

3 *Nephrops*(Norway lobster) in Division IIIa and Division IV

Nephrops stocks have previously been identified by WGNEPH on the basis of population distribution, and defined as separate Functional Units. The Functional Units (FU) are defined by the groupings of ICES statistical rectangles given in Table 3.1.1 and illustrated in Figure 3.1.1.

Functional Units are aggregated into Management Areas (MA) Table 3.1.1, the level at which WGNEPH and ACFM have previously recommended management should take place.

Nephrops management operates at the Division level. Division IIIa is covered in Sections 3.2 and 3.3 and deals with Management Area E (FU3&4) in Section 3.2.1. Division IV is covered in Sections 3.4 and 3.5 and deals with Management Area F (FU9&10) in Section 3.4.1, Management Area G (FU7) in Section 3.4.2, Management Area S (FU32) in Section 3.4.3, Management Area I (FU6&8) in Section 3.4.4 and Management Area H (FU5&33) in Section 3.4.5. Management considerations for Division IIIa and Division IV are discussed as a whole in Sections 3.3 and 3.5 respectively.

Landings are reported by Management area in Table 3.1.2. Overall there was slight drop in landings in IIIa and a marked increase in IV, largely as a result of increases in two of the inshore Management Areas F and I and also in the southern North Sea (MA H). General comments relating to the handling of *Nephrops* stocks at WGNSSK 2007 are covered in Section 3.1

3.1 General comments relating to all *Nephrops* stocks

During the early 1990's ICES assessed *Nephrops* stocks on an annual basis but this changed in 1995 to a biennial cycle. The advent of the area working groups, led to a resumption of annual assessments in 2005 and 2006. A continuing feature of most *Nephrops* stocks, however, appears to be their general stability and smaller year to year recruitment variability compared to most fish stocks. This is reflected in the TOR for 2007 which only request an update of *Nephrops* landings.

Information included in WGNSSK 2007

Each Management Area section contains a summary of ecosystem aspects specific to that area and a brief description of the Functional Units and Fisheries. Information on fishery developments will be updated at the 2008 meeting.

A summary of the 2006 ICES advice is provided together with the management outcomes operating in 2006 and 2007.

In response to the TOR, updates of the landings in the FUs are provided together with a brief commentary. Of particular note is the provision of new, detailed landing information from Germany covering a number of FUs. The implementation in the UK of 'buyers and sellers legislation' towards the end of 2005 and effective throughout 2006 is believed to have improved the quality of reported landings information.

While making landings data extractions, some countries also summarised effort data and these are included where available. A limited amount of updated mean size information was also supplied.

There were no new assessments performed this year and new catch advice is not provided. Where observations from the landings update are considered relevant to management,

however, a note of these is included in brief sections covering management considerations at the end of each MA section.

Ongoing developments in methodology for future assessments of Nephrops

Previously, WGNEPH has conducted a variety of analyses on *Nephrops* data, including the review of basic fishery indicators, the use of LCA and XSA, and examination of trends in underwater TV surveys. Other assessment approaches are also being considered by WKNEPH (Workshop on *Nephrops* stocks), including length based SURBA and VPA methods, and CSA.

In 2006 WGNSSK agreed that its approach should be essentially the same as in 2005. There were no cohort based numerical assessments performed and judgements about the states of the populations of *Nephrops* in the various FUs in both Division IIIa and Division IV relied on three main approaches:

- For all FUs there was consideration of basic fishery data such as catch, landings and effort
- For most FUs, attention was paid to length composition data and this year length distributions were included as well as the mean size information used in previous years. It was felt that the additional information afforded by looking at the tails of length distributions and in comparison to MLS was beneficial.
- For FUs where a reasonable time-series of UTV data is available, this was used as the principle indicator of stock condition.

Various length based approaches are in the process of further development in ICES WGs (SGASAM) and other fora. Improvements in the quality of commercial data should mean that in a few years it will be possible to revisit the use of catch based methods to assess *Nephrops* stocks. Critically, this will most likely also depend on the acquisition of improved estimates of biological parameters, most notably growth.

In the meantime, fishery independent underwater TV surveys (UTV) continue to provide a way of assessing trends in *Nephrops* populations and offering guidance on catch possibilities. Several countries already have well established surveys but these are neither internationally coordinated nor operating to the same protocol as happens with other survey such as the IBTS. There is, however, considerable exchange of expertise between the laboratories regarding equipment and protocol but the need for standardisation remains. A special workshop, WKTVNEPH was convened in April 2007 with the following TOR.

- a) review and report technological developments used in underwater TV surveys for *Nephrops*;
- b) compare survey designs employed in different areas and evaluate, where possible, the relative performance of these;
- c) report on work addressing outstanding issues influencing the accuracy and precision of TV estimates of abundance *inter alia* burrow identification, occupancy rate, counting method, survey data analysis, raising procedures;
- d) document the protocols used to conduct surveys across the range of European stocks, highlighting standard practices and 'norms' adopted in UWTV work;
- e) investigate and make recommendations on procedures for inter-calibration, quality assurance and the reporting of precision from TV surveys;
- f) report on developments in the translation of survey estimates into stock assessment information and catch forecast advice, recommending where additional work is most urgently required;
- g) consider the wider utility of the techniques employed in *Nephrops* UWTV surveys for estimation of other benthic species and habitat assessment.

The report of the meeting was not available to WGNSSK, although a verbal report was given. The workshop was of the view that these surveys provide good indications of population abundance trends and there was full support for the further development of the methodology. Significant progress was made in the collation of survey designs, equipment specifications and survey SOPs with recommendations regarding minimum standards and best practice.

The requirement for training, analyses and standardisation was emphasised and there are recommendations for the creation of reference datasets for the analysis of counting performance as well as the creation of a standard burrow-identification key to aid with the training and development of counters. Adoption of these practices would put the quality control of *Nephrops* burrow counting on a par with otolith reading.

A list of the areas of uncertainty regarding the estimation of population abundance was developed by the group with a view to refining and improving the methodology. This includes topics such as burrow occupancy, burrow species identification, video track width, video distance and variation in camera height. Each area is linked to an assessment of the likely impact upon abundance estimates and suggestions for how these areas might be tackled.

Based on the findings of the workshop it seems unlikely that the current perceptions of stocks assessed by UTV at the 2006 meeting of WGNSSK will change significantly. Update assessments based on UTV surveys (where available) will be provided at the 2008 WG meeting.

Overarching ICES advice from 2006

Stock specific ICES *Nephrops* advice from 2006 is summarised in Management Area Sections. ICES advice was also provided for all demersal fisheries based on mixed-fishery considerations; *Nephrops* fisheries come into this category.

“Fisheries in Division IIIa (Skagerrak-Kattegat), in Subarea IV (North Sea) and in Division VIIId (Eastern Channel) should in 2007 be managed according to the following rules, which should be applied simultaneously:

Demersal fisheries

- *with minimal bycatch or discards of cod;*
- *Implement TACs or other restrictions that will curtail fishing mortality for those stocks mentioned above for which reduction in fishing pressure is advised;*
- *within the precautionary exploitation limits for all other stocks (see text table above);*
- *Where stocks extent beyond this area, e.g. into Division VI (saithe and anglerfish) or are widely migratory (Northern hake), taking into account the exploitation of the stocks in these areas so that the overall exploitation remains within precautionary limits.*
- *With minimum by-catch of spurdog (see Volume 9, section 1.6), porbeagle and thornback ray and skate.”*

General Ecosystem considerations

Although specific quantitative data are not available for all stocks, qualitative observations suggests that there have been general increases in *Nephrops* abundance observed throughout Divisions IIIa and IV in recent years. The widespread nature of these observations suggest

they may be related to environmental influences, perhaps having a positive effect on recruitment.

Individual stocks inhabit distinct areas of suitable muddy sediment. Information is not available on the extent to which larval mixing occurs between *Nephrops* stocks.

Cod have 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.

3.2 *Nephrops* in Division IIIa

3.2.1 *Nephrops* in Management Area E

Official landings supplied to ICES for Division IIIa are shown in Table 3.2.1.1

MA E contains Division IIIa, which includes FU 3 and 4. Total *Nephrops* landings by FU and country is shown in Table 3.2.1.2 and Table 3.2.1.3. When these two FU's are assessed they are treated together.

3.2.1.1 General

3.2.1.1.1 Ecosystem aspects

Nephrops lives in burrows in suitable muddy sediments and is characterised by being omnivorous and emerge out of the burrows to feed. It can, however, also sustain itself as a suspension feeder (in the burrows) (Loo et al., 1993). This ability may contribute to maintaining a high production of this species in IIIa, due to increased organic production.

Severe depletion in oxygen content in the water can force the individuals out of their burrows, thus temporarily increasing the trawl catchability of this species during such environmental changes (Bagge et al. 1979). A severe case was observed at the end of 1980s in the southern part of IIIa in late summer, where initially unusual high catch rates of *Nephrops* were observed. Eventually the increasing amount of dead specimens in the catches lead to the conclusion that there was severe oxygen deficiency especially in the southern part of IIIa (Kattegat) in late 1988 (Bagge et al., 1990).

No information is available on the extent to which larval mixing occurs between *Nephrops* stocks but the similarity in stock indicator trends between FU 3 and 4 for both Denmark and Sweden indicates that the recruitment has been similar in the areas. These observations suggest they may be related to environmental influences.

3.2.1.1.2 Functional Units and their Fisheries

Danish, Swedish and Norwegian *Nephrops* vessels operate in the Skagerrak (FU3) area, while the Kattegat (FU4) is prosecuted by Danish and Swedish fleets. Germany takes small catches in both areas. The fisheries are described in the 1999 WG report (ICES, 1999a) and there have been a number of changes in these fisheries in recent years.

For the Swedish fishery, twin trawling is now associated with a more mixed fishery for fish and *Nephrops*, while single trawlers continue to target mainly *Nephrops*. Since 2004 there have also been introductions of technical measures such as species selective grids and square meshed codends.

Restrictions in demersal fisheries, especially for cod have resulted in some significant changes in the Danish fisheries for *Nephrops*. In particular there have been moves away from the traditional 70-89 mm mesh sizes to the use of gears with larger mesh sizes >89mm (which previously have been used in the fishery for cod, plaice and other demersal fish species). EU

legislation (Council Regulation 27/2005) restricts the use of mesh sizes between 70-89 mm unless the codend and the extension piece is constructed of square meshed netting with a sorting grid). Economically, *Nephrops* is one of the most important human consumption species in the Danish fishery in IIIa.

A full update of the fishery developments affecting this area will be given when the stocks are assessed in 2008.

3.2.1.1.3 ICES Advice

In 2006 ICES concluded that:

The available information is inadequate to evaluate spawning stock or fishing mortality relative to risk, so the state of the stock is unknown. Indices from the commercial fishery suggest that the stocks in this Management Area are exploited at sustainable levels. High rates of discards in particular years (1999 2000) may indicate strong recruitment.

and advised that:

“Given the apparent stability of the stocks, current levels of exploitation appear to be sustainable.”

*“Due to uncertainty in the available data ICES is not able to reliably forecast catch. Therefore ICES recommends that fishing effort for fleets targeting *Nephrops* should not be allowed to increase.”*

*Since most of the trawl fisheries for *Nephrops* in Division IIIa are mixed fisheries, the effort in these fisheries may affect by-catch levels of other commercial species caught unless the species and size selectivity properties of the *Nephrops* trawls is improved (e.g. grids and square meshes). In view of the catch restrictions for cod and other demersal fish species in the North Sea and IIIa it should also be noted that if *Nephrops* fishing effort is allowed to increase, this may have implications for those stocks in mixed fisheries where *Nephrops* is targeted, unless species and size selectivity of the gears is improved (see above). Cod and sole are significant by-catch species in these fisheries in IIIa, and even if data on catch including discards of the by-catch gradually become available, they have not yet been used in the management.*

*Discards of *Nephrops* are known to be very high and any improvement of the selectivity in the trawls would benefit the stock and medium-term yield.*

3.2.1.1.4 Management

No management objectives have been set for this fishery. The 2006 and 2007 TAC for *Nephrops* in ICES area IIIa was 5170 tonnes. This figure arose from an adjustment by 10% of the 2005 TAC (set at 4700 t.). This change was not based on any new biological information but has remained in place since then.

The minimum landings size for *Nephrops* in area IIIa is 40mm carapace length.

Days at sea limits and various technical measures also apply in IIIa

3.2.1.2 The Skagerrak (FU3)

3.2.1.2.1 Update of *Nephrops* landings and effort data

Table 3.2.1.4 shows updated landings for FU3. A small decline in total landings to is noted. This is due to a 10% decline in Danish landings. Swedish landings increased by 10%.

Denmark, Sweden and Norway exploit this FU. Denmark and Sweden dominate this fishery, with 63 % and 33 % by weight of the landings in 2006. Landings by the Swedish creel fishery

account for approximately 27% in the recent years. Norway takes smaller landings, and German landings are negligible.

The updated effort data are shown in Tables 3.2.1.5 and 3.2.1.6 and Fig.3.2.1.1. Swedish single trawl effort has increased recently while twin trawl effort and Danish effort has decreased. LPUE has been relatively constant in the last few years. Mean sizes, separated into sex and size categories are shown in Table 3.2.1.7 and Fig. 3.2.1.1 and are all fluctuating without trend.

3.2.1.3 The Kattegat (FU4)

3.2.1.3.1 Update of *Nephrops* landings and effort data

Updated landings are shown in Table 3.2.1.8. A decline in total landings in 2006 to 1281 (close to the 1996 level) is noted for FU4. Denmark and Sweden exploit this FU. In the recent years Denmark has accounted for 70-75% of the landings and Sweden the remaining part of the landings. German landings are negligible. Again here, the decline is due to a drop in Danish landings. Swedish landings increased by 10%.

The updated effort data are shown in Tables 3.2.1.9 and 3.2.1.10 and in Fig. 3.2.1.2 Effort and LPUE have been relatively stable. Mean sizes, separated into sex and size categories are shown in Table 3.2.1.11 and Fig. 3.2.1.2 and are all fluctuating without trend.

3.2.1.4 Management Area E Considerations

Since Management Area E covers Division IIIa, management considerations are dealt with in the section below on Division IIIa

3.3 Division IIIa *Nephrops* Management Considerations

There is no new advice for Division IIIa.

The *Nephrops* TAC for IIIa has not been restrictive, and logbook data are considered reliable. The high recruitment (shown as high discard levels) observed in 1999 and 2000 has resulted in high LPUE in recent years. The previous WG conclusions appear to still hold, that the *Nephrops* stocks in the Skagerrak and Kattegat area are fluctuating at a relatively stable level and show no signs of overexploitation.

Mixed fishery aspects

In view of the catch restrictions for cod and other demersal fish species in the North Sea and IIIa it should also be noted that if *Nephrops* fishing effort is allowed to increase, this may have implications for those stocks in mixed fisheries where *Nephrops* is targeted, unless species and size selectivity of the gears is improved (see above). Cod and sole are significant bycatch species in these fisheries in IIIa but available data have been limited and so far have not been included in assessments of these species.

3.4 *Nephrops* IN Division IV

Official catch statistics for Division IV are presented in Table 3.4.1.1

Division IV contains MA F, G, H, I and S, which include FU 5, 6, 7, 8, 9, 10, 32, and 33. Although ICES provides Management Advice at the MA level, management is actually applied at the scale of ICES Division through the use of a TAC and an effort regime.

