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The Shrimp Fishery in NAFO Subarea 1 in 1992 and Early-1993.

by

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INTRODUCTION

In June 1991 STACFIS advised a TAC for the offshore catch of shrimp in NAFO Subareas 0 and 1 (not including Subarea 1 north of 71°N) of 50,000 tons for 1992. The effective TAC for offshore Subarea 1 - in the area for which advice was given - was set by the Greenland Home Rule Authorities at 35,700 tons, including a Greenland allocation of 35,300 tons. At the June meeting in 1992 STACFIS changed the advice for 1992 to 40,000 tons, but no reductions were implied on the effective TAC. Trawlers above 75 GRT reported a total catch in the Subarea of 53,437 tons, including 2,647 tons taken north of 71°N, 2,012 tons taken in the inshore areas, and 10,586 tons taken in a trial fishery. Total catches of smaller vessels are estimated to 26,223 tons, of which about 7,100 tons were taken in the offshore area.

Since 1986 logbooks have been compulsory for all vessels above 50 GRT fishing in Greenland waters. For 1992 logbooks available to Greenland Fisheries Research Institute (GF) cover about 166,000 hours of trawling and a total catch of about 56,700 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 1992 and early 1993 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.

A new standardized catch-rate index for the shrimp fishery in Division 1B based on the fishery of 22 trawlers was introduced in 1991 (Carlsson and Lassen, 1991). SAS multiple regression procedures are used to calculate standardized annual catch-rate indices for the total catch and for catch of large shrimp (> 8.5 g) to minimize the influence of unreported discards. The index is updated by inclusion of data for 1992.

Shrimp samples from the commercial fishery were available from Div. 1A in November and from Div. 1C, 1D, and 1E in May and August. Samples were not sorted by sexual characteristics. Shrimp 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 1992 and early 1993.

Table 1a shows catches by division, nation and month in Subarea 1 in 1992 as reported by vessels above 75 GRT, and Table 2a the numbers of reporting vessels. The figures for Greenland include catches in the offshore fishery north of 71°N (in Division 1A 'north', 2,647 tons), and inshore catches of 2,012 tons. Furthermore the figures include 10,586 tons from the TAC-area, landed in a project allowing landings outside quotas of small shrimp, that would otherwise have been discarded.

The shrimp landings from Subarea 1 in 1992 by smaller Greenland vessels (below 75 GRT) are about 26,223 tons, of which about 19,000 tons are estimated to be inshore catches.

The total nominal shrimp catch in Subarea 1 was 79,260 tons in 1992, which is about 10,000 tons more than in 1991.

Summary table (nominal catches by Greenland in Subarea 1 in 1992, distribution between inshore and offshore catches of vessels < 75 GRT is estimated):

	Vessel > 75 GRT	Vessels < 75 GRT	Total
Offshore, north of 71°N	2,647	0	2,647
Offshore, south of 71°N	37,792	7,087	44,879
Offshore, south of 71°N, disc.proj.	10,586	0	10,586
Inshore	2,012	19,136	21,148
Total	53,037	26,223	79,260

Table 1b shows reported catches by vessels greater than 75 GRT in early 1993 (April incomplete), and Table 2b the number of reporting vessels. Reported catches in the January-March period declined from about 8,000 tons in 1992 to about 5,700 tons in 1993. The project allowing landings of otherwise discarded shrimp outside the quotas was not continued in 1993.

#### Geographical distribution of the offshore fishery.

Figure 1 shows that the distribution of total catches in 1992 as recorded in logbooks from Greenland trawlers was very similar to 1991 (Carlsson and Kanneworff, 1992). Catches were widespread over the fishing grounds along the coast. Table 3 and 4 show the distribution of effort and catches in logbooks by division and year from 1987 to 1992. The tables show a significant shift in the fishery in recent years from Div. 1A and 1B to Div. 1C and 1D. The distribution of both effort and catch in 1992 is similar to 1991, except for a continued decrease in Div. 1B and slight increases in Div. 1A to the north and 1D and 1E to the south.

Figure 2a and 2b show the monthly distribution of mean catch-rates and effort (numbers of hours trawled) from January through December 1992. As has been the case in recent years (1987 - 1991) 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 south of 67°N were open, and it was not possible to access all the fishing grounds north of Store Hellefiske Bank until the beginning of June. During the rest of the year the fishery was widespread.

The fishery north of 71°N took place from June to December.

#### Catch rate indices.

Standardized annual 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 in catches (> 8.5 g) and one for the total catch. Both indices decrease from 1987 to 1989 and remain relatively stable from 1989 to 1992.

#### Biological samples.

Numbers of shrimp by carapace length group in samples from the commercial fishery in Subarea 1 in 1992, pooled by division and month, are given in Table 5 and Fig. 4. Samples from Div. 1A in November show a male group around 19.5 mm carapace length (CL) and a dominant peak at 23.5 mm CL, consisting of males and/or primiparous females (probably the 1985 year class). Larger female groups are present, but not conspicuous. All samples from Div. 1C, 1D, and 1E in May and August show a significant (female) peak at 25.5 mm CL, while larger female components seem to be negligible. In Div. 1C a peak at 24 mm CL is indicated while smaller shrimp are almost absent, especially in May. Samples from Div. 1D show a significant peak at 21 mm CL, and in August also minor peaks at 18.5 and 24 mm CL. Samples from Div. 1E in August show the occurrence of several groups of males between 18 and 22 mm CL.

#### CONCLUSIONS

The nominal catch of shrimp in NAFO Subarea 1 increased to 79,260 tons in 1992, the highest ever recorded. The estimated inshore component of this catch is 21,148 tons, also the highest on record. Northwest Greenland (north of 71°N) catches increased to 2,647 tons, compared to 2,121 tons in 1990 and 1,077 tons in 1991. Nominal catch offshore south of 71°N (i.e. the part of Subarea 1, for which STACFIS advises together with adjacent parts of SA 0) increased from 50,544 tons in 1991 to 55,465 tons in 1992. The 1992-figure includes ab. 10,000 tons taken in a project where trawlers were allowed to land smaller shrimp otherwise (supposedly) discarded in excess of the vessels quota.

Ice conditions in 1992 were similar to 1991, ice hampering the access to the important shrimp fishing grounds on the slopes of Store Hellefiske Bank in spring time.

About 50% of the catches reported in logbooks were taken in Div. 1C-F in 1992, while Div. 1A and - especially - 1B have been the most important divisions in the past.

Standardized catch rate indices for catch of large shrimp and for total catch based on the fishery of 22 Greenland trawlers in Div. 1B both show a decrease from 1987 to 1989 and indicate stability from 1989 to 1992.

Shrimp samples from the commercial fishery in Division 1A, 1C, 1D, and 1E indicate that smaller males are mostly found to the south in Div. 1D and 1E and to the north in Div. 1A. As in 1991 the largest females are found in Div. 1A, where also the 1985 year class is most evident peaking at 23.5 mm carapace length.

REFERENCES

Carlsson, D.M. & P. Kanneworff, 1992. The Shrimp Fishery in NAFO Subarea 1 in 1991. NAFO SCR Doc. 92/65. Ser. No. N2119.

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. Shrimp catches (tons) by division, nation and month in 1992 in Subarea 1 as reported to Greenland authorities by vessels above 75 GRT (including 2,012 tons taken inshore).

Division		JAN	FEB	MAR	APR	MAJ	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1AN	GREENLAND	.	.	.	.	.	12	81	411	640	867	468	169	2647
	TOTAL	.	.	.	.	.	12	81	411	640	867	468	169	2647
1AS	GREENLAND	.	.	.	.	.	4	17	302	1163	1128	655	198	3467
	TOTAL	.	.	.	.	.	4	17	302	1163	1128	655	198	3467
1B	DANMARK GREENLAND	10 967	.	129	781	1073	1641	3723	972	2475	1878	1443	1168	16249 67
	TOTAL	977	.	129	781	1073	1641	3779	972	2475	1878	1443	1168	16317
1C	DANMARK FAROE ISL. GREENLAND	.	.	.	.	.	84	.	.	.	2	32	22	55 84
	TOTAL	522	417	2754	1037	777	2823	1624	558	498	29	774	659	12389
1D	DANMARK FAROE ISL. GREENLAND	13 605	45 888	984	1256	1465	2561	819	1827	745	1054	1119	940	14264 21
	TOTAL	618	933	984	1256	1465	2582	819	1827	745	1101	1135	940	14405
1E	DANMARK GREENLAND	.	412	20	11	443	106	303	606	23	27	25	.	52
	TOTAL	.	412	20	11	443	106	303	606	23	956	500	294	3675
1F	GREENLAND	80	23	108	50	86	.	.	.	0	.	.	.	347
	TOTAL	80	23	108	50	86	.	.	.	0	.	.	.	347
TOTAL	DANMARK FAROE ISL. GREENLAND	23 2174	45 1740	3995	3135	3844	105 7063	6567	4676	5543	5912	4959	3428	53037 105
	TOTAL	2198	1785	3995	3135	3843	7168	6623	4676	5543	5989	5032	3450	53437

Table 1b. Shrimp catches (tons) by division, nation and month in January-April 1993 (April incomplete) in Subarea 1 as reported to Greenland authorities by vessels above 75 GRT.

Division		JAN	FEB	MAR	APR	TOTAL
1B	GREENLAND	40	32	418	70	560
	TOTAL	40	32	418	70	560
1C	GREENLAND	322	855	1238	330	2745
	TOTAL	322	855	1238	330	2745
1D	GREENLAND	643	402	554	80	1679
	TOTAL	643	402	554	80	1679
1E	GREENLAND	123	14	486	18	641
	TOTAL	123	14	486	18	641
1F	GREENLAND	151	229	198	10	588
	TOTAL	151	229	198	10	588
TOTAL	GREENLAND	1278	1532	2894	509	6213
	TOTAL	1278	1532	2894	509	6213

Table 2a. No. of vessels above 75 GRT by nation, division and month in the shrimp fishery in Subarea 1 in 1992 as reported to the Greenland authorities.

		JAN	FEB	MAR	APR	MAJ	JUN	JUL	AUG	SEP	OKT	NOV	DEC	TOTAL
1AN	GREENLAND	.	.	.	.	.	2	2	10	13	13	11	3	18
	TOTAL	.	.	.	.	.	2	2	10	13	13	11	3	18
1AS	GREENLAND	.	.	.	.	.	1	1	11	20	21	18	5	27
	TOTAL	.	.	.	.	.	1	1	11	20	21	18	5	27
1B	DANMARK GREENLAND	1 22	.	7	23	16	22	26	21	20	22	24	25	2
	TOTAL	23	.	7	23	16	22	27	21	20	22	24	25	41
1C	DANMARK FAROE ISL. GREENLAND	.	.	.	.	.	2	.	.	.	1	2	1	2
	24	18	24	25	24	26	23	14	14	3	17	22	.	39
	TOTAL	24	18	24	25	24	28	23	14	14	4	19	23	43
1D	DANMARK FAROE ISL. GREENLAND	1 14	1 22	21	26	21	25	17	14	11	7	11	19	2
	TOTAL	15	23	21	26	21	27	17	14	11	9	12	19	43
1E	DANMARK GREENLAND	.	13	6	2	11	4	7	8	3	2	2	4	26
	TOTAL	.	13	6	2	11	4	7	8	3	8	6	13	28
1F	GREENLAND	1	1	2	1	2	.	.	.	1	.	.	.	3
	TOTAL	1	1	2	1	2	.	.	.	1	.	.	.	3
TOTAL	DANMARK FAROE ISL. GREENLAND	1 27	1 25	26	33	35	36	35	32	36	35	35	33	3
	TOTAL	28	26	26	33	35	38	36	32	36	37	37	34	44

Table 2b. No. of vessels above 75 GRT by nation, division and month in the shrimp fishery in Subarea 1 in January-April 1993 (April incomplete) in 1993 as reported to the Greenland authorities.

Division		JAN	FEB	MAR	APR	TOTAL
1B	GREENLAND	5	2	16	7	19
	TOTAL	5	2	16	7	19
1C	GREENLAND	12	15	22	21	26
	TOTAL	12	15	22	21	26
1D	GREENLAND	20	15	22	11	26
	TOTAL	20	15	22	11	26
1E	GREENLAND	8	4	15	1	16
	TOTAL	8	4	15	1	16
1F	GREENLAND	6	6	6	1	10
	TOTAL	6	6	6	1	10
TOTAL	GREENLAND	22	18	26	25	27
	TOTAL	22	18	26	25	27

Table 3. Distribution of effort (in hours and % of total hours per year) by Division and year in logbooks from the Greenland fishery, 1987-92.

Year	1A		1B		1C		1D		1E		1F		Total hours
	hours	%	hours	%	hours	%	hours	%	hours	%	hours	%	
1987	33198	39.8	41771	50.0	6470	7.7	2067	2.5	4	0.0	-	-	83510
1988	31818	27.2	72034	61.7	10807	9.3	1381	1.2	2	0.0	729	0.6	116771
1989	36123	26.4	61513	44.9	23113	16.9	12906	9.4	2	0.0	3344	2.4	137001
1990	32656	20.2	61764	38.2	42356	26.2	22660	14.0	-	-	2205	1.4	161641
1991	27421	15.9	68759	39.8	39138	22.7	35858	20.8	564	0.3	962	0.6	172702
1992	34137	20.6	55140	33.2	33990	20.5	36345	21.9	5336	3.2	924	0.6	165872

Table 4. Distribution of catches (in tons and % of total logbook catch per year) by Division and year in logbooks from the Greenland fishery, 1987-92.

