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Abundance and Biomass estimates of Redfish (S. mentella) in Div. 3LN from USSR Groundfish Surveys during 1972-1990

by

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INTRODUCTION

In order to assess the status of a stock of fish an index of abundance provides a basis for evaluation. In order to provide such an index for redfish in Div. 3LN, USSR spring-summer groundfish surveys from 1972-1990 were analyses. The mean number and mean weight per standard (1.8 nm) tow in each stratum were analyses with a multiplicative analysis to estimate strata that were not sampled for any particular year.

MATERIALS AND METHODS

USSR bottom trawl surveys have been conducted in NAFO Subareas 2 and 3 since 1954 (Bulatova and Chumakov, MS 1986). For the purposes of evaluating this historic series for redfish, and in accordance with the STACREC Working group recommendations (ANON MS 1990), only data from 1972 to 1990 inclusive were considered. From 1972 to 1982 these surveys were based on a fixed station design. In the present analysis these surveys were post-stratified according to the standard NAFO stratification for Divisions 3L and 3N. From 1983 onward these surveys have been conducted on a stratified-random design. Vessels conducting the survey have been of the same tonnage class (the BMRT series) and have been towing a standard gear (except for 1985 when a vessel of a smaller tonnage class (PST) was employed.

The multiplicative analysis is based on a multiple regression of the log(ln) mean catch per tow (for number and weight separately) in each stratum as the dependent variable against the effects of stratum and year. These results are then used to estimate a value for unsampled strata in the survey series. Strata which consistently show zero to very low abundance over the series of surveys were eliminated from the analysis (Tables 1-2). A value of 0.5 was added to the mean values of all strata in the analysis to compensate for strata sampled with zero catches because of the log(ln) based design of the model. The analysis was conducted for each NAFO division separately. The individual survey tows were

adjusted to a standard 1.8 n mi. distance before the analysis. There were no data available for 1983.

RESULTS AND DISCUSSION

A graphical view of the stratification by depth of NAFO Divisions 3L and 3N (Fig. 1) shows the basis of the current stratified-random design. For strata from 183 m (100 fathoms) to 732 m (400 fathoms), an area of 11225 n mi^2 of Div. 3L is represented while in Div. 3N this depth range accounts for 2872 n mi^2.

Stratified mean number and weight (kg.) using the stratum area as a weighting factor for Div. 3L show much between year variability (Table 1-2, Fig. 2). Density estimates in terms of mean weight per tow (Table 2) have ranged from a low of 7.59 kg. per standard tow in 1990 to 163 kg. per tow in 1981. Stratum by stratum estimates (Table 1-2) show quite clearly that the highest concentrations are found in deeper waters along the slope.

Identical trends can be seen for the time series in terms of numbers and weight. From 1972 to 1984 there have been changes in the density estimates from one year to the next that are perhaps too dynamic to be solely explained as changes in stock abundance. The estimates from 1972 to 1976 are highly dependent on the results of the multiplicative analysis. In practice, these types of analyses are best suited to a situation where only a few strata are to be estimated relative to those sampled. From 1977 to 1982 there are quite a few stratum estimates based on only one set per stratum in areas of highest density because these surveys were post-stratified from a fixed station design. The series from 1984 to 1990, corresponding to a period when the estimates were derived primarily from sampling, there has been a steady decline in the density over this period.

Stratified mean number and weight (kg.) per tow for surveys in Div. 3N since 1972 (Tables 3-4, Fig. 3) indicate tremendous interannual fluctuation in terms of number and weight. However, we feel that for the period 1972 to 1982 the same arguments can be put forth here regarding the confidence of the yearly estimates of abundance. There are too many values estimated within each year by the multiplicative analysis relative to those estimated by sampling. Yearly estimates of density since 1984 in terms of mean weight (kg.) per tow have ranged from a high of about 637 in 1984 to a low of 11 in 1990. Although there are still some rather dynamic changes over this period, there is an indication of a general decline. This is evident in both the mean number and weight per tow.

Estimates of abundance indicate a trend of decline in both Div. 3L and Div. 3N since 1984. This is generally true for measures of density based on numbers (Fig. 4) and weights (Fig. 5). The 1990 survey estimates of density in both divisions are the lowest on record from these surveys.

REFERENCES

ANON. MS 1990. Final report of the STACREC Working Group on Survey Design and Procedures. NAFO SCS Doc., No. 20, Serial No. N1634, 81 p.

BULATOVA, A. Yu., and A. K. CHUMAKOV. 1986. USSR Trawl Surveys in NAFO Subareas 0, 2 and 3. NAFO SCR Doc., No 66, Serial No. N1183, 13 p.

Table 1. Mean number of redfish per standard tow from USSR spring—summer surveys in Div. 3L. Number of successful sets in brackets. Asterisks (*) represent imputed values from a multiplicative analysis. Dashes (–) represent strata that were not fished and were not included in the analysis. (P III = PERSEY III, N.K. = NICKOLAY KONONOV, G = GENICHESK)

Stratum	Depth range (m)	Area (sq. n. mi)	Jun 3–Jun 15 1972 (P III)	Jul 20–Jul 31 1973 (P III)	Jun 26–Aug 7 1974 (P III)	Aug 30–Sep 14 1975 (P III)	May 9–May 24 1976 (P III)	Apr 27–Jun 10 1977 (P III)	May 30–Jun 10 1978 (P III)	Apr 30–May 13 1979 (SULOY)	May 5–Jun 13 1980 (N.K.)
341[a]	93–183	1519	–	–	–	–	–	–	–	–	–
344[a]	184–274	1494	0.00(2)	0.00(1)	0.00(1)	16.97(1)	–	–	–	–	–
345	275–366	1432	30.34(2)	0.00(1)	18.23(*)	85.37(1)	3.86(2)	29.65(*)	10.34(*)	12.45(*)	41.14(1)
346	275–366	865	66.34(1)	186.17(1)	85.37(1)	70.71(2)	14.48(*)	112.98(*)	8.74(2)	51.43(2)	1081.03(1)
347	184–274	983	5.66(2)	1.89(3)	0.00(3)	0.00(4)	4.29(3)	13.63(4)	0.00(3)	0.00(2)	0.51(3)
348[a]	93–183	2120	0.00(2)	0.00(3)	0.00(3)	0.00(2)	0.00(1)	0.00(2)	0.00(2)	0.00(3)	0.00(2)
349[a]	93–183	2114	–	0.00(1)	0.00(1)	0.00(1)	0.00(2)	–	0.00(1)	0.00(2)	0.00(1)
350[a]	57–91	2071	0.00(2)	0.00(2)	0.00(1)	0.00(2)	0.00(2)	0.00(2)	0.00(1)	0.00(1)	0.00(2)
363[a]	57–91	1780	0.00(1)	0.00(1)	0.00(1)	0.00(2)	0.00(2)	0.00(2)	0.00(1)	0.26(2)	0.00(2)
364[a]	93–183	2817	0.00(1)	0.00(3)	0.00(3)	0.00(3)	0.00(4)	0.00(4)	0.00(2)	0.00(2)	0.00(2)
365[a]	93–183	1041	0.00(2)	0.00(2)	0.00(2)	0.00(3)	0.00(1)	–	1.03(2)	0.00(1)	0.00(1)
366	184–274	1394	0.00(3)	22.94(5)	41.04(5)	33.94(3)	1.29(4)	260.54(5)	3.34(2)	3.43(3)	5.91(4)
368	275–366	334	67.89(1)	436.11(2)	102.69(3)	50.40(3)	13.37(1)	113.83(3)	16.46(2)	43.54(3)	181.71(3)
369	184–274	961	18.00(3)	12.17(3)	12.86(1)	22.97(3)	2.91(3)	8.00(3)	16.46(4)	11.06(4)	40.63(2)
370[a]	93–183	1320	0.00(3)	0.00(3)	0.00(2)	0.00(3)	0.00(3)	0.00(5)	0.00(5)	0.00(4)	0.00(4)
371[a]	57–91	1121	0.00(1)	0.00(2)	0.00(2)	0.00(2)	0.00(2)	–	–	–	0.00(1)
372[a]	57–91	2460	0.00(5)	0.00(5)	0.00(4)	0.00(4)	0.00(4)	0.00(4)	0.00(2)	0.00(4)	0.00(3)
384[a]	57–91	1120	0.00(3)	0.00(3)	0.00(3)	0.00(3)	0.00(2)	0.00(2)	0.00(2)	0.00(2)	0.00(3)
385[a]	93–183	2356	0.00(3)	0.00(2)	0.00(2)	0.00(2)	0.00(2)	0.00(2)	0.00(3)	0.00(2)	0.00(2)
386	184–274	983	1.54(2)	1.80(4)	0.00(4)	1.80(4)	0.00(4)	12.99(4)	15.17(2)	14.74(3)	111.94(3)
387	275–366	718	266.40(2)	360.51(2)	2852.23(2)	294.69(2)	11.49(3)	36.00(1)	27.77(1)	107.49(1)	340.46(1)
388	275–366	361	127.54(1)	349.03(3)	999.77(2)	233.49(3)	15.17(2)	6.69(1)	180.26(2)	118.80(1)	13.37(1)
389	184–274	821	0.00(3)	5.40(2)	0.00(3)	0.00(2)	0.00(3)	1.41(4)	8.87(4)	17.38(5)	5.14(4)
390[a]	93–183	1481	0.00(2)	0.00(4)	0.00(3)	0.00(4)	3.09(4)	0.00(3)	47.66(3)	0.51(3)	0.17(3)
391	184–274	282	4.50(4)	0.00(3)	32.91(3)	28.97(3)	0.86(3)	13.96(*)	12.34(1)	4.63(1)	18.00(1)
392	275–366	145	23.66(1)	30.29(*)	41.66(*)	90.00(1)	10.80(1)	49.37(2)	66.86(2)	63.26(2)	9.26(1)
729	367–549	186	163.44(*)	465.43(1)	476.23(1)	299.25(*)	58.20(*)	444.23(*)	159.37(*)	190.60(*)	66.34(1)
730	550–731	170	38.31(*)	47.26(*)	64.90(*)	70.47(*)	13.40(*)	37.22(2)	0.00(1)	2.31(2)	23.66(1)
731	367–549	216	44.34(*)	54.69(*)	75.04(*)	81.50(*)	15.56(*)	121.15(*)	43.23(*)	51.77(*)	65.31(1)
732	550–731	231	43.41(*)	53.54(*)	73.49(*)	79.79(*)	15.22(*)	38.57(2)	2.57(1)	4.11(1)	26.23(1)
733	367–549	468	553.75(*)	681.56(*)	933.42(*)	323.49(1)	197.97(*)	447.43(2)	922.63(2)	645.68(*)	349.20(2)
734	550–731	228	176.46(*)	217.26(*)	297.72(*)	323.07(*)	62.87(*)	1799.49(2)	2191.37(2)	208.29(3)	304.20(2)
735	367–549	272	267.44(*)	329.24(*)	451.02(*)	489.43(*)	95.44(*)	726.63(*)	1437.69(2)	192.34(1)	1214.49(2)
736	55—731	175	132.36(*)	163.00(*)	223.39(*)	242.45(*)	47.08(*)	118.90(2)	265.37(1)	154.42(*)	356.23(*)
From multiplicative analysis											
Weighted mean (by area)			74.99	120.54	305.32	97.35	18.53	140.57	140.51	64.91	190.15
Total ($\times 10^{-6}$)			60.49	97.24	246.32	78.54	14.95	113.41	113.35	52.36	153.40

