Working Document to be presented to the Working Group on the
Biology and Assessment of Deep Sea Fisheries Resources

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Results on greater forkbeard (*Phycis blennoides*), Spanish ling (*Molva macrophthalma*), roughsnout grenadier (*Trachyrincus scabrus*), bluemouth (*Helicolenus dactylopterus*) and other scarce deep water species on the Northern Spanish Shelf Groundfish Survey

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Abstract

This working document presents the results on the most significant deep fish species on the Spanish Groundfish Survey on the northern Spanish shelf in 2020. Biomass, abundance, length distributions and geographic ranges were analysed for greater forkbeard (*Phycis blennoides*), Spanish ling (*Molva macrophthalma*), roughsnout grenadier (*Trachyrincus scabrus*), bluemouth (*Helicolenus dactylopterus*) and other scarce deep sea species. The biomass of *M. macrophthalma* and *T. scabrus* decreased whereas *P. blennoides* and *H. dactylopterus* increased. *Aphanopus carbo, Beryx spp*. and *Pagellus bogaraveo* were scarce as usual and *Coryphaenoides rupestris* was not found in this last survey.

Introduction

The bottom trawl survey on the Northern Spanish Shelf has been carried out every autumn since 1983, except in 1987, to provide data and information for the assessment of the commercial fish species and the ecosystems on the Galician and Cantabrian shelves (ICES Divisions 8c and 9a North).

The aim of this working document is to update the results (abundance indices, length frequencies and geographic distribution) of the most common deep water fish species on the bottom trawl surveys on the Northern Spanish Shelf after the results presented previously (Blanco *et al*. 2019, Fernández-Zapico *et al*. 2020). The species analyzed are *Phycis blennoides* (greater forkbeard), *Molva macrophthalma* (spanish ling), *Trachyrincus scabrus* (roughsnout grenadier), *Helicolenus dactylopterus* (bluemouth), and some other scarce species as *Aphanopus carbo* (black scabbardfish), *Coryphaenoides rupestris* (roundnose grenadier), *Beryx spp.* (alfonsinos) and *Pagellus bogaraveo* (blackspot seabream). Although results on *Helicolenus dactylopterus* were not included in the ICES data call, they are also updated considering its remarkable abundance and geographical distribution in the surveyed area, and the fact that these indices were used in the WGDEEP report when reviewing the abundance and status of the stock on the north-eastern Atlantic.

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Material and methods

The area covered in the Northern Spanish Shelf Groundfish Survey on the Cantabrian Sea an Off Galicia (Divisions 8c and Northern part of 9a; SPNGFS) extends from longitude 1° W to 10° W and from latitude 42° N to 44.5° N, following the standard IBTS methodology for the western and southern areas (ICES, 2017). The sampling design is random stratified with five geographical sectors (MF: Miño-Finisterre, FE: Finisterre-Estaca de Bares, EP: Estaca de Bares - Peñas, PA: Peñas - Ajo, AB: Ajo - Bidasoa) and three depth strata (70-120 m, 121-200 m and 201-500) (Figure 1, ICES, 2017). The shallower depth stratum was changed in 1997 from 30-100 m to 70-120 m, due to the small area and scarcity of trawlable shallower grounds.

Nevertheless, some extra hauls are carried out every year, if possible, to cover shallower (<70 m) and deeper (>500 m) grounds. These additional hauls are plotted in the distribution maps, although they are not included in the calculation of the stratified abundance indices since the coverage of these grounds (shallower and deeper) are not considered representative of the area. However, the information from these depths is considered relevant due to the changes in the depth distribution of fishing activities in the area (Punzón et al. 2011) and these hauls are also used to define the depth range of the species.

The standardized indices of the deep water fishes analyzed in this report probably underestimate its real biomass due to the fact that most of its catches might happen out of the standard stratification area, in additional hauls deeper than 500 m. For this reason, the catches in standard and deeper additional hauls were plotted in this report.

Results

This last survey was carried out under the COVID-19 pandemic situation, therefore participants were decreased and the objectives were rearranged. Nonetheless, 123 valid hauls were carried out, 109 of these were standard hauls and 14 additional hauls (2 of them shallower than 70 m and 12 of them between 500 m and 800 m) (Figure 1).

The total stratified catch per haul increased considerably in 2020, recovering the high values of the time series (Figure 2).

In 2020, as usual, most of the biomass of *P. blennoides, M. macrophthalma*, *T. scabrus, A. carbo* and *Beryx spp*. was found in the additional deep water hauls (>500 m) in contrast to *H. dactylopterus* which was mainly found in standard hauls. *P.bogaraveo* was scarcely found out the stratification in the shallow area (<70 m). The biomass of *P. blennoides* increased slightly whereas *M. macrophthalma* and *T. scabrus* decreased. The biomass of *H. dactylopterus* increased reaching the highest value of the time series, but the abundance decreased and small specimens were not as abundant as previous years. Only a few specimens of *A. carbo, Beryx spp*. and *P. bogaraveo* were found and *C. rupestris* was not.

Phycis blennoides (greater forkbeard)

In 2020, 41% of the hauls where *P. blennoides* was found were additional hauls deeper than 500 m and contained 77% of the biomass. This last year the biomass in standard hauls remained low similarly to the values of the three previous years whereas the biomass in additional deep hauls remained being high, after the increase in 2019 (Figure 3).

The geographical distribution of *P. blennoides* remained similar to previous years, being widespread in the sampling area (Figure).

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The length distribution in standard hauls remained showing low abundances per size and even fewer small (13-19 cm) and large (24-45 cm) specimens than in 2019 (Figure 5). The largest individuals which ranged from 26 cm to 65 cm were found in the additional deeper hauls, although specimens around 35 cm were more abundant (Figure 6).

Molva macrophthalma **(Spanish ling)**

This last year, the biomass of *M. macrophtalma* decreased sharply in standard hauls whereas increased slightly in additional hauls (Figure 7). Most of the biomass (91%) was found in these deeper hauls (> 500 m) which were 45% of the total hauls with *M. macrophtalma*.

The species kept on being widespread in the study area but present in fewer spots this last survey (Figure 8).

The little abundance of specimens in standard hauls was strikingly evident this last survey (Figure 9). Only 31 specimens which ranged from 21 cm to 73 cm were found there, most of them around 21 and 29 cm. In contrast, in additional deeper hauls larger specimens, up to 115 cm, were found (Figure 10).

Trachyrincus scabrus **(roughsnout grenadier)**

T. scabrus has been found mostly in additional hauls (>500 m) in the last decade. In 2020, all the biomass was found in these deep hauls and catches decreased slightly (Figure 11).

The geographical distribution showed fewer spots of biomass this last survey, but in the usual deep areas of Galicia and the northeastern Cantabrian Sea (Figure 12).

Specimens ranged from 80 mm to 265 mm, although more abundance of large specimens (200-210 mm) was found (Figure 13).

Helicolenus dactylopterus **(bluemouth)**

Although bluemouth is not requested for ICES DCF Data Call, the biomass and abundance are significant in the area and useful for the assessment of the stock (ICES, 2017).

H. dactylopterus has been mainly found in standard hauls, therefore the catches of the additional deeper hauls are not plotted.

In 2020, the biomass slightly increased reaching the highest value of the time series whereas the abundance decreased, although it remained among the medium-high values of the time series (Figure 14).

The geographical distribution of *H. dactylopterus* remained similar to the previous year, with greater biomass in the Galician area, although bigger spots near Finisterre than previous years, and the usual spot in the easternmost Ajo-Bidasoa sector (Figure 15).

Length distribution showed fewer recruits than the previous year and a smooth mode around 15 cm, after the remarkable mode of 12 cm in 2019 (Figure 16).

Other scarce deep water species

Other species scarcely caught in the survey were *Aphanopus carbo*, *Coryphaenoides rupestris, Beryx spp.* and *Pagellus bogaraveo.* They have been mainly found out of the standard stratification, the first three species in deeper additional hauls (>500 m) whereas *P. bogaraveo* in shallower additional hauls (< 70 m).

This last survey *C. rupestris* was not found.

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A. carbo was caught in two hauls at 847 m in Galician area and at 530 m in eastern Cantabrian Sea (Figure 17 and Figure 18), with a total of eleven specimens which ranged from 87 to 109 cm.

Beryx spp. were found in three hauls at 140 m, 530 m and 607 m in the Cantabrian sea (Figure 19 and Figure 20). Four specimens were *B. decadactylus* and two *B. splendens* and all of them ranged from 26 to 30 cm.

Only one specimen of *P. bogaraveo* of 18 cm was found at 58 m depth near Peñas Cape (Figure 21 and Figure 22).

