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Results of a Stratified Random Bottom Trawl Survey
in NAFO Divisions 2GH in 1996

by

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Introduction

Southern sub-stock of Greenland halibut has been a main target of the bottom trawl/gill net fisheries since 1990 especially in the NAFO Regulatory Area. While recent trend of over exploitation of this sub-stock was apparent, the Scientific Council of NAFO could not find an appropriate effort level on this sub-stock. Part of the reason for this can be attribute to the shortage of survey coverage on this sub-stock. This document reports the result of a stratified random bottom trawl survey in NAFO Divs. 2GH, where no scientific survey has been conducted in recent years, during August 1996 conducted under the cooperation between Japan and Canada. The aim of survey was to estimate stock sizes and to obtain information on distribution, size composition and biology of Greenland halibut (*Reinhardtius hippoglossoides*) and other demersal fishes such as roundnose grenadier (*Coryphaenoides rupestris*) and beaked redfish (*Sebastes mentella*) in Divs. 2GH.

Materials and Method

One stratified random bottom trawl survey was conducted by the R/V Shinkai Maru (3395 GRT, Japan Marine Fishery Resource Research Center) in August 1996 in NAFO Divs. 2GH at depths between 201 to 1,500 m. Stratification of the survey area was followed by Canadian new stratification scheme (Bishop, 1994) and the number of trawl stations in each stratum was allocated in proportion to the area of each stratum with a minimum of two stations per stratum.

Trawl operations were made not only in daytime but also in night time, by assuming that habitat of Greenland halibut did not change between day and night. Towing duration and speed were 30 minutes and 3.5 knot. The net was equipped with a 140 mm mesh codend with a 30 mm mesh liner. Wing spread was approximately 40 m. Detailed information on the vessel and gear is given in Yamada et al. (1988). The swept method was applied to for biomass estimation, assuming the catchability coefficient as 1.0. The coefficient of variation (C.V.) is standard error of estimate divided by estimate.

All the catches of Greenland halibut were measured as total length to cm below, and roundnose grenadier and roughhead grenadier as anal fin length to 0.5 cm below.

Size compositions were made in 1.0 cm groups for Greenland halibut, and 0.5 cm groups for roundnose grenadier and roughhead grenadier. The size composition in a stratum was calculated as the average of standardized size composition of each station (fish/km² swept area). Size composition by depth strata was calculated as the average of the size composition of each stratum, using the stratum area as weighting factor.

Results

Trawl operations were successfully made at 81 stations out of 89 in Div. 2G, and at 62 stations out of 68 designed in Div. 2H (Table 1). When rough bottom conditions or gill nets set of the fishers prevented towing at some designated stations deeper than 751 m, the captain changed the stations to the nearest points within the strata. Finally, two strata in both divisions were not covered. Data in strata covered with single tow were combined with the data in next stratum with same depth range. Biomass estimates and their CV value of 23 species/species groups are shown in Table 2 and detailed data by each stratum shown in Tables 3 and 4.

1. Greenland halibut

(1) Biomass, abundance and distribution

Greenland halibut was the most abundant species and was caught at all stations (Fig. 1). Most of catches (83%) were obtained from strata north of 59° 40' in Div. 2G (Table 7). While in Div. 2H, higher catch rates were observed in the southern stations.

The estimated biomass and abundance were 29,000 tons and 50,000 thousands fishes in Div. 2G and 25,000 tons and in 88,000 thousands fishes in Div. 2H (Tables 3, 4, 5, and 6). About half of the total estimated biomass was obtained from strata deeper than 1001 m in Div. 2G with their ratio of abundance to the total was 28 %, while about quarter biomass with 8% abundance to the total were obtained from the same depth range in Div. 2H.

(2) Size composition

The size compositions expressed as densities (number/km²) at each 1 cm length class by depth strata were shown in Fig. 2 for Div. 2G and Fig. 3 for Div. 2H. The density of Greenland halibut was higher in Div. 2H than in Div. 2G at depths shallower than 1000 m. Positions of the peaks of the modes at each depth stratum were same between two divisions. Size of fishes caught became larger as depth strata went deeper and the position of the peak of the mode in deepest stratum was around 47-48 cm in both divisions.

Sex ratio (male/female) by depth strata was shown in Fig. 4. Data for unsexed samples were excluded for the calculation of the sex ratio. Sex ratio was around 1.0 at depth range between 201 to 750 m followed by sharp increase to 1.5 in Div. 2G and 2.4 in Div. 2H at depth strata of 751-1000 m (Tables 5 and 6). In the strata deeper than 1001 m, sex ratio was about 1.2 in Div. 2G and about 1.5 in Div. 2H.

2. Roundnose grenadier

Roundnose grenadier was caught mainly from strata deeper than 751 m in both divisions (Tables 3 and 4). Estimated biomass of roundnose grenadier was 2,300 tons in Div. 2G and 2,700 tons in Div. 2H.

The size compositions expressed as densities (number/km²) at each 0.5 cm length class by depth strata were shown in Fig. 5 for Div. 2G and Fig. 6 for Div. 2H. Shapes of the modes were appeared to be different at each depth stratum between two divisions.

High densities of small sized and unsexed individuals were observed in depth strata deeper than 1001 m in Div. 2G. Position of the mode of the larger fishes was about 3 - 4 cm higher in Div. 2H than in Div. 2G.

3. Roughhead grenadier

While roughhead grenadier was caught at all strata deeper than 751 m in both divisions as roundnose grenadier, some higher catches were observed in strata shallower than 750 m in Div. 2G (Tables 3 and 4). Estimated biomass of roughhead grenadier in Div. 2G (1,800 tons) was 5 times higher than that in Div. 2H (400 tons). Almost of all the catches (92%) in Div. 2G were obtained in strata north of 59° 40' as Greenland halibut (Table 7).

The size compositions expressed as densities (number/km²) at each 0.5 cm length class by depth strata were shown in Fig. 7 for Div. 2G and Fig. 8 for Div. 2H. Size of fishes caught spread over the range between 5 to 30 cm and no notable mode were observed in depth strata between 401 - 1500 m in both of two divisions. Relative high densities in depth strata of 301-400 m and 401-500 m were observed only in Div. 2G and a notable mode with its peak around 18 cm was observed at depth strata of 301-400 m.

4. Redfishes

Sebastes mentella was dominant in both of two divisions, and it was mainly caught in the depth range between 401 to 1250 m in Div. 2G and between 401 to 1000 m in Div. 2H. Estimated biomass of *S. mentella* was 3.7 times higher in Div. 2G (2,500 tons) than that in Div. 2H (700 tons).

Unsexed size frequencies by the data collected arbitrarily from catches are shown in Fig. 9 for Div. 2G and Fig. 10 for Div. 2H. Data of depth strata with less than 50 fishes were not shown in figures. Size frequency was mono-modal with its peak at around 22 - 24 cm in all depth strata except for depth stratum of 301-400 m in Div. 2G which had another mode with its peak at around 8-9 cm.

Discussion

Apparent inclines of the distribution of Greenland halibut and roughhead grenadier were observed in Div. 2G. About 80% of the total estimated biomass of Greenland halibut was obtained from strata north of 59° 40' in Div. 2G (Table 7). Although part of the reason of this distribution inclines of Greenland halibut can attribute to the fact that only 4 successful hauls out of 12 planned were made at deeper (>751 m) and southern (south of 59° 40') strata in Div. 2G, relatively low catch rate of Greenland halibut observed in southern strata in Div. 2G and northern strata in Div. 2H (table 8) should suggest the existence of the distribution gap of Greenland halibut.

If this observed incline of distribution of Greenland halibut reflects true distribution pattern, then fishes inhabiting in northern strata (north of 59° 40', 918 - 929) in Div. 2G should be an outflow of northern sub-stock of Greenland halibut which distributes in Subareas 0 and 1. The southward redistribution was recently reported for the southern sub-stock of the Greenland halibut (NAFO SC, 1994). The southward outflow of northern sub-stock which was suggested by the present survey should occurred in conjunction with the redistribution of the southern sub-stock.

