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Abundance and Biomass Estimates of Redfish (*S. mentella*) in Div. 3LN from Russian Groundfish Surveys from 1984-91

by

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INTRODUCTION

The former USSR have been conducting multispecies bottom trawl surveys in NAFO Subareas 2 and 3 since 1954 (Bulatova and Chumakov, MS 1986). Information from spring-summer surveys to Div. 3LN from 1972-1990 were analysed and evaluated by Power and Chumakov (MS 1991) for the purpose of providing an index of abundance for redfish. They post-stratified the 1972 to 1982 fixed-station sets and estimated mean numbers and mean weights for umsampled strata with a multiplicative model. The resultant index for this period was not condisidered reflective of stock abundance. The purpose of this paper is provide the results of the 1991 survey to Div. 3LN by the Russian Federation and evaluate the series since 1984 when the surveys were conducted based on a stratified-random design.

MATERIALS AND METHODS

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. Mean number and mean weight per standard tow (one half hour tow at 3.5 knots) were estimated from sucessful sets only. Survey tows were adjusted to a standard 1.8 n mi. distance before the analysis. Stratum area was used as a weighting factor for deriving an overall mean estimate by year for each division. Depth strata which consistently showed zero abundance were not considered in this calculation.

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.) per standard tow for Div. 3L using the stratum area as a weighting factor show a general decline from 1984 to 1990 (Table 1-2, Fig. 2-3). Mean density estimates have ranged from 105 kg. (221 fish) per tow in 1984 to 8 kg. (18 fish) per tow in 1990. The 1991 results indicate a three fold increase in both number and weight from 1990. Stratum by stratum estimates indicate some rather dynamic fluctuations between some years, for example between 1985 and 1986 which may be a reflection of migration. Individual tows within a stratum can also result in a large range of catches which is exemplified by the high variance around the overall mean estimates, especially prior to 1989.

Stratified mean number and weight (kg.) per standard tow for surveys in Div. 3N since 1984 (Tables 3-4, Fig. 4-5) have ranged from 637 kg. (2748 fish) in 1984 to 11 kg. (56 fish) in 1990. Although there are some rather large changes in the magnitude of the density estimates over this period, there is an indication of a general decline. This is evident in both the mean number and weight per tow. The 1991 estimates represent an increase of 34% for mean number and 45% for mean weight from 1990. Stratum by stratum estimates exhibit a similar pattern observed for Div. 3L with regard to interannual fluctuations between some years and the overall mean values of density are also estimated with large variances.

With the indications of migrations and the inherent variability of the trawl surveys it is difficult to interpret changes in the mean density from one year to the next as being solely reflective of changes in population abundance. What is apparent, in light of these uncertainties, is the consistent estimates of densities (both number and weight) since about 1988 for Div. 3L and 1989 for Div. 3N that are substantially lower relative to what they were in the mid-1980s, and which occurred over a comparably short time span.

REFERENCES

Bulatova, A. Yu, and A. K. Chumakov. MS 1986. USSR Trawl Surveys in NAFO Subareas 0,2 and 3. NAFO SCR Doc. 86/66, Serial No. N1183, 13p.

Power, D., and A. K. Chumakov. MS 1991. Abundance and Biomass estimates of Redfish (S. mentella) in Div. 3LN from USSR Groundfish Surveys during 1972-1990. NAFO SCR Doc. 91/75, Serial No. N1959, 15p

Table 1. Mean number of redfish per standard tow from Russian spring-summer surveys in Div. 3L. Number of successful sets in brackets. Dashes (-) represent strata that were not fished. (P III = PERSEY III, N.K. = NICKOLAY KONOSOV, G = GRIGORIBAK, V = VILNIUS).

