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An Assessment of Redfish in Division 3LN

by

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Nominal Catches

The average reported catch from Div. 3LN from 1959 to 1985 was about 22,000 t ranging between 10,000 t and 45,000 t (Table 1, Fig. 1). Catches increased sharply from about 21,000 in 1985, peaked at a historical high of 79,000 t in 1987 and declined to about 27,000 t in 1992. The 1993 and 1994 catches were about 23,000 t and 7000 t respectively. These could not be estimated precisely because of discrepancies in the available sources of information, however, the likely amount is between 20,000 t and 26,000 t for 1993 and 3,700 t to 7,500 t for 1994.

Description of the Fishery

In the early-1980's the former USSR, Cuba and Canada were the primary fleets directing for redfish in what is essentially a trawler fishery (Table 2a,b). The rapid expansion of the fishery in 1986 was due primarily to the entry of EU-Portugal, taking about 21,000 t. In 1987 various countries who were not contracting parties of NAFO, most notably South Korea, Panama and Caymen Islands began to fish in the regulatory area accounting for a catch of about 24,000 t. Since then these countries have taken between 1,000 t and 13,000 t annually.

Information from surveillance sources indicate that during the 1980s most of the Div. 3LN catch was taken in the vicinity of the Div. 3N and Div. 3O border in addition to the slopes of the Grand Bank in Div. 3L. Since the 1990s a considerable amount of activity has occurred in the 'Beothuk knoll' area which is southwest of the Flemish Cap at the Div. 3M, Div. 3L and Div. 3N border. However, in 1993 and 1994 activity increased in the southwest portion of Div. 3N. In 1994 fleets from the Baltic countries returned home early in the year because of a poor fishery in this area.

From 1980 to 1990 the TAC each year for this stock has been 25,000 t. The TAC was reduced to 14,000 for 1991 and has been at that level to 1995. The catch for 1994, even at the higher estimate of 7,500 t, is the first time since 1985 that the TAC was not exceeded. In some years catches have been double (1988) and even triple (1987) the agreed TAC.

The monthly pattern of the catches in recent years (Table 3a,b) reveals the fishery is conducted year round in Div. 3L but mostly in the second half of the year in Div. 3N. Catches for each division by gear since 1981 (Table 4) shows the bottom trawl is the predominant gear in the fishery.

Commercial Fishery Data

Catch and Effort

Catch and effort data from 1959 to 1991 ICNAF/NAFO Statistical Bulletins were obtained and combined with provisional 1992-1993 NAFO data and preliminary Canadian data for 1993-1994. In addition, preliminary Russian data for 1993 were also incorporated into this database. Previous analysis of this database (Power MS 1994) utilized catch rate data available in Portuguese research reports from NAFO SCS Document series for 1989-1993 from the annual Portuguese sampling program. These data were substituted for the Portuguese data from the NAFO database because of possible confounding with directed effort of other target species. However, it is probably more appropriate to analyze observer data separately and accordingly the current analysis only utilizes the NAFO database. Only those data where redfish comprised more than 50% of the total catch were selected for further analysis as these were considered to be redfish directed.

The catch/effort data were analyzed with a multiplicative model (Gavaris 1980) to derive a standardized catch rate series in tons per hour and additional series utilizing effort in days fished. Effects included in the model were a combination country-gear-tonnage class category type (CGT), NAFO division, month, and a category type representing the amount of by-catch associated with each observation, consistent with last years assessment (eg. see Power and Atkinson, MS 1989).

In the usual practise, catch or effort data of less than 10 units were eliminated prior to analysis. Category types where there was less than five samples in the database, except the year category type, were also eliminated. However, for the analysis utilizing the effort in terms of days fished catch less than 10 tons or effort less than an arbitrarily chosen 5 days were eliminated prior to analysis. For all analyses an unweighted regression was run because of unknown percentages of prorating prior to 1984. The data were analyzed for each division separately because of different trends in the catch rate series in recent years, which violates a basic assumption of the model if the data are combined.

The regression for Div. 3L using effort in hours is significant ($p < .05$), reducing 57% of the total variation in catch rates (Table 5). All category types were significant. Although the year category type is significant, only the estimated coefficient for 1991 is statistically different from 1959 (within 2 s.e.). The standardized catch rate series (Table 9, Fig. 2a) shows much interannual variability especially prior to 1974. There is a slight trend of increase from 1974 to 1986 followed by a decline to 1991 except for an intermittent increase in 1989. The catch rate increased sharply in 1992 and the 1993 data suggest a further marginal increase although these mean values are associated with high variability.

The regression for Div. 3N using effort in hours fished is significant ($p < .05$), reducing 56% of the total variability in the CPUE data (Table 6). All category types were significant, except the month category. For the year category type only seven of the estimated coefficients are different from 1959 (within 2 s.e.), four of these are in the recent period 1990-1993. The standardized catch rate series (Table 10, Fig. 2b) shows much within year variability over time, especially for the period prior to 1976. There is a general trend of increase from 1976 to one of the highest rates in the series in 1980 followed by a decline to 1986. Catch rate increased sharply in 1987 and has since declined to the lowest rate in the series in 1994.

Analyses incorporating effort measured in days fished were conducted on the premise that such a unit of effort may reflect time searching for concentrations of redfish.

The regression for Div. 3L using effort in days fished was significant ($p < .05$), reducing 61% of the total variation in the CPUE data (Table 7). All category types were significant, except month. For the year category type only five of the estimated coefficients are different from 1959 (within 2 s.e.). The standardized catch rate series (Table 11, Fig. 3a) shows much interannual variability throughout the series especially prior to 1976. There is a trend of successive increases from 1978 to 1982 followed by a decrease to 1985. Catch rate increased again in 1986 to about the level of the 1982 rate and except for an intermittent increase in 1989 decreased systematically to one of the lowest rates on record in 1991. Since 1991 the rate has increased substantially and the preliminary 1993 data suggest the catch rate is at the level of that experienced in the mid-1980s.

The regression utilizing effort as days fished for Div. 3N was significant ($p < .05$), reducing 67% of the total variability in CPUE (Table 8). Only the month category type was not significant. The catch rate series has much interannual variability associated with the mean (Table 12, Fig. 3b) particularly prior to 1980 but there is an indication of stability. From 1980 to 1985 there is a trend of decline followed by successive increases to 1987 and a subsequent declined to one of the lowest rates in the series in 1993.

A standardized catch rate series utilizing effort in hours fished for the Portuguese fleet based on logbook information (Avila de Melo et al., MS 1995) suggests stability in Div. 3L from 1988 to 1993. There was no directed effort in Div. 3L in 1994. The data for Div. 3NO combined suggest an increase from 1991 to 1994 and a corresponding shift in fleet effort to Div. 3NO over the same period. It is uncertain whether these are representative of trends in the population or simply reflect the experience of the Portuguese fleet.

Since the multiplicative analyses on Div. 3L and Div. 3N CPUE data indicated there was generally little contrast in the estimated catch rate series over time, general production analyses were not considered appropriate.

Commercial fishery sampling

Limited sampling from the 1994 Portuguese fishery in Div. 3L (Avila de Melo et al., MS 1995) suggests males 24 cm-30 cm and females 24 cm-38 cm dominated the catch based on samples obtained in May. The mean lengths of the samples were 30.0 cm for males and 31.4 cm for females. Sampling of the 1994 Div. 3N Portuguese fishery from March to June suggest malos 22 cm-29 cm and femalos 22 cm-35 cm dominated the catch. The mean lengths of these samples were 27.0 for males and 29.7 for females.

Sampling from a 1994 exploratory Russian fishery in Div. 3L in June-July (Savvatimsky and Borovkov, MS 1995) suggests males 24 cm-29 cm and females 24 cm-31 cm comprised the bulk of the catch. The mean lengths of these samples were 26.1 cm for males and 26.8c m for females.

Research Survey Data

Stratified-random surveys have been conducted by Canada in Div. 3L in various years and seasons from 1978 to 1994 in which strata up to a maximum of 732 m (400 fathoms) were sampled. Although these surveys were conducted at various times of the year throughout the period, they provide an indication of relative abundance and dynamics of the population. The design of the surveys was based on a stratification scheme down to 400 fathoms for Div. 3LN (Fig. 4).

Mean number and mean weight (kg) per standard tow show large fluctuations between some adjacent years (Table 13-14, Fig. 5a). There are also rather large changes in stratum by stratum density estimates in adjacent years where seasons can be compared. Although it is difficult to interpret year to

year changes in the estimates, in general, the data suggest that trawlable biomass since 1992 is at its lowest level (average 5,000 t) relative to earlier time period up to 1986 (average 103,000 t).

Stratified-random surveys have also been conducted in spring and autumn by Canada in Div 3N from 1991-1994 that also cover to the extent of the stratification (732 m or 400 fathoms). Mean number and weight per standard tow (Table 15-16, Fig. 5b) are considerably higher than in Div 3L but it is evident that there is much more variability in these estimates as well. The source of this variability is unclear but is likely due to availability to the trawl gear rather than real changes in population abundance and therefore the interpretation of these data in terms of year-to-year trends is difficult. The average trawlable biomass over the 1991-1994 period is about 16,000 t. A preliminary estimate from the spring 1995 survey is about 1300 t.

Russian stratified-random bottom trawl surveys in Div. 3L indicate that from 1984 to 1990 there has been a decline in mean number and mean weight per standard tow (see Power and Vaskov, MS 1992). There was an increase in the 1991 estimates. The survey was not conducted in 1992. The 1993 and 1994 estimates are both near the level of the 1989-1990 estimates which are the lowest in the time series (Fig. 6a). The trawlable biomass estimate derived from the 1994 survey is about 4,000 t. In Div. 3N, although there are still some rather dynamic changes over this period, there is also an indication of a decline from 1984 to 1991. This is evident in both the mean number and weight per standard tow (Fig. 6b). The 1993 survey suggests a rather large increase relative to 1991 but this is highly influenced by the trawling conducted in one stratum (see Vaskov (1994), Table 2) which accounted for 70% of the biomass but only represents about 9% of the area surveyed. There was no survey conducted in 1994 in Div. 3N.

A comparison of the Canadian and Russian bottom trawl surveys in Div. 3L (Fig. 7a) indicate a similar trend of decline in density estimates from 1984 to 1990 and have remained at this relatively low level to 1994. The situation is unclear for Div. 3N (Fig. 7b). The Russian surveys indicate relatively low mean weight per tow from 1989-1991 with a dramatic rise in 1993 (as explained above). The Canadian survey results display high seasonal and within year variability over the time they have been conducted making direct comparisons difficult.

Canada has conducted deepwater surveys in Div. 3L in the summer of 1991 and winters of 1994 and 1995 (Bowering et al., MS 1995). The distribution of the catches indicate a generally low occurrence in depths greater than 750 m. Trawlable biomass estimates derived over the three surveys ranged from 600 t in 1991 to 1500 t in 1995. There was partial coverage of Div. 3N for those strata close in proximity to Div. 3L and greater than 550 m with highest biomass occurring in the 1994 survey at 205 t.

A deepwater survey was conducted by Japan in March-April 1995 in Div. 3L in the depth range 732 m -1280 m which utilized a trawl with an unlined 140 mm mesh codend (Yokawa and Koga, MS 1995). Although the station selection was chosen at random, the swept area biomass estimate assuming a catchability of 1.0 was less than 150 t which again indicates low occurrence of redfish beyond 750 m.

Length distributions in terms of mean number per tow at length and corresponding age distributions in number per thousand from the regular spring and autumn Canadian surveys in Div. 3L indicate there has been relatively poor recruitment over the time period covered by the surveys (Fig. 8). These also indicate the seasonal variability in years where seasons have been covered sufficiently. For the 1994 spring and fall surveys similar length distributions were sampled with a mode at 26 cm which corresponds to fish born about 1984.

Length distributions and age distributions from the Div. 3N regular spring and autumn Canadian surveys in from 1991-1994 (Fig. 9) show different compositions compared with Div. 3L for each corresponding seasonal survey, generally being composed of size groups that are much smaller. There was a relatively good pulse of recruitment picked up in the 1991 autumn survey in the range of 12-14 cm (1986-1987 year-classes) that could be tracked through to the 1994 fall survey at about 19 cm. Given the variability in the survey estimates the magnitude of this recruitment cannot be determined. However, there is no sign of any good year-classes subsequent to this in the surveys.

Length distributions in terms of percent at length from the 1994 Russian survey of Div. 3L (Vaskov, MS 1995) indicate the bulk of the research catch occurred from 24 cm-29 cm. The historical series of these distributions extending back to 1989 suggest that fish greater than 32 cm are much less represented in the size distribution since 1991. There was a mode which occurred at 19 cm similar to that of the 1994 Canadian autumn survey but it was relatively less abundant in the Russian survey.

A length distribution derived from the Japanese survey in 1995 suggest a range between 27 cm-35 cm. Given the survey utilized a trawl with an unlined 140 mm mesh size in the codend this size range is more related to an exploitable size distribution rather than some indication of the total stock.

State of the Stock

It is not possible to provide an estimate of the absolute size of the stock in Div. 3LN. The results from Canadian spring and autumn surveys suggest trawlable biomass has been low in Div. 3L since 1991 relative to the late-1970's to mid-1980's. The situation in Div. 3N based on the Canadian surveys is unclear because of large seasonal fluctuations, however, trawlable biomass has averaged 16,000 t since 1991 which is about three times the average trawlable biomass from based on Canadian surveys in Div. 3L since 1992 (5,000 t). Russian bottom trawl surveys also indicate a decline in relative abundance to historically low values in recent years for Div. 3L and indicate a decline for Div. 3N from 1984 to 1991.

The catch rate indices derived for Div. 3L and Div. 3N show much variability. Although some of the changes in mean catch rate between some years are too dramatic to be solely the result of changes in population abundance, there are indications of decline from the mid-1980s to 1990 in all the derived indices. This corresponds to a period when some of the largest catches historically were taken and have likely generated high fishing mortalities.

In summary, Div. 3L appears to be very low with no sign of good recruitment. Div. 3N has declined from 1984 to 1991 but the status since then is uncertain. The Div. 3N portion contains a recruiting component of unknown abundance that may already be recruiting to some fleet sectors. Despite this there is no sign in the research surveys of any good year-classes to follow.

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Table 1. Summary of nominal catches (t) of redfish in Divisions 3LN (provisional for 1993-1994).

Year	3L	3N	Total	TAC
1959	34,107	10,478	44,585	
1960	10,015	16,547	26,562	
1961	8,349	14,826	23,175	
1962	3,425	18,009	21,439[a]	
1963	8,191	12,906	27,362[a]	
1964	3,898	4,206	10,261[a]	
1965	18,772	4,694	23,466	
1966	6,927	10,047	16,974	
1967	7,684	19,504	27,188	
1968	2,378	15,265	17,660[a]	
1969	2,344	22,356	24,750[a]	
1970	1,029	13,359	14,419[a]	
1971	10,043	24,310	34,370[a]	
1972	3,095	25,838	28,933	
1973	4,709	28,588	33,297	
1974	11,419	10,867	22,286	28,000
1975	3,838	14,033	17,871	20,000
1976	15,971	4,541	20,513	20,000
1977	13,452	3,064	16,516	16,000
1978	6,318	5,725	12,043	16,000
1979	5,584	8,483	14,067	18,000
1980	4,367	11,663	16,030	25,000
1981	9,407	14,873	24,280	25,000
1982	7,870	13,677	21,547	25,000
1983	8,657	11,090	19,747	25,000
1984	2,696	12,065	14,761	25,000
1985	3,677	16,880	20,557	25,000
1986	27,833	14,972	42,805	25,000
1987	30,342	40,949	79,031[b]	25,000
1988	22,317	23,049	53,266[b]	25,000
1989	18,947	12,902	33,649[b]	25,000
1990	15,538	9,217	29,105[b]	25,000
1991	8,892	12,723	25,815[b]	14,000
1992	4,630	10,153	27,283[b]	14,000
1993	10,012	7,148	20,364-26,244[b,c]	14,000
1994	379	2273	3,717-7,544[b,c]	14,000
1995				14,000

[a]Includes catch that could not be identified by division.

[b]Includes estimates of unreported catch.

[c]Catch could not be precisely estimated due to discrepancies in figures from available sources.

Table 2a. Nominal reported catches (t) of redfish in Div. 3L by country and year since 1981.

Country	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993[b]	1994[b]
Canada (M)	1,696	1,003	2,663	52	342	2,597	2,352	5,042	1,095	73	37	86	-	-
Canada (N)	5,925	5,910	3,800	1,229	1,716	2,235	2,159	1,444	489	947	362	656	5	-
EEC/Germany	509	12	586	938	981	540	696	694	742	646	1151	1,455	-	-
Japan	128	159	-	105	129	135	114	152	114	151	84	67	37	82
EEC/Portugal	275	125	91	48	4	13,469	19,858	9,867	5,408	4,820	5,099	769	1	4
EEC/Spain	137	25	347	91	192	199	335	94	109	837	681	625	29	128
Russia	737	607	1,168	232	309	8,658	4,459	5,004	10,037	7,003	1,032	571	2,407	22
Lithuania	-	-	-	-	-	-	-	-	-	-	-	-	696	-
Latvia	-	-	-	-	-	-	-	-	-	-	-	-	2,156	55
Estonia	-	-	-	-	-	-	-	-	-	-	-	-	4,115	88
Kor-S	-	29	-	-	-	-	364	20	952	1,061	420	370	586	-
Others[a]	-	-	2	1	4	-	5	-	1	-	26	31	-	-
TOTAL	9,407	7,870	8,657	2,696	3,677	27,833	30,342	22,317	18,947	15,538	8,892	4,630	10,012	379

[a]Others include France (M), France (SP), Poland, EEC-UK.
[b]Provisional.

Table 2b. Nominal reported catches (t) of redfish in Div. 3N by country and year since 1981.

Country	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993[b]	1994[b]
Canada (M)	442	-	-	13	311	-	-	1	22	-	-	-	-	110
Canada (N)	63	337	1	2	82	17	21	4	4	11	-	1	40	-
EEC/Portugal	-	1	-	365	890	8,273	7,854	2,147	600	1,235	3,275	1,149	252	59
Japan	-	-	-	81	-	12	51	-	39	4	4	1	19	-
EEC/Spain	239	278	875	239	2,881	1,393	132	581	224	416	956	119	7	106
Russia	12,762	10,414	7,844	9,045	10,576	2,227	14,397	6,735	941	359	4,821	3,009	3,212	1,998
Lithuania	-	-	-	-	-	-	-	-	-	-	-	-	1,116	-
Latvia	-	-	-	-	-	-	-	-	-	-	-	-	1,247	-
Estonia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cuba	1,309	2,621	2,370	2,320	2,055	2,429	2,433	2,483	2,869	2,456	1,378	1,308	1,152	-
Kor-S	-	26	-	-	-	617	16,053	11,098	8,203	4,640	2,276	4,560	122	-
Others[a]	58	-	-	-	85	4	8	-	-	96	13	6	-	-
TOTAL	14,873	13,677	11,090	12,065	16,880	14,972	40,949	23,049	12,902	9,217	12,723	10,153	7,148	2,273

[a]Others include France (M), USA, EEC-Germany, Denmark (Greenland).
[b]Provisional.

