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Norwegian investigations on the deep sea shrimp (Pandalus borealis) in West Greenland waters 1977

by

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1 Introduction

Due to the quota regulations, only 20 Norwegian vessels participated in the shrimp fishery in West Greenland waters in 1977, while 26 trawlers participated in 1976.

The main fishing area was as in 1976 the continental slope off Store Hellefiskebanke.

The fishing gear and technique was the same in 1977 as in previous years, and are described by Ulltang and Øynes (1976). The main fishing grounds are shown in Figure 1.

2 Investigations on the fishing grounds in 1977

From 25 June to 12 July one of the authors stayed on board the Norwegian shrimp trawler "Kap Farvel" as an observer. M/S "Kap Farvel" M206H is a stern trawler of 454 tons, with a length of 135 feet. "Kap Farvel" used only one type of trawl, a 1800 mesh Sputnik trawl, with a ground rope of 51 m. The mesh size in all trawls used were 43 mm. The trawl was taken in at the stern. The catch was dumped into a seawater tank which was dimensioned to take 4 tons of shrimps. On the top the tank had a hatch to float out the red fish and other floating fishes. Three sorting machines were used, two with 11.5 mm and one with 9 mm split, which sorted the shrimps into "large" and "small" and sorted out the discards.

Table 1 gives the data from the trawl hauls which were examined by the observer. The quantities of "large", "small" and discarded shrimps are given only in the cases when it was certain that there was no mixing of different hauls in the tank. The counting of the floating fishes was difficult due to the continuous outflowing through the top hatch.

The catch rates were relatively low at the time the observer stayed on board "Kap Farvel", and the trawler fleet moved searching from one area to another. The low catch rates were probably caused by the fact that the shrimps were in the "soft shelled" period. Low catch rates during such periods have regularly been observed in the Barents Sea. During the stay of the observer the "Kap Farvel" fished at the Disco bay area, the western slope of Store Hellefiskebanke and on the Sukkertoppen deep outside Godthaab. Altogether 51 hauls with a total catch of 45 734 kg. shrimp were examined.

3 Size composition of shrimps

During the stay of the observer M/S "Kap Farvel" fished on three different fishing grounds; off Disco, at the slope of Store Hellefiskebanke and at the Sukkertoppen Dyb. The size composition of the shrimps from the different grounds are shown in Table 2 and Figure 2.

The fishing gear used on board M/S "Kap Farvel" was the same type as used by the M/S "Pero" in 1976 (Ulltang and Øynes, 1976). The mesh size was in both cases 43 mm. M/S "Pero"'s catches consisted of two main size groups, one group of shrimps around 21-22 mm carapax length and another group around 26 mm carapax length. The latter group was the dominant one (Figure 2). This is not the case for the catches investigated in 1977 on board M/S "Kap Farvel". From Figure 2 it is seen that the main bulk of the shrimps both from Store Hellefiskebanke and the Sukkertoppen Dyb are of size around 22 mm carapax length. Off Disco the catches contained relatively more large shrimps.

Both in 1976 and 1977 only catches from one trawler during a period of less than a month were sampled. Due to this poor sampling covering of the catches, it is not possible to draw any firm conclusions from the observed difference in size composition of the shrimps from 1976 to 1977. A change in age composition of the stock should, however, be expected when the fishing mortality increases. If the observed change in size composition reflects a real change in age composition from 1976 to 1977, it may be an effect of increasing fishing mortality or natural variations in year class strength, or a combination of these two factors.

Figure 3 shows the length composition of "large", "small" and discarded shrimps. The length composition of the discards is also shown in Table 2.

The amount of discards was higher on board M/S "Kap Farvel" in 1977 than on M/S "Pero" in 1976. At the slope of Store Hellefiskebanke 1302 kg. of a catch of 6007 kg. of shrimps - or 21.7% - were discarded, and at the Sukkertoppen Dyb 1785 kg. of a total catch of 13 645 kg. were discarded (13.1%). On board M/S "Pero" in 1976 only 8.4% of the total catch were discarded.

