Northwest Atlantic Fisheries Organization

Serial No. N2908 NAFO SCR Doc. 97/74

SCIENTIFIC COUNCIL MEETING - JUNE 1997

Roundnose Grenadier (*Coryphaenoides Rupestris*) in NAFO Subareas 2+3

by

D. Power

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

Nominal Caches

After the first reported catch of about 17,000 t of roundnose grenadier in NAFO Subareas 2+3 in 1967, nominal catches were greater than 20,000 t in most years (Table 1, Fig. 1) from then until extension of jurisdiction by Canada in 1977. During this period, most of the annual catch was taken in Div. 3K with the exception of 1971 when over 50,000 t was reported from Div. 2G.

After declining to only about 2,000 t in 1980, catches increased somewhat during the 1980s to about 7,000 t in 1986 and 1987 due to increased catches by the USSR and to some extent, GDR (Table 2). Catches declined again since then as a result of declines in catches by 'traditional' countries in 'traditional' areas, and beginning in 1993 there have been no allocations to non-Canadian vessels inside the Canadian zone. The majority of the catch since 1993 are primarily because of by-catch associated with the Greenland halibut fishery primarily prosecuted by non-Canadian fleets outside 200 miles in Div. 3LMNO.

It has been recognized for a number of years that recent reported catches represented a mixture of both roundnose and roughhead grenadiers. Atkinson (MS 1995) provided a revision of catches based on information from Spain and Portugal on the species mix in the catches. Portugal reported that all of their catch since 1988 was roughhead grenadier. It is likely that EU-Spain catches are also mostly Roughhead grenadier. Beginning in 1990, more roughhead grenadier have been caught than roundnose although the nominal statistics don't indicate this. It is believed that the catches have been between 50 to 60 tons for 1995 and 1996 most of which was taken by Japan.

During the years of the directed fishery for roundnose grenadier, most of the catch was taken during the second half of the year. The distribution of actual roundnose grenadier catches by area and season in the Regulatory Area in recent years has not been confirmed, but based on reports to NAFO, catches of roundnose and roughhead combined have been taken primarily during the first half of the year corresponding with the period of the most effort for Greenland halibut.

A TAC was first imposed at 32,000 t in 1974, increased marginally to 35,000 t in 1977 and reduced successively to 27,000 t by 1982. A reduction of 16,000 t occurred for 1983 and the TAC was maintained at 11,000 t to 1993. From 1994 to 1996 a 3,000 t TAC was in effect for the Canadian zone only. Currently there is a moratorium on the directed fishery imposed within the Canadian zone.

Commercial Fishery Data

Limited sampling information is available for roundnose grenadier from the discarded bycatch of the Spanish trawler fleet (Junquera MS 1997). These data suggest the bulk of the bycatch in Div. 3L was composed of sizes between 6.5cm to 12.0cm based on pre-anal fin length. In Div. 3M, fish between 8.0cm-13.5cm pre-anal fin length dominated the yearly aggregated size distribution.

Research Survey Data

Relative Abundance and Biomass

Canada conducted a stratified-random bottom trawl survey in 1996 for groundfish from September to December in Div. 2G to Div. 3O with allocation of sets proportional to stratum area with the constraint that each stratum have a minimum of 2 sets. Various segments of the survey were accomplished by the Alfred Needler, the Wilfred Templeman (the preceding two of the same design) and the Teleost, a larger tonnage converted shrimp trawler. All vessels used a Campelen 1800 trawl

was used with a standard tow of 0.75 n. mi (15 minute tow X 3.0 knots). Bottom contact and general gear configuration was monitored with the SCANMAR net monitoring system. The survey initially planned to cover down to 1500 m in Div. 2GHJ3K and to about 1500 m in 3LMNO with the exception of Div. 3M where certain deep strata on the east and south were not covered. There was no coverage in Div. 3NO beyond 732 m and in Div. 2G beyond 500 m because of various unplanned interruptions in the surveys. Overall, highest abundance occurred in strata beyond 900 m and in Div. 2H and Div. 3K. Survey biomass estimates ranged from 2 600 tons in Div. 3L to 26 000 tons in Div. 2H. The total survey biomass amounted to about 68 000 tons.

