NOT TO BE CITED WITHOUT PRIOR
REFERENCE TO THE AUTHOR(S)

Northwest Atlantic Fisheries Organization

**Serial No. N5260** **NAFO SCR Doc. 06/37**

**SCIENTIFIC COUNCIL MEETING – JUNE 2006**

# Witch Flounder in NAFO Divisions 3NO

by

D. Maddock Parsons

Northwest Atlantic Fisheries Center, P.O. Box 5667
St. John's, Newfoundland, Canada, A1C 5X1

## Abstract

Biomass and abundance indices from Canadian spring surveys in Division 3N have been at very low levels since 1984. In most years the biomass index was estimated to be less than 1 000 tons or 2 million fish. Similarly mean weights and numbers per tow in the spring surveys have been very low since 1984, not exceeding 2 fish or 1 kg per tow. For Div. 3O, estimates of stock size exhibited considerable annual fluctuations on average between 3 000 and 24 000 tons or 6-44 million fish particularly in the late 1980s. Mean weight and number per tow in Div. 3O showed the same variability ranging from 3-18 fish per tow at 1-10 kg per tow. In 2003, an increase in the mean numbers and weights per tow (from 2.81 kg/tow and 7.55 fish/tow in 2002 to 6 kg/tow and 17.98 fish/tow in 2003) can be attributed to one large set. The data for Div. 3NO combined suggest an overall-declining trend in stock size with the estimates for the spring 1998 survey at the lowest level observed since 1984. Since then, all indices have generally increased but remain variable.

Indices from Canadian fall surveys for Div. 3N are similar to the spring in both stock size estimates, which are very low but lack trend. Indices are highly variable for Div. 3O in the fall surveys and also lack any overall trend. Nonetheless, the estimates for each seasonal series are generally within the same numeric range.

## Fisheries and Management

Catches in the 1960's peaked at 11 000-12 000 tons in 1967-68 and remained relatively high during the next several years (Table 1; Fig. 1). During the period 1971-84 catches ranged from a low of about 2 400 tons in 1980 and 1981 to as high as 15 000 tons in 1971 which is the highest recorded catch in the history of the fishery, however, from 1975-84 annual catches rarely exceeded 6 000 tons. Species specific catch statistics for flatfish prior to 1973 were largely developed from breakdowns of unspecified flounders and therefore should be quoted with caution.

As a result of an increase in fishing effort in the NRA during 1985 and 1986, especially by EU-Spain and EU-Portugal, catches rose rapidly to levels of 8 800 and 9 100 tons, respectively. This increased effort was primarily concentrated on the "tail" of the Grand Bank in the NAFO Regulatory area of Division 3N. Non-Contracting parties such as South Korea, USA, Cayman Islands and Panama also contributed to increased catch levels during this period. Catches remained relatively high in 1987 and 1988 at 7 600 and 7 300 tons, respectively. During 1990-93 estimated catches were in the range of 4 200-5 000 tons. The estimated catch for 1994 was still in the order of 1 100 tons despite a moratorium being introduced on fishing this stock (Table 1; Fig. 1). The catch dropped to 300 tons in 1995 likely as a result of a substantial reduction in fishing effort for Greenland halibut where witch flounder comprises a by-catch. Since then catches have increased steadily and by 1999 was about 800 tons although declined again to an estimated 450 tons in 2002 (Table 1; Fig. 1). In 2003 several sources of catch data were available and a single source could not be considered more valid. As a result, catches were estimated to range between 850 and 2 239 tons (Table 1; Fig 1).

Historically, mostly Canada and the former Soviet Union conducted the fishery. Canadian catches fluctuated from between 1 200 and 3 000 tons from 1985-91 but increased to about 4 300 tons in 1992 and 4 200 in 1993 (Table 1). The increase in 1992 and 1993 was essentially the result of a quota transfer to Canada by the Russian Federation. Canada has taken very little catch since then due to the moratorium. Catches by the USSR/Russian vessels declined from between 1 000 and 2 000 tons in the period 1982-88 to less than 100 tons in 1989-90 and little or no catch since then until 1999-2003 when Russia caught between 50 and 112 tons (Table 1).

The first total allowable catch (TAC) for this resource was introduced by ICNAF in 1974 at a level of 10 000 tons largely based on average historical catches (Fig. 1). This level remained in effect until 1979 when it was reduced to 7 000 tons in consideration of declining commercial catch rates. It was further reduced to 5 000 tons in 1981 and remained at that level to 1993. The Scientific Council advised that for 1994 catches from this stock should not exceed 3 000 tons. A TAC of 3 000 tons was agreed by the NAFO Fisheries Commission, however, it was also agreed that no directed fishery would be conducted for witch flounder in 1994 due to the poor state of the stock and to allow for rebuilding. The NAFO Fisheries Commission introduced a complete moratorium for directed fishing in 1995 which has continued through 2005.

## Research Vessel Surveys

Stratified-random research vessel surveys have been carried out by Canada on the Grand Bank (including Div. 3NO) during spring since 1971 although during the early period coverage was limited and, in fact, for most years only surveyed to 366 meters. Since 1990, on the other hand, depth coverage was extended to 720 meters, which should be more representative of the stock distribution. Nevertheless, this still may not cover the entire range of depth distribution of witch flounder when compared to its distribution observed in other stock areas during recent years. In addition to spring surveys, a time series of fall surveys was begun in 1990 to investigate seasonal variation in stock distribution and abundance of various groundfish species. In fall 1998 the survey depth range was further extended to 1 500 meters.

Beginning with the 1995 fall survey the survey gear was changed from an *Engel 145* groundfish trawl with steel bobbin footgear to a *Campelen 1800* shrimp trawl with rockhopper footgear. The data from these surveys have now been converted from Engel trawl catches to Campelen 1800 trawl catch equivalents. Only the converted survey data are presented here.

*Survey Biomass and Abundance Indices*

Biomass (Tables 2-5) and abundance (Tables 6-9) estimates by stratum are presented for the spring and fall surveys in NAFO Div. 3N and 3O, respectively. Mean numbers (Tables 10-13) and weights (Tables 14-17) per tow are also presented by stratum and division for the spring and fall surveys. Graphical plots to better illustrate the comparative trends in stock biomass and abundance by season are presented by NAFO Div. 3N and 3O separately and combined in figures 2-4, respectively.

All indices derived from spring surveys (which are the longer time series) in Div. 3N have been at very low levels throughout the period since 1984. In most years, trawlable stock size was estimated to be less than 1 000 tons or 2 million fish, and less then 1.5 fish (0.60 kg) per tow were caught in the surveys (Fig. 2; Tables 2, 6, 10 and 14). Estimates for recent years remain low. For Div. 3O, estimates of stock size showed considerable annual fluctuations on average between 8 000 and 24 000 tons or 6-44 million fish particularly in the late 1980's (Fig. 2; Tables 3 and 7). Mean weight and number per tow also varied annually, ranging from about 10 kg (18 fish) per tow in 1985 to a low of less than 1 kg or 3 fish per tow in 1998 (Fig. 2; Tables 11 and 15). The indices show overall declining trends from the mid-80s to lowest values in 1998 and 1999. Although wide fluctuations continue to occur since then, some improvement in the estimates are indicated (Fig. 4). Peaks in the indices in some years may be related to distribution changes or single large catches, considering the wide confidence limits (see Fig. 6-8 for illustration). In 2003 a single large set (684 fish) in one stratum increased the indices from 2002 with very wide confidence limits.

Indices derived from the fall surveys in Div. 3N are, similar to the spring series, very low and lack trend (Fig. 3; Tables 4, 8, 12, and 16). The data trends for Div. 3O in the fall surveys are quite different than in the spring series (Fig. 3; Tables 5, 9, 13 and 17). There is an increasing trend for 1991-96, however, when the higher value for 1990 and the lower values for 1997 and 1998 are included the trend is removed (Fig. 3). Confidence limits depicted in

Fig. 3 are wide for this time period as well, arguing against any significant trend in the indices. Nonetheless, the estimates for each seasonal series are generally within the same numeric range. With Div. 3NO combined, the most recent indices from the spring surveys, although variable, are improved since 1998 (Fig. 4). The fall survey series for Div. 3NO combined is also quite variable but indicates a generally increasing trend over the recent period. It should be emphasized as well that the more recent estimates are also based on more detailed survey coverage than in the earlier years.

## Assessment Results

*Surplus production model (ASPIC)*

A non-equilibrium surplus production model incorporating covariates (ASPIC; Prager, 1994, 1995) was applied to catch and survey biomass indices in order to investigate the usefulness of this method in quantitative assessment of this stock. Several model formulations were explored using the biomass index series and mean weight per tow series for both the Canadian spring surveys (1984-2004) and the Canadian autumn surveys from 1990-2004 (Campelen equivalents prior to 1995). None of the model formulations fit the data well. Indicators of poor model suitability included unreasonably high B/Bmsy ratio, poor observed to estimated CPUE relationship, and strong residual patterns. These results suggest that this data should not be modeled using ASPIC.b

*Precautionary limit reference points*

In the absence of an analytical assessment for this stock, it was not possible to calculate precautionary limit reference points directly. A proxy for $B_{lim}$ has been calculated for other stocks (3LNO and 3M shrimp, and 2J+3KL witch flounder) as 15% of the highest observed biomass estimate. For this stock, however, such an approach is more difficult. The two survey series that provide biomass estimates cover different time periods, and both series are highly variable, with trends in biomass or abundance that are less clear than for other stocks (e.g. 2J+3KL witch). The autumn survey estimates are often higher than the spring estimates in the same year. As well, the highest observed biomass estimates are in the early part of the time series when the survey covered less of the entire stock area. As a result, $B_{lim}$ may be underestimated using this method. Using this proxy for $B_{lim}$ may not be appropriate.

## Resource Status

The spring survey indices indicate that the resource was at its lowest levels in the mid- to late 1990s, from higher levels in the 1980s. The general trend in this longer (spring) survey series suggests that the stock showed some slight improvement since then, increasing to 2003 but decreased again in 2005. It is difficult to comment on any recruitment prospects for the resource since there have been no aging data available for some years. Population abundance at length from true *Campelen 1800* surveys in the fall of 1995-2005 indicated a higher proportion of smaller fish in the 1998-2000 surveys (Fig. 5), which may have contributed to the apparent improvement in the stock in 2003. The peak of smaller fish seen in most years was absent from the 2001 and 2003-2005 fall surveys, but 2002 showed a significant amount of fish at the smaller sizes. Length frequencies of witch taken as by-catch in the EU Spain Greenland halibut fishery show a frequency similar to Canadian surveys and modal length at 38 cm, but smaller sizes, which might indicate recruitment, are not in the sampled sizes from this fishery.

## References

Prager, M.H. 1994. A suite of extensions to a nonequilibrium surplus-production model. *Fish. Bull.*, **92**: 374-389.

Prager, M.H. 1995. Users manual for ASPIC: a stock-production model incorporating covariates. *SEFSC Miami Lab. Doc.*, MIA-92/93-55.

Table 1. Catches and TACs ( t ) of Witch Flounder in Div. 3NO from 1960-2005.

| Year | Canada | USSR (Russia) | Other | Total | TAC |
|---|---|---|---|---|---|
| 1960 | - | - | - | 5799 | |
| 1961 | - | - | - | 4627 | |
| 1962 | - | - | - | 1228 | |
| 1963 | 895 | 485 | 803 | 2183 | |
| 1964 | 1055 | - | 11 | 1066 | |
| 1965 | 1324 | 849 | 4 | 2177 | |
| 1966 | 3644 | 3828 | 50 | 7522 | |
| 1967 | 2863 | 8565 | 75 | 11503 | |
| 1968 | 1503 | 9078 | 18 | 10599 | |
| 1969 | 479 | 4215 | 6 | 4700 | |
| 1970 | 723 | 6039 | 1 | 6763 | |
| 1971 | 178 | 14774 | 13 | 14965 | |
| 1972 | 3419 | 5738 | 20 | 9177 | |
| 1973 | 4943 | 1714 | 34 | 6691 | |
| 1974 | 2807 | 5235 | 3 | 8045 | 10000 |
| 1975 | 1137 | 5019 | 12 | 6168 | 10000 |
| 1976 | 3044 | 2991 | - | 6035 | 10000 |
| 1977 | 3013 | 2742 | 4 | 5759 | 10000 |
| 1978 | 1165 | 2275 | 33 | 3473 | 10000 |
| 1979 | 1193 | 1868 | 16 | 3077 | 7000 |
| 1980 | 425 | 1994 | 1 | 2420 | 7000 |
| 1981 | 381 | 2044 | - | 2425 | 5000 |
| 1982 | 1760 | 1969 | 3 | 3732 | 5000 |
| 1983 | 1674 | 1942 | - | 3616 | 5000 |
| 1984 | 834 | 1955 | 13 | 2802 | 5000 |
| 1985 | 2746 | 1908 | 4117 | 8771 | 5000 |
| 1986 | 2937 | 1724 | 4470 | 9131 | 5000 |
| 1987 | 2829 | 1425 | 3342 | 7596 | 5000 |
| 1988 | 1927 | 1037 | 4361 | 7325 | 5000 |
| 1989 | 1241 | 81 | 2366 | 3688 | 5000 |
| 1990 | 2654 | 9 | 1516 | 4179 | 5000 |
| 1991 | 2624 | - | 2223 | 4847 | 5000 |
| 1992 | 4328 | - | 632 | 4960 | 5000 |
| 1993 | 4337 | 3 | 250 | 4414 | 5000 |
| 1994 | 2 | - | 1117 | 1119 | 3000 |
| 1995 | - | - | 300 | 300 | 0 |
| 1996 | 64 | - | 294 | 358 | 0 |
| 1997 | 19 | - | 493 | 512 | 0 |
| 1998 | 2 | 5 | 605 | 612 | 0 |
| 1999 | 6 | 86 | 671 | 763 | 0 |
| 2000 | 12 | 50 | 483 | 545 | 0 |
| 2001 | 13 | 34 | 647 | 694 | 0 |
| 2002 | 26 | 112 | 312 | 450 | 0 |
| 2003 | 62 | 59 | 1423* | 1544* | 0 |
| 2004 | 58 | 60 | 509 | 627 | 0 |
| 2005 | 49 | 8 | 200 | 257 | 0 |

Note: Although a TAC of 3000 tons was agreed by the FC, it was also agreed that no directed fishing be conducted in 1994 due to the poor state of the stock.
*The catch for Other sources in 2003 is the mean of a range of catch information.

Table 2. Estimated Biomass (tons) of Witch flounder (M+F) in each stratum from surveys in Div. 3N during spring of 1984-2005. (Engel 145 data converted to Campelen Units for 1984-95).

| Depth Range (m) | Old Stratum Area | New Stratum Area | Stratum | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <=56 | 1593 | 1593 | 375 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 1499 | 1499 | 376 | 0 | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 18 | 0 | 0 | 0 | 0 | 0 | 0 |
| 57 - 92 | 2992 | 2992 | 360 | 1715 | 89 | 629 | 461 | 1519 | 175 | 0 | 0 | 29 | 165 | 0 | 0 | 0 | 115 | 33 | 120 | 266 | 0 | 0 | 19 | 97 | 983 |
| | 1853 | 1853 | 361 | 119 | 0 | 0 | 39 | 50 | 0 | 20 | 0 | 0 | 0 | 0 | 39 | 0 | 0 | 0 | 0 | 242 | 45 | 0 | 0 | 0 | 35 |
| | 2520 | 2520 | 362 | 0 | 82 | 23 | 18 | 147 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2520 | 2520 | 373 | 0 | 0 | 43 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 931 | 931 | 374 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 34 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30 | 0 | 0 | 0 |
| | 674 | 674 | 383 | 0 | 57 | 0 | 37 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 93 - 183 | 421 | 421 | 359 | 231 | 47 | 99 | 43 | 306 | 121 | 0 | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 67 | 149 | 58 | 13 | 0 | 0 | 334 |
| | 100 | 100 | 377 | 8 | 0 | 0 | 72 | 3 | 32 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 647 | 647 | 382 | 0 | 0 | 0 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 40 |
| 184 - 274 | 225 | 225 | 358 | 40 | 308 | 42 | 137 | 20 | 29 | 57 | 0 | 44 | 132 | 106 | 7 | 51 | 49 | 134 | 6 | 9 | 154 | 14 | 168 | 0 | 42 |
| | 139 | 139 | 378 | 22 | 19 | 32 | 155 | 31 | 42 | 0 | 0 | 29 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 5 | 8 | 1 | 0 | 0 |
| | 182 | 182 | 381 | 21 | 7 | 32 | 101 | 69 | 0 | 28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 |
| 275 - 366 | 164 | 164 | 357 | 8 | 87 | 154 | | 4 | 60 | 21 | 0 | 31 | 49 | 81 | 20 | 36 | 12 | 159 | 21 | 75 | 17 | 26 | 65 | 42 | 0 |
| | 106 | 106 | 379 | 36 | 12 | 23 | 173 | 44 | 20 | 35 | 3 | 18 | 0 | 4 | 0 | 0 | 9 | 2 | 26 | 4 | 4 | 0 | 4 | 0 | 6 |
| | 116 | 116 | 380 | 6 | 53 | 0 | 134 | 24 | 7 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 3 | 0 | 0 |
| 367 - 549 | 155 | 155 | 723 | | | | | | | | 90 | 102 | 79 | 36 | 51 | 16 | 25 | 53 | 33 | 36 | 23 | 130 | 60 | 34 | 108 |
| | 105 | 105 | 725 | | | | | | | | 62 | | 40 | 44 | 0 | 5 | 28 | 4 | 20 | 32 | 8 | 3 | 7 | 0 | 103 |
| | 160 | 160 | 727 | | | | | | | | 0 | 5 | 38 | 17 | 0 | 0 | 3 | 9 | 13 | 12 | 3 | 0 | 0 | 23 | 41 |
| 550 - 731 | 124 | 124 | 724 | | | | | | | | 327 | 181 | 218 | 51 | 36 | 29 | 157 | 53 | 105 | 106 | 127 | 96 | 101 | 54 | 65 |
| | 72 | 72 | 726 | | | | | | | | 81 | 25 | 22 | 28 | 3 | 12 | 42 | 96 | 59 | 65 | 84 | 18 | 50 | 21 | 8 |
| | 156 | 156 | 728 | | | | | | | | 92 | 19 | 82 | 22 | 152 | 21 | | 15 | 32 | 45 | 98 | 43 | 53 | 75 | 42 |
| 732 - 914 | . | 134 | 752 | | | | | | | | | | | 27 | | | | | | | | | | | |
| | . | 106 | 756 | | | | | | | | | | | 33 | | | | | | | | | | | |
| | . | 154 | 760 | | | | | | | | | | | 26 | | | | | | | | | | | |
| Grand Total | | | | 2205 | 761 | 1078 | 1401 | 2218 | 485 | 164 | 655 | 484 | 862 | 510 | 308 | 170 | 443 | 566 | 525 | 1042 | 632 | 380 | 532 | 346 | 1807 |
| Biomass >366 m | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 652 | 333 | 480 | 284 | 242 | 84 | 255 | 230 | 262 | 296 | 343 | 289 | 272 | 207 | 366 |
| Percent >366 m | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 99.5 | 68.8 | 55.7 | 55.7 | 78.6 | 49.2 | 57.6 | 40.6 | 49.9 | 28.4 | 54.2 | 76.0 | 51.0 | 59.9 | 20.3 |

Table 3. Estimated Biomass (tons) of Witch flounder (M+F) in each stratum from surveys in Div. 3O during spring of 1984-2005. (Engel 145 data converted to Campelen Units for 1984-95).

