



SCIENTIFIC COUNCIL MEETING – OCTOBER/NOVEMBER 2005

The Norwegian Fishery for Northern Shrimp (*Pandalus borealis*) in the North Sea and Skagerrak (ICES Divisions IVa east and IIIa), 1970-2004

by

C. Hvingel

Institute of Marine Research
Box 6404, N-9294 Tromsø, Norway

Abstract

The resource of northern shrimp (*Pandalus borealis*) in the North Sea and Skagerrak is assessed as three separate stocks: 1) the North Sea Skagerrak stock which is largely confined to ICES Div. IVa east and IIIa, 2) the Fladen Ground stock in ICES Div. IVa west and 3) the Farn Deep stock in ICES Div. IVb west. Vessels from Denmark, Sweden, UK and Norway exploit this resource. The fishery is managed by catch control.

Catches have increased recently from 6 000 tons in 2000 to 9 000 tons in 2004. Annual discard of small shrimp may be in the range of 2-23% by weight.

Landings per unit effort have almost doubled over the same period reaching 57 kg/hr in 2004. The cause of this increase could not be resolved from the available fishery data.

The 2004 catch composition could not be evaluated as samples were not available for analyses.

Introduction

The resource of northern shrimp (*Pandalus borealis*) in the North Sea and Skagerrak is assessed as three separate stocks (Anon., 2005): 1) the North Sea Skagerrak stock which is largely confined to ICES Div. IVa east and IIIa, 2) the Fladen Ground stock in ICES Div. IVa west and 3) the Farn Deep stock in ICES Div. IVb west (Fig. 1). Vessels from Denmark, Sweden, UK and Norway exploit this resource.

The Norwegian fishery is conducted by multi-purpose fishing vessels (20-100 GRT) largely trawling south of 62°N. This fleet is restricted to waters deeper than 60 m and by a maximum number of by-catch of undersized cod or haddock (8 per 10 kg shrimp) and of under-sized shrimp (10% of shrimp catch by weight <15 mm carapace length). Minimum mesh size in the trawl is 35 mm and discarding is prohibited. The fishery is catch regulated by individual vessel quotas. These quotas are evenly allocated to three four-month periods, which again are dispersed in time by individual trip quotas and a mandatory minimum-number-of-days between trips.

The annual quotas set for the Norwegian fleet are in most years fully exploited. The overall quota for 2003 was set at 8 040 tons of which 7 715 tons were landed. In 2004 landings increased to 8 998 tons from a quota of 8 530 tons.

About 35% of the total landings are large boiled, fresh shrimp (140-150 individuals per kg) for the Norwegian and Swedish markets. The rest is landed as smaller raw shrimp for factory processing a shore (~180-250 individuals per kg). The landing price for boiled, fresh shrimp is app. 5 times that of the raw shrimp which together with the catch regulation gives incitement for “high grading” (discarding of smaller shrimp).

The present paper updates available information derived from catch statistics, logbooks and catch sampling from the Norwegian trawl fishery for shrimp in the North Sea and Skagerrak (ICES Div. IIIa and IVa).

Materials and Methods

Logbook data were analysed to show the spatial and temporal distribution of the fishery.

Until 2002 the discards were estimated by the difference in length distribution in commercial landings and in the unprocessed catches of a research survey vessel using commercial-type trawling gear. Due to changes in the survey this method could not be continued. Instead the 2003 and 2004 values were estimated as the average of the estimated discard 1985 to 2002.

Fishing effort was calculated by applying the landings per hour fished as calculated from logbooks to the nominal landings.

Samples for resolving the size distribution of the 2004 catches were not available for analyses.

Results

Spatial and seasonal distribution

The fishery has been conducted mainly in the Norwegian Deeps and Skagerrak in depths of 60 to 500 m (Fig. 2). In 2004 most effort (~30%) was allocated to waters off Egersund (Fig. 2). The fishery took place in all months (Fig. 3) but was most intense in February to July. Fishing effort declined thereafter to a minimum in December.

