ICES Special Request Advice
Bay of Biscay and the Iberian Coast Ecoregion
sr.2018.02

Published 9 February 2018
DOI: 10.17895/ices.pub.3967

EU request for advice on a sentinel fishery for Norway lobster (*Nephrops)* in functional unit 25, Division 8.c

Advice summary

ICES considers that fisheries-independent approaches such as the use of underwater television (UWTV) surveys, a methodology that is used for many other Norway lobster (*Nephrops)* functional units (FUs) in the ICES area, would be the best method to obtain an index of abundance while minimizing the impact on the stock as it does not require that animals be fished.

ICES advises that in order to minimize the impact on the stock, catches should be zero. However, if an UWTV survey cannot be conducted, collecting of sentinel fishery CPUE data of reasonable precision to monitor FU 25 *Nephrops* would require ten fishing trips and would imply catches for 2018 of no more than 1.7 t. ICES notes that further work will be needed to determine if this CPUE data could be used as an appropriate abundance index for assessing the status of the stock.

This sentinel fishery should be carried out within an observers' on-board programme, with five trips per month in each of August and September, carried out in the same area covered by the 2017 observer programme and utilizing the same vessels and the same gear, and with each trip being of no more than two days duration. The programme should be supervised by a scientific institute.

Request

Background:
In relation to the setting of fishing opportunities, ICES has advised that for 2017-2019 the 8c *Nephrops* fishery should have a zero TAC. For 2018, the Commission has proposed a zero TAC (same as in 2017). *In discussions with Spain, there has been a request tabled for a sentinel fishery for 8c Nephrops in 2018 in the order of 10t. This could allow to collect necessary catch/landing data for FU 25. Indeed, in WGBIE (2017) ICES states that: "Fishing industry presented a working document to the WG with qualitative and quantitative information about Nephrops' fishery in FU25 (WD10, 2016[1]). The WG decided that the LPUE data provided, only for years 2015 and 2016, could be used as an abundance index in a future benchmark as long as the time-series is continued and extended historically". This would immediately seem to indicate that a continuation of the collection of data would be to the benefit of stock assessment. Spain has submitted additional information, including information compiled by IEO.*

Request:

- *Assess a level of catches that would minimise impact on the stock but would be sufficient to allow collection of LPUE data for potential use as an abundance index*
- *Suggest any specific conditions that should apply to the fishery, and data collected, in order for it to be useful in an abundance index context – i.e. trips, timeframe, geographical area, etc.*

Elaboration on the advice

ICES notes that there are two FUs for *Nephrops* in Division 8.c (FUs 25 and 31; see Figure 1), but the advice provided here is for FU 25 only.

ICES considers that fisheries-independent approaches such as the use of underwater television (UWTV) surveys, a methodology that is used for many other *Nephrops* FUs in the ICES area, would be the best method to obtain an index of abundance while minimizing the impact on the stock as it does not require that animals be fished.

[1] This working document was submitted at the 2017 meeting of WGBIE and is referenced below as Fernández *et al.* (2017).

If an UWTV survey cannot be conducted, ICES advises that five trips in each of the months August and September would allow a reasonable precision (a coefficient of variation [CV] of 30% with 90% probability) for a sentinel fishery CPUE index. The implied catch of 1.7 tonnes is an estimate, derived by multiplying the number of trips per month (5) by the catch rate observed in the 2017 programme in each of those months and then adding a 15% buffer to account for potential catches in case catch rates in 2018 are higher. While the data collected should allow the calculation of a CPUE series, further work will be required to determine if this CPUE series is appropriate for use as an unbiased index of abundance. This additional work would be examined in a future benchmark.

ICES notes that the catches realized from such a programme designed with a fixed effort level (10 trips) can be expected to vary from year to year according to the abundance of *Nephrops* on the fishing grounds. The amount of catch expected from the programme is based on an abundance level similar to that observed in 2017.

