1 | 11,638 | 12,000 |
| 1978 | 15,091 | 375 | - | - | - | 15,466 | 15,000 |
| 1979 | 18,116 | 202 | - | - | 33 | 18,351 | 18,000 |
| 1980 | 12,011 | 366 | - | - | - | 12,377 | 18,000 |
| 1981 | 14,122 | 558 | - | - | - | 14,680 | 21,000 |
| 1982 | 11,479 | 110 | - | 1,073 | 657 | 13,319 | 23,000 |
| 1983 | 9,085 | 165 | - | 1,223 | - | 10,473 | 19,000 |
| 1984 | 12,437 | 89 | - | 2,373 | 1,836 [b] | 16,735 | 17,000 |
| 1985 | 13,440 | - | - | 4,278 | 11,245 [b] | 28,963 | 15,000 |
| 1986 | 14,168 | 77 | - | 2,049 | 13,882 [b] | 30,176 | 15,000 |
| 1987 | 13,420 | 51 | - | 125 | 2,718 | 16,314 | 15,000 |
| 1988 | 10,607 | - | - | 1,383 | 4,166 [b] | 16,158 | 15,000 |
| 1989 | 5,009 | 139 | - | 3,508 | 1,551 | 10,207 | 5,000 |
| 1990 | 4,966 | - | - | 5,903 | 3,117 | 13,986 | 5,000 |
| 1991 | 6,589 | - | - | 4,156 | 5,458 | 16,203 | 7,000 |
| 1992 | 6,814 | - | - | 3,825 | 123 | 10,762 | 7,000 |
| 1993 | 6,747 | - | - | - | 6,868 | 13,615 | 7,000 |
| 1994 | - | - | - | - | 2,069 | 2,069 | 7,000 [d] |
| 1995 | 2 | - | - | - | 65 | 67 | 0 [d] |
| 1996 | - | - | - | - | 232 | 232 | 0 [d] |
| 1997 | 1 | - | - | - | 657 | 658 | 0 [d] |
| 1998 | 3,739 | - | - | - | 647 | 4,386 | 4,000 |
| 1999 | 5,746 | - | 96 | - | 1,052 [b] | 6,894 | 6,000 |
| 2000 [c] | 9,463 | - | 212 | - | 1,486 | 11,161 | 10,000 |
| 2001 [c] | 12,238 | - | 148 | - | 1,759 | 14,145 | 13,000 |
| 2002 [c] | 9,959 | - | 103 | - | 636 | 10,698 | 13,000 |
| 2003 [c] | 12,708 | - | 184 | - | 914 [e] | 13,806 | 14,500 |
| 2004 | 12,575 | - | 158 | - | 621 | 13,354 | 14,500 |
| 2005 | 13,140 | 299 | 8 | - | 486 | 13,933 | 15,000 |
| 2006 | 177 | - | 1 | - | 752 | 930 | 15,000 |
| 2007 | | | | | | | 15,500 |

[a] South Korean catches ceased after 1992

[b] includes catches estimated from Canadian surveillance reports

[c] provisional

[d] no directed fishery permitted

[e] Includes catches averaged from a range of estimates

Table 2. Canadian catches of yellowtail flounder by division, from 1973 to 2006. Data from 2003-06 are from preliminary Canadian ZIF statistics and maybe slightly different from STATLANT data.

| | OTTER TRAWL | | | | |
|---|---|---|---|---|---|
| YEAR | 3L | 3N | 30 | 3LNO | OTHER GEARS |
| 1973 | 4,188 | 21,470 | 2,827 | 28,475 | 17 |
| 1974 | 1,107 | 14,757 | 1,119 | 16,983 | 70 |
| 1975 | 2,315 | 13,289 | 2,852 | 18,456 | 2 |
| 1976 | 448 | 4,978 | 2,478 | 7,904 | 6 |
| 1977 | 2,546 | 7,166 | 1,583 | 11,295 | 0 |
| 1978 | 2,537 | 10,705 | 1,793 | 15,035 | 56 |
| 1979 | 2,575 | 14,359 | 1,100 | 18,034 | 82 |
| 1980 | 1,892 | 9,501 | 578 | 11,971 | 40 |
| 1981 | 2,345 | 11,245 | 515 | 14,105 | 17 |
| 1982 | 2,305 | 7,554 | 1,607 | 11,466 | 13 |
| 1983 | 2,552 | 5,737 | 770 | 9,059 | 26 |
| 1984 | 5,264 | 6,847 | 318 | 12,429 | 8 |
| 1985 | 3,404 | 9,098 | 829 | 13,331 | 9 |
| 1986 | 2,933 | 10,196 | 1,004 | 14,133 | 35 |
| 1987 | 1,584 | 10,248 | 1,529 | 13,361 | 59 |
| 1988 | 1,813 | 7,146 | 1,475 | 10,434 | 173 |
| 1989 | 844 | 2,407 | 1,506 | 4,757 | 252 |
| 1990 | 1,263 | 2,725 | 668 | 4,656 | 310 |
| 1991 | 798 | 2,943 | 2,284 | 6,025 | 564 |
| 1992 | 95 | 1,266 | 4,633 | 5,994 | 820 |
| 1993 | - | 2,062 | 3,903 | 5,965 | 782 |
| 1994 | - | - | - | - | 0 |
| 1995 | - | - | - | - | 2 |
| 1996 | - | - | - | - | 0 |
| 1997 | - | 1 | - | 1 | 0 |
| 1998 | - | 2,968 | 742 | 3,710 | 29 |
| 1999 | - | 5,636 | 107 | 5,743 | 3 |
| 2000 | 1,409 | 7,733 | 278 | 9,420 | 43 |
| 2001 | 183 | 8,709 | 3,216 | 12,108 | 130 |
| 2002 | 22 | 7,707 | 2,035 | 9,764 | 195 |
| 2003 | 28 | 8,186 | 4,482 | 12,696 | 1 |
| 2004 | 2,760 | 7,205 | 2,609 | 12,574 | 3 |
| 2005 | 284 | 10,572 | 2,283 | 13,139 | 1 |
| 2006 | - | 176 | | 176 | 1 |

