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The Status of the Division 3LN Redfish Resource

by

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Introduction

The average reported catch from Div. 3LN from 1959 to 1985 was about 21,000 t ranging between 8,000 t and 45,000 t (Table 1, Fig. 1). In 1986 the catch of 43,000 t was double that taken in 1985. The catch increased again in 1987 to the highest recorded historically at 79,000 t and has since declined substantially. The 1993 catch could not be estimated precisely because of discrepancies in the available sources of information, however, the likely amount is between 18,600 t and 24,400 t.

From 1980 to 1985 the former USSR, Cuba and Canada were the primary fleets in essentially a trawler fishery. Canada accounted for most of the Div. 3L catch while the USSR was the dominant fleet in Div. 3N (Table 2a,b). Over this period catches averaged 19,000 t and between 60%-80% was taken from Div. 3N. The rapid expansion of the fishery in 1986 was due primarily to the entry of EU-Portugal, taking about 21,000 t. The former USSR, which had taken the majority of its catch from Div. 3N since 1980, also diverted the major portion of its fishery to Div. 3L in 1986. 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 7,000 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 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 an area known as the 'Beothuk knoll' which is southwest of the Flemish Cap at the Div. 3M, Div. 3N and Div. 3L border. This area is not favourable for bottom trawlers.

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 maintained at that level to 1994. The TAC has been exceeded each year for the past 8 years, and 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 3) 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 1980 (Table 4) shows the bottom trawl is the predominant gear in the fishery. Since 1986 the shifts in the proportion of midwater trawl catches in Div. 3L is probably reflective of movements of the Russian fleet as it accounts for most of the catches by this gear.

Commercial Fishery Data

Catch and Effort

Catch and effort data from 1959 to 1990 ICNAF/NAFO Statistical Bulletins were obtained and combined with provisional 1991-1992 NAFO data and preliminary Canadian data for 1992-1993. In addition, catch rate data available in Portuguese research reports from NAFO SCS Document series for 1989-1993 from the annual Portuguese sampling program and preliminary Russian data for 1993 were also incorporated into this 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. Data for Portugal prior to 1989 were not selected because they were considered confounded with cod directed effort.

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), explaining 58% of the variation in catch rates (Table 5). All category types were significant. Although the year category type is significant, none of the estimated coefficients are 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.

The regression for Div. 3N using effort in hours fished is significant (p <.05), explaining 63% of the variability in the CPUE data (Table 6). All category types were significant, except the month category. For the year category type only six of the estimated coefficients are different from 1959 (within 2 s.e.). 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 1990. Since then the catch rate has alternately increased and decreased to 1993.

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), explaining 65% of the variation in the CPUE data (Table 7). All category types were significant. For the year category type only three 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 1978. There is a trend of successive increases from 1978 to 1982 followed by a decrease to 1985. Catch rate increased again in 1986 to the level of the 1983 rate and except for an intermittent large increase in 1989 decreased systematically to 1991. Since 1991 the rate has increased 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), explaining 68% of the 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. The catch rate declined to 1990 and since then has been erratic but higher.

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 Portuguese fishery in Div. 3L (Alpoim et al., MS 1994) indicate the dominant size in the catch was between 24-28 cm in January (Fig. 4). Sampling in Div. 3N suggest the dominant size range was 28-33 in the March to June period.

Research Survey Data

Stratified-random surveys have been conducted by Canada in Div. 3L in various years and seasons from 1978 to 1993 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. 5).

Mean number and mean weight (kg) per standard tow show large fluctuations between some adjacent years (Table 13-14, Fig. 6a). There are also rather large changes in stratum by stratum density estimates in adjacent years where seasons can be compared. In spite of these cautions it appears that both abundance and biomass are at there lowest levels in 1993 relative to time period the surveys cover.

Stratified-random surveys have also been conducted by Canada in Div 3N from 1991-1993 that cover to the extent of the stratification (732 m). Mean number and weight per standard tow (Table 15-16, Fig. 6b) 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.

Russian stratified-random bottom trawl surveys in Div. 3L (Power and Vaskov, MS 1992) indicate that from 1984 to 1990 there has been a steady decline in mean number and mean weight per standard tow. There was an increase in the 1991 estimates and a subsequent decrease in 1993 to the level of the low 1990 estimate (Fig. 7a). The survey was not conducted in 1992. 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 1992. This is evident in both the mean number and weight per standard tow (Fig. 7b). 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). A comparison of Canadian and Russian bottom trawl surveys in Div.

3L (Fig. 8a) indicate a decline in density estimates in terms of stratified mean weight from 1984 to 1990 and have remained at this relatively low level subsequently. The situation is unclear for Div. 3N (Fig. 8b). The Russian surveys indicate low abundance from 1989-1991 with a dramatic rise in 1993. The Canadian survey results display high seasonal variability in the short time they have been conducted.

Length frequencies and corresponding age distributions from the Canadian surveys in Div. 3L indicate there has been relatively poor recruitment observed over the time period covered by the surveys (Fig. 9). For the 1993 spring, summer and fall surveys the research survey catch was dominated by 24-30 cm fish corresponding to the year classes that were likely born from 1980-1985.

Length frequencies and age distributions from the Div. 3N Canadian surveys in from 1991-1993 (Fig 10) show different distributions compared with Div. 3L for each corresponding seasonal survey, consistently being composed of size groups that are much smaller. There was a relatively good pulse of recruitment picked up in the 1991 fall survey in the range of 12-14 cm (1986-1987 year classes) that could be tracked through to the 1993 fall survey at about 18 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.

Prognosis

The catch rate indices derived for Div. 3L and Div. 3N show much variability, particularly prior to 1975. 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 have been taken and have probably generated high fishing mortalities. Although there are increases suggested since 1991 from Div. 3L indices, anecdotal information about the 1994 fishery from Canadian surveillance reports indicated that most of the Baltic fleets have returned home because of poor catch rates.

Russian bottom trawl surveys indicate a decline in relative abundance to historically low values in recent years for Div. 3L and Div. 3N. The situation in Div. 3L is confirmed in the surveys conducted by Canada that cover the deep strata sufficiently. An increase observed in Div. 3N from the 1993 Russian trawl survey relative to 1991 is mostly accounted for in a single stratum that comprised only 9% of the surveyed area. Canadian surveys in Div. 3N from 1991-1993 indicate high seasonal variability with no trend. Russian trawl-acoustic surveys which provide an estimate of the total biomass have been quite variable since they were initiated in 1988. The results from these surveys have indicated large changes in biomass by as much as 150,000 t between adjacent years. These are too dramatic to be solely explained by changes in the stock abundance.

Although a cautious approach should be taken in drawing conclusions about stock status given the inherent variability in bottom trawl surveys, the 1993 Canadian surveys in Div. 3L indicate that relative abundance and biomass are the lowest observed since 1978. There is no information to evaluate where the current TAC (14,000 tons) stands in relation to an appropriate reference catch. The resource in Div. 3L appears to be very low with no sign of good recruitment. The Div. 3N portion appears lower since 1989 but contains a recruiting component of unknown size that would not be fully recruited to the fishery for about three or fours years. Despite this there is no sign in the research surveys of any good year classes to follow. Therefore, a cautious approach is warranted in establishing an appropriate catch level. In consideration of this there continues to be non-reported catch from the Regulatory area that is primarily due to activity by non-contracting parties.

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Table 1. Summary of nominal catches (t) of redfish in Divisions 3LN.

Year	3L	3N	Total	TAC
1959	34,107	10,478	44,585	
1960	11,463	16,547	28,010	
1961	8,349	14,826	23,175	
1962	3,425	18,009	21,434	
1963	8,191	12,906	21,097	
1964	3,898	4,206	8,104	
1965	9,451	4,042	13,493	
1966	6,927	10,047	16,974	
1967	7,684	19,504	27,188	
1968	2,348	15,265	17,613	
1969	927	22,142	23,069	
1970	1,029	13,359	14,388	
1971	10,043	24,310	34,353	
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	20,512	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[a]	25,000
1988	22,317	23,049	53,266[a]	25,000
1989	18,947	12,902	33,649[a]	25,000
1990[b]	15,538	9,217	29,105[a]	25,000
1991[b]	8,891	12,724	25,815[a]	14,000
1992[b]	4,629	10,154	27,283[a]	14,000
1993[b]	7,078	7,895	18,600-24,400[a,c]	14,000
1994				14,000

[a]Includes estimates of unreported catch.
[b]Provisional.
[c]Catch could not be precisely estimated due to discrepancies in figures from available sources.

Table 2a. Nominal catches (t) of redfish in Div. 3L by country and year since 1980.

Country	1980	1981	1982	1983	1984	1985	1986	1987[b]	1988[b]	1989[b]	1990[b]	1991[b,c]	1992[b,c]	1993[b,c]
Canada (M)	554	1,696	1,003	2,663	52	342	2,597	2,352	5,042	1,095	73	37	86	-
Canada (N)	2,412	5,925	5,910	3,800	1,229	1,716	2,235	2,159	1,444	489	947	362	655	5
EU/Germany	375	509	12	586	938	981	540	696	694	742	646	1151	1,455	-
Japan	26	128	159	-	105	129	135	114	152	114	151	83	67	36
EU/Portugal	639	275	125	91	48	4	13,469	19,858	9,867	5,408	4,820	5,099	769	1
EU/Spain	-	137	25	347	91	192	199	335	94	109	837	681	625	29
Russia	345	737	607	1,168	232	309	8,658	4,459	5,004	10,037	7,003	1,032	571	2,407
Lithuania														895
Latvia														2,156
Estonia														963
Kor-S	-	-	29	-	-	-	-	364	20	952	1,061	420	370	586
Others[a]	16	-	-	2	1	4	-	5	-	1	-	26	31	-
TOTAL	4,367	9,407	7,870	8,657	2,696	3,677	27,833	30,342	22,317	18,947	15,538	8,891	4,701	7,078

[a]Others include France (M), France (SP), Poland, EU/UK.
[b]Does not include estimates of unreported catches.
[c]Provisional.

Table 2b. Nominal catches (t) of redfish in Div. 3N by country and year since 1980.

Country	1980	1981	1982	1983	1984	1985	1986	1987[b]	1988[b]	1989[b]	1990[b]	1991[b,c]	1992[b,c]	1993[b,c]
Canada (M)	683	442	-	-	13	311	-	-	1	22	-	-	-	-
Canada (N)	367	63	337	1	2	82	17	21	4	4	11	-	2	40
EU/Portugal	-	-	1	-	365	890	8,273	7,854	2,147	600	1,235	3,275	1,149	252
Japan	-	-	-	-	81	-	12	51	-	39	4	5	1	-
EU/Spain	14	239	278	875	239	2,881	1,393	132	581	224	416	956	119	7
Russia	8,944	12,762	10,414	7,844	9,045	10,576	2,227	14,397	6,735	941	359	4,821	3,009	3,212
Lithuania														895
Latvia														1,247
Estonia														963
Cuba	1,644	1,309	2,621	2,370	2,320	2,055	2,429	2,433	2,483	2,869	2,456	1,378	1,308	1,151
Kor-S	-	-	26	-	-	-	617	16,053	11,098	8,203	4,640	2,276	4,560	122
Others[a]	11	58	-	-	-	85	4	8	-	-	96	13	6	6
TOTAL	11,663	14,873	13,677	11,090	12,065	16,880	14,972	40,949	23,049	12,902	9,217	12,724	10,154	7,895

[a]Others include France (M), USA, EU/Germany, Denmark (Greenland).
[b]Does not include estimates of unreported catches.
[c]Provisional.

Table 3a. Nominal catches (t) of redfish in Division 3L by month and year since 1980.

Year	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total
1980	271	112	396	119	373	261	80	10	718	311	22	1,694	4,367
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[a]	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[a]	2,856	1,623	865	1,466	471	1,213	2,776	4,800	1,628	1,869	682	2,068	22,317
1989[a]	786	4,497	4,301	1,140	1,628	501	1,730	1,311	832	1,151	1,002	68	18,947
1990[a]	269	331	297	831	578	1,717	3,061	3,683	1,911	1,611	1,056	193	15,538
1991[a,b]	214	882	561	762	547	371	232	162	213	651	2,123	1,058	7,776[c]
1992[a,b]	337	271	137	1,459	921	230	10	7	27	24	470	98	3,991[d]

[a] Does not include estimates of unreported catches.
[b] Provisional.
[c] Does not include 1,115 t that could not be disaggregated by month.
[d] Does not include 638 t that could not be disaggregated by month.

Table 3b. Nominal catches (t) of redfish in Division 3N by month and year since 1980.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1980	3,561	2,798	2,269	121	368	833	81	422	1,085	122	2	1	11,663
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[a]	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[a]	662	648	815	841	952	1,295	2,327	4,505	3,390	1,419	3,453	2,742	23,049
1989[a]	576	151	274	380	278	1,183	928	4,109	2,085	1,515	1,164	259	12,902
1990[a]	220	366	537	9	1,003	1,679	1,236	1,716	619	754	858	220	9,217
1991[a,b]	371	91	15	122	296	664	1,165	359	857	2,013	1,085	860	7,898[c]
1992[a,b]	274	638	87	65	97	1,062	1,758	440	432	703	926	662	7,144[d]

[a]Does not include estimates of unreported catches.
[b]Provisional.
[c]Does not include 4,826 t that could not disaggregated by month.
[d]Does not include 3,010 t that could not be disaggregated by month.