Stratum	Depth range (m)	Area (sq. n. mi)	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)	May 9–Jun 6 1991 (V)
341[a]	93–183	1519	0.00(3)	–	0.00(4)	0.00(3)	0.00(4)	0.00(3)	0.00(4)	0.00(3)
344[a]	184–274	1494	–	–	–	–	–	–	–	–
345	275–366	1432	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	116.33(3)	69.00(3)	56.67(3)	11.00(3)	3.25(4)	26.00(3)	16.33(3)	30.67(3)
347	184–274	983	0.00(3)	1.00(3)	3.67(3)	0.00(4)	0.00(4)	0.00(6)	0.00(3)	0.00(3)
348[a]	93–183	2120	0.00(3)	0.00(3)	0.00(4)	0.00(5)	0.00(6)	0.00(8)	0.00(3)	0.00(4)
349[a]	93–183	2114	0.00(4)	0.00(4)	0.00(4)	0.00(5)	0.00(5)	0.00(6)	0.00(4)	0.00(4)
350[a]	57–91	2071	0.00(4)	0.00(3)	0.00(4)	0.00(4)	0.00(5)	0.00(5)	0.00(5)	0.00(4)
363[a]	57–91	1780	0.00(3)	0.00(3)	0.00(4)	0.00(6)	0.00(4)	0.00(4)	0.00(4)	0.00(3)
364[a]	93–183	2817	0.00(4)	0.00(4)	0.00(5)	0.00(6)	0.00(7)	0.00(7)	0.00(4)	0.00(4)
365[a]	93–183	1041	0.00(3)	0.00(3)	0.00(3)	0.00(4)	0.00(4)	0.00(3)	0.00(5)	0.00(3)
366	184–274	1394	0.00(4)	31.67(3)	7.75(4)	7.50(4)	1.25(4)	0.00(5)	1.00(3)	3.25(4)
368	275–366	334	936.75(4)	152.67(3)	81.00(3)	18.33(3)	29.50(4)	29.75(4)	7.33(4)	52.67(3)
369	184–274	961	0.00(4)	2.67(3)	2.25(4)	4.67(3)	0.00(3)	0.33(3)	0.80(3)	0.33(3)
370[a]	93–183	1320	0.00(3)	0.00(3)	0.00(4)	0.00(5)	0.00(3)	0.00(5)	0.00(5)	0.00(4)
371[a]	57–91	1121	0.00(3)	0.00(3)	0.00(4)	0.00(4)	0.00(4)	0.00(3)	0.00(4)	0.00(3)
372[a]	57–91	2460	0.00(3)	0.00(4)	0.00(5)	0.00(5)	0.00(4)	0.00(5)	0.00(4)	0.00(4)
384[a]	57–91	1120	0.00(3)	0.00(3)	0.00(4)	0.00(4)	0.00(3)	0.00(4)	0.00(5)	0.00(3)
385[a]	93–183	2356	0.00(4)	0.00(3)	0.00(5)	0.00(5)	0.00(5)	0.00(5)	0.00(4)	0.00(4)
386	184–274	983	3.00(4)	0.00(3)	1.00(4)	0.75(4)	0.00(4)	1.75(4)	0.00(5)	0.00(3)
387	275–366	718	408.00(4)	612.00(3)	9.67(3)	11.67(3)	7.00(3)	24.60(5)	12.00(4)	48.67(3)
388	275–366	361	42.00(3)	8.50(4)	15.67(3)	6.67(3)	6.33(3)	11.75(4)	8.00(3)	14.67(3)
389	184–274	821	7.67(3)	10.00(3)	4.50(4)	0.25(4)	2.75(4)	1.25(4)	1.25(4)	1.25(4)
390[a]	93–183	1481	0.00(3)	0.00(4)	0.00(4)	0.00(5)	0.00(4)	0.00(5)	0.00(4)	0.00(4)
391	184–274	282	1.00(3)	6.25(4)	0.00(3)	0.00(3)	30.67(3)	8.33(3)	3.00(3)	0.00(3)
392	275–366	145	622.67(3)	8.50(4)	7.25(4)	15.67(3)	3.33(3)	7.67(3)	1.75(4)	11.50(4)
729	367–549	186	793.00(3)	264.67(3)	621.33(3)	69.67(3)	49.00(3)	19.33(3)	13.67(3)	13.67(3)
730	550–731	170	961.00(3)	675.67(3)	1049.33(3)	535.33(3)	110.67(3)	88.67(3)	0.33(3)	34.33(3)
731	367–549	216	232.33(3)	70.00(3)	15.33(3)	35.00(3)	40.67(3)	17.00(3)	14.00(3)	95.00(3)
732	550–731	231	627.50(2)	876.50(2)	113.33(3)	142.00(3)	41.67(3)	18.00(3)	3.67(3)	296.33(3)
733	367–549	468	1391.00(2)	554.33(3)	1713.33(3)	1027.75(4)	815.33(3)	167.50(4)	32.33(3)	177.00(3)
734	550–731	228	711.67(3)	581.67(3)	1713.67(3)	2591.67(3)	12.00(3)	1.33(3)	42.67(3)	844.33(3)
735	367–549	272	559.00(3)	522.00(3)	131.33(3)	94.75(4)	85.25(4)	97.75(4)	104.67(3)	52.67(3)
736	55—731	175	949.33(3)	285.67(3)	426.00(3)	102.67(3)	64.67(3)	28.67(3)	83.00(3)	115.33(3)
From stratified analysis										
Upper (95% CI)			418.3	219.2	272.6	295.2	183.6	39.0	54.3	67.0
Mean			221.3	142.4	156.0	116.8	44.4	17.8	17.9	51.0
Lower (95% CI)			24.3	65.6	39.4	–61.5	–94.8	–3.4	–18.5	35.0
Total (x 10^{-6})			178.5	114.9	125.9	94.2	35.8	14.4	14.4	35.9

[a]Strata not included in calculation of overall mean.

Table 2. Mean weight (kg) of redfish per standard tow from Russian spring-summer surveys in Div. 3L. Number of sucessful sets in brackets. Dashes (-) represent strata that were not fished. (P III = PERSEY III, N.K. = NICKOLAY KOSOGOV, G = GENICHESK, V = VILNIUS).

