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The Catch Statistics of the Shrimp Fishery (*Pandalus borealis*)
in the Denmark Strait in the Years 1980-1994

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 1988-1994 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 area. The so-called middle and south areas may represent a different stocks so the data coming from those will be kept separate at present.

The catch rates remain in the traditional north 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 157 kg/hour after the annual catches have been limited. Most marked was the change in CPUE in 1994 after the effort was directed more to the two new areas in the south.

The nominal catch was some 4 500 tonnes in 1994 in the north area, some 1 900 tonnes in the middle area and some 1 700 tonnes in the south area.

Introduction

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 as 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 months for all countries and strata within each area and then combined for the years 1988-1994. Similar proceedings have been carried out for the previous years 1980-1987 (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 throughout the paper as it is not certain that there is a connection to the traditional north area.

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 calculated CPUE are presented in tables 1 to 6 for the six countries for the north area, namely north of 65°N. The data for the middle area, between 63°30' N and 65°N, are presented in tables 8 - 11 and for the south area, south of 63°N, in table 12 (Fig. 1). 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. The nominal catch data were obtained from Carlsson and Kanneworff (1992) and now from Siegstad (1994).

Table 7 which has data for the north area for all countries by half years goes right back to year 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 boats it is known that gear size was about 2400 meshes (circumference) for many years, but increased in 1993 to about 2700 meshes. There is also a fall in CPUE in the latter half of the year. However a second peak in catch rates can occur late in the year. The yearly catch rate is calculated in table 13. 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 thousand hours in 1989 to some 72 thousand hours in 1993. In 1994 there is the most dramatic drop in effort or down to 28 thousand hours. The catch in the traditional area has gone down drastically as the new areas come into use. The CPUE has now increased to 157 kg in 1994 in the traditional area.

Table 14 contains the logbook data gathered together for the four countries for the middle area in 1993 and 1994. Apart from the huge CPUE that the Faroe Islands report on in late 1993 the CPUEs are not as high or between 137 kg in the first half year of 1993 going to 1563 kg in the autumn of 1993, becoming 210 kg in early 1994 and finally increasing again to 282 kg in late 1994. When summed together the whole year the CPUE has risen from 146 kg in 1993 to 223 kg per trawling hour in 1994 (table 15). There are logbook data just one country fishing in the south area, namely Greenland (table 12). There were high catches for Greenland in late 1993, 1251 kg/hour and the overall CPUE for Greenland was high for both years, namely 472 kg for 1993 and 438 kg for 1994.

The total catch is listed in Table 17 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 14 000 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 the Greenland. In the north area the yearly catch has been gradually falling as CPUE and availability decreased. Moreover in 1993 and 1994 much effort was directed towards the new areas. The total catch was only 4 456 tons in the traditional area in 1994 as compared to 6 556 tons in 1993. In the middle area 1 079 tons and 1937 tons were fished in years 1993 and 1994 respectively. The south area has become quite as high increasing from 205 tonnes in 1993 to 1 734 tonnes in 1994. So altogether 7 841 tons were fished in 1993 and 8 128 tons in 1994.

Conclusion

The fishery in the traditional area of Denmark Strait appears to have reached the stage where stock level is increasing again as judged by CPUE. The reduced annual removals from the shrimp stock in the north area of Denmark Strait appear to have a beneficial influence on the state of stock. It is not certain what if any connection there is between the traditional north area and the more southerly new area.

References:

- Carlsson, D. M., and P. Kanneworff. 1992. The commercial shrimp fishery in Denmark Strait in 1991 and early 1992. NAFO SCR Doc. No. 64, Ser. No. N2118. 26p.
- Carlsson, D. M., P. Kanneworff and H. Siegstad 1993. The commercial shrimp fishery in Denmark Strait January to October 1993. NAFO SCR Doc. 93/64, Ser. No. N2343. 24p.
- 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. 1994. The commercial shrimp fishery in Denmark Strait in 1993 and January to October 1994. NAFO SCR Doc. 94/91, Ser. No. N2478. 36p.
- 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.
1993. The catch statistics of the shrimp fishery (*Pandalus borealis*) in the Denmark Strait, in the years 1980-1993. NAFO SCR Doc. 93/133, Ser. No N2345 13p.
- 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. Catch rates (kg per hour trawling) corresponding effort (hours trawling) and catch (tonnes) 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. Total catch is with discards in 1993 and 1994.

