

Northwest Atlantic



Fisheries Organization

Serial No. N455

NAFO SCR Doc. 81/XI/146

SPECIAL MEETING OF SCIENTIFIC COUNCIL - NOVEMBER 1981

Data on the Shrimp (*Pandalus borealis*)
Fishery in Division OA in 1981

by

D.G. Parsons, P.J. Veitch and G.E. Tucker
Department of Fisheries and Oceans
Research and Resource Services
Northwest Atlantic Fisheries Center
P.O. Box 5667
St. John's, Newfoundland
A1C 5X1

Introduction

Fourteen vessels have participated in a Canadian shrimp fishery in Division OA during 1981. Approximately 3,900 (78 %) of 5,000 tons allocated for this fishery have been taken up to Nov. 12. Observers are routinely assigned to these vessels by Department of Fisheries and Oceans to obtain information on catch rates and composition, discarding and by-catch. Catch and effort data are also available from vessel logs.

The 1981 data are presented below with some comparison to relevant data from previous years. Since vessel logs are often difficult to obtain in time for assessment meetings, observers' estimates of catch per unit effort are considered as an alternative measure of relative abundance.

Methods and Materials

Details of catch and effort data from observers' reports and vessel logs were summarized by month for 1980. Observers' reports only were used for 1981. Monthly distribution of effort and related CPUE for 1980 and 1981 from observers' reports were compiled according to the Danish statistical square. Carapace length was measured to the nearest 0.5 mm and length frequencies were constructed for each month by 100 m depth intervals. Size composition was observed for both the

total catch and discards. A species breakdown expressed as percent of the total catch for each month was constructed from observers' estimates.

Results and Discussion

A comparison of CPUE by month (1980 and 1981) from observers' reports and vessel logs is given in Figure 1 and Table 1. Although catch rates differed in most cases, trends were essentially the same and there was good positive correlation between the two sources. Generally, observers' estimates of catch rates were higher than those from vessel logs, especially in cases where rates were relatively high. When rates were low, differences occurred in both directions.

The high estimates from observers can be explained by the inclusion of discards. Under ideal conditions for estimating discards, their inclusion in catch rate data could help reduce variation due to variable patterns of discarding. However, in reality the quality of the discard data is at times not much better than a rough guess while in other cases can be considered reasonably accurate. The net effect on CPUE estimates at this stage is unclear.

Observer data are usually more easily obtained than vessel logs as evident in 1980 (Table 1). In 1981 observer reports were considered to be the more representative source since, up to November, there was a general scarcity of vessel logs. Since trends in CPUE appeared similar and vessel log data were incomplete (even for 1980), monthly catch rates for 1980 and 1981 were compared using observers' estimates and were considered as an index of relative abundance.

Catch rates by Division for vessels fishing the Canadian quota in 1980 and 1981 are given in Table 2 and a detailed breakdown of hours fished and catch per hour by statistical square is presented in Figures 2 and 3.

In 1980 fishing occurred in Subarea 1 during the early months of the year. Effort increased in Divisions OA and 1B in May when ice conditions were less severe (Fig. 2). Catch rates in the northwest area were higher than in previous months in other areas and Division OA produced higher rates than Division 1B from June to August. Fishing effort in November-December was concentrated in the immediate area of the international

boundary. The mean catch per hour from July to September in Division 1B was 332 kg and 348 kg in Division 0A. Both were lower than the 466 kg reported for Greenland trawlers in Division 1B for the same period in 1980 (Carlsson 1980) but appeared to be higher than rates given for Norwegian vessels (Jakobsen and Torheim 1980) and for the French trawler, Finlande III, in the 0A-1B area (Derible et al. 1980). Direct comparison with Canadian data for 1979 is not possible since the 1979 CPUE figures are based on vessel logs (Parsons et al. 1980). It is worth noting, however, that catch rates in November and December in 1979 were much lower than in 1980. This difference would not be entirely explained by differences in the sources of data. The Danish and Norwegian data (op. cit.) also indicated low catch rates in November and December, 1979, in Division 1B.

Canadian fishing effort in 1981 was restricted to Division 0A and from June to September generally occurred in an area between 58° and 59°W (Fig. 3). Catch rates from June to September were 391 kg per hour compared to 356 kg for the same area and period in 1980. The July to September rate was 368 kg per hour compared to 348 in 1980. It appears that no noticeable decline in abundance occurred in Division 0A between 1980 and 1981.

Size composition of shrimp catches by month at 100 m depth intervals are given in Fig. 4 and 5. During the summer of 1980 two modes were evident in the catches in Division 0A, at roughly 23 and 27 mm carapace length (Fig. 4). The relative contribution of the smallest (youngest) group to the catch had diminished by September and in November and December mostly large ovigerous females in the 27 mm mode comprised the catch. Greater proportions of larger animals occurred in deeper water in August and September. This was not obvious in December when there was a general absence of smaller animals (males).

In 1981 three modal groups were obvious in the commercial catches in Division 0A (Fig. 5) at lengths around 19, 23, and 27 mm. In contrast to the previous year, relative proportions of smaller animals had not shown any obvious decrease by September. In fact, smaller sizes were more abundant at this time. The 23 mm group in 1981 appears to be at least as strong as the same modal group of the previous year but the relative strength of the 19 mm group from these data is uncertain. The 1981

figures do not show any increase in proportions of larger animals at greater depths, contrary to previous observations. The onset of egg laying occurred during September in both years.

Shrimp discards were relatively high, around 16% (Table 3), in June and July, 1980. Most discarded animals sampled were from the 23 mm modal group, especially in June (Fig. 6). As the proportion of smaller shrimp in the catches decreased so did the discard rate, down to less than 2% in November-December. By comparison, in 1981 discard rates were lower in June and July but by September had exceeded the 1980 level reflecting the higher proportions of smaller animals in the catch during this month. However, most discards sampled were from the 19 mm modal group (Fig. 7) and by comparing the two figures, relative abundance of this size (age) group may be considerably higher than any corresponding group of the previous year provided sampling is representative of the fleet and availability is not an important factor. If these assumptions are true, a general improvement in the discarding practices over 1980 is indicated.

Species composition of the monthly catches in Division OA in 1980 and 1981 is given in Table 4. Redfish continued to be the major by-catch species in 1981 but were down considerably in all months where comparisons were possible except for August. Other species consistently comprised less than 1% of the total catch weight except for incidental catches of Greenland shark.

Conclusions

The quality of data from an intensive observer programme monitoring Canadian shrimp fishing in the Davis Strait is sufficient to construct reasonable estimates of CPUE and to use these as a relative abundance index. Data of this nature indicated that abundance in Division OA did not differ appreciably between 1980 and 1981.

A comparison of length frequencies showed changes in size distribution over the fishing season especially in 1980. Recruitment patterns in 1981 appeared at least comparable with 1980 and discard information indicated the possibility of the recruitment of a relatively strong year-class in 1982 (provided no reduction in mesh size or increase in availability occurred over that period).

Discarding of shrimp is inherent in the Davis Strait fishery but some improvement was indicated in 1981 over the previous year. The major by-catch

continues to be redfish but catch rates of this species generally decreased in Division OA in 1981.

References

- Carlsson, D.M. 1980. Data on the Greenland Shrimp Fishery in Subarea 0+1 in 1980 Compared to Earlier Years. NAFO SCR Doc. 80/XI/174: 46 pp.
- Derible, P., H. Dupouy and J.P. Minet. 1980. Catch, Effort and Biological Characteristics of Shrimp (Pandalus borealis) in the French Fishery off West Greenland, 1980. NAFO SCR Doc. 80/XI/159: 18 pp.
- Jakobsen, T. and S. Torheim. 1980. Norwegian Investigations on Shrimps, Pandalus borealis, off West Greenland in 1980. NAFO SCR Doc. 80/XI/163: 10 pp.
- Parsons, D.G. and P.J. Veitch. 1980. Information on Catch and Catch per Unit Effort for Shrimp, Pandalus borealis, off West Greenland, 1980. NAFO SCR Doc. 80/XI/167: 19 pp.

Table 1. Comparison of CPUE (MT) by month from vessel logs¹ and observers' reports², 1980.

Year	Month	OA		1B		1C		1D	
		C/Hr ¹	C/Hr ²	C/Hr ¹	C/Hr ²	C/Hr ¹	C/Hr ²	C/Hr ¹	C/Hr ²
1980	Jan.			0.075		0.043			
	Feb.			0.111	0.158	0.097	0.153	0.103	0.152
	Mar.			0.198	0.167	0.129	0.111	0.213	
	Apr.			0.288	0.408	0.295	0.462	0.137	0.062
	May		0.505	0.251	0.312	0.235	0.319		0.247
	June		0.460	0.249	0.382	0.461	0.738	0.421	0.670
	July	0.445	0.431	0.133	0.366				
	Aug.		0.355		0.282				
	Sept.		0.307		0.455				
	Oct.								
	Nov.		0.644		0.639				
	Dec.	0.306	0.361		0.491				
1981	Jan.								
	Feb.								
	Mar.								
	Apr.								
	May								
	June	0.483	0.535						
	July	0.422	0.416						
	Aug.	0.346	0.326						
	Sept.	0.312	0.362						
	Oct.	0.228							
	Nov.								
	Dec.								

