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Report on a Stratified-random Trawl Survey for Shimp (Pandalus borealis) in NAFO Subareas 0+1 in July 1988

by

D. M. Carlsson and P. Kanneworff

Greenland Fisheries Research Institute, Tagensvej 135, 1
DK-2200 Kobenhavn N, Denmark

1. INTRODUCTION.

In July 1988 a stratified-random trawl survey was carried out in the Davis Strait, in NAFO Divisions 0A and 1A-1D.

Since the first assessment of offshore shrimp (Pandalus borealis) in the Davis Strait took place in 1976, ICNAF and NAFO have continuously recommended that stratified-random trawl surveys be conducted to determine changes in distribution and abundance.

The aim of the present survey was to assess the trawlable biomass of shrimp in the offshore distribution area of the Subarea 0+1 stock, and to collect biological samples to estimate the size composition of this stock.

The survey was carried out with a commercial trawler, owned by the Greenland Home Rule Trawler Company, and made available to the Greenland Fisheries Research Institute.

The survey was carried out in two periods through July with the scientific staff as follows:

Period 1: D.M. Carlsson, R. Larsen and H. Lund.

Period 2: M.W. Arnold, A.C. Arup, and P. Kanneworff.

Canadian authorities kindly granted permission for carrying out research in the Canadian economic zone, NAFO SA0.

The surveying conditions were good with few problems of ice covering the planned station sites. Bad weather did not hamper the fishing operations.

2. MATERIAL AND METHODS.

The survey covered the offshore area between $64^{\circ}52'5N$ and $72^{\circ}30'N$ at the West coast of Greenland, from the 3-mile limit to 600 meters depth.

The trawler, M/T ELIAS KLEIST, is a commercial 722 GRT shrimp trawler. The trawling gear used was a 'SKJERVØY' 3300 meshes (20 mm) shrimp trawl equipped with bobbingear and a double-bag with 44 mm meshes in the codend. The doors were of the type 'PERFECT', abt. 3000 kg each (10 m^2).

The duration of hauls was held as close as possible to one hour. A mean towing speed of 2.4 knots gave an average swept area per haul of 0.119 square kilometers, calculated by using an estimated distance

between trawl wings of 26.5 m (U.J. Hansen, Danish Institute of Fisheries Technology, pers. comm.).

In the area between 63°52'5N and 69°30'N stratification was made on basis of depths. Five subareas (A-E , NB! not equal to NAFO divisions!) were established based on earlier experience on the distribution of the biomass of shrimp and of the commercial fishery (Fig. 1-2). Each subarea was divided into four depth strata: 150-200 m, 200-300 m, 300-400 m and 400-600 m. The sizes of these 20 strata are given in Table 1, totalling 59,496 km^2.

In the area north of 69°30'N, the topography is not described sufficiently well to establish depth strata with known areas as in the south, but based on logbook information from the commercial fishery it was possible to define four areas as specific fishing grounds irrespective of the depths (Fig. 3, I-IV). The total size of strata I-IV is 7,423 km^2. The rest of the area was divided into two large strata north and south of 71°N (V-VI, totalling 33,478 km^2). The sizes of the northern strata are given in Table 2.

It was estimated that about 140 trawling operations could be made during the time available for the survey. With the requirement that the degree of coverage of this trawl survey should not be lower than that of the Fed. Rep. of Germany's stratified groundfish trawl surveys around Greenland, i.e. better than one haul per 600 km^2, a total of 115-120 hauls had to be allocated to the subareas A-E and the strata I-IV together. Is was decided to spread the rest of the hauls evenly over the remaining two strata V-VI in the north. A much lower degree of coverage (one haul per 1,450 km^2) was thus accepted for this latter area.

The hauls were allocated to the strata proportionally to the size of their areas. However, as a minimum of two hauls should always be taken in a stratum, additional hauls were placed in some of the smaller strata. The final allocation of hauls is given in Tables 1-2. Within the strata the trawling sites were chosen at random according to the NAFO 'Manual on Groundfish Surveys in the Northwest Atlantic' (Doubleday, 1981). The selected stations are shown on Fig. 4-6 together with the survey route. Unexpectedly, nearly all the sites chosen had bottom conditions suitable for trawling, so little time was wasted during the survey by moving station positions and searching for better bottom conditions.

While towing all relevant information on the trawling operation was recorded: Date, position, time and depth to bottom by the beginning and by the end of towing, together with haul number, warp length, average towing speed, towing direction and range of fishing depth. As soon as the trawl was on deck a shrimp sample of abt. 5 kg was taken directly from the codend, before the trawl was emptied into the hatch. Below deck the catch was sorted into species, and the amount of shrimp, main by-catch (cod, greenland halibut and redfish) and other by-catch species were recorded and weighed. In cases with large catches only subsamples in baskets or boxes were weighed and raised to total weight by number of baskets or boxes. Whenever possible, length samples and age-length samples were taken of the main by-catch species.

A total of 139 trawl stations was occupied during the survey. For each of these a shrimp biomass estimate for the corresponding stratum was calculated by means of the swept area method. These estimates were averaged over the strata, and standard deviations of the means were calculated. A pooled standard deviation for each region was calculated to indicate the level of confidence for the final biomass estimate.

3. RESULTS AND DISCUSSION.

Catches in each haul are shown in the station list, Tables 3a-3f.

The biggest catches were taken in the Sukkertoppen Deep, the Holsteinsborg Deep and the areas west and north of Store Hellefiskebanke. On a few locations very high densities were met, with catches of two to three tons of shrimp per hour. In the northern area catches normally were very small, especially between 69°N and 71°N (stratum VI and the northern part of stratum A). Low densities were observed almost continuously also along the western slopes of the banks south of 67°N. Table 4 gives the mean densities in the different depth strata in areas A-E. Apart from a single, very large catch in the western part of Holsteinsborg Deep (Area code JZ008) the depth zone 150-200 m showed extreme low densities in all areas. The densities in the northern area were low in all strata except in strata III-IV as shown in Table 5.

Total biomass for all strata covered by the survey was calculated by means of the density figures obtained from each trawl haul and the stratum areas. The results are given in Tables 6-7 for the two main regions respectively, together with information on statistics on the mean values. The total biomass estimate calculated for the area south of 69°30'N is 138,497 +/- 40,386 tons (= 2 x standard deviation), and for the northern area 24,530 +/- 16,537 tons.