This sentinel fishery should be carried out within an observers' on-board programme, with five trips per month in each of August and September, carried out in the same area covered by the 2017 observer programme and utilizing the same vessels and the same gear, and with each trip being of no more than two days duration. A sentinel fishery during the months of August and September is considered sufficient to provide an index of the changes in the abundance of the stock and would provide comparable data to that collected in 2017. Although catch rates are not the highest during these months, *Nephrops* are out of their burrows during that period and are caught in sufficient numbers to constitute a representative index of the changes in stock abundance. If the same vessels are not available, replacement vessels should have similar power and tonnage, and use the same gear as in 2017. The specifications of the gear to be used as well as the sampling area should clearly be documented so that the sentinel fishery would take place in a similar fashion each year. To reduce potential bias in the CPUE, the fishing hauls should be made in different parts of the sampling area and not be concentrated at a single location.

In addition to these general conditions, data on catch rates should be collected on a haul basis and should include, at least, the following variables: the position, the time of day (start and end), duration of the haul, depth, vessel, gear specifications, catch of *Nephrops* in kg, as well as length frequency and sex ratio. Catch information on the numbers and length frequencies of other species caught during the individual hauls should also be recorded as the presence of other species may inhibit *Nephrops* from getting out of their burrows, thus having a potential impact on catch rates. The collection of all of these data would allow for standardization of catch rates and calculation of CPUE at a finer level than by trip. While not considered essential, it would be desirable to standardize the haul duration. It is recommended that the programme be under the supervision of a research institute to ensure data quality and integrity.

Basis of the advice

Background

Nephrops landings from ICES Division 8.c have been constantly decreasing since 1989 (ICES, 2017), resulting in an ICES advice of zero tonnes for Division 8.c *Nephrops* since 2002 (ICES, 2016) in both of the FUs 25 and 31 (Figure 1). A total allowable catch (TAC) of zero tonnes for Division 8.c was established for 2017 (EU, 2017).

In 2017, the fishing industry submitted a working document (ICES, 2018) to the ICES Working Group for the Bay of Biscay and Iberian waters Ecoregion (WGBIE), suggesting – based on their own data – an increase in the FU 25 *Nephrops* catch per unit effort (CPUE), from 6.46 kg h^{-1} in 2015 to 10.81 kg h^{-1} in 2016. There are no *Nephrops* discards in this functional unit (ICES, 2017); therefore, CPUE in FU 25 is equivalent to landings per unit effort (LPUE). ICES 2017 WGBIE considered that the CPUE data provided by the fishing industry could be examined as an abundance index in a future benchmark as long as the time-series is continued and extended historically.

Spain requested that the EU establish a scientific quota for *Nephrops* in FU 25 in order to carry out an observer programme supervised by the Spanish Institute of Oceanography (IEO) in 2017. This programme (CARACAS) was conducted in August and

September 2017 providing CPUE data. The 2017 programme was carried out on two commercial vessels on the fishing grounds northwest of A Coruña (FU 25, NW of Spain) between 200 and 500 m depth. A total of 14 trips with 79 hauls were made (Table 1). The *Nephrops* CPUE in the *Nephrops*-directed hauls was 7.2 kg h^{-1} (ICES, 2018). This CPUE is not directly comparable with those of 2015 and 2016 without taking into account the details of the data and the sampling programme.

Following the work conducted during 2017, the EU has requested ICES to provide advice on a sentinel fishery in FU 25.

Methods

An observers' on-board programme, designed to obtain an FU 25 *Nephrops* abundance index, is proposed for 2018.

The historical monthly monitoring of the FU 25 *Nephrops* fishery by IEO shows that catch rates are highest during the period of May to September, when *Nephrops* males and females are out of their burrows (Figure 2 and Table 2). According to these data, this monthly variation of the CPUE is persistent throughout the time-series. Moreover, similar relative monthly CPUE distributions are found in other FUs (González Herraiz, 2011). A sentinel fishery during the months of August and September, as was conducted in 2017, is therefore considered adequate to provide an index of the changes in the abundance of the stock and would provide comparable data to that collected in 2017. Although catch rates are not the highest during these months, *Nephrops* are out of their burrows during that period and are caught in sufficient numbers so that CPUE could constitute a representative index of the changes in stock abundance.

In the 2017 observers' programme, nine trips were carried out in August and five trips in September. A resampling simulation with replacement of the CPUEs of the fishing trips was performed by month (Figure 3). It was concluded that five trips each month (August and September) with observers on board is the minimum number of sampling trips required to achieve a CV ≤ 30% with a probability of 90%.

