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Norwegian Investigations on Shrimps,  
Pandalus borealis, off West Greenland  
in 1980

by

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INTRODUCTION

The Norwegian quota of shrimp off West Greenland decreased from 5016 tons in 1979 to 2500 tons in 1980. In 1979, 25 vessels and in 1980, 24 vessels have taken part in the fishery.

Results of field investigations, together with analyses of commercial fishery data for the years 1975-1978, were reported by Ulltang and Øynes (1978, 1980) and Ulltang and Torheim (1979). The results of investigations carried out in 1980 together with analyses of preliminary catch and effort data for 1980 and the final catch and effort data for 1979 are presented in this paper.

MATERIALS AND METHODS

From 3-12 July one of the authors was an observer on board the stern trawler "Langskjær". The shrimp were sorted into "large", "small" and "discard" categories after they were separated from the fish species in the catch. Details of the trawl hauls which were examined by the observer are given in Table 1. Apart from three hauls at Sukkertoppen Dyb, all catches examined were taken in a small area on the slope of Store Hellefiske Bank (Fig. 1).

Random samples of shrimp catches were taken for length measurement (carapace length to nearest mm). In addition some length composition data were obtained for by-catches of redfish and Greenland halibut.

Monthly catch and effort data for 1979 and 1980 were compiled from logbooks of the vessels participating in the fishery. The 1980 data are practically complete, covering catches of 2494 tons compared to the quota of 2500 tons. However, a final check on the data has not yet been made and there may still be some minor errors in the distribution of catches by months.

#### SIZE COMPOSITION OF SHRIMP

Length compositions of shrimp in samples of total catch collected by the observer on board "Langskjær" are listed in Table 2. The weighted mean length compositions (with catch as the weighting factor) for Sukkertoppen Dyp and the slope of Store Hellefiske Bank are shown in Fig. 2. On the slope of Store Hellefiske Bank large shrimp with a modal group around 26-27 mm were dominating, and the length composition is very similar to the one reported by Ulltang and Torheim (1979) for 1979 in this area.

The quantity of discarded shrimp was 2.7% of the retained catches, compared to 8.4% in the same area in 1976, 21.7% in 1977, and 10.0% in 1978 and 6.5% in 1979 (Ulltang and Torheim, 1979).

From Sukkertoppen Dyp only two catches of shrimp were sampled and in both cases about half of the catch was shrimp of 19-22 cm. In one haul 27% was discarded, in the other there was no discard of shrimp.

#### BY-CATCHES IN THE SHRIMP FISHERY

By-catches of fish species in the trawl hauls of "Langskjær" examined by the observer are listed in Table 1. None of the fish were kept except those consumed on board during the trip. Compared to 1976-1979, redfish were far less dominating, although still the most numerous. The mean number of fish relative to the mean shrimp catch (retained) per tow is given in the table below together with corresponding data for 1976-1979 (Ulltang and Torheim, 1979).

| Species                   | Mean number per haul |      |      |      |      |
|---------------------------|----------------------|------|------|------|------|
|                           | 1976                 | 1977 | 1978 | 1979 | 1980 |
| Redfish                   | 2254                 | 1334 | 906  | 630  | 45   |
| Greenland halibut         | 105                  | 63   | 67   | 20   | 16   |
| Cod                       | 6                    | 3    | +    | +    | 2    |
| Others                    | 21                   | 38   | 22   | 109  | 31   |
| Mean by-catch             | 2386                 | 1438 | 995  | 759  | 94   |
| No. of hauls observed     | 71                   | 38   | 54   | 40   | 23   |
| Mean shrimp catch (kg)    | 1438                 | 862  | 1215 | 420  | 612  |
| No. of fish per kg shrimp | 1.66                 | 1.67 | 0.82 | 1.81 | 0.15 |

The rate of by-catch was less than 10% of the 1979 level, chiefly due to the large reduction in by-catches of redfish. However, also the category others, i.e. mostly small skates and flatfishes, was much reduced and back to the 1976-1978 level.

