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Results of Data Conversions for Witch Flounder in Div. 3NO from Comparative Fishing Trials between the *Engel* Otter Trawl and the *Campelen 1800* Shrimp Trawl used on Research Vessels on the southern Grand Bank

by

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Introduction

During 1995 the Canadian Department of Fisheries and Oceans, Science Branch, Newfoundland Region replaced its *Engel* bottom otter trawl with bobbin footgear used in groundfish surveys with a *Campelen 1800* shrimp trawl using rockhopper footgear. In order to ensure an orderly transition and maintain continuity with the older data time series, comparative-fishing trials were conducted in 1996 to develop conversion factors between the two fishing gears. The trials were conducted between the research vessel *Wilfred Templeman* (the regular survey vessel) using the new survey gear and its sister ship *Alfred Needler* using the old survey gear. It was assumed that there was no difference between vessels and that the only observed differences in catch were a result of the use of the different fishing gears. Six target species were investigated (one being witch flounder) because of their commercial significance and management requirements.

A thorough description of the experimental design and mathematical determinations can be found in Warren et al. (1997) and thus will not be described in detail here. The purpose of this paper is to illustrate the results of the conversion factors and the impact on length and age distribution as well as trends in stock size using the newly converted data time series similar to that carried out by Stansbury (1997) for cod.

Materials and Methods

Length frequencies, standardized for towing distance, for witch flounder in NAFO Divisions 3NO were converted from Engel trawl catches to Campelen 1800 trawl catch equivalents for the years beginning in 1984 (the year the Engel trawl was introduced as the standard survey trawl). The data converted were spring surveys in Div. 3NO during 1984-95 and fall surveys in Div. 3NO during 1990-94. All subsequent surveys were actually carried out using the Campelen 1800 trawl. Conversion factors as presented in Warren et al. (1997) for witch flounder were applied using weighted least squares as follows:

For the converted length y_i

$$y_i = \beta * n_i$$

where

$$\beta = e^a X_i^b e^{cx_i}$$

n_i = number at length in the set
x_i = midpoint of length class
a = 23.209213, b = -7.475675 and c = 0.11559
β = 8.41 for x_i<24 and β= 0.75 for x_i>49

Weights were applied as the number of fishing sets used to estimate the ratio for a given length class.

After the length frequencies were converted to Campelen trawl catch equivalents they were summed to provide total numbers of witch flounder caught per standard Campelen set (0.8 nautical mile tow distance in 15 minutes with a wing spread of 16.84 m). Using various combinations of length-weight relationships available from surveys during the 1990's, the converted length frequencies were adjusted also to provide the total weights caught per standard Campelen set. The mean number and weight (kg) per set by stratum and year for converted and unconverted data for Divisions 3N and 3O independently are presented for detailed information purposes. For surveys conducted in spring 1984-97 the data are shown in in Tables 1-8, respectively and for surveys conducted in fall 1990-97 the data are presented in Tables 9-16, respectively. No adjustments have been made for differences in revisions to the stratum areas, however, changes are only minimal for this management area.

Results and Discussion

For illustration, a comparison of the abundance at length between the converted and unconverted data sets is presented in Fig. 1 for spring surveys only during the period 1984–1995. Very few fish were caught with the Engel trawl less than 24 cm therefore conversions below this length are not very apparent. In the range of about 30-50 cm where most fish were caught there was a substantial increase in the numbers of fish when converted to Campelen units. For fish over 54 cm the differences diminished substantially. Age compositions from the Engel surveys are shown in Fig. 2. Virtually no witch flounder were caught less than 6 years old and in most years few were caught less than 8 years old or older than 12 years old. From 1985 to 1989 the peaks tended to shift somewhat to the right whereas after 1990 the patterns remained rather constant. As expected the patterns of distribution were very similar in the converted data set (Fig. 3) although the numbers in the center of the distributions were generally proportionately higher.

The effect on the overall biomass index between the converted and unconverted data is illustrated in Fig. 4 for the entire Engel time series, the converted period and the Campelen surveys in 1995-96. It is apparent that the overall trend in biomass is the same except that the relative values estimated for the Campelen trawl are higher.

As an indicator of the catch potential for the Campelen 1800 shrimp trawl, the length frequency distributions of witch flounder from the fall surveys in Divisions 3NO during 1995-97 where the Campelen 1800 trawl was actually used are presented in Figure 5. It is clear that the Campelen trawl is much more effective at capturing smaller (younger) witch flounder (i.e. below 24 cm in length) compared to the Engel trawl. This likely will lead to increases in overall abundance indices in the new survey time series with the Campelen 1800 shrimp trawl relative to the Engel trawl indices in the old time series.

The lack of small fish therefore in the converted data is most likely an expression of the inability of the Engel trawl to catch small witch flounder and should not be interpreted as small fish not being available in the stock although there is no way of knowing for certain. It is prudent, nevertheless, to treat the absence of small witch flounder in the converted frequencies as an indicator of recruitment prospects with considerable scepticism. Any observations on recruitment probably should be reserved until the Campelen survey series is long enough to put some faith in pre-recruit estimates without reliance on the historic time series.

References

Stansbury, D.E. 1997. Conversion factors for cod from Comparative Fishing Trials for Engel 145 Otter Trawl and the Campelen 1800 Shrimp Trawl used on Research Vessels. NAFO SCR Doc. 97/73, Ser. No. N2907: 10p.

Warren, W., W. Brodie, D. Stansbury, S. Walsh, J. Morgan, and D. Orr. 1997. Analysis of the 1996 Comparative Fishing Trials between the *Alfred Needler* with the Engel 145 trawl and the *Wilfred Templeman* with the Campelen 1800 trawl. NAFO SCR Doc. 97/68, Ser. No. N2902: 12p.

Table 1. Mean number of Witch flounder per set from surveys in Div. 3N during spring 1984-1997 by the Wilfred Templeman (Engel data converted to Campelen units for 1984-95)
Number of sets in brackets.

Year				1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Depth Range (meters)	Old Stratum Area (sq. n. mi.)	New Stratum Area (sq. n. mi.)	Stratum														
<=56	1593	1593	375	0.00 (5)	0.00 (8)	0.00 (8)	0.00 (8)	0.00 (6)	0.00 (8)	0.00 (8)	0.00 (6)	0.00 (6)	0.00 (6)	0.00(4)	0.00 (6)	0.00 (6)	0.00 (5)
<=56	1499	1499	376	0.00 (4)	0.00 (7)	0.00 (9)	0.13 (8)	0.00 (6)	0.00 (8)	0.00 (7)	0.00 (7)	0.00 (7)	0.00 (6)	0.00(4)	0.00 (6)	0.00 (5)	0.00 (4)
57 - 92	2992	2992	360	5.43 (7)	0.31 (16)	1.77 (13)	1.80 (15)	6.42 (12)	0.53 (15)	0.00 (15)	0.00 (12)	0.14 (14)	0.55 (11)	0.00(8)	0.00 (12)	0.00 (11)	0.32 (9)
57 - 92	1853	1853	361	0.60 (5)	0.00 (7)	0.00 (10)	0.13 (8)	0.14 (7)	0.00 (10)	0.11 (9)	0.00 (8)	0.00 (8)	0.00 (8)	0.00(5)	0.14 (7)	0.00 (7)	0.00 (5)
57 - 92	2520	2520	362	0.00 (7)	0.27 (11)	0.07 (14)	0.08 (13)	0.50 (10)	0.00 (13)	0.00 (10)	0.00 (10)	0.00 (12)	0.00 (9)	0.00(6)	0.00 (10)	0.00 (9)	0.00 (7)
57 - 92	2520	2520	373	0.00 (7)	0.00 (9)	0.14 (14)	0.00 (13)	0.00 (10)	0.00 (13)	0.00 (10)	0.00 (11)	0.00 (10)	0.00 (9)	0.00(7)	0.00 (10)	0.00 (9)	0.00 (7)
57 - 92	931	931	374	0.00 (3)	0.00 (4)	0.00 (6)	0.00 (5)	0.00 (5)	0.00 (5)	0.00 (5)	0.00 (5)	0.00 (5)	0.33 (3)	0.33(3)	0.00 (4)	0.00 (3)	0.00 (3)
57 - 92	674	674	383	0.00 (3)	0.67 (3)	0.00 (4)	0.33 (3)	0.00 (3)	0.00 (3)	0.00 (2)	0.00 (3)	0.00 (2)	0.00 (3)	0.00(2)	0.00 (3)	0.00 (2)	0.00 (2)
93 - 183	421	421	359	7.00 (2)	1.00 (2)	4.00 (2)	1.00 (2)	17.00 (2)	3.50 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.50 (2)	0.00(2)	0.00 (2)	0.00 (2)	0.00 (2)
93 - 183	100	100	377	1.00 (2)	0.00 (2)	0.00 (2)	13.50 (2)	0.50 (2)	6.00 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.00(2)	0.00 (2)	0.00 (2)	0.00 (2)
93 - 183	647	647	382	0.00 (3)	0.00 (4)	0.00 (4)	0.33 (3)	0.00 (2)	0.00 (3)	0.00 (3)	0.00 (2)	0.00 (3)	0.00 (2)	0.00(2)	0.00 (3)	0.00 (2)	0.00 (2)
184 - 274	225	225	358	2.50 (2)	18.00 (2)	3.00 (2)	9.00 (2)	1.00 (2)	1.50 (2)	3.00 (2)	0.00 (2)	3.00 (2)	9.50 (2)	7.50(2)	1.00 (2)	2.50 (2)	2.67 (2)
184 - 274	139	139	378	2.50 (2)	1.50 (2)	2.50 (2)	18.50 (2)	4.50 (2)	6.00 (2)	0.00 (2)	0.00 (3)	5.00 (2)	0.00 (2)	0.00(2)	0.00 (2)	0.00 (2)	0.44 (2)
184 - 274	182	182	381	1.00 (3)	0.50 (2)	1.67 (3)	6.50 (2)	3.00 (2)	0.00 (2)	1.00 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.00(2)	0.00 (2)	0.00 (2)	0.00 (2)
275 - 366	164	164	357	1.00 (2)	8.00 (2)	24.50 (2)	. (.)	0.50 (2)	10.50 (2)	2.50 (2)	0.00 (2)	4.00 (2)	5.50 (2)	4.50(2)	1.00 (2)	1.78 (2)	1.33 (2)
275 - 366	106	106	379	4.50 (2)	2.50 (2)	4.67 (3)	29.00 (2)	7.00 (2)	3.00 (2)	7.50 (2)	0.50 (2)	3.00 (2)	0.00 (2)	1.50(2)	0.00 (2)	0.00 (2)	1.24 (2)
275 - 366	116	116	380	0.50 (2)	5.50 (2)	0.00 (3)	15.50 (2)	2.00 (2)	0.50 (2)	0.50 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.00(2)	0.00 (2)	0.00 (2)	0.00 (2)
367 - 549	155	155	723	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	13.50 (2)	16.00 (2)	12.00 (2)	2.50(2)	8.50 (2)	2.13 (2)	2.40 (2)
367 - 549	105	105	725	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	11.50 (2)	. (.)	7.00 (2)	6.00(2)	0.00 (2)	0.89 (2)	16.30 (2)
367 - 549	160	160	727	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	0.00 (2)	0.50 (2)	2.50 (2)	1.00(2)	0.00 (2)	0.00 (2)	0.50 (2)
550 - 731	124	124	724	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	66.50 (2)	34.00 (2)	35.00 (2)	11.00(2)	7.00 (2)	7.50 (2)	25.35 (2)
550 - 731	72	72	726	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	21.50 (2)	6.00 (2)	3.00 (2)	11.50(2)	0.50 (2)	3.33 (2)	18.49 (2)
550 - 731	156	156	728	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	8.50 (2)	1.00 (2)	6.50 (2)	1.33(3)	8.00 (2)	6.22 (2)	. (.)
732 - 914	.	134	752	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	2.00(2)	. (.)	. (.)	. (.)
732 - 914	.	106	756	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	6.00(2)	. (.)	. (.)	. (.)
732 - 914	.	154	760	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	4.50(2)	. (.)	. (.)	. (.)
915 -1097	.	138	753	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	102	757	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	171	761	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	180	754	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	99	758	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	212	762	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	385	755	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	127	759	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	261	763	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)

Table 2. Mean number of Witch flounder per set from surveys in Div. 3O during spring 1984-1997 by the Wilfred Templeman (Engel data converted to Campelen units for 1984-95)

Number of sets in brackets.

