



SCIENTIFIC COUNCIL MEETING - SEPTEMBER 1998

**Biomass estimate, length and age distribution of the northern shrimp
(*Pandalus borealis*) stock on Flemish Cap (NAFO Div. 3M) in July 1998
and Faroese catches in 1997 and 1998**

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Catches and effort

In 1997 five double trawl and one single trawl and in 1998 five double trawl and two single trawl Faroese shrimp vessels were engaged in the shrimp fishery on Flemish Cap (NAFO Div. 3M). Catch and effort by month for 1997 and 1998 (until week no. 34) are presented in Tab. 1. The data were originally recorded by week and subsequently transformed to months. A month that shared a week was allotted a value proportional to the number of days of the shared week in the month.

The catches were 7387 t and 6866 t in 1997 and 1998 (until week no. 34), respectively. The effort was 1250 days and 858 days in 1997 and 1998 (until week no. 34), respectively. The catches in the months March-July in 1998 are up 30% from the previous year. The effort for the months March-July in 1998 is down 1% from the previous year. The CPUE for the months March-July in 1998 is up 27% from the previous year. The higher CPUE values in 1998 compared to 1997 probably reflects either a larger stock biomass or increased availability, or both.

Survey

In 1996 the Faroese Government decided to assess the shrimp stock on Flemish Cap (NAFO Div. 3M) and these investigations continued in 1998. The first shrimp survey was carried out in June 1997 (Nicolajsen, 1997).

Materials and methods

Biomass estimate.

In July 1998 a total of 62 stations were selected in a stratified random trawl survey design (Fig. 1). The stations were allotted to the strata proportional to strata area. Stations were in the depth range 100-300 fathoms. Tow duration was 60 minutes and tows went on both day and night. As in the survey in 1997 the Faroese commercial shrimp trawler R/T Høgifossur (4400HP) was used for the operation. A single Angmassalik 3000 shrimp trawl with 40mm meshsize in the codend and 22mm bar spacing in the sorting grade was used.

For each station the density was calculated (Fig. 2). The catch data were standardized by dividing the catches by area swept, *i.e.* length of tow times width of the trawl. The length of tow was calculated by multiplying towing time with the average towing speed. The width of the trawl was calculated as the average distance between the doors as measured by an acoustic distance measuring device (Scanmar). The average density values were calculated for each strata and multiplied with the strata area and summed for all strata to get the total biomass (Tab. 2).

Length distribution

At each station a sample of about 200 specimens of shrimp were taken from the unsorted catch and analysed onboard. The shrimps were measured to the nearest 0.5 mm using Vernier calipers and within length groups sorted by males and females (Rasmussen, 1953) and the females were further grouped into primiparous and multiparous (McCrary, 1971).

The length distribution from each sample was raised to the total shrimp catch and divided by area swept for each station to get abundance per unit area (density) at length. Mean density at length was calculated for each strata and multiplied by strata

area to get stock in numbers by strata. Stock in weight was calculated using a weight-length curve for shrimp in Div. 3M in the period 1993-95 (Nicolajsen, 1996).

Age structure

The length distribution from each sample was raised to the total shrimp catch from the station before summing with in sex and maturity groups. The three main sex and maturity groups: males, females with headroe with and with out sternal spines were seperated into age groups using the MIX software by MacDonnald and Pitcher (1979).

Results

Biomass estimate.

The result of the total stock biomass calculations was 22804t (Tab. 2).

Length distribution

Age group 2 (at 14 mm) in 1997 constitutes as 3 yr (18.5 mm) in 1998 a large male component (Tabs. 3 and 4, Figs. 3 and 4). Age group 3 (18 mm) in 1997 as 4 yr (22.5 mm) in 1998 increasing the female component considerably. For the stock weight at length this development is even more evident (Tabs. 5 and 6, Figs. 5 and 6).

The stock in weight calculated for all strata for 1997 was 16461 t (Tab.5) compared with an area swept estimate of 16370 t (Nicolajsen, 1997) and for 1998 the calculated stock in weight was 23035 t (Tab. 6) compared with an area swept estimate of 22804 t (Tab. 2). The discrepancies are less then 1%.

Stock in numbers and biomass was more evenly distributed among the strata in 1998 compared to 1997 (Figs. 7 and 8). Mean weight of shrimp in the stock rose from 4.6 g to 5.9 g from 1997 to 1998.

Age structure

The length distribution by sex and maturity are shown in Tabs. 8 and 9 and Figs. 9 and 10 for 1997 and 1998. Codes used for sex and maturity used in the tables are shown in Tab. 7. Age distribution is shown in Tabs. 10 and 11 and Figs. 11 and 12 for 1997 and 1998.

Discussion

Biomass estimate.

The stock biomass is 39% higher than the 16370t area swept result based on last years Faroese shrimp survey (Nicolajsen, 1997). The trend in these results are in accordance with the trend in catch rates in the Faroese shrimp fleet. Parsons *et.al.* (1997), based on a research trawl survey in September-October 1996, calculated the biomass with spatial analysis software to about 21500t.

References

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Table 1 Shrimp catches (t), effort (days) and CPUE (t/day) by Faroese shrimp vessels on Flemish Cap (NAFO Div. 3M) in 1997 and 1998 (until week no. 34).

Month	Catch, t		Effort, days		CPUE, t/day	
	1997	1998	1997	1998	1997	1998
Jan	0	0	0	0		
Feb	37	0	7	0	5.194	
Mar	756	625	110	98	6.870	6.382
Apr	1015	1030	138	130	7.374	7.921
May	845	1528	159	177	5.312	8.634
Jun	924	1493	165	153	5.590	9.760
Jul	998	1216	159	168	6.267	7.247
Aug	836	973	135	132	6.175	7.366
Sep	817	0	127	0	6.433	
Oct	563	0	94	0	5.989	
Nov	385	0	102	0	3.772	
Dec	210	0	53	0	3.971	
<i>Total</i>	7387	6866	1250	858	Average 5.722	7.885

Table 2 Area swept assessment of the Flemish Cap (NAFO Div. 3M) shrimp stock biomass for July 1998.

Strata no.	Average density t·km ⁻²	Strata area km ²	Biomass t	Number of stations	Number of squares in strata	Coverage %
13	0.831	2572	2137	5	30	17
14	1.119	2401	2687	5	28	18
15	0.497	1629	810	3	19	16
16	0.565	5574	3150	12	65	18
17	0.629	5402	3395	11	63	17
18	0.550	4116	2262	9	48	19
19	1.076	1715	1846	4	20	20
20	1.373	1886	2591	4	22	18
21	0.255	1629	415	2	19	11
22	1.080	943	1019	2	11	18
23	1.223	1286	1574	3	15	20
26	0.631	1458	919	2	17	12
Total		30612	22804	62	357	17
Weighted average	0.745					

Table 3 Stock in numbers (mill.) at length by strata and total from Faroese survey on Flemish Cap in June 1997.

