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Data on the Shrimp Fishery in NAFO Subarea 1 in 1983 and 1984

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INTRODUCTION

The scientific advice for the total offshore catch of shrimp in NAFO Subareas 0 and 1 has been maintained at 29,500 tons per year since 1979, while nominal offshore catches have varied between 36,000 and 39,000 tons in the same years. For 1984 effective TACs have been set to 5,000 tons by Canada for Subarea 0, and 29,925 tons by the EEC for offshore Subarea 1. The Greenland offshore allocation was 28,215 tons.

In 1984 the nine trawlers of the Royal Greenland Trade Department have fished about 34% of the Greenland quota (by October). As has been the case since 1975 haul-by-haul logbook information and reports on landings covering the total activity of these trawlers in 1984 have been available to the Greenland Fisheries and Environmental Research Institute. The present paper updates earlier information compiled from the logbook data base with information on the distribution of the offshore shrimp fishery, on catch rates and on by-catches in 1983 and 1984. Also data on reported total catches by all nations fishing in Subarea 1 in these years is included. Information based on the analysis of 21 shrimp samples collected in the Davis Strait between $66^{\circ}N$ and $70^{\circ}30^{\circ}N$ in July and August 1984 during a photographic survey is presented.

MATERIAL AND METHODS

Total catches and numbers of vessels in the shrimp fishery in NAFO Subarea 1 were compiled by nation and month based on the obligatory weekly reportings to Greenland authorities by all vessels above 80 GRT. Logbook data from nine trawlers of the Royal Greenland Trade Department was analysed to show the overall distribution of hauls and monthly distribution of hauls and mean catch rates in 1983 and 1984.

Monthly mean catch rates in Division 1B from 1975 to October 1984 and the corresponding numbers of hours trawled were calculated from the logbook data base. Indices of mean catch rates for the July-September period used to evaluate the status of the shrimp stock in Division 1B in recent years were derived from the same data base, as were the levels of by-catches in the shrimp fishery in Subarea 1. Shrimp samples from a photographic research survey in the main distribution area of the offshore shrimp stock were sorted by stages of sexual development and measured to nearest 0.1 mm carapace length. Length-frequency diagrams were established to evaluate the occurrence of sexual stages in the shrimp stock.

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RESULTS AND DISCUSSION

Reported catches in 1983 and 1984.

Table 1 shows reported catches of shrimp in Subarea 1 by month and nation in 1983 and 1984, and Table 2 the corresponding numbers of reporting vessels. The reporting system covers vessels above 80 GRT. Offshore catches of smaller vessels can only be roughly estimated to about 3,200 tons in both years. Total offshore catches in 1983 and 1984 are thus about 34,000 and 35,200 tons respectively, these figures, however, not including a supposed unreported discard of shrimp from vessels processing the catch at sea. Reliable estimates of unreported discards can not be given, as they may vary over the year and from vessel to vessel depending on the quality and size composition of the catch and differences in processing methods.

Geographical distribution of the offshore fishery.

Figure 1 shows the distribution of shrimp fishing grounds in Subarea 1 offshore and the Disko Bay, based on available logbook data and information from the Disko Bay fishery.

Figure 2 and 3 show the distribution of hauls by eight trawlers of the Royal Greenland Trade Department in 1983 and 1984 (through October). As in 1982 - but different from 1980 and 1981 (Carlsson, 1981) - these trawlers did not exploit the fishing grounds in Division 1A. In both years the fishery concentrated in the northern and western slopes of the Store Hellefiske Banke, in the Holsteinsborg Deep and in the area off the main entrance to the Disko Bay. In 1984, however, an extensive fishery also was performed in the southern part of Division 1C.

Figure 4 shows the monthly distribution of number of hauls and mean catch of shrimp per hour from January 1983 through October 1984. In both years - as in 1982 (Carlsson, 1983) - severe ice conditions hampered the shrimp fishery in the main fishing area in the first months of each year. In 1984 no fishing occurred in Division 1B from January to March, and ice still hindered the access to parts of the fishing area through June.

Trends in catch rates.