Management at ICES Division Level

The 2006 EC TAC for *Nephrops* in ICES area IV in EC waters was 28147 tonnes with an additional EC quota of 1300 tonnes in Norwegian waters. For 2007 the EC TAC in EC waters was reduced slightly to 26144 tonnes. The EC quota in Norwegian waters was maintained at 1300 tonnes).

The TAC outcome for 2007 differs from the 2006 ICES advice. ACFM based its advice on the time series of historic reported landings. EU STECF were asked to advise on whether this was appropriate and concluded that this did not always provide a reliable forecast of future catch. STECF reiterated its 2005 advice consistent with long term sustainable objectives and concluded that a harvest rate based on a fishing mortality rate equivalent to $F_{0.1}$ from a yield per recruit curve was likely to be sustainable providing that fishing effort was controlled and providing *Nephrops* were managed at the Functional Unit level. The latter approach formed the basis of the TAC outcomes for stocks where UTV surveys were available.

The minimum landings size for *Nephrops* in area IV is 25mm carapace length. Denmark, Sweden and Norway applies a national MLS of 40mm.

Days at sea limits restrict *Nephrops* trawler activities to some extent and EU catch composition regulations apply to *Nephrops* trawlers.

UK legislation (SI 2001/649, SSI 2000/227) requires at least a 90mm square mesh panel in trawls from 80 to 119mm, where the rear of the panel should be not more than 15m from the cod-line. The length of the panel must be 3m if the engine power of the vessel exceeds 112 kW, otherwise a 2m panel may be used. Under UK legislation, when fishing for *Nephrops*, the cod-end, extension and any square mesh panel must be constructed of single twine, of a thickness not exceeding 4mm for mesh sizes 70-99mm, while EU legislation restricts twine thickness to a maximum of 8mm single or 6mm double.

Under EU legislation, a maximum of 120 meshes round the cod-end circumference is permissible for all mesh sizes less than 90mm. For this mesh size range, an additional panel must also be inserted at the rear of the headline of the trawl. UK legislation also prohibits twin or multiple rig trawling with a diamond cod end mesh smaller than 100mm in the north Sea south of 57°30'N.

3.4.1 *Nephrops* in Management Area F

3.4.1.1 General

3.4.1.1.1 Ecosystem aspects

Management Area F is located to the north west of Division IV. In common with other *Nephrops* fisheries the bounds of the Functional Units making up the MA are defined by the limits of muddy substrate. The Functional Units are geographically restricted with little apparent mixing. Although the substrates may be similar, the latitude or location, depth, and local tidal patterns will differ between the FUs and with other MAs which would suggest that each the area of each could be ecologically unique.

The major *Nephrops* fisheries within this management area fall within 30 miles of the UK coast. The Moray Firth (FU9) is a relatively sheltered inshore area, that supports populations of juvenile pelagic fish and relatively high densities of squid at certain times. The Noup (FU10) is located in a more exposed area adjacent to areas supporting diverse demersal fish populations.

3.4.1.1.2 Functional Units and their Fisheries

There are two Functional Units in this Management Area, FU 9 Moray Firth and FU 10 Noup. Landings by FU and by country are shown in Tables 3.4.1.2 and 3.4.1.3 respectively.

The Moray Firth area is fished by a number of smaller local Nephrops boat (12-16m), joined occasionally by vessels from other parts of the UK. Some small vessels attempted twin trawling in 2005 but have reverted to single trawls. In 2004 and 2005 a squid fishery developed in the area that attracted some of the Nephrops boats but this didn't take place in 2006. The Noup grounds are fished by 3-4 boats (16-24m) from Scrabster. They mainly target a mixed fish (mainly flats and monks) and Nephrops fishery using 100mm (twin-rig) to stay within the catch composition regulations.

A full update of the fishery developments affecting this area will be given when the stocks are assessed in 2008.

3.4.1.1.3 Advice

In 2006 ICES concluded that

“The available fishery information is inadequate to evaluate spawning stock or fishing mortality relative to precautionary reference points.

- a) *Moray Firth: The TV survey estimate of abundance for Nephrops in the Moray Firth suggests that the population increased by around 40% in 2002, probably due to good recruitment in that year. 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.*
- b) *Noup: The TV survey estimate of abundance for Nephrops in the Noup suggests that the population declined between the two surveys in 1994 and 1999, but unfortunately no recent data are available.*
- c) *Small quantities of landings are made outside the statistical rectangles describing the Functional Unit, but within the Management Area.”*

and advised that

The effort in this fishery should not be allowed to increase relative to the past three years. In addition to the ceiling on effort ICES advises that the harvest ratio in this stock should be no more than 15%, until such time that more reliable catch information becomes available. This corresponds to landings of less than 2400 tonnes for the Moray Firth stock.

The fishery in the Noup stock should be less than 240 t, the average of the last three years.

ACFM also provided a table of harvest rate options.

Overarching advice covering mixed-fishery considerations for all demersal fisheries is given in Section 3.1 above.

3.4.1.1.4 Management

No management objectives have been set for this fishery. TAC and effort management affecting this Functional Unit takes place at the ICES Division level as described at the beginning of Section 3.4.

In addition to the EU management measures, a number of UK measures apply. In addition to the ones outlined at the beginning of Section 3.4, part of the Moray Firth is designated as a Special Area of Conservation for the protection of a population of bottle-nosed dolphins which are periodically resident in the area.

3.4.1.2 Moray Firth (FU 9)

3.4.1.2.1 Update of Nephrops landings and effort data

Landings from this Functional Unit are presented in Table 3.4.1.4 and are predominantly reported from Scotland, with very small contributions from England in the mid 1990s. The long term landings trends are shown in Figure 3.4.1.1. Total international reported landings in 2006 were 1771 tonnes, mostly by Scottish *Nephrops* trawlers. This estimate for total landings has increased in the most recent years, and is at the highest level since 1993. Reported effort by Scottish *Nephrops* trawlers has fluctuated around a relatively stable level since 1990, and in 2006 was slightly above the value of the previous year and close to the average of the recent period (Table 3.4.1.5 and Figure 3.4.1.1). LPUE calculations for Scottish *Nephrops* trawls are shown in Table 3.4.1.5 for single trawls, multiple trawls and combined. Examination of the long term LPUE data (Figure 3.4.1.1) suggests that the stock increased in the mid- 1980s, declined to a stable level over the next 12 years or so and has recently increased.

3.4.1.3 Noup (FU 10)

3.4.1.3.1 Update of Nephrops landings and effort data

Landings from this fishery are solely reported from Scotland, and are presented in Table 3.4.1.6, together with a breakdown by gear type. Total international reported landings in 2006 was 133 tonnes, which represents a further decline from the recent high value of 401 tonnes in 2002. Reported effort by Scottish *Nephrops* trawlers increased rapidly in the late 1980s and early 1990s, to a peak in 1994, but has shown a general decline since this date Table 3.4.1.7 and Figure 3.4.1.2). Scottish *Nephrops* trawler LPUE has shown an increasing trend since the mid 1980's and has recently been very high. The Noup ground is located some distance from the main areas of *Nephrops* fishing and it appears that factors other than stock abundance have made the area less attractive to fishermen in recent years.

3.4.1.4 Management Area F Management considerations

There is no new assessment on which to base advice or management considerations. Updated landings and effort data do not point to any emerging problems in this area.

Effort should not be allowed to increase in this MA, and the WG, ACFM and STECF have repeatedly advised that management should be at a smaller scale than the ICES Division level.

In 2005, high abundance of 0 group cod was recorded in Scottish surveys in the Moray Firth area. The abundance of these cod as 2 year olds still appears to be relatively high. It is important that efforts are made to ensure that these and other fish are not taken as unwanted bycatch in smaller mesh fisheries and technical measures that improve the exploitation pattern would be beneficial in the fisheries of this MA. Uptake of a new derogation for 90mm mesh nets which requires a square mesh panel close to the codend and releases cod and small haddock and whiting has so far been slow.

3.4.2 *Nephrops* in Management Area G

3.4.2.1 General

3.4.2.1.1 Ecosystem aspects

Management Area G is located towards the centre of the northern part of Division IV. Its eastern boundary is adjacent to the Norwegian Deeps area.

A density driven gyre centred on the ground influences the hydrographic features of the area. The gyre relies on persistent cold dense bottom water and sustained periods of these conditions may affect Nephrops growth and other biological features.

The abundance of gadoid predators is currently higher in this area than in a number of the inshore grounds close to the Scottish coast, particularly towards the north of the ground.

3.4.2.1.2 Functional Units and their Fisheries

There is one Functional Units in this Management Area, FU 7 the Fladen Ground. Landings by FU and other rectangles and by country are shown in Tables 3.4.2.1 and 3.4.2.2 respectively.

General information on the fishery can be found in the Stock Annex. The Fladen fishery (FU7), the largest Scottish Nephrops fishery, takes a mixed catch with ground and round fish (mainly haddock, whiting, and monkfish and flats), making an important contribution to the boats earnings. Most of the vessels are larger trawlers, many using twin trawling technique. The fishery traditionally exhibits some seasonal changes in spatial distribution but in some years (2004-2005) activity was more evenly distributed. In 2005, some Fladen vessels moved into the Moray Firth to fish for squid but this was not the case in 2006. Quality control appears to have increased dramatically, resulting in prawns in a better conditions at market, this is partly because of handling practices and partly because fishing trips seem to be shorter in more recent years (2005 and 2006).

A full update of the fishery developments affecting this area will be given when the stocks are assessed in 2008.

3.4.2.1.3 Advice

In 2006 ICES concluded that

The available fishery information makes it inadequate to use analytical methods to evaluate spawning stock or fishing mortality in relation to the precautionary approach. Results from TV surveys suggest that the stock is probably exploited at a sustainable level. The TV survey estimates of abundance for Nephrops on the Fladen Ground indicate that the stock has fluctuated around twofold since 1992. In the last four years it has declined by 40% and is currently of a size similar to that observed in the late 1990s. Small quantities of landings are made outside the main Fladen Ground Functional Unit, but within the Management Area.

and advised that

The effort in this fishery should not be allowed to increase relative to the past three years. In addition to the ceiling on effort ICES advises that the harvest ratio in this stock should be no more than 7.5%, until such time that more reliable catch information becomes available. This corresponds to landings of less than 10 882 tonnes for the Fladen stock. The fishery in adjacent squares should be limited to 105 t, the average of the last three years.

ACFM included a range of harvest rate options.

Overarching advice covering mixed-fishery considerations for all demersal fisheries is given in Section 3.4 above.

3.4.2.1.4 Management

No management objectives have been set for these fisheries. Management is at the ICES Division level as described at the beginning of Section 3.4

3.4.2.2 Fladen Ground (FU 7)

3.4.2.2.1 Update of *Nephrops* landings and effort data

Landings from this fishery are predominantly reported from Scotland, with small contributions from Denmark and others. Table 3.4.2.3, presents a breakdown by gear type. Total international reported landings in 2006 was 10693 tonnes (97% by Scotland) this represents a small increase on the year before. Reported effort by Scottish *Nephrops* trawlers increased up to 2002, but declined sharply in 2003 (Table 3.4.2.4 and Figure 3.4.2.1). Since then it has been fairly stable and in 2006 was only slightly above the year before. Scottish *Nephrops* trawler LPUE fluctuates around a relatively high level, with a considerable increase from 2003 onwards. The 2006 figure was similar to the year before. Danish LPUE data was also updated and this also shows the recent increase evident in the Scottish fishery (Table 3.4.2.5).

3.4.2.3 Management Area G Management considerations

There is no new assessment on which to base advice or management considerations. Updated landings and effort data do not suggest any emerging problems with this stock.

Effort should not be allowed to increase in this MA, and the WG, ACFM and STECF have repeatedly advised that management should be at a smaller scale than the ICES Division level.

An important consideration here is the further development of multiple rigs (into triple and quadruple trawls). Such developments potentially increase efficiency and increases in effective effort. While technological developments represent a feature of most industries, in this situation the opportunity to increase technological efficiency without overall control of the level of effective effort is not considered sustainable. UK legislation restricts the use of this gear.

In 2005, high abundance of 0 group cod was recorded in Scottish surveys in the Moray Firth area. The abundance of these cod as 2 year olds still appears to be relatively high and they have spread into other areas such as the Fladen Ground. Similar comments can be made about the emerging 2005 haddock year class which will begin entering the fishery in 2007 and already appears to have led to increased discard numbers under the present exploitation pattern. It is important that efforts are made to ensure that unwanted small fish bycatch is avoided and technical measures that improve the exploitation pattern would be beneficial in the fisheries of this MA. Uptake of a new derogation for 90mm mesh nets which requires a square mesh panel close to the codend and releases cod and small haddock and whiting has so far been slow.

3.4.3 *Nephrops* in Management Area S

3.4.3.1 General

This MA includes only FU 32 (Norwegian Deep).

3.4.3.1.1 Ecosystem aspects.

Sediment maps for the Norwegian Deep indicate that the area of suitable sediment for *Nephrops* is larger than the current extent of the fishery, and there may be possibilities of expansion into new grounds, on which *Nephrops* is not currently exploited.

3.4.3.1.2 Functional Units and their fisheries

Traditionally, Danish and Norwegian fisheries exploit this stock, while small landings are also made by UK vessels. Denmark accounts for the majority of landings from this Management area, see Table 3.4.3.1

A full update of the fishery developments affecting this area will be given when the stocks are assessed in 2008.

3.4.3.1.3 Advice

In 2006 ICES noted for this stock

“that the available information was inadequate to evaluate spawning stock or fishing mortality relative to risk. Information on this stock is considered inadequate to provide advice based on precautionary limits. “

and added:

“The Danish LPUE figures for this FU increased dramatically from 1992 to 1994, and then levelled off. Since 1995 they have fluctuated around 200 kg/day. In the last 2 years an increasing trend is seen. It could be that only part of the stock is exploited at present. Sediment maps for this Management Area indicate that there are possibilities to let the fishery expand into new grounds, which have scarcely been fished to date”.

ICES advised that

“Information on this stock is considered inadequate to provide advice based on precautionary limits.”

No TAC was suggested for 2006. In previous years TACs based on historical landings have been suggested.

Overarching advice covering mixed-fishery considerations for all demersal fisheries is given in Section 3.4 above.

3.4.3.1.4 Management

No management objectives have been set for these fisheries. The EC fisheries in FU 32 take place mainly in the Norwegian zone of the North Sea. The EU fisheries are managed by a separate TAC for this area. For 2007 the agreed TAC for EC vessels was 1300 t.

3.4.3.2 Norwegian Deepseas FU32

3.4.3.2.1 Update of Nephrops landings and effort data

International landings from the Norwegian Deep increased from less than 20 t in the mid-1980s to 1,216 t in 2002, the highest figure so far Table 3.4.3.1 and Figure 3.4.3.1. Since then landings have fluctuated around 1000 tonnes and total landings in 2006 amounted to 1060 tonnes. Danish vessels take 80-90 % of total landings with Norwegian and UK vessels making up the remainder. Effort by the Danish fleet (from logbook data Table 3.4.3.2) has fluctuated in recent years and rose in 2006 from the previous year. LPUE in 2006 declined slightly but remains at a relatively high level (Figure 3.4.3.1)

3.4.3.3 Management considerations for Area S

There is no new assessment or advice for this stock. The trend in Danish LPUE figures do not indicate any decline in stock abundance.

