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An exploratory survey for shrimp (*Pandalus borealis*) in
Statistical Areas OA and OB

by

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Introduction

The 442 ton, 44 metre Faroese stern trawler Kristina Logos was chartered for a period of 30 days from September 4 to October 3, 1978. The vessel was chartered by the Industrial Development Branch, Fisheries and Environment Canada to conduct exploratory fishing for shrimp (*P. borealis*) in areas North of latitude 57°N. This paper supplies some basic information obtained on the distribution and abundance of shrimp and characteristics of catches in general in ICNAF Statistical Areas OA and OB. The material is presented as supplementary to the report by Jones and Parsons (1978) for the same general area.

Materials and Methods

The trawl used throughout the survey was a modified Sputnik 1800 with a 51 m headline, 61 m groundrope and a codend with 25 mm mesh. A total of 39 successful sets were made, the length of tow varying from 10 to 130 minutes in depths of 223-646 m (Table 1, Fig. 1).

A crude estimate of minimum trawlable biomass for shrimp was obtained by areal expansion based on areas calculated by Minet (1977) for Statistical Area OB only. Towing speed was 3.0 knots and the wingspread of the net was approximately 27 m. Assumptions of homogeneity were expanded to accommodate all sets in which shrimp were caught.

Results

Details of Shrimp Catches

Pandalus borealis occurred in varying amounts in 27 of 39 sets (Table 1). Catches in Area OA were very poor, the highest being 8 kg in 30 minutes. Ten other sets resulted in catches of less than 1 kg each. In OB best catches were 120 kg/hr at 65°04'N, 60°41'W and 35 kg/hr at 64°42'N, 60°21'W in 289 and 349 metres respectively. Generally speaking, the area between 64°30'N and 65°30'N produced the most productive catches; however, even within this area some sets resulted in little or no shrimp. South of 63°N catches were again extremely poor, the largest catch yielding only 10 kg in a 30 minute tow.

Fig. 2 and 3 show length frequencies obtained over the whole area and for different depths. The first indicates the trimodal distribution with peaks at 20, 24 and 30 mm representing, most likely, 3, 4 and 5+ age-groups. Fig. 3 illustrates size distribution through a 35 metre depth stratification. A low percentage of ovigerous females is evident in shallower water (5% at 240-274 m). This percentage increases with depth to 65% at 422-457 m.

Estimate of Minimum Trawlable Biomass

Details of the estimated biomass are presented in Table 2 and Fig. 4. Approximately 3500 metric tons are indicated for Statistical Area OB between depths of 276 and 550 m. This estimate does not consider diel variability or the relative efficiency of the Sputnik 1800 trawl for catching shrimp. A lack of data for depths shallower than 276 m and deeper than 550 m precluded the calculation of biomass in these areas.

Other Species

The major fish species taken were Greenland halibut (Reinhardtius hippoglossoides), redfish (Sebastes mentella), and Arctic cod (Boreogadus saida).

Greenland halibut was caught most often, but in small quantities. The largest catch taken was 60 kg/hr at 66°00'N and 60°57'W in 364 metres. Fig. 5 shows a majority of the number caught as non-commercial size with approximately a 60-40 percent ratio of males to females.

Redfish were usually caught in small quantities. However, one set produced 692 kg/hr at position 62°33'N and 62°01'W in 302 m. It was determined using a weight/length key (Legge, personal communication) that 97% of the weight caught was represented by lengths less than or equal to 25 cm. Fig. 6 shows the increase in redfish size with increase in depth.

Arctic cod were caught in larger quantities but on fewer occasions than either Greenland halibut or redfish. Largest catches resulted in 5000 kg for a 10 min tow at position 67°32'N and 62°04'W, (234 m) and 1250 kg for 30 min at position 68°10'N and 64°06'W (272 m). Fig. 7 indicates at least three year-classes are represented and younger fish were caught in shallower depths.

Discussion

The results of this survey indicated no commercial shrimp concentrations in Statistical Areas OA and OB. However, the area is very large and, with the sampling density limited to only about 1 set every 2500 km² the possibility of small or even relatively large shrimp grounds being missed cannot be ruled out. Nevertheless, results presented must be regarded as somewhat negative in terms of commercial potential.

