Abundance indices data collection for *Nephrops* FU 25 (North Galicia) in 2018

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INTRODUCTION

Nephrops landings in FU 25 (ICES Division 8c, North Galicia) have decreased an 89% from 1975 to 2016. ICES advice for this stock is on the basis of a data-limited approach since 2006, meaning that no analytical stock assessment is conducted in this FU. According to this approach, FU 25 is considered as category 3.1.4 (ICES, 2012) and it is assessed mainly by the analysis of the LPUE series trend. ICES recommendation for this FU has been zero catch since 2002. Results of the last assessments in 2016 indicated an extremely low abundance level and a zero TAC was also recommended for 2017, 2018 and 2019. This recommendation was established in the rule-power of EU (EU, 2017) in 2017 and as consequence the *Nephrops* fishery in FU 25 was closed for that triennium.

Fishing industry presented abundance data of this stock for 2015 and 2016 in WGBIE 2017 (ICES, 2017) based on catches and effort information obtained from two trawler vessels based in the A Coruña port (Fernández et al., 2017). Part of each one of their trips are directed to *Nephrops* in FU 25. There are no *Nephrops* discards in this FU, therefore catches are equivalent to landings (ICES, 2018a). ICES 2017 WGBIE considered that "the LPUE data provided […] could be used as an abundance index in a future Benchmark as long as the time series is continued and extended historically".

Get new fishery data and commercial abundance indices is impossible with the closed FU 25 *Nephrops* fishery. Moreover, there are not appropriate abundance indices from scientific survey. Therefore, any new approach of analysis and assessment of the stock trends in the next few years cannot be achieved. So, the fishing industry asked the Spanish General Secretariat of Fisheries (SGP) the possibility of carrying out a survey in 2017 to still providing a a *Nephrops* abundance index. This survey would be restricted to the two vessels used for the calculation of abundance indices submitted to WGBIE 2017 (Fernández et al., 2017). Spain requested a special quota for *Nephrops* in FU 25 to EU in order to carry out an observer's programme in 2017 supervised by the Spanish Oceanographic Institute (IEO). EU conceded 4.2 tonnes for *Nephrops* in FU25 and a sentinel fishery for *Nephrops* was carried out in August and September of 2017. A permission to carry out a 2018 sentinel fishery was solicited later to DG-MARE by Spain. EU requested to ICES for advice on the level of catch and characteristics needed for the 2018 sentinel fishery, what was answered by ICES in February 2018 (ICES, 2018b). In June 2018 EU provided a special quota of 2 t for the Sentinel fishery 2018 (EU, 2018, Annex I), that was carried out in August and September of 2018. In November of 2018 EU provided a special quota of 2 t for the Sentinel fishery 2019 (EU, 2019).

In this working document the results of the Sentinel fisheries of 2018 are analyzed.

SURVEY OBJECTIVES

The main objective of this survey was to obtain an abundance index for *Nephrops* FU 25 in 2018 to continue the time series of commercial CPUEs initiated by the fishing industry in 2015 and followed by the first Sentinel fishery of 2017 (Vila et al., 2018). Other objectives were obtain the size composition and the proportion of sexes in catches.

METHODS

The survey was conducted between 1st August to 21st September 2018 by two commercial vessels on the fishing grounds at the Northwest of A Coruña (FU 25, NW of Spain) (Figure 1). The survey was designed and coordinated by IEO (C.O. A Coruña), the Association of owners of fishing vessels of Galicia, "Pescagalicia-Arpega-O Barco", and the shipowners of "Ana Isabel" and "Burelés". Conditions of the authorization of the 2018 observers survey in Annex I.

Study area

Figure 1 shows the fishing area covered in this survey (in green), ranging between 200 and 500 m depth. This area is where the *Nephrops* densities are highest in this FU (ICES statistical rectangles 15E0-E1 and 16E1, in red).

