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The shrimp fishery in NAFO Subarea 1 in 1990

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 1990. 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 36,725 tons. Greenland trawlers above 75 GRT reported a total catch in the Subarea of 41,962 tons, including 2,121 tons taken north of the area considered by STACFIS. Total catches of smaller vessels are estimated to about 20,500 tons, of which about 5,500 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 fishing in the offshore area. For 1990 logbooks available to GF cover about 159,500 hours of trawling and a total catch of about 49,000 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 analyzed to show the yearly and monthly distribution of catches, fishing effort and mean catch-rates.

Mean catch-rate indices for seven trawlers for the July-September period have been used since 1976 to reflect the state of the shrimp stock in Div. 1B. This index covered only a certain part of the year, while changes in availability inside years might occur, and therefore a multiple regression analysis was carried out in 1990 on the data for the seven trawlers from 1976 to 1989 to obtain an index which would be an improved representation of the performance of the fleet (Lassen and Carlsson, 1990). Most of these vessels have now been taken out of the fishery, so neither of these indices can be continued. Instead a new standardized index based on a larger part of the fleet and taking into account non-reported discard of shrimp has been developed as presented elsewhere (Carlsson and Lassen, 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 quarter to show overall size distribution of commercial catches.

## RESULTS AND DISCUSSION

### Reported catches in 1990

Table 1 shows catches by division, nation and month in offshore Subarea 1 in 1990 as reported by vessels above 75 GRT, and Table 2 the 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 2,000 tons in 1990.

The shrimp landings from Subarea 1 in 1990 by smaller Greenland vessels (below 75 GRT) are about 20,500 tons (preliminary figure), of which about 15,000 tons are estimated to be inshore catches.

The preliminary total nominal shrimp catch in Subarea 1 was about 63,500 tons in 1990, which is about 2,500 tons more than in 1989.

### Geographical distribution of the offshore fishery

Figure 1 shows the distribution of total catches (in tons per statistical unit) in 1990 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 northern and western slopes of Store Hellefiske Bank and Disko Bank. Some catches were also taken in the southernmost grounds in the Northwest Greenland area. Higher catches than normal were taken in Sukkertoppen Deep.

Since 1987 there has been some yearly changes in the distribution of the fishery between divisions as illustrated by Table 3, which shows effort (in hours) by year and division from 1987 to 1990 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 shift in the fishery in recent years with more effort being spent in Div. 1C and 1D.

Figure 2 shows the monthly distribution of mean catch-rates and effort (numbers of hours trawled) from January through December 1990. As has been the case in several years (1983, 84 and 87-89) 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 was it 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 June to December

The area between 68°30'N and 71°N west of 58°W is a new regulatory area established in 1989. Although the area is south of 71°N, Greenland authorities do not consider it part of the area for which STACFIS advises. About 2,250 tons were reported from this area in 1990.

### Biological samples

Data on numbers of shrimp by length in shrimp samples from the commercial fishery in Subarea 1 pooled by division and quarter are given in Table 5 and Fig. 3. Samples from Div. 1A in the third quarter show a dominant peak of female shrimp around 27 mm carapace length and a smaller group of males around 21 mm. Samples from Div. 1B all show dominant peaks around 20 mm and 24.5 mm, the first peak representing males and the second females. There are indications of growth of males by the progression of the peak from 19.5 mm in the second quarter to 21 mm in the fourth quarter. The female group in the second quarter has two peaks, of which the first peak around 23.5 mm may indicate primiparous females, that are included in the general female group in third and fourth quarter after spawning.

## CONCLUSIONS

The nominal offshore catch of shrimp in NAFO Subarea 1 is estimated to be about 63,500 tons in 1990, including about 2,000 tons from the area north of 71°N.

As in earlier years, but different from 1985 and 1986, ice hampered the access to the important shrimp fishing grounds on the slopes of Store Hellefiske Bank in spring time.

A significant shift in the fishery took place in 1989 and 1990, larger parts of the catches being taken in Div. 1C and 1D compared to the years before.

Shrimp samples from the commercial fishery in Div. 1A and 1B show one dominant male peak and one dominant female peak. Growth is indicated for the male group from second quarter throughout the year and for primiparous females between the second and the third quarter.

REFERENCES

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.

Lassen, H., and D. M. Carlsson. 1990. A catch-rate index for the Greenland shrimp fishery in NAFO Subarea 1. NAFO SCR Doc. 90/90, Ser. No. N1817.

Table 1. Offshore shrimp catches (tons) by division, nation and month in 1990 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	-	-	-	-	-	28	93	257	512	754	414	63	2121
	TOTAL	-	-	-	-	-	28	93	257	512	754	414	63	2121
1A SOUTH	GREENLAND	-	-	-	-	17	153	657	394	1101	669	319	20	3330
	TOTAL	-	-	-	-	17	153	657	394	1101	669	319	20	3330
1B	DENMARK	-	-	-	-	3	-	-	-	-	-	-	-	3
	FRANCE	-	-	-	-	-	-	15	8	-	-	-	-	23
	GREENLAND	208	42	82	157	3222	2740	2043	1510	1362	889	2313	890	15458
	TOTAL	208	42	82	157	3225	2740	2058	1518	1362	889	2313	890	15484
1C	DENMARK	-	88	-	-	1	6	-	-	-	-	-	-	95
	FAROE ISL.	-	-	-	-	-	7	116	40	-	-	-	-	163
	FRANCE	-	-	-	10	-	-	12	63	-	-	-	-	85
	GREENLAND	2083	1270	1894	3667	1305	910	1151	849	30	119	269	976	14523
TOTAL	2083	1358	1894	3677	1306	923	1279	952	30	119	269	976	14866	
1D	DENMARK	-	105	-	28	70	52	-	-	-	-	-	-	255
	FAROE ISL.	-	-	-	-	4	44	-	12	-	-	-	-	60
	FRANCE	-	-	-	229	59	-	4	-	-	-	-	-	292
	GREENLAND	219	1166	454	1044	704	492	419	120	53	1040	239	349	6299
TOTAL	219	1271	454	1301	837	588	423	132	53	1040	239	349	6906	
1E	GREENLAND	-	-	-	-	-	-	1	-	-	-	-	-	1
	TOTAL	-	-	-	-	-	-	1	-	-	-	-	-	1
1F	GREENLAND	27	16	96	12	-	-	-	-	8	20	36	15	230
	TOTAL	27	16	96	12	-	-	-	-	8	20	36	15	230
TOTAL	DENMARK	-	193	-	28	74	58	-	-	-	-	-	-	353
	FAROE ISL.	-	-	-	-	4	51	116	52	-	-	-	-	223
	FRANCE	-	-	-	239	59	-	31	71	-	-	-	-	400
	GREENLAND	2537	2494	2526	4880	5248	4323	4364	3130	3066	3491	3590	2313	41962
TOTAL	2537	2687	2526	5147	5385	4432	4511	3253	3066	3491	3590	2313	42938	

Table 2. Number of vessels above 75 GRT by nation and month in the shrimp fishery in Subarea 1 in 1990 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	12	15	19	23	23	21	3	29

South of 71°N	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Greenland	26	26	29	44	43	40	41	39	30	33	38	34	51
Denmark	0	1	0	1	1	1	0	0	0	0	0	0	2
France	0	0	0	2	1	0	1	1	0	0	0	0	2
Feroe Islands	0	0	0	0	0	2	2	2	0	0	0	0	2
TOTAL	26	27	29	47	45	43	44	42	38	33	30	34	57

Table 3. Distribution of effort (in hours and % of total hours per year) by Division and year in logbooks from the Greenland fishery, 1987-1990.

	1A		1B		1C		1D		1E		1F		Total hours <sup>1</sup>
	hours	%	hours	%	hours	%	hours	%	hours	%	hours	%	
1987	33,205	39.8	41,759	50.0	6,472	7.8	2,067	2.5	4	0.0	-	-	83,507
1988	31,785	27.2	72,007	61.7	10,808	9.3	1,383	1.2	2	0.0	720	0.6	116,705
1989	35,905	26.4	61,201	44.9	22,928	16.8	12,820	9.4	2	0.0	3,309	2.4	136,165
1990	32,257	20.2	60,876	38.2	41,724	26.2	22,412	14.1	-	-	2,208	1.4	159,477

Table 4. Distribution of catches (in tons and % of total logbook catch per year) by Division and year in logbooks from the Greenland fishery, 1987-1990.