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

	3L					3N				
Year	Bottom trawl	MW trawl	Gillnets	Misc.	Total	Bottom trawl	MW trawl	Gillnets	Misc.	Total
1980	3,920	314	133	-	4,367	9,197	2,463	-	3	11,663
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[a]	25,294	4,441	276	331	30,342	32,391	8,527	-	31	40,949
1988[a]	15,435	6,722	105	55	22,317	16,740	6,269	17	23	23,049
1989[a]	7,542	10,922	449	34	18,947	9,131	3,746	-	25	12,902
1990[a]	7,851	7,537	136	14	15,538	6,511	2,675	10	21	9,217
1991[a,b,c]	7,003	625	71	77	7,776[c]	6,453	1,378	-	67	7,898[c]
1992[a,b,d]	3,312	535	68	76	3,991[d]	5,754	1,308	6	76	7,144[d]

[a]Does not include estimates of unreported catches.
[b]Provisional.
[c]Does not include 1,115 t catch in Div. 3L and 4,826 t catch in Div. 3N that could not disaggregated by gear.
[d]Does not include 638 t catch in Div. 3L and 3,010 t catch in Div. 3N that could not be disaggregated by gear.

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 (1991-1993 BASED ON PRELIMINARY DATA).

REGRESSION OF MULTIPLICATIVE MODEL

MULTIPLE R............ 0.758
MULTIPLE R SQUARED..... 0.575

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DF	SUMS OF SQUARES	MEAN SQUARES	F-VALUE
INTERCEPT	1	3.431E1	3.431E1	
REGRESSION	78	1.519E2	1.947E0	8.322
Country|Gear|TC (1)	29	6.710E1	2.314E0	9.890
Month (2)	11	1.099E1	9.987E-1	4.269
Bycatch PCT (3)	4	1.854E1	4.634E0	19.807
Year (4)	34	1.369E1	4.025E-1	1.721
RESIDUALS	480	1.123E2	2.340E-1	
TOTAL	559	2.985E2		

REGRESSION COEFFICIENTS

CATEGORY	CODE	VARIABLE	COEFFICIENT	STD. ERROR	NO. OBS.
Country|Gear|TC	3125	INTERCEPT	0.213	0.178	559
Month	7				
Bycatch PCT	95				
Year	59				
(1)	2114	1	-0.647	0.206	9
	2125	2	-0.111	0.196	8
	2155	3	-0.078	0.222	6
	3114	4	-0.469	0.184	15
	3124	5	-0.011	0.175	9
	3154	6	-0.531	0.241	5
	3155	7	0.231	0.123	27
	10127	8	-0.571	0.237	5
	11115	9	-0.459	0.214	10
	11116	10	-0.353	0.221	8
	11125	11	0.058	0.119	22
	11126	12	-0.025	0.209	11
	11127	13	-0.045	0.138	20
	11155	14	-0.499	0.231	5
	14126	15	-0.352	0.188	8
	14127	16	0.457	0.203	13
	16127	17	-0.041	0.182	27
	17116	18	-0.139	0.244	5
	17126	19	-0.811	0.172	11
	20114	20	-1.270	0.199	11
	20116	21	-0.221	0.221	11
	20127	22	0.328	0.095	60
	20145	23	1.187	0.347	12
	20157	24	0.486	0.091	54
	25126	25	-0.334	0.169	12
	25127	26	0.496	0.172	12
	27125	27	0.100	0.095	37
(1)	27126	28	0.292	0.213	6
	27157	29	1.055	0.206	7
(2)	1	30	-0.074	0.113	38
	2	31	0.048	0.108	41
	3	32	0.237	0.100	52
	4	33	0.364	0.098	55
	5	34	0.120	0.104	45
	6	35	-0.159	0.095	54
	8	36	-0.128	0.098	53
	9	37	0.041	0.102	46
	10	38	-0.080	0.100	50
	11	39	-0.031	0.104	43
	12	40	0.042	0.127	23
(3)	55	41	-0.623	0.109	29
	65	42	-0.633	0.087	45
	75	43	-0.378	0.077	67
	85	44	-0.105	0.063	102
(4)	60	45	0.194	0.205	13
	61	46	0.466	0.262	7
	62	47	0.131	0.240	10
	63	48	0.355	0.249	9
	64	49	0.619	0.340	3
	65	50	0.510	0.289	5
	66	51	0.066	0.224	13
	67	52	0.338	0.221	19
	68	53	0.167	0.265	7
	69	54	0.227	0.241	7
	70	55	0.334	0.249	8
	71	56	0.280	0.241	12
	72	57	0.110	0.255	6
	73	58	0.469	0.324	3
	74	59	-0.326	0.338	15
	75	60	-0.105	0.296	4
	76	61	-0.025	0.173	31
	77	62	-0.084	0.179	32
	78	63	-0.176	0.186	22
	79	64	0.112	0.200	18
	80	65	-0.012	0.202	16
	81	66	0.141	0.196	18
	82	67	0.156	0.187	25
	83	68	0.210	0.188	21
	84	69	0.069	0.205	15
	85	70	0.242	0.198	19
	86	71	0.292	0.184	31
	87	72	0.115	0.194	21
	88	73	-0.033	0.180	36
	89	74	0.352	0.197	24
	90	75	-0.191	0.181	38
	91	76	-0.084	0.238	10
	92	77	0.324	0.232	11
	93	78	0.405	0.267	6

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 (1991-1993 BASED ON PRELIMINARY DATA).

REGRESSION OF MULTIPLICATIVE MODEL

MULTIPLE R............. 0.792
MULTIPLE R SQUARED..... 0.628

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DF	SUMS OF SQUARES	MEAN SQUARES	F-VALUE
INTERCEPT	1	3.898E1	3.898E1	
REGRESSION	66	1.238E2	1.876E0	9.375
Country¦Gear¦TC (1)	17	2.977E1	1.751E0	8.750
Month (2)	11	2.584E0	2.349E¯1	1.174 (NS)
Bycatch PCT (3)	4	1.803E1	4.508E0	22.525
Year (4)	34	1.923E1	5.656E¯1	2.826
RESIDUALS	367	7.344E1	2.001E¯1	
TOTAL	434	2.362E2		

REGRESSION COEFFICIENTS

CATEGORY	CODE	VARIABLE	COEFFICIENT	STD. ERROR	NO. OBS.
Country¦Gear¦TC	3125	INTERCEPT	0.114	0.157	434
Month	7				
Bycatch PCT	95				
Year	59				
(1)	2114	1	¯0.285	0.165	17
	3114	2	¯0.031	0.135	59
	3124	3	0.057	0.214	6
	4127	4	0.393	0.156	18
	4157	5	0.567	0.145	30
	11115	6	¯0.486	0.264	5
	14127	7	0.468	0.251	5
	16127	8	¯0.159	0.234	5
	17116	9	¯0.335	0.265	5
	17126	10	¯0.336	0.212	13
	20114	11	¯0.920	0.213	8
	20116	12	¯0.002	0.210	8
	20127	13	0.601	0.115	95
	20157	14	0.685	0.125	64
	25126	15	0.356	0.175	17
	25127	16	0.723	0.145	44
	27125	17	0.375	0.221	6
(2)	1	18	¯0.143	0.107	33
	2	19	¯0.098	0.113	30
	3	20	¯0.110	0.106	34
	4	21	0.032	0.121	25
	5	22	0.012	0.113	27
	6	23	¯0.010	0.102	35
	8	24	0.007	0.090	52
	9	25	¯0.083	0.090	54
	10	26	¯0.201	0.102	36
	11	27	¯0.122	0.107	31
(2)	12	28	¯0.290	0.117	24
(3)	55	29	¯0.693	0.098	48
	65	30	¯0.649	0.084	46
	75	31	¯0.383	0.079	55
	85	32	¯0.255	0.071	64
(4)	60	33	0.258	0.241	5
	61	34	0.217	0.189	11
	62	35	0.301	0.170	16
	63	36	0.193	0.209	8
	64	37	0.231	0.220	8
	65	38	0.441	0.227	7
	66	39	0.565	0.168	17
	67	40	0.495	0.262	6
	68	41	¯0.283	0.271	4
	69	42	0.187	0.205	8
	70	43	0.146	0.204	8
	71	44	0.069	0.290	3
	72	45	0.133	0.188	10
	73	46	0.275	0.219	8
	74	47	0.617	0.222	7
	75	48	0.455	0.229	6
	76	49	¯0.215	0.204	8
	77	50	0.029	0.229	6
	78	51	0.079	0.206	8
	79	52	0.155	0.165	17
	80	53	0.470	0.166	16
	81	54	0.343	0.173	17
	82	55	0.409	0.164	17
	83	56	0.239	0.171	15
	84	57	¯0.002	0.183	13
	85	58	¯0.079	0.179	15
	86	59	¯0.056	0.187	12
	87	60	0.348	0.150	38
	88	61	0.048	0.163	24
	89	62	¯0.075	0.173	21
	90	63	¯0.402	0.172	16
	91	64	0.002	0.217	10
	92	65	¯0.328	0.218	8
	93	66	0.118	0.172	17

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 (1991-1993 BASED ON PRELIMINARY DATA).

REGRESSION OF MULTIPLICATIVE MODEL

MULTIPLE R............ 0.807
MULTIPLE R SQUARED..... 0.651

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DF	SUMS OF SQUARES	MEAN SQUARES	F-VALUE
INTERCEPT	1	2.700E3	2.700E3	
REGRESSION	74	9.963E1	1.346E0	8.176
Country;Gear;TC (1)	25	4.722E1	1.889E0	11.469
Month (2)	11	3.609E0	3.281E$^-$1	1.993
Bycatch PCT (3)	4	9.878E0	2.470E0	14.997
Year (4)	34	1.120E1	3.295E$^-$1	2.001
RESIDUALS	324	5.335E1	1.647E$^-$1	
TOTAL	399	2.853E3		

REGRESSION COEFFICIENTS

CATEGORY	CODE	VARIABLE	COEFFICIENT	STD. ERROR	NO. OBS.
Country;Gear;TC	3125	INTERCEPT	2.878	0.168	399
Month	7				
Bycatch PCT	95				
Year	59				
(1)	2114	1	-0.573	0.201	7
	2125	2	-0.199	0.184	7
	2155	3	-0.203	0.210	5
	3114	4	-0.549	0.182	11
	3124	5	0.345	0.168	7
	3155	6	0.316	0.122	24
	10125	7	0.178	0.194	8
	10126	8	0.104	0.169	14
	11115	9	-0.525	0.203	9
	11125	10	-0.171	0.113	18
	11126	11	-0.154	0.231	10
	11127	12	-0.345	0.138	15
	11155	13	-0.955	0.200	5
	14126	14	-0.488	0.175	7
	16127	15	-0.124	0.159	24
	17116	16	-0.160	0.239	4
	17126	17	-0.329	0.195	6
	20114	18	-1.479	0.206	8
	20116	19	-0.740	0.210	8
	20127	20	0.391	0.112	39
	20145	21	0.476	0.484	11
	20157	22	0.571	0.100	36
	25127	23	0.522	0.209	5
	27125	24	0.142	0.097	27
	27157	25	0.456	0.210	5
(2)	1	26	-0.334	0.115	26

CATEGORY	CODE	VARIABLE	COEFFICIENT	STD. ERROR	NO. OBS.
(2)	2	27	-0.241	0.118	21
	3	28	-0.005	0.101	36
	4	29	0.005	0.102	37
	5	30	-0.112	0.118	23
	6	31	-0.222	0.097	37
	8	32	-0.058	0.096	41
	9	33	-0.031	0.097	38
	10	34	-0.108	0.097	44
	11	35	-0.209	0.106	30
	12	36	-0.136	0.115	22
(3)	55	37	-0.635	0.111	20
	65	38	-0.526	0.093	34
	75	39	-0.360	0.075	57
	85	40	-0.116	0.064	83
(4)	60	41	0.112	0.175	13
	61	42	0.162	0.182	15
	62	43	0.102	0.199	10
	63	44	0.362	0.230	6
	64	45	0.548	0.287	3
	65	46	0.036	0.264	4
	66	47	-0.086	0.199	12
	67	48	0.228	0.222	12
	68	49	0.057	0.239	6
	69	50	0.011	0.230	5
	70	51	-0.609	0.287	3
	71	52	0.193	0.344	3
	72	53	-0.604	0.247	4
	73	54	-0.010	0.313	2
	74	55	-0.507	0.466	12
	75	56	-0.271	0.282	3
	76	57	-0.015	0.151	24
	77	58	-0.070	0.157	27
	78	59	-0.373	0.166	16
	79	60	-0.140	0.194	11
	80	61	-0.094	0.203	9
	81	62	0.109	0.190	13
	82	63	0.209	0.184	15
	83	64	0.196	0.182	13
	84	65	-0.066	0.214	8
	85	66	-0.139	0.193	12
	86	67	0.154	0.176	22
	87	68	0.004	0.181	17
	88	69	-0.092	0.175	24
	89	70	0.178	0.198	12
	90	71	-0.283	0.184	25
	91	72	-0.346	0.242	5
	92	73	-0.211	0.228	6
	93	74	0.072	0.274	4

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 (1991-1993 based on preliminary data).

