

## Stock Annex: Norway lobster (*Nephrops norvegicus*) in Division 4.a, Functional Unit 10 (northern North Sea, Noup)

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Stock specific documentation of standard assessment procedures used by ICES.

**Stock:** Norway lobster

**Working Group:** Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK)

**Created:**

**Authors:**

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**Last revised by:** WGNSSK – Carlos Mesquita

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### A. General

#### A.1. Stock definition

Throughout its distribution, *Nephrops* is limited to muddy habitat, and requires sediment with a silt & clay content of between 10–100% to excavate its burrows. This means that the distribution of suitable sediment defines the species distribution. Adult *Nephrops* only undertake very small scale movements (a few 100 m) but larval transfer may occur between separate mud patches in some areas. The Noup is located to the far north west of Division 4 adjacent to ICES 6.a and closer to the influence of the west of Scotland waters. In common with other *Nephrops* fisheries the bounds of the Functional Unit are defined by the limits of muddy substrate. This small stock is one of the most isolated Functional Units. Particle tracking models suggest that plankton is transported from the west coast and passes across this area.

The Noup consists of a single ICES statistical rectangle: 47E6. The spatial extent of the *Nephrops* stock in this area is 409 km<sup>2</sup>.

#### A.2. Fishery

The Noup grounds are regularly fished by 3-4 boats (16-24m) from Scrabster. They mainly target a mixed fish (mainly flat fish and monkfish) and *Nephrops* fishery using 100mm (twin-rig) to stay within the catch composition regulations. Boats land an average of around 1.5 tonnes of *Nephrops* from a 6-7 day trip. Occasionally some of the Fraserburgh *Nephrops* fleets fish the Noup grounds although this did not happen in 2005 - 2007, as many of the boats who used to make the journey have been decommissioned. The Noup ground has previously produced a period of good fishing every year but the area has not been important in the last couple, of years.

#### A.3. Ecosystem aspects

No information on the ecosystem aspects of this stock has been collated by the Working Group.

## B. Data

### B.1. Commercial catch

Given that the levels of market sampling are low and discard sampling is not available, the length structure of removals in the fishery is not considered to be well represented by the available data. Table B1-1 shows the landings, effort and LPUE data for single trawls, multiple trawls and combined while Figure B1-1 illustrates the long term commercial LPUE data. The low levels of sampling for this fishery mean it is not realistic to draw conclusions from changes in size composition or sex ratio. For the data limited approach, the mean weight in landings and discard rate is assumed to be the same as the Moray Firth (FU 9) as this is the closest functional unit to the Noup. Figures B1-2 and B1-3 show landings and effort, and LPUE data, respectively. Due to the very low levels of effort, small changes are likely to have very large effects and for this reason some data points in Figure B1-3 have been removed.

### B.2. Biological

No data available

### B.3. Surveys

Underwater TV surveys are available for this stock in 1994 and 1999 and were also carried out in 2006 and 2007, where 7 and 9 stations were successfully surveyed in each year respectively and raised to a stock area of 339 km<sup>2</sup> (Figure B3–1). These two most recent surveys give consistent estimates of population size which are slightly lower than the 1999 value. All of these are lower than the very high value observed in 1994.

#### Relative to absolute conversion factor

A number of factors are suspected to contribute bias to the surveys. In order to use the survey abundance estimate as absolute (required for both the *Nephrops* data limited approach and the full UWTv survey approach), it is necessary to correct for these potential biases. For other FUs, these are based on simulation studies, preliminary experimentation and expert opinion.

For the Noup, the footage, in terms of burrow complex diameter, water clarity and presence of other burrowing fauna, appears very similar to that of the Fladen and therefore the same overall conversion factor is used – 1.35.

### B.4. Commercial CPUE

Landings and effort data for Scottish *Nephrops* trawl gears are used to generate a LPUE index. LPUE is estimated using officially recorded effort (days absent). The effort & LPUE are not standardized and therefore do not account for changes in efficiency, seasonality or other factors that could influence the trend in LPUE over time.

For more information see section B.1

### B.5. Other relevant data

## C. Assessment: data and method

Advice should be provided for *Nephrops* in FU10 on the basis of the data limited approach (see below and category 4.1.4 of ICES DLS approach). This can provide an indication of the level of medium-term average F in relation to  $F_{MSY}$  (borrowed from

neighbouring stocks with similar characteristics) and this may also provide guidance on the level of abundance relative to  $MSY_{Btrigger}$ .