	1A		1B		1C		1D		1E		1F		Total, tons
	tons	%	tons	%	tons	%	tons	%	tons	%	tons	%	
1987	9,590	26.9	21,898	61.4	3,610	10.1	571	1.6	-	-	-	-	35,669
1988	7,643	18.1	29,890	70.7	4,310	10.2	315	0.7	1	0.0	91	0.2	42,250
1989	9,672	21.4	21,445	47.5	7,907	17.5	5,864	13.0	-	-	296	0.7	45,184
1990	7,518	15.4	19,242	39.3	14,216	29.0	7,691	15.7	-	-	297	0.6	48,964

Table 5. No. of shrimp per length group in commercial samples from Subarea 0 in 1990, pooled by Division and quarter. 'Corresponding catch' is the catch represented by the samples.

CL, mm	Division and Year-quarter			
	1A 9003	1B 9002	1B 9003	1B 9004
9.5	0	6781	3850	4329
10	0	13575	6138	4773
10.5	0	34266	20771	10082
11	0	43767	27473	12007
11.5	430	49345	39349	28290
12	1221	39309	30864	62739
12.5	667	25445	26612	112860
13	0	16270	18981	235914
13.5	721	15316	11586	339773
14	2223	15766	9712	395239
14.5	1241	17429	16863	394639
15	349	41471	24137	290749
15.5	3341	75412	27774	219563
16	4826	87476	47971	189311
16.5	6879	114102	48565	202939
17	16352	161369	72695	291439
17.5	34966	221141	102704	363064
18	71373	394120	171779	555100
18.5	108438	567807	238404	833575
19	191926	690087	334637	1259019
19.5	254249	728948	411550	1648518
20	414776	626792	412822	2017935
20.5	565245	512882	363320	2151282
21	611843	357757	291768	2226897
21.5	627879	270622	236170	1995803
22	589079	276264	208720	1638737
22.5	547601	316844	235575	1429514
23	615830	354220	285135	1423998
23.5	703217	469166	328070	1607914
24	681459	473425	377583	1821849
24.5	761152	493391	383572	2066267
25	741858	405068	341345	2090838
25.5	918974	302772	250072	2091084
26	1070110	197141	189690	2020535
26.5	1194579	147552	134187	1735822
27	1213302	105367	92992	1388294
27.5	1124279	68508	76561	959999
28	883205	43061	51825	603145
28.5	728162	18583	43560	386020
29	458245	8992	21817	204842
29.5	296111	9845	12393	101550
30	132224	3020	8295	57694
30.5	72330	472	2347	17527
31	36423	916	1362	11882
31.5	6657	0	0	2843
32	2833	0	591	2824
32.5	541	0	984	0
33	135	313	0	901
33.5	0	0	0	1164
34	0	0	0	333
34.5	0	0	0	0
35	0	0	0	0
35.5	0	0	984	0
36	0	0	0	0
36.5	0	0	0	0
ALL	15697249	8822176	6044149	37511414
No. of samples	89	44	45	108
Σ sample weight	585.4	147.5	139.6	582.0
Corresp. catch	158853	58029	38588	277620

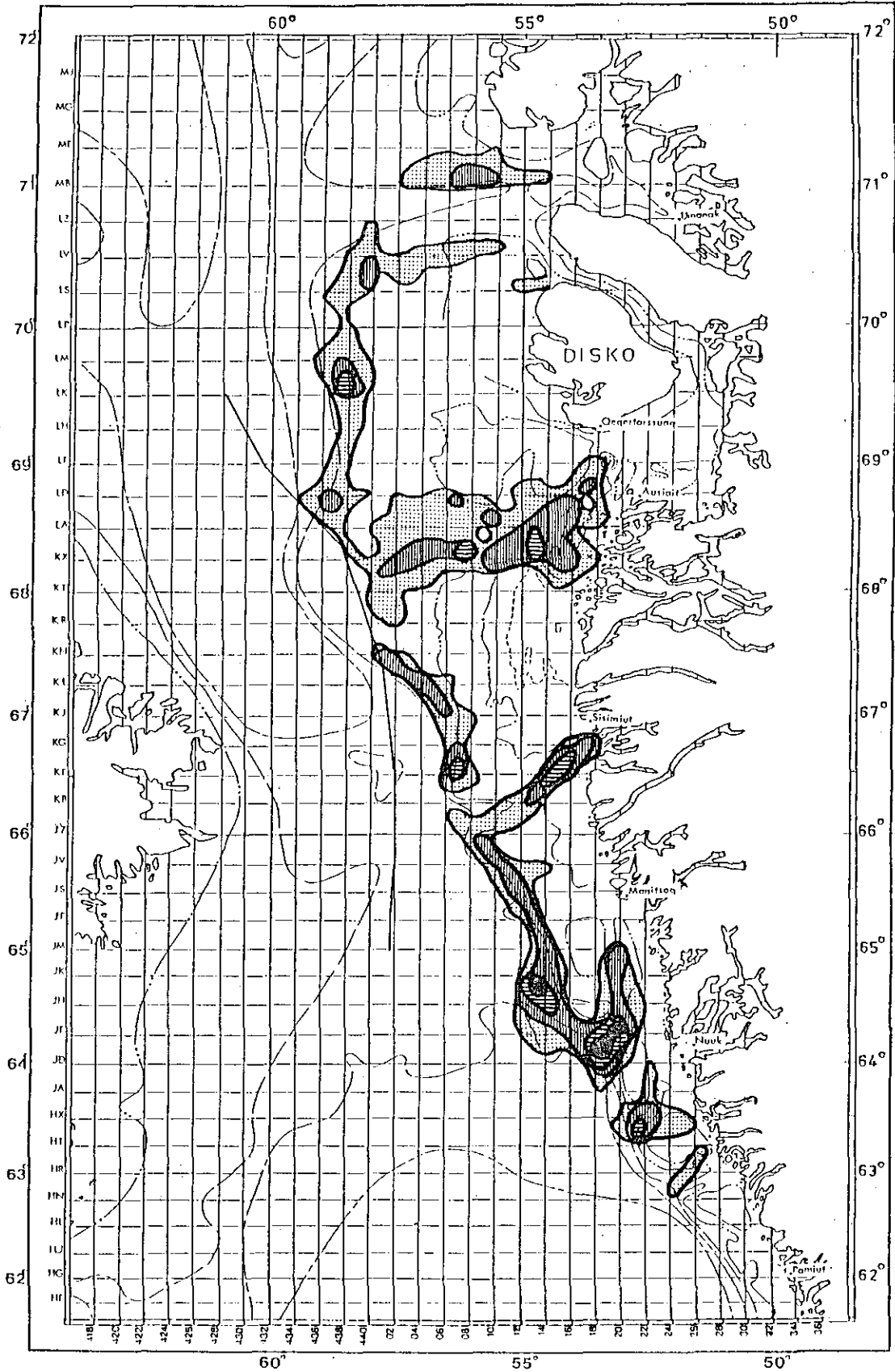


Figure 1. Distribution of total catches of shrimp (tons per statistical unit) in 1990 in NAFO Subarea 1 between 62°N and 72°N, based on logbooks from Greenland trawlers.

