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Biomass Estimate of the Northern Shrimp (*Pandalus borealis*) Stock on Flemish Cap (NAFO Division 3M) for 2003

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Abstract

Annual stratified random bottom trawl surveys for shrimp on Flemish Cap were carried out in the period 1997-2003. The estimated stock biomass were 16 000 tons, 22 000 tons, 16 500 tons, 20 000 tons, 19 000 tons, 28 000 tons and 27 000 tons, respectively. Average total and female stock biomass was about 21 000 tons and 10 000 tons, respectively.

Introduction

Previous results from the Faroese stratified random bottom trawl survey for northern shrimp on Flemish Cap are reported by Nicolajsen (1997, 1998, 1999, 2000, 2001, 2002).

Materials and Methods

In June 2003 a total of 61 stations were selected in a stratified random trawl survey as shown in Fig. 1. The number of stations allotted to the strata proportional to strata area. Stations were in the depth range 100-300 fathoms. Tow duration was 60 minutes and towing went on both in day and night time. As in the surveys in 1997-2002 the Faroese commercial shrimp trawler R/T *Høggifossur* (4400 HP) was used for the operation.

In 1997-2003 an *Angmassalik II* shrimp trawl with 40 mm mesh size in the codend and 22 mm bar spacing in the sorting grade was used. A single trawl was almost exclusively used except for a few stations in 1997 where a double trawl was used. In 1997-1999 the trawl had a circumference of 3000 50 mm mesh equivalent (50 mm m.e.), which was 3600 50 mm m.e. in 2000 and 3200 50 mm m.e. in 2001, 2002 and 2003. Doorspread and towing speed was recorded for these trawl types and average values calculated for each type and arrangement.

For each station the density was calculated, Fig. 2. The catch data were standardized dividing the catches by area swept, i.e. length of tow-times average 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 SCANMAR acoustic distance measuring device. The average density values were calculated for each stratum and multiplied by the strata area and summed for all strata to total biomass, Table 1.

Sample weight and counts were recorded for the whole sample and for the three maturity groups: males, primiparous and multiparous separately.

Results

The result of the total stock biomass calculations by the area swept method was 27 246 tons (Table 1). Biomass, stock in numbers, mean weight and C.V. % for each year are shown in Table 2. Total and female biomass is shown in Fig. 3 and 4.

References

- Nicolajsen, Á. 1997. Biomass Estimate by Area Swept of the Shrimp Stock on Flemish Cap (Div. 3M) in June 1997. NAFO SC WP 97/49. 3 p.
- Nicolajsen, Á. 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. NAFO SC WP 98/83. 3 p.
- Nicolajsen, Á. 1999. Biomass Estimate, Growth, Length and Age Distribution of the Northern Shrimp (*Pandalus borealis*) Stock on Flemish Cap (NAFO Div. 3M) in June 2000 and Faroese Shrimp catches 1996-1999. NAFO SC WP 99/114. 18 p.
- Nicolajsen, Á. 2000. Biomass Estimate, Growth, Length and Age Distribution of the Northern Shrimp (*Pandalus borealis*) Stock on Flemish Cap (NAFO Div. 3M) in June 2000. NAFO SCR Doc. 00/83. 17 p.
- Nicolajsen, Á. 2001. Biomass Estimate, Growth, Length and Age Distribution of the Northern Shrimp (*Pandalus borealis*) Stock on Flemish Cap (NAFO Division 3M) in June 2001. NAFO SCR Doc. 01/188 20 p.
- Nicolajsen, Á. 2002. Biomass Estimate, Growth, Length and Age Distribution of the Northern Shrimp (*Pandalus borealis*) Stock on Flemish Cap (NAFO Division 3M) in June 2002. NAFO SCR Doc. 02/156 20 p.

Table 1. Area swept assessment of the Flemish Cap (NAFO Div. 3M) shrimp stock biomass for June 2003.

