6.4.14 *Nephrops* in Subarea IV (North Sea)

Nephrops are limited to a muddy habitat. This means that the distribution of suitable sediment defines the species distribution and the stocks are therefore assessed as eight separate functional units (Figure 6.4.14.1):

Section	FU no.	Name	ICES area	Statistical rectangles
6.4.14.1	9	Moray Firth	IVa	44-45 E6-E7; 44E8
6.4.14.2	10	Noup	IVa	47E6
6.4.14.3	7	Fladen Ground	IVa	44-49 E9-F1; 45-46E8
6.4.14.4	32	Norwegian Deep	lVa	44-52 F2-F6; 43F5-F7
6.4.14.5	6	Farn Deeps	IVb	38-40 E8-E9; 37E9
6.4.14.6	8	Firth of Forth	IVb	40-41E7; 41E6
6.4.14.7	5	Botney Gut - Silver Pit	IVb,c	36-37 F1-F4; 35F2-F3
6.4.14.8	33	Off Horn Reef	lVb	39-41E4; 39-41E5

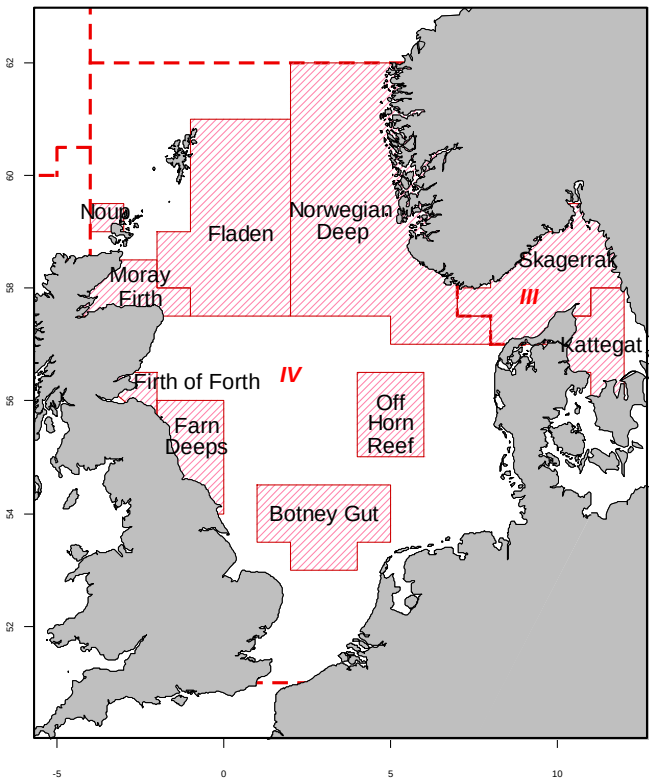

Figure 6.4.14.1 *Nephrops* Functional Units in the North Sea and Skagerrak/Kattegat region (see Section 6.4.13).

State of the stocks

Most stocks appear to be fairly stable in terms of abundance and size composition. Noted exceptions are the Fladen Ground (FU 7) stock which showed a marked increase in abundance and the Farn Deeps (FU 6) stock where the population size dropped in 2007 and unusual changes in the seasonal sex-ratio pattern occurred. Trends in landings of different functional units are shown in Figure 6.4.14.2. Trends according to the North Sea fishers' survey are shown in Figure 6.4.14.3.

Management objectives

No management objectives have been set for these stocks.

Reference points

Precautionary reference points have not been determined for *Nephrops*.

$F_{0.1}$ estimates from a yield-per-recruit analysis based on a combined sex–length cohort analysis (LCA) could be used as an appropriate harvest ratio for *Nephrops* stocks.

Single-stock exploitation boundaries

Given the apparent stability of the stocks, current levels of exploitation and effort appear to be sustainable. ICES generally recommends not to increase effort and catches above the recent average values (2006–2007). An overview of advice for different functional units is presented in Table 6.4.14.1.

Management considerations

There have been important developments in the methodology to assess the status of *Nephrops* stocks. The use of Underwater TV surveys (UWTV) has enabled the development of fishery-independent indicators of abundance. STECF (2005) has suggested that a combination of an absolute abundance estimate from an UWTV survey and a harvest rate based on $F_{0.1}$ from a combined sex–length cohort analysis (LCA) and the mean weight and selection pattern from the commercial fishery could be used to calculate appropriate landings. The approach has been further elaborated and evaluated by an ICES workshop in 2007 (ICES, 2007), and by a peer review in 2008. The conclusion of the peer review was that the use of UWTV surveys for absolute abundance estimates could lead to an overestimation bias due to misidentification of burrows, habitat estimation, and occupancy rate. The amount of overestimation bias could not be specified. ICES has therefore not based the advice for 2009 on the approach indicated above but has used the UWTV survey only as relative indicator of abundance. ICES will organize a follow-up workshop in 2008 or 2009 to further develop the approach to *Nephrops* advice.

Current management of *Nephrops* in Subarea IV (both in terms of TACs and effort) does not provide adequate safeguards to ensure that local effort is sufficiently limited to avoid depletion of resources in Functional Units. In the current situation catches can be taken anywhere in the ICES Subarea and this could imply inappropriate harvest rates from some parts. More importantly, vessels are free to move between grounds, allowing effort to develop on some grounds in a largely uncontrolled way. This appears to have been a particular problem in the Farn Deeps in 2006 where increased vessel activity from other parts of the UK occurred. An overriding management consideration for these stocks is therefore that management should be at the Functional Unit rather than the ICES Subarea level. Management at the Functional Unit level could provide the controls to ensure that catch opportunities and effort are compatible and in line with the scale of the resources in each of the stocks defined by the Functional Units.

ICES has previously presented the advice for *Nephrops* organized by different Management Areas, which were a combination of a few functional units. However, because the Management Areas were not areas used by managers, ICES now presents its advice by Functional Unit within the true management area: ICES Subarea IV.

It is expected that the quality of fishery data available for these stocks will continue to improve. The UK Registration of Buyers and Sellers (since 2006) has led to more accurate landings information from these stocks and within a few years this should improve the basis for assessment and forecasts of catch. Stock monitoring continues, and enhanced work on observer trips on-board commercial vessels should furnish additional data which will be beneficial in developing assessment approaches further.

In general, bycatches of cod in the *Nephrops* fisheries have been fairly small, particularly in recent years in inshore grounds of Subarea IV. However, it is important that emerging year classes should not be subject to mortality as bycatch. The capture of juvenile fish or other species such as haddock is also a problem in some of the Functional Units and discarding of these is a problem in some years. This problem can be addressed with the use of more selective gear and efforts are already being made in Scotland through the Conservation Credits scheme, requiring vessels targeting *Nephrops* to use gear with larger square meshed panels (110 mm). Subject to evaluation of the effectiveness of these measures, further action may be required to reduce bycatch.

The advice is presented separately for each Functional Unit. There are increasing and significant landings from some isolated patches outside the Functional Units, most notably the Devil's Hole area. Table 6.4.14.1 below shows that in 2007 overall landings in Subarea IV were around 24 500 tonnes, similar to landings in 2006. Landings from other rectangles amounted to over 1600 tonnes in 2007. To provide some guidance on appropriate future landings for these areas, the use of average landings of no more than 1400 tonnes (2006–2007) could be considered (Table 6.4.14.1).

Impacts of fisheries on the ecosystem

Trawling for *Nephrops* results in bycatch and discards of other species, including cod, haddock, and whiting.

80 mm is the predominant mesh size used in *Nephrops* fisheries and the resulting discarding of fish can be high. Initiatives are in place to reduce the discard problem with respect to small fish (see Regulations and their effects below).

The high mud content and soft nature of *Nephrops* grounds means that trawling readily marks the seabed, trawl marks remaining visible for some time. Burrowing fauna can be seen re-emerging from freshly trawled grounds, implying that there is some resilience to trawling.

Factors affecting the fisheries and the stock

Regulations and their effects

The introduction of the "buyers and sellers" regulations in 2006 considerably tightened up the levels of reporting for *Nephrops*, and the landings figures since then are considered to be more reliable. Recent increases in landings and lpue may result from the increase in reporting levels and do not necessarily reflect changes to the stock.

There will be a ban on all Scottish boats using multi-trawl gears (3 or more trawls) from April of 2008, limiting the expansion of effective effort.

Days-at-sea regulations have reduced opportunities for directed whitefish fishing. The STECF effort database suggests some effort transfer occurred to the smaller mesh fisheries of the North Sea shortly after the introduction of the regulations; since then effort in these categories has been fairly stable.

The development of a Conservation Credits scheme in Scotland (the major contributor to landings from the Fladen Ground) requires all trawlers to implement more selective gears, including the use of 110 mm square mesh panels in 80 mm gear. This measure should reduce catches (and discards) of small fish, including whiting, haddock, and juvenile cod.

Scientific basis

Data and methods

Assessments of the *Nephrops* Functional Units of Subarea IV utilized a number of approaches, including TV surveys, length composition information, and basic fishery data such as landings and effort. Owing to uncertainties in the accuracy of historic landings and to inaccurate effort figures in some fisheries, increasing attention is paid to survey information and size composition data as an indicator of stock stability.

Information from the fishing industry

Trends according to the North Sea fishers' survey generally indicate stable or increasing abundance of *Nephrops* (Figure 6.4.14.3).

Uncertainties in assessment and forecast

UWTV surveys are used to indicate abundance trends. Since they are based on a standardized fishery-independent survey method, they should give a more accurate indication of abundance trends than lpue data that is subject to uncertainties associated with changes in fishing practices. However, UWTV surveys cannot at this time be used for estimates of absolute abundance (i.e., the actual number or biomass of *Nephrops* in the population) because of uncertainty in the occupancy rate of burrows, misidentification of burrows, and other factors (ICES, 2007).

It would be desirable in the future to have scientifically defensible estimates of absolute abundance based on UWTV surveys and/or other sources of information. ICES will conduct a rigorous evaluation of UWTV surveys with a view toward absolute abundance estimation, including identification of potential research needs, prior to giving advice on these stocks. Depending on the outcome of the evaluation, it may be appropriate to give advice next year rather than in 2010, as would normally be the case.

The calculations of harvest ratio and $F_{0.1}$ are all based on yield-per-recruit analyses and therefore apply to stocks in equilibrium. However, it is unlikely that the *Nephrops* stocks to which the approach has been applied are actually in equilibrium due to variable recruitment. $F_{0.1}$ estimates may vary substantially in subsequent years.

Commercial catch data may have been subject to misreporting. Simulation studies (Dobby *et al.*, 2007) which derived yield-per-recruit curves that do not rely on commercial catch data could be used to provide a more robust method to derive $F_{0.1}$.

Comparison with previous assessment and advice

The indicators used to assess the status of the *Nephrops* stocks are largely the same as in 2006. The advice in 2006 was based on a 15% harvest ratio for several of the *Nephrops* stocks (but 7.5% for Fladen ground), which was in turn based on UWTV surveys interpreted as estimates of absolute abundance. This year, UWTV surveys are used as indicators of relative abundance because they are deemed inappropriate for absolute abundance estimation at this time (see discussion above). For stocks where UWTV surveys are not available, advice is provided on the same basis as in 2006.

Sources of information

Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak, 7–13 May 2008 (ICES CM 2008/ACOM:09).

ICES 2007. Workshop on the Use of UWTV Surveys for Determining Abundance in *Nephrops* Stocks throughout European Waters. WKNEPHTV. ICES CM 2007/ACFM:14.

Dobby, H., Bailey, N., and Campbell, N. 2007. The use of underwater TV surveys in the provision of advice for *Nephrops* stocks around Scotland. ICES CM 2007/O:23.

Laurenson, C. H. 2007. North Sea Stock Survey 2007. NAFC Marine Centre, Shetland, UK.

STECF. 2005. Commission Staff Working Paper. 21st Report of the Scientific, Technical and Economic Committee for Fisheries (Second Plenary Meeting). Brussels, 7–11 November 2005.

Nephrops in Subarea IV. Summary of the advice by Functional Unit plus Other rectangles.