Stratum	Depth range (m)	Area (sq. n. mi)	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)	May 9–Jun 6 1991 (V)
341[a]	93–183	1519	0.00(3)	–	0.00(4)	0.00(3)	0.00(4)	0.00(3)	0.00(4)	0.00(3)
344[a]	184–274	1494	–	–	–	–	–	–	–	–
345	275–366	1432	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	58.53(3)	30.07(3)	28.93(3)	5.67(3)	1.33(4)	11.60(3)	7.47(3)	8.60(3)
347	184–274	983	0.00(3)	0.03(3)	0.83(4)	0.00(4)	0.00(4)	0.00(6)	0.00(3)	0.00(3)
348[a]	93–183	2120	0.00(3)	0.00(3)	0.00(4)	0.00(5)	0.00(6)	0.00(8)	0.00(3)	0.00(4)
349[a]	93–183	2114	0.00(4)	0.00(4)	0.00(4)	0.00(5)	0.00(5)	0.00(6)	0.00(4)	0.00(4)
350[a]	57–91	2071	0.00(4)	0.00(3)	0.00(4)	0.00(4)	0.00(5)	0.00(5)	0.00(5)	0.00(4)
363[a]	57–91	1780	0.00(3)	0.00(3)	0.00(5)	0.00(6)	0.00(4)	0.00(4)	0.00(4)	0.00(3)
364[a]	93–183	2817	0.00(4)	0.00(4)	0.00(3)	0.00(6)	0.00(7)	0.00(7)	0.00(4)	0.00(4)
365[a]	93–183	1041	0.00(3)	0.00(3)	0.00(4)	0.00(4)	0.00(4)	0.00(3)	0.00(5)	0.00(3)
366	184–274	1394	0.00(4)	6.70(3)	1.85(3)	1.25(4)	0.20(4)	0.00(5)	0.28(3)	0.98(4)
368	275–366	334	283.35(4)	46.90(3)	33.53(4)	5.00(3)	7.20(4)	5.98(4)	1.93(4)	16.20(3)
369	184–274	961	0.00(4)	1.53(3)	1.60(4)	1.67(3)	0.00(3)	0.13(3)	0.50(3)	0.03(3)
370[a]	93–183	1320	0.00(3)	0.00(3)	0.00(4)	0.00(5)	0.00(3)	0.00(5)	0.00(5)	0.00(4)
371[a]	57–91	1121	0.00(3)	0.00(3)	0.00(5)	0.00(4)	0.00(4)	0.00(3)	0.00(4)	0.00(3)
372[a]	57–91	2460	0.00(3)	0.00(4)	0.00(4)	0.00(5)	0.00(4)	0.00(5)	0.00(4)	0.00(4)
384[a]	57–91	1120	0.00(3)	0.00(3)	0.00(5)	0.00(4)	0.00(3)	0.00(4)	0.00(5)	0.00(3)
385[a]	93–183	2356	0.00(4)	0.00(3)	0.00(4)	0.00(5)	0.00(5)	0.00(5)	0.00(4)	0.00(4)
386	184–274	983	2.08(4)	0.00(3)	0.63(3)	0.13(4)	0.00(4)	0.95(4)	0.00(5)	0.00(3)
387	275–366	718	205.35(4)	194.13(3)	4.53(3)	4.17(3)	1.23(3)	8.14(5)	5.30(4)	16.97(3)
388	275–366	361	15.40(3)	2.10(4)	2.63(4)	1.07(3)	1.30(3)	1.35(4)	1.93(3)	2.03(3)
389	184–274	821	3.73(3)	1.57(3)	0.50(4)	0.03(4)	0.35(4)	0.08(4)	0.10(4)	0.25(4)
390[a]	93–183	1481	0.00(3)	0.00(4)	0.00(3)	0.00(5)	0.00(4)	0.00(5)	0.00(4)	0.00(4)
391	184–274	282	0.27(3)	1.27(4)	0.00(4)	0.00(3)	0.23(3)	0.47(3)	0.03(3)	0.00(3)
392	275–366	145	238.67(3)	2.05(4)	3.17(3)	2.67(3)	0.63(3)	2.07(3)	0.25(4)	1.75(4)
729	367–549	186	318.93(3)	68.17(3)	277.63(3)	18.67(3)	15.53(3)	6.50(3)	3.30(3)	2.37(3)
730	550–731	170	467.33(3)	225.33(3)	403.57(3)	204.33(3)	53.60(3)	37.90(3)	0.27(3)	10.63(3)
731	367–549	216	87.20(3)	19.20(3)	4.20(3)	10.20(3)	9.30(3)	5.10(3)	2.90(3)	18.33(3)
732	550–731	231	308.60(2)	319.05(2)	47.00(3)	57.33(3)	13.70(3)	6.03(3)	0.70(3)	94.77(3)
733	367–549	468	677.70(2)	237.00(3)	696.83(3)	369.25(4)	460.23(3)	98.63(4)	7.60(3)	39.77(3)
734	550–731	228	476.90(3)	258.13(3)	866.13(3)	1008.67(3)	4.03(3)	1.00(3)	8.93(3)	573.53(3)
735	367–549	272	235.00(3)	147.13(3)	39.57(3)	26.25(4)	18.05(4)	20.50(4)	21.93(3)	12.03(3)
736	55—731	175	558.77(3)	135.00(3)	145.93(3)	36.00(3)	21.93(3)	8.00(3)	18.33(3)	35.73(3)
From stratified analysis										
Upper (95% CI)			191.7	69.4	117.8	110.7	102.3	20.2	29.2	48.7
Mean			104.5	51.1	66.8	43.6	22.1	7.6	7.6	21.9
Lower (95% CI)			17.3	32.7	15.8	-23.5	-58.1	-5.0	014.1	-4.9
Trawlable biomass (t)			84326	41207	53912	35177	17817	6135	6119	15425

[a]Strata not included in calculation of overall mean.

