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The Status of the Redfish Resource in NAFO Divisions 3LN

by

D. Power and D. Maddock Parsons

Science Branch, Department of Fisheries and Oceans
P. O. Box 5667, St. John's, Newfoundland, Canada A1C 5X1

Introduction

There are two species of Sebastes that have been commercially fished in Div. 3LN: the deep sea redfish (*Sebastes mentella)* and the Acadian redfish (*Sebastes fasciatus*) The external characteristics are very similar, making them difficult to distinguish, and as a consequence they are reported collectively as "redfish" in the commercial fishery statistics.

Nominal Catches and TACs

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 t in 1985, peaked at a historical high of 79,000 t in 1987 and declined steadily to about 500 tons in 1996. The provisional catch for 1997 is 600 tons.

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 was maintained at that level to 1995. The TAC was reduced again in 1996 at 11,000 tons and maintained at that level in 1977. The Fisheries Commission agreed on a moratorium for this stock in 1998. In the 12 year period since 1986, TACs have been exceeded in all but the last four years. In some years catches have been double (1988) and even triple (1987) the agreed TAC.

Description of the Fishery

In the early 1980's the former USSR, Cuba and Canada were the primary fleets directing for redfish (Table 2a,b). The rapid expansion of the fishery in 1986 and continued high level in 1987 and 1988 was due to new entrants, primarily EU-Portugal and various non-Contracting parties (NCP), most notably South Korea, Panama and Caymen Islands. These countries began to fish in the regulatory area and accounted for a catch of about 24,000 t. In the period from 1988 to 1994 non-Contracting parties had taken between 1,000 t and 19,000 t annually, however, NCPs did not fish in Div. 3LN since 1994.

Surveillance sources indicate that fishing pattern changed from the one that concentrated in the vicinity of the Div. 3N and Div. 3O border and the slope edge in Div. 3L in the early 1980's , to one that predominated in an area southwest of the Flemish Cap at the border of Div. 3LNM in the 1990's. Cuba has not fished since 1993 because of a poor fishery and the Baltic states have not directed for redfish since 1994. EU/Portugal has directed predominantly to Div. 3O redfish and other species in the NAFO Regulatory Area since 1994. Russia has also reduced its directed effort in 1996. The reasons for the reduced effort in recent years was varied amongst the fleets involved. The Russian fleet has been affected by economical problems, the Baltic countries have reduced their fleet and have directed to shrimp in Div. 3M. Portugal have directed to other fisheries (Div. 3O) and species (Greenland halibut) because of insufficient

quota in Div. 3LN. Cuba has not fished in recent years because of poor yields with the current regulated mesh size of 130 mm. The Canadian fleet has not fished in this area recently because of poor yields.

The most recent pattern of the catches when there was directed effort (Table 3a,b) reveals the fishery occurred during the first half of the year in Div. 3L but mostly from April to September in Div. 3N. Catches for each division by gear since 1984 (Table 4) shows the bottom trawl is the predominant gear in the fishery in the 1980s The fleets fishing the Div. 3LMN border on the "Beothuk Knoll" probably account for most of the midwater catch.

Commercial Fishery Data

Catch and Effort

The annual update for the standardized catch rate series provided little new information probably because of low catches in recent years. Therefore a revised catch rate standardization was not considered to provide anything different from the last analysis. (Power MS 1997)

These data are not considered reflective of year to year changes in population abundance (see NAFO Sci. Coun. Rep., 1996, p. 72), although they may be indicative of trends over longer periods of time. Because of the limited number of observations and high variability in recent years no judgement can be rendered from the recent data in the series. In any event, these indices of abundance are of little value in determining current stock status.

Commercial fishery sampling

Limited trawl sampling of redfish as bycatch from a 1997 Portuguese trawl fishery in Div. 3L (Alpoim et al., MS 1998) suggested the catches were dominated by lengths between 25cm-33cm with two modes at 26cm and 30cm (mean length of 29.5 cm) based on samples obtained in March, April, May and October . Sampling of the 1997 Div. 3N Portuguese trawl fishery for January and February indicates that dominant lengths of redfish in the catches sampled were between 29cm to 34cm with a mode at 33cm.

Research Survey Data

Abundance Indices

Stratified-random surveys have been conducted by Canada in Div. 3L in various years and seasons from 1978 to 1998 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 732 metres (400 fathoms) for Div. 3LN (Fig. 2). Recently the stratification scheme has been updated to include depths out to 1464 metres (800 fathoms) but only the 1994, 1996 and 1997 autumn surveys have had some sampling of stations over 732 metres (400 fathoms). Up until the autumn of 1995 these surveys were conducted with an Engels 145 high lift otter trawl with a small mesh liner (29mm) in the codend and tows planned for 30 minute duration. Starting with the autumn 1995 survey in Div. 3LN, a Campelen 1800 survey gear was adopted with a 12mm liner in the codend and 15 minute tows utilizing SCANMAR. The Engel data were converted into Campelen equivalents units for this assessment. A comparison of the generated data with the original Engel data suggested overall trends in abundance were the same except that the relative measure of abundance estimated for the Campelen trawl conversions were higher (Power and Maddock Parsons MS 1998). The derived swept area survey biomass calculations will therefore be higher than presented in the past because (1) converted catches were generally higher and (2) the trawlable unit for a Campelen equivalent is smaller.

Mean number and calculated mean weight (kg) per Campelen equivalent standard tow continue to show large fluctuations between some adjacent years (Table 5-7, Fig. 3) 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 the survey biomass index from spring 1992 up to spring 1995 is at its lowest level (average 8,400 t) relative to the time period prior to 1986 (average 179,000 t). The autumn 1995 to autumn 1997 surveys were derived with the Campelen trawl and averaged 20,000 t. The autumn 1995 index at 50,000 t is highly the result of a single large catch in one stratum (about 45,000 t of this estimate is due to this relatively large catch and without this survey the average over the period is about 12,500 t.

Stratified-random surveys have also been conducted in spring and autumn by Canada in Div 3N from 1991-1998 that also cover to the extent of the stratification (732 m or 400 fathoms). The Campelen trawl and protocol were also utilized on these surveys beginning in the autumn of 1995. These data were also converted into Campelen equivalents were appropriate. Mean number and weight per tow (Table 8-10, Fig. 4) are considerably higher than in Div 3L but there are relatively greater variability in these estimates as well. A consistent pattern of higher autumn estimates is evident.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 survey biomass index for the converted data in the 1991 to spring 1995 period is about 35,000 t. The average Campelen survey biomass index from autumn 1995 to spring 1998 is about 25,000 t. About 28,000 t of the fall 1995 estimate of 41,000 t occurred in a single stratum due to a large catch.

A comparison of the Canadian and Russian bottom trawl surveys in Div. 3L (Fig. 5) indicate a similar trend of decline in density estimates from 1984 to 1990 and both indices have remained at this relatively low level to 1994. The Canadian index continued to be relatively low to autumn 1997 except for the spike observed in autumn 1995. The situation is unclear for Div. 3N (Fig. 6). The Russian surveys indicate relatively low mean weight per tow from 1989-1991 with a dramatic rise in 1993. This large increase in 1993 relative to 1991 was 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 have been no Russian surveys conducted in Div. 3L since 1994 or 3N since 1993.

Recruitment

Length distributions in terms of mean number per tow at length from the regular spring and autumn and various summer Canadian surveys in Div. 3L in terms of Campelen units indicate there has been relatively poor recruitment over the time period covered by the surveys (Fig. 7). The 1997 spring and autumn distributions were dominated by fish between 21cm-27cm which would be in the range of 11-13 years old. In the autumn 1997 survey indicated that the Campelen trawl picked up fish in the 10 cm range for the first time since it has been used as a survey gear. There is no sign of any good recruitment in the recent surveys up to autumn 1997.

Length distributions and age distributions from spring and autumn Canadian surveys in Div. 3N from 1991-1998 (Fig. 8) show different compositions compared with Div. 3L for each corresponding seasonal survey, generally being composed of size groups that are 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 1998 spring survey at about 22 cm. There is no sign of any good year classes subsequent to this in the surveys. A mode picked up in the 1997 spring survey had not increased its relative stature in either of the following two surveys up to spring 1998.

State of the Stock

Interpretation of available data remains difficult for this stock. The surveys demonstrate considerable inter-annual variability, the changes frequently being the result of single large catches being taken in different years. Nonetheless, estimates from recent surveys are considerably lower than those from the 1980's indicating a reduced and low stock size.

Poor recruitment has persisted in Div. 3L since the early 1980's. The last good recruitment in Div. 3N was the 1986-87 year-classes. These year-classes are now available to the commercial fleets but have not resulted in a turn around in catch levels which remain low. This is interpreted as another sign of low overall stock size. Any new year classes will not recruit to any fishery for about 8-10 years after they are born. Thus any recovery of the resource in the short or intermediate term is not anticipated.

Reference Points under a Precautionary Approach

A non-equilibrium production model (ASPIC) was run using various combinations of Portuguese logbook CPUE, Canadian survey data and Russian survey data. However, no acceptable results were achieved.

Various yield per recruit analyses have been conducted for redfish (see ANON 1989 and Avila de Melo et al, 1998):

Div. 3LN (ANON 1989)

F	Yield (kg)	
$F_{0.1}$	0.120	0.173
F_{max}	0.222	0.186

Div. 3M (Avila de Melo et al. 1998)

F	Yield (kg)	
$F_{0.1}$	0.115	0.115
F_{max}	0.227	0.125

While the estimates of F0.1 and Fmax were similar, the estimated yields at these reference points were different. It is believed that these differences are due, in a large part, to differences in ageing methodologies; scales versus otoliths. This type of difficulty with redfish, caused by differences in age reading methodology and interpretation, is a continuing problem and hampers use of age based analyses to develop meaningful reference points. Work is continuing to examine the use of length based information. At present however, it is not possible to determine limit or other reference points for either fishing mortality or biomass for Div. 3LN redfish. It is not possible to determine limit or target reference points based on spawning stock biomass or fishing mortalities.

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Table 1. Summary of nominal catches (t) of redfish in Divisions 3LN (provisional for 1994-1997).

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	5,897	9,077	18,599-24,017 [b,c]	14,000
1994	379	2,274	3,828-7,654 [b,c,d]	14,000
1995	291	1,697	1,988 [d]	14,000
1996	113	340	453 [d]	11,000
1997	151	478	629 [d]	11,000
1998				Moratorium

[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.

[d] Provisional.

Table 2a. Nominal reported catches (t) of redfish in Division 3L by country and year since 1984.

Country	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994 [b]	1995 [b]	1996 [b]	1997 [b]
Canada (M)	342	2,597	2,352	5,042	1,095	73	37	86	-	-	3	-	-
Canada (N)	1,716	2,235	2,159	1,444	489	947	362	656	6	-	-	-	20
EU/Germany	981	540	696	694	742	646	1151	1,455	-	-	-	-	-
Japan	129	135	114	152	114	151	84	67	37	82	47	72	68
EU/Portugal	4	13,469	19,858	9,867	5,408	4,820	5,099	769	-	4	-	39	48
EU/Spain	192	199	335	94	109	837	681	625	29	128	241	2	13
Russia	309	8,658	4,459	5,004	10,037	7,003	1,032	571	2,407	22	-	-	-
Lithuania	-	-	-	-	-	-	-	-	676	-	-	-	-
Latvia	-	-	-	-	-	-	-	-	2,156	55	-	-	-
Estonia	-	-	-	-	-	-	-	-	-	88	-	-	-
South Korea			364	20	952	1,061	420	370	586	-	-	-	-
Others [a]	4	-	5	-	1	-	26	31	-	-	-	-	2
TOTAL	3,677	27,833	30,342	22,317	18,947	15,538	8,892	4,630	5,897	379	291	113	151

[a] Others include France(M), France(SP), Poland, EU/Unknown

[b] Provisional

Table 2b. Nominal reported catches (t) of redfish in Division 3N by country and year since 1983.