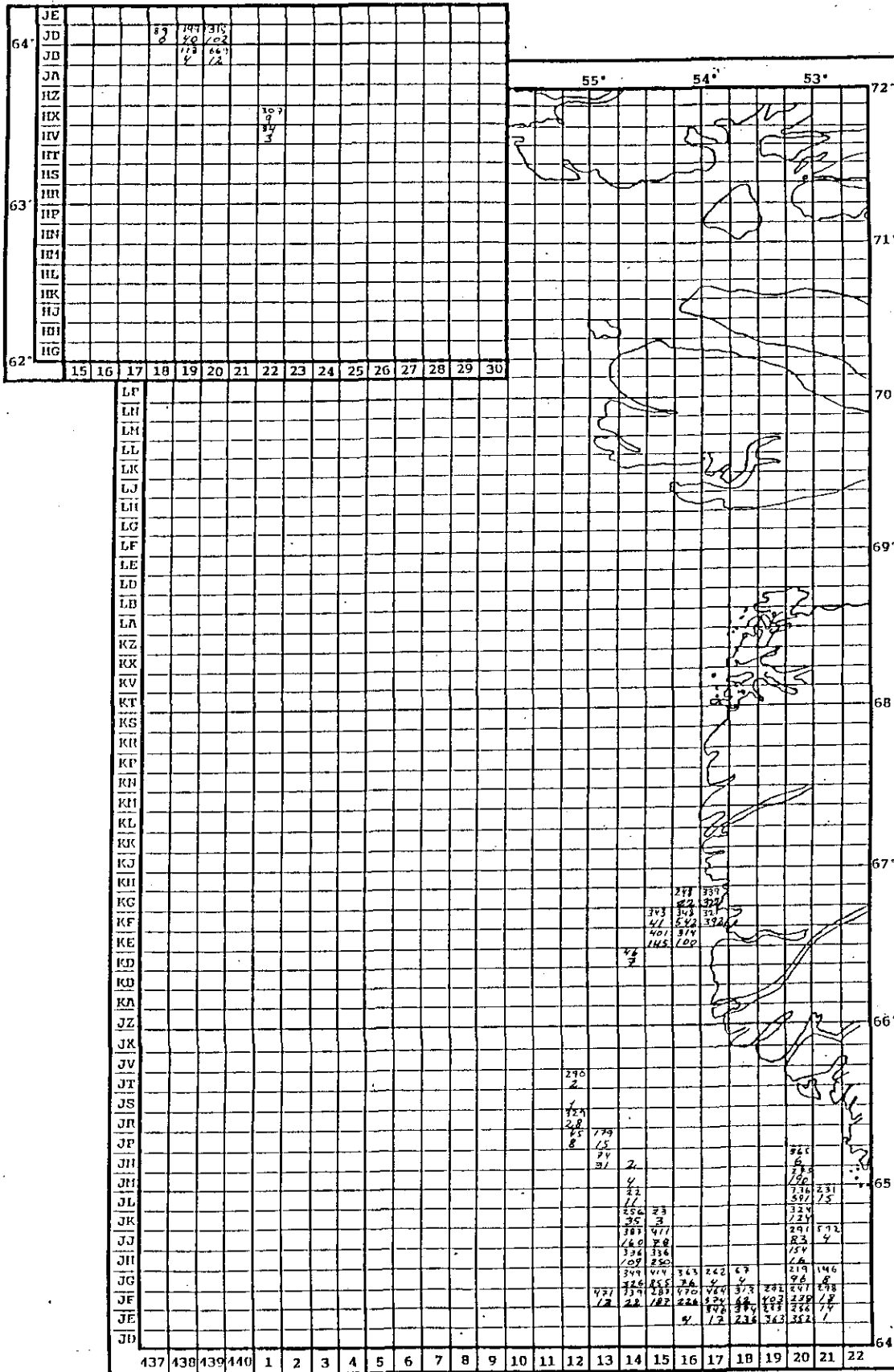


Figure 2. Distribution of mean catch rate (kg/hour, upper figure) and effort (hours, lower figure) in each statistical unit between 62°N and 72°N, NAFO Subarea 1 in January 1990.

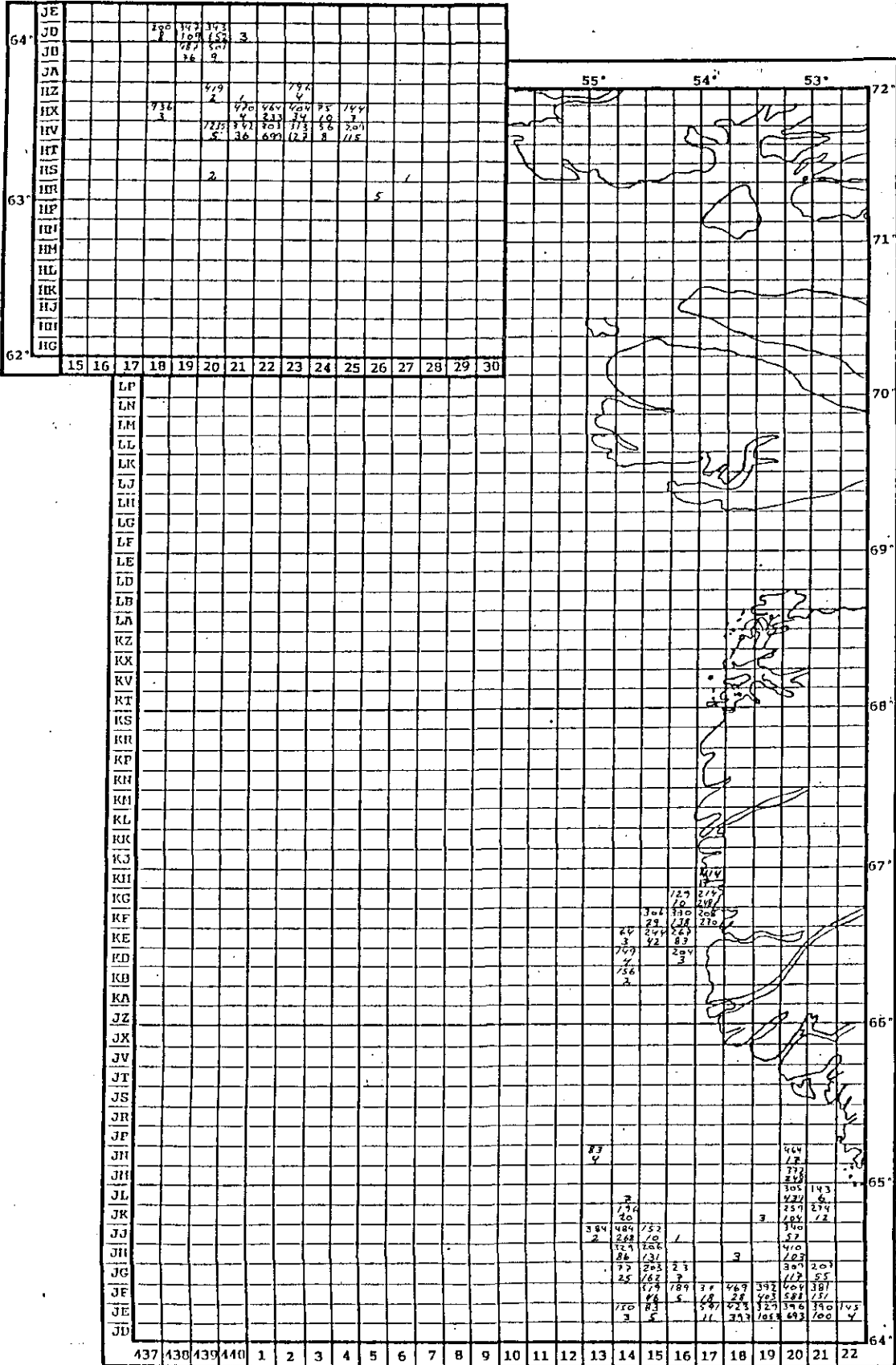


Figure 2 continued. Data from February 1990.