Year	Moray Firth (FU9)	Noup (FU10)	Fladen Ground (FU7)	Nor-wegian Deeps (FU32)	Farn Deeps (FU6)	Firth of Forth (FU8)	Botney Gut-Silver Pit (FU5)	Off Horn's Reef (FU33)	Other rec-tangles [2]	Total advice	Agreed TAC [1]	ICES landings
Mgt Area	MA F		MA G	MA S	MA I		MA H					
1992	~2.4		~2.7		~4.6		0.87			10.6	12.0	9.5
1993	2.4		2.7		4.17		0.87			10.2	12.0	12.7
1994	2.4		5.0		4.17		0.87			12.5	13.0	14.2
1995	2.4		5.0		4.17		0.87			12.5	15.2	14.7
1996	2.4		5.0		4.17		0.87			12.5	15.2	13.7
1997	2.4		5.0		4.17		0.87			12.5	15.2	15.2
1998	2.4		7.0		4.17		1.0			14.6	15.2	13.7
1999	2.4		7.0		4.17		1.0			14.6	15.2	16.5
2000	1.85		9.0		4.17		1.6			16.7	17.2	15.1
2001	1.85		9.0		4.17		1.6			16.7	15.48	15.9
2002	2.0		9.0	1.2	4.17		2.1			18.5	16.623	15.7
2003	2.0		9.0	1.2	4.17		2.1			18.5	16.623	15.6
2004	2.0		12.8	1.5	4.17		2.38			22.9	21.350	18.6
2005	2.0		<12.8	1.5	4.17		2.38			22.9	21.350	21.9
2006	-		-	NA	-		2.38			NA	28.147	24.4
2007	2.4 [3]	0.2	<10.9 [4]	NA	3.5 [3]	1.5 [3]	NA	NA	24.6	NA	26.144	24.6
2008 [5]	2.4	0.2	<10.9	NA	3.5	1.5	NA	NA	9.5	NA	26.144	
2009	< 1.8	< 0.24	< 11.3	--	< 3.0	< 2.5	--	--	< 1.4	NA		

Weights in '000 t.

[1] EU zone of Division IIa and Subarea IV.

[2] Prior to advice for 2009, landings for other rectangles were included in 'Management Areas (MA)'.

[3] Based on a 15% harvest (removal) rate applied to TV survey abundance data.

[4] Based on a 7.5% harvest rate applied to TV abundance data.

[5] Same advice as 2007.

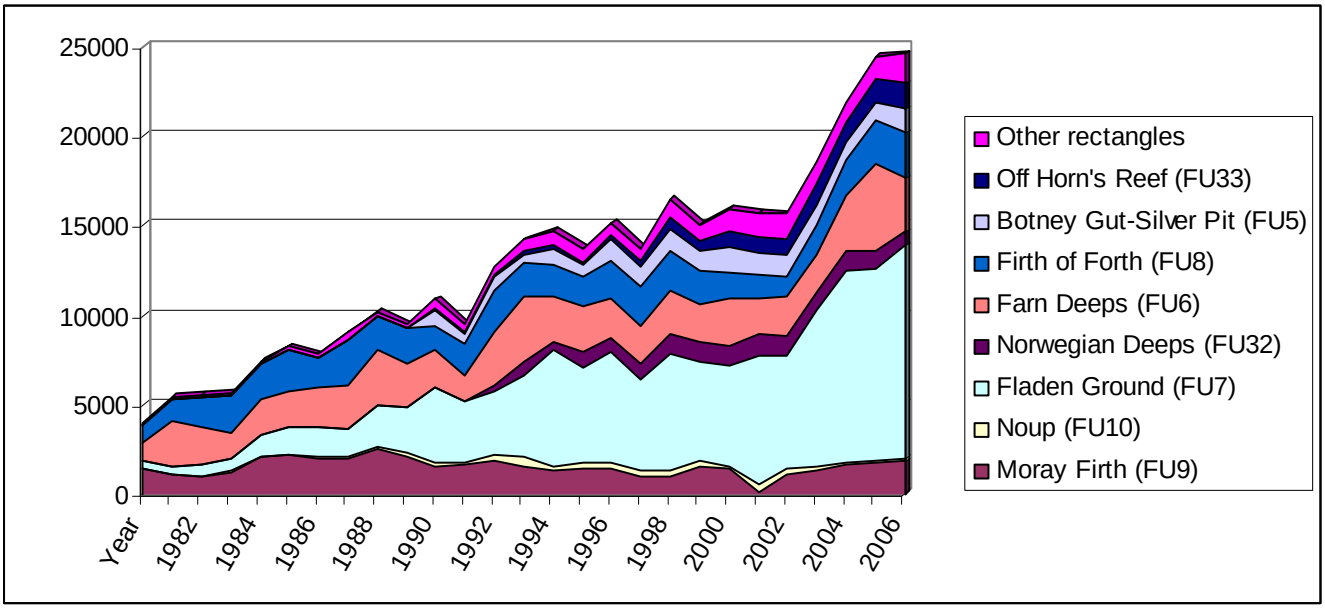

Figure 6.4.14.2 *Nephrops* in Subarea IV. Total landings divided into Functional Units and Other rectangles (tonnes).

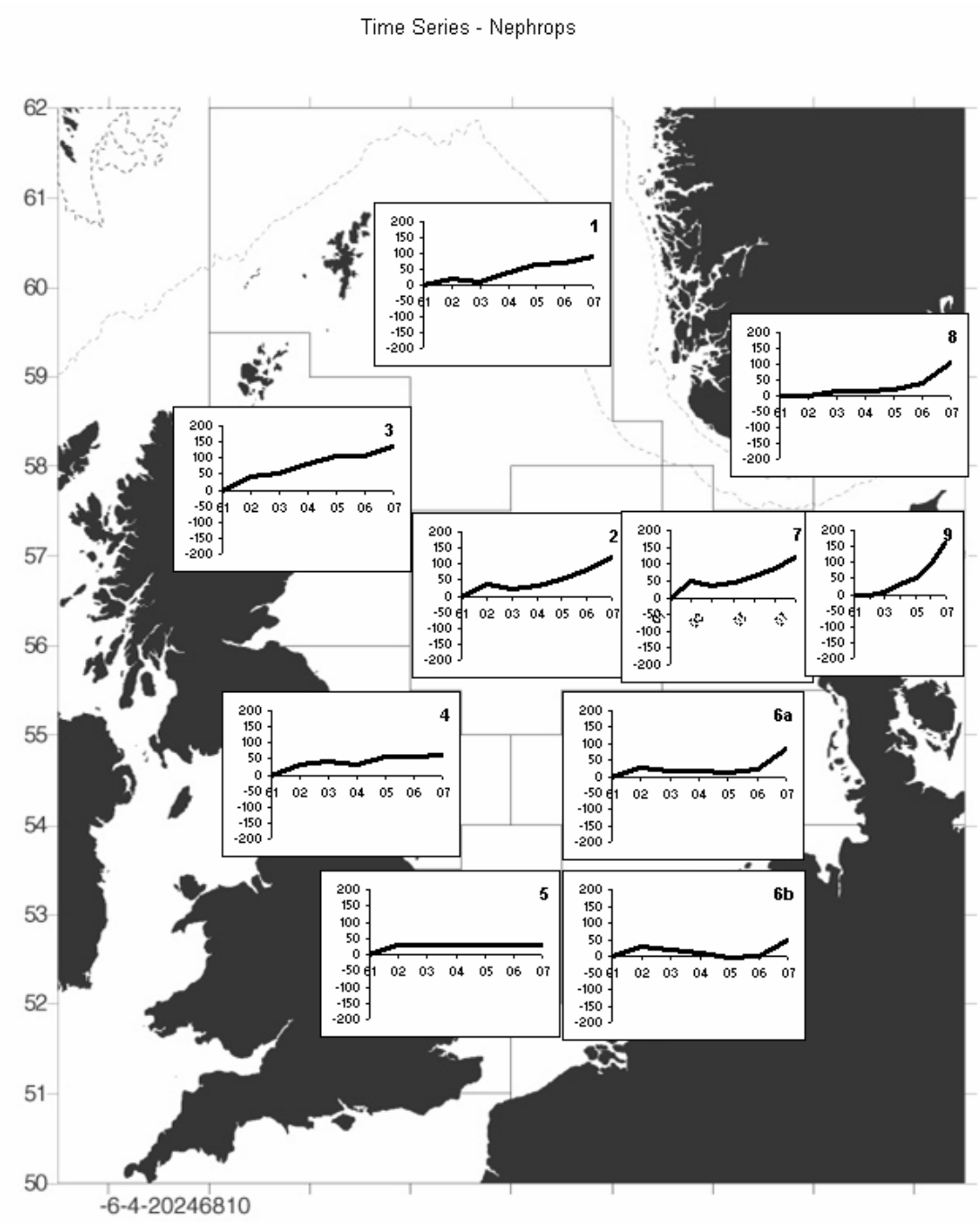

Figure 6.4.14.3 *Nephrops* in Subarea IV. Results of the North Sea Commission fishers' survey.

Table 6.4.14.1 *Nephrops* in Subarea IV. Officially reported landings (tonnes) by Functional Unit plus Other rectangles.

Year	Moray Firth (FU9)	Noup (FU10)	Fladen Ground (FU7)	Norwegian Deeps (FU32)	Farn Deeps (FU6)	Firth of Forth (FU8)	Botney Gut-Silver Pit (FU5)	Off Horn's Reef (FU33)	Other rectangles	Total Landings
1981	1416	36	373		1073	1006			76	3980
1982	1120	19	422		2524	1195			157	5437
1983	940	15	693		2078	1724			101	5551
1984	1170	111	646		1479	2134			88	5628
1985	2081	22	1148		2027	1969			139	7386
1986	2143	68	1543		2015	2263			204	8236
1987	1991	44	1696		2191	1674			195	7791
1988	1959	76	1573		2505	2528			364	9005
1989	2576	84	2299		3098	1886			233	10176
1990	2038	217	2540		2498	1930			222	9445
1991	1519	196	4221		2064	1404	862	74	560	10900
1992	1591	188	3363		1463	1757	612	76	401	9451
1993	1808	376	3493	339	3030	2369	721	160	434	12730
1994	1538	495	4569	755	3684	1850	503	137	703	14234
1995	1297	280	6440	489	2568	1763	869	164	844	14714
1996	1451	344	5218	952	2482	1688	679	77	808	13699
1997	1446	316	6171	760	2189	2194	1149	276	662	15163
1998	1032	254	5136	836	2176	2145	1111	357	694	13741
1999	1008	279	6521	1119	2401	2205	1244	737	988	16502
2000	1541	275	5570	1084	2178	1785	1121	610	900	15064
2001	1403	177	5541	1190	2574	1528	1443	791	1268	15915
2002	118	401	7247	1170	1953	1340	1231	861	1383	15704
2003	1079	337	6294	1089	2245	1126	1144	929	1390	15633
2004	1335	228	8729	922	2152	1658	1070	1268	1224	18586
2005	1605	165	10685	1089	3093	1990	1066	1050	1120	21863
2006	1771	133	10693	1028	4835	2425	986	1292	1249	24412
2007*	1841	155	11910	755	2955	2566	1311	1467	1637	24597

*Provisional.

6.4.14.1 *Nephrops* in Moray Firth (FU 9)

State of the stock

The TV survey estimate of abundance for *Nephrops* in the Moray Firth suggests that the population decreased by around 55% in 2006, but rose again slightly to above the long-term average in 2007. Based on the surveys the stock has been relatively stable since 2002, while length compositions in the catch have been relatively stable for 10 years.

Single-stock exploitation boundaries

Exploitation boundaries in relation to precautionary considerations

The current fishery appears sustainable. Therefore, ICES recommends that *Nephrops* fisheries should not be allowed to increase relative to the past two years (2006–2007). This corresponds to landings of no more than 1800 tonnes for the Moray Firth stock.

Factors affecting the fisheries and the stock

The UK Registration of Buyers and Sellers (since 2006) has led to more accurate landings information from these stocks. Therefore the advice for this stock refers to landings average landings 2006-2007 only and does not use landings data prior to 2006.

In the Moray Firth area the *Nephrops* stock inhabits a single continuous area of muddy sediment extending from north of Fraserburgh to Inverness.

The Moray Firth *Nephrops* ground is located close to the Scottish coast and is exploited almost exclusively by UK vessels. Landings from this fishery are predominantly reported from Scotland, with very small contributions from England in the mid-1990s, but none recently.

Regulations and their effects

Discarding rates averaged over the period 2005 to 2007 for this stock were about 10% by number, or 5% by weight. This represents a marked reduction in discarding rate compared to the average for the period 2003 to 2008. This may arise from the increasing use of larger size meshes in the northern North Sea, although reduction in recruitment may also account for this change.

Changes in fishing technology and fishing patterns

The Moray Firth vessels shifted seasonally from targeting *Nephrops* to targeting squid in 2005 and 2007 (and to a lesser extent in 2006).

Scientific basis

Data and methods

Underwater TV survey estimates are available for 1993–1994 and from 1996 onwards. Length compositions from the commercial fishery are available from 1980.

Information from the fishing industry

The NSCFP stock survey shows a continuous increase in *Nephrops* to the northeast of Scotland since 2001.

