



SCIENTIFIC COUNCIL MEETING - JANUARY 1987

Preliminary Report of a Cruise with M/T "MASI" to East Greenland Waters in September 1986

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, 1985 and 1986). 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 experiences from this cruise were so good that the same period and also the same ship were chosen for 1985 and 1986. The cruise in 1986 are carried out in the period 8. September - 6. October 1985. This report gives some results from that cruise.

2. MATERIAL AND METHODS.

The investigated area lies between 65°N and 68°N (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<sup>2</sup>).  
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. 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 decrease towing distance to 0.5 nautical mile. 72 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). Because of few trawls, some strata were combined. The combined strata are: 8 and 9, 12 and 18, 25 and 32, and 26 and 27.

The statistical treatment of the catch data was done as described in Randa and Smedstad (1982). For biomass calculations the following length/weight relations were used (Smedstad 1986):

Ovigerous females:

$$w = 0.003498 L^{2.51}$$

Individuals without eggs:

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

The carapace length was measured to nearest mm below.

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 shrimp catches are seen in Fig 3. The biggest catches of shrimp were taken in strata 16 and 22.

#### 3.1 Horizontal distribution

The horizontal distribution of the sexes shows the same pattern as found in earlier years. Fig. 4 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. 5), we find the same pattern with highest abundance in west (strata 19 and 26) and in north (strata 1, 8, 13, 14, 15, 16, 21 and 22). Males were found in smallest numbers around Dohrn Bank (strata 23, 29, and 30). For the total investigated area 41.4 % of the shrimp in numbers were males.

Females were found in greatest numbers in west (strata 13, 19 and 20) and northeast of Dohrn Bank (strata 15, 16, 22 and 23) (Fig. 6 and 8). Most of the females were ovigerous (BR - E), very few had head roe (HR), and 26 % 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. 7).

#### 3.2 Length distribution

Fig. 10 shows length distributions of shrimp from selected stations. The stations represent a line from north to south with station 3 as the northern and 69 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.

#### 3.3 Biomass

Table 1 and Fig. 9 show the calculated biomasses for each strata. The stock in the investigated area was estimated to 49 000 tons with a Standard Error of 7221 tons. This is an increase of about 17 000 tons from last years estimate. Some of this increase may be due to increased experience in trawling since the investigations in this difficult area have been carried out for only three years. 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 approximate level of the stock size in the investigated area.

#### 4. DISCUSSION

The present results agree well with the results from earlier years, and support the theory of the Dohrn Bank area as a breeding area, the northern and western areas being nursery areas and with an active migration of ovigerous females towards the breeding 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. In 1984, 1985 and in 1986 very small concentrations of shrimp were found in these areas in September. The Norwegian fishery in spring 1985 and 1986 was good (Smedstad and Torheim, 1986 and 1987). The length frequencies and the horizontal distribution of males indicate that the nursery areas are north and west of the Dohrn Bank area. Fig. 11 show possible drift- and migration routes for the shrimp population in the Denmark Strait.

#### 5. REFERENCES

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Table 1. Estimated abundance of shrimp in each stratum at East Greenland.

Stratum	Numb. of hauls	Area nm	Mean catch number/hour	S.E of catch	Number in mill.	Mean catch kg/ hour	S.E. of catch	Biomass Tonnes
1	2	681	2014.0	1980.0	72.4	23.6	23.2	849
8	5	1392	4172.0	1914.6	306.0	58.4	27.1	4290
12	2	1434	370.5	172.5	28.0	8.5	2.0	647
13	3	710	5250.0	2499.2	197.0	82.6	38.0	3090
14	5	710	222.0	107.9	8.3	3.8	1.7	144
15	6	710	10775.0	2824.0	404.0	155.3	39.7	5820
16	5	710	14613.8	4155.4	547.0	244.8	68.8	9170
17	3	710	4221.0	3381.1	158.0	76.1	57.2	2850
19	2	724	7626.0	6834.0	291.0	102.9	89.0	3930
20	2	724	7213.5	2914.5	276.0	127.5	52.5	4870
21	6	724	565.0	359.4	21.6	8.4	4.9	323
22	8	724	9468.0	4619.9	362.0	152.0	73.2	5800
23	4	724	4783.5	2790.8	183.0	83.2	48.6	3180
25	2	1492	1239.0	1062.0	97.5	21.7	18.4	1710
26	2	1478	1590.0	1260.0	124.0	25.8	19.2	2010
29	3	739	224.0	125.7	87.3	3.9	2.2	152
30	4	739	71.2	71.2	27.8	1.3	1.3	50
<b>Total</b>	<b>68</b>	<b>24356</b>	<b>2402.1</b>	<b>369.3</b>	<b>3090.0</b>	<b>38.0</b>	<b>5.6</b>	<b>48900</b>

