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ON THE SPAWNING GROUNDS OF GREENLAND HALIBUT IN ICELANDIC WATERS

by

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The Icelandic tagging experiments on Greenland halibut in recent years have proved that the main spawning migrations are made to the waters west of Iceland. However, the locations of the spawning grounds have not been established. The slopes off the continental shelf of East Greenland have been pointed out as likely spawning grounds, but less attention has been drawn to the slopes off the west coast of Iceland, even though favourable conditions in the sea are known to be present.

In November 1976 samples were taken by trawl along the slope off the continental shelf west off Iceland, partly to make sure if the Greenland halibut was preparing for spawning in the area or not. Fig. 1 shows the stations where Greenland halibut was caught in the area from Reykjanesridge to Dohrnbank. Greenland halibut was caught in the whole area, but no great concentrations were found, the catch being from 1-300 individuals per trawling hour.

The area was divided into three subareas with regard to the characteristics of the material (see Fig. 1).

Table 1 and Fig. 2 show that maturity stage II (preparing for spawning) dominated especially in subarea 1 and 2 where males also predominated (Figs. 2 and 3 and Table 1). Here the Greenland halibut was already on the spawning grounds though the spawning does not occur until in the first months of the next year. The bottom temperature in subarea 1 and 2 was around 5°C.

The Greenland halibut leaves the feeding grounds north off Iceland in late August after grasing there during the summer in temperatures under 0°C. Probably this early start of the spawning migration is due to a need for higher temperature for the development of the gonads.

In the last half of March 1977 the spawning area west off Iceland was sampled again by trawl (Fig. 4). This time the area was divided into four subareas. The results as far as spawning is concerned are summarized in Table 2 and Figs. 5 and 6. Subarea 1 was obviously a spawning grounds as 44.1% of the Greenland halibut were spawning and 25.3% were newly spawned (Table 2 and Figs. 5 and 6). No great concentrations were found as the catch was 2-180 individuals per trawling hour. On the other hand the Greenland halibut might have been partly up in the watermasses during the spawning. The Greenland halibut was most abundant in the northern end of the subarea.

Considerable spawning took also place in subarea 2 where 20.9% of the Greenland halibut were spawning and 21.6% were newly spawned (Table 2 and Figs. 5 and 6). Here the number of individuals per trawling hour were 3-98.

In subarea 3 no spawning was observed, but only 16 individuals were caught in 9 hauls.

In subarea 4 no spawning was expected. However, 4.5% of the sample were at maturity stage III, but Greenland halibut is frequently found in this maturity stage outside spawning areas and spawning time. This is not surprising especially as the subarea is near the spawning grounds in subarea 2.
The majority of the Greenland halibut or 80.8% were immature as expected (Table 2 and Fig. 5), and the bottom temperature was ÷ 0.2°C which is far below the temperature on the spawning grounds.

The time of sampling (15th - 28th March) was presumably late in the spawning season. In subarea 1 and 2 (Fig. 4) newly spawned individuals constituted over 20% of the catch (Table 2 and Fig. 5), and some of those grouped under maturity stage III had almost finished spawning. It is also

well known that the Greenland halibut starts already in April to concentrate near the middle of subarea 2 (Fig. 4), 2 or 3 weeks after the end of the research trip in which the material was sampled. These great concentrations might indicate more intensive spawning somewhere else, but it is also possible that the Greenland halibut hesitates before it passes the coldwater front and, therefore, concentrates when leaving temperatures from 4° or 5°C to temperature under 0°C.

Obviously the slopes off the continental shelf west off Iceland at depth of around 1000 m are spawning grounds for the Greenland halibut, which grases off the northwest and north coast of Iceland in the summer. The area is big enough to be the only spawning ground of the stock, but as yet it is still possible that there are also spawning grounds off the coast of East Greenland although the samples from subarea 3 from March this year do not indicate anything in that direction.

Table 1.

Number (N) and percentage of Greenland halibut west of Iceland in November 1976 by maturity stage and subarea (Fig.1). I=immature, II-preparing for spawning, III=spawning IV-spawned.

Bottom temperature measured at 940-1060m in subarea 1, at 970m in subarea 2 and at 750m in subarea 3.