Table 3a. Nominal reported catches (t) of redfish in Division 3L by month and year since 1981.

Year	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total
1981	280	61	137	1,120	2,286	532	73	90	404	161	1,980	2,283	9,407
1982	1,126	672	1,232	1,225	295	289	459	37	643	1,367	173	352	7,870
1983	1,304	496	672	1,080	934	708	274	642	562	1,070	799	116	8,657
1984	243	135	168	360	76	161	49	57	1,002	318	46	81	2,696
1985	481	120	177	331	215	165	41	78	354	866	441	408	3,677
1986	423	845	3,470	7,266	3,662	503	975	2,196	544	3,964	2,166	1,819	27,833
1987	2,439	1,631	5,306	1,423	1,765	75	1,233	3,877	3,285	4,215	3,712	1,381	30,342
1988	2,856	1,623	865	1,466	471	1,213	2,776	4,800	1,628	1,869	682	2,068	22,317
1989	786	4,497	4,301	1,140	1,628	501	1,730	1,311	832	1,151	1,002	68	18,947
1990	269	331	297	831	578	1,717	3,061	3,683	1,911	1,611	1,056	193	15,538
1991	328	901	642	821	685	503	613	296	229	692	2,123	1,059	8,892
1992	417	203	137	1,479	1487	246	15	9	26	30	480	101	4,630

Table 3b. Nominal reported catches (t) of redfish in Division 3N by month and year since 1981.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1981	6,293	3,657	877	78	77	145	1,035	1,577	413	273	208	240	14,873
1982	3,042	1,970	2,919	1,141	243	100	581	3,156	485	21	12	7	13,677
1983	869	609	2,029	2,186	1,226	675	1,121	1,266	303	376	208	222	11,090
1984	4,562	1,763	1,821	676	67	74	1,694	1,014	156	93	131	14	12,065
1985	1,110	2,169	2,181	4,213	1,668	420	1,665	676	784	541	230	1,223	16,880
1986	392	665	406	534	454	915	4,392	81	1,196	110	4,131	1,696	14,972
1987	3,787	3,118	1,885	2,203	2,698	2,383	4,339	6,280	7,287	2,431	1,004	3,534	40,949
1988	662	648	815	841	952	1,295	2,327	4,505	3,390	1,419	3,453	2,742	23,049
1989	576	151	274	380	278	1,183	928	4,109	2,085	1,515	1,164	259	12,902
1990	220	366	537	9	1,003	1,679	1,236	1,716	619	754	858	220	9,217
1991	387	91	15	122	312	670	3,241	2,229	1698	2,013	1,085	860	12,723
1992	274	638	87	65	104	2,285	2,352	1,626	432	702	926	662	10,153

Table 4. Nominal reported catches by gear type for redfish in Divisions 3L and 3N since 1981.

	3L					3N				
Year	Bottom trawl	MW trawl	Gillnets	Misc.	Total	Bottom trawl	MW trawl	Gillnets	Misc.	Total
1981	8,397	650	223	137	9,407	8,858	5,774	2	239	14,873
1982	7,234	466	145	25	7,870	7,400	6,001	1	275	13,677
1983	7,760	308	238	351	8,657	7,050	3,165	-	875	11,090
1984	2,151	237	218	90	2,696	3,287	8,767	-	11	12,065
1985	3,092	307	128	150	3,677	10,232	6,453	-	195	16,880
1986	18,964	8,624	122	123	27,833	10,423	3,405	-	1,144	14,972
1987	25,294	4,441	276	331	30,342	32,391	8,527	-	31	40,949
1988	15,435	6,722	105	55	22,317	16,740	6,269	17	23	23,049
1989	7,542	10,922	449	34	18,947	9,131	3,746	-	25	12,902
1990	7,851	7,537	136	14	15,538	6,511	2,675	10	21	9,217
1991	7,322	1,422	71	77	8,892	11,028	1,628	-	67	12,723
1992	3,538	949	67	76	4,630	8,553	1,518	6	76	10,153

Table 5. ANOVA results and regression coefficients from a multiplicative model utilized to derive a standardized catch rate series for redfish in Div. 3L. Effort is measured in hours fished (1993 based on preliminary data).

REGRESSION OF MULTIPLICATIVE MODEL
MULTIPLE R..... 0.754
MULTIPLE R SQUARED..... 0.569

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DF	SUMS OF SQUARES	MEAN SQUARES	F-VALUE
INTERCEPT	1	3.347E1	3.347E1	
REGRESSION	80	1.598E2	1.997E0	8.213
Country¦Gear¦TC	31	6.709E1	2.164E0	8.900
Month	11	1.175E1	1.068E0	4.392
Bycatch PCT	4	1.597E1	3.993E0	16.421
Year	34	2.637E1	7.757E-1	3.190
RESIDUALS	498	1.211E2	2.432E-1	
TOTAL	579	3.143E2		

REGRESSION COEFFICIENTS

CATEGORY	CODE	VARIABLE	COEFFICIENT	STD. ERROR	NO. OBS.
Country¦Gear¦TC	3125	INTERCEPT	0.294	0.180	579
Month	7				
Bycatch PCT	95				
Year	59				
(1)	2114	1	-0.709	0.209	9
	2125	2	-0.126	0.199	8
	2155	3	-0.080	0.225	6
	3114	4	-0.517	0.186	15
	3124	5	-0.012	0.178	9
	3154	6	-0.517	0.244	5
	3155	7	0.223	0.124	27
	10127	8	-0.629	0.242	5
	11115	9	-0.518	0.218	10
	11116	10	-0.425	0.225	8
	11125	11	0.036	0.121	22
	11126	12	-0.092	0.212	11
	11127	13	-0.081	0.140	20
	11155	14	-0.466	0.235	5
	14126	15	-0.367	0.191	8
	14127	16	0.367	0.195	14
	16127	17	-0.122	0.184	27
	17116	18	-0.943	0.250	5
	17126	19	-0.745	0.224	6
	17127	20	0.197	0.184	9
	20114	21	-1.359	0.202	11
	20116	22	-0.294	0.224	11
	20127	23	0.235	0.092	66
	20145	24	1.191	0.353	12
	20157	25	0.462	0.089	55
	25126	26	-0.255	0.169	13
	25127	27	0.685	0.165	13
	27125	28	0.096	0.097	37
	27126	29	0.381	0.217	6
	27157	30	1.065	0.209	7
	34157	31	0.542	0.349	6
(2)	1	32	-0.028	0.112	40
	2	33	0.018	0.109	41
	3	34	0.253	0.100	53
	4	35	0.359	0.099	56
	5	36	0.136	0.104	47
	6	37	-0.121	0.095	59
	8	38	-0.144	0.098	54
	9	39	-0.013	0.103	45
	10	40	-0.159	0.100	51
	11	41	-0.046	0.104	46
	12	42	0.036	0.124	26
(3)	55	43	-0.573	0.112	28
	65	44	-0.599	0.088	46
	75	45	-0.296	0.077	67
	85	46	-0.084	0.064	102
(4)	60	47	0.161	0.208	13
	61	48	0.449	0.267	7
	62	49	0.120	0.244	10
	63	50	0.329	0.253	9
	64	51	0.593	0.346	3
	65	52	0.452	0.295	5
	66	53	0.007	0.227	13
	67	54	0.308	0.224	19
	68	55	0.108	0.270	7
	69	56	0.155	0.245	7
	70	57	0.333	0.251	8
	71	58	0.260	0.242	12
	72	59	0.108	0.260	6
	73	60	0.446	0.330	3
	74	61	-0.403	0.344	15
	75	62	0.064	0.266	6
	76	63	-0.066	0.175	32
	77	64	-0.157	0.181	33
	78	65	-0.350	0.185	27
	79	66	0.053	0.198	24
	80	67	0.016	0.201	18
	81	68	0.041	0.199	18
	82	69	0.084	0.189	25
	83	70	0.151	0.191	21
	84	71	-0.002	0.207	15
	85	72	0.154	0.200	19
	86	73	0.197	0.186	31
	87	74	0.019	0.196	21
	88	75	-0.114	0.182	36
	89	76	0.219	0.197	23
	90	77	-0.353	0.184	29
	91	78	-0.740	0.188	22
	92	79	0.250	0.237	11
	93	80	0.428	0.354	7

Table 6. ANOVA results and regression coefficients from a multiplicative model utilized to derive a standardized catch rate series for redfish in Div. 3N. Effort is measured in hours fished (1993 based on preliminary data).

REGRESSION OF MULTIPLICATIVE MODEL
MULTIPLE R..... 0.746
MULTIPLE R SQUARED..... 0.556

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DF	SUMS OF SQUARES	MEAN SQUARES	F-VALUE
INTERCEPT	1	4.594E1	4.594E1	
REGRESSION	68	1.042E2	1.533E0	6.861
Country¦Gear¦TC	18	2.904E1	1.613E0	7.223
Month	11	2.343E0	2.130E-1	0.953 (NS)
Bycatch PCT	4	1.434E1	3.585E0	16.048
Year	35	2.918E1	8.338E-1	3.733
RESIDUALS	372	8.310E1	2.234E-1	
TOTAL	441	2.333E2		

REGRESSION COEFFICIENTS

CATEGORY	CODE	VARIABLE	COEFFICIENT	STD. ERROR	NO. OBS.
Country¦Gear¦TC	3125	INTERCEPT	0.111	0.165	441
Month	7				
Bycatch PCT	95				
Year	59				
(1)	2114	1	-0.314	0.173	17
	3114	2	-0.064	0.142	59
	3124	3	0.051	0.226	6
	4127	4	0.424	0.165	18
	4157	5	0.657	0.152	32
	11115	6	-0.468	0.279	5
	14127	7	0.487	0.265	5
	16127	8	-0.176	0.247	5
	17126	9	0.065	0.268	5
	20114	10	-0.952	0.225	8
	20116	11	-0.064	0.221	8
	20127	12	0.543	0.121	90
	20156	13	0.075	0.234	6
	20157	14	0.730	0.131	65
	25126	15	0.432	0.185	17
	25127	16	0.880	0.151	46
	27125	17	0.368	0.234	7
	34127	18	1.540	0.256	13
(2)	1	19	-0.077	0.110	35
	2	20	-0.001	0.118	30
	3	21	-0.069	0.112	34
	4	22	0.123	0.129	24
	5	23	0.000	0.118	27
	6	24	0.073	0.106	36
	8	25	0.034	0.093	55
	9	26	-0.045	0.093	57
	10	27	-0.154	0.109	33
	11	28	-0.100	0.114	30
	12	29	-0.227	0.125	23
(3)	55	30	-0.585	0.105	35
	65	31	-0.570	0.088	48
	75	32	-0.397	0.083	55
	85	33	-0.181	0.075	64
(4)	60	34	0.243	0.254	5
	61	35	0.195	0.200	11
	62	36	0.285	0.180	16
	63	37	0.173	0.221	8
	64	38	0.154	0.232	8
	65	39	0.425	0.239	7
	66	40	0.514	0.178	17
	67	41	0.431	0.276	6
	68	42	-0.332	0.286	4
	69	43	0.095	0.217	8
	70	44	0.103	0.215	8
	71	45	0.022	0.306	3
	72	46	0.128	0.199	10
	73	47	0.258	0.231	8
	74	48	0.516	0.234	7
	75	49	0.346	0.242	6
	76	50	-0.171	0.207	9
	77	51	-0.074	0.242	6
	78	52	-0.021	0.217	8
	79	53	0.116	0.174	17
	80	54	0.414	0.175	16
	81	55	0.262	0.183	17
	82	56	0.318	0.173	17
	83	57	0.160	0.181	15
	84	58	-0.197	0.189	14
	85	59	-0.212	0.188	15
	86	60	-0.201	0.197	12
	87	61	0.224	0.157	39
	88	62	-0.096	0.172	24
	89	63	-0.261	0.178	24
	90	64	-0.662	0.185	13
	91	65	-0.617	0.187	14
	92	66	-0.573	0.224	10
	93	67	-0.798	0.251	14
	94	68	-0.859	0.537	1

Table 7. ANOVA results and regression coefficients from a multiplicative model utilized to derive a standardized catch rate series for redfish in Div. 3L. Effort is measured in days fished (1993 based on preliminary data).

REGRESSION OF MULTIPLICATIVE MODEL
MULTIPLE R..... 0.781
MULTIPLE R SQUARED..... 0.610

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DF	SUMS OF SQUARES	MEAN SQUARES	F-VALUE
INTERCEPT	1	2.865E3	2.865E3	
REGRESSION	75	1.055E2	1.407E0	7.312
Country¦Gear¦TC	26	5.096E1	1.960E0	10.187
Month	11	3.312E0	3.011E-1	1.565 (NS)
Bycatch PCT	4	7.341E0	1.835E0	9.538
Year	34	2.055E1	6.043E-1	3.141
RESIDUALS	350	6.734E1	1.924E-1	
TOTAL	426	3.038E3		

REGRESSION COEFFICIENTS

CATEGORY	CODE	VARIABLE	COEFFICIENT	STD. ERROR	NO. OBS.
Country¦Gear¦TC	3125	INTERCEPT	2.989	0.176	426
Month	7				
Bycatch PCT	95				
Year	59				
(1)	2114	1	-0.681	0.215	7
	2125	2	-0.259	0.197	7
	2155	3	-0.261	0.225	5
	3114	4	-0.620	0.195	11
	3124	5	0.332	0.181	7
	3155	6	0.294	0.128	24
	10125	7	0.083	0.207	8
	10126	8	0.045	0.182	14
	11115	9	-0.547	0.219	9
	11125	10	-0.179	0.122	18
	11126	11	-0.179	0.248	10
	11127	12	-0.355	0.148	15
	11155	13	-0.898	0.216	5
	14126	14	-0.483	0.188	7
	16127	15	-0.208	0.171	24
	17126	16	-0.224	0.129	20
	17127	17	0.543	0.222	5
	20114	18	-1.610	0.221	8
	20116	19	-0.852	0.223	8
	20127	20	0.256	0.112	44
	20145	21	0.871	0.517	12
	20157	22	0.617	0.102	36
	25127	23	0.656	0.213	6
	27125	24	0.139	0.104	27
	27157	25	0.478	0.224	5
	34157	26	0.359	0.374	5
(2)	1	27	-0.319	0.117	29
	2	28	-0.321	0.122	23
	3	29	-0.017	0.106	39
	4	30	0.001	0.107	39
	5	31	-0.062	0.120	27
	6	32	-0.120	0.100	41
	8	33	-0.082	0.101	42
	9	34	-0.103	0.103	37
	10	35	-0.117	0.102	44
	11	36	-0.165	0.110	33
	12	37	-0.161	0.117	26
(3)	55	38	-0.472	0.112	25
	65	39	-0.470	0.095	39
	75	40	-0.324	0.078	63
	85	41	-0.091	0.069	82
(4)	60	42	0.047	0.188	13
	61	43	0.093	0.194	15
	62	44	0.044	0.214	10
	63	45	0.308	0.247	6
	64	46	0.477	0.309	3
	65	47	-0.061	0.284	4
	66	48	-0.191	0.213	12
	67	49	0.140	0.238	12
	68	50	-0.095	0.256	6
	69	51	-0.113	0.247	5
	70	52	-0.650	0.309	3
	71	53	0.079	0.371	3
	72	54	-0.609	0.266	4
	73	55	0.047	0.338	2
	74	56	-0.812	0.501	13
	75	57	-0.376	0.303	3
	76	58	-0.110	0.161	25
	77	59	-0.148	0.168	27
	78	60	-0.560	0.173	19
	79	61	-0.237	0.202	12
	80	62	-0.122	0.207	11
	81	63	-0.038	0.200	13
	82	64	0.102	0.195	15
	83	65	0.092	0.194	13
	84	66	-0.179	0.227	8
	85	67	-0.274	0.204	12
	86	68	0.023	0.180	27
	87	69	-0.090	0.183	24
	88	70	-0.228	0.179	28
	89	71	-0.047	0.206	12
	90	72	-0.487	0.194	18
	91	73	-0.935	0.181	14
	92	74	-0.151	0.248	6
	93	75	0.141	0.389	5

Table 8. ANOVA results and regression coefficients from a multiplicative model utilized to derive a standardized catch rate series for redfish in Div. 3N. Effort is measured in days fished (1993 based on preliminary data).

REGRESSION OF MULTIPLICATIVE MODEL
MULTIPLE R..... 0.817
MULTIPLE R SQUARED..... 0.668

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DF	SUMS OF SQUARES	MEAN SQUARES	F-VALUE
INTERCEPT	1	2.957E3	2.957E3	
REGRESSION	60	1.276E2	2.127E0	10.877
Country¦Gear¦TC	12	7.321E1	6.101E0	31.198
Month	11	1.536E0	1.396E-1	0.714 (NS)
Bycatch PCT	4	4.393E0	1.098E0	5.617
Year	33	2.503E1	7.584E-1	3.878
RESIDUALS	325	6.355E1	1.955E-1	
TOTAL	386	3.148E3		

REGRESSION COEFFICIENTS

CATEGORY	CODE	VARIABLE	COEFFICIENT	STD. ERROR	NO. OBS.
Country¦Gear¦TC	3125	INTERCEPT	2.286	0.226	386
Month	7				
Bycatch PCT	95				
Year	59				
(1)	2114	1	-0.190	0.222	13
	3114	2	0.008	0.195	46
	4127	3	0.088	0.225	15
	4157	4	0.606	0.220	28
	17126	5	-0.340	0.225	25
	20114	6	-1.433	0.289	6
	20127	7	0.504	0.192	75
	20157	8	0.763	0.203	50
	22114	9	1.249	0.209	50
	25126	10	0.134	0.239	17
	25127	11	0.673	0.218	41
	34127	12	1.392	0.307	10
(2)	1	13	-0.168	0.114	33
	2	14	-0.079	0.113	32
	3	15	-0.120	0.115	31
	4	16	-0.016	0.122	25
	5	17	-0.265	0.119	26
	6	18	-0.072	0.111	29
	8	19	-0.062	0.097	46
	9	20	-0.060	0.100	42
	10	21	-0.023	0.114	28
	11	22	-0.020	0.116	26
	12	23	-0.131	0.118	25
(3)	55	24	-0.376	0.098	35
	65	25	-0.346	0.094	37
	75	26	-0.126	0.084	47
	85	27	-0.058	0.083	44
(4)	60	28	0.829	0.169	12
	61	29	0.147	0.146	22
	62	30	0.232	0.187	12
	63	31	-0.012	0.150	19
	64	32	0.026	0.172	12
	65	33	0.154	0.239	5
	66	34	0.391	0.226	6
	68	35	0.198	0.317	3
	69	36	0.415	0.238	7
	70	37	0.495	0.238	7
	71	38	0.344	0.295	3
	72	39	0.454	0.212	9
	73	40	0.279	0.360	2
	74	41	-1.460	0.481	1
	75	42	0.591	0.263	5
	76	43	-0.073	0.216	7
	77	44	0.381	0.289	4
	78	45	0.078	0.265	5
	79	46	0.493	0.214	9
	80	47	0.591	0.211	10
	81	48	0.352	0.216	11
	82	49	0.334	0.199	15
	83	50	0.323	0.207	13
	84	51	0.055	0.225	9
	85	52	-0.312	0.197	18
	86	53	0.081	0.223	10
	87	54	0.446	0.184	44
	88	55	0.164	0.193	29
	89	56	0.144	0.206	20
	90	57	-0.391	0.233	8
	91	58	-0.093	0.215	11
	92	59	-0.226	0.243	10
	93	60	-0.448	0.278	10

Table 9. Standardized catch rate series for Div. 3L redfish from a multiplicative model utilizing hours fished as a measure of effort.

