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The Catch Statistics of the Shrimp Fishery (*Pandalus borealis*) in the Denmark Strait in the Years 1980-1995

by

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Abstract

In this paper detailed data on the catch, effort and CPUE from the shrimp fishery in the Denmark Strait for all countries in the years 1989 to 1995 are shown. Total effort and mean CPUE of all countries combined has been calculated using the figures for nominal catch for every country going as far back as 1978. It is considered here that the shrimp stock is the same on both sides of the midline between Iceland and Greenland in the so-called north and east area. The so-called middle and south areas may represent different stocks so the data coming from those will be kept separate from the north at present.

The catch rates in the traditional north and east area have been low for a number of years, namely from 90 to 109 kg in the years 1989 through 1993. The catch rate has now risen to 158 kg/hour in 1994 and remained stable in 1995 at 156 kg/hour. Most marked was the change in CPUE in 1994 after the effort was directed more to the two new areas south 65°N.

The nominal catch was some 5 200 tons in 1995 in the north (and east) area and some 1 700 tons in the middle area and south area.

Introduction

Shrimp in fishable concentrations in the Denmark Strait area was first found in September 1976 but a fishery was first commenced in 1978 by Iceland and a year later the Norwegians started fishing in the area as well, and by 1980, Greenland, Denmark, Faroe Islands and France joined in. From then on the fishery was carried out by all these 6 countries. However France has not been fishing since 1991.

In this paper all data available on the catch, effort and the CPUE, are gathered by month for all countries and strata within each area and then combined for the years 1989-1995. Similar proceedings have been carried out for the previous years 1980-1988 (Skúladóttir, 1991).

By 1993 there are two new areas being fished south of 65°N. The south area was searched by Greenland in 1989 (Lehmann, 1990) and some concentrations of shrimp were found. After opening the redfish box in 1993 a fishery was started in the so-called middle area (Fig. 1). The data from these two new areas are kept separate from the north and east area throughout the paper.

Material and Methods

For most of the catch there are logbook data which include catch and effort. The individual authors have also calculated the CPUE by dividing the catch per month (in kg) by the corresponding effort (in trawling hours). In order to assess the overall CPUE per every half year, all the effort in the period January to June was summed. Then only the catches that correspond to stated effort are summed by every half year. The subtotal sum of the catch is divided by the subtotal sum of effort to get the CPUE per every half year. In order to assess the total effort exerted by each country in the area, the nominal catch per month is summed by every half year. The nominal catch is often higher than the catch reported in logbooks. Therefore the effort was corrected by every half year by dividing the nominal total catch by the CPUE of the same half year. It has been assumed here that the gear and the efficiency of all vessels of a country is more like that of the ones not reporting of the same country than that of other countries. Therefore the effort was first corrected by individual countries.

Results and Discussion

The effort, catch and nominal catch as well as the calculated CPUE are presented in tables 1 to 6 for the six countries for the north area, including the east area which is only fished by Iceland (Table 4) namely north of 65°N. The data for the middle and south areas combined, namely south of 65°N, are presented in tables 8 - 11.

For the first years the CPUE and effort was taken from the NAFO Scientific Council Reports 1980 and 1983 (Skúladóttir 1991). Later the CPUE and effort data were obtained from the scientists of the respective countries. For Norway, the data come from Smedstad and Torheim (1992) and later Smedstad, Kuhnle and Gilja (personal communication). For France the data come from Bertrand, Battaglia and Poulard (personal communication). The nominal catch data were obtained from Carlsson and Kannevorff (1992) and now from Siegstad and Carlsson (1994 and 1995).

Table 7 which has data for the north area for all countries by half years goes back to 1978. From table 7 it is notable that there is considerable variation in the CPUE of the different countries. This could be due to different gear sizes and the difference in power of the respective vessels. For the Icelandic vessels it is known that gear size was about 2400 meshes (circumference) for many years, but increased in 1993 to about 2700 meshes. The mean size of trawl has gone down again for 1994 and 1995, being some 2100 and 2300 meshes respectively. There is also a fall in CPUE in the latter half of year 1995. However a second peak in catch rates can occur late in the year.

The yearly catch rate is calculated in table 12 where the half years are added together. The CPUEs have been falling gradually since the years 1980 and 1981 or from 245 kg per hour to 90 kg in 1991. In spite of doubling the effort there was little gain in addition to the 11 thousand tons fished in 1986. However by 1993 the effort has decreased considerably or from 11 thous hours in 1989 to some 72 thous. hours in 1993. In 1994 there is the most dramatic drop in effort or down to 31 thous. hours. The catch in the traditional area has gone down drastically as well at the same time as the new areas come into use. The CPUE has now increased to 158 kg in 1994 in the traditional area, and is about the same in 1995 namely 156 kg.

Table 13 contains the logbook data gathered together for the four countries for the middle and south area combined in 1993 through 1995. Apart from the huge CPUE that the Faroe Islands and Greenland report in the second half of 1993, 1381 kg per trawling hour with only little effort spent, the CPUEs are not much higher than they were in the beginning of the eighties in the traditional north area as average annual CPUE. The mean CPUE was 164 kg, 268 kg and 214 kg/hour in the years 1993, 1994 and 1995 respectively (table 14).