Year				1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Depth Range	Old Stratum	New Stratum	Stratum														
(meters)	Area (sq. n. mi.)	Area (sq. n. mi.)															
57 - 92	2089	2089	330	0.00 (4)	0.00 (10)	0.00 (9)	0.00 (11)	0.11 (9)	0.00 (11)	0.00 (10)	0.00 (11)	0.00 (10)	0.00 (7)	0.00(5)	0.00 (7)	0.00 (8)	0.25 (7)
57 - 92	456	456	331	56.67 (3)	6.00 (3)	1.50 (4)	0.50 (2)	16.00 (2)	0.00 (2)	. (.)	0.00 (2)	0.00 (2)	0.00 (2)	0.00(2)	0.00 (2)	1.00 (2)	0.00 (2)
57 - 92	1898	1898	338	0.80 (5)	45.56 (9)	5.78 (9)	7.44 (9)	20.75 (8)	9.50 (10)	2.25 (8)	0.00 (10)	0.50 (6)	1.83 (6)	0.00(6)	1.17 (6)	5.43 (7)	0.00 (6)
57 - 92	1716	1716	340	0.25 (4)	0.89 (9)	0.00 (7)	0.11 (9)	0.00 (7)	0.00 (9)	0.22 (9)	0.00 (9)	0.60 (5)	0.00 (6)	0.00(5)	0.00 (5)	0.00 (6)	0.00 (6)
57 - 92	2520	2520	351	2.67 (6)	0.67 (9)	1.43 (14)	0.77 (13)	3.80 (10)	0.69 (13)	0.33 (12)	0.00 (12)	0.00 (10)	0.00 (9)	0.00(7)	0.00 (8)	0.00 (8)	0.00 (8)
57 - 92	2580	2580	352	0.29 (7)	5.09 (11)	1.21 (14)	5.77 (13)	5.18 (11)	2.62 (13)	5.00 (13)	0.14 (14)	0.25 (8)	0.14 (7)	0.13(8)	0.20 (10)	0.22 (9)	0.56 (8)
57 - 92	1282	1282	353	53.00 (2)	7.00 (6)	9.71 (7)	12.17 (6)	74.00 (5)	22.00 (7)	16.50 (6)	0.00 (7)	1.50 (4)	2.00 (4)	0.00(4)	0.20 (5)	0.20 (5)	1.50 (4)
93 - 183	1721	1721	329	0.00 (5)	0.00 (8)	0.00 (8)	0.00 (9)	6.14 (7)	0.22 (9)	0.14 (7)	3.22 (9)	0.00 (8)	0.00 (6)	51.80(5)	2.20 (5)	0.00 (6)	0.15 (6)
93 - 183	1047	1047	332	76.50 (2)	115.20 (5)	45.33 (6)	50.20 (5)	111.25 (4)	19.80 (5)	73.40 (5)	31.33 (6)	40.00 (5)	3.50 (4)	3.00(4)	27.25 (4)	20.32 (4)	39.33 (3)
93 - 183	948	948	337	1.00 (2)	70.40 (5)	20.20 (5)	27.17 (6)	20.25 (4)	19.60 (5)	20.00 (5)	24.40 (5)	6.25 (4)	16.00 (2)	0.67(3)	9.50 (4)	6.33 (3)	3.59 (3)
93 - 183	585	585	339	5.50 (2)	0.00 (3)	1.00 (3)	3.33 (3)	1.67 (3)	0.00 (3)	0.00 (3)	0.00 (3)	0.00 (2)	0.00 (2)	0.00(2)	0.00 (2)	2.00 (2)	0.44 (2)
93 - 183	474	474	354	18.00 (2)	3.67 (3)	50.33 (3)	7.00 (2)	9.50 (2)	3.00 (2)	5.50 (2)	4.00 (3)	4.00 (2)	25.50 (2)	0.00(2)	0.00 (3)	1.50 (2)	0.50 (2)
184 - 274	151	147	333	1.00 (2)	7.50 (2)	1.67 (3)	0.00 (2)	7.00 (2)	2.50 (2)	16.00 (2)	65.50 (2)	9.00 (2)	14.50 (2)	665.00(2)	21.00 (2)	1.50 (2)	13.72 (2)
184 - 274	121	121	336	1.50 (2)	1.00 (2)	10.50 (2)	4.00 (2)	12.50 (2)	0.00 (2)	9.50 (2)	82.00 (2)	197.50 (2)	16.00 (2)	182.00(2)	7.50 (2)	25.93 (2)	41.00 (2)
184 - 274	103	103	355	6.50 (2)	29.50 (2)	9.00 (2)	9.50 (2)	0.00 (2)	27.00 (2)	36.00 (2)	24.00 (2)	2.00 (2)	7.00 (2)	24.00(2)	7.00 (2)	11.83 (2)	13.78 (2)
275 - 366	92	96	334	0.00 (2)	7.50 (2)	13.00 (2)	5.00 (2)	7.50 (2)	3.50 (2)	4.00 (2)	3.00 (2)	21.50 (2)	5.00 (2)	169.50(2)	3.00 (2)	35.00 (2)	66.67 (2)
275 - 366	58	58	335	0.00 (2)	25.50 (2)	5.00 (2)	1.00 (2)	18.50 (2)	8.50 (2)	41.50 (2)	13.67 (3)	293.33 (3)	28.00 (2)	27.00(2)	13.50 (2)	24.06 (2)	30.40 (2)
275 - 366	61	61	356	2.00 (2)	25.50 (2)	4.50 (2)	6.50 (2)	13.00 (2)	9.50 (2)	15.00 (2)	11.00 (2)	41.50 (2)	38.00 (2)	22.50(2)	15.00 (2)	10.50 (2)	4.80 (2)
367 - 549	93	166	717	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	2.50 (2)	29.00 (2)	13.00 (2)	261.00(2)	10.00 (2)	59.67 (2)	06.49 (2)
367 - 549	76	76	719	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	27.50 (2)	242.50 (2)	25.50 (2)	3.50(2)	4.00 (2)	34.84 (2)	11.07 (2)
367 - 549	76	76	721	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	22.50 (2)	20.00 (2)	9.00 (2)	18.50(2)	4.00 (2)	4.00 (2)	6.04 (2)
550 - 731	111	134	718	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	18.50 (2)	8.00 (2)	33.50 (2)	63.00(2)	29.00 (2)	28.09 (2)	27.52 (2)
550 - 731	105	105	720	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	25.00 (2)	26.00 (2)	71.00 (2)	34.50(2)	3.00 (2)	6.98 (2)	35.83 (2)
550 - 731	93	93	722	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	3.50 (2)	13.00 (2)	40.00 (2)	40.50(2)	47.00 (2)	21.44 (2)	64.06 (2)
732 - 914	.	105	764	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	15.00(2)	. (.)	. (.)	. (.)
732 - 914	.	99	768	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
732 - 914	.	135	772	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	27.00(2)	. (.)	. (.)	. (.)
915 -1097	.	124	765	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	138	769	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	128	773	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	144	766	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	128	770	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	135	774	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	158	767	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	175	771	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	155	775	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)

Table 3. Mean number per set of Witch flounder from surveys in Div. 3N during spring 1984-1995 by the Alfred Needler and Wilfred Templeman (Unconverted data)

Number of sets in brackets.

Year				1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Depth Range	Old Stratum	New Stratum	Stratum												
(meters)	Area (sq. n. mi.)	Area (sq. n. mi.)													
<=56	1593	1593	375	0.00 (5)	0.00 (8)	0.00 (8)	0.00 (8)	0.00 (6)	0.00 (8)	0.00 (8)	0.00 (6)	0.00 (6)	0.00 (6)	0.00(4)	0.00 (6)
<=56	1499	1499	376	0.00 (4)	0.00 (7)	0.00 (9)	0.13 (8)	0.00 (6)	0.00 (8)	0.00 (7)	0.00 (7)	0.00 (7)	0.00 (6)	0.00(4)	0.00 (6)
57 - 92	2992	2992	360	5.57 (7)	0.25 (16)	1.77 (13)	1.67 (15)	6.00 (12)	0.47 (15)	0.00 (15)	0.00 (12)	0.14 (14)	0.55 (11)	0.00(8)	0.00 (12)
57 - 92	1853	1853	361	0.60 (5)	0.00 (7)	0.00 (10)	0.13 (8)	0.14 (7)	0.00 (10)	0.11 (9)	0.00 (8)	0.00 (8)	0.00 (8)	0.00(5)	0.14 (7)
57 - 92	2520	2520	362	0.00 (7)	0.27 (11)	0.21 (14)	0.08 (13)	0.50 (10)	0.00 (13)	0.00 (10)	0.00 (10)	0.00 (12)	0.00 (9)	0.00(6)	0.00 (10)
57 - 92	2520	2520	373	0.00 (7)	0.00 (9)	0.00 (14)	0.00 (13)	0.00 (10)	0.00 (13)	0.00 (10)	0.00 (11)	0.00 (10)	0.00 (9)	0.00(7)	0.00 (10)
57 - 92	931	931	374	0.00 (3)	0.00 (4)	0.00 (6)	0.00 (5)	0.00 (5)	0.00 (5)	0.00 (5)	0.00 (5)	0.00 (5)	0.33 (3)	0.33(3)	0.00 (4)
57 - 92	674	674	383	0.00 (3)	0.67 (3)	0.00 (4)	0.33 (3)	0.00 (3)	0.00 (3)	0.00 (2)	0.00 (3)	0.00 (2)	0.00 (3)	0.00(2)	0.00 (3)
93 - 183	421	421	359	6.00 (2)	1.00 (2)	3.00 (2)	1.00 (2)	9.50 (2)	3.50 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.50 (2)	0.00(2)	0.00 (2)
93 - 183	100	100	377	1.00 (2)	0.00 (2)	0.00 (2)	9.50 (2)	0.50 (2)	4.50 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.00(2)	0.00 (2)
93 - 183	647	647	382	0.00 (3)	0.00 (4)	0.00 (4)	0.33 (3)	0.00 (2)	0.00 (3)	0.00 (3)	0.00 (2)	0.00 (3)	0.00 (2)	0.00(2)	0.00 (3)
184 - 274	225	225	358	2.00 (2)	15.50 (2)	2.00 (2)	8.00 (2)	1.00 (2)	1.50 (2)	3.00 (2)	0.00 (2)	2.50 (2)	7.50 (2)	5.50(2)	0.50 (2)
184 - 274	139	139	378	2.00 (2)	1.50 (2)	2.50 (2)	14.00 (2)	3.00 (2)	4.00 (2)	0.00 (2)	0.33 (3)	3.50 (2)	0.00 (2)	0.00(2)	0.00 (2)
184 - 274	182	182	381	1.00 (3)	0.50 (2)	1.67 (3)	6.00 (2)	3.00 (2)	0.00 (2)	1.00 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.00(2)	0.00 (2)
275 - 366	164	164	357	1.00 (2)	6.00 (2)	14.30 (2)	. ( )	0.50 (2)	5.00 (2)	2.00 (2)	0.00 (2)	3.00 (2)	4.00 (2)	4.50(2)	1.00 (2)
275 - 366	106	106	379	4.00 (2)	1.50 (2)	4.00 (3)	20.50 (2)	5.50 (2)	2.50 (2)	4.50 (2)	0.50 (2)	2.50 (2)	0.00 (2)	0.50(2)	0.00 (2)
275 - 366	116	116	380	0.50 (2)	5.00 (2)	0.00 (3)	14.00 (2)	2.00 (2)	0.50 (2)	0.50 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.00(2)	0.00 (2)
367 - 549	155	155	723	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	8.00 (2)	8.00 (2)	7.50 (2)	2.50(2)	4.00 (2)
367 - 549	105	105	725	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	8.00 (2)	. ( )	5.00 (2)	4.50(2)	0.00 (2)
367 - 549	160	160	727	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	0.00 (2)	0.50 (2)	2.50 (2)	1.00(2)	0.00 (2)
550 - 731	124	124	724	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	36.19 (2)	21.00 (2)	24.50 (2)	6.00(2)	4.00 (2)
550 - 731	72	72	726	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	16.50 (2)	5.00 (2)	4.00 (2)	6.39(2)	0.50 (2)
550 - 731	156	156	728	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	7.00 (2)	1.00 (2)	7.05 (2)	1.33(3)	10.25 (2)
732 - 914	.	134	752	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	2.00(2)	. ( )
732 - 914	.	106	756	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	4.00(2)	. ( )
732 - 914	.	154	760	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	1.63(2)	. ( )
915 -1097	.	138	753	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )
915 -1097	.	102	757	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )
915 -1097	.	171	761	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )
1098 -1280	.	180	754	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )
1098 -1280	.	99	758	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )
1098 -1280	.	212	762	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )
1281 -1463	.	385	755	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )
1281 -1463	.	127	759	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )
1281 -1463	.	261	763	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )	. ( )

Table 4. Mean number per set of Witch flounder from surveys in Div. 3O during spring 1984-1995 by the Alfred Needler and Wilfred Templeman (Unconverted data)

Number of sets in brackets.