[a]Strata not included in multiplicative analysis.

Table 1. (Cont'd.)

Stratum	Depth range (m)	Area (sq. n. mi)	Jun 8–Jul 11 1981 (N.K.)	May 25–Jun 11 1982 (SULOY)	Jun 6–Jun 22 1984 (SULOY)	Apr 22–Jun 17 1985 (G)	Apr 16–May 22 1986 (N.K.)	Apr 26–May 11 1987 (P III)	Apr 7–Apr 23 1988 (P III)	Apr 27–May 21 1989 (P III)	Apr 26–May 15 1990 (P III)
341[a]	93–183	1519	–	–	0.00(3)	–	0.00(4)	0.00(3)	0.00(4)	0.00(3)	0.00(4)
344[a]	184–274	1494	–	–	–	–	–	–	–	–	–
345	275–366	1432	15.40(*)	12.89(*)	17.50(2)	14.33(3)	9.75(4)	4.67(3)	0.25(4)	1.50(4)	65.67(4)
346	275–366	865	8.74(1)	41.14(1)	116.33(3)	69.00(3)	56.67(3)	11.00(3)	3.25(4)	26.00(3)	16.33(3)
347	184–274	983	0.00(1)	0.00(2)	0.00(3)	1.00(3)	3.67(3)	0.00(4)	0.00(4)	0.00(6)	0.00(3)
348[a]	93–183	2120	–	0.00(2)	0.00(3)	0.00(3)	0.00(4)	0.00(5)	0.00(6)	0.00(8)	0.00(3)
349[a]	93–183	2114	0.00(2)	0.00(2)	0.00(4)	0.00(4)	0.00(4)	0.00(5)	0.00(5)	0.00(6)	0.00(4)
350[a]	57–91	2071	0.00(2)	0.00(1)	0.00(4)	0.00(3)	0.00(4)	0.00(4)	0.00(5)	0.00(5)	0.00(5)
363[a]	57–91	1780	0.00(2)	0.00(2)	0.00(3)	0.00(3)	0.00(4)	0.00(6)	0.00(4)	0.00(4)	0.00(4)
364[a]	93–183	2817	0.00(2)	0.00(2)	0.00(4)	0.00(4)	0.00(5)	0.00(6)	0.00(7)	0.00(7)	0.00(4)
365[a]	93–183	1041	0.00(1)	–	0.00(3)	0.00(3)	0.00(3)	0.00(4)	0.00(4)	0.00(3)	0.00(5)
366	184–274	1394	41.79(4)	12.24(5)	0.00(4)	31.67(3)	7.75(4)	7.50(4)	1.25(4)	0.00(5)	1.00(3)
368	275–366	334	1433.31(3)	12.86(1)	936.75(4)	152.67(3)	81.00(3)	18.33(3)	29.50(4)	29.75(4)	7.33(4)
369	184–274	961	0.00(2)	10.87(5)	0.00(4)	2.67(3)	2.25(4)	4.67(3)	0.00(3)	0.33(3)	0.80(3)
370[a]	93–183	1320	0.00(4)	0.00(2)	0.00(3)	0.00(3)	0.00(4)	0.00(5)	0.00(3)	0.00(5)	0.00(5)
371[a]	57–91	1121	0.00(1)	0.00(1)	0.00(3)	0.00(3)	0.00(4)	0.00(4)	0.00(4)	0.00(3)	0.00(4)
372[a]	57–91	2460	0.00(4)	0.00(4)	0.00(3)	0.00(4)	0.00(5)	0.00(5)	0.00(4)	0.00(5)	0.00(4)
384[a]	57–91	1120	0.00(2)	0.26(2)	0.00(3)	0.00(3)	0.00(4)	0.00(4)	0.00(3)	0.00(4)	0.00(5)
385[a]	93–183	2356	0.00(1)	26.49(2)	0.00(4)	0.00(3)	0.00(5)	0.00(5)	0.00(5)	0.00(5)	0.00(4)
386	184–274	983	0.77(2)	16.97(1)	3.00(4)	0.00(3)	1.00(4)	0.75(4)	0.00(4)	1.75(4)	0.00(5)
387	275–366	718	1349.83(3)	0.00(1)	408.00(4)	612.00(3)	9.67(3)	11.67(3)	7.00(3)	24.60(5)	12.00(4)
388	275–366	361	1032.43(2)	192.34(1)	42.00(3)	8.50(4)	15.67(3)	6.67(3)	6.33(3)	11.75(4)	8.00(3)
389	184–274	821	12.99(4)	6.94(4)	7.67(3)	10.00(3)	4.50(4)	0.25(4)	2.75(4)	1.25(4)	1.25(4)
390[a]	93–183	1481	0.00(1)	0.00(1)	0.00(3)	0.00(4)	0.00(4)	0.00(5)	0.00(4)	0.00(5)	0.00(4)
391	184–274	282	14.23(3)	41.55(5)	1.00(3)	6.25(4)	0.00(3)	0.00(3)	30.67(3)	8.33(3)	3.00(3)
392	275–366	145	1364.40(1)	190.54(2)	622.67(3)	8.50(4)	7.25(4)	15.67(3)	3.33(3)	7.67(3)	1.75(4)
729	367–549	186	2656.80(1)	621.00(2)	793.00(3)	264.67(3)	621.33(3)	69.67(3)	49.00(3)	19.33(3)	13.67(3)
730	550–731	170	42.69(1)	46.28(*)	961.00(3)	675.67(3)	1049.33(3)	535.33(3)	110.67(3)	88.67(3)	0.33(3)
731	367–549	216	191.83(1)	53.53(*)	232.33(3)	70.00(3)	15.33(3)	35.00(3)	40.67(3)	17.00(3)	14.00(3)
732	550–731	231	62.34(*)	534.09(1)	627.50(2)	876.50(2)	113.33(3)	142.00(3)	41.67(3)	18.00(3)	3.67(3)
733	367–549	468	2408.40(1)	1774.39(5)	1391.00(2)	554.33(3)	1713.33(3)	1027.75(4)	815.33(3)	167.50(4)	32.33(3)
734	550–731	228	3.60(1)	631.38(1)	711.67(3)	581.67(3)	1713.67(3)	2591.67(3)	12.00(3)	1.33(3)	42.67(3)
735	367–549	272	554.91(1)	344.31(2)	559.00(3)	522.00(3)	131.33(3)	94.75(4)	85.25(4)	97.75(4)	104.67(3)
736	55—731	175	29.83(1)	577.03(1)	949.33(3)	285.67(3)	426.00(3)	102.67(3)	64.67(3)	28.67(3)	83.00(3)
From multiplicative analysis											
Weighted mean (by area)			353.06	146.49	221.28	142.39	156.01	116.81	44.42	17.80	17.88
Total ($\times 10^{-6}$)			284.83	118.18	178.52	114.87	125.86	94.24	35.84	14.36	14.43

[a]Strata not included in multiplicative analysis.