Table 3. Mean number of redfish per standard tow from Russian spring-summer surveys in Div. 3N. Number of sucessful sets in brackets. (P III = PERSEY III, N.K. = NICKOLAY KONONOV, G = GENICHESK, V = VILNIUS).

Stratum	Depth range (m)	Area (sq. n. mi)	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)	Apr 17–Apr 27 1991 (V)
357	275–366	164	7521.75(4)	1968.75(4)	988.00(4)	2293.75(4)	2661.67(3)	617.00(6)	54.00(4)	155.00(4)
358	185–274	225	12405.00(5)	1706.00(4)	184.60(5)	251.80(5)	277.67(3)	276.89(9)	5.20(5)	25.20(5)
359	93–183	421	1406.40(5)	0.00(4)	0.00(4)	1.00(4)	0.00(4)	2.60(5)	0.00(4)	0.00(4)
360[a]	57–91	2992	4.20(5)	0.00(7)	0.00(5)	0.00(5)	0.00(5)	0.00(11)	0.00(6)	0.33(6)
361[a]	57–91	1853	0.00(4)	0.00(3)	0.00(4)	0.00(4)	0.00(4)	0.00(4)	0.00(4)	0.00(4)
362[a]	57–91	2520	0.00(4)	0.00(4)	0.00(4)	0.00(5)	0.00(4)	0.00(4)	0.00(5)	0.00(4)
373[a]	57–91	2520	0.00(4)	0.00(4)	0.00(5)	0.00(5)	0.00(4)	0.00(5)	0.00(5)	0.00(4)
374[a]	57–91	931	0.00(3)	0.00(3)	0.00(4)	0.00(4)	0.00(3)	0.00(4)	0.00(4)	0.00(4)
375[a]	< 56	1593	0.00(5)	0.00(3)	0.00(4)	0.00(4)	0.00(3)	0.00(4)	0.00(4)	0.00(4)
376[a]	< 56	1499	0.00(5)	0.00(4)	0.00(4)	0.00(4)	0.00(4)	0.00(4)	0.00(4)	0.00(4)
377	93–183	100	17.67(3)	0.00(4)	6.00(3)	0.00(3)	0.00(3)	0.00(4)	0.00(3)	0.00(3)
378	185–274	139	1082.00(3)	81.75(4)	3.33(3)	89.33(3)	38.33(3)	2.50(4)	11.00(3)	1.67(3)
379	275–366	106	242.25(4)	152.50)4)	493.67(3)	1732.00(3)	5081.00(3)	185.75(4)	4.00(3)	41.00(3)
380	275–366	116	13.00(4)	25.67(3)	3.33(3)	167.67(3)	34.33(3)	8.60(5)	0.33(3)	1.00(3)
381	185–274	182	8.00(3)	0.60(5)	0.00(3)	0.00(2)	16.33(3)	1.50(4)	1.25(4)	0.00(3)
382	93–183	647	3.33(3)	0.00(3)	0.00(3)	0.00(3)	0.00(4)	0.00(7)	0.00(3)	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)	0.00(3)
723	367–549	155	7878.00(3)	773.80(5)	1155.00(3)	3177.25(4)	3239.00(3)	1263.80(5)	200.67(3)	203.33(3)
724	550–731	124	686.33(3)	3399.33(3)	149.33(3)	2133.67(3)	1010.00(3)	199.00(4)	39.67(3)	47.67(3)
725	367–549	105	13847.33(3)	197.33(3)	1303.33(3)	1263.67(3)	1470.33(3)	170.25(4)	939.00(3)	526.67(3)
726	550–731	72	1337.33(3)	10449.50(2)	67.33(3)	149.67(3)	181.67(3)	226.33(3)	57.67(3)	354.00(3)
727	367–549	160	301.25(4)	86.33(3)	84.33(3)	78.33(3)	99.00(4)	40.00(6)	16.67(3)	42.00(3)
728	550–731	156	1206.33(3)	317.67(3)	47.00(3)	62.67(3)	435.67(3)	54.60(5)	48.00(3)	350.67(3)
From stratified analysis										
Upper (95% CI)			4455.0	2102.7	325.3	874.3	1289.4	233.3	204.8	141.0
Mean			2748.1	736.5	215.0	547.2	671.5	158.6	56.1	75.0
Lower (95% CI)			1041.2	-629.6	104.7	220.1	53.6	83.9	-92.5	9.0
Total (x 10^{-6})			567.2	152.0	44.4	112.9	138.6	32.7	11.6	15.5

[a]Strata not included in calculation of overall mean.

Table 4. Mean weight (kg) of redfish per standard tow from Russian spring-summer surveys in Div. 3M. Number of sucessful sets in brackets. (P III = PERSEY III, N.K. = NICKOLAY KONONOV, G = GENICHESK, V = VILNIUS).

