

Northwest Atlantic



Fisheries Organization

Serial No. N946

NAFO SCR Doc. 85/I/12

SCIENTIFIC COUNCIL MEETING - JANUARY 1985

Data on the Shrimp Fishery at East Greenland in 1984 Compared to Earlier Years

by

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INTRODUCTION

In 1984 the total reported catch of shrimp in the Greenland part of the Denmark Strait was 5,930 tons, above the regulatory TAC of 5,245 tons and the advised TAC for the Denmark Strait area - including fishing grounds on the Icelandic side of the mid-line - of 4,200 tons.

Except for a Faroese catch of less than 100 tons in November and December the fishery was confined to the period from January to May.

In 1984 logbook data from only one trawler fishing at East Greenland from January to March has been available to the Greenland Fisheries and Environment Research Institute. An observer was onboard the trawler in February and March for gathering of information on the commercial fishery and sampling of shrimp from the catches.

The present paper updates the information given by Carlsson (1983, 1984) on catches and analysis of commercial fishery data including shrimp samples.

MATERIALS AND METHODS

Total catches and numbers of vessels in the shrimp fishery were compiled by nation and month based on the obligatory weekly reportings to Greenland authorities by all vessels above 80 GRT. Logbook data from one trawler fishing from January to March was analysed to show the overall distribution of hauls and catches in 1984 and monthly distribution of catches, hauls and mean catch rates. Monthly mean catch rates from 1980 to March 1984 were calculated from logbook data available, together with rates of by-catches. Information on fishery, on environmental conditions and on by-catches and discards was extracted from an observer's report. Shrimp samples from the commercial fishery were sorted by characteristics of sexual development and carapace length was measured to nearest 0.1 mm to establish length-frequency distributions.

RESULTS AND DISCUSSION

Reported catches in 1983 and 1984.

Table 1 shows reported catches of shrimp by nation and month in 1983 and 1984, and Table 2 the corresponding numbers of reporting vessels. Due to rough environmental conditions and the distance from the fishing grounds to port facilities vessels smaller than 80 GRT are assumed not to join the fishery, and the tables should therefore represent the total shrimp fishery.

Except for a minor fishery by one Faroese trawlers in the last two month of 1984 the fishery this year was confined to the period from January to May, when national allocations were exhausted. This may be explained by the highest catch rates being obtained early in the year and the closure of the most important shrimp fishing grounds at West Greenland in the first five month of the year due to ice, similar to the situation in 1983. As in 1983 the total monthly catch was greatest in March, while the highest number of vessels in the fishery was found in April.

Geographical distribution of the fishery.

Figure 1 shows the extent of the shrimp fishing grounds in the Denmark Strait on the Greenland side of the mid-line to Iceland, based on available logbook information. According to an observer's report the bottom is generally even with soft mud in the areas fished in 1984 (i.e. in the southern part of the main fishing area - see Figure 1 and 2), but otherwise no information is available on the distribution of bottom types. Trawlable bottom with shrimp in fishable quantities may well be present off the fishing grounds shown in Figure 1, as ice may hinder the access to certain areas throughout the year.

For 1984 logbook data from only one trawler (fishing from January to March) is available. Figure 2 shows the distribution of hauls by statistical units, all located in the southern fishing ground, and Figure 3 the distribution of total catches. Figure 4a-c gives the distribution of hauls and mean catch rates by month, showing that the fishery in January and February was confined to very limited areas, whereas it was more spread out in March, high catch rates however still being obtained in confined areas. According to the observer's report, covering the period from the end of February to the mid of March, ice was a general problem to the fishery, hindering the acces to more northern areas. The fishing activity was highest around statistical unit KA113 and took place close to the ice border or in drift ice areas. Unit JT108 and JT110 were fished only due to problems with ice north of and around KA113.

Catch and effort.

The highest total catch reported in the available logbook data was obtained around statistical unit KA112 (Figure 2), where also the highest mean catch rates throughout the months covered are found. Table 4 shows the mean catch rates of shrimp by month in a south to north grid (7.5 minute latitude scale) based on logbook data from 1980 to 1984, Table 5 the corresponding numbers of hours trawled. As in 1983, the poor data for 1984 does not show the northward shift in the fishery throughout the year that was found in 1980, but the decline in catch rates is evident as in earlier years.

