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# Witch Flounder in NAFO Subdivision 3Ps

# Plie grise de la sous-division 3Ps de l'OPANO

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## Abstract

Landings from this stock over the last 20 years have fluctuated between 300t and 1000t. From 1986-1993 landings were relatively stable averaging around 1000t annually. During the past five years landings averaged just over 500 t but were as low as 250t in 1996. The main directed fishery is prosecuted by offshore otter trawlers complemented by a nearshore Danish seine fishery. However, in recent years it appears to be a mixed American plaice and witch flounder fishery by otter trawlers. During 2000-2003 American plaice catch rates in the otter trawl directed witch flounder fishery ranged from 72-143% of the witch catch, compared to less than 6% by Danish seiners. In 2004 by-catch of American plaice in the otter trawl component of this fishery declined to about 50%. Although survey stock size indices since 1983 have been highly variable, the survey biomass index during recent years suggests that the biomass is on average about 75% of the 1983-1990 average when catches were around 800t. The age and size structure observed in this stock since the early 1980s also appear to have remained stable with little change in growth pattern. Geographic distribution has not changed appreciably since 1983 except during the early to mid 1990s when fish disappeared from the 83-193m depth zone coincident with extremely cold sea bottom water temperatures. In recent years the distribution appears to be returning to a more normal pattern. No measurable change in recruitment has been observed over the past 20 years.

## Résumé

Au cours des vingt dernières années, les débarquements annuels de plies grises appartenant à ce stock ont varié entre 300 et 1 000 t. De 1986 à 1993, ils étaient relativement stables et se chiffraient en moyenne à environ 1 000 t. Au cours des cinq dernières années, ils ont été en moyenne légèrement supérieurs à 500 t, mais ont atteint seulement 250 t en 1996. La principale pêche dirigée est effectuée par des chalutiers à panneaux hauturiers, et complétée par une flottille côtière de senneurs danois. Cependant, au cours des dernières années, il semble que les chalutiers à panneaux aient effectué une pêche mixte de la plie canadienne et de la plie grise. En effet, de 2000 à 2003, les taux de prises accidentelles de plie canadienne au cours de la pêche dirigée de la plie grise au chalut à panneaux ont varié entre 72 et 143 %, comparativement au taux de moins de 6 % pour la pêche par les senneurs danois. En 2004, le taux de prises accidentelles de plie canadienne des chalutiers à panneaux au cours de cette pêche a diminué d’environ 50 %. En dépit du fait que les indices de l'effectif du stock ont été très variables depuis 1983, les indices de biomasse des dernières années portent à croire que la biomasse se chiffre en moyenne à environ 75 % de la moyenne pour la période de 1983 à 1990, lorsque les prises atteignaient environ 800 t. Les structures d'âge et de taille pour ce stock semblent également stables depuis le début des années 1980, sans changement notable en ce qui concerne la croissance. La répartition géographique a peu varié depuis 1983, sauf au cours de la première moitié des années 1990 quand le poisson a disparu de la zone située entre 83 et 193 m de profondeur, lorsque les eaux de fond étaient extrêmement froides. Depuis quelques années, la répartition semble redevenir plus normale. Le recrutement n'a pas varié de manière notable au cours des vingt dernières années.

## Commercial Fishery

*Description of the fishery*

The first total allowable catch (TAC) was established for this stock in 1974 at 3000 tons, which remained in effect until 1988 when it was reduced to 1000 tons (Fig. 1). It was further reduced to 500 tons in 1996 and 1997 but was increased again to 650 tons for 1998 and has remained at that level since then.

Catches of witch flounder in NAFO Subdivision 3Ps (Table 1; Fig. 1) ranged between about 300 and 1000 t annually since the early 1970's when the catch was reported to be over 4200 tons. From 1986-93, annual catches were relatively stable averaging around 1000 tons, however, since then the average annual catch has been just over 400 tons. During the 1980's the catch was primarily a by-catch of other groundfish fisheries, however, in recent years with the severe declines in other major groundfish resources, in particular, cod and American plaice, certain sectors of the fishing industry have come to depend more on catches delivered from this stock. The main participant is Canada (Newfoundland) with relatively small catches being taken by France (St. Pierre & Miquelon).

Catches have been taken primarily by Canadian (Newfoundland) trawlers (Table 2; Fig. 2) fishing offshore on St. Pierre Bank. Effort was usually concentrated along the deeper southwest slope of the bank in Statistical Area 3Psg and at the tail of the bank into Halibut Channel in Statistical Area 3Psh. However, during the past 10 years or so nearly all the offshore otter trawler effort for witch flounder occurs in Statistical Area 3Psh (Table 3).

The American plaice fishery in Subdivision 3Ps has been closed since 1994. Bycatches of American plaice in the witch flounder fishery often exceed 100% whereas seine catches have had very little American plaice bycatch (Table 4).

*Length Compositions*

Length frequency distributions from the Canada (Newfoundland) offshore otter trawl fishery from 1996-2005 are presented in Figure 4. Most of the annual witch flounder catches are comprised of fish in the range of 35-50 cm with modes mostly in the range of 40-42 cm. Although some small variation in the size composition was apparent for 1996-1997 virtually no variability was observed for other years.

Data available from the seine catches for 2000-2004 are shown in Figure 5. Most of the distributions from the seine fishery for witch flounder show sizes ranging from 30-42cm with modes around 33-38 cm. The 2000 data were more similar to the otter trawl data, with most fish in the 32-46cm size range.

## Research Vessel Surveys

*Survey Biomass and Abundance Indices*

Standard stratified random bottom trawl surveys during winter-spring were conducted by Canada (N) in NAFO Subdivision 3Ps using an *Engel 145* High Rise otter trawl with bobbin footgear from 1983-1995. However, in late 1995 the standard survey gear was changed to a *Campelen 1800* shrimp trawl using rockhopper footgear. Therefore, all subsequent surveys were conducted using the new gear. Prior to the changeover, comparative fishing trials were carried out and length based conversion factors developed for the major species (witch flounder included) to allow for uninterrupted continuation of the survey time series. The details of the comparative fishing trials and development of the agreed conversion factors have been discussed in previous papers and won't be repeated here (see Bowering 1999 for witch flounder in Subdivision 3Ps). All data

presented here are based on *Engel 145* data converted to *Campelen 1800* equivalents for 1983-1995 and true *Campelen 1800* data for 1996-2004. A map showing the survey area and strata is provided in Figure 6.

The estimated abundance and biomass indices, as well as mean number and weight per tow by stratum and year, are presented in detail in Tables 5-8. Graphic illustrations of trends are shown in Figure 7 with 95% confidence limits on the research vessel survey data.

Abundance and biomass indices have been highly variable over the 20 year period examined with little in the way of discernible trends (Tables 5-8; Fig. 7). The error bars on the annual estimates are extremely large in many cases probably reflecting the patchiness of the distributions. Nevertheless, the biomass estimates during the 1990's are lower than those of the 1980's. The lowest biomass value observed occurred in 1999 but values have increased in recent years and are currently in the range of the 1980s values.

An examination of survey indices by depth zone would suggest that up until about 1988 considerable biomass was estimated for nearly all strata surveyed in 93-183 m (51-100 fathoms) (Table 6). However, during 1990-97 few strata at these depths had any witch flounder biomass observed in them and for those that that did it was negligible. More recently, witch flounder again appeared in higher abundance in this depth zone especially during the 1999-2000 and 2004 surveys but was lower again in 2001-2003. It is possible that the distribution shift to and from the area is related to bottom temperatures, which, for the surveys, are given in Table 9. When plotted against bottom temperature in the 93-183m depth zone (Fig. 8), the percentage of the biomass index in this zone decreases when temperatures decrease to values near or below zero. The highest proportions of the biomass seen in this zone occur when the temperatures are higher than 1 degree Celsius.

*Length Compositions*

Length (cm) frequency distributions as estimated abundance at length from the true *Campelen 1800* surveys of 1996-2005 are illustrated in Figure 9 with the <20 cm range magnified in Figure 10 to examine for potential recruitment. Witch flounder were present in all surveys from 1996-2005 up to a length of at least 50 cm with most of the abundance occurring in the range of about 20-40 cm (Fig. 9). These observations are similar to the length compositions from 1983-1995 presented in previous assessments (Bowering 1999; Bowering and Power 2002). The number of fish estimated in the smaller size range of <20 cm was highly variable and there are no distinct modes of potentially strong year-classes that could be tracked from year to year (Fig. 9). However, in some years (1998, 2000-2002 and 2005), there were higher numbers of witch flounder <10 cm estimated compared to other years since 1997 where very few were observed (Fig, 10).

*Geographic Distribution*

*Annual Spring Groundfish Surveys 1994-2005*

Distribution plots of witch flounder in Subdivision 3Ps are presented as Canadian survey catches (kg/set) for the survey years 1994-2005 (Figs. 11-12). Witch flounder are distributed rather continuously in the deeper water along the southwestern slope of St. Pierre Bank and throughout the Laurentian and Hermitage Channels. Few, if any, are caught on the shallow parts of St. Pierre Bank, Green Bank or Burgeo Bank. Recent surveys have been extended into Fortune Bay and Placentia Bay where some catches of witch flounder also have been encountered. The area of highest abundance in the offshore appears to be along the mid southwest slope of St. Pierre Bank although this is not necessarily consistent with the area of effort concentration by otter trawlers. On the other hand, the area of highest abundance in the more coastal region appears to be in the inner part of Hermitage Channel just off Hermitage Bay where the Danish/Scottish Seiner effort has concentrated. Overall, the general distribution of witch flounder does not appear

to have changed during the period shown here and is now much similar to the earlier years (Bowering 1999).

*Unit 2 Redfish Surveys*

Redfish directed surveys using stratified random design were conducted in Unit 2 (NAFO Divisions 3P and 4V) using the *Campelen 1800* survey trawl during the summers of 1994-96, 2000 and 2002. Details and distribution plots are given in Bowering and Power (2002). Since catches were evenly distributed in the survey area especially throughout the Laurentian Channel, it is likely that the Div. 3P-4V boundary is arbitrary with respect to stock boundaries.

*GEAC Fall Surveys 1998-2004*

Annual GEAC fall surveys have been conducted from 1998-2004. Biomass and abundance indices are lower than those from the DFO research vessel surveys for all years except 1999, and do not follow the same general trends (Fig. 7).

Estimates of total mortality (Z) were calculated using the abundance at age from the GEAC survey for ages 6-13 (Fig. 13). Ages 6-8 show negative mortalities which are likely dure to those ages not being fully recruited to the survey. The older ages, particularly ages 12 and 13, show high total mortality.

Abundance at age from the GEAC surveys (Fig. 14) also show that witch flounder are fully recruited to the survey gear at around age 9 and then are rapidly lost from the survey.

## Summary

The average annual catch during the 1996-2004 period is about 470 tons, approximately 60% of the 1983-90 average of 800 tons.

The mean biomass index for 1996-2005 is about 79% of the 1983-90 period.

The biomass index reached its lowest point in 1999 but has been increasing since then.

Length frequency distributions indicate little appreciable change in the size composition of the population at least over the past 20 years.

No indications of any measurable change in recruitment over the same 20 year period.

Although relatively low in abundance the population is widely distributed and continuous throughout subdivision 3Ps beyond the 50 fathom contour and into the deeper waters of neighbouring NAFO Divisions (3Pn; 4Vs; 4Vn).

## References

Bowering, W.R. and D. J. Power. 2002. Observations on the witch flounder population in NAFO Subdivision 3Ps from the commercial fishery and research vessel survey data. DFO Can. Sci. Advis. Sec. Res. Doc. 2002/099, 34p.

Bowering, W.R. 1999. Stock status of witch flounder in NAFO Subdivision 3Ps. DFO Can. Sci. Advis. Sec. Res. Doc. 1999/144, 31p.

Table 1. Landings of witch flounder in subdivision 3Ps by country during 1974-2005.

| | CAN-MQ | CAN-N | FRA-SP | E/PRT | USSR | E/FRA-M | CAN-M | Total Catch | TAC |
|---|---|---|---|---|---|---|---|---|---|
| 1974 | 94 | 1605 | 47 | 40 | | | | 1786 | 3000 |
| 1975 | 187 | 1183 | 41 | 13 | 4 | | | 1428 | 3000 |
| 1976 | 40 | 826 | 32 | 2 | 3 | | | 903 | 3000 |
| 1977 | 219 | 3973 | 55 | | | | | 4247 | 3000 |
| 1978 | 23 | 978 | 6 | | | | | 1007 | 3000 |
| 1979 | | 756 | 8 | | | 17 | 73 | 854 | 3000 |
| 1980 | | 790 | 20 | | | | 31 | 841 | 3000 |
| 1981 | | 412 | 53 | | | | 4 | 469 | 3000 |
| 1982 | | 419 | 56 | | | | 14 | 489 | 3000 |
| 1983 | | 256 | 125 | | | | 6 | 387 | 3000 |
| 1984 | | 327 | 34 | | | 2 | 115 | 478 | 3000 |
| 1985 | | 396 | 118 | | | 2 | 81 | 597 | 3000 |
| 1986 | | 613 | 606 | | | | 110 | 1329 | 3000 |
| 1987 | | 1131 | 71 | | | 53 | 18 | 1273 | 3000 |
| 1988 | | 475 | 53 | | | 6 | 102 | 636 | 1000 |
| 1989 | | 831 | 67 | | | | 29 | 927 | 1000 |
| 1990 | | 940 | 73 | | | | 31 | 1044 | 1000 |
| 1991 | | 1056 | 216 | | | | 59 | 1331 | 1000 |
| 1992 | | 1012 | 50 | | | | 68 | 1130 | 1000 |
| 1993 | | 956 | | | | | 17 | 973 | 1000 |
| 1994 | | 429 | | | | | 2 | 431 | 1000 |
| 1995 | | 273 | | | | | 1 | 274 | 1000 |
| 1996 | | 250 | | | | | 6 | 256 | 500 |
| 1997 | | 259 | 7 | | | | 30 | 296 | 500 |
| 1998 | | 452 | 43 | | | | 4 | 499 | 650 |
| 1999 | | 509 | 33 | | | | 18 | 560 | 650 |
| 2000 | | 332 | 7 | | | | 7 | 346 | 650 |
| 2001 | | 450 | 85 | | | | 33 | 568 | 650 |
| 2002 | | 517 | 38 | | | | 1 | 556 | 650 |
| 2003 | | 529 | 4 | | | | 8 | 541 | 650 |
| 2004 | | 543 | 37 | | | | 7 | 587 | 650 |
| 2005 | | 406 | | | | | 3 | 409 | 650 |