Table 2. Catch (MT) and catch per hour by month and Division, 1980 and 1981, Tonnage classes 4, 5, and 6 from 'observed hours'.

Year	Month	OA		1B		1C		1D		Total observed catch
		Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE	
1980	Jan.									
	Feb.			30	0.158	5	0.153	6	0.152	41
	Mar.			7	0.167	1	0.111			8
	Apr.			198	0.408	103	0.462	1	0.062	302
	May	1	0.505	155	0.312	95	0.319	3	0.247	254
	June	23	0.460	172	0.382	124	0.738			319
	July	12	0.431	83	0.366					95
	Aug.	168	0.355	45	0.282					213
	Sept.	44	0.307	1	0.455					45
	Oct.									
	Nov.	22	0.644	8	0.639					30
	Dec.	56	0.361	18	0.491					74
	TOTAL	326	0.368	717	0.341	328	0.448	10	0.143	1381
1981	Jan.									
	Feb.									
	Mar.									
	Apr.									
	May									
	June	262	0.535							262
	July	523	0.416							523
	Aug.	440	0.326							440
	Sept.	173	0.362							173
	Oct.									
	Nov.									
	Dec.									
	TOTAL	1398	0.391							1398

Table 3. Shrimp discards in Division OA in 1980 and 1981.

Month	1980		1981	
	Observed Catch (tons)	% Discard	Observed Catch (tons)	% Discard
June	25.6	15.5	304.7	2.4
July	12.6	15.7	575.6	2.6
Aug.	176.5	6.0	478.0	5.1
Sept.	48.5	2.4	178.3	7.4
Oct.				
Nov.	21.6	0.1		
Dec.	74.2	1.3		

Table 4. By-catches in shrimp fishery in Div. 0A, May-December 1980 and June-September 1981.

1980		
May		
SPECIES NAME	WEIGHT (MT)	% CATCH
SHRIMP (PANDALUS)	1.390	94.95
REDFISH (UNSPECIFIED)	0.075	5.12
TOTALS	1.464	100.00
June		
SPECIES NAME	WEIGHT (MT)	% CATCH
SHRIMP (PANDALUS)	23.056	84.68
AMERICAN PLAICE	0.255	0.94
COD	0.001	0.00
HALIBUT	0.010	0.04
REDFISH (UNSPECIFIED)	3.790	13.92
TURBOT	0.011	0.04
WOLFFISH (UNSPECIFIED)	0.120	0.44
TOTALS	27.226	100.00
July		
SPECIES NAME	WEIGHT (MT)	% CATCH
SHRIMP (PANDALUS)	11.924	74.25
AMERICAN PLAICE	0.090	0.56
REDFISH (UNSPECIFIED)	0.000	24.91
TURBOT	0.030	0.19
WOLFFISH (UNSPECIFIED)	0.025	0.16
TOTALS	16.060	100.00
August		
SPECIES NAME	WEIGHT (MT)	% CATCH
SHRIMP (PANDALUS)	168.070	85.10
AMERICAN PLAICE	1.078	0.55
COD	0.045	0.02
HALIBUT	0.160	0.08
REDFISH (UNSPECIFIED)	27.188	13.77
TURBOT	0.562	0.28
SKATE (UNSPECIFIED)	0.042	0.02
WOLFFISH (STRIPED)	0.052	0.03
WOLFFISH (SPOTTED)	0.075	0.04
WOLFFISH (UNSPECIFIED)	0.389	0.20
TOTALS	197.499	100.00
September		
SPECIES NAME	WEIGHT (MT)	% CATCH
SHRIMP (PANDALUS)	44.134	74.70
ARCTIC COD	0.001	0.00
HALIBUT	0.328	0.56
REDFISH (UNSPECIFIED)	13.806	23.37
TURBOT	0.587	0.99
SKATE (UNSPECIFIED)	0.085	0.14
WOLFFISH (STRIPED)	0.054	0.09
WOLFFISH (SPOTTED)	0.146	0.25
TOTALS	59.081	100.00
November		
SPECIES NAME	WEIGHT (MT)	% CATCH
SHRIMP (PANDALUS)	21.625	96.27
REDFISH (UNSPECIFIED)	0.820	3.65
TURBOT	0.025	0.11
OTHER	0.002	0.01
TOTALS	22.462	100.00
December		
SPECIES NAME	WEIGHT (MT)	% CATCH
SHRIMP (PANDALUS)	56.382	85.64
COD	0.274	0.42
HALIBUT	0.025	0.04
REDFISH (UNSPECIFIED)	5.914	8.98
TURBOT	0.372	0.57
WITCH	0.005	0.01
LONG-HORN SCULPIN	0.158	0.24
SKATE (THORNY)	0.105	0.16
WOLFFISH (BROADHEAD)	0.085	0.13
GREENLAND SHARK	2.450	3.72
OTHER	0.098	0.15
TOTALS	65.837	100.00

1981		
June		
SPECIES NAME	WEIGHT (MT)	% CATCH
SHRIMP (PANDALUS)	261.541	96.74
AMERICAN PLAICE	0.157	0.06
REDFISH (MARINUS)	0.010	0.00
REDFISH (UNSPECIFIED)	7.915	2.93
TURBOT	0.193	0.07
WITCH	0.018	0.01
EELPOUTS/BLENNIES	0.001	0.00
SKATE (UNSPECIFIED)	0.064	0.02
SKATE (THORNY)	0.010	0.00
WOLFFISH (STRIPED)	0.015	0.01
WOLFFISH (SPOTTED)	0.045	0.02
WOLFFISH (UNSPECIFIED)	0.033	0.01
CUSK	0.002	0.00
GREENLAND SHARK	0.500	0.18
OTHER	0.000	0.00
BYCATCH TOTALS	8.813	3.26
GRAND TOTALS	270.353	100.00
July		
SPECIES NAME	WEIGHT (MT)	% CATCH
SHRIMP (PANDALUS)	522.560	94.16
AMERICAN PLAICE	1.478	0.27
COD	0.016	0.00
ARCTIC COD	0.305	0.06
HAUDDOCK	0.002	0.00
HALIBUT	0.089	0.02
REDFISH (UNSPECIFIED)	26.738	4.82
TURBOT	2.145	0.39
WITCH	0.032	0.01
EELPOUTS/BLENNIES	0.186	0.03
SKATE (UNSPECIFIED)	0.230	0.04
SKATE (THORNY)	0.019	0.00
WOLFFISH (BROADHEAD)	0.011	0.00
WOLFFISH (STRIPED)	0.100	0.02
WOLFFISH (SPOTTED)	0.128	0.02
WOLFFISH (UNSPECIFIED)	0.273	0.05
GREENLAND SHARK	0.910	0.16
OTHER	0.033	0.01
BYCATCH TOTALS	32.382	5.83
GRAND TOTALS	554.941	100.00
August		
SPECIES NAME	WEIGHT (MT)	% CATCH
SHRIMP (PANDALUS)	440.210	83.39
AMERICAN PLAICE	0.937	0.18
COD	0.076	0.01
ARCTIC COD	0.579	0.11
HAUDDOCK	0.002	0.00
HALIBUT	0.020	0.00
REDFISH (UNSPECIFIED)	79.154	14.99
TURBOT	3.094	0.59
WITCH	0.720	0.14
CAPELIN	0.002	0.00
EELPOUTS/BLENNIES	0.453	0.09
SKATE (UNSPECIFIED)	0.128	0.02
SKATE (THORNY)	0.133	0.03
WOLFFISH (BROADHEAD)	0.022	0.00
WOLFFISH (STRIPED)	0.438	0.08
WOLFFISH (SPOTTED)	0.245	0.05
WOLFFISH (UNSPECIFIED)	0.131	0.02
SQUID (ILLEX)	0.006	0.00
GREENLAND SHARK	1.100	0.21
OTHER	0.764	0.14
BYCATCH TOTALS	87.695	16.61
GRAND TOTALS	527.895	100.00
September		
SPECIES NAME	WEIGHT (MT)	% CATCH
SHRIMP (PANDALUS)	173.129	89.72
AMERICAN PLAICE	0.296	0.15
COD	0.006	0.00
ARCTIC COD	0.169	0.09
REDFISH (UNSPECIFIED)	13.815	7.16
TURBOT	1.510	0.78
WITCH	0.198	0.10
EELPOUTS/BLENNIES	0.203	0.11
SKATE (UNSPECIFIED)	0.264	0.14
SKATE (THORNY)	0.021	0.01
WOLFFISH (BROADHEAD)	0.008	0.00
WOLFFISH (STRIPED)	0.292	0.15
WOLFFISH (SPOTTED)	0.044	0.02
SQUID (ILLEX)	0.001	0.00
GREENLAND SHARK	2.850	1.48
OTHER	0.218	0.11
BYCATCH TOTALS	19.842	10.28
GRAND TOTALS	192.971	100.00