STRATA OCL, mm	13	14	15	16	17	18	19	20	21	23	26	29	Total
7.5	0	0	0	0	0	0	0	0	0	0	0	0	0
8.0	0	0	0	0	1	0	0	0	0	0	0	0	1
8.5	0	0	0	0	0	0	0	0	0	0	0	0	0
9.0	0	0	0	0	0	0	0	0	0	0	0	0	0
9.5	0	0	0	0	0	0	0	0	0	0	0	0	0
10.0	0	0	0	0	0	0	0	0	0	0	0	0	0
10.5	0	0	0	0	0	0	0	0	0	0	0	0	0
11.0	0	0	0	0	0	0	0	0	0	0	0	0	0
11.5	0	0	0	0	1	0	0	0	0	0	0	0	1
12.0	0	0	0	0	20	0	0	0	0	0	0	0	20
12.5	0	0	0	0	33	0	0	0	0	0	0	0	33
13.0	16	1	0	2	79	0	0	0	0	0	0	0	97
13.5	28	1	0	1	80	2	0	0	0	0	0	0	113
14.0	48	7	1	1	118	3	0	0	0	0	0	0	178
14.5	50	12	2	3	85	0	0	0	0	0	0	0	152
15.0	37	14	5	9	47	4	0	0	0	0	0	0	116
15.5	33	10	8	6	40	5	0	0	0	0	0	0	101
16.0	28	19	10	3	41	7	0	0	0	0	0	0	107
16.5	25	9	8	5	44	8	0	0	0	1	0	0	101
17.0	78	23	6	8	57	21	0	0	0	0	0	0	194
17.5	77	29	5	7	50	28	0	0	0	0	0	0	196
18.0	126	52	5	15	67	28	0	1	0	0	0	0	294
18.5	105	44	4	25	83	43	1	1	0	0	0	0	306
19.0	88	43	5	42	53	27	1	2	0	2	0	0	262
19.5	40	19	4	15	35	17	3	2	0	0	0	0	134
20.0	27	10	1	20	31	8	2	1	0	1	0	0	101
20.5	7	4	1	11	16	4	1	2	0	0	0	1	48
21.0	4	3	1	12	18	4	2	1	0	0	0	3	45
21.5	3	2	0	9	24	4	3	1	0	2	0	3	51
22.0	11	3	0	22	38	5	9	2	0	4	0	6	100
22.5	14	8	1	13	25	8	7	1	0	4	0	4	85
23.0	22	6	0	14	26	9	11	2	1	6	0	9	105
23.5	13	9	0	15	27	5	13	3	1	5	0	14	105
24.0	9	5	1	11	24	6	13	5	2	4	0	14	95
24.5	21	9	1	12	20	9	18	5	2	5	0	11	111
25.0	10	8	0	7	13	6	13	6	5	4	0	20	92
25.5	4	2	0	10	4	3	13	4	0	5	0	13	56
26.0	2	3	0	7	15	4	10	3	7	4	0	15	70
26.5	0	1	0	5	6	1	5	1	7	3	0	9	39
27.0	0	0	0	4	6	2	4	1	5	1	0	4	28
27.5	1	0	0	2	1	0	2	0	4	1	0	3	15
28.0	0	0	0	2	2	0	1	0	2	0	0	1	8
28.5	0	0	0	1	1	1	1	0	1	1	0	1	8
29.0	0	0	0	1	0	0	0	0	1	0	0	1	4
29.5	0	0	0	1	0	0	0	0	1	0	0	1	4
30.0	0	0	0	0	0	0	0	0	0	0	0	1	2
30.5	0	0	0	0	1	0	0	0	1	0	0	1	3
31.0	0	0	0	0	0	0	0	0	0	0	0	0	0
31.5	0	0	0	0	0	0	0	0	0	0	0	0	0
32.0	0	0	0	0	0	0	0	0	0	0	0	1	1
32.5	0	0	0	0	0	0	0	0	0	0	0	0	0
33.0	0	0	0	0	0	0	0	0	0	0	0	0	0
33.5	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	926	356	69	322	1229	272	134	45	41	56	1	135	3585

Table 4 Stock in numbers (mill.) at length by strata and total from Faroese survey on Flemish Cap in July 1998.

STRATA OCL, mm	13	14	15	16	17	18	19	20	21	23	26	29	Total
7.5	0	0	0	0	0	0	0	0	0	0	0	0	0
8.0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.5	0	0	0	0	0	0	0	0	0	0	0	0	0
9.0	0	0	0	0	0	0	0	0	0	0	0	0	0
9.5	0	0	0	0	0	2	0	0	0	0	0	0	2
10.0	0	0	0	0	0	2	0	0	0	0	0	0	2
10.5	0	0	0	0	1	3	0	0	0	0	0	0	4
11.0	0	0	0	0	1	1	0	0	0	0	0	0	2
11.5	1	0	0	0	1	1	0	0	0	0	0	0	3
12.0	1	0	0	0	2	1	0	0	0	0	0	0	4
12.5	1	0	0	1	4	3	0	0	0	0	0	0	9
13.0	0	0	0	2	8	5	0	0	0	0	0	0	16
13.5	5	3	0	4	11	10	0	0	0	0	0	0	33
14.0	10	6	1	6	14	11	0	0	0	0	0	0	48
14.5	17	12	2	4	13	15	0	0	0	0	0	0	62
15.0	15	18	3	4	10	7	0	0	0	0	1	0	57
15.5	12	22	5	4	6	5	4	1	0	0	0	0	61
16.0	5	18	5	3	4	3	0	0	0	0	0	0	38
16.5	7	16	8	1	3	5	1	1	0	0	0	0	43
17.0	6	8	5	2	6	8	1	0	0	0	0	0	37
17.5	20	12	5	10	11	15	5	1	0	0	2	0	80
18.0	34	16	7	24	17	32	10	6	0	0	7	0	153
18.5	77	41	7	35	18	49	31	17	0	0	23	3	302
19.0	44	78	11	40	25	48	28	54	1	0	21	4	353
19.5	57	70	14	34	25	56	34	57	1	0	25	5	380
20.0	21	46	15	27	18	24	10	46	1	1	12	5	227
20.5	17	34	10	20	22	19	6	41	1	1	14	4	188
21.0	3	22	7	25	25	13	7	17	1	2	9	8	139
21.5	12	24	5	21	34	10	13	21	1	3	9	4	158
22.0	17	14	7	20	42	18	14	17	1	6	11	7	174
22.5	16	20	13	25	38	19	12	16	1	9	12	6	187
23.0	18	22	6	20	30	20	13	15	1	7	12	6	171
23.5	10	19	13	25	25	23	12	24	2	3	22	5	180
24.0	7	15	6	27	19	16	13	22	2	6	13	2	150
24.5	9	10	3	24	22	7	9	16	3	5	12	3	122
25.0	3	3	1	25	24	9	10	6	5	5	11	4	107
25.5	7	6	1	21	26	4	12	10	7	9	12	5	120
26.0	2	2	0	15	22	6	12	15	4	11	7	7	104
26.5	0	2	0	10	14	4	12	10	6	12	5	10	84
27.0	1	1	0	10	7	1	9	3	2	11	2	8	55
27.5	2	0	0	7	5	0	3	3	2	7	0	5	33
28.0	0	0	0	4	2	0	1	1	1	4	1	5	19
28.5	0	1	0	2	1	0	1	1	1	2	0	2	10
29.0	0	0	0	1	1	0	1	0	0	1	0	0	5
29.5	0	0	0	1	1	0	1	0	0	1	0	0	4
30.0	0	0	0	0	0	0	0	1	0	0	0	0	2
30.5	0	0	0	0	0	0	0	0	0	0	0	0	0
31.0	0	0	0	0	2	0	0	0	0	0	0	0	2
31.5	0	0	0	0	0	0	0	0	0	0	0	0	1
32.0	0	0	0	0	0	0	0	1	0	0	0	0	2
32.5	0	1	0	0	0	0	0	0	0	0	0	0	1
33.0	0	0	0	0	0	0	0	0	0	0	0	0	0
33.5	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	459	564	160	507	558	475	282	423	43	107	245	108	3934

Table 5 Stock weight (t) at length by strata and total from Faroese survey on Flemish Cap in June 1997.

