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Catch, Effort and Biological Data of Shrimp (*Pandalus borealis*)

in the French Fisheries off Greenland in 1986 and 1987

by

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French trawlers have made six trips for shrimp off East and West Greenland during Spring to Fall for each of the two years 1986 and 1987. Logbooks for most of these trips were available.

A total of six samples were collected and frozen on board by the crews off East Greenland in 1986 and four samples off West Greenland during the same year. All these samples were examined at the Boulogne-sur-Mer IFREMER laboratory.

Information on these different fisheries and observations on the biological characteristics of the shrimp samples are presented below.

I- Catches and Fishing Effort

1. East Greenland

For recent years, two main periods can be distinguished in the French exploitation of shrimp: Spring and Fall (Table 5).

During Spring 1986, the French trawlers total catches of shrimp off East Greenland were up to 557 tons (Table 1). During the same period in 1987 a total catch of 235 tons⁽¹⁾ of shrimp was reported (Table 2).

In Fall 1986, 171 tons of shrimp were caught in the same area by the French trawlers (Table 1), and 405 tons in Fall 1987 (Table 2)

1.1. Fishing time and areas

For the two years, as usual, most of the fishing activity took place during April and May. The fishery was located on the Dorhn Bank, on the Greenland side of the mid-line to Iceland (Fig. 1 to 9).

As in previous years (Poulard et al. 1986), the shrimp fishery was held on 65°30' N to 66°N in April with extending to the northeast later, the southeastern part of this area being unexploited during Fall. The effort was principally distributed in depth between 300 and 325 meters and between 375 and 425 meters

⁽¹⁾ Provisional data

during the two Spring periods (Table 3 and 4). In Fall 1986, only the first of these two ranges of depth was mainly fished.

1.2. Catch and Effort

Catch, effort and cpue (kg/hour) are given monthly in table 1 for 1986 and in table 2 for half-year 1987. As in 1981 and 1985, the cpue declined throughout the fishing period in 1986 from 372 kg/hour in March to 180 kg/hour in June (Fig. 10). The same pattern appears in Fall the same year with 365 kg/hour in September to 185 kg/hour in November. In 1987, cpue was higher in May than in April with a very high mean cpue for these two months (362 kg/hour). Monthly bathymetric distribution of the cpue is given in table 6 for 1986 and in table 7 for 1987.

2. West Greenland

As in previous years (Poulard, 1986), French fishing activity in NAFO Division 1 took place mostly during Summer (July and August) in 1986 and 1987. 572 tons of shrimp were caught by the French trawlers during this period in 1986 (table 1) and 596 tons in 1987 (table 2).

During July 1986, effort was mainly exerted in the NAFO Division 1B in the northwest of the Great Hellefiskebanke (Fig. 11). In August, trawlers were on the same area and also on both sides of the line between divisions 1B and 1C (fig. 12).

In July-August 1987, the mean cpue (kg/hour) was less than the very high value noted for 1986, but still above the values recorded for previous years (table 8).

II- Observation of samples

As in previous years, the shrimps of each sample were sorted by reference to sexual characteristics and also to the stage of the sternal spines (Dupouy et al., 1983) for all samples collected off East and West Greenland.

1. East Greenland

In 1986, five samples were collected during the Spring period and only one in Fall. Characteristics of these samples are given in table 9.

Hatching period

Considering only adult females (i.e. females ovigerous, with eggs and with egg-setae), time of reproduction has been identified for Spring 1986 (table 10). As for the year 1985, hatching period started from the end of April but contrarily to this previous year, no female with eggs totally hatched was yet found at the end of May.

Length distribution

In April-May 1986, all the individuals ranged between 19 and 34 mm (CL) with a peak between 28 and 31 mm. The mean length (29.3 mm) was close to those observed in previous years. In Fall, The unique sample shows a smaller mean length (27.7 mm).

Distribution of lengths and sexual compositions are given in tables 11 and 12 and figure 13.

2. West Greenland

Characteristics of the four samples collected during summer 1986 off West Greenland are presented in table 13.

All shrimp measurements ranged from 12 to 29 mm with a bulk between 19 and 22 mm for males as previously observed by Carlsson and Kannevorf (1987), and between 24 and 26 mm for females III (table 14 and fig. 14).

III- Discards and by-catch

Informations on shrimps discards and by-catch were available for two trips off East Greenland in 1986 (table 15). For these trawlers, shrimp discards were very low (less than 0.5% of total shrimp catches). By-catch constituted about 3.5% of the weight of shrimp catches and were mostly made of redfish (almost 1.5% of the shrimp catch weight).

References

- CARLSSON D.M. and KANNEWORFF P., 1987 - The shrimp fishery in NAFO Subarea 1 in 1985 and 1986 - NAFO SCR Doc. 87/08, ser. No. N1276; 32p.
- DUPOUY H., DERIBLE P. and BISEAU A., 1983 - Catch, effort and biological characteristics of shrimp (*Pandalus borealis*) in the French fishery off East Greenland in 1982 - NAFO SCR Doc., 83/I/43; 21p.
- POULARD J.C., 1986 - Data on French shrimp fishery off West Greenland in 1985 - NAFO SCR Doc. 86/7, Ser.No. N1105; 6p.
- POULARD J.C., FONTAINE B. BATTAGLIA A. and DERIBLE P., 1986 - Catch, effort and biological data of shrimp (*Pandalus borealis*) in the French fishery off East Greenland in 1985 - NAFO SCR Doc. 86/6 Ser.No. N1104; 17p.

Area	Fishing period	Catch (tons)	Effort (hours)	CPUE (kg/hour)
East Greenland Spring fishery (3 trawlers)	March 30-31	16	43	372
	April 1-30	212	831	255
	May 1-31	285	1073	266
	June 1-10	44	245	180
	Total	557	2192	254
East Greenland Autumn Fishery (1 trawler)	September 16-30	57	156	365
	October 1-31	109	327	333
	November 1-03	5	27	185
	Total	171	510	335
West Greenland (2 trawlers)	July 17-31	150	264	568
	August 01-31	422	548	770
	Total	572	812	704

Table 1. French vessels catch and effort for shrimp in 1986.

Area	Fishing period	Catch (tons)	Effort (hours)	cpue
East Greenland Spring fishery (3 trawlers)	April 9-30	91	273	358
	May 1-31	144	395	365
	March 31-May 05 ⁽²⁾	188	N.D.	N.D.
	March 26-May 21 ⁽²⁾	202	N.D.	N.D.
	TOTAL	625	668⁽¹⁾	362⁽¹⁾
East Greenland Autumn fishery (1 trawler)	Aug. 26	405	N.D.	N.D.
	Nov 09 ⁽²⁾			
TOTAL		405		
West Greenland (2 trawlers)	July 13 - Aug 21	299	705	424
	July 05 - July 31	204	441	474
	Aug 01 - Aug 13	93	193	547
	TOTAL	596	1339	445

(1) partial data

(2) trip dates

Table 2. French vessels catch and effort for shrimp in 1987 (provisional data).

Depth range (m)	March	April	May	June	Sept	Oct	Nov	Total
175-199			1					1
200-224								
225-249								
250-274					1			1
275-299		2	44	6	8	14	1	75
300-324		123	178	116	61	97	11	586
325-349		12	8	3	4	40		67
350-374	1	31	65	1				98
375-399	18	180	160	2				360
400-424		42	57					99
Total	19	390	512	128	74	151	12	1286

Table 3. Monthly bathymetric distribution of tows made by French fishing vessels at East Greenland in 1986.

