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Results of Russian Surveys on Assessment of Greenland Halibut Stock in the Flemish Pass and on the Flemish Cap in 1996

by

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ABSTRACT

Results of the Russian trawl surveys for Greenland halibut in the Flemish Pass area in February, 1996, (abundance constituted 46.1 mill. spec., and biomass - 31.8 thou. t) and on the Flemish Cap in May (abundance - 2.8 mill. spec., and biomass - 1.2 thou. t) are presented.

Length-age keys and age composition of Greenland halibut catches in the Flemish Pass are given. The age of males constituted 3 to 13 years old (length was 24-70 cm) and that of females - 3 to 20 years old (length - 24-102 cm). Males at the age of 4-5 and females at the age of 4-6 constituted the basis of catches in that area.

A short description of Russian fishery for Greenland halibut in the NAFO area is given.

INTRODUCTION

The Flemish Pass is a relatively new fishing ground consisting of areas of a continental slope of the Grand Bank of Newfoundland (3L Div.) and western slope of the Flemish Cap (3M Div.) which are outside the 200-mile fishing zone of Canada. Greenland halibut is the main fishing object there, however redfish and roughhead grenadier are also numerous. Fishery for Greenland halibut has been successively developed in that area since the early 1990's. Total annual catch (of Spain and Portugal, mainly) reached almost 60 thou. t. The catch of Russia did not exceed hundreds of tons. Because of the fishery for halibut has been commenced there comparatively recently, the information on fishery, catch composition and biology is scanty. The paper presents data on the Russian fishery for Greenland halibut in 1996, as well as species composition of catches, growth rates, length and age composition in trawl catches. Results of assessment of halibut stocks on the the Flemish Cap in 1995 and 1996 are given.

MATERIAL AND METHODS

In 1996, two trawl surveys on Greenland halibut stock assessment were carried out in Divs. 3L and 3M. Abundance and biomass of Greenland halibut were estimated by a random-stratified method on the basis of the first survey carried out from 17 to 24 February, 1996, in the northern part of the Flemish Pass by MI-0707 "Ozenitsa". Surveys on stratified scheme, carried out in NAFO Divisions, were described by Doubleday (1981). Method of the survey and some results of investigations are given in detail in Gorchinsky (1996).

The second survey of bottom fish including Greenland halibut was carried out on the Flemish Cap from April, 30, to May, 12, 1996, by the same standard method by MI-8339 "Olaine". Depths from 730 to 914 m were observed. Halibut distribution was investigated in the period from 13 to 29 of May.

The whole length of halibut was measured to compose length frequencies. Age was determined by otoliths.

Preliminary results of fishery for halibut by Russian vessels in NAFO Divisions in 1996 are presented.

REVIEW OF RUSSIAN FISHERY FOR GREENLAND HALIBUT IN 1996

In January, February and early March, one vessel with a daily efficiency of 3.4-3.5 t fished for Greenland halibut on the northwestern slope of the Flemish Cap and in the Flemish Pass (47°55′ - 48°29′N, 46°03′ - 47°11′W) at depths 860-1.390 m (Table 1). By-catches of grenadier constituted in average 15-30 % and 50 % at depths larger than 1.000 m.

In March and early April, two vessels of a BMRT type and in the end of May, one vessel of a STM type fished for Greenland halibut with a daily efficiency 2.9 to 5.3 t at depths 870-1.400 m in the area of the Flemish Pass slightly more to the south than in January-March. By-catches of grenadier, catfish and American plaice fluctuated within 12-60 %.

Due to preliminary data, 306 t of Greenland halibut were caught in total from January to May.

From September to December, 1-2 BMRT vessels fished for Greenland halibut at depths 800 to 1.500 m with a daily efficiency of 4.2 to 5.0 t in the area of West Greenland between 63°29′-63°49′N, 56°40′-57°50′W. By-catches of grenadier and other fish species did not exceed 7 %.