The redfish caught at Store Hellefiske Bank (Fig. 3) was dominated by the length group 9-11 cm which is small compared to previous years (Ulltang and Øynes, 1980, Ulltang and Torheim, 1979). At Sukkertoppen Dyb, redfish by-catches in 1980 contained larger fish, up to 40-50 cm. Also for Greenland Halibut a decrease in size was evident (Fig. 4) with most of the fish at a length of 10-14 cm.

#### CATCH AND CATCH PER UNIT OF EFFORT

Table 3 shows catch and catch per hour trawling (CPUE) by month and division for the Norwegian shrimp fishery off West Greenland in 1979 and 1980. The 1980 data although practically complete, may still be subject to slight changes, but this will probably be of very little significance to the CPUE figures.

The annual mean catch rates (Table 4) in Div. 1B, 1C and 1D all decreased somewhat from 1979 to 1980. The value for Div. 1B in 1980 is the lowest on record, and in Div. 1C and 1D only 1978 has given a lower CPUE. The catch rates in 1980 have been consistently at a low level in all areas throughout the fishing season, the only exceptions being July and August in Div. 1B and July in Div. 1D. There is no information which would indicate that the drop in CPUE values can be explained by changes in the fishery.

The CPUE by quarters in Div. 1B (Fig. 5) show a clear decline after the first quarter 1977. There is, however, a slightly increasing trend in the 1980 values.

#### REFERENCES

- ULLTANG, Ø. and S. TORHEIM. 1979. Norwegian investigations on shrimp, Pandalus borealis, off West Greenland in 1979, NAFO/SCR DOC: 79/XI/2, ser. No. N013: 1-9.
- ULLTANG, Ø. and P. ØYNES. 1978. Norwegian investigations on the deep sea shrimp, Pandalus borealis, in West Greenland waters. ICNAF Sel. Papers No. 4: 35-42.
- ULLTANG, Ø. and P. ØYNES. 1980. Norwegian investigations on shrimp, Pandalus borealis, off West Greenland in 1977 and 1978. ICNAF Sel. Papers No. 6: 27-34.

Table 1. Catches of shrimp and by-catches of fish in some trawl hauls by M/V "Langskjær" off West Greenland in July 1980.