STRATA OCL, mm	13	14	15	16	17	18	19	20	21	23	26	29	Total
7.5	0	0	0	0	0	0	0	0	0	0	0	0	0
8.0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.5	0	0	0	0	0	0	0	0	0	0	0	0	0
9.0	0	0	0	0	0	0	0	0	0	0	0	0	0
9.5	0	0	0	0	0	0	0	0	0	0	0	0	0
10.0	0	0	0	0	0	0	0	0	0	0	0	0	0
10.5	0	0	0	0	0	0	0	0	0	0	0	0	0
11.0	0	0	0	0	0	0	0	0	0	0	0	0	0
11.5	0	0	0	0	1	0	0	0	0	0	0	0	1
12.0	0	0	0	0	21	0	0	0	0	0	0	0	21
12.5	0	0	0	0	40	0	0	0	0	0	0	0	40
13.0	21	1	0	2	106	0	0	0	0	0	0	0	131
13.5	43	2	0	2	121	3	0	0	0	0	0	0	170
14.0	80	11	2	2	198	6	0	0	0	0	0	0	299
14.5	94	22	3	5	159	0	0	0	0	0	0	0	283
15.0	76	29	11	18	98	8	0	0	0	0	0	0	240
15.5	74	23	18	13	90	11	0	0	0	0	0	0	229
16.0	71	47	24	7	102	17	0	0	0	0	0	0	267
16.5	68	25	22	15	120	23	0	0	0	3	0	0	277
17.0	233	67	18	25	169	63	1	1	0	1	0	0	580
17.5	251	95	16	23	163	89	0	1	0	0	0	0	639
18.0	445	185	16	54	236	100	1	2	0	0	0	0	1040
18.5	403	168	16	97	316	164	3	4	0	1	0	0	1172
19.0	364	178	19	172	221	112	6	8	0	7	0	0	1086
19.5	177	83	17	69	155	77	11	9	1	1	0	0	600
20.0	131	49	5	95	147	38	11	7	0	4	0	0	486
20.5	34	23	5	59	84	21	5	8	0	1	0	7	248
21.0	21	14	5	65	98	20	10	4	0	2	0	15	253
21.5	18	14	2	52	145	24	20	6	0	11	0	16	306
22.0	67	20	2	140	240	35	58	10	0	27	0	38	637
22.5	97	56	4	89	174	52	48	9	0	27	0	27	583
23.0	159	42	2	100	191	63	82	15	4	40	0	67	766
23.5	99	70	3	118	209	36	101	24	7	41	0	108	814
24.0	77	44	5	94	200	46	109	39	20	35	0	115	784
24.5	182	81	6	103	172	77	156	46	18	40	0	99	979
25.0	91	75	0	67	117	59	117	52	48	37	1	191	855
25.5	38	19	3	98	35	32	124	35	0	48	1	124	558
26.0	23	33	0	77	152	42	101	31	69	46	1	159	735
26.5	5	8	0	56	69	13	53	14	77	37	1	95	428
27.0	0	4	4	52	65	18	51	12	60	16	2	46	331
27.5	11	0	0	23	15	2	24	4	54	15	1	41	191
28.0	0	0	0	21	26	6	10	6	21	4	2	9	104
28.5	0	0	0	10	15	15	18	2	17	9	1	18	106
29.0	0	0	0	10	0	1	2	2	13	4	1	19	53
29.5	0	3	0	17	0	1	2	1	22	0	1	10	56
30.0	0	0	0	4	0	1	2	5	0	4	0	11	28
30.5	0	0	0	0	15	0	0	0	12	7	1	11	46
31.0	0	0	0	0	0	0	2	2	0	2	1	0	8
31.5	0	0	0	0	0	0	0	0	3	0	1	0	4
32.0	0	0	0	3	0	0	0	1	7	0	0	13	25
32.5	0	0	0	0	0	0	0	0	0	0	0	0	0
33.0	0	0	0	0	0	0	0	0	0	0	0	0	0
33.5	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	3453	1491	230	1856	4486	1278	1128	362	453	471	15	1237	16461

Table 6 Stock weight (t) at length by strata and total from Faroese survey on Flemish Cap in July 1998.

STRATA OCL, mm	13	14	15	16	17	18	19	20	21	23	26	29	Total
7.5	0	0	0	0	0	0	0	0	0	0	0	0	0
8.0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.5	0	0	0	0	0	0	0	0	0	0	0	0	0
9.0	0	0	0	0	0	0	0	0	0	0	0	0	0
9.5	0	0	0	0	0	1	0	0	0	0	0	0	1
10.0	0	0	0	0	0	1	0	0	0	0	0	0	1
10.5	0	0	0	0	1	2	0	0	0	0	0	0	3
11.0	0	0	0	0	0	1	0	0	0	0	0	0	2
11.5	1	0	0	0	1	1	0	0	0	0	0	0	3
12.0	1	0	0	0	2	1	0	0	0	0	0	0	4
12.5	1	0	0	1	5	4	0	0	0	0	0	0	11
13.0	1	0	0	3	11	6	0	0	0	0	0	0	22
13.5	7	5	0	6	17	15	0	0	0	0	0	0	50
14.0	18	10	2	10	24	18	0	0	0	0	0	0	81
14.5	31	22	3	8	24	27	0	0	0	0	0	0	116
15.0	31	37	6	7	20	14	0	0	0	0	1	0	117
15.5	27	51	12	8	15	12	10	3	0	0	0	0	138
16.0	13	45	12	7	10	7	0	0	0	0	0	0	95
16.5	20	44	21	4	9	13	2	4	0	0	0	0	118
17.0	18	23	15	7	17	25	3	0	0	0	1	1	109
17.5	64	40	15	33	35	48	17	4	0	0	6	0	262
18.0	120	58	24	84	59	113	35	22	1	0	23	2	540
18.5	296	158	27	136	71	189	117	65	1	1	87	11	1158
19.0	181	321	45	165	102	200	114	224	4	0	88	16	1463
19.5	257	314	63	153	113	250	153	255	3	1	113	23	1699
20.0	103	223	72	131	87	117	49	220	5	5	60	25	1097
20.5	88	178	53	102	112	98	32	211	5	3	71	20	974
21.0	18	122	41	141	139	70	36	96	4	12	52	42	774
21.5	72	143	31	126	203	60	78	123	6	19	55	27	944
22.0	107	88	42	131	270	118	87	111	6	36	73	45	1114
22.5	109	135	90	174	260	126	84	112	5	63	80	41	1281
23.0	133	163	47	149	216	144	92	113	9	52	86	41	1243
23.5	79	145	98	192	191	176	89	184	13	23	169	37	1397
24.0	60	128	51	223	160	131	111	178	19	53	110	13	1237
24.5	80	92	30	207	189	62	78	137	25	48	107	22	1076
25.0	30	32	6	231	221	86	97	58	45	49	105	40	1000
25.5	71	63	13	212	255	38	116	104	65	85	117	50	1190
26.0	22	23	0	155	233	60	122	160	45	116	78	77	1090
26.5	1	21	0	112	160	42	127	107	65	130	55	108	928
27.0	9	10	0	119	81	15	108	31	19	130	27	89	638
27.5	21	0	0	83	64	2	33	36	22	91	6	56	413
28.0	0	0	0	58	29	6	14	9	8	46	9	65	244
28.5	0	12	0	34	8	1	8	11	8	25	1	30	139
29.0	0	0	0	13	14	0	14	3	3	12	0	7	67
29.5	0	0	0	15	10	0	12	2	5	13	3	3	64
30.0	0	0	0	4	5	0	0	9	3	0	0	7	28
30.5	0	0	0	0	0	0	0	2	3	0	0	1	6
31.0	0	0	0	1	27	0	0	0	1	0	0	2	32
31.5	0	0	0	0	0	8	0	0	2	0	0	1	11
32.0	0	0	0	0	7	0	0	26	0	0	0	1	33
32.5	0	18	0	0	0	0	0	0	0	0	0	0	18
33.0	0	0	0	0	0	0	0	0	1	0	0	0	1
33.5	0	0	0	0	0	0	0	0	0	5	0	0	5
Total	2090	2724	821	3246	3475	2311	1839	2618	402	1021	1584	902	23035

Table 7 Codes used for sex and maturity used in the tables.

