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The shrimp fishery in NAFO Subarea 1 in 1991.

by

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INTRODUCTION

The scientific advice for the offshore catch of shrimp in NAFO Subareas 0 and 1 (not including Subarea 1 north of 71°N) was 50,000 tons for 1991. The effective TAC for offshore Subarea 1 - in the area for which advice was given - was set by the Greenland Home Rule Authorities at 37,725 tons, including a Greenland allocation of 37,125 tons. Trawlers above 75 GRT reported a total catch in the Subarea of 45,568 tons, including 1,077 tons taken north of the area considered by STACFIS and about 1,100 tons inshore. Total catches of smaller vessels are estimated to about 24,000 tons, of which about 7,000 tons were taken in the offshore area (preliminary figures).

Until 1986 only logbooks from the fishery of nine trawlers owned by the Greenland Home Rule Administration were available to the Greenland Fisheries Research Institute (GF). Since 1986 logbooks have been compulsory for all vessels above 50 GRT. For 1991 logbooks from the fishery by Greenland vessels cover about 172,700 hours of trawling and a total catch of about 52,500 tons of shrimp in Subarea 1. The logbook data base has been used to estimate standardized effort in catch rate calculations.

The present paper updates earlier information on the geographical distribution, catch rates and by-catches in the offshore Subarea 1 shrimp fishery. Also, results from analysis of samples from the commercial shrimp fishery is presented.

MATERIAL AND METHODS

Based on the compulsory weekly reportings to Greenland authorities by all vessels above 75 GRT total catches and numbers of vessels in the shrimp fishery in NAFO Subarea 1 in 1990 were compiled by nation and month.

Logbook data were analysed to show the yearly and monthly distribution of catches, fishing effort and mean catch-rates.

A new standardized index for the shrimp fishery in Division 1B based on 22 trawlers was introduced in 1991 (Carlsson and Lassen, 1991). The index is based on reported catches in logbooks of shrimp larger than 8.5 grammes (i.e. 120 shrimp per kg), as discard of shrimp in these size groups is supposed to be negligible. The index is updated by inclusion of data from 1991.

Shrimp samples from the commercial shrimp fishery were measured to nearest .1 mm carapace length and pooled in .5 mm length groups by division and month to show overall size distribution of commercial catches.

RESULTS AND DISCUSSION

Reported catches in 1991.

Tables 1a and 1b show catches by division, nation and month in offshore Subarea 1 in 1991 and 1992 (until April), respectively, as reported by vessels above 75 GRT, and Table 2a and 2b the corresponding numbers of reporting vessels. The figures for Greenland include catches in the offshore fishery north of 71°N, but these catches have declined steadily since 1986 (about 11,000 tons) to about 1,000 tons in 1991.

The shrimp landings from Subarea 1 in 1990 by smaller Greenland vessels (below 75 GRT) are about 24,000 tons (preliminary figure), of which about 17,000 tons are estimated to be inshore catches.

The preliminary total nominal shrimp catch in Subarea 1 was 69,505 tons in 1991, which is about 5,400 tons more than in 1990.

Geographical distribution of the offshore fishery.

Fig. 1 shows the distribution of total catches (in tons per statistical unit) in 1991 as recorded in the logbook data base from Greenland trawlers. As in earlier

years the fishery concentrated in Sukkertoppen Deep (64 - 64°30'N), Holsteinsborg Deep (around 66°30'N), and in the area between Store Hellefiske Bank and Disko Bank. Only few catches were taken in the southernmost grounds in the Northwest Greenland area. High catches were taken in Sukkertoppen Deep, and more catches than before were taken in the area between 62°N and 64°N.

Since 1987 there has been some yearly displacements of the fishery between divisions as illustrated by Table 3, which shows effort (in hours) by year and division from 1987 to 1991 in the logbook data for Greenland trawlers (> 50 GRT). Table 4 shows distribution of catches in the same data (the figures are not directly comparable to reported catches in Table 1, as these are only from vessels above 75 GRT). The tables show a significant shift in the fishery in recent years from Div. 1A and 1B to Div. 1C and 1D (and in 1991 also Div. 1E).

Fig. 2 shows the monthly distribution of mean catch-rates and effort (numbers of hours trawled) from January through December 1991. As has been the case in several years (1983, 84 and 87-90) ice hampered the access to the fishing grounds west and north of the Store Hellefiske Bank area in the beginning of the year. From January to April only the grounds in Sukkertoppen Deep and Holsteinsborg Deep were open, and not until May it was possible to access the grounds north of Store Hellefiske Bank. During the rest of the year the fishery was widespread.

The fishery north of 71°N took place from July to November.

The area between 68°30'N and 71°N west of 58°W is a new regulatory area opened in 1989 and not considered included in the area for which STACFIS advises by Greenland authorities. No catches were, however, reported from this area in 1991.

Catch rate indices.

Standardized yearly catch rate indices for 22 trawlers in Division 1B are shown in Fig. 3. The figure shows the development in two indices, one for the large shrimp component (> 8.5 g) and one for the total reported catch. Both indices show a decline from 1987 to 1989. The large shrimp index is stable from 1989 to 1991, while the total catch index declines further from 1989 to 1990 and increases slightly in 1991. The apparent stability between 1989 and 1991 is not in immediate agreement with the decline in biomass indices from trawl surveys over the same period (Carlsson & Kannevorff, 1992). A possible explanation could be that the catch rate indices are influenced by a change in discarding procedures in the commercial fleet, because the mean size of shrimp has decreased. This would imply, that the assumption that shrimp larger than 8.5 g are not discarded, may be wrong in some years, when larger shrimp are more abundant.

Biological samples.

Data on numbers of shrimp by length in shrimp samples from the commercial fishery in Subarea 1 pooled by division and month are given in Table 5 and Fig. 4a-b. Samples from Div. 1A in September show a large peak of female shrimp around 27 mm CL and a dominant group of males around 22 mm. Samples from Div. 1B in September show dominant peaks around 21.5 mm and 24.5 mm, while samples from November and December show a mixture of several size groups with a dominant peak around 23 mm CL. The same is the case in samples from Div. 1C in June and December, with a dominant peak around 24 mm CL. Samples from Div. 1D in June show modes at 22 and 24.5 mm CL.

The supposed 1985 year-class occurs in all samples around 21.5 to 22 mm, however most distinct in June and September. Indications of a recruiting year-class at 17-18 mm CL are seen in samples from Div. 1B, 1C, and 1D. In Div. 1A the dominant mode of large shrimp (at 27 mm CL) is found in both 1990 and 1991, while there is very little indication of new recruitment of small shrimp (Carlsson & Kannevorff, 1991).

CONCLUSIONS

The nominal catch of shrimp in NAFO Subarea 1 is estimated to 69,505 tons in 1991, including about 1,000 tons from the area north of 71°N.

As in earlier years ice hampered the access to the the important shrimp fishing grounds on the slopes of Store Hellefiske Bank in spring time.

A significant shift in the fishery took place from 1989, larger parts of the catches being taken in Div. 1C and 1D (and 1E in 1991) compared to the years before.

A standardized catch rate index for 22 trawlers in Division 1B is declining from 1987 to 1989 and relatively stable from 1989 to 1991.

Shrimp samples from the commercial fishery in Division 1A, 1B, 1C, and 1D show - like in 1990 - a dominant mode of large shrimp in Div. 1A, while catches in more southern divisions mainly consisted of smaller size groups. Some recruitment of small shrimp to the commercial fishery is indicated in Div. 1B, 1C, and 1D.

REFERENCES

Carlsson, D. M. and P. Kannevorff, 1991. The shrimp fishery in NAFO Subarea 1 in 1990. NAFO SCR Doc. 91/69, Ser.No. N1953.

Carlsson, D. M. and P. Rannevold, 1992. Report on a stratified-random trawl survey for shrimp (*Pandalus borealis*) in NAFO Subarea 0+1 in July-September 1991, and a comparison with earlier surveys. NAFO SCR Doc. 92/67, Ser. No. N2121.

Carlsson, D. M. and H. Lassen, 1991. A catch-rate index for large shrimp in the Greenland shrimp fishery in NAFO Division 1B. NAFO SCR Doc. 91/57, Ser.No. N1941.

Table 1a. Offshore shrimp catches (tons) by division, nation and month in 1991 in Subarea 1 as reported to Greenland authorities by vessels above 75 GRT.

NAFO DIVISION		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1A NORTH	GREENLAND	-	-	-	-	-	-	27	91	337	509	113	-	1077
	TOTAL	-	-	-	-	-	-	27	91	337	509	113	-	1077
1A SOUTH	GREENLAND	-	9	-	-	-	-	53	213	341	1432	1278	39	3365
	TOTAL	-	9	-	-	-	-	53	213	341	1432	1278	39	3365
1B	DENMARK	-	-	-	-	-	-	10	-	-	-	-	-	10
	FAROE ISL.	-	-	-	-	1	-	-	-	-	-	-	-	1
	FRANCE	-	-	-	-	-	-	141	20	-	-	-	-	161
	GREENLAND	23	44	78	625	1123	1697	2887	2160	1750	1876	2123	2932	17318
TOTAL	23	44	78	625	1124	1697	3038	2180	1750	1876	2123	2932	17490	
1C	DENMARK	16	-	-	-	-	-	-	-	-	-	-	7	23
	FAROE ISL.	-	-	-	-	11	15	12	3	11	-	-	-	52
	FRANCE	-	-	-	-	-	-	33	-	-	-	-	-	33
	GREENLAND	1336	728	1147	1030	438	1751	1951	755	304	253	898	373	10984
TOTAL	1352	728	1147	1030	449	1766	1996	758	315	253	898	380	11072	
1D	DENMARK	138	42	-	-	-	-	-	-	-	-	-	6	186
	FAROE ISL.	-	-	-	-	-	30	33	25	18	-	-	-	106
	FRANCE	-	-	6	21	-	-	-	-	-	-	-	-	27
	GREENLAND	987	889	880	469	1727	1437	1041	557	1258	1186	556	836	11823
TOTAL	1125	931	886	490	1727	1467	1074	582	1276	1186	556	842	12142	
1E	GREENLAND	-	-	-	1	-	-	-	-	7	153	50	2	213
	TOTAL	-	-	-	1	-	-	-	-	7	153	50	2	213
1F	GREENLAND	79	95	35	-	-	-	-	-	-	-	-	-	209
	TOTAL	79	95	35	-	-	-	-	-	-	-	-	-	209
TOTAL	DENMARK	154	42	-	-	-	-	10	-	-	-	-	-	13
	FAROE ISL.	-	-	-	-	12	45	45	28	29	-	-	-	219
	FRANCE	-	-	6	21	-	-	174	20	-	-	-	-	159
	GREENLAND	2425	1765	2140	2125	3288	4885	5959	3776	3997	5409	5018	4182	44969
	TOTAL	2579	1807	2146	2146	3300	4930	6188	3824	4026	5409	5018	4195	45568

Table 1b. Offshore shrimp catches (tons) by division, nation and month in 1992, January-April, in Subarea 1 as reported to Greenland authorities by vessels above 75 GRT.

