The “Smalls” *Nephrops* Grounds (FU22) 2024 UWTV Survey Report and catch scenarios for 2025.

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Acknowledgments

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Photography credits

Disclaimer

Abstract

This report provides the main results and findings of the nineteenth annual underwater television survey on the ‘Smalls grounds’ ICES assessment area; Functional Unit 22. The survey was multi-disciplinary in nature collecting UWTV and other ecosystem data. A total of 39 UWTV stations were surveyed successfully (high quality image data), carried out over an isometric grid at 4.5nmi or 8.3km intervals. The precision, with a CV of 7%, was well below the upper limit of 20% recommended by SGNEPS (ICES, 2012). The 2024 abundance estimate was 9% lower than in 2023 and at 703 million is below the MSY $B_{trigger}$ reference point (990 million). Using the 2024 estimate of abundance and updated stock data implies catch in 2025 that correspond to the ICES MSY approach of 1541 tonnes, assuming that discard rates and fishery selection patterns do not change from the average of 2021 - 2023. One species of sea pen was recorded as present at the stations surveyed: *Virgularia mirabilis*. Trawl marks were observed at 41% of the stations surveyed.

Key words: *Nephrops norvegicus,* stock assessment, geostatistics, underwater television (UWTV), benthos.

Introduction

The prawn (*Nephrops norvegicus*) are common in the Celtic Sea occurring in geographically distinct sandy/muddy areas where the sediment is suitable for them to construct their burrows (Figure 1). The *Nephrops* fishery in ICES sub-area 7 is extremely valuable with Irish landings in 2023 worth around €52 m at first sale. The Celtic Sea area (Functional Units 19-22, see Figure 1) supports a large multi-national targeted *Nephrops* fishery, mainly using otter trawls and yielding landings in the region of ~4,100 t annually over the last decade (ICES, 2024). The Smalls ground is particularly important to the Irish demersal fleet accounting for around 13% of the fishing effort by all demersal vessels >15m in length, between 2006 and 2009 (Gerritsen, *et al.,* 2012). The Irish demersal fleet now account for ~95% of the FU 22 *Nephrops* landings (ICES, 2024). Good scientific information on stock status and exploitation rates are required to inform sustainable management of this resource.

Nephrops spend a great deal of time in their burrows and their emergence behaviour is influenced by several factors: time of year, light intensity, tidal strength, etc. Underwater television surveys and assessment methodologies have been developed to provide a fishery independent estimate of stock size, exploitation status and catch advice (ICES, 2009 and 2012).

This was the nineteenth in a time series of UWTV surveys in the Celtic Sea FU22 “Smalls” ground carried out by the Marine Institute, Ireland. The 2024 survey was multi-disciplinary in nature and also covered TV stations in other Functional Units, the results of which are presented elsewhere (https://oar.marine.ie/handle/10793/59).

The specific objectives of the 2024 survey are listed below:

1. To obtain 2024 quality assured estimates of *Nephrops* burrow densities 41 randomised fixed isometric grid UWTV stations, with 4.5 nautical mile (nmi) spacing, over the known spatial and bathymetric distribution of the stock on the “Smalls” *Nephrops* ground (FU 22).
2. To collect ancillary information from the UWTV footage collected at each station such as the presence of sea-pens, other macrobenthos and fish species and trawl marks on the sea bed.
3. To collect oceanographic data using a sledge mounted Temperature-Depth profiler.
4. To sample *Nephrops* and macro benthos using a 4 m beam trawl deployed at 8 stations.

This report details the UWTV results of the 2024 survey and documents other data collected during the survey. Operational survey details are available in the form of a survey narrative available from the scientist in charge (JD). The 2024 abundance estimate is used to generate catch scenarios for 2025 in line with procedures outlined in the stock annex for FU22 (ICES, 2024) and using the F_{MSY} reference points proposed by FMSYREF4 (ICES, 2016).

Material and methods

UWTV

To maintain a coefficient of variance (CV) < 20%, to achieve good spatial coverage over the ground and to generate a burrow surface that reflects the underlying abundance of *Nephrops*, a survey grid of 4.5 nm spacing has been used since 2012. The 2024 randomised isometric grid, which resulted in 39 planned stations (Figure 2), was generated using using the “spsampl” function in the “sp” package (Pebesma and Bivand, 2005) in “R” (R Core Team, 2017). The boundary used to delineate the edge of the ground was based on information from VMS (Gerritsen and Lordan, 2011), habitat maps, and previous UWTV observations. The same boundary has been used through the time series.

The 2024 Celtic Sea survey took place on RV. *Tom Crean* between the 11^{th} - 21^{st} June. The survey normally takes place in either July or August each year. UWTV stations were also completed in FU 19, FU 20-21 and FU 15 to maximise survey effort. UWTV survey station carried out in FU 15 by the Marine Institute are carried out in collaboration with the Fisheries and Aquatic Ecosystems Branch, Agri-Food and BioSciences Institute (AFBI), UK Northern Ireland.

In 2024 image data were collected by a custom built camera system recording High Definition (HD) still image data at 12 frames per second with a camera angle of 75°. The digital images were stored on a server and were reviewed at sea through an in-house developed Image annotation R Shiny app (Aristegui, M., 2020). This app allows each reviewer to annotate burrows for each randomly assigned station in an efficient manner. The survey process is now paperless. Video guide of the review app is available here.

The operational protocols used were those reviewed by WKNEPHTV 2007 (ICES, 2007) and follow internationally agreed standards as recommended in the Manual for the *Nephrops* Underwater TV Surveys (TIMES) (Dobby H., *et al.,* 2021). These protocols are employed on other UWTV surveys in Irish waters and can be summarised as follows: At each station the UWTV sledge was deployed. Once stable on the seabed a 10 minute tow was recorded. Time referenced high definition image data were collected with a field of view or ‘FOV’ of 1.01 metres estimated by object tracking method. Table 1 shows the FOV calculations and method for the UWTV survey series. Vessel position (DGPS) and position of sledge (using a USBL transponder) were recorded every 1 to 2 seconds. The navigational data were quality controlled using an “R” script developed by the Marine Institute (ICES, 2009) an example is shown in Figure 3. In 2024 the USBL navigational data were used to calculate distance over ground for 100% of stations.

A new HD reference set was developed in 2020 for training material and reference set (ICES, 2021). In line with recommendations of the Workshop on *Nephrops* Burrow Counting (WKNEPS), all scientists were trained/re-familiarised (ICES, 2018). All counts were conducted by trained scientists independent of each other back onshore. The numbers of *Nephrops* burrows systems (multiple burrows in close proximity which appear to be part of a single system) were counted as one. *Nephrops* activity in and out of burrows were counted and recorded for each station. Following the recommendation of SGNEPS the time for verified recounts was 7 minutes (ICES, 2009).

Presence / absence for the occurrence of trawl marks, fish and other species were also recorded at each station. Presence / absence of sea-pen species were recorded to fulfil an OSPAR Special Request (ICES 2011) using an in-house identification guide available here.

Finally, if there was any time during the one-minute block where counting was not possible, due to sediment clouds or other reasons, this was also estimated so that the time could be removed from the distance over ground calculations.

Survey count data were screened to check for any unusual discrepancies using Lin's Concordance Correlation Coefficient (CCC) with a threshold of 0.6. Lin's CCC (Lin, 1989) measures the ability of counters to reproduce each other's counts on a scale of 1 to -1 where 1 is perfect concordance (i.e. a pairwise plot will have all points lying along the 1:1 line). A value of -1 would be generated by all points lying on the -1:1 line and a value of 0 indicates no correspondence at all. Lin's CCC quality control plots of survey count data for stations stations 136, 137 and 138 are shown in Figure 4. When the count data fell below the threshold of 0.6 a third review was carried out. The paired count data that passed the Lin's CCC threshold was used in the analysis. When the paired counts did not pass the threshold an average of the three reviewers was deemed appropriate to use in the analysis.