| Table 3. Biomass estimates ('000t) of Yellowtail Flounder by stratum, Div 3LN0 - Spring | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Depth** | **Stratum** | **No. of** | **1984** | **1985** | **1986** | **1987** | **1988** | **1989** | **1990** | **1991** | **1992** | **1993** | **1994** | **1995** |
| **Range** | | **trawlable** | *AN 27,28* | *AN 43* | *WT 47,48* | *WT 58-60* | *WT 70,71* | *WT 82-83* | *WT 94-96* | *WT 105-107* | *WT 119-122* | *WT 136-138* | *WT 152-154* | *WT 168-170* |
| **(m)** | | **Units** | | *WT 28-30* | | | | | | | | | | |
| <=56 | 375 | 219,134.8 | 32.9 | 17.1 | 39.8 | 22.8 | 11.1 | 4.6 | 18.5 | 2.6 | 25.9 | 10.8 | 2.7 | 13.1 |
| | 376 | 206,204.1 | 6.2 | 13.8 | 13.8 | 16.2 | 2.6 | 25.1 | 14.6 | 29.6 | 4.6 | 1.1 | 0.1 | 0.6 |
| | 784 | 36,866.4 | | | | | | | | | | | | |
| **TOTAL** | | | **39.1** | **30.9** | **53.6** | **39.0** | **13.7** | **29.7** | **33.1** | **32.2** | **30.6** | **11.9** | **2.8** | **13.7** |
| | | | | | | | | | | | | | | |
| 57-92 | 330 | 287,365.1 | 0.2 | 1.9 | 0.7 | 0.2 | 0.2 | 0.3 | 0.2 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 331 | 62,727.9 | 1.4 | 1.9 | 0.2 | 0.8 | 0.3 | 0.9 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.0 |
| | 338 | 261,090.9 | 3.3 | 2.8 | 1.4 | 0.5 | 5.1 | 1.7 | 1.4 | 1.3 | 2.1 | 1.4 | 0.7 | 1.3 |
| | 340 | 236,054.8 | 0.7 | 1.5 | 1.8 | 4.3 | 1.1 | 0.8 | 2.0 | 0.6 | 0.4 | 0.4 | 0.0 | 0.0 |
| | 350 | 284,889.0 | 0.4 | 1.0 | 0.6 | 0.2 | 0.4 | 0.2 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 351 | 346,653.9 | 12.4 | 13.0 | 11.7 | 6.0 | 11.2 | 6.9 | 8.4 | 4.0 | 1.1 | 0.8 | 0.0 | 0.1 |
| | 352 | 354,907.6 | 10.0 | 8.7 | 10.7 | 15.2 | 7.5 | 8.0 | 11.2 | 13.6 | 7.1 | 33.0 | 8.1 | 5.5 |
| | 353 | 17.6353.31 | 0.2 | 7.6 | 2.8 | 13.4 | 0.3 | 0.9 | 1.7 | 2.3 | 0.8 | 5.3 | 0.2 | 5.6 |
| | 360 | 411,582.8 | 43.9 | 19.0 | 4.6 | 3.1 | 1.0 | 25.1 | 5.0 | 5.0 | 10.4 | 3.6 | 1.0 | 16.3 |
| | 361 | 254,900.7 | 32.3 | 15.3 | 9.8 | 14.8 | 17.9 | 11.1 | 26.8 | 21.0 | 7.5 | 21.0 | 41.8 | 27.7 |
| | 362 | 346,653.9 | 30.1 | 11.1 | 21.2 | 14.0 | 12.2 | 8.5 | 10.5 | 8.5 | 1.0 | 14.2 | 0.5 | 0.1 |
| | 363 | 244,858.7 | 5.4 | 3.1 | 1.7 | 1.6 | 1.1 | 0.4 | 0.8 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 371 | 154,206.0 | . | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 372 | 338,400.3 | 15.7 | 16.3 | 9.7 | 3.8 | 2.1 | 3.4 | 1.3 | 0.7 | 0.1 | 0.1 | 0.0 | 0.0 |
| | 373 | 346,653.9 | 18.3 | 9.1 | 4.8 | 6.2 | 6.3 | 3.8 | 0.3 | 2.5 | 0.0 | 0.0 | 0.3 | 0.0 |
| | 374 | 128,069.4 | 3.9 | 2.7 | 1.1 | 0.6 | 0.3 | 0.0 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 |
| | 383 | 92,716.2 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 384 | 154,068.4 | . | 0.6 | 0.2 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 785 | 63,965.9 | . | | | | | | | | | | | |
| **TOTAL** | | | **178.3** | **115.7** | **83.1** | **84.7** | **67.1** | **72.1** | **69.8** | **61.0** | **30.7** | **79.9** | **52.8** | **56.7** |
| | | | | | | | | | | | | | | |
| 93-183 | 328 | 208,955.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 329 | 236,742.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 332 | 144,026.5 | 0.0 | 0.0 | 1.1 | 0.7 | 0.0 | 1.7 | 0.1 | 0.1 | 0.1 | 0.9 | 0.0 | 0.1 |
| | 337 | 130,407.9 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.2 | 0.0 | 0.0 | 0.1 | 0.6 | 0.0 | 0.0 |
| | 339 | 80,473.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 341 | 216,521.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 342 | 80,473.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 343 | 72,219.6 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 348 | 291,629.5 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 349 | 290,804.1 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 354 | 65,204.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 359 | 57,913.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 364 | 387,509.6 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 365 | 143,201.1 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 370 | 181,580.6 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 377 | 13,756.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 382 | 89,002.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 385 | 324,093.9 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 390 | 203,728.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 786 | 11,555.1 | . | . | . | . | . | . | . | . | . | . | . | . |
| | 787 | 84,325.0 | . | . | . | . | . | . | . | . | . | . | . | . |
| | 794 | 29,713.2 | . | . | . | . | . | . | . | . | . | . | . | . |
| | 797 | 13,481.0 | . | . | . | . | . | . | . | . | . | . | . | . |
| **TOTAL** | | | **0.3** | **0.2** | **1.5** | **0.9** | **0.2** | **2.0** | **0.2** | **0.3** | **0.1** | **1.5** | **0.1** | **0.2** |

| **Table 3 Con'd** | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Depth** | **Stratum** | **No. of** | **1984** | **1985** | **1986** | **1987** | **1988** | **1989** | **1990** | **1991** | **1992** | **1993** | **1994** | **1995** |
| **Range** | | **trawlable** | *AN 27,28* | *AN 43* | *WT 47,48* | *WT 58-60* | *WT 70,71* | *WT 82-83* | *WT 94-96* | *WT 105-107* | *WT 119-122* | *WT 136-138* | *WT 152-154* | *WT 168-170* |
| (m) | | Units | | *WT 28-30* | | | | | | | | | | |
| 184-274 | 333 | 20,771.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 336 | 16,644.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 344 | 205,516.3 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 347 | 135,222.6 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 355 | 14,168.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 358 | 30,951.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 366 | 191,760.2 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 |
| | 369 | 132,196.2 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 378 | 19,121.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 381 | 25,036.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 386 | 135,222.6 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 389 | 112,937.7 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 391 | 38,792.2 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 795 | 22,560.0 | . | . | . | . | . | . | . | . | . | . | . | . |
| **TOTAL** | | | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** |
| | | | | | | | | | | | | | | |
| 275-366 | 334 | 12,655.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 335 | 7,978.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 345 | 196,987.5 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 346 | 118,990.3 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 |
| | 356 | 8,391.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 357 | 22,560.0 | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 368 | 45,945.4 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 |
| | 379 | 14,581.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 380 | 15,957.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 387 | 98,768.9 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 388 | 49,659.6 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 392 | 19,946.4 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 796 | 24,073.2 | . | . | . | . | . | . | . | . | . | . | . | . |
| | 798 | 13,756.1 | . | . | . | . | . | . | . | . | . | . | . | . |
| **TOTAL** | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| 367-549 | 717 | 12,793.2 | . | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 719 | 10,454.6 | . | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 721 | 10,454.6 | . | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 723 | 21,322.0 | . | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 725 | 14,443.9 | . | . | . | . | . | . | . | 0.0 | | 0.0 | 0.0 | 0.0 |
| | 727 | 22,009.8 | . | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 729 | 25,586.4 | . | 0.0 | . | . | . | . | . | 0.0 | | 0.0 | 0.0 | 0.0 |
| | 731 | 29,713.2 | . | 0.0 | . | . | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 733 | 64,378.6 | . | 0.0 | . | . | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 735 | 37,416.6 | . | 0.0 | . | . | . | . | . | | 0.0 | 0.0 | 0.0 | 0.0 |
| **TOTAL** | | | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** |

| Table 3 Con'd | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Depth | Stratum | No. of | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
| Range | | trawlable | *AN 27,28* | *AN 43* | *WT 47,48* | *WT 58-60* | *WT 70,71* | *WT 82-83* | *WT 94-96* | *WT 105-107* | *WT 119-122* | *WT 136-138* | *WT 152-154* | *WT 168-170* | *WT 188-191* | *WT 204-208* | *WT221-224* | *WT 238-41* | *WT315-18* | *WT367-70* | *WT419-24* | WT479-82 | WT 546-549 | *WT618-19* | WT692-93 |
| (m) | | Units | | *WT 28-30* | | | | | | | | | | | | | | | | | | | | | AN 729 |
| 550-731 | 718 | 15,269.3 | . | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| | 720 | 14,443.9 | . | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| | 722 | 12,793.2 | . | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| | 724 | 17,057.6 | . | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| | 726 | 9,904.4 | . | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| | 728 | 21,459.5 | . | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| | 730 | 23,385.4 | . | 0.0 | . | . | . | . | . | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 732 | 31,776.6 | . | 0.0 | . | . | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 734 | 31,363.9 | . | 0.0 | . | . | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 736 | 24,073.2 | . | 0.0 | . | . | . | . | . | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **TOTAL** | | | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| 732-914 | 737 | 31,226.4 | . | . | . | . | . | . | . | . | . | . | 0.0 | . | . | . | . | . | . | . | . | . | | | |
| | 741 | 30,676.1 | . | . | . | . | . | . | . | . | . | . | 0.0 | . | . | . | . | . | . | . | . | . | | | |
| | 745 | 47,871.3 | . | . | . | . | . | . | . | . | . | . | 0.0 | . | . | . | . | . | . | . | . | . | | | |
| | 748 | 21,872.2 | . | . | . | . | . | . | . | . | . | . | 0.0 | . | . | . | . | . | . | . | . | . | | | |
| | 752 | 18,433.2 | . | . | . | . | . | . | . | . | . | . | 0.0 | . | . | . | . | . | . | . | . | . | | | |
| | 756 | 14,581.5 | . | . | . | . | . | . | . | . | . | . | 0.0 | . | . | . | . | . | . | . | . | . | | | |
| | 760 | 21,184.4 | . | . | . | . | . | . | . | . | . | . | 0.0 | . | . | . | . | . | . | . | . | . | | | |
| | 764 | 14,443.9 | . | . | . | . | . | . | . | . | . | . | 0.0 | . | . | . | . | . | . | . | . | . | | | |
| | 772 | 18,570.8 | . | | . | . | . | . | . | . | . | . | 0.0 | . | . | . | . | . | . | . | . | . | | | |
| **TOTAL** | | | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Biomass ('000t)** | | | **217.7** | **146.8** | **138.2** | **124.6** | **81.0** | **103.8** | **103.1** | **93.4** | **61.4** | **93.3** | **55.6** | **70.6** | **175.6** | **174.9** | **202.2** | **365.7** | **287.0** | **366.0** | **199.5** | **386.5** | **307.9** | **388.8** | **503.8** |
| **Upper C.I.** | | | **276.2** | **175.3** | **179.7** | **159.5** | **103.0** | **141.4** | **137.5** | **121.8** | **91.5** | **143.7** | **92.2** | **100.9** | **210.8** | **231.3** | **254.9** | **440.2** | **342.2** | **516.6** | **252.2** | **445.2** | **372.4** | **463.8** | **597.0** |
| **Lower C.I.** | | | **159.3** | **118.3** | **96.7** | **89.6** | **59.0** | **66.1** | **68.8** | **65.0** | **31.3** | **42.8** | **19.0** | **40.3** | **140.4** | **118.6** | **149.6** | **291.2** | **231.8** | **215.3** | **146.8** | **327.8** | **243.3** | **313.7** | **410.7** |

