Northwest Atlantic Fisheries Organization

Serial No. N1954 NAFO SCR Doc. 91/70

SCIENTIFIC COUNCIL MEETING - JUNE 1991

Report on Stratified-random Trawl Surveys for Shrimp (Pandalus borealis) in NAFO Subarea 0+1 in July-August 1990, and a Comparison with Earlier Surveys

by

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INTRODUCTION

In July-August 1990 two stratified-random trawl surveys were carried out in the main part of the area of shrimp (*Pandalus borealis*) distribution in NAFO Divisions 1A-1E and a part of SA0.

The surveys were carried out in almost the same area as similar surveys in 1988 and 1989 with the scope of assessing the trawlable biomass of the offshore Subareas 0+1 shrimp stock, and to collect biological samples to estimate the size composition of this stock.

The two trawlers worked simultaneously, both covering the entire survey area. Surveying conditions were favourable without ice problems and bad weather.

MATERIAL AND METHODS

The surveys were carried out in the offshore area between 61°52'5N and 72°30'N at the west coast of Greenland, from the 3-mile limit in depths between 150 meters and 600 meters, including that part of Subarea 0 which is adjacent to the shrimp areas in Subarea 1.

The surveys were conducted with two vessels of 722 GRT and 690 GRT, respectively (M/T MANITSOQ and M/T AUVEQ), which were of the same size as the trawlers used during the surveys in the years before. Also, similar trawling gear (Skjervoy 3300/20 with bobbin gear and a double-bag with 44-mm mesh size in the codend) were used. The trawl doors used were in 1988 and 1990 of the 'PERFECT' type, while in the 1989 survey 'BMV' doors were used, giving a much lesser wing spread. During the trawl operations in 1989 and 1990 the wing spread was measured by means of SCANMAR equipment to 17.2 m and 28.1 m at average, respectively. For the 1988 survey the wing spread was estimated to 26.5 m based on results from tank experiments, lacking equipment to measure the wing spread during the survey.

The duration of hauls was held as close as possible to 60 minutes. In order to minimize the influence of vertical shrimp migration the trawl operations were planned to be carried out only in the daytime (0900-1900 UTC). Due to time constraint, however, it became necessary to work on a 24-hour schedule in the last part of the surveys in 1989 and 1990.

In the area between 61°52'5N and 69°30'N the stratification was made on basis of depth contours. As in the stratification scheme for the earlier surveys this area was divided into subareas (Fig. 1). Each of these subareas was further divided into four depth strata: 150-200 m, 200-300 m, 300-400 m and 400-600 m.

Due to scarce information on bottom topography the area between 69°30'N and 71°00'N was divided into separate shrimp grounds as defined by the distribution of the fishery. However, some changes have been made in the stratification of this area through the three years of trawl surveys due to establishment of a new management strategy from 1989.

It was estimated that 130 and 143 hauls could be taken by the two vessels, respectively, during the time available for the survey in 1990, and with trawling operations in the day-time only. In most of the survey area the degree of coverage would then be close to 600 km² per haul. Only in some of the strata in the northern area a lower degree of coverage (around 1600 km² per haul) was accepted, being areas with known very low shrimp densities.

The hauls were allocated to the strata proportionally to their sizes. However, a minimum of two hauls per stratum was always scheduled, so additional hauls were placed in some of the smaller strata (Tables 1a-c). Within the strata the trawling sites were chosen at random according to the NAFO 'Manual of Groundfish Surveys in the Northwest Atlantic' (Doubleday, 1981). Fig. 2a-h show the fishing locations and the survey routes for the two vessels.

For each station a shrimp biomass estimate for the actual stratum was calculated by means of the swept area method. On the basis of these a mean estimate for each stratum together with standard deviations of the means were calculated. Further, a pooled standard deviation for each region was derived to indicate the level of confidence for the final biomass estimate.

Biological shrimp samples were taken from all catches of one of the vessels. However, from some hauls the catch was to small or to damaged to yield a proper sample. Shrimps were sorted by sexual characteristics and oblique carapace length measured to nearest .1 mm and afterwards pooled in .5 mm groups. Samples were weighted by catch and stratum area, to obtain estimates of total number of shrimp by sex and length group for each stratum and for the total survey area. These estimates were compared to results from the 1988 and 1989 survey to give indications of changes in abundance of size groups.

RESULTS AND DISCUSSION

Shrimp catches from the trawl hauls were used to estimate the trawlable biomass for all strata. Table 1a-c give a list of all catches taken by the two vessels. As the figures from the two vessels are reasonably well correlated, a combined biomass estimate has been calculated. The total biomass estimates for the main areas obtained by means of data from both vessels are shown in Table 2a-c.

When comparing the size of the estimated biomass from the recent survey with the results from corresponding surveys in 1988 and 1989 (Carlsson and Kanneworff, 1989; 1990), a fairly stable situation is indicated (Table 3). The figures from 1989 are somewhat higher (about 30%), but uncertainty remains about the influence of a significantly smaller wing spread used that year than in the two other years. The calculated absolute biomass levels through the three years can therefore only be compared with caution. However, some information may be obtained on a.o. displacement of the stock from year to year by analyzing figures for the proportion of biomass in different strata relative to the yearly totals (Table 4). In relation to 1988 and 1990 a larger part of the stock was found in the southern strata (W3-W5) and in the 200-300 meters depth layer in 1989. In the 1990 data some displacement of the stock to deeper water is indicated, especially in the north (areas W1-W2). A steady decline in biomass is seen through the three years in the northernmost areas (N1-N7). Furthermore, in the depth stratum 150-200 meters practically no shrimp were found in the 1990 surveys.

Length-frequency distributions of shrimp for the total survey areas in 1988, 1989 and 1990 are given in Fig. 3 and Tables 5, 6, and 7.

A direct comparison of total numbers of shrimp by sex from year to year is complicated not only by differences in trawl design and minor changes in the area surveyed between years. Also samples could not be obtained from all strata in all years, however most strata without samples contain very small biomass estimates.

Total estimates of specimens in each sexual group by year (from Tables 5, 6 and 7) show an increase in number of males from 1988 til 1989, and a decrease in 1990 to the level of 1988:

billions shrimp	1988	1989	1990
males	19.8	34.0	19.4
prim.fem.	3.5	2.6	3.3
mult.fem.	4.6	3.7	3.4
Total	27.9	40.3	26.1

Numbers of primiparous females decrease from 1988 to 1989, but increase in 1990 almost to the level of 1988. During the three years number of multiparous females decrease consistently. Total number of shrimp increases in 1989 due to recruitment of small males and levels off in 1990 to the level of 1988.

Savard *et al.* (1989) used modal analysis on shrimp samples collected during Greenland trawl surveys in Davis Strait in 1983 to 1987 and summarized age and growth data as shown in Table 9. Using these data as a length-at-age key on the total length-frequency distributions from the surveys in 1988 to 1990 (Fig. 3 and Tables 5, 6, and 7), some consistency is found from year to year. In 1988 a dominant peak is found around 20 mm CL and another peak at 22.5 mm CL, representing 5 and 6 years old males. In 1989 these peaks have moved to 22 mm and 24.5-25 mm CL, respectively, now representing 6-year-old males and 7-year-old primiparous females. A new mode of males is indicated around 20 mm CL (5 years old), but the distribution is characterized by a dominant mode at 17.5 mm CL, showing a significant recruitment to the fishery of probably 4-year-old males. In 1990 this 'year-class' is still significant, now at 19.5 mm CL, while there are no indications of a significant new recruitment to the fishery of smaller shrimp. The 20 mm group found in 1989 cannot be seen in 1990, while the 22 mm group from 1989 may be found as primary females in 1990.

Figures 4-12 show length-frequencies of the total number of shrimp by stratum and years. All depth strata are combined, the strata north of 69°30'N are combined in two main strata (stratum NW = stratum N1-N4, NS = N5-N7) and all strata on the Canadian side of the midline combined in one stratum (C) (refer

to Fig. 1). Both main strata north of 69°30'N (Fig. 4 and 5) show a significant decrease in abundance of shrimp for all sizes over the three years, except for a minor increase in the male group in stratum NW between 1989 and 1990. In stratum C (Fig. 6) all size groups decrease from 1988 to 1989, while in 1990 numbers of females increase and a dominant male group around 20 mm CL is evident. Fig. 13-15 show the numbers of shrimp in different sex stages and total by stratum (stratum W1-W6) and depth from 1988 to 1990. Comparing these figures with Fig. 7-12 indicates an axis from shallower water in southern areas with smaller shrimp to deeper water to the north with larger shrimp.

CONCLUSIONS

The total biomass estimate from the stratified trawl survey in 1990 indicate a fairly stable situation when compared to results of the surveys in 1988 and 1989. While the figures in 1989 were about 30% higher than in 1988, the 1990 biomass is at the level of 1988. In 1989 a southward displacement of the stock was indicated. In 1990 a displacement in the opposite direction is found in the areas south of 69°30'N, while the biomass is decreasing further in the areas north of these.

In 1989 the stock was concentrated in strata with depths between 200 and 300 meter, while in 1990 shrimp were more concentrated in depths between 300 and 400 meter, similar to the situation in 1988.

Doubt whether the estimates of absolute biomass from the three trawl surveys are comparable has been expressed. The arguments are based on the differences in gear design between years. When looking at the total biomasses in terms of length-frequency distributions the recruitment of a substantial group of males in 1989 may however explain at least in parts the high biomass estimate obtained in 1989.

Also, there is some consistency with regard to the progression of identifiable size groups of shrimp between the years. In 1989 a substantial recruitment to the fishery of small shrimp around 19.5 mm CL is obvious. L50 is at the mesh size used in the surveys (about 43 mm stretched mesh) around 16.5 mm CL (Degel and Lehmann, 1991). If a smaller mesh size had been used, coming recruitment might have been indicated for smaller size groups, if they were available in the survey area.

The primary females found in 1990 may contribute to the multiparous females in 1991, but as the number of multiparous females in 1990 was smaller than in 1988, and as there are no indications of a good recruitment to the primiparous females in 1991, the total number of females may decrease in 1991. The significant recruitment of males in 1989 will not contribute to the group of primiparous females until 1992, and the significance of this recruitment to the large shrimp group will depend heavily on the fishing pressure in the years before 1992. There are no indications of a good recruitment of new groups of males in 1990.

Having only three years of data available, the validation of the apparent consistency in progression of size groups from year to year will depend heavily on results from the planned survey in 1991. If a good agreement with data from recent surveys if found, the next exercise will be to use modal analysis on distributions from strata to investigate the possibly to assess strength of year-classes.

REFERENCES

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Table 1a. List of trawl hauls in strata west of the midline in the Davis Strait survey 1990. Catches are given in kg.

STATION-IDENTIFICATION	AREA-CODE	DEPTH	TR-TIME	SHR	COD	GHL	RED	MIX	TOTAL
STRATUM C1-3									
90MA0190072 059	KX437	324.0	59	135	0	2	8	4	149
90MA0190073 066	KZ436	326.5	62	1400	0	4	15	32	1451
90AU0100067 068	KZ436	317.5	61	401	0	10	73	17	502
STRATUM C1-4									
90AU0100074 089	KX438	435.5	60	5	0	2	27	5	38
STRATUM C3-2									
90MA0190067 045	KN439	288.5	60	485	0	1	5	6	497
90AU0100064 052	KS436	278.5	61	734	0	0	8	35	776
90AU0100066 056	KT436	289.5	60	398	0	7	68	19	492
90MA0190070 050	KT437	277.0	61	180	0	0	0	21	201
STRATUM C3-3									
90AU0100062 046	KP438	342.0	62	558	0	23	37	6	623
90MA0190068 046	KR437	363.0	58	554	0	25	235	0	814
90AU0100065 053	KS436	365.5	60	192	0	30	89	10	322
90MA0190069 048	KS438	391.5	60	87	0	17	249	4	356
STRATUM C3-4									
90MA0190066 042	KM440	429.5	61	336	0	5	27	10	378
90AU0100061 044	KP438	477.0	62	2	0	7	7	3	19
90AU0100063 049	KR436	466.0	60	23	0	129	71	7	230
90MA0190071 056	KV435	469.0	61	2	0	12	32	0	46

Table 1b. List of trawl hauls in strata north of 69°30'N of the midline in the Davis Strait survey 1990. Catches are given in kg.

STATION-IDENTIFICATION	AREA-CODE	DEPTH	TR-TIME	SHR	COD	GHL	RED	MIX	TOTAL
STRATUM N1									
90MA0190085 128	ML005	314.0	63	112	0	6	0	8	126
90MA0190086 124	ML005	287.5	60	72	0	0	0	60	132
90AU0100090 138	ML007	316.5	60	204	0	31	0	52	288
90MA0190083 126	MM003	375.5	66	42	0	5	0	3	51
90MA0190084 127	MM004	331.5	61	150	0	0	0	22	172
90AU0100088 139	MM437	370.5	60	0	0	5	1	5	11
90AU0100089 140	MM440	296.5	60	0	0	5	1	5	11
90MA0190082 129	MN002	344.5	60	161	0	11	0	13	185
90MA0190081 130	MN439	283.0	61	5	0	0	0	5	10
STRATUM N2									
90MA0190092 117	MD003	303.0	60	151	0	1	0	4	155
90MA0190094 119	ME002	274.5	63	3	0	0	0	1	4
90AU0100092 134	MF003	250.0	63	2	0	2	0	3	7
90AU0100093 132	MF004	229.0	53	2	0	1	0	3	7
90MA0190088 122	MH002	245.5	62	1	0	0	0	5	6
90MA0190087 123	MJ002	240.0	59	2	0	0	0	5	7
90AU0100091 137	MJ007	165.0	39	8	0	0	0	6	14
STRATUM N3									
90MA0190090 120	MF007	266.5	61	91	0	16	0	39	146
90AU0100094 133	MF007	260.5	61	60	0	19	0	29	108
90MA0190089 121	MG007	286.0	60	142	0	12	0	37	191
STRATUM N4									
90AU0100099 127	MA005	364.0	63	251	0	20	0	68	339
90MA0190093 116	MB002	327.0	60	148	0	2	0	8	158
90AU0100098 128	MB007	343.0	43	163	0	11	0	17	191
90AU0100097 129	MB011	352.0	60	422	0	18	0	24	464
90AU0100096 130	MD004	316.0	75	232	0	4	0	13	249
90AU0100095 131	MD005	270.0	60	110	0	1	0	21	131
90MA0190091 118	MD007	322.0	60	3	0	2	0	4	8
STRATUM N5									
90MA0190101 096	LL437	494.5	60	0	0	8	30	0	37
90AU0100081 105	LL439	317.5	60	82	0	3	5	17	107
90AU0100082 106	LM435	378.0	61	9	0	1	16	4	30
90MA0190077 099	LN433	489.5	60	0	0	1	29	1	31
90AU0100083 110	LN434	391.5	61	0	0	0	2	0	3
90MA0190076 097	LN436	302.0	14	4	0	1	1	4	9
90AU0100084 109	LP434	442.5	61	0	0	0	0	0	1
90AU0100085 111	LP434	456.0	65	0	0	2	11	0	13
90MA0190075 100	LP439	346.5	58	7	0	4	0	35	46
90MA0190078 102	LR433	486.0	60	0	0	11	19	8	38
90MA0190079 103	LR436	365.0	19	13	0	1	2	3	19
90AU0100086 113	LR436	374.5	60	46	0	5	2	8	61
90AU0100087 114	LR437	318.0	63	4	0	1	4	6	16
90AU0100102 116	LT437	485.0	61	0	0	6	2	1	9
90MA0190080 106	LT438	513.0	58	0	0	4	2	0	7
90AU0100103 117	LT440	478.5	60	4	0	15	8	3	30
90AU0100104 118	LT440	411.0	60	27	0	3	9	9	47
STRATUM N6									
90AU0100080 103	LR002	239.0	61	0	0	0	0	0	0
90AU0100107 108	LN009	137.0	60	4	0	0	0	2	7
90MA0190100 098	LP010	118.5	63	0	0	0	0	32	32
90MA0190099 101	LR010	94.0	59	0	0	0	0	36	36
90MA0190098 104	LS006	261.5	60	1	0	0	0	5	6
90MA0190097 105	LT006	256.5	60	9	0	0	0	8	17
90AU0100101 122	LZ002	476.5	60	12	0	14	1	1	28
90AU0100100 124	MA003	400.5	61	9	0	5	0	4	17
STRATUM N7									
90AU0100106 115	LT011	183.0	60	1	0	1	0	6	7
90MA0190096 107	LV009	229.0	61	45	0	0	0	9	54
90AU0100105 119	LV009	314.0	60	277	0	12	1	107	398
90MA0190095 111	LX011	434.0	61	11	0	2	1	3	16

Table 1c. List of trawl hauls in strata south of 69°30'N of the midline in the Davis Strait survey 1990. Catches are given in kg.