Table 2. Landings of witch flounder in subdivision 3Ps by gear type during 1974-2005 for Canada (N) only.

| Year | OTB | SEINES | OTHER | TOTAL | TAC |
|---|---|---|---|---|---|
| 1974 | 1409 | 177 | 19 | 1605 | 3000 |
| 1975 | 684 | 491 | 4 | 1179 | 3000 |
| 1976 | 590 | 153 | 58 | 801 | 3000 |
| 1977 | 3387 | 454 | | 3841 | 3000 |
| 1978 | 627 | 342 | | 969 | 3000 |
| 1979 | 484 | 75 | 2 | 561 | 3000 |
| 1980 | 569 | 219 | 2 | 790 | 3000 |
| 1981 | 168 | 233 | 11 | 412 | 3000 |
| 1982 | 284 | 50 | | 334 | 3000 |
| 1983 | 147 | 1 | 6 | 154 | 3000 |
| 1984 | 322 | | 3 | 325 | 3000 |
| 1985 | 198 | 175 | 3 | 376 | 3000 |
| 1986 | 285 | 297 | 31 | 613 | 3000 |
| 1987 | 879 | 217 | 35 | 1131 | 3000 |
| 1988 | 260 | 153 | 62 | 475 | 1000 |
| 1989 | 557 | 196 | 78 | 831 | 1000 |
| 1990 | 635 | 244 | 61 | 940 | 1000 |
| 1991 | 789 | 195 | 72 | 1056 | 1000 |
| 1992 | 761 | 214 | 37 | 1012 | 1000 |
| 1993 | 712 | 183 | 61 | 956 | 1000 |
| 1994 | 131 | 288 | 10 | 429 | 1000 |
| 1995 | 4 | 268 | | 273 | 1000 |
| 1996 | 77 | 172 | 1 | 250 | 500 |
| 1997 | 135 | 122 | 2 | 259 | 500 |
| 1998 | 261 | 189 | 3 | 454 | 650 |
| 1999 | 233 | 235 | 41 | 510 | 650 |
| 2000 | 154 | 166 | 11 | 331 | 650 |
| 2001 | 281 | 141 | 27 | 449 | 650 |
| 2002 | 360 | 131 | 27 | 518 | 650 |
| 2003 | 362 | 141 | 27 | 530 | 650 |
| 2004 | 364 | 141 | 37 | 542 | 650 |
| *2005 | 321 | 58 | 27 | 406 | 650 |

*Data for 2005 are preliminary to Sept 2, 2005.

Table 3. Landings of witch flounder (Canada (N)) in Subdivision 3Ps by statistical area from 1985-2005.

| | Statistical Area | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 3Psa | 3Psb | 3Psc | 3Psd | 3Pse | 3Psf | 3Psg | 3Psh |
| 1985 | 15 | 113 | | 36 | 12 | 26 | 94 | 120 |
| 1986 | 16 | 227 | 2 | 68 | 5 | 14 | 136 | 163 |
| 1987 | 49 | 151 | 1 | 52 | 7 | 44 | 236 | 539 |
| 1988 | 4 | 70 | 2 | 37 | 1 | 8 | 58 | 238 |
| 1989 | 11 | 167 | 2 | 8 | | 12 | 73 | 476 |
| 1990 | 5 | 179 | 2 | 25 | 11 | 3 | 286 | 322 |
| 1991 | 4 | 71 | 3 | 10 | | 6 | 115 | 590 |
| 1992 | 16 | 62 | | 7 | | 5 | 281 | 464 |
| 1993 | 4 | 259 | | 7 | | | 88 | 593 |
| 1994 | 7 | 317 | 3 | 1 | | | 1 | 109 |
| 1995 | 16 | 213 | 40 | 2 | | | 1 | 2 |
| 1996 | 89 | 80 | | 3 | | | | 82 |
| 1997 | 20 | 51 | | | | | 16 | 148 |
| 1998 | 122 | 64 | 7 | 2 | | | 1 | 258 |
| 1999 | 72 | 141 | 9 | 1 | 22 | | 1 | 264 |
| 2000 | 10 | 154 | 1 | 21 | | | | 144 |
| 2001 | 9 | 156 | 2 | 3 | | | 1 | 277 |
| 2002 | 29 | 122 | 16 | 11 | | | 3 | 338 |
| 2003 | 43 | 125 | 2 | 13 | | | 5 | 343 |
| 2004 | 46 | 145 | 2 | 26 | | | 6 | 318 |
| 2005 | 62 | 21 | 2 | 0 | 1 | | | 319 |

Notes:1) There are years when some of the catch has not been reported by unit area.
2) Data for 1998 to 2002 are updated from those reported in SCR 02/99

Table 4. Bycatch of American plaice in the Otter trawl and Danish seine fisheries for witch flounder in NAFO subdivision 3Ps.

| | Otter trawl fleet | | | Danish seine fleet | |
|---|---|---|---|---|---|
| | Tons of plaice | % bycatch | | Tons of plaice | % bycatch |
| 1999 | 118 | 46 | 1999 | 6 | 3 |
| 2000 | 200 | 143 | 2000 | 3 | 2 |
| 2001 | 235 | 101 | 2001 | 8 | 6 |
| 2002 | 296 | 92 | 2002 | 8 | 6 |
| 2003 | 229 | 72 | 2003 | 6 | 4 |
| 2004 | 146 | 49 | 2004 | 6 | 5 |

Table 5. Estimated Abundance (000s) of Witch Flounder (M+F) in each stratum from surveys in NAFO subdivision 3Ps from 1983-2004. (Engel 145 data converted to Campelen Units for 1983-94).

| Sum of Abundance | | YR | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Range | Str | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 WT133 | 1993 WT135 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
| <=56 | 314 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 0 | 17 | 0 | 0 | 0 |
| | 320 | 532 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 318 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 149 | 0 |
| 57-92 | 293 [3] | | | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 308 | 0 | 0 | 0 | 0 | 0 | 31 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 312 | 0 | 75 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 0 | 0 |
| | 315 | 284 | 796 | 0 | 265 | 0 | 341 | 179 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 72 | 116 | 0 | 0 | 0 | 173 | 100 |
| | 321 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 73 | 0 | 0 | 0 | 98 | 0 | 0 | 16 | 0 | 0 |
| | 325 | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 326 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 783 [1] | | | | | | | | | | | | | 0 | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 93-183 | 294 [3] | | | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 9 | 65 | 0 | 0 |
| | 297 [3] | | | | | | | | | | | | | | | | 63 | 0 | 660 | 385 | 0 | 21 | 0 | 38 | 167 |
| | 307 | 408 | 109 | 290 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 54 | 353 | 0 | 41 | 0 | 0 | 223 | 72 | 0 | 0 | 127 | 72 | 39 |
| | 311 | 0 | 414 | 55 | 5945 | 15 | 240 | 58 | 0 | 44 | 0 | 15 | 0 | 33 | 87 | 0 | 0 | 15 | 1508 | 1875 | 0 | 15 | 0 | 44 | 1242 |
| | 317 | 9779 | 16487 | 252 | 544 | 9 | 690 | 0 | 0 | 0 | 119 | 0 | 53 | 0 | 0 | 0 | 0 | 478 | 2217 | 6252 | 13 | 0 | 0 | 3664 | 199 |
| | 319 | 445 | 338 | 68 | 761 | 587 | 457 | 4010 | | 60 | 0 | 0 | 0 | 0 | 406 | 1339 | 15 | 1946 | 846 | 2320 | 2927 | 1083 | 118 | 4126 | 4822 |
| | 322 | 39 | 620 | 0 | 162 | 0 | 36 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 33 | 150 | 118 | 29 | 32 | 2254 | 1257 | 66 | 116 | 166 | 497 |
| | 323 | 1548 | 48 | 319 | 19 | 383 | 38 | 41 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 22 | 24 | 207 | 46 | 432 | 32 | 16 | 0 | 16 | 0 |
| | 324 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 68 | 0 | 0 | 0 |
| | 781 [1] | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 0 | 0 | 0 | 0 | 0 |
| | 782 [1] | | | | | | | | | | | | | 0 | 0 | | 0 | 0 | 13 | 0 | 0 | 0 | 0 | 0 | 0 |
| 184-274 | 295 [3] | | | | | | | | | | | | | | | | 661 | 1073 | 14 | 1849 | 142 | 43 | 1508 | 86 | 1107 |
| | 298 [3] | | | | | | | | | | | | | | | | 354 | 502 | 955 | 223 | 729 | 1610 | 623 | 153 | 3481 |
| | 300 [3] | | | | | | | | | | | | | | | | 371 | 2421 | 1030 | 410 | 338 | 254 | 876 | 1642 | 2284 |
| | 306 | 620 | 58 | 317 | 1114 | 144 | 43 | 134 | 0 | 922 | 115 | 58 | 29 | 86 | 100 | 1492 | 766 | 188 | 610 | 1291 | 350 | 1572 | 525 | 510 | 1015 |
| | 309 | 556 | 183 | 828 | 305 | 122 | 231 | 163 | 244 | 529 | 305 | 27 | 163 | 801 | 556 | 790 | 457 | 706 | 41 | 1112 | 81 | 163 | 640 | 814 | 977 |
| | 310 | 70 | 105 | 304 | 257 | 316 | 70 | 374 | 117 | 35 | 94 | 58 | 35 | 296 | 164 | 129 | 66 | 373 | 316 | 237 | 186 | 175 | 164 | 234 | 177 |
| | 313 | 1687 | 193 | 340 | 375 | 125 | 863 | 863 | 4142 | 340 | 1997 | 329 | 1975 | 5062 | 3007 | 898 | 295 | 1291 | 363 | 1634 | 1343 | 4188 | 4222 | 1612 | 1192 |
| | 316 | 6357 | 3874 | 4368 | 3952 | 4766 | 14975 | 5607 | 14403 | 143 | 14975 | | 9940 | 1430 | 1729 | 6071 | 11128 | 4901 | 2590 | 2093 | 7683 | 6851 | 10439 | 10758 | 1638 |
| | 318 | 1128 | 178 | | 3443 | 178 | 1870 | 76 | | 4661 | 102 | 288 | 4941 | 0 | 6548 | 719 | 311 | 825 | 201 | 687 | 2023 | 1659 | 1180 | 754 | 914 |
| | 779 [1] | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 19 | 82 | 58 | 0 | 58 | 0 | 19 | 203 |
| | 780 [1] | | | | | | | | | | | | | 0 | 0 | | 0 | 0 | 156 | 25 | 18 | 166 | 37 | 0 | 148 |
| 275-366 | 296 [3] | | | | | | | | | | | | | | | | 352 | 191 | 102 | 469 | 230 | 932 | 24 | 541 | 348 |
| | 299 [3] | | | | | | | | | | | | | | | | 1492 | 2341 | 1721 | 3292 | 2189 | 3281 | 5149 | 3339 | 1516 |
| | 705 | 957 | 429 | 912 | 1113 | 590 | 2106 | 1194 | 456 | 2133 | 1623 | 550 | 724 | 581 | 711 | 891 | 1019 | 1085 | 440 | 858 | 1621 | 3353 | 1122 | 1119 | 994 |
| | 706 | 5998 | 3372 | 2488 | 4273 | 5147 | 3536 | 2063 | 5959 | 8299 | 6626 | 2728 | 5029 | 4240 | 7350 | 3318 | 2447 | 4551 | 1855 | 2588 | 3650 | 10968 | 6519 | 6963 | 3769 |
| | 707 | 443 | 198 | | 403 | 512 | 192 | 294 | | 6141 | 2309 | 678 | 409 | 0 | 2698 | 75 | 59 | 148 | 23 | 229 | 289 | 87 | 453 | 84 | 84 |
| | 715 | 751 | 163 | | 209 | 309 | 327 | 890 | 36 | 0 | 163 | 45 | 413 | 295 | 660 | 471 | 72 | 76 | 44 | 446 | 337 | 2283 | 458 | 501 | 558 |
| | 716 | 1112 | 939 | 1691 | 4041 | 2373 | 2491 | 2892 | 3589 | 1987 | 2694 | 2002 | 1260 | 1394 | 756 | 5068 | 1598 | 2815 | 968 | 6790 | 2570 | 1823 | 5052 | 1483 | 2923 |
| 367-549 | 708 | 531 | 370 | | 628 | 370 | 121 | 853 | | 3275 | 467 | 660 | 225 | 1421 | 225 | 503 | 14294 | 193 | 29 | 160 | 104 | 83 | 69 | 447 | 135 |
| | 711 | 10724 | 7852 | 11088 | 15114 | 6459 | 5760 | 9575 | 8593 | 9452 | 17582 | 3913 | 5526 | 3063 | 7260 | 5363 | 2471 | 3446 | 3945 | 3707 | 2625 | 9609 | 7735 | 4410 | 3839 |
| | 712 | 6138 | | 14857 | 10529 | 7161 | 6922 | 7077 | 7656 | 13652 | 18498 | 4264 | 3251 | 3557 | 14911 | 8195 | 4384 | 5499 | 3067 | 3455 | 6184 | 11329 | 7352 | 6400 | 7642 |
| | 713 | 3715 | | 5472 | 6848 | 8200 | 8252 | 5668 | 7150 | 13068 | 12742 | 8870 | 3485 | 4313 | 6087 | 7036 | 6621 | 7682 | 4433 | 7336 | 7631 | 11336 | 9419 | 9185 | 11889 |
| | 714 | 2252 | | | 9140 | 5055 | 10356 | 8532 | 8712 | 12254 | 8924 | 4588 | 4932 | 2301 | 7461 | 7040 | 7394 | 6395 | 3892 | 4485 | 6446 | 9300 | 7548 | 8520 | 7053 |
| 550-731 | 709 [2] | 20 | 7 | | | | | 647 | | 1631 | | 508 | 92 | 283 | 5955 | 718 | | 1345 | 1336 | 1375 | 667 | 904 | 162 | 216 | 705 |
| 732-914 | 710 [1] | 87 | 42 | 82 | 163 | | 10 | | | 74 | | 87 | 30 | 436 | | | | | 441 | | | | | | |
| Grand Total | | 56181 | 36877 | 43730 | 69623 | 42819 | 59957 | 51189 | 61058 | 78703 | 89336 | 29668 | 42903 | 29943 | 66736 | 50401 | 56831 | 50780 | 34295 | 58647 | 51667 | 83321 | 71736 | 68238 | 61657 |

[1] These strata were added to the stratification scheme in 1994

[2] Strata 709 was redrawn in 1994 and includes the area covered by strata 710 in previous surveys. All sets done in 710 prior to 1994 have been recoded to 709.