Depth range (m)	April	May	Total
275-299		1	1
300-324		39	39
325-349		4	4
350-374	20	13	33
375-399	67	63	130
400-424	46	68	114
425-449	3		3
Total	136	188	324

Table 4. Monthly bathymetric distribution of the tows made by one French vessel off East Greenland in spring 1987.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1980							40						40
1981				157	522	257							936
1982				331	563	238							1132
1983				248	245	206							699
1984			132	723	349								1204
1985				257	402	137				294	37		1127
1986			43	831	1073	245			156	327	27		2702
1987				273	395								668

Table 5. No. of hours trawled by year and month from March to November in the French fishery at East Greenland as reported in logbooks of 1 trawler in 1980, 1981 and 1982, 2 trawlers in 1983 and 1984, 1 trawler in 1985, 3 trawlers in 1986 and 1 in 1987 (half-year).

Depth range (m)	March	April	May	June	Sept	Oct	Nov	Total
175-199			926(1)					926(1)
200-224								
225-249								
250-274					50(2)			50(2)
275-299		52(2)	213(97)	104(10)	449(18)	235(30)	126(2)	234(159)
300-324		292(245)	195(391)	187(224)	377(129)	332(211)	208(24)	256(1224)
325-349		312(23)	274(14)	217(3)	109(6)	376(85)		338(131)
350-374		190(2)	216(67)	328(121)	71(1)			286(191)
375-399	382(40)	235(398)	316(317)	17(4)				275(759)
400-424		267(91)	335(126)					306(217)
Total	382(40)	256(826)	266(1067)	180(242)	371(155)	335(326)	201(26)	270(2684)

Table 6. Monthly bathymetric distribution of the mean cpue (kg/hour) and the effort (hours, in bracket) obtained by French fishing vessels in East Greenland in 1986.

Depth range (m)	April	May	Total
275-299		480 (1)	480 (1)
300-324		582 (75)	582 (75)
325-349		599 (6)	599 (6)
350-374	383 (34)	268 (26)	333 (60)
375-399	321 (135)	303 (142)	312 (277)
400-424	338 (100)	320 (145)	327 (245)
425-449	153 (4)		153 (4)

Table 7. Monthly bathymetric distribution of the mean cpue (kg/hour) and the effort (hours, in bracket) obtained by one French trawler off East Greenland in 1987.

Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
July	322	241	285	350	256	-	-	-	543	424
August	-	-	243	330	324	-	-	333	757	

Table 8. CPUE of a French trawler (OTB2-6) in NAFO Div: 1 until 1985 and another (OTB2-7) in July and August 1986 and 1987 (kg/hour).

Sample N°	Date	Average position		Mean depth (m)	Duration of haul GMT	N° of shrimp examined	Composition by sex in percentage		
		Lat.N	Long.W				Males	Transitionals	Females
1	April 13	65°47	30°07	385	10H15-14H20	117	0	9	91
2	April 22	65°53	30°10	385	09H35-13H00	118	1	5	94
3	May 5	65°40	31°09	375	09H15-11H50	116	9	6	85
4	May 11	65°43	30°07	390	11H55-15H00	121	1	1	98
5	May 18	66°14	29°41	302	11H00-14H05	90	2	0	98
Total first trip						562			
6	Sept.5	66°21	29°03	299	12H20-15H20	74	5	0	95
Total second trip						74			

Table 9. Characteristics of samples collected off East Greenland in 1986.

	April 1-15	April 16-30	May 1-15	May 16-31	September 1-15
Females with eggs not hatched	100	98	84	68	100
Females with eggs partially hatched	0	2	16	32	0
Females with eggs totally hatched	0	0	0	0	0

Table 10. Indices of egg maturity off East Greenland in 1986.

Lcp (mm)	Males	Transitionals and females II	Females III	Total
19	2			2
20	2			2
21	2			2
22	2			2
23	7			7
24	0		2	2
25	4	2	0	6
26	0	5	12	17
27	4	2	44	50
28	4	12	158	174
29	0	12	274	286
30	2	7	238	247
31		2	135	137
32		0	37	37
33		4	21	25
34			4	4
Total/1000	29	46	925	1000
Mean (mm)	24.31	28.74	29.47	29.28
Sd (mm)	3.21	1.96	1.41	1.75

Table 11. Length distribution by sex of shrimp collected off East Greenland in April-May 1986.

Lcp (mm)	Males	Transitionals and females II	Females III	Total
23	1	3		4
24	1	1		2
25	1	14		15
26	1	8		9
27		14	1	15
28		5	9	14
29		3	15	18
30			11	11
31			7	7
32			4	4
Total/100	5	47	47	100
Mean (mm)	24.50	26.17	29.55	27.71
Sd (mm)	1.29	1.49	1.27	2.26

Table 12. Length distribution by sex of shrimp collected off East Greenland in September 1986.

Sample N°	Date	Average position		Mean depth (m)	Duration of haul GMT	N° of shrimp examined	Composition by sex in percentage		
		Lat.N	Long.W				Males	Transitionals	Females
1	July 24	67°53	58°00	317	10H05-13H05	98	51	18	31
2	July 31	67°53	58°02	312	10H45-13H55	100	38	15	47
3	August 07	66°14	55°42	202	09H30-13H30	127	53	9	38
4	August 14	66°27	55°30	191	21H00-00H10	157	56	17	27
482									

Table 13. Characteristics of samples collected off West Greenland in 1986.

Lcp (mm)	Males	Transitionals and females II	Females III	Total
12	6			6
13	15			15
14	10			10
15	2			2
16	6			6
17	38			38
18	61			61
19	67			67
20	90			90
21	99	2		101
22	71	10	2	83
23	29	10	17	56
24	10	36	75	121
25	2	60	116	178
26		33	67	100
27		10	38	48
28		2	10	12
29			6	6
Total/1000	506	163	331	1000
Mean (mm)	19.66	24.78	25.25	22.34
Sd (mm)	2.47	1.32	1.29	3.37

Table 14. Length distribution by sex of shrimp collected off West Greenland in 1986.

Species	March	April	May	June	Total
Redfish	0.5	1.9	1.1	1.1	1.4
American plaice		0.6	0.5	0.6	0.5
Greenland halibut		0.5	0.4	0.4	0.5
Atlantic halibut			+		+
Catfish		0.3	0.8	1.0	0.7
Capelin	0.7	+	0.1		0.1
Skates		+		+	+
Shrimp discards		+	0.1	0.3	0.1
Shrimp catches (tons)	3	129	197	44	373

Table 15. "By catch" percentages by species and by month for two french fishing vessels off East Greenland in 1986 (+ : less than 0.05 %).