| Depth Range (m) | Old Stratum Area | New Stratum Area | Stratum | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 57 - 92 | 2089 | 2089 | 330 | 0 | 0 | 0 | 0 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21 | 121 | 111 | 0 | 0 | 0 | 117 | 129 |
| | 456 | 456 | 331 | 1912 | 302 | 36 | 18 | 444 | 0 | | 0 | 0 | 0 | 0 | 0 | 74 | 0 | 36 | 537 | 28 | 375 | 102 | 0 | 0 | 292 |
| | 1898 | 1898 | 338 | 134 | 7806 | 1108 | 1184 | 3075 | 1827 | 434 | 0 | 109 | 295 | 0 | 228 | 870 | 0 | 357 | 780 | 183 | 1354 | 121 | 320 | 1171 | 646 |
| | 1716 | 1716 | 340 | 40 | 146 | 0 | 21 | 0 | 0 | 15 | 0 | 147 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 83 | 0 | 0 | 0 | 0 | 26 |
| | 2520 | 2520 | 351 | 688 | 211 | 385 | 222 | 978 | 217 | 109 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21 | 22 | 0 | 0 | 0 | 0 | 0 |
| | 2580 | 2580 | 352 | 82 | 951 | 225 | 1275 | 1330 | 664 | 1426 | 40 | 105 | 60 | 40 | 63 | 59 | 100 | 53 | 1196 | 130 | 53 | 693 | 27 | 628 | 551 |
| | 1282 | 1282 | 353 | 4519 | 1122 | 1067 | 1609 | 7208 | 2486 | 1637 | 0 | 243 | 209 | 0 | 42 | 23 | 2 | 272 | 2209 | 1300 | 469 | 688 | 470 | 572 | 430 |
| 93 - 183 | 1721 | 1721 | 329 | 0 | 0 | 0 | 0 | 789 | 48 | 27 | 494 | 0 | 0 | 5071 | 193 | 0 | 11 | 51 | 240 | 26 | 0 | 0 | 2209 | 0 | 147 |
| | 1047 | 1047 | 332 | 3779 | 8589 | 2485 | 3367 | 6829 | 1485 | 4599 | 2426 | 2182 | 359 | 58 | 1791 | 1180 | 235 | 460 | 981 | 407 | 3025 | 2458 | 10236 | 7945 | 1075 |
| | 948 | 948 | 337 | 50 | 4129 | 1415 | 1506 | 1061 | 1543 | 1627 | 1581 | 580 | 675 | 50 | 654 | 330 | 163 | 321 | 879 | 936 | 1823 | 752 | 715 | 233 | 655 |
| | 585 | 585 | 339 | 335 | 0 | 16 | 223 | 136 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 5 | 2 | 0 | 0 | 189 |
| | 474 | 474 | 354 | 495 | 105 | 1231 | 233 | 345 | 47 | 240 | 144 | 149 | 841 | 0 | 0 | 36 | 0 | 226 | 1062 | 826 | 914 | 553 | 163 | 496 | 640 |
| 184 - 274 | 151 | 147 | 333 | 10 | 48 | 10 | 0 | 67 | 16 | 129 | 498 | 79 | 80 | 5196 | 162 | 7 | 109 | 25 | 27 | 30 | 122 | 375 | 63 | 36 | 39 |
| | 121 | 121 | 336 | 12 | 7 | 43 | 25 | 63 | 0 | 53 | 492 | 1374 | 100 | 1057 | 62 | 180 | 293 | 23 | 47 | 27 | 163 | 598 | 211 | 61 | 51 |
| | 103 | 103 | 355 | 45 | 181 | 38 | 71 | 0 | 97 | 126 | 136 | 16 | 34 | 129 | 43 | 86 | 48 | 50 | 18 | 14 | 87 | 193 | 340 | 117 | 12 |
| 275 - 366 | 92 | 96 | 334 | 0 | 42 | 42 | 18 | 22 | 23 | 26 | 20 | 108 | 20 | 860 | 15 | 150 | 362 | 4 | 7 | 11 | 2 | 143 | 133 | 29 | 3 |
| | 58 | 58 | 335 | 0 | 98 | 18 | 2 | 51 | 22 | 92 | 42 | 1107 | 65 | 103 | 43 | 78 | 109 | 2 | 62 | 128 | 8 | 8 | 53 | 10 | 11 |
| | 61 | 61 | 356 | 5 | 83 | 17 | 23 | 18 | 29 | 55 | 39 | 129 | 77 | 75 | 62 | 40 | 11 | 29 | 23 | 14 | 34 | 38 | 49 | 13 | 18 |
| 367 - 549 | 93 | 166 | 717 | | | | | | | | 11 | 120 | 35 | 2375 | 53 | 465 | 4353 | 44 | 19 | 17 | 41 | 201 | 142 | 5 | 17 |
| | 76 | 76 | 719 | | | | | | | | 148 | 1024 | 49 | 14 | 18 | 137 | 601 | 15 | 16 | 25 | 12 | 95 | 39 | 3 | 14 |
| | 76 | 76 | 721 | | | | | | | | 76 | 48 | 31 | 72 | 18 | 16 | 19 | 38 | 37 | 28 | 85 | 38 | 26 | 9 | 4 |
| 550 - 731 | 111 | 134 | 718 | | | | | | | | 35 | 29 | 104 | 221 | 80 | 71 | 37 | 33 | 38 | 15 | 57 | 55 | 43 | 13 | 13 |
| | 105 | 105 | 720 | | | | | | | | 217 | 134 | 182 | 95 | 15 | 21 | 150 | 32 | 21 | 40 | 38 | 7 | 23 | 9 | 69 |
| | 93 | 93 | 722 | | | | | | | | 18 | 49 | 150 | 217 | 206 | 89 | 87 | 31 | 71 | 47 | 121 | 62 | 64 | 12 | 27 |
| 732 - 914 | . | 105 | 764 | | | | | | | | | | | 60 | | | | | | | | | | | |
| | . | 135 | 772 | | | | | | | | | | | 75 | | | | | | | | | | | |
| Grand Total | | | | 12108 | 23820 | 8136 | 9799 | 22438 | 8503 | 10594 | 6415 | 7734 | 3364 | 15769 | 3748 | 3915 | 6691 | 2121 | 8411 | 4448 | 8786 | 7182 | 15323 | 11479 | 5057 |
| Biomass >366 m | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 504 | 1405 | 550 | 3128 | 390 | 800 | 5247 | 192 | 201 | 172 | 354 | 459 | 336 | 51 | 144 |
| Percent >366 m | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 7.9 | 18.2 | 16.4 | 19.8 | 10.4 | 20.4 | 78.4 | 9.1 | 2.4 | 3.9 | 4.0 | 6.4 | 2.2 | 0.4 | 2.9 |

Table 4. Estimated Biomass (tons) of Witch flounder (M+F) in each stratum from surveys in Div. 3N during fall of 1990-2005. (Engel 145 data converted to Campelen Units for 1990-94).

| Depth Range (m) | Old Stratum Area | New Stratum Area | Stratum | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <=56 | 1593 | 1593 | 375 | 0 | 73 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 35 | 0 | 0 | 0 |
| | 1499 | 1499 | 376 | 0 | 0 | 0 | 0 | 0 | 14 | 0 | 22 | 0 | 0 | 0 | 0 | 38 | 28 | 0 | 0 |
| 57 - 92 | 2992 | 2992 | 360 | 265 | 171 | 1297 | 173 | 75 | 888 | 23 | 427 | 431 | 177 | 535 | 326 | 520 | 586 | 836 | 2364 |
| | 1853 | 1853 | 361 | 28 | 467 | 463 | 0 | 32 | 0 | 0 | 14 | 0 | 268 | 28 | 170 | 148 | 99 | 0 | 168 |
| | 2520 | 2520 | 362 | 400 | 221 | 87 | 0 | 0 | 0 | 0 | 0 | 0 | 32 | 0 | 0 | 0 | 136 | 0 | 0 |
| | 2520 | 2520 | 373 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 931 | 931 | 374 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 674 | 674 | 383 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 93 - 183 | 421 | 421 | 359 | 0 | 0 | 278 | 0 | 0 | 22 | 0 | 0 | 1213 | 1 | 0 | 121 | 42 | 110 | 139 | 43 |
| | 100 | 100 | 377 | 0 | | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 647 | 647 | 382 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 184 - 274 | 225 | 225 | 358 | 0 | 20 | 66 | 24 | 0 | 74 | 0 | 11 | 30 | 19 | 40 | 45 | 0 | 145 | 22 | 107 |
| | 139 | 139 | 378 | 0 | 41 | 15 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 3 | 5 | 0 | 0 | 0 |
| | 182 | 182 | 381 | | 0 | | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 |
| 275 - 366 | 164 | 164 | 357 | 0 | 234 | 9 | 187 | 43 | 85 | 0 | 27 | 0 | | 52 | 18 | 21 | 41 | 27 | 37 |
| | 106 | 106 | 379 | 4 | | 4 | 0 | 0 | 0 | 1 | 7 | 0 | 0 | 2 | 111 | 33 | 8 | 867 | 0 |
| | 116 | 116 | 380 | | 0 | | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 5 | 0 | 0 | 0 | 9 | 11 |
| 367 - 549 | 155 | 155 | 723 | | 41 | | 163 | 180 | 57 | 15 | 28 | 74 | 27 | 28 | 66 | 16 | 123 | 20 | 98 |
| | 105 | 105 | 725 | | | 15 | 376 | 46 | 19 | 0 | 135 | 10 | 33 | 19 | 7 | 5 | 10 | | 7 |
| | 160 | 160 | 727 | | | | 0 | 38 | 0 | 0 | 29 | 7 | 4 | 0 | 10 | 0 | 0 | 7 | 21 |
| 550 - 731 | 124 | 124 | 724 | | 172 | | 414 | 180 | 104 | 60 | 197 | 72 | 181 | 87 | 70 | 90 | | 70 | 95 |
| | 72 | 72 | 726 | | | | 310 | 54 | 48 | 40 | 21 | 38 | 34 | 16 | 22 | 59 | 52 | 32 | 19 |
| | 156 | 156 | 728 | | | | | 153 | 35 | 21 | 76 | 78 | 106 | 153 | 103 | 286 | 178 | 93 | 19 |
| 732 - 914 | . | 134 | 752 | | | | | | | | | 120 | | 23 | 0 | 1 | | | |
| | . | 106 | 756 | | | | | | | | | 124 | | 51 | 83 | 9 | | | 82 |
| | . | 154 | 760 | | | | | | | | | 88 | | 41 | 78 | 173 | | | 18 |
| 915 -1097 | . | 138 | 753 | | | | | | | | | 0 | | 0 | 0 | 3 | | | |
| | . | 102 | 757 | | | | | | | | | 0 | | 0 | 37 | 7 | | | 0 |
| | . | 171 | 761 | | | | | | | | | 46 | | 147 | 42 | 10 | | | 118 |
| 1098 -1280 | . | 180 | 754 | | | | | | | | | 0 | | 0 | 0 | 0 | | | |
| | . | 99 | 758 | | | | | | | | | 0 | | 0 | 0 | 0 | | | 0 |
| | . | 212 | 762 | | | | | | | | | | | 0 | 109 | 0 | | | 15 |
| 1281 -1463 | . | 385 | 755 | | | | | | | | | 0 | | 0 | 0 | 0 | | | |
| | . | 127 | 759 | | | | | | | | | 0 | | 0 | 2 | 0 | | | 0 |
| | . | 261 | 763 | | | | | | | | | | | 19 | 5 | 10 | | | 0 |
| Grand Total | | | | 696 | 1441 | 2235 | 1647 | 808 | 1346 | 160 | 993 | 2333 | 884 | 1244 | 1435 | 1511 | 1516 | 2122 | 3221 |
| Biomass >366 m | | | | 0 | 213 | 15 | 1263 | 651 | 263 | 137 | 485 | 657 | 385 | 582 | 634 | 669 | 363 | 222 | 491 |
| Percent >366 m | | | | 0.0 | 14.8 | 0.7 | 76.7 | 80.5 | 19.5 | 85.6 | 48.8 | 28.2 | 43.5 | 46.8 | 44.2 | 44.3 | 23.9 | 10.5 | 15.2 |

Table 5. Estimated Biomass (tons) of Witch flounder (M+F) in each stratum from surveys in Div. 3O during fall of 1990-2005. (Engel 145 data converted to Campelen Units for 1990-94).

| Depth Range (m) | Old Stratum Area | New Stratum Area | Stratum | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 57 - 92 | 2089 | 2089 | 330 | 122 | 67 | 79 | 0 | 0 | 247 | 0 | 72 | 168 | 208 | 48 | 284 | 342 | 438 | 74 | 312 |
| | 456 | 456 | 331 | 22 | 315 | 134 | 0 | 0 | 108 | 0 | 0 | 256 | 946 | 243 | 468 | 775 | 306 | 14 | 394 |
| | 1898 | 1898 | 338 | 2226 | 438 | 837 | 3966 | 2193 | 4684 | 503 | 1329 | 483 | 2736 | 375 | 943 | 976 | 2666 | 3899 | 1931 |
| | 1716 | 1716 | 340 | 173 | 280 | 63 | 0 | 0 | 204 | 0 | 22 | 0 | 415 | 104 | 172 | 123 | 57 | 28 | 116 |
| | 2520 | 2520 | 351 | 1690 | 284 | 72 | 0 | 0 | 0 | 0 | 0 | 37 | 205 | 0 | 172 | 0 | 25 | 35 | 54 |
| | 2580 | 2580 | 352 | 1415 | 896 | 1352 | 946 | 228 | 379 | 273 | 573 | 374 | 1491 | 920 | 430 | 789 | 964 | 3377 | 1663 |
| | 1282 | 1282 | 353 | 2405 | 343 | 477 | 0 | 732 | 538 | 789 | 168 | 1066 | 2996 | 2379 | 1360 | 1490 | 1204 | 2657 | 3710 |
| 93 - 183 | 1721 | 1721 | 329 | 99 | 85 | 0 | 18 | 0 | 417 | 0 | 173 | 305 | 0 | 0 | 282 | 732 | 97 | 484 | 250 |
| | 1047 | 1047 | 332 | 2102 | 155 | 1724 | 813 | 321 | 1114 | 4569 | 190 | 245 | 1664 | 544 | 343 | 1155 | 807 | 1512 | 2061 |
| | 948 | 948 | 337 | 1333 | 188 | 954 | 563 | 2132 | 421 | 492 | 322 | 479 | 978 | 344 | 67 | 211 | 352 | 114 | 1721 |
| | 585 | 585 | 339 | 1132 | 224 | 651 | 119 | 742 | 1911 | 0 | 481 | 261 | | 344 | 338 | 1927 | 457 | 3755 | 1854 |
| | 474 | 474 | 354 | 1291 | 23 | 316 | 75 | 210 | 191 | 4647 | 215 | 201 | 103 | 766 | 258 | 470 | 967 | 438 | 316 |
| 184 - 274 | 151 | 147 | 333 | 221 | 11 | 22 | 30 | 92 | 26 | | 4 | 6 | 33 | 4 | 20 | 17 | 48 | 0 | 3 |
| | 121 | 121 | 336 | 82 | 151 | 76 | 298 | 13 | 35 | 32 | 19 | 19 | 67 | 31 | 37 | 23 | 10 | 5 | 35 |
| | 103 | 103 | 355 | | 497 | 93 | 120 | 25 | 16 | 343 | 6 | 14 | 110 | 35 | 5 | 6 | 6 | 21 | 2 |
| 275 - 366 | 92 | 96 | 334 | 24 | 16 | 0 | 9 | 17 | 4 | | 5 | 1 | 7 | 5 | 14 | 9 | 8 | 0 | 16 |
| | 58 | 58 | 335 | 194 | 25 | 25 | 30 | 18 | 1 | 23 | 0 | 1 | 23 | 8 | 3 | 9 | 1 | 5 | 3 |
| | 61 | 61 | 356 | | 11 | 7 | 430 | 98 | 7 | 60 | 3 | 4 | 32 | 22 | 7 | 3 | 6 | 2 | 7 |
| 367 - 549 | 93 | 166 | 717 | 30 | | | 0 | 32 | 37 | | 12 | 42 | 260 | 0 | 13 | 11 | 54 | 9 | 2 |
| | 76 | 76 | 719 | 110 | 2 | | 65 | 6 | 1 | 226 | 19 | 9 | 10 | 14 | 29 | 6 | 15 | 3 | 6 |
| | 76 | 76 | 721 | | 18 | | 169 | 67 | 21 | 54 | 6 | 14 | 67 | 17 | 2 | 14 | 17 | 2 | 15 |
| 550 - 731 | 111 | 134 | 718 | | | | 22 | 68 | 8 | | 68 | 47 | 53 | 34 | 50 | 54 | 161 | 48 | 130 |
| | 105 | 105 | 720 | | | | 73 | 0 | 13 | 68 | | 2 | 17 | 4 | 83 | 26 | 31 | 10 | 39 |
| | 93 | 93 | 722 | | 9 | | 81 | 21 | 14 | 39 | 12 | 12 | 26 | 8 | 15 | 5 | 7 | 14 | 29 |
| 732 - 914 | . | 105 | 764 | | | | | | | | | 75 | | 12 | 21 | 36 | | | 4 |
| | . | 99 | 768 | | | | | | | | | 18 | | 7 | 18 | 38 | | | 4 |
| | . | 135 | 772 | | | | | | | | | 173 | | 62 | | 49 | 29 | | 50 |
| 915 -1097 | . | 124 | 765 | | | | | | | | | 24 | | 3 | 20 | 55 | | | 10 |
| | . | 138 | 769 | | | | | | | | | 17 | | 5 | 28 | 59 | | | 20 |
| | . | 128 | 773 | | | | | | | | | 4 | | 13 | 32 | 89 | 12 | | 8 |
| 1098 -1280 | . | 144 | 766 | | | | | | | | | | | 24 | 2 | 37 | | | 57 |
| | . | 128 | 770 | | | | | | | | | | | 4 | 23 | 67 | | | 13 |
| | . | 135 | 774 | | | | | | | | | | | 4 | 31 | 15 | 27 | | 43 |
| 1281 -1463 | . | 158 | 767 | | | | | | | | | | | 15 | 0 | 0 | | | 0 |
| | . | 175 | 771 | | | | | | | | | | | 0 | 17 | 0 | | | 10 |
| | . | 155 | 775 | | | | | | | | | | | 0 | 0 | 0 | 28 | | 21 |
| Grand Total | | | | 14671 | 4036 | 6884 | 7827 | 7013 | 10397 | 12117 | 3698 | 4356 | 12446 | 6396 | 5586 | 9619 | 8798 | 16510 | 14911 |
| Biomass >366 m | | | | 140 | 29 | 0 | 410 | 193 | 95 | 386 | 116 | 436 | 433 | 224 | 384 | 562 | 381 | 87 | 460 |
| Percent >366 m | | | | 1.0 | 0.7 | 0.0 | 5.2 | 2.8 | 0.9 | 3.2 | 3.1 | 10.0 | 3.5 | 3.5 | 6.9 | 5.8 | 4.3 | 0.5 | 3.1 |

Table 6. Abundance (000s) of Witch flounder (M+F) in each stratum from surveys in Div. 3N during spring of 1984-2005. (Engel 145 data converted to Campelen Units for 1984-95).