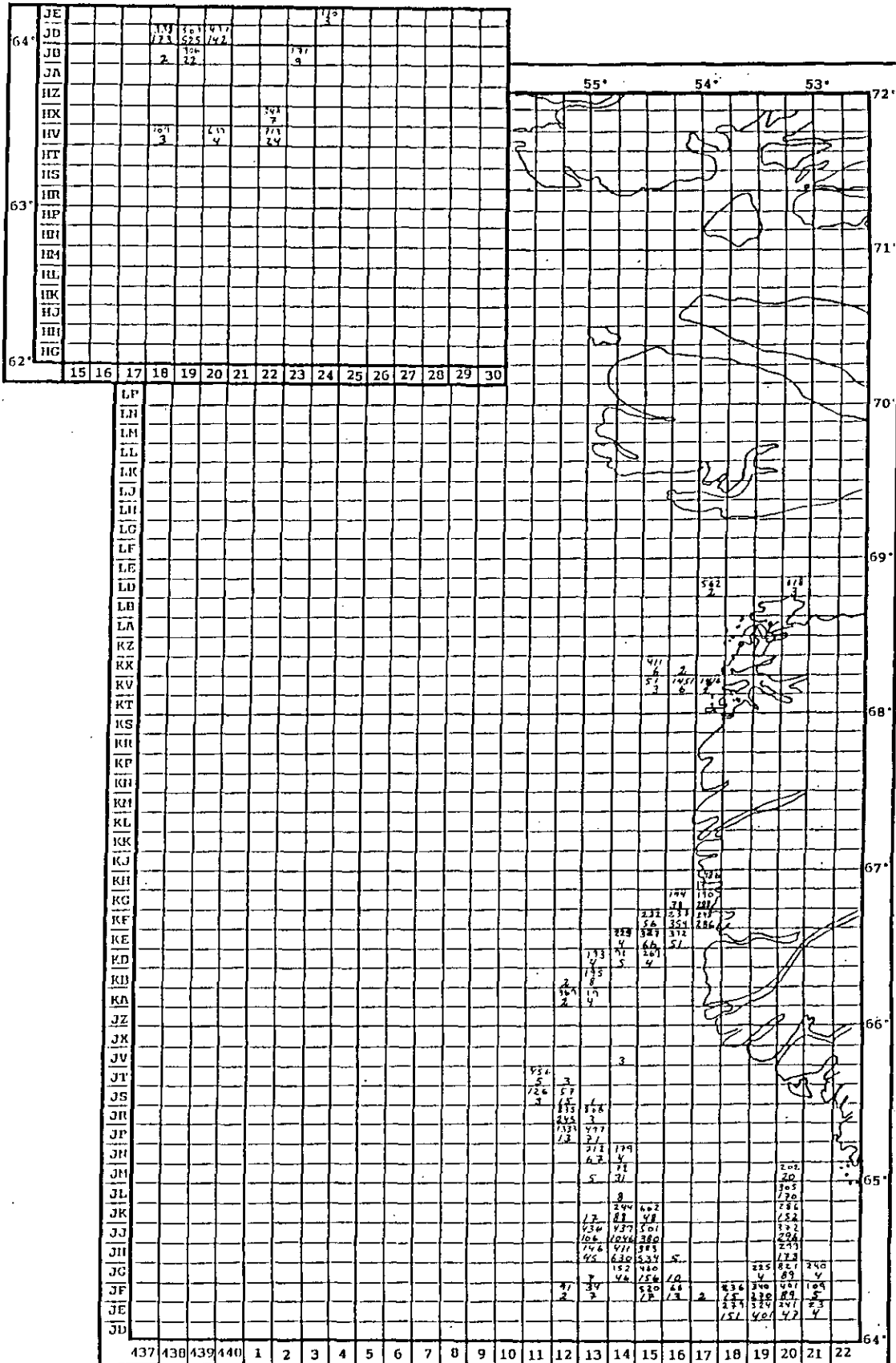


Figure 2 continued. Data from March 1990.

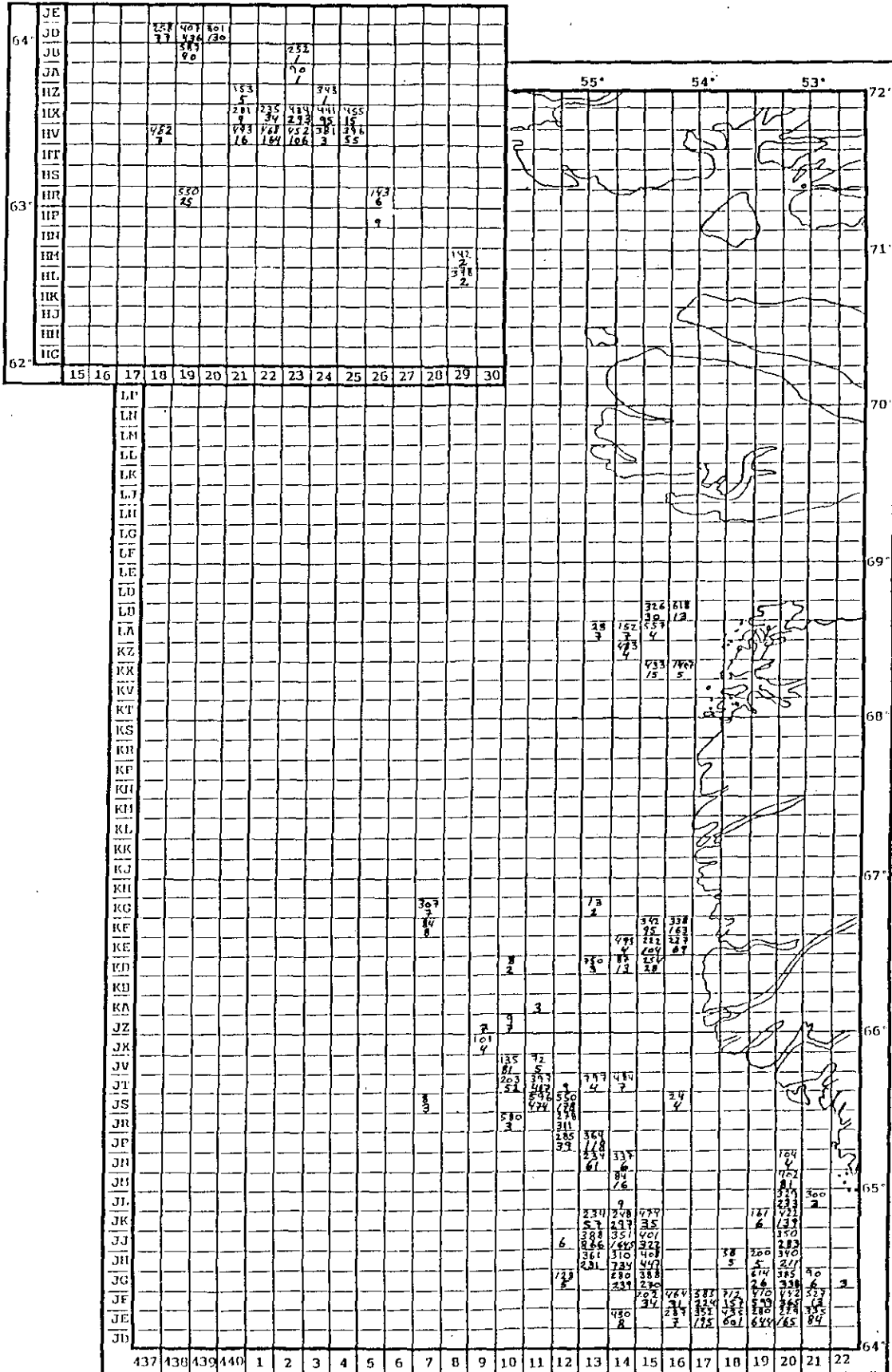


Figure 2 continued. Data from April 1990.