Mean density was calculated by dividing the total number of burrow systems by the survey area observed. The USBL data were used to calculate distance over ground of the sledge. The field of view (FOV) of the camera at the bottom of the screen was estimated by extrapolation at 1.01 metre assuming that the sledge was flat on the seabed (i.e. no sinking). Occasionally the lasers were not visible at the bottom of the screen due to sinking in very soft mud. The impact of this is a minor under estimate of densities at stations where this occurred.

From 2006 to 2014 calculation of spatial co-variance, spatial structuring, geo-statistical analysis of the mean and variance was carried out using SURFER Version 10.7.972. From 2015 the geostatistical analysis was carried out using the "RGeostats" package (Renard D., *et al*, 2015) and is available as a separate "R markdown" document. The same basic steps were carried out as in previous years; construction of experimental variogram, a model variogram produced with an exponential model, create a krigged grid file using all data points as neighbours, same boundary used to estimate the domain area, mean density, total burrow abundance and calculate survey precision.

Bottom Temperature sensor

For each UWTV station a temperature and depth profile was logged for the duration of each tow using a sled mounted and calibrated RBR. This data will be processed at a later stage in-house and is considered an emerging time series.

Beam trawls

Eight beam trawl tows were conducted randomly across the Smalls grounds. All *Nephrops* caught were sorted by sex and maturity category, weighed and measured using the NEMESYS electronic measuring system. A length stratified sub-sample of *Nephrops* was taken from each haul where individual length, whole weight and maturity were recorded. The fish catch was identified to species level and sampled by weight (kgs) only. The benthic catch was identified, weighed (g) and counted. The UWTV station positions and tracks for the eight beam trawl tows are shown in Figure 2.

Results

UWTV

In 2024 39 stations were completed successfully on the Smalls. A summary of the results is presented in Table 1. The density and estimated abundance decreased by around 9% in 2024. The average density and the abundance were the second lowest in the time series. Figure 5 shows bubble plots of the variability between minutes and counters. These show that the burrow estimates are very consistent between minutes and counters. A combined violin and box plot of the observed burrow densities is presented in Figure 6. This shows that median and mean burrow densities are similar in most years. The inter-quartile range is between 0.2 and 0.7 in most years. However, in 2024 as in years 2022, 2021, 2020, 2018 and 2016, this inter-quartile range was lower, in the region of 0.1 to 0.4. In 2024 the mean adjusted[1] burrow density was 0.25 burrows/m^2. The adjusted geostatistical abundance estimate is derived using the mean of the krigged grid, where the mean of the observations is reported in Table 2.

The krigged and point density data for 2006 to 2024 are shown in Figure 7. The krigged contours correspond well to the observed data. In general, highest densities show a tendency towards the centre of the ground in all years, with some variability to this of higher values towards the south, west and central area of the ground.

The annual survey statistics from this geo-statistical analysis are given in Table 3 and Figure 8. The 2024 estimate of 703 million burrows is below the geometric mean of the series (geomean [2006-2024]: 1076 million burrows) and is below the MSY $B_{trigger}$ reference point of 990 million. The estimation of variance of the 2024 survey as calculated by RGeostats is low (with a CV or RSE of 7%), which is well below the SGNEPS recommendation for a CV <20% (ICES, 2012).

Sea-pen presence/absence distribution across the Smalls *Nephrops* grounds is mapped in Figure 9. One species of sea-pen (*Virgularia mirabilis*) was identified across the survey area from image data in 2022. Trawl marks were noted at 41% of the stations surveyed.

The UWTV abundance data together with data from the fishery; landings, discards and removals in number, were used to calculate the harvest rate for 2023 of 8.8%. The mean weight in the landings and discards and the proportions of removals retained are also shown (Table 3).

The basis to 2025 catch scenarios are given in Table 4. The catch and landings scenarios at various different fishing mortalities were calculated in line with the stock annex of the

[1] Note the “adjusted” density estimates in this report are adjusted by dividing by 1.3 (Table 2) to take account of edge effect over estimation of area viewed during UWTV transects (see Campbell et al 2009).

Report of the Working Group on Celtic Seas Ecoregion (ICES, 2024) using the 2024 survey abundance (Table 5). The latest estimate of stock abundance (result from June 2024 survey, 703 million) is below the MSY $B_{trigger}$ (990 million). ICES maximum sustainable yield (MSY) approach states that under such conditions the F_{MSY} harvest rate (12.8% for FU 22 Norway lobster) should be reduced by multiplying it by the ratio of the current abundance to MSY $B_{trigger}$. This corresponds to a harvest rate of [12.8 × (703/990)] = 9.1 % for the catch advice in 2024. Fishing at the F ranges in 2025 would result in catches of no more than 1541 tonnes assuming that discard rates and fishery selection patterns do not change from the average of 2021–2023.

Beam trawls

A total of 563 *Nephrops* were caught and individually measured along the eight hauls, ranging from 1 individual in Haul 2 to 180 individuals in Haul 8, but with similar length frequency distributions (LFDs) in each of them (Figure 10). Figure 11 shows the standardised length LFDs by sex of *Nephrops* caught using a beam trawl on the Smalls grounds from 2006 to 2024 surveys. Fishing operations were not carried out for several years (2010, 2013, 2014, 2015, 2019, 2022 and 2023) due to time constraints and also were not possible in 2020 and 2021 owing to minimal staffing levels on the survey due to the COVID-19 pandemic. For plotting purposes, the individuals <10mm caught were split evenly between males and females as it is not possible to accurately assign sex to individuals of this size. A strong cohort was apparent in the 2006 catches of around 17mm and can be tracked in catches in subsequent years. There was a shift to larger sizes in 2011 and 2012, with a shift back again to smaller sizes in 2016 to 2018. 2024 length frequencies are similar to those in 2018.

A summary of the benthic taxa by tow is presented in Figure 12. This heatmap combined with a dendrogram shows the proportional counts of benthic species. A threshold was used which removed those species with less than 1% as their maximum relative abundance. Hierarchical clustering using the complete linkage method with Euclidean distance measure identifies stations which have similar benthic compositions. *Nephrops norvegicus* was the most abundant species in seven of the eight hauls, and its abundance drove the clustering of the dendogram. The individuals from the *Crangon* genus was the most abundant in the other hauls.

Table 6. summarises the fish catches, where the most abundant fish species recorded were: *Lepidorhombus whiffiagonis* (megrim), *Scyliorhinus canicula* (dogfish), *Eutrigla gurnardus* (grey gurnard), *Hippoglossoides platessoides* (long rough dab) and *Lophius piscatorius* (white-bellied monkfish).

Discussion

Since 2006 a dedicated annual UWTV survey has taken place which gives abundance estimates for this ground with high precision. The burrow abundance and mean density estimates have decreased in 2024 to the second lowest level observed in the series. Sudden declines followed by large increases in abundance have also been observed in other *Nephrops* stocks in the past (e.g. FU19 and FU20-21 in 2017 to 2019).

Nephrops in this area have been covered under the landings obligation since 2016 with several exemptions. Discard rates in weight for this FU have been around 13% in recent years. The provision of catch advice and scenarios for 2025 assumes that discard rates and fishery selection patterns do not change from the average of 2021-2023.