| Depth Range (m) | Old Stratum Area | New Stratum Area | Stratum | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <=56 | 1593 | 1593 | 375 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 1499 | 1499 | 376 | 0 | 0 | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 34 | 34 | 0 | 0 | 0 | 0 | 0 | 0 |
| 57 - 92 | 2992 | 2992 | 360 | 2234 | 129 | 728 | 741 | 2641 | 220 | 0 | 0 | 59 | 224 | 0 | 0 | 0 | 132 | 65 | 224 | 613 | 0 | 0 | 82 | 123 | 1555 |
| | 1853 | 1853 | 361 | 153 | 0 | 0 | 32 | 36 | 0 | 28 | 0 | 0 | 0 | 0 | 36 | 0 | 0 | 0 | 0 | 212 | 85 | 0 | 0 | 0 | 36 |
| | 2520 | 2520 | 362 | 0 | 95 | 25 | 27 | 173 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2520 | 2520 | 373 | 0 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 931 | 931 | 374 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 43 | 43 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 85 | 0 | 0 | 0 |
| | 674 | 674 | 383 | 0 | 62 | 0 | 31 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 93 - 183 | 421 | 421 | 359 | 405 | 58 | 232 | 58 | 985 | 203 | 0 | 0 | 0 | 29 | 0 | 0 | 0 | 0 | 0 | 203 | 405 | 58 | 29 | 0 | 0 | 695 |
| | 100 | 100 | 377 | 14 | 0 | 0 | 186 | 7 | 83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 647 | 647 | 382 | 0 | 0 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 89 |
| 184 - 274 | 225 | 225 | 358 | 77 | 557 | 93 | 279 | 31 | 46 | 93 | 0 | 93 | 294 | 232 | 31 | 77 | 83 | 261 | 15 | 41 | 325 | 28 | 296 | 0 | 110 |
| | 139 | 139 | 378 | 48 | 29 | 48 | 354 | 86 | 115 | 0 | 0 | 96 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 8 | 33 | 8 | 0 | 17 |
| | 182 | 182 | 381 | 25 | 13 | 42 | 163 | 75 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 0 | 11 | 0 | 0 | 0 | 0 |
| 275 - 366 | 164 | 164 | 357 | 23 | 180 | 553 | | 11 | 237 | 56 | 0 | 90 | 124 | 102 | 23 | 40 | 30 | 373 | 259 | 293 | 63 | 55 | 150 | 45 | 0 |
| | 106 | 106 | 379 | 66 | 36 | 68 | 423 | 102 | 44 | 109 | 7 | 44 | 0 | 22 | 0 | 0 | 18 | 6 | 102 | 28 | 13 | 0 | 16 | 0 | 40 |
| | 116 | 116 | 380 | 8 | 88 | 0 | 247 | 32 | 8 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 8 | 0 | 0 |
| 367 - 549 | 155 | 155 | 723 | | | | | | | | 288 | 341 | 256 | 53 | 181 | 45 | 51 | 149 | 96 | 171 | 88 | 322 | 152 | 96 | 313 |
| | 105 | 105 | 725 | | | | | | | | 166 | | 101 | 87 | 0 | 13 | 235 | 26 | 51 | 72 | 19 | 6 | 17 | 0 | 264 |
| | 160 | 160 | 727 | | | | | | | | 0 | 11 | 55 | 22 | 0 | 0 | 11 | 33 | 33 | 21 | 10 | 0 | 0 | 31 | 68 |
| 550 - 731 | 124 | 124 | 724 | | | | | | | | 1134 | 580 | 597 | 188 | 119 | 128 | 432 | 144 | 550 | 500 | 516 | 267 | 283 | 145 | 171 |
| | 72 | 72 | 726 | | | | | | | | 213 | 59 | 30 | 114 | 5 | 33 | 183 | 322 | 213 | 198 | 346 | 65 | 134 | 63 | 18 |
| | 156 | 156 | 728 | | | | | | | | 182 | 21 | 139 | 29 | 172 | 134 | | 64 | 158 | 145 | 258 | 136 | 143 | 161 | 64 |
| 732 - 914 | . | 134 | 752 | | | | | | | | | | | 37 | | | | | | | | | | | |
| | . | 106 | 756 | | | | | | | | | | | 87 | | | | | | | | | | | |
| | . | 154 | 760 | | | | | | | | | | | 95 | | | | | | | | | | | |
| Grand Total | | | | 3053 | 1246 | 1837 | 2595 | 4180 | 954 | 320 | 1991 | 1394 | 1892 | 1110 | 567 | 470 | 1184 | 1491 | 1947 | 2701 | 1799 | 1027 | 1289 | 664 | 3440 |
| Biomass >366 m | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1984 | 1013 | 1178 | 712 | 477 | 353 | 913 | 738 | 1100 | 1107 | 1236 | 797 | 728 | 496 | 898 |
| Percent >366 m | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 99.6 | 72.7 | 62.3 | 64.1 | 84.1 | 75.0 | 77.1 | 49.5 | 56.5 | 41.0 | 68.7 | 77.6 | 56.5 | 74.6 | 26.1 |

Table 7. Abundance (000s) of Witch flounder (M+F) in each stratum from surveys in Div. 3O during spring of 1984-2005. (Engel 145 data converted to Campelen Units for 1984-95).

| Depth Range (m) | Old Stratum Area | New Stratum Area | Stratum | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 57 - 92 | 2089 | 2089 | 330 | 0 | 0 | 0 | 0 | 32 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 73 | 36 | 210 | 242 | 0 | 0 | 0 | 146 | 205 |
| | 456 | 456 | 331 | 3555 | 376 | 94 | 31 | 1004 | 0 | | 0 | 0 | 0 | 0 | 0 | 63 | 0 | 94 | 1104 | 63 | 721 | 94 | 0 | 0 | 784 |
| | 1898 | 1898 | 338 | 209 | 11894 | 1509 | 1944 | 5418 | 2480 | 587 | 0 | 131 | 479 | 0 | 305 | 1417 | 0 | 671 | 1973 | 348 | 2263 | 305 | 609 | 2990 | 2089 |
| | 1716 | 1716 | 340 | 59 | 210 | 0 | 26 | 0 | 0 | 52 | 0 | 142 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 142 | 0 | 0 | 0 | 0 | 47 |
| | 2520 | 2520 | 351 | 924 | 231 | 495 | 267 | 1317 | 240 | 116 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 39 | 43 | 0 | 0 | 0 | 0 | 0 |
| | 2580 | 2580 | 352 | 101 | 1807 | 431 | 2048 | 1839 | 928 | 1775 | 51 | 89 | 51 | 44 | 71 | 79 | 197 | 35 | 1814 | 197 | 44 | 1952 | 44 | 1183 | 1065 |
| | 1282 | 1282 | 353 | 9347 | 1234 | 1713 | 2146 | 13050 | 3880 | 2910 | 0 | 265 | 353 | 0 | 35 | 35 | 265 | 459 | 5055 | 2539 | 901 | 831 | 1102 | 957 | 872 |
| 93 - 183 | 1721 | 1721 | 329 | 0 | 0 | 0 | 0 | 1454 | 53 | 34 | 763 | 0 | 0 | 12263 | 521 | 0 | 35 | 68 | 623 | 47 | 0 | 0 | 5303 | 0 | 742 |
| | 1047 | 1047 | 332 | 11018 | 16592 | 6529 | 7230 | 16023 | 2852 | 10572 | 4513 | 5761 | 504 | 432 | 3925 | 2927 | 5665 | 1085 | 5045 | 2232 | 8354 | 6769 | 32886 | 24519 | 5041 |
| | 948 | 948 | 337 | 130 | 9181 | 2634 | 3543 | 2641 | 2556 | 2608 | 3182 | 815 | 2087 | 87 | 1239 | 826 | 469 | 848 | 3709 | 3260 | 6738 | 1826 | 1565 | 764 | 2454 |
| | 585 | 585 | 339 | 443 | 0 | 80 | 268 | 134 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 161 | 36 | 80 | 36 | 80 | 282 | 241 | 0 | 0 | 443 |
| | 474 | 474 | 354 | 1174 | 239 | 3282 | 456 | 619 | 196 | 359 | 261 | 261 | 1663 | 0 | 0 | 98 | 33 | 563 | 3208 | 2739 | 2100 | 1467 | 359 | 913 | 1960 |
| 184 - 274 | 151 | 147 | 333 | 21 | 156 | 35 | 0 | 145 | 52 | 332 | 1361 | 187 | 301 | 13447 | 425 | 30 | 277 | 140 | 267 | 261 | 576 | 940 | 215 | 225 | 273 |
| | 121 | 121 | 336 | 25 | 17 | 175 | 67 | 208 | 0 | 158 | 1365 | 3287 | 266 | 3029 | 125 | 432 | 682 | 150 | 173 | 219 | 583 | 1273 | 524 | 258 | 368 |
| | 103 | 103 | 355 | 92 | 418 | 128 | 135 | 0 | 383 | 510 | 340 | 28 | 99 | 340 | 99 | 168 | 195 | 157 | 38 | 41 | 220 | 569 | 945 | 246 | 57 |
| 275 - 366 | 92 | 96 | 334 | 0 | 95 | 165 | 63 | 95 | 44 | 51 | 38 | 272 | 63 | 2238 | 40 | 462 | 880 | 7 | 161 | 167 | 30 | 376 | 533 | 238 | 20 |
| | 58 | 58 | 335 | 0 | 203 | 40 | 8 | 148 | 68 | 331 | 109 | 2340 | 223 | 215 | 108 | 192 | 243 | 12 | 169 | 368 | 60 | 47 | 131 | 35 | 78 |
| | 61 | 61 | 356 | 17 | 214 | 38 | 55 | 109 | 80 | 126 | 92 | 348 | 319 | 189 | 126 | 88 | 40 | 90 | 54 | 50 | 67 | 78 | 131 | 25 | 82 |
| 367 - 549 | 93 | 166 | 717 | | | | | | | | 32 | 371 | 166 | 5960 | 228 | 1362 | 11566 | 710 | 237 | 162 | 273 | 651 | 468 | 46 | 181 |
| | 76 | 76 | 719 | | | | | | | | 288 | 2535 | 267 | 37 | 42 | 364 | 1161 | 150 | 112 | 228 | 97 | 268 | 89 | 19 | 131 |
| | 76 | 76 | 721 | | | | | | | | 235 | 209 | 94 | 193 | 42 | 42 | 63 | 214 | 152 | 112 | 204 | 139 | 84 | 31 | 19 |
| 550 - 731 | 111 | 134 | 718 | | | | | | | | 282 | 122 | 512 | 1161 | 535 | 518 | 507 | 517 | 324 | 138 | 525 | 1189 | 578 | 66 | 177 |
| | 105 | 105 | 720 | | | | | | | | 361 | 376 | 1026 | 498 | 43 | 101 | 518 | 186 | 104 | 351 | 309 | 50 | 104 | 41 | 765 |
| | 93 | 93 | 722 | | | | | | | | 45 | 166 | 512 | 518 | 601 | 274 | 819 | 177 | 364 | 207 | 361 | 198 | 210 | 53 | 154 |
| 732 - 914 | . | 105 | 764 | | | | | | | | | | | 217 | | | | | | | | | | | |
| | . | 135 | 772 | | | | | | | | | | | 501 | | | | | | | | | | | |
| Grand Total | | | | 27114 | 42867 | 17347 | 18286 | 44236 | 13811 | 20520 | 13317 | 17705 | 8983 | 41372 | 8508 | 9639 | 23724 | 6449 | 24969 | 14238 | 24707 | 19265 | 45880 | 32754 | #### |
| Biomass >366 m | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1243 | 3779 | 2576 | 9086 | 1491 | 2661 | 14634 | 1954 | 1293 | 1198 | 1769 | 2495 | 1533 | 255 | 1425 |
| Percent >366 m | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 9.3 | 21.3 | 28.7 | 22.0 | 17.5 | 27.6 | 61.7 | 30.3 | 5.2 | 8.4 | 7.2 | 13.0 | 3.3 | 0.8 | 7.9 |

Table 8. Abundance (000s) of Witch flounder (M+F) in each stratum from surveys in Div. 3N during fall of 1990-2005. (Engel 145 data converted to Campelen Units for 1990-94).

| Depth Range (m) | Old Stratum Area | New Stratum Area | Stratum | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <=56 | 1593 | 1593 | 375 | 0 | 55 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 55 | 0 | 0 | 0 |
| | 1499 | 1499 | 376 | 0 | 0 | 0 | 0 | 0 | 23 | 0 | 19 | 0 | 0 | 0 | 0 | 59 | 59 | 0 | 0 |
| 57 - 92 | 2992 | 2992 | 360 | 382 | 206 | 1646 | 320 | 103 | 1232 | 41 | 672 | 755 | 360 | 926 | 514 | 1080 | 1022 | 1132 | 4888 |
| | 1853 | 1853 | 361 | 32 | 425 | 701 | 0 | 42 | 0 | 0 | 23 | 0 | 306 | 51 | 204 | 255 | 102 | 0 | 211 |
| | 2520 | 2520 | 362 | 441 | 277 | 116 | 0 | 0 | 0 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 198 | 0 | 0 |
| | 2520 | 2520 | 373 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 931 | 931 | 374 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 674 | 674 | 383 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 93 - 183 | 421 | 421 | 359 | 0 | 0 | 608 | 0 | 0 | 87 | 0 | 0 | 2722 | 29 | 0 | 405 | 116 | 232 | 203 | 87 |
| | 100 | 100 | 377 | 0 | | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 647 | 647 | 382 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 184 - 274 | 225 | 225 | 358 | 0 | 46 | 108 | 31 | 0 | 234 | 0 | 31 | 93 | 46 | 69 | 136 | 0 | 307 | 31 | 251 |
| | 139 | 139 | 378 | 0 | 105 | 19 | 0 | 0 | 0 | 0 | 8 | 10 | 0 | 0 | 8 | 10 | 0 | 0 | 0 |
| | 182 | 182 | 381 | | 0 | | 0 | 0 | 0 | 0 | 7 | 13 | 0 | 0 | 11 | 0 | 0 | 0 | 0 |
| 275 - 366 | 164 | 164 | 357 | 0 | 384 | 23 | 338 | 135 | 180 | 0 | 60 | 0 | | 124 | 33 | 20 | 102 | 34 | 98 |
| | 106 | 106 | 379 | 7 | | 15 | 0 | 0 | 0 | 19 | 22 | 0 | 0 | 6 | 296 | 91 | 26 | 1915 | 13 |
| | 116 | 116 | 380 | | 0 | | 0 | 0 | 0 | 0 | 0 | 8 | 8 | 24 | 0 | 0 | 0 | 16 | 24 |
| 367 - 549 | 155 | 155 | 723 | | 53 | | 330 | 394 | 117 | 21 | 88 | 313 | 85 | 104 | 190 | 57 | 347 | 43 | 299 |
| | 105 | 105 | 725 | | | 36 | 701 | 173 | 49 | 0 | 237 | 29 | 101 | 71 | 22 | 14 | 29 | | 21 |
| | 160 | 160 | 727 | | | | 0 | 44 | 11 | 0 | 55 | 11 | 11 | 0 | 13 | 0 | 11 | 11 | 59 |
| 550 - 731 | 124 | 124 | 724 | | 443 | | 1126 | 512 | 223 | 178 | 571 | 326 | 640 | 337 | 264 | 270 | | 177 | 247 |
| | 72 | 72 | 726 | | | | 669 | 114 | 119 | 99 | 40 | 92 | 125 | 40 | 37 | 176 | 129 | 84 | 42 |
| | 156 | 156 | 728 | | | | | 268 | 195 | 129 | 212 | 215 | 311 | 417 | 223 | 633 | 351 | 161 | 73 |
| 732 - 914 | . | 134 | 752 | | | | | | | | | 165 | | 28 | 0 | 74 | | | |
| | . | 106 | 756 | | | | | | | | | 255 | | 149 | 182 | 22 | | | 175 |
| | . | 154 | 760 | | | | | | | | | 244 | | 229 | 409 | 530 | | | 53 |
| 915 -1097 | . | 138 | 753 | | | | | | | | | 0 | | 9 | 0 | 33 | | | |
| | . | 102 | 757 | | | | | | | | | 0 | | 0 | 96 | 92 | | | 7 |
| | . | 171 | 761 | | | | | | | | | 106 | | 578 | 202 | 24 | | | 412 |
| 1098 -128 | . | 180 | 754 | | | | | | | | | 0 | | 0 | 0 | 12 | | | |
| | . | 99 | 758 | | | | | | | | | 0 | | 0 | 0 | 8 | | | 0 |
| | . | 212 | 762 | | | | | | | | | | | 0 | 483 | 0 | | | 58 |
| 1281 -146 | . | 385 | 755 | | | | | | | | | 0 | | 0 | 0 | 0 | | | |
| | . | 127 | 759 | | | | | | | | | 0 | | 0 | 9 | 0 | | | 0 |
| | . | 261 | 763 | | | | | | | | | | | 72 | 18 | 88 | | | 0 |
| Grand Total | | | | 863 | 1995 | 3272 | 3515 | 1793 | 2470 | 488 | 2046 | 5355 | 2073 | 3233 | 3756 | 3717 | 2912 | 3806 | 7017 |
| Biomass >366 m | | | | 0 | 497 | 36 | 2825 | 1506 | 714 | 427 | 1203 | 1755 | 1274 | 2033 | 2148 | 2032 | 866 | 475 | 1446 |
| Percent >366 m | | | | 0.0 | 24.9 | 1.1 | 80.4 | 84.0 | 28.9 | 87.6 | 58.8 | 32.8 | 61.5 | 62.9 | 57.2 | 54.7 | 29.7 | 12.5 | 20.6 |

Table 9. Abundance (000s) of Witch flounder (M+F) in each stratum from surveys in Div. 3O during fall of 1990-2005. (Engel 145 data converted to Campelen Units for 1990-94).

| Depth Range (m) | Old Stratum Area | New Stratum Area | Stratum | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 57 - 92 | 2089 | 2089 | 330 | 131 | 144 | 72 | 0 | 0 | 517 | 0 | 96 | 335 | 383 | 192 | 575 | 588 | 766 | 123 | 479 |
| | 456 | 456 | 331 | 42 | 502 | 125 | 0 | 0 | 408 | 0 | 0 | 596 | 4799 | 533 | 1066 | 1850 | 1004 | 31 | 1098 |
| | 1898 | 1898 | 338 | 3264 | 627 | 1436 | 6893 | 4700 | 8459 | 522 | 2872 | 1723 | 7572 | 609 | 1984 | 2245 | 6893 | 11652 | 4774 |
| | 1716 | 1716 | 340 | 262 | 330 | 118 | 0 | 0 | 295 | 0 | 47 | 0 | 1652 | 189 | 378 | 189 | 94 | 47 | 243 |
| | 2520 | 2520 | 351 | 1837 | 347 | 58 | 0 | 0 | 0 | 0 | 0 | 50 | 347 | 0 | 198 | 0 | 50 | 50 | 99 |
| | 2580 | 2580 | 352 | 1597 | 1242 | 2011 | 1115 | 355 | 371 | 355 | 1141 | 754 | 1825 | 1668 | 1065 | 1448 | 2296 | 6584 | 2484 |
| | 1282 | 1282 | 353 | 2822 | 485 | 941 | 0 | 1176 | 999 | 882 | 573 | 5467 | 5996 | 6172 | 2954 | 9523 | 3395 | 5291 | 6525 |
| 93 - 183 | 1721 | 1721 | 329 | 132 | 101 | 0 | 47 | 0 | 663 | 0 | 616 | 852 | 0 | 0 | 805 | 1989 | 379 | 703 | 710 |
| | 1047 | 1047 | 332 | 3625 | 396 | 5281 | 2064 | 960 | 5233 | 11954 | 1248 | 2544 | 7393 | 3249 | 1392 | 4342 | 3738 | 6145 | 8381 |
| | 948 | 948 | 337 | 2347 | 424 | 2347 | 1043 | 5216 | 1434 | 717 | 1130 | 1613 | 3738 | 1623 | 348 | 714 | 1434 | 397 | 5067 |
| | 585 | 585 | 339 | 1556 | 241 | 724 | 121 | 966 | 2776 | 0 | 1086 | 356 | | 3943 | 563 | 3822 | 684 | 7559 | 4507 |
| | 474 | 474 | 354 | 1891 | 33 | 685 | 359 | 424 | 489 | 8955 | 489 | 782 | 391 | 2478 | 630 | 1415 | 1989 | 1150 | 978 |
| 184 - 274 | 151 | 147 | 333 | 582 | 52 | 83 | 62 | 312 | 187 | | 192 | 147 | 152 | 27 | 118 | 90 | 243 | 30 | 51 |
| | 121 | 121 | 336 | 222 | 466 | 216 | 633 | 42 | 549 | 208 | 100 | 215 | 300 | 141 | 150 | 58 | 75 | 50 | 300 |
| | 103 | 103 | 355 | | 1459 | 298 | 425 | 85 | 63 | 768 | 28 | 170 | 411 | 85 | 21 | 28 | 21 | 92 | 35 |
| 275 - 366 | 92 | 96 | 334 | 76 | 70 | 0 | 21 | 57 | 56 | | 33 | 20 | 58 | 18 | 36 | 35 | 53 | 65 | 122 |
| | 58 | 58 | 335 | 371 | 100 | 112 | 68 | 52 | 64 | 64 | 4 | 40 | 48 | 37 | 8 | 39 | 12 | 18 | 7 |
| | 61 | 61 | 356 | | 25 | 8 | 1254 | 252 | 40 | 113 | 13 | 34 | 75 | 55 | 19 | 17 | 34 | 31 | 45 |
| 367 - 549 | 93 | 166 | 717 | 122 | | | 0 | 96 | 703 | | 46 | 833 | 2166 | 0 | 91 | 203 | 351 | 117 | 10 |
| | 76 | 76 | 719 | 209 | 42 | | 277 | 10 | 52 | 612 | 183 | 178 | 99 | 75 | 183 | 37 | 96 | 96 | 78 |
| | 76 | 76 | 721 | | 47 | | 444 | 183 | 102 | 131 | 17 | 125 | 311 | 98 | 10 | 84 | 81 | 11 | 135 |
| 550 - 731 | 111 | 134 | 718 | | | | 107 | 428 | 164 | | 535 | 618 | 581 | 396 | 488 | 1432 | 1483 | 575 | 1040 |
| | 105 | 105 | 720 | | | | 339 | 0 | 105 | 316 | | 29 | 202 | 39 | 762 | 298 | 302 | 206 | 336 |
| | 93 | 93 | 722 | | 26 | | 243 | 58 | 64 | 134 | 51 | 103 | 122 | 70 | 94 | 34 | 50 | 90 | 199 |
| 732 - 914 | . | 105 | 764 | | | | | | | | | 357 | | 72 | 144 | 217 | | | 29 |
| | . | 99 | 768 | | | | | | | | | 217 | | 24 | 163 | 374 | | | 34 |
| | . | 135 | 772 | | | | | | | | | 1514 | | 669 | | 383 | 190 | | 390 |
| 915 -1097 | . | 124 | 765 | | | | | | | | | 165 | | 31 | 119 | 289 | | | 77 |
| | . | 138 | 769 | | | | | | | | | 180 | | 38 | 237 | 380 | | | 142 |
| | . | 128 | 773 | | | | | | | | | 35 | | 136 | 346 | 708 | 94 | | 62 |
| 1098 -128 | . | 144 | 766 | | | | | | | | | | | 113 | 11 | 146 | | | 307 |
| | . | 128 | 770 | | | | | | | | | | | 36 | 185 | 460 | | | 88 |
| | . | 135 | 774 | | | | | | | | | | | 28 | 241 | 119 | 244 | | 297 |
| 1281 -146 | . | 158 | 767 | | | | | | | | | | | 65 | 0 | 0 | | | 0 |
| | . | 175 | 771 | | | | | | | | | | | 0 | 132 | 0 | | | 60 |
| | . | 155 | 775 | | | | | | | | | | | 0 | 0 | 0 | 213 | | 107 |
| Grand Total | | | | 21086 | 7158 | 14515 | 15517 | 15369 | 23795 | 25731 | 10499 | 20054 | 38620 | 22908 | 15520 | 33557 | 26262 | 41114 | 39294 |
| Biomass >366 m | | | | 331 | 114 | 0 | 1411 | 774 | 1191 | 1193 | 831 | 4354 | 3480 | 1890 | 3210 | 5163 | 3103 | 1095 | 3390 |
| Percent >366 m | | | | 1.6 | 1.6 | 0.0 | 9.1 | 5.0 | 5.0 | 4.6 | 7.9 | 21.7 | 9.0 | 8.3 | 20.7 | 15.4 | 11.8 | 2.7 | 8.6 |