STATION-IDENTIFICATION	AREA-CODE	DEPTH	TR-TIME	SHR	COD	GHL	RED	MIX	TOTAL
STRATUM W1-1									
90MA0190122 077	LD008	166.5	59	2	0	1	0	1	4
90MA0190128 086	LG010	154.5	60	0	0	0	0	6	6
90AU0100125 092	LH009	170.0	48	0	0	0	0	0	0
90AU0100127 094	LH014	163.5	60	32	0	0	0	7	39
STRATUM W1-2									
90AU0100119 074	LB007	289.5	61	143	0	2	2	6	152
90MA0190121 074	LB008	295.5	62	243	0	4	2	10	257
90MA0190115 076	LD001	295.0	60	120	0	0	0	14	134
90MA0190107 080	LE001	296.0	60	88	0	3	0	11	102
90AU0100113 086	LF003	223.0	62	1	0	0	0	6	7
90MA0190123 082	LF004	236.0	60	19	0	0	0	7	26
90MA0190124 085	LG003	262.5	40	10	0	0	0	6	16
90AU0100112 091	LG004	203.0	60	1	0	0	0	9	10
90AU0100075 085	LG440	272.0	73	5	0	1	4	14	23
90MA0190125 089	LH004	205.5	60	0	0	0	0	0	0
90AU0100126 093	LH013	209.5	60	15	0	2	0	5	22
90AU0100110 095	LJ004	211.0	60	1	0	0	0	2	3
90AU0100111 096	LJ005	207.5	61	3	0	1	0	4	8
90MA0190126 092	LJ009	245.5	61	130	0	0	0	59	189
90MA0190127 091	LJ009	232.5	58	8	0	0	0	5	13
90AU0100108 104	LJ011	228.0	60	17	0	1	0	9	27
90AU0100109 097	LJ011	231.5	60	146	0	11	0	22	179
STRATUM W1-3									
90MA0180047 060	KX439	322.0	61	1635	0	7	5	22	1669
90AU0100117 064	KX440	327.5	63	190	0	17	23	6	236
90AU0100120 066	KZ004	378.5	61	261	0	35	27	5	328
90MA0180052 061	KZ006	369.0	60	668	1	65	54	14	802
90AU0100118 065	LA001	338.5	61	319	0	0	0	0	319
90AU0100121 069	LA003	361.0	60	535	0	45	30	6	616
90MA0180053 067	LA006	387.5	60	180	0	38	13	15	246
90AU0100068 072	LA436	394.0	61	22	0	10	100	4	136
90MA0190112 075	LA437	320.0	62	899	0	0	0	26	924
90MA0190113 072	LA438	324.0	65	605	0	0	0	15	619
90MA0190114 073	LA440	317.5	61	161	0	0	0	17	178
90AU0100122 073	LB003	317.0	61	1366	0	18	8	18	1410
90MA0190074 071	LB436	321.0	63	274	0	1	2	15	291
90AU0100069 077	LB438	323.5	59	81	0	10	27	33	151
90AU0100123 078	LD003	321.0	61	891	0	16	2	8	917
90AU0100070 079	LE437	361.0	60	45	0	5	81	4	134
90AU0100072 082	LE438	350.0	60	155	0	2	20	13	190
90MA0190116 079	LE439	327.5	62	69	0	5	1	12	87
90AU0100071 080	LE439	333.5	60	125	0	5	12	16	157
90MA0190106 081	LF001	305.0	61	158	0	7	0	35	201
90AU0100073 084	LF438	343.0	60	313	0	4	10	15	342
90MA0190105 084	LF439	306.0	60	13	0	2	1	4	20
90AU0100076 090	LH439	300.5	62	88	0	9	26	9	132
90AU0100077 100	LJ438	329.5	61	99	0	10	45	22	176
90AU0100079 098	LJ438	386.0	65	18	0	4	83	10	116
90MA0190102 093	LJ439	335.5	61	76	0	3	10	15	104
STRATUM W1-4									
90MA0190104 088	LG437	517.0	62	0	0	1	6	1	8
90MA0190103 090	LG438	518.5	60	1	0	0	0	1	2
90AU0100078 099	LJ438	418.0	63	12	0	3	100	25	140
STRATUM W2-1									
90MA0190131 087	LD010	185.0	60	0	0	0	0	1	1
90AU0100130 081	LE014	173.0	62	1	0	0	0	0	1
90MA0190130 083	LF011	162.0	61	0	0	0	0	1	1
90AU0100128 088	LF013	165.0	60	5	1	0	0	1	7
90AU0100129 083	LF015	155.0	37	0	0	0	0	0	0
STRATUM W2-2									
90AU0090038 051	KT016	265.0	60	622	0	5	30	138	795
90MA0180063 055	KV015	242.5	62	235	0	1	14	6	255
90AU0090040 062	KX015	233.5	60	0	0	0	0	0	0
90MA0180060 064	KZ015	291.0	47	144	0	3	15	16	177
90MA0180057 068	LA011	271.5	60	280	0	2	4	7	293
90AU0090045 075	LB011	260.0	61	99	0	2	2	8	111
90AU0090043 076	LB015	260.0	65	16	0	0	5	9	30
STRATUM W2-3									
90MA0180061 065	KZ013	327.5	45	651	0	4	49	30	734
90MA0180058 069	LA013	309.0	60	2863	2	12	76	113	3065
90AU0090044 070	LA013	313.5	72	1864	0	5	68	30	1967
STRATUM W2-4									
90MA0180062 063	KX013	456.5	46	233	4	105	59	28	428
90AU0090039 061	KX013	447.5	60	2524	0	89	104	19	2737
90AU0090041 063	KX015	407.0	65	3691	0	0	0	0	3691
90AU0090041 063	KZ015	407.5	71	835	6	56	322	27	1245
90MA0180059 070	LA016	542.5	61	1450	0	16	24	28	1517
90AU0090042 071	LA016	538.0	60	1864	0	31	61	15	1972

Table 1c continued.

STATION-IDENTIFICATION	AREA-CODE	DEPTH	TR-TIME	SHR	COD	GHL	RED	MIX	TOTAL
STRATUM W3-1									
90MA0180041 038	KL006	194.5	66	1	0	0	0	6	6
90AU0090052 041	KM006	186.5	60	0	0	0	0	0	0
90AU0090050 048	KP006	180.0	62	0	0	0	0	0	0
90AU0090051 045	KP007	154.5	57	1	0	0	8	6	15
90MA0180050 049	KT006	177.0	46	4	0	1	1	5	11
90MA0180054 054	KV010	177.0	60	2	0	0	0	7	9
STRATUM W3-2									
90MA0180040 037	KK005	256.5	60	1316	0	0	1	9	1326
90AU0090054 038	KL004	263.5	61	43	0	2	3	7	55
90MA0190065 043	KM001	242.0	62	0	0	1	3	1	5
90AU0090058 039	KM003	232.5	61	0	0	0	0	2	2
90AU0090057 040	KM004	223.0	60	1	1	0	0	3	5
90MA0180042 041	KM005	217.5	58	1	0	0	0	4	5
90AU0090055 042	KN002	236.5	60	0	0	0	0	0	0
90MA0180043 044	KN003	213.5	60	0	0	0	0	1	2
90AU0090056 043	KN004	221.0	63	6	0	2	1	5	13
90AU0100060 047	KR001	283.5	62	302	0	5	16	11	335
90MA0180051 053	KV006	282.0	61	420	0	0	3	10	433
90AU0090047 058	KV007	209.0	61	5	0	7	3	14	29
STRATUM W3-3									
90MA0180039 036	KJ006	355.0	60	308	0	4	4	2	318
90MA0180044 040	KM002	300.5	60	215	0	1	2	9	226
90AU0100059 050	KS002	304.5	65	1137	0	1	7	11	1156
90MA0180045 047	KT001	352.0	67	493	0	10	14	5	522
90AU0090049 054	KT002	344.5	60	271	0	12	17	5	305
90AU0090048 055	KT003	335.0	62	957	0	31	18	7	1014
90AU0100114 057	KT439	385.0	60	235	0	20	112	2	369
90MA0180046 051	KT440	393.0	62	185	0	16	42	3	246
90MA0180049 052	KV004	321.5	66	2123	0	7	28	28	2186
STRATUM W3-4									
90AU0090037 036	KJ006	408.5	57	23	0	31	255	1	310
90AU0090053 037	KL002	410.5	46	40	0	8	22	16	87
90MA0190064 039	KM001	455.0	60	0	0	12	75	4	91
90AU0100115 059	KV002	429.5	60	177	0	19	17	4	218
90MA0180048 057	KX003	416.0	60	175	0	37	109	13	335
90AU0100116 060	KX004	409.0	60	497	0	26	46	7	576
90MA0180055 058	KX009	505.5	60	270	0	29	14	8	321
90AU0090046 067	KZ009	500.5	62	95	0	24	5	5	129
90MA0180056 062	LA008	419.0	61	640	0	45	45	14	744
STRATUM W4-1									
90AU0090026 023	JX011	172.5	62	0	0	0	0	3	4
90AU0090027 026	JZ012	165.5	60	0	0	0	0	0	0
90MA0180030 025	KA013	180.5	60	0	0	0	0	2	3
90MA0180028 027	KB008	169.0	58	3	0	0	1	1	5
90AU0090029 028	KB008	168.0	61	0	0	0	0	7	8
90MA0180034 030	KD009	183.0	62	0	0	0	0	1	1
90AU0090030 029	KD009	187.5	69	0	0	0	2	2	4
90AU0090031 030	KD012	179.0	58	0	0	0	0	0	0
90MA0180035 028	KE007	185.0	63	0	0	0	0	1	1
90AU0090033 033	KE008	164.0	64	3	0	1	4	5	13
90MA0180033 031	KE010	169.0	64	0	0	0	0	0	0
90MA0180032 032	KE014	153.5	43	11	0	0	0	8	19
STRATUM W4-2									
90AU0090025 025	JZ010	210.0	62	0	0	0	1	1	2
90MA0180029 024	KA011	228.0	59	1	0	0	0	5	7
90AU0090028 027	KA011	218.5	60	4	0	1	0	5	10
90AU0090035 034	KF007	244.0	67	4091	0	0	0	4	4095
90MA0180031 034	KF016	260.5	61	133	0	1	0	14	148
STRATUM W4-3									
90MA0180027 023	KA007	332.0	57	167	4	1	16	18	206
90AU0090032 031	KD014	366.5	62	173	0	9	29	16	226
90MA0180037 033	KF007	371.5	68	127	1	4	1073	10	1214
90AU0090036 035	KH006	363.5	67	265	0	0	23	15	303
STRATUM W4-4									
90AU0090023 022	JX007	576.5	78	1	0	26	10	3	39
90AU0090024 024	JZ006	547.5	61	1	24	12	0	4	41
90MA0180026 026	KA007	517.0	60	0	0	4	20	13	36
90MA0180036 029	KE006	458.5	60	19	1	26	63	4	113
90AU0090034 032	KE006	569.0	60	1	0	34	3	2	41
90MA0180038 035	KH006	486.5	61	0	0	1	1	0	2
STRATUM W5-1									
90AU0090014 011	JF017	179.0	61	0	0	0	0	0	0
90AU0090009 016	JH020	193.0	61	5	0	0	0	4	9
90MA0180020 015	JJ018	161.5	62	0	0	0	0	0	0
90AU0090020 018	JL014	187.0	65	0	0	0	3	2	5
90MA0180022 019	JL015	183.5	60	0	0	0	0	2	2
90MA0180024 022	JV010	181.0	62	0	0	0	0	0	1
STRATUM W5-2									
90AU0090013 007	JD020	230.5	58	163	0	0	3	1	167
90MA0180013 009	JF015	243.0	61	14	0	0	1	2	17
90AU0090015 009	JF016	280.5	61	3	0	0	1	1	5
90MA0180014 013	JG014	262.5	60	8	0	0	1	1	9
90AU0090017 013	JG014	269.5	59	2	0	0	5	0	7
90AU0090018 015	JH014	281.5	62	70	0	0	1	0	72
90MA0180021 014	JH015	234.0	60	79	0	0	0	0	79
90MA0180017 016	JJ013	294.5	64	2	0	0	1	0	3
90AU0090019 017	JJ015	215.0	63	0	0	0	0	0	0
90MA0180018 020	JL020	274.5	64	738	0	0	11	18	767

Table 1c continued.

STATION-IDENTIFICATION	AREA-CODE	DEPTH	TR-TIME	SHR	COD	GHL	RED	MIX	TOTAL
STRATUM W5-3									
90AU0090011 012	JE019	314.5	68	2392	0	1	6	5	2404
90AU0090012 010	JE019	341.0	61	320	1	2	26	10	358
90MA0180016 011	JG013	324.5	62	0	3	0	0	0	3
90MA0180023 018	JL014	322.0	60	0	0	0	2	1	3
90AU0090010 019	JM020	366.0	61	71	0	0	75	29	176
STRATUM W5-4									
90AU0090016 008	JE016	511.5	61	5	0	2	32	60	99
90MA0180012 010	JF020	475.5	61	83	5	2	15	3	109
90MA0180015 012	JG013	449.0	60	0	1	0	0	0	1
90AU0090008 014	JG022	588.5	60	296	0	0	0	50	346
90MA0180019 017	JJ021	531.0	60	536	0	8	6	9	559
90AU0090021 020	JS011	585.5	60	2	0	11	0	119	132
90AU0090022 021	JT010	481.5	59	14	0	12	264	35	325
90MA0180025 021	JV009	426.5	64	199	1	3	70	7	280
STRATUM W6-1									
90MA0180006 003	HL028	172.5	61	18	0	0	3	13	34
90MA0180009 006	HR026	183.0	60	0	0	0	0	0	0
90AU0090007 006	JA023	176.5	61	8	0	1	3	3	15
STRATUM W6-2									
90AU0090001 001	HM029	268.5	55	2	475	6	6	21	509
90MA0180010 007	HX023	267.0	59	429	2	0	9	13	453
90AU0090005 004	HX023	247.0	60	469	0	0	16	7	492
STRATUM W6-3									
90MA0180007 004	HL029	363.5	62	5	1208	2	12	5	1231
90MA0180008 005	HP025	359.5	59	36	69	0	2	3	109
STRATUM W6-4									
90AU0090003 102	HP027	417.5	60	147	30	1	0	13	191
90AU0090004 003	HT022	441.5	60	0	5	0	85	19	109
90MA0180011 008	HX024	507.5	62	352	11	6	9	17	395
90AU0090006 005	HX024	526.0	62	352	1	18	17	16	404

Table 2a. Estimated trawlable biomass in strata west of the midline in the Davis Strait survey 1990.

STRATUM	SQKM	BIOMASS IN STRATA					
		TONS	HAULS	STD	STDERR	MIN	MAX
AREA C1 300-400 M	655	3651.6	3	3827.9	2210.0	763	7993
AREA C1 400-600 M	312	8.6	1	.	.	9	9
AREA C3 200-300 M	660	2377.0	4	1263.6	631.8	984	4053
AREA C3 300-400 M	1192	3440.1	4	2566.6	1283.3	956	6744
AREA C3 400-600 M	623	481.8	4	861.3	430.7	11	1771

Table 2b. Estimated trawlable biomass in strata north of 69°30'N in the Davis Strait survey 1990.

STRATUM	SQKM	BIOMASS IN STRATA					
		TONS	HAULS	STD	STDERR	MIN	MAX
AREA N1	3649	2560.8	9	2476.8	825.6	3	6345
AREA N2	11789	1755.4	7	3788.0	1431.7	61	10315
AREA N3	367	287.8	3	148.7	85.8	177	457
AREA N4	2249	3107.9	7	2125.6	803.4	60	6640
AREA N5	9607	1020.2	17	1532.5	371.7	0	4914
AREA N6	15926	594.7	8	653.9	231.2	0	1555
AREA N7	1159	901.0	4	1425.6	712.8	13	3018

Table 2c. Estimated trawlable biomass in strata south of 69°30'N east of the midline in the Davis Strait survey 1990.

STRATUM	SQKM	BIOMASS IN STRATA					
		TONS	HAULS	STD	STDERR	MIN	MAX
AREA W1 150-200 M	2363	171.3	4	312.9	156.5	0	640
AREA W1 200-300 M	5213	2256.4	17	3079.2	746.8	4	10907
AREA W1 300-400 M	9239	26163.0	26	34316.5	6730.0	1265	153923
AREA W1 400-600 M	752	28.4	3	45.0	26.0	1	80
AREA W2 150-200 M	1499	16.4	5	27.5	12.3	0	63
AREA W2 200-300 M	2477	5007.3	7	5376.9	2032.3	0	15663
AREA W2 300-400 M	1453	25931.8	3	14031.6	8101.1	11968	40030
AREA W2 400-600 M	559	8773.4	6	5898.6	2408.1	1446	16210
AREA W3 150-200 M	2215	31.8	6	45.3	18.5	0	115
AREA W3 200-300 M	4810	9159.4	12	22680.8	6547.4	0	78794
AREA W3 300-400 M	2714	15140.7	9	15403.7	5134.6	4648	51892
AREA W3 400-600 M	3361	6781.9	9	7402.1	2467.4	10	22973
AREA W4 150-200 M	4204	64.6	12	133.0	38.4	0	454
AREA W4 200-300 M	1736	9713.7	5	20548.4	9189.5	0	46439
AREA W4 300-400 M	745	1118.6	4	328.7	164.4	687	1484
AREA W4 400-600 M	1915	49.0	6	97.1	39.6	5	247
AREA W5 150-200 M	1995	18.6	6	44.1	18.0	0	109
AREA W5 200-300 M	3454	3520.8	10	7519.5	2377.9	0	24417
AREA W5 300-400 M	1797	7736.9	5	13898.5	6215.6	0	32288
AREA W5 400-600 M	2806	3672.6	8	5223.4	1846.7	0	14551
AREA W6 150-200 M	1095	96.0	3	88.5	51.1	0	174
AREA W6 200-300 M	1491	4652.9	3	4008.6	2314.3	28	7120
AREA W6 300-400 M	1300	217.4	2	217.9	154.1	63	371
AREA W6 400-600 M	884	1653.8	4	1280.6	640.3	2	2714

Table 3. Sum of estimated biomasses i main areas 1988-90.