Year	1A		1B		1C		1D		1E		1F		Total tons
	tons	%	tons	%	tons	%	tons	%	tons	%	tons	%	
1987	9605	26.9	21921	61.4	3620	10.1	571	1.6	0	0.0	-	-	35717
1988	7667	18.1	29957	70.7	4330	10.2	316	0.7	1	0.0	91	0.2	42362
1989	9705	21.4	21541	47.5	7940	17.5	5878	13.0	0	0.0	297	0.7	45361
1990	7570	15.2	19564	39.5	14497	29.2	7742	15.6	-	-	298	0.6	49671
1991	7572	14.4	20659	39.3	11665	22.2	12106	23.0	380	0.7	150	0.3	52532
1992	9170	16.2	19422	34.3	11504	20.3	13382	23.6	2861	5.0	365	0.6	56704

Table 5. No. of shrimp per length group in commercial samples from Subarea 1 in 1992, pooled by Division and month. The entry 'Corresponding catch' is the catch represented by the samples.

CL mm	Year-month and NAFO Division						
	9205 1C	9205 1D	9205 1E	9208 1C	9208 1D	9208 1E	9211 1A
5.5	0	1	0	0	0	0	0
6.0	0	0	0	0	0	0	0
6.5	0	0	0	0	0	0	0
7.0	0	0	0	0	0	0	0
7.5	0	0	0	0	0	0	0
8.0	0	0	0	0	0	0	0
8.5	0	1	0	0	0	0	0
9.0	0	2	0	1	2	0	0
9.5	0	1	0	1	1	0	1
10.0	0	4	0	0	3	0	0
10.5	0	2	0	0	5	1	0
11.0	0	1	0	1	4	3	4
11.5	0	6	0	0	6	6	2
12.0	0	8	0	0	5	0	9
12.5	0	9	0	0	7	3	9
13.0	0	18	1	0	7	0	20
13.5	0	27	1	0	39	4	13
14.0	0	44	0	0	46	3	7
14.5	0	61	1	4	111	5	16
15.0	0	75	0	3	159	8	22
15.5	1	90	0	5	190	8	26
16.0	0	95	2	6	238	13	72
16.5	0	125	2	11	330	35	70
17.0	0	157	0	19	353	45	124
17.5	2	187	2	20	428	58	163
18.0	2	225	2	20	459	64	272
18.5	7	315	7	24	475	67	406
19.0	10	439	9	43	437	64	459
19.5	23	610	10	55	556	69	456
20.0	16	849	10	112	687	66	455
20.5	21	1077	29	131	782	78	415
21.0	25	1151	21	144	873	75	445
21.5	28	1016	26	179	825	75	556
22.0	47	903	25	183	728	66	665
22.5	65	895	18	198	646	37	816
23.0	93	890	24	247	617	40	862
23.5	126	979	22	285	722	34	952
24.0	168	1080	21	319	765	47	928
24.5	162	1246	32	310	787	67	873
25.0	209	1447	25	284	998	108	781
25.5	262	1477	21	364	1080	116	704
26.0	215	1281	24	325	995	134	607
26.5	171	935	15	300	811	106	566
27.0	126	458	17	251	526	71	484
27.5	99	240	4	110	323	47	466
28.0	54	96	2	85	166	28	418
28.5	37	43	1	51	83	14	323
29.0	17	25	0	26	38	11	270
29.5	13	14	1	11	21	3	185
30.0	7	6	0	5	5	1	131
30.5	1	8	0	1	7	0	71
31.0	1	2	0	0	2	0	27
31.5	0	0	0	0	2	0	11
32.0	1	0	0	0	1	0	2
32.5	0	1	0	0	1	0	1
33.0	0	1	0	0	0	0	0
33.5	0	2	0	0	0	0	0
34.0	1	0	0	0	0	0	0
34.5	0	0	0	0	0	0	0
35.0	0	0	0	0	1	0	0
35.5	0	1	0	0	1	0	0
36.0	0	0	0	0	0	0	0
36.5	0	1	0	0	0	0	0
37.0	0	0	0	0	0	0	0
37.5	0	1	0	0	0	0	0
All	2010	18628	375	4134	16354	1680	14166
No. of samples	6	43	1	12	40	4	45
$\Sigma$ sample weight	21	158	3	37	121	13	129
Corresp. catch	492	33182	1843	28805	100845	5894	41149

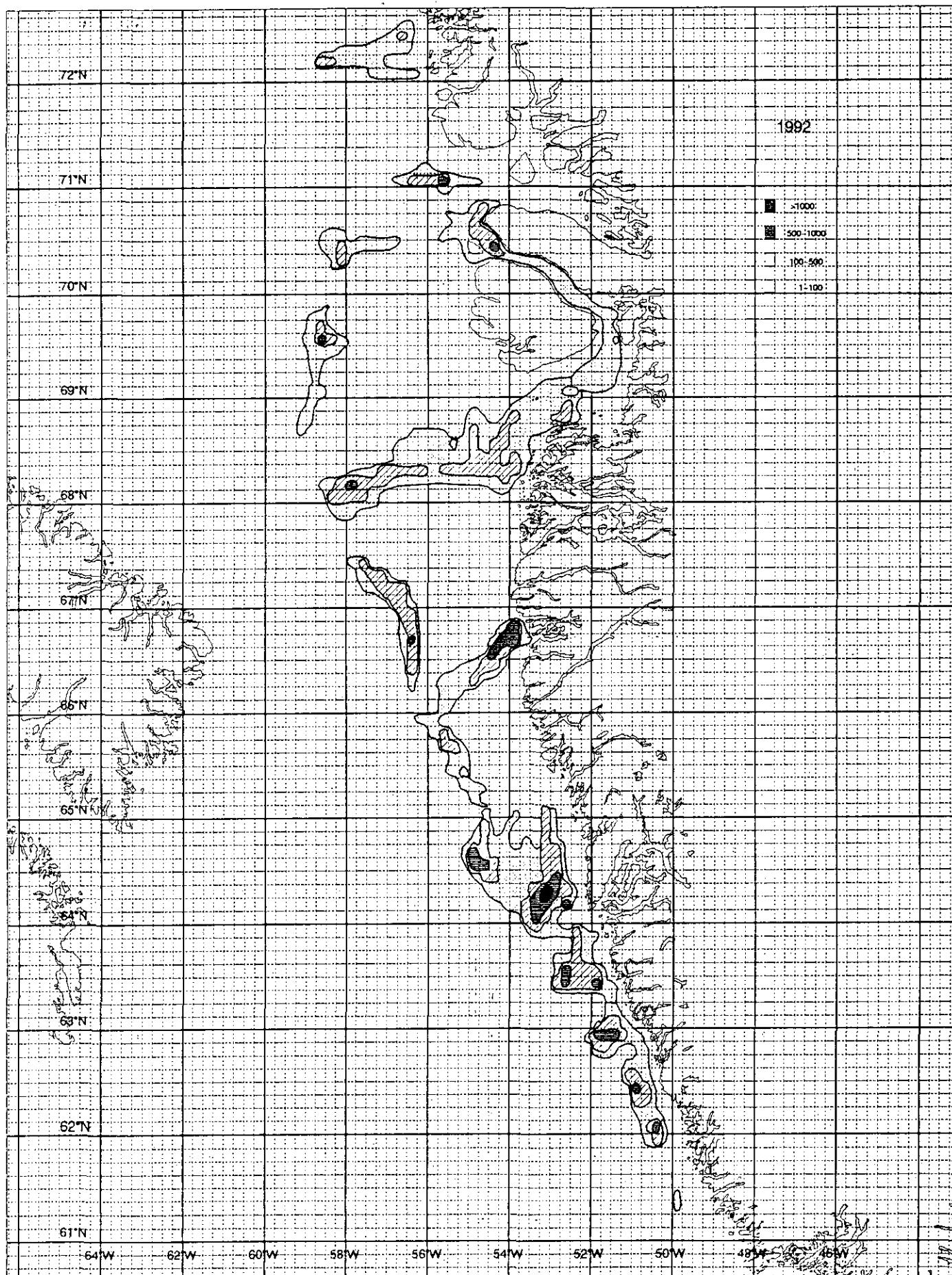


Figure 1. Distribution of total catches of shrimp (tons per statistical unit) in 1992 in NAFO Subarea 1 between 61°N and 72°30'N, based on logbooks from the Greenland trawlers.

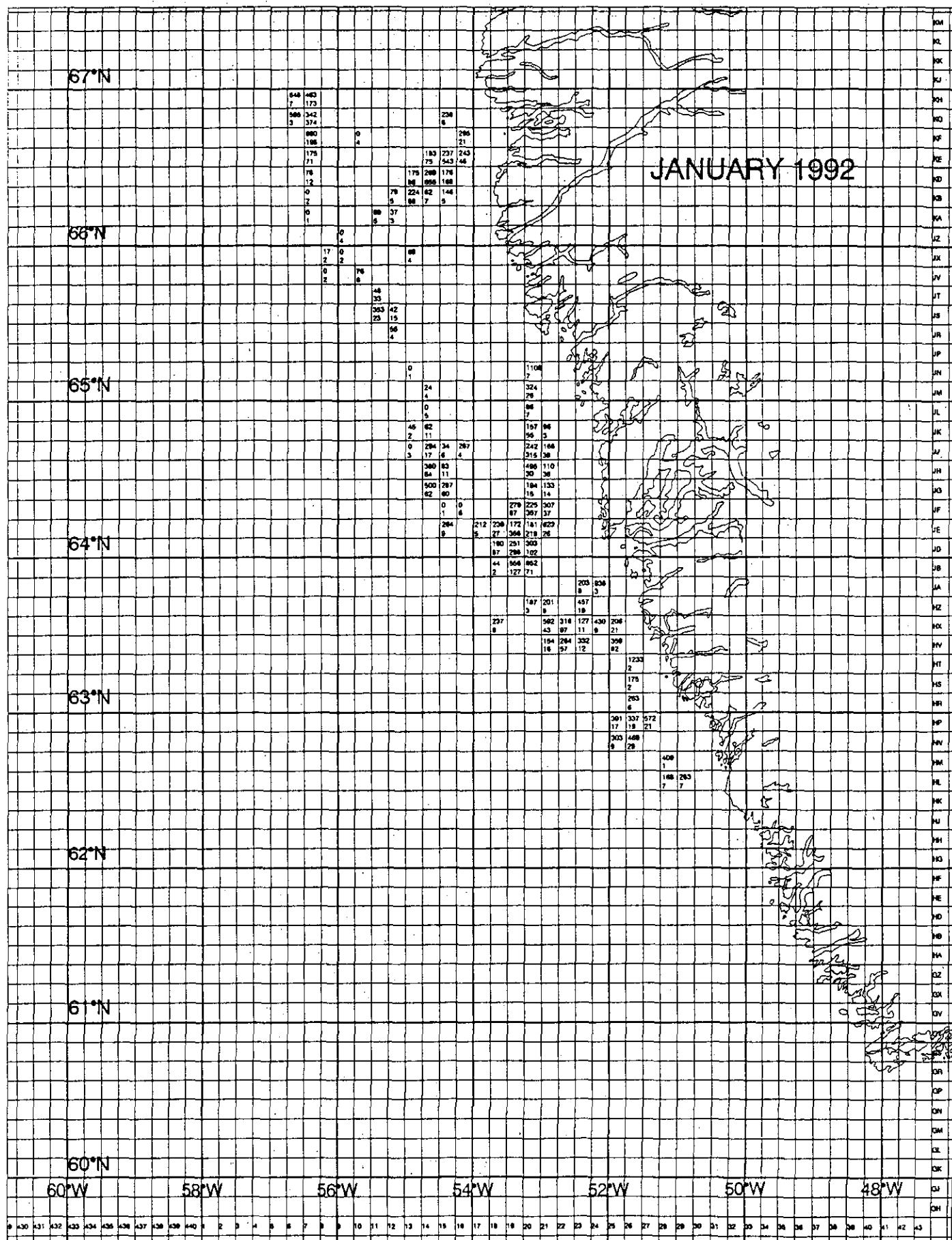


Figure 2a. Distribution of mean catch rate (kg/hour, upper figure) and effort (hours, lower figure) in each statistical unit between 60°N and 67°30'N, NAFO Subarea 1 in January 1992.