Table 10. Mean numbers per tow for Witch flounder (M+F) in each stratum from surveys in Div. 3N during spring of 1984-2005. (Engel 145 data converted to Campelen Units for 1984-95).

| Depth Range (m) | Old Stratum Area | New Stratum Area | Stratum | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <=56 | 1593 | 1593 | 375 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 1499 | 1499 | 376 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.17 | 0.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 57 - 92 | 2992 | 2992 | 360 | 5.43 | 0.31 | 1.77 | 1.80 | 6.42 | 0.53 | 0.00 | 0.00 | 0.14 | 0.55 | 0.00 | 0.00 | 0.00 | 0.32 | 0.16 | 0.55 | 1.49 | 0.00 | 0.00 | 0.20 | 0.30 | 3.78 |
| | 1853 | 1853 | 361 | 0.60 | 0.00 | 0.00 | 0.13 | 0.14 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.83 | 0.33 | 0.00 | 0.00 | 0.00 | 0.14 |
| | 2520 | 2520 | 362 | 0.00 | 0.27 | 0.07 | 0.08 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2520 | 2520 | 373 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 931 | 931 | 374 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.33 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.67 | 0.00 | 0.00 | 0.00 |
| | 674 | 674 | 383 | 0.00 | 0.67 | 0.00 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 93 - 183 | 421 | 421 | 359 | 7.00 | 1.00 | 4.00 | 1.00 | 17.00 | 3.50 | 0.00 | 0.00 | 0.00 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.50 | 7.00 | 1.00 | 0.50 | 0.00 | 0.00 | 12.00 |
| | 100 | 100 | 377 | 1.00 | 0.00 | 0.00 | 13.50 | 0.50 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 647 | 647 | 382 | 0.00 | 0.00 | 0.00 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 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 |
| 184 - 274 | 225 | 225 | 358 | 2.50 | 18.00 | 3.00 | 9.00 | 1.00 | 1.50 | 3.00 | 0.00 | 3.00 | 9.50 | 7.50 | 1.00 | 2.50 | 2.67 | 8.44 | 0.50 | 1.33 | 10.50 | 0.89 | 9.57 | 0.00 | 3.56 |
| | 139 | 139 | 378 | 2.50 | 1.50 | 2.50 | 18.50 | 4.50 | 6.00 | 0.00 | 0.00 | 5.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.44 | 0.00 | 0.00 | 0.00 | 0.44 | 1.71 | 0.44 | 0.00 | 0.89 |
| | 182 | 182 | 381 | 1.00 | 0.50 | 1.67 | 6.50 | 3.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.00 | 0.00 | 0.44 | 0.00 | 0.00 | 0.00 | 0.00 |
| 275 - 366 | 164 | 164 | 357 | 1.00 | 8.00 | 24.50 | | 0.50 | 10.50 | 2.50 | 0.00 | 4.00 | 5.50 | 4.50 | 1.00 | 1.78 | 1.33 | 16.56 | 11.50 | 13.00 | 2.78 | 2.44 | 6.67 | 2.00 | 0.00 |
| | 106 | 106 | 379 | 4.50 | 2.50 | 4.67 | 29.00 | 7.00 | 3.00 | 7.50 | 0.50 | 3.00 | 0.00 | 1.50 | 0.00 | 0.00 | 1.24 | 0.44 | 7.00 | 1.94 | 0.89 | 0.00 | 1.07 | 0.00 | 2.73 |
| | 116 | 116 | 380 | 0.50 | 5.50 | 0.00 | 15.50 | 2.00 | 0.50 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.00 | 0.00 | 0.00 | 0.50 | 0.00 | 0.00 |
| 367 - 549 | 155 | 155 | 723 | | | | | | | | 13.50 | 16.00 | 12.00 | 2.50 | 8.50 | 2.13 | 2.40 | 7.00 | 4.50 | 8.00 | 4.11 | 15.11 | 7.11 | 4.50 | 14.67 |
| | 105 | 105 | 725 | | | | | | | | 11.50 | | 7.00 | 6.00 | 0.00 | 0.89 | 16.30 | 1.78 | 3.50 | 5.00 | 1.33 | 0.44 | 1.14 | 0.00 | 18.28 |
| | 160 | 160 | 727 | | | | | | | | 0.00 | 0.50 | 2.50 | 1.00 | 0.00 | 0.00 | 0.50 | 1.50 | 1.50 | 0.94 | 0.44 | 0.00 | 0.00 | 1.40 | 3.11 |
| 550 - 731 | 124 | 124 | 724 | | | | | | | | 66.50 | 34.00 | 35.00 | 11.00 | 7.00 | 7.50 | 25.35 | 8.44 | 32.22 | 29.33 | 30.22 | 15.67 | 16.61 | 8.50 | 10.00 |
| | 72 | 72 | 726 | | | | | | | | 21.50 | 6.00 | 3.00 | 11.50 | 0.50 | 3.33 | 18.49 | 32.50 | 21.50 | 20.00 | 34.94 | 6.58 | 13.50 | 6.35 | 1.78 |
| | 156 | 156 | 728 | | | | | | | | 8.50 | 1.00 | 6.50 | 1.33 | 8.00 | 6.22 | | 3.00 | 7.37 | 6.76 | 12.00 | 6.33 | 6.67 | 7.50 | 3.00 |
| 732 - 914 | . | 134 | 752 | | | | | | | | | | | 2.00 | | | | | | | | | | | |
| | . | 106 | 756 | | | | | | | | | | | 6.00 | | | | | | | | | | | |
| | . | 154 | 760 | | | | | | | | | | | 4.50 | | | | | | | | | | | |
| Grand Total | | | | 1.33 | 0.54 | 0.80 | 1.14 | 1.82 | 0.42 | 0.14 | 0.83 | 0.58 | 0.79 | 0.45 | 0.24 | 0.20 | 0.50 | 0.62 | 0.81 | 1.12 | 0.75 | 0.43 | 0.54 | 0.28 | 1.43 |

Table 11. Mean numbers per tow for Witch flounder (M+F) in each stratum from surveys in Div. 3O during spring of 1984-2005. (Engel 145 data converted to Campelen Units for 1984-95).

| Depth Range (m) | Old Stratum Area | New Stratum Area | Stratum | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 57 - 92 | 2089 | 2089 | 330 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | 0.13 | 0.73 | 0.84 | 0.00 | 0.00 | 0.00 | 0.51 | 0.71 |
| | 456 | 456 | 331 | 56.67 | 6.00 | 1.50 | 0.50 | 16.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.50 | 17.60 | 1.00 | 11.50 | 1.50 | 0.00 | 0.00 | 12.50 |
| | 1898 | 1898 | 338 | 0.80 | 45.56 | 5.78 | 7.44 | 20.75 | 9.50 | 2.25 | 0.00 | 0.50 | 1.83 | 0.00 | 1.17 | 5.43 | 0.00 | 2.57 | 7.56 | 1.33 | 8.67 | 1.17 | 2.33 | 11.45 | 8.00 |
| | 1716 | 1716 | 340 | 0.25 | 0.89 | 0.00 | 0.11 | 0.00 | 0.00 | 0.22 | 0.00 | 0.60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.20 |
| | 2520 | 2520 | 351 | 2.67 | 0.67 | 1.43 | 0.77 | 3.80 | 0.69 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2580 | 2580 | 352 | 0.29 | 5.09 | 1.21 | 5.77 | 5.18 | 2.62 | 5.00 | 0.14 | 0.25 | 0.14 | 0.13 | 0.20 | 0.22 | 0.56 | 0.10 | 5.11 | 0.56 | 0.13 | 5.50 | 0.13 | 3.33 | 3.00 |
| | 1282 | 1282 | 353 | 53.00 | 7.00 | 9.71 | 12.17 | 74.00 | 22.00 | 16.50 | 0.00 | 1.50 | 2.00 | 0.00 | 0.20 | 0.20 | 1.50 | 2.60 | 28.66 | 14.40 | 5.11 | 4.71 | 6.25 | 5.43 | 4.94 |
| 93 - 183 | 1721 | 1721 | 329 | 0.00 | 0.00 | 0.00 | 0.00 | 6.14 | 0.22 | 0.14 | 3.22 | 0.00 | 0.00 | 51.80 | 2.20 | 0.00 | 0.15 | 0.29 | 2.63 | 0.20 | 0.00 | 0.00 | 22.40 | 0.00 | 3.13 |
| | 1047 | 1047 | 332 | 76.50 | 115.20 | 45.33 | 50.20 | 111.25 | 19.80 | 73.40 | 31.33 | 40.00 | 3.50 | 3.00 | 27.25 | 20.32 | 39.33 | 7.54 | 35.03 | 15.50 | 58.00 | 47.00 | 228.33 | 170.24 | 35.00 |
| | 948 | 948 | 337 | 1.00 | 70.40 | 20.20 | 27.17 | 20.25 | 19.60 | 20.00 | 24.40 | 6.25 | 16.00 | 0.67 | 9.50 | 6.33 | 3.59 | 6.50 | 28.44 | 25.00 | 51.67 | 14.00 | 12.00 | 5.86 | 18.82 |
| | 585 | 585 | 339 | 5.50 | 0.00 | 1.00 | 3.33 | 1.67 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.00 | 0.44 | 1.00 | 0.44 | 1.00 | 3.50 | 3.00 | 0.00 | 0.00 | 5.50 |
| | 474 | 474 | 354 | 18.00 | 3.67 | 50.33 | 7.00 | 9.50 | 3.00 | 5.50 | 4.00 | 4.00 | 25.50 | 0.00 | 0.00 | 1.50 | 0.50 | 8.64 | 49.20 | 42.00 | 32.21 | 22.50 | 5.50 | 14.00 | 30.06 |
| 184 - 274 | 151 | 147 | 333 | 1.00 | 7.50 | 1.67 | 0.00 | 7.00 | 2.50 | 16.00 | 65.50 | 9.00 | 14.50 | 665.00 | 21.00 | 1.50 | 13.72 | 6.93 | 13.20 | 12.93 | 28.50 | 46.50 | 10.61 | 11.14 | 13.50 |
| | 121 | 121 | 336 | 1.50 | 1.00 | 10.50 | 4.00 | 12.50 | 0.00 | 9.50 | 82.00 | 197.50 | 16.00 | 182.00 | 7.50 | 25.93 | 41.00 | 9.00 | 10.40 | 13.14 | 35.00 | 76.50 | 31.50 | 15.50 | 22.11 |
| | 103 | 103 | 355 | 6.50 | 29.50 | 9.00 | 9.50 | 0.00 | 27.00 | 36.00 | 24.00 | 2.00 | 7.00 | 24.00 | 7.00 | 11.83 | 13.78 | 11.11 | 2.67 | 2.89 | 15.50 | 40.13 | 66.67 | 17.36 | 4.00 |
| 275 - 366 | 92 | 96 | 334 | 0.00 | 7.50 | 13.00 | 5.00 | 7.50 | 3.50 | 4.00 | 3.00 | 21.50 | 5.00 | 169.50 | 3.00 | 35.00 | 66.67 | 0.50 | 12.18 | 12.67 | 2.28 | 28.50 | 40.39 | 18.00 | 1.50 |
| | 58 | 58 | 335 | 0.00 | 25.50 | 5.00 | 1.00 | 18.50 | 8.50 | 41.50 | 13.67 | 293.33 | 28.00 | 27.00 | 13.50 | 24.06 | 30.40 | 1.50 | 21.22 | 46.14 | 7.50 | 5.94 | 16.44 | 4.36 | 9.78 |
| | 61 | 61 | 356 | 2.00 | 25.50 | 4.50 | 6.50 | 13.00 | 9.50 | 15.00 | 11.00 | 41.50 | 38.00 | 22.50 | 15.00 | 10.50 | 4.80 | 10.67 | 6.44 | 6.00 | 7.94 | 9.33 | 15.56 | 3.00 | 9.78 |
| 367 - 549 | 93 | 166 | 717 | | | | | | | | 2.50 | 29.00 | 13.00 | 261.00 | 10.00 | 59.67 | 506.49 | 31.11 | 10.40 | 7.11 | 11.94 | 28.50 | 20.50 | 2.00 | 7.93 |
| | 76 | 76 | 719 | | | | | | | | 27.50 | 242.50 | 25.50 | 3.50 | 4.00 | 34.84 | 111.07 | 14.33 | 10.67 | 21.80 | 9.27 | 25.67 | 8.50 | 1.80 | 12.50 |
| | 76 | 76 | 721 | | | | | | | | 22.50 | 20.00 | 9.00 | 18.50 | 4.00 | 4.00 | 6.04 | 20.50 | 14.55 | 10.67 | 19.56 | 13.33 | 8.00 | 3.00 | 1.78 |
| 550 - 731 | 111 | 134 | 718 | | | | | | | | 18.50 | 8.00 | 33.50 | 63.00 | 29.00 | 28.09 | 27.52 | 28.02 | 17.56 | 7.50 | 28.50 | 64.50 | 31.33 | 3.56 | 9.59 |
| | 105 | 105 | 720 | | | | | | | | 25.00 | 26.00 | 71.00 | 34.50 | 3.00 | 6.98 | 35.83 | 12.84 | 7.20 | 24.28 | 21.39 | 3.43 | 7.22 | 2.83 | 52.94 |
| | 93 | 93 | 722 | | | | | | | | 3.50 | 13.00 | 40.00 | 40.50 | 47.00 | 21.44 | 64.06 | 13.83 | 28.44 | 16.21 | 28.22 | 15.49 | 16.44 | 4.14 | 12.00 |
| 732 - 914 | . | 105 | 764 | | | | | | | | | | | 15.00 | | | | | | | | | | | |
| | . | 135 | 772 | | | | | | | | | | | 27.00 | | | | | | | | | | | |
| Grand Total | | | | 11.01 | 17.41 | 7.04 | 7.43 | 17.96 | 5.61 | 8.55 | 5.25 | 6.97 | 3.54 | 16.00 | 3.33 | 3.78 | 9.30 | 2.53 | 9.78 | 5.58 | 9.68 | 7.55 | 17.98 | 12.83 | 7.05 |

Table 12. Mean numbers per tow for Witch flounder (M+F) in each stratum from surveys in Div. 3N during fall of 1990-2005. (Engel 145 data converted to Campelen Units for 1990-94).

| Depth Range (m) | Old Stratum Area | New Stratum Area | Stratum | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <=56 | 1593 | 1593 | 375 | 0.00 | 0.25 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 | 0.00 | 0.00 |
| | 1499 | 1499 | 376 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.29 | 0.29 | 0.00 | 0.00 |
| 57 - 92 | 2992 | 2992 | 360 | 0.93 | 0.50 | 4.00 | 0.78 | 0.25 | 2.99 | 0.10 | 1.63 | 1.83 | 0.88 | 2.25 | 1.25 | 2.63 | 2.48 | 2.75 | 11.88 |
| | 1853 | 1853 | 361 | 0.13 | 1.67 | 2.75 | 0.00 | 0.17 | 0.00 | 0.00 | 0.09 | 0.00 | 1.20 | 0.20 | 0.80 | 1.00 | 0.40 | 0.00 | 0.83 |
| | 2520 | 2520 | 362 | 1.27 | 0.80 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 0.57 | 0.00 | 0.00 |
| | 2520 | 2520 | 373 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 931 | 931 | 374 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 674 | 674 | 383 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 93 - 183 | 421 | 421 | 359 | 0.00 | 0.00 | 10.50 | 0.00 | 0.00 | 1.50 | 0.00 | 0.00 | 47.00 | 0.50 | 0.00 | 7.00 | 2.00 | 4.00 | 3.50 | 1.50 |
| | 100 | 100 | 377 | 0.00 | | 0.00 | 0.00 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 647 | 647 | 382 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 184 - 274 | 225 | 225 | 358 | 0.00 | 1.50 | 3.50 | 1.00 | 0.00 | 7.56 | 0.00 | 1.00 | 3.00 | 1.50 | 2.22 | 4.39 | 0.00 | 9.91 | 1.00 | 8.11 |
| | 139 | 139 | 378 | 0.00 | 5.50 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.44 | 0.50 | 0.00 | 0.00 | 0.44 | 0.50 | 0.00 | 0.00 | 0.00 |
| | 182 | 182 | 381 | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.30 | 0.50 | 0.00 | 0.00 | 0.44 | 0.00 | 0.00 | 0.00 | 0.00 |
| 275 - 366 | 164 | 164 | 357 | 0.00 | 17.00 | 1.00 | 15.00 | 6.00 | 8.00 | 0.00 | 2.67 | 0.00 | | 5.50 | 1.44 | 0.89 | 4.50 | 1.50 | 4.33 |
| | 106 | 106 | 379 | 0.50 | | 1.00 | 0.00 | 0.00 | 0.00 | 1.33 | 1.50 | 0.00 | 0.00 | 0.44 | 20.33 | 6.21 | 1.78 | 131.36 | 0.89 |
| | 116 | 116 | 380 | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.50 | 1.50 | 0.00 | 0.00 | 0.00 | 1.00 | 1.50 |
| 367 - 549 | 155 | 155 | 723 | | 2.50 | | 15.50 | 18.50 | 5.50 | 1.00 | 4.12 | 14.67 | 4.00 | 4.89 | 8.93 | 2.67 | 16.28 | 2.00 | 14.00 |
| | 105 | 105 | 725 | | | 2.50 | 48.50 | 12.00 | 3.40 | 0.00 | 16.40 | 2.00 | 7.00 | 4.89 | 1.50 | 1.00 | 2.00 | | 1.44 |
| | 160 | 160 | 727 | | | | 0.00 | 2.00 | 0.50 | 0.00 | 2.50 | 0.50 | 0.50 | 0.00 | 0.57 | 0.00 | 0.50 | 0.50 | 2.67 |
| 550 - 731 | 124 | 124 | 724 | | 26.00 | | 66.00 | 30.00 | 13.07 | 10.44 | 33.50 | 19.11 | 37.50 | 19.73 | 15.50 | 15.82 | | 10.35 | 14.49 |
| | 72 | 72 | 726 | | | | 67.50 | 11.50 | 12.00 | 10.00 | 4.00 | 9.33 | 12.67 | 4.00 | 3.71 | 17.78 | 13.00 | 8.50 | 4.28 |
| | 156 | 156 | 728 | | | | | 12.50 | 9.07 | 6.00 | 9.90 | 10.00 | 14.50 | 19.43 | 10.40 | 29.50 | 16.33 | 7.50 | 3.42 |
| 732 - 914 | . | 134 | 752 | | | | | | | | | 8.94 | | 1.50 | 0.00 | 4.00 | | | |
| | . | 106 | 756 | | | | | | | | | 17.50 | | 10.21 | 12.50 | 1.50 | | | 12.00 |
| | . | 154 | 760 | | | | | | | | | 11.50 | | 10.79 | 19.29 | 25.00 | | | 2.50 |
| 915 -1097 | . | 138 | 753 | | | | | | | | | 0.00 | | 0.50 | 0.00 | 1.71 | | | |
| | . | 102 | 757 | | | | | | | | | 0.00 | | 0.00 | 6.86 | 6.57 | | | 0.50 |
| | . | 171 | 761 | | | | | | | | | 4.50 | | 24.57 | 8.57 | 1.00 | | | 17.50 |
| 1098 -128 | . | 180 | 754 | | | | | | | | | 0.00 | | 0.00 | 0.00 | 0.50 | | | |
| | . | 99 | 758 | | | | | | | | | 0.00 | | 0.00 | 0.00 | 0.57 | | | 0.00 |
| | . | 212 | 762 | | | | | | | | | | | 0.00 | 16.57 | 0.00 | | | 2.00 |
| 1281 -146 | . | 385 | 755 | | | | | | | | | 0.00 | | 0.00 | 0.00 | 0.00 | | | |
| | . | 127 | 759 | | | | | | | | | 0.00 | | 0.00 | 0.50 | 0.00 | | | 0.00 |
| | . | 261 | 763 | | | | | | | | | | | 2.00 | 0.50 | 2.44 | | | 0.00 |
| Grand Total | | | | 0.38 | 0.87 | 1.79 | 1.48 | 0.75 | 1.03 | 0.20 | 0.85 | 2.04 | 0.87 | 1.20 | 1.40 | 1.38 | 1.22 | 1.59 | 2.73 |

