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An Interim Status of the International Fishery for Shrimp (*Pandalus borealis*) in Division 3M (Flemish Cap), 1993-2006

by

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Abstract

The development of the international shrimp (*Pandalus borealis*) fishery in NAFO Division 3M is described. Various indices show that the stock is not declining. The standardized CPUE was the highest in 2005 and significantly higher in 2005 as compared to 2004. The standardized CPUE is not yet available for the whole year 2006. The CPUE of Iceland alone January to June shows a CPUE higher in 2006 than ever before and a great deal higher than in 2005 which was near the mean of the series. Indices of female stock calculated from an international data base and standardized CPUE showed a decrease from 2003 to 2004 and an increase to 2005. No data are as yet available for year 2006. Female biomass from the EU survey show that the female biomass is the same as in 2003 and 2004, higher in 2005 as compared to 2003 and 2004. Provisional data for 2006 show a decrease in biomass of females although female biomass is still high compared to the whole series. Recruitment as judged from the 2 year olds in the commercial fishery was very good in 2004 but very bad in 2005. No measure of recruitment has been obtained as yet from the 2006 fishery or the survey. Nominal catch was 45 000 tons in 2004 as compared to only 11 500 tons in 2005. The catch of 2005 and 2006 are underestimates as there is little or no reporting by EU countries on shrimp catch at Flemish Cap. Rumours say it was twice as high. The catch to 1 July in 2006 is even lower or 3 300 tons compared to about 8 000 tons at the same time in 2005.

1. Introduction

The fishery for northern shrimp at Flemish Cap began in the spring of 1993 and has since continued with estimated annual catches (as estimated by STACFIS) of approximately 27 000 to 48 000 in the years 1993 through 1996. After 1996 catches were lower or rising slowly from 25 000 tons in 1997 to 53 000 tons in 2000 and further to 63 200 tons in 2003, the highest in the series. Removals to July 2006 of about 3 300 tons are much lower than those reported for the same period in 2005 (8 000 tons). So for economic reasons most countries seem to be loosing interest in this fishery. Vessels from as many as 19 nations have participated in this fishery since its beginning.

The development of the international shrimp (*Pandalus borealis*) fishery in NAFO Div. 3M is described. A few indices are listed here with the purpose of tracking the status of the Flemish Cap shrimp stock. These are mainly CPUE from the Icelandic fleet (1 vessel) that has indeed stopped fishing by 1 July and the EU provisional data for female biomass from the survey in 2006. At the October meeting more indices will be presented. Among those are the standardized CPUE for all countries and recruitment indices. For last years results see Scientific Council Reports (Anon., 2005).

Background on the assessment and management of this resource since 1993 can be found in Parsons (1998), Skuladottir and Petursson (2005) and NAFO Scientific Council Reports (2005).

2. **Catch**

Catch of shrimp by months is listed in Tables 1-3 for the years 2004, 2005 and 2006. Those are provisional numbers as reported to STACFIS every month. If a month is not reported at the right time but later the missing catch figure will still be included in the "year to date" figure at the right hand side of the table. Nominal catch by years is presented in Table 4 (Fig. 1). In the most recent years the total catch is listed as the total catch as reported to NAFO provisionally by month. Sometimes STACFIS had to estimate the catches in years when there was misreporting between the areas 3L and 3M. As there is a lot of misreporting by EU since 2005, the catch has to be estimated by STACFIS for the years 2005 and 2006. This shall be done at the shrimp meeting in October. Since the countries Latvia, Lithuania, Estonia and Poland joined EU in 2005 there is little reporting of catch in 2005 or only of about 1 700 tons for the whole of EU and nobody knows for which country this is. Fishery biologists of Estonia, Poland and Spain have reported on about 12 000 tons of shrimp catch in 2005, but catch data for Lithuania and Latvia in 2005 are still missing. There was also misreporting of the no. of days in 2005 By EU as they spent 0 days in the area in that year as compared to 558 days reported in 2006 to 1 July out of 3 293 days allocated for the whole year. Then there was no shrimp catch reported. As there were no days reported by EU in 2005 I do not know whether the fishery by EU countries is declining or not in 2006.