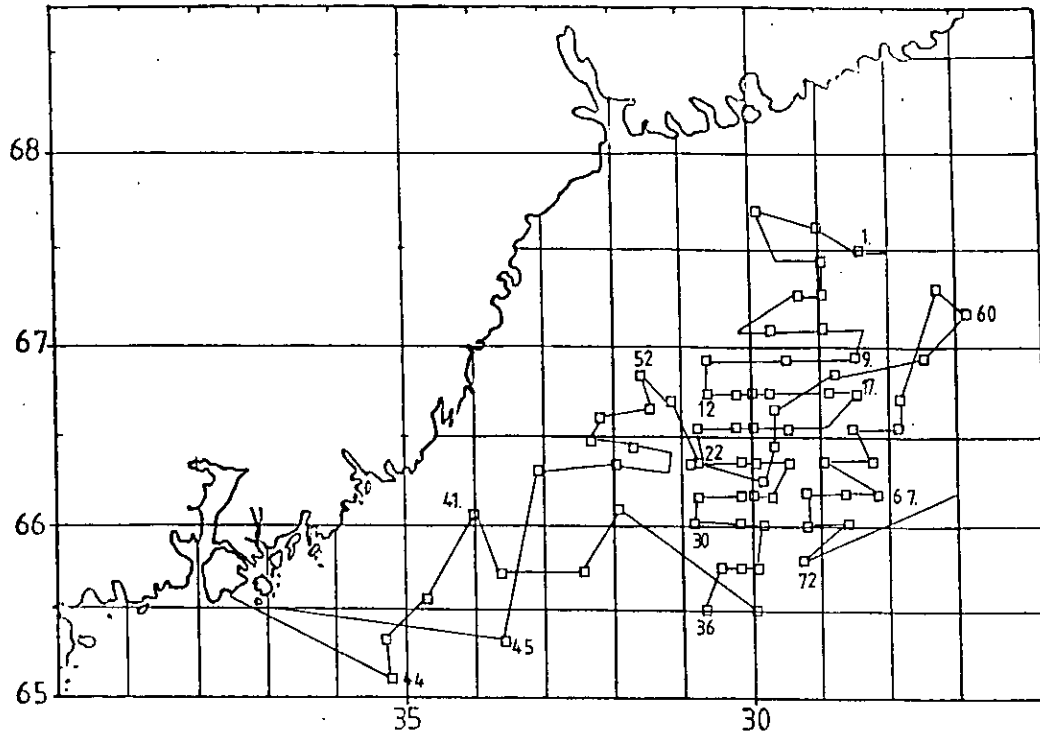


Fig.1. Survey tracks and trawl stations taken by M/T "Masi" in September 1986.