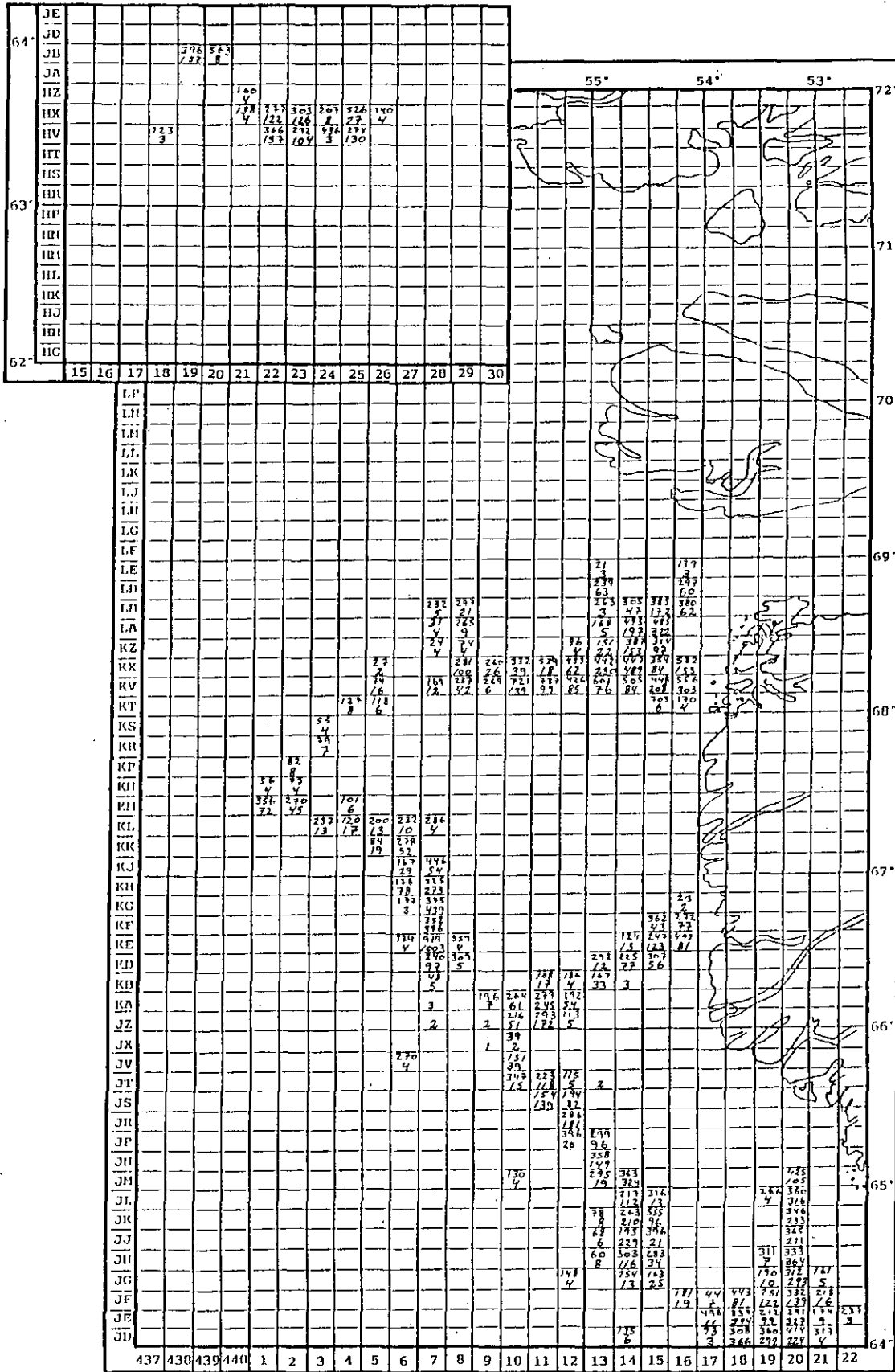


Figure 2 continued. Data from May 1990.

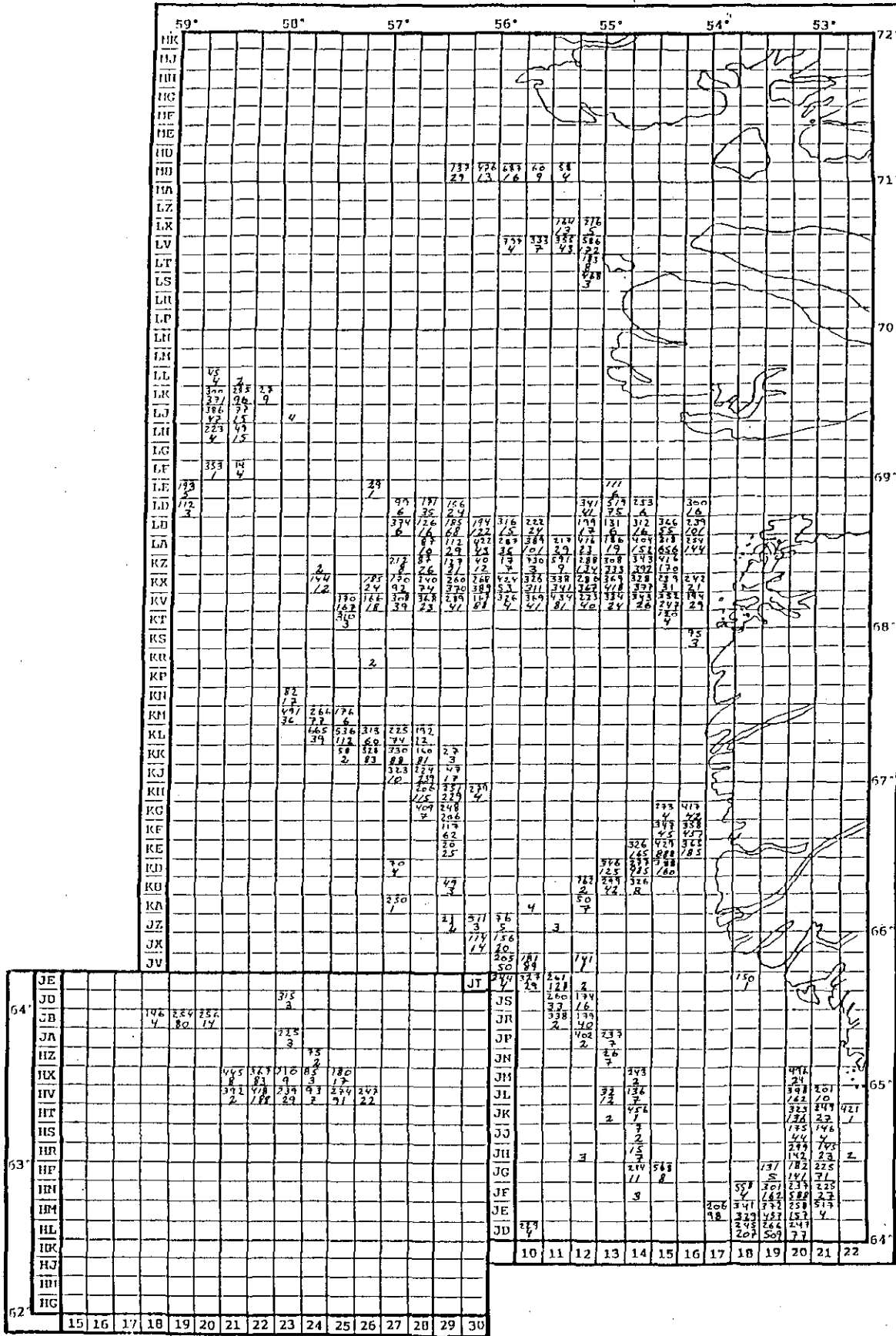


Figure 2 continued. Data from June 1990.