Figure 5 shows the variation by month in mean catch rates from October 1975 through October 1984 in NAFO Division 1B based on logbook information and landings of seven trawlers (630-722 GRT) of the Royal Greenland Trade Department (Table 3 shows the corresponding numbers of hours trawled). In 1984, the spring peak catch rates were not as dominant as found in earlier years, due to ice hindering the fishery on spring concentrations of berried female shrimp in the main fishing area. From June to September the catch rates declined steadily as in earlier years.

Table 4 shows the mean catch rates by division and month in a south to north 7.5' latitude grid in 1983 and 1984 (through October),

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and Table 5 shows the corresponding numbers of hours trawled. The 'northward shift in the fishery throughout the year, as found in previous years (Carlsson, 1981), was not as evident in 1983 and 1984.

Comparison of catch rates between years in the Davis Strait fishery has been based on mean catch rate indices for the period July-September in Division 1B. CPUE indices for seven Greenland trawlers (630-722 GRT) from 1976 to 1984 are shown in Figure 6 based on the following figures:

	1976	1977	1978	1979	1980	1981	1982	1983	1984
Hours									
trawled	1,005	2,966	3,446	3,588	1,872	5,285	3,543	3,967	2,784
kg/hour	743	549	501	379	468	438	550	490	495
Index	1.00	0.74	0.67	0.51	0.63	0.59	0.74	0.66	0.67

CPUE indices for 1981-1984 may not be direct comparable to those of earlier years due to the introduction of more efficient gears from 1980 (Carlsson, 1983). Also the reduction in total catches in 1982-1984 in spring due to ice may have caused relatively higher abundance of shrimp later in the fishing season.

In Figure 8 is shown the variation in CPUE in the July-September period in 30⁻ latitude strips (see Figure 7) from 1976 to 1984. From 1982 to 1984, catch rates seem to have stabilized between 400-500 kg/hour in all block-strips.

By-catches in the shrimp fishery

Table 6 shows the reported by-catches from logbooks of the seven trawlers of the Royal Greenland Trade Department from 1976 to 1984 (through October) by division and species. Table 7 shows a break-down by month for 1983 and 1984. Although the by-catch level is still low compared to 1978 and 1979 figures, a slight increase has been reported in 1984 (from about 1% in 1981-1983 to 2.0% in 1984). The increase is based on higher catches of redfishes in Divisions 1B and 1C and may be due to a change in the geographical distribution of the fishery.

Biological samples

Figures 9-29 show length frequency distributions for shrimp samples from research trawl catches in July and August 1984 in the Davis Strait between $66^{\circ}N$ and $70^{\circ}30^{\circ}N$, Table 8 shows a more extensive break-down of the samples by stages of sexual development. Samples were collected at the stations in the photographic survey in 1984 (Kanneworff, 1985), where trawling was possible.

Similar to samples collected in 1983 (Carlsson, 1984) males were dominating in most samples, especially at the stations north of $69^{\circ}N$ (Figures 25-27 and 29). Both in 1983 and 1984 the sample from the Hare Island area (stat. unit LS 014 ~ Figure 28) was aberrant in showing many smaller males and juveniles, and a high proportion of the females being without roe, while many of those spawning in 1984 had spawned already at the sampling time. Samples from statistical units KP 440 (Figure 15), LD 439 (Figure 22), KX 007 (Figure 23), KZ 012 (Figure 24) and LS 014 (Figure 28) showed a relatively higher proportion of females than the other samples. Time has not allowed a more thorough analysis of the composition of samples by stages of sexual development for this paper.

CONCLUSIONS

The total offshore catch of shrimp in NAFO Subarea 1 is estimated to be above 35,200 tons in 1984 compared to about 34,000 tons in 1983. Actual catches may have been higher due to uncertainty regarding the amount of non-reported discards of shrimp.

The offshore fishery was distributed similarly in 1983 and 1984, except for a more extensive fishery with higher catch rates in Division 1C by Greenland trawlers. As in 1982 and 1983, the fishery was hampered by ice, especially in the first six months of 1984.

Mean catch rates in Division 1B in the July-September period for Greenland trawlers kept a stable level compared to 1982 and 1983. In a south to north grid of 30^{$^{\circ}$} latitude from 66^{$^{\circ}$}N to 69^{$^{\circ}$}N all mean catch rates in this period have stabilized between 400 and 500 kg per hour.