The WG considers that the stock should be monitored more closely. The Norwegian logbook system should be improved. Sampling of Norwegian commercial catches from this area should be intensified and analysed. Also the sampling of the Danish vessels should be intensified to cover all seasons of the year. It could be that only part of the stock is exploited at present. Sediment maps for this Management Area indicate that there are possibilities to let the fishery expand into new grounds, which have scarcely been fished to date.

3.4.4 *Nephrops* in Management Area I

3.4.4.1 General

3.4.4.1.1 Ecosystem aspects

A common feature of *Nephrops* fisheries is that their bounds appear to be defined by the limits of muddy substrate (See Stock Annex). The stocks are geographically restricted with little apparent mixing. Although the substrate may be similar, the latitude or location, depth, and local tidal patterns will differ between stocks which would suggest that each the area of each could be ecologically unique.

The major *Nephrops* fisheries within this management area fall within 30 miles of the UK coast.

3.4.4.1.2 Functional Units and their Fisheries

There are two Functional Units in this Management Area: Farn Deeps (FU 6) and Firth of Forth (FU 8). Landings by FU and by country are shown in Tables 3.4.4.1 and 3.4.4.2 respectively. General information on the fisheries in these areas can be found in the Stock Annex. More recently a significant twin-rig fishery has developed at the Devil's Hole located further offshore.

The fishery in the Farn Deeps is characteristically a winter fishery running from around September through to March. In the Firth of Forth the peak of the fishery is in the late summer and early autumn.

In 2006, buyers and sellers regulations have led to increased traceability of catches and greater confidence in the quality of landings data.

A full update of the fishery developments affecting this area will be given when the stocks are assessed in 2008.

3.4.4.1.3 Advice

In 2006 ICES concluded that

“The available information is inadequate to use analytical methods to evaluate spawning stock or fishing mortality relative to risk. Results from TV surveys, however, suggest that the stocks in this Management Area are exploited at a sustainable level.

- a) *Farn Deeps: The TV fall survey estimates of abundance for Nephrops in the Farn Deeps indicate that the population has increased from 2002 to 2005. Effort currently appears to be at its lowest level since 1984 and LPUE appears to be at its highest in the series. Mean size of the smaller length groups for males and females has increased in recent years, but the LPUE for these length groups has remained fairly static.*
- b) *Firth of Forth: The TV survey estimate of abundance for Nephrops in the Firth of Forth suggests that the population declined between 1993 and 1998, but has increased since then and has been at a relatively high level in the last four years. The increases in abundance in the late 1990s and most recent years have been*

reflected in CPUE and mean size data, in that they suggest an increase in recruitment in 1998 and 2003.

- c) *Some landings are made outside the Functional Units, but inside the Management Area.”*

and advised that

“The effort in this fishery should not be allowed to increase relative to the past three years. In addition to the ceiling on effort ICES advises that the harvest ratio in these stocks should be no more than 15% until more reliable catch information becomes available. This corresponds to landings of less than 3500 tonnes for the Farn Deeps stock and 1500 tonnes for Firth of Forth stock. The fishery in other statistical squares in this area should be less than 600 t, the average of the last three years.

Overarching advice covering mixed-fishery considerations for all demersal fisheries is given in Section 3.4 above.

3.4.4.1.4 Management

No management objectives have been set for these fisheries. These stocks are managed at the ICES division level as described in 3.4. There are no local management restrictions but the 55° latitude line used in the EU catch composition regulations bisects this fishery. This may have an impact on the distribution of effort.

3.4.4.2 Farn Deeps (FU 6)

3.4.4.2.1 Update of Nephrops landings and effort data

Landings from the Farn Deeps are shown in Table 3.4.4.3. Since the beginning of the time-series, the UK fleet has accounted for virtually all of the landings with small quantities taken by Belgium, Netherlands and Denmark.

Total landings increased to a maximum in 1994 after which they were relatively stable around a mean of 2200 tonnes. Landings in 2005 rose markedly and in 2006 reached a new peak of 4835 tonnes through increases by England and Scotland (Figure 3.4.4.1, Table 3.4.4.3).

Fishing effort by UK trawlers (Table 3.4.4.4) declined in the 1990s but has recently increased again and is currently at about average levels for the period since 1985. The figure in 2006 was above that of 2005. Recent trends in LPUE have been upward with a new maximum reached in 2006. This may be attributed to increased abundance but also the implementation of buyers and sellers which has improved the quality of landings information available.

3.4.4.3 Firth of Forth (FU 8)

3.4.4.3.1 Update of Nephrops landings and effort data

Landings from the Firth of Forth fishery are presented in Table 3.4.4.5 and are predominantly reported from Scotland, with very small contributions from England. The Table also shows a breakdown by gear type. Total international reported landings in 2006 was 2425 tonnes. This estimate for total landings has increased by over 400 tonnes from 2005 continuing a recent rapid increase in landings. These are still lower than the previous high of over 2528 tonnes landed in 1988. Reported effort by Scottish *Nephrops* trawlers dipped in 2003, but has remained relatively stable since 1995 (Table 3.4.4.6 and Figure 3.4.4.2) falling slightly in 2006. Scottish *Nephrops* trawler LPUE was relatively stable in the late 1980's and early 1990's, but has apparently fluctuated widely since then and is currently at a relatively high level, the 2006 figure is highest in the series and suggests that the stock is currently abundant.

3.4.4.4 Management Area I Management considerations

There is no new assessment on which to base advice or management considerations. Updated landings and effort data do not point to any emerging problems in this area.

Effort should not be allowed to increase in this MA and the WG, ACFM and STECF have repeatedly advised that management should be at a smaller scale than the ICES Division level.

Earlier WGs have indicated that the FUs in this Management Area have high Nephrops discard rates 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. In 2005, high abundance of 0 group cod was recorded in Scottish surveys in the Moray Firth area. The abundance of these cod as 2 year olds still appears to be relatively high and they have spread into other areas. Similar comments can be made about the emerging 2005 haddock year class which will begin entering the fishery in 2007 and is already leading to higher discard numbers under the present exploitation pattern. It is important that efforts are made to ensure that these and other fish are not taken as unwanted bycatch in smaller mesh fisheries and technical measures that improve the exploitation pattern would be beneficial in the fisheries of this MA. Uptake of a new derogation for 90mm mesh nets which requires a square mesh panel close to the codend and releases cod and small haddock and whiting has so far been slow.

3.4.5 *Nephrops* in Management Area H

3.4.5.1 General

Management area H (Figure 3.1.1) covers the south-eastern part of the North Sea. This area comprises two FUs: the Botney Gut unit (FU 5) and the Horn Reef unit (FU 33). Landings for the 2 FUs and in other squares are given in Table 3.4.5.1 and landings by contry are given in Table 3.4.5.2.

3.4.5.1.1 Ecosystem aspects

It is mentioned for the North sea as a whole, that qualitative observations suggests that there have been general increases in *Nephrops* abundance in the North Sea in recent years. The FU on Horn reef is an example of significant increase in *Nephrops* densities on new localities in the North Sea during the last 20 years. It may be related to environmental influences, perhaps having a positive effect on recruitment as well as sediment.

3.4.5.1.2 Functional Units and their fisheries

An extensive description of the *Nephrops* directed fisheries in the Botney Gut - Silver Pit area is given in the 2003 Report of WGNEPH (ICES, 2003). Recently, the Belgian *Nephrops* fishery in the area has declined while Dutch, German and UK activity has increased.

A description of the Danish *Nephrops* fishery Off Horn Reef is given in the 1999 Report of WGNEPH (ICES, 1999). Initially, this *Nephrops* fishery was carried out mainly by Danish vessels but there have been considerable increases recently in Dutch and German landings from this area.

A full update of the fishery developments affecting this area will be given when the stocks are assessed in 2008.

3.4.5.1.3 Advice

In 2006 ICES stated:

“The available information is inadequate to evaluate spawning stock or fishing mortality relative to risk.

- a) *Botney Gut: Indications from landing per unit effort do not indicate a decline in stock density. The mean sizes of males in the landings show evidence of an overall long term downward trend, while mean sizes of females seem to have stabilised, albeit at a level that is lower than in the early 1990s.*
- b) *Off Horn Reef: The upward trend in LPUE is noted for the recent years. A precautionary interpretation of this increase suggests that the stock level remains relatively stable. However, the marked shift in the size distribution for 2005 compared to previous years could be a sign of a too high exploitation level in recent years. However, as LPUE was at a high level in 2005, the decrease in mean size in the catch could merely be a sign of large recruitment.”*

and advised that :

“Information on these stocks is considered inadequate to provide advice based on precautionary limits. Therefore ICES recommends that the level of exploitation, i.e. effort on these stocks should not be increased.”

Overarching advice covering mixed-fishery considerations for all demersal fisheries is given in Section 3.4 above.

3.4.5.1.4 Management

No management objectives have been set for these fisheries. TAC and effort management affecting this Functional Unit takes place at the ICES Division level as described at the beginning of Section 3.4.

3.4.5.2 Botney Gut / Silver Pit (FU 5)

3.4.5.2.1 Update of Nephrops landings and effort data

Landings for FU 5 are shown in Table 3.4.5.3. The declining Nephrops fleet in Belgium took 77 t of *Nephrops* landings in 2006. Up to 1995, the Belgian fleet used to take over 75% of the international landings from this stock, but since then, its share has dropped to less than 15%. For some years now, the Netherlands is the most important player in FU 5, with over 60% of the total international landings being made by Dutch trawlers, for first sale in the Netherlands or in Belgium. New information on German landings were provided at this WG amounting to 99 tonnes in 2006. The remaining landings are by UK and Denmark, Table 3.4.5.2

Total international *Nephrops* landings from FU 5 in 2006 were at 986 t, a further decline compared to 2005 landings. Figure 3.4.5.1 shows the long term trend.

An update of Danish effort was available (Table 3.4.5.4) which suggested effort had dropped but that LPUE increased in 2006. Previous data for Belgium and the Netherlands suggest that the fishery is becoming much less important to Belgium but increasingly important to the Netherlands. LPUE observed by these fleets has also been showing recent upward trends.

3.4.5.3 Off Horn Reef (FU 33)

3.4.5.3.1 Update of Nephrops landings and effort data

The landings from FU 33 were marginal for many years. However, from 1996 to 2004, Danish landings increased considerably, from 74 to 1,097 t (Table 3.4.5.5). In 2006 total international landings rose to 1292 of which the Danish landings were 710 tonnes (about 55%). The other countries reporting landings from the area are Belgium, Netherlands, UK and at this WG new data was provided by Germany. According to logbook information, most of the Danish *Nephrops* directed fishery in FU 33 takes place in the 3rd quarter.

Table 3.4.5.6 and Figure 3.4.5.2 show the development in Danish effort and LPUE. Note that the 10-fold increase in fishing effort from 1996 to 2004 seems to correspond to the above mentioned increase in landings during the same period. Since then, Danish effort has dropped but judging by the landings, Dutch effort has been rising. The Danish LPUEs were rather stable from 1998 to 2004, fluctuating around 200 kg.day⁻¹. 2005 and 2006 saw increases in LPUE and the stock seems to be abundant.

3.4.5.4 Management Area H Management considerations

There is no new assessment on which to base advice or management considerations. Updated landings and effort data do not suggest any emerging problems with this area.

3.5 Division IV *Nephrops* Management Considerations

Division IV contains 5 different management areas which differ in size, nature of *Nephrops* population biology, extent of fishery development and fleets involved in fishing them. Updates of landings and, in some cases, effort do not point to any emerging problems. Landings in IV have increased overall (Table 3.4.4.1) through increases in some of the constituent MAs – notably F, I and H. Available LPUE data suggest, however, that abundance remains high. To some extent the increased landings may reflect greater accuracy in landings as a result of a strengthening of reporting procedures.

Assessments in previous years of the state of the Functional Units contained within the Management Areas involved the use of three types of information, trends in fishery indicators, examination of length compositions and, where available, underwater TV surveys. For the present, UTV surveys provide the best indication of the states of *Nephrops* populations. Outcomes from WKNEPH will be used to refine the approach in readiness for assessments in 2008.

It should not be overlooked that advice is provided on a Management Area basis, while management through the TAC is applied over the whole North Sea, and includes a number of other FUs exhibiting various states of exploitation. On numerous occasions (see e.g. ICES, 1997a and 1999a), the WGNNEPH has pointed out the difficulties of managing *Nephrops* stocks in this way, and suggested that some subdivision of the TAC area would be desirable.

Judging by the updated effort data provided to this WG, there have not been major increases so far. It is important, however, that ‘step-changes’ in the effectiveness of fishing do not occur through the introduction of more efficient gears. The use of gears with multiple nets is developing in some parts of the North Sea and this should be discouraged.

Mixed fishery aspects

The overall position of stable or increasing *Nephrops* stocks in Division IV is similar to that in Division IIIa, VIa and VIIa and appears to be representative of a general increase in *Nephrops* in more northerly waters. These increases imply increased catching opportunities without the

need for increased effort and on a single species basis should be sustainable (there is, however, a continuing need to address the high levels of discards of *Nephrops* in FUs 6 and FUs 8). Such opportunities also present a challenge in a mixed fisheries context since there is the potential for bycatch in a number of FUs – this is often unwanted bycatch of small individuals of other fish species. This represents a particular problem where smaller mesh sizes are used and where emergent year classes of demersal fish, especially cod are found.

Analysis of catch rates from half hour tows on trawl surveys of the Farn deeps involving four commercial *Nephrops* trawlers (Bell, M. et al, 2004, Fisheries Science Partnership 2004/5 Programme 6: NE *Nephrops*) showed that there was a tendency for catch rates of cod, plaice, haddock and lemon sole to be low when catch rates of *Nephrops* were high and vice versa. This relationship was particularly apparent for cod and plaice. The possible reasons are discussed but generally the analysis suggests that specific targeting of *Nephrops* can reduce bycatch.

Bycatches of cod do occur in some *Nephrops* areas (most notable in parts of the Fladen Ground and IIIa) and traditionally young cod were found in many inshore areas. All efforts should be made to improve selectivity and species selection to avoid these fish. Other technical measures (eg seasonal and spatial closures) should be investigated.

Table 3.1.1 *Nephrops* Functional Units and descriptions by statistical rectangle.

Functional Unit	Stock	ICES Rectangles	Management Area	Division
3	Skagerrak	47G0-G1; 46F9-G1; 45F8-G1; 44F7-G0; 43F8-F9	E	IIIa
4	Kattegat	44G1-G2; 42-43G0-G2; 41G1-G2	E	IIIa
5	Botney Gut	36-37 F1-F4; 35F2-F3	H	IV
6	Farn Deep	38-40 E8-E9; 37E9	I	IV
7	Fladen	44-49 E9-F1; 45-46E8	G	IV
8	Firth of Forth	40-41E7; 41E6	I	IV
9	Moray Firth	44-45 E6-E7; 44E8	F	IV
10	Noup	47E6	F	IV
32	Norwegian Deep	44-52 F2-F6; 43F5-F7	S	IV
33	Off Horn Reef	39-41E4; 39-41E5	H	IV

Table 3.1.2 Summary of *Nephrops* landings from the ICES area, by Management Area, 1991-2006 as used by the Working Group

ICES sub-area	IIIa						Area IV Total	Overall total	
	MA	E	F	G	S	I			H
1991		4238	1780	4273	178	3823	1023	11077	15315
1992		2912	1822	3402	160	3491	736	9611	12523
1993		3209	2253	3532	338	5661	945	12729	15938
1994		2874	2171	4686	759	5953	682	14251	17125
1995		3427	1654	6624	494	4704	1234	14710	18137
1996		3979	1896	5368	960	4557	921	13702	17681
1997		4206	1856	6266	760	4722	1554	15159	19365
1998		5044	1360	5230	838	4599	1640	13667	18711
1999		4943	1361	6696	1129	5006	2204	16396	21339
2000		4703	1880	5650	1051	4353	1978	14912	19615
2001		4055	1696	5644	1191	4735	2429	15695	19750
2002		4441	1588	7410	1216	3917	2418	16549	20990
2003		3754	1534	6402	1110	4024	2457	15527	19281
2004		3953	1665	8807	934	4399	2621	18426	22379
2005		4032	1802	10791	1117	5619	2313	21642	25674
2006		3672	1948	10793	1060	7844	2799	24444	28116

* provisional

Table 3.2.1.1 Nominal landings (tonnes) of *Nephrops* in Division IIIa, 1986 – 2006, as officially reported to ICES.