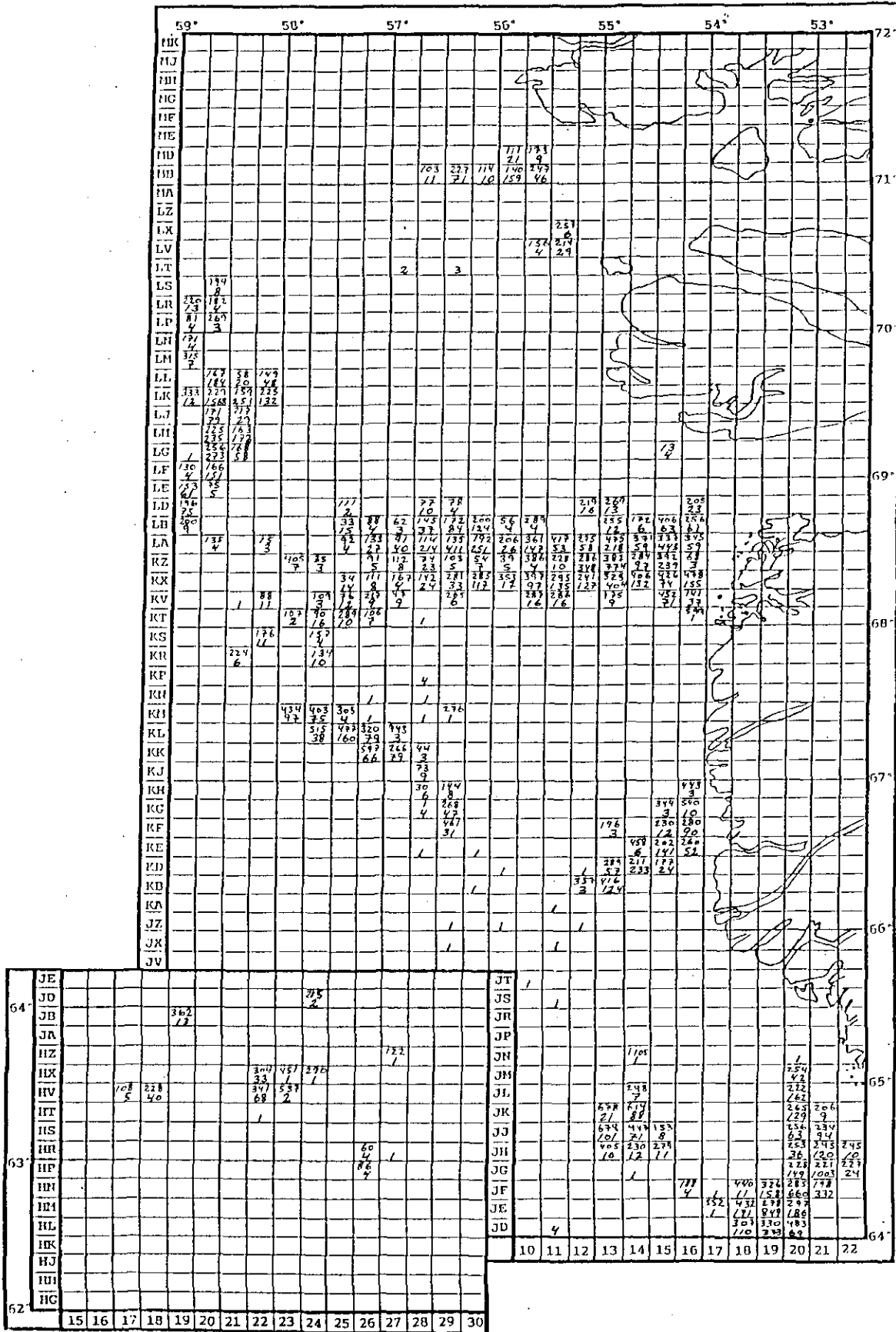


Figure 2 continued. Data from July 1990.

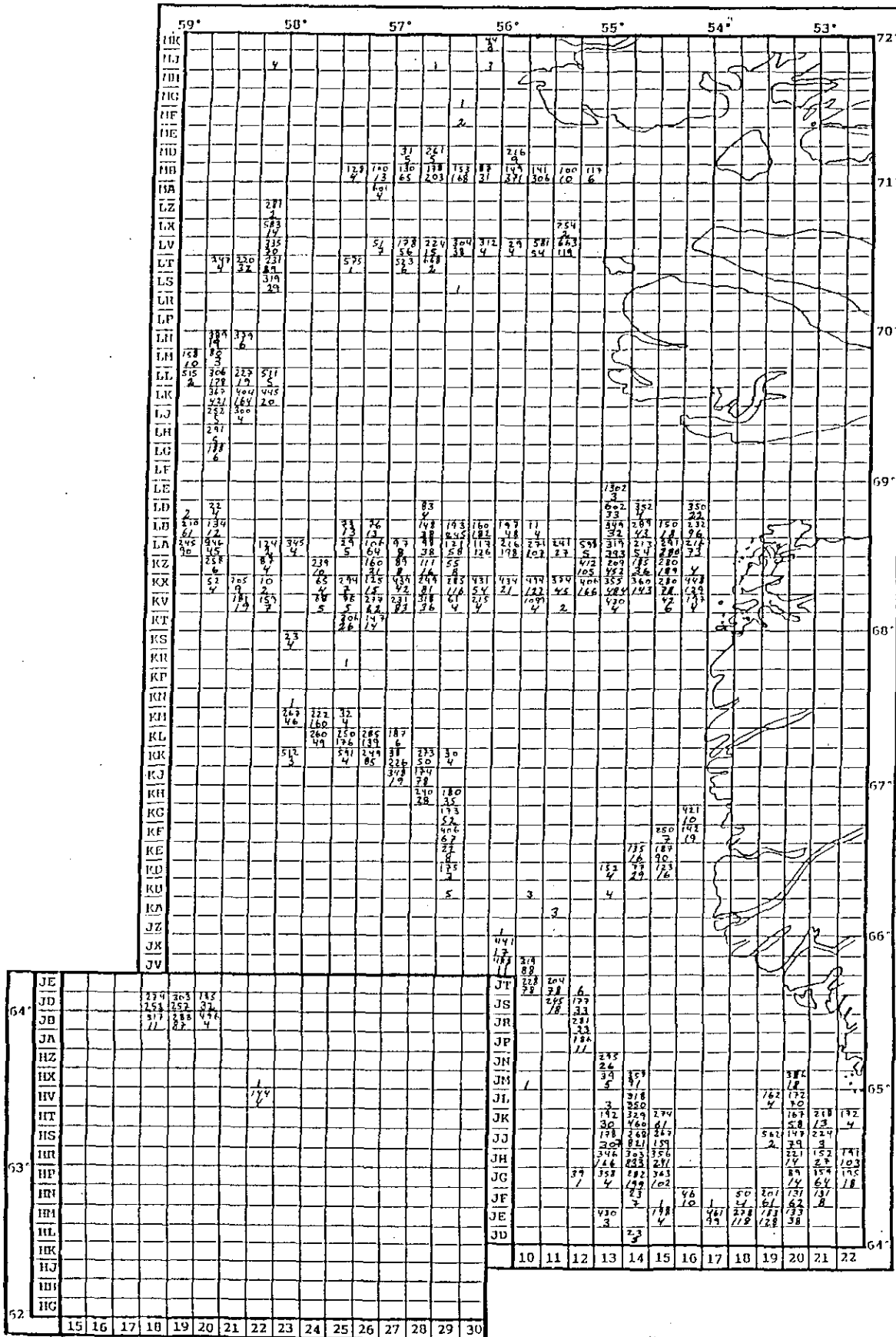


Figure 2 continued. Data from August 1990.