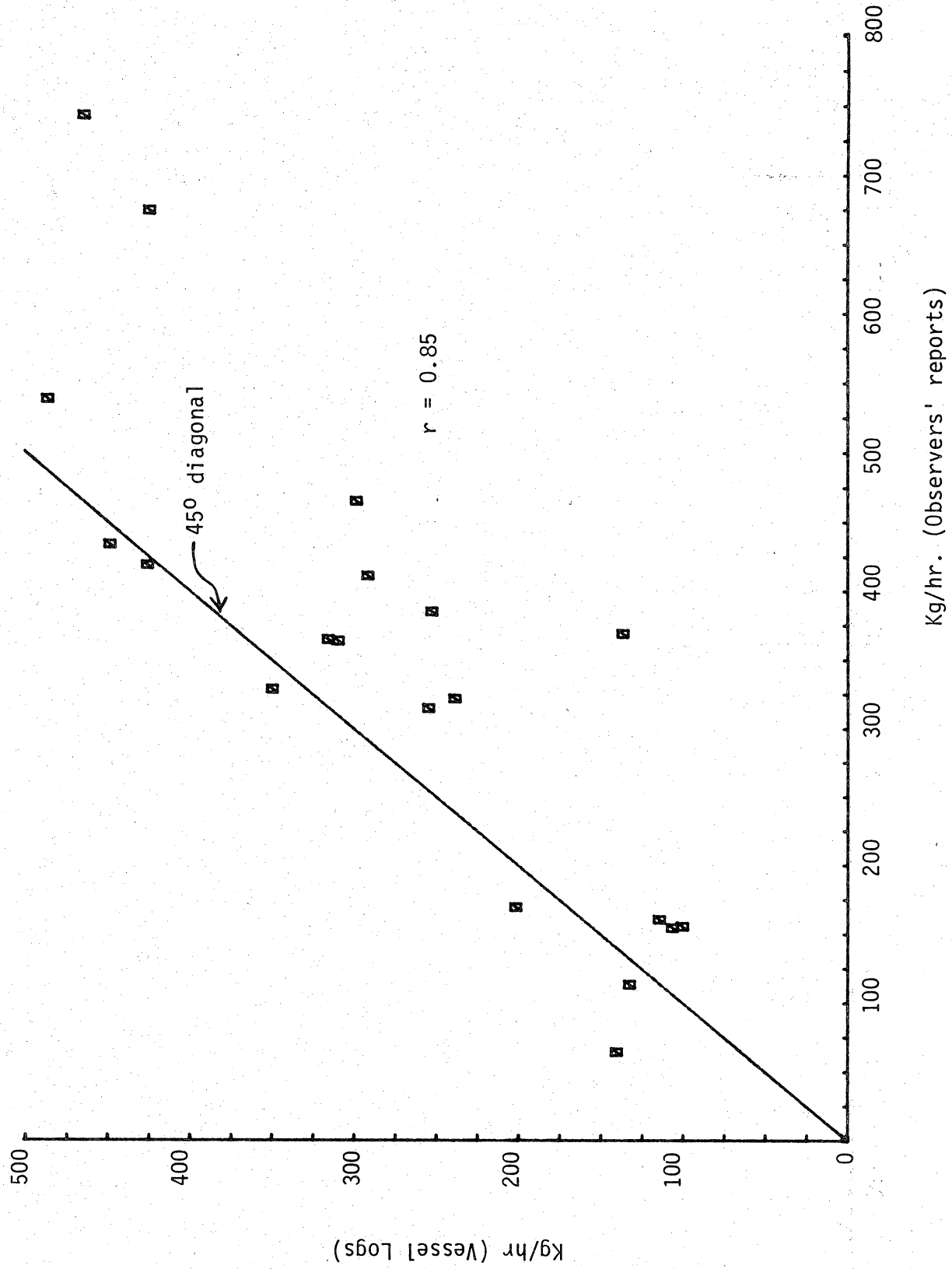


Fig. 1. Comparison of catch rates from vessel logs and observer reports

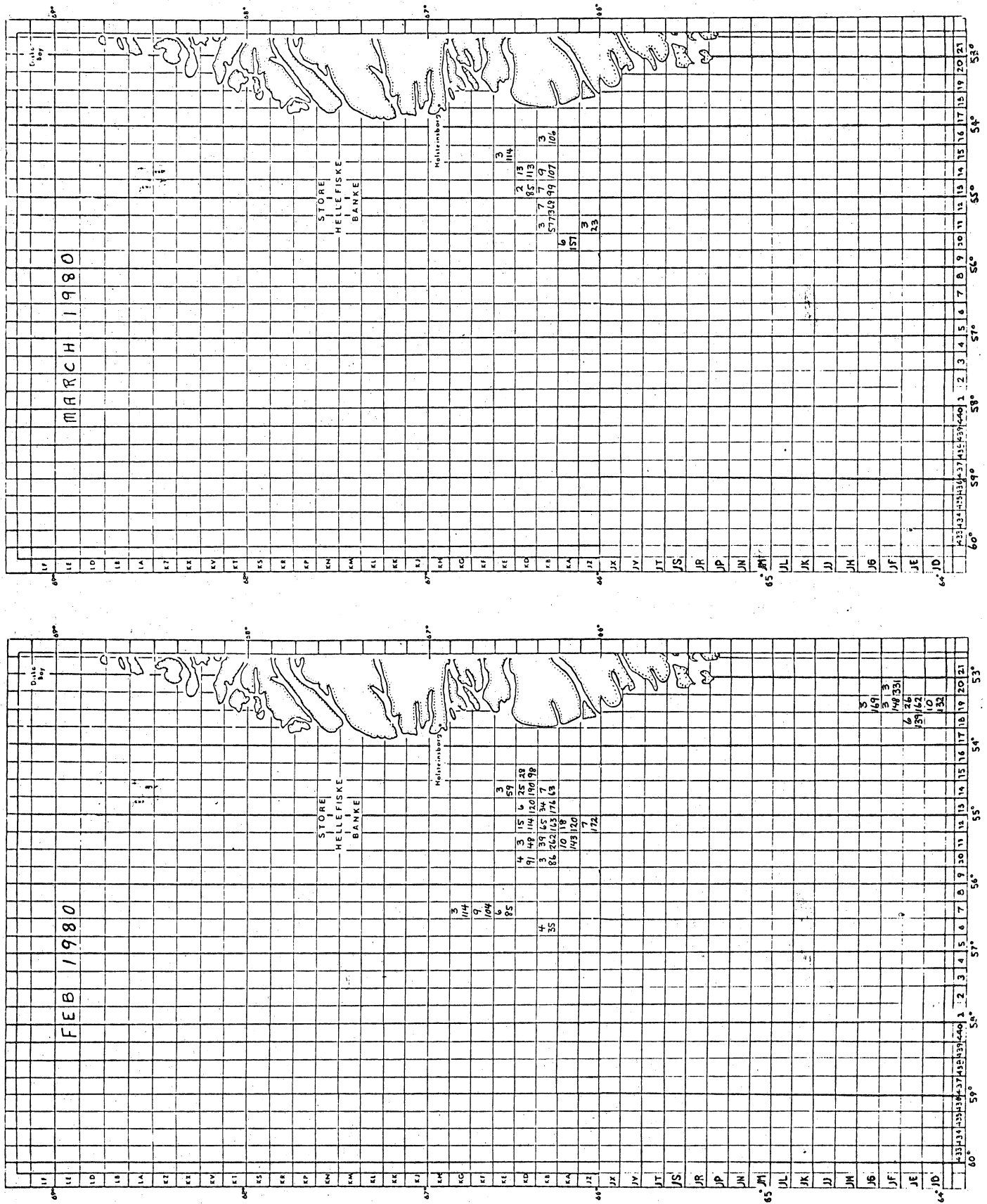


Fig. 2. Hours fished (upper) and kg./hr (lower) by statistical square, 1980.