The reason for the higher amount of discards in 1977 is probably that the machine which sorted out the discards on board M/S "Kap Farvel" had a split of 9 mm, and shrimps of 18-20 mm carapax length fell through this split. M/S "Pero" in 1976 used a split of 8.5 mm, and with this split most of the discards were soft shelled and crusted shrimps (Ulltang and Øynes, 1976).

4 Bycatches

Table 1 shows the bycatches in some trawl hauls from M/S "Kap Farvel" in June and July 1977. The fish are given as numbers of individuals and are exactly counted, except for the red fish where the numbers in some cases are given in estimated thousands. When no figure is given in one of the columns for fish, it means that there were no fish of the species. No fish were kept except those for consumption on board. The investigations on fish are made from a total catch of 32 759 kg. shrimps (discards not included).

Bycatches are small even compared to the catches taken by M/S "Pero" in 1976 (Ulltang and Øynes, 1976). Among approximately 104 tons of shrimps it was caught 7 454 fish on board M/S "Pero" in 1976. From a catch of approximately 33 tons M/S "Kap Farvel" caught only 1 441 fishes. As usual in shrimp trawling the redfish was the most numerous. Except for the stations at Sukkertoppen Dyb all the redfish were small (Figure 4). Only 124 cod were found in the catches from M/S "Kap Farvel". The number of cod caught per ton shrimp is less than half the number in 1976. On the northern stations (St. 1-4) the cod in Table 1 is Gadus Ogac.

The Greenland halibut was less numerous in 1977 than the year before, 2 400 were found in all. No fry of Greenland halibut was found in the catches of M/S "Kap Farvel".

The only fish which was more often found in 1977 than the year before was halibut, altogether 21 specimens.

A peculiar bycatch was a seal (Pusa hispida) caught 30 June in position N 67°41'W57°25'.

5 Catch and catch per unit of effort (CPUE)

Tables 3-5 show catch and catch per hour trawling by month and ICNAF Division for 1975, 1976 and 1977. A weighted average catch per hour trawling for each division for each year is also given, using the monthly catches as weighting factor. The 1977 data are not complete, as some logbooks had not been returned, and some fishing still was going on, at the time this analysis was carried out.

Also in 1977 has the highest CPUE been obtained in Division 1B (Holsteinborg Dyb and west of Store Hellefiskebanke), but with high variations from month to month as observed in previous years (Table 5). The highest CPUE was obtained in January - March. During this period the catch per hour was at the same level as in the first months of 1976 (Table 4). However, in 1976 the CPUE remained at that high level also in April - May, while in 1977 it was reduced to a lower level already in April.

Although the 1977 data still are incomplete, it may be concluded that the average CPUE in Div. 1B and 1C in 1977 will be somewhat lower than in 1976, probably more or less equal to the 1975 level. This would indicate that there have been no drastic changes in stock size during the period 1975 - 1977, apart from some temporary increase in 1976 according to the Norwegian data.

Reference

Ulltang, Ø. and Øynes, P. 1976 Norwegian investigations on the deep sea shrimp (Pandalus borealis) in West Greenland waters. ICNAF Res.Doc. 76/XII/155 [Mimeo]

Table 1. Total catch of shrimps and bycatch of fish from some trawl hauls made by M/S "Kap Farvel" at West Greenland in June/July 1977

