

Acoustic assessment and distribution of the main pelagic fish species in ICES Subdivision 9a South during the *ECOCADIZ-RECLUTAS 2019-10* Spanish survey (October 2019).

By

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ABSTRACT

The present working document summarises the main results obtained during the *ECOCADIZ-RECLUTAS 2019-10* Spanish (pelagic ecosystem-) acoustic survey. The survey was conducted by IEO between 10th and 30th October 2019 in the Portuguese and Spanish shelf waters (20-200 m isobaths) off the Gulf of Cadiz onboard the R/V *Ramón Margalef*. The survey's main objective is the acoustic assessment of anchovy and sardine juveniles (age 0 fish) in the recruitment areas of the Gulf of Cadiz. The 21 foreseen acoustic transects were sampled. A total of 25 valid fishing hauls were carried out for echo-trace ground-truthing purposes. From the pelagic fish species set, anchovy and chub mackerel were the most frequent species in those hauls, followed by horse mackerel, mackerel and sardine. Anchovy abundance and biomass were of 5518 million fish and 48 398 t. The abundance and biomass of age-0 anchovies were estimated at 4845 million fish and 36 405 t, 88% and 75% of the total population abundance and biomass, respectively. These estimates suggest a recent increase in relation to previous years (the 2019 juveniles estimate is the maximum record in terms of biomass and the second maximum in terms of abundance). The estimates for Gulf of Cadiz sardine in the surveyed area were of 937 million fish and 36 465 t and they were either close to (abundance) or above (biomass) their respective historical means. Estimates of age-0 sardine were of 384 million fish and 7858 t, 41% and 22% of the total estimated abundance and biomass, and both estimates were well below the historical mean.

INTRODUCTION

The first attempt by the IEO of acoustically assessing the abundance of anchovy and sardine juveniles in their main recruitment areas off the Gulf of Cadiz dates back to 2009 (*ECOCADIZ-RECLUTAS 1009* survey). However, that survey was unsuccessful as to the achievement of their objectives because of the succession of a series of unforeseen problems which led to drastically reduce the foreseen sampling area to only the 6 easternmost transects. The continuation of this survey series was not guaranteed for next years and, in fact, no survey of these characteristics was carried out in 2010 and 2011. In 2012, the *ECOCADIZ-RECLUTAS 1112* survey was financed by the Spanish Fisheries Secretariat and planned and conducted by the IEO with the aim of obtaining an autumn estimate of Gulf of Cadiz anchovy biomass and abundance. The survey was conducted with the R/V *Emma Bardán*. Although the survey was restricted to the Spanish waters only it has been considered as the first survey within its series (Ramos *et al.*, 2013). *ECOCADIZ-RECLUTAS 2014-10* restarted the series and it was conducted with the R/V *Ramón Margalef*. The 2017 survey should be the fifth survey within its series. However, an unexpected a serious breakdown of the vessel's propulsion system led to an early termination of the survey, which restricted the surveyed area to the one comprised by the seven easternmost transects only.

The general objective of these surveys is the acoustic assessment by vertical echo-integration and mapping of the abundance and biomass of recruits of small pelagic species (especially anchovy and sardine), as well as the mapping of both the oceanographic and biological conditions featuring the recruitment areas of these species in the Division 9a. The long term objective of the surveys would be to be able to assess the strength of the incoming recruitment to the fishery of these species the next year.

The present Working Document reports the main results from the *ECOCADIZ-RECLUTAS 2019-10* survey, namely the acoustic estimates of abundance and biomass (age-structured for anchovy, sardine and chub mackerel) and the spatial distribution of the assessed species.

MATERIAL AND METHODS

The *ECOCADIZ-RECLUTAS 2019-10* survey was conducted between 10th and 30th October 2019 onboard the Spanish R/V *Ramón Margalef* covering a survey area which comprised the waters of the Gulf of Cadiz, both Spanish and Portuguese, between the 20 m and 200 m isobaths. The survey design consisted in a systematic parallel grid with tracks equally spaced by 8 nm, normal to the shoreline (**Figure 1**).

Echo-integration was carried out with a recently installed *Simrad™ EK80* echo-sounder working in the multi-frequency fashion (18, 38, 70, 120, 200, 333 kHz) and in CW mode. Average survey speed was about 10 knots and the acoustic signals were integrated over 1-nm intervals (ESDU). Raw acoustic data were stored for further post-processing using *Myriax Software Echoview™* software package (by *Myriax Software Pty. Ltd.*, ex *SonarData Pty. Ltd.*). Acoustic equipment was calibrated between 11st and 16th October in the Bay of Algeciras following the new ICES standard procedures (Demer *et al.*, 2015; see also Foote *et al.*, 1987).

Survey execution and abundance estimation followed the methodologies firstly adopted by the ICES *Planning Group for Acoustic Surveys in ICES Sub-Areas VIII and IX* (ICES, 1998) and the recommendations given later by the *Working Group on Acoustic and Egg Surveys for Sardine and Anchovy in ICES areas VIII and IX* (WGACEGG; ICES, 2006a,b).

Fishing stations for echo-trace ground-truthing were opportunistic, according to the echogram information, and they were carried out using a *Gloria HOD 352* pelagic trawl gear (ca. 10 m-mean vertical opening net) at an average speed of 4-4.5 knots. Gear performance and geometry during the effective fishing was monitored with *Simrad™ Mesotech FS20/25* trawl sonar. Trawl sonar data from each haul were recorded and stored for further analyses.

Ground-truthing haul samples provided biological data on species and they were also used to identify fish species and to allocate the back-scattering values into fish species according to the proportions found at the fishing stations (Nakken and Dommasnes, 1975).

Length frequency distributions (LFD) by 0.5-cm class were obtained for all the fish species in trawl samples (either from the total catch or from a representative random sample of 100-200 fish). Only those LFDs based on a minimum of 30 individuals and showing a normal distribution were considered for the purpose of the acoustic assessment.

Individual biological sampling (length, weight, sex, maturity stage, stomach fullness, and mesenteric fat content) was performed in each haul for anchovy, sardine, mackerel (2 spp.) and horse-mackerel species (3 spp.), and bogue. Otoliths were extracted from anchovy, sardine and chub mackerel sampled specimens.

The following TS/length relationship table was used for acoustic estimation of assessed species (recent IEO standards after ICES, 1998; and recommendations by ICES, 2006a,b):

Species	b_{20}
Sardine (<i>Sardina pilchardus</i>)	-72.6
Round sardinella (<i>Sardinella aurita</i>)	-72.6
Anchovy (<i>Engraulis encrasicolus</i>)	-72.6
Chub mackerel (<i>Scomber japonicus</i>)	-68.7
Mackerel (<i>S. scombrus</i>)	-84.9
Horse mackerel (<i>Trachurus trachurus</i>)	-68.7
Mediterranean horse-mackerel (<i>T. mediterraneus</i>)	-68.7
Blue jack mackerel (<i>T. picturatus</i>)	-68.7
Bogue (<i>Boops boops</i>)	-67.0
Transparent goby (<i>Aphia minuta</i>)	-67.5
Atlantic pomfret (<i>Brama brama</i>)	-67.5
Blue whiting (<i>Micromesistius poutassou</i>)	-67.5
Silvery lightfish/pearlside (<i>Maurolicus muelleri</i>)	-72.2
Longspine snipefish (<i>Macroramphosus scolopax</i>)	-80.0
Boarfish (<i>Capros aper</i>)	-66.2* (-72.6)

*Boarfish b_{20} estimate following to Fässler *et al.* (2013). Between parentheses the usual IEO value considered in previous surveys.

The *PESMA* software (J. Miquel, IEO, unpublished) has got implemented the needed procedures and routines for the acoustic assessment following the above approach and it has been the software package used for the acoustic estimation.

A *Sea-bird Electronics™ SBE 21 SEACAT* thermosalinograph and a *Turner™ 10 AU 005 CE Field* fluorometer were used during the acoustic tracking to continuously collect some hydrographical variables (sub-surface sea temperature, salinity, and *in vivo* fluorescence). Vertical profiles of hydrographical variables were also recorded by night from 181 CTD_{O₂} casts using a *Sea-bird Electronics™ SBE 911+ SEACAT* (with coupled *Datasonics* altimeter, *SBE 43* oximeter, *WetLabs ECO-FL-NTU* fluorimeter and *WetLabs C-Star 25 cm* transmissometer sensors) profiler (**Figure 2**). *VMADCP RDI 150 kHz* records were also continuously recorded by night between CTD stations. Census of top predators was not recorded during the survey.

RESULTS

Acoustic sampling

The acoustic sampling was restricted to the period comprised between 16th and 28th October. The complete grid (21 transects) was acoustically sampled (**Table 1; Figure 1**). The sampling scheme followed to accomplish this grid was conditioned by the conduction of OTAN naval exercises during the survey. Thus, the acoustic sampling started by the coastal end of the transect R01 on 16th October and proceeded westward up to the R06 on 20th October. The acoustic sampling was previously interrupted on 18-19th October in order to satisfy the R/V's refueling and provisioning needs. The second leg proceeded between 20st and 28th October. Aiming at avoiding the naval exercises, on 21th October the acoustic sampling started by the R09, followed by the R10, whereas on 22th the RA07 was the first sampled transect, followed by the R08. In order to perform the acoustic sampling with daylight, this sampling started at 06:45-07:00 UTC, although this time might vary depending on the duration of the works related with the hydrographic sampling the previous night.

Groundtruthing hauls

A total of twenty six (26) fishing operations for echo-trace ground-truthing (25 of them were valid according to a correct gear performance and resulting catches), were carried out during the survey (**Table 2, Figure 3**). The pelagic trawl gear initially utilized had to be replaced after the trawl PE03 by other gear of

similar characteristics because a serious gear breaking caused by a snagging with the bottom during that haul. Because of many echo-traces usually occurred close to the bottom, all the pelagic hauls but PE04 (a pelagic haul *sensu stricto*) were carried out like a bottom-trawl haul, with the ground rope working over or very close to the bottom. According to the above, the sampled depth range in the valid hauls oscillated between 33 and 135 m.

During the survey were captured 2 Chondrichthyan, 32 Osteichthyes, 1 Crustacean, 7 Cephalopod, 1 Echinoderm, and 1 Cnidarian species. The percentage of occurrence of the more frequent fish species (sharks excluded) in the hauls is shown in the enclosed Text Table below (see also **Figure 4**). The pelagic ichthyofauna was both the most frequently captured species set and the one composing the bulk of the overall yields of the catches. Within this pelagic fish species set, anchovy and chub mackerel were the most frequent species in the valid hauls (76% and 72% presence index), followed by horse mackerel (60%), mackerel and sardine (56% each), Mediterranean horse mackerel (36%), blue jack mackerel (28%), and bogue (24%). Round sardinella, Atlantic pomfret, pearlside, boarfish and snipefish showed either a low or an incidental occurrence in the hauls performed in the surveyed area.

For the purposes of the acoustic assessment, anchovy, sardine, mackerel species, horse & jack mackerel species, bogue, Atlantic pomfret, boarfish, snipefish and pearlside were initially considered as the survey target species. All the invertebrates, skates, rays and benthic fish species were excluded from the computation of the total catches in weight and in number from those fishing stations where they occurred. Catches of the remaining non-target fish species were included in an operational category termed as "Others".

According to the above premises, during the survey were captured a total of 12 717 kg and 371 thousand fish (**Table 3**). Thirty eight per cent (38%) of this "total" fished biomass corresponded to chub mackerel, 26% to sardine, 21% to anchovy, 8% to Atlantic pomfret, 4% to blue jack mackerel, and contributions lower than 1% for the remaining species. The most abundant species in ground-truthing trawl hauls was anchovy (65%), followed by sardine and chub mackerel (18% and 14%, respectively), with each of the remaining species accounting for equal to or less than 1%.

Species	# of fishing stations	Occurrence (%)	Total weight (kg)	Total number
<i>Merluccius merluccius</i>	23	92	19,37	161
<i>Engraulis encrasicolus</i>	19	76	2674,673	240807
<i>Scomber colias</i>	18	72	4857,623	53205
<i>Trachurus trachurus</i>	15	60	18,771	439
<i>Scomber scombrus</i>	14	56	30,325	281
<i>Sardina pilchardus</i>	14	56	3348,456	66976
<i>Trachurus mediterraneus</i>	9	36	82,201	270
<i>Pagellus erythrinus</i>	8	32	5,519	37
<i>Spondylisoma cantharus</i>	7	28	22,893	126
<i>Trachurus picturatus</i>	7	28	480,541	3985
<i>Boops boops</i>	6	24	5,833	46
<i>Diplodus vulgaris</i>	5	20	29,877	167
<i>Brama brama</i>	4	16	1023,305	1481
<i>Lepidopus caudatus</i>	4	16	0,173	12
<i>Serranus hepatus</i>	3	12	0,063	4
<i>Pagellus acarne</i>	3	12	3,400	20
<i>Diplodus annularis</i>	3	12	1,183	21
<i>Maurolicus muelleri</i>	2	8	0,024	14
<i>Macroramphosus scolopax</i>	2	8	1,084	88
<i>Capros aper</i>	2	8	24,080	2411
<i>Stromateus fiatola</i>	2	8	17,923	33
<i>Aphia minuta</i>	2	8	0,003	6
<i>Diplodus bellottii</i>	2	8	0,775	9
<i>Arnoglossus laterna</i>	1	4	0,039	2
<i>Citharus linguatula</i>	1	4	0,041	1
<i>Cepola macrophthalma</i>	1	4	0,179	2
<i>Spicara flexuosa</i>	1	4	0,101	2
<i>Sardinella aurita</i>	1	4	0,48	2
<i>Mullus barbatus</i>	1	4	0,225	2
<i>Sarda sarda</i>	1	4	1,34	1
<i>Spicara smaris</i>	1	4	0,217	3
<i>Trachinotus ovatus</i>	1	4	0,34	1

The species composition of these fishing hauls (as expressed in terms of percentages in number) is shown in **Figure 4**.

Back-scattering energy attributed to the “pelagic assemblage” and individual species

A total of 310 nmi (ESDU) from 21 transects has been acoustically sampled by echo-integration for assessment purposes. The enclosed text table below provides the nautical area-scattering coefficients attributed to each of the selected target species and for the whole “pelagic fish assemblage”.

S_A 2 ($m^2 nmi^{-2}$)	Total spp.	PIL	ANE	MAC	VAM	HOM	HMM	JAA	BOG	POA
Total Area (%)	149941 (100,0)	22427 (15,0)	65266 (43,5)	8 (0,01)	34331 (22,9)	579 (0,4)	15335 (10,2)	1678 (1,1)	158 (0,1)	3166 (2,1)
Portugal (%)	71975 (48,0)	17624 (78,6)	16960 (26,0)	7 (87,5)	33846 (98,6)	423 (73,1)	180 (1,2)	1645 (98,0)	81 (51,3)	0 (0,0)
Spain (%)	77966 (52,0)	4802 (21,4)	48307 (74,0)	1 (12,5)	485 (1,4)	156 (26,9)	15155 (988)	32 (1,9)	78 (49,4)	3166 (100)

S_A 2 ($m^2 nmi^{-2}$)	BOC	SNS	MAV
Total Area (%)	202 (0,1)	21 (0,01)	6769 (4,5)
Portugal (%)	202 (100)	21 (100)	985 (14,6)
Spain (%)	0 (0,0)	0 (0,0)	5784 (85,4)

For this “pelagic fish assemblage” has been estimated a total of 149 941 $m^2 nmi^{-2}$. The highest NASC value was recorded in the mid-shelf waters (80 m) in front of Portimão (transect R19, **Figure 5**). By species, anchovy accounted for 44% of this total back-scattered energy, followed by chub mackerel (23%), sardine (15%) and Mediterranean horse mackerel (10%), and the remaining species with relative contributions of acoustic energies lower than 5%.

According to the resulting values of integrated acoustic energy and the availability and representativeness of the length frequency distributions, the species acoustically assessed in the present survey finally were anchovy, sardine, mackerel, chub mackerel, blue jack mackerel, horse mackerel, Mediterranean horse mackerel, bogue, Atlantic pomfret, boarfish, snipefish and pearlside.

Spatial distribution and abundance/biomass estimates

Anchovy

Parameters of the survey’s length-weight relationship for anchovy are given in **Table 4**. Size composition and mean size in the fishing hauls are represented in the spatial context in **Figure 6**. The mapping of the backscattering energy (nautical area scattering coefficient, *NASC*, in $m^2 nmi^{-2}$) attributed to the species and the coherent strata considered for the acoustic estimation are shown in **Figure 7**. The estimated abundance and biomass by size and age class are given in **Tables 5** and **6** and **Figures 8** and **9**.

The spatial pattern of distribution of the acoustic density was characterized by a concentration of the bulk of the population practically all over the shelf between Alfanzinha (west of Cape Santa Maria) and Bay of Cadiz (**Figure 7**). The size composition of anchovy catches indicates that smallest recruits occurred mainly in the Spanish coastal waters (**Figure 6**).

Gulf of Cadiz anchovy abundance and biomass in autumn 2019 were of 5 518 million fish and 48 398 t. Spanish waters concentrated 78% (4 301 million) and 67% (32 309 t) of the total estimated abundance and biomass respectively. Portuguese estimates amounted to 1 217 million and 16 089 t (**Table 5, Figure 8**).

The size range recorded for the estimated population was comprised between 8.0 and 19.0 cm size classes, with a marked mode at the 10.0 cm size class (**Table 5, Figure 8**). The mean size and weight of the

estimated population were 11.1 cm and 8.8 g, respectively. The anchovy size composition by coherent post-strata in the surveyed area evidences that juveniles were widely distributed in the coastal-inner shelf waters between the Guadiana river mouth and Chipiona-Rota area, with the coastal area comprised between Guadiana and Guadalquivir rivers being the area where the highest densities of anchovy juveniles were recorded (**Table 5, Figure 8**).

The population was composed by the age groups 0 to 2. Age 0 was the dominant age group (88% of total abundance and 75% of the total biomass: 4845 million, 36 405 t), followed by 1-year olds (563 million, 10%; 9307 t, 19%). Spanish waters concentrated 84% of age-0 fish (4082 million, 29 792 t), whereas the Portuguese ones recorded the remaining 16% of the recruits' population (763 million, 6613 t), (**Table 6, Figure 9**).

Sardine

Parameters of the survey's size-weight relationship for sardine are shown in **Table 4**. Size composition and mean size in the fishing hauls are represented in the spatial context in **Figure 10**. The mapping of the backscattering energy (nautical area scattering coefficient, *NASC*, in $\text{m}^2 \text{nmi}^{-2}$) attributed to the species and the coherent strata considered for the acoustic estimation are shown in **Figure 11**. Estimated abundance and biomass by size and age class are given in **Tables 8 and 9**, and **Figures 12 and 13**.

Sardine was widely distributed all over the surveyed area, although the highest acoustic densities were recorded in Portuguese waters (**Figure 11**). The sardine size composition in the positive hauls indicates that juveniles were mainly distributed in the Spanish coastal waters between Guadiana river mouth and Bay of Cadiz (**Figure 10**).

Sardine abundance and biomass in the surveyed area were of 937 million fish and 36 465 t (**Table 8, Figure 12**). Portuguese waters concentrated 67% (629 million) and 85% (30 877 t) of the total estimated abundance and biomass, respectively. Estimates from Spanish waters amounted to 308 million and 5 588 t (**Table 8, Figure 12**).

The size range recorded for the estimated population was comprised between 9.5 and 23.0 cm size classes, with a dominant mode at 17.0 cm size class and a secondary one at 13.5 cm (**Table 8, Figure 12**). The mean size and weight of the estimated population were 16.0 cm and 38.9 g, respectively. The sardine size and age composition by coherent post-strata in the surveyed area confirm that juveniles were widely distributed and more abundant in the coastal-inner shelf waters between the Guadiana river mouth and Bay of Cadiz (**Tables 8 and 9, Figures 12 and 13**).

The population was composed by the age groups 0 to 5. Age 1 was the dominant age group (45% of total abundance and 54% of the total biomass: 424 million, 19 656 t), followed by 0 olds. The age-0 population fraction in the surveyed area was estimated at 384 million fish and 7 858 t, 41% and 22% of the total estimated abundance and biomass, respectively. Spanish waters concentrated 76% of age-0 fish (290 million, 4 993 t), whereas the Portuguese ones recorded the remaining 24% of the recruits' population (94 million, 2 865 t), (**Table 9, Figure 13**).

Mackerel

Parameters of the survey's length-weight relationship are shown in **Table 4**. Size composition and mean size in the fishing hauls are represented in the spatial context in **Figure 14**. The mapping of the backscattering energy (nautical area scattering coefficient, *NASC*, in $\text{m}^2 \text{nmi}^{-2}$) attributed to the species and the coherent strata considered for the acoustic estimation are shown in **Figure 15**. Estimated abundance and biomass by size class are given in **Table 11 and Figure 16**.

Mackerel was absent in the easternmost waters and was distributed over the shelf waters comprised between Portimão and Punta Umbría, with the relatively highest densities being located in the Portuguese waters (**Figure 15**). The mackerel size composition in the positive hauls does not indicate any clear trend either in the latitudinal or bathymetric gradients (**Figure 14**).

Mackerel abundance and biomass in the surveyed area were estimated at about 3 million fish and 261 t (**Table 11, Figure 16**). Eighty eight per cent (88%) of both total abundance and biomass were estimated in the Portuguese waters (2.7 million; 230 t). Spanish waters yielded a population of 0.4 million and 31 t.

The size range recorded for the estimated population was comprised between 20.5 and 34.5 cm size classes, with a dominant mode at 22.0 cm size class. A similar size composition is also recorded for the estimated biomass (**Table 11, Figure 16**).

Chub mackerel

Parameters of the survey's length-weight relationship are shown in **Table 4**. Size composition and mean size in the fishing hauls are represented in the spatial context in **Figure 17**. The mapping of the backscattering energy (nautical area scattering coefficient, *NASC*, in $\text{m}^2 \text{nmi}^{-2}$) attributed to the species and the coherent strata considered for the acoustic estimation are shown in **Figure 18**. Estimated abundance and biomass by size and age class are given in **Tables 12 and 13** and **Figures 19 and 20**.

Chub mackerel, although widely distributed, showed, however, a relatively scattered distribution in Spanish waters. The highest integration values were recorded between Cape San Vicente and Cape Santa Maria, in the western Algarve (**Figure 18**). Size composition in the species' positive hauls indicates that juvenile/sub-adult fish mainly occurred in the Portuguese westernmost shelf waters of the surveyed area whereas larger fish were distributed in shallower waters between Punta Umbría and Matalascañas (**Figure 17**).

Chub mackerel abundance and biomass in the surveyed area were of 367 million fish and 26 212 t (**Table 12, Figure 19**). Portuguese waters accounted for 99% (363 million) and 98% (25 782 t) of the total abundance and biomass, respectively. Spanish waters yielded a population of only 4 million and 430 t.

The size range recorded for the estimated population was comprised between 17.5 and 27.0 cm size classes, with a dominant mode at 20.0 cm size class. A rather similar size composition is also recorded for the estimated biomass (**Table 12, Figure 19**). Portuguese and Spanish waters hosted very contrasted fractions of the population in terms of size composition, with larger fish being recorded in Spanish waters (mode at 22.5 cm vs mode at 20.0 cm size class in Spanish waters).

The population was structured by the age groups 0 to 3. Age 1 was the dominant age group (67% of total abundance and biomass: 245 million, 17 655 t). The age-0 population fraction in the surveyed area was estimated at 88 million fish and 5 265 t, 24% and 20% of the total estimated abundance and biomass, respectively. Portuguese waters concentrated 99.8% of age-0 fish (88 million, 5 254 t), whereas the Spanish ones recorded the remaining 0.2% of the recruits' population (0.1 million, 11 t), (**Table 13, Figure 20**).

Horse mackerel

The survey's length-weight relationship for this species is shown in **Table 4**. Size composition and mean size in the fishing hauls are represented in the spatial context in **Figure 21**. The mapping of the backscattering energy (nautical area scattering coefficient, *NASC*, in $\text{m}^2 \text{nmi}^{-2}$) attributed to the species and the coherent strata considered for the acoustic estimation are shown in **Figure 22**. Estimated abundance and biomass by size class are given in **Table 15** and **Figure 23**.

The species showed a scattered distribution with a scarce occurrence in the easternmost third of the surveyed area and the highest densities in the Portuguese waters (**Figure 22**). Size composition in the species' positive hauls seems to suggest the localisation of larger specimens in the outer shelf of the western Algarve waters, whereas spots of juvenile fish are mainly located in Spanish waters (**Figure 21**).

Horse mackerel abundance and biomass in the surveyed area were of 32 million fish and 335 t (**Table 15**, **Figure 23**). Portuguese waters accounted for 61% (19 million) and 79% (264 t) of the total abundance and biomass, respectively. Spanish waters yielded a population of 13 million and 21 t.

The size range recorded for the estimated population was comprised between 3.5 and 27.5 cm size classes, with a dominant mode at 6.5 cm size class, a secondary mode at 18.0 cm and a third mode at 25.5 cm size class. A rather similar size composition is also recorded for the estimated biomass, although in this case those modes corresponding to larger sizes were the dominant ones (**Table 15**, **Figure 23**).

Mediterranean horse-mackerel

The survey's length-weight relationship for this species is shown in **Table 4**. Size composition and mean size in the fishing hauls are represented in the spatial context in **Figure 24**. The mapping of the backscattering energy (nautical area scattering coefficient, *NASC*, in $\text{m}^2 \text{nmi}^{-2}$) attributed to the species and the coherent strata considered for the acoustic estimation are shown in **Figure 25**. Estimated abundance and biomass by size class are given in **Table 16** and **Figure 26**.

The species was mainly distributed over the inner-middle shelf of the Spanish waters, especially in the easternmost waters, although a residual nucleus was also recorded west of Cape Santa Maria, in the western Algarve (**Figure 25**). Size composition in the species' positive hauls shows that the largest specimens were located in the outer shelf of the easternmost waters of the surveyed area, whereas the rest of the surveyed area is frequented by smaller but adult fish. Some incidental spots of juvenile fish were recorded in front of the Matalascañas area (**Figure 24**).

Mediterranean horse mackerel abundance and biomass in the surveyed area were of 55 million fish and 19 307 t (**Table 16**, **Figure 26**). Spanish waters accounted for 99% of both the total abundance (54 million) and biomass (19 050 t), respectively. Portuguese waters yielded a population of 1 million and 258 t.

The size range recorded for the estimated population was comprised between 29.0 and 42.0 cm size classes, with a main mode at 31.0 cm and a secondary one at 37.0 cm. About the same modal classes but with reversed relative importance were also recorded in the distribution of the estimated biomass by size class (**Table 16**, **Figure 26**).

Blue jack mackerel

The survey's length-weight relationship for this species is shown in **Table 4**. Size composition and mean size in the fishing hauls are represented in the spatial context in **Figure 27**. The mapping of the backscattering energy (nautical area scattering coefficient, *NASC*, in $\text{m}^2 \text{nmi}^{-2}$) attributed to the species and

the coherent strata considered for the acoustic estimation are shown in **Figure 28**. Estimated abundance and biomass by size class are given in **Table 17** and **Figure 29**.

The species was mainly distributed over the Portuguese shelf between Portimão and Tavira, although a residual nucleus was also recorded in the easternmost Spanish waters (**Figure 28**). Size composition in the species' positive hauls shows that the largest specimens were located in the outer shelf of easternmost waters of the surveyed area, whereas the rest of the positive area is frequented by sub-adult and adult fish (**Figure 27**).

Blue jack mackerel abundance and biomass in the surveyed area were of 17 million fish and 1 422 t (**Table 17, Figure 29**). Portuguese waters accounted for more than 97% of both the total abundance (17 million) and biomass (1 387 t), respectively. Spanish waters yielded a population of 0.4 million and 36 t.

The size range recorded for the estimated population was comprised between 14.5 and 25.0 cm size classes, with a main mode at 22.0 cm and a secondary one at 16.5 cm. The same modal classes and relative importance were also recorded in the distribution of the estimated biomass by size class (**Table 17, Figure 29**).

Bogue

The survey's length-weight relationship for this species is shown in **Table 4**. Size composition and mean size in the fishing hauls are represented in the spatial context in **Figure 30**. The mapping of the backscattering energy (nautical area scattering coefficient, *NASC*, in $\text{m}^2 \text{nmi}^{-2}$) attributed to the species and the coherent strata considered for the acoustic estimation are shown in **Figure 31**. Estimated abundance and biomass by size class are given in **Table 18** and **Figure 32**.

The species was restricted to the central and western waters of the surveyed area, where showed a scattered distribution all over the shelf, with several spots of high acoustic density (**Figure 31**). Size composition in the species' positive hauls shows that larger specimens are located in the middle-outer shelf of the central waters of the surveyed area, whereas the rest of the positive area was frequented by smaller adult fish (**Figure 30**).

Bogue abundance and biomass in the surveyed area were less of 1 million fish and 117 t (**Table 18, Figure 32**). Portuguese and Spanish waters similarly contributed in the total abundance and biomass. Portuguese waters yielded 0.4 million fish and 55 t. Spanish waters yielded a population of 0.4 million and 62 t.

The size range recorded for the estimated population was comprised between 17.5 and 29.0 cm size classes, with a main mode at 24.0 cm and a secondary one at 21.5 cm. The same dominant modal classes were also recorded in the distribution of the estimated biomass by size class (**Table 18, Figure 32**).

Atlantic pomfret

The survey's length-weight relationship for this species is shown in **Table 4**. Size composition and mean size in the fishing hauls are represented in the spatial context in **Figure 33**. The mapping of the backscattering energy (nautical area scattering coefficient, *NASC*, in $\text{m}^2 \text{nmi}^{-2}$) attributed to the species and the coherent strata considered for the acoustic estimation are shown in **Figure 34**. Estimated abundance and biomass by size class are given in **Table 19** and **Figure 35**.

The species was recorded in a restricted area comprising the Spanish middle-outer shelf waters between the Guadalquivir river mouth and the Bay of Cadiz (**Figure 34**). Size composition in the species' positive hauls shows that larger specimens are occurred in shallower waters (**Figure 33**).

Pomfret abundance and biomass in the surveyed area were of 6 million fish and 4333 t (**Table 19, Figure 35**).

The size range recorded for the estimated population was comprised between 36.0 and 45.5 cm size classes, with a main mode at 41.5 cm. The same dominant modal class was also recorded in the distribution of the estimated biomass by size class (**Table 19, Figure 35**).

Boarfish

The survey's length-weight relationship for this species is shown in **Table 4**. Size composition and mean size in the fishing hauls are represented in the spatial context in **Figure 36**. The mapping of the backscattering energy (nautical area scattering coefficient, *NASC*, in $\text{m}^2 \text{nmi}^{-2}$) attributed to the species and the coherent strata considered for the acoustic estimation are shown in **Figure 37**. Estimated abundance and biomass by size class are given in **Table 20** and **Figure 38**.

The species was confined to a small area of the middle-outer shelf just to the west of Cape Santa María (**Figure 37**).

Boarfish abundance and biomass in the surveyed area were of 10 million fish and 99 t (**Table 20, Figure 38**).

The size range recorded for the estimated population was comprised between 6.0 and 13.0 cm size classes, with a main mode at 7.5 cm. The same dominant modal class was also recorded in the distribution of the estimated biomass by size class (**Table 20, Figures 36 and 38**).

Longspine snipefish

The survey's length-weight relationship for this species is shown in **Table 4**. Size composition and mean size in the fishing hauls are represented in the spatial context in **Figure 39**. The mapping of the backscattering energy (nautical area scattering coefficient, *NASC*, in $\text{m}^2 \text{nmi}^{-2}$) attributed to the species and the coherent strata considered for the acoustic estimation are shown in **Figure 40**. Estimated abundance and biomass by size class are given in **Table 21** and **Figure 41**.

The species showed a concurrent distribution with boarfish (**Figure 40**).

Snipefish abundance and biomass in the surveyed area were of 10 million fish and 124 t (**Table 21, Figure 41**).

The size range recorded for the estimated population was comprised between 10.5 and 14.5 cm size classes, with a not clearly defined main mode at 12.0 or 13 cm. A similar figure is also observed in the distribution of the estimated biomass by size class (**Table 21, Figures 39 and 41**).

Pearlside

The survey's length-weight relationship for this species is shown in **Table 4**. Size composition and mean size in the fishing hauls are represented in the spatial context in **Figure 42**. The mapping of the backscattering energy (nautical area scattering coefficient, *NASC*, in $\text{m}^2 \text{nmi}^{-2}$) attributed to the species and the coherent strata considered for the acoustic estimation are shown in **Figure 43**. Estimated abundance and biomass by size class are given in **Table 22** and **Figure 44**.

Pearlside was located close to the deepest limit of the surveyed area (200 m), just in the transition between outer shelf and upper slope waters. The highest densities were recorded in the Spanish outer shelf (**Figure 43**).

Pearlside abundance and biomass in the surveyed area were of 1 668 million fish and 1 823 t (**Table 22, Figure 44**). Spanish waters accounted for 80-81% of both the total abundance (1 351 million) and biomass (1 454 t), respectively. Portuguese waters yielded estimates of 317 million and 368 t.

The size range recorded for the estimated population was comprised between 5.0 and 6.0 cm size classes, with a single mode at 5.5 cm size class. The same modal class was also recorded in the distribution of the estimated biomass by size class (**Table 22, Figure 44**).

(SHORT) DISCUSSION

The time series of anchovy and sardine estimates from this survey series are described in **Tables 7** and **10** and **Figure 45**. For those surveys covering the whole survey's area (i.e. 2014-2016, 2018-2019), the 2019 anchovy estimates were the highest ones in the series, both for the total population (abundance and biomass) and for the juveniles biomass. Anchovy juveniles abundance in autumn 2019 was the second peak in the series after the maximum recorded in 2015 (**Table 7**).

Sardine total biomass in autumn 2019 experienced a noticeable increase, reaching the second peak in the autumn series. However, total abundance showed an opposite trend, suggesting a population sustained by large fish. Thus, abundance and biomass levels of sardine juveniles were estimated well below the historical average (**Table 10, Figure 45**).

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Table 1. *ECOCADIZ-RECLUTAS 2019-10* survey. Descriptive characteristics of the acoustic tracks.