Table 13. Mean numbers per tow for Witch flounder (M+F) in each stratum from surveys in Div. 3O during fall of 1990-2005. (Engel 145 data converted to Campelen Units for 1990-94).

| Depth Range (m) | Old Stratum Area | New Stratum Area | Stratum | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 57 - 92 | 2089 | 2089 | 330 | 0.46 | 0.50 | 0.25 | 0.00 | 0.00 | 1.80 | 0.00 | 0.33 | 1.17 | 1.33 | 0.67 | 2.00 | 2.05 | 2.67 | 0.43 | 1.67 |
| | 456 | 456 | 331 | 0.67 | 8.00 | 2.00 | 0.00 | 0.00 | 6.50 | 0.00 | 0.00 | 9.50 | 76.50 | 8.50 | 17.00 | 29.50 | 16.00 | 0.50 | 17.50 |
| | 1898 | 1898 | 338 | 12.50 | 2.40 | 5.50 | 26.40 | 18.00 | 32.40 | 2.00 | 11.00 | 6.60 | 29.00 | 2.33 | 7.60 | 8.60 | 26.40 | 44.63 | 18.29 |
| | 1716 | 1716 | 340 | 1.11 | 1.40 | 0.50 | 0.00 | 0.00 | 1.25 | 0.00 | 0.20 | 0.00 | 7.00 | 0.80 | 1.60 | 0.80 | 0.40 | 0.20 | 1.03 |
| | 2520 | 2520 | 351 | 5.30 | 1.00 | 0.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 1.00 | 0.00 | 0.57 | 0.00 | 0.14 | 0.14 | 0.29 |
| | 2580 | 2580 | 352 | 4.50 | 3.50 | 5.67 | 3.14 | 1.00 | 1.05 | 1.00 | 3.21 | 2.13 | 5.14 | 4.70 | 3.00 | 4.08 | 6.47 | 18.55 | 7.00 |
| | 1282 | 1282 | 353 | 16.00 | 2.75 | 5.33 | 0.00 | 6.67 | 5.67 | 5.00 | 3.25 | 31.00 | 34.00 | 35.00 | 16.75 | 54.00 | 19.25 | 30.00 | 37.00 |
| 93 - 183 | 1721 | 1721 | 329 | 0.56 | 0.43 | 0.00 | 0.20 | 0.00 | 2.80 | 0.00 | 2.60 | 3.60 | 0.00 | 0.00 | 3.40 | 8.40 | 1.60 | 2.97 | 3.00 |
| | 1047 | 1047 | 332 | 25.17 | 2.75 | 36.67 | 14.33 | 6.67 | 36.33 | 83.00 | 8.67 | 17.67 | 51.33 | 22.56 | 9.67 | 30.15 | 25.95 | 42.67 | 58.19 |
| | 948 | 948 | 337 | 18.00 | 3.25 | 18.00 | 8.00 | 40.00 | 11.00 | 5.50 | 8.67 | 12.37 | 28.67 | 12.44 | 2.67 | 5.48 | 11.00 | 3.05 | 38.86 |
| | 585 | 585 | 339 | 19.33 | 3.00 | 9.00 | 1.50 | 12.00 | 34.50 | 0.00 | 13.50 | 4.43 | | 49.00 | 7.00 | 47.50 | 8.50 | 93.93 | 56.00 |
| | 474 | 474 | 354 | 29.00 | 0.50 | 10.50 | 5.50 | 6.50 | 7.50 | 137.33 | 7.50 | 12.00 | 6.00 | 38.00 | 9.67 | 21.70 | 30.50 | 17.64 | 15.00 |
| 184 - 274 | 151 | 147 | 333 | 28.00 | 2.50 | 4.00 | 3.00 | 15.00 | 9.00 | | 9.50 | 7.28 | 7.50 | 1.33 | 5.83 | 4.44 | 12.00 | 1.50 | 2.50 |
| | 121 | 121 | 336 | 13.33 | 28.00 | 13.00 | 38.00 | 2.50 | 33.00 | 12.50 | 6.00 | 12.94 | 18.00 | 8.50 | 9.00 | 3.50 | 4.50 | 3.00 | 18.00 |
| | 103 | 103 | 355 | | 103.00 | 21.00 | 30.00 | 6.00 | 4.44 | 54.20 | 2.00 | 12.00 | 29.00 | 6.00 | 1.50 | 2.00 | 1.50 | 6.50 | 2.44 |
| 275 - 366 | 92 | 96 | 334 | 6.00 | 5.50 | 0.00 | 1.67 | 4.50 | 4.43 | | 2.50 | 1.50 | 4.43 | 1.33 | 2.72 | 2.67 | 4.00 | 4.89 | 9.22 |
| | 58 | 58 | 335 | 46.50 | 12.50 | 14.00 | 8.50 | 6.50 | 8.00 | 8.00 | 0.50 | 5.00 | 6.00 | 4.61 | 1.00 | 4.89 | 1.50 | 2.22 | 0.89 |
| | 61 | 61 | 356 | | 3.00 | 1.00 | 149.50 | 30.00 | 4.78 | 13.50 | 1.50 | 4.00 | 8.89 | 6.50 | 2.28 | 2.00 | 4.00 | 3.71 | 5.33 |
| 367 - 549 | 93 | 166 | 717 | 9.50 | | | 0.00 | 7.50 | 54.95 | | 2.00 | 36.50 | 94.83 | 0.00 | 4.00 | 8.89 | 15.39 | 5.14 | 0.44 |
| | 76 | 76 | 719 | 20.00 | 4.00 | | 26.50 | 1.00 | 5.00 | 58.50 | 17.50 | 17.00 | 9.50 | 7.15 | 17.50 | 3.56 | 9.14 | 9.14 | 7.50 |
| | 76 | 76 | 721 | | 4.50 | | 42.50 | 17.50 | 9.80 | 12.50 | 1.60 | 12.00 | 29.71 | 9.33 | 1.00 | 8.00 | 7.72 | 1.02 | 12.89 |
| 550 - 731 | 111 | 134 | 718 | | | | 7.00 | 28.00 | 10.72 | | 29.00 | 33.50 | 31.50 | 21.50 | 26.50 | 77.67 | 80.44 | 31.20 | 56.40 |
| | 105 | 105 | 720 | | | | 23.50 | 0.00 | 7.28 | 21.89 | | 2.00 | 14.00 | 2.67 | 52.76 | 20.62 | 20.89 | 14.29 | 23.24 |
| | 93 | 93 | 722 | | 2.00 | | 19.00 | 4.50 | 5.00 | 10.50 | 4.00 | 8.06 | 9.50 | 5.50 | 7.33 | 2.67 | 3.89 | 7.06 | 15.56 |
| 732 - 914 | . | 105 | 764 | | | | | | | | | 24.71 | | 5.00 | 10.00 | 15.00 | | | 2.00 |
| | . | 99 | 768 | | | | | | | | | 15.94 | | 1.78 | 12.00 | 27.43 | | | 2.50 |
| | . | 135 | 772 | | | | | | | | | 81.50 | | 36.00 | | 20.63 | 10.22 | | 21.00 |
| 915 -1097 | . | 124 | 765 | | | | | | | | | 9.67 | | 1.83 | 7.00 | 16.93 | | | 4.50 |
| | . | 138 | 769 | | | | | | | | | 9.50 | | 2.00 | 12.50 | 20.00 | | | 7.50 |
| | . | 128 | 773 | | | | | | | | | 2.00 | | 7.71 | 19.67 | 40.20 | 5.35 | | 3.50 |
| 1098 -128 | . | 144 | 766 | | | | | | | | | | | 5.71 | 0.57 | 7.39 | | | 15.50 |
| | . | 128 | 770 | | | | | | | | | | | 2.07 | 10.50 | 26.14 | | | 5.00 |
| | . | 135 | 774 | | | | | | | | | | | 1.50 | 13.00 | 6.43 | 13.14 | | 16.00 |
| 1281 -146 | . | 158 | 767 | | | | | | | | | | | 3.00 | 0.00 | 0.00 | | | 0.00 |
| | . | 175 | 771 | | | | | | | | | | | 0.00 | 5.50 | 0.00 | | | 2.50 |
| | . | 155 | 775 | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 10.00 | | 5.00 |
| Grand Total | | | | 8.56 | 2.87 | 5.89 | 6.11 | 6.05 | 9.37 | 10.39 | 4.14 | 7.56 | 15.63 | 8.25 | 5.63 | 12.09 | 9.99 | 16.11 | 14.16 |

Table 14. Mean weights (kg) per tow for Witch flounder (M+F) in each stratum from surveys in Div. 3N during spring of 1984-2005. (Engel 145 data converted to Campelen Units for 1984-95).

| Depth Range (m) | Old Stratum Area | New Stratum Area | Stratum | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <=56 | 1593 | 1593 | 375 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 1499 | 1499 | 376 | 0.00 | 0.00 | 0.00 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 57 - 92 | 2992 | 2992 | 360 | 4.17 | 0.22 | 1.53 | 1.12 | 3.69 | 0.43 | 0.00 | 0.00 | 0.07 | 0.40 | 0.00 | 0.00 | 0.00 | 0.28 | 0.08 | 0.29 | 0.65 | 0.00 | 0.00 | 0.05 | 0.24 | 2.39 |
| | 1853 | 1853 | 361 | 0.47 | 0.00 | 0.00 | 0.15 | 0.20 | 0.00 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.95 | 0.18 | 0.00 | 0.00 | 0.00 | 0.14 |
| | 2520 | 2520 | 362 | 0.00 | 0.24 | 0.07 | 0.05 | 0.42 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2520 | 2520 | 373 | 0.00 | 0.00 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 931 | 931 | 374 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.23 | 0.00 | 0.00 | 0.00 |
| | 674 | 674 | 383 | 0.00 | 0.62 | 0.00 | 0.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 93 - 183 | 421 | 421 | 359 | 3.99 | 0.81 | 1.71 | 0.75 | 5.28 | 2.09 | 0.00 | 0.00 | 0.00 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.15 | 2.58 | 1.00 | 0.23 | 0.00 | 0.00 | 5.78 |
| | 100 | 100 | 377 | 0.58 | 0.00 | 0.00 | 5.25 | 0.21 | 2.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 647 | 647 | 382 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.45 |
| 184 - 274 | 225 | 225 | 358 | 1.29 | 9.94 | 1.37 | 4.42 | 0.64 | 0.95 | 1.86 | 0.00 | 1.44 | 4.26 | 3.42 | 0.24 | 1.65 | 1.58 | 4.33 | 0.21 | 0.29 | 4.98 | 0.47 | 5.43 | 0.00 | 1.36 |
| | 139 | 139 | 378 | 1.17 | 1.00 | 1.69 | 8.10 | 1.64 | 2.19 | 0.00 | 0.00 | 1.51 | 0.00 | 0.00 | 0.00 | 0.00 | 0.18 | 0.00 | 0.00 | 0.00 | 0.24 | 0.41 | 0.07 | 0.00 | 0.00 |
| | 182 | 182 | 381 | 0.82 | 0.28 | 1.27 | 4.04 | 2.77 | 0.00 | 1.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 |
| 275 - 366 | 164 | 164 | 357 | 0.35 | 3.85 | 6.83 | | 0.18 | 2.65 | 0.91 | 0.00 | 1.36 | 2.16 | 3.61 | 0.89 | 1.58 | 0.53 | 7.04 | 0.95 | 3.33 | 0.77 | 1.14 | 2.87 | 1.85 | 0.00 |
| | 106 | 106 | 379 | 2.48 | 0.83 | 1.60 | 11.84 | 3.00 | 1.38 | 2.38 | 0.21 | 1.27 | 0.00 | 0.29 | 0.00 | 0.00 | 0.60 | 0.15 | 1.75 | 0.25 | 0.26 | 0.00 | 0.28 | 0.00 | 0.40 |
| | 116 | 116 | 380 | 0.40 | 3.34 | 0.00 | 8.38 | 1.52 | 0.43 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.35 | 0.00 | 0.00 | 0.00 | 0.20 | 0.00 | 0.00 |
| 367 - 549 | 155 | 155 | 723 | | | | | | | | 4.21 | 4.80 | 3.71 | 1.68 | 2.41 | 0.77 | 1.16 | 2.48 | 1.53 | 1.70 | 1.08 | 6.08 | 2.80 | 1.58 | 5.04 |
| | 105 | 105 | 725 | | | | | | | | 4.26 | | 2.78 | 3.08 | 0.00 | 0.37 | 1.91 | 0.31 | 1.40 | 2.20 | 0.56 | 0.20 | 0.51 | 0.00 | 7.15 |
| | 160 | 160 | 727 | | | | | | | | 0.00 | 0.24 | 1.73 | 0.76 | 0.00 | 0.00 | 0.15 | 0.42 | 0.60 | 0.56 | 0.14 | 0.00 | 0.00 | 1.04 | 1.84 |
| 550 - 731 | 124 | 124 | 724 | | | | | | | | 19.18 | 10.63 | 12.81 | 3.02 | 2.11 | 1.73 | 9.22 | 3.11 | 6.17 | 6.22 | 7.47 | 5.62 | 5.91 | 3.18 | 3.80 |
| | 72 | 72 | 726 | | | | | | | | 8.21 | 2.52 | 2.24 | 2.81 | 0.35 | 1.20 | 4.25 | 9.65 | 5.93 | 6.58 | 8.46 | 1.78 | 5.07 | 2.15 | 0.82 |
| | 156 | 156 | 728 | | | | | | | | 4.31 | 0.88 | 3.84 | 1.02 | 7.07 | 0.97 | | 0.70 | 1.51 | 2.08 | 4.56 | 2.01 | 2.49 | 3.51 | 1.95 |
| 732 - 914 | . | 134 | 752 | | | | | | | | | | | 1.47 | | | | | | | | | | | |
| | . | 106 | 756 | | | | | | | | | | | 2.29 | | | | | | | | | | | |
| | . | 154 | 760 | | | | | | | | | | | 1.22 | | | | | | | | | | | |
| Grand Total | | | | 0.96 | 0.33 | 0.47 | 0.62 | 0.97 | 0.21 | 0.07 | 0.27 | 0.20 | 0.36 | 0.21 | 0.13 | 0.07 | 0.19 | 0.24 | 0.22 | 0.43 | 0.26 | 0.16 | 0.23 | 0.14 | 0.75 |

Table 15. Mean weights (kg) per tow for Witch flounder (M+F) in each stratum from surveys in Div. 3O during spring of 1984-2005. (Engel 145 data converted to Campelen Units for 1984-95).