PREDICTED CATCH RATE

YEAR	LN TRANSFORM MEAN	LN TRANSFORM S.E.	RETRANSFORMED MEAN	RETRANSFORMED S.E.	CATCH	EFFORT
1959	0.2940	0.0324	1.491	0.266	34107	22871
1960	0.4554	0.0362	1.749	0.330	10015	5726
1961	0.7430	0.0654	2.298	0.579	8349	3633
1962	0.4144	0.0528	1.665	0.378	3425	2057
1963	0.6234	0.0581	2.046	0.487	8191	4003
1964	0.8865	0.1128	2.591	0.847	3898	1505
1965	0.7457	0.0818	2.285	0.641	18772	8214
1966	0.3014	0.0388	1.498	0.292	6927	4626
1967	0.6019	0.0363	2.025	0.383	7684	3795
1968	0.4024	0.0545	1.644	0.379	2378	1447
1969	0.4495	0.0508	1.726	0.385	2344	1358
1970	0.6273	0.0557	2.057	0.479	1029	500
1971	0.5542	0.0467	1.921	0.410	10043	5229
1972	0.4024	0.0566	1.642	0.385	3095	1885
1973	0.7398	0.1005	2.251	0.697	4709	2092
1974	-0.1087	0.1015	0.963	0.299	11419	11859
1975	0.3582	0.0521	1.575	0.355	3838	2438
1976	0.2277	0.0175	1.406	0.185	15971	11359
1977	0.1366	0.0173	1.284	0.168	13452	10479
1978	-0.0561	0.0169	1.059	0.137	6318	5967
1979	0.3473	0.0219	1.581	0.233	5584	3531
1980	0.3103	0.0210	1.524	0.220	4367	2865
1981	0.3347	0.0206	1.562	0.223	9407	6021
1982	0.3778	0.0160	1.635	0.206	7870	4814
1983	0.4453	0.0186	1.747	0.238	8657	4956
1984	0.2919	0.0237	1.495	0.229	2696	1804
1985	0.4477	0.0198	1.750	0.245	3677	2101
1986	0.4914	0.0149	1.833	0.223	27833	15187
1987	0.3134	0.0186	1.531	0.208	34212	22347
1988	0.1798	0.0149	1.342	0.163	26267	19573
1989	0.5128	0.0203	1.867	0.265	19847	10629
1990	-0.0594	0.0159	1.056	0.133	17713	16774
1991	-0.4458	0.0195	0.716	0.100	8892	12415
1992	0.5441	0.0385	1.909	0.371	4630	2425
1993	0.7218	0.1088	2.201	0.707	10012	4548

AVERAGE C.V. FOR THE RETRANSFORMED MEAN: 0.193

Table 10. Standardized catch rate series for Div. 3N redfish from a multiplicative model utilizing hours fished as a measure of effort.

PREDICTED CATCH RATE

YEAR	LN TRANSFORM MEAN	LN TRANSFORM S.E.	RETRANSFORMED MEAN	RETRANSFORMED S.E.	CATCH	EFFORT
1959	0.1110	0.0272	1.233	0.202	10478	8499
1960	0.3544	0.0690	1.540	0.398	16547	10744
1961	0.3055	0.0437	1.485	0.307	14826	9982
1962	0.3959	0.0350	1.633	0.303	18009	11030
1963	0.2839	0.0518	1.448	0.326	12906	8915
1964	0.2649	0.0565	1.417	0.333	4206	2968
1965	0.5364	0.0611	1.855	0.452	4694	2531
1966	0.6249	0.0253	2.063	0.327	10047	4870
1967	0.5419	0.0706	1.856	0.485	19504	10508
1968	-0.2209	0.0702	0.866	0.226	15265	17631
1969	0.2062	0.0464	1.343	0.286	22356	16645
1970	0.2144	0.0464	1.354	0.289	13359	9865
1971	0.1325	0.0941	1.218	0.366	24310	19957
1972	0.2392	0.0397	1.393	0.275	25838	18552
1973	0.3687	0.0465	1.580	0.337	28588	18094
1974	0.6265	0.0536	2.037	0.466	10867	5334
1975	0.4570	0.0568	1.717	0.404	14033	8174
1976	-0.0599	0.0435	1.031	0.213	4541	4406
1977	0.0366	0.0572	1.127	0.266	3064	2718
1978	0.0895	0.0485	1.194	0.260	5725	4796
1979	0.2269	0.0252	1.386	0.219	8483	6121
1980	0.5248	0.0298	1.862	0.319	11663	6262
1981	0.3725	0.0295	1.600	0.273	14873	9298
1982	0.4287	0.0270	1.694	0.277	13677	8073
1983	0.2707	0.0317	1.443	0.255	11090	7684
1984	-0.0859	0.0353	1.008	0.188	12065	11964
1985	-0.1007	0.0329	0.995	0.179	16880	16968
1986	-0.0895	0.0384	1.003	0.195	14972	14924
1987	0.3351	0.0238	1.545	0.237	44819	29005
1988	0.0149	0.0287	1.119	0.188	26999	24125
1989	-0.1502	0.0311	0.948	0.166	13802	14565
1990	-0.5506	0.0326	0.634	0.114	11392	17956
1991	-0.5064	0.0348	0.662	0.123	12723	19207
1992	-0.4624	0.0492	0.687	0.151	10153	14774
1993	-0.6874	0.0626	0.545	0.134	7148	13114
1994	-0.7481	0.2781	0.460	0.227	2273	4936

AVERAGE C.V. FOR THE RETRANSFORMED MEAN: 0.213

Table 11. Standardized catch rate series for Div. 3L redfish from a multiplicative model utilizing days fished as a measure of effort.

PREDICTED CATCH RATE

YEAR	LN TRANSFORM MEAN	LN TRANSFORM S.E.	RETRANSFORMED MEAN	RETRANSFORMED S.E.	CATCH	EFFORT
1959	2.9886	0.0310	21.531	3.767	34107	1584
1960	3.0353	0.0371	22.493	4.299	10015	445
1961	3.0811	0.0400	23.513	4.660	8349	355
1962	3.0323	0.0472	22.310	4.799	3425	154
1963	3.2964	0.0618	28.843	7.070	8191	284
1964	3.4656	0.0947	33.603	10.115	3898	116
1965	2.9272	0.0831	19.729	5.578	18772	952
1966	2.7976	0.0392	17.715	3.477	6927	391
1967	3.1290	0.0505	24.536	5.450	7684	313
1968	2.8933	0.0519	19.370	4.362	2378	123
1969	2.8751	0.0567	18.976	4.460	2344	124
1970	2.3388	0.1003	10.859	3.358	1029	95
1971	3.0671	0.1346	22.111	7.857	10043	454
1972	2.3793	0.0692	11.486	2.974	3095	269
1973	3.0352	0.1190	21.584	7.239	4709	218
1974	2.1764	0.2538	8.548	4.052	11419	1336
1975	2.6126	0.0797	14.427	3.998	3838	266
1976	2.8783	0.0199	19.392	2.723	15971	824
1977	2.8406	0.0195	18.677	2.600	13452	720
1978	2.4285	0.0202	12.364	1.753	6318	511
1979	2.7514	0.0279	17.011	2.827	5584	328
1980	2.8667	0.0271	19.098	3.127	4367	229
1981	2.9502	0.0239	20.795	3.201	9407	452
1982	3.0901	0.0189	23.977	3.286	7870	328
1983	3.0801	0.0217	23.706	3.480	8657	365
1984	2.8097	0.0332	17.985	3.253	2696	150
1985	2.7145	0.0237	16.429	2.517	3677	224
1986	3.0115	0.0152	22.206	2.735	27833	1253
1987	2.8988	0.0178	19.813	2.637	34212	1727
1988	2.7601	0.0170	17.254	2.243	26267	1522
1989	2.9419	0.0262	20.599	3.318	19847	963
1990	2.5020	0.0216	13.298	1.949	17713	1332
1991	2.0532	0.0231	8.483	1.283	8892	1048
1992	2.8380	0.0537	18.312	4.193	4630	253
1993	3.1293	0.1410	23.454	8.518	10012	427

AVERAGE C.V. FOR THE RETRANSFORMED MEAN: 0.213

Table 12. Standardized catch rate series for Div. 3N redfish from a multiplicative model utilizing days fished as a measure of effort.

PREDICTED CATCH RATE

YEAR	LN TRANSFORM MEAN	LN TRANSFORM S.E.	RETRANSFORMED MEAN	RETRANSFORMED S.E.	CATCH	EFFORT
1959	2.2860	0.0510	10.574	2.362	10478	991
1960	3.1154	0.0602	24.126	5.840	16547	686
1961	2.4328	0.0515	12.244	2.746	14826	1211
1962	2.5179	0.0588	13.283	3.179	18009	1356
1963	2.2742	0.0537	10.437	2.389	12906	1237
1964	2.3121	0.0615	10.798	2.640	4206	390
1965	2.4404	0.0889	12.108	3.537	4694	388
1966	2.6771	0.0545	15.609	3.600	10047	644
1968	2.4836	0.0833	12.678	3.590	15265	1204
1969	2.7014	0.0751	15.829	4.263	22356	1412
1970	2.7809	0.0766	17.124	4.658	13359	780
1971	2.6301	0.1068	14.506	4.624	24310	1676
1972	2.7404	0.0573	16.605	3.925	25838	1556
1973	2.5649	0.1460	13.327	4.919	28588	2145
1974	0.8259	0.2452	2.228	1.040	10867	4878
1975	2.8772	0.0877	18.752	5.442	14033	748
1976	2.2131	0.0624	9.775	2.408	4541	465
1977	2.6670	0.0971	15.125	4.609	3064	203
1978	2.3640	0.0864	11.232	3.237	5725	510
1979	2.7785	0.0428	17.377	3.561	8483	488
1980	2.8766	0.0584	19.018	4.538	11663	613
1981	2.6383	0.0611	14.966	3.649	14873	994
1982	2.6203	0.0509	14.773	3.297	13677	926
1983	2.6089	0.0553	14.574	3.384	11090	761
1984	2.3405	0.0654	11.087	2.793	12065	1088
1985	1.9739	0.0550	7.725	1.790	16880	2185
1986	2.3667	0.0657	11.380	2.874	14972	1316
1987	2.7315	0.0487	16.529	3.608	44819	2711
1988	2.4500	0.0524	12.450	2.818	26999	2169
1989	2.4300	0.0574	12.173	2.880	13802	1134
1990	1.8950	0.0688	7.089	1.830	11392	1607
1991	2.1934	0.0607	9.593	2.332	12723	1326
1992	2.0599	0.0738	8.339	2.228	10153	1217
1993	1.8381	0.0927	6.618	1.971	7148	1080

AVERAGE C.V. FOR THE RETRANSFORMED MEAN: 0.262

Table 13. Mean number per standard tow from various Canadian surveys in Div. 3L where strata greater than 366 m (200 fathoms) were sampled. Dashes (-) represent unsampled strata. Number of successful sets in brackets. G.A. = GADUS ATLANTICA, W.T. = WILFRED TEMPLEMAN, A.N. = ALFRED NEEDLER.

Stratum	Depth range (m)	Area (sq.n.mi)	Aug 16-Aug 29 1978 (G.A. 12)	Sep 4-Sep 10 1979 (G.A. 25)	May 8-May 13 1980 (G.A. 36)	Sep 18-Sep 26 1981 (G.A. 55)	Jul 26-Sep 3 1984 (W.T. 16-18)	Jan 10-Feb 11 1985-Q1 (W.T. 22-24)	Apr 17-May 26 1985-Q2 (W.T. 28-30)	Jul 27-Aug 25 1985-Q3 (W.T. 32-34)	Oct 9-Nov 18 1985-Q4 (W.T. 37-39)
347	184-274	983	131.67(3)	0.00(2)	0.00(4)	3.96(4)	0.00(6)	0.00(5)	0.40(5)	0.00(3)	0.00(5)
366	184-274	1394	197.00(3)	13.50(2)	9.83(6)	47.67(6)	13.91(11)	0.00(5)	1.33(6)	17.40(5)	17.22(9)
369	184-274	961	0.00(3)	1.00(2)	0.25(4)	13.75(4)	0.43(7)	0.00(5)	0.20(5)	0.17(6)	0.00(6)
386	184-274	983	115.67(3)	11.50(2)	2.00(4)	11.00(4)	23.13(8)	0.00(5)	0.40(5)	19.60(5)	0.60(5)
389	184-274	821	0.33(3)	0.00(1)	29.50(2)	4.00(3)	21.67(6)	4.00(4)	0.20(5)	1.75(4)	7.40(5)
391	184-274	282	0.00(2)	19.00(2)	4.00(2)	1.50(2)	0.50(2)	0.00(2)	0.00(2)	0.00(2)	12.50(2)
345	275-366	1432	68.50(2)	96.75(4)	12.00(4)	46.60(5)	37.80(7)	3.33(3)	3.20(5)	62.29(7)	5.11(9)
346	275-366	865	206.00(2)	126.75(4)	27.00(2)	70.33(3)	263.33(6)	10.00(4)	20.00(2)	91.33(3)	84.40(5)
368	275-366	334	2709.00(2)	140.00(3)	24.00(2)	526.50(2)	4379.50(2)	4.50(2)	14.50(2)	320.50(2)	351.50(2)
387	275-366	718	532.00(2)	595.40(5)	23.67(3)	1748.67(3)	4678.00(3)	102.00(4)	11.33(6)	1807.33(3)	628.00(4)
388	275-366	361	1240.50(2)	2326.33(3)	4.50(2)	464.50(2)	195.00(2)	16.00(3)	20.00(2)	397.00(2)	78.00(2)
392	275-366	145	-	818.00(3)	27.33(3)	536.50(2)	2811.00(2)	4.00(2)	10.00(2)	131.50(2)	1398.50(2)
735	367-549	272	810.50(2)	452.67(3)	39.00(2)	768.00(2)	723.33(3)	10.50(2)	52.50(2)	282.00(2)	232.00(2)
733	367-549	468	817.00(2)	1300.67(3)	43.67(3)	1420.50(2)	480.00(4)	1921.67(3)	1147.53(3)	1699.50(2)	727.00(3)
731	367-549	216	486.00(2)	457.00(3)	325.50(2)	176.00(2)	257.00(2)	80.67(3)	63.00(2)	257.00(2)	502.00(2)
729	367-549	186	-	488.00(3)	77.00(1)	1050.00(2)	448.00(2)	3406.00(2)	24.50(2)	1231.00(2)	2720.50(2)
736	550-731	175	163.50(2)	270.33(3)	119.00(1)	84.00(2)	17.00(1)	-	532.50(2)	26.50(2)	222.00(2)
734	550-731	228	1435.50(2)	535.67(3)	1756.00(2)	760.50(2)	557.00(3)	195.50(2)	366.00(2)	912.00(2)	540.00(2)
732	550-731	231	85.50(2)	54.00(2)	104.00(2)	53.00(2)	90.00(2)	416.00(2)	141.50(2)	48.00(2)	39.00(2)
730	550-731	170	1135.00(2)	399.33(3)	295.00(2)	496.50(2)	100.50(2)	816.00(2)	8926.00(2)	347.00(2)	37.50(2)
737	732-914	227	-	-	-	-	-	-	-	-	-
741	732-914	223	-	-	-	-	-	-	-	-	-
745	732-914	348	-	-	-	-	-	-	-	-	-
748	732-914	159	-	-	-	-	-	-	-	-	-
Upper (95% CI)[a]			653.4	544.2	266.4	680.1	1078.5	302.2	1909.1	465.2	290.3
Weighted mean (by area) (incl. strata with 1 set)			349.3	257.3	64.5	293.5	567.5	174.7	208.7	286.8	187.9
Lower (95% CI)[a]			45.2	11.03	-139.6	-93.2	73.94	47.2	-1491.7	108.5	85.5
Abundance of surveyed area ($\times 10^{-6}$)			285.6	216.8	54.3	247.3	478.2	144.9	175.9	241.7	158.3

[a]Confidence interval of mean for those strata with at least two sets.

Table 13. (Cont'd.)