Strata No.	Average density t•km ⁻²	Strata area km ⁻²	Biomass tons	No. of Stations
13	0.785	2572	2020	5
14	1.391	2401	3341	5
15	0.141	1629	229	3
16	0.981	5574	5468	13
17	1.393	5402	7524	11
18	1.392	4116	5729	9
19	0.321	1715	550	4
20	0.185	1886	348	4
21	0.084	1629	137	2
22	0.805	943	759	2
23	0.886	1286	1140	3
Total		29154	27246	61
Average	0.935			

Table 2. Biomass, Stock in Numbers, Mean Weight, and Coefficient of Variation for northern shrimp on Flemish Cap (NAFO Div. 3M) in the period 1997-2003.

Biomass, t

Year	Total	Female	Primiparous	Multiparous	Males
1997	16370	6732	4654	2078	9638
1998	22804	12559	8408	4151	10245
1999	16477	8864	5004	3860	7613
2000	20380	10155	5899	4256	10225
2001	19036	9374	5166	4208	9662
2002	27634	11761	6835	4926	15873
2003	27246	12402	5786	6616	14844
Average	21421	10264	5965	4299	11157

Stock in numbers (10^{-6})

Year	Total	Female	Primiparous	Multiparous	Males
1997	3564	747	548	199	2817
1998	3895	1465	1050	415	2429
1999	3518	1122	690	432	2396
2000	4220	1415	889	527	2804
2001	4031	1261	713	548	2770
2002	5660	1500	934	566	4160
2003	5493	1527	759	768	3966
Average	4340	1291	798	493	3049

Mean weight, g

Year	Total	Female	Primiparous	Multiparous	Males
1997	4.59	8.54	8.49	10.45	3.42
1998	5.86	7.96	8.00	10.01	4.22
1999	4.68	7.90	7.25	8.93	3.18
2000	4.83	7.17	6.64	8.08	3.65
2001	4.72	7.44	7.25	7.68	3.49
2002	4.88	7.84	7.32	8.70	3.82
2003	4.96	8.12	7.62	8.62	3.74
Average	4.93	7.85	7.51	8.92	3.64

Coefficient of variation

Year	C.V.%
1997	111
1998	94
1999	75
2000	75
2001	58
2002	70
2003	78
Average	80

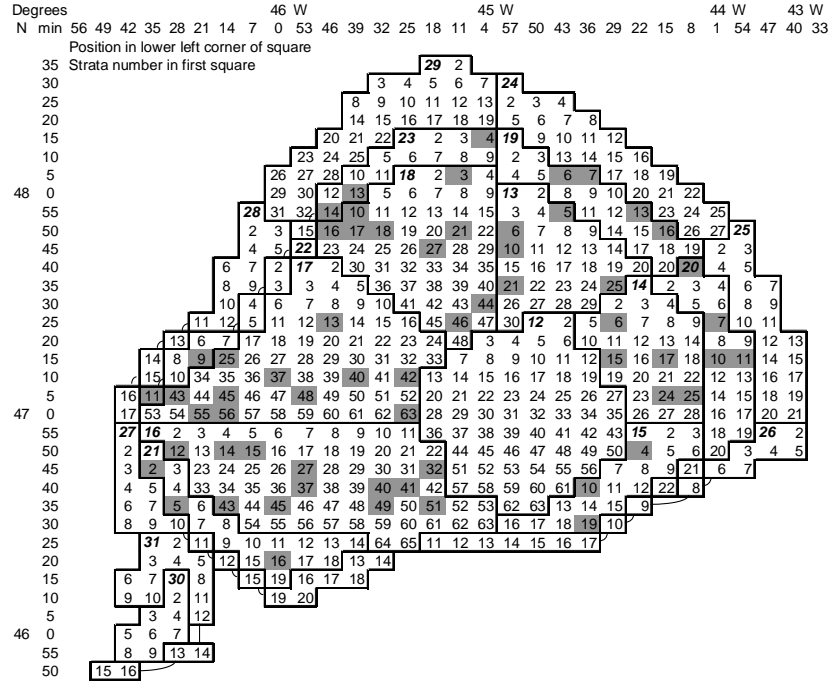


Fig. 1. Map of Flemish Cap (NAFO Div. 3M) showing strata with randomly selected stations (squares shaded) in the June 2003.

