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Norwegian Investigations on Shrimp (*Pandalus borealis*)
in East Greenland Waters in 1989

by

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INTRODUCTION

The Norwegian quota of shrimp in East Greenland waters in 1989 was 2050 tonnes. 21 vessels participated in the fishery. According to the fishing logbooks received, the data in the present paper represents catches of 1975 tonnes.

Results of field investigations together with commercial fishery data in 1988 were reported by Smedstad and Torheim (1989). The results of the investigations together with fishery data in 1989 are presented in this paper.

LOCATION OF THE FISHERY

From 1 March to 11 April one of the authors was an observer on board the sterntrawler "Lyshaug". In the period 10 March to 9 April the fishing area of "Lyshaug" was located south of 66°N and west of 30°W (Fig.1). Fig. 7-18 shows the location of the Norwegian fishery from January to December 1989. Because of uncertain positions 4 tonnes fished in 62 hours are omitted.

MATERIAL AND METHODS

The shrimp were sorted in "landing" and "discard" categories after they were separated from fish species in the catch.

Details of the trawl hauls examined by the observer are given in Table 1. Random samples of shrimp were taken for length measurements (Carapace length to nearest mm below) (Table 2). In addition length compositions were obtained from by-catches of Greenland halibut (Fig.3), redfish (Fig.4) and cod (Fig.5).

Monthly catch and effort data from 1982-1989 are compiled from logbooks of the vessels participating in the fishery. (Table 3).

SIZE AND SEX COMPOSITION OF SHRIMP

Length compositions in samples collected by the observer on board "Lyshaug" are given in Table 2 and in Fig.2. Shrimp with modal group 30 mm length were dominating. Samples taken from catches fished west of 31° W deeper than 400 m contained more small shrimps than samples taken in the eastern part of the fishing area. East of 31° W no significant changes were evident in the length composition of shrimp sampled during the stay of the observer.

On an average the samples consisted of 18.7% males, 0.7% females without roe, 20.1% with headroe and 60.5% were eggbearing (Br+E).

DISCARD

The quantity of discarded shrimp varied from 0 - 5,3 %. On an average about 2% of the total catch was discarded.

CATCH AND CATCH PER UNIT EFFORT

Table 3 shows catch and catch per hour trawling (CPUE) by month for the Norwegian fishery off East Greenland (ICES Div. XIV B) from 1983 to 1989. The quarterly CPUE for the period 1980-1989 are shown in Fig.6. Only for the second quarter data exist for all years. In this quarter the CPUE has been relatively stable of about 0.15 tonnes per hour in the period 1984-1987, but in 1988 and 1989 the CPUE dropped to about 0.08 tonnes per hour.

BY-CATCHES IN THE SHRIMP FISHERY

By-catches of fish in the trawl hauls of "Lyshaug" examined by the observer are listed in Table 1. The major by-catch continues to be redfish. The category others consists of small skates, plaice and catfish.

None of the fish were kept on board. The mean number of fish relative to the mean shrimp catch (retained) per tow for the years 1982-1989 are given in the table below.

Species	Mean number per tow							
	1982	1983	1984	1985	1986	1987	1988	1989
Cod	23	3	3	3	1	9	0	1
Greenland halibut	7	9	120	7	1	2	3	3
Redfish	53	47	87	74	103	293	421	192
Others	13	5	3	17	3	12	9	11
Total	96	64	213	101	108	316	433	207
Nos of hauls observed	37	21	19	40	19	24	7	39
Mean shrimp catch(kg)	608	346	880	732	410	528	300	246
Nos of fish per kg shrimp	0.16	0.18	0.24	0.13	0.26	0.60	1.44	0.84

REFERENCES

Smedstad, O.M. and Torheim, S. 1989. Norwegian Investigations on shrimp (Pandalus borealis) in East Greenland waters in 1988. NAFO SCR Doc.89/18, 12 p.

Table 1. Catches of shrimp and by-catches of fish in some trawl hauls by M/V "Lyshaug" off East Greenland in March-April 1989.

Nos	Date	Time (hr)	Position		Direction towed	Towing time (hr)	Shrimpcatches				By-catches (Nos)			
			N	W			Landings Kg	Discards		Total Kg	Cod hal.	Gre. hal.	Red fish	Other
								Kg	%					
1	10 March	2110	65°40'	30°32'	240°	2.83	350	2	0.6	352	-	5	100	7
2	11 March	0200	65°36'	31°01'	50°	4.83	349	4	1.1	353	-	6	150	19
3	11 March	0800	65°41'	30°37'	250°	4.50	192	2	1.0	194	-	-	150	1
4	11 March	1315	65°37'	31°03'	90°	5.00	152	2	1.3	154	-	-	120	1
5	12 March	0625	65°32'	30°27'	70°	4.00	330	7	2.1	337	3	1	400	11
6	12 March	1655	65°34'	30°39'	80°	5.00	134	3	2.2	137	-	-	150	16
7	13 March	0435	65°34'	30°46'	55°	5.50	666	12	1.8	678	-	5	500	78
8	13 March	1440	65°36'	30°33'	50°	4.33	188	2	1.1	190	-	4	150	12
9	14 March	1940	65°37'	30°12'	240°	4.58	317	3	0.9	320	2	-	300	55
10	14 March	0115	65°32'	30°44'	90°	4.00	219	6	2.7	225	2	2	350	61
11	15 March	0305	65°35'	30°41'	100°	5.50	136	-	-	136	-	3	150	29
12	15 March	1000	65°33'	30°12'	270°	4.66	21	-	-	21	-	-	200	14
13	15 March	1525	65°34'	30°42'	270°	4.50	55	-	-	55	2	-	100	4
14	16 March	0255	65°39'	30°59'	80°	4.50	101	-	-	101	3	-	200	8
15	17 March	0610	65°33'	30°37'	80°	4.00	45	-	-	45	-	-	200	13
16	23 March	0705	65°51'	30°41'	260°	2.00	101	2	1.9	103	-	3	80	-
17	23 March	1350	65°41'	31°07'	60°	5.00	79	-	-	79	-	1	150	-
18	23 March	2015	65°41'	30°38'	60°	3.83	216	2	0.9	218	5	8	400	9
19	24 March	0500	65°38'	30°57'	80°	5.50	180	10	5.3	190	5	-	150	3
20	24 March	1730	65°37'	31°08'	50°	5.00	135	2	1.5	137	-	2	350	1
21	25 March	0940	65°39'	31°00'	50°	5.00	165	2	1.2	167	-	-	200	3
22	25 March	1455	65°45'	30°43'	220°	5.00	156	5	3.1	161	2	-	250	7
23	26 March	0745	65°36'	30°41'	280°	4.25	213	2	0.9	215	-	-	100	1
24	26 March	1245	65°41'	30°44'	215°	3.91	148	1	0.7	149	1	-	200	7
25	26 March	1740	65°36'	30°49'	60°	4.00	232	4	1.7	236	3	5	400	21
26	27 March	1510	65°52'	30°23'	40°	4.00	103	-	-	103	1	52	120	8
27	28 March	0140	65°35'	30°47'	40°	5.00	275	2	0.7	277	3	4	100	1
28	28 March	1645	65°42'	30°30'	225°	4.16	331	3	0.9	334	2	6	70	25
29	29 March	0600	65°43'	30°28'	220°	5.00	177	1	0.6	178	1	1	200	8
30	30 March	0550	65°43'	30°30'	180°	4.00	138	4	2.8	142	5	3	150	4
31	31 March	1455	65°50'	31°06'	200°	2.00	815	20	2.4	835	-	-	50	-
32	1 April	0730	65°00'	31°06'	160°	3.50	624	10	1.6	634	-	-	30	-
33	2 April	2000	65°47'	31°01'	95°	3.50	197	5	2.5	202	3	4	150	4
34	3 April	2350	65°37'	30°56'	80°	2.66	137	3	2.1	140	3	-	150	9
35	5 April	2000	65°47'	31°08'	270°	2.00	252	10	3.8	262	-	-	250	2
36	6 April	1325	65°49'	31°31'	170°	2.50	746	20	2.6	766	-	-	200	-
37	7 April	1910	65°46'	31°21'	200°	2.00	342	12	3.4	354	-	-	200	-
38	9 April	0815	65°47'	31°08'	50°	3.16	308	20	6.1	328	1	-	150	-
39	9 April	1555	65°47'	31°12'	30°	3.66	264	10	3.6	274	1	3	200	-