References

Bishop, C.A., 1994. Revisions and additions to stratification schemes used during research vessel survey in NAFO Subareas 2 and 3. NAFO SCR Doc. 94/43.

Northwest Atlantic Fisheries Organization, 1994. Stock assessments/Greenland Halibut in Subarea 2 and Divisions 3K and 3L. NAFO Scientific Council Reports 1993. pp.99-103.

Yamada, H., K. Okada, and O. Jorgensen, 1988a. West Greenland groundfish biomasses estimated from a stratified-random trawl in 1987. NAFO SCR Doc., 88/31.

Table 1. Outline of the survey.

2G

Strata No.	Depth Range (m)	Area (Km ²)	Proportion (%)	Hauls successful	Hauls planned
901	201-300	3739	13.6	11	11
908	201-300	2006	7.3	4	4
911	201-300	2373	8.6	5	5
924	201-300	2593	9.4	5	5
926	201-300	1485	5.4	3	3
902	301-400	412	1.5	3	2
912	301-400	250	0.9	2	2
923	301-400	796	2.9	2	2
927	301-400	2854	10.4	6	6
903	401-500	274	1.0	2	2
913	401-500	213	0.8	2	2
922	401-500	638	2.3	2	2
928	401-500	2686	9.8	6	6
904	501-750	525	1.9	2	2
914	501-750	388	1.4	2	2
921	501-750	487	1.8	2	2
929	501-750	4325	15.7	12	12
905	751-1000	563	2.0	1	2
915	751-1000	329	1.2	0	2
920	751-1000	590	2.1	2	2
906	1001-1250	785	2.9	1	2
916	1001-1250	501	1.8	1	2
919	1001-1250	1084	3.9	2	2
907	1251-1500	1235	4.5	0	2
917	1251-1500	566	2.1	1	2
918	1251-1500	1766	6.4	2	3
Total	201-1500	27525	100.0	81	89

2H

Strata No.	Depth Range (m)	Area (Km ²)	Proportion (%)	Hauls successful	Hauls planned
931	201-300	947	4.4	2	2
943	201-300	1214	5.7	2	2
950	201-300	895	4.2	2	2
953	201-300	998	4.7	2	2
955	201-300	1334	6.2	2	2
958	201-300	1008	4.7	2	2
932	301-400	189	0.9	2	2
944	301-400	2950	13.7	5	5
949	301-400	707	3.3	0	2
952	301-400	607	2.8	2	2
959	301-400	611	2.8	2	2
933	401-500	171	0.8	2	2
942	401-500	189	0.9	2	2
945	401-500	1581	7.4	2	2
948	401-500	844	3.9	2	2
951	401-500	803	3.7	2	2
960	401-500	367	1.7	2	2
934	501-750	268	1.2	2	2
941	501-750	305	1.4	1	2
946	501-750	2473	11.5	5	5
947	501-750	779	3.6	2	2
961	501-750	724	3.4	2	2
935	751-1000	329	1.5	2	2
940	751-1000	333	1.6	2	2
962	751-1000	830	3.9	2	2
936	1001-1250	268	1.2	2	2
939	1001-1250	446	2.1	1	2
963	1001-1250	909	4.2	2	2
937	1251-1500	322	1.5	2	2
938	1251-1500	655	3.1	0	2
964	1251-1500	1173	5.5	2	2
Total	201-1500	21454	100.0	62	68

Table 2. Estimated biomass and its CV value of each species/species group.

Division	2G		2H	
	Biomass(t)	CV(%)	Biomass(t)	CV(%)
Total catch	52,866	10	41,749	13
Greenland halibut	29,222	17	25,029	7
American plaice	102	21	344	12
Witch flounder	1	72	25	41
Atlantic halibut	615	40	82	60
Roundnose grenadier	2,250	37	2,736	44
Roghhead grenadier	1,827	19	363	16
Redfish <i>S. mentella</i>	2,474	26	663	23
<i>S. marinus</i>	2	100	74	95
Wolffish Northern	296	35	118	45
Spotted	71	39	78	40
Striped	1	58	23	52
Atlantic Cod	161	28	180	24
Other demarsal fishes	9,187	54	2,044	14
Dogfishes	237	42	230	34
Catsharks	20	100	5	23
Greenland Shark	0	-	5,125	100
Rays	1,542	15	1,744	22
Snow crab	0	-	53	41
Other crabs	89	42	74	21
Northern shrimp	3,874	49	2,004	27
Other shrimps	821	22	610	47
Other smaller shrimps	1	100	15	77
Cephalopodas	73	40	130	48

Table 3. Estimated biomass (ton) of each species/species groups by strata in Div. 2G.

Stratum	901	908	911	924	926	902	912	923	927	903	913	922	928	904	914	929	921	920	905	919	906	916	917	918	Total
	201- 300	201- 300	201- 300	201- 300	201- 300	301- 400	301- 400	301- 400	301- 400	401- 500	401- 500	401- 500	401- 500	501- 750	501- 750	501- 750	501- 750	1000	1000	1001- 1251	1001- 1251	1251- 1500	1251- 1500	1500	
No. of successful tow	11	4	5	5	3	3	2	2	6	2	2	2	6	2	2	12	2	2	3	2	2	2	3	81	
Depth range (m)	201- 300	201- 300	201- 300	201- 300	201- 300	301- 400	301- 400	301- 400	400	400	401- 500	401- 500	401- 500	501- 750	501- 750	501- 750	501- 750	1000	1000	1001- 1251	1001- 1251	1251- 1500	1251- 1500	1500	
Total biomass	3643	2139	432	1083	1463	189	54	714	3891	77	188	347	5421	609	466	6392	127	2796	4361	3936	14499	52866	52866		
Greenland halibut	819	112	93	318	852	27	20	40	1780	49	98	173	3537	423	186	4831	61	2261	3823	2509	7209	29222	29222		
American plaice	49	6	6	9	0	3	1	0	14	0	1	0	4	0	0	0	0	1	0	8	0	102	102		
Witch flounder	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1		
Atlantic halibut	0	0	0	0	0	0	0	0	0	0	1	0	129	0	0	485	0	0	0	0	0	0	615		
Roundnose grenadier	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	173	456	1603	2250			
Roughhead grenadier	0	0	2	0	7	1	0	0	770	2	4	5	579	24	10	56	1	29	90	.66	182	1827			
Redfishes S. mentella	9	6	5	3	9	2	7	19	61	6	77	145	385	139	259	338	55	347	50	549	3	2474			
S. marinus	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2		
Wolfishes Northern	9	0	0	0	37	0	0	0	119	0	0	0	62	0	0	69	0	0	0	0	0	0	296		
Spotted	17	0	0	15	23	1	0	0	12	0	0	0	3	0	0	0	0	0	0	0	0	0	71		
Striped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
Atlantic Cod	11	7	2	0	2	1	4	6	117	6	2	0	3	0	0	0	0	0	0	0	0	0	161		
Other demersal fishes	1536	197	216	436	364	38	19	43	298	11	3	8	184	15	3	109	3	30	144	268	5262	9187			
Dogfishes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42	0	54	67	0	74	237			
Catsharks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20		
Greenland Shark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Rays	63	5	9	161	116	2	2	8	384	0	0	14	448	1	5	192	3	9	3	9	109	1542			
Snow crab	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Other crabs	1	3	3	2	0	0	0	3	0	0	0	3	0	0	0	14	3	5	6	34	11	89			
Northern shrimp	925	1776	0	28	21	114	1	650	324	2	0	0	36	0	0	0	0	0	0	0	0	0	3674		
Other shrimps	201	26	95	88	33	0	0	0	12	0	1	1	42	4	1	253	1	41	4	12	5	821			
Other smaller shrimps	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1		
Cephalopods	3	0	0	6	1	1	0	2	0	1	0	1	6	1	1	0	0	1	0	0	28	73			

Table 4. Estimated biomass (ton) of each species/species groups by strata in Div. 2H.