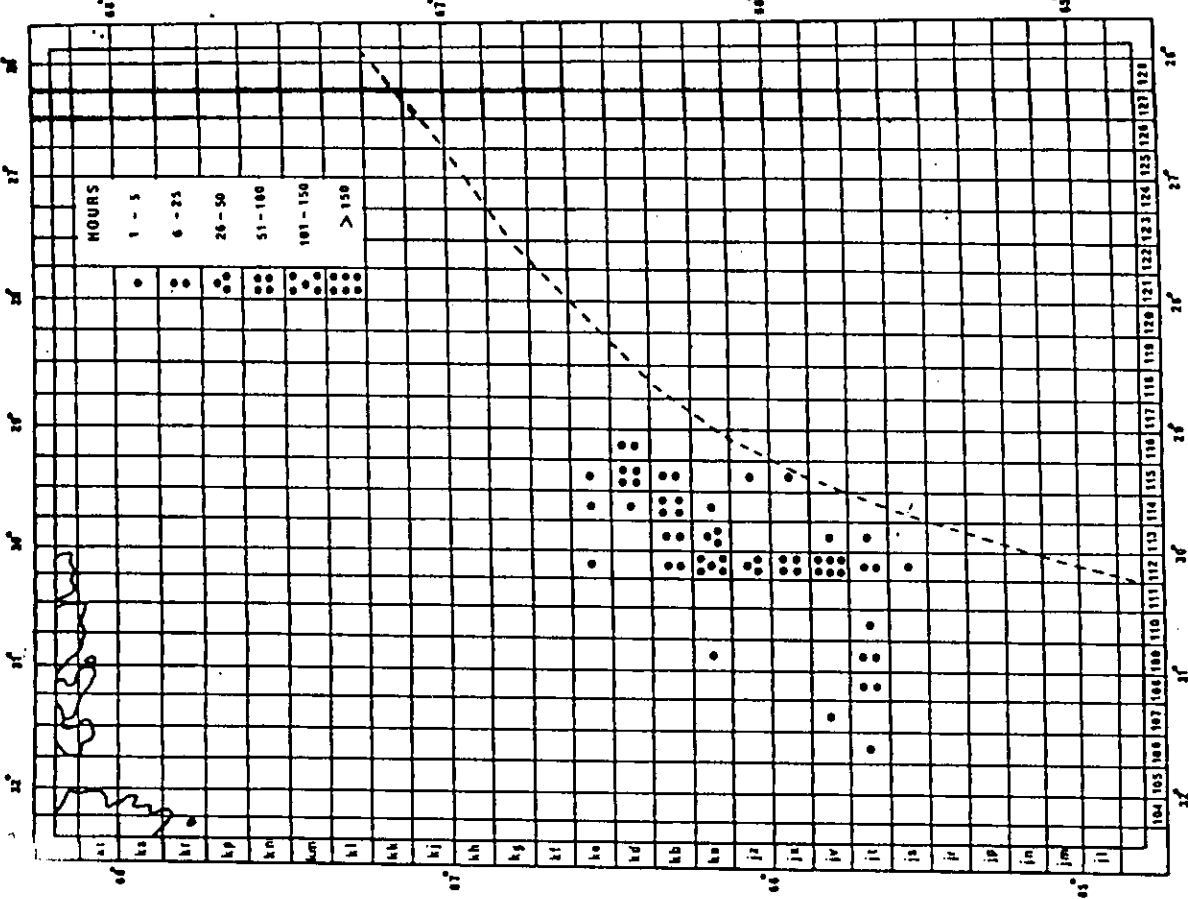


Fig. 1 - Distribution of effort (hours) in March 1986 for two French trawlers off East Greenland.

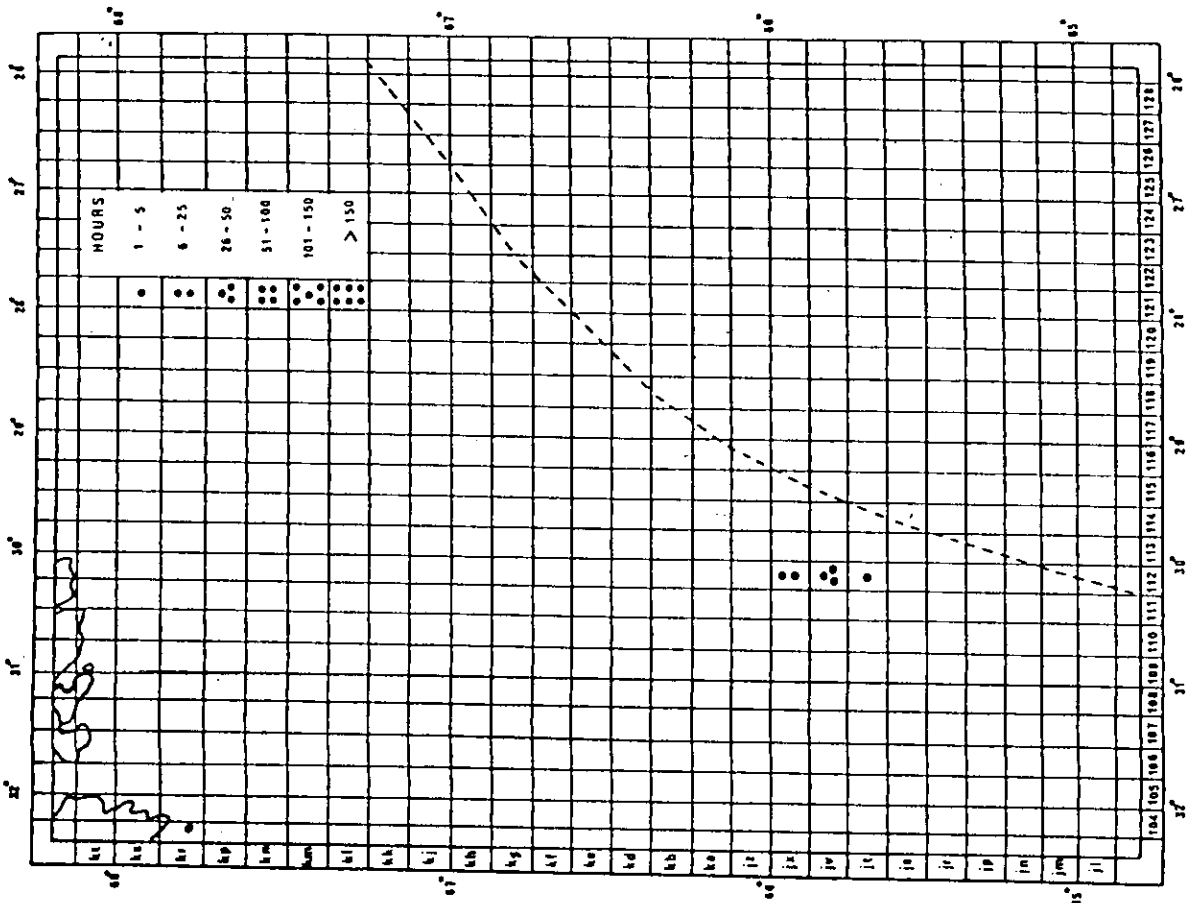


Fig. 2 - Distribution of effort (hours) in April 1986 for three French trawlers off East Greenland.