Due to preliminary data, the Russian catch of halibut constituted 229 t from September to December.

RESULTS OF INVESTIGATIONS

Both in February and May, no dense schools of Greenland halibut were revealed. Fish were widely distributed on slopes of the Flemish Cap and in the Flemish Pass and were revealed in all catches deeper than 630 m.

In February, the survey was only carried out in the northern part of the Flemish Pass in adjacent areas of 3L and 3M Divs. at the depth larger than 700 m. Halibut abundance constituted 46.1 mill. spec. and biomass - 31.8 thou. t (Gorchinsky, 1996). These results were higher than data of Canadian (Bowering and Power, 1995) and Japanese (Yokawa and Koga, 1995) deepwater surveys carried out in 1995.

Due to results of trawl survey on the Flemish Cap Bank carried out in May 1996, the abundance of halibut constituted 2.8 mill. spec. and biomass - 1.2 thou. t (Table 2). During the survey in May, 1995, approximately the same results were obtained: halibut abundance constituted 2.5 mill. spec. and biomass - 1.1 thou. t (Table 3). Since the catchability coefficient of a trawl was accepted equal to 1, then the obtained estimations are considered to be the populational indices. At equal estimations of abundance and biomass of halibut in 1995 and 1996, it is necessary to remember that in 1995 the depths to 730 m only were observed, whereas in 1996 - to 914 m. The largest catches of halibut were found at the depth of 700-900 m.

Trawl surveys of Spain on the Flemish Cap have shown that in 1994, halibut biomass constituted 7.9 thou. t, and that of 1995 was 10.7 thou. t (Vazquez, 1996). In 1994, fish at the age of 6-7 predominated. In 1995, the number of all fish at the age from 1 to 9 slightly increased, that favoured the increase of biomass.

Age composition of Greenland halibut in the Flemish Pass area was different between commercial and research catches. Predominating length of fish in commercial catches was 42-45 cm in January-March, whereas that in the research ones - 34-42 cm (Fig. 1). The larger differences between research catches on Flemish Cap and in the area of the Flemish Pass were observed in May, 1996 (Fig. 2). This is caused by different depths of catching. Halibut length increased with the depth.

Tables 4, 5 and 6 present age-length keys, which characterize growth rate of males and females in the Flemish Pass area. At the age of 5, males have the average length of 40.5 cm and weight - 641 g. To the age of 10 the average length increases to 61.8 cm and weight - to 2.245 g. Females grow faster than males and their life cycle is longer. Males in catches were at the age of 3 to 13, whereas females - from 3 to 20. Halibut males at the age of 4-5 (Table 7) and females at the age of 4-6 predominated in research catches (Table 8).

It was the first time when a Russian vessel assessed halibut stock, therefore the results do not yet allow to conclude on the stock dynamics, as well as on length and age composition of catches.

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Table I. Results from operations by the russian vessels during fishery on Greenland halibut using a bottom trawl in the NAFO area in 1996.
(preliminary data)

Month	Type of vessel	No. of fishing days	Catch per day/vessel, t	Main catch, t	By-catch of grenadier, %	Depth, m
			Flemish-Pass			
1	STM	15	3,5	52	23,1	1000-1390
2	STM	24	3,4	82	26,8	860-1320
3	STM,BMRT	55	2,9	159	14,9	870-1400
4	BMRT	20	5,3	106	32,6	1100-1360
5	STM	6	4,2	28	-	840-900
			West Greenland			
9	BMRT	11	5,0	55	7,3	1340-1470
10	BMRT	15	4,2	63	1,6	800-1400
11	BMRT	21	4,3	90	1,6	1250-1580
12	BMRT	4	5,3	21	0.0	1400-1460

Table 2 . Results from the trawl survey for Halibut in Div 3M. May,1996.