Length frequencies indicate a good range of the sizes under virgin conditions and a fair proportion of large animals even at shallower depths. An anomalous condition is evident in Fig. 3 where in the 240-274 m interval a high proportion of large, non-ovigerous shrimp was found.

Minimum trawlable biomass must be considered in perspective. Too many errors and omissions in sampling exist to accept the 3500 ton figure as accurate. It does not even represent the total range of shrimp distribution. Inclusion is made to corroborate other work (Minet 1977, Jones and Parsons 1978) which also indicate low levels of biomass (10,000 and 15,000 tons respectively). The considerably lower figure in this report may be, in part, a function of time of year. The survey was conducted at a time when other shrimp fisheries usually experience a decline in catch rates. This was particularly evident in the Labrador fishery in September and October in 1978.

Arctic cod was the only fish species to be taken in commercial quantities.

References

Minet, J.P., A. Forest and J.B. Perodou. New biological data on the shrimp, *Pandalus borealis*, in the Baffin Island waters (ICNAF Statistical Area 0). ICNAF Res. Doc. 77/XI/70, 16 pp.

Jones, B.C. and D.G. Parsons. Report on Exploratory Fishing Assessment of Pink Shrimp Fishery Potential in Northeastern Canadian Waters. ICNAF Res. Doc. 78/XI/87.

Table 1. Details of catch by the stern trawler Kristina Logos in Statistical Divisions OA and OB, September 1978.

Set #	Position		Date	Mean Time (NST)	Dur. (mins)	Depth (metres)	Wt. Caught (Kg)			Arctic Cod
	Lat.	Long.					Shrimp	Greenland Halibut	Redfish	
9	64° 30'	60° 37'	10/09	1825	110	364	28.00	4.54	4.54	
10	64° 42'	60° 21'	10/09	2135	120	340	70.00	4.54	40.00	
11	64° 44'	61° 26'	11/09	0610	120	314	30.00	5.00	5.00	
12	64° 47'	61° 07'	11/09	0855	120	320	23.00	4.54	8.00	
13	64° 57'	60° 34'	11/09	1230	100	311	25.00	1.36	2.27	
14	65° 04'	60° 41'	11/09	1455	100	289	200.00	0.91	2.27	
15	65° 07'	60° 58'	11/09	1710	90	271	15.00	0.91		
16	65° 13'	61° 12'	11/09	1945	90	276		0.45		
17	65° 34'	61° 49'	12/09	0620	60	223		2.27		
18	65° 47'	61° 12'	12/09	0930	60	314		9.09		
20	66° 00'	61° 09'	12/09	1210	30	241		0.91		200.00
21	66° 00'	60° 57'	12/09	1350	70	364	20.00	70.00		2.00
22	66° 17'	60° 52'	12/09	1705	30	395	8.00	16.00		2.00
23	68° 10'	64° 06'	13/09	0903	35	272				1500.00
24	68° 24'	64° 22'	13/09	1220	30	351		0.23	0.09	
25	68° 31'	64° 37'	13/09	1410	30	441	0.05	1.27		1.27
26	68° 39'	64° 41'	13/09	1645	60	571	0.09	7.00	2.60	2.27
27	69° 02'	64° 46'	13/09	2013	45	450	<0.05		1.36	125.00
28	67° 32'	62° 04'	14/09	1205	10	234				5000.00
29	67° 24'	61° 29'	14/09	1420	30	422				20.00
30	67° 10'	61° 16'	14/09	1640	40	333		15.00		15.00
31	66° 46'	60° 58'	14/09	1945	30	382	0.05	9.91	<0.05	2.27
32	66° 24'	60° 41'	15/09	0625	30	439	0.23	9.08	0.05	0.23
33	66° 02'	60° 23'	15/09	0930	30	395	2.10	13.62	0.05	0.23
34	65° 37'	60° 48'	15/09	1255	30	313	9.00	15.00		0.91
35	65° 21'	60° 34'	15/09	1520	30	360	11.00	18.18	0.60	0.45
36	65° 08'	60° 07'	15/09	1845	120	408	30.00	9.08	1.81	
37	66° 04'	59° 07'	16/09	0643	45	646	0.13	0.91	0.23	
40	65° 00'	59° 18'	16/09	1815	30	450	4.20	9.08	7.50	
41	64° 51'	59° 40'	16/09	2015	30	358	4.60	0.91	6.70	
42	64° 31'	59° 53'	17/09	0658	95	351	20.00			
43	63° 05'	61° 16'	20/09	1020	30	377	1.00	4.00	2.00	
44	62° 54'	61° 13'	20/09	1235	60	424		2.27	2.27	
45	62° 53'	61° 52'	20/09	1525	30	284	10.00	6.81	22.70	
46	62° 33'	62° 01'	20/09	1905	130	302	6.00	9.10	1500.00	
47	62° 11'	62° 49'	21/09	0728	65	369	1.50		25.00	
48	62° 12'	63° 11'	21/09	0940	60	322	<0.50	2.00	5.00	
49	61° 44'	63° 23'	21/09	1408	65	476		6.81	7.70	
51	61° 19'	65° 10'	22/09	2017	33	320		5.46		
TOTALS							519.05	266.24	1647.79	6871.63