St.	Date	Time	Position	Hauling period	Shrimp catch in kg.			Bycatch in nr. of individuals				
					Large	Small	Dis-cards	Total	Cod	Greenl. Hal.	Red fish	Others
1	26.6	0820	N68°13'W55°06'	2 hrs	308	66		374		75	145	34
2	"	1110	"	2 hrs	264	66		330	16	70	240	20
3	"	1350	N68°15'W54°40'	1 hr	132	22		154	4	21	114	7
4	"	1620	N68°09'W55°33'	1 hr	132	22		154	5	18	114	40
5	27.6	0655	N67°42'W57°04'	2 hrs 25 mins	780	240	122	1020		220	4000	120
6	"	0944	"	2 hrs 35 mins	530	240	100	770	Not counted			
7	"	1335	"	2 hrs 30 mins	300	130	200	430		107	2500	A few
8	"	1645	"	2 hrs 30 mins	600	290	400	890	Not counted			
9	28.6	0510	N67°13'W57°21'	2 hrs 20 mins	950	220		1170	3	159	3500	50
10	"	1020	"	2 hrs 10 mins	750	250		1000	Not counted			
11	"	1300	"	2 hrs 15 mins				800		92	5500	20
12	29.6	0635	"	2 hrs 15 mins	970	230	300	1200	3	378	5500	131
13	"	0935	"	2 hrs 15 mins	950	250		1200	Not counted			
14	"	1220	"	2 hrs 10 mins	770	220		990	2	135	6500	63
15	"	1510	"	2 hrs 10 mins	750	250		1000	Not counted			Split tr.
16	30.6	0845	N67°41'W57°25'	1 hr 40 mins	220	175	180	395		36	261	1
17	"	1050	"	2 hrs 10 mins	640	810		1450		112	344	1 seal
18	"	1325	"	2 hrs 5 mins	615	725		1340		109	361	7
19	"	1840	"	2 hrs	640	660		1300	Not counted			
20	2.7	0755	N64°15'W53°17'	3 hrs 10 mins	900	460	220	1360	2	118	178	1
21	"	1200	"	3 hrs	925	310		1235	3	98	361	46
22	"	1545	"	3 hrs 20 mins	840	290		1130	1	77	127	3
23	4.7	0745	"	3 hrs 10 mins	530	150		680	2	32	66	13
24	"	1140	N64°10'W53°15'	3 hrs 20 mins	725	240		965	5	31	173	19
25	"	1535	" W53°25'	3 hrs 30 mins	330	90		420	1	14	38	0
26	5.7	0645	N64°05'W53°10'	3 hrs 15 mins	750	250	150	1000	6	34	155	53
27	"	1030	"	3 hrs 10 mins	640	220		860	4	23	161	17
28	"	1420	"	3 hrs 30 mins	680	220		900	3	19	231	27
29	6.7	0545	N64°25'W53°10'	1 hr 30 mins	1200			1200	6	17	321	10
30	"	0855	"	1 hr 55 mins	350	110		460	1	7	410	17
31	"	1125	"	2 hrs	750	220		970	Not counted			
32	"	1410	"	2 hrs	440	130		570		9	1500	2
33	7.7	0815	N64°15' "	2 hrs 10 mins	530	150	100	600	4	18	231	A few
34	"	1105	N64°21'W53°15'	2 hrs 20 mins	1060	370	200	1430	2	77	200	4
35	"	1410	"	2 hrs 30 mins	500	200	150	700	Not counted			
36	8.7	0345	"	3 hrs 40 mins	810	200	200	1010	7	18	300	32
37	"	0750	"	3 hrs 10 mins	660	220	150	880		8	150	27
38	"	1135	"	2 hrs 40 mins	620	220		840		9	110	5
39	"	1450	"	3 hrs 25 mins	620	310	150	930		9	123	A few
40	9.7	0615	N64°20'W53°15'	3 hrs	920	180	200	1100	2	22	5000	49
41	"	0950	"	3 hrs 10 mins	840	220		1060	7	79	4000	164
42	"	1335	"	3 hrs 20 mins	730	260		990	Not counted			
43	10.7	0330	N64°19'W53°17'	3 hrs	900	220		1120	Not counted			
44	"	0705	"	3 hrs	620	150		770	20	34	2000	138
45	"	1030	"	3 hrs 10 mins	480	90		570	Not counted			
46	"	1415	"	3 hrs	620	180		800	8	11	1000	116
47	11.7	0515	N64°20'W55°19'	2 hrs 30 mins	726	286		1012	3	22	800	60
48	"	0845	"	3 hrs	1320	245	250	1565	Not counted			
49	"	1235	"	3 hrs	840	310	150	1150	2	54	2000	104
50	12.7	0720	"	3 hrs	480	110		590	2	29	2000	41
51	"	1055	"	3 hrs	680	220		900	Not counted			

Table 2 Length composition of shrimps caught by M/S "Kap Farvel" in June/July 1977.
Random samples from the catch and the discarded shrimps.