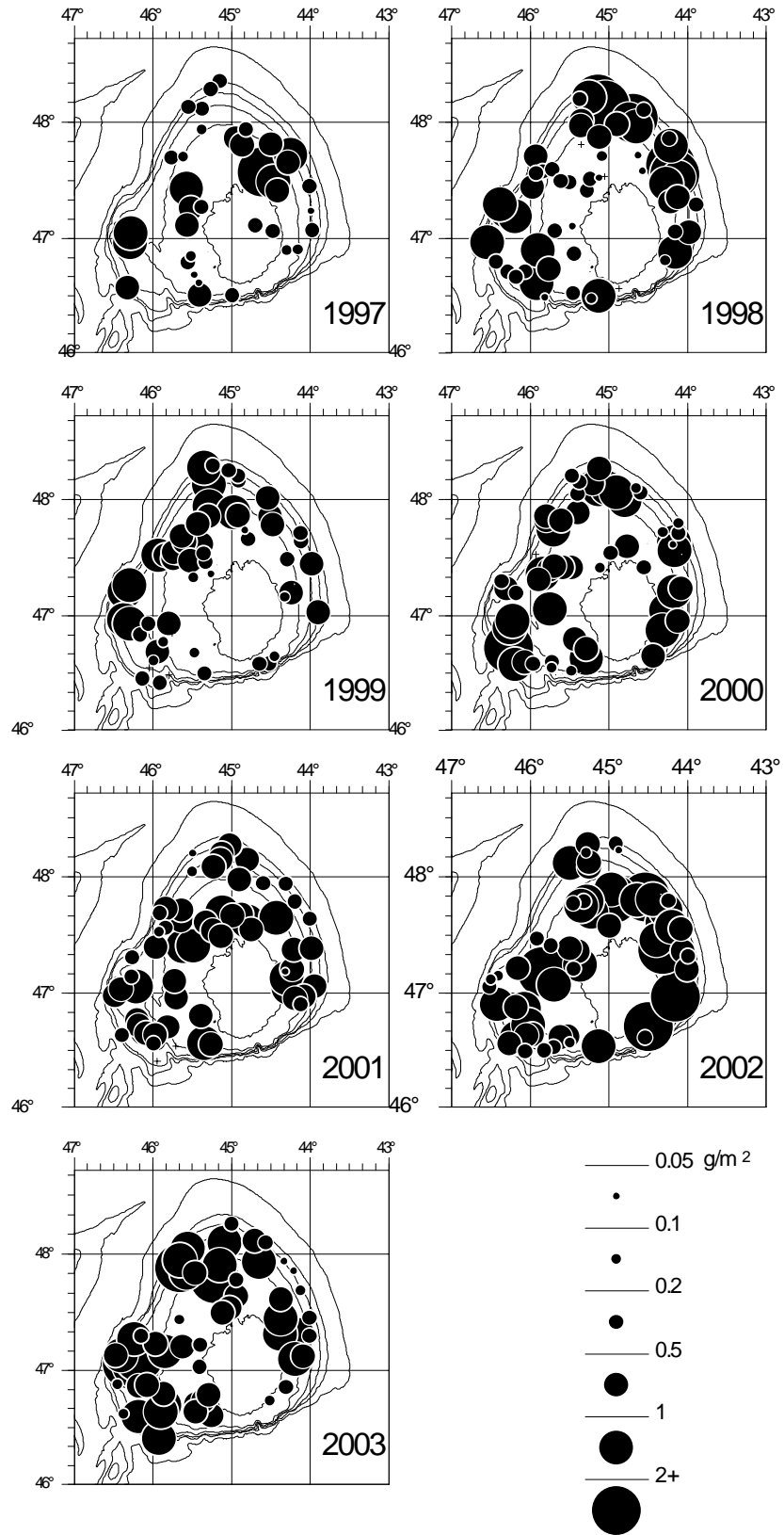


Fig. 2. Distribution of density of northern shrimp from surveys on Flemish Cap (NAFO Div. 3M) in 1997-2003 (shown by row). The largest circles are about 2 g.m⁻²

