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Data on catches, CPUE and biomass
of shrimp (Pandalus borealis) from the
French fishery off West Greenland in 1979

by

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Introduction.

The French fishery for shrimp (Pandalus borealis) off West Greenland was again conducted in 1979 by the freezer trawler Finlande III which to date has completed two trips, one from 4 July to 4 September and other from 18 September to 30 October. The fishing logbooks including information on date, position and depth at start and end, time, duration and catches for each tow were provided for analysis at the St. Pierre Laboratory. Also were collected on board, before commercial sorting, samples of shrimp : five during the first trip and three during the second one (Table 1). These samples, kept frozen, were also examined at the Laboratory.

Observation on samples.

After separation and weighing of the different sexual stages in each sample, the carapace length (Lc) of each specimen was measured to the millimeter below. The length distributions of shrimp collected during the first trip are indicated in Table 2 and illustrated in Fig. 1. Those for samples collected during the second trip are indicated in Table 3 and illustrated in Fig. 2.

The proportions in number and weight of each sexual component in each sample are given in Table 4. The most notable changes are the progressive decrease in number and weight of females in the samples of trip no. 1 and, on the contrary, the greater percentages of females in the samples of trip no. 2 and particularly of berried individuals.

Composition of catches.

During the first trip, 221 metric tons of shrimp were caught : 115 tons from 4 to 30 July and 106 tons from 1st August to 4 September. During the second trip, the catch was 123 tons composed of 29 tons from 18 to 30 September and 94 tons from 1st to 30 October.

The length distributions of male, transitional and female shrimp reported to the total catches during the two trips are illustrated in Fig. 3, indicating no significant change from one to another.

The mean carapace length (\bar{L}_c in mm) for each sexual component are as follows :

Trip No. :	♂	♀	♀			
			NR	HR	KR	BR
I :	21.7	23.6	26.6		23.7	
II :	22.1	23.8	25.1	26.9	28.7	25.9

The mean proportion in weight and removals of each sexual component, by month and trip, reported to the corresponding total catches are indicated in Table 5. It appears that proportionally more female were caught during the second trip due to larger catches of berried individuals.

Fishing effort.

Efforts calculated in adding all tow durations give values of 476 hours fishing in July, 533 hours in August, 268 hours in September and 308 hours in October.

The monthly distributions of the French fishing effort (in hour) are reported in Fig. 4, 5, 6 and 7 using the rectangular units (15° latitude \times 7.5° longitude) proposed by the Danish scientists.

These figures indicate that the effort was concentrated in a rather small area of the offshore grounds (between $67^\circ 15'$ and $68^\circ 00'$ latitude N) in July-August that spread and narrowed during the September-October period.

Catch-per-unit-effort.

Data on CPUE of shrimp (kg/hour) by month and by trip are indicated in Table 6. The resulting average figures were calculated from all reported catches including nil ones and without adjustments in relation to the fishing time (night or different periods of the day). Average CPUE were 208 kg/hour and 240 kg/hour for the first and second trip respectively.

The distribution of CPUE (kg/hour) are reported in Fig. 8 and 9 for the first and second trip respectively using again the rectangular unit areas. These figures indicate also the slight change in the area covered during each trip.

Estimate of the minimum exploitable biomass.

Taking into account the specifications of the gear used by Finlande III (opening of 17.5 m between wings) and the average trawling speed (2.8 knots) the area swept by the commercial trawl in one hour of fishing is calculated to be 0.09 km^2 .

- Estimate from data of the first trip.

The average CPUE calculated for the first trip (208 kg/h) can be expressed = 2.311 tons/km^2 . The area of fishing concentration during this trip (s_1) consists of 40 rectangular units i.e. approximately $6,000 \text{ km}^2$. The value of the minimum exploitable biomass in s_1 is then $b_1 = 14,000 \text{ tons}$.

When referring to the results of R/V Thalassa in September-October 1979 (DUPOUY et al., 1979) the area s_1 corresponds approximately to :

1/2 area of stratum No. 05 i.e. 320 km²
plus 2/3 area of stratum No. 06 i.e. 2400 km²
plus area of stratum No. 09 i.e. 1600 km²
and plus 1/2 area of stratum No. 04 i.e. 1500 km²

i.e. a total of 5820 km² in which the mean adjusted catch is 2.416 tons/km² and the biomass estimate 13,500 t.

For the remainder of the area surveyed by R/V Thalassa (strata No. 02, 03, 10, 11, 12, 13, 15 i.e. 20,000 km²), the mean adjusted catch is 1.022 kg/km². This indicates that outside the concentration area s_1 , the CPUE must be considered as about the half of the value found inside.

Considering the total area of shrimp distribution on the offshore grounds of West Greenland $S = 34,000$ km² (HORSTED, 1978), the area outside s_1 is $s'_1 = 28,000$ km² and the value of the minimum exploitable biomass in s'_1 is then $b'_1 = 32,000$ tons.

The first estimate of the minimum exploitable biomass (B_1) for the area S as a whole is therefore 46,000 tons.

- Estimate from data of the second trip.