		Length (mm carapax)																									
		10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31				
Disco field	St 1			1	1				3	3	13	14	12	10	5	9	11	9	7	4							
	St 2						2	3	5	14	11	20	8	11	4	7	6	2	2	4	1						
	St 3						1	1	1	1	4	14	8	16	13	8	3	7	16	5	4						
	St 4								1	3	4	7	2	6	6	2	13	9	17	8	5						
Total				1	1	3	4	10	21	32	55	30	43	28	26	33	27	42	21	10					387		
%				0.3	0.3	0.8	1.0	2.6	5.4	8.3	14.2	7.8	11.1	7.2	6.7	8.5	7.0	10.9	5.4	2.6					100.01		
W. slope of Store Hellefiskebanke	St 5				2	6	7	10	12	11	5	8	5	8	6	6	4	3	5	2							
	St 7		1	3	3	5	14	14	7	4	6	9	7	2	5	6	13	5	5	1	1						
	St12		1	2	2	4	2	4	2	5	3	5	5	7	6	5	18	19	13	7	4			1			
	St16						1	1		2	7	11	14	29	15	5	4	3	4	3	1		1				
	St17						1		2	2	8	8	13	32	12	7	5	6	4				1				
St19	3		2			2	2	5	2	3	9	10	18	18	8	4	4	7	5	2							
Total		3	2	7	5	11	26	28	26	27	38	47	57	93	64	37	50	41	36	21	10	2	1	632			
%		0.5	0.3	1.1	0.8	1.7	4.1	4.4	4.1	4.3	6.0	7.4	9.0	14.7	10.1	5.9	7.9	6.5	5.7	3.3	1.6	0.3	0.2	99.9			
Sukker- toppen Dyb	St20					1		1	1	3	1	9	17	12	14	5	9	6	5	1							
	St26				1		1	1	2	2	3	5	7	16	19	10	9	7	12	6	1	2					
	St33			1		1	2	2	7	12	12	9	8	14	6	3	4	6	5	2	1		1				
	St38		2	1		3	2	3	4	5	9	18	6	18	11	6	3	2	5	3	3						
	St45						1	9	9	7	8	9	5	10	5	2	12	7	7	3	4						
Total		2	2	1	4	7	15	23	27	35	42	35	75	53	35	33	31	35	19	10	2	1	487				
%		0.4	0.4	0.2	0.8	1.4	3.1	4.7	5.5	7.2	8.6	7.2	15.4	10.9	7.2	6.8	6.4	7.2	3.9	2.1	0.4	0.2	100.0				
Discards	St 5			1		2	12	6	5	13	15	18	12	9	4	1	1	1									
	St12	1		8	4	4	7	6	7	10	16	12	13	4	5	1	1	1		1			1				
	St20		1					1	3	2	1	9	12	27	26	7	4	1	1								
	St26						2	6	3	6	13	21	25	15	2	1	2										
	St33			1		2	5	5	11	9	16	20	18	8	6												
	St38			1	1		1	3	8	5	16	21	19	14	3	1	1	2	1				1				
St45	1				1	1	4	6	5	11	20	21	14	4	1	4	3										
Total		2	1	11	5	9	28	31	43	50	88	121	120	89	50	12	13	8	2	1		2	686				
%		0.3	0.1	1.6	0.7	1.3	4.1	4.5	6.3	7.3	12.8	17.6	17.5	13.0	7.3	1.7	1.9	1.2	0.3	0.1		0.3	99.9				