Acoustic Track	Location	Date	Start				End			
			Latitude	Longitude	UTC time	Mean depth (m)	Latitude	Longitude	UTC time	Mean depth (m)
R01	Trafalgar	16/10/2019	36° 12,933' N	6° 08,968' W	06:55	24	36° 02,190' N	6° 28,790' W	10:55	200
R02	Sancti-Petri	16/10/2019	36° 08,850' N	6° 34,250' W	11:48	200	36° 19,330' N	6° 14,940' W	17:36	27
R03	Cádiz	17/10/2019	36° 26,611' N	6° 19,380' W	06:54	27	36° 17,330' N	6° 36,290' W	10:56	189
R04	Rota	17/10/2019	36° 24,589' N	6° 40,726' W	11:51	200	36° 34,711' N	6° 22,075' W	15:47	21
R05	Chipiona	20/10/2019	36° 31,216' N	6° 46,319' W	08:39	200	36° 40,339' N	6° 29,519' W	10:17	22
R06	Doñana	20/10/2019	36° 37,927' N	6° 51,557' W	15:53	202	36° 47,165' N	6° 34,689' W	17:36	20
R07	Matalascañas	22/10/2019	36° 44,032' N	6° 58,302' W	6:56	200	36° 54,262' N	6° 39,423' W	10:21	20
R08	Mazagón	22/10/2019	37° 01,190' N	6° 44,406' W	13:49	21	36° 49,350' N	7° 06,156' W	18:05	200
R09	Punta Umbría	21/10/2019	36° 49,740' N	7° 06,532' W	06:53	197	37° 04,639' N	6° 55,868' W	10:49	24
R10	El Rompido	21/10/2019	37° 07,564' N	7° 07,115' W	11:59	20	36° 50,076' N	7° 07,171' W	17:44	200
R11	Isla Cristina	23/10/2019	37° 06,837' N	7° 17,178' W	7:08	24	36° 53,433' N	7° 17,121' W	10:39	234
R12	V.R. do Sto. Antonio	23/10/2019	37° 06,581' N	7° 27,057' W	12:28	20	36° 56,288' N	7° 27,087' W	15:04	202
R13	Tavira	24/10/2019	37° 04,609' N	7° 37,105' W	07:05	20	36° 57,031' N	7° 37,052' W	07:50	199
R14	Fuzeta	24/10/2019	36° 55,474' N	7° 47,030' W	13:27	200	36° 59,330' N	7° 47,036' W	13:49	37
R15	Cabo Sta. María	25/10/2019	36° 55,810' N	7° 57,005' W	07:09	60	36° 52,1104' N	7° 56,929' W	07:31	205
R16	Quarteira	25/10/2019	36° 49,736' N	8° 06,934' W	10:32	200	37° 01,575' N	8° 06,975' W	13:08	48
R17	Albufeira	26/10/2019	37° 01,794' N	8° 16,920' W	07:09	25	36° 49,402' N	8° 16,815' W	10:14	107
R18	Alfanzinha	26/10/2019	36° 50,309' N	8° 26,748' W	11:27	200	37° 04,659' N	8° 27,038' W	15:13	21
R19	Portimao	27/10/2019	37° 05,393' N	8° 36,979' W	07:46	29	36° 51,321' N	8° 36,758' W	11:03	201
R20	Burgau	27/10/2019	36° 51,989' N	8° 46,656' W	14:37	197	37° 02,607' N	8° 46,971' W	15:39	46
R21	Ponta de Sagres	28/10/2019	36° 59,161' N	8° 56,853' W	8:01	26	36° 50,672' N	8° 57,264' W	10:21	117

Table 2. ECOCADIZ-RECLUTAS 2019-10 survey. Descriptive characteristics of the fishing hauls.

Fishing haul	Date	Start		End		UTC Time		Depth (m)		Duration (min)		Trawled Distance (nm)	Acoustic Transect	Zone (landmark)
		Latitude	Longitude	Latitude	Longitude	Start	End	Start	End	Effective Trawling	Total Manoeuvre			
1	16-10-2019	36° 03.8140 N	6° 25.5317 W	36° 05.3881 N	6° 22.8491 W	09:00	09:40	102,56	79,38	0:40	1:23	2,683	R01	Trafalgar
2	16-10-2019	36° 12.5328 N	6° 26.9486 W	36° 10.8599 N	6° 30.4071 W	12:56	13:44	88,52	114,74	0:48	1:27	3,260	R02	Sancti-Petri
3	16-10-2019	36° 16.0562 N	6° 20.7204 W	36° 14.8724 N	6° 22.7704 W	15:39	16:09	48,25	52,63	0:29	1:12	2,036	R02	Sancti-Petri
4	17-10-2019	36° 22.3298 N	6° 27.1413 W	36° 24.1247 N	6° 23.7157 W	08:25	09:14	62,12	49,35	0:48	1:18	3,296	R03	Cádiz
5	17-10-2019	36° 29.2443 N	6° 32.1474 W	36° 27.4997 N	6° 35.1720 W	13:08	13:51	68,16	90,76	0:43	1:24	2,998	R04	Rota
6	20-10-2019	36° 36.2217 N	6° 36.9126 W	36° 34.5781 N	6° 39.8945 W	11:09	11:52	60,37	81,22	0:43	1:26	2,909	R05	Chipiona
7	20-10-2019	36° 30.6422 N	6° 43.0233 W	36° 33.1271 N	6° 44.5460 W	13:48	14:29	119,76	120,78	0:40	1:29	2,768	R05	Chipiona
8	21-10-2019	36° 50.7991 N	7° 05.1267 W	36° 52.5506 N	7° 04.1154 W	08:20	08:49	132,84	111,50	0:29	1:23	1,928	R09	Punta Umbría
9	21/10/2019	37° 01.8776 N	7° 07.1545 W	37° 04.6160 N	7° 07.2459 W	13:03	13:43	48,72	32,91	0:40	1:19	2,736	R10	El Rompido
10	21/10/2019	36° 55.5919 N	7° 07.2061 W	36° 58.2915 N	7° 07.2247 W	15:41	16:20	98,09	79,25	0:39	1:23	2,696	R10	El Rompido
11	22/10/2019	36° 45.7332 N	6° 55.1433 W	36° 45.2861 N	6° 55.9368 W	07:54	08:06	113,77	120,57	0:11	1:00	0,778	R07	Matalascañas
12	22/10/2019	36° 51.2179 N	6° 45.0416 W	36° 49.6247 N	6° 48.0559 W	11:08	11:50	33,98	53,87	0:42	1:16	2,896	R07	Matalascañas
13	22/10/2019	36° 56.4020 N	6° 53.2854 W	36° 58.2832 N	6° 49.8260 W	15:07	15:56	48,89	36,06	0:49	1:30	3,349	R08	Mazagón
14	23/10/2019	37° 02.4192 N	7° 17.0105 W	37° 05.2068 N	7° 17.0339 W	08:03	08:46	53,67	32,84	0:42	1:28	2,784	R11	Isla Cristina
15	23/10/2019	36° 58.4180 N	7° 27.2595 W	36° 59.6580 N	7° 27.0902 W	13:49	14:08	110,98	99,05	0:19	1:01	1,246	R12	V. R. Sto. Antonio
16	24/10/2019	37° 02.8723 N	7° 36.9136 W	37° 00.7518 N	7° 36.9597 W	08:50	09:20	44,60	95,27	0:30	1:15	2,118	R13	Tavira
17	24/10/2019	37° 00.4089 N	7° 37.0353 W	36° 57.9952 N	7° 37.0192 W	11:00	11:35	96,58	126,42	0:35	1:31	2,411	R13	Tavira
18	24/10/2019	36° 58.3203 N	7° 46.9955 W	36° 56.1834 N	7° 46.9914 W	14:23	14:55	73,10	108,50	0:31	1:20	2,134	R14	Fuzeta
19	25/10/2019	36° 54.7034 N	7° 56.9667 W	36° 52.1844 N	7° 56.9489 W	08:15	08:50	74,89	188,35	0:35	1:29	2,516	R15	Cabo de Sta M ^a
20	25/10/2019	36° 55.8915 N	8° 06.7695 W	36° 53.3990 N	8° 07.0200 W	11:38	12:15	52,39	93,54	0:36	1:15	2,497	R16	Quarteira
21	25/10/2019	36° 59.5280 N	8° 07.0209 W	36° 56.4144 N	8° 07.0539 W	14:12	14:58	40,11	48,18	0:46	1:21	3,110	R16	Quarteira
22	26/10/2019	36° 53.2862 N	8° 16.8967 W	36° 56.1687 N	8° 17.1895 W	08:34	09:17	103,55	79,35	0:42	1:21	2,888	R17	Albufeira
23	26/10/2019	36° 54.4352 N	8° 26.8725 W	36° 50.9401 N	8° 26.7866 W	12:20	13:11	116,63	134,59	0:50	1:39	3,491	R18	Alfanzina
24	27/10/2019	37° 03.4728 N	8° 36.2125 W	37° 03.0031 N	8° 38.3574 W	09:03	09:29	40,62	40,32	0:25	0:52	1,780	R19	Portimão
25	27/10/2019	36° 52.3146 N	8° 36.7508 W	36° 55.4934 N	8° 36.7452 W	12:10	12:56	117,25	96,04	0:46	1:25	3,175	R19	Portimão
26	28/10/2019	36° 54.1791 N	8° 54.5330 W	36° 53.7336 N	8° 57.2315 W	09:49	10:21	118,06	116,68	0:31	1:12	2,210	R21	Ponta de Sagres

Table 3. ECOCADIZ-RECLUTAS 2019-10 survey. Catches by species in number (upper panel) and weight (in kg, lower panel) from valid fishing stations.

Fishing haul	CATCH IN NUMBER (n)															TOTAL
	Anchovy	Sardine	Round sardinella	Chub mack.	Mackerel	Blue Jack mack.	Horse-mack.	Medit. Horse-mack.	Bogue	Atlantic pomfret	Transp. goby	Boarfish	Snipefish	Pearlside	Other spp.	
01	0	0	0	6	0	1	1	66	0	0	0	0	0	0	2	76
02	0	0	0	2	0	0	0	163	0	0	0	0	0	0	5	170
03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04	0	0	2	0	0	0	0	10	0	0	0	0	0	0	0	12
05	439	38	0	0	0	0	0	2	0	6	0	0	0	0	10	495
06	2805	110	0	0	0	0	0	0	0	1466	0	0	0	0	4	4385
07	49981	0	0	2010	0	0	0	0	0	8	0	0	0	0	25	52024
08	54859	2	0	29	8	0	4	0	0	0	0	0	0	13	18	54933
09	8485	78	0	3	2	0	0	12	5	0	0	0	0	0	38	8623
10	21608	8	0	0	0	0	53	0	0	0	2	0	0	1	13	21685
11	23159	0	0	0	1	0	0	0	0	1	0	0	0	0	13	23174
12	22100	916	0	0	0	0	34	4	0	0	4	0	0	0	44	23102
13	3739	410	0	1	0	0	4	4	0	0	0	0	0	0	25	4183
14	5097	1	0	0	3	0	156	7	0	0	0	0	0	0	24	5288
15	6734	0	0	3	0	0	0	0	0	0	0	0	0	0	2	6739
16	6585	2702	0	103	13	4	0	0	3	0	0	0	0	0	9	9419
17	2326	280	0	28338	153	65	3	0	5	0	0	0	0	0	3	31173
18	744	0	0	21	2	27	14	0	0	0	0	0	0	0	6	814
19	12515	0	0	102	47	2	2	0	0	0	0	2395	85	0	49	15197
20	982	13	0	3	6	0	1	0	0	0	0	16	3	0	10	1034
21	0	4109	0	11409	3	163	84	2	29	0	0	0	0	0	262	16061
22	163	0	0	3285	5	0	3	0	0	0	0	0	0	0	12	3468
23	17934	1	0	907	29	3723	56	0	2	0	0	0	0	0	11	22663
24	0	58308	0	192	0	0	0	0	0	0	0	0	0	0	0	58500
25	0	0	0	5272	8	0	2	0	0	0	0	0	0	0	8	5290
26	552	0	0	1519	1	0	22	0	2	0	0	0	0	0	4	2100
TOTAL	240807	66976	2	53205	281	3985	439	270	46	1481	6	2411	88	14	597	370608

Table 3. ECOCADIZ-RECLUTAS 2019-10 survey. Cont'd.

Fishing haul	CATCH IN WEIGHT (kg)															TOTAL
	Anchovy	Sardine	Round sardinella	Chub mack.	Mackerel	Blue Jack mack.	Horse-mack.	Medit. Horse-mack.	Bogue	Atlantic pomfret	Transp. goby	Boarfish	Snipefish	Pearlside	Other spp.	
01	0	0	0	0,421	0	0,236	0,037	25,946	0	0	0	0	0	0	0,250	26,890
02	0	0	0	0,126	0	0	0	49,027	0	0	0	0	0	0	0,719	49,872
03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04	0	0	0,480	0	0	0	0	1,935	0	0	0	0	0	0	0	2,415
05	5,173	0,759	0,0	0	0	0	0	0,374	0	4,664	0	0	0	0	1,192	12,162
06	25,900	2,159	0	0	0	0	0	0	0	1012,160	0	0	0	0	41,638	1081,857
07	449,550	0	0	264,720	0	0	0	0	0	5,908	0	0	0	0	4,904	725,082
08	446,460	0,025	0	2,139	0,715	0	0,017	0	0	0	0	0	0	0,023	2,565	451,944
09	50,320	1,064	0	0,917	0,519	0	0	2,508	1,202	0	0	0	0	0	43,134	99,664
10	170,340	0,153	0	0	0	0	0,212	0	0	0	0,001	0	0	0,001	0,898	171,605
11	243,460	0	0	0	0,084	0	0	0	0	0,573	0	0	0	0	1,151	245,268
12	111,280	12,585	0	0	0	0	0,193	0,082	0	0	0,002	0	0	0	4,925	129,067
13	18,860	5,540	0	0,221	0	0	0,138	0,664	0	0	0	0	0	0	2,336	27,759
14	38,920	0,017	0	0	0,738	0	0,734	1,544	0	0	0	0	0	0	2,247	44,200
15	112,820	0	0	0,227	0	0	0	0	0	0	0	0	0	0	0,026	113,073
16	90,080	87,380	0	9,202	3,315	0,184	0	0	0,302	0	0	0	0	0	1,590	192,053
17	35,296	16,335	0	2997,544	13,357	3,438	0,143	0	0,828	0	0	0	0	0	0,737	3067,678
18	15,260	0	0	2,002	0,267	1,077	0,652	0	0	0	0	0	0	0	0,951	20,209
19	291,780	0	0	10,252	3,607	0,092	0,163	0	0	0	0	23,930	1,049	0	11,637	342,510
20	22,673	0,667	0	0,250	0,450	0	0,136	0	0	0	0	0,150	0,035	0	1,194	25,555
21	0	186,280	0	710,78	0,442	6,614	4,849	0,121	3,030	0	0	0	0	0	43,201	955,317
22	4,211	0	0	270,000	1,714	0	0,353	0	0	0	0	0	0	0	1,433	277,711
23	525,150	0,044	0	68,860	4,406	468,900	8,219	0	0,258	0	0	0	0	0	1,626	1077,463
24	0	3035,448	0	11,582	0	0	0	0	0	0	0	0	0	0	0	3047,030
25	0	0	0	400,300	0,633	0	0,218	0	0	0	0	0	0	0	0,856	402,007
26	17,140	0	0	108,080	0,078	0	2,707	0	0,213	0	0	0	0	0	0,507	128,725
TOTAL	2674,673	3348,456	0,480	4857,623	30,325	480,541	18,771	82,201	5,833	1023,305	0,003	24,080	1,084	0,024	169,717	12717,116

Table 4. ECOCADIZ-RECLUTAS 2019-10 survey. Parameters of the size-weight relationships for the survey's target species susceptible of being assessed. FAO codes for the species: ANE: *Engraulis encrasicolus*; PIL: *Sardina pilchardus*; VAM: *Scomber colias*; MAC: *S. scombrus*; JAA: *Trachurus picturatus*; HOM: *T. trachurus*; HMM: *T. mediterraneus*; BOG: *Boops boops*; POA: *Brama brama*; BOC: *Capros aper*; SNS: *Macroramphosus scolopax*; MAV: *Maurolicus muelleri* (LW relationship from ECOCADIZ-RECLUTAS 2018-10 survey).

Parameter	ANE	PIL	VAM	MAC	JAA	HOM	HMM	BOG	POA	BOC	SNS	MAV
Size range (mm)	85-191	110-226	182-323	212-384	157-310	45-275	97-420	175-290	362-459	62-108	105-145	32-66
n	1015	463	565	177	158	218	140	46	167	100	85	129
a	0,002527603	0,002004432	0,003528031	0,001779081	0,003881192	0,009617424	0,011285218	0,004010563	0,005845242	0,033443272	0,012431483	0,006143344
b	3,353568996	3,52240318	3,262952516	3,436861614	3,246707232	2,956537435	2,893014429	3,272984272	3,129312126	2,791647808	2,7186097	3,028111499
r ²	0,989734159	0,987590659	0,948187114	0,98908085	0,9751995	0,998313258	0,984256772	0,914810497	0,721867302	0,911656079	0,702710433	0,93733259

Table 5. ECOCADIZ-RECLUTAS 2019-10 survey. Anchovy (*E. encrasicolus*). Estimated abundance (absolute numbers and million fish) and biomass (t) by size class (in cm). Polygons (*i.e.*, coherent or homogeneous post-strata) numbered as in **Figure 7.**

ECOCADIZ-RECLUTAS 2019-10 . <i>Engraulis encrasicolus</i> . ABUNDANCE (in numbers and million fish)																
Size class	POL01	POL02	POL03	POL04	POL05	POL06	POL07	POL08	POL09	POL10	<i>n</i>			Millions		
											PORTUGAL	SPAIN	TOTAL	PORTUGAL	SPAIN	TOTAL
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	543228	811548	7976001	0	993406	3121872	543228	12902827	13446055	1	13	13
8.5	0	0	0	0	1055879	1577415	66184169	0	1930895	25905029	1055879	95597508	96653387	1	96	97
9	0	0	0	517976	5694386	8507041	254215755	0	10413370	99502140	6212362	372638306	378850668	6	373	379
9.5	0	0	0	564754	42484424	63468957	419829463	0	77691611	164324710	43049178	725314741	768363919	43	725	768
10	0	0	0	4719451	137553722	205496283	201059753	4027121	251545608	78696443	142273173	740825208	883098381	142	741	883
10.5	0	0	0	15189215	173360393	258989113	50595741	29242089	317025559	19803590	188549608	675656092	864205700	189	676	864
11	0	0	0	13012272	128411819	191838876	42285301	152042426	234827736	16550815	141424091	637545154	778969245	141	638	779
11.5	0	0	0	23568127	80185136	119791361	13245870	196965254	146635211	5184542	103753263	481822238	585575501	104	482	586
12	0	0	0	19772660	53330127	79671729	4416226	158087310	97525237	1728547	73102787	341429049	414531836	73	341	415
12.5	0	0	158621	23548078	20359687	30416044	3515119	65873533	37231926	1375846	44066386	138412468	182478854	44	138	182
13	0	0	2208143	53127771	5507242	8227460	0	33559316	10071138	0	60843156	51857914	112701070	61	52	113
13.5	0	0	7899004	73299096	3056166	4565713	1757559	6709026	5588836	687923	84254266	19309057	103563323	84	19	104
14	46655	1707881	28257379	61852242	543228	811548	0	4376182	993406	0	92407385	6181136	98588521	92	6	99
14.5	62092	2272966	38226124	34193725	0	0	0	0	0	0	74754907	0	74754907	75	0	75
15	215640	7893801	38100112	16138853	0	0	0	1342374	0	0	62348406	1342374	63690780	62	1	64
15.5	335415	12278331	21084540	5149656	0	0	0	0	0	0	38847942	0	38847942	39	0	39
16	385659	14117601	11986727	2932708	0	0	0	0	0	0	29422695	0	29422695	29	0	29
16.5	308130	11279550	4741005	648890	0	0	0	0	0	0	16977575	0	16977575	17	0	17
17	163041	5968342	2865573	517976	0	0	0	0	0	0	9514932	0	9514932	10	0	10
17.5	76954	2817006	238905	0	0	0	0	0	0	0	3132865	0	3132865	3	0	3
18	19041	697023	0	0	0	0	0	0	0	0	716064	0	716064	1	0	1
18.5	2929	107234	0	0	0	0	0	0	0	0	110163	0	110163	0.1	0	0.1
19	1465	53617	0	0	0	0	0	0	0	0	55082	0	55082	0.1	0	0.1
19.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL <i>n</i>	1617021	59193352	155766133	348753450	652085437	974173088	1065080957	652224631	1192473939	416881457	1217415393	4300834072	5518249465	1217	4301	5518
Millions	2	59	156	349	652	974	1065	652	1192	417						

Table 5. ECOCADIZ-RECLUTAS 2019-10 survey. Anchovy (*E. encrasicolus*). Cont'd.

ECOCADIZ-RECLUTAS 2019-10. <i>Engraulis encrasicolus</i> . BIOMASS (t)													
Size class	POL01	POL02	POL03	POL04	POL05	POL06	POL07	POL08	POL09	POL10	PORTUGAL	SPAIN	TOTAL
6	0	0	0	0	0	0	0	0	0	0	0	0	0
6.5	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0
7.5	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	1.626	2.429	23.872	0	2.973	9.344	1.626	38.618	40.243
8.5	0	0	0	0	3.850	5.751	241.297	0	7.040	94.446	3.850	348.533	352.383
9	0	0	0	2.275	25.014	37.369	1116.694	0	45.743	437.083	27.289	1636.889	1664.178
9.5	0	0	0	2.960	222.656	332.633	2200.275	0	407.172	861.206	225.616	3801.287	4026.902
10	0	0	0	29.250	852.537	1273.635	1246.138	24.959	1559.042	487.749	881.788	4591.524	5473.312
10.5	0	0	0	110.444	1260.545	1883.171	367.894	212.626	2305.168	143.997	1370.989	4912.856	6283.845
11	0	0	0	110.198	1087.493	1624.643	358.105	1287.615	1988.707	140.165	1197.691	5399.236	6596.927
11.5	0	0	0	230.930	785.685	1173.762	129.788	1929.942	1436.789	50.800	1016.615	4721.082	5737.697
12	0	0	0	222.799	600.926	897.744	49.762	1781.334	1098.918	19.477	823.725	3847.236	4670.961
12.5	0	0	2.044	303.437	262.352	391.937	45.295	848.837	479.766	17.729	567.833	1783.564	2351.398
13	0	0	32.372	778.859	80.737	120.615	0	491.983	147.644	0	891.967	760.243	1652.210
13.5	0	0	131.117	1216.702	50.730	75.787	29.174	111.364	92.770	11.419	1398.548	320.514	1719.062
14	0.873	31.957	528.736	1157.343	10.165	15.185	0	81.885	18.588	0	1729.073	115.658	1844.731
14.5	1.304	47.745	802.960	718.257	0	0	0	0	0	0	1570.266	0	1570.266
15	5.065	185.427	894.978	379.104	0	0	0	31.533	0	0	1464.574	31.533	1496.107
15.5	8.779	321.374	551.869	134.788	0	0	0	0	0	0	1016.810	0	1016.810
16	11.210	410.346	348.409	85.243	0	0	0	0	0	0	855.208	0	855.208
16.5	9.914	362.927	152.545	20.878	0	0	0	0	0	0	546.264	0	546.264
17	5.790	211.944	101.760	18.394	0	0	0	0	0	0	337.888	0	337.888
17.5	3.008	110.095	9.337	0	0	0	0	0	0	0	122.440	0	122.440
18	0.817	29.901	0	0	0	0	0	0	0	0	30.718	0	30.718
18.5	0.138	5.037	0	0	0	0	0	0	0	0	5.174	0	5.174
19	0.075	2.751	0	0	0	0	0	0	0	0	2.826	0	2.826
19.5	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0
20.5	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	46.973	1719.503	3556.126	5521.862	5244.314	7834.663	5808.295	6802.079	9590.320	2273.415	16088.777	32308.772	48397.550

Table 6. ECOCADIZ-RECLUTAS 2019-10 survey. Anchovy (*E. encrasicolus*). Estimated abundance (thousands of individuals) and biomass (tonnes) by age group. Polygons (i.e., coherent or homogeneous post-strata) numbered as in **Figure 7** and ordered from west to east.

Age group	POL01	POL02	POL03	POL04	POL05	POL06	POL07	POL08	POL09	POL10	PORTUGAL	SPAIN	SURVEYED AREA
	N	N	N	N	N	N	N	N	N	N	N	N	N
0	3	105	4392	139405	619436	925397	1051309	560967	1132767	411491	763341	4081931	4845272
I	675	24715	108658	191171	32088	47938	5796	90738	58680	2269	357307	205422	562729
II	939	34373	42716	18178	18	27	0	519	33	0	96224	579	96802
III	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	1617	59193	155766	348753	651542	973362	1057105	652225	1191481	413760	1216872	4287931	5504803

Age group	POL01	POL02	POL03	POL04	POL05	POL06	POL07	POL08	POL09	POL10	PORTUGAL	SPAIN	SURVEYED AREA
	B	B	B	B	B	B	B	B	B	B	B	B	B
0	0.1	2	74	1662	4874	7282	5719	5638	8914	2239	6613	29792	36405
I	18	657	2367	3431	368	550	65	1152	673	26	6841	2465	9307
II	29	1060	1115	428	0.3	0.5	0	12	1	0	2633	13	2645
III	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	47	1720	3556	5522	5243	7832	5784	6802	9587	2264	16087	32270	48357

Table 7. ECOCADIZ-RECLUTAS surveys series. Anchovy (*E. encrasicolus*). Acoustic estimates of biomass (t) and abundance (million fish) for the whole Gulf of Cadiz anchovy population and for the juvenile fraction (i.e. age 0 fish, between parentheses). The 2017 estimates correspond to an incomplete coverage (only the seven easternmost transects) of the standard surveyed area due to a research vessels' breakdown.

Estimate/Year	Total Population (Recruits at age 0)						
	2012	2014	2015	2016	2017	2018	2019
Biomass (t)	13680 (13354)	8113 (5131)	30827 (29219)	19861 (15969)	7642 (7290)	10493 (3834)	48357 (36405)
Abundance (millions)	2469 (2619)	986 (814)	5227 (5117)	3667 (3445)	1492 (1433)	953 (543)	5505 (4845)

Table 8. *ECOCADIZ-RECLUTAS 2019-10* survey. Sardine (*Sardina pilchardus*). Estimated abundance (absolute numbers and million fish) and biomass (t) by size class (in cm). Polygons (i.e., coherent or homogeneous post-strata) numbered as in **Figure 11**.

<i>ECOCADIZ-RECLUTAS 2019-10. Sardina pilchardus. ABUNDANCE (in numbers and million fish)</i>												
Size class	POL01	POL02	POL03	POL04	POL05	POL06	<i>n</i>			Millions		
							PORTUGAL	SPAIN	TOTAL	PORTUGAL	SPAIN	TOTAL
6	0	0	0	0	0	0	0	0	0	0	0	0
6.5	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0
7.5	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
8.5	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0
9.5	0	0	701	545438	0	0	701	545438	546139	0.001	1	1
10	0	0	400	311299	0	0	400	311299	311699	0.0004	0.3	0.3
10.5	0	0	1502	1168035	0	0	1502	1168035	1169537	0.002	1	1
11	0	0	16284	12664444	0	0	16284	12664444	12680728	0.02	13	13
11.5	0	0	39838	30983062	1105	811103	39838	31795270	31835108	0.04	32	32
12	0	0	60176	46799955	17685	12977645	60176	59795285	59855461	0.1	60	60
12.5	0	0	33212	25829881	29756	21835742	33212	47695379	47728591	0.03	48	48
13	2294113	0	8672	6744451	44794	32871010	2302785	39660255	41963040	2	40	42
13.5	2294113	217048	1403	1090875	78099	57310819	2512564	58479793	60992357	3	58	61
14	13830224	0	0	0	26004	19082261	13830224	19108265	32938489	14	19	33
14.5	18418450	0	1102	856736	22775	16712987	18419552	17592498	36012050	18	18	36
15	31275938	0	0	0	10879	7982959	31275938	7993838	39269776	31	8	39
15.5	34265724	0	701	545438	4421	3244411	34266425	3794270	38060695	34	4	38
16	82016048	2407228	0	0	0	0	84423276	0	84423276	84	0	84
16.5	69224107	3179688	0	0	7650	5613685	72403795	5621335	78025130	72	6	78
17	72842611	13077176	0	0	0	0	85919787	0	85919787	86	0	86
17.5	49140261	13160536	0	0	1105	811103	62300797	812208	63113005	62	1	63
18	33917085	17909529	0	0	0	0	51826614	0	51826614	52	0	52
18.5	42533380	8872786	119	92790	1105	811103	51406285	904998	52311283	51	1	52
19	40239267	10088591	0	0	0	0	50327858	0	50327858	50	0	50
19.5	26062009	10940088	0	0	0	0	37002097	0	37002097	37	0	37
20	11539126	6368625	0	0	0	0	17907751	0	17907751	18	0	18
20.5	3615489	2297923	0	0	0	0	5913412	0	5913412	6	0	6
21	0	1338683	0	0	0	0	1338683	0	1338683	1	0	1
21.5	5280885	217048	0	0	0	0	5497933	0	5497933	5	0	5
22	0	0	0	0	0	0	0	0	0	0	0	0
22.5	0	0	0	0	0	0	0	0	0	0	0	0
23	0	217048	0	0	0	0	217048	0	217048	0.2	0	0.2
23.5	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0
24.5	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL n	53878830	90291997	164110	127632404	245378	180064828	629244937	307942610	937187547	629	308	937
Millions	539	90	0.2	128	0.2	180	629	308	937			

Table 8. ECOCADIZ-RECLUTAS 2019-10 survey. Sardine (*Sardina pilchardus*). Cont'd.

ECOCADIZ-RECLUTAS 2019-10 . <i>Sardina pilchardus</i> . BIOMASS (t)									
Size class	POL01	POL02	POL03	POL04	POL05	POL06	PORTUGAL	SPAIN	TOTAL
6	0	0	0	0	0	0	0	0	0
6.5	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0
7.5	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0
8.5	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0
9.5	0	0	0.004	3.330	0	0	0.004	3.330	3.334
10	0	0	0.003	2.266	0	0	0.003	2.266	2.269
10.5	0	0	0.013	10.057	0	0	0.013	10.057	10.070
11	0	0	0.165	127.985	0	0	0.165	127.985	128.150
11.5	0	0	0.469	364.939	0.013	9.554	0.469	374.506	374.975
12	0	0	0.821	638.397	0.241	177.028	0.821	815.666	816.487
12.5	0	0	0.522	405.664	0.467	342.935	0.522	749.066	749.588
13	41.258	0	0.156	121.293	0.806	591.155	41.413	713.253	754.667
13.5	47.008	4.447	0.029	22.353	1.600	1174.327	51.484	1198.280	1249.764
14	321.382	0	0	0	0.604	443.427	321.382	444.032	765.414
14.5	483.283	0	0.029	22.480	0.598	438.533	483.312	461.610	944.922
15	922.901	0	0	0	0.321	235.564	922.901	235.885	1158.786
15.5	1132.808	0	0.023	18.032	0.146	107.259	1132.831	125.437	1258.267
16	3026.941	88.843	0	0	0	0	3115.784	0	3115.784
16.5	2842.644	130.572	0	0	0.314	230.522	2973.216	230.837	3204.052
17	3317.774	595.628	0	0	0	0	3913.402	0	3913.402
17.5	2475.193	662.896	0	0	0.056	40.855	3138.089	40.911	3179.000
18	1884.023	994.837	0	0	0	0	2878.860	0	2878.860
18.5	2598.634	542.095	0.007	5.669	0.068	49.555	3140.736	55.292	3196.028
19	2697.270	676.246	0	0	0	0	3373.516	0	3373.516
19.5	1912.093	802.642	0	0	0	0	2714.735	0	2714.735
20	924.528	510.261	0	0	0	0	1434.789	0	1434.789
20.5	315.666	200.630	0	0	0	0	516.295	0	516.295
21	0	127.105	0	0	0	0	127.105	0	127.105
21.5	544.213	22.368	0	0	0	0	566.580	0	566.580
22	0	0	0	0	0	0	0	0	0
22.5	0	0	0	0	0	0	0	0	0
23	0	28.290	0	0	0	0	28.290	0	28.290
23.5	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0
24.5	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0
TOTAL	25487.617	5386.860	2.240	1742.465	5.234	3840.714	30876.718	5588.414	36465.131

Table 9. ECOCADIZ-RECLUTAS 2019-07 survey. Sardine (*Sardina pilchardus*). Estimated abundance (thousands of individuals) and biomass (tonnes) by age group. Polygons (i.e., coherent or homogeneous post-strata) numbered as in **Figure 11** and ordered from west to east.

Age group	POL01	POL02	POL03	POL04	POL05	POL06	PORTUGAL	SPAIN	SURVEYED AREA
	N	N	N	N	N	N	N	N	N
0	92142	1389	161	125367	224	164362	93692	289953	383645
I	349756	56396	3	2227	21	15232	406155	17480	423635
II	58609	20119	0.04	27	0.5	352	78728	380	79108
III	27855	10464	0.01	7	0.1	88	38318	95	38414
IV	5146	1491	0.004	3	0.04	30	6637	34	6670
V	5281	217	0	0	0	0	5498	0	5498
VI	0	0	0	0	0	0	0	0	0
TOTAL	538789	90075	164	127632	245	180065	629028	307943	936970

Age group	POL01	POL02	POL03	POL04	POL05	POL06	PORTUGAL	SPAIN	SURVEYED AREA
	B	B	B	B	B	B	B	B	B
0	2810	53	2	1699	4	3290	2865	4993	7858
I	16048	3042	0.1	41	1	524	19090	566	19656
II	3831	1366	0.002	2	0.03	20	5196	22	5218
III	1907	771	0.001	0.4	0.01	5	2679	6	2684
IV	347	104	0.0003	0.2	0.003	2	452	2	454
V	544	22	0	0	0	0	567	0	567
VI	0	0	0	0	0	0	0	0	0
TOTAL	25488	5359	2	1742	5	3841	30848	5588	36437

Table 10. ECOCADIZ-RECLUTAS surveys series. Sardine (*Sardina pilchardus*). Acoustic estimates of biomass (t) and abundance (million fish) for the whole Gulf of Cadiz anchovy population and for the juvenile fraction (i.e. age 0 fish, between parentheses). Note that the 2012 survey only surveyed the Spanish waters. The 2017 estimates correspond to an incomplete coverage (only the seven easternmost transects) of the standard surveyed area due to a research vessels' breakdown.

Estimate/Year	Total Population (Recruits at age 0)						
	2012	2014	2015	2016	2017	2018	2019
Biomass (t)	22119 (9182)	36571 (705)	30992 (8645)	35173 (21899)	12119 (8778)	20679 (15224)	36465 (7858)
Abundance (millions)	603 (359)	507 (26)	861 (509)	2379 (1940)	591 (483)	1134 (1036)	937 (384)

Table 11. ECOCADIZ-RECLUTAS 2019-10 survey. Atlantic mackerel (*Scomber scombrus*). Estimated abundance (absolute numbers and million fish) and biomass (t) by size class (in cm). Polygons (*i.e.*, coherent or homogeneous post-strata) numbered as in **Figure 15**.

ECOCADIZ-RECLUTAS 2019-10 . <i>Scomber scombrus</i> . ABUNDANCE (in numbers and million fish)								
Size class	POL01	POL02	n			Millions		
			PORTUGAL	SPAIN	TOTAL	PORTUGAL	SPAIN	TOTAL
18	0	0	0	0	0	0	0	0
18.5	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0
19.5	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0
20.5	26608	3646	26608	3646	30254	0.03	0.00	0.03
21	144553	19805	144553	19805	164358	0.1	0.02	0.2
21.5	515184	70585	515184	70585	585769	1	0.1	1
22	1173978	160847	1173978	160847	1334825	1	0.2	1
22.5	636526	87210	636526	87210	723736	1	0.1	1
23	146252	20038	146252	20038	166290	0.1	0.02	0.2
23.5	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0
24.5	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0
25.5	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0
26.5	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0
27.5	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0
28.5	26608	3646	26608	3646	30254	0.03	0.004	0.03
29	0	0	0	0	0	0	0	0
29.5	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0
30.5	26608	3646	26608	3646	30254	0.03	0.004	0.03
31	0	0	0	0	0	0	0	0
31.5	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0
32.5	26608	3646	26608	3646	30254	0.03	0.004	0.03
33	0	0	0	0	0	0	0	0
33.5	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0
34.5	26608	3646	26608	3646	30254	0.03	0.004	0.03
35	0	0	0	0	0	0	0	0
35.5	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0
36.5	0	0	0	0	0	0	0	0
TOTAL n	2749533	376715	2749533	376715	3126248	3	0.4	3
Millions	3	0.4						

Table 11. *ECOCADIZ-RECLUTAS 2019-10* survey. Atlantic mackerel (*Scomber scombrus*). Cont'd.