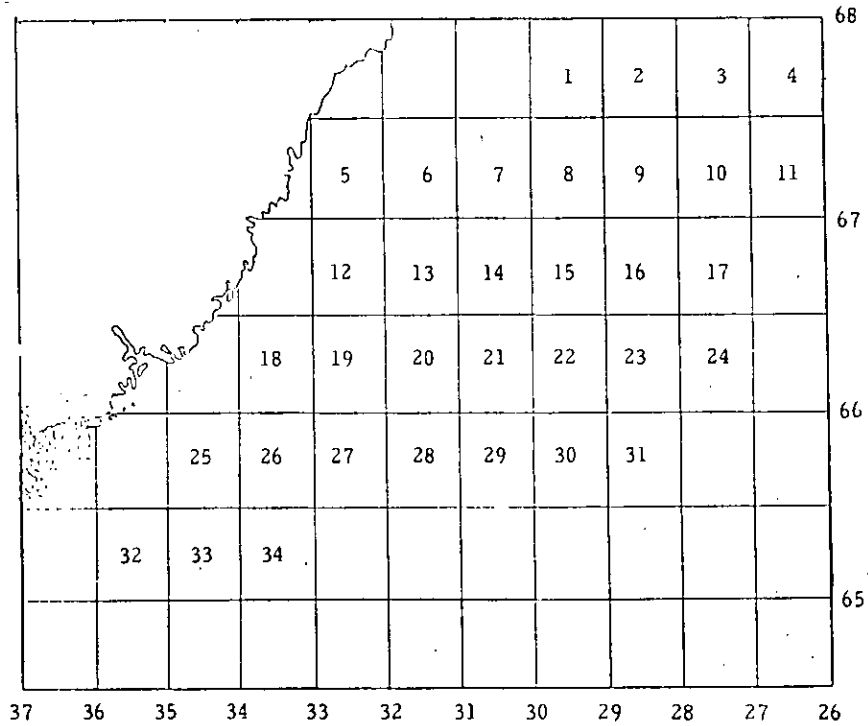


Fig.2. Strata numbers.

