

Results on haddock (*Melanogrammus aeglefinus*), whiting (*Merlangius merlangius*) and Norway lobster (*Nephrops norvegicus*) from the Porcupine Bank Survey (NE Atlantic)

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Abstract

This working document presents the results on haddock (*Melanogrammus aeglefinus*), whiting (*Merlangius merlangius*) and Norway lobster (*Nephrops norvegicus*) caught in the Porcupine Spanish Groundfish Survey (SP-PORC-Q3) in 2020. Biomass, abundance, distribution and length frequency were analysed. *M. aeglefinus* remained low in the study area, although it increased slightly, but *M. merlangius* grew strongly and reached the highest values in the time series. No signs of recruits for neither two species were found. In addition, the incidental species *Pleuronectes platessa* and *Solea solea* were not found in 2020 and *Pollachius pollachius* has never been caught in the time series. The crustacean *N. norvegicus* fell sharply this last survey, although the mean individual weight was slightly higher than in previous years since 2016.

Introduction

The Spanish bottom trawl survey on the Porcupine Bank (ICES Divisions 7c and 7k) has been carried out annually in the third-quarter (September) since 2001 to study the distribution, relative abundance and biological parameters of commercial fish in the area (ICES, 2017).

The aim of this working document is to update the results (biomass and abundance indices, length frequency and geographic distributions) of the species *Melanogrammus aeglefinus* (haddock), *Merlangius merlangius* (whiting) and *Nephrops norvegicus* (Norway lobster) on the Porcupine bottom trawl surveys after the results presented previously (Ruiz-Pico *et al* 2018, 2019, 2020).

Material and methods

The Spanish Ground Fish Survey on the Porcupine bank (SP-PORC-Q3) has been carried out annually since 2001 on board the R/V “*Vizconde de Eza*”, a stern trawler of 53 m and 1800 Kw. The area covered extends from longitude 12° W to 15° W and from latitude 51° N to 54° N, following the standard methodology for the IBTS North Eastern Atlantic surveys (ICES, 2017). The sampling design was random stratified to the area (Velasco and Serrano, 2003) with two

geographical sectors (Northern and Southern) and three depth strata (<300 m, 300-450 m and 450-800 m) (Figure 1). Hauls allocation is proportional to the strata area following a buffered random sampling procedure (as proposed by Kingsley et al., 2004) to avoid the selection of adjacent 5×5 nm rectangles. More details on the survey design and methodology are presented in ICES (2017).

The reduction in the tow duration (20 instead of 30 minutes) has been applied since 2016 to reduce the catches. The biomass indices of the entire time series are not affected by this reduction as the samples are still representative. The results are extrapolated to 30 minutes of trawling time to maintain the consistency of the time series.

Results and discussion

Despite the problems created by the pandemic and the COVID-19 disruption, Porcupine Groundfish Survey was carried out without major problems, apart from an initial 9-day delay that did not affect the overall survey duration.

In 2020, 81 valid standard hauls and 10 additional hauls were carried out. Among the additional hauls, three of them have been carried out into the standard stratification, to improve coverage in the gaps left by random sampling and seven of them, between 839 and 1425 m, to explore the continuity of the fish community in Porcupine Seabight (Figure 1).

The total stratified catch per haul increased significantly in 2020 compared to the previous year, becoming the second highest catch in the historical series below the year 2015 (Figure 2). Fish represented 96% of the total catch and the species analyzed in this report represented only a small percentage of the total fish catch: haddock (0.3%) and whiting (0.05%). However, Norway lobster represented 6% of the total crustacean catch.

In 2020, the biomass and abundance of these two fishes increased compared to the previous year, slightly for *M. aeglefinus*, remaining quite low values in the time series, but it did strongly for *M. merlangius*, reaching the highest values in the time series, both in biomass and abundance terms.

No signs of recruits for neither two species were found. In addition, the abundance of specimens around 30 cm of both species also increased, specially for *M. merlangius*.

The biomass and abundance of the crustacean *N. norvegicus* fell sharply in this last survey and it did for all the groups of sizes: adults (> 26 mm), juveniles (21-26 mm) and recruits (< 21 mm), although the mean individual weight was slightly higher than in previous years since 2016.

***Melanogrammus aeglefinus* (haddock)**

In 2020 this species increased slightly both in terms of biomass and abundance and, although the biomass recovered mean values of the historical series, the abundance value remained among the lower values of the time series after the peak in 2013 (Figure 3).

M. aeglefinus was distributed on the Irish shelf, as usual, and a few spots of biomass were found in the south and in the west of the bank (Figure 4).

After the high recruitments in 2016 and 2017, small specimens (< 20 cm) have been decreasing in the last two years and no individuals below 26 cm were found in this last survey (Figure 5, Figure 6 and Figure 7).

***Merlangius merlangius* (whiting)**

Biomass of *M. merlangius* has increased six times the value of the previous year and abundance has raised almost five times. Both biomass and abundance of this species have reached the highest values of the historical series after the strong increase in 2020 (Figure 8).

All the specimens were found in two hauls around 200 m depth, in the Irish shelf (Figure 9). They ranged from 24 to 48 cm, but the most abundant sizes were around 34 cm (Figure 10).

***Nephrops norvegicus* (Norway lobster)**

In 2020, the downward trend in biomass and abundance of this species continued from the peak of 2018, but in this last survey it fell sharply, dividing the biomass value in more than a half compared to the previous year and also the abundance value by around a third (Figure 11).

The muddy slope of the Porcupine Seabight is where both adults and recruits of *N. norvegicus* dwell. *Nephrops* remained concentrated in and around the closed area. In 2020, 9 positive catches, representing 61% of the total biomass, were found in the closed area and 17 out and around the area, representing 32%. Only 7% of the biomass was found in 15 hauls in the rest of the study area (Figure 12 and Figure 13).

Fewer specimens were found in 2020, fewer recruits (< 21 mm), juveniles (21-26 mm) and adults (> 26mm) (Figure 14). However, the mean individual weight was slightly higher than in previous years since 2016 (around 34g) (Figure 15). Recruits were concentrated mainly in the northern part of the closed area as usual (Figure 16). The length distribution (Figure 17) showed a predominance of adults around 32 mm in this last survey, similarly to the previous three years, although in less abundance.