The total catch is listed in Table 15 as well as advised TAC by the Scientific Council of NAFO, by years. Through the years the effective TAC by Greenlandic authorities has usually been moderate and similar to the advised TAC. However from the year 1990 onwards the effective TACs have been far too high. Those unrealistic TACs of some 13 000 to 14 500 tons have never been reached in Denmark Strait not even with the additional catch east of the midline which is not included in the TAC set by

Greenland. In the north area the yearly catch has been gradually falling as CPUE and availability decreased. Moreover in 1993 through 1995 much effort was directed towards the new areas, south of 65° N. The total catch was only 4 872 tons in the traditional area in 1994 as compared to 6 503 tons in 1993. In the middle and south area 1 191 tons and some 4950 tons were fished in the years 1993 and 1994 respectively. In 1995 there appears to be an increased fishery in the north area. The catch in the east area in 1995 is the lowest in 4 years as a result of heavy ice conditions. In the area altogether 7 694 tons were fished in 1993 and 9 822 tons in 1994. The provisional catch in 1995 for the months January-October is 6 907 tons.

Conclusion

The stock in the traditional area of Denmark Strait appears to have reached the stage in 1995 where stock level has reached a higher stable level than in the years 1989 to 1993 as judged by CPUE although not as high as that of the early eighties. The reduced annual removals from the shrimp stock in the north area of Denmark Strait appear to have had a beneficial influence on the state of stock. It is not certain if a connection exists between the northern area and the southern areas.

References:

- Carlsson, D. M., and P. Kannevorff. 1992. The commercial shrimp fishery in Denmark Strait in 1991 and early 1992. NAFO SCR Doc. No. 64, Ser. No. N2118. 26p.
- Lehmann, K. 1990. Report on a commercial trial fishery for shrimp (*Pandalus borealis*) off southwest, south east and east Greenland. NAFO SCR Doc. 90/62, Ser. No. N1784. 6p.
- Siegstad, H. and D. Carlsson 1994. The commercial shrimp fishery in Denmark Strait in 1993 and January-October 1994. NAFO SCR Doc. 94/91, Ser. No. N2478. 36p.
- Siegstad, H. 1995. The commercial shrimp fishery in Denmark Strait in 1994 and January to October 1995. NAFO SCR Doc. 95/112, Ser. No. N2651. 28p.
- Skúladóttir, U. 1991. The catch statistics of the shrimp fishery (*Pandalus borealis*) in the Denmark Strait, in the years 1978-1990. NAFO SCR Doc. No 58. No N1942 16p.
1994. The catch statistics of the shrimp fishery (*Pandalus borealis*) in the Denmark Strait, in the years 1980-1994. NAFO SCR Doc. 94/92, Ser. No N2479 17p.
- Smedstad, O.M., and S. Torheim 1992. Norwegian investigations on shrimp (*Pandalus borealis*) in East Greenland waters in 1991. NAFO SCR Doc. No 17, Serial No N2062, 8p.

Table 1. North area. Catch rates (kg per hour effort (hours trawling) and trawling) corresponding catch (tons) from the shrimp fishery in Denmark Strait, in the traditional north area, i.e. north of 65° N, by Greenland in two periods of the year.

Year	January - June				July - December			
	Month	Cpue	Effort	Catch	Month	Cpue	Effort	Catch
1989	Jan	249	6602	1646.6	Jul	27	15	0.4
	Feb	214	6361	1361.0	Aug	44	713	31.3
	Mar	131	3905	512.1	Sep	59	2290	135.3
	Apr	197	3505	690.6	Oct	96	2600	248.7
	May	68	2322	157.5	Nov	67	7031	474.1
	Jun	39	137	5.4	Dec	84	7107	598.9
	Subtotal	192	22832	4373.2	Subtotal	75	19756	1488.7
	Total	192	23343	4471.0	Total	75	20039	1510.0
1990	Jan	139	8602	1196.8	Jul	94	82	7.7
	Feb	185	8289	1533.1	Aug	59	352	20.6
	Mar	143	8299	1186.1	Sep	64	710	45.2
	Apr	473	1050	496.9	Oct	58	1734	101.4
	May	455	2133	971.5	Nov	65	2121	138.7
	Jun	45	116	5.2	Dec	79	5160	408.5
	Subtotal	189	28489	5389.6	Subtotal	71	10159	722.1
	Total	189	28956	5478.0	Total	71	10298	732.0
1991	Jan	142	6812	964.0	Jul	0	38	0.0
	Feb	129	7205	926.0	Aug	0	0	0.0
	Mar	101	6403	646.0	Sep	74	404	30.0
	Apr	128	7700	987.0	Oct	64	375	24.0
	May	85	5084	434.0	Nov	91	505	46.0
	Jun	72	471	34.0	Dec	106	897	95.0
	Subtotal	119	33675	3991.0	Subtotal	88	2219	195
	Total	119	33582	3980.0	Total	88	2560	225.0
1992	Jan	94	3698	346.0				
	Feb	113	3802	431.0				
	Mar	123	5423	665.0	Oct	35	143	5.0
	Apr	73	3682	268.0	Nov	84	358	30.0
	May	101	1260	127.0	Dec	104	1669	174.0
	Subtotal	103	17865	1837.0	Subtotal	96	2170	209.0
	Total	103	17612	1811.0	Total	96	2087	201.0
	1993	Jan	85	6216	528.0			
Feb		93	5066	469.0				
Mar		120	2347	282.0				
Apr		85	390	33.0				
May		0	26	0.0	Dec	176	95	16.7
Subtotal		93	14045	1312.0	Subtotal	176	95	16.7
Total		93	15073	1408.0	Total	176	97	17.0
1994		Jan	217	844	183.0			
	Feb	172	3037	523.0				
	Mar	155	2194	340.0				
	Apr	39	76	3.0				
	May		2	0.0				
	Subtotal	170	6153	1049.0				
	Total	170	6194	1056.0				
1995	Jan	262	3801	996.0				
	Feb	192	2691	518.0				
	Mar	174	1907	332.0				
	May	0	1	0.0				
	Subtotal	220	8400	1846.0				
		220	8550	1879.0				

Table 2. North area. Catch rates (kg per hour trawling) and corresponding effort (hours trawling) and catch (tons) from the shrimp fishery in Denmark Strait, by France in two periods of the year.