Acknowledgements

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Figures

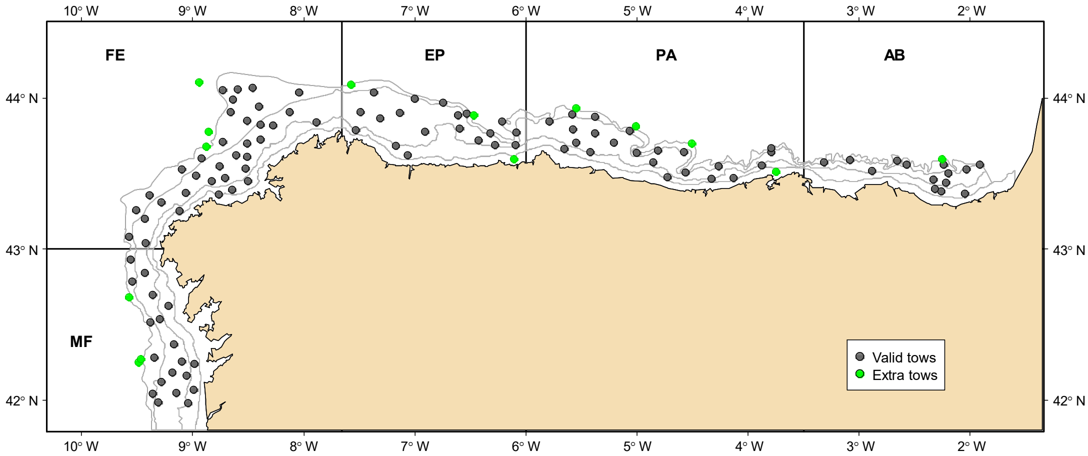

Figure 1 Stratification design and hauls on the Northern Spanish shelf groundfish survey in 2020; Depth strata are: A) 70-120 m, B) 121 – 200 m and C) 201 – 500 m. Geographic sectors are MF: Miño-Finisterre, FE: Finisterre-Estaca, EP: Estaca-cabo Peñas, PA: Peñas-cabo Ajo, and AB: Ajo-Bidasoa

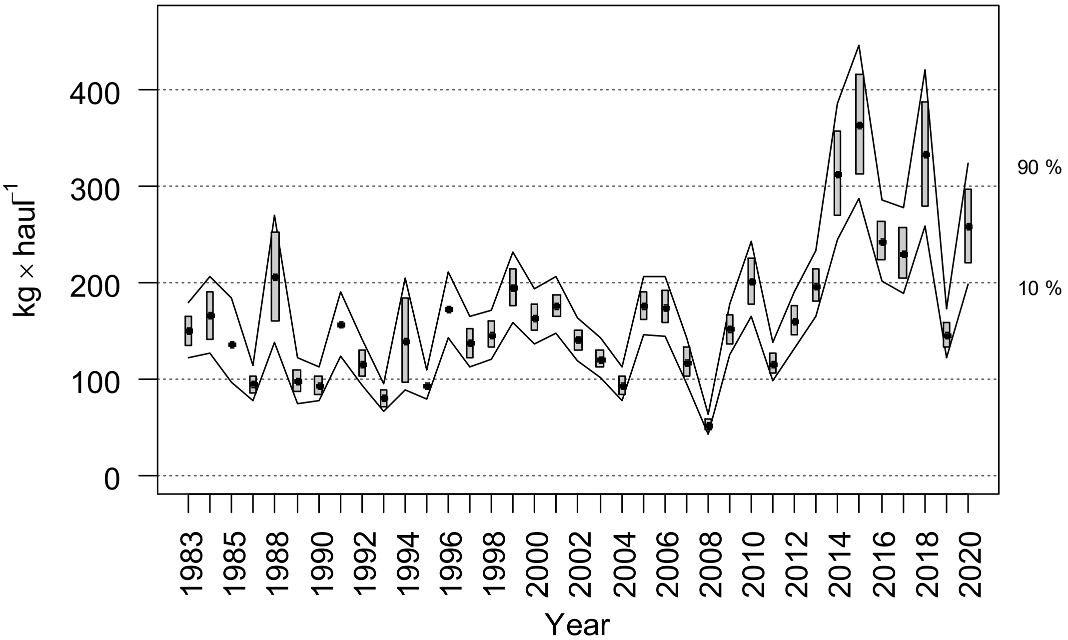

Figure 1 Evolution of the total catch in biomass on the Northern Spanish shelf groundfish survey

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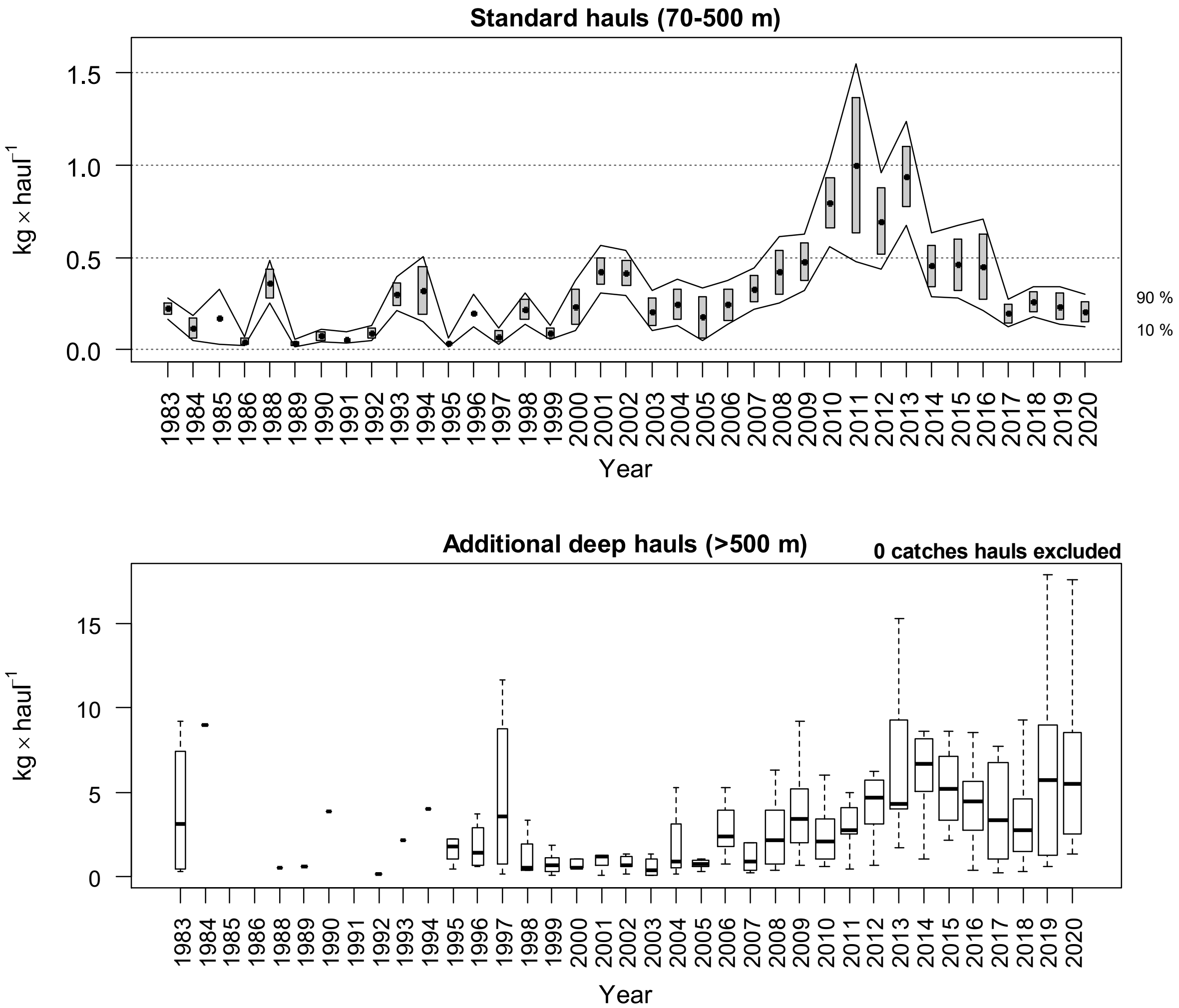

Figure 3 Evolution of *Phycis blennoides* stratified biomass index in standard hauls and additional deep hauls during the North Spanish shelf bottom trawl survey time series. For the standard hauls boxes mark parametric standard error of the stratified biomass index. Lines mark bootstrap confidence intervals (α= 0.80, bootstrap iterations = 1000). For the additional deep water hauls boxplots represent the median and interquartiles of the biomass catches in the deep hauls performed.