Stratum	Depth, m	Area, mile sq.	Nos of tows	Mean catch/ 1 valid tow		Abundance, '000	Biomass, tons
				fish	kg		
501	127-146	342	3	-	-	-	-
502	147-183	838	4	-	-	-	-
503	184-256	628	3	1.3	0,2	61.9	8.1
504	-"-	348	3	0.7	0.01	17.3	0.3
505	-"-	703	3	1.0	0.1	52.1	5.2
506	-"-	496	3	1.0	0.1	36.7	3.7
507	258-366	822	3	9.0	1.3	548.0	79.3
508	-"-	646	3	3.7	0.4	175.5	18.2
509	-"-	314	3	0.3	0.01	7.7	0.2
510	-"-	951	3	3.3	0.4	234.6	28.4
511	-"-	806	3	0.3	0.04	19.7	2.3
512	367-546	670	3	1.7	0.3	82.9	15.9
513	-"-	249	3	0.7	0.04	12.4	0.8
514	-"-	602	3	-	-	-	-
515	-"-	666	3	0.7	0.1	33.1	4.8
516	550-731	634	3	4.0	2.0	187.9	95.9
517	-"-	216	4	0.5	0.2	8.0	3.3
518	-"-	210	5	-	-	-	-
519	-"-	414	3	2.0	0.8	61.3	25.5
520	732-914	525	4	1.8	1.3	68.1	52.4
524	-"-	253	5	2.4	1.8	45.0	34.6
528	-"-	530	3	27.7	19.9	1086.3	781.8
533	-"-	98	3	4.3	2.3	31.4	17.0
Total		11961	76			2769.9	1177.7

Table 3. Results from the trawl survey for Halibut in Div 3M. May,1995.

Stratum	Depth, m	Area, mile sq.	Nos of tows	Mean catch/ 1 valid tow fish	kg	Abundance, '000	Biomass, tons
501	127-146	342	3	-	-	-	-
502	147-183	838	3	-	-	-	-
503	184-256	628	3	2.3	0.1	108.4	3.5
504	-"-	348	3	-	-	-	-
505	-"-	703	3	1.3	0.4	70.0	19.2
506	-"-	496	3	0.7	0.03	24.6	0.9
507	258-366	822	3	4.3	0.5	263.6	31.8
508	-"-	646	3	0.3	0.01	15.8	0.6
509	-"-	314	3	0.3	0.01	7.8	1.9
510	-"-	951	3	2.3	0.2	164.1	11.3
511	-"-	806	4	4.0	0.5	238.8	30.6
512	367-546	670	3	2.0	0.6	99.3	27.2
513	-"-	249	3	-	-	-	-
514	-"-	602	3	0.3	0.01	14.7	0.4
515	-"-	666	3	0.7	0.3	32.6	12.3
516	550-731	634	3	19.0	12.8	892.3	600.5
517	-"-	216	3	5.0	5.6	80.0	90.0
518	-"-	210	3	6.0	4.9	93.3	76.4
519	-"-	414	3	14.3	5.0	439.5	152.1
Total		10555	58			2543.9	1058.3

Table 4. Greenland halibut age-length key (males), 1996.

Length, cm	Age, years 3	4	5	6	7	8	9	10	11	12	13	No	Average weight, g
24	1											1	95.0
26	1	1										2	132.5
28	2	1										3	168.3
30	6	1										7	195.7
32	4	8	1									13	253.1
34	3	8	5									16	308.1
36		10	4	1								15	387.3
38		9	4	2	1							16	453.1
40		2	8	4	1							15	568.7
42		1	8	6								15	724.7
44			7	4	2		1					14	855.7
46				8	7							15	925.3
48			2	3	7	3						15	1072.7
50				1	6	6	1					14	1119.3
52					8	7	1					16	1330.6
54					2	6	6					14	1422.9
56					2	7	4	1				14	1551.4
58						4	6	3				13	1785.4
60						3	5	1	1			10	1947.0
62								2	3			5	2270.0
64					1			1	1	2		5	2590.0
66								1	1	2	1	5	2776.0
68								1	1	1		3	3030.0
70									1			1	3440.0
No	17	41	39	29	37	36	24	10	8	5	1	247	
W.av..g	206.2	364.4	641.0	792.8	1133.5	1444.7	1569.6	2245.0	2532.5	2684.0	3090.0		1041.6
L.av..cm	30.7	35.5	40.5	44.0	49.9	54.3	56.4	61.8	64.5	66.2	67.0		46.6