Country	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994 [b]	1995 [b]	1996 [b]	1997 [b]
Canada (M)	311	-	-	1	22	-	-	-	-	110	-	-	-
Canada (N)	82	17	21	4	4	11		1	40	-	-	-	1
EU/Portugal	890	8,273	7,854	2,147	600	1,235	3,275	1,149	255	60	78	199	101
Japan	-	12	51	-	39	4	4	1	-	-	-	-	-
EU/Spain	2,881	1,393	132	581	224	416	956	119	7	106	200	107	1
Russia	10,576	2,227	14,397	6,735	941	359	4,821	3,009	3,212	1,998	1,419	34	375
Lithuania	-	-	-	-	-	-	-	-	1,116	-	-	-	-
Latvia	-	-	-	-	-	-	-	-	1,247	-	-	-	-
Estonia	-	-	-	-	-	-	-	-	1,926	-	-	-	-
Cuba	2,055	2,429	2,433	2,483	2,869	2,456	1,378	1,308	1,152	-	-	-	-
South Korea		617	16,053	11,098	8,203	4,640	2,276	4,560	122	-	-	-	-
Others [a]	85	4	8	-	-	96	13	6	-	-	-	-	-
TOTAL	16,880	14,972	40,949	23,049	12,902	9,217	12,723	10,153	9,077	2,274	1,697	340	478

[a] Others include France(M), USA, EU/Germany, Denmark(Greenland)

[b] Provisional

Table 3a. Nominal reported catches (t) of redfish in Division 3L by month and year since 1984.

Year	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total
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	1,487	246	15	9	26	30	480	101	4,630
1993	1	9	676	2,721	2,479	2	1	5	1	-	1	1	5,897
1994 [a]	-	-	34	147	13	3	1	2	-	19	27	133	379
1995 [a]	77	65	25	54	44	15	-	-	-	2	-	9	291

[a] Provisional

Table 3b. Nominal reported catches (t) of redfish in Division 3N by month and year since 1984.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
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
1993	228	286	430	2,184	4,095	1,224	164	52	270	12	48	84	9,077
1994 [a]	151	53	5	68	595	723	302	-	1	28	310	38	2,274
1995 [a]	63	80	1	10	147	313	358	251	338	-	48	88	1,697

[a] Provisional

Table 4. Nominal reported catches by gear type for redfish in Divisions 3L and 3N since 1984.

	Division 3L					Division 3N				
Year	Bottom trawl	Midwater trawl	Gillnets	Misc.	Total	Bottom trawl	MW trawl	Gillnets	Misc.	Total
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
1993	652	5,245	-	-	5,897	3,532	5,441	-	104	9,077
1994 [a]	361	18	-	-	379	276	1,998	-	-	2,274
1995 [a]	291	-	-	-	291	278	1,419	-	-	1,697

[a] Provisional

Table 5. Mean number per standard tow from various Canadian surveys in Div. 3L where strata greater than 366 m (200 fath.) were sampled. Dashes (-) represent unsampled strata. Number of successful sets in brackets. The data are Campelen trawl equivalent units based on a comparative fishing experiment with an Engel 145 otter trawl (see text). G.A. = GadusAtlantica, W.T. = Wilfred Templeman, A.N. = Alfred Needler.

Stratum	Depth Range (M)	Area (sq. n.) mi	Aug 16-Aug 2(1978-Q3 (G.A. 12)	Sep 4-Sep 10 1979-Q3 (G.A. 25)	May 8-May 13 1980-Q2 (G.A. 36)	Sep 18-Sep 2(1981-Q3 (G.A. 55)	Jul 26-Sep 3 1984-Q3 (W.T. 16-18)	Jan 10-Feb 11 1985-Q1 (W.T. 22-24)	Apr 17-May 2(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	303.00 (3)	0.00 (2)	0.00 (4)	15.75 (4)	0.00 (6)	0.00 (5)	3.20 (5)	0.00 (3)	0.00 (5)
366	184-274	1394	885.33 (3)	63.50 (2)	35.83 (6)	81.33 (6)	63.55 (11)	0.00 (5)	9.83 (6)	44.40 (5)	30.89 (9)
369	184-274	961	0.00 (3)	1.00 (2)	0.25 (4)	40.25 (4)	3.43 (7)	0.00 (5)	0.20 (5)	0.17 (6)	0.00 (6)
386	184-274	983	230.67 (3)	12.50 (2)	2.25 (4)	15.75 (4)	27.25 (8)	0.00 (5)	1.80 (5)	17.20 (5)	0.60 (5)
389	184-274	821	1.00 (3)	---	55.50 (2)	7.00 (3)	33.00 (6)	19.50 (4)	1.60 (5)	4.25 (4)	23.40 (5)
391	184-274	282	0.00 (2)	43.00 (2)	11.50 (2)	10.50 (2)	4.00 (2)	0.00 (2)	0.00 (2)	0.00 (2)	11.50 (2)
345	275-366	1432	96.50 (2)	133.00 (4)	22.00 (4)	74.00 (5)	36.71 (7)	8.00 (3)	4.60 (5)	52.00 (7)	8.67 (9)
346	275-366	865	330.00 (2)	223.75 (4)	45.00 (2)	85.67 (3)	221.67 (6)	12.50 (4)	18.50 (2)	77.33 (3)	86.40 (5)
368	275-366	334	4307.50 (2)	238.67 (3)	59.50 (2)	1028.00 (2)	3418.50 (2)	8.00 (2)	27.00 (2)	265.50 (2)	286.00 (2)
387	275-366	718	936.50 (2)	942.00 (5)	54.67 (3)	3068.00 (3)	3678.30 (3)	87.50 (4)	18.00 (6)	1524.70 (3)	508.25 (4)
388	275-366	361	2824.50 (2)	5037.00 (3)	18.50 (2)	891.50 (2)	167.00 (2)	28.00 (3)	28.50 (2)	323.50 (2)	75.00 (2)
392	275-366	145	---	1556.00 (3)	63.00 (3)	1129.00 (2)	2321.50 (2)	6.50 (2)	18.00 (2)	121.50 (2)	1164.00 (2)
729	367-549	186	---	816.00 (3)	---	1714.00 (2)	374.00 (2)	2767.00 (2)	26.00 (2)	968.00 (2)	2143.50 (2)
731	367-549	216	626.50 (2)	676.33 (3)	640.00 (2)	309.50 (2)	205.00 (2)	84.33 (3)	77.00 (2)	207.50 (2)	400.00 (2)
733	367-549	468	1070.00 (2)	1884.70 (3)	85.67 (3)	1993.00 (2)	376.75 (4)	1519.70 (3)	916.33 (3)	1313.50 (2)	566.33 (3)
735	367-549	272	935.50 (2)	664.67 (3)	73.00 (2)	1147.00 (2)	567.33 (3)	10.00 (2)	62.50 (2)	221.00 (2)	188.50 (2)
730	550-731	170	1604.00 (2)	511.33 (3)	512.00 (2)	662.00 (2)	83.50 (2)	634.00 (2)	6963.50 (2)	269.50 (2)	31.00 (2)
732	550-731	231	110.50 (2)	74.00 (2)	192.50 (2)	70.00 (2)	72.50 (2)	325.00 (2)	113.50 (2)	40.00 (2)	32.00 (2)
734	550-731	228	1571.00 (2)	669.67 (3)	2065.00 (2)	1009.00 (2)	436.33 (3)	152.00 (2)	291.00 (2)	719.00 (2)	420.50 (2)
736	550-731	175	261.50 (2)	418.67 (3)	---	116.50 (2)	---	---	425.00 (2)	25.50 (2)	173.50 (2)
737	732-914	227	---	---	---	---	---	---	---	---	---
741	732-914	223	---	---	---	---	---	---	---	---	---
745	732-914	348	---	---	---	---	---	---	---	---	---
748	732-914	159	---	---	---	---	---	---	---	---	---
Upper (95% CI)			1086.0	1068.5	336.1	1156.5	860.6	244.5	1496.1	370.1	235.9
Weighted mean (by area)			634.0	479.5	96.4	482.2	465.7	142.9	168.9	237.4	155.9
Lower (95% CI)			182.0	-109.5	-143.4	-192.0	70.8	41.3	-1158.4	104.7	75.9
Abundance of surveyed area (millions)			950.1	686.2	144.0	744.6	707.9	217.2	260.8	366.6	240.7

Table 5. Mean number in Campelen equivalents , Div. 3L (continued)

Stratum	Depth Range (M)	Area (sq. n.) mi	Jan 22-Feb 27 1986-Q1 (W.T.42-44)	Nov13-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 2 1991-Q2 (W.T. 106-7)	Aug 4- Aug 11 1991-Q3 (W.T. 109)	Nov 10- Dec 2 1991-Q4 (W.T. 114-5)	May 13-June 7 1992-Q2 (W.T 120-2)
347	184-274	983	12.00 (4)	0.00 (4)	0.75 (4)	1.75 (4)	0.00 (2)	2.00 (2)	0.00 (3)	0.00 (4)	0.00 (4)
366	184-274	1394	12.00 (2)	20.00 (4)	5.20 (5)	16.50 (4)	0.00 (6)		0.33 (3)	1.19 (21)	0.50 (6)
369	184-274	961	0.00 (3)	7.67 (3)	0.00 (4)	10.50 (4)	0.00 (4)	0.00 (2)	8.25 (4)	1.78 (9)	0.00 (4)
386	184-274	983	2.86 (7)	18.50 (4)	5.00 (4)	8.43 (7)	15.25 (4)	5.33 (3)	2.33 (3)	0.00 (3)	0.00 (4)
389	184-274	821	6.00 (4)	2.00 (4)	0.00 (3)	21.33 (3)	4.67 (3)	8.33 (3)	0.33 (3)	0.00 (3)	0.00 (3)
391	184-274	282	0.00 (3)	16.50 (2)	4.00 (5)	2.40 (5)	0.00 (2)	0.00 (3)	5.33 (3)	0.00 (3)	3.50 (2)
345	275-366	1432	10.67 (3)	5.50 (4)	1.40 (5)	16.17 (6)	1.00 (5)	3.00 (3)	4.50 (4)	0.25 (4)	0.00 (6)
346	275-366	865	16.25 (4)	24.67 (3)	23.67 (3)	201.86 (7)	61.33 (3)	---	25.25 (4)	9.67 (15)	2.00 (4)
368	275-366	334	---	29.00 (2)	25.00 (2)	1392.60 (7)	79.50 (2)	---	339.75 (4)	42.33 (6)	11.50 (2)
387	275-366	718	13.00 (4)	11.00 (2)	110.67 (3)	278.20 (10)	92.67 (3)	59.67 (3)	173.60 (5)	15.40 (5)	8.33 (3)
388	275-366	361	30.00 (3)	---	24.00 (2)	201.71 (7)	78.00 (2)	32.33 (3)	73.67 (3)	29.00 (3)	2.50 (2)
392	275-366	145	12.33 (3)	322.00 (2)	4.50 (2)	166.33 (9)	25.50 (2)	4.00 (2)	315.67 (3)	14.33 (3)	4.00 (2)
729	367-549	186	2150.00 (2)	1197.00 (2)	165.50 (2)	258.43 (7)	182.50 (2)	20.50 (2)	196.50 (2)	127.67 (3)	68.00 (2)
731	367-549	216	---	---	90.00 (2)	142.67 (6)	235.50 (2)	37.50 (2)	208.00 (3)	44.67 (3)	30.50 (2)
733	367-549	468	353.50 (2)	---	77.00 (2)	397.22 (9)	204.50 (2)	19.50 (2)	486.00 (4)	285.67 (3)	51.50 (2)
735	367-549	272	---	--- (2)	223.50 (2)	484.17 (6)	---	---	93.00 (3)	119.00 (3)	68.50 (2)
730	550-731	170	---	---	89.50 (2)	145.75 (4)	---	169.50 (2)	175.67 (3)	273.50 (2)	96.00 (2)
732	550-731	231	---	---	57.50 (2)	49.89 (9)	154.00 (2)	318.50 (2)	79.33 (3)	35.50 (2)	180.50 (2)
734	550-731	228	354.50 (2)	---	114.50 (2)	214.60 (5)	36.00 (2)	236.00 (2)	47.33 (3)	15.00 (2)	120.00 (2)
736	550-731	175	---	22.50 (2)	185.50 (2)	75.83 (6)	222.00 (2)	---	12.67 (3)	43.50 (2)	56.00 (2)
737	732-914	227	---	---	---	--- ---	---	---	---		
741	732-914	223	---	---	---	---	---	---	---		
745	732-914	348	---	---	---	---	---	---	---		
748	732-914	159	---	---	---	---	---	---	---		
Upper (95% CI)			371.2	58.8	57.0	218.8	60.9	136.3	77.1	52.0	37.4
Weighted mean (by area)			74.7	43.4	32.8	135.0	42.8	30.6	48.5	28.1	15.3
Lower (95% CI)			-221.9	28.0	8.5	51.3	24.6	-75.0	19.9	4.1	-6.8
Abundance of surveyed area (millions)			100.9	57.0	50.6	208.5	63.5	34.5	74.9	43.3	23.6