**Table 4. Biomass ('000t) of Yellowtail Flounder by stratum, Div 3LN0-Fall**

| Depth Range (m) | Stratum | No. of trawlable Units | 1990 *WT 101,102* | 1991 *WT 113-115* | 1992 *WT 128-130 GA 226* | 1993 *WT 144-146* | 1994 *WT 160-162* | 1995 *WT 176-179,181 TEL 22,23* | 1996 *WT196-98,200 TEL41,42;AN 253* | 1997 *WT212-216 TEL57,58* | 1998 WT 229-33 TEL 75,76 | 1999 WT 244-48 | 2000 WT319-23 TEL338-43 | 2001 *WT372-76TEL 357-61 AN399* | 2002 *WT427-31 TEL411-15* | 2003 *WT 485-89,511 T2L469.513* | 2004 *WT 557-559 WT 587* | 2005 *WT627-630,632 TEL608,609,662* AN 657,658 | 2006 *WT704-707 TEL679,682-684* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 - 56 | 784 | 36,866.4 | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | . | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| **TOTAL** | | | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.1** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | |
| <=56 | 375 | 219,134.8 | 3.2 | 5.1 | . | 8.0 | 31.1 | 14.8 | 12.0 | 15.4 | 19.1 | 24.6 | 25.4 | 39.0 | 32.7 | 31.1 | 76.2 | 42.9 | 20.9 |
| | 376 | 206,204.1 | 20.1 | 10.9 | 10.8 | 31.3 | 10.2 | 24.4 | 24.2 | 32.5 | 35.9 | 37.7 | 125.2 | 123.2 | 47.4 | 57.5 | 49.9 | 122.4 | 67.0 |
| **TOTAL** | | | **23.3** | **16.0** | **10.8** | **39.3** | **41.3** | **39.2** | **36.2** | **47.9** | **55.0** | **62.3** | **150.6** | **162.2** | **80.0** | **88.6** | **126.1** | **165.3** | **88.0** |
| 57 - 92 | 330 | 287,365.1 | 0.2 | 0.0 | 0.2 | 0.5 | 0.0 | 1.1 | 0.0 | 0.8 | 0.2 | 3.6 | 0.3 | 2.8 | 1.0 | 2.2 | 1.9 | 2.3 | 1.2 |
| | 331 | 62,727.9 | 0.2 | 0.9 | 0.3 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.4 | 0.8 | 0.1 | 1.3 | 0.9 | 0.8 |
| | 338 | 261,090.9 | 1.0 | 2.0 | 0.2 | 1.1 | 0.1 | 7.2 | 0.0 | 5.7 | 2.8 | 2.8 | 6.4 | 25.9 | 0.6 | 6.5 | 0.3 | 0.9 | 9.9 |
| | 340 | 236,054.8 | 0.6 | 4.0 | 0.0 | 0.3 | 0.2 | 0.5 | 0.0 | 2.6 | 2.2 | 2.6 | 0.5 | 3.3 | 9.2 | 2.1 | 6.7 | 8.0 | 2.6 |
| | 350 | 284,889.0 | 0.8 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.3 | 1.2 | 1.7 | 2.6 | 1.6 | 0.3 | 0.4 |
| | 351 | 346,653.9 | 5.5 | 2.3 | 0.3 | 5.0 | 1.0 | 2.2 | 1.3 | 14.5 | 18.8 | 11.9 | 24.0 | 17.5 | 15.2 | 32.5 | 22.3 | 13.7 | 18.9 |
| | 352 | 354,907.6 | 7.0 | 21.0 | 18.2 | 8.3 | 9.3 | 13.7 | 15.2 | 26.5 | 28.5 | 23.5 | 36.5 | 27.1 | 22.2 | 38.6 | 26.8 | 38.1 | 15.4 |
| | 353 | 176,353.3 | 2.4 | 0.0 | 0.0 | 0.6 | 0.0 | 0.8 | 0.7 | 7.3 | 0.0 | 3.8 | 1.8 | 3.8 | 2.9 | 15.3 | 1.1 | 2.4 | 2.4 |
| | 360 | 411,582.8 | 6.7 | 8.3 | 8.0 | 24.8 | 11.2 | 16.3 | 36.8 | 47.2 | 56.1 | 60.7 | 61.0 | 42.2 | 83.8 | 71.6 | 69.3 | 37.8 | 70.8 |
| | 361 | 254,900.7 | 9.5 | 19.6 | 24.3 | 29.8 | 41.0 | 34.1 | 31.2 | 36.4 | 37.3 | 17.7 | 10.4 | 59.8 | 47.2 | 39.1 | 21.2 | 7.8 | 8.5 |
| | 362 | 346,653.9 | 6.8 | 6.4 | 1.0 | 0.3 | 1.0 | 12.1 | 8.0 | 27.6 | 18.8 | 35.1 | 17.5 | 54.8 | 33.9 | 31.7 | 36.2 | 22.1 | 23.6 |
| | 363 | 244,858.7 | 0.7 | 0.1 | 0.2 | 0.0 | 0.0 | 0.6 | 0.4 | 0.2 | 3.9 | 8.9 | 10.2 | 10.1 | 3.1 | 8.6 | 8.8 | 7.9 | 2.7 |
| | 371 | 154,206.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 |
| | 372 | 338,400.3 | 0.6 | 0.8 | 0.6 | 1.1 | 0.0 | 0.6 | 1.8 | 1.1 | 1.2 | 0.5 | 1.8 | 14.2 | 8.6 | 7.4 | 11.7 | 4.1 | 15.7 |
| | 373 | 346,653.9 | 0.2 | 0.5 | 0.0 | 0.0 | 0.9 | 1.0 | 0.0 | 4.2 | 5.4 | 6.1 | 8.1 | 41.3 | 23.0 | 17.8 | 24.4 | 14.8 | 23.0 |
| | 374 | 128,069.4 | 0.0 | 0.1 | . | 0.0 | 0.0 | 0.0 | 1.1 | 0.8 | 1.0 | 10.0 | 5.2 | 8.6 | 4.4 | 3.2 | 10.8 | 10.8 | 15.5 |
| | 383 | 92,716.2 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 |
| | 384 | 154,068.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.7 | 0.7 |
| | 785 | 63,965.9 | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| **TOTAL** | | | **42.2** | **66.1** | **53.4** | **72.3** | **64.7** | **90.2** | **96.5** | **174.9** | **176.3** | **187.5** | **184.1** | **312.9** | **257.7** | **279.2** | **244.4** | **173.6** | **211.9** |
| 93 - 183 | 328 | 208,955.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 329 | 236,742.6 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 332 | 144,026.5 | 0.1 | 0.0 | 0.1 | 1.0 | 0.4 | 0.1 | 0.2 | 0.0 | 0.0 | 0.1 | 0.1 | 0.5 | 0.9 | 0.0 | 0.4 | 0.1 | 0.2 |
| | 337 | 130,407.9 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 1.3 | 0.1 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.7 | 0.4 |
| | 339 | 80,473.2 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.2 | 0.7 | 0.4 | 0.0 | 0.1 | 0.3 |
| | 341 | 216,521.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 342 | 80,473.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 343 | 72,219.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 348 | 291,629.5 | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 349 | 290,804.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 1.9 |
| | 354 | 65,204.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 359 | 57,913.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.3 | 0.0 | 0.5 |
| | 364 | 387,509.6 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 |
| | 365 | 143,201.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 |
| | 370 | 181,580.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 |
| | 377 | 13,756.1 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 2.7 | 2.4 |
| | 382 | 89,002.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 385 | 324,093.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 390 | 203,728.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 786 | 11,555.1 | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| | 787 | 84,325.0 | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 788 | 35,903.4 | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 790 | 12,242.9 | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | . | 0.0 | |
| | 793 | 9,904.4 | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| | 794 | 29,713.2 | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 797 | 13,481.0 | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 799 | 9,904.4 | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **TOTAL** | | | **0.2** | **0.2** | **0.2** | **1.0** | **0.4** | **0.1** | **1.5** | **0.1** | **0.3** | **0.1** | **0.2** | **0.7** | **2.0** | **0.4** | **1.2** | **3.7** | **5.6** |
| 184 - 274 | 333 | 20,221.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 336 | 16,644.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 344 | 217,621.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 347 | 135,222.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 355 | 14,168.8 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 358 | 30,951.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 366 | 191,760.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 |
| | 369 | 132,196.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 |
| | 378 | 19,121.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 |
| | 381 | 25,036.1 | . | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 386 | 135,222.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 |
| | 389 | 112,937.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 391 | 38,792.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 795 | 22,560.0 | | | | | | | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **TOTAL** | | | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.1** | **0.0** | **0.0** |