Landings

Total Norwegian landings increased from 2 000 tons in 1970 to around 7 500 tons in the late 1980s (Fig.4A; Table 1). Landings fluctuated around this level since then with a maximum in 1998 of 9 600 tons and a minimum in 1990 to 1991 of 6 150 tons. However, since 2000 overall landings have increased continuously from about 6 000 tons to 9 000 tons in 2004. In Recent years landings were equally divided between Skagerrak (Div. IIIa) and the Norwegian Deeps (Div. IVa east).

In Skagerrak the Norwegian landings peaked in 1998 at about 6 500 tons, decreased to 3 000 tons in 2001 and increased thereafter to 4 636 tons in 2004. In the Norwegian deeps Landings fluctuated around 3 000 tons in the 1990s after which they increased from 2 550 tons in 2000 to 4 360 tons in 2004 (Fig. 4A; Table 1).

From 2001 to 2004 reported landing have gone from 85% to 105% of the set quotas (Table 1). The overall quota for 2003 was set at 8 040 tons of which 7 715 tons were landed. In 2004 landings increased to 8 998 tons from a quota of 8 530 tons.

Discards

Discard of shrimp may take place in two ways: 1.) At sea, as a result of “high-grading” (discard of smaller and less valuable shrimp to improve the economic return of quotas); 2.) At shore, as a “quality discard” (the processing plants do not accept shrimp smaller than approximately 15 mm cpl).

Estimates of discards at sea for 1996 and 1997 were 400- and 1000 tons respectively (based on Anon., 1998) or approximately 5- and 12% of the catches. Later estimates are not available but may be considered to be at the same order of magnitude. Estimates of discards at shore varied from 2- to 11% of the catches i.e. 200- to 700 tons annually (Table 1).

Effort

Effort data could not be standardised to remove effects of variations in fishing pattern and changes in the composition of the fleet (e.g. Hvingel *et al.*, 2000) due to compulsory encryption of the relevant information in the logbook database.

After a relatively stable 1996 to 2001 period with fishing efforts of around 200 Khr's/year, effort declined to 166 Khr's in 2004 (Fig. 4B). This decrease mainly due to a reduction of effort spent in Div IIIa by almost 50% over that period (Fig. 4B). In 2003 and 2004 an equal amount of about 80 Khr's was allocated to each of the two areas (Table 1).

Overall LPUE increased from 30 kg/hr in 2001 to 60 kg/hr in 2004 (Fig. 4C). The trend was similar for both areas. How much of this increase was due to technical changes in the fishery or fleet composition could not be resolved.

Catch composition

No samples from 2004 were available for analyses.

References

Anon., 2004. Report of the Pandalus assessment working group. ICES CM 2005/ACFM:05, 74 pp.

Anon., 1998. Report of the Pandalus assessment working group. ICES CM 1998/Assess:5, 39 pp.

Table 1. Nominal landings, actual Total Allowable Catch (TAC), estimated discard (discard at sea are not included), Landings per Unit of Effort (LPUE) and number of trawling hours (effort) of the Norwegian shrimp fishery in ICES Div. IIIa and IVa 1970-2005. Landings are in tons (t), LPUE is kg per hours trawled and effort is in thousand hours.