Table 2. Mean weight (kg) of redfish per standard tow from USSR spring—summer surveys in Div. 3L. Number of successful sets in brackets. Asterisks (*) represent imputed values from a multiplicative analysis. Dashes (–) represent strata that were not fished and were not included in the analysis. (P III = PERSEY III, N.K. = NICKOLAY KONONOV, G = GENICHESK)

Stratum	Depth range (m)	Area (sq. n. mi)	Jun 3–Jun 15 1972 (P III)	Jul 20–Jul 31 1973 (P III)	Jun 26–Aug 7 1974 (P III)	Aug 30–Sep 14 1975 (P III)	May 9–May 24 1976 (P III)	Apr 27–Jun 10 1977 (P III)	May 30–Jun 10 1978 (P III)	Apr 30–May 13 1979 (SULOY)	May 5–Jun 13 1980 (N.K.)
341[a]	93–183	1519	–	–	–	–	–	–	–	–	–
344[a]	184–274	1494	0.00(2)	0.00(1)	0.00(1)	12.24(1)	–	–	–	–	–
345	275–366	1432	23.89(2)	0.00(1)	12.21(*)	77.45(1)	2.19(2)	23.54(*)	7.45(*)	7.12(*)	15.58(1)
346	275–366	865	13.32(1)	170.85(1)	65.47(1)	50.45(2)	8.66(*)	60.05(*)	2.65(2)	28.08(2)	285.89(1)
347	184–274	983	0.18(2)	1.25(3)	0.00(3)	0.00(4)	2.02(3)	9.13(4)	0.00(3)	0.00(2)	0.34(3)
348[a]	93–183	2120	0.00(2)	0.00(3)	0.00(3)	0.00(2)	0.00(1)	0.00(2)	0.00(2)	0.00(3)	0.00(2)
349[a]	93–183	2114	–	0.00(1)	0.00(1)	0.00(1)	0.00(2)	–	0.00(1)	0.00(2)	0.00(1)
350[a]	57–91	2071	0.00(2)	0.00(2)	0.00(1)	0.00(2)	0.00(2)	0.00(2)	0.00(1)	0.00(1)	0.00(2)
363[a]	57–91	1780	0.00(1)	0.00(1)	0.00(1)	0.00(2)	0.00(2)	0.00(2)	0.00(1)	0.01(2)	0.00(2)
364[a]	93–183	2817	0.00(1)	0.00(3)	0.00(3)	0.00(3)	0.00(4)	0.00(4)	0.00(2)	0.00(2)	0.00(2)
365[a]	93–183	1041	0.00(2)	0.00(2)	0.00(2)	0.00(3)	0.00(1)	–	0.59(2)	0.00(1)	0.00(1)
366	184–274	1394	0.00(3)	0.93(5)	3.57(5)	2.16(3)	0.94(4)	79.79(5)	0.75(2)	0.11(3)	0.64(4)
368	275–366	334	18.00(1)	100.98(2)	14.73(3)	8.07(3)	2.31(1)	21.29(3)	3.57(2)	5.23(3)	57.53(3)
369	184–274	961	3.67(3)	2.28(3)	1.59(1)	4.46(3)	0.38(3)	5.46(3)	4.54(4)	2.52(4)	22.58(2)
370[a]	93–183	1320	0.00(3)	0.00(3)	0.00(2)	0.00(3)	0.00(3)	0.00(5)	0.00(5)	0.00(4)	0.00(4)
371[a]	57–91	1121	0.00(1)	0.00(2)	0.00(2)	0.00(2)	0.00(2)	–	–	–	0.00(1)
372[a]	57–91	2460	0.00(5)	0.00(5)	0.00(4)	0.00(4)	0.00(4)	0.00(4)	0.00(2)	0.00(4)	0.00(3)
384[a]	57–91	1120	0.00(3)	0.00(3)	0.00(3)	0.00(3)	0.00(2)	0.00(2)	0.00(2)	0.00(2)	0.00(3)
385[a]	93–183	2356	0.00(3)	0.00(2)	0.00(2)	0.00(2)	0.00(2)	0.00(2)	0.00(3)	0.00(2)	0.00(2)
386	184–274	983	0.93(2)	0.94(4)	0.00(4)	1.13(4)	0.00(4)	5.79(4)	7.87(2)	8.04(3)	60.27(3)
387	275–366	718	107.56(2)	155.16(2)	1066.11(2)	142.84(2)	3.67(3)	12.67(1)	12.39(1)	31.47(1)	92.67(1)
388	275–366	361	61.51(1)	82.39(3)	326.60(2)	73.08(3)	6.20(2)	3.38(1)	76.35(2)	27.36(1)	1.29(1)
389	184–274	821	0.00(3)	0.82(2)	0.00(3)	0.00(2)	0.00(3)	0.31(4)	1.66(4)	3.57(5)	0.39(4)
390[a]	93–183	1481	0.00(2)	0.00(4)	0.00(3)	0.00(4)	0.49(4)	0.00(3)	13.70(3)	0.01(3)	0.01(3)
391	184–274	282	1.09(4)	0.00(3)	5.79(3)	9.51(3)	0.09(3)	3.54(*)	4.01(1)	0.10(1)	1.85(1)
392	275–366	145	10.34(1)	7.91(*)	12.34(*)	50.71(1)	1.70(1)	11.16(2)	23.89(2)	18.77(2)	1.59(1)
729	367–549	186	61.54(*)	158.86(1)	177.07(1)	108.22(*)	27.06(*)	181.72(*)	59.74(*)	57.26(*)	22.42(1)
730	550–731	170	18.88(*)	19.20(*)	29.59(*)	33.46(*)	8.11(*)	13.72(2)	0.00(1)	1.23(2)	6.74(1)
731	367–549	216	13.40(*)	13.64(*)	21.08(*)	23.87(*)	5.68(*)	40.34(*)	13.00(*)	12.45(*)	13.89(1)
732	550–731	231	19.79(*)	20.12(*)	30.99(*)	35.05(*)	8.51(*)	16.27(2)	1.75(1)	2.11(1)	12.29(1)
733	367–549	468	253.29(*)	257.52(*)	393.48(*)	116.69(1)	112.24(*)	284.80(2)	402.45(2)	235.83(*)	198.67(2)
734	550–731	228	100.31(*)	101.99(*)	156.01(*)	176.16(*)	44.28(*)	1108.25(2)	1478.21(2)	137.19(3)	161.51(2)
735	367–549	272	93.38(*)	94.95(*)	145.25(*)	164.02(*)	41.20(*)	275.32(*)	468.00(2)	52.61(1)	743.53(2)
736	55—731	175	57.91(*)	58.89(*)	90.18(*)	101.87(*)	25.45(*)	61.63(2)	91.44(1)	53.90(*)	118.53(*)
From multiplicative analysis											
Weighted mean (by area)			31.78	49.04	115.55	44.63	9.63	67.47	67.06	23.55	71.54
Biomass (t)			25634	39560	93216	36000	7769	54429	54097	18994	57712

[a]Strata not included in multiplicative analysis.

Table 2. (Cont'd.)