REGRESSION OF MULTIPLICATIVE MODEL

MULTIPLE R............. 0.825
MULTIPLE R SQUARED..... 0.681

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DF	SUMS OF SQUARES	MEAN SQUARES	F-VALUE
INTERCEPT	1	2.842E3	2.842E3	
REGRESSION	59	1.160E2	1.965E0	10.965
Country;Gear;TC (1)	11	5.667E1	5.152E0	28.745
Month (2)	11	1.938E0	1.762E-1	0.983 (NS)
Bycatch PCT (3)	4	7.458E0	1.865E0	10.403
Year (4)	33	1.777E1	5.385E-1	3.005
RESIDUALS	303	5.431E1	1.792E-1	
TOTAL	363	3.013E3		

REGRESSION COEFFICIENTS

CATEGORY	CODE	VARIABLE	COEFFICIENT	STD. ERROR	NO. OBS.
Country;Gear;TC	3125	INTERCEPT	2.417	0.218	363
Month	7				
Bycatch PCT	95				
Year	59				
1	2114	1	-0.244	0.213	13
	3114	2	-0.034	0.187	46
	4127	3	0.019	0.216	15
	4157	4	0.438	0.212	26
	17126	5	-0.228	0.254	12
	20114	6	-1.471	0.278	6
	20127	7	0.530	0.185	79
	20157	8	0.696	0.195	49
	22114	9	1.166	0.201	50
	25126	10	0.148	0.229	17
	25127	11	0.614	0.209	40
2	1	12	-0.294	0.115	29
	2	13	-0.188	0.113	31
	3	14	-0.171	0.114	29
	4	15	-0.131	0.121	24
	5	16	-0.288	0.121	23
	6	17	-0.154	0.112	26
	8	18	-0.138	0.096	44
	9	19	-0.145	0.099	41
	10	20	-0.105	0.110	29
	11	21	-0.116	0.113	26
	12	22	-0.267	0.120	22
3	55	23	-0.537	0.101	42
	65	24	-0.489	0.098	32
	75	25	-0.223	0.087	42
	85	26	-0.166	0.083	41
4	60	27	0.861	0.162	12
	61	28	0.185	0.140	22
4	62	29	0.227	0.179	12
	63	30	0.024	0.144	19
	64	31	0.097	0.165	12
	65	32	0.246	0.230	5
	66	33	0.385	0.217	6
	68	34	0.297	0.304	3
	69	35	0.492	0.229	7
	70	36	0.529	0.228	7
	71	37	0.372	0.283	3
	72	38	0.478	0.204	9
	73	39	0.297	0.345	2
	74	40	-1.398	0.461	1
	75	41	0.688	0.252	5
	76	42	-0.010	0.208	7
	77	43	0.484	0.277	4
	78	44	0.196	0.255	5
	79	45	0.503	0.205	9
	80	46	0.601	0.203	10
	81	47	0.406	0.208	11
	82	48	0.396	0.191	15
	83	49	0.354	0.198	13
	84	50	0.248	0.222	8
	85	51	-0.021	0.198	13
	86	52	0.206	0.215	10
	87	53	0.424	0.180	36
	88	54	0.171	0.190	23
	89	55	0.151	0.202	17
	90	56	-0.213	0.214	10
	91	57	0.145	0.237	7
	92	58	-0.157	0.233	8
	93	59	0.213	0.209	14

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	S.E.	RETRANSFORMED MEAN	S.E.	CATCH	EFFORT
1959	0.2134	0.0318	1.370	0.243	34107	24898
1960	0.4073	0.0354	1.660	0.310	11463	6906
1961	0.6798	0.0634	2.149	0.533	8349	3884
1962	0.3443	0.0512	1.546	0.346	3425	2215
1963	0.5685	0.0562	1.930	0.452	8191	4244
1964	0.8324	0.1090	2.447	0.787	3898	1593
1965	0.7239	0.0791	2.229	0.615	9451	4240
1966	0.2791	0.0377	1.459	0.281	6927	4749
1967	0.5512	0.0353	1.917	0.357	7684	4008
1968	0.3805	0.0526	1.602	0.363	2348	1466
1969	0.4405	0.0495	1.704	0.375	927	544
1970	0.5475	0.0553	1.891	0.439	1029	544
1971	0.4936	0.0468	1.799	0.385	10043	5582
1972	0.3230	0.0551	1.511	0.350	3095	2049
1973	0.6824	0.0973	2.119	0.646	4709	2222
1974	0.1122	0.0979	0.957	0.293	11419	11933
1975	0.1081	0.0693	1.210	0.313	3838	3172
1976	0.1883	0.0175	1.346	0.177	15971	11870
1977	0.1291	0.0172	1.268	0.166	13452	10607
1978	0.0379	0.0181	1.157	0.155	6318	5460
1979	0.3251	0.0233	1.538	0.234	5584	3630
1980	0.2013	0.0217	1.360	0.200	4367	3211
1981	0.3545	0.0200	1.587	0.223	9407	5928
1982	0.3699	0.0156	1.615	0.201	7870	4873
1983	0.4236	0.0181	1.702	0.228	8657	5087
1984	0.2827	0.0230	1.475	0.222	2696	1828
1985	0.4554	0.0192	1.756	0.243	3677	2094
1986	0.5059	0.0145	1.851	0.222	27833	15034
1987	0.3280	0.0181	1.547	0.207	34212	22118
1988	0.1807	0.0145	1.337	0.161	26267	19642
1989	0.5651	0.0198	1.959	0.275	19847	10131
1990	0.0224	0.0151	1.141	0.140	17713	15522
1991	0.1293	0.0373	1.256	0.240	10879	8662
1992	0.5378	0.0361	1.891	0.356	10991	5813
1993	0.6184	0.0535	2.032	0.464	10191	5016

AVERAGE C.V. FOR THE RETRANSFORMED MEAN: 0.191

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	S.E.	RETRANSFORMED MEAN	S.E.	CATCH	EFFORT
1959	0.1142	0.0245	1.224	0.191	10478	8560
1960	0.3719	0.0622	1.554	0.382	16547	10646
1961	0.3312	0.0395	1.509	0.297	14826	9823
1962	0.4154	0.0317	1.648	0.292	18009	10925
1963	0.3076	0.0467	1.469	0.314	12906	8786
1964	0.3448	0.0511	1.521	0.340	4206	2765
1965	0.5548	0.0551	1.873	0.434	4042	2158
1966	0.6793	0.0230	2.156	0.325	10047	4661
1967	0.6089	0.0637	1.969	0.490	19504	9908
1968	-0.1691	0.0633	0.904	0.224	15265	16879
1969	0.3008	0.0417	1.463	0.296	22142	15139
1970	0.2600	0.0417	1.404	0.284	13359	9514
1971	0.1836	0.0844	1.273	0.363	24310	19092
1972	0.2467	0.0357	1.390	0.261	25838	18591
1973	0.3889	0.0417	1.597	0.323	28588	17898
1974	0.7316	0.0482	2.243	0.487	10867	4845
1975	0.5694	0.0512	1.904	0.426	14033	7369
1976	-0.1008	0.0426	0.978	0.200	4541	4641
1977	0.1428	0.0515	1.243	0.279	3064	2465
1978	0.1936	0.0439	1.313	0.272	5725	4362
1979	0.2690	0.0227	1.430	0.215	8483	5931
1980	0.5844	0.0269	1.957	0.319	11663	5960
1981	0.4569	0.0267	1.723	0.280	14873	8634
1982	0.5230	0.0244	1.843	0.286	13677	7423
1983	0.3531	0.0285	1.551	0.260	11090	7148
1984	0.1124	0.0333	1.217	0.221	12065	9917
1985	0.0350	0.0298	1.128	0.194	16880	14965
1986	0.0578	0.0348	1.151	0.213	14972	13007
1987	0.4621	0.0219	1.736	0.256	44819	25822
1988	0.1619	0.0261	1.283	0.206	26999	21046
1989	0.0387	0.0292	1.132	0.192	13802	12187
1990	-0.2882	0.0285	0.817	0.137	11392	13944
1991	0.1166	0.0480	1.213	0.263	14824	12224
1992	-0.2143	0.0465	0.872	0.186	16404	18817
1993	0.2317	0.0313	1.372	0.241	11009	8023

AVERAGE C.V. FOR THE RETRANSFORMED MEAN: 0.195

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	2.8782	0.0282	19.043	3.181	34107	1791
1960	2.9907	0.0328	21.261	3.823	11463	539
1961	3.0404	0.0348	22.321	4.134	8349	374
1962	2.9806	0.0411	20.959	4.214	3425	163
1963	3.2399	0.0535	26.996	6.171	8191	303
1964	3.4258	0.0819	32.052	9.000	3898	122
1965	2.9145	0.0720	19.318	5.098	9451	489
1966	2.7927	0.0341	17.430	3.194	6927	397
1967	3.1065	0.0437	23.741	4.916	7684	324
1968	2.9350	0.0449	19.987	4.192	2348	117
1969	2.8889	0.0495	19.042	4.190	927	49
1970	2.2695	0.0872	10.058	2.910	1029	102
1971	3.0715	0.1159	22.109	7.323	10043	454
1972	2.2744	0.0609	10.242	2.494	3095	302
1973	2.8686	0.1039	18.159	5.712	4709	259
1974	2.3708	0.2202	10.412	4.635	11419	1097
1975	2.6072	0.0687	14.229	3.672	3838	270
1976	2.8628	0.0181	18.845	2.530	15971	847
1977	2.8081	0.0174	17.849	2.346	13452	754
1978	2.5053	0.0204	13.166	1.872	6318	480
1979	2.7385	0.0255	16.582	2.636	5584	337
1980	2.7843	0.0255	17.359	2.759	4367	252
1981	2.9869	0.0208	21.307	3.061	9407	442
1982	3.0877	0.0164	23.619	3.021	7870	333
1983	3.0740	0.0189	23.268	3.188	8657	372
1984	2.8125	0.0289	17.826	3.014	2696	151
1985	2.7396	0.0205	16.641	2.376	3677	221
1986	3.0325	0.0145	22.372	2.686	27833	1244
1987	2.8820	0.0177	19.215	2.548	34212	1780
1988	2.7867	0.0159	17.484	2.200	26267	1502
1989	3.0562	0.0232	22.810	3.460	19847	870
1990	2.5950	0.0183	14.417	1.943	17713	1229
1991	2.5319	0.0448	13.357	2.801	10879	814
1992	2.6676	0.0443	15.302	3.190	10991	718
1993	2.9501	0.0599	20.139	4.862	10191	506

AVERAGE C.V. FOR THE RETRANSFORMED MEAN: 0.199

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	2.4174	0.0473	11.984	2.581	10478	874
1960	3.2784	0.0560	28.226	6.599	16547	586
1961	2.6023	0.0480	14.413	3.126	14826	1029
1962	2.6443	0.0545	14.983	3.455	18009	1202
1963	2.4411	0.0500	12.255	2.711	12906	1053
1964	2.5140	0.0575	13.133	3.108	4206	320
1965	2.6631	0.0834	15.047	4.263	4042	269
1966	2.8029	0.0506	17.592	3.914	10047	571
1967	2.7142	0.0779	15.880	4.354	15265	961
1968	2.9093	0.0698	19.380	5.039	22142	1143
1969	2.9463	0.0709	20.098	5.268	13359	665
1970	2.7895	0.0987	16.943	5.203	24310	1435
1971	2.8958	0.0536	19.276	4.410	25838	1340
1972	2.7141	0.1350	15.430	5.491	28588	1853
1973	1.0195	0.2260	2.707	1.220	10867	4014
1974	3.1056	0.0817	23.441	6.576	14033	599
1975	2.4077	0.0582	11.804	2.812	4541	385
1976	2.9011	0.0905	19.021	5.605	3064	161
1977	2.6138	0.0807	14.342	4.000	5725	399
1978	2.9205	0.0399	19.894	3.939	8483	426
1979	3.0188	0.0543	21.791	5.016	11663	535
1980	2.8236	0.0569	17.904	4.218	14873	831
1981	2.7717	0.0475	17.808	3.842	13677	768
1982	2.6650	0.0512	17.046	3.814	11090	651
1983	2.6610	0.0640	15.223	3.797	12065	793
1984	2.3961	0.0562	11.680	2.734	16880	1445
1985	2.6234	0.0617	14.620	3.581	14972	1024
1986	2.8413	0.0460	18.322	3.891	44819	2446
1987	2.5888	0.0505	14.202	3.155	26999	1901
1988	2.5681	0.0548	13.880	3.211	13802	994
1989	2.2045	0.0601	9.625	2.327	11392	1184
1990	2.5627	0.0714	13.692	3.600	14824	1083
1991	2.2605	0.0691	10.133	2.622	16404	1619
1992	2.6304	0.0561	14.764	3.455	11009	746

AVERAGE C.V. FOR THE RETRANSFORMED MEAN: 0.253

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)
Upper (95% CI)*			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)*			45.2	11.03	-139.6	-93.2	73.94	47.2	-1491.7	108.5	85.5
Abundance of surveyed area (x 10^{-6})			285.6	216.8	54.3	247.3	478.2	144.9	175.9	241.7	158.3