Comparison with previous assessment and advice

The advice in 2006 was based on a 15% harvest ratio for several of the *Nephrops* stocks, in turn based on UWTV surveys interpreted as estimates of absolute abundance. This year, UWTV surveys are used as indicators of relative abundance because they are deemed inappropriate for absolute abundance estimation at this time.

Nephrops, Moray Firth (FU 9). Single-stock exploitation boundaries (advice), management, and landings.

Year	ICES advice	Recommended landings Moray Firth (FU9)	Recommended landings FU9+FU10	Agreed TAC[1]	ICES landings[2]
1987					2.0
1988					2.0
1989					2.6
1990					2.0
1991					1.5
1992			~2.4	12.0	1.6
1993			2.4	12.0	1.8
1994			2.4	13.0	1.5
1995			2.4	15.2	1.3
1996	*Status quo* TAC		2.4	15.2	1.5
1997	*Status quo* TAC		2.4	15.2	1.4
1998			2.4	15.2	1.0
1999			2.4	15.2	1.0
2000			1.85	17.2	1.5
2001			1.85	15.48	1.4
2002	Catches to be maintained at the 2000 level		2.0	16.623	1.1
2003	Catches to be maintained at the 2000 level		2.0	16.623	1.1
2004	Catches to be maintained at the 2000 level		2.0	21.350	1.3
2005	Catches to be maintained at the 2000 level		2.0	21.350	1.6
2006	No increase in effort		-	28.147	1.8
2007	No increase in effort, and harvest rate below 15%	2.4	2.64	26.144	1.8
2008	No new advice, same as for 2007	2.4	2.64	26.144	
2009	No increase in effort and recent average landings	< 1.8			

Weights in '000 t.
[1)] EU zone of Division IIa and Subarea IV.
[2)] Does not include discards.

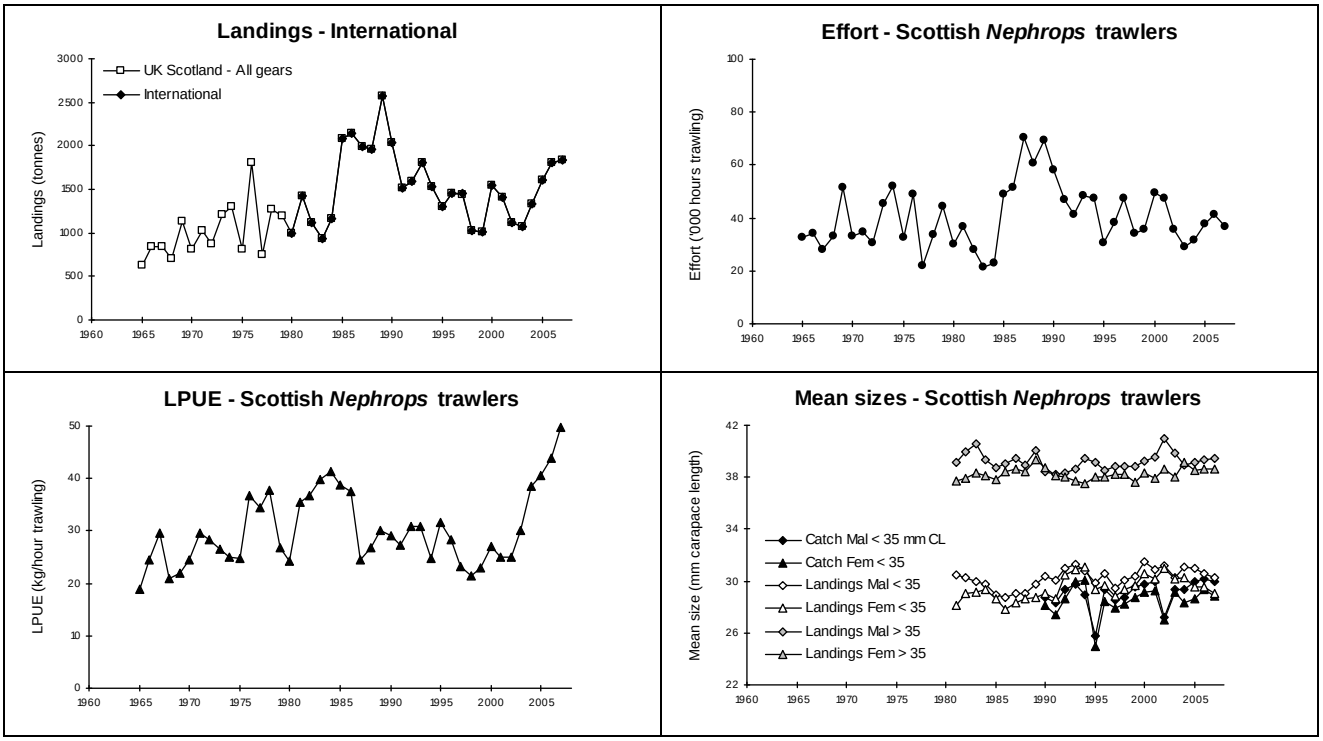

Figure 6.4.14.1.1 *Nephrops*, Moray Firth (FU 9). Long-term trends in landings, effort, lpue, and mean sizes.

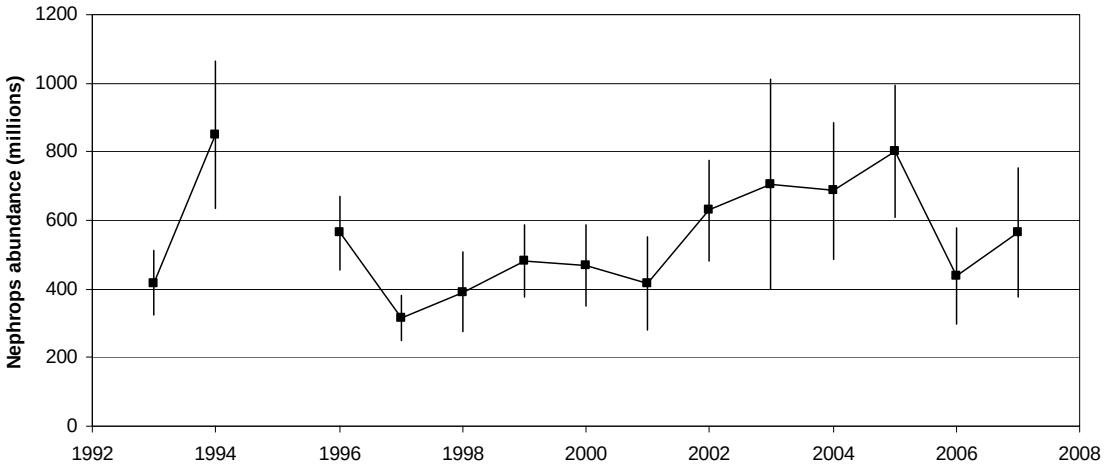

Figure 6.4.14.1.2 *Nephrops*, Moray Firth (FU 9). Time-series of TV survey abundance estimates, with 95% confidence intervals, 1993–2007. Abundance is expressed in number of individuals, but advice is based on interpretation of UWTV surveys indicative of relative abundance.

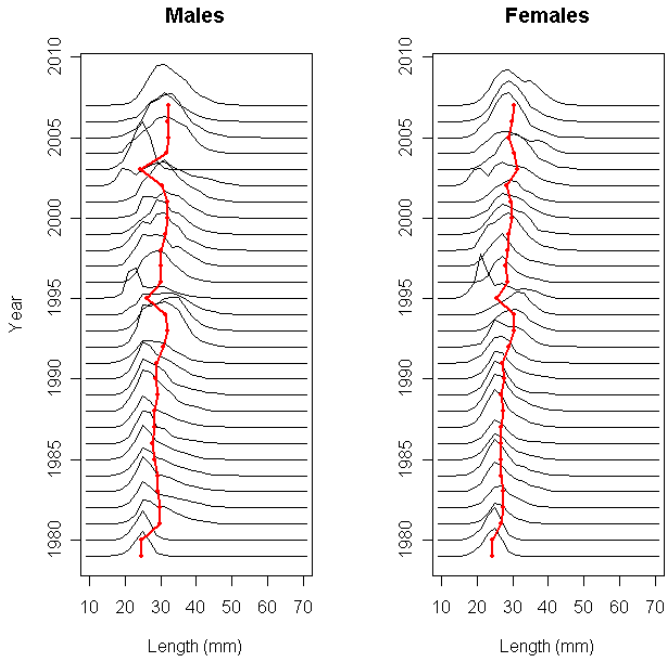

Figure 6.4.14.1.3 *Nephrops*, Moray Firth (FU 9), Catch length frequency distribution and mean sizes (red line).

Table 6.4.14.1.1 *Nephrops*, Moray Firth (FU 9). Nominal landings as officially reported (tonnes).

Year	UK Scotland				UK England	Total **
	Nephrops trawl	Other trawl	Creel	Sub-total		
1981	1298	118	0	1416	0	1416
1982	1034	86	0	1120	0	1120
1983	850	90	0	940	0	940
1984	960	210	0	1170	0	1170
1985	1908	173	0	2081	0	2081
1986	1933	210	0	2143	0	2143
1987	1723	268	0	1991	0	1991
1988	1638	321	0	1959	0	1959
1989	2101	475	0	2576	0	2576
1990	1698	340	0	2038	0	2038
1991	1285	234	0	1519	0	1519
1992	1285	306	0	1591	0	1591
1993	1505	303	0	1808	0	1808
1994	1178	360	0	1538	0	1538
1995	967	330	0	1297	0	1297
1996	1084	364	1	1449	2	1451
1997	1102	343	0	1445	1	1446
1998	739	289	4	1032	0	1032
1999	813	193	2	1008	0	1008
2000	1344	194	3	1541	0	1541
2001	1188	213	2	1403	0	1403
2002	884	232	2	1118	0	1118
2003	874	194	11	1079	0	1079
2004	1223	103	9	1335	0	1335
2005	1526	64	12	1602	3	1605
2006	1718	73	11	1802	1	1803
2007	1818	16	6	1840	2	1843

* provisional na = not available

** There are no landings by other countries from this FU

6.4.14.2 *Nephrops* in Noup (FU 10)

State of the stock

The lpue indicator is increasing and mean length in the catches is stable. Current levels of exploitation appear to be sustainable.

Single-stock exploitation boundaries

Exploitation boundaries in relation to precautionary considerations

Given the apparent stability of the stock, current levels of exploitation and effort appear to be sustainable. ICES maintains the previous advice (based on the average landings 2003–2005) for the Noup fishery, i.e. less than 240 t. This amount is almost identical to the long-term average for the time-series.

Factors affecting the fisheries and the stock

In the Noup area the *Nephrops* stock inhabits a single continuous area of muddy sediment extending from north of Fraserburgh to Inverness.

Scientific basis

Data and methods

Stock status is based on lpue information and mean length in the commercial landings. Underwater TV survey estimates are available for 1993 and 1999, and for 2006 and 2007. Length compositions are available intermittently from 1996.

Information from the fishing industry

The NSCFP stock survey shows a continuous increase in *Nephrops* to the northeast of Scotland since 2001.

Uncertainties in assessment and forecast

There are concerns over effort data because of possible changes in selectivity or gear efficiency leading to "technological creeping". Lpue may be affected by changes in catchability due to sudden changes in the environmental conditions.

Comparison with previous assessment and advice

The advice has the same basis as in 2006.

Nephrops, Noup (FU 10). Single-stock exploitation boundaries (advice), management, and landings.

Year	ICES advice	Recommended landings Noup (FU10)	Recommended landings FU9+FU10	Agreed TAC[1)]	ICES landings [2)]
1987					0.04
1988					0.08
1989					0.08
1990					0.22
1991					0.19
1992			~2.4	12.0	0.19
1993			2.4	12.0	0.38
1994			2.4	13.0	0.50
1995			2.4	15.2	0.28
1996	*Status quo* TAC		2.4	15.2	0.34
1997	*Status quo* TAC		2.4	15.2	0.32
1998			2.4	15.2	0.25
1999			2.4	15.2	0.28
2000			1.85	17.2	0.28
2001			1.85	15.48	0.18
2002	Catches to be maintained at the 2000 level		2.0	16.623	0.40
2003	Catches to be maintained at the 2000 level		2.0	16.623	0.34
2004	Catches to be maintained at the 2000 level		2.0	21.350	0.23
2005	Catches to be maintained at the 2000 level		2.0	21.350	0.17
2006	No increase in effort		-	28.147	0.13
2007	No increase in effort, and recent average landings	0.24	2.64	26.144	0.15
2008	No new advice, same as for 2007	0.24	2.64 [3)]	26.144	
2009	No increase in effort, and average landings 2003–2005	< 0.24			

Weights in '000 t.
[1)] EU zone of Division IIa and Subarea IV.
[2)] Does not include discards.
[3)] Based on a 15% harvest rate applied to TV survey abundance data. Includes Moray Firth (FU 9).