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Denmark	2840	2869	3022	3094	2790	2046	2251	2049	2419	2843	2959	3538	3487	3329	2868	3277	2752	2956	2918	2434
Germany	0	0	0	0	0	0	0	0	1	1	5	12	6	7	1	7	12	13	2	6
Germany, Fed. Rep	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Norway	80	88	54	140	185	104	103	62	90	102	117	184	214	181	138	116	99	95	83	91
Sweden	1240	1062	829	1098	1249	772	863	763	913	1105	1129	1314	1259	1195	1040	1033	896	904	1044	1150
Total	4160	4019	3905	4332	4224	2922	3217	2874	3423	4051	4210	5048	4966	4712	4047	4433	3759	3969	4047	3681

Table 3.2.1.2 Management Area E (IIIa): Total *Nephrops* landings (tonnes) by Functional Unit plus Other rectangles, 1991-2006.

Year	FU 3	FU 4	Other	Total
1991	2934	1304	0	4238
1992	1900	1012	0	2912
1993	2285	924	0	3209
1994	1981	893	0	2874
1995	2429	998	0	3427
1996	2694	1285	0	3979
1997	2612	1594	0	4206
1998	3253	1803	0	5056
1999	3197	1752	0	4949
2000	2896	1814	0	4710
2001	2282	1775	0	4057
2002	2978	1470	0	4448
2003	2126	1640	0	3766
2004	2315	1650	0	3965
2005	2546	1488	0	4034
2006	2392	1281	0	3672

Table 3.2.1.3 Management Area E (IIIa): Total *Nephrops* landings (tonnes) by country, 1991-2006.

Year	Denmark	Norway	Sweden	Germany	Total
1991	2824	195	1219		4238
1992	2052	111	749		2912
1993	2250	100	859		3209
1994	2049	62	763		2874
1995	2419	90	918		3427
1996	2844	101	1034		3979
1997	2959	117	1130		4206
1998	3541	184	1319	12	5056
1999	3486	214	1243	6	4949
2000	3325	181	1197	7	4710
2001	2880	138	1037	1	4056
2002	3293	116	1032	7	4448
2003	2757	99	898	13	3767
2004	2955	95	903	12	3965
2005	2901	83	1048	2	4034
2006	2432	91	1143	6	3672

Table 3.2.1.4 *Nephrops* Skagerrak (FU 3): Landings (tonnes) by country, 1991-2006.

Year	Denmark	Germany	Norway	Sweden			Total
				Trawl	Creel	Sub-total	
1991	1639		195	949	151	1100	2934
1992	1151		111	524	114	638	1900
1993	1485		100	577	123	700	2285
1994	1298		62	531	90	621	1981
1995	1569		90	659	111	770	2429
1996	1772		101	708	113	821	2694
1997	1687		117	690	118	808	2612
1998	2055	5	184	864	145	1009	3253
1999	2070	3	214	793	117	910	3197
2000	1877	2	181	689	147	836	2896
2001	1416	0	138	594	134	728	2282
2002	2053	1	116	658	150	808	2978
2003	1421	0	99	471	135	606	2126
2004	1595	3	95	449	173	622	2315
2005	1727	0	83	538	198	736	2546
2006	1516	0	91	583	201	784	2392

Table 3.2.1.5 Nephrops Skagerrak (FU 3): Catches and landings (tonnes), effort ('000 hours trawling), CPUE and LPUE (kg/hour trawling) of Swedish *Nephrops* trawlers, 1991-2006 (data presented for single and twin trawls separately).

Single trawl					
Year	Catches	Landings	Effort	CPUE	LPUE
1991	676	401	71.4	9.5	5.6
1992	360	231	73.7	4.9	3.1
1993	614	279	72.6	8.4	3.8
1994	441	246	60.1	7.3	4.1
1995	501	336	60.8	7.8	5.2
1996	754	488	51.1	14.8	9.6
1997	643	437	44.4	14.4	9.8
1998	794	557	49.7	16.0	11.2
1999	605	386	34.5	17.5	9.3
2000	486	329	32.7	14.9	10.9
2001	446	236	26.2	17.0	10.4
2002	503	301	29.4	17.1	8.8
2003	310	254	21.5	13.9	11.4
2004	474	257	20.1	23.6	12.8
2005	760	339	29.7	25.6	11.4
2006	839	401	37.5	22.4	10.7

Twin trawl					
Year	Catches	Landings	Effort	CPUE	LPUE
1991	740	439	39.5	18.7	11.1
1992	370	238	34.1	10.9	7.0
1993	568	258	35.9	15.8	7.2
1994	444	248	34.1	13.1	7.3
1995	403	270	32.9	12.2	8.2
1996	187	121	13.0	14.4	9.3
1997	219	149	17.5	12.5	8.5
1998	254	178	16.7	15.2	10.6
1999	382	244	27.6	13.8	8.8
2000	349	237	31.3	11.1	10.1
2001	470	249	33.7	14.0	7.4
2002	392	244	33.3	11.8	7.1
2003	168	138	22.5	7.5	6.1
2004	217	118	21.7	10.0	5.4
2005	263	117	22.1	11.9	5.3
2006	253	121	19.6	12.9	6.2

Table 3.2.1.6 *Nephrops* Skagerrak (FU 3): Logbook recorded effort (days fishing) and LPUE (kg/day) for bottom trawlers catching *Nephrops* with codend mesh sizes of 70 mm or above, and estimated total effort by Danish trawlers, 1991-2006.

Year	Logbook data		Estimated total effort
	Effort	LPUE	
1991	17136	73	22158
1992	12183	70	16239
1993	11073	105	14068
1994	10655	110	11958
1995	10494	132	11935
1996	11885	138	12793
1997	11791	140	12075
1998	12501	155	13038
1999	13686	139	14787
2000	14802	120	15663
2001	14244	100	13976
2002	16386	123	16750
2003	10645	121	11802
2004	11987	122	12996
2005	10682	144	12003
2006	9638	141	10737

Table 3.2.1.7 *Nephrops* Skagerrak (FU 3): Mean sizes (mm CL) of male and female *Nephrops* in catches of Danish, Swedish and Norwegian trawlers combined, 1991-2006

Year	Catches					
	Undersized		Full sized		All	
	Males	Females	Males	Females	Males	Females
1991	30.2	30.9	41.2	42.7	30.9	29.8
1992	33.3	32.3	43.3	44.7	33.3	32.2
1993	33.0	31.5	42.0	43.6	33.0	31.5
1994	31.7	29.6	41.7	43.6	31.7	29.6
1995	30.0	28.5	41.6	41.3	32.9	29.8
1996	33.2	31.9	42.9	44.0	37.6	37.0
1997	35.8	34.5	44.6	44.1	39.8	39.1
1998	34.8	34.4	46.1	43.9	40.7	37.3
1999	34.6	33.9	44.9	43.8	39.3	36.1
2000	30.6	30.5	45.6	45.0	32.5	34.1
2001	33.6	33.6	45.5	43.6	37.3	36.4
2002	33.9	33.7	44.0	42.5	37.2	37.3
2003	33.5	32.6	43.2	43.4	38.0	36.7
2004	34.3	33.4	44.6	45.2	38.7	36.6
2005	33.5	32.4	43.7	43.0	36.4	35.3
2006	33.2	32.9	44.7	42.7	37.1	36.1

Table 3.2.1.8 *Nephrops* Kattegat (FU 4): Landings (tonnes) by country, 1991-2006.

Year	Denmark	Germany	Sweden			Total
			Trawl	Creel	Sub-total	
1991	1185		119	0	119	1304
1992	901		111	0	111	1012
1993	765		159	0	159	924
1994	751		142	0	142	893
1995	850		148	0	148	998
1996	1072		213	0	213	1285
1997	1272		319	3	322	1594
1998	1486	7	306	4	310	1803
1999	1416	3	329	4	333	1752
2000	1448	5	357	4	361	1814
2001	1464	1	304	6	309	1775
2002	1240	6	219	5	224	1470
2003	1336	12	287	5	292	1640
2004	1360	10	270	11	281	1650
2005	1175	2	303	8	311	1488
2006	916	6	347	11	358	1281

Table 3.2.1.9 *Nephrops* Kattegat (FU 4): Catches and landings (tonnes), effort ('000 hours trawling), CPUE and LPUE (kg/hour trawling) of Swedish *Nephrops* trawlers, 1991-2006 (data presented for single and twin trawls separately).

Single trawl					
Year	Catches	Landings	Effort	CPUE	LPUE
1991	66	39	10.3	6.4	3.7
1992	44	28	11.6	3.8	2.4
1993	128	58	14.9	8.6	3.9
1994	95	53	16.2	5.7	3.2
1995	79	53	9.6	7.8	5.5
1996	207	134	13.7	15.1	9.8
1997	269	183	18.0	15.0	10.2
1998	181	127	13.1	13.8	9.7
1999	146	93	8.1	17.9	11.4
2000	114	77	8.5	13.4	9.1
2001	117	62	7.6	15.4	8.2
2002	42	25	3.7	11.2	6.7
2003	49	40	4.6	10.7	8.7
2004	70	44	4.3	16.2	10.1
2005	147	100	12.3	11.9	8.1
2006	234	154	15.1	15.5	10.2

Twin trawl					
Year	Catches	Landings	Effort	CPUE	LPUE
1991	93	55	8.8	10.6	6.2
1992	101	65	14.2	7.1	4.6
1993	187	85	17.8	10.6	4.8
1994	138	77	14.2	9.7	5.4
1995	125	84	11.0	12.2	7.7
1996	97	63	7.5	13.0	8.4
1997	183	124	12.7	14.3	9.7
1998	215	151	15.0	14.4	10.1
1999	306	195	20.1	15.2	9.7
2000	330	224	24.5	13.5	9.1
2001	353	187	25.1	14.1	7.4
2002	256	153	23.2	11.0	6.6
2003	222	181	24.8	9	7.3
2004	253	158	16.5	15.4	9.6
2005	198	135	15.3	12.9	8.8
2006	183	121	12.7	14.4	9.5

Table 3.2.1.10 *Nephrops* Kattegat (FU 4): Logbook recorded effort (days fishing) and LPUE (kg/day) for bottom trawlers catching *Nephrops* with codend mesh sizes of 70 mm or above, and estimated total effort by Danish trawlers, 1991-2006.

Year	Logbook data		Estimated total effort
	Effort	LPUE	
1991	13494	69	17175
1992	12126	65	13627
1993	8815	75	10195
1994	9403	77	9802
1995	9039	91	9357
1996	9872	96	11209
1997	10028	112	11348
1998	10388	122	12144
1999	11434	109	13019
2000	12845	100	14448
2001	13017	93	15870
2002	11571	88	13772
2003	11768	103	13015
2004	11122	115	11669
2005	9286	127	9286
2006	8080	113	7998

Table 3.2.1.11 *Nephrops* Kattegat (FU 4): Mean sizes (mm CL) of male and female *Nephrops* in discards, landings and catches of Danish trawlers, 1991-2006.

Year	Discards					
	Discards		Landings		Catch	
	Males	Females	Males	Females	Males	Females
1991	30.7	31.1	42.4	42.5	32.5	32.9
1992	33.0	30.3	44.4	43.2	36.7	34.9
1993	30.5	29.3	42.3	43.1	31.3	30.1
1994	29.7	28.3	40.8	40.2	31.2	28.9
1995	30.8	30.5	42.4	42.0	33.7	33.2
1996	32.7	31.3	42.0	44.0	36.7	37.3
1997	33.6	33.2	45.0	44.5	37.1	35.0
1998	34.2	33.2	45.6	44.1	41.3	36.8
1999	32.9	33.8	45.3	40.9	37.8	34.9
2000	35.1	35.2	45.7	42.1	40.4	36.9
2001	32.2	33.0	44.1	41.9	35.9	36.5
2002	34.4	33.3	44.4	43.8	37.2	36.2
2003	33.0	33.2	43.5	42.2	37.1	36.0
2004	34.7	34.2	45.1	43.2	39.9	37.5
2005	33.5	33.9	45.8	43.1	38.7	38.7
2006	33.2	33.6	45.1	42.8	37.9	37.4

Table 3.4.1.1 Nominal landings (tonnes) of *Nephrops* in Division IV, 1987 – 2005, as officially reported to ICES.

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Belgium	437	500	574	610	427	384	418	304	410	185	311	238	350	252	283	284	229	213	183	211
Denmark	479	409	508	743	880	581	691	1128	1182	1315	1309	1440	1963	1747	1935	2154	2128	2244	2339	2021
Faeroe Islands	0	0	0	0	0	0	1	3	12	0	1	1	1	0	0	0	0	0	0	0
France	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Germany	0	0	0	0	2	2	16	24	16	69	64	58	104	79	140	125	50	50	109	288
Germany, Fed. Rep	1	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0
Netherlands	0	0	0	9	3	134	131	159	254	423	627	695	662	572	851	966	940	918	1019	982
Norway	2	17	17	46	117	125	107	171	74	83	64	93	144	147	115	130	100	93	131	96
Sweden	0	0	0	0	4	0	1	1	1	0	1	3	4	37	26	14	1	1	3	2
UK - Eng+Wales+N	0	0	2938	2332	1955	1451	2983	3613	2530	2462	2206	2094	2431	2210	2691	1964	2295	2241	3622	0
UK - England & Wa	2173	2397	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UK - Scotland	5304	6527	7065	6871	7501	6898	8250	8850	10018	8981	10466	8980	10715	9834	9681	11045	10094	12912	14446	0
UK																				21003
Total	8403	9852	11103	10613	10889	9575	12598	14253	14497	13518	15049	13602	16374	14878	15722	16682	15838	18674	21851	24603

Table 3.4.1.2 *Nephrops*, Management Area F: Total *Nephrops* landings (tonnes) by Functional Unit plus Other rectangles, 1981-2006.

Year	FU 9	FU 10	Other	Total
1981	1416	36	0	1452
1982	1120	19	1	1140
1983	940	15	1	956
1984	1170	111	3	1284
1985	2081	22	15	2118
1986	2143	68	44	2255
1987	1991	44	34	2069
1988	1959	76	45	2080
1989	2576	84	44	2704
1990	2038	217	68	2323
1991	1519	196	65	1780
1992	1591	188	43	1822
1993	1808	376	69	2253
1994	1538	495	138	2171
1995	1297	280	77	1654
1996	1451	344	101	1896
1997	1446	316	94	1856
1998	1032	254	74	1360
1999	1008	279	74	1361
2000	1541	275	64	1880
2001	1403	177	116	1696
2002	1118	401	69	1588
2003	1079	337	118	1534
2004	1335	228	80	1643
2005	1605	165	32	1802
2006*	1771	133	44	1948
* provisional				

Table 3.4.1.3 Management Area F : Total Nephrops landings (tonnes) by country, 1981-2006.

