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Preliminary Report of a Cruise with M/T "MASI" to East Greenland Waters in September 1985

by

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1. INTRODUCTION

In the last years a total of about 5000 tons of shrimp have been fished in Denmark Strait. Except for sampling of the commercial catches, little is known about the stock in this area. Therefore, Norway has since 1983 conducted scientific cruises in East Greenland waters (Smedstad, 1984 and 1985). In 1983 the cruise was carried out with R/V "Eldjarn" in november, but the investigations were very hampered by ice. In 1984 we therefore carried out the investigations earlier in the autumn. A freshfish trawler were hired for the period 7 - 28 September. The experience from this cruise were so good that the same period and also the same ship were chosen for 1985. The cruise were carried out in the period 26 August - 26 September 1985. This report gives some results from that cruise.

2. MATERIAL AND METHODS.

The investigated area lies between 65^0N and 68^0N (Fig. 1). We had no problems with ice.

M/T "Masi" F 68 H is a commercial freshfish trawler 46.7 m long with a main engine of 1200 Hp. The bottom trawl equipment was as follows:

Trawldoors: Steinshavn nr 8 (about 8 m^2).
Bridles : 40 m.
Gear : Six 21" steelbobbins on each side, and six 24" steelbobbins in the middle.
Trawl : "Campelen Super 1800 mesh" shrimp trawl with 35 mm meshes in the codend and an innernet with 4 mm meshes. 50 extra floats along the sides and about 20 extra floats along the fishline.

Towing speed was 2.5 knots and standard towing distance was 1 nautical mile. In the western area, the bottom conditions were so bad that we had to trawl 0.5 nautical mile. 68 trawlstations were taken. The positions are seen in Fig. 1.

For calculations of "swept area" we used 11.7 m as the width of the trawl. This is the same width as used in the Barents Sea for the same trawl (Teigsmark and Øynes, 1982).

In lack of good depth-data over the area, the different strata were defined as statistical squares (Fig. 2).

The statistical treatment of the catch data were done as descr ibed in Teigsmark and Øynes (1981).

The carapace length was measured to nearest mm below. One sample was frozen and taken to the laboratory where each shrimp was weighed.

The determination of sex was based on the form of the endopodite of the first pleopod as described by Rasmussen (1953). Females and transitionals were classified by use of the following scheme:

1. (BR - E): Ovigerous females, eyes not visible on the eggs.
2. (BR + E): Ovigerous females, eyes visible on the eggs.
3. (JH) : Females with setae on the pleopods.
4. (HR) : Females or transitionals with head roe.
5. (WR) : Females or transitionals without roe.

Stages found on this cruise were males, transitionals without roe, females without roe, females with head roe and ovigerous females with no eyes on the eggs.

On this cruise we had no possibility to take hydrographical samples.

3. RESULTS

The catches are tabulated in Table 1. The biggest catches of shrimp were taken in strata 19 and strata 15.

3.1 Horizontal distribution

The horizontal distribution of the sexes shows the same pattern as found in 1984. Fig. 3 shows that males and transitionals were found in greatest numbers in the western and northern areas. Transitionals were, however, scarce. The numbers represent mainly males. Looking at the relative abundance of males in different strata (Fig. 4), we find the same pattern with highest abundance in west (strata 18, 19, 24 and 25) and in north (strata 1, 7, 15, 16 and 17). Males were found in smallest numbers around Dohrn Bank (strata 21, 22, 27 and 28). For the total investigated area 42.6 % of the shrimp in numbers were males.

Females were also found in greatest numbers in west (strata 18, 19 and 20) and in north (strata 8 and 15) (Fig. 5 and 7). Most of the females were ovigerous (BR - E), very few had head roe (HR), and 21 % of the females were without roe (WR). The highest frequencies of females without roe were found in the north and the lowest frequencies around Dohrn Bank (Fig. 6).

3.2 Length distribution

Fig. 9 shows length distributions of shrimp from selected stations. The stations 67, 58 and 11 represent a line from north to south with 67 as the northern and 11 as the southern station (Fig. 1). It is clearly seen from these samples that the shrimps increase in length southwards. It is also seen that the smallest males are mainly found in the north.

Station 45 represent the western area. Compared with station 11 the same pattern is seen: An increase in length from west towards the Dohrn Bank area, and greater frequencies of males smaller than 25 mm in the western area.

In spite of using an innernet with 4 mm mesh size in the cod end no specimens smaller than 20 mm carapace length were found in the samples.

3.3 Length/weight relation

Fig. 10 shows the length/weight relation from one sample. The relation for shrimps without eggs were found to be:

$$w = 0.00148\ L^{2.71}$$

Dupoy et al. (1983) found the following equations from samples taken in springtime:
Ovigerous females:

$$w = 0.001773\ L^{2.718}$$

Individuals without eggs:

$$w = 0.000788\ L^{2.924}$$

In the Barents Sea Teigsmark (1983) found values of b from 3.10 to 3.15.