Acknowledgements

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Figures

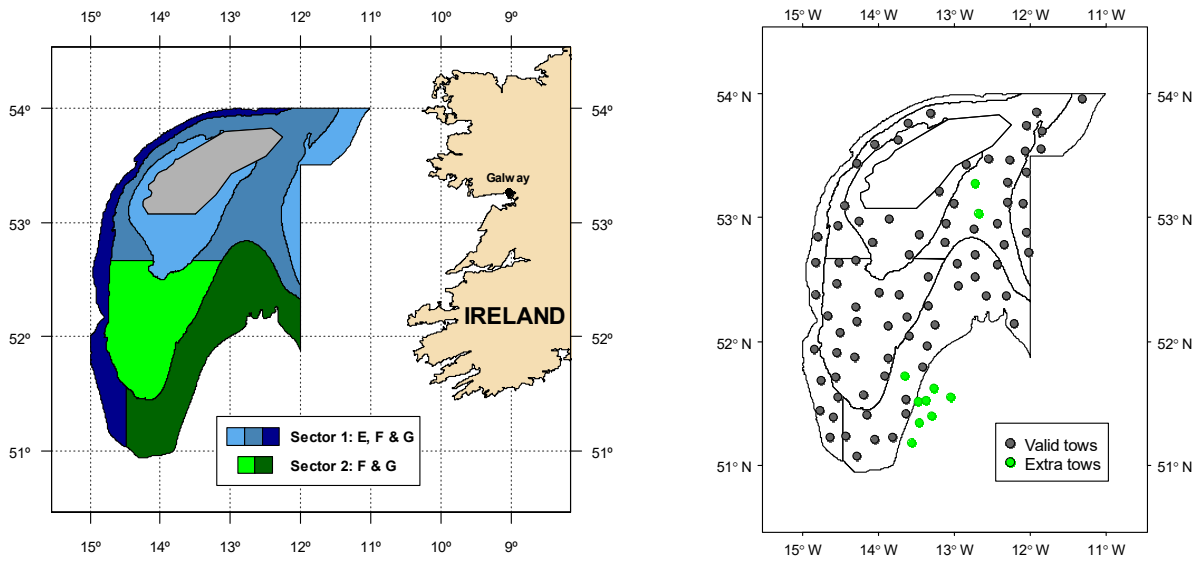


Figure 1. Left: Stratification design used in Porcupine surveys from 2003, previous data were re-stratified. Depth strata are: E) shallower than 300 m, F) 301 – 450 m and G) 451 – 800 m. Grey area in the middle of Porcupine bank corresponds to a large non-trawlable area not considered for area measurements and stratification. Right: hauls performed in 2020

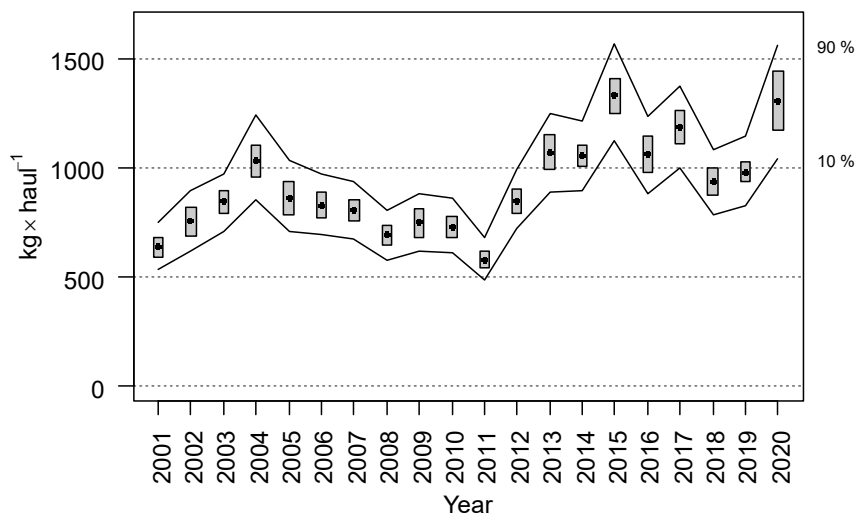


Figure 2. Evolution of the total catch in Porcupine surveys (2001-2020)

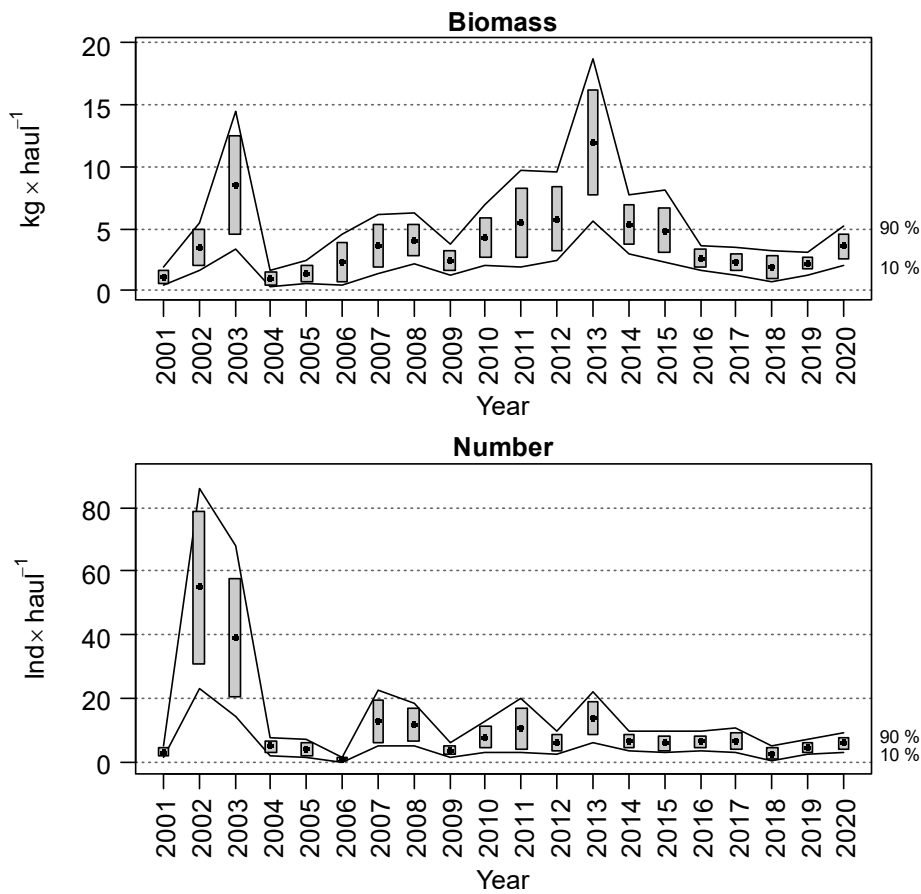


Figure 3. Evolution of *Melanogrammus aeglefinus* biomass and abundance indices in Porcupine surveys (2001-2020). Boxes mark parametric standard error of the stratified abundance index. Lines mark bootstrap confidence intervals ($\alpha = 0.80$, bootstrap iterations = 1000)