Year				1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Depth Range	Old Stratum	New Stratum	Stratum												
(meters)	Area (sq. n. mi.)	Area (sq. n. mi.)													
57 - 92	2089	2089	330	0.00 (4)	0.00 (10)	0.00 (9)	0.00 (11)	0.11 (9)	0.00 (11)	0.00 (10)	0.00 (11)	0.00 (10)	0.00 (7)	0.00(5)	0.00 (7)
57 - 92	456	456	331	52.33 (3)	6.33 (3)	1.25 (4)	0.50 (2)	11.50 (2)	0.00 (2)	. (.)	0.00 (2)	0.00 (2)	0.00 (2)	0.00(2)	0.00 (2)
57 - 92	1898	1898	338	0.80 (5)	46.78 (9)	6.22 (9)	7.11 (9)	17.00 (8)	10.20 (10)	2.25 (8)	0.00 (10)	0.50 (6)	1.67 (6)	0.00(6)	1.17 (6)
57 - 92	1716	1716	340	0.25 (4)	0.89 (9)	0.00 (7)	0.11 (9)	0.00 (7)	0.00 (9)	0.11 (9)	0.00 (9)	0.60 (5)	0.00 (6)	0.00(5)	0.00 (5)
57 - 92	2520	2520	351	2.67 (6)	0.78 (9)	1.64 (14)	0.85 (13)	4.30 (10)	0.77 (13)	0.33 (12)	0.00 (12)	0.00 (10)	0.00 (9)	0.00(7)	0.00 (8)
57 - 92	2580	2580	352	0.29 (7)	4.18 (11)	1.00 (14)	5.08 (13)	5.36 (11)	2.54 (13)	5.69 (13)	0.14 (14)	0.25 (8)	0.14 (7)	0.13(8)	0.20 (10)
57 - 92	1282	1282	353	43.00 (2)	7.50 (6)	9.29 (7)	13.33 (6)	68.40 (5)	22.57 (7)	13.33 (6)	0.00 (7)	1.50 (4)	2.00 (4)	0.00(4)	0.20 (5)
93 - 183	1721	1721	329	0.00 (5)	0.00 (8)	0.00 (8)	0.00 (9)	5.14 (7)	0.22 (9)	0.14 (7)	3.22 (9)	0.00 (8)	0.00 (6)	36.80(5)	1.40 (5)
93 - 183	1047	1047	332	49.50 (2)	102.40 (5)	31.33 (6)	41.20 (5)	85.25 (4)	17.80 (5)	57.00 (5)	27.67 (6)	26.40 (5)	3.50 (4)	1.00(4)	21.25 (4)
93 - 183	948	948	337	1.00 (2)	56.00 (5)	17.80 (5)	20.00 (6)	14.25 (4)	19.20 (5)	19.00 (5)	21.20 (5)	6.00 (4)	10.00 (2)	0.67(3)	8.25 (4)
93 - 183	585	585	339	5.50 (2)	0.00 (3)	0.33 (3)	3.33 (3)	1.67 (3)	0.00 (3)	0.00 (3)	0.00 (3)	0.00 (2)	0.00 (2)	0.00(2)	0.00 (2)
93 - 183	474	474	354	13.50 (2)	2.67 (3)	34.33 (3)	6.50 (2)	8.50 (2)	1.50 (2)	5.50 (2)	3.33 (3)	3.00 (2)	23.00 (2)	0.00(2)	0.00 (3)
184 - 274	151	147	333	1.00 (2)	5.00 (2)	1.00 (3)	0.00 (2)	6.00 (2)	1.50 (2)	11.50 (2)	43.50 (2)	6.50 (2)	7.50 (2)	465.44(2)	15.00 (2)
184 - 274	121	121	336	1.00 (2)	1.00 (2)	4.50 (2)	2.50 (2)	5.50 (2)	0.00 (2)	6.00 (2)	53.50 (2)	145.00 (2)	11.00 (2)	115.00(2)	6.00 (2)
184 - 274	103	103	355	5.50 (2)	22.50 (2)	4.50 (2)	8.00 (2)	1.00 (2)	12.50 (2)	16.50 (2)	15.00 (2)	2.00 (2)	4.00 (2)	16.00(2)	6.00 (2)
275 - 366	92	96	334	0.00 (2)	5.50 (2)	6.50 (2)	2.50 (2)	3.63 (2)	3.00 (2)	3.00 (2)	3.07 (2)	14.50 (2)	3.50 (2)	118.00(2)	2.50 (2)
275 - 366	58	58	335	0.00 (2)	20.00 (2)	4.10 (2)	0.50 (2)	11.00 (2)	4.50 (2)	18.25 (2)	9.33 (3)	238.00 (3)	16.30 (2)	22.00(2)	9.50 (2)
275 - 366	61	61	356	1.00 (2)	16.50 (2)	3.50 (2)	4.50 (2)	4.00 (2)	6.00 (2)	11.20 (2)	8.50 (2)	26.00 (2)	17.50 (2)	17.00(2)	12.00 (2)
367 - 549	93	166	717	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	1.50 (2)	18.00 (2)	5.00 (2)	185.50(2)	4.50 (2)
367 - 549	76	76	719	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	21.00 (2)	173.50 (2)	8.44 (2)	2.69(2)	3.00 (2)
367 - 549	76	76	721	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	13.00 (2)	8.00 (2)	6.00 (2)	11.50(2)	3.00 (2)
550 - 731	111	134	718	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	4.50 (2)	3.50 (2)	13.50 (2)	25.00(2)	8.50 (2)
550 - 731	105	105	720	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	22.75 (2)	17.00 (2)	23.50 (2)	12.50(2)	2.00 (2)
550 - 731	93	93	722	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	2.50 (2)	6.64 (2)	20.81 (2)	27.50(2)	28.00 (2)
732 - 914		105	764	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	7.50(2)	. (.)
732 - 914		99	768	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
732 - 914		135	772	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	7.69(2)	. (.)
915 -1097		124	765	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097		138	769	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097		128	773	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280		144	766	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280		128	770	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280		135	774	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463		158	767	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463		175	771	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463		155	775	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)

Table 5. Mean weight (kg) per set of Witch flounder from surveys in Div. 3N during spring 1984-1997 by Wilfred Templeman (Engel data converted to Campelen units for 1984-95)

Number of sets in brackets.

Year				1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Depth Range	Old Stratum	New Stratum	Stratum														
(meters)	Area (sq. n. mi.)	Area (sq. n. mi.)															
<=56	1593	1593	375	0.00 (5)	0.00 (8)	0.00 (8)	0.00 (8)	0.00 (6)	0.00 (8)	0.00 (8)	0.00 (6)	0.00 (6)	0.00 (6)	0.00(4)	0.00 (6)	0.00 (6)	0.00 (5)
<=56	1499	1499	376	0.00 (4)	0.00 (7)	0.00 (9)	0.09 (8)	0.00 (6)	0.00 (8)	0.00 (7)	0.00 (7)	0.00 (7)	0.00 (6)	0.00(4)	0.00 (6)	0.00 (5)	0.00 (4)
57 - 92	2992	2992	360	4.17 (7)	0.22 (16)	1.53 (13)	1.12 (15)	3.69 (12)	0.43 (15)	0.00 (15)	0.00 (12)	0.07 (14)	0.40 (11)	0.00(8)	0.00 (12)	0.00 (11)	0.28 (9)
57 - 92	1853	1853	361	0.47 (5)	0.00 (7)	0.00 (10)	0.15 (8)	0.20 (7)	0.00 (10)	0.08 (9)	0.00 (8)	0.00 (8)	0.00 (8)	0.00(5)	0.15 (7)	0.00 (7)	0.00 (5)
57 - 92	2520	2520	362	0.00 (7)	0.24 (11)	0.07 (14)	0.05 (13)	0.42 (10)	0.00 (13)	0.00 (10)	0.00 (10)	0.00 (12)	0.00 (9)	0.00(6)	0.00 (10)	0.00 (9)	0.00 (7)
57 - 92	2520	2520	373	0.00 (7)	0.00 (9)	0.12 (14)	0.00 (13)	0.00 (10)	0.00 (13)	0.00 (10)	0.00 (11)	0.00 (10)	0.00 (9)	0.00(7)	0.00 (10)	0.00 (9)	0.00 (7)
57 - 92	931	931	374	0.00 (3)	0.00 (4)	0.00 (6)	0.00 (5)	0.00 (5)	0.00 (5)	0.00 (5)	0.00 (5)	0.00 (5)	0.14 (3)	0.27(3)	0.00 (4)	0.00 (3)	0.00 (3)
57 - 92	674	674	383	0.00 (3)	0.62 (3)	0.00 (4)	0.40 (3)	0.00 (3)	0.00 (3)	0.00 (2)	0.00 (3)	0.00 (2)	0.00 (3)	0.00(2)	0.00 (3)	0.00 (2)	0.00 (2)
93 - 183	421	421	359	3.99 (2)	0.81 (2)	1.71 (2)	0.75 (2)	5.28 (2)	2.09 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.33 (2)	0.00(2)	0.00 (2)	0.00 (2)	0.00 (2)
93 - 183	100	100	377	0.58 (2)	0.00 (2)	0.00 (2)	5.25 (2)	0.21 (2)	2.31 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.00(2)	0.00 (2)	0.00 (2)	0.00 (2)
93 - 183	647	647	382	0.00 (3)	0.00 (4)	0.00 (4)	0.14 (3)	0.00 (2)	0.00 (3)	0.00 (3)	0.00 (2)	0.00 (3)	0.00 (2)	0.00(2)	0.00 (3)	0.00 (2)	0.00 (2)
184 - 274	225	225	358	1.29 (2)	9.94 (2)	1.37 (2)	4.42 (2)	0.64 (2)	0.95 (2)	1.86 (2)	0.00 (2)	1.44 (2)	4.26 (2)	3.42(2)	0.24 (2)	1.65 (2)	1.58 (2)
184 - 274	139	139	378	1.17 (2)	1.00 (2)	1.69 (2)	8.10 (2)	1.64 (2)	2.19 (2)	0.00 (2)	0.00 (3)	1.51 (2)	0.00 (2)	0.00(2)	0.00 (2)	0.00 (2)	0.18 (2)
184 - 274	182	182	381	0.82 (3)	0.28 (2)	1.27 (3)	4.04 (2)	2.77 (2)	0.00 (2)	1.14 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.00(2)	0.00 (2)	0.00 (2)	0.00 (2)
275 - 366	164	164	357	0.35 (2)	3.85 (2)	6.83 (2)	. (.)	0.18 (2)	2.65 (2)	0.91 (2)	0.00 (2)	1.36 (2)	2.16 (2)	3.61(2)	0.89 (2)	1.58 (2)	0.53 (2)
275 - 366	106	106	379	2.48 (2)	0.83 (2)	1.60 (3)	11.84 (2)	3.00 (2)	1.38 (2)	2.38 (2)	0.21 (2)	1.27 (2)	0.00 (2)	0.29(2)	0.00 (2)	0.00 (2)	0.60 (2)
275 - 366	116	116	380	0.40 (2)	3.34 (2)	0.00 (3)	8.38 (2)	1.52 (2)	0.43 (2)	0.24 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.00(2)	0.00 (2)	0.00 (2)	0.00 (2)
367 - 549	155	155	723	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	4.21 (2)	4.80 (2)	3.71 (2)	1.68(2)	2.41 (2)	0.77 (2)	1.16 (2)
367 - 549	105	105	725	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	4.26 (2)	. (.)	2.78 (2)	3.08(2)	0.00 (2)	0.37 (2)	1.91 (2)
367 - 549	160	160	727	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	0.00 (2)	0.24 (2)	1.73 (2)	0.76(2)	0.00 (2)	0.00 (2)	0.15 (2)
550 - 731	124	124	724	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	19.18 (2)	10.63 (2)	12.81 (2)	3.02(2)	2.11 (2)	1.73 (2)	9.22 (2)
550 - 731	72	72	726	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	8.21 (2)	2.52 (2)	2.24 (2)	2.81(2)	0.35 (2)	1.20 (2)	4.25 (2)
550 - 731	156	156	728	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	4.31 (2)	0.88 (2)	3.84 (2)	1.02(3)	7.07 (2)	0.97 (2)	. (.)
732 - 914	.	134	752	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	1.47(2)	. (.)	. (.)	. (.)
732 - 914	.	106	756	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	2.29(2)	. (.)	. (.)	. (.)
732 - 914	.	154	760	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	1.22(2)	. (.)	. (.)	. (.)
915 -1097	.	138	753	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	102	757	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	171	761	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	180	754	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	99	758	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	212	762	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	385	755	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	127	759	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	261	763	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)

Table 6. Mean weight (kg) per set of Witch flounder from surveys in Div. 3O during spring 1984-1997 by Wilfred Templeman (Engel data converted to Campelen units for 1984-95)

Number of sets in brackets.