Table 2. Length composition of random samples from shrimp catches by M/V "Lyshaug" off East Greenland in March-April 1989. (Numbers in heading refers to tow number in the first column of Table 1)

Carapace-length (mm)	2	4	5	7	9	10	11	13	14	19	20	22	23	28	30	31	32	33	35	36	38	TOTAL
16	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	2	-	-	4
17	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	1	4	-	1	3	-	11
18	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	2	2	2	1	-	-	9
19	1	2	-	-	-	-	-	-	-	-	6	-	-	-	-	5	7	1	8	4	2	36
20	3	-	-	-	-	-	-	-	1	1	3	1	-	-	1	7	7	-	6	6	8	44
21	3	2	-	-	-	-	-	-	-	-	5	2	-	-	-	7	13	2	14	6	7	61
22	2	3	-	-	-	-	-	-	-	1	5	2	-	1	1	15	9	-	6	4	8	57
23	1	3	1	-	-	-	-	-	2	1	3	2	1	2	1	14	12	5	7	14	9	78
24	3	4	1	1	-	-	-	-	-	1	8	2	0	-	2	11	13	2	10	10	13	81
25	3	1	1	1	2	1	1	-	2	2	12	1	1	-	6	15	14	1	13	11	17	105
26	11	5	5	3	3	6	6	1	3	6	37	-	0	-	3	12	26	6	11	10	19	173
27	12	11	4	10	7	6	9	4	3	10	67	8	10	6	7	34	15	9	19	13	27	291
28	27	12	12	20	21	17	20	9	6	37	71	28	28	28	23	21	25	20	19	18	25	487
29	37	44	51	45	36	28	45	37	28	57	39	41	49	55	54	27	37	26	27	32	11	806
30	60	40	42	72	62	42	77	48	51	39	25	59	56	83	78	31	36	29	36	45	25	1036
31	37	31	38	41	40	28	31	28	32	18	9	36	43	60	54	17	32	25	28	14	23	665
32	24	20	17	19	20	12	8	21	14	12	-	18	25	29	22	7	7	21	16	5	5	322
33	12	10	2	1	2	5	5	7	8	4	-	2	4	10	16	3	3	5	7	5	1	112
34	1	2	1	-	1	-	1	-	-	-	-	2	1	2	1	1	-	-	1	-	-	14
Total	238	190	175	213	194	145	203	155	150	189	294	204	218	276	269	231	262	154	232	200	200	4392

Table 3. Catch (tonnes) and catch per hour trawling in division XIV B from 1983 to 1989.

Month	1983 ¹		1984		1985		1986		1987		1988 ²		1989 ³	
	Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
Jan.	-	-	-	-	-	-	31	0.112	-	-	2	0.050	84	0.199
Feb.	-	-	79	0.232	-	-	208	0.141	150	0.187	273	0.112	64	0.129
Mar.	-	-	622	0.224	760	0.184	737	0.166	565	0.140	305	0.076	161	0.070
April	350	0.128	732	0.183	995	0.166	548	0.133	601	0.123	343	0.074	380	0.088
May	367	0.255	500	0.167	269	0.137	337	0.131	196	0.133	323	0.082	16	0.035
Jun.	257	0.143	-	-	-	-	-	-	-	-	28	0.108	14	0.026
Jul.	6	0.133	-	-	-	-	2	0.071	-	-	1	0.038	-	-
Aug.	61	0.098	-	-	-	-	116	0.131	32	0.124	218	0.096	56	0.035
Sep.	-	-	-	-	-	-	47	0.110	224	0.135	281	0.086	239	0.037
Oct.	-	-	-	-	-	-	-	-	187	0.091	176	0.071	402	0.055
Nov.	-	-	-	-	-	-	-	-	57	0.047	18	0.061	287	0.047
Dec.	-	-	-	-	-	-	-	-	-	-	-	-	271	0.094
TOTAL	1041	0.157	1933	0.191	2024	0.166	2026	0.143	2012	0.123	1968	0.083	1975	0.060