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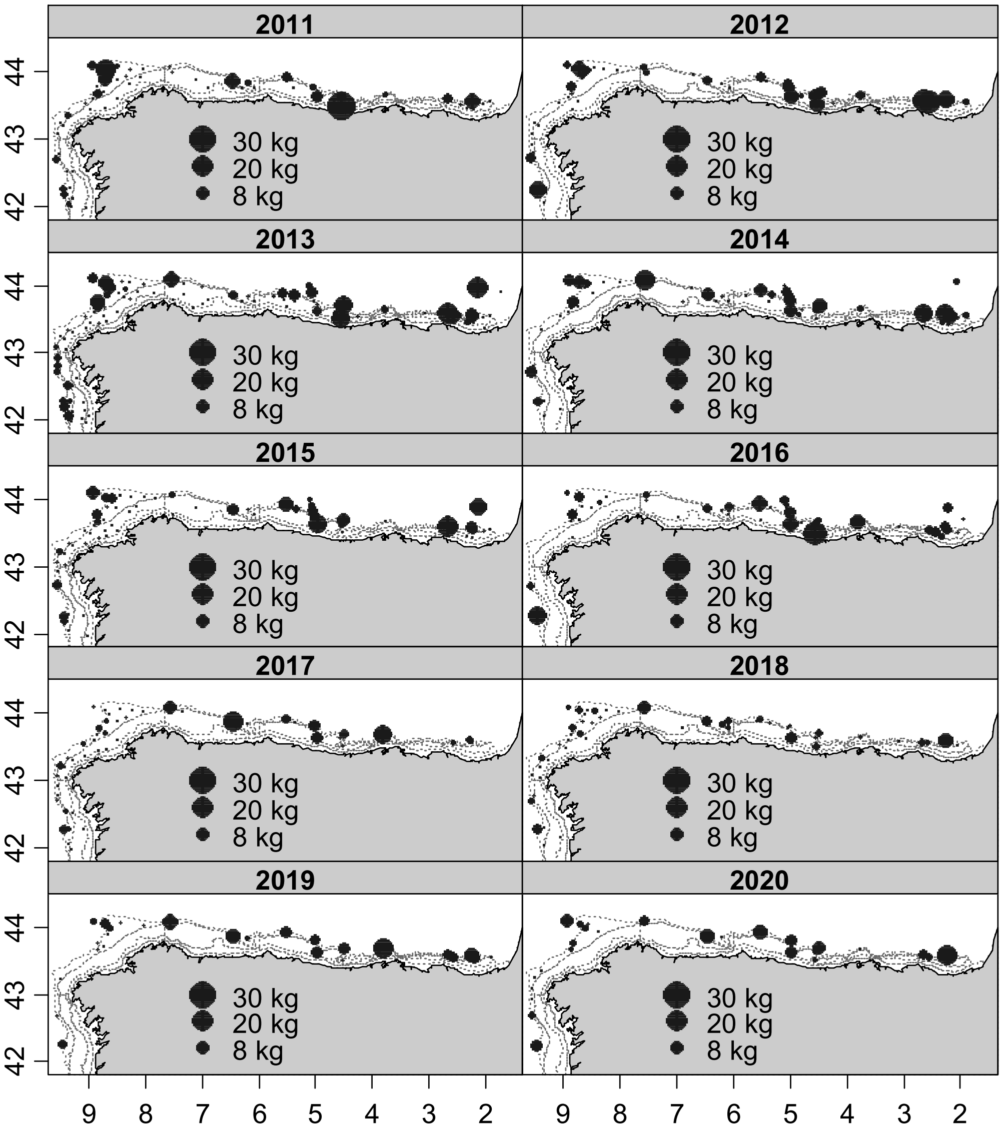

Figure 4 Geographic distribution of *Phycis blennoides* catches (kg·haul^{-1}) in the Northern Spanish Shelf bottom trawl surveys in the last decade

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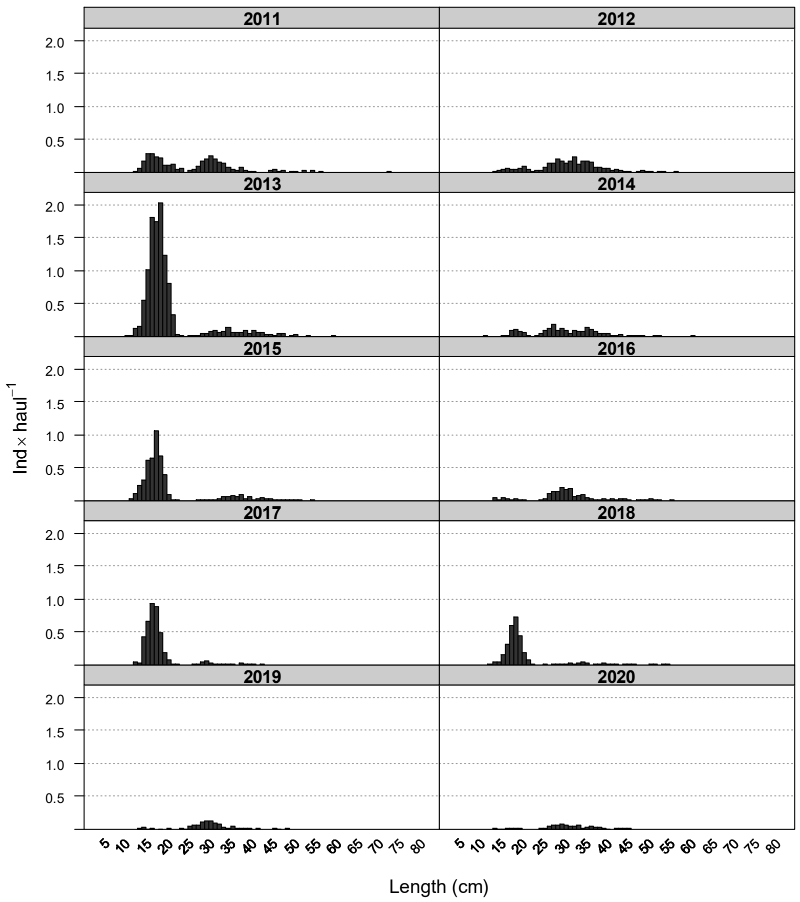

Figure 5 Mean stratified length distributions of *Phycis blennoides* in Northern Spanish Shelf surveys in the last decade

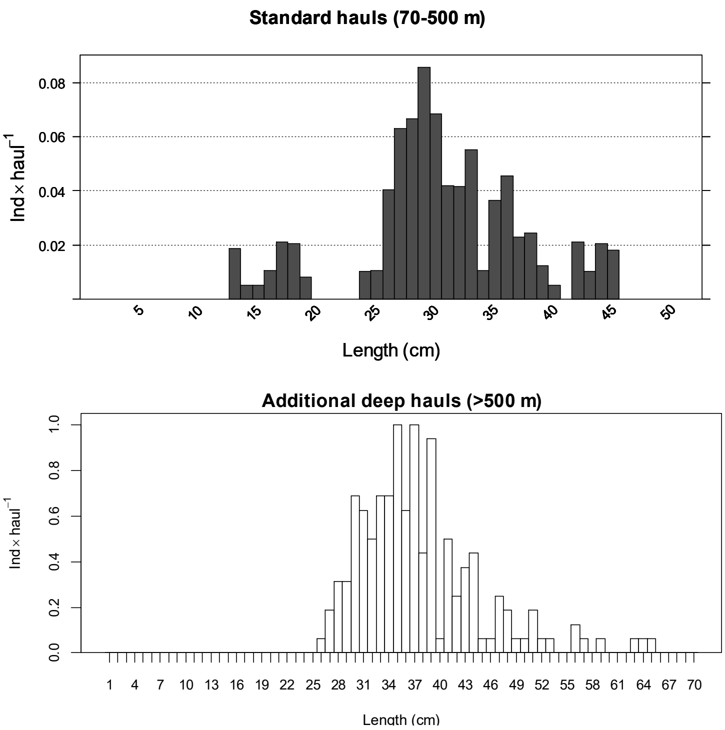

Figure 6 Mean length distributions of *Phycis blennoides* in additional hauls (>500 m) and in the standard hauls (70-500 m) in the North Spanish Shelf survey 2020

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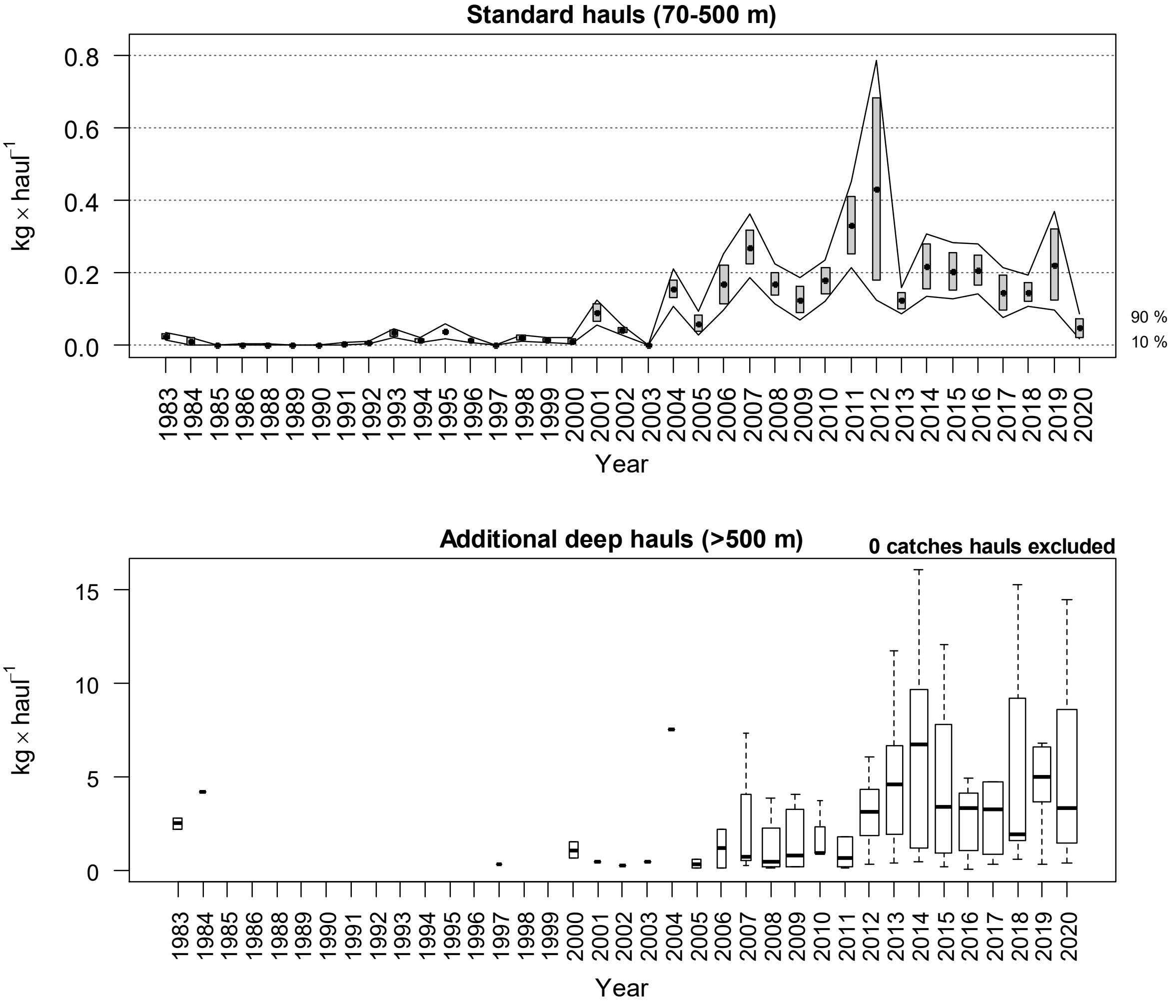

Figure 7 Evolution of *Molva macrophtalma* stratified biomass index in standard hauls and additional deep hauls during the North Spanish shelf bottom trawl survey time series. For the standard hauls boxes mark parametric standard error of the stratified biomass index. Lines mark bootstrap confidence intervals (α= 0.80, bootstrap iterations = 1000). For the additional deep water hauls boxplots represent the median and interquartiles of the biomass catches in the deep hauls performed.