The results from this survey should be treated with caution, because this survey was the first real stratified-random trawl survey for shrimp made in this area. Other factors than depth might in future be considered better as a basis for the stratification, and also analyses of biological samples and information from the commercial fishery might give better guidance for optimal coverage of the large survey area.

No time series are available to make comparison to other years, but in July 1976 a stratified trawl survey was carried out in part of the area covered by the 1988-survey (Horsted, 1978), corresponding roughly to the areas A-D. This survey gave a trawlable biomass of 54,568 tons compared to 122,758 tons, calculated for the areas A-D in the 1988-survey. No information on confidence levels was given for the 1976-survey. Apart from a possible increase of the shrimp stock in the intervening period, the large difference in the two biomass estimates might be due partly to the different trawl types used ('Fjortoft Sputnik' in 1976, and the high-opening type 'Skjervøy' in 1988), and partly to the different stratification and coverage of the two surveys.

In the present study no attempt has been made to correct for the diel variation in catchability of this stock. It is known from various sources (e.g. logbook information from the commercial fishery; Carlsson et. al., 1978; Smidt, 1978) that a considerable variation exists. Application of the same correction factors as used by these authors would, however, be erroneus in this case, these factors being estimated from trawling with other trawl types than those used in the present survey. It is expected that a special study on this topic will be carried out in near future at the Greenland Fisheries Research Institute and, it is likely that a new correction for diel variations will be very different from the former when based on the high-opening trawl types and possibly also on migration patterns for separate development stages of shrimp. Further, it is conceiveable that the nature of diurnal migration could appear so complex that fishing during day-time only would be an optimal sampling procedure in future trawl surveys.

Biological samples were taken from all hauls, but the material has not yet been worked up. These samples might, however, offer valuable information on the distribution of different development stages of the shrimp, and could eventually indicate special nursery grounds, breeding areas etc.

4. CONCLUSION.

From the density-figures in the different areas and depths it appears that the survey covered most of the shrimp distribution area in Div 1A-1D (and the adjacent part of SA0). Parts of the northern regions might eventually be omitted in future surveys without much loss of information, these areas exhibiting extreme low shrimp densities.

The relatively low values for the confidence of the calculated biomasses, especially for the region south of 69°30'N indicate, that the stratification scheme used in the present survey has been satisfactory.

A future survey plan might be optimized either by putting more effort into some of the strata on basis of the results of the present survey, or by carrying out a two-stage survey in which the sampling effort in the second stage should be determined by the results from the first.

5. REFERENCES.

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Table 1. Stratum areas and number of hauls in the area 63°52'N - 69°30'N.

	DEPTHS STRATUM				
	150-200 M	200-300 M	300-400 M	400-600 M	TOTAL
AREA A	2365	5213	9763	956	18297
HAULS	4	9	16	2	31
AREA B	1497	2477	1450	554	5978
HAULS	3	4	2	2	11
AREA C	2234	5470	3909	3989	15602
HAULS	4	9	7	7	27
AREA D	4204	1736	745	1915	8600
HAULS	7	3	2	3	15
AREA E	2268	4032	1957	2762	11019
HAULS	4	7	3	5	19
SUM AREAS	12568	18928	17824	10176	59496
SUM HAULS	22	32	30	19	103

Table 2. Stratum areas and number of hauls in the area 69°30'N - 72°30'N.

STRATUM	AREA	NUMBER OF HAULS
I	3649	5
II	367	3
III	2248	5
IV	1160	2
V	11210	7
VI	22267	14
TOTAL	40901	36

Table 3a. List of trawl hauls in the four depth strata in area A. For area codes see Fig. 1-2. Catches are given in kg.

STATION-IDENTIFICATION		AREA-CODE	DEPTH	TR-TIME	SHR	COD	GHL	RED	MIX	TOTAL
STRATUM A1										
88EK0130054	94	LF007	174.0	70	0	0	0	0	3	3
88EK0130075	95	LG012	169.0	60	0	0	0	0	2	2
88EK0130052	100	LH008	160.0	61	0	0	0	0	2	2
STRATUM A2										
88EK0130003	82	LD001	296.5	62	59	0	29	4	7	100
88EK0130055	86	LE005	212.0	62	9	0	1	0	2	12
88EK0130053	93	LG006	223.5	65	0	0	0	0	3	3
88EK0130010	98	LH002	275.0	60	73	0	45	.	9	127
88EK0130011	99	LH002	255.5	62	13	0	8	.	18	39
88EK0130012	101	LJ002	249.0	64	1	0	.	.	4	5
88EK0130049	102	LJ007	216.5	59	6	0	2	0	9	16
88EK0130050	103	LJ008	235.0	64	45	0	8	0	9	61
88EK0130051	104	LJ012	247.5	60	53	0	8	0	4	65
STRATUM A3										
88EK0120054	62	KX002	321.5	70	870	0	30	7	3	910
88EK0120056	70	KX004	335.0	70	1351	0	.	.	133	1484
88EK0120049	55	KX435	351.0	60	902	0	4	8	4	918
88EK0120051	61	KX436	331.0	64	166	1	2	0	52	220
88EK0120055	69	KZ003	328.5	65	838	0	.	.	106	944
88EK0130068	71	KZ006	377.5	61	404	1	70	98	34	606
88EK0120052	67	KZ437	337.5	60	47	0	1	17	10	74
88EK0120053	68	KZ440	336.5	70	134	0	20	58	8	219
88EK0130069	73	LA005	355.5	65	338	0	50	51	7	445
88EK0130070	77	LB007	348.0	60	827	1	104	45	40	1016
88EK0130001	76	LB437	345.0	57	87	1	7	51	27	173
88EK0130002	81	LD440	331.5	62	110	0	19	23	6	158
88EK0130004	83	LE002	302.0	71	291	0	59	16	10	375
88EK0130005	85	LE440	324.0	67	48	0	24	10	12	95
88EK0130006	89	LF440	311.5	61	49	0	29	8	16	102
88EK0130007	92	LG438	376.0	54	16	0	2	208	4	230
88EK0130009	97	LH439	320.0	66	260	0	10	10	35	315
STRATUM A4										
88EK0120050	60	KX435	475.5	80	1	7	44	195	9	256
88EK0130008	91	LG437	563.5	65	0	0	19	115	2	135

Table 3b. List of trawl hauls in the four depth strata in area B. For area codes see Fig. 1-2. Catches are given in kg.