Code	Sex and maturity
1	Males
2	Intermediate
3	Females with sternal spines
4	Females without sternal spines
5	Females with headroe with sternal spines
6	Females with headroe without sternal spines
7	Females ovigerous without eyes
8	Females ovigerous with eyes
9	Females ovigerous with eyes with headroe

Table 10 Age separation by sex groups. Northern shrimp (*Pandalus borealis*) Flemish Cap June 1997.

Sex	Males	Intermediate	Females + sternal spines	Females - sternal spines	Headroe + sternal spines	Headroe - sternal spines	Ovigerous -eyes	Ovigerous -eyes	Ovigerous s-eyes + headroe	Sum
Age	Prop.									
1	0.001									
2	0.290									
3	0.572				0.030	0.005				
4	0.138				0.970	0.097				
5						0.213				
6						0.685				
Total	2268016	668	630	580	380339	135344				2785578
Age	Catch in numbers									
1	1678									1678
2	658065									658065
3	1296398				11463	715				1308576
4	311875				368876	13142				693893
5						28781				28781
6						92708				92708
Sum	2268016				380339	135346				2783701
	Means	Means	Means	Means	Means	Means	Means	Means	Means	
1	8.0									
2	14.0									
3	18.5				20.0	20.0				
4	22.0				24.0	22.0				
5						25.0				
6						26.5				
	Sigmas	Sigmas	Sigmas	Sigmas	Sigmas	Sigmas	Sigmas	Sigmas	Sigmas	
1	0.36									
2	0.63									
3	0.83				0.90	0.90				
4	0.99				1.08	0.99				
5						1.13				
6						1.19				

Table 11 Age separation by sex groups. Northern shrimp (*Pandalus borealis*) Flemish Cap July 1998.

Sex	Males	Intermediat e	Females + sternal spines	Females - sternal spines	Headroe + sternal spines	Headroe - sternal spines	Ovigero us -eyes	Ovigero us -eyes	Ovigero us -eyes + headroe	Sum
Age	Prop.									
1	0.007									
2	0.137					0.001				
3	0.671					0.035				
4	0.185				0.867	0.105				
5					0.133	0.722				
6						0.137				
Total	1354655	57		453	584787	227062	1321			2168335
Age	Catch in numbers									
1	9198									9198
2	185655					193				185848
3	908621					7895				916516
4	251167				507280	23912				782358
5					77508	164037				241544
6						31026				31026
Sum	1354642				584787	227062				2166491
	Means	Means	Means	Means	Means	Means	Means	Means	Means	
1	10.8									
2	14.7					16.3				
3	19.0					18.5				
4	21.6				23.2	23.5				
5					26.2	25.5				
6						28.0				
	Sigmas	Sigmas	Sigmas	Sigmas	Sigmas	Sigmas	Sigmas	Sigmas	Sigmas	
1	0.46									
2	0.68					0.73				
3	0.86					0.83				
4	0.95				1.35	1.06				
5					0.78	1.15				
6						1.26				

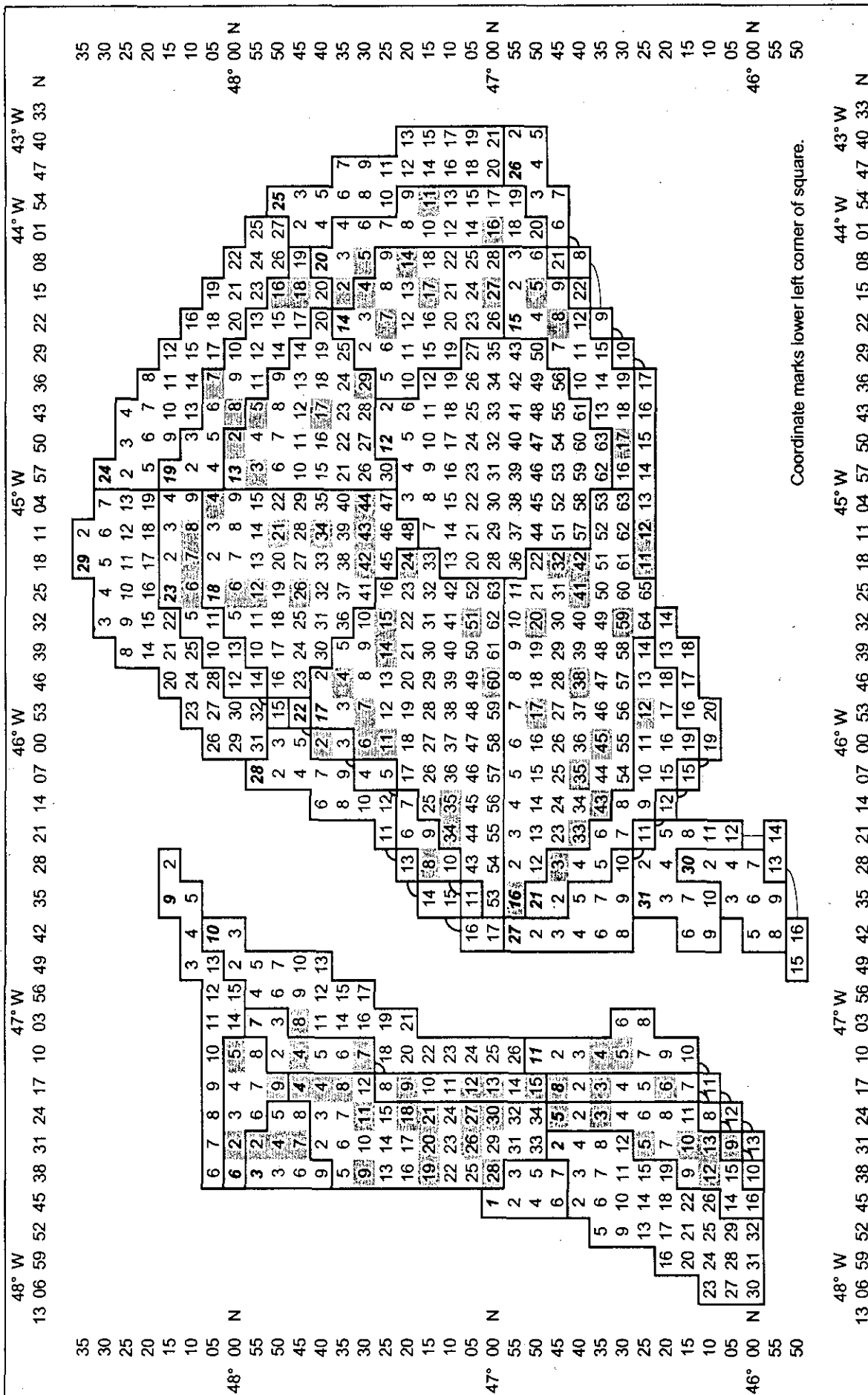


Figure 1 Map of Flemish Cap and Grand Bank showing design of survey with tow stations (shaded). Grid squares are 5 by approx. 5 nm².