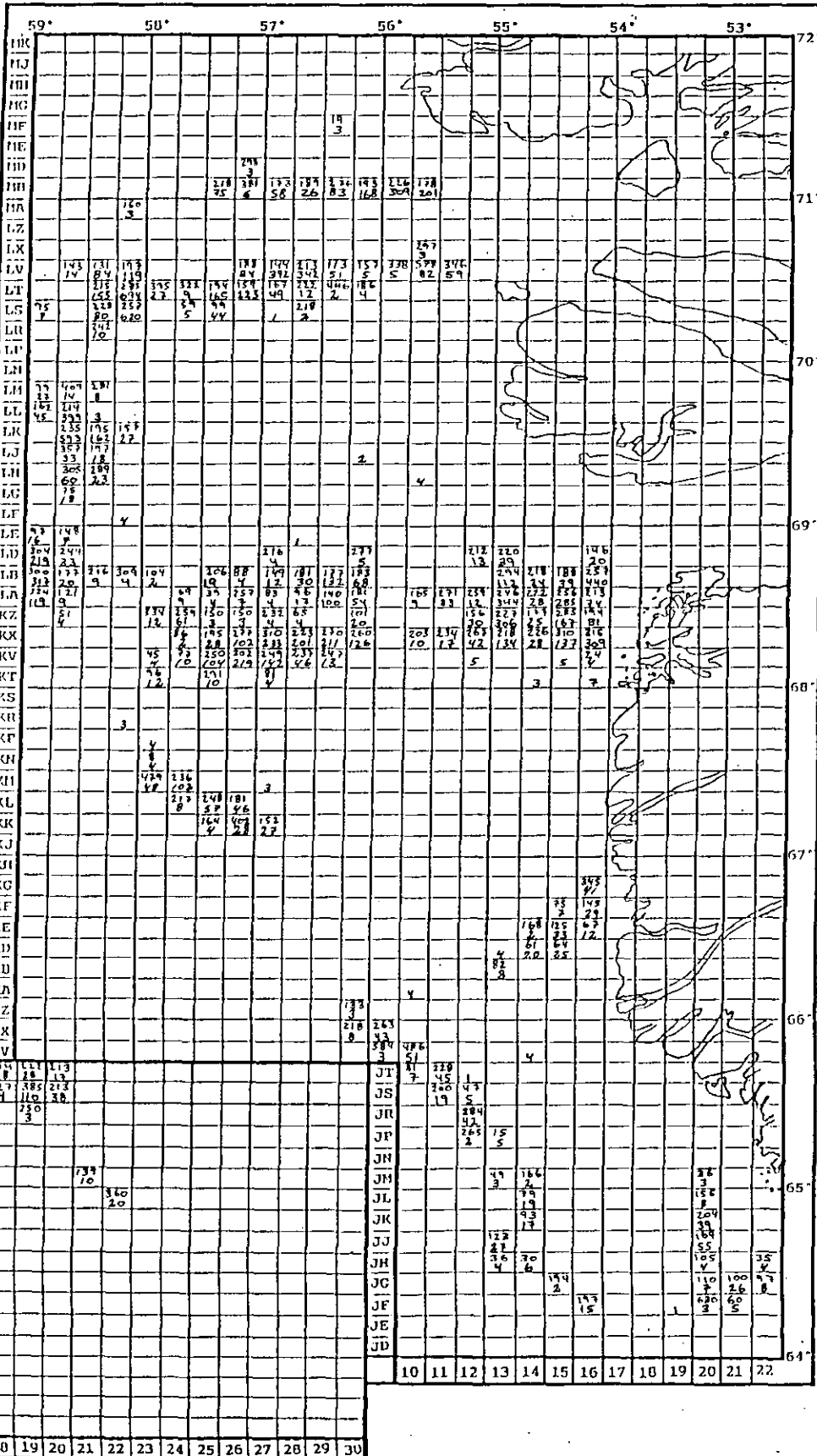


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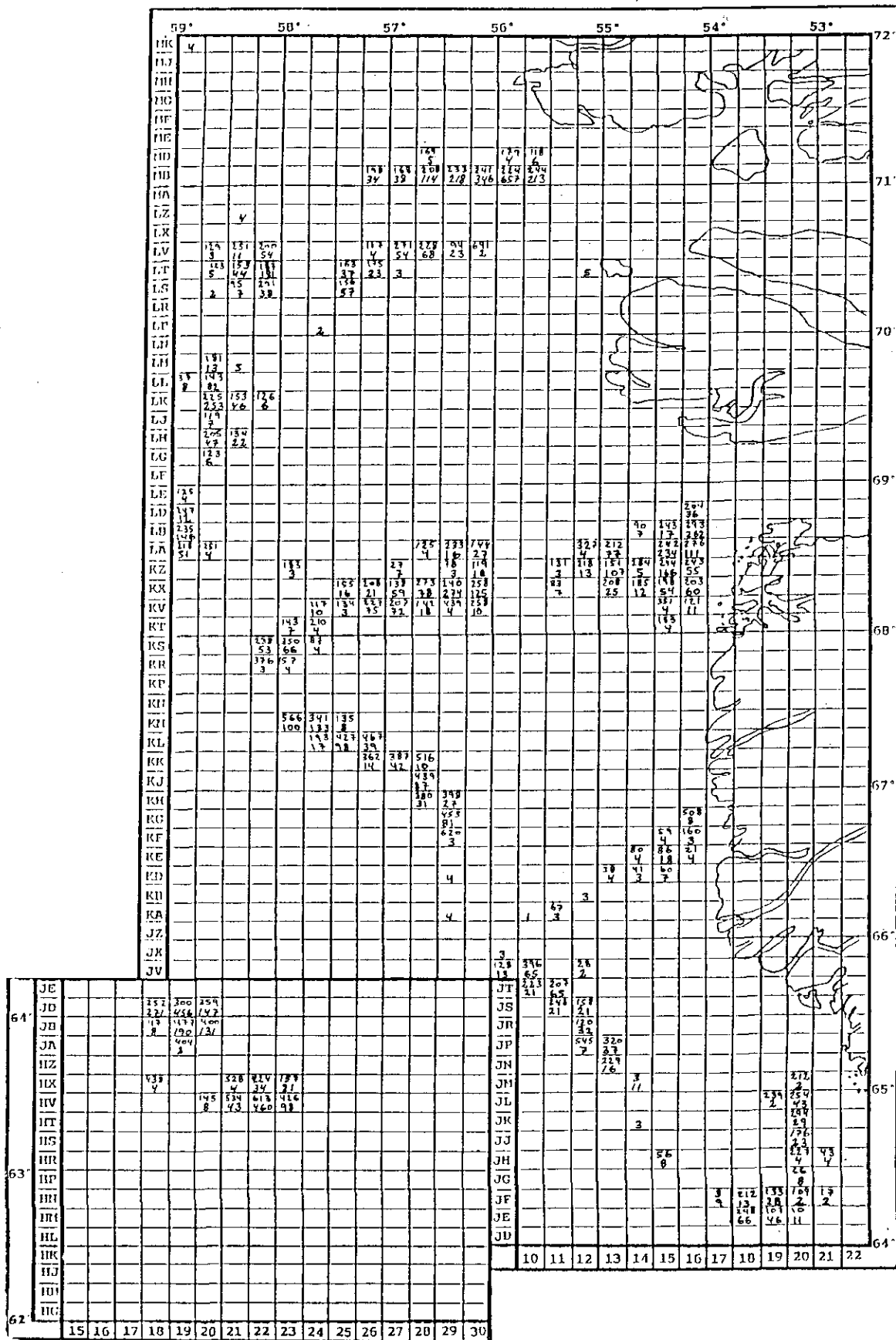


Figure 2 continued. Data from October 1990.