STATION-IDENTIFICATION		AREA-CODE	DEPTH	TR-TIME	SHR	COD	GHL	RED	MIX	TOTAL
STRATUM B1										
88EK0130077	88	LE014	199.0	60	0	0	0	0	2	2
88EK0130074	87	LF011	164.5	61	1	0	1	0	3	5
88EK0130078	90	LF013	175.5	64	0	0	0	0	0	0
88EK0130076	96	LF015	162.0	48	0	0	.	0	5	5
STRATUM B2										
88EK0120077	59	KV014	249.0	67	711	0	.	.	43	754
88EK0130072	79	LB011	263.0	67	123	0	7	1	4	136
88EK0130073	84	LD012	279.0	62	3	0	2	0	2	7
88EK0120081	80	LD013	281.0	70	679	0	1	2	6	687
STRATUM B3										
88EK0130071	78	LA009	357.5	75	685	5	50	26	129	894
88EK0120080	74	LA015	327.0	74	1799	1	48	85	18	1950
STRATUM B4										
88EK0120078	72	KZ016	558.0	30	102	0	20	9	29	159
88EK0120079	75	LA016	487.0	69	678	0	53	48	15	793

Table 3c. List of trawl hauls in the four depth strata in area C. For area codes see Fig. 1-2. Catches are given in kg.

STATION-IDENTIFICATION		AREA-CODE	DEPTH	TR-TIME	SHR	COD	GHL	RED	MIX	TOTAL
STRATUM C1										
88EK0120034	36	KJ007	168.0	62	0	0	0	0	13	13
88EK0120041	47	KR007	168.5	64	0	0	.	.	3	3
88EK0120042	51	KS005	192.0	66	9	0	1	1	17	27
88EK0120086	58	KV009	192.0	63	2	0	0	8	16	27
STRATUM C2										
88EK0120035	38	KK006	293.0	70	2166	0	5	84	9	2264
88EK0120036	40	KL006	225.0	74	675	0	2	1	6	683
88EK0120039	41	KN005	222.0	63	228	0	3	3	9	242
88EK0120044	42	KR001	283.5	70	683	0	4	61	2	750
88EK0120043	46	KR003	278.0	62	487	0	2	0	6	494
88EK0120040	43	KR005	223.5	64	36	0	1	1	29	67
88EK0120045	45	KR440	295.0	82	1062	0	.	62	4	1128
88EK0120063	53	KT004	290.0	68	262	2	28	38	51	380
88EK0120085	54	KV006	209.0	63	15	0	2	1	11	28
STRATUM C3										
88EK0120046	44	KR440	310.5	75	1446	0	.	.	105	1551
88EK0120060	50	KS001	351.0	65	486	0	0	85	2	573
88EK0120048	48	KS438	328.5	64	262	0	.	.	84	346
88EK0120047	49	KS439	385.5	70	454	0	47	150	5	656
88EK0120061	52	KT002	347.0	61	614	1	25	90	0	730
STRATUM C4										
88EK0120037	37	KK004	538.5	64	9	2	74	4	6	95
88EK0120038	39	KL003	456.5	58	570	1	57	29	11	668
88EK0120059	56	KT001	407.0	61	242	.	49	51	6	348
88EK0120058	57	KV001	414.0	64	112	0	.	.	107	219
88EK0120057	63	KV003	429.0	72	112	0	.	.	74	186
88EK0120084	64	KX006	478.5	66	327	0	45	9	4	384
88EK0120066	65	KX010	506.0	60	262	0	118	19	10	409
88EK0120067	66	KX010	463.5	65	519	1	69	74	8	671

Table 3d. List of trawl hauls in the four depth strata in area D. For area codes see Fig. 1-2. Catches are given in kg.

STATION-IDENTIFICATION		AREA-CODE	DEPTH	TR-TIME	SHR	COD	GHL	RED	MIX	TOTAL
STRATUM D1										
88EK0120022	22	JZ008	189.0	64	3110	2	0	7	10	3129
88EK0120023	23	JZ011	181.5	77	2	0	0	3	12	17
88EK0120026	24	KA008	177.0	61	0	0	0	0	0	0
88EK0120024	27	KB013	174.0	58	6	0	0	8	19	33
88EK0120030	30	KE008	167.5	70	0	0	0	0	0	0
88EK0120031	31	KE009	175.0	69	0	0	3	1	5	9
88EK0120032	34	KF009	153.0	66	0	0	0	0	15	16
STRATUM D2										
88EK0120021	21	JX008	239.0	60	0	2	2	15	20	38
88EK0120025	25	KA010	203.5	60	0	0	.	1	18	19
88EK0120033	35	KH007	282.5	66	1158	0	1	20	28	1207
STRATUM D3										
88EK0120028	28	KD007	372.5	67	4	.	22	173	23	222
88EK0140016	33	KF016	352.5	61	133	0	101	34	58	325
STRATUM D4										
88EK0120027	26	KB006	575.5	70	0	0	21	16	24	61
88EK0140015	32	KD015	439.5	63	581	0	87	11	49	728
88EK0120029	29	KE006	573.0	62	125	0	63	91	6	285

Table 3e. List of trawl hauls in the four depth strata in area E. For area codes see Fig. 1-2. Catches are given in kg.

STATION-IDENTIFICATION		AREA-CODE	DEPTH	TR-TIME	SHR	COD	GHL	RED	MIX	TOTAL
STRATUM E1										
88EK0120009	8	JG016	185.0	68	0	0	0	2	9	11
88EK0120015	13	JJ019	170.5	60	0	0	0	0	0	0
88EK0120018	17	JP019	167.0	41	0	0	1	7	11	19
88EK0120019	18	JS012	170.5	43	0	0	0	0	0	0
STRATUM E2										
88EK0120005	2	JD018	277.0	62	7	155	1	10	14	186
88EK0120004	1	JD019	262.0	62	150	17	2	2	1	173
88EK0120008	7	JG015	250.0	68	3	6	2	8	5	23
88EK0120011	11	JJ013	295.5	62	7	6	0	20	1	34
88EK0120010	12	JJ014	277.5	61	1008	5	1	1058	8	2080
88EK0120014	10	JJ019	210.0	62	0	1	0	2	5	7
88EK0120013	15	JK014	297.5	69	6	0	0	11	9	26
STRATUM E3										
88EK0120003	4	JE019	359.5	60	310	43	4	36	16	409
88EK0120007	5	JF015	308.0	66	0	18	0	95	32	145
88EK0120017	16	JM020	328.0	58	495	172	0	147	78	891
STRATUM E4										
88EK0120006	3	JE016	537.0	60	0	0	0	10	38	48
88EK0120002	6	JF020	463.0	61	395	.	.	.	.	395
88EK0120001	9	JH021	444.5	45	728	23	38	0	4	793
88EK0120012	14	JK012	576.5	81	1	1	44	199	129	373
88EK0120020	19	JV009	575.5	61	3	0	19	40	113	175

Table 3f. List of trawl hauls in strata in the area north of 69°30'N. For area codes see Fig. 3. Catches are given in kg.