In terms of stock trends, there are currently insufficient length frequency data for use in constructing indicators. There is a commercial LPUE series extending back to 2000 which should be used (with caution) to monitor stock trends.

Input data required:

**Recent absolute (bias corrected) density estimate from UWTV survey**

In the range  $0.1 - 0.2 \text{ m}^{-2}$  - to cover the range of density estimates

**Spatial extent**

409 km<sup>2</sup>

**Landings mean weight**

24 g (from Moray Firth FU 9)

**Discard rate in number**

12 % (from Moray Firth FU 9)

**Discard survival**

25 % (from Fladen FU 7). A survival of 0% is assumed for the application of Data Limited method in producing Advice, in line with other North Sea *Nephrops* Category 4 stocks.

Model and software: see spreadsheet derived at WGNSSK 2012 ('FINAL version of Nep-IV nonTVstocks included in advice.xls').

Steps in formulating the data limited table:

1. Use absolute density & spatial extent to derive *Nephrops* abundance for a range of densities (see above)
2. Convert potential landings weight into numbers using landings mean weight for a range of total landings (10 year average, half of 10 year average, maximum of time series)
3. Convert landings numbers into total removals by dividing by (1 – discard rate in number)
4. Divide total removals (from 3) by *Nephrops* abundance (from 1) to obtain a matrix of harvest rates which can be compared to  $F_{MSY}$ .

**D. Short-Term Forecast**

Not relevant – uses *Nephrops* data limited approach.

**E. Medium-Term Forecast**

Not relevant – uses *Nephrops* data limited approach.

**F. Long-Term Forecast**

Not relevant – uses *Nephrops* data limited approach

## G. Biological Reference Points

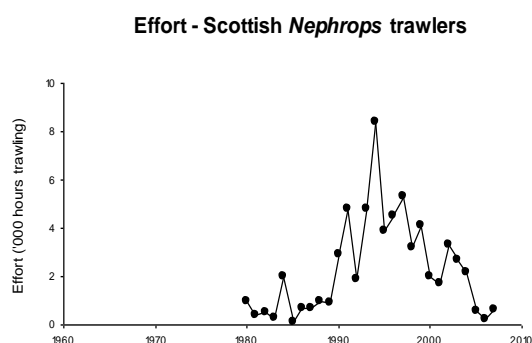
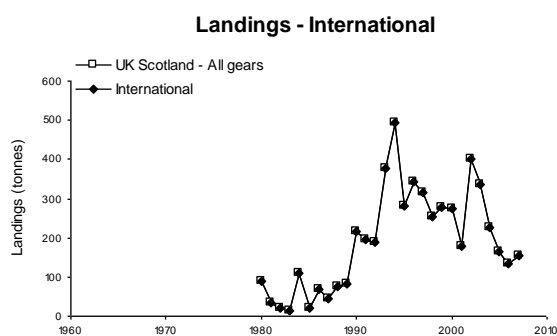
No reference points have been calculated for this functional unit. The *Nephrops* data limited approach compares calculated harvest rates to the range of Fmsy harvest rates estimated for other North Sea Functional Units (8-16 %)

## H. Other Issues

## I. References

**Table B1-1. *Nephrops*, Noup (FU 10): Landings (tonnes), effort ('000 hours trawling) and LPUE (kg/hour trawling) of Scottish *Nephrops* trawlers, 1981-2007 (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	81	0.6	133.9	185	2.1	88.1	59	1.2	49.2
2003	258	0.5	551.3	217	2.3	94.3	41	0.4	102.5
2004	175	2.2	79.5	144	2.2	65.2	31	0.0	-
2005	81	0.6	135.0	58	0.6	98.3	23	0.0	-
2006	44	0.3	146.7	42	0.4	94.6	2	0.0	-
2007	47	0.6	78.3	43	0.6	71.3	4	0.0	-