Stratum	Depth range (m)	Area (sq.n.mi)	Jan 22-Feb 27 1986-Q1 (W.T. 42-44)	Nov 13-Nov 30 1986-Q4 (A.N. 72)	Jan 17-Jan 25 1990-Q1 (W.T. 90)	Aug 7-Aug 19 1990-Q3 (W.T. 98)	Oct 18-Nov 18 1990-Q4 (W.T. 101)	May 11-May 29 1991-Q2 (W.T. 106-7)	Aug 4-Aug 11 1991-Q3 (W.T. 109)	Nov 10-Dec 2 1991-Q4 (W.T. 114-115)
347	184-274	983	1.50(4)	0.00(4)	0.50(4)	1.93(4)	0.00(2)	0.25(2)	0.00(3)	0.00(4)
366	184-274	1394	1.50(2)	5.50(4)	1.00(5)	9.00(4)	0.00(6)	-	0.33(3)	0.19(21)
369	184-274	961	0.00(3)	4.24(3)	0.00(4)	2.50(4)	0.00(4)	0.00(2)	6.50(4)	0.56(9)
386	184-274	983	0.86(7)	4.10(4)	5.50(4)	1.29(7)	2.00(4)	0.67(3)	1.00(3)	0.00(3)
389	184-274	821	1.50(4)	2.25(4)	0.00(3)	5.33(3)	1.00(3)	1.67(3)	0.33(3)	0.00(3)
391	184-274	282	0.00(3)	18.00(2)	0.50(2)	1.00(5)	0.00(2)	0.00(3)	5.67(3)	0.00(3)
345	275-366	1432	1.33(3)	6.68(4)	0.40(5)	16.33(6)	1.00(5)	0.67(3)	4.50(4)	0.25(4)
346	275-366	865	4.25(4)	22.13(3)	14.67(3)	247.66(7)	67.00(3)	-	30.00(4)	6.80(15)
368	275-366	334	7.00(1)	24.90(2)	21.00(2)	1728.57(7)	57.50(2)	-	409.75(4)	31.17(6)
387	275-366	718	12.00(4)	6.00(2)	135.00(3)	297.70(10)	89.67(3)	45.00(3)	189.40(5)	13.00(5)
388	275-366	361	15.67(3)	-	13.00(2)	183.86(7)	16.00(2)	13.53(3)	50.33(3)	12.33(3)
392	275-366	145	9.67(3)	359.50(2)	4.00(2)	146.56(9)	9.00(2)	2.50(2)	350.67(3)	4.67(3)
735	367-549	272	-	153.50(2)	223.00(2)	603.51(6)	195.00(1)	-	106.82(3)	125.67(3)
733	367-549	468	452.07(2)	-	72.00(2)	490.87(9)	216.00(2)	16.00(2)	611.00(4)	340.00(3)
731	367-549	216	153.00(1)	220.80(1)	68.00(2)	166.83(6)	275.50(2)	27.50(2)	244.00(3)	41.00(3)
729	367-549	186	2690.00(2)	1491.22(2)	206.50(2)	328.43(7)	206.50(2)	19.00(2)	190.00(2)	142.00(3)
736	550-731	175	-	24.74(2)	208.50(2)	93.50(6)	281.00(2)	-	12.67(3)	51.00(2)
734	550-731	228	451.00(2)	-	142.93(2)	271.60(5)	42.00(2)	231.60(2)	59.67(3)	16.00(2)
732	550-731	231	1694.00(1)	-	68.00(2)	59.44(9)	193.00(2)	300.00(2)	96.67(3)	39.00(2)
730	550-731	170	1822.50(1)	-	109.50(2)	183.52(4)	42.00(1)	178.00(2)	222.33(3)	348.50(2)
737	732-914	227	-	-	-	-	-	-	-	-
741	732-914	223	-	-	-	-	-	-	-	-
745	732-914	348	-	-	-	-	-	-	-	-
748	732-914	159	-	-	-	-	-	-	-	-
Upper (95% CI)[a]			466.0	66.3	62.5	263.8	63.1	123.2	94.9	58.3
Weighted mean (by area) (incl. strata with 1 set)			146.4	49.9	33.9	156.2	45.9	25.7	76.9	30.4
Lower (95% CI)[a]			-294.7	25.8	5.3	48.6	21.3	-71.9	58.8	2.5
Abundance of surveyed area ($\times 10^{-6}$)			118.5	36.6	28.6	131.6	38.7	15.8	64.8	25.6

[a]Confidence interval of mean for those strata with at least two sets.

Table 13. (Cont'd.)

Stratum	Depth range (m)	Area (sq.n.mi)	May 13-Jun 7 1992-Q2 (W.T. 120-122)	Nov 5-Nov 29 1992-Q4 (W.T. 129-130)	May 18-Jun 10 1993-Q2 (W.T. 137-138)	Aug 5-Aug 15 1993-Q3 (G.A. 233)	Nov 12-Dec 4 1993-Q4 (W.T. 145-146)	May 22-Jun 10 1994-Q2 (W.T. 153-154)	Nov. 8-Dec. 7 1994-Q4 (W.T. 161-162)
347	184-274	983	0.00(4)	0.00(2)	0.00(4)	0.00(3)	0.00(4)	0.00(4)	0.00(8)
366	184-274	1394	0.33(6)	1.00(24)	0.00(7)	2.50(2)	0.21(14)	0.20(5)	0.10(10)
369	184-274	961	0.00(4)	0.00(8)	0.00(5)	0.00(3)	0.14(7)	0.33(3)	0.00(3)
386	184-274	983	0.00(4)	0.00(3)	0.20(5)	0.00(3)	0.00(3)	0.00(4)	0.00(3)
389	184-274	821	0.00(3)	0.67(3)	0.00(4)	1.00(3)	0.00(3)	0.00(3)	0.00(3)
391	184-274	282	2.50(2)	0.00(3)	0.00(2)	0.33(3)	1.00(3)	0.00(2)	1.67(3)
345	275-366	1432	0.00(6)	0.25(4)	0.00(6)	1.67(3)	0.00(3)	0.60(5)	0.00(8)
346	275-366	865	1.75(4)	2.64(14)	2.25(4)	5.33(3)	5.09(11)	1.83(3)	0.29(7)
368	275-366	334	12.00(2)	18.20(10)	9.50(2)	25.00(3)	5.63(8)	3.50(2)	0.50(12)
387	275-366	718	8.00(3)	10.00(3)	6.07(3)	51.33(3)	2.33(3)	1.00(3)	3.22(9)
388	275-366	361	2.00(2)	20.00(3)	1.50(2)	11.00(3)	6.67(3)	0.00(2)	2.86(7)
392	275-366	145	3.50(2)	3.33(3)	1.50(2)	21.00(3)	4.67(3)	0.00(2)	4.67(3)
735	367-549	272	76.50(2)	222.33(3)	14.50(2)	35.00(3)	31.00(3)	34.00(2)	11.20(11)
733	367-549	468	53.00(2)	210.00(3)	20.67(3)	215.67(3)	18.67(3)	20.50(2)	40.89(9)
731	367-549	216	26.00(2)	205.00(3)	26.00(2)	170.00(3)	21.67(3)	41.00(2)	35.50(7)
729	367-549	186	59.50(2)	296.50(2)	31.50(2)	210.33(3)	172.67(3)	18.50(2)	800.67(9)
736	550-731	175	60.50(2)	45.50(2)	40.50(2)	11.67(3)	24.67(3)	23.00(2)	25.43(7)
734	550-731	228	140.00(2)	108.00(2)	19.06(2)	20.67(3)	70.50(2)	43.38(2)	44.87(3)
732	550-731	231	214.50(2)	198.50(2)	401.00(2)	93.67(3)	18.00(2)	53.00(2)	98.67(3)
730	550-731	170	113.50(2)	69.50(2)	249.00(2)	50.33(3)	332.00(3)	35.00(2)	114.33(3)
737	732-914	227	-	-	-	-	-	5.50(2)	-
741	732-914	223	-	-	-	-	-	1.50(2)	-
745	732-914	348	-	-	-	-	-	0.50(2)	-
748	732-914	159	-	-	-	-	-	1.00(2)	-
Upper (95% CI)[a]			38.6	49.8	117.9	41.6	24.65	8.8	39.3
Weighted mean (by area) (incl. strata with 1 set)			16.7	33.3	16.2	25.6	13.1	5.9	21.5
Lower (95% CI)[a]			-5.2	16.8	-85.5	9.5	1.5	2.8	3.6
Abundance of surveyed area ($\times 10^{-6}$)			14.1	28.1	13.7	21.5	11.0	5.3	18.1

[a]Confidence interval of mean for those strata with at least two sets.

Table 14. Mean weight (kg) per standard tow from various Canadian surveys in Div. 3L where strata greater than 366 m (200 fathoms) were sampled. Dashes (-) represent unsampled strata. Number of successful sets in brackets. G.A. = GADUS ATLANTICA, W.T. = WILFRED TEMPLEMAN, A.N. = ALFRED NEEDLER.

Stratum	Depth range (m)	Area (sq. n. mi)	Aug 16-Aug 29 1978 (G.A. 12)	Sep 4-Sep 10 1979 (G.A. 25)	May 8-May 13 1980 (G.A. 36)	Sep 18-Sep 26 1981 (G.A. 55)	Jul 26-Sep 3 1984 (W.T. 16-18)	Jan 10-Feb 11 1985-Q1 (W.T. 22-24)	Apr 17-May 26 1985-Q2 (W.T. 28-30)	Jul 27-Aug 25 1985-Q3 (W.T. 32-34)	Oct 9-Nov 18 1985-Q4 (W.T. 37-39)
347	184-274	983	42.52(3)	0.00(2)	0.00(4)	1.32(4)	0.00(6)	0.00(5)	0.00(5)	0.00(3)	0.00(5)
366	184-274	1394	35.42(3)	1.82(2)	2.00(6)	25.01(6)	1.14(11)	0.00(5)	0.05(6)	4.00(5)	5.33(9)
369	184-274	961	0.00(3)	0.80(2)	0.25(4)	2.40(4)	0.00(7)	0.00(5)	0.20(5)	0.17(6)	0.00(6)
386	184-274	983	62.99(3)	11.34(2)	1.25(4)	8.50(4)	14.18(8)	0.00(5)	0.21(5)	15.30(5)	0.44(5)
389	184-274	821	0.03(3)	0.00(1)	9.25(2)	2.33(3)	8.83(6)	0.50(4)	0.01(5)	0.63(4)	1.46(5)
391	184-274	282	0.00(2)	6.39(2)	0.75(2)	0.08(2)	0.03(2)	0.00(2)	0.00(2)	0.00(2)	4.00(2)
345	275-366	1432	51.08(2)	78.92(4)	8.50(4)	35.80(5)	31.10(7)	0.83(3)	3.14(5)	44.41(7)	3.32(9)
346	275-366	865	151.18(2)	80.88(4)	14.75(2)	64.83(3)	163.33(6)	5.80(4)	18.25(2)	67.50(3)	61.50(5)
368	275-366	334	1154.53(2)	61.72(3)	7.25(2)	176.75(2)	1915.75(2)	2.00(2)	5.35(2)	181.75(2)	151.50(2)
387	275-366	718	203.16(2)	286.77(5)	6.83(3)	572.00(3)	1972.33(3)	71.50(4)	4.68(6)	633.03(3)	279.17(4)
388	275-366	361	262.18(2)	562.10(3)	1.10(2)	145.50(2)	63.00(2)	14.17(3)	7.65(2)	130.50(2)	30.75(2)
392	275-366	145	-	304.24(3)	7.50(3)	146.75(2)	1118.44(2)	1.40(2)	1.50(2)	45.75(2)	451.50(2)
735	367-549	272	603.98(2)	252.05(3)	14.50(2)	348.00(2)	442.00(3)	4.50(2)	20.50(2)	186.00(2)	127.75(2)
733	367-549	468	460.96(2)	647.34(3)	18.83(3)	754.00(2)	280.63(4)	895.28(3)	623.43(3)	1023.50(2)	353.76(3)
731	367-549	216	289.42(2)	255.57(3)	112.25(2)	69.00(2)	120.00(2)	29.17(3)	16.00(2)	121.50(2)	275.50(2)
729	367-549	186	-	199.53(3)	24.00(1)	413.50(2)	203.43(2)	1249.00(2)	7.25(2)	560.00(2)	1213.50(2)
736	550-731	175	61.59(2)	116.73(3)	28.00(1)	42.25(2)	11.00(1)	-	152.00(2)	17.25(2)	107.75(2)
734	550-731	228	1084.93(2)	357.43(3)	1187.45(2)	430.64(2)	350.00(3)	119.75(2)	146.75(2)	598.50(2)	387.13(2)
732	550-731	231	47.44(2)	29.94(2)	30.25(2)	30.50(2)	49.25(2)	217.50(2)	56.00(2)	33.00(2)	22.00(2)
730	550-731	170	509.74(2)	238.85(3)	96.75(2)	263.25(2)	57.25(2)	408.00(2)	4710.00(2)	195.50(2)	19.75(2)
737	732-914	227	-	-	-	-	-	-	-	-	-
741	732-914	223	-	-	-	-	-	-	-	-	-
745	732-914	348	-	-	-	-	-	-	-	-	-
748	732-914	159	-	-	-	-	-	-	-	-	-
Upper (95% CI)*			252.9	164.5	185.3	245.6	536.8	111.3	1008.1	264.9	278.7
Weighted mean (by area) (incl. strata with 1 set)			163.5	114.6	34.4	124.4	255.5	78.7	107.3	138.3	88.8
Lower (95% CI)*			74.13	82.8	-115.9	3.2	-18.1	46.1	-793.4	11.7	-101.1
Trawlable biomass (t) of surveyed area			133724	96536	29001	104817	215259	65282	90432	116543	74828

*Confidence interval of mean for those strata with at least two sets.

Table 14. (Cont'd.)

Stratum	Depth range (m)	Area (sq.n.mi)	Jan 22-Feb 27 1986-Q1 (W.T. 42-44)	Nov 13-Nov 30 1986-Q4 (A.N. 72)	Jan 17-Jan 25 1990-Q1 (W.T. 90)	Aug 7-Aug 19 1990-Q3 (W.T. 98)	Oct 18-Nov 18 1990-Q4 (W.T. 101)	May 11-May 29 1991-Q2 (W.T. 106-7)	Aug 4-Aug 11 1991-Q3 (W.T. 109)	Nov 10-Dec 24 1991-Q4 (W.T. 114-115)
347	184-274	983	0.08(4)	0.00(4)	0.06(4)	0.63(4)	0.00(2)	0.00(4)	0.00(3)	0.00(4)
366	184-274	1394	0.01(2)	2.13(4)	0.04(5)	2.56(4)	0.00(6)	-	0.10(3)	0.03(21)
369	184-274	961	0.00(3)	0.71(3)	0.00(4)	0.79(4)	0.00(4)	0.00(2)	3.27(4)	0.12(9)
386	184-274	983	0.45(7)	0.34(4)	3.21(4)	0.09(7)	0.05(4)	0.02(3)	0.20(3)	0.00(3)
389	184-274	821	0.15(4)	0.84(4)	0.00(3)	0.85(3)	0.54(3)	0.07(3)	0.22(3)	0.00(3)
391	184-274	282	0.00(3)	3.50(2)	0.01(2)	0.26(5)	0.00(2)	0.00(2)	1.40(3)	0.00(3)
345	275-366	1432	0.04(3)	5.21(4)	0.02(5)	8.66(6)	0.53(5)	0.07(3)	2.13(4)	0.12(4)
346	275-366	865	1.08(4)	16.80(3)	3.22(3)	172.19(7)	38.98(3)	-	11.46(4)	2.59(15)
368	275-366	334	1.70(1)	7.25(2)	5.10(2)	737.95(7)	14.25(2)	-	153.78(4)	6.80(6)
387	275-366	718	8.00(4)	3.10(2)	75.92(3)	115.68(10)	35.05(3)	12.73(3)	61.37(5)	6.08(5)
388	275-366	361	5.33(3)	-	2.85(2)	47.46(7)	3.30(2)	1.56(3)	8.13(3)	1.67(3)
392	275-366	145	4.10(3)	113.25(2)	2.08(2)	35.49(9)	2.32(2)	0.48(2)	133.63(3)	0.56(3)
735	367-549	272	-	63.50(2)	51.22(2)	417.61(6)	70.45(1)	-	47.01(3)	30.17(3)
733	367-549	468	238.22(2)	-	30.00(2)	314.42(9)	59.60(2)	5.83(2)	282.51(5)	100.25(3)
731	367-549	216	69.00(1)	105.60(1)	18.38(2)	66.18(6)	116.86(2)	5.47(2)	78.32(3)	9.65(3)
729	367-549	186	1118.30(2)	480.88(2)	121.20(2)	175.09(7)	94.00(2)	4.45(2)	86.38(2)	40.88(3)
736	550-731	175	-	14.38(2)	65.63(2)	51.32(6)	156.25(2)	-	6.43(3)	22.02(2)
734	550-731	228	296.90(2)	-	80.68(2)	164.97(5)	23.00(2)	43.29(2)	37.08(3)	11.00(2)
732	550-731	231	850.50(1)	-	37.75(2)	31.32(9)	118.85(2)	56.35(2)	44.95(3)	19.08(2)
730	550-731	170	767.81(1)	-	59.68(2)	107.15(4)	25.90(1)	45.30(2)	120.32(3)	247.68(2)
737	732-914	227	-	-	-	-	-	-	-	-
741	732-914	223	-	-	-	-	-	-	-	-
745	732-914	348	-	-	-	-	-	-	-	-
748	732-914	159	-	-	-	-	-	-	-	-
Upper (95% CI)[a]			202.7	24.8	31.9	130.0	29.9	11.7	40.8	19.8
Weighted mean (by area) (incl. strata with 1 set)			68.6	18.5	14.9	80.1	19.7	5.53	31.5	11.4
Lower (95% CI)[a]			-121.9	8.3	-2.1	30.1	6.6	-0.6	22.1	2.9
Trawlable biomass (t) of surveyed area			55514	13568	12525	67453	16563	3399	26510	9576

[a]Confidence interval of mean for those strata with at least two sets.

Table 14. (Cont'd.)

Stratum	Depth range (m)	Area (sq.n.mi)	May 13-Jun 7 1992-Q2 (W.T. 120-122)	Nov 5-Nov 29 1992-Q4 (W.T. 129-130)	May 18-Jun 10 1993-Q2 (W.T. 137-138)	Aug 5-Aug 15 1993-Q3 (G.A. 233)	Nov 12-Dec 4 1993-Q4 (W.T. 145-146)	May 22-Jun 10 1994-Q2 (W.T. 153-154)	Nov. 8-Dec.7 1994-Q4 (W.T. 161-162)
347	184-274	983	0.00(4)	0.00(2)	0.00(4)	0.00(3)	0.00(4)	0.00(4)	0.00(8)
366	184-274	1394	0.08(6)	0.28(24)	0.00(7)	0.70(2)	0.06(14)	0.08(5)	0.04(10)
369	184-274	961	0.00(4)	0.00(8)	0.00(5)	0.00(3)	0.03(7)	0.06(3)	0.00(3)
386	184-274	983	0.00(4)	0.00(3)	0.09(5)	0.00(3)	0.00(3)	0.00(4)	0.00(3)
389	184-274	821	0.00(3)	0.03(3)	0.00(4)	0.14(3)	0.00(3)	0.00(3)	0.00(3)
391	184-274	282	0.40(2)	0.00(3)	0.00(2)	0.22(3)	0.53(3)	0.00(2)	0.78(3)
345	275-366	1432	0.00(6)	0.19(4)	0.00(6)	0.48(3)	0.00(3)	0.23(5)	0.00(8)
346	275-366	865	0.50(4)	0.83(14)	0.52(4)	1.43(3)	1.94(11)	0.56(3)	0.09(7)
368	275-366	334	4.70(2)	4.60(10)	3.25(2)	6.77(3)	1.04(8)	0.63(2)	0.10(12)
387	275-366	718	2.47(3)	2.43(3)	2.36(3)	14.45(3)	0.68(3)	0.17(3)	0.78(9)
388	275-366	361	0.30(2)	3.27(3)	0.49(2)	3.28(3)	2.33(3)	0.00(2)	0.81(7)
392	275-366	145	1.63(2)	0.55(3)	0.36(2)	3.45(3)	1.56(3)	0.00(2)	2.11(3)
735	367-549	272	20.88(2)	79.35(3)	3.90(2)	7.60(3)	5.32(3)	5.95(2)	2.43(11)
733	367-549	468	16.83(2)	68.35(3)	6.68(3)	68.48(3)	4.92(3)	5.30(2)	10.54(9)
731	367-549	216	6.75(2)	46.25(3)	7.25(2)	59.72(3)	5.08(3)	9.53(2)	6.88(7)
729	367-549	186	13.70(2)	89.72(2)	6.75(2)	60.22(3)	55.12(3)	3.82(2)	235.73(9)
736	550-731	175	17.38(2)	13.60(2)	13.60(2)	6.43(3)	6.35(3)	5.40(2)	8.25(7)
734	550-731	228	51.63(2)	43.58(2)	7.93(2)	11.35(3)	21.03(2)	12.29(2)	16.53(3)
732	550-731	231	71.70(2)	67.80(2)	90.90(2)	45.27(3)	4.57(2)	13.15(2)	31.68(3)
730	550-731	170	41.40(2)	36.53(2)	43.95(2)	23.32(3)	168.46(3)	10.15(2)	45.77(3)
737	732-914	227	-	-	-	-	-	1.98(2)	-
741	732-914	223	-	-	-	-	-	0.65(2)	-
745	732-914	348	-	-	-	-	-	0.43(2)	-
748	732-914	159	-	-	-	-	-	0.32(2)	-
Upper (95% CI)[a]			12.5	16.2	24.9	14.8	10.7	2.1	12.0
Weighted mean (by area) (incl. strata with 1 set)			5.4	10.7	3.9	8.4	4.9	1.4	6.5
Lower (95% CI)[a]			-1.7	5.3	-17.2	1.9	-1.0	0.7	1.0
Trawlable biomass (t) of surveyed area			4528	9037	3243	7037	4095	1313	5463

[a]Confidence interval of mean for those strata with at least two sets.