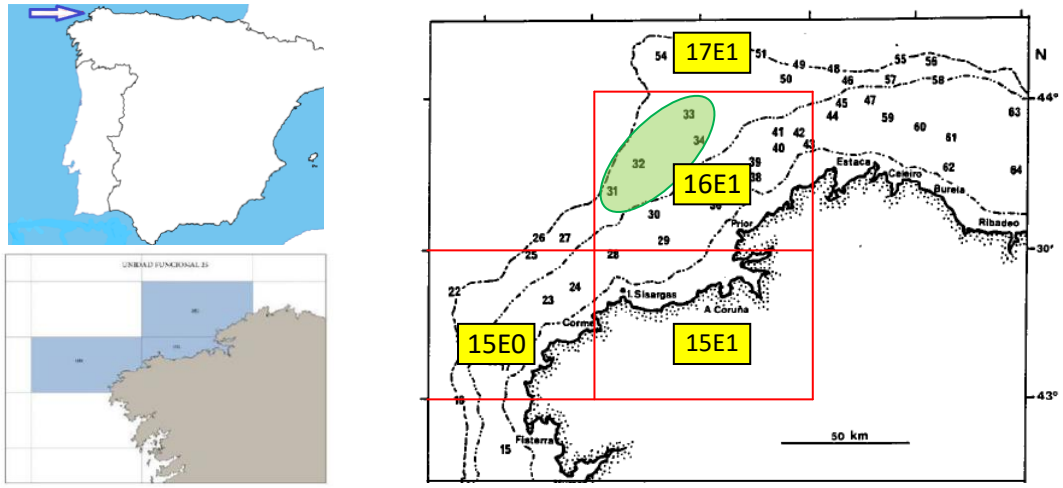

Figure 1. Statistical rectangles of *Nephrops* Functional Unit 25 (North of Galicia) in red, rectangles names in yellow. Study area in the observers survey in green.

Observation and data collection methodology

A total of 33 fishing days targeting to *Nephrops* were made in the 2018 survey, a 38% more than in the 2017 survey. The observers were on board all of the days. Table 1 shows the specifications of the vessels that participated in this programme and Table 2 shows the fishing calendar. The development of trips, schedules, and sets followed the normal commercial schemes in the bottom trawl fishery and there was not interference in the usual procedure of commercial fishing in order to commercial indices were comparable with the previously provided by the industry. Trips usually take two days because of the distance of the fishing grounds to the base port. The gear used was the usual with the regulatory 70 mm mesh size.

Table 1. Technical specifications of vessels participating in the survey.

	BURELÉS	**ANA ISABEL**
REGISTER	FE-2-1-97	VI-5-8-00
CATEGORY - FLEET CENSUS	Bottom-Trawl Cantábrico NW	Bottom-Trawl Cantábrico NW
GROSS TONNAGE (GT)	223.61	219.02
TOTAL LENGTH	28 m	28 m
POWER	625 cv	320 cv
GEAR	Otter Trawl (OTB)	Otter Trawl (OTB)
MESH SIZE	70 mm	70 mm

Table 2. Calendar of the fishing days by vessel of the survey.

Vessel	August	September	Total fishing days
Ana Isabel	1, 9, 10, 14, 15, 23, 24, 28 and 29	4, 5, 10, 13, 14, 18 and 19	16
Burelés	2, 3, 7, 8, 16, 17, 21, 22, 30 and 31	6, 7, 11, 12, 17, 20 and 21	17

Nephrops shows daily and seasonal variations in its catchability, due to their behaviour (Aguzzi and Sardá, 2008). Individuals at more than 200 m of depth are inside their burrows during hours of low-light (Chapman, 1980). To avoid the effect of daily variations in the catchability of *Nephrops* according to Aguzzi et al. (2003), the hauls that were carried out in more than 50% of time between dusk and dawn were considered non-directed to *Nephrops*. 66 hauls were directed to *Nephrops* and 37 hauls were not (22% and 48% more than the previous year, respectively). The duration of each haul was calculated as the elapsed time in hours between the moments in which the gear makes firm in the bottom to the beginning of the turned. Effort unit was trawling hour. A weekly CPUE for *Nephrops* was calculated for each vessel and for both vessels together to analyse the temporal evolution during the survey. *Nephrops* CPUE was estimated as the average of the weekly values of CPUE.

The observers followed the working protocol established, which consisted in:

1. General data collection of the trips and hauls, including latitude, longitude, depth and duration of the haul in hours.
2. For each haul, quantitative data of the total catch by specie, both landed and discarded.
3. Random sampling of *Nephrops* length (mm Carapace Length) by sex in each haul. Proportion of sex.
4. Size sampling of catch of other commercial species (hake, megrims, anglerfishes, and blue whiting).

All the information obtained by the observers was recorded in the IEO fishing database (SIRENO).

Nephrops size composition by haul was obtained rising the sampling carried out on board using the length-weight relationship for males and females according to Fariña (1984).

RESULTS

Trips

18 trips (9 for each vessel) targeting *Nephrops* were undertaken during this survey, 29% more than in the previous year. 15 trips were two-days long, 50% more than in the previous year, and 3 trips were one-day long, 25% less than the previous year. In 2018 survey, 105 hauls ranging to 188 and 526 m of depth were carried out, 33% more than in the previous year. Information by haul (date, hour, duration, depths, total catch, retained catch and *Nephrops* catch) in Annex II.

Total and Nephrops *catches*

A total catch of 22 822 kg of different species was caught, a 59% less than in the previous year, because in the 2017 survey a huge quantity of Henslow's swimming crab (*Polybius henslowii)* and squat lobsters (*Munida spp.*) was caught (and discarded). That is the reason why in the percentage of catch discarded in the 2017 survey was 69% (38 046 kg) and in 2018 only 19% (4 399 kg). Retained catch in 2018 was 18 424 kg, 8% more than in 2017.