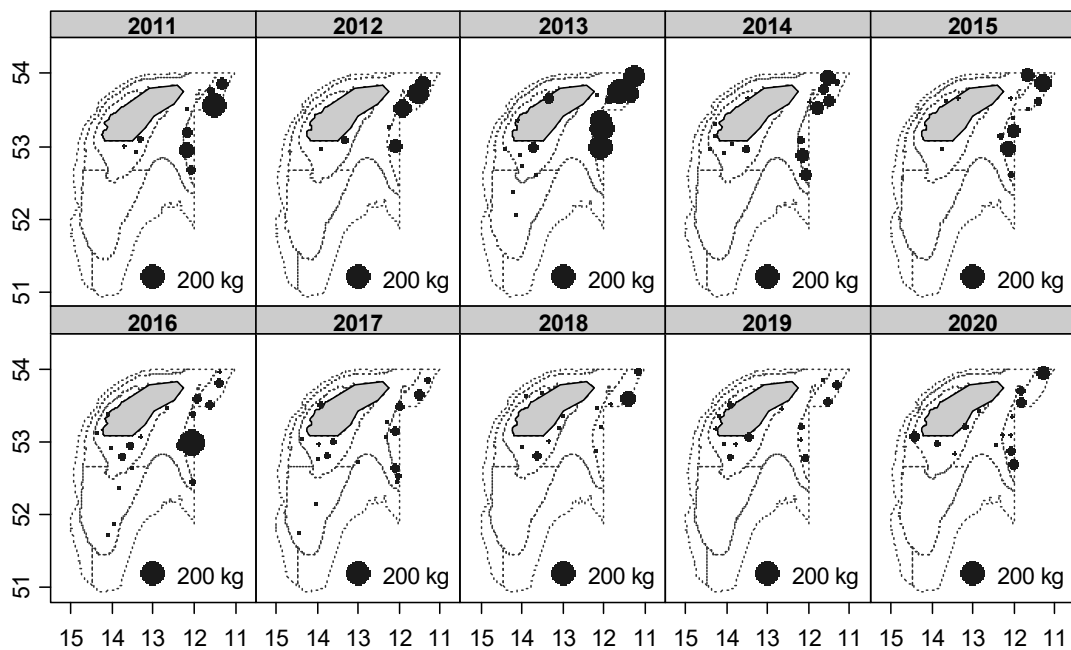


Figure 4. Geographic distribution of *Melanogrammus aeglefinus* catches ($\text{kg} \times 30 \text{ min haul}^{-1}$) in Porcupine surveys (2011-2020)

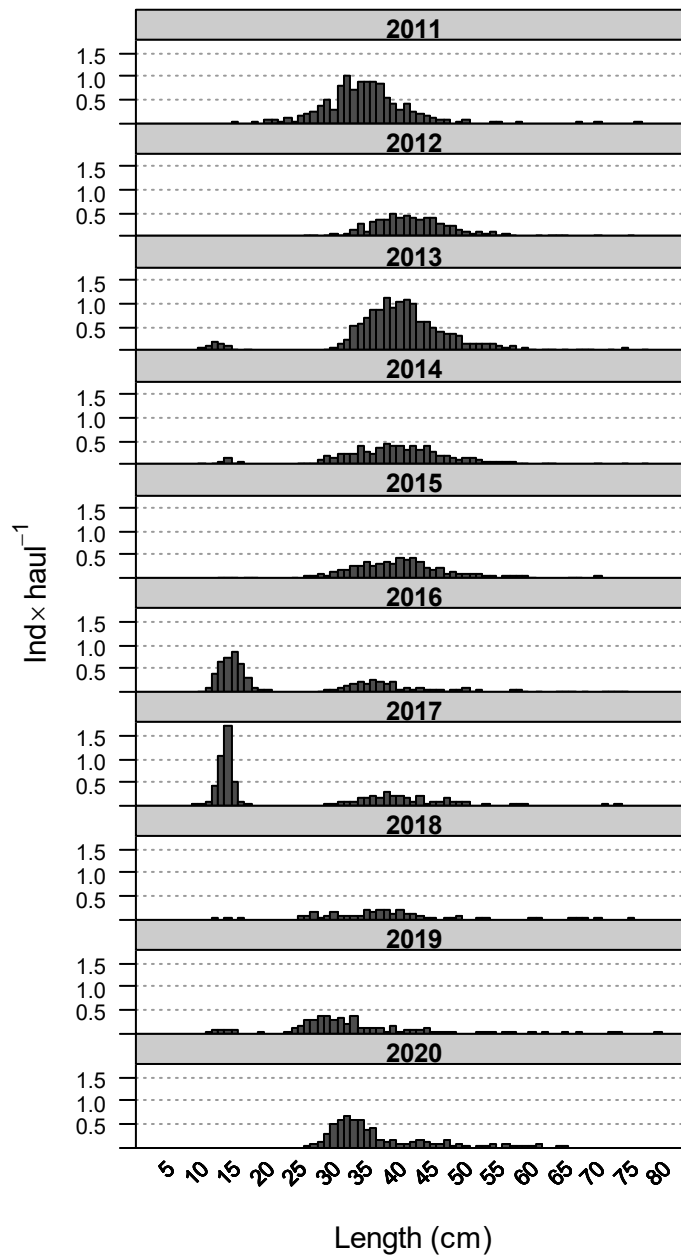


Figure 5. Mean stratified length distributions of *Melanogrammus aeglefinus* in Porcupine surveys (2011-2020)