Year	January - June				July - December			
	Month	Cpue	Effort	Catch	Month	Cpue	Effort	Catch
1988	Jan	301	6951	2089.8	Aug	117	1019	119.6
	Feb	226	7950	1793.2	Sep	121	1487	179.4
	Mar	152	6408	975.1	Oct	105	2586	270.5
	Apr	104	1121	116.0	Nov	157	3207	503.3
	May	114	550	62.9	Dec	205	4662	957.7
	Subtotal	219	22980	5037.0	Subtotal	157	12961	2030.5
	Total	219	24111	5285.0	Total	157	13820	2165.0
	1989	Jan	249	6602	1646.6	Jul	27	15
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	141	6793	956.9	Jul	0	38	0.0
	Feb	128	7192	919.1	Aug	0	0	0.0
	Mar	101	6393	643.8	Sep	73	404	29.6
	Apr	128	7681	982.3	Oct	64	371	23.8
	May	85	5045	430.8	Nov	91	505	45.8
	Jun	72	471	33.9	Dec	105	892	93.8
	Subtotal	118	33575	3966.8	Subtotal	87	2210	193
	Total	118	33684	3979.7	Total	87	2572	224.6
1992	Jan	93	3691	344.3	Oct	34	139	4.7
	Feb	114	3780	429.1	Nov	88	340	29.8
	Mar	123	5395	661.0	Dec	104	1669	173.8
	Apr	72	3658	264.7	Subtotal	97	2148	208
	May	101	1257	126.5	Total	97	2073	201.0
	Subtotal	103	17781	1825.6				
	Total	103	17639	1811.0				
	1993	Jan	85	6216	527.2	Dec	176	95
Feb		92	5066	468.1	Subtotal	176	95	16.7
Mar		120	2347	280.6	Total			
Apr		85	390	33.1				
May		15	26	0.4				
Subtotal		93	14045	1309.4				
Total		93	14182	1322.2				
1994*		Jan	216	844	182.1			
	Feb	171	3037	519.9				
	Mar	154	2194	337.0				
	Apr	37	76	2.8				
	May		2	0.0				
	Subtotal	169	6153	1041.8				
	Total				Total			65.9

Table 2. Catch rates (kg per hour trawling) and corresponding effort (hours trawling) and catch (tonnes) from the shrimp fishery in Denmark Strait, i.e. north of 65°N, 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
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. 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	
1988	Jan	66	30	2	Jul	71	14	1	
	Feb	112	2438	273	Aug	96	2271	218	
	Mar	76	4013	305	Sep	86	3267	281	
	Apr	74	4635	343	Oct	71	2479	176	
	May	82	3939	323	Nov	61	295	18	
	June	108	259	28					
	Subtotal	83	15314	1274	Subtotal	83	8312	693	
	Total		15314	1274	Total		9332	778	
	1989	Jan	199	422	84	Aug	35	1600	56
Feb		129	496	64	Sep	37	6459	239	
Mar		70	2300	161	Oct	55	7309	402	
Apr		88	4318	380	Nov	47	6106	287	
May		35	457	16	Dec	94	2883	271	
June		26	538	14					
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		68	23614	1594	Subtotal	56	16141	901	
Total		68	23703	1600	Total	56	16195	904	
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	63	23938	1514	Subtotal	68	10580	722	
	Total	63	23938	1514	Total	68	14448	986	
	1993	Jan	51	4378	223	Sep	71	1033	73
		Feb	77	4582	352	Oct		2970	134
Mar		61	5459	333	Nov		3136	76	
Apr		58	5622	326	Dec		1050	95	
May		80	2307	185					
Subtotal		63	22348	1419	Subtotal	46	8189	378	
Total		63	23340	1482	Total	46	8189	378	
1994*		Jan	175	315	55	Aug			
		Feb	228	1053	240	Sep	70	1516	106
	Mar	167	1836	307	Oct	85	386	33	
	Apr	111	4996	556	Nov				
	May	82	1429	117	Dec				
	Subtotal	132	9629	1275	Subtotal	73	1902	139	
	Total	132	9629	1275	Total	73	4180	306	

Table 4. Catch rates (kg per hour trawling) and corresponding effort (hours trawling) and catch (tonnes) from the shrimp fishery in Denmark Strait, i.e. north of 65° N, by Iceland in two periods of the year.