Table 2. Estimates of trawlable biomass of shrimp in Statistical Area 0, September 1978.

Stratum	Area (Km ²)	Depth Range (m)	No. of Sets	Biomass (metric tons)
3	3919	276-366	6	755.3
6	9156	368-549	3	549.8
8	15614	276-366	7	1652.2
20	7128	276-366	3	353.9
21	17229	368-549	4	94.6
Totals	53046 km		23	3405.8
	Upper limit			Lower limit
	4756.8 metric tons			2054.8 tons

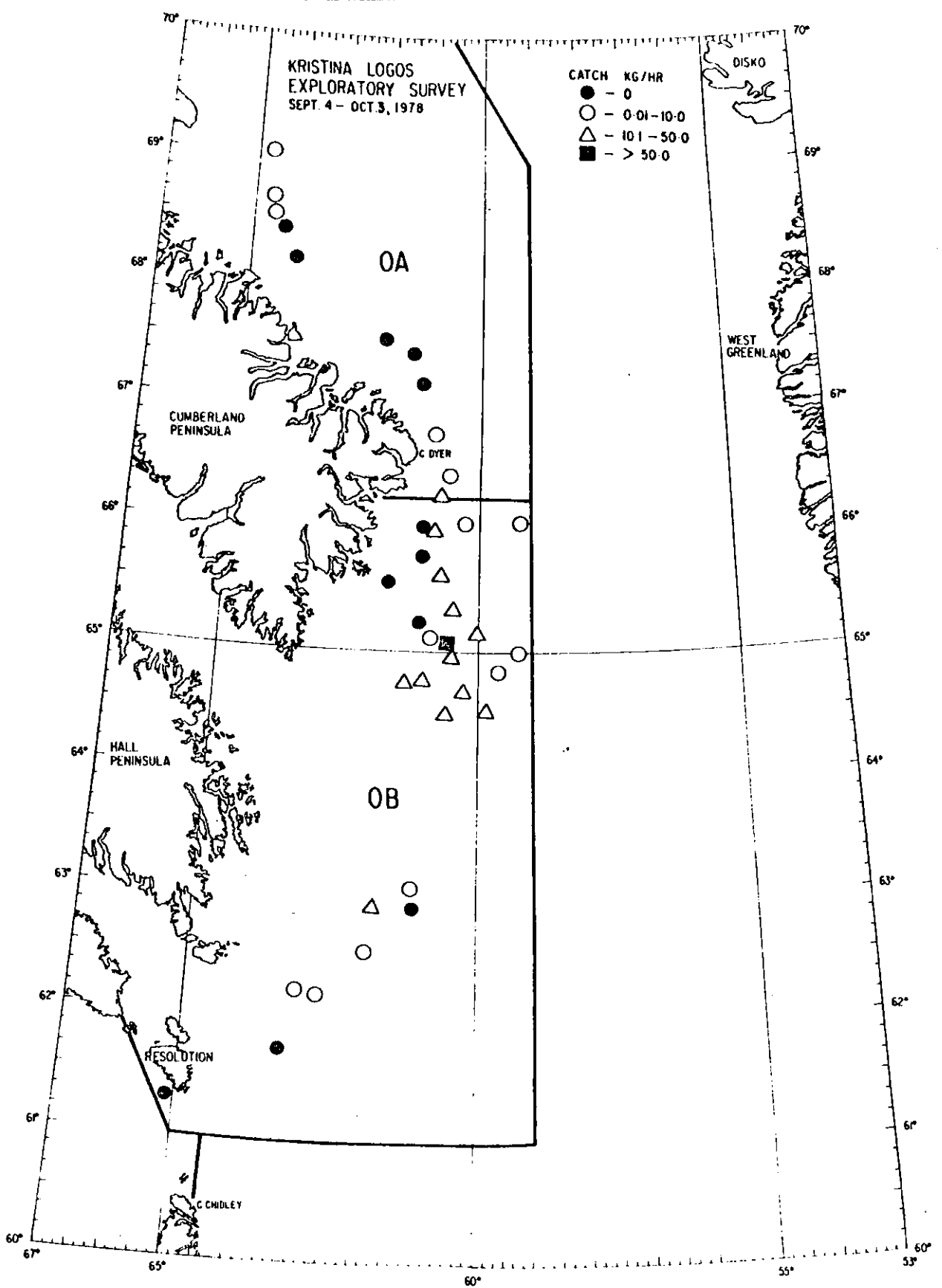


Fig. 1. Distribution of shrimp catches in the survey area, September 1978.

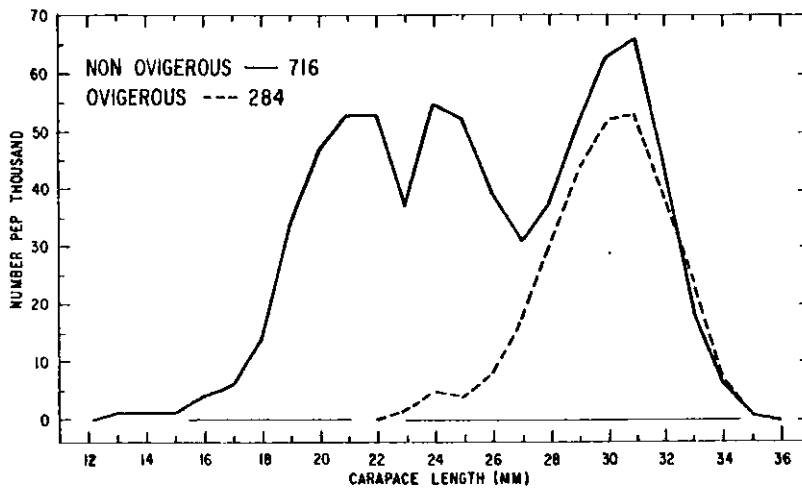


Fig. 2. Overall length distribution of shrimp from samples of catches taken in Statistical Area 0, September 1978.