Table 15. Mean number per standard tow from various Canadian surveys in Div. 3N where strata greater than 366 m (200 fathoms) were sampled. Dashes (-) represent unsampled strata. Number of successful sets in brackets. W.T. = WILFRED TEMPLEMAN, G.A. = GADUS ATLANTICA.

Stratum	Depth range (m)	Area (sq. n. mi.)	May 3-11 1991-Q2 (W.T. 106)	Aug 11-18 1991-Q3 (W.T. 109)	Oct 27-Nov 10 1991-Q4 (W.T. 113-114)	May 2-May 13 1992-Q2 (W.T. 119-120)	Oct 26-Nov 5 1992-Q4 (W.T. 128-129)	May 5-May 18 1993-Q2 (W.T. 136-137)	Aug 15-Aug 20 1993-Q3 (G.A. 233)	Nov 1-Nov 12 1993-Q4 (W.T. 144-145)	May 14-May 22 1994-Q2 (W.T. 153)	Oct. 29-Dec. 13 1994-Q4 (W.T. 160-161)
382	93-183	647	0.50(2)	0.00(3)	0.00(3)	0.00(3)	0.00(2)	0.00(2)	0.00(3)	0.00(2)	0.00(2)	0.00(2)
377	93-183	100	0.00(2)	0.00(2)	0.00(1)	0.00(2)	0.00(2)	0.00(2)	2.00(3)	0.50(2)	0.00(2)	0.50(2)
359	93-183	421	0.50(2)	26.25(4)	0.00(2)	0.00(2)	0.00(2)	0.00(2)	0.33(3)	0.00(2)	0.00(2)	1.50(2)
381	185-274	182	0.50(2)	5.00(3)	1.00(2)	1.00(2)	-	0.00(2)	2.00(4)	3.00(2)	0.00(2)	0.00(2)
378	185-274	139	5.33(3)	13.00(3)	177.00(2)	7.50(2)	1.50(2)	1.00(2)	4.33(3)	3.00(2)	0.50(2)	1.50(2)
358	185-274	225	9.00(2)	677.00(3)	1867.50(2)	6.00(2)	18258.00(2)	526.00(2)	6700.75(4)	4.50(2)	12.50(2)	143.00(2)
380	275-366	116	1.00(2)	3856.00(2)	197.00(2)	0.00(2)	-	4.00(2)	318.00(2)	2.50(2)	2.00(2)	0.00(2)
379	275-366	106	30.00(2)	6305.20(2)	57.00(1)	6.50(2)	94.50(2)	10.00(2)	982.00(3)	156.50(2)	25.50(2)	50.00(2)
357	275-366	164	101.50(2)	2649.00(2)	2380.00(2)	105.00(2)	4188.00(2)	176.00(2)	545.33(3)	113.50(2)	94.50(2)	2253.00(2)
727	367-549	160	15.50(2)	121.44(4)	-	9.00(2)	-	32.00(2)	1551.05(3)	195.50(2)	36.50(2)	128.00(2)
725	367-549	105	148.00(2)	502.67(3)	378.33(1)	219.00(1)	2083.70(2)	72.00(2)	746.00(3)	296.50(2)	28.50(2)	418.00(2)
723	367-549	155	158.00(2)	328.00(1)	170.00(2)	236.50(2)	-	266.50(2)	1517.57(4)	1509.00(2)	78.50(2)	1268.00(2)
728	550-731	156	72.50(2)	66.50(4)	-	85.00(2)	-	1203.73(2)	100.67(3)	31.00(1)	38.00(3)	9.29(2)
726	550-731	72	402.00(2)	91.00(2)	74.00(1)	89.50(2)	-	93.25(2)	362.50(2)	79.50(2)	34.85(2)	262.50(2)
724	550-731	124	446.85(2)	61.00(1)	34.76(2)	80.50(2)	-	194.50(2)	783.75(4)	676.00(2)	66.00(2)	1035.00(2)
752	732-914	134	-	-	-	-	-	-	-	-	1.50(2)	-
756	732-914	106	-	-	-	-	-	-	-	-	5.50(2)	-
760	732-914	154	-	-	-	-	-	-	-	-	3.69(2)	-
Upper (95% CI)[a]			134.6	2964.8	850.2	55.1	23024.8	1090.0	1969.9	767.7	28.1	1703.1
Weighted mean (by area) (Incl. strata with 1 set)			56.2	648.9	367.7	38.5	2634.5	146.8	849.6	149.1	18.5	284.6
Lower (95% CI)[a]			-22.2	-1572.3	-32.2	8.7	-17755.9	-796.5	-270.7	-456.0	8.9	-133.8
Abundance of surveyed area (X 10^{-6})			12.1	139.9	70.6	6.6	377.1	31.6	182.2	31.8	4.5	61.4

[a]Confidence interval of mean for those strata with at least 2 sets.

Table 16. Mean weight (kg) per standard tow from various Canadian surveys in Div. 3N where strata greater than 366 m (200 fathoms) were sampled. Dashes (-) represent unsampled strata. Number of successful sets in brackets. W.T. = WILFRED TEMPLEMAN, G.A. = GADUS ATLANTICA.

Stratum	Depth range (m)	Area (sq. n. mi.)	May 3-11 1991-Q2 (W.T. 106)	Aug 11-18 1991-Q3 (W.T. 109)	Oct 27-Nov 10 1991-Q4 (W.T. 113-114)	May 2-May 13 1992-Q2 (W.T. 119-120)	Oct 26 - Nov 5 1992-Q4 (W.T. 128-129)	May 5-May 18 1993-Q2 (W.T. 136-137)	Aug 15-Aug 20 1993-Q3 (G.A. 233)	Nov 1-Nov 12 1993-Q4 (W.T. 144-145)	May 14-May 22 1994-Q2 (W.T. 153)	Oct. 29-Dec. 13 1994-Q4 (W.T. 160-164)
382	93-183	647	0.16(2)	0.00(3)	0.00(3)	0.00(3)	0.00(2)	0.00(2)	0.00(3)	0.00(2)	0.00(2)	0.00(2)
377	93-183	100	0.00(2)	0.00(2)	0.00(1)	0.00(2)	0.00(2)	0.00(2)	0.37(3)	0.25(2)	0.00(2)	0.13(2)
359	93-183	421	0.00(2)	0.60(4)	0.00(2)	0.00(2)	0.00(2)	0.00(2)	0.06(3)	0.00(2)	0.00(2)	1.20(2)
381	185-274	182	0.13(2)	0.97(3)	0.09(2)	0.17(2)	-	0.00(2)	0.58(4)	1.00(2)	0.00(2)	0.00(2)
378	185-274	139	0.88(3)	3.68(3)	57.39(2)	1.10(2)	0.38(2)	0.30(2)	1.41(3)	0.80(2)	0.07(2)	0.10(2)
358	185-274	225	0.18(2)	106.19(3)	132.02(2)	0.30(2)	2176.10(2)	54.13(2)	547.29(4)	0.90(2)	0.72(2)	12.23(2)
380	275-366	116	0.03(2)	1041.38(2)	53.54(2)	0.00(2)	-	0.68(2)	62.67(2)	0.18(2)	0.12(2)	0.00(2)
379	275-366	106	3.14(2)	949.58(2)	7.25(1)	0.73(2)	13.28(2)	1.30(2)	212.93(3)	23.95(2)	2.67(2)	7.58(2)
357	275-366	164	11.13(2)	576.92(2)	324.18(2)	5.95(2)	674.36(2)	23.48(2)	95.47(3)	14.05(2)	9.60(2)	301.35(2)
727	367-549	160	2.85(2)	40.73(4)	-	1.20(2)	-	4.54(2)	558.06(3)	43.95(2)	6.97(2)	32.20(2)
725	367-549	105	18.78(2)	177.22(3)	127.50(1)	27.05(1)	589.09(2)	14.52(2)	246.24(3)	79.54(2)	5.22(2)	112.40(2)
723	367-549	155	19.05(2)	188.85(1)	46.42(2)	31.20(2)	-	74.20(2)	605.24(4)	291.95(2)	13.45(2)	375.87(2)
728	550-731	156	22.20(2)	30.75(4)	-	23.95(2)	-	513.79(2)	40.93(3)	11.25(1)	10.37(3)	3.65(2)
726	550-731	72	97.75(2)	41.17(2)	40.05(1)	26.80(2)	-	20.99(2)	180.50(2)	30.17(2)	9.24(2)	116.92(2)
724	550-731	124	76.18(2)	36.10(1)	26.17(2)	18.33(2)	-	82.08(2)	314.30(4)	281.02(2)	23.30(2)	383.55(2)
752	732-914	134	-	-	-	-	-	-	-	-	0.50(2)	-
756	732-914	106	-	-	-	-	-	-	-	-	2.38(2)	-
760	732-914	154	-	-	-	-	-	-	-	-	1.52(2)	-
Upper (95% CI)			24.4	729.9	160.7	10.3	2769.5	392.8	250.4	72.1	4.4	136.0
Weighted mean (by area) incl. strata with 1 set)			9.7	141.7	48.7	6.0	348.0	42.4	151.9	36.5	3.5	64.5
Lower (95% CI)			-5.1	-442.0	-61.7	0.0	-2073.6	-308.0	53.5	3.8	2.6	-7.0
Drawlable biomass (t)			2085	30552	9350	1071	49807	9148	32752	7735	864	13907
of surveyed area												

*Confidence interval of mean for those strata with at least 2 sets.

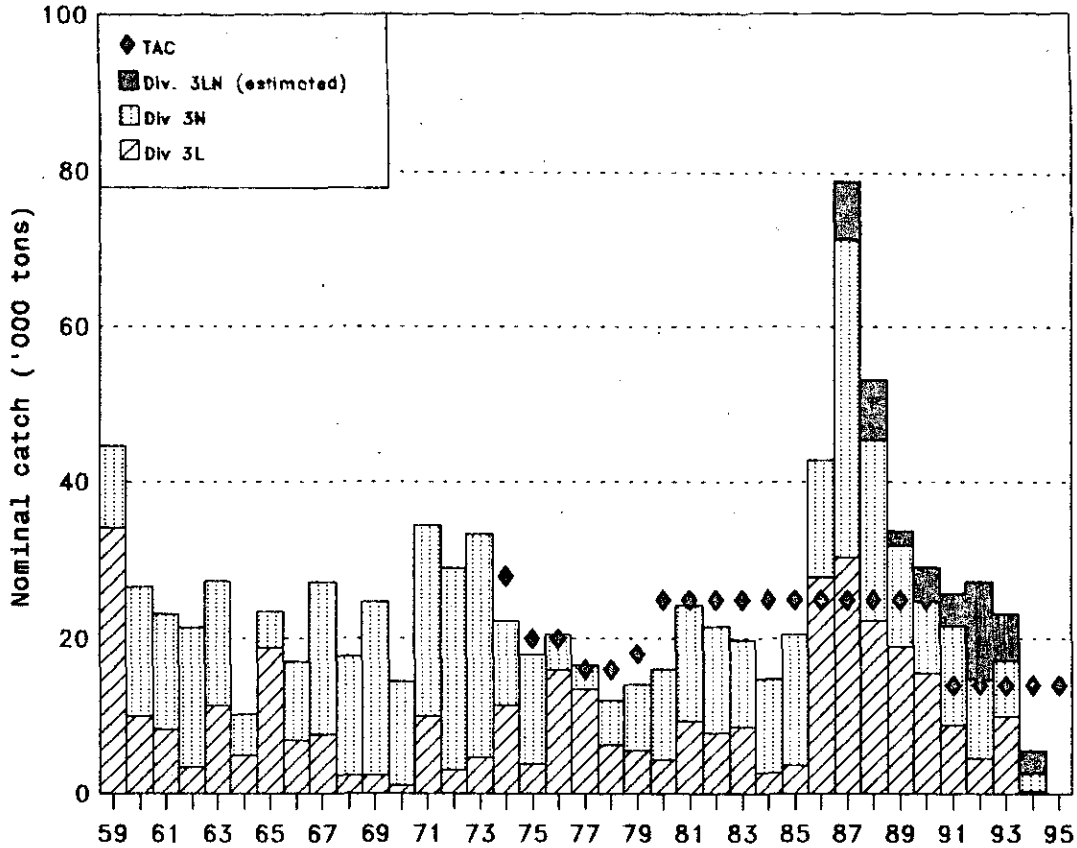

Fig. 1. Nominal catches and TACs of redfish in Div. 3LN (1993-94 are provisional)

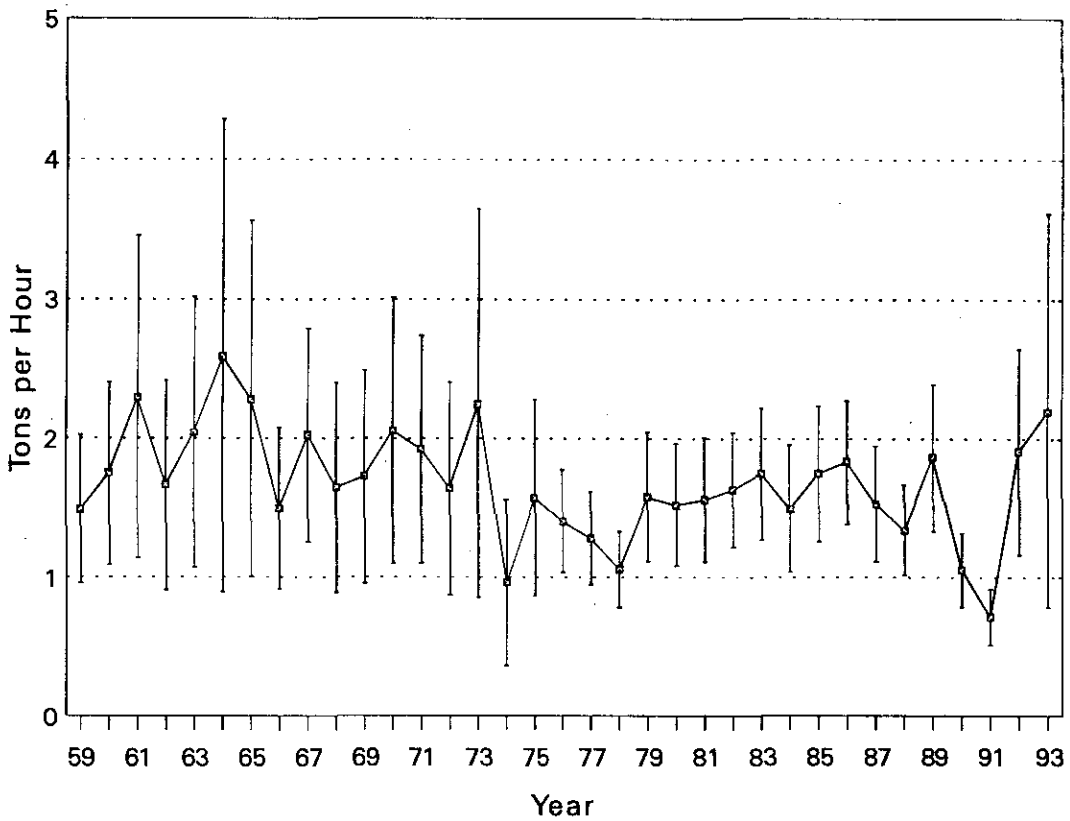

Fig. 2a. Standardized CPUE and approximate 95% confidence interval for Div. 3L redfish based on effort in hours fished for 1959-1993.

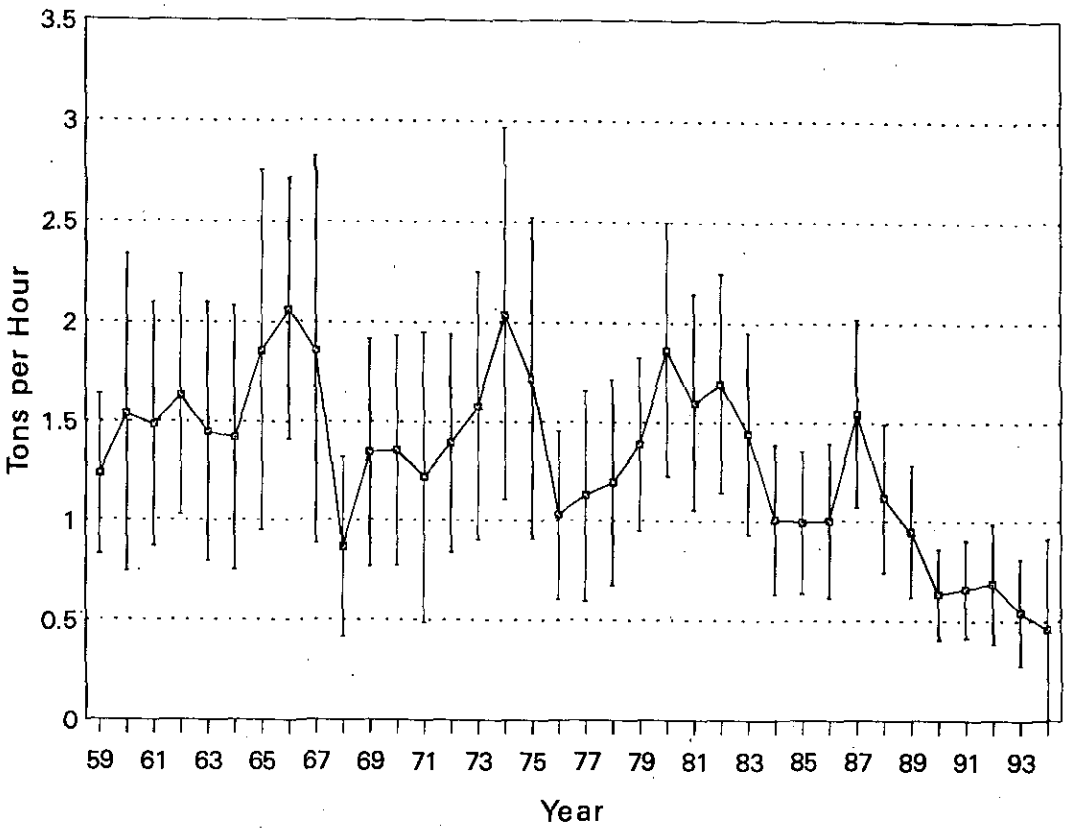

Fig. 2b. Standardized CPUE and approximate 95% confidence interval for Div. 3N redfish based on effort in hours fished for 1959-1994.