- 1) 60% of total landings
- 2) 96% of the quota
- 3) 96% of the quota

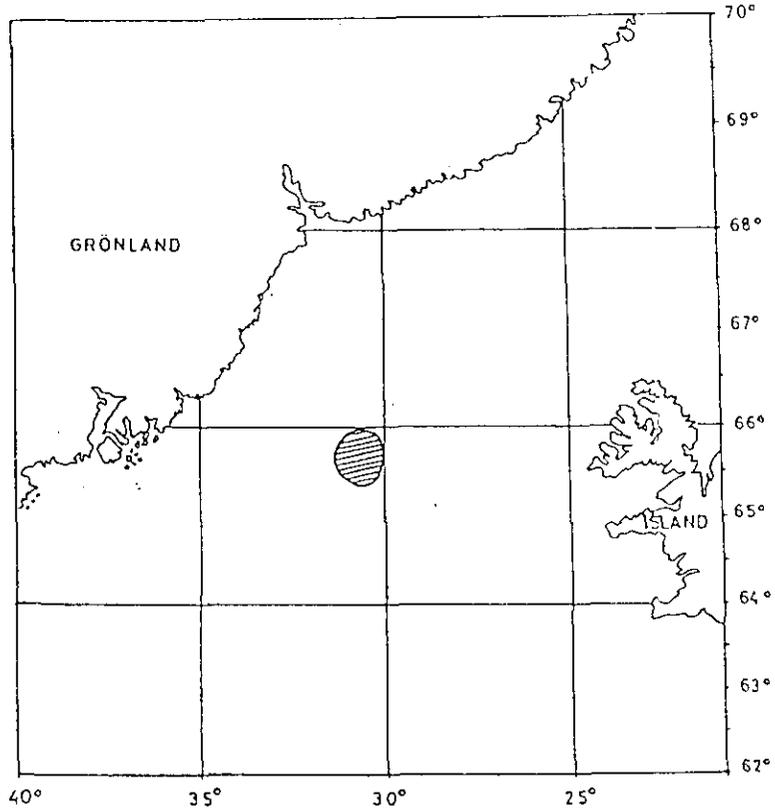


Fig. 1. Hatched area: Area fished by M/V Lyshaug during the stay of the observer in March-April 1989.

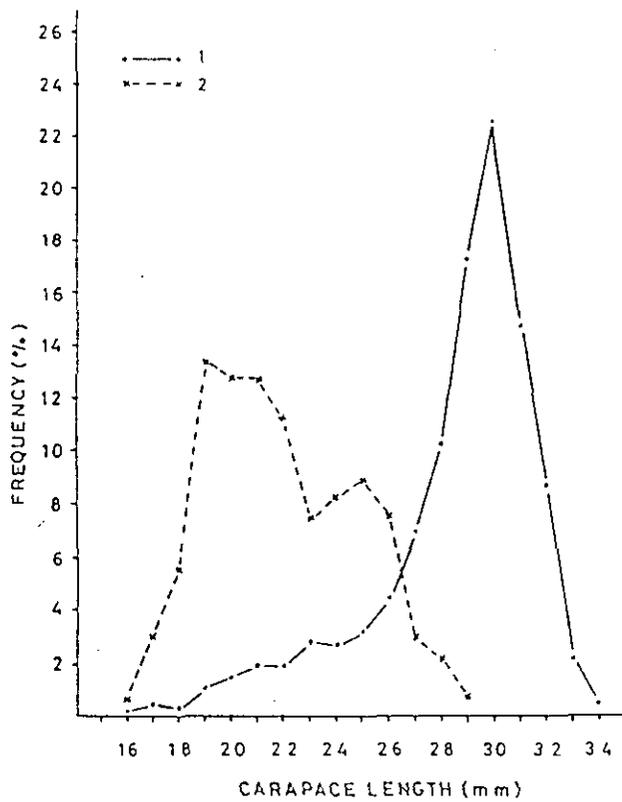


Fig. 2. Weighted mean length composition of shrimp samples taken off East Greenland in March-April 1989. 1) landed shrimp. 2) discarded shrimp.

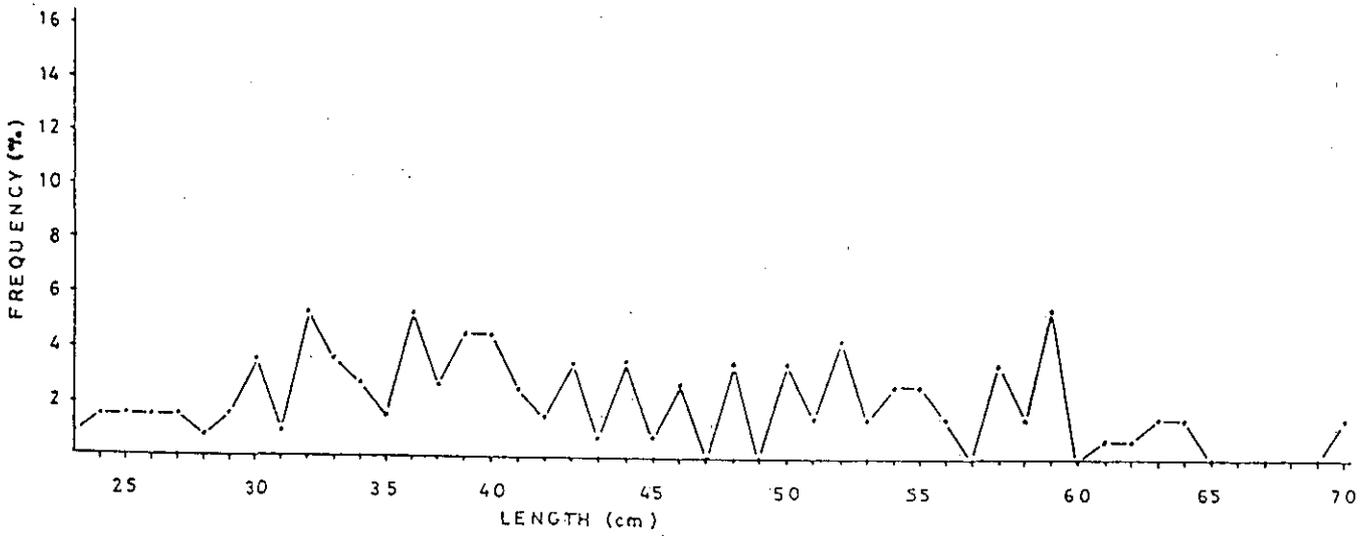


Fig. 3. Length composition of Greenland halibut taken as by-catch with shrimp off East Greenland in March - April 1989.