Figure 5 shows the monthly mean catch rates based on logbook

data in the main fishing area (Carlsson, 1984), updated with data from 1984. The peak catch rates found in earlier years early in the fishing season are present again in 1984, reaching almost the level of 1980, when the East Greenland fishery began, but being confined to January and with a steep decline through February and March to the mean levels found in 1982 and 1983. As the data comes from vessels of varying sizes through the years, caution should however be taken when evaluating the absolute values. Furthermore, as ice throughout the years to a varying degree has hindered the access to parts of the fishing grounds, the distributional pattern of concentrations of berried females, on which peak catch rates are obtained, is uncertain. The obvious influence on shrimp abundance of the fishery may therefore be confined to only a part of the total stock.

By-catches and discard of shrimp.

By-catches reported in the available logbook data are shown in Table 6 and compared to logbook-catches of shrimp. The by-catch rate varies considerably in the data, as does species composition. In 1984 redfishes are reported in greater quantities than in earlier years. According to the observers report the by-catch is dominated by small redfishes (10-15 cm total length), while other species are occurring in small but varying amounts. Other species seen are Greenland halibut, rays, eel pouts, American plaice, blue whiting, spotted catfish, sculpins, and capelin. It has not been possible to the observer to quantify by-catch amounts.

While discards of shrimp is considered a major problem in estimating the total catches of shrimp in the West Greenland fishery, discards of shrimp at sea is assumed to be negligible at East Greenland, first of all due to the bigger mean size of shrimp. The observer reports only minimal discards. As the type of processing shrimp catches vary from vessel to vessel, discarding habits may - however - be different in other trawlers.

Biological samples.

A length-frequency diagram for 19 samples of Pandalus borealis pooled from statistical units KA112-KA113 in February 1984 is shown in Figure 6, and frequencies for two samples from statistical units JT108 and JT110 in March are shown in Figure 7 and 8 respectively. Table 7 gives a more detailed description of composition of the samples by stages of sexual development. As mentioned above the commercial fishery concentrated in KA112 and KA113 at the time when the February samples were taken. The samples (Figure 6) were dominated by females ranging in size from 24 to 34.5 mm carapace length. However, 26.2% of the shrimps were males (from 16.5 to 28 mm carapace length), showing that an unusual large proportion of the commercial catches at that time were males. The sample from JT108 also showed a large proportion of males (32.4%), while the sample taken at little further to the east two days later contained only 4.6% of males. In commercial samples from the southernmost part of the main fishing area (FS112 and FT112) taken in April 1983 males were totally absent (Carlsson, 1984). In the 1984 samples only a small proportion of the transitionals did not show early development of head roe. In the March sample 89.1% of the females were berried, while 10.4% were unberried but showed early development of head roe.

CONCLUSIONS

Reported catches of shrimp in 1984 from the Greenland part of

the Denmark Strait totalled 5,390 tons, which is the highest catch figure since the fishery started in 1980. As in 1983 41 vessels joined the shrimp fishery, i.e. with a (reported) mean catch rate of little more than 100 tons per vessel. The fishery mainly took place from January to May, when all national allocations except the Faroese were exhausted.

In January to March fishing was concentrated in the southern parts of the main fishing area, as ice hindered the access to more northern areas. Ice is in general a problem to the fishery.

In 1984 peak catch rates were obtained in January, almost reaching the level of 1980 peak catch rates, but with a steep decline through the following months. The decline is assumed to reflect the impact of the fishery on shrimp abundance in the limited areas available to the fleet, but an overall view of stock distribution and abundance can not be obtained due to the ice covers.

Reported by-catches in the East Greenland shrimp fishery varies in species composition and amounts, redfishes being the most abundant species in the 1984 data.

An observer's report from the 1984 fishery confirms that discarding of shrimp is minimal in this fishery.

Biological samples from the commercial fishery showed an unusual large proportion of male shrimp in the commercial catches at the end of March. Between 80 and 90% of all females in the samples were berried, most of them showing early development of head roe in preparation for the next spawning season.