Year	UK	Other	Total
1981	1452	0	1452
1982	1140	0	1140
1983	956	0	956
1984	1284	0	1284
1985	2118	0	2118
1986	2255	0	2255
1987	2069	0	2069
1988	2080	0	2080
1989	2704	0	2704
1990	2323	0	2323
1991	1780	0	1780
1992	1822	0	1822
1993	2253	0	2253
1994	2171	0	2171
1995	1654	0	1654
1996	1896	0	1896
1997	1856	0	1856
1998	1360	0	1360
1999	1361	0	1361
2000	1880	0	1880
2001	1696	0	1696
2002	1588	0	1588
2003	1534	0	1534
2004	1643	0	1643
2005	1802	0	1802
2006	1948	0	1948
* provisional			

Table 3.4.1.4 *Nephrops*, Moray Firth (FU 9), Nominal Landings of *Nephrops*, 1981-2006, as officially reported.

Year	UK Scotland				UK England	Total **
	<i>Nephrops</i> 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	209	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	2102	474	0	2576	0	2576
1990	1700	338	0	2038	0	2038
1991	1284	233	0	1519	0	1519
1992	1282	305	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	194	1	1008	0	1008
2000	1343	195	3	1541	0	1541
2001	1188	213	2	1403	0	1403
2002	883	248	2	1118	0	1118
2003	872	197	10	1079	0	1079
2004	1223	103	9	1335	0	1335
2005	1526	64	12	1602	3	1605
2006	1718	41	11	1770	1	1771

* provisional na = not available
** There are no landings by other countries from this FU

Table 3.4.1.5 *Nephrops*, Moray Firth (FU 9): Landings (tonnes), effort ('000 hours trawling) and LPUE (kg/hour trawling) of Scottish *Nephrops* trawlers, 1981-2006 (data for all *Nephrops* gears combined, and for single and multirigs separately).

Year	All <i>Nephrops</i> gears combined			Single rig			Multirig		
	Landings	Effort	LPUE	Landings	Effort	LPUE	Landings	Effort	LPUE
1981	1298	36.7	35.4	1298	36.7	35.4	na	na	na
1982	1034	28.2	36.7	1034	28.2	36.7	na	na	na
1983	850	21.4	39.7	850	21.4	39.7	na	na	na
1984	960	23.2	41.4	960	23.2	41.4	na	na	na
1985	1908	49.2	38.8	1908	49.2	38.8	na	na	na
1986	1933	51.6	37.5	1933	51.6	37.5	na	na	na
1987	1723	70.6	24.4	1723	70.6	24.4	na	na	na
1988	1638	60.9	26.9	1638	60.9	26.9	na	na	na
1989	2102	69.6	30.2	2102	69.6	30.2	na	na	na
1990	1700	58.4	29.1	1700	58.4	29.1	na	na	na
1991	1284	47.1	27.3	571	25.1	22.7	713	22.0	32.4
1992	1282	40.9	31.3	624	24.8	25.2	658	16.1	40.9
1993	1505	48.6	31.0	783	28.1	27.9	722	20.6	35.0
1994	1178	47.5	24.8	1023	42.0	24.4	155	5.5	28.2
1995	967	30.6	31.6	857	27.0	31.7	110	3.6	30.6
1996	1084	38.2	28.4	1057	37.4	28.3	27	0.8	33.8
1997	1102	47.7	23.1	960	42.5	22.6	142	5.1	27.8
1998	739	34.4	21.5	576	28.1	20.5	163	6.3	25.9
1999	813	35.5	22.9	699	31.5	22.2	114	4.0	28.5
2000	1343	49.5	27.1	1068	39.8	26.8	275	9.7	28.4
2001	1188	47.6	25.0	913	37.0	24.7	275	10.6	25.9
2002	883	35.5	24.9	649	27.2	23.9	234	7.9	29.6
2003	872	28.9	30.2	737	25.3	29.1	135	3.6	37.5
2004	1223	31.7	38.6	1100	29.2	37.7	123	2.5	49.2
2005	1526	37.6	40.6	1308	34.0	38.5	218	3.6	60.0
2006	1718	40.1	42.9	1477	36.5	40.5	241	3.6	66.8

Table 3.4.1.6 *Nephrops*, Noup (FU 10), Nominal Landings of *Nephrops*, 1981-2006, as officially reported.

Year	UK Scotland				Total **
	<i>Nephrops</i> 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

* provisional na = not available
** There are no landings by other countries from this FU

Table 3.4.1.7 *Nephrops*, Noup (FU 10): Landings (tonnes), effort ('000 hours trawling) and LPUE (kg/hour trawling) of Scottish *Nephrops* trawlers, 1981-2006 (data for all *Nephrops* gears combined, and for single and multirigs separately).

Year	All <i>Nephrops</i> gears combined			Single rig			Multirig		
	Landings	Effort	LPUE	Landings	Effort	LPUE	Landings	Effort	LPUE
1981	13	0.4	34.3	13	0.4	34.3	na	na	na
1982	12	0.5	24.7	12	0.5	24.7	na	na	na
1983	9	0.3	30.7	9	0.3	30.7	na	na	na
1984	75	2.0	36.9	75	2.0	36.9	na	na	na
1985	2	0.1	25.0	2	0.1	25.0	na	na	na
1986	46	0.7	62.6	46	0.7	62.6	na	na	na
1987	12	0.7	18.1	12	0.7	18.1	na	na	na
1988	23	1.0	34.3	23	1.0	34.3	na	na	na
1989	24	0.9	25.8	24	0.9	25.8	na	na	na
1990	101	2.9	34.6	101	2.9	34.6	na	na	na
1991	110	4.8	22.9	23	0.9	25.6	87	3.9	22.3
1992	56	1.8	31.1	33	1.4	23.6	23	0.4	57.5
1993	200	4.8	41.7	152	3.6	42.0	48	1.2	39.0
1994	308	8.4	36.7	273	7.6	36.0	35	0.8	42.1
1995	162	3.9	41.5	139	3.5	39.9	23	0.4	63.2
1996	180	4.4	40.9	174	4.2	41.4	6	0.2	30.0
1997	185	5.3	34.9	172	4.9	35.1	13	0.4	32.5
1998	183	3.2	57.2	171	3.0	57.0	12	0.2	60.0
1999	211	4.1	51.8	196	3.8	53.0	15	0.3	54.9
2000	196	2.0	98.0	161	1.8	89.4	35	0.2	175.0
2001	89	1.7	52.4	82	1.4	58.6	7	0.3	23.3
2002	244	3.3	73.9	185	2.1	88.1	59	1.2	49.2
2003	258	2.7	95.6	217	2.3	94.3	41	0.4	102.5
2004	175	2.2	79.5	144	2.2	65.5	31	0.0	
2005	81	0.6	135.0	58	0.6	96.7	23	0.0	
2006	44	0.3	173.9	42	0.2	183.3	2	0.0	

Table 3.4.2.1 *Nephrops*, Management Area G: Total *Nephrops* landings (tonnes) by Functional Unit plus Other rectangles, 1981-2006 .

Year	FU 7	Other	Total
1981	373	2	375
1982	422	0	422
1983	693	0	693
1984	646	7	653
1985	1148	18	1166
1986	1543	17	1560
1987	1696	14	1710
1988	1573	11	1584
1989	2299	31	2330
1990	2540	20	2560
1991	4221	52	4273
1992	3363	39	3402
1993	3493	39	3532
1994	4569	117	4686
1995	6440	184	6624
1996	5218	150	5368
1997	6171	95	6266
1998	5136	94	5230
1999	6521	175	6696
2000	5570	81	5650
2001	5541	103	5644
2002	7247	163	7410
2003	6294	108	6402
2004	8729	101	8830
2005	10685	107	10792
2006	10693	100	10793

* provisional

Table 3.4.2.2 Management Area G : Total *Nephrops* landings (tonnes) by country, 1981-2006.

Year	Belgium	Denmark	Norway	UK	Total
1981	0	0	0	375	375
1982	0	0	0	422	422
1983	0	0	0	693	693
1984	0	0	0	653	653
1985	0	7	0	1159	1166
1986	0	50	0	1510	1560
1987	0	323	0	1387	1710
1988	0	81	0	1503	1584
1989	0	175	0	2155	2330
1990	2	240	1	2317	2560
1991	0	427	4	3842	4273
1992	3	364	28	3007	3402
1993	0	228	3	3301	3532
1994	0	395	6	4285	4686
1995	0	441	1	6182	6624
1996	0	287	1	5079	5368
1997	0	235	0	6031	6266
1998	0	173	0	5057	5230
1999	16	96	0	6584	6696
2000	6	105	0	5539	5650
2001	0	64	2	5573	5644
2002	0	173	5	7232	7410
2003	0	82	0	6320	6402
2004	0	136	0	8694	8830
2005	0	321	0	10471	10792
2006	0	285	0	10508	10793

* provisional na = not available
very small landings by Germany in 1999

Table 3.4.2.3 *Nephrops*, Fladen (FU 7), Nominal Landings of *Nephrops*, 1981-2006, as officially reported.

Year	Denmark	UK Scotland			Other countries **	Total
		<i>Nephrops</i> 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	4	4221
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	1	10685
2006	283	9396	1005	10401	9	10693

* provisional na = not available
** Other countries includes Belgium, Norway and UK England

Table 3.4.2.4 *Nephrops*, Fladen (FU 7): Landings (tonnes), effort ('000 hours trawling) and LPUE (kg/hour trawling) of Scottish *Nephrops* trawlers, 1981-2006 (data for all *Nephrops* gears combined, and for single and multirigs separately).

Year	All <i>Nephrops</i> gears combined			Single rig			Multirig		
	Landings	Effort	LPUE	Landings	Effort	LPUE	Landings	Effort	LPUE
1981	304	8.6	35.3	304	8.6	35.3	na	na	na
1982	382	12.2	31.3	382	12.2	31.3	na	na	na
1983	548	15.4	35.6	548	15.4	35.6	na	na	na
1984	549	11.4	48.2	549	11.4	48.2	na	na	na
1985	1016	26.6	38.2	1016	26.6	38.2	na	na	na
1986	1398	37.8	37.0	1398	37.8	37.0	na	na	na
1987	1024	41.6	24.6	1024	41.6	24.6	na	na	na
1988	1306	41.7	31.3	1306	41.7	31.3	na	na	na
1989	1719	47.2	36.4	1719	47.2	36.4	na	na	na
1990	1703	43.4	39.2	1703	43.4	39.2	na	na	na
1991	3024	78.5	38.5	410	11.4	36.0	2614	67.1	39.0
1992	1794	38.8	46.2	340	9.4	36.2	1454	29.4	49.5
1993	2033	49.9	40.7	388	9.6	40.4	1645	40.3	40.8
1994	1817	48.8	37.2	301	8.4	35.8	1516	40.4	37.5
1995	3569	75.3	47.4	2457	52.3	47.0	1022	23.0	44.4
1996	2338	57.2	40.9	2089	51.4	40.6	249	5.8	42.9
1997	2713	76.5	35.5	2013	54.7	36.8	700	21.8	32.1
1998	2291	60.0	38.2	1594	39.6	40.3	697	20.5	34.0
1999	2860	76.8	37.2	1980	50.3	39.4	880	26.5	33.2
2000	2915	92.1	31.7	2002	62.9	31.8	913	29.2	31.3
2001	3539	108.2	32.7	2162	65.8	32.9	1377	42.4	32.5
2002	4513	109.6	41.2	2833	58.9	48.1	1680	50.7	33.1
2003	4175	53.7	77.7	3388	42.8	79.2	787	10.9	72.2
2004	7274	56.1	129.8	6177	47.5	130.2	1097	8.6	127.6
2005	8849	61.3	144.4	6834	43.4	157.5	2015	17.9	112.7
2006	9396	65.5	143.4	7100	50.1	141.7	2296	15.4	149.1

Table 3.4.2.5 *Nephrops*, Fladen (FU 7): Logbook recorded effort (days fishing) and LPUE (kg/day) for bottom trawlers catching *Nephrops* with codend mesh sizes of 70 mm or above (1991-2006), and estimated total effort by Danish trawlers, 1993-2006.

Year	Logbook data		Estimated effort
	Effort	LPUE	
1991	3115	116	
1992	2289	130	
1993	820	130	1851
1994	1209	251	1620
1995	841	343	1604
1996	568	254	1187
1997	395	349	1100
1998	268	165	1323
1999	197	251	437
2000	292	170	828
2001	213	181	728
2002	335	368	1030
2003	194	308	271
2004	290	461	292
2005	607	482	666
2006	576	450	627
* provisional			

Table 3.4.3.1 *Nephrops* Norwegian Deep (FU 32): Landings (tonnes) by country, 1993-2006.

Year	Denmark	Norway	UK	Total
1993	220	102	16	338
1994	584	165	10	759
1995	418	74	2	494
1996	868	82	10	960
1997	689	64	7	760
1998	743	91	4	838
1999	972	144	13	1129
2000	871	147	33	1051
2001	1026	112	53	1191
2002	1043	121	52	1216
2003	996	100	14	1110
2004	835	93	6	934
2005	979	132	6	1117
2006*	939	114	6	1060
* provisional				

Table 3.4.3.2 *Nephrops* Norwegian Deep (FU 32): Danish effort(days and LPUE, 1993 to 2006

Year	effort	LPUE
1993	1317	121
1994	2126	208
1995	1792	198
1996	3139	235
1997	3189	218
1998	2707	214
1999	3710	226
2000	3986	192
2001	5372	166
2002	4968	188
2003	5273	177
2004	3488	216
2005	3919	234
2006	4796	196

Table 3.4.4.1 Nephrops, Management Area I: Total Nephrops landings (tonnes) by Functional Unit plus Other rectangles, 1981-2006.

Year	FU 6	FU 8	Other	Total
1981	1073	1006	74	2153
1982	2524	1195	156	3875
1983	2078	1724	100	3902
1984	1479	2134	78	3691
1985	2027	1969	106	4103
1986	2015	2263	143	4421
1987	2191	1674	147	4012
1988	2505	2528	308	5341
1989	3098	1886	158	5142
1990	2498	1930	134	4561
1991	2064	1404	355	3823
1992	1463	1757	271	3491
1993	3030	2369	262	5661
1994	3684	1850	407	5940
1995	2568	1763	373	4704
1996	2482	1688	387	4557
1997	2189	2194	339	4722
1998	2176	2145	278	4599
1999	2401	2205	401	5006
2000	2178	1785	391	4353
2001	2574	1528	633	4735
2002	1953	1340	637	3930
2003	2245	1126	653	4024
2004	2152	1658	589	4399
2005	3093	1990	529	5612
2006	4835	2425	584	7844

* provisional

Table 3.4.4.2 Management Area I : Total Nephrops landings (tonnes) by country, 1981-2006.