Stratum	931	943	953	955	958	932	944	952	959	933	942	945	948	951	960	946	947	961	934+941	935	940	962	963	936+931	937	964	Total	
No. of successful tows	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	60
Depth range (m)	201-300	201-300	201-300	201-300	201-300	400-500	301-401	301-401	301-401	401-500	401-500	401-500	401-500	401-500	401-500	500-750	501-750	501-750	501-750	750-1000	751-1000	751-1000	1000-1250	1001-1250	1001-1251	1251-1500	1500-201-	1500
Total biomass	188	213	1697	519	259	57	1553	2461	220	62	47	3035	6071	2447	198	5506	1150	1180	795	1852	1381	798	1775	3803	1355	3125	41749	
Greenland halibut	48	68	788	98	46	30	913	890	65	45	14	2782	685	1550	95	4876	869	980	465	1728	913	582	1431	2299	868	1890	25029	
American plaice	4	1	27	25	6	0	16	32	6	0	0	53	32	10	0	88	40	0	4	0	0	0	0	0	0	0	0	344
Witch flounder	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	9	2	2	4	0	0	6	0	0	0	25
Atlantic halibut	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	0	23	40	0	0	2	0	0	0	0	0	0	82
Roundnose grenadier	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	23	11	341	60	168	1224	223	674	2736	
Roughhead grenadier	0	0	0	0	1	43	0	2	2	2	0	4	0	34	6	13	0	25	15	32	42	4	11	65	39	25	363	
Redfishes S. mentella	6	0	4	17	4	2	32	6	1	4	7	38	5	37	71	61	1	61	233	23	35	10	0	6	0	0	663	
S. marinus	0	0	0	0	0	0	70	0	0	0	1	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	74	
Walffishes Northern	0	0	0	0	0	0	42	0	0	2	0	0	0	0	18	0	0	0	3	0	0	0	0	10	31	13	118	
Spotted	0	0	41	0	5	1	0	10	3	0	0	0	0	19	0	0	0	0	0	0	0	0	0	0	0	0	78	
Striped	4	6	0	0	3	0	9	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	
Atlantic Cod	0	4	0	0	5	1	28	77	11	3	0	5	0	38	4	4	1	0	0	0	0	0	0	0	0	0	180	
Other demersal fishes	105	93	129	231	43	20	24	40	8	3	22	44	103	79	6	124	115	23	23	15	25	40	76	67	110	478	2044	
Dogfishes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	1	10	7	83	17	75	19	10	230	
Catsharks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	
Greenland Shark	0	0	0	0	0	0	0	0	0	0	0	0	5125	0	0	0	0	0	0	0	0	0	0	0	0	0	5125	
Rays	5	0	21	85	0	3	117	563	6	2	0	91	69	414	0	265	52	0	2	9	2	0	0	7	31	0	1744	
Snow crab	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	19	0	0	0	20	0	0	53	
Other crabs	4	0	0	0	0	0	0	0	0	1	0	4	0	0	2	5	0	4	1	3	7	1	16	21	2	3	74	
Northern shrimp	11	1	411	0	147	0	250	844	118	0	0	0	0	222	0	0	0	0	0	0	0	0	0	0	0	0	0	2004
Other shrimps	1	38	276	63	0	0	6	0	0	0	0	15	49	25	0	49	42	17	3	0	5	8	6	1	0	5	610	
Other smaller shrimps	0	0	0	0	0	0	0	0	0	0	2	0	0	0	13	0	0	0	1	0	0	0	0	0	0	0	15	
Cephalopods	0	0	0	0	0	0	2	0	0	0	1	0	2	2	0	1	8	1	0	0	0	0	51	4	27	28	130	

Table 5. Abundance of Grennland halibut in Div 2G by strata.

Depth	Stratum	Male	Female	Unsexed	Total	Propotion	male/female
201-300	901	1,771,194	1,604,948	2,393,642	5,769,784		1.10
	908	104,925	154,496	1,765,071	2,024,492		0.68
	911	103,440	128,086	1,668,860	1,900,385		0.81
	924	324,124	461,999	1,251,946	2,038,069		0.70
	926	717,420	801,067	111,025	1,629,512		0.90
	Total	3,021,102	3,150,596	7,190,544	13,362,243	0.27	0.96
301-400	902	94,350	95,031	-	189,381		0.99
	912	39,622	33,606	-	73,228		1.18
	923	93,439	68,859	25,259	187,556		1.36
	927	1,122,234	1,329,106	471,785	2,923,125		0.84
	Total	1,349,645	1,526,601	497,043	3,373,290	0.07	0.88
401-500	903	94,616	83,891	-	178,506		1.13
	913	153,619	127,063	-	280,682		1.21
	922	221,145	164,786	-	385,931		1.34
	928	2,434,026	2,806,261	-	5,240,287		0.87
	Total	2,903,405	3,182,001	-	6,085,406	0.12	0.91
501-750	904	536,496	408,185	-	944,681		1.31
	914	282,461	206,443	-	488,904		1.37
	921	71,730	33,108	-	104,838		2.17
	929	3,866,203	3,331,145	105,800	7,303,148		1.16
	Total	4,756,891	3,978,881	105,800	8,841,571	0.18	1.20
751-1000	905+920	3,046,596	1,269,720	-	4,316,316	0.09	2.40
1001-1250	906+916	2,333,381	1,398,058	-	3,731,439		1.67
	919	2,736,050	1,642,689	-	4,378,739		1.67
	Total	5,069,431	3,040,747	-	8,110,178	0.16	1.67
1251-1500	917+918	3,462,937	2,446,001	-	5,908,938	0.12	1.42
201-1500	Total	23,610,007	18,594,548	7,793,387	49,997,942	1.00	1.27

Table 6. Abundance of Grennland halibut in Div 2H by strata.

Depth	Stratum	Male	Female	Unsexed	Total	Propotion	Male/Female
201-300	931	74,969	39,120	1,518,371	1,632,460		1.92
	943	352,647	337,108	717,136	1,406,890		1.05
	953	2,164,615	2,108,329	-	4,272,944		1.03
	955	191,933	147,943	586,781	926,657		1.30
	958	110,594	139,150	505,643	755,387		0.79
	Total	2,894,758	2,771,650	3,327,930	8,994,338	0.10	1.04
301-400	932	32,451	32,409	1,122,868	1,187,729		1.00
	944	2,519,366	2,502,970	3,606,949	8,629,285		1.01
	952	3,049,695	2,537,102	-	5,586,797		1.20
	959	135,840	177,827	155,599	469,266		0.76
	Total	5,737,353	5,250,308	4,885,416	15,873,077	0.18	1.09
401-500	933	84,627	78,401	-	163,027		1.08
	942	24,412	23,699	-	48,111		1.03
	945	6,576,080	6,528,341	417,718	13,522,139		1.01
	948	1,211,695	960,515	115,523	2,287,733		1.26
	951	2,406,812	2,227,101	78,666	4,712,579		1.08
	960	151,427	158,437	40,661	350,525		0.96
	Total	10,455,052	9,976,494	652,568	21,084,114	0.24	1.05
501-750	934	444,762	337,337	-	782,099		1.32
	941	483,428	224,531	-	707,959		2.15
	946	10,183,716	9,716,448	191,866	20,092,030		1.05
	947	1,918,875	1,726,663	1,063,447	4,708,985		1.11
	981	1,227,633	598,276	-	1,825,909		2.05
	Total	14,258,415	12,603,254	1,255,313	28,116,981	0.32	1.13
751-1000	935	2,410,365	1,728,549	-	4,138,914		1.39
	940	853,618	673,393	-	1,527,011		1.27
	962	725,511	272,859	-	998,370		2.66
	Total	3,989,494	2,674,801	-	6,664,295	0.08	1.49
1001-1250	936	755,315	689,392	-	1,444,707		1.10
	939	1,154,682	1,123,220	-	2,277,902		1.03
	963	910,178	600,330	-	1,510,509		1.52
	Total	2,820,176	2,412,942	-	5,233,118	0.06	1.17
1251-1500	937	306,092	309,400	-	615,491		0.99
	964	718,273	684,667	-	1,402,940		1.05
	Total	1,024,365	994,067	-	2,018,432	0.02	1.03
201-1500	Total	41,179,611	36,683,516	10,121,228	87,984,355	1.00	1.12

Table 7. Comparison of the estimated biomass between northern strata and southern strata in Div. 2G.