CPUE = 240 kg/h = 2.667 tons/km²
 $s_2 = 32$ units ≈ 5000 km²
 $b_2 = 13,000$ tons
 $s'_2 = 29,000$ km² with a CPUE of 1.334 tons/km²
 $b'_2 = 39,000$ tons
 $B_2 = 52,000$ tons

From these results, the minimum exploitable biomass of shrimp off West Greenland in 1979 is therefore ranging between 46,000 t and 52,000 t. However, taking into account that the totality of shrimp on and off bottom is not caught by the trawl and that the CPUE values were not adjusted to diurnal variations in availability of the species, these estimates must be considered as very minimum.

References

- DUPOUY, H., J. FRECHETTE, and C. LEROY. 1979. Biomass estimate of the northern deepwater shrimp, Pandalus borealis, in NAFO Divisions 1B and 0B - R/V Thalassa survey, September-October 1979. NAFO/SCR Doc. 79/XI/6, Serial No. N017.
- HORSTED, Sv. Aa. 1978. A trawl survey of the offshore shrimp grounds in ICNAF Division 1B and an estimate of the shrimp biomass. ICNAF Sel. Papers No. 4, 23-30.

Table 5. Mean percentages in weight and removals of each sexual stage of shrimp, by month and trip, reported to the catches of Finlande III at West Greenland in 1979.

Trip No.	Fishing Period	Males		Transitionals		NR		HR		Females		BR		Preliminary Total Catch (MT)
		W %	Catch (MT)	W %	Catch (MT)	W %	Catch (MT)	W %	Catch (MT)	W %	Catch (MT)	W %	Catch (MT)	
I	4-31 July	23.5	27	8.7	10		67.8		78		0	0		115
	1 Aug.-4 Sept.	23.6	25	14.2	15		61.3		65		0.9	1		106
	TOTAL	23.5	52	11.3	25		64.7		143		0.5	1		221
II	18-30 Sept.	17.2	5	3.4	1	(0)	72.4	21	0		6.9	2		29
	1-30 Oct.	20.2	19	6.4	6	3.2	42.6	40	(0)		27.7	26		94
	TOTAL	19.5	24	5.7	7	2.4	49.6	61	(0)		22.8	28		123

Table 6. Catch and effort data by month and trip for Finlande III at West Greenland in 1979.

Trip No.	Fishing Periods	Catch (kg)	Effort (h)	CPUE (kg/h)
I	4-31 July	115,010	476	241
	1-31 Aug.	95,270	533	178
	1-4 Sept.	11,330	58	195
	TOTAL	221,610	1067	208
II	18-30 Sept.	30,170	210	143
	1-30 Oct.	(94,000)	(308)	(305)
	TOTAL	(124,170)	(518)	(240)

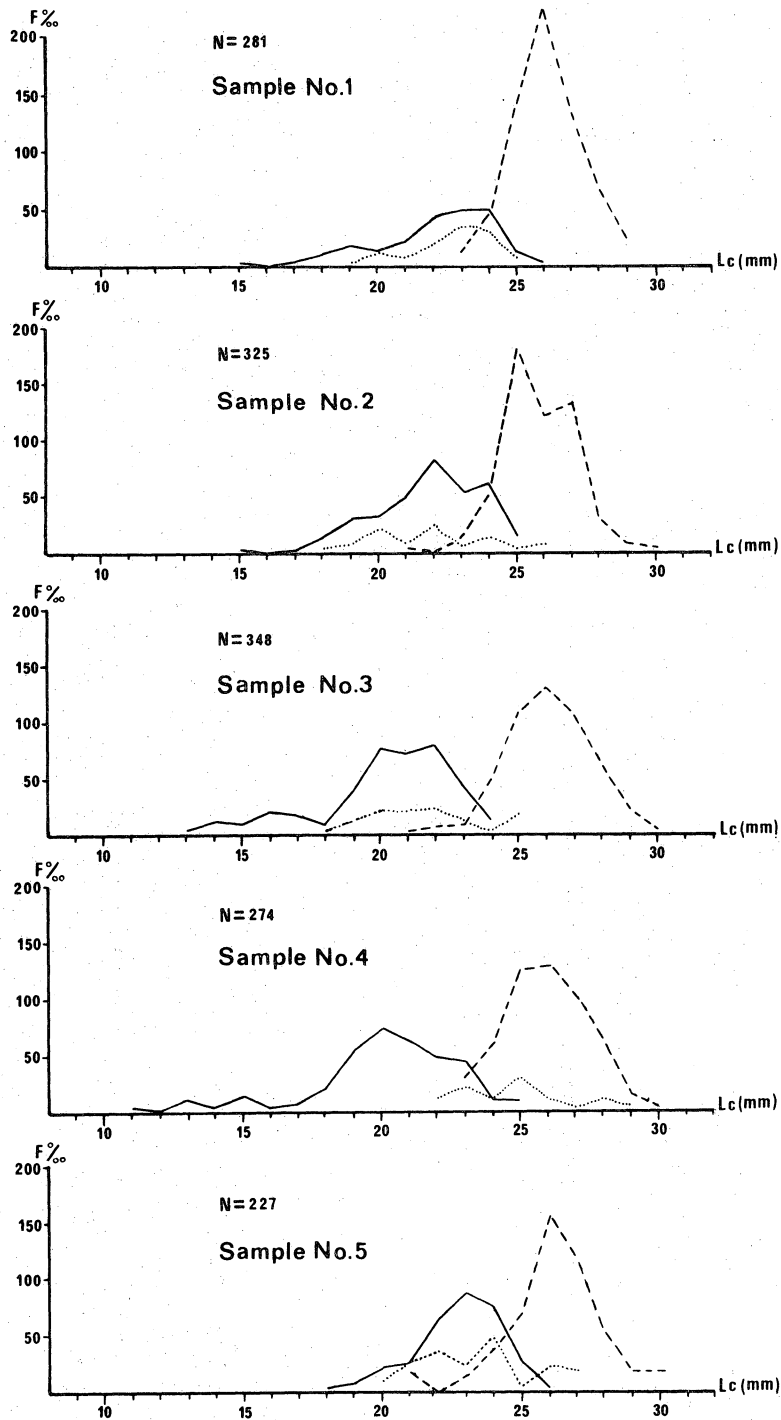


Fig. 1 - Length distribution of male, transitional and female shrimp in samples collected during the first trip of Finlande III at West Greenland (4 July-4 September 1979).