[3] These strata were added to the stratification shceme in 1997.

Table 6. Estimated Biomass (tons) of Witch Flounder (M+F) in each stratum from surveys in NAFO subdivision 3Ps from 1983-2004. (Engel 145 data converted to Campelen Units for 1983-94).

| Sum of Biomass | | YR | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Range | Str | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 WT133 | 1993 WT135 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
| <=56 | 314 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 320 | 200 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 64 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 0 |
| 57-92 | 293 [3] | | | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 308 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 312 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 |
| | 315 | 134 | 273 | 0 | 68 | 0 | 76 | 44 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 35 | 40 | 0 | 0 | 0 | 36 | 24 |
| | 321 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| | 325 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 326 [1] | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 783 [1] | | | | | | | | | | | | | 0 | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 93-183 | 294 [3] | | | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 |
| | 297 [3] | | | | | | | | | | | | | | | | 2 | 0 | 122 | 93 | 0 | 8 | 0 | 5 | 37 |
| | 307 | 51 | 49 | 39 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 64 | 0 | 1 | 0 | 0 | 81 | 33 | 0 | 0 | 6 | 23 | 9 |
| | 311 | 0 | 139 | 27 | 1564 | 6 | 79 | 7 | 0 | 7 | 0 | 5 | 0 | 9 | 15 | 0 | 0 | 2 | 416 | 377 | 0 | 1 | 0 | 1 | 287 |
| | 317 | 3253 | 4662 | 75 | 144 | 4 | 154 | 0 | 0 | 0 | 42 | 0 | 22 | 0 | 0 | 0 | 0 | 76 | 430 | 1301 | 0 | 0 | 0 | 605 | 63 |
| | 319 | 171 | 230 | 93 | 319 | 242 | 170 | 1716 | | 21 | 0 | 0 | 0 | 0 | 93 | 618 | 8 | 829 | 265 | 548 | 884 | 468 | 2 | 1431 | 1813 |
| | 322 | 31 | 121 | 0 | 24 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 1 | 1 | 0 | 0 | 9 | 8 | 1 | 1 | 1 | 11 |
| | 323 | 791 | 30 | 285 | 14 | 165 | 30 | 35 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 1 | 24 | 2 | 0 | 0 | 0 | 0 | 0 |
| | 324 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| | 781 [1] | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 782 [1] | | | | | | | | | | | | | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 184-274 | 295 [3] | | | | | | | | | | | | | | | | 109 | 203 | 0 | 40 | 7 | 3 | 99 | 1 | 181 |
| | 298 [3] | | | | | | | | | | | | | | | | 90 | 188 | 305 | 90 | 159 | 359 | 97 | 11 | 646 |
| | 300 [3] | | | | | | | | | | | | | | | | 44 | 268 | 79 | 111 | 53 | 34 | 46 | 188 | 295 |
| | 306 | 208 | 16 | 101 | 177 | 61 | 23 | 74 | 0 | 57 | 14 | 16 | 7 | 30 | 24 | 72 | 42 | 35 | 51 | 101 | 18 | 86 | 18 | 48 | 66 |
| | 309 | 126 | 79 | 238 | 90 | 12 | 29 | 36 | 46 | 57 | 20 | 15 | 50 | 104 | 87 | 31 | 53 | 52 | 22 | 82 | 13 | 9 | 19 | 110 | 101 |
| | 310 | 34 | 65 | 128 | 138 | 51 | 33 | 117 | 77 | 9 | 7 | 29 | 5 | 63 | 22 | 11 | 11 | 40 | 90 | 31 | 34 | 42 | 31 | 23 | 31 |
| | 313 | 335 | 62 | 103 | 100 | 32 | 198 | 249 | 747 | 58 | 285 | 59 | 471 | 1244 | 623 | 158 | 47 | 248 | 78 | 412 | 246 | 602 | 880 | 280 | 270 |
| | 316 | 1598 | 1139 | 1275 | 1198 | 1260 | 3595 | 1343 | 2829 | 28 | 3124 | | 2175 | 333 | 209 | 1512 | 1802 | 857 | 619 | 359 | 1464 | 1061 | 1654 | 1978 | 298 |
| | 318 | 286 | 35 | | 1196 | 57 | 551 | 30 | | 1538 | 17 | 81 | 1462 | 0 | 1540 | 149 | 119 | 212 | 48 | 108 | 482 | 377 | 267 | 175 | 248 |
| | 779 [1] | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 5 |
| | 780 [1] | | | | | | | | | | | | | 0 | 0 | | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 1 |
| 275-366 | 296 [3] | | | | | | | | | | | | | | | | 161 | 23 | 35 | 40 | 47 | 119 | 3 | 146 | 59 |
| | 299 [3] | | | | | | | | | | | | | | | | 371 | 674 | 430 | 755 | 593 | 760 | 1121 | 629 | 265 |
| | 705 | 208 | 124 | 243 | 267 | 211 | 596 | 325 | 137 | 467 | 331 | 89 | 175 | 128 | 161 | 142 | 158 | 215 | 71 | 141 | 234 | 653 | 194 | 199 | 147 |
| | 706 | 1216 | 817 | 621 | 1067 | 1461 | 935 | 481 | 1205 | 2032 | 1482 | 764 | 1387 | 875 | 1442 | 571 | 491 | 873 | 316 | 507 | 570 | 2009 | 1285 | 1117 | 711 |
| | 707 | 117 | 44 | | 152 | 180 | 62 | 116 | | 2007 | 675 | 234 | 200 | 0 | 666 | 12 | 15 | 36 | 8 | 43 | 77 | 20 | 125 | 19 | 21 |
| | 715 | 173 | 48 | | 84 | 112 | 93 | 248 | 28 | 0 | 43 | 14 | 106 | 68 | 139 | 90 | 20 | 12 | 23 | 68 | 75 | 399 | 111 | 95 | 100 |
| | 716 | 401 | 355 | 597 | 1321 | 938 | 920 | 918 | 1042 | 519 | 708 | 528 | 366 | 304 | 208 | 1045 | 275 | 460 | 242 | 1128 | 400 | 326 | 580 | 174 | 412 |
| 367-549 | 708 | 97 | 80 | | 186 | 148 | 55 | 251 | | 1741 | 167 | 239 | 62 | 342 | 64 | 92 | 4988 | 29 | 3 | 20 | 21 | 23 | 13 | 106 | 33 |
| | 711 | 1540 | 1218 | 1517 | 2385 | 1239 | 1058 | 1572 | 1470 | 1416 | 3378 | 846 | 1119 | 492 | 1078 | 667 | 328 | 464 | 471 | 418 | 350 | 1131 | 903 | 606 | 560 |
| | 712 | 940 | | 2006 | 1556 | 1047 | 1228 | 944 | 1265 | 1946 | 3003 | 891 | 515 | 662 | 2011 | 860 | 446 | 636 | 321 | 335 | 626 | 928 | 722 | 726 | 742 |
| | 713 | 566 | | 786 | 1073 | 1769 | 1240 | 919 | 1066 | 2149 | 2113 | 1526 | 554 | 690 | 903 | 718 | 846 | 625 | 451 | 535 | 600 | 1045 | 898 | 917 | 1013 |
| | 714 | 371 | | | 2152 | 937 | 2010 | 1344 | 1580 | 2309 | 1871 | 816 | 757 | 374 | 1136 | 747 | 1130 | 702 | 412 | 476 | 798 | 1136 | 862 | 695 | 517 |
| 550-731 | 709 [2] | 3 | 2 | | | | | 137 | | 379 | | 114 | 38 | 42 | 890 | 59 | | 126 | 137 | 79 | 80 | 168 | 19 | 41 | 61 |
| 732-914 | 710 [1] | 15 | 11 | 13 | 28 | | 4 | | | 17 | | 21 | 1 | 57 | | | | | 39 | | | | | | |
| Grand Total | | 12864 | 9639 | 8147 | 15315 | 9929 | 13155 | 10907 | 11492 | 16757 | 17280 | 6285 | 9557 | 5878 | 11337 | 7564 | 11556 | 7891 | 5628 | 8283 | 7841 | 11775 | 9973 | 10402 | 9028 |

[1] These strata were added to the stratification scheme in 1994

[2] Strata 709 was redrawn in 1994 and includes the area covered by strata 710 in previous surveys. All sets done in 710 prior to 1994 have been recoded to 709.

[3] These strata were added to the stratification shceme in 1997.

Table 7. Mean Numbers per tow of witch flounder (M+F) in each stratum from surveys in NAFO subdivision 3Ps from 1983-2004. Engel 145 data converted to Campelen Units for 1983-94.