Stratum	Depth range (m)	Stratum Area (sq. n. mi)	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)	Apr 17–Apr 27 1991 (V)
357	275–366	164	1970.85(4)	355.78(4)	145.80(4)	462.50(4)	413.27(3)	78.23(6)	4.60(4)	10.13(4)
358	185–274	225	2068.90(5)	234.13(4)	17.58(5)	29.60(5)	34.33(3)	9.42(9)	0.46(5)	2.34(5)
359	93–183	421	184.58(5)	0.00(4)	0.00(4)	0.35(4)	0.00(4)	0.12(5)	0.00(4)	0.00(4)
360[a]	57–91	2992	0.56(5)	0.00(7)	0.00(5)	0.00(5)	0.00(5)	0.00(11)	0.00(6)	0.07(6)
361[a]	57–91	1853	0.00(4)	0.00(3)	0.00(4)	0.00(4)	0.00(4)	0.00(4)	0.00(4)	0.00(4)
362[a]	57–91	2520	0.00(4)	0.00(4)	0.00(4)	0.00(5)	0.00(4)	0.00(4)	0.00(5)	0.00(4)
373[a]	57–91	2520	0.00(4)	0.00(4)	0.00(5)	0.00(5)	0.00(4)	0.00(5)	0.00(5)	0.00(4)
374[a]	57–91	931	0.00(3)	0.00(3)	0.00(4)	0.00(4)	0.00(3)	0.00(4)	0.00(4)	0.00(4)
375[a]	< 56	1593	0.00(5)	0.00(3)	0.00(4)	0.00(4)	0.00(3)	0.00(4)	0.00(4)	0.00(4)
376[a]	< 56	1499	0.00(5)	0.00(4)	0.00(4)	0.00(4)	0.00(4)	0.00(4)	0.00(4)	0.00(4)
377	93–183	100	4.97(3)	0.00(4)	1.33(3)	0.00(3)	0.00(3)	0.00(4)	0.00(3)	0.00(3)
378	185–274	139	393.93(3)	10.93(4)	1.03(3)	17.00(3)	4.73(3)	0.40(4)	2.70(3)	0.20(3)
379	275–366	106	31.38(4)	17.80(4)	98.47(3)	263.00(3)	822.27(3)	36.08(4)	0.53(3)	6.40(3)
380	275–366	116	2.65(4)	5.13(3)	1.10(3)	41.33(3)	1.37(3)	1.72(5)	0.03(3)	0.10(3)
381	185–274	182	3.90(3)	0.10(5)	0.00(3)	0.00(2)	0.47(3)	0.33(4)	0.38(4)	0.00(3)
382	93–183	647	1.53(3)	0.00(3)	0.00(3)	0.00(3)	0.00(4)	0.00(7)	0.00(3)	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)	0.00(3)
723	367–549	155	2162.00(3)	188.44(5)	244.37(3)	903.00(4)	451.60(3)	241.10(5)	32.27(3)	24.70(3)
724	550–731	124	212.83(3)	1890.10(3)	65.23(3)	1365.33(3)	463.17(3)	83.58(4)	12.73(3)	9.30(3)
725	367–549	105	3686.80(3)	40.37(3)	316.40(3)	457.33(3)	441.30(3)	32.20(4)	182.83(3)	71.97(3)
726	550–731	72	749.50(3)	4543.25(2)	31.03(3)	75.67(3)	96.57(3)	119.57(3)	14.87(3)	104.10(3)
727	367–549	160	105.00(4)	25.07(3)	17.93(3)	21.67(3)	19.20(4)	10.32(6)	3.33(3)	6.27(3)
728	550–731	156	539.07(3)	131.57(3)	19.87(3)	30.67(3)	187.53(3)	30.90(5)	16.03(3)	136.83(3)
From stratified analysis										
Upper (95% CI)			1092.3	857.5	66.8	351.4	231.0	44.9	39.8	28.8
Mean			637.4	255.8	43.9	170.2	131.1	29.7	10.9	15.8
Lower (95% CI)			182.5	-346.0	21.0	-11.0	31.3	14.6	-18.1	2.8
Trawlable biomass (t)			131557	52789	9063	35121	27067	6133	2246	3255

[a]Strata not included in calculation of overall mean.