STATION-IDENTIFICATION		AREA-CODE	DEPTH	TR-TIME	SHR	COD	GHL	RED	MIX	TOTAL
STRATUM N1										
88EK0130036	135	ML003	294.0	61	7	0	1	0	59	67
88EK0130035	136	MM004	267.5	60	266	0	18	0	46	330
88EK0130031	137	MN439	265.5	64	39	0	2	0	18	58
88EK0130033	139	MP003	201.5	51	0	0	.	.	3	3
88EK0130034	140	MP005	313.5	60	39	0	14	0	20	73
STRATUM N2										
88EK0130040	130	MF007	284.0	61	25	0	18	0	8	51
88EK0130038	133	MG007	216.5	60	0	0	0	0	2	2
88EK0130039	141	MG008	263.0	66	15	0	2	2	18	37
STRATUM N3										
88EK0130025	124	MB002	330.5	61	305	0	32	0	25	362
88EK0130024	120	MB003	338.5	62	0	0	0	0	0	0
88EK0130041	125	MB008	395.0	69	176	0	77	75	40	369
88EK0130042	126	MB008	427.5	65	222	0	57	11	34	323
88EK0130043	127	MB011	468.5	61	406	0	67	0	22	494
STRATUM N4										
88EK0130045	114	LT011	175.5	61	1	0	1	0	36	37
88EK0130046	115	LT011	157.0	63	670	0	0	1	6	676
STRATUM N5										
88EK0130026	123	MB001	312.5	61	356	0	42	0	23	421
88EK0130027	122	MD437	378.0	61	499	0	45	0	12	556
88EK0130028	128	MF001	290.0	60	2	0	0	0	1	3
88EK0130029	131	MH001	263.0	58	1	0	2	0	12	14
88EK0130037	132	MH006	201.0	66	0	0	.	.	2	2
88EK0130030	134	MK437	400.5	60	3	0	25	3	8	38
88EK0130032	138	MP002	234.5	67	1	0	1	0	9	11
STRATUM N6										
88EK0130013	105	LL002	239.0	62	1	0	2	0	24	27
88EK0130014	106	LM006	170.0	49	0	0	.	.	5	5
88EK0130016	107	LN001	320.0	63	3	0	.	.	7	10
88EK0130015	108	LN004	197.5	61	0	.	.	.	3	3
88EK0130048	110	LN008	149.5	63	0	0	0	0	3	3
88EK0130017	109	LP439	347.5	60	42	0	12	3	27	83
88EK0130047	113	LS008	141.5	61	1	0	0	0	2	3
88EK0130018	111	LS440	366.0	64	56	0	6	23	32	116
88EK0130019	112	LT003	407.5	60	142	0	6	49	27	224
88EK0130020	117	LV002	481.0	64	11	0	12	16	17	56
88EK0130021	116	LX440	533.5	59	1	0	13	10	2	25
88EK0130022	118	LZ440	505.0	60	10	0	8	49	8	74
88EK0130023	119	MA003	453.0	61	57	0	114	2	6	178
88EK0130044	121	MA009	576.5	63	19	0	22	0	7	47

Table 4. Stratum areas (km^2), shrimp densities (kg/km^2), calculated fishable biomass (in tons) and number of hauls in the area $63^{\circ}52'5N$ - $69^{\circ}30'N$.

	DEPTHS STRATUM				
	150-200 M	200-300 M	300-400 M	400-600 M	TOTAL
AREA A	2365	5213	9763	956	18297
DENSITY	0	254	3065	3	-
BIOMASS	0	1324	29924	3	31251
HAULS	4	9	16	2	31
AREA B	1497	2477	1450	554	5978
DENSITY	2	2833	7848	2802	-
BIOMASS	3	7017	11379	1180	19579
HAULS	3	4	2	2	11
AREA C	2234	5470	3909	3989	15602
DENSITY	28	4322	5028	2022	-
BIOMASS	63	23643	19655	8335	51696
HAULS	4	9	7	7	27
AREA D	4204	1736	745	1915	8600
DENSITY	2750	2788	496	1807	-
BIOMASS	11563	4840	369	3460	20232
HAULS	7	3	2	3	15
AREA E	2268	4032	1957	2762	11019
DENSITY	1	1485	2232	1947	-
BIOMASS	2	5989	4368	5379	15738
HAULS	4	7	3	5	19
SUM AREAS	12568	18928	17824	10176	59496
SUM BIOM.	11631	42813	65695	18357	138497
SUM HAULS	22	32	30	19	103

Table 5. Stratumareas (km^2), shrimp densities (kg/km^2) and number of hauls in the area $69^{\circ}30'N$ - $72^{\circ}30'N$.

STRATUM AREA	DENSITY	BIOMASS	NUMBER OF HAULS
I: 3649	630	2301	5
II: 367	128	47	3
III: 2248	1771	3982	5
IV: 1160	2872	3331	2
V: 11210	936	10495	7
VI: 22267	196	4374	14
TOTAL	-	24530	36

Table 6. Calculated shrimp biomass (tons) and statistics on the biomass estimates in strata north of 69°30'N.

		STRBIOM					
STRATUM	SQKM	TONS	HAULS	STD	STDERR	MIN	MAX
AREA I	3649	2300.58	5	3758.35	1680.78	0	8948
AREA II	367	47.06	3	45.12	26.05	1	91
AREA III	2248	3982.30	5	2738.63	1224.75	0	7405
AREA IV	1160	3331.46	2	4703.29	3325.73	6	6657
AREA V	11210	10494.70	7	18544.11	7009.01	0	46061
AREA VI	22267	4374.01	14	7349.33	1964.19	0	26452

Table 7. Calculated shrimp biomass (tons) and statistics on the biomass estimates, in strata south of 69°30'N.