NAFO DIVISION		JAN	FEB	MAR	APR	TOTAL
1B	DENMARK	-	-	-	-	-
	FAROE ISL.	11	-	-	-	11
	FRANCE	-	-	-	-	-
	GREENLAND	909	-	115	778	1802
TOTAL	920	-	115	778	1813	
1C	DENMARK	-	-	-	-	-
	FAROE ISL.	-	-	-	-	-
	FRANCE	-	-	-	-	-
	GREENLAND	538	407	2276	957	4178
TOTAL	538	407	2276	957	4178	
1D	DENMARK	13	46	-	-	59
	FAROE ISL.	-	-	-	-	-
	FRANCE	-	-	-	-	-
	GREENLAND	584	875	772	1217	3448
TOTAL	597	921	772	1217	3507	
1E	GREENLAND	-	379	19	12	410
	TOTAL	-	379	19	12	410
1F	GREENLAND	79	95	35	-	209
	TOTAL	79	95	35	-	209
TOTAL	DENMARK	24	46	-	-	70
	FAROE ISL.	-	-	-	-	-
	FRANCE	-	-	-	-	-
	GREENLAND	2111	1684	3320	3015	10130
	TOTAL	2135	1730	3320	3015	10200

Table 2a. No. of vessels above 75 BRT by nation and month in the shrimp fishery in Subarea 1 in 1991 as reported to the Greenland authorities.

North of 71°N	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total

Greenland	0	0	0	0	0	0	0	2	3	8	4	0	16

South of 71°N	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total

Greenland	28	27	28	29	38	37	42	38	32	38	37	37	48
Denmark	2	1	0	0	0	0	1	0	0	0	0	1	2
France	0	0	1	1	0	0	1	1	0	0	0	0	1
Faroe Islands	0	0	0	0	1	1	2	1	1	0	0	0	2
TOTAL	30	28	29	30	39	38	46	40	33	38	37	38	53

Table 2b. No. of vessels above 75 BRT by nation and month in the shrimp fishery in Subarea 1 in 1992, January-April, as reported to the Greenland authorities.

South of 71°N	Jan	Feb	Mar	Apr	Total

Greenland	65	54	58	75	33
Denmark	2	1	0	0	0
France	0	0	0	0	0
Faroe Islands	0	0	0	0	1
TOTAL	67	55	58	75	34

Table 3. Distribution of effort (in hours and % of total hours per year) by Division and year in logbooks from the Greenland fishery, 1987-1991.

	1A		1B		1C		1D		1E		1F		Total hours
	hours	%	hours	%	hours	%	hours	%	hours	%	hours	%	
1987	33,198	39.8	41,771	50.0	6,470	7.7	2,067	2.5	4	0.0	-	-	83,510
1988	31,818	27.2	72,034	61.7	10,807	9.3	1,381	1.2	2	0.0	729	0.6	118,771
1989	36,123	26.4	61,513	44.9	23,113	16.9	12,906	9.4	2	0.0	3,344	2.4	137,001
1990	32,656	20.7	61,764	38.2	42,349	26.2	22,660	14.0	-	-	2,205	1.4	161,634
1991	27,421	15.9	68,752	39.8	39,138	22.7	35,852	20.8	564	0.3	962	0.6	172,689

Table 4. Distribution of catches (in tons and % of total logbook catch per year) by Division and year in logbooks from the Greenland fishery, 1987-1991.

	1A		1B		1C		1D		1E		1F		Total
	tons	%	tons	%	tons	%	tons	%	tons	%	tons	%	
1987	9,605	26.9	21,921	61.4	3,620	10.1	571	1.6	0	0.0	-	-	35,717
1988	7,667	18.1	29,957	70.7	4,330	10.2	316	0.7	1	0.0	91	0.2	42,362
1989	9,705	21.4	21,541	47.5	7,940	17.5	5,878	13.0	0	0.0	297	0.7	45,361
1990	7,570	15.3	19,555	39.5	14,366	29.0	7,730	15.6	-	-	298	0.6	49,519
1991	7,571	14.4	20,626	39.3	11,665	22.2	12,097	23.0	380	0.7	150	0.3	52,489

Table 5. No. of shrimp per length group in commercial samples from Subarea 1 in 1991, pooled by Division and month. The entry 'Corresponding catch' is the catch represented by the samples.

CL, mm	1C 9106	1D 9106	1A 9109	1B 9109	1B 9111	1B 9112	1C 9112	1D 9112
7.0	0	0	0	0	0	1	0	0
7.5	0	0	0	0	0	0	0	0
8.0	0	0	0	0	0	0	0	0
8.5	0	0	0	0	0	0	0	0
9.0	0	0	0	0	0	0	0	0
9.5	0	0	0	1	0	0	0	0
10.0	0	0	0	5	0	0	0	0
10.5	0	0	3	6	0	0	0	0
11.0	0	0	0	13	0	0	0	0
11.5	0	0	2	17	0	0	0	0
12.0	0	0	8	19	0	0	1	0
12.5	0	0	7	36	0	0	2	0
13.0	0	1	9	33	3	1	3	1
13.5	0	1	8	27	8	3	3	0
14.0	0	2	11	31	10	3	6	0
14.5	0	1	12	33	6	2	4	0
15.0	1	1	25	77	5	5	5	5
15.5	1	2	36	131	11	3	10	5
16.0	0	5	71	227	12	5	10	10
16.5	0	8	87	372	28	5	17	10
17.0	2	1	119	500	37	2	19	5
17.5	2	3	155	545	49	20	27	10
18.0	5	3	203	501	57	29	66	21
18.5	4	6	239	485	55	28	124	28
19.0	3	9	329	602	68	31	131	36
19.5	7	14	603	928	75	48	144	49
20.0	15	20	1020	1464	99	70	160	44
20.5	24	34	1454	2213	153	107	159	66
21.0	30	51	1917	2788	245	179	180	64
21.5	44	58	2138	2908	255	207	222	106
22.0	43	68	2228	2805	266	219	291	99
22.5	46	57	2122	2515	279	227	340	130
23.0	44	48	1797	2430	275	278	340	140
23.5	45	39	1535	2329	286	265	379	168
24.0	48	34	1388	2439	227	258	377	203
24.5	46	37	1350	2459	212	249	313	164
25.0	43	34	1366	2246	164	189	301	204
25.5	45	31	1455	2031	156	188	245	173
26.0	41	20	1612	1768	115	155	184	136
26.5	33	15	1719	1698	128	120	155	86
27.0	24	9	1847	1485	84	120	116	69
27.5	24	3	1717	1307	93	101	82	56
28.0	11	3	1483	924	56	84	42	33
28.5	9	2	1094	614	49	62	27	11
29.0	4	1	798	394	28	39	19	8
29.5	4	8	537	239	16	18	8	3
30.0	1	3	319	128	8	6	5	1
30.5	0	0	162	54	5	1	4	1
31.0	0	0	83	25	5	0	0	0
31.5	0	0	28	12	2	1	0	0
32.0	0	0	21	4	0	0	0	0
32.5	0	0	4	4	0	0	0	0
33.0	0	0	4	0	0	0	0	0
33.5	0	0	1	0	0	0	0	0
ALL	649	6181	33126	41872	3631	3346	4518	2122
No. of samples	3	21	42	51	9	12	21	17
[sample weight	11.9	89.7	303.4	348.9	26.4	29.5	61.4	35.0
Corresp. catch	11	6923	104689	79741	12630	23352	7731	87