TABLE 5. GREENLAND HALIBUT AGE-LENGTH KEY (FEMALES). 1996.

LENGTH. CM	AGE. YEARS																		NO	AVERAGE WEIGHT. G
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
24		3																	3	93.3
26	1																		1	170.0
28	1																		1	160.0
30	3		1																4	200.0
32	6	8	1																15	257.3
34	4	10	1																15	322.7
36	1	12	2																15	368.0
38	1	10	3																14	443.6
40			11	4															15	625.3
42			11	4															15	728.7
44			9	5	2														16	861.3
46			5	9	1														15	1010.0
48			2	5	9														16	1006.3
50				2	7	5													14	1134.3
52				1	4	8	3	1											17	1270.6
54					6	7	3												16	1418.1
56					4	5	7												16	1563.1
58						4	6	5	1										16	1730.6
60						1	1	7	1										10	1859.0
62						1	1	5	3	2	1								13	2090.8
64							1		2	6									9	2544.4
66							2	1	1	9									13	2820.0
68					1			1	1	7	2								12	3150.8
70									4	2	4								10	3449.0
72										4	6	1							11	3768.2
74										4	9	2	1						16	4329.1
76										2	7	1	1						11	4903.6
78									1	2	11	6							20	5217.5
80												14	4	1					19	5964.2
82											2	4	9	6					21	6501.7
84											1	4	3	1					9	7198.9
86											1	3	5	9					18	7596.7
88												1	4	5					10	8740.0
90													1	1	1				3	9223.3
92													2			2	1		5	10196.0
94												1							1	10800.0
96																				-
98																				-
100																	1	1	2	13300.0
102																	1		1	14010.0
NO	17	43	46	30	34	31	24	20	14	38	44	37	30	23	1	2	3	1	438	
W.AV..G	268.2	333.1	700.0	920.0	1262.1	1408.1	1712.1	1931.0	2822.1	3393.9	4595.8	6208.6	7070.8	7616.5	9380.0	11000.0	12430.0	14100.0		3003.5
L.AV..CM	32.7	34.8	42.0	45.6	51.7	54.7	57.8	60.8	66.5	69.2	75.5	81.4	84.2	86.0	90.0	92.0	98.7	100.0		60.4

TABLE 6. GREENLAND HALIBUT AGE-LENGTH KEY (TOTAL). 1996.