- For symbols, see Fig. 2.

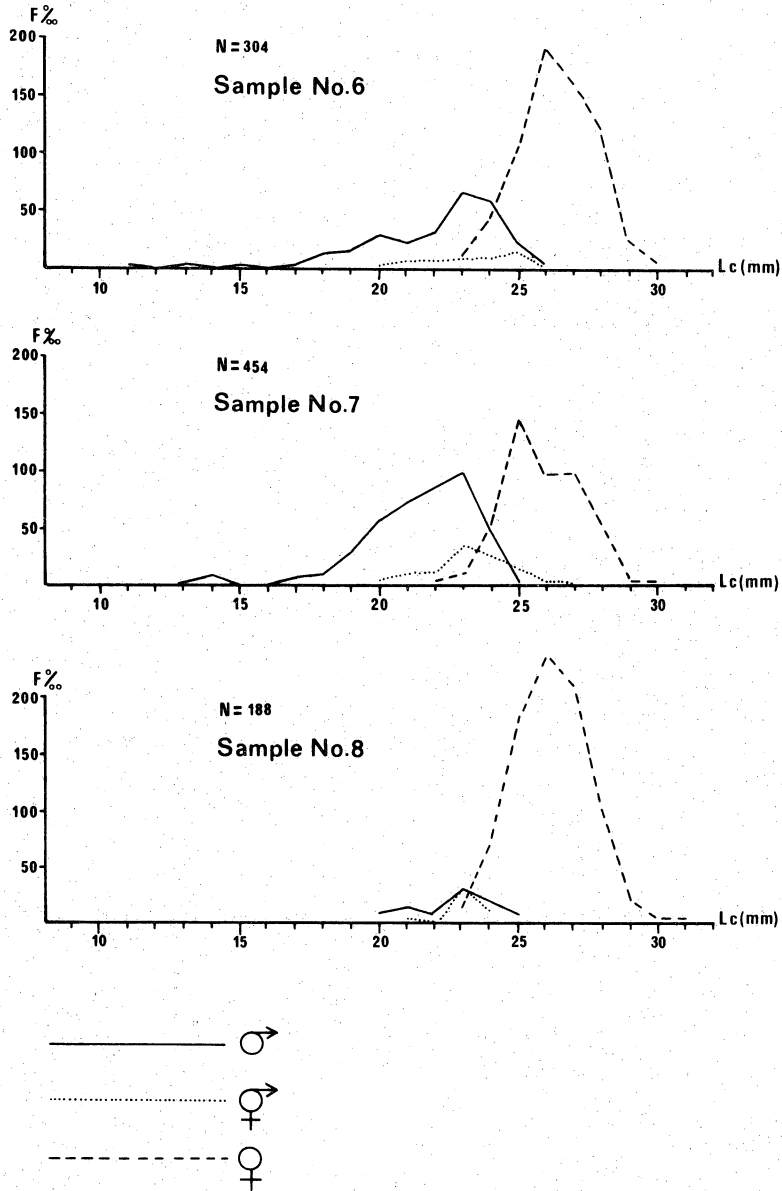


Fig. 2 - Length distribution of male, transitional and female shrimp in samples collected during the second trip of Finlande III at West Greenland (18 September-30 October 1979).