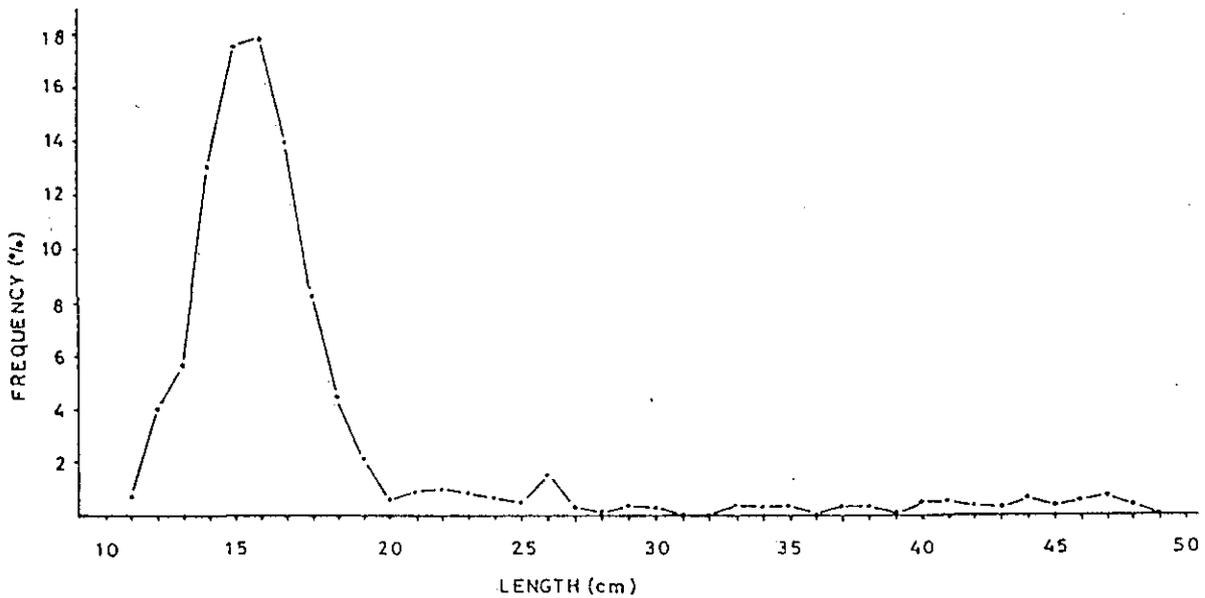


Fig. 4. Length composition of redfish taken as by-catch with shrimps off East Greenland in March - April 1989.

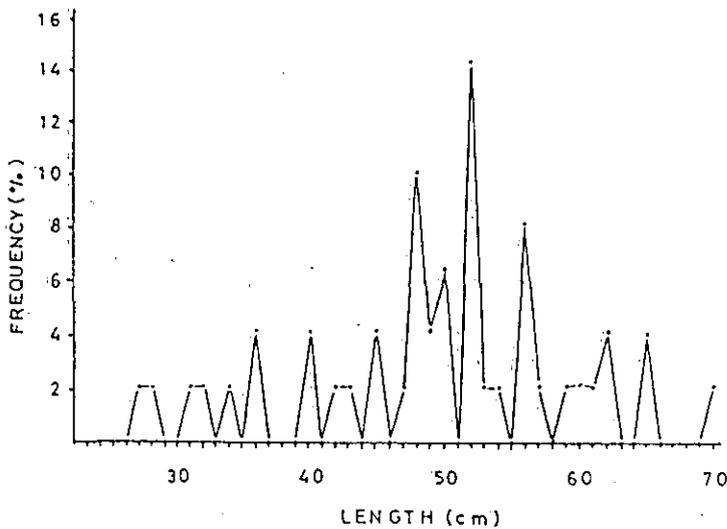


Fig. 5. Length composition of cod taken as by-catch with shrimp off East-Greenland in March-April 1989.

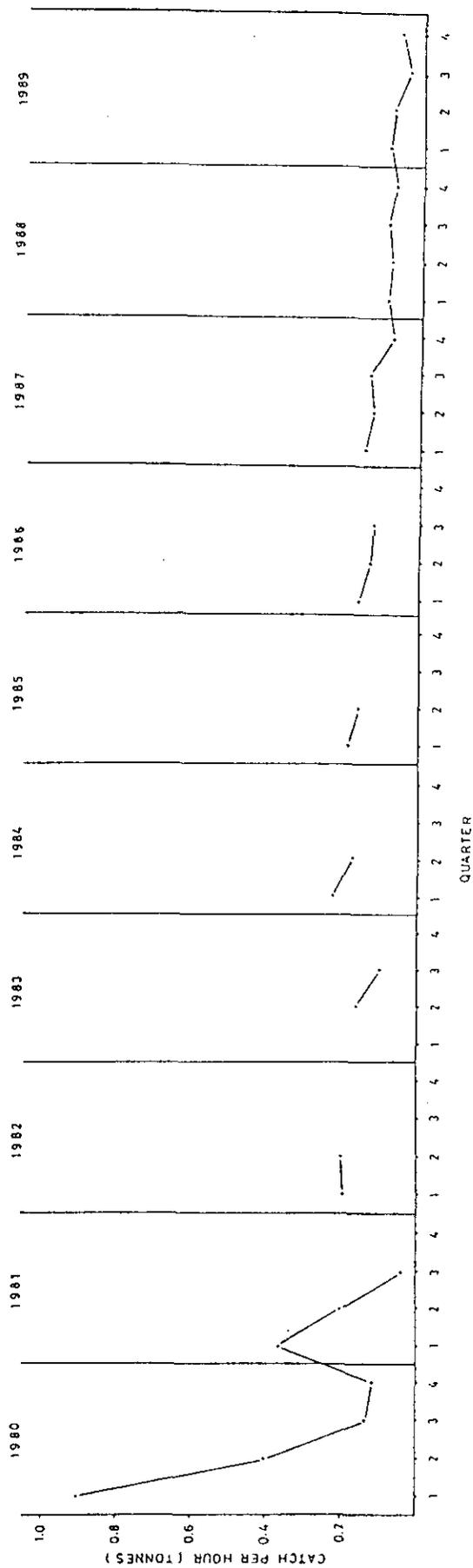


Fig. 6. Quarterly mean shrimp catch per hours trawling by Norwegian vessels in Div. XIV B, 1980-1989.