AREA	BIOMASS 1988	1989	1990
WEST (S of 69°30'N)	122323	184032	131977
CANADA	8111	3992	9959
NORTH (N of 69°30'N)	25177	11805	10228
TOTAL	155611	199829	152164

Table 4. Stratumareas in % of total survey area (shaded lines) and calculated biomass estimates in % of total (yearly) biomass from surveys 1988-90 in the area 61°52'5N - 72°30'N.

	DEPTHS STRATUM 150-200 M	200-300 M	300-400 M	400-600 M	TOTAL
C1 AREA	0	0	0.6	0.3	0.9
1988-BIOM	-	-	1.1	0.0	1.1
1989-BIOM	-	-	0.5	0.0	0.6
1990-BIOM	-	-	2.2	0.0	2.2
C3 AREA	0	0.6	1.1	0.6	2.3
1988-BIOM	-	-	4.1	-	4.1
1989-BIOM	-	-	1.1	0.3	1.4
1990-BIOM	-	1.6	2.3	0.3	4.2
N1 AREA	-	-	-	-	3.4
1988-BIOM	-	-	-	-	1.5
1989-BIOM	-	-	-	-	2.2
1990-BIOM	-	-	-	-	1.6
N2 AREA	-	-	-	-	10.9
1988-BIOM	-	-	-	-	7.0
1989-BIOM	-	-	-	-	0.6
1990-BIOM	-	-	-	-	1.1
N3 AREA	-	-	-	-	0.3
1988-BIOM	-	-	-	-	0.0
1989-BIOM	-	-	-	-	0.1
1990-BIOM	-	-	-	-	0.2
N4 AREA	-	-	-	-	2.1
1988-BIOM	-	-	-	-	2.6
1989-BIOM	-	-	-	-	1.4
1990-BIOM	-	-	-	-	1.7
N5 AREA	-	-	-	-	8.9
1988-BIOM	-	-	-	-	1.4
1989-BIOM	-	-	-	-	1.7
1990-BIOM	-	-	-	-	0.6
N6 AREA	-	-	-	-	14.7
1988-BIOM	-	-	-	-	1.5
1989-BIOM	-	-	-	-	-
1990-BIOM	-	-	-	-	0.4
N7 AREA	-	-	-	-	1.1
1988-BIOM	-	-	-	-	2.1
1989-BIOM	-	-	-	-	0.0
W1 AREA	2.2	4.8	8.6	0.7	16.2
1988-BIOM	0.0	0.8	18.8	0.0	19.5
1989-BIOM	0.1	5.2	6.7	0.0	12.0
1990-BIOM	0.1	1.5	18.2	0.0	19.9
W2 AREA	1.4	2.3	1.3	0.5	5.5
1988-BIOM	0.0	4.4	7.3	1.0	12.8
1989-BIOM	0.0	6.0	10.6	0.9	17.5
1990-BIOM	0.0	3.4	17.2	5.0	25.7
W3 AREA	2.0	4.4	2.5	3.1	12.1
1988-BIOM	0.0	11.8	7.7	4.4	23.9
1989-BIOM	0.1	17.2	5.9	3.8	27.0
1990-BIOM	0.0	7.1	9.9	4.7	21.7
W4 AREA	3.9	1.6	0.7	1.8	7.9
1988-BIOM	7.4	3.1	0.2	2.2	13.0
1989-BIOM	1.4	14.0	0.0	0.1	15.5
1990-BIOM	0.0	5.5	0.7	0.0	6.3
W5 AREA	1.8	3.2	1.8	2.6	9.3
1988-BIOM	0.0	3.3	2.6	3.5	9.4
1989-BIOM	3.4	9.8	5.4	1.5	20.2
1990-BIOM	0.0	2.3	4.2	2.4	9.0
W6 AREA	1.0	1.4	1.2	0.8	4.4
1988-BIOM	-	-	-	-	-
1989-BIOM	-	-	-	-	-
1990-BIOM	0.1	3.5	0.1	1.3	5.0
1990-BIOM	-	-	-	-	0.6

Table 5. Numbers of shrimps per length group (carapace length) in total biomass estimate in 1988, based on pooling of individual samples weighted by catch and stratum area.

LENGTH	MALES + JUV.	PRIM.FEM	MULT.FEM	TOTAL
6	0	0	0	0
6.5	31348	0	0	31348
7	768392	0	0	768392
7.5	0	0	0	0
8.5	0	0	0	0
9	13800	0	0	13800
9.5	351328	0	0	351328
10	3283661	0	0	3283661
10.5	9779150	0	0	9779150
11	16254116	0	0	16254116
11.5	47212768	0	0	47212768
12	62784033	0	0	62784033
12.5	98195854	0	0	98195854
13	123447557	0	0	123447557
13.5	154140740	0	0	154140740
14	153263776	0	0	153263776
14.5	162184387	0	0	162184387
15	202168608	0	0	202168608
15.5	253078261	0	0	253078261
16	334722078	0	0	334722078
16.5	466057022	0	0	466057022
17	646752914	0	146042	646898956
17.5	834528218	0	0	834528218
18	890597706	645721	5285	891248712
18.5	1022945788	0	496172	1023441960
19	1214739235	165096	17203	1214921534
19.5	1282367961	82172	290535	1282740668
20	1470132929	19681	414040	1470566650
20.5	1721015607	3825836	5594376	1730435819
21	1644808329	7517936	2393278	1654719543
21.5	1447386399	8148087	3665892	1459200378
22	1401014926	21939380	9873799	1432828105
22.5	1221212329	51952111	7683784	1280848224
23	1150517246	135861319	38503159	1324881724
23.5	809792737	231161995	75455631	1116410363
24	529406774	422927075	171779221	1124113070
24.5	266053307	534052465	301306629	1101412401
25	115600496	628756258	457378537	1201735291
25.5	32964472	618885560	636968750	1288818782
26	13651378	425302611	688125174	1127079163
26.5	3267691	249187432	682991505	935446628
27	246961	111874569	519447344	631568874
27.5	0	39815471	398464330	438279801
28	0	8557494	279219524	287777018
28.5	0	361885	162361945	162723830
29	0	0	89499584	89499584
29.5	0	1256855	39399190	40656045
30	0	0	27248926	27248926
30.5	0	0	13866113	13866113
31	0	0	6243837	6243837
31.5	0	0	718685	718685
32	0	0	114331	114331
32.5	0	0	719526	719526
33	0	0	0	0
TOTAL	19806740282	3502297009	4620392347	27929429638

Table 6. Numbers of shrimps per length group (carapace length) in total biomass estimate in 1989, based on pooling of individual samples weighted by catch and stratum area.

LENGTH	MALES + JUV.	PRIM.FEM	MULT.FEM	TOTAL
7	0	0	0	0
7.5	2904063	0	0	2904063
8	273954	0	0	273954
8.5	1765687	0	0	1765687
9	9515989	0	0	9515989
9.5	5544662	0	0	5544662
10	7333988	0	0	7333988
10.5	15375942	0	0	15375942
11	18571799	0	0	18571799
11.5	22696662	0	0	22696662
12	98535879	0	0	98535879
12.5	70976171	0	0	70976171
13	125157504	0	0	125157504
13.5	142287404	0	0	142287404
14	226257363	0	0	226257363
14.5	481843988	0	0	481843988
15	757102347	0	0	757102347
15.5	1374306418	0	0	1374306418
16	2180862141	0	0	2180862141
16.5	2615997559	0	0	2615997559
17	3570805620	1084918	0	3571890538
17.5	3908009636	0	0	3908009636
18	3606988174	509589	353223	3607850986
18.5	2822206529	992737	202699	2823401965
19	2218815614	134677	196226	2219146517
19.5	1824113468	953467	4029845	1829096780
20	1455357395	11454827	3639358	1470451580
20.5	1316524798	18377552	5864828	1340767178
21	1093911596	15883588	13990022	1123785206
21.5	963766938	24439849	12434326	1000641113
22	885823369	105965822	24314479	1016103670
22.5	689231971	82800235	59345122	831377328
23	550202811	139651627	75014837	764869275
23.5	395418063	219929639	122224967	737572669
24	240841972	278227635	159931393	679001000
24.5	144505679	396037551	268268763	808811993
25	69740161	399657406	398210674	867608241
25.5	28499488	375494630	480153618	884147736
26	8483363	276352798	474806830	759642991
26.5	1102863	183120550	494551241	678774654
27	530420	69222480	399622936	469375836
27.5	14824	32075156	297657294	329747274
28	0	9741737	187169056	196910793
28.5	7330	3929382	128852811	132789523
29	1765687	495323	59799620	62060630
29.5	7330	467419	38007703	38482452
30	0	0	18886182	18886182
30.5	0	0	9865746	9865746
31	0	0	2328256	2328256
31.5	0	0	1442508	1442508
32	0	0	28941	28941
32.5	0	0	89942	89942
33	0	0	9922	9922
33.5	0	0	0	0
TOTAL	33953984619	2647000594	3741293368	40342278581

Table 7. Numbers of shrimps per length group (carapace length) in total biomass estimate in 1990, based on pooling of individual samples weighted by catch and stratum area.

LENGTH	MALES + JUV.	PRIM.FEM	MULT.FEM	TOTAL
6	0	0	0	0
6.5	662036	0	0	662036
7	0	0	0	0
7.5	284456	0	0	284456
8	260548	0	0	260548
8.5	1363073	0	0	1363073
9	5167114	0	0	5167114
9.5	10772910	0	0	10772910
10	21435343	0	0	21435343
10.5	32242856	0	0	32242856
11	67219580	0	0	67219580
11.5	113606892	0	0	113606892
12	148948954	0	0	148948954
12.5	216964962	0	0	216964962
13	221852388	0	0	221852388
13.5	244708861	0	0	244708861
14	209535320	0	0	209535320
14.5	186775480	0	0	186775480
15	212243222	0	0	212243222
15.5	261486107	0	0	261486107
16	326337187	0	0	326337187
16.5	513313790	6212	265774	513585776
17	601750138	6212	1949108	603705458
17.5	952023104	126277	6212	952155593
18	1246042342	0	52816	1246095158
18.5	1589898561	12424	155692	1590066677
19	1997895769	5808261	107073	2003811103
19.5	2155562318	5063959	344846	2160971123
20	1931360654	11000294	888959	1943249907
20.5	1798156452	15654341	1224291	1815035084
21	1461355181	68258385	6065180	1535678746
21.5	1107228856	81449447	7680861	1196359164
22	746258487	140073938	21104184	907436609
22.5	447013545	242602130	43198361	732814036
23	242262831	319699070	77447028	639408929
23.5	135767112	400668960	123034623	659470695
24	84824142	419584645	127713477	632122264
24.5	61606442	441776256	222549908	725932606
25	23030618	432950866	371526233	827507717
25.5	12773796	297221462	411021050	721016308
26	3947850	205773814	417132586	626854250
26.5	987947	138572282	462133821	601694050
27	1346421	67972152	374102863	443421436
27.5	26138	27080815	293640099	320747052
28	0	6684970	185446216	192131186
28.5	0	3170422	108644400	111814822
29	0	2156373	47654840	49811213
29.5	0	128422	21159827	21288249
30	0	0	18666650	18666650
30.5	0	0	8121772	8121772
31	0	0	1881377	1881377
31.5	0	0	2663774	2663774
32	0	0	132526	132526
32.5	0	0	358083	358083
33	0	0	0	0
TOTAL	19396299783	3333502389	3358074510	26087876682

Table 8. Numbers of shrimp (millions) by sexual group and stratum (see Fig. 1) in 1988, 1989 and 1990 based on pooling of shrimp samples (see text).

STRATUM	1988				1989				1990			
	MALES	PRIMI	MULTI	SUM	MALES	PRIMI	MULTI	SUM	MALES	PRIMI	MULTI	SUM
N1	356.26	6.61	57.38	420.25	369.22	10.56	138.72	518.50	359.90	2.58	67.06	429.54
N2	1487.98	300.60	78.20	1866.78	134.80	2.21	87.08	224.09	572.32	0.15	46.33	618.80
N3	5.25	0.07	0.29	5.61	40.60	0.09	1.43	42.12	32.25	0.00	11.39	43.64
N4	430.96	80.24	145.40	656.60	278.93	3.69	106.54	389.16	161.25	7.67	13.69	182.61
N5	112.76	13.37	118.84	244.97	254.86	17.06	149.72	421.64	92.04	18.20	28.61	138.85
N6	293.65	67.61	164.44	525.70					10.88	0.00	12.60	23.48
N7	134.61	15.56	232.96	383.13	0.12		0.02	0.14	12.74	0.00	20.30	33.04
SUM	2821.47	484.06	797.51	4103.04	1078.53	33.61	483.51	1595.65	1241.38	28.60	199.98	1469.96
C1-3	115.20	35.49	39.31	190.00	84.35	33.42	21.54	139.31	74.58	240.18	85.38	400.14
C1-4	0.11	0.04	0.06	0.21	0.69	0.60	2.79	4.08				
C3-2									218.95	39.66	32.71	291.32
C3-3	747.47	106.72	99.64	953.83	183.15	30.15	65.01	278.31	212.88	93.58	38.16	344.62
C3-4					83.62	7.54	4.68	95.84	25.09	9.53	60.99	95.61
SUM	862.78	142.25	139.01	1144.04	351.81	71.71	94.02	517.54	531.50	382.95	217.24	1131.69
W1-2	301.41	14.29	26.32	342.02	2787.59	11.34	75.55	2874.48	590.01	29.85	111.68	731.54
W1-3	3217.41	571.24	662.27	4450.92	1021.81	288.29	432.04	1742.14	2689.18	827.73	1092.37	4609.28
W1-4					0.12	0.00	0.69	0.81	0.24	0.03	0.06	0.33
W2-1	0.64	0.03	0.09	0.76	1.50	0.02	0.08	1.60				
W2-2	611.39	125.55	317.06	1054.00	1778.60	164.67	614.53	2557.80	1010.30	40.16	92.52	1142.98
W2-3	821.93	374.18	294.75	1490.86	2592.34	473.17	295.93	3361.44	3322.36	528.39	498.94	4349.69
W2-4	101.52	39.22	45.91	186.65	124.35	11.63	78.05	214.03	490.63	66.30	93.50	650.43
W3-1	1.84	1.36	17.64	20.84	14.10	2.05	15.84	31.99	4.62	2.42	0.86	7.90
W3-2	2573.62	400.52	263.85	3237.99	10021.13	376.70	201.75	10599.58	2811.45	316.57	287.28	3415.30
W3-3	1339.61	279.45	193.75	1812.81	999.34	322.98	302.77	1625.09	1793.42	484.51	297.48	2575.41
W3-4	485.74	128.20	254.15	868.09	714.22	229.05	277.21	1220.48	910.73	252.75	193.10	1356.58
W4-1	3659.28	289.27	480.88	4429.43	508.13	42.02	30.19	580.34	4.65	2.01	0.90	7.56
W4-2	1733.85	305.82	202.15	2241.82	5430.84	120.46	354.45	5905.75	182.22	36.59	11.25	230.07
W4-3	11.67	15.75	10.09	37.51	1.02	0.41	0.38	1.81	78.58	26.39	11.50	116.47
W4-4	301.09	226.68	449.91	977.68	8.51	4.72	5.65	18.88	12.17	2.28	0.60	15.05
W5-1	0.57	0.00	0.20	0.77	1631.00	137.91	69.60	1838.51				
W5-2	771.34	3.82	108.87	884.03	3602.72	201.23	233.87	4037.82	1587.12	43.56	60.83	1691.51
W5-3	189.57	100.59	355.99	646.15	1286.32	155.02	175.19	1616.53	0.03	0.04	0.13	0.20
W5-4									1064.58	157.06	80.79	1302.43
W6-1									8.50	2.32	10.99	21.81
W6-2									1049.85	94.69	88.04	1232.58
W6-3									12.77	8.33	8.01	29.11
SUM	16122.48	2875.97	3683.88	22682.33	32523.64	2541.67	3163.77	38229.08	17623.41	2921.98	2940.83	23486.22
ALL STR.	19806.73	3502.28	4620.40	27929.41	33953.98	2646.99	3741.30	40342.27	19396.29	3333.53	3358.05	26087.87

Tabel 9. Summary of age and growth data for samples of northern shrimp from Davis Strait, 1983 - 1987, combined, (from savard et. al. ,1989).