Year	January - June				July - December			
	Month	CPUE	Effort	Catch	Month	CPUE	Effort	Catch
1987	Apr	227	400	90.9	Sep			94.0
	May	250	578	144.7	Oct			59.0
					Nov			170.0
	Subtotal	241	978	235.6	Subtotal			323.0
	Total	241	2599	626.0	Total			405.0
1988	Apr	147	462	68.1	Aug			2.0
	May	136	473	64.2	Sept			48.0
	Subtotal	141	935	132.3				
	Total	141	3138	444.0	Total			50.0
1989	Mar	203	247	50.2	Jul	58	116	6.7
	Apr	192	907	174.2	Aug	59	409	24.0
	May	23	23	0.5				
	Subtotal	191	1177	225	Subtotal	58	525	30.7
	Total	191	1525	291.3	Total	58	1536	89.8
1990	Mar	126	172	23.3				
	Subtotal	126	172	23.3				
	Total	126	286	36.0	Total			15.0
1991	Feb	141	206	29.0				
	Mar	93	350	32.7				
	Apr	119	468	55.8				
	Subtotal	115	1024	117.5				
	Total	115	1024	117.5				

Table 3. North area. Catch rate (kg per hour trawling) and corresponding effort (hours trawling) and catch (tons) from the shrimp fishery in the north area of Denmark Strait, i.e. north of 65°N, by Norway.

Year	January - June			July - December				
	Month	CPUE	Effort	Catch	Month	CPUE	Effort	Catch
1989	Jan	199	422	84				
	Feb	129	496	64	Aug	35	1600	56
	Mar	70	2300	161	Sep	37	6459	239
	Apr	88	4318	380	Oct	55	7309	402
	May	35	457	16	Nov	47	6106	287
	June	26	538	14	Dec	94	2883	271
	Subtotal	84	8532	719	Subtotal	52	24358	1255
	Total	84	8354	704	Total	52	27056	1394
1990	Jan	77	1584.4	122	July	38	368	14
	Feb	73	2424.7	177	Aug	37	2162	80
	Mar	70	3914.3	274	Sep	43	6465	278
	Apr	66	1848.5	122	Oct	52	6077	316
	May	237	1898.7	450	Nov	52	6981	363
					Dec	68	3500	238
	Subtotal	98	11671	1145	Subtotal	50	25553	1289
	Total	98	11982	1175.6	Total	50	26247	1324
1991	Jan	96	3197.9	307	Aug	37	270	10
	Feb	70	4885.7	342	Sep	49	1469	72
	Mar	58	4206.9	244	Oct	45	4711	212
	Apr	76	5631.6	428	Nov	55	6473	356
	May	48	5458.3	262	Dec	78	3218	251
	June	47	234.04	11	Subtotal	56	16141	901
	Subtotal	68	23614	1594	Total	56	16195	904
	Total	68	23703	1600				
1992	Jan	72	3500	252	Sep	50	820	41
	Feb	71	4309.9	306	Oct	50	3180	159
	Mar	69	5956.5	411	Nov	74	3878	287
	Apr	63	5381	339	Dec	87	2701	235
	May	43	4790.7	206	Subtotal	68	10580	722
	Subtotal	63	23938	1514	Total	68	14448	986
	Total	63	23938	1514				
	1993	Jan	51	4378	223	Sep	71	1033
Feb		77	4582	352	Oct	45	2970	134
Mar		61	5459	333	Nov	24	3136	76
Apr		58	5622	326	Dec	90	1050	95
May		80	2307	185	Subtotal	46	8189	378
Subtotal		63	22348	1419	Total	46	8189	378
Total		63	23340	1482				
1994*		Jan	175	276	48.3	Aug		
	Feb	228	925	210.8	Sep	74	1992	147.4
	Mar	167	1615	269.7	Oct	57	1970	112.3
	Apr	111	4400	488.4	Nov	87	1947	169.4
	May	82	1254	102.8	Dec	210	890	186.9
	Subtotal	132	8469.2	1120	Subtotal	91	6799	616
	Total				Total			
	1995*	Jan	125	1971	246.4	Aug	27	113
Feb		57	570	32.5	Sep			
Mar		104	1897	197.3	Oct			
Apr		66	1362	89.9	Nov			
May		109	664	72.4	Dec			
Subtotal		99	6464.8	638.5	Subtotal	27	113	3
Total		99	13065	1290.4	Total	27	226	6

Table 4. East area. Catch rates (kg per hour trawling) and corresponding effort (hours trawling) and catch (tons) from the shrimp fishery in Denmark Strait by Iceland in two periods of the year.