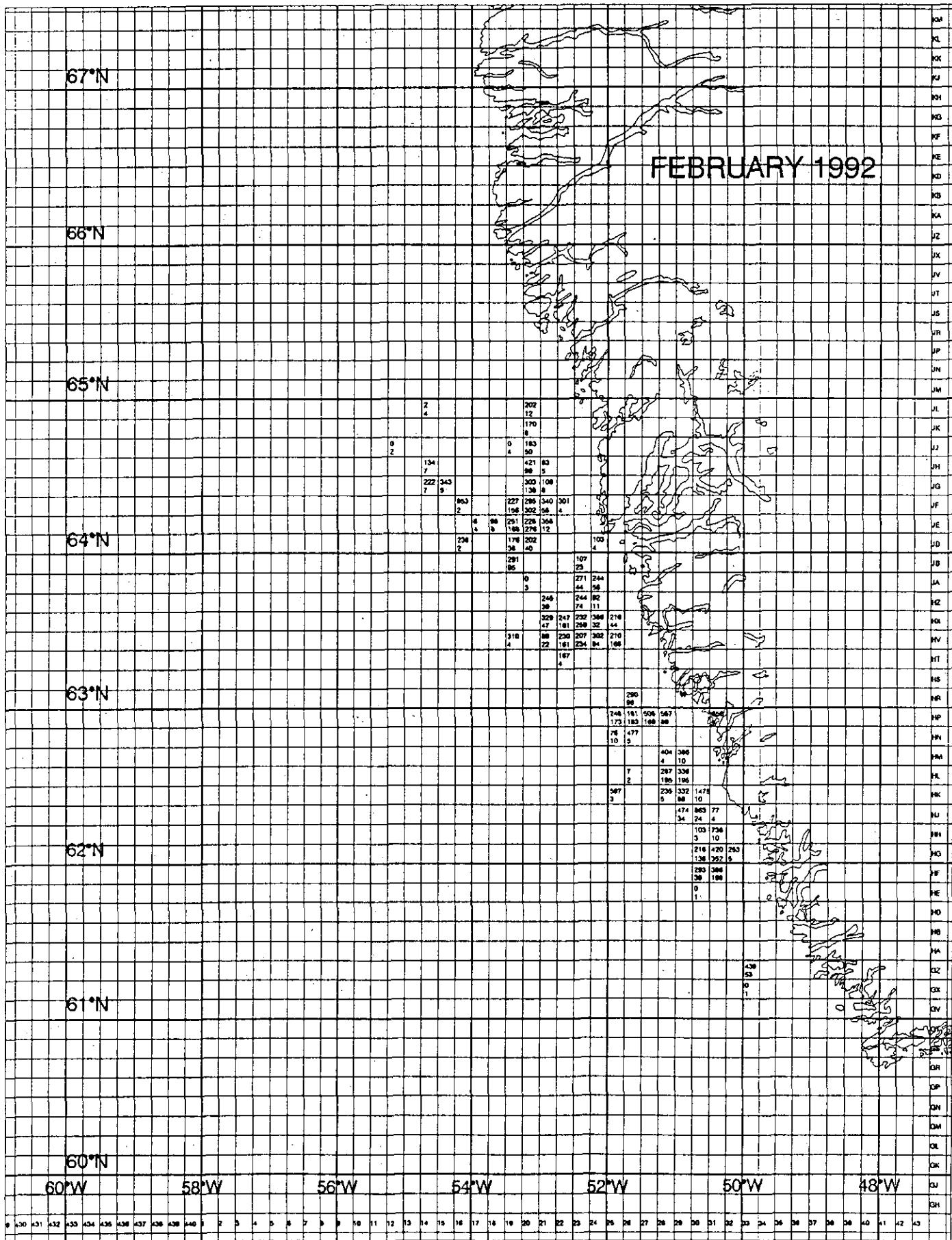


Figure 2a continued. Data from February 1992.

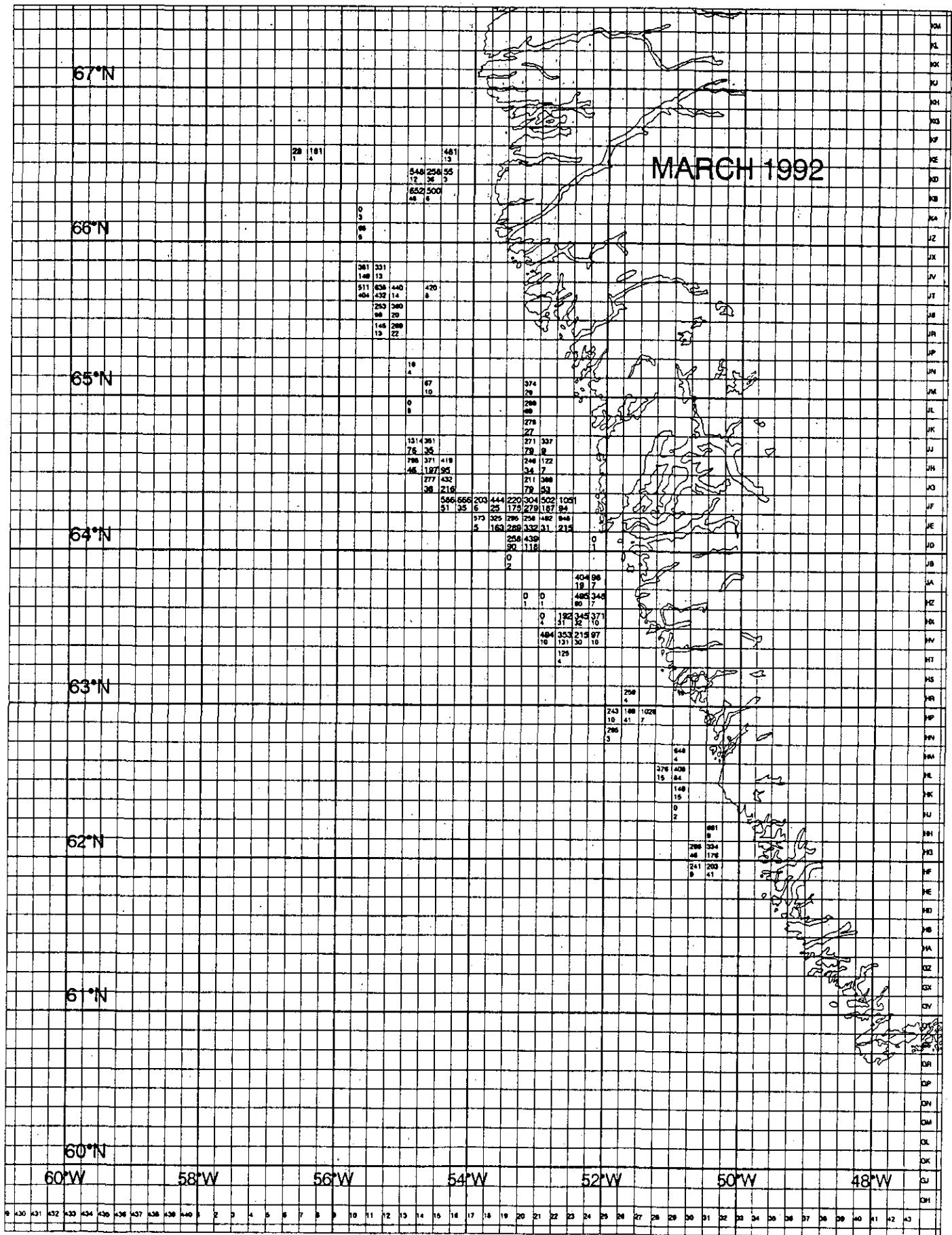


Figure 2a continued. Data from March 1992.

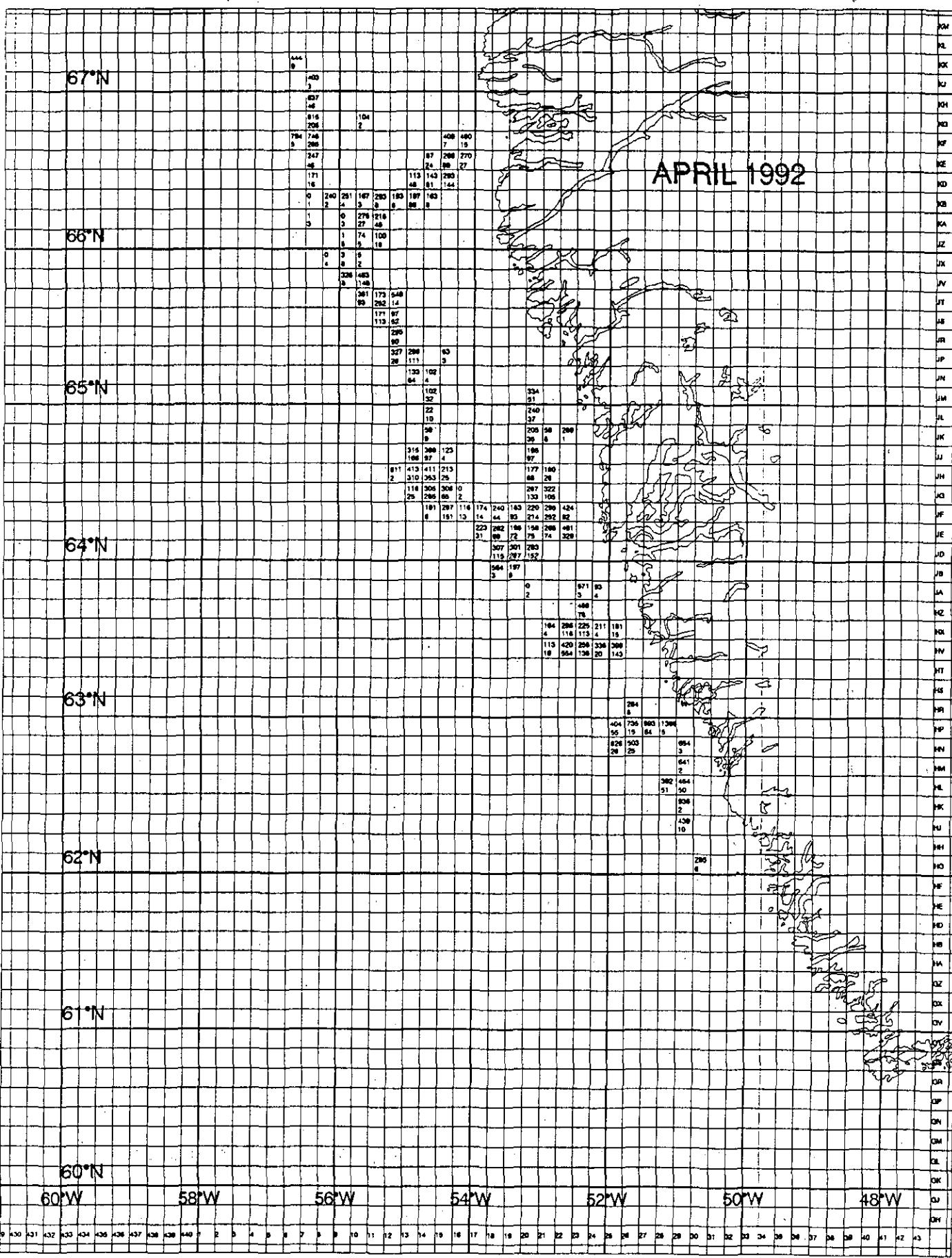


Figure 2a continued. Data from April 1992.

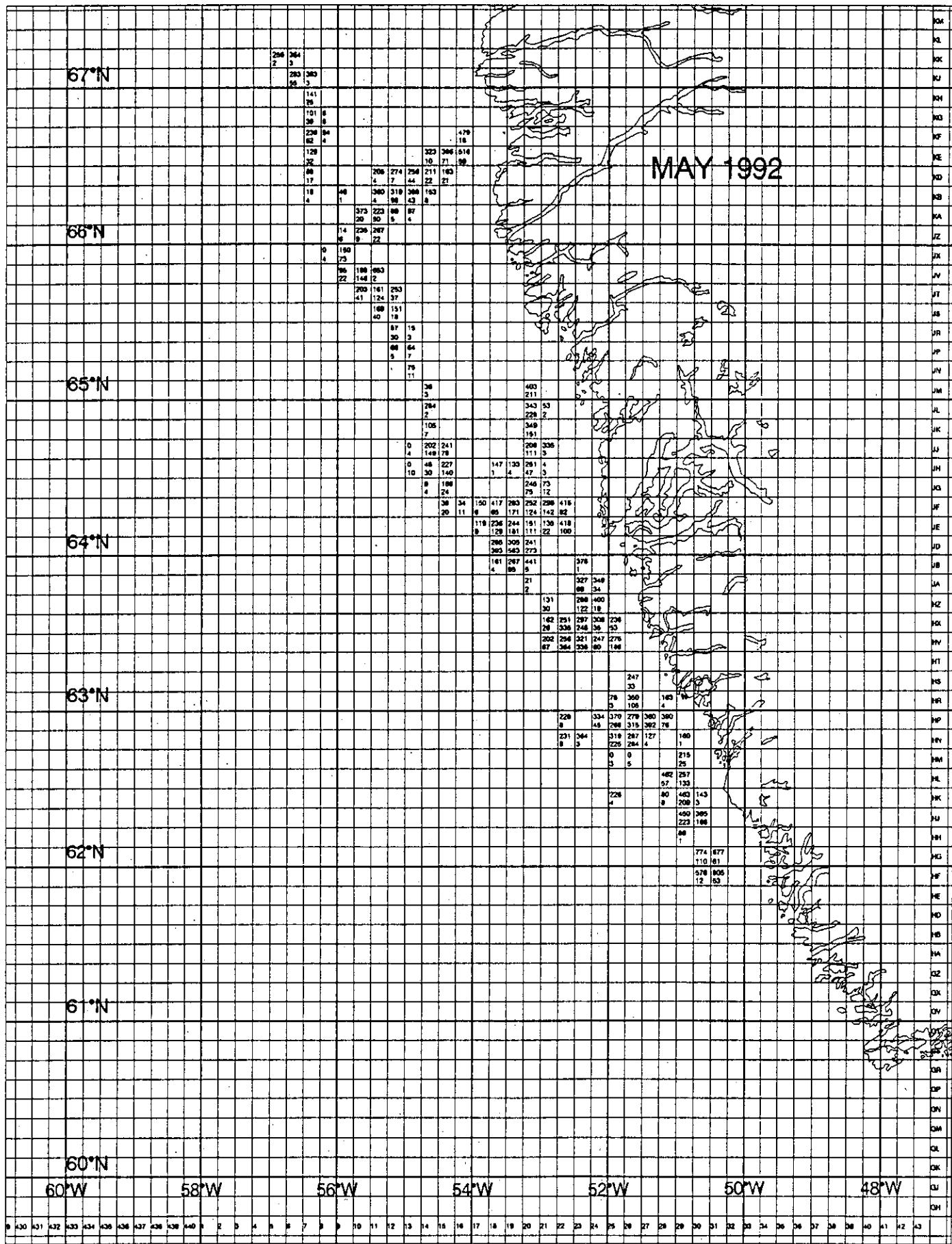


Figure 2a continued. Data from May 1992.