3.4 Biomass

Table 2 and Fig. 8 shows the calculated biomasses for each strata. The stock in the investigated area were estimated to 31 000 tons with a Standard Error of 4500 tons. We must, however, stress that some of the strata only have one trawl station, and in those cases the Standard Error has been set to zero when calculating the overall Standard Error. The number of trawl stations should have been greater in the western area, but we had problems with the bad bottom conditions. The accuracy of the biomass estimation is less because of this, but we think that the present estimation gives an aproximate level of the stock size in the investigated area.

4. DISCUSSION

The present results agree well with the results from last year, and support the theory of the Dohrn Bank area as a spawning area, the nothern and western areas being nursery areas and with an activ migration of ovigerous females towards the spawning area in winter and early spring. The commercial fishery in spring takes mainly place in strata 27 and 28 and to some extent in strata 21 and 22 if the ice conditions are good. Most of these catches are females. Both in 1984 and in 1985 very small concentrations of shrimp were found in these areas in September. The Norwegian fishery in spring 1985 was good (Smedstad and Torheim, 1986).

The length frequencies and the horizontal distribution of males indicates that the nursery areas are north and west of the Dohrn Bank area. The lack of specimens smaller than 20 mm is, however, a bit puzzeling. Either the small specimens must live north and west of the investigated area, or they must live more pelagic or very close to the bottom in September. In all cases they seem to be very difficult to catch with a trawl in September.

5. REFERENCES

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Tabel 1. Catch per 3 nautical mile (kg) taken by M/Tr "Masi" in September 1985.

St. nr.	Positions	Depth	Shrimp	Cod	Greenland halibut	Sebastes mentella	Sebastes marinus	Polar cod	Catfish	Smaller catfish	Grenadier
1	65°32'N-29°31'W	400		Stuck in the bottom							
2	65°30'N-30°31'W	385	-	91,7	6,9	-	414,0	-	23,9	11,0	
3	65°46'N-30°20'W	424	1,5	-	10,1	45,8	6,0	+	0,3	1,5	-
4	65°45'N-30°08'W	401	24,8	-	-	124,5	15,0	+	4,5	-	50,0
5	65°45'N-29°49'W	326	0,8	4,1	8,3	64,4	7,5	-	6,9	9,0	36,0
6	66°01'N-29°46'W	295	2,4	19,5	52,5	18,0	-	-	84,0	-	6,5
7	66°00'N-30°05'W	360	2,3	2,6	23,3	12,0	-	1,5	12,6	-	-
8	66°01'N-30°48'W	470	5,3	-	10,8	8,6	2,0	+	1,5	-	11,0
9	66°12'N-30°44'W	509	1,2	-	25,5	3,5	0,8	+	-	-	6,8
10	66°09'N-30°03'W	348	0,5	-	60,0	15,0	-	-	21,8	-	-
11	66°11'N-29°55'W	300	26,4	2,0	67,5	11,0	-	-	34,5	0,8	24,0
12	66°12'N-29°35'W	310	0,6	-	-	4,8	-	-	-	0,5	7,2
13	66°21'N-29°20'W	310	61,5	7,5	77,3	+	+	+	15,0	-	-
14	66°22'N-29°52'W	329	18,6	0,5	96,0	45,5	4,1	+	6,0	-	1,2
15	66°20'N-30°05'W	365	5,4	-	148,5	23,4	-	0,3	1,7	-	4,5
16	66°21'N-30°36'W	436		Stuck in the bottom							22,5
17	66°35'N-30°41'W	485	2,4	-	18,0	2,3	-	0,6	-	-	
18	66°31'N-30°08'W	344	12,9	-	30,0	11,1	6,0	+	6,0	-	-
19	66°34'N-29°53'W	301	18,0	-	9,0	24,0	12,0	-	6,6	-	-
20	66°33'N-29°18'W	315	4,5	-	7,5	4,5	-	-	34,5	-	-
21	66°33'N-28°47'W	325	6,9	-	6,6	-	-	5,4	4,5	-	-
22	66°44'N-28°49'W	350	82,5	-	51,0	1,2	-	-	9,0	-	-
23	66°44'N-29°39'W	326	100,8	+	94,5	1,8	-	-	3,0	-	-
24	66°44'N-29°54'W	318	78,0	8,4	39,0	13,8	-	+	0,9	-	-
25	66°44'N-30°05'W	325	42,0	-	43,5	12,6	-	+	0,9	-	-
26	66°45'N-30°34'W	440	4,5	-	47,1	4,5	-	+	-	-	-
27	66°55'N-30°34'W	485	2,7	-	78,0	1,5	-	-	-	-	6,6
28	66°56'N-30°05'W	310		Sponge and stones							2,1
29	66°55'N-29°13'W	290	99,0	-	0,9	0,9	-	-	-	-	
30	66°55'N-28°47'W	315		Stuck in the bottom							-
31	67°06'N-28°45'W	326	63,0	-	46,2	-	-	-	-	-	
32	67°03'N-29°38'W	242	108,0	-	6,0	-	+	18,0	-	-	-
33	67°05'N-30°05'W	210	36,0	2,4	6,0	+	-	+	7,8	-	-
34	67°04'N-30°27'W	390		Sponge							-

Tabel 1. Continues.