Year	January - June				July - December			
	Month	CPUE	Effort	Catch	Month	CPUE	Effort	Catch
1989					Aug	51	3910	197.5
	May	154	2234	344.9	Sep	41	4558	186.4
	Jun	84	4188	349.6	Oct	27	321	8.5
	Subtotal	108	6422	694.5	Subtotal	45	8789	392.4
	Total		7835	847.3	Total		10722	478.7
1990	Jan	5	8	0.0	Jul	84	40	3.4
	Feb	44	11	0.5	Aug	69	168	11.7
	Apr	12	9	0.1	Sep	65	835	54.2
	Jun	81	2347	190.2	Oct	62	47	2.9
	Subtotal	80	2375	190.8	Subtotal	66	1090	72.2
	Total	80	2538	203.9	Total	66	1165	77.1
1991					Aug	24	9	0.2
	May	252	1536	387.7	Sep	68	64	4.4
	Jun	85	394	33.4	Oct	112	350	39.2
	Total	218	1930	421.1	Total	104	423	43.7
1992	Apr	326	2839	926.0	Jul	110	90	9.9
	May	127	3908	494.7	Sep	17	6	0.1
					Oct	78	13	1.0
	Subtotal	211	6747	1421	Sub total	101	109	11
	Total	211	8232	1733.3	Total	101	169	17.1
1993	Mar	329	688	226.4	Sep	220	15	3.3
	Apr	193	7296	1405.9	Oct	200	4	0.8
	May	147	4381	644.3				
	Jun	114	29	3.3	Subtotal	216	19	4.1
	Subtotal	184	12394	2279.9	Total	216	21	4.6
	Total	184	13854	2548.4				
1994 *	Feb	364	14	5.1	Aug	179	14	2.5
	Mar	350	1533	536.2	Sep	55	56	3.1
	Apr	70	86	6.0	Oct	104	77	8
	May	265	2045	542.3	Nov	90	20	1.8
	Jun	149	263	39.2	Subtotal	92	167	15.4
	Subtotal	286	3941	1128.8	Total			
	Total	286	5233	1498.9				
1995 *	Feb	383	1339	513.2	Sep	171	7	1.2
	Mar	209	983	205.6	Oct			
	May	10	4	0.0	Subtotal	171	7	1.2
	Subtotal	309	2326	718.8	Total			
	Total	309	3721	1150.0				

Table 5. North area. Catch rates (kg per hour trawling) and corresponding effort (hours trawling) and catch (tons) from the shrimp fishery in the Denmark Strait, north of 65°N, by Faroe Islands.

Year	January - June				July - December			
	Month	CPUE	Effort	Catch	Month	CPUE	Effort	Catch
1989	Jan	158	862	136.2				
	Feb	122	781	95.1				
	Mar	108	781	84.3	Nov	51	430	22.0
	Apr	297	230	68.3	Dec	108	1202	130.3
	Subtotal	145	2654	383.9	Subtotal	93	1632	152.3
	Total	145	3035	439.0	Total	93	1672	156.0
1990	Jan	93	1205	112.5				
	Feb	109	1307	142.2				
	Mar	85	957	81.2	Nov	65	307	13.9
	Apr	23	113	2.6	Dec	62	1357	122.7
	May	269	660	177.5	Subtotal	82	1664	136.6
	Subtotal	122	4242	516.0	Total	82	1925	158.0
Total	122	5631	685.0					
1991	Jan	112	1980	221.6	Sep	83	262	21.7
	Feb	91	2922	266.7	Oct		274	13.2
	Mar	68	1790	122.5	Nov	60	1333	79.6
	Apr	129	330	42.5	Dec	88	2759	244.1
	Subtotal	93	7022	653.3	Subtotal	77	4628	358.6
	Total	93	8610	801.0	Total	77	2659	206.0
1992	Jan	69	2040	140.0				
	Feb	66	1536	101.2				
	Mar	96	1135	108.6	Oct	25	290	9.1
	Apr	52	356	18.4	Nov	81	2120	171.6
	May	50	1234	61.7	Dec	112	3131	350.2
	Subtotal	68	6301	429.9	Subtotal	96	5541	530.9
Total	68	7446	508.0	Total	96	6095	584.0	
1993*	Jan	66	2634	175.0				
	Feb	70	2394	167.0				
	Mar	63	1674	105.0				
	Apr	57	721	41.0				
	May	43	23	1.0				
	Subtotal	66	7446	489.0				
Total	66	8436	554.0					
1994*	Jan	398	133	53.0				
	Feb	173	596	103.0				
	Mar	167	293	49.0	Nov	52	287	15.0
	Apr	64	235	15.0	Dec	178	381	68.0
	May	90	189	17.0	Subtotal	124	668	83.0
	Subtotal	164	1446	237.0	Total	124	660	82.0
Total	164	1745	286.0					
1995*	Jan	114	1569	179.0				
	Feb	82	1242	102.0				
	Mar	97	1106	107.0				
	Apr	46	259	12.0				
			0	0.0				
	Subtotal	96	4176	400.0				
Total	96	5878	563.0				63.0	

Table 6. North area. Catch rates, corresponding effort (trawling hours) and catch (tons) from the shrimp fishery in the Denmark Strait by Denmark, north of 65°N.