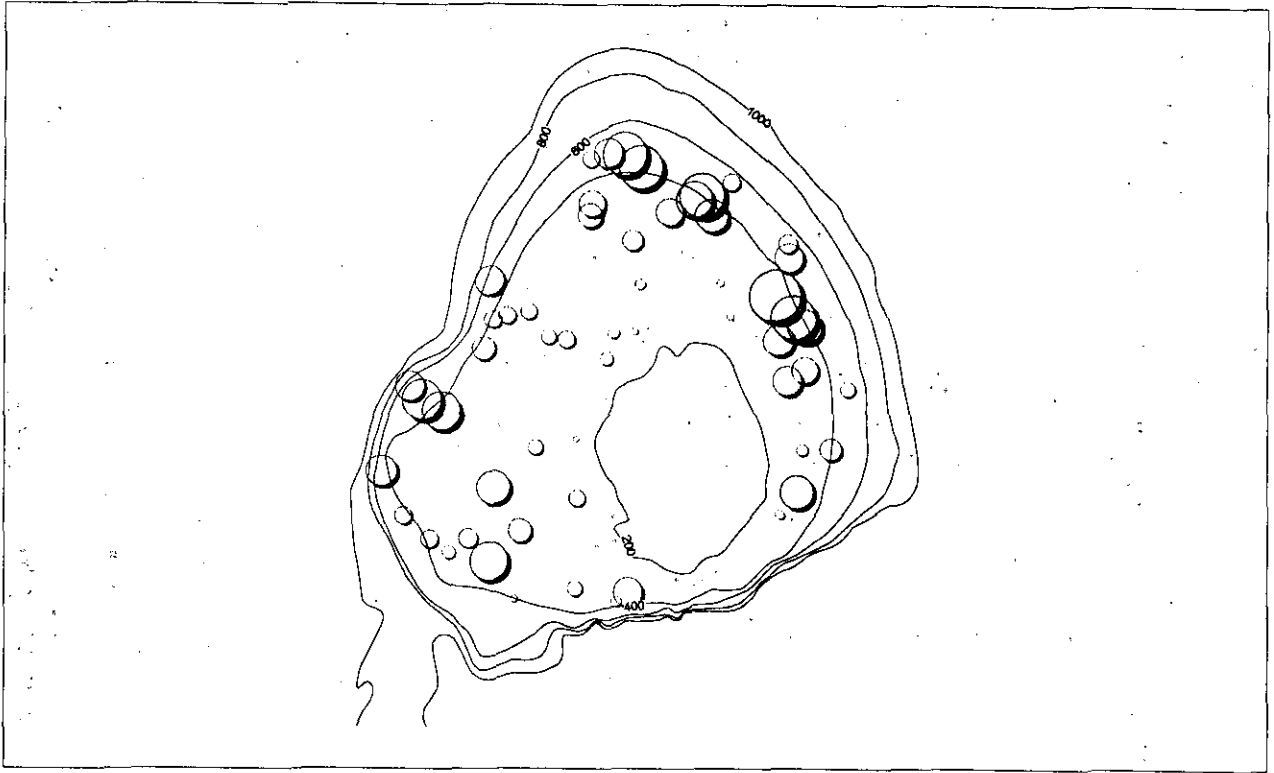


Figure 2 Density plot of shrimp on Flemish Cap from survey in July 1998. The largest circles represent approx. $3\text{g}\cdot\text{m}^{-2}$. Depth curves in meters.

Flemish Cap survey 1997

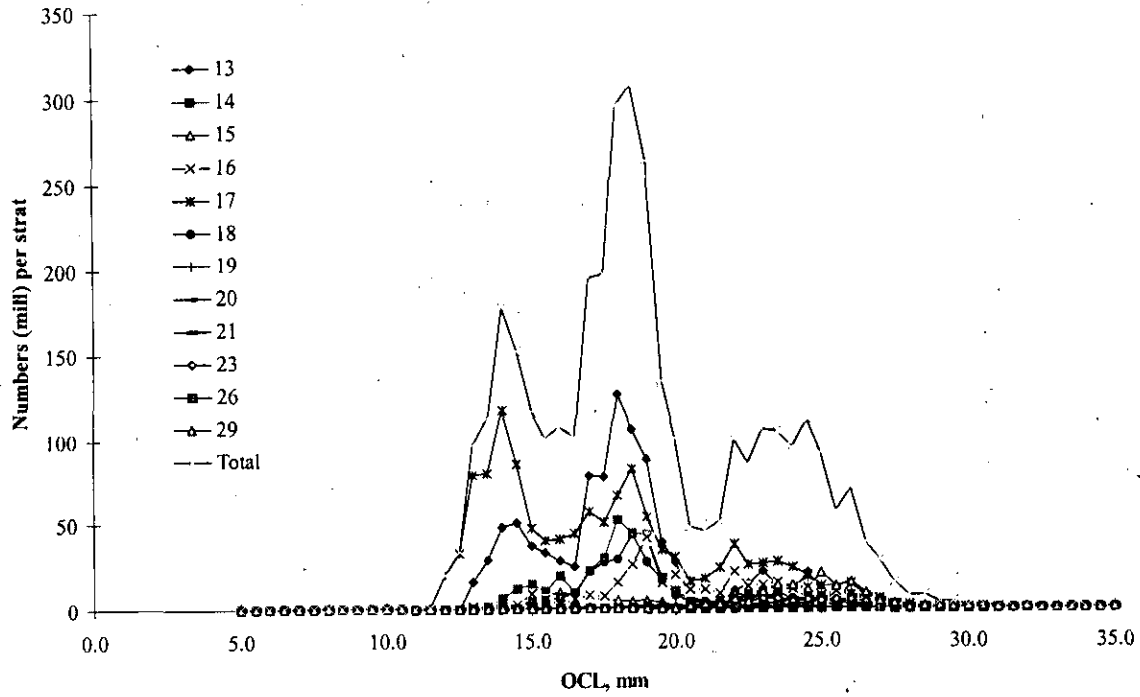


Figure 3 Stock in numbers (mill.) at length by strata and total from Faroese survey on Flemish Cap in June 1997.