| Depth Range (m) | Old Stratum Area | New Stratum Area | Stratum | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 57 - 92 | 2089 | 2089 | 330 | 0.00 | 0.00 | 0.00 | 0.00 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.07 | 0.42 | 0.39 | 0.00 | 0.00 | 0.00 | 0.41 | 0.45 |
| | 456 | 456 | 331 | 30.49 | 4.82 | 0.58 | 0.29 | 7.09 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.18 | 0.00 | 0.58 | 8.56 | 0.45 | 5.98 | 1.63 | 0.00 | 0.00 | 4.65 |
| | 1898 | 1898 | 338 | 0.51 | 29.90 | 4.24 | 4.53 | 11.78 | 7.00 | 1.66 | 0.00 | 0.42 | 1.13 | 0.00 | 0.88 | 3.33 | 0.00 | 1.37 | 2.99 | 0.70 | 5.19 | 0.46 | 1.23 | 4.49 | 2.48 |
| | 1716 | 1716 | 340 | 0.17 | 0.62 | 0.00 | 0.09 | 0.00 | 0.00 | 0.07 | 0.00 | 0.62 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 |
| | 2520 | 2520 | 351 | 1.99 | 0.61 | 1.11 | 0.64 | 2.82 | 0.63 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.06 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2580 | 2580 | 352 | 0.23 | 2.68 | 0.63 | 3.59 | 3.75 | 1.87 | 4.02 | 0.11 | 0.30 | 0.17 | 0.11 | 0.18 | 0.17 | 0.28 | 0.15 | 3.37 | 0.37 | 0.15 | 1.95 | 0.08 | 1.77 | 1.55 |
| | 1282 | 1282 | 353 | 25.63 | 6.36 | 6.05 | 9.12 | 40.87 | 14.10 | 9.28 | 0.00 | 1.38 | 1.19 | 0.00 | 0.24 | 0.13 | 0.01 | 1.54 | 12.53 | 7.37 | 2.66 | 3.90 | 2.66 | 3.24 | 2.44 |
| 93 - 183 | 1721 | 1721 | 329 | 0.00 | 0.00 | 0.00 | 0.00 | 3.33 | 0.20 | 0.11 | 2.09 | 0.00 | 0.00 | 21.42 | 0.82 | 0.00 | 0.05 | 0.21 | 1.01 | 0.11 | 0.00 | 0.00 | 9.33 | 0.00 | 0.62 |
| | 1047 | 1047 | 332 | 26.24 | 59.64 | 17.26 | 23.38 | 47.42 | 10.31 | 31.93 | 16.84 | 15.15 | 2.49 | 0.41 | 12.44 | 8.20 | 1.63 | 3.19 | 6.81 | 2.83 | 21.00 | 17.07 | 71.07 | 55.16 | 7.46 |
| | 948 | 948 | 337 | 0.39 | 31.66 | 10.85 | 11.55 | 8.13 | 11.83 | 12.48 | 12.12 | 4.45 | 5.18 | 0.38 | 5.01 | 2.53 | 1.25 | 2.46 | 6.74 | 7.18 | 13.98 | 5.77 | 5.48 | 1.79 | 5.02 |
| | 585 | 585 | 339 | 4.17 | 0.00 | 0.20 | 2.78 | 1.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.01 | 0.01 | 0.01 | 0.06 | 0.02 | 0.00 | 0.00 | 2.35 |
| | 474 | 474 | 354 | 7.60 | 1.61 | 18.88 | 3.58 | 5.30 | 0.73 | 3.68 | 2.21 | 2.28 | 12.90 | 0.00 | 0.00 | 0.55 | 0.01 | 3.46 | 16.28 | 12.68 | 14.02 | 8.48 | 2.50 | 7.60 | 9.81 |
| 184 - 274 | 151 | 147 | 333 | 0.50 | 2.30 | 0.48 | 0.00 | 3.23 | 0.75 | 6.20 | 23.96 | 3.83 | 3.83 | 256.95 | 8.00 | 0.33 | 5.38 | 1.22 | 1.32 | 1.47 | 6.03 | 18.55 | 3.12 | 1.80 | 1.95 |
| | 121 | 121 | 336 | 0.75 | 0.43 | 2.60 | 1.48 | 3.79 | 0.00 | 3.16 | 29.55 | 82.55 | 6.00 | 63.53 | 3.73 | 10.83 | 17.58 | 1.38 | 2.82 | 1.65 | 9.78 | 35.90 | 12.65 | 3.65 | 3.07 |
| | 103 | 103 | 355 | 3.19 | 12.77 | 2.69 | 5.05 | 0.00 | 6.82 | 8.89 | 9.58 | 1.14 | 2.38 | 9.12 | 3.03 | 6.09 | 3.40 | 3.56 | 1.27 | 1.01 | 6.18 | 13.63 | 23.99 | 8.25 | 0.87 |
| 275 - 366 | 92 | 96 | 334 | 0.00 | 3.32 | 3.31 | 1.44 | 1.74 | 1.80 | 2.07 | 1.59 | 8.51 | 1.58 | 65.16 | 1.17 | 11.36 | 27.44 | 0.33 | 0.54 | 0.83 | 0.16 | 10.87 | 10.07 | 2.20 | 0.20 |
| | 58 | 58 | 335 | 0.00 | 12.26 | 2.27 | 0.30 | 6.40 | 2.72 | 11.50 | 5.27 | 138.78 | 8.20 | 12.91 | 5.44 | 9.78 | 13.71 | 0.22 | 7.81 | 16.03 | 0.95 | 1.01 | 6.64 | 1.25 | 1.33 |
| | 61 | 61 | 356 | 0.59 | 9.84 | 2.09 | 2.78 | 2.13 | 3.51 | 6.56 | 4.61 | 15.34 | 9.23 | 9.00 | 7.34 | 4.75 | 1.28 | 3.44 | 2.75 | 1.68 | 4.01 | 4.58 | 5.84 | 1.58 | 2.14 |
| 367 - 549 | 93 | 166 | 717 | | | | | | | | 0.83 | 9.41 | 2.77 | 104.01 | 2.32 | 20.37 | 190.65 | 1.91 | 0.82 | 0.76 | 1.80 | 8.80 | 6.23 | 0.24 | 0.73 |
| | 76 | 76 | 719 | | | | | | | | 14.16 | 97.97 | 4.65 | 1.31 | 1.74 | 13.13 | 57.44 | 1.44 | 1.49 | 2.39 | 1.16 | 9.12 | 3.70 | 0.26 | 1.33 |
| | 76 | 76 | 721 | | | | | | | | 7.24 | 4.64 | 2.93 | 6.91 | 1.76 | 1.55 | 1.80 | 3.65 | 3.50 | 2.64 | 8.17 | 3.60 | 2.47 | 0.85 | 0.40 |
| 550 - 731 | 111 | 134 | 718 | | | | | | | | 2.27 | 1.89 | 6.80 | 11.97 | 4.34 | 3.88 | 1.99 | 1.79 | 2.08 | 0.82 | 3.10 | 3.00 | 2.34 | 0.69 | 0.70 |
| | 105 | 105 | 720 | | | | | | | | 15.00 | 9.28 | 12.60 | 6.56 | 1.03 | 1.48 | 10.41 | 2.19 | 1.42 | 2.79 | 2.60 | 0.51 | 1.57 | 0.65 | 4.81 |
| | 93 | 93 | 722 | | | | | | | | 1.42 | 3.86 | 11.72 | 16.93 | 16.11 | 6.94 | 6.78 | 2.42 | 5.54 | 3.69 | 9.42 | 4.84 | 4.97 | 0.94 | 2.13 |
| 732 - 914 | . | 105 | 764 | | | | | | | | | | | 4.17 | | | | | | | | | | | |
| | . | 135 | 772 | | | | | | | | | | | 4.07 | | | | | | | | | | | |
| Grand Total | | | | 4.92 | 9.67 | 3.30 | 3.98 | 9.11 | 3.45 | 4.41 | 2.53 | 3.05 | 1.33 | 6.10 | 1.47 | 1.53 | 2.62 | 0.83 | 3.30 | 1.74 | 3.44 | 2.81 | 6.00 | 4.50 | 1.98 |

Table 16. Mean weights (kg) per tow for Witch flounder (M+F) in each stratum from surveys in Div. 3N during fall of 1990-2005. (Engel 145 data conver to Campelen Units for 1990-94).

| Depth Range (m) | Old Stratum Area | New Stratum Area | Stratum | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <=56 | 1593 | 1593 | 375 | 0.00 | 0.33 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.00 |
| | 1499 | 1499 | 376 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.19 | 0.13 | 0.00 | 0.00 |
| 57 - 92 | 2992 | 2992 | 360 | 0.64 | 0.42 | 3.15 | 0.42 | 0.18 | 2.16 | 0.06 | 1.04 | 1.05 | 0.43 | 1.30 | 0.79 | 1.26 | 1.42 | 2.03 | 5.74 |
| | 1853 | 1853 | 361 | 0.11 | 1.83 | 1.82 | 0.00 | 0.13 | 0.00 | 0.00 | 0.06 | 0.00 | 1.05 | 0.11 | 0.67 | 0.58 | 0.39 | 0.00 | 0.66 |
| | 2520 | 2520 | 362 | 1.15 | 0.64 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.09 | 0.00 | 0.00 | 0.00 | 0.39 | 0.00 | 0.00 |
| | 2520 | 2520 | 373 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 931 | 931 | 374 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 674 | 674 | 383 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 93 - 183 | 421 | 421 | 359 | 0.00 | 0.00 | 4.81 | 0.00 | 0.00 | 0.39 | 0.00 | 0.00 | 20.95 | 0.01 | 0.00 | 2.10 | 0.73 | 1.90 | 2.40 | 0.75 |
| | 100 | 100 | 377 | 0.00 | | 0.00 | 0.00 | 0.56 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 647 | 647 | 382 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 184 - 274 | 225 | 225 | 358 | 0.00 | 0.65 | 2.14 | 0.76 | 0.00 | 2.40 | 0.00 | 0.36 | 0.98 | 0.63 | 1.29 | 1.45 | 0.00 | 4.69 | 0.73 | 3.44 |
| | 139 | 139 | 378 | 0.00 | 2.17 | 0.81 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.01 | 0.00 | 0.00 | 0.14 | 0.27 | 0.00 | 0.00 | 0.00 |
| | 182 | 182 | 381 | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.01 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 |
| 275 - 366 | 164 | 164 | 357 | 0.00 | 10.39 | 0.42 | 8.27 | 1.91 | 3.76 | 0.00 | 1.18 | 0.00 | | 2.33 | 0.82 | 0.91 | 1.80 | 1.20 | 1.64 |
| | 106 | 106 | 379 | 0.27 | | 0.25 | 0.00 | 0.00 | 0.00 | 0.04 | 0.45 | 0.00 | 0.00 | 0.13 | 7.59 | 2.24 | 0.58 | 59.46 | 0.00 |
| | 116 | 116 | 380 | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.14 | 0.30 | 0.00 | 0.00 | 0.00 | 0.55 | 0.68 |
| 367 - 549 | 155 | 155 | 723 | | 1.93 | | 7.65 | 8.44 | 2.69 | 0.73 | 1.31 | 3.48 | 1.25 | 1.33 | 3.09 | 0.77 | 5.77 | 0.95 | 4.58 |
| | 105 | 105 | 725 | | | 1.01 | 26.05 | 3.20 | 1.31 | 0.00 | 9.32 | 0.68 | 2.28 | 1.29 | 0.48 | 0.38 | 0.68 | | 0.51 |
| | 160 | 160 | 727 | | | | 0.00 | 1.71 | 0.01 | 0.00 | 1.30 | 0.30 | 0.20 | 0.00 | 0.46 | 0.00 | 0.02 | 0.33 | 0.97 |
| 550 - 731 | 124 | 124 | 724 | | 10.11 | | 24.29 | 10.57 | 6.09 | 3.54 | 11.58 | 4.21 | 10.60 | 5.08 | 4.13 | 5.28 | | 4.09 | 5.54 |
| | 72 | 72 | 726 | | | | 31.26 | 5.47 | 4.80 | 4.03 | 2.08 | 3.80 | 3.39 | 1.59 | 2.18 | 5.96 | 5.20 | 3.20 | 1.92 |
| | 156 | 156 | 728 | | | | | 7.11 | 1.62 | 1.00 | 3.53 | 3.65 | 4.95 | 7.11 | 4.80 | 13.33 | 8.31 | 4.34 | 0.90 |
| 732 - 914 | . | 134 | 752 | | | | | | | | | 6.54 | | 1.23 | 0.00 | 0.03 | | | |
| | . | 106 | 756 | | | | | | | | | 8.53 | | 3.47 | 5.67 | 0.60 | | | 5.60 |
| | . | 154 | 760 | | | | | | | | | 4.18 | | 1.93 | 3.67 | 8.18 | | | 0.83 |
| 915 -1097 | . | 138 | 753 | | | | | | | | | 0.00 | | 0.01 | 0.00 | 0.17 | | | |
| | . | 102 | 757 | | | | | | | | | 0.00 | | 0.00 | 2.66 | 0.48 | | | 0.01 |
| | . | 171 | 761 | | | | | | | | | 1.94 | | 6.23 | 1.80 | 0.41 | | | 5.00 |
| 1098 -128 | . | 180 | 754 | | | | | | | | | 0.00 | | 0.00 | 0.00 | 0.01 | | | |
| | . | 99 | 758 | | | | | | | | | 0.00 | | 0.00 | 0.00 | 0.01 | | | 0.00 |
| | . | 212 | 762 | | | | | | | | | | | 0.00 | 3.74 | 0.00 | | | 0.50 |
| 1281 -146 | . | 385 | 755 | | | | | | | | | 0.00 | | 0.00 | 0.00 | 0.00 | | | |
| | . | 127 | 759 | | | | | | | | | 0.00 | | 0.00 | 0.10 | 0.00 | | | 0.00 |
| | . | 261 | 763 | | | | | | | | | | | 0.53 | 0.15 | 0.28 | | | 0.00 |
| Grand Total | | | | 0.31 | 0.63 | 1.22 | 0.69 | 0.34 | 0.56 | 0.07 | 0.41 | 0.89 | 0.37 | 0.46 | 0.53 | 0.56 | 0.64 | 0.89 | 1.25 |

Table 17. Mean weights (kg) per tow for Witch flounder (M+F) in each stratum from surveys in Div. 3O during fall of 1990-2005. (Engel 145 data conver to Campelen Units for 1990-94).

| Depth Range (m) | Old Stratum Area | New Stratum Area | Stratum | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 57 - 92 | 2089 | 2089 | 330 | 0.43 | 0.23 | 0.28 | 0.00 | 0.00 | 0.86 | 0.00 | 0.25 | 0.58 | 0.73 | 0.17 | 0.99 | 1.19 | 1.53 | 0.26 | 1.09 |
| | 456 | 456 | 331 | 0.35 | 5.02 | 2.14 | 0.00 | 0.00 | 1.73 | 0.00 | 0.00 | 4.08 | 15.08 | 3.88 | 7.46 | 12.35 | 4.88 | 0.23 | 6.28 |
| | 1898 | 1898 | 338 | 8.53 | 1.68 | 3.21 | 15.19 | 8.40 | 17.94 | 1.93 | 5.09 | 1.85 | 10.48 | 1.44 | 3.61 | 3.74 | 10.21 | 14.94 | 7.40 |
| | 1716 | 1716 | 340 | 0.73 | 1.19 | 0.27 | 0.00 | 0.00 | 0.86 | 0.00 | 0.09 | 0.00 | 1.76 | 0.44 | 0.73 | 0.52 | 0.24 | 0.12 | 0.49 |
| | 2520 | 2520 | 351 | 4.87 | 0.82 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.59 | 0.00 | 0.50 | 0.00 | 0.07 | 0.10 | 0.16 |
| | 2580 | 2580 | 352 | 3.99 | 2.52 | 3.81 | 2.66 | 0.64 | 1.07 | 0.77 | 1.62 | 1.06 | 4.20 | 2.59 | 1.21 | 2.22 | 2.72 | 9.51 | 4.69 |
| | 1282 | 1282 | 353 | 13.64 | 1.94 | 2.70 | 0.00 | 4.15 | 3.05 | 4.48 | 0.95 | 6.04 | 16.99 | 13.49 | 7.71 | 8.45 | 6.83 | 15.07 | 21.04 |
| 93 - 183 | 1721 | 1721 | 329 | 0.42 | 0.36 | 0.00 | 0.07 | 0.00 | 1.76 | 0.00 | 0.73 | 1.29 | 0.00 | 0.00 | 1.19 | 3.09 | 0.41 | 2.05 | 1.06 |
| | 1047 | 1047 | 332 | 14.59 | 1.08 | 11.97 | 5.65 | 2.23 | 7.74 | 31.73 | 1.32 | 1.70 | 11.55 | 3.77 | 2.38 | 8.02 | 5.60 | 10.50 | 14.31 |
| | 948 | 948 | 337 | 10.22 | 1.45 | 7.32 | 4.32 | 16.35 | 3.23 | 3.78 | 2.47 | 3.67 | 7.50 | 2.64 | 0.51 | 1.62 | 2.70 | 0.88 | 13.20 |
| | 585 | 585 | 339 | 14.07 | 2.78 | 8.10 | 1.48 | 9.22 | 23.75 | 0.00 | 5.98 | 3.25 | | 4.27 | 4.20 | 23.95 | 5.68 | 46.66 | 23.04 |
| | 474 | 474 | 354 | 19.81 | 0.36 | 4.85 | 1.16 | 3.22 | 2.94 | 71.28 | 3.30 | 3.08 | 1.58 | 11.75 | 3.95 | 7.21 | 14.83 | 6.72 | 4.85 |
| 184 - 274 | 151 | 147 | 333 | 10.65 | 0.52 | 1.07 | 1.46 | 4.43 | 1.24 | | 0.19 | 0.29 | 1.65 | 0.18 | 0.99 | 0.84 | 2.38 | 0.01 | 0.17 |
| | 121 | 121 | 336 | 4.92 | 9.10 | 4.57 | 17.93 | 0.78 | 2.08 | 1.93 | 1.13 | 1.14 | 4.03 | 1.88 | 2.20 | 1.36 | 0.58 | 0.33 | 2.10 |
| | 103 | 103 | 355 | | 35.07 | 6.59 | 8.44 | 1.76 | 1.16 | 24.22 | 0.45 | 0.99 | 7.75 | 2.48 | 0.35 | 0.45 | 0.46 | 1.50 | 0.18 |
| 275 - 366 | 92 | 96 | 334 | 1.93 | 1.26 | 0.00 | 0.75 | 1.34 | 0.28 | | 0.41 | 0.11 | 0.52 | 0.40 | 1.03 | 0.67 | 0.60 | 0.01 | 1.24 |
| | 58 | 58 | 335 | 24.31 | 3.09 | 3.20 | 3.76 | 2.23 | 0.10 | 2.89 | 0.01 | 0.17 | 2.92 | 1.00 | 0.37 | 1.07 | 0.09 | 0.67 | 0.36 |
| | 61 | 61 | 356 | | 1.35 | 0.81 | 51.23 | 11.66 | 0.84 | 7.14 | 0.38 | 0.50 | 3.80 | 2.67 | 0.88 | 0.36 | 0.70 | 0.21 | 0.89 |
| 367 - 549 | 93 | 166 | 717 | 2.31 | | | 0.00 | 2.50 | 2.87 | | 0.53 | 1.83 | 11.37 | 0.00 | 0.58 | 0.50 | 2.38 | 0.40 | 0.11 |
| | 76 | 76 | 719 | 10.53 | 0.23 | | 6.24 | 0.58 | 0.13 | 21.58 | 1.78 | 0.85 | 0.93 | 1.29 | 2.80 | 0.56 | 1.46 | 0.32 | 0.55 |
| | 76 | 76 | 721 | | 1.69 | | 16.19 | 6.39 | 2.02 | 5.15 | 0.54 | 1.32 | 6.43 | 1.59 | 0.20 | 1.35 | 1.62 | 0.23 | 1.42 |
| 550 - 731 | 111 | 134 | 718 | | | | 1.45 | 4.43 | 0.52 | | 3.70 | 2.55 | 2.90 | 1.83 | 2.73 | 2.94 | 8.71 | 2.63 | 7.06 |
| | 105 | 105 | 720 | | | | 5.02 | 0.00 | 0.91 | 4.68 | | 0.12 | 1.15 | 0.24 | 5.72 | 1.78 | 2.16 | 0.70 | 2.67 |
| | 93 | 93 | 722 | | 0.69 | | 6.30 | 1.62 | 1.13 | 3.03 | 0.91 | 0.91 | 2.05 | 0.66 | 1.16 | 0.38 | 0.58 | 1.07 | 2.24 |
| 732 - 914 | . | 105 | 764 | | | | | | | | | 5.21 | | 0.80 | 1.43 | 2.50 | | | 0.26 |
| | . | 99 | 768 | | | | | | | | | 1.34 | | 0.49 | 1.35 | 2.80 | | | 0.27 |
| | . | 135 | 772 | | | | | | | | | 9.29 | | 3.33 | | 2.65 | 1.54 | | 2.68 |
| 915 -1097 | . | 124 | 765 | | | | | | | | | 1.40 | | 0.21 | 1.18 | 3.25 | | | 0.59 |
| | . | 138 | 769 | | | | | | | | | 0.92 | | 0.26 | 1.45 | 3.13 | | | 1.08 |
| | . | 128 | 773 | | | | | | | | | 0.23 | | 0.73 | 1.80 | 5.08 | 0.71 | | 0.45 |
| 1098 -128 | . | 144 | 766 | | | | | | | | | | | 1.21 | 0.13 | 1.85 | | | 2.90 |
| | . | 128 | 770 | | | | | | | | | | | 0.23 | 1.29 | 3.79 | | | 0.73 |
| | . | 135 | 774 | | | | | | | | | | | 0.22 | 1.65 | 0.83 | 1.46 | | 2.33 |
| 1281 -146 | . | 158 | 767 | | | | | | | | | | | 0.68 | 0.00 | 0.00 | | | 0.00 |
| | . | 175 | 771 | | | | | | | | | | | 0.00 | 0.73 | 0.00 | | | 0.41 |
| | . | 155 | 775 | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 1.29 | | 0.98 |
| Grand Total | | | | 5.96 | 1.62 | 2.80 | 3.08 | 2.76 | 4.10 | 4.89 | 1.46 | 1.64 | 5.04 | 2.30 | 2.03 | 3.47 | 3.35 | 6.47 | 5.37 |

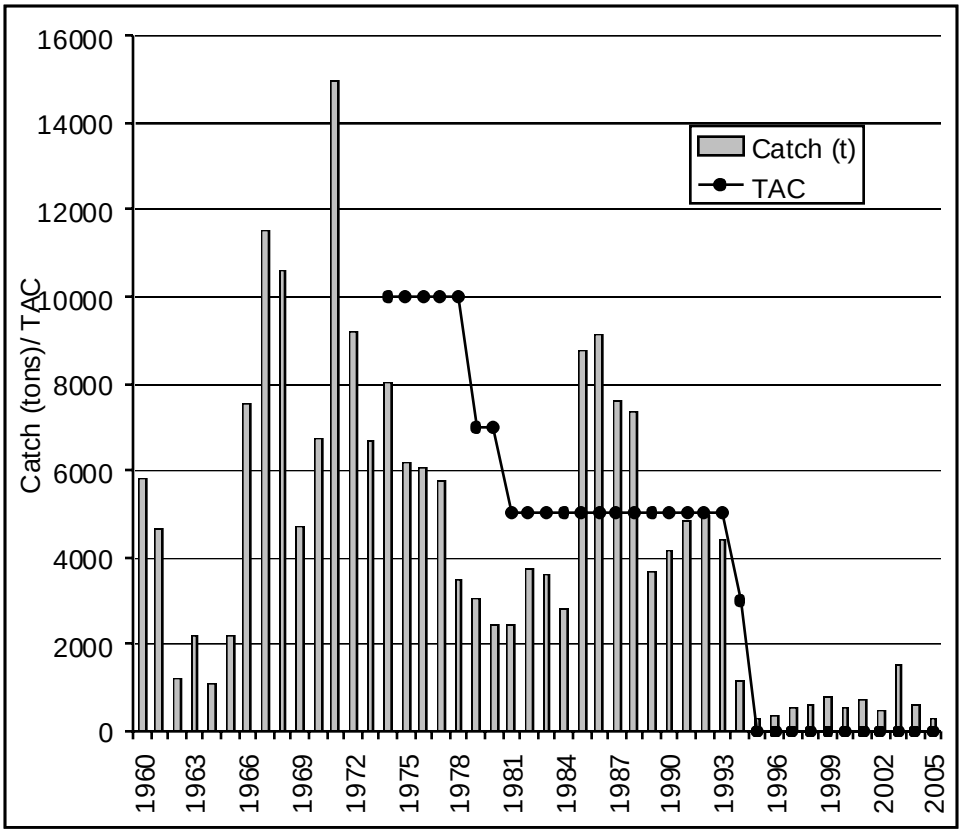


Fig. 1. Commercial catches of witch flounder in Div. 3NO from 1960-2003 and TACs from1974-2004. * Note: Although a TAX of 3 000 tons was agreed by the Fisheries Commission, it was also agreed that no directed fishing on witch flounder in Div. 3NO take place during 1994 due to the poor state of the stock. Estimated catch in2003 is the mean of a range of catch from several sources.