Table 3. Catch and catch per hour trawling (CPUE), 1975

Month	ICNAF Division					Total catch reported from Subarea 1
	1 A Catch CPUE	1 B Catch CPUE	1 C Catch CPUE	1 D Catch CPUE	1 E Catch CPUE	
1			4 0.20	32 0.221		36
2		21 0.206	140 0.237	126 0.257		287
3		43 0.297	143 0.194	86 0.208	2 0.2	274
4		717 0.869	3 0.25	4 0.308		724
5		461 1.11	24 1.20			485
6		217 0.371	136 0.255	232 0.237		585
7		1485 0.504	116 0.208	86 0.396		1687
8		792 0.438		23 0.169	2 0.167	817
9	58 0.319	373 0.237	26 0.184	85 0.243		542
10	17 0.378	1425 0.657	10 0.156	82 0.225		1534
11		579 0.431		5 0.128		584
12		221 0.442				221
Unspeci- fied						902
Total	75	6334	602	761	4	8678
Weighted average CPUE	0.332	0.584	0.260	0.251		

Table 4. Catch and catch per hour trawling (CPUE), 1976

Month	ICNAF Division					Total catch 1)
	1 A Catch CPUE	1 B Catch CPUE	1 C Catch CPUE	1 D Catch CPUE	1 E Catch CPUE	
1		180 0.621	78 0.438	73 0.257		340
2		516 0.822	31 0.254	52 0.274		651
3		29 1.16	110 0.245	178 0.272		375
4		662 1.033	156 0.398	125 0.179		999
5		1684 1.328				1771
6		1032 0.603		1 0.167		1179
7		1269 0.471	14 0.259	8 0.421		1291
8		1573 0.376	2 0.2	2 0.2		1577
9		899 0.366		5 0.357		937
10		677 0.247		39 0.271	1 1	838
11	28 0.412	1190 0.265	1 0.111			1405
12		184 0.246		4 0.25		242
Total	28	9895	392	487	1	11605
Weighted average						
CPUE		0.622	0.345	0.249		
CPUE/CPUE						
76 75		1.065	1.323	0.992		

1) Includes catches not allocated to Division.

Table 5. Catch and catch per hour trawling (CPUE), 1977 (preliminary data).

Month	ICNAF Division						Catch Subarea 1	Catch Subarea 2
	1 B Catch CPUE	1 C Catch CPUE	1 D Catch CPUE	1 F Catch CPUE	2 H Catch CPUE	2 J Catch CPUE		
1	471 0.75	8 0.667	5 0.313	10 0.323			494	
2	805 0.752						805	
3	230 1.04		18 0.353				248	
4	292 0.458	10 0.250	32 0.274				334	
5	1737 0.490	2 0.167			18 0.581		1739	18
6	415 0.272	4 0.250	149 0.320				568	
7	506 0.412	90 0.223	330 0.262			11 0.262	926	11
8	152 0.304						152	
9	24 0.289						24	
Total	4632	114	534	10	18	11	5290	29
Weighted average CPUE	0.553	0.256	0.282					