Reported by-catches in the shrimp fishery are still at a low level compared to earlier years, although a small increase in the by-catch of redfishes was reported in 1984.

Research shrimp samples from July-August 1984 showed similar trends in the relative abundance of stages of sexual development compared to samples from 1983.

REFERENCES

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- Carlsson, D. M., 1983. Data on the shrimp fishery in NAFO Subareas 0 and 1 in 1981 and 1982. NAFO SCR Doc. 83/I/8, Ser.No. N646.
- Carlsson, D. M., 1984. Data on the shrimp fishery in NAFO Subarea 1 in 1982 and 1983. NAFO SCR Doc. 84/1/9, Ser.No. N778.

Kanneworff, P., 1985. Biomass of shrimp (Pandalus borealis) in NAFO SA1 1 in 1981-1984 estimated by means of bottom photography. NAFO SCR Doc. 85/1/8. Table 1. Offshore catches of shrimp (tons) by nation and month in NAFO Subarea 1 by trawlers above 80 GRT as reported to Greenland authorities in 1983 (a) and 1984 (b).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
					a.	1983							
Greenland	20	173	137	665	3165	3388	4065	4497	2998	3123	3257	3498	28986
Denmark	-	-	-	-	-	42	67	-	-	-	33	259	401
Farce Islands	-	-	-,	-	42	84	29	-	-	166	154	-	475
Norway	~		-	-	-	35	402	80		-	-	-	517
France	-	-	-	-	-	-	100	318	-	-	-	-	418
Total	20	173	137	665	3207	3549	4663	4895	2998	3289	3444	3757	30797
					ь.	1984							
Greenland	17	65	770	2641	4649	4307	5957	3086	1738	2424	3427	1248	30329
Denmark	13	-	-	-	113	45	-	-	69	150		-	390
Farce Islands	-	-	-	-	-	57	54	-	1	100	120	51	383
Norway	-	-	-	-	113	58	266	17	-	-	-	-	454
France	-	-	-	-	-	-	60	183	161	-	-	-	404
Total	30	65	770	2641	4875	4467	6337	3286	1969	2674	3547	1299	31960

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Table 2. No. of vessels above 80 GRT by nation and month in the shrimp fishery in NAFO Subarea 1 as reported to Greenland authorities in 1983 (a) and 1984 (b).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
					a.	1983							
Greenland	2	4	2	. 10	24	26	27	27	26	28	31	30	34
Denmark	-	-		-	-	1	2	-	-	-	2	2	2
Farce Islands	-	-	-	-	2	2	1	-	-	3	3	_	- 5
Norway	-	-	-	-	-	1	4	3	-	_	_	· _	4
France	-	-	-	-	-	-	2	2	-	-	-	-	2
Total	2	4	2	10	26	30	36	32	26	31	36	32	48
					b.	1984							
Greenland	4	3	6	22	27	26	31	28	23	27	28	22	36
Denmark	2	-	-		1	. 1	-	-	1	1	-	-	2
Farce Islands	-	-	-	-		1	1	-	1	2	3	1	4
Norway	-	-	-	-	1	1	2	2	-	-	-	-	4
France	-	-		-	-	-	1	1	1	-	-	-	1
Total	6	3	6	22	29	29	35	31	26	30	31	23	47

Table 3.

• No. of hours trawled per month and year from October 1975 through October 1984 in NAFO Divisions 1A and 1B in the shrimp fishery of seven trawlers (630-722 GRT) of the Royal Greenland Trade Department.