		STRBIOM					
STRATUM	SQKM	TONS	HAULS	STD	STDERR	MIN	MAX
AREA A 150-200M	2321	0.00	3	0.00	0.00	0	0
AREA A 200-300M	5213	1323.88	9	1325.62	441.87	0	3186
AREA A 300-400M	9763	29924.12	17	31834.39	7720.97	1498	112911
AREA A 400-600M	956	3.13	2	4.43	3.13	0	6
AREA B 150-200M	1542	2.75	4	5.49	2.75	0	11
AREA B 200-300M	2477	7016.74	4	6592.74	3296.37	53	13203
AREA B 300-400M	1450	11379.47	2	6575.39	4649.50	6730	16029
AREA B 400-600M	421	1179.58	2	900.35	636.64	543	1816
AREA C 150-200M	2234	63.48	4	102.92	51.46	0	215
AREA C 200-300M	5470	23643.04	9	25974.37	8658.12	745	85017
AREA C 300-400M	3909	19655.23	5	12031.83	5380.80	10392	40267
AREA C 400-600M	4122	8335.18	8	6536.64	2311.05	285	19742
AREA D 150-200M	4204	11562.80	7	30456.15	11511.34	0	80631
AREA D 200-300M	1736	4839.74	3	8377.83	4836.94	0	14514
AREA D 300-400M	745	369.41	2	490.83	347.07	22	716
AREA D 400-600M	1915	3460.18	3	4709.36	2718.95	1	8824
AREA E 150-200M	2268	1.75	4	3.51	1.75	0	7
AREA E 200-300M	4032	5989.48	7	12975.62	4904.32	0	35000
AREA E 300-400M	1957	4368.17	3	4289.06	2476.29	0	8573
AREA E 400-600M	2762	5378.61	5	7811.37	3493.35	0	17212

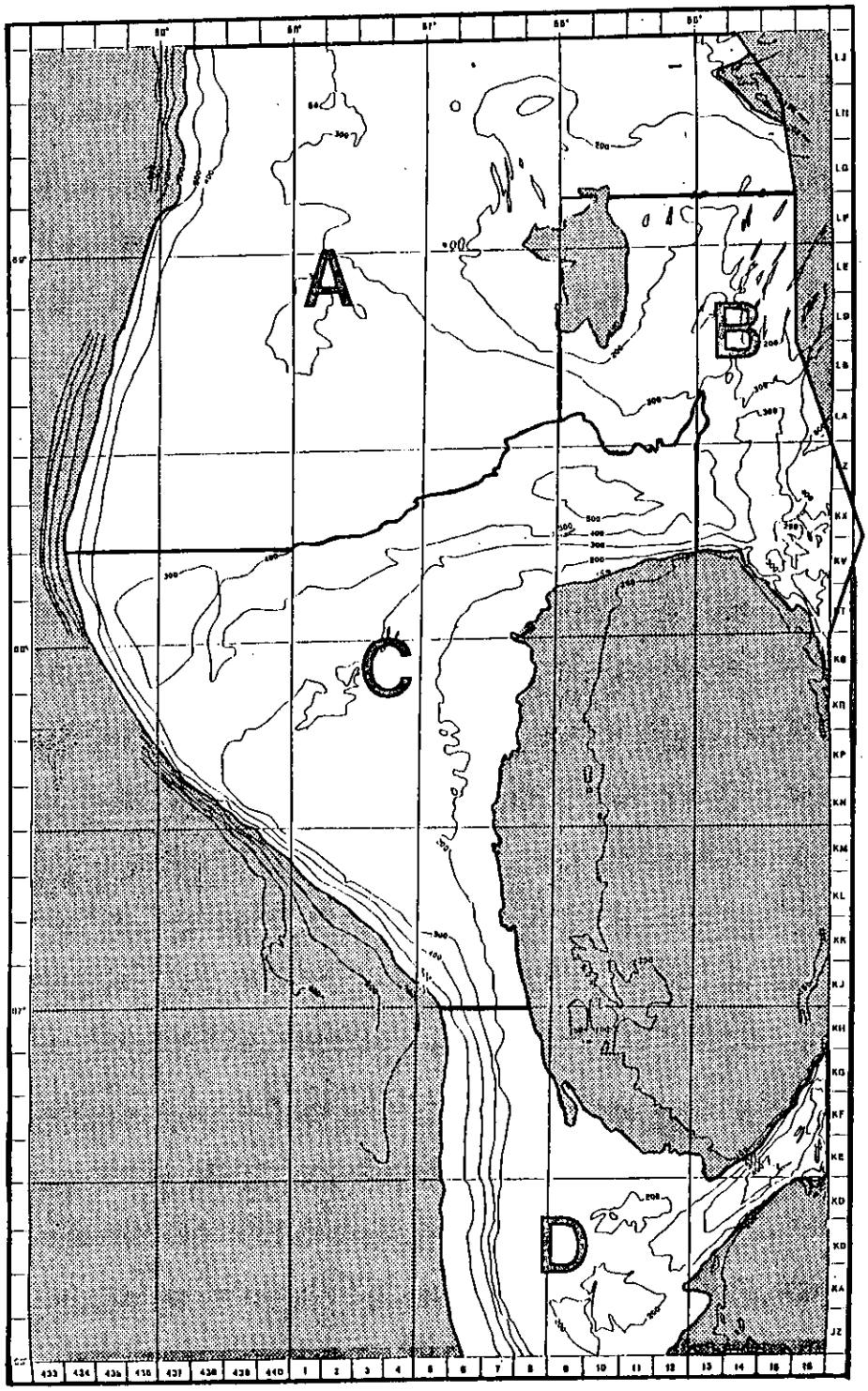

Fig. 1. Strata in the area 66°00'N - 69°30'N. Note that the subareas A-E do not correspond to the NAFO divisions A-E.