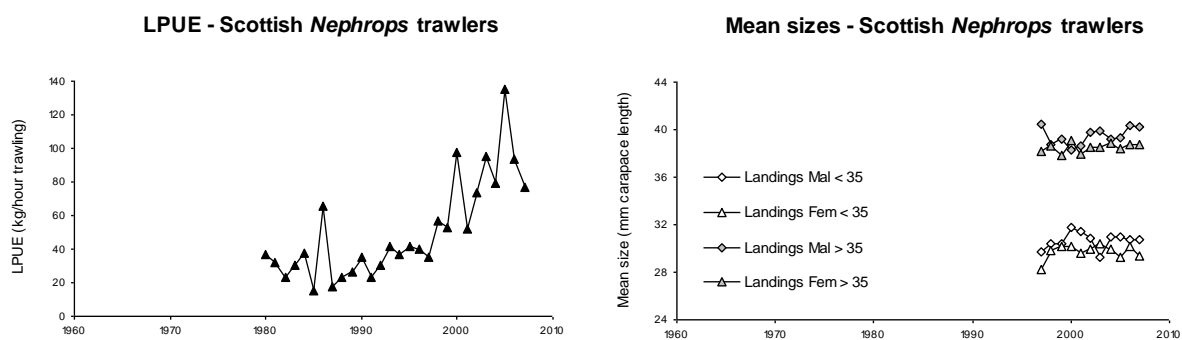


Figure 3.4.1.11 *Nephrops*, Noup (FU 10), Long term landings, effort, LPUE and mean sizes.

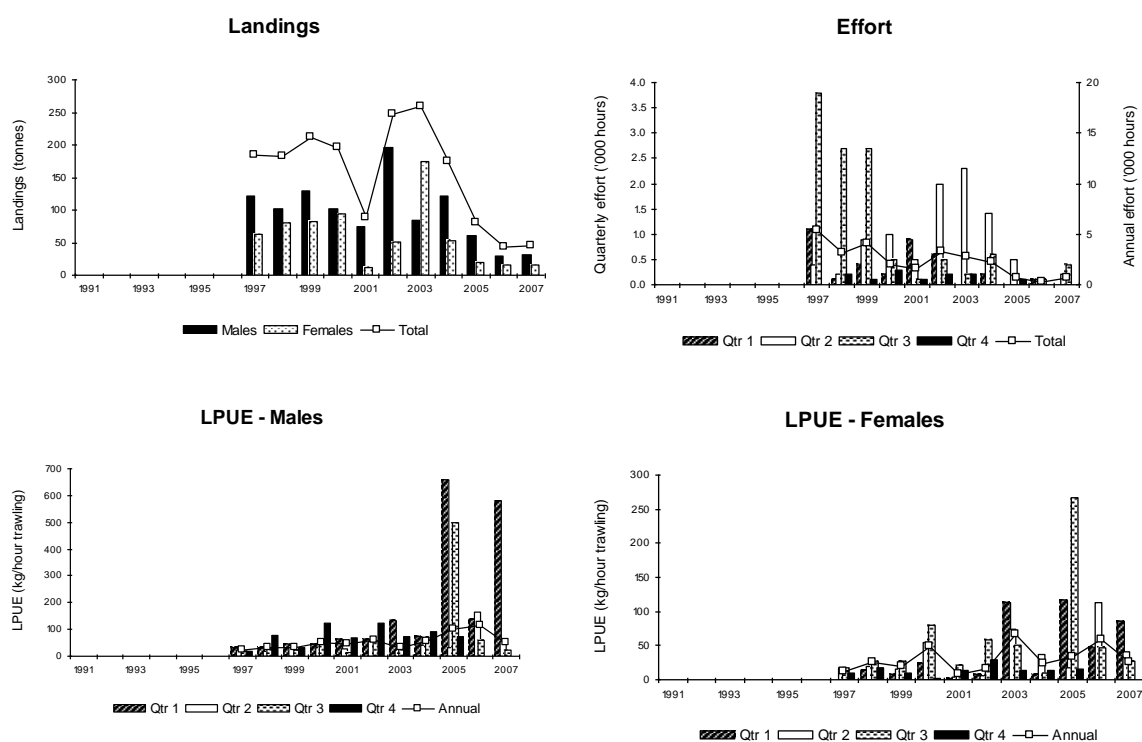
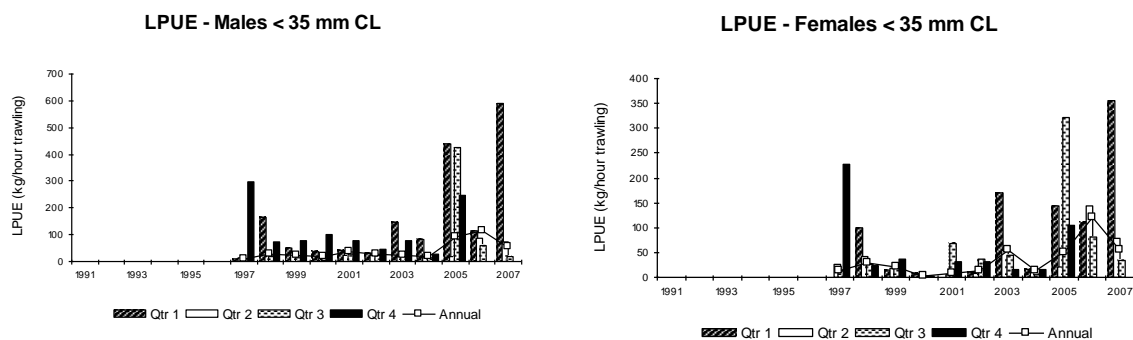