| No.             | Date    | Time | Position |        | Towing<br>time<br>(hr) | Shrimp catch (kg) |       |       |              | By-catches (numbers) |              |             |       |
|-----------------|---------|------|----------|--------|------------------------|-------------------|-------|-------|--------------|----------------------|--------------|-------------|-------|
|                 |         |      | N.lat.   | W.long |                        | Large             | Small | Total | Dis-<br>card | Cod                  | Gre.<br>hal. | Red<br>fish | Other |
| 1 <sup>a)</sup> | 3 July  | 2000 | 64°19'   | 53°19' | 1.50                   | -                 | -     | -     | -            | -                    | -            | 25          | -     |
| 2               | 4 July  | 0020 | 64°18'   | 52°58' | 4.00                   | 120               | 40    | 220   | 60           | 20                   | 8            | 110         | 110   |
| 3               | 4 July  | 0750 | 64°18'   | 52°58' | 3.00                   | 228               | 80    | 308   | 0            | 29                   | 141          | 80          | 108   |
| 4               | 5 July  | 1145 | 67°28'   | 57°45' | 2.75                   | 420               | 30    | 460   | 10           | 0                    | 0            | 0           | 0     |
| 5               | 8 July  | 0205 | 67°23'   | 57°31' | 2.80                   | 30                | 0     | 30    | 0            | 0                    | 0            | 5           | 2     |
| 6               | 8 July  | 0626 | 67°27'   | 57°48' | 2.23                   | 912               | 50    | 982   | 20           | 0                    | 6            | 20          | 13    |
| 7               | 8 July  | 1010 | 67°33'   | 57°54' | 2.80                   | 1434              | 70    | 1524  | 20           | 0                    | 5            | 5           | 7     |
| 8               | 8 July  | 1425 | 67°29'   | 57°43' | 3.00                   | 834               | 40    | 894   | 20           | 0                    | 2            | 5           | 4     |
| 9               | 8 July  | 1915 | 67°34'   | 57°48' | 3.00                   | 434               | 60    | 524   | 30           | 0                    | 1            | 100         | 1     |
| 10              | 8 July  | 2320 | 67°31'   | 57°37' | 2.00                   | 120               | 10    | 130   | 0            | 0                    | 0            | 0           | 0     |
| 11              | 9 July  | 1030 | 67°28'   | 57°45' | 3.00                   | 582               | 20    | 617   | 15           | 0                    | 4            | 125         | 27    |
| 12              | 9 July  | 1500 | 67°33'   | 57°53' | 3.00                   | 566               | 35    | 566   | 15           | 0                    | 3            | 30          | 20    |
| 13              | 9 July  | 1930 | 67°30'   | 57°53' | 3.00                   | 204               | 8     | 216   | 4            | 0                    | 6            | 56          | 11    |
| 14              | 10 July | 2355 | 67°36'   | 57°52' | 3.00                   | 744               | 60    | 844   | 40           | 0                    | 6            | 50          | 20    |
| 15              | 10 July | 0440 | 67°27'   | 57°47' | 3.00                   | 744               | 25    | 779   | 10           | 0                    | 5            | 80          | 310   |
| 16              | 10 July | 1200 | 67°29'   | 57°38' | 1.66                   | 1332              | 70    | 1442  | 40           | 0                    | 3            | 28          | 13    |
| 17              | 10 July | 1515 | 67°26'   | 57°38' | 2.80                   | 528               | 25    | 568   | 15           | 3                    | 22           | 12          | 0     |
| 18              | 10 July | 1925 | 67°28'   | 57°45' | 3.00                   | 648               | 35    | 703   | 20           | 3                    | 11           | 19          | 0     |
| 19              | 10 July | 2305 | 67°28'   | 57°31' | 3.16                   | 72                | 3     | 77    | 0            | 0                    | 3            | 11          | 14    |
| 20              | 11 July | 0400 | 67°33'   | 57°34' | 1.75                   | 126               | 5     | 131   | 0            | Not counted          |              |             |       |
| 21              | 11 July | 0645 | 67°31'   | 57°38' | 3.00                   | 288               | 20    | 318   | 10           | 0                    | 4            | 10          | 1     |
| 22              | 11 July | 1115 | 67°26'   | 57°43' | 3.00                   | 834               | 60    | 924   | 30           | 0                    | 85           | 20          | 21    |
| 23              | 11 July | 1530 | 67°33'   | 57°47' | 1.08                   | 864               | 80    | 969   | 25           | 0                    | 21           | 150         | 15    |
| 24              | 11 July | 2000 | 67°30'   | 57°33' | 3.00                   | 476               | 80    | 586   | 30           | 0                    | 33           | 72          | 5     |
| 25              | 12 July | 0030 | 67°34'   | 57°44' | 3.00                   | 360               | 20    | 390   | 10           | 0                    | 2            | 48          | 9     |

a) Trawl torn. No shrimp retained.

Table 2. Length composition of random samples from shrimp catches by M/V "Langskjær" off West Greenland in July 1980 (Numbers in heading refer to tow numbers in the first column of Table 1).