REFERENCES

Carlsson, D.M., 1983. Data on the shrimp fishery at East Greenland, 1980-82. NAFO SCR Doc., No. 83/I/9, Ser.No. N647.

Carlsson, D.M., 1984. Data on the shrimp fishery at East Greenland in 1983 compared to earlier years. NAFO SCR Doc., No. 84/I/5, Ser.No. N774.

Table 1. Catches of shrimp (tons) at East Greenland by nation and month 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	156	-	905	303	94	9	-	-	-	-	-	-	1467
Denmark	-	-	38	166	-	-	-	-	-	-	-	-	204
Faroe Islands	-	-	185	122	63	73	-	-	-	-	-	-	443
Norway	-	-	50	329	309	426	22	197	105	157	132	-	1727
France	-	-	-	79	121	73	-	-	-	-	-	-	273
Total	156	-	1178	999	587	581	22	197	105	157	132	-	4114
b. 1984													
Greenland	353	470	1146	191	90	-	-	-	-	-	-	-	2250
Denmark	284	102	-	57	-	-	-	-	-	-	-	-	443
Faroe Islands	-	220	193	163	-	-	-	-	-	-	43	49	668
Norway	-	37	629	664	798	-	-	-	-	-	-	-	2128
France	-	-	17	230	194	-	-	-	-	-	-	-	441
Total	637	829	1985	1305	1082	-	-	-	-	-	43	49	5930

Table 2. No. of vessels in the shrimp fishery at East Greenland by nation and month 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	1	-	7	11	2	1	-	-	-	-	-	-	13
Denmark	-	-	1	2	-	-	-	-	-	-	-	-	2
Faroe Islands	-	-	5	5	3	2	-	-	-	-	-	-	9
Norway	-	-	1	14	14	11	3	6	3	4	3	-	15
France	-	-	-	2	2	2	-	-	-	-	-	-	2
Total	1	-	14	34	21	16	3	6	3	4	3	-	41
b. 1984													
Greenland	3	6	11	7	1	-	-	-	-	-	-	-	12
Denmark	2	1	-	1	-	-	-	-	-	-	-	-	2
Faroe Islands	-	5	4	3	-	-	-	-	-	-	1	1	7
Norway	-	2	9	15	15	-	-	-	-	-	-	-	18
France	-	-	1	2	2	-	-	-	-	-	-	-	2
Total	5	14	25	28	18	-	-	-	-	-	1	1	41

Table 6. By-catches by species and month reported in logbooks from the Denmark Strait shrimp fishery, compared to the corresponding shrimp catches.

SPECIES	8004	8005	8006	8007	8008	8009	8010	8011	8104	8105	8106	8203	8204	8205	8303	8304	8401	8402	8403
Redfishes	0.8	4.0	0.1	-	1.1	0.2	0.4	-	-	10.5	-	-	-	-	-	1.0	-	20.1	1.5
Capelin	2.2	22.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sand lance	-	2.7	-	-	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mixed	-	1.4	0.8	-	-	0.2	0.5	-	-	-	-	-	-	-	3.7	0.8	-	-	-
Total bycatch	3.0	30.8	0.9	-	3.1	0.4	0.9	-	-	10.5	-	-	-	-	3.7	1.8	-	20.1	1.5
Corresponding shrimp catch	23	507	44	4	1	87	125	67	653	240	1	124	301	386	182	76	63	111	63
Bycatch in % of shrimp catch	13.0	6.1	2.1	-	620.0	0.5	0.7	-	-	4.4	-	-	-	-	2.0	2.4	-	18.1	2.4

Table 7. Composition by stages of sexual development (in number of specimens) of samples of P. borealis from the commercial fishery in the Denmark Strait February-March 1984.

Date	Area kode	Number of specimens in groups								Totals										
		1	2	3	4	5	6	7	8	Mal.	Tran	Fem.	All							
21.2	KA112																			
-26.2	-KA113	1038	10	103	2	291	1710	791	15	1038	113	2809	3960							
5.3	JT108	120	0	7	0	30	129	84	0	120	7	243	370							
7.3	JT110	8	0	3	0	45	69	47	0	8	3	161	172							

- 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.