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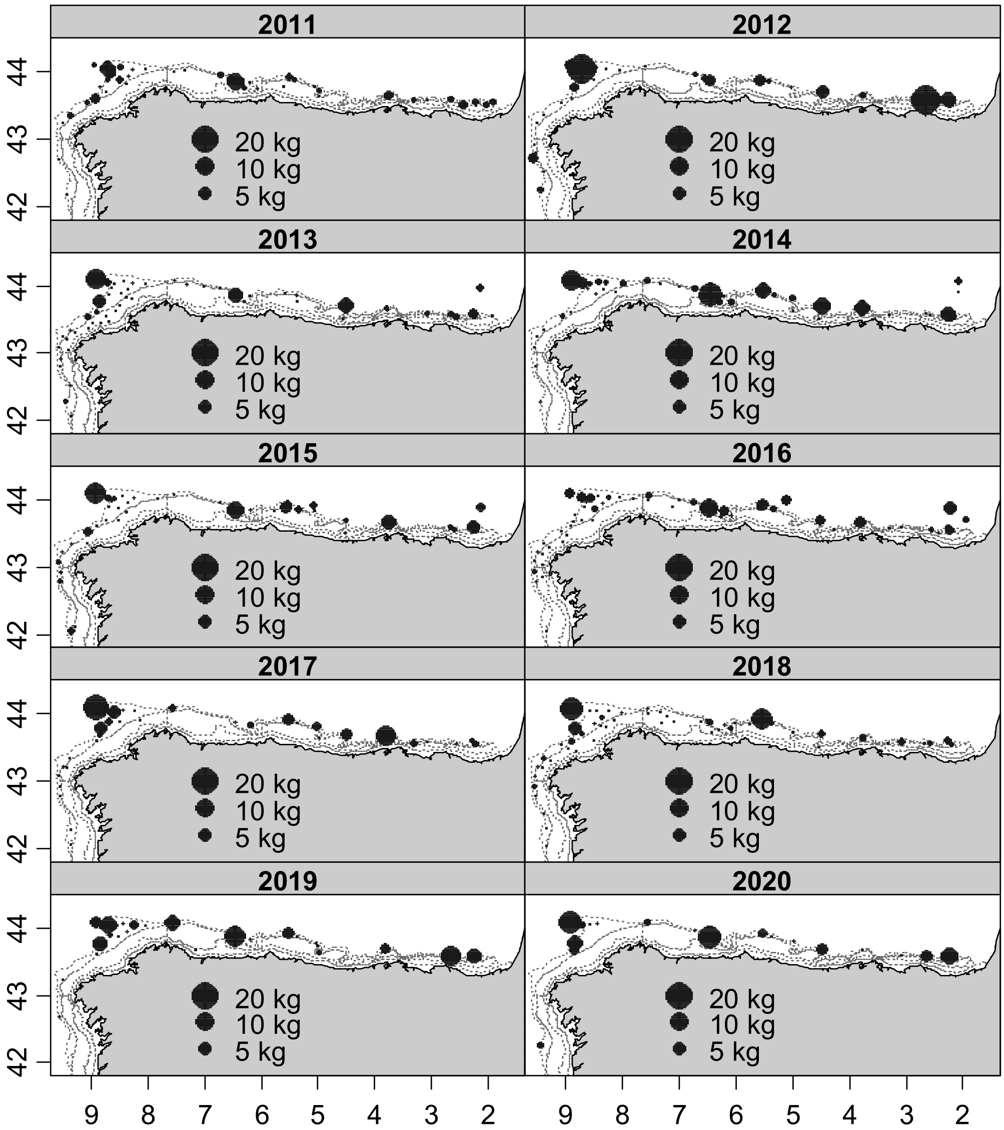

Figure 8 Geographic distribution of *Molva macrophtalma* catches (kg·haul^{-1}) in the Northern Spanish Shelf bottom trawl surveys in the last decade

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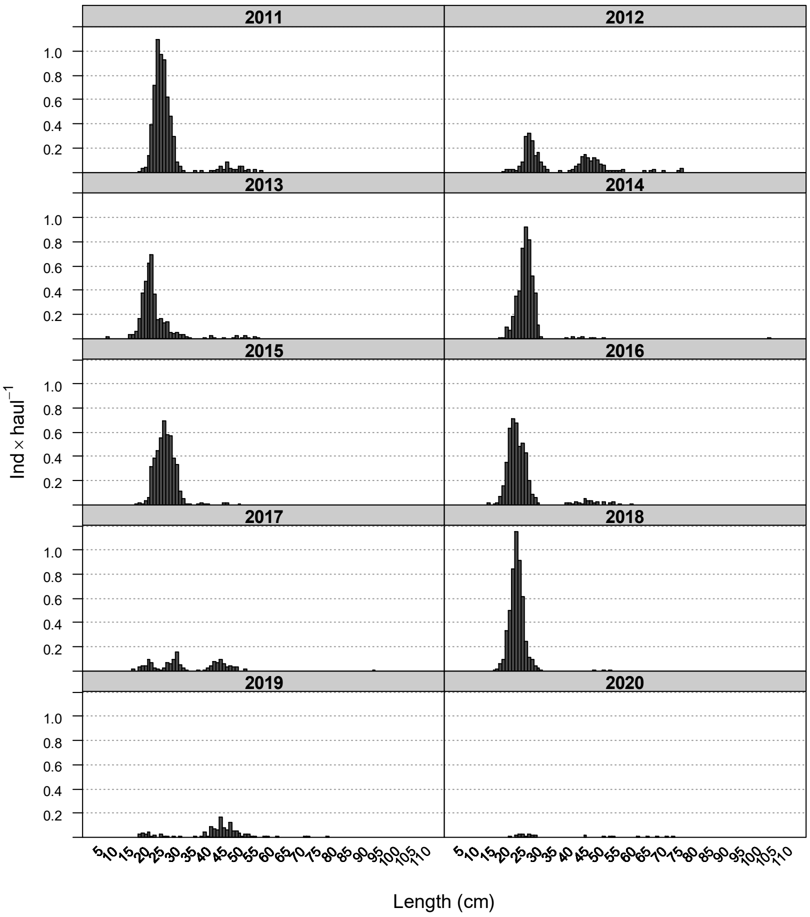

Figure 9 Mean stratified length distributions of *Molva macrophtalma* in Northern Spanish Shelf surveys in the last decade

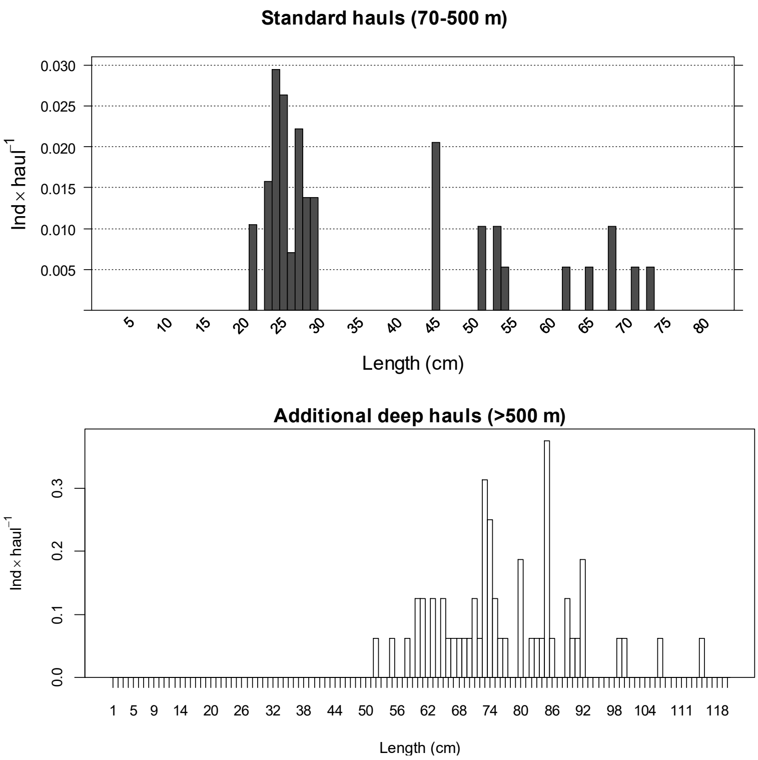

Figure 10 Mean length distributions of *Molva macrophtalma* in additional hauls (>500 m) and in the standard hauls (70-500 m) in the North Spanish Shelf survey 2020