3. **CPUE**

An Icelandic CPUE calculated as that of a standard size of trawl (3 000 meshes) is shown as this has provisional data for year 2006 (Table 5, Fig. 2). The CPUE has increased in 2005 to about average for the period January to July from the low 227 kg/hr in 2004 and further to the highest observed in the series of 387 kg/hr in 2006. The standardized CPUE (Fig. 3) is lifted from last year's assessment paper (Skuladottir and Petursson, 2005). These were calculated by using a multiplicative model based on data presented by 6 nations.

4. **Recruitment**

For recruitment one can refer to last year's Report (Anon., 2005) where there is presented the series of two year olds in the commercial fishery as well as in the EU survey data, juvenile bag and main trawl. The 2002 year-class appears to be one of the strongest. The 2003 year-class on the other hand appears to be small (Casas *et al*., 2005, anon 2005).

5. **Female Biomass**

A spawning stock biomass (SSB) index was calculated as kg/hr of primiparous (including transitionals) plus multiparous females from the international observer database and the standardized CPUE model (Skuladottir and Petursson, 2005). This was compared to the results of the EU survey (Casas, personal communication, 2006) and the Faroese survey biomass indices (Nicolajsen, 2003). The data are provided in Table 8.

The female biomass from the Faroese survey indices have shown much the same trend as the EU although not fluctuating as much and appears to be rather stable since 1998. The spawning stock (female biomass) as determined from the EU survey biomass index gradually increased during the years prior to the fishery. This may have been due to a gradual increase in stock size after the cod biomass declined in the area. But this was also a reflection of the very strong 1987 year class, most of that were female during 1992. The female index showed a decrease from 1994 through 1997, then an increase during 1998. The female biomass of EU survey has fluctuated at a high level between 1998 and 2005 but decreased a little in 2006 (Table 6, Fig. 4). The 2006 value is provisional and from Casas (personal communication).

6. **Summary**

Catches of shrimp on the Flemish Cap have been maintained at a high level averaging about 48 000 tons for the last five years. The CPUE model indicated that there was a general decline between 1993 and 1996. Then beginning in 1997, catch rates began to increase and increased to 2003 similar to that in 1993. The spawning stock biomass also decreased between 1993 and 1994. The survey SSB of the Faroese survey remained low during 1997 but showed an increasing trend to 2003. The SSB of the EU survey also increased from 1997 to 1998 to remain rather stable in the

years 1999-2005, decreasing somewhat in 2006 (provisional). The 2002 year-classes is considered to be above average but the 2003 is considered to be very weak.

7. **Acknowledgement**

Appreciation is expressed to those who provided data for inclusion in this paper in advance of the 2005 September Meeting.

8. **References**

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Table 1. Catch (tons) by nations and months as reported provisionally to NAFO in year 2004.

Nation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Total**	**Year to date**
Canada													**0**	
Cuba	95	2	178	218	241								**734**	**969**
Estonia	50	829	510	971			1214	1063	1318	1684	1571	1436	**10646**	**13455**
EU/Denmark													**0**	
EU/Portugal													**0**	
EU/Spain				22	528	570		222	233	249	265	47	**2136**	**2724**
Faroe Is.	26		60	227	434	564	455	491	324	369	654	449	**4053**	**4932**
France St. Pierre et Miquelon									72	188	135	28	**423**	**423**
Greenland													**0**	
Honduras													**0**	
Iceland		272	290	360		356	476	456	284	296	403	326	**3519**	**3519**
Japan													**0**	
Latvia			305	240	267	154	73	444	398				**1881**	**2332**
Lithuania	203	529	410	443	576	790	604	462	538	247			**4599**	**4802**
Norway		579			369	447		2319	1591	1553	1493	522	**8873**	**10743**
Poland		93	242	62						173	204	352	**1126**	**1124**
Portugal													**0**	
Russia										288	252	114	**654**	**654**
Ukraina						147	132	35					**314**	**314**
USA			153	180			287	32					**652**	**952**
Total	**374**	**2304**	**2148**	**2723**	**2415**	**3028**	**3241**	**5524**	**4758**				**39610**	**46943**

Table 2. Catch (tons) by nations and months as reported provisionally to NAFO in year 2005.