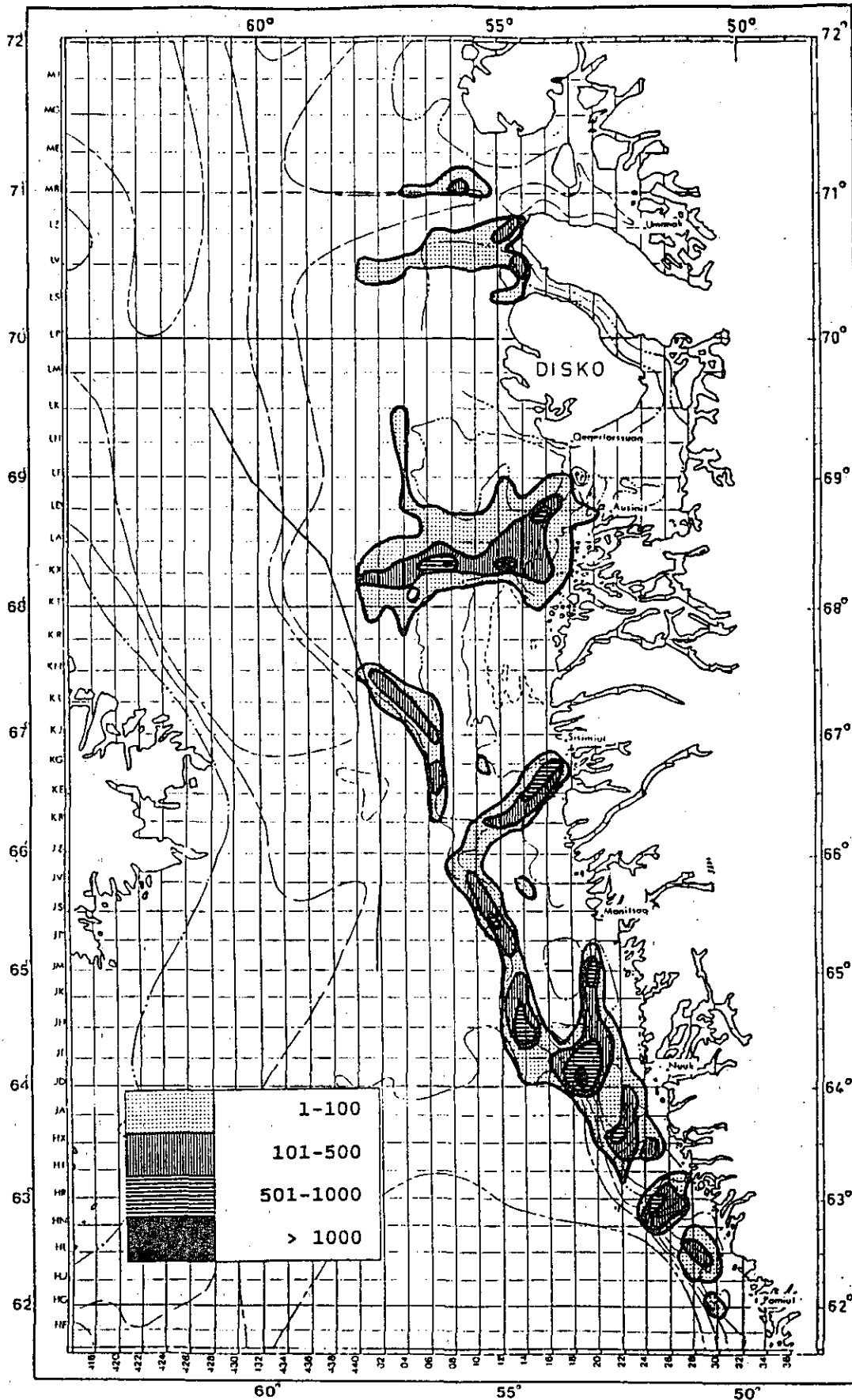


Figure 1. Distribution of total catches of shrimp (tons per statistical unit) in 1991 in NAFO Subarea 1 between 62°N and 72°N, based on logbooks from the Greenland trawlers.

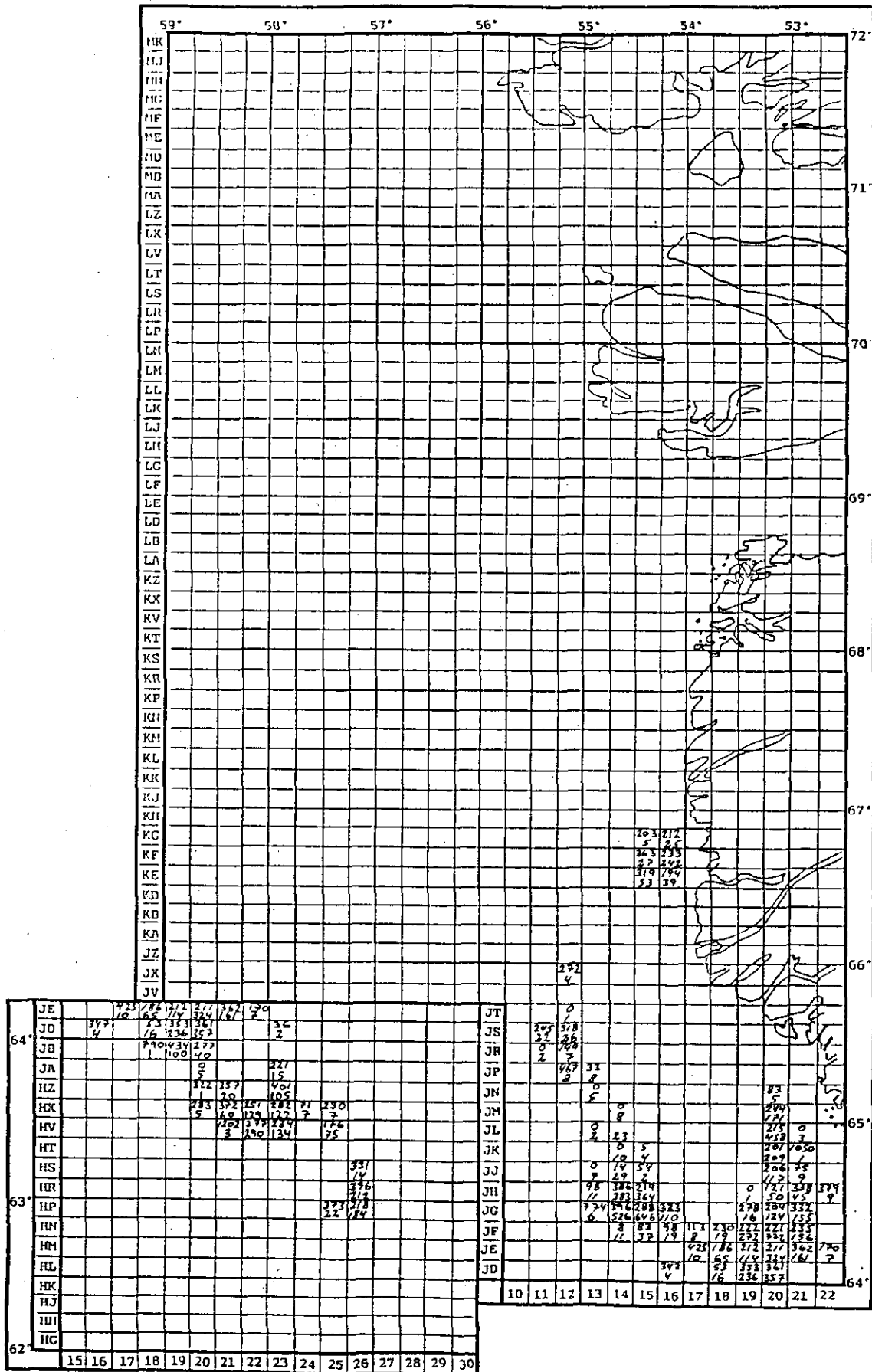


Figure 2. Distribution of mean catch rate (kg/hour, upper figure) and effort (hours, lower figure) in each statistical unit between 62°N and 72°N, NAFO Subarea 1 in January 1991.

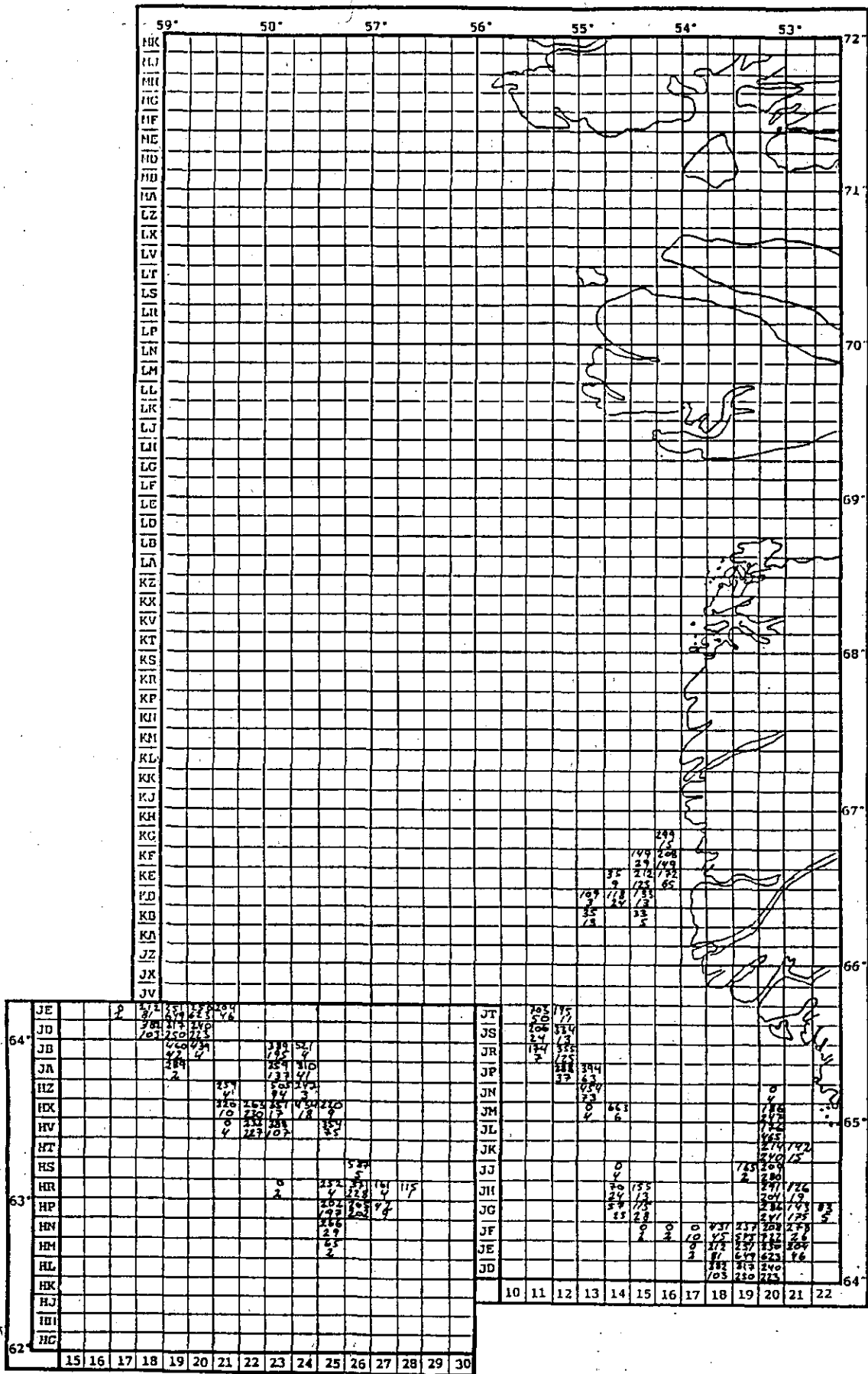


Figure 2 continued. Data from February 1991.