Age	Min - Max Lengths (mm)	Range	Mean Length (mm)	Increment (mm)
1	7.4 - 9.8	2.4	8.4	
				> 3.9
2	10.9 - 13.1	2.2	12.3	
				> 3.4
3	14.5 - 16.6	2.1	15.7	
				> 2.8
4	17.6 - 19.4	1.8	18.5	
				> 2.1
5	19.1 - 22.1	3.0	20.6	
				> 2.1
6	21.3 - 23.8	2.5	22.7	
				> 2.2
7	23.0 - 26.6	3.6	24.9	
				> 1.4
8	24.4 - 28.0	3.6	26.3	

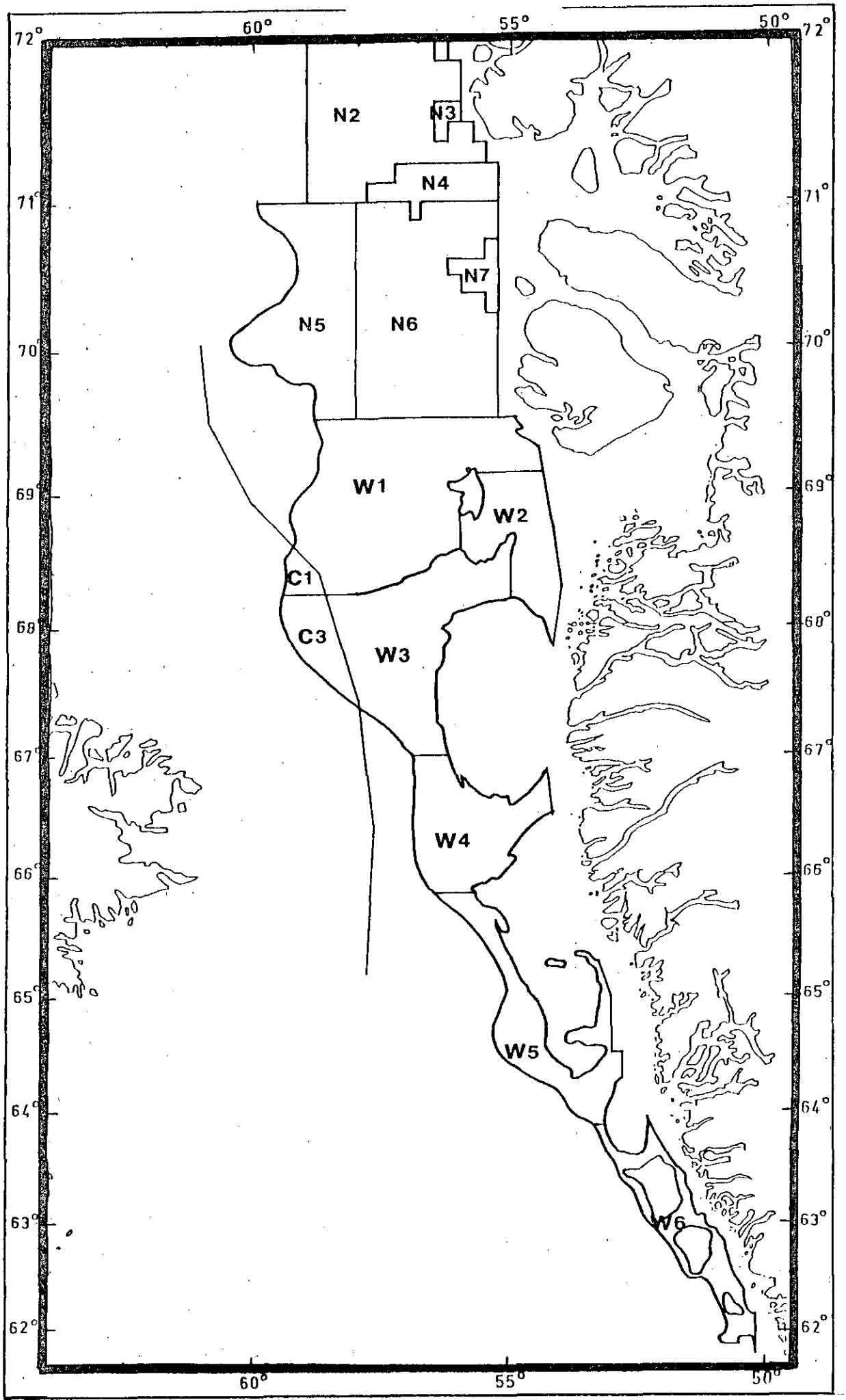


Figure 1. Stratification scheme for the West Greenland trawl survey in 1990, showing strata in the main areas in the Davis Strait.

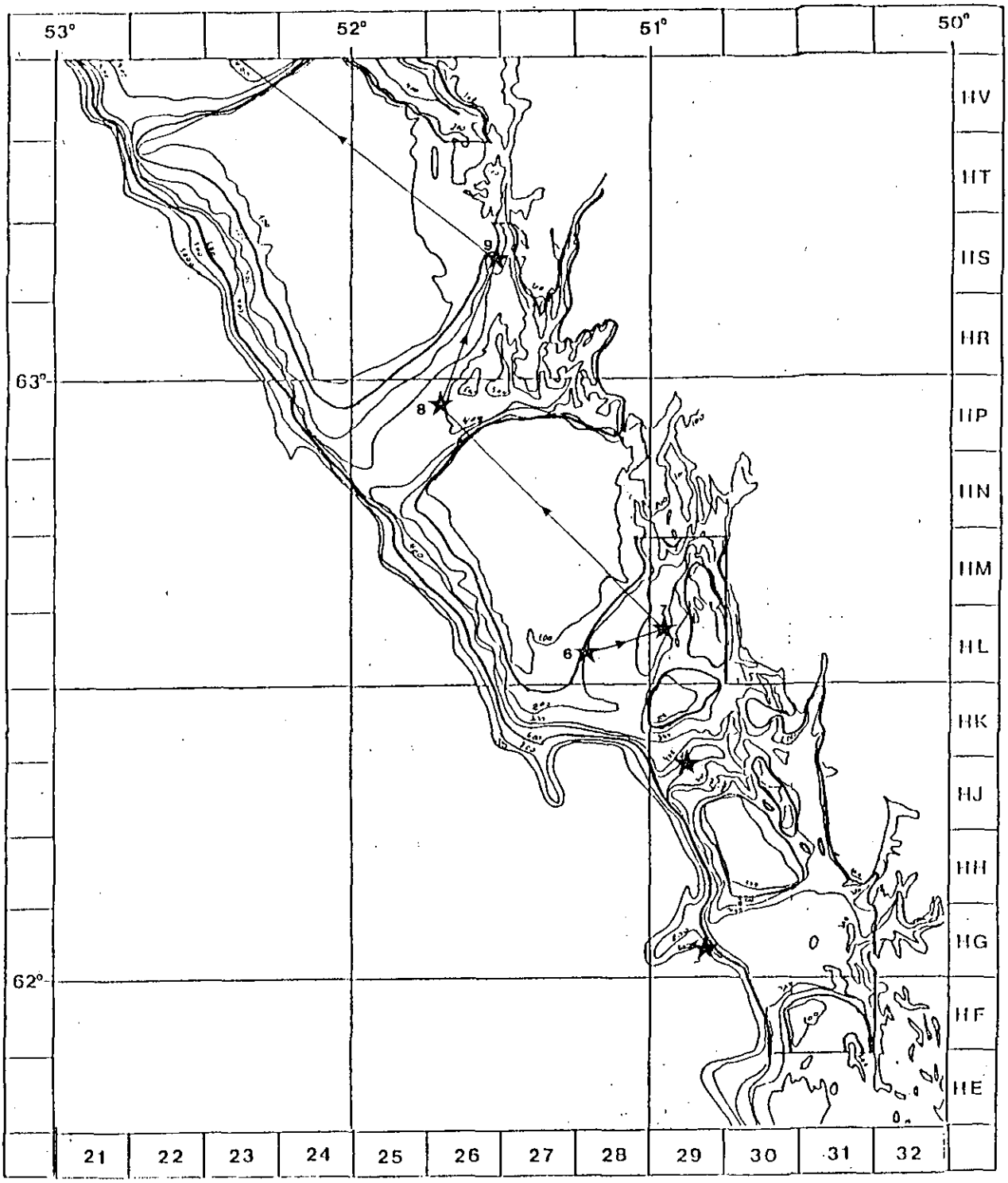


Figure 2a. Trawlstations and the survey route for M/T *MANITSOQ* in the area 62°-63°30'N in 1990.

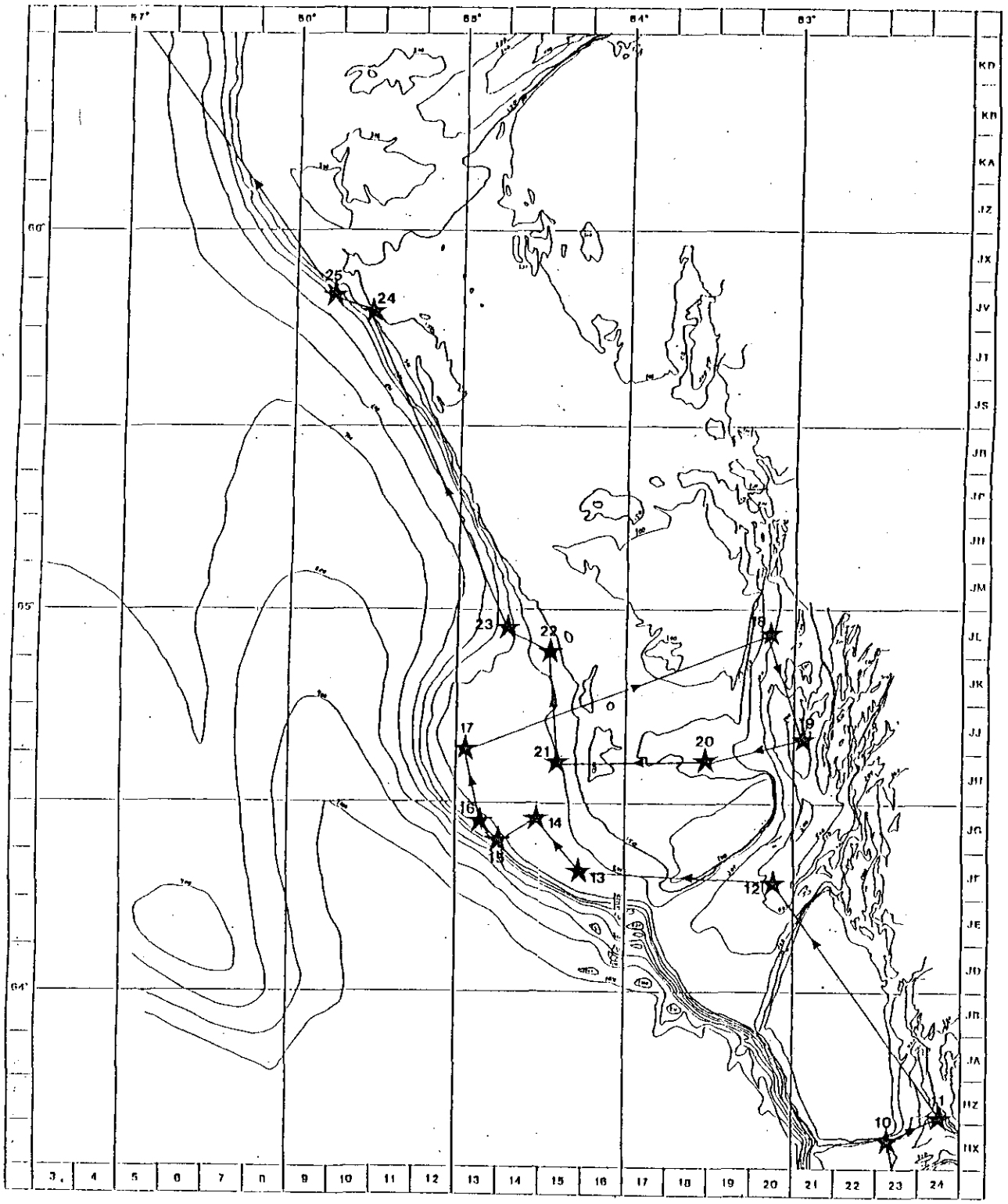


Figure 2b. Trawlstations and the survey route for M/T *MANITSOQ* in the area 63°30'-66°30'N in 1990.

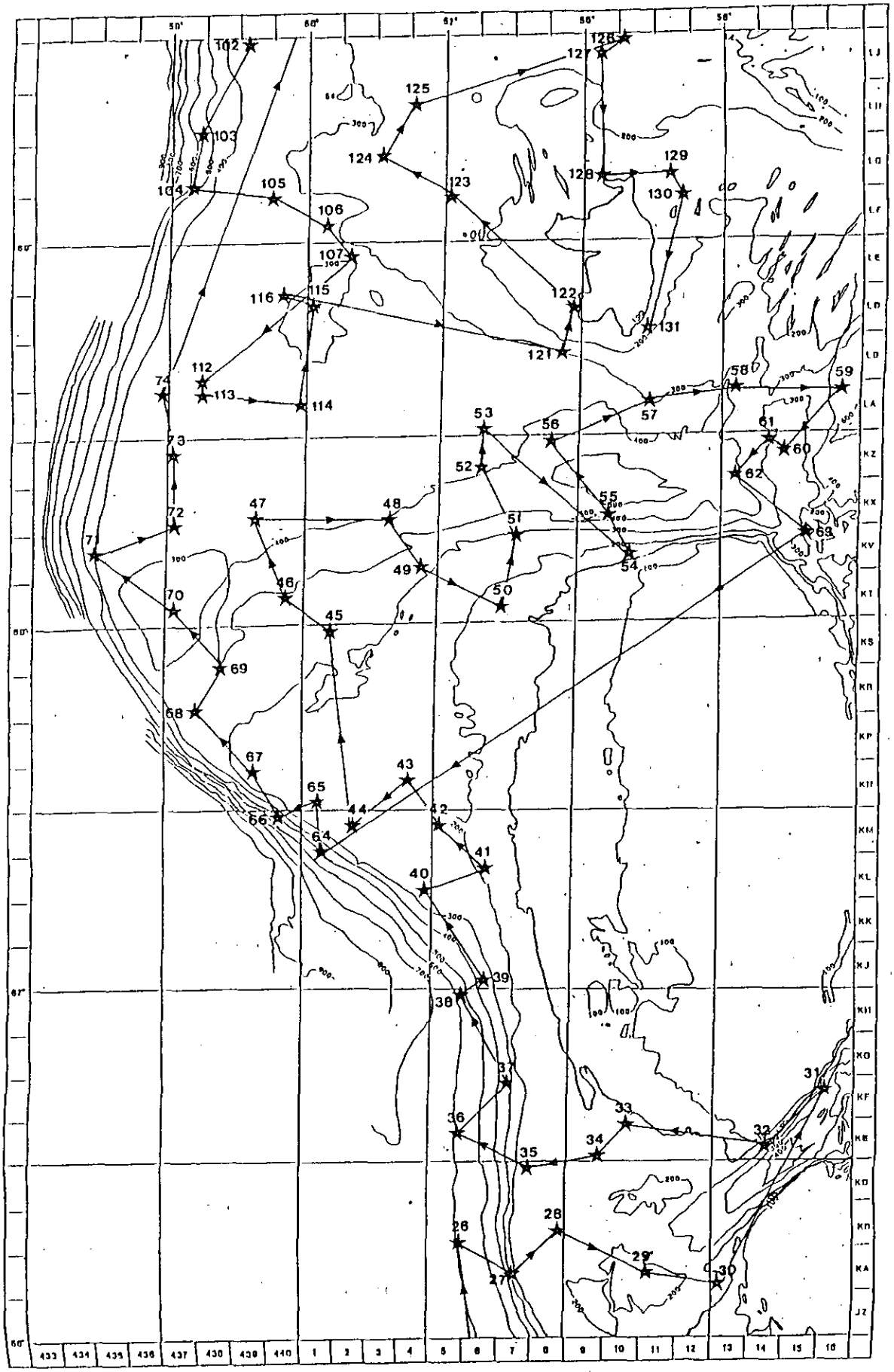


Figure 2c. Trawlstations and the survey route for M/T *MANITSOQ* in the area 66°30'-69°30'N in 1990.