Maturity Stage			I		II		III		IV		Total		II-IV		Bottom Temperatur
Subarea	Depth m	Sex	N	%	N	%	N	%	N	%	N	%	N	%	
1[1]	649-1110	♀♀	7	2,7	62	24,0			2	0,8	71	27,5	64	24,8	4,9°-5,7°
		♂♂	6	2,3	167	64,7	14	5,4			187	72,5	181	70,2	
		♂♂+♀♀	13	5,0	229	88,8	14	5,4	2	0,8	258	100,0	245	95,0	
2	776-980	♀♀	25	12,2	41	20,0			1	0,5	67	32,7	42	20,5	5,1°
		♂♂	13	6,3	124	60,5	1	0,5			138	67,3	125	61,0	
		♂♂+♀♀	38	18,5	165	80,5	1	0,5	1	0,5	205	100,0	167	81,5	
3[2]	370-800	♀♀	48	27,3	45	25,6			16	9,1	109	61,9	61	34,7	3,2°
		♂♂	20	11,4	39	22,2	5	2,8	3	1,7	67	38,1	47	26,7	
		♂♂+♀♀	68	38,6	84	47,7	5	2,8	19	10,8	176	100,0	108	61,4	

1) One Greenland halibut caught at less than 850m

2) Two Greenland halibuts caught at less than 500m

Table 2.

Number (N) and percentage of Greenland halibut west of Iceland in March 1977 by maturity stage and subarea (Fig.1). I to IV see Table 1.

Maturity Stage			I		II		III		IV		Total		II-IV		Bottom
Subarea	Depth m	Sex	N	%	N	%	N	%	N	%	N	%	N	%	Temperature
		♀♀	91	14,7	15	2,4	94	15,1	110	17,7	310	49,9	219	35,3	
1	850-	♂♂	81	13,0	3	0,5	180	29,0	47	7,6	311	50,1	230	37,0	4,3°-5,3°
	1230	♂♂+♀♀	172	27,7	18	2,9	274	44,1	157	25,3	621	100,0	449	72,3	
		♀♀	57	37,3	2	1,3	14	9,2	14	9,2	87	56,9	30	19,6	
2	750-	♂♂	29	19,0	-	-	18	11,8	19	12,4	66	43,1	37	24,2	4,1°-5,3°
	1140	♂♂+♀♀	86	56,2	2	1,3	32	20,9	33	21,6	153	100,1	67	43,8	
		♀♀	6	37,5	-	-	-	-	3	18,8	9	56,3	3	18,8	
3	450-	♂♂	6	37,5	-	-	-	-	1	6,2	7	43,7	1	6,3	4,1°-4,9°
	960	♂♂+♀♀	12	75,0	-	-	-	-	4	25,0	16	100,0	4	25,0	
		♀♀	342	57,6	3	0,5	12	2,0	29	4,9	386	65,0	44	7,4	
4	510-	♂♂	138	23,2	1	0,2	15	2,5	54	9,1	208	35,0	70	11,8	-0,2°
	525	♂♂+♀♀	480	80,8	4	0,7	27	4,5	83	14,0	594	100,0	114	19,2	