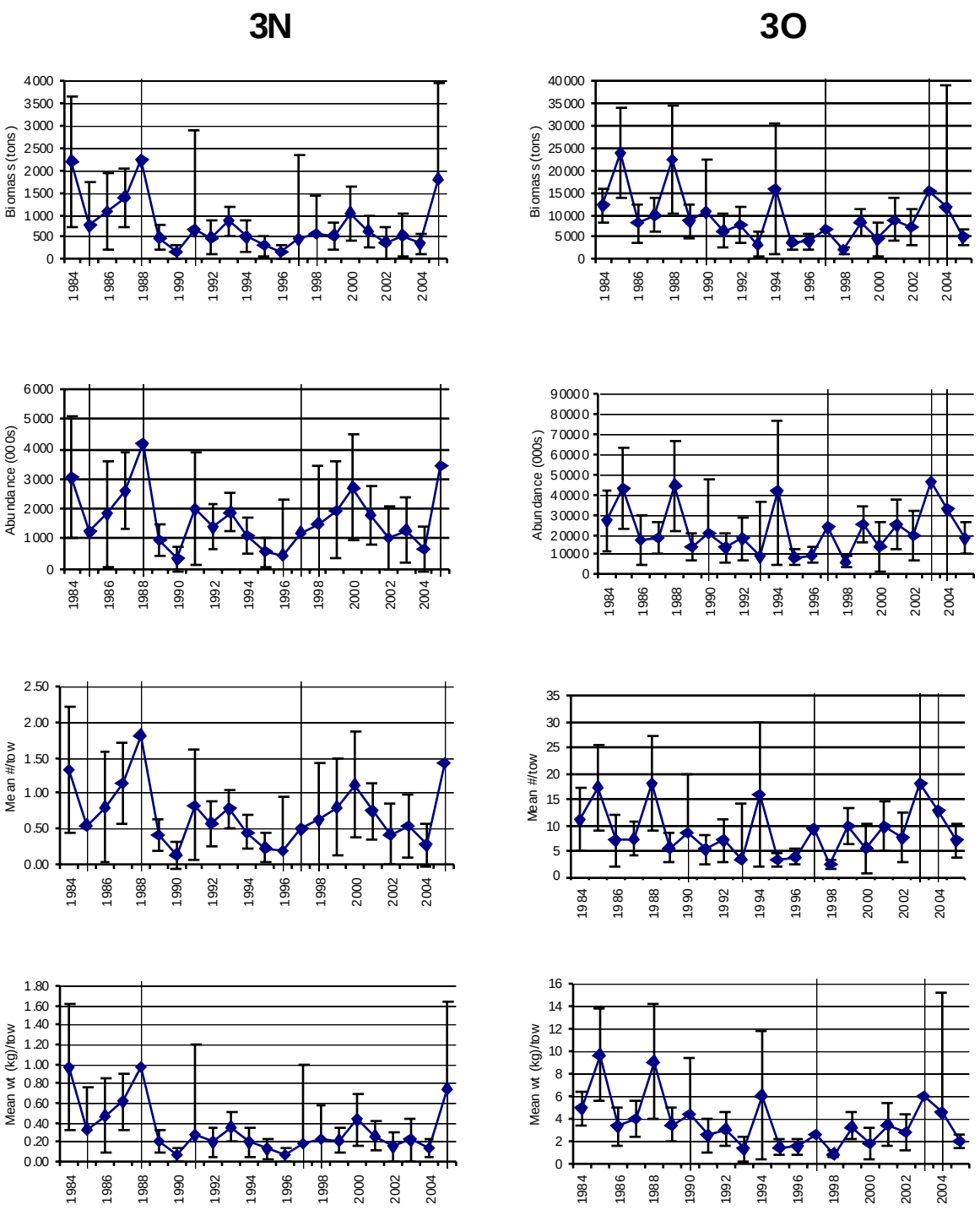


Fig. 2. Biomass (tons), abundance ('000s), and mean numbers and weights (kg) per tow for witch flounder from Canadian spring surveys in Div. 3N and 3O during 1984-2005.

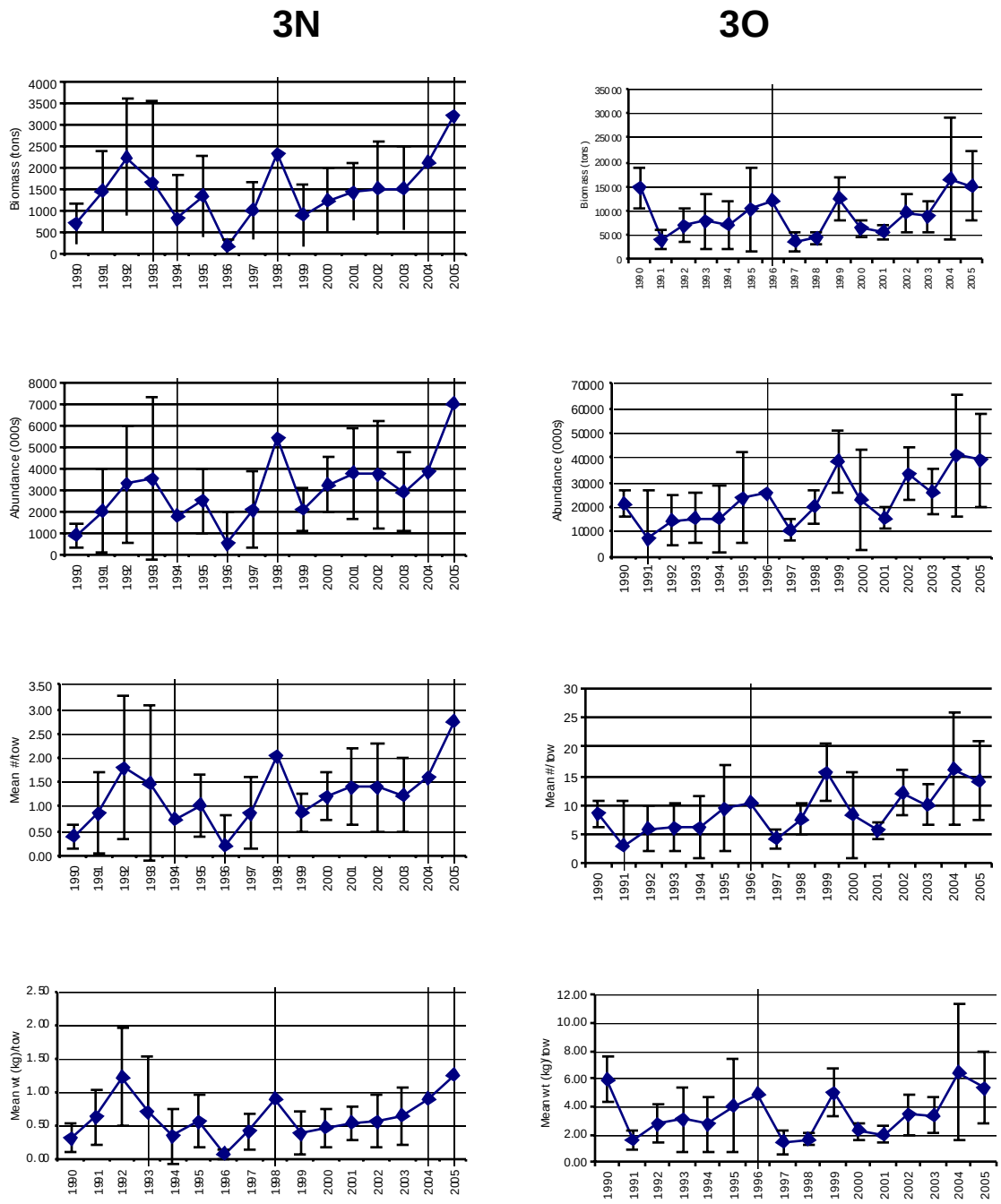


Fig. 3. Biomass (tons), abundance ('000s), and mean numbers and weights (kg) per tow for witch flounder from Canadian fall surveys in Div. 3N and 3O during 1990-2005.

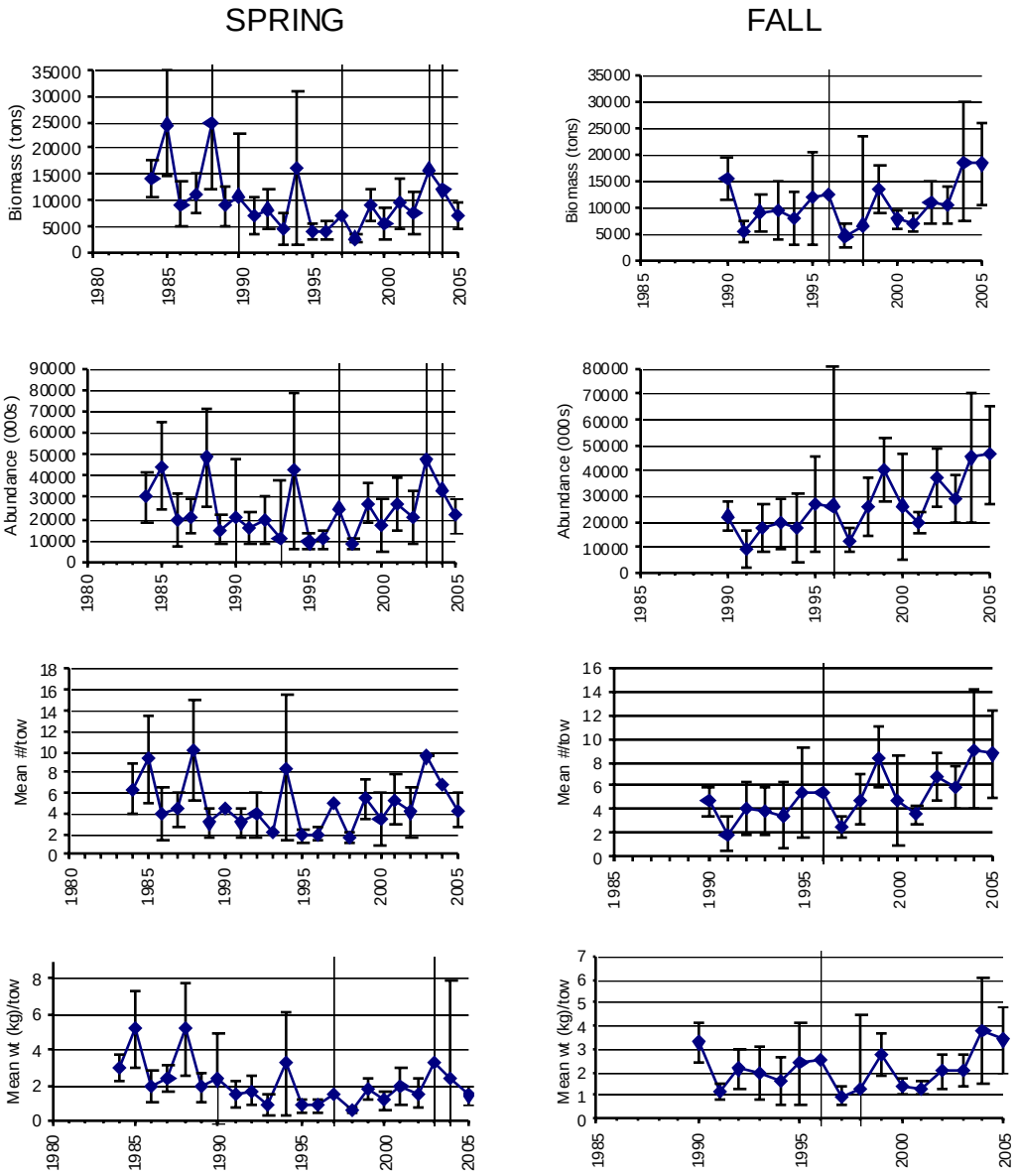


Fig. 4. Biomass (tons), abundance ('000s), and mean numbers and weights (kg) per tow for witch flounder in Div. 3NO combined.

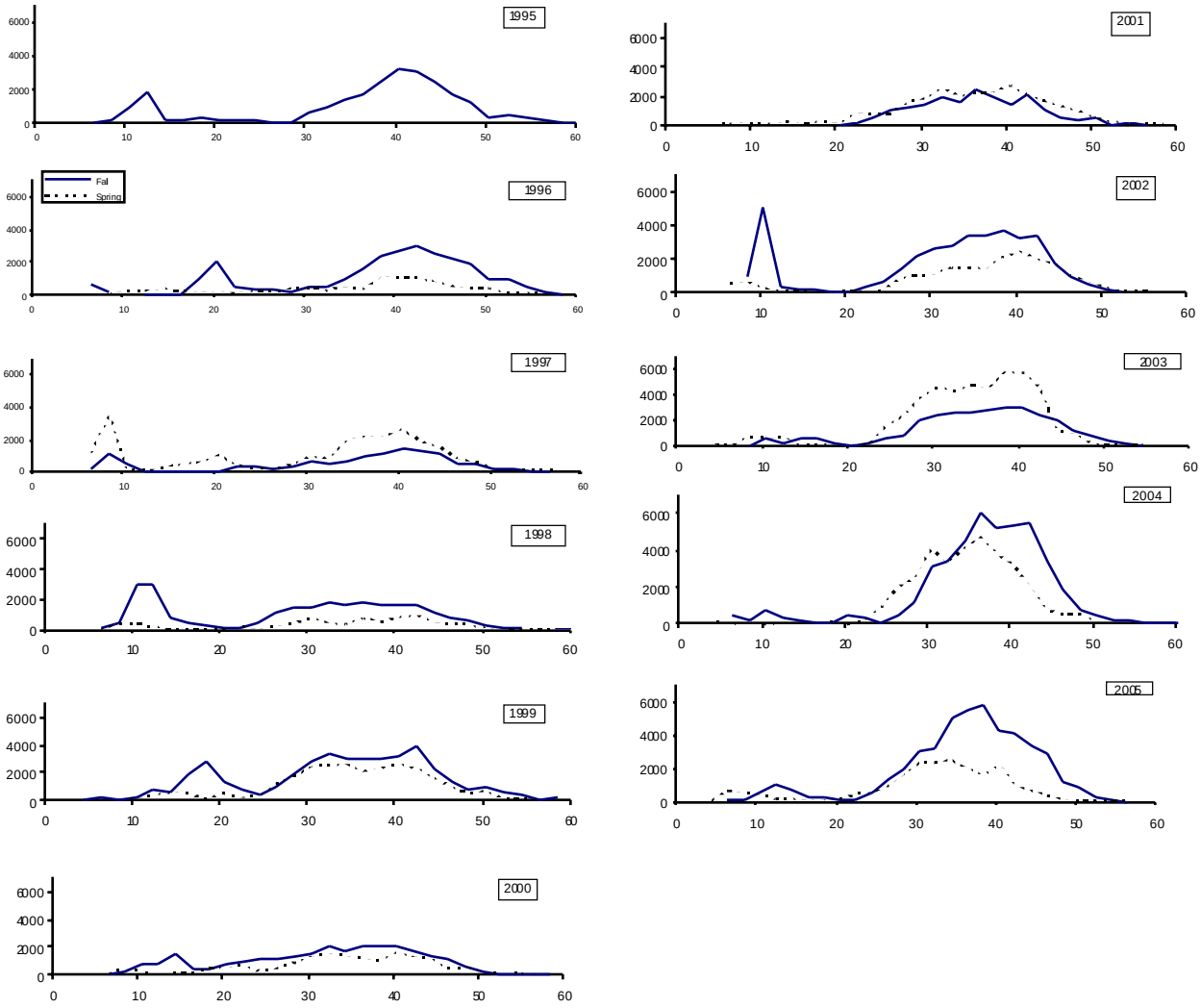


Fig. 5. Length frequency distributions of witch flounder from both spring and fall surveys using the Campelen 1800 shrimp trawl. Estimates represent abundance at length (cm) of the surveyed area. All distributions are for Div. 3NO combined.

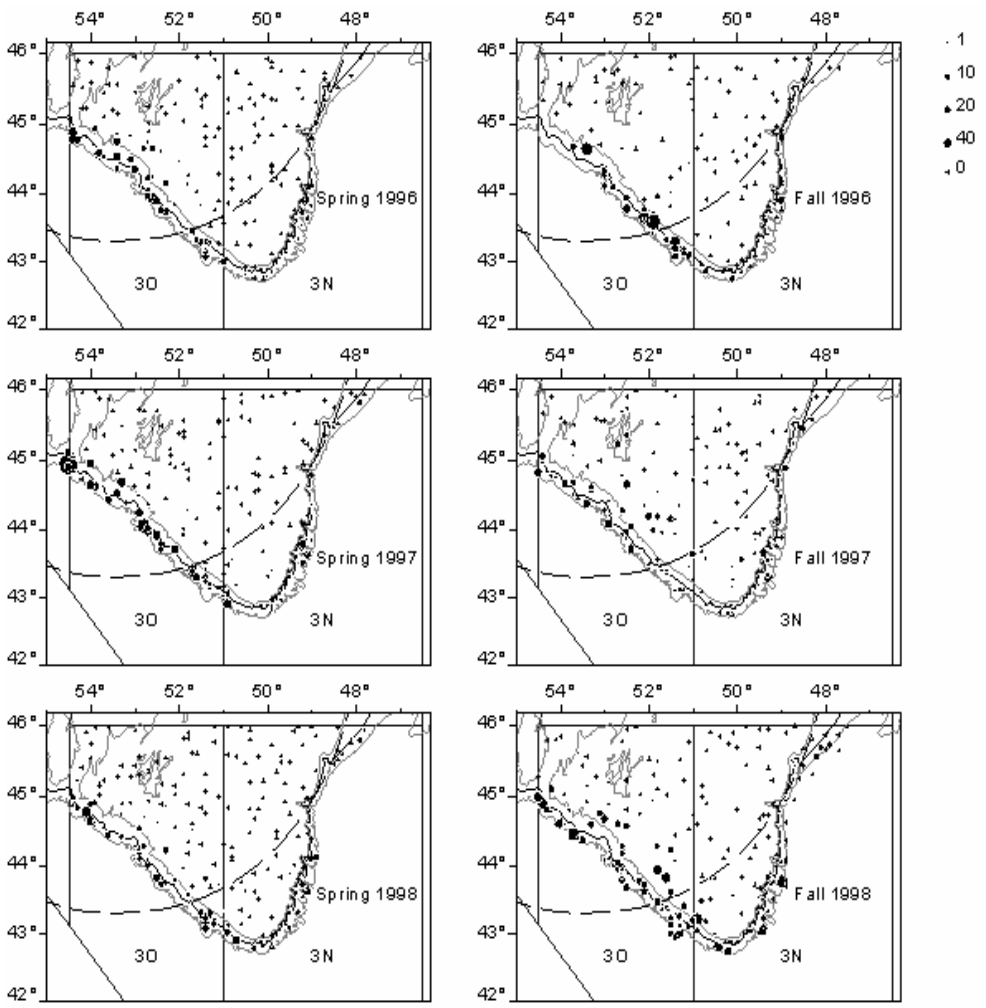


Fig. 6a. Distribution of witch flounder (numbers per set) from spring and fall Canadian surveys in NAFO Div. 3NO during 1996-1998.