| Carapace-length<br>(mm) | Sukkertopp-Dyb |     |       | Slope of Store Hellefiske Bank |     |     |     |     |     |     |       |
|-------------------------|----------------|-----|-------|--------------------------------|-----|-----|-----|-----|-----|-----|-------|
|                         | 2              | 3   | Total | 4                              | 6   | 11  | 15  | 22  | 24  | 25  | Total |
| 12                      | -              | -   | -     | -                              | -   | -   | -   | -   | -   | 2   | 2     |
| 13                      | -              | -   | -     | 1                              | -   | -   | 1   | 5   | -   | 10  | 17    |
| 14                      | -              | -   | -     | 1                              | -   | -   | 2   | 4   | 1   | 8   | 16    |
| 15                      | -              | -   | -     | 5                              | -   | -   | 2   | 5   | 2   | 2   | 16    |
| 16                      | 3              | -   | 3     | 5                              | -   | -   | -   | 2   | 1   | 1   | 9     |
| 17                      | 4              | 6   | 10    | 3                              | -   | -   | 3   | 2   | 2   | 1   | 11    |
| 18                      | 15             | 7   | 22    | 4                              | 1   | 1   | -   | 6   | 7   | 5   | 24    |
| 19                      | 24             | 20  | 44    | 6                              | 2   | 6   | 2   | 4   | 4   | 5   | 29    |
| 20                      | 31             | 23  | 54    | 11                             | 3   | 4   | 3   | 14  | 4   | 8   | 47    |
| 21                      | 36             | 30  | 66    | 12                             | 6   | 2   | 2   | 10  | 8   | 8   | 48    |
| 22                      | 22             | 26  | 48    | 11                             | 14  | 6   | 8   | 12  | 23  | 13  | 87    |
| 23                      | 12             | 6   | 18    | 19                             | 13  | 6   | 4   | 25  | 15  | 10  | 92    |
| 24                      | 12             | 15  | 27    | 12                             | 16  | 8   | 5   | 19  | 14  | 10  | 84    |
| 25                      | 24             | 8   | 32    | 17                             | 16  | 21  | 20  | 15  | 25  | 25  | 139   |
| 26                      | 14             | 11  | 25    | 20                             | 30  | 19  | 29  | 23  | 24  | 31  | 176   |
| 27                      | 16             | 7   | 23    | 35                             | 21  | 26  | 30  | 21  | 26  | 30  | 189   |
| 28                      | 9              | 7   | 16    | 20                             | 10  | 13  | 9   | 5   | 9   | 9   | 75    |
| 29                      | 7              | 5   | 12    | 6                              | 2   | 1   | 4   | 3   | 1   | 3   | 20    |