Year	January - June				July - December			
	Month	CPUE	Effort	Catch	Month	CPUE	Effort	Catch
1989	Jan	232	346	80.1	Aug	52	112	5.8
	Feb	277	474	131.4	Sept	51	418	21.4
	May	169	415	70.0	Oct	68	305	20.7
	Jun	13	105	1.4	Nov	48	337	16.3
					Dec	72	264	19.0
	Subtotal	211	1340	282.9	Subtotal	58	1436	83.2
	Total	211	1336	282.0	Total	58	1450	84.0
1990	Jan	100	243	24.3	Jul	46	316	14.5
	Feb	74	140	10.3	Aug	43	454	19.3
	Mar	93	338	31.3	Sep	38	373	14.2
					Oct	47	414	19.4
					Nov	46	406	18.7
					Dec	17	186	3.1
	Subtotal	91	721	65.9	Subtotal	42	2149	89.2
Total	91	3304	302.0	Total	42	2120	88.0	
1991	Mar	52	349	18.2	Sep	45	230	10.3
	Apr	81	424	34.4	Oct	69	521	35.7
	May	78	328	25.6	Nov	0	3	0.0
					Dec	52	294	15.2
	Subtotal	71	1101	78.2	Subtotal	58	1048	61.2
Total	71	3295	234.0	Total	58	2123	124.0	
1992	Jan	59	70	4.1	Nov	37	115	4.3
	Mar	41	293	11.9	Dec	53	217	11.4
	Apr	42	212	9.0				
	Subtotal	43	575	25.0	Subtotal	47	332	15.7
	Total	43	3013	131.0	Total	47	613	29.0
1993	Jan	34	451	15.5				
	Feb	46	566	25.9				
	Mar	44	477	21.2				
	Apr	33	222	7.3	Dec	72	167	12.0
	Subtotal	41	1716	69.9	Subtotal	72	167	12.0
	Total	41	2094	85.3	Total	72	353	25.4
1994*	Jan	150	147	22.0				
	Feb	77	65	5.0	Sept	49	41	2.0
	Mar	102	283	29.0	Oct	72	125	9.0
	Apr	55	110	6.0	Nov	66	122	8.0
	May	51	59	3.0	Dec	178	557	99.0
	Subtotal	102	605	62.0	Subtotal	140	845	118
	Total	102	634	65.0	Total	140	952	133.0
1995*	Jan	203	659	134.0				
	Feb	108	721	78.0				
	Mar	228	127	29.0				
	Apr		0					
	Subtotal	160	1507	241.0				
	Total	160	1570	251.0				

Table 7. North area. Catch rates (kg per hour trawling) and corresponding effort (hours trawling) and catch (tons) from the shrimp fishery in Denmark Strait north of 65° N, by all nations combined in two periods of the year.

Year	Country	January-June			July - December		
		CPUE	Effort	Catch	CPUE	Effort	Catch
1978	Iceland	215	298	64.2	314	952	299.2
1979	Iceland	186	166	30.9	229	1982	454.4
1980	Greenland, Denmark	350	1665	582.0	129	2483	320.0
	France			50.0			
	Norway	468	3108	1455.0	124	8106	1006.0
	Iceland	125	1760	219.3	101	5318	539.4
	Faroe Islands	427	9115	3892.0			341.0
	Subtotal	393	15648	6148.3	117	15907	1865.4
	Total	393	15775	6198.3	117	18815	2206.4
1981	Greenland, Denmark	395	4013	1585.0			
	France	246	1436	353.0			
	Norway	216	9296	2006.0	43	232	10.0
	Iceland	99	688	68.0	67	848	56.9
	Faroe Islands			686.0			27.0
	Subtotal	260	15433	4012.0	62	1080	66.9
	Total	260	18072	4698.0	62	1516	93.9
1982	Greenland, Denmark	220	8432	1855.0			
	France	226	1833	414.0			
	Norway	203	9337	1894.0			
	Faroe Islands			737.0			
	Subtotal	212	19602	4163.0			
	Total	212	23072	4900.0			
1983	Greenland	255	5752	1467.0			
	France	192	1516	291.0			
	Norway	163	6830	1114.0	101	6100	613.0
	Iceland	99	52	5.1	161	238	38.3
	Denmark			204.0			
	Faroe Islands			443.0			
	Subtotal	203	14150	2877.1	103	6338	651.3
	Total	203	17332	3524.1	103	6338	651.3
1984	Greenland	340	6627	2250.0			
	France	256	1951	500.0			
	Norway	191	11141	2128.0			
	Iceland	42	53	2.2	103	7164	739.6
	Denmark			443.0			
	Faroe Islands			576.0			92.0
	Subtotal	247	19772	4880.2	103	7164	739.6
	Total	247	23900	5899.2	103	8074	831.6
1985	Greenland	270	6469	1744.0	251	3389	852.0
	France	194	2594	504.0	170	814	138.0
	Norway	166	12355	2051.0			
	Iceland	88	4485	396.0	94	14944	1398.0
	Denmark			150.0	137	1482	203.0
	Faroe Islands			404.0			270.0
	Subtotal	181	25903	4695.0	126	20629	2591.0
	Total	181	28959	5249.0	126	22779	2861.0

Table 7 continued

Year	January-June			July - December			
	Country	CPUE	Effort	Catch	CPUE	Effort	Catch
1986	Greenland	288	14285	4114.0	437	3811	1667.0
	France	175	3415	597.0	218	841	183.0
	Norway	145	12845	1861.0	123	1340	165.0
	Iceland	73	3205	234.0	103	8893	916.0
	Denmark	226	1962	443.0	226	252	57.0
	Faroe Islands	93	5428	506.0	416	531	221.0
	Subtotal	189	41140	7755.0	205	15668	3209.0
Total	189	41140	7755.0	205	15668	3209.0	
1987	Greenland	314	17667	5547.0	144	7502	1080.0
	Norway	135	11353	1533.0	96	5261	507.0
	Iceland				79	16835	1330.0
	France	241	2599	626.0			405.0
	Denmark	144	2997	431.0	99	1250	124.0
	Faroe Islands	229	1635	375.0	106	2068	220.0
	Subtotal	235	36251	8512.0	99	32916	3261.0
Total	235	36251	8512.0	99	37004	3666.0	
1988	Greenland	219	24111	5285.0	157	13820	2165.0
	Norway	83	15314	1274.0	83	9332	778.0
	Iceland	107	1769	189.5	54	22735	1234.5
	France	141	3138	444.0			50.0
	Denmark	95	3479	329.0	98	1172	115.0
	Faroe Islands	166	4031	669.0			10.0
	Subtotal	158	51842	8190.5	91	47059	4292.5
Total	158	51842	8190.5	91	47717	4352.5	
1989	Greenland	192	23343	4471.0	75	20039	1510.0
	Norway	84	8354	704.0	52	27056	1394.0
	Iceland	108	7835	847.3	45	10722	478.7
	France	191	1525	291.3	58	1536	89.8
	Denmark	211	1336	282.0	58	1450	84.0
	Faroe Islands	145	3035	439.0	93	1672	156.0
	Total	155	45428	7034.6	59	62475	3712.5
1990	Greenland	189	28956	5478.0	71	10298	732.0
	Norway	98	11982	1176.0	50	26247	1324.0
	Iceland	80	2538	203.9	66	1165	77.1
	France	126	286	36.0			15.0
	Denmark	91	3304	302.0	42	2120	88.0
	Faroe Islands	122	5631	685.0	82	1925	158.0
	Subtotal	150	52697	7880.9	57	41740	2379.1
Total	150	52697	7880.9	57	42003	2394.1	
1991	Greenland	119	33582	3980.0	88	2560	225.0
	Norway	68	23703	1600.0	56	16195	904.0
	Iceland	218	1930	421.1	104	423	43.7
	France	115	1024	117.5			
	Denmark	71	3295	234.0	58	2123	124.0
	Faroe Islands	93	8610	801.0	77	2659	206.0
	Total	99	72144	7153.6	63	23960	1502.7
1992	Greenland	103	17612	1811.0	96	2087	201.0
	Norway	63	23938	1514.0	68	14448	986.0
	Iceland	211	8232	1733.3	101	169	17.1
	Denmark	43	3013	131.0	47	613	29.0
	Faroe Islands	68	7446	508.0	96	6095	584.0
	Total	95	60241	5697.3	78	23412	1817.1