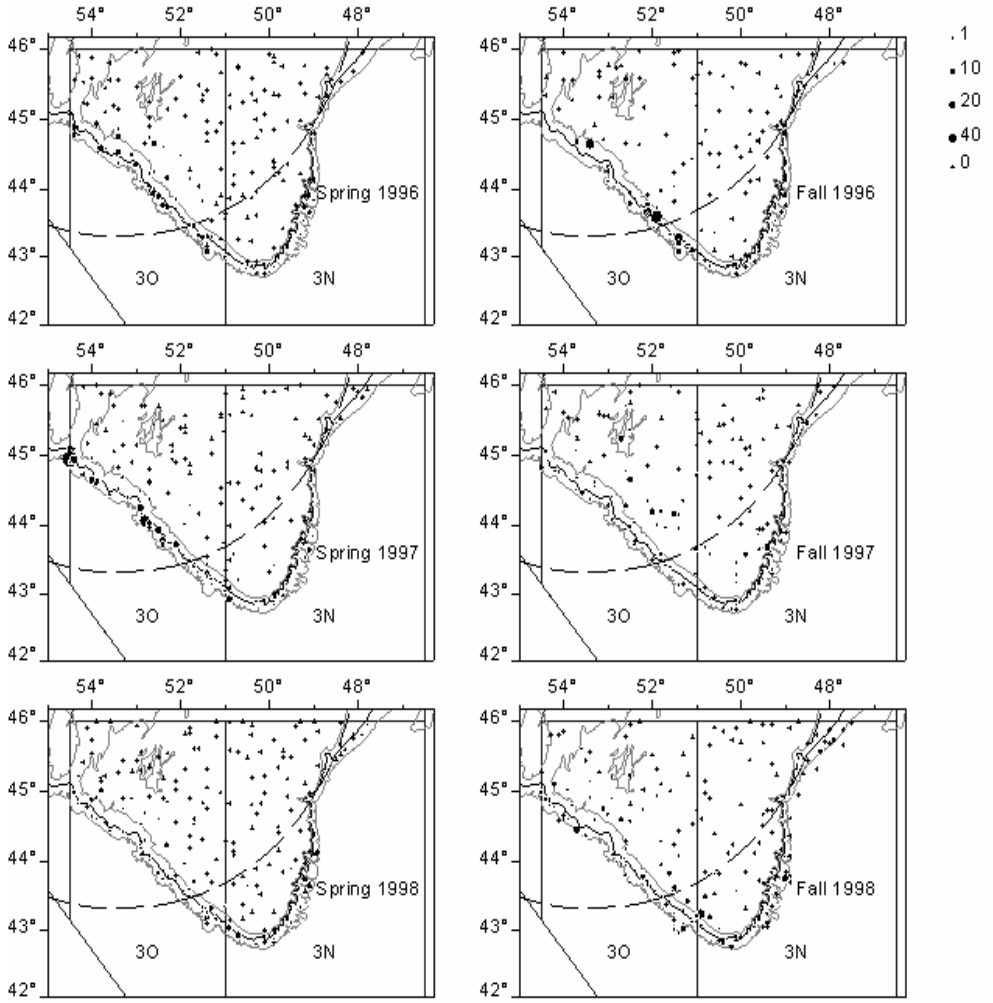


Fig. 6b. Distribution of witch flounder (weights (kg) per set) from spring and fall Canadian surveys in NAFO Div. 3NO during 1996-1998.

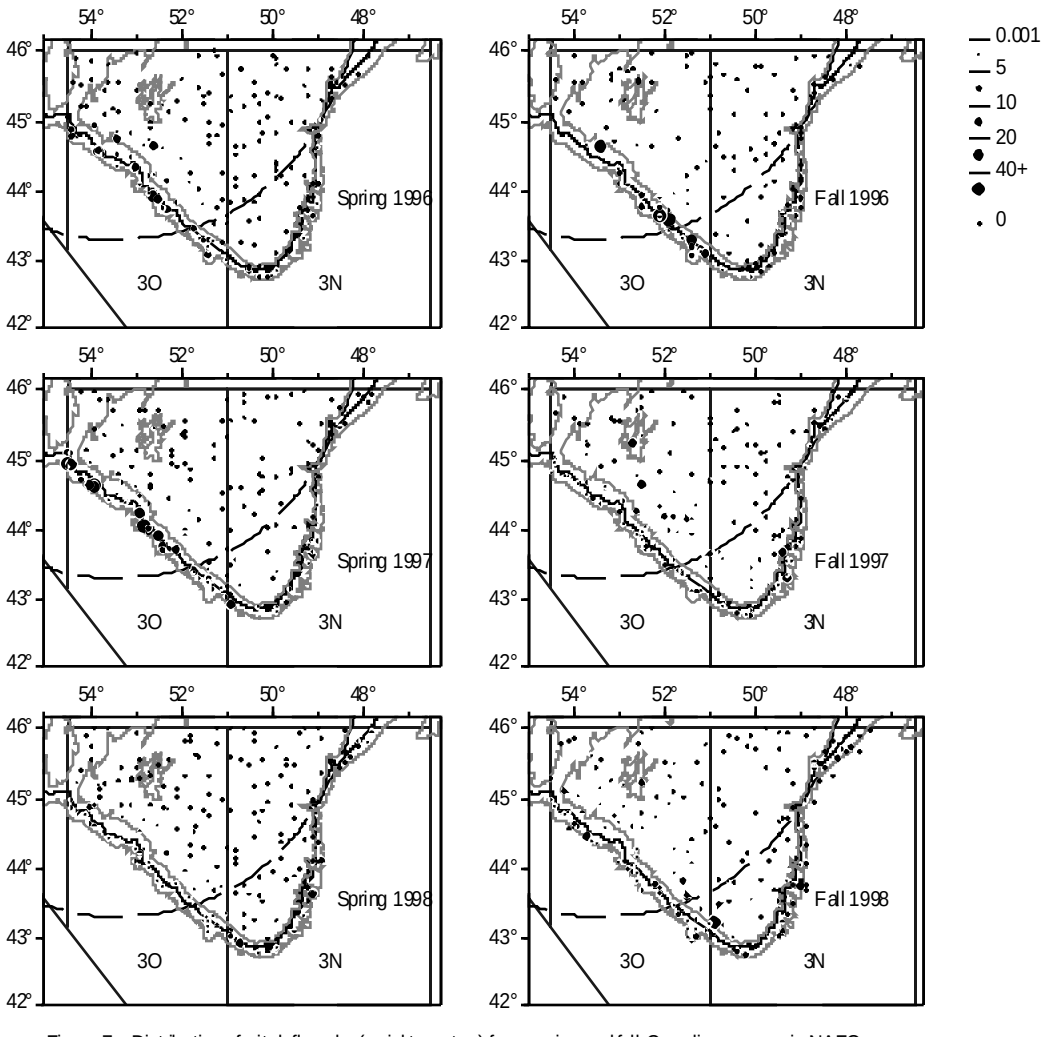


Fig. 7a. Distribution of witch flounder (numbers per tow) from spring and fall Canadian surveys in NAFO Div. 3NO during 1996-1998.

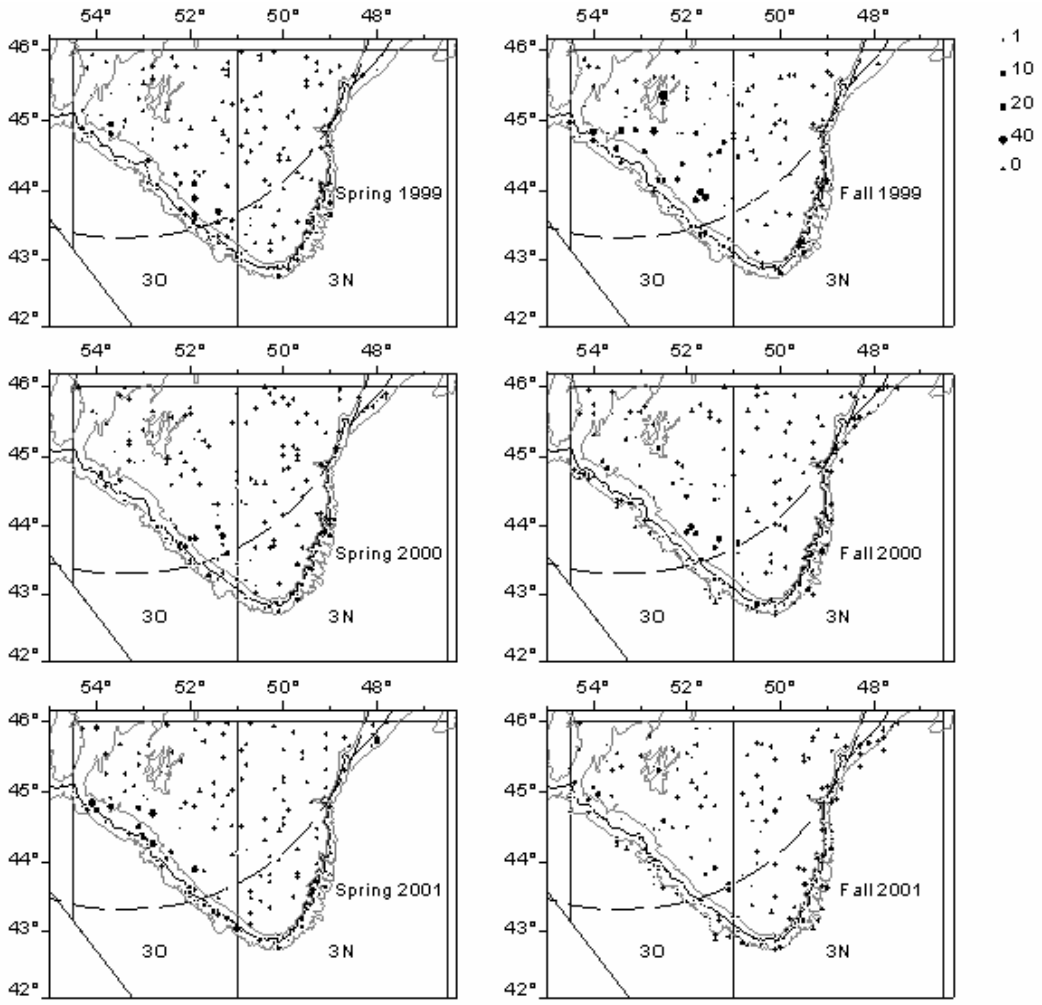


Fig. 7b. Distribution of witch flounder (weights (kg) per tow) from spring and fall Canadian surveys in NAFO Div. 3NO during 1996-1998.

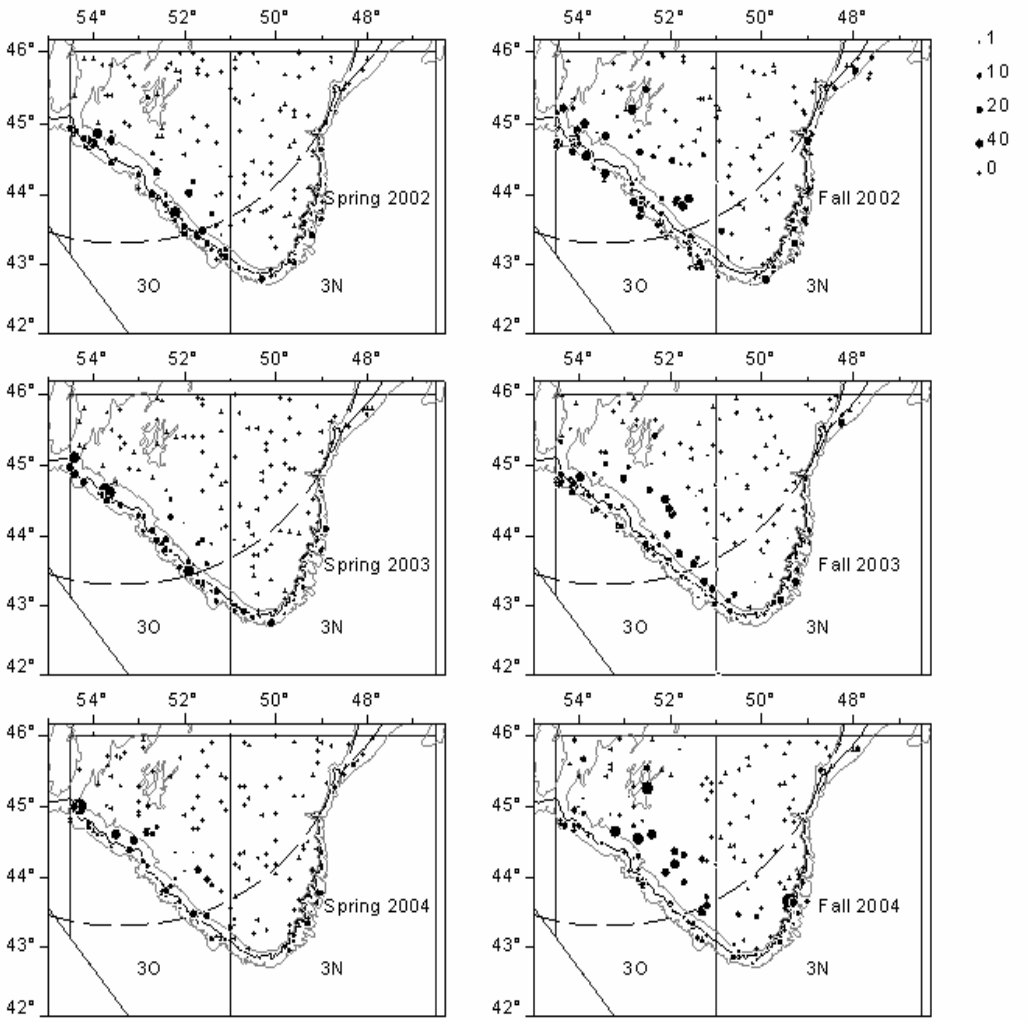


Fig. 8a. Distribution of witch flounder (numbers per tow) from spring and fall Canadian surveys in NAFO Div. 3NO during 1996-1998.

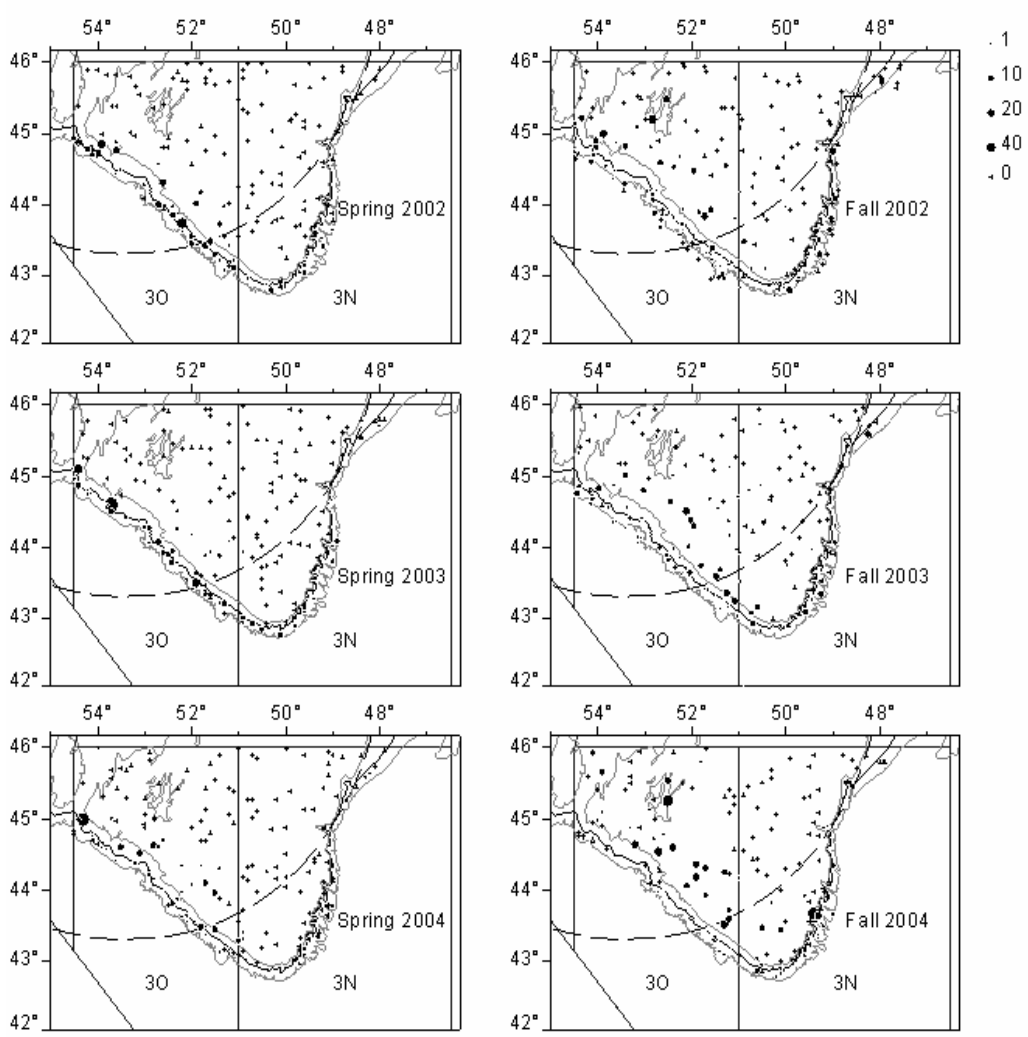


Fig 8b. Distribution of witch flounder (weights per tow) from spring and fall Canadian surveys in NAFO divisions 3NO during 2002-2004.

Fig. 8b. Distribution of witch flounder (weights (kg) per tow) from spring and fall Canadian surveys in NAFO Div. 3NO during 1996-1998.

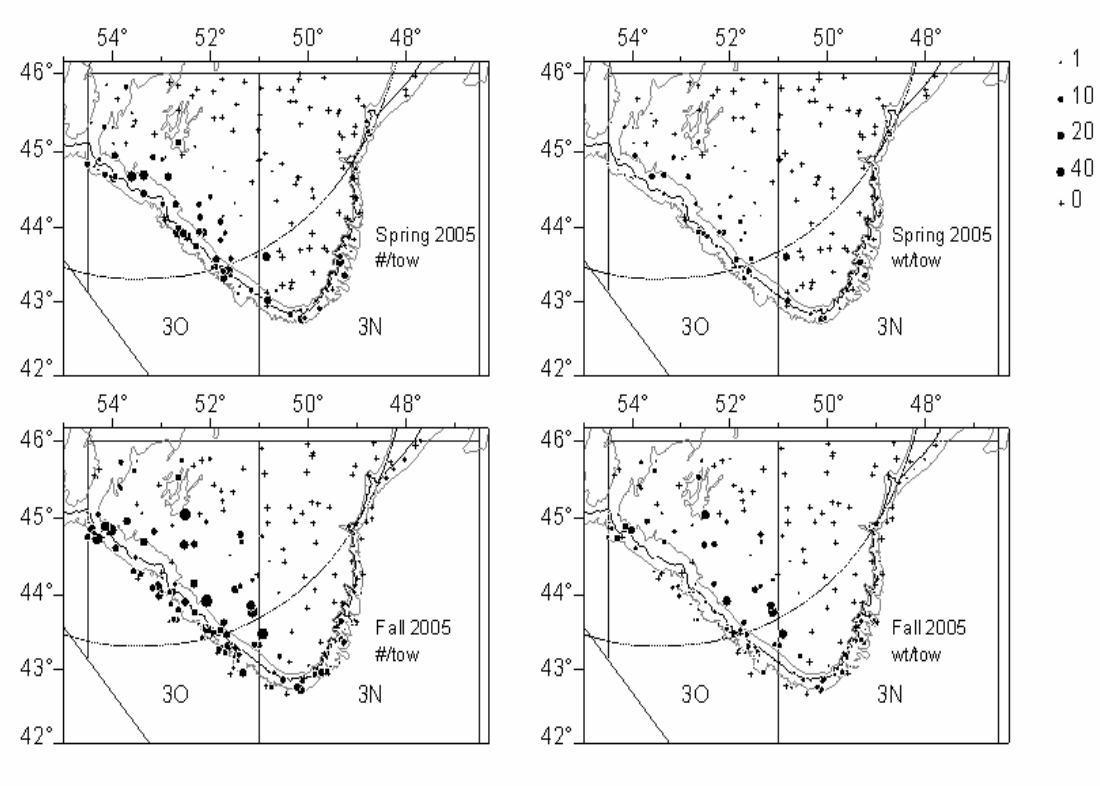


Fig. 8c. Distribution of witch flounder (numbers and weights per tow) from spring and fall Canadian surveys in NAFO Div. 3NO during 1996-1998.