Melanogrammus aeglefinus

1 - 20 cm

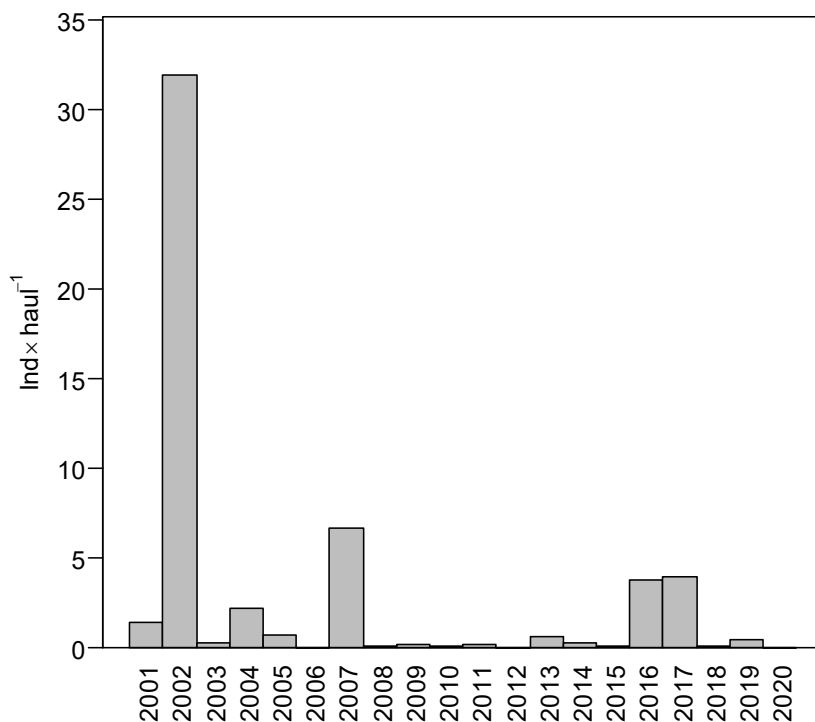


Figure 6. Mean stratified abundance of *Melanogrammus aeglefinus* recruits (< 20 cm) in Porcupine surveys (2001-2020)

Melanogrammus aeglefinus <20 cm

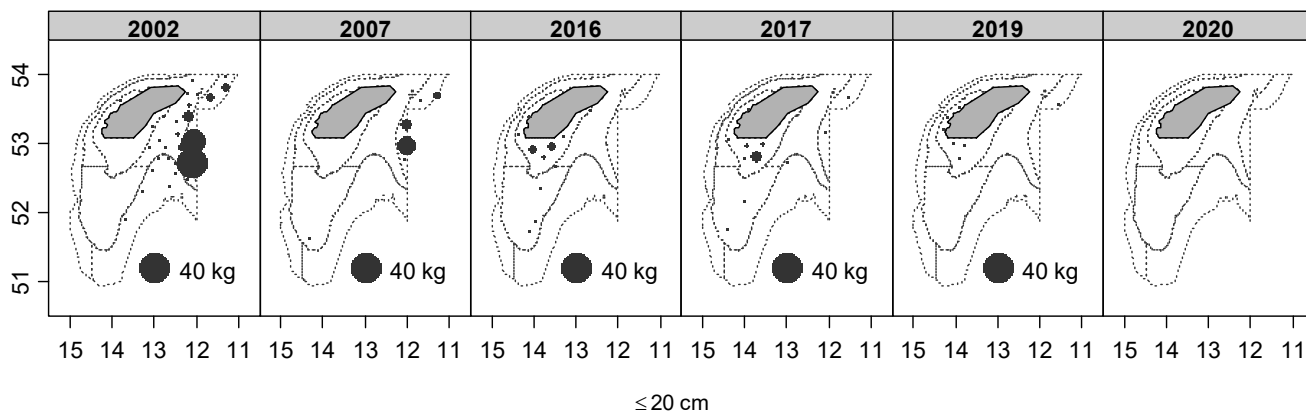


Figure 7. Geographic distribution of *Melanogrammus aeglefinus* recruits (< 20 cm) in Porcupine surveys

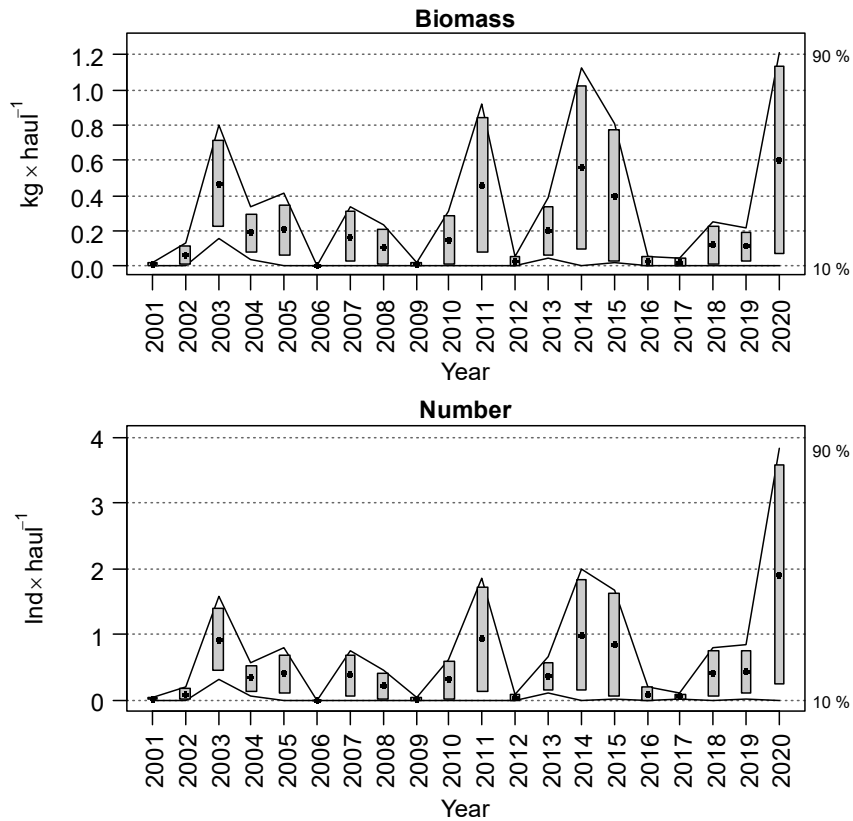


Figure 8. Evolution of *Merlangius merlangus* biomass and abundance indices in Porcupine surveys (2001-2020). Boxes mark parametric standard error of the stratified abundance index. Lines mark bootstrap confidence intervals ($\alpha = 0.80$, bootstrap iterations = 1000)