| Average of Mean_no. | | YR | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Range | Str | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 WT133 | 1993 WT135 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
| <=56 | 314 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 |
| | 320 | 2.93 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.75 | 0.00 | 0.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.82 | 0.00 |
| 57-92 | 293 [3] | | | | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 308 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 312 | 0.00 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.00 | 0.00 |
| | 315 | 2.50 | 7.00 | 0.00 | 2.33 | 0.00 | 3.00 | 1.57 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.64 | 1.02 | 0.00 | 0.00 | 0.00 | 1.52 | 0.88 |
| | 321 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.44 | 0.00 | 0.00 | 0.00 | 0.60 | 0.00 | 0.00 | 0.10 | 0.00 | 0.00 |
| | 325 | 0.00 | 0.20 | 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 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 326 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 783 [1] | | | | | | | | | | | | | 0.00 | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 93-183 | 294 [3] | | | | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 3.50 | 0.00 | 0.00 |
| | 297 [3] | | | | | | | | | | | | | | | | 3.00 | 0.00 | 31.56 | 18.43 | 0.00 | 1.00 | 0.00 | 1.83 | 8.00 |
| | 307 | 7.50 | 2.00 | 5.33 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 6.50 | 0.00 | 0.75 | 0.00 | 0.00 | 4.10 | 1.33 | 0.00 | 0.00 | 2.33 | 1.33 | 0.71 |
| | 311 | 0.00 | 9.50 | 1.25 | 136.33 | 0.33 | 5.50 | 1.33 | 0.00 | 1.00 | 0.00 | 0.33 | 0.00 | 0.75 | 2.00 | 0.00 | 0.00 | 0.33 | 34.59 | 43.00 | 0.00 | 0.33 | 0.00 | 1.00 | 28.48 |
| | 317 | 368.33 | 621.00 | 9.50 | 20.50 | 0.33 | 26.00 | 0.00 | 0.00 | 0.00 | 4.50 | 0.00 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 18.00 | 83.50 | 235.50 | 0.50 | 0.00 | 0.00 | 138.00 | 7.50 |
| | 319 | 3.29 | 2.50 | 0.50 | 5.63 | 4.33 | 3.38 | 29.63 | | 0.44 | 0.00 | 0.00 | 0.00 | 0.00 | 3.00 | 9.89 | 0.11 | 14.38 | 6.25 | 17.14 | 21.63 | 8.00 | 0.88 | 30.48 | 35.63 |
| | 322 | 0.18 | 2.88 | 0.00 | 0.75 | 0.00 | 0.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 | 0.70 | 0.55 | 0.14 | 0.15 | 10.46 | 5.83 | 0.31 | 0.54 | 0.77 | 2.31 |
| | 323 | 16.17 | 0.50 | 3.33 | 0.20 | 4.00 | 0.40 | 0.43 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.23 | 0.25 | 2.17 | 0.48 | 4.51 | 0.33 | 0.17 | 0.00 | 0.17 | 0.00 |
| | 324 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 |
| | 781 [1] | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 782 [1] | | | | | | | | | | | | | 0.00 | 0.00 | | 0.00 | 0.00 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 184-274 | 295 [3] | | | | | | | | | | | | | | | | 23.00 | 37.33 | 0.50 | 64.30 | 4.94 | 1.50 | 52.44 | 3.00 | 38.50 |
| | 298 [3] | | | | | | | | | | | | | | | | 15.06 | 21.33 | 40.61 | 9.50 | 31.00 | 68.44 | 26.50 | 6.50 | 148.00 |
| | 300 [3] | | | | | | | | | | | | | | | | 12.44 | 81.11 | 34.50 | 13.72 | 11.33 | 8.50 | 29.33 | 55.00 | 76.50 |
| | 306 | 10.75 | 1.00 | 5.50 | 19.33 | 2.50 | 0.75 | 2.33 | 0.00 | 16.00 | 2.00 | 1.00 | 0.50 | 1.50 | 2.00 | 29.89 | 15.33 | 3.77 | 12.22 | 25.85 | 7.00 | 31.48 | 10.52 | 10.22 | 20.33 |
| | 309 | 13.67 | 4.50 | 20.33 | 7.50 | 3.00 | 5.67 | 4.00 | 6.00 | 13.00 | 7.50 | 0.67 | 4.00 | 19.67 | 13.67 | 19.41 | 11.22 | 17.33 | 1.00 | 27.30 | 2.00 | 4.00 | 15.72 | 20.00 | 24.00 |
| | 310 | 3.00 | 4.50 | 13.00 | 11.00 | 13.50 | 3.00 | 16.00 | 5.00 | 1.50 | 4.00 | 2.50 | 1.50 | 12.67 | 7.00 | 5.50 | 2.83 | 15.94 | 13.50 | 10.14 | 7.94 | 7.50 | 7.00 | 10.00 | 7.56 |
| | 313 | 74.33 | 8.50 | 15.00 | 16.50 | 5.50 | 38.00 | 38.00 | 182.50 | 15.00 | 88.00 | 14.50 | 87.00 | 223.00 | 132.50 | 39.56 | 13.00 | 56.89 | 16.00 | 72.00 | 59.17 | 184.50 | 186.00 | 71.00 | 52.50 |
| | 316 | 244.50 | 149.00 | 168.00 | 152.00 | 183.33 | 576.00 | 215.67 | 554.00 | 5.50 | 576.00 | | 382.33 | 55.00 | 66.50 | 233.50 | 428.00 | 188.50 | 99.60 | 80.50 | 295.50 | 263.50 | 401.50 | 413.78 | 63.00 |
| | 318 | 66.67 | 10.50 | | 203.50 | 10.50 | 110.50 | 4.50 | | 275.50 | 6.00 | 17.00 | 292.00 | 0.00 | 369.00 | 40.50 | 17.50 | 46.50 | 11.32 | 38.72 | 114.00 | 93.50 | 66.50 | 42.50 | 51.50 |
| | 779 [1] | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.33 | 1.42 | 1.00 | 0.00 | 1.00 | 0.00 | 0.33 | 3.50 |
| | 780 [1] | | | | | | | | | | | | | 0.00 | 0.00 | | 0.00 | 0.00 | 2.82 | 0.44 | 0.33 | 3.00 | 0.67 | 0.00 | 2.67 |
| 275-366 | 296 [3] | | | | | | | | | | | | | | | | 36.06 | 19.56 | 10.44 | 48.00 | 23.50 | 95.39 | 2.50 | 55.36 | 35.64 |
| | 299 [3] | | | | | | | | | | | | | | | | 51.17 | 80.27 | 59.00 | 112.89 | 75.06 | 112.50 | 176.56 | 114.50 | 52.00 |
| | 705 | 35.67 | 16.00 | 34.00 | 41.50 | 22.00 | 78.50 | 44.50 | 17.00 | 79.50 | 60.50 | 20.50 | 27.00 | 21.67 | 26.50 | 33.20 | 38.00 | 40.44 | 16.39 | 32.00 | 60.44 | 125.00 | 41.83 | 41.72 | 37.06 |
| | 706 | 91.60 | 51.50 | 38.00 | 65.25 | 78.60 | 54.00 | 31.50 | 91.00 | 126.75 | 101.20 | 41.67 | 76.80 | 64.75 | 112.25 | 50.67 | 37.37 | 69.50 | 28.33 | 39.53 | 55.75 | 167.50 | 99.56 | 106.33 | 57.56 |
| | 707 | 34.67 | 15.50 | | 31.50 | 40.00 | 15.00 | 23.00 | | 480.00 | 180.50 | 53.00 | 32.00 | 0.00 | 265.00 | 7.40 | 5.78 | 14.50 | 2.22 | 22.50 | 28.43 | 8.50 | 44.50 | 8.28 | 8.29 |
| | 715 | 41.33 | 9.00 | | 11.50 | 17.00 | 18.00 | 49.00 | 2.00 | 0.00 | 9.00 | 2.50 | 22.75 | 16.25 | 37.50 | 26.72 | 4.06 | 4.33 | 2.50 | 25.33 | 19.11 | 129.64 | 26.00 | 28.44 | 31.67 |
| | 716 | 15.00 | 12.67 | 22.80 | 54.50 | 32.00 | 33.60 | 39.00 | 48.40 | 26.80 | 36.33 | 27.00 | 17.00 | 18.80 | 10.20 | 68.35 | 21.56 | 37.97 | 13.06 | 91.58 | 34.67 | 24.58 | 68.14 | 20.00 | 39.42 |
| 367-549 | 708 | 33.00 | 23.00 | | 39.00 | 23.00 | 7.50 | 53.00 | | 203.50 | 29.00 | 41.00 | 14.00 | 82.00 | 13.00 | 29.00 | 824.67 | 11.11 | 1.69 | 9.22 | 6.00 | 4.80 | 4.00 | 25.78 | 7.78 |
| | 711 | 81.13 | 59.40 | 83.88 | 114.33 | 48.86 | 43.57 | 72.43 | 65.00 | 71.50 | 133.00 | 29.60 | 41.80 | 23.17 | 89.00 | 65.75 | 30.29 | 42.24 | 48.36 | 45.44 | 32.18 | 117.80 | 94.82 | 54.06 | 47.07 |
| | 712 | 45.86 | | 111.00 | 78.67 | 53.50 | 51.71 | 52.88 | 57.20 | 102.00 | 138.20 | 31.86 | 24.29 | 26.57 | 148.29 | 81.50 | 43.60 | 54.69 | 30.50 | 34.36 | 61.50 | 112.67 | 73.11 | 63.65 | 76.00 |
| | 713 | 28.43 | | 41.88 | 52.40 | 62.75 | 63.14 | 43.38 | 54.71 | 100.00 | 97.50 | 67.88 | 26.67 | 33.00 | 52.00 | 60.11 | 56.56 | 65.62 | 37.87 | 62.67 | 65.19 | 96.84 | 80.46 | 78.46 | 101.56 |
| | 714 | 13.70 | | | 55.60 | 30.75 | 63.00 | 51.90 | 53.00 | 74.55 | 54.29 | 27.91 | 30.00 | 14.00 | 50.50 | 47.65 | 50.05 | 43.28 | 26.35 | 30.36 | 43.63 | 62.95 | 51.09 | 57.67 | 47.74 |
| 550-731 | 709 [2] | 1.50 | 0.50 | | | | | 49.00 | | 123.50 | | 38.50 | 7.00 | 13.00 | 294.50 | 35.50 | | 66.50 | 66.06 | 68.00 | 33.00 | 44.70 | 8.00 | 10.67 | 34.86 |
| 732-914 | 710 [1] | 17.67 | 8.50 | 16.50 | 33.00 | | 2.00 | | | 15.00 | | 17.50 | 6.00 | 18.00 | | | | | 20.57 | | | | | | |
| | Total | 23.24 | 18.54 | 20.31 | 28.96 | 17.84 | 24.94 | 21.22 | 27.52 | 32.55 | 37.23 | 12.51 | 17.69 | 11.19 | 29.84 | 20.86 | 21.12 | 18.73 | 12.55 | 21.64 | 19.06 | 30.74 | 26.46 | 25.17 | 22.75 |

[1] These strata were added to the stratification scheme in 1994

[2] Strata 709 was redrawn in 1994 and includes the area covered by strata 710 in previous surveys. All sets done in 710 prior to 1994 have been recoded to 709.

[3] These strata were added to the stratification shceme in 1997.

Table 8. Mean weight (kg) per tow of witch flounder (M+F) in each stratum from surveys in NAFO subdivision 3Ps from 1983-2004. Engel 145 data converted to Campelen Units for 1983-94.

| Average of Mean_wt. | | YR | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Range | Str | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 WT133 | 1993 WT135 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
| <=56 | 314 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 320 | 1.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.35 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.10 | 0.00 |
| 57-92 | 293 [3] | | | | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 308 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.49 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 312 | 0.00 | 0.52 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 | 0.00 |
| | 315 | 1.18 | 2.40 | 0.00 | 0.60 | 0.00 | 0.67 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.31 | 0.35 | 0.00 | 0.00 | 0.00 | 0.31 | 0.21 |
| | 321 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 325 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 326 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 783 [1] | | | | | | | | | | | | | 0.00 | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 93-183 | 294 [3] | | | | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.33 | 0.00 | 0.00 |
| | 297 [3] | | | | | | | | | | | | | | | | 0.08 | 0.00 | 5.82 | 4.44 | 0.00 | 0.38 | 0.00 | 0.23 | 1.75 |
| | 307 | 0.94 | 0.91 | 0.72 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.19 | 1.18 | 0.00 | 0.03 | 0.00 | 0.00 | 1.50 | 0.60 | 0.00 | 0.00 | 0.11 | 0.42 | 0.17 |
| | 311 | 0.00 | 3.18 | 0.62 | 35.87 | 0.13 | 1.80 | 0.16 | 0.00 | 0.15 | 0.00 | 0.11 | 0.00 | 0.20 | 0.35 | 0.00 | 0.00 | 0.04 | 9.53 | 8.64 | 0.00 | 0.02 | 0.00 | 0.02 | 6.59 |
| | 317 | 122.51 | 175.59 | 2.83 | 5.41 | 0.13 | 5.81 | 0.00 | 0.00 | 0.00 | 1.57 | 0.00 | 0.84 | 0.00 | 0.00 | 0.00 | 0.00 | 2.85 | 16.20 | 49.00 | 0.01 | 0.00 | 0.00 | 22.78 | 2.38 |
| | 319 | 1.26 | 1.70 | 0.69 | 2.36 | 1.79 | 1.26 | 12.68 | | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.69 | 4.56 | 0.06 | 6.13 | 1.96 | 4.05 | 6.53 | 3.46 | 0.01 | 10.57 | 13.40 |
| | 322 | 0.14 | 0.56 | 0.00 | 0.11 | 0.00 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.00 | 0.01 | 0.00 | 0.00 | 0.04 | 0.04 | 0.00 | 0.01 | 0.00 | 0.05 |
| | 323 | 8.27 | 0.32 | 2.98 | 0.15 | 1.72 | 0.31 | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.10 | 0.00 | 0.01 | 0.26 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 324 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 |
| | 781 [1] | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 782 [1] | | | | | | | | | | | | | 0.00 | 0.00 | | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 184-274 | 295 [3] | | | | | | | | | | | | | | | | 3.80 | 7.07 | 0.02 | 1.40 | 0.24 | 0.12 | 3.44 | 0.03 | 6.30 |
| | 298 [3] | | | | | | | | | | | | | | | | 3.83 | 8.00 | 12.98 | 3.82 | 6.75 | 15.28 | 4.11 | 0.45 | 27.45 |
| | 300 [3] | | | | | | | | | | | | | | | | 1.47 | 8.96 | 2.65 | 3.71 | 1.78 | 1.15 | 1.54 | 6.28 | 9.88 |
| | 306 | 3.61 | 0.28 | 1.75 | 3.07 | 1.06 | 0.40 | 1.28 | 0.00 | 0.99 | 0.25 | 0.28 | 0.12 | 0.52 | 0.47 | 1.44 | 0.85 | 0.70 | 1.03 | 2.02 | 0.36 | 1.73 | 0.36 | 0.95 | 1.33 |
| | 309 | 3.09 | 1.95 | 5.84 | 2.20 | 0.29 | 0.70 | 0.89 | 1.12 | 1.40 | 0.48 | 0.37 | 1.23 | 2.54 | 2.14 | 0.76 | 1.31 | 1.29 | 0.55 | 2.02 | 0.32 | 0.23 | 0.47 | 2.69 | 2.49 |
| | 310 | 1.46 | 2.78 | 5.49 | 5.90 | 2.17 | 1.41 | 4.99 | 3.30 | 0.40 | 0.29 | 1.22 | 0.23 | 2.71 | 0.96 | 0.48 | 0.45 | 1.71 | 3.84 | 1.34 | 1.44 | 1.79 | 1.33 | 0.98 | 1.33 |
| | 313 | 14.75 | 2.75 | 4.52 | 4.39 | 1.40 | 8.71 | 10.99 | 32.90 | 2.56 | 12.57 | 2.59 | 20.74 | 54.80 | 27.47 | 6.96 | 2.05 | 10.93 | 3.43 | 18.15 | 10.84 | 26.53 | 38.75 | 12.33 | 11.91 |
| | 316 | 61.45 | 43.83 | 49.03 | 46.08 | 48.45 | 138.28 | 51.64 | 108.83 | 1.06 | 120.17 | | 83.64 | 12.81 | 8.04 | 58.16 | 69.30 | 32.98 | 23.81 | 13.83 | 56.33 | 40.83 | 63.60 | 76.09 | 11.45 |
| | 318 | 16.89 | 2.05 | | 70.71 | 3.39 | 32.54 | 1.78 | | 90.89 | 1.00 | 4.80 | 86.41 | 0.00 | 86.81 | 8.38 | 6.69 | 11.93 | 2.73 | 6.09 | 27.18 | 21.25 | 15.05 | 9.88 | 14.00 |
| | 779 [1] | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 | 0.00 | 0.01 | 0.09 |
| | 780 [1] | | | | | | | | | | | | | 0.00 | 0.00 | | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.04 | 0.01 | 0.00 | 0.02 |
| 275-366 | 296 [3] | | | | | | | | | | | | | | | | 16.43 | 2.36 | 3.55 | 4.10 | 4.83 | 12.23 | 0.33 | 14.93 | 6.02 |
| | 299 [3] | | | | | | | | | | | | | | | | 12.74 | 23.10 | 14.75 | 25.89 | 20.33 | 26.08 | 38.43 | 21.58 | 9.08 |
| | 705 | 7.76 | 4.64 | 9.07 | 9.97 | 7.87 | 22.23 | 12.13 | 5.10 | 17.42 | 12.34 | 3.31 | 6.52 | 4.76 | 6.01 | 5.28 | 5.90 | 8.01 | 2.65 | 5.24 | 8.71 | 24.33 | 7.23 | 7.41 | 5.47 |
| | 706 | 18.56 | 12.48 | 9.49 | 16.29 | 22.31 | 14.28 | 7.35 | 18.40 | 31.03 | 22.63 | 11.67 | 21.18 | 13.36 | 22.02 | 8.72 | 7.49 | 13.34 | 4.82 | 7.74 | 8.71 | 30.68 | 19.62 | 17.06 | 10.86 |
| | 707 | 9.15 | 3.46 | | 11.86 | 14.06 | 4.87 | 9.10 | | 156.85 | 52.79 | 18.29 | 15.60 | 0.00 | 65.43 | 1.14 | 1.43 | 3.50 | 0.76 | 4.25 | 7.55 | 2.00 | 12.28 | 1.88 | 2.08 |
| | 715 | 9.54 | 2.67 | | 4.60 | 6.15 | 5.11 | 13.68 | 1.52 | 0.00 | 2.36 | 0.75 | 5.81 | 3.74 | 7.87 | 5.08 | 1.16 | 0.68 | 1.33 | 3.89 | 4.27 | 22.66 | 6.33 | 5.42 | 5.69 |
| | 716 | 5.41 | 4.78 | 8.05 | 17.82 | 12.65 | 12.40 | 12.39 | 14.06 | 7.00 | 9.55 | 7.12 | 4.93 | 4.10 | 2.80 | 14.10 | 3.71 | 6.20 | 3.26 | 15.22 | 5.40 | 4.40 | 7.83 | 2.35 | 5.55 |
| 367-549 | 708 | 6.05 | 4.97 | | 11.54 | 9.20 | 3.41 | 15.60 | | 108.19 | 10.38 | 14.85 | 3.84 | 19.72 | 3.68 | 5.30 | 287.78 | 1.65 | 0.18 | 1.14 | 1.20 | 1.33 | 0.73 | 6.11 | 1.91 |
| | 711 | 11.65 | 9.21 | 11.47 | 18.04 | 9.37 | 8.00 | 11.89 | 11.12 | 10.72 | 25.56 | 6.40 | 8.46 | 3.72 | 13.22 | 8.18 | 4.02 | 5.69 | 5.78 | 5.12 | 4.29 | 13.87 | 11.07 | 7.43 | 6.87 |
| | 712 | 7.03 | | 14.99 | 11.63 | 7.82 | 9.17 | 7.05 | 9.45 | 14.54 | 22.44 | 6.65 | 3.85 | 4.95 | 20.00 | 8.55 | 4.44 | 6.33 | 3.19 | 3.34 | 6.23 | 9.23 | 7.18 | 7.22 | 7.38 |
| | 713 | 4.33 | | 6.01 | 8.21 | 13.54 | 9.49 | 7.03 | 8.16 | 16.45 | 16.17 | 11.68 | 4.24 | 5.28 | 7.71 | 6.13 | 7.23 | 5.34 | 3.85 | 4.57 | 5.13 | 8.93 | 7.67 | 7.83 | 8.65 |
| | 714 | 2.26 | | | 13.09 | 5.70 | 12.22 | 8.17 | 9.61 | 14.05 | 11.38 | 4.96 | 4.61 | 2.27 | 7.69 | 5.05 | 7.65 | 4.75 | 2.79 | 3.22 | 5.40 | 7.69 | 5.84 | 4.71 | 3.50 |
| 550-731 | 709 [2] | 0.23 | 0.17 | | | | | 10.35 | | 28.71 | | 8.61 | 2.86 | 1.91 | 44.00 | 2.93 | | 6.25 | 6.78 | 3.93 | 3.98 | 8.31 | 0.93 | 2.05 | 3.03 |
| 732-914 | 710 [1] | 3.12 | 2.28 | 2.55 | 5.75 | | 0.76 | | | 3.51 | | 4.34 | 0.24 | 2.37 | | | | | 1.83 | | | | | | |
| | Total | 5.32 | 4.85 | 3.78 | 6.37 | 4.14 | 5.47 | 4.52 | 5.18 | 6.93 | 7.20 | 2.65 | 3.94 | 2.20 | 4.95 | 3.13 | 4.30 | 2.91 | 2.06 | 3.06 | 2.89 | 4.34 | 3.68 | 3.84 | 3.33 |