*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)
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 (x 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)
347	184-274	983	0.00(4)	0.00(2)	0.00(4)	0.00(3)	0.00(4)
366	184-274	1394	0.33(6)	1.00(24)	0.00(7)	2.50(2)	0.21(14)
369	184-274	961	0.00(4)	0.00(8)	0.00(5)	0.00(3)	0.14(7)
386	184-274	983	0.00(4)	0.00(3)	0.20(5)	0.00(3)	0.00(3)
389	184-274	821	0.00(3)	0.67(3)	0.00(4)	1.00(3)	0.00(3)
391	184-274	282	2.50(2)	0.00(3)	0.00(2)	0.33(3)	1.00(3)
345	275-366	1432	0.00(6)	0.25(4)	0.00(6)	1.67(3)	0.00(3)
346	275-366	865	1.75(4)	2.64(14)	2.25(4)	5.33(3)	5.09(11)
368	275-366	334	12.00(2)	18.20(10)	9.50(2)	25.00(3)	5.63(8)
387	275-366	718	8.00(3)	10.00(3)	6.07(3)	51.33(3)	2.33(3)
388	275-366	361	2.00(2)	20.00(3)	1.50(2)	11.00(3)	6.67(3)
392	275-366	145	3.50(2)	3.33(3)	1.50(2)	21.00(3)	4.67(3)
735	367-549	272	76.50(2)	222.33(3)	14.50(2)	35.00(3)	31.00(3)
733	367-549	468	53.00(2)	210.00(3)	20.67(3)	215.67(3)	18.67(3)
731	367-549	216	26.00(2)	205.00(3)	26.00(2)	170.00(3)	21.67(3)
729	367-549	186	59.50(2)	296.50(2)	31.50(2)	210.33(3)	172.67(3)
736	550-731	175	60.50(2)	45.50(2)	40.50(2)	11.67(3)	24.67(3)
734	550-731	228	140.00(2)	108.00(2)	19.06(2)	20.67(3)	70.50(2)
732	550-731	231	214.50(2)	198.50(2)	401.00(2)	93.67(3)	18.00(2)
730	550-731	170	113.50(2)	69.50(2)	249.00(2)	50.33(3)	332.00(3)
Upper (95% CI)*			38.6	49.8	117.9	41.6	24.65
Weighted mean (by area) (incl. strata with 1 set)			16.7	33.3	16.2	25.6	13.1
Lower (95% CI)*			-5.2	16.8	-85.5	9.5	1.5
Abundance of surveyed area (x 10⁻⁶)			14.1	28.1	13.7	21.5	11.0

*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(3)	238.85(3)	96.75(2)	263.25(2)	57.25(2)	408.00(2)	4710.00(2)	195.50(2)	19.75(2)
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)
Upper (95% CI)*			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)*			-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

*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)
347	184-274	983	0.00(4)	0.00(2)	0.00(4)	0.00(3)	0.00(4)
366	184-274	1394	0.08(6)	0.28(24)	0.00(7)	0.70(2)	0.06(14)
369	184-274	961	0.00(4)	0.00(8)	0.00(5)	0.00(3)	0.03(7)
386	184-274	983	0.00(4)	0.00(3)	0.09(5)	0.00(3)	0.00(3)
389	184-274	821	0.00(3)	0.03(3)	0.00(4)	0.14(3)	0.00(3)
391	184-274	282	0.40(2)	0.00(3)	0.00(2)	0.22(3)	0.53(3)
345	275-366	1432	0.00(6)	0.19(4)	0.00(6)	0.48(3)	0.00(3)
346	275-366	865	0.50(4)	0.83(14)	0.52(4)	1.43(3)	1.94(11)
368	275-366	334	4.70(2)	4.60(10)	3.25(2)	6.77(3)	1.04(8)
387	275-366	718	2.47(3)	2.43(3)	2.36(3)	14.45(3)	0.68(3)
388	275-366	361	0.30(2)	3.27(3)	0.49(2)	3.28(3)	2.33(3)
392	275-366	145	1.63(2)	0.55(3)	0.36(2)	3.45(3)	1.56(3)
735	367-549	272	20.88(2)	79.35(3)	3.90(2)	7.60(3)	5.32(3)
733	367-549	468	16.83(2)	68.35(3)	6.68(3)	68.48(3)	4.92(3)
731	367-549	216	6.75(2)	46.25(3)	7.25(2)	59.72(3)	5.08(3)
729	367-549	186	13.70(2)	89.72(2)	6.75(2)	60.22(3)	55.12(3)
736	550-731	175	17.38(2)	13.60(2)	13.60(2)	6.43(3)	6.35(3)
734	550-731	228	51.63(2)	43.58(2)	7.93(2)	11.35(3)	21.03(2)
732	550-731	231	71.70(2)	67.80(2)	90.90(2)	45.27(3)	4.57(2)
730	550-731	170	41.40(2)	36.53(2)	43.95(2)	23.32(3)	168.46(3)
Upper (95% CI)*			12.5	16.2	24.9	14.8	10.7
Weighted mean (by area) (incl. strata with 1 set)			5.4	10.7	3.9	8.4	4.9
Lower (95% CI)*			-1.7	5.3	-17.2	1.9	-1.0
Trawlable biomass (t) of surveyed area			4528	9037	3243	7037	4095

*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)
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)
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)
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)
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)
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)
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)
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)
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)
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)
727	367-549	160	15.50(2)	121.44(4)	-	9.00(2)	-	32.00(2)	1551.05(3)	195.50(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)
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)
728	550-731	156	72.50(2)	66.50(4)	-	85.00(2)	-	1203.73(2)	100.67(3)	31.00(1)
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)
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)
Upper (95% CI)*			134.6	2964.8	850.2	55.1	23024.8	1090.0	1969.9	767.7
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
Lower (95% CI)*			-22.2	-1572.3	-32.2	8.7	-17755.9	-796.5	-270.7	-456.0
Abundance of surveyed area (X 10⁻⁶)			12.1	139.9	70.6	6.6	377.1	31.6	182.2	31.8

*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)
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)
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)
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)
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)
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)
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)
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)
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)
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)
727	367-549	160	2.85(2)	40.73(4)	-	1.20(2)	-	4.54(2)	558.06(3)	43.95(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)
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)
728	550-731	156	22.20(2)	30.75(4)	-	23.95(2)	-	513.79(2)	40.93(3)	11.25(1)
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)
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)
Upper (95% CI)			24.4	729.9	160.7	10.3	2769.5	392.8	250.4	72.1
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
Lower (95% CI)			-5.1	-442.0	-61.7	0.0	-2073.6	-308.0	53.5	3.8
Trawlable biomass (t) of surveyed area			2085	30552	9350	1071	49807	9148	32752	7735