Table 5. Mean number in Campelen equivalents , Div. 3L (continued)

Stratum	Depth Range (M)	Area (sq. n.) mi	Nov 5-Nov 29 1992-Q4 (W.T 129-30)	May 18-Jun 1(1993-Q2 (W.T 137-8)	Aug 5-Aug 15 1993-Q3 (G.A. 223)	Nov 12- Dec 4 1993-Q4 (W.T. 145-6)	May 22-Jun 1(1994-Q2 (W.T. 153-54	Nov 8-Dec 7 1994-Q4 (W.T. 161-62	May 27-Jun 14 1995-Q2 (W.T. 169-70)
347	184-274	983	0.00 (2)	0.00 (4)	0.00 (3)	0.00 (4)	0.00 (4)	0.00 (8)	0.00 (4)
366	184-274	1394	1.75 (24)	0.00 (7)	5.50 (2)	0.21 (14)	0.20 (5)	0.10 (10)	0.00 (5)
369	184-274	961	0.00 (8)	0.00 (5)	0.00 (3)	0.14 (7)	0.33 (3)	0.00 (3)	0.00 (3)
386	184-274	983	0.00 (3)	0.20 (5)	0.00 (3)	0.00 (3)	0.00 (4)	0.00 (3)	0.00 (4)
389	184-274	821	3.67 (3)	0.00 (4)	5.67 (3)	0.00 (3)	0.00 (3)	0.00 (3)	2.75 (4)
391	184-274	282	0.00 (3)	0.00 (2)	0.67 (3)	1.00 (3)	0.00 (2)	2.33 (3)	5.00 (2)
345	275-366	1432	0.25 (4)	0.00 (2)	4.33 (3)	0.00 (3)	0.60 (5)	0.00 (8)	0.00 (5)
346	275-366	865	4.36 (14)	4.00 (6)	12.33 (3)	6.36 (11)	2.33 (3)	0.29 (7)	0.67 (3)
368	275-366	334	26.70 (10)	11.00 (4)	57.33 (3)	17.00 (8)	9.50 (2)	1.17 (12)	6.50 (2)
387	275-366	718	12.00 (3)	5.33 (2)	104.67 (3)	2.33 (3)	1.33 (3)	5.11 (9)	12.00 (3)
388	275-366	361	24.33 (3)	2.00 (3)	23.00 (3)	9.67 (3)	0.00 (2)	7.14 (7)	9.50 (2)
392	275-366	145	5.67 (3)	1.50 (2)	65.00 (3)	8.33 (3)	0.00 (2)	7.00 (3)	61.50 (2)
729	367-549	186	241.50 (3)	36.50 (2)	405.00 (3)	149.33 (3)	19.00 (2)	681.78 (9)	67.00 (2)
731	367-549	216	182.67 (3)	24.00 (3)	309.67 (3)	27.67 (3)	40.00 (2)	42.86 (7)	34.00 (2)
733	367-549	468	176.33 (3)	21.33 (2)	394.67 (3)	19.67 (3)	19.50 (2)	39.33 (9)	10.50 (2)
735	367-549	272	192.67 (3)	19.00 (2)	76.33 (3)	79.00 (3)	58.50 (2)	16.91 (11)	27.00 (2)
730	550-731	170	55.00 (2)	203.50 (2)	77.67 (3)	261.00 (3)	29.50 (2)	18.67 (3)	68.50 (2)
732	550-731	231	161.00 (2)	365.00 (2)	140.33 (3)	16.50 (2)	44.50 (2)	80.67 (3)	46.00 (2)
734	550-731	228	87.50 (2)	19.00 (2)	28.67 (3)	62.00 (2)	39.00 (2)	35.67 (3)	95.00 (2)
736	550-731	175	40.50 (2)	34.50 (2)	17.00 (3)	25.00 (3)	21.00 (2)	22.00 (7)	36.00 (2)
737	732-914	227	.	.	.	.	5.50 (2)	-	.
741	732-914	223	.	.	0.25	.	1.50 (2)	-	.
745	732-914	348	.	.	0.33	.	0.50 (2)	-	.
748	732-914	159	.	.	7.00	.	1.00 (2)	-	.
Upper (95% CI)			42.7	105.6	77.1	20.3	10.2	32.1	12.4
Weighted mean (by area)			29.4	15.0	48.5	13.3	6.5	18.0	9.8
Lower (95% CI)			16.0	-75.5	19.9	6.3	2.7	3.6	7.1
Abundance of surveyed area (millions)			45.3	23.2	74.9	20.6	10.0	27.7	15.1

Table 6. Mean weight (kg) per standard tow from various Canadian surveys in Div. 3L where *strata greater* than 366 m (200 fath.) were sampled. Dashes (-) represent unsampled strata. Number of successful sets in brackets. The data were generated from Campelen trawl equivalent numbers based on a comparative fishing experiment with an Engel145 otter trawl (see text). G.A. = GadusAtlantica, W.T. = Wilfred Templeman, A.N. = Alfred Needler.

Stratum	Depth Range (M)	Area (sq. n.) mi	Aug 16-Aug 2! 1978-Q3 (G.A. 12)	Sep 4-Sep 10 1979-Q3 (G.A. 25)	May 8-May 13 1980-Q2 (G.A. 36)	Sep 18-Sep 2(1981-Q3 (G.A. 55)	Jul 26-Sep 3 1984-Q3 (W.T. 16-18)	Jan 10-Feb 11 1985-Q1 (W.T. 22-24)	Apr 17-May 2(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	64.75 (3)	0.00 (2)	0.00 (4)	1.61 (4)	0.00 (6)	0.00 (5)	0.02 (5)	0.00 (3)	0.00 (5)
366	184-274	1394	70.50 (3)	3.91 (2)	3.63 (6)	28.33 (6)	2.91 (11)	0.00 (5)	0.21 (6)	4.10 (5)	4.83 (9)
369	184-274	961	0.00 (3)	0.63 (2)	0.17 (4)	5.32 (4)	0.05 (7)	0.00 (5)	0.13 (5)	0.15 (6)	0.00 (6)
386	184-274	983	69.30 (3)	9.52 (2)	1.60 (4)	8.32 (4)	9.96 (8)	0.00 (5)	0.14 (5)	11.30 (5)	0.41 (5)
389	184-274	821	0.10 (3)	---	15.04 (2)	2.77 (3)	7.97 (6)	0.97 (4)	0.02 (5)	0.75 (4)	1.96 (5)
391	184-274	282	0.00 (2)	9.83 (2)	1.63 (2)	0.32 (2)	0.10 (2)	0.00 (2)	0.00 (2)	0.00 (2)	3.71 (2)
345	275-366	1432	50.70 (2)	70.55 (4)	7.51 (4)	33.92 (5)	22.19 (7)	0.93 (3)	2.83 (5)	32.20 (7)	2.84 (9)
346	275-366	865	146.01 (2)	81.03 (4)	16.82 (2)	54.53 (3)	119.76 (6)	5.64 (4)	14.51 (2)	47.61 (3)	44.07 (5)
368	275-366	334	1556.20 (2)	77.48 (3)	10.65 (2)	261.75 (2)	1366.30 (2)	1.66 (2)	4.86 (2)	126.45 (2)	112.15 (2)
387	275-366	718	292.79 (2)	352.46 (5)	11.42 (3)	928.47 (3)	1341.20 (3)	49.01 (4)	3.89 (6)	501.85 (3)	193.26 (4)
388	275-366	361	568.32 (2)	1059.10 (3)	1.94 (2)	233.12 (2)	50.92 (2)	5.72 (3)	7.09 (2)	96.07 (2)	22.46 (2)
392	275-366	145	---	429.96 (3)	12.95 (3)	249.94 (2)	783.64 (2)	1.42 (2)	2.05 (2)	34.58 (2)	342.65 (2)
729	367-549	186	---	277.43 (3)	---	608.41 (2)	162.05 (2)	987.53 (2)	6.45 (2)	419.21 (2)	855.75 (2)
731	367-549	216	339.34 (2)	288.20 (3)	166.22 (2)	95.19 (2)	87.92 (2)	24.70 (3)	14.55 (2)	94.99 (2)	203.45 (2)
733	367-549	468	553.31 (2)	819.89 (3)	24.73 (3)	912.39 (2)	214.76 (4)	670.29 (3)	458.64 (3)	759.06 (2)	255.38 (3)
735	367-549	272	616.36 (2)	291.17 (3)	21.13 (2)	464.28 (2)	319.91 (3)	4.18 (2)	19.11 (2)	147.66 (2)	89.77 (2)
730	550-731	170	709.46 (2)	268.32 (3)	159.42 (2)	319.49 (2)	43.25 (2)	313.63 (2)	3654.40 (2)	140.65 (2)	16.04 (2)
732	550-731	231	57.55 (2)	36.68 (2)	51.77 (2)	36.78 (2)	37.43 (2)	152.24 (2)	45.32 (2)	22.35 (2)	17.48 (2)
734	550-731	228	1084.60 (2)	368.78 (3)	1296.40 (2)	500.24 (2)	258.73 (3)	81.97 (2)	116.80 (2)	429.61 (2)	265.85 (2)
736	550-731	175	95.56 (2)	160.36 (3)	.	53.26 (2)	---	---	129.59 (2)	14.89 (2)	78.29 (2)
737	732-914	227	---	---	---	---	---	---	---	---	---
741	732-914	223	---	---	---	---	---	---	---	---	---
745	732-914	348	---	---	---	---	---	---	---	---	---
748	732-914	159	---	---	---	---	---	---	---	---	---
Upper (95% CI)a			330.9	249.0	193.9	374.5	381.9	87.4	778.0	195.9	105.3
Weighted mean (by area)			207.6	159.2	41.2	169.3	182.7	59.4	82.8	104.3	63.6
Lower (95% CI)a			84.4	69.3	-111.6	-35.9	-16.5	31.4	-612.3	12.7	21.9
Survey biomass index (tons)			311163	227788	61502	261384	277711	90245	127888	161038	98233