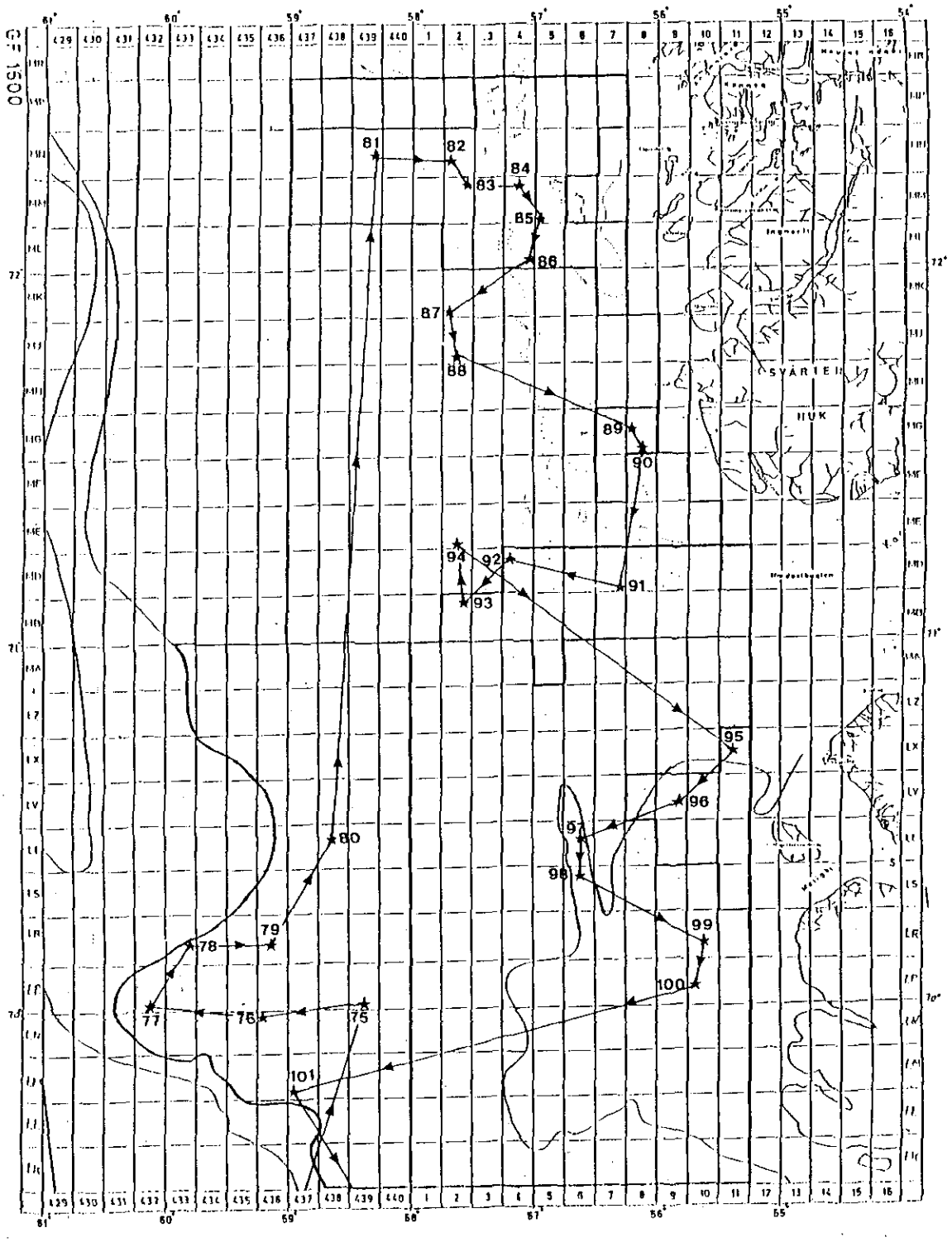


Figure 2d. Trawlstations and the survey route for M/T *MANITSOQ* in the area 69°30'-72°30'N in 1990.

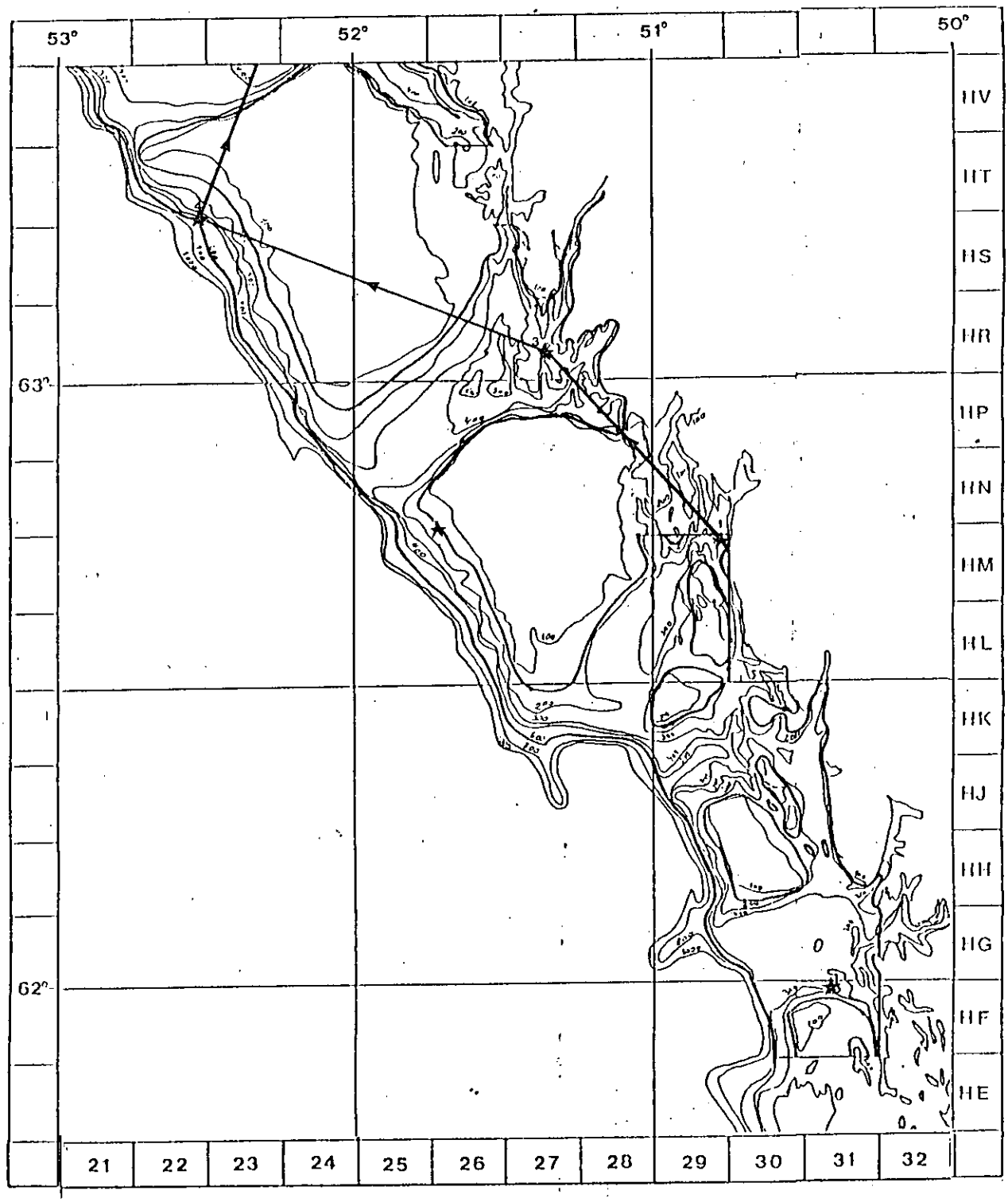


Figure 2e. Trawlstations and the survey route for M/T *AUVEQ* in the area 62°-63°30'N in 1990.

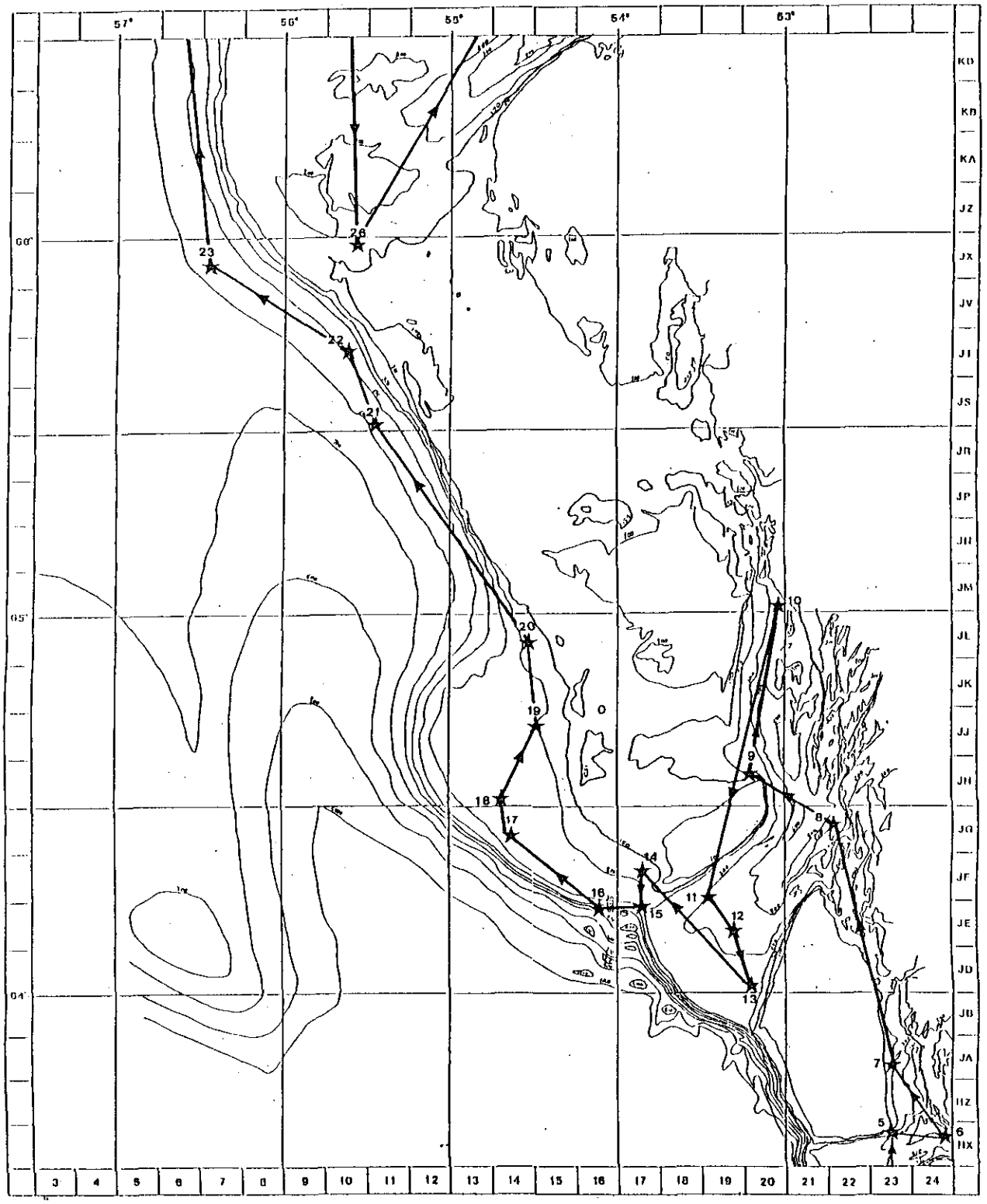


Figure 2f. Trawlstations and the survey route for M/T *AUVEQ* in the area 63°30'-66°30'N in 1990.

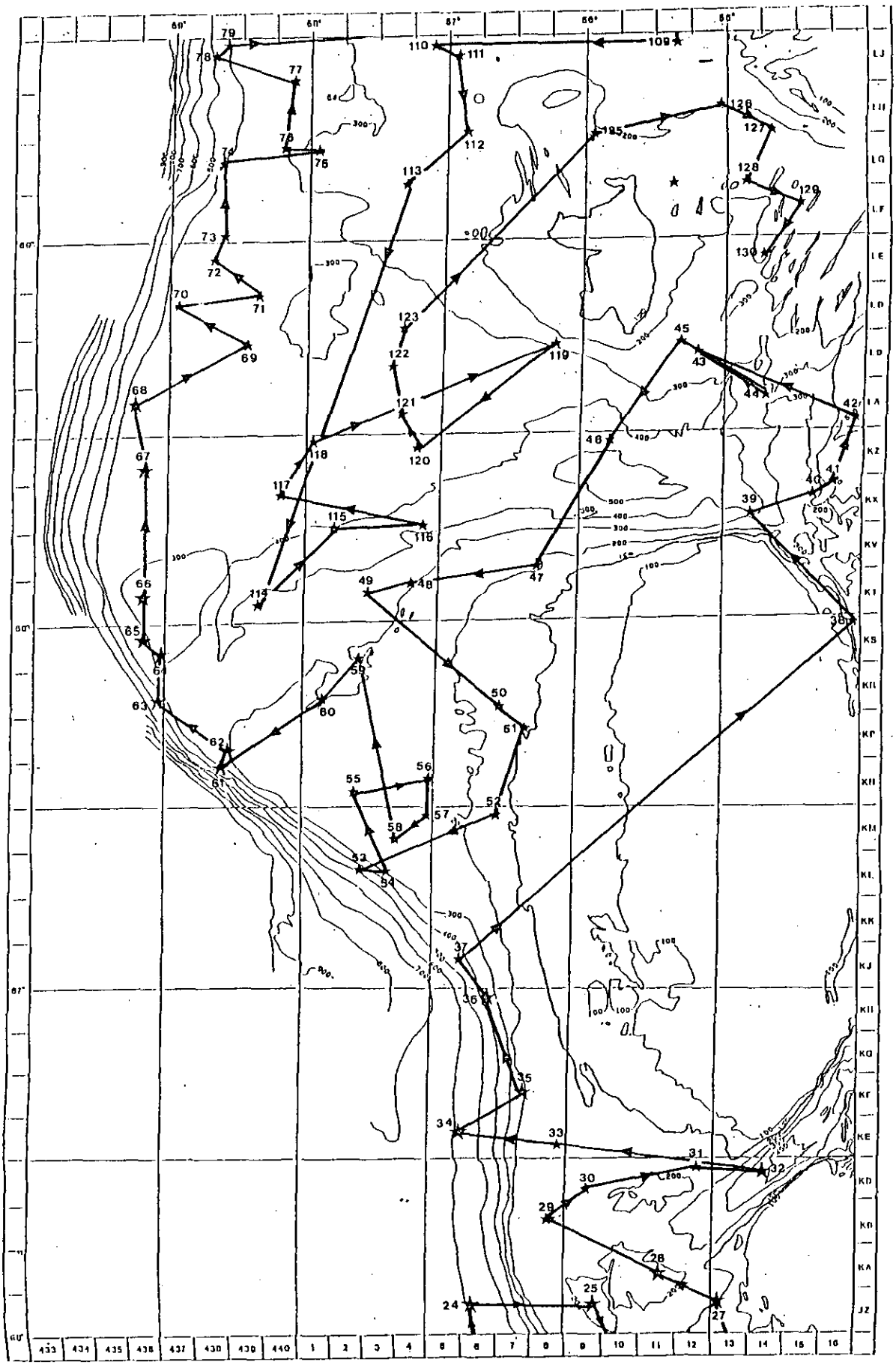


Figure 2g. Trawlstations and the survey route for M/T *AUVEQ* in the area 66°30'-69°30'N in 1990.

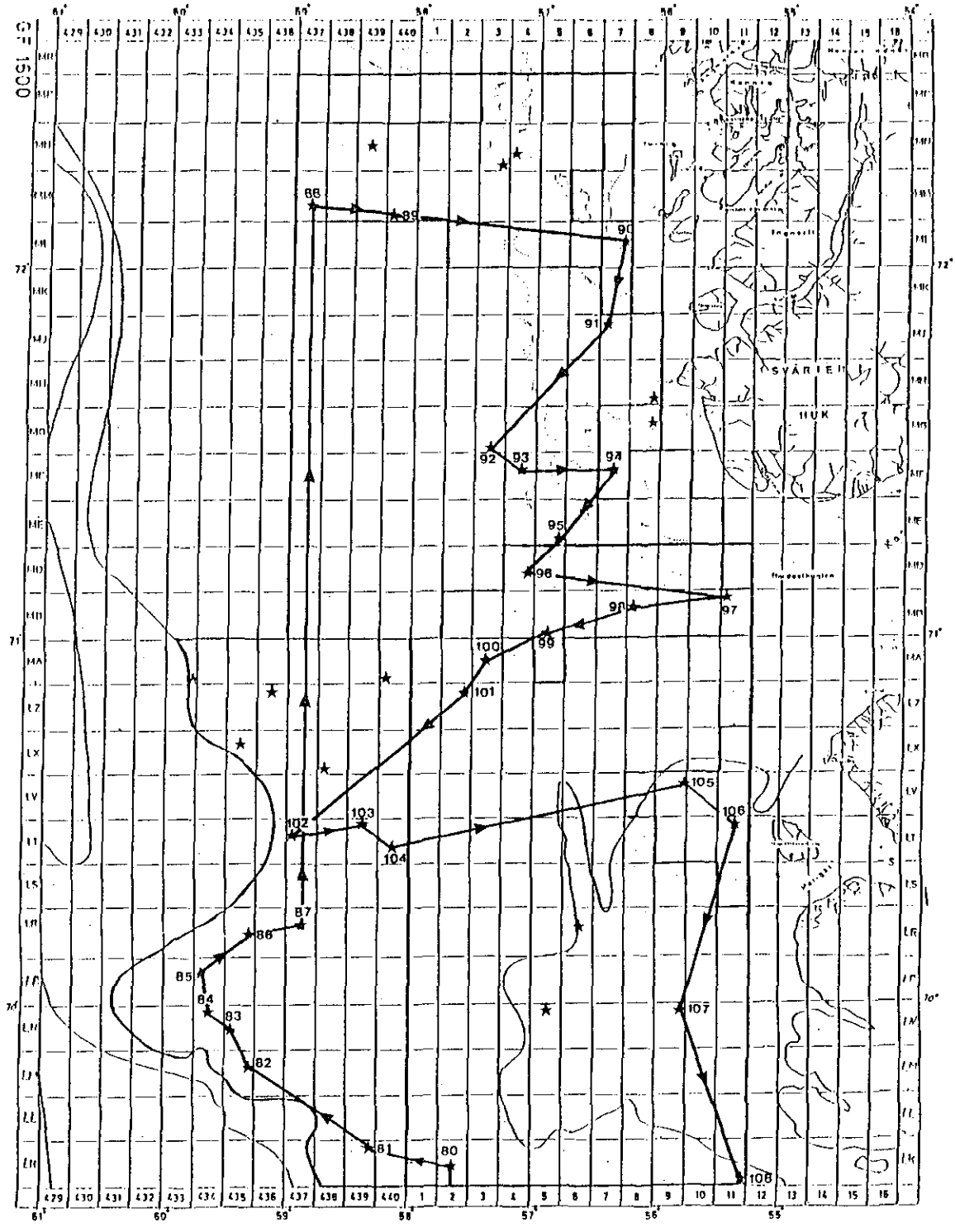


Figure 2h. Trawlstations and the survey route for M/T *AUVEQ* in the area 69°30'-72°30'N in 1990.