Table 7 continued

Year	Country	January-June			July - December		
		CPUE	Effort	Catch	CPUE	Effort	Catch
1993	Greenland	93	15073	1408.0	176	97	17.0
	Norway	63	22340	1482.0	46	8189	378.0
	Iceland	184	13854	2548.4	216	21	4.6
	Denmark	41	2094	85.3	72	353	25.4
	Faroe Islands	66	8436	554.0			
	Total	98	61797	6077.7	49	8660	425.0
1994*	Greenland	170	6194	1056.0			
	Norway	132	8469	1120.0	91	6799	616.0
	Iceland	286	5233	1498.9	92	167	15.4
	Denmark	100	657	65.8	140	859	120.0
	Faroe Islands	164	1745	286.0	124	660	82.0
	Total	181	22298	4026.7	98	8485	833
1995*	Greenland	220	8550	1879.0			
	Norway	99	13065	1290.4	27	226	6.0
	Iceland	309	3721	1150.0	171	7	1.2
	Denmark	160	1570	251.0			
	Faroe Islands	96	5878	563.0			
	Total	157	32784	5133.4	31	233	7.2

Table 8. Middle and South area. Catch rates, corresponding effort and catch (tonnes) from the shrimp fishery in the middle area in the Denmark Strait, i.e. south of 65° N by Greenland in two periods of the year.

Year	Month	January - June			July - December			
		CPUE	Effort	Catch	Month	CPUE	Effort	Catch
1993	Jan	149	74	11.0				
	Feb	69	350	24.0				
	Mar	162	802	130.0				
	Apr	181	2422	438.0				
	May	329	923	304.0	Dec	1138	80	91.0
	Subtotal	198	4571	907.0	Subtotal	1138	80	91.0
	Total	198	4168	827.0	Total	1138	80	91.0
1994*	Jan	439	2015	884.0	Jul	474	19	9.0
	Feb	322	1123	362.0	Aug	460	904	416.0
	Mar	192	642	123.0	Sept	380	92	35.0
	Apr	287	835	240.0	Oct	250	32	8.0
	May	239	493	118.0	Nov	512	813	416.0
					Dec	320	878	281.0
	Subtotal	338	5108	1727.0	Subtotal	425	2738	1165
Total	338	5037	1703.0	Total				
1995*	Jan	362	785	284.0	Jul	452	31	14.0
	Feb	164	452	74.0	Aug	372	476	177.0
	Mar	42	24	1.0				
	Apr		0	0.0				
	May	481	405	195.0				
	Subtotal	333	1666	554.0	Subtotal	377	507	191.0
	Total	333	1558	518.0	Total	377	573	216.0

Table 9. Middle and South area. Catch rates, corresponding effort and catch (tons) from the shrimp fishery south of 65° N by Norway in two periods of the year.

Year	January - June				July - December			
	Month	CPUE	Effort	Catch	Month	CPUE	Effort	Catch
1994*	Jan	373	254	94.7	Aug	256	308	79.0
	Feb	181	293	53.0	Sep	139	512	71.0
	March	167	225	37.6	Oct	106	463	49.0
	April	111	614	68.1	Nov	176	1251	220.0
	May	173	619	107.0	Dec	185	205	38.0
	Subtotal	180	2005	360.4	Subtotal	167	2739	457.0
	Total				Total			
1995*	Jan	125	398	49.8	Aug	288	285	82.0
	Feb	57	116	6.6	Sep			
	March	104	384	39.9				
	April	93	301	28.0				
	May	109	134	14.6				
	Subtotal	104	1333	138.9	Subtotal	288	285	82
	Total	104	2694	280.7	Total	288	575	165.7

Table 10. Middle and South area. Catch rates, corresponding effort and catch (tons) from the shrimp fishery south of 65° N by Faroe Islands in two periods of the year.