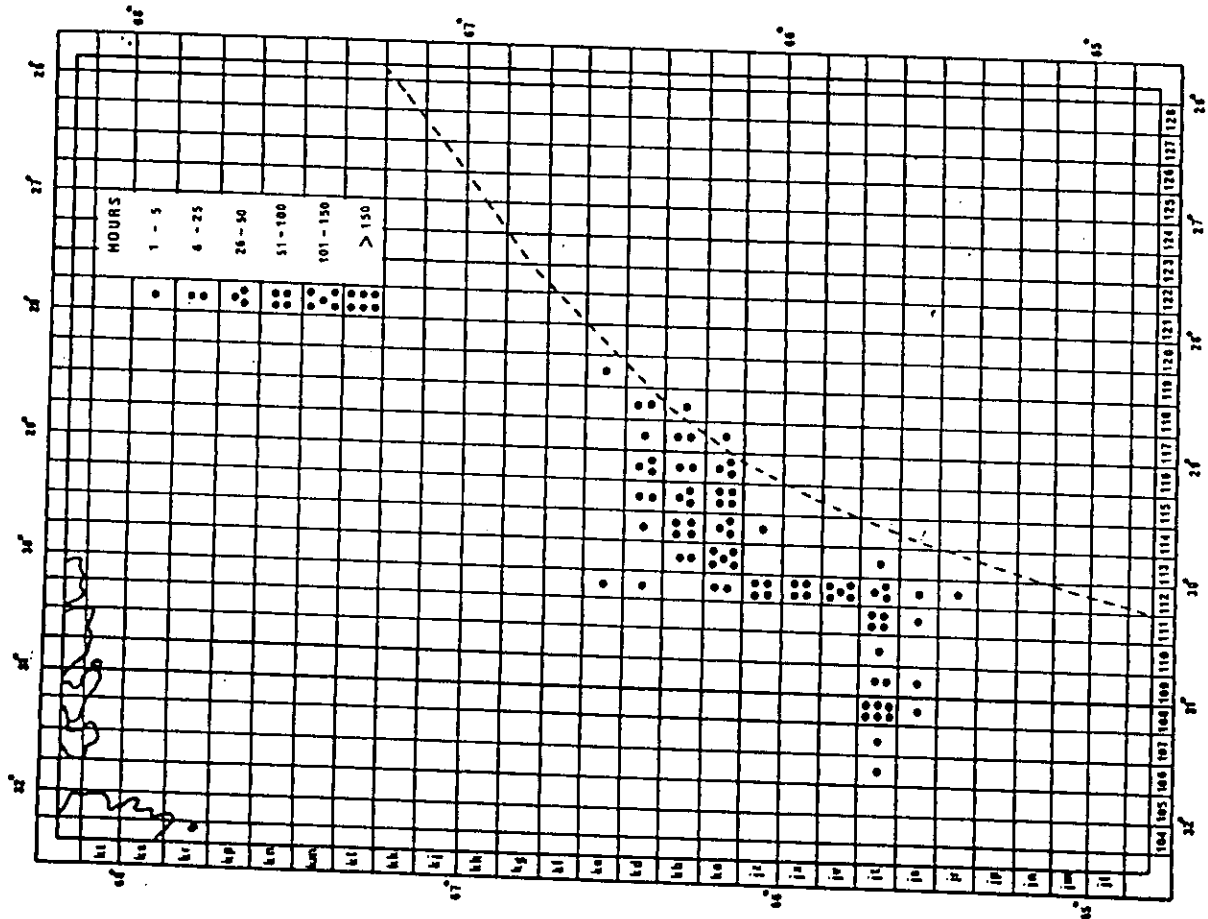


Fig. 3 - Distribution of effort (hours) in May 1986 for three French trawlers off East Greenland.

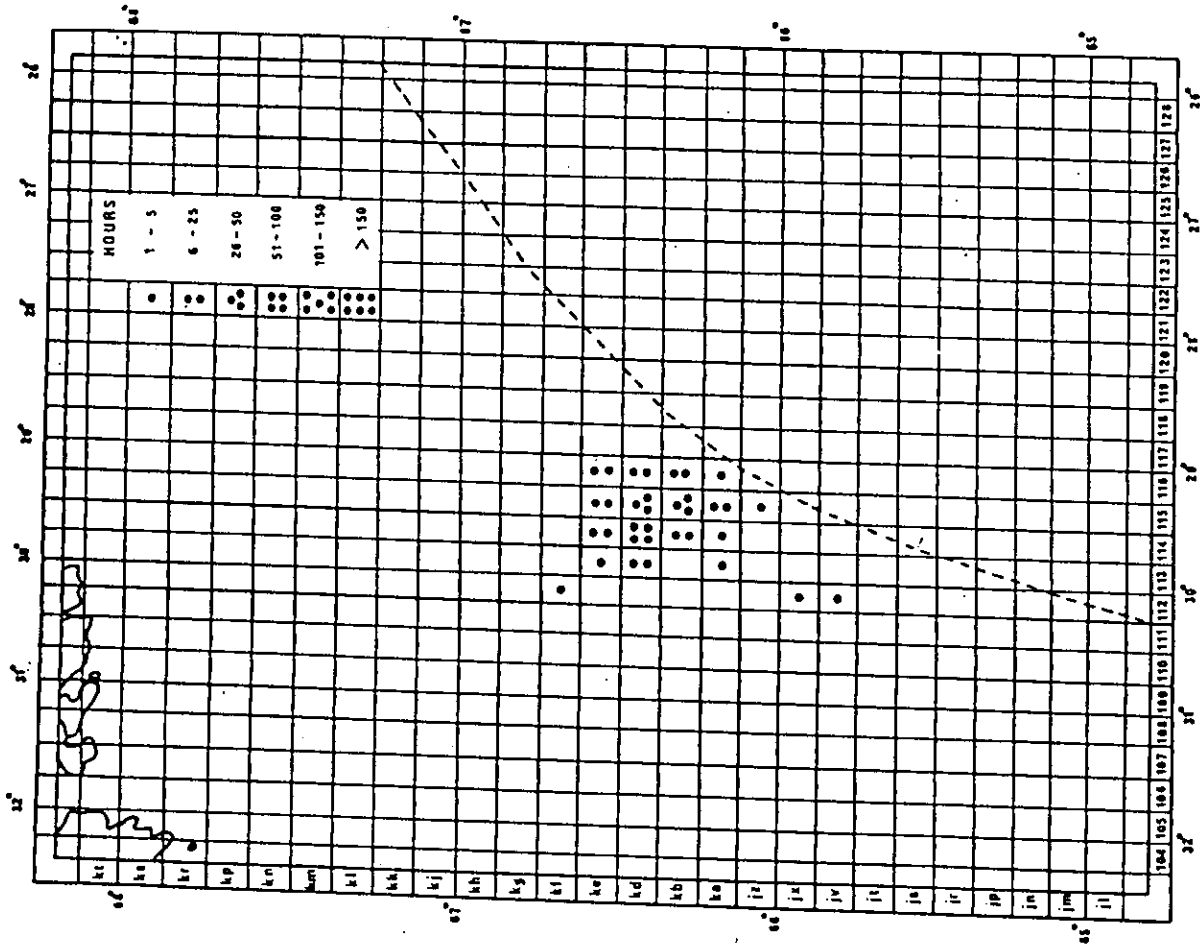


Fig. 4 - Distribution of effort (hours) in June 1986 for two French trawlers off East Greenland.