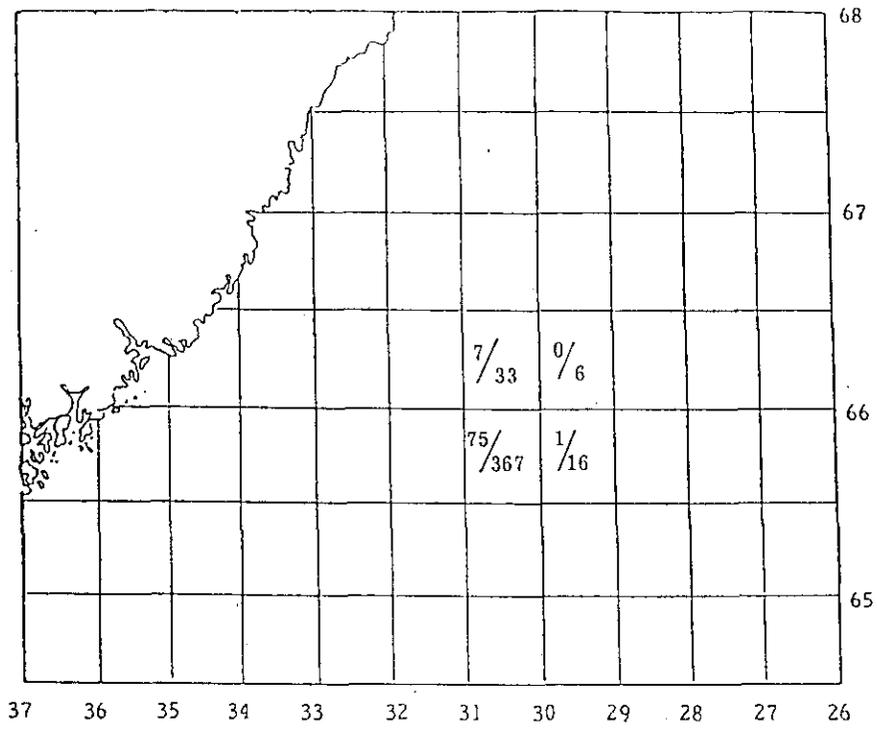


Fig. 7. January (Catch in tonnes/ hours fished).

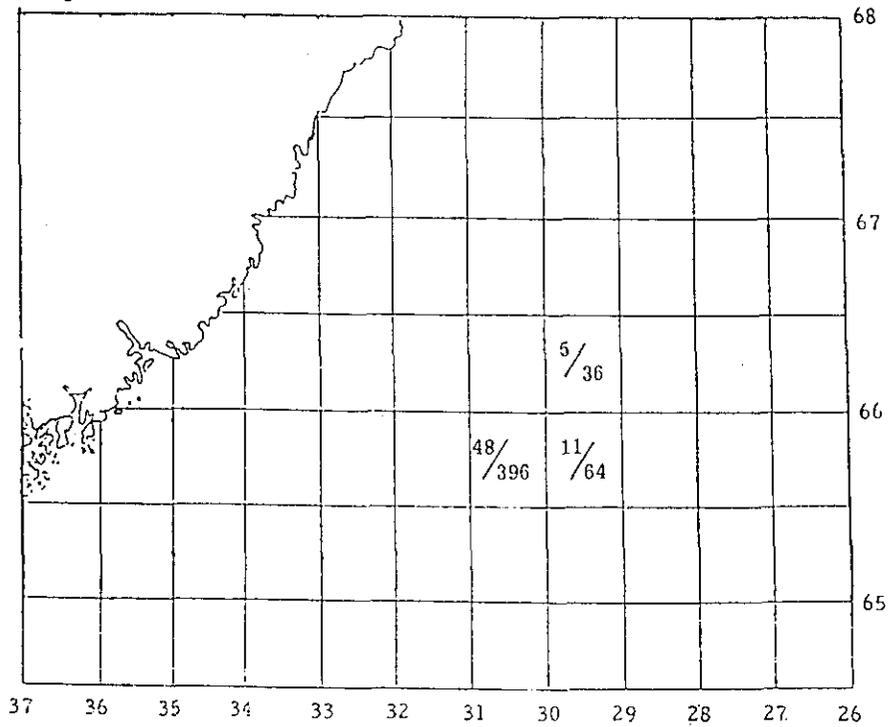


Fig. 8. February (Catch in tonnes/ hours fished).

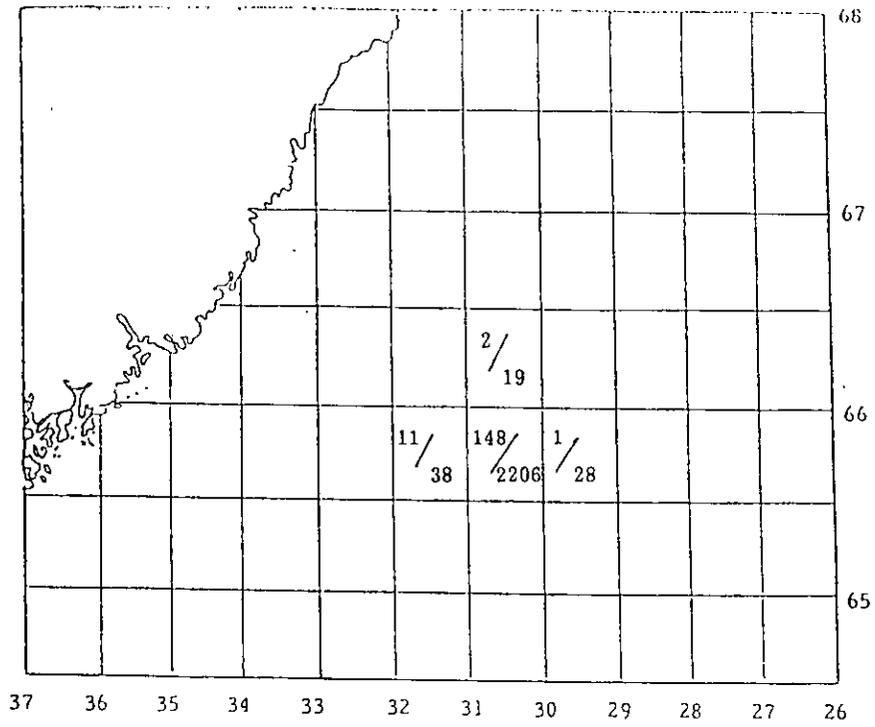


Fig.9. March (Catch in tonnes/ hours fished).