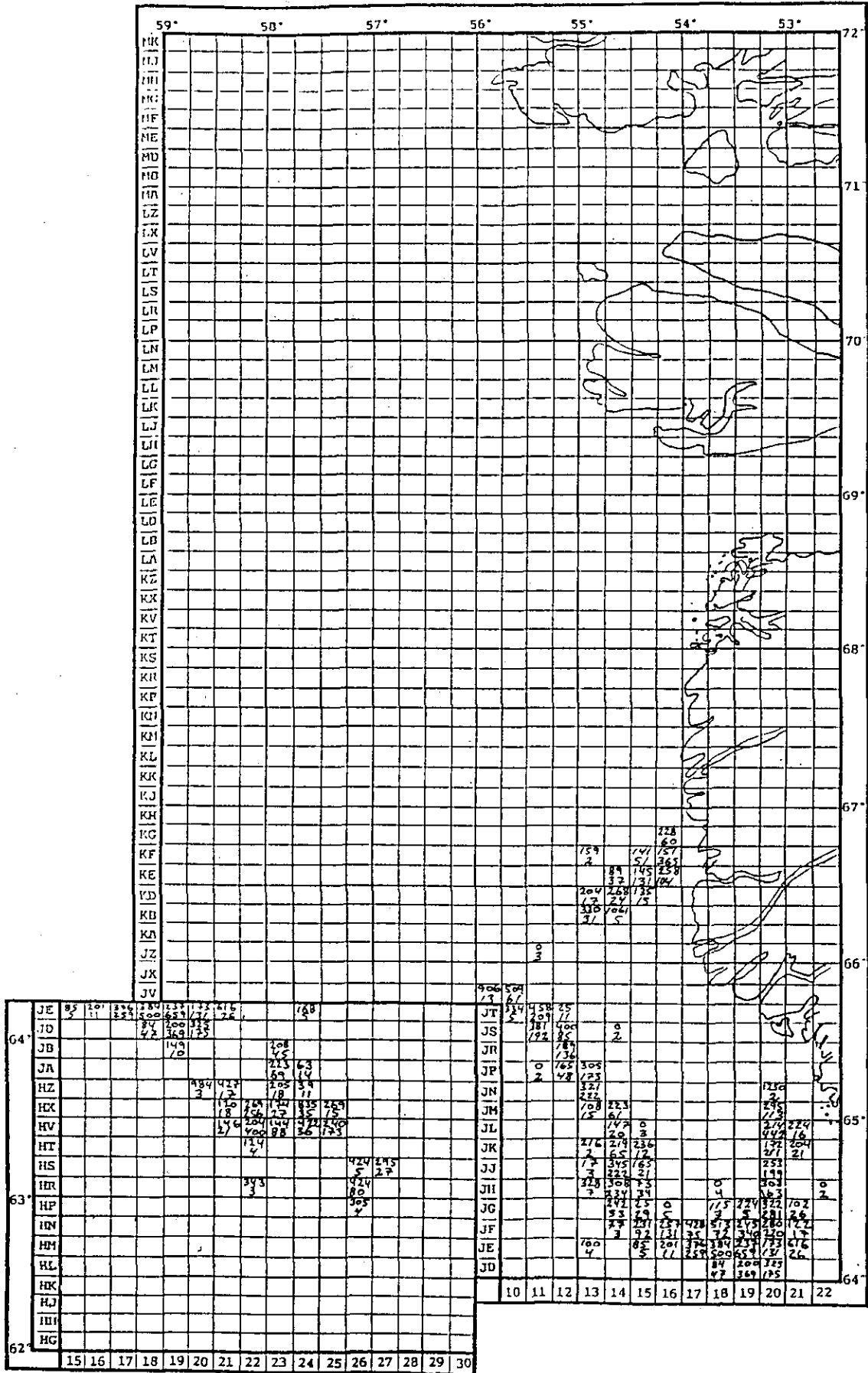


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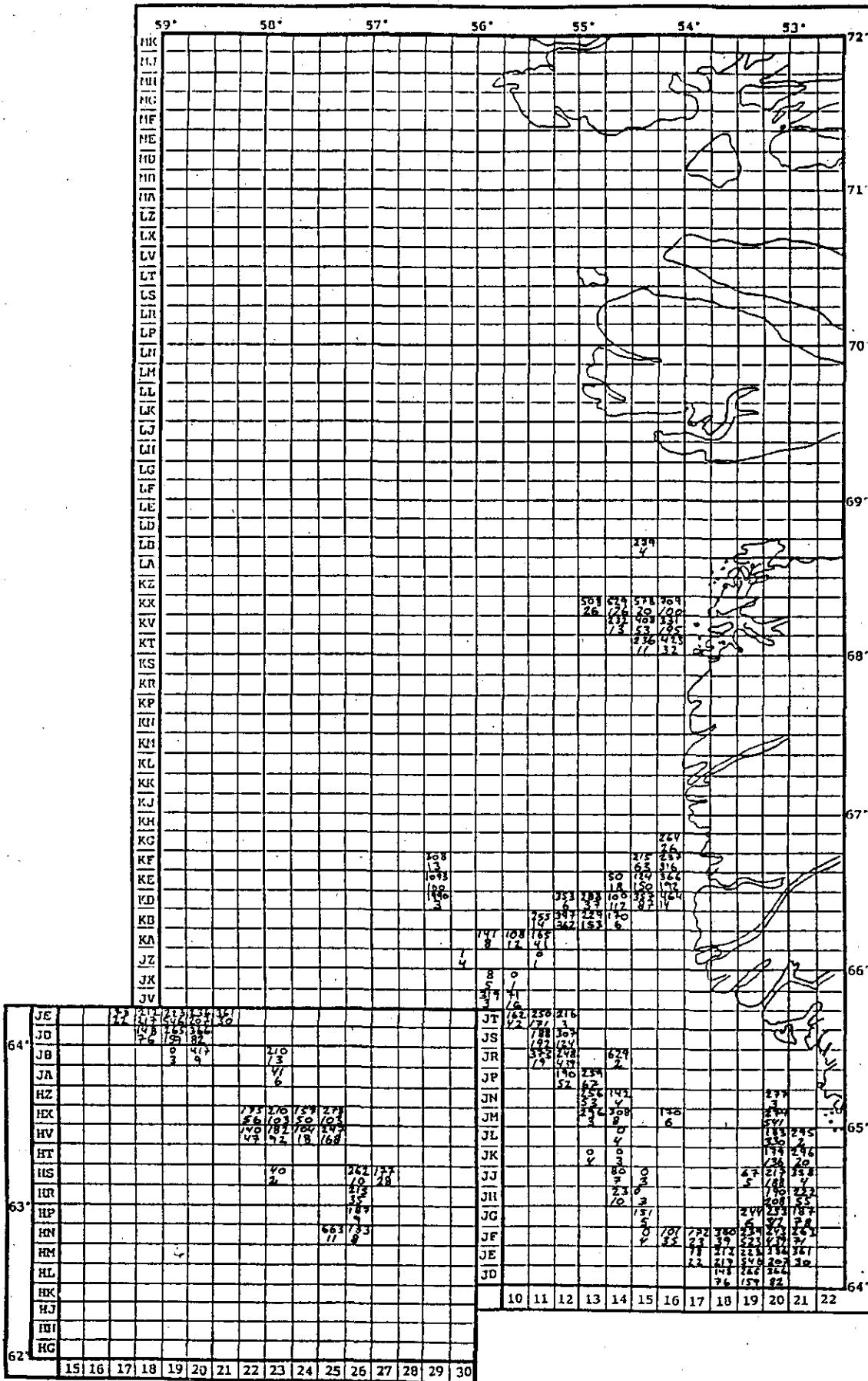


Figure 2 continued. Data from April 1991.