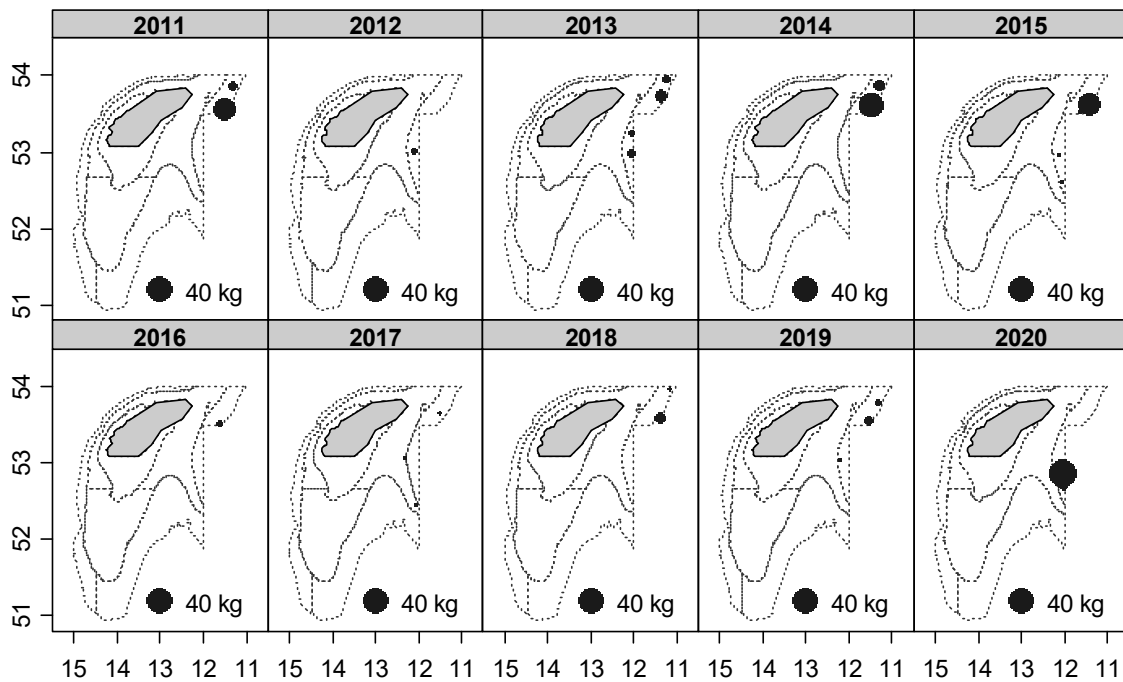


Figure 9. Geographic distribution of *Merlangius merlangus* catches ($\text{kg} \times 30 \text{ min haul}^{-1}$) in Porcupine surveys (2011-2020)

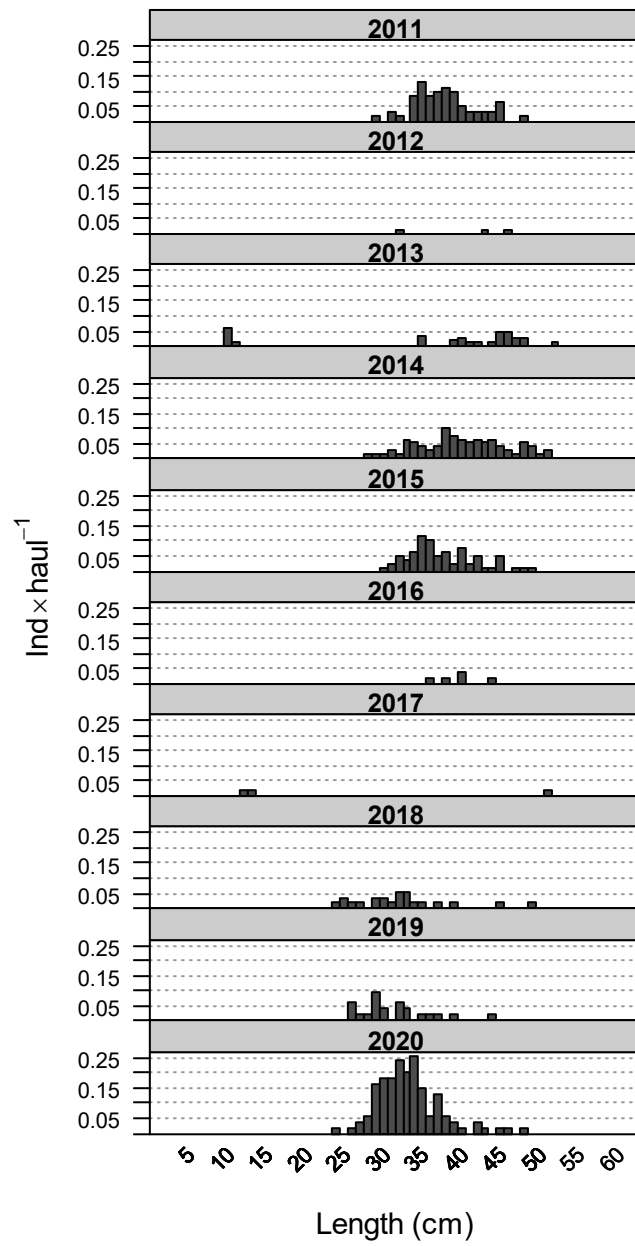


Figure 10. Mean stratified length distribution of *Merlangius merlangus* in Porcupine surveys (2011-2020)