<i>ECOCADIZ-RECLUTAS 2019-10 . Scomber scombrus . BIOMASS (t)</i>					
Size class	POL01	POL02	PORTUGAL	SPAIN	TOTAL
18	0	0	0	0	0
18.5	0	0	0	0	0
19	0	0	0	0	0
19.5	0	0	0	0	0
20	0	0	0	0	0
20.5	1.591	0.218	1.591	0.218	1.809
21	9.379	1.285	9.379	1.285	10.664
21.5	36.209	4.961	36.209	4.961	41.170
22	89.216	12.224	89.216	12.224	101.439
22.5	52.212	7.154	52.212	7.154	59.365
23	12.927	1.771	12.927	1.771	14.698
23.5	0	0	0	0	0
24	0	0	0	0	0
24.5	0	0	0	0	0
25	0	0	0	0	0
25.5	0	0	0	0	0
26	0	0	0	0	0
26.5	0	0	0	0	0
27	0	0	0	0	0
27.5	0	0	0	0	0
28	0	0	0	0	0
28.5	4.879	0.669	4.879	0.669	5.548
29	0	0	0	0	0
29.5	0	0	0	0	0
30	0	0	0	0	0
30.5	6.148	0.842	6.148	0.842	6.990
31	0	0	0	0	0
31.5	0	0	0	0	0
32	0	0	0	0	0
32.5	7.634	1.046	7.634	1.046	8.681
33	0	0	0	0	0
33.5	0	0	0	0	0
34	0	0	0	0	0
34.5	9.360	1.283	9.360	1.283	10.642
35	0	0	0	0	0
35.5	0	0	0	0	0
36	0	0	0	0	0
36.5	0	0	0	0	0
TOTAL	229.556	31.452	229.556	31.452	261.007

Table 12. ECOCADIZ-RECLUTAS 2019-10 survey. Chub mackerel (*Scomber colias*). Estimated abundance (absolute numbers and million fish) and biomass (t) by size class (in cm). Polygons (*i.e.*, coherent or homogeneous post-strata) numbered as in **Figure 18**.

ECOCADIZ-RECLUTAS 2019-10 . <i>Scomber colias</i> . ABUNDANCE (in numbers and million fish)														
Size class	POL01	POL02	POL03	POL04	POL05	POL06	POL07	POL08	n			Millions		
									PORTUGAL	SPAIN	TOTAL	PORTUGAL	SPAIN	TOTAL
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17.5	1310473	291540	0	0	0	0	0	0	1602013	0	1602013	2	0	2
18	6294458	291540	0	33595	0	0	0	0	6619593	0	6619593	7	0	7
18.5	15027266	1567366	0	0	0	0	0	0	16594632	0	16594632	17	0	17
19	28037599	8242491	14561	0	484	3091	17395	6612	36294651	27582	36322233	36	0	36
19.5	39657146	9341874	0	0	0	0	0	0	48999020	0	48999020	49	0	49
20	37276380	25750542	0	67190	484	3091	17395	6612	63094112	27582	63121694	63	0	63
20.5	9495329	32142009	43683	335948	3950	25201	141834	53916	42016969	224901	42241870	42	0	42
21	4983985	44183005	97963	403137	969	6181	34790	13225	49668090	55165	49723255	50	0	50
21.5	2444712	31638230	195978	772679	4434	28292	159229	60529	35051599	252484	35304083	35	0	35
22	655236	24905407	426470	638300	11812	75365	424165	161240	26625413	672582	27297995	27	1	27
22.5	0	15427894	499274	403137	13787	87966	495083	188198	16330305	785034	17115339	16	1	17
23	0	11180871	346979	302353	11812	75365	424165	161240	11830203	672582	12502785	12	1	13
23.5	0	3373950	372190	134379	10359	66093	371981	141403	3880519	589836	4470355	4	1	4
24	0	985236	264819	235163	8384	53493	301064	114445	1485218	477386	1962604	1	0	2
24.5	0	1695018	378823	0	3465	22110	124440	47304	2073841	197319	2271160	2	0	2
25	0	291540	192014	67190	2459	15691	88312	33570	550744	140032	690776	1	0	1
25.5	0	0	83402	33595	484	3091	17395	6612	116997	27582	144579	0	0	0
26	0	0	54280	0	484	3091	17395	6612	54280	27582	81862	0	0	0
26.5	0	0	0	33595	484	3091	17395	6612	33595	27582	61177	0	0	0
27	0	0	0	0	969	6181	34790	13225	0	55165	55165	0	0	0
27.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL n	145182584	211308513	2970436	3460261	74820	477393	2686828	1021355	362921794	74820	362996614	363	4	367
Millions	145	211	3	3	0.1	0.5	3	1						

Table 12. ECOCADIZ-RECLUTAS 2019-10 survey. Chub mackerel (*Scomber colias*). Cont'd.

ECOCADIZ-RECLUTAS 2019-10 . <i>Scomber colias</i> . BIOMASS (t)											
Size class	POL01	POL02	POL03	POL04	POL05	POL06	POL07	POL08	PORTUGAL	SPAIN	TOTAL
14	0	0	0	0	0	0	0	0	0	0	0
14.5	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0
15.5	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0
16.5	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0
17.5	55.085	12.255	0	0	0	0	0	0	67.340	0	67.340
18	289.689	13.417	0	1.546	0	0	0	0	304.652	0	304.652
18.5	755.362	78.785	0	0	0	0	0	0	834.147	0	834.147
19	1535.712	451.468	0.798	0	0.027	0.169	0.953	0.362	1987.978	1.511	1989.489
19.5	2361.717	556.340	0	0	0	0	0	0	2918.057	0	2918.057
20	2408.624	1663.879	0	4.342	0.031	0.200	1.124	0.427	4076.844	1.782	4078.626
20.5	664.370	2248.915	3.056	23.506	0.276	1.763	9.924	3.772	2939.847	15.736	2955.583
21	376.893	3341.157	7.408	30.486	0.073	0.467	2.631	1.000	3755.944	4.172	3760.115
21.5	199.446	2581.135	15.988	63.037	0.362	2.308	12.990	4.938	2859.607	20.598	2880.205
22	57.571	2188.265	37.471	56.083	1.038	6.622	37.268	14.167	2339.390	59.095	2398.485
22.5	0	1457.488	47.167	38.085	1.302	8.310	46.771	17.779	1542.739	74.163	1616.902
23	0	1133.917	35.189	30.663	1.198	7.643	43.017	16.352	1199.770	68.210	1267.980
23.5	0	366.772	40.460	14.608	1.126	7.185	40.437	15.371	421.840	64.119	485.959
24	0	114.636	30.813	27.362	0.976	6.224	35.030	13.316	172.811	55.546	228.357
24.5	0	210.803	47.113	0	0.431	2.750	15.476	5.883	257.916	24.540	282.455
25	0	38.703	25.490	8.920	0.326	2.083	11.724	4.457	73.113	18.590	91.703
25.5	0	0	11.803	4.755	0.068	0.437	2.462	0.936	16.558	3.904	20.461
26	0	0	8.179	0	0.073	0.466	2.621	0.996	8.179	4.156	12.336
26.5	0	0	0	5.384	0.078	0.495	2.788	1.060	5.384	4.420	9.804
27	0	0	0	0	0.165	1.052	5.923	2.251	0	9.391	9.391
27.5	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0
28.5	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0
TOTAL	8704.469	16457.935	310.936	308.775	7.550	48.176	271.138	103.069	25782.115	429.933	26212.048

Table 13. ECOCADIZ-RECLUTAS 2019-07 survey. Chub mackerel (*Scomber colias*). Estimated abundance (thousands of individuals) and biomass (tonnes) by age group. Polygons (i.e., coherent or homogeneous post-strata) numbered as in **Figure 18** and ordered from west to east.

Age group	POL01	POL02	POL03	POL04	POL05	POL06	POL07	POL08	PORTUGAL	SPAIN	SURVEYED AREA
	N	N	N	N	N	N	N	N	N	N	N
0	56223	30976	68	258	2	15	87	33	87524	137	87662
I	87948	150595	1488	2261	41	259	1458	554	242291	2311	244602
II	1012	28488	1186	819	27	169	952	362	31505	1509	33014
III	0	1250	229	122	5	34	191	73	1601	303	1904
IV	0	0	0	0	0	0	0	0	0	0	0
V	0	0	0	0	0	0	0	0	0	0	0
VI	0	0	0	0	0	0	0	0	0	0	0
TOTAL	145183	211309	2970	3460	75	477	2687	1021	362922	4260	367182

Age group	POL01	POL02	POL03	POL04	POL05	POL06	POL07	POL08	PORTUGAL	SPAIN	SURVEYED AREA
	B	B	B	B	B	B	B	B	B	B	B
0	3151	2079	6	19	0.2	1	7	3	5254	11	5265
I	5473	11626	144	193	4	25	138	52	17436	219	17655
II	81	2617	133	81	3	18	101	38	2911	160	3071
III	0	136	29	16	1	4	25	10	181	40	221
IV	0	0	0	0	0	0	0	0	0	0	0
V	0	0	0	0	0	0	0	0	0	0	0
VI	0	0	0	0	0	0	0	0	0	0	0
TOTAL	8704	16458	311	309	8	48	271	103	25782	430	26212

Table 14. ECOCADIZ-RECLUTAS 2019-10 survey. Horse mackerel (*Trachurus trachurus*). Estimated abundance (absolute numbers and million fish) and biomass (t) by size class (in cm). Polygons (*i.e.*, coherent or homogeneous post-strata) numbered as in **Figure 22**.

ECOCADIZ-RECLUTAS 2019-10 . <i>Trachurus trachurus</i> . ABUNDANCE (in numbers and million fish)															
Size class	POL01	POL02	POL03	POL04	POL05	POL06	POL07	POL08	n			Millions			
									PORTUGAL	SPAIN	TOTAL	PORTUGAL	SPAIN	TOTAL	
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.5	0	0	0	56106	15796	0	19547	0	56106	35343	91449	0.1	0.04	0.1	
4	0	0	0	392743	110573	0	136832	0	392743	247405	640148	0.4	0.2	1	
4.5	0	0	0	224425	63184	0	78190	0	224425	141374	365799	0.2	0.1	0.4	
5	0	0	0	1066018	300126	0	371402	0	1066018	671528	1737546	1	1	2	
5.5	0	0	0	1693087	476671	80142	589874	0	1693087	1146687	2839774	2	1	3	
6	0	0	0	3138647	883653	160284	1093510	0	3138647	2137447	5276094	3	2	5	
6.5	0	0	0	4000042	1126170	160284	1393622	0	4000042	2680076	6680118	4	3	7	
7	0	0	0	3640302	1024889	213712	1268288	0	3640302	2506889	6147191	4	3	6	
7.5	0	0	0	1366351	384682	400710	476039	0	1366351	1261431	2627782	1	1	3	
8	0	0	0	425747	119865	133570	148331	0	425747	401766	827513	0.4	0.4	1	
8.5	0	0	0	369641	104069	186998	128784	0	369641	419851	789492	0.4	0.4	1	
9	0	0	0	0	0	53428	0	0	0	53428	53428	0	0.1	0.1	
9.5	0	0	0	112212	31592	26714	39095	0	112212	97401	209613	0.1	0.1	0.2	
10	0	0	0	56106	15796	0	19547	0	56106	35343	91449	0.1	0.04	0.1	
10.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
11.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
12.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
13	0	0	0	56106	15796	0	19547	0	56106	35343	91449	0.1	0.04	0.1	
13.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
14	0	0	0	56106	15796	0	19547	0	56106	35343	91449	0.1	0.04	0.1	
14.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
15.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
16	0	55722	0	0	0	0	0	5604	55722	5604	61326	0.1	0.01	0.1	
16.5	0	97513	0	0	0	0	0	9807	97513	9807	107320	0.1	0.01	0.1	
17	0	83583	0	112212	31592	0	39095	8406	195795	79093	274888	0.2	0.1	0.3	
17.5	0	125374	0	257428	72476	0	89689	12609	382802	174774	557576	0.4	0.2	1	
18	0	153235	0	369641	104069	0	128784	15410	522876	248263	771139	1	0.2	1	
18.5	0	208956	0	0	0	0	0	21014	208956	21014	229970	0.2	0.02	0.2	
19	0	139304	0	0	0	0	0	14010	139304	14010	153314	0.1	0.01	0.2	
19.5	0	55722	0	56106	15796	0	19547	5604	111828	40947	152775	0.1	0.04	0.2	
20	5846	69652	7065	56106	15796	0	19547	7005	138669	42348	181017	0.1	0.04	0.2	
20.5	0	27861	0	0	0	0	0	2802	27861	2802	30663	0.03	0.003	0.03	
21	5846	27861	7065	0	0	0	0	2802	40772	2802	43574	0.04	0.003	0.04	
21.5	5846	41791	7065	0	0	0	0	4203	54702	4203	58905	0.1	0.004	0.1	
22	5846	13930	7065	0	0	0	0	1401	26841	1401	28242	0.03	0.001	0.03	
22.5	5846	27861	7065	0	0	0	0	2802	40772	2802	43574	0.04	0.003	0.04	
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
23.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
24	11692	13930	14131	0	0	0	0	1401	39753	1401	41154	0.04	0.001	0.04	
24.5	23384	0	28261	0	0	0	0	0	51645	0	51645	0.1	0	0.1	
25	40922	0	49458	0	0	0	0	0	90380	0	90380	0.1	0	0.1	
25.5	75999	13930	91850	0	0	0	0	1401	181779	1401	183180	0.2	0.001	0.2	
26	75999	0	91850	0	0	0	0	0	167849	0	167849	0.2	0	0.2	
26.5	29230	13930	35327	0	0	0	0	1401	78487	1401	79888	0.1	0.001	0.1	
27	35076	0	42392	0	0	0	0	0	77468	0	77468	0.1	0	0.1	
27.5	5846	0	7065	0	0	0	0	0	12911	0	12911	0.01	0	0.01	
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
28.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
29.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
TOTAL n	327378	1170155	395659	17505132	4928387	1415842	6098817	117682	19398324	12560728	31959052	19	13	32	
Millions	0.3	1	0.4	18	5	1	6	0.1							

Table 14. *ECOCADIZ-RECLUTAS 2019-10* survey. Horse mackerel (*Trachurus trachurus*). Cont'd.

<i>ECOCADIZ-RECLUTAS 2019-10 . Trachurus trachurus . BIOMASS (t)</i>											
Size class	POL01	POL02	POL03	POL04	POL05	POL06	POL07	POL08	n		
									PORTUGAL	SPAIN	TOTAL
2	0	0	0	0	0	0	0	0	0	0	0
2.5	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
3.5	0	0	0	0.027	0.008	0	0.009	0	0.027	0.017	0.044
4	0	0	0	0.272	0.077	0	0.095	0	0.272	0.172	0.444
4.5	0	0	0	0.216	0.061	0	0.075	0	0.216	0.136	0.352
5	0	0	0	1.380	0.389	0	0.481	0	1.380	0.870	2.250
5.5	0	0	0	2.869	0.808	0.136	1.000	0	2.869	1.943	4.812
6	0	0	0	6.805	1.916	0.348	2.371	0	6.805	4.635	11.440
6.5	0	0	0	10.889	3.066	0.436	3.794	0	10.889	7.296	18.185
7	0	0	0	12.241	3.446	0.719	4.265	0	12.241	8.430	20.671
7.5	0	0	0	5.596	1.575	1.641	1.950	0	5.596	5.166	10.762
8	0	0	0	2.098	0.591	0.658	0.731	0	2.098	1.980	4.077
8.5	0	0	0	2.167	0.610	1.096	0.755	0	2.167	2.462	4.629
9	0	0	0	0	0	0.369	0	0	0	0.369	0.369
9.5	0	0	0	0.906	0.255	0.216	0.316	0	0.906	0.786	1.692
10	0	0	0	0.525	0.148	0	0.183	0	0.525	0.331	0.856
10.5	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0
11.5	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0
12.5	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	1.122	0.316	0	0.391	0	1.122	0.707	1.829
13.5	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	1.391	0.392	0	0.485	0	1.391	0.876	2.267
14.5	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0
15.5	0	0	0	0	0	0	0	0	0	0	0
16	0	2.037	0	0	0	0	0	0.205	2.037	0.205	2.242
16.5	0	3.899	0	0	0	0	0	0.392	3.899	0.392	4.291
17	0	3.646	0	4.895	1.378	0	1.705	0.367	8.540	3.450	11.990
17.5	0	5.951	0	12.218	3.440	0	4.257	0.598	18.169	8.295	26.465
18	0	7.896	0	19.046	5.362	0	6.636	0.794	26.942	12.792	39.734
18.5	0	11.662	0	0	0	0	0	1.173	11.662	1.173	12.835
19	0	8.404	0	0	0	0	0	0.845	8.404	0.845	9.249
19.5	0	3.626	0	3.651	1.028	0	1.272	0.365	7.278	2.665	9.943
20	0.410	4.881	0.495	3.932	1.107	0	1.370	0.491	9.717	2.967	12.684
20.5	0	2.098	0	0	0	0	0	0.211	2.098	0.211	2.309
21	0.472	2.251	0.571	0	0	0	0	0.226	3.295	0.226	3.521
21.5	0.506	3.617	0.612	0	0	0	0	0.364	4.735	0.364	5.099
22	0.541	1.290	0.654	0	0	0	0	0.130	2.485	0.130	2.614
22.5	0.578	2.754	0.698	0	0	0	0	0.277	4.031	0.277	4.308
23	0	0	0	0	0	0	0	0	0	0	0
23.5	0	0	0	0	0	0	0	0	0	0	0
24	1.396	1.663	1.687	0	0	0	0	0.167	4.747	0.167	4.914
24.5	2.966	0	3.584	0	0	0	0	0	6.550	0	6.550
25	5.506	0	6.655	0	0	0	0	0	12.161	0	12.161
25.5	10.836	1.986	13.096	0	0	0	0	0.200	25.919	0.200	26.119
26	11.470	0	13.863	0	0	0	0	0	25.333	0	25.333
26.5	4.665	2.223	5.638	0	0	0	0	0.224	12.525	0.224	12.749
27	5.913	0	7.146	0	0	0	0	0	13.059	0	13.059
27.5	1.040	0	1.257	0	0	0	0	0	2.297	0	2.297
28	0	0	0	0	0	0	0	0	0	0	0
28.5	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0
29.5	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0
TOTAL	46.299	69.885	55.956	92.247	25.971	5.619	32.139	7.028	264.388	70.758	335.145

Table 15. *ECOCADIZ-RECLUTAS 2019-10* survey. Mediterranean horse mackerel (*Trachurus mediterraneus*). Estimated abundance (absolute numbers and million fish) and biomass (t) by size class (in cm). Polygons (*i.e.*, coherent or homogeneous post-strata) numbered as in **Figure 25**.

<i>ECOCADIZ-RECLUTAS 2019-10 . Trachurus mediterraneus . ABUNDANCE (in numbers and million fish)</i>											
Size class	POL01	POL02	POL03	POL04	POL05	<i>n</i>			Millions		
						PORTUGAL	SPAIN	TOTAL	PORTUGAL	SPAIN	TOTAL
25	0	0	0	0	0	0	0	0	0	0	0
25.5	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0
26.5	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0
27.5	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0
28.5	0	0	0	0	0	0	0	0	0	0	0
29	75	0	0	372353	0	75	372353	372428	0.0001	0.4	0.4
29.5	149	0	0	744707	0	149	744707	744856	0.0001	1	1
30	149	0	0	744707	0	149	744707	744856	0.0001	1	1
30.5	411	0	0	2047944	0	411	2047944	2048355	0.0004	2	2
31	1046	0	0	5212948	0	1046	5212948	5213994	0.001	5	5
31.5	561	0	0	2792651	0	561	2792651	2793212	0.001	3	3
32	523	0	0	2606474	0	523	2606474	2606997	0.001	3	3
32.5	336	0	0	1675590	0	336	1675590	1675926	0.0003	2	2
33	299	0	0	1489414	0	299	1489414	1489713	0.0003	1	1
33.5	262	0	0	1303237	0	262	1303237	1303499	0.0003	1	1
34	374	9401	6694	1861767	358616	9775	2227077	2236852	0.01	2	2
34.5	224	9401	6694	1117060	358616	9625	1482370	1491995	0.01	1	1
35	336	28202	20082	1675590	1075848	28538	2771520	2800058	0.03	3	3
35.5	112	18801	13388	558530	717232	18913	1289150	1308063	0.02	1	1
36	149	47003	33471	744707	1793080	47152	2571258	2618410	0.05	3	3
36.5	112	65804	46859	558530	2510312	65916	3115701	3181617	0.1	3	3
37	112	103406	73636	558530	3944775	103518	4576941	4680459	0.1	5	5
37.5	262	84605	60247	1303237	3227543	84867	4591027	4675894	0.1	5	5
38	149	84605	60247	744707	3227543	84754	4032497	4117251	0.1	4	4
38.5	112	75204	53553	558530	2868927	75316	3481010	3556326	0.1	3	4
39	75	37602	26777	372353	1434464	37677	1833594	1871271	0.04	2	2
39.5	0	28202	20082	0	1075848	28202	1095930	1124132	0.03	1	1
40	112	9401	6694	558530	358616	9513	923840	933353	0.01	1	1
40.5	37	0	0	186177	0	37	186177	186214	0.00004	0.2	0.2
41	37	0	0	186177	0	37	186177	186214	0.00004	0.2	0.2
41.5	0	9401	6694	0	358616	9401	365310	374711	0.01	0.4	0.4
42	75	9401	6694	372353	358616	9476	737663	747139	0.01	1	1
42.5	0	0	0	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0	0	0	0
43.5	0	0	0	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0	0	0	0
44.5	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0
TOTAL <i>n</i>	6089	620439	441812	30346803	23668652	626528	54457267	55083795	1	54	55
Millions	0.01	1	0.4	30	24						

Table 15. ECOCADIZ-RECLUTAS 2019-10 survey. Mediterranean horse mackerel (*Trachurus mediterraneus*). Cont'd.

ECOCADIZ-RECLUTAS 2019-10 . <i>Trachurus mediterraneus</i> . BIOMASS (t)								
Size class	POL01	POL02	POL03	POL04	POL05	PORTUGAL	SPAIN	TOTAL
25	0	0	0	0	0	0	0	0
25.5	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0
26.5	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0
27.5	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0
28.5	0	0	0	0	0	0	0	0
29	0.015	0	0	73.280	0	0.015	73.280	73.295
29.5	0.031	0	0	153.927	0	0.031	153.927	153.958
30	0.032	0	0	161.531	0	0.032	161.531	161.563
30.5	0.093	0	0	465.785	0	0.093	465.785	465.878
31	0.249	0	0	1242.270	0	0.249	1242.270	1242.519
31.5	0.140	0	0	696.776	0	0.140	696.776	696.915
32	0.137	0	0	680.396	0	0.137	680.396	680.532
32.5	0.092	0	0	457.305	0	0.092	457.305	457.397
33	0.085	0	0	424.708	0	0.085	424.708	424.793
33.5	0.078	0	0	388.018	0	0.078	388.018	388.096
34	0.116	2.921	2.080	578.403	111.413	3.037	691.895	694.932
34.5	0.073	3.046	2.169	361.902	116.183	3.118	480.254	483.372
35	0.113	9.522	6.781	565.759	363.257	9.636	935.797	945.433
35.5	0.039	6.612	4.708	196.429	252.243	6.652	453.381	460.033
36	0.055	17.208	12.254	272.644	656.463	17.263	941.361	958.624
36.5	0.043	25.065	17.849	212.749	956.202	25.108	1186.801	1211.909
37	0.044	40.959	29.167	221.232	1562.511	41.003	1812.910	1853.913
37.5	0.108	34.830	24.802	536.509	1328.696	34.938	1890.006	1924.944
38	0.064	36.181	25.764	318.472	1380.249	36.245	1724.486	1760.730
38.5	0.050	33.392	23.779	247.999	1273.862	33.442	1545.639	1579.081
39	0.035	17.327	12.339	171.580	660.999	17.362	844.917	862.279
39.5	0.000	13.480	9.599	0.000	514.240	13.480	523.839	537.320
40	0.056	4.659	3.317	276.801	177.726	4.715	457.844	462.559
40.5	0.019	0	0	95.622	0	0.019	95.622	95.641
41	0.020	0	0	99.056	0	0.020	99.056	99.076
41.5	0	5.179	3.688	0	197.571	5.179	201.258	206.438
42	0.043	5.361	3.817	212.327	204.494	5.403	420.638	426.041
42.5	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0
43.5	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0
44.5	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0
TOTAL	1.828	255.742	182.113	9111.478	9756.110	257.570	19049.700	19307.271

Table 16. *ECOCADIZ-RECLUTAS 2019-10* survey. Blue jack mackerel (*Trachurus picturatus*). Estimated abundance (absolute numbers and million fish) and biomass (t) by size class (in cm). Polygons (*i.e.*, coherent or homogeneous post-strata) numbered as in **Figure 28**.

<i>ECOCADIZ-RECLUTAS 2019-10 . Trachurus picturatus . ABUNDANCE (in numbers and million fish)</i>														
Size class	POL01	POL02	POL03	POL04	POL05	POL06	POL07	<i>n</i>			Millions			
								PORTUGAL	SPAIN	TOTAL	PORTUGAL	SPAIN	TOTAL	
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14.5	91653	0	25	0	0	0	2678	91678	2678	94356	0.1	0.003	0.1	
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15.5	0	80893	0	23	0	21376	0	102292	0	102292	0.1	0	0.1	
16	0	444910	0	125	0	117567	0	562602	0	562602	1	0	1	
16.5	91653	498839	25	141	0	131817	2678	722475	2678	725153	1	0.003	1	
17	0	498839	0	141	0	131817	0	630797	0	630797	1	0	1	
17.5	91653	283125	25	80	45916	74815	2678	495614	2678	498292	0.5	0.003	0.5	
18	91653	242678	25	68	45916	64127	2678	444467	2678	447145	0.4	0.003	0.4	
18.5	0	134821	0	38	290798	35626	0	461283	0	461283	0.5	0	0.5	
19	91653	13482	25	4	336714	3563	2678	445441	2678	448119	0.4	0.003	0.4	
19.5	91653	0	25	0	76526	0	2678	168204	2678	170882	0.2	0.003	0.2	
20	556969	0	149	0	168357	0	16273	725475	16273	741748	1	0.02	1	
20.5	930631	0	249	0	45916	0	27190	976796	27190	1003986	1	0.03	1	
21	930631	0	249	0	0	0	27190	930880	27190	958070	1	0.03	1	
21.5	1674431	0	448	0	0	0	48922	1674879	48922	1723801	2	0.05	2	
22	2700240	0	723	0	0	0	78893	2700963	78893	2779856	3	0.1	3	
22.5	1861262	0	498	0	0	0	54380	1861760	54380	1916140	2	0.1	2	
23	1861262	0	498	0	0	0	54380	1861760	54380	1916140	2	0.1	2	
23.5	1304293	0	349	0	0	0	38107	1304642	38107	1342749	1	0.04	1	
24	556969	0	149	0	0	0	16273	557118	16273	573391	1	0.02	1	
24.5	91653	0	25	0	0	0	2678	91678	2678	94356	0.1	0.003	0.1	
25	91653	0	25	0	0	0	2678	91678	2678	94356	0.1	0.003	0.1	
25.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL n	13109912	2197587	3512	620	1010143	580708	383032	16902482	383032	17285514				
Millions	13	2	0.004	0.001	1	1	0.4				17	0.4	17	

Table 16. ECOCADIZ-RECLUTAS 2019-10 survey. Blue jack mackerel (*Trachurus picturatus*). Cont'd.

ECOCADIZ-RECLUTAS 2019-10 . <i>Trachurus picturatus</i> . BIOMASS (t)										
Size class	POL01	POL02	POL03	POL04	POL05	POL06	POL07	PORTUGAL	SPAIN	TOTAL
12	0	0	0	0	0	0	0	0	0	0
12.5	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0
13.5	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0
14.5	2.217	0	0.001	0	0	0	0.065	2.218	0.065	2.283
15	0	0	0	0	0	0	0	0	0	0
15.5	0	2.422	0	0.001	0	0.640	0	3.062	0	3.062
16	0	14.741	0	0.004	0	3.895	0	18.640	0	18.640
16.5	3.351	18.237	0.001	0.005	0	4.819	0.098	26.412	0.098	26.510
17	0	20.064	0	0.006	0	5.302	0	25.372	0	25.372
17.5	4.045	12.495	0.001	0.004	2.026	3.302	0.118	21.872	0.118	21.990
18	4.427	11.721	0.001	0.003	2.218	3.097	0.129	21.466	0.129	21.596
18.5	0	7.109	0	0.002	15.333	1.878	0	24.322	0	24.322
19	5.264	0.774	0.001	0	19.337	0.205	0.154	25.581	0.154	25.735
19.5	5.721	0	0.002	0	4.776	0	0.167	10.499	0.167	10.666
20	37.703	0	0.010	0	11.397	0	1.102	49.110	1.102	50.211
20.5	68.189	0	0.018	0	3.364	0	1.992	71.572	1.992	73.564
21	73.670	0	0.020	0	0	0	2.152	73.689	2.152	75.842
21.5	142.946	0	0.038	0	0	0	4.176	142.984	4.176	147.160
22	248.172	0	0.066	0	0	0	7.251	248.239	7.251	255.490
22.5	183.863	0	0.049	0	0	0	5.372	183.912	5.372	189.284
23	197.309	0	0.053	0	0	0	5.765	197.362	5.765	203.127
23.5	148.155	0	0.040	0	0	0	4.329	148.195	4.329	152.524
24	67.694	0	0.018	0	0	0	1.978	67.712	1.978	69.690
24.5	11.903	0	0.003	0	0	0	0.348	11.906	0.348	12.254
25	12.701	0	0.003	0	0	0	0.371	12.705	0.371	13.076
25.5	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0
26.5	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0
27.5	0	0	0	0	0	0	0	0	0	0
TOTAL	1217.329	87.561	0.326	0.025	58.451	23.138	35.567	1386.830	35.567	1422.396

Table 17. ECOCADIZ-RECLUTAS 2019-10 survey. Bogue (*Boops boops*). Estimated abundance (absolute numbers and million fish) and biomass (t) by size class (in cm). Polygons (*i.e.*, coherent or homogeneous post-strata) numbered as in **Figure 31**.

ECOCADIZ-RECLUTAS 2019-10 . <i>Boops boops</i> . ABUNDANCE (in numbers and million fish)										
Size class	POL01	POL02	POL03	POL04	<i>n</i>			Millions		
					PORTUGAL	SPAIN	TOTAL	PORTUGAL	SPAIN	TOTAL
17	0	0	0	0	0	0	0	0	0	0
17.5	69	4056	0	0	4125	0	4125	0.004	0	0.004
18	0	0	0	0	0	0	0	0	0	0
18.5	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0
19.5	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0
20.5	69	4056	0	0	4125	0	4125	0.004	0	0.004
21	69	4056	7716	42400	11841	42400	54241	0.01	0.04	0.1
21.5	1424	83158	0	0	84582	0	84582	0.1	0	0.1
22	486	28395	7716	42400	36597	42400	78997	0.04	0.04	0.1
22.5	278	16226	7716	42400	24220	42400	66620	0.02	0.04	0.1
23	208	12169	0	0	12377	0	12377	0.01	0	0.01
23.5	208	12169	0	0	12377	0	12377	0.01	0	0.01
24	2153	125751	4629	25440	132533	25440	157973	0.1	0.03	0.2
24.5	1007	58819	4629	25440	64455	25440	89895	0.1	0.03	0.1
25	69	4056	4629	25440	8754	25440	34194	0.01	0.03	0.03
25.5	0	0	4629	25440	4629	25440	30069	0.005	0.03	0.03
26	0	0	0	0	0	0	0	0	0	0
26.5	0	0	9259	50880	9259	50880	60139	0.01	0.1	0.1
27	0	0	0	0	0	0	0	0	0	0
27.5	0	0	0	0	0	0	0	0	0	0
28	0	0	9259	50880	9259	50880	60139	0.01	0.1	0.1
28.5	0	0	4629	25440	4629	25440	30069	0.005	0.03	0.03
29	0	0	4629	25440	4629	25440	30069	0.005	0.03	0.03
29.5	0	0			0	0	0	0	0	0
30	0	0			0	0	0	0	0	0
30.5	0	0			0	0	0	0	0	0
TOTAL <i>n</i>	6040	352911	69440	381600	428391	381600	809991	0.4	0.4	1
Millions	0.01	0.4	0.1	0.4						

Table 17. ECOCADIZ-RECLUTAS 2019-10 survey. Bogue (*Boops boops*). Cont'd.

ECOCADIZ-RECLUTAS 2019-10 . <i>Boops boops</i> . BIOMASS (t)							
Size class	POL01	POL02	POL03	POL04	PORTUGAL	SPAIN	TOTAL
17	0	0	0	0	0	0	0
17.5	0.003	0.199	0	0	0.203	0	0.203
18	0	0	0	0	0	0	0
18.5	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0
19.5	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0
20.5	0.006	0.333	0	0	0.338	0	0.338
21	0.006	0.360	0.684	3.758	1.050	3.758	4.808
21.5	0.136	7.954	0	0	8.090	0	8.090
22	0.050	2.926	0.795	4.369	3.771	4.369	8.140
22.5	0.031	1.798	0.855	4.698	2.684	4.698	7.382
23	0.025	1.448	0	0	1.473	0	1.473
23.5	0.027	1.552	0	0	1.579	0	1.579
24	0.294	17.173	0.632	3.474	18.100	3.474	21.574
24.5	0.147	8.588	0.676	3.714	9.410	3.714	13.125
25	0.011	0.632	0.722	3.966	1.365	3.966	5.330
25.5	0	0	0.769	4.228	0.769	4.228	4.998
26	0	0	0	0	0	0	0
26.5	0	0	1.743	9.580	1.743	9.580	11.323
27	0	0	0	0	0	0	0
27.5	0	0	0	0	0	0	0
28	0	0	2.084	11.453	2.084	11.453	13.537
28.5	0	0	1.104	6.065	1.104	6.065	7.168
29	0	0	1.168	6.417	1.168	6.417	7.585
29.5	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0
30.5	0	0	0	0	0	0	0
TOTAL	0.735	42.963	11.232	61.723	54.930	61.723	116.652

Table 18. ECOCADIZ-RECLUTAS 2019-10 survey. Atlantic pomfret (*Brama brama*). Estimated abundance (absolute numbers and million fish) and biomass (t) by size class (in cm). Polygons (*i.e.*, coherent or homogeneous post-strata) numbered as in **Figure 34**.

ECOCADIZ-RECLUTAS 2019-10 . <i>Brama brama</i> . ABUNDANCE (in numbers and million fish)							
Size class	POL01	n			Millions		
		PORTUGAL	SPAIN	TOTAL	PORTUGAL	SPAIN	TOTAL
32	0	0	0	0	0	0	0
32.5	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0
33.5	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0
34.5	0	0	0	0	0	0	0
35	0	0	0	0	0	0	0
35.5	0	0	0	0	0	0	0
36	38361	0	38361	38361	0	0.04	0.04
36.5	38361	0	38361	38361	0	0.04	0.04
37	38361	0	38361	38361	0	0.04	0.04
37.5	149183	0	149183	149183	0	0.1	0.1
38	38361	0	38361	38361	0	0.04	0.04
38.5	110821	0	110821	110821	0	0.1	0.1
39	225905	0	225905	225905	0	0.2	0.2
39.5	225905	0	225905	225905	0	0.2	0.2
40	524270	0	524270	524270	0	1	1
40.5	562632	0	562632	562632	0	1	1
41	673453	0	673453	673453	0	1	1
41.5	822636	0	822636	822636	0	1	1
42	750175	0	750175	750175	0	1	1
42.5	750175	0	750175	750175	0	1	1
43	485909	0	485909	485909	0	0.5	0.5
43.5	225905	0	225905	225905	0	0.2	0.2
44	187544	0	187544	187544	0	0.2	0.2
44.5	110821	0	110821	110821	0	0.1	0.1
45	149183	0	149183	149183	0	0.1	0.1
45.5	149183	0	149183	149183	0	0.1	0.1
46	0	0	0	0	0	0	0
46.5	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0
47.5	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0
48.5	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
49.5	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0
50.5	0	0	0	0	0	0	0
51	0	0	0	0	0	0	0
51.5	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0
52.5	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0
53.5	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0
54.5	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0
TOTAL n	6257144	0	6257144	6257144	0	6	6
Millions	6	0			0	6	6

Table 18. ECOCADIZ-RECLUTAS 2019-10 survey. Atlantic pomfret (*Brama brama*). Cont'd.