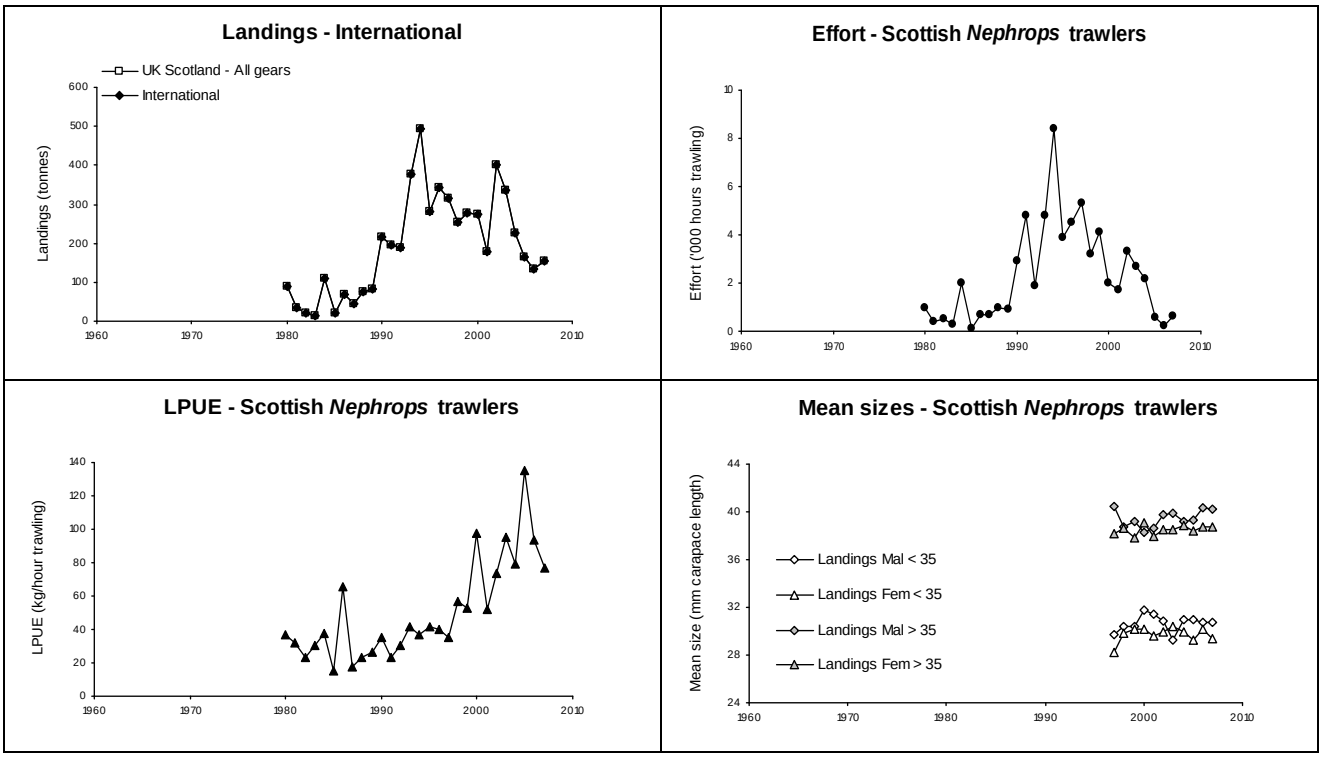

Figure 6.4.14.2.1 *Nephrops*, Noup (FU 10). Long-term trends in landings, effort, lpue, and mean sizes.

Table 6.4.14.2.1 *Nephrops*, Noup (FU 10). Nominal landings as officially reported (tonnes).

Year	UK Scotland				Total **
	Nephrops trawl	Other trawl	Creel	Sub-total	
1981	13	23	0	36	36
1982	12	7	0	19	19
1983	9	6	0	15	15
1984	75	36	0	111	111
1985	2	20	0	22	22
1986	46	22	0	68	68
1987	12	32	0	44	44
1988	23	53	0	76	76
1989	24	61	0	84	84
1990	101	116	0	217	217
1991	110	86	0	196	196
1992	56	130	0	188	188
1993	200	176	0	376	376
1994	308	187	0	495	495
1995	162	118	0	280	280
1996	180	164	0	344	344
1997	185	130	1	316	316
1998	183	71	0	254	254
1999	211	68	0	279	279
2000	196	79	0	275	275
2001	89	88	0	177	177
2002	244	157	0	401	401
2003	258	79	0	337	337
2004	175	53	0	228	228
2005	81	84	0	165	165
2006	44	89	0	133	133
2007*	47	108	0	155	155

* provisional na = not available

** There are no landings by other countries from this FU

6.4.14.3 *Nephrops* Fladen Ground (FU 7)

State of the stock

TV survey estimates of abundance for *Nephrops* on the Fladen Ground indicate that the stock has fluctuated without trend since 1992. Stock abundance rose in 2006 and 2007 to reach the highest estimated in the time-series. Indicators of stock status based on size composition show a stable situation and the size range has not decreased through time. The mean size of *Nephrops* >35 mm carapace length (CL) has fluctuated slightly without trend over the time-series. For *Nephrops* <35 mm CL a slight decline in mean size has been observed over the last couple of years, which is probably associated with increased recruitment leading to increased abundance.

Single-stock exploitation boundaries

Exploitation boundaries in relation to precautionary considerations

The current fishery appears sustainable. Therefore, ICES recommends that *Nephrops* fisheries should not be allowed to increase relative to the past two years (2006–2007). This corresponds to landings of no more than 11 300 tonnes for the Fladen stock.

Management considerations

The UK Registration of Buyers and Sellers (since 2006) has led to more accurate landings information from these stocks. Therefore the advice for this stock refers to landings average landings 2006-2007 only and does not use landings data prior to 2006.

In 2005, a high abundance of 0-group cod was recorded in Scottish surveys near to this ground. This year class of cod has subsequently contributed to a slightly improved cod stock biomass and efforts are being made to avoid the capture of cod so that this stock can build further. The Scottish industry is operating under a Conservation Credits scheme and has implemented improved selectivity measures in gears targeting *Nephrops* and real-time closures with a view to reducing unwanted bycatch of cod and other species. Given that the year class is now three years old and the cod are growing quite large, additional gear-related measures will require substantial improvements in selectivity or will require species selection devices to remove cod from catches.

Factors affecting the fisheries and the stock

The TV survey is conducted over the main part of the ground, representing an area of around 28 200 km^2 of suitable mud substrate (the largest ground in Europe). The Fladen Ground Functional Unit contains several patches of mud to the north of the ground, bringing the overall area of substrate to 30 633 km^2. This area is not surveyed but would add to the abundance estimate.

In the Fladen area the *Nephrops* stock is restricted to a generally continuous area of muddy sediments extending from 57°30'N to 60°N, and from 1°W to 1°30'E, with other smaller patches to the north. The Fladen Ground is the largest known *Nephrops* ground where fishing activity can shift spatially so that effort may be minimized on parts of the ground.

The fleet fishing the Fladen Ground for *Nephrops* comprises approximately 100 trawlers, which are predominantly Scottish (> 97%), based along the Scottish NE coast.

Nearly three quarters of the landings are made by single-rig vessels and one-quarter by twin-rig vessels. 80 mm mesh is the commonest mesh size. Nearly 40% of the *Nephrops* landings at Fladen are reported as bycatch, in fisheries which may be described as mixed.

Cod has been identified as a predator of *Nephrops* in some areas, and the generally low level of the cod stock is likely to have resulted in reduced predation.

The effects of regulations

The minimum landing size for *Nephrops* on the Fladen Ground is 25 mm CL. Discarding takes place at sea, but fewer undersized animals are caught here and proportionally fewer need to be discarded than in other areas. Discarding rates averaged over the period 2005 to 2007 for this stock were 18% by number, or 11% by weight.

Changes in fishing technology and fishing patterns

In the early years of the fishery, effort was primarily directed to a region that could be reached within 12 hours steaming from ports along the NE coast of Scotland. In recent years, logbook information and GPS loggers show that vessels are fishing more widely over the ground, including to the far eastern and northern edges of the extensive mud area. High fuel prices may limit steaming to some of these areas in 2008.

There has been an increasing focus on improving the product quality of Fladen *Nephrops*, including reducing the time from capture to landing and concentrating more on the 'whole' animal market rather than tails.

Vessels which participate in this fishery also provide guard duty services to the oil industry. During 2007 a number of vessels were involved in this activity.

Scientific basis

Data and methods

The stock trends are based on an UWTV survey, mean length in the commercial landings, and lpue information. The UWTV survey of the Fladen grounds is available for 1992–1995 and from 1997 onwards. Regular sampling of landed and discarded *Nephrops* takes place and provides length composition data.

Information from the fishing industry

The NSCFP stock survey shows an increase in *Nephrops* between 2001 and 2002, a slight decrease to 2003, and a marked increase since then (Figure 6.4.14.3).

Uncertainties in assessment and forecast

The trends in abundance observed in the UWTV survey are not reflected in lpue data or in the mean size data. This may be due to the short time-series of discard data or to spatial changes in the fishery.

Comparison with previous assessment and advice

The advice in 2006 was based on a 7.5% harvest ratio for several of the *Nephrops* stocks based on UWTV surveys interpreted as estimates of absolute abundance. This year, UWTV surveys are used as indicators of relative abundance because they are deemed inappropriate for absolute abundance estimation at this time.

Nephrops, Fladen (FU 7). Single-stock exploitation boundaries (advice), management, and landings.

Year	ICES advice	Recommended Landings	Agreed TAC[1]	ICES Landings[2]
1989				2.3
1990				2.5
1991				4.2
1992		~2.7	12.0	3.4
1993		2.7	12.0	3.5
1994		5.0	13.0	4.6
1995		5.0	15.2	6.4
1996		5.0	15.2	5.2
1997		5.0	15.2	6.2
1998		7.0	15.2	5.1
1999		7.0	15.2	6.5
2000		9.0	17.2	5.6
2001		9.0	15.48	5.5
2002		9.0	16.623	7.2
2003		9.0	16.623	6.3
2004		12.8	21.350	8.7
2005		<12.8	21.350	10.7
2006	No increase of effort	-	28.147	10.8
2007	No increase in effort and harvest rate below 7.5%	<10.9	26.144	11.9
2008	No new advice, same as for 2007	<10.9	26.144	
2009	No increase in effort and recent average landings	<11.3		

Weights in '000 t.
[1)] EU zone Division IIa and Subarea IV.
[2)] Does not include discards.

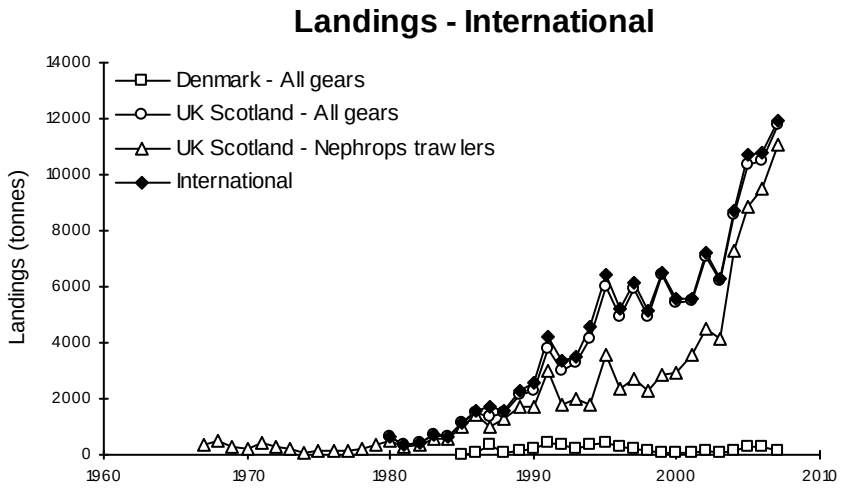

Figure 6.4.14.3.1 *Nephrops*, Fladen (FU 7). Long-term landings in tonnes.