St. nr.	Positions	Depth	Shrimp	Cod	*Greenland* halibut	Sebastes mentella	Sebastes marinus	Polar cod	Catfish	Smaller catfish	Grenadier
35	67°15'N-30°08'W	165		Thorne							
36	67°15'N-29°07'W	235	18.8	+	-	-	-	+	-	6.8	-
37	67°15'N-28°48'W	293	18.0	-	-	-	-	+	-	-	-
38	67°27'N-28°59'W	204	7.5	-	-	-	-	1.5	-	+	-
39	67°09'N-32°03'W			Stuck in the bottom							
40	66°49'N-31°32'W	349	28.8		+			+			
41	66°38'N-32°11'W	338	36.0	21.0	3.0	7.2		4.8			
42	66°41'N-33°08'W	295		Clay							
43	66°29'N-32°17'W	351	72.0	-	79.2	15.6	-	+		-	-
44	66°20'N-32°02'W	328	360.0	21.6	72.0	-	-	-		-	-
45	66°15'N-33°05'W	339	85.0	-	8.0	8.5	+	+	-	-	-
46	66°05'N-31°55'W	305	150.0	-	57.0	12.0	-	-		-	-
47	66°03'N-33°58'W	270	51.0	-	-	30.0	-	+		-	-
48	65°05'N-35°17'W	312	-	+	15.0	41.7	6.3	-	10.5	3.6	6.0
49	65°20'N-35°21'W	350	-	-	3.3	18.6	2.1	+	+		+
50	65°21'N-33°36'W	281	-	3.6	-	60.0	33.0	-	0.6	3.0	-
51	65°34'N-34°47'W	327	19.2	6.0	4.8	7.2	-	-	+	-	+
52	65°42'N-33°39'W	326	63.0	-	14.7	33.0	4.5	-	-	-	3.9
53	65°43'N-32°31'W	330	2.7	-	18.6	59.4	5.4	-	15.3	-	-
54	66°15'N-31°07'W	485	9.0	-	2.1	18.0	4.8	+	3.6		
55	66°24'N-31°10'W	443	30.0	-	+	8.4	-	1.8	-	-	-
56	66°40'N-31°10'W	450	5.0	-	65.0	7.5	-	+	-	-	-
57	66°27'N-29°36'W	315	46.5	-	33.9	25.5	2.1	+	10.8	0.9	-
58	66°38'N-29°37'W	302	133.5	-	7.5	3.6	-	0.9	3.9	-	-
59	66°43'N-28°23'W	318	90.0	-	5.7	+	-	+	18.0	-	-
60	66°56'N-27°24'W	373	6.6	-	27.6	2.1	-	0.6	-	-	-
61	66°55'N-28°27'W	344	4.2	-	39.6	+	-	+	12.6	-	-
62	67°05'N-28°16'W	348	1.8	-	21.9	+	-	-	3.0	-	-
63	67°10'N-26°47'W	436	-	-	72.0	-	-	5.4	-	-	-
64	67°17'N-27°12'W	330	-	-	66.0	-	-	37.5	-	-	-
65	67°27'N-28°19'W	293	16.8	-	+	-	-	2.4	10.2	-	-
66	67°37'N-29°00'W	278	4.8	-	1.2	+	-	1.5	-	-	-
67	67°44'N-29°48'W	270	27.0	-	1.5	+	-	+	6.3	-	-
68	66°38'N-29°36'W	302	127.5	-	27.0	21.6	-	-	7.8	-	-

Table 2. Estimated density ($\bar{C}_k$) and biomass in each stratum at East Greenland.