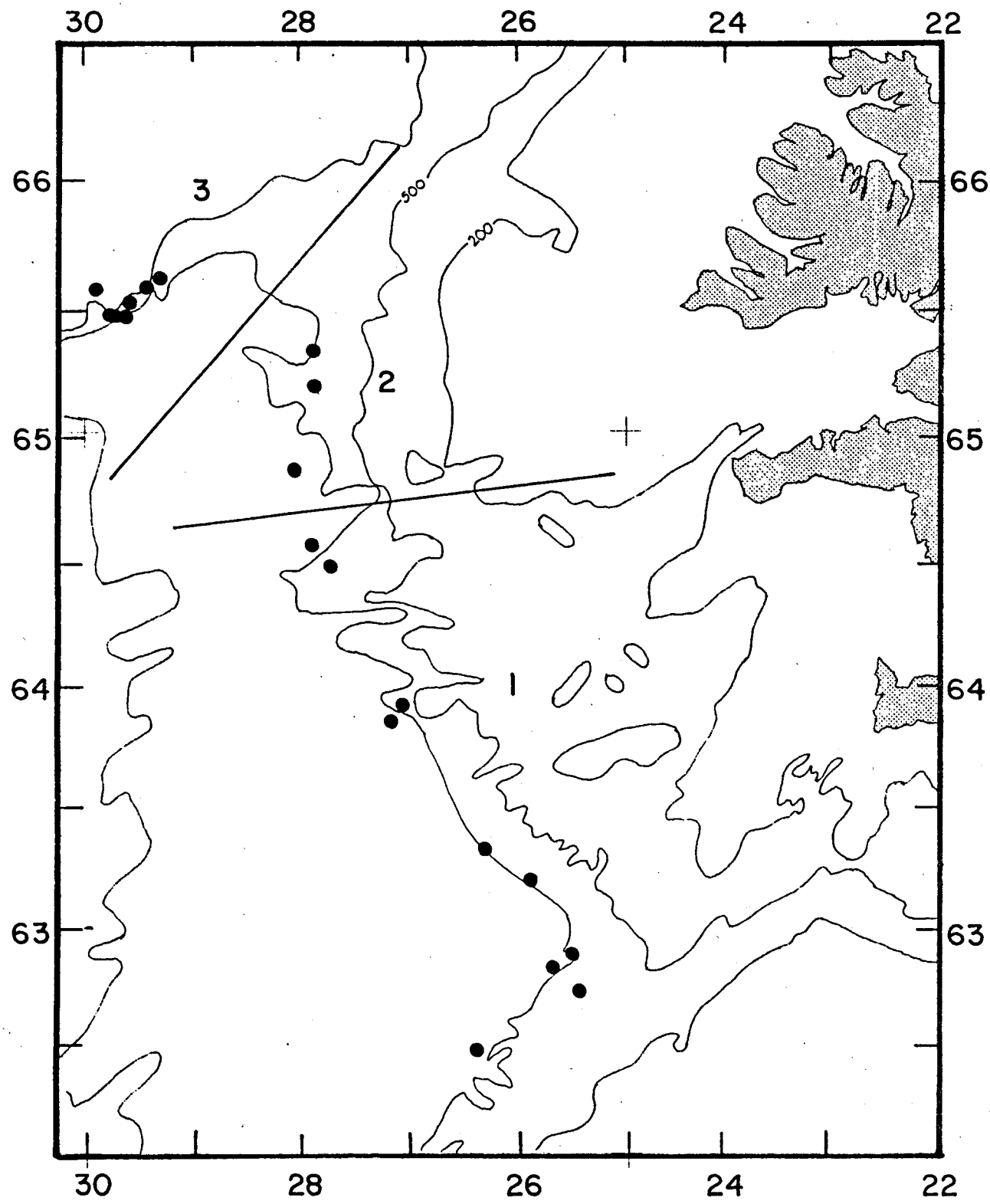

Fig. 1. Positive stations taken in November 1976.
The area is divided into three subareas.