Japan conducted a stratified-random trawl survey in Div. 2GH in August 1996 (Yokawa and Satani MS 1997). The survey covered strata from 201m to 1500m and utilized the same stratification scheme as the Canadian survey mentioned above. Tow duration was 30 minutes at 3.5 knots. The gear used had 140mm mesh codend with a 30mm liner. The survey biomass estimate was 2,250 t for Div. 2G and 2,736 t for Div. 2H.

Size distribution

Size distribution (mean number per standard tow at length using pre-anal fin length measurements) from the 1996 Canadian survey by division (Fig. 2) indicate a smaller size range and predominantly smaller fish in the southern divisions, at least for 3LM, compared to the northern divisions 2HJ3K. Div. 2H consisted of fish between 4cm to 18 cm with a somewhat symetric distribution around a predominant mode at 12cm. There was a bi-modal distribution in Div 2J with peaks at 5.5cm and 10cm. There was a single mode in Div. 3K at 7cm. Divisions 3L and 3M both were similar in having a narrower range of fish than other areas further north (mostly between 3.5cm and 11cm). Div. 3L had a mode at 5cm while Div. 3M had the majority of the catch between 5cm and 7cm with no clear mode. There was very few fish captured in Divs. 3NO to draw any conclusions.

The pre-anal fin length distributions sampled from the Japanese survey in Div. 2GH suggested a familiar pattern of increasing fish size with depth for both Div. 2G and div. 2H. The overall size distribution for Div. 2G ranged from about 2.5cm to about 18cm with bulk of the catch between 4.5cm and 8cm with a clear mode at 6.5 cm. In Div. 2H the sizes ranged between 2cm and 17cm and the majority of catch was between 6cm and 12cm with a mode around 7cm.

Discussion/Status of the stock

There has been very limited commercial data since the cessation of fishing within the Canadian zone in 1993. Deepwater surveys in Div. 3K in 1991 and 1994 suggested no change in status in Div. 3K during this time period, but a decline of about 70% was noted in 1995 (Bowering *et al.* MS 1995). In 1995 it was concluded that based on the 1995 survey results, the TAC, at 3,000 t for the area inside the Canadian zone may be excessive (NAFO Sci. Coun. Rep., 1995, page 32). This resource is currently under moratorium for directed fishing. The 1996 Canadian survey is not directly comparable to the data from the 1994-1995 Canadian surveys because a different gear was used. For the same reason the 1996 survey by Japan is not comparable to the 1996 survey by Canada. Due to the limited amount of information, the status of the stock cannot be determined. The 1996 estimate of survey biomass is the only point available, and as such, the status of the stock compared with the historical period when a directed fishery occurred cannot be determined.

References

Anon. 1995. NAFO Sci. Coun. Rep., 1995, page 32.

Atkinson, D.B. and D. Power, and J. Morgan. MS 1994. Roundnose Grenadier (*Coryphaenoides rupestris*) and Roughhead Grenadier (*Macrourus berglax*) in NAFO Subareas 2+3. NAFO SCR Doc. 94/48. Ser. No. N2419. 11p.

Atkinson, D.B. MS 1995. An update on Roundnose Grenadier (*Coryphaenoides rupestris*) in NAFO Subareas 2+3 with Information on Roughhead Grenadier (*Macrourus berglax*). NAFO SCR Doc. 95/61. Ser. No. N2576. 7p.

Bowering, W.R., D. Power and M.J. Morgan. MS 1995. Distribution and Abundance of Five Major Groundfish Species at the Continental Slope of Divisions 3KLMN Based upon Canadian Deepwater Surveys in 1991, 1994 and 1995. NAFO SCR Doc. 95/51. Ser. No. N2562. 26p.

Godinho, M.L., R. Alpoim, A.M. Avila de Melo, and E. Santos. MS 1996. Portuguese Research Report for 1995. NAFO SCS Doc. 96/12. Ser. No. N2703. 61p.

Junquera, S. MS 1997. Spanish research report for 1996. NAFO SCS Doc. No. 97/10. Ser. No. N2873. 9p

Yokawa, K., and M. Satani MS 1997. Results of a stratified random bottom trawl survey in NAFO Divisions 2GH in 1996. NAFO SCR Doc. 97/23. Ser. No. N2853.19p.