*Confidence interval of mean for those strata with at least 2 sets.
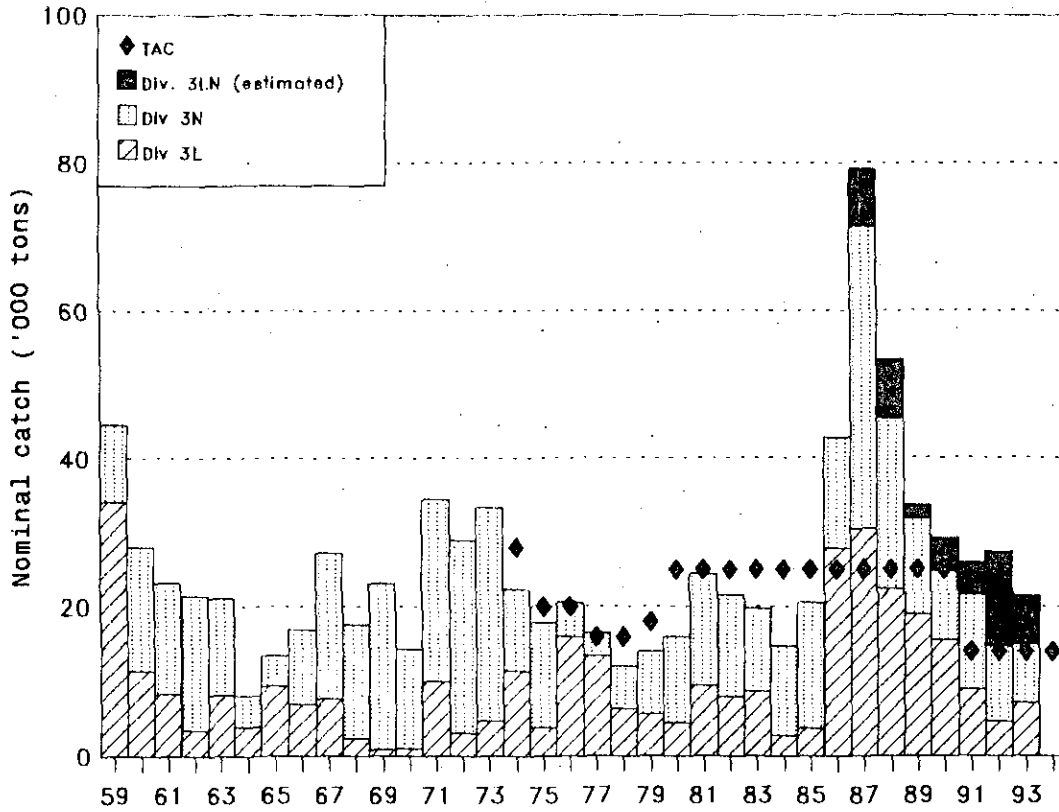
Fig. 1. Nominal catches and TACs of redfish in Div. 3LN
(1990-92 are provisional).
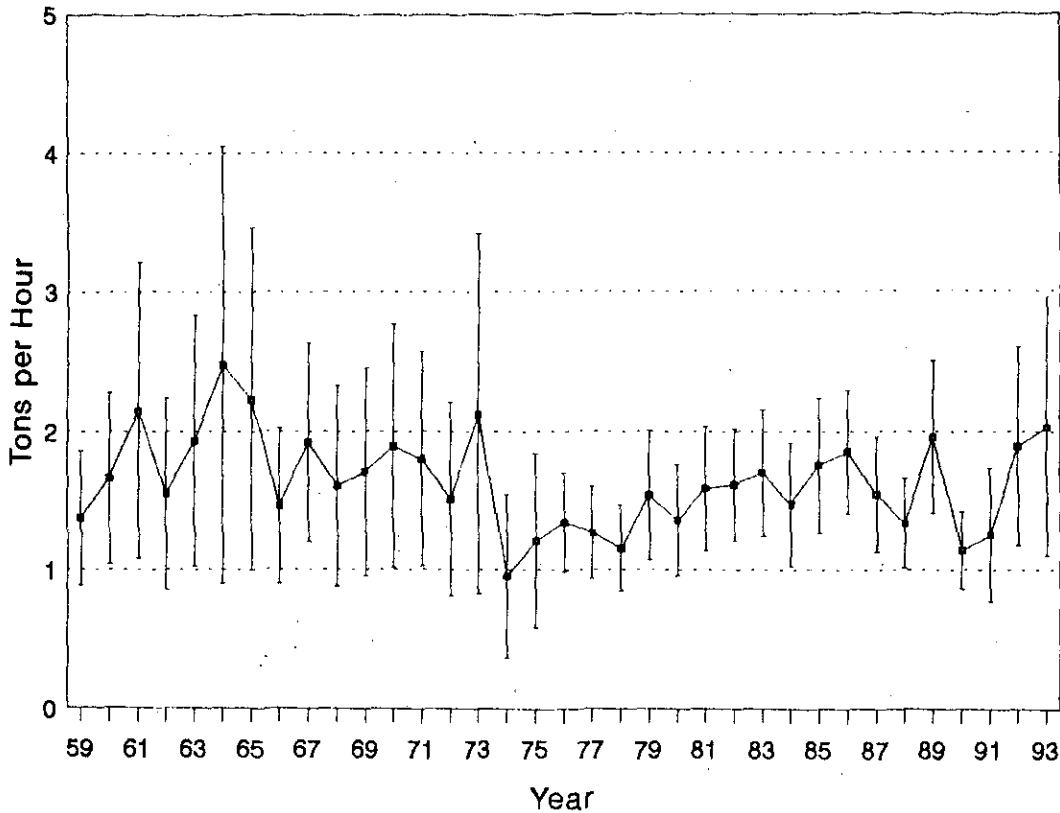
Fig. 2a. Standardized CPUE and approximate 95% confidence interval
for Div. 3L redfish based on effort in hours fished for 1959-1993.
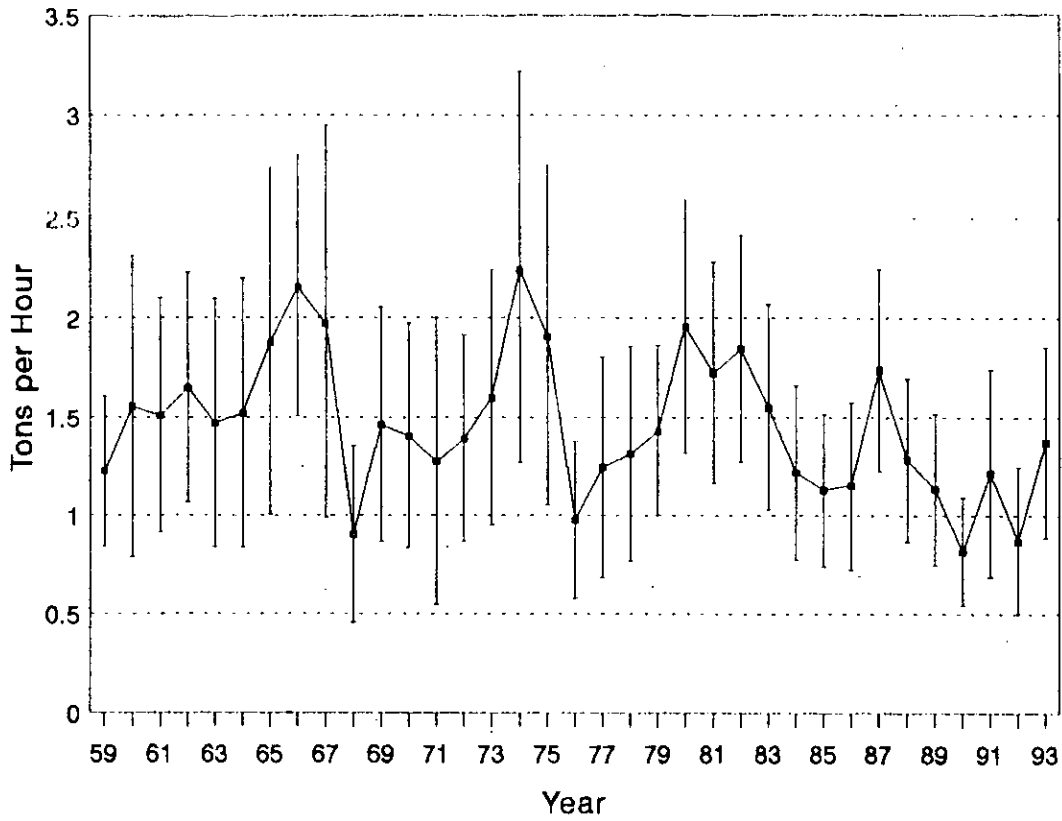
Fig. 2b. Standardized CPUE and approximate 95% confidence interval
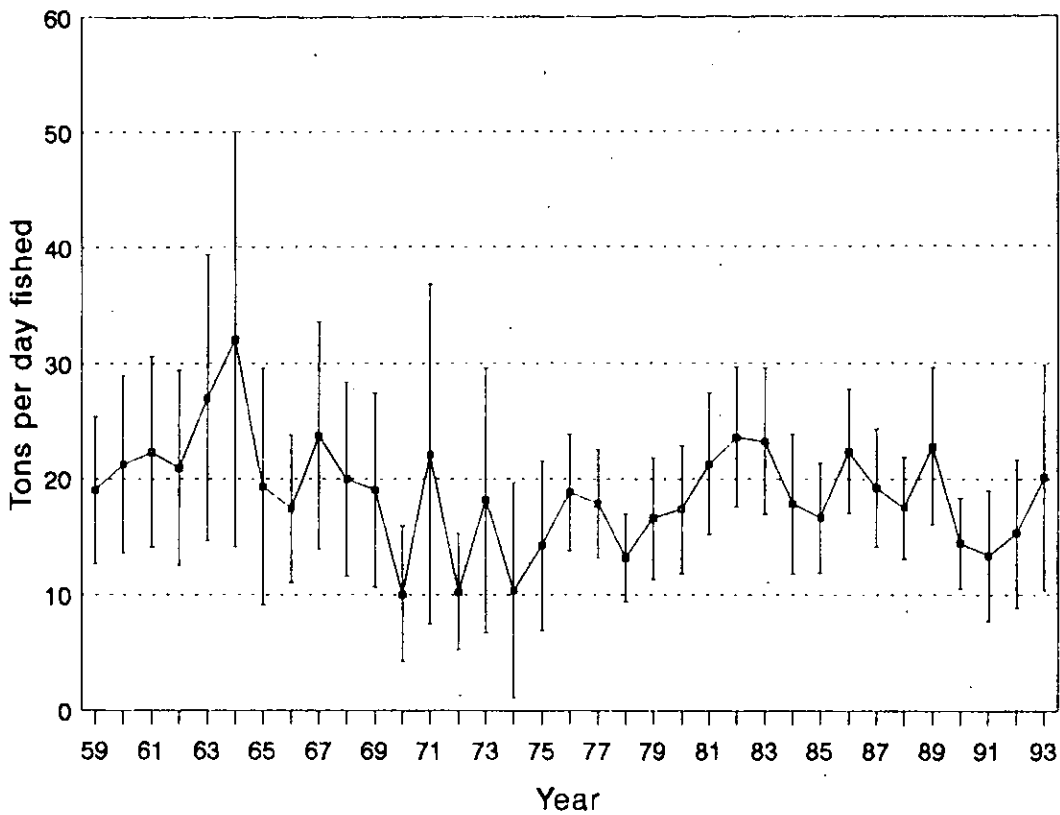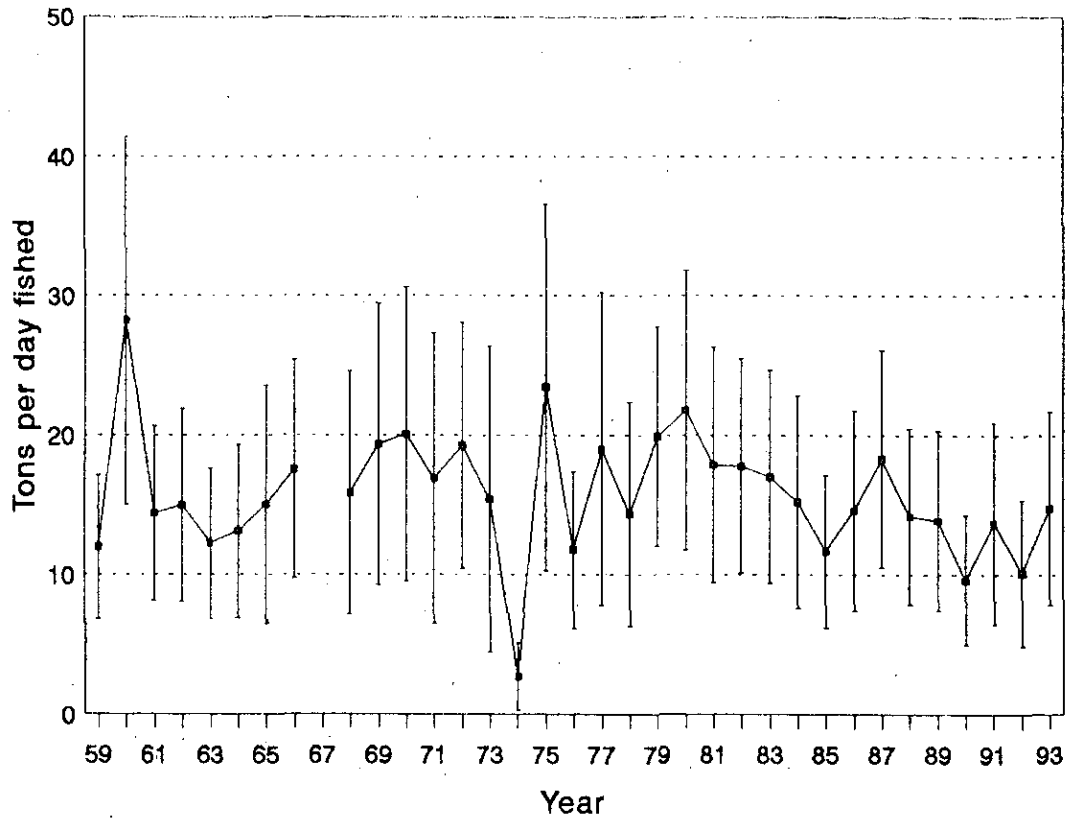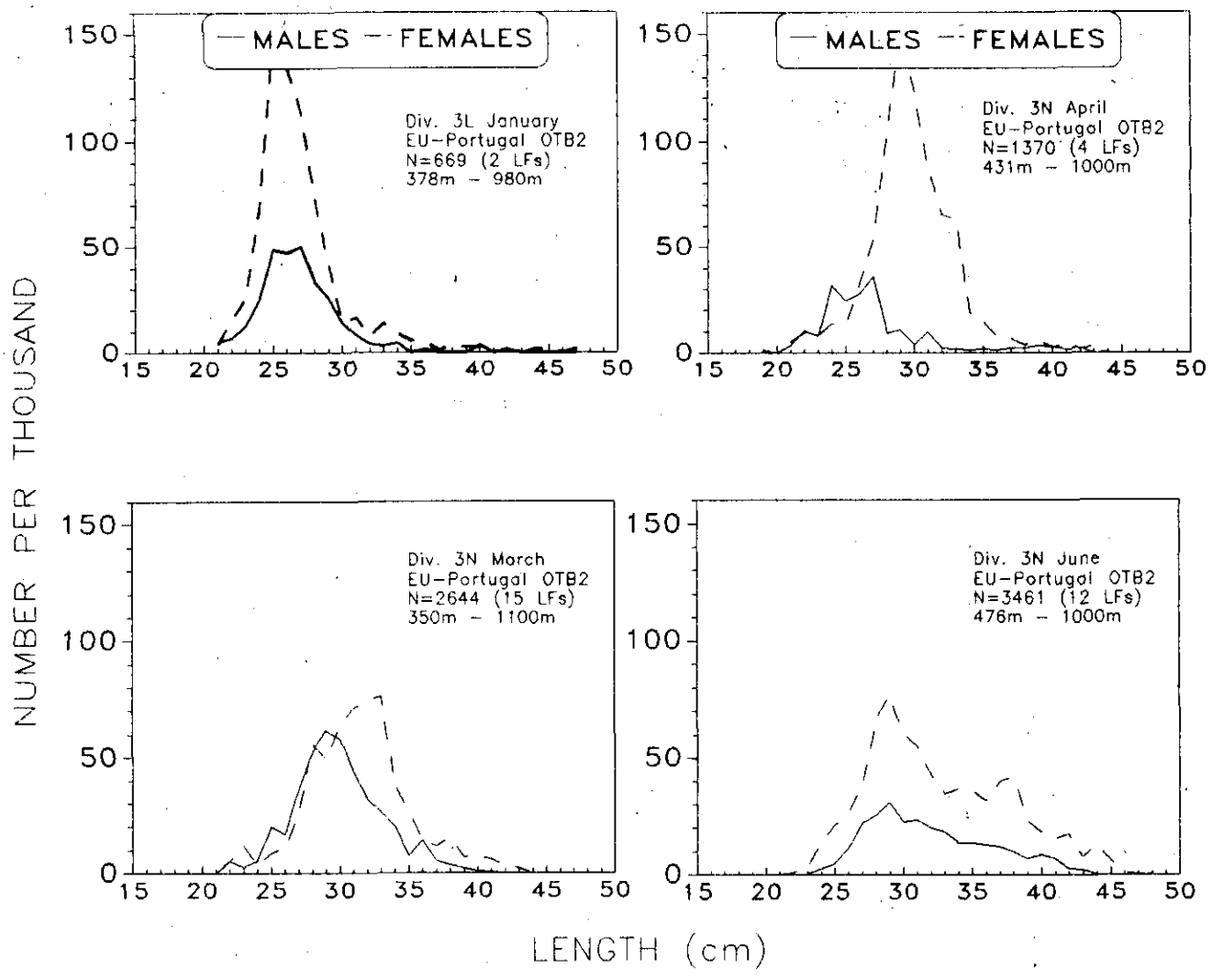for Div. 3N redfish based on effort in hours fished for 1959-1993.