Table 6. **Mean weight** in Campelen equivalents , Div. 3L (continued)

Stratum	Depth Range (M)	Area (sq. n.) mi	Jan 22-Feb 27 1986-Q1 (W.T.42-44)	Nov13-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 2 1991-Q2 (W.T. 106-7)	Aug 4- Aug 11 1991-Q3 (W.T. 109)	Nov 10- Dec 2 1991-Q4 (W.T. 114-5)	May 13-June 7 1992-Q2 (W.T 120-2)
347	184-274	983	0.26 (4)	0.00 (4)	0.09 (4)	0.44 (4)	0.00 (2)	0.04 (2)	0.00 (3)	0.00 (4)	0.00 (4)
366	184-274	1394	0.35 (2)	1.36 (4)	0.18 (5)	2.58 (4)	0.00 (6)	---	0.10 (3)	0.05 (21)	0.10 (6)
369	184-274	961	0.00 (3)	1.03 (3)	0.00 (4)	1.03 (4)	0.00 (4)	0.00 (2)	2.79 (4)	0.15 (9)	0.00 (4)
386	184-274	983	0.40 (7)	0.94 (4)	2.58 (4)	0.30 (7)	0.37 (4)	0.17 (3)	0.30 (3)	0.00 (3)	0.00 (4)
389	184-274	821	0.36 (4)	0.70 (4)	0.00 (3)	1.34 (3)	0.57 (3)	0.38 (3)	0.20 (3)	0.00 (3)	0.00 (3)
391	184-274	282	0.00 (3)	4.61 (2)	0.10 (5)	0.29 (5)	0.00 (2)	0.00 (3)	1.24 (3)	0.00 (3)	0.50 (2)
345	275-366	1432	0.21 (3)	3.84 (4)	0.09 (5)	8.04 (6)	0.46 (5)	0.10 (3)	2.14 (4)	0.11 (4)	0.00 (6)
346	275-366	865	1.55 (4)	12.95 (3)	3.38 (3)	120.04 (7)	29.56 (3)	---	9.47 (4)	2.44 (15)	0.49 (4)
368	275-366	334	---	6.84 (2)	5.01 (2)	545.05 (7)	14.43 (2)	---	112.11 (4)	7.15 (6)	4.23 (2)
387	275-366	718	6.81 (4)	2.77 (2)	55.18 (3)	88.37 (10)	29.25 (3)	11.56 (3)	47.10 (5)	5.06 (5)	2.36 (3)
388	275-366	361	5.01 (3)	---	2.89 (2)	42.58 (7)	4.63 (2)	2.80 (3)	10.07 (3)	2.41 (3)	0.35 (2)
392	275-366	145	3.15 (3)	87.30 (2)	2.08 (2)	31.30 (9)	2.76 (2)	0.51 (2)	105.45 (3)	0.95 (3)	1.51 (2)
729	367-549	186	754.72 (2)	378.90 (2)	80.51 (2)	132.44 (7)	63.74 (2)	4.43 (2)	69.30 (2)	32.02 (3)	14.56 (2)
731	367-549	216	--- (1)	---	19.41 (2)	54.61 (6)	82.40 (2)	5.81 (2)	67.96 (3)	8.75 (3)	6.75 (2)
733	367-549	468	152.73 (2)	---	27.89 (2)	233.83 (9)	50.70 (2)	6.06 (2)	210.97 (4)	77.02 (3)	16.76 (2)
735	367-549	272	---	46.11 (2)	45.94 (2)	320.47 (6)	---	---	38.71 (3)	25.86 (3)	18.14 (2)
730	550-731	170	---	---	47.87 (2)	81.28 (4)	---	42.73 (2)	92.11 (3)	175.39 (2)	34.23 (2)
732	550-731	231	---	---	31.33 (2)	25.26 (9)	86.00 (2)	57.51 (2)	36.52 (3)	16.02 (2)	62.14 (2)
734	550-731	228	191.89 (2)	---	62.48 (2)	122.31 (5)	17.70 (2)	44.08 (2)	27.00 (3)	9.60 (2)	43.13 (2)
736	550-731	175	---	12.12 (2)	53.72 (2)	40.46 (6)	106.09 (2)	---	5.56 (3)	18.32 (2)	15.58 (2)
737	732-914	227	---	---	---	---	---	---	---	---	---
741	732-914	223	---	---	---	---	---	---	---	---	---
745	732-914	348	---	---	---	---	---	---	---	---	---
748	732-914	159	---	---	---	---	---	---	---	---	---
Upper (95% CI)			135.9	18.9	24.1	96.0	22.2	11.6	22.2	15.3	11.9
Weighted mean (by area)			27.1	13.0	11.8	60.1	14.0	5.6	13.5	8.8	4.8
Lower (95% CI)			-81.8	7.2	-0.5	24.2	5.7	-0.5	4.8	2.4	-2.3
Survey biomass index (tons)			36568	17119	18202	92840	20743	6267	20838	13665	7404

Table 6. Mean weight in Campelen equivalents , Div. 3L (continued)

Stratum	Depth Range (M)	Area (sq. n.) mi	Nov 5-Nov 29 1992-Q4 (W.T 129-30)	May 18-Jun 1(1993-Q2 (W.T 137-8)	Aug 5-Aug 15 1993-Q3 (G.A. 223)	Nov 12- Dec 4 1993-Q4 (W.T. 145-6)	May 22-Jun 1(1994-Q2 (W.T. 153-54	Nov 8-Dec 7 1994-Q4 (W.T. 161-62	May 27-Jun 14 1995-Q2 (W.T. 169-70)
347	184-274	983	0.00 (2)	0.00 (4)	0.00 (3)	0.00 (4)	0.00 (4)	0.00 (8)	0.00 (4)
366	184-274	1394	0.28 (24)	0.00 (7)	1.26 (2)	0.06 (14)	0.07 (5)	0.03 (10)	0.00 (5)
369	184-274	961	0.00 (8)	0.00 (5)	0.00 (3)	0.04 (7)	0.04 (3)	0.00 (3)	0.00 (3)
386	184-274	983	0.00 (3)	0.08 (5)	0.00 (3)	0.00 (3)	0.00 (4)	0.00 (3)	0.00 (4)
389	184-274	821	0.12 (3)	0.00 (4)	0.34 (3)	0.00 (3)	0.00 (3)	0.00 (3)	0.67 (4)
391	184-274	282	0.00 (3)	0.00 (2)	0.23 (3)	0.47 (3)	0.00 (2)	0.63 (3)	0.41 (2)
345	275-366	1432	0.18 (4)	0.00 (2)	0.86 (3)	0.00 (3)	0.24 (5)	0.00 (8)	0.00 (5)
346	275-366	865	0.81 (14)	0.55 (6)	2.57 (3)	1.56 (11)	0.57 (3)	0.08 (7)	0.29 (3)
368	275-366	334	4.69 (10)	3.13 (4)	11.95 (3)	1.38 (8)	0.91 (2)	0.12 (12)	0.40 (2)
387	275-366	718	2.28 (3)	1.97 (2)	24.72 (3)	0.59 (3)	0.18 (3)	0.85 (9)	1.60 (3)
388	275-366	361	3.84 (3)	0.50 (3)	5.33 (3)	2.29 (3)	0.00 (2)	0.98 (7)	0.97 (2)
392	275-366	145	0.62 (3)	0.57 (2)	8.12 (3)	1.60 (3)	0.00 (2)	1.93 (3)	5.01 (2)
729	367-549	186	72.02 (3)	7.45 (2)	107.99 (3)	42.93 (3)	3.74 (2)	179.20 (9)	9.88 (2)
731	367-549	216	41.49 (3)	6.70 (3)	93.33 (3)	5.36 (3)	9.01 (2)	7.31 (7)	5.78 (2)
733	367-549	468	53.68 (3)	5.96 (2)	112.82 (3)	4.60 (3)	5.49 (2)	8.80 (9)	1.60 (2)
735	367-549	272	63.43 (3)	3.41 (2)	16.21 (3)	7.16 (3)	7.50 (2)	2.56 (11)	4.44 (2)
730	550-731	170	27.90 (2)	72.36 (2)	32.21 (3)	122.00 (3)	9.19 (2)	7.02 (3)	18.74 (2)
732	550-731	231	53.62 (2)	91.09 (2)	59.45 (3)	4.21 (2)	12.60 (2)	24.56 (3)	15.28 (2)
734	550-731	228	33.35 (2)	7.72 (2)	13.25 (3)	18.10 (2)	11.64 (2)	12.31 (3)	29.68 (2)
736	550-731	175	11.39 (2)	11.72 (2)	7.99 (3)	6.04 (3)	5.41 (2)	6.67 (7)	11.96 (2)
737	732-914	227	.	.	.	.	1.63 (2)	.	.
741	732-914	223	.	.	0.17	.	0.61 (2)	-	.
745	732-914	348	.	.	0.15	.	0.26 (2)	-	.
748	732-914	159	.	.	1.57	.	0.30 (2)	-	.
Upper (95% CI)			12.83	27.68	22.21	8.07	2.24	8.66	2.57
Weighted mean (by area)			8.69	4.18	13.50	3.89	1.49	4.65	2.13
Lower (95% CI)			4.56	-19.31	4.78	-0.28	0.74	0.63	1.69
Survey biomass index (tons)			13424	6461	20838	6011	2302	7173	3284

Table 7. Mean number (left panel) and weight (kg, right panel)per standard tow from Canadian surveys in Div. 3L (autumn 1995 to 1997) where strata greater than 366 m (200 fath.) were sampled. Dashes (-) represent unsampled strata. Number of successful sets in brackets. The gear utilized was a Campelen 1800 survey trawl with a small mesh liner in the codend. WT = WilfredTempleman, AN = Alfred Needler, T=Teleost.