Stratum	Depth range (m)	Area (sq. n. mi)	Jun 8–Jul 11 1981 (N.K.)	May 25–Jun 11 1982 (SULOY)	Jun 6–Jun 22 1984 (SULOY)	Apr 22–Jun 17 1985 (G)	Apr 16–May 22 1986 (N.K.)	Apr 26–May 11 1987 (P III)	Apr 7–Apr 23 1988 (P III)	Apr 27–May 21 1989 (P III)	Apr 26–May 15 1990 (P III)
341[a]	93–183	1519	–	–	0.00(3)	–	0.00(4)	0.00(3)	0.00(4)	0.00(3)	0.00(4)
344[a]	184–274	1494	–	–	–	–	–	–	–	–	–
345	275–366	1432	13.31(*)	5.56(*)	13.10(2)	11.53(3)	7.95(3)	4.00(3)	0.03(4)	1.35(4)	39.33(4)
346	275–366	865	3.96(1)	13.11(1)	58.53(3)	30.07(3)	28.93(3)	5.67(3)	1.33(4)	11.60(3)	7.47(3)
347	184–274	983	0.00(1)	0.00(2)	0.00(3)	0.03(3)	0.83(4)	0.00(4)	0.00(4)	0.00(6)	0.00(3)
348[a]	93–183	2120	–	0.00(2)	0.00(3)	0.00(3)	0.00(4)	0.00(5)	0.00(6)	0.00(8)	0.00(3)
349[a]	93–183	2114	0.00(2)	0.00(2)	0.00(4)	0.00(4)	0.00(4)	0.00(5)	0.00(5)	0.00(6)	0.00(4)
350[a]	57–91	2071	0.00(2)	0.00(1)	0.00(4)	0.00(3)	0.00(4)	0.00(4)	0.00(5)	0.00(5)	0.00(5)
363[a]	57–91	1780	0.00(2)	0.00(2)	0.00(3)	0.00(3)	0.00(5)	0.00(6)	0.00(4)	0.00(4)	0.00(4)
364[a]	93–183	2817	0.00(2)	0.00(2)	0.00(4)	0.00(4)	0.00(3)	0.00(6)	0.00(7)	0.00(7)	0.00(4)
365[a]	93–183	1041	0.00(1)	–	0.00(3)	0.00(3)	0.00(4)	0.00(4)	0.00(4)	0.00(3)	0.00(5)
366	184–274	1394	7.74(4)	0.93(5)	0.00(4)	6.70(3)	1.85(3)	1.25(4)	0.20(4)	0.00(5)	0.28(3)
368	275–366	334	666.84(3)	1.59(1)	283.35(4)	46.90(3)	33.53(4)	5.00(3)	7.20(4)	5.98(4)	1.93(4)
369	184–274	961	0.00(2)	2.08(5)	0.00(4)	1.53(3)	1.60(4)	1.67(3)	0.00(3)	0.13(3)	0.50(3)
370[a]	93–183	1320	0.00(4)	0.00(2)	0.00(3)	0.00(3)	0.00(4)	0.00(5)	0.00(3)	0.00(5)	0.00(5)
371[a]	57–91	1121	0.00(1)	0.00(1)	0.00(3)	0.00(3)	0.00(5)	0.00(4)	0.00(4)	0.00(3)	0.00(4)
372[a]	57–91	2460	0.00(4)	0.00(4)	0.00(3)	0.00(4)	0.00(4)	0.00(5)	0.00(4)	0.00(5)	0.00(4)
384[a]	57–91	1120	0.00(2)	0.03(2)	0.00(3)	0.00(3)	0.00(5)	0.00(4)	0.00(3)	0.00(4)	0.00(5)
385[a]	93–183	2356	0.00(1)	0.26(2)	0.00(4)	0.00(3)	0.00(4)	0.00(5)	0.00(5)	0.00(5)	0.00(4)
386	184–274	983	0.36(2)	0.15(1)	2.08(4)	0.00(3)	0.63(3)	0.13(4)	0.00(4)	0.95(4)	0.00(5)
387	275–366	718	752.76(3)	0.00(1)	205.35(4)	194.13(3)	4.53(3)	4.17(3)	1.23(3)	8.14(5)	5.30(4)
388	275–366	361	227.47(2)	80.90(1)	15.40(3)	2.10(4)	2.63(4)	1.07(3)	1.30(3)	1.35(4)	1.93(3)
389	184–274	821	3.51(4)	1.65(4)	3.73(3)	1.57(3)	0.50(4)	0.03(4)	0.35(4)	0.08(4)	0.10(4)
390[a]	93–183	1481	0.00(1)	0.00(1)	0.00(3)	0.00(4)	0.00(3)	0.00(5)	0.00(4)	0.00(5)	0.00(4)
391	184–274	282	3.99(3)	1.61(5)	0.27(3)	1.27(4)	0.00(4)	0.00(3)	0.23(3)	0.47(3)	0.03(3)
392	275–366	145	426.34(1)	48.52(2)	238.67(3)	2.05(4)	3.17(3)	2.67(3)	0.63(3)	2.07(3)	0.25(4)
729	367–549	186	1272.24(1)	216.54(2)	318.93(3)	68.17(3)	277.63(3)	18.67(3)	15.53(3)	6.50(3)	3.30(3)
730	550–731	170	17.64(1)	13.86(*)	467.33(3)	225.33(3)	403.57(3)	204.33(3)	53.60(3)	37.90(3)	0.27(3)
731	367–549	216	114.22(1)	9.80(*)	87.20(3)	19.20(3)	4.20(3)	10.20(3)	9.30(3)	5.10(3)	2.90(3)
732	550–731	231	33.75(*)	210.03(1)	308.60(2)	319.05(2)	47.00(3)	57.33(3)	13.70(3)	6.03(3)	0.70(3)
733	367–549	468	1136.06(1)	720.95(5)	677.70(2)	237.00(3)	696.83(3)	369.25(4)	460.23(3)	98.63(4)	7.60(3)
734	550–731	228	2.52(1)	437.12(1)	476.90(3)	258.13(3)	866.13(3)	1008.67(3)	4.03(3)	1.00(3)	8.93(3)
735	367–549	272	288.21(1)	182.55(2)	235.00(3)	147.13(3)	39.57(3)	26.25(4)	18.05(4)	20.50(4)	21.93(3)
736	55—731	175	38.00(1)	232.51(1)	558.77(3)	135.00(3)	145.93(3)	36.00(3)	21.93(3)	8.00(3)	18.33(3)
From multiplicative analysis											
Weighted mean (by area)			163.40	60.76	104.53	51.08	66.83	43.60	22.09	7.61	7.59
Biomass (t)			131822	49015	84326	41207	53912	35177	17817	6135	6119

[a]Strata not included in multiplicative analysis.

Table 3. Mean number of redfish per standard tow from USSR spring—summer surveys in Div. 3N. Number of successful sets in brackets. Asterisks (*) represent imputed values from a multiplicative analysis. Dashes (-) represent strata that were not fished and were not included in the analysis. (P III = PERSEY III, N.K. = NICKOLAY KONONOV, G = GENICHESK)

Stratum	Depth range (m)	Area (sq. n. mi)	Apr 11–Jun 2 1972 (P III)	Jun 30–Sep 19 1973 (P III)	Jun 15–Jun 27 1974 (P III)	Jul 27–Sep 23 1975 (P III)	Apr 7–May 8 1976 (P III)	May 1–May 27 1977 (P III)	Jun 10–Jun 19 1978 (P III)	Apr 8–Apr 22 1979 (SULOY)	May 8–Jun 1 1980 (N.K.)
357	275–366	164	137.83(2)	1380.96(5)	3368.91(3)	5511.34(4)	438.69(4)	874.32(*)	357.94(2)	11943.60(3)	1449.77(2)
358	185–274	225	437.91(4)	573.43(2)	1221.77(3)	3506.79(4)	718.97(2)	351.15(5)	2025.00(2)	549.90(*)	96.17(1)
359	93–183	421	124.59(4)	575.69(5)	195.43(6)	50.79(4)	34.05(5)	264.60(4)	3076.03(6)	838.59(5)	10.63(3)
360[a]	57–91	2992	0.00(8)	0.00(9)	0.00(6)	0.00(7)	2.42(7)	0.00(2)	0.00(1)	1682.74(6)	10.46(3)
361[a]	57–91	1853	0.00(2)	0.00(3)	0.00(2)	0.00(6)	0.00(3)	0.77(2)	0.00(6)	0.00(2)	0.00(3)
362[a]	57–91	2520	0.00(1)	0.00(4)	0.00(4)	0.00(8)	0.00(4)	0.00(2)	0.00(2)	0.00(2)	0.00(2)
373[a]	57–91	2520	0.00(3)	0.00(4)	0.00(4)	0.00(4)	0.00(4)	0.00(3)	9.77(3)	0.00(3)	0.00(3)
374[a]	57–91	931	0.77(2)	0.00(3)	0.00(2)	0.00(1)	0.00(2)	–	77.66(2)	0.00(1)	–
375[a]	< 56	1593	0.00(3)	0.00(5)	0.00(4)	0.00(7)	0.00(5)	1.80(4)	0.00(1)	0.00(3)	0.00(3)
376[a]	< 56	1499	0.00(1)	0.00(9)	0.00(6)	0.00(5)	0.00(2)	0.00(2)	0.00(1)	0.00(3)	0.00(2)
377	93–183	100	2143.20(3)	16.08(*)	3.60(1)	0.00(1)	0.00(1)	1.03(5)	42.17(1)	0.00(1)	4.89(4)
378	185–274	139	317.06(2)	3864.86(1)	2343.09(2)	3517.71(1)	80.23(2)	103.77(*)	683.49(3)	5.49(3)	11.06(2)
379	275–366	106	0.00(2)	2303.07(*)	833.04(*)	1407.60(2)	364.46(*)	420.62(2)	6689.31(4)	12726.51(2)	218.96(*)
380	275–366	116	35.35(*)	2014.97(1)	86.23(3)	745.97(2)	17.49(3)	10.29(2)	695.31(2)	52.97(3)	2388.86(2)
381	185–274	182	0.37(7)	257.14(6)	167.14(5)	94.63(6)	6.09(6)	4.97(3)	479.14(3)	0.00(2)	39.34(4)
382	93–183	647	0.00(7)	2.23(6)	0.00(5)	5.25(5)	1.80(4)	0.00(3)	11.83(3)	0.00(3)	0.69(3)
383[a]	57–91	674	0.00(1)	0.00(1)	0.00(1)	0.00(1)	0.00(1)	–	–	–	–
723	367–549	155	1002.77(*)	8887.76(*)	3214.87(*)	6142.17(*)	1407.33(*)	1122.43(2)	13561.88(*)	1507.89(1)	2759.91(2)
724	550–731	124	315.88(*)	2803.59(*)	1013.38(*)	1936.55(*)	443.42(*)	432.20(*)	77.66(1)	1363.89(1)	266.65(*)
725	367–549	105	900.62(*)	7984.99(*)	2887.59(*)	5516.65(*)	1264.03(*)	1231.90(*)	12181.74(*)	1756.80(*)	732.86(1)
726	550–731	72	173.44(*)	1541.56(*)	556.92(*)	1064.48(*)	243.57(*)	237.44(*)	2352.31(*)	20.57(1)	146.42(*)
727	367–549	160	91.01(*)	810.24(*)	292.79(*)	559.80(*)	127.92(*)	271.03(3)	697.89(2)	20982.86(1)	0.00(1)
728	550–731	156	145.58(*)	3548.57(1)	467.69(*)	893.90(*)	204.50(*)	199.24(*)	1974.74(*)	50.40(1)	122.84(*)
From multiplicative analysis											
Weighted mean (by area)			269.9	1748.1	853.6	1579.6	270.9	293.7	2358.3	2696.9	397.4
Total ($\times 10^{-6}$)			55.7	360.8	176.2	326.1	55.9	60.6	486.8	556.7	82.0

[a]Strata not included in multiplicative analysis.