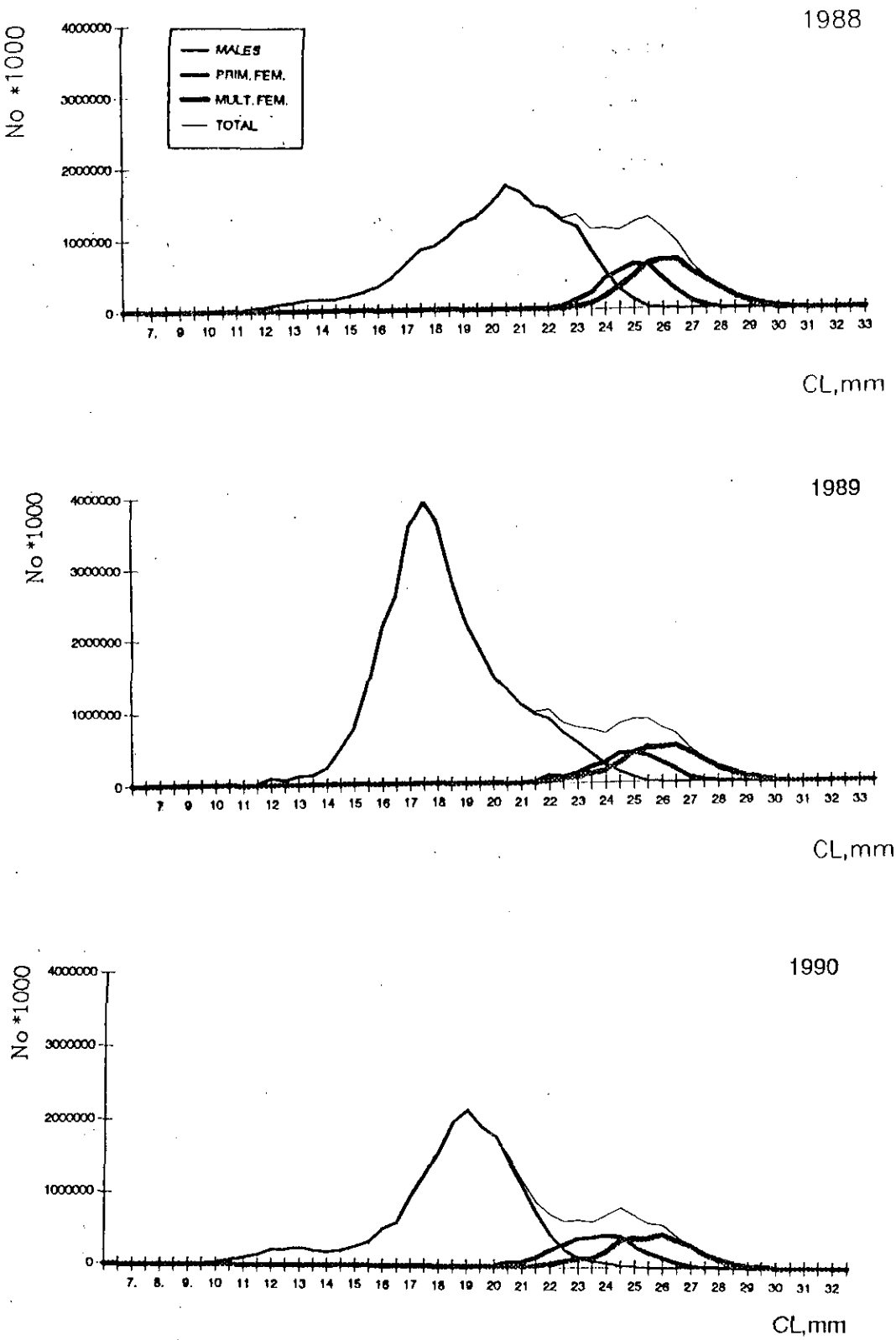
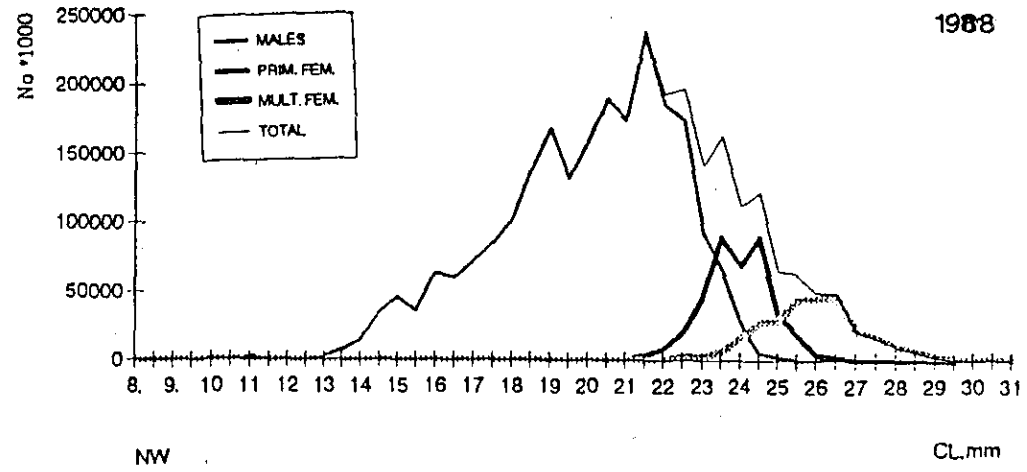
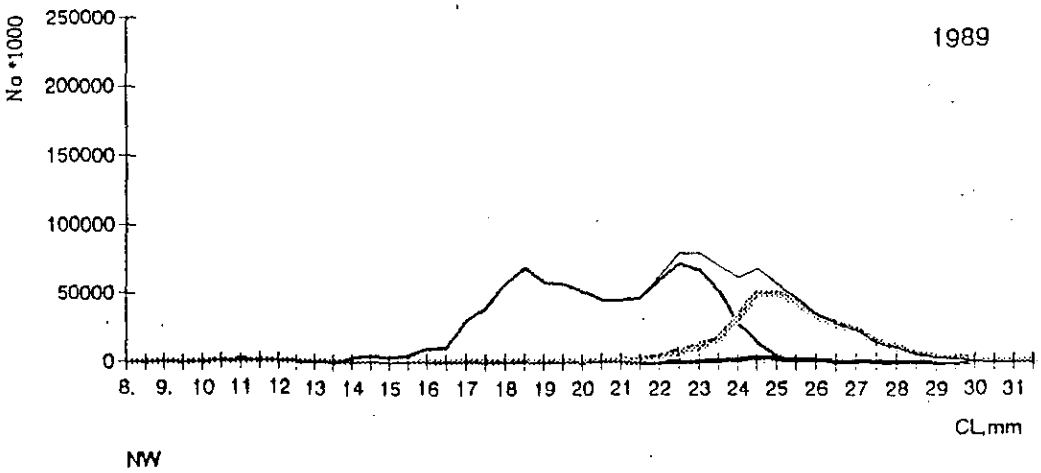


Figure 3. Numbers of shrimp by length group (CL) in the total survey area in 1988, 1989 and 1990, based on pooling of samples weighted by catch and stratum areas.





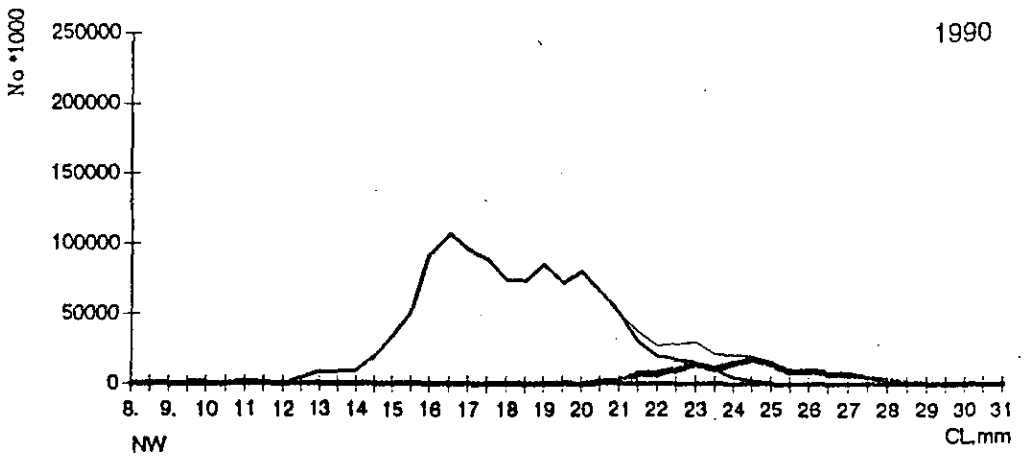


Figure 4. Numbers of shrimp by length group (CL) in stratum N1+N2+N3+N4 (see Fig. 1) in 1988, 1989 and 1990, based on pooling of samples weighted by catch and stratum areas.

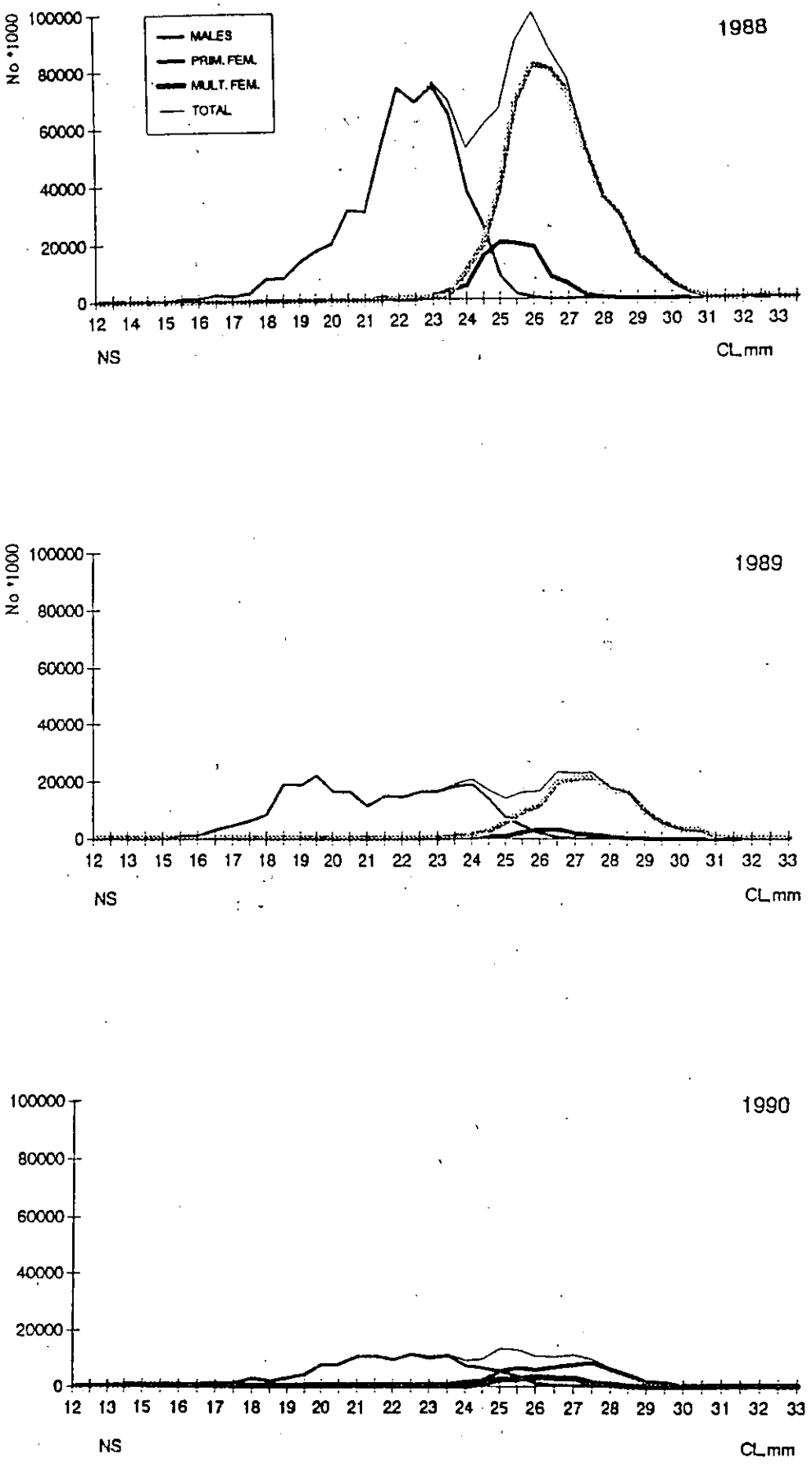


Figure 5. Numbers of shrimp by length group (CL) in stratum N5+N6+N7 (see Fig. 1) in 1988, 1989 and 1990, based on pooling of samples weighted by catch and stratum areas.

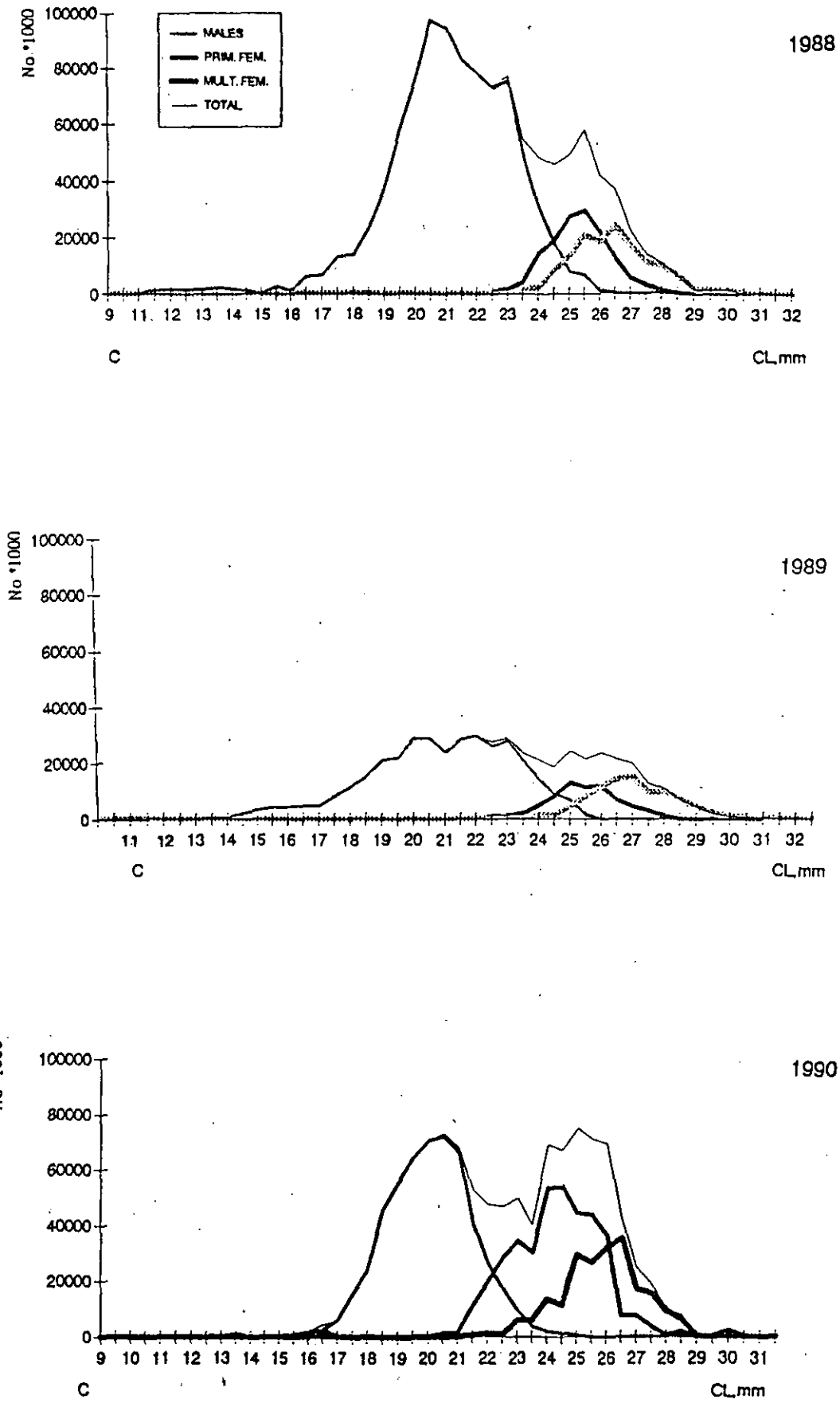


Figure 6. Numbers of shrimp by length group (CL) in stratum C1+C3 (see Fig. 1) in 1988, 1989 and 1990, based on pooling of samples weighted by catch and stratum areas.