[1] These strata were added to the stratification scheme in 1994

[2] Strata 709 was redrawn in 1994 and includes the area covered by strata 710 in previous surveys. All sets done in 710 prior to 1994 have been recoded to 709.

[3] These strata were added to the stratification shceme in 1997.

Table 9. Temperatures from research surveys 1983-2005 by depth zones.

| | DepthZone | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| YR | <=56 | 57-92 | 93-183 | 184-274 | 275-366 | 367-549 | 550-731 | Average |
| 83 | 2.37 | 0.59 | 0.53 | 5.09 | 5.24 | 4.83 | 4.70 | 3.20 |
| 84 | 1.75 | 0.92 | 2.05 | 6.41 | 6.08 | 5.36 | 5.40 | 3.55 |
| 85 | -1.15 | -1.14 | 0.27 | 6.09 | 7.23 | 5.75 | | 3.46 |
| 86 | -0.77 | -0.92 | 0.70 | 7.35 | 6.64 | 5.63 | 5.70 | 3.37 |
| 87 | -0.92 | -0.73 | 0.11 | 5.79 | 5.54 | 4.98 | 4.20 | 2.55 |
| 88 | 0.16 | 0.33 | 0.83 | 5.95 | 5.66 | 4.70 | | 3.16 |
| 89 | -0.52 | -0.32 | 0.23 | 4.15 | 5.28 | 5.11 | 4.50 | 2.72 |
| 90 | -0.86 | -0.83 | -0.29 | 3.96 | 5.73 | 4.80 | | 2.60 |
| 91 | -0.27 | -0.48 | -0.01 | 4.13 | 5.48 | 4.91 | 4.35 | 2.73 |
| 92 | -0.86 | -0.69 | 0.16 | 5.35 | 5.41 | 4.76 | | 2.87 |
| 93W | -0.72 | -0.75 | -0.04 | 6.24 | 6.17 | 5.20 | 4.65 | 3.25 |
| 93s | -0.39 | -1.00 | -0.66 | 6.44 | 6.71 | 5.22 | 4.67 | 3.32 |
| 94 | 0.41 | -0.70 | -0.34 | 4.66 | 5.91 | 5.06 | 4.30 | 2.80 |
| 95 | 0.33 | -0.56 | 0.09 | 5.30 | 6.02 | 5.11 | 4.48 | 3.63 |
| 96 | 1.07 | 0.34 | 1.33 | 5.28 | 5.83 | 5.15 | 4.28 | 3.96 |
| 97 | 0.20 | -0.41 | 0.05 | 5.26 | 5.18 | 4.79 | 4.10 | 3.51 |
| 98 | 1.72 | 0.39 | 0.80 | 4.11 | 4.73 | 4.72 | 4.15 | 2.83 |
| 99 | 2.49 | 0.70 | 1.34 | 4.20 | 5.12 | 4.91 | 4.70 | 3.14 |
| 00 | 2.51 | 0.93 | 1.78 | 4.95 | 5.91 | 5.16 | 4.38 | 4.03 |
| 01 | 0.67 | -0.07 | 0.00 | 4.04 | 5.02 | 4.87 | 4.25 | 2.58 |
| 02 | 0.92 | -0.08 | 0.19 | 4.97 | 5.38 | 5.19 | 4.50 | 3.65 |
| 03 | -0.32 | -0.76 | -0.52 | 3.54 | 5.45 | 4.87 | 4.27 | 2.37 |
| 04 | 1.38 | 0.57 | 0.65 | 4.41 | 4.77 | 4.78 | 4.25 | 2.88 |
| 05 | 1.91 | 0.79 | 1.65 | 4.20 | 5.12 | 4.86 | 4.36 | 3.20 |
| Total | 0.57 | -0.09 | 0.52 | 4.96 | 5.60 | 5.02 | 4.44 | 3.19 |

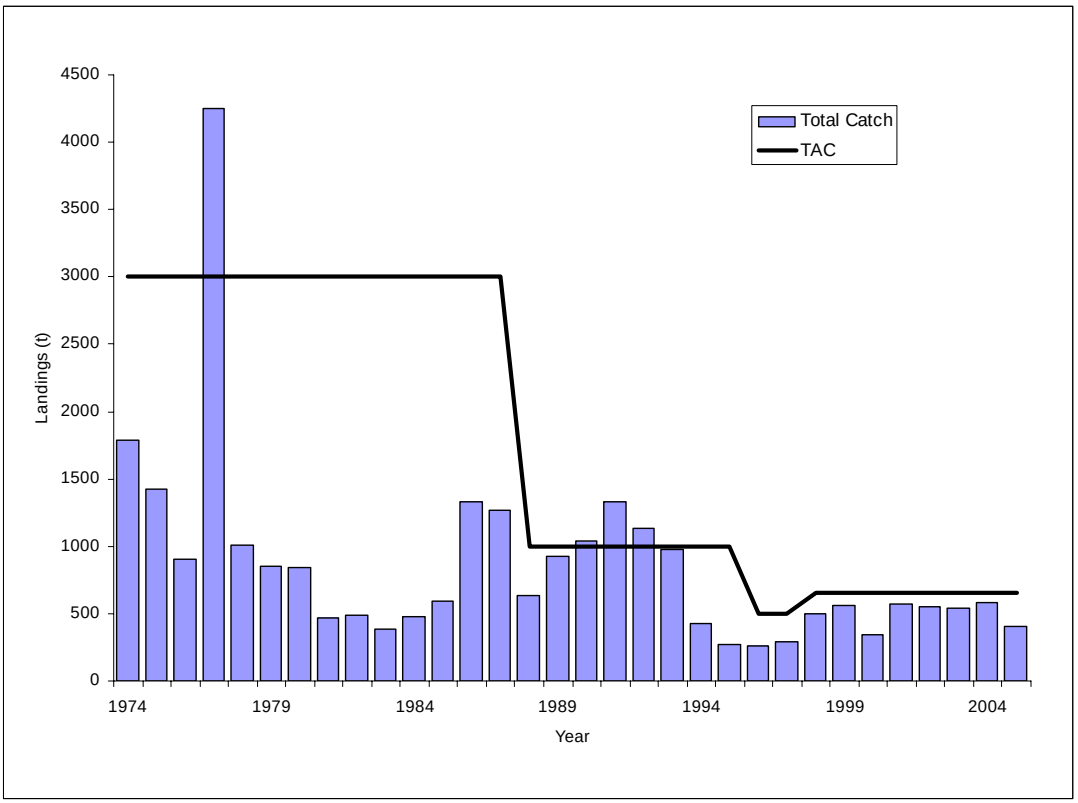


Fig. 1. Total landings and TACs of witch flounder from Subdivision 3Ps during 1974-2005 (2005 data are preliminary to Sept 2).

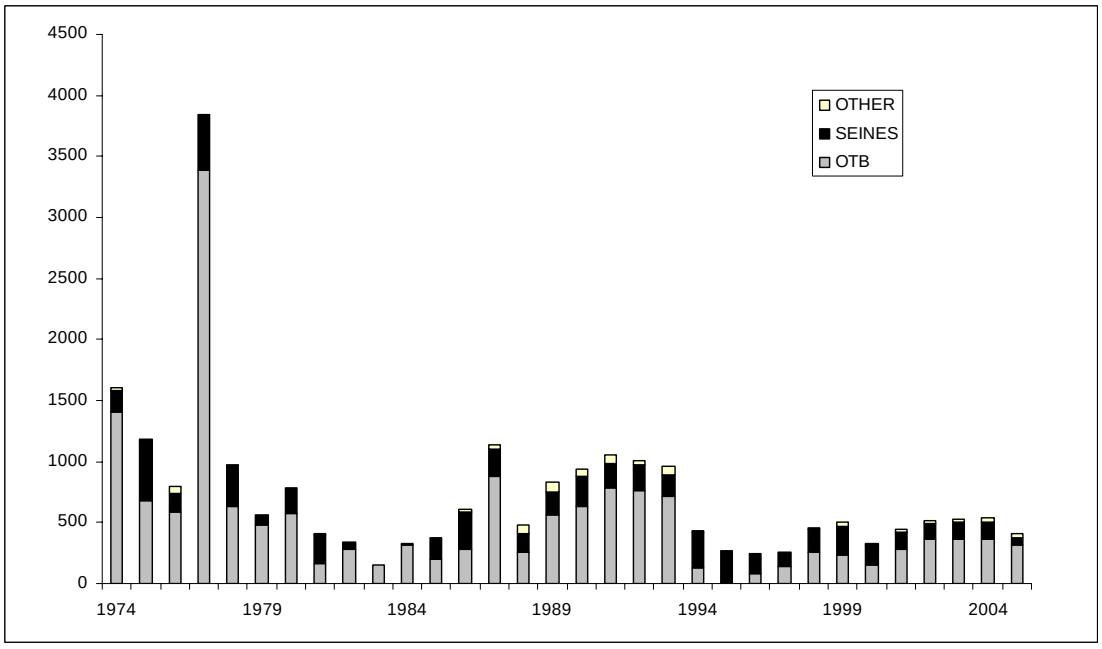


Fig 2. Landings by gear type of witch flounder by Canada (N) from Subdivision 3Ps during 1974-2005 (2005 data are preliminary to Sept 2).