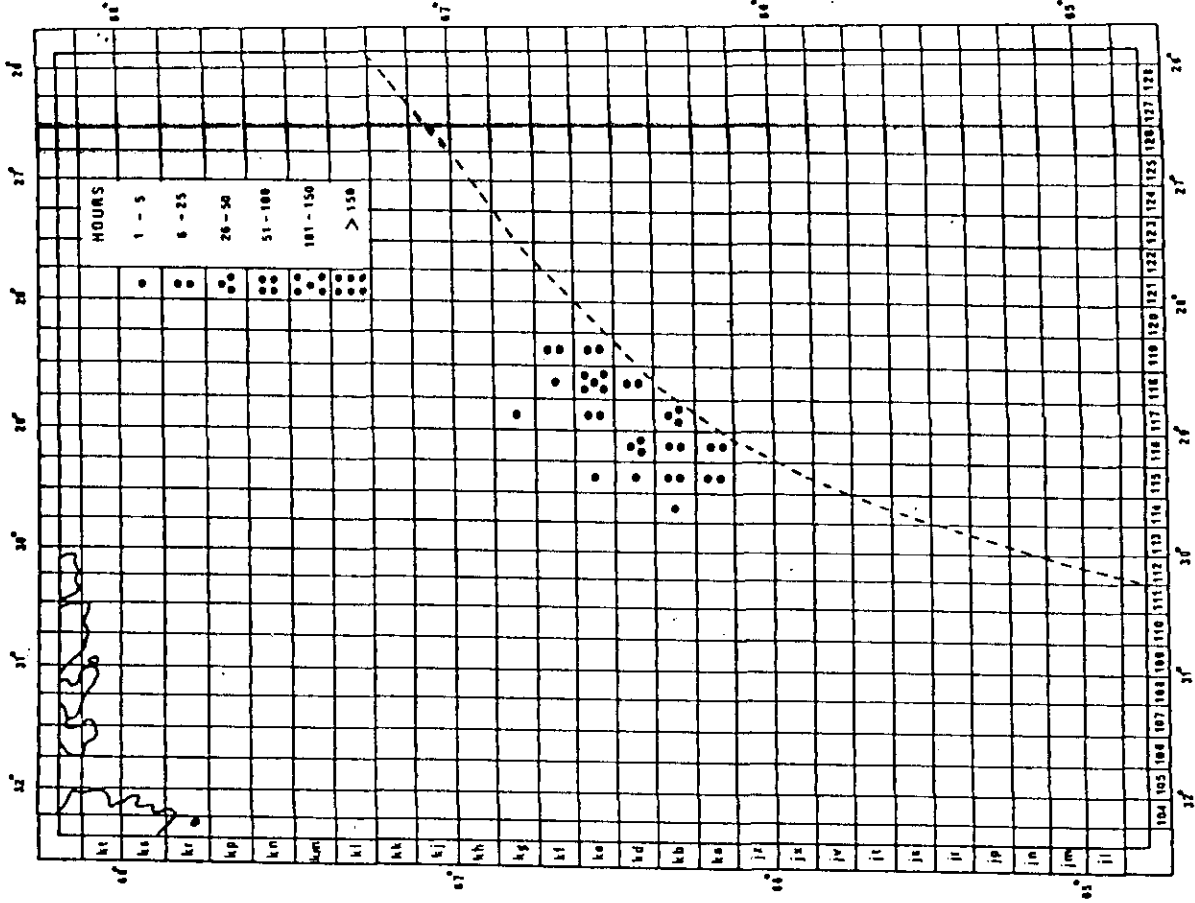


Fig. 6 - Distribution of effort (hours) in October 1986 for one French trawler off East Greenland.

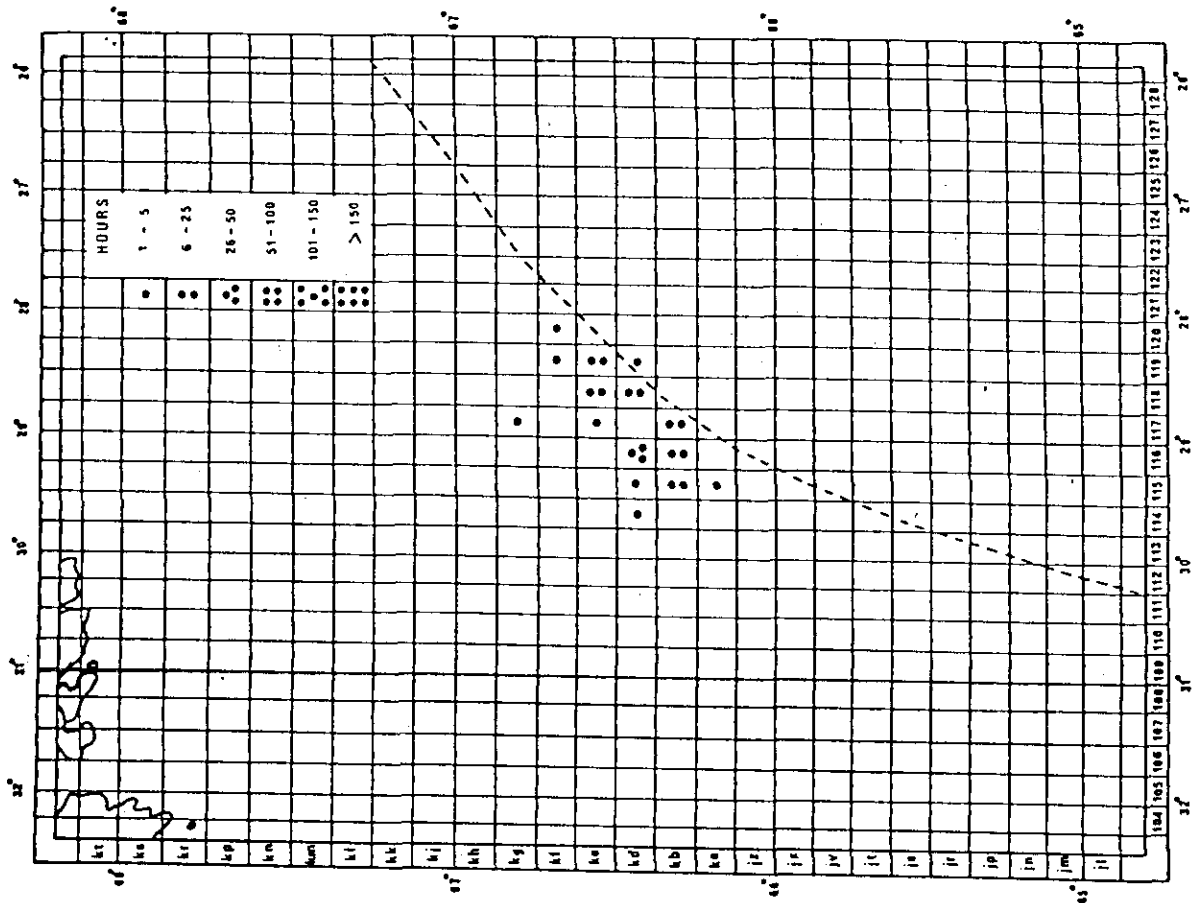


Fig. 5 - Distribution of effort (hours) in September 1986 for one French trawler off East Greenland.

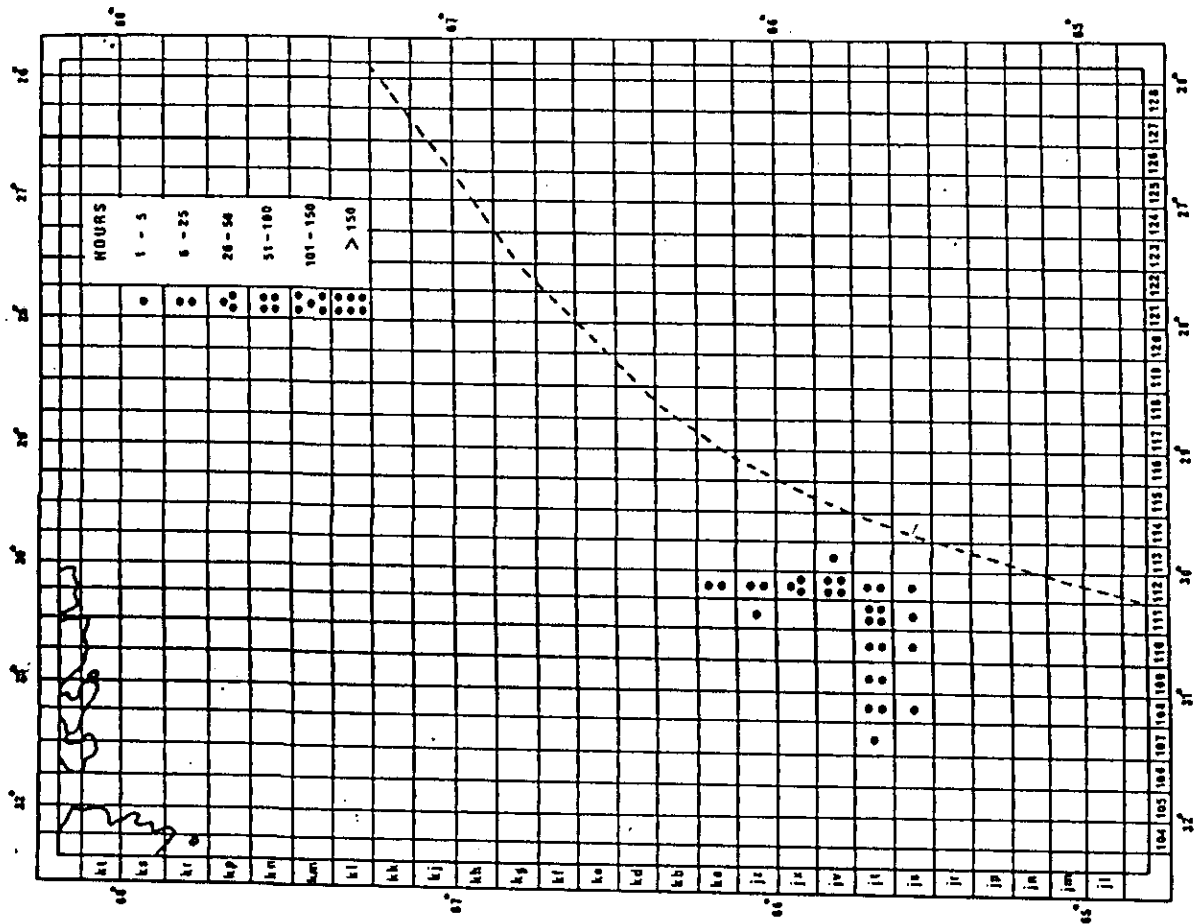


Fig. 8 - Distribution of effort (hours) in April 1987 for one French trawler off East Greenland.