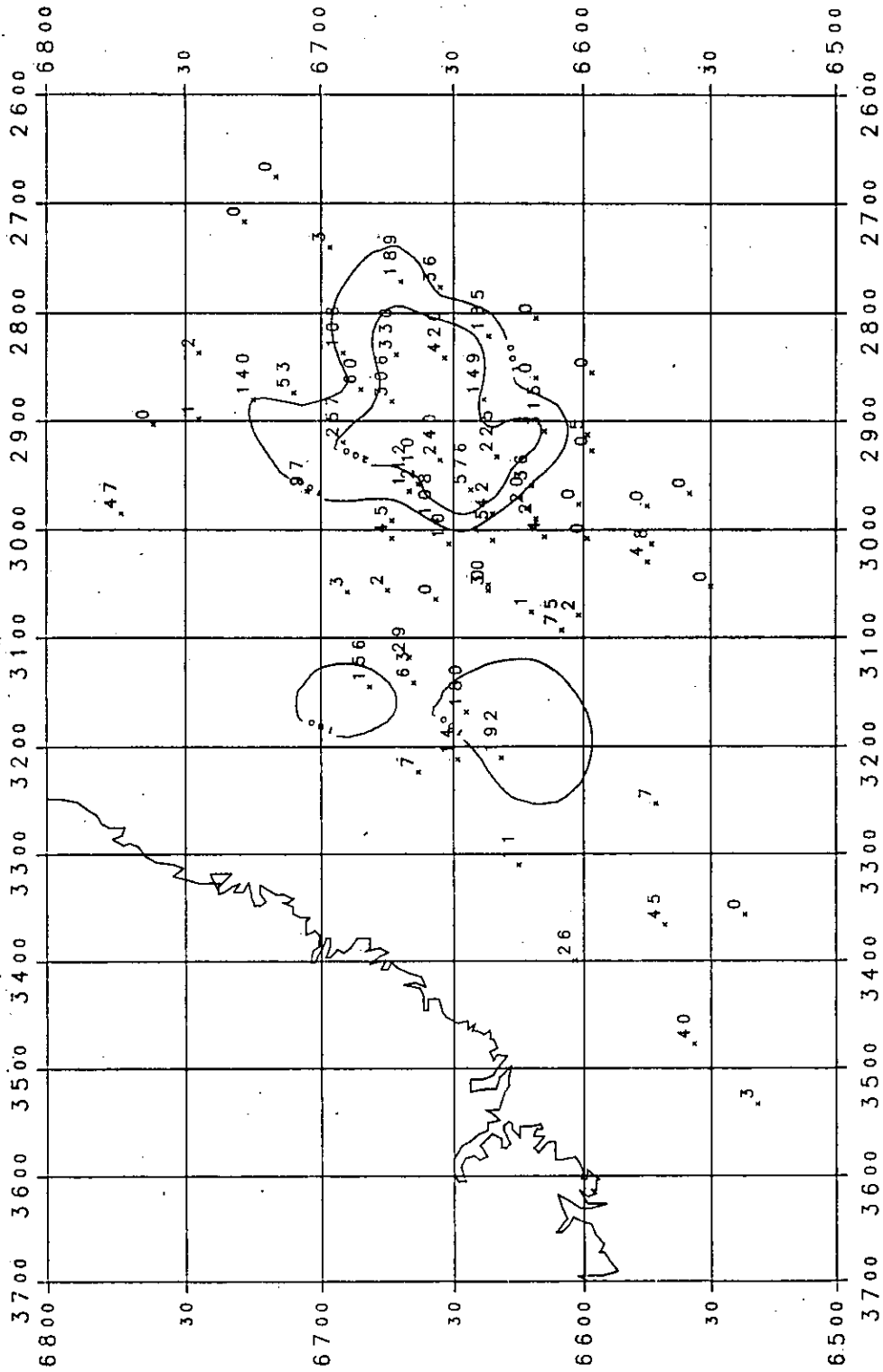


Fig.3. Catches of shrimps in kg per 3 nautical miles.

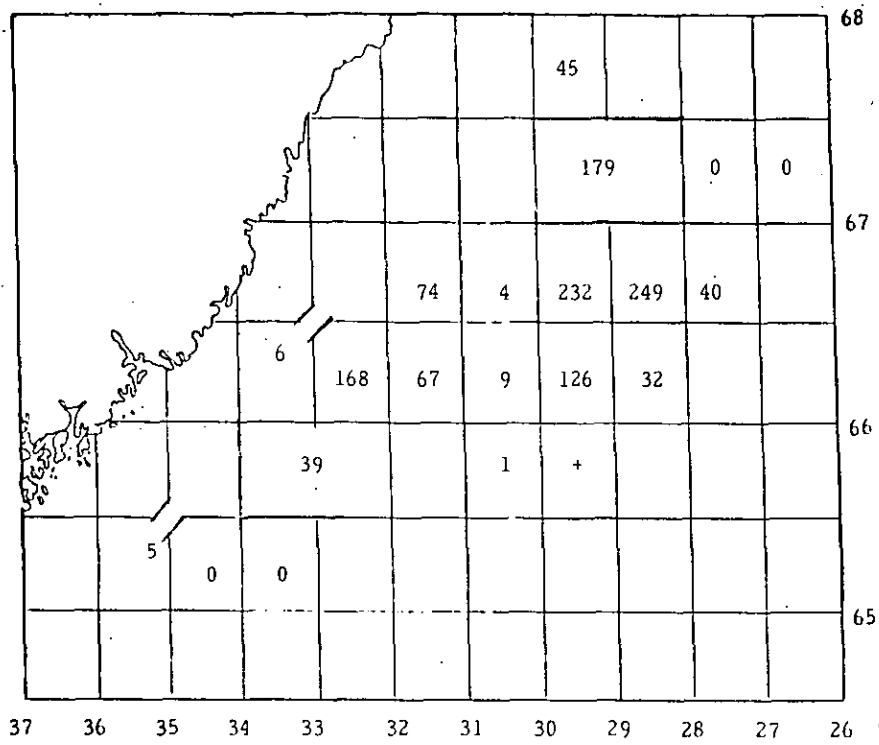


Fig.4. Calculated numbers of males and intersexes (In millions).