LENGTH. CM	AGE. YEARS																			NO	AVERAGE WEIGHT. G
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20			
24	1	3																		4	93.8
26	2	1																		3	145.0
28	3	1																		4	166.3
30	9	1	1																	11	197.3
32	10	16	2																	28	255.4
34	7	18	6																	31	315.2
36	1	22	6	1																30	377.7
38	1	19	7	2	1															30	448.7
40		2	19	8	1															30	597.0
42		1	19	10																30	726.7
44			16	9	4		1													30	872.7
46			5	17	8															30	967.7
48			4	8	16	3														31	1038.4
50				3	13	11	1													28	1126.8
52				1	12	15	4	1												33	1299.7
54					8	13	9													30	1420.3
56					6	12	11	1												30	1557.7
58						8	12	8	1											29	1755.2
60						4	6	8	2											20	1903.0
62						1	1	7	6	2	1									18	2140.6
64					1		1	1	3	8										14	2560.7
66							2	2	2	11	1									18	2807.8
68					1			2	2	8	2									15	3126.7
70									5	2	4									11	3448.2
72										4	6	1								11	3768.2
74										4	9	2	1							16	4329.1
76										2	7	1	1							11	4903.6
78									1	2	11	6								20	5217.5
80												14	4	1						19	5964.2
82											2	4	9	6						21	6501.7
84											1	4	3	1						9	7198.9
86											1	3	5	9						18	7596.7
88												1	4	5						10	8740.0
90													1	1	1					3	9223.3
92													2			2	1			5	10196.0
94												1								1	10800.0
96																					-
98																					-
100																	1	1		2	13300.0
102																	1			1	14010.0
NO	34	84	85	59	71	67	48	30	22	43	45	37	30	23	1	2	3	1	685		
W.AV..G	237.2	349.4	672.9	857.5	1195.1	1427.8	1640.8	2035.7	2716.8	3311.4	4562.3	6208.6	7070.8	7616.5	9380.0	11000.0	12430.0	14100.0			2296.1
L.AV..CM	31.7	35.1	41.3	44.8	50.8	54.5	57.1	61.1	65.8	68.8	75.3	81.4	84.2	86.0	90.0	92.0	98.7	100.0			55.5

Table 7. Length frequency converted to age-length key of Greenland halibut males in Flemish-Pass area. February, 1996.

Length, cm	Age, years											No
	3	4	5	6	7	8	9	10	11	12	13	
24	3											3
26	19	19										38
28	85	42										127
30	141	24										165
32	106	212	27									345
34	81	217	135									433
36		427	171	43								640
38		395	176	88	44							702
40		81	323	162	40							606
42		37	297	222								556
44			197	113	56		28					394
46				194	170							364
48			36	54	126	54						270
50				9	52	52	9					121
52					49	42	6					97
54					6	18	18					42
56					5	18	10	3				36
58						6	8	4				18
60						3	6	1	1			11
62								2	3			5
64					1			1	1	2		5
66								1	1	2	1	5
68								1	1	1		3
70									1			1
No	435	1473	1361	884	549	193	85	13	8	5	1	4987
%	8.7	29.1	27.3	17.7	11.0	3.9	1.7	0.3	0.2	0.1	+	100

TABLE 8. LENGTH FREQUENCY CONVERTED TO AGE-LENGTH KEY OF GREENLAND HALIBUT FEMALES IN THE FLEMISH-PASS AREA. FEBRUARY. 1996.

LENGTH. CM	AGE. YEARS																		No
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
24		5																	5
26	40																		40
28	156																		156
30	125		42																167
32	104	139	17																260
34	114	286	29																429
36	45	537	89																671
38	64	638	191																893
40			581	211															792
42			529	192															721
44			305	170	68														543
46			150	270	30														450
48			40	99	179														318
50				22	77	55													154
52				8	30	61	23	8											130
54					25	29	13												67
56					15	19	27												61
58						9	13	11	2										35
60						3	3	22	3										31
62						1	1	6	3	2	1								14
64							2		3	9									14
66							1			4									5
68										3	1								4
70									3	1	3								7
72										2	3	1							6
74										1	1								2
76										1	3								4
78									1		2	1							4
80												4	1						5
82																			-
84												1	1						2
86												1	1	2					4
88																			-
90																			-
92																			-
94																			-
96																			-
98																			-
100																	1	1	2
No	648	1605	1973	972	424	177	83	47	15	23	14	8	3	2			1	1	5996
%	10.8	26.8	32.9	16.2	7.1	2.9	1.4	0.8	0.2	0.4	0.2	0.1	0.05	+			+	+	100