Table 3. (Cont'd.)

Stratum	Depth range (m)	Area (sq. n. mi)	Jun 11–Jun 20 1981 (N.K.)	May 3–May 14 1982 (SULOY)	Apr 30–May 14 1984 (SULOY)	May 3–May 26 1985 (G)	Apr 19–May 10 1986 (N.K.)	Mar 11–Apr 13 1987 (P III)	Mar 17–Apr 6 1988 (P III)	Mar 24–May 21 1989 (P III)	Apr 5–Apr 26 1990 (P III)
357	275–366	164	3215.57(2)	661.11(2)	7521.75(4)	1968.75(4)	988.00(4)	2293.75(4)	2661.67(3)	617.00(6)	54.00(4)
358	185–274	225	4262.91(3)	245.44(4)	12405.00(5)	1706.00(4)	184.60(5)	251.80(5)	277.67(3)	276.89(9)	5.20(5)
359	93–183	421	12267.94(3)	24.17(4)	1406.40(5)	0.00(4)	0.00(4)	1.00(4)	0.00(4)	2.60(5)	0.00(4)
360[a]	57–91	2992	0.00(4)	4.76(4)	4.20(5)	0.00(7)	0.00(5)	0.00(5)	0.00(5)	0.00(11)	0.00(6)
361[a]	57–91	1853	0.00(2)	0.00(2)	0.00(4)	0.00(3)	0.00(4)	0.00(4)	0.00(4)	0.00(4)	0.00(4)
362[a]	57–91	2520	0.00(2)	0.00(2)	0.00(4)	0.00(4)	0.00(4)	0.00(5)	0.00(4)	0.00(4)	0.00(5)
373[a]	57–91	2520	0.00(4)	0.00(3)	0.00(4)	0.00(4)	0.00(5)	0.00(5)	0.00(4)	0.00(5)	0.00(5)
374[a]	57–91	931	0.00(1)	–	0.00(3)	0.00(3)	0.00(4)	0.00(4)	0.00(3)	0.00(4)	0.00(4)
375[a]	< 56	1593	0.00(3)	0.00(4)	0.00(5)	0.00(3)	0.00(4)	0.00(4)	0.00(3)	0.00(4)	0.00(4)
376[a]	< 56	1499	0.00(2)	0.00(5)	0.00(5)	0.00(4)	0.00(4)	0.00(4)	0.00(4)	0.00(4)	0.00(4)
377	93–183	100	3924.17(3)	0.00(3)	17.67(3)	0.00(4)	6.00(3)	0.00(3)	0.00(3)	0.00(4)	0.00(3)
378	185–274	139	10219.89(1)	1072.63(3)	1082.00(3)	81.75(4)	3.33(3)	89.33(3)	38.33(3)	2.50(4)	11.00(3)
379	275–366	106	3829.11(2)	4555.54(1)	242.25(4)	152.50)4)	493.67(3)	1732.00(3)	5081.00(3)	185.75(4)	4.00(3)
380	275–366	116	3223.54(2)	227.31(3)	13.00(4)	25.67(3)	3.33(3)	167.67(3)	34.33(3)	8.60(5)	0.33(3)
381	185–274	182	17.49(1)	19.93(4)	8.00(3)	0.60(5)	0.00(3)	0.00(2)	16.33(3)	1.50(4)	1.25(4)
382	93–183	647	0.00(4)	0.64(4)	3.33(3)	0.00(3)	0.00(3)	0.00(3)	0.00(4)	0.00(7)	0.00(3)
383[a]	57–91	674	–	–	0.00(3)	0.00(3)	0.00(3)	0.00(4)	0.00(4)	0.00(3)	0.00(3)
723	367–549	155	821.83(1)	385.71(1)	7878.00(3)	773.80(5)	1155.00(3)	3177.25(4)	3239.00(3)	1263.80(5)	200.67(3)
724	550–731	124	3791.14(*)	446.43(*)	686.33(3)	3399.33(3)	149.33(3)	2133.67(3)	1010.00(3)	199.00(4)	39.67(3)
725	367–549	105	10798.72(*)	741.60(1)	13847.33(3)	197.33(3)	1303.33(3)	1263.67(3)	1470.33(3)	170.25(4)	939.00(3)
726	550–731	72	2084.47(*)	245.29(*)	1337.33(3)	10449.50(2)	67.33(3)	149.67(3)	181.67(3)	226.33(3)	57.67(3)
727	367–549	160	3375.26(3)	128.77(*)	301.25(4)	86.33(3)	84.33(3)	78.33(3)	99.00(4)	40.00(6)	16.67(3)
728	550–731	156	1749.90(*)	205.86(*)	1206.33(3)	317.67(3)	47.00(3)	62.67(3)	435.67(3)	54.60(5)	48.00(3)
From multiplicative analysis											
Weighted mean (by area)			4158.0	382.9	2748.1	736.5	215.0	547.2	671.5	158.6	56.1
Total ($\times 10^{-6}$)			858.3	79.0	567.2	152.0	44.4	112.9	138.6	32.7	11.6

[a]Strata not included in multiplicative analysis.

Table 4. Mean weight (kg) of redfish per standard tow from spring–summer surveys in Div. 3N. Number of successful sets in brackets. Asterisks (*) represent imputed values from a multiplicative analysis. Dashes (–) represent strata that were not fished and were not included in the analysis. (P III = PERSEY III, N.K. = NICKOLAY KONONOV, G = GENICHESK)

Stratum	Depth range (m)	Area (sq. n. mi)	Apr 11–Jun 2 1972 (P III)	Jun 30–Sep 19 1973 (P III)	Jun 15–Jun 27 1974 (P III)	Jul 27–Sep 23 1975 (P III)	Apr 7–May 8 1976 (P III)	May 1–May 27 1977 (P III)	Jun 10–Jun 19 1978 (P III)	Apr 8–Apr 22 1979 (SULOY)	May 8–Jun 1 1980 (N.K.)
357	275–366	164	31.78(2)	498.03(5)	668.90(3)	1061.22(4)	77.27(4)	191.22(*)	133.56(2)	2112.09(3)	326.65(2)
358	185–274	225	45.00(4)	109.59(2)	234.79(3)	522.06(4)	76.89(2)	40.10(5)	325.72(2)	78.98(*)	11.06(1)
359	93–183	421	9.03(4)	33.22(5)	5.98(6)	1.67(4)	3.61(5)	23.97(4)	447.81(6)	70.04(5)	1.39(3)
360[a]	57–91	2992	0.00(8)	0.00(9)	0.00(6)	0.00(7)	0.30(7)	0.00(2)	0.00(1)	353.01(6)	1.73(3)
361[a]	57–91	1853	0.00(2)	0.00(3)	0.00(2)	0.00(6)	0.00(3)	0.05(2)	0.00(6)	0.00(2)	0.00(3)
362[a]	57–91	2520	0.00(1)	0.00(4)	0.00(4)	0.00(8)	0.00(4)	0.00(2)	0.00(2)	0.00(2)	0.00(2)
373[a]	57–91	2520	0.00(3)	0.00(4)	0.00(4)	0.00(4)	0.00(4)	0.00(3)	3.65(3)	0.00(3)	0.00(3)
374[a]	57–91	931	0.33(2)	0.00(3)	0.00(2)	0.00(1)	0.00(2)	–	20.24(2)	0.00(1)	–
375[a]	< 56	1593	0.00(3)	0.00(5)	0.00(4)	0.00(7)	0.00(5)	0.95(4)	0.00(1)	0.00(3)	0.00(3)
376[a]	< 56	1499	0.00(1)	0.00(9)	0.00(6)	0.00(5)	0.00(2)	0.00(2)	0.00(1)	0.00(3)	0.00(2)
377	93–183	100	279.81(3)	7.61(*)	1.80(1)	0.00(1)	0.00(1)	0.55(5)	11.88(1)	0.00(1)	1.27(4)
378	185–274	139	67.04(2)	759.03(1)	490.76(2)	815.91(1)	41.66(2)	27.31(*)	148.70(3)	1.06(3)	3.24(2)
379	275–366	106	0.00(2)	431.56(*)	151.37(*)	339.94(2)	80.37(*)	114.50(2)	1762.78(4)	2760.20(2)	50.78(*)
380	275–366	116	9.54(*)	780.27(1)	21.41(3)	226.21(2)	5.35(3)	4.11(2)	205.97(2)	9.21(3)	879.25(2)
381	185–274	182	0.14(7)	73.68(6)	45.09(5)	34.77(6)	2.51(6)	2.12(3)	114.39(3)	0.00(2)	11.61(4)
382	93–183	647	0.00(7)	1.24(6)	0.00(5)	2.09(5)	0.93(4)	0.00(3)	5.85(3)	0.00(3)	0.12(3)
383[a]	57–91	674	0.00(1)	0.00(1)	0.00(1)	0.00(1)	0.00(1)	–	–	–	–
723	367–549	155	207.94(*)	1519.29(*)	533.62(*)	888.67(*)	283.89(*)	291.63(2)	2679.46(*)	313.77(1)	731.19(2)
724	550–731	124	144.57(*)	1057.59(*)	371.22(*)	618.35(*)	197.42(*)	213.59(*)	55.75(1)	1020.29(1)	125.07(*)
725	367–549	105	227.95(*)	1665.52(*)	584.91(*)	974.02(*)	311.20(*)	336.64(*)	2936.86(*)	480.06(*)	187.97(1)
726	550–731	72	77.94(*)	571.73(*)	200.50(*)	334.12(*)	106.52(*)	115.28(*)	1008.50(*)	9.62(1)	67.41(*)
727	367–549	160	27.28(*)	202.04(*)	70.68(*)	118.00(*)	37.40(*)	89.59(3)	267.89(2)	7273.34(1)	0.00(1)
728	550–731	156	51.99(*)	861.89(1)	134.01(*)	223.42(*)	71.12(*)	76.95(*)	674.51(*)	11.26(1)	44.93(*)
From multiplicative analysis											
Weighted mean (by area)			52.14	392.24	173.04	302.94	60.37	72.77	519.58	723.95	113.94
Biomass (t)			10762	80962	35718	62531	12461	15021	107246	149430	23518