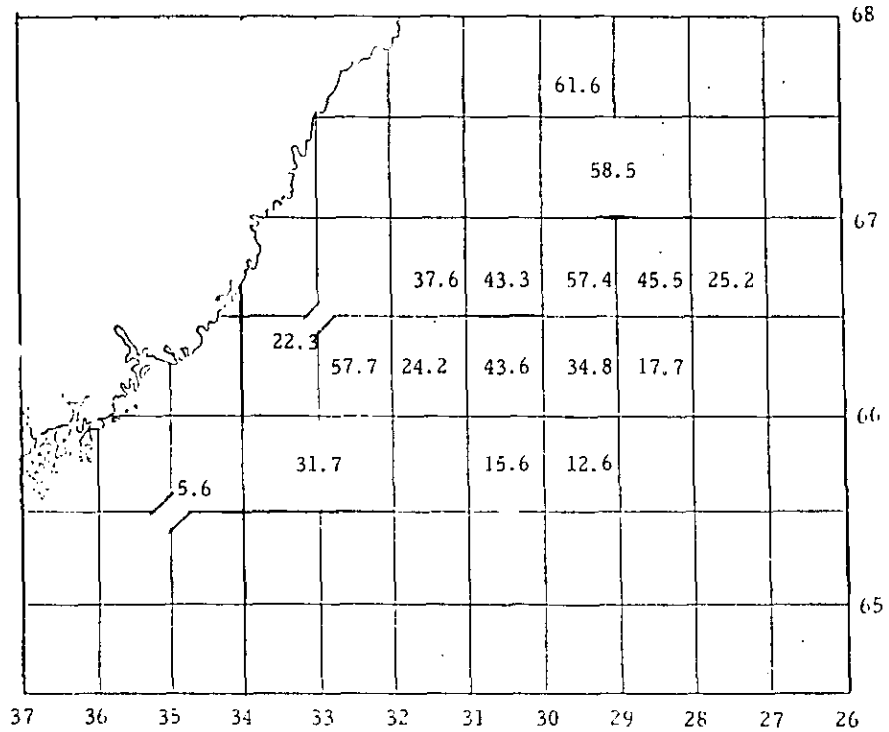


Fig.5. Males and intersexes in per cent of total number.

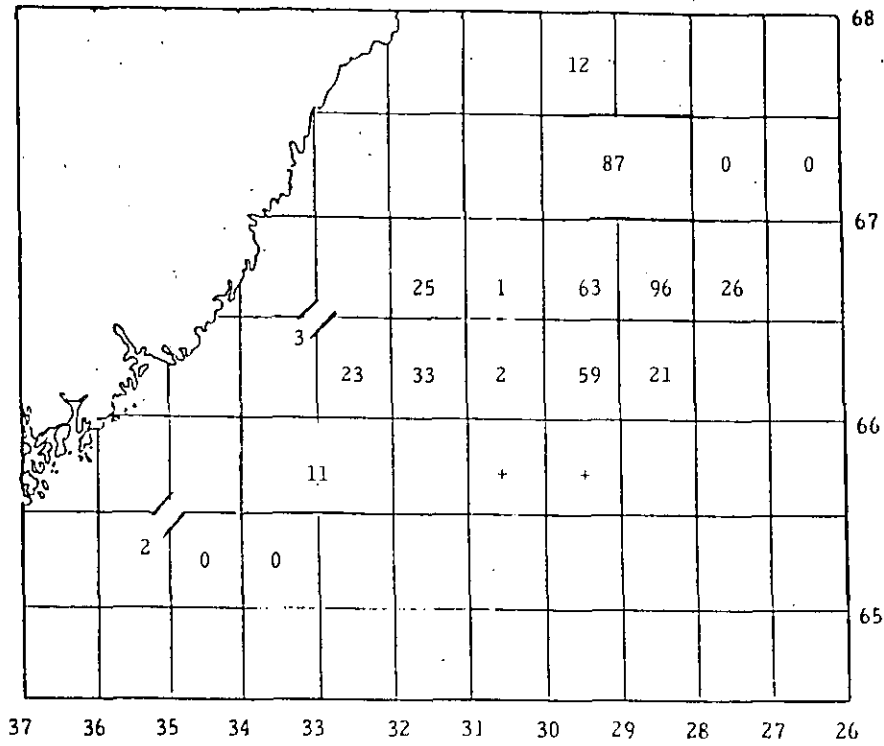


Fig.6. Calculated numbers of female shrimps without roe (In millions).