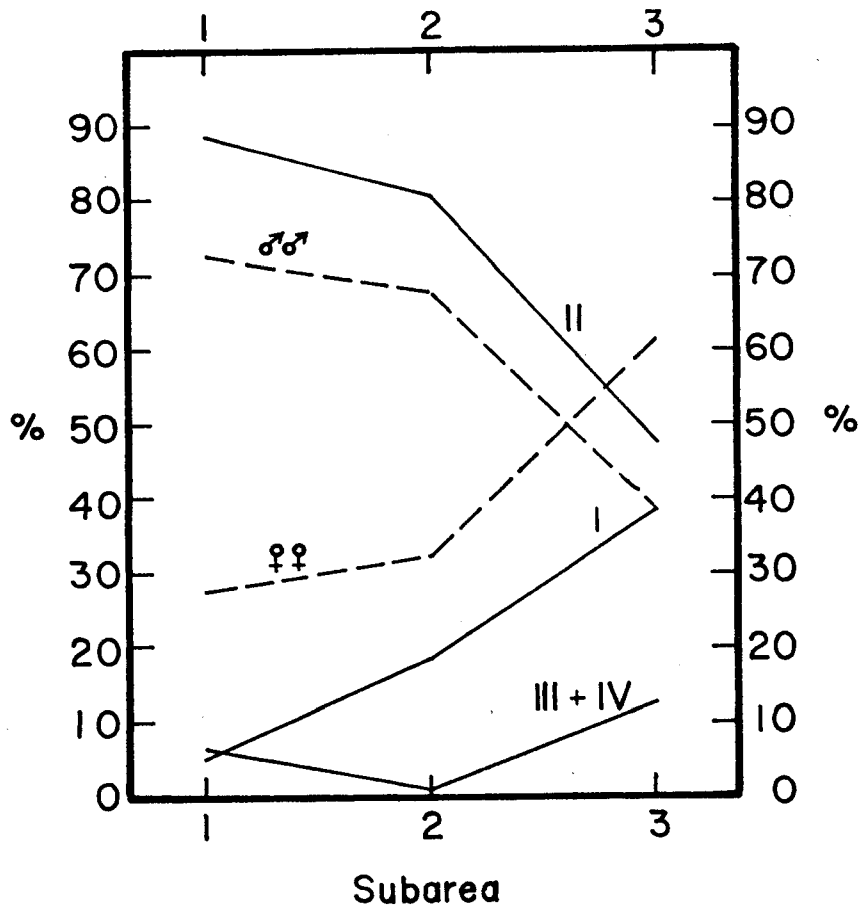

Fig. 2. Percentage of the sexes and the maturity stages I-IV by subareas (Fig. 1 and Table 1). Material from November 1976.