Year				1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Depth Range	Old Stratum	New Stratum	Stratum														
(meters)	Area (sq. n. mi.)	Area (sq. n. mi.)															
57 - 92	2089	2089	330	0.00 (4)	0.00 (10)	0.00 (9)	0.00 (11)	0.08 (9)	0.00 (11)	0.00 (10)	0.00 (11)	0.00 (10)	0.00 (7)	0.00(5)	0.00 (7)	0.00 (8)	0.00 (7)
57 - 92	456	456	331	30.49 (3)	4.82 (3)	0.58 (4)	0.29 (2)	7.09 (2)	0.00 (2)	. (.)	0.00 (2)	0.00 (2)	0.00 (2)	0.00(2)	0.00 (2)	1.18 (2)	0.00 (2)
57 - 92	1898	1898	338	0.51 (5)	29.90 (9)	4.24 (9)	4.53 (9)	11.78 (8)	7.00 (10)	1.66 (8)	0.00 (10)	0.42 (6)	1.13 (6)	0.00(6)	0.88 (6)	3.33 (7)	0.00 (6)
57 - 92	1716	1716	340	0.17 (4)	0.62 (9)	0.00 (7)	0.09 (9)	0.00 (7)	0.00 (9)	0.07 (9)	0.00 (9)	0.62 (5)	0.00 (6)	0.00(5)	0.00 (5)	0.00 (6)	0.00 (6)
57 - 92	2520	2520	351	1.99 (6)	0.61 (9)	1.11 (14)	0.64 (13)	2.82 (10)	0.63 (13)	0.31 (12)	0.00 (12)	0.00 (10)	0.00 (9)	0.00(7)	0.00 (8)	0.00 (8)	0.00 (8)
57 - 92	2580	2580	352	0.23 (7)	2.68 (11)	0.63 (14)	3.59 (13)	3.75 (11)	1.87 (13)	4.02 (13)	0.11 (14)	0.30 (8)	0.17 (7)	0.11(8)	0.18 (10)	0.17 (9)	0.28 (8)
57 - 92	1282	1282	353	25.63 (2)	6.36 (6)	6.05 (7)	9.12 (6)	40.87 (5)	14.10 (7)	9.28 (6)	0.00 (7)	1.38 (4)	1.19 (4)	0.00(4)	0.24 (5)	0.13 (5)	0.01 (4)
93 - 183	1721	1721	329	0.00 (5)	0.00 (8)	0.00 (8)	0.00 (9)	3.33 (7)	0.20 (9)	0.11 (7)	2.09 (9)	0.00 (8)	0.00 (6)	21.42(5)	0.82 (5)	0.00 (6)	0.05 (6)
93 - 183	1047	1047	332	26.24 (2)	59.64 (5)	17.26 (6)	23.38 (5)	47.42 (4)	10.31 (5)	31.93 (5)	16.84 (6)	15.15 (5)	2.49 (4)	0.41(4)	12.44 (4)	8.20 (4)	1.63 (3)
93 - 183	948	948	337	0.39 (2)	31.66 (5)	10.85 (5)	11.55 (6)	8.13 (4)	11.83 (5)	12.48 (5)	12.12 (5)	4.45 (4)	5.18 (2)	0.38(3)	5.01 (4)	2.53 (3)	1.25 (3)
93 - 183	585	585	339	4.17 (2)	0.00 (3)	0.20 (3)	2.78 (3)	1.69 (3)	0.00 (3)	0.00 (3)	0.00 (3)	0.00 (2)	0.00 (2)	0.00(2)	0.00 (2)	0.02 (2)	0.00 (2)
93 - 183	474	474	354	7.60 (2)	1.61 (3)	18.88 (3)	3.58 (2)	5.30 (2)	0.73 (2)	3.68 (2)	2.21 (3)	2.28 (2)	12.90 (2)	0.00(2)	0.00 (3)	0.55 (2)	0.01 (2)
184 - 274	151	147	333	0.50 (2)	2.30 (2)	0.48 (3)	0.00 (2)	3.23 (2)	0.75 (2)	6.20 (2)	23.96 (2)	3.83 (2)	3.83 (2)	256.95(2)	8.00 (2)	0.33 (2)	5.38 (2)
184 - 274	121	121	336	0.75 (2)	0.43 (2)	2.60 (2)	1.48 (2)	3.79 (2)	0.00 (2)	3.16 (2)	29.55 (2)	82.55 (2)	6.00 (2)	63.53(2)	3.73 (2)	10.83 (2)	17.58 (2)
184 - 274	103	103	355	3.19 (2)	12.77 (2)	2.69 (2)	5.05 (2)	0.00 (2)	6.82 (2)	8.89 (2)	9.58 (2)	1.14 (2)	2.38 (2)	9.12(2)	3.03 (2)	6.09 (2)	3.40 (2)
275 - 366	92	96	334	0.00 (2)	3.32 (2)	3.31 (2)	1.44 (2)	1.74 (2)	1.80 (2)	2.07 (2)	1.59 (2)	8.51 (2)	1.58 (2)	65.16(2)	1.17 (2)	11.36 (2)	27.44 (2)
275 - 366	58	58	335	0.00 (2)	12.26 (2)	2.27 (2)	0.30 (2)	6.40 (2)	2.72 (2)	11.50 (2)	5.27 (3)	138.78 (3)	8.20 (2)	12.91(2)	5.44 (2)	9.78 (2)	13.71 (2)
275 - 366	61	61	356	0.59 (2)	9.84 (2)	2.09 (2)	2.78 (2)	2.13 (2)	3.51 (2)	6.56 (2)	4.61 (2)	15.34 (2)	9.23 (2)	9.00(2)	7.34 (2)	4.75 (2)	1.28 (2)
367 - 549	93	166	717	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	0.83 (2)	9.41 (2)	2.77 (2)	104.01(2)	2.32 (2)	20.37 (2)	90.65 (2)
367 - 549	76	76	719	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	14.16 (2)	97.97 (2)	4.65 (2)	1.31(2)	1.74 (2)	13.13 (2)	57.44 (2)
367 - 549	76	76	721	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	7.24 (2)	4.64 (2)	2.93 (2)	6.91(2)	1.76 (2)	1.55 (2)	1.80 (2)
550 - 731	111	134	718	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	2.27 (2)	1.89 (2)	6.80 (2)	11.97(2)	4.34 (2)	3.88 (2)	1.99 (2)
550 - 731	105	105	720	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	15.00 (2)	9.28 (2)	12.60 (2)	6.56(2)	1.03 (2)	1.48 (2)	10.41 (2)
550 - 731	93	93	722	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	1.42 (2)	3.86 (2)	11.72 (2)	16.93(2)	16.11 (2)	6.94 (2)	6.78 (2)
732 - 914	.	105	764	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	4.17(2)	. (.)	. (.)	. (.)
732 - 914	.	99	768	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
732 - 914	.	135	772	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	4.07(2)	. (.)	. (.)	. (.)
915 -1097	.	124	765	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	138	769	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	128	773	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	144	766	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	128	770	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	135	774	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	158	767	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	175	771	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	155	775	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)

Table 7. Mean Wt. (kg) of Witch flounder from surveys in Div. 3N during spring 1984-1997 using the Wilfred Templeman (Unconverted data)

Number of sets in brackets.

Year				1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Depth Range	Old Stratum	New Stratum	Stratum												
(meters)	Area (sq. n. mi.)	Area (sq. n. mi.)													
<=56	1593	1593	375	0.00 (5)	0.00 (8)	0.00 (8)	0.00 (8)	0.00 (6)	0.00 (8)	0.00 (8)	0.00 (6)	0.00 (6)	0.00 (6)	0.00(4)	0.00 (6)
<=56	1499	1499	376	0.00 (4)	0.00 (7)	0.00 (9)	0.06 (8)	0.00 (6)	0.00 (8)	0.00 (7)	0.00 (7)	0.00 (7)	0.00 (6)	0.00(4)	0.00 (6)
57 - 92	2992	2992	360	5.07 (7)	0.27 (16)	1.78 (13)	1.63 (15)	4.00 (12)	0.45 (15)	0.00 (15)	0.00 (12)	0.08 (14)	0.41 (11)	0.00(8)	0.00 (12)
57 - 92	1853	1853	361	0.60 (5)	0.00 (7)	0.00 (10)	0.15 (8)	0.26 (7)	0.00 (10)	0.09 (9)	0.00 (8)	0.00 (8)	0.00 (8)	0.00(5)	0.15 (7)
57 - 92	2520	2520	362	0.00 (7)	0.23 (11)	0.21 (14)	0.05 (13)	0.51 (10)	0.00 (13)	0.00 (10)	0.00 (10)	0.00 (12)	0.00 (9)	0.00(6)	0.00 (10)
57 - 92	2520	2520	373	0.00 (7)	0.00 (9)	0.00 (14)	0.00 (13)	0.00 (10)	0.00 (13)	0.00 (10)	0.00 (11)	0.00 (10)	0.00 (9)	0.00(7)	0.00 (10)
57 - 92	931	931	374	0.00 (3)	0.00 (4)	0.00 (6)	0.00 (5)	0.00 (5)	0.00 (5)	0.00 (5)	0.00 (5)	0.00 (5)	0.15 (3)	0.35(3)	0.00 (4)
57 - 92	674	674	383	0.00 (3)	0.67 (3)	0.00 (4)	0.42 (3)	0.00 (3)	0.00 (3)	0.00 (2)	0.00 (3)	0.00 (2)	0.00 (3)	0.00(2)	0.00 (3)
93 - 183	421	421	359	4.25 (2)	1.10 (2)	1.90 (2)	0.88 (2)	4.00 (2)	4.20 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.33 (2)	0.00(2)	0.00 (2)
93 - 183	100	100	377	0.75 (2)	0.00 (2)	0.00 (2)	5.00 (2)	0.20 (2)	2.25 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.00(2)	0.00 (2)
93 - 183	647	647	382	0.00 (3)	0.00 (4)	0.00 (4)	0.13 (3)	0.00 (2)	0.00 (3)	0.00 (3)	0.00 (2)	0.00 (3)	0.00 (2)	0.00(2)	0.00 (3)
184 - 274	225	225	358	1.25 (2)	11.00 (2)	1.20 (2)	4.50 (2)	0.75 (2)	0.85 (2)	1.60 (2)	0.00 (2)	1.35 (2)	3.83 (2)	3.00(2)	0.10 (2)
184 - 274	139	139	378	1.25 (2)	1.13 (2)	1.70 (2)	8.75 (2)	1.35 (2)	1.60 (2)	0.00 (2)	0.41 (3)	1.11 (2)	0.00 (2)	0.00(2)	0.00 (2)
184 - 274	182	182	381	0.83 (3)	0.30 (2)	1.53 (3)	4.00 (2)	2.75 (2)	0.00 (2)	1.38 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.00(2)	0.00 (2)
275 - 366	164	164	357	0.30 (2)	4.25 (2)	5.40 (2)	. (.)	0.25 (2)	1.60 (2)	0.77 (2)	0.00 (2)	1.10 (2)	2.55 (2)	3.85(2)	0.80 (2)
275 - 366	106	106	379	2.40 (2)	0.90 (2)	1.93 (3)	11.00 (2)	2.70 (2)	1.40 (2)	1.68 (2)	0.21 (2)	1.15 (2)	0.00 (2)	0.10(2)	0.00 (2)
275 - 366	116	116	380	0.25 (2)	3.25 (2)	0.00 (3)	9.50 (2)	2.00 (2)	0.45 (2)	0.30 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.00(2)	0.00 (2)
367 - 549	155	155	723	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	2.75 (2)	3.71 (2)	2.58 (2)	1.78(2)	2.25 (2)
367 - 549	105	105	725	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	3.43 (2)	. (.)	2.25 (2)	2.98(2)	0.00 (2)
367 - 549	160	160	727	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	0.00 (2)	0.28 (2)	1.90 (2)	0.83(2)	0.00 (2)
550 - 731	124	124	724	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	12.00 (2)	7.63 (2)	9.95 (2)	2.05(2)	1.31 (2)
550 - 731	72	72	726	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	7.08 (2)	2.38 (2)	3.03 (2)	2.48(2)	0.28 (2)
550 - 731	156	156	728	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	4.08 (2)	0.95 (2)	5.04 (2)	1.07(3)	9.79 (2)
732 - 914	.	134	752	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	1.35(2)	. (.)
732 - 914	.	106	756	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	1.85(2)	. (.)
732 - 914	.	154	760	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	1.12(2)	. (.)
915 -1097	.	138	753	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	102	757	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	171	761	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	180	754	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	99	758	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	212	762	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	385	755	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	127	759	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	261	763	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)

Table 8. Mean Wt. (kg) of Witch flounder from surveys in Div. 3O during spring 1984-1995 using the Wilfred Templeman (Unconverted data)

Number of sets in brackets.

Year				1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Depth Range	Old Stratum	New Stratum	Stratum												
(meters)	Area (sq. n. mi.)	Area (sq. n. mi.)													
57 - 92	2089	2089	330	0.00 (4)	0.00 (10)	0.00 (9)	0.00 (11)	0.08 (9)	0.00 (11)	0.00 (10)	0.00 (11)	0.00 (10)	0.00 (7)	0.00(5)	0.00 (7)
57 - 92	456	456	331	28.83 (3)	5.50 (3)	0.50 (4)	0.30 (2)	6.50 (2)	0.00 (2)	. (.)	0.00 (2)	0.00 (2)	0.00 (2)	0.00(2)	0.00 (2)
57 - 92	1898	1898	338	0.70 (5)	32.22 (9)	5.32 (9)	5.21 (9)	12.13 (8)	8.50 (10)	1.66 (8)	0.00 (10)	0.45 (6)	1.08 (6)	0.00(6)	1.06 (6)
57 - 92	1716	1716	340	0.13 (4)	0.64 (9)	0.00 (7)	0.11 (9)	0.00 (7)	0.00 (9)	0.04 (9)	0.00 (9)	0.58 (5)	0.00 (6)	0.00(5)	0.00 (5)
57 - 92	2520	2520	351	2.23 (6)	0.87 (9)	1.55 (14)	0.86 (13)	3.24 (10)	0.74 (13)	0.33 (12)	0.00 (12)	0.00 (10)	0.00 (9)	0.00(7)	0.00 (8)
57 - 92	2580	2580	352	0.29 (7)	3.32 (11)	0.71 (14)	4.34 (13)	4.20 (11)	2.02 (13)	5.27 (13)	0.12 (14)	0.30 (8)	0.18 (7)	0.11(8)	0.21 (10)
57 - 92	1282	1282	353	25.00 (2)	8.33 (6)	7.66 (7)	12.08 (6)	43.70 (5)	17.33 (7)	10.76 (6)	0.00 (7)	1.50 (4)	1.27 (4)	0.00(4)	0.25 (5)
93 - 183	1721	1721	329	0.00 (5)	0.00 (8)	0.00 (8)	0.00 (9)	3.29 (7)	0.24 (9)	0.12 (7)	2.24 (9)	0.00 (8)	0.00 (6)	19.36(5)	0.47 (5)
93 - 183	1047	1047	332	19.00 (2)	61.50 (5)	15.53 (6)	22.96 (5)	40.88 (4)	10.36 (5)	29.52 (5)	17.68 (6)	13.85 (5)	2.56 (4)	0.30(4)	11.26 (4)
93 - 183	948	948	337	0.45 (2)	29.70 (5)	11.60 (5)	12.57 (6)	7.58 (4)	12.34 (5)	13.65 (5)	12.54 (5)	4.91 (4)	3.90 (2)	0.38(3)	4.63 (4)
93 - 183	585	585	339	4.00 (2)	0.00 (3)	0.10 (3)	3.40 (3)	1.83 (3)	0.00 (3)	0.00 (3)	0.00 (3)	0.00 (2)	0.00 (2)	0.00(2)	0.00 (2)
93 - 183	474	474	354	8.00 (2)	2.00 (3)	17.00 (3)	4.25 (2)	6.50 (2)	0.48 (2)	3.95 (2)	2.08 (3)	2.05 (2)	13.00 (2)	0.00(2)	0.00 (3)
184 - 274	151	147	333	0.40 (2)	2.38 (2)	0.32 (3)	0.00 (2)	2.95 (2)	0.40 (2)	5.88 (2)	19.55 (2)	2.88 (2)	2.48 (2)	203.40(2)	6.13 (2)
184 - 274	121	121	336	0.50 (2)	0.50 (2)	2.00 (2)	1.30 (2)	2.50 (2)	0.00 (2)	2.43 (2)	24.93 (2)	74.90 (2)	4.43 (2)	50.13(2)	3.25 (2)
184 - 274	103	103	355	4.00 (2)	13.00 (2)	2.60 (2)	4.75 (2)	0.15 (2)	6.10 (2)	6.08 (2)	7.00 (2)	1.23 (2)	1.75 (2)	7.15(2)	2.63 (2)
275 - 366	92	96	334	0.00 (2)	3.25 (2)	2.50 (2)	0.70 (2)	0.81 (2)	1.55 (2)	1.85 (2)	1.80 (2)	7.73 (2)	1.14 (2)	49.78(2)	0.94 (2)
275 - 366	58	58	335	0.00 (2)	12.15 (2)	1.95 (2)	0.10 (2)	6.25 (2)	2.50 (2)	10.18 (2)	4.77 (3)	130.03 (3)	5.41 (2)	11.68(2)	4.66 (2)
275 - 366	61	61	356	0.50 (2)	8.75 (2)	2.05 (2)	2.15 (2)	0.75 (2)	2.90 (2)	7.24 (2)	3.85 (2)	12.49 (2)	5.10 (2)	7.28(2)	6.68 (2)
367 - 549	93	166	717	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	0.60 (2)	3.73 (2)	1.53 (2)	86.40(2)	1.33 (2)
367 - 549	76	76	719	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	15.20 (2)	88.26 (2)	2.76 (2)	1.21(2)	1.55 (2)
367 - 549	76	76	721	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	5.23 (2)	3.13 (2)	2.10 (2)	5.40(2)	1.65 (2)
550 - 731	111	134	718	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	0.68 (2)	0.98 (2)	3.13 (2)	6.20(2)	1.58 (2)
550 - 731	105	105	720	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	15.92 (2)	7.50 (2)	5.43 (2)	3.49(2)	0.90 (2)
550 - 731	93	93	722	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	1.13 (2)	2.86 (2)	7.60 (2)	14.10(2)	12.30 (2)
732 - 914	.	105	764	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	2.75(2)	. (.)
732 - 914	.	99	768	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
732 - 914	.	135	772	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	1.28(2)	. (.)
915 -1097	.	124	765	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	138	769	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	128	773	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	144	766	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	128	770	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	135	774	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	158	767	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	175	771	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	155	775	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)