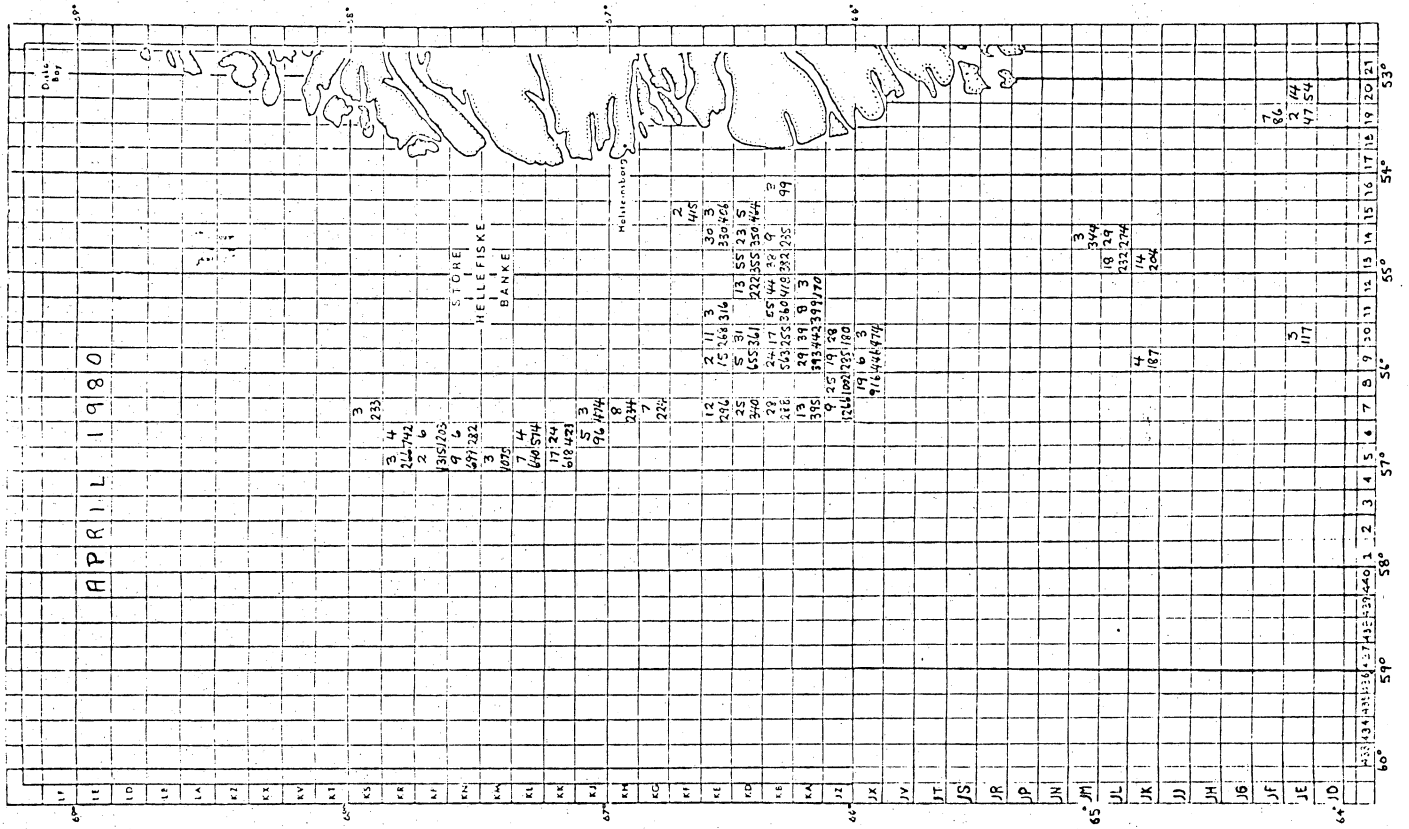
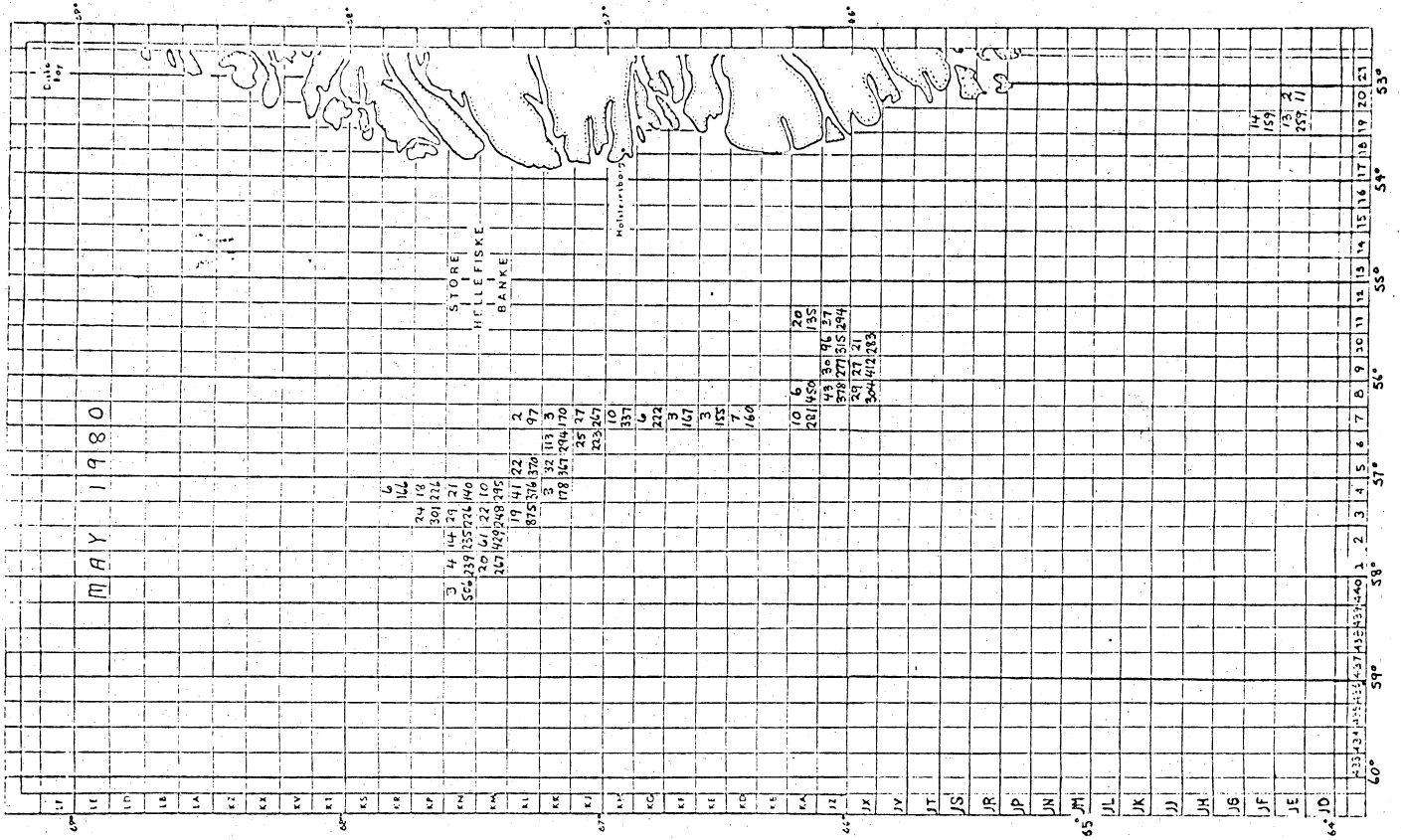