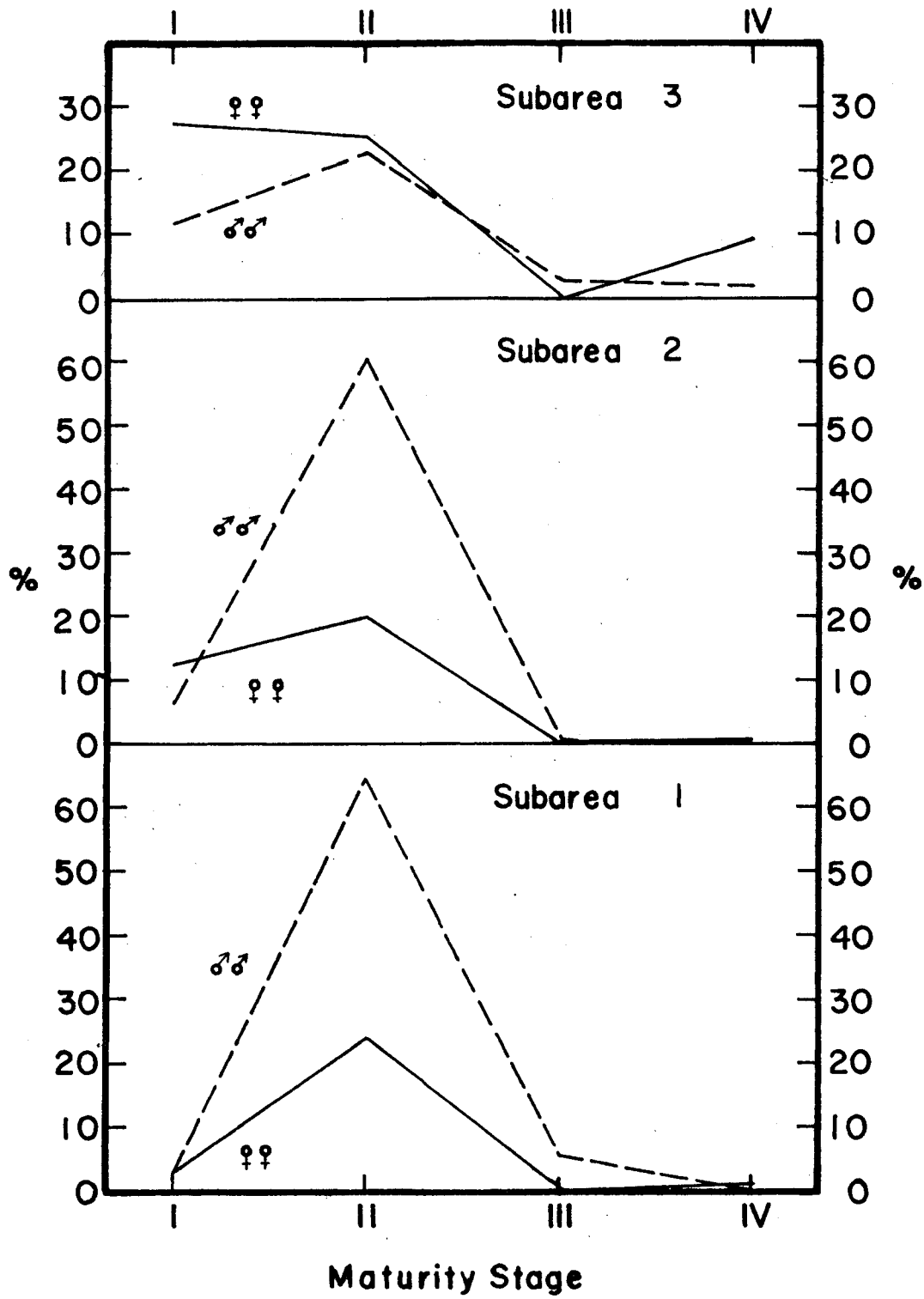

Fig. 3. Percentage of the sexes by maturity stages and subareas (Fig. 1 and Table 1). Material from November 1976.