Table 9 Mean number per set of Witch flounder from surveys in Div. 3N during fall 1990-1997 by the Wilfred Templeman, Alfred Needler and Teleost
(Converted data for 1990-94 from Engel to Campelen units)

Year				1990	1991	1992	1993	1994	1995	1996	1997
Depth Range	Old Stratum	New Stratum	Stratum								
(meters)	Area (sq. n. mi.)	Area (sq. n. mi.)									
<=56	1593	1593	375	0.00 (6)	0.25 (4)	. (.)	0.00 (4)	0.00(5)	. (.)	0.00 (6)	0.00 (8)
<=56	1499	1499	376	0.00 (7)	0.00 (5)	0.00 (3)	0.00 (4)	0.00(4)	0.11 (9)	0.00 (8)	0.09 (11)
57 - 92	2992	2992	360	0.93 (14)	0.50 (8)	4.00 (6)	0.78 (9)	0.25(8)	2.99 (17)	0.10 (10)	1.63 (19)
57 - 92	1853	1853	361	0.13 (8)	1.67 (6)	2.75 (4)	0.00 (5)	0.17(6)	0.00 (11)	0.00 (10)	0.09 (11)
57 - 92	2520	2520	362	1.27 (11)	0.80 (10)	0.33 (3)	0.00 (7)	0.00(9)	0.00 (5)	0.00 (6)	0.00 (7)
57 - 92	2520	2520	373	0.00 (11)	0.00 (6)	0.00 (2)	0.00 (7)	0.00(7)	0.00 (5)	0.00 (7)	0.00 (7)
57 - 92	931	931	374	0.00 (5)	0.00 (2)	. (.)	0.00 (3)	0.00(2)	0.00 (2)	0.00 (2)	0.00 (3)
57 - 92	674	674	383	0.00 (3)	0.00 (3)	. (.)	0.00 (2)	0.00(2)	0.00 (2)	0.00 (2)	0.00 (2)
93 - 183	421	421	359	0.00 (2)	0.00 (2)	10.50 (2)	0.00 (2)	0.00(2)	1.50 (2)	0.00 (2)	0.00 (2)
93 - 183	100	100	377	0.00 (2)	. (.)	0.00 (2)	0.00 (2)	0.50(2)	0.00 (2)	0.00 (2)	0.00 (2)
93 - 183	647	647	382	0.00 (3)	0.00 (3)	0.00 (2)	0.00 (2)	0.00(2)	0.00 (2)	0.00 (2)	0.00 (2)
184 - 274	225	225	358	0.00 (2)	1.50 (2)	3.50 (2)	1.00 (2)	0.00(2)	7.56 (2)	0.00 (2)	1.00 (2)
184 - 274	139	139	378	0.00 (2)	5.50 (2)	1.00 (2)	0.00 (2)	0.00(2)	0.00 (2)	0.00 (2)	0.44 (2)
184 - 274	182	182	381	. (.)	0.00 (2)	. (.)	0.00 (2)	0.00(2)	0.00 (2)	0.00 (2)	0.30 (3)
275 - 366	164	164	357	0.00 (2)	17.00 (2)	1.00 (2)	15.00 (2)	6.00(2)	8.00 (2)	0.00 (2)	2.67 (2)
275 - 366	106	106	379	0.50 (2)	. (.)	1.00 (2)	0.00 (2)	0.00(2)	0.00 (2)	1.33 (2)	1.50 (2)
275 - 366	116	116	380	. (.)	0.00 (2)	. (.)	0.00 (2)	0.00(2)	0.00 (2)	0.00 (2)	0.00 (2)
367 - 549	155	155	723	. (.)	2.50 (2)	. (.)	15.50 (2)	18.50(2)	5.50 (2)	1.00 (2)	4.12 (3)
367 - 549	105	105	725	. (.)	. (.)	2.50 (2)	48.50 (2)	12.00(2)	3.40 (2)	0.00 (2)	16.40 (2)
367 - 549	160	160	727	. (.)	. (.)	. (.)	0.00 (2)	2.00(2)	0.50 (2)	0.00 (2)	2.50 (2)
550 - 731	124	124	724	. (.)	26.00 (2)	. (.)	66.00 (2)	30.00(2)	13.07 (2)	10.44 (2)	33.50 (2)
550 - 731	72	72	726	. (.)	. (.)	. (.)	67.50 (2)	11.50(2)	12.00 (2)	10.00 (2)	4.00 (2)
550 - 731	156	156	728	. (.)	. (.)	. (.)	. (.)	12.50(2)	9.07 (2)	6.00 (2)	9.90 (2)
732 - 914		134	752	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
732 - 914		106	756	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
732 - 914		154	760	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097		138	753	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097		102	757	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097		171	761	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280		180	754	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280		99	758	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280		212	762	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463		385	755	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463		127	759	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463		261	763	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)

Table 10 Mean number per set of Witch flounder from surveys in Div. 3O during fall 1990-1997 by the Wilfred Templeman, Alfred Needler and Teleost (Converted data for 1990-94 from Engel to Campelen units).

Year				1990	1991	1992	1993	1994	1995	1996	1997
Depth Range (meters)	Old Stratum Area (sq. n. mi.)	New Stratum Area (sq. n. mi.)	Stratum								
57 - 92	2089	2089	330	0.46 (11)	0.50 (8)	0.25 (4)	0.00 (6)	0.00(7)	1.80 (5)	0.00 (6)	0.33 (6)
57 - 92	456	456	331	0.67 (3)	8.00 (2)	2.00 (2)	0.00 (2)	0.00(2)	6.50 (2)	0.00 (2)	0.00 (2)
57 - 92	1898	1898	338	12.50 (8)	2.40 (5)	5.50 (4)	26.40 (5)	18.00(4)	32.40 (5)	2.00 (2)	11.00 (5)
57 - 92	1716	1716	340	1.11 (9)	1.40 (5)	0.50 (4)	0.00 (5)	0.00(5)	1.25 (4)	0.00 (5)	0.20 (5)
57 - 92	2520	2520	351	5.30 (10)	1.00 (10)	0.17 (6)	0.00 (7)	0.00(9)	0.00 (7)	0.00 (6)	0.00 (7)
57 - 92	2580	2580	352	4.50 (10)	3.50 (10)	5.67 (6)	3.14 (7)	1.00(6)	1.05 (17)	1.00 (7)	3.21 (14)
57 - 92	1282	1282	353	16.00 (2)	2.75 (4)	5.33 (3)	0.00 (3)	6.67(3)	5.67 (3)	5.00 (2)	3.25 (4)
93 - 183	1721	1721	329	0.56 (9)	0.43 (7)	0.00 (3)	0.20 (5)	0.00(6)	2.80 (5)	0.00 (5)	2.60 (5)
93 - 183	1047	1047	332	25.17 (6)	2.75 (4)	36.67 (3)	14.33 (3)	6.67(3)	36.33 (3)	83.00 (2)	8.67 (3)
93 - 183	948	948	337	18.00 (5)	3.25 (4)	18.00 (2)	8.00 (3)	40.00(2)	11.00 (2)	5.50 (2)	8.67 (3)
93 - 183	585	585	339	19.33 (3)	3.00 (2)	9.00 (2)	1.50 (2)	12.00(2)	34.50 (2)	0.00 (3)	13.50 (2)
93 - 183	474	474	354	29.00 (2)	0.50 (2)	10.50 (2)	5.50 (2)	6.50(2)	7.50 (2)	137.33 (2)	7.50 (2)
184 - 274	151	147	333	28.00 (2)	2.50 (2)	4.00 (2)	3.00 (2)	15.00(2)	9.00 (2)	(.)	9.50 (2)
184 - 274	121	121	336	13.33 (3)	28.00 (2)	13.00 (2)	38.00 (2)	2.50(2)	33.00 (2)	12.50 (2)	6.00 (2)
184 - 274	103	103	355	(.)	103.00 (2)	21.00 (2)	30.00 (2)	6.00(2)	4.44 (2)	54.20 (2)	2.00 (2)
275 - 366	92	96	334	6.00 (2)	5.50 (2)	0.00 (2)	1.67 (3)	4.50(2)	4.43 (2)	(.)	2.50 (2)
275 - 366	58	58	335	46.50 (2)	12.50 (2)	14.00 (2)	8.50 (2)	6.50(2)	8.00 (2)	8.00 (2)	0.50 (2)
275 - 366	61	61	356	(.)	3.00 (2)	1.00 (2)	149.50 (2)	30.00(2)	4.78 (2)	13.50 (2)	1.50 (2)
367 - 549	93	166	717	9.50 (2)	(.)	(.)	0.00 (2)	7.50(2)	54.95 (2)	(.)	2.00 (2)
367 - 549	76	76	719	20.00 (2)	4.00 (2)	(.)	26.50 (2)	1.00(2)	5.00 (2)	58.50 (2)	17.50 (2)
367 - 549	76	76	721	(.)	4.50 (2)	(.)	42.50 (2)	17.50(2)	9.80 (2)	12.50 (2)	1.60 (2)
550 - 731	111	134	718	(.)	(.)	(.)	7.00 (2)	28.00(2)	10.72 (2)	(.)	29.00 (2)
550 - 731	105	105	720	(.)	(.)	(.)	23.50 (2)	0.00(2)	7.28 (2)	21.89 (2)	(.)
550 - 731	93	93	722	(.)	2.00 (2)	(.)	19.00 (2)	4.50(2)	5.00 (2)	10.50 (2)	4.00 (2)
732 - 914		105	764	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
732 - 914		99	768	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
732 - 914		135	772	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
915 -1097		124	765	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
915 -1097		138	769	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
915 -1097		128	773	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
1098 -1280		144	766	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
1098 -1280		128	770	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
1098 -1280		135	774	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
1281 -1463		158	767	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
1281 -1463		175	771	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
1281 -1463		155	775	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)

Table 11 Mean number per set of Witch flounder from surveys in Div. 3N during fall 1990-1994 by the Wilfred Templeman (Unconverted data).

Year				1990	1991	1992	1993	1994
Depth Range (meters)	Old Stratum Area (sq. n. mi.)	New Stratum Area (sq. n. mi.)	Stratum					
<=56	1593	1593	375	0.00 (6)	0.25 (4)	. (.)	0.00 (4)	0.00(5)
<=56	1499	1499	376	0.00 (7)	0.00 (5)	0.00 (3)	0.00 (4)	0.00(4)
57 - 92	2992	2992	360	0.86 (14)	0.50 (8)	4.00 (6)	0.56 (9)	0.25(8)
57 - 92	1853	1853	361	0.13 (8)	1.67 (6)	2.75 (4)	0.00 (5)	0.17(6)
57 - 92	2520	2520	362	1.46 (11)	0.80 (10)	0.33 (3)	0.00 (7)	0.00(9)
57 - 92	2520	2520	373	0.00 (11)	0.00 (6)	0.00 (2)	0.00 (7)	0.00(7)
57 - 92	931	931	374	0.00 (5)	0.00 (2)	. (.)	0.00 (3)	0.00(2)
57 - 92	674	674	383	0.00 (3)	0.00 (3)	. (.)	0.00 (2)	0.00(2)
93 - 183	421	421	359	0.00 (2)	0.00 (2)	8.00 (2)	0.00 (2)	0.00(2)
93 - 183	100	100	377	0.00 (2)	. (.)	0.00 (2)	0.00 (2)	0.50(2)
93 - 183	647	647	382	0.00 (3)	0.00 (3)	0.00 (2)	0.00 (2)	0.00(2)
184 - 274	225	225	358	0.00 (2)	1.50 (2)	3.50 (2)	1.00 (2)	0.00(2)
184 - 274	139	139	378	0.00 (2)	4.00 (2)	1.00 (2)	0.00 (2)	0.00(2)
184 - 274	182	182	381	. (.)	0.00 (2)	. (.)	0.00 (2)	0.00(2)
275 - 366	164	164	357	0.00 (2)	14.50 (2)	1.00 (2)	12.50 (2)	3.50(2)
275 - 366	106	106	379	0.50 (2)	. (.)	0.50 (2)	0.00 (2)	0.00(2)
275 - 366	116	116	380	. (.)	0.00 (2)	. (.)	0.00 (2)	0.00(2)
367 - 549	155	155	723	. (.)	2.50 (2)	. (.)	13.00 (2)	14.00(2)
367 - 549	105	105	725	. (.)	. (.)	2.30 (2)	41.50 (2)	6.00(2)
367 - 549	160	160	727	. (.)	. (.)	. (.)	0.00 (2)	2.00(2)
550 - 731	124	124	724	. (.)	16.91 (2)	. (.)	43.00 (2)	19.50(2)
550 - 731	72	72	726	. (.)	. (.)	. (.)	53.50 (2)	9.50(2)
550 - 731	156	156	728	. (.)	. (.)	. (.)	. (.)	11.14(2)
732 - 914	.	134	752	. (.)	. (.)	. (.)	. (.)	. (.)
732 - 914	.	106	756	. (.)	. (.)	. (.)	. (.)	. (.)
732 - 914	.	154	760	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	138	753	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	102	757	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	171	761	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	180	754	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	99	758	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	212	762	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	385	755	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	127	759	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	261	763	. (.)	. (.)	. (.)	. (.)	. (.)