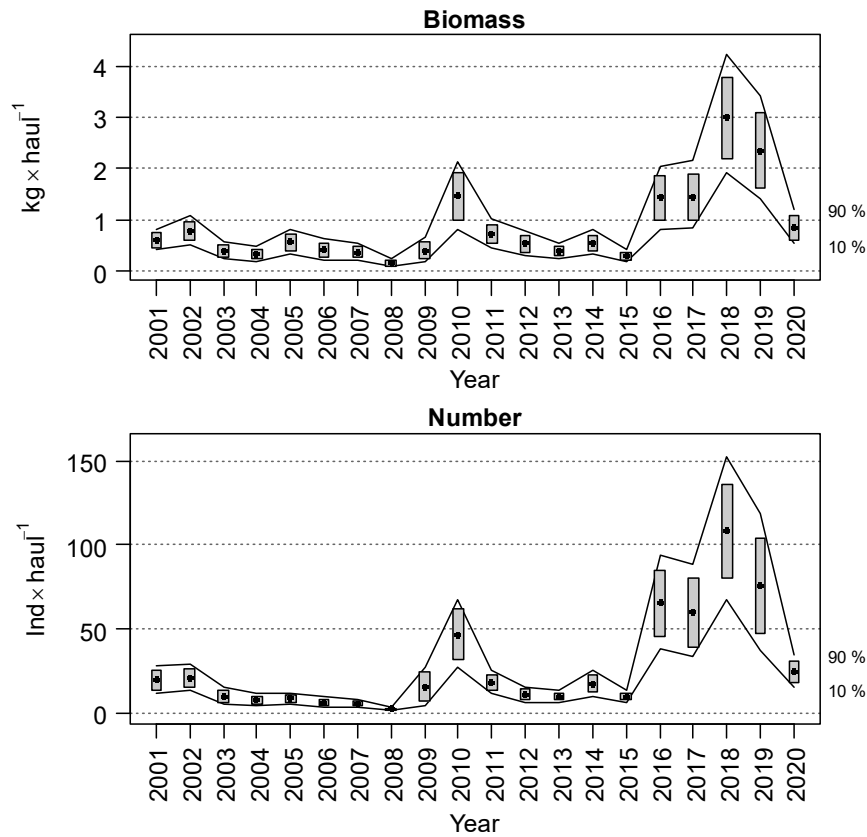


Figure 11. Evolution of *Nephrops norvegicus* biomass and abundance indices in Porcupine surveys (2001-2020). Boxes mark parametric standard error of the stratified abundance index. Lines mark bootstrap confidence intervals ($\alpha = 0.80$, bootstrap iterations = 1000)

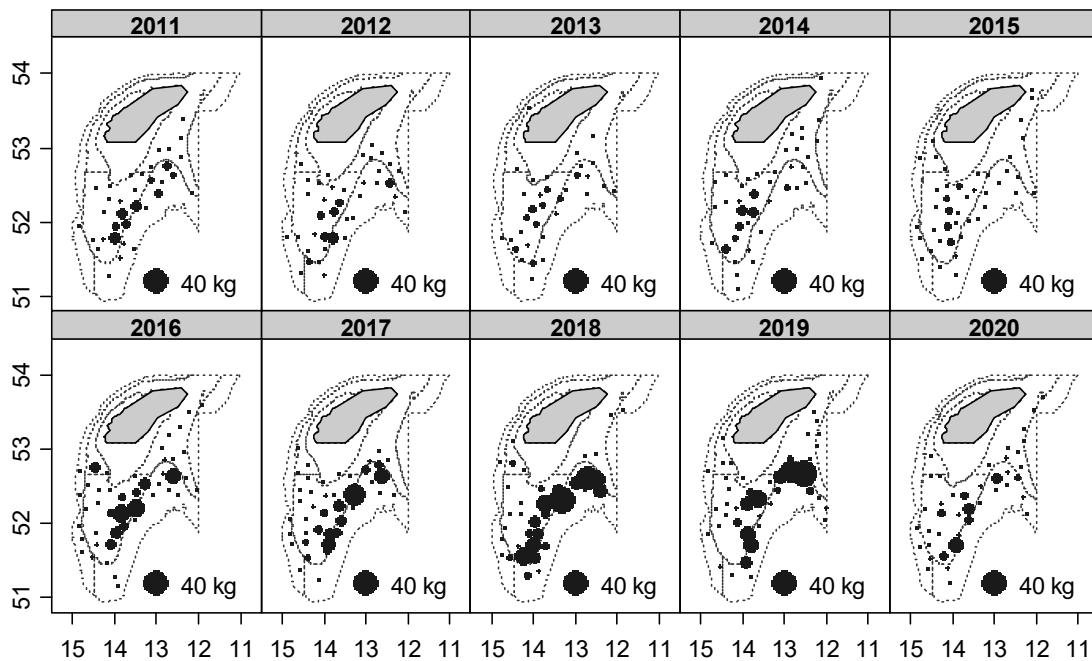


Figure 12. Geographic distribution of *Nephrops norvegicus* catches ($\text{kg} \times 30 \text{ min haul}^{-1}$) in Porcupine surveys (2011-2020)

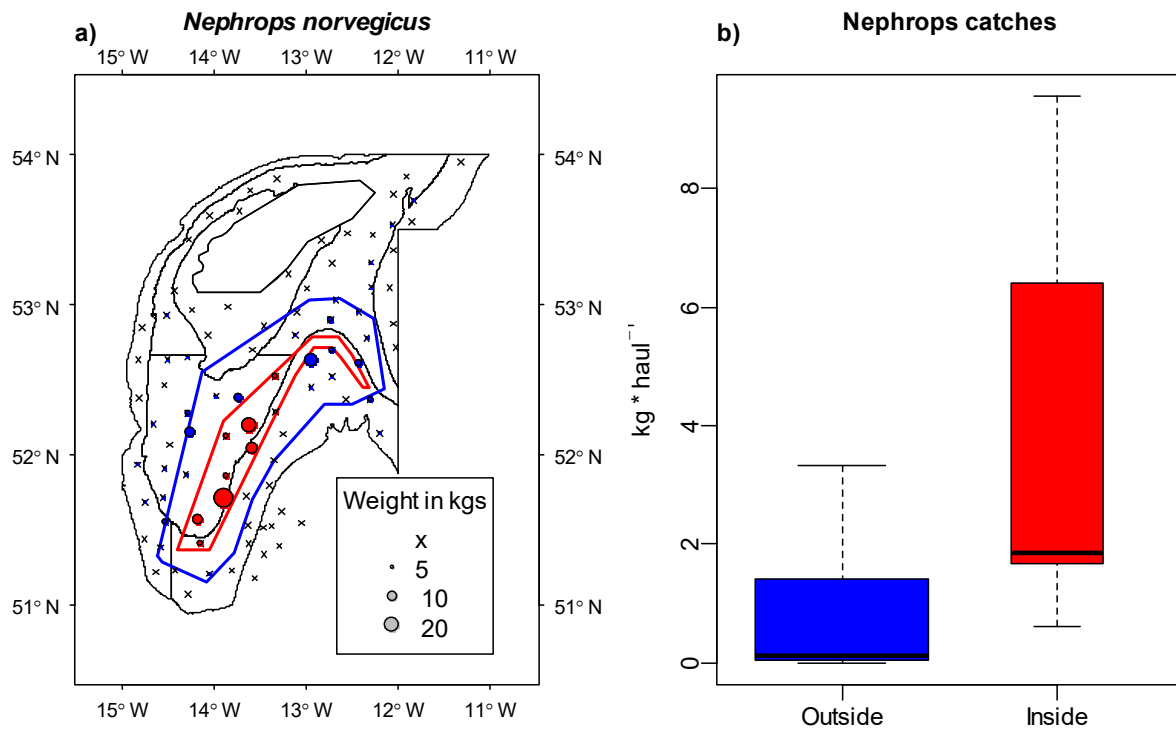


Figure 13. a) *Nephrops norvegicus* catches in Porcupine survey 2020 showing hauls performed inside and outside the area closed to trawl (red line). b) boxplot showing the differences in catches inside and outside the closed area (only hauls with *Nephrops* catches are considered)