Table 1: Summary of nominal catches (t) of roundnose grenadier by Subarea and Division.

Year	2G	2H	2J	3K	3L	3M	3N	3O	Other	Total	TAC
1966											
1967	-	868	217	16,009					210	17,304	
1968	2,536	4,089	479	23,553					606	31,263	
1969	387	-	264	11,682					-	12,333	
1970	-	-	468	22,267					129	22,864	
1971	54,179	2,738	81	18,392					55	75,445	
1972	2,161	655	293	21,122					155	24,386	
1973	5,880	232	632	10,655					165	17,564	
1974	3,220	2,007	333	22,816					40	28,416	32,000
1975	6,489	3,536	1,754	15,388					258	27,425	32,000
1976	3,841	1,460	1,381	13,636					275	20,593	32,000
1977	2,597	525	206	11,935	48	0	75	0		15,386	35,000
1978	3,112	1,412	913	15,250	12	0	3	0		20,702	35,000
1979	1,035	3,090	438	3,200	16	0	2	0		7,781	35,000
1980	279	493	726	451	68	32	4	0		2,053	30,000
1981	967	1,693	463	3,920	24	0	18	0		7,085	27,000
1982	719	734	182	2,709	0	0	0	0		4,344	27,000
1983	140	1,390	36	1,916	85	2	0	0		3,569	11,000
1984	107	289	3	3,362	89	23	0	0		3,873	11,000
1985	0	80	13	4,642	181	18	0	14		4,948	11,000
1986	0	117	56	7,222	23	8	0	1		7,427	11,000
1987	80	254	213	6,682	963	8	98	0		8,298	11,000
1988	329	226	9	4,658	976	39	56	0		6,293	11,000
1989	32	202	47	4,361	253	37	13	11		4,956	11,000
1990	86	52	2	606	2,252	714	312	6		4,030	11,000
1991 [a]	178	84	45	94	2,512	503	1,093	10		4,519	11,000
1992	72	11	20	253	2,674	3,542	806	129		7,507	11,000
1993 [b]	128	8	14	145	2,213	819	1,109	16		4,452	11,000
1994 [b]	7	10	5	23	579	2,300	950	183		4,057	3,000
1995 [b]	12	10	1	18	1,168	1,767	1,054	93		4,123	3,000
1996 [b]	5	2	5	8	1,626	932	554	12		3,144	3,000
1997											0

[a] 1991 catch could not be well estimated; based on revised data is estimated to be 8,000 - 14,000 t

[b] Provisional (TACs for Canadian zone only, Grenadiers are unregulated in the NAFO Regulatory area.

Catches reported from 3L, 3M, 3N and 3O since 1987 contain a mix of roundnose and roughhead grenadiers.

NOTE:

Portugal has indicated that catches from 1988-1995 previously reported as roundnose were actually roughhead grenadier

Spain has estimated that their 1992 reported roundnose grenadier catch was actually about 52% roughhead grenadier

Table 2: Nominal catches (t) of roundnose grenadier in Subarea 2+3 by country and year.

Country	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994*	1995*	1996*
Canada	-	-	9	10	2	20	155	152	409	268	49	42	27
E/GER	23	178	13	-	8	-	-	2	35	-	-	-	-
GDR	3,650	3,740	4,571	4,469	3,380	2,352	1	-	-	-	-	-	-
Poland	51	12	17	1	17	17	-	-	-	-	-	-	-
E/ESP	-	-	-	-	-	-	-	-	4,970	2,054	1,720	2,518	3090
USSR	147	1,018	2,801	2,725	1,890	2,230	538	132	-	-	-	-	-
Russia	-	-	-	-	-	-	-	-	4	-	-	130	-
Japan	2	-	13	79	85	46	125	156	80	134	-	56	27
EEC	-	-	-	-	-	-	-	-	-	-	-	-	-
E/PRT	-	-	3	1,001	911	290	3,211	4,053	2,004	1,996	2,224	1,377	-
Faroes	-	-	-	9	-	-	-	-	3	-	-	-	-
Norway	-	-	-	-	-	1	-	24	-	-	-	-	-
Cuba	-	-	-	4	-	-	-	-	-	-	-	-	-
Den(Green)	-	-	-	-	-	-	-	-	2	-	-	-	-
TOTAL	3,873	4,948	7,427	8,298	6,293	4,956	4,030	4,519	7,507	4,452	3,993	4,123	3,144

* Provisional.