Fig. 2 cont'd

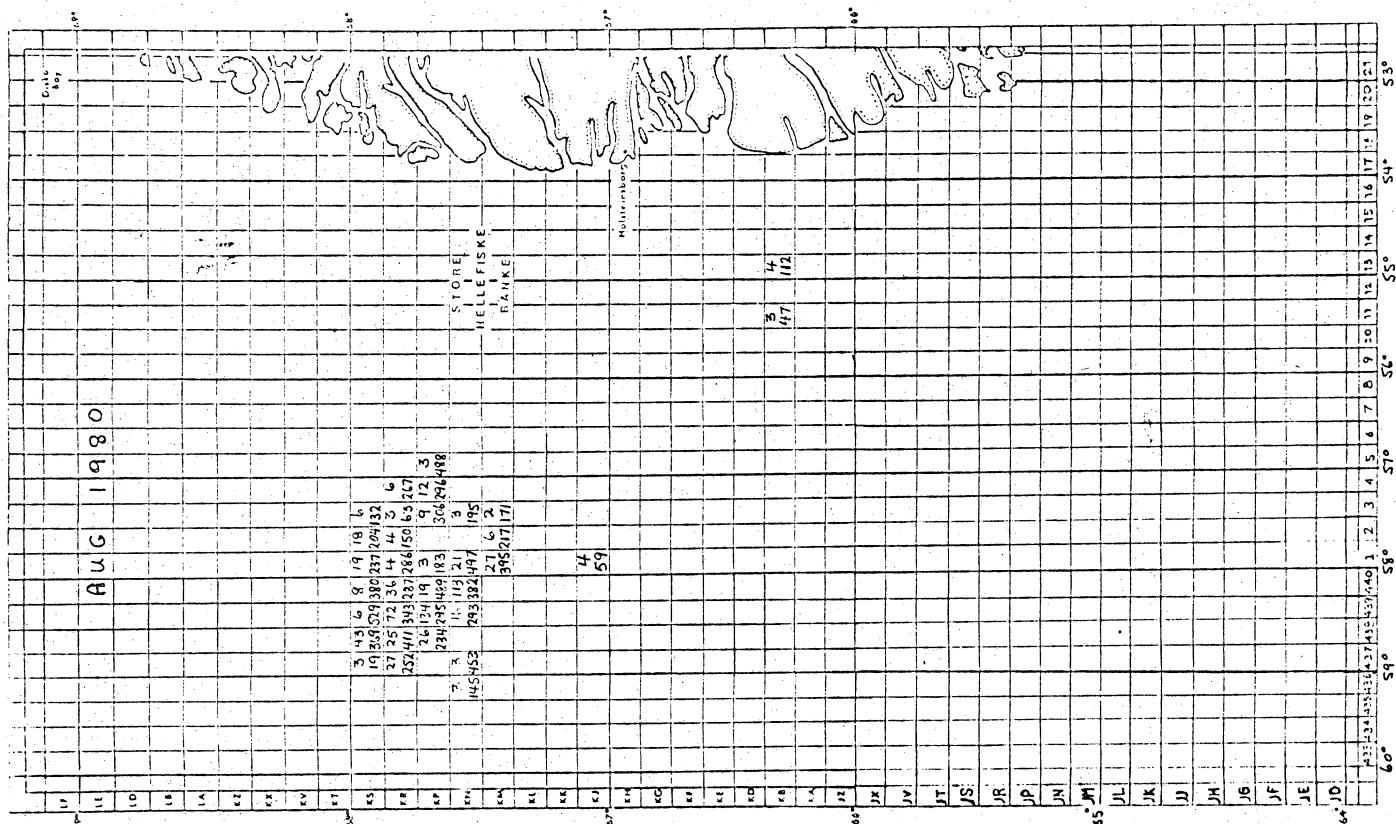
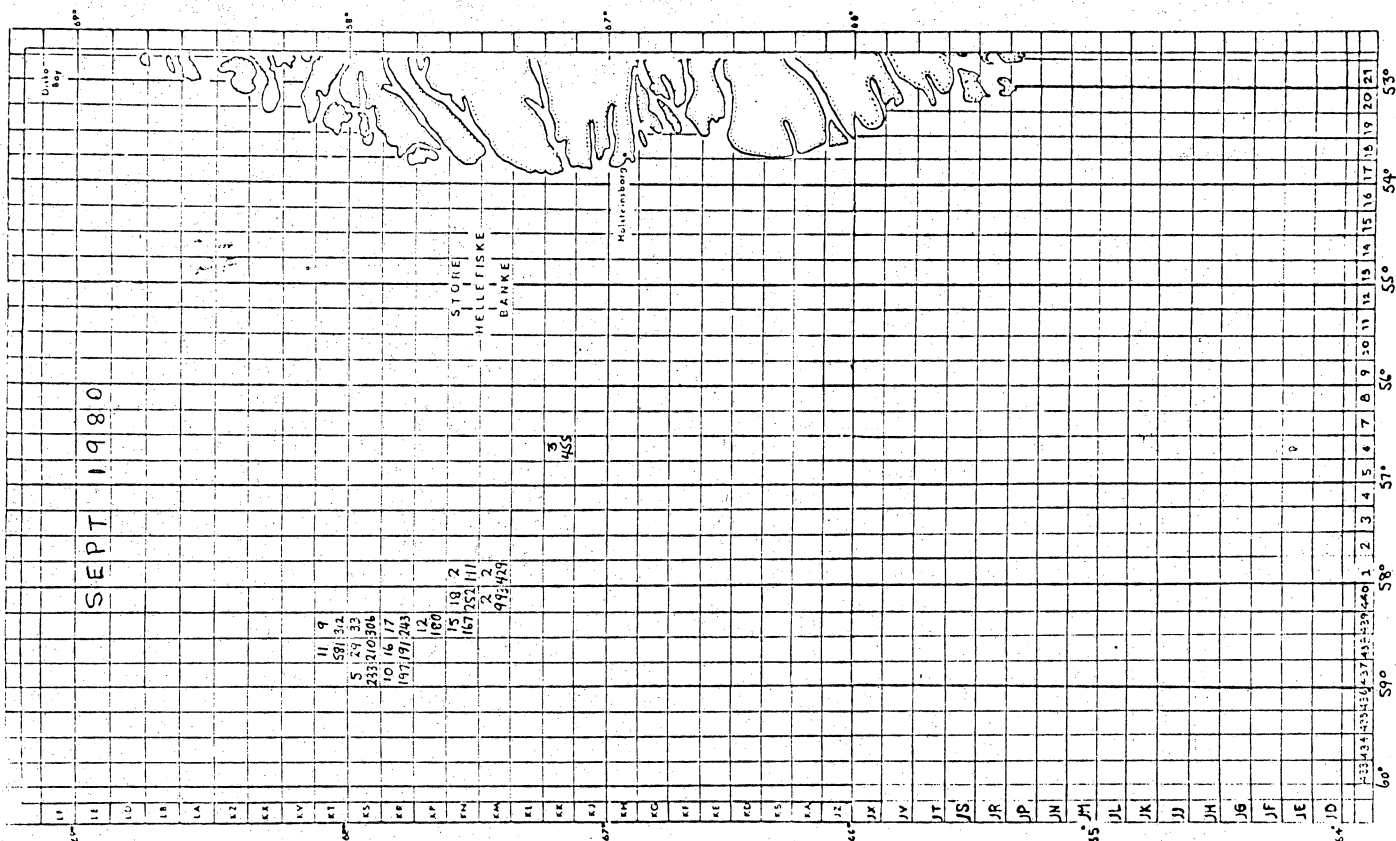


Fig. 2 cont'd

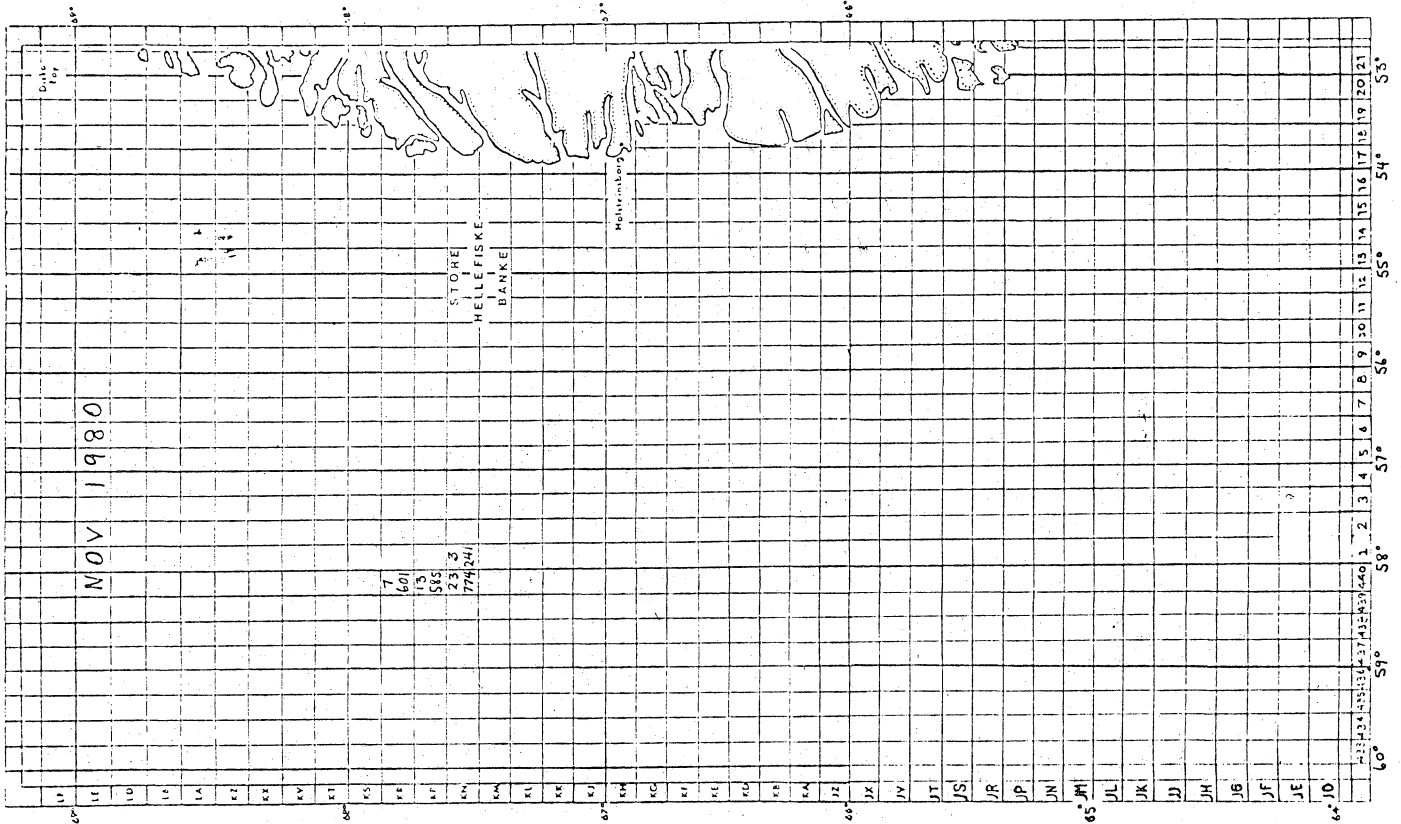
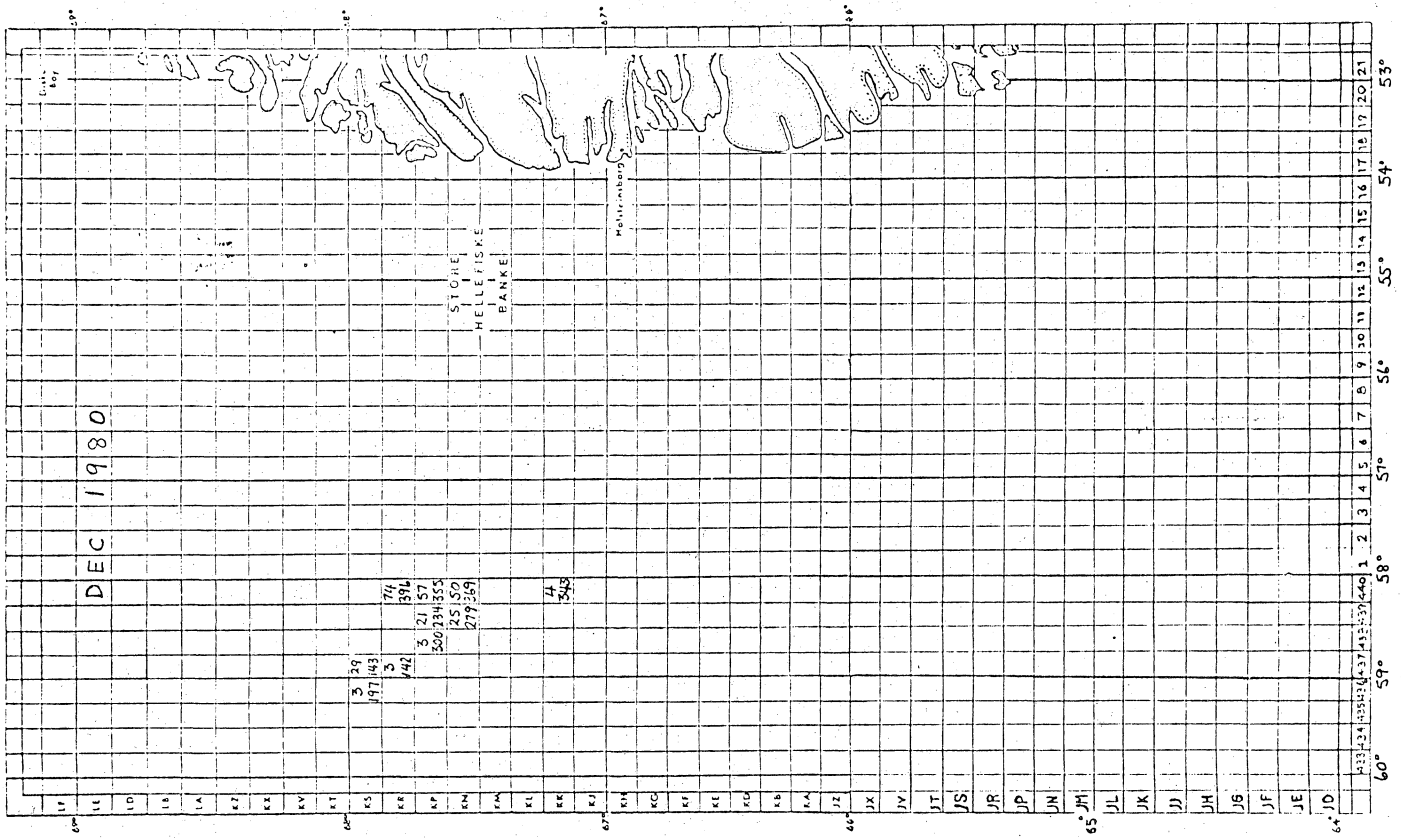