Year	Belgium	Denmark	UK	Total
1981	na	na	2153	2153
1982	na	na	3875	3875
1983	na	na	3902	3902
1984	na	na	3691	3691
1985	na	na	4103	4103
1986	0	na	4421	4421
1987	0	na	4012	4012
1988	0	10	5331	5341
1989	0	0	5142	5142
1990	5	2	4554	4561
1991	4	1	3818	3823
1992	1	7	3483	3491
1993	1	6	5654	5661
1994	0	1	5939	5940
1995	0	2	4702	4704
1996	0	3	4554	4557
1997	0	1	4721	4722
1998	0	2	4597	4599
1999	0	0	5006	5006
2000	1	0	4352	4353
2001	2	0	4733	4735
2002	15	0	3902	3917
2003	0	0	4024	4024
2004	0	0	4399	4399
2005	0	0	5612	5612
2006	0	15	7829	7844

* provisional na = not available
Germany and Belgium made landings of less than 1 tonne in 2006

Table 3.4.4.3 *Nephrops* Farn Deepes (FU 6): Landings (tonnes) by country, 1981-2006

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	3093
2006*	4388	434	4822	13	4835

* provisional
** Other countries includes Ne, Be and Dk

Table 3.4.4.4 *Nephrops* Farn Deepes (FU 6): Catches and landings (tonnes), effort ('000 hours trawling), CPUE and LPUE (kg/hour trawling) of UK *Nephrops* trawlers, 1985-2006.

Year	Catches	Landings	Effort	CPUE	LPUE
1985	4224	2012	88.7	47.6	22.7
1986	2800	1995	90.1	31.1	22.1
1987	4435	2177	98.3	45.1	22.2
1988	5530	2472	118.1	46.8	20.9
1989	4639	3076	133.5	34.7	23.0
1990	4096	2471	116.2	35.3	21.3
1991	3075	2020	114.7	26.8	17.6
1992	2287	1437	69.5	32.9	20.7
1993	3567	3011	111.8	31.9	26.9
1994	5190	3684	143.4	36.2	25.7
1995	3152	2539	97.0	32.5	26.2
1996	3681	2475	90.5	40.7	27.4
1997	2501	2155	85.3	29.3	25.3
1998	2134	2128	78.2	27.3	27.2
1999	3748	2369	86.7	43.2	27.3
2000	3526	2073	88.7	39.8	23.4
2001	5069	2412	103.6	48.9	23.3
2002	3080	1898	75.2	40.9	25.2
2003	3891	2165	77.9	49.9	27.8
2004	3061	1986	60.8	50.3	32.7
2005	4134	2819	72.9	56.7	38.7
2006*	6913	4623	96.9	71.3	47.7

* provisional

Table 3.4.4.5 *Nephrops*, Firth of Forth (FU 8), Nominal Landings of *Nephrops*, 1981-2006, as officially reported.

Year	UK Scotland				UK England	Total **
	<i>Nephrops</i> 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	2	4	1979	11	1990
2006*	2405	3	12	2420	5	2425

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

Table 3.4.4.6 *Nephrops*, Firth of Forth (FU 8): Landings (tonnes), effort ('000 hours trawling) and LPUE (kg/hour trawling) of Scottish *Nephrops* trawlers, 1981-2006 (data for all *Nephrops* gears combined, and for single and multirigs separately).

Year	All <i>Nephrops</i> gears combined			Single rig			Multirig		
	Landings	Effort	LPUE	Landings	Effort	LPUE	Landings	Effort	LPUE
1981	945	42.6	22.2	945	42.6	22.2	na	na	na
1982	1138	51.7	22.0	1138	51.7	22.0	na	na	na
1983	1681	60.7	27.7	1681	60.7	27.7	na	na	na
1984	2078	84.7	24.5	2078	84.7	24.5	na	na	na
1985	1908	73.9	25.8	1908	73.9	25.8	na	na	na
1986	2204	74.7	29.5	2204	74.7	29.5	na	na	na
1987	1582	62.1	25.5	1582	62.1	25.5	na	na	na
1988	2455	94.8	25.9	2455	94.8	25.9	na	na	na
1989	1833	78.7	23.3	1833	78.7	23.3	na	na	na
1990	1901	81.8	23.2	1901	81.8	23.2	na	na	na
1991	1359	69.4	19.6	1231	63.9	19.3	128	5.5	23.3
1992	1714	73.1	23.4	1480	63.3	23.4	198	8.5	23.3
1993	2349	100.3	23.4	2340	100.1	23.4	9	0.2	45.0
1994	1827	87.6	20.9	1827	87.6	20.9	0	0.0	0.0
1995	1708	78.9	21.6	1708	78.9	21.6	0	0.0	0.0
1996	1621	69.7	23.3	1621	69.7	23.3	0	0.0	0.0
1997	2137	71.6	29.8	2137	71.6	29.8	0	0.0	0.0
1998	2105	70.7	29.8	2105	70.7	29.8	0	0.0	0.0
1999	2192	67.7	32.4	2192	67.7	32.4	0	0.0	0.0
2000	1775	75.3	23.6	1761	75.0	23.5	14	0.3	46.7
2001	1484	68.8	21.6	1464	68.3	21.4	20	0.5	40.0
2002	1302	63.6	20.5	1286	63.3	20.3	16	0.3	53.3
2003	1115	53.0	21.0	1082	52.4	20.6	33	0.6	55.0
2004	1651	63.2	26.1	1633	62.9	26.0	18	0.4	49.7
2005	1973	66.6	29.6	1970	66.5	29.6	3	0.1	58.8
2006	2405	60.5	39.7	2400	60.2	39.9	5	0.4	12.5

Table 3.4.5.1 Nephrops Management Area H (North Sea South East): Total Nephrops landings (tonnes) by Functional Unit plus Other rectangles, 1991-2006.

Year	FU 5	FU 33	Other	Total
1991	862	74	88	1024
1992	612	76	48	736
1993	721	160	64	945
1994	503	137	41	681
1995	869	164	210	1243
1996	679	77	170	926
1997	1149	276	134	1559
1998	1111	357	248	1717
1999	1244	737	338	2319
2000	1121	610	364	2095
2001	1443	791	416	2650
2002	1231	861	514	2606
2003	1144	929	511	2585
2004	1070	1268	454	2792
2005	1066	1050	452	2568
2006	986	1292	521	2799
* provisional				

Table 3.4.5.2 Management Area H : Total Nephrops landings (tonnes) by country, 1991-2006.

Year	Belgium	Denmark	Netherl.	Germany	UK	Total
1991	704	305	0		15	1024
1992	589	115	0		32	736
1993	706	228	0		11	945
1994	515	146	0		20	681
1995	657	318	256		12	1243
1996	290	152	424		60	926
1997	491	377	629		62	1559
1998	380	519	708	57	53	1717
1999	475	893	670	103	178	2319
2000	391	767	613	79	245	2095
2001	432	812	945	139	322	2650
2002	312	932	1032	126	204	2606
2003	281	1039	1034	50	181	2585
2004	228	1258	1048	50	208	2792
2005	192	891	1027	108	350	2568
2006	227	776	989	287	520	2799
* provisional						

Table 3.4.5.3 *Nephrops* Botney Gut - Silver Pit (FU 5): Landings (tonnes) by country, 1991-2006

Year	Belgium	Denmark	Netherl.	Germany	UK	Total **
1991	682	176	na	na	4	862
1992	571	22	na	na	19	612
1993	694	20	na	na	7	721
1994	494	0	na	na	9	503
1995	641	77	148	na	3	869
1996	266	41	317	na	55	679
1997	486	67	540	na	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	117	87	654	51	157	1066
2006*	77	24	444	99	342	986

* provisional na = not available
** Totals for 1991-94 and 1991-1997 exclusive of NL and Germany resp.

Table 3.4.5.4 *Nephrops* Botney Gut - Silver Pit (FU 5): Landings (tonnes), effort ('000 hours trawling) and LPUE (kg/hour trawling) of Belgian *Nephrops* trawlers, 1991-2005. Dutch trawlers 2000 – 2005 and Danish trawlers 1996 -2006

Year	Belgium (1)			Netherlands (2)			Denmark (3)		
	Landings	Effort	LPUE	Landings	Effort	LPUE	Landings	Effort	LPUE
	tons	'000 hrs	kg/hour	tons	days at sea	kg/day	tons	days at sea	kg/day
1991	566	74.0	7.7						
1992	525	74.5	7.0						
1993	672	58.3	11.5						
1994	453	35.5	12.7						
1995	559	32.5	17.2						
1996	245	30.1	8.1				34	132	261.0
1997	399	31.8	12.5				24	59	412.0
1998	309	28.6	10.8				78	174	447.0
1999	322	31.8	10.1				44	107	408.0
2000	174	21.8	8.0	402	7936	50.7	76	247	306.0
2001	195	21.5	9.1	553	9797	56.5	78	283	275.0
2002	144	15.8	9.1	617	8999	68.6	47	200	237.0
2003	118	6.2	19.3	661	9043	73.1	33	132	247.3
2004	106	5.7	18.8	646	8676	74.5	36	149	241.9
2005	69	2.9	23.9	654	7912	82.7	87	297	290.9
2006							24	66	365.6

* provisional na = not available
(1) Vessels directed towards *Nephrops* at least 10 months per year
(2) All vessels operating in FU 5, regardless of directedness towards *Nephrops*
(3) Logbook records from vessels operating in FU 5, with mesh size ≥ 70 mm with *Nephrops* in catches

Table 3.4.5.5 *Nephrops* Off Horn Reef (FU 33): Landings (tonnes) by country, 1993-2006.

Year	Belgium	Denmark	Netherl.	Germany	UK	Total **
1993	0	159	na	na	1	160
1994	0	137	na	na	0	137
1995	3	158	3	na	1	164
1996	1	74	2	na	0	77
1997	0	274	2	na	0	276
1998	4	333	12	8	1	357
1999	22	683	12	14	6	737
2000	13	537	39	12	9	610
2001	52	667	61	11	+	791
2002	21	772	51	13	4	861
2003	15	842	67	4	1	929
2004	37	1097	109	24	1	1268
2005	16	803	191	31	9	1050
2006*	102	710	314	151	15	1292

* provisional na = not available
** Totals for 1993-94 and 1993-1997 exclusive of NL and Germany resp.

Table 3.4.5.6 *Nephrops* Off Horns Reef (FU 33): Logbook recorded effort (days fishing) and LPUE (kg/day) for bottom trawlers catching *Nephrops* with codend mesh sizes of 70 mm or above, and estimated total effort by Danish trawlers, 1993-2006.

Year	Logbook data		Estimated total effort
	Effort	LPUE	
1993	975	170	971
1994	739	165	830
1995	724	194	816
1996	370	157	471
1997	925	161	1702
1998	1442	208	1601
1999	2323	252	2710
2000	2286	209	2569
2001	2818	191	3489
2002	3214	207	3734
2003	3640	212	3973
2004	4306	234	4694
2005	2524	285	2776
2006	2062	308	2288

* provisional na = not available

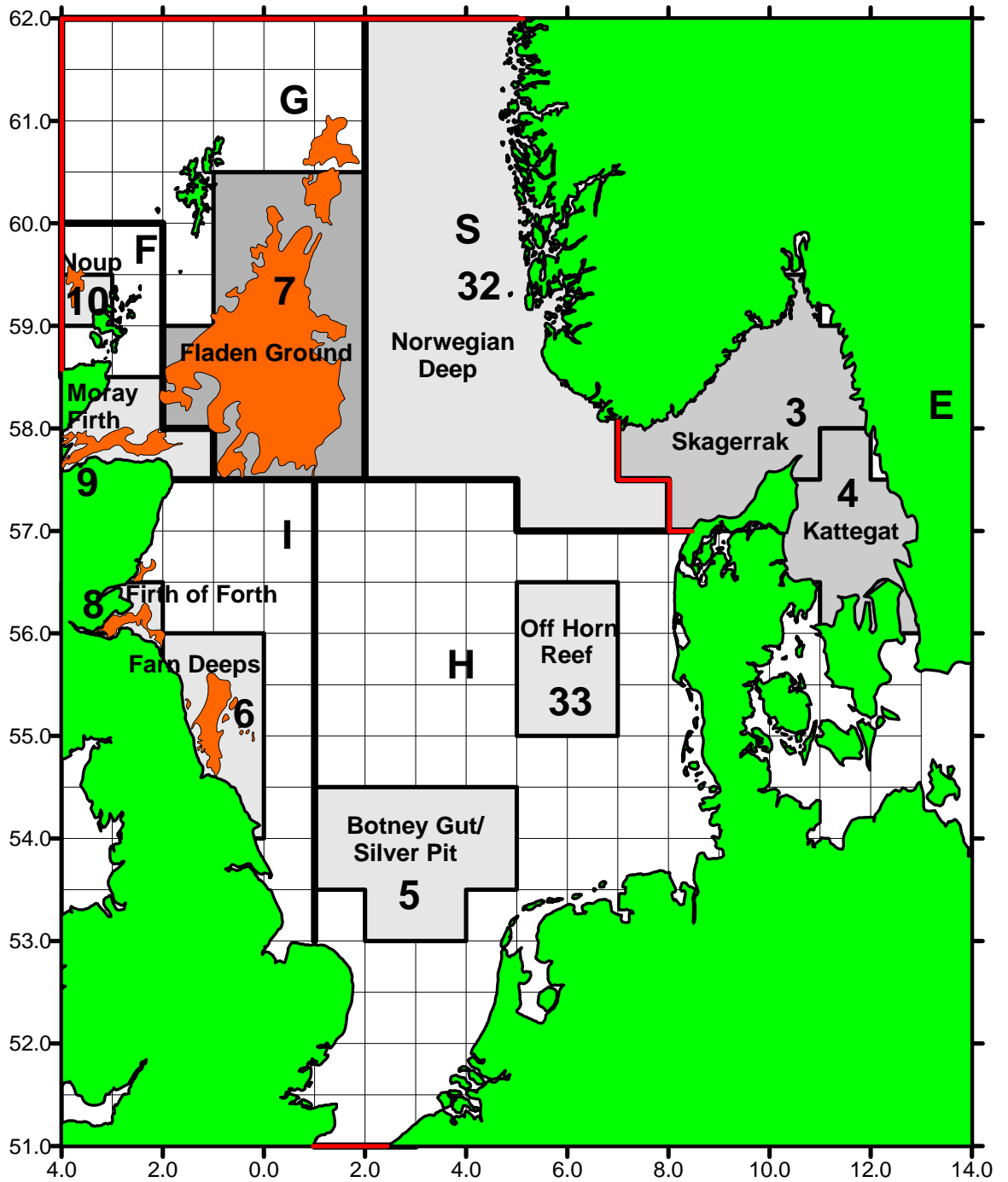


Figure 3.1.1 *Nephrops* Functional Units and Management Areas in the North Sea and Skagerrak/Kattegat region.