ECOCADIZ-RECLUTAS 2019-10 . <i>Brama brama</i> . BIOMASS (t)				
Size class	POL01	PORTUGAL	SPAIN	TOTAL
32	0	0	0	0
32.5	0	0	0	0
33	0	0	0	0
33.5	0	0	0	0
34	0	0	0	0
34.5	0	0	0	0
35	0	0	0	0
35.5	0	0	0	0
36	16.992	0	16.992	16.992
36.5	17.737	0	17.737	17.737
37	18.503	0	18.503	18.503
37.5	75.022	0	75.022	75.022
38	20.102	0	20.102	20.102
38.5	60.481	0	60.481	60.481
39	128.336	0	128.336	128.336
39.5	133.522	0	133.522	133.522
40	322.234	0	322.234	322.234
40.5	359.434	0	359.434	359.434
41	446.967	0	446.967	446.967
41.5	566.957	0	566.957	566.957
42	536.642	0	536.642	536.642
42.5	556.767	0	556.767	556.767
43	373.997	0	373.997	373.997
43.5	180.244	0	180.244	180.244
44	155.054	0	155.054	155.054
44.5	94.901	0	94.901	94.901
45	132.272	0	132.272	132.272
45.5	136.900	0	136.900	136.900
46	0	0	0	0
46.5	0	0	0	0
47	0	0	0	0
47.5	0	0	0	0
48	0	0	0	0
48.5	0	0	0	0
49	0	0	0	0
49.5	0	0	0	0
50	0	0	0	0
50.5	0	0	0	0
51	0	0	0	0
51.5	0	0	0	0
52	0	0	0	0
52.5	0	0	0	0
53	0	0	0	0
53.5	0	0	0	0
54	0	0	0	0
54.5	0	0	0	0
55	0	0	0	0
TOTAL	4333.065	0	4333.065	4333.065

Table 19. ECOCADIZ-RECLUTAS 2019-10 survey. Boarfish (*Capros aper*). Estimated abundance (absolute numbers and million fish) and biomass (t) by size class (in cm). Polygons (*i.e.*, coherent or homogeneous post-strata) numbered as in **Figure 37**.

ECOCADIZ-RECLUTAS 2019-10 . <i>Capros aper</i> . ABUNDANCE (in numbers and million fish)							
Size class	POL01	<i>n</i>			Millions		
		PORTUGAL	SPAIN	TOTAL	PORTUGAL	SPAIN	TOTAL
2	0	0	0	0	0	0	0
2.5	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0
3.5	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0
4.5	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0
5.5	0	0	0	0	0	0	0
6	71593	71593	0	71593	0.1	0	0.1
6.5	787518	787518	0	787518	1	0	1
7	2505738	2505738	0	2505738	3	0	3
7.5	3937588	3937588	0	3937588	4	0	4
8	1718220	1718220	0	1718220	2	0	2
8.5	143185	143185	0	143185	0.1	0	0.1
9	71593	71593	0	71593	0.1	0	0.1
9.5	71593	71593	0	71593	0.1	0	0.1
10	143185	143185	0	143185	0.1	0	0.1
10.5	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0
11.5	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0
12.5	0	0	0	0	0	0	0
13	71593	71593	0	71593	0.1	0	0.1
13.5	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0
14.5	0	0	0	0	0	0	0
TOTAL <i>n</i>	9521806	9521806	0	9521806	10	0	10
Millions	10	10	0	10	10	0	10

Table 19. *ECOCADIZ-RECLUTAS 2019-10* survey. Boarfish (*Capros aper*). Cont'd.

<i>ECOCADIZ-RECLUTAS 2019-10 . Capros aper . BIOMASS (t)</i>				
Size class	POL01	PORTUGAL	SPAIN	TOTAL
2	0	0	0	0
2.5	0	0	0	0
3	0	0	0	0
3.5	0	0	0	0
4	0	0	0	0
4.5	0	0	0	0
5	0	0	0	0
5.5	0	0	0	0
6	0.399	0.399	0	0.399
6.5	5.441	5.441	0	5.441
7	21.135	21.135	0	21.135
7.5	40.009	40.009	0	40.009
8	20.788	20.788	0	20.788
8.5	2.042	2.042	0	2.042
9	1.192	1.192	0	1.192
9.5	1.381	1.381	0	1.381
10	3.175	3.175	0	3.175
10.5	0	0	0	0
11	0	0	0	0
11.5	0	0	0	0
12	0	0	0	0
12.5	0	0	0	0
13	3.251	3.251	0	3.251
13.5	0	0	0	0
14	0	0	0	0
14.5	0	0	0	0
TOTAL	98.813	98.813	0	98.813

Table 20. ECOCADIZ-RECLUTAS 2019-10 survey. Longspine snipefish (*Macroramphosus scolopax*). Estimated abundance (absolute numbers and million fish) and biomass (t) by size class (in cm). Polygons (*i.e.*, coherent or homogeneous post-strata) numbered as in **Figure 40**.

ECOCADIZ-RECLUTAS 2019-10 . <i>Macroramphosus scolopax</i> . ABUNDANCE (in numbers and million fish)							
Size class	POL01	<i>n</i>			Millions		
		PORTUGAL	SPAIN	TOTAL	PORTUGAL	SPAIN	TOTAL
8	0	0	0	0	0	0	0
8.5	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0
9.5	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0
10.5	465063	465063	0	465063	0.5	0	0.5
11	232531	232531	0	232531	0.2	0	0.2
11.5	1162657	1162657	0	1162657	1	0	1
12	2325314	2325314	0	2325314	2	0	2
12.5	1743985	1743985	0	1743985	2	0	2
13	2441579	2441579	0	2441579	2	0	2
13.5	1162657	1162657	0	1162657	1	0	1
14	232531	232531	0	232531	0.2	0	0.2
14.5	116266	116266	0	116266	0.1	0	0.1
15	0	0	0	0	0	0	0
15.5	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0
TOTAL <i>n</i>	9882583	9882583	0	9882583	10	0	10
Millions	10						

ECOCADIZ-RECLUTAS 2019-10 . <i>Macroramphosus scolopax</i> . BIOMASS (t)				
Size class	POL01	PORTUGAL	SPAIN	TOTAL
8	0	0	0	0
8.5	0	0	0	0
9	0	0	0	0
9.5	0	0	0	0
10	0	0	0	0
10.5	3.682	3.682	0	3.682
11	2.083	2.083	0	2.083
11.5	11.722	11.722	0	11.722
12	26.256	26.256	0	26.256
12.5	21.954	21.954	0	21.954
13	34.124	34.124	0	34.124
13.5	17.971	17.971	0	17.971
14	3.961	3.961	0	3.961
14.5	2.175	2.175	0	2.175
15	0	0	0	0
15.5	0	0	0	0
16	0	0	0	0
TOTAL	123.927	123.927	0.000	123.927

Table 21. ECOCADIZ-RECLUTAS 2019-10 survey. Pearlside (*Maurolicus muelleri*). Estimated abundance (absolute numbers and million fish) and biomass (t) by size class (in cm). Polygons (*i.e.*, coherent or homogeneous post-strata) numbered as in **Figure 43**.

ECOCADIZ-RECLUTAS 2019-10 . <i>Maurolicus muelleri</i> . ABUNDANCE (in numbers and million fish)										
Size class	POL01	POL02	POL03	POL04	n			Millions		
					PORTUGAL	SPAIN	TOTAL	PORTUGAL	SPAIN	TOTAL
0	0	0	0	0	0	0	0	0	0	0
0.5	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0
1.5	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0
2.5	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0
3.5	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0
4.5	0	0	0	0	0	0	0	0	0	0
5	78696032	18745874	384800210	31001127	97441906	415801337	513243243	97	416	513
5.5	157392063	37491747	769600421	62002253	194883810	831602674	1026486484	195	832	1026
6	19674008	4686468	96200053	7750282	24360476	103950335	128310811	24	104	128
6.5	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0
TOTAL n	255762103	60924089	1250600684	100753662	316686192	1351354346	1668040538	317	1351	1668
Millions	256	61	1251	101						

ECOCADIZ-RECLUTAS 2019-10 . <i>Maurolicus muelleri</i> . BIOMASS (t)							
Size class	POL01	POL02	POL03	POL04	PORTUGAL	SPAIN	TOTAL
0	0	0	0	0	0	0	0
0.5	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0
1.5	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0
2.5	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0
3.5	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0
4.5	0	0	0	0	0	0	0
5	73.296	17.460	358.396	28.874	90.756	387.270	478.025
5.5	193.084	45.994	944.124	76.063	239.078	1020.187	1259.265
6	31.068	7.401	151.913	12.239	38.468	164.151	202.620
6.5	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0
TOTAL	297.448	70.854	1454.432	117.175	368.302	1454.432	1822.734

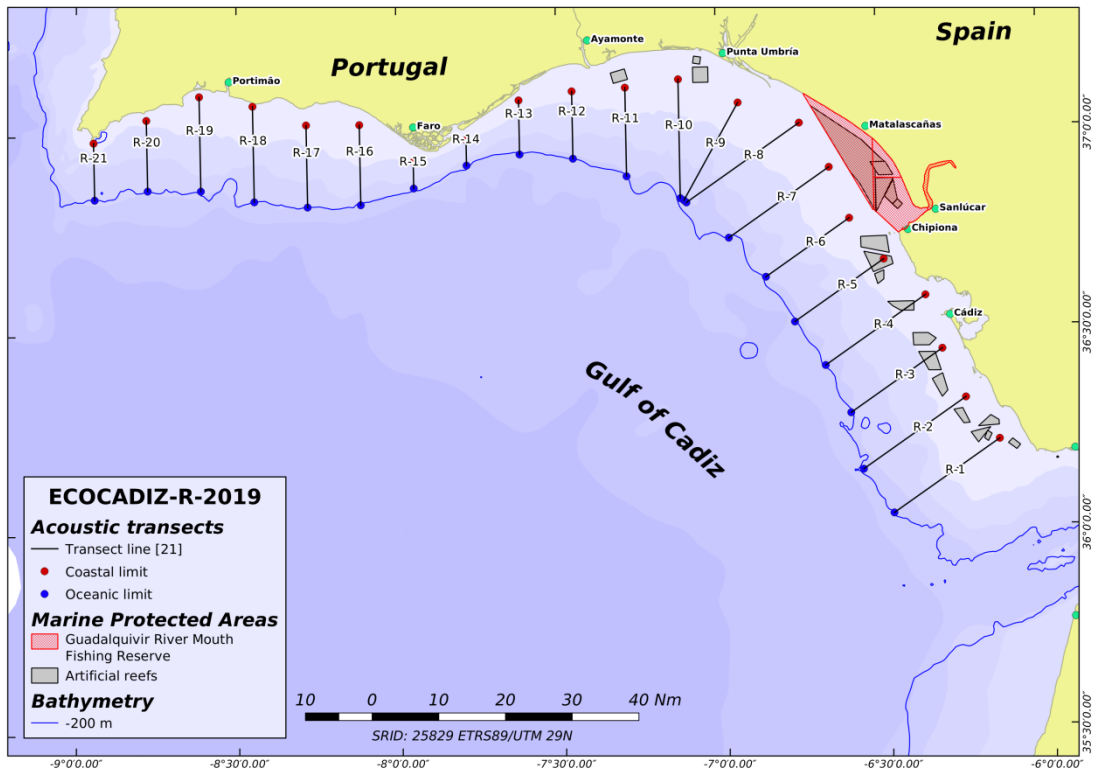


Figure 1. ECOCADIZ-RECLUTAS 2019-10 survey. Location of the acoustic transects sampled during the survey. The different protected areas inside the Guadalquivir river mouth Fishing Reserve and artificial reef polygons are also shown.

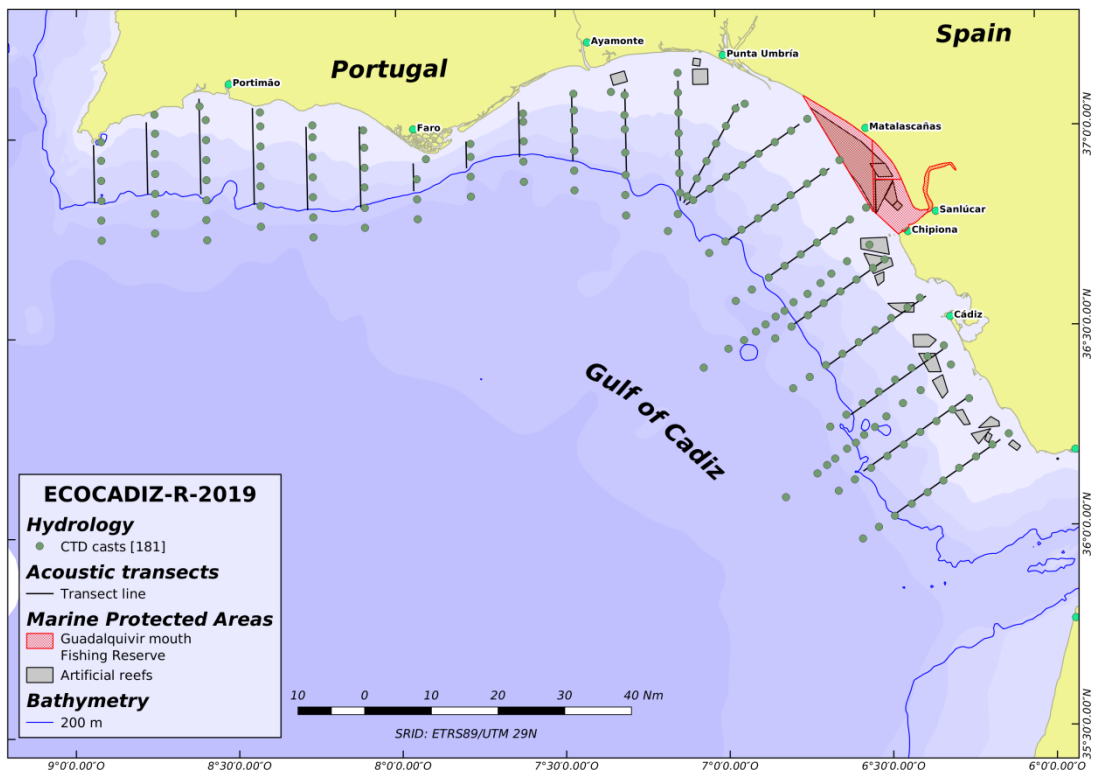


Figure 2. ECOCADIZ-RECLUTAS 2019-10 survey. Location of CTD stations.

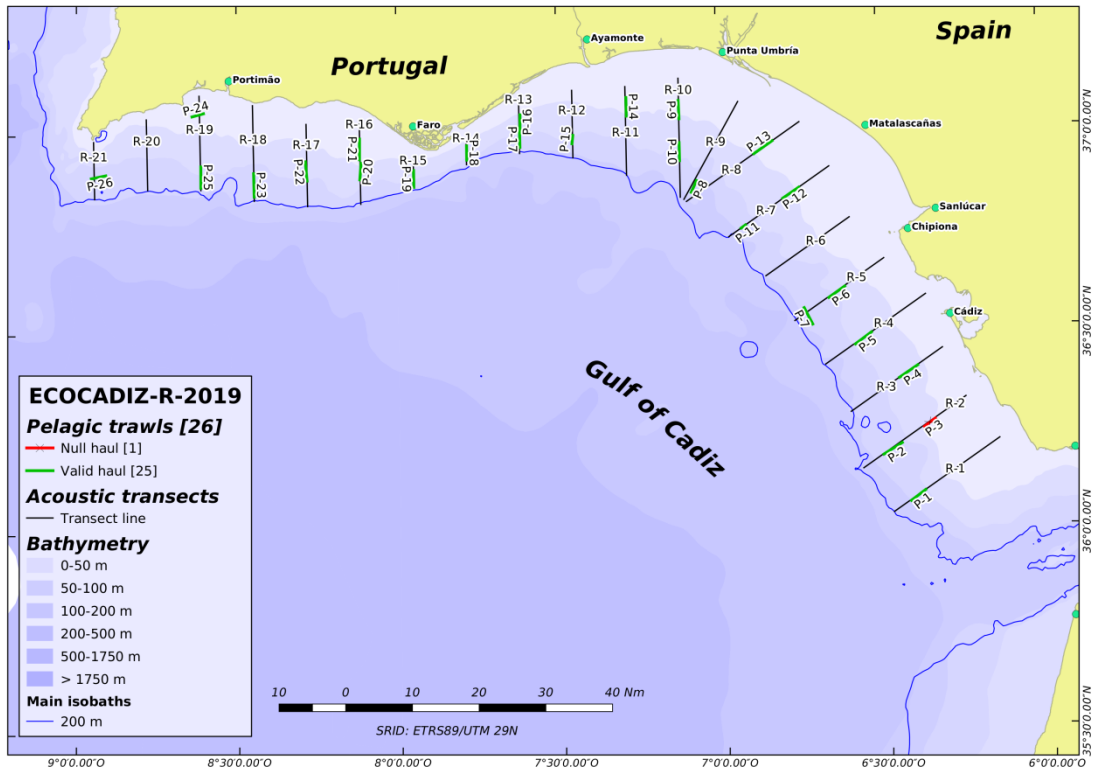


Figure 3. EOCADIZ-RECLUTAS 2019-10 survey. Location of ground-truthing fishing hauls.

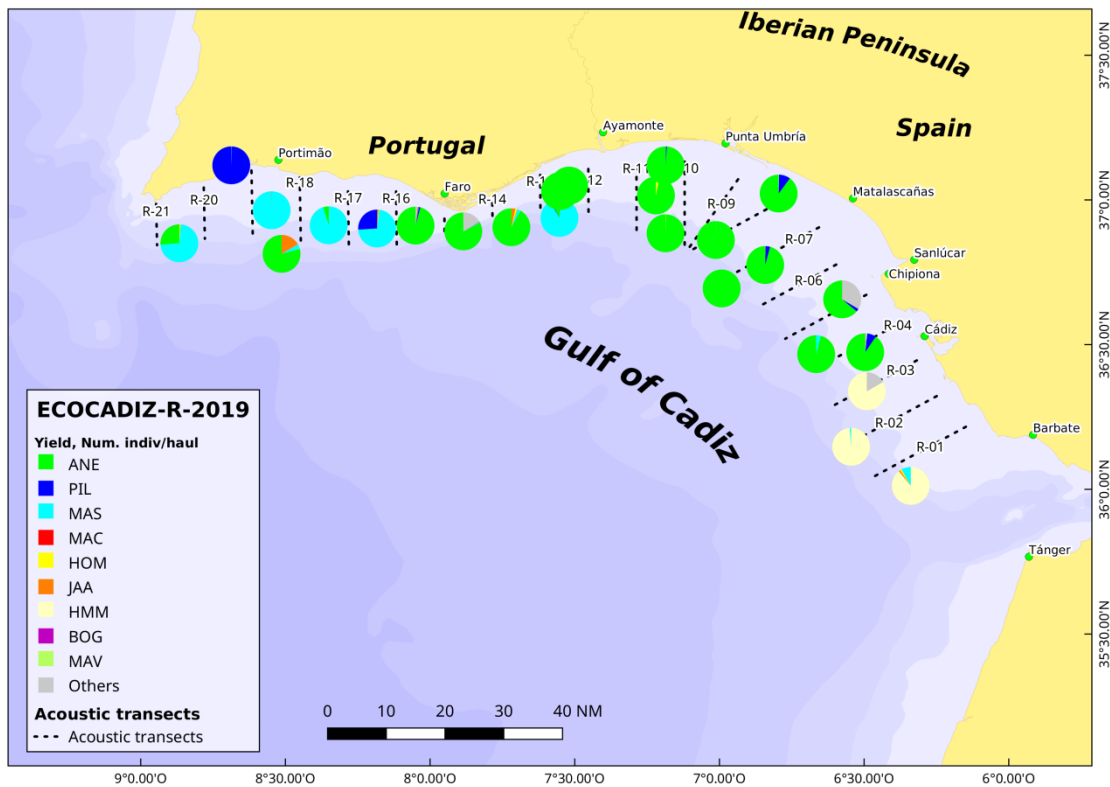


Figure 4. EOCADIZ-RECLUTAS 2019-10 survey. Species composition (percentages in number) in valid fishing hauls.

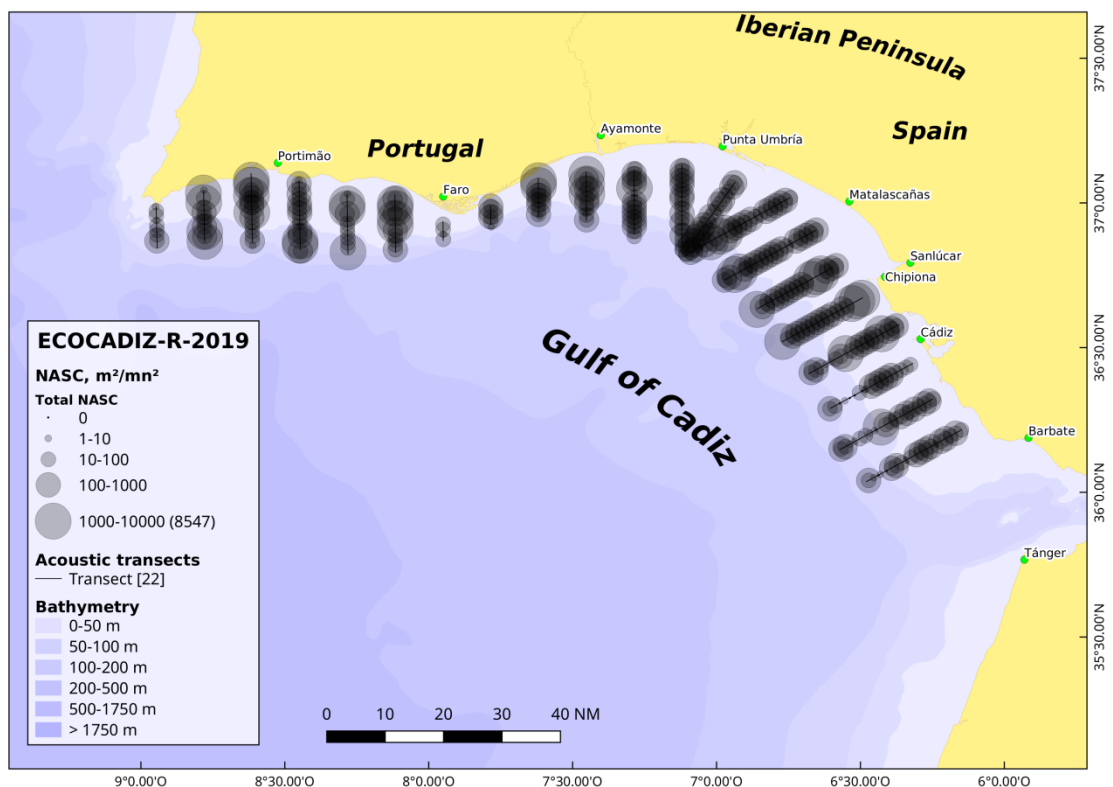


Figure 5. ECOCADIZ-RECLUTAS 2019-10 survey. Distribution of the total backscattering energy (Nautical area scattering coefficient, $NASC$, in $m^2 nmi^{-2}$) attributed to the pelagic fish species assemblage.

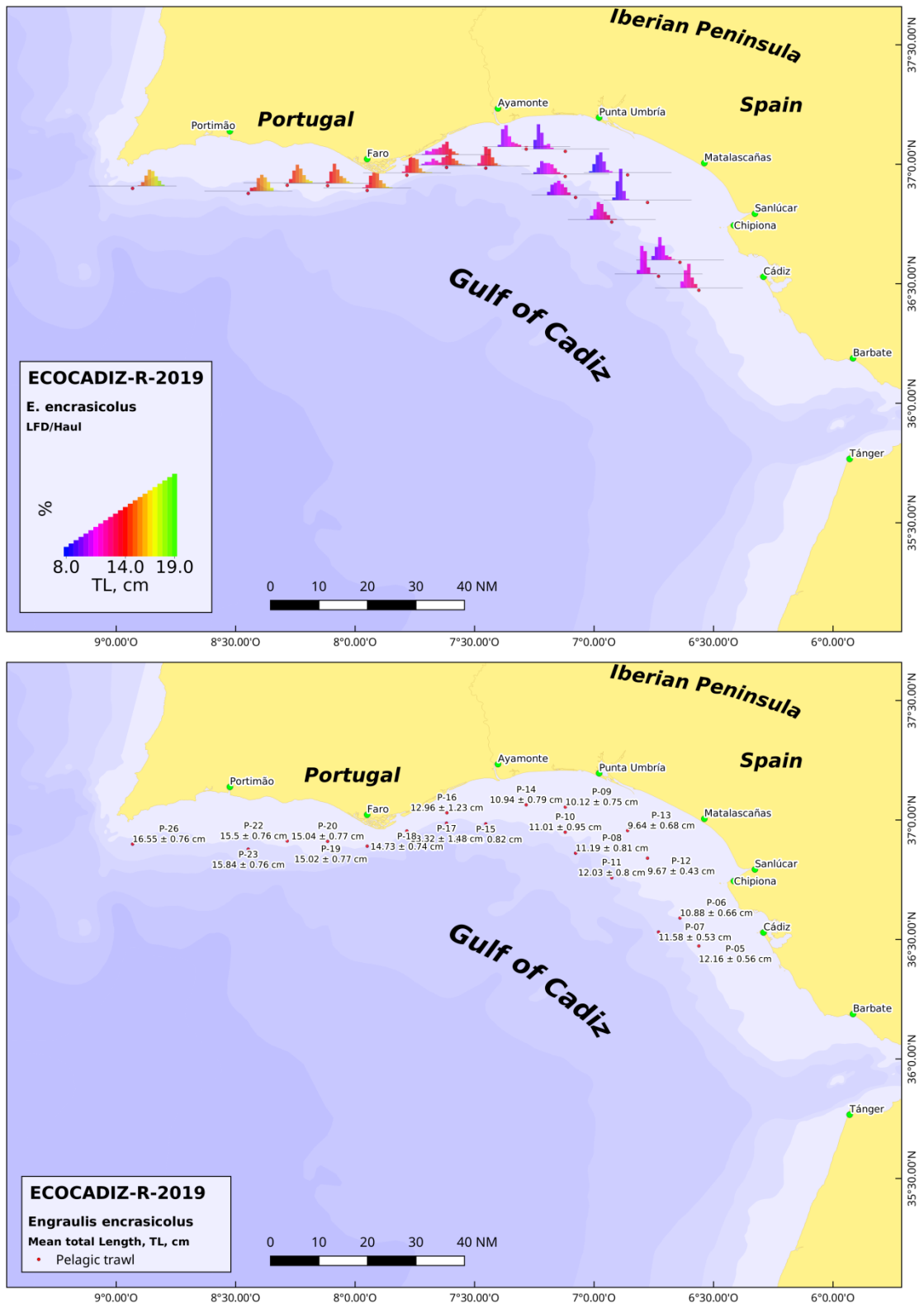


Figure 6. ECOCADIZ-RECLUTAS 2019-10 survey. Anchovy (*Engraulis encrasicolus*). Top: length frequency distributions in fishing hauls. Bottom: mean \pm sd length by haul.

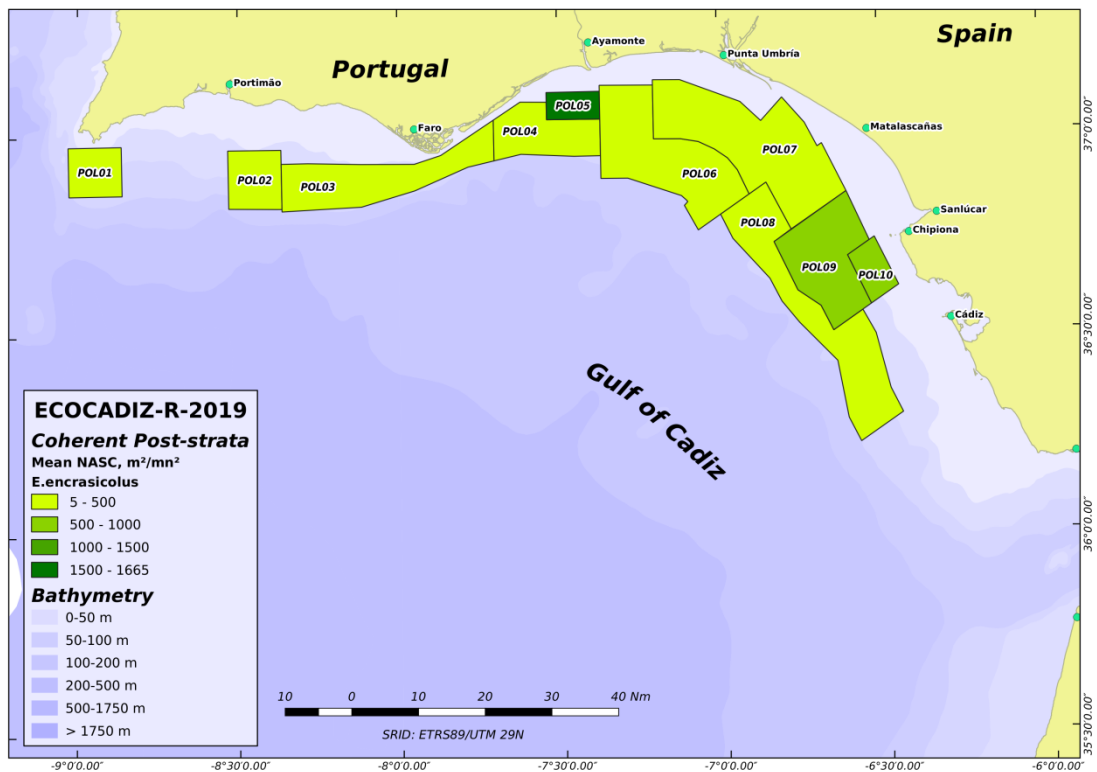
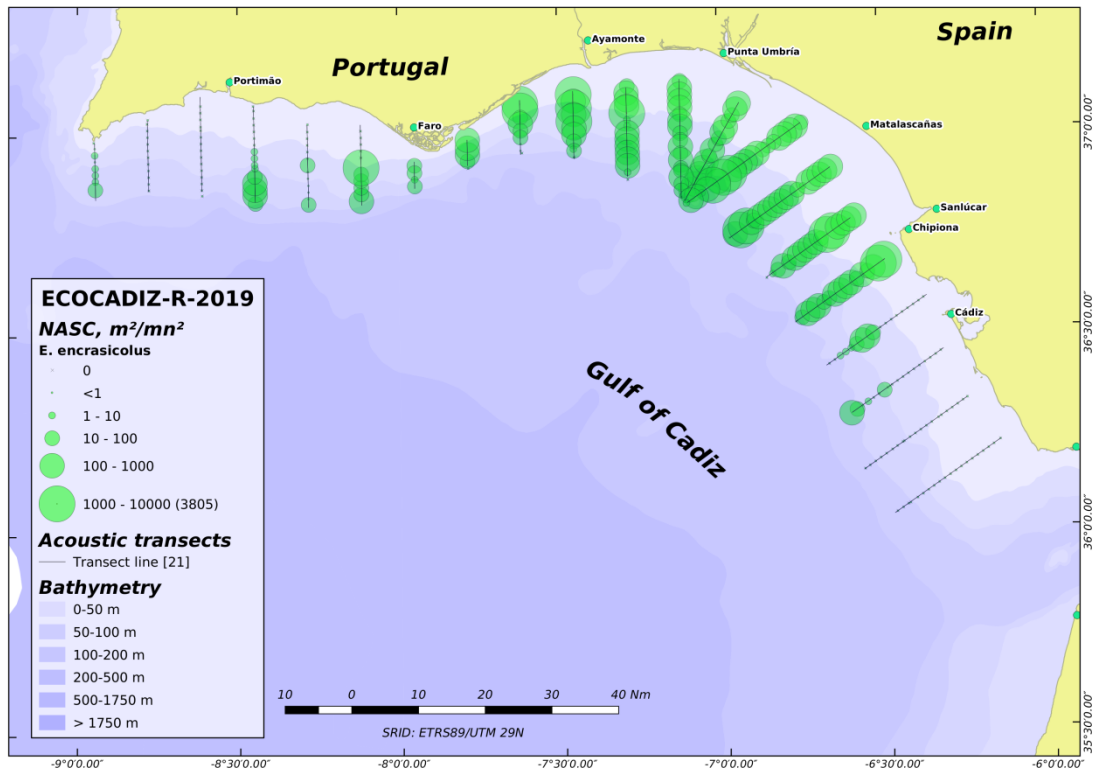


Figure 7. ECOCADIZ-RECLUTAS 2019-10 survey. Anchovy (*Engraulis encrasicolus*). Top: distribution of the total backscattering energy (Nautical area scattering coefficient, NASC, in $m^2 nmi^{-2}$) attributed to the species. Bottom: distribution of homogeneous size-based post-strata used in the biomass/abundance estimates. Colour scale according to the mean value of the backscattering energy attributed to the species in each stratum.