Stratum	Area nm^2	Number of hauls	$\bar{C}_k$ tons/nm^2	S_k^2	$V(\bar{c}_k)$	Coeff. of var. (S.E./ $\bar{c}_k$)	Biomass tons	S.E. of biomass
1	681.	2.	0.839	0.343	0.172	0.494	571.	282.026
7	696.	1.	1.899	0.000	0.000	0.000	1322.	0.000
8	696.	2.	3.344	5.544	2.772	0.498	2327.	1158.794
9	696.	6.	0.942	1.263	0.211	0.487	656.	319.386
12	710.	1.	1.899	0.000	0.000	0.000	1349.	0.000
13	710.	2.	0.892	0.394	0.197	0.498	633.	315.228
14	710.	5.	0.681	0.630	0.126	0.522	483.	252.046
15	710.	6.	4.778	5.080	0.847	0.193	3392.	653.311
16	710.	4.	2.422	4.555	1.139	0.441	1720.	757.639
17	710.	1.	0.348	0.000	0.000	0.000	247.	0.000
18	724.	2.	3.588	0.805	0.402	0.177	2598.	459.205
19	724.	2.	11.397	57.729	28.864	0.471	8251.	3889.734
20	724.	3.	3.324	10.741	3.580	0.569	2407.	1369.913
21	724.	4.	0.162	0.014	0.004	0.368	117.	43.285
22	724.	7.	1.921	2.783	0.398	0.328	1391.	456.536
23	739.	1.	1.013	0.000	0.000	0.000	749.	0.000
24	739.	1.	3.324	0.000	0.000	0.000	2457.	0.000
25	739.	1.	0.142	0.000	0.000	0.000	105.	0.000
27	739.	4.	0.376	0.290	0.073	0.716	278.	199.016
28	739.	1.	0.040	0.000	0.000	0.000	29.	0.000
						All strata:	31082.	4489.493

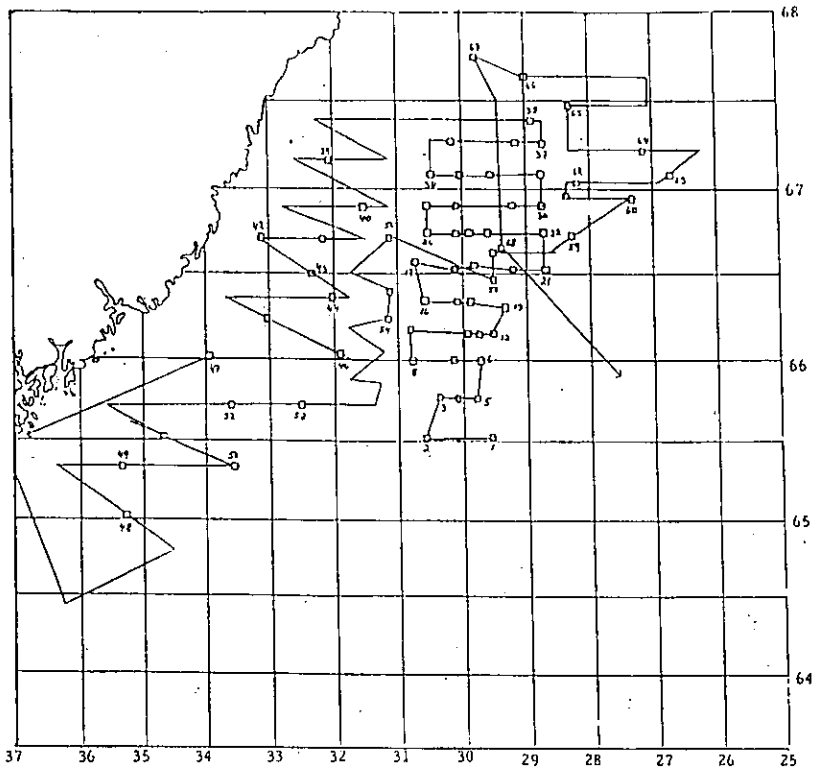

Figure 1. Survey tracks and trawl stations taken by M/T "Masi" in September 1985

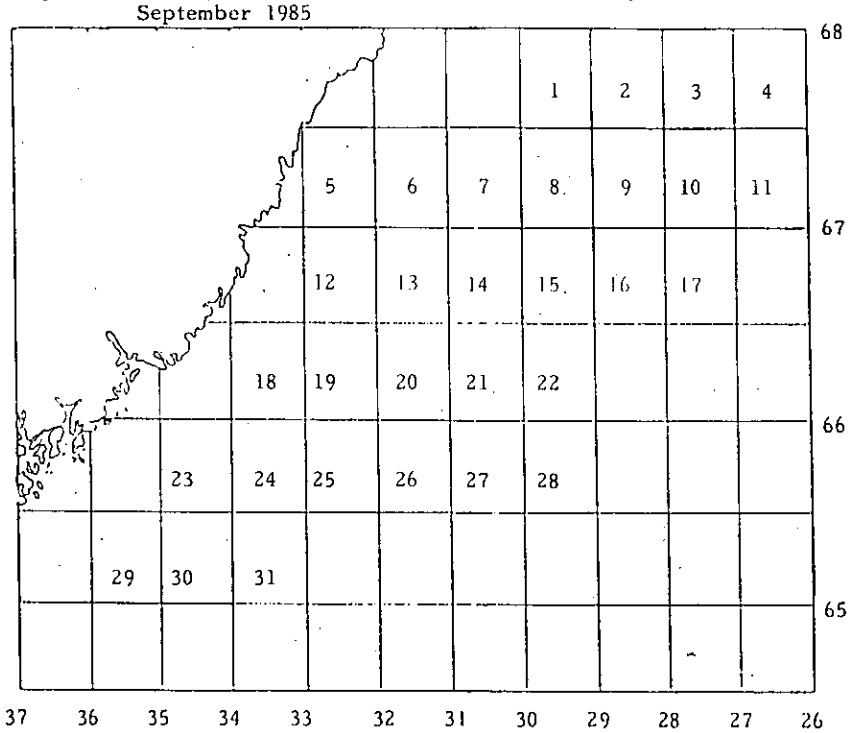

Figure 2. Strata numbers.