Stratu	Depth Range (M)	Area (sq. n.) mi	Oct 3-Nov23 1995-Q4 (WT176) (WT178-179)	May-June 1996-Q2 (WT 189-191	Sep-Nov 1996-Q4 (WT196-198) (T41)	May-June 1997-Q2 (WT 205-20	Oct-Dec 1997-Q4 (WT213-217)	Oct 3-Nov23 1995-Q4 (WT176) (WT178-179)	May-June 1996-Q2 (WT 189-19	Sep-Nov 1996-Q4 (WT196-198) (T41)	May-June 1997-Q2 (WT 205-20	Oct-Dec 1997-Q4 (WT213-217)
347	184-274	983	0.00 (4)	0.00 (4)	0.00 (3)	0.00 (4)	0.00 (3)	0.00 (4)	0.00 (4)	0.00 (3)	0.00 (4)	0.00 (3)
366	184-274	1394	0.60 (5)	0.18 (5)	1.60 (5)	7.50 (6)	18.80 (5)	0.09 (5)	0.00 (5)	0.03 (5)	0.62 (6)	0.42 (5)
369	184-274	961	14.52 (3)	0.00 (4)	0.00 (2)	0.00 (4)	3.00 (3)	1.82 (3)	0.00 (4)	0.00 (2)	0.00 (4)	0.52 (3)
386	184-274	983	4.25 (4)	0.50 (4)	0.00 (3)	0.22 (4)	5.33 (3)	0.65 (4)	0.02 (4)	0.00 (3)	0.00 (4)	1.22 (3)
389	184-274	821	3.33 (3)	0.00 (4)	8.33 (3)	5.33 (3)	0.67 (3)	0.57 (3)	0.00 (4)	0.26 (3)	0.77 (3)	0.00 (3)
391	184-274	282	3.67 (2)	0.00 (2)	0.44 (2)	0.00 (2)	0.00 (2)	1.32 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.00 (2)
345	275-366	1432	0.71 (7)	0.80 (6)	0.86 (5)	0.20 (5)	0.00 (5)	0.06 (7)	0.19 (6)	0.15 (5)	0.03 (5)	0.00 (5)
346	275-366	865	1.00 (3)	1.50 (4)	1.00 (3)	9.00 (3)	2.33 (3)	0.17 (3)	0.09 (4)	0.17 (3)	0.75 (3)	0.23 (3)
368	275-366	334	38.00 (2)	22.33 (3)	0.30 (3)	7.05 (2)	26.50 (2)	5.33 (2)	3.03 (3)	0.00 (3)	0.72 (2)	2.23 (2)
387	275-366	718	12.67 (3)	9.81 (3)	8.33 (2)	15.50 (2)	18.61 (2)	1.75 (3)	2.37 (3)	0.55 (2)	2.20 (2)	1.68 (2)
388	275-366	361	8.00 (2)	5.00 (3)	14.00 (2)	14.00 (2)	23.67 (2)	1.29 (2)	0.40 (3)	2.17 (2)	2.08 (2)	2.38 (2)
392	275-366	145	38.61 (2)	69.00 (2)	40.44 (2)	93.50 (2)	12.50 (2)	3.06 (2)	7.28 (2)	4.44 (2)	23.60 (2)	2.23 (2)
729	367-549	186	145.00 (2)	688.50 (2)	214.67 (2)	53.48 (3)	1006.00 (2)	24.97 (2)	140.25 (2)	35.53 (2)	10.42 (3)	246.23 (2)
731	367-549	216	123.22 (2)	278.73 (3)	138.00 (1)	54.50 (2)	135.00 (2)	17.53 (2)	43.53 (3)	24.75 (1)	10.40 (2)	22.18 (2)
733	367-549	468	1,625.50 (2)	441.52 (3)	22.41 (3)	320.00 (2)	41.00 (2)	702.57 (2)	79.86 (3)	4.13 (3)	67.16 (2)	7.50 (2)
735	367-549	272	28.50 (2)	164.44 (3)	139.31 (2)	204.44 (2)	181.50 (2)	4.45 (2)	17.80 (3)	28.98 (2)	37.41 (2)	28.93 (2)
730	550-731	170	72.11 (2)	282.33 (2)	21.16 (2)	3.94 (2)	26.00 (2)	24.21 (2)	88.44 (2)	8.88 (2)	1.38 (2)	9.73 (2)
732	550-731	231	67.72 (2)	43.47 (2)	10.80 (2)	56.44 (2)	359.00 (2)	15.11 (2)	12.77 (2)	4.08 (2)	15.96 (2)	95.05 (2)
734	550-731	228	58.40 (2)	295.28 (2)	61.70 (2)	68.20 (2)	616.44 (2)	19.99 (2)	85.49 (2)	23.63 (2)	26.97 (2)	152.16 (2)
736	550-731	175	73.33 (2)	61.70 (2)	78.80 (2)	69.00 (2)	317.50 (2)	16.76 (2)	16.22 (2)	32.52 (2)	19.38 (2)	78.95 (2)
737	732-914	227	41.50 (2)	-	5.50 (2)	-	2.00 (2)	13.07 (2)	-	2.58 (2)	-	0.93 (2)
741	732-914	223	-	-	2.50 (2)	-	0.50 (2)	-	-	0.53 (2)	-	0.23 (2)
745	732-914	348	-	-	0.00 (2)	-	17.00 (2)	-	-	0.00 (2)	-	5.85 (2)
748	732-914	159	-	-	17.00 (2)	-	1.00 (2)	-	-	6.30 (2)	-	0.45 (2)
Upper (95% CI)a			892.7	87.9	19.5	36.1	237.7	388.2	20.0	5.1	9.3	57.2
Weighted mean (by area (incl. strata with 1 set)			82.1	53.9	15.2	28.8	52.9	31.8	10.9	3.2	6.0	11.7
Lower (95% CI)a			-728.5	19.9	6.5	21.6	-131.9	-324.6	1.8	0.7	2.7	11.7
Abundance of surveyed (millions)			129.4	83.3	21.3	44.5	88.7					
Survey biomass index (tons)								50078	16825	4691	9277	19544

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

Table 8. Mean number per standard tow from various Canadian surveys in Div. 3N where strata greater than 366 m (200 fath.) were sampled. Dashes (-) represent unsampled strata. Number of successful sets in brackets. The data are Campelen trawl equivalent units based on a comparative fishing experiment with an Engel 145 otter trawl (see text). G.A. = Gadus Atlantica, W.T. = Wilfred Templeman.

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. 113-4)	May 2-13 1992-Q2 (W.T.119-20)	Oct 26-Nov 5 1992-Q4 (W.T. 128-9)	May 5-18 1993-Q2 (W.T.136-7)	Aug 15-20 1993-Q3 (G.A.233)	Nov 1-12 1993-Q4 (W.T.144-5)	May 14-22 1994-Q2 (W.T.153)	Oct 29-Dec 13 1994-Q4 (W.T.160-61)	May 13-27 1995-Q2 (W.T.168-69)
382	093-183	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)	0.00 (2)
377	093-183	100	0.00 (2)	0.00 (2)	---	0.00 (2)	0.00 (2)	0.00 (2)	4.67 (3)	0.50 (2)	0.00 (2)	0.50 (2)	0.00 (2)
359	093-183	421	0.00 (2)	205.75 (4)	0.00 (2)	0.00 (2)	0.00 (2)	0.00 (2)	1.00 (3)	0.00 (2)	0.00 (2)	4.00 (2)	0.00 (2)
381	185-274	182	0.50 (2)	5.67 (3)	4.50 (2)	1.00 (2)	---	0.00 (2)	6.00 (4)	3.00 (2)	0.00 (2)	0.00 (2)	0.00 (2)
378	185-274	139	8.00 (3)	26.67 (3)	183.50 (2)	42.00 (2)	1.50 (2)	1.00 (2)	16.67 (3)	4.50 (2)	0.50 (2)	5.00 (2)	2.50 (2)
358	185-274	225	68.00 (2)	979.67 (3)	9350.00 (2)	34.00 (2)	30425.00 (2)	1473.00 (2)	25736.00 (4)	17.50 (2)	68.00 (2)	350.00 (2)	3.50 (2)
380	275-366	116	8.00 (2)	3471.50 (2)	179.50 (2)	0.00 (2)	---	13.50 (2)	793.50 (2)	10.50 (2)	10.50 (2)	0.00 (2)	21.50 (2)
379	275-366	106	56.50 (2)	7880.00 (2)	---	15.50 (2)	123.00 (2)	13.50 (2)	2304.00 (3)	270.50 (2)	59.50 (2)	100.50 (2)	42.50 (2)
357	275-366	164	212.50 (2)	2607.00 (2)	3521.50 (2)	593.00 (2)	5207.50 (2)	395.50 (2)	1408.70 (3)	262.50 (2)	210.50 (2)	3687.50 (2)	159.50 (2)
727	367-549	160	24.50 (2)	109.00 (4)	---	15.50 (2)	---	50.00 (2)	2699.00 (3)	208.00 (2)	46.00 (2)	136.00 (2)	94.00 (2)
725	367-549	105	229.00 (2)	427.00 (3)	---	---	1672.50 (2)	89.50 (2)	1356.30 (3)	270.50 (2)	43.00 (2)	477.50 (2)	48.50 (2)
723	367-549	155	261.00 (2)	---	146.00 (2)	510.50 (2)	---	270.00 (2)	3159.80 (4)	1832.50 (2)	129.00 (2)	1212.00 (2)	112.00 (2)
728	550-731	156	66.50 (2)	16.75 (4)	---	75.50 (2)	---	965.00 (2)	164.67 (3)	---	34.33 (3)	8.50 (2)	109.00 (2)
726	550-731	72	385.00 (2)	73.50 (2)	---	75.00 (2)	---	86.00 (2)	545.50 (2)	65.50 (2)	31.50 (2)	207.00 (2)	163.00 (2)
724	550-731	124	517.50 (2)	---	29.00 (2)	103.50 (2)	---	166.00 (2)	1317.00 (4)	532.00 (2)	57.50 (2)	802.50 (2)	184.50 (2)
760	732-914	154	---	---	---	---	---	---	---	---	3.50 (2)	---	---
756	732-914	106	---	---	---	---	---	---	---	---	5.50 (2)	---	---
752	732-914	134	---	---	---	---	---	---	---	---	1.50 (2)	---	---
Upper (95% CI)			173.0	1536.0	7884.4	129.4	38182.7	1767.0	7088.9	1042.7	96.3	2427.2	136.5
Weighted mean (by area)			79.8	789.6	1267.7	81.0	4136.6	221.4	2665.2	182.1	32.3	373.3	43.0
Lower (95% CI)			-13.4	43.3	-5349.1	32.6	-29909.5	-1324.1	-1758.6	-678.5	-31.8	-1680.6	-50.6
Abundance of surveyed area (millions)			31.5	281.7	378.9	30.8	1085.2	87.5	1052.9	68.0	14.5	147.5	17.0

Table 9. Mean weight (kg) per standard tow from various Canadian surveys in Div. 3N where strata greater than 366 m (200 fath.) were sampled. Dashes (-) represent unsampled strata. Number of successful sets in brackets. The data were generated from Campelen trawl equivalent numbers based on a comparative fishing experiment with an Engel145 otter trawl (see text). G.A. = GadusAtlantica, W.T. = Wilfred Templeman.