ECOCADIZ-RECLUTAS 2019-10: Anchovy (*E. encrasicolus*)

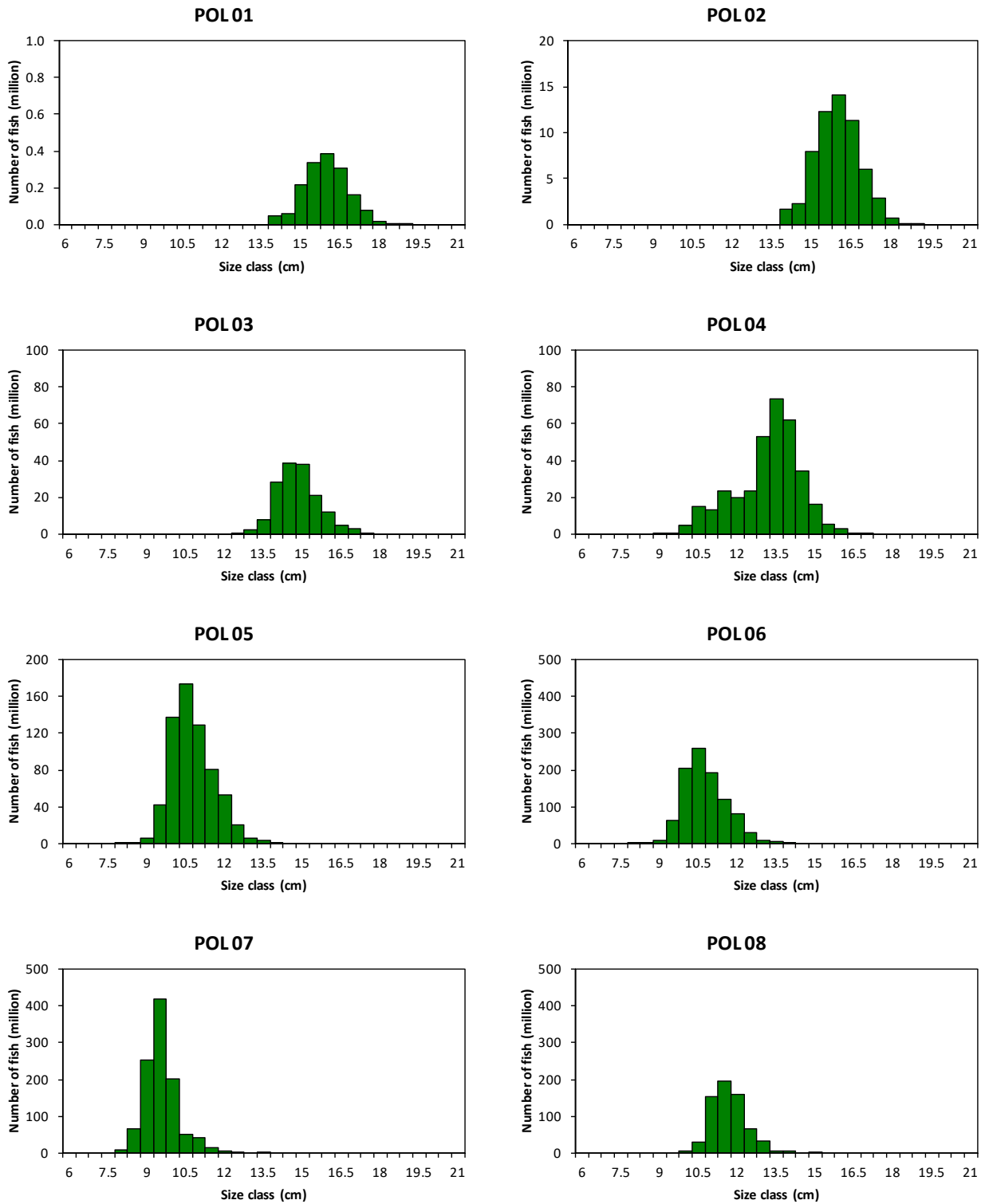


Figure 8. ECOCADIZ-RECLUTAS 2019-10 survey. Anchovy (*Engraulis encrasicolus*). Estimated abundances (number of fish in millions) by length class (cm) by homogeneous stratum (POL01-POLn, numeration as in **Figure 7**) and total sampled area. Post-strata ordered in the W-E direction. The estimated biomass (t) by size class for the whole sampled area is also shown for comparison. Note the different scales in the y axis.

ECOCADIZ-RECLUTAS 2019-10: Anchovy (*E. encrasicolus*)

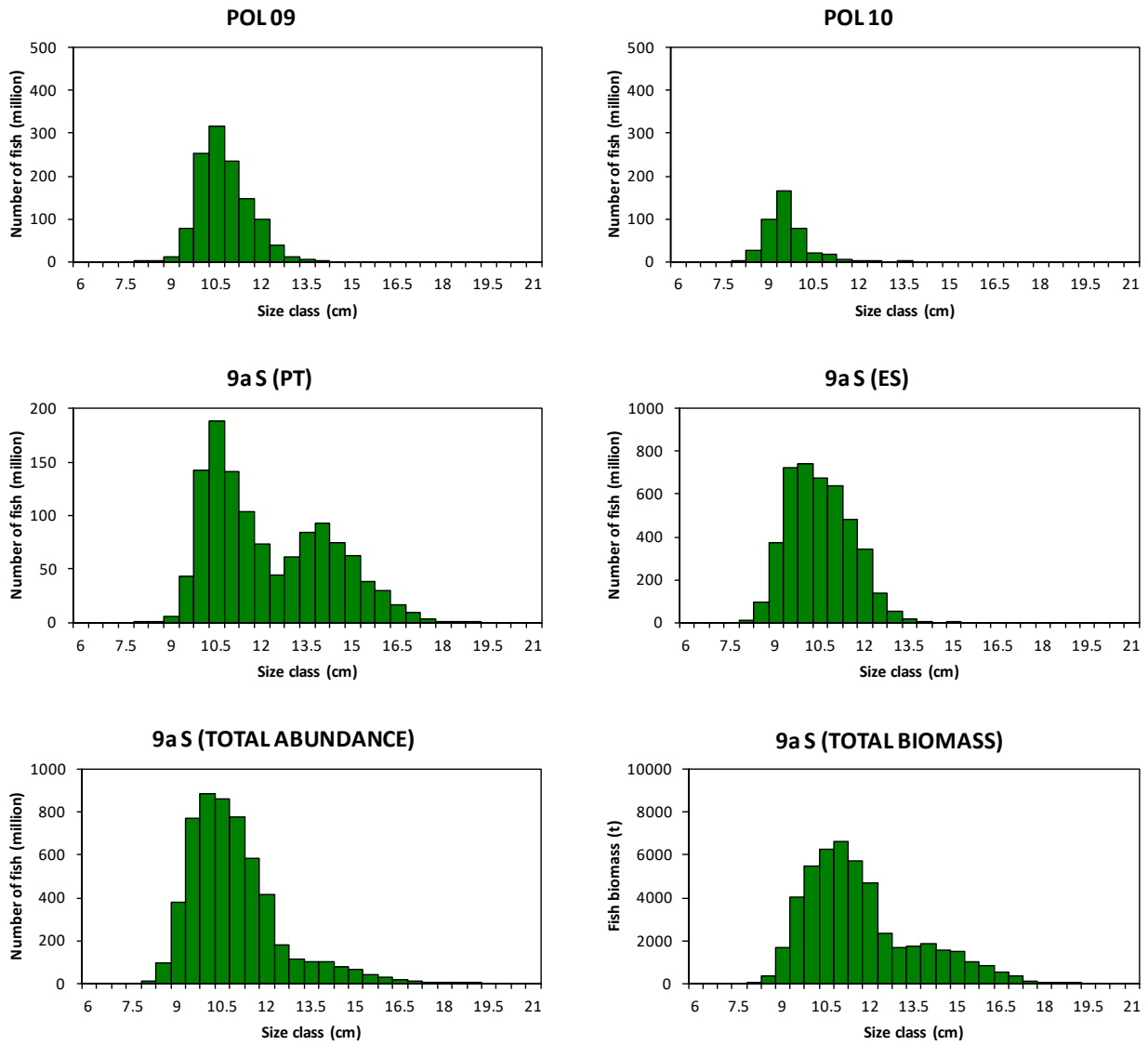


Figure 8. ECOCADIZ-RECLUTAS 2019-10 survey. Anchovy (*Engraulis encrasicolus*). Cont'd.

ECOCADIZ-RECLUTAS 2019-10: Anchovy (*E. encrasicolus*)

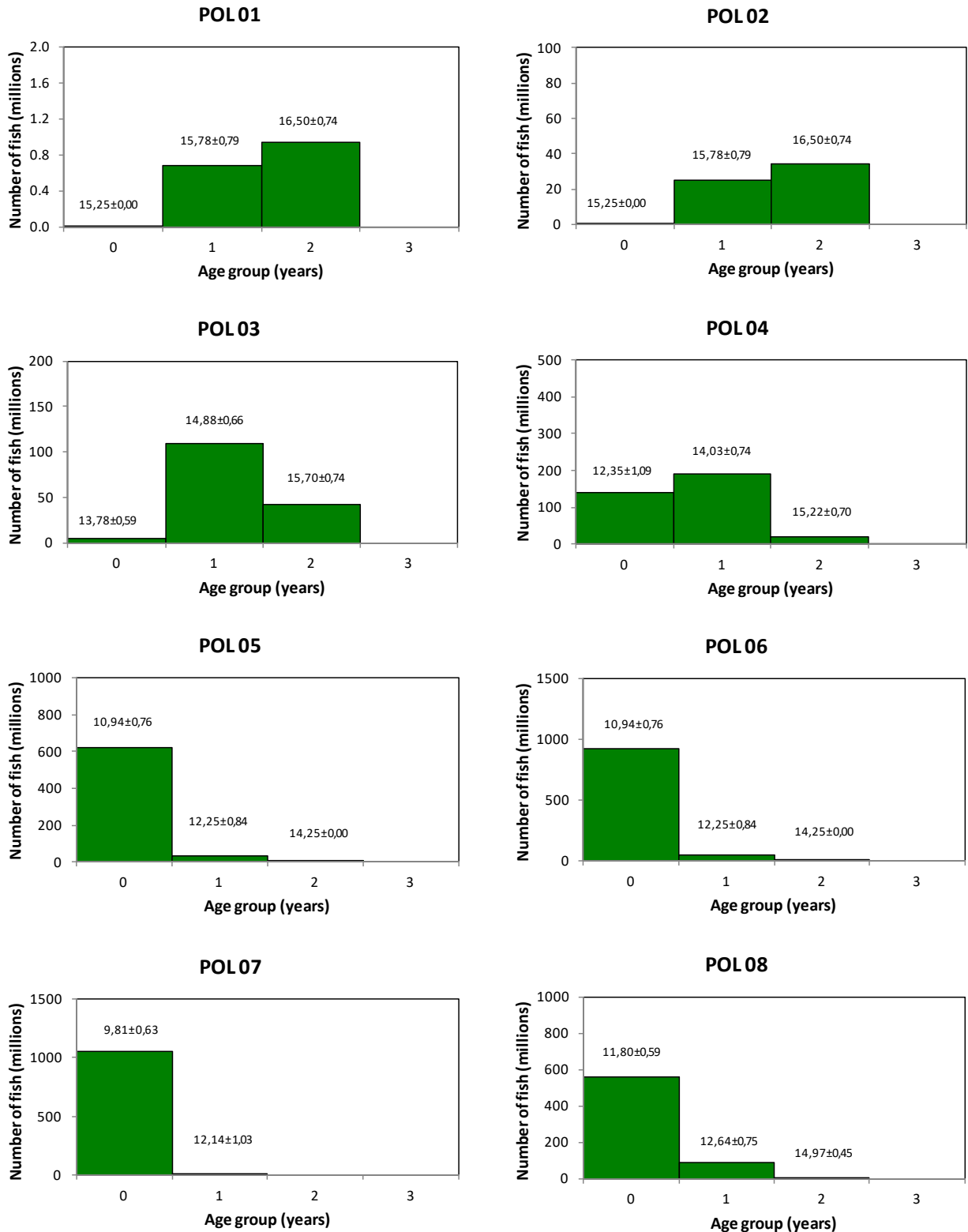


Figure 9. ECOCADIZ-RECLUTAS 2019-10 survey. Anchovy (*Engraulis encrasicolus*). Estimated abundances (number of fish in millions) by age group (years) by homogeneous stratum (POL01-POLn, numeration as in Figure 7) and total sampled area. Post-strata ordered in the W-E direction. The estimated biomass (t) by age group for the whole sampled area is also shown for comparison. Note the different scales in the y axis.

ECOCADIZ-RECLUTAS 2019-10: Anchovy (*E. encrasicolus*)

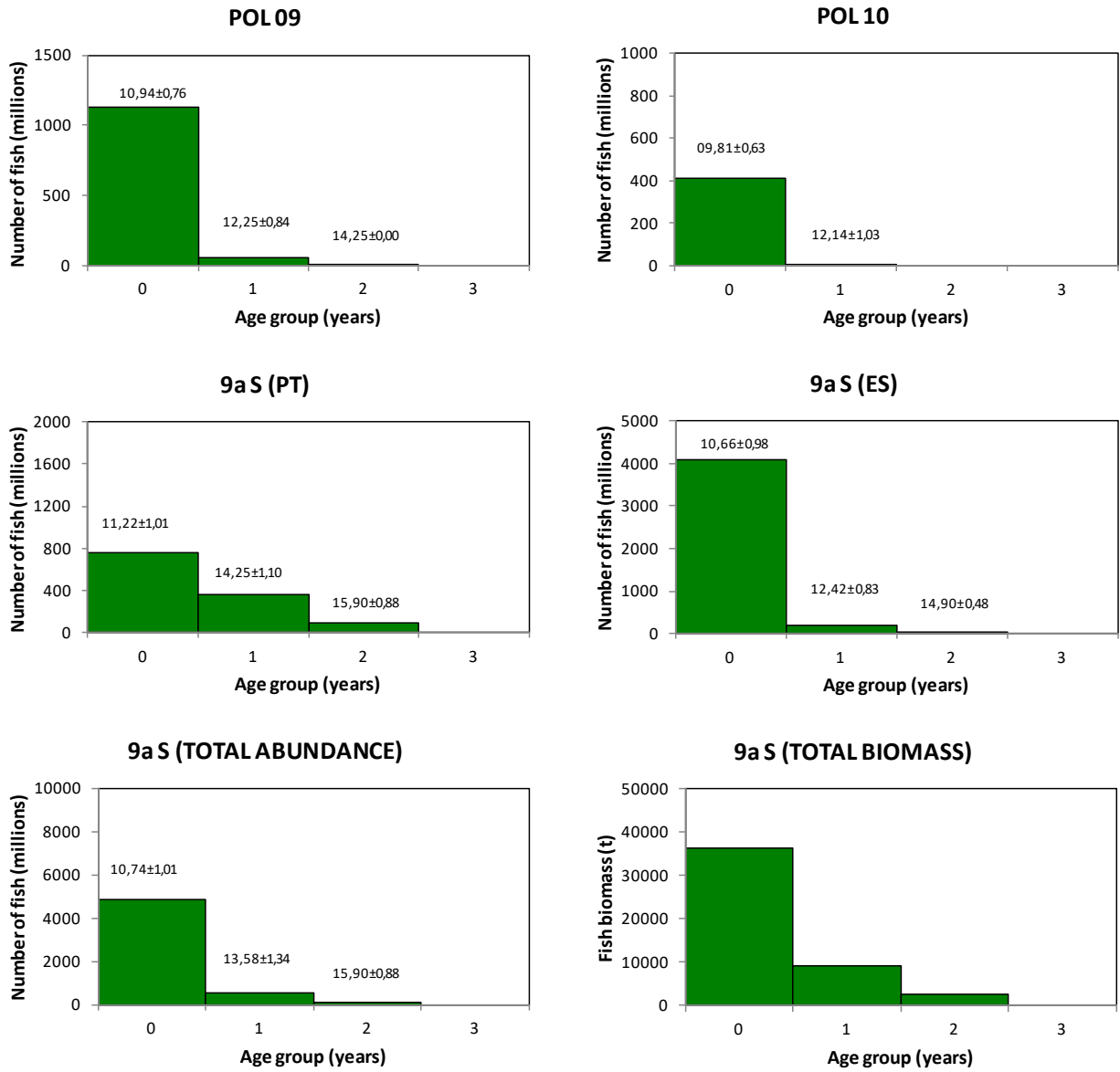


Figure 9. ECOCADIZ-RECLUTAS 2019-10 survey. Anchovy (*Engraulis encrasicolus*). Cont'd.

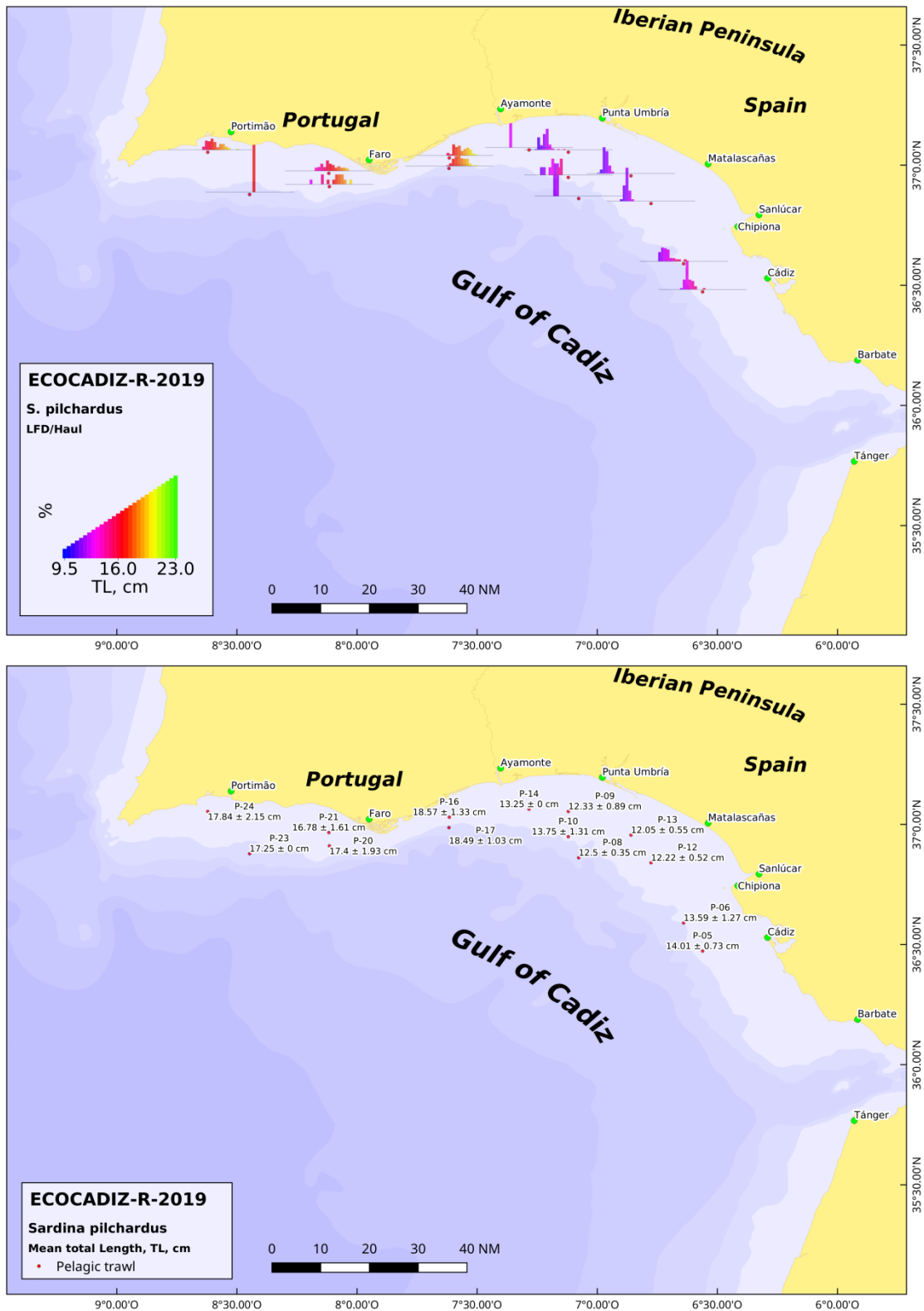


Figure 10. ECOCADIZ-RECLUTAS 2019-10 survey. Sardine (*Sardina pilchardus*). Top: length frequency distributions in fishing hauls. Bottom: mean \pm sd length by haul.

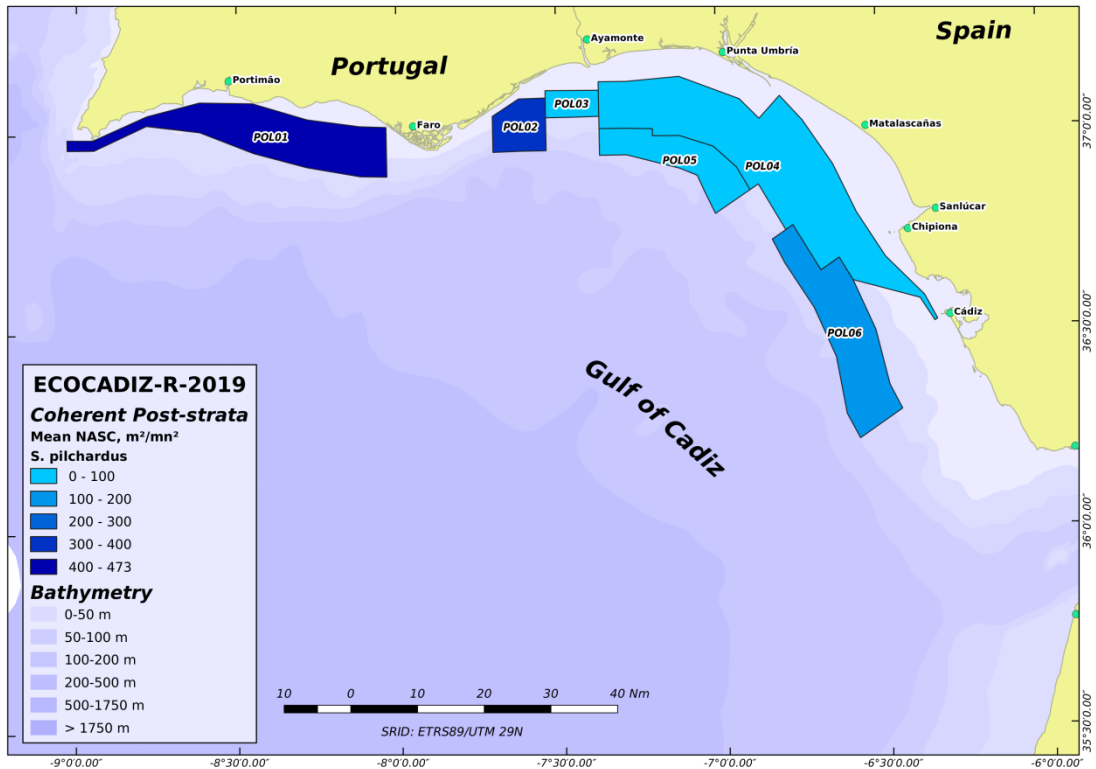
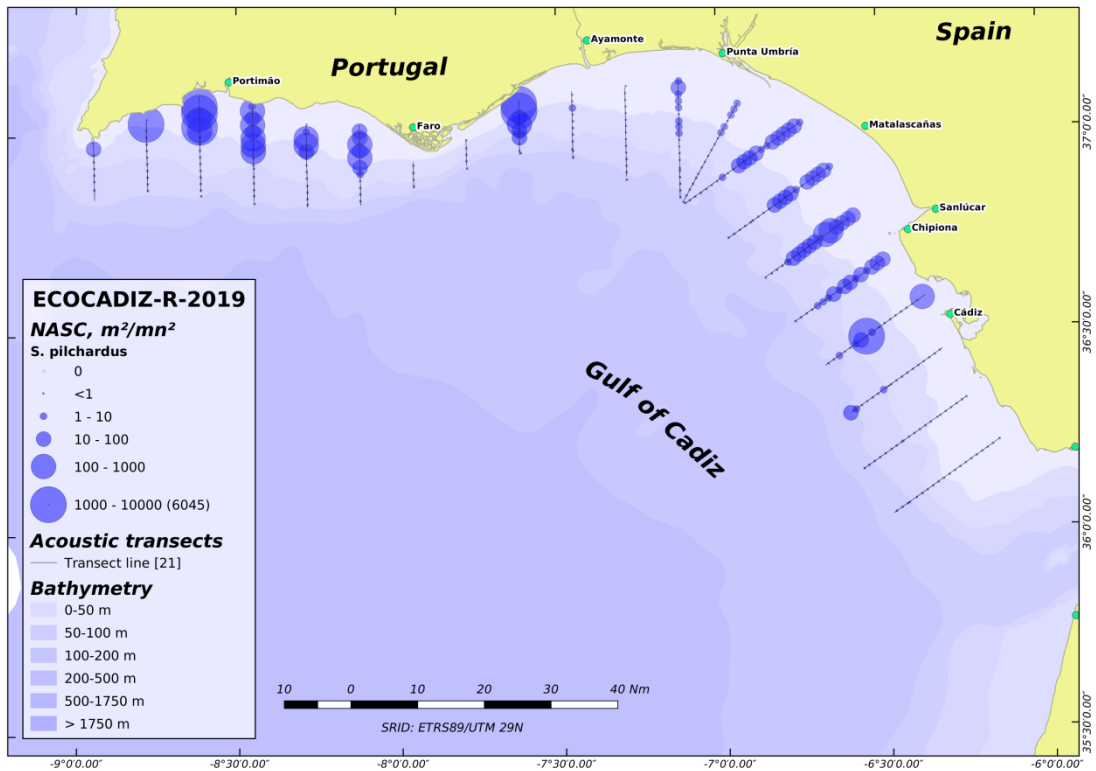


Figure 11. ECOCADIZ-RECLUTAS 2019-10 survey. Sardine (*Sardina pilchardus*). Top: distribution of the total backscattering energy (Nautical area scattering coefficient, NASC, in $m^2\ nmi^{-2}$) attributed to the species. Bottom: distribution of homogeneous size-based post-strata used in the biomass/abundance estimates. Colour scale according to the mean value of the backscattering energy attributed to the species in each stratum.

ECOCADIZ-RECLUTAS 2019-10: Sardine (*S. pilchardus*)

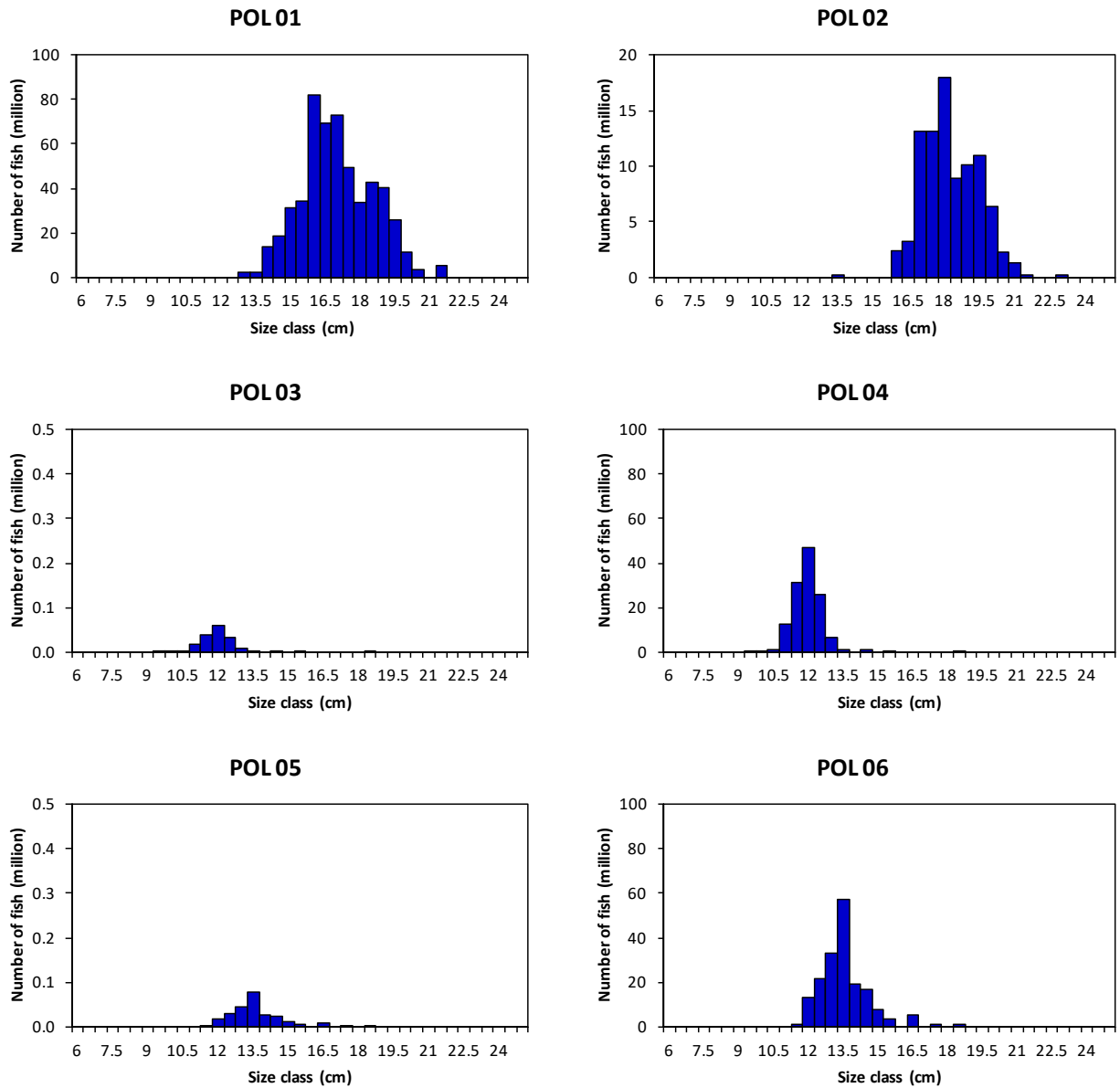


Figure 12. ECOCADIZ-RECLUTAS 2019-10 survey. Sardine (*Sardina pilchardus*). Estimated abundances (number of fish in millions) by length class (cm) by homogeneous stratum (POL01-POLn, numeration as in **Figure 11**) and total sampled area. Post-strata ordered in the W-E direction. The estimated biomass (t) by size class for the whole sampled area is also shown for comparison. Note the different scales in the y axis.

ECOCADIZ-RECLUTAS 2019-10: Sardine (*S. pilchardus*)

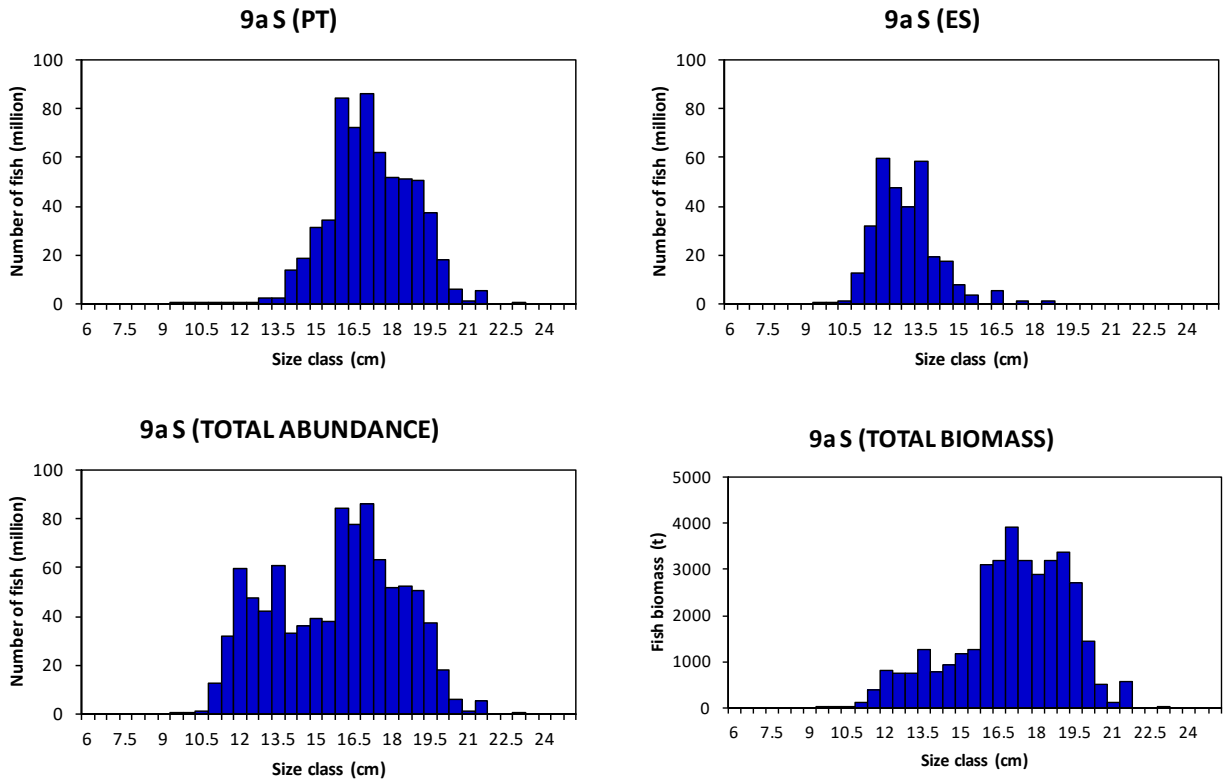


Figure 12. ECOCADIZ-RECLUTAS 2019-10 survey. Sardine (*Sardina pilchardus*). Cont'd.

ECOCADIZ-RECLUTAS 2019-10: Sardine (*S. pilchardus*)

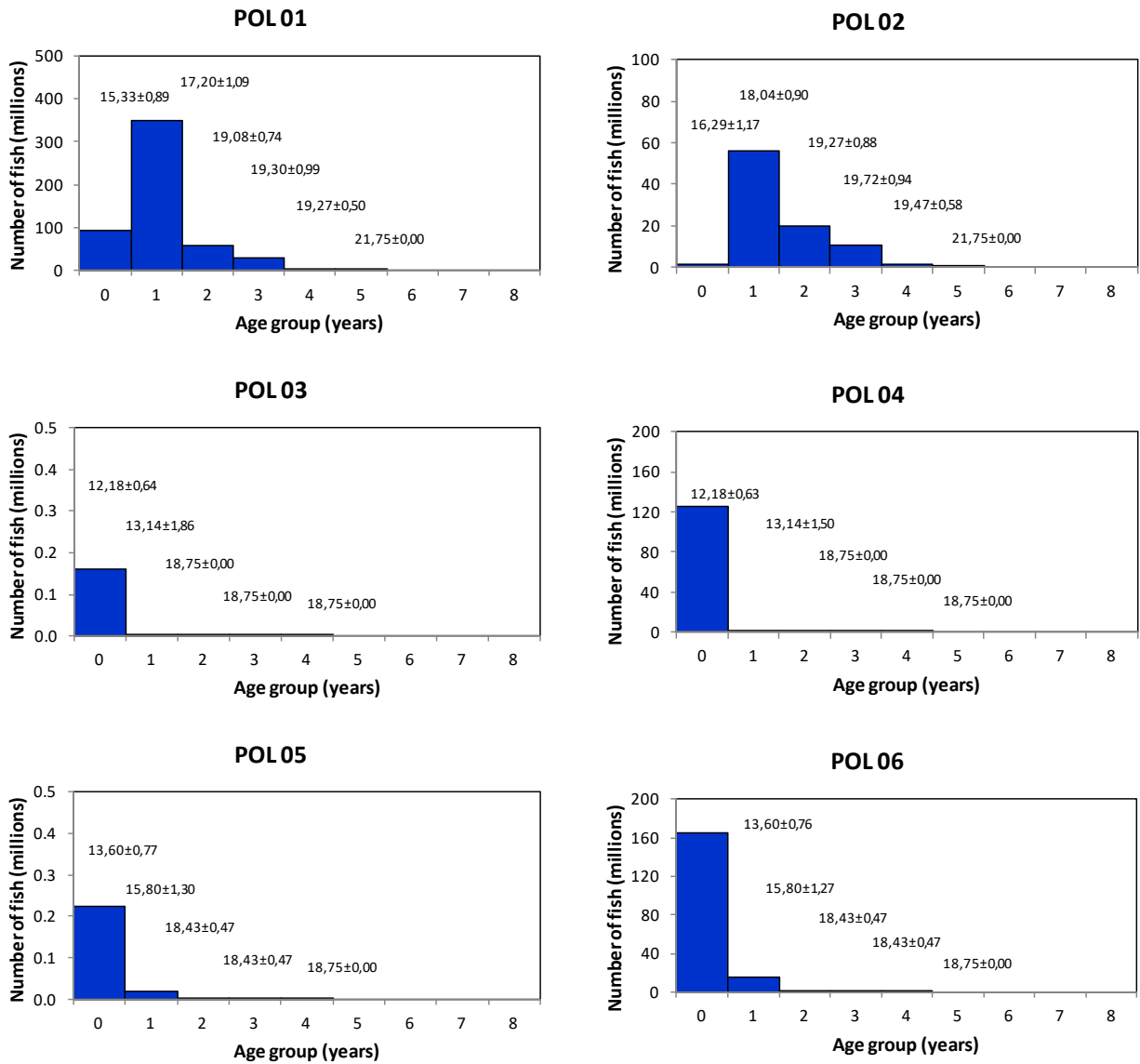


Figure 13. ECOCADIZ-RECLUTAS 2019-10 survey. Sardine (*Sardina pilchardus*). Estimated abundances (number of fish in millions) by age group (years) by homogeneous stratum (POL01-POLn, numeration as in **Figure 11**) and total sampled area. Post-strata ordered in the W-E direction. The estimated biomass (t) by age group for the whole sampled area is also shown for comparison. Note the different scales in the y axis.