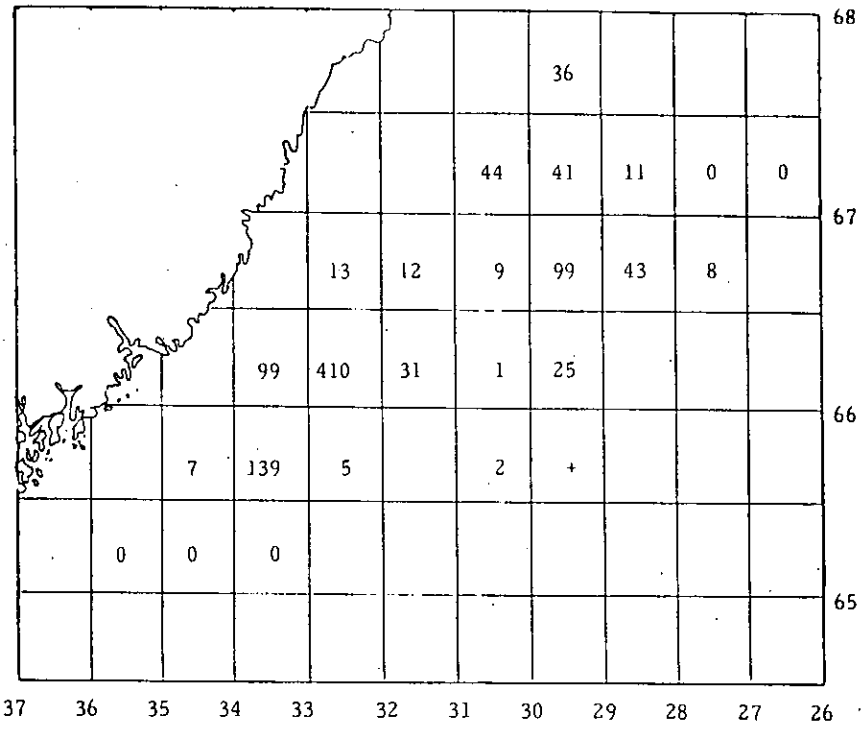

Figure 3 . Calculated numbers of males and intersexes (In millions).

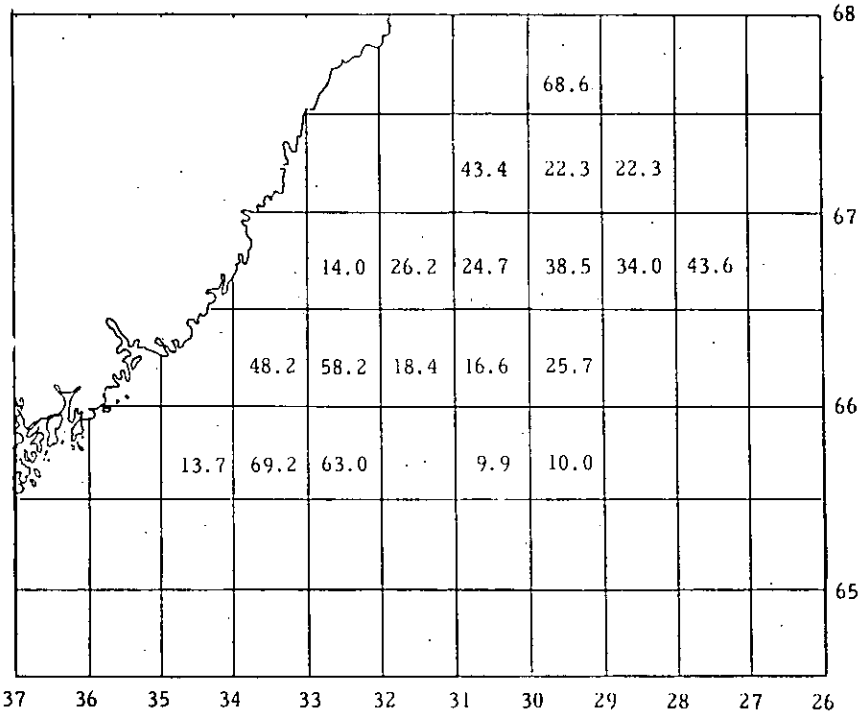

Figure 4 . Males and intersexes in per cent of total number.