[a]Strata not included in multiplicative analysis.

Table 4. (Cont'd.)

Stratum	Depth range (m)	Stratum Area (sq. n. mi)	Jun 11–Jun 20 1981 (N.K.)	May 3–May 14 1982 (SULOY)	Apr 30–May 14 1984 (SULOY)	May 3–May 26 1985 (G)	Apr 19–May 10 1986 (N.K.)	Mar 11–Apr 13 1987 (P III)	Mar 17–Apr 6 1988 (P III)	Mar 24–May 21 1989 (P III)	Apr 5–Apr 26 1990 (P III)
357	275–366	164	762.30(2)	152.00(2)	1970.85(4)	355.78(4)	145.80(4)	462.50(4)	413.27(3)	78.23(6)	4.60(4)
358	185–274	225	933.51(3)	47.20(4)	2068.90(5)	234.13(4)	17.58(5)	29.60(5)	34.33(3)	9.42(9)	0.46(5)
359	93–183	421	1273.61(3)	4.89(4)	184.58(5)	0.00(4)	0.00(4)	0.35(4)	0.00(4)	0.12(5)	0.00(4)
360[a]	57–91	2992	0.00(4)	1.21(4)	0.56(5)	0.00(7)	0.00(5)	0.00(5)	0.00(5)	0.00(11)	0.00(6)
361[a]	57–91	1853	0.00(2)	0.00(2)	0.00(4)	0.00(3)	0.00(4)	0.00(4)	0.00(4)	0.00(4)	0.00(4)
362[a]	57–91	2520	0.00(2)	0.00(2)	0.00(4)	0.00(4)	0.00(4)	0.00(5)	0.00(4)	0.00(4)	0.00(5)
373[a]	57–91	2520	0.00(4)	0.00(3)	0.00(4)	0.00(4)	0.00(5)	0.00(5)	0.00(4)	0.00(5)	0.00(5)
374[a]	57–91	931	0.00(1)	–	0.00(3)	0.00(3)	0.00(4)	0.00(4)	0.00(3)	0.00(4)	0.00(4)
375[a]	< 56	1593	0.00(3)	0.00(4)	0.00(5)	0.00(3)	0.00(4)	0.00(4)	0.00(3)	0.00(4)	0.00(4)
376[a]	< 56	1499	0.00(2)	0.00(5)	0.00(5)	0.00(4)	0.00(4)	0.00(4)	0.00(4)	0.00(4)	0.00(4)
377	93–183	100	926.21(3)	0.00(3)	4.97(3)	0.00(4)	1.33(3)	0.00(3)	0.00(3)	0.00(4)	0.00(3)
378	185–274	139	1654.71(1)	239.74(3)	393.93(3)	10.93(4)	1.03(3)	17.00(3)	4.73(3)	0.40(4)	2.70(3)
379	275–366	106	1094.30(2)	1232.07(1)	31.38(4)	17.80(4)	98.47(3)	263.00(3)	822.27(3)	36.08(4)	0.53(3)
380	275–366	116	818.56(2)	61.71(3)	2.65(4)	5.13(3)	1.10(3)	41.33(3)	1.37(3)	1.72(5)	0.03(3)
381	185–274	182	4.73(1)	0.68(4)	3.90(3)	0.10(5)	0.00(3)	0.00(2)	0.47(3)	0.33(4)	0.38(4)
382	93–183	647	0.00(4)	0.09(4)	1.53(3)	0.00(3)	0.00(3)	0.00(3)	0.00(4)	0.00(7)	0.00(3)
383[a]	57–91	674	–	–	0.00(3)	0.00(3)	0.00(3)	0.00(4)	0.00(4)	0.00(3)	0.00(3)
723	367–549	155	220.68(1)	80.49(1)	2162.00(3)	188.44(5)	244.37(3)	903.00(4)	451.60(3)	241.10(5)	32.27(3)
724	550–731	124	1828.31(*)	191.92(*)	212.83(3)	1890.10(3)	65.23(3)	1365.33(3)	463.17(3)	83.58(4)	12.73(3)
725	367–549	105	2879.34(*)	350.07(1)	3686.80(3)	40.37(3)	316.40(3)	457.33(3)	441.30(3)	32.20(4)	182.83(3)
726	550–731	72	988.49(*)	103.57(*)	749.50(3)	4543.25(2)	31.03(3)	75.67(3)	96.57(3)	119.57(3)	14.87(3)
727	367–549	160	1426.25(3)	36.34(*)	105.00(4)	25.07(3)	17.93(3)	21.67(3)	19.20(4)	10.32(6)	3.33(3)
728	550–731	156	661.13(*)	69.12(*)	539.07(3)	131.57(3)	19.87(3)	30.67(3)	187.53(3)	30.90(5)	16.03(3)
From multiplicative analysis											
Weighted mean (by area)			825.71	106.53	637.36	255.75	43.91	170.15	131.13	29.71	10.88
Biomass (t)			170435	21989	131557	52790	9063	35121	27067	6133	2245

[a]Strata not included in multiplicative analysis.