Nation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Total**	**Year to date**
Canada										188	188		**376**	**188**
Cuba	150	174	186	321									**831**	**1043**
EU		126	124	130	136	9	282	169				65	**1041**	**1724**
EU/Estonia													**0**	
EU/Latvia													**0**	
EU/Lithuania													**0**	
EU/Poland													**0**	
EU/Portugal													**0**	
EU/Spain													**0**	
Faroe Is.	242	147	173	347	302	343	143	178	22		6	160	**2063**	**2341**
France St. Pierre et Miquelon							126	174	154			32	**486**	**487**
Greenland													**0**	
Honduras													**0**	
Iceland			311	394	456	468	443	469	422	295	381	434	**4073**	**4073**
Japan													**0**	
Norway													**0**	**184**
Russia			2	41	212	13							**268**	**268**
Ukraina													**0**	
USA		57	363	297									**717**	**1188**
Total	**392**	**504**	**1159**	**1530**	**1106**	**833**	**994**	**990**	**598**	**483**	**575**	**691**	**9855**	**11496**

Table 3. Catch (tons) by nations and months as reported provisionally to NAFO in year 2006.

Nation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Total**	**Year to date**
Canada													**0**	
Cuba													**0**	
EU													**0**	
EU/Estonia													**0**	
EU/Latvia													**0**	
EU/Lithuania													**0**	
EU/Poland													**0**	
EU/Portugal													**0**	
EU/Spain													**0**	
Faroe Is.	45	184	110	37		120							**496**	**496**
France St. Pierre et Miquelon													**0**	
Greenland						596							**596**	**596**
Honduras													**0**	
Iceland		389	360	545	388	417							**2099**	**2099**
Japan													**0**	
Norway													**0**	
Russia					46								**46**	**46**
Ukraina					32	2							**34**	**34**
USA													**0**	
Total	**45**	**573**	**470**	**582**	**466**	**1135**	**0**	**0**	**0**	**0**	**0**	**0**	**3271**	**3271**

Table 4. Catch (tons) by nations as estimated by STACFIS.

Nation	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003***	**2004***	**2005***	**2006**
Canada	3724	1041	970	906	807	484	490	618[2]	295[1]	16[2]			188	
Cuba							119	46[1]				969[4]	1043[4]	
Estonia		1081	2092	1900	3240	5694	10835	13256[2]	9851[1]	14215[2]	12851	13443[1]		
EU													1724[4]	
EU/Denmark	800	400	200			437	235		93[1]	359[1]				
EU/Portugal	300		150		170	203	227	289[1]	420[1]	16[1]		50[1]		
EU/Spain	240	300	158	50	421	913	1019	1388[2]	855[1]	674[1]	857	1134[1]		
EU/United Kingdom											547			
Faroe Is.	7333	6791	5993	8688	7410	9368	9199	7719[2]	10228	8516	12676	4952[1]	2341	496
Greenland	3788	2275	2400	1107	105	853	576	1734[1]		684[2]	1181			596
Honduras	1265													
Iceland	2243	2300	7623	20681	6381	6572	9277	8912[2]	5265[2]	5741[2]	4695	3567[2]	4073[4]	2099[4]
Japan									130[1]	100	117			
Latvia		300	350	1940	997	1191	3080	3105[1]	2961[1]	1892[1]	3533	3059[1]		
Lithuania		1225	675	2900	1785	3106	3370	3529[1]	2701[1]	3321[1]	3744	4802[1]		
Norway	7183	8461	9533	5683	1831	1339	2975	2669[2]	13291[2]	11833[1]	22765	10819[1]	184[4]	
Poland					824[2]	148	894	1692[2]	209[1]			1158[1]	[4]	
Russia		350	3327	4445	1090		1142	7078[2]	5687[1]	1176[1]	3	654[1]	268[4]	46[4]
Fr. St. Pierre et Miquelon		75			150				337[1]	161[1]			487[4]	[4]
Ukraina									348[1]		237	315[1]	[4]	34[4]
USA								629[1]					1188[4]	[4]
Total	**26876**	**24599**	**33471**	**48300**	**25211**	**30308**	**43438**	**52664**	**52671**	**48704**	**63206**	**44922**	**11496**	**3271**

[1] NAFO STATLANT 21A.
[2] From the fisheries biologist of respective countries.
[3] Assessed by STACFIS.
[4] Reported to NAFO provisionally.
* Provisional to 1 July.