The introduction of the landings obligation to *Nephrops* fisheries in 2016 should result in changes in selectivity. This is not taken into account in any of the catch advice because it is not possible to predict impacts exactly. The main message is that any improvements in selectivity in the fishery and reductions in discards will result in increased mean weight in the catches. This will in turn reduce overall mortality on the stocks and allow for catch increases in the future.

An important objective of this UWTV survey was to collect various ancillary information. The occurrence of trawl marks on the footage is notable for two reasons. Firstly, it makes identification of *Nephrops* burrows more difficult as the trawl marks remove some signature features making accurate burrow identification more difficult. Secondly, only occupied *Nephrops* burrows will persist in heavily trawled grounds and it is assumed that each burrow is occupied by one individual *Nephrops* (ICES, 2008).

Monitoring the occurrence and frequency of sea-pens observed on this ground is important in the context of OSPAR's designations of sea-pen and burrowing megafauna communities as threatened. The sea-pen species *Virgularia mirabilis* which was seen in 2024 have been observed on previous surveys of FU22. Monitoring *Nephrops* stock and the benthic habitat is also important in the context of the MFSD indicators (e.g. sea floor integrity).

The main objectives of the survey were successfully met for the nineteenth successive year. The UWTV coverage and footage quality was excellent throughout the survey. This was mainly due to good survey planning to coincide with slack tides. The multi-disciplinary nature of the survey means that the information collected is highly relevant for a number of research and advisory applications.

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Furthermore, the collection of beam trawl data in the 2024 UWTV survey was a key achievement; especially because in recent years it had not been possible to carry out fishing stations during UWTV surveys in FU22 due to weather downtime, time constraints ins some years and due to reduced staffing because of COVID-19 protocols (2020 and 2021). LFDs of *Nephrops* above 20 mm carapace length in 2024 are similar to those back in previous years. However, there are fewer individuals below 20 mm length than in other years.

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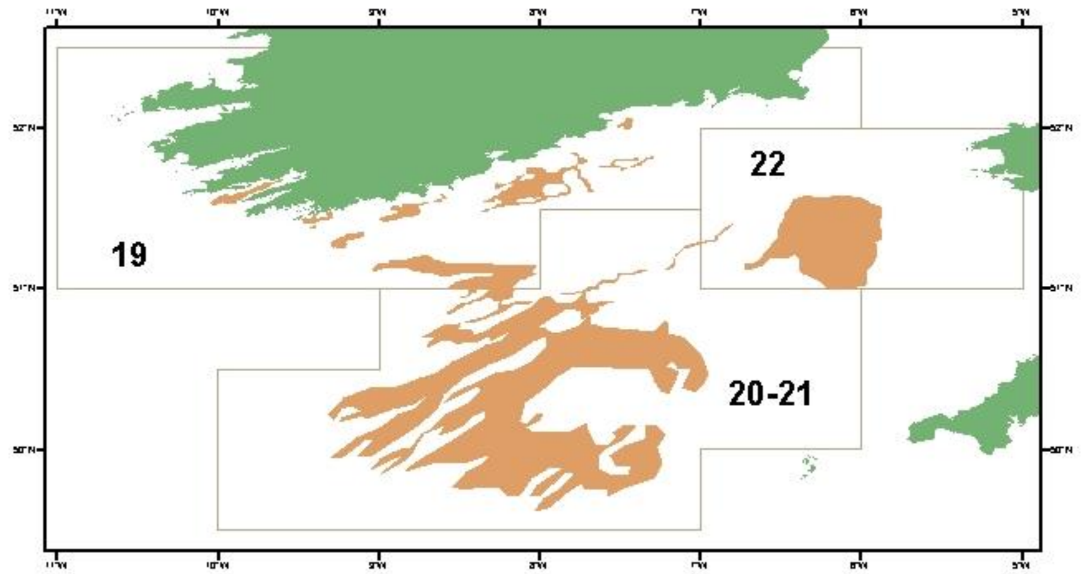

Figure 1: FU22 Smalls grounds: *Nephrops* Functional Units (FUs) and *Nephrops* grounds (area polygons in orange shading) in the greater Celtic Sea.

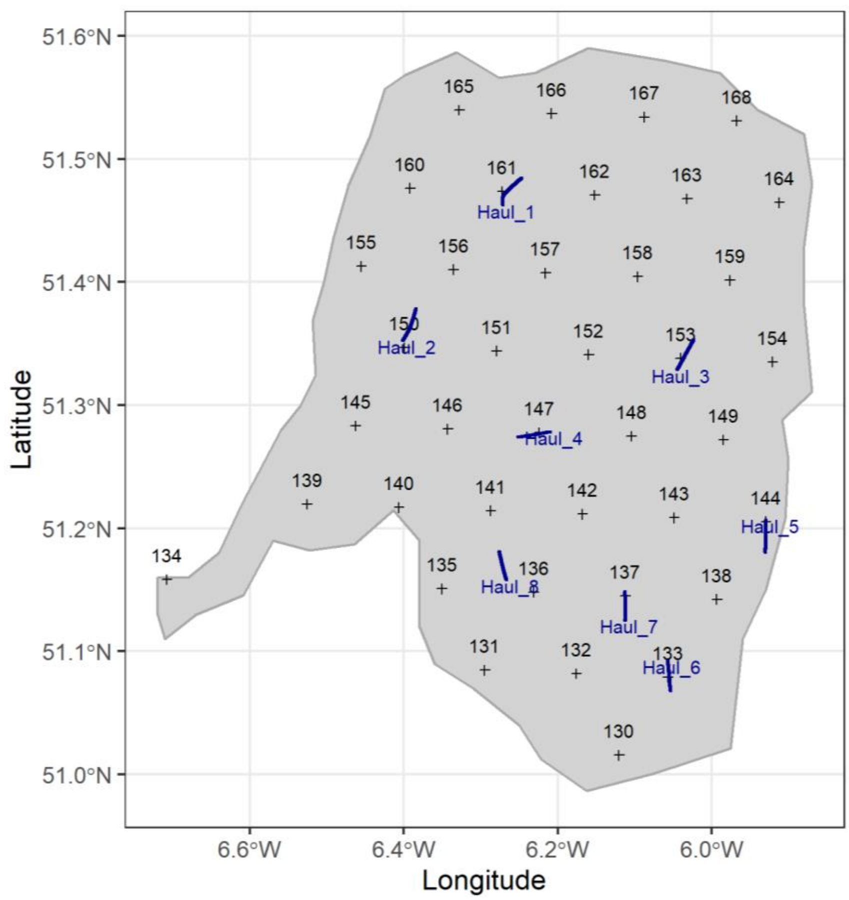

Figure 2: FU22 Smalls grounds: TV stations completed on the 2024 survey.