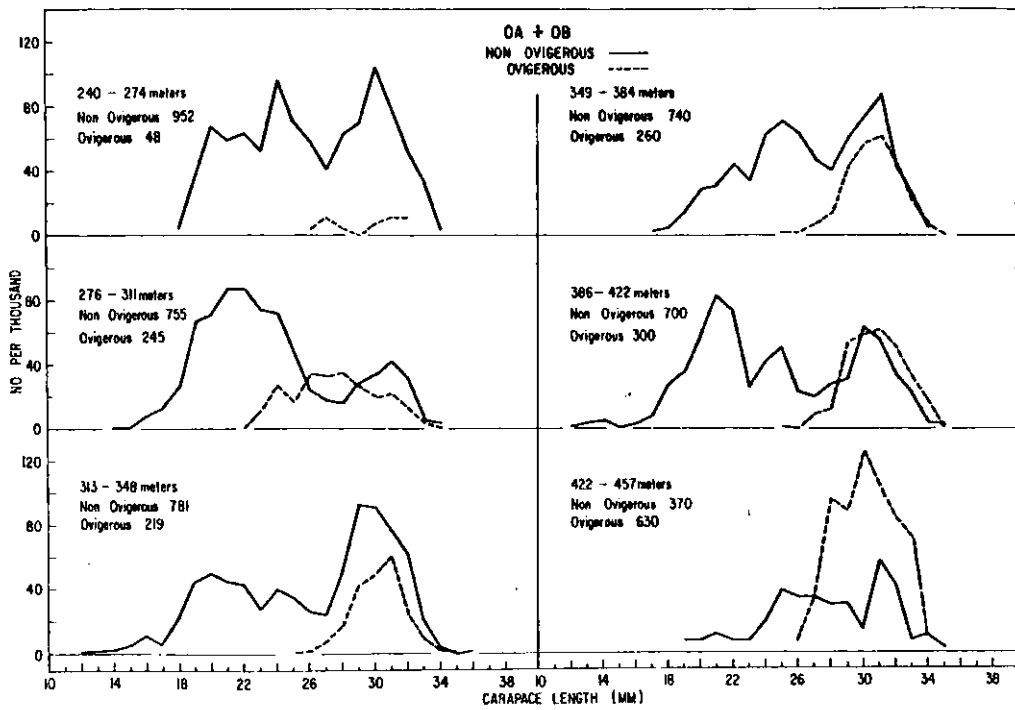


Fig. 3. Length distribution of shrimp by depth zones in Statistical Area 0, September 1978.

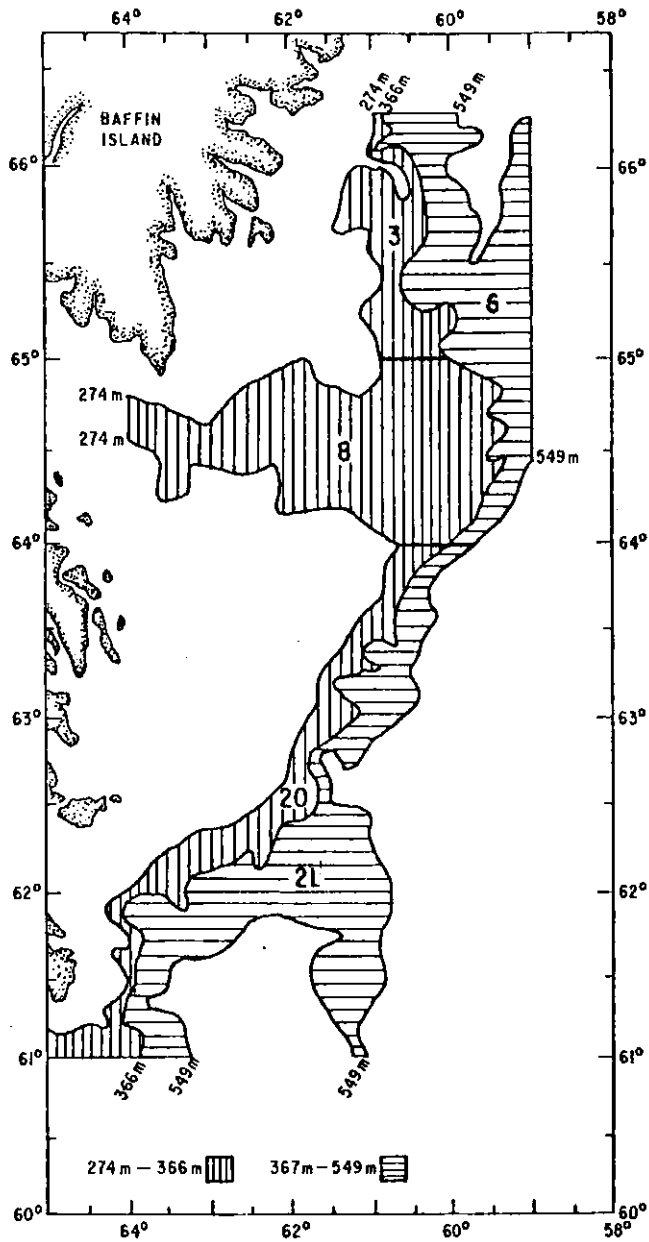


Fig. 4. Stratification chart of Statistical Area 0, based on the survey by Minet (1977).