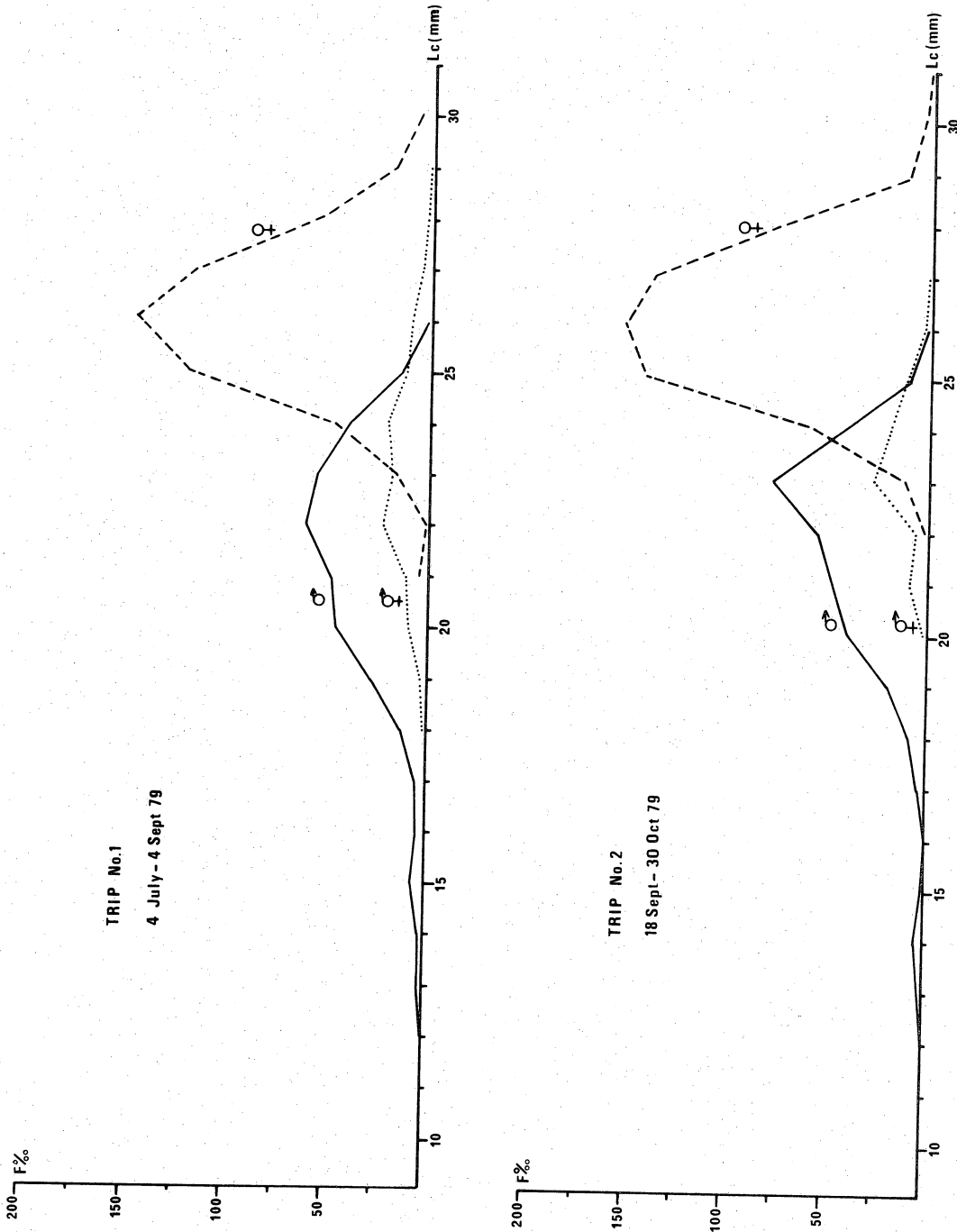


Fig. 3 - Length distribution of male, transitional and female shrimp in the catches of Finlande III during the two trips at West Greenland in 1979.

- For symbols, see Fig. 2.