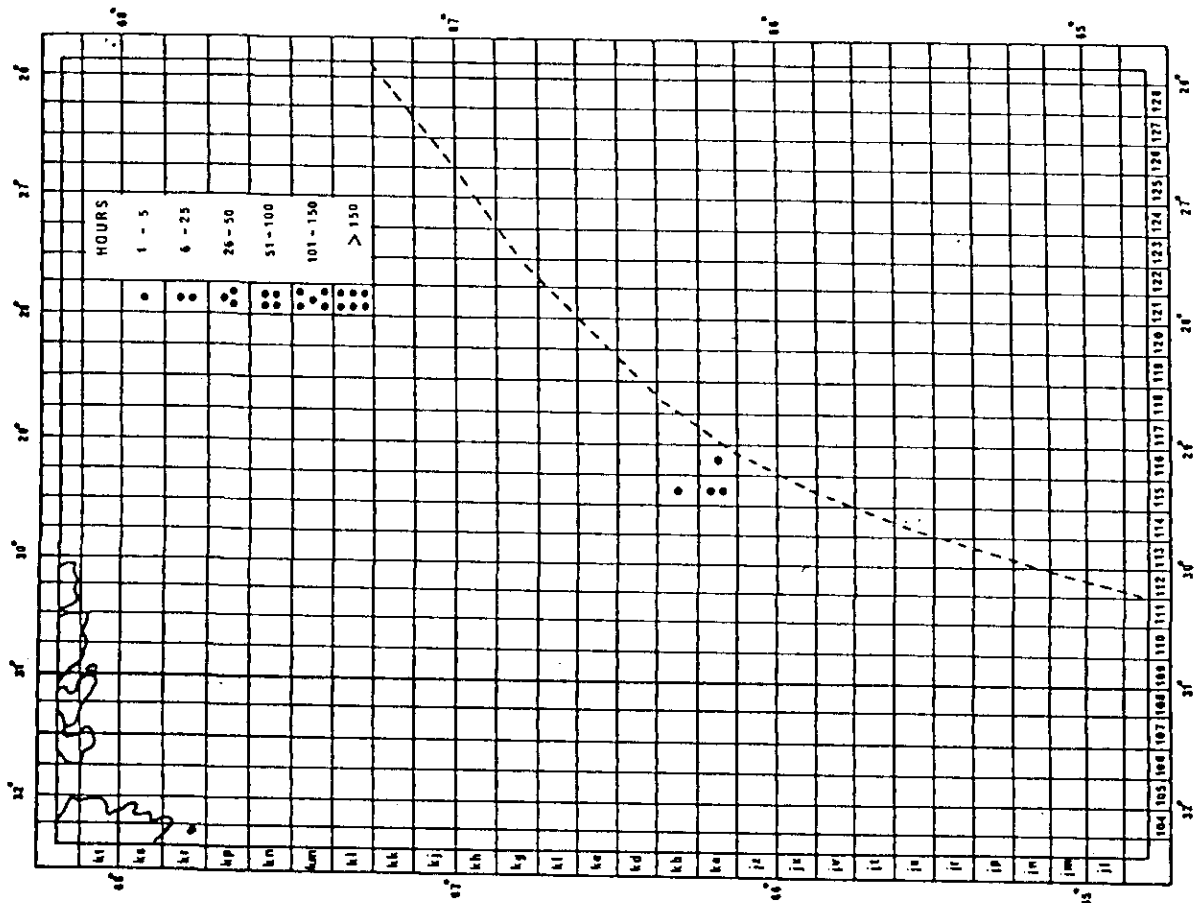


Fig. 7 - Distribution of effort (hours) in November 1986 for one French trawler off East Greenland.

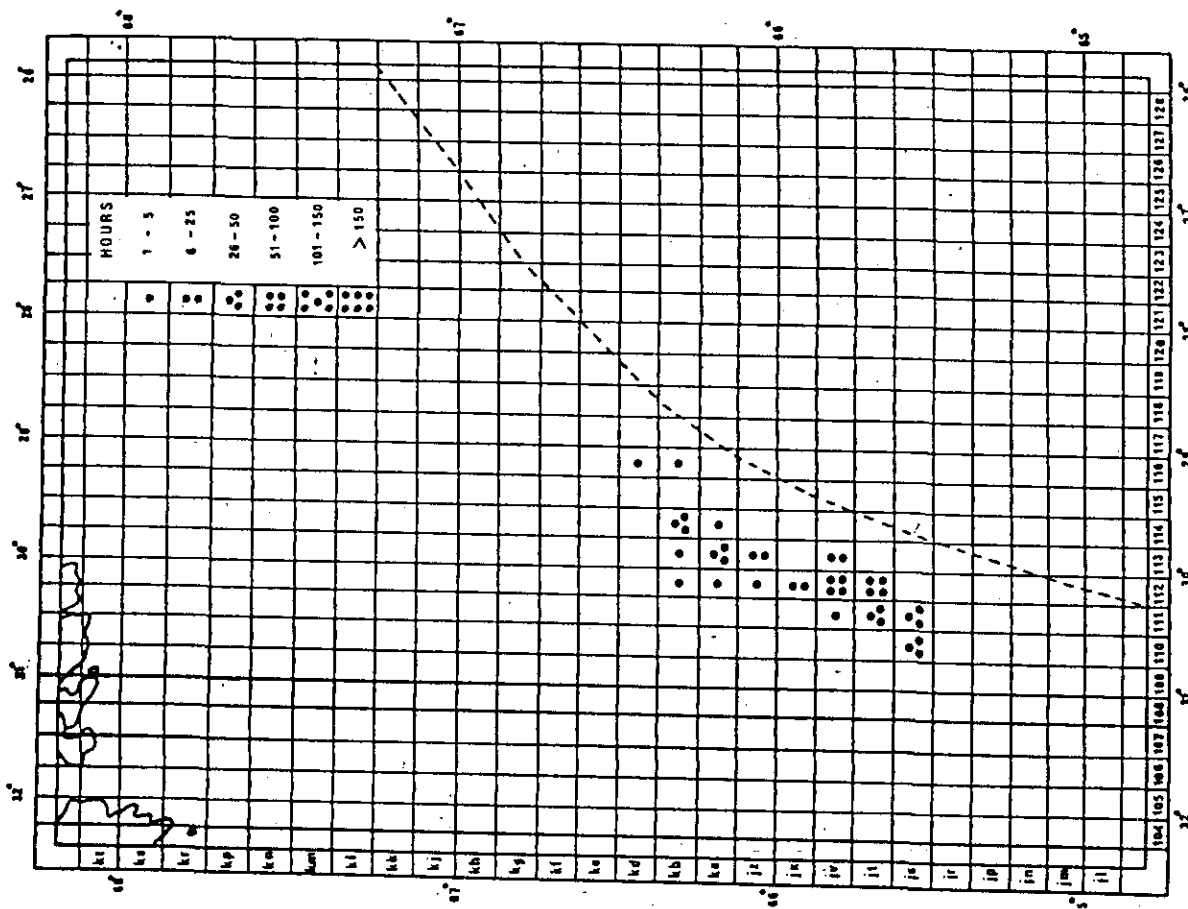


Fig. 9 - Distribution of effort (hours) in May 1987 for one French trawler off East Greenland.

