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The Icelandic Shrimp Fishery (*Pandalus borealis*) in the Denmark Strait in 1998-1999.

by

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Abstract

In this paper there are logbook information on the Icelandic fishery for the years 1998-1999 as well as nominal catches. The nominal catch of 1999 was 749 tons as compared to 1 420 tons in 1998.

Introduction

In this paper there is an account of logbook information for the Icelandic fishery taking place on the eastern side of the midline between Greenland and Iceland. This information is presented here for the years 1990 to 1999 as well as the nominal catch.

Material and Methods

For most of the catch data there are logbook data which include catch and effort. Although skippers send in the logbooks, some information is not turned in and nominal catch is therefore always higher. Effort is adjusted with respect to the nominal catch by dividing CPUE every half year into the nominal catch of every half year. Twin trawls were treated by doubling the effort of twin trawls.

The measuring of the shrimp was carried out using sliding calipers and measuring the carapace from the eye socket to the hind end of the carapace mid-dorsally to the nearest half mm. After this every specimen in a length class is grouped by sexual character as done by Rasmussen (1953) as well as detecting the presence or absence of sternal spines (McCrary 1971). The sex groups detected are 9. Later the 9 sex groups are combined and grouped together in the three main groups males, primiparous females (with sternal spines) and multiparous females (without sternal spines). In the group primiparous females there are also transitionals.

Catch and Effort Data

In 1999 the fishery was carried out in the period January through June. But most of the catch was taken in March, April and May. The total annual catch was much lower than usual or only 749 tons in 1999 (table 1). The mean CPUE for the year 1995 was the highest ever for Iceland, namely 309 kg per trawling hour in the period January-June. In 1996 and 1997 the mean CPUE was 242 and 250 kg/hour, respectively which was also rather high. The CPUE was lower in 1998 and 1999 i.e. 175 and 153 kg/hour. The average size of gear was about 3 340 meshes as compared to 3400 meshes circumference of the belly in 1998, compared to 3 200 and 3 120 meshes in 1997 and 1996 respectively. In most previous years the size was about 2 400 meshes, so there has been a substantial increase in the size of gear in later years and hence the CPUE is likely to be overestimated.

Commercial Samples

The samples were obtained from shrimpers in 1998 and 1999. The proportion of males in 1996 was very high namely 70% as compared to 50% in 1997. The percentage of females was then 30% in 1996 as compared to 50% in 1997 and 40% in 1998. As the Icelandic commercial samples have been quite few the last years it is not wise to draw any conclusions on the proportions of females in the catch.

Of the multiparous females 64% were carrying eggs in 1999, so there were 36% of females in the resting phase. 72% were carrying eggs in 1998. As pointed out before a proportion of the females will spawn every second year as hinted by the high percentage of mature females not carrying eggs. As a comparison in 1996 and 1997 the proportions not carrying eggs were 28% and 17% respectively. In 1999 1.6% was preparing the next batch of eggs to be spawned in the following summer.

References

- McCrary, J. A. 1971. Sternal spines as characteristic for differentiating between females of some Pandalidae. J. Fish. Res. Board Can., **28**: 98-100.
- Rasmussen, B. 1953. On the geographical variation in growth and sexual development of the deep sea prawn (*Pandalus borealis* Kr.). FiskDir. Skr. Ser. Havunders. **10** (3) : 160 p.

Table 1. Continued.

1997 *	Jan	29	7	0.2				
	Feb	245	785	192.5				
	Mar	262	4278	1120.4	Oct	71	236	16.8
	Apr	286	2700	772.1	Nov	14	7	0.1
	May	134	1189	159.5	Dec	108	931	100.1
	Jun	25	8	0.2				
	Subtotal	250	8967	2244.9	Subtotal	100	1174	117.0
	Total	250	10856	2717.8	Total	100	1388	138.3
1998 *	Jan	58	66	3.8				
	Feb	173	314	54.2	Sep	41	17	0.7
	Mar	90	39	3.5	Oct	30	10	0.3
	Apr	219	3507	766.5	Nov	60	243	14.5
	May	130	3148	408.8	Dec	117	47	5.5
	Subtotal	175	7074	1236.8	Subtotal	66	317	21.0
	Total	175	8010	1400.4	Total	66	317	21.0
1999 *	Jan	174	310	54.0				
	Feb	119	114	13.6				
	Mar	311	327	101.6				
	Apr	144	2156	311.0				
	May	122	1107	135.6				
	Jun	100	33	3.3				
	Subtotal	153	4047	619.1				
	Total	153	4896	749.0				

Table 2. The length distribution by 3 major categories by months.

