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Northern Shrimp (*Pandalus borealis*) Stock on Flemish Cap

by

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The shrimp population (Pandalus borealis) during the survey on Flemish Cap in July 1992 was analyzed. Results are presented in this paper and compared with those previously observed.

MATERIAL AND METHODS

The tecnical details of the survey have been described by Vázquez (1993).

Whenever shrimp appeared in the trawls, samples of approximately 1 Kg. were taken. Samples were conserved by freezing for laboratory analysis, following the same procedures as in previous years (Mena, 1992).

Sex was identified by observation of the endopod of the first pleopod (Rasmussen, 1953). Individuals changing sex were included with the males. Females were classified into primiparous (first time spawners) and multiparous (spawned previously) according to their sternal spines (McCrary, 1971). No ovigerous females were found this year, as expected, because the spawning period in this zone begins at the end of July or early August (Mena, 1991) and the survey was earlier.

The oblique caparace length (CL): distance from the base of the eye to the posterior lateral edge of the caparace (Horsted and Smidt, 1956) was used as a size reference.

Individual weights were measured after waiting some minutes to allow remaining water to drain.

RESULTS

Total shrimp biomass by the swept area method in the last five years is shown in the Table 1. The increase observed in 1991 has continued in 1992. The estimated biomass for 1992 doubled the estimate for 1991.

Length frequencies by sex are shown in Table 2. Multiparous females between 20.5 and 24.5 mm CL are probably primiparous females incorrectly classified, because the sternal spines of primiparous females appear slightly blunted when the change from males to females is late (McCrary, 1971). This circumstance probably occurred this year, as we comment later.

Length frequencies by strata (Table 3) follow the characteristic distribution of this species described by Mena (1990): shrimps do not appear in depths shallower than 257 m (140 fathoms). The smaller individuals (CL between 16 and 21 mm) occupy shallower strata, between 259 and 368 m (141-240 fathoms). Individuals greater than 21 mm of CL are distributed in depths between 259 m (141 fathoms) and 552 m (300 fathoms). Shrimps are scarce in greater depths than 552 m.

Shrimp biomass estimated by strata from 1988 to 1992 is shown in Table 4. Strata characterized by the abundance or scarcity of shrimps are approximately the same every year, which indicates that their distribution pattern is stable.

The structure of the three modal size groups observed can be interpreted following the model proposed by Mena (1992): according to this author, in the first modal group, composed exclusively of males, individuals are one year old. This group had a size range between 18 and 21 mm CL in 1992. In the intermediate modal group (24-27 mm CL in 1991), composed of males and females, individuals are two years old. This group had sizes between 22 and 28 mm CL in 1992. Males of this group have a size range similar to primiparous females of the previous year, which indicates that the population was in an earlier phase of development in 1992, that is, the sex change was delayed. The third modal group is composed of shrimps three years old. Individuals in this group had sizes between 29 and 31 mm CL in 1992. The proportion of individuals older than three years is small, although their abundance is higher than in previous years.

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TABLE 1 - Total biomass estimated by swept area method and average catch per mile.

Year	Biomass(t)	Average catch per mile (Kg)
1988	2164	1.54 ± 0.28
1989	1923	1.37 ± 0.24
1990	2139	1.53 ± 0.21
1991	8211	5.83 ± 0.71
1992	16531	11.75 ± 1.86

TABLE 2 - Length frequencies by sex.

Length	Ind	M	F: prim	mult	ovig
16.0 -		5			
16.5 -		3			
17.0 -	3	43			
17.5 -		121			
18.0 -		198			
18.5 -	3	142			
19.0 -		178			
19.5 -		176			
20.0 -	2	175			
20.5 -		60	3		
21.0 -		25		4	
21.5 -		17		4	
22.0 -		88		1	
22.5 -	3	212		9	
23.0 -	2	439		17	
23.5 -		702	10	16	
24.0 -	3	603	21	44	
24.5 -		629	9	122	
25.0 -		519	142	75	
25.5 -	1	507	125	179	
26.0 -		738	140	369	
26.5 -	7	637	195	711	
27.0 -	3	501	231	1141	
27.5 -	15	408	405	1213	
28.0 -		130	525	1111	
28.5 -		112	498	840	
29.0 -	9	34	366	686	
29.5 -		2	326	575	
30.0 -	4	10	102	280	
30.5 -	3		66	263	
31.0 -			21	360	
31.5 -			12	189	
32.0 -	1	1	2	111	
32.5 -		1		59	
33.0 -				51	
33.5 -				7	
34.0 -				8	
34.5 -					
35.0 -				3	

frequencies x 100000

Ind - indetermined
M - male
F - female
prim - primiparous
mult - multiparous
ovig - ovigerous

TABLE 3 - Length frequencies by strata.