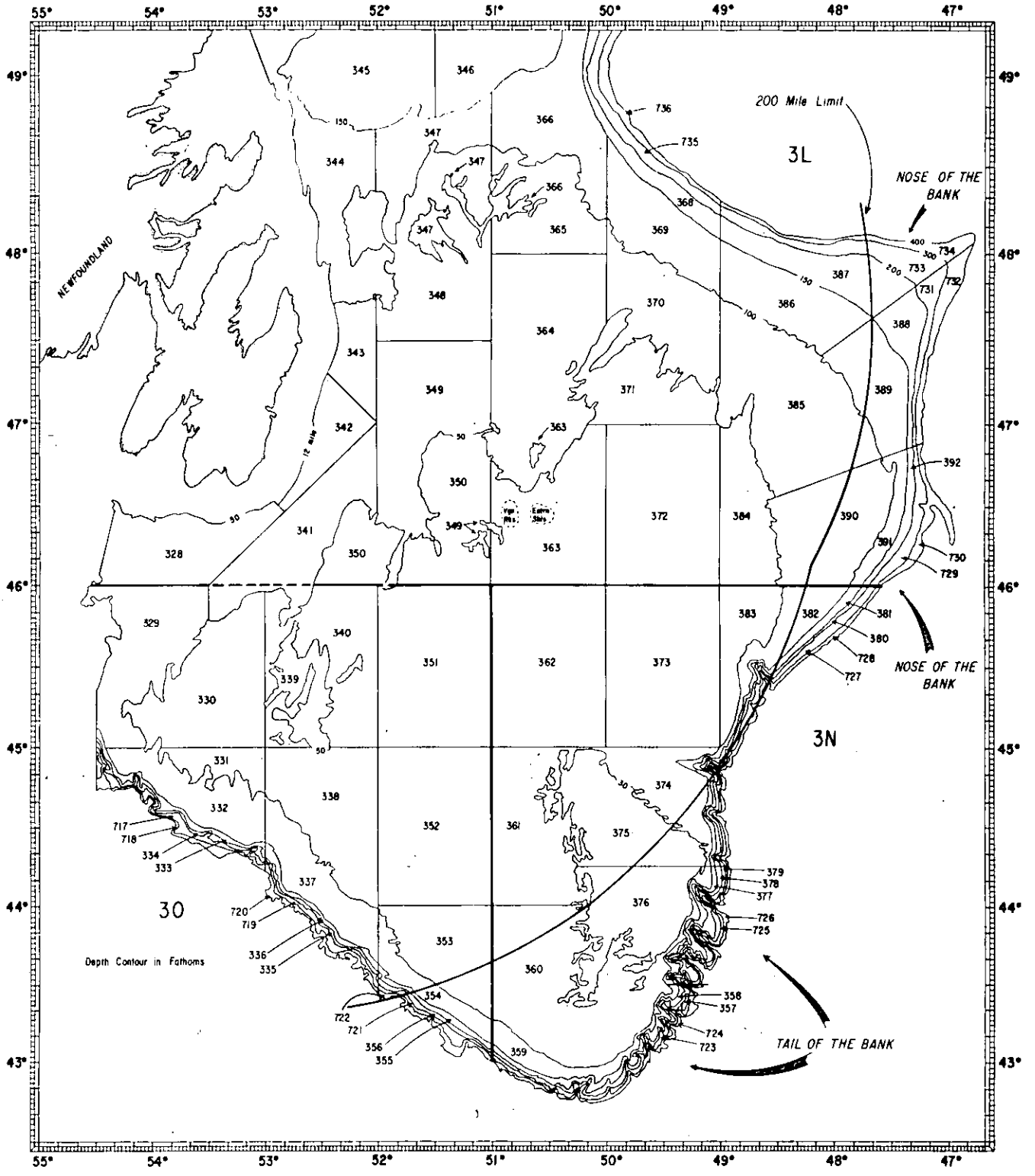

Fig. 1. Stratification scheme of NAFO Div. 3L and 3N.

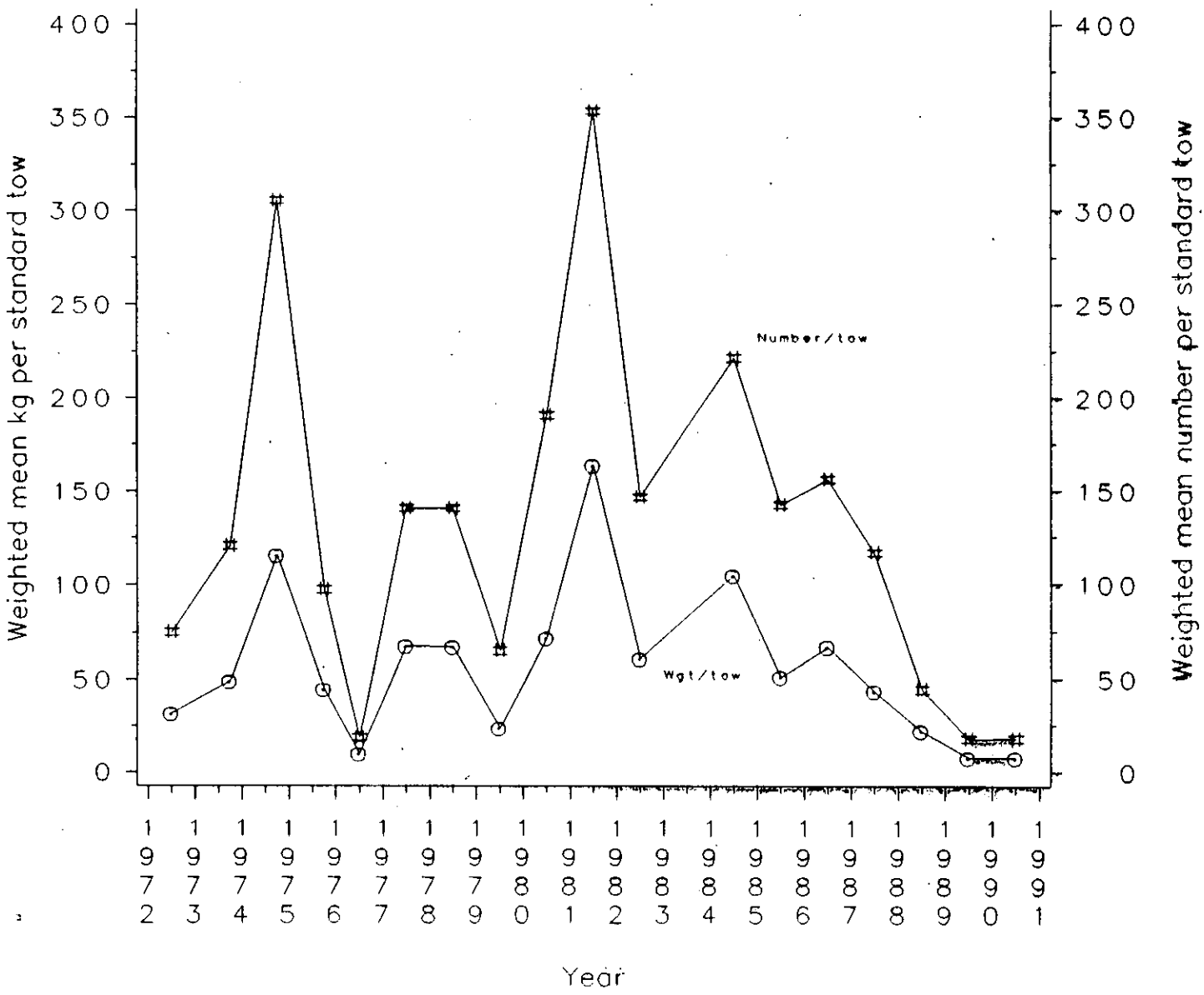

Fig. 2: Stratified mean numbers and weight per standard tow from USSR trawl surveys in Div. 3L derived from a multiplicative analysis to fill in mean values for years in which various strata were not sampled by the survey.

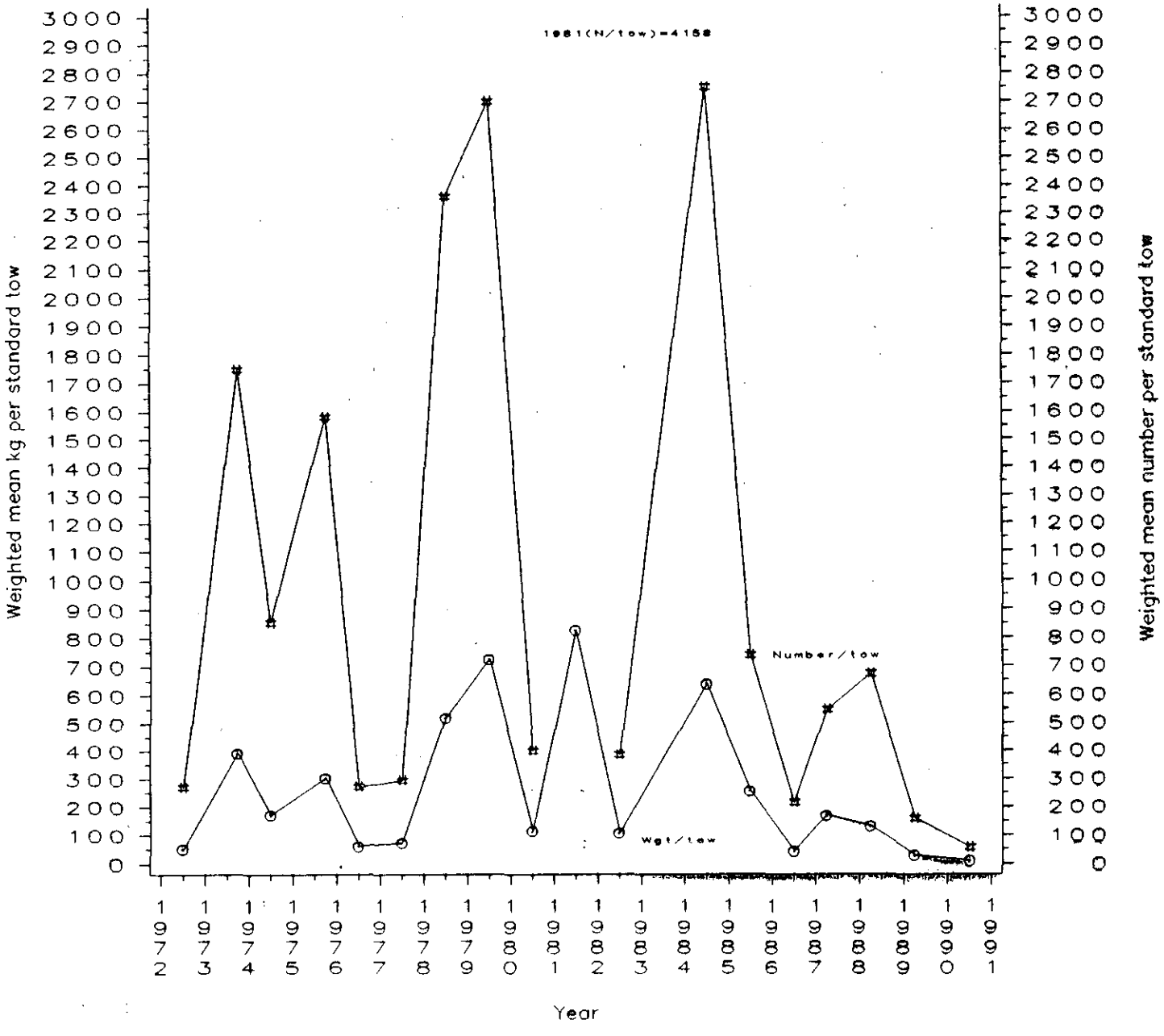

Fig. 3 : Stratified mean numbers and weight per standard tow from USSR trawl surveys in Div. 3H derived from a multiplicative analysis to fill in mean values for years in which various strata were not sampled by the survey.