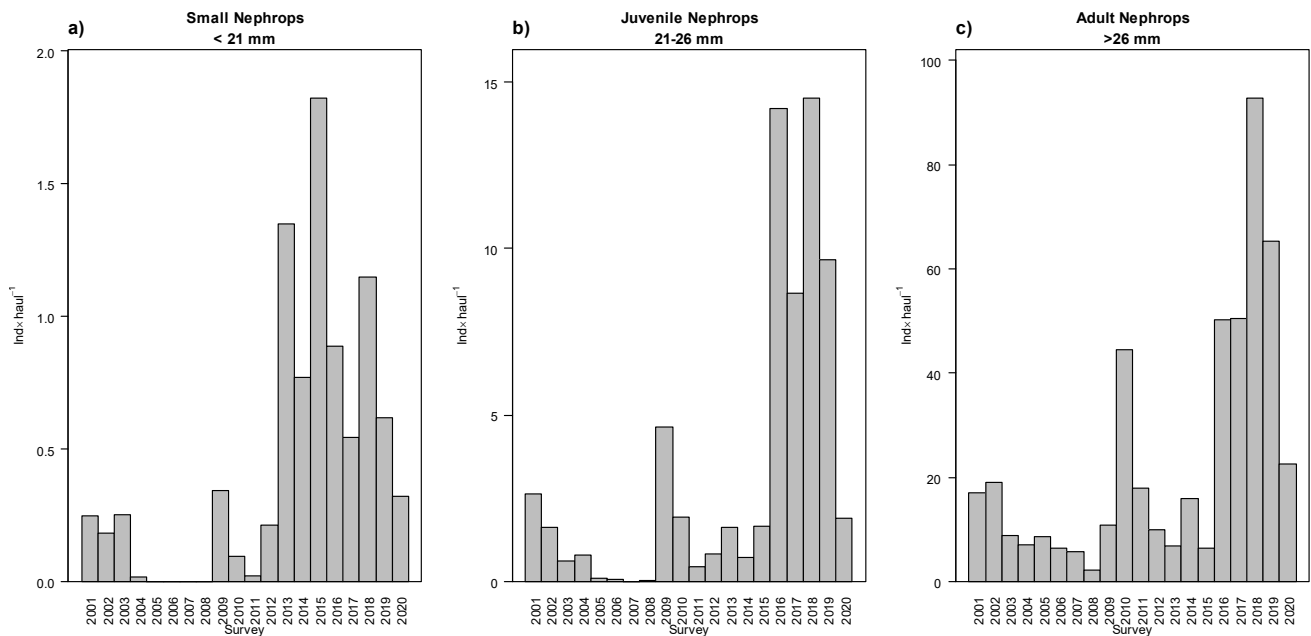


Figure 14. Abundance of small *Nephrops* (<21 mm), juveniles between 21-26 mm and adults (>26 mm) in Porcupine survey 2001-2020