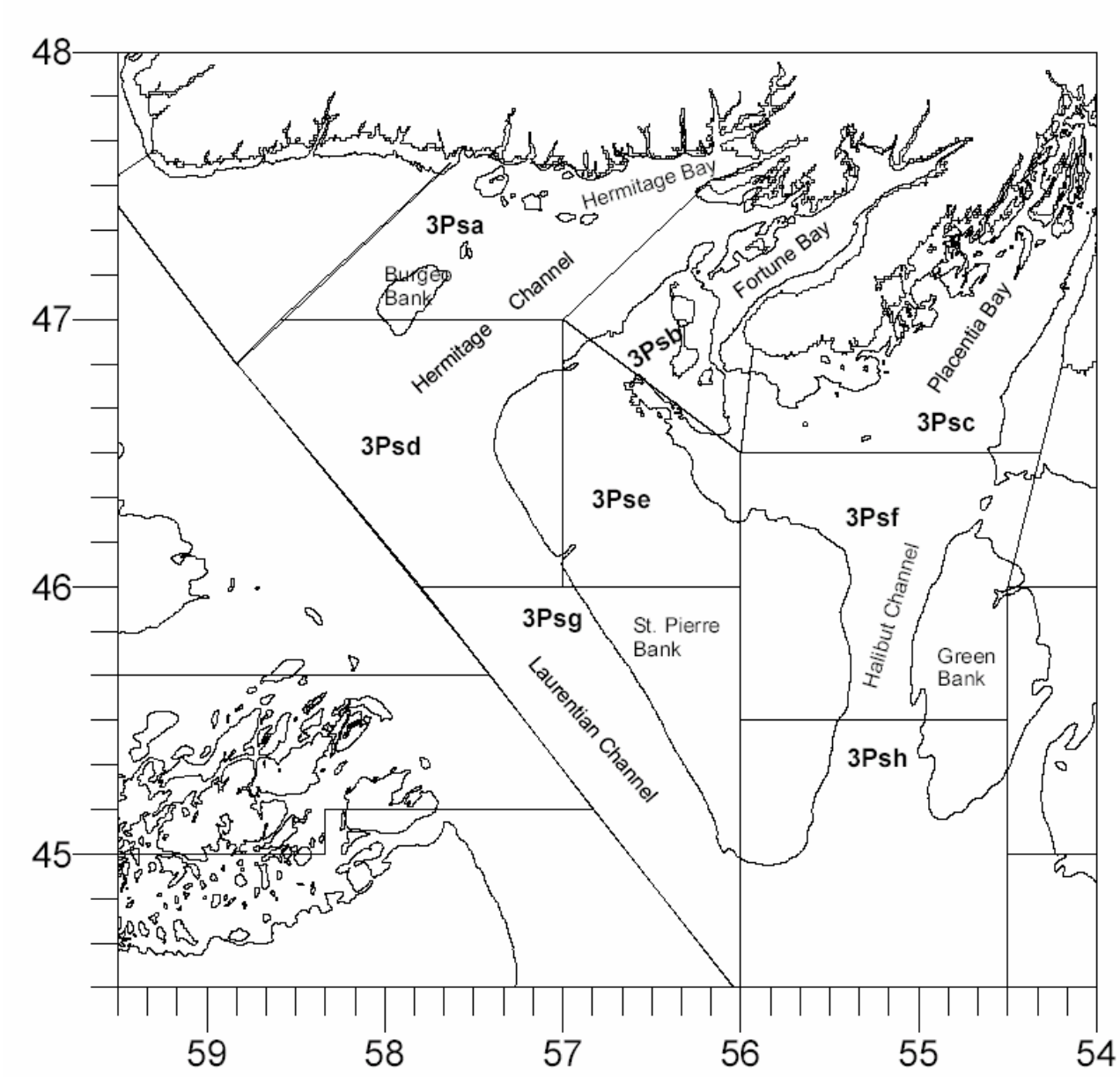


Fig. 3. Commercial catch reporting statistical area for NAFO Subdivision 3Ps.

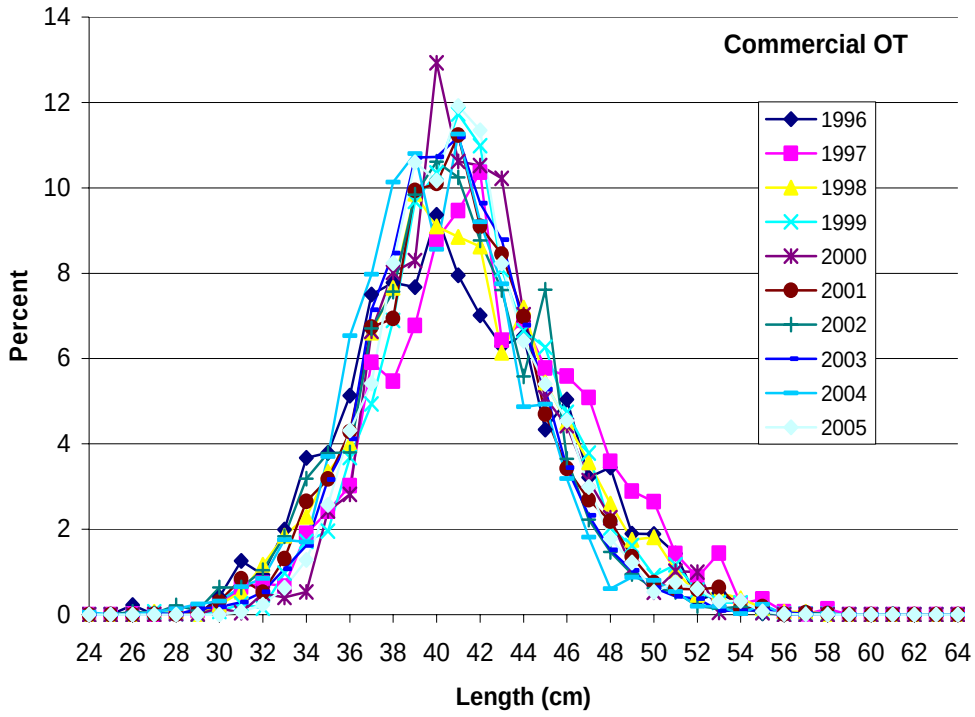


Fig. 4. Percent of witch flounder caught at length (cm) from the Canada (Newfoundland) commercial offshore otter trawl fishery in NAFO Subdivision 3Ps from 1996-2005.

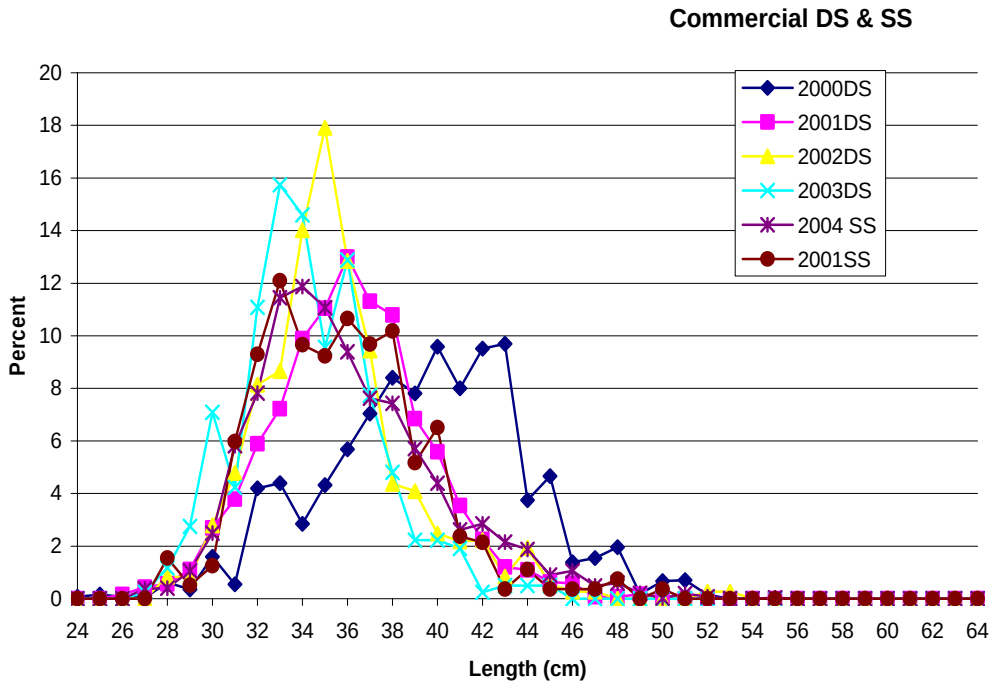


Fig. 5. Percent of witch flounder caught at length (cm) from the Canada (Newfoundland) commercial Danish Seine and Scottish Seine fishery in NAFO Subdivision 3Ps from 1996-2005.

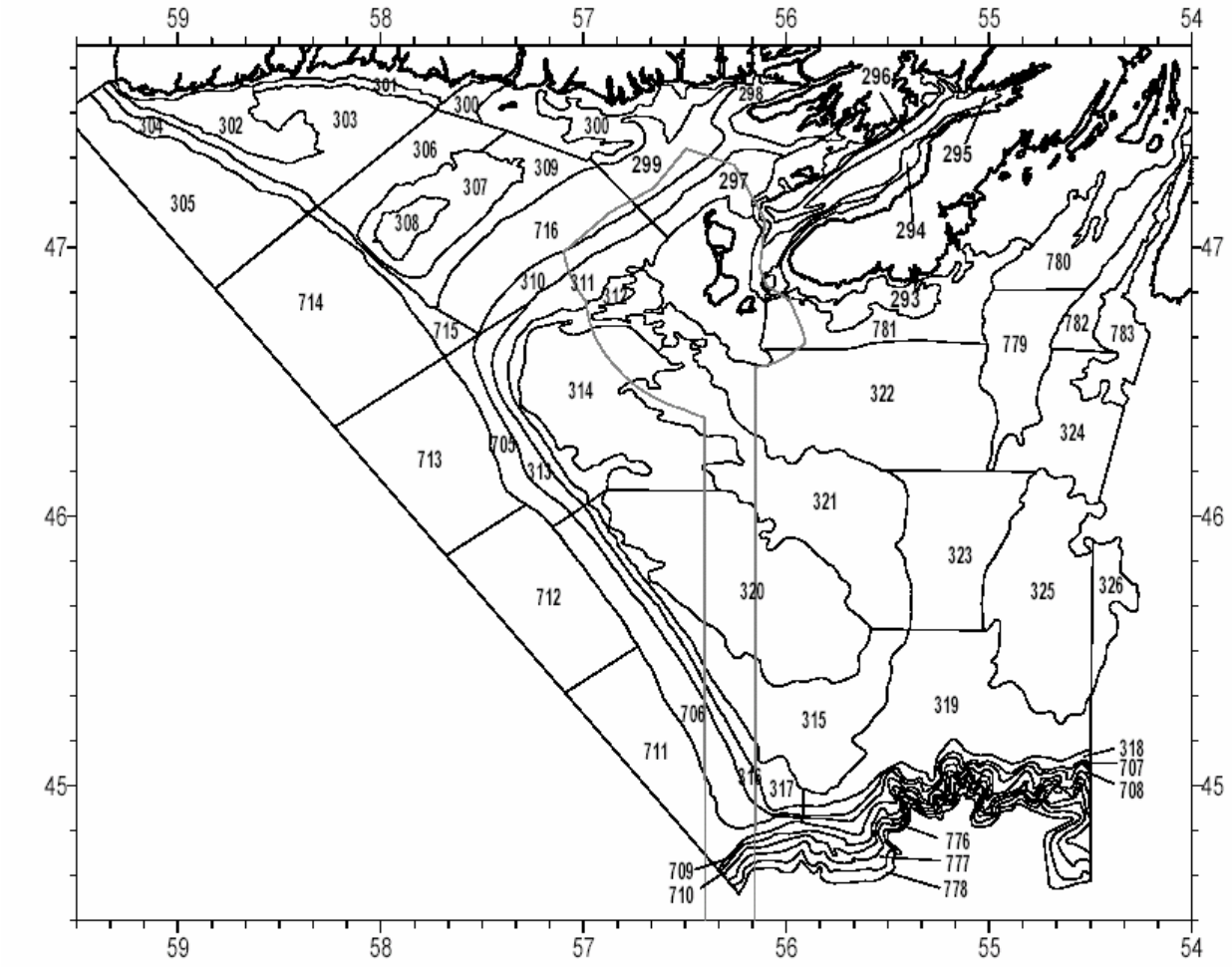


Fig. 6. The survey area in NAFO Subdivision 3Ps showing strata boundaries currently used in the spring research vessel bottom trawl surveys.

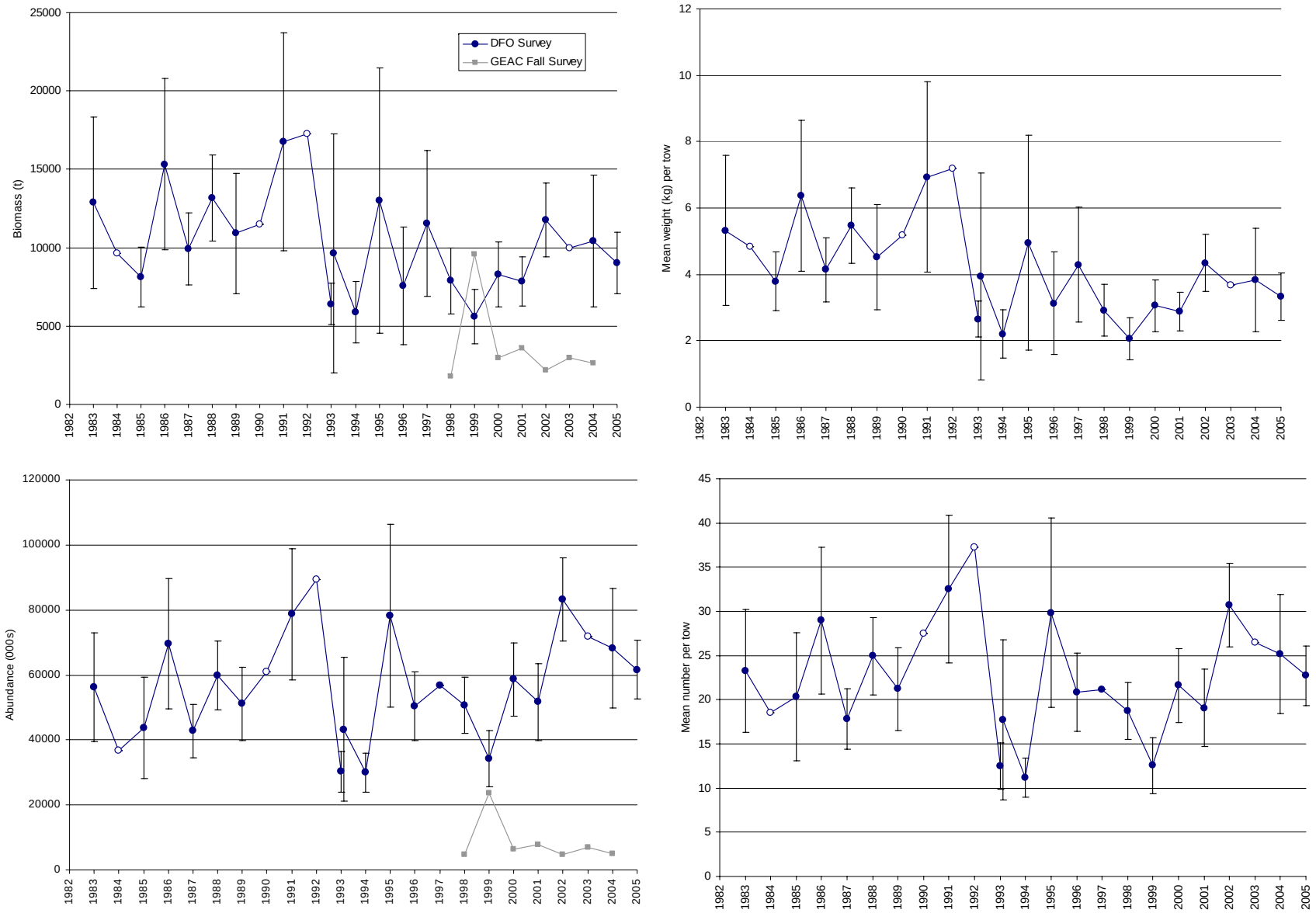


Fig. 7. Biomass (tons), abundance (000s), mean weights (kg) per tow and mean numbers per tow of witch flounder in Subdivision 3Ps from 1983 to 2005 and GEAC surveys from 1998 to 2004. Where 95% confidence limits were negative, they were omitted (hollow symbols).