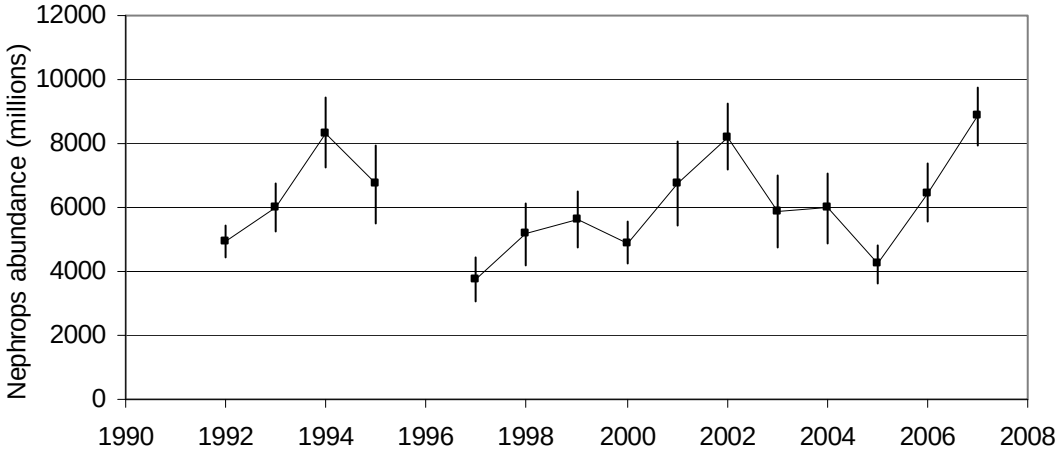

Figure 6.4.14.3.2 *Nephrops*, Fladen (FU 7). Time-series of TV survey abundance estimates, with 95% confidence intervals, 1992–2005. Abundance is expressed in number of individuals, but advice is based on interpretation of UWTV surveys indicative of relative abundance.

Table 6.4.14.3.2 *Nephrops*, Fladen (FU 7). Total landings (tonnes).

Year	Denmark	UK Scotland			Other countries **	Total
		Nephrops trawl	Other trawl	Sub-total		
1981	0	304	69	373	0	373
1982	0	382	40	422	0	422
1983	0	548	145	693	0	693
1984	0	549	97	646	0	646
1985	7	1016	125	1141	0	1148
1986	50	1398	95	1493	0	1543
1987	323	1024	349	1373	0	1696
1988	81	1306	186	1492	0	1573
1989	165	1719	415	2134	0	2299
1990	236	1703	598	2301	3	2540
1991	424	3024	769	3793	6	4223
1992	359	1794	1179	2973	31	3363
1993	224	2033	1233	3266	3	3493
1994	390	1817	2356	4173	6	4569
1995	439	3569	2428	5997	4	6440
1996	286	2338	2592	4930	2	5218
1997	235	2713	3221	5934	2	6171
1998	173	2291	2672	4963	0	5136
1999	96	2860	3549	6409	16	6521
2000	103	2915	2546	5461	6	5570
2001	64	3539	1936	5475	2	5541
2002	173	4513	2546	7059	15	7247
2003	82	4175	2033	6208	4	6294
2004	136	7274	1319	8593	0	8729
2005	321	8849	1514	10363	0	10684
2006	283	9469	1028	10497	2	10782
2007*	119	11054	734	11788	0	11907

* provisional na = not available

** Other countries includes Belgium, Norway and UK England

6.4.14.4 *Nephrops* in Norwegian Deeps (FU 32)

State of the stock

Landings per unit effort (lpue) have been relatively stable over the last 14 years and suggest that current levels of exploitation are sustainable. A slight increase in mean size in the catches in 2007 could indicate a reduced exploitation pressure.

Single-stock exploitation boundaries

Exploitation boundaries in relation to precautionary considerations

The current fishery appears sustainable. Therefore, ICES recommends that effort should not be allowed to increase.

Management considerations

It could be that only part of the stock is exploited at present. Sediment maps for this area indicate that there are possibilities to let the fishery expand into new grounds, which have scarcely been fished to date.

Recent trends in overall size distribution in the catches indicate that the *Nephrops* stock in the Norwegian Deep is not overexploited. The trend in lpue does not indicate any decline in stock abundance. ICES concludes that the level of exploitation of this stock is sustainable. Recent average landings (2002–2007) have been approximately 1000 t.

Factors affecting the fisheries and the stock

The stock is mainly exploited by Danish vessels (85–90% of the landings from FU 32). During the last five years, landings have fluctuated between 750 and 1100 t. The Danish lpue has fluctuated around a mean of 200 kg day^{-1} for the last 14 years. Mean sizes in commercial catches are high compared to neighbouring areas (Skagerrak and Kattegat).

Regulations and their effects

The EU fisheries are managed by a separate TAC for this area, which in 2007 was 1300 t. The TAC has not been taken in the past two years. The minimum legal size is 40 mm CL.

Due to changes in mesh size regulations in the Norwegian zone of the northern North Sea in 2002, there was a switch to increasing Danish effort targeting *Nephrops* in the mixed fisheries in the Norwegian Deep. Trawls with mesh sizes down to 70 mm are legal, but require square meshes in the codend. In the Norwegian fisheries, there has been a change in the most commonly used mesh size. In 1999, 90% of the vessels used 70–80 mm trawls according to the logbooks. In 2000–2005 small-meshed trawls (70–80 mm) taking 17% of the *Nephrops* landings performed 22% of the trawling hours.

Scientific basis

Data and methods

The perception of the stock status is based on Danish lpue and mean size data.

Information from the fishing industry

Logbook data from Norwegian *Nephrops* trawlers are available for 2001–2005 and represent 15–40% of the international landings. The data are not suitable for lpue analysis.

The NSCFP stock survey shows an increase in *Nephrops* between 2001 and 2002, a slight decrease to 2003, and a marked increase since then (Figure 6.4.14.3). The 2007 index is the highest in the series. This supports the suggestion of an increase in abundance for this area. There are no indications of changes in the levels of discards or recruits.

Uncertainties in assessment and forecast

There are concerns over effort data because of possible changes in selectivity or gear efficiency leading to "technological creeping". Lpue may be affected by changes in catchability due to sudden changes in the environmental conditions.

Discards could reflect the strength of the recruitment, but are also dependent on selectivity of the gear and on discarding practices. Trends in mean size of the catch are difficult to interpret without information on changes in the fishing pattern and practices.

Comparison with previous assessment and advice:

There has been no change in the perception of the stock or the basis for the advice.

Nephrops in the Norwegian Deep (FU 32). Single-stock exploitation boundaries (advice), management, and landings.

Year	ICES advice	Recommended Landings	TAC agreed	ICES landings
1987				< 0.1
1988				< 0.1
1989				< 0.1
1990				0.2
1991				0.2
1992				0.2
1993				0.3
1994				0.8
1995				0.5
1996				1.0
1997				0.8
1998				0.8
1999				1.1
2000				1.1
2001				1.2
2002		1.2	No TAC agreed	1.2
2003		1.2	No TAC agreed	1.1
2004		1.5	1.0	0.9
2005		1.5	1.0	1.1
2006	No increase in effort		1.3	1.0
2007	No increase in effort		1.3	0.8
2008	No new advice, same as for 2007		1.3	
2009	No increase in effort			

Weights in ‘000 t. Norwegian zone of Subarea IV.

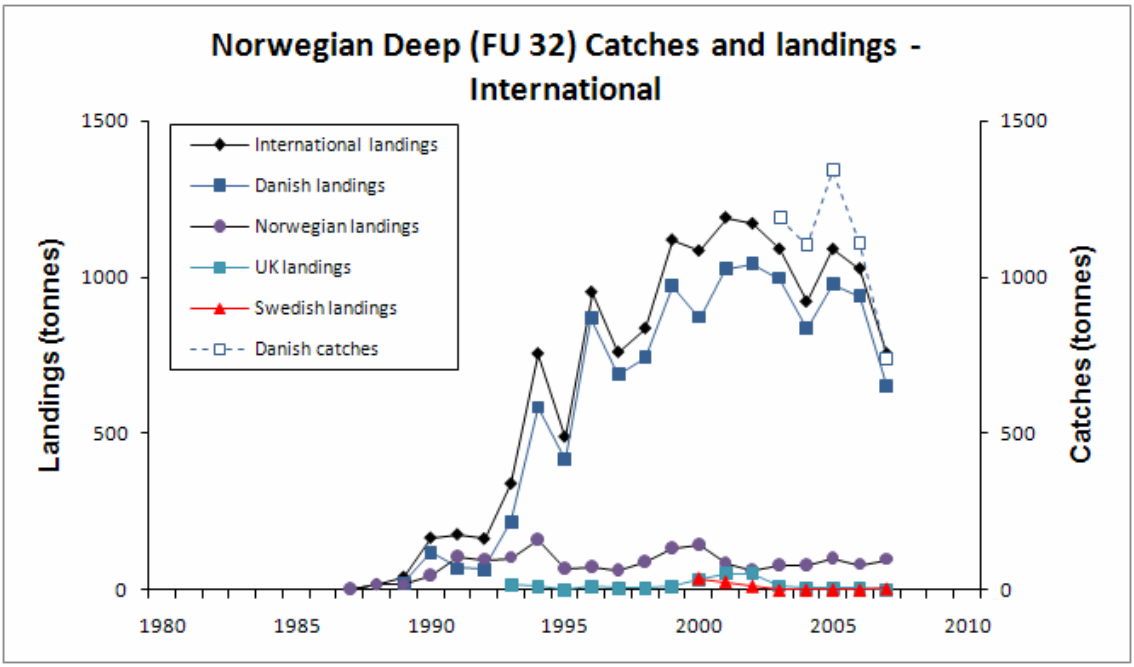

Figure 6.4.14.4.1 *Nephrops* in the Norwegian Deep (FU 32). Landings by country and total international.

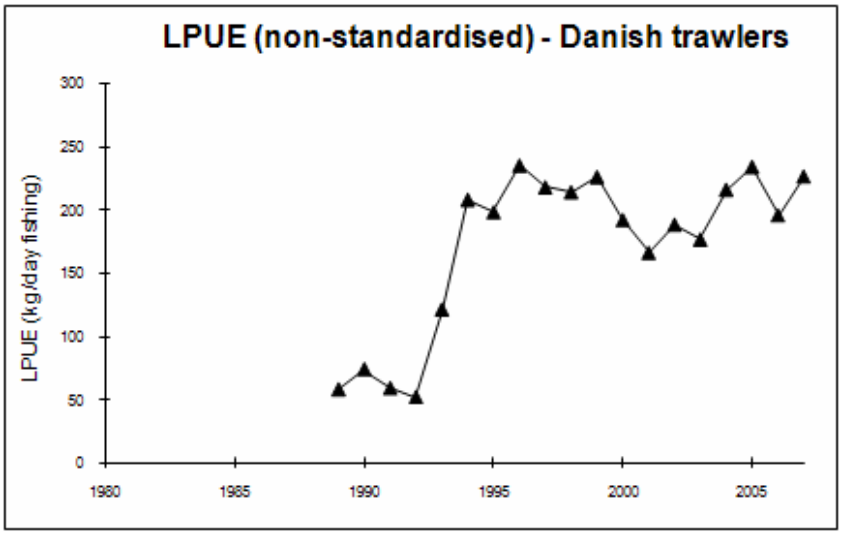

Figure 6.4.14.4.2 *Nephrops* in the Norwegian Deep (FU 32). Non-standardized Danish lpue.

Table 6.4.14.4.1 *Nephrops* in the Norwegian Deep (FU 32): Landings (tonnes) by country and total international.

Year	Denmark	Norway			Sweden	UK	Total
		Trawl	Creel	Sub-total			
1993	220	102	1	103		16	339
1994	584	161	0	161		10	755
1995	418	68	1	69		2	489
1996	868	73	1	74		10	952
1997	689	56	8	64		7	760
1998	743	88	1	89		4	836
1999	972	119	15	134		13	1119
2000	871	143	0	143	37	33	1084
2001	1026	72	13	85	26	53	1190
2002	1043	42	21	63	13	52	1171
2003	996	68	11	79	1	14	1090
2004	835	72	8	80	1	6	922
2005	979	89	13	102	2	6	1089
2006	939	62	19	81	1	6	1027
2007*	652	77	20	97	5	1	755

* provisional

6.4.14.5 *Nephrops* in Farn Deeps (FU 6)

State of the stock

The TV survey and lpue data indicate a decline in abundance from the highest estimate in the time-series in 2006 to levels comparable to 1997 and 2002. Mean length in the catches has increased which could indicate that recruitment in 2007 is low, or it could indicate a reduction in fishing mortality. However, there is no apparent trend over the available time-series of relative abundance and mean length and the stock appears to be stable.

Single-stock exploitation boundaries

Exploitation boundaries in relation to precautionary considerations

ICES recommends that the *Nephrops* fisheries should not be allowed to increase relative to 2007. This corresponds to landings of no more than 3000 t for the Farn Deeps stock.

Management considerations

The UK Registration of Buyers and Sellers (since 2006) has led to more accurate landings information from this stock. The available indices point to the stock in 2007 having been reduced to a lower level following the high abundances in 2005–2006. Latest recruitment signals are low and landings reported in 2006 were the highest in the time-series. Therefore the advice for this stock refers to landings in 2007 only and does not use landings data prior to 2007.