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. 113-4)	May 2-13 1992-Q2 (W.T.119-20)	Oct 26-Nov 5 1992-Q4 (W.T. 128-9)	May 5-18 1993-Q2 (W.T.136-7)	Aug 15-20 1993-Q3 (G.A.233)	Nov 1-12 1993-Q4 (W.T.144-5)	May 14-22 1994-Q2 (W.T.153)	Oct 29-Dec 13 1994-Q4 (W.T.160-61)	May 13-27 1995-Q2 (W.T.168-69)
382	093-183	647	0.2 (2)	0.0 (3)	0.0 (3)	0.0 (3)	0.0 (2)	0.0 (2)	0.0 (3)	0.0 (2)	0.00 (2)	0.00 (2)	0.00 (3)
377	093-183	100	0.0 (2)	0.0 (2)	---	0.0 (2)	0.0 (2)	0.0 (2)	0.9 (3)	0.2 (2)	0.00 (2)	0.13 (2)	0.00 (2)
359	093-183	421	0.0 (2)	4.6 (4)	0.0 (2)	0.0 (2)	0.0 (2)	0.0 (2)	0.2 (3)	0.0 (2)	0.00 (2)	0.29 (2)	0.00 (2)
381	185-274	182	0.1 (2)	1.0 (3)	0.1 (2)	0.2 (2)	---	0.0 (2)	1.0 (4)	1.1 (2)	0.00 (2)	0.00 (2)	0.00 (2)
378	185-274	139	0.9 (3)	3.7 (3)	48.4 (2)	2.4 (2)	0.3 (2)	0.2 (2)	2.2 (3)	0.8 (2)	0.08 (2)	0.33 (2)	0.08 (2)
358	185-274	225	1.2 (2)	115.4 (3)	390.4 (2)	1.3 (2)	3206.1 (2)	104.0 (2)	2069.1 (4)	1.3 (2)	2.49 (2)	26.8 (2)	2.49 (2)
380	275-366	116	0.2 (2)	814.8 (2)	41.9 (2)	0.0 (2)	---	1.1 (2)	135.2 (2)	0.4 (2)	0.37 (2)	0.00 (2)	0.37 (2)
379	275-366	106	5.4 (2)	1086.4 (2)	. (1)	1.3 (2)	16.9 (2)	1.7 (2)	431.4 (3)	30.2 (2)	4.93 (2)	10.8 (2)	4.93 (2)
357	275-366	164	19.1 (2)	517.7 (2)	414.7 (2)	23.7 (2)	727.5 (2)	35.1 (2)	224.9 (3)	23.8 (2)	18.1 (2)	405.3 (2)	18.1 (2)
727	367-549	160	3.4 (2)	33.7 (4)	---	1.7 (2)	.	5.9 (2)	845.9 (3)	39.4 (2)	8.06 (2)	28.6 (2)	8.06 (2)
725	367-549	105	26.9 (2)	135.0 (3)	---	---	491.0 (2)	15.2 (2)	402.3 (3)	69.1 (2)	6.27 (2)	97.7 (2)	6.27 (2)
723	367-549	155	29.7 (2)	---	38.8 (2)	47.1 (2)	---	60.7 (2)	765.1 (4)	293.8 (2)	16.3 (2)	302.3 (2)	16.3 (2)
728	550-731	156	20.2 (2)	7.0 (4)	---	20.2 (2)	---	421.3 (2)	60.8 (3)	---	9.61 (3)	3.12 (2)	9.61 (2)
726	550-731	72	87.8 (2)	32.6 (2)	---	22.9 (2)	---	18.8 (2)	225.7 (2)	26.0 (2)	7.93 (2)	86.4 (2)	7.93 (2)
724	550-731	124	81.6 (2)	---	20.8 (2)	18.6 (2)	---	69.5 (2)	461.8 (4)	220.9 (2)	19.1 (2)	294.6 (2)	19.1 (2)
760	732-914	154	---	---	---	---	---	---	---	---	1.2 (2)	---	---
756	732-914	106	---	---	---	---	---	---	---	---	2.4 (2)	---	---
752	732-914	134	---	---	---	---	---	---	---	---	0.5 (2)	---	---
Upper (95% CI)			26.1	599.1	110.5	10.3	4050.9	340.8	636.0	144.9	5.4	158.1	11.0
Weighted mean (by area)			11.1	133.5	81.0	7.0	468.8	40.8	328.6	35.4	4.1	62.2	6.5
Lower (95% CI)			-4.0	-332.0	51.5	3.7	-3113.2	-259.3	21.1	-74.1	2.9	-33.6	2.0
Survey biomass index (tons)			4375.0	47624.0	24221.0	2662.0	122990.0	16112.0	129808.0	13222.0	1860.0	24584.0	2572.0

Table 10. Mean number and weight per standard tow from Canadian surveys in Div. 3N (autumn 1995 to spring 1998) where strata greater than 366 m (200 fath.) were sampled. Dashes (-) represent unsampled strata. Number of successful sets in brackets. The gear utilized was a Campelen 1800 survey trawl with a small mesh liner in the codend. WT = WilfredTempleman, AN = Alfred Needler, T=Teleost.

Stratum	Depth Range (M)	Area (sq. n.) mi	Sep28-Oct26 1995-Q4 (WT176-177)	May22-May30 1996-Q2 (WT189)	Nov25-Dec13 1996-Q4 (AN253) (T41-42)	May-Jun 1997-Q2 (WT205-206)	Oct-Dec 1997-Q4 (WT213-217)	May-Jun 1998-Q2 (WT221-222)	Sep28-Oct26 1995-Q4 (WT176-177)	May22-May30 1996-Q2 (WT189)	Nov25-Dec13 1996-Q4 (AN253) (T41-42)	May-Jun 1997-Q2 (WT205-206)	Oct-Dec 1997-Q4 (WT213-217)	May-Jun 1998-Q2 (WT221-222)
359	093-183	421	0.00 (2)	0.00 (2)	3.11 (2)	3.50 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.67 (2)	0.45 (2)	0.00 (2)	0.00 (2)
377	093-183	100	2.00 (2)	0.50 (2)	0.00 (2)	0.50 (2)	0.00 (2)	1.50 (2)	0.28 (2)	0.09 (2)	0.00 (2)	0.14 (2)	0.00 (2)	0.07 (2)
382	093-183	647	1.00 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.14 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.00 (2)	0.00 (2)
358	185-274	225	425.78 (2)	152.00 (2)	74.83 (2)	144.50 (2)	144.00 (2)	1891.00 (2)	39.93 (2)	7.45 (2)	4.98 (2)	9.78 (2)	14.15 (2)	285.49 (2)
378	185-274	139	1.00 (2)	62.00 (2)	3.00 (2)	11.00 (2)	48.44 (2)	15.50 (2)	0.47 (2)	8.57 (2)	0.38 (2)	1.47 (2)	5.64 (2)	2.30 (2)
381	185-274	182	0.50 (2)	8.44 (2)	4.40 (2)	0.50 (2)	11.41 (3)	0.00 (2)	0.00 (2)	0.16 (2)	1.48 (2)	0.00 (2)	0.79 (3)	0.00 (2)
357	275-366	164	10297.78 (2)	197.33 (2)	858.22 (2)	245.50 (2)	3610.67 (2)	3183.00 (2)	1,230.70 (2)	30.56 (2)	175.24 (2)	23.67 (2)	581.51 (2)	588.43 (2)
379	275-366	106	548.89 (2)	569.00 (2)	25.78 (2)	152.50 (2)	7864.83 (2)	198.00 (2)	59.05 (2)	65.43 (2)	3.96 (2)	19.83 (2)	1405.50 (2)	24.65 (2)
380	275-366	116	733.78 (2)	47.50 (2)	17.09 (2)	72.00 (2)	184.22 (2)	9.50 (2)	117.53 (2)	4.63 (2)	1.13 (2)	9.43 (2)	27.54 (2)	1.08 (2)
723	367-549	155	791.00 (2)	252.31 (2)	420.00 (2)	366.00 (2)	1027.44 (3)	364.50 (2)	197.07 (2)	32.63 (2)	66.11 (2)	40.28 (2)	217.39 (3)	97.85 (2)
725	367-549	105	293.80 (2)	455.00 (2)	136.50 (2)	490.40 (2)	1345.60 (2)	140.00 (2)	46.88 (2)	78.18 (2)	24.23 (2)	76.49 (2)	447.89 (2)	27.45 (2)
727	367-549	160	329.80 (2)	166.06 (2)	48.50 (2)	248.00 (2)	930.00 (2)	141.00 (2)	35.86 (2)	19.32 (2)	8.85 (2)	48.67 (2)	230.07 (2)	24.53 (2)
724	550-731	124	120.86 (2)	120.56 (2)	339.56 (2)	233.00 (2)	23.00 (2)	549.50 (2)	46.19 (2)	37.54 (2)	96.44 (2)	33.63 (2)	8.58 (2)	229.96 (2)
726	550-731	72	322.00 (2)	208.61 (2)	906.00 (2)	546.00 (2)	9.50 (2)	1039.00 (2)	113.38 (2)	71.41 (2)	272.98 (2)	138.67 (2)	3.98 (2)	358.83 (2)
728	550-731	156	243.07 (2)	62.39 (2)	157.00 (2)	-	18.00 (2)	95.50 (2)	60.99 (2)	12.70 (2)	32.97 (2)	-	6.71 (2)	27.00 (2)
752	732-914	134	-	-					-	-	-			
756	732-914	106	-	-					-	-	-			
760	732-914	154	-	-					-	-	-			
Upper (95% CI)			7503.4	169.1	673.1	197.9	3693.1	2652.9	910.5	27.2	158.2	28.0	717.7	448.6
Weighted mean (by area)			770.0	103.0	133.7	103.2	676.9	426.0	102.9	15.2	28.5	15.1	129.4	85.1
Lower (95% CI)			-5963.4	36.8	-405.8	8.5	-2339.3	-1800.9	-704.7	3.1	-101.1	2.3	-458.9	-278.4
Abundance of surveyed area (millions)			304.2	40.7	52.8	38.5	267.4	168.4						
Survey biomass index (tons)									40650	5987	11277	5651	51116	33611

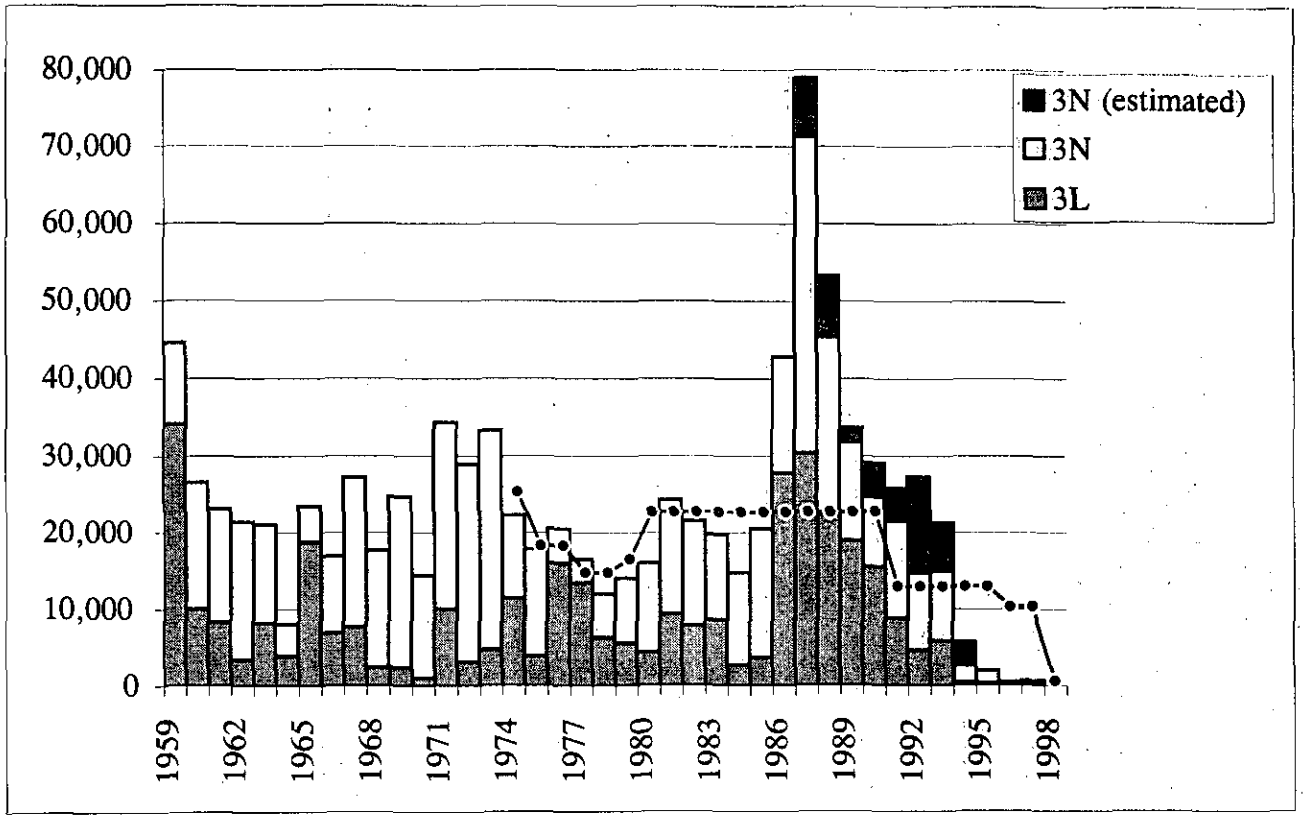

Fig. 1: Nominal catches and TACs of redfish in Div. 3LN (1994-96 are provisional).