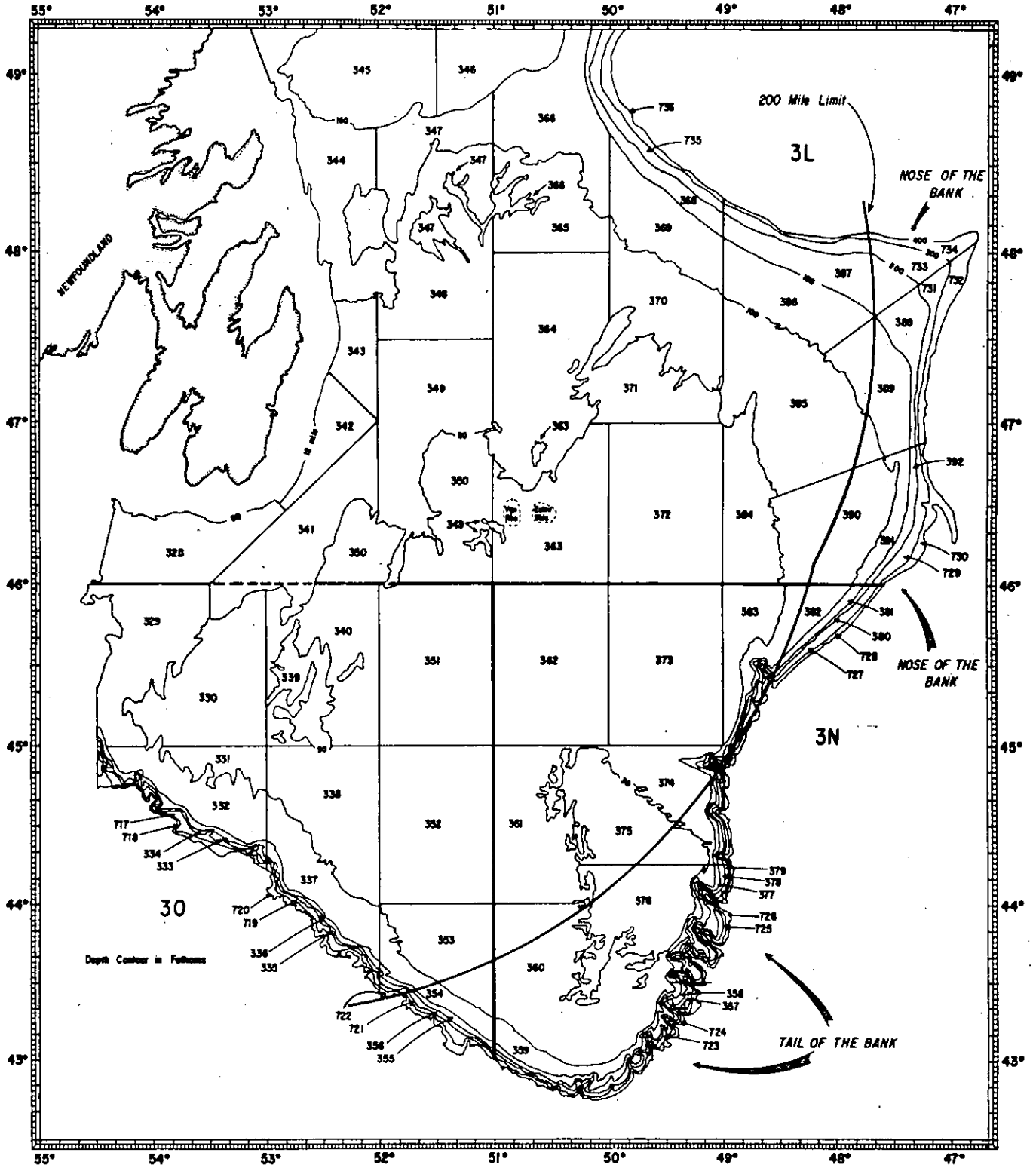

Fig. 1. Stratification scheme of NAFO Div. 3L and 3N.