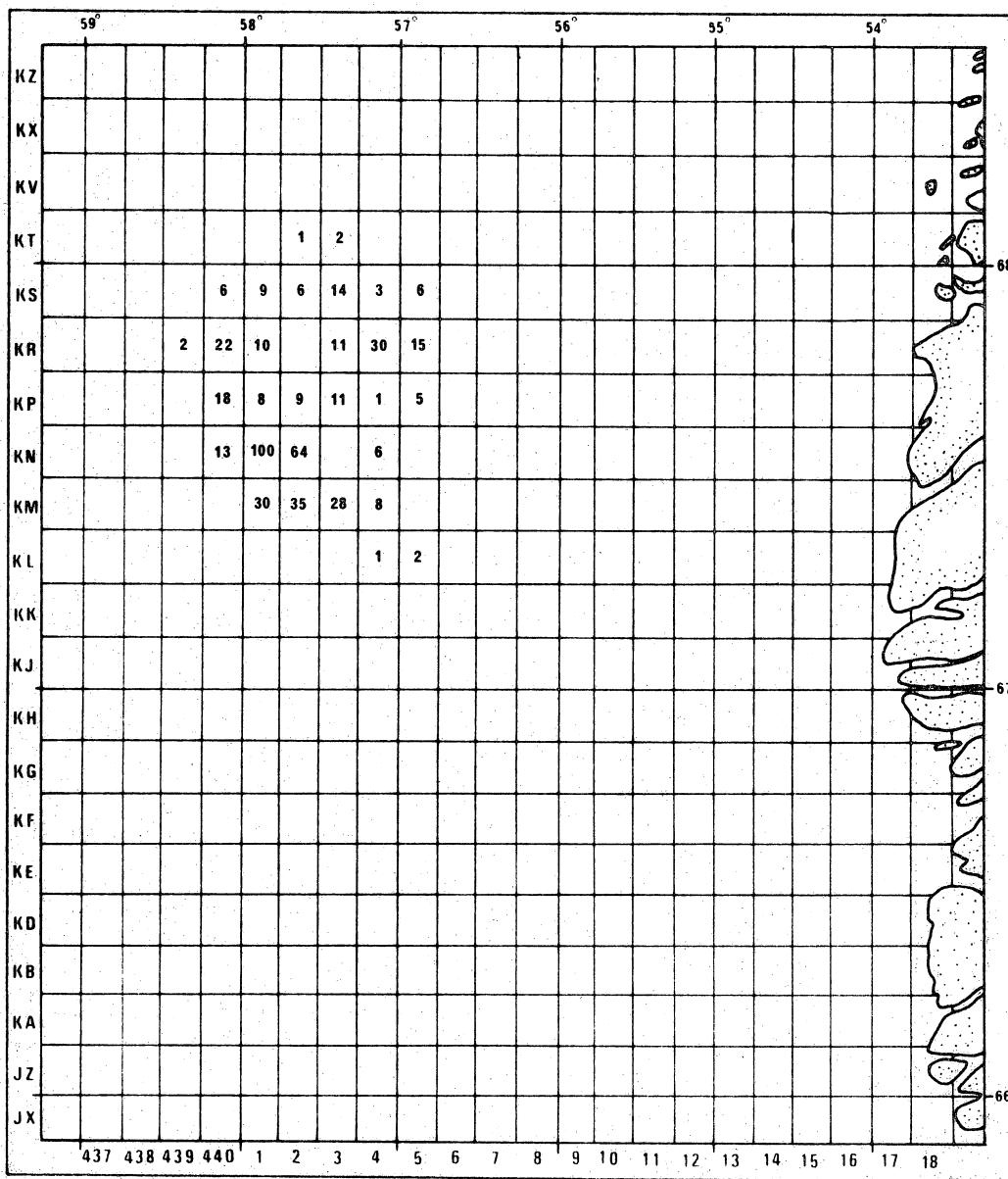


Fig. 4 - Distribution of the fishing effort (hours) of Finlande III at West Greenland, in July 1979.

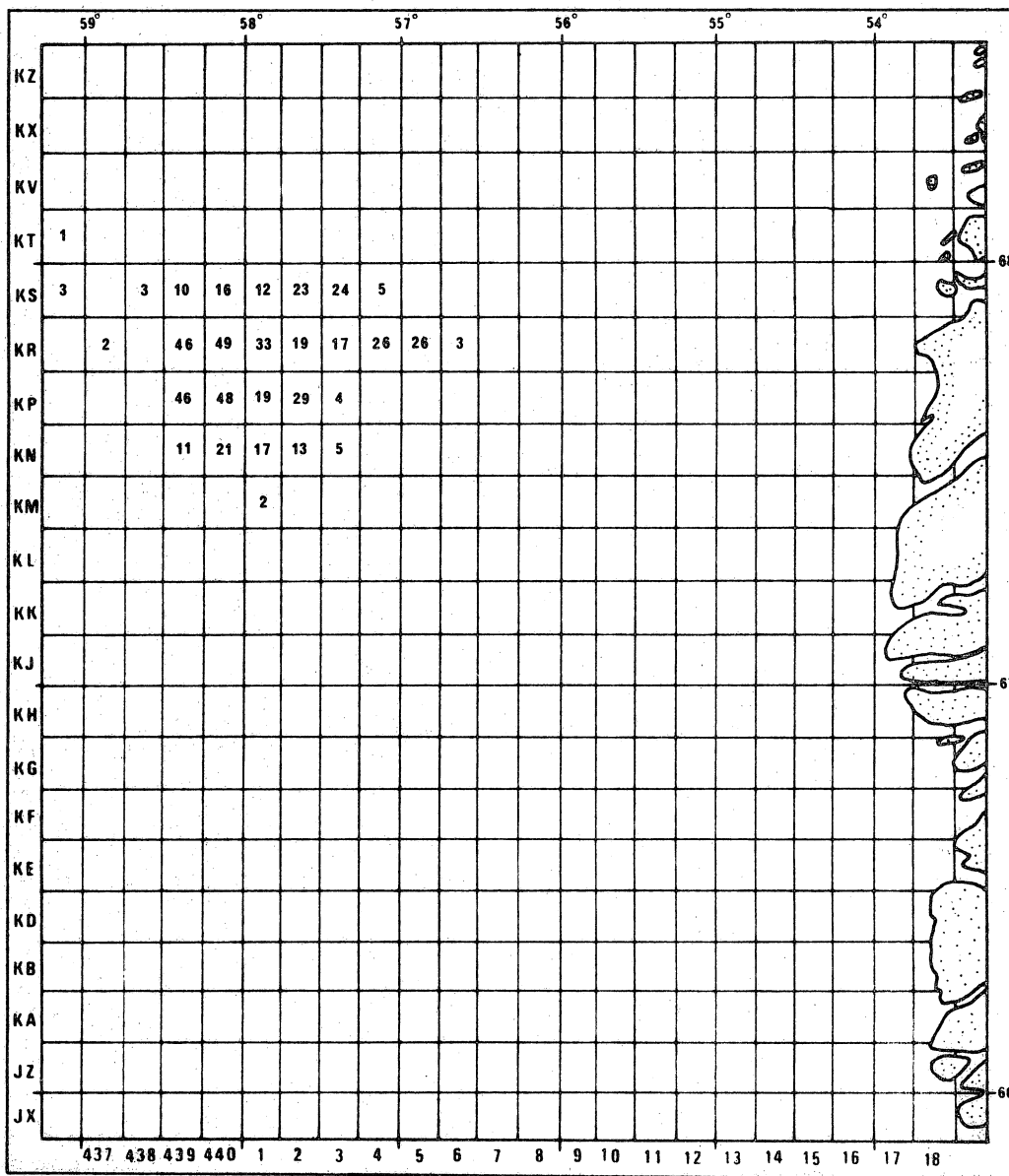


Fig. 5 - Distribution of the fishing effort (hours) of Finlande III at West Greenland, in August 1979.