All available indices point to the stock in 2007 having been reduced to a low level following the high abundances in 2005–2006. Latest recruitment signals are low. This is consistent with the industry's perception of the stock.

Management measures for this stock need to be more restrictive than currently achieved through the TAC regulation covering the whole of Subarea IV.

Increases in abundance in other FUs (i.e. Moray Firth and the Fladen grounds) are likely to translate to increases in TAC, increasing the risk of higher effort being deployed in this FU. The increasing cost of fuel combined with the relative coastal proximity of this ground may result in it attracting additional fishing effort, which would be inadvisable given the current low level of the stock.

Factors affecting the fisheries and the stock

High effort in 2005–2006 coupled with an unexplained shift in sex ratio are likely to be responsible for the change in stock status. The high ratio of females in the catches of the 2006/2007 fishery indicates that they were not incubating eggs in their burrows. This in turn may result from male abundance being too low for effective reproduction.

Changes in fishing technology and fishing patterns

Increases in the numbers of vessels using twin-rig gears observed in this area are likely to have increased the effective fishing power per kW hour.

Poor catch rates during the 2007–2008 season resulted in several Scottish and Northern Irish vessels leaving the fishery early.

Scientific basis

Data and methods

The UWTV survey has been conducted since 2002. Potential bias in survey design has been detected and accounted for in the assessment this year.

Length composition data from catch and discard sampling programmes have been used from 2002 to estimate the length composition of landings. Data prior to 2002 were raised using landings sampling due to insufficient discard sampling in this period.

Information from the fishing industry

The North Sea Stock Survey of 2007 still suggested a slight improvement in the stock from 2005 to 2006. This could be due to the unusually high availability of females. All available indices point to the stock in 2007 having been reduced to a low level following the high abundances in 2005–2006. Latest recruitment signals are low. This is consistent with the industry's perception of the stock.

Uncertainties in assessment and forecast

Direct landings sampling is likely to have missed portions of the landings landed as tails (as opposed to whole), leading to a significant overestimate of discarding above MLS.

Comparison with previous assessment and advice

The perception of the state of the stock has not changed since the assessment in 2006. The indicators show that the stock has been reduced from a relatively high abundance in the two years since the last assessment, but it is comparable to the beginning of the decade.

The advice in 2006 was based on a 15% harvest ratio for several of the *Nephrops* stocks based on UWTV surveys interpreted as estimates of absolute abundance. This year, UWTV surveys are used as indicators of relative abundance because they are deemed inappropriate for absolute abundance estimation at this time.

Nephrops Farn Deeps (FU 6). Single-stock exploitation boundaries (advice), management, and landings.

Year	ICES advice	Recommended landings Farn Deeps (FU6)	Recommended landings FU6+FU7	Agreed TAC[1]	ICES Landings[2]
1987					2.2
1988					2.5
1989					3.1
1990					2.5
1991					2.1
1992			~4.6	12.0	1.5
1993			4.17	12.0	3.0
1994			4.17	13.0	3.7
1995			4.17	15.2	2.6
1996			4.17	15.2	2.5
1997			4.17	15.2	2.2
1998			4.17	15.2	2.2
1999			4.17	15.2	2.4
2000			4.17	17.2	2.2
2001			4.17	15.48	2.6
2002			4.17	16.623	2.0
2003			4.17	16.623	2.2
2004			4.17	21.350	2.2
2005			4.17	21.350	3.1
2006	No increase in effort		-	28.147	4.9
2007	No increase in effort, harvest rate <15%	3.5	5.0	26.144	3.0
2008	No new advice, same as for 2007	3.5	5.0	26.144	
2009	No increase in effort and landings (2007)	< 3.0			

Weights in '000 t.
[1)] EU Zone of Division IIa and Subarea IV.
[2)] Does not include discards.

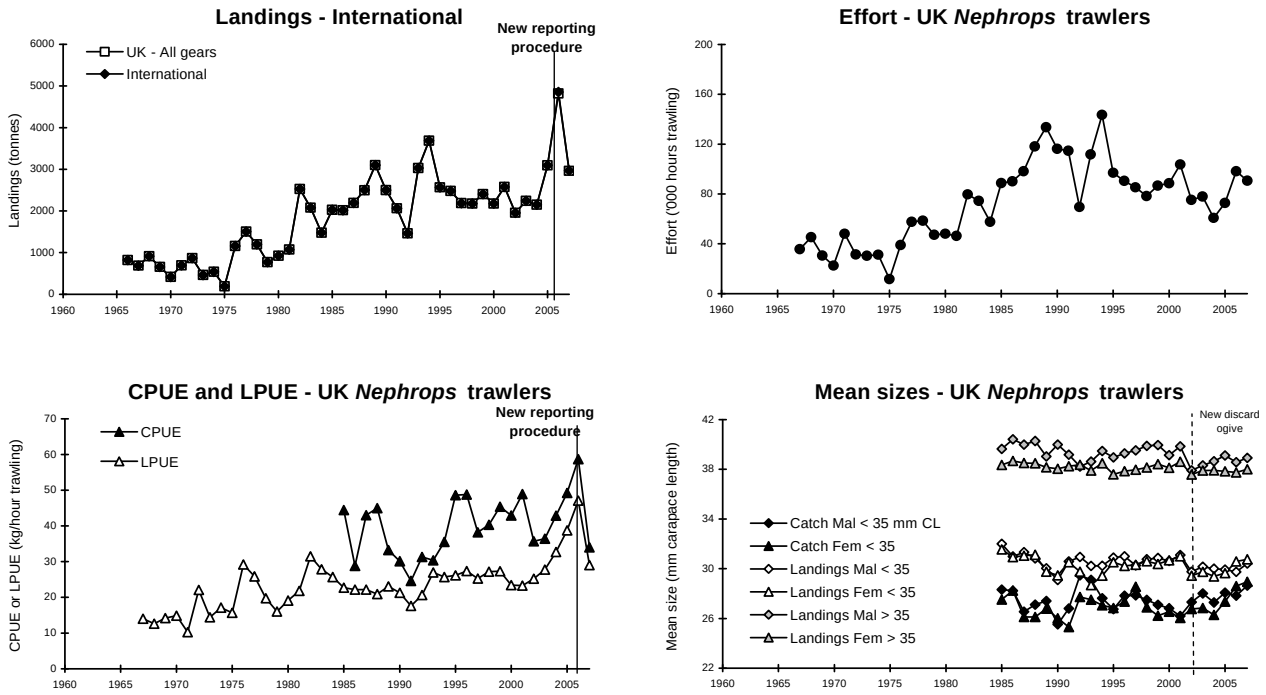

Figure 6.4.14.5.1 *Nephrops* Farn Deeps (FU 6): Long-term trends in landings, effort, cpues and lpues, and mean sizes of *Nephrops*.

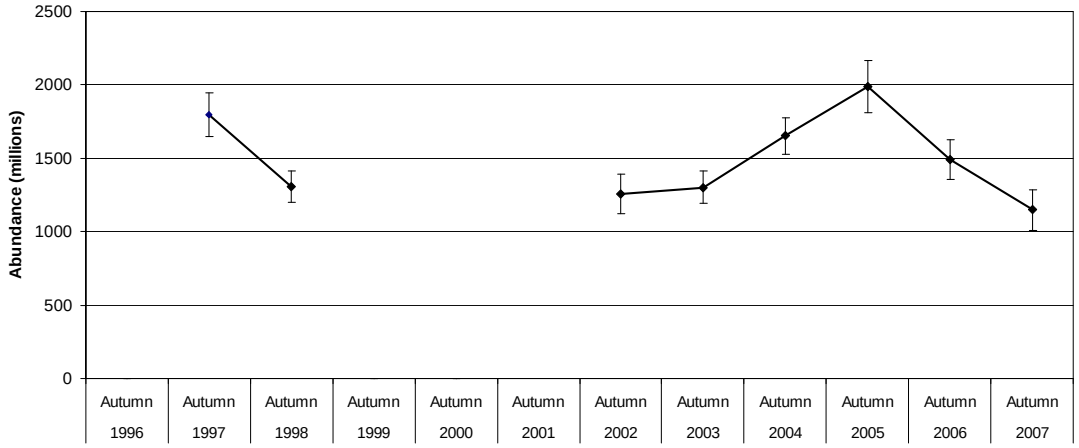

Figure 6.4.14.5.2 *Nephrops* Farn Deeps (FU 6). Abundance estimates from TV survey. Abundance is expressed in number of individuals, but advice is based on interpretation of UWTV surveys as indicative of relative abundance.

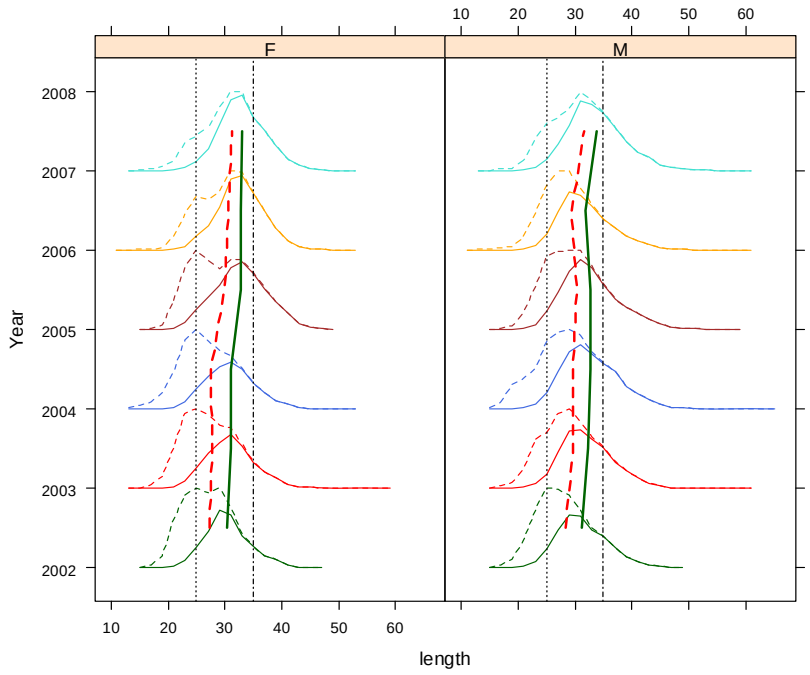

Figure 6.4.14.4.3 *Nephrops* Farn Deeps (FU 6). Length composition of catch (dotted) and landed (solid) of males (right) and females left from 1996 (bottom) to 2007 (top). Mean sizes of catch and landings (using same line types) is shown in relation to Minimum Landing Size (MLS).

Table 6.4.14.5.1 *Nephrops* Farn Deeps (FU 6). Official landings (tonnes).

Year	UK England	UK Scotland	Sub total	Other countries**	Total
1981	1006	67	1073	0	1073
1982	2443	81	2524	0	2524
1983	2073	5	2078	0	2078
1984	1471	8	1479	0	1479
1985	2009	18	2027	0	2027
1986	1987	28	2015	0	2015
1987	2158	33	2191	0	2191
1988	2390	105	2495	0	2495
1989	2930	168	3098	0	3098
1990	2306	192	2498	0	2498
1991	1884	179	2063	0	2063
1992	1403	60	1463	10	1473
1993	2941	89	3030	0	3030
1994	3530	153	3683	0	3683
1995	2478	90	2568	1	2569
1996	2386	96	2482	1	2482
1997	2109	80	2189	0	2189
1998	2029	147	2176	1	2177
1999	2197	194	2391	0	2391
2000	1947	231	2178	0	2178
2001	2319	255	2574	0	2574
2002	1739	215	1953	0	1953
2003	2031	214	2245	0	2245
2004	1952	201	2152	0	2152
2005	2936	158	3093	0	3094
2006	4385	434	4819	39	4858
2007*	2525	437	2962	4	2966

* Preliminary.
** Includes Denmark, Belgium, and the Netherlands.

6.4.14.6 *Nephrops* in Firth of Forth (FU 8)

State of the stock

The UWTV survey indicates that the stock abundance has been at a high level since about 2002. The size composition of the commercial landings are stable and do not show a decrease over time.

Single-stock exploitation boundaries

Exploitation boundaries in relation to precautionary considerations

The current fishery appears sustainable. Therefore, ICES recommends that *Nephrops* fisheries should not be allowed to increase relative to the past two years (2006–2007). This corresponds to landings of no more than 2500 tonnes for the Firth of Forth stock.

Management considerations

The UK Registration of Buyers and Sellers (since 2006) has led to more accurate landings information from these stocks. Therefore the advice for this stock refers to landings average landings 2006-2007 only and does not use landings data prior to 2006.