Division	Southern strata (strata <917)		Northern strata (strata >918)	
	Biomass(t)	Ratio	Biomass(t)	Ratio
Total biomass	17,505	34%	34,609	66%
Greenland halibut	5,195	17%	24,636	83%
American plaice	75	73%	28	27%
Witch flounder	2	100%	0	0%
Atlantic halibut	1	0%	614	100%
Roundnose grenadier	1,161	56%	910	44%
Roghhead grenadier	153	8%	1,695	92%
Redfishes S. mentella	1,497	58%	1,105	42%
S. marinus	0	0%	2	100%
Wolffishes Northern	9	3%	287	97%
Spotted	18	25%	53	75%
Striped	1	66%	0	34%
Atlantic Cod	33	20%	128	80%
Other demarsal fishes	5,986	76%	1,864	24%
Dogfishes	2	1%	233	99%
Catsharks	14	100%	0	0%
Greenland Shark	0	-	0	-
Rays	95	6%	1,460	94%
Snow crab	0	-	0	-
Other crabs	54	62%	33	38%
Northern shrimp	2,817	73%	1,057	27%
Other shrimps	357	44%	463	56%
Other smaller shrimps	1	100%	0	0%
Cephalopodas	35	45%	42	55%

Table 8. Comparison of average catch (ton/km²) of G. halibut between southern and northern strata in both divisions at area deeper than 751 m (number in parenthesis indicates number of set).

Depth (m)	2G		2H	
	Northern strata ¹⁾	Southern strata ²⁾	Northern strata ³⁾	Southern strata ⁴⁾
751-1000	2.4 (2)	1.1 (1)	0.7 (2)	4.0 (4)
1001-1250	3.5 (2)	2.0 (2)	1.6 (2)	3.2 (3)
1251-1500	4.4 (2)	0.4 (1)	1.6 (2)	2.7 (2)

¹⁾ Strata north of 59° 40'

²⁾ Strata south of 59° 40'

³⁾ Strata north of 56° 40'

⁴⁾ Strata south of 56° 40'

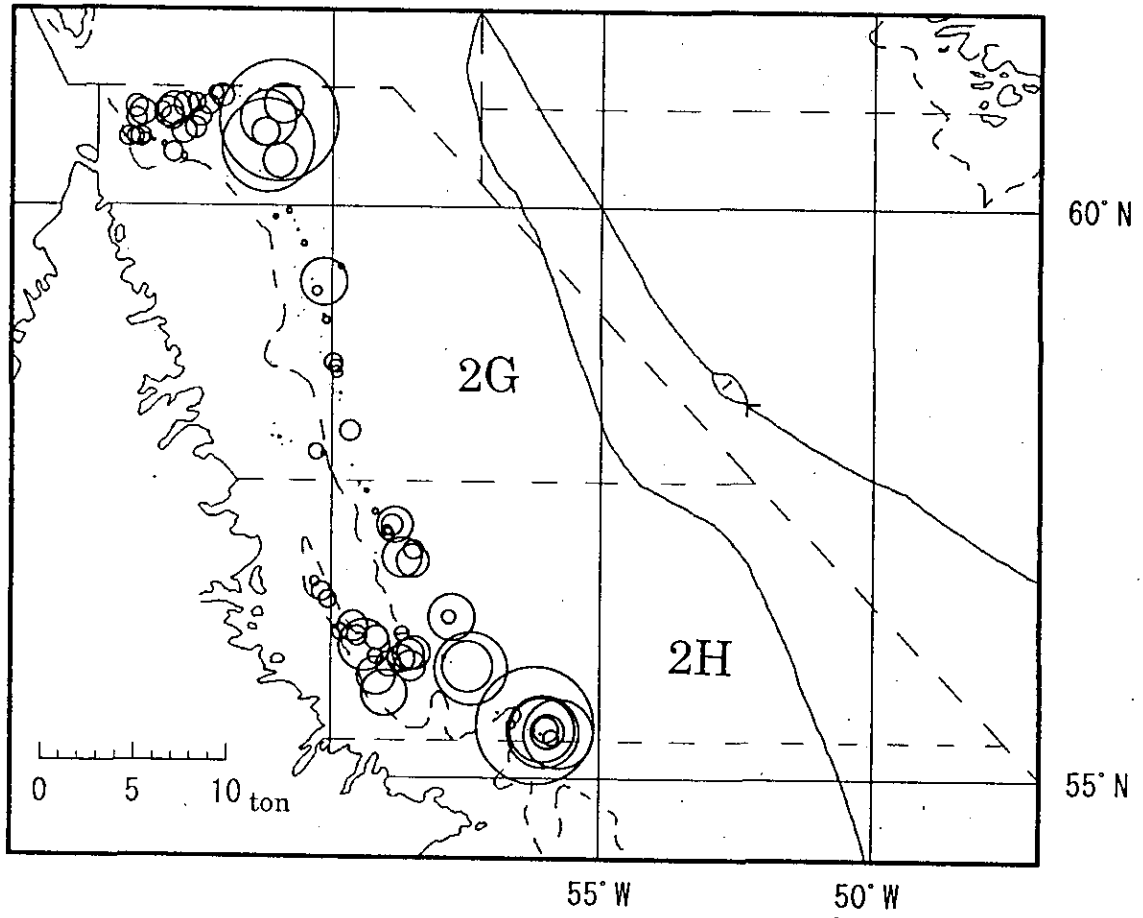


Fig. 1. Catch distribution of Greenland halibut in Divs. 2GH.