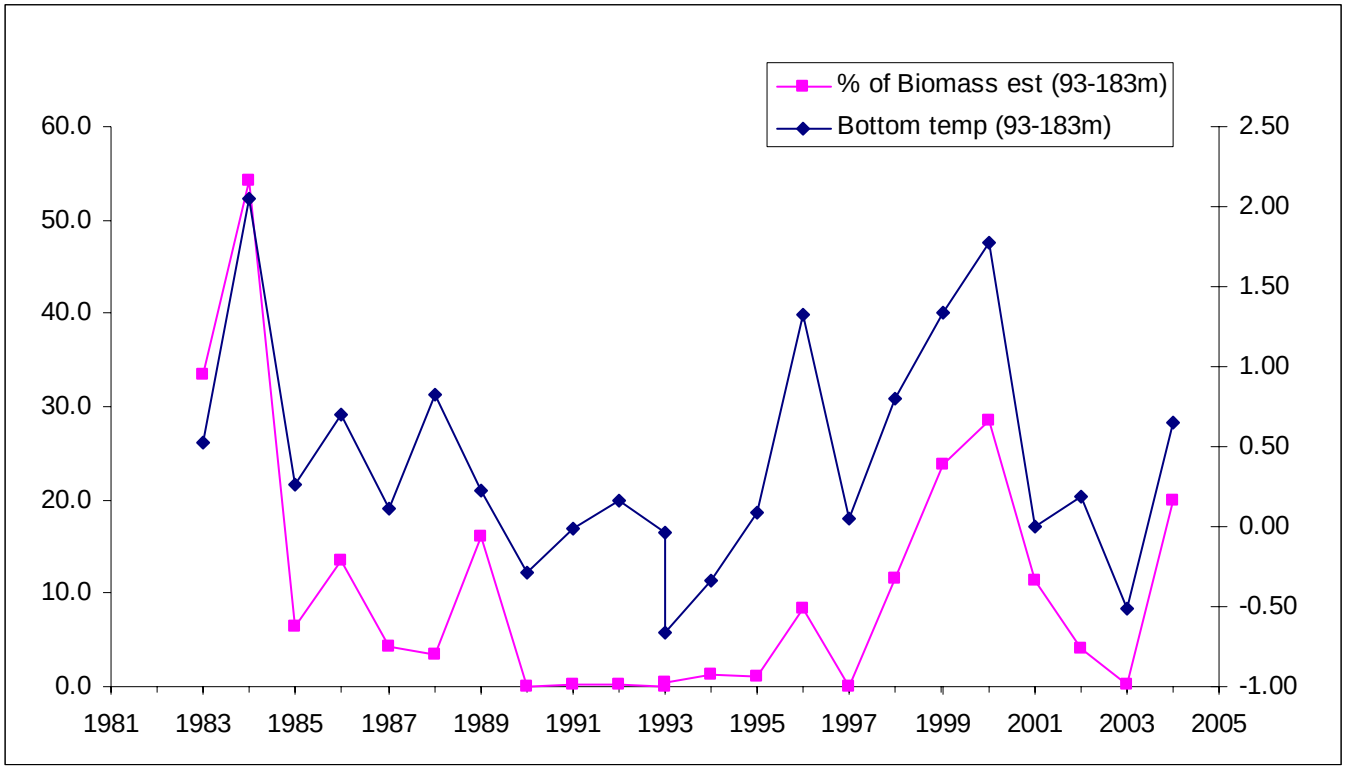


Fig.8. Percentage of biomass estimate found in the 93-183m depth zone and bottom temperatures from the vessel surveys 1983-2004.

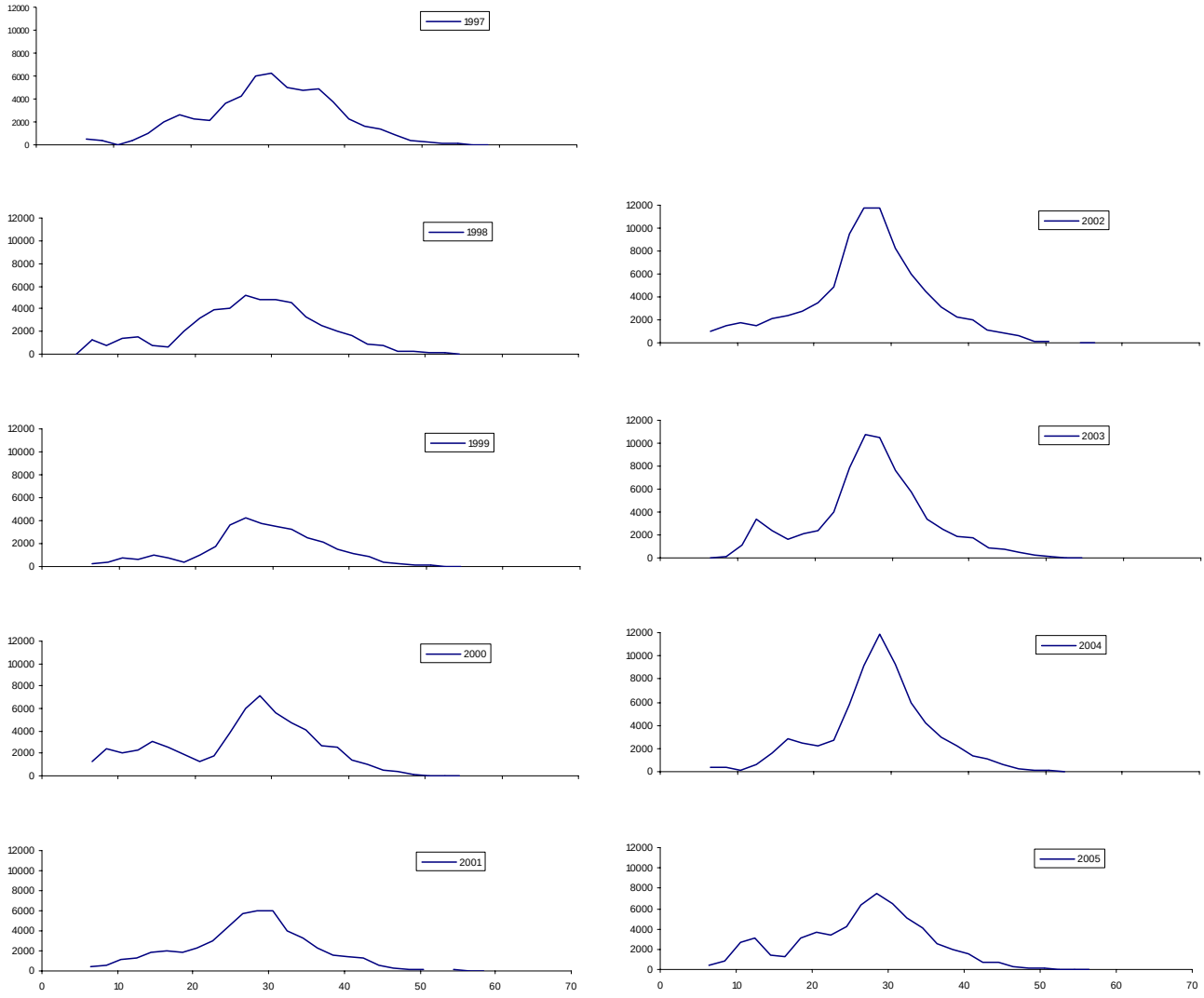


Fig. 9. Abundance (000s) at length (cm) of witch flounder from Canadian spring surveys in NAFO Subdivision 3Ps during 1997 to 2005.

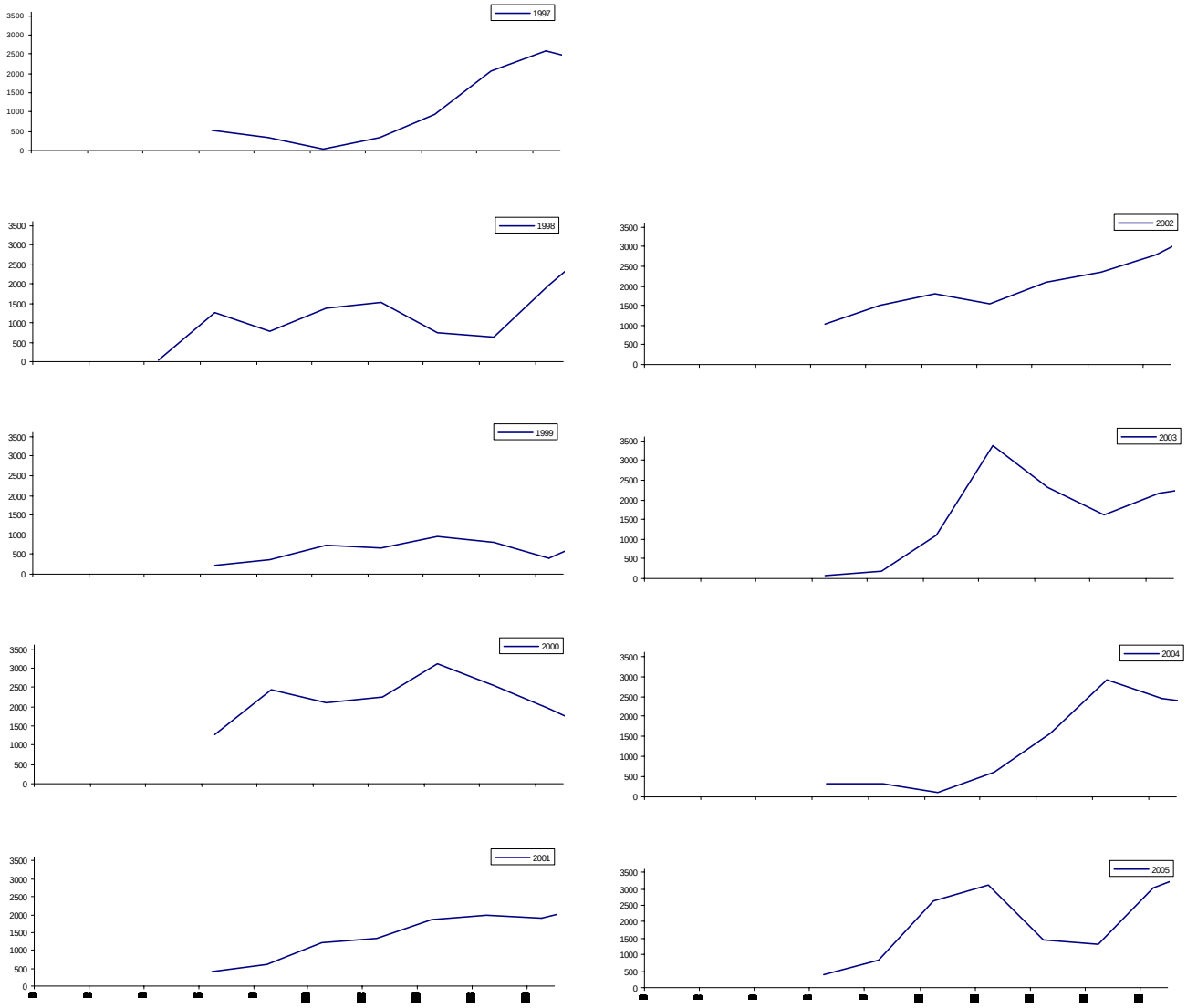


Fig. 10. Abundance (000s) at length (cm) of witch flounder (less than 20 cm) from Canadian spring surveys in NAFO Subdivision 3Ps during 1997 to 2005.