| 30                      | 1              | -   | 1     | 1                              | 1   | 2   | 1   | 2   | 3   | 2   | 12    |
| 31                      | 1              | -   | 1     | 2                              | -   | -   | 1   | -   | 1   | 1   | 4     |
| Total                   | 231            | 171 | 402   | 191                            | 135 | 115 | 126 | 177 | 170 | 183 | 1097  |

Table 3. Catch (metric tons) and catch per hour trawling (CPUE) by month and division in 1979 and 1980. (CPUE is calculated as total catch/total effort; data for 1980 are preliminary).

| Year  | Month | 0A    | 1A    | 1B    | 1C    | 1D    | 1E    | 1F    | Total |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|       |       | Catch | CPUE  | Catch | CPUE  | Catch | CPUE  | Catch | catch |
| 1979  | Jan   | 4     | 0.286 | 598   | 0.355 |       |       |       | 602   |
|       | Feb   |       |       | 621   | 0.329 |       |       |       | 760   |
|       | Mar   |       |       | 298   | 0.385 | 23    | 0.228 | 116   | 374   |
|       | Apr   |       |       | 118   | 0.352 | 48    | 0.215 | 28    | 118   |
|       | May   |       |       | 316   | 0.191 |       |       |       | 316   |
|       | Jun   |       |       | 147   | 0.128 |       |       |       | 620   |
|       | Jul   | 106   | 0.240 | 421   | 0.200 | 1     | 0.111 | 473   | 543   |
|       | Aug   | 56    | 0.190 | 94    | 0.156 |       |       | 15    | 152   |
|       | Sep   | 169   | 0.254 | 41    | 0.163 | 2     | 0.111 | 2     | 210   |
|       | Oct   | 403   | 0.261 | 14    | 0.304 |       |       | 4     | 836   |
|       | Nov   |       |       | 9     | 0.360 | 1     | 0.250 | 9     | 419   |
|       | Dec   |       |       |       |       |       |       | 11    | 39    |
| Total |       | 738   | 0.249 | 23    | 0.324 | 73    | 0.211 | 658   | 4989  |
| 1980  | Jan   |       |       | 317   | 0.184 |       |       | 1     | 318   |
|       | Feb   |       |       | 345   | 0.162 | 22    | 0.195 | 29    | 401   |
|       | Mar   |       |       | 94    | 0.132 | 11    | 0.115 | 6     | 111   |
|       | Apr   |       |       | 135   | 0.166 | 21    | 0.157 | 3     | 161   |
|       | May   |       |       | 228   | 0.191 | 23    | 0.184 | 19    | 270   |
|       | Jun   |       |       | 109   | 0.168 |       |       | 454   | 563   |
|       | Jul   |       |       | 407   | 0.240 |       |       | 91    | 498   |
|       | Aug   |       |       | 160   | 0.329 |       |       |       | 160   |
|       | Sep   |       |       | 12    |       |       |       |       | 12    |
|       | Total |       |       | 1807  | 0.185 | 77    | 0.165 | 603   | 2494  |
| Total |       |       |       |       |       | 2     | 0.154 | 5     |       |