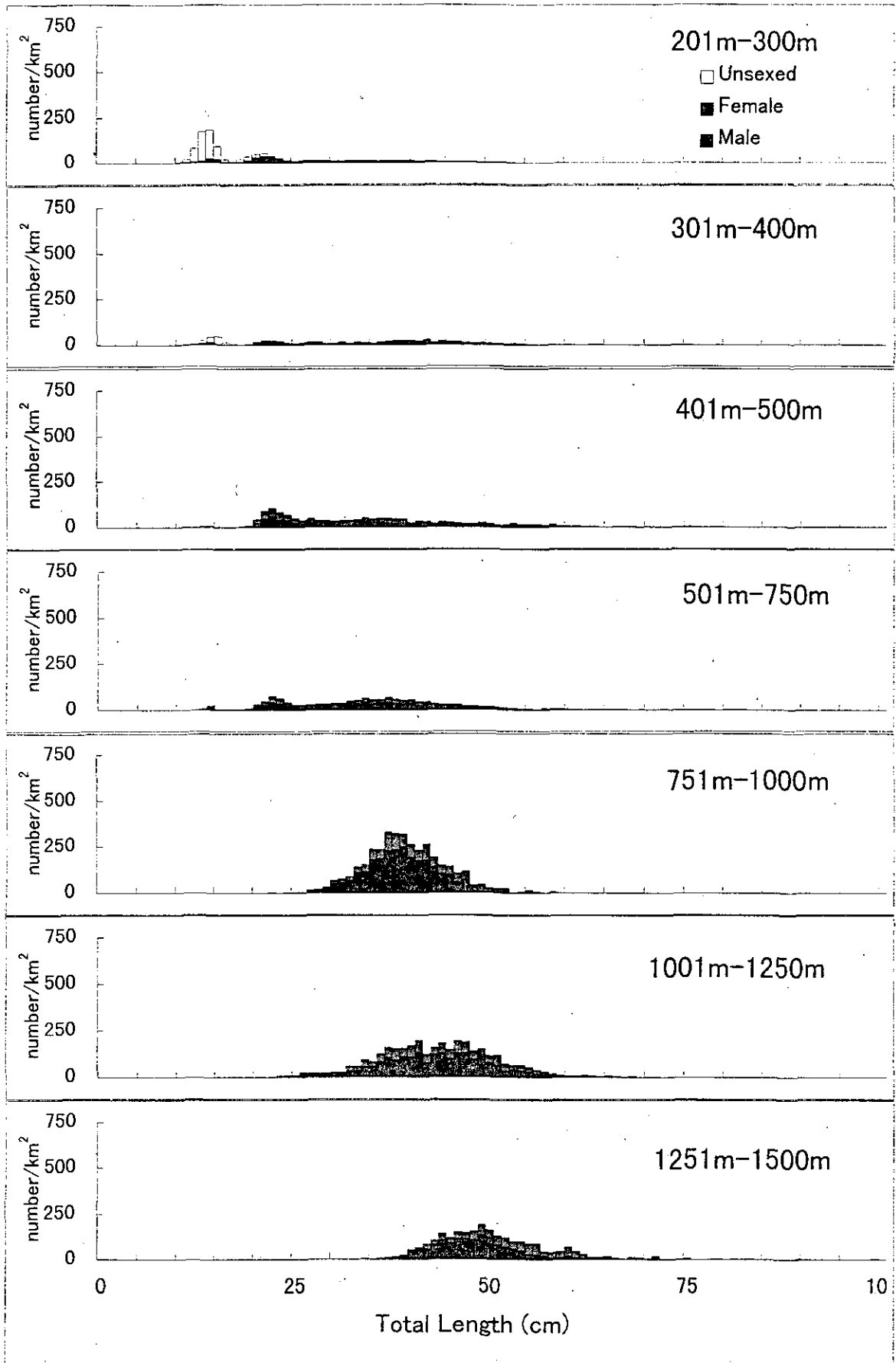


Fig. 2. The density (number/km²) of G. Halibut by length class and by depth strata in division 2G.

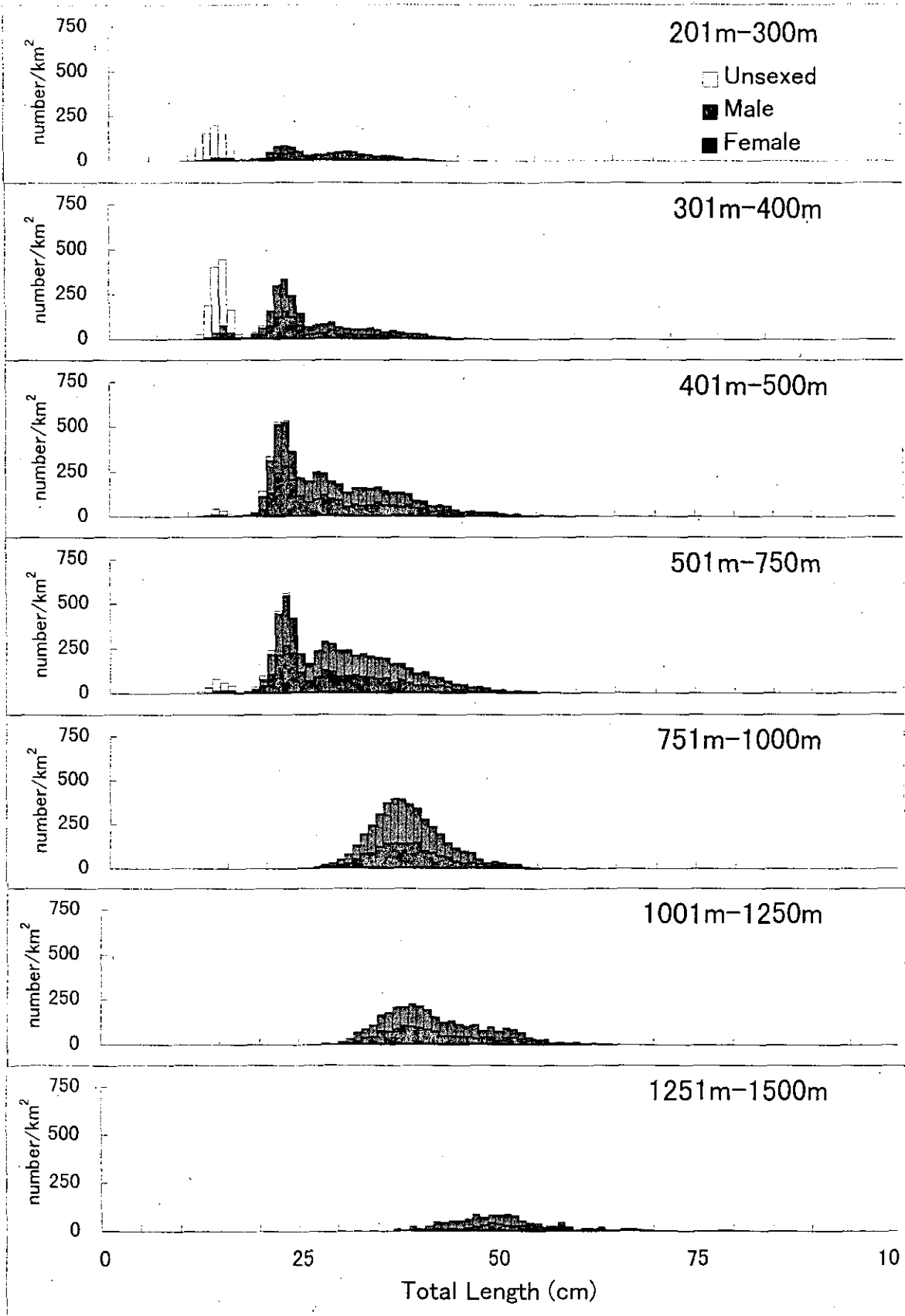


Fig. 3. The density (number/km²) of G. Halibut by length class and by depth strata in division 2H.

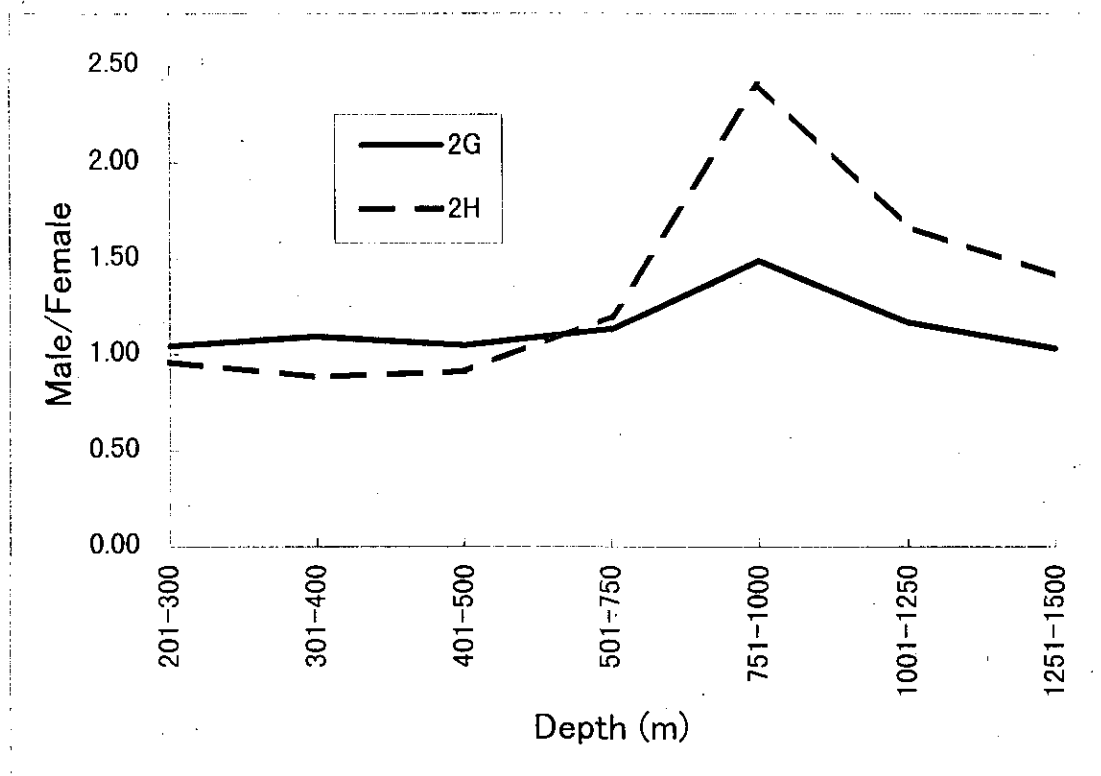


Fig. 4. Sex ratio (male/female) of Greenland halibut by depth strata. Data for unsexed individuals were not counted for the calculation of sex ratio.