Flemish Cap survey 1998

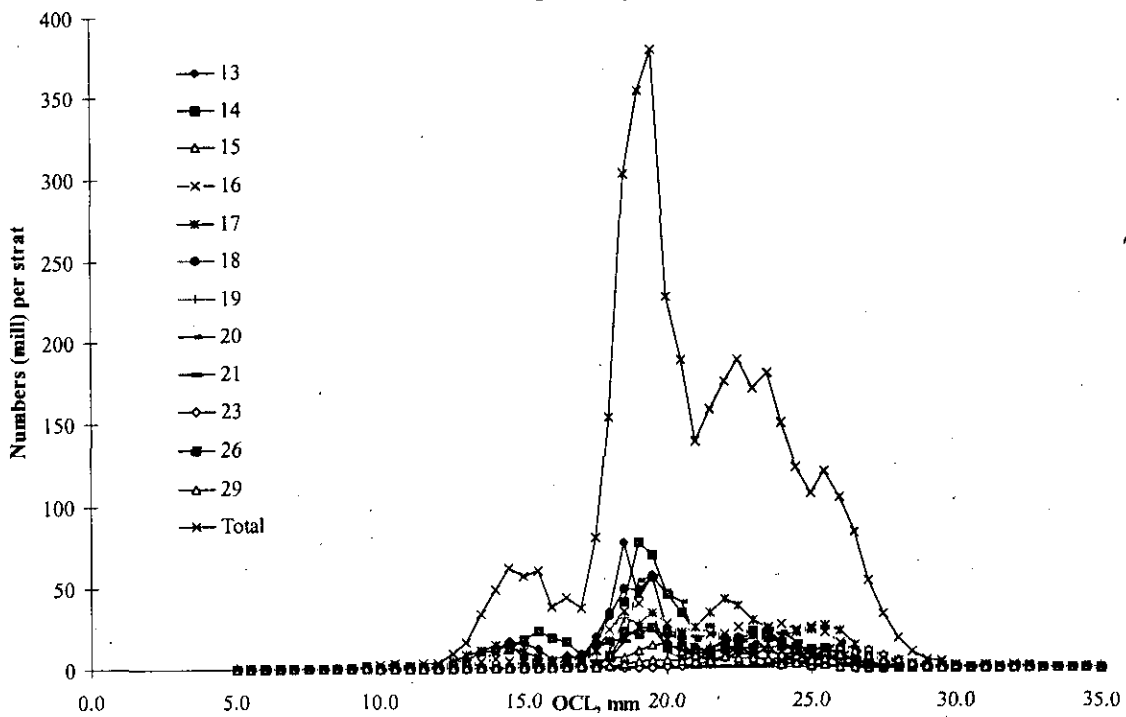


Figure 4 Stock in numbers (mill.) at length by strata and total from Faroese survey on Flemish Cap in July 1998.

Flemish Cap survey 1997

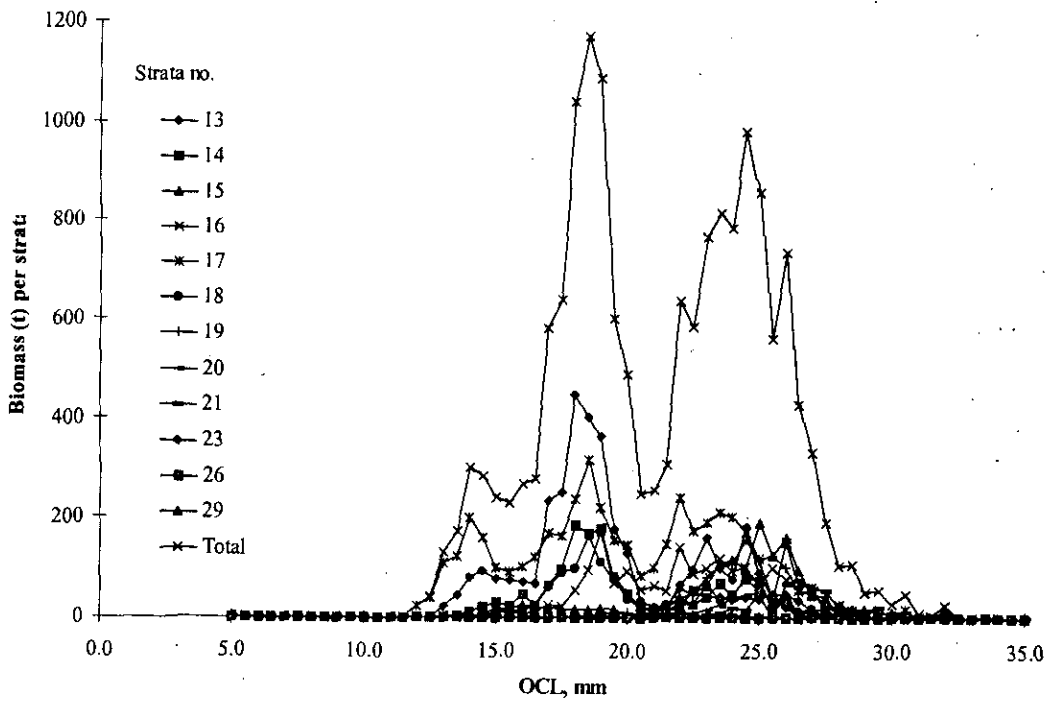


Figure 5 Stock weight (t) at length by strata and total from Faroese survey on Flemish Cap in June 1997

Flemish Cap survey 1998

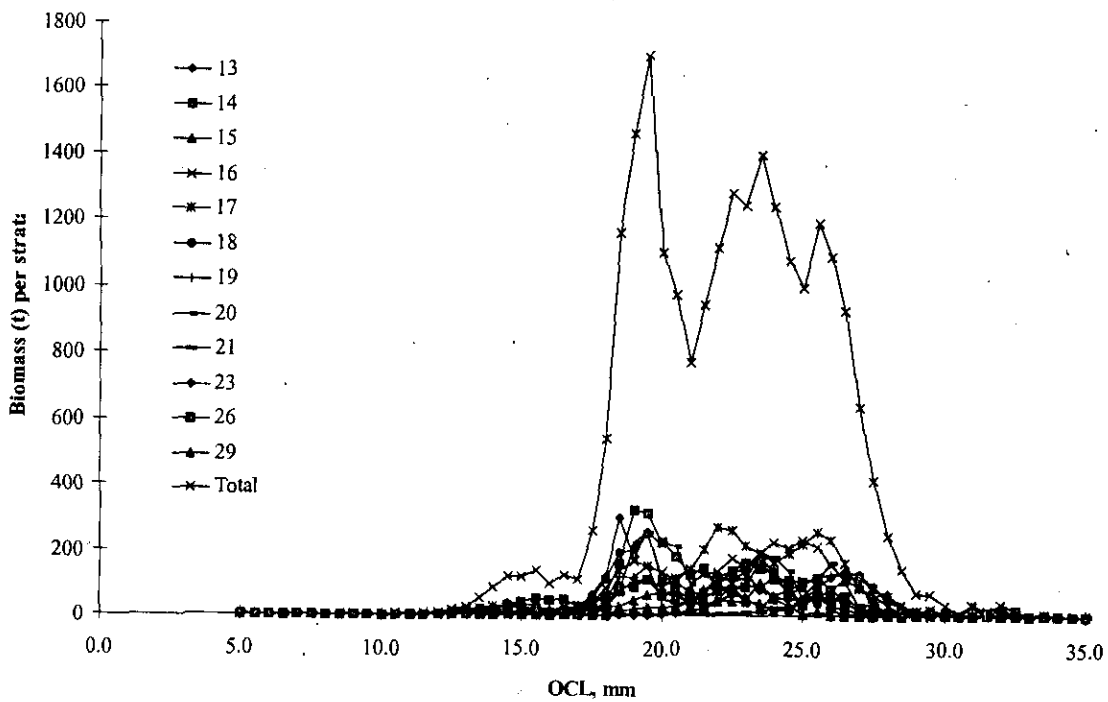


Figure 6 Stock weight (t) at length by strata and total from Faroese survey on Flemish Cap in July 1998.