Table 5. Nominal catch for the whole year and some averages calculated from the Icelandic logbooks to show trends in CPUEs and size of circumference of trawl. In calculations of CPUE the effort of twin trawls is multiplied by 1.9. The adjusted CPUE of January-July to that of 3000 meshes trawl is highlighted.

Year	Nominal Catch Tons	Twin trawls % of catch	Mean trawl size No. of meshes Jan.-Jul.	Unstandardized CPUE Jan.-Jul.	**CPUE at size 3000 trawl Jan.-Jul.**	Mean trawl size No. of meshes Jan.-Sep.	Unstandardized CPUE Jan.-Sep.	CPUE at size 3000 trawl Jan.-Sep.
1993	2 243	43.4	3063	373	**363**	3102	356	344
1994	2 300	54.4	2994	238	**240**	2951	216	219
1995	7623	38.2	2779	254	**283**	2733	228	251
1996	20681	42.9	2803	206	**218**	2813	198	211
1997	6483	53.4	2780	188	**192**	2921	198	203
1998	6572	74.8	3016	288	**294**	2974	264	266
1999	9217	70.6	3441	280	**252**	3402	276	243
2000	8978	81.4	3528	287	**245**	3528	282	240
2001	5301	63.0	3571	328	**290**	3518	325	289
2002	5741	73.6	3713	370	**305**	3713	363	294
2003	4695	92.6	3949	367	**302**	4004	358	291
2004	3567	98.9	4460	320	**227**	4460	332	250
2005	3567	99.0	4463	386	**260**	4460	394	265
2006	2541	98.0	4463	575	**387**			
Mean 93-2006	7081	70	3502	319	276	3429	292	259

Table 6. Shrimp in Div. 3M. Indices of female biomass in the EU survey, Faroese survey and the commercial fishery standardized CPUE. The indices in the EU survey were converted for the years 1988-2002 to that of the new vessel R/V *Vizconde de Eza*, the same as measured in 2003-2005 (personal communication from Casas, 2005).

Year	EU survey female biomass	Faroese Survey biomass	Standardized CPUE Kg/hour
1988	4.525		
1989	1.359		
1990	1.363		
1991	6.365		
1992	15.472		
1993	6.923		275.9
1994	2.923		134.0
1995	4.857		150.6
1996	5.132		127.4
1997	4.885	6.731	126.4
1998	11.444	12.559	172.4
1999	13.669	8.863	212.5
2000	10.172	10.154	223.2
2001	13.336	9.374	190.0
2002	17.091	11.761	214.3
2003	11.589	12.402	251.6
2004	12.081		233.7
2005	14.253		331.7
2006	11.642		
Mean	10.000	10	203.4

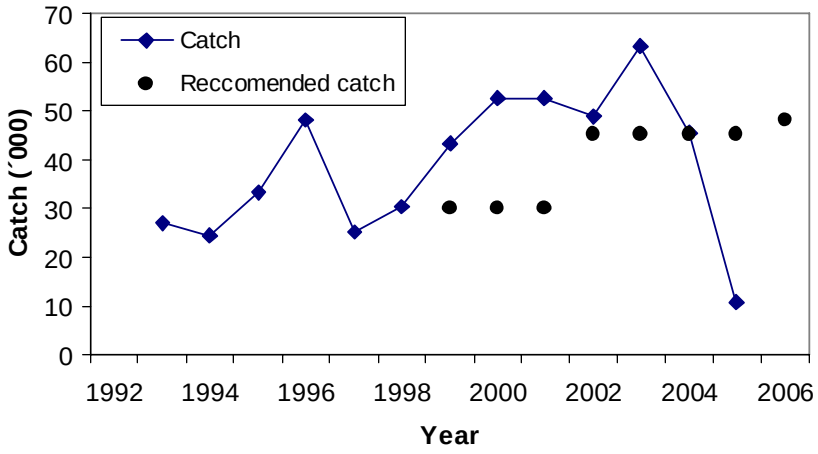

Fig. 1. Shrimp in Div. 3M: catches. The catch may have been twice as much as reported in 2005.