Figure 3.4.1.12 *Nephrops*, Noup (FU 10), Landings, effort and LPUEs by quarter and sex from Scottish *Nephrops* trawlers.



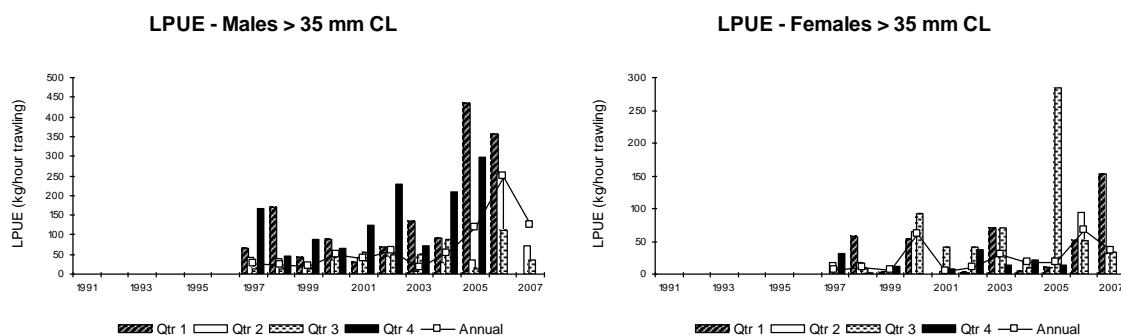


Figure 3.4.1.13 *Nephrops*, Noup (FU 10), LPUEs by sex and quarter for selected size groups, Scottish *Nephrops* trawlers.

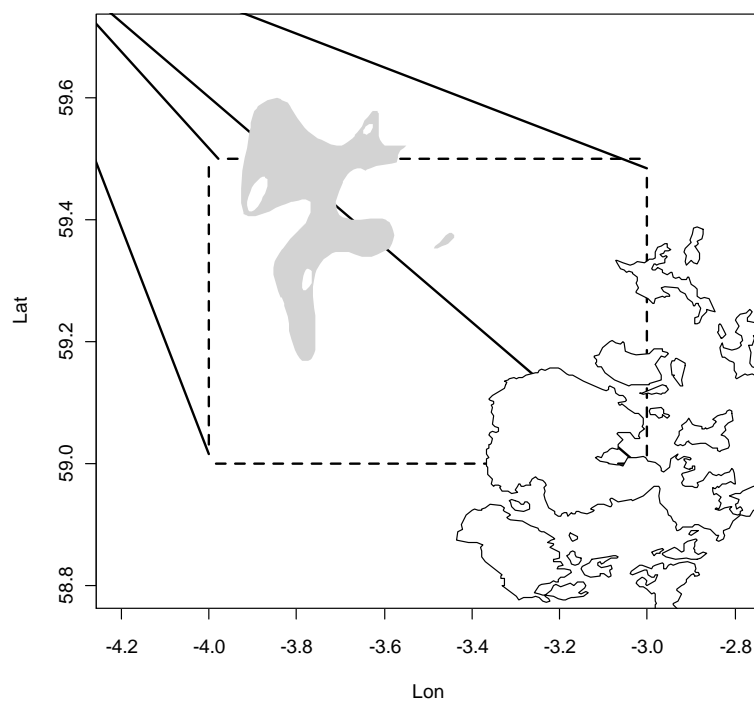


Figure B3–1. Distribution of *Nephrops* sediments in Noup (FU 10). Thick dashed lines represent the boundary of the functional unit. Sediments are: Dark grey – Mud; Grey – Sandy Mud, Light Grey – Muddy.