Table 12 Mean number per set of Witch flounder from surveys in Div. 3O during fall 1990-1994 by the Wilfred Templeman (Unconverted data).

Year				1990	1991	1992	1993	1994
Depth Range	Old Stratum	New Stratum	Stratum					
(meters)	Area (sq. n. mi.)	Area (sq. n. mi.)						
57 - 92	2089	2089	330	0.46 (11)	0.38 (8)	0.25 (4)	0.00 (6)	0.00(7)
57 - 92	456	456	331	0.67 (3)	8.00 (2)	2.00 (2)	0.00 (2)	0.00(2)
57 - 92	1898	1898	338	12.13 (8)	2.40 (5)	5.00 (4)	24.00 (5)	14.75(4)
57 - 92	1716	1716	340	1.11 (9)	1.40 (5)	0.50 (4)	0.00 (5)	0.00(5)
57 - 92	2520	2520	351	5.70 (10)	1.00 (10)	0.17 (6)	0.00 (7)	0.00(9)
57 - 92	2580	2580	352	5.00 (10)	3.50 (10)	5.67 (6)	3.14 (7)	1.00(6)
57 - 92	1282	1282	353	18.50 (2)	2.50 (4)	4.33 (3)	0.00 (3)	6.50(3)
93 - 183	1721	1721	329	0.56 (9)	0.43 (7)	0.00 (3)	0.20 (5)	0.00(6)
93 - 183	1047	1047	332	23.17 (6)	2.00 (4)	22.33 (3)	9.67 (3)	4.33(3)
93 - 183	948	948	337	15.60 (5)	2.50 (4)	12.50 (2)	7.00 (3)	27.50(2)
93 - 183	585	585	339	20.00 (3)	3.00 (2)	9.50 (2)	1.50 (2)	13.00(2)
93 - 183	474	474	354	29.50 (2)	0.50 (2)	8.50 (2)	2.00 (2)	5.50(2)
184 - 274	151	147	333	19.50 (2)	1.00 (2)	2.00 (2)	2.00 (2)	8.00(2)
184 - 274	121	121	336	8.33 (3)	16.50 (2)	9.00 (2)	30.00 (2)	1.50(2)
184 - 274	103	103	355	. (.)	60.50 (2)	12.50 (2)	14.50 (2)	3.50(2)
275 - 366	92	96	334	4.00 (2)	2.50 (2)	0.00 (2)	1.33 (3)	2.50(2)
275 - 366	58	58	335	40.00 (2)	5.50 (2)	6.00 (2)	7.00 (2)	3.53(2)
275 - 366	61	61	356	. (.)	2.50 (2)	1.00 (2)	90.00 (2)	21.50(2)
367 - 549	93	166	717	4.50 (2)	. (.)	. (.)	0.00 (2)	4.00(2)
367 - 549	76	76	719	17.40 (2)	0.50 (2)	. (.)	11.89 (2)	1.00(2)
367 - 549	76	76	721	. (.)	2.50 (2)	. (.)	28.50 (2)	12.00(2)
550 - 731	111	134	718	. (.)	. (.)	. (.)	3.00 (2)	8.50(2)
550 - 731	105	105	720	. (.)	. (.)	. (.)	9.50 (2)	0.00(2)
550 - 731	93	93	722	. (.)	1.50 (2)	. (.)	10.50 (2)	3.00(2)
732 - 914	.	105	764	. (.)	. (.)	. (.)	. (.)	. (.)
732 - 914	.	99	768	. (.)	. (.)	. (.)	. (.)	. (.)
732 - 914	.	135	772	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	124	765	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	138	769	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	128	773	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	144	766	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	128	770	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	135	774	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	158	767	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	175	771	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	155	775	. (.)	. (.)	. (.)	. (.)	. (.)

Table 13 Mean weight (kg) per set of Witch flounder from surveys in Div. 3N during fall 1990-1997 by the Wilfred Templeman, Alfred Needler and Teleost (Converted data for 1990-94 from Engel to Campelen units).

Year				1990	1991	1992	1993	1994	1995	1996	1997
Depth Range (meters)	Old Stratum Area (sq. n. mi.)	New Stratum Area (sq. n. mi.)	Stratum								
<=56	1593	1593	375	0.00 (6)	0.33 (4)	. (.)	0.00 (4)	0.00(5)	0.00 (9)	0.00 (6)	0.00 (8)
<=56	1499	1499	376	0.00 (7)	0.00 (5)	0.00 (3)	0.00 (4)	0.00(4)	0.07 (9)	0.00 (8)	0.11 (11)
57 - 92	2992	2992	360	0.64 (14)	0.42 (8)	3.15 (6)	0.42 (9)	0.18(8)	2.16 (17)	0.06 (10)	1.04 (19)
57 - 92	1853	1853	361	0.11 (8)	1.83 (6)	1.82 (4)	0.00 (5)	0.13(6)	0.00 (11)	0.00 (10)	0.06 (11)
57 - 92	2520	2520	362	1.15 (11)	0.64 (10)	0.25 (3)	0.00 (7)	0.00(9)	0.00 (5)	0.00 (6)	0.00 (7)
57 - 92	2520	2520	373	0.00 (11)	0.00 (6)	0.00 (2)	0.00 (7)	0.00(7)	0.00 (5)	0.00 (7)	0.00 (7)
57 - 92	931	931	374	0.00 (5)	0.00 (2)	. (.)	0.00 (3)	0.00(2)	0.00 (2)	0.00 (2)	0.00 (3)
57 - 92	674	674	383	0.00 (3)	0.00 (3)	. (.)	0.00 (2)	0.00(2)	0.00 (2)	0.00 (2)	0.00 (2)
93 - 183	421	421	359	0.00 (2)	0.00 (2)	4.81 (2)	0.00 (2)	0.00(2)	0.39 (2)	0.00 (2)	0.00 (2)
93 - 183	100	100	377	0.00 (2)	. (.)	0.00 (2)	0.00 (2)	0.56(2)	0.00 (2)	0.00 (2)	0.00 (2)
93 - 183	647	647	382	0.00 (3)	0.00 (3)	0.00 (2)	0.00 (2)	0.00(2)	0.00 (2)	0.00 (2)	0.00 (2)
184 - 274	225	225	358	0.00 (2)	0.65 (2)	2.14 (2)	0.76 (2)	0.00(2)	2.40 (2)	0.00 (2)	0.36 (2)
184 - 274	139	139	378	0.00 (2)	2.17 (2)	0.81 (2)	0.00 (2)	0.00(2)	0.00 (2)	0.00 (2)	0.05 (2)
184 - 274	182	182	381	. (.)	0.00 (2)	. (.)	0.00 (2)	0.00(2)	0.00 (2)	0.00 (2)	0.04 (3)
275 - 366	164	164	357	0.00 (2)	10.39 (2)	0.42 (2)	8.27 (2)	1.91(2)	3.76 (2)	0.00 (2)	1.18 (2)
275 - 366	106	106	379	0.27 (2)	. (.)	0.25 (2)	0.00 (2)	0.00(2)	0.00 (2)	0.04 (2)	0.45 (2)
275 - 366	116	116	380	. (.)	0.00 (2)	. (.)	0.00 (2)	0.00(2)	0.00 (2)	0.00 (2)	0.00 (2)
367 - 549	155	155	723	. (.)	1.93 (2)	. (.)	7.65 (2)	8.44(2)	2.69 (2)	0.73 (2)	1.31 (3)
367 - 549	105	105	725	. (.)	. (.)	1.01 (2)	26.05 (2)	3.20(2)	1.31 (2)	0.00 (2)	9.32 (2)
367 - 549	160	160	727	. (.)	. (.)	. (.)	0.00 (2)	1.71(2)	0.01 (2)	0.00 (2)	1.30 (2)
550 - 731	124	124	724	. (.)	10.11 (2)	. (.)	24.29 (2)	10.57(2)	6.09 (2)	3.54 (2)	11.58 (2)
550 - 731	72	72	726	. (.)	. (.)	. (.)	31.26 (2)	5.47(2)	4.80 (2)	4.03 (2)	2.08 (2)
550 - 731	156	156	728	. (.)	. (.)	. (.)	. (.)	7.11(2)	1.62 (2)	1.00 (2)	3.53 (2)
732 - 914		134	752	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
732 - 914		106	756	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
732 - 914		154	760	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097		138	753	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097		102	757	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097		171	761	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280		180	754	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280		99	758	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280		212	762	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463		385	755	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463		127	759	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463		261	763	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)

Table 14 Mean weight (kg) per set of Witch flounder from surveys in Div. 3O during fall 1990-1997 by the Wilfred Templeman, Alfred Needler and Teleost (Converted data for 1990-94 from Engel to Campelen units).

Year				1990	1991	1992	1993	1994	1995	1996	1997
Depth Range	Old Stratum	New Stratum	Stratum								
(meters)	Area (sq. n. mi.)	Area (sq. n. mi.)									
57 - 92	2089	2089	330	0.43 (11)	0.23 (8)	0.28 (4)	0.00 (6)	0.00(7)	0.86 (5)	0.00 (6)	0.25 (6)
57 - 92	456	456	331	0.35 (3)	5.02 (2)	2.14 (2)	0.00 (2)	0.00(2)	1.73 (2)	0.00 (2)	0.00 (2)
57 - 92	1898	1898	338	8.53 (8)	1.68 (5)	3.21 (4)	15.19 (5)	8.40(4)	17.94 (5)	1.93 (2)	5.09 (5)
57 - 92	1716	1716	340	0.73 (9)	1.19 (5)	0.27 (4)	0.00 (5)	0.00(5)	0.86 (4)	0.00 (5)	0.09 (5)
57 - 92	2520	2520	351	4.87 (10)	0.82 (10)	0.21 (6)	0.00 (7)	0.00(9)	0.00 (7)	0.00 (6)	0.00 (7)
57 - 92	2580	2580	352	3.99 (10)	2.52 (10)	3.81 (6)	2.66 (7)	0.64(6)	1.07 (17)	0.77 (7)	1.62 (14)
57 - 92	1282	1282	353	13.64 (2)	1.94 (4)	2.70 (3)	0.00 (3)	4.15(3)	3.05 (3)	4.48 (2)	0.95 (4)
93 - 183	1721	1721	329	0.42 (9)	0.36 (7)	0.00 (3)	0.07 (5)	0.00(6)	1.76 (5)	0.00 (5)	0.73 (5)
93 - 183	1047	1047	332	14.59 (6)	1.08 (4)	11.97 (3)	5.65 (3)	2.23(3)	7.74 (3)	31.73 (2)	1.32 (3)
93 - 183	948	948	337	10.22 (5)	1.45 (4)	7.32 (2)	4.32 (3)	16.35(2)	3.23 (2)	3.78 (2)	2.47 (3)
93 - 183	585	585	339	14.07 (3)	2.78 (2)	8.10 (2)	1.48 (2)	9.22(2)	23.75 (2)	0.00 (3)	5.98 (2)
93 - 183	474	474	354	19.81 (2)	0.36 (2)	4.85 (2)	1.16 (2)	3.22(2)	2.94 (2)	71.28 (2)	3.30 (2)
184 - 274	151	147	333	10.65 (2)	0.52 (2)	1.07 (2)	1.46 (2)	4.43(2)	1.24 (2)	. (.)	0.19 (2)
184 - 274	121	121	336	4.92 (3)	9.10 (2)	4.57 (2)	17.93 (2)	0.78(2)	2.08 (2)	1.93 (2)	1.13 (2)
184 - 274	103	103	355	. (.)	35.07 (2)	6.59 (2)	8.44 (2)	1.76(2)	1.16 (2)	24.22 (2)	0.45 (2)
275 - 366	92	96	334	1.93 (2)	1.26 (2)	0.00 (2)	0.75 (3)	1.34(2)	0.28 (2)	. (.)	0.41 (2)
275 - 366	58	58	335	24.31 (2)	3.09 (2)	3.20 (2)	3.76 (2)	2.23(2)	0.10 (2)	2.89 (2)	0.01 (2)
275 - 366	61	61	356	. (.)	1.35 (2)	0.81 (2)	51.23 (2)	11.66(2)	0.84 (2)	7.14 (2)	0.38 (2)
367 - 549	93	166	717	2.31 (2)	. (.)	. (.)	0.00 (2)	2.50(2)	2.87 (2)	. (.)	0.53 (2)
367 - 549	76	76	719	10.53 (2)	0.23 (2)	. (.)	6.24 (2)	0.58(2)	0.13 (2)	21.58 (2)	1.78 (2)
367 - 549	76	76	721	. (.)	1.69 (2)	. (.)	16.19 (2)	6.39(2)	2.02 (2)	5.15 (2)	0.54 (2)
550 - 731	111	134	718	. (.)	. (.)	. (.)	1.45 (2)	4.43(2)	0.52 (2)	. (.)	3.70 (2)
550 - 731	105	105	720	. (.)	. (.)	. (.)	5.02 (2)	0.00(2)	0.91 (2)	4.68 (2)	. (.)
550 - 731	93	93	722	. (.)	0.69 (2)	. (.)	6.30 (2)	1.62(2)	1.13 (2)	3.03 (2)	0.91 (2)
732 - 914	.	105	764	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
732 - 914	.	99	768	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
732 - 914	.	135	772	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	124	765	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	138	769	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	128	773	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	144	766	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	128	770	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	135	774	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	158	767	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	175	771	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	155	775	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)	. (.)