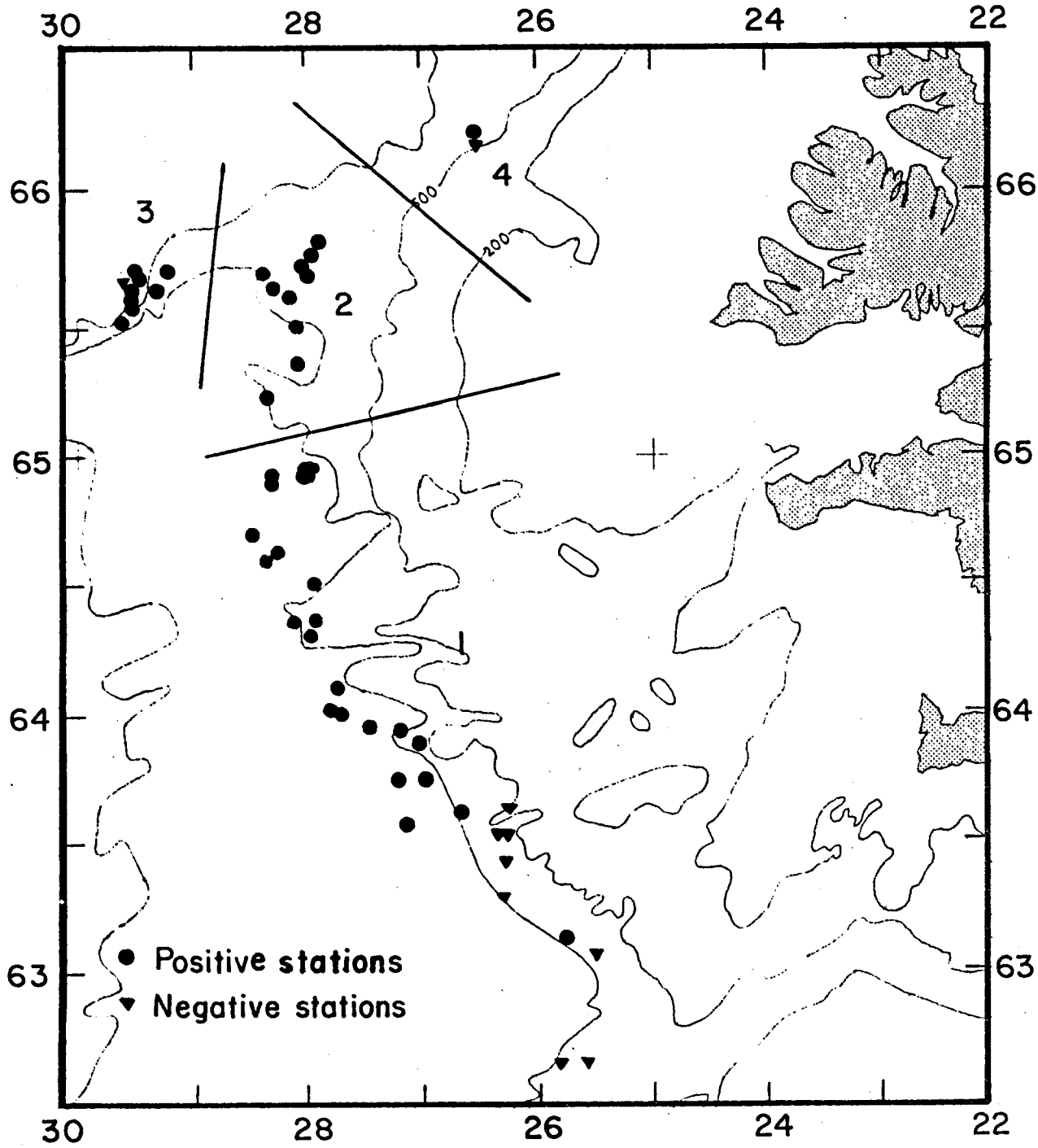

Fig. 4. Trawl stations taken in March 1977.
The area is divided into four subareas.

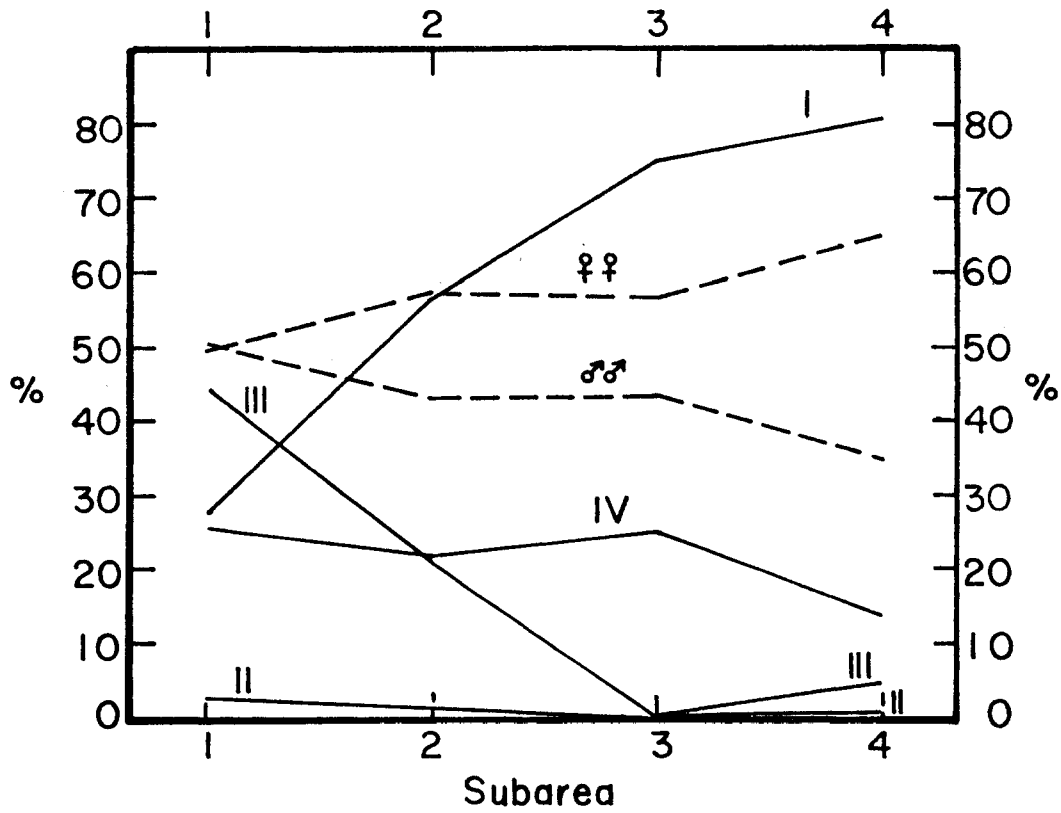

Fig. 5. Percentage of the sexes and the maturity stages I-IV by subareas (Fig. 4 and Table 2). Material from March 1977.