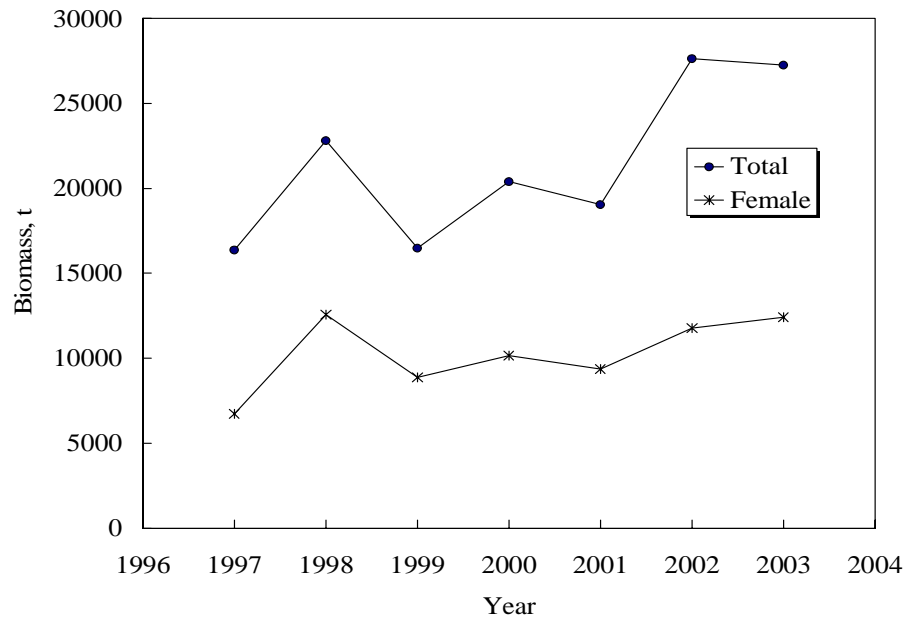


Fig. 3 Total shrimp stock biomass and female stock biomass on Flemish Cap (NAFO Div. 3M) in the period 1997-2003.

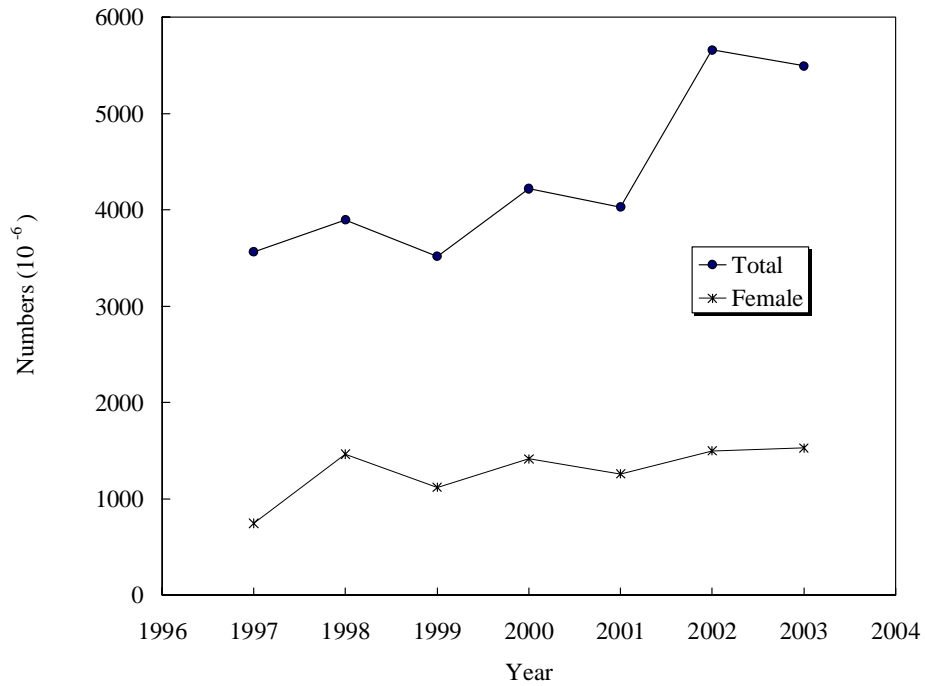


Fig. 4. Total shrimp stock in numbers and female stock in numbers on Flemish Cap (NAFO Div. 3M) in the period 1997-2003.