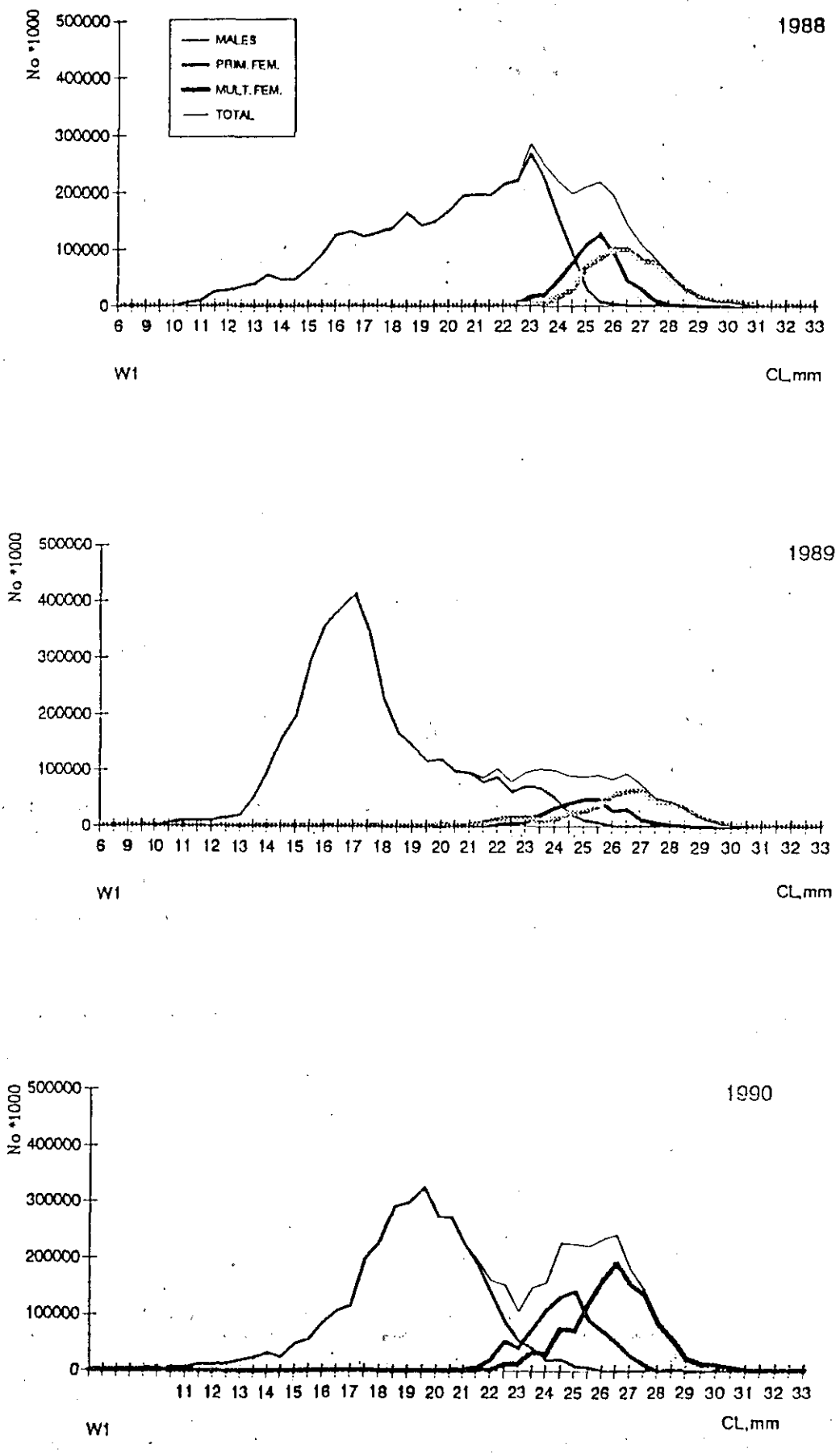


Figure 7. Numbers of shrimp by length group (CL) in stratum W1 (see Fig. 1) in 1988, 1989 and 1990, based on pooling of samples weighted by catch and stratum areas.

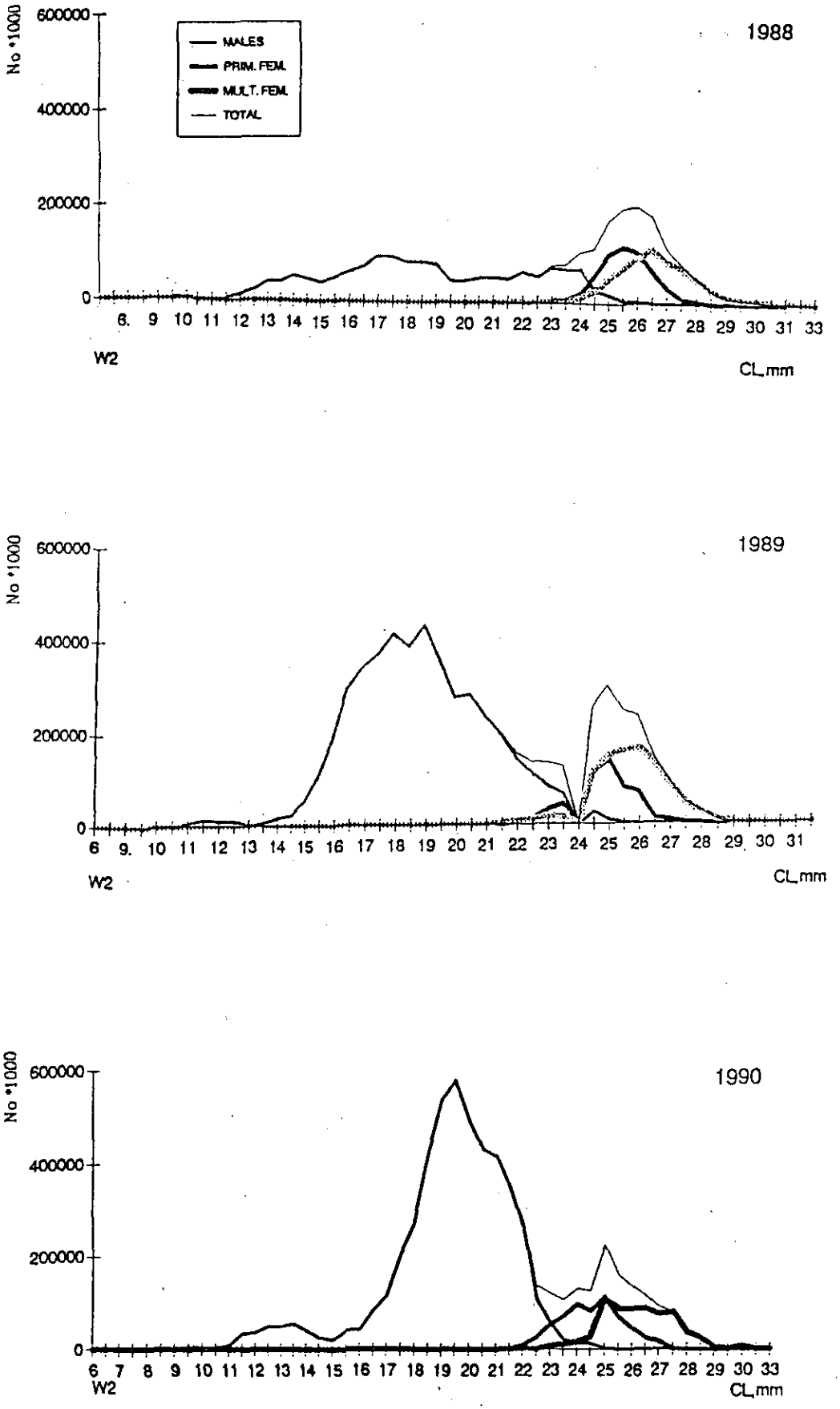


Figure 8. Numbers of shrimp by length group (CL) in stratum W2 (see Fig. 1) in 1988, 1989 and 1990, based on pooling of samples weighted by catch and stratum areas.

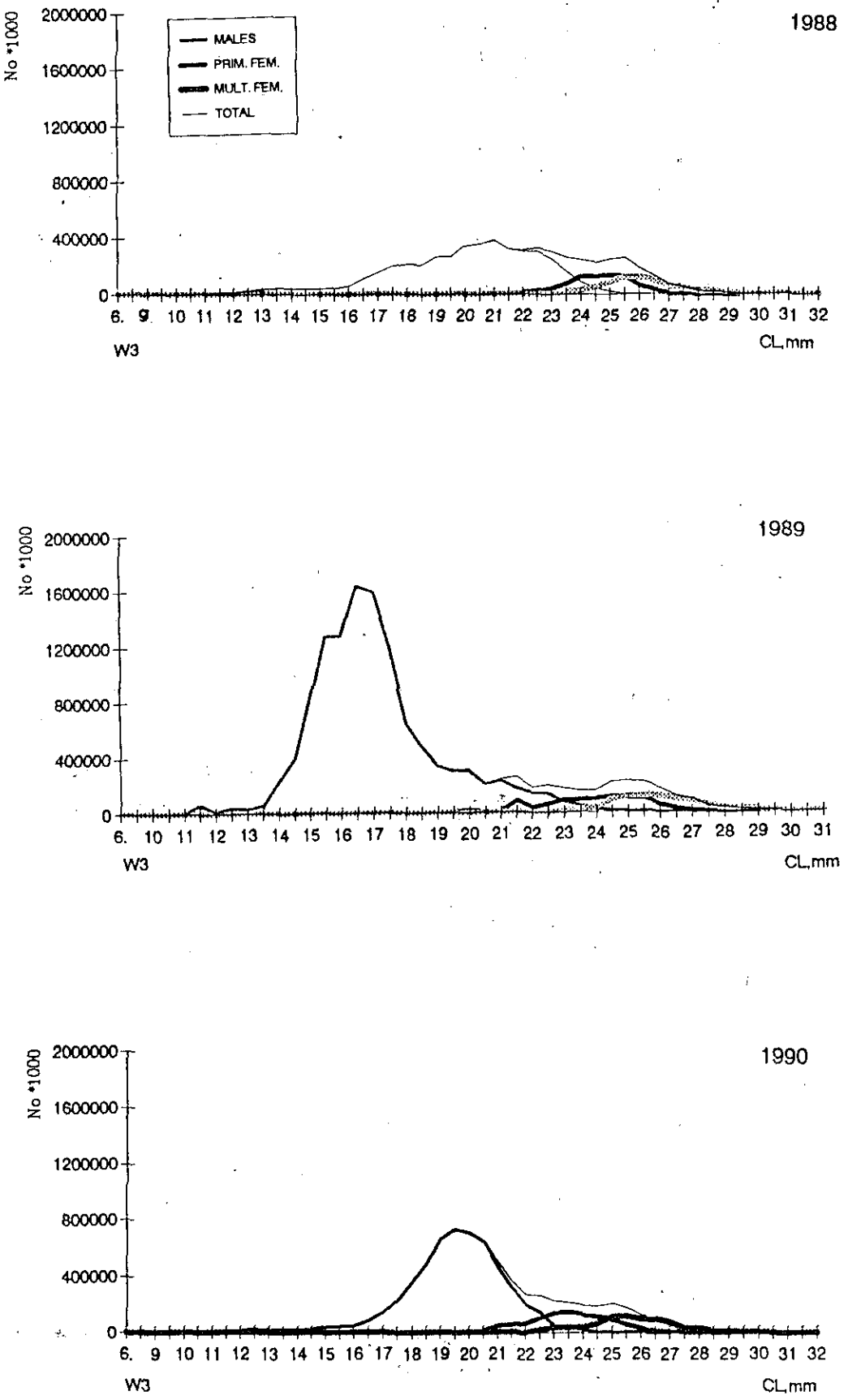
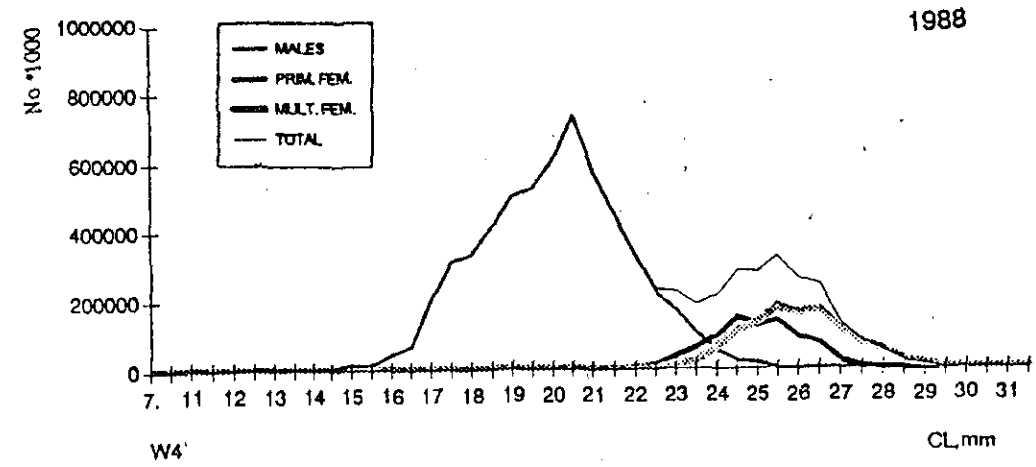
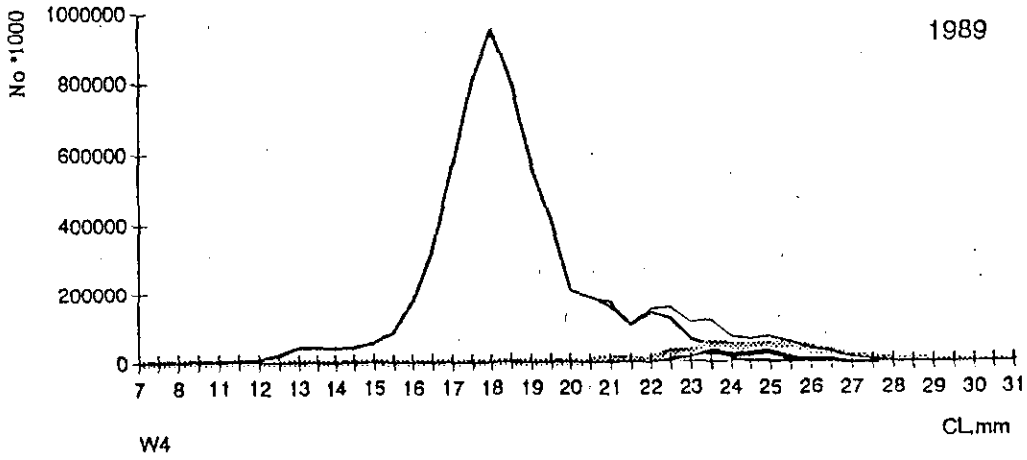


Figure 9. Numbers of shrimp by length group (CL) in stratum W3 (see Fig. 1) in 1988, 1989 and 1990, based on pooling of samples weighted by catch and stratum areas.





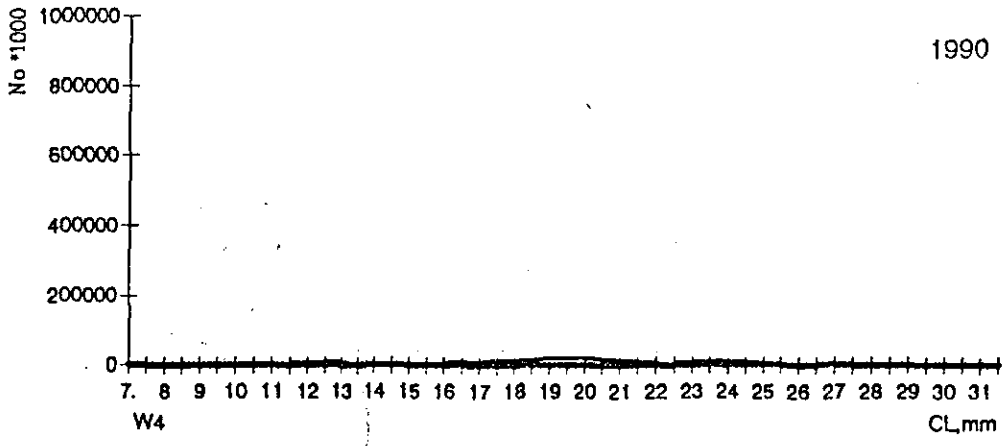


Figure 10. Numbers of shrimp by length group (CL) in stratum W4 (see Fig. 1) in 1988, 1989 and 1990, based on pooling of samples weighted by catch and stratum areas.