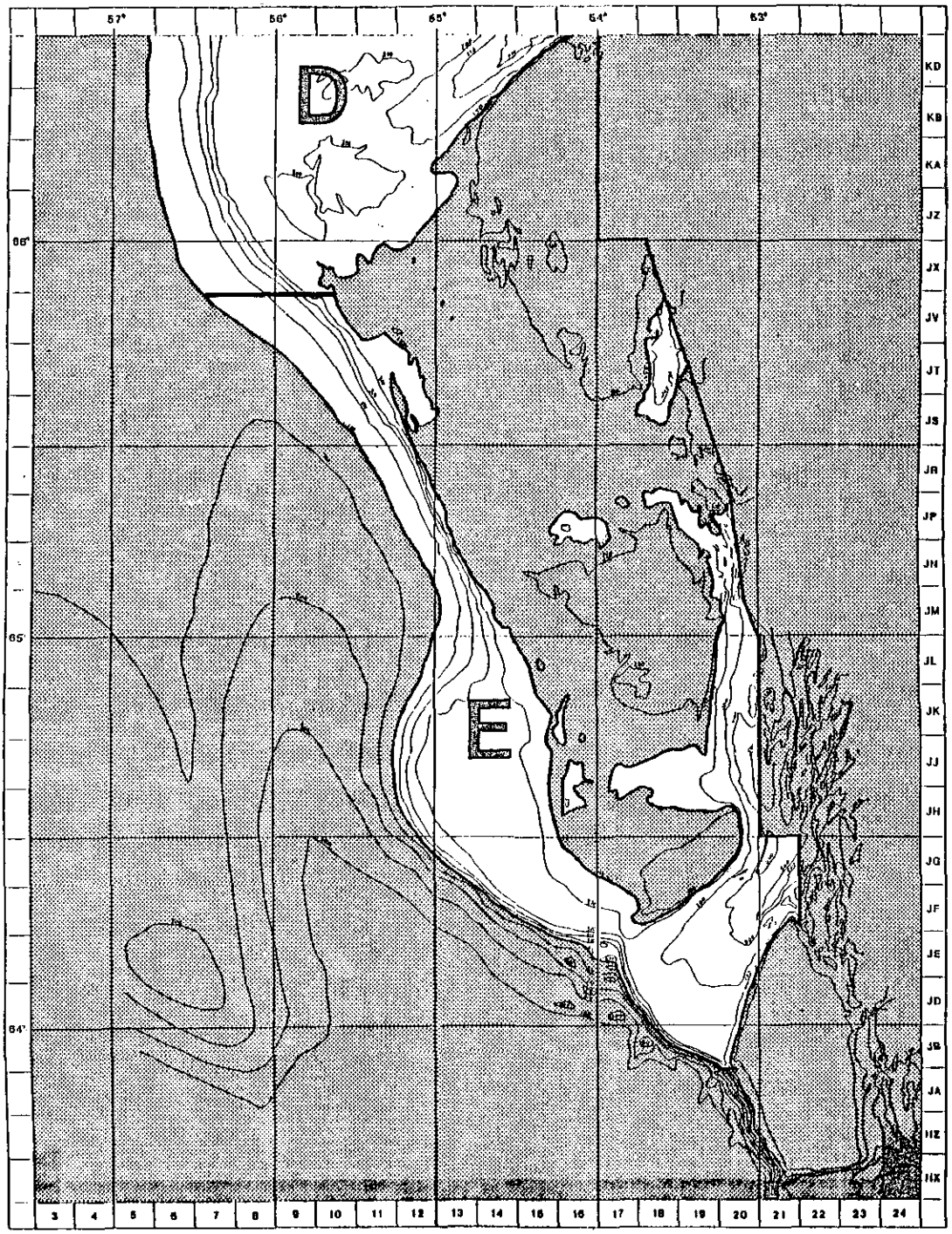

Fig. 2. Strata in the area 63°52'5N - 66°30'N. Note that the subareas D and E do not correspond to the NAFO divisions D and E.

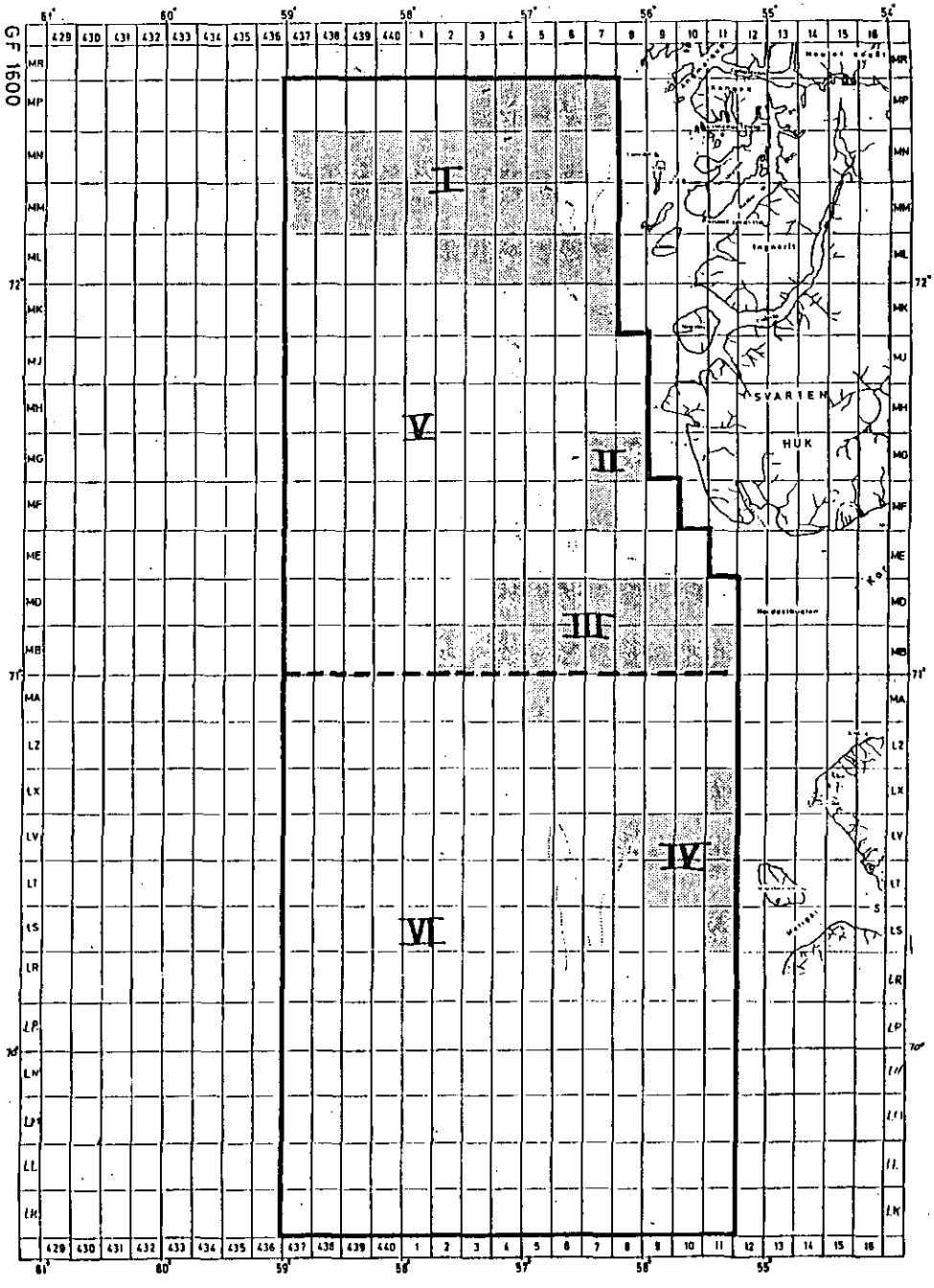

Fig. 3. Strata in the area north of 69°30'N. The strata I - IV correspond to areas of commercial interest, see text.