Year	January - June				July - December			
	Month	CPUE	Effort	Catch	Month	CPUE	Effort	Catch
1988	Jan	90	23	2.1	Jul	47	977	45.7
	Feb	42	21	0.8	Aug	52	4596	238.1
	Jun	108	1463	158.5	Sep	62	6257	386.1
					Oct	52	7166	372.3
					Nov	26	363	9.5
	Subtotal	107	1507	161.4	Subtotal	54	19359	1051.7
	Total		1769	189.5	Total		22735	1234.5
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
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	2280	Total	216	21	4.6
	Total	184	13854	2548.4				
1994 *	Mar	317	960	304.1	Sep	74	68	5
	Apr	53	75	4.0	Oct			0.4
	May	280	1518	424.7				
	Jun	153	254	38.9	Subtotal	74	68	5.4
	Subtotal	275	2807	772	Total			
	Total	275	5134	1411.5				

Table 5. Catch rates (kg per hour trawling) and corresponding effort (hours trawling) and catch (tonnes) 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
1988	Jan	204	863	175.8				
	Feb	195	1271	248.4				
	Mar	129	647	83.6				
	Apr	76	468	35.7				
	May	104	70	7.3				
	Subtotal	166	3319	550.8				
	Total	166	4031	669.0				
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	2773	182.1				
	Feb	69	2394	165.7				
	Mar	62	1674	103.8				
	Apr	57	703	40.2				
	May	61	23	1.4				
	Subtotal	65	7567	493.2				
	Total	65	10847	707.0				
1994*	Jan	395	133	52.6				
	Feb	178	596	106.1				
	Mar	168	293	49.3				
	Apr	65	235	15.3				
		107	98	10.5				
	Subtotal	173	1355	233.8				
Total	173	1658	286.1					

Table 6. Catch rates, corresponding effort (trawling hours) and catch (tonnes) 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	
1988	Feb	91	360	32.9	Sept	84	203	17.1	
	Mar	104	188	19.6	Oct	83	445	37.1	
	Apr	78	41	3.2	Nov	87	375	32.5	
					Dec	155	242	37.4	
	Subtotal	95	589	55.7	Subtotal	98	1265	124.1	
	Total	95	3479	329.0	Total	98	1172	115.0	
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					
	Mar	41	293	11.9	Nov	37	115	4.3	
	Apr	42	212	9.0	Dec	53	217	11.4	
		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	146	147	21.5					
	Feb	72	65	4.7					
	Mar	102	283	28.8					
	Apr	51	110	5.6					
		Subtotal	100	605	60.6				
	Total	100	645	64.6					

Table 7. Catch rates (kg per hour trawling) and corresponding effort (hours trawling) and catch (tonnes) 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	Country	January-June			July - December		
		CPUE	Effort	Catch	CPUE	Effort	Catch
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
	Subtotal	155	45428	7034.6	59	62475	3712.5
	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	118	33991	4016.0	87	2256	197.0
	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
	Subtotal	99	72553	7189.6	62	23656	1474.7
	Total	99	72553	7189.6	62	23656	1474.7
1992	Greenland	103	17781	1825.6	97	2148	208.0
	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	60410	5711.9	78	23473	1824.1

Table 7 continued

1993	Greenland	93	14182	1322.2	176	95	16.7
	Norway	63	22340	1482.0	46	8189	378.0
	Iceland	184	13854	2548.4	216	21	4.6
	Denmark	41	2094	85.3	72	167	12.0
	Faroe Islands	65	10847	707.0			
	Total	97	63317	6144.9	49	8472	411.3
1994*	Greenland	169	6153	1041.8			65.9
	Norway	132	9629	1275.0	73	4180	306.0
	Iceland	275	5134	1411.5	74	68	5.4
	Denmark	100	645	64.6			
	Faroe Islands	173	1658	286.1			
	Subtotal	176	23219	4079.0	73	4248	311.4
	Total	176	23219	4079.0	73	5147	377.3

Table 8. 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, but north of 63°30' N, by Greenland in two periods of the year. Total catch includes discards.