Year	Nominal Landings (t)			TAC (t)	Disc. (t)	LPUE (kg/hr)			Effort (Khr's)		
	Div. IIIa	Div. Iva	Total	Total	Total	Div. IIIa	Div. Iva	Total	Div. IIIa	Div. Iva	Total
1970	982	1107	2089								
1971	1392	1265	2657								
1972	1123	1216	2339								
1973	1415	931	2346								
1974	1186	767	1953								
1975	1463	604	2067								
1976	2541	1051	3592								
1977	2167	960	3127								
1978	1841	692	2533								
1979	2489	594	3083								
1980	3498	1140	4638								
1981	3753	1435	5188								
1982	3877	1545	5422								
1983	3722	1657	5379								
1984	3509	1274	4783		126						
1985	4772	1785	6557		288						
1986	4811	1681	6492		210			36			179
1987	5198	3145	8343		426			36			230
1988	3047	4614	7661		472			31			251
1989	3156	3418	6574		657			24			273
1990	3006	3146	6152		740			27			232
1991	3441	2715	6156		263			30			206
1992	4257	2945	7202		299			35			204
1993	4089	3449	7538		533			31			243
1994	4388	2426	6814		126			31			218
1995	5181	2879	8060		165			32			255
1996	5143	2772	7915		178	43	31	37	119	90	214
1997	5460	3112	8572		591	45	39	40	122	81	212
1998	6519	3092	9611		217	45	40	44	144	78	219
1999	3987	2761	6748		383	32	29	31	125	94	219
2000	3556	2562	6118		392	31	32	31	114	81	195
2001	2959	3952	6911	8140	442	30	34	32	100	118	217
2002	3709	3612	7321	8040	154	36	44	39	104	82	186
2003	3736	3979	7715	8040	*385	46	47	46	82	84	166
2004	4638	4360	8998	8530	*450	60	54	57	77	81	159
2005				8530							

*based on estimated mean discard percentage 1984 to 2002.