Fig. 2 cont'd

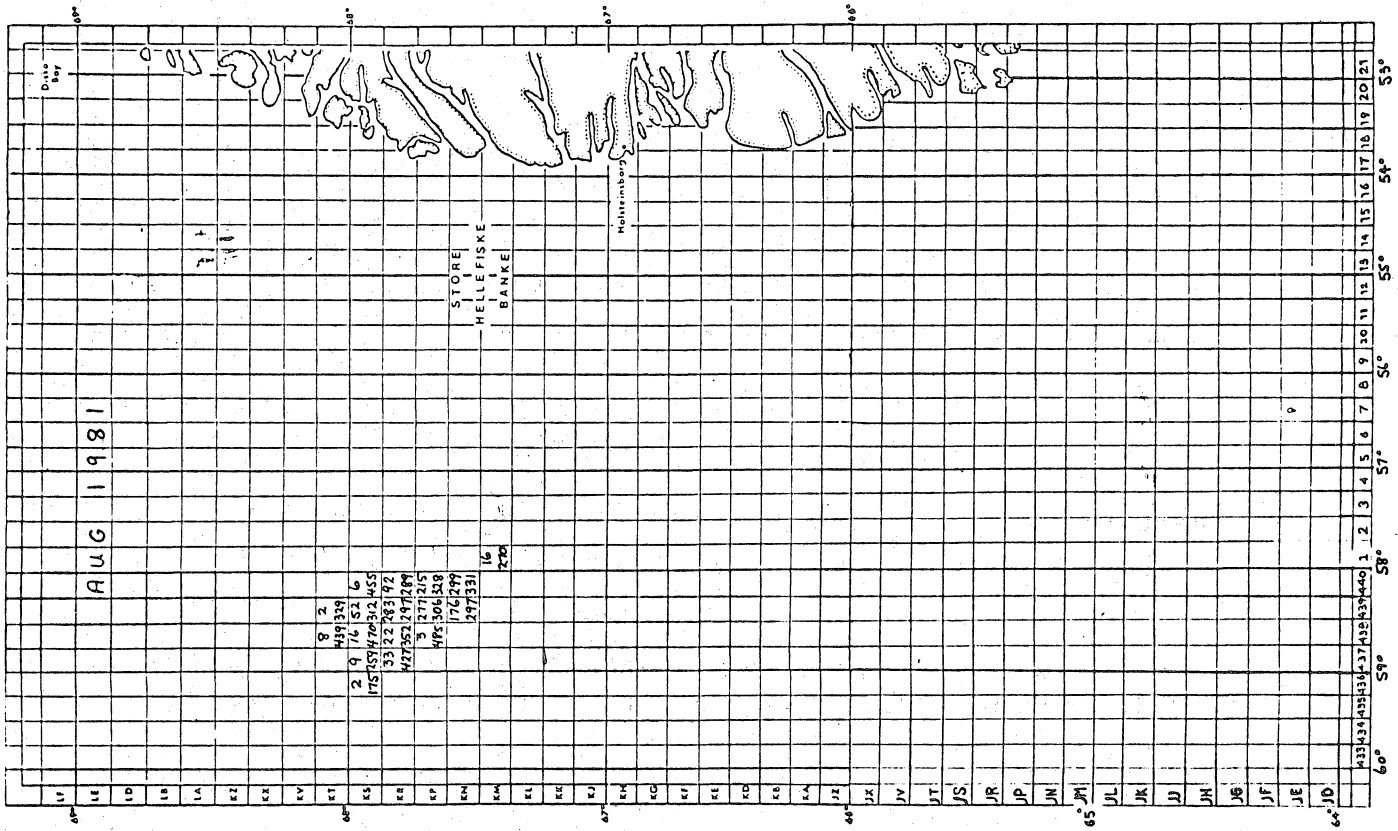
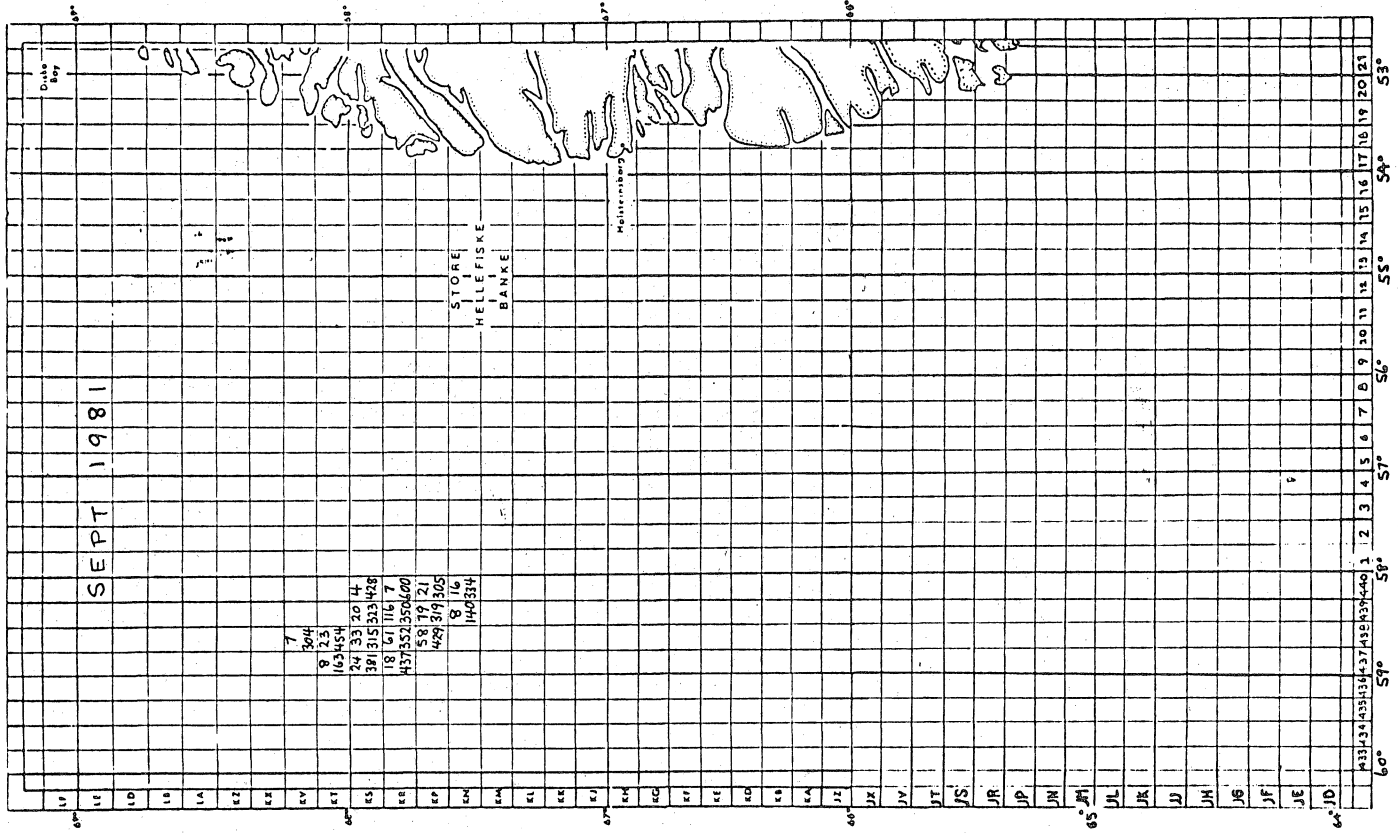