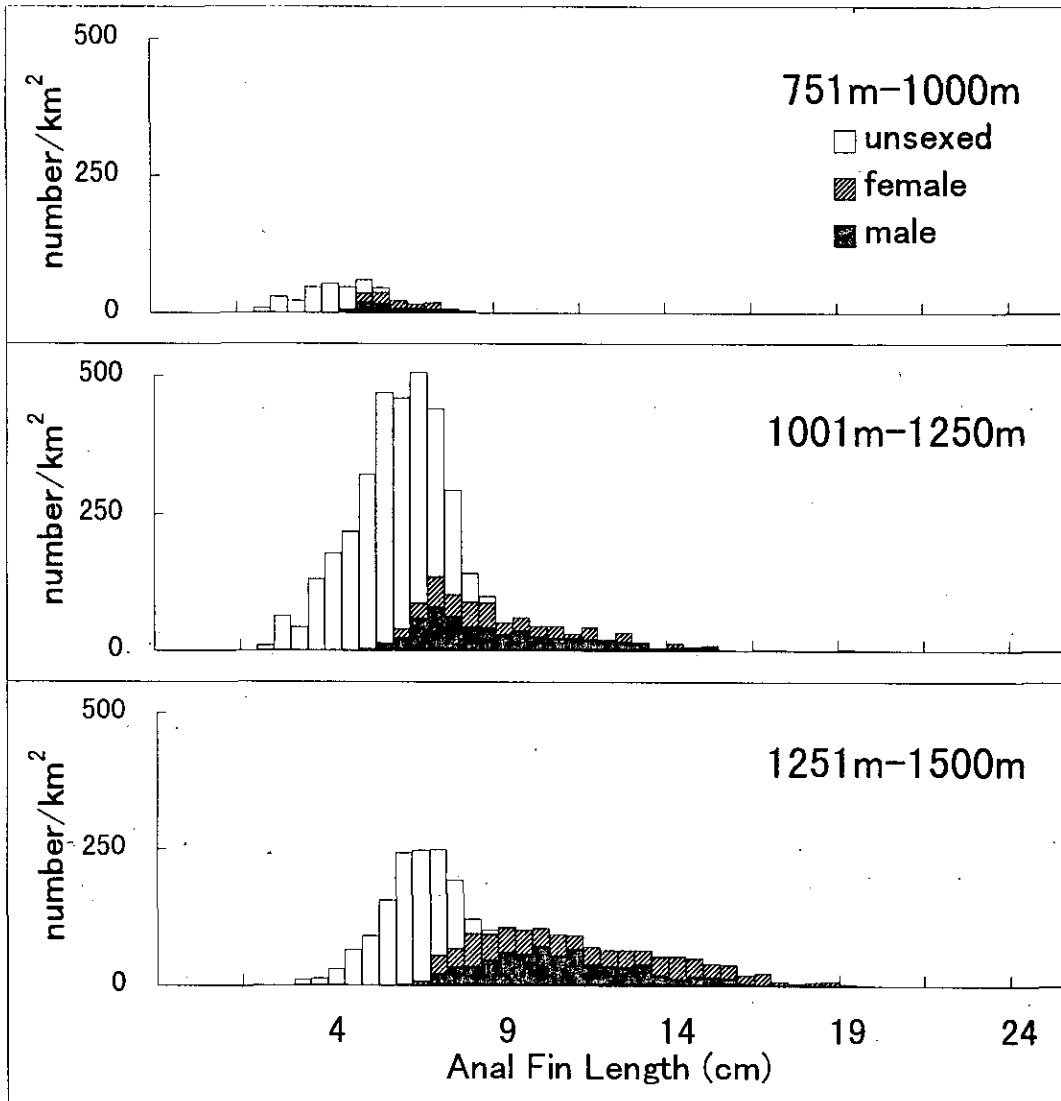


Fig. 5. The density (number/km²) of roundnose grenadier by length class and by depth strata in Div. 2G.

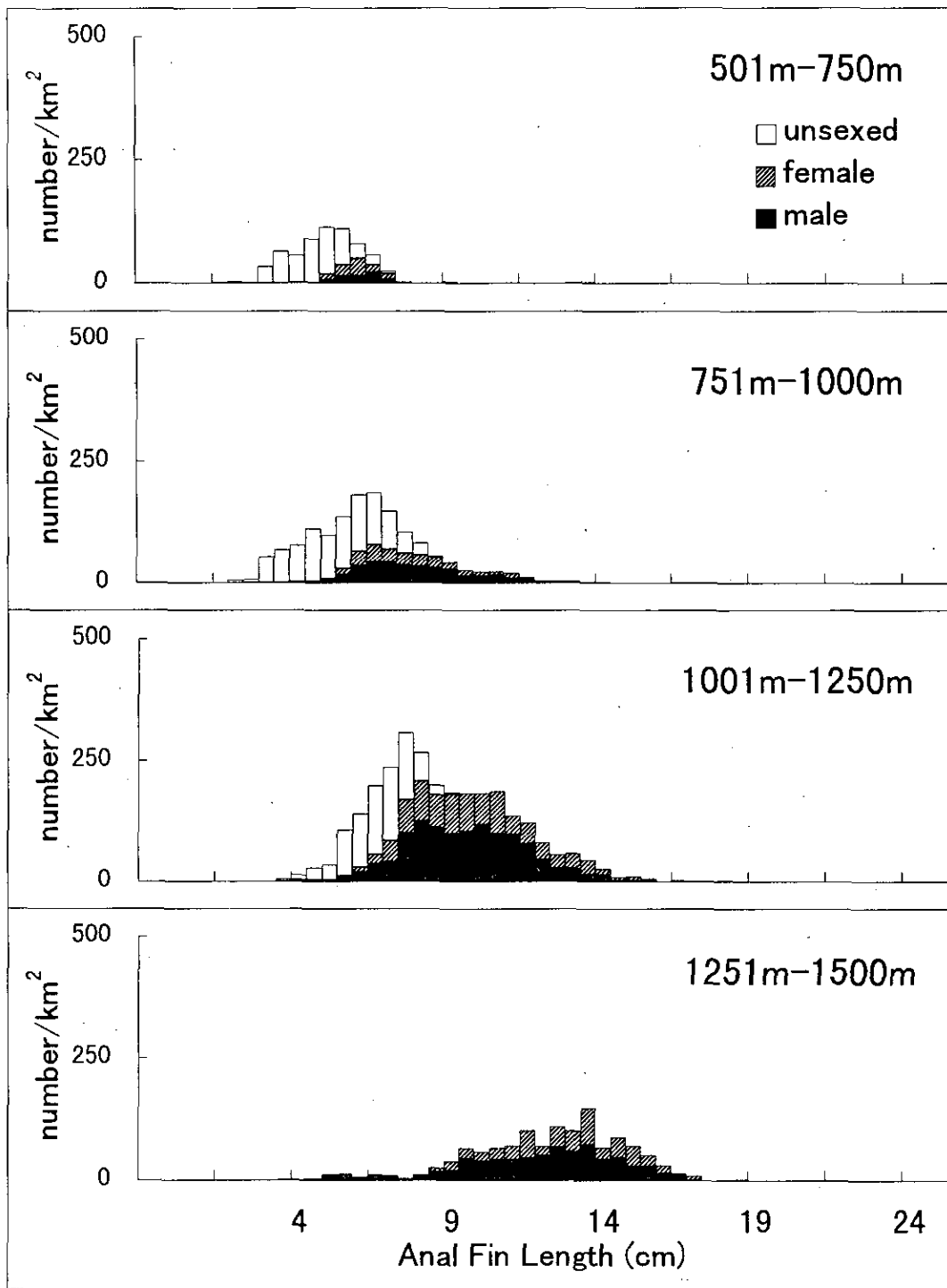


Fig. 6. The density (number/km²) of roundnose grenadier by length class and by depth strata in Div. 2H.