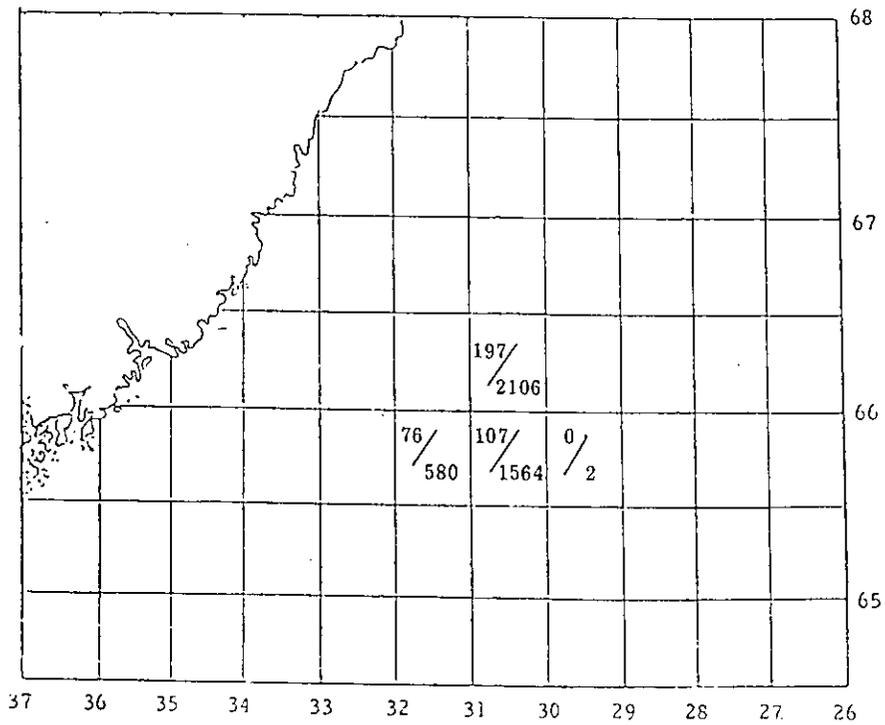


Fig.10. April (Catch in tonnes/ hours fished).

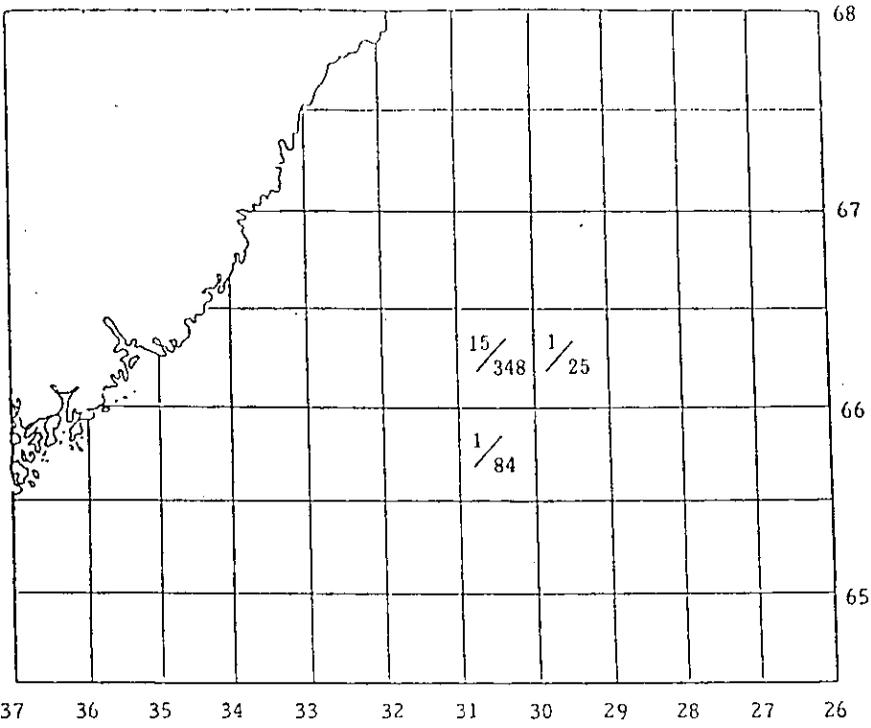


Fig.11. May (Catch in tonnes/ hours fished).

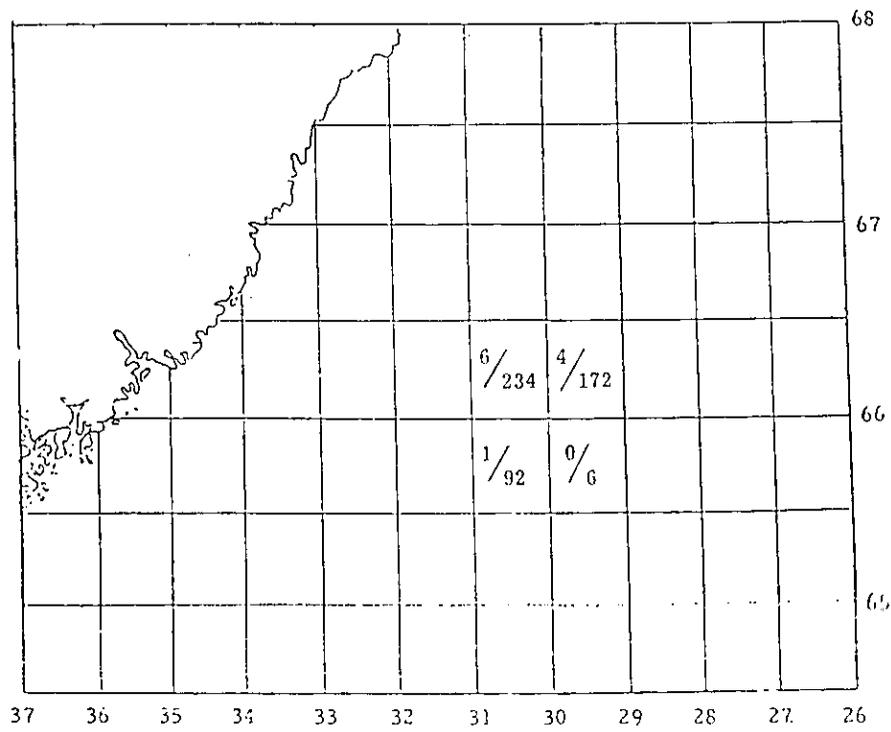


Fig.12. June (Catch in tonnes/ hours fished).