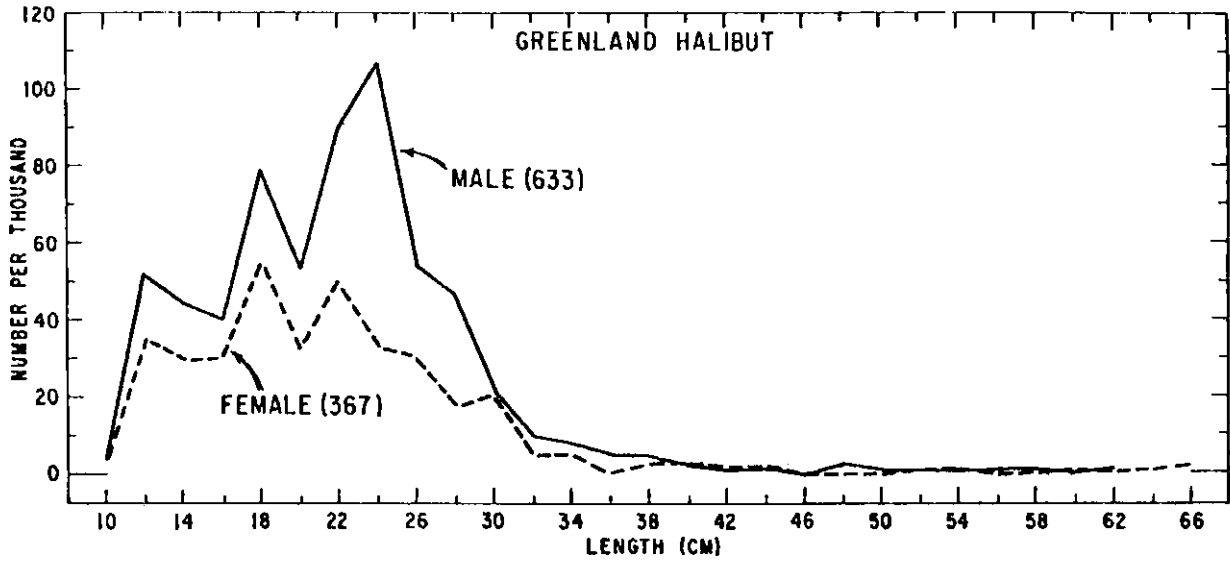


Fig. 5. Length distribution of Greenland halibut in Statistical Area 0, September 1978.

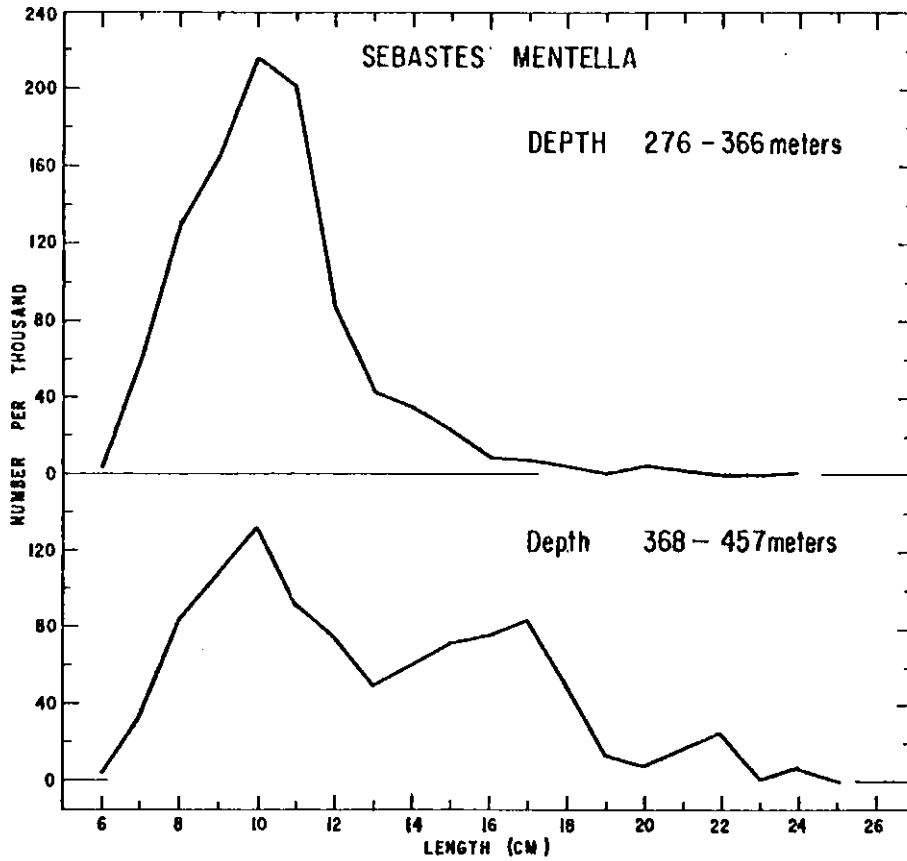


Fig. 6. Length distribution of redfish from catches in Statistical Area 0, September 1978.