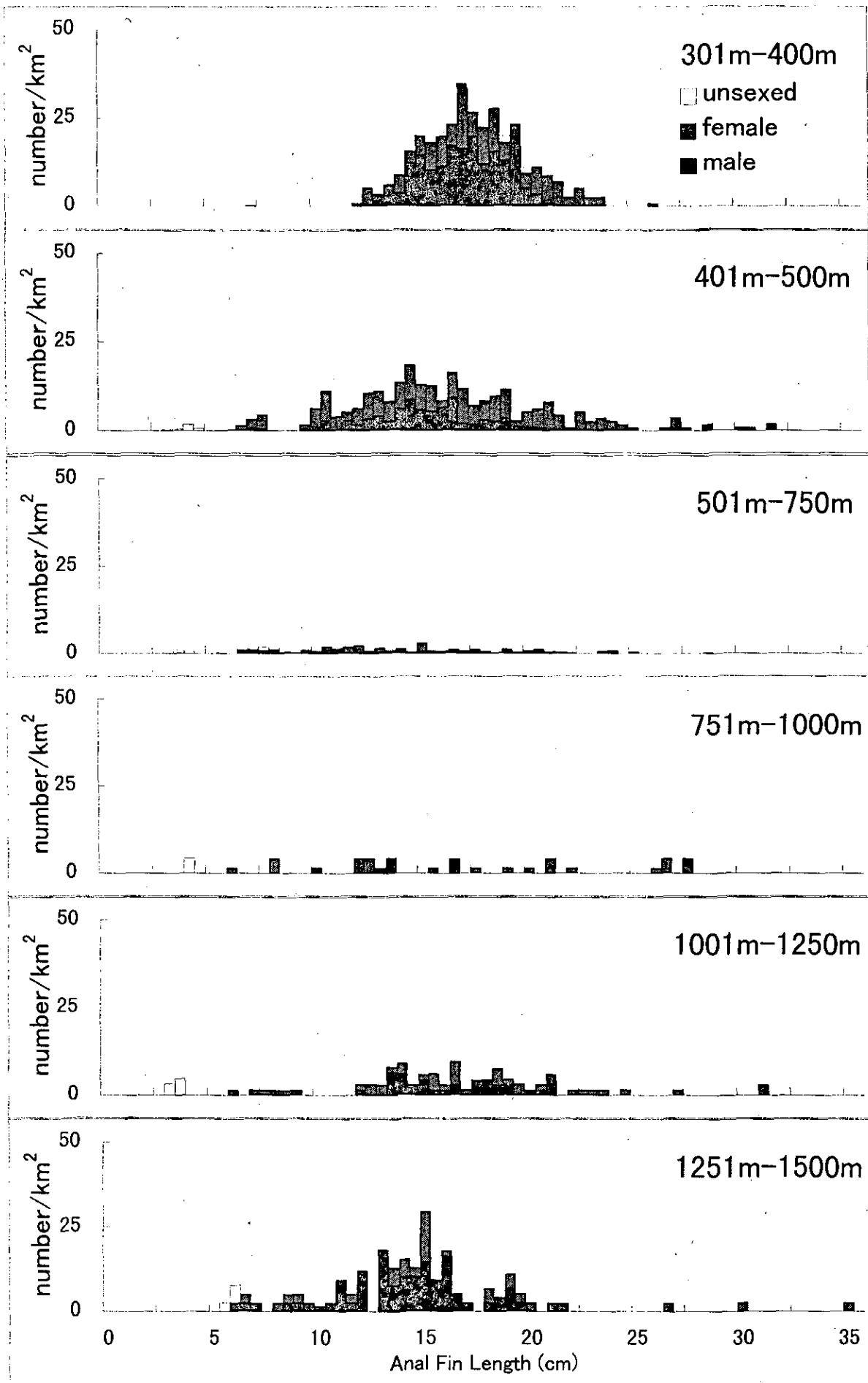


Fig. 7. The density (number/km²) of roughhead grenadier by length class and by depth strata in Div. 2G.

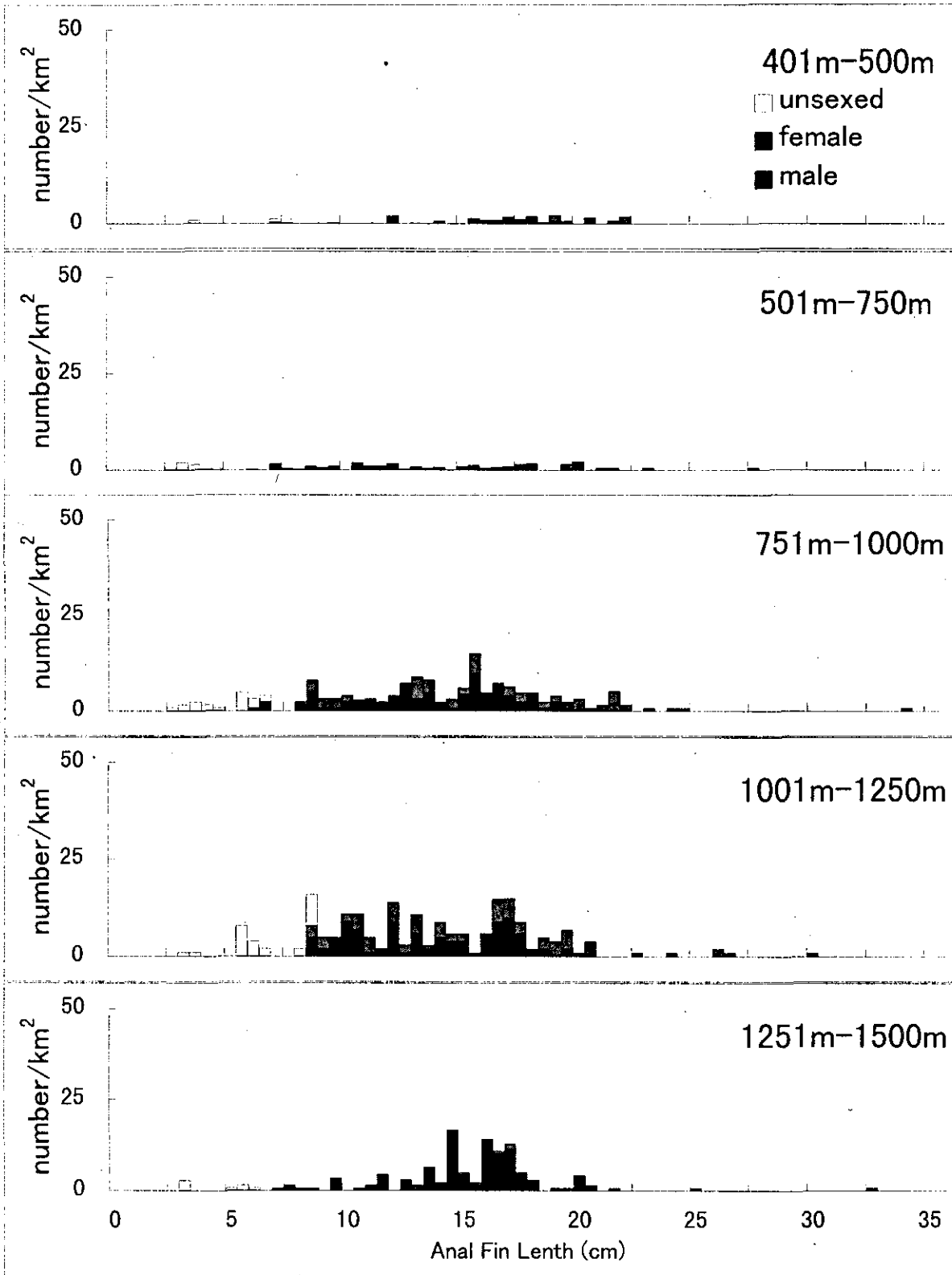


Fig. 8. The density (number/km²) of roughhead grenadier by length class and by depth strata in Div. 2H.