Year	January - June				July - December			
	Month	CPUE	Effort	Catch	Month	CPUE	Effort	Catch
1993	Feb	39	153	6.0				
	Mar	73	875	64.0				
	Apr	65	1332	87.0				
	May	32	180	5.7	Dec	1889	38	72.0
	Subtotal	64	2540	162.7	Subtotal	1889	38	72.0
	Total	64	2389	153.0	Total			
1994*	Jan	326	500	163.0				
	Feb	183	556	102.0				
	Mar	168	161	27.0	Oct	131	254	33.0
	Apr	229	380	87.0	Nov	237	554	131.0
	May	106	310	33.0	Dec	288	472	136.0
	Subtotal	216	1907	412.0	Subtotal	234	1280	300.0
	Total	216	2111	456.0	Total	234	1370	321.0
1995*	Feb	92	520	48.0				
	Mar	85	181	15.0				
	Apr	70	268	19.0				
	May		0	0.0				
	Jun		0	0.0				
	Subtotal	85	969	82.0				
Total	85	1524	129.0					

Table 12. North area. Catch rates (kg per hour trawling) and corresponding effort (hours trawling) and catch (tons) from the shrimp fishery in Denmark Strait north of 65° N, by years.

Year	Periods	CPUE	Effort	Catch
1980	Jan-Jun	393	15775	6198.3
	Jul-Dec	117	18815	2206.4
	Mean/Total	243	34590	8404.7
1981	Jan-Jun	260	18072	4698.0
	Jul-Dec	62	1516	93.9
	Mean/Total	245	19588	4791.9
1982	Jan-Jun	212	23072	4900.0
	Jul-Dec	-	-	-
	Mean/Total	212	23072	4900.0
1983	Jan-Jun	203	17332	3524.1
	Jul-Dec	103	6338	651.3
	Mean/Total	176	23670	4175.4
1984	Jan-Jun	247	23900	5899.2
	Jul-Dec	103	8074	831.6
	Mean/Total	211	31974	6730.8
1985	Jan-Jun	181	28959	5249.0
	Jul-Dec	126	22779	2861.0
	Mean/Total	157	51738	8110.0
1986	Jan-Jun	189	41140	7755.0
	Jul-Dec	205	15668	3209.0
	Mean/Total	193	56808	10964.0
1987	Jan-Jun	235	36251	8512.0
	Jul-Dec	99	37004	3666.0
	Mean/Total	166	73255	12178.0
1988	Jan-Jun	158	51842	8190.5
	Jul-Dec	91	47717	4352.5
	Mean/Total	126	99559	12543.0
1988	Jan-Jun	155	45428	7034.8
	Jul-Dec	59	62475	3712.5
	Mean/Total	100	107903	10747.1
1990	Jan-Jun	150	52697	7860.9
	Jul-Dec	57	42003	2394.1
	Mean/Total	109	94700	10275.0
1991	Jan-Jun	99	72144	7153.6
	Jul-Dec	63	23960	1502.7
	Mean/Total	90	96104	8656.3
1992	Jan-Jun	95	60241	5897.3
	Jul-Dec	78	23412	1817.1
	Mean/Total	90	83653	7514.4
1993	Jan-Jun	98	61797	6077.7
	Jul-Dec	49	8660	425.0
	Mean/Total	92	70457	6502.7
1994*	Jan-Jun	180	22298	4028.7
	Jul-Dec	98	8485	833.0
	Mean/Total	158	30783	4861.7
1995*	Jan-Jun	157	32784	5133.4
	Jul-Dec	31	233	7.2
	Mean/Total	156	33017	5140.6

Table 13. Middle and south area. Catch rates (kg per hour trawling) and corresponding effort (hours trawling) and catch (tons) from the shrimp fishery in the middle area of Denmark Strait, i.e. south of 65°, by all nations combined in two periods of the year.

Year	Country	January-June			July - December		
		CPUE	Effort	Catch	CPUE	Effort	Catch
1993*	Greenland	198	4168	827.0	1138	80	91.0
	Denmark	83	572	47.6			
	Faroe Islands	64	2389	153.0	1895	38	72.0
	Total	144	7129	1027.6	1381	118	163.0
1994*	Greenland	338	5037	1703.0	425	2738	1165.0
	Norway	180	2005	360.4	167	2739	457.0
	Denmark	136	391	53.0	211	2061	435.0
	Faroe Islands	216	2111	456.0	234	1370	321.0
	Total	270	9544	2572.4	267	8908	2378.0
1995*	Greenland	332	1558	518.0	377	573	216.0
	Norway	104	2694	280.7	288	575	165.7
	Denmark	366	41	15.0	379	1002	380.0
	Faroe Islands	85	1524	129.0			
	Total	162	5817	942.7	354	2150	761.7

Table 14. Middle and south area. Catch rates (kg per hour trawling) and corresponding effort (hours trawling) and catch (tons) from the shrimp fishery in the middle area of Denmark Strait south of 65° N by years.

Year	Periods	CPUE	Effort	Catch
1993*	Jan-Jun	144	7129	1027.6
	Jul-Dec	1381	118	163.0
	Mean/Total	164	7247	1190.6
1994*	Jan-Jun	270	9544	2572.4
	Jul-Dec	267	8908	2378.0
	Mean/Total	268	18452	4950.4
1995*	Jan-Jun	162	5817	942.7
	Jul-Dec	354	2150	761.7
	Mean/Total	214	7967	1704.4

Table 15. Nominal catch (tonnes) of shrimp in the Denmark Strait.