ECOCADIZ-RECLUTAS 2019-10: Sardine (*S. pilchardus*)

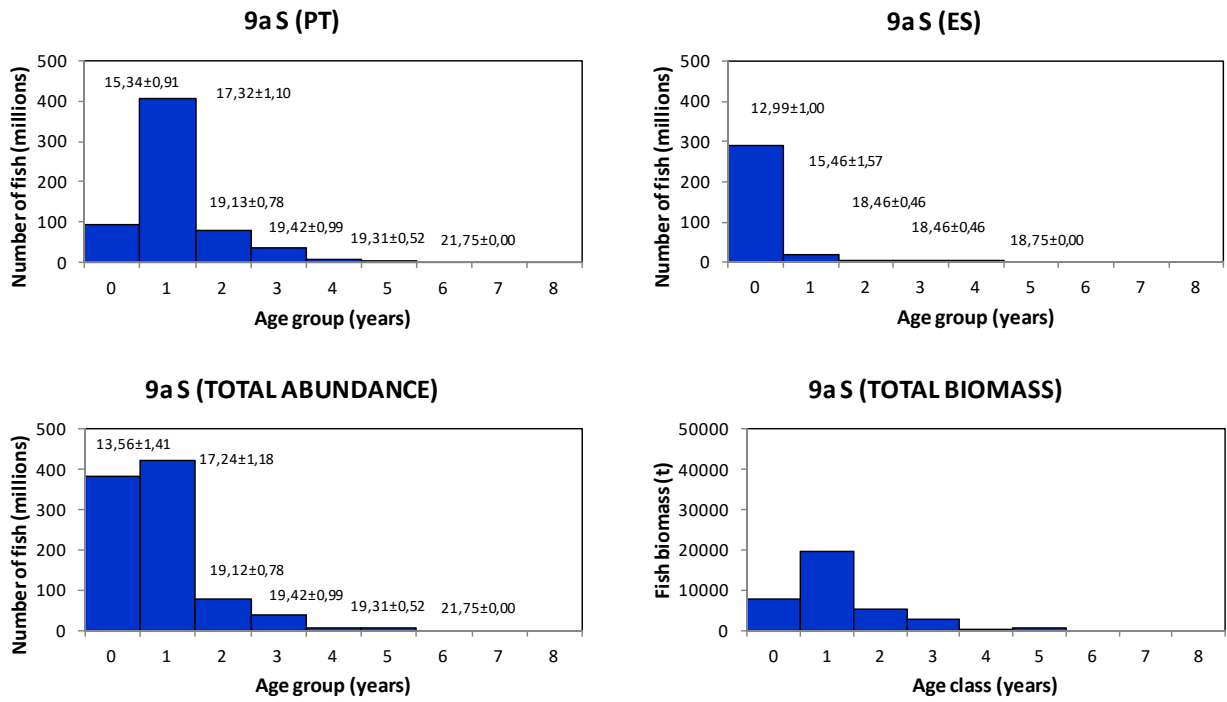


Figure 13. ECOCADIZ-RECLUTAS 2019-10 survey. Sardine (*Sardina pilchardus*). Cont'd

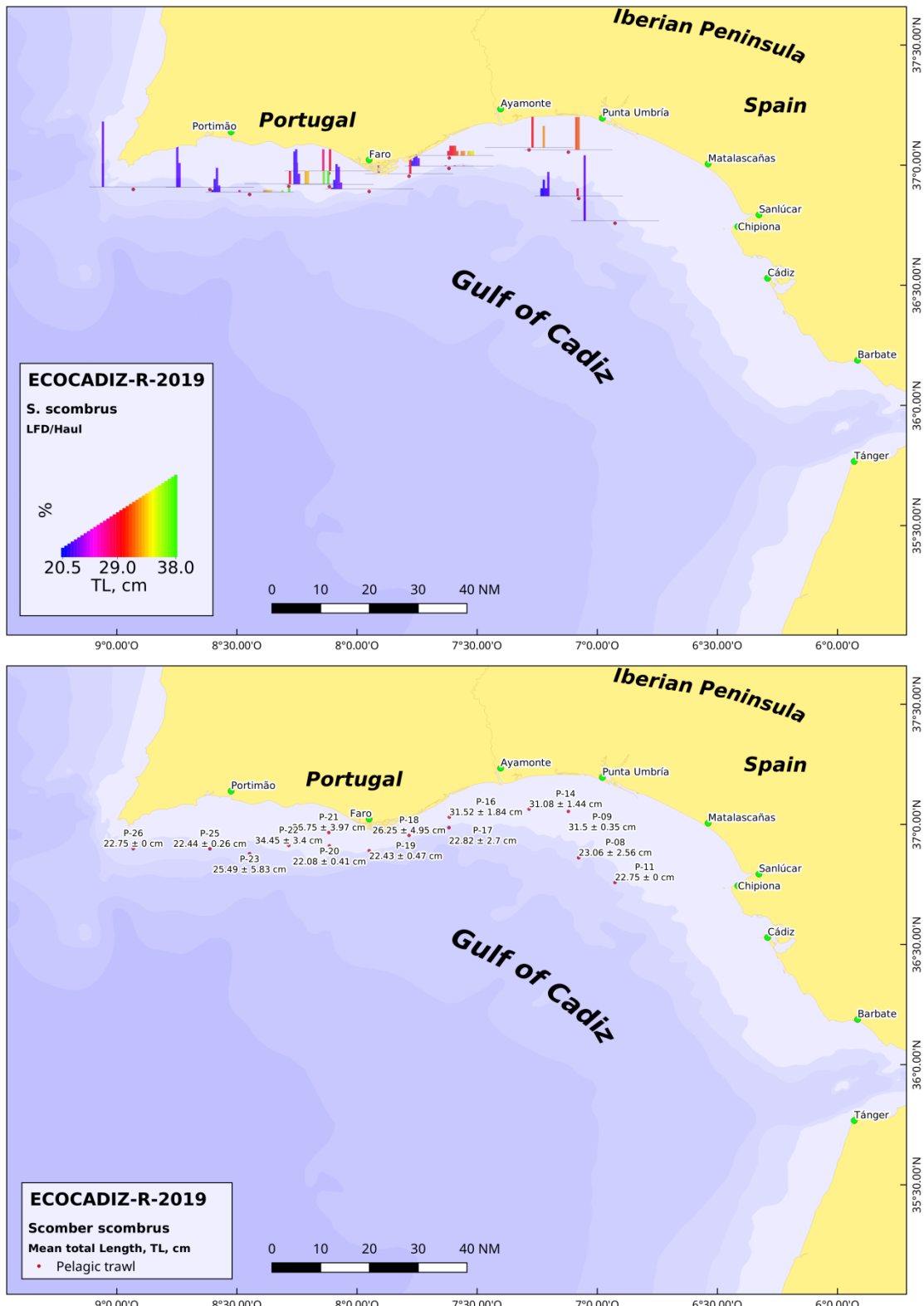


Figure 14. ECOCADIZ-RECLUTAS 2019-10 survey. Atlantic mackerel (*Scomber scombrus*). Top: length frequency distributions in fishing hauls. Bottom: mean \pm sd length by haul.

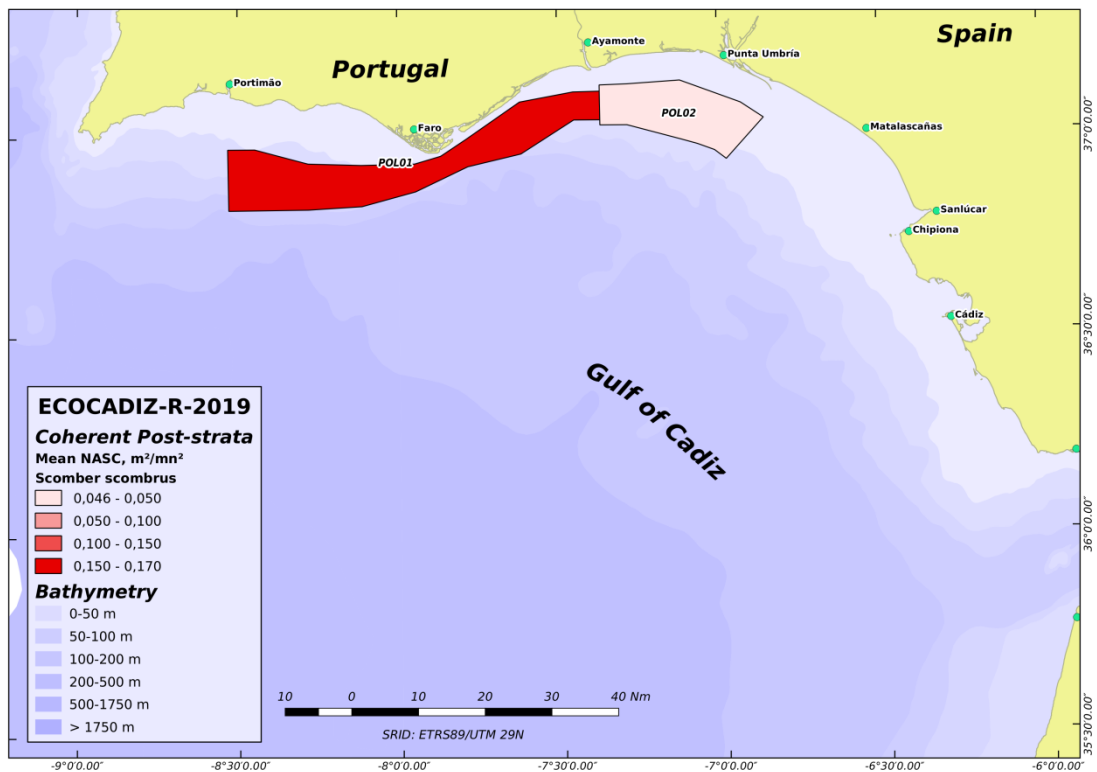
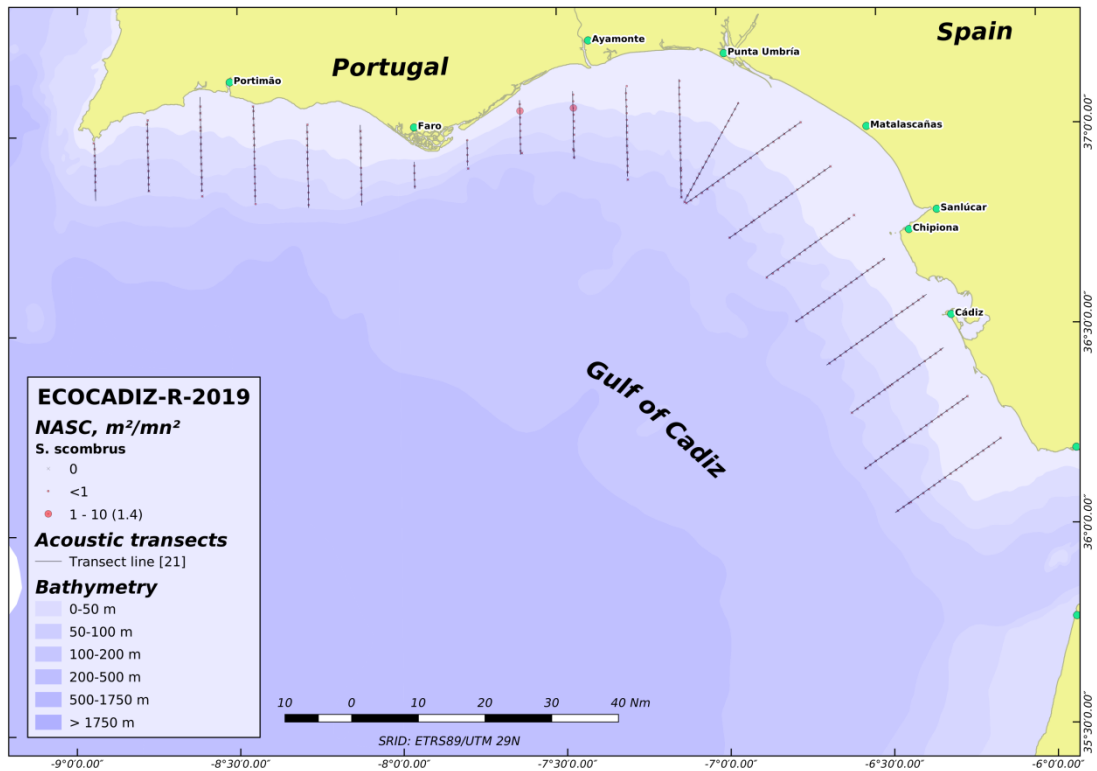


Figure 15. ECOCADIZ-RECLUTAS 2019-10 survey. Atlantic mackerel (*Scomber scombrus*). Top: distribution of the total backscattering energy (Nautical area scattering coefficient, NASC, in $m^2 nmi^{-2}$) attributed to the species. Bottom: distribution of homogeneous size-based post-strata used in the biomass/abundance estimates. Colour scale according to the mean value of the backscattering energy attributed to the species in each stratum.

ECOCADIZ-RECLUTAS 2019-10: Atlantic mackerel (*S. scombrus*)

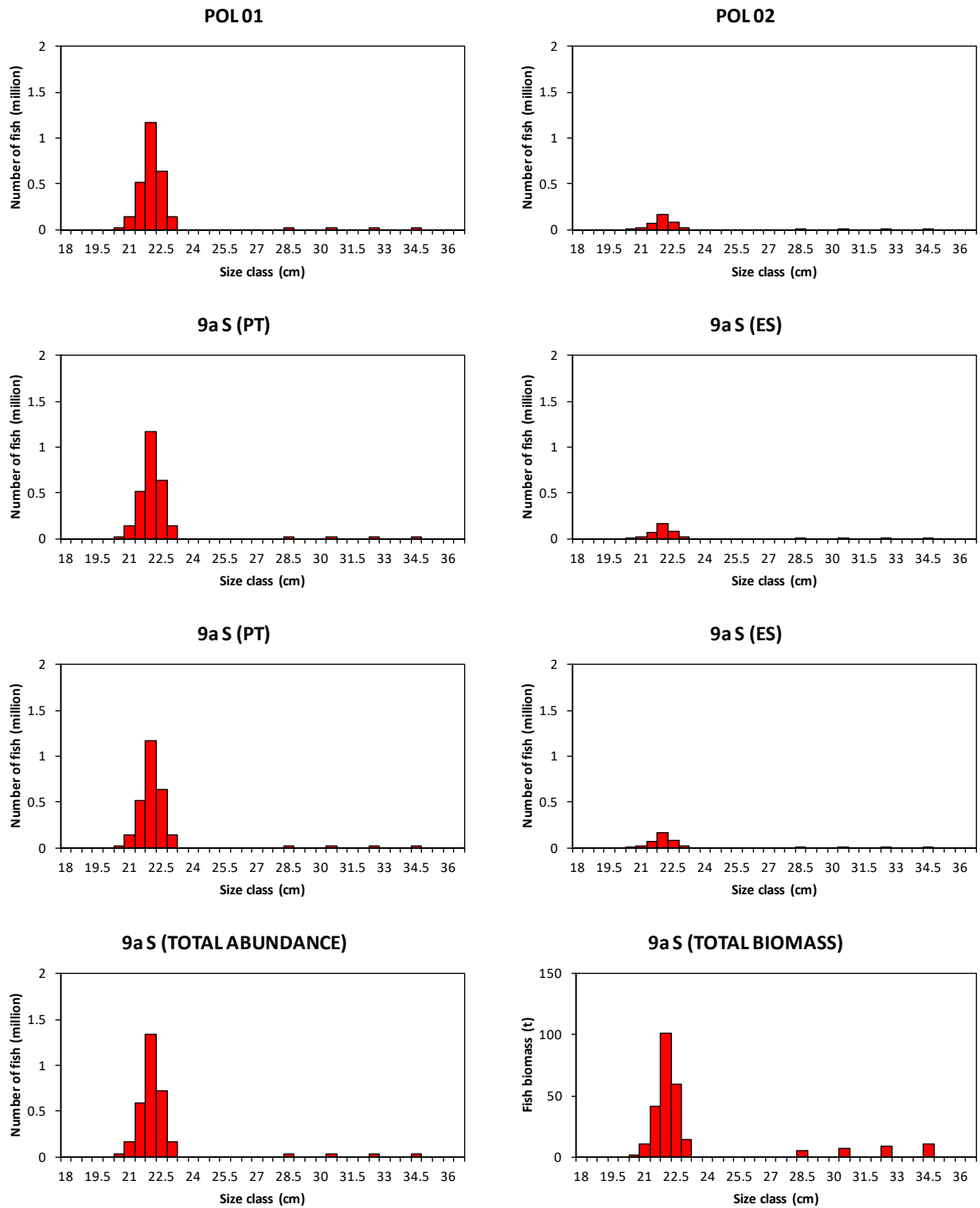
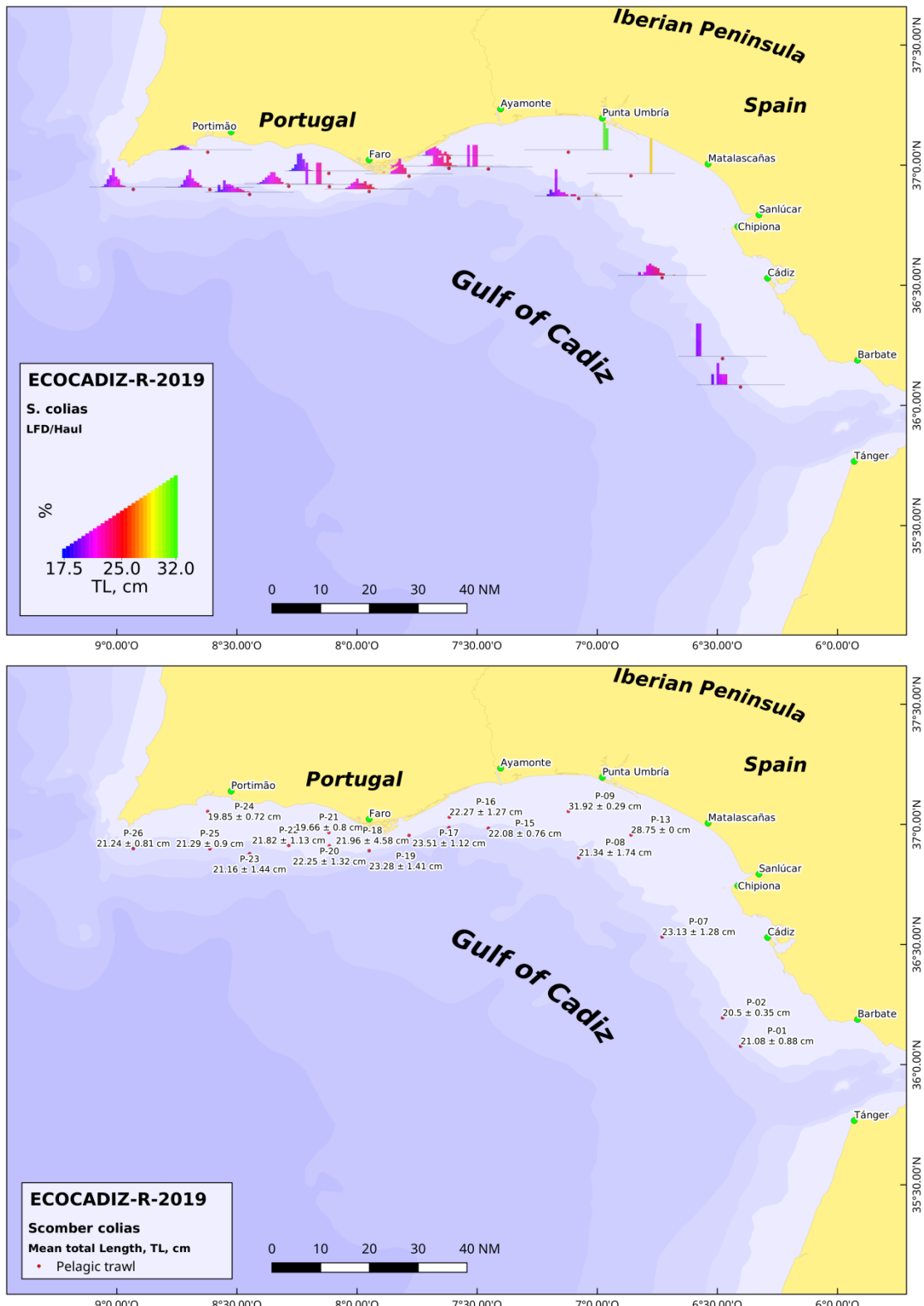


Figure 16. ECOCADIZ-RECLUTAS 2019-10 survey. Atlantic mackerel (*Scomber scombrus*). Estimated abundances (number of fish in millions) by length class (cm) by homogeneous stratum (POL01-POLn, numeration as in **Figure 15**) and total sampled area. Post-strata ordered in the W-E direction. The estimated biomass (t) by size class for the whole sampled area is also shown for comparison. Note the different scales in the y axis.



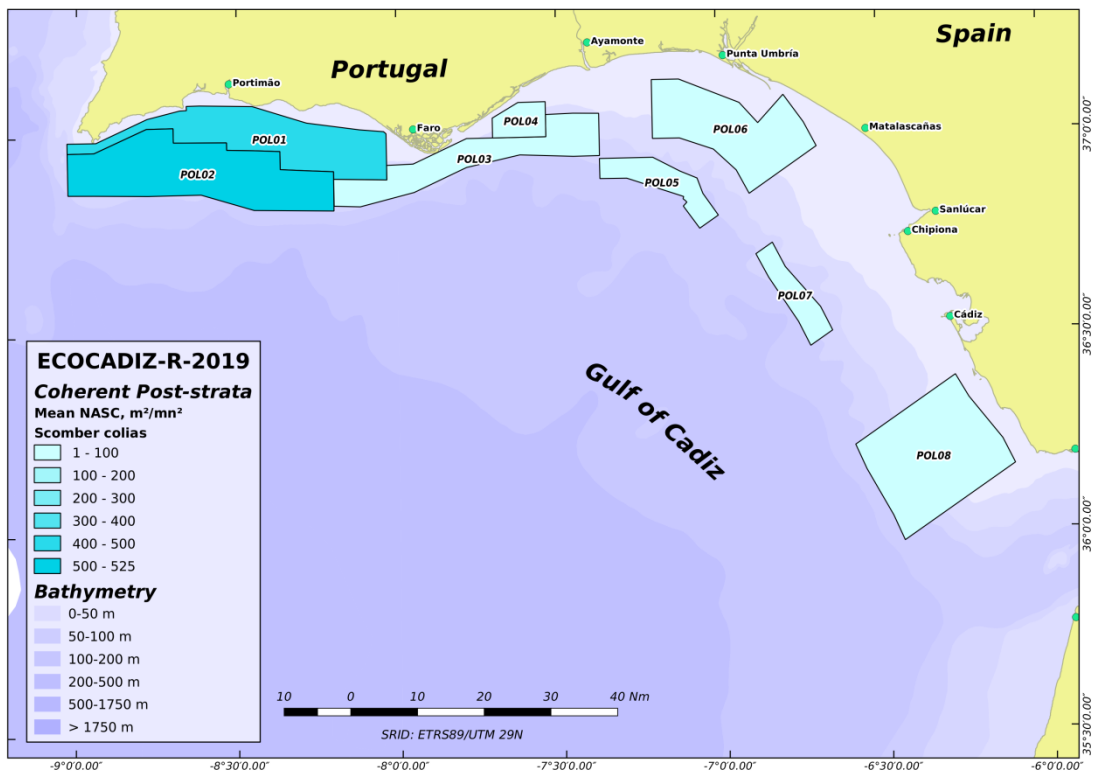
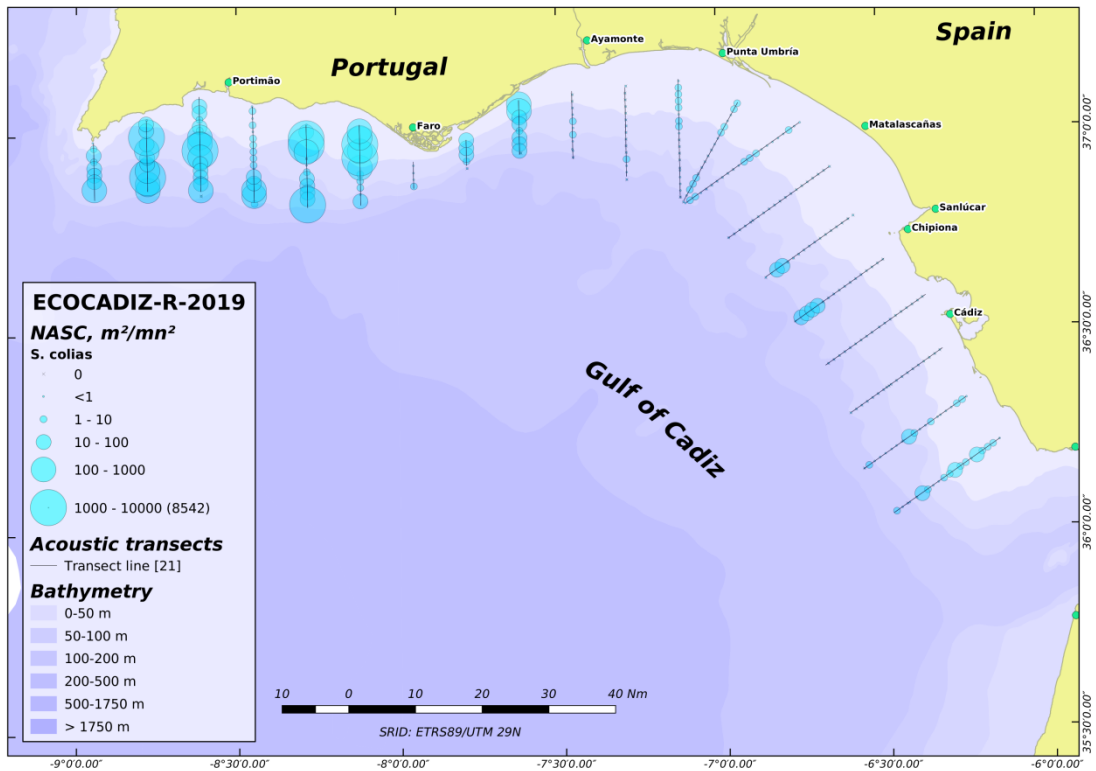


Figure 18. ECOCADIZ-RECLUTAS 2019-10 survey. Chub mackerel (*Scomber colias*). Top: distribution of the total backscattering energy (Nautical area scattering coefficient, NASC, in $m^2 nmi^{-2}$) attributed to the species. Bottom: distribution of homogeneous size-based post-strata used in the biomass/abundance estimates. Colour scale according to the mean value of the backscattering energy attributed to the species in each stratum.

ECOCADIZ-RECLUTAS 2019-10: Chub mackerel (*S. colias*)

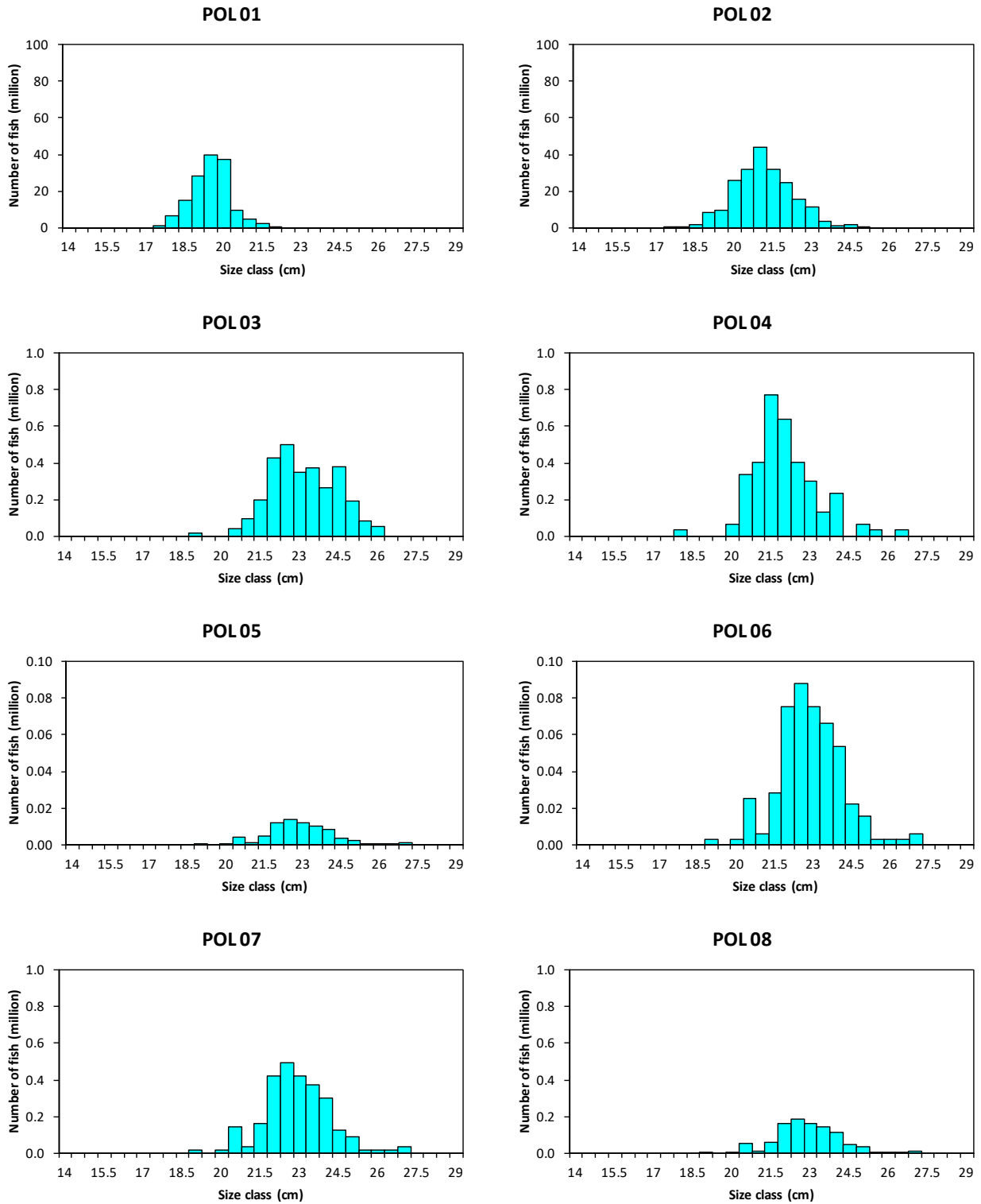


Figure 19. ECOCADIZ-RECLUTAS 2019-10 survey. Chub mackerel (*Scomber colias*). Estimated abundances (number of fish in millions) by length class (cm) by homogeneous stratum (POL01-POLn, numeration as in **Figure 18**) and total sampled area. Post-strata ordered in the W-E direction. The estimated biomass (t) by size class for the whole sampled area is also shown for comparison. Note the different scales in the y axis.

ECOCADIZ-RECLUTAS 2019-10: Chub mackerel (*S. colias*)

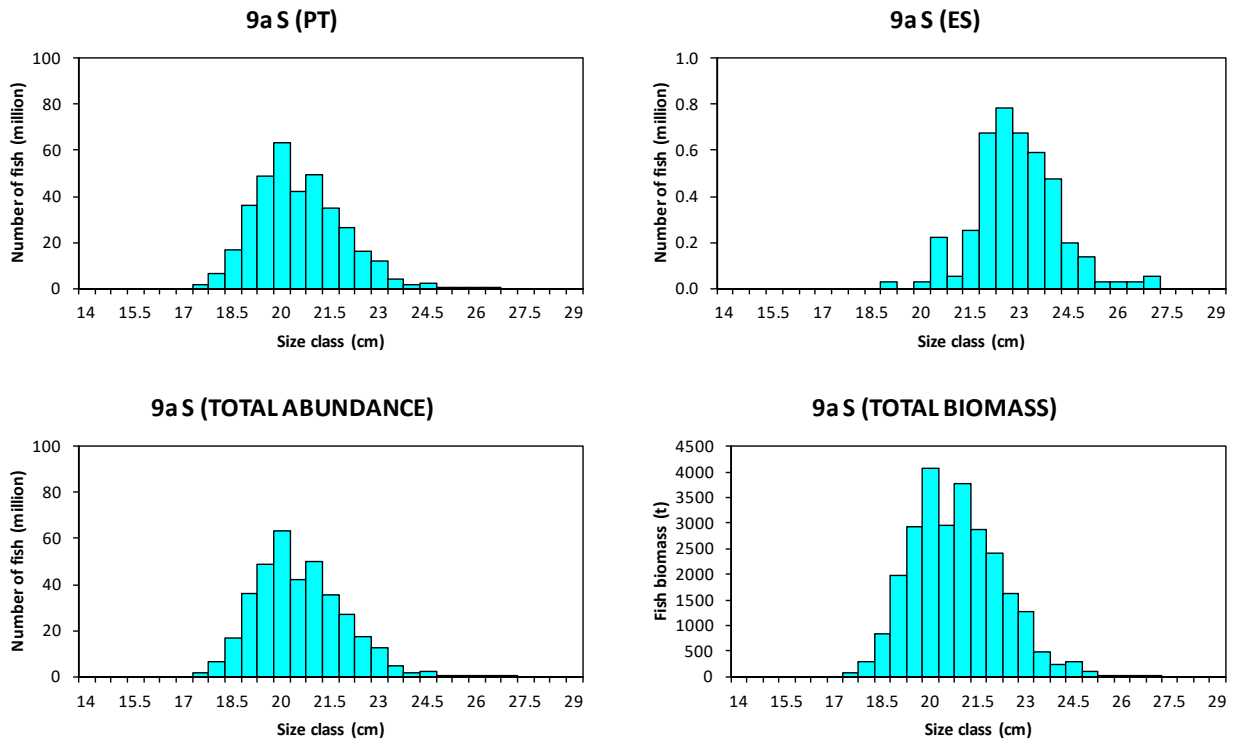


Figure 19. ECOCADIZ-RECLUTAS 2019-10 survey. Chub mackerel (*Scomber colias*). Cont'd.