January 1998				
CL mm	Males	Primip. Females	Multip. Females	Σ
14				
14.5				
15				
15.5				
16				
16.5	1			1
17	1			1
17.5	5			5
18	8			8
18.5	8			8
19	7			7
19.5	8			8
20	10			10
20.5	14			14
21	8			8
21.5	8			8
22	6		1	7
22.5	12	1		13
23	14	1		15
23.5	9			9
24	15			15
24.5	7		2	9
25	14			14
25.5	9		1	10
26	5		4	9
26.5	5	2	3	10
27	3	4	5	12
27.5	3	2	7	12
28		1	9	10
28.5	1	3	8	12
29		1	12	13
29.5			10	10
30			8	8
30.5			6	6
31			6	6
31.5			4	4
32				0
32.5			1	1
33				0
33.5			2	2
34				
34.5				
35				
35.5				
Σ	181	15	89	285
Σ	ma	mi	mg	gm
mean CL	181	11	0	4
%	22.27	26.46	0.00	28.25
	63.51	3.86	0.00	1.40
Σ	ag	ga	ea	em
mean CL	5	22	48	14
%	28.00	29.43	28.90	27.89
	1.75	7.72	16.84	4.91
Σ	eg			
mean CL	0			
%	0.00			

ma: males
mi: transitional
mg: females with sternal spines

February 1998				
CL mm	Males	Primip. Females	Multip. Females	Σ
14				
14.5				
15				
15.5				
16				
16.5				
17	1			1
17.5	2			2
18	6			6
18.5	11			11
19	14			14
19.5	14			14
20	22			22
20.5	17			17
21	15			15
21.5	14	1		15
22	21		1	22
22.5	20		1	21
23	17	1	1	19
23.5	22			22
24	32	2	1	35
24.5	28			28
25	30			30
25.5	16	1		17
26	20		3	23
26.5	14	5	14	33
27	10	6	12	28
27.5	8	3	14	25
28	6	4	18	28
28.5	1	5	17	23
29			15	15
29.5		2	17	19
30			15	15
30.5			12	12
31			10	10
31.5			5	5
32			4	4
32.5			2	2
33			2	2
33.5				0
34			1	1
34.5				
35				
35.5				
Σ	361	30	165	556
Σ	ma	mi	mg	gm
mean CL	361	17	1	12
%	23.04	26.71	25.50	27.42
	64.93	3.06	0.18	2.16
Σ	ag	ga	ea	em
mean CL	14	24	4	117
%	28.50	29.44	27.25	28.72
	2.52	4.32	0.72	21.04
Σ	eg			
mean CL	6			
%	29.42			
	1.08			

gm: females with st.sp., green in head
ag: females without st. sp.
ga: females without st. sp., green in head

April 1998				
CL mm	Males	Primip. Females	Multip. Females	Σ
14				
14.5	3			3
15				0
15.5	1			1
16	1			1
16.5	2			2
17				0
17.5	2			2
18	11			11
18.5	12			12
19	17			17
19.5	19			19
20	29			29
20.5	15			15
21	30		1	31
21.5	21			21
22	37			37
22.5	32	1		33
23	31	1	2	34
23.5	44	2	2	48
24	43	1	1	45
24.5	43	1	4	48
25	51		4	55
25.5	59	2	4	65
26	65	7	8	80
26.5	35	9	12	56
27	25	11	15	51
27.5	17	8	16	41
28	11	14	21	46
28.5	5	16	43	64
29	1	7	41	49
29.5		10	32	42
30	1	3	44	48
30.5		2	29	31
31			22	22
31.5			18	18
32			10	10
32.5			7	7
33			4	4
33.5			4	4
34			1	1
34.5			2	2
35				
35.5				
Σ	663	95	347	1105
Σ	ma	mi	mg	gm
mean CL	663	5	2	88
%	23.59	27.20	28.00	27.67
	60.00	0.45	0.18	7.96
Σ	ag	ga	ea	em
mean CL	6	89	17	206
%	27.83	29.77	28.38	28.97
	0.54	8.05	1.54	18.64
Σ	eg			
mean CL	29			
%	29.60			
	2.62			

ea: eggbearing females, no eyes
em: eggbearing females, eyes
eg: eggbearing females, eyes, green in head

Table 2. Continued.