Flemish Cap survey 1997

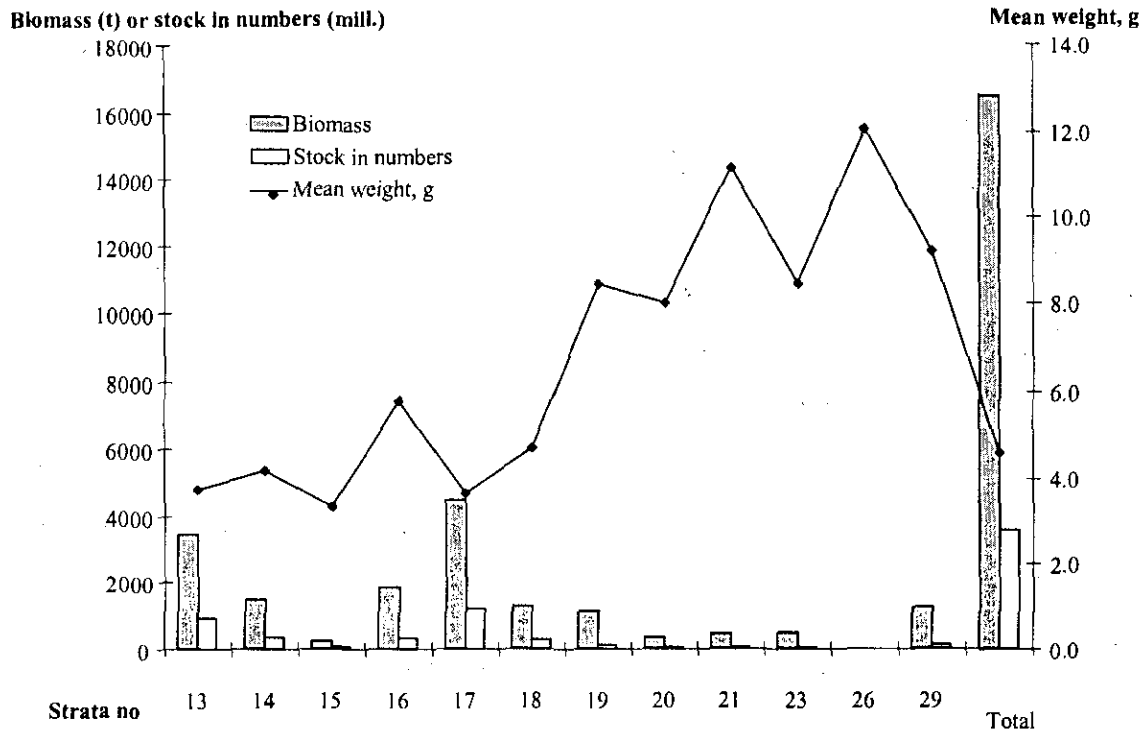


Figure 7 Biomass (t), stock in numbers (mill.) and mean weight (g) by strata and total from Faroese survey on Flemish Cap in June 1997.

Flemish Cap survey 1998

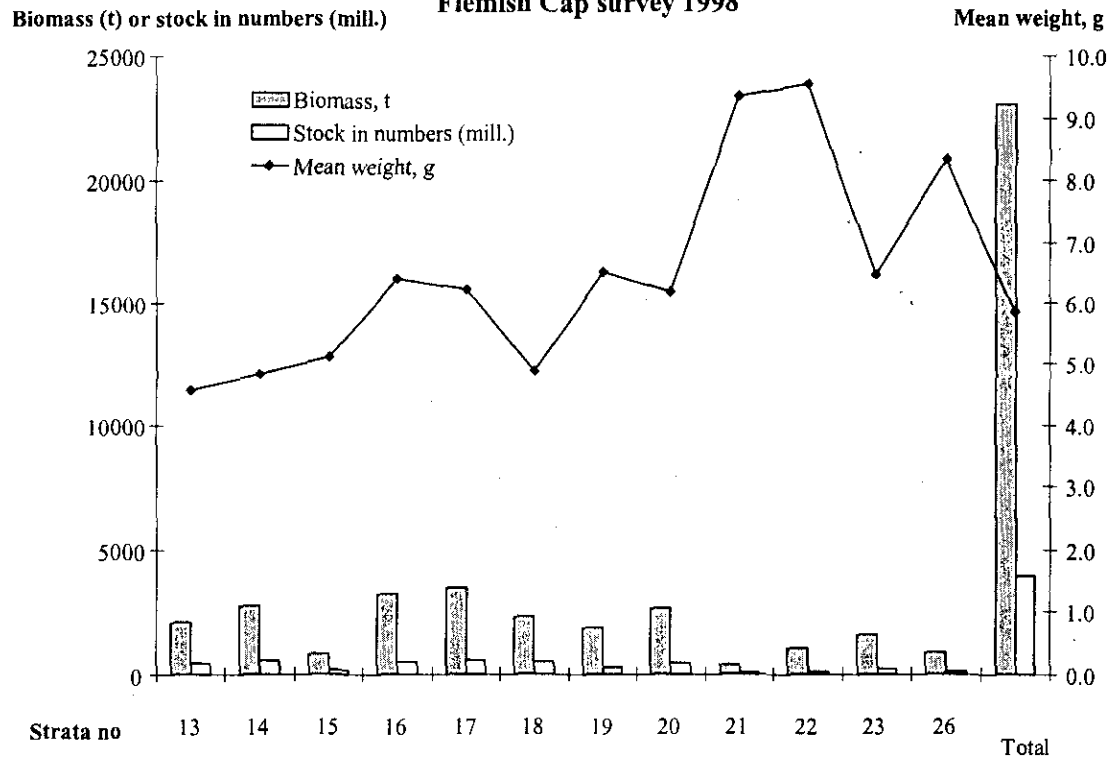


Figure 8 Biomass (t), stock in numbers (mill.) and mean weight (g) by strata and total from Faroese survey on Flemish Cap in July 1998.

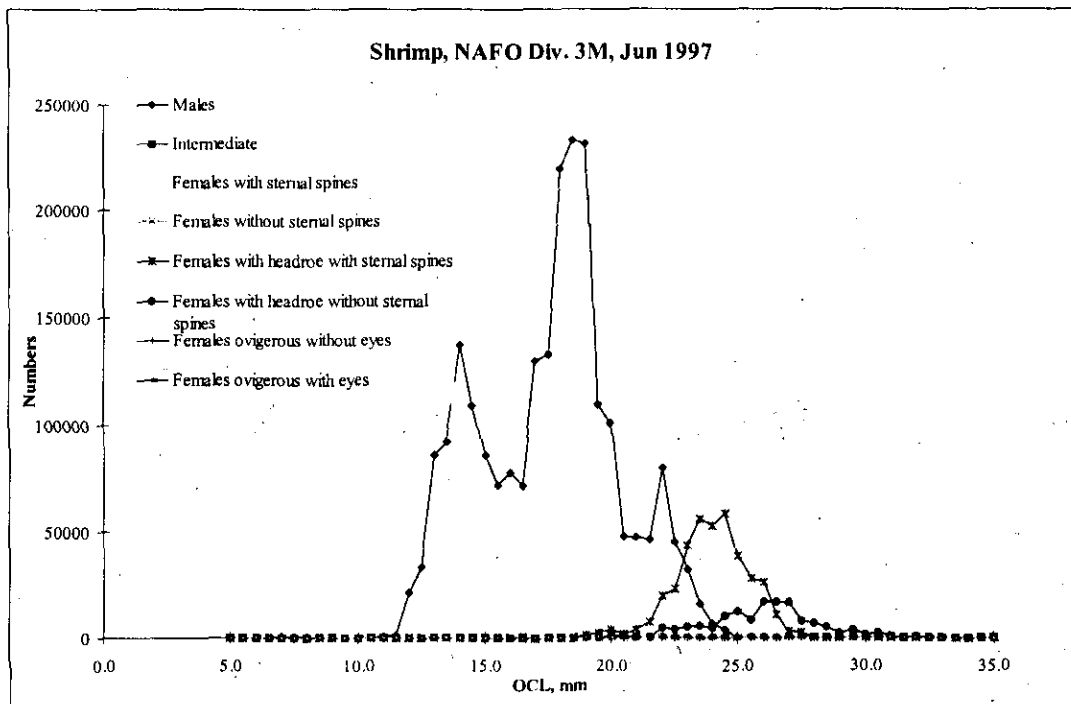


Figure 9 Shrimp, Survey, Flemish Cap, June 1997. OCL distribution by sex and maturity raised to catches.