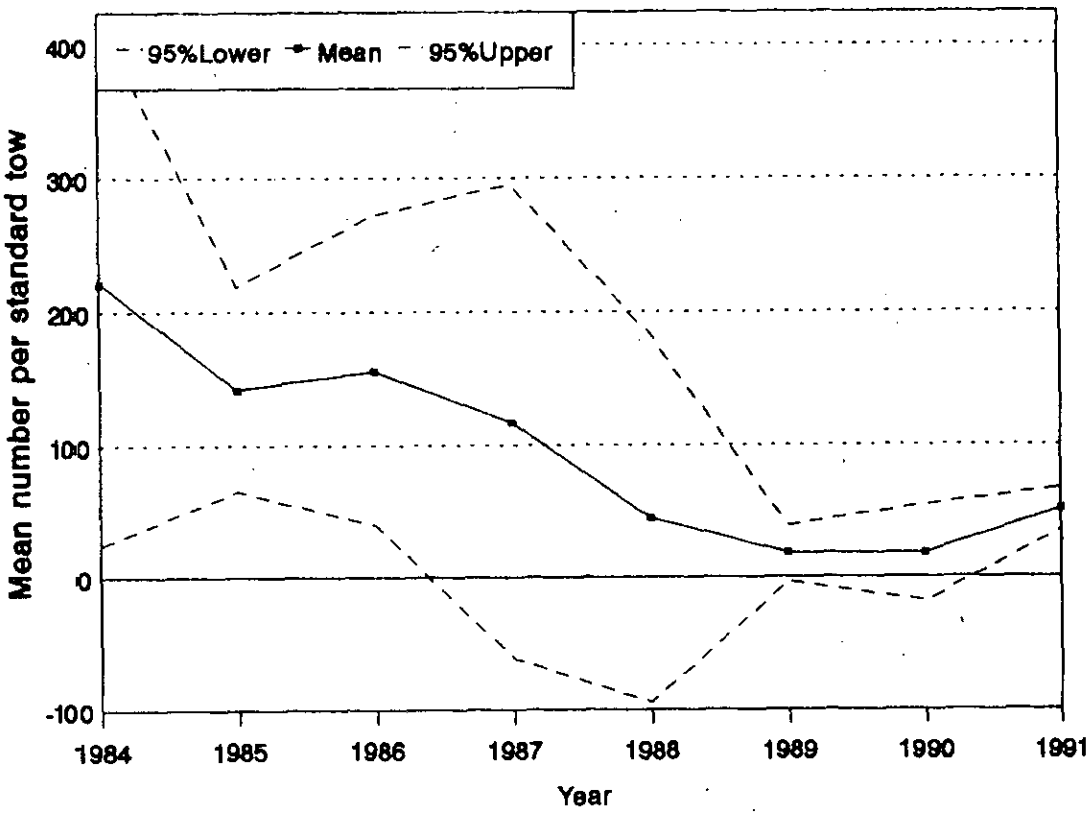

Fig. 2. Stratified mean number per standard tow from Russian trawl surveys in Div. 3L from 1984 to 1991.

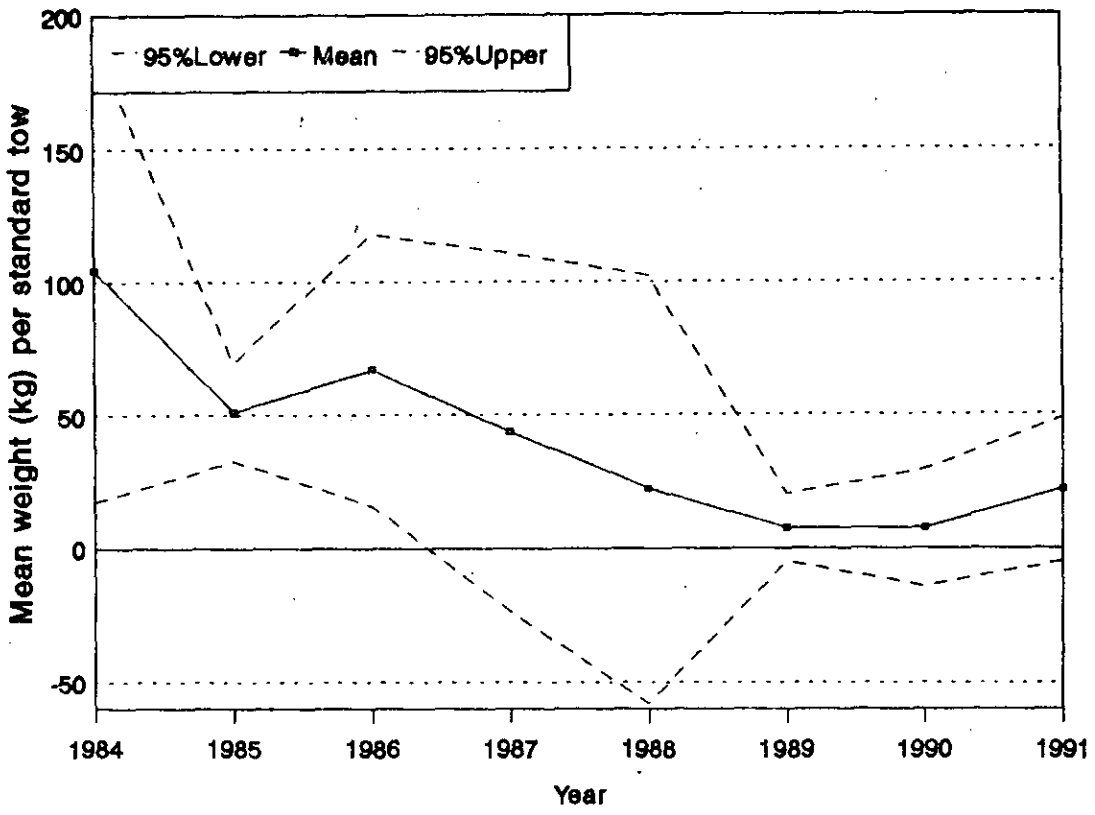

Fig. 3. Stratified mean weight (kg) per standard tow from Russian trawl surveys in Div. 3L from 1984 to 1991.