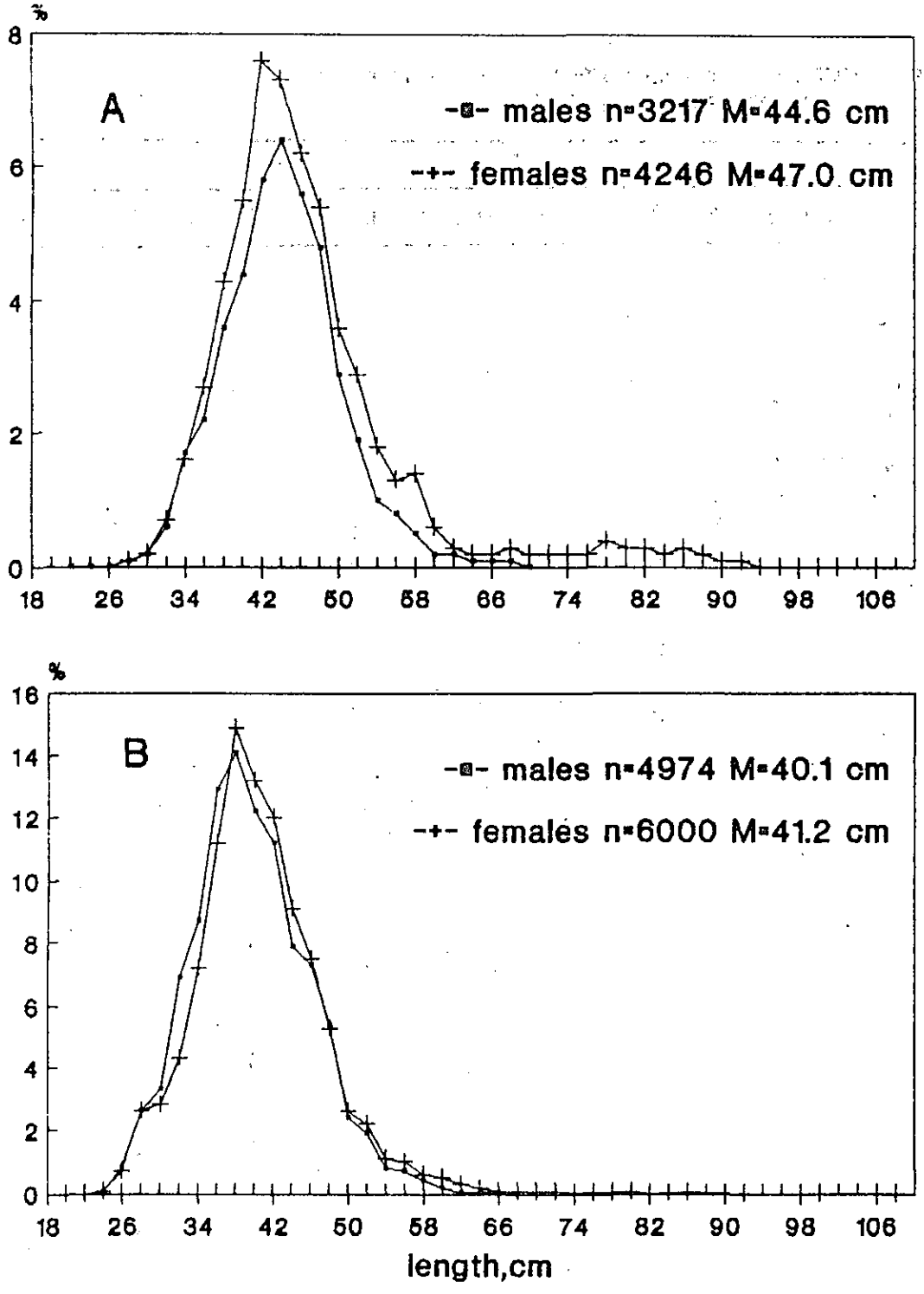

Fig. I. Length composition of Greenland halibut from commercial (A) and sampling trawls (B). Flemish-Pass, january-march, 1996.