**Table 4 Con'd**

| Depth Range (m) | Stratum | No. of trawlable Units | 1990 *WT 101,102* | 1991 *WT 113-115* | 1992 *WT 128-130 GA 226* | 1993 *WT 144-146* | 1994 *WT 160-162* | 1995 *WT 176-179,181 TEL 22,23* | 1996 *WT196-98,200 TEL 41,42 AN 253* | 1997 *WT 212-17 TEL 57,58* | 1998 *WT229-33 3EL 75,76* | 1999 *WT 244-48 TEL 88* | 2000 *WT319-23 TEL338-43* | 2001 *WT372-76TEL 357-61 AN399* | 2002 *WT427-31 TEL411-15* | 2003 *WT 485-89,511 T2L469.513* | 2004 *WT 557-559 WT 587* | 2005 *WT627-630,632 TEL608,609,662 AN 657,658* | 2006 *WT704-707 TEL679,682-684* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 184 - 366 | 789 | 9,904.4 | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 791 | 31,226.4 | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| | 798 | 13,756.1 | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | . | 0.0 | |
| **TOTAL** | | | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** |
| 275 - 366 | 334 | 13,205.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 335 | 7,978.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 345 | 196,987.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 346 | 118,990.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 356 | 8,391.2 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 357 | 22,560.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 368 | 45,945.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 |
| | 379 | 14,581.5 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 380 | 15,957.1 | . | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 387 | 98,768.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 |
| | 388 | 49,659.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 392 | 19,946.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 796 | 24,073.2 | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **TOTAL** | | | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** |
| 367 - 549 | 717 | 22,835.1 | 0.0 | . | . | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 719 | 10,454.6 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 721 | 10,454.6 | . | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 723 | 21,322.0 | . | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 725 | 14,443.9 | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| | 727 | 22,009.8 | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 729 | 25,586.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 731 | 29,713.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 733 | 64,378.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 735 | 37,416.6 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 |
| | 792 | 6,878.1 | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | . | 0.0 | |
| **TOTAL** | | | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** |
| 550 - 731 | 718 | 18,433.2 | . | . | . | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| | 720 | 14,443.9 | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 722 | 12,793.2 | . | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 724 | 17,057.6 | . | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| | 726 | 9,904.4 | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 728 | 21,459.5 | . | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 730 | 23,385.4 | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 732 | 31,776.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 734 | 31,363.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 |
| | 736 | 24,073.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 |
| **TOTAL** | | | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** |
| 732 - 914 | 737 | 31,226.4 | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| | 741 | 30,676.1 | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | 0.0 |
| | 745 | 47,871.3 | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | 0.0 |
| | 748 | 21,872.2 | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | 0.0 |
| | 756 | | | | | | | | | | | | | | | | | 0.0 | |
| | 760 | | | | | | | | | | | | | | | | | 0.0 | |
| | 764 | | | | | | | | | | | | | | | | | 0.0 | |
| | 768 | | | | | | | | | | | | | | | | | 0.0 | |
| | 772 | | | | | | | | | | | | | | | | | 0.0 | |
| **TOTAL** | | | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | | **0.0** | **0.0** |
| 915 -1097 | 738 | 30,401.0 | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | 0.0 |
| | 742 | 28,337.6 | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | 0.0 |
| | 746 | 53,924.0 | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | 0.0 |
| | 749 | 17,332.7 | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| | 753 | | | | | | | | | | | | | | | | | 0.0 | |
| | 757 | | | | | | | | | | | | | | | | | 0.0 | |
| | 761 | | | | | | | | | | | | | | | | | 0.0 | |
| | 765 | | | | | | | | | | | | | | | | | 0.0 | |
| | 769 | | | | | | | | | | | | | | | | | 0.0 | |
| | 773 | | | | | | | | | | | | | | | | | 0.0 | |
| **TOTAL** | | | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | | **0.0** | **0.0** |
| 1098 -1280 | 739 | 34,940.5 | . | . | . | . | . | . | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| | 743 | 29,025.4 | . | . | . | . | . | . | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | 0.0 |
| | 747 | 99,594.2 | . | . | . | . | . | . | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | 0.0 |
| | 750 | 76,484.0 | . | . | . | . | . | . | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| | 758 | | | | | | | | | | | | | | | | | 0.0 | |
| | 762 | | | | | | | | | | | | | | | | | 0.0 | |
| | 766 | | | | | | | | | | | | | | | | | 0.0 | |
| | 770 | | | | | | | | | | | | | | | | | 0.0 | |
| | 774 | | | | | | | | | | | | | | | | | 0.0 | |
| **TOTAL** | | | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | | **0.0** | **0.0** |
| 1281 -1463 | 740 | 36,316.1 | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| | 744 | 38,517.1 | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | 0.0 |
| | 751 | 31,501.5 | . | . | . | . | . | . | 0.0 | 0.0 | 0.0 | . | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| | 759 | | | | | | | | | | | | | | | | | 0.0 | |
| | 763 | | | | | | | | | | | | | | | | | 0.0 | |
| | 767 | | | | | | | | | | | | | | | | | 0.0 | |
| | 771 | | | | | | | | | | | | | | | | | 0.0 | |
| | 775 | | | | | | | | | | | | | | | | | 0.0 | |
| **TOTAL** | | | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | | **0.0** | **0.0** |
| **Biomass ('000t)** | | | **65.8** | **82.4** | **64.5** | **112.8** | **106.4** | **129.8** | **134.3** | **222.9** | **231.6** | **249.9** | **335.0** | **475.8** | **339.7** | **368.3** | **374.7** | **342.7** | **305.5** |
| **Upper C.I.** | | | **99.8** | **117.5** | **103.8** | **168.0** | **171.0** | **164.3** | **178.3** | **272.5** | **285.2** | **301.8** | **463.5** | **588.5** | **434.2** | **452.1** | **452.2** | **413.4** | **401.9** |
| **Lower C.I.** | | | **31.8** | **47.3** | **25.2** | **57.6** | **41.9** | **95.2** | **90.3** | **173.4** | **178.1** | **198.0** | **206.5** | **363.1** | **245.2** | **284.6** | **297.2** | **271.9** | **209.2** |