Year	January - June				July - December			
	Month	CPUE	Effort	Catch	Month	CPUE	Effort	Catch
1993	Jan	142	72	10.2				
	Feb	70	350	24.4				
	Mar	105	613	64.3				
	Apr	173	2298	396.5				
	May	336	878	295.0	Dec	113	8	0.9
	Subtotal	188	4211	790.4	Subtotal	113	8	0.9
	Total	188	4252	798.1	Total	113	8	0.9
1994	Jan	179	405	72.5	Aug	821	14	11.5
	Feb	190	300	57.0				
	Mar	178	600	107.0				
	Apr	270	595	160.8				
	May	126	247	31.2				
	Subtotal	200	2147	428.5	Subtotal	821	14	11.5
	Total			Total				

Table 9. 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, but north of 63°30' N, by Norway in two periods of the year.

Year	January - June				July - December			
	Month	CPUE	Effort	Catch	Month	CPUE	Effort	Catch
1994*	Jan	407	216	88.0	Aug	246	256	63.0
	Feb	146	164	24.0	Sep	185	27	5.0
	May	209	445	93.0				
	Subtotal	248	825	205.0	Subtotal	240	283	68.0
	Total	248	825	205.0	Total	240	618	148.5

Table 10. 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 Faroe Islands.

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	86.2				
	May	32	180	5.7	Dec	1894	38	71.0
	Subtotal	64	2540	161.9	Subtotal	1894	38	71.0
	Total		0		Total			
1994*	Jan	321	500	160.4				
	Feb	197	495	97.5				
	Mar	167	161	26.9				
	Apr	230	376	86.5				
	May	124	247	30.6				
	Subtotal	226	1779	401.9				
	Total	226	3280	740.9				

Table 11. 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 Denmark.

Year	January - June				July - December			
	Month	CPUE	Effort	Catch	Month	CPUE	Effort	Catch
1993	Apr	65	361	23.4				
	May	120	183	21.9				
	Subtotal	83	544	45.3				
	Total	83	572	47.6				
1994*	Jan	100	10	1.0	Aug	329	236	77.7
	Apr	155	303	47.1	Sep	216	79	17.1
	May	95	114	10.8				
	Subtotal	138	427	58.9	Subtotal	301	315	94.8
	Total	138	856	118.1	Total	301	942	283.6

Table 12. Catch rates, corresponding effort and catch (tonnes) from the shrimp fishery in the southern area in the Denmark Strait, i.e. south of 63°30' N, by Greenland.

Year	January - June				July - December			
	Month	CPUE	Effort	Catch	Month	CPUE	Effort	Catch
1993	Jan	500	2	1.0				
	Mar	346	189	65.3				
	Apr	316	124	39.2				
	May	182	44	8.0	Dec	1251	72	90.1
	Subtotal	316	359	113.5	Subtotal	1251	72	90.1
	Total	316	362	114.6				
1994*	Jan	501	1609	806.2	Jul	463	19	8.8
	Feb	367	823	302.1	Aug	452	890	402.7
	Mar	336	42	14.1	Sep	377	92	34.7
	Apr	330	239	78.8				
	May	351	246	86.3				
	Subtotal	435	2959	1287.5	Subtotal	446	1001	446.2
	Total				Total			

Table 13 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	383	15775	6198.3
	Jul-Dec	117	18815	2206.4
	Mean/Total	243	34590	8404.7
1981	Jan-Jun	260	18072	4688.0
	Jul-Dec	62	1516	93.9
	Mean/Total	245	19588	4781.9
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	6336	651.3
	Mean/Total	176	23670	4175.4
1984	Jan-Jun	247	23900	5899.2
	Jul-Dec	103	8074	631.6
	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
1989	Jan-Jun	155	45428	7034.6
	Jul-Dec	59	62475	3712.5
	Mean/Total	100	107903	10747.1
1990	Jan-Jun	150	52697	7880.9
	Jul-Dec	57	42003	2394.1
	Mean/Total	109	94700	10275.0
1991	Jan-Jun	99	72553	7189.6
	Jul-Dec	62	23656	1474.7
	Mean/Total	90	96209	8664.3
1992	Jan-Jun	95	60410	5711.9
	Jul-Dec	78	23473	1824.1
	Mean/Total	90	83883	7536.0
1993	Jan-Jun	97	63317	6144.9
	Jul-Dec	49	8472	411.3
	Mean/Total	91	71789	6556.2
1994*	Jan-Jun	176	23219	4079
	Jul-Dec	73	5147	377.3
	Mean/Total	157	28366	4456.3