The total *Nephrops* catch obtained by the two vessels was 1 982 kg, 4% less than in 2017. *Nephrops* discard was zero, in 2017 only one individual with CL under 25 mm had been discarded.

Nephrops CPUE

The average yield was 110 kg/trip, 60 kg/fishing day, 19 kg/haul and 3.1 kg/hour, 26-33% less than in 2017. Nevertheless, it is necessary to take into account the time of the year (ICES, 2018b) and if the haul is directed to *Nephrops* or not when *Nephrops* CPUE is analysed.

Figure 2 shows weekly trend of *Nephrops* CPUE data in the hauls directed to Nephrops. Maximum yield was observed in the first week of the survey (10 Kg/hour). Yield decreased since then up to 3.2 kg/hour in the week of September 3rd-9th. In hauls non directed to *Nephrops* CPUE varied between zero and 1.9 kg/hour without trend. The mean CPUE during the survey was 3.1 kg/hour. In the hauls directed to *Nephrops* the vessel Ana Isabel obtained higher CPUEs in the three first weeks than Burelés (Figure 3). The Ana Isabel overall catch trend was declining from early August to the the week of September 3rd-9th and Burelés CPUE varied around 4 kg/hour along the whole period. *Nephrops* CPUE in hauls directed to this specie for the whole period were 6.6 kg/hour for "Ana Isabel" and 4.1 kg/hour for "Burelés", 10 and 45% less than in 2017 survey, respectively. The *Nephrops* CPUE of the whole survey in the hauls directed to the species descended from 7.2 in 2017 to 5.2 in 2018 (Table 3). This decline could be related to bad weather conditions.

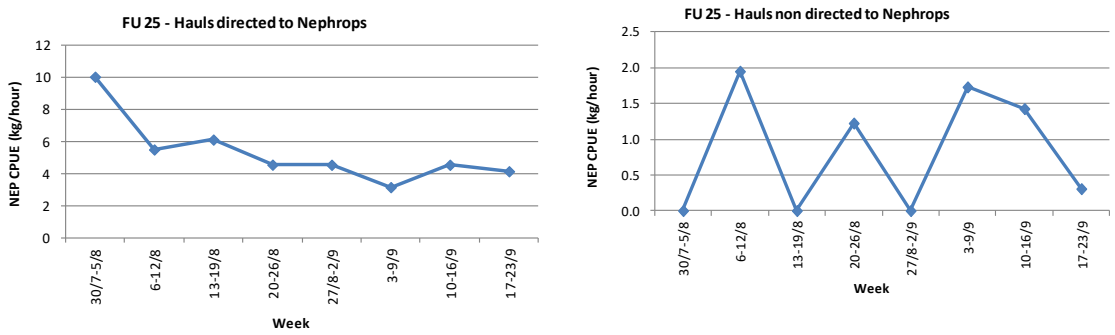

Figure 2. Weekly trend of CPUE in weight for *Nephrops* in hauls directed (left) and hauls non-directed (right).

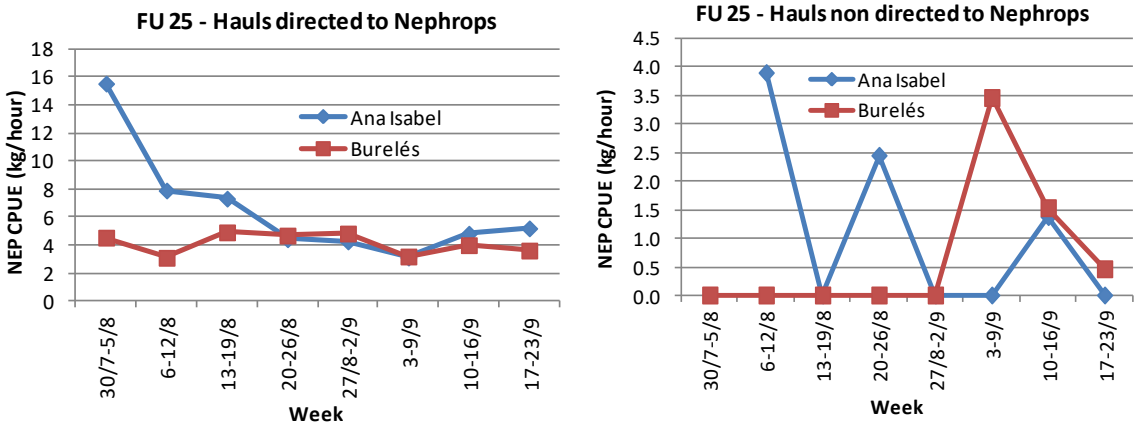

Figure 3. Weekly trend of CPUE for *Nephrops* by vessel in hauls directed (left) and hauls non-directed (right).