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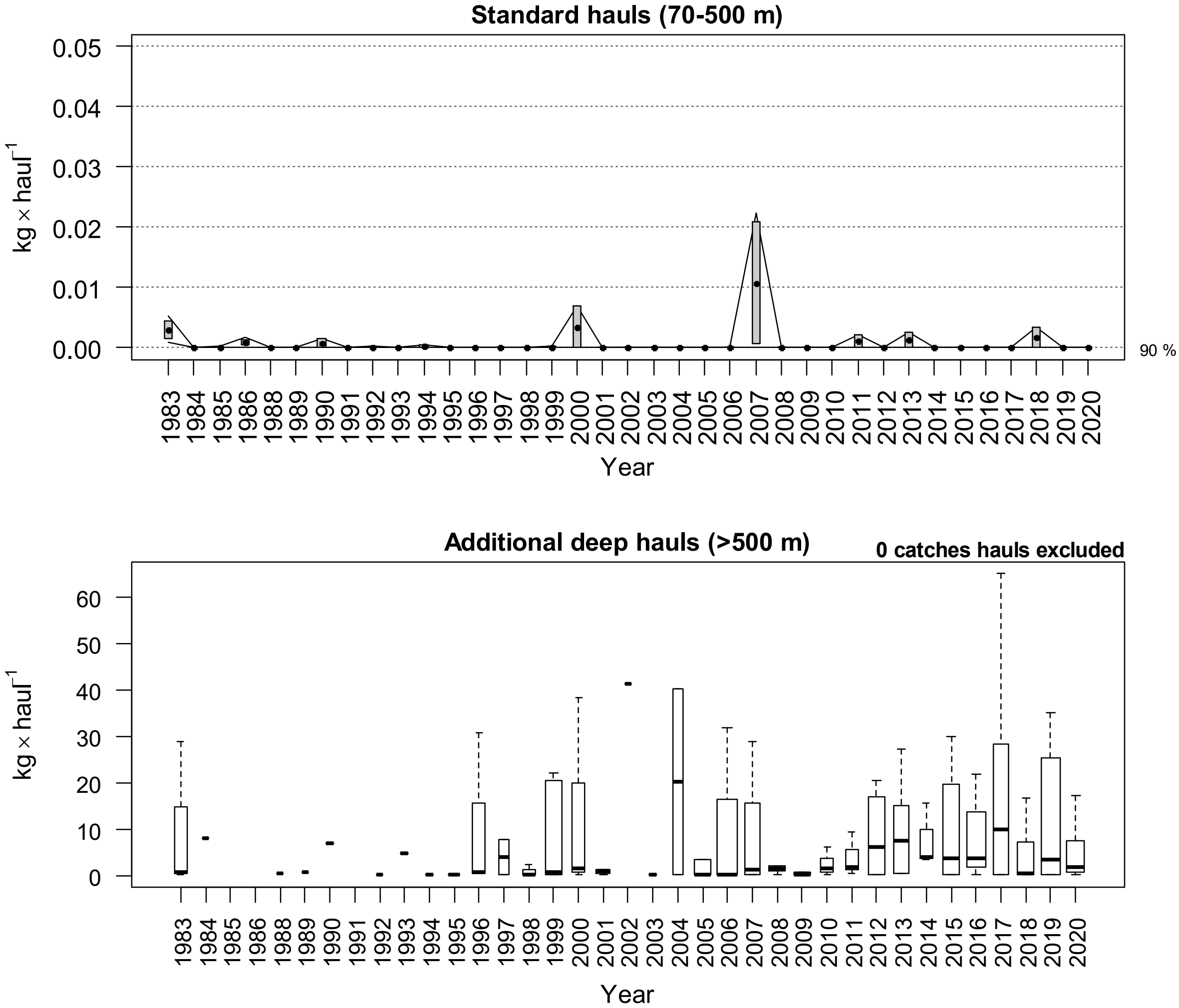

Figure 11 Evolution of *Trachyrincus scabrus* stratified biomass index in standard hauls and additional deep hauls during the North Spanish shelf bottom trawl survey time series. For the standard hauls boxes mark parametric standard error of the stratified biomass index. Lines mark bootstrap confidence intervals (α= 0.80, bootstrap iterations = 1000). For the additional deep water hauls boxplots represent the median and interquartiles of the biomass catches in the deep hauls performed.

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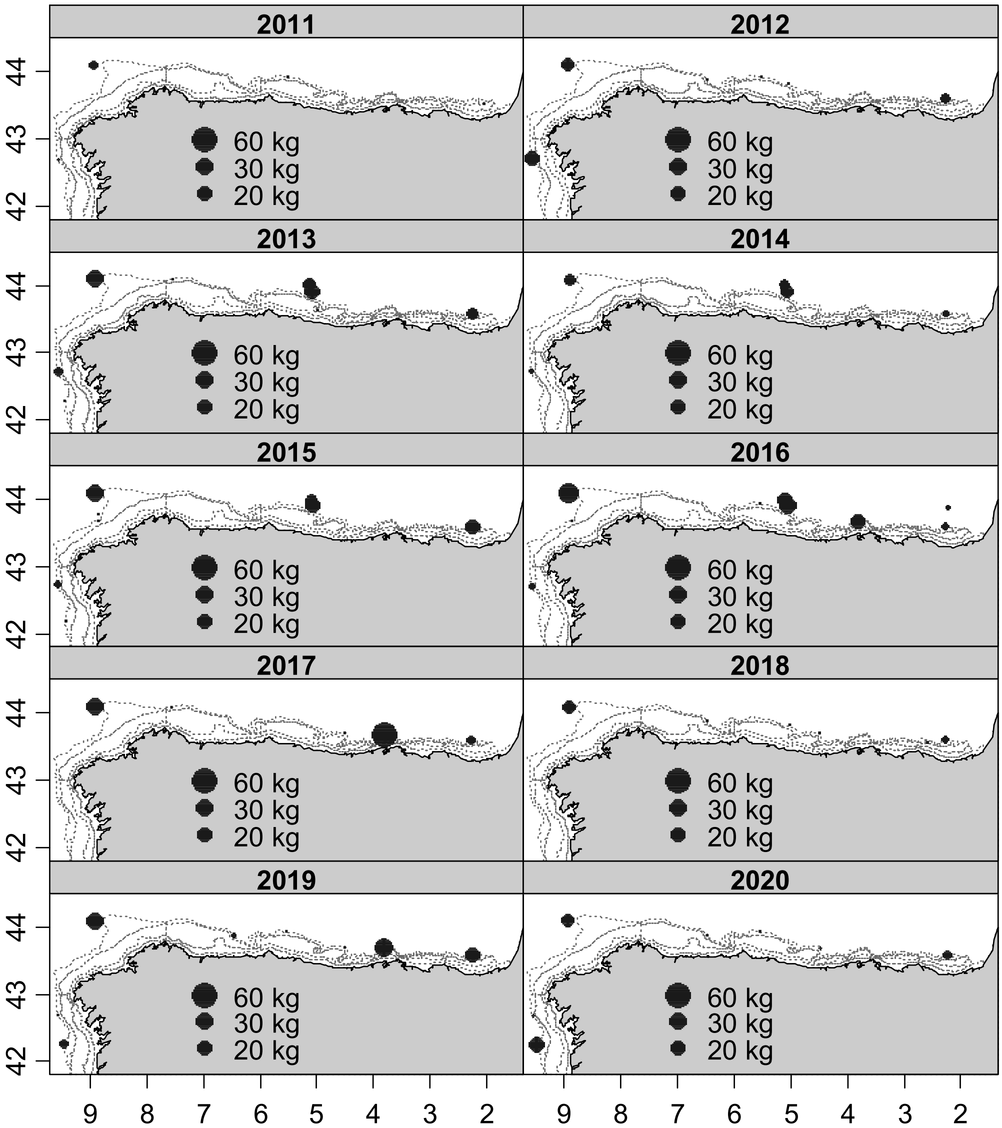

Figure 12 Geographic distribution of *Trachyrincus scabrus* catches (kg·haul^{-1}) in the Northern Spanish Shelf bottom trawl surveys in the last decade

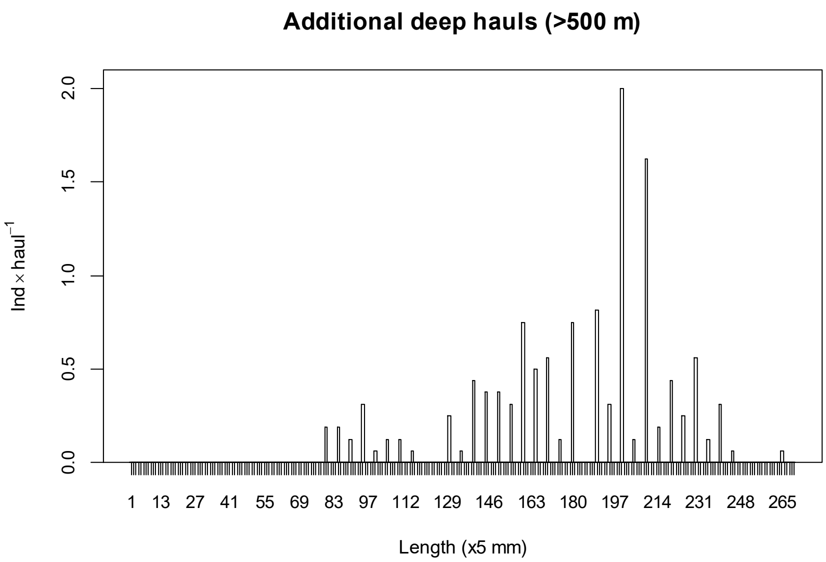

Figure 13 Mean length distributions of *Trachyrincus scabrus* in additional hauls (>500 m) in the North Spanish Shelf survey 2020

