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Northern Shrimp (*Pandalus borealis*) on Flemish Cap in July 1994

by

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The shrimp (*Pandalus borealis*) population was analyzed with data from the survey on Flemish Cap carried out in July 1994. The results are also compared with those previously obtain.

Material and Methods

The survey was conducted with the same technical characteristics as previous ones (Vázquez, 1994). Samples of one kilogram were frozen for subsequent analysis following the same procedures as in previous years. Sex was identified by observation of the endopod of the first pleopod (Rasmussen, 1953). Individuals changing sex were included in the males. Females were classified into immature (first time spawners) and mature (spawned previously) according to the condition of the sternal spines (McCrary, 1971). Some ovigerous females were found this year as in 1990. In that year the survey was delayed and ended in the first week of August. The survey in 1994 was also later than the 1991-1993 surveys. The spawning period in Flemish Cap starts near the end of July and the beginning of August (Mena, 1991). Individuals were measured to the lower 0.5 mm. We used the oblique carapace length (OCL): distance from the base of the eye to the posterior dorsal edge of the carapace (Shumway et al., 1985).

Results

Total shrimp biomass estimated by the swept area method in recent years is show in Table 1. The increase observed in 1991 and 1992 was followed by a notable decrease in 1993 and 1994. The length frequency distribution in 1994 by sex is shown in Table 2. Length frequencies by strata are shown in Table 3. Individuals occupy strata between 259 m. and 552 m. Shrimp are scarce in depths greater than 552 m. and do not appear in depths shallower than 257 m. Shrimp biomass estimated by strata is shown in Table 4 and their distribution pattern is the same as observed on previous surveys. Shrimp length distribution on Flemish Cap 1990-1994 is shown in Figure 1. It is assumed that modal groups named A are comprised of individuals of the same year-class. All individuals of this year-class were males in 1990, gradually became females in 1991 and 1992, and were females in 1993. According this scheme the total transition from males to females lasted two years. In 1992 we found the maximum abundance in the 24 mm length modal group. This class grew to a modal length of 28 mm in 1994. During this period the abundance of this modal class decreased, not only due to the natural mortality rate but also as consequence of the shrimp fishing in this zone, mainly in 1993. The modal group of 18 mm does not appear significantly in 1994. In spite of it low abundance at sea, these small size shrimp are inefficiently caught by the 35 mm mesh size cod-end used up to 1993 and the 40 mm used in 1994.

References

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

Year	Biomass (Tm)	Average catch per mile
1988	2164	1.54 Kg ± 0.28
1989	1923	1.37 Kg ± 0.24
1990	2139	1.53 Kg ± 0.21
1991	8211	5.83 Kg ± 0.71
1992	16531	11.75 Kg ± 1.86
1993	9256	6.57 Kg ± 1.04
1994	3337	2.37 Kg ± 0.35

Table 2.- Length frequencies by sex

Length	Ind	M	F : Immat	Mat		
14.5		2				
15.0		6				
15.5		75				
16.0		77				
16.5		161				
17.0		188				
17.5		390				
18.0		267				
18.5		141				
19.0		44				
19.5		87	3			
20.0		236				
20.5		694				
21.0	1132		19	1		
21.5	1330		14			
22.0	1342		37			
22.5	747		92	2		
23.0	562		44	18		
23.5	486		90	75		
24.0	721		203	52		
24.5	621		384	96	1	
25.0	160		657	206	19	
25.5	43		1089	352	2	
26.0	13		669	614	21	
26.5	16		665	1495	32	Ind Indetermined
27.0	2		1094	2321		M Male
27.5	21		668	3596	22	F Female
28.0			684	3076	37	inmat Inmature
28.5			505	2834		mat mature
29.0			48	2264	8	ovig ovigerous
29.5			18	947		
30.0			4	760		
30.5				227		
31.0			5	165		
31.5				175		
32.0				1		
32.5				28		
33.0				3		

Table 3.- Length frequencies by strata
Stratum

Length	7	8	10	11	12	14	15	16	19	total
14.5-			3	4						2
15.0-			13							6
15.5-			32	30						75
16.0-		1	28	36						77
16.5-	13		61	66			7			161
17.0-			59	116			19			188
17.5-		2	113	90		13	82			390
18.0-			99	63			39		11	267
18.5-			51	48			33			141
19.0-			24	6		15				44
19.5-			65	7			13		2	90
20.0-			83	18	13	19	72	3	6	236
20.5-	13	1	186	63	38	91	201		17	694
21.0-	1	1	178	155	35	190	346	5	37	1152
21.5-		2	216	133	105	373	418	9	47	1344
22.0-	2	1	116	97	99	289	379	7	50	1379
22.5-	16	2	131	78	70	155	246	7	7	841
23.0-	1		34	67	63	175	120	6	39	624
23.5-		1	63	96	67	68	233	8	48	651
24.0-	58	2	122	100	106	177	193	11	51	976
24.5-	52	4	166	173	122	212	154	7	44	1102
25.0-	32	1	274	182	112	66	247	11	29	1042
25.5-	137	4	327	283	111	85	318	10	25	1486
26.0-	101	1	286	177	203	56	397	17	15	1317
26.5-	108	5	452	421	307	205	483	14	29	2208
27.0-	110	4	606	307	596	370	675	35	77	3417
27.5-	150		894	380	657	541	785	48	69	4307
28.0-	80		562	210	581	662	966	42	57	3797
28.5-	40		375	87	627	650	830	42	64	3339
29.0-			213	62	343	407	535	35	45	2320
29.5-			53	4	192	213	220	25	49	965
30.0-			5	4	201	108	134	12	42	764
30.5-			5		56	24	99	7	20	227
31.0-			3		14	53	78	2	20	170
31.5-					54	1	26	3		175
32.0-					4			1	3	1
32.5-					12	14				28
33.0-						1			6	3