Div.	Year	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1A	1975	_	-	-	-	-	-	-	-	-	-	-	-	D
	1976	-	••	-		-	-	2	-	-	-	-	-	2
	1977	-	-	-	-	-	-	-	4	58	-	-	-	62
	1978	-	-	-	-	-	-	-	10	-	-	-	100	110
	1979	77	-	-	91	· 65	143	-	-	-	-	-	-	376
	1980	39	118	93	46	70	979	171	199	255	319	-	-	2289
	1981	187	-	13	71	369	178	66	209	82	72	-	19	1266
	1982	6	-	-	-	6	-	35	14	-	20.	25	-	106
	1983	-	-	-	-	5	-	13	20	5	24	9	-	76
	1984	-		~	34	45		3	-	-	7			89
Div.	Year	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
18	1975	-	-	-	-	-	-	-	-	-	50	331	183	564
	1976	12	-	-	-	7	252	326	309	370	329	-	-	1605
	1977	104	84	245	391	643	839	874	1053	1039	1297	1293	957	8819
	1978	233	-	-	13	948	1209	1226	1326	894	1282	1199	626	8956
	1979	27	18	823	752	991	972	1191	1521	876	911	922	891	9895
	1980	771	627	685	670	1330	131	469	822	581	254	-	-	6340
	1981	857	172	366	729	1059	1167	1915	1816	1554	1436	1254	692	13017
	1982	169	-	-	220	711	1001	1301	1302	940	1258	684	13	7599
	1983	-	-	-	15	1032	1184	1244	1307	1416	1452	819	50	8519
<u>.</u>	1984	-	-	3	543	1936	1846	1851	602	331	1311			8423

Table 4. Mean catch of shrimp (kg/hour) by month in 1983 and 1984 in NAFO Subarea 0+1 in the shrimp fishery of eight trawlers (473-722 GRT) of the Royal Greenland Trade Department in a south to north grid (7.5 minutes latitude scale, see Fig. 2).

Div.	8301	8302	8303	8304	8305	8306	8307	8308	8309	8310	8311	8312	8401	8402	8403	8404	8405	8406	8407	8408	8409	8410
OA KP	· -	-	-	-	-		-	-	-	-	-	~	-	-	-	-	-	-	162		73	-
1A LV	-	-	-	-	-	~	-		-	-	-	-	-	-	-	-	~		356	-	-	-
LT	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	92	<u>.</u>	-	-
LF	-	-	-	-	-	-				600		-	-	-	-	-	-	-		-	-	-
LE	-	-	-	-	275	-	664	511	472	428	589	-	-	-	-	1200	488	-	585	-	-	579
18 LD	-	-	-	-	600	1273	340	600	352	413	386	-	-	-	-	712	449	400	365	-	-	374
145	-		-		029	602	207	595	209	4/2	432	-		-	_	515	474	234	440	-	_	345
K7.		-	_	_	787	554	588	549	427	512	542	_	_	_	_	740	412	928	108	343	367	202
ĸx	-	-	-	1494	774	463	465	474	399	395	486	-	-	-	-	710	571	822	503	533		275
KV	-	-	-	351	854	543	367	393	404	487	519	-	-	-	-	_	709	512	329	375	319	439
KT	-	-	-	-	261	427	444	398	297	298	580	· •	-	-	-	0	520	354	340	528	318	267
KS	-	-	-	-	-	648	613	311	60	175	200	-	-	-	-	-	-	715	470	613	361	270
KR	-	-	-	-	-	647	676	494		-		-	-	-	-	-		708	475	389	40	329
RP .	-	-	-	-	-	612	693	406	264			-	-	· +	-	-	723	707	492		243	338
KN XX	-	_	-	-	205	710	530	200	281	232	217	-	-	-	-	-	692	641	477	458		558
ND NT	-	-	-	-	200	209	642	455	200	300	673	202	-	-	-	_	233	508	230		302	226
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KJ	-	-	-	-	253	150	664	73	55	280	171	145	-	-		-	705		1063	203	165	- *'_
KH	-	-	-	-	161	-	<u> </u>	171		-	178	26	-	-	_	-	1315	-	192	-		1620
KG	-	-	-	-	0	-	-	-	14	-	251	*	-	-	-	-	362	0	_	-	-	
· KF	-	-	-	-	0	225	-	-	-	-	-	36	-	-	-	-	872	0	950	-	-	
KE	-	-		-	0	-			-	-	185	-	-	~	-	745	438	-	-	-	260	175
KD	-	-	-	-	537	364	430	591	186		274	107	-	-	- 88	602	703	1226	588	374	44	284
KB	-	-	. =	-	546	837	484	361	295	252	72	320	-	-	-	870	577	1103	566	502	424	159
1C KA	-	-	-	998	301	1049	746	493	329	257	338	411	-	-	• • •	802	487	275	457	477	336	239
J2 TV	-			1008	453	522		-	408	250	424	741		_		942	400	120	12	619	319	300
JTV.	_	-	_	_	154		_	_	_	298	66	517	-			_		200	_	54	305	110
JT	-	~	-	_		-	-	-	-		128	349		-	· _	508	150	415	293	_	375	476
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·JR	-		-	-	~	-	-	-	-	-	-	697	-	-	· -	1013	-	1161	634	-	382	682
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JG	-	-	-	-	-	-	-	-	-	-	-	-	147	-	674	710	0	1068	595	546	113	267
JF	-	-	-	-	-	-	-	-	-	-	-	-	-	• 0	611	643	-	-	654	435	-	248
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Table 5.