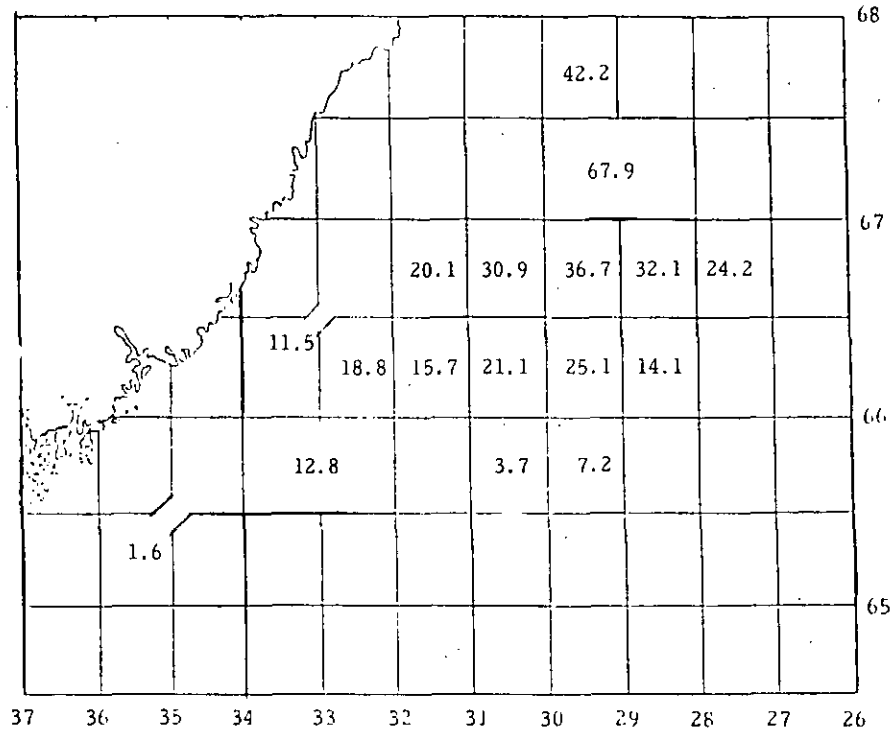


Fig.7. Female shrimps without roe in per cent of total females.



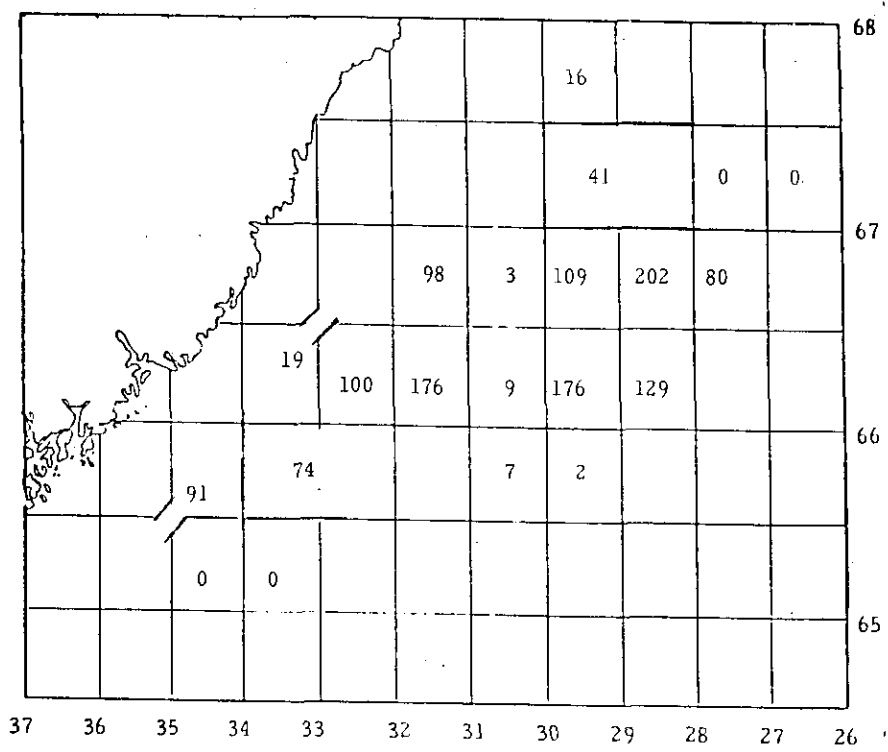


Fig. 8. Calculated numbers of female shrimps with roe (In millions).