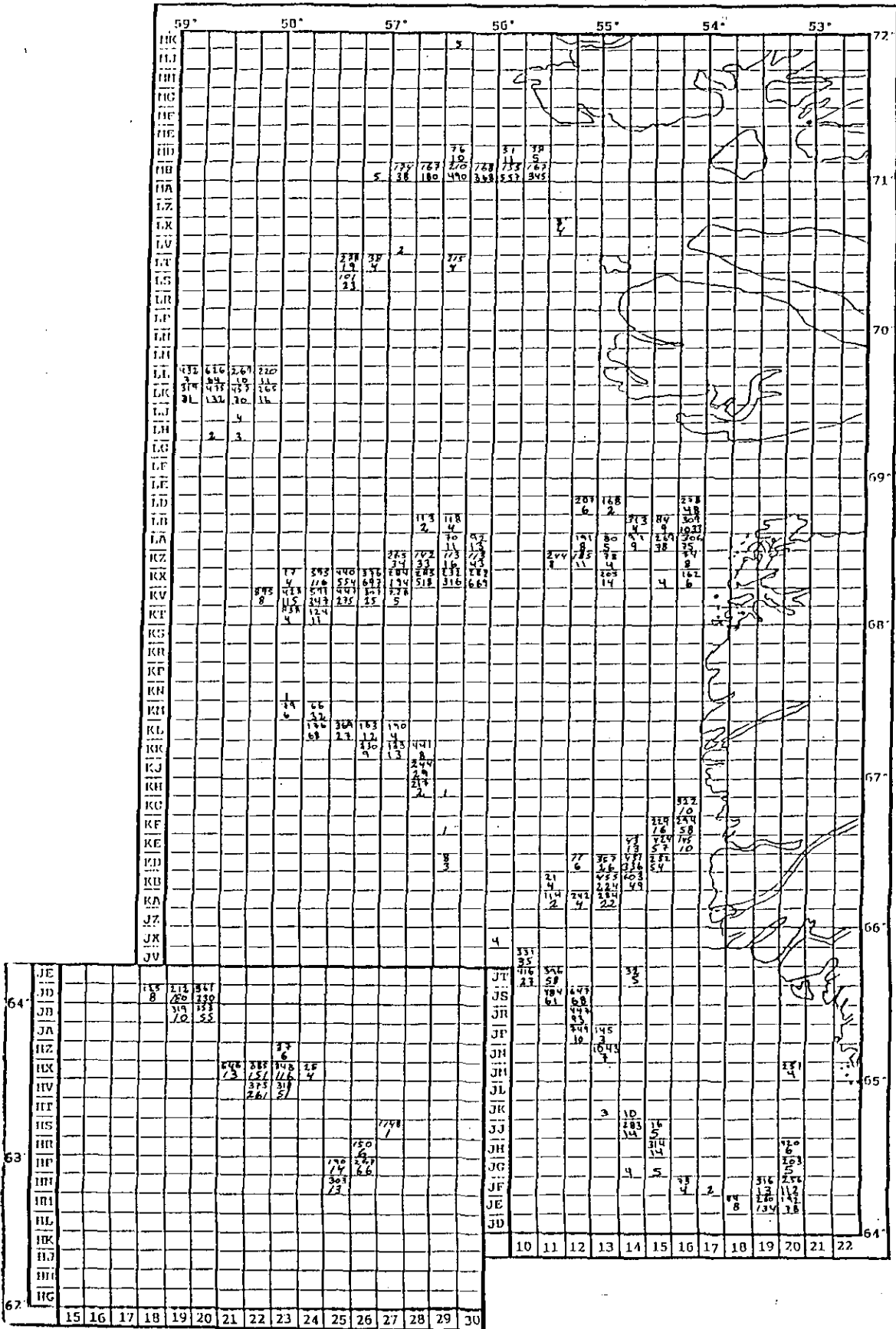


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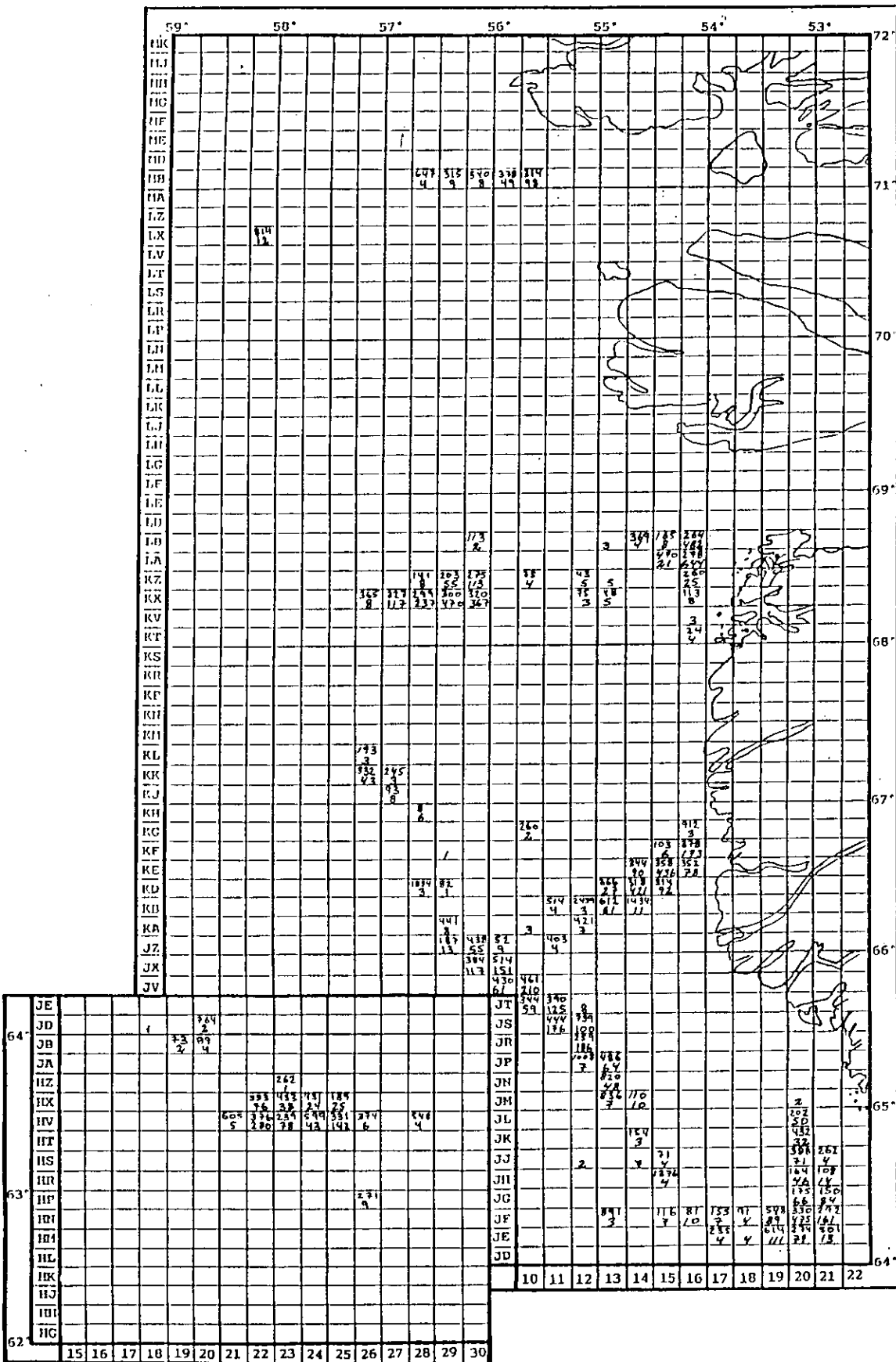


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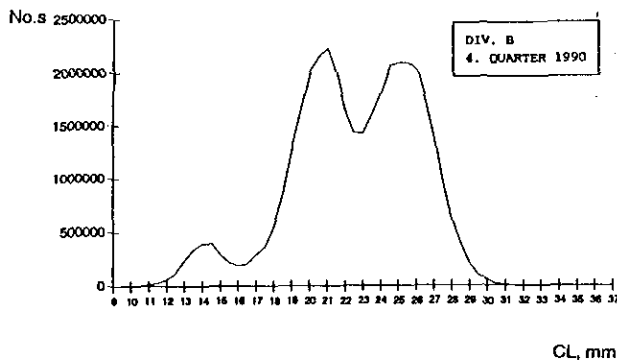
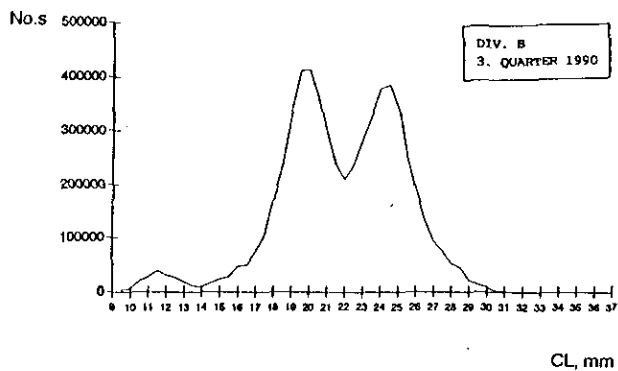
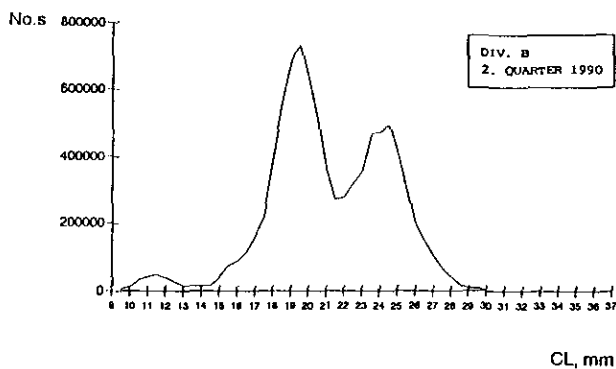
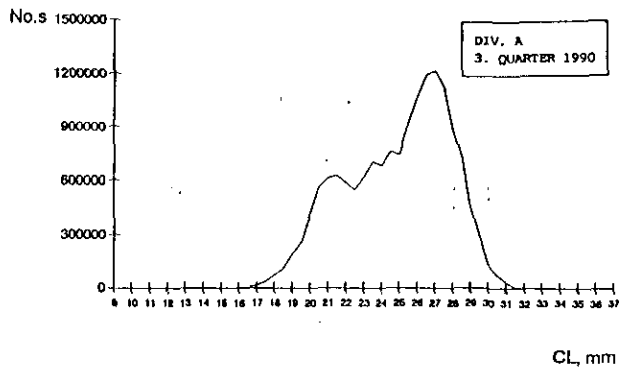


Figure 3. Commercial shrimp samples from Suabarea 1 in 1990, pooled by Division and quarter (ref. Table 5).