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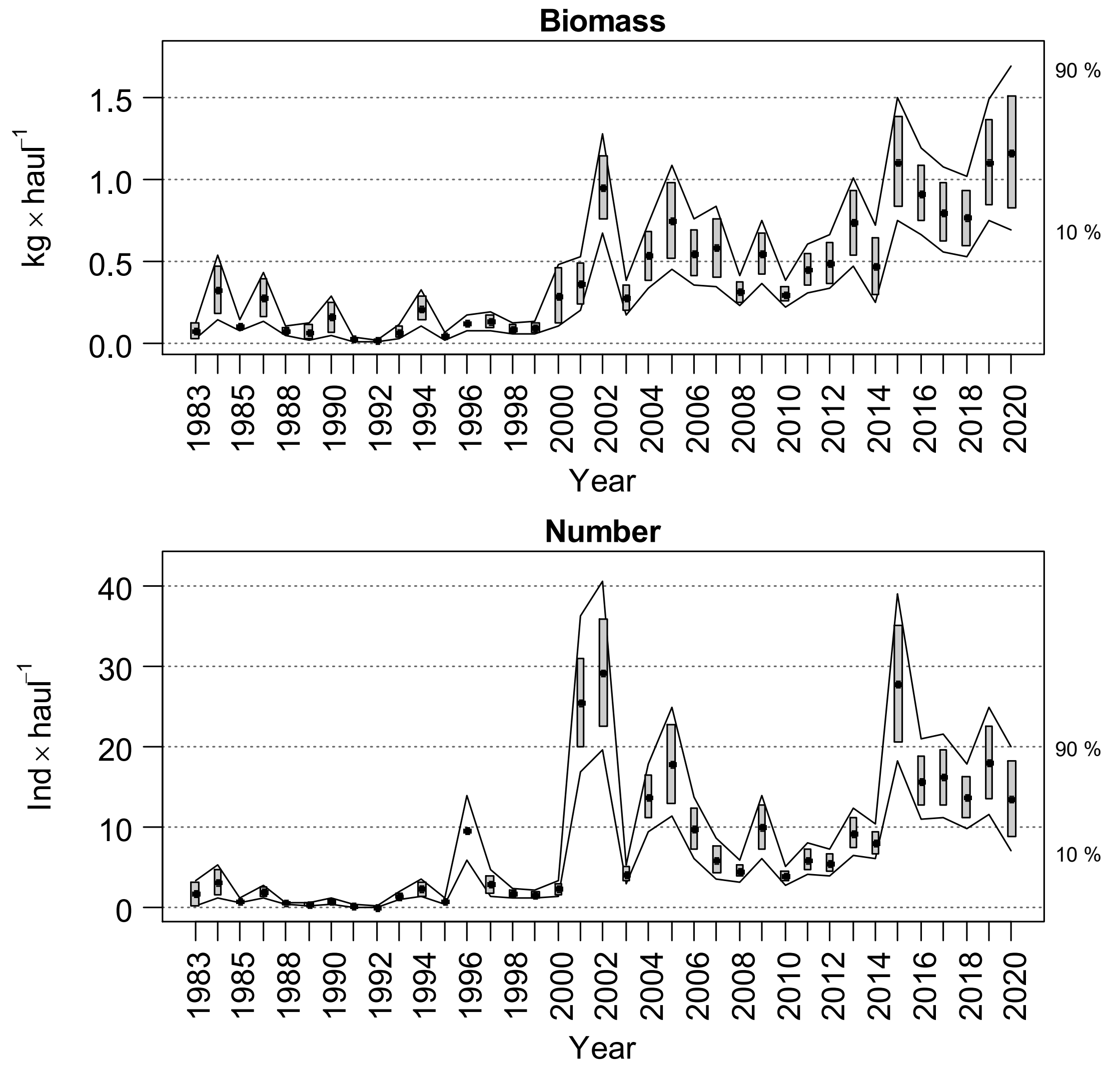

Figure 14 Evolution of *Helicolenus dactylopterus* mean stratified biomass and abundance in Northern Spanish Shelf surveys time series. Boxes mark parametric standard error of the stratified biomass index. Lines mark bootstrap confidence intervals (α= 0.80, bootstrap iterations = 1000)

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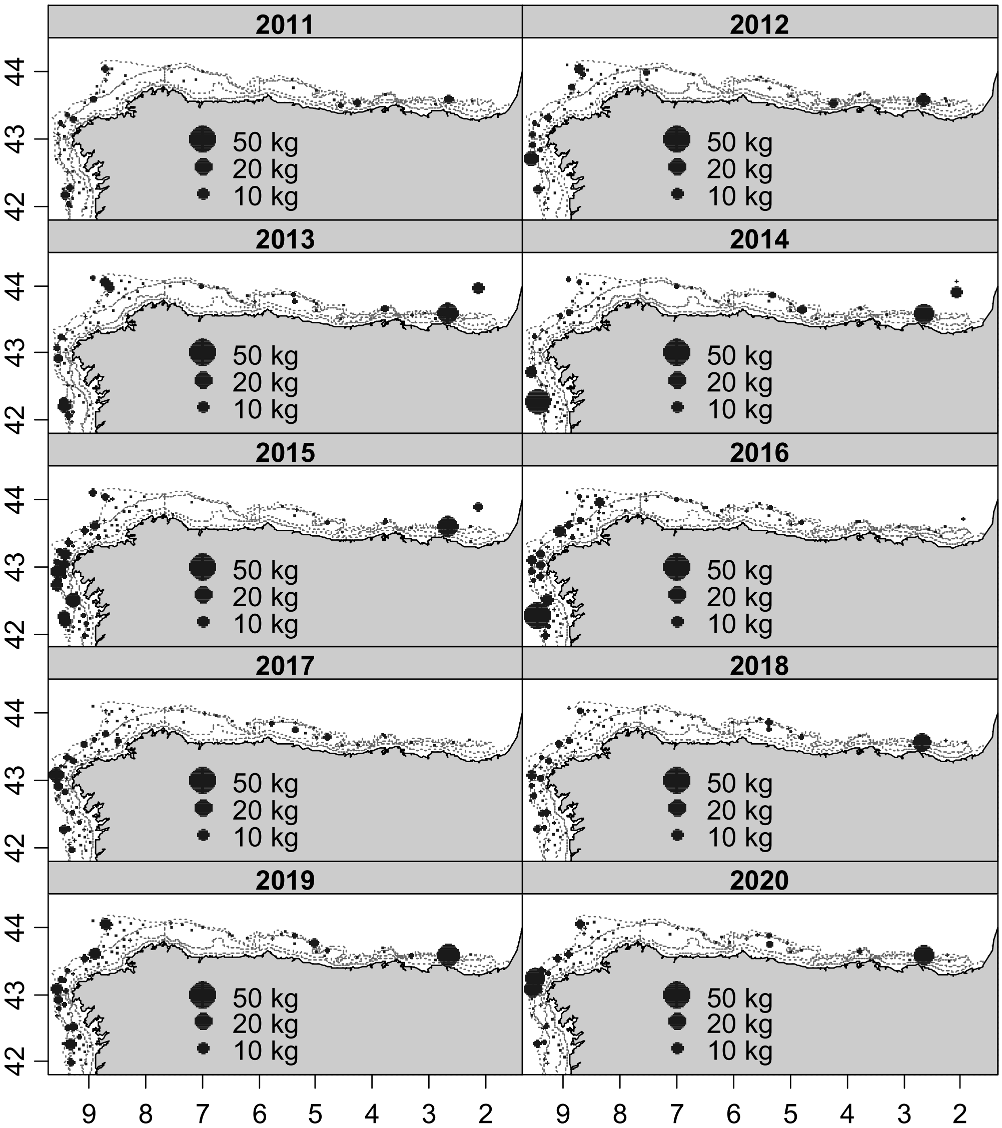

Figure 15 Geographic distribution of *Helicolenus dactyloperus* catches (kg·haul^{-1}) in the Northern Spanish Shelf bottom trawl surveys in the last decade