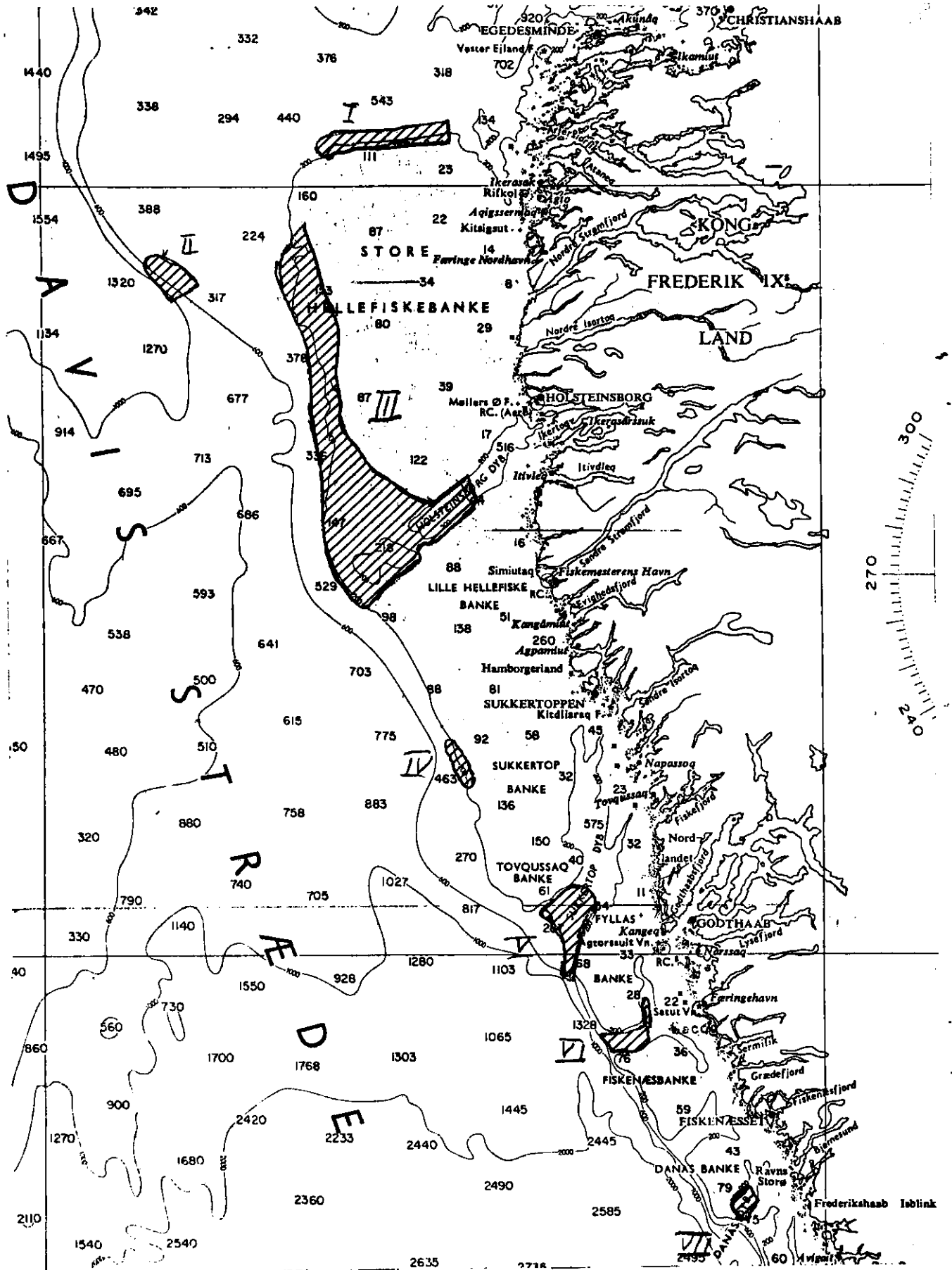


Fig. 1: The main areas fished by the Norwegian shrimp trawlers at West Greenland. I: Southwest of Disko Bugt. II and III: The slope of Store Hellefiskebanke and Holsteinsborg Dyb. IV: The slope of Sukkertop Banke. V: Sukkertop Dyb. VI: Godthåp Dyb. VII: Danas Dyb.