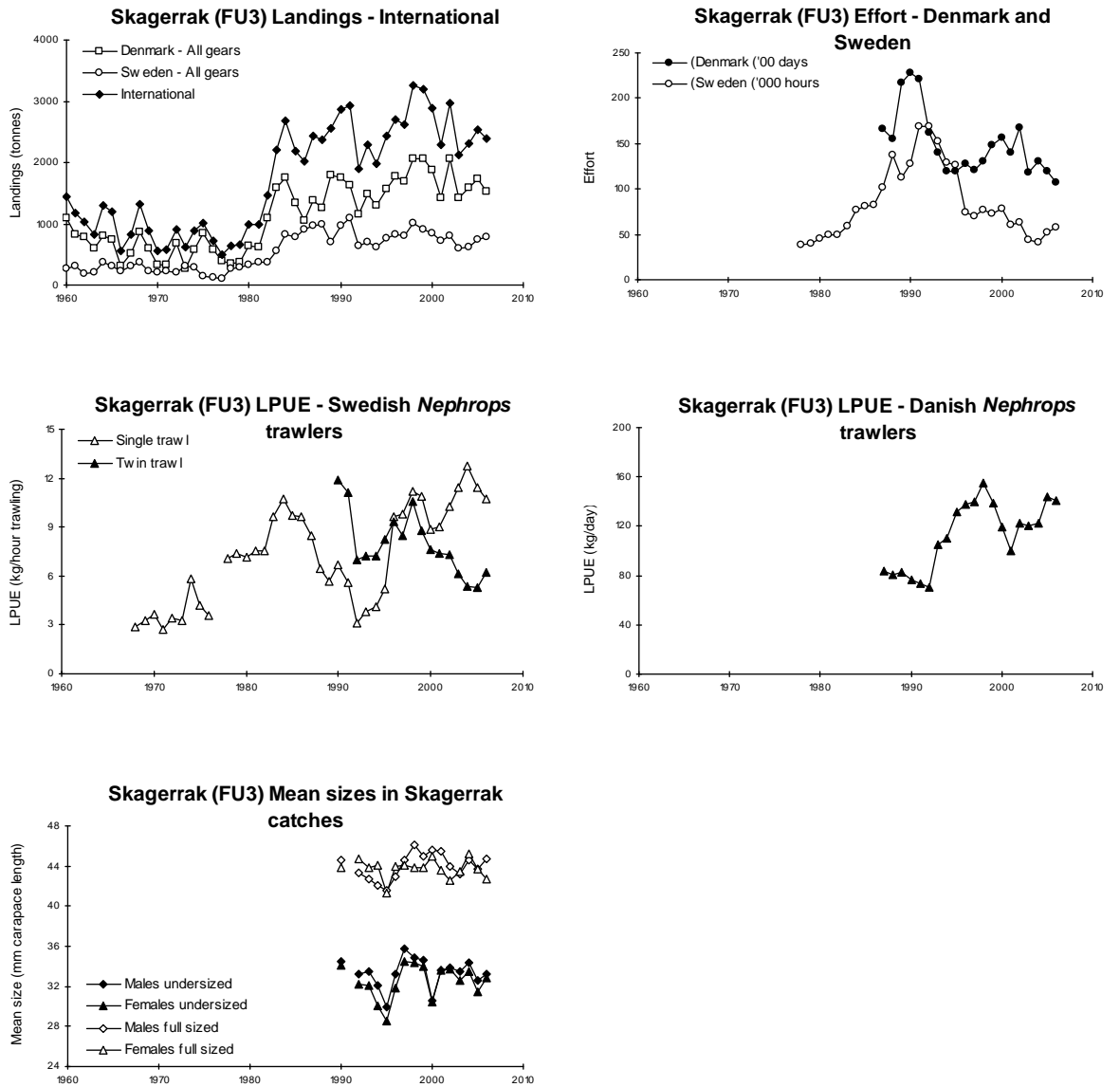


Figure 3.2.1.1 *Nephrops* Skagerrak (FU 3): Long-term trends in landings, effort, LPUEs, and mean sizes of *Nephrops*.

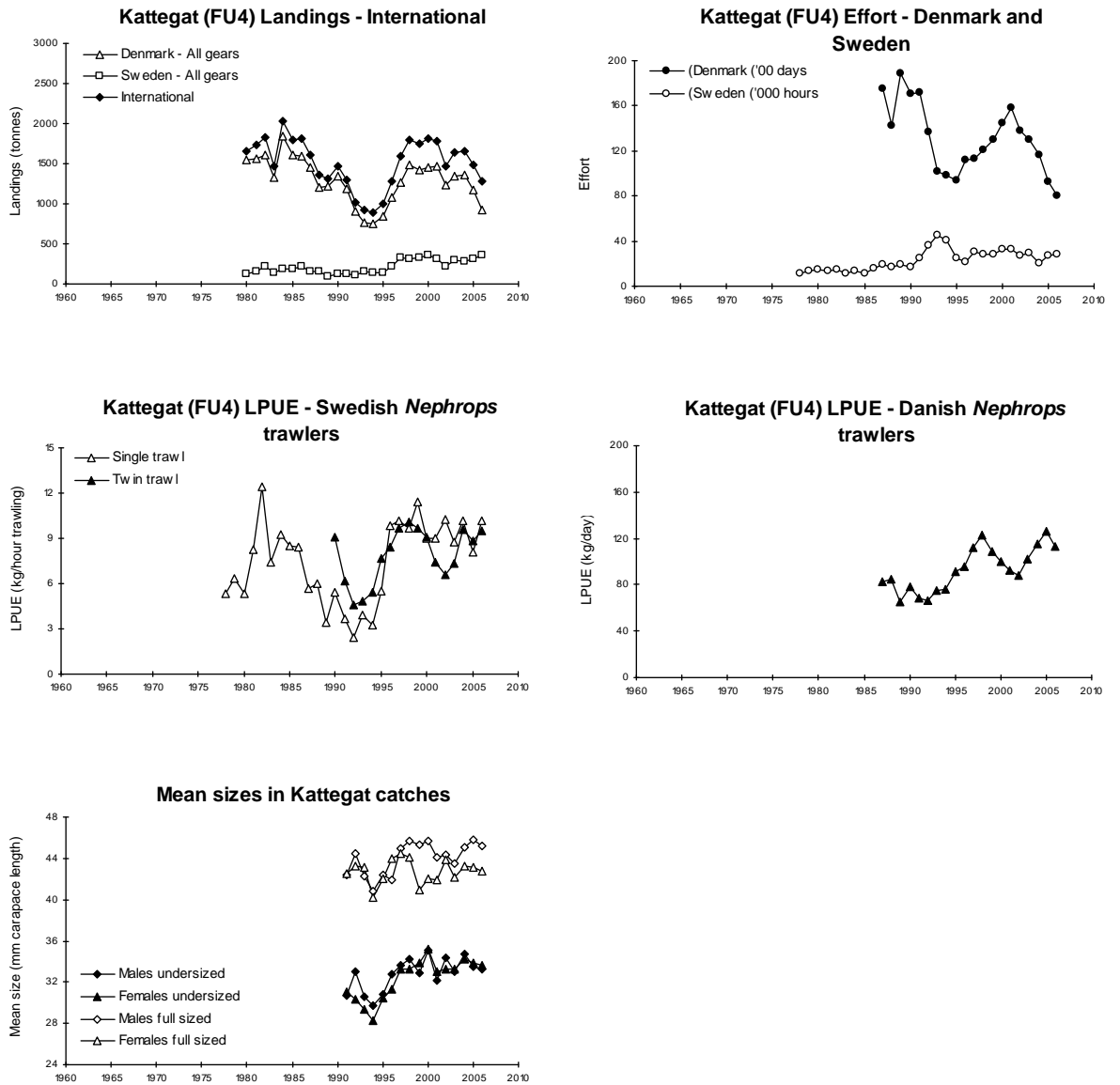


Figure 3.2.1.2 *Nephrops* Kattegat (FU 4): Long-term trends in landings, effort, LPUEs, and mean sizes of *Nephrops*.

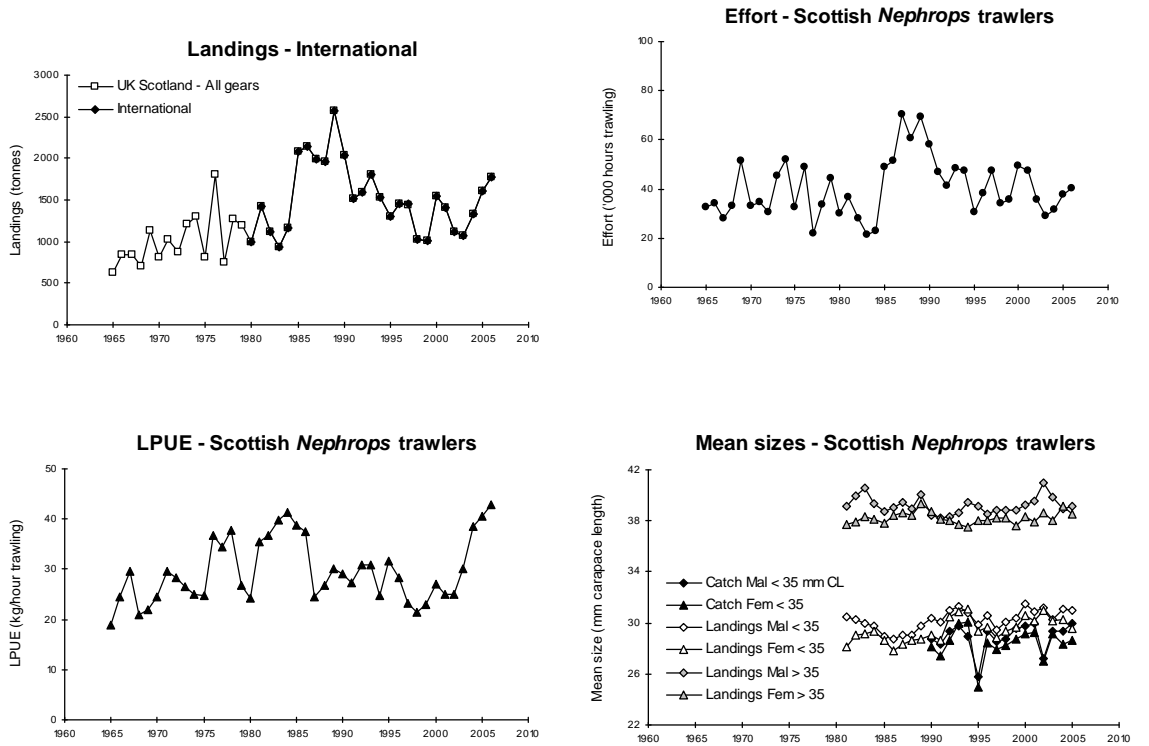


Figure 3.4.1.1 *Nephrops*, Moray Firth (FU 9), Long term landings, effort, LPUE and mean sizes.

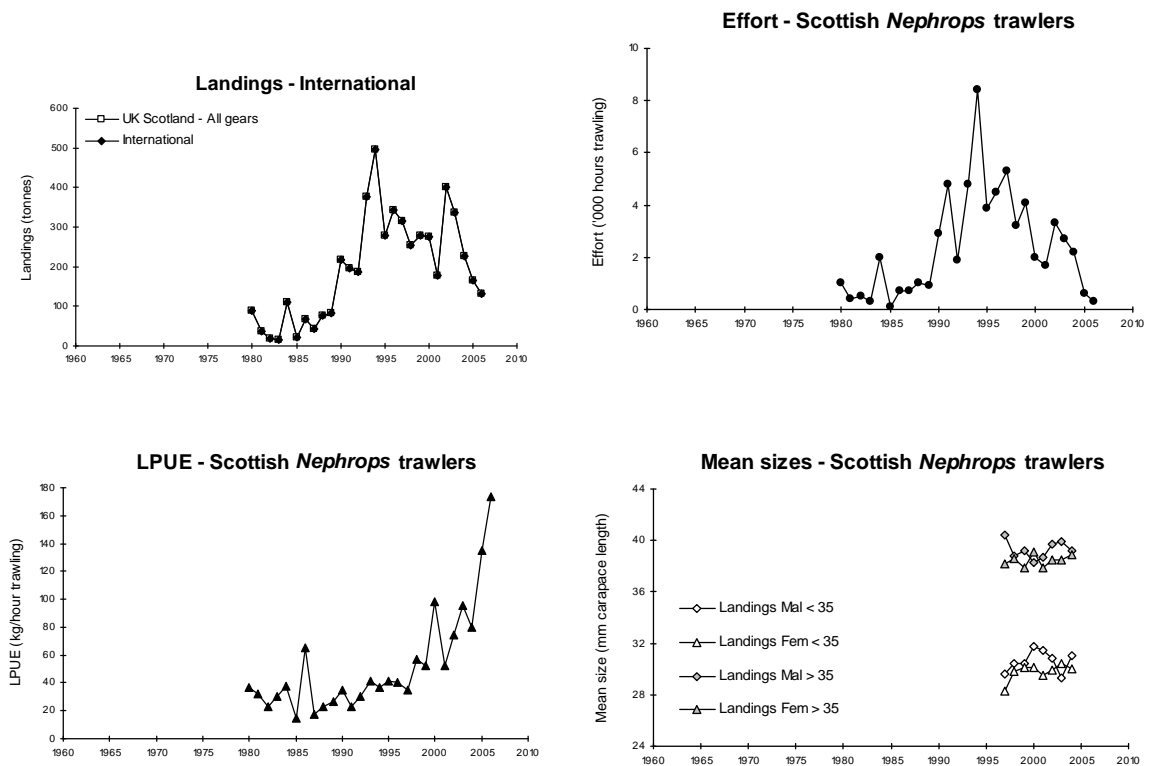


Figure 3.4.1.2 *Nephrops*, Noup (FU 10), Long term landings, effort, LPUE and mean sizes.

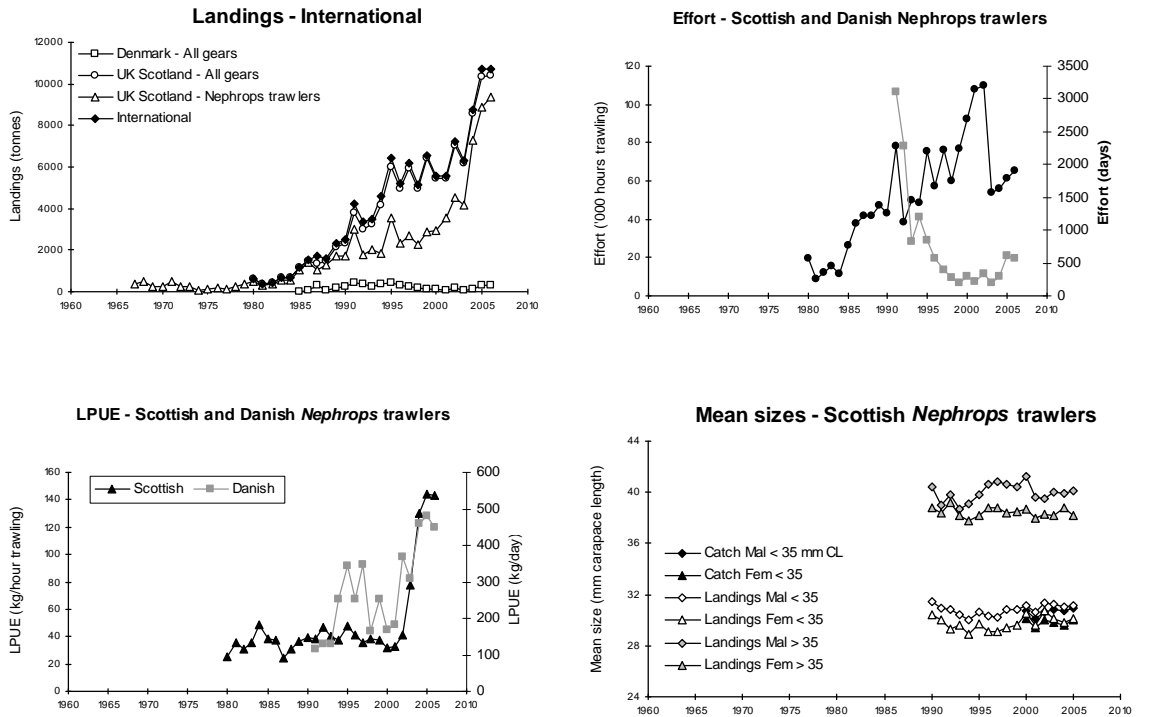


Figure 3.4.2.1 *Nephrops*, Fladen (FU 7), Long term landings, effort, LPUE and mean sizes.