Nephrops discard rates in the Firth of Forth are high and there is a need to reduce these and to improve the exploitation pattern. An additional reason for suggesting improved selectivity in this area relates to bycatch of other fish species. It is important that efforts are made to ensure that other fish are not taken as unwanted bycatch in this fishery which uses 80 mm mesh. Larger square mesh panels implemented as part of the Scottish Conservation Credits scheme should help to improve the exploitation pattern for some species such as haddock and whiting and small cod.

Factors affecting the fisheries and the stock

Landings from the Firth of Forth fishery are predominantly reported from Scotland, with very small contributions from England. The area is periodically visited by vessels from other parts of the UK. There is a risk that owing to fuel costs vessels which would normally fish further offshore will locate to inshore grounds. The Firth of Forth is close inshore and is of small geographic size so that significant influx of effort will have deleterious effects.

Catches of marketable bycatch fish are small from this area and there are few other species in the area for vessels to target. Squid is periodically important.

Estimated discarding rates are 43% by number (24% by weight) in the Firth of Forth. This arises from the use of mainly small-meshed (80 mm) nets and the population size structure which appears to arise from slower growth. Local markets for small whole *Nephrops* are seasonally important.

The effects of regulations

Restrictions designed to conserve other species, e.g. cod recovery measures, days at sea, catch composition regulations, and technical conservation measures are likely to have affected vessels operating in this area.

The development of a Conservation Credits scheme in Scotland (the major contributor to landings from the Firth of Forth stock) requires all trawlers to implement more selective gears, including the use of 110 mm square mesh panels in 80 mm gear. This measure should reduce catches (and discards) of small fish including whiting, haddock, and juvenile cod.

Changes in fishing technology and fishing patterns

The Firth of Forth resident fleet contains numerous small boats which are generally restricted to more sheltered inshore waters. There are, however, observations of shifts of *Nephrops* fishing by larger vessels from the fleet to grounds such as the Devil's Hole (an offshore ground not included as part of a Functional Unit).

Reduction in the size and number of predators, primarily cod, may have been beneficial to this stock.

Scientific basis

Data and methods

The UWTV survey has been conducted annually since 1993 (missing surveys in 1995 and 1997). Monthly market sampling and quarterly on-board observer sampling provides good coverage of length compositions. Fishery statistics prior to 2006 are considered to be unreliable, but the situation has now improved with the introduction of the UK Registration of Buyers and Sellers (2006).

Information from the fishing industry

The NSCFP survey (Figure 6.4.14.3) does not include specific information for the Firth of Forth, but the NSCFP survey area containing the Firth of Forth shows a continuous increase in *Nephrops* since 2001. Adjacent North Sea areas also show this trend. This supports the suggestion of an increase in abundance since 2001, with generally moderate or high numbers of recruits.

Uncertainties in assessment and forecast

There are concerns regarding the accuracy of landings and effort data before 2006.

Comparison with previous assessment and advice

The advice in 2006 was based on a 15% harvest ratio for several of the *Nephrops* stocks, in turn based on UWTV surveys interpreted as estimates of absolute abundance. This year, UWTV surveys are used as indicators of relative abundance because they are deemed inappropriate for absolute abundance estimation at this time.

Nephrops, Firth of Forth (FU 8). Single-stock exploitation boundaries (advice), management, and landings.

Year	ICES advice	Recommended landings Firth of Forth (FU7)	Recommended landings FU6+FU7	Agreed TAC[1]	ICES Landings[2]
1992			~4.6	12.0	1.8
1993			4.17	12.0	2.4
1994			4.17	13.0	1.9
1995			4.17	15.2	1.8
1996			4.17	15.2	1.7
1997			4.17	15.2	2.2
1998			4.17	15.2	2.1
1999			4.17	15.2	2.2
2000			4.17	17.2	1.8
2001			4.17	15.48	1.5
2002			4.17	16.623	1.3
2003			4.17	16.623	1.1
2004			4.17	21.350	1.7
2005			4.17	21.350	2.0
2006	No increase in effort		-	28.147	2.4
2007	No increase in effort, harvest rate <15%	1.5	5.0	26.144	2.6
2008	No new advice, same as for 2007	1.5	5.0	26.144	
2009	No increase in effort and recent average landings	< 2.5			

Weights in '000 t.
[1)] EU Zone of Division IIa and Subarea IV.
[2)] Does not include discards.

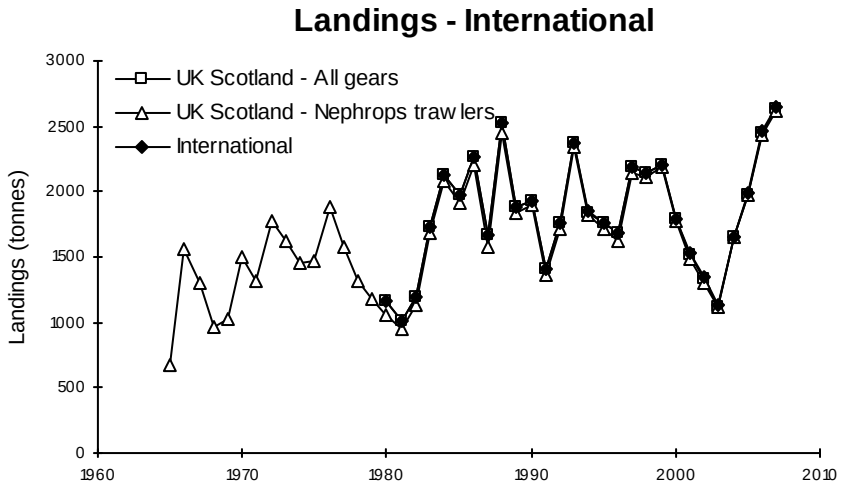

Figure 6.4.14.6.1 *Nephrops*, Firth of Forth (FU 8). Long-term trends in landings.

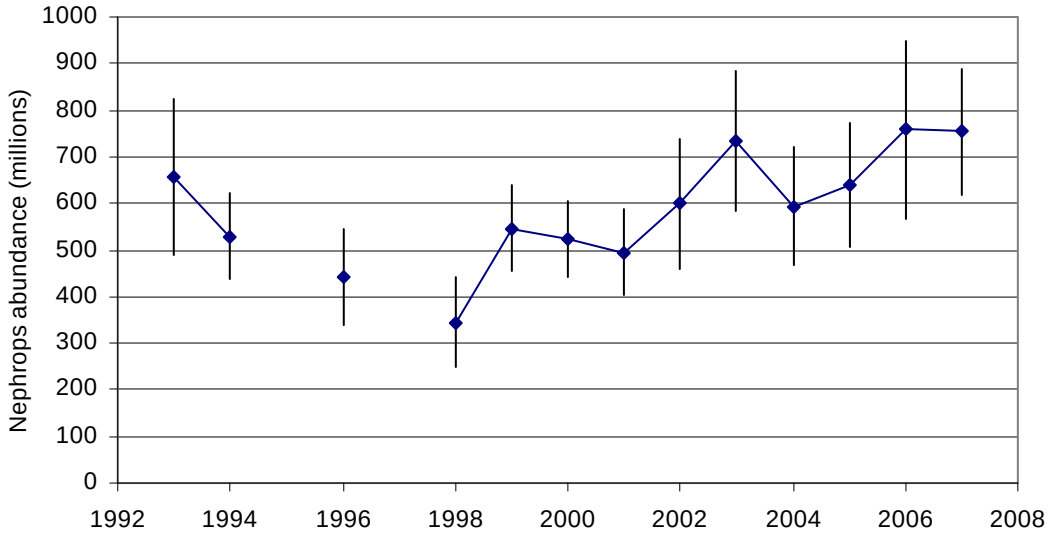

Figure 6.4.14.6.2 *Nephrops*, Firth of Forth (FU 8). Time-series of TV survey abundance estimates (in millions), with 95% confidence intervals, 1993–2005. Abundance is expressed in number of individuals, but advice is based on interpretation of UWTV surveys indicative of relative abundance.

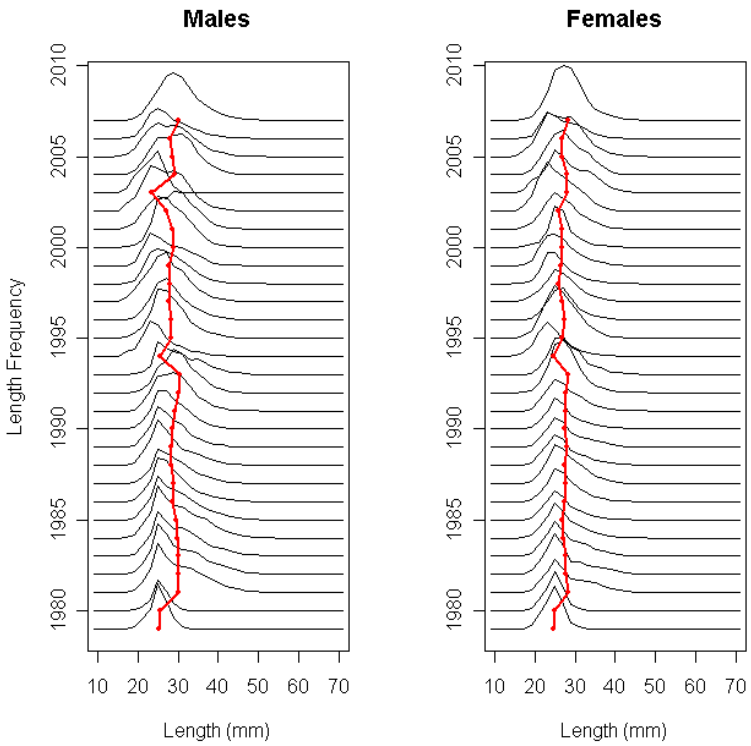

Figure 6.4.14.6.3 *Nephrops*, Firth of Forth (FU 8). Catch length frequency distribution and mean sizes (red line).

Table 6.4.14.6.1 *Nephrops*, Firth of Forth (FU 8). Total landings (tonnes) 1981–2007.

Year	UK Scotland				UK England	Total **
	Nephrops trawl	Other trawl	Creel	Sub-total		
1981	945	61	0	1006	0	1006
1982	1138	57	0	1195	0	1195
1983	1681	43	0	1724	0	1724
1984	2078	56	0	2134	0	2134
1985	1908	61	0	1969	0	1969
1986	2204	59	0	2263	0	2263
1987	1582	92	0	1674	0	1674
1988	2455	73	0	2528	0	2528
1989	1833	52	0	1885	1	1886
1990	1901	28	0	1929	1	1930
1991	1359	45	0	1404	0	1404
1992	1714	43	0	1757	0	1757
1993	2349	18	0	2367	2	2369
1994	1827	17	0	1844	6	1850
1995	1708	53	0	1761	2	1763
1996	1621	66	1	1688	0	1688
1997	2137	55	0	2192	2	2194
1998	2105	38	0	2143	2	2145
1999	2192	9	1	2202	3	2205
2000	1775	9	0	1784	1	1785
2001	1484	35	0	1519	9	1528
2002	1302	31	1	1334	6	1340
2003	1115	8	0	1123	3	1126
2004	1651	4	0	1655	3	1658
2005	1973	0	6	1979	11	1990
2006	2437	4	12	2453	5	2458
2007*	2622	9	8	2639	7	2646

* provisional na = not available

** There are no landings by other countries from this FU

6.4.14.7 Nephrops in Botney Gut – Silver Pit (FU 5)

State of the stock

The state of this stock is unknown. Lpue indicators show different trends for different fleets and not all of the indicators have been updated for 2006 and 2007.

Single-stock exploitation boundaries

Exploitation boundaries in relation to precautionary considerations

The state of the stock is unknown. ICES recommends that the level of effort should not be allowed to increase.

Management considerations

Lpue indicators are not optimal as indicators of stock density, but for this stock they do not indicate any decline in availability. The mean lengths in the landings do not show a clear trend. The lack of data for 2006 and 2007 along with the strong increase in landings gives rise to concern.

Factors affecting the fisheries and the stock

For many years Belgium was the only country exploiting *Nephrops* in this area. In recent years the Netherlands and the UK have become the most important exploiters of this stock, taking around 80% of the total international landings. Reported landings in 2007 are among the highest in the time-series.

Scientific basis

Data and methods

The perception of the Botney Gut stock (FU 5) is based on lpue information and mean sizes in the catches.

Information from the fishing industry

The NSCFP stock survey trends show an increase between 2001 and 2002, a stable period to 2004, and an increase in 2005. There were no strong indications of changes in recruitment or discarding levels.