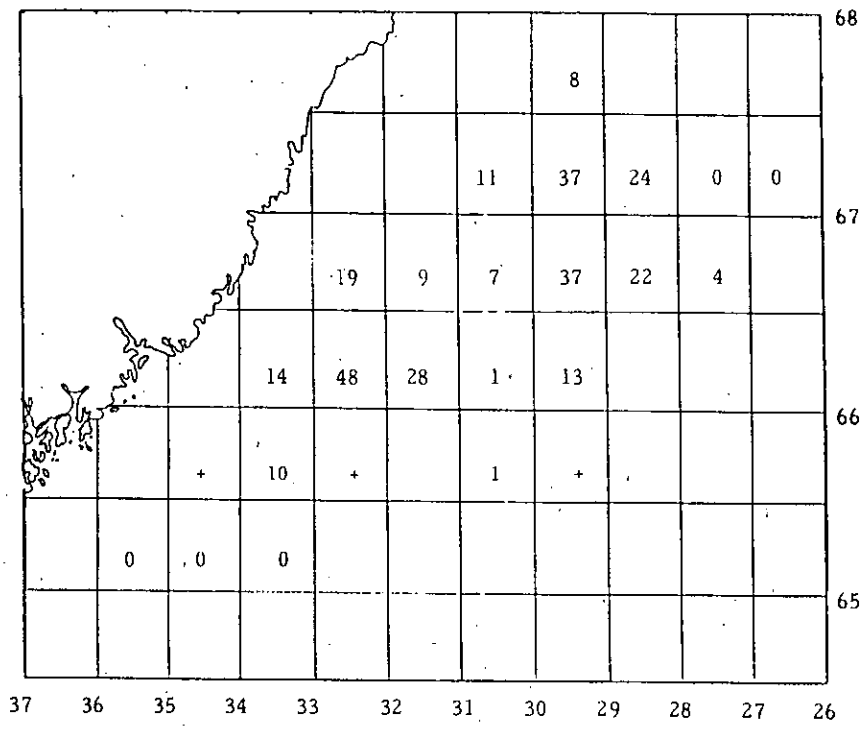

Figure 5 . Calculated numbers of female shrimp without roe. (In millions)

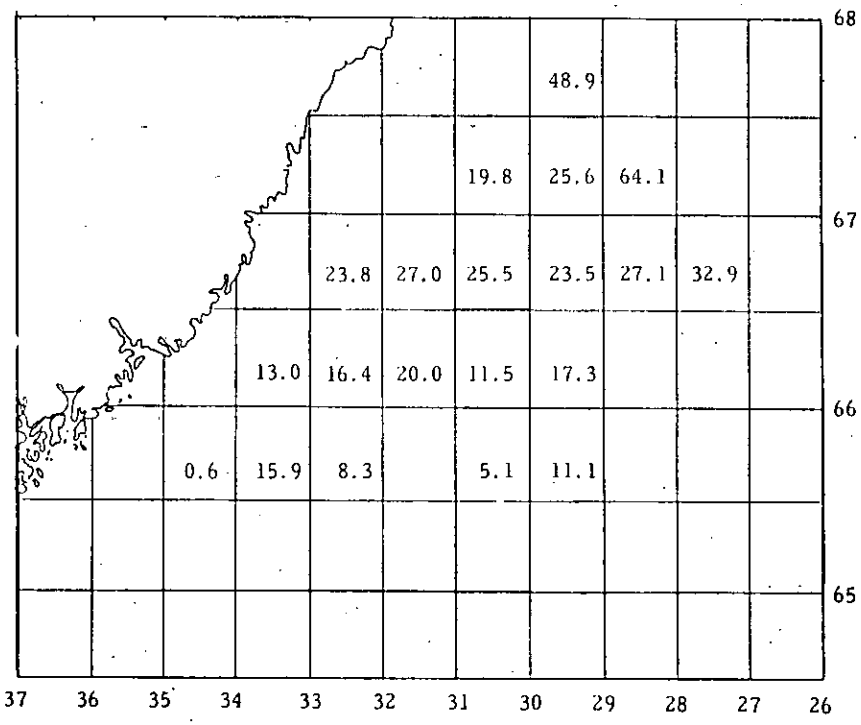

Figure 6 . Female shrimp without roe in per cent of total females.