ECOCADIZ-RECLUTAS 2019-10: Chub mackerel (*S. colias*)

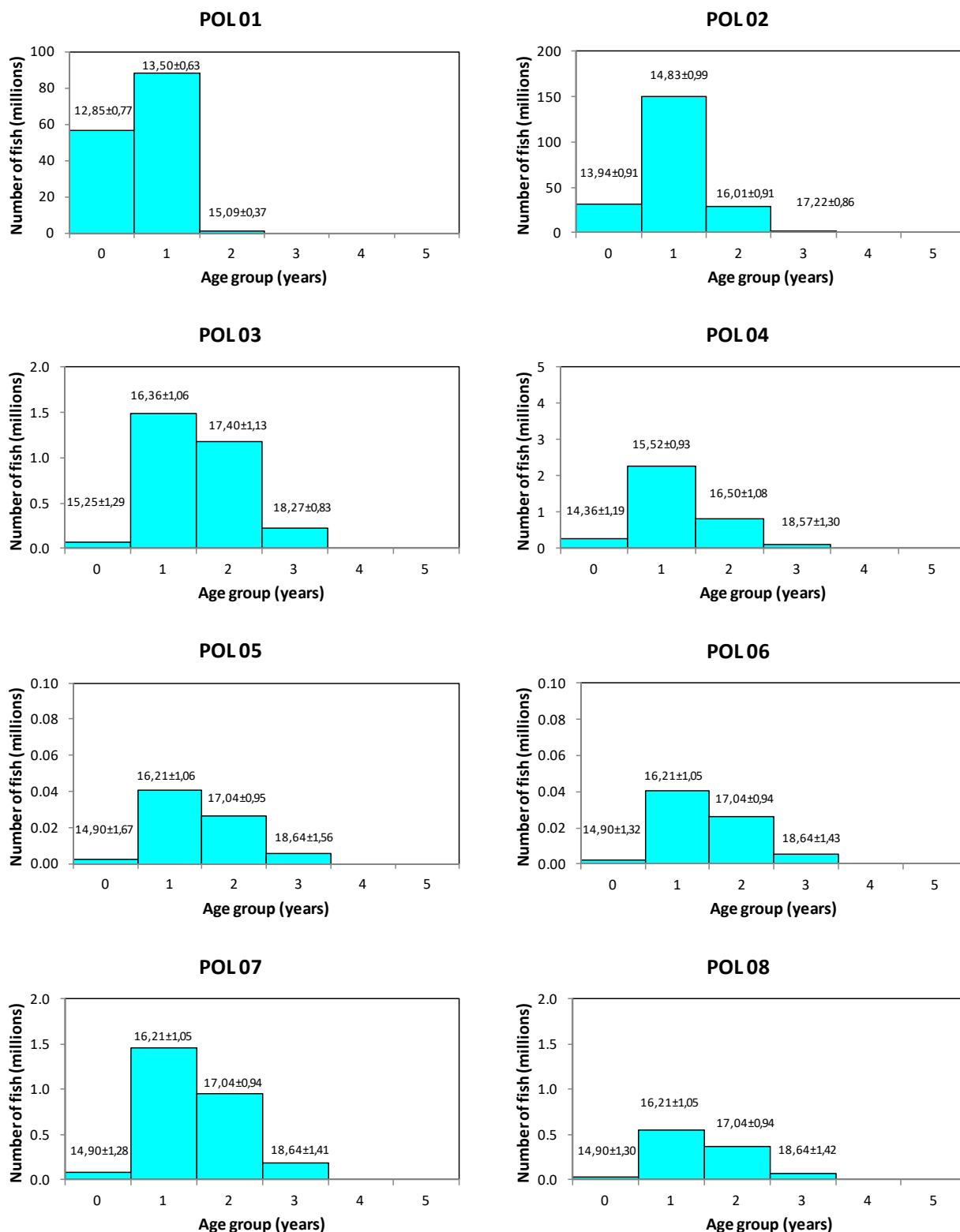


Figure 20. ECOCADIZ-RECLUTAS 2019-10 survey. Chub mackerel (*Scomber colias*). Estimated abundances (number of fish in millions) by age group (cm) by homogeneous stratum (POL01-POLn, numeration as in **Figure 18**) and total sampled area. Post-strata ordered in the W-E direction. The estimated biomass (t) by age group for the whole sampled area is also shown for comparison. Note the different scales in the y axis.

ECOCADIZ-RECLUTAS 2019-10: Chub mackerel (*S. colias*)

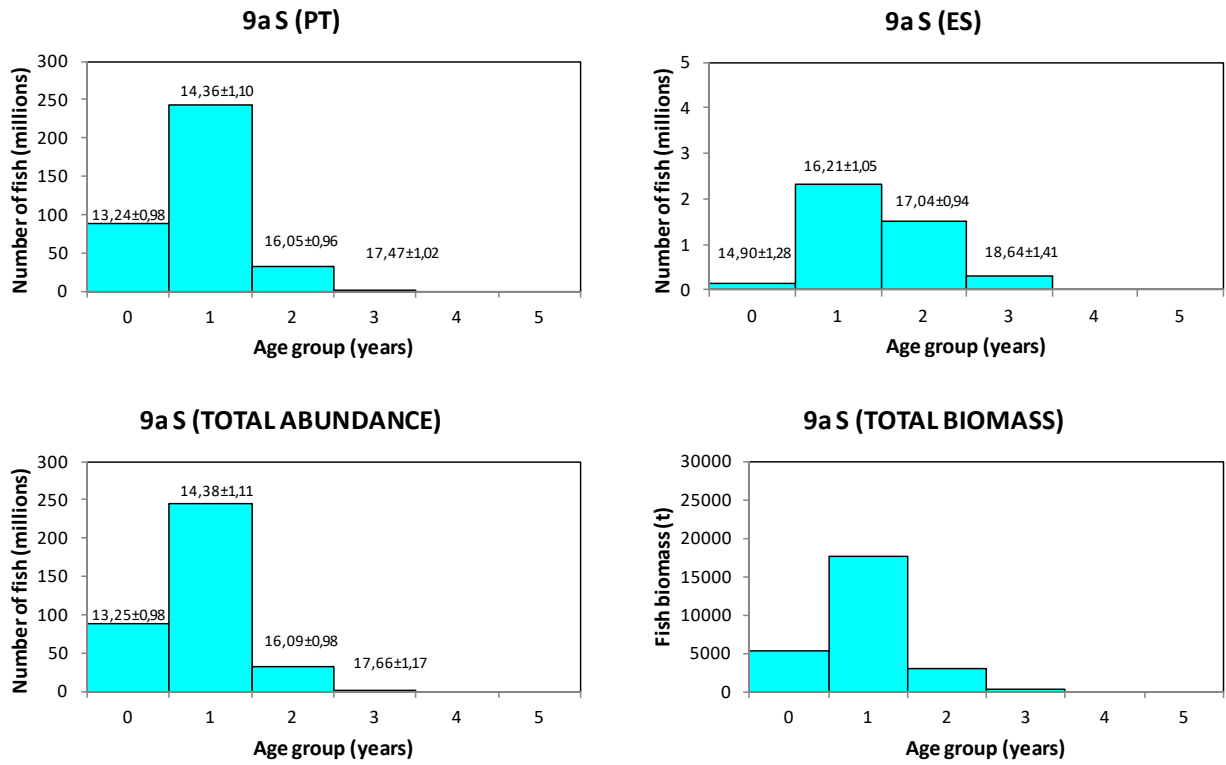


Figure 20. ECOCADIZ-RECLUTAS 2019-10 survey. Chub mackerel (*Scomber colias*). Cont'd.

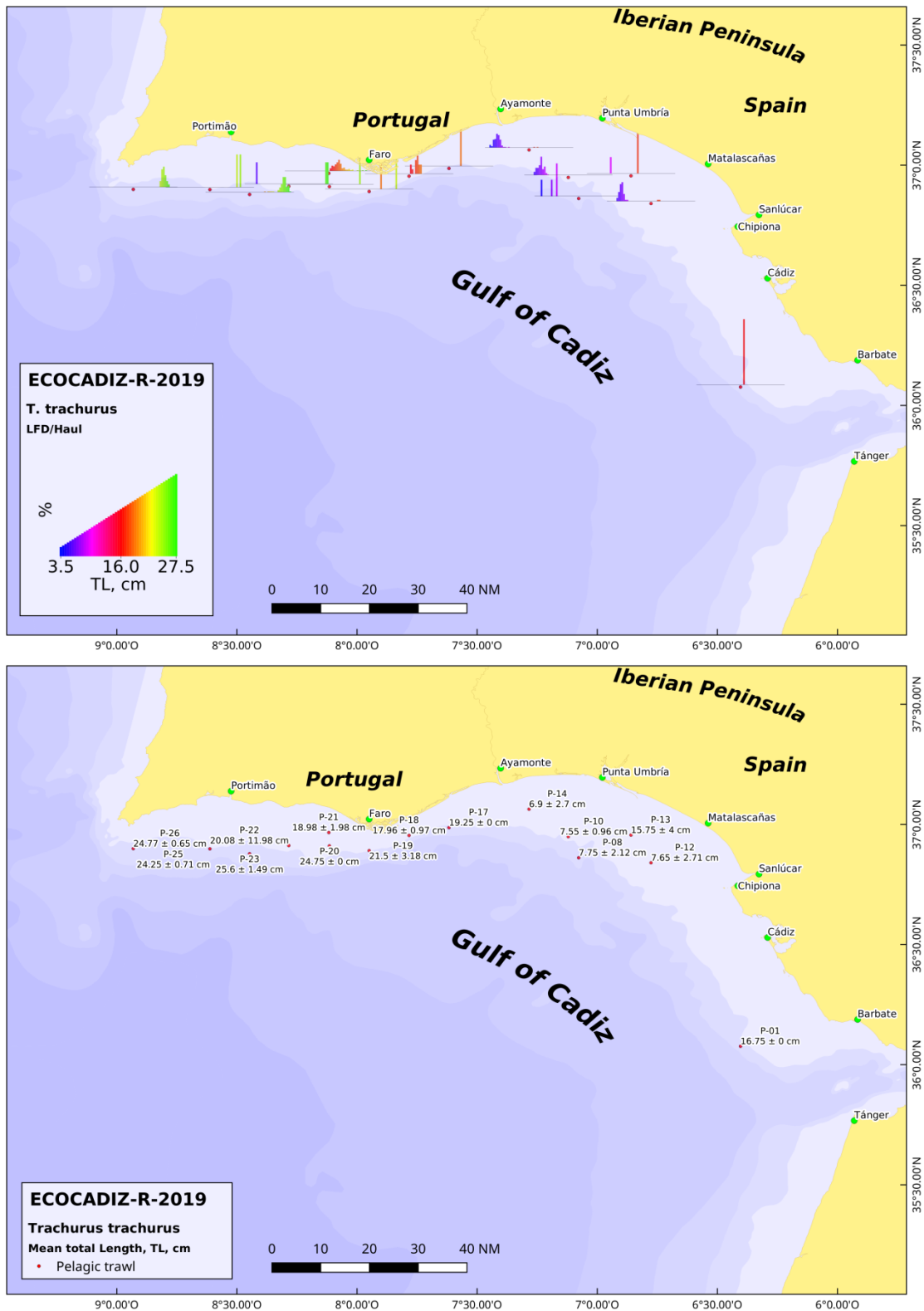


Figure 21. ECOCADIZ-RECLUTAS 2019-10 survey. Horse mackerel (*Trachurus trachurus*). Top: length frequency distributions in fishing hauls. Bottom: mean \pm sd length by haul.

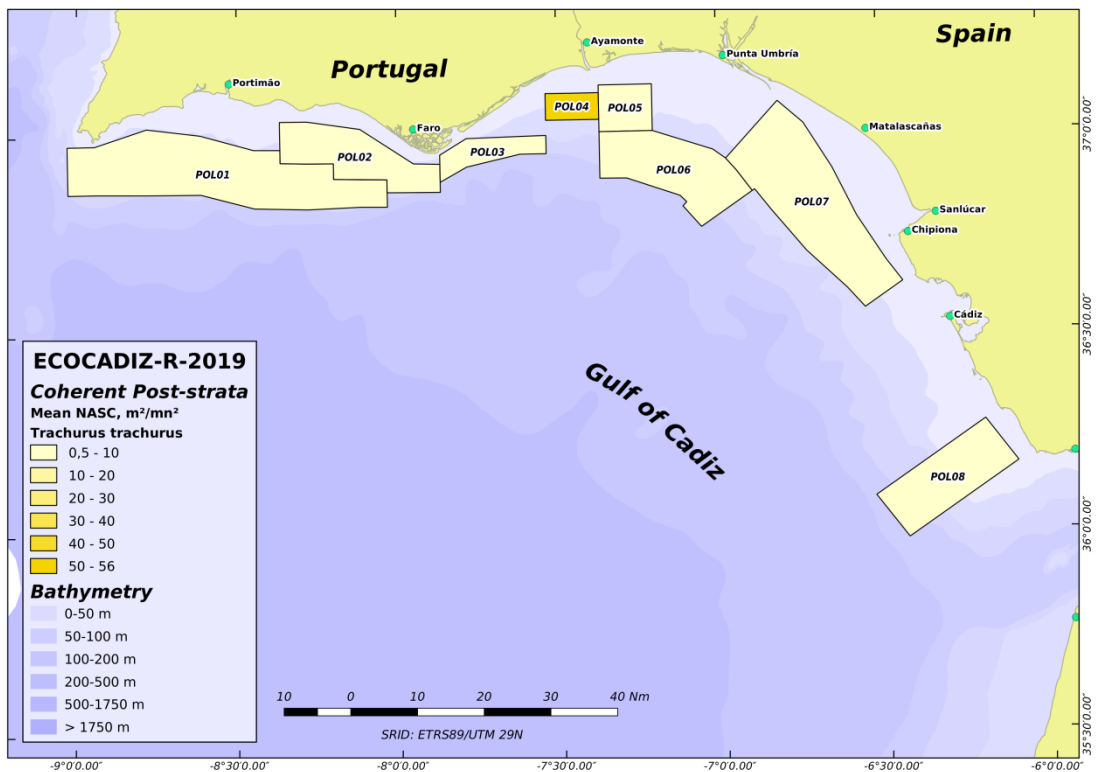
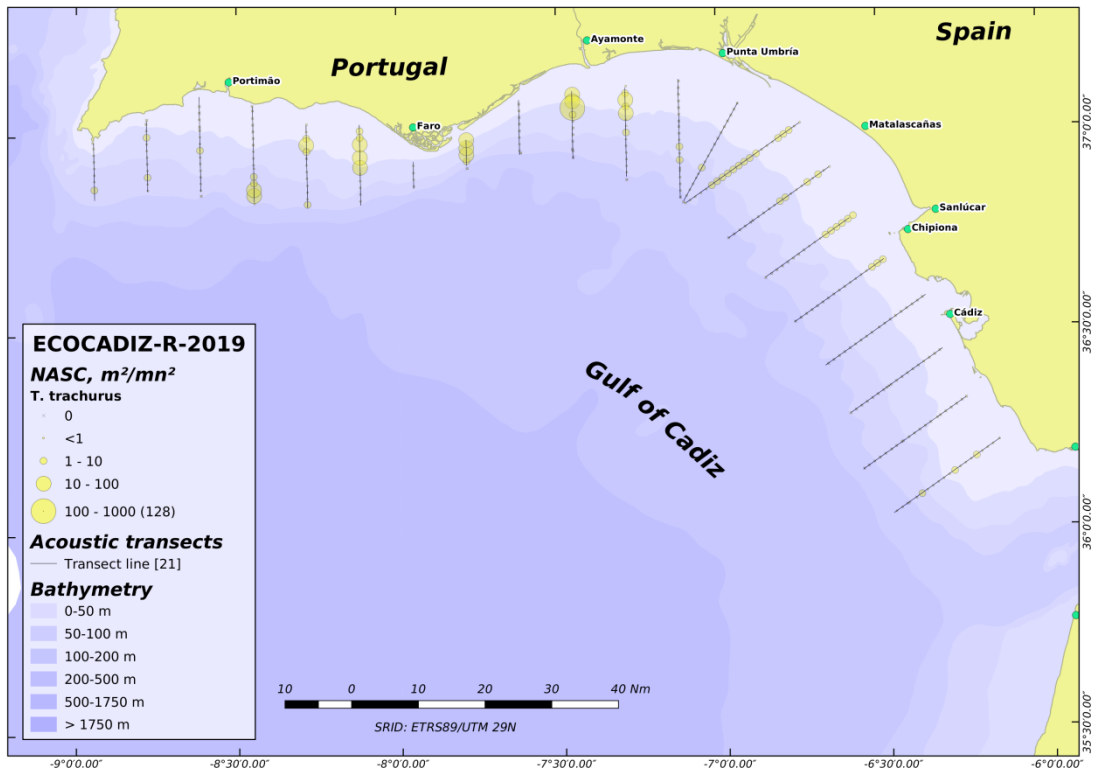


Figure 22. ECOCADIZ-RECLUTAS 2019-10 survey. Horse mackerel (*Trachurus trachurus*). Top: distribution of the total backscattering energy (Nautical area scattering coefficient, NASC, in m² nmi⁻²) attributed to the species. Bottom: distribution of homogeneous size-based post-strata used in the biomass/abundance estimates. Colour scale according to the mean value of the backscattering energy attributed to the species in each stratum.

ECOCADIZ-RECLUTAS 2019-10: Horse mackerel (*T. trachurus*)

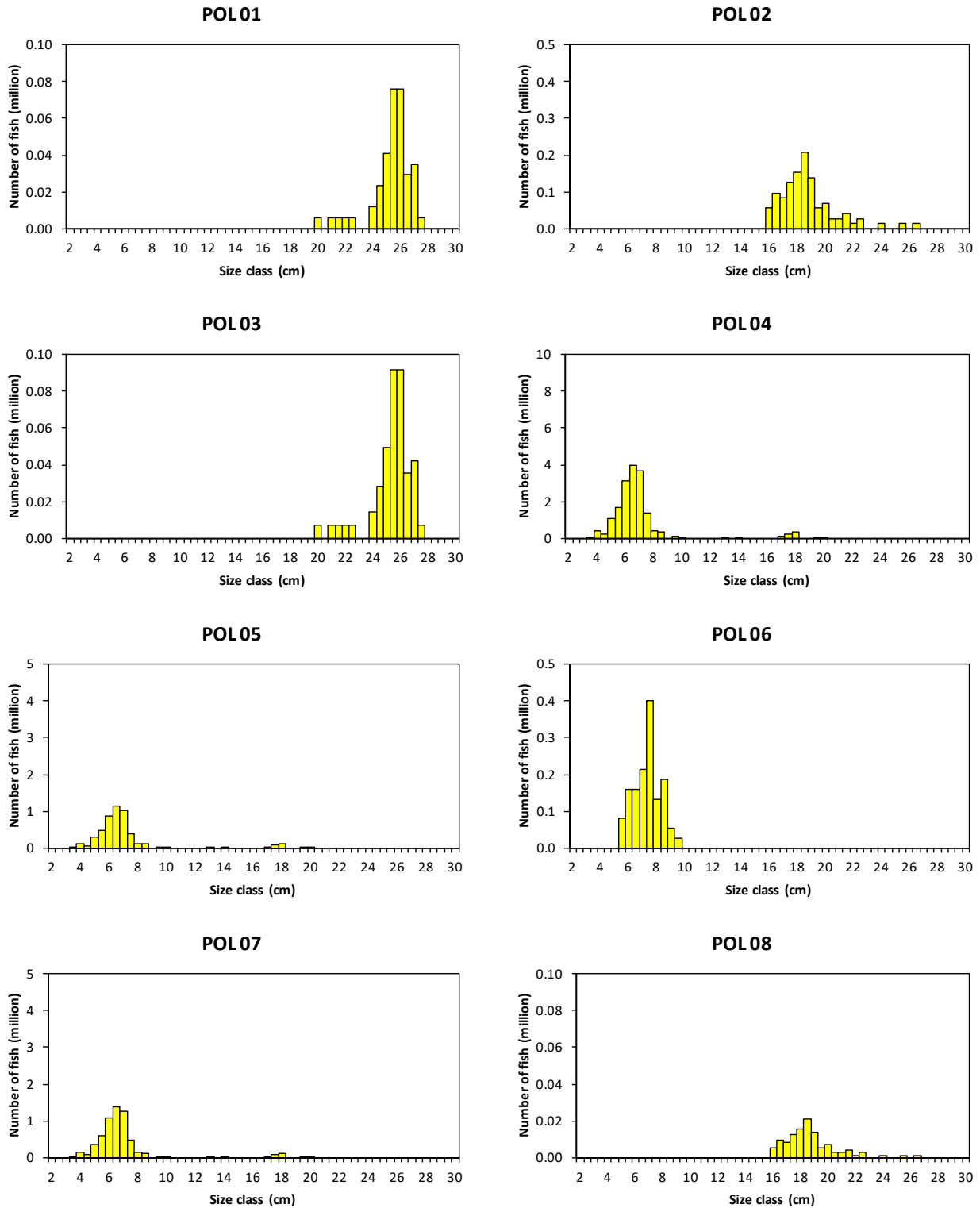
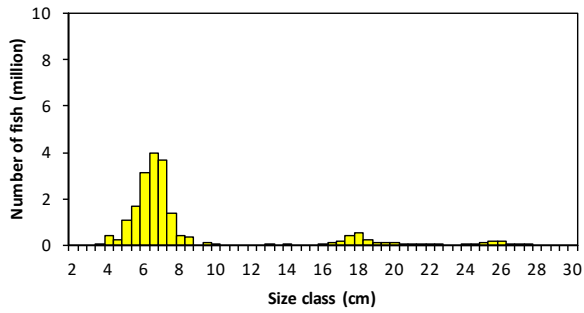


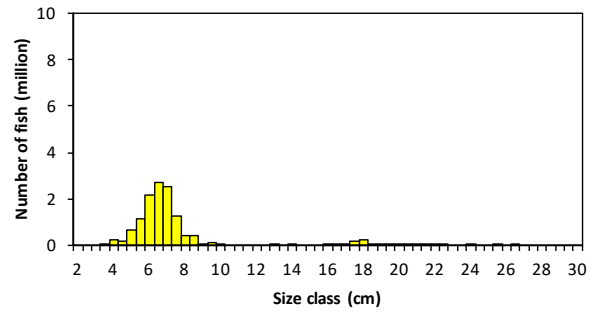
Figure 23. ECOCADIZ-RECLUTAS 2019-10 survey. Horse mackerel (*Trachurus trachurus*). Estimated abundances (number of fish in millions) by length class (cm) by homogeneous stratum (POL01-POLn, numeration as in **Figure 22**) and total sampled area. Post-strata ordered in the W-E direction. The estimated biomass (t) by size class for the whole sampled area is also shown for comparison. Note the different scales in the y axis.

ECOCADIZ-RECLUTAS 2019-10: Horse mackerel (*T. trachurus*)

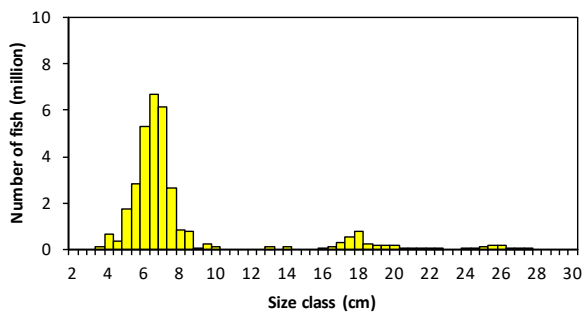
9a S (PT)



9a S (ES)



9a S (TOTAL ABUNDANCE)



9a S (TOTAL BIOMASS)

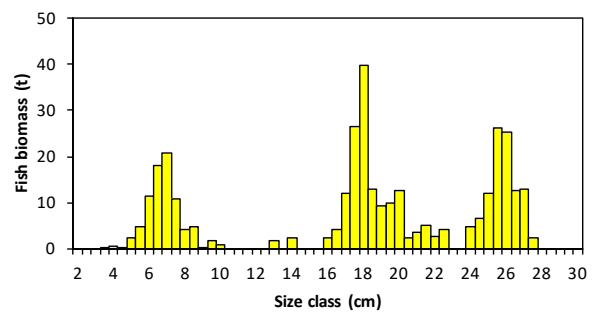


Figure 23. ECOCADIZ-RECLUTAS 2019-10 survey. Horse mackerel (*Trachurus trachurus*). Cont'd.

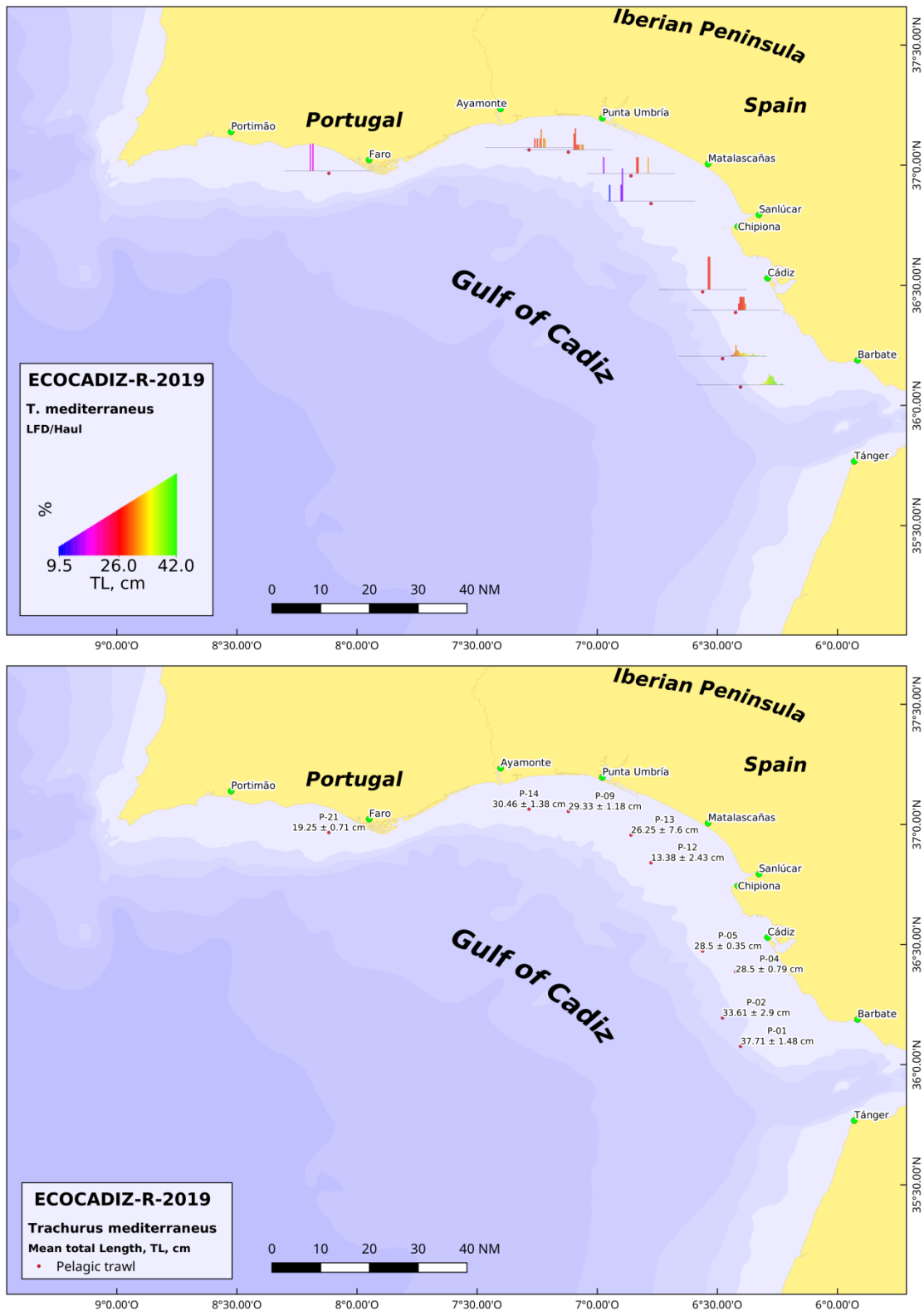


Figure 24. ECOCADIZ-RECLUTAS 2019-10 survey. Mediterranean horse mackerel (*Trachurus mediterraneus*). Top: length frequency distributions in fishing hauls. Bottom: mean \pm sd length by haul.

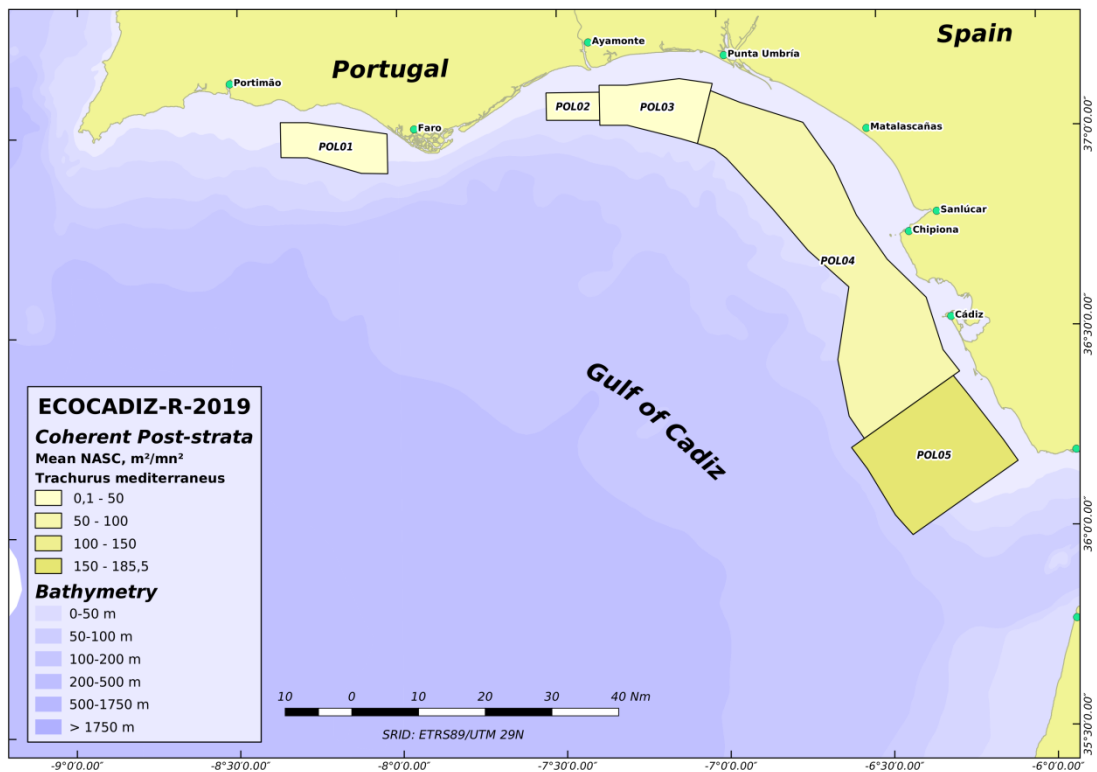
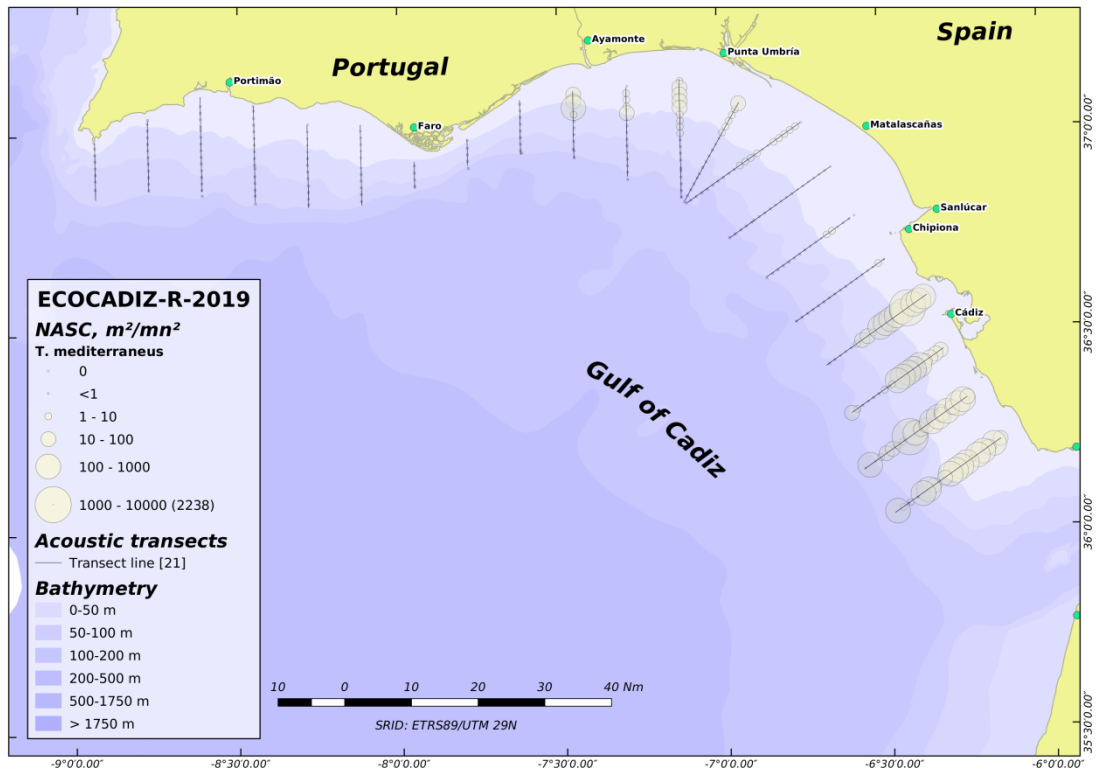


Figure 25. ECOCADIZ-RECLUTAS 2019-10 survey. Mediterranean horse mackerel (*Trachurus mediterraneus*). Top: distribution of the total backscattering energy (Nautical area scattering coefficient, NASC, in $m^2\ nmi^{-2}$) attributed to the species. Bottom: distribution of homogeneous size-based post-strata used in the biomass/abundance estimates. Colour scale according to the mean value of the backscattering energy attributed to the species in each stratum.

ECOCADIZ-RECLUTAS 2019-10: Mediterranean horse mackerel (*T. mediterraneus*)

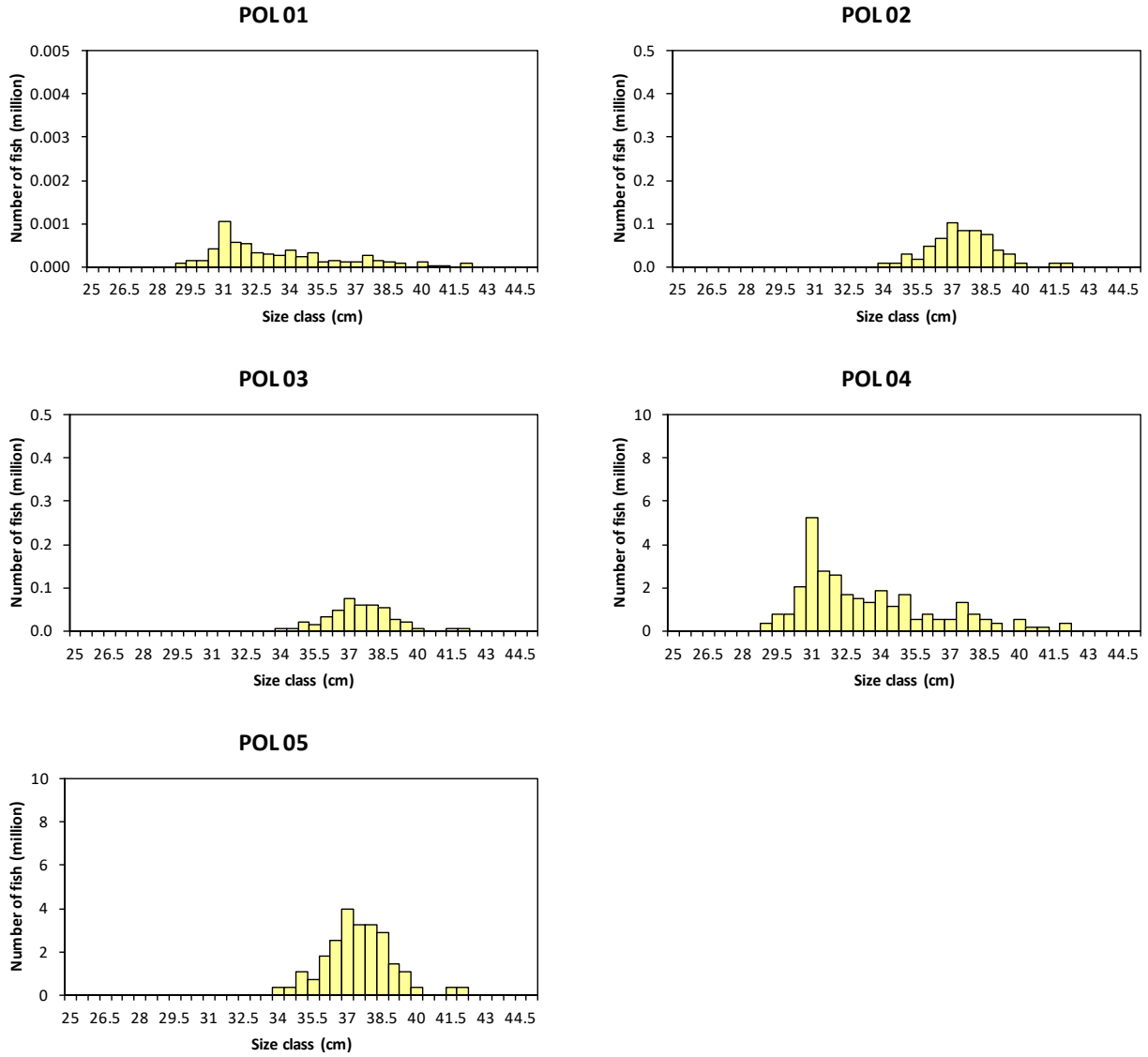


Figure 26. ECOCADIZ-RECLUTAS 2019-10 survey. Mediterranean horse mackerel (*Trachurus mediterraneus*). Estimated abundances (number of fish in millions) by length class (cm) by homogeneous stratum (POL01-POLn, numeration as in **Figure 25**) and total sampled area. Post-strata ordered in the W-E direction. The estimated biomass (t) by size class for the whole sampled area is also shown for comparison. Note the different scales in the y axis.