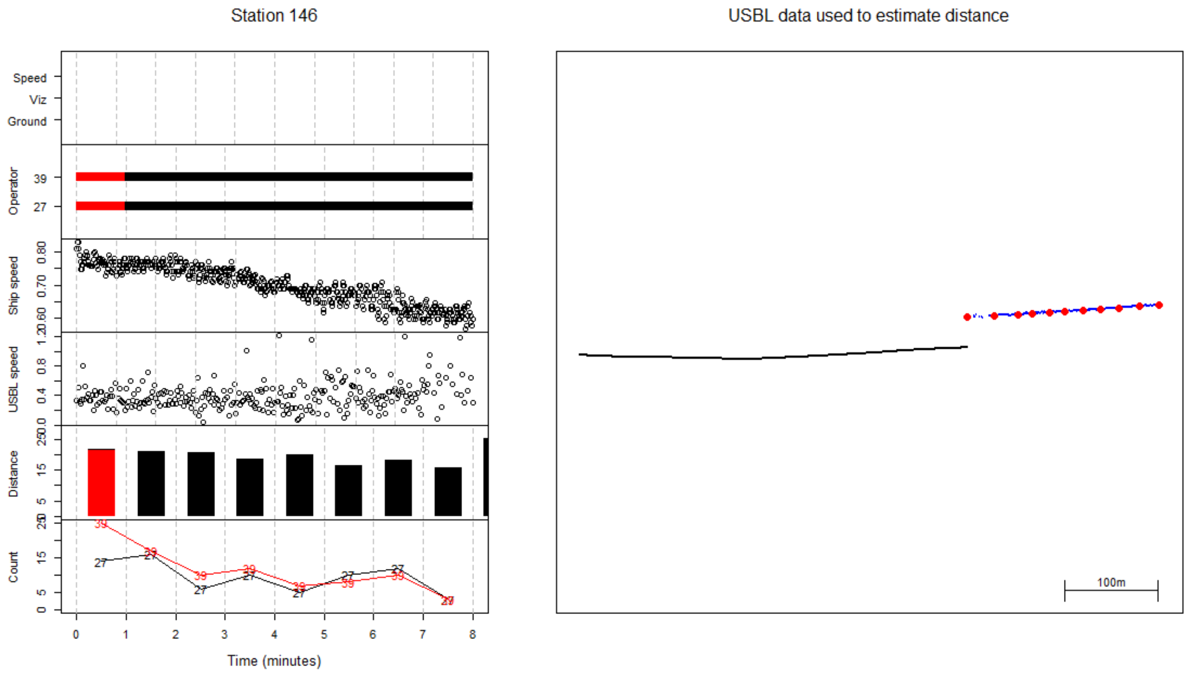

Figure 3: FU22 Smalls grounds: R - tool quality control plot for station 146 of the 2023 survey.

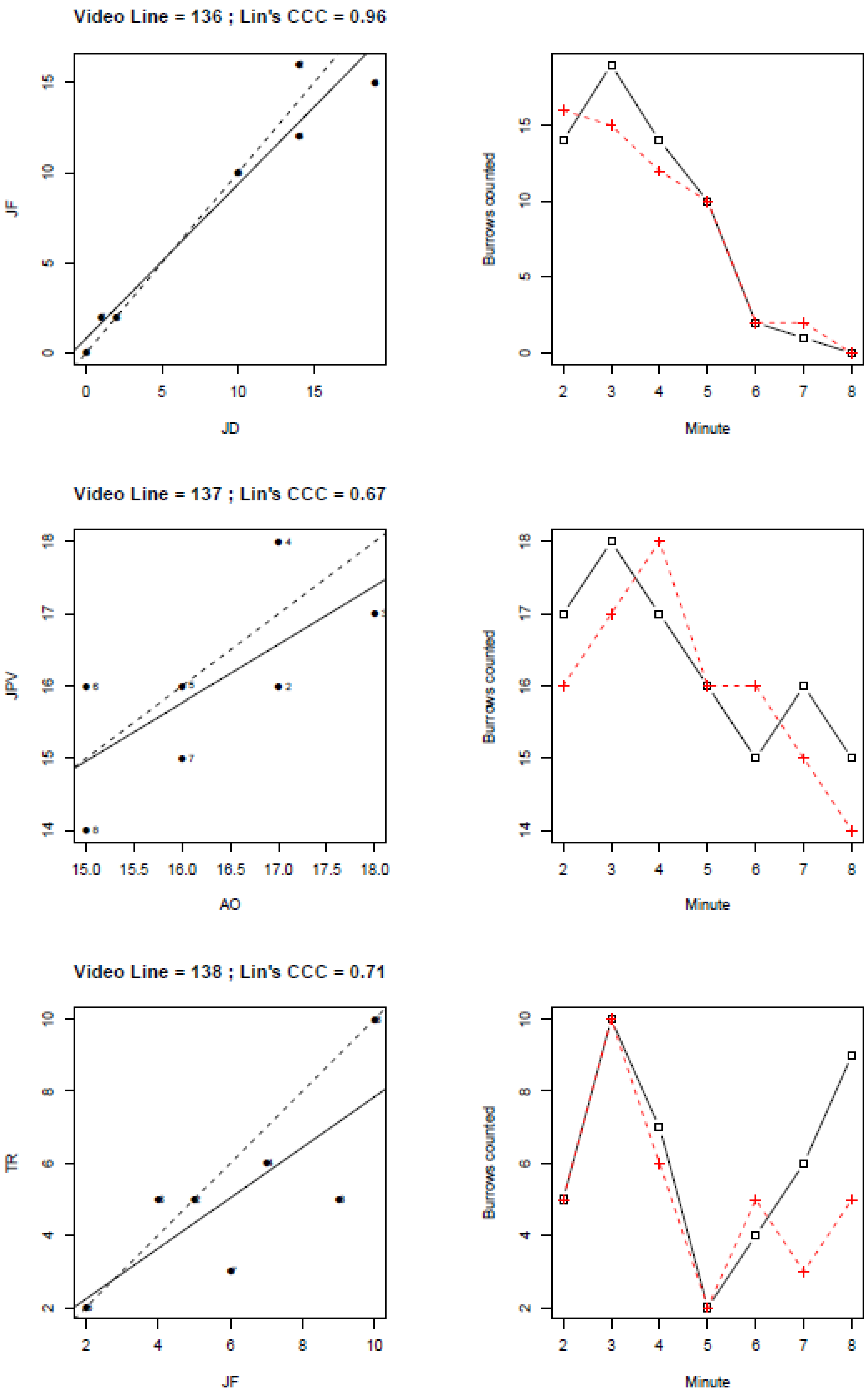

Figure 4 : FU22 Smalls grounds: Lin's CCC quality control plots of count data for stations 136, 137 and 138 of the 2024 survey.

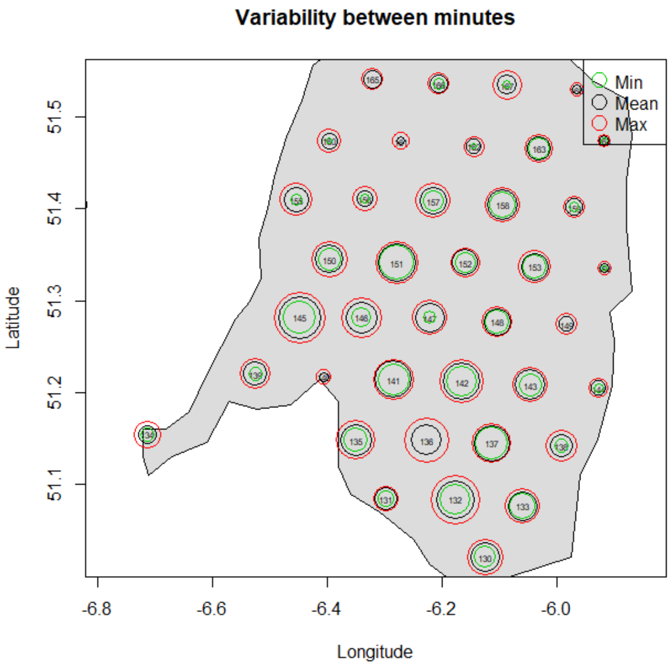

Figure 5: FU22 Smalls grounds: Plots of the variability in density between minutes.