Note: Totals reflect nominal catches and have not been corrected for roughhead grenadier stimates

Table 3 . Mean number and weight per standard tow of roundnose grenadier from Canadian surveys conducted in Div. 2HJ3K in autumn 1996. Number of successful sets in brackets. The gear utilized was a Campelen 1800 survey trawl with a small mesh liner in the codend. Only those strata > 400 m that were sampled are included.WT = Wilfred Templeman, AN = Alfred Needler, T=Teleost.

Stratum	Depth Range (M)	Area (sq. n.) mi	2H Num/tow (T36-37)	2H Kg/tow (T36-37)
951	0401-500	234	0.00 (2)	0.00
960	0401-500	107	0.00 (2)	0.00
933	0401-500	50	0.00 (2)	0.00
942	0401-500	55	0.00 (2)	0.00
948	0401-500	246	0.00 (2)	0.00
945	0401-500	461	0.00 (2)	0.00
961	0501-750	211	12.00 (2)	0.57
947	0501-750	227	0.00 (2)	0.00
941	0501-750	89	0.00 (2)	0.00
934	0501-750	78	135.00 (2)	9.22
946	0501-750	721	0.00 (3)	0.00
940	0751-1000	97	1008.50 (2)	147.98
962	0751-1000	242	177.00 (2)	13.55
963	1001-1250	265	40.00 (2)	15.43
939	1001-1250	130	1442.00 (2)	378.52
964	1251-1500	342	343.10 (2)	184.05
938	1251-1500	191	640.50 (2)	289.33
Upper (95% CI)a			736.9	113.2
Weighted mean (by area) (incl. strata with 1 set)			157.9	50.7
Lower (95% CI)a			-421.1	-11.8
Abundance of surveyed area (millions)			81.4	
Survey biomass index (tons)				26133

Stratum	Depth Range (M)	Area (sq. n.) mi	2J Num/tow (T39)	2J Kg/tow (T39)
204	0401-500	288	0.00 (2)	0.00
227	0401-500	598	0.00 (2)	0.00
235	0401-500	414	0.00 (2)	0.00
240	0401-500	133	0.00 (2)	0.00
217	0401-500	241	0.50 (2)	0.28
224	0501-750	228	0.00 (2)	0.00
212	0501-750	557	0.00 (2)	0.00
218	0501-750	362	175.50 (2)	42.65
239	0501-750	120	0.00 (2)	0.00
230	0501-750	185	4.11 (2)	0.60
231	0751-1000	186	77.50 (2)	9.43
219	0751-1000	283	248.17 (2)	64.25
236	0751-1000	193	106.00 (2)	7.18
225	1001-1250	195	121.00 (2)	38.28
232	1001-1250	228	25.50 (2)	11.18
220	1001-1250	303	108.00 (2)	28.65
221	1251-1500	330	85.71 (2)	40.25
233	1251-1500	237	121.86 (2)	54.96
226	1251-1500	201	100.28 (2)	45.83
Upper (95% CI)a			127.0	34.7
Weighted mean (by area) (incl. strata with 1 set)			58.5	17.3
Lower (95% CI)a			-10.5	-0.1
Abundance of surveyed area (millions)			42.5	
Survey biomass index (tons)				12538