No. of hours trawled by month in 1983 and 1984 in NAFO Subarea 0+1 in the shrimp fishery of eight trawlers (473-722 GRT) of the Royal Greenland Trade Department in a south to north grid (7.5 minutes latitude scale, see Fig. 2).

Div.	l	8301	8302	8303	8304	8305	8306	8307	8308	8309	8310	8311	8312	B401	8402	8403	8404	8405	8406	8407	8408	8409	8410
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Table 6.	Reported by-catches (tons) in the shrimp fishery from 1977 to	
	1984 in NAFO Subarea 0 and 1 by eight trawlers (473-722 GRT) of	
	the Royal Greenland Trade Department and a comparison with the	
	corresponding total shrimp catches.	

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	Species .	1977	1978	1979	1980	1981	1982	1983	1984
Div OA	Redfishes	4.2	9.2	132.7	106.9	0.1	0.3	-	-
	Others		-	-		-	-	-	-
- 1A	Redfishes	0.1	4.1	5.8	18,3	0.6	-	-	0.6
	Others	-	-	-	-	· , -	-	-	-
- 1B	Redfishes	102.3	1035.5	903.8	360.1	63.4	27.6	39.8	134,6
÷	Others	1.2	19.9	8.4	1.6	-	21.0	-	0.2
- 1C	Redfishes	2.8	15.6	39.3	40.4	6.9	5.6	29.1	35.1
	Others	4.2	-	, 1-4	20.5	-	· –	-	0.6
- 1D	Redfishes	-	• -	-	-	-	-	-	2.3
	Others	-	-	-	-		- ,	-	-
SA 0+1	Redfishes	109.4	1064.4	1081.6	525.7	71.0	33.5	68.9	172.6
	Others	5.4	19.9	9.8	22.1		21.0	-	0.8
-	Total								
	bycatch	114.8	1084.3	1091.4	547.8	71.0	54.5	68.9	173.4
-	Total								
	shrimp catch	5503	4703	6605	8484	9239	6946	6228	8765
-	Bycatch in			16.5	<i></i>				
	s or total shrimp catch	<i></i>	23.1	10.5	6.5	0.8	0.8	1.1	2.0

Table 7. Reported by-catches (tons) by species and month in 1983 and 1984 in the shrimp fishery in NAFO Subarea 0 and 1 by eight trawlers (473-722 GRT) of the Royal Greenland Trade Department and a comparison with the corresponding shrimp catches.

	•		8301	8302	8303	8304	8305	8306	8307	8308	8309	8310	8311	8312	8401	8402	8403	8404	8405	8406	8407	8408	8409	8410
Div	1A	Redfishes	-	-	-	-	-	****	-	-	-	-	-	-	-	-	-	-	-	-	0.6	-	-	-
-	1B	Redfishes Cod	-		-	-	7.3 -	5.5	5.3	5.5	6.4 -	6.0	0.3 -	3.5	-	-	-	2.3	25.3	39.9 -	38.8 -	13.0	7.4	7.9 0.2
•	1C	Rodfishes	-	-	-	0.6	1.9	0.1	0.1	0.5	1.0	1.2	5.7	18.0	-	-	1.9	3.5	2.6	6.4	7.1	3.3	2.4	8.0
-	10	Redfishes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.7	0.1		-	-	-	-	-
SA	0+1	Redfishes Cod		-	-	0.6 -	9 . 2 -	5.6	5.4	6.0 -	7.4	7.2	6.0	21.5	-	-	2.5 0.6	5.9	27.9	46.3	46.5	16.3 -	9.8 -	17.4 0.2
	-	Total bycatch	-	-	-	0.6	9.2	5.6	5 . 4	6.0	7.4	7.2	6.0	21.5		-	3 . 1	5.9	27.9	46.3	46.5	16.3	9 . 8	17.6
	-	Total shrimp catch	5	-	-	128	978	954	943	787	685	709	631	408	8	74	882	1423	1573	1716	1533	676	254	626
SA 0+1	B Q	Dycatch in of total phrimp catch	0	-	-	0.5	0.9	0.6	0.6	0.8	1.1	1.0	1.0	5.3	٥	0	0.4	0.4	1.8	2.7	3.0	2.4	3.9	2.8

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Table 8.