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. Length frequencies from sampling of commercial fisheries in Div. 3L and 3N in 1992.
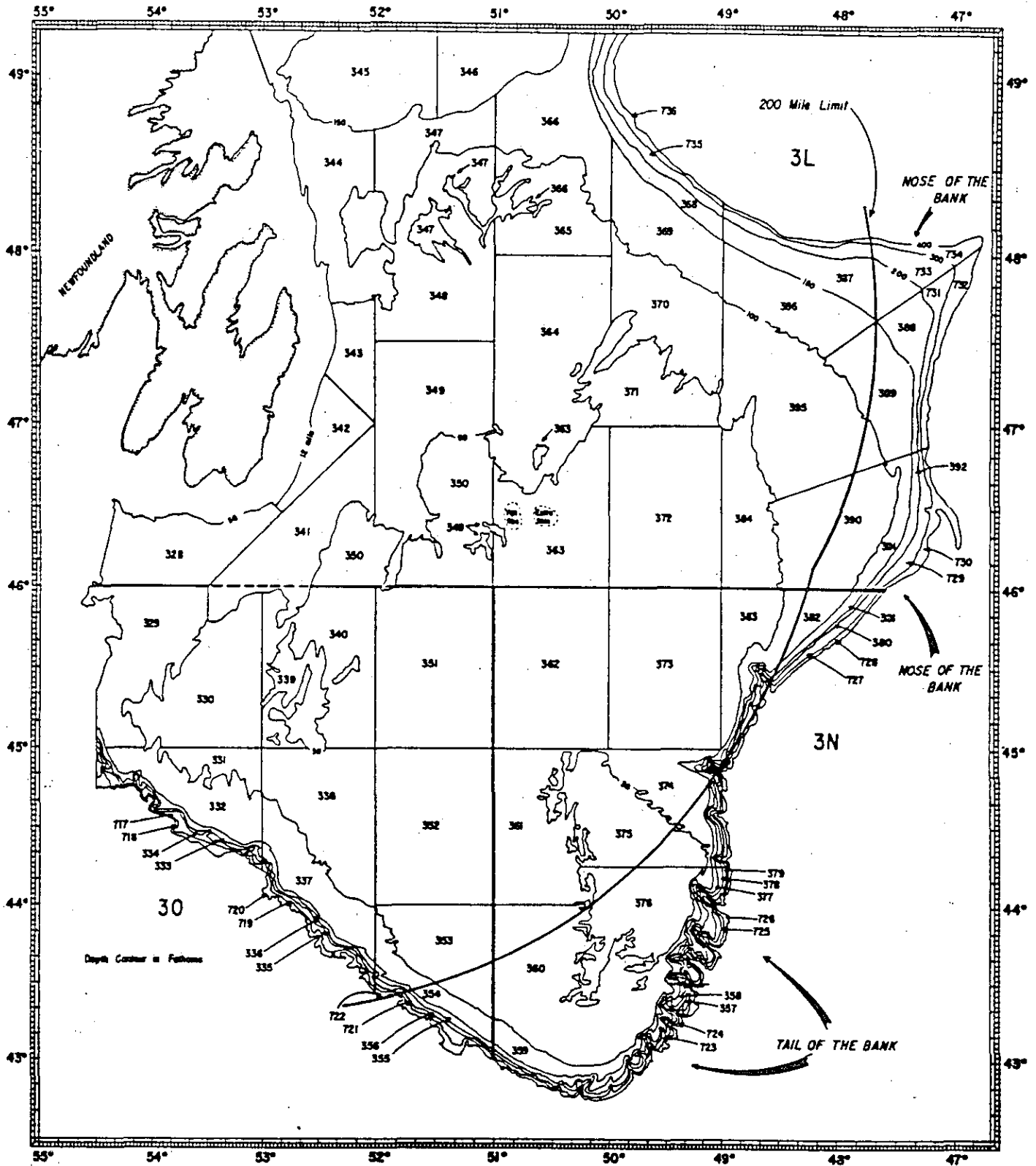
Fig. 5. Stratification scheme for NAFO Divisions 3LNO showing the boundary line
between the Canadian economic zone and the Regulatory area.
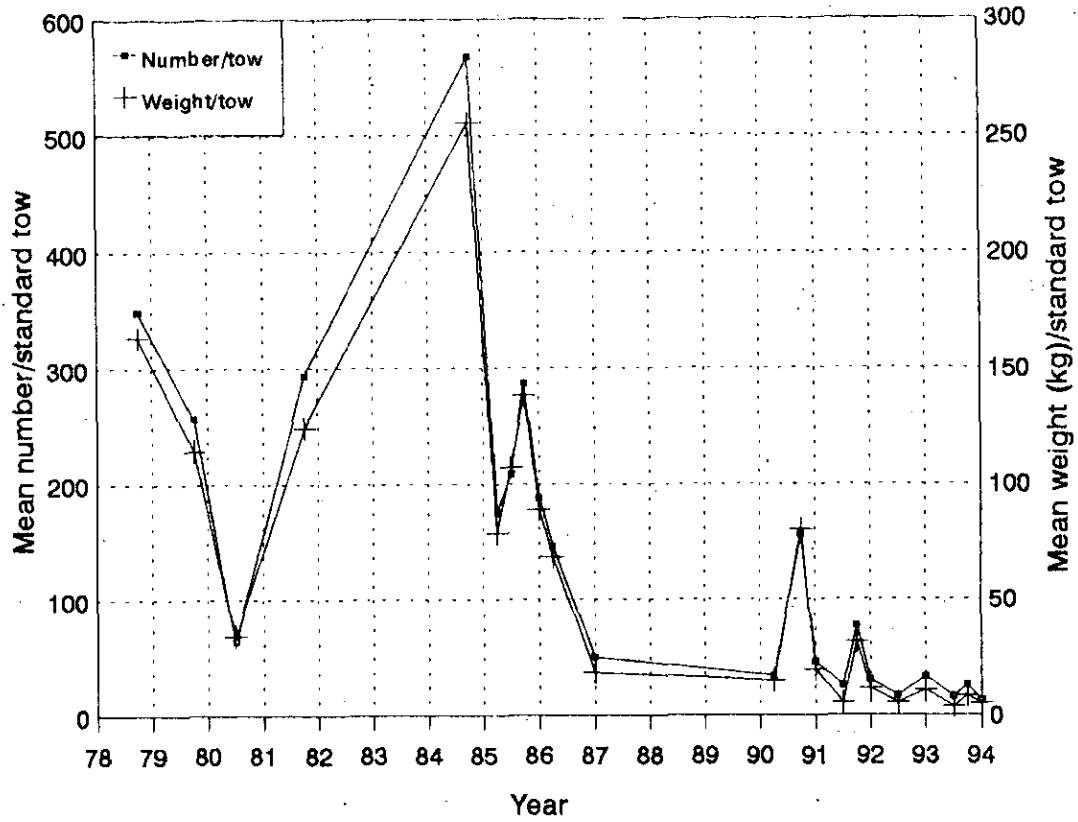
Fig 6a. Stratified mean number and weight per standard tow in Div. 3L from various Canadian surveys where strata greater than 366 m were surveyed.
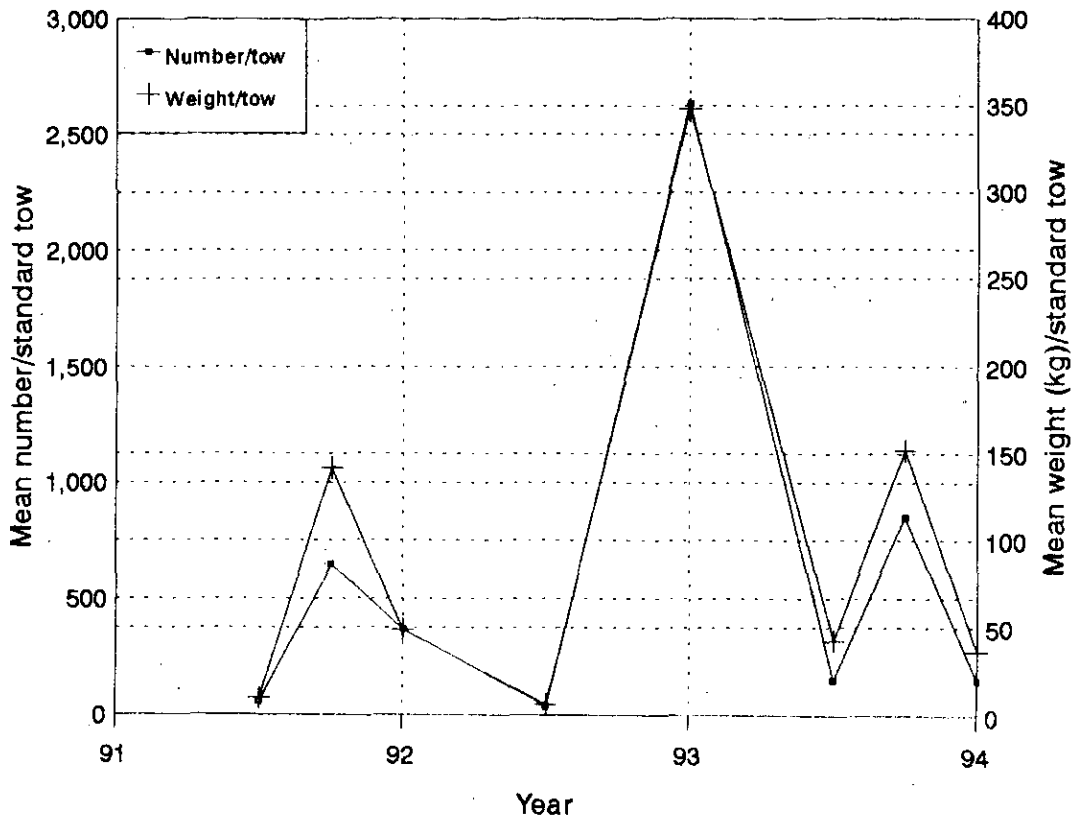