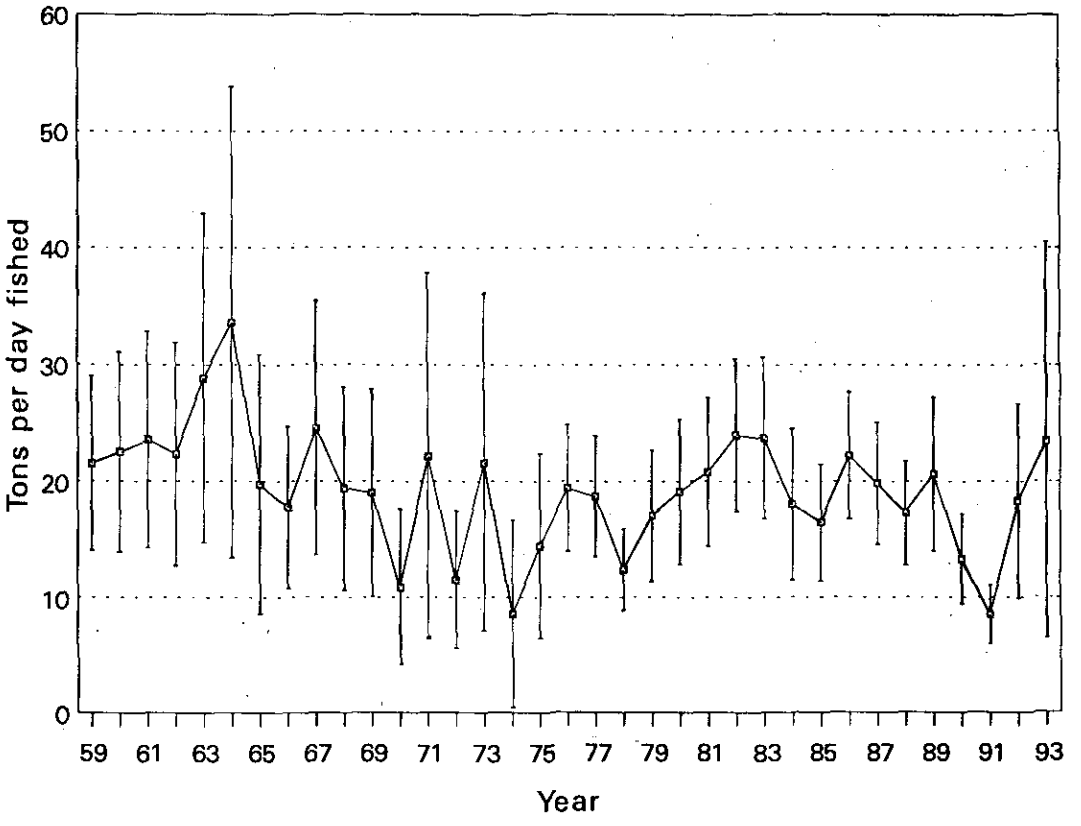

Fig. 3a. Standardized CPUE and approximate 95% confidence interval for Div. 3L redfish based on effort in days fished for 1959-1993.

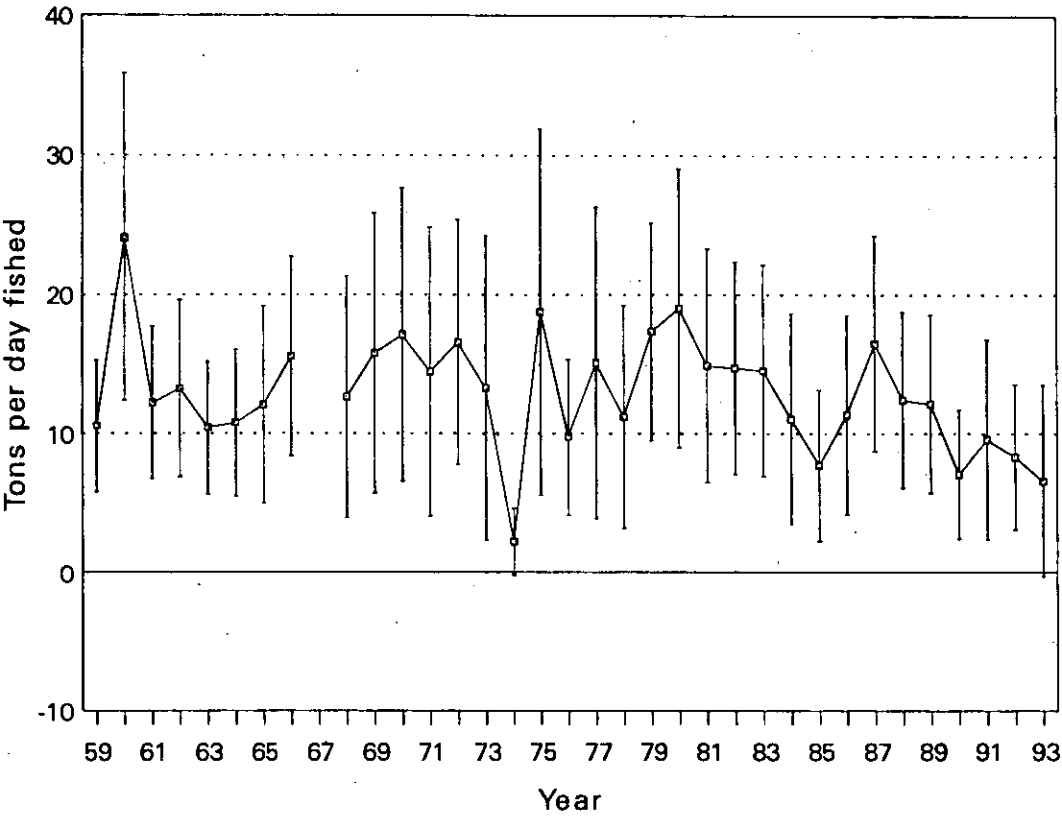

Fig. 3b. Standardized CPUE and approximate 95% confidence interval for Div. 3N redfish based on effort in days fished for 1959-1993.

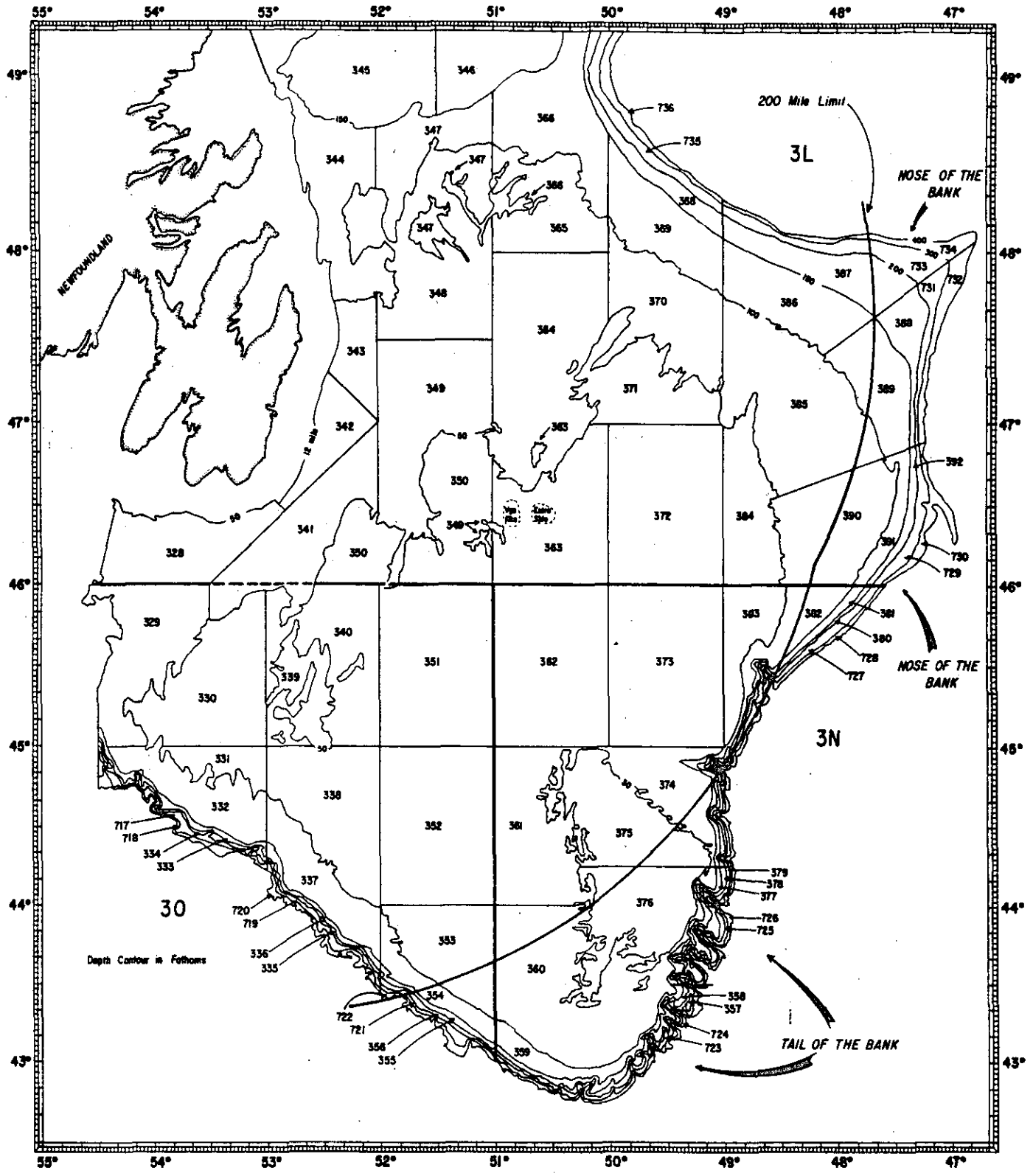

Fig. 4. Stratification scheme for NAFO Divisions 3LNO showing the boundary line between the Canadian economic zone and the NAFO Regulatory area.

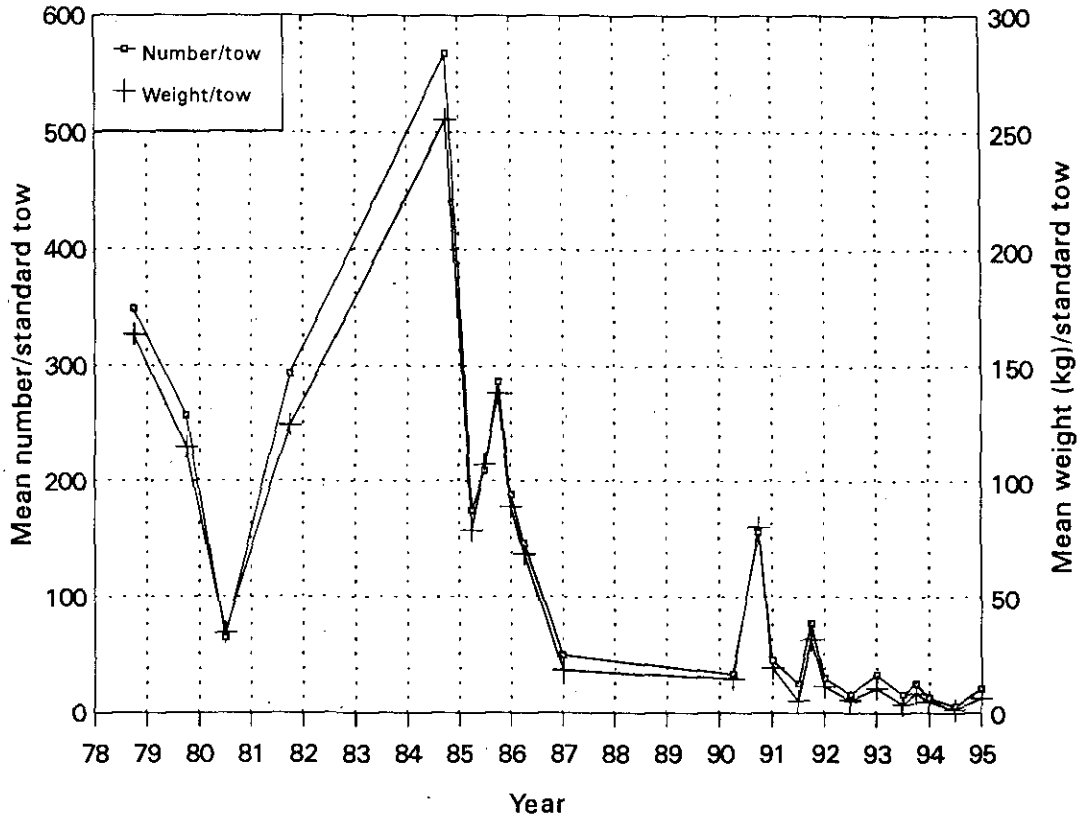

Fig 5a. Stratified mean number and weight per standard tow in Div. 3L from various Canadian surveys where strata greater than 366 m were surveyed.

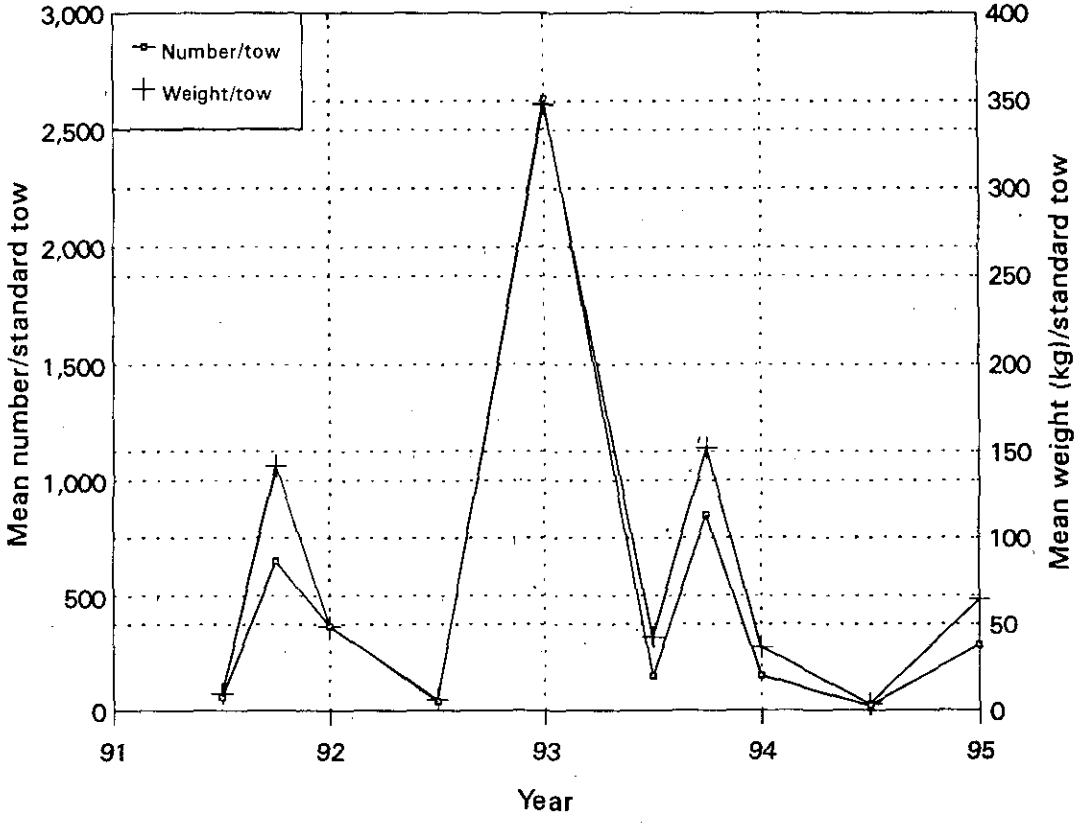

Fig 5b. Stratified mean number and weight per standard tow from Canadian surveys in Div. 3N from 1991-1993.

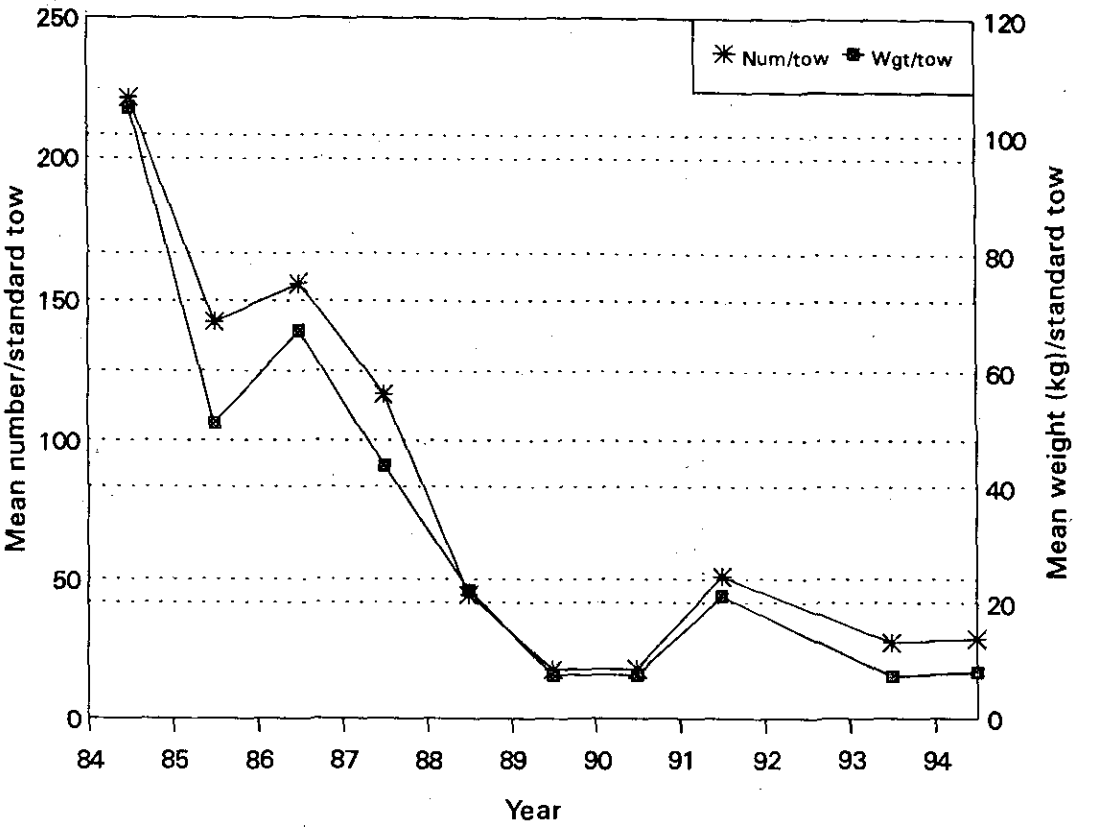

Fig 6a. Stratified mean number and weight per standard tow from Russian surveys in Div. 3L.