Table 3. Mean *Nephrops* CPUE, in kg per hour, and standard deviation for the 2017 and 2018 surveys.

Survey	Hauls directed to Nephrops		Hauls Non directed to Nephrops	
	CPUE (kg/hour)	s.d	CPUE (kg/hour)	s.d
August-September 2017	7.2	1.6	0.6	0.6
August-September 2018	5.2	2.9	0.9	1.3

Size composition and sex-ratio of the Nephrops *catch*

A total of 8 524 individuals were measured, 17% more than in the previous year, 5 406 males and 3 118 females. The percentage of females were the 37%. Carapace length fluctuated from 23 mm to 78 mm CL for males and from 24 mm to 68 mm CL for females (Figure 4). Mean sizes increased from 2017 to 2018 (Table 4).

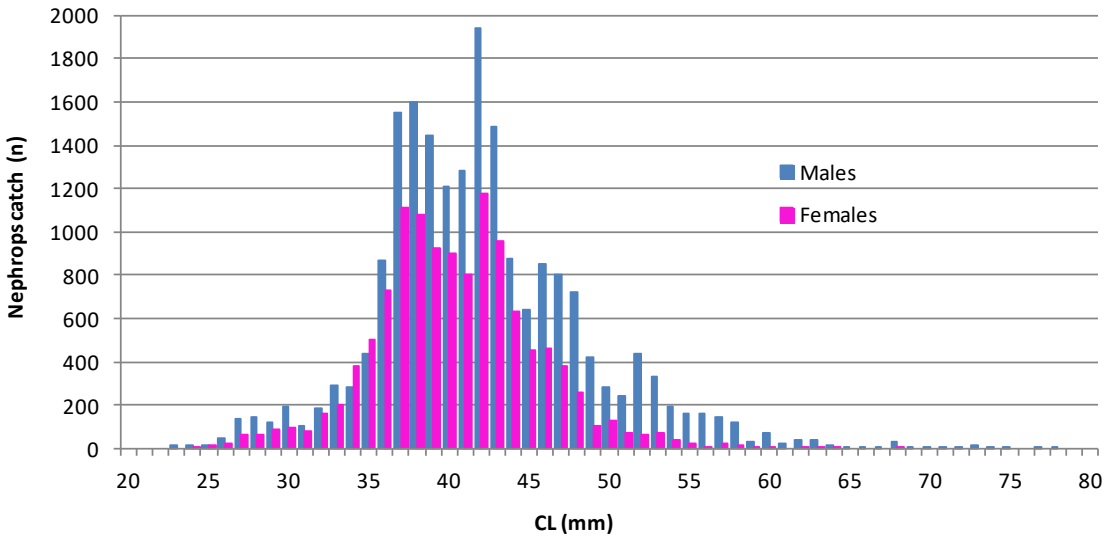

Figure 4. Length frequency distribution for the total catch for males (blue) and females (pink).

Table 4. *Nephrops* mean sizes for males and females in surveys 2017 and 2018.

	Mean size	
	2017	2018
Males	41.7	42.1
Females	39.8	40.3

Nephrops weight in catch

The percentage of *Nephrops* in the catch in weight is shown in Table 5. In the survey, *Nephrops* catch represents 13% in the directed hauls, 15% less than in 2017, and 2% in the non directed hauls.

Nephrops represents between 9% and 20% of the weight in hauls directed to this species. The highest values were recorded in the first week of the survey in August, while the lowest values were recorded in September. Results are consistent with the seasonal cycle of *Nephrops* in the area, which is very pronounced between May and August, with an abundance peak in July (ICES, 2018b). In August-September, starting the incubation season (González Herraiz et al., 2011) and females with eggs are confined in their burrows, resulting less accessible to the fishing gear.

Table 5. Percentage of *Nephrops* weight in total catch.

Week	Directed hauls	Non-directed hauls
30/07-05/08/2018	20.3	0.0
06-12/08/2018	11.8	3.7
13-19/08/2018	14.4	0.0
20-26/08/2018	13.7	3.2
27/08-02/09/2018	10.7	0.0
03-09/09/2018	8.9	4.1
10-16/09/2018	10.7	2.2
17-23/09/2018	10.4	1.1
Total Survey	12.6	1.8

CPUE associated species

Data concerning other associated species were collected, although *Nephrops* was the target species in the survey. For all hauls carried out in the survey, both night and day, catch retained per effort unit (RPUE) and catch discarded per effort unit (DPUE) were estimated (Table 6). The species with the highest yields in the survey were blue whiting (*Micromessistius poutassou*), hake (*Merluccius merluccius*), megrims (*Lepidorhombus spp*.) and Norway lobster (*Nephrops norvegicus*) with 9.8, 7.5, 6.1, and 3.7 Kg/hour, respectively. Therefore, in this fishing ground, *Nephrops* was the fourth species in relative importance in weight. The main discarded species was squat lobster (*Munida spp*.) with 5 kg/hour.