 Composition by stages of sexual development (in number of specimens) of samples of <u>P. borealis</u> from the photographic survey in the Davis Strait in 1984.

S	tation	Area	Numb	er of	spe	cimens	in	groups			Tot	als		
1	no.	code	1	2	3	4	5	6	7	8	Mal.	Tran	Fem.	All
T														T
1	6713	KA 0 1 1	398	0	78	6	82	0	0	1	398	78	89	565
1	6714	KB008	36	Ο,	2	0	5	0	0	0	36	2	5	43
1	6716	KF 008	36	0	1	0	1	0	0	0	36	1	1	38
Ι	6719	KR006	831	2	31	51	65	0	1	1	831	33	118	982
Į.	6720	KR004	1038	0	90	4	46	0	0	2	1038	90	52	1180
1	6721	KN003	911	6	29	17	74	0	0	0 1	911	35	91	1037
Ì	6722	KP440	427	1	144	21	182	0	0	3	427	145	206	778
1	6723	KL006	100	1	4	1	34	0	0	0	100	5	35	140
	6724	KT001	762	1	81	2	38	0	0	0	762	82	• 40	884
ł	6725	KT437	757	0 '	82	20	52	0	0	0	757	82	72	911
Ì	6726	KX438	669	0,	53	7	31	0	0	2	669	53	40	762
Ι	6728	KZ002	367	0	23	10	38	0	· 0	2	367	23	50	440
1	6729	LB005	439	0	49	13	76	0	5	3	439	49	97	585
l	6733	LD439	141	0	52	36	132	0	3	16	141	52	187	380
1	6734	KX007	207	0	72	15	95	0	4	5	207	72	119	398
1	6737	KZ012	159	0	45	25	217	0	15	15	159	· 45	272	476
1	6738	LD012	718	1	58	6	36	0	76	21	718	59	139	916
	6739	LG017	868	0	2	49	8	0	57	4	868	2	118	988
	6740	LH014	862	2	1	28	3	0	52	10	862	3	93	958
1	6746	LS014	290	6	40	124	45	0	102	10	290	46	281	617
Ţ	6749	LJ011	1150	1	6	5	2	0	31	8	1150		46	1203

Group 1. Juveniles and males. - 2. Transitionals without roe. - 3. Transitionals with head roe. - 4. Females without roe. - 5. Females with head roe. - 6. Females, berried, with head roe. - 7. Females, berried. - 8. Females with egg hairs.



Figure 1. Distribution of shrimp fishing grounds in the offshore areas at West Greenland and in the Disko Bay based on logbook recordings and other information.



Figure 2. Distribution of hauls in 1983 in the shrimp fishery of seven trawlers (473-722 GRT) of the Royal Greenland Trade Department in NAFO Subarea 0 and 1 between 64[°]N and 72[°]N.



Figure 3. Distribution of hauls in 1984 in the shrimp fishery of eight trawlers (473-722 GRT) of the Royal Greenland Trade Department in NAFO Subarea 0 and 1 between 64[°]N and 72[°]N.

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Figure 4. Distribution of effort and mean catch of shrimp per hour in January 1983 in NAFO Subarea 1 in the shrimp fishery of seven trawlers (473-722 GRT) of the Royal Greenland Trade Department. Upper figure in each statistical is no. of hauls, lower figure the mean catch rate (kg/hour).

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Figure 4. Continued. April 1983.

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- 15 -



Figure 4. Continued. May 1983.

- 16 -



Figure 4. Continued. June 1983.



Figure 4. Continued. July 1983.



Figure 4. Continued. August 1983.

- 19 -



Figure 4. Continued. September 1983.

- 20 -



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Figure 4. Continued. October 1983.