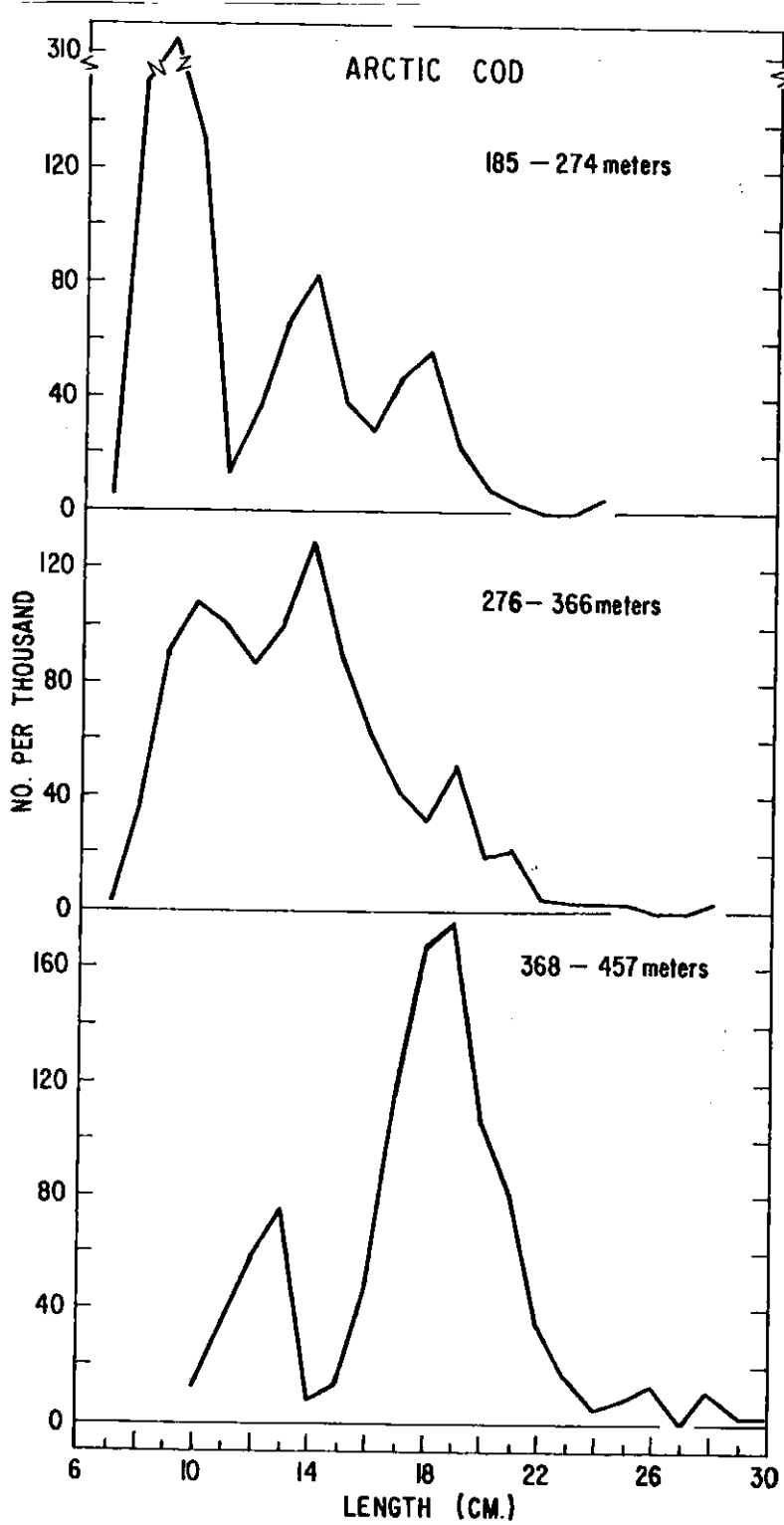


Fig. 7. Length distribution of Arctic cod from catches in Statistical Area 0, September 1978.