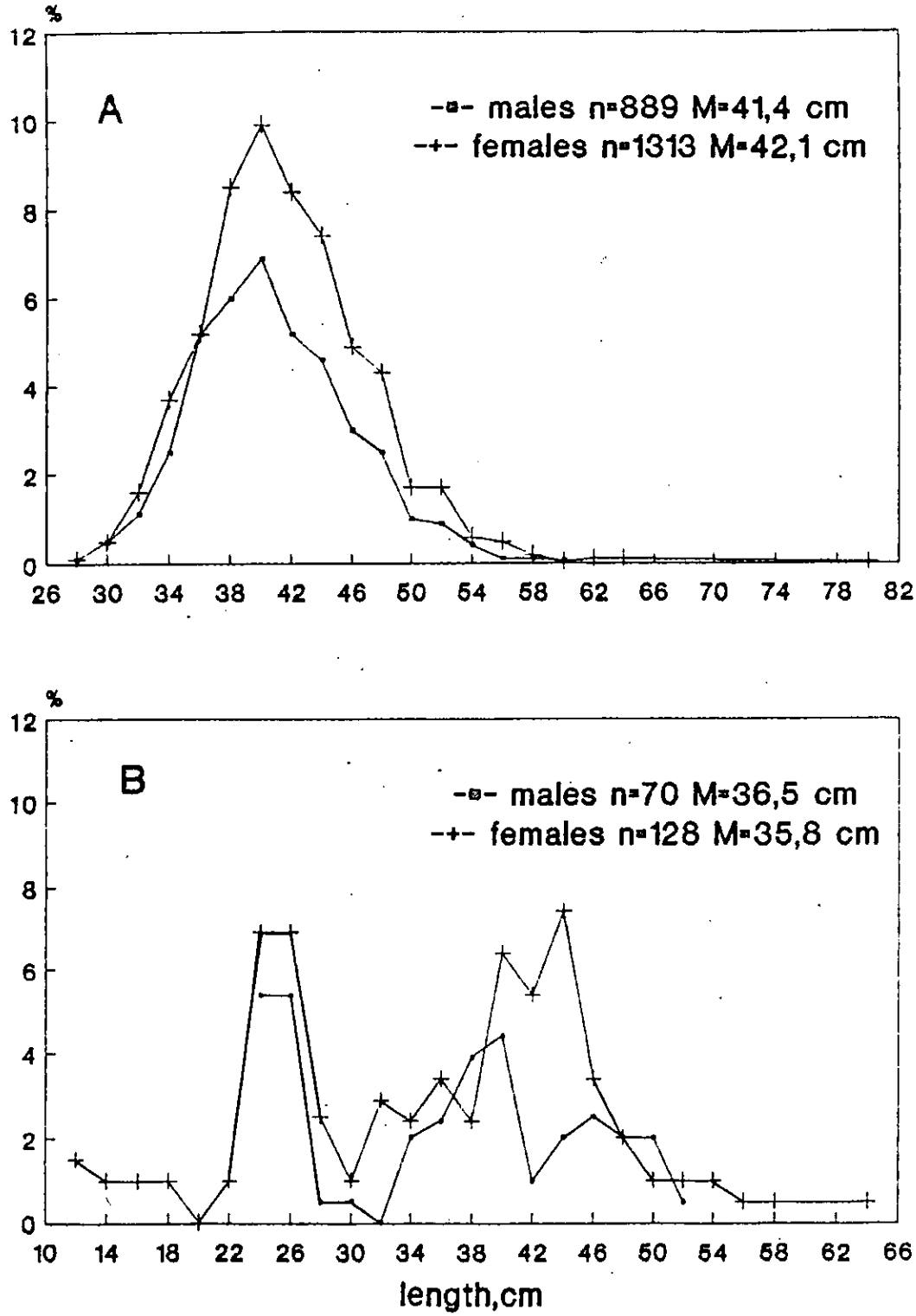

Fig. 2. Length composition of Greenland halibut from sampling trawls in Flemish-Pass (A) and on the Flemish Cap Bank (B), may, 1996.