Table 4.- Total biomass estimated by strata (tonnes)

strata	Depth (fathoms)	1988	1989	1990	1991	1992	1993	1994
1	70-80							
2	81-100							
3	101-140				5		1	
4	101-140							
5	101-140				4	8		
6	101-140			2	19	3	3	
7	141-200	18	20	212	713	2134	1404	93
8	141-200	9	51	46	158	1130	545	3
9	141-200	57	47	24	150	88	109	
10	141-200	115	44	188	1499	2278	972	658
11	141-200	89		105	733	2714	794	358
12	201-300	786	582	313	1733	3329	1786	599
13	201-300	64	58	41	63	28	120	
14	201-300	255	218	407	814	1640	(1161)	556
15	201-300	404	328	558	1485	2522	2029	916
16	301-400	308	234	239	171	303	133	44
17	301-400	2	10				36	
18	301-400							
19	301-400	56	331	4	663	354	163	111
Total		2164	1923	2139	8211	16531	9256	3337

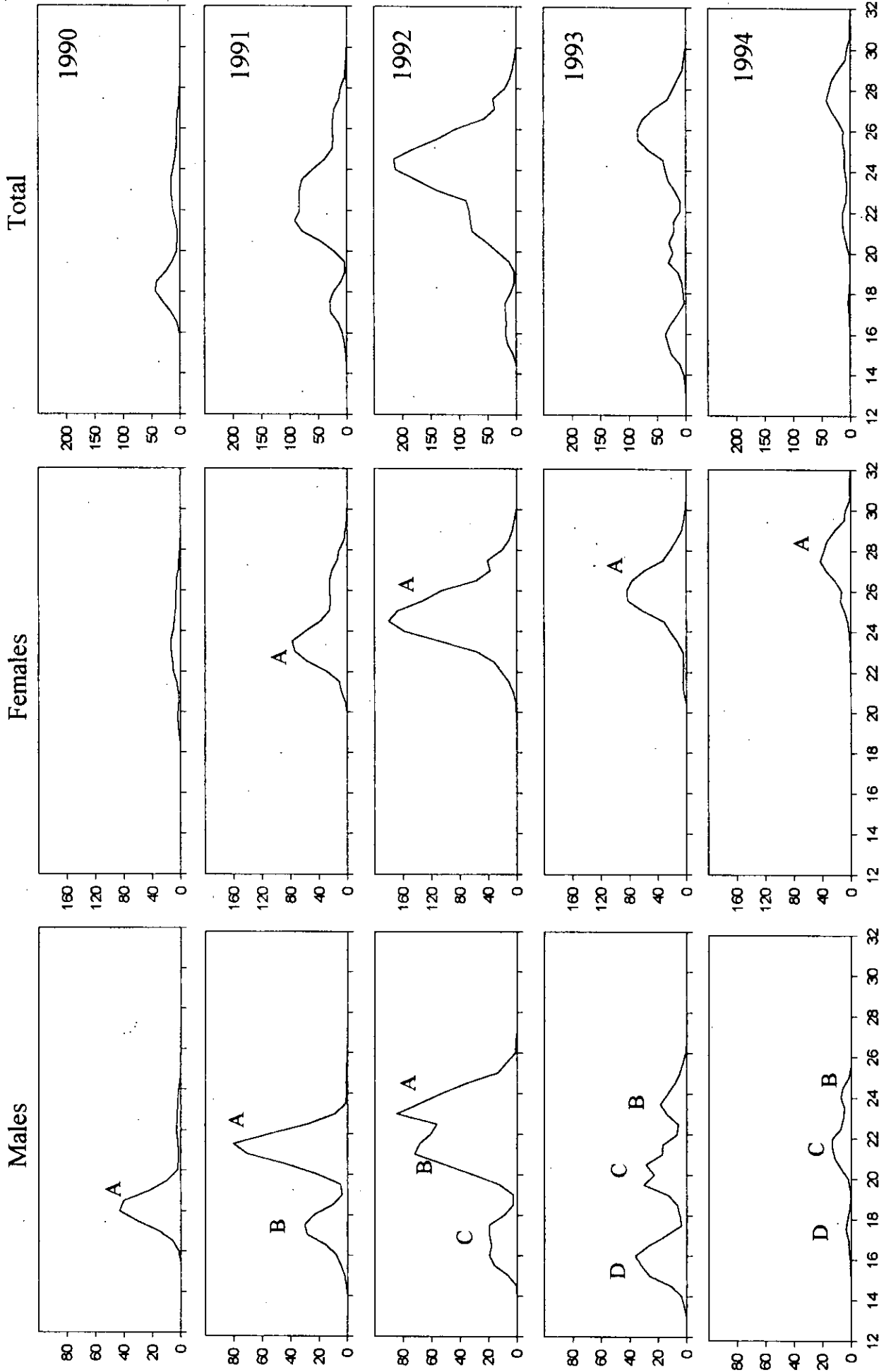


Figure 1. Shrimp length distribution on Flemish Cap, 1990-1994. Y-Axis = Frequency (10³) X-Axis = Length (mm)