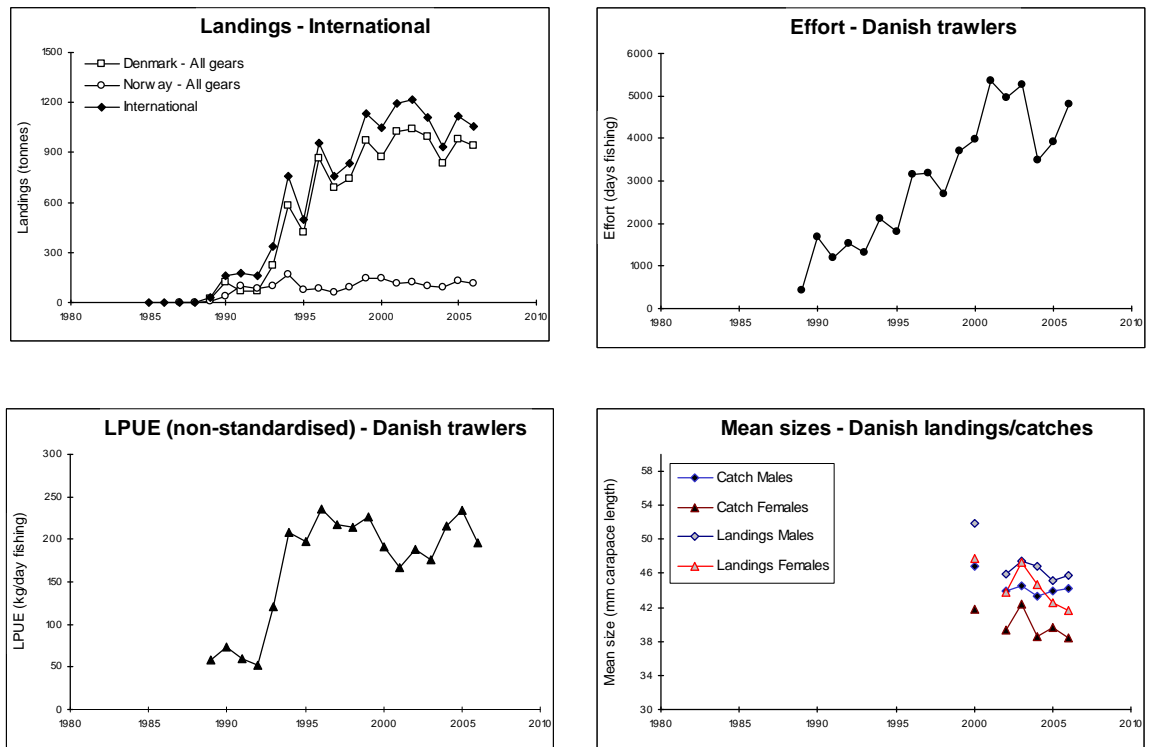


Figure 3.4.3.1 *Nephrops* Norwegian Deep (FU 32): Long-term trends in landings, effort, CPUEs and/or LPUEs, and mean sizes of *Nephrops*.

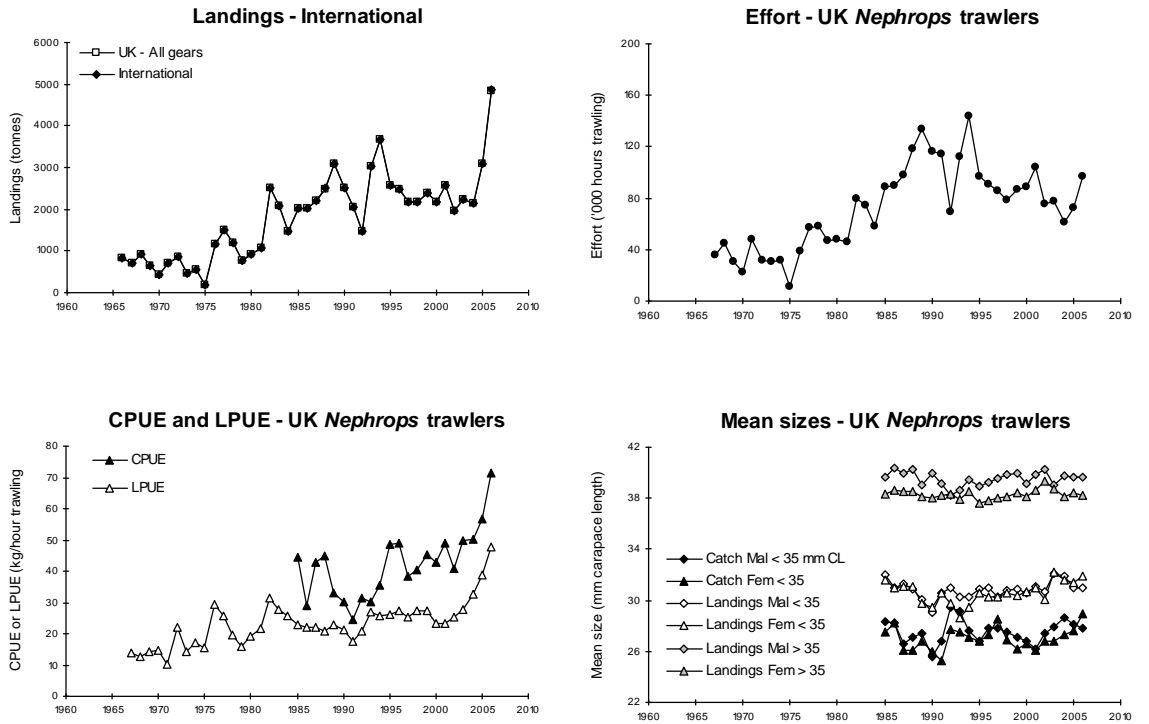


Figure 3.4.4.1 *Nephrops* Farn Deeps (FU 6): Long-term trends in landings, effort, CPUEs and/or LPUEs, and mean sizes of *Nephrops*

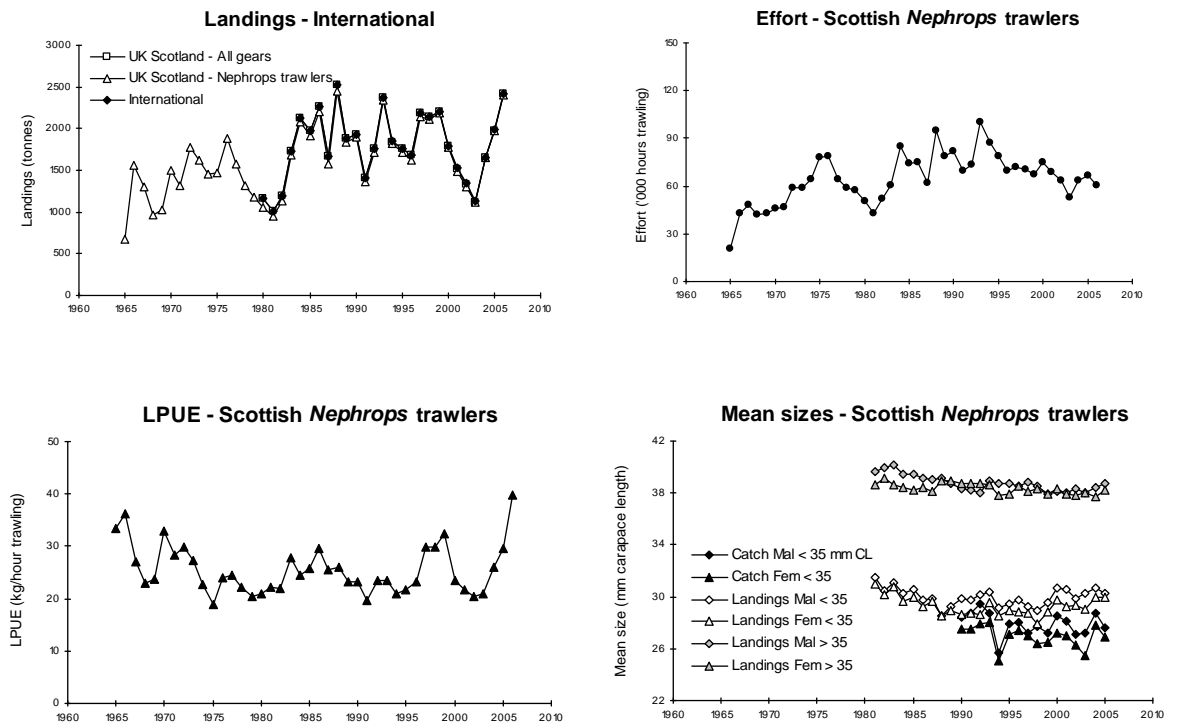


Figure 3.4.4.2 *Nephrops*, Firth of Forth (FU 8), Long term landings, effort, LPUE and mean sizes.

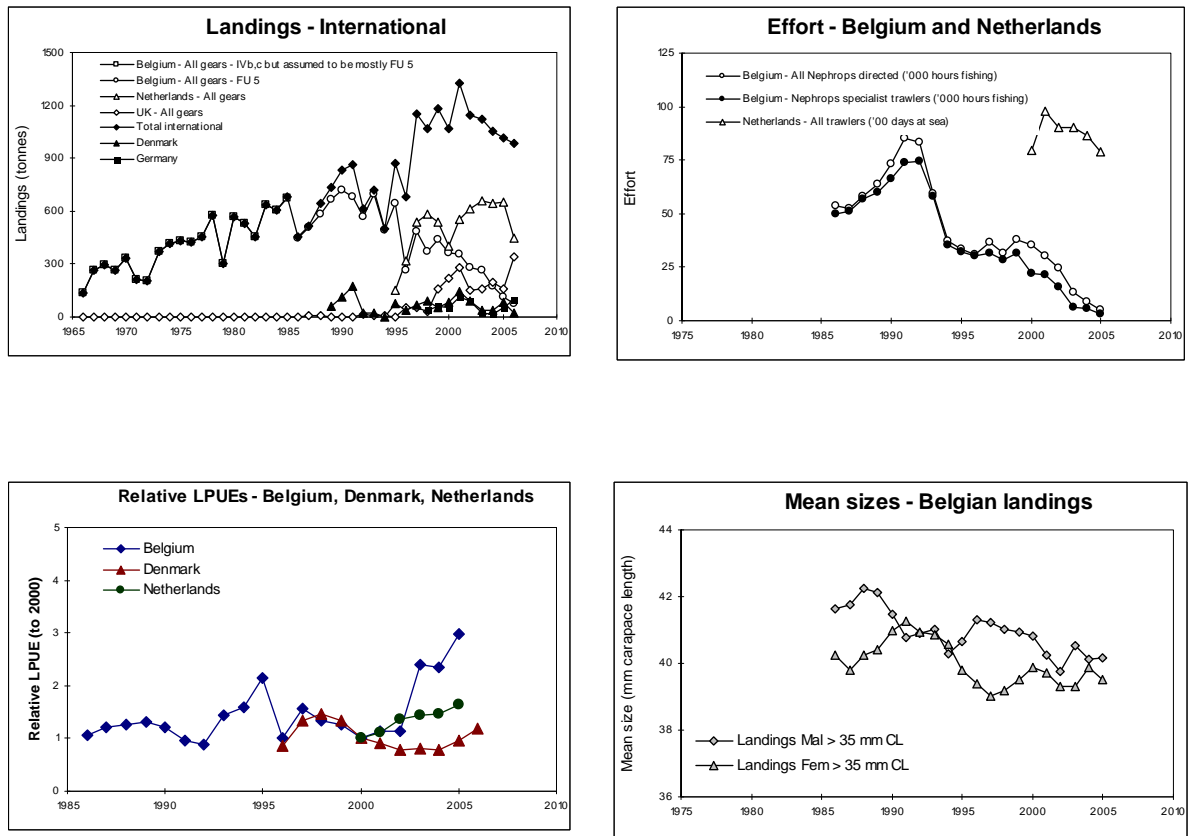


Figure 3.4.5.1 Botney Gut - Silver Pit (FU 5): Long-term trends in landings, effort, CPUEs and/or LPUEs, and mean sizes of Nephrops.

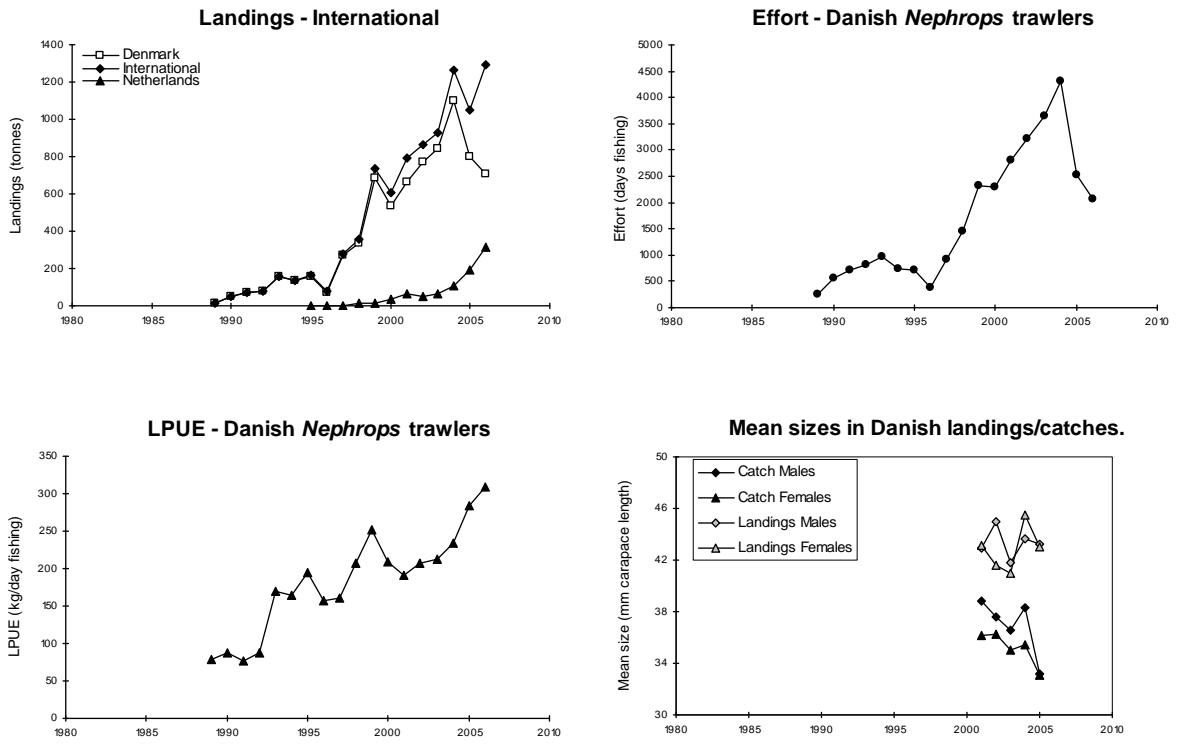


Figure 3.4.5.2 *Nephrops* Off Horn Reef (FU 33): Long-term trends in landings, effort, CPUEs and/or LPUEs, and mean sizes of *Nephrops*.