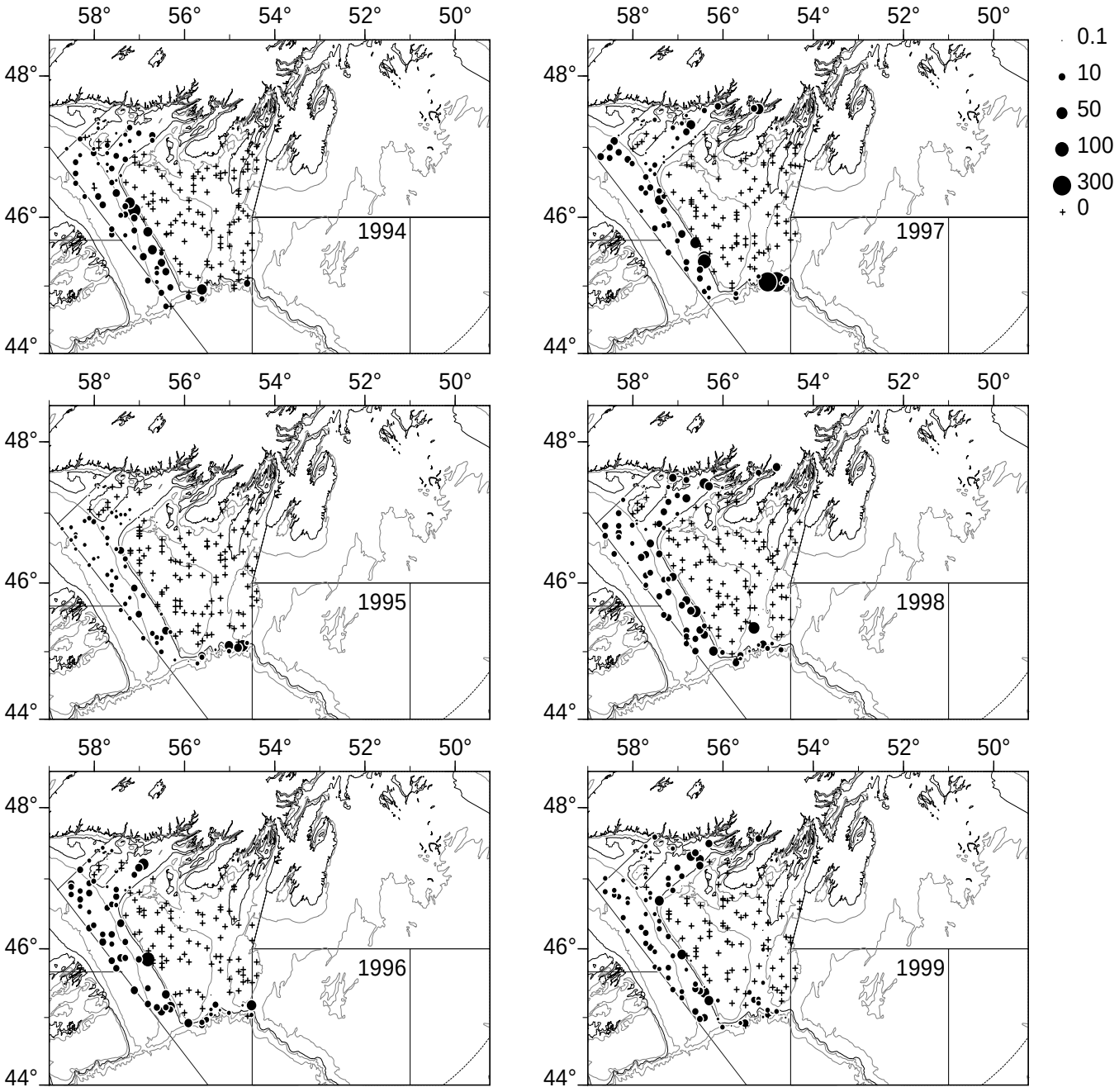


Fig. 11. Witch flounder distribution (kg/set) from Canadian spring surveys conducted using a Campelen shrimp trawl from 1994-1999.

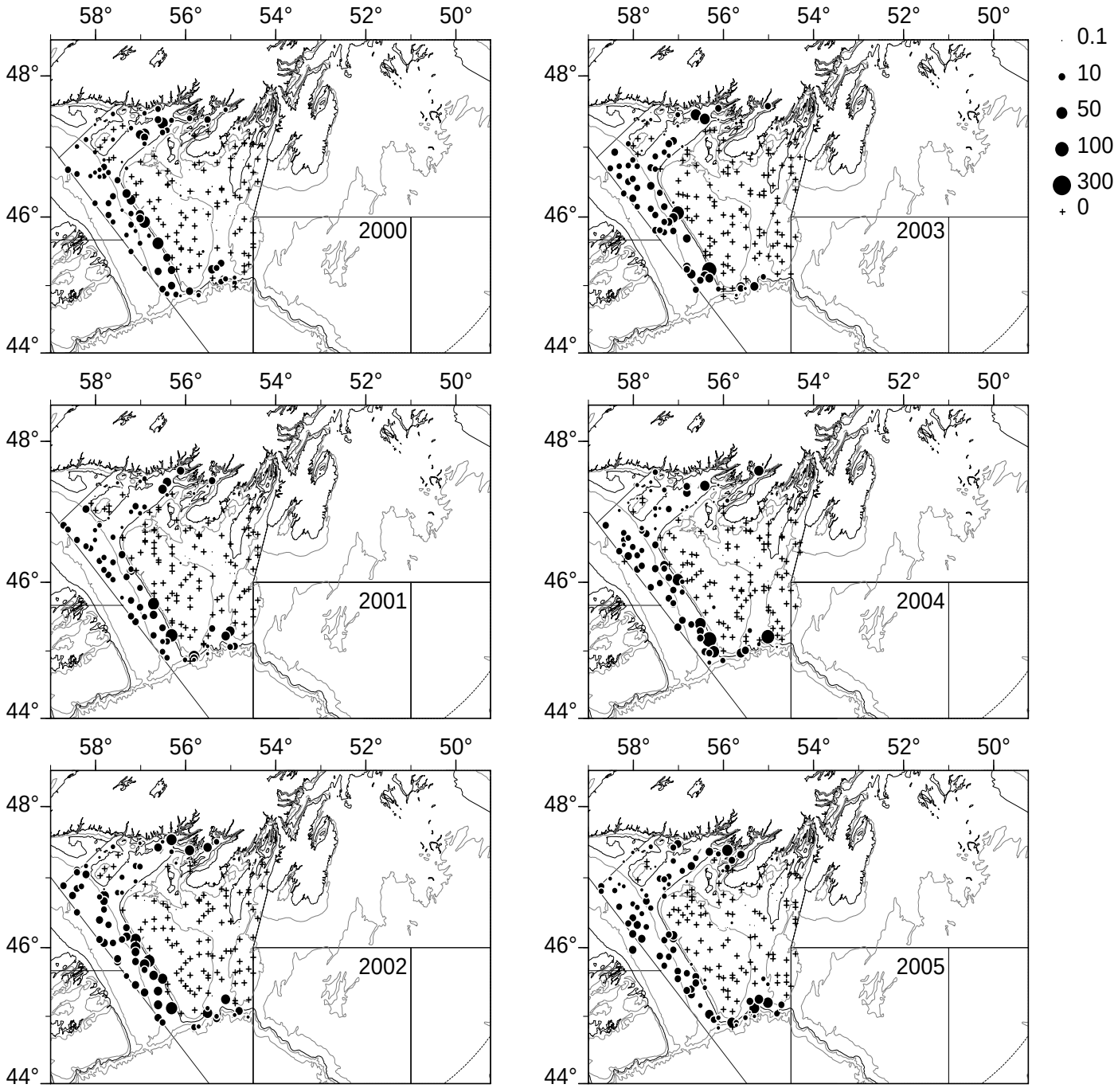


Fig. 12. Witch flounder distribution (kg/set) from Canadian spring surveys conducted using a Campelen shrimp trawl from 2000-2005.

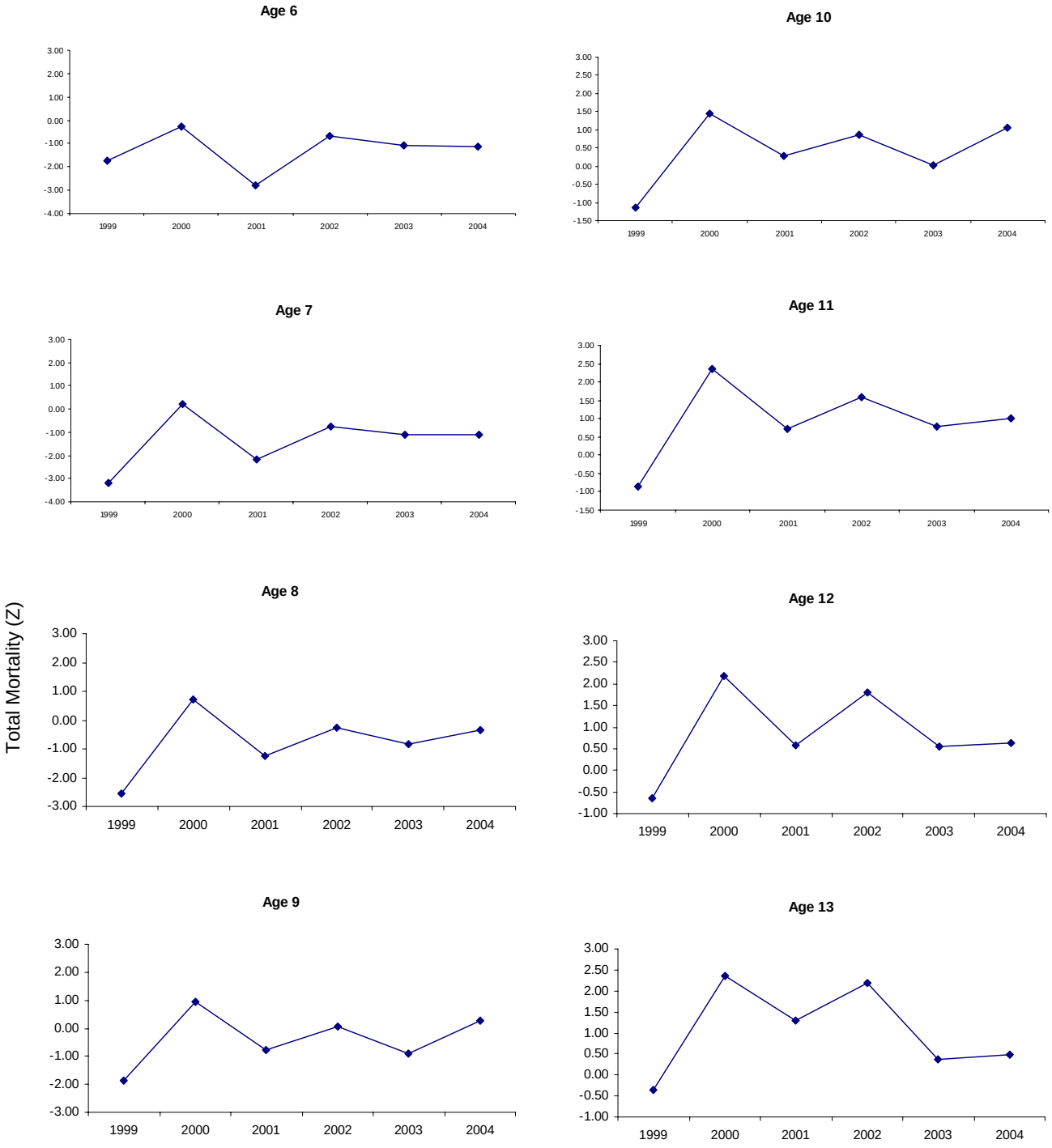


Fig. 13. Total mortality estimates (Z) for ages 6-13 from the GEAC fall surveys 1999-2003.

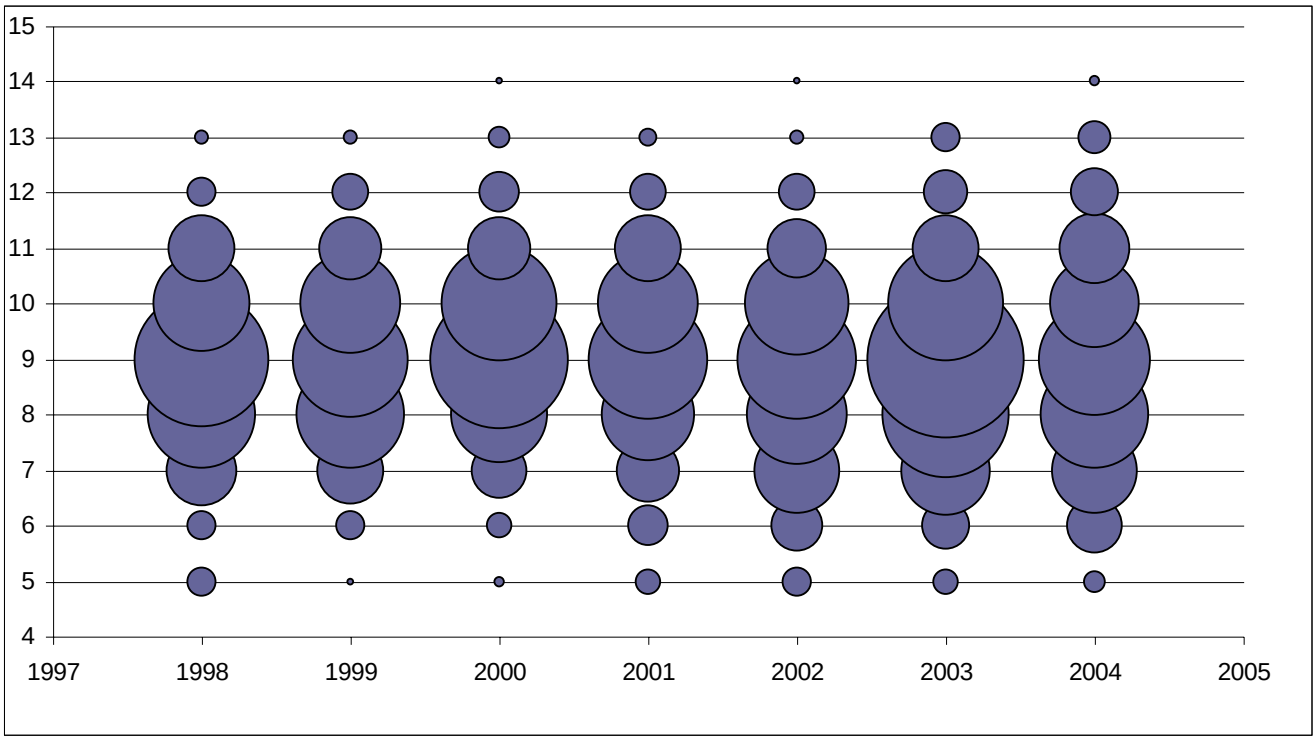


Fig. 14. Abundance at age (relative to the mean of each year) of witch flounder from the GEAC fall survey 1998-2004.