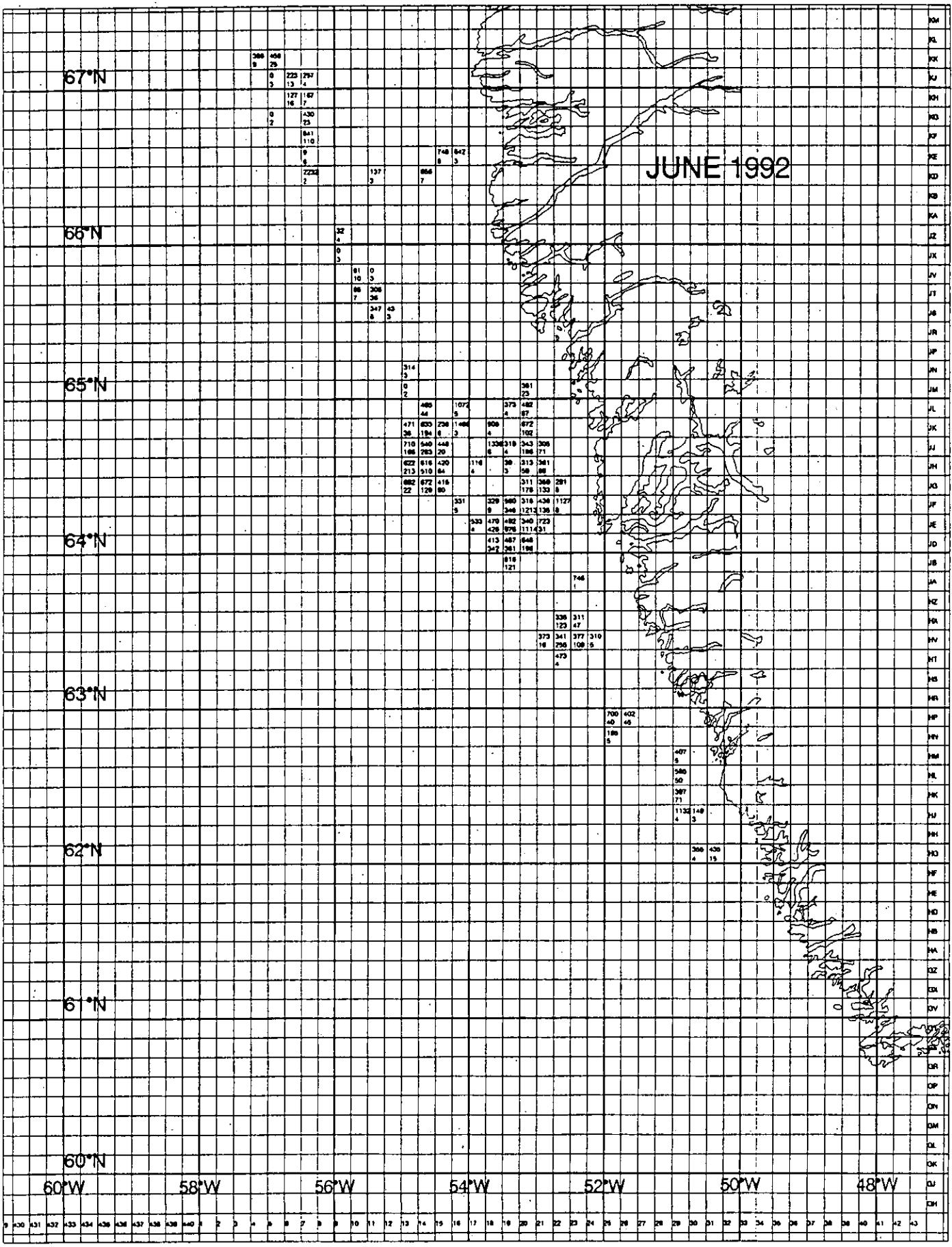


Figure 2a continued. Data from June 1992.

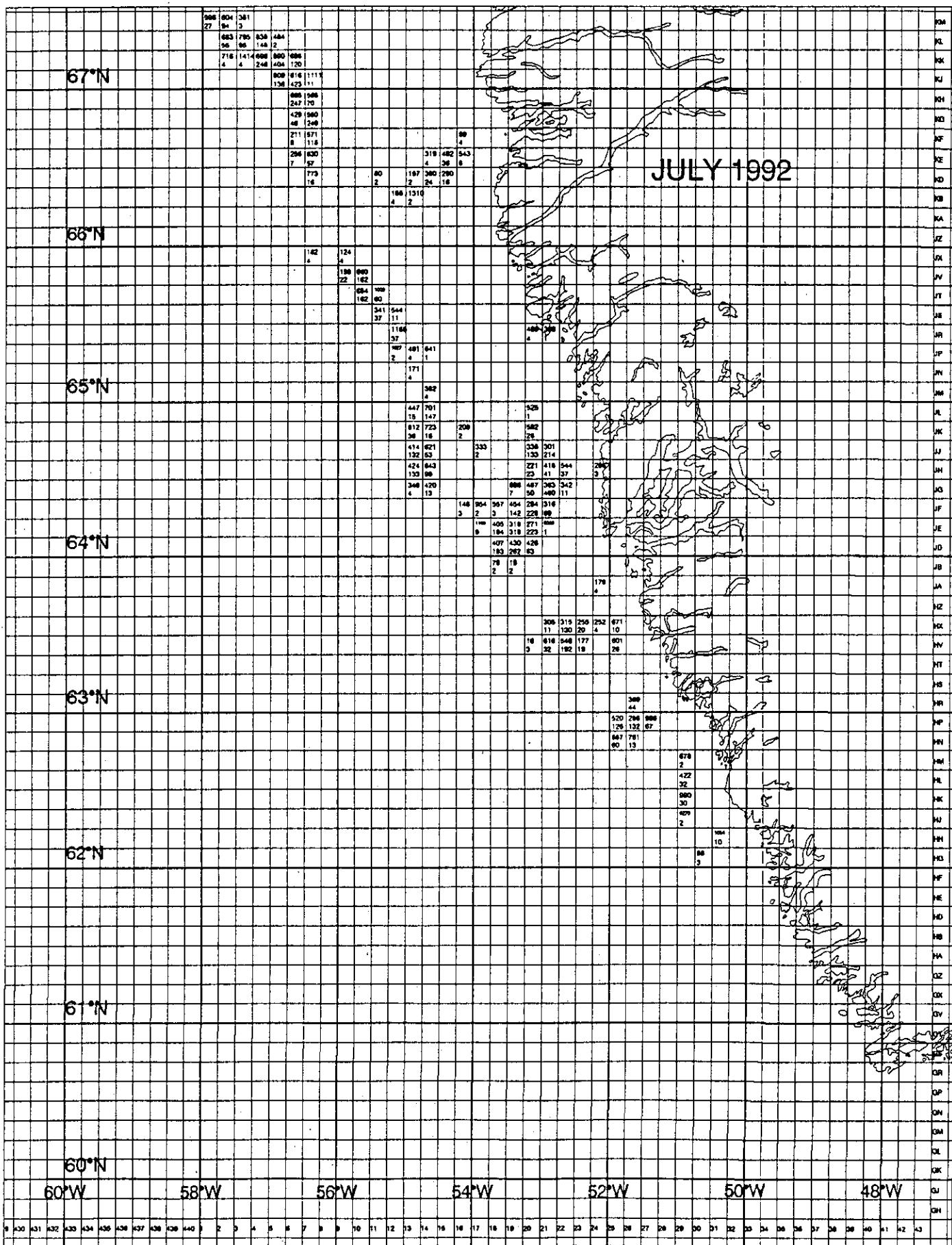


Figure 2a continued. Data from July 1992.

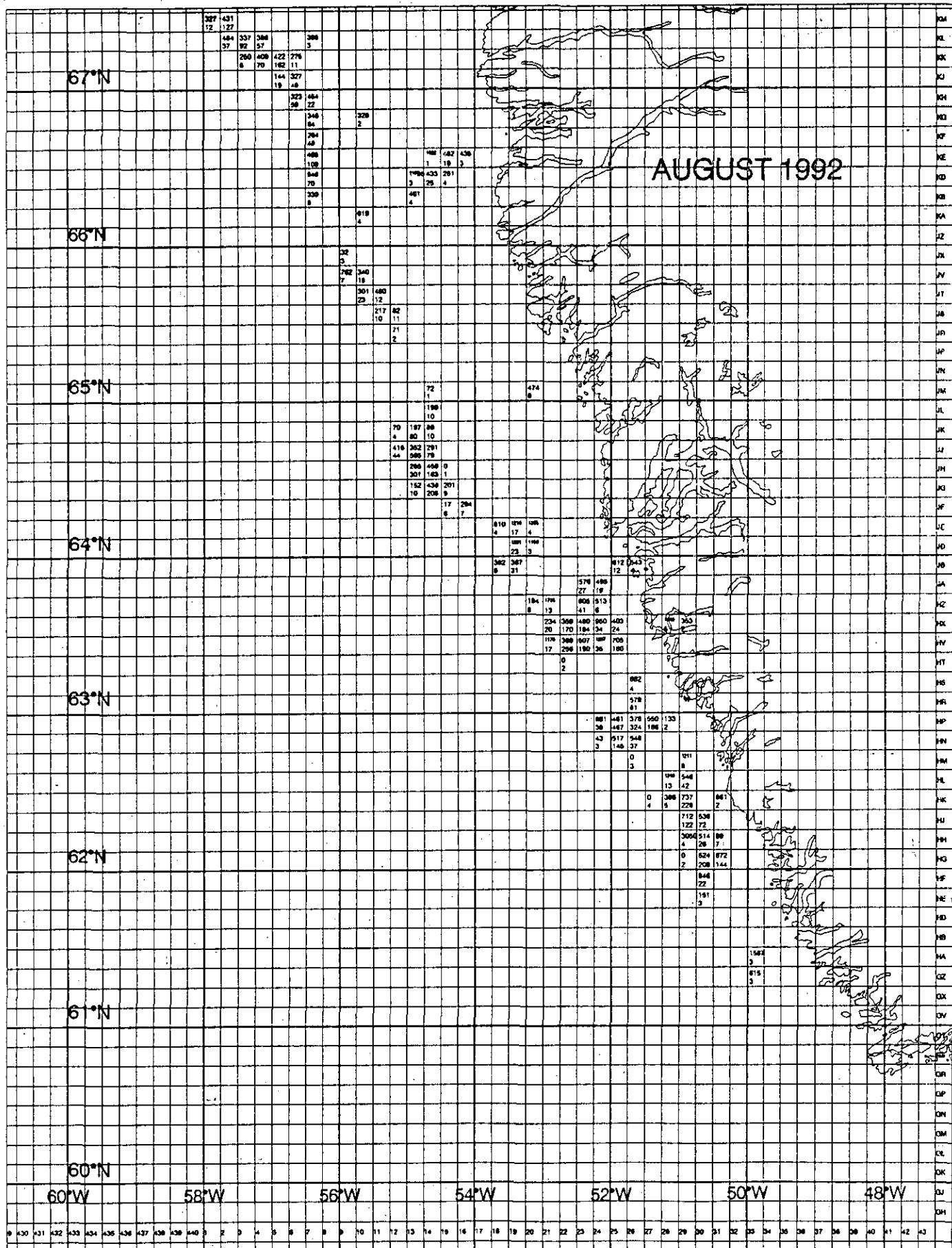


Figure 2a continued. Data from August 1992.

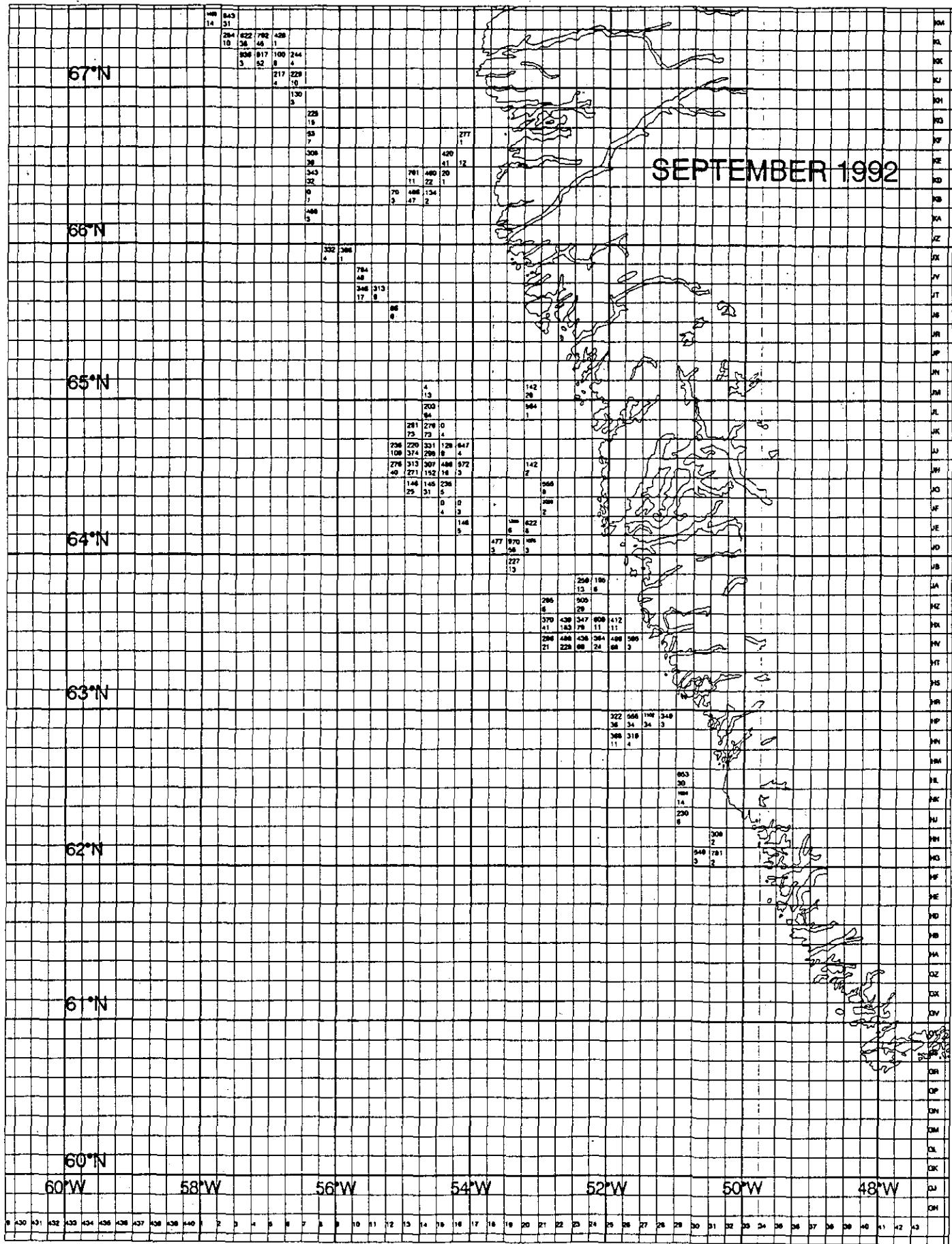


Figure 2a continued. Data from September 1992.