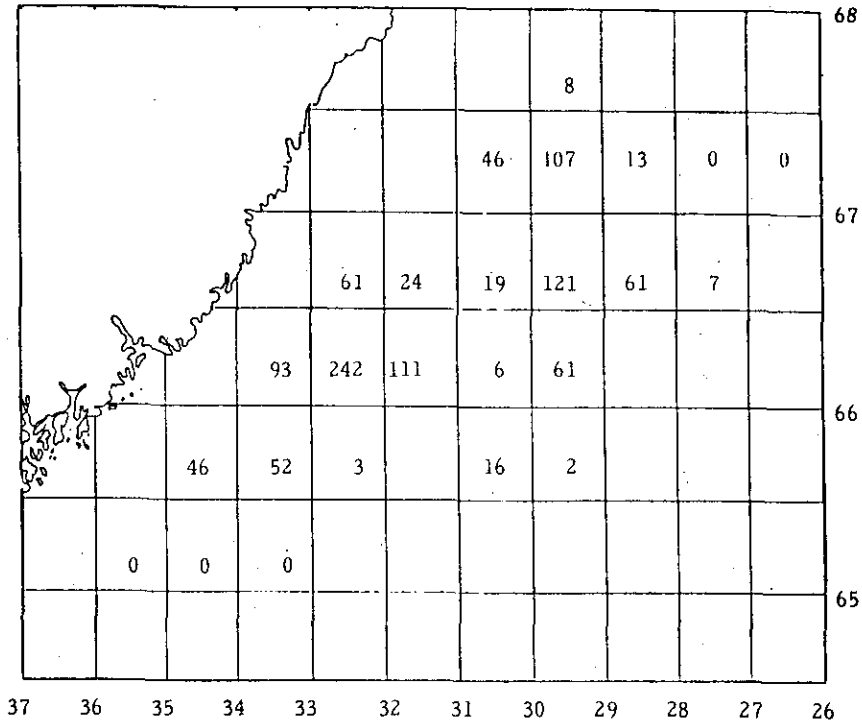

Figure 7 . Calculated numbers of females with roe. (In millions).

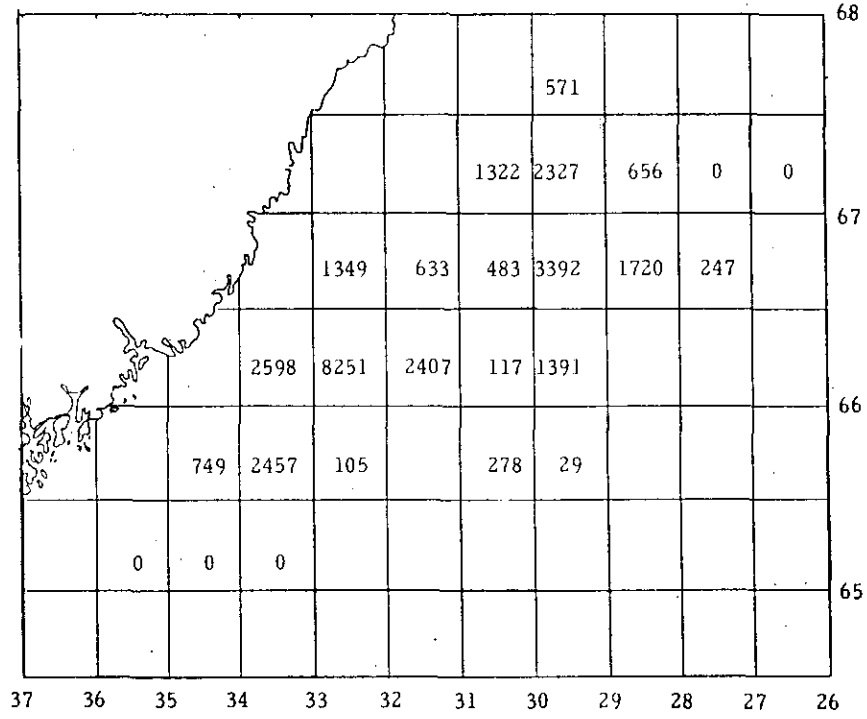

Figure 8 . Calculated total biomass of shrimp in tons.