Stratum	Depth Range (M)	Area (sq. n.) mi	3K Num/tow (T39-41) (WT198)	3K Kg/tow (T39-41) (WT198)
617	0301-400	593	0.00 (3)	0.00
645	0401-500	216	0.50 (2)	0.03
650	0401-500	134	0.00 (2)	0.00
631	0401-500	1321	0.00 (6)	0.00
627	0401-500	1255	0.00 (5)	0.00
622	0401-500	691	0.00 (3)	0.00
640	0401-500	69	0.50 (2)	0.04
641	0501-750	230	21.00 (2)	0.64
646	0501-750	325	13.86 (2)	0.89
651	0501-750	359	9.00 (2)	0.28
652	0751-1000	516	66.50 (2)	2.38
647	0751-1000	360	673.50 (2)	79.10
642	0751-1000	418	285.50 (2)	18.10
643	1001-1250	733	407.67 (3)	44.90
648	1001-1250	228	592.14 (2)	105.16
653	1001-1250	531	75.50 (2)	6.45
654	1251-1500	479	66.50 (2)	11.45
649	1251-1500	212	213.00 (2)	84.18
644	1251-1500	474	430.50 (2)	63.70
Upper (95% CI)a			216.4	28.9
Weighted mean (by area) (incl. strata with 1 set)			127.3	16.6
Lower (95% CI)a			38.1	4.2
Abundance of surveyed area (millions)			160.1	
Survey biomass index (tons)				20861

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

Table 4 . Mean number and weight per standard tow of roundnose grenadier from Canadian surveys conducted in Div. 3LMNO in autumn 1996.
Number of successful sets in brackets. The gear utilized was a Campelen 1800 survey trawl with a small mesh liner in the codend.
Only those strata > 400 m that were sampled are included.WT = Wilfred Templeman, AN = Alfred Needler, T=Teleost.

Stratum	Depth Range (M)	Area (sq. n.) mi	3L Num/tow (T41) WT196-198	3L Kg/tow (T41) WT196-198
729	0367-549	186	0.00 (2)	0.00
733	0367-549	468	0.00 (3)	0.00
735	0367-549	272	0.00 (2)	0.00
734	0550-731	228	37.00 (2)	0.99
736	0550-731	175	62.90 (2)	1.85
730	0550-731	170	2.18 (2)	0.04
732	0550-731	231	1.80 (2)	0.22
737	0732-914	227	61.00 (2)	2.40
748	0732-914	159	30.50 (2)	0.95
741	0732-914	223	75.50 (2)	2.17
745	0732-914	348	7.50 (2)	0.33
746	0915-1097	392	66.00 (2)	4.18
738	0915-1097	221	21.50 (3)	1.13
742	0915-1097	206	15.50 (2)	0.45
749	0915-1097	126	38.50 (2)	1.65
743	1098-1280	211	73.50 (2)	6.60
739	1098-1280	254	50.27 (2)	5.31
750	1098-1280	556	69.50 (2)	5.60
747	1098-1280	724	44.00 (3)	4.28
740	1281-1463	264	42.00 (2)	7.80
751	1281-1463	229	200.29 (2)	12.6
744	1281-1463	280	41.30 (2)	4.46
Upper (95% CI)a			60.4	4.3
Weighted mean (by area) (incl. strata with 1 set)			43.0	3.1
Lower (95% CI)a			25.5	2.0
Abundance of surveyed area (millions)			36.4	
Survey biomass index (tons)				2647

Stratum	Depth Range (M)	Area (sq. n.) mi	3M Num/tow (T41) WT195-196	3M Kg/tow (T39)
512	0367-549	670	0.00 (4)	0.00
513	0367-549	249	0.00 (2)	0.00
514	0367-549	602	0.00 (4)	0.00
515	0367-549	666	0.00 (3)	0.00
519	0550-731	414	0.00 (3)	0.00
518	0550-731	210	0.89 (2)	0.03
517	0550-731	216	0.80 (2)	0.08
516	0550-731	634	9.00 (4)	0.23
529	0732-914	488	293.07 (2)	21.61
528	0732-914	530	83.50 (2)	3.40
534	0732-914	486	143.00 (2)	12.25
532	0732-914	238	53.00 (2)	2.17
533	0732-914	98	22.20 (2)	0.85
535	1098-1280	92	81.50 (2)	13.38
530	1098-1280	1134	105.28 (2)	16.97
536	1281-1463	112	83.56 (2)	20.03
531	1281-1463	203	35.00 (2)	6.18
Upper (95% CI)a			132.2	37.6
Weighted mean (by area) (incl. strata with 1 set)			59.8	6.1
Lower (95% CI)a			-12.6	-25.4
Abundance of surveyed area (millions)			57.90	
Survey biomass index (tons)				5921