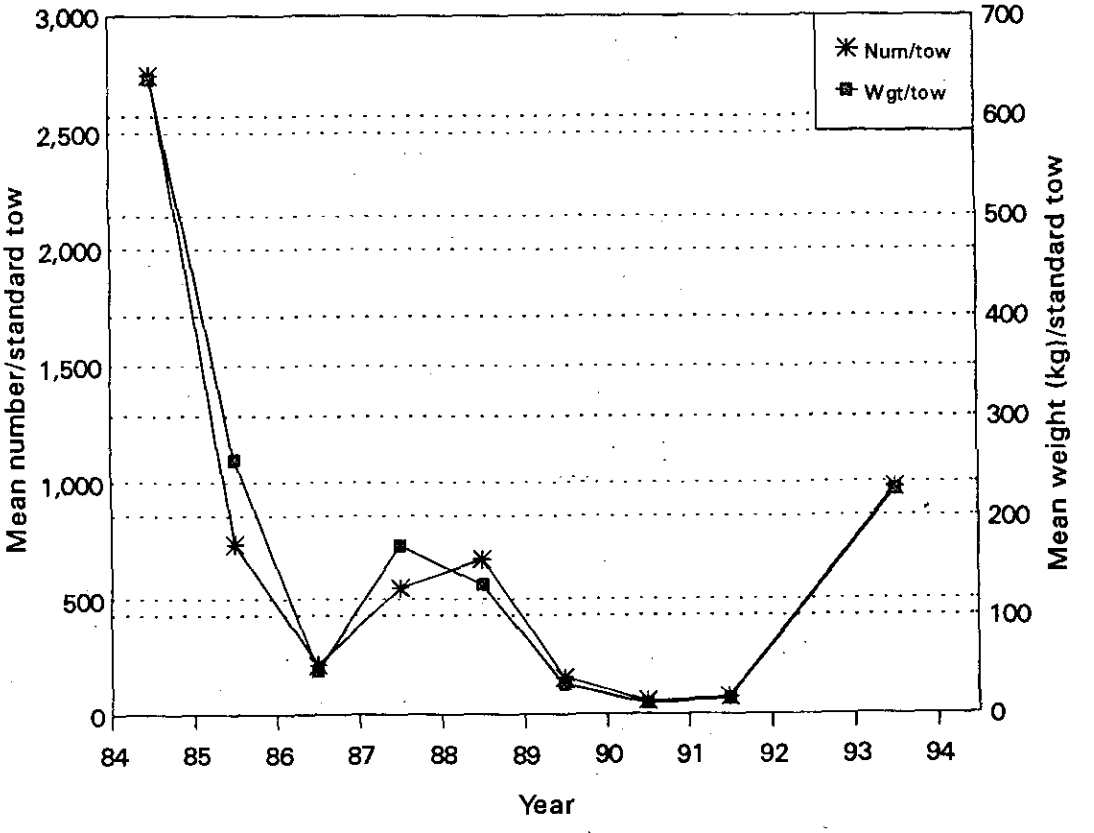

Fig 6b. Stratified mean number and weight per standard tow from Russian surveys in Div. 3N.

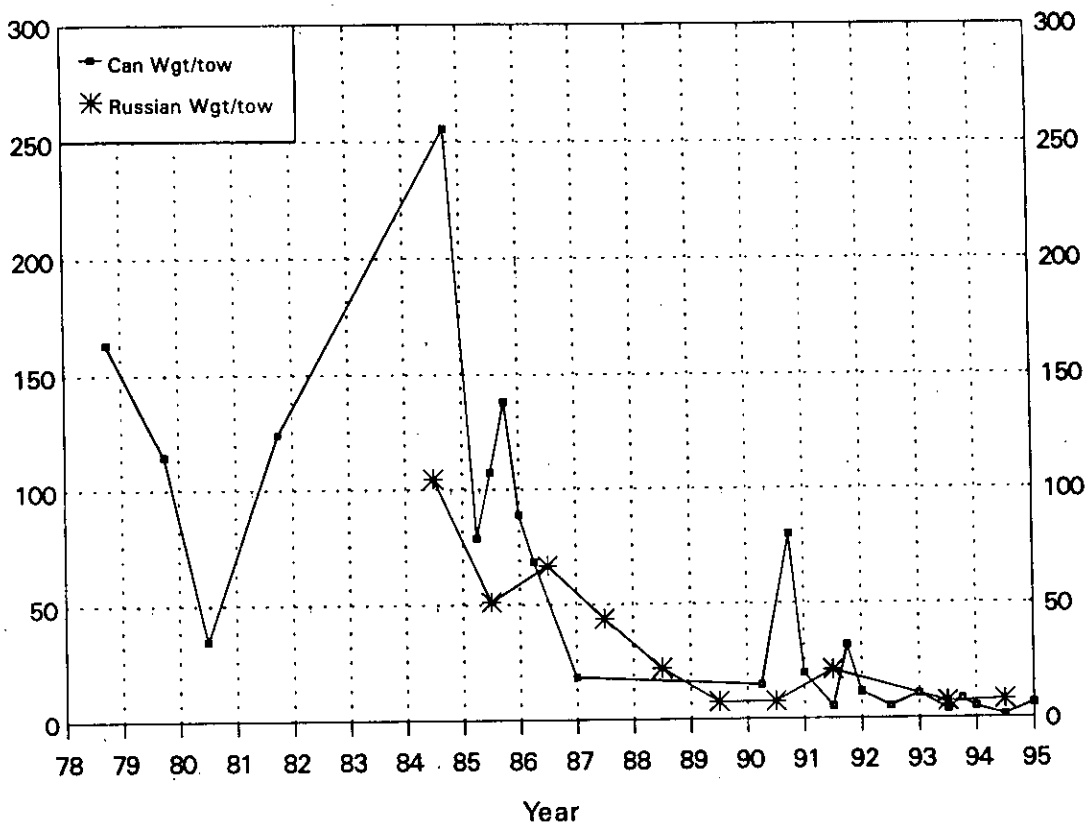

Fig 7a. Stratified mean weight (kg) per standard tow in Div. 3L from Canadian and Russian surveys where strata greater than 366 m were surveyed.

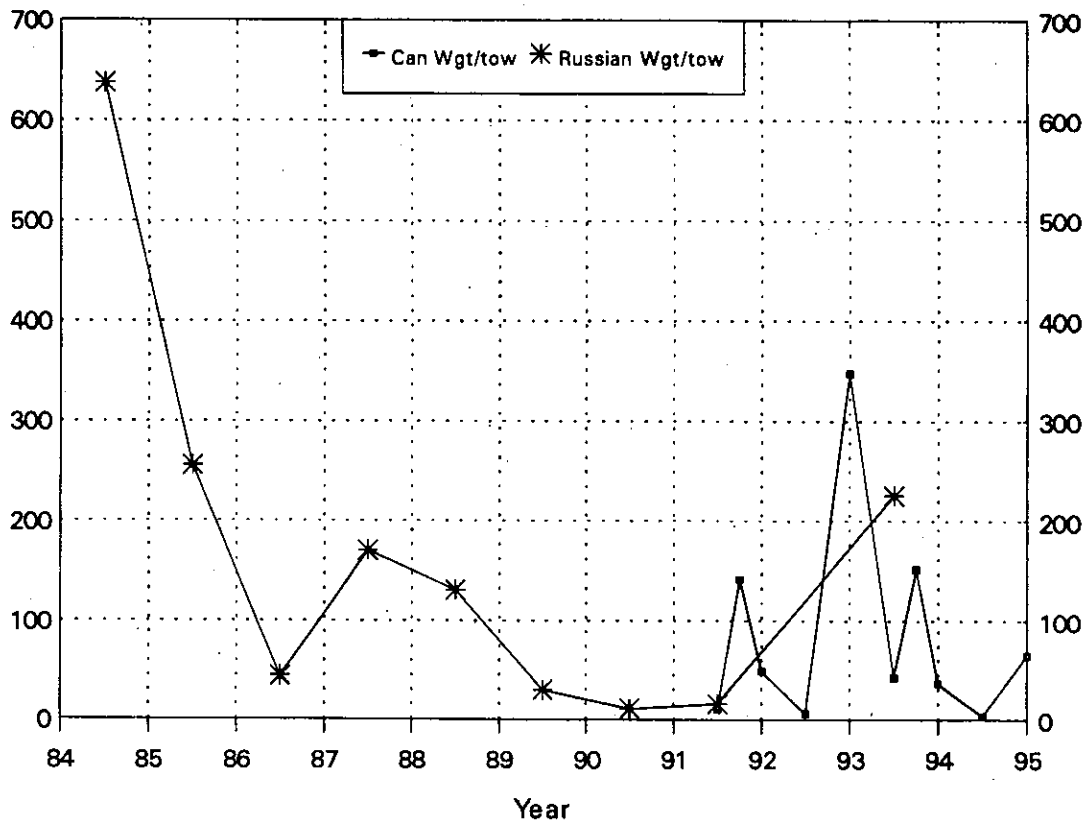

Fig 7b. Stratified mean weight (kg) per standard tow in Div. 3N from Canadian and Russian surveys where strata greater than 366 m were surveyed.

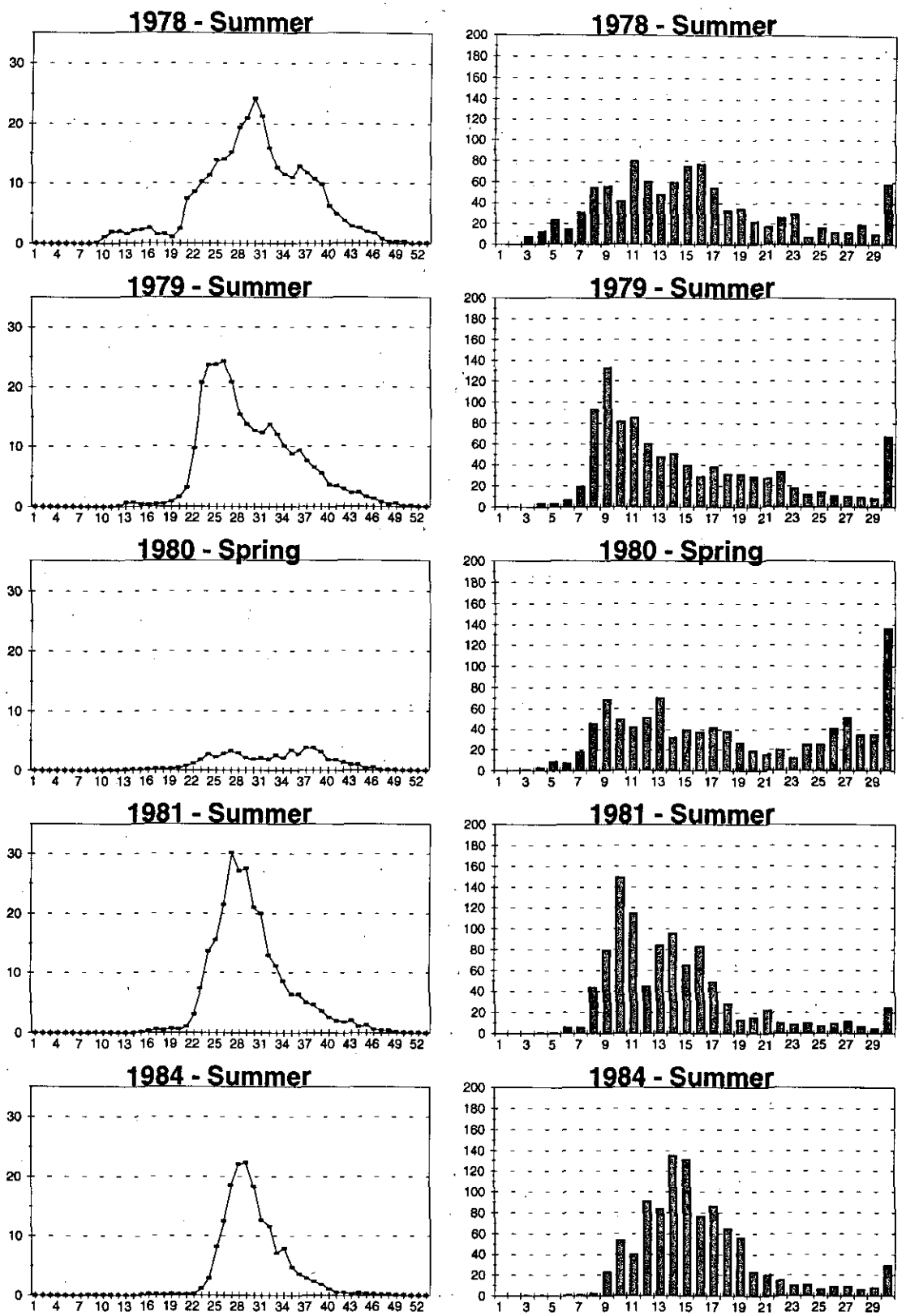

Fig. 8 . Length frequencies and corresponding age distribution from stratified-random research surveys to Div. 3L from 1978-1994. Plotted above are mean number per standard tow (left) and corresponding number per thousand age distribution (right). X-axis is forklength in centimetres for left plot, and age in years for right plot.

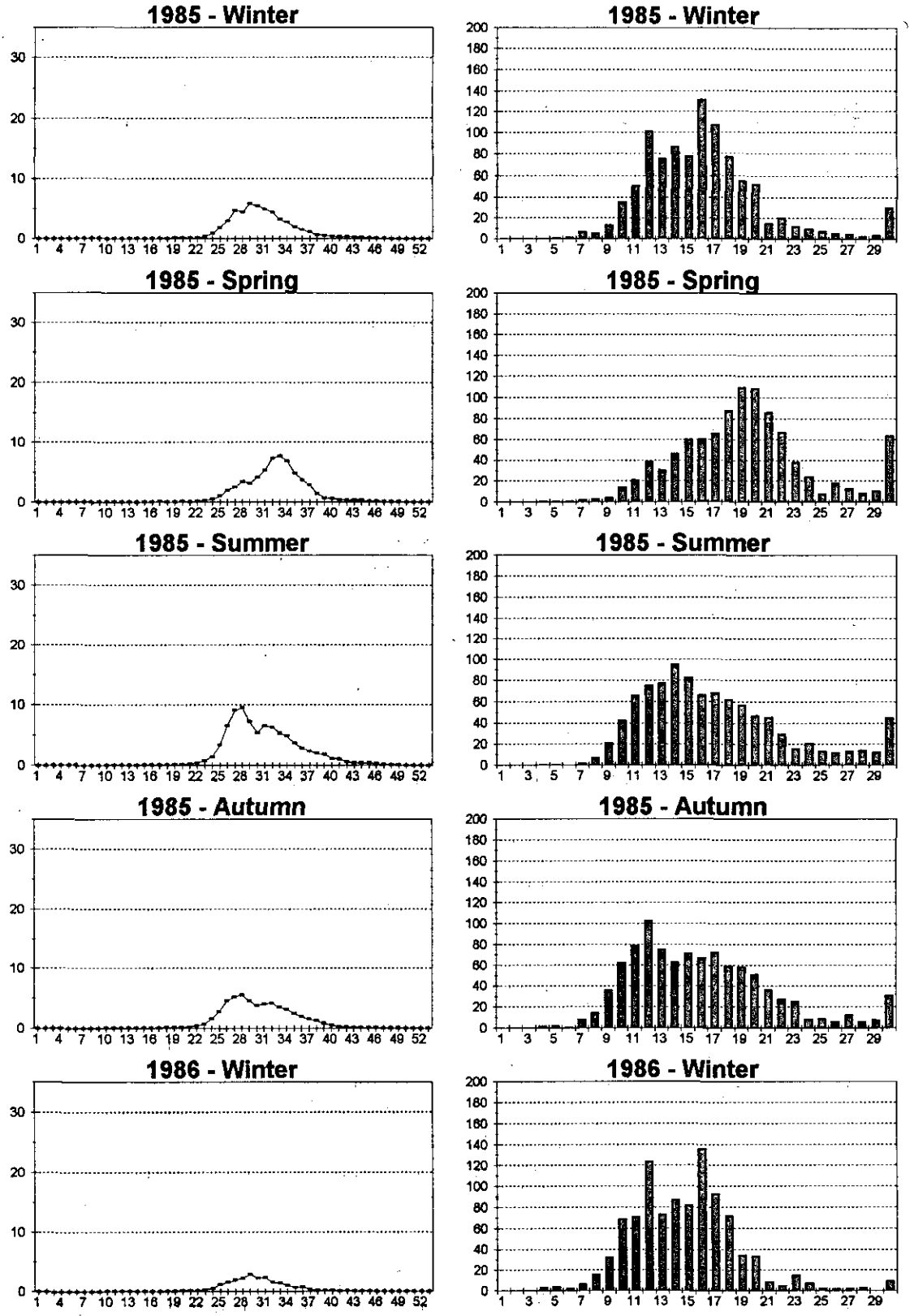

Fig. 8. (continued)