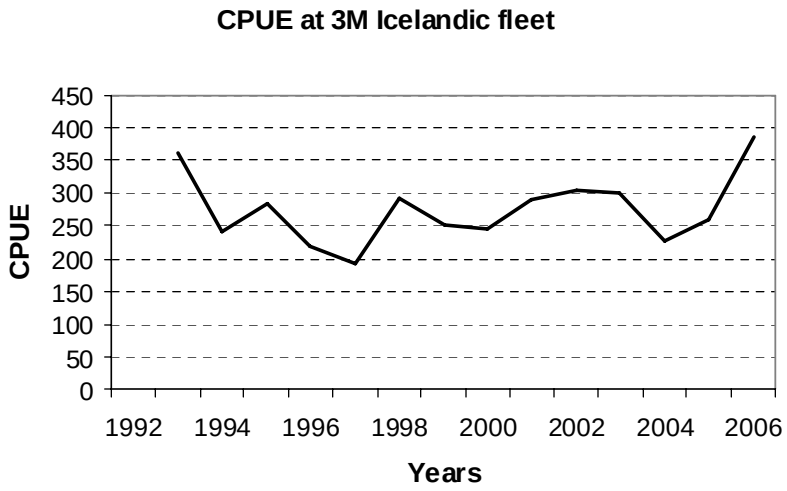

Fig. 2.. Shrimp in Div. 3M: CPUE from the Icelandic fleet for the months January-July 1993-2006. CPUE is standardized to the trawl of 3000 meshes circumference. The effort for double trawl is multiplied by 1.9 when comparing CPUE for single and double trawls.

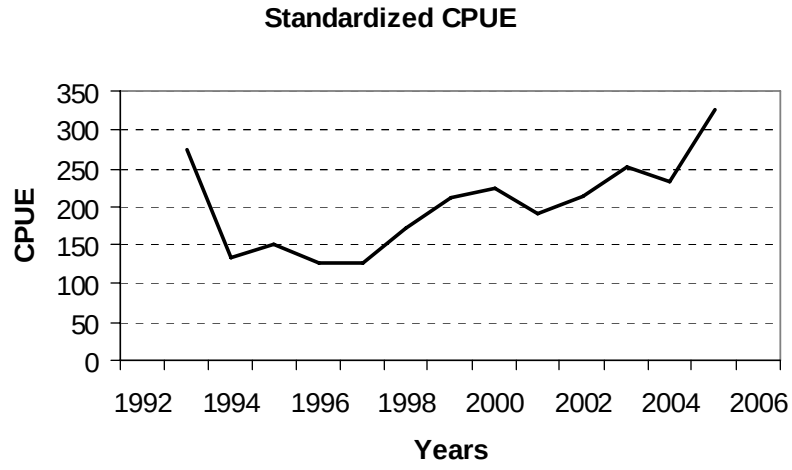

Fig. 3. Shrimp Div. 3M: The standardized female CPUE of shrimp on Flemish Cap, 1993-2005.

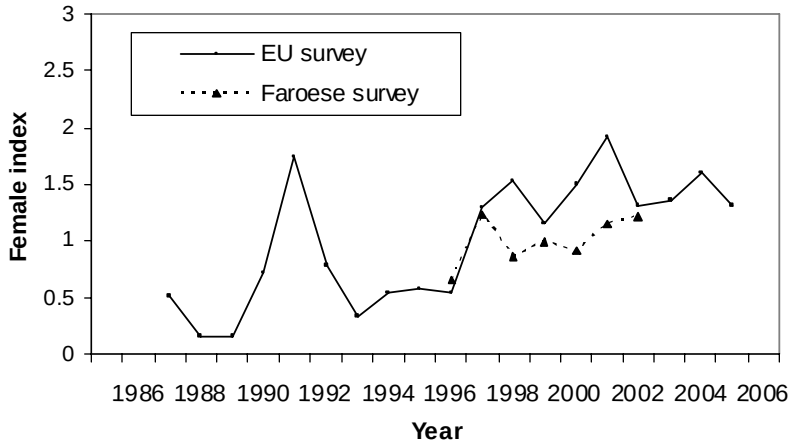

Fig. 4. Shrimp in Div. 3M: female biomass index from EU trawl surveys, 1988-2006, Faroese survey, 1997-2003 Each series was standardized to the mean of that series.