Nation	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	****1995	*** 1996
North area																			
Denmark	-	-	702	581	740	204	443	353	500	555	444	366	390	358	160	111	198	251	
Faroe Islands	-	-	4233	713	737	443	688	674	727	595	679	595	843	1007	1092	554	368	626	
France	-	-	50	353	414	291	500	642	780	1030	494	381	51	118					
Greenland	-	-	200	1004	1115	1487	2250	2586	5781	6627	7456	5976	6270	4205	2012	1425	1056	1878	
Iceland	363	485	759	125	0	43	742	1784	1150	1330	1431	1326	281	485	1750	2553	1514	1151	
Norway	-	800	2481	2016	1896	1727	2128	2051	2026	2041	2052	2098	2500	2504	2500	1860	1736	1286	
Total	363	1285	8405	4792	4902	4175	6731	8110	10964	12178	12556	10742	10275	8657	7514	6503	4872	5203	
Middle and south area																			
Denmark	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	48	488	395	
Faroe Islands	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	225	777	128	
Greenland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	918	2868	734	
Norway	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	817	446	
Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1191	4850	1704	
Σ eastern side	363	485	759	125	0	43	742	1794	1150	1330	1431	1326	281	485	1750	2553	1514	1151	
Σ north area not eastern side	0	800	7646	4667	4902	4132	5989	6316	9814	10848	11125	9416	9994	8192	5764	3950	3358	4052	
Σ middle and south area																1191	4850	1704	
Σ western side	0	800	7646	4667	4902	4132	5989	6316	9814	10848	11125	9416	9994	8192	5764	5141	8308	5756	
ΣΣ all areas	363	1285	8405	4792	4902	4175	6731	8110	10964	12178	12556	10742	10275	8657	7514	7694	9822	8907	
Advised TAC	-	-	-	-	4200	4200	4200	5000	-	-	-	10000*	10000*	10000*	8000	5000	5000	5000	5000
Effective TAC western side	-	-	-	8000	4500	5725	5245	6090	7525**	7725**	8725**	9025**	14100	14500	13000	9563	9563	9563	9563

* Advised for a few years as a precautionary measure.

** not including Greenland fishery north of 66°30'N.

*** Provisional

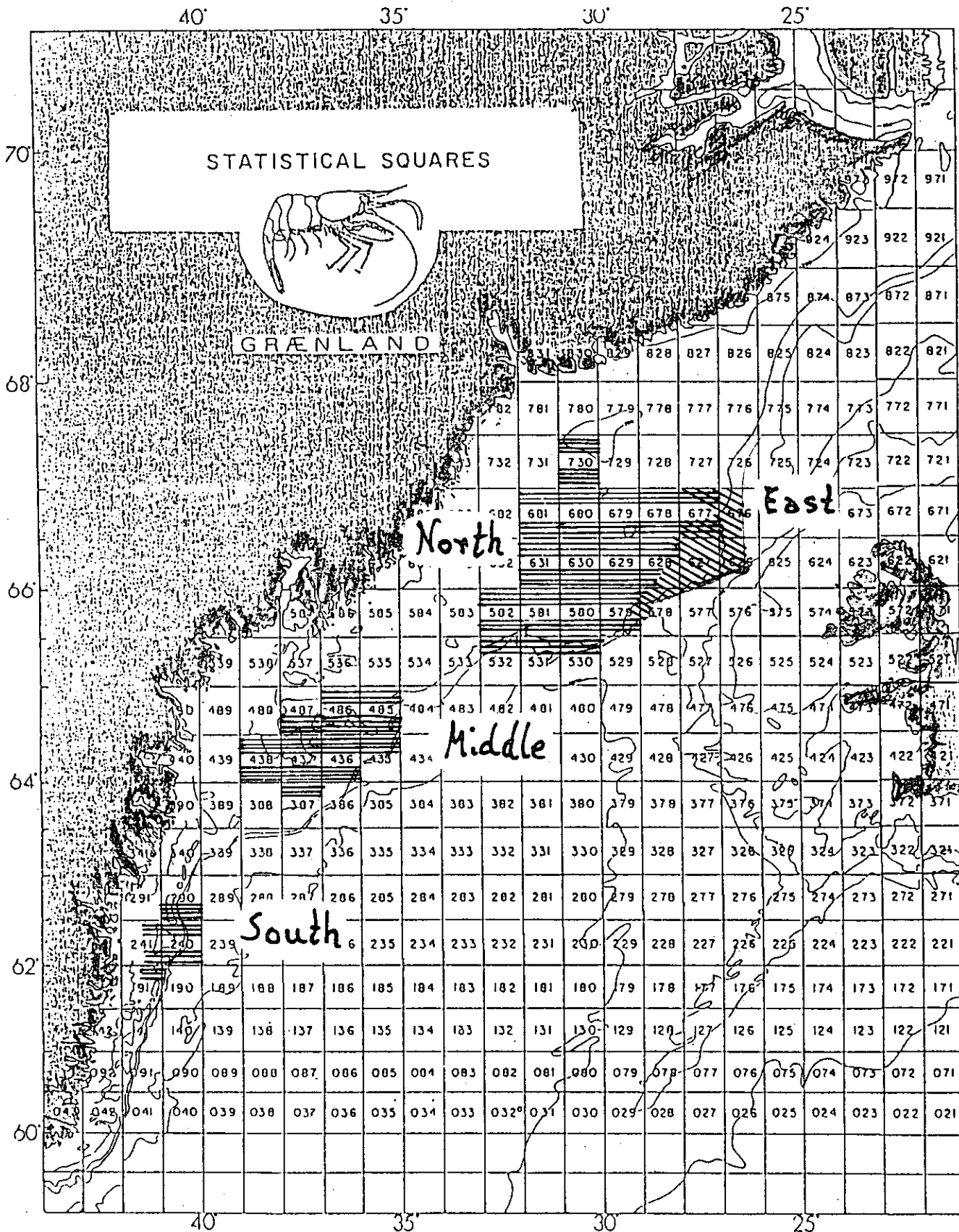


Fig. 1. The strata numbers in the Denmark strait.