**Table 5 A comparison of spring and fall mean weight per tow, with upper and lower confidence limits for 3LNO combined from annual bottom trawl surveys, 1984-2006**

| SPRING | | | | FALL | | | |
|---|---|---|---|---|---|---|---|
| YEAR | MEAN | UPPER | LOWER | YEAR | MEAN | UPPER | LOWER |
| 1984 | 31.97 | 40.56 | 23.39 | 1984 | | | |
| 1985 | 14.56 | 17.38 | 11.73 | 1985 | | | |
| 1986 | 14.08 | 18.30 | 9.85 | 1986 | | | |
| 1987 | 12.72 | 16.29 | 9.15 | 1987 | | | |
| 1988 | 8.25 | 10.49 | 6.01 | 1988 | | | |
| 1989 | 10.57 | 14.41 | 6.73 | 1989 | | | |
| 1990 | 10.57 | 14.09 | 7.05 | 1990 | 6.59 | 9.99 | 3.19 |
| 1991 | 9.49 | 12.37 | 6.60 | 1991 | 8.14 | 11.60 | 4.67 |
| 1992 | 6.05 | 9.02 | 3.08 | 1992 | 6.70 | 10.79 | 2.62 |
| 1993 | 9.08 | 14.00 | 4.17 | 1993 | 11.33 | 16.88 | 5.78 |
| 1994 | 5.29 | 8.78 | 1.81 | 1994 | 10.37 | 16.66 | 4.08 |
| 1995 | 6.86 | 9.81 | 3.92 | 1995 | 12.61 | 15.97 | 9.25 |
| 1996 | 17.06 | 20.48 | 13.64 | 1996 | 11.97 | 15.89 | 8.04 |
| 1997 | 17.03 | 22.52 | 11.55 | 1997 | 19.71 | 24.09 | 15.32 |
| 1998 | 25.70 | 32.39 | 19.01 | 1998 | 19.89 | 24.48 | 15.29 |
| 1999 | 35.27 | 42.49 | 28.05 | 1999 | 23.43 | 28.28 | 18.58 |
| 2000 | 27.89 | 33.25 | 22.52 | 2000 | 28.72 | 39.74 | 17.70 |
| 2001 | 34.87 | 49.22 | 20.52 | 2001 | 40.26 | 49.80 | 30.73 |
| 2002 | 19.20 | 24.27 | 14.12 | 2002 | 28.70 | 36.69 | 20.72 |
| 2003 | 37.16 | 42.80 | 31.52 | 2003 | 34.17 | 41.94 | 26.40 |
| 2004 | 29.29 | 35.43 | 25.15 | 2004 | 38.77 | 46.79 | 30.75 |
| 2005 | 37.77 | 45.07 | 30.48 | 2005 | 30.51 | 36.80 | 24.21 |
| 2006 | 58.26 | 69.03 | 47.48 | 2006 | 27.81 | 36.58 | 19.04 |

Table 6. Number of successful sets, and depth ranges surveyed in 3LNO spring surveys, 1996-2006 (Campelen time series). Except for 47 sets carried out by *CCG Alfred Needler* in 2006, all surveys were conducted by *CCG Wilfred Templeman*. Range of dates (earliest start date each year) shown in lower panel. Reprinted from Brodie and Stansbury 2007.

| | 3L | # of inshore sets included | 3N | 3O | Tot Excl. inshore | earliest | latest |
|---|---|---|---|---|---|---|---|
| **1996** | 188 | 0 | 82 | 86 | 356 | 7-May | 27-Jun |
| **1997** | 158 | 0 | 71 | 81 | 310 | 30-Apr | 26-Jun |
| **1998** | 163 | 8 | 88 | 93 | 336 | 12-May | 30-Jun |
| **1999** | 177 | 32 | 82 | 86 | 313 | 11-May | 29-Jun |
| **2000** | 134 | 0 | 81 | 83 | 298 | 11-May | 29-Jun |
| **2001** | 154 | 12 | 79 | 79 | 300 | 29-Apr | 24-Jun |
| **2002** | 146 | 4 | 79 | 79 | 300 | 27-Apr | 22-Jun |
| **2003** | 155 | 14 | 79 | 79 | 299 | 8-May | 26-Jun |
| **2004** | 151 | 12 | 79 | 79 | 297 | 12-May | 26-Jun |
| **2005** | 133 | 0 | 78 | 79 | 290 | 9-May | 29-Jun |
| **2006** | 141 | 0 | 22 | 32 | 195 | 10-Jun | 30-Jun |
| *mean* | *154.5* | | *74.5* | *77.8* | *299.5* | | |
| *allocation 2006* | *176* | *34* | *79* | *79* | *300* | | |

Depth range (m), Campelen spring surveys 1996-2006, Div. 3LNO.

| | 3L | | 3N | | 3O | |
|---|---|---|---|---|---|---|
| | **min** | **max** | **min** | **max** | **min** | **max** |
| **1996** | 66 | 664 | 42 | 665 | 65 | 685 |
| **1997** | 60 | 681 | 35 | 689 | 62 | 669 |
| **1998** | 53 | 721 | 38 | 682 | 64 | 657 |
| **1999** | 41 | 692 | 40 | 659 | 62 | 679 |
| **2000** | 61 | 681 | 45 | 664 | 61 | 694 |
| **2001** | 34 | 695 | 40 | 650 | 74 | 699 |
| **2002** | 42 | 710 | 40 | 641 | 63 | 628 |
| **2003** | 62 | 698 | 39 | 681 | 63 | 726 |
| **2004** | 47 | 710 | 44 | 675 | 61 | 636 |
| **2005** | 64 | 672 | 45 | 691 | 66 | 719 |
| **2006** | 60 | 701 | 46 | 77 | 64 | 103 |

Date range, Campelen spring surveys 1996-2006, Div. 3LNO.

| | 3L | | 3N | | 3O | |
|---|---|---|---|---|---|---|
| | **1'st set** | **last set** | **1'st set** | **last set** | **1'st set** | **last set** |
| **1996** | 30-May | 27-Jun | 22-May | 30-May | 7-May | 22-May |
| **1997** | 4-Jun | 26-Jun | 18-May | 4-Jun | 30-Apr | 17-May |
| **1998** | 6-Jun | 30-Jun | 24-May | 4-Jun | 12-May | 30-May |
| **1999** | 6-Jun | 29-Jun | 19-May | 7-Jun | 11-May | 28-May |
| **2000** | 3-Jun | 29-Jun | 23-May | 9-Jun | 11-May | 5-Jun |
| **2001** | 26-May | 24-Jun | 14-May | 6-Jun | 29-Apr | 13-May |
| **2002** | 29-May | 22-Jun | 13-May | 29-May | 27-Apr | 14-May |
| **2003** | 4-Jun | 26-Jun | 18-May | 4-Jun | 8-May | 15-May |
| **2004** | 4-Jun | 26-Jun | 24-May | 8-Jun | 12-May | 24-May |
| **2005** | 11-Jun | 29-Jun | 22-May | 19-Jun | 9-May | 22-May |
| **2006** | 10-Jun | 29-Jun | 27-Jun | 29-Jun | 25-Jun | 30-Jun |