Table 15 Mean weight (kg) per set of Witch flounder from surveys in Div. 3N during fall 1990-1994 by the Wilfred Templeman (Unconverted data).

Year				1990	1991	1992	1993	1994
Depth Range (meters)	Old Stratum Area (sq. n. mi.)	New Stratum Area (sq. n. mi.)	Stratum					
<=56	1593	1593	375	0.00 (6)	0.36 (4)	. (.)	0.00 (4)	0.00(5)
<=56	1499	1499	376	0.00 (7)	0.00 (5)	0.00 (3)	0.00 (4)	0.00(4)
57 - 92	2992	2992	360	0.66 (14)	0.42 (8)	3.27 (6)	0.35 (9)	0.23(8)
57 - 92	1853	1853	361	0.11 (8)	1.97 (6)	2.03 (4)	0.00 (5)	0.14(6)
57 - 92	2520	2520	362	1.42 (11)	0.68 (10)	0.28 (3)	0.00 (7)	0.00(9)
57 - 92	2520	2520	373	0.00 (11)	0.00 (6)	0.00 (2)	0.00 (7)	0.00(7)
57 - 92	931	931	374	0.00 (5)	0.00 (2)	. (.)	0.00 (3)	0.00(2)
57 - 92	674	674	383	0.00 (3)	0.00 (3)	. (.)	0.00 (2)	0.00(2)
93 - 183	421	421	359	0.00 (2)	0.00 (2)	4.30 (2)	0.00 (2)	0.00(2)
93 - 183	100	100	377	0.00 (2)	. (.)	0.00 (2)	0.00 (2)	0.62(2)
93 - 183	647	647	382	0.00 (3)	0.00 (3)	0.00 (2)	0.00 (2)	0.00(2)
184 - 274	225	225	358	0.00 (2)	0.65 (2)	2.38 (2)	0.76 (2)	0.00(2)
184 - 274	139	139	378	0.00 (2)	1.53 (2)	0.75 (2)	0.00 (2)	0.00(2)
184 - 274	182	182	381	. (.)	0.00 (2)	. (.)	0.00 (2)	0.00(2)
275 - 366	164	164	357	0.00 (2)	9.44 (2)	0.48 (2)	7.75 (2)	1.45(2)
275 - 366	106	106	379	0.30 (2)	. (.)	0.12 (2)	0.00 (2)	0.00(2)
275 - 366	116	116	380	. (.)	0.00 (2)	. (.)	0.00 (2)	0.00(2)
367 - 549	155	155	723	. (.)	2.05 (2)	. (.)	7.13 (2)	7.45(2)
367 - 549	105	105	725	. (.)	. (.)	0.98 (2)	24.40 (2)	2.23(2)
367 - 549	160	160	727	. (.)	. (.)	. (.)	0.00 (2)	1.73(2)
550 - 731	124	124	724	. (.)	7.42 (2)	. (.)	17.55 (2)	7.83(2)
550 - 731	72	72	726	. (.)	. (.)	. (.)	27.53 (2)	5.03(2)
550 - 731	156	156	728	. (.)	. (.)	. (.)	. (.)	7.48(2)
732 - 914	.	134	752	. (.)	. (.)	. (.)	. (.)	. (.)
732 - 914	.	106	756	. (.)	. (.)	. (.)	. (.)	. (.)
732 - 914	.	154	760	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	138	753	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	102	757	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	171	761	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	180	754	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	99	758	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	212	762	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	385	755	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	127	759	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	261	763	. (.)	. (.)	. (.)	. (.)	. (.)

Table 16 Mean weight (kg) per set of Witch flounder from surveys in Div. 3O during fall 1990-1994 by the Wilfred Templeman (Unconverted data).

Year				1990	1991	1992	1993	1994
Depth Range (meters)	Old Stratum Area (sq. n. mi.)	New Stratum Area (sq. n. mi.)	Stratum					
57 - 92	2089	2089	330	0.41 (11)	0.20 (8)	0.30 (4)	0.00 (6)	0.00(7)
57 - 92	456	456	331	0.34 (3)	4.72 (2)	2.45 (2)	0.00 (2)	0.00(2)
57 - 92	1898	1898	338	9.46 (8)	1.71 (5)	3.16 (4)	15.05 (5)	7.48(4)
57 - 92	1716	1716	340	0.82 (9)	1.20 (5)	0.29 (4)	0.00 (5)	0.00(5)
57 - 92	2520	2520	351	5.44 (10)	0.85 (10)	0.23 (6)	0.00 (7)	0.00(9)
57 - 92	2580	2580	352	4.78 (10)	2.66 (10)	4.46 (6)	2.89 (7)	0.70(6)
57 - 92	1282	1282	353	18.65 (2)	1.90 (4)	3.13 (3)	0.00 (3)	4.36(3)
93 - 183	1721	1721	329	0.44 (9)	0.36 (7)	0.00 (3)	0.08 (5)	0.00(6)
93 - 183	1047	1047	332	14.23 (6)	0.92 (4)	8.38 (3)	4.73 (3)	1.62(3)
93 - 183	948	948	337	10.14 (5)	1.28 (4)	5.93 (2)	4.35 (3)	13.13(2)
93 - 183	585	585	339	16.12 (3)	2.93 (2)	8.88 (2)	1.47 (2)	11.53(2)
93 - 183	474	474	354	21.78 (2)	0.40 (2)	4.45 (2)	1.10 (2)	3.08(2)
184 - 274	151	147	333	7.73 (2)	0.32 (2)	0.56 (2)	1.15 (2)	2.95(2)
184 - 274	121	121	336	3.75 (3)	6.53 (2)	3.20 (2)	14.60 (2)	0.53(2)
184 - 274	103	103	355	. (.)	27.50 (2)	4.48 (2)	6.00 (2)	1.43(2)
275 - 366	92	96	334	1.38 (2)	0.70 (2)	0.00 (2)	0.78 (3)	0.80(2)
275 - 366	58	58	335	22.33 (2)	1.93 (2)	2.15 (2)	3.10 (2)	1.49(2)
275 - 366	61	61	356	. (.)	1.23 (2)	0.68 (2)	36.33 (2)	9.60(2)
367 - 549	93	166	717	1.70 (2)	. (.)	. (.)	0.00 (2)	1.68(2)
367 - 549	76	76	719	9.93 (2)	0.02 (2)	. (.)	4.35 (2)	0.57(2)
367 - 549	76	76	721	. (.)	1.20 (2)	. (.)	12.80 (2)	4.90(2)
550 - 731	111	134	718	. (.)	. (.)	. (.)	0.66 (2)	1.88(2)
550 - 731	105	105	720	. (.)	. (.)	. (.)	2.93 (2)	0.00(2)
550 - 731	93	93	722	. (.)	0.48 (2)	. (.)	4.45 (2)	1.20(2)
732 - 914	.	105	764	. (.)	. (.)	. (.)	. (.)	. (.)
732 - 914	.	99	768	. (.)	. (.)	. (.)	. (.)	. (.)
732 - 914	.	135	772	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	124	765	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	138	769	. (.)	. (.)	. (.)	. (.)	. (.)
915 -1097	.	128	773	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	144	766	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	128	770	. (.)	. (.)	. (.)	. (.)	. (.)
1098 -1280	.	135	774	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	158	767	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	175	771	. (.)	. (.)	. (.)	. (.)	. (.)
1281 -1463	.	155	775	. (.)	. (.)	. (.)	. (.)	. (.)

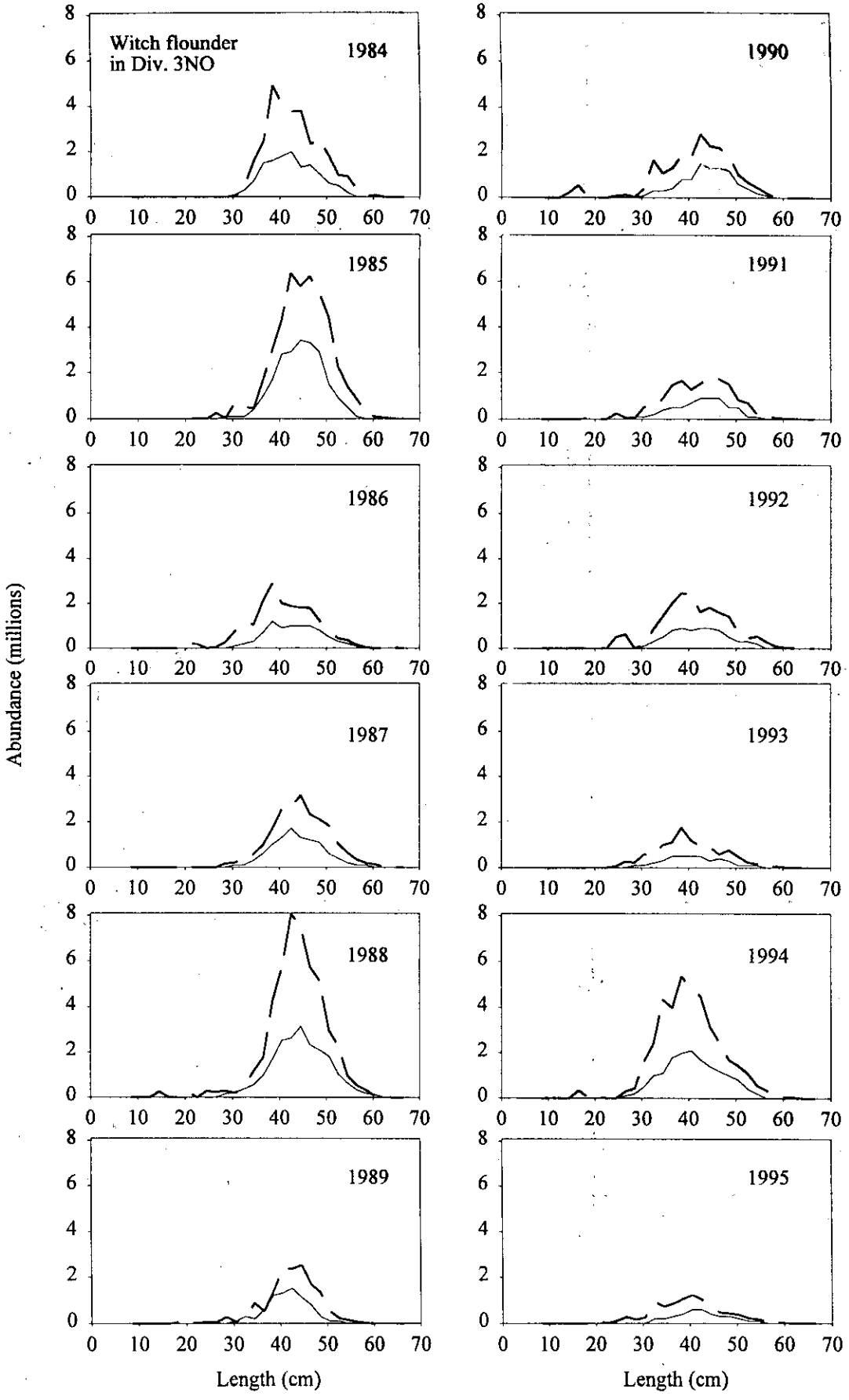

Fig. 1 Abundance (millions) at length (cm) of witch flounder from spring surveys in Div. 3NO combined during 1984-95. Solid line represents estimates using Engel trawl and dashed line represents Campelen trawl catch equivalents.