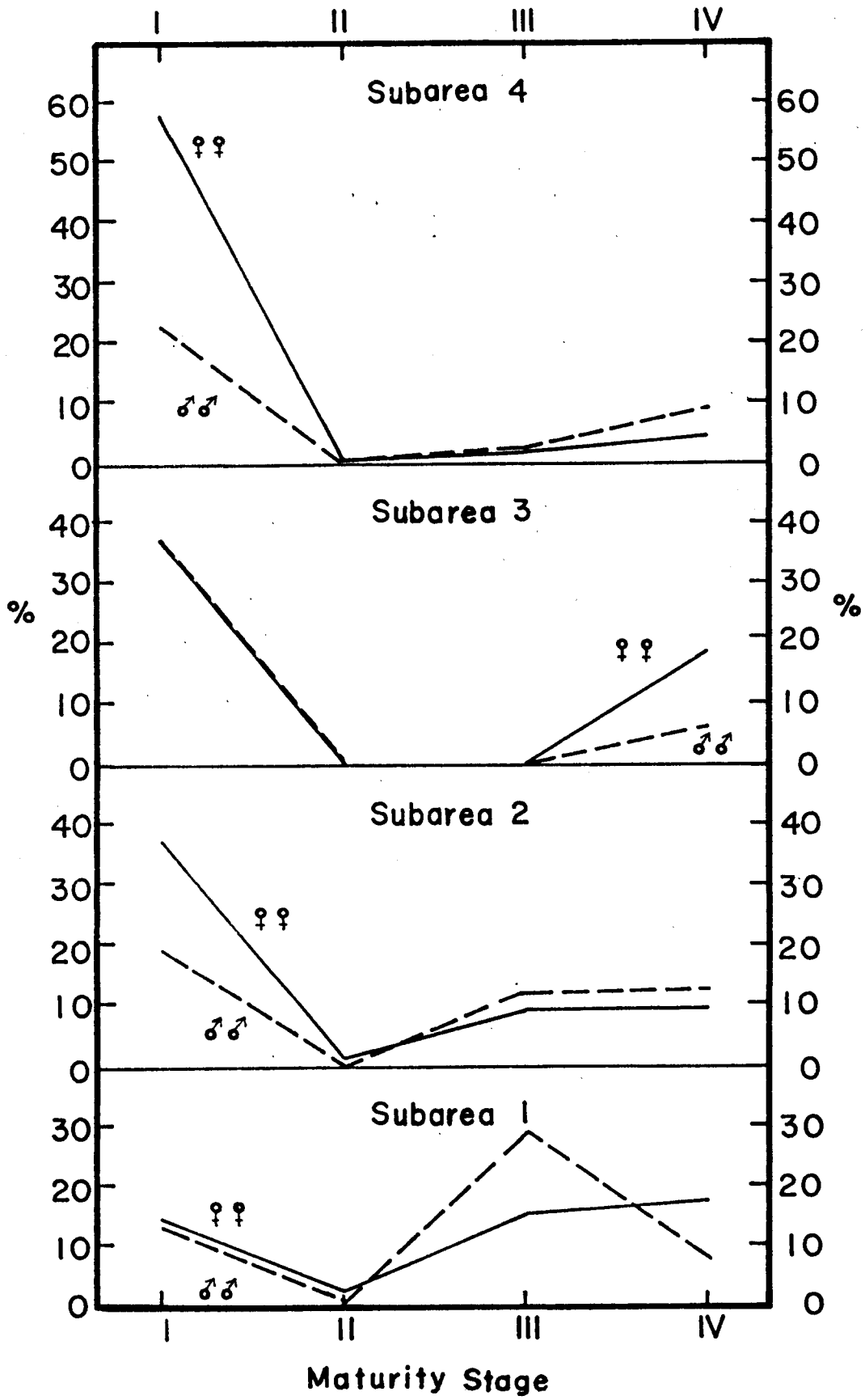

Fig. 6. Percentage of the sexes by maturity stages and subareas. Material from March 1977