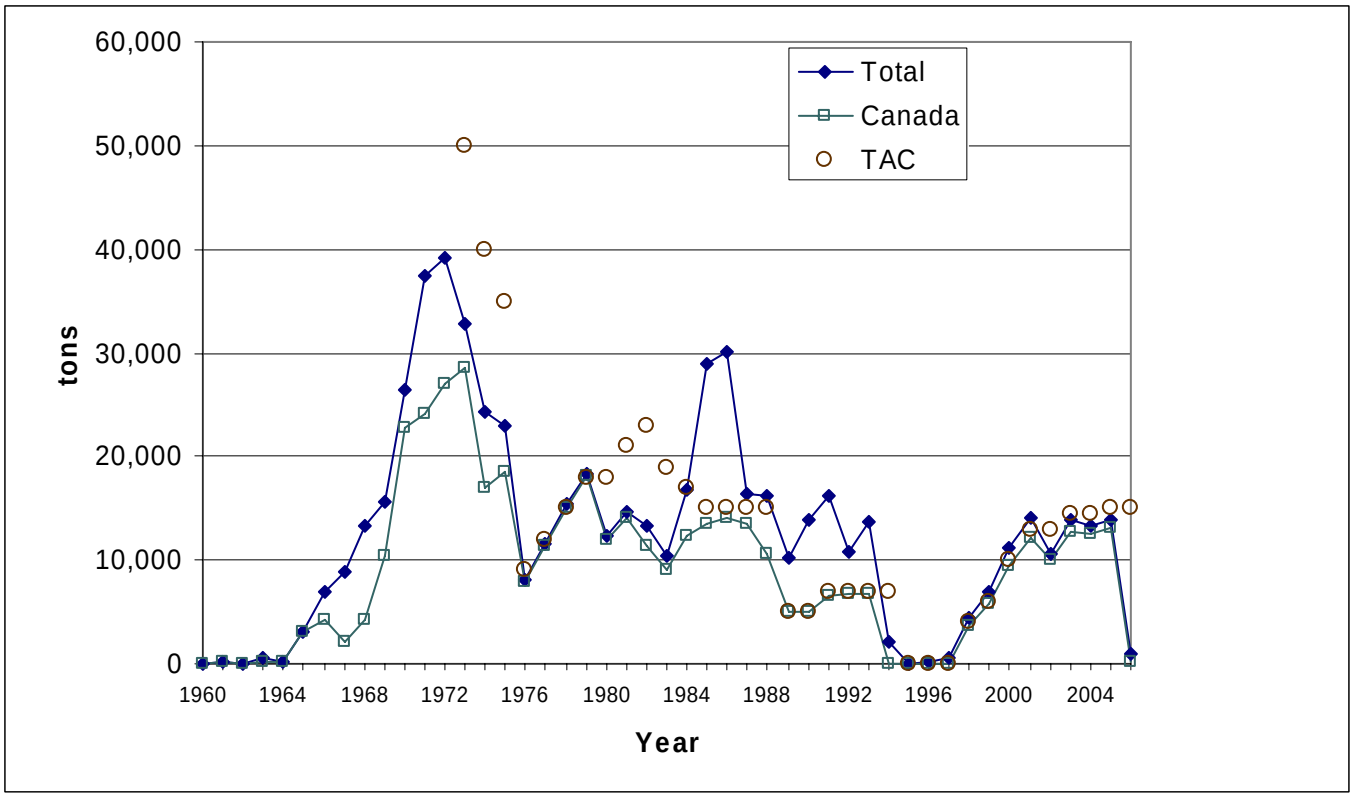


Fig. 1 . Nominal landings and TACs for yellowtail flounder fishery on the Grand Bank, NAFO Divisions3LNO

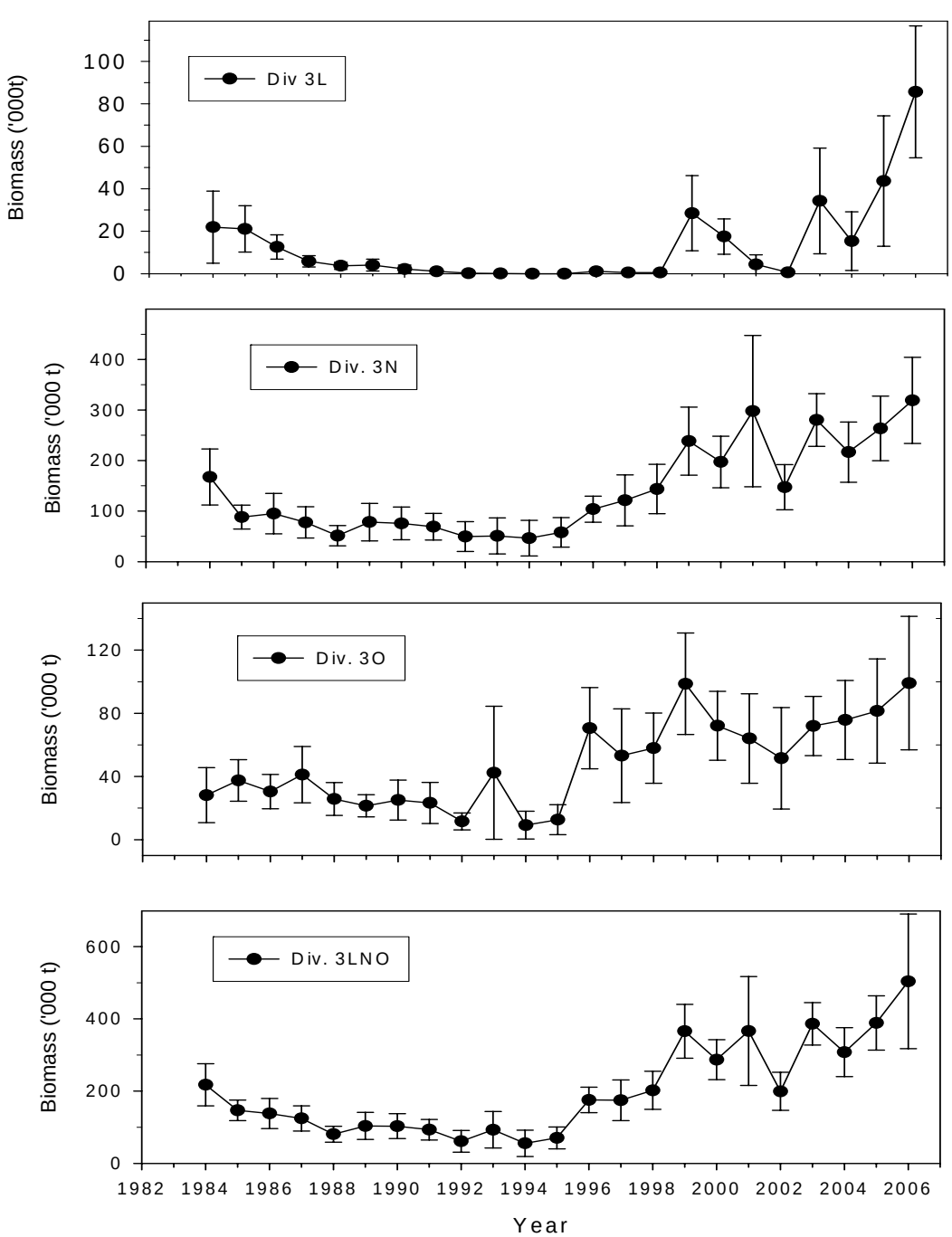


Fig. 2 Biomass of yellowtail flounder (with approx. 95%CI) by Division and cumulative biomass for Div. 3LNO from Canadian Spring surveys, 1984-2006.