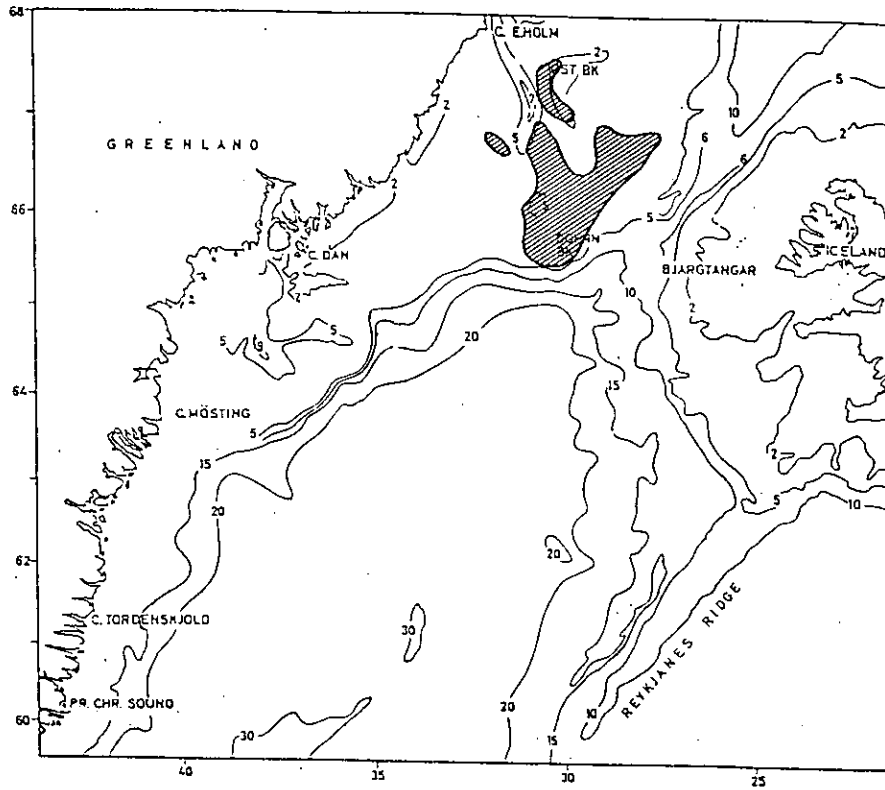


Figure 1. Shrimp fishing grounds in the Denmark Strait based on logbook recordings.

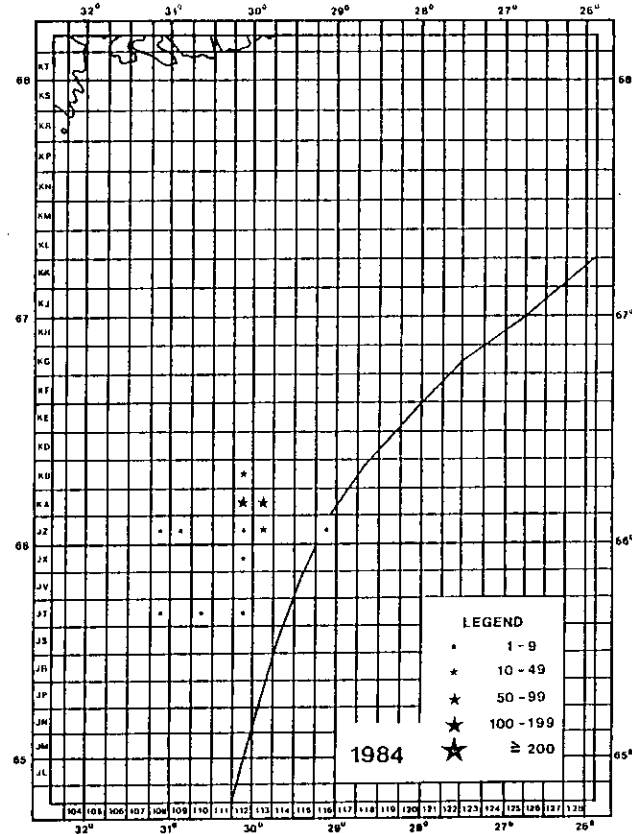


Figure 2. Distribution of hauls by 1 trawler in the shrimp fishery at East Greenland in January to March 1984, based on logbook information.