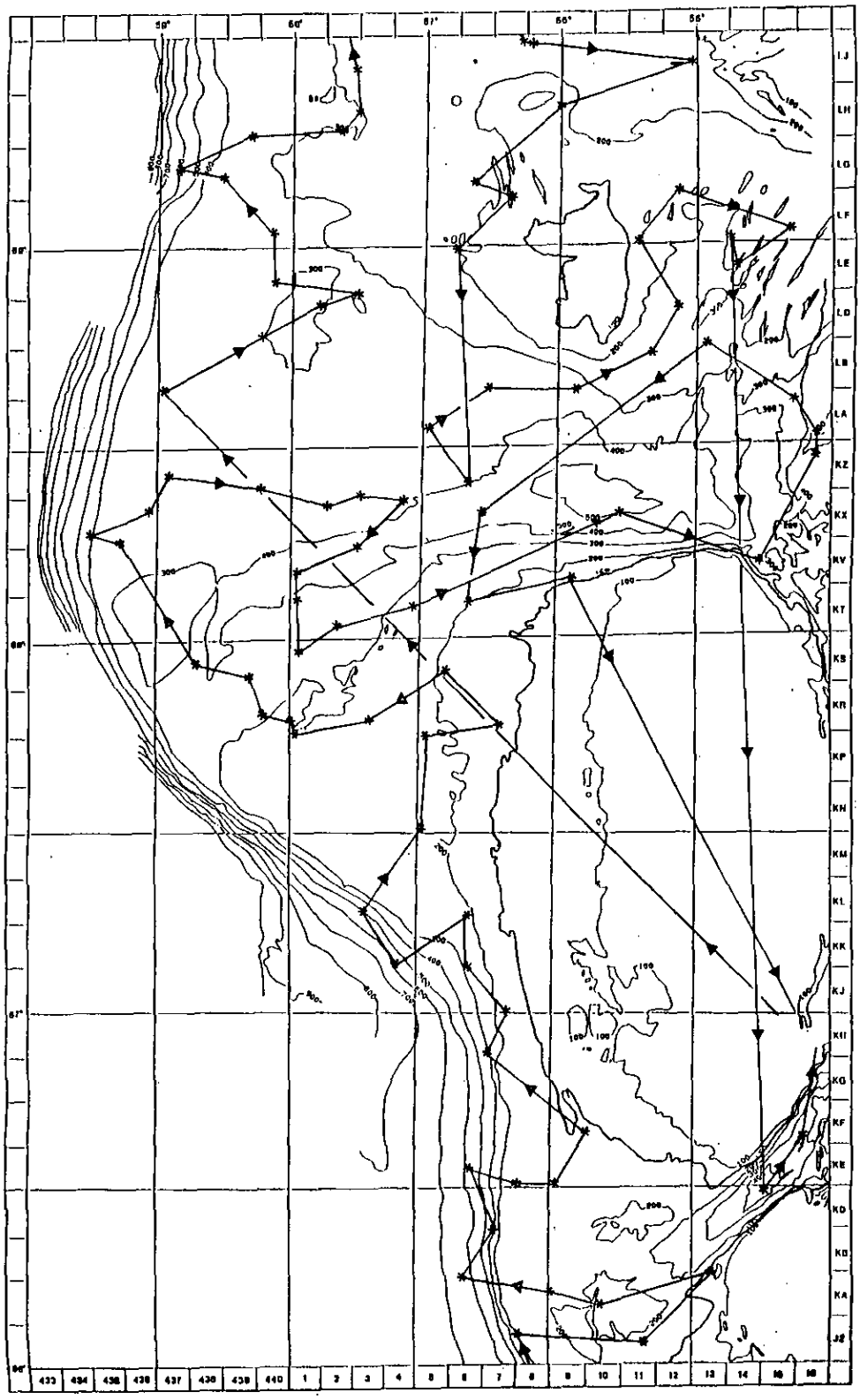

Fig. 4. Selected stations and the survey route in the area 66°00'N - 69°30'N.