To estimate the implied catch of the programme in 2018, the 2017 August and September mean CPUEs (158 kg $trip^{-1}$ and 129 kg $trip^{-1}$, respectively; see Table 1) were considered proxies of the expected CPUEs of the same months in 2018. Each of these expected CPUEs (kg $trip^{-1}$) was multiplied by the necessary number of trips per month (five trips) to provide an estimate of the implied catch (kg) for August and September 2018. This resulted in 790 kg for August and 645 kg for September, giving a total of 1.4 t. A 15% buffer was added to this catch to account for a potential increase in catch rates in 2018 and resulted in the estimate of the total catch upper limit of 1.7 t.

Results and conclusions

To continue monitoring FU 25, an observers' programme similar to the 2017 programme should be carried out in 2018, with five trips in each of August and September, when the *Nephrops* are available to provide a representative sample and the sex ratio is balanced in the fishery (Fariña, 1996).

Additional information

Table 1 2017 observers' programme designed for FU 25 *Nephrops*. CPUE (kg trip^{-1}).

			Monthly CPUE		
Trip	Month	CPUE (kg trip^{-1})	Average	Standard deviation	Coefficient of variation
1	August	213.00	158.37	60	0.38
2	August	248.00			
3	August	133.00			
4	August	73.75			
5	August	214.25			
6	August	100.00			
7	August	108.00			
8	August	183.00			
9	August	152.35			
10	September	124.00	128.85	29	0.23
11	September	84.00			
12	September	135.75			
13	September	136.50			
14	September	164.00			

Table 2 Monthly FU 25 *Nephrops* CPUE and standard error in kg trip^{-1} (1980–2008). Data from the Spanish Oceanographic Institute (IEO).

	CPUE (kg trip^{-1})		
Month	Average	Standard deviation	Coefficient of variation
January	26.0	14.7	0.57
February	23.8	14.1	0.59
March	24.5	16.2	0.66
April	26.3	19.8	0.75
May	55.3	39.9	0.72
June	69.7	44.1	0.63
July	81.3	49.7	0.61
August	69.2	44.7	0.65
September	40.3	30.4	0.75
October	32.4	21.8	0.67
November	32.2	18.9	0.59
December	39.2	21.2	0.54

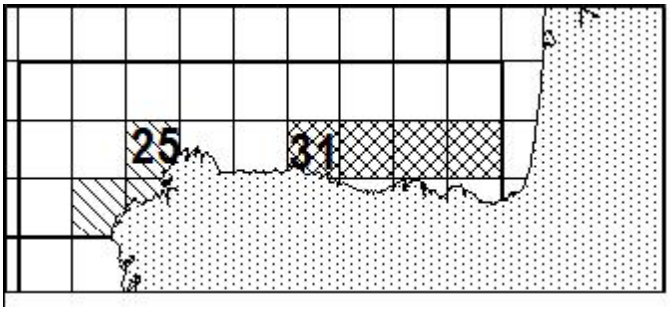

Figure 1 *Nephrops* functional units in Division 8.c. FU 25 covers statistical rectangles 15E0–E1 and 16E1.

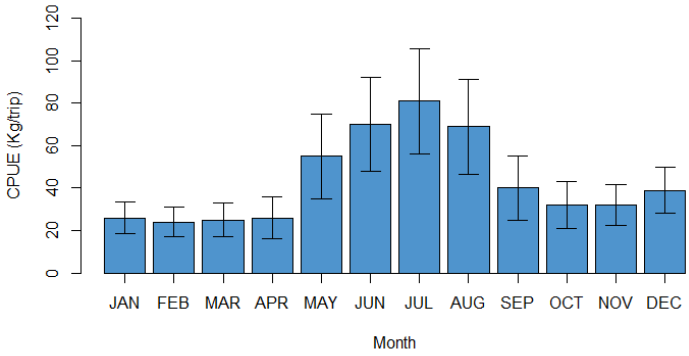

Figure 2 Monthly FU 25 *Nephrops* CPUE and standard deviation in kg trip^{-1} (1980–2008). Data from the Spanish Institute of Oceanography (IEO).