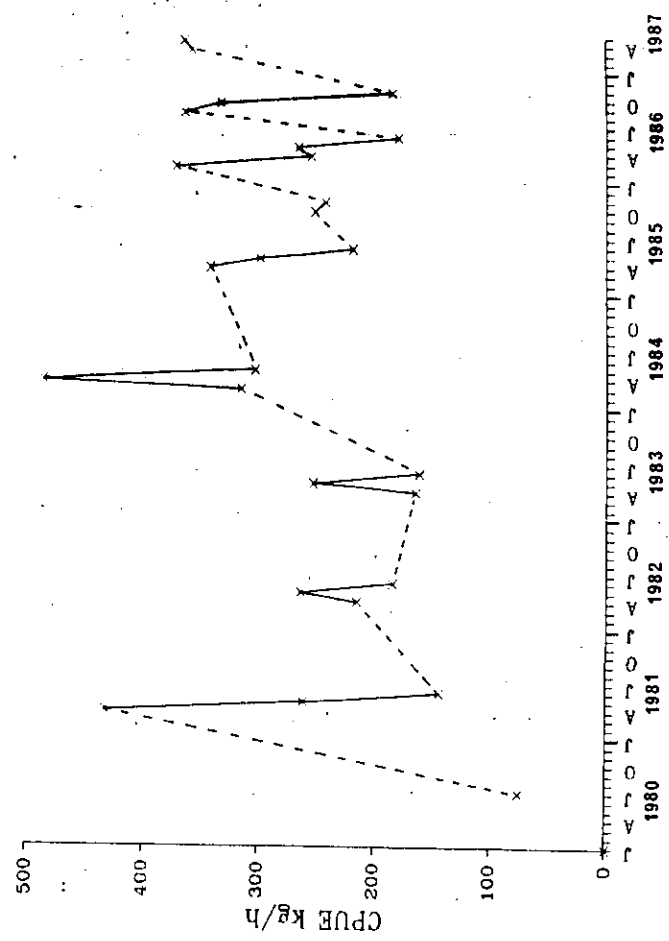


Fig. 10 - Monthly mean catch rate of shrimp (kg/hour) in the French fishery off East Greenland from July 1980 to May 1987 based on logbook informations (Table 3 shows the corresponding number of hours trawled).

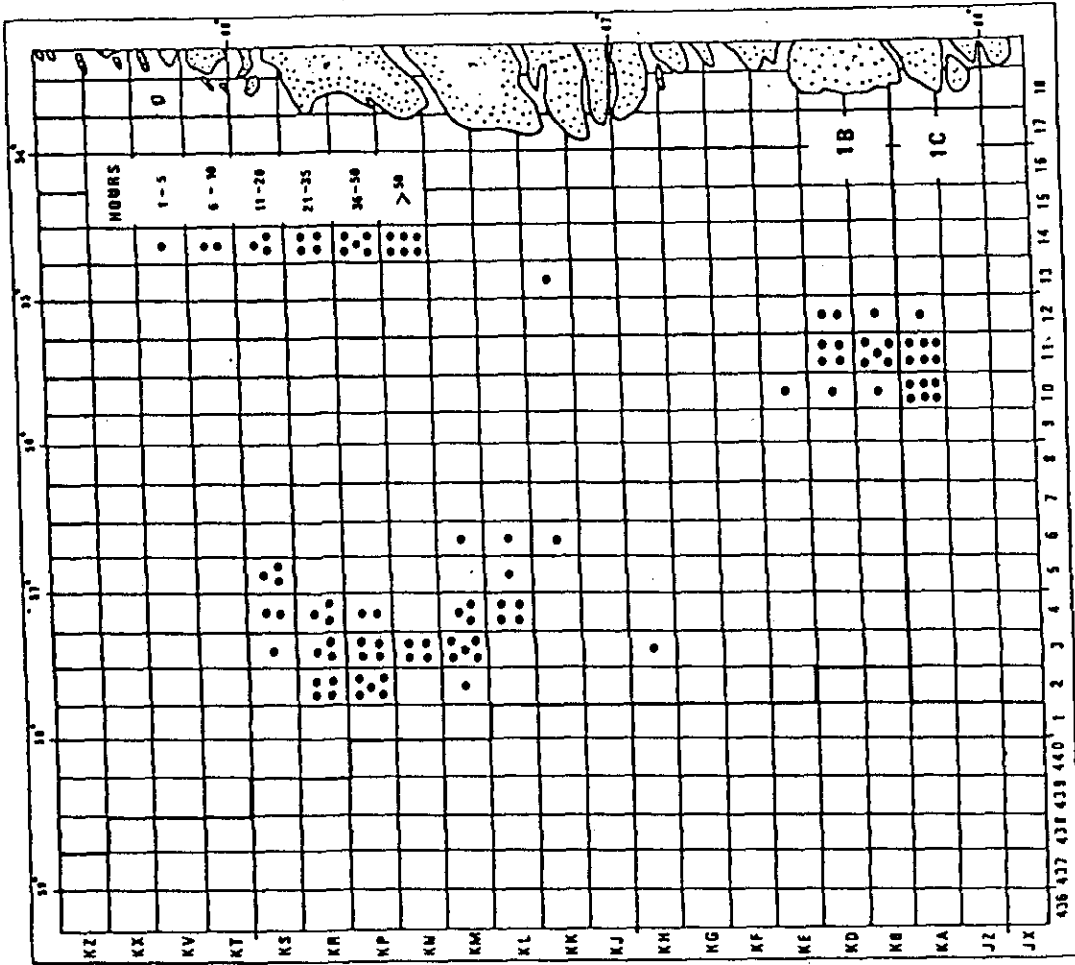


Fig. 12 - Distribution of effort (hours) in August 1986 for two French trawlers off West Greenland.