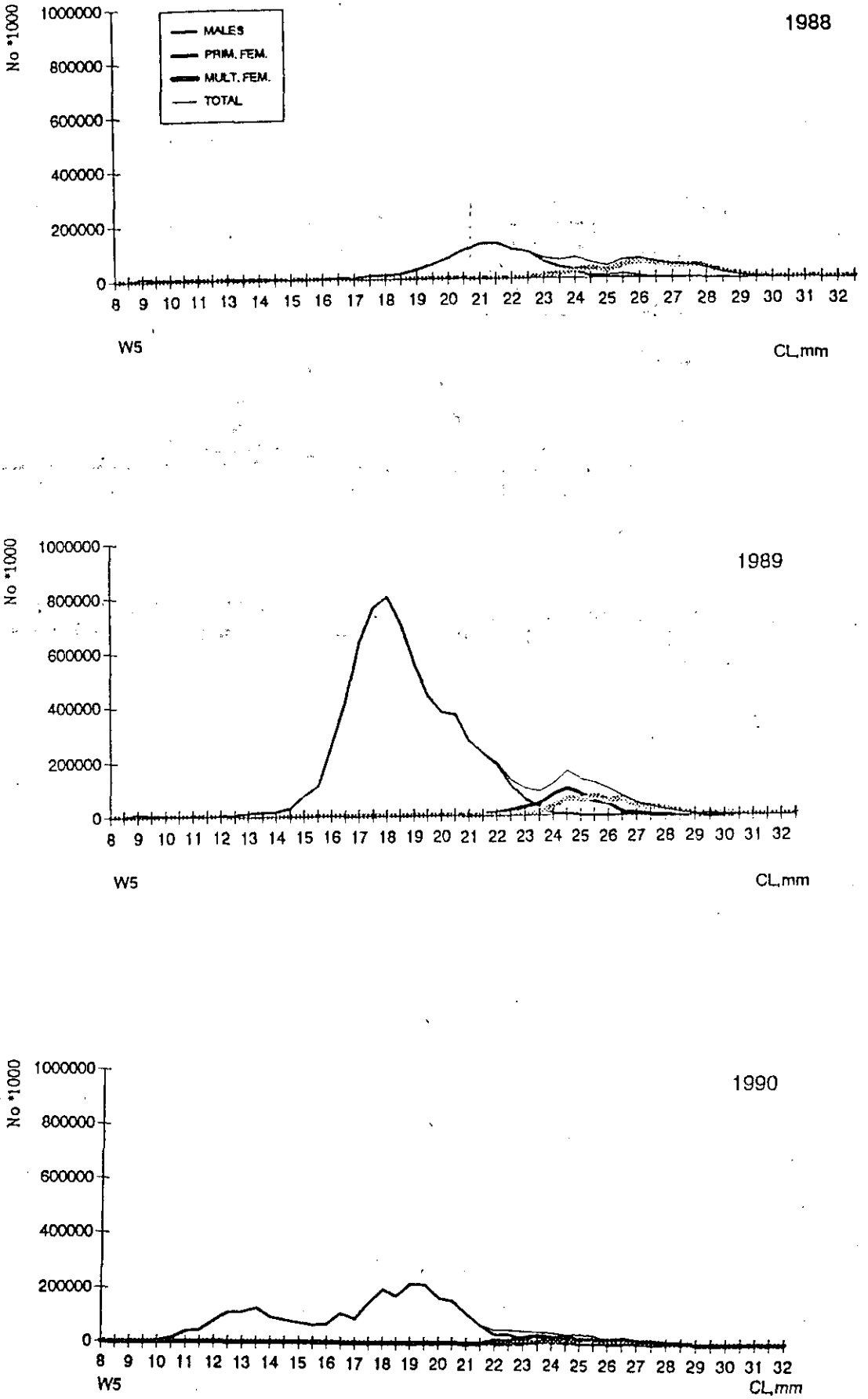


Figure 11. Numbers of shrimp by length group (CL) in stratum W5 (see Fig. 1) in 1988, 1989 and 1990, based on pooling of samples weighted by catch and stratum areas.

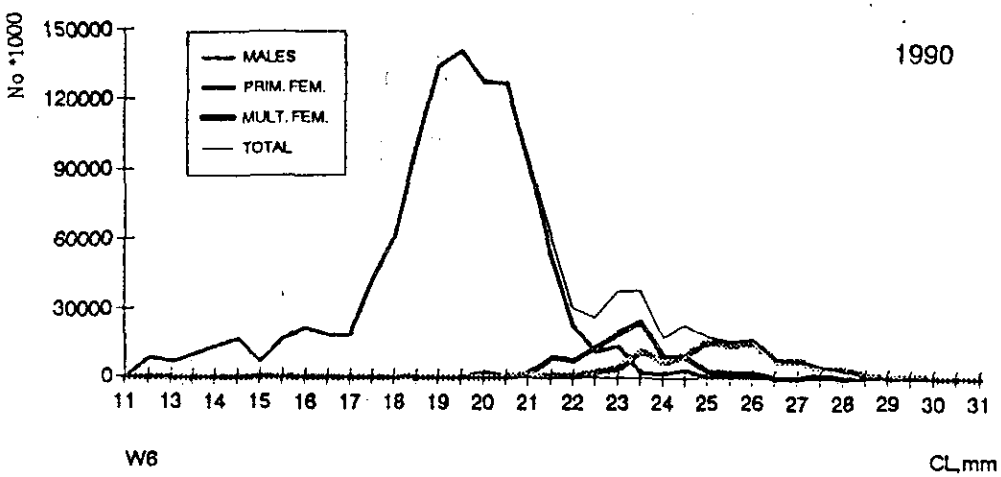
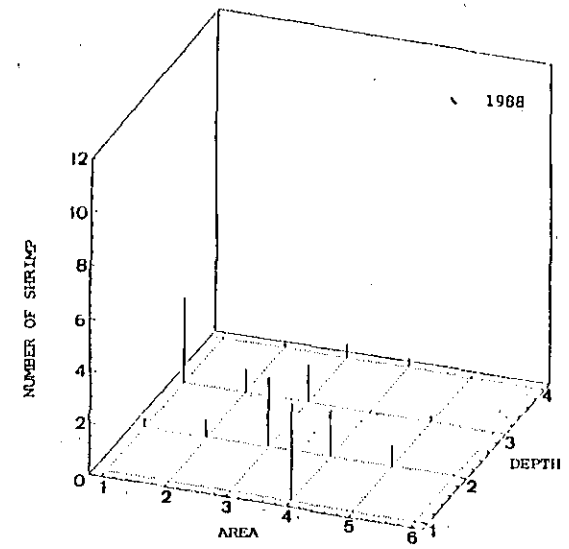
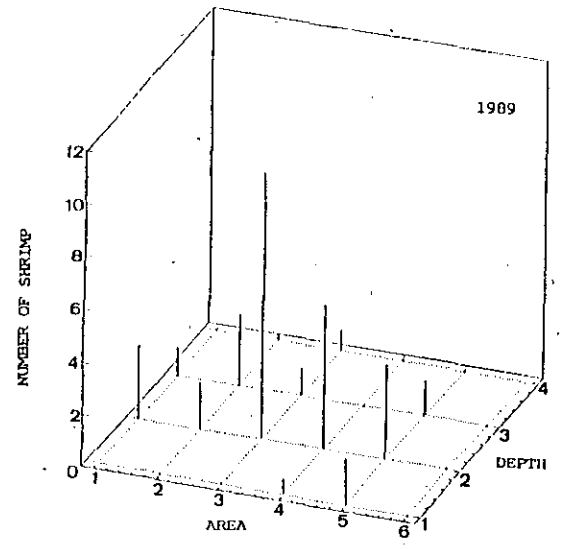


Figure 12. Numbers of shrimp by length group (CL) in stratum W6 (see Fig. 1) in 1990, based on pooling of samples weighted by catch and stratum areas.





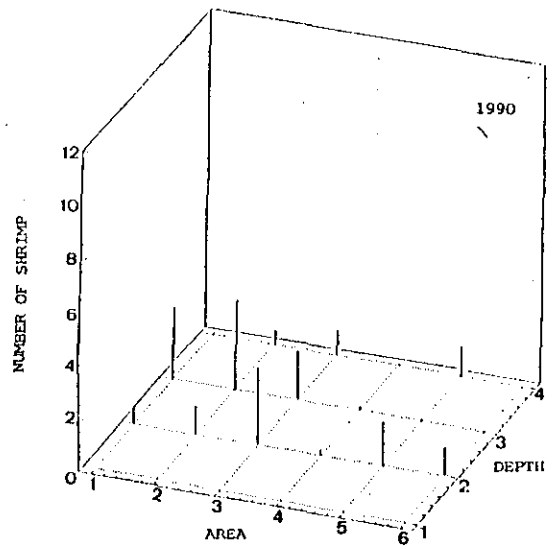
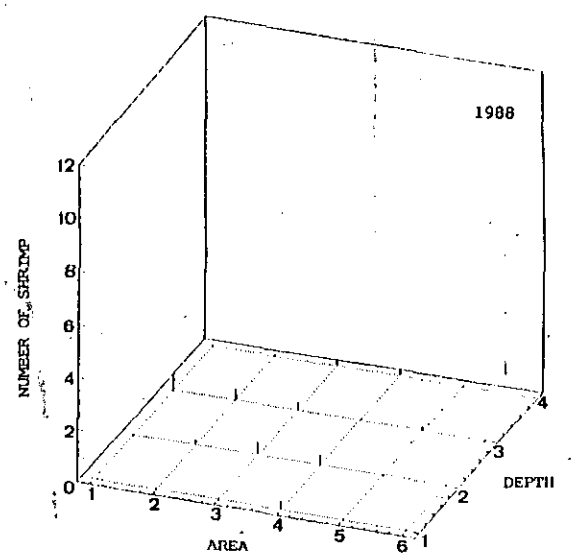
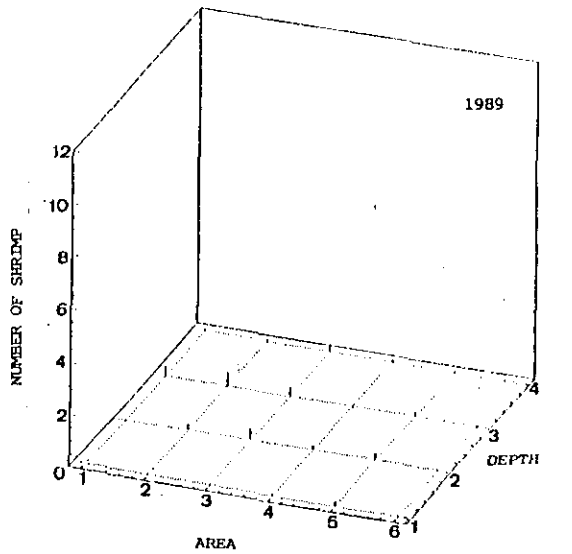


Figure 13. Numbers of males by stratum and depth in 1988, 1989 and 1990, based on pooling of samples (see text).





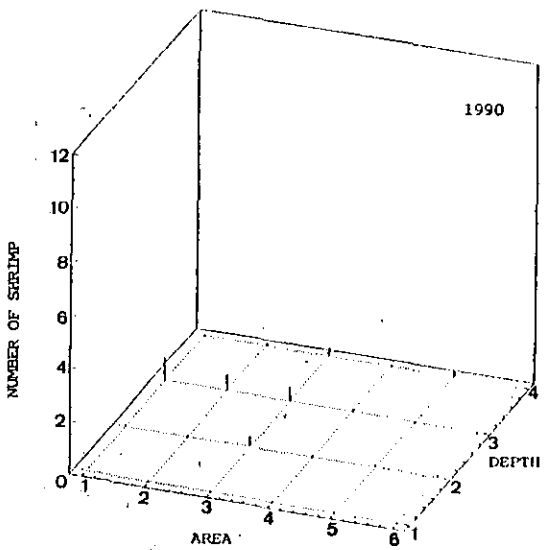


Figure 14. Numbers of primiparous females by stratum and depth in 1988, 1989 and 1990, based on pooling of samples (see text).

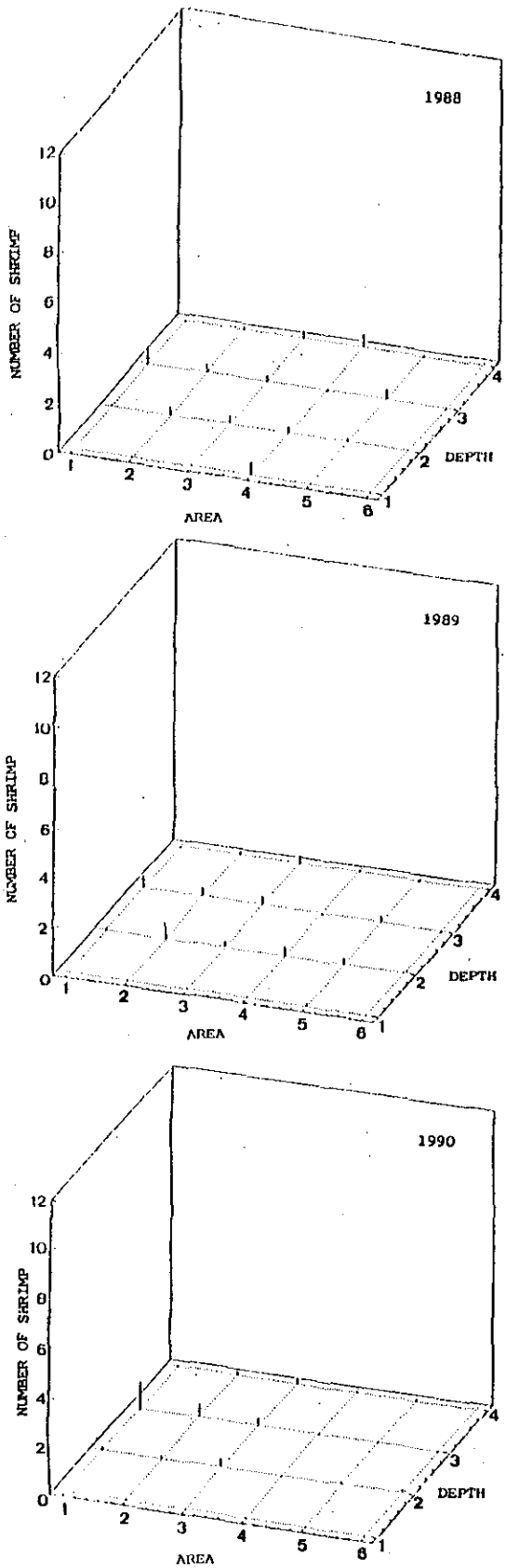


Figure 15. Numbers of multiparous females by stratum and depth in 1988, 1989 and 1990, based on pooling of samples (see text).

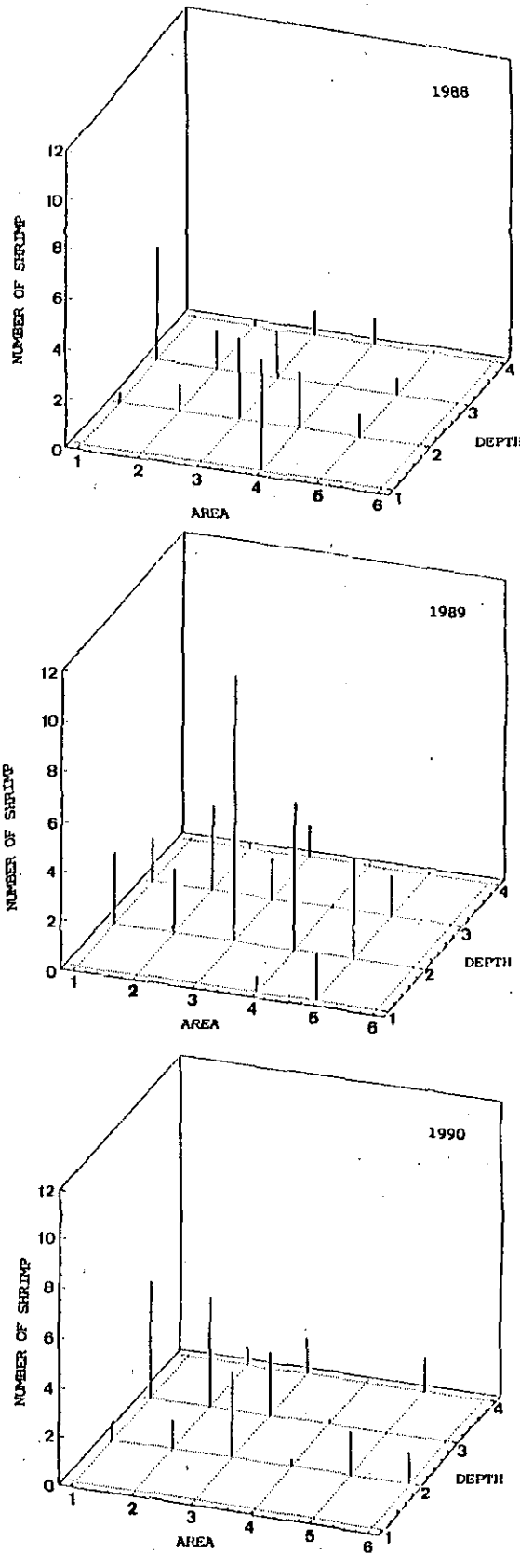


Figure 16. Total numbers of shrimp by stratum and depth in 1988, 1989 and 1990, based on pooling of samples (see text).