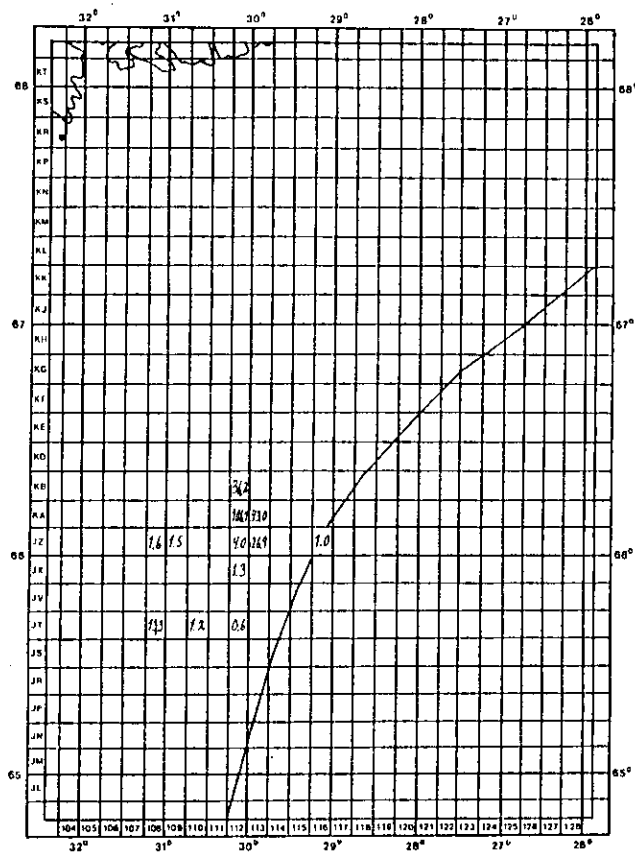


Figure 3. Distribution of total catches of shrimp (tons) by 1 trawler fishing at East Greenland in 1984, based on logbook information.

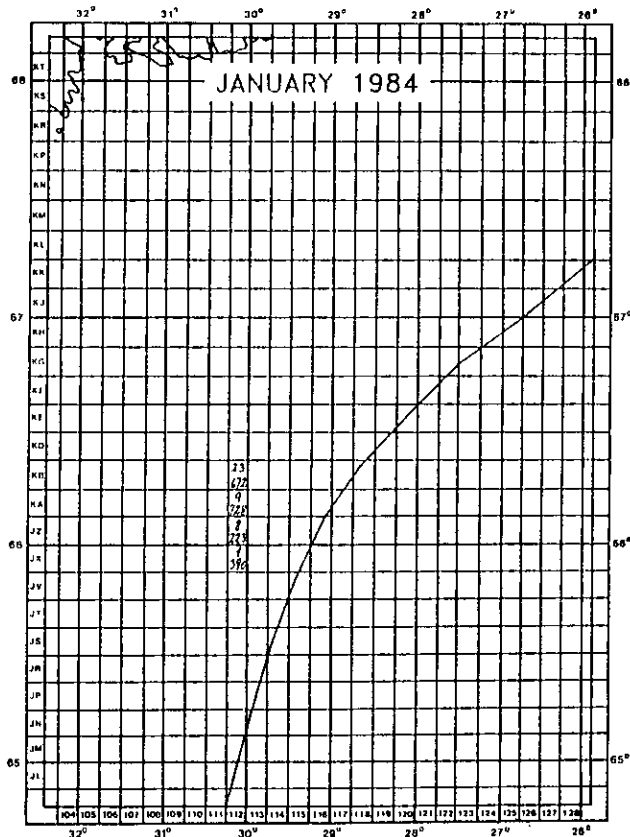


Figure 4a. Distribution of effort and mean catch of shrimp per hour in January 1984 based on logbook information from 1 trawler. Upper figure in each statistical is no. of hauls, lower figure the mean catch rate (kg/hour).