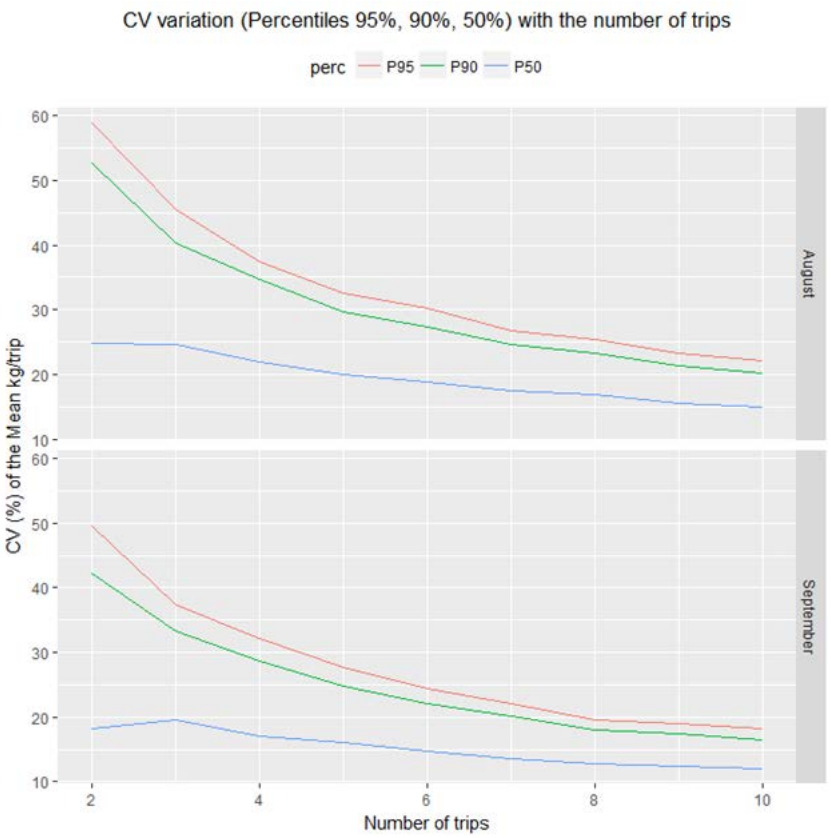

Figure 3 Relationship between the coefficient of variation of the mean CPUE (kg trip^{-1}) and the number of sampled trips per month with percentiles (95%, 90%, and 50%). Results from the trips' resampling simulations per month with replacements, based on the 2017 observers' on-board programme data.

Sources and references

EU. 2017. COUNCIL REGULATION (EU) 2017/127 of 20 January 2017, fixing for 2017 the fishing opportunities for certain fish stocks and groups of fish stocks, applicable in Union waters and, for Union fishing vessels, in certain non-Union waters. Official Journal of the European Union, 28.1.2017, L24. 172 pp. http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017R0127&from=EN.

Fariña, A. C. 1996. Megafauna de la plataforma continental y talud superior de Galicia. Biología de la cigala *Nephrops norvegicus*. Doctoral thesis. Universidade da Coruña. October 1996.

Fernández, R., Teixeira, T., and Corrás, J. 2017. Information regarding fishing for *Nephrops norvegicus* (Norway lobster) in Galicia (FU 25). *In* Report of the Working Group for the Bay of Biscay and Iberian waters Ecoregion (WGBIE), 4–11 May 2017, Cádiz, Spain. ICES CM 2017/ACOM:12. 532 pp. Annex 6, Working Document No. 10.

González Herraiz, I. 2011. Biología y análisis de la pesquería española de cigala (*Nephrops norvegicus*) del Suroeste de Irlanda. PhD. Universidade da Coruña.

ICES. 2016. Report of the ICES Advisory Committee, 2016. ICES Advice 2016, Book 7 (Bay of Biscay and Iberian waters).

ICES. 2017. Report of the Working Group for the Bay of Biscay and Iberian waters Ecoregion (WGBIE), 4–11 May 2017, Cádiz, Spain. ICES CM 2017/ACOM:12. 532 pp.

ICES. 2018. Sentinel fishery for *Nephrops* in FU 25 in Division 8.c. Coming as Annex 8 in the report of the Working Group for the Bay of Biscay and the Iberian Waters Ecoregion (WGBIE), scheduled to meet 3–10 May 2018 at ICES HQ, Denmark.

http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2018/WGBIE/29%20WGBIE%20Report%20-%20Annex%208.pdf