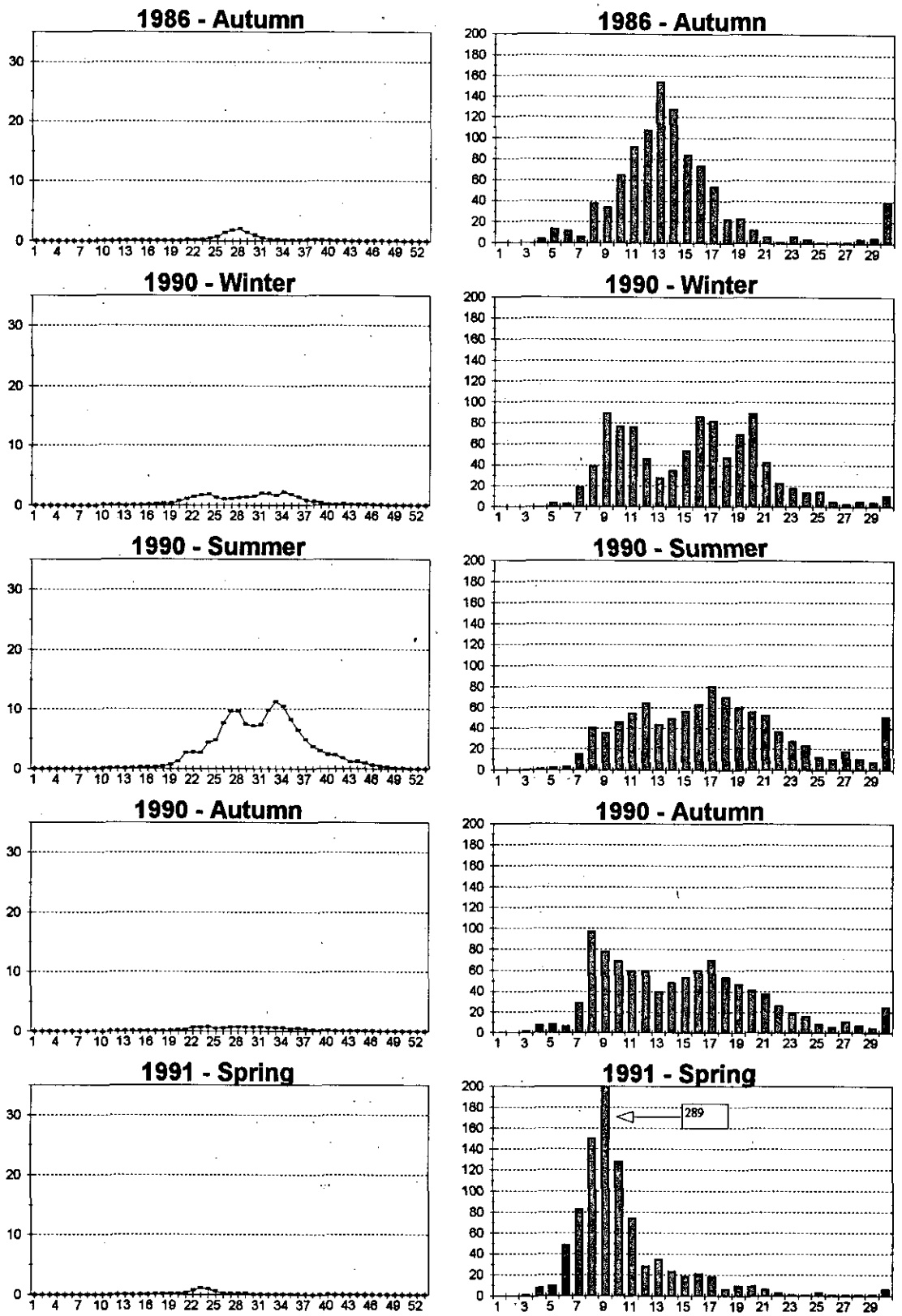

Fig. 8. (continued)

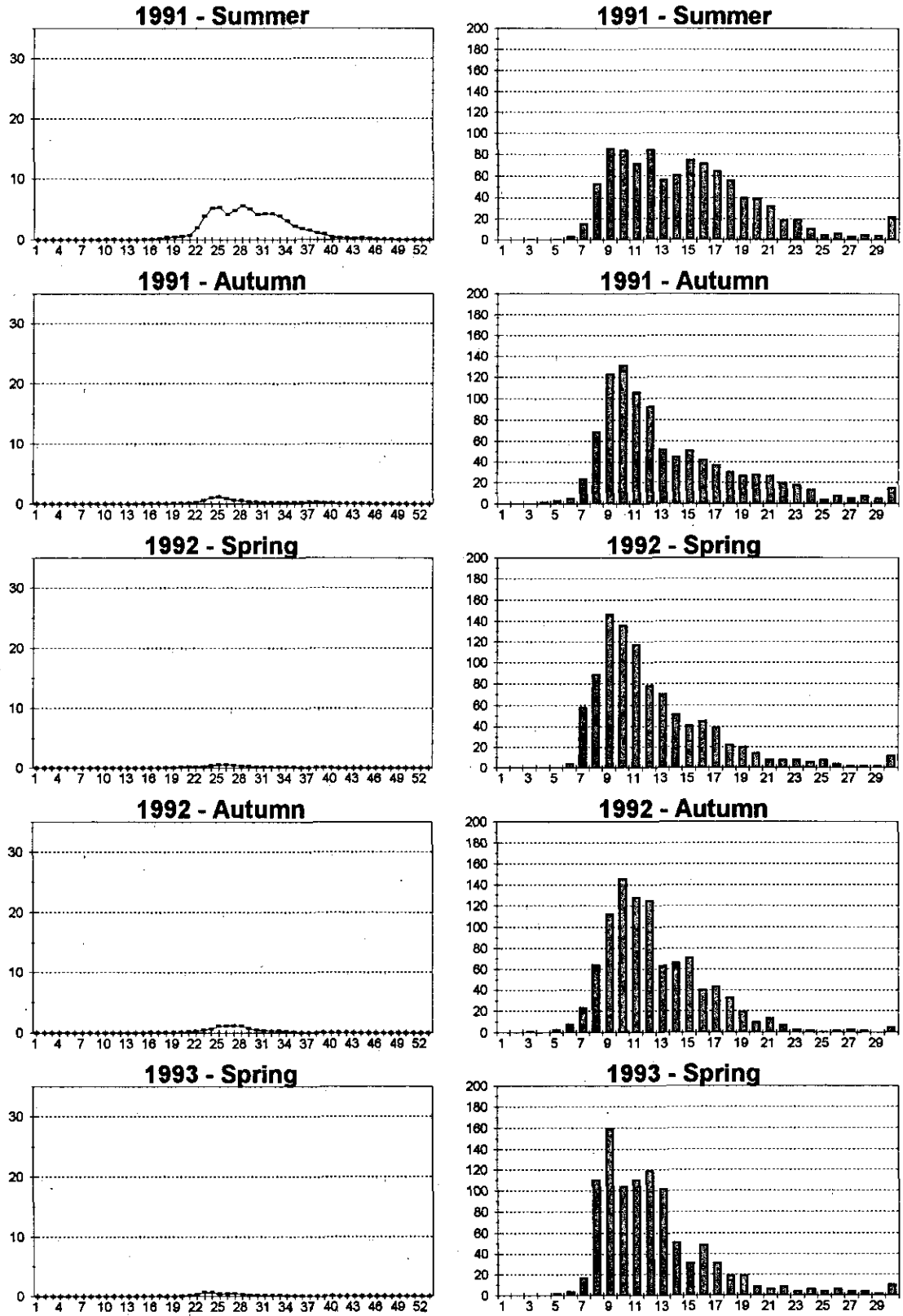

Fig. 8. (continued)

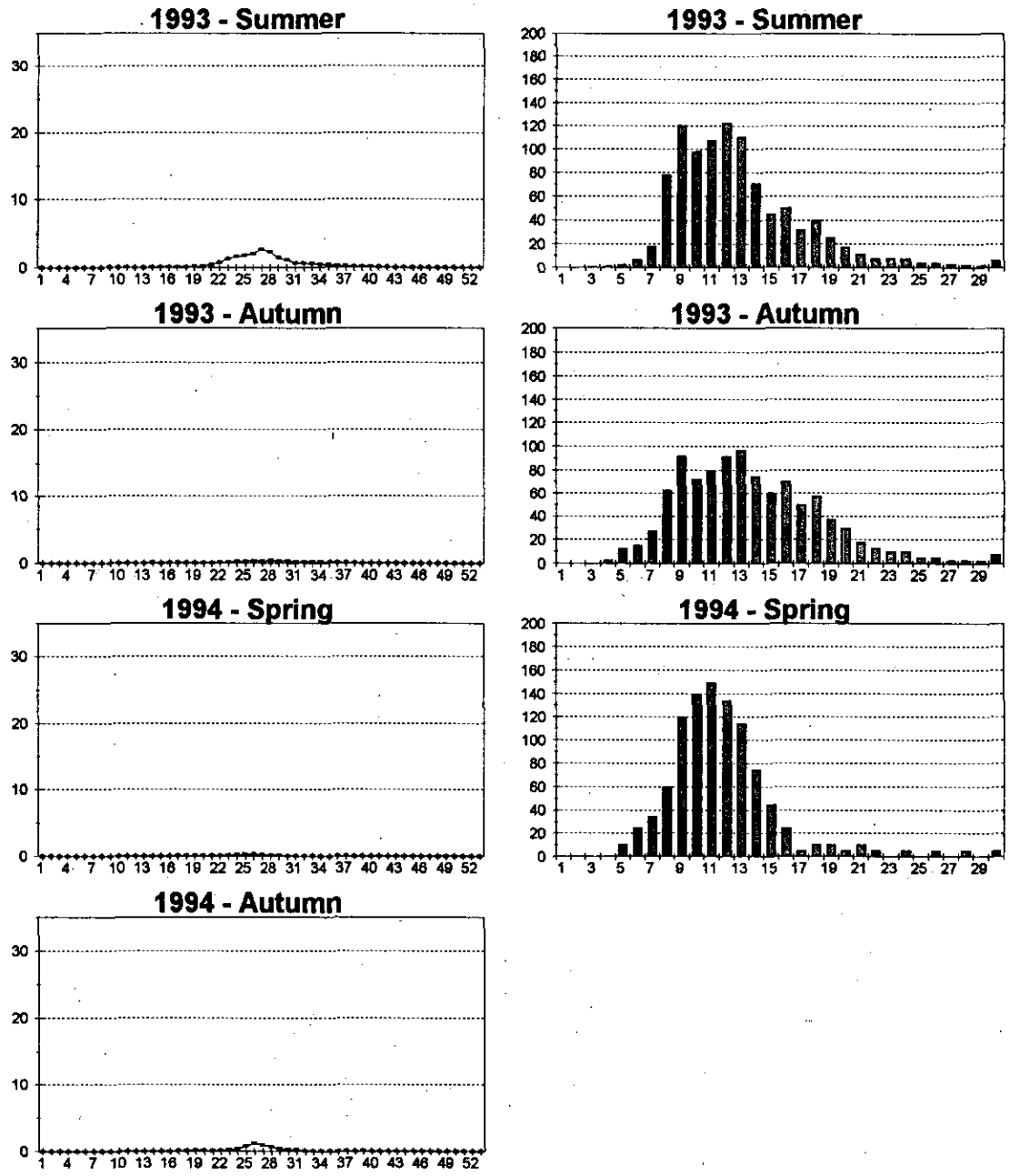

Fig. 8. (continued)

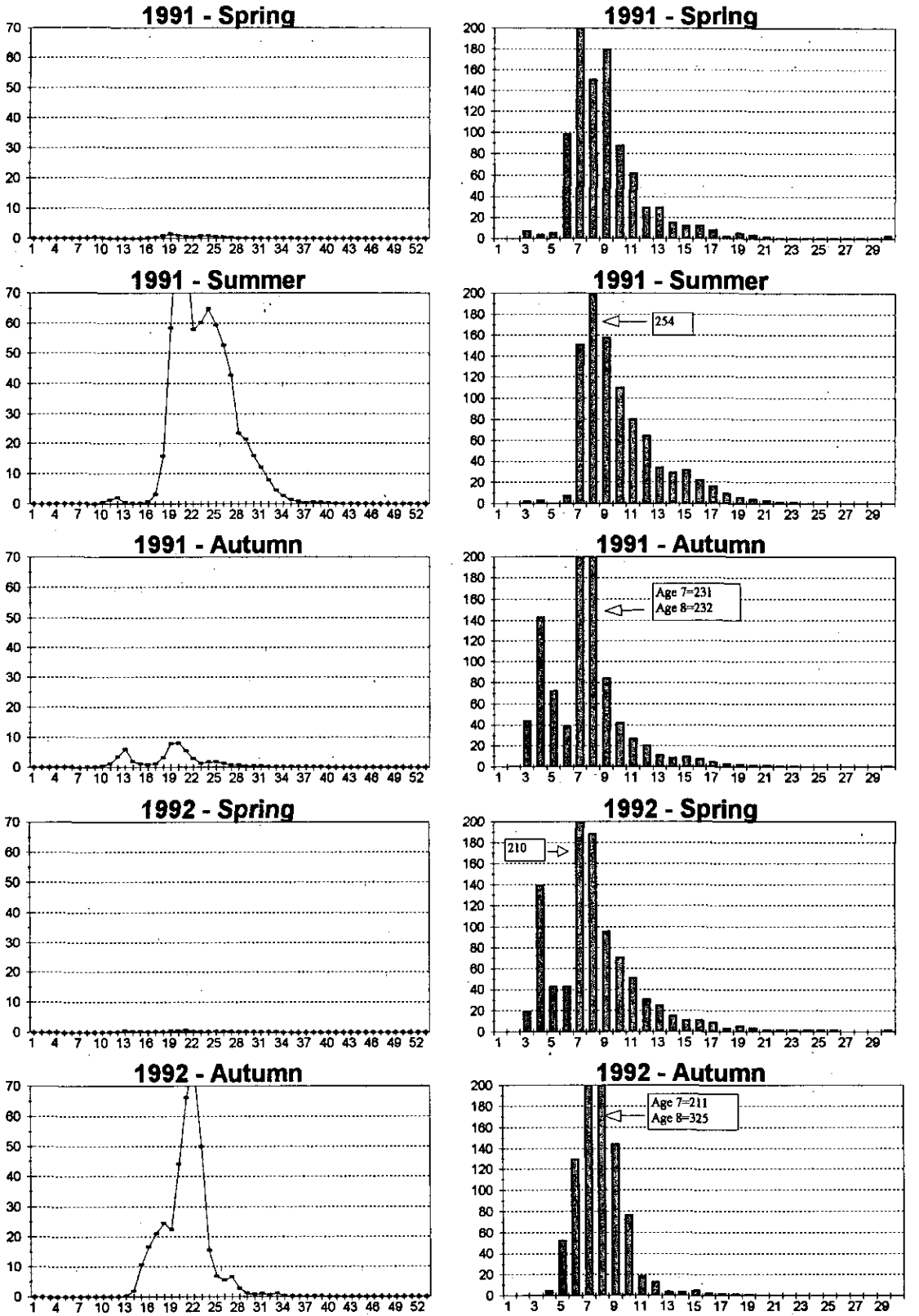

Fig. 9. Length frequencies and corresponding age distribution from stratified-random research surveys to Div. 3N from 1991-1994. Plotted above are mean number per standard tow (left) and corresponding number per thousand age distribution (right). X-axis is forklength in centimetres for left plot, and age in years for right plot.

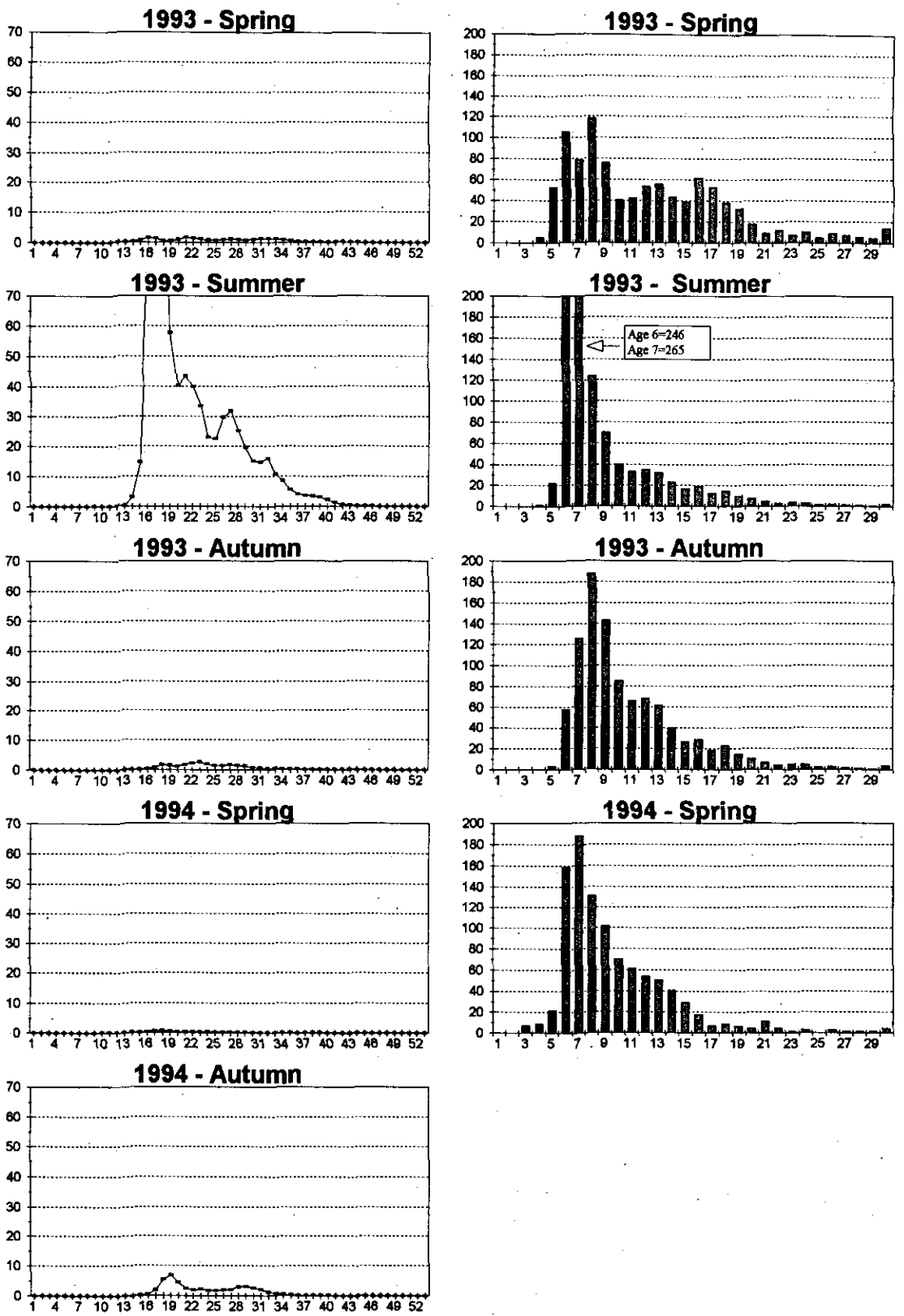

Fig. 9. (continued)