Table 6. Retained and discarded catch per effort unit (RPUE and DPUE) for the main species catches for all hauls carried out in the survey (day and night). *Nephrops* appears shaded.

Common name	Scientific name	RPUE (kg/hour)
Blue whiting	*Micromesistius poutassou*	9.8
Hake	*Merluccius merluccius*	7.5
Megrim	*Lepidorhombus spp*	6.1
Norway lobster	*Nephrops norvegicus*	3.7
Anglerfish	*Lophius spp*	3.1
Small-spotted catshark	*Scyliorhinus canicula*	1.3
Greater forkbeard	*Phycis blennoides*	0.7
Shortfin squid	*Illex coindetii*	0.7
Blackbelly rosefish	*Helicolenus dactylopterus*	0.5
White anglerfish	*Lophius piscatorius*	0.2
Horned octopus	*Eledone cirrhosa*	0.1
Gurnards	*Triglidae*	0.1
Conger	*Conger conger*	0.1

Common name	Scientific name	DPUE (kg/hour)
Squat lobster	*Munida spp*	4.9
Deania dogfishes nei	*Deania spp*	0.6
Fishes	*Pisces*	0.6
Crustaceans	*Crustacea*	0.5
Catsharks	*Galeus spp*	0.3
Deep-sea lantern shark	*Etmopterus spinax*	0.3
Gastropods	*Gastropoda*	0.2
Anemone	*Actinauge richardi*	0.2
Sevenstar flying squid	*Martialia hyadesi*	0.1
Rabbit fish	*Chimaera monstrosa*	0.1
Sea cucumber	*Holothuria spp*	0.1

FINAL CONSIDERATIONS

Results of the two observers surveys (2017 and 2018) provided relevant information about *Nephrops* in FU 25 (abundance index, sex-ratio, size composition, etc). Table 7 shows the *Nephrops* abundance index (CPUE) estimated in 2017 and 2018 from these surveys in FU 25, as well as the previous CPUE series estimated from the fishing industry in 2015 and 2016.

Table 7. Commercial CPUE time series available for *Nephrops* in FU25.

Source	Year	Period	Directed CPUE (kg/hour)	s.d.	Non-directed CPUE (kg/hour)	s.d.
Fishing Industry	2015	Year	6.46		0.18	
Fishing Industry	2016	Year	10.81		0.27	
2017 survey	2017	Aug-Sep	7.22	1.57	0.59	0.56
2018 survey	2018	Aug-Sep	5.21	2.94	0.88	1.30

This CPUE time series is still very short to describe the trend of the abundance index of *Nephrops* in FU 25.

Together with a CPUE decrease, a contraction of FU 25 *Nephrops* stock could have been occurred since 2009 (Figs. 5 and 6), with less presence of the species in the west part of the FU (statistical rectangle 15E0). 15E0 landings decreased an 87 between from 2007 to 2016. In 2016 Sentinel area was almost the only part of the FU 25 with *Nephrops* presence (Fig. 6).

According to this, yields provided by the Sentinel fisheries (Fig. 6) could not be representatives of the rest of the FU. High differences in population characteristics (CPUE, growth, etc.) in adyacent patches of the same population are not strange in *Nephrops* (Tuck et al., 1997) since is a species with a capacity of dispersion almost null (Chapman y Rice, 1971).