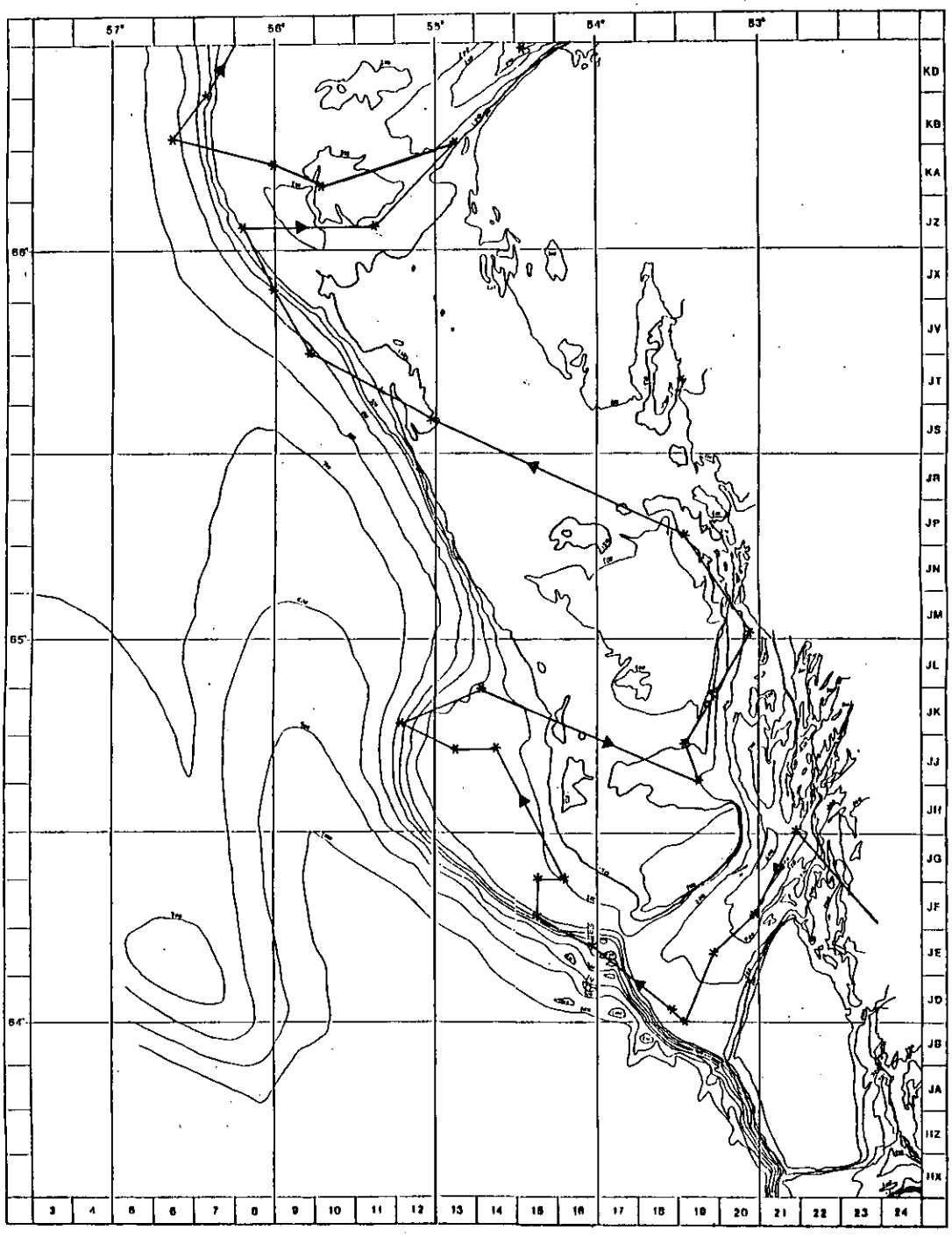

Fig. 5. Selected stations and the survey route in the area 63°52'5N - 66°30'N.

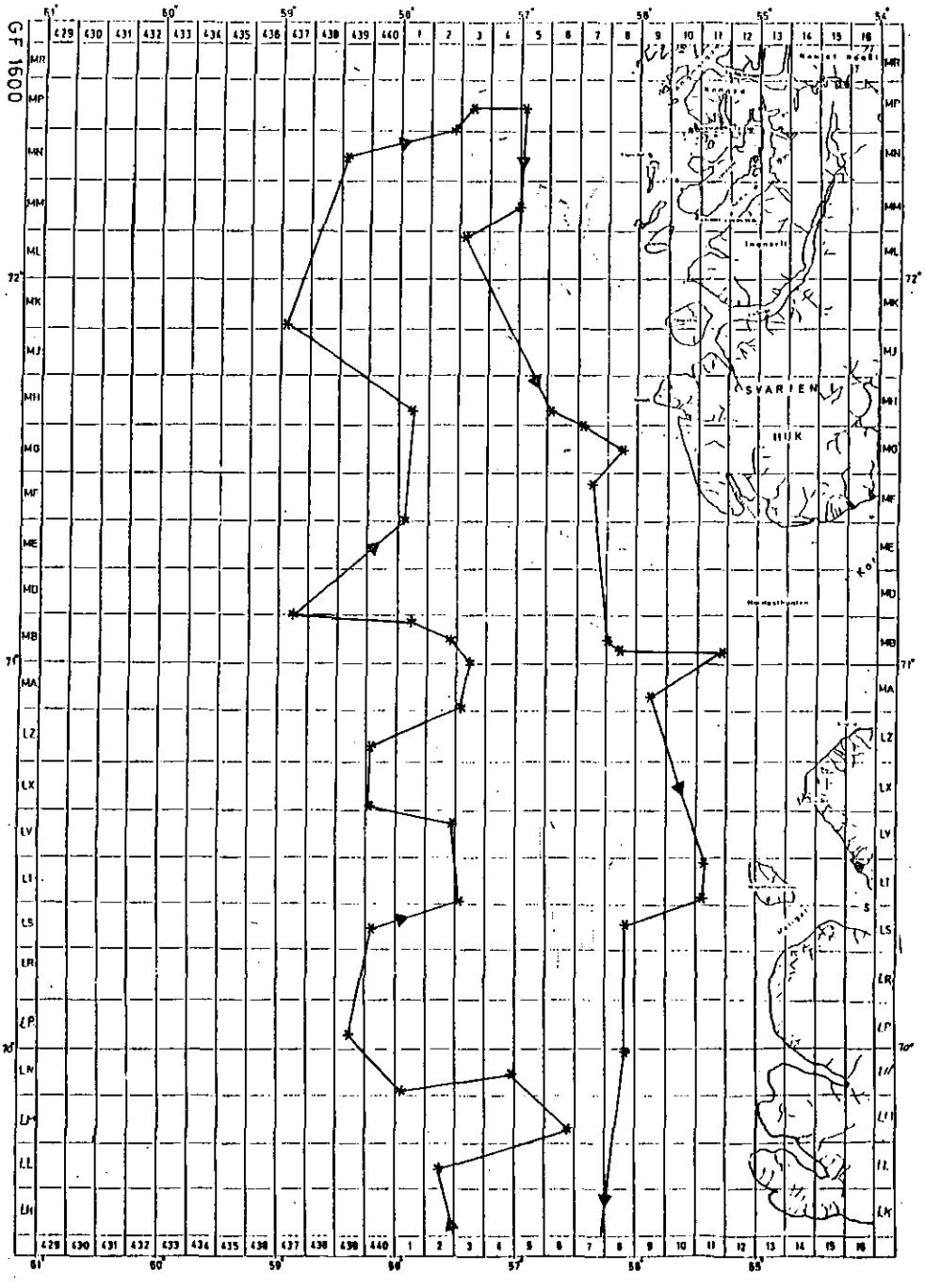

Fig. 6. Selected stations and the survey route in the area north of 69°30'N.