Fig. 3 cont'd

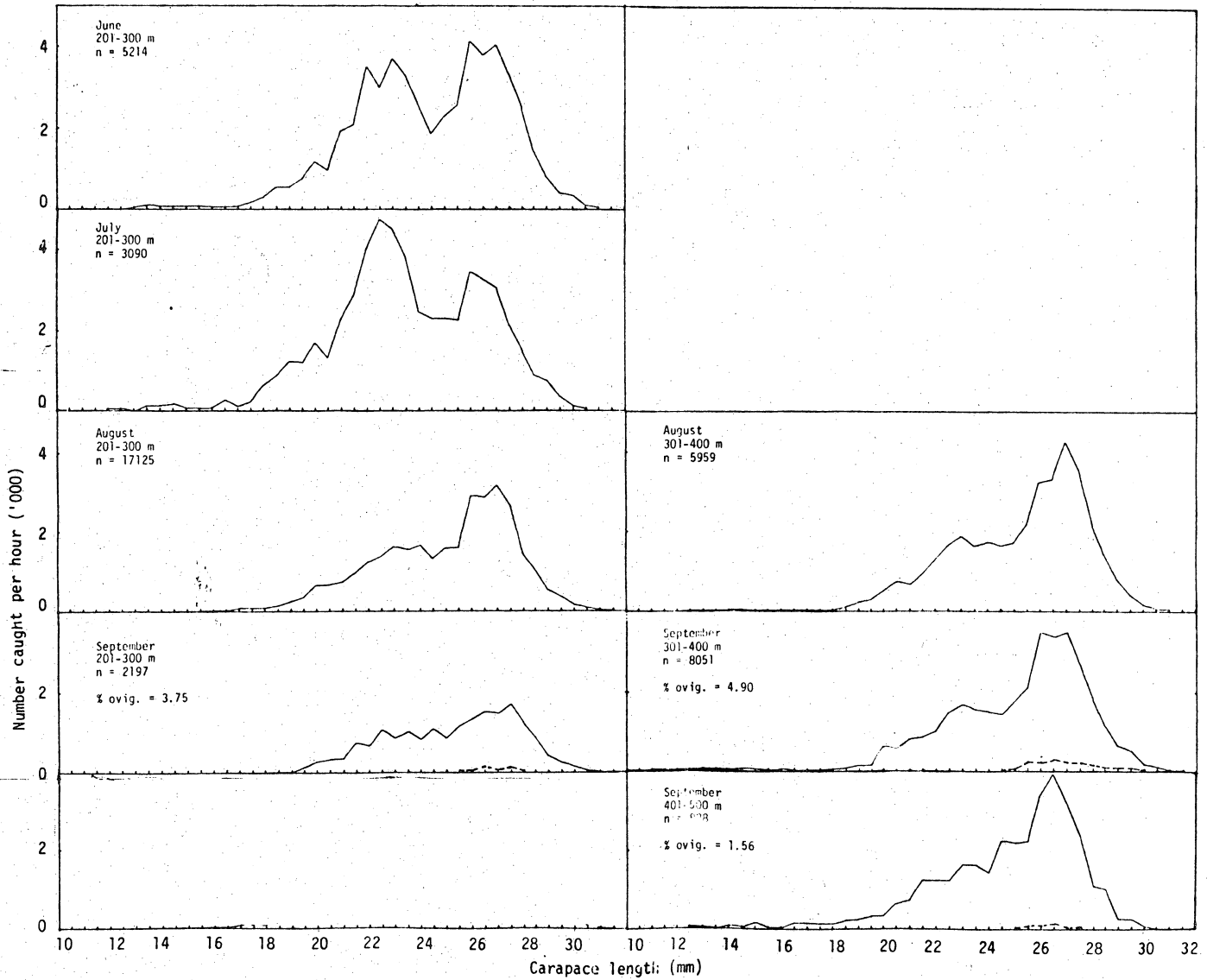


Fig. 4. Commercial length frequencies west of 58°W (June-September) and in Div. 0A (November-December) 1980. Ovigerous animals represented by broken line.