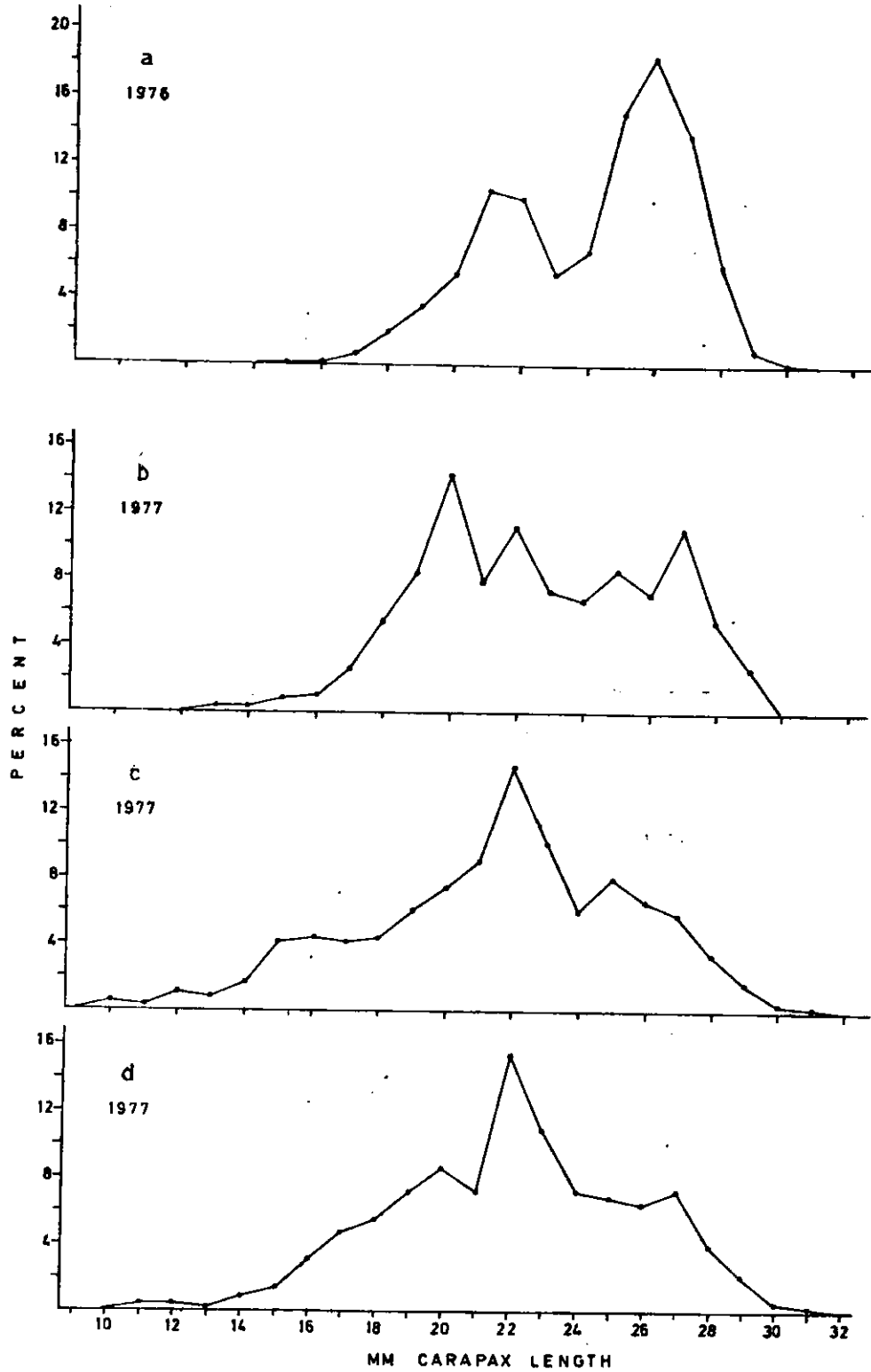


Figure 2. a; Length composition of shrimps caught by M/S "Pero" July/August 1976 at the slope of Store Hellefiskebanke.

b, c, and d: Length composition of shrimps caught by M/S "Kap Farvel" June/July 1977 off Disco (b), at the slope of Store Hellefiskebanke (c), and at Sukkertoppen Dyb (d).