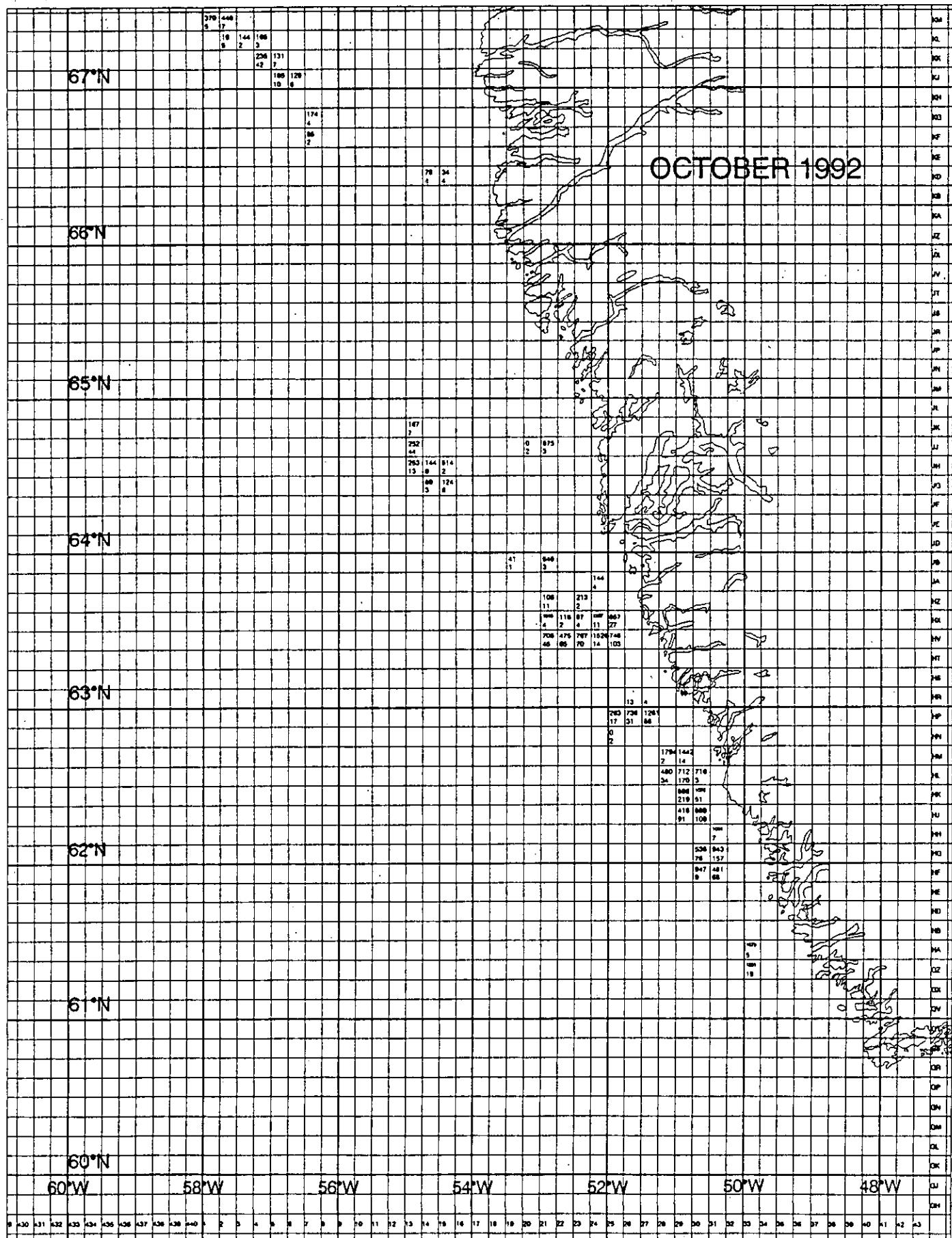


Figure 2a continued. Data from October 1992.

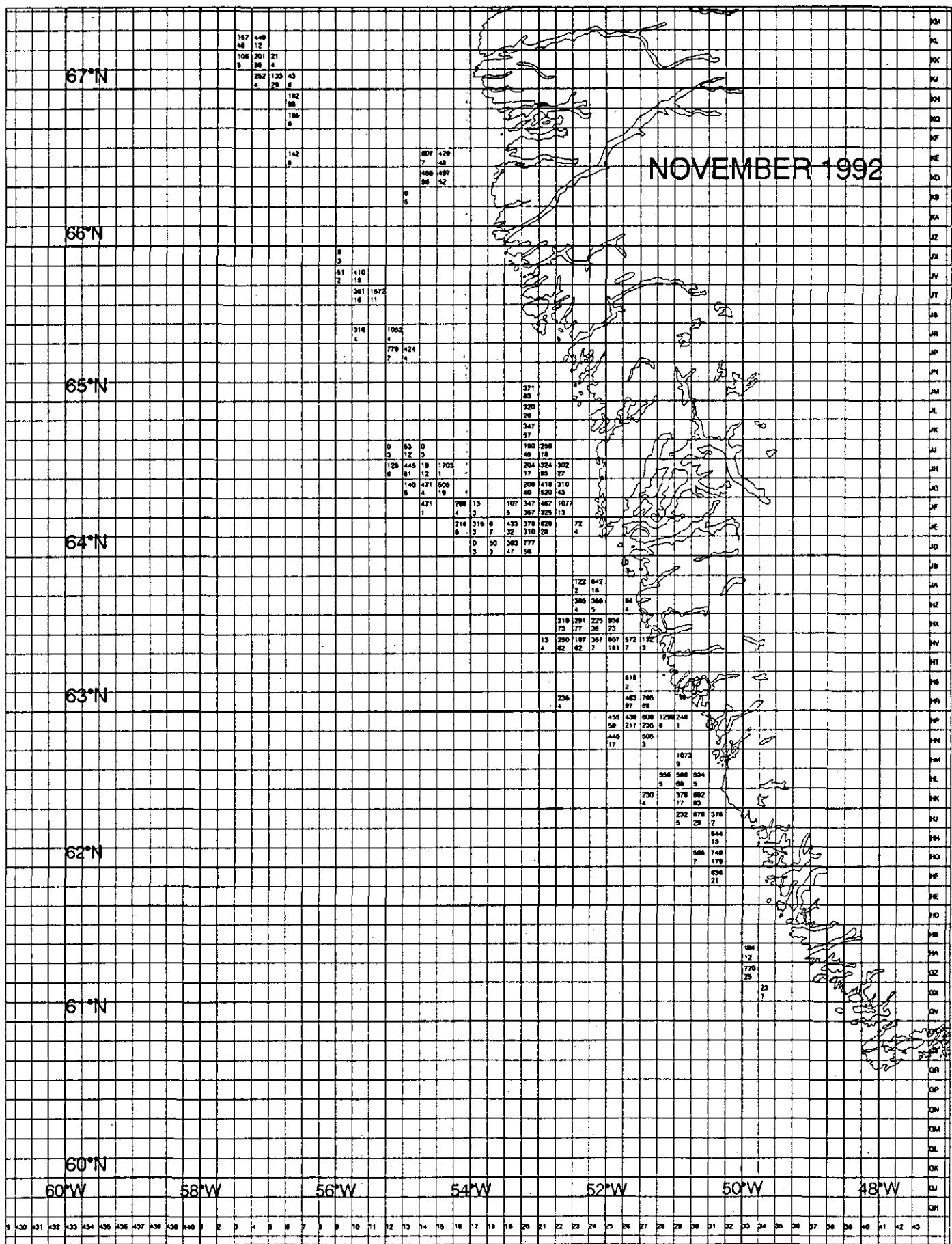


Figure 2a continued. Data from November 1992.

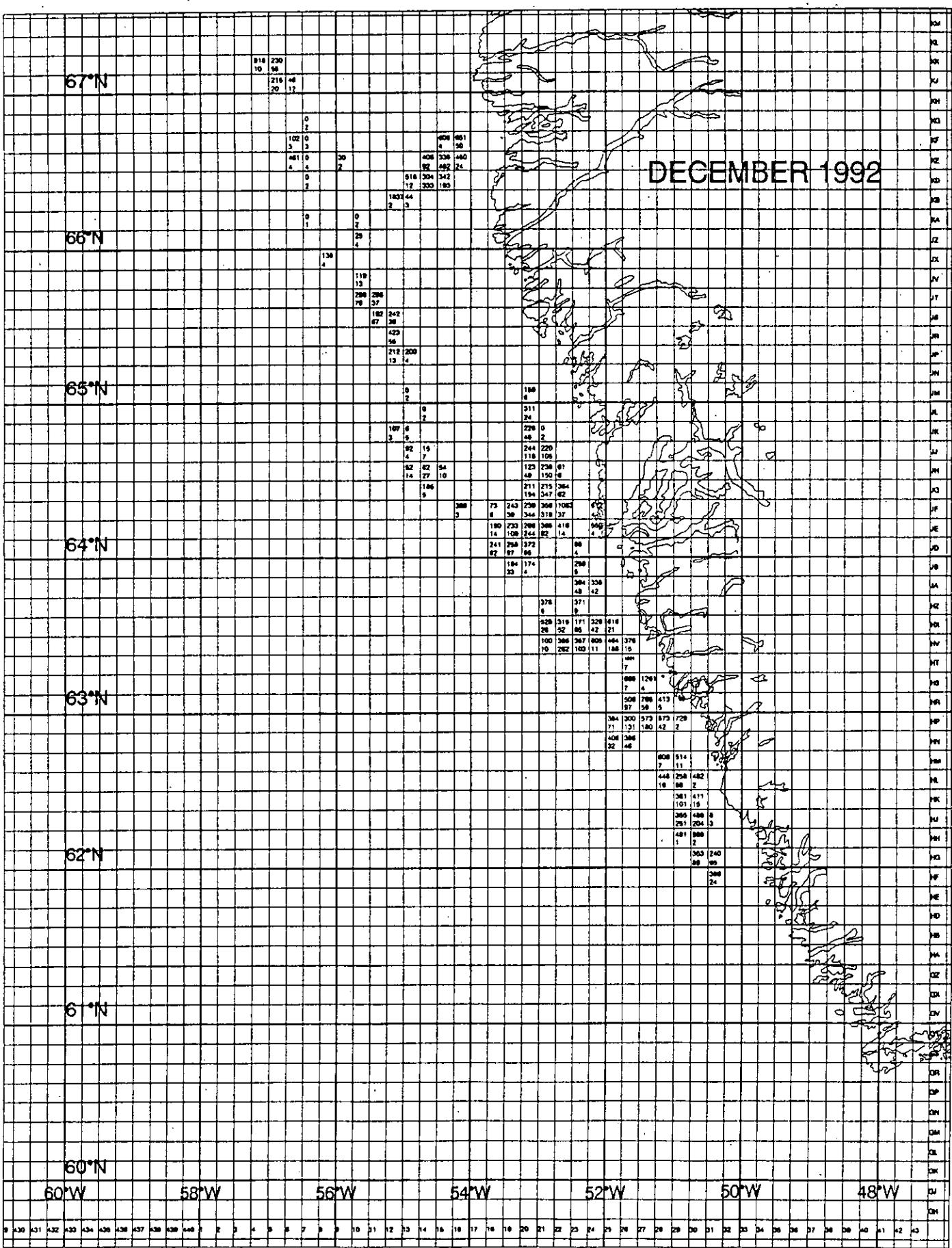


Figure 2a continued. Data from December 1992.