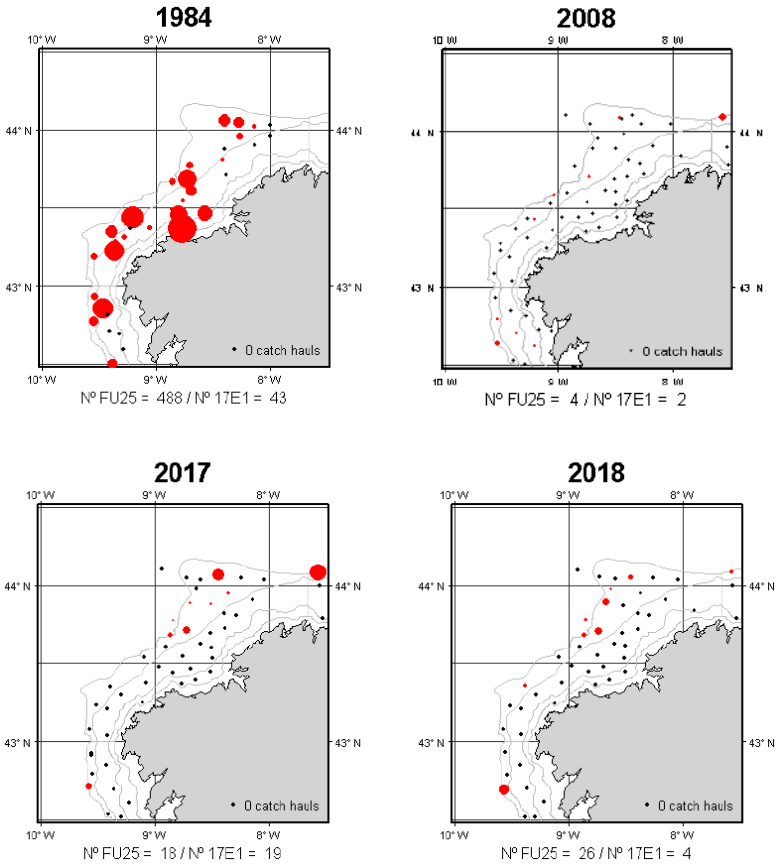

Fig. 5. *Nephrops* yield (n/haul) in IEO "Demersal" trawl survey. Year 1984, example of high CPUEs (1983-1996). Year 2008, example of low CPUEs (1997-2008). Years 2017 and 2018, example of *Nephrops* almost only present in sentinel area (2009-2018). Black points: zero catch of *Nephrops*.

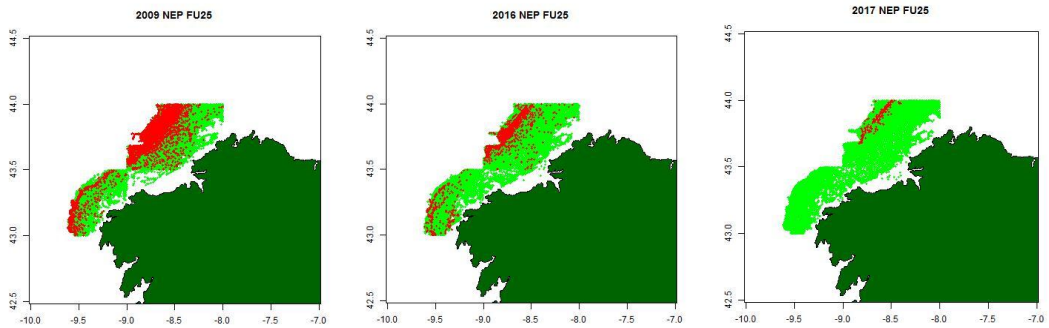

Fig. 6. *Nephrops* presence (red) and absence (green) in the commercial trips of trawl (OTB_DEF, OTB_MPD and PTB_DEF) in FU 25 (2009, 2016) and in the 2017 Sentinel fishery.

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Annex I

Observers Survey framework authorized by the General Secretariat of Fisheries (SGP).

MINISTERIO
DE AGRICULTURA, PESCA
Y ALIMENTACIÓN

SECRETARIA GENERAL DE PESCA

DIRECCION GENERAL DE ORDENACION
PESQUERA Y ACUICULTURA
SUBDIRECCION GENERAL DE CONTROL
INSPECCION

F A X

DE:	SUBDIRECCION GENERAL DE CONTROL E INSPECCIÓN
A:	IEO – CENTRO OCEANOGRÁFICO DE A CORUÑA (fax: 981 229 077) DIRECCIÓN ÁREA FUNCIONAL DE AGRICULTURA Y PESCA DE A CORUÑA SUB. GRAL. DE PROTECCIÓN DE LOS RECURSOS PESQUEROS SUB. GRAL. DE CALADERO NACIONAL Y AGUAS COMUNITARIAS
ASUNTO:	CAMPAÑA IEO – CENTINELA – CIGALA UF-25
S/REF:	N/REF: JAM/JAF
FECHA:	27 de julio de 2018
NUMERO PAGINAS INCLUYENDO PORTADA: 2	

En el marco del estudio del IEO en relación a una campaña sobre el índice de población de cigala en la Unidad Funcional (FU) 25, se autoriza a los buques pesqueros **"BURELES", "FE-2-1-97", Código U.E.: ESP000023450** y **"ANA ISABEL", "VI-5-8-00", Código U.E.: ESP000024668** a realizar, esta campaña.

La presente autorización queda subordinada a las siguientes condiciones:

- **Arte de pesca autorizado**: Arrastre de fondo, según Anexo I del Reglamento (CE) nº 850/98 del Consejo de 30 de marzo de 1998.
- **Periodo de validez de la autorización**: 5 mareas por buque/mes del día 1 de agosto al 30 de septiembre de lunes a viernes. Total de mareas 20 (10 por buque).
- **Zona de actividad**: Unidad funcional 25, correspondiente al Caladero Nacional del CNW (CIEM VIIIc).
- **Especies objetivo:** Cigala. Con posibilidad de estudio de otras especies secundarias (gallo, rape, merluza, etc). El **tope** de capturas de **cigala** será de **2.000 kg** para la totalidad de la campaña.
- Será obligatorio por parte del patrón del pesquero, reseñar en el diario de a bordo que la marea se encuentra bajo campaña científica, para ello tendrá que cumplimentar en el DEA en "Salida de Puerto" el campo "Actividad prevista" con la opción "Investigación científica".