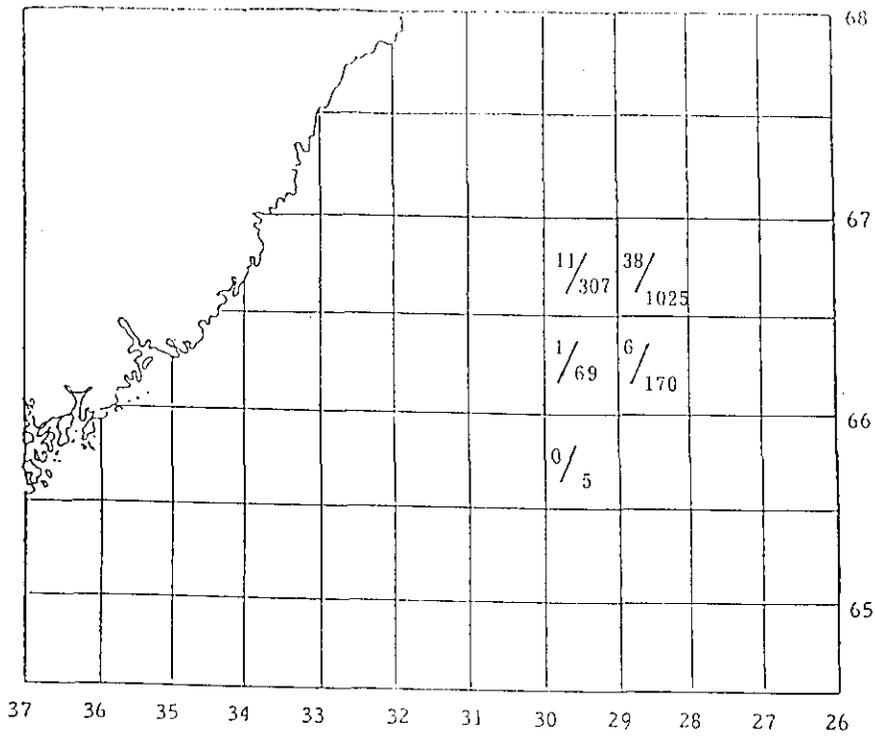


Fig. 13. August (Catch in tonnes/ hours fished).

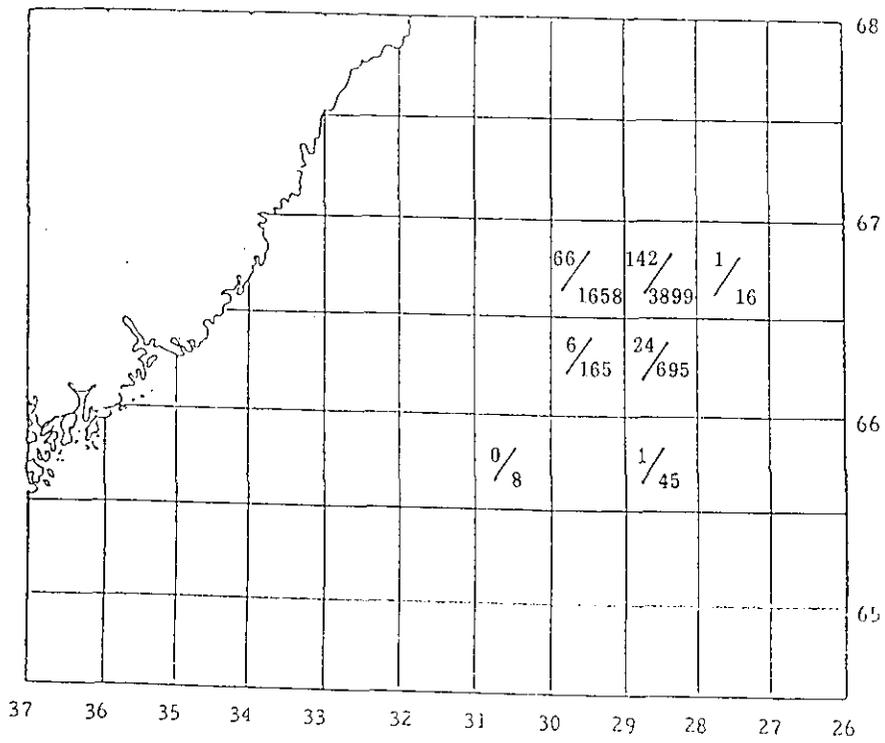


Fig. 14. September (Catch in tonnes/ hours fished).

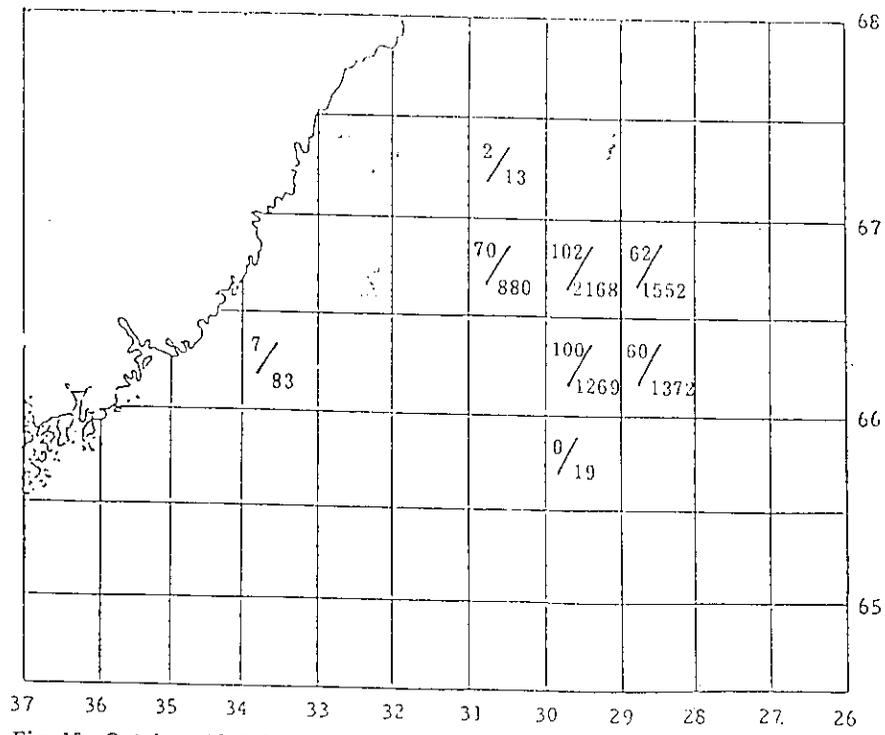


Fig. 15. October (Catch in tonnes/ hours fished).