Table 4. Mean catch per hour trawling (metric tons) for shrimp off West Greenland by Norwegian vessels in 1975 to 1980.

| Year | 0A    | 1A    | 1B      | 1C      | 1D      |
|------|-------|-------|---------|---------|---------|
| 1975 | -     | -     | 0.510   | 0.225   | 0.242   |
| 1976 | -     | -     | 0.452   | 0.323   | 0.239   |
| 1977 | 0.216 | -     | 0.409   | 0.229   | 0.275   |
| 1978 | -     | 0.369 | 0.220   | 0.162   | 0.161   |
| 1979 | 0.249 | -     | 0.223   | 0.211   | 0.262   |
| 1980 | -     | -     | (0.185) | (0.165) | (0.224) |

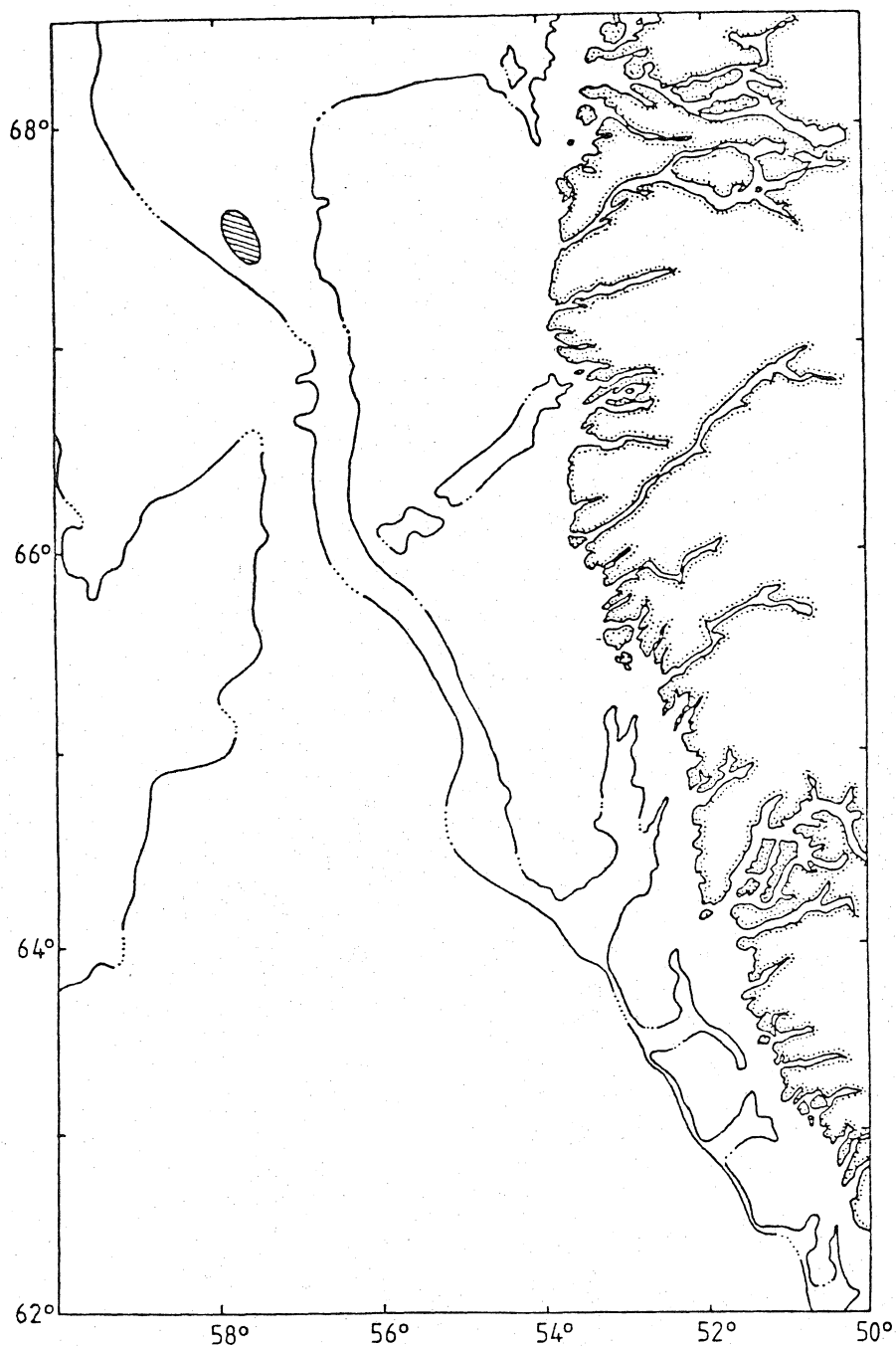


Fig. 1. Hatched area: Main area fished by MV "Langskjær" during the stay of the observer in July 1980.