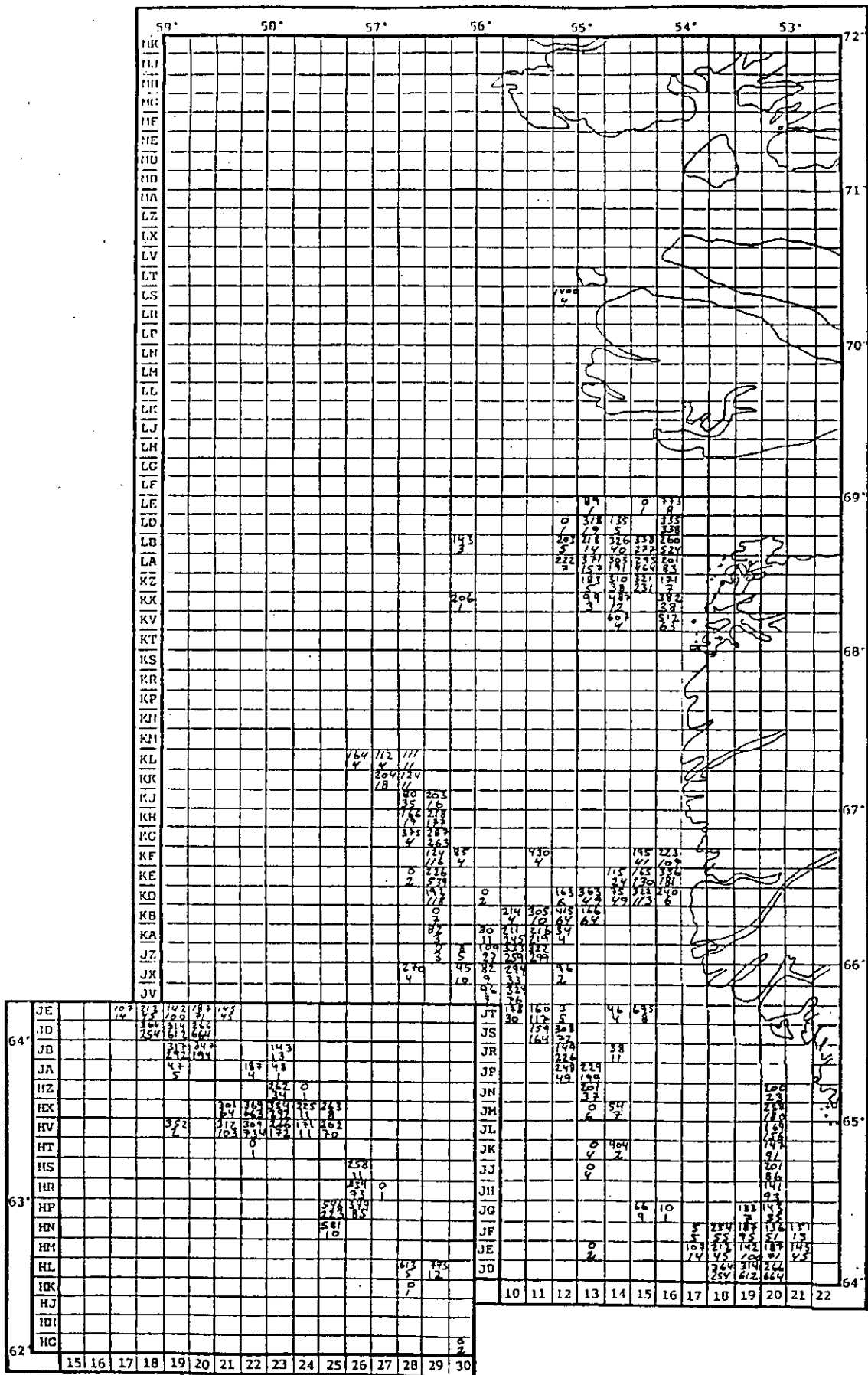


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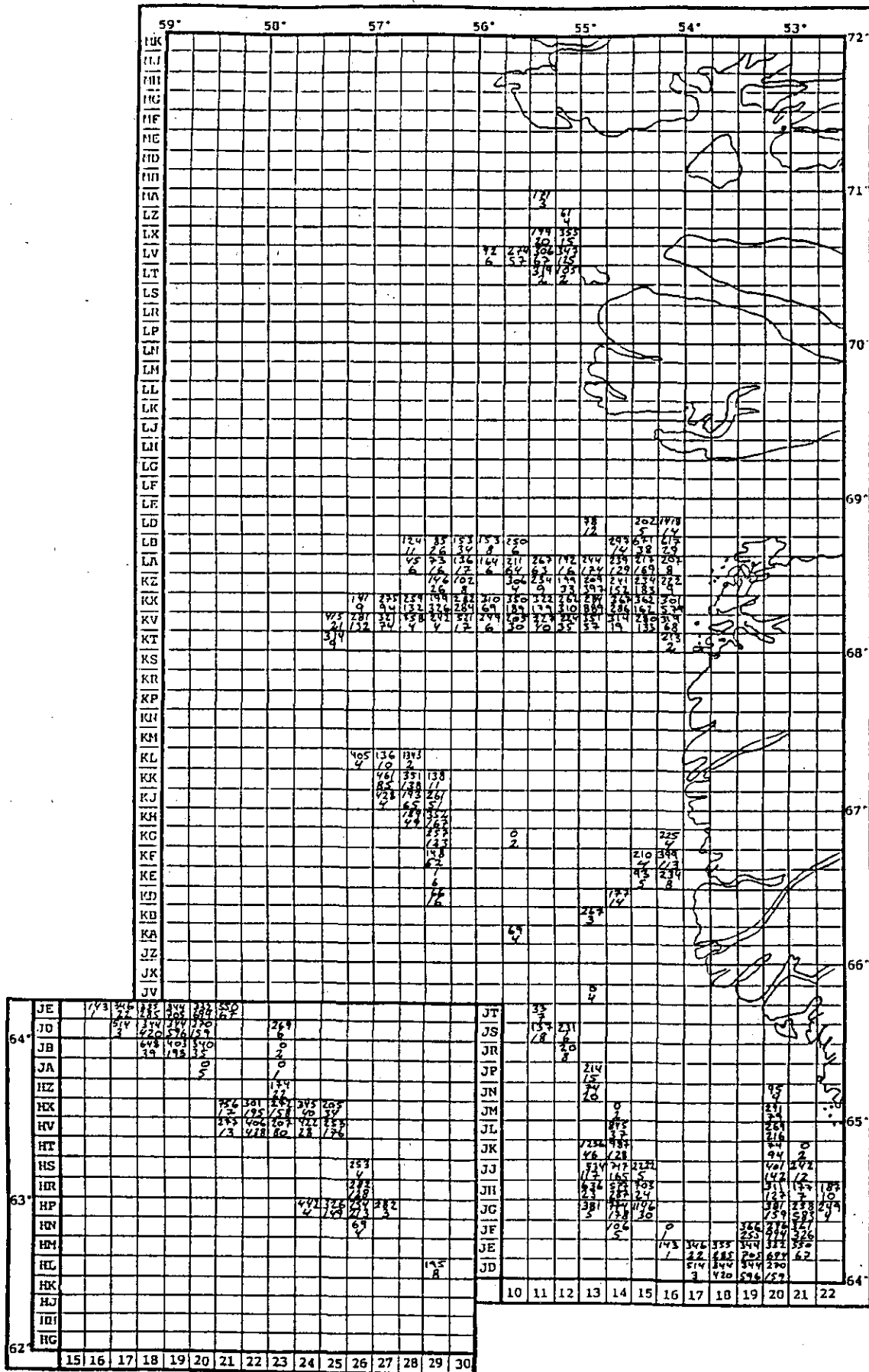


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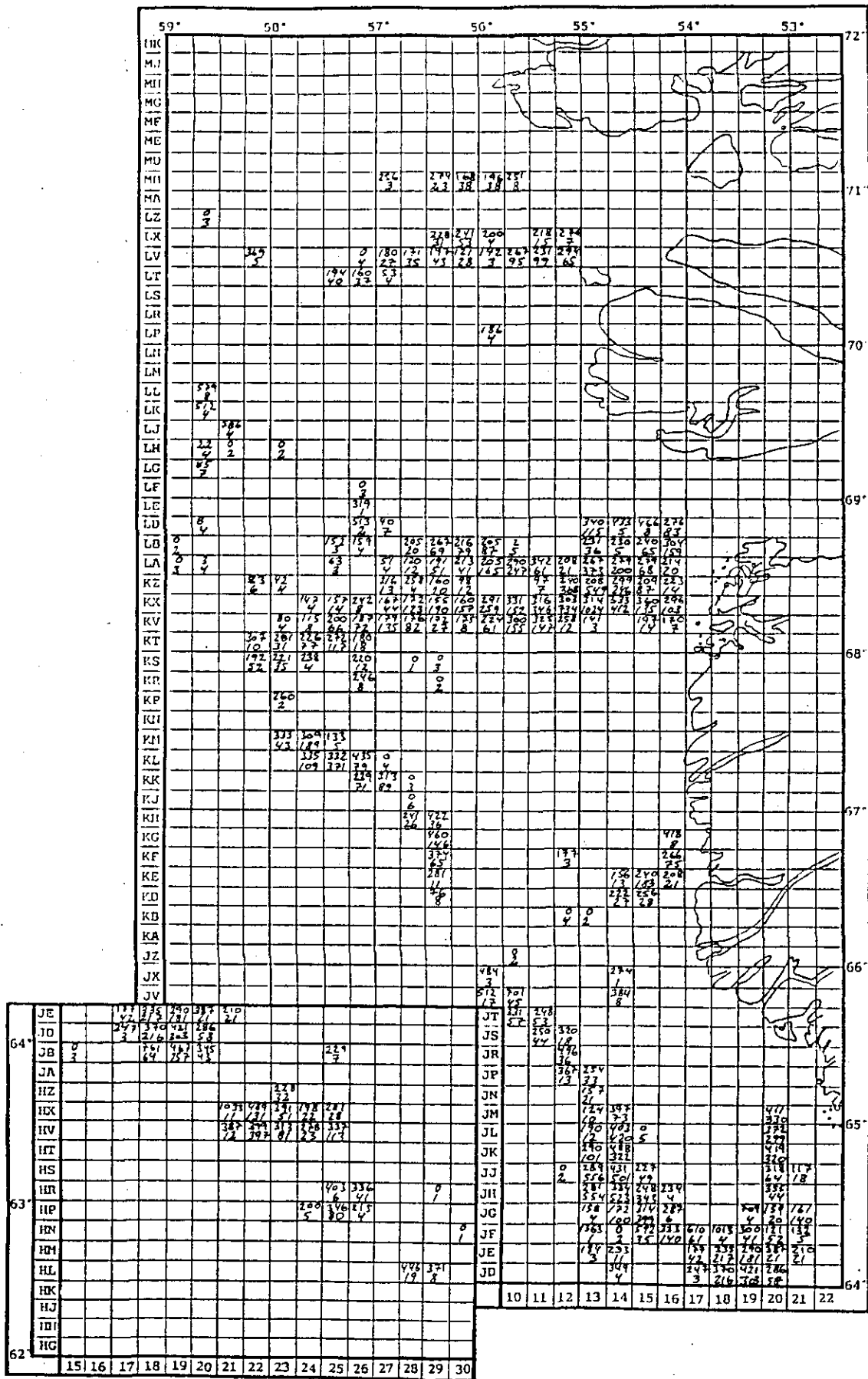