- 21 -



Figure 4. Continued. November 1983.

- 22 -



Figure 4. Continued. December 1983.



Figure 4. Continued. January 1984.

- 24 -



Figure 4. Continued. February 1984.



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Figure 4. Continued. March 1984.

- 26 -



Figure 4. Continued. April 1984.

- 27 -





- 28 -







Figure 4. Continued. July 1984.

- 30 -



Figure 4. Continued. August 1984.



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Figure 4. Continued. September 1984.



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Figure 4. Continued. October 1984.

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Figure 5. Monthly mean catch rate of shrimp (kg/hour) in NAFO Division 18 from October 1975 to October 1984 based on logbook information and landings from seven trawlers (630-722 GRT) of the Royal Greenland Trade Department (corresponding no. of hours trawled are given in Table 3).



Figure 6. Indices of mean catch rates for the period July-September by year in NAFO Divison 1B from 1976 to 1984, based on logbook information and landings of seven trawlers (630-722 GRT) of the Royal Greenland Trade Department. Indices are calculated relative to the mean catch rate for the period in 1976.



Figure 7. Map showing block-strips used in Figure 8.

BLOCKSTRIP-CPUE 1976-1984





3. Mean catch rates (kg/hour) of shrimp for the period July-September in block-strips in NAFO Division 1 from 1976 to 1984, based on logbook information from eight trawlers (473-722 GRT) of the Royal Greenland Trade Department. Curve no.s refer to blockstrips shown in Fig. 7.





Figure 9. Length-frequency distribution of <u>P.</u> borealis in a research shrimp sample from statistical unit KA011 in July 1984.



Figure 10. Length-frequency distribution of <u>P.</u> borealis in a research shrimp sample from statistical unit KB008 in July 1984.

SHRIMP SAMPLE WEST GREENLAND KB008 JULY 1984



Figure 11. Length-frequency distribution of <u>P. borealis</u> in a research shrimp sample from statistical unit KF008 in July 1984.







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Figure 13. Length-frequency distribution of <u>P. borealis</u> in a research shrimp sample from statistical unit KR004 in July 1984.





Figure 14. Length-frequency distribution of <u>P. borealis</u> in a research shrimp sample from statistical unit KN003 in July 1984.



Figure 15. Length-frequency distribution of <u>P. borealis</u> in a research shrimp sample from statistical unit KP440 in July 1984.





Figure 16. Length-frequency distribution of <u>P. borealis</u> in a research shrimp sample from statistical unit KL006 in July 1984.

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Figure 17. Length-frequency distribution of <u>P. borealis</u> in a research shrimp sample from statistical unit KT001 in July 1984.





Figure 18. Length-frequency distribution of <u>P.</u> borealis in a research shrimp sample from statistical unit KT437 in July 1984.

- 41 -SHRIMP SAMPLE WEST GREENLAND KX438 JULY 1984



Figure 19. Length-frequency distribution of <u>P. borealis</u> in a research shrimp sample from statistical unit KX438 in July 1984.





Figure 20. Length-frequency distribution of <u>P. borealis</u> in a research shrimp sample from statistical unit KZ002 in August 1984.





Figure 21. Length-frequency distribution of <u>P.</u> <u>borealis</u> in a research shrimp sample from statistical unit LB005 in August 1984.

SHRIMP SAMPLE WEST GREENLAND LD439 AUGUST 1984



Figure 22. Length-frequency distribution of <u>P. borealis</u> in a research shrimp sample from statistical unit LD439 in August 1984.







SHRIMP SAMPLE WEST GREENLAND KZ012 AUGUST 1984



Figure 24. Length-frequency distribution of <u>P. borealis</u> in a research shrimp sample from statistical unit KZ012 in August 1984.

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Figure 26. Length-frequency distribution of <u>P. borealis</u> in a research shrimp sample from statistical unit LG017 in August 1984.





Figure 27. Length-frequency distribution of <u>P. borealis</u> in a research shrimp sample from statistical unit LH014 in August 1984.

SHRIMP SAMPLE WEST GREENLAND LS014 AUGUST 1984





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Figure 29. Length-frequency distribution of <u>P. borealis</u> in a research shrimp sample from statistical unit LJ011 in August 1984.