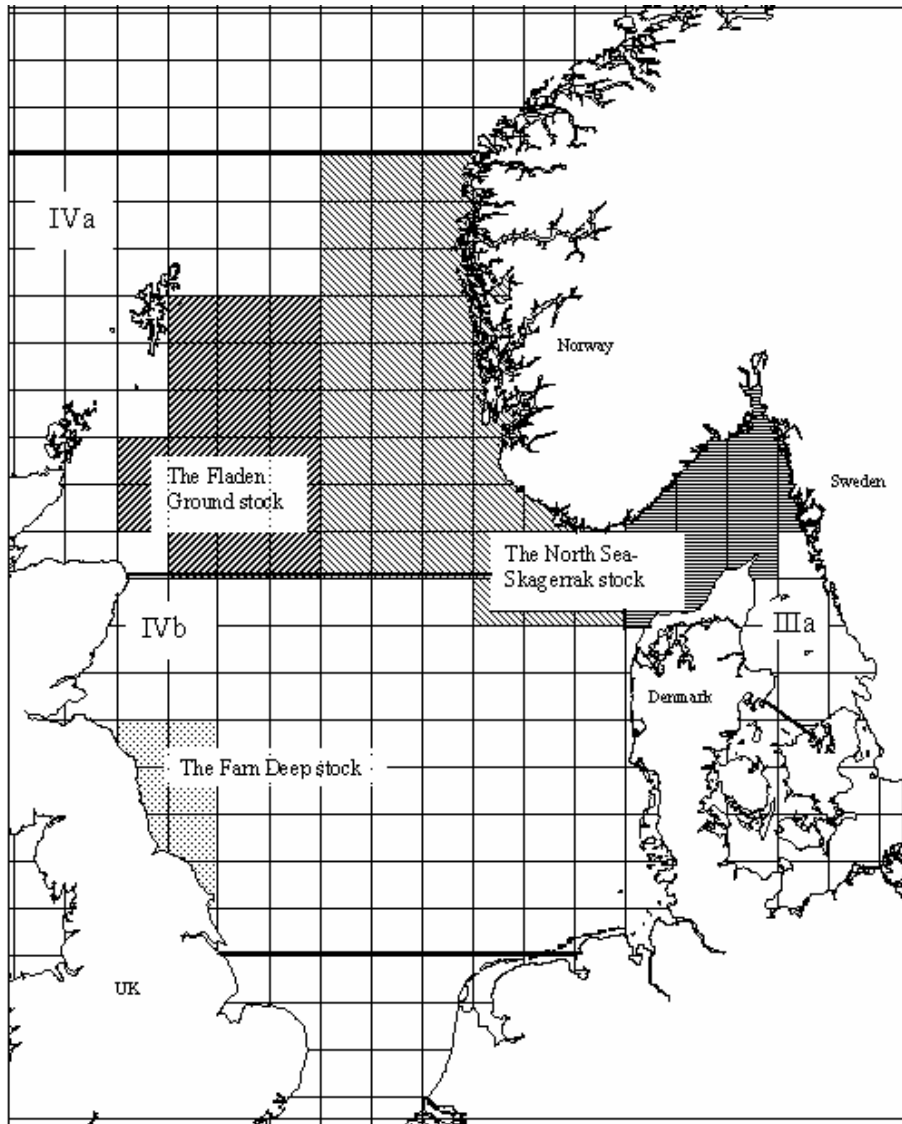


Fig. 1. Distribution of the Northern shrimp (*Pandalus borealis*) the North Sea and Skagerrak and the defined assessment units. Grid is standard “ICES squares”: 0.5° lat. by 2° long. (based on Anon., 2004).

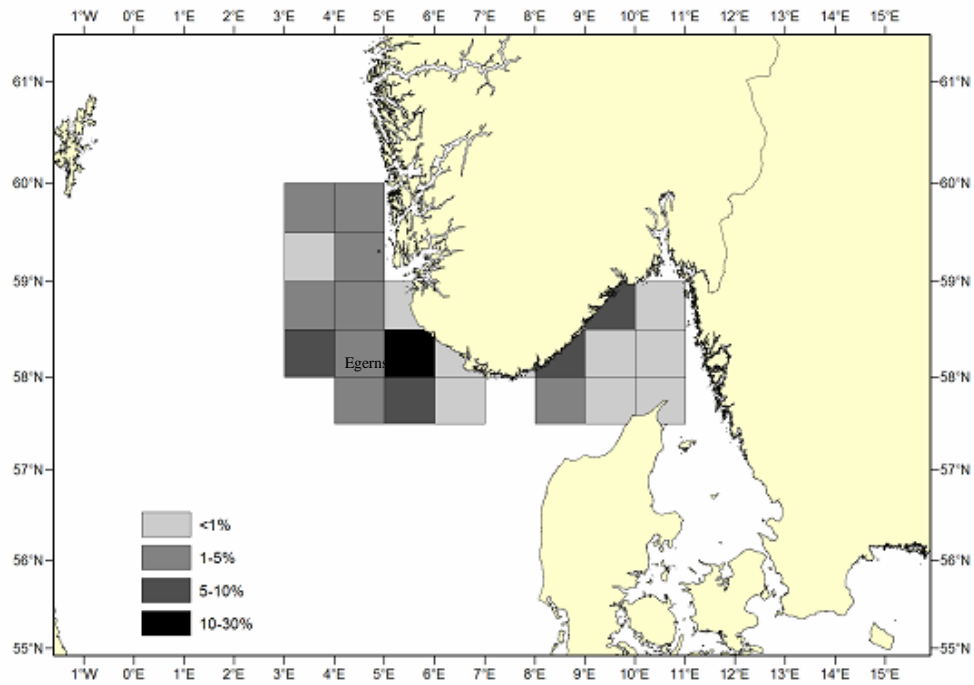


Fig. 2. The distribution of effort (percent trawling hours) in the Norwegian shrimp fishery in the North Sea-Skagerrak in 2004 by statistical squares (0.5° lat. by 2° long.).