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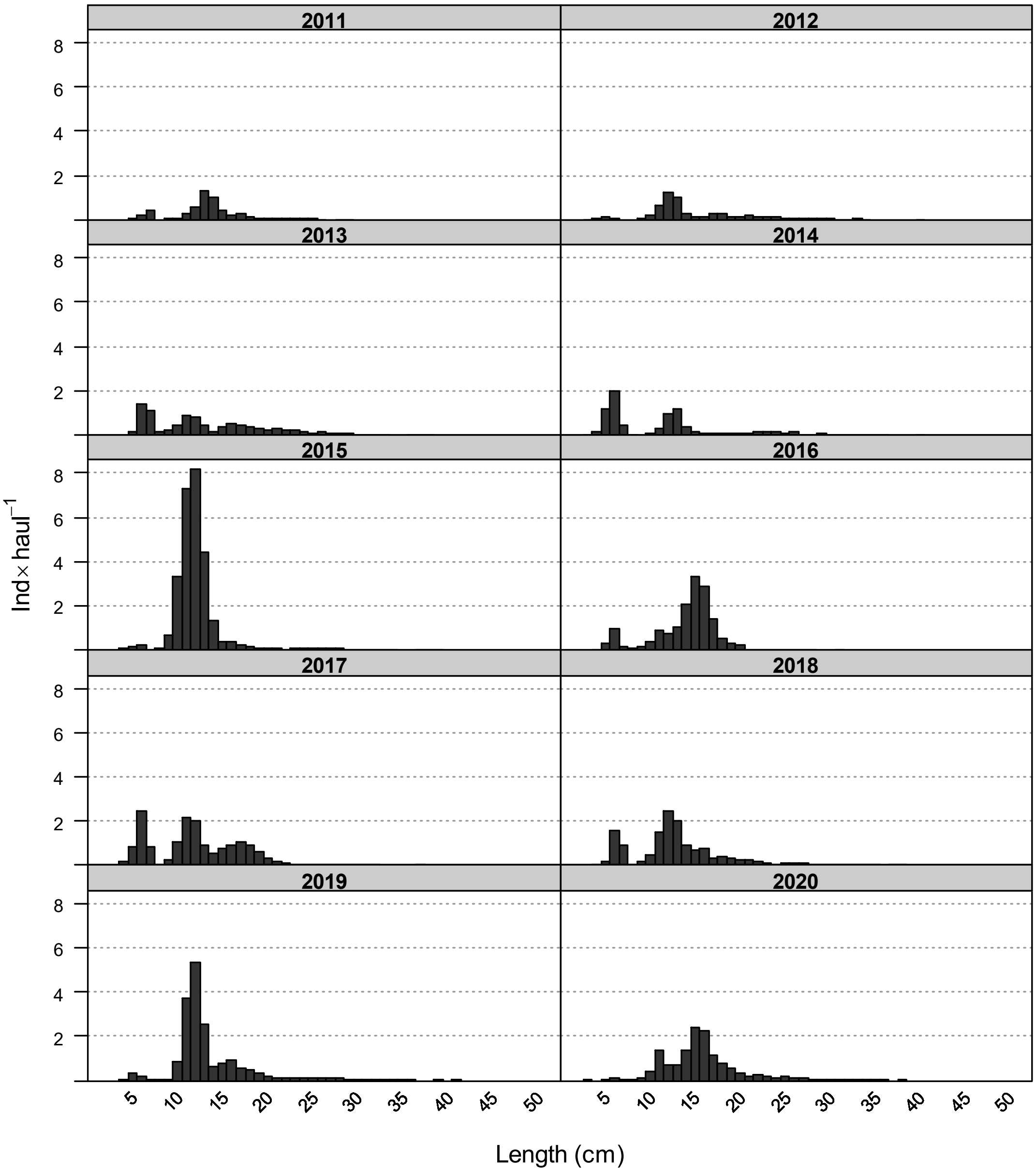

Figure 16 Mean stratified length distributions of *Helicolenus dactyloperus* in Northern Spanish Shelf surveys in the last decade

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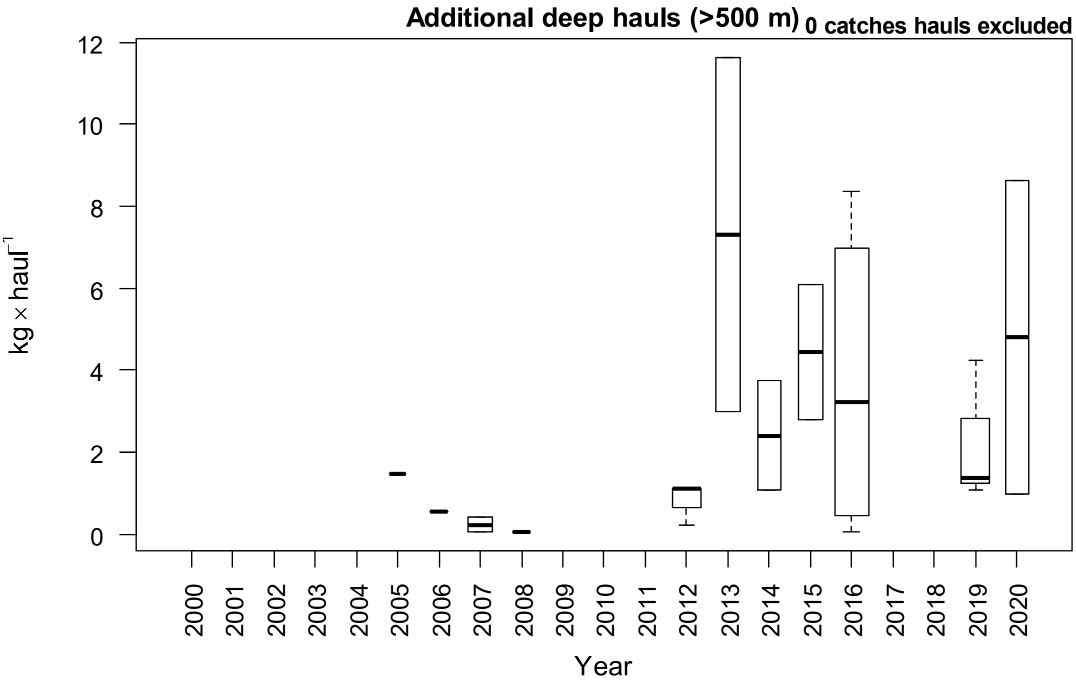

Figure 17 Evolution of *Aphanopus carbo* biomass in additional deep hauls during the North Spanish shelf bottom trawl survey time series. Boxplots represent the median and interquartiles of the biomass catches in the deep hauls performed.

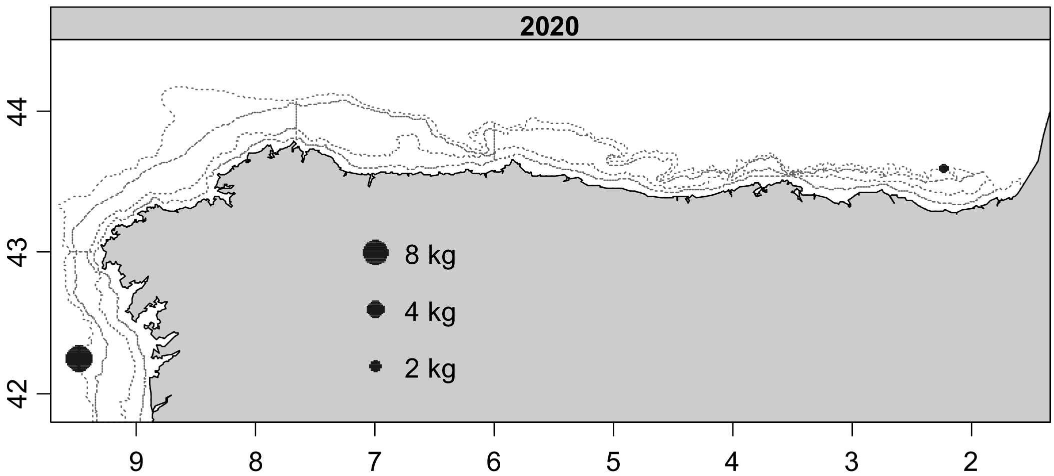

Figure 18 Geographic distribution of *Aphanopus carbo* catches (kg·haul^{-1}) in the Northern Spanish Shelf bottom trawl survey 2020

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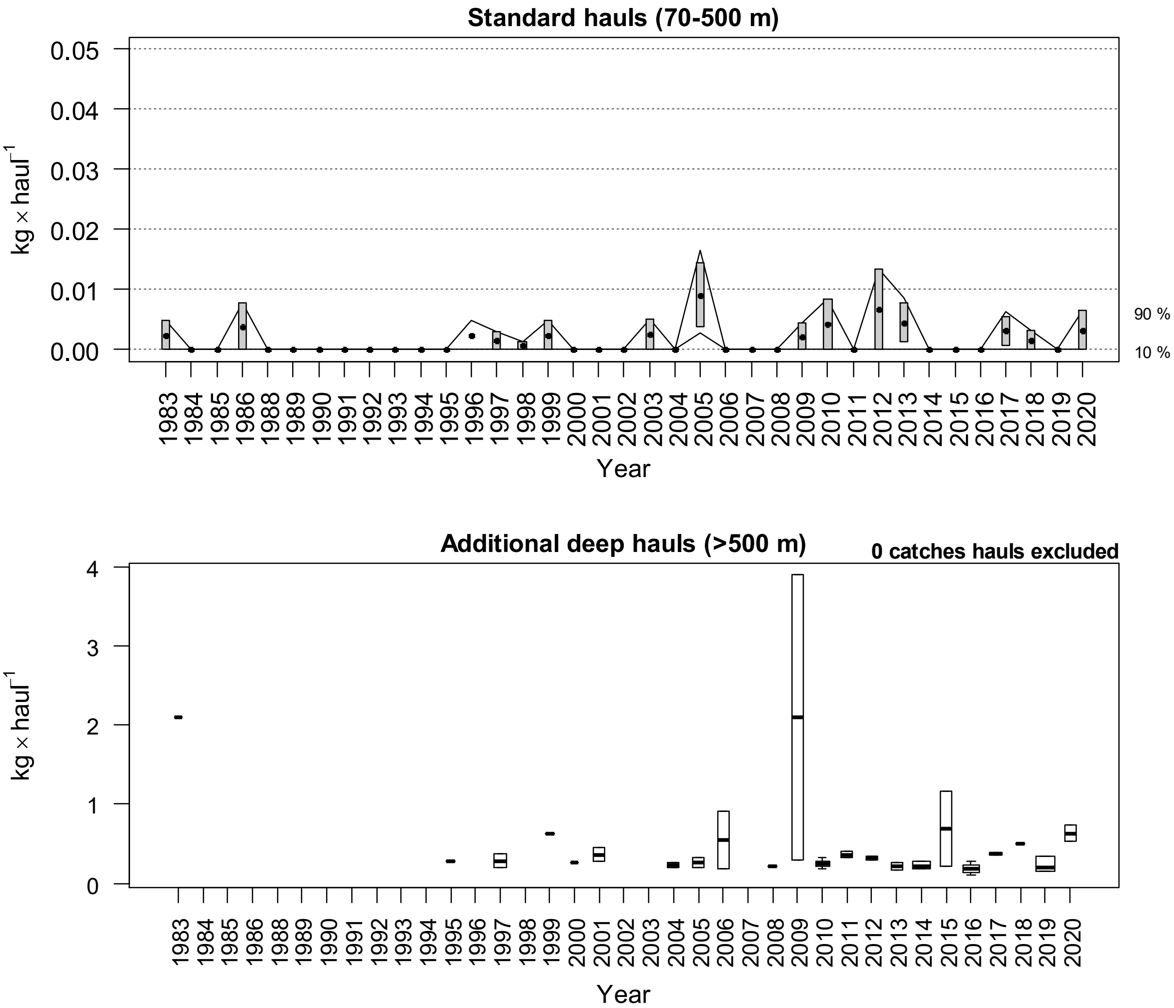