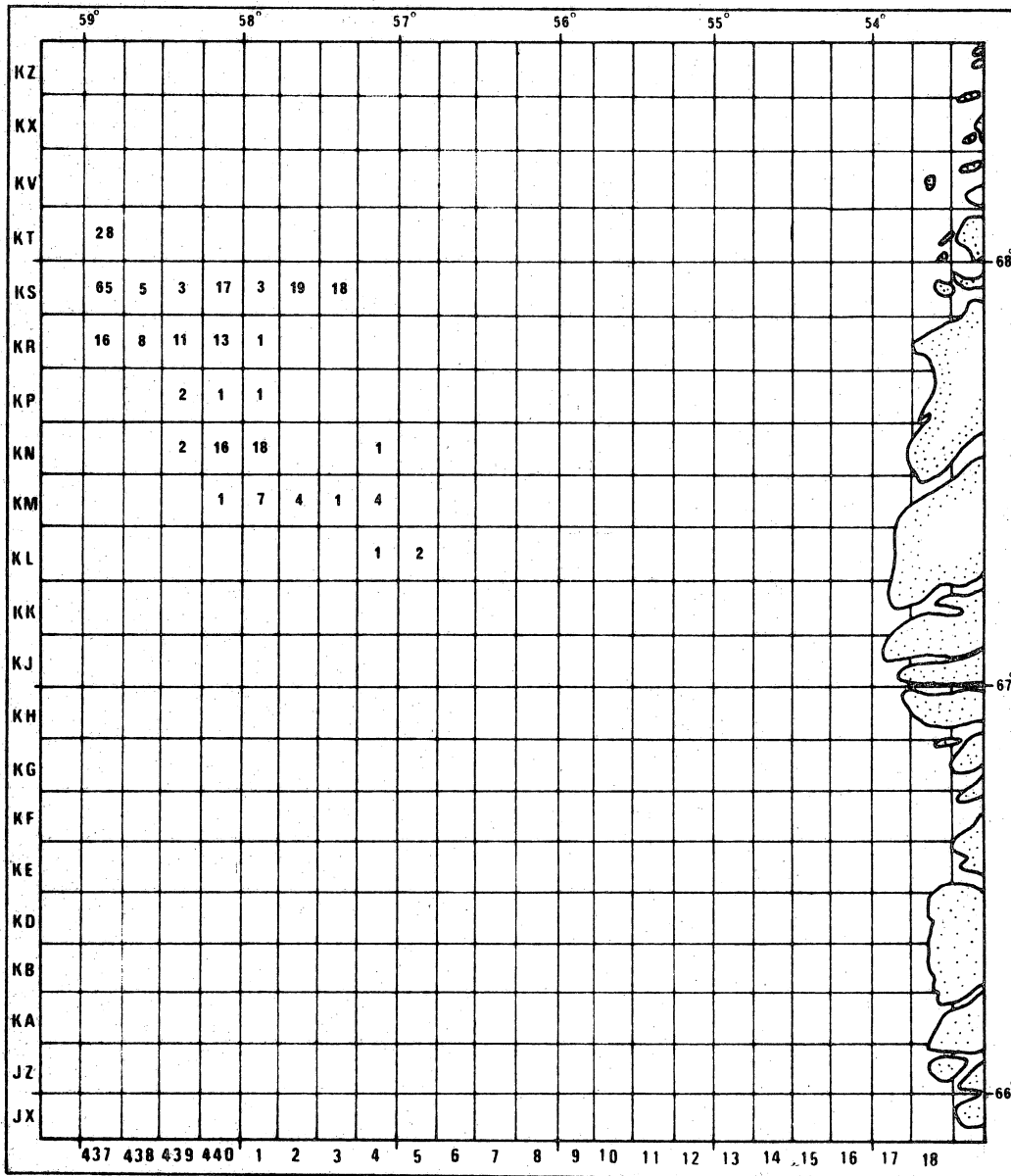


Fig. 6 - Distribution of the fishing effort (hours) of Finlande III at West Greenland, in September 1979.