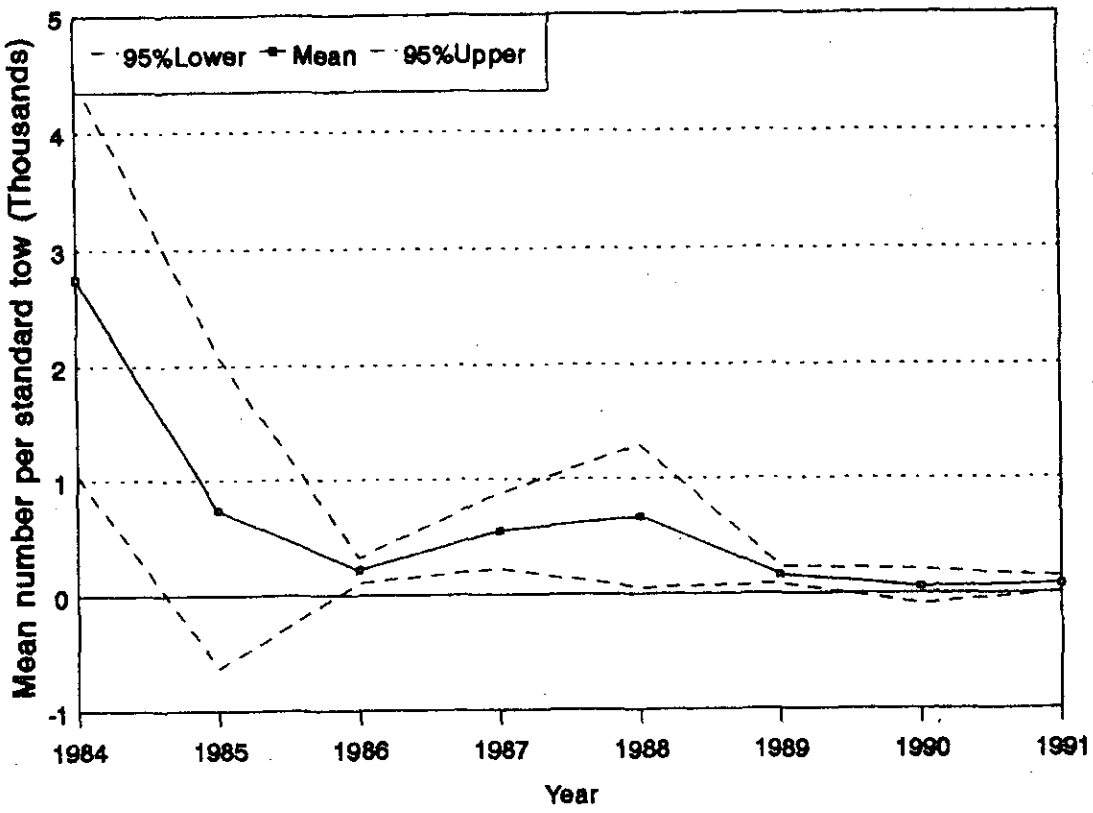

Fig. 4. Stratified mean number per standard tow from Russian trawl surveys in Div. 3N from 1984 to 1991.

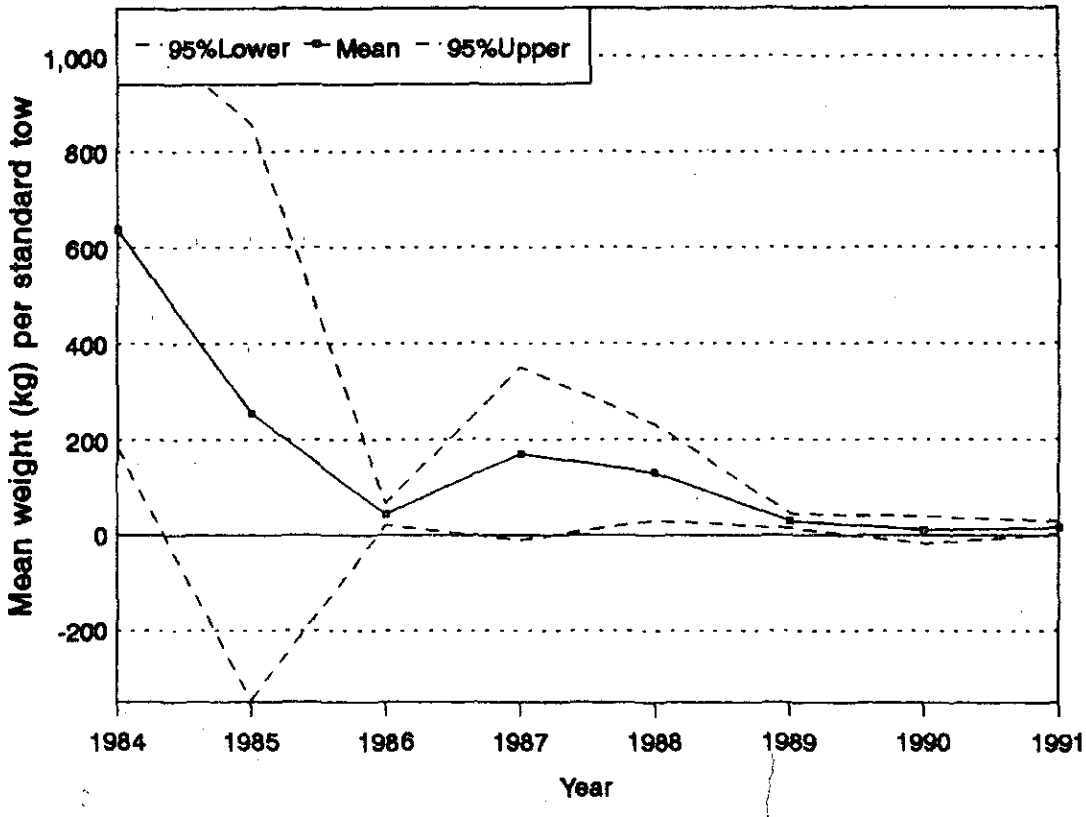

Fig. 5. Stratified mean weight (kg) per standard tow from Russian trawl surveys in Div. 3N from 1984 to 1991.