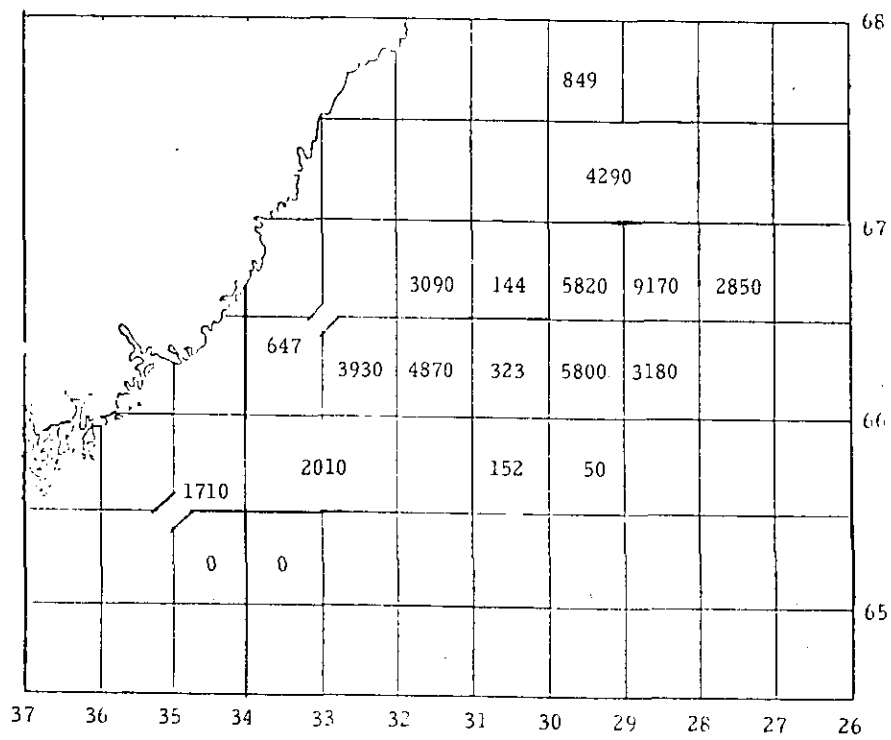


Fig. 9. Calculated total biomass of shrimps in tons.