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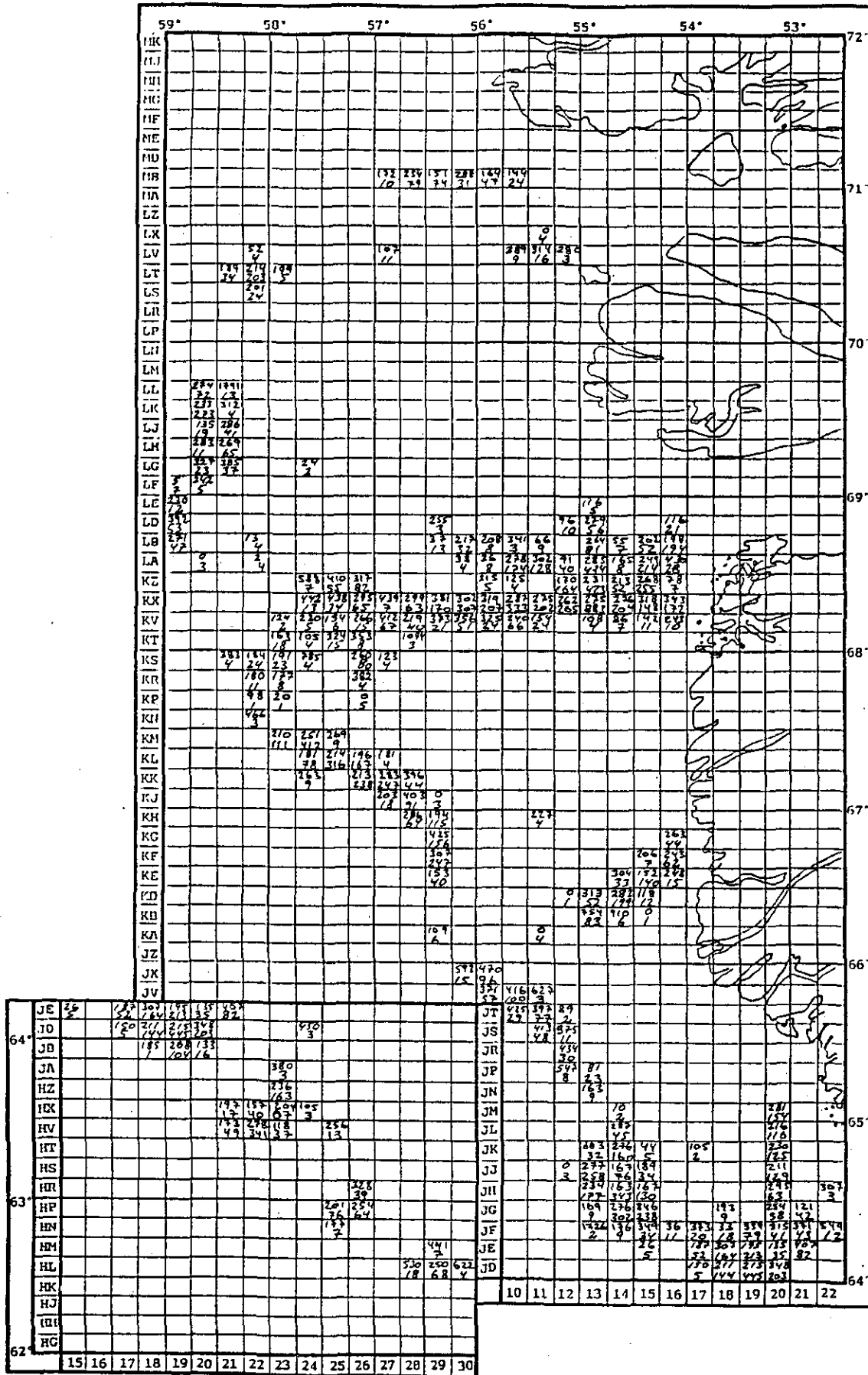


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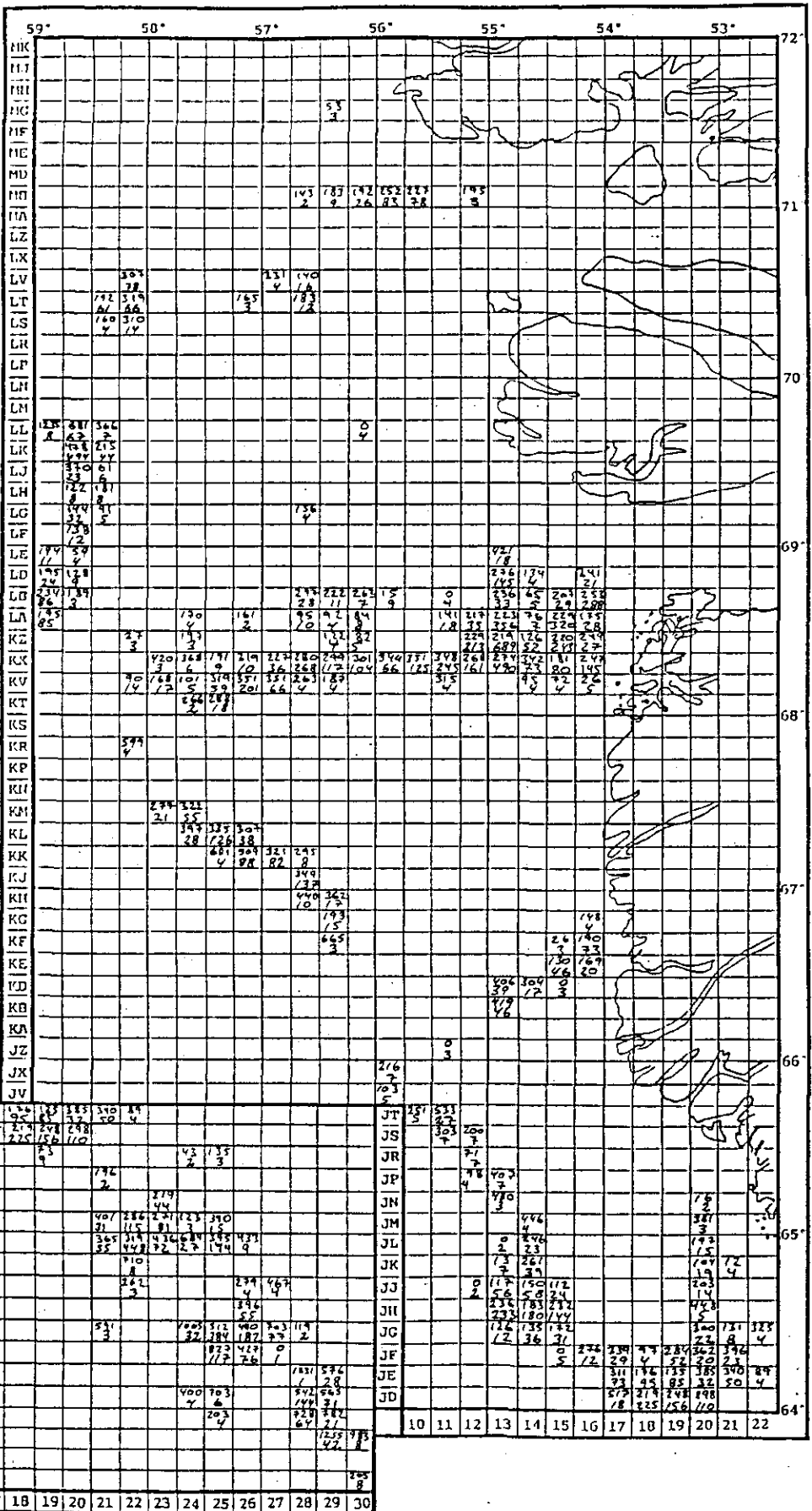


Figure 2 continued. Data from September 1991.