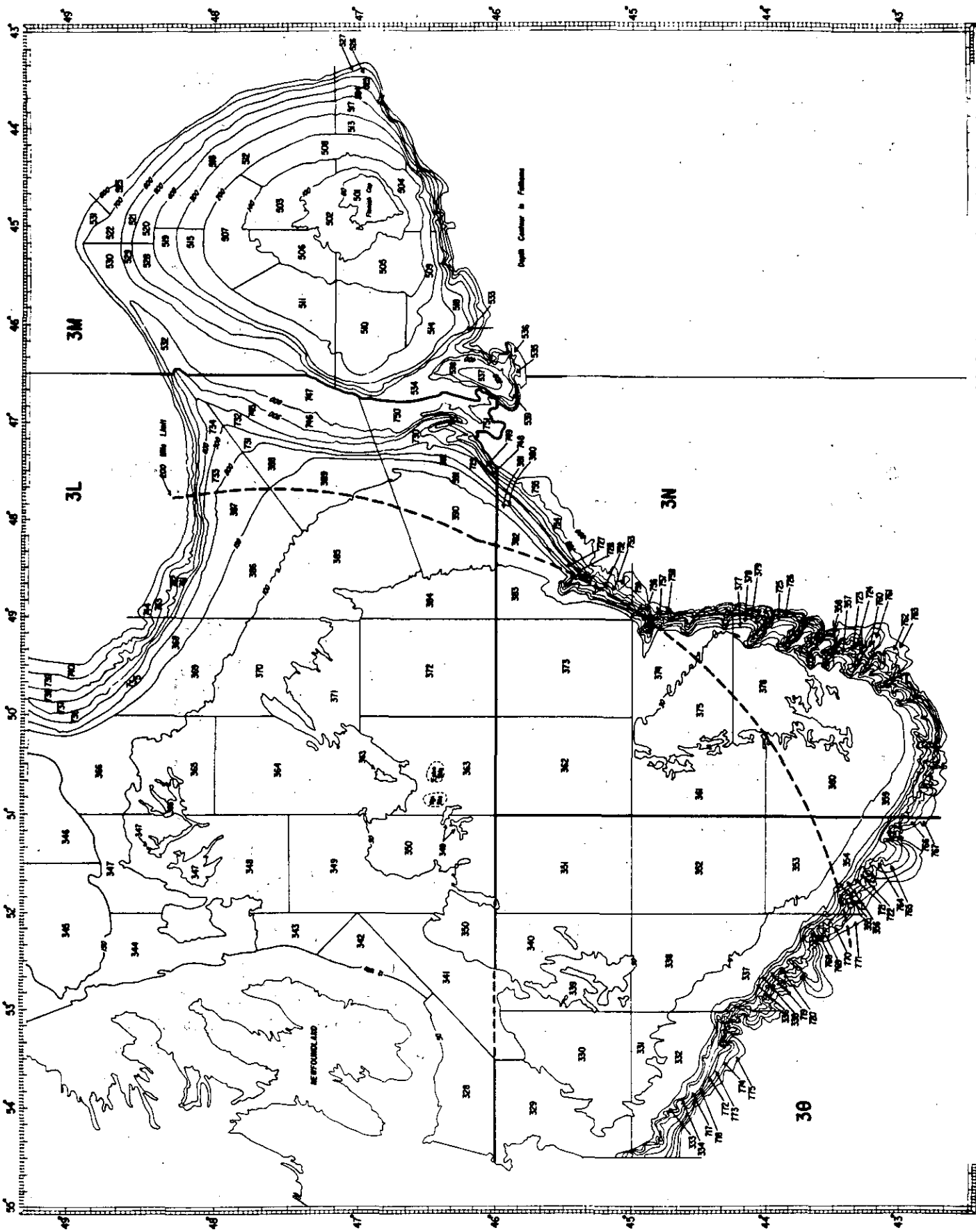

Fig. 2. Stratification scheme for NAFO Divisions 3LNO covering depths to 732 m (400 fathoms) showing the boundary line between the Canadian 200-mile exclusive economic zone and the NAFO Regulatory area.

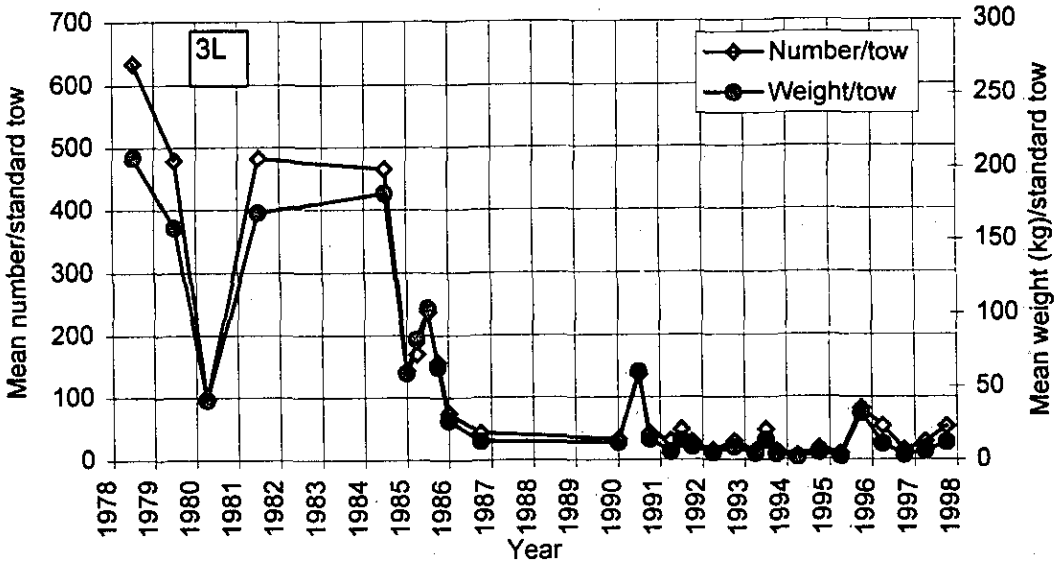

Figure 3. Stratified mean number and weight (kg) per tow in Div. 3L from various Canadian surveys where strata greater than 366m were covered. Surveys up to spring 1995 used an Engel trawl (data plotted in Campelen equivalents) and those from autumn 1995 onward used a Campelen trawl.

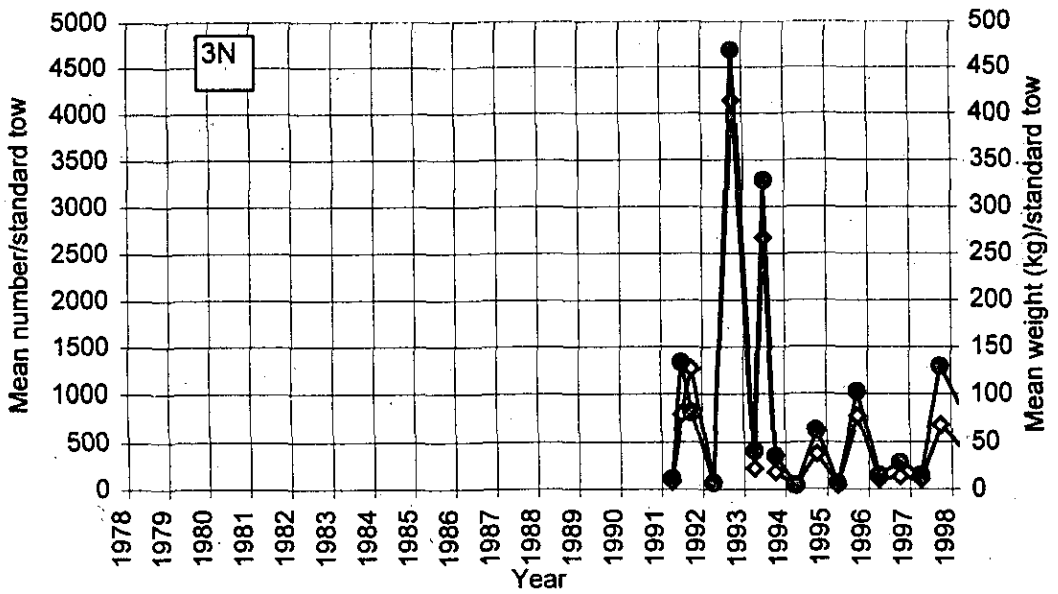

Figure 4. Stratified mean number and weight (kg) per tow in Div. 3N for 1991-1997 Canadian surveys where strata greater than 366m were covered. Surveys up to spring 1995 used an Engel trawl (data plotted in Campelen equivalents) and those from autumn 1995 onward used a Campelen trawl.

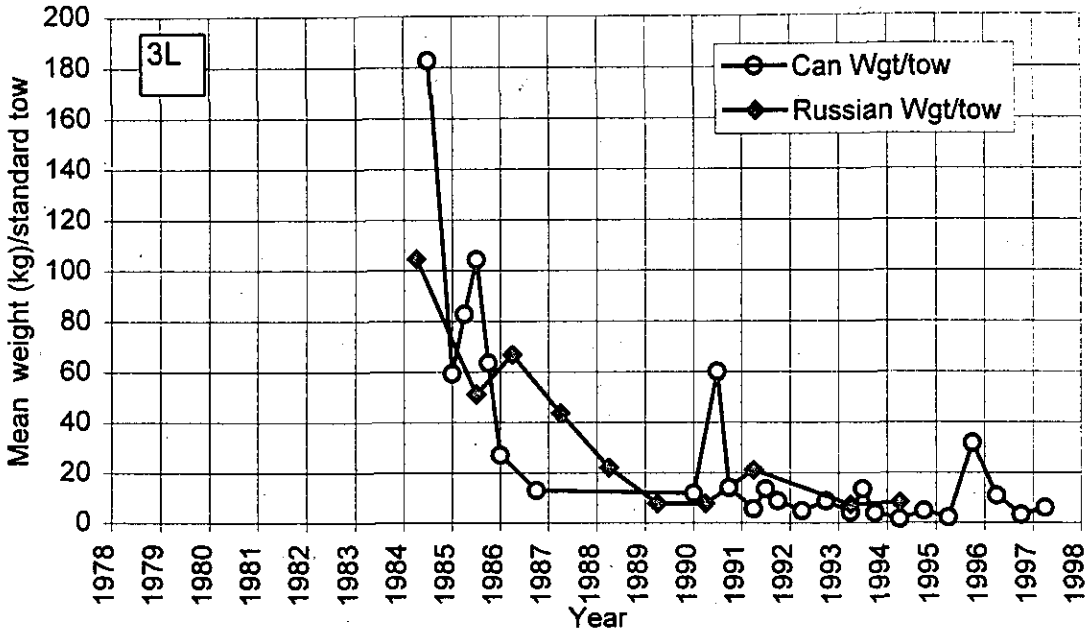

Figure 5. Stratified mean weight (kg) per tow in Div. 3L from Canadian and Russian surveys since 1978.