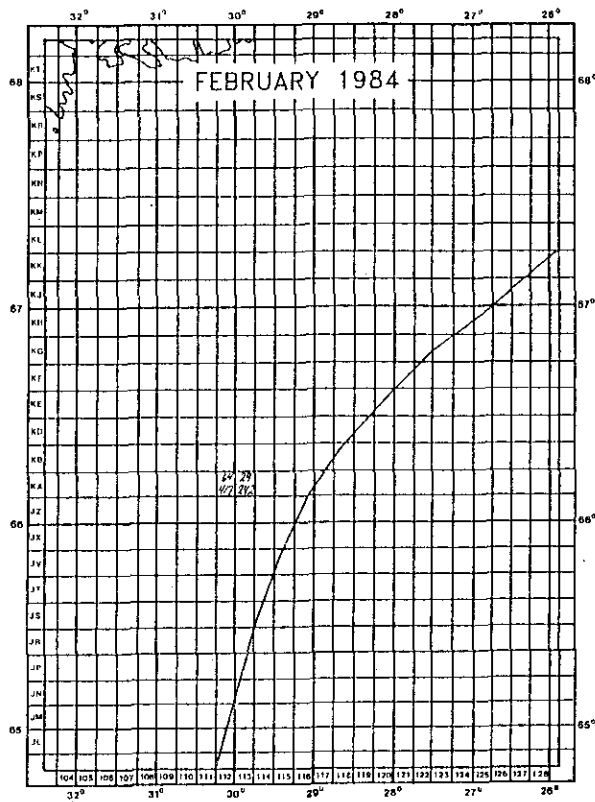


Figure 4b. Distribution of effort and mean catch per hour of shrimp in February 1984 based on logbook information from 1 trawler. Upper figure in each statistical is no. of hauls, lower figure the mean catch rate (kg/hour).

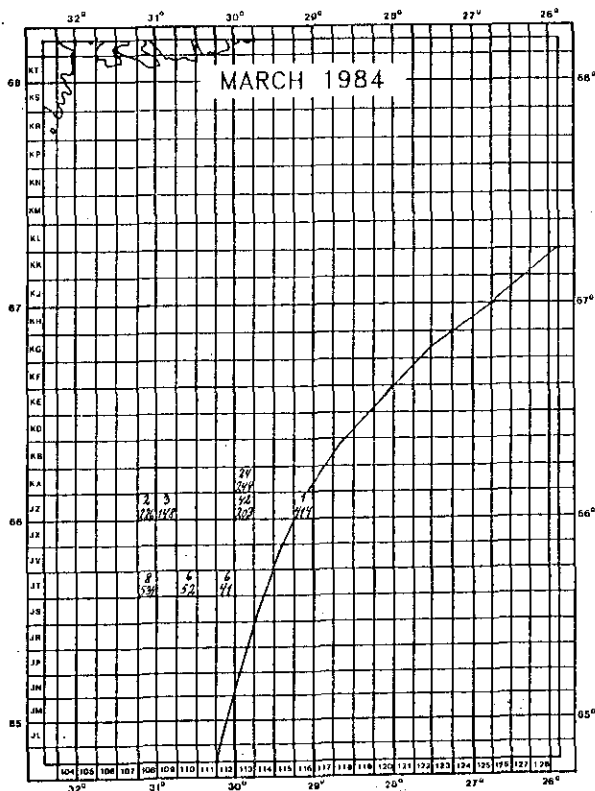


Figure 4c. Distribution of effort and mean catch per hour of shrimp in March 1984 based on logbook information from 1 trawler. Upper figure in each statistical is no. of hauls, lower figure the mean catch rate (kg/hour).