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- Las cantidades de capturas serán contabilizadas a parte de la cuota general asignada a España hasta el máximo del 2% sobre dicha cuota.

- Las capturas se deberán desembarcar en el puerto de A Coruña, puerto habitual de descarga de estos pesqueros, permitiendo su comercialización, excepto ejemplares de tamaño inferior al reglamentario.

- El pesquero deberá disponer de un equipo de localización de buques vía satélite (caja azul) que se encuentre activo y operativo durante su permanencia en la mar.

- Deberá encontrarse a bordo personal del IEO los días efectivos de investigación y solo se considerarán esos días dentro de la presente autorización.

- Se deberá cumplir con todo lo establecido por el Reglamento (CE) nº 1224/2009 del Consejo, de 20 de noviembre de 2009, por el que se establece un régimen comunitario de control.

- A fin de poder conocer los días concretos de actividad, será necesario comunicar a esta Subdirección General (inspecpm@mapama.es) con al menos 24h de antelación el día o días a llevar a cabo dicha actividad.

Esta autorización es complementaria a la licencia comunitaria y a las respectivas autorizaciones de pesca que disponga cada pesquero y por tanto deberá llevarse a bordo.

La presente autorización se concede exclusivamente para el ámbito de la actividad pesquera y, por tanto, está condicionado al cumplimiento de la normativa en materia de seguridad y demás aspectos de la navegación que exige la Dirección General de la Marina Mercante.

EL Subdirector Adjunto Control e Inspección

Juan Antonio Agüero Monedero

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Annex II

Characteristics of hauls carried out during observers survey, total catch retained catch and *Nephrops* catch by haul.

HAUL	STARTING DATE	STARTING HOUR	DURATION (hh : min)	STARTING DEPTH (m)	ENDING DEPTH (m)	TOTAL CATCH (kg)	RETAINED CATCH (kg)	NEPHROPS CATCH (kg)
1	01-ago-18	6:35	6:55	529	384	294	279	85
2	01-ago-18	14:15	2:15	457	421	83	83	40
3	01-ago-18	18:23	4:40	466	439	602	597	77
4	02-ago-18	7:30	4:45	457	390	263	208	40
5	02-ago-18	13:15	5:00	413	567	159	124	21
6	02-ago-18	19:15	4:46	576	428	91	70	8
7	03-ago-18	0:45	5:20	433	238	134	120	0
8	03-ago-18	8:30	4:00	313	329	169	119	24
9	03-ago-18	13:30	5:00	380	377	413	403	13
10	07-ago-18	7:32	3:58	368	318	96	62	9
11	07-ago-18	11:58	4:32	322	302	160	110	22
12	07-ago-18	17:17	4:42	349	355	195	157	17
13	07-ago-18	23:00	3:30	285	289	143	131	0
14	08-ago-18	3:20	3:10	285	287	178	162	0
15	08-ago-18	7:30	5:01	408	380	201	179	24
16	08-ago-18	13:25	5:08	375	415	161	138	7
17	08-ago-18	19:25	3:59	304	311	129	106	7
18	09-ago-18	7:22	5:09	437	373	242	193	27
19	09-ago-18	13:20	5:22	393	422	266	220	57
20	09-ago-18	19:30	4:58	433	452	303	275	30
21	10-ago-18	1:39	4:36	468	499	160	140	8
22	10-ago-18	7:28	5:09	441	371	271	236	30
23	10-ago-18	13:20	5:09	391	463	333	288	51
24	14-ago-18	7:06	5:37	433	388	207	150	30
25	14-ago-18	13:10	5:20	393	424	241	201	35
26	14-ago-18	19:15	5:35	402	470	159	133	0
27	15-ago-18	2:15	3:45	426	333	159	139	0
28	15-ago-18	7:35	4:26	313	406	246	192	40
29	15-ago-18	12:45	6:50	402	406	363	247	57
30	15-ago-18	20:30	3:28	278	177	149	149	0
31	16-ago-18	7:35	6:18	395	377	265	180	34
32	16-ago-18	14:48	6:47	390	358	245	150	29
33	16-ago-18	22:35	3:25	307	187	120	120	0
34	17-ago-18	2:40	3:50	190	331	302	302	0
35	17-ago-18	7:25	5:05	406	316	123	80	23
36	17-ago-18	13:20	4:56	320	320	248	205	27
37	21-ago-18	7:35	4:32	333	313	137	94	24
38	21-ago-18	12:55	8:09	320	358	310	223	37
39	21-ago-18	21:55	4:05	265	197	161	161	0
40	22-ago-18	2:45	3:59	212	289	152	152	0
41	22-ago-18	7:33	6:34	382	375	237	158	37
42	22-ago-18	15:02	8:29	382	481	167	157	29
43	23-ago-18	7:39	6:51	368	382	180	114	21
44	23-ago-18	15:26	7:04	358	335	165	108	25
45	23-ago-18	23:30	6:33	494	497	249	184	16
46	24-ago-18	7:05	5:53	499	485	202	161	28
47	24-ago-18	13:45	4:45	496	497	420	379	30
48	28-ago-18	7:30	6:07	384	406	235	193	12
49	28-ago-18	14:21	5:04	402	318	201	134	20
50	28-ago-18	20:10	4:20	322	340	170	156	0
51	29-ago-18	2:30	4:00	234	219	105	90	0
52	29-ago-18	7:30	6:07	307	401	248	172	35
53	29-ago-18	14:32	4:59	395	384	303	215	27
54	29-ago-18	20:15	4:00	307	197	126	126	0
55	30-ago-18	7:45	5:18	368	382	190	123	25
56	30-ago-18	14:00	7:12	353	315	237	163	29
57	30-ago-18	22:15	3:45	302	203	97	97	0
58	31-ago-18	2:45	4:05	210	276	88	88	0
59	31-ago-18	8:00	5:02	384	357	207	133	29
60	31-ago-18	14:00	4:45	373	395	294	230	23
61	04-sep-18	7:35	5:35	439	393	198	137	14
62	04-sep-18	13:55	6:05	384	302	192	128	15
63	04-sep-18	20:50	4:40	247	241	191	191	0
64	05-sep-18	2:20	4:40	228	232	122	122	0
65	05-sep-18	8:00	6:09	312	391	283	212	20
66	05-sep-18	15:10	4:58	404	342	181	135	21
67	05-sep-18	21:05	3:25	274	190	140	140	0
68	06-sep-18	7:30	5:30	395	351	209	148	21
69	06-sep-18	14:00	7:00	371	333	207	154	18