May 1998				
CL mm	Males	Primip. Females	Multip. Females	Σ
14				
14.5				
15				
15.5				
16	2			2
16.5				0
17	1			1
17.5	1			1
18				0
18.5	3			3
19	7			7
19.5	8			8
20	14			14
20.5	12			12
21	8			8
21.5	12			12
22	13	1		14
22.5	15			15
23	21	2	1	24
23.5	19	2	2	23
24	34	2	3	39
24.5	29			29
25	37	2	3	42
25.5	40	2	3	45
26	46	1	7	54
26.5	24	5	12	41
27	28	4	10	42
27.5	20	5	15	40
28	12	13	27	52
28.5	4	14	19	37
29		11	25	36
29.5		10	36	46
30			30	30
30.5		1	29	30
31		1	19	20
31.5			16	16
32			6	6
32.5			5	5
33			7	7
33.5			5	5
34			1	1
34.5				
35				
35.5				
Σ	410	76	281	767
	ma	mi	mg	gm
Σ	410	2	1	73
mean CL	24.33	25.25	30.50	27.75
%	53.46	0.26	0.13	9.52
	ag	ga	ea	em
Σ	4	84	0	188
mean CL	30.13	29.85	0.00	28.98
%	0.52	10.95	0.00	24.51
	eg			
Σ	5			
mean CL	29.90			
%	0.65			

Jan.,Feb.,April, May 1998				
CL mm	Males	Primip. Females	Multip. Females	Σ
14	3			3
14.5				0
15				0
15.5	1			1
16	3			3
16.5	3			3
17	3			3
17.5	10			10
18	25			25
18.5	34			34
19	45			45
19.5	49			49
20	75			75
20.5	58			58
21	61		1	62
21.5	55	1		56
22	77	1	2	80
22.5	79	2	1	82
23	83	5	4	92
23.5	94	4	4	102
24	124	5	5	134
24.5	107	1	6	114
25	132	2	7	141
25.5	124	5	8	137
26	136	8	22	166
26.5	78	21	41	140
27	66	25	42	133
27.5	48	18	52	118
28	29	32	75	136
28.5	11	38	87	136
29	1	19	93	113
29.5		22	95	117
30	1	3	97	101
30.5		3	76	79
31		1	57	58
31.5			43	43
32			20	20
32.5			15	15
33			13	13
33.5			11	11
34			3	3
34.5			2	2
35				
35.5				
Σ	1615	216	882	2713
	ma	mi	mg	gm
Σ	1615	35	4	177
mean CL	23.51	26.61	28.00	27.70
%	59.53	1.29	0.15	6.52
	ag	ga	ea	em
Σ	29	219	69	525
mean CL	28.50	29.73	28.67	28.89
%	1.07	8.07	2.54	19.35
	eg			
Σ	40			
mean CL	29.61			
%	1.47			

December 1998				
CL mm	Males	Primip. Females	Multip. Females	Σ
14				0
14.5				0
15				0
15.5				0
16				0
16.5	1			1
17				0
17.5				0
18	3			3
18.5	2			2
19	2			2
19.5	4			4
20	7			7
20.5	8			8
21	9			9
21.5	8		2	10
22	10	1		11
22.5	8		1	9
23	12	1	1	14
23.5	6			6
24	10		2	12
24.5	8	1	1	10
25	16		1	17
25.5	7			7
26	8		1	9
26.5	3	3	2	8
27	7	2	5	14
27.5	1	3	1	5
28	1	3	8	12
28.5	2	1	4	7
29		5	11	16
29.5			8	8
30			7	7
30.5			7	7
31			11	11
31.5			6	6
32			2	2
32.5				0
33				0
33.5				0
34				0
34.5				0
35				
35.5				
Σ	143	20	81	244
	ma	mi	mg	gm
Σ	143	18	1	1
mean CL	23.14	26.94	29.00	29.00
%	58.61	7.38	0.41	0.41
	ag	ga	ea	em
Σ	14	25	42	0
mean CL	29.11	30.22	27.98	0.00
%	5.74	10.25	17.21	0.00
	eg			
Σ	0			
mean CL	0.00			
%	0.00			

Table 2. Continued.