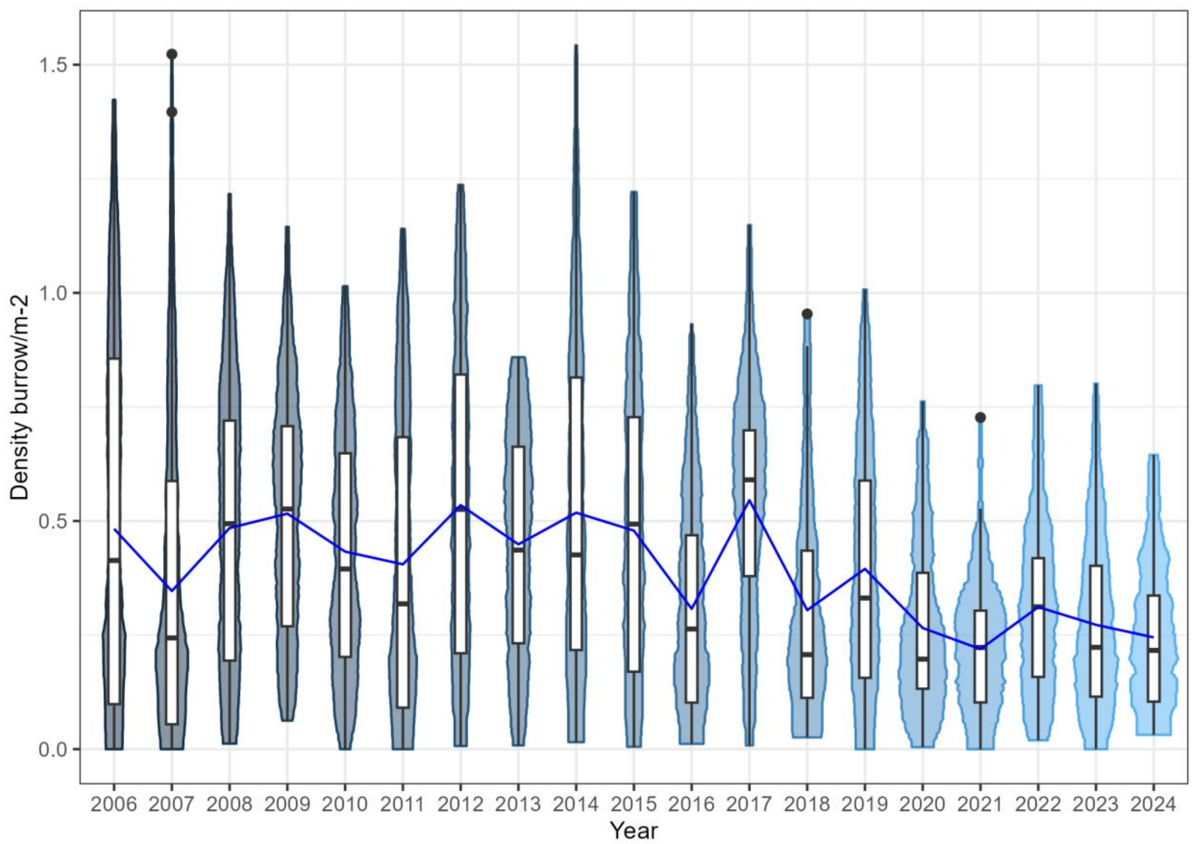

Figure 6: FU22 Smalls grounds: Violin and box plot of adjusted burrow density distributions by year from 2006 -2024. The blue line indicates the mean density over time. The horizontal black lines represent medians, white boxes the inter quartile ranges, the black vertical lines the range and the black dots are outliers.

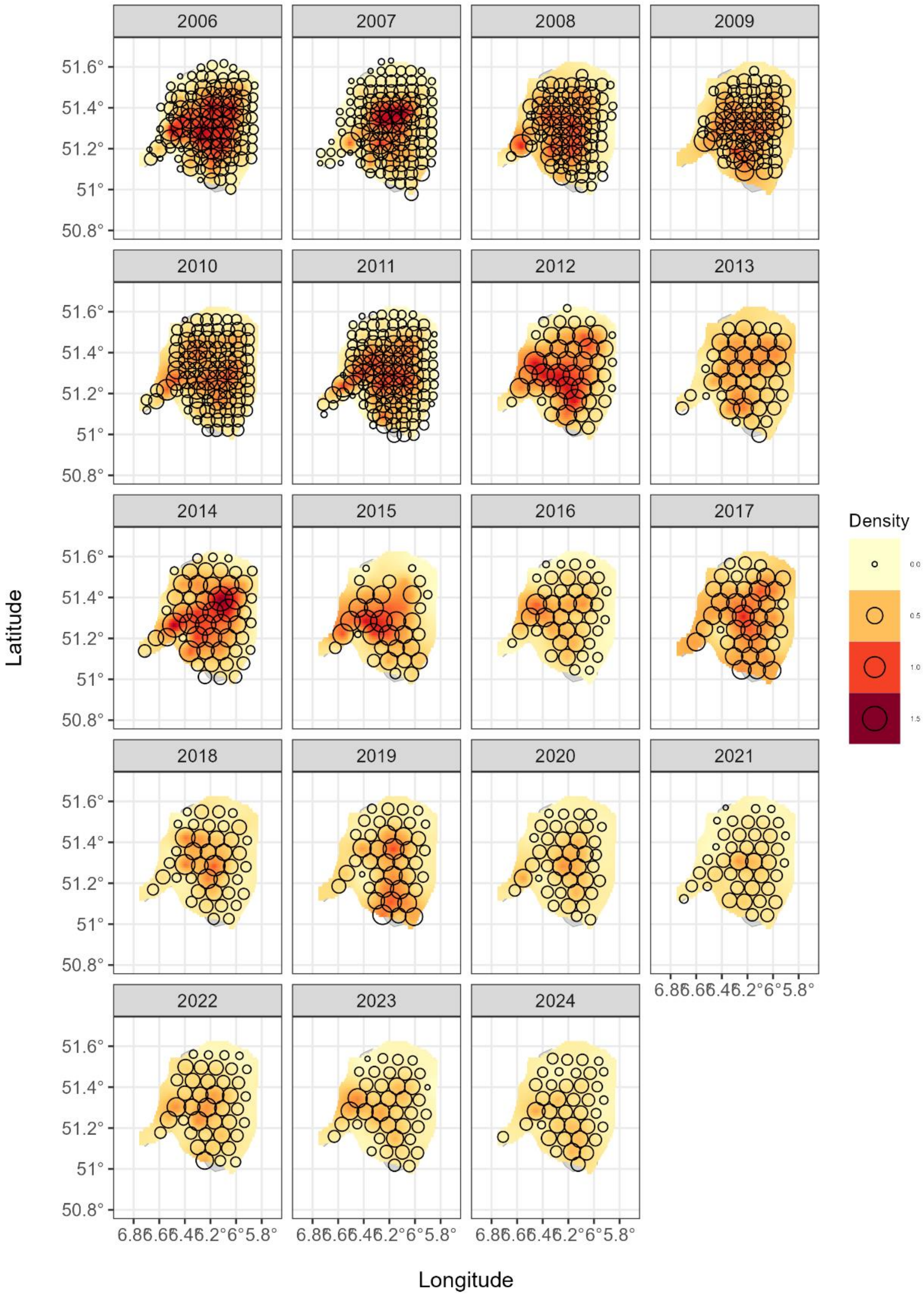

Figure 7: FU22 Smalls grounds: Contour plots of the krigged density estimates by year from 2006 (top left) – 2024 (bottom left).