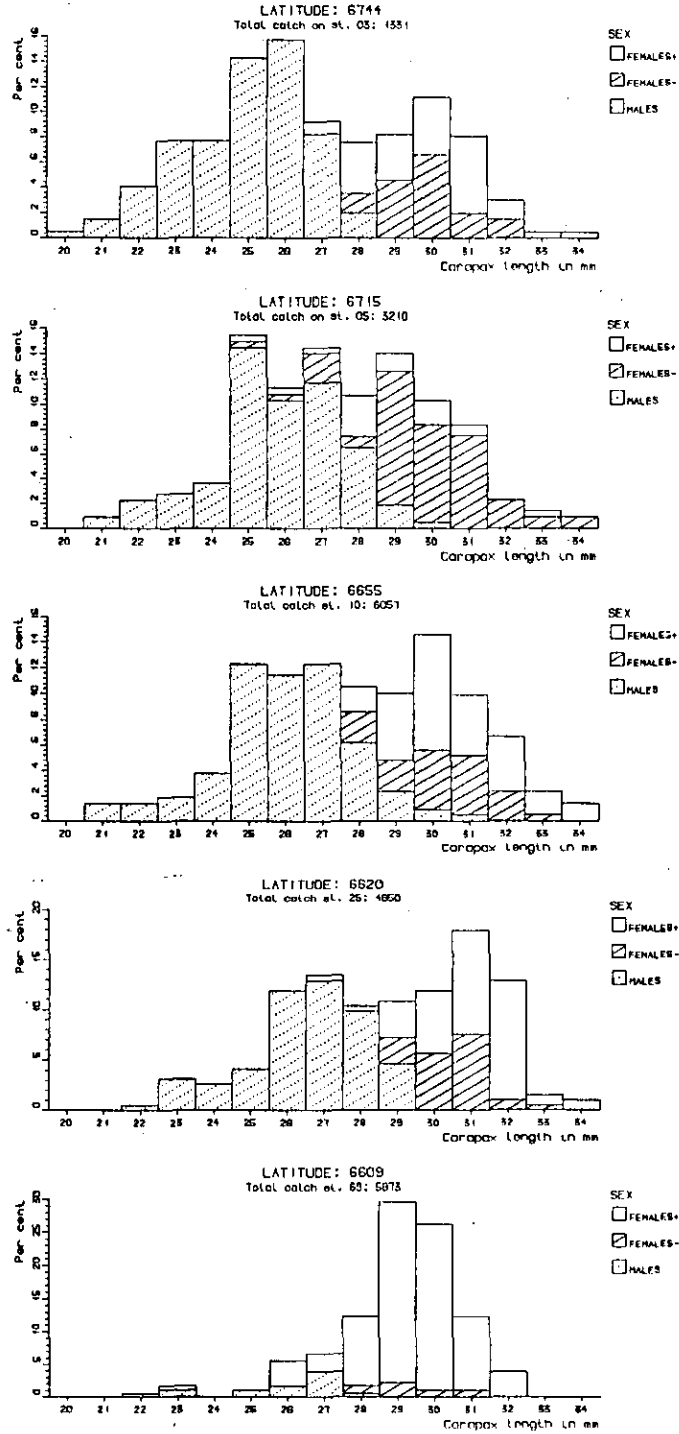


Fig.10. Length distributions of shrimp from selected stations from north to south...

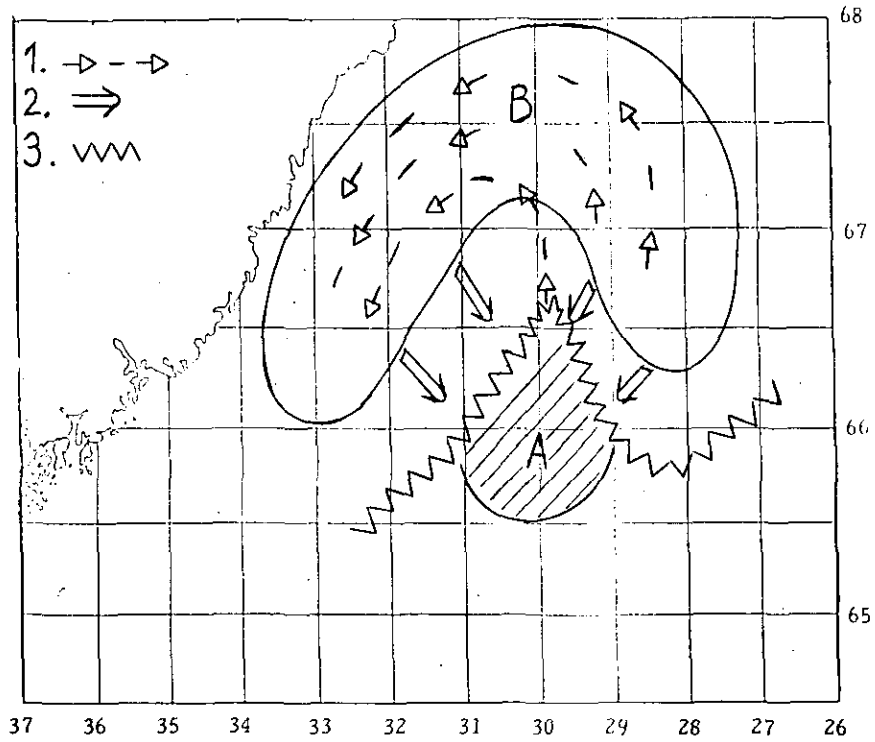


Fig.11. Possible drift- and migration routes for the shrimp population in the Denmark Strait.

A. "Breeding area". This is the fishing area in spring. The catches consist of approximately 100% females.

B. Feeding area. Males increase in numbers northwards.

1. Possible drift routes for offspring.

2. "Spawning" migration in winter-spring.

3. "Normal" ice border in spring.