Fig 6b. Stratified mean number and weight per standard tow from Canadian surveys in Div. 3N from 1991-1993.
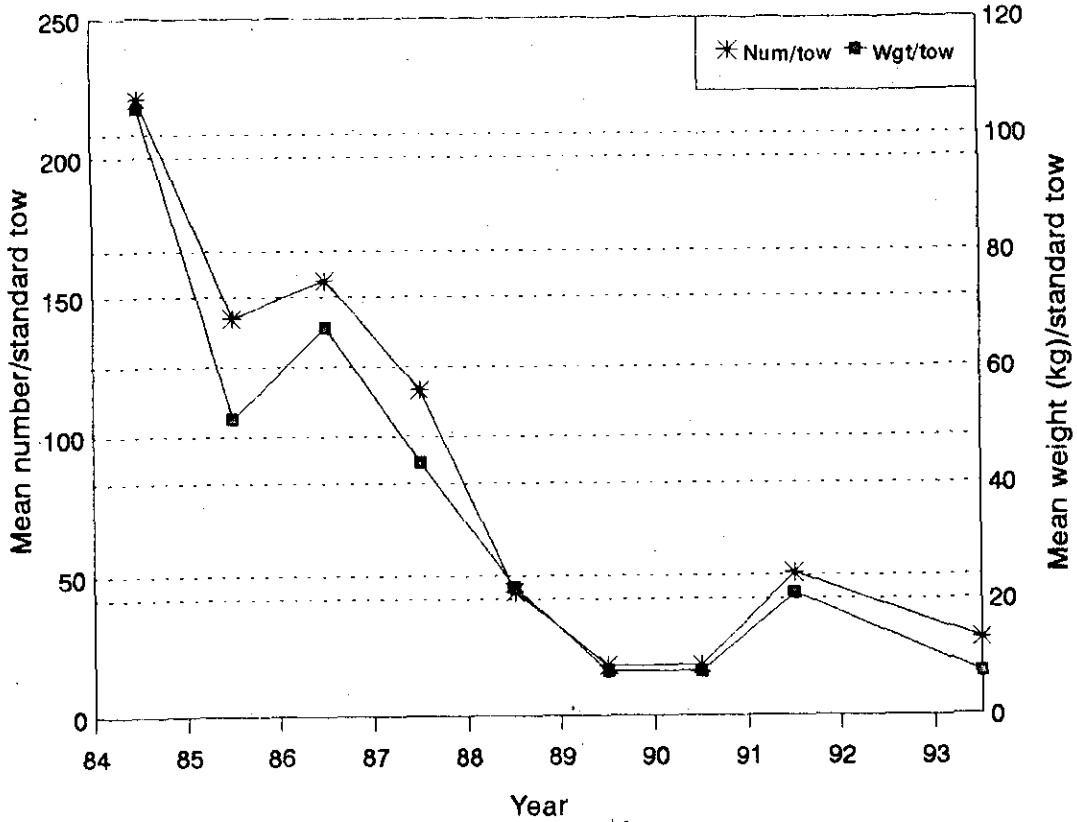
Fig 7a. Stratified mean number and weight per standard
tow from Russian surveys in Div. 3L.
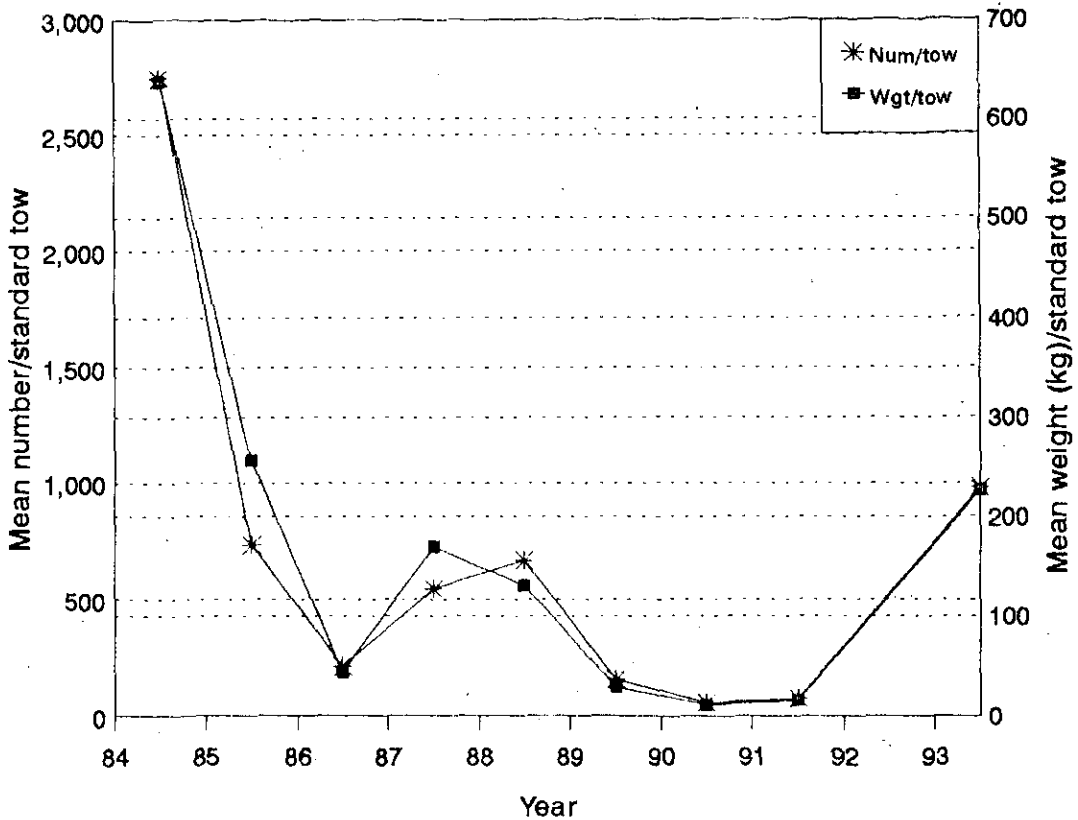
Fig 7b. Stratified mean number and weight per standard
tow from Russian surveys in Div. 3N.
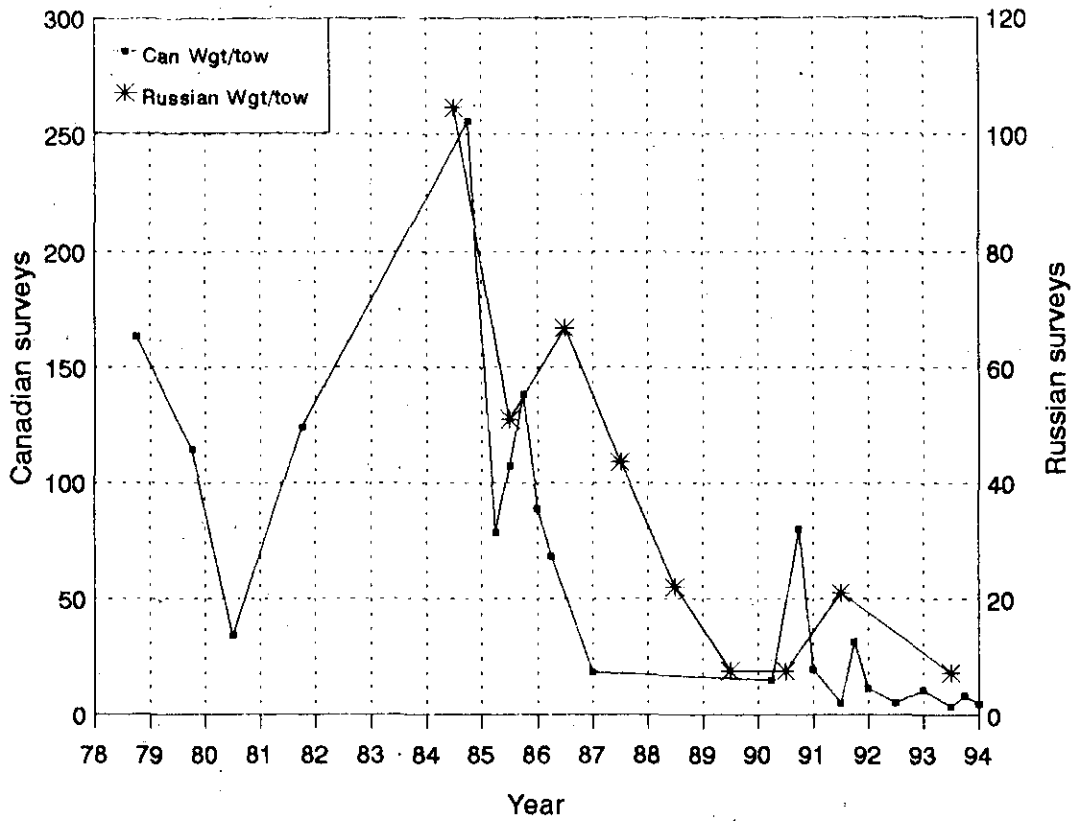
Fig 8a. Stratified mean weight (kg) per standard tow in Div. 3L from Canadian and Russian surveys where strata greater than 366 m were surveyed.
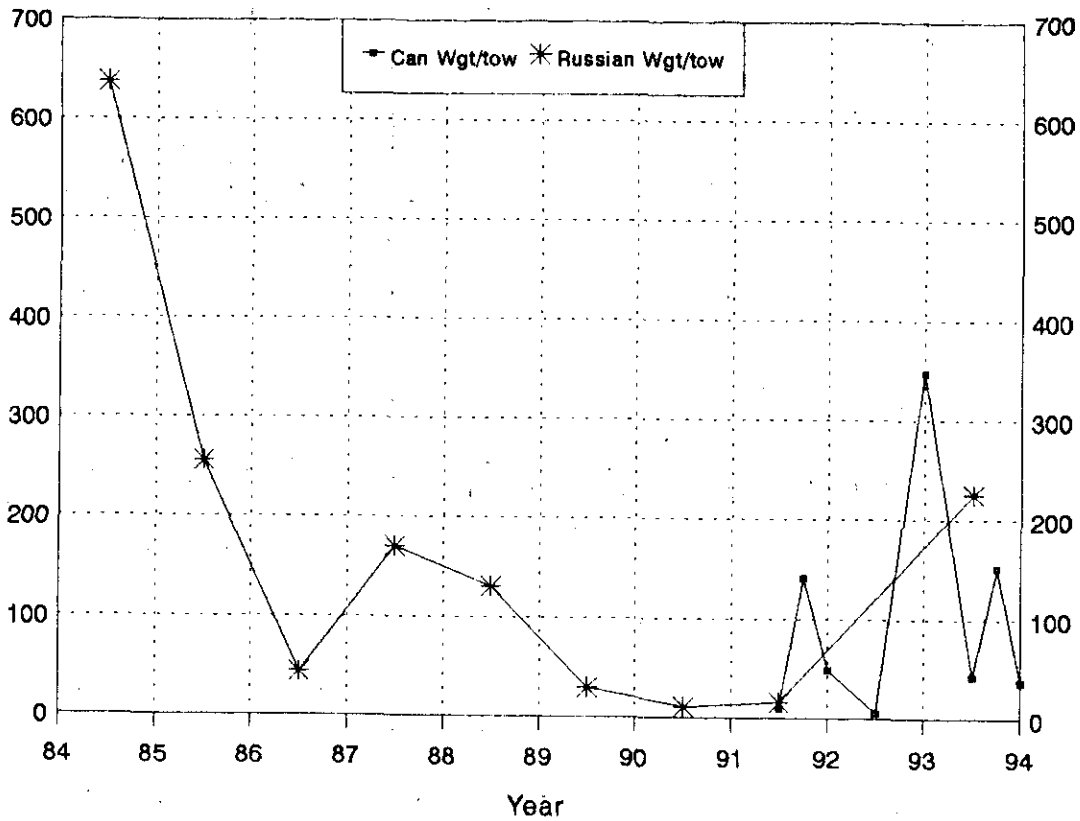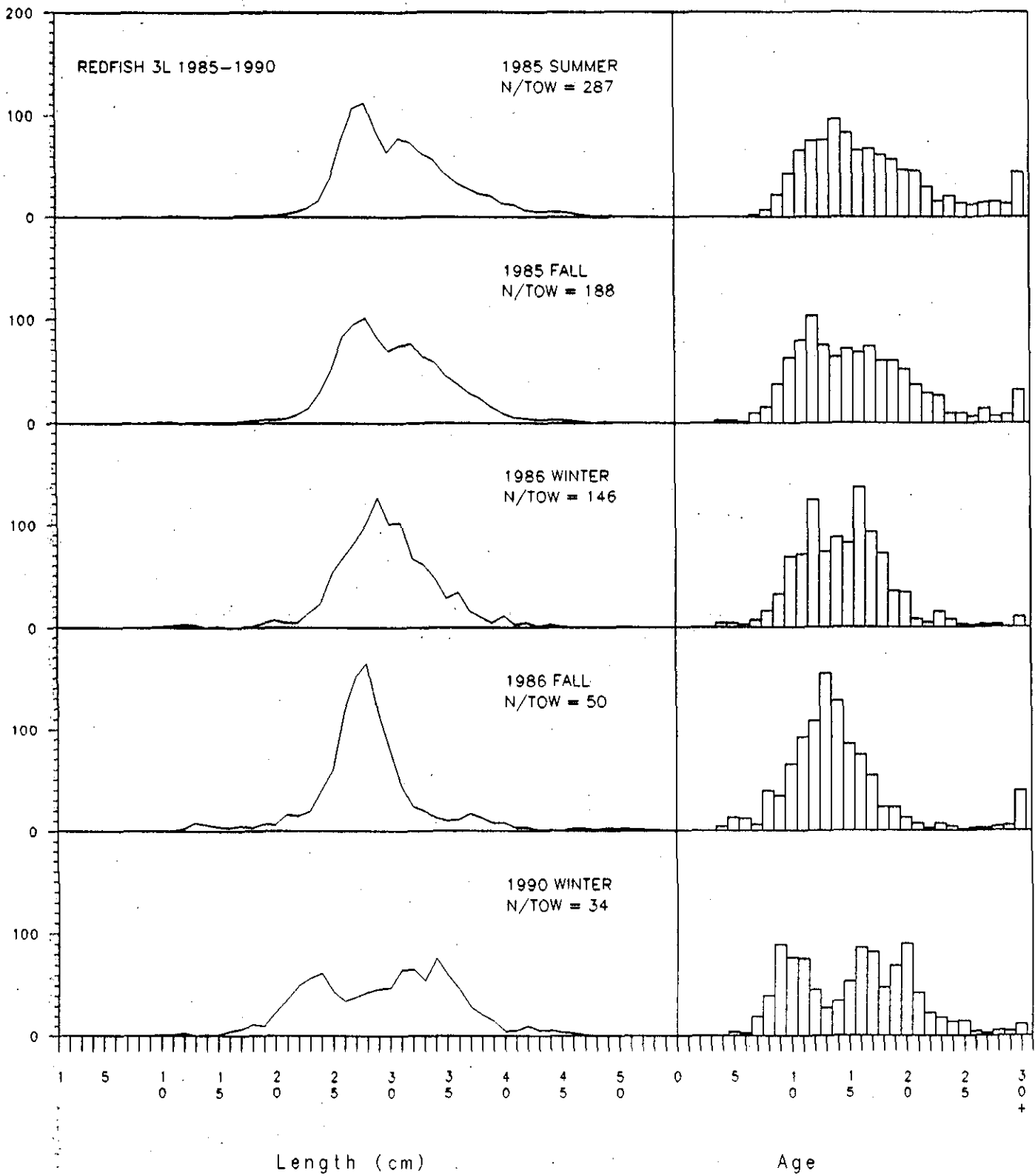

Fig 8b. Stratified mean weight (kg) per standard tow in Div. 3N from Canadian and Russian surveys where strata greater than 366 m were surveyed.

Figure 9 . Length frequencies and corresponding age distribution
from various stratified random research surveys where strata greater
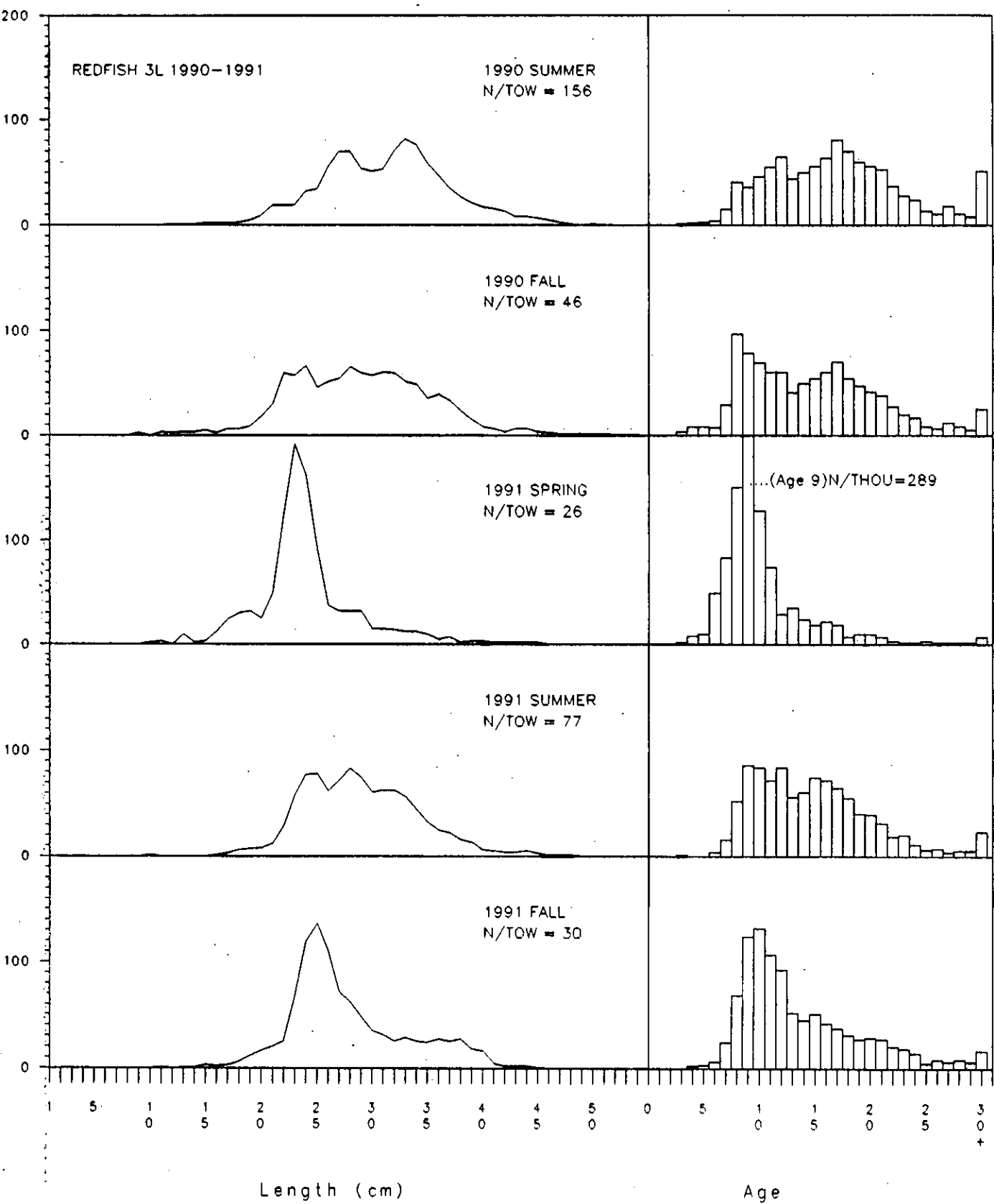than 366 m (200 fathoms) were sampled in Div. 3L from 1985–1993.