Table 14. Catch rates (kg per hour trawling) and corresponding effort (hours trawling) and catch (tonnes) from the shrimp fishery in the middle area of Denmark Strait, i.e. south of 65° N and north of 63°30' N, by all nations combined in two periods of the year.

Year	Country	January-June			July - December		
		CPUE	Effort	Catch	CPUE	Effort	Catch
1993	Greenland	188	4252	798.1	113	8	0.9
	Denmark	83	572	47.6			
	Faroe Islands	64	2540	161.9	1894	38	71.0
	Total	137	7364	1007.6	1563	46	71.9
1994*	Greenland	200	2147	428.5	821	14	11.5
	Norway	248	825	205.0	240	618	148.5
	Denmark	138	856	116.1	301	942	283.6
	Faroe Islands	226	3280	740.9			
	Total	210	7108	1492.5	282	1574	443.6

Table 15. Catch rates (kg per hour trawling) and corresponding effort (hours trawling) and catch (tonnes) from the shrimp fishery in the middle area of Denmark Strait south of 65° N and north of 63°30' N, by years.

Year	Periods	CPUE	Effort	Catch
1993*	Jan-Jun	137	7364	1007.6
	Jul-Dec	1563	46	71.0
	Mean/Total	146	7410	1078.6
1994*	Jan-Jun	210	7108	1492.5
	Jul-Dec	282	1574	443.6
	Mean/Total	223	8682	1936.1

Table 16. Catch rates (kg per hour trawling) and corresponding effort (hours trawling) and catch (tonnes) from the shrimp fishery in the south area of Denmark Strait south of 63°30' N, by years.

1993	Jan-Jun	316	362	114.6
	Jul-Dec	1251	72	90.1
	Mean/Total	472	434	204.7
1994*	Jan-Jun	435	2959	1287.5
	Jul-Dec	446	1001	446.2
	Mean/Total	438	3960	1733.7

Table 17. 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
North area																		
Denmark	-	-	702	581	740	204	443	353	500	555	444	366	390	358	160	97	65	
Faroe Islands	-	-	4233	713	737	443	668	674	727	595	679	595	843	1007	1092	707	286	
France	-	-	50	353	414	291	500	642	780	1030	494	381	51	118				
Greenland	-	-	200	1004	1115	1467	2250	2596	5781	6627	7456	5976	6210	4213	2034	1339	1108	
Iceland	363	485	759	125	0	43	742	1794	1150	1330	1431	1326	281	465	1750	2553	1417	
Norway	-	800	2461	2016	1896	1727	2128	2051	2026	2041	2052	2098	2500	2504	2500	1860	1581	
Total	363	1285	8405	4792	4902	4175	6731	8110	10964	12178	12556	10742	10275	8665	7536	6556	4457	
Middle area																		
Denmark	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	48	402
Faroe Islands	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	233	741
Greenland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	799	440
Norway	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	354
Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1080	1937
South area																		
Greenland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	205	1734
Σ eastern side	363	485	759	125	0	43	742	1794	1150	1330	1431	1326	281	465	1750	2553	1417	
Σ north area not eastern side	0	800	7646	4667	4902	4132	5989	6316	9814	10848	11125	9416	9994	8200	5786	4003	3040	
Σ middle area																	1080	1937
Σ south area																	205	1734
Σ western side	0	800	7646	4667	4902	4132	5989	6316	9814	10848	11125	9416	9994	8200	5786	4003	3040	
ΣΣ all areas	363	1285	8405	4792	4902	4175	6731	8110	10964	12178	12556	10742	10275	8665	7536	7841	8128	
Advised TAC	-	-	-	-	4200	4200	4200	5000	-	-	-	10000*	10000*	10000*	10000*	8000	5000	5000
Effective TAC western side	-	-	-	8000	4500	5725	5245	6080	7525**	7725**	8725**	9025**	14100	14500	13000	9563		

* Advised for a few years as a precautionary measure.