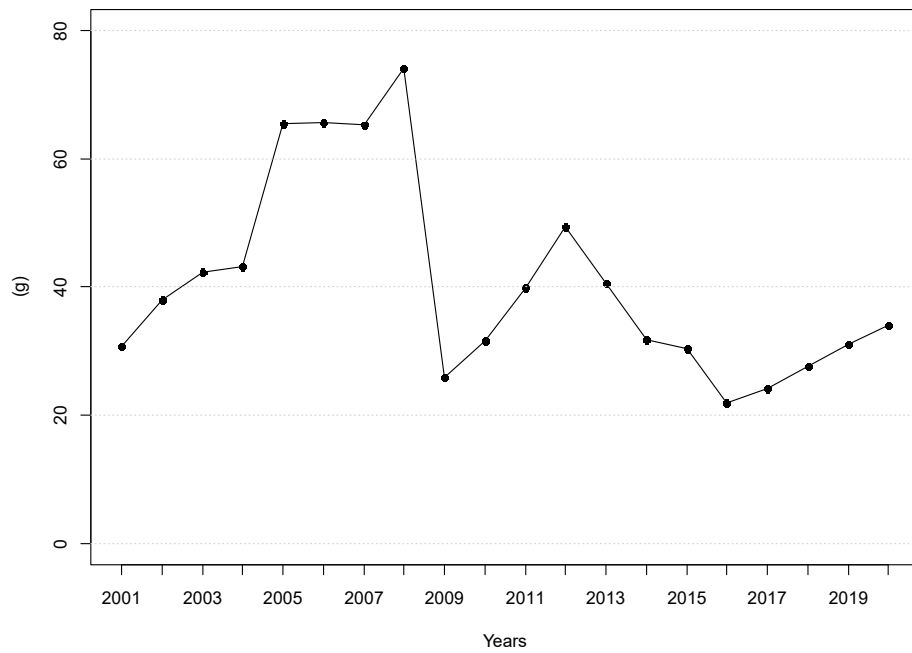


Figure 15. Mean individual weight in Porcupine survey 2001-2020

Nephrops norvegicus <21 cm

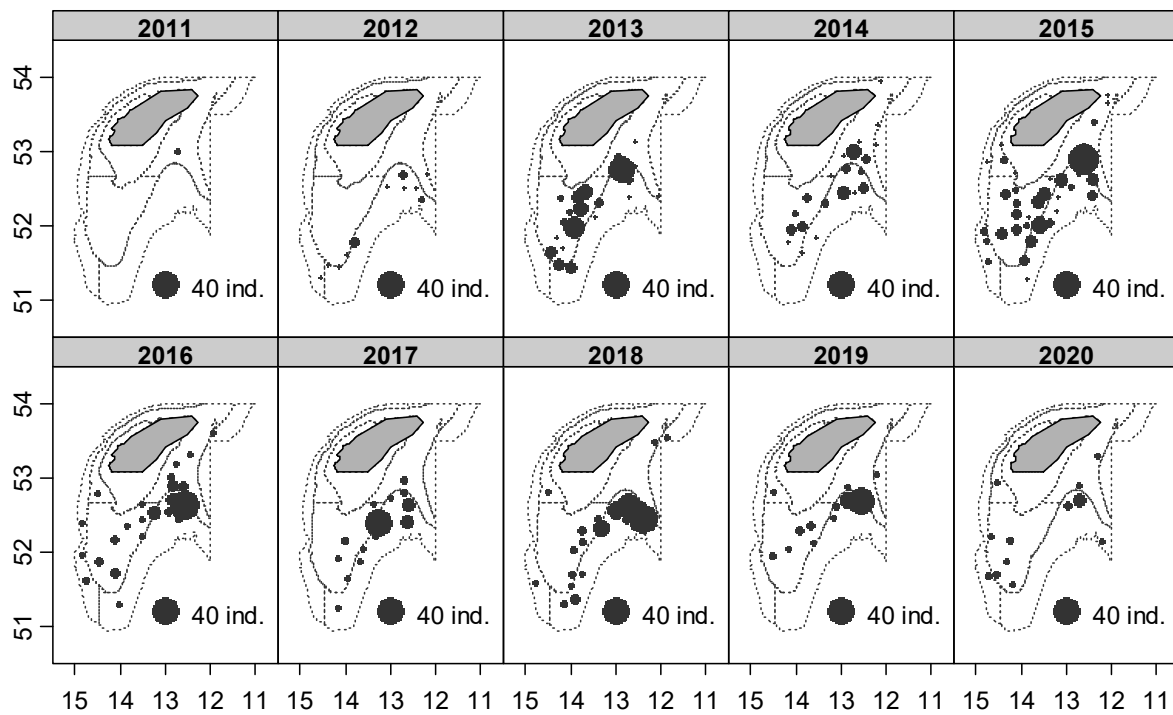


Figure 16. Geographic distribution of *Nephrops norvegicus* recruits (< 21 mm) in Porcupine surveys (2011-2020)

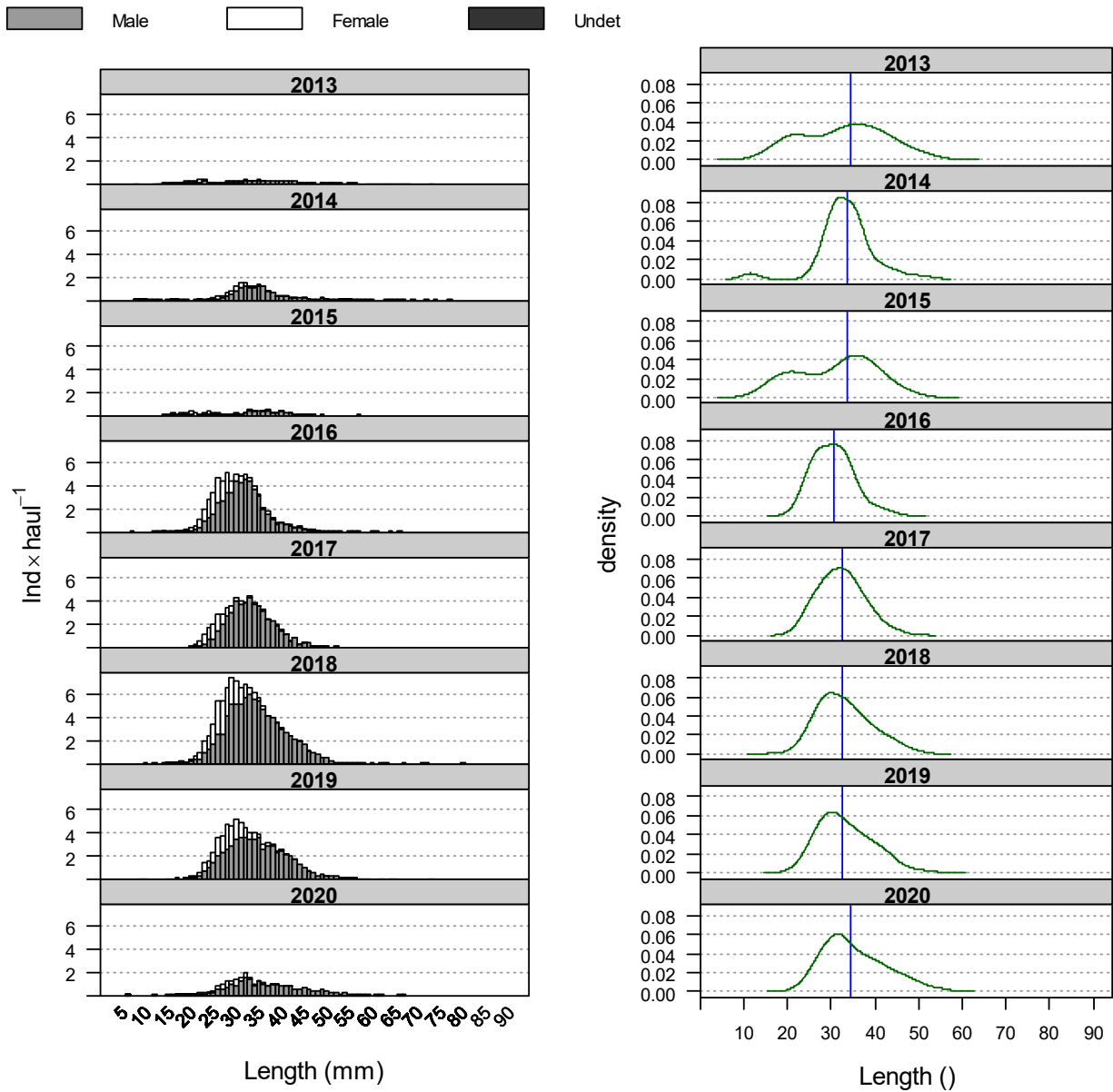


Figure 17. Mean stratified length distributions and length density plots of *Nephrops norvegicus* in Porcupine surveys (2013-2020)