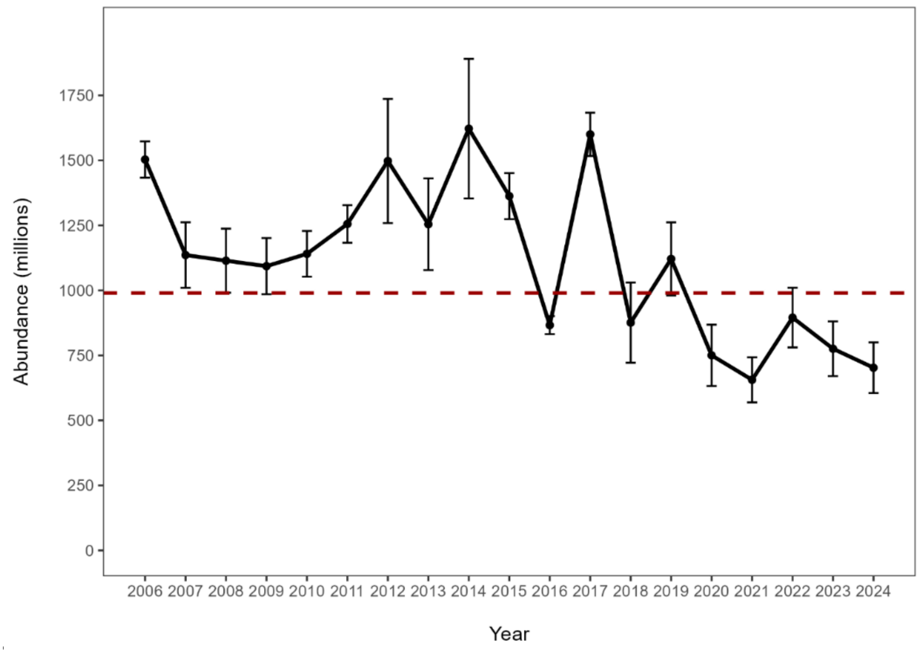

Figure 8: FU22 Smalls grounds: Time series of geo-statistical adjusted abundance estimates (in millions of burrows). The error bars indicate the 95% confidence intervals and $B_{trigger}$ is dashed line.

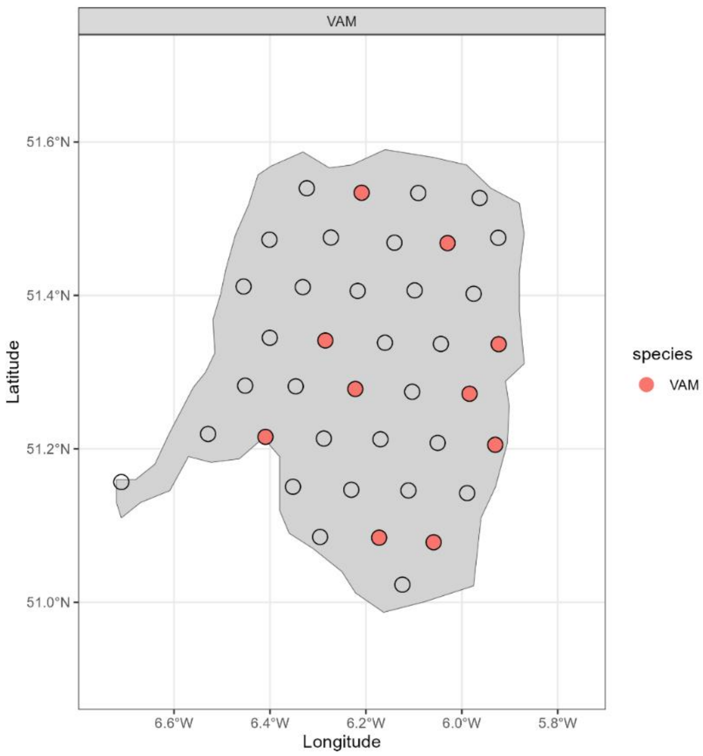

Figure 9: FU22 Smalls grounds: 2024 stations where *Virgularia mirabilis* (VAM) were identified. Closed circles indicated presence and open circles denotes TV stations with no sea-pen observations.

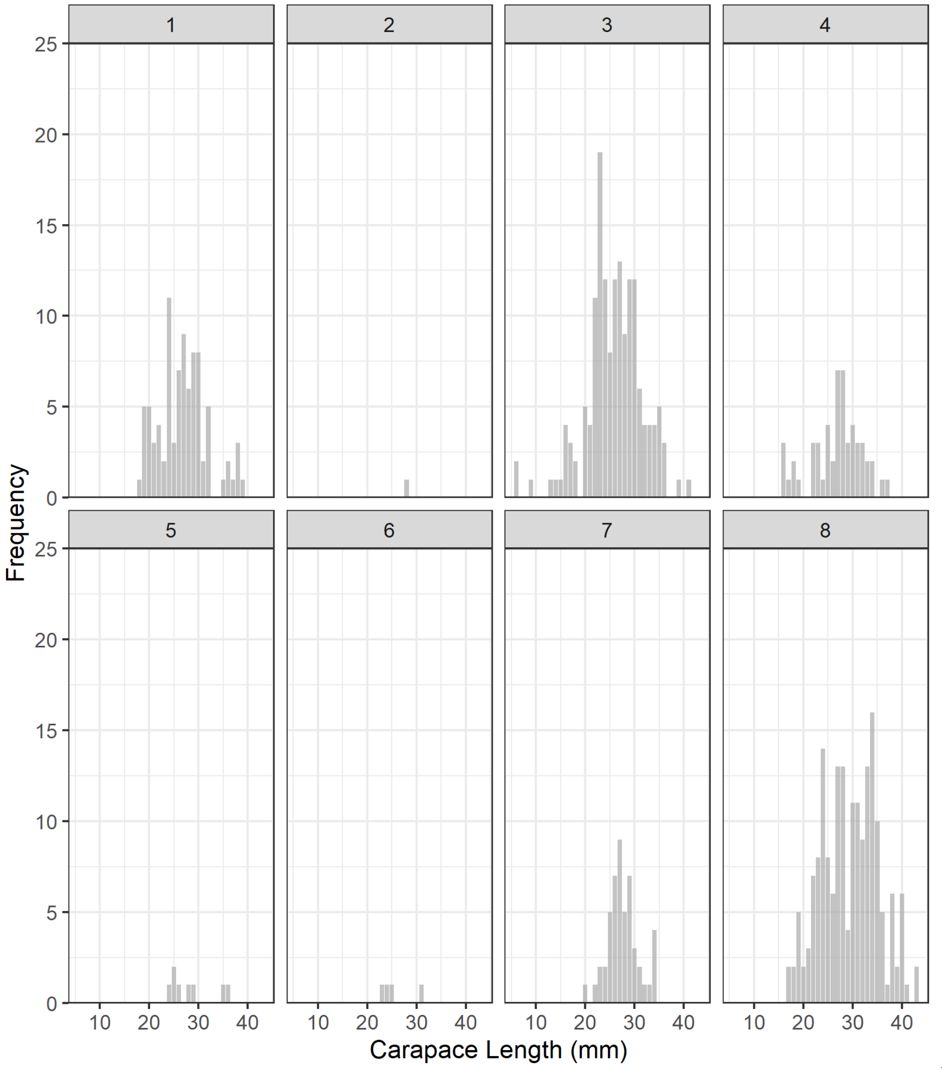

Figure 10: FU22 Smalls grounds: *Nephrops norvegicus* length frequency distributions caught in each 2024 beam trawl haul.