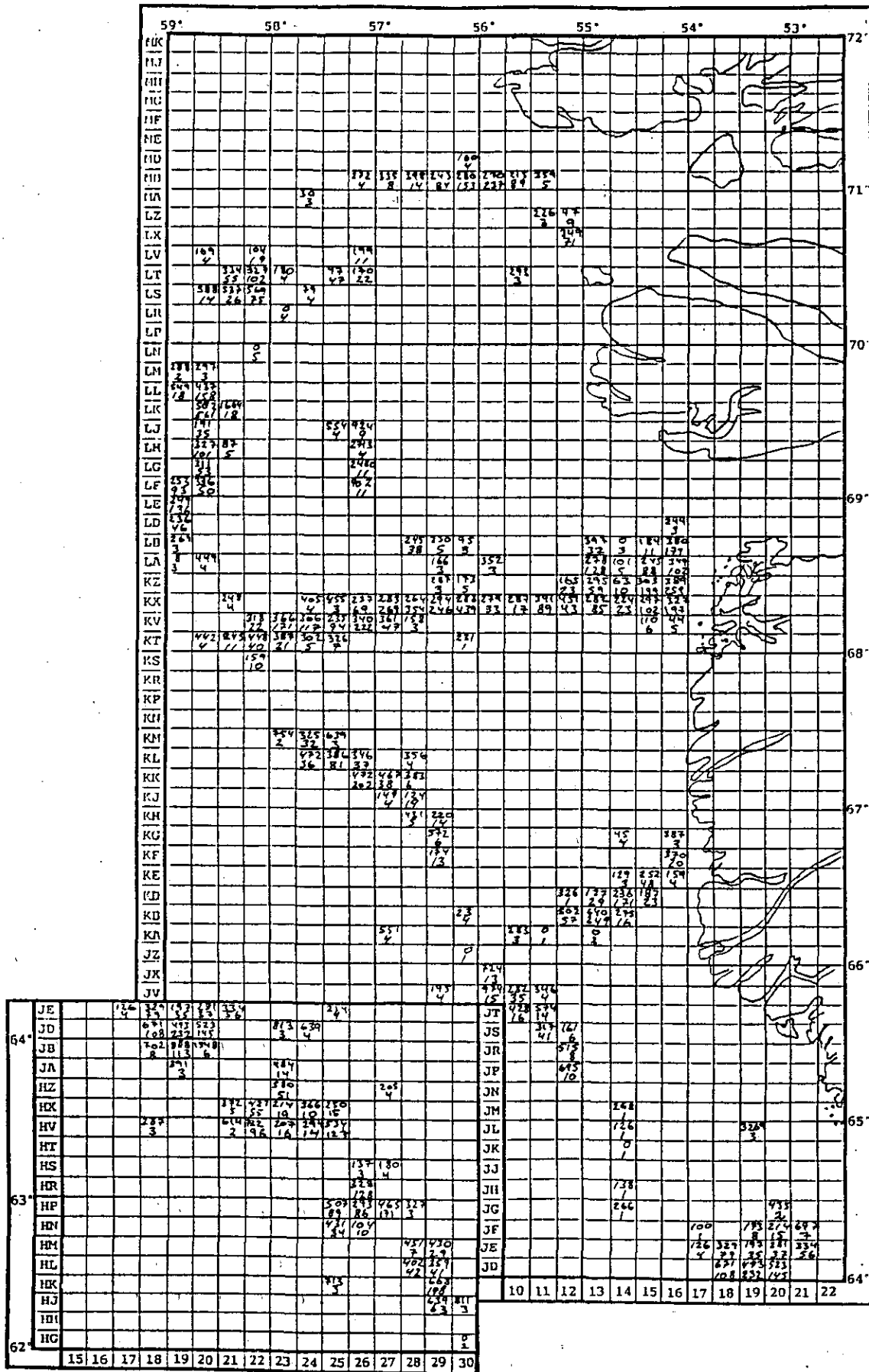


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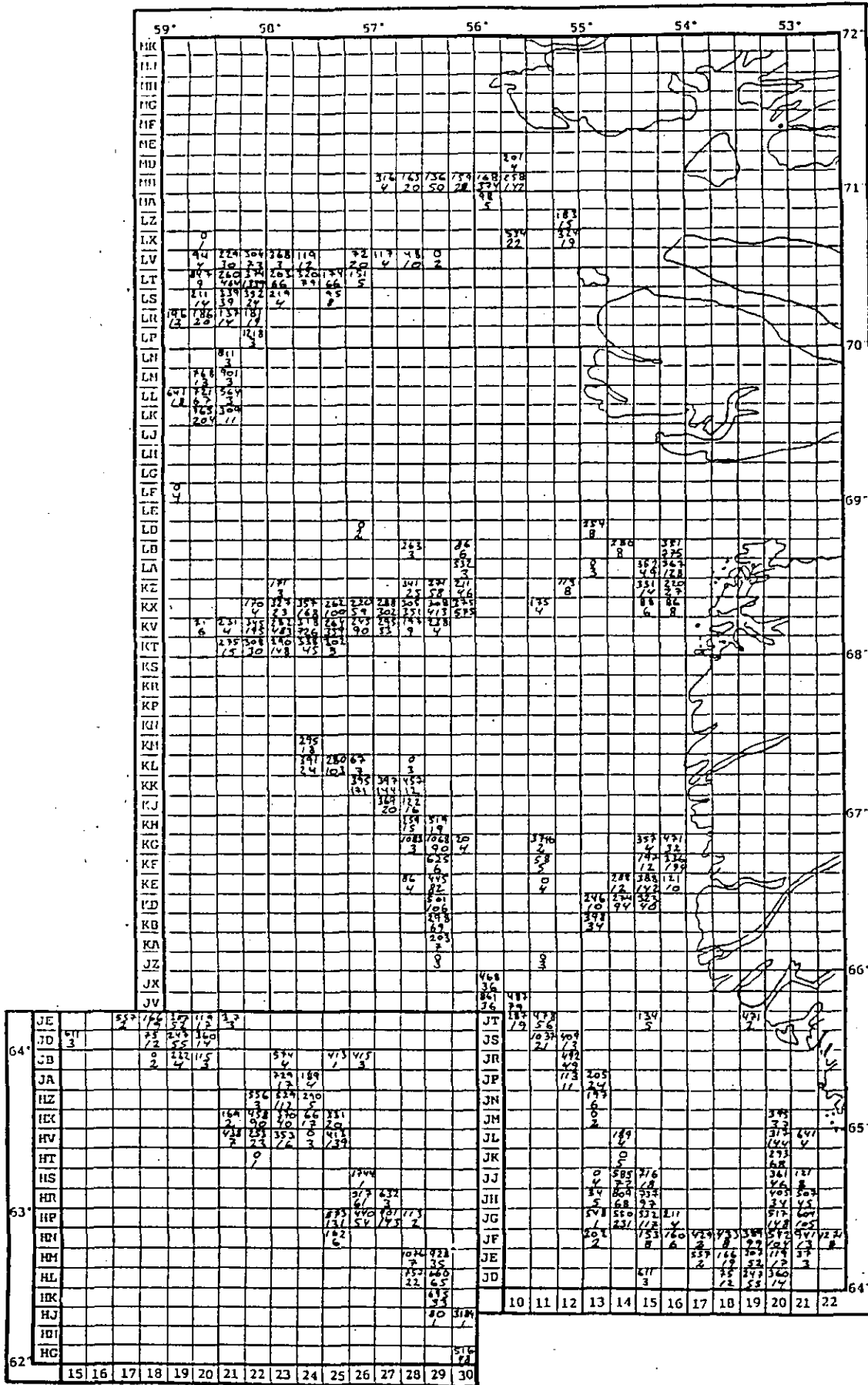


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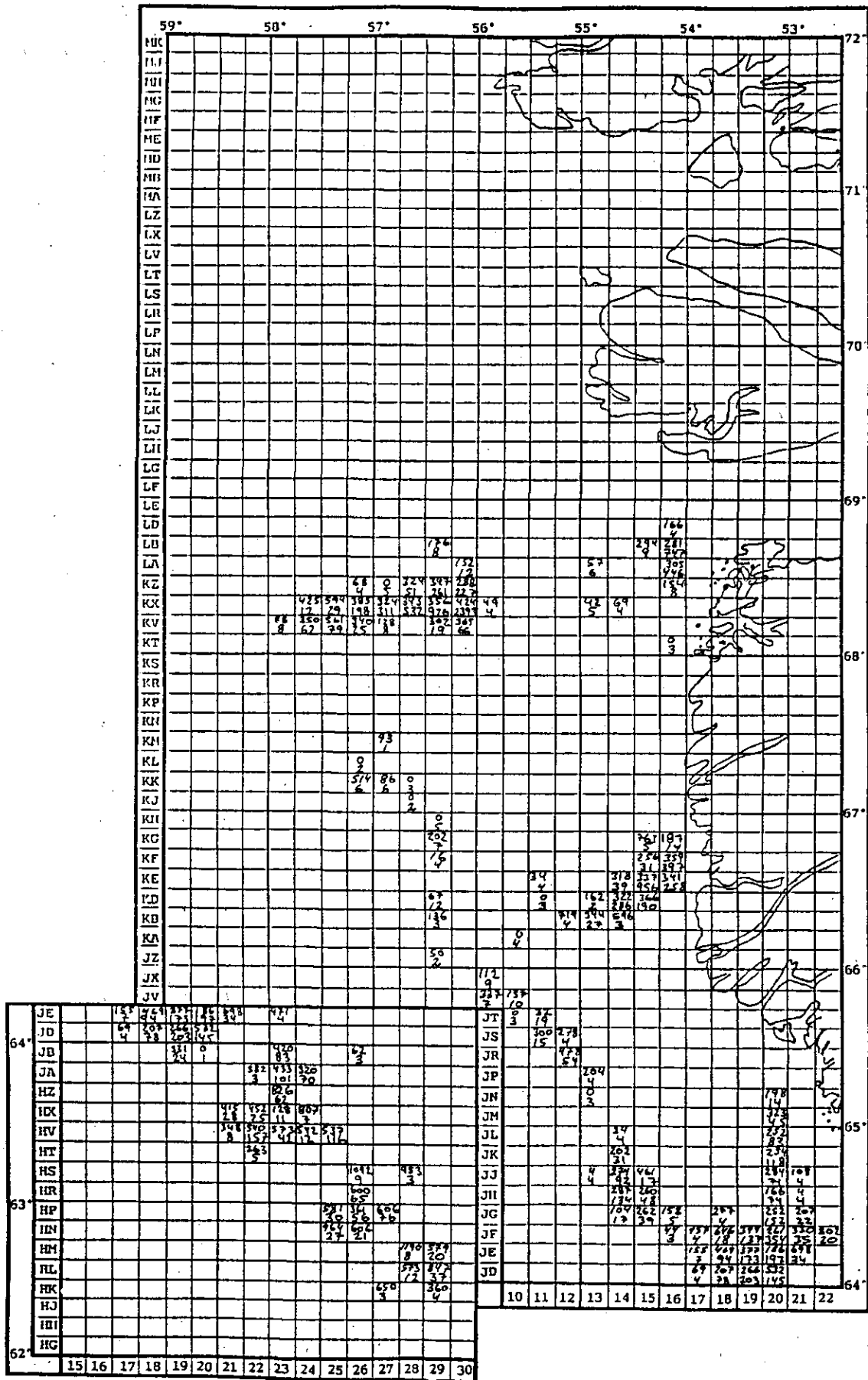