January 1999				
CL mm	Males	Primip. Females	Multip. Females	Σ
14				
14.5				
15	1			
15.5				
16	3			
16.5	2			2
17	2			2
17.5	3			3
18	1			1
18.5	1			1
19	5			5
19.5	5			5
20	8			8
20.5	12			12
21	13			13
21.5	21	1		22
22	15			15
22.5	11	1	1	13
23	5	1		6
23.5	11			11
24	11	1	1	13
24.5	10		1	11
25	8			8
25.5	7		1	8
26	5	1	1	7
26.5	5	2	1	8
27	8	3	2	13
27.5	2	5	4	11
28	2	2	11	15
28.5		4	3	7
29	1		7	8
29.5		1	5	6
30			3	3
30.5			5	5
31			6	6
31.5			5	5
32			1	1
32.5			1	1
33				0
33.5				0
34				
34.5				
35				
35.5				
Σ	178	22	59	255
	ma	mi	mg	gm
Σ	178	4	0	18
mean CL	22.47	24.63	0.00	27.19
%	68.73	1.54	0.00	6.65
	ag	ga	ea	em
Σ	1	24	0	34
mean CL	24.50	30.21	0.00	28.18
%	0.39	9.27	0.00	13.13
	eg			
Σ	0			
mean CL	0.00			
%	0.00			

February 1999				
CL mm	Males	Primip. Females	Multip. Females	Σ
14				
14.5				
15				
15.5				
16				
16.5				
17				0
17.5				0
18				0
18.5				0
19				0
19.5				0
20				0
20.5				0
21				0
21.5				0
22				0
22.5				0
23				0
23.5				0
24				0
24.5				0
25				0
25.5				0
26				0
26.5				0
27				0
27.5				0
28				0
28.5				0
29				0
29.5				0
30				0
30.5				0
31				0
31.5				0
32				0
32.5				0
33				0
33.5				0
34				0
34.5				
35				
35.5				
Σ	0	0	0	0
	ma	mi	mg	gm
Σ				
mean CL				
%				
	ag	ga	ea	em
Σ				
mean CL				
%				
	eg			
Σ				
mean CL				
%				

April 1999				
CL mm	Males	Primip. Females	Multip. Females	Σ
14				0
14.5				0
15				0
15.5				0
16				0
16.5				0
17				0
17.5				0
18				0
18.5				0
19				0
19.5				0
20				0
20.5				0
21				0
21.5				0
22				0
22.5				0
23				0
23.5				0
24				0
24.5				0
25				0
25.5				0
26				0
26.5				0
27				0
27.5				0
28				0
28.5				0
29				0
29.5				0
30				0
30.5				0
31				0
31.5				0
32				0
32.5				0
33				0
33.5				0
34				0
34.5				0
35				
35.5				
Σ	0	0	0	0
	ma	mi	mg	gm
Σ				
mean CL				
%				
	ag	ga	ea	em
Σ				
mean CL				
%				
	eg			
Σ				
mean CL				
%				

Table 2. Continued.

May 1999				
CL mm	Males	Primip. Females	Multip. Females	Σ
14	1			
14.5	1			
15				
15.5	1			
16	6			6
16.5	6			6
17	7			7
17.5	8			8
18	15			15
18.5	13			13
19	14			14
19.5	21			21
20	20			20
20.5	23			23
21	29		1	30
21.5	21			21
22	33	4		37
22.5	29	2	1	32
23	36	2		38
23.5	33			33
24	24	2	3	29
24.5	17	1	2	20
25	11		1	12
25.5	14	3	1	18
26	12	1	2	15
26.5	17	5	6	28
27	11	5	6	22
27.5	3	12	12	27
28	6	11	12	29
28.5	2	8	16	26
29		5	16	21
29.5	2	1	21	24
30		2	12	14
30.5			15	15
31			18	18
31.5			15	15
32			6	6
32.5			1	1
33				0
33.5				0
34			1	1
34.5				
35				
35.5				
Σ	436	64	168	665
	ma	mi	mg	gm
Σ	436	6	0	58
mean CL	22.13	23.17	0.00	27.29
%	65.27	0.90	0.00	8.68
	ag	ga	ea	em
Σ	3	58	0	103
mean CL	25.83	30.02	0.00	28.74
%	0.45	8.68	0.00	15.42
	eg			
Σ	4			
mean CL	30.25			
%	0.60			

Jan.,Feb.,April, May 1999				
CL mm	Males	Primip. Females	Multip. Females	Σ
14	1			1
14.5	1			1
15	1			1
15.5	1			1
16	11			11
16.5	8			8
17	11			11
17.5	12			12
18	20			20
18.5	18			18
19	32			32
19.5	40			40
20	47			47
20.5	52			52
21	57		1	58
21.5	62	3	1	66
22	70	5		75
22.5	63	4	3	70
23	50	6		56
23.5	59		2	61
24	51	4	4	59
24.5	47	3	4	54
25	36	2	2	40
25.5	31	5	3	39
26	25	2	7	34
26.5	28	12	9	49
27	20	10	17	47
27.5	8	21	27	56
28	11	17	28	56
28.5	3	17	31	51
29	3	11	33	47
29.5	2	2	34	38
30		2	27	29
30.5			25	25
31			27	27
31.5			24	24
32			11	11
32.5			3	3
33			1	1
33.5				0
34			1	1
34.5				0
35				
35.5				
Σ	881	126	325	1332
	ma	mi	mg	gm
Σ	881	16	0	110
mean CL	22.28	23.44	0.00	27.19
%	66.14	1.20	0.00	8.26
	ag	ga	ea	em
Σ	4	113	0	203
mean CL	25.50	29.83	0.00	28.51
%	0.30	8.48	0.00	15.24
	eg			
Σ	5			
mean CL	30.00			
%	0.38			