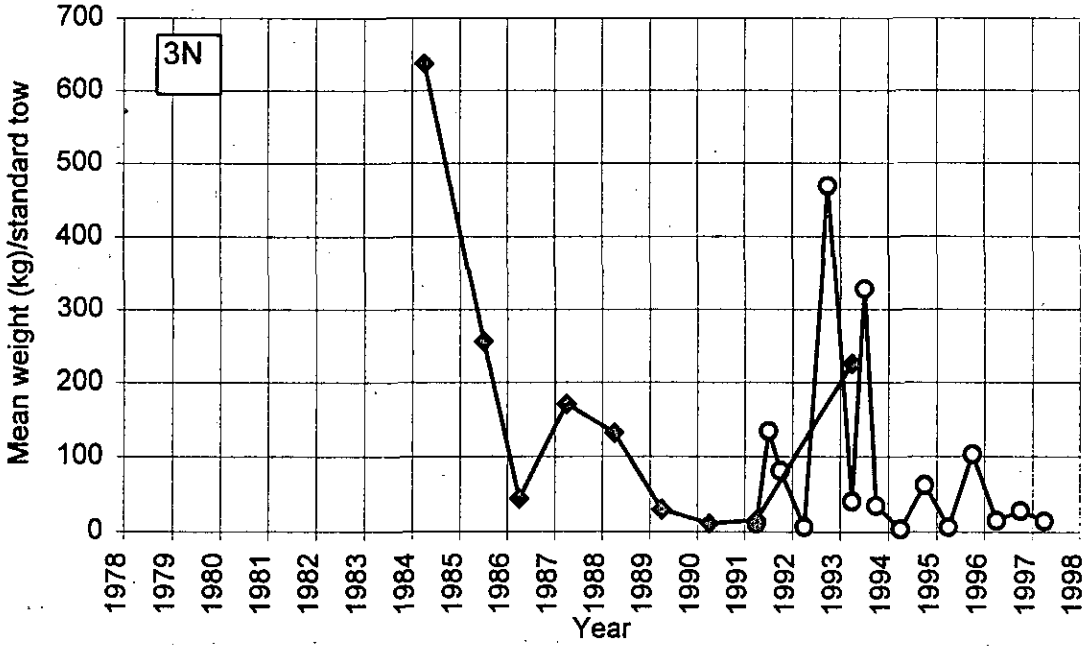

Figure 6. Stratified mean weight (kg) per tow in Div. 3N from Canadian and Russian surveys since 1978.

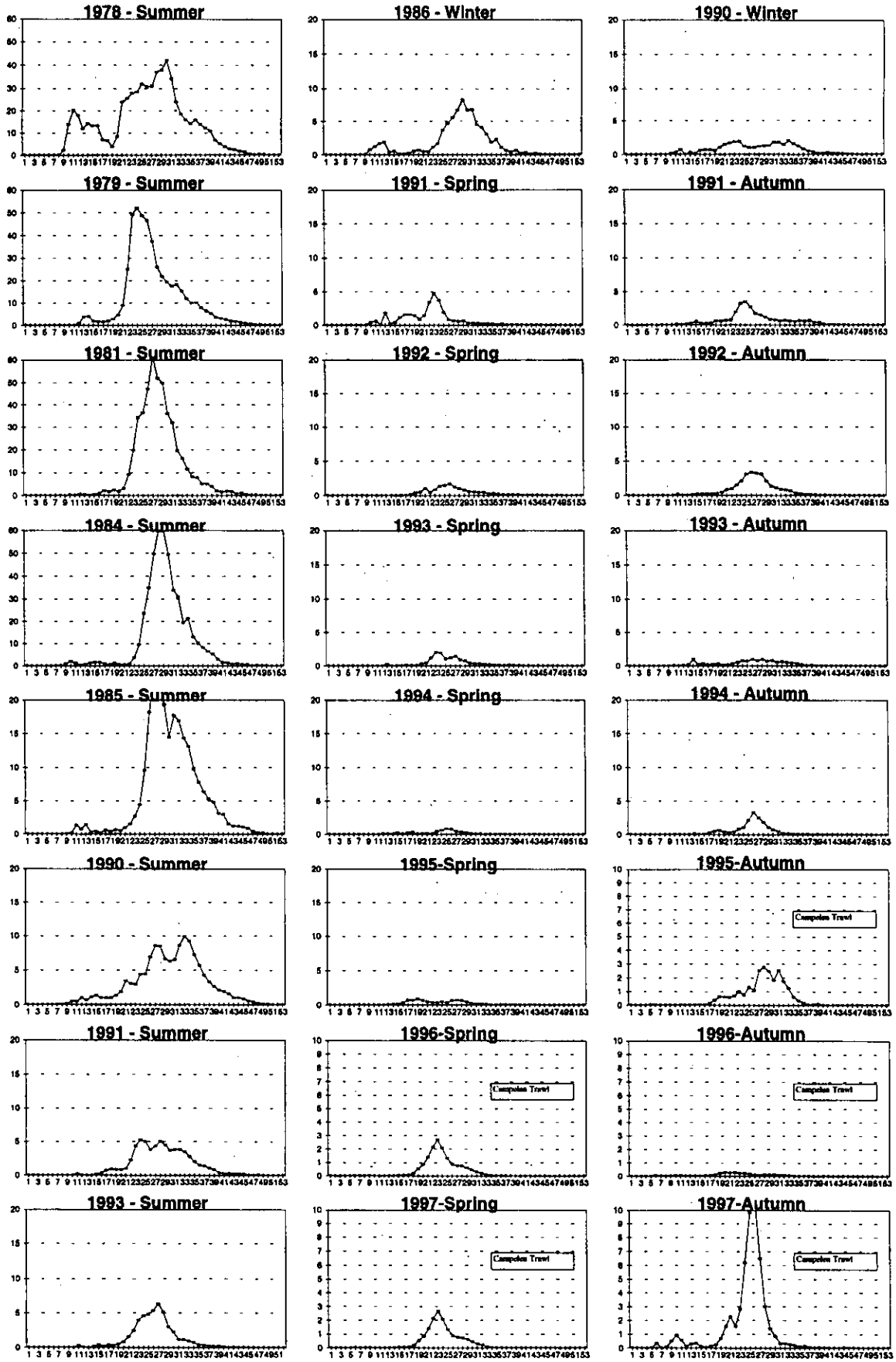

Fig. 7 Length frequency distribution from stratified-random research surveys to Div. 3L from 1978 to 1998. Plotted are mean number per standard tow in Campelen equivalent units. X-axis is forklength in centimetres.

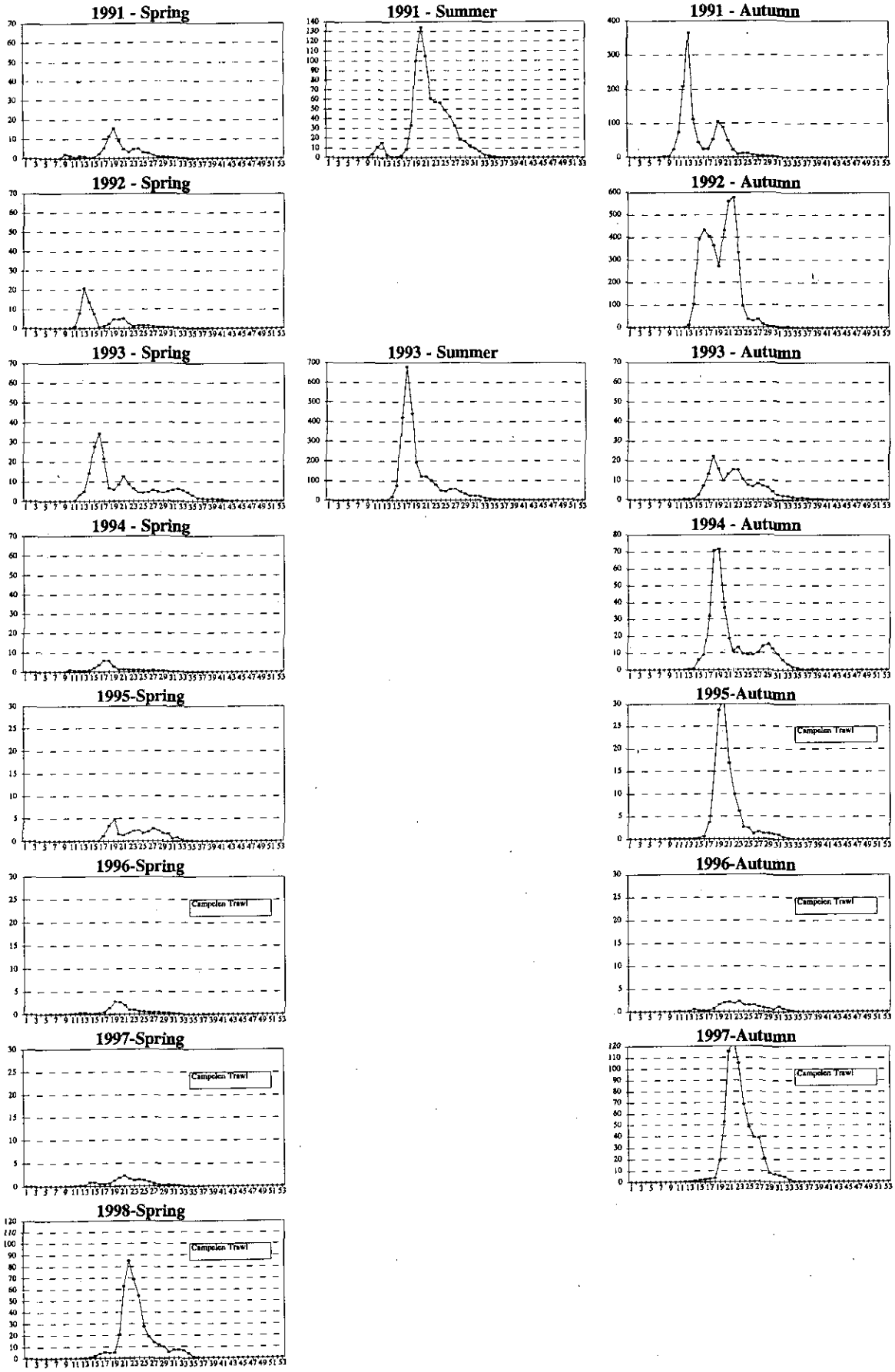

Fig. 8. Length frequency distribution from stratified-random research surveys to Div. 3N from 1991 to 1998. Plotted are mean number per standard tow in Campelen equivalent units. X-axis is forklength in centimetres.