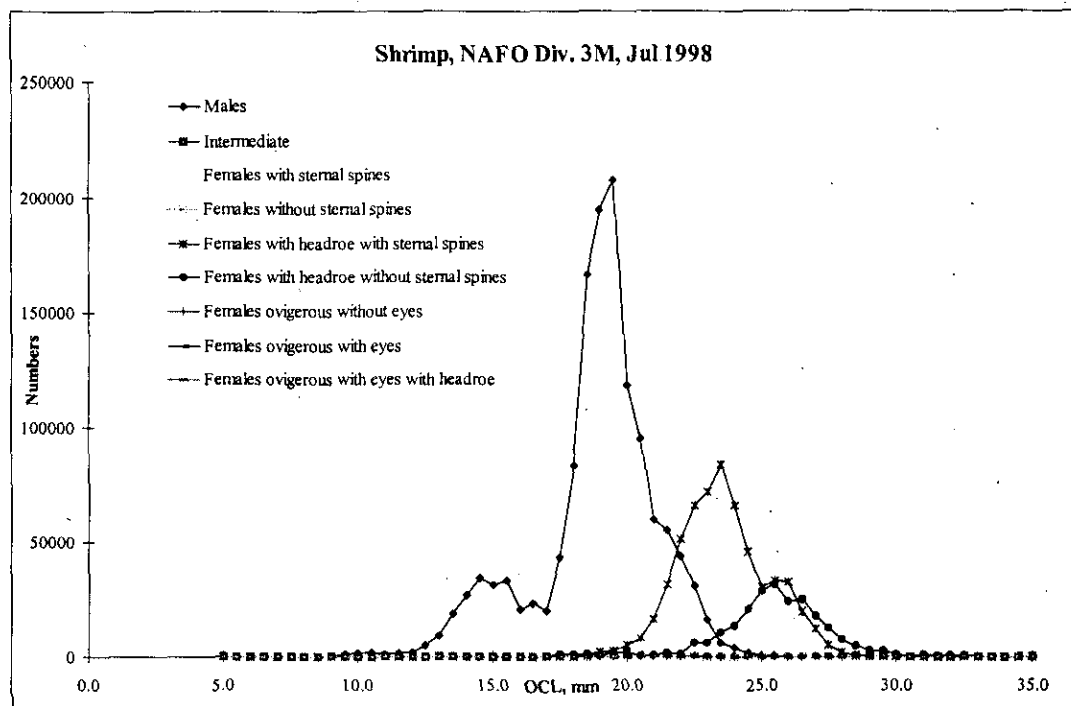


Figure 10 Shrimp, Survey, Flemish Cap, July 1998. OCL distribution by sex and maturity raised to catches.

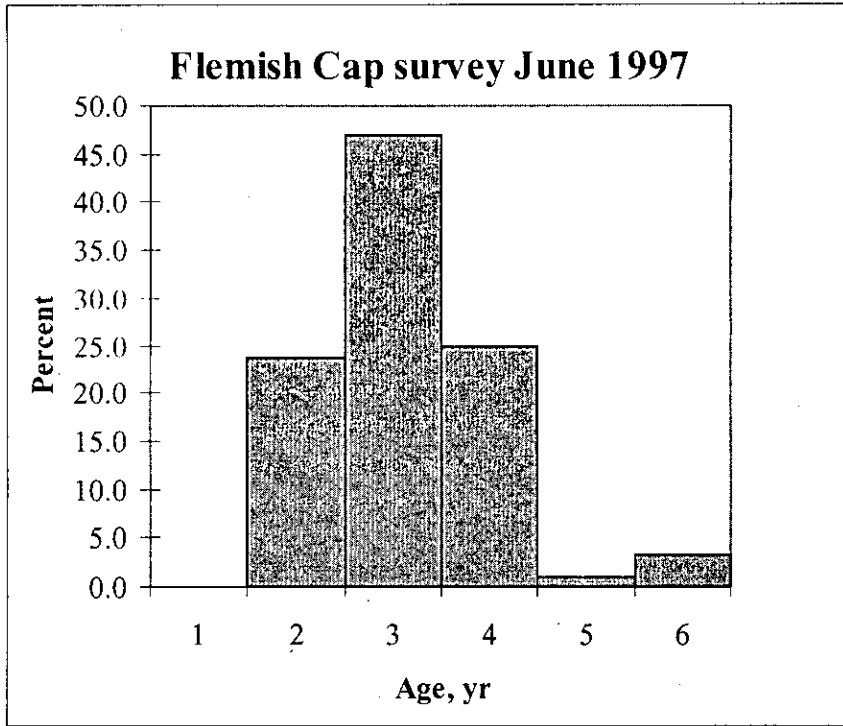


Figure 11 Shrimp, Survey, Flemish Cap, June 1997. Age distribution raised to catches.

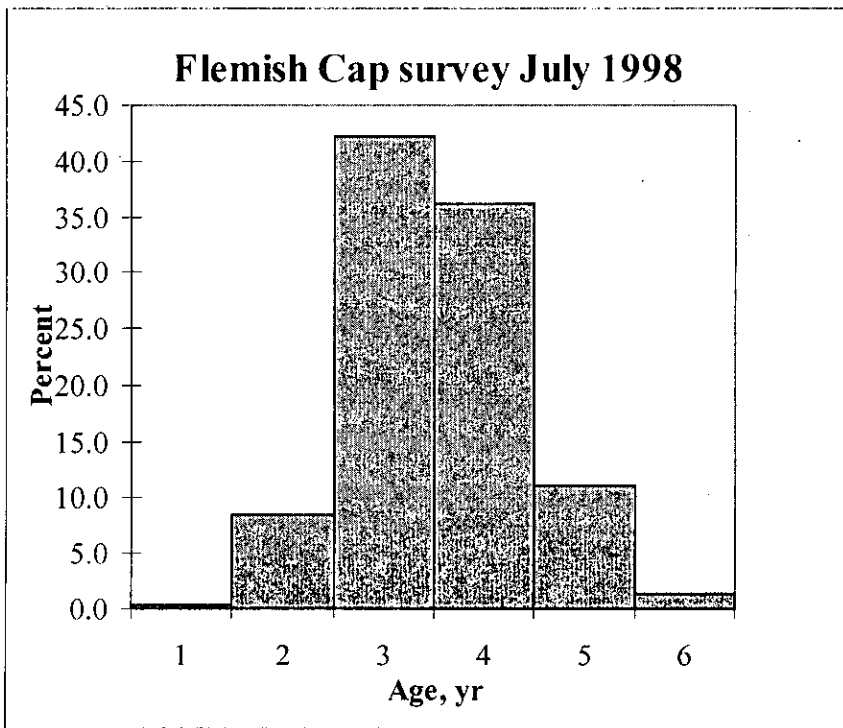


Figure 12 Shrimp, Survey, Flemish Cap, July 1998. Age distribution raised to catches.