Figure 19 Evolution of *Beryx spp.* stratified biomass index in standard hauls and additional deep hauls during the North Spanish shelf bottom trawl survey time series. For the standard hauls boxes mark parametric standard error of the stratified biomass index. Lines mark bootstrap confidence intervals (α= 0.80, bootstrap iterations = 1000). For the additional deep water hauls boxplots represent the median and interquartiles of the biomass catches in the deep hauls performed.

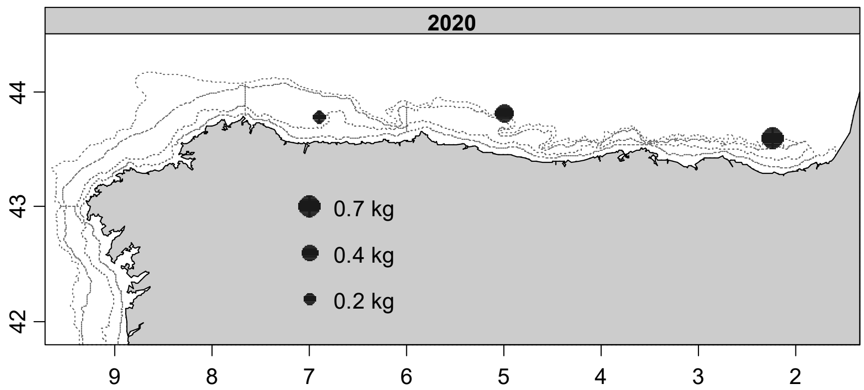

Figure 20 Geographic distribution of *Beryx* spp. catches (kg•haul-1) in the Northern Spanish Shelf bottom trawl survey 2020

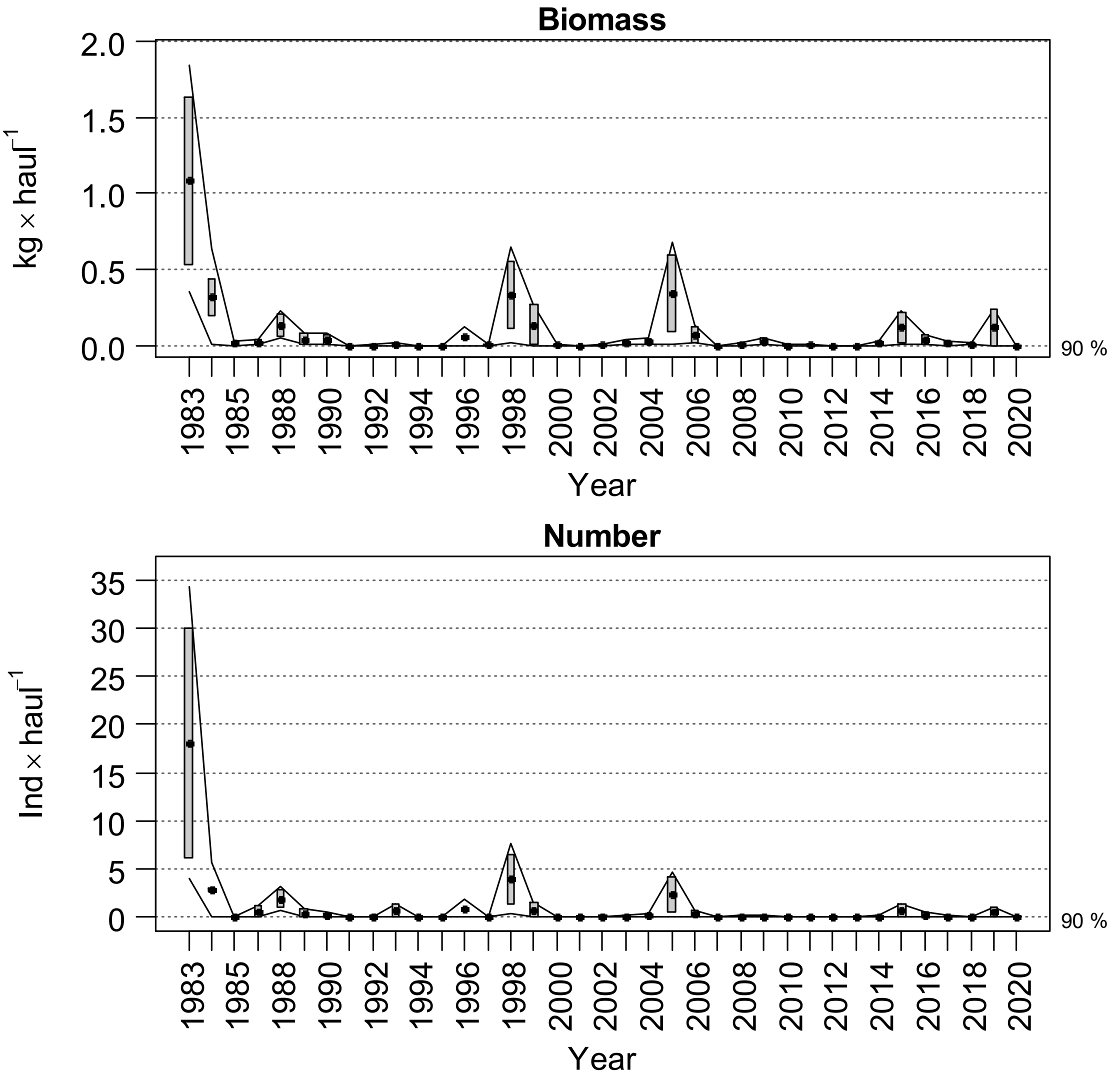

Figure 21 Evolution of *Pagellus bogaraveo* mean stratified biomass and abundance in Northern Spanish Shelf surveys time series. Boxes mark parametric standard error of the stratified biomass index. Lines mark bootstrap confidence intervals (α= 0.80, bootstrap iterations = 1000)

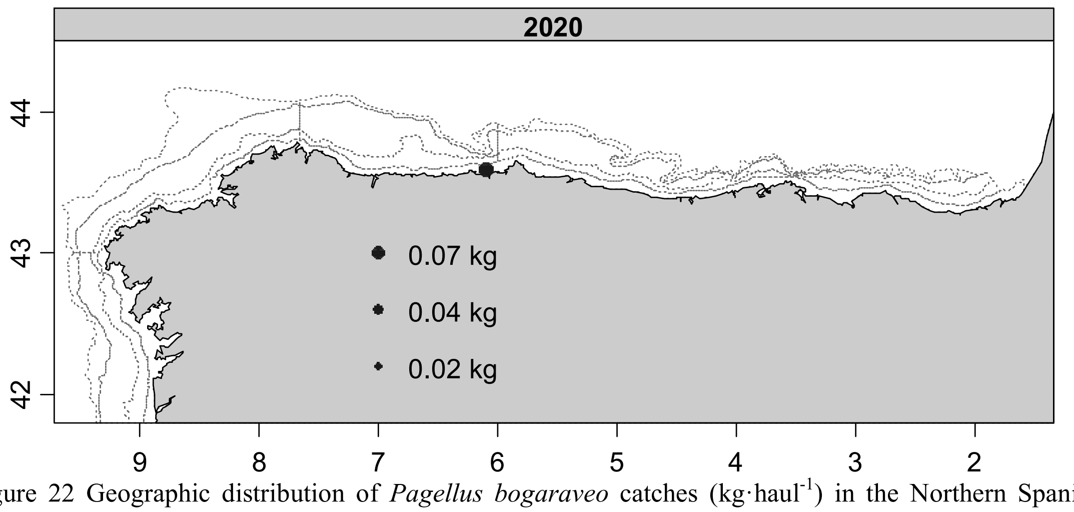

Figure 22 Geographic distribution of *Pagellus bogaraveo* catches (kg·haul^{-1}) in the Northern Spanish Shelf bottom trawl survey 2020

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