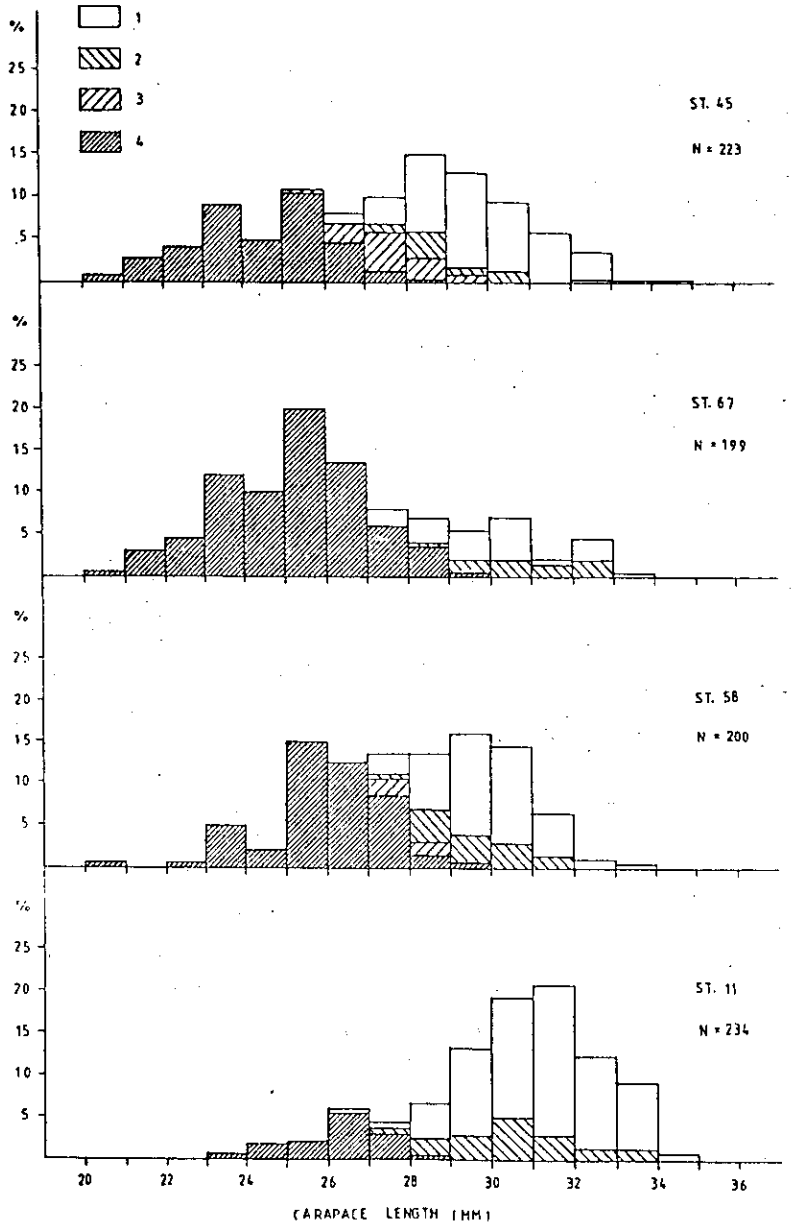

Figure 9. Length distributions of shrimp from selected stations at East Greenland.

1=Ovigerous females, eyes not visible on eggs

2=Females without roe. 3=Transitionals. 4=Males

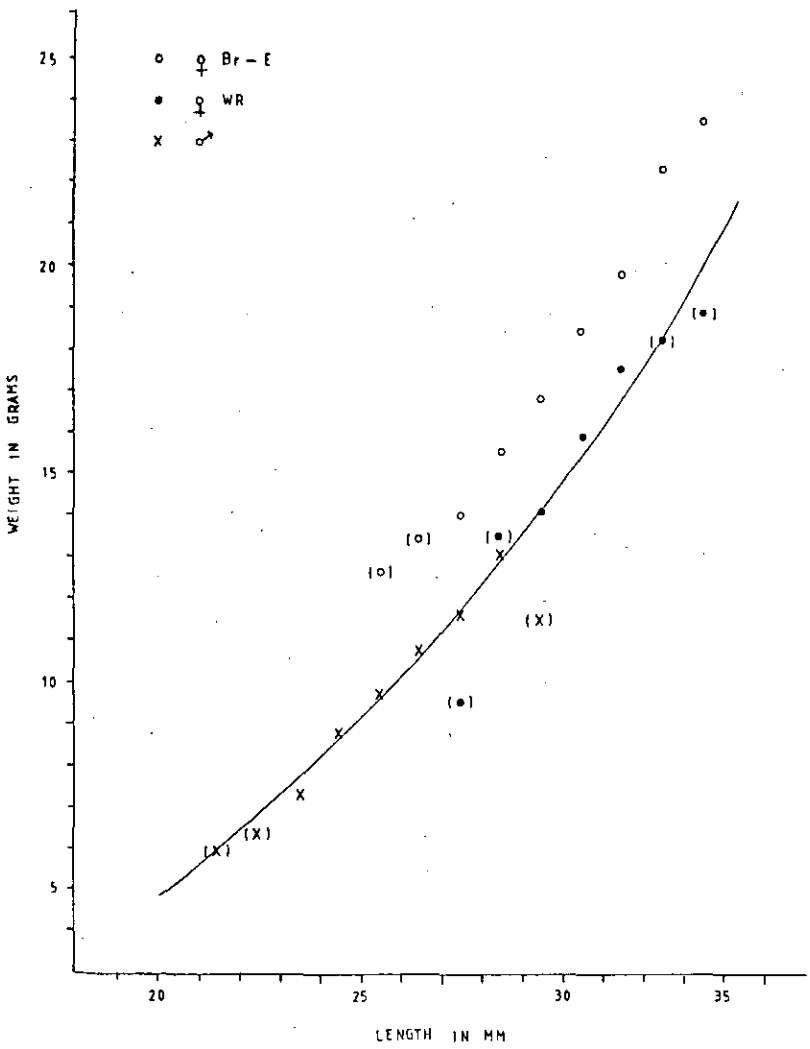

Figure 10 . Length/ weight relationship.
x = males, ● = females without roe,
o = females with roe. The curve represent the equation $w = 0.00148\ L^{2.71}$