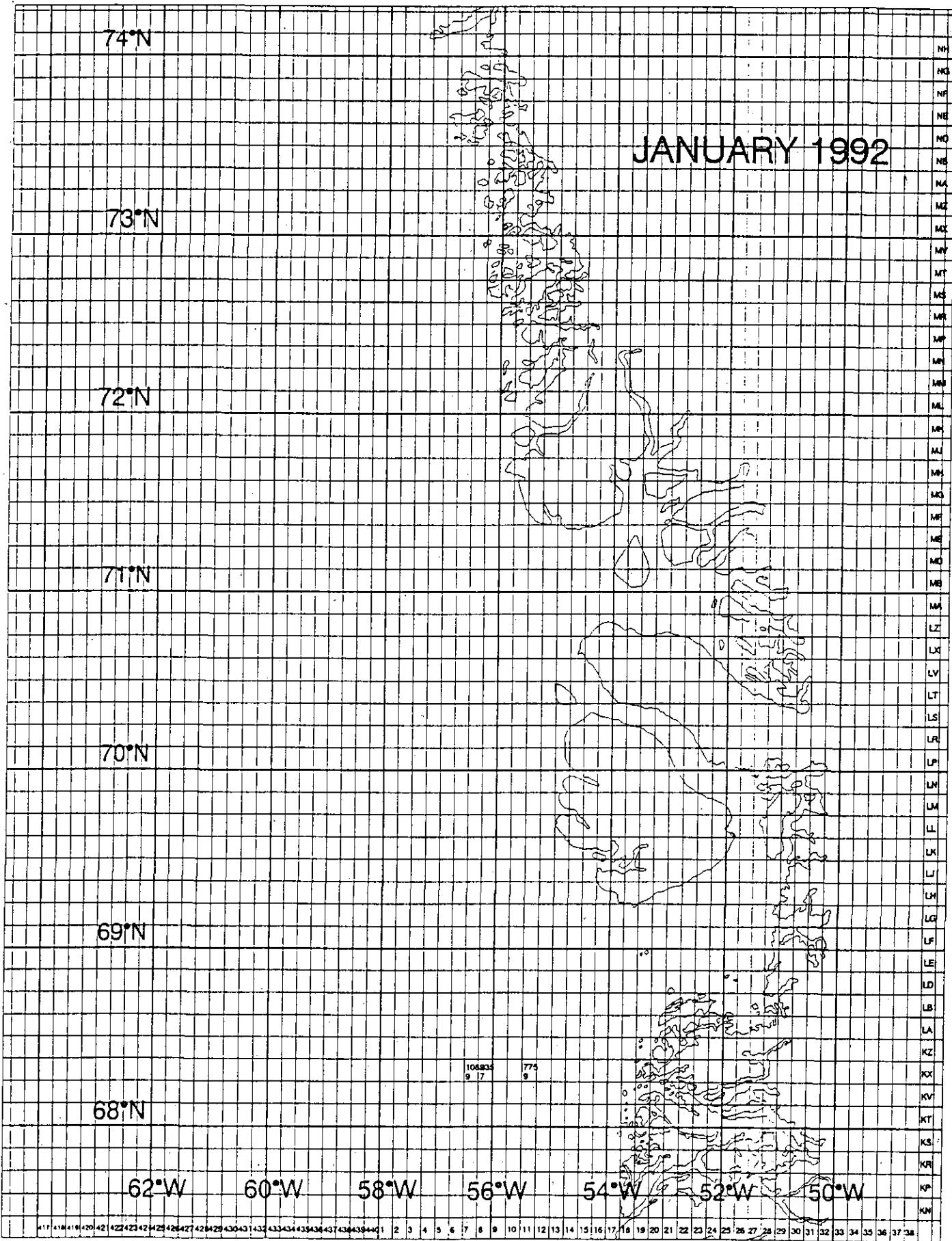


Figure 2b. Distribution of mean catch rate (kg/hour, upper figure) and effort (hours, lower figure) in each statistical unit between 67°30'N and 74°N, NAFO Subarea 1 in January 1992.

74°N

73°N

71°N

70°N

69°N

68°N

62°W

60°W

58°W

56°W

54°W

52°W

50°W

APRIL 1992

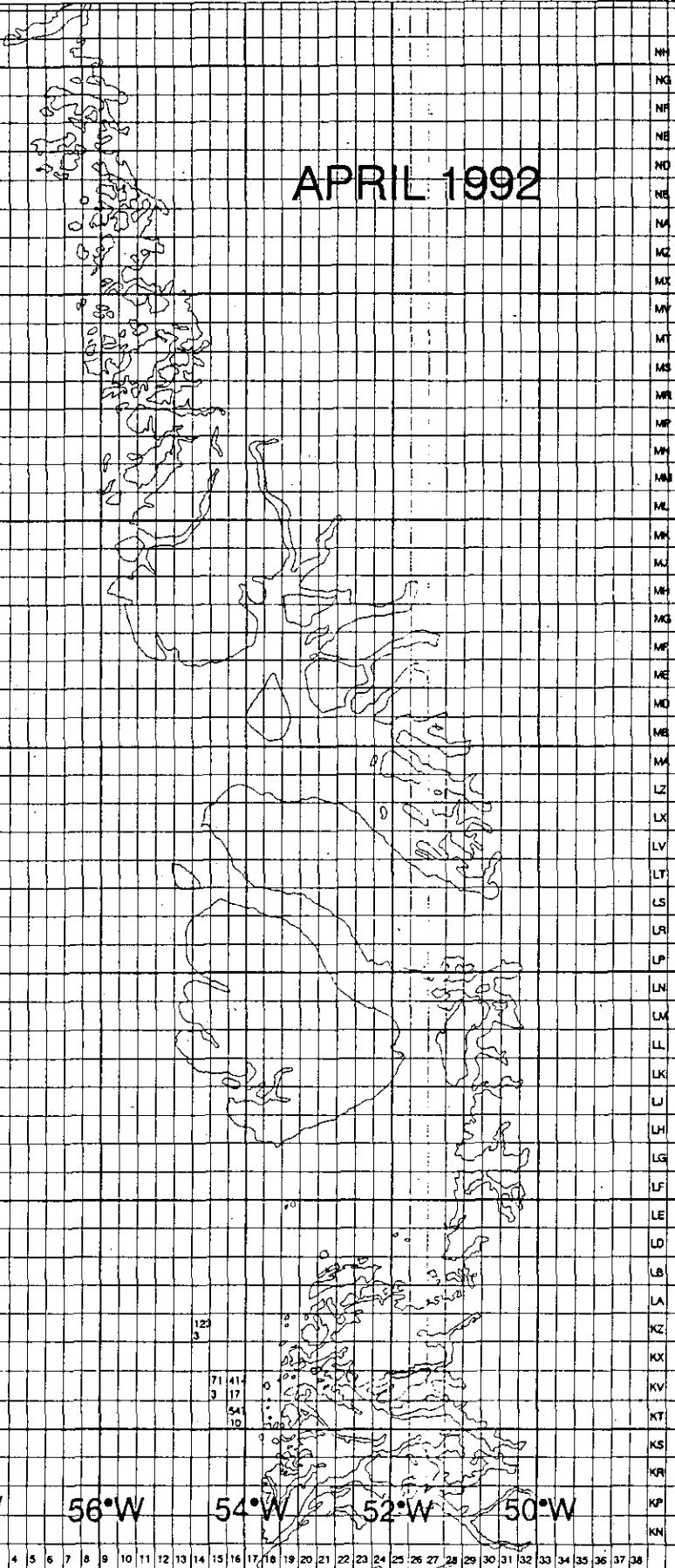


Figure 2b continued. Data from April 1992.

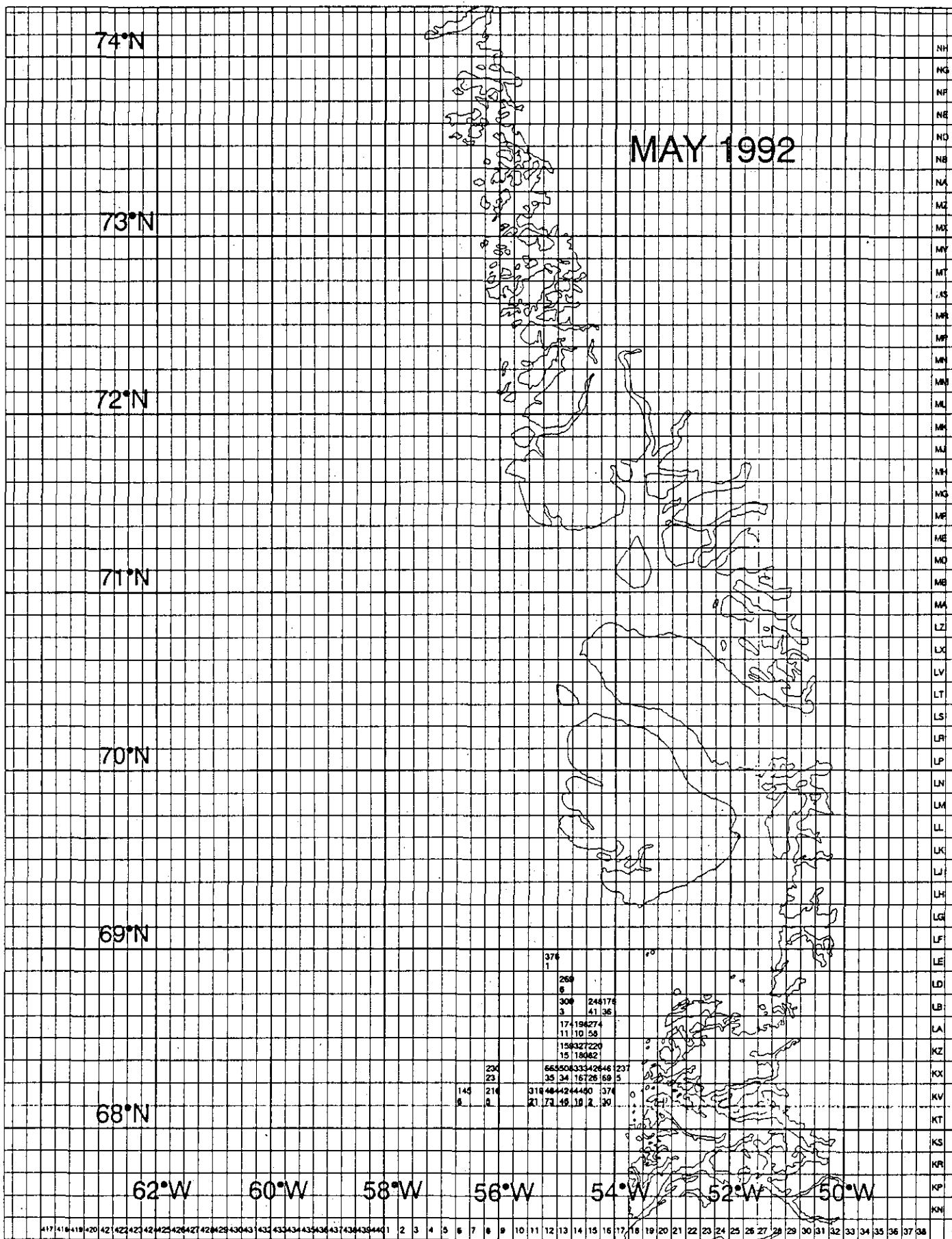


Figure 2b continued. Data from May 1992.

74°N

JUNE 1992

73°N

72°N

71°N

70°N

69°N

68°N

62°W

60°W

58°W

56°W

54°W

52°W

50°W

417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38

Figure 2b continued. Data from June 1992.

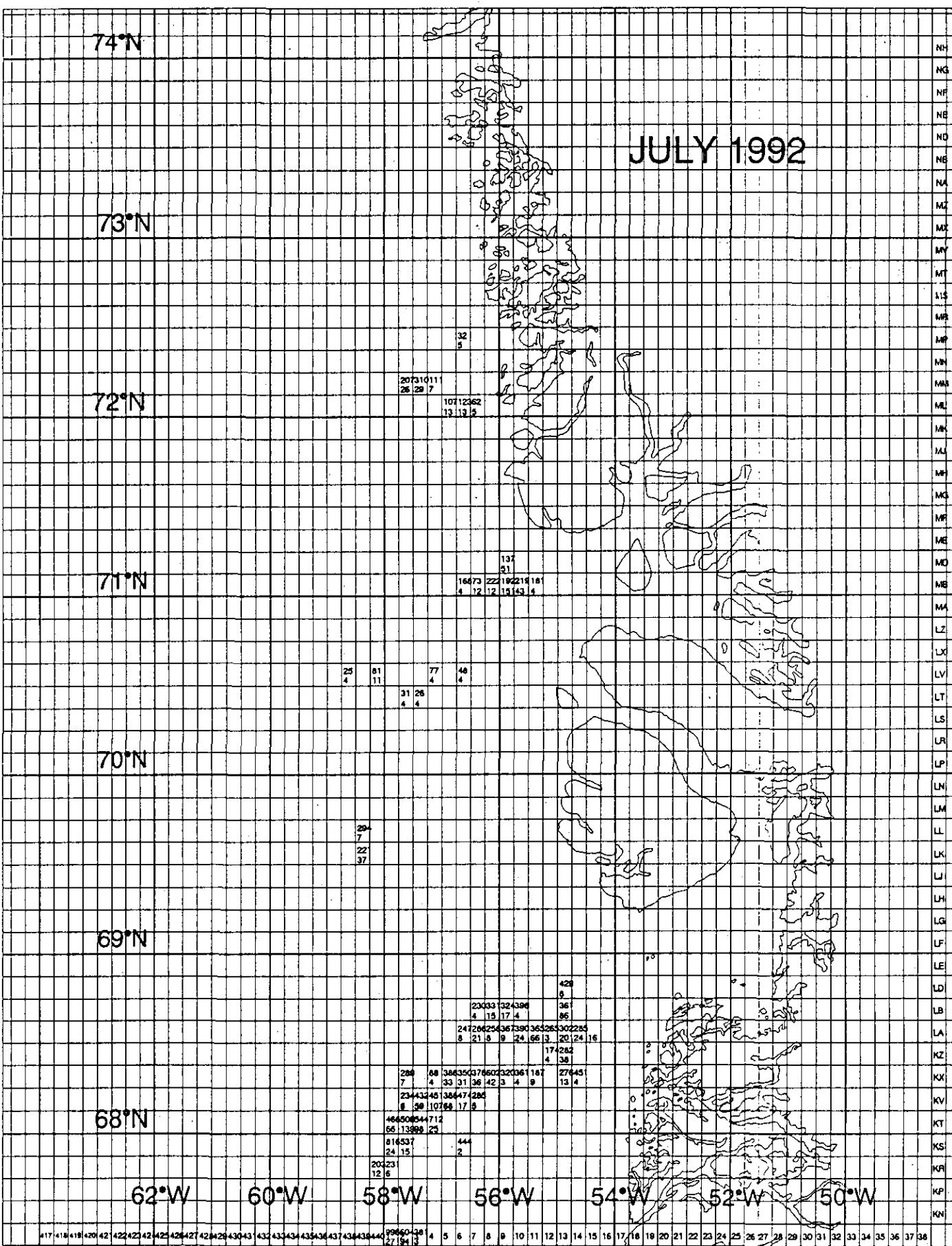


Figure 2b continued. Data from July 1992.