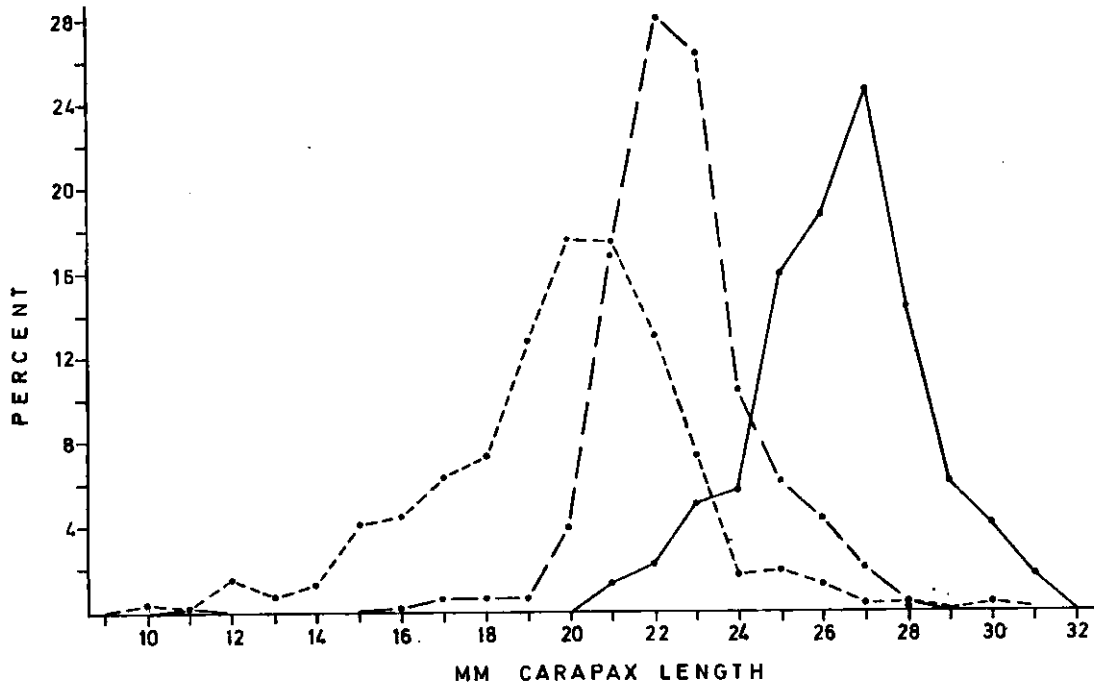


Figure 3. Length composition of "large", "small" and discarded shrimps caught by M/S "Kap Farvel" June/July 1977.

———— "large" shrimps
----- "small" shrimps
..... discards

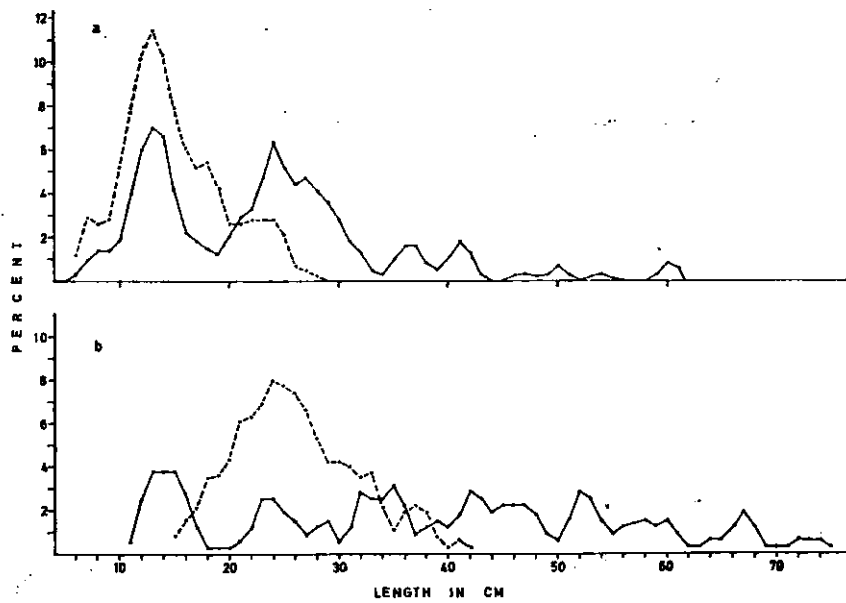


Figure 4. Length composition of bycatches of redfish (a) and Greenland halibut (b) caught by M/S "Kap Farvel" June/July 1977.

———— Sukkertoppen Dyb
----- Store Hellefiskebanke