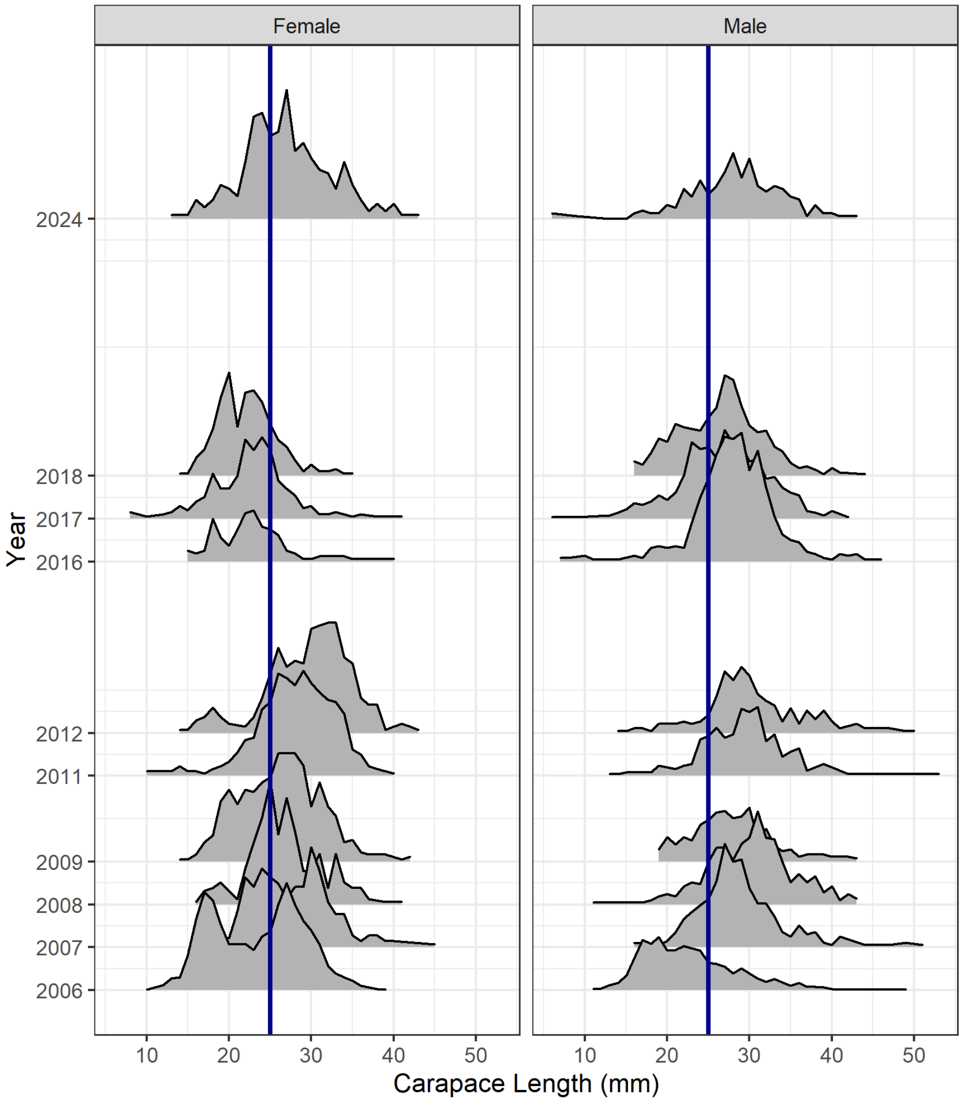

Figure 11: FU22 Smalls grounds: Standardised length frequency distributions for male and female *Nephrops* caught using beam trawl from 2006 to 2018 UWTV surveys (except years 2010, 2013 - 2015, 2019 - 2023). Blue line indicates minimum conservation reference size 25 mm carapace length.

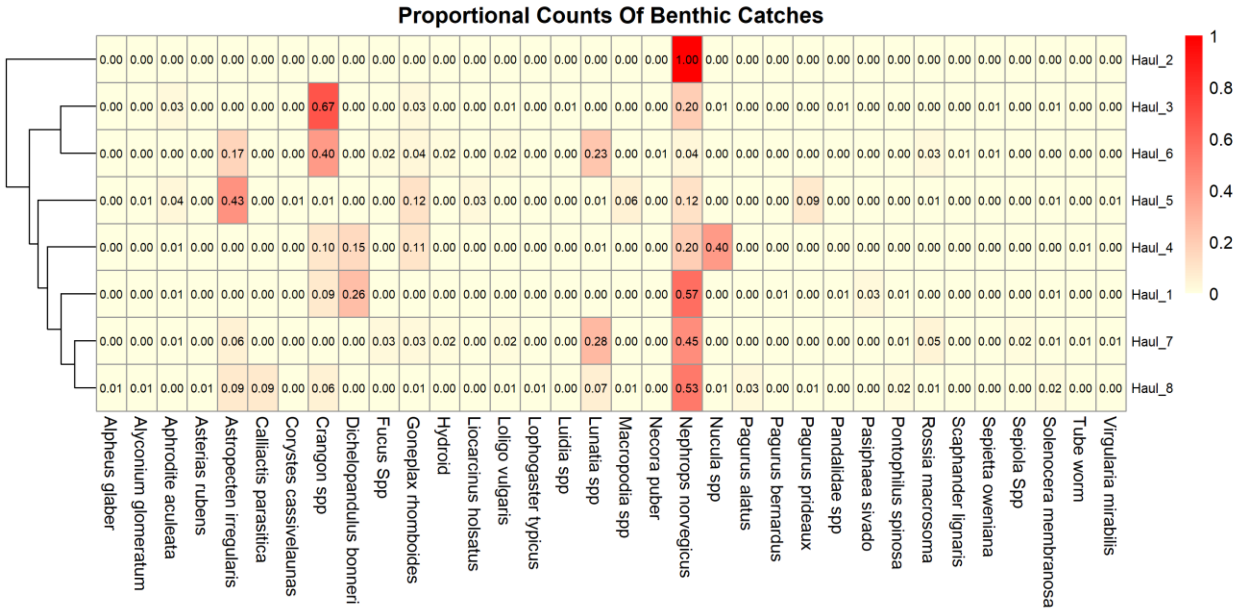

Figure 12: FU22 Smalls grounds: Heat map and dendrogram of benthic catches from 2024 beam trawl hauls. No benthic catch in beam trawl haul 2.

Table 1: FU22 Smalls grounds: FOV calculations for all UWTV survey times series.

Camera ID	StartDate Camera Usage	EndDate Camera Usage	Camera Type	FOV Multiplier (metres)	FOV Method	Camera Angle
1	01/01/2000	31/12/2018	SD	0.75	Deck measurement	45
2	01/01/2019	31/12/2020	HD	1.01	Object tracking -Median value	75
3	01/01/2021	31/12/2021	HD	1.03	Object tracking -Median value	75
5	01/01/2022	31/12/2022	HDF	1.05	Object tracking -Median value	75
4	01/01/2000	31/12/2018	SDF	1	Deck measurement	45
6	01/01/2022	31/12/2022	HD	1	Object tracking -Median value	75
7	01/01/2023	31/12/2023	HD	1.02	Object tracking -Median value	75
8	01/01/2024	31/12/2024	HD	1.01	Object tracking -Median value	75

SD denotes Standard definition camera.
HD denotes High definition camera.
SDF denotes Standard definition camera forward facing.
HDF denotes High definition camera forward facing.

Table 2: FU22 Smalls grounds: Overview of geo-statistical results from 2006-2024.