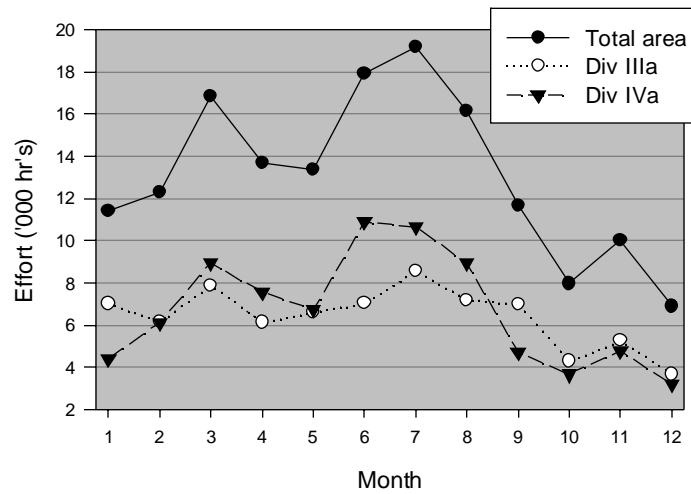


Fig. 3. Monthly distribution of effort (hr's trawled) by the Norwegian shrimp fishery 2004 in ICES Div. IIIa and IVa.

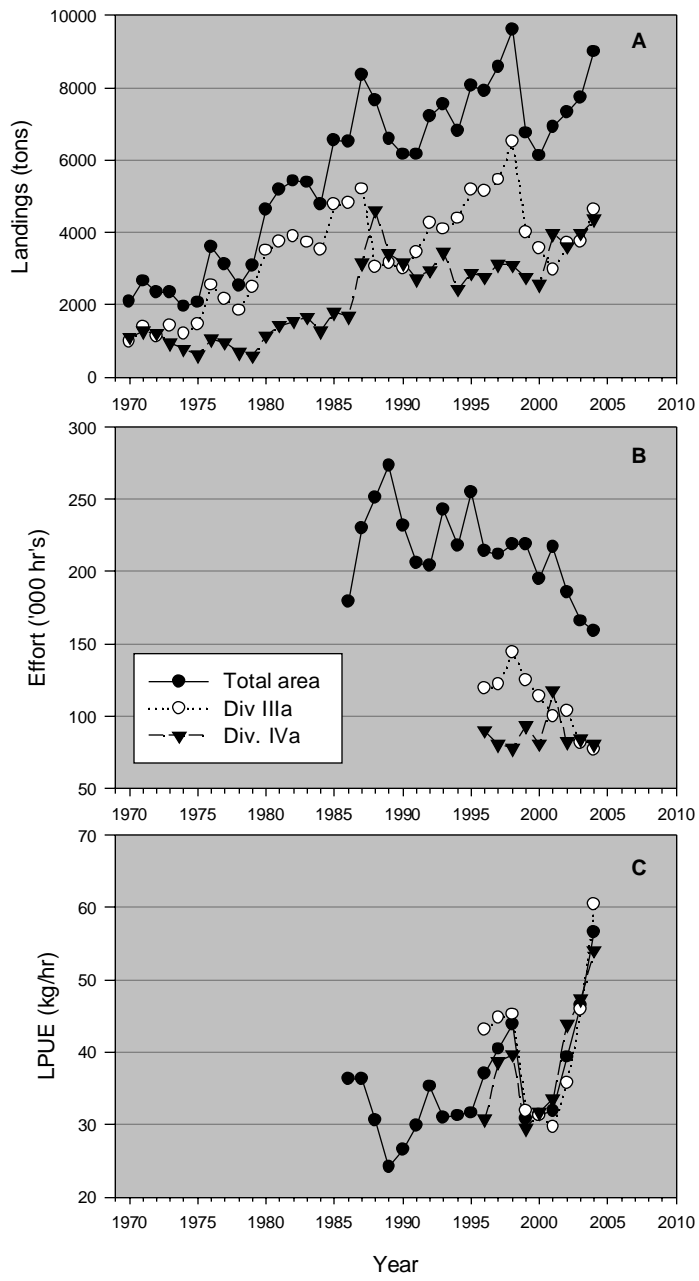


Fig. 4. Landings (A), effort (B) and Landings-Per.Unit-Effort (C) of the Norwegian shrimp fishery in ICES Div IIIa and IVa.