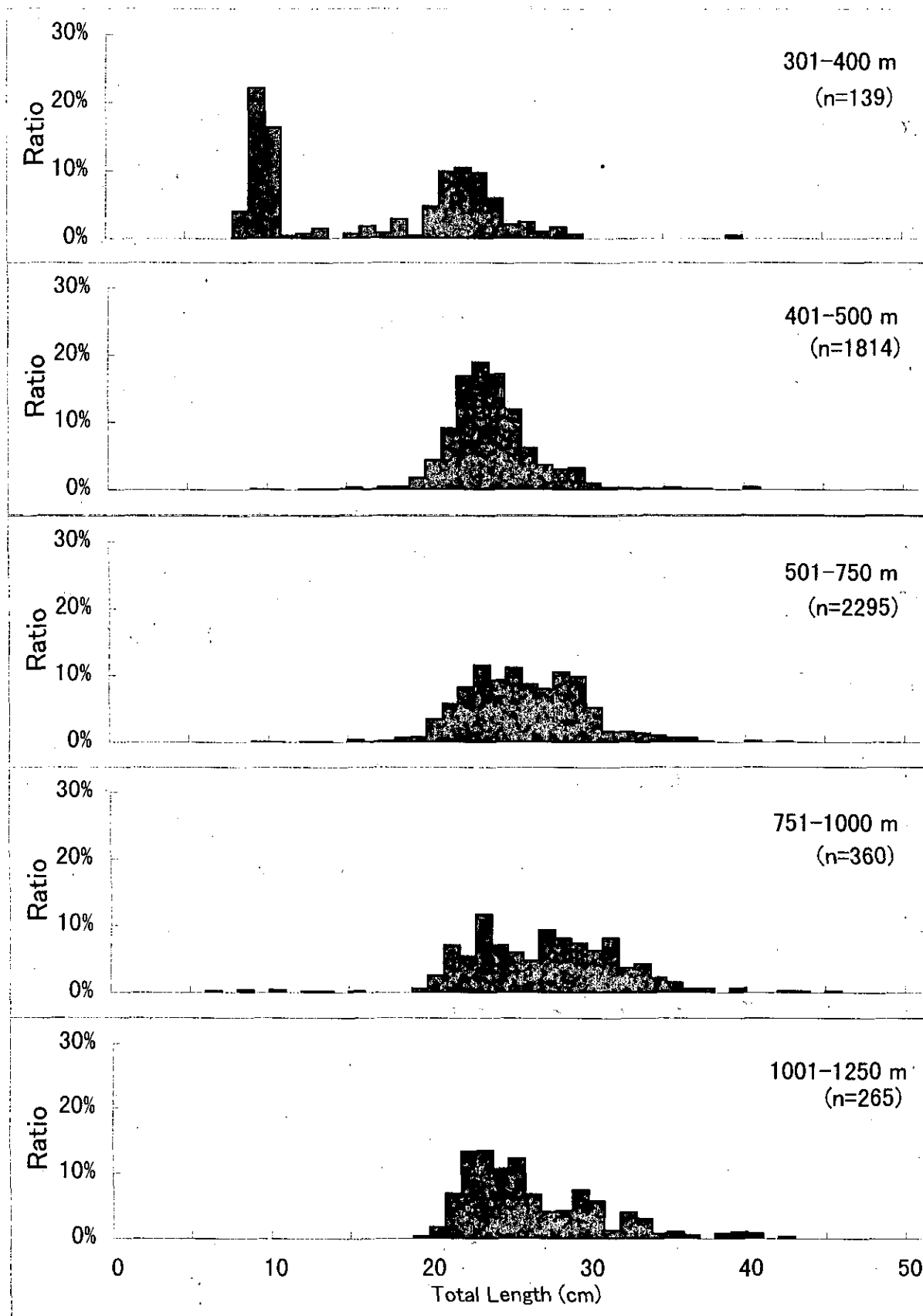


Fig. 9. Size frequency of *Sebastes mentella* by depth strata in Div. 2G.

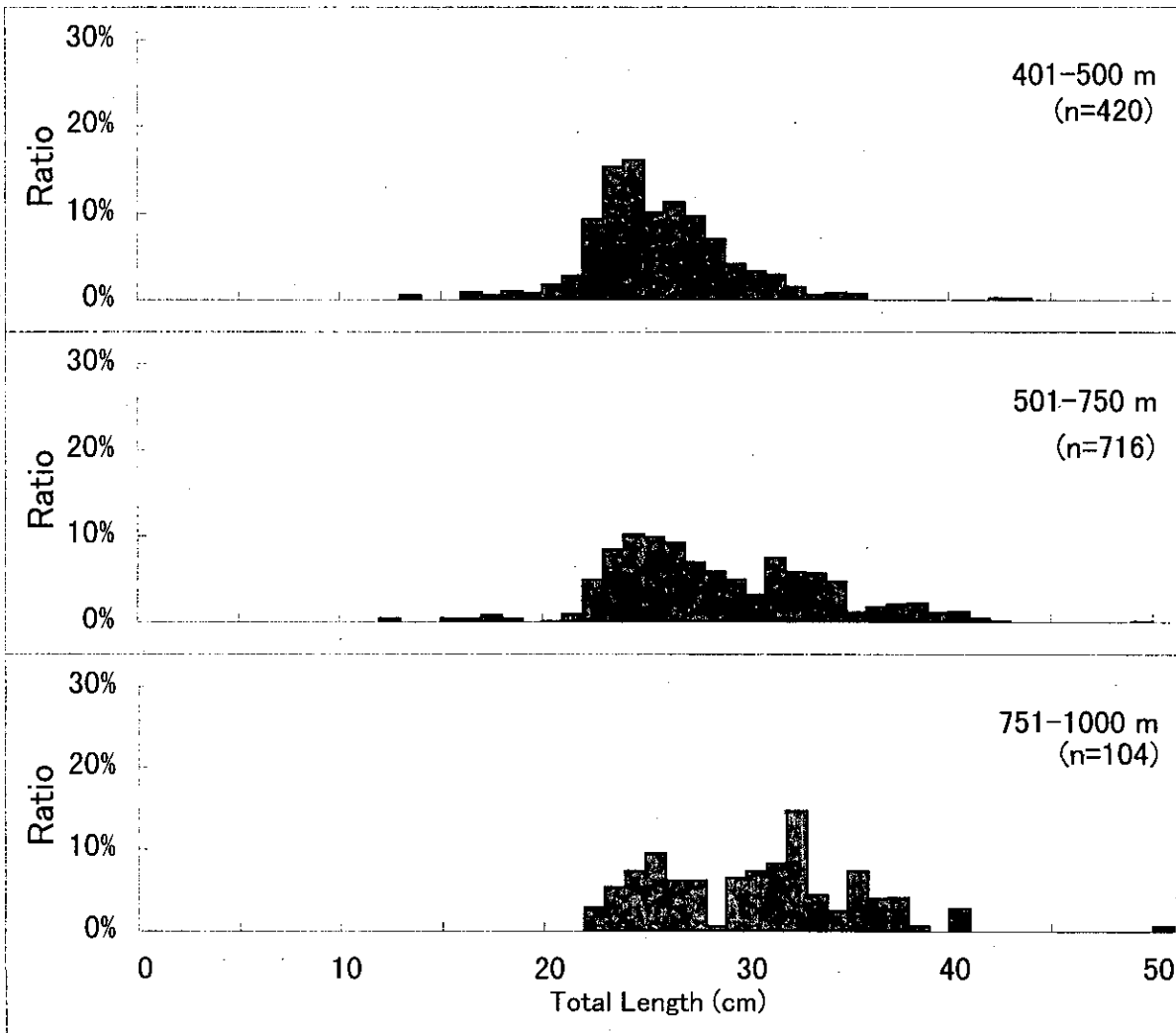


Fig. 10. Size frequency of *Sebastes mentella* by depth strata in Div. 2H.