Uncertainties in assessment and forecast

For this FU assessment data have become sparse in the past 2 years. The available lpue figures from the Danish fisheries (continuous) and Belgian fisheries (up to 2005) must be viewed very cautiously as stock indicators.

Comparison with previous assessment and advice:

There is no change in the perception or advice for this stock since the 2006 assessment.

Nephrops in Botney Gut – Silver Pit (FU 5). Single-stock exploitation boundaries (advice), management, and landings.

Year	ICES advice	Recommended landings	Agreed TAC[1]	ICES Landings[2]
1991				0.9
1992		0.87	12.0	0.6
1993		0.87	12.0	0.7
1994		0.87	13.0	0.5
1995		0.87	15.2	0.9
1996		0.87	15.2	0.7
1997		0.87	15.2	1.1
1998		1.0	15.2	1.1
1999		1.0	15.2	1.2
2000		1.6	17.2	1.1
2001		1.6	15.48	1.4
2002		2.1	16.623	1.2
2003		2.1	16.623	1.1
2004		2.38	21.350	1.1
2005		2.38	21.350	1.1
2006		2.38[3)]	28.147	1.0
2007	No increase in effort	-	26.144	1.3
2008	No new advice, same as for 2007	-	26.144	
2009	No increase in effort	-		

Weights in '000 t.
[1)] EU Zone of Division IIa and Subarea IV.
[2)] Does not include discards.
[3)] Includes Off Horns Reef FU 33.

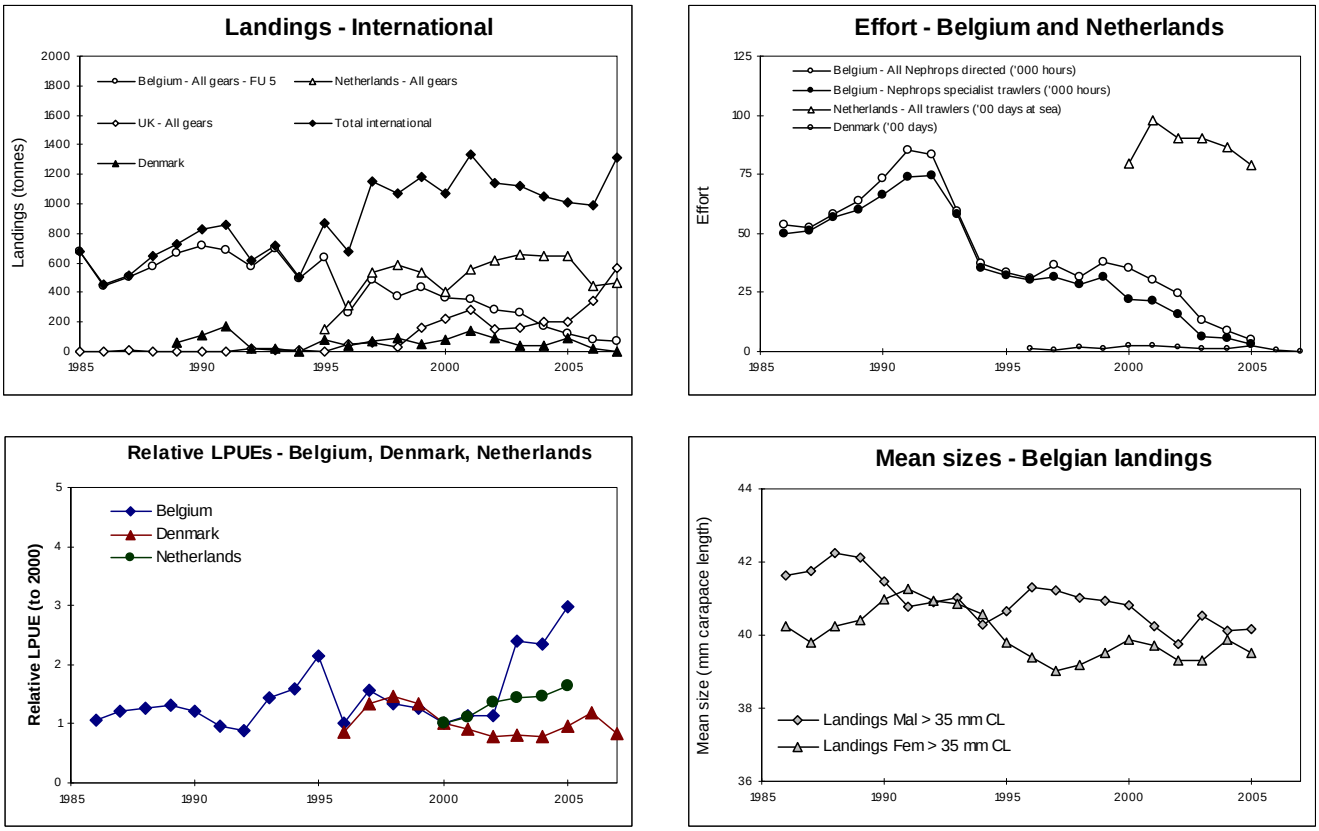

Figure 6.4.14.7.1 *Nephrops*, Botney Gut – Silver Pit (FU 5): Long-term trends in landings, effort, lpue, and mean sizes.

Table 6.4.14.7.1 *Nephrops* in Botney Gut – Silver Pit (FU 5). Total landings (tonnes).

Year	Belgium	Denmark	Netherl.	Germany	UK	Total **
1991	682	176	na		4	862
1992	571	22	na		19	612
1993	694	20	na		7	721
1994	494	0	na		9	503
1995	641	77	148		3	869
1996	266	41	317		55	679
1997	486	67	540		56	1149
1998	372	88	584	39	28	1111
1999	436	53	538	59	158	1244
2000	366	83	402	52	218	1121
2001	353	145	553	114	278	1443
2002	281	94	617	88	151	1231
2003	265	36	661	24	158	1144
2004	171	39	646	16	198	1070
2005	109	87	654	51	157	1058
2006	77	24	444	99	342	986
2007*	75	3	464	201	568	1311

* Provisional. na = not available.

** Totals for 1991–94 exclusive of landings by the Netherlands.

6.4.14.8 *Nephrops* off Horn's Reef (FU 33)

State of the stock

The state of this stock is unknown. The lpues from major fisheries do not indicate any decline in availability.

Single-stock exploitation boundaries

Exploitation boundaries in relation to precautionary considerations

The state of the stock is unknown. ICES recommends that the level of effort should not be allowed to increase.

Factors affecting the fisheries and the stock

For several years Denmark was the only country exploiting *Nephrops* in FU 33 (Off Horn Reef), and accounted for more than 90% of total landings up to 2005. However, in recent years Germany and the Netherlands have expanded their share of this stock. Landings in 2007 are the highest in the time-series.

Scientific basis

Data and methods

The perception of this stock is based on lpue and mean sizes in the catches.

Information from the fishing industry

The NSCFP stock survey trends show an increase between 2001 and 2002, a stable period to 2004, and an increase in 2005. There were no strong indications of changes in recruitment or discarding levels.

Uncertainties in assessment and forecast

Assessment data are sparse for this FU. Lpue figures from the Danish fisheries must be viewed very cautiously as stock indicators.

Comparison with previous assessment and advice:

There is no change in the perception or advice for this stock since the 2006 assessment.

Nephrops, FU 33 (Off Horn Reef). Single-stock exploitation boundaries (advice), management, and landings.

Year	ICES advice	Recommended landings	Agreed TAC[1]	ICES Landings[2]
1992		0.87	12.0	
1993		0.87	12.0	0.2
1994		0.87	13.0	0.1
1995		0.87	15.2	0.2
1996		0.87	15.2	<0.1
1997		0.87	15.2	0.3
1998		1.0	15.2	0.3
1999		1.0	15.2	0.7
2000		1.6	17.2	0.6
2001		1.6	15.48	0.8
2002		2.1	16.623	0.9
2003		2.1	16.623	0.9
2004		2.38	21.350	1.3
2005		2.38	21.350	1.1
2006		2.38[3)]	28.147	1.3
2007	No increase in effort	-	26.144	1.5
2008	No new advice, same as for 2007	-	26.144	
2009	No increase in effort	-		

Weights in '000 t.
[1)] EU Zone of Division IIa and Subarea IV.
[2)] Does not include discards.
[3)] Includes Farn Deeps (FU6).

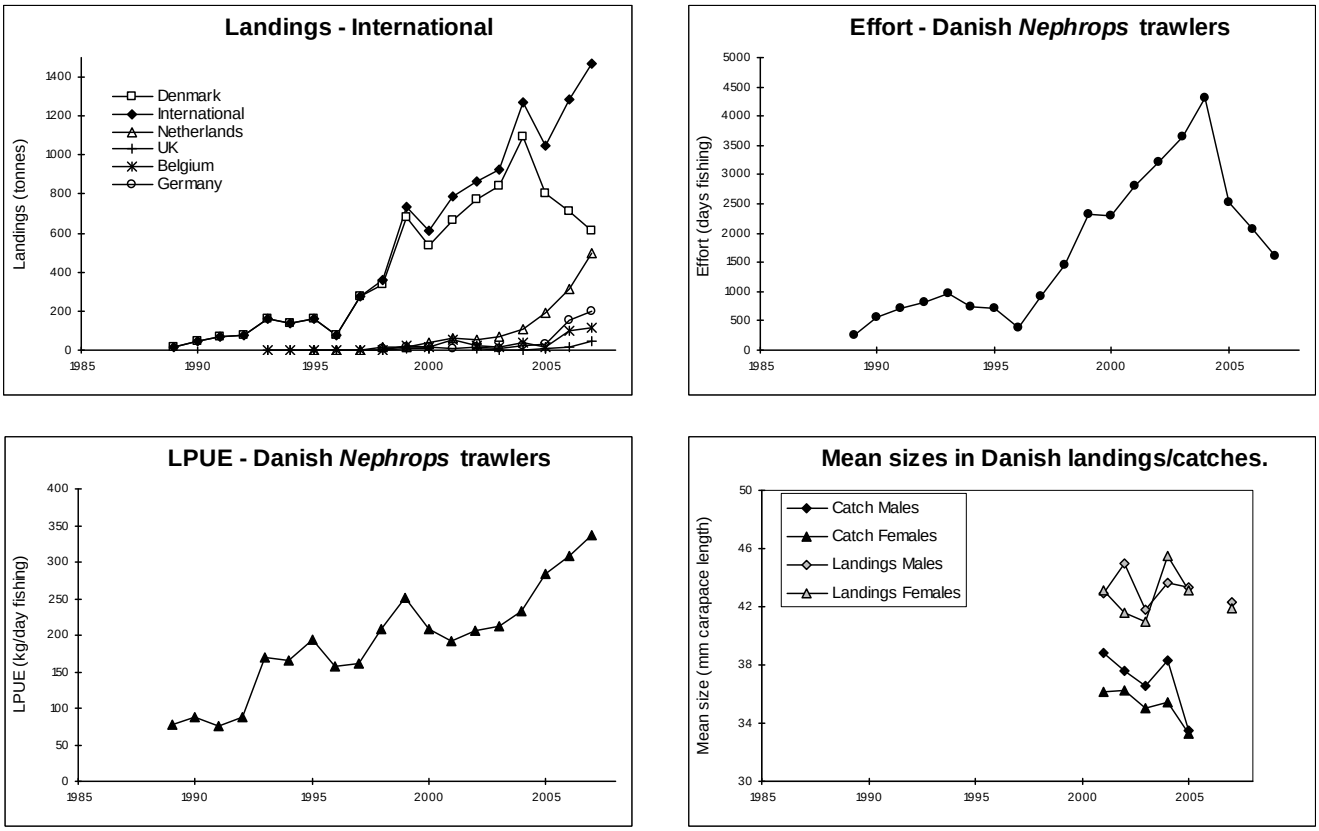

Figure 6.4.14.8.1 *Nephrops*, Off Horn Reef (FU 33): Long-term trends in landings, effort, lpue, and mean sizes in catches and landings.

Table 6.4.14.8.1 *Nephrops*, FU 33 (Off Horn Reef). Total landings (tonnes).

Year	Belgium	Denmark	Germany	Netherl.	UK	Total **
1993	0	159		na	1	160
1994	0	137		na	0	137
1995	3	158		3	1	164
1996	1	74		2	0	77
1997	0	274		2	0	276
1998	4	333	8	12	1	350
1999	22	683	14	12	6	724
2000	13	537	12	39	9	597
2001	52	667	11	61	+	791
2002	21	772	13	51	4	861
2003	15	842	4	67	1	929
2004	37	1097	24	109	1	1268
2005	16	803	31	191	9	1050
2006	97	710	151	314	15	1288
2007	118	610	201	496	42	1467
	* provisional na = not available					
	** Totals for 1993-94 exclusive of landings by the Netherlands					