Depth (m):	186-257		259-368				372-552				554-736		
Strata:	5	6	7	8	10	11	12	13	14	15	16	19	total
length													
16.0-					2	3							5
16.5-			2										3
17.0-			39		6								46
17.5-			53	34	4	3			26				121
18.0-	1		156		6	22			13				198
18.5-			110		10	25							145
19.0-			101		29	48							178
19.5-			87		12	45	5		26				176
20.0-			89		12	26			39	11			177
20.5-			23		15	21			3				63
21.0-					23	6							29
21.5-			4		11		5						21
22.0-			33		4	5	24			23			89
22.5-			48		16	14	120		13	11		1	224
23.0-			137		23	85	163		1	49			458
23.5-			207	34	38	101	218		32	95			728
24.0-	1		102	68	63	199	121		39	67	8		671
24.5-		1	70	103	71	238	160		2	109	4		760
25.0-			49	137	98	147	187		54	49	11		736
25.5-	1		72	34	82	235	166		106	108		5	812
26.0-	1	1	154	34	174	276	199		242	142	15	6	1247
26.5-	1		262	34	134	299	278	1	278	244	8	7	1550
27.0-	1		381	206	258	243	196	2	288	261	19	13	1876
27.5-	1		251	137	374	278	197	2	339	400	42	11	2041
28.0-			328	103	282	296	228	2	208	276	19	17	1766
28.5-			120	206	293	224	247	3	95	223	19	15	1450
29.0-			74	34	278	177	172	3	34	266	34	19	1095
29.5-			43	137	127	118	202	2	90	127	22	30	903
30.0-			9		54	62	101	3	3	123	23	16	396
30.5-			10		8	40	127	3	29	51	19	46	332
31.0-			24		5	7	221	1	17	45	34	26	381
31.5-						7	97	2	6	49	11	29	201
32.0-							64		4	23	4	20	115
32.5-							33		3	3	11	8	60
33.0-							27		1	13	4	5	51
33.5-							5	1					7
34.0-							5		2				8
34.5-													
35.0-							3						3

TABLE 4 - Total biomass stimated by strata (t).

Strata	Depth (fathoms)	1988	1989	1990	1991	1992
1 -	70- 80	-	-	-	-	-
2 -	81-100	-	-	-	-	-
3 -	101-140	-	-	-	5	-
4 -	"	-	-	-	-	-
5 -	"	-	-	-	4	8
6 -	"	-	-	2	19	3
7 -	141-200	18	20	212	713	2134
8 -	"	9	51	46	158	1130
9 -	"	57	47	24	150	68
10 -	"	115	44	188	1499	2279
11 -	"	89	-	105	733	2714
12 -	201-300	786	582	513	1733	3329
13 -	"	64	58	41	63	28
14 -	"	255	218	407	914	1540
15 -	"	404	328	558	1485	2522
16 -	301-400	308	234	239	171	303
17 -	"	2	10	-	-	-
18 -	"	-	-	-	-	-
19 -	"	56	331	4	663	354
total (t)		2164	1923	2139	8211	16531