Stratum	Depth Range (M)	Area (sq. n.) mi	3N Num/tow (T41-42) (AN253)	3N Kg/tow (T41-42) (AN253)
725	0367-549	105	0.00 (2)	0.00
727	0367-549	160	0.50 (2)	0.01
723	0367-549	155	0.00 (2)	0.00
728	0550-731	156	0.00 (2)	0.00
724	0550-731	124	18.22 (2)	2.11
726	0550-731	72	0.00 (2)	0.00
Upper (95% CI)a			34.8	4.2
Weighted mean (by area) (incl. strata with 1 set)			3.0	0.3
Lower (95% CI)a			-28.7	-3.5
Abundance of surveyed area (millions)			0.3	
Survey biomass index (tons)				36

Stratum	Depth Range (M)	Area (sq. n.) mi	3O Num/tow (T42) (AN253) WT200	3O Kg/tow (T42) (AN253) WT200
721	0367-549	76	0.00 (2)	0.00
719	0367-549	76	0.00 (2)	0.00
722	0550-731	93	6.00 (2)	0.57
720	0550-731	105	0.00 (2)	0.00
Upper (95% CI)a			21.9	2.1
Weighted mean (by area) (incl. strata with 1 set)			1.6	0.2
Lower (95% CI)a			-18.7	-1.8
Abundance of surveyed area (millions)			0.1	
Survey biomass index (tons)				7