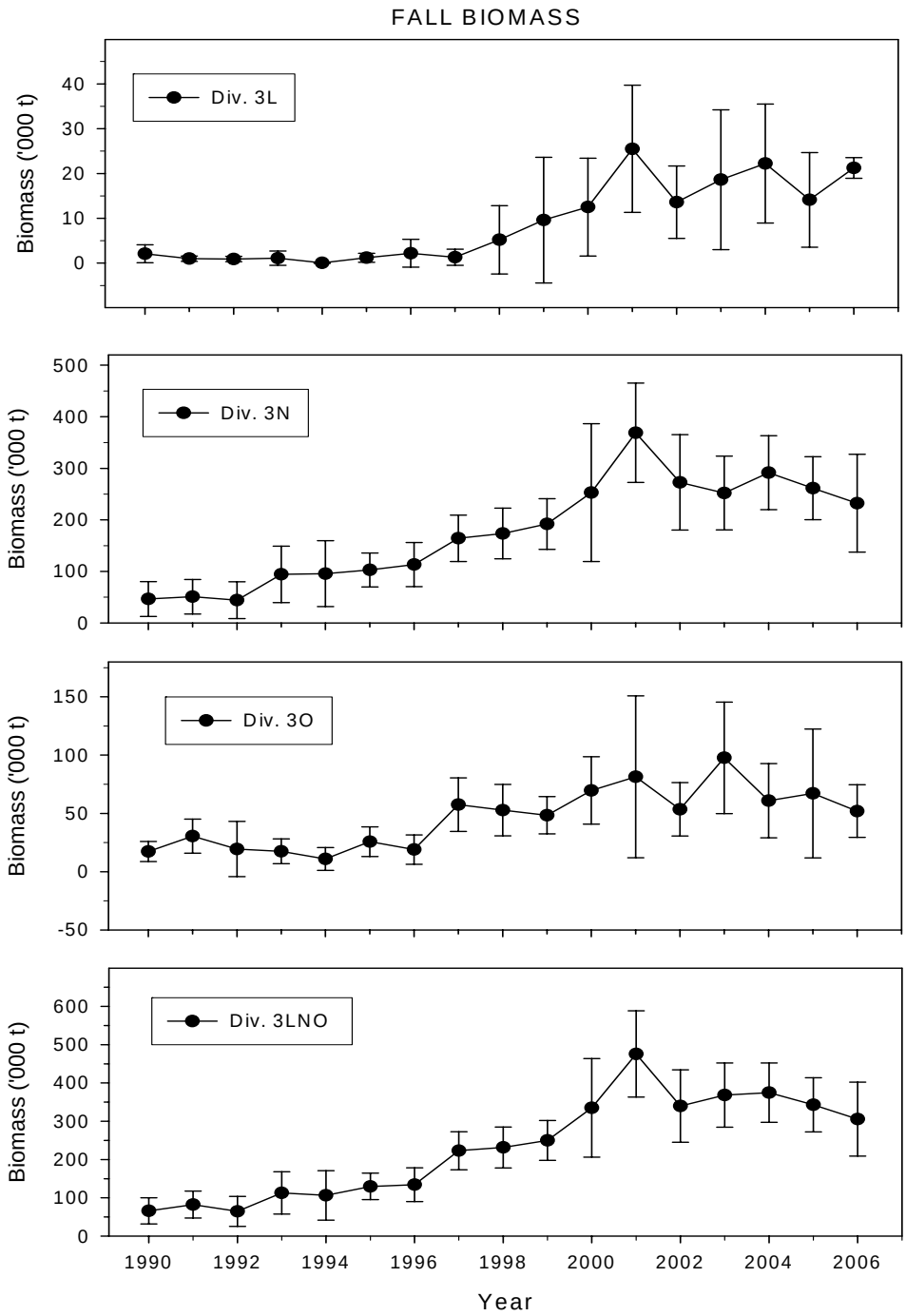


Fig. 3. Biomass estimates (with approx. 95%CI) by Division and cumulative biomass for Div. 3LNO (lower panel) of yellowtail flounder from the Canadian fall surveys from 1990-2006.

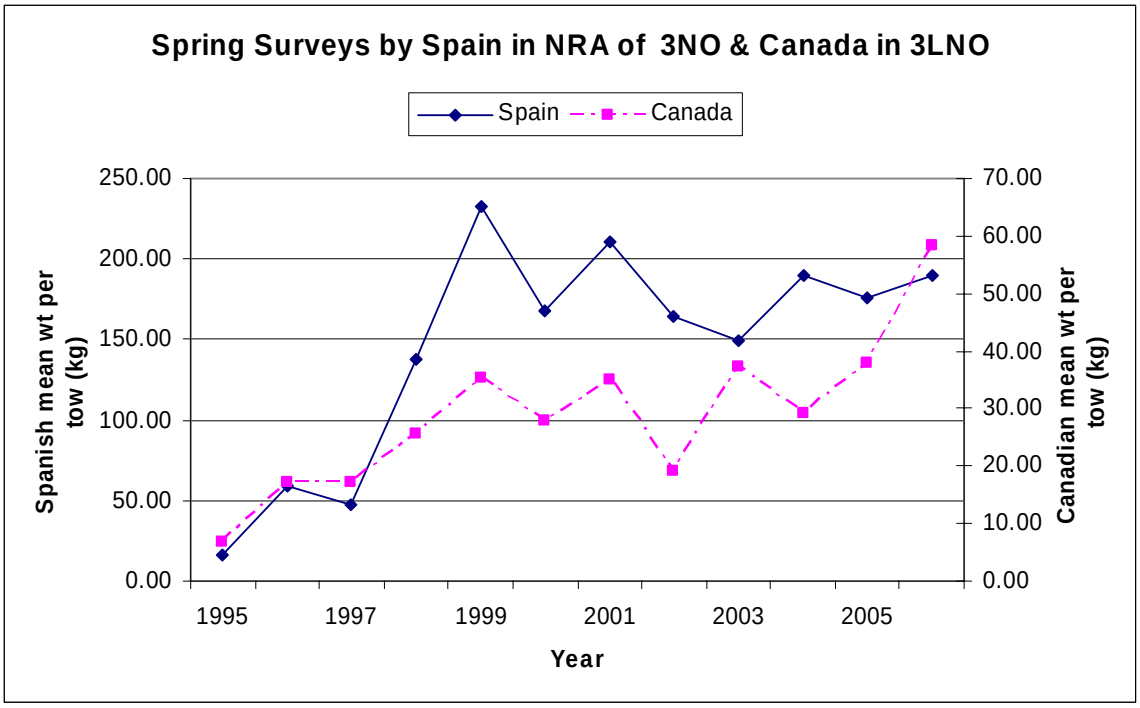


Fig.4 Comparison of survey mean weight per tow (kg) from Canadian and Spanish surveys for yellowtail flounder on the Grand Bank.

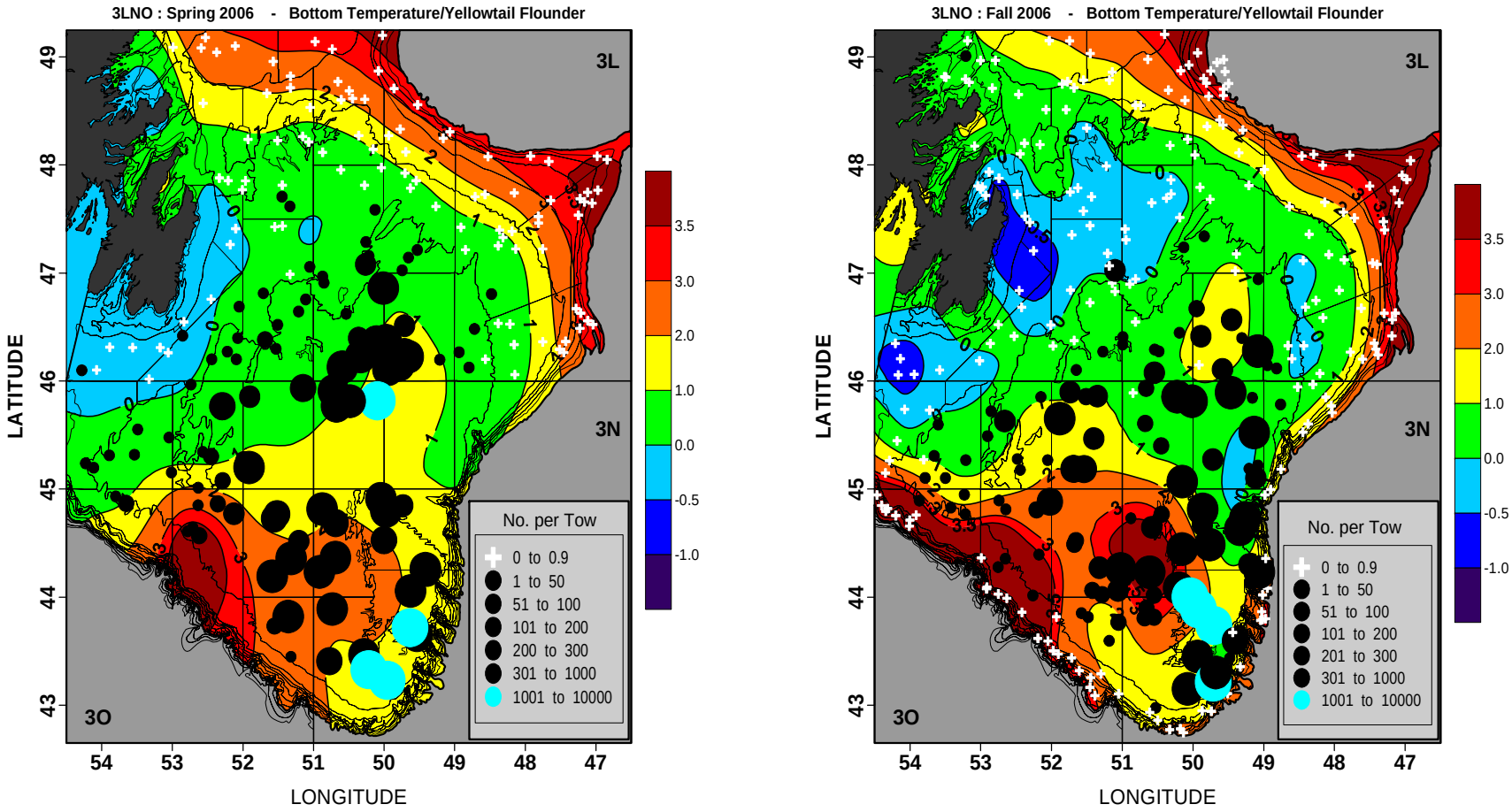


Fig. 5. Yellowtail flounder (number per tow) in Div 3LNO from the 2006 spring and fall surveys survey temperatures overlaid for the same time period. "+ (crosses) indicate zero catches.