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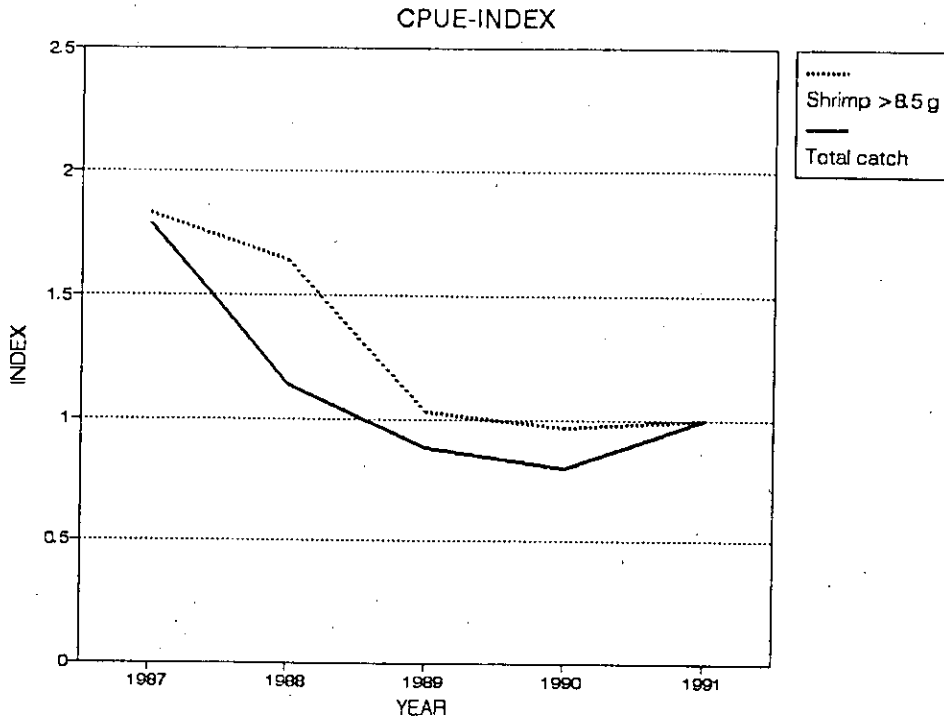


Figure 3. Yearly CPUE-indices calculated for shrimp >8.5 g and for total catch.

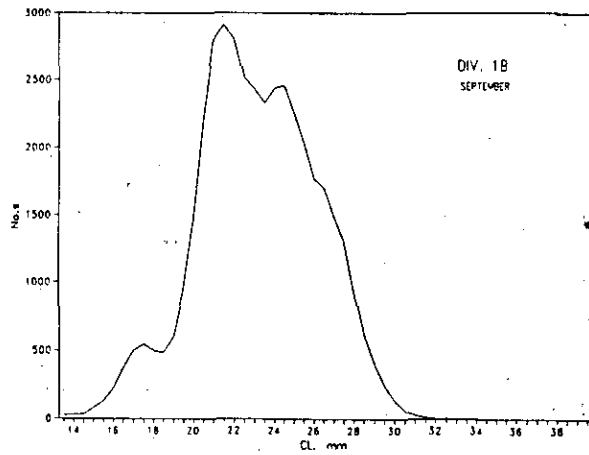
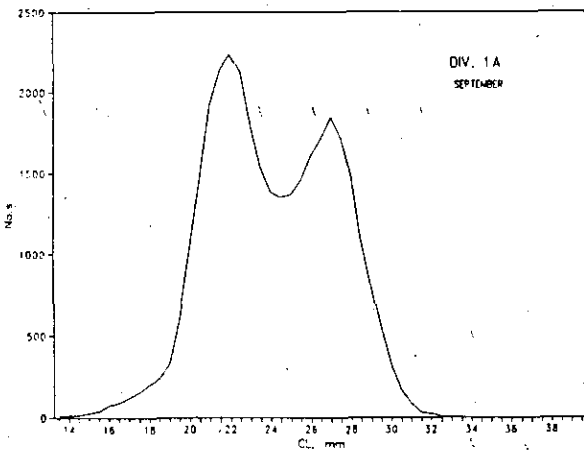
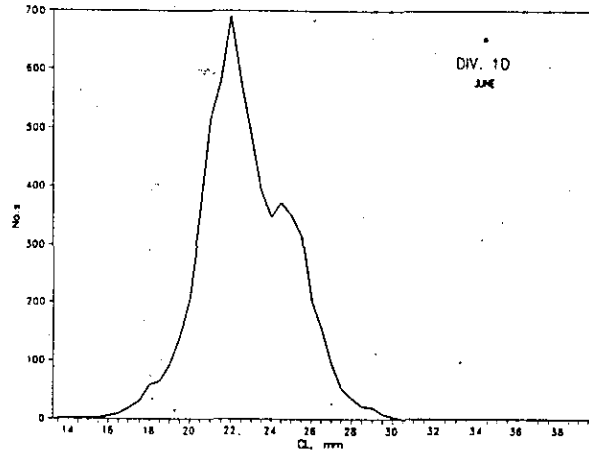
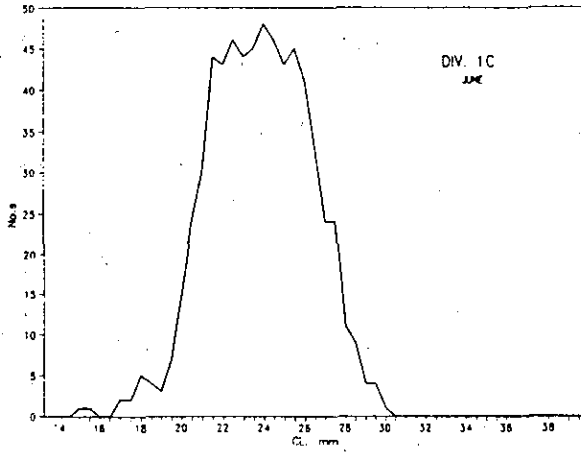


Figure 4a. Commercial shrimp samples from June and September 1991, pooled by Division and month.

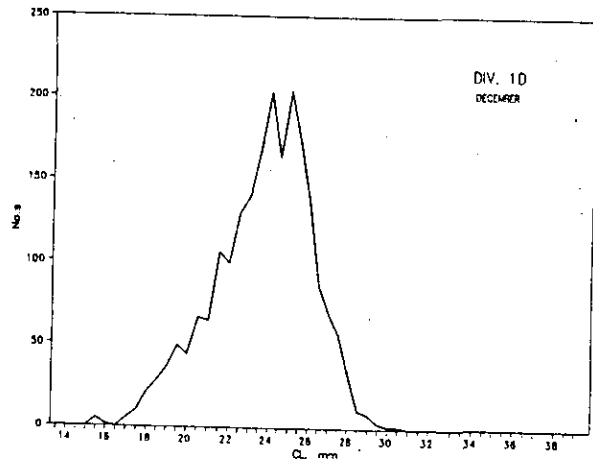
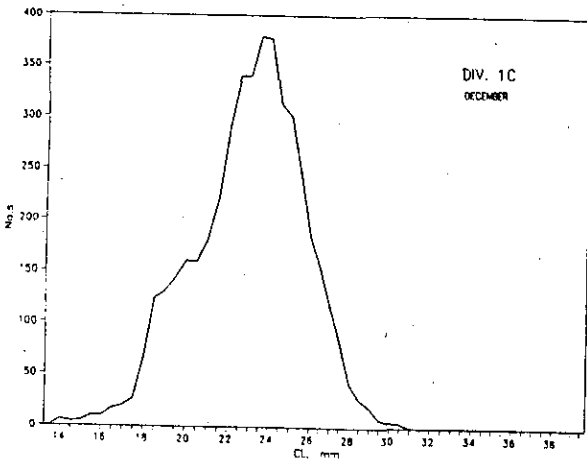
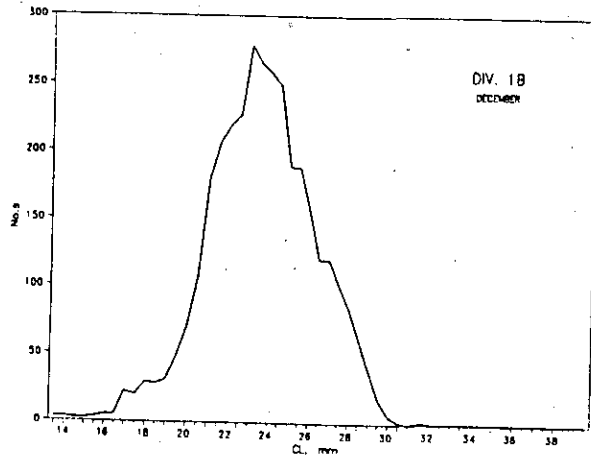
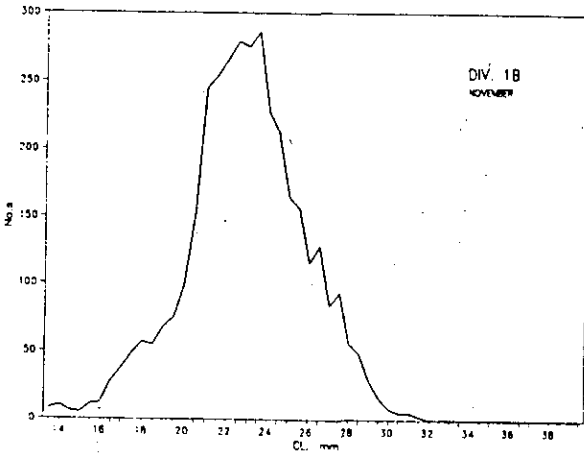


Figure 4b. Commercial shrimp samples from November and December 1991, pooled by Division and month.