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

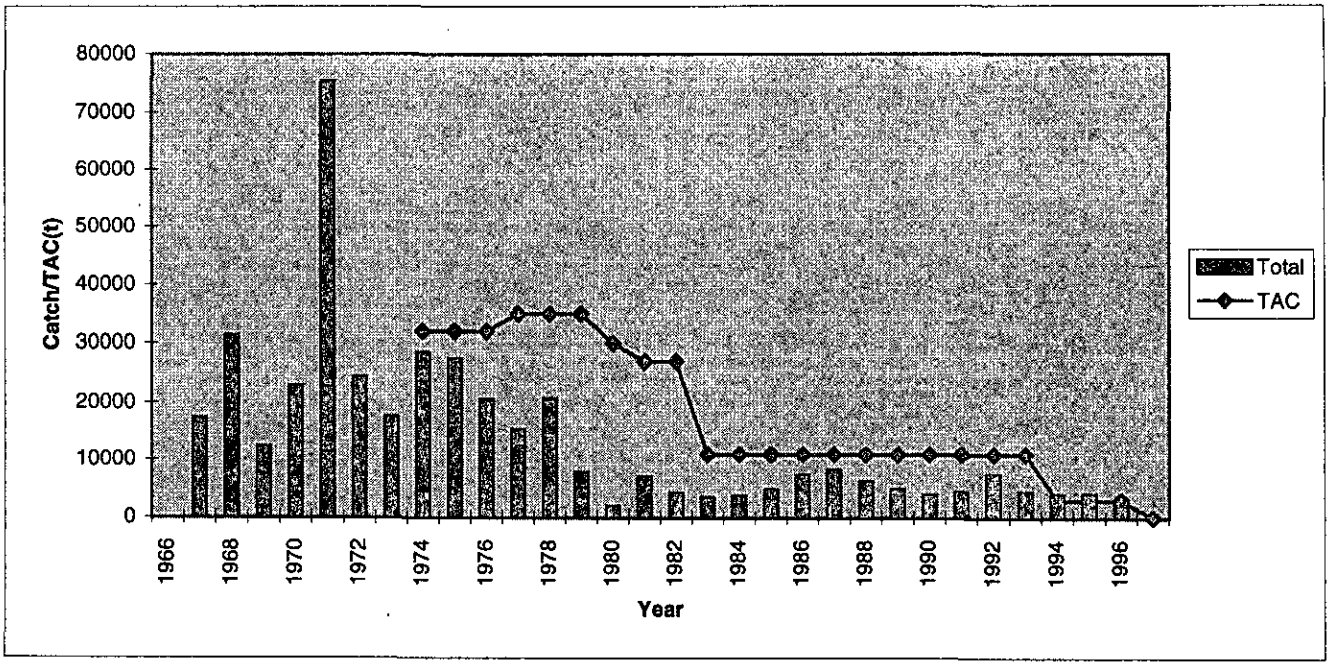

Fig. 1. Reported catches of roundnose grenadier in SA 2+3

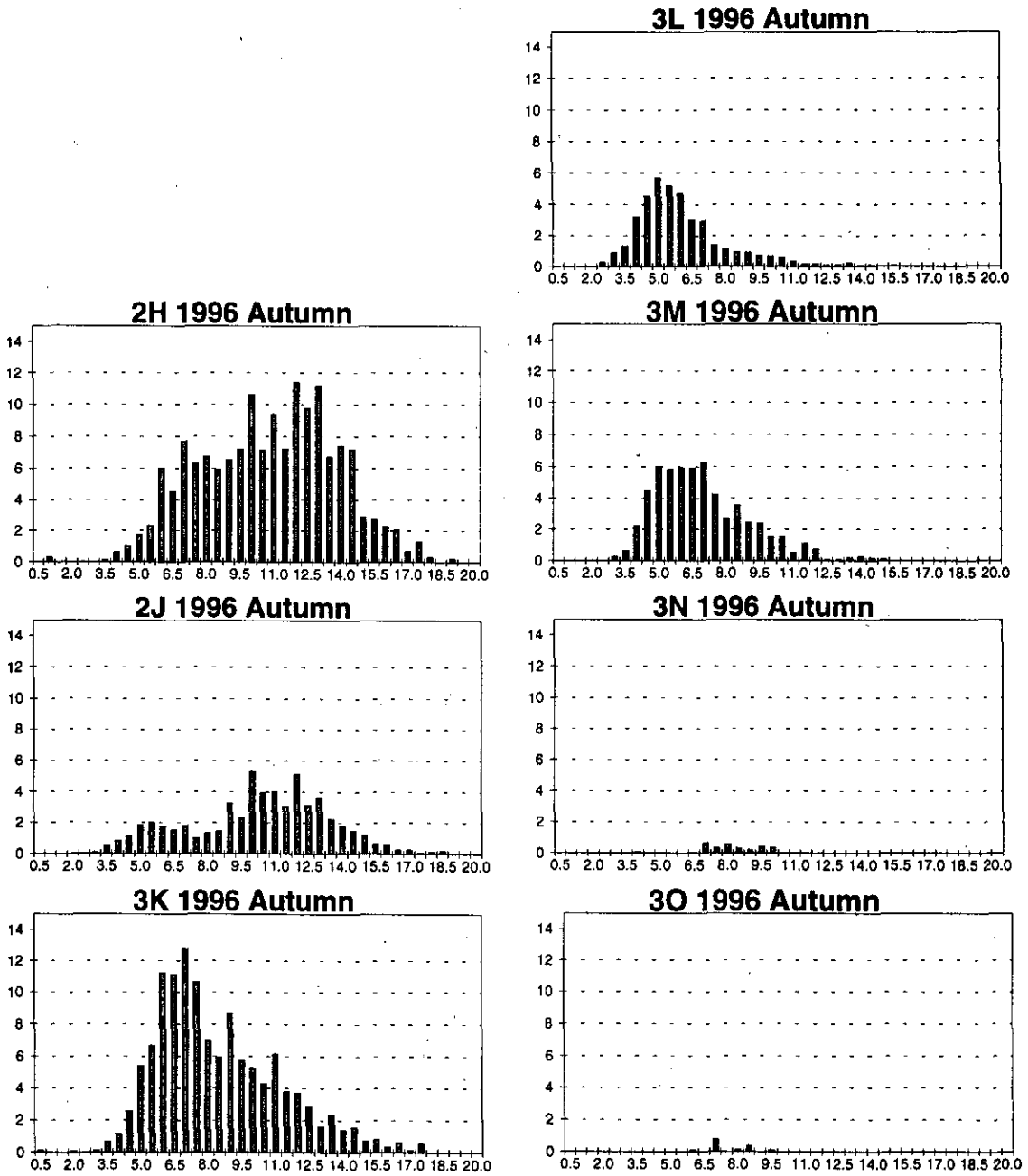

Fig. 2. Pre-anal length distributions from stratified-random research surveys conducted in Divisions 2HJ3KLMNO in autumn 1996. Plotted above are stratified mean number per tow. X-axis is pre-anal length in 0.5 cm groupings.