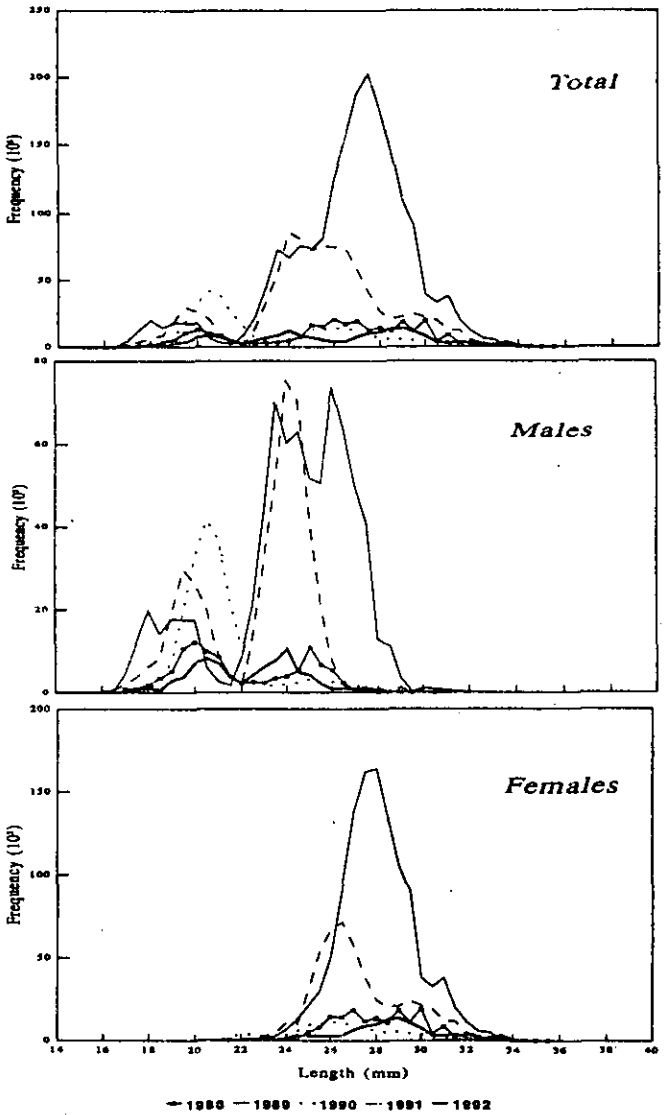

Figure 1. Shrimp length distribution on Flemish Cap, 1988-1992.

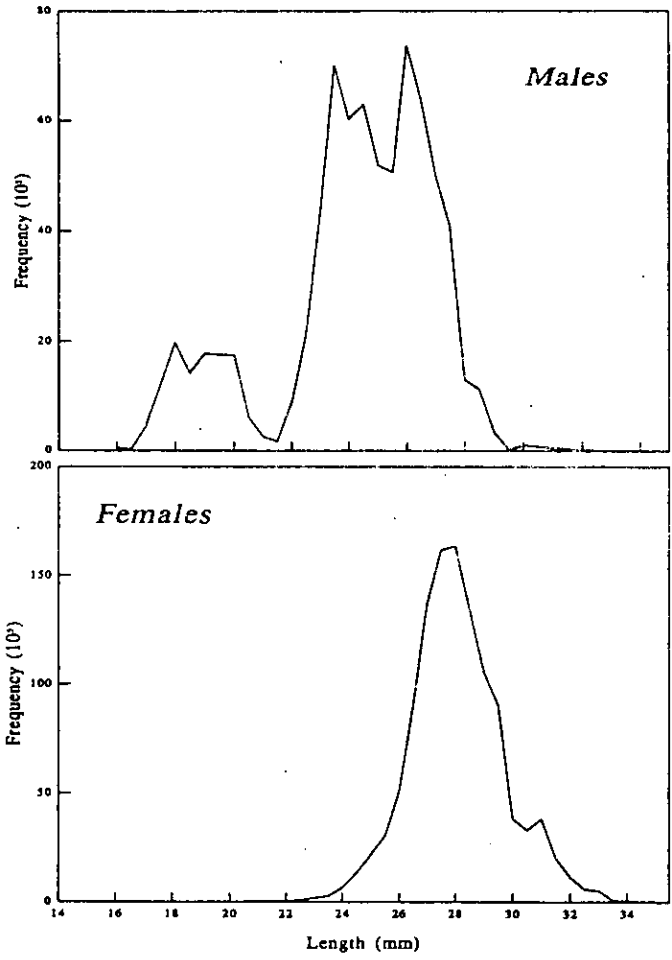

Figure 2. Shrimp length distribution on Flemish Cap in July 1992