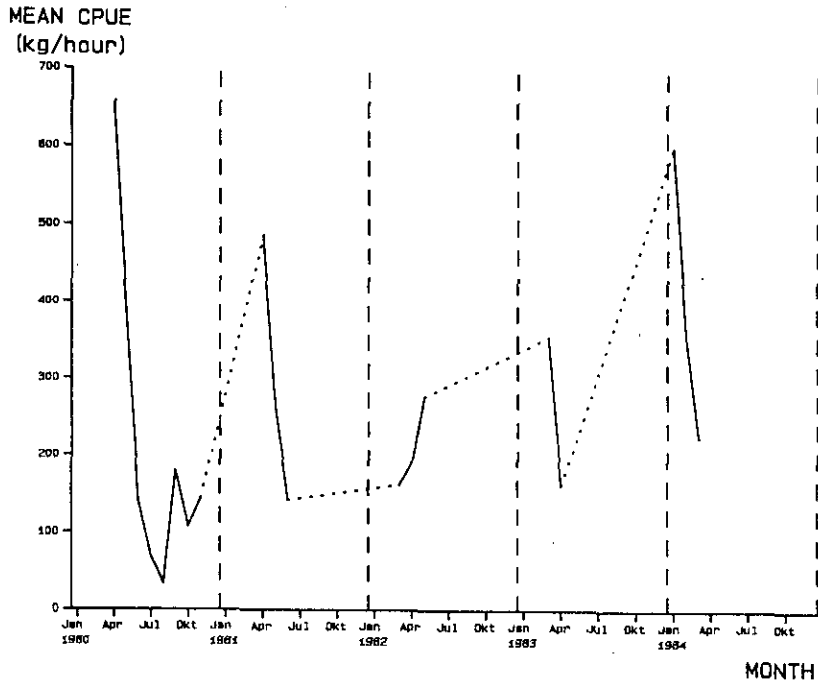


Figure 5. Monthly mean catch rate of shrimp (kg/hour) in the main fishing area at East Greenland from April 1980 to March 1984 based on logbook information from 8 trawlers in 1980, 5 trawlers in 1981 and 1982, 2 trawlers in 1983, and 1 trawler in 1984 (Table 3 shows the corresponding no. of hours trawled).

POOLED SHRIMP SAMPLE EAST GREENLAND
KA112-KA113 FEBRUARY 1984 N = 3959

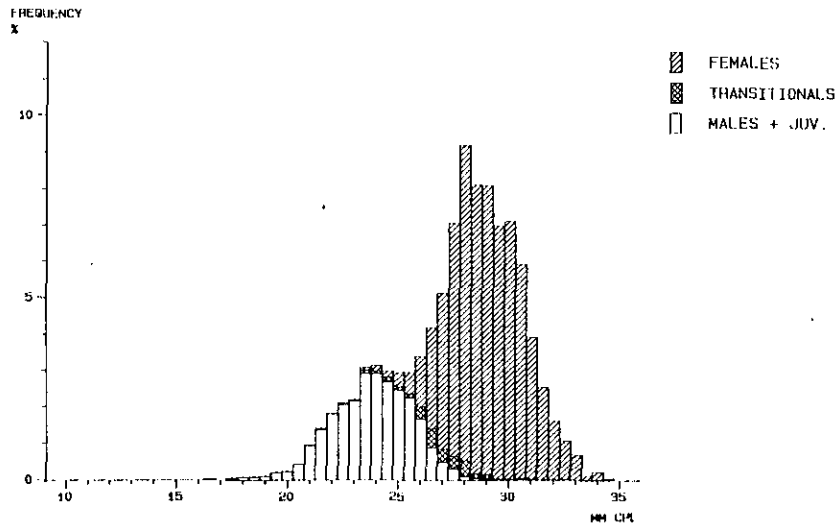


Figure 6. Length-frequency distribution of a pooled sample of *P. borealis* from 19 commercial hauls in statistical units KA112-KA113 in late February 1984.