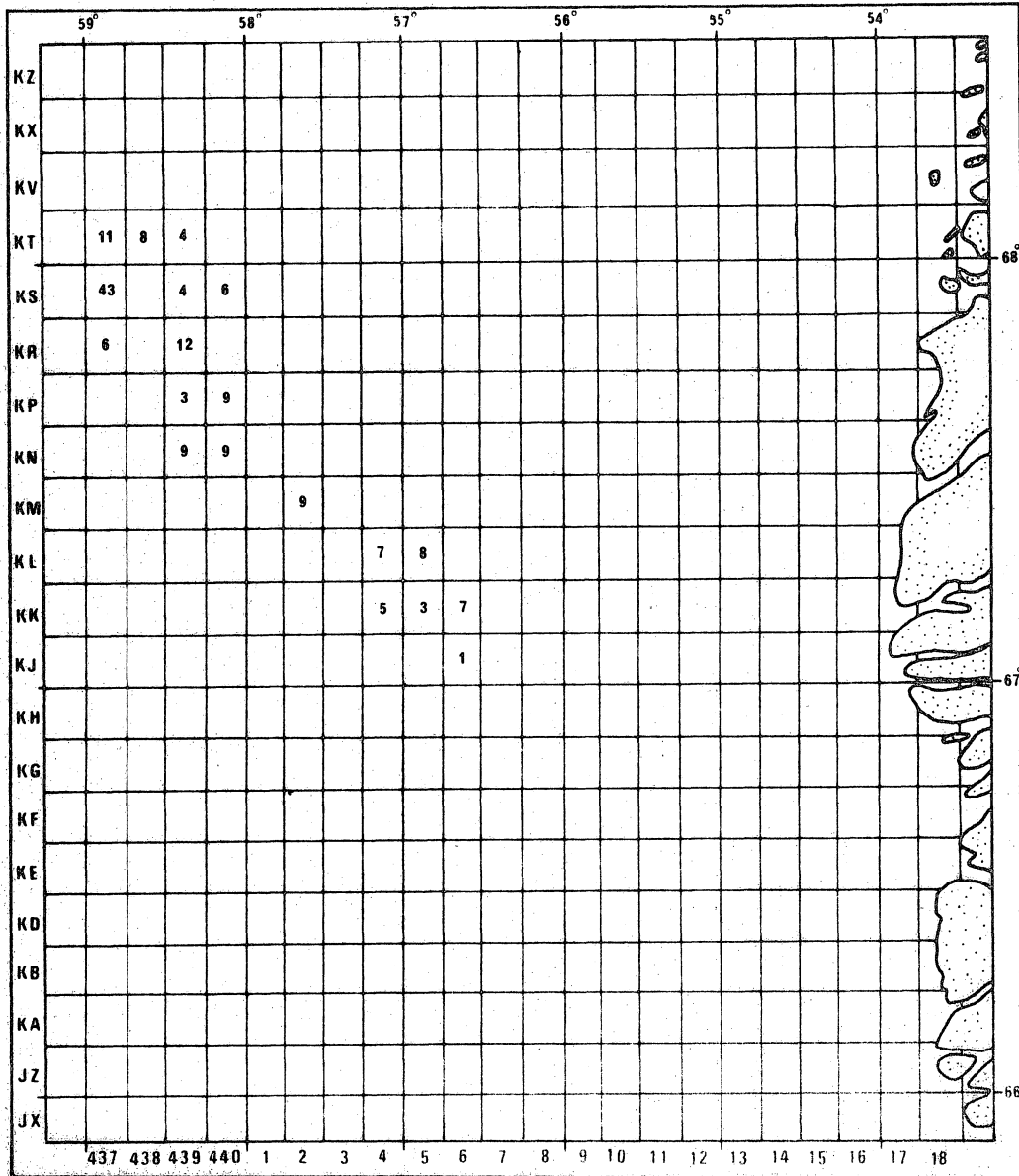


Fig. 7 - Distribution of the fishing effort (hours) of Finlande III at West Greenland, during a part (1-16) of October 1979.