74°N

3  
4  
0  
2  
0  
3  
0 19  
1 5  
31 0  
10 2  
0 0  
2 1

73°N

0  
2  
0 0  
4 2  
0 0  
0 0

72°N

11 12 15 11 4 14 5 19 12 3  
9 69 22 36 7 67 36 4  
10 17 6 17 21 18 21 4 10 7  
4 51 13 6 17 21 4  
21 27 8 14 0 14 6  
39 22 27 5

71°N

0  
3  
0  
2  
25  
15  
13 6 4 0 13  
6 19 22  
4 68  
4 4

70°N

2  
4  
33 272  
3 2  
25 142 40  
3 7 4  
80 21 272  
5 34 3  
28 128  
57 661  
112  
5

69°N

101  
5  
35  
4  
41  
7  
73  
4  
0  
2

31565  
12410  
111 107  
2 11  
24 42  
111 58  
4 1 85  
178  
10  
32  
171

0 23228430 133427984  
3 15 74 11758 37 14 13 8  
306365226  
24 23 4

468  
9

68°N

127 431  
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38

62°W 60°W 58°W 56°W 54°W 52°W 50°W

AUGUST 1992

NH  
NF  
NE  
NO  
NB  
NA  
M2  
MX  
MY  
MT  
WS  
MR  
MF  
MM  
ML  
MK  
MH  
MG  
MF  
ME  
MO  
ME  
MA  
LZ  
LX  
LV  
LT  
LS  
LR  
LN  
LM  
LU  
LK  
LI  
LH  
LG  
LF  
LE  
LD  
LB  
LA  
KZ  
KK  
KV  
KT  
KR  
KN

Figure 2b continued. Data from August 1992.

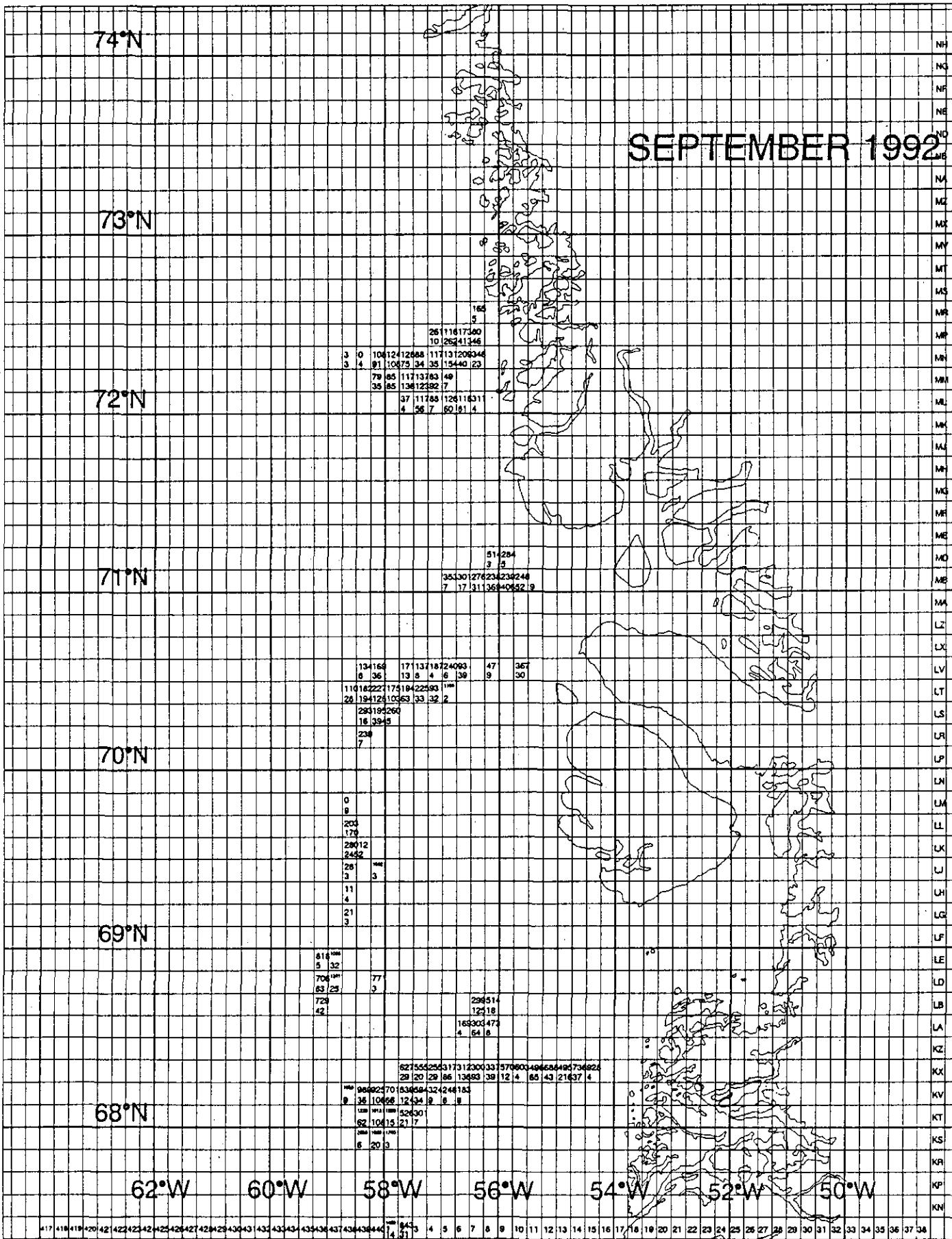


Figure 2b continued. Data from September 1992.

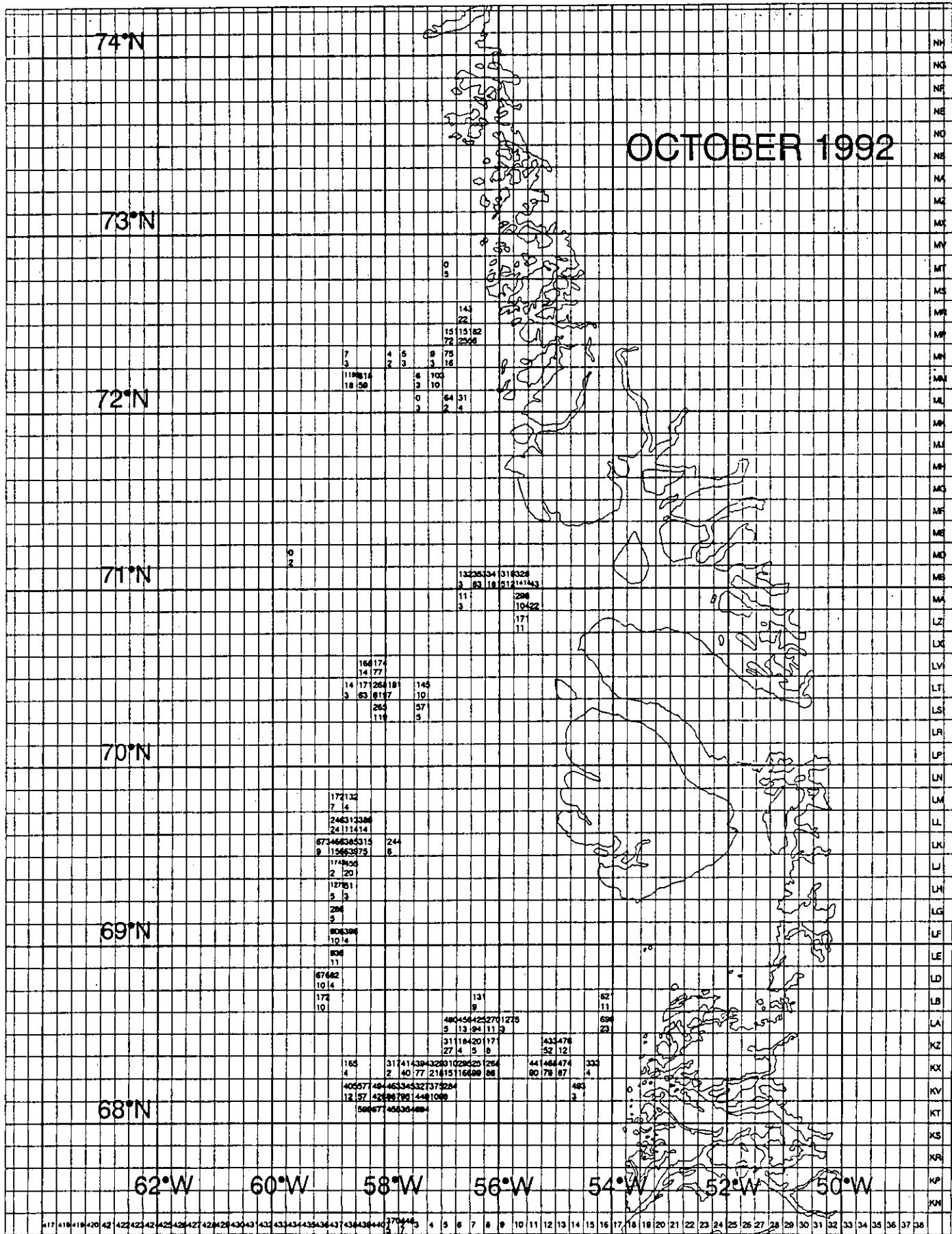


Figure 2b continued. Data from October 1992.

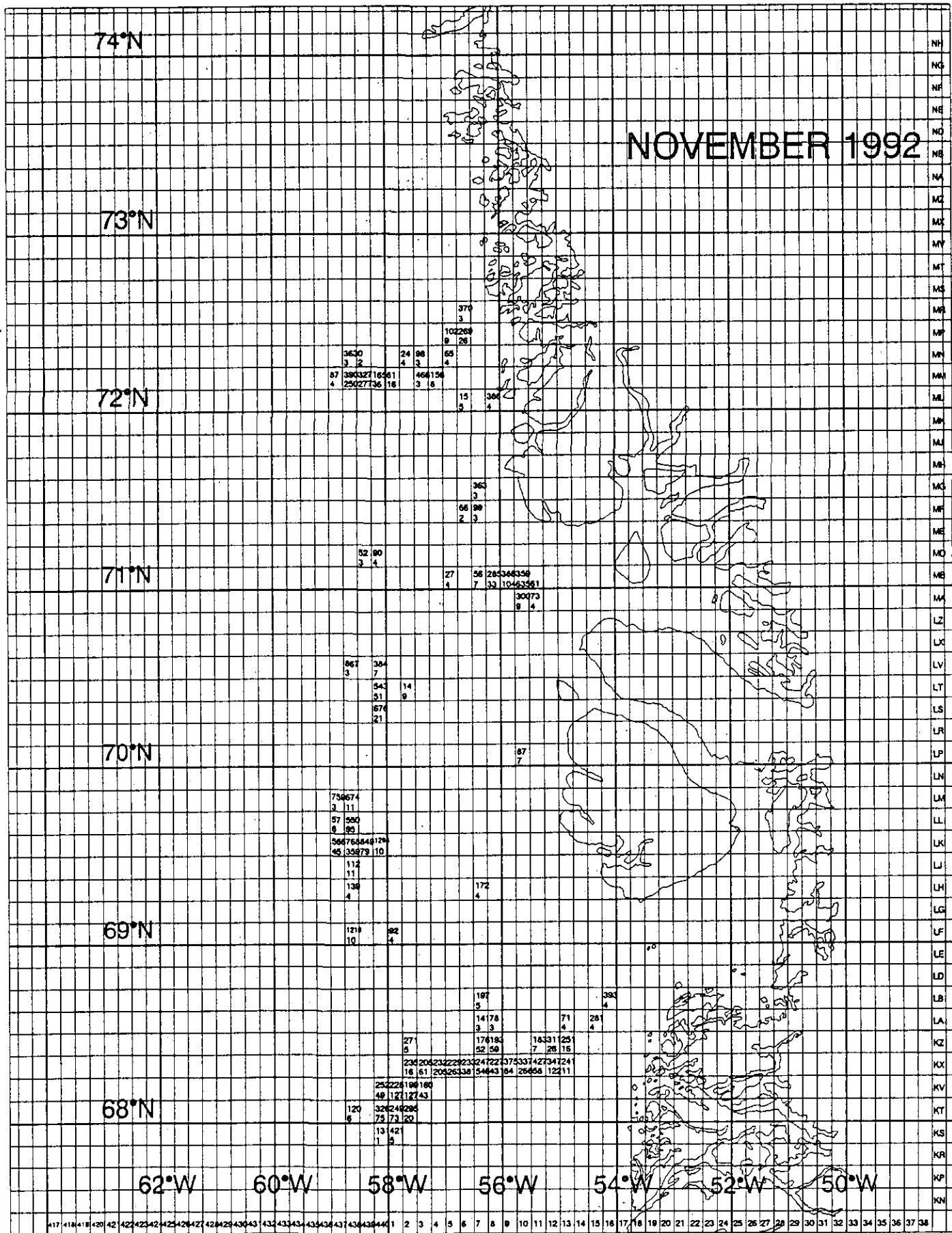


Figure 2b continued. Data from November 1992.