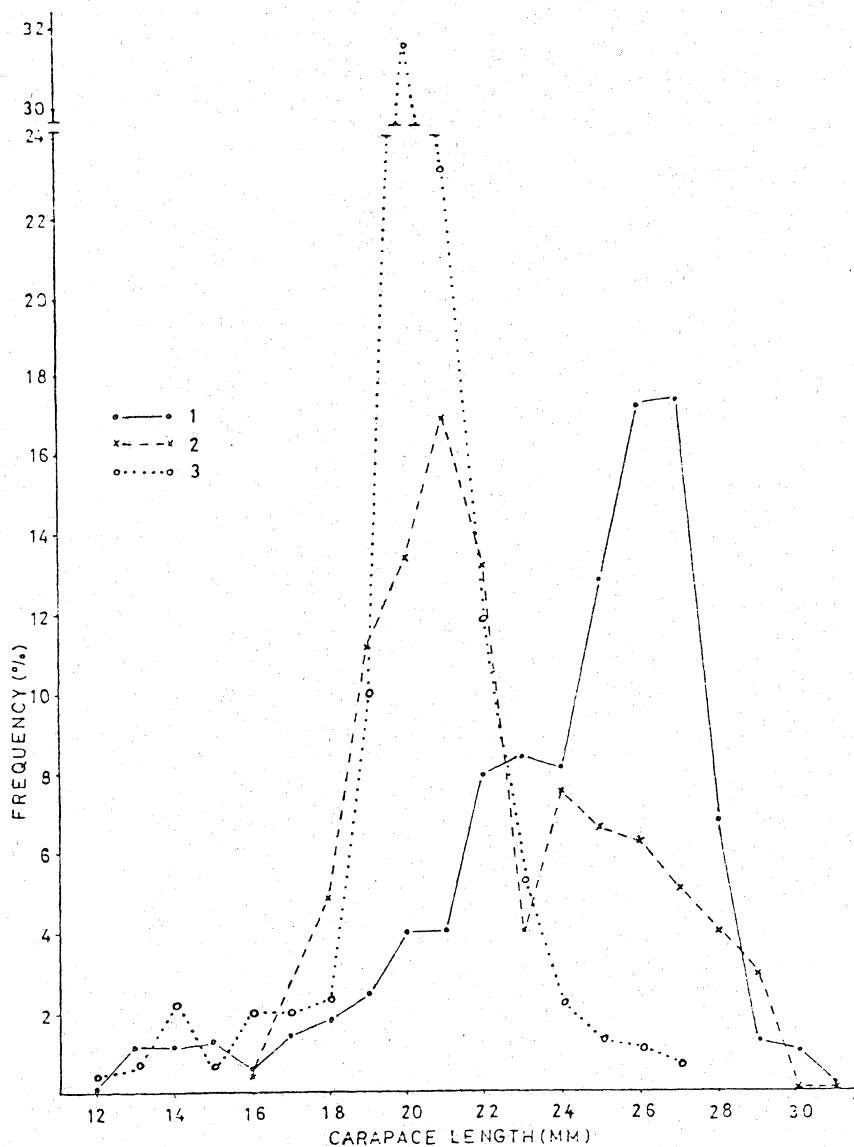


Fig. 2. Weighted mean length composition of shrimp from samples taken off West Greenland in July 1980. 1) Slope of Store Hellefiske Bank 2) Sukkertoppen Dyb 3) Discarded shrimp caught on the slope of Store Hellefiske Bank.



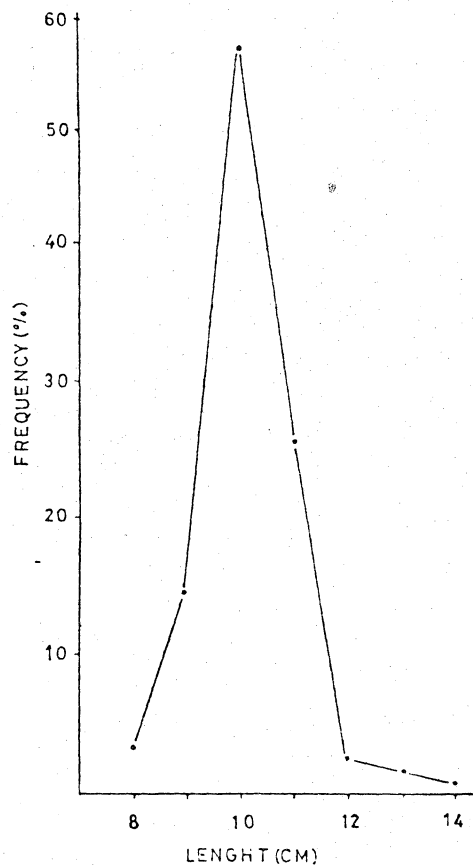


Fig. 3. Length composition of redfish taken as by-catch with shrimp on the slope of Store Hellefiske Bank in July 1980.