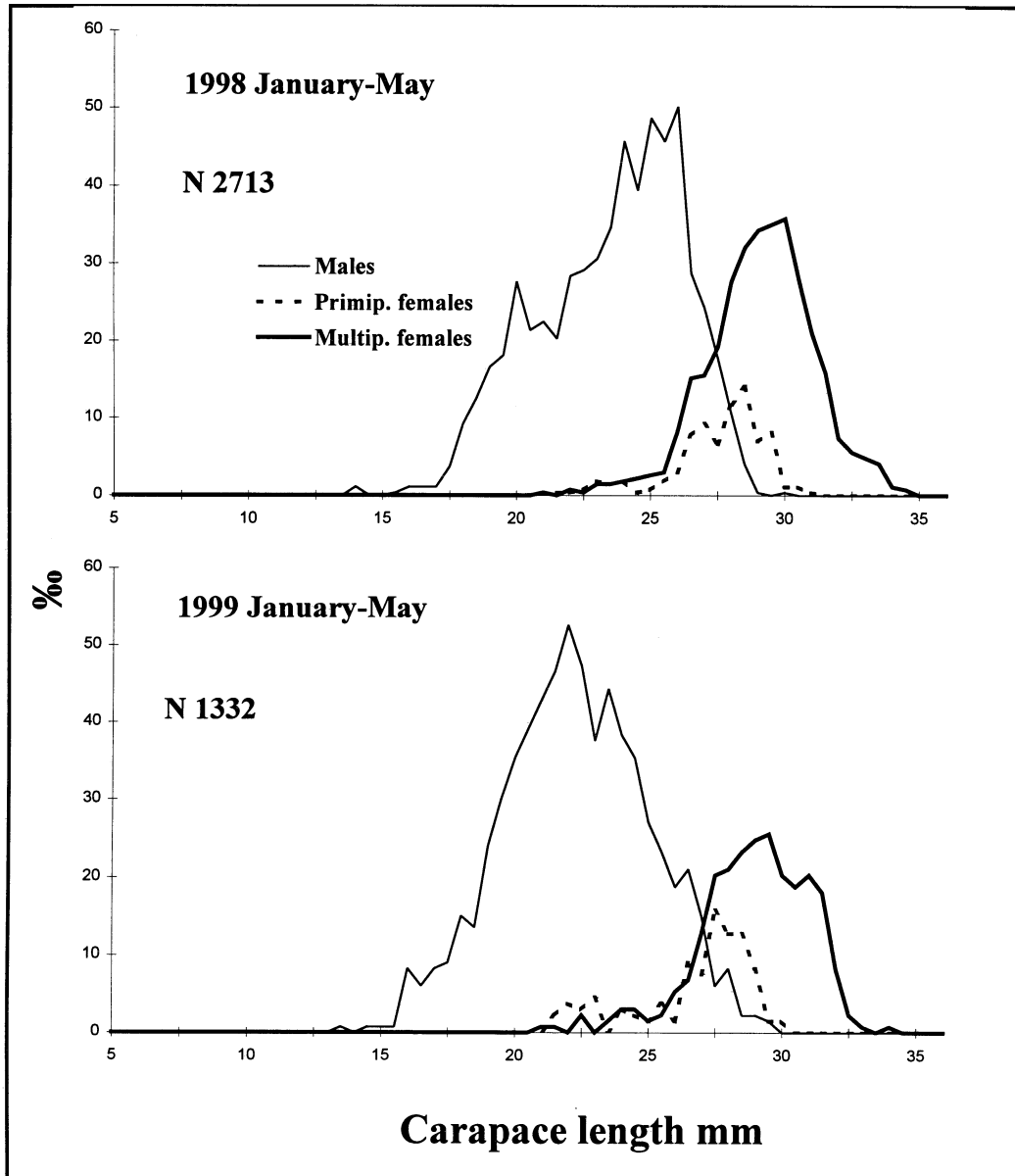


Figure 1. The Icelandic samples in 1998 and 1999.