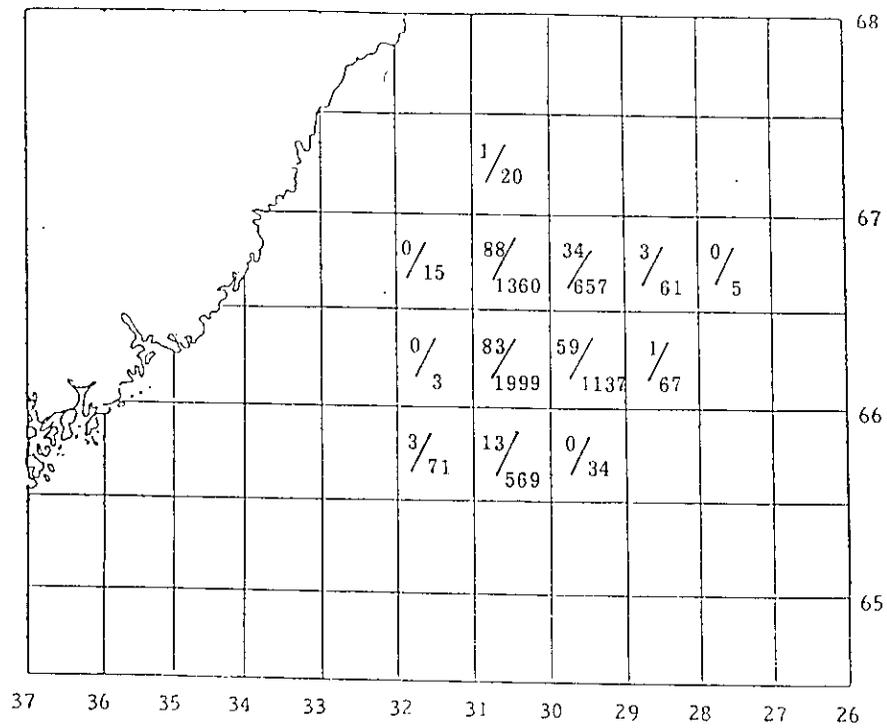


Fig. 16. November (Catch in tonnes/ hours fished).

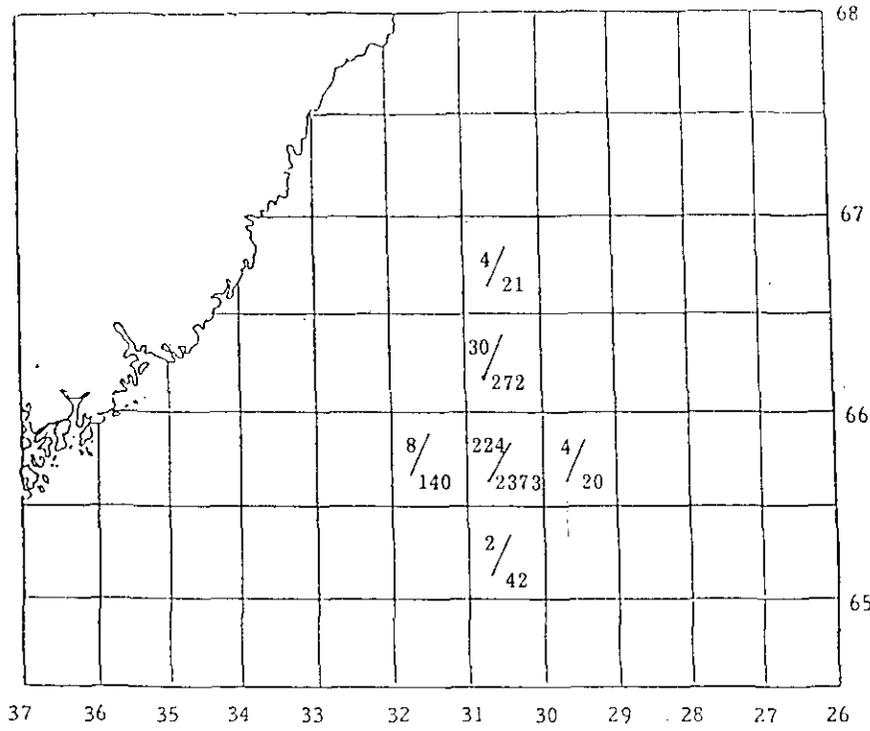


Fig.17. December (Catch in tonnes/ hours fished).

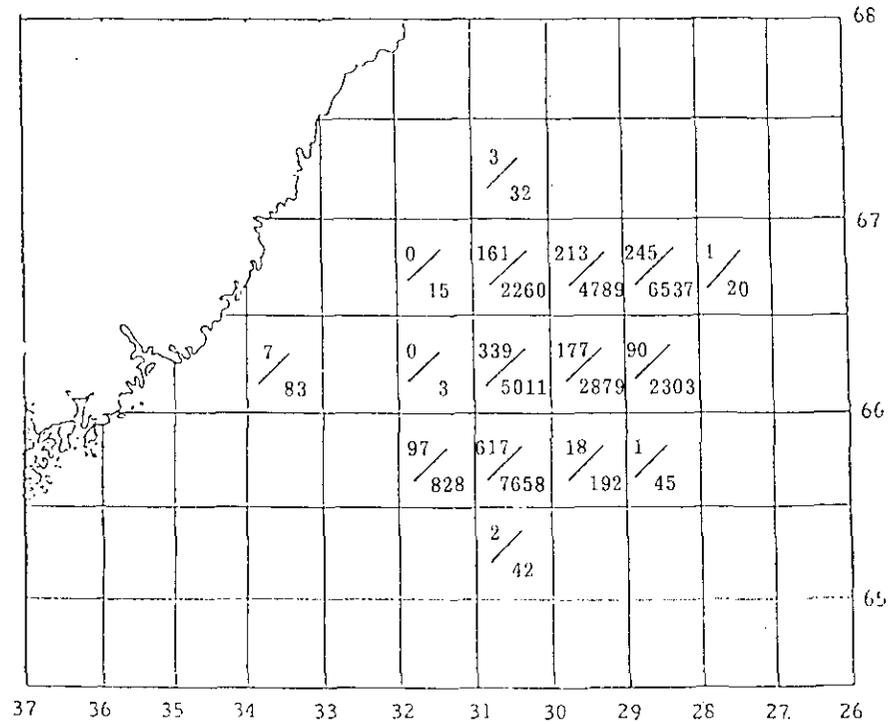


Fig.18. Total (Catch in tonnes/ hours fished).