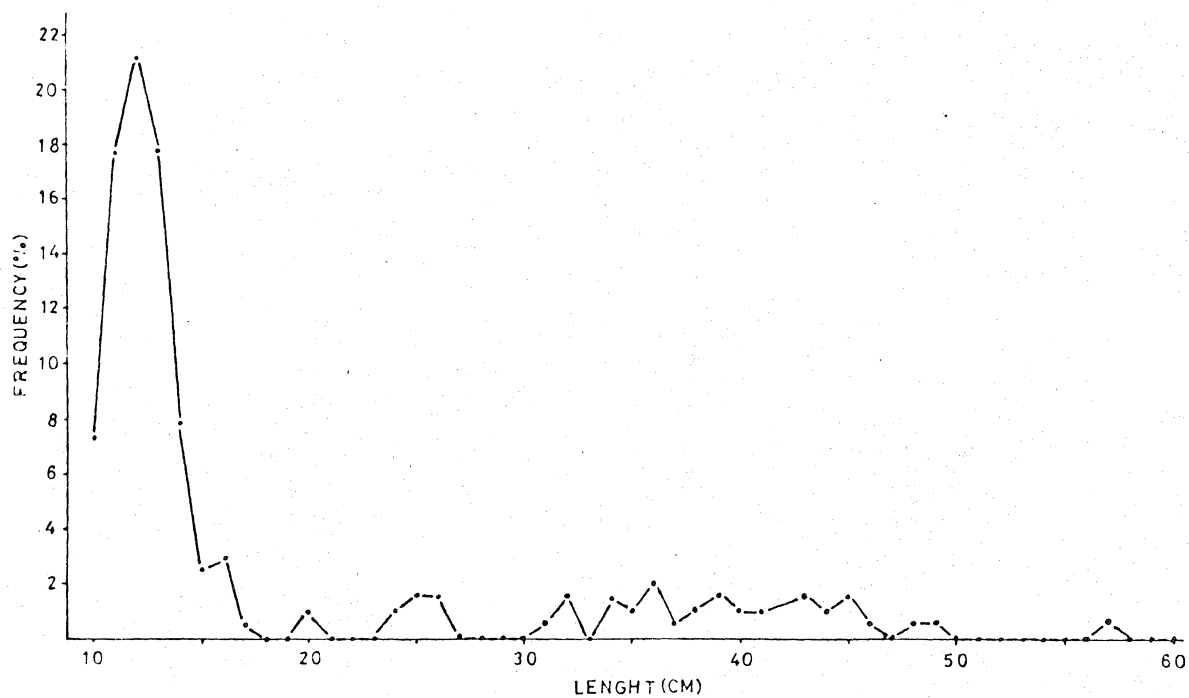


Fig. 4. Length composition of Greenland halibut taken as by-catch with shrimp on the slope of Store Hellefiske Bank in July 1980.

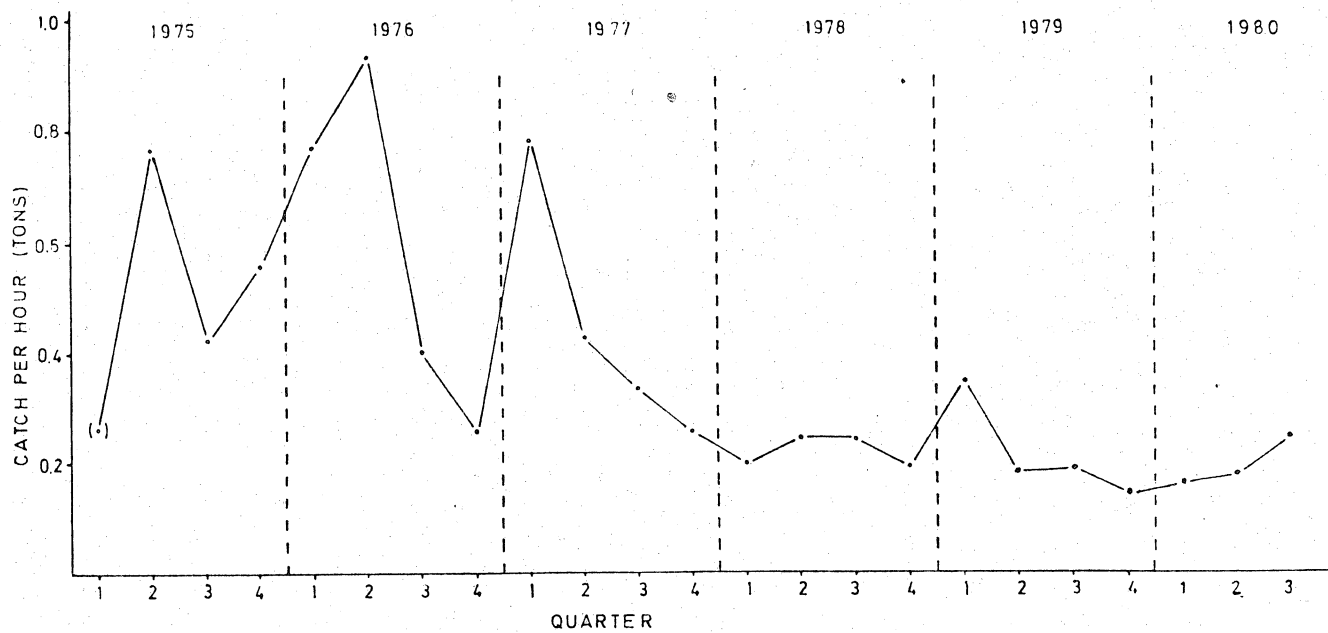


Fig. 5. Quarterly mean shrimp catch per hour trawling by Norwegian vessels in Div. 1B 1975 - 1980.