SHRIMP SAMPLE EAST GREENLAND
JT108 MARCH 1984

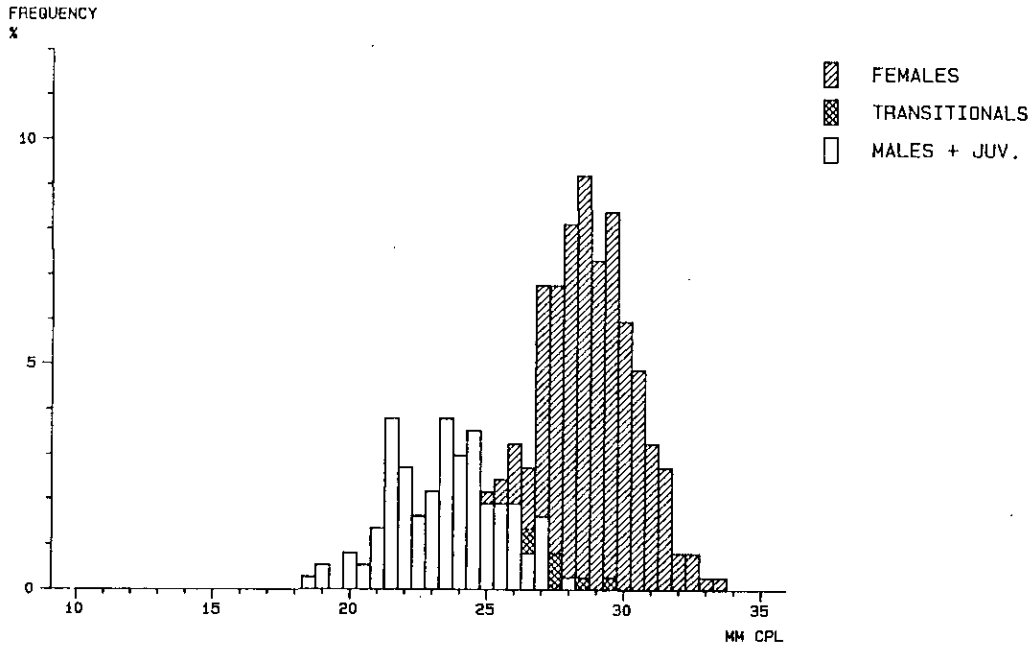


Figure 7. Length-frequency distribution of a sample of *P. borealis* from 1 commercial haul in statistical unit JT108 on March 5, 1984.

SHRIMP SAMPLE EAST GREENLAND
JT110 MARCH 1984

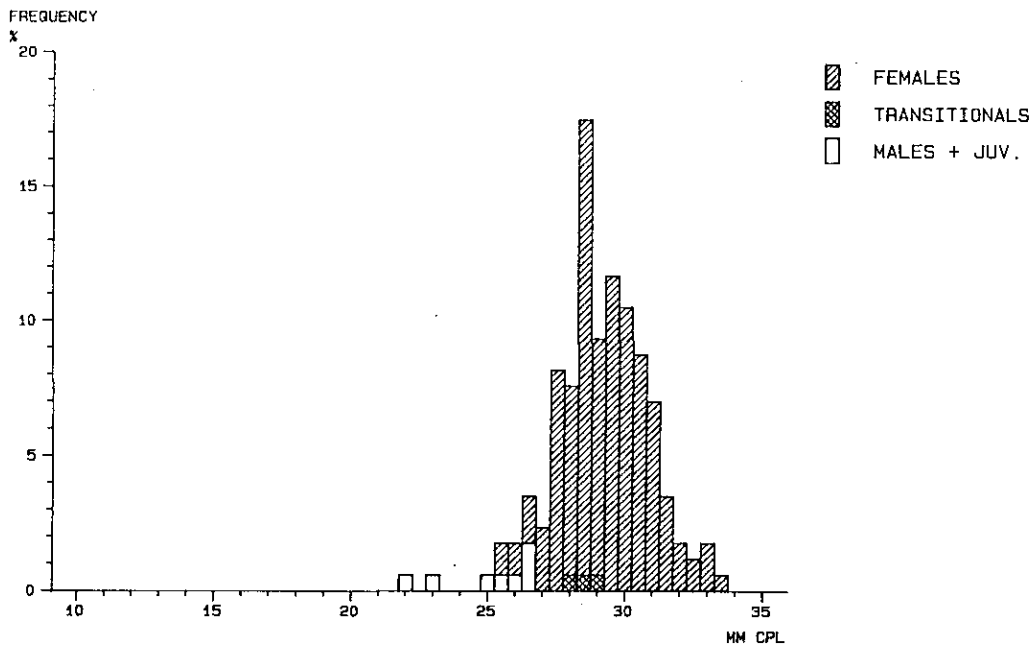


Figure 8. Length-frequency distribution of a sample of *P. borealis* from 1 commercial haul in statistical unit JT110 on March 7, 1984.