Year	Number of stations	Mean Density adjusted (burrow/m²)	Domain Area (Km²)	Geo-statistical Abundance adjusted (millions of burrows)	95% confidence interval (millions of burrows)	CV on Burrow estimate (%)
2006	100	0.49	2962	1503	70	2.4
2007	107	0.37	2955	1136	126	5.7
2008	76	0.36	2698	1114	123	5.6
2009	67	0.36	2824	1093	108	5.0
2010	90	0.37	2861	1141	88	3.9
2011	107	0.41	2881	1256	72	2.9
2012*	47	0.49	2934	1498	239	8.1
2013*	41	0.41	2975	1254	177	7.2
2014*	52	0.53	2970	1622	268	8.4
2015*^	40	0.49	3064	1363	180	7.0
2016*	41	0.31	3063	866	112	6.6
2017*	40	0.55	3063	1600	153	4.9
2018*	42	0.31	3063	876	154	9.0
2019*	41	0.4	3063	1121	141	6.4
2020*	40	0.27	3063	750	118	8.0
2021*	42	0.23	3063	656	87	6.7
2022*	41	031	3063	895	115	6.5
2023*	41	0.27	3063	776	105	6.9
2024*	39	0.25	3063	703	97	7.0

*reduced randomised isometric grid
^ In 2015 seven of the stations were filled in with an estimate based on the mean density of historical stations within 2 nmi of the station plan.

Table 3: FU22 Smalls grounds: Inputs to catch scenarios table.

Year	Low	UWTV abundance estimate	High	Landings in number	Total discards in number *	Removals in number	Harvest rate (by number)	Landings	Total discards *	Discard rate (by number)	Dead discard rate (by number)	Mean weight in landings	Mean weight in discards
		millions					%	tonnes		%		grammes	
2003				95	68	146		2065	720	41.5	34.7	21.70	10.65
2004				71	13	80		1828	202	15.6	12.2	25.87	15.39
2005				119	129	216		2533	1648	51.9	44.7	21.24	12.81
2006	1433	1503	1573	100	45	134	8.9	1761	454	31.1	25.3	17.58	10.06
2007	1010	1136	1262	165	181	301	27	2950	1906	52.3	45.1	17.86	10.54
2008	991	1114	1237	144	26	163	14.6	3090	289	15.3	12.0	21.52	11.11
2009	985	1093	1201	92	33	117	10.7	2185	371	26.4	21.2	23.75	11.25
2010	1053	1141	1229	122	45	155	13.6	2714	636	26.8	21.5	22.28	14.28
2011	1184	1256	1328	60	13	70	5.6	1636	196	18.0	14.1	27.29	14.93
2012	1259	1498	1737	120	31	144	9.6	2618	347	20.7	16.3	21.75	11.07
2013	1077	1254	1431	94	40	124	9.9	2257	497	30.0	24.3	24.13	12.39
2014	1354	1622	1890	100	33	125	7.7	2526	460	25.0	20.0	25.22	13.78
2015	1183	1363	1543	114	44	147	10.8	2350	450	28.0	22.6	20.59	10.14
2016	754	866	978	160	54	200	23	3329	519	25.1	20.0	20.79	9.70
2017	1447	1600	1753	164	39	194	12.1	3560	424	19.2	15.2	21.66	10.84
2018	722	876	1030	98	30	121	13.8	1974	336	23.7	18.9	20.19	11.03
2019	980	1121	1262	81	19	95	8.5	2083	262	19.2	15.1	25.76	13.67
2020	632	750	868	59	21	76	10.1	1518	288	26.5	21.3	25.56	13.43
2021	569	656	743	61	11	70	10.7	1616	149	15.6	12.2	26.32	13.13
2022	780	895	1010	49	11	57	6.4	1271	141	19.1	15.0	26.12	12.28
2023	670	776	881	51	23	68	8.8	1242	312	30.9	25.1	24.29	13.68
2024	605	703	800										

Table 4: The basis for the catch advice and scenarios.

Variable	Value	Notes
Stock abundance (2025)	703	UWTV survey 2024; individuals in millions
Mean weight in projected landings (2025)	25.58	Average 2021–2023; in grammes
Mean weight in projected discards (2025)	13.03	Average 2021–2023; in grammes
Projected discard rate (2025)	22	Average 2021–2023; percentage by number of the total catch
Discard survival rate (2025)	25	Percentage by number of the discards

Table 5: Catch advice and scenarios for 2025; Discarding assumed to continue at recent average. All weights are in tonnes.

Basis	Total catch	Dead removals	Projected landings	Projected dead discards	Projected surviving discards	% harvest rate*	% advice change **
	PL + PDD + PSD	PL + PDD	PL	PDD	PSD	for PL + PDD	
ICES advice basis							
MSY approach: F_{MSY} × Stock abundance 2025 / MSY $B_{trigger}$	1541	1493	1348	145	48	9.1	-19.4
Other scenarios							
$F_{MSY\ lower}$ × Stock abundance 2025 / MSY $B_{trigger}$	1222	1183	1068	115	38	7.2	-36
F_{MSY}	2172	2104	1899	204	68	12.8	13.6
$F_{MSY\ lower}$	1731	1676	1513	163	54	10.2	-9.5
$F_{MSY\ upper}$***	2172	2104	1899	204	68	12.8	13.6
F_{2023}	1492	1446	1305	140	47	8.8	-22

* By number.

** Advice values for 2025 are relative to the 2024 advice (FMSY advice of 1912 tonnes).

*** $F_{MSY\ upper}$ = F_{MSY} for this stock.

Table 6: Summary of fish catches by tow in weight (kg) from 2024 fishing operations.

Species	Weight (kg)							
	Tow1	**Tow2**	**Tow3**	**Tow4**	**Tow5**	**Tow6**	**Tow7**	**Tow8**
ARGENTINA SPHYRAENA			0.001					
ARNOGLOSSUS LATERNA					0.01			
CALLIONYMUS LYRA					0.036	0.032	0.008	0.008
CALLIONYMUS MACULATUS				0.014				
CAPROS APER					0.016	0.02	0.084	
CONGER CONGER								0.388
DIPTERUS INTERMEDIA							0.684	0.926
EUTRIGLA (CHELIDONICTHYS) GURNARDUS			0.001		2.562	0.31	0.058	
GAIDROPSARUS VULGARIS			0.018				0.018	
GLYPTOCEPHALUS CYNOGLOSSUS			0.022		0.048		0.032	1.69
GOBIES							0.002	
HIPPOGLOSSOIDES PLATESSOIDES	0.022		0.156	0.076	0.534	0.772	0.742	0.262
LEPIDORHOMBUS WHIFFIAGONIS	0.366				0.968	1.222	1.824	2.108
LIMINDA LIMANDA					0.336			
LOLIGO VULAGARIS							0.008	
LOPHIUS PISCATORIUS						0.51		1.682
MERLANGIUS MERLANGUS					0.086			
MERLUCCIUS MERLUCCIUS			0.18		0.394	0.394	0.002	0.096
MICROCHIRUS VARIEGATUS	0.002		0.002	0.004	0.18			0.114
MICROSTOMUS KITT								0.244
MICROMESISTIUS POUTASSOU	0.54	0.1	0.25	0.096	0.146	0.408	0.068	0.022
PHYCIS BLENNOIDES								0.03
PLEURONECTES PLATESSA					0.182			
SCYLIORHINUS CANICULA	0.372		0.232		0.704	1.72	0.508	0.148
SOLEA SOLEA					0.152		0.406	
TRISOPTERUS ESMARKI	0.23		0.256	0.004	0.076	0.034	0.004	
TRISOPTERUS MINUTUS	0.034		0.034		0.134		0.048	0.218
Total Weight (kg)	1.566	0.100	1.151	0.194	6.564	5.422	4.496	7.936