Annex II *cont*

HAUL	STARTING DATE	STARTING HOUR	DURATION (hh : min)	STARTING DEPTH (m)	ENDING DEPTH (m)	TOTAL CATCH (kg)	RETAINED CATCH (kg)	NEPHROPS CATCH (kg)
70	06-sep-18	22:10	5:40	417	490	134	134	0
71	07-sep-18	4:40	4:05	576	475	173	154	28
72	07-sep-18	10:00	8:47	408	395	311	268	20
73	10-sep-18	4:04	4:16	475	461	210	139	0
74	10-sep-18	9:00	5:00	421	391	277	202	32
75	10-sep-18	14:54	4:55	379	455	277	199	32
76	10-sep-18	20:40	4:05	465	459	509	464	13
77	11-sep-18	7:55	5:50	415	375	229	138	30
78	11-sep-18	14:40	6:05	384	415	208	125	21
79	11-sep-18	21:50	4:35	481	527	608	456	14
80	12-sep-18	3:35	4:25	485	286	515	448	7
81	12-sep-18	8:58	5:17	439	395	143	112	19
82	12-sep-18	15:15	5:18	399	386	113	73	13
83	12-sep-18	21:32	3:58	223	152	146	146	0
84	13-sep-18	8:07	5:53	428	404	261	216	22
85	13-sep-18	14:50	5:42	430	408	186	141	22
86	13-sep-18	21:20	5:55	475	470	200	200	0
87	14-sep-18	4:10	6:05	477	375	289	225	14
88	14-sep-18	11:00	7:05	475	335	265	211	16
89	17-sep-18	3:27	4:38	441	430	133	71	9
90	17-ago-18	8:50	5:10	397	384	158	99	12
91	17-sep-18	15:00	5:00	366	358	168	94	14
92	17-sep-18	21:00	3:10	236	236	179	179	0
93	18-sep-18	7:35	5:55	315	390	220	206	16
94	18-sep-18	14:20	6:15	380	315	316	221	30
95	18-sep-18	21:40	3:50	430	430	118	118	0
96	19-sep-18	2:35	4:40	391	314	172	172	0
97	19-sep-18	8:00	5:03	313	316	260	172	34
98	19-sep-18	13:50	6:43	347	324	308	224	44
99	19-sep-18	21:15	4:00	247	165	76	76	0
100	20-sep-18	8:00	5:00	320	313	156	98	21
101	20-sep-18	14:00	6:34	335	335	261	187	27
102	20-sep-18	21:25	3:05	274	207	88	88	0
103	21-sep-18	1:25	5:55	207	322	291	291	0
104	21-sep-18	8:10	4:45	331	315	146	93	19
105	21-sep-18	13:43	4:47	313	327	244	162	31