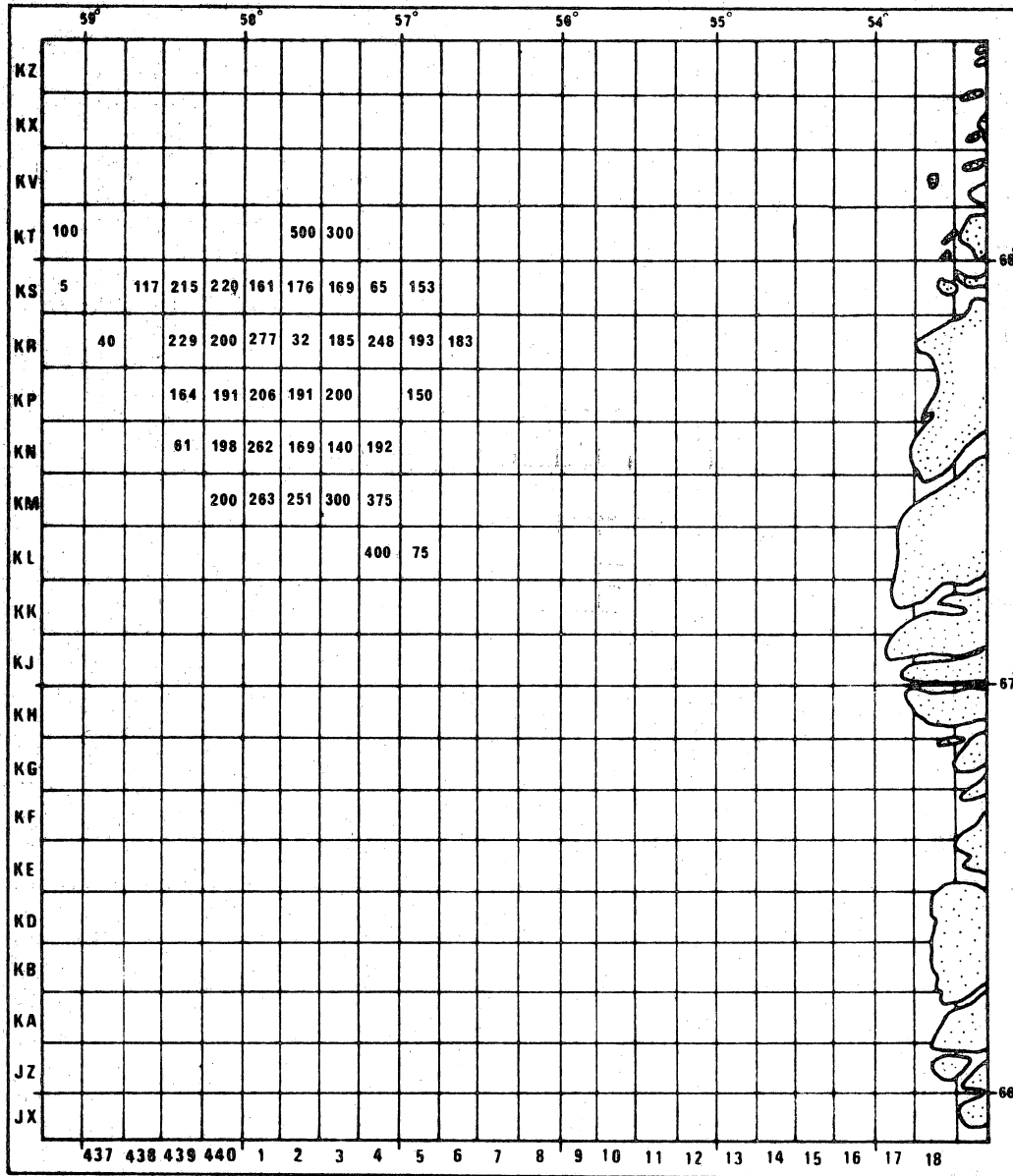


Fig. 8 - Distribution of the CPUE (kg/hour) of Finlande III during the first trip at West Greenland (4 July-4 September 1979).

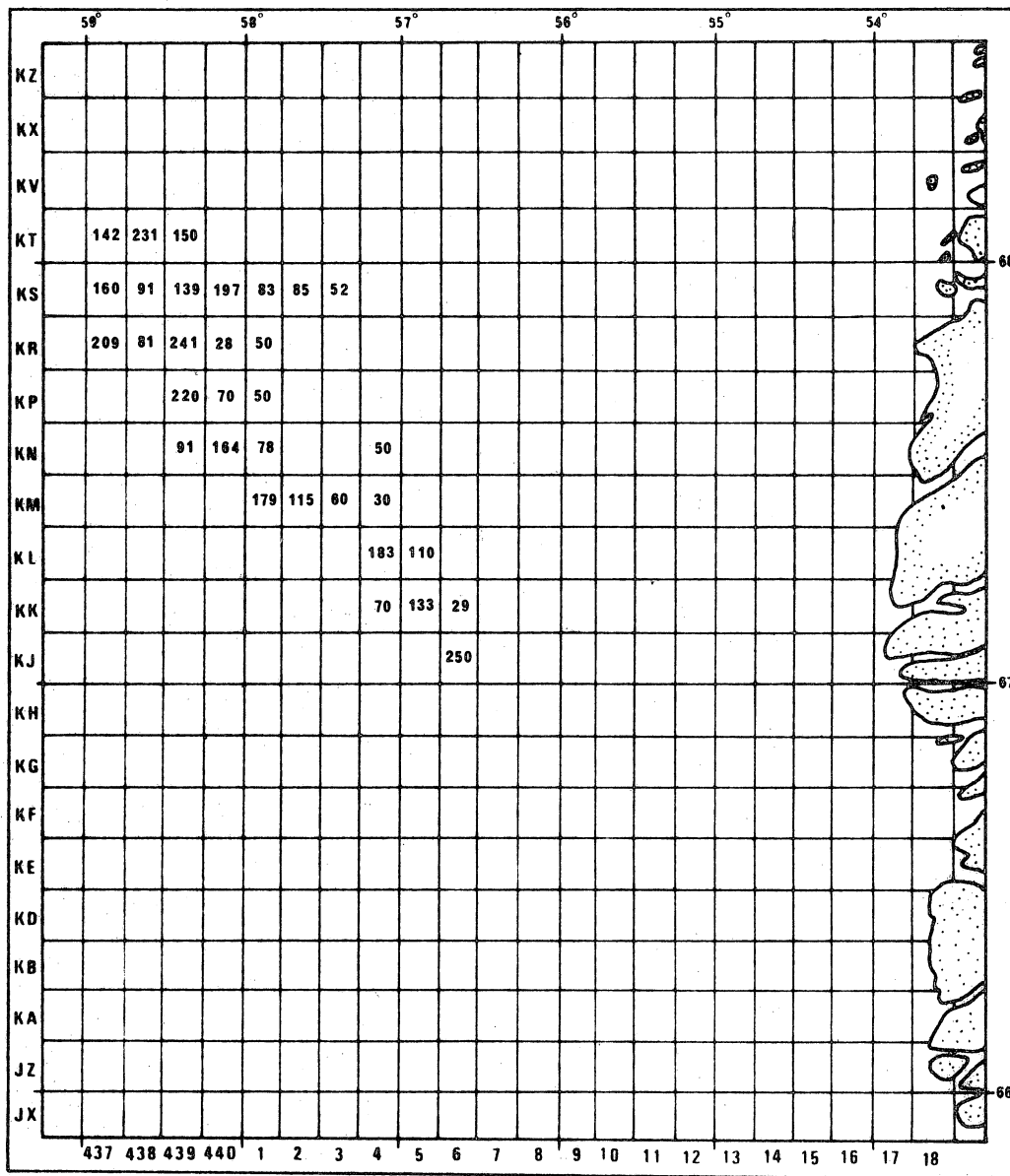


Fig. 9 - Distribution of the CPUE (kg/hour) of Finlande III during a part of the second trip (18 September-16 October 1979).