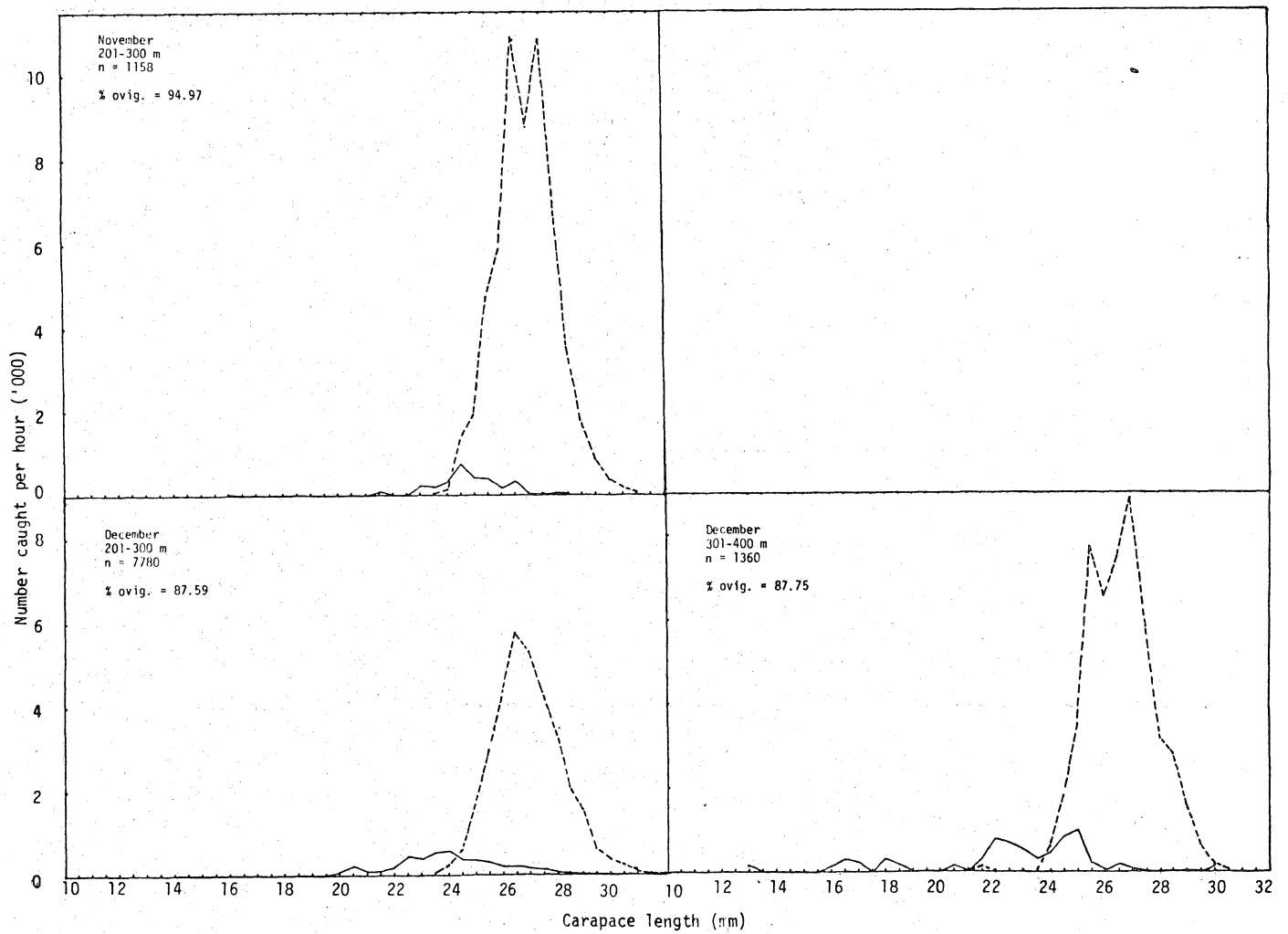


Fig. 4 cont'd

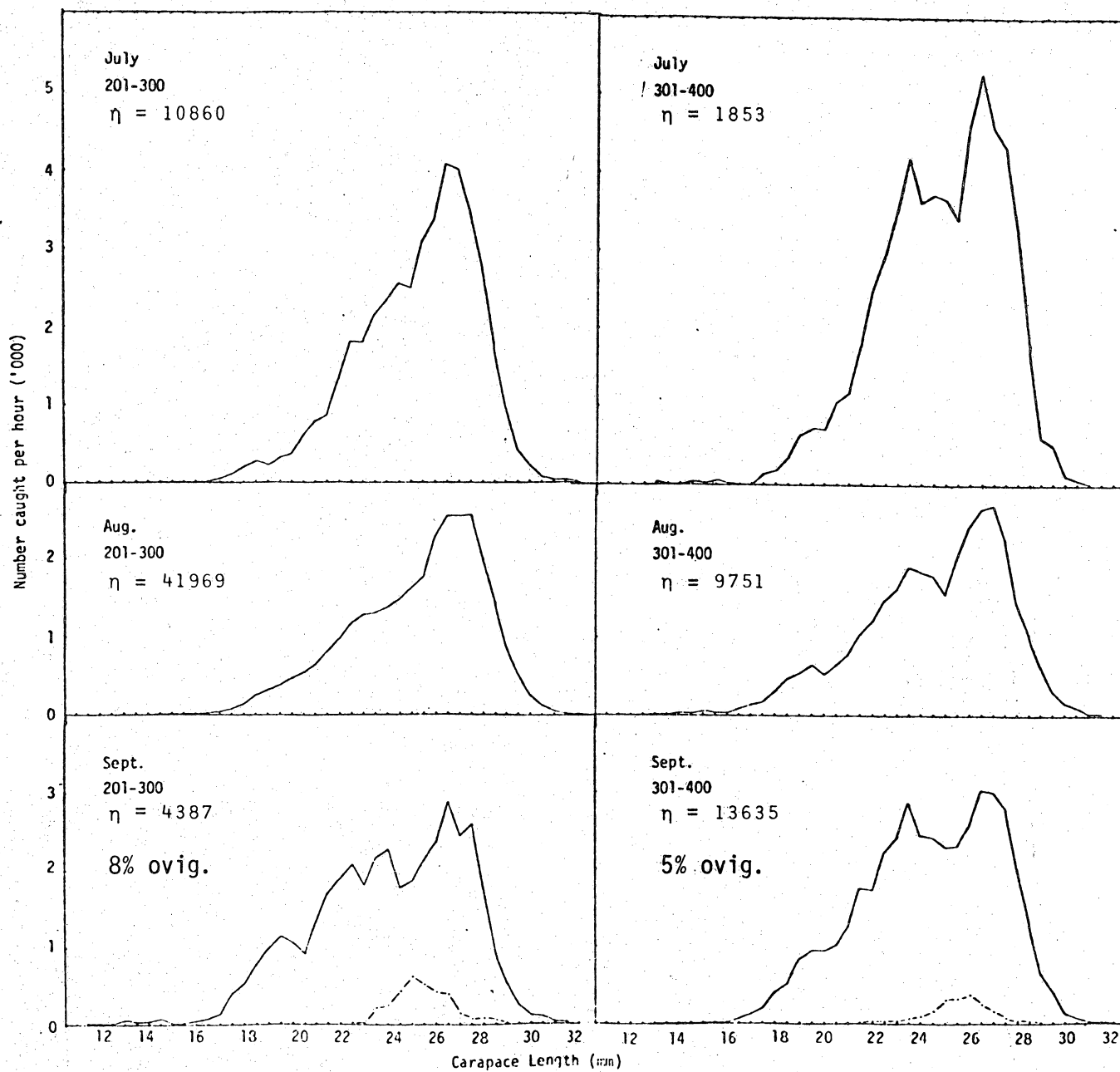


Fig. 5. Commercial length frequency, Div. OA, 1-81. Ovigerous animals represented by broken line.

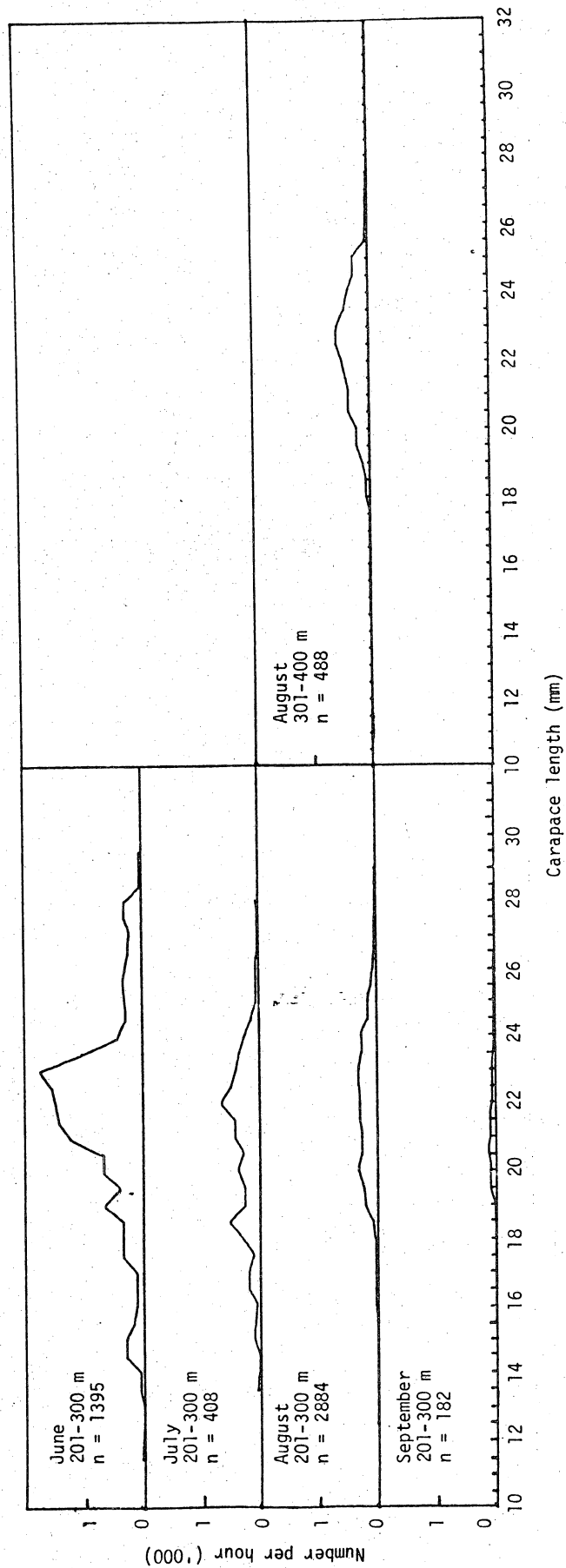


Fig. 6. Discard length frequency west of 58°W, 1980

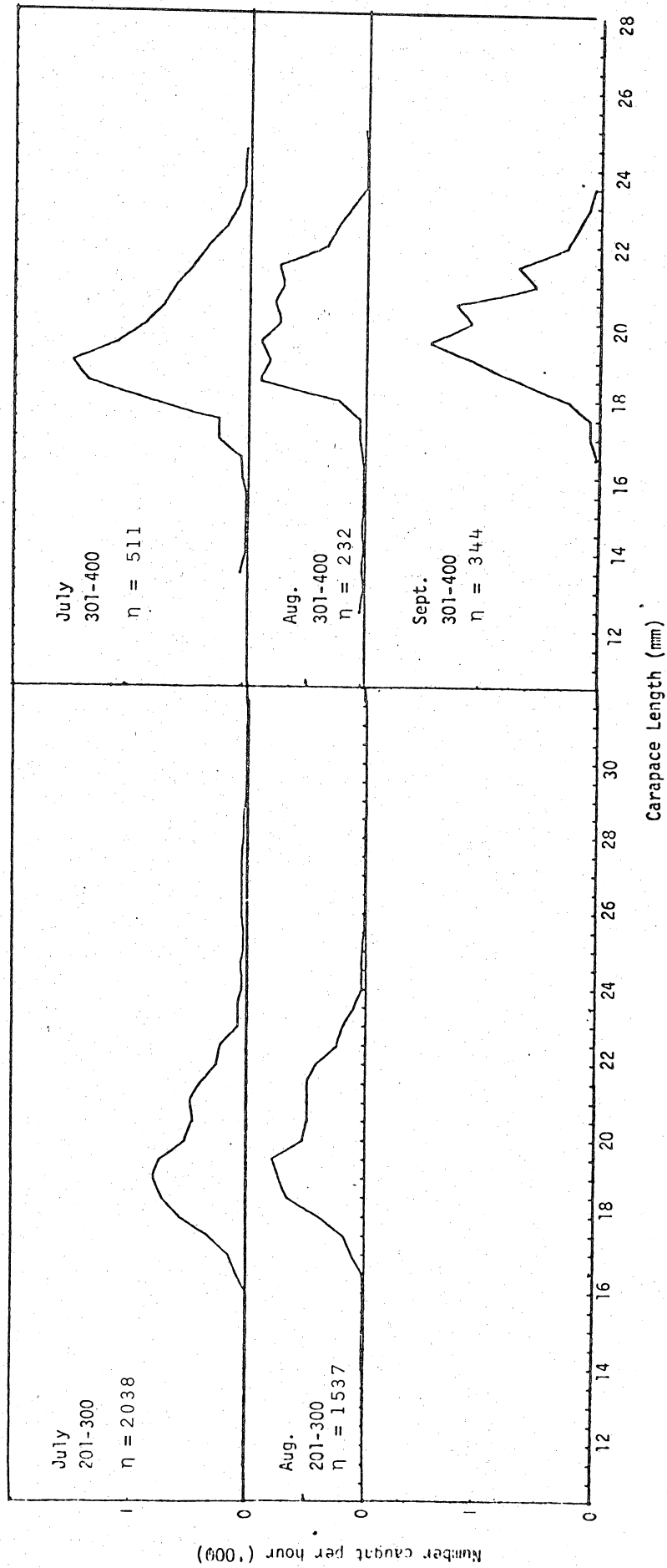


Fig. 7. Discard length frequency, Div. OA, 1981.