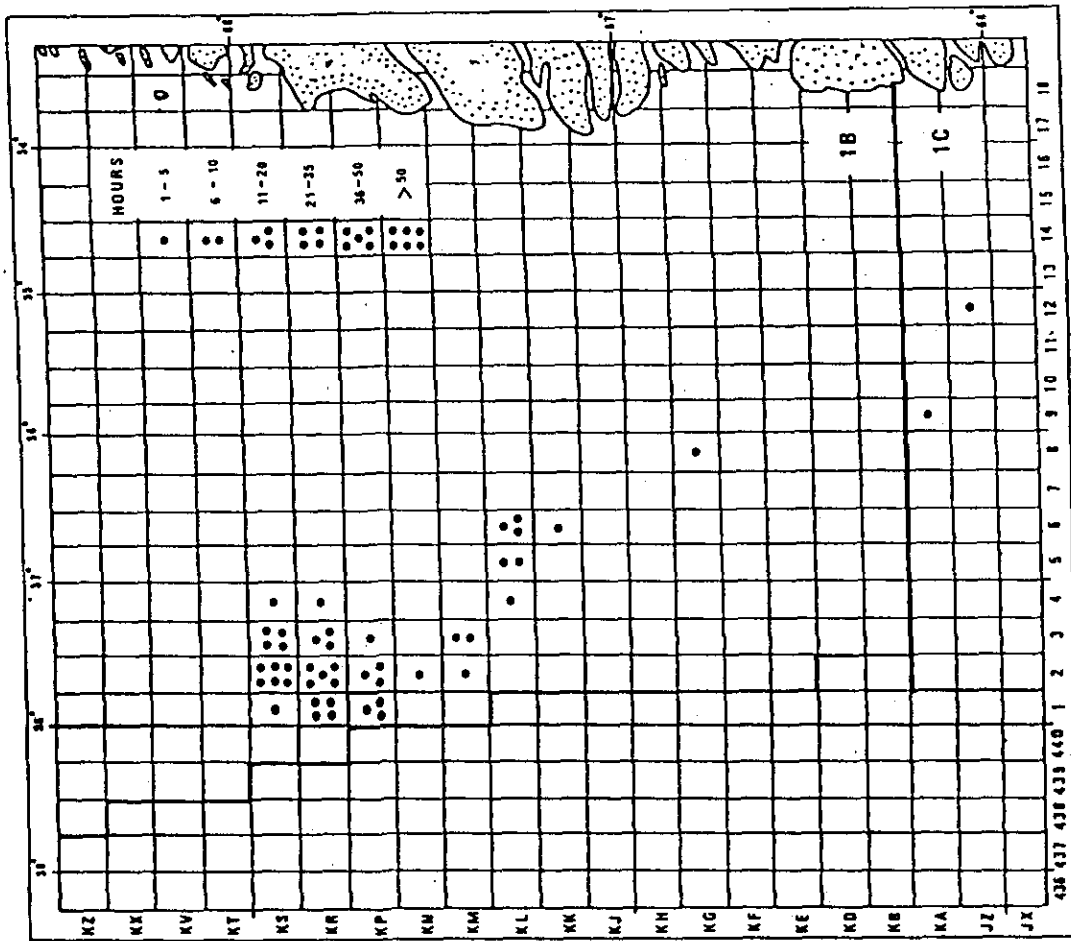


Fig. 11 - Distribution of effort (hours) in July 1986 for two French trawlers off West Greenland.

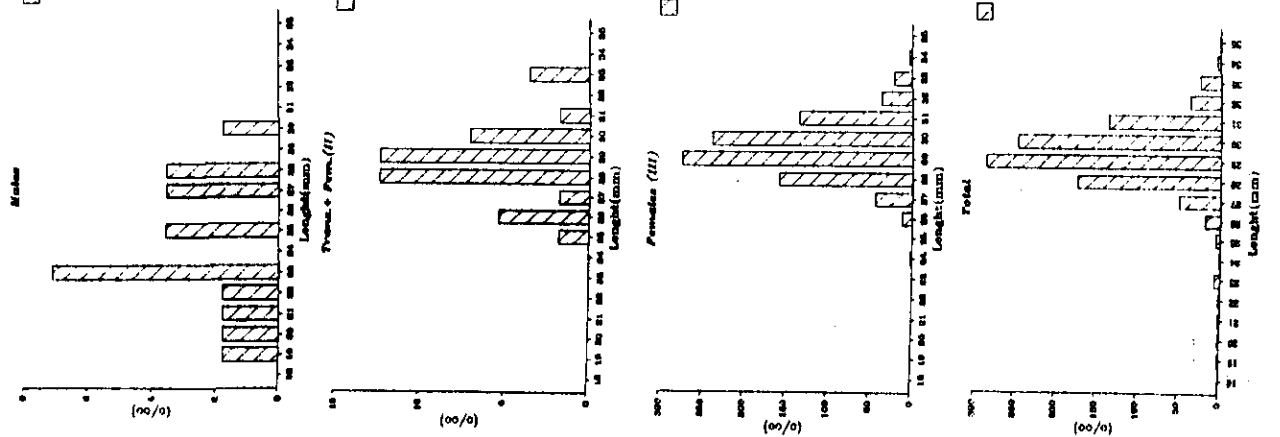
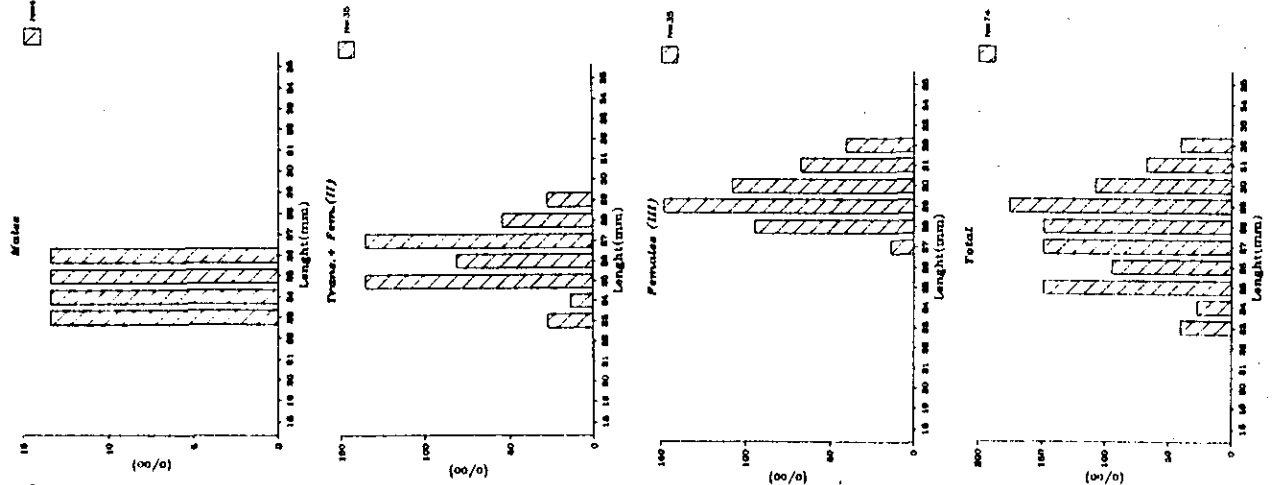
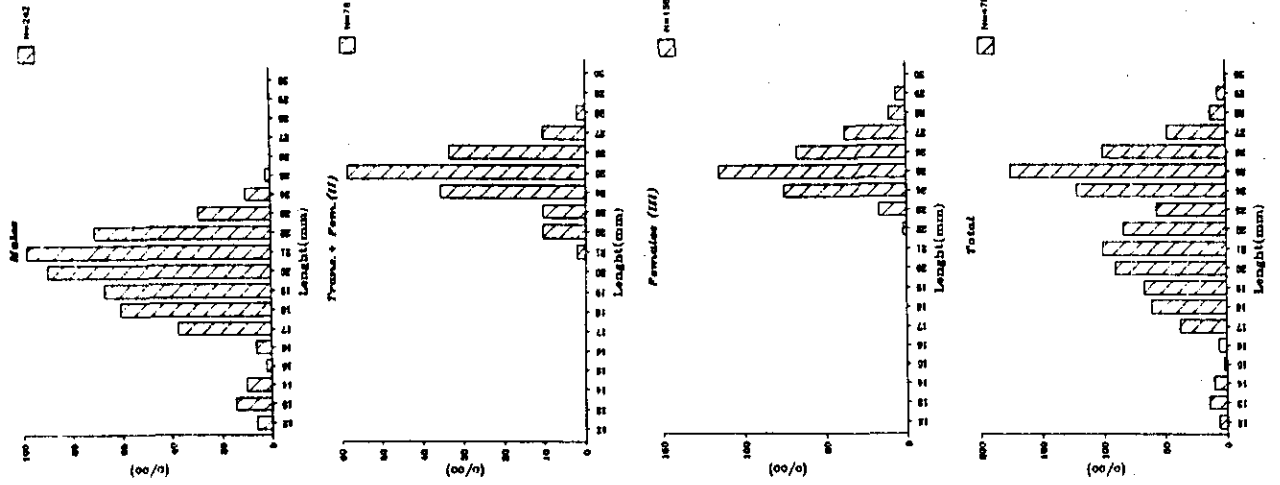


Fig. 14 - Length frequency distribution of *Pandalus borealis* in commercial shrimp samples off West Greenland in July-August 1986.

Fig. 13 - Length frequency distribution of *Pandalus borealis* in commercial shrimp samples off East Greenland. a - April-May 1986 b - September 1986