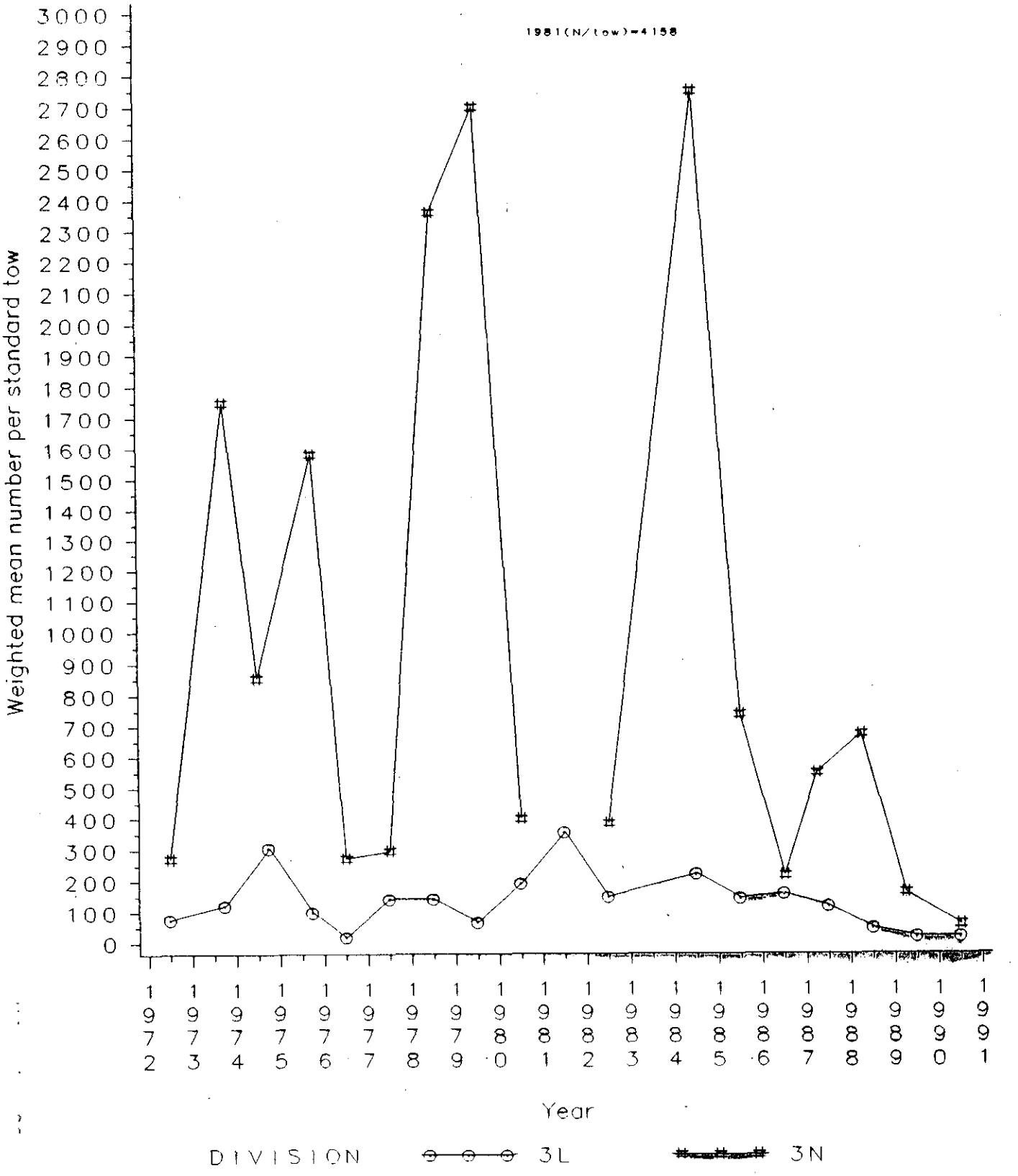

Fig. 4 : Stratified mean number per standard tow in Div. 3L and 3N from USSR surveys conducted from 1972 to 1990. Unsampled strata were estimated with a multiplicative analysis (see text).

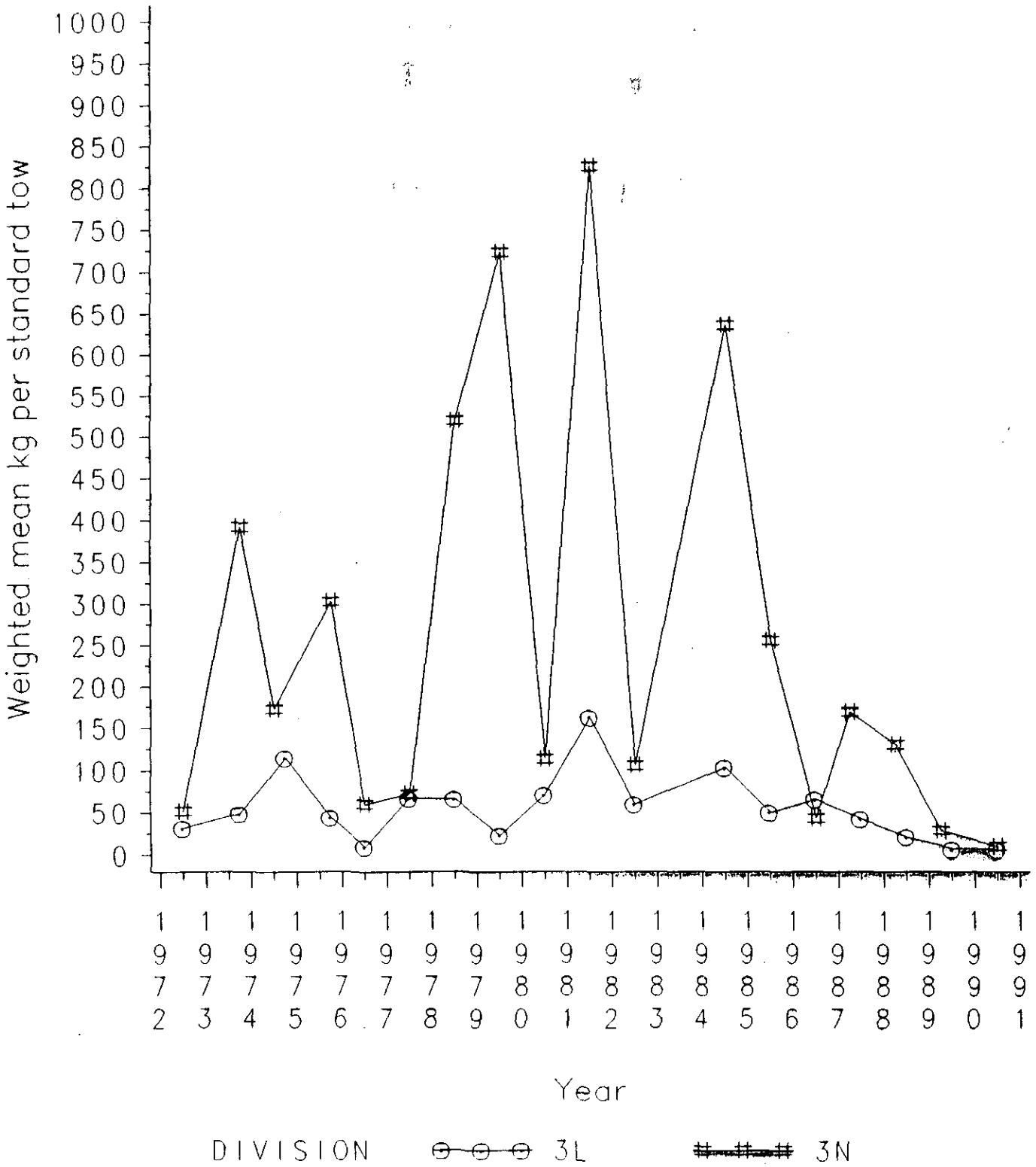

Fig. 5 : Stratified mean weight per standard tow in Div. 3L and 3N from USSR surveys conducted from 1972 to 1990. Unsampled strata were estimated with a multiplicative analysis (see text).