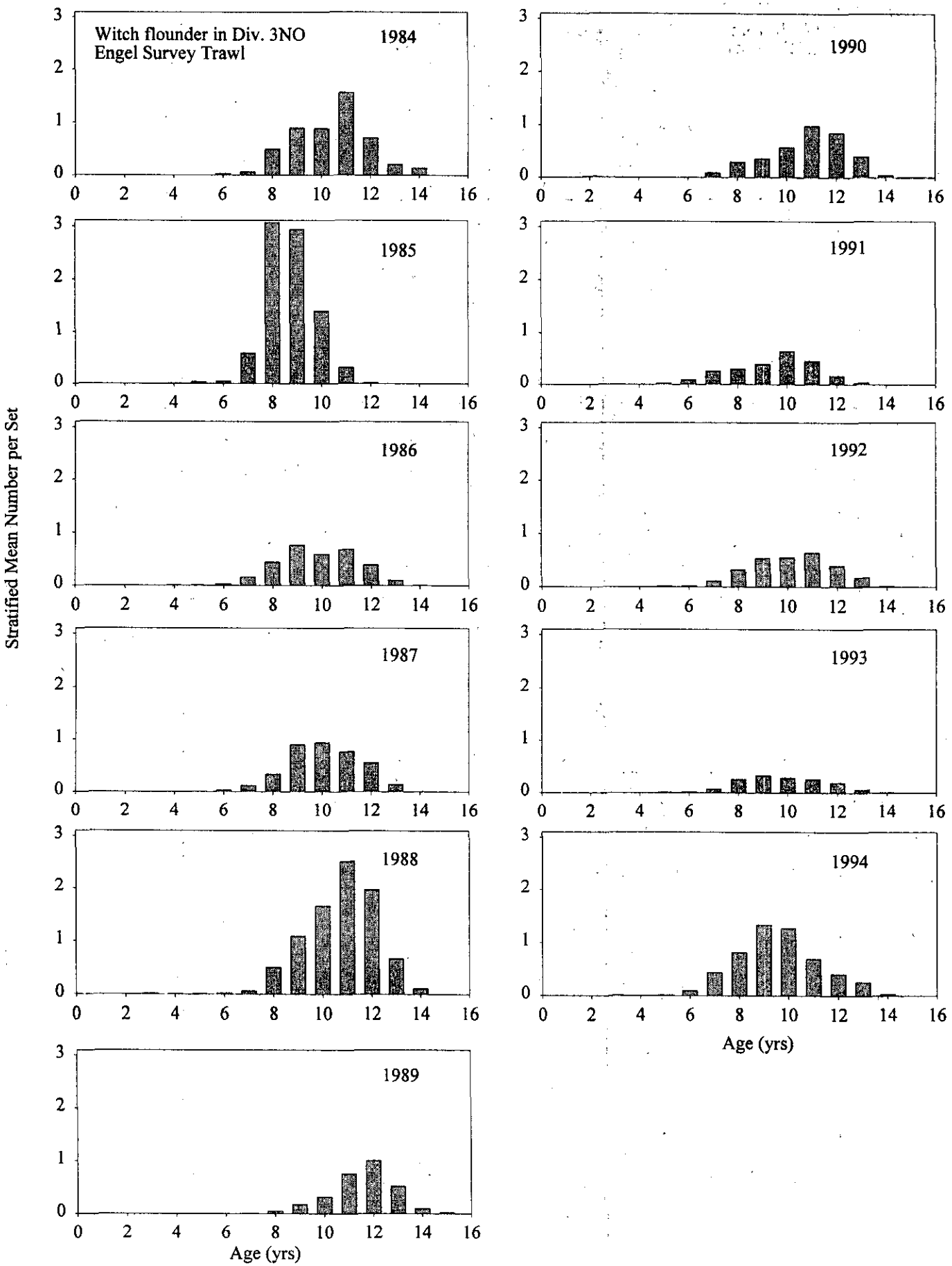

Fig. 2 Stratified mean number per set at age of witch flounder in Div. 3NO (combined) from spring surveys during 1984-94. Surveys were conducted using an Engel otter trawl (No conversions applied).

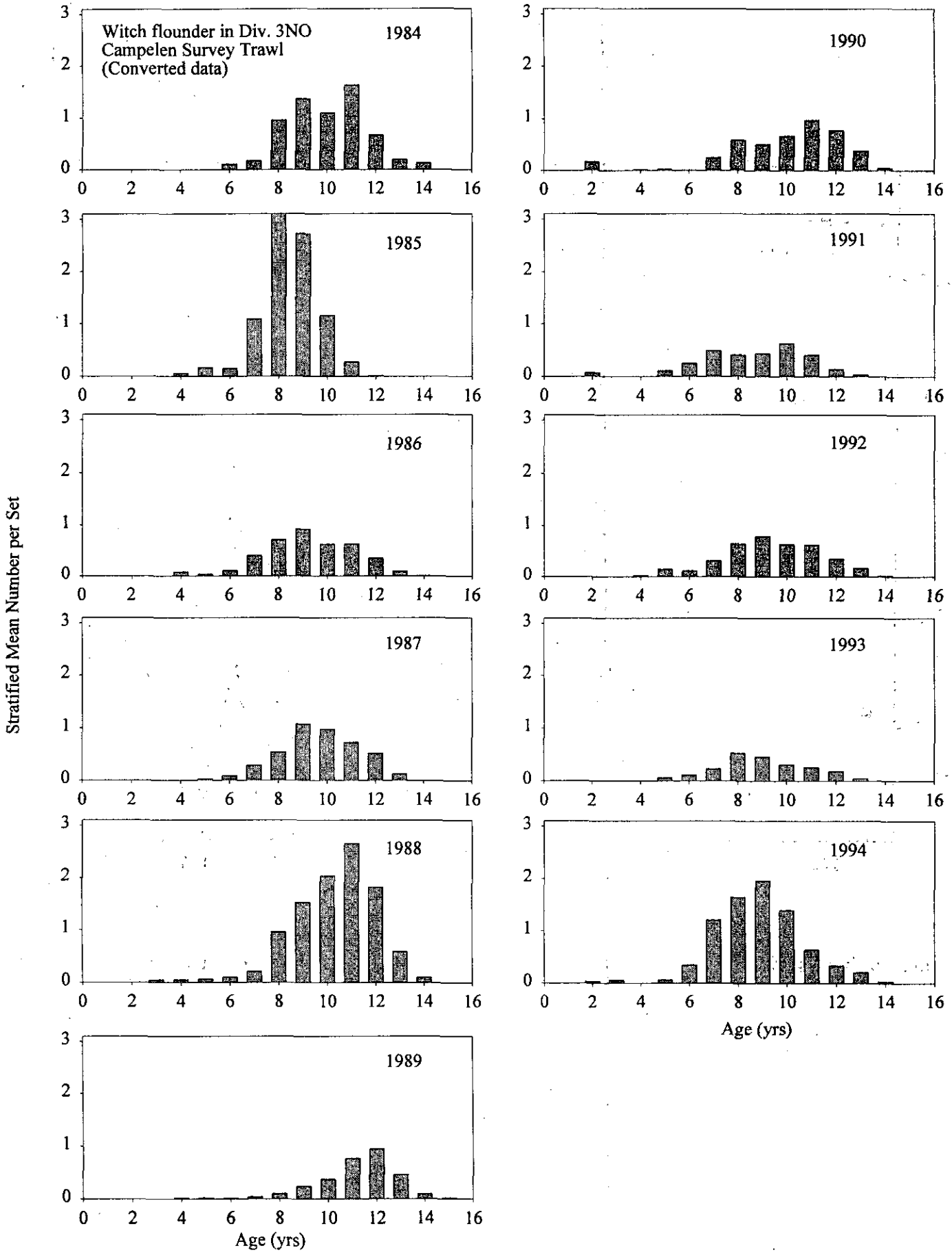

Fig. 3 Stratified mean number per set at age of witch flounder in Div. 3NO (combined) from spring surveys during 1984-94. Surveys were conducted using an Engel otter trawl but data presented here have been converted to Campelen trawl catch equivalents.

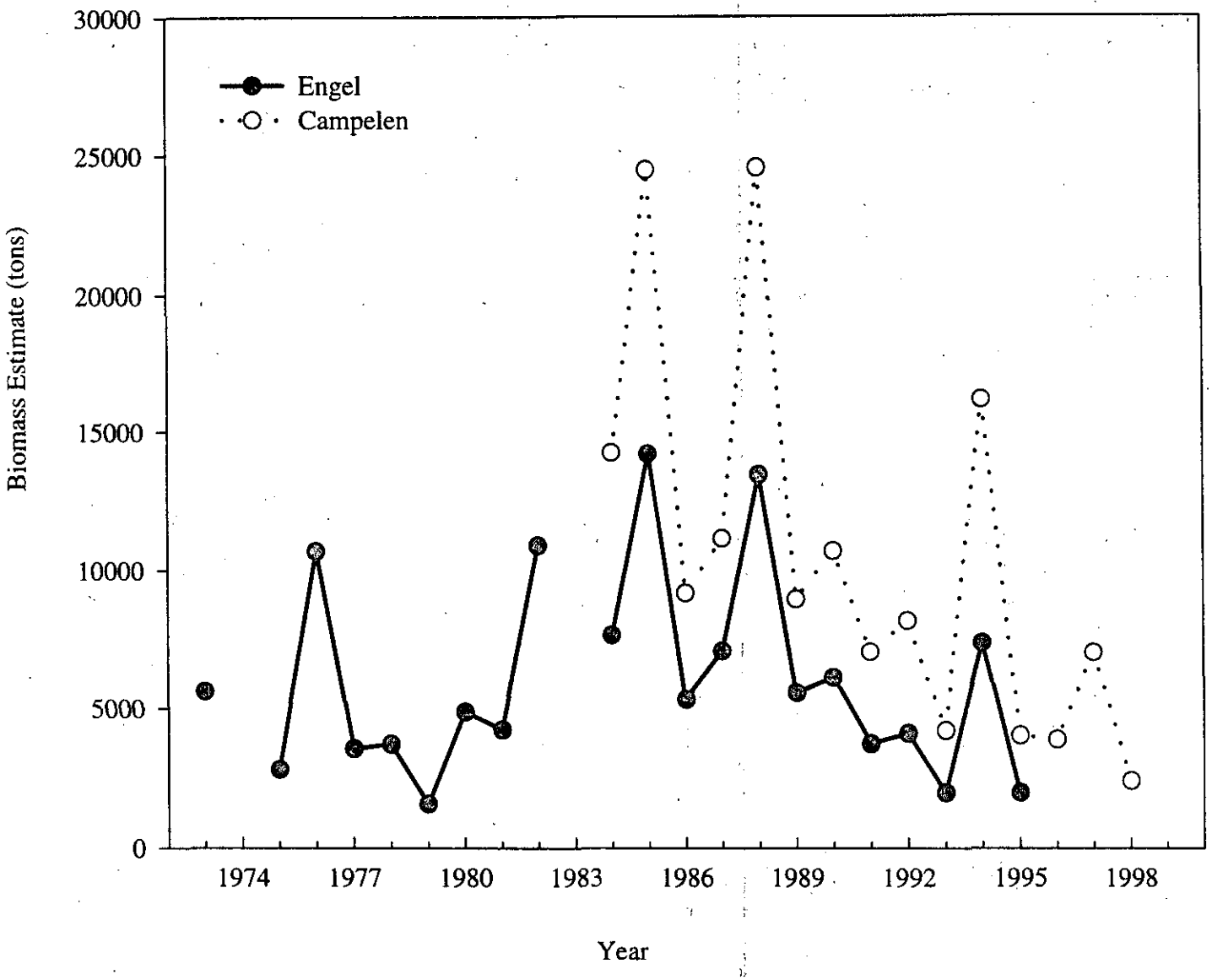

Fig. 4 Biomass estimates of witch flounder in Div. 3NO combined from Canadian spring surveys during 1973-98.

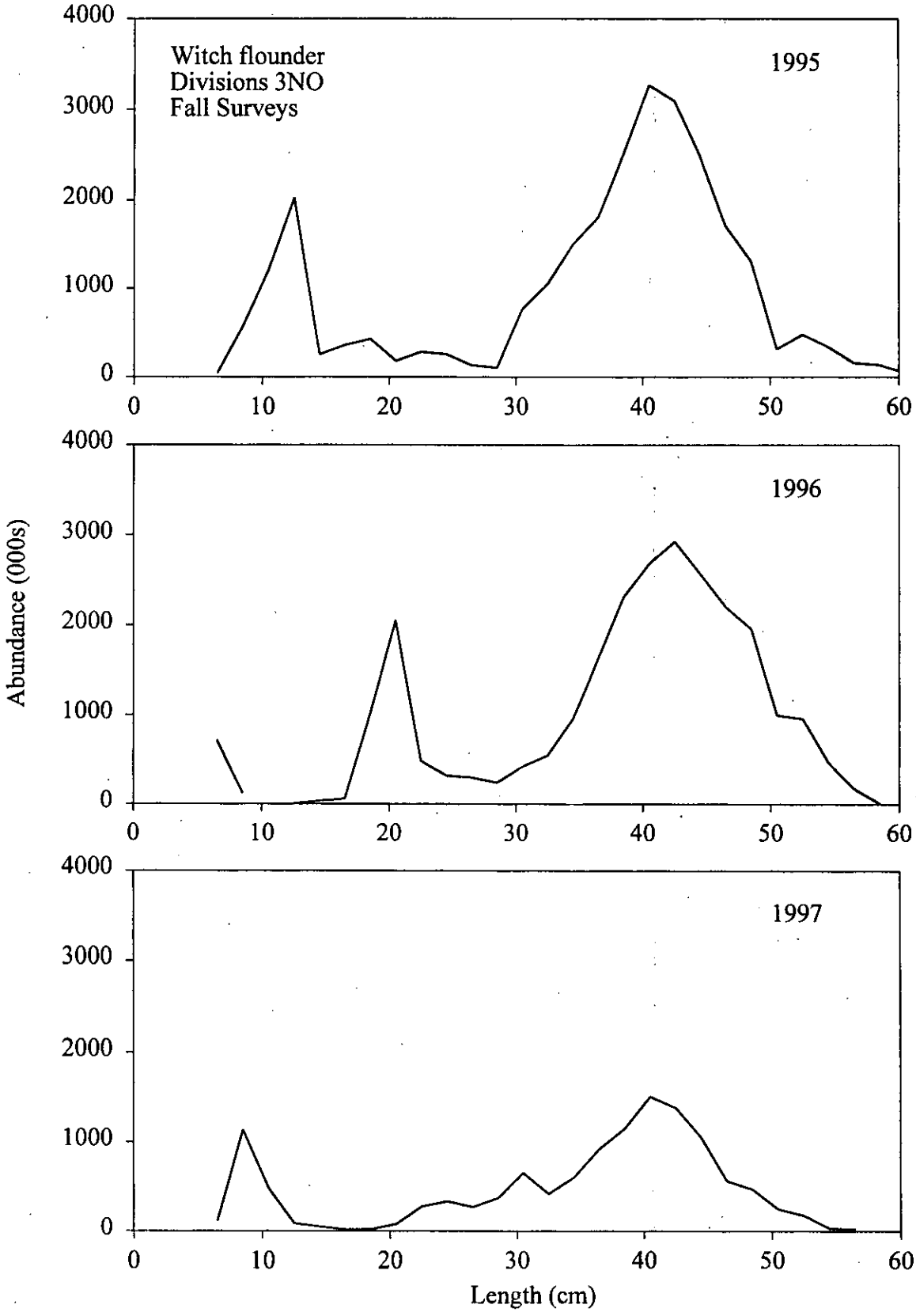

Fig. 5 Length frequency distributions of witch flounder from fall surveys in 1995-97 using the Campelen 1800 shrimp survey trawl.