REDFISH 3L 1990-1991

1990 SUMMER
N/TOW = 156

1990 FALL
N/TOW = 46

1991 SPRING
N/TOW = 26

...(Age 9)N/THOU=289

1991 SUMMER
N/TOW = 77

1991 FALL
N/TOW = 30

Length (cm)

Age

Figure 9 . (continued, 1990 summer - 1991 fall)

REDFISH 3L 1992–1993

1992 SPRING
N/TOW = 17

1992 FALL
N/TOW = 33

1993 SPRING
N/TOW = 16

1993 SUMMER
N/TOW = 26

1993 FALL
N/TOW = 13

Length (cm)

Age
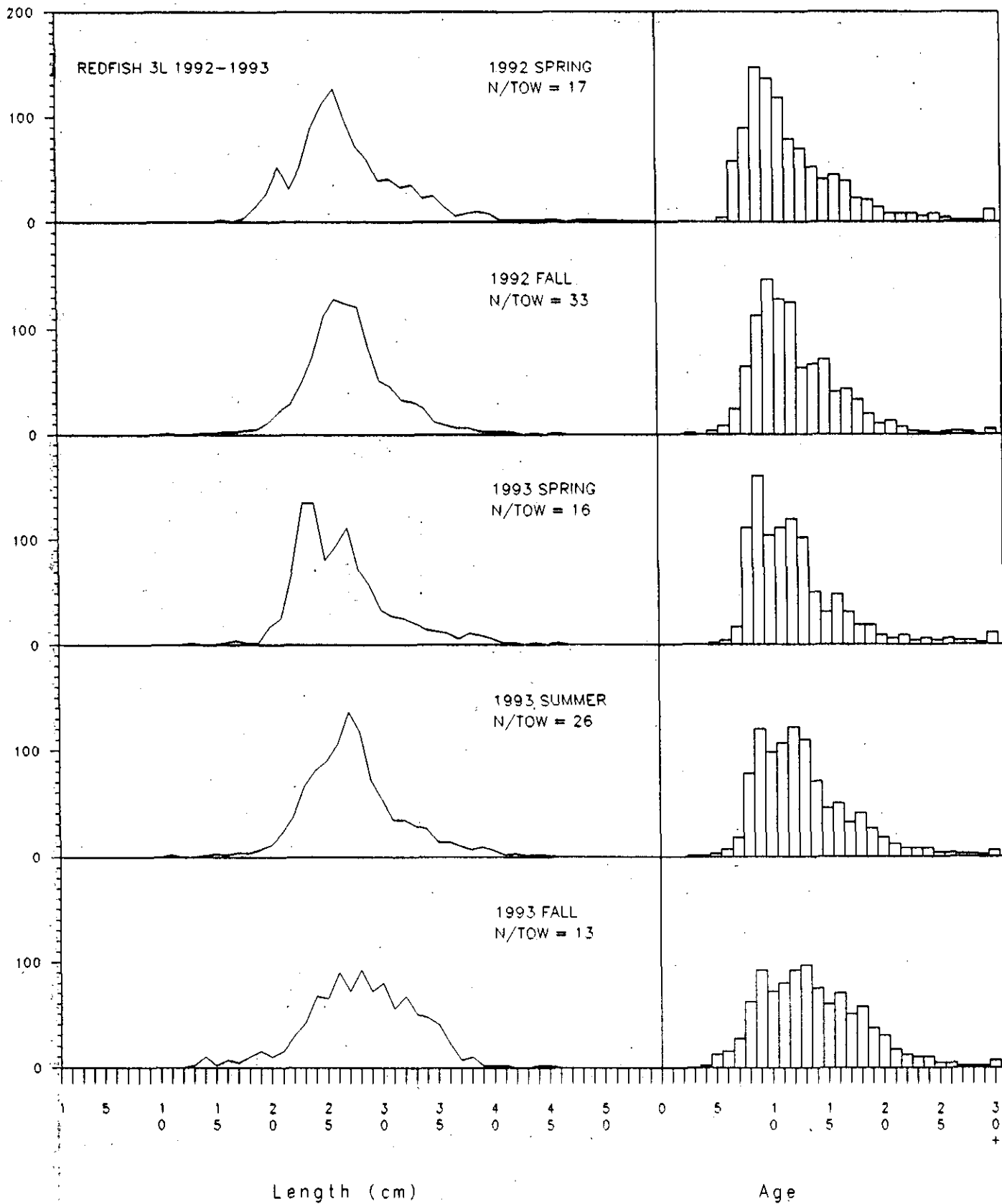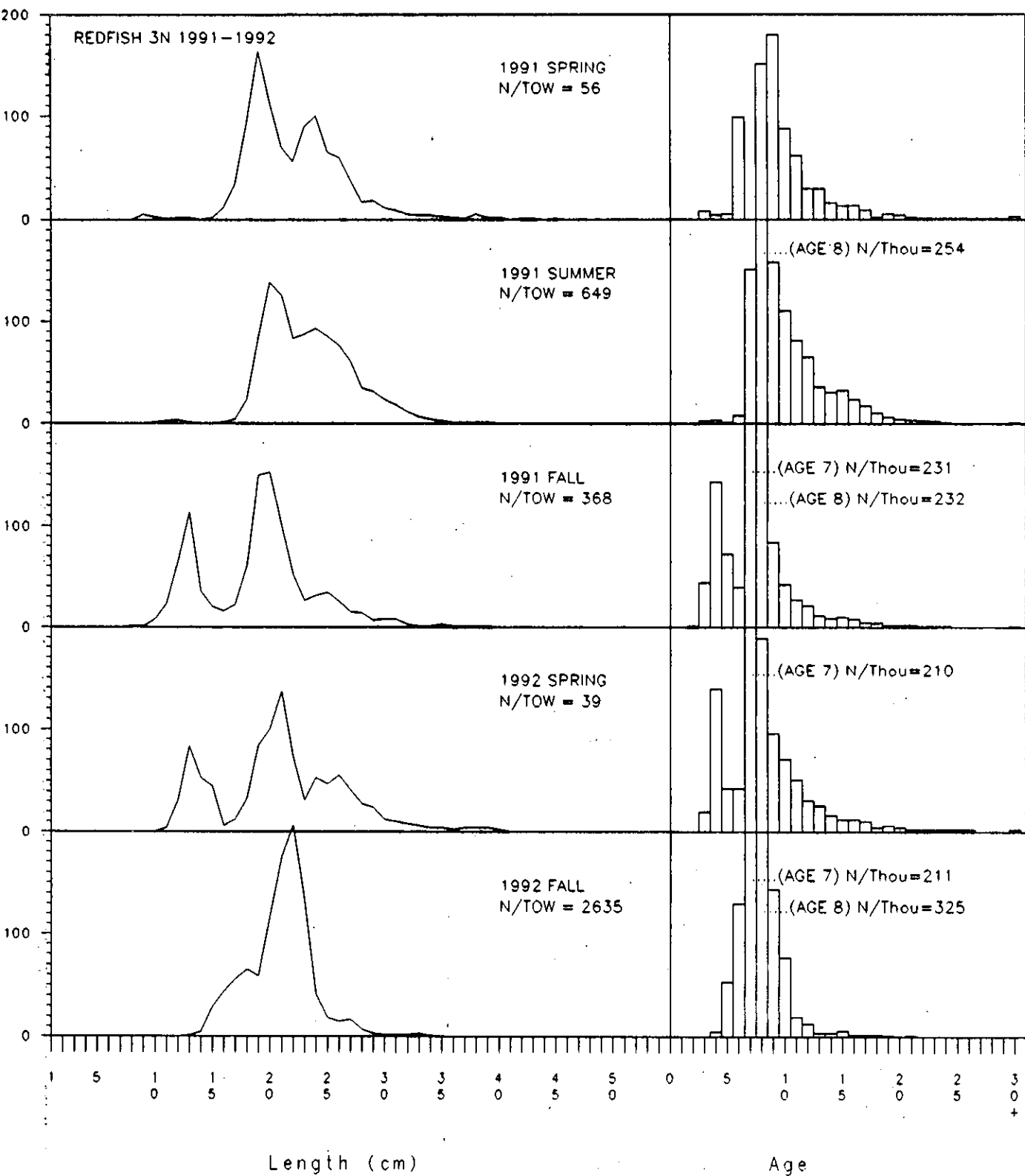
Figure 9. (continued, 1992 spring – 1993 fall)

Figure 10. Length frequencies and corresponding age distribution from various stratified random research surveys where strata greater than 366 m (200 fathoms) were sampled in Div. 3N from 1991–1993.

REDFISH 3N 1993

1993 SPRING
N/TOW = 147

1993 SUMMER
N/TOW = 850
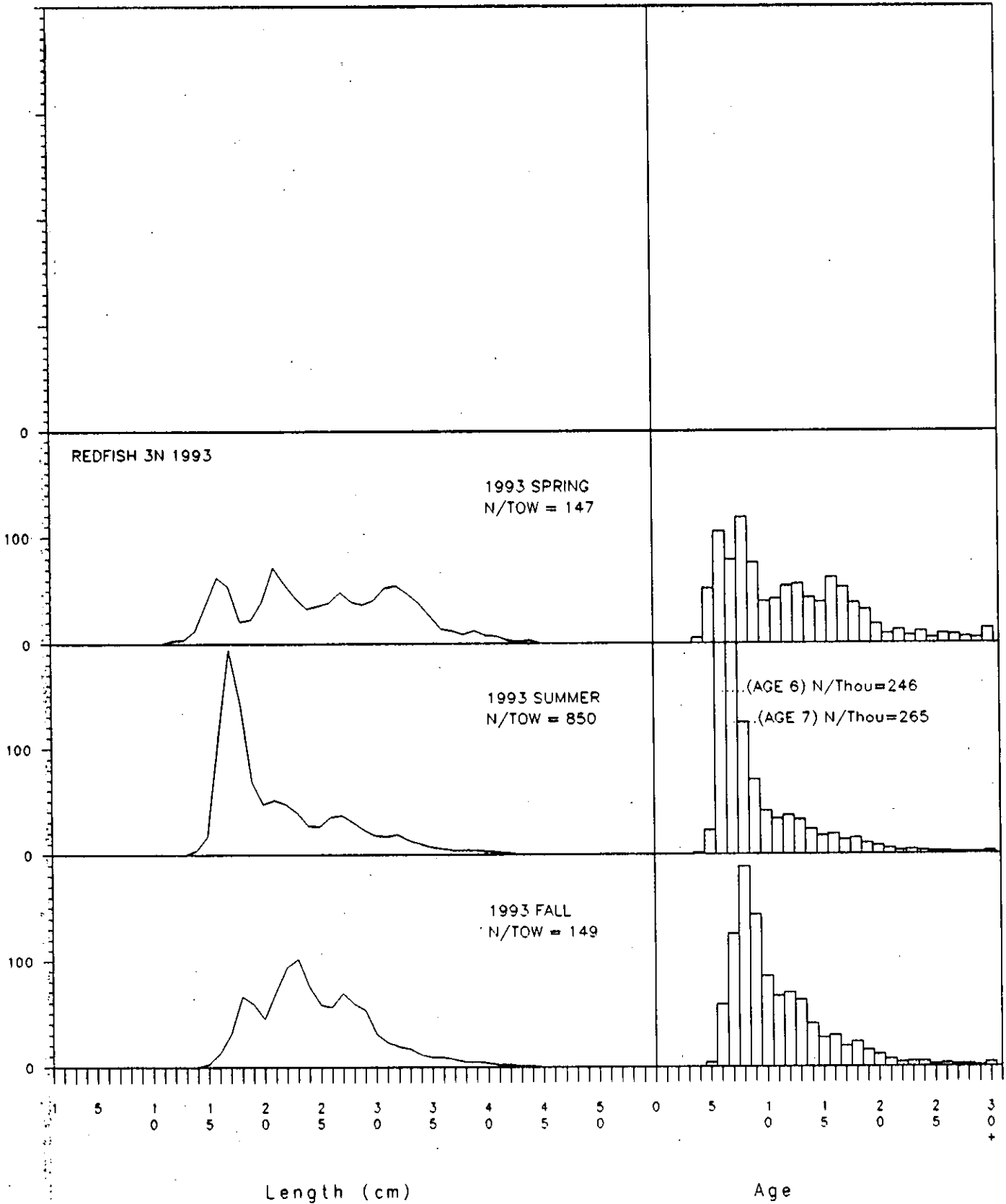
(AGE 6) N/Thou=246
(AGE 7) N/Thou=265

1993 FALL
N/TOW = 149

Length (cm)

Age

Figure 10. (continued, 1993)