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

*** Provisional

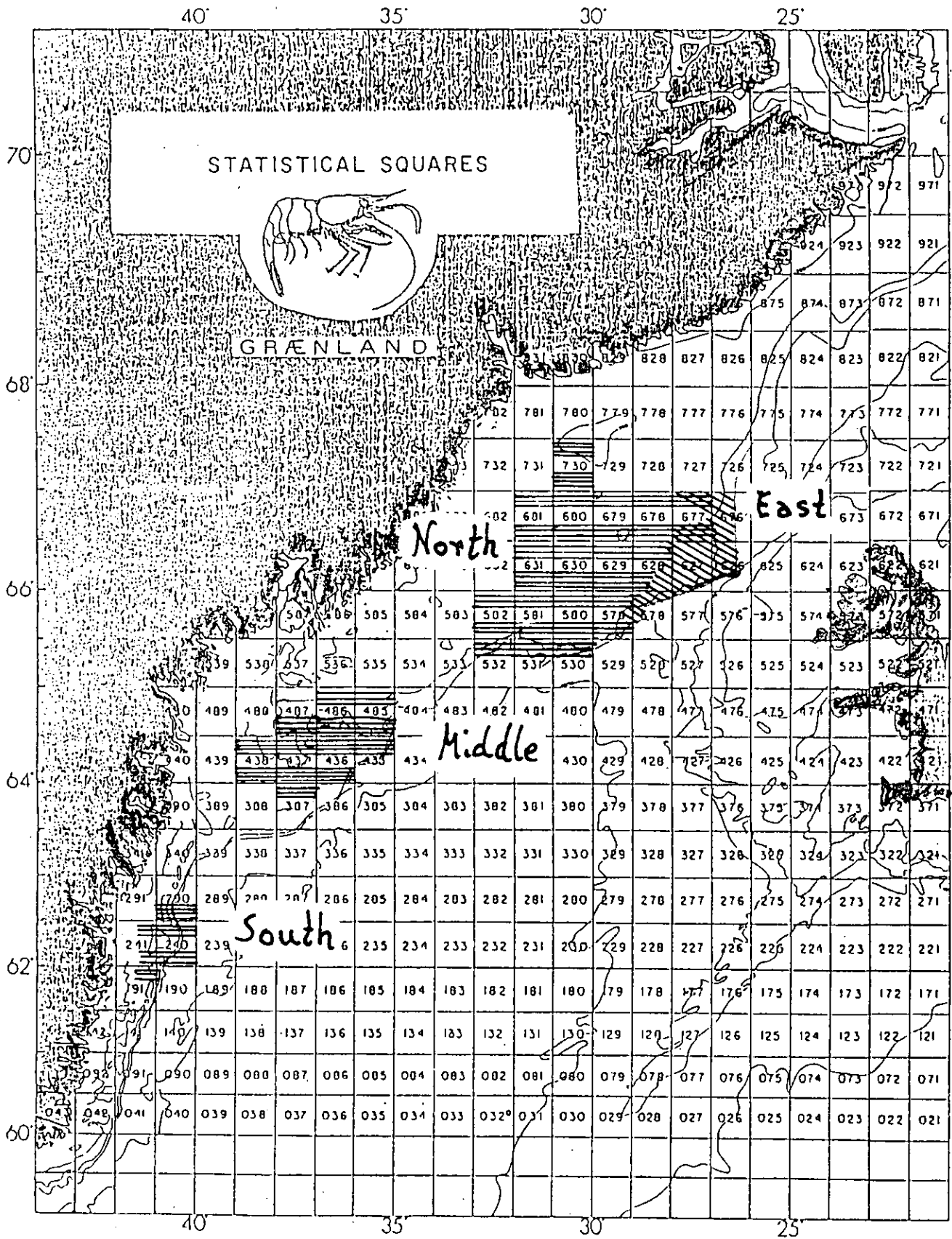


Fig. 1. The strata numbers in the Denmark strait.