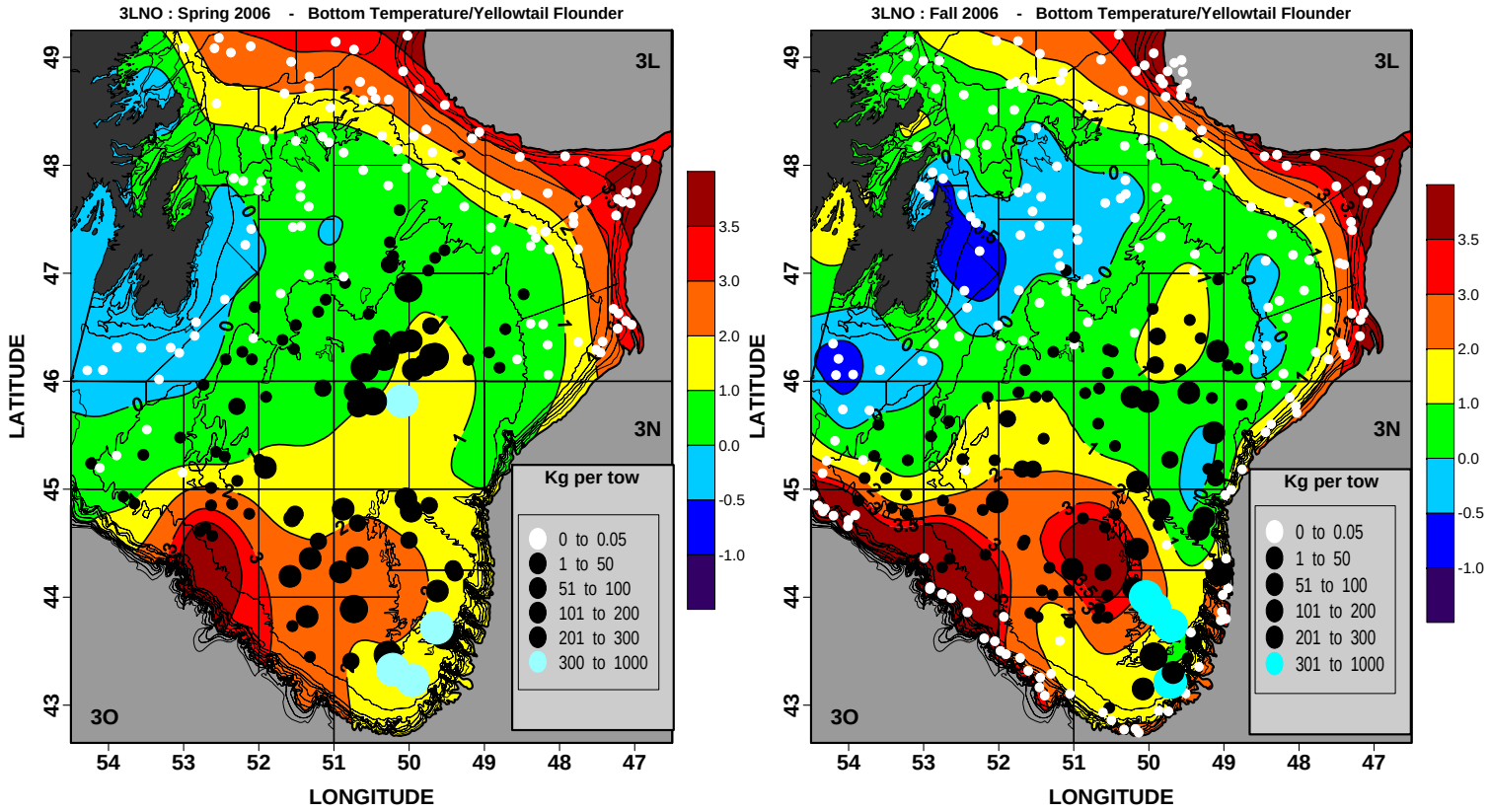


Fig. 6. Yellowtail flounder (weight per tow) in Div. 3LN) from the spring and fall surveys for 2006 overlaid on survey temperatures for the same time period. ‘0” indicate zero catches.

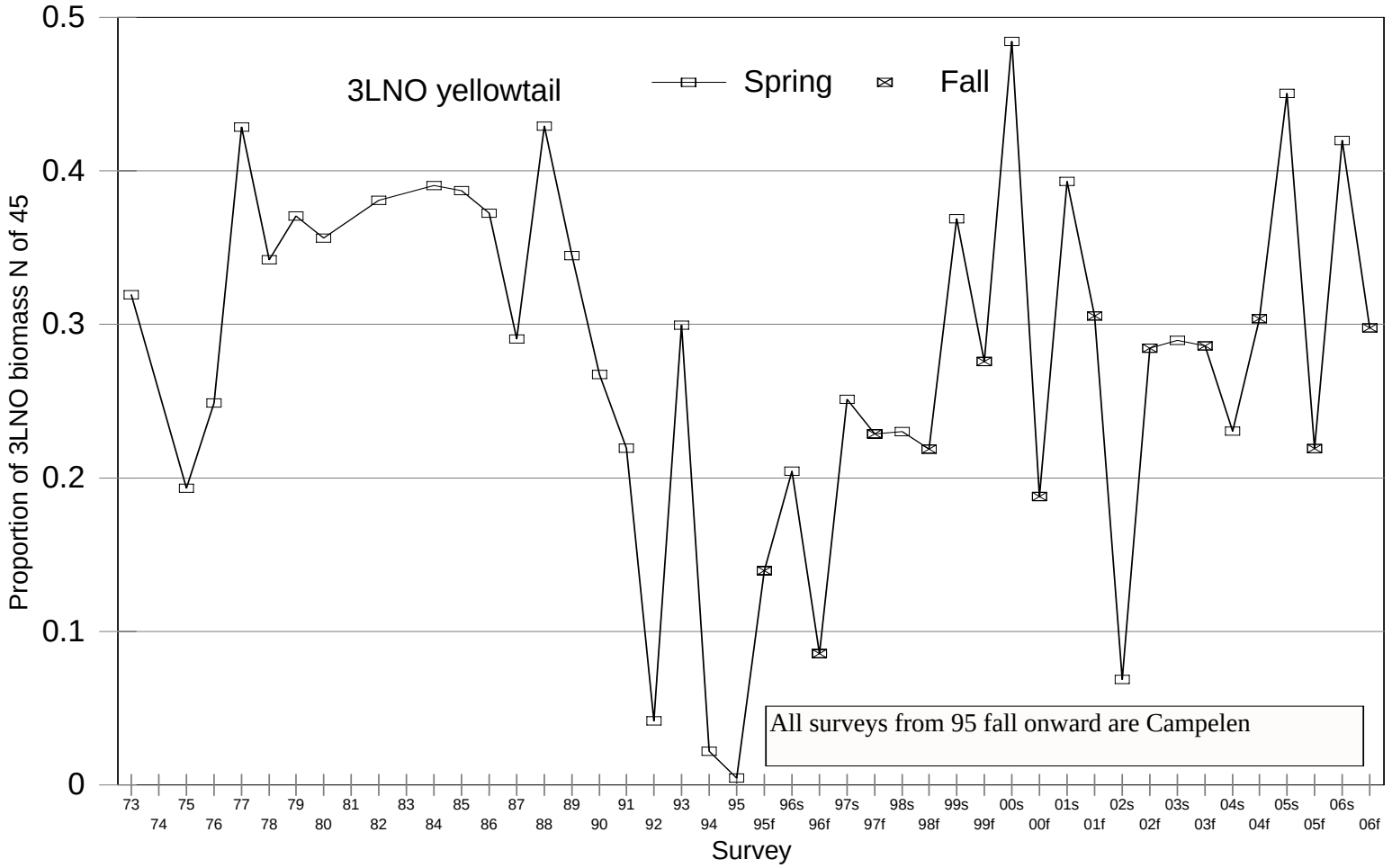


Fig. 7. Proportion of yellowtail flounder caught north of $45^0$N in Divs. 3LNO. All data up to 1995 are from spring surveys only.