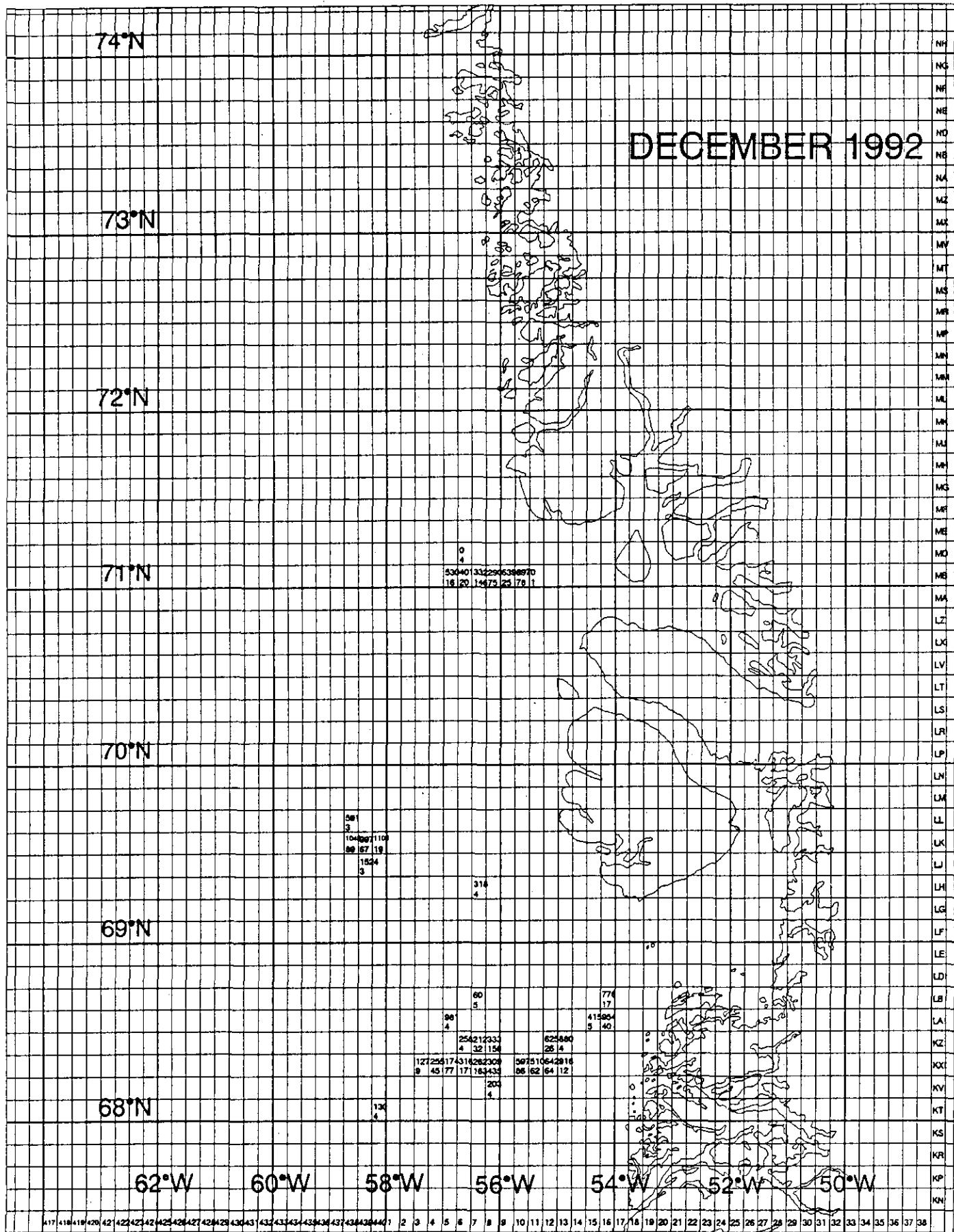


Figure 2b continued. Data from December 1992.

CPUE-INDEX

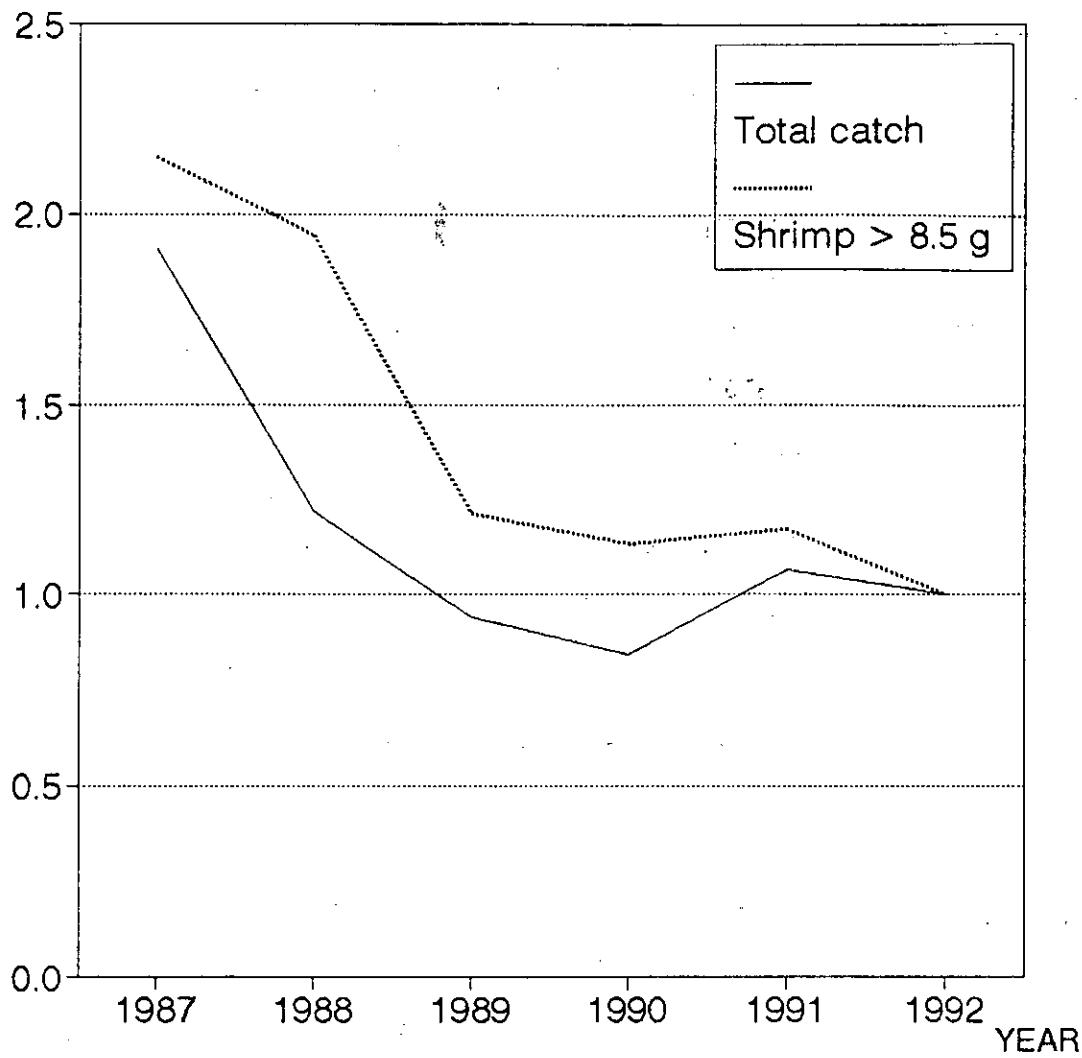


Figure 3. Annual CPUE-indices calculated for catch of shrimp >8.5 g and for total catch by 22 Greenland trawlers in Div 1B from 1987 to 1992.

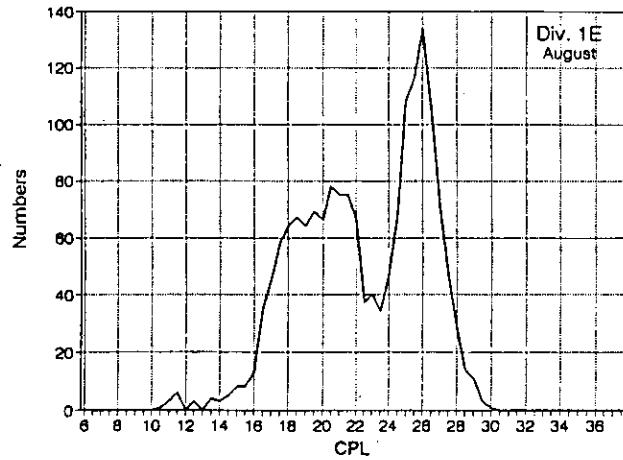
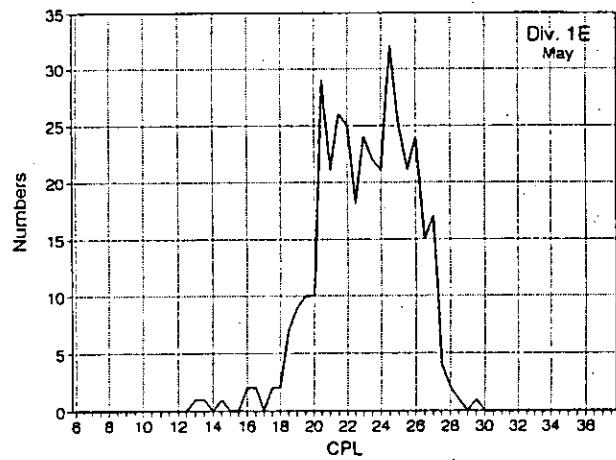
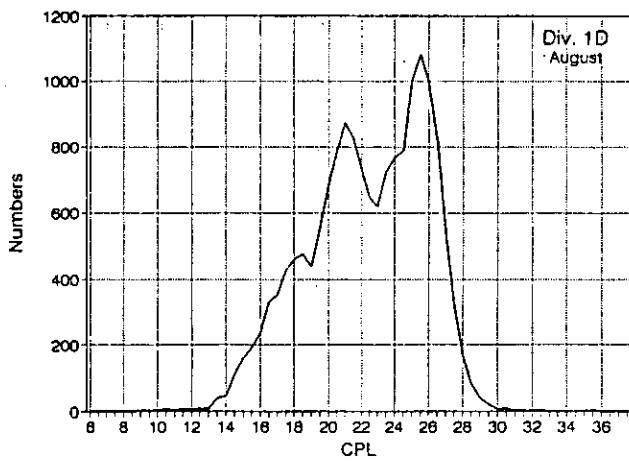
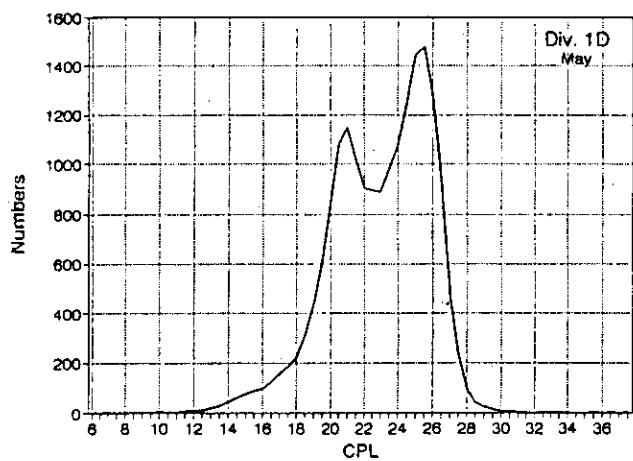
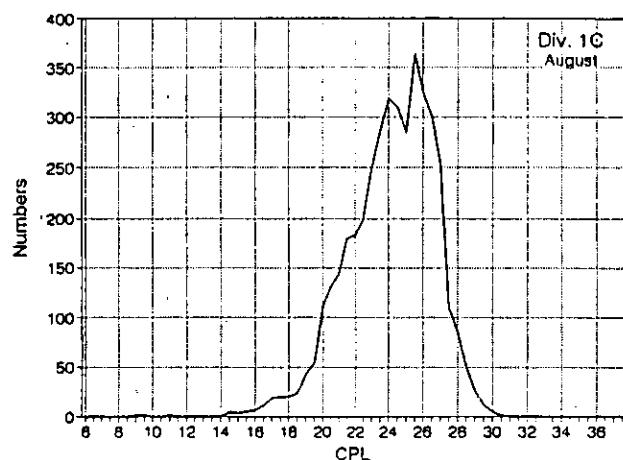
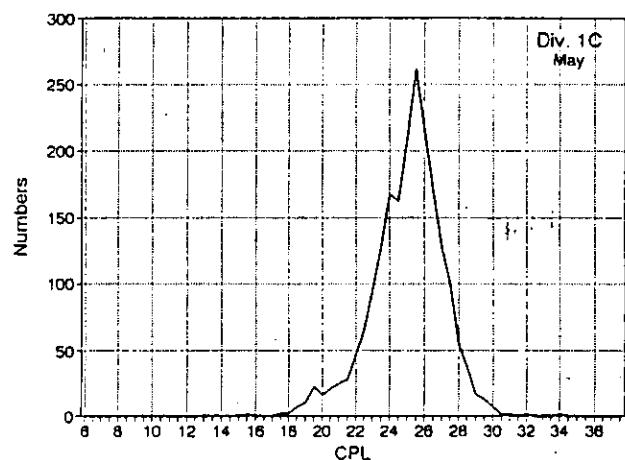


Figure 4. Commercial shrimp samples from May, August and November 1992, pooled by Division (1C, 1D and 1E) and month.

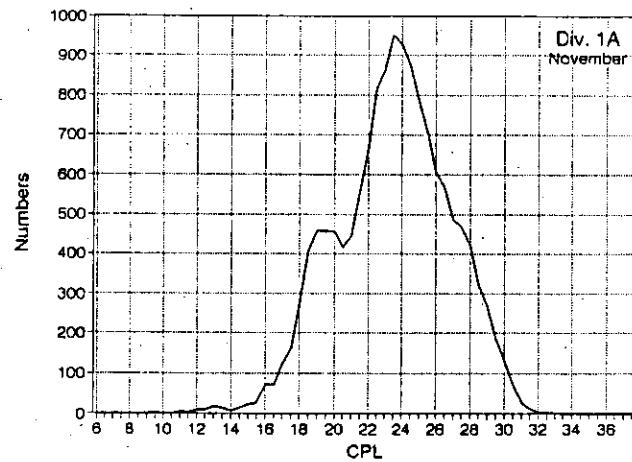


Figure 4 continued. Data from Division 1A.