ECOCADIZ-RECLUTAS 2019-10: Mediterranean horse mackerel (*T. mediterraneus*)

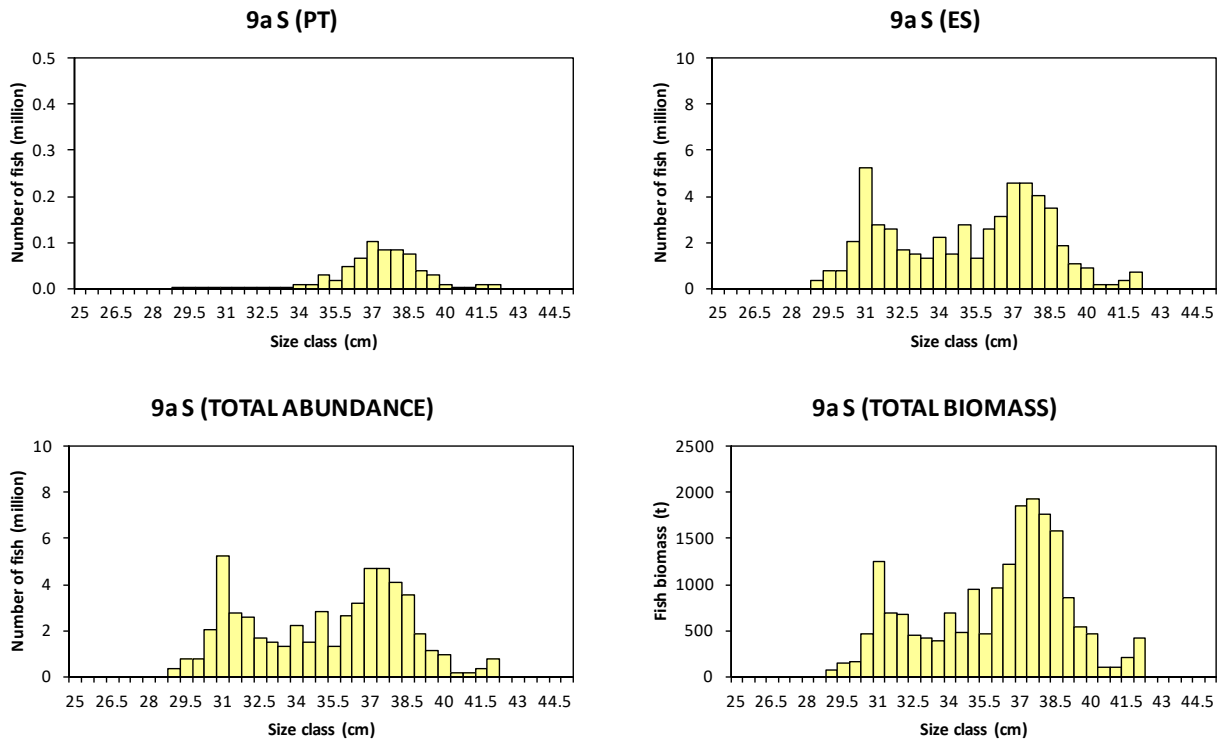


Figure 26. ECOCADIZ-RECLUTAS 2019-10 survey. Mediterranean horse mackerel (*Trachurus mediterraneus*).Cont'd.

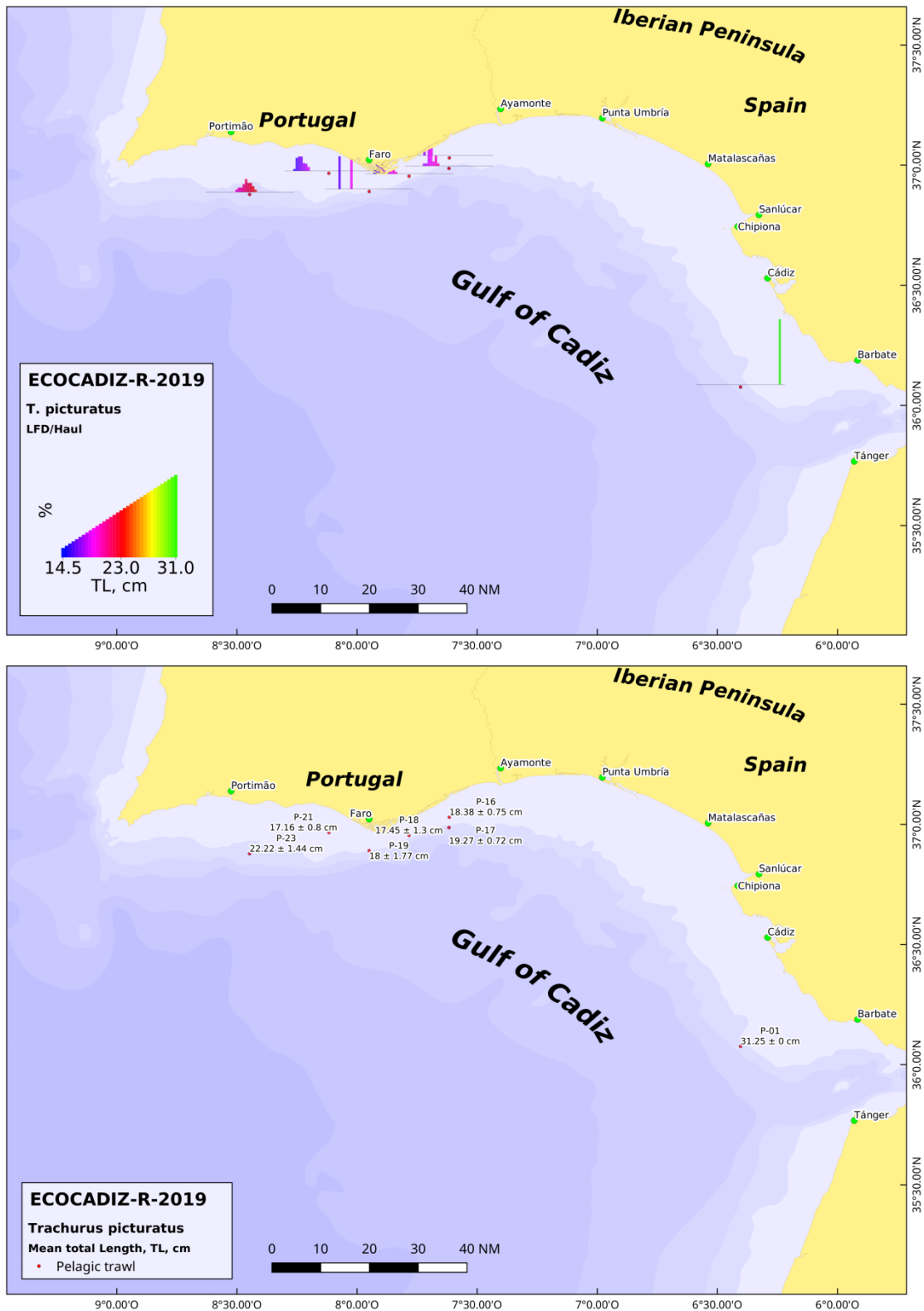


Figure 27. ECOCADIZ-RECLUTAS 2019-10 survey. Blue jack mackerel (*Trachurus picturatus*). Top: length frequency distributions in fishing hauls. Bottom: mean \pm sd length by haul.

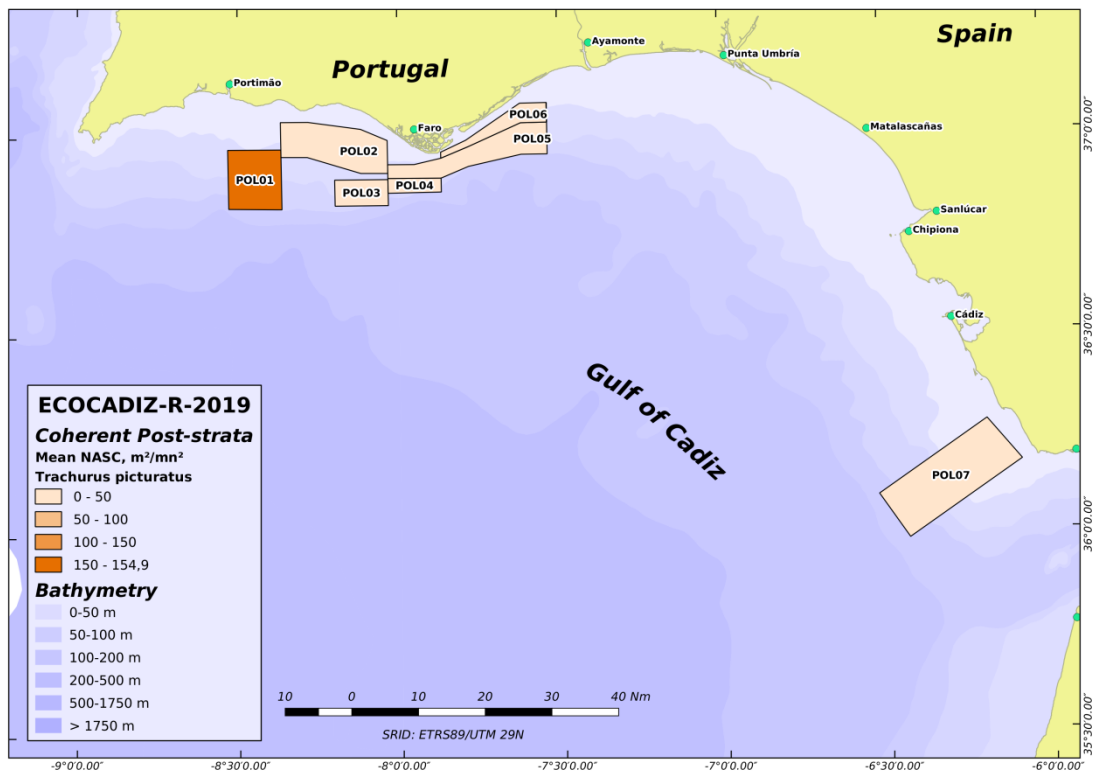
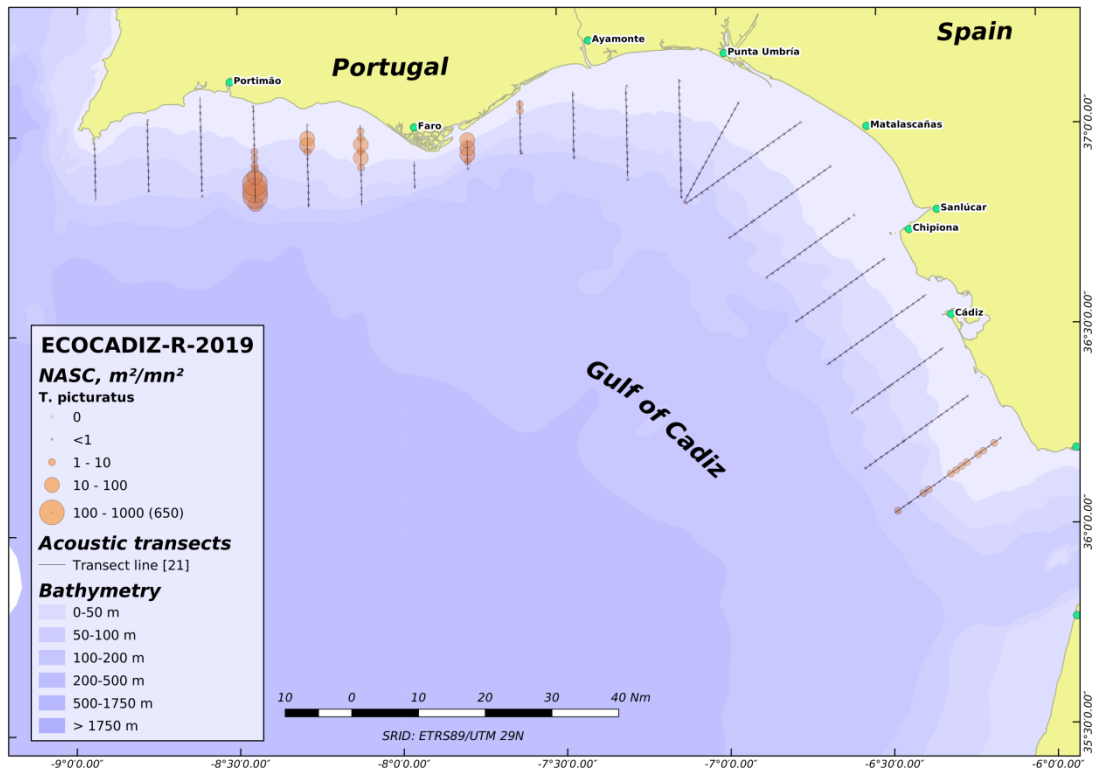


Figure 28. ECOCADIZ-RECLUTAS 2019-10 survey. Blue jack mackerel (*Trachurus picturatus*). Top: distribution of the total backscattering energy (Nautical area scattering coefficient, NASC, in $m^2 nmi^{-2}$) attributed to the species. Bottom: distribution of homogeneous size-based post-strata used in the biomass/abundance estimates. Colour scale according to the mean value of the backscattering energy attributed to the species in each stratum.

ECOCADIZ-RECLUTAS 2019-10: Blue jack mackerel (*T. picturatus*)

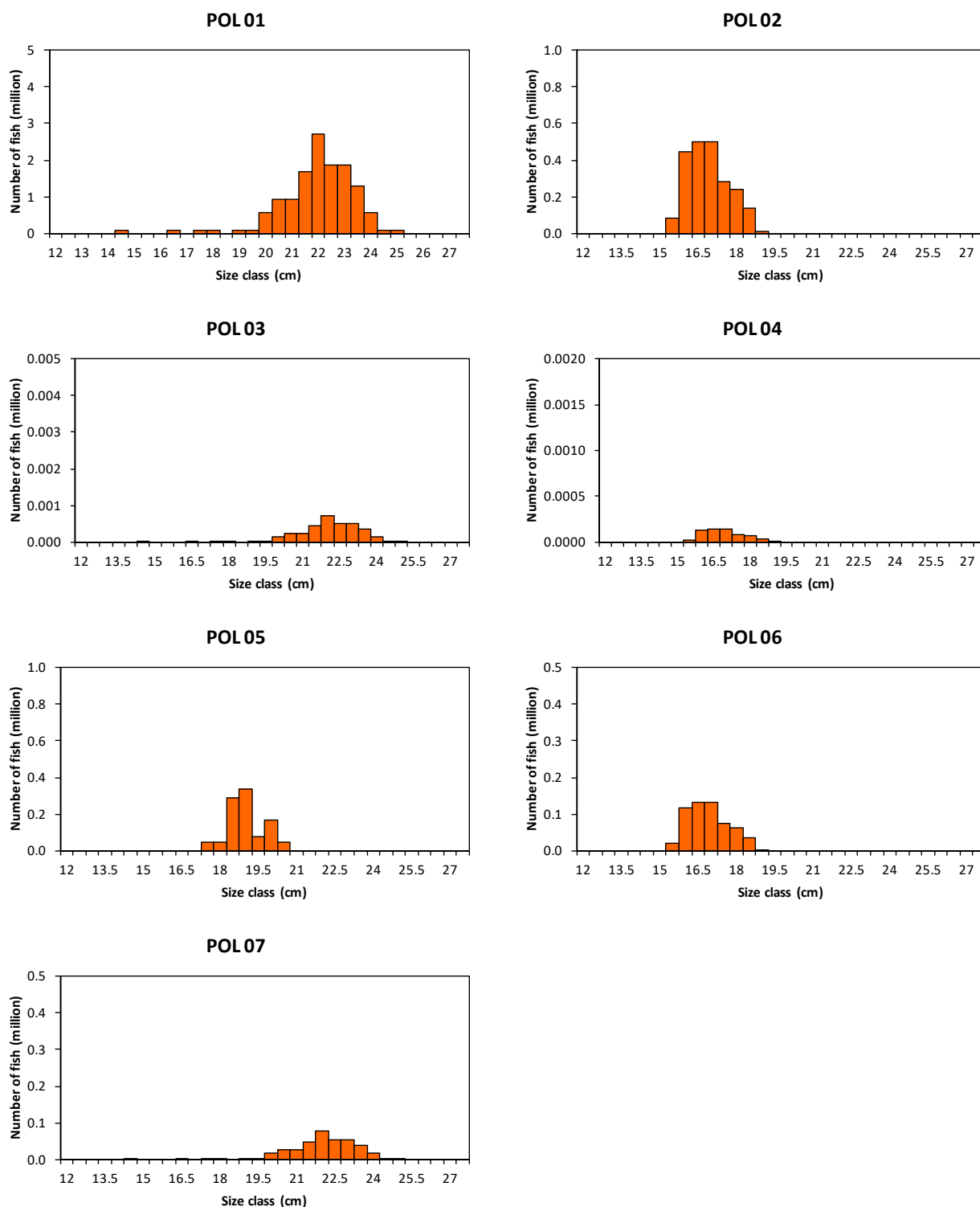


Figure 29. ECOCADIZ-RECLUTAS 2019-10 survey. Blue jack mackerel (*Trachurus picturatus*). Estimated abundances (number of fish in millions) by length class (cm) by homogeneous stratum (POL01-POLn, numeration as in **Figure 28**) and total sampled area. Post-strata ordered in the W-E direction. The estimated biomass (t) by size class for the whole sampled area is also shown for comparison. Note the different scales in the y axis.

ECOCADIZ-RECLUTAS 2019-10: Blue jack mackerel (*T. picturatus*)

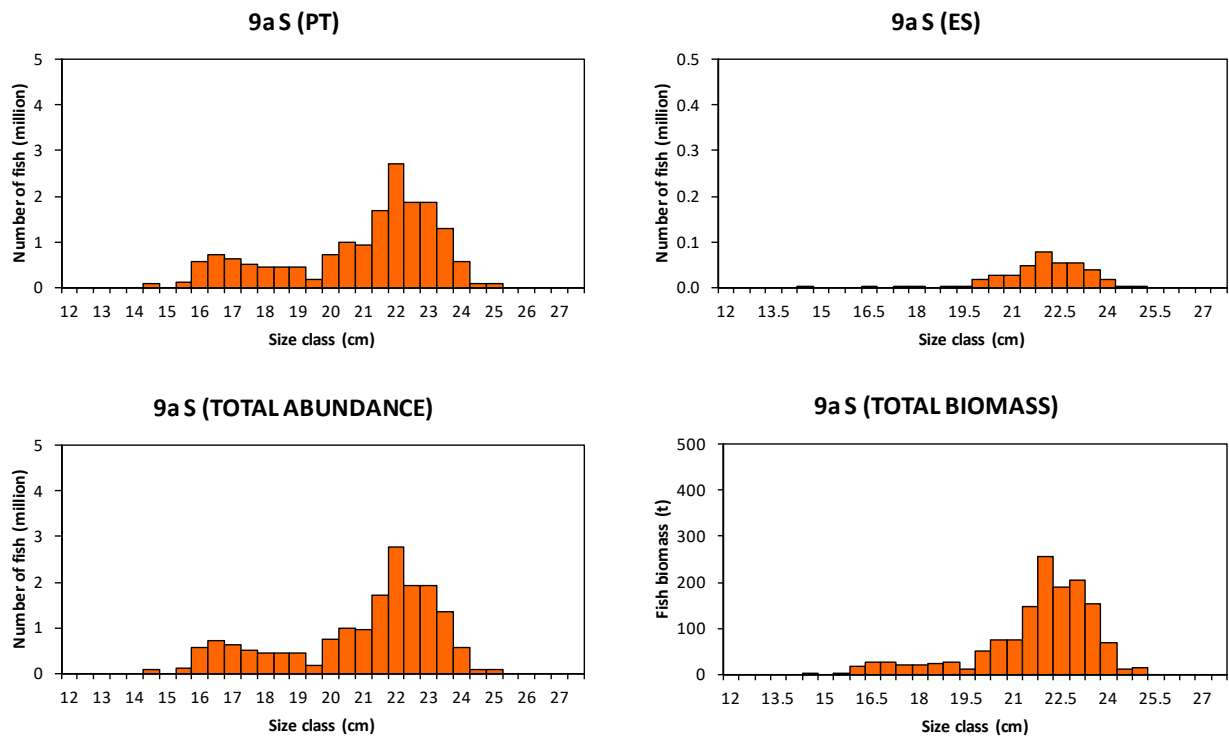
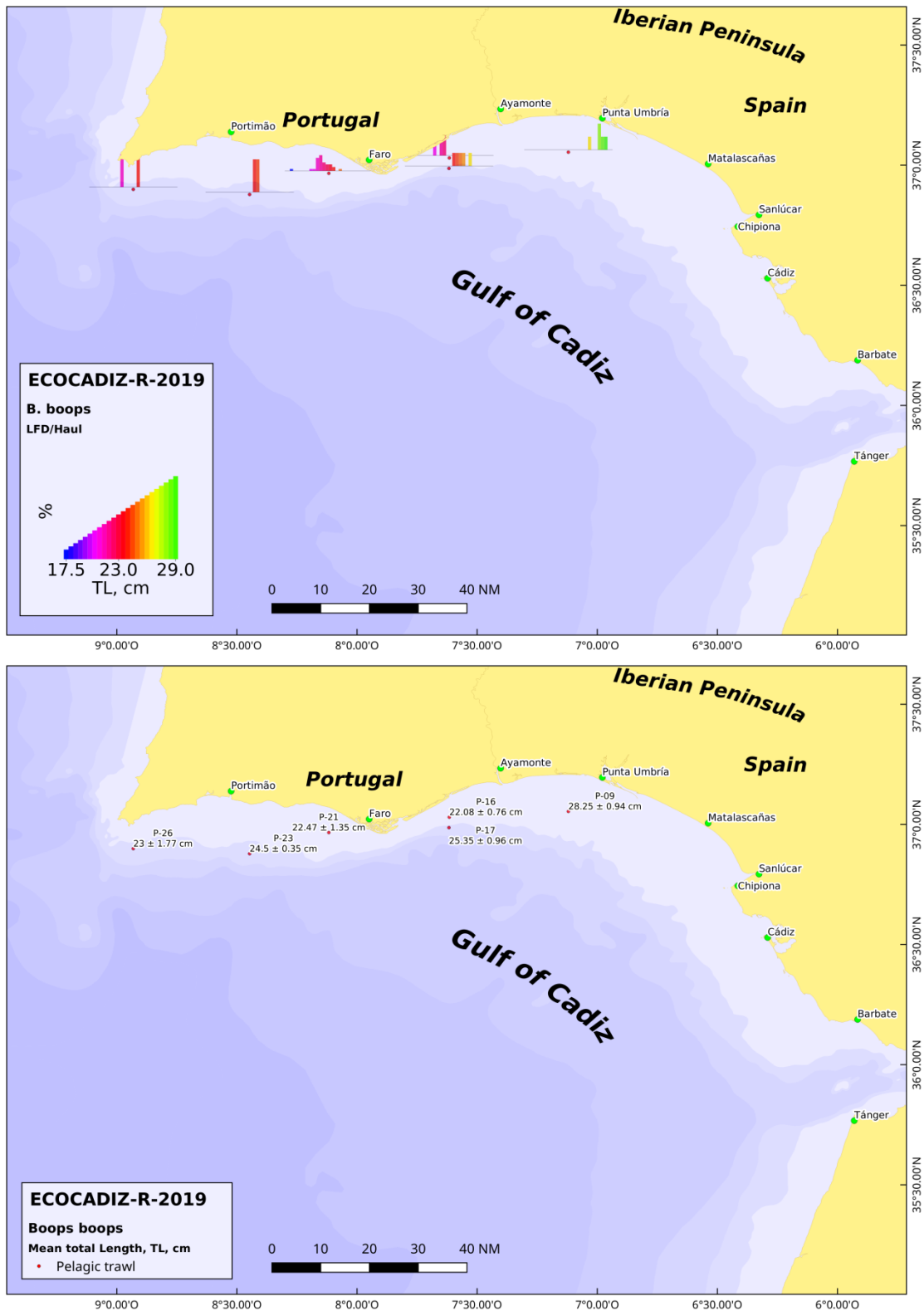


Figure 29. ECOCADIZ-RECLUTAS 2019-10 survey. Blue jack mackerel (*Trachurus picturatus*). Cont'd.



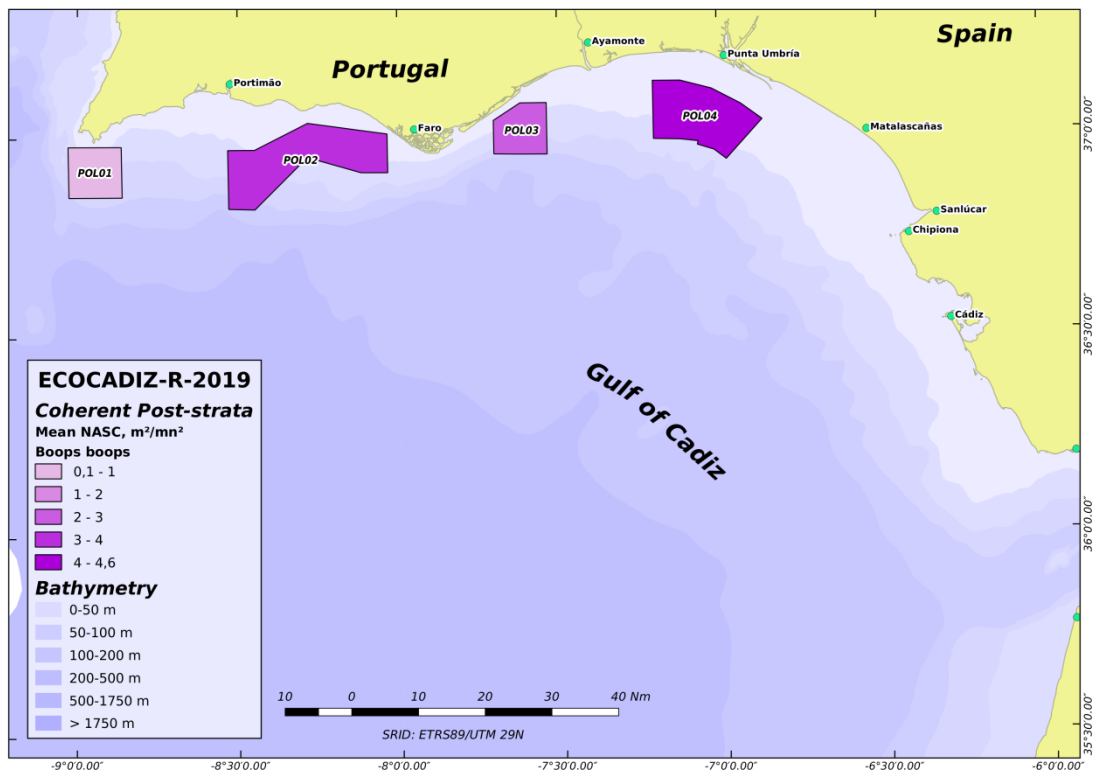
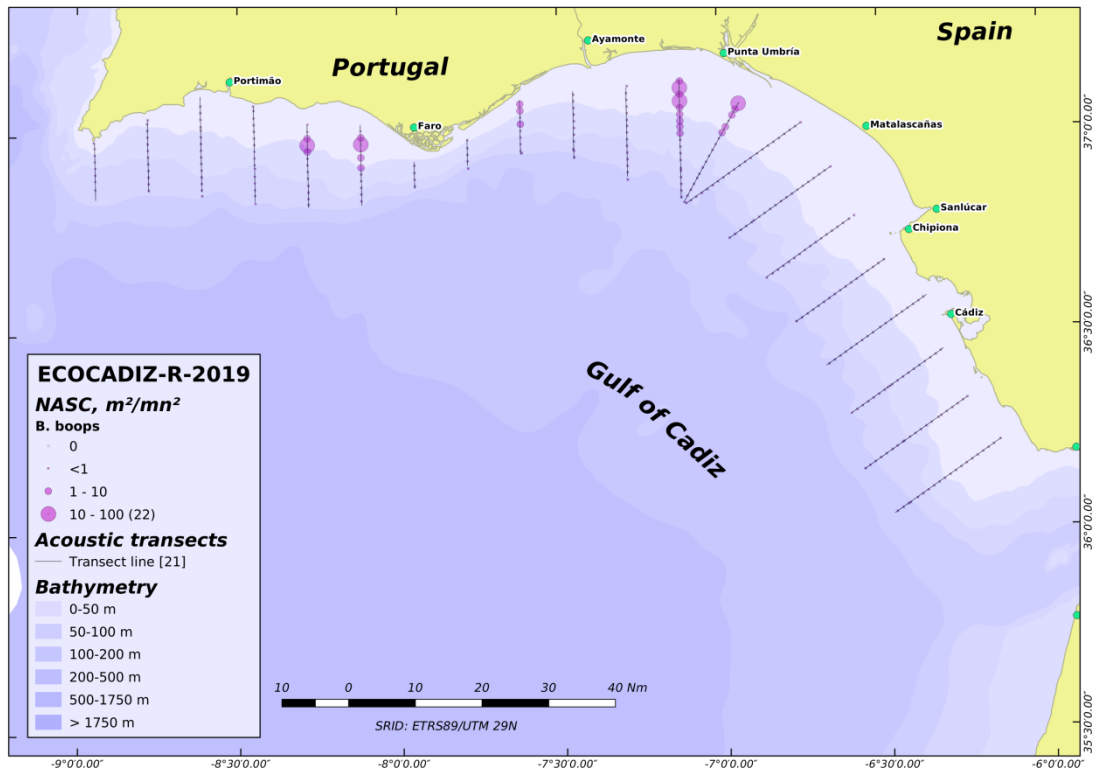


Figure 31. ECOCADIZ-RECLUTAS 2019-10 survey. Bogue (*Boops boops*). Top: distribution of the total backscattering energy (Nautical area scattering coefficient, NASC, in m² nmi⁻²) attributed to the species. Bottom: distribution of homogeneous size-based post-strata used in the biomass/abundance estimates. Colour scale according to the mean value of the backscattering energy attributed to the species in each stratum.

ECOCADIZ-RECLUTAS 2019-10: Bogue (*B. boops*)

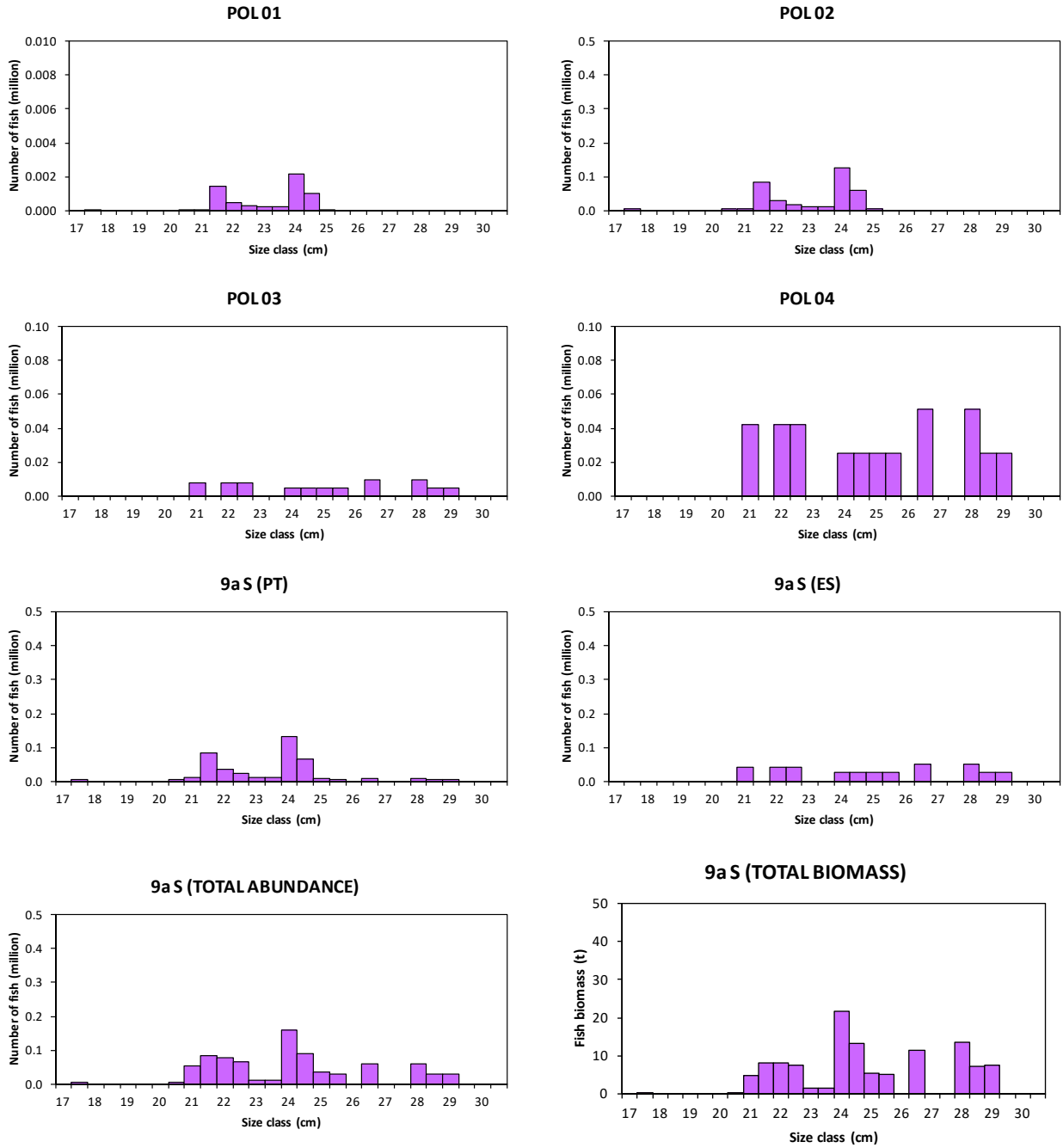


Figure 32. ECOCADIZ-RECLUTAS 2019-10 survey. Bogue (*Boops boops*). Estimated abundances (number of fish in millions) by length class (cm) by homogeneous stratum (POL01-POLn, numeration as in **Figure 31**) and total sampled area. Post-strata ordered in the W-E direction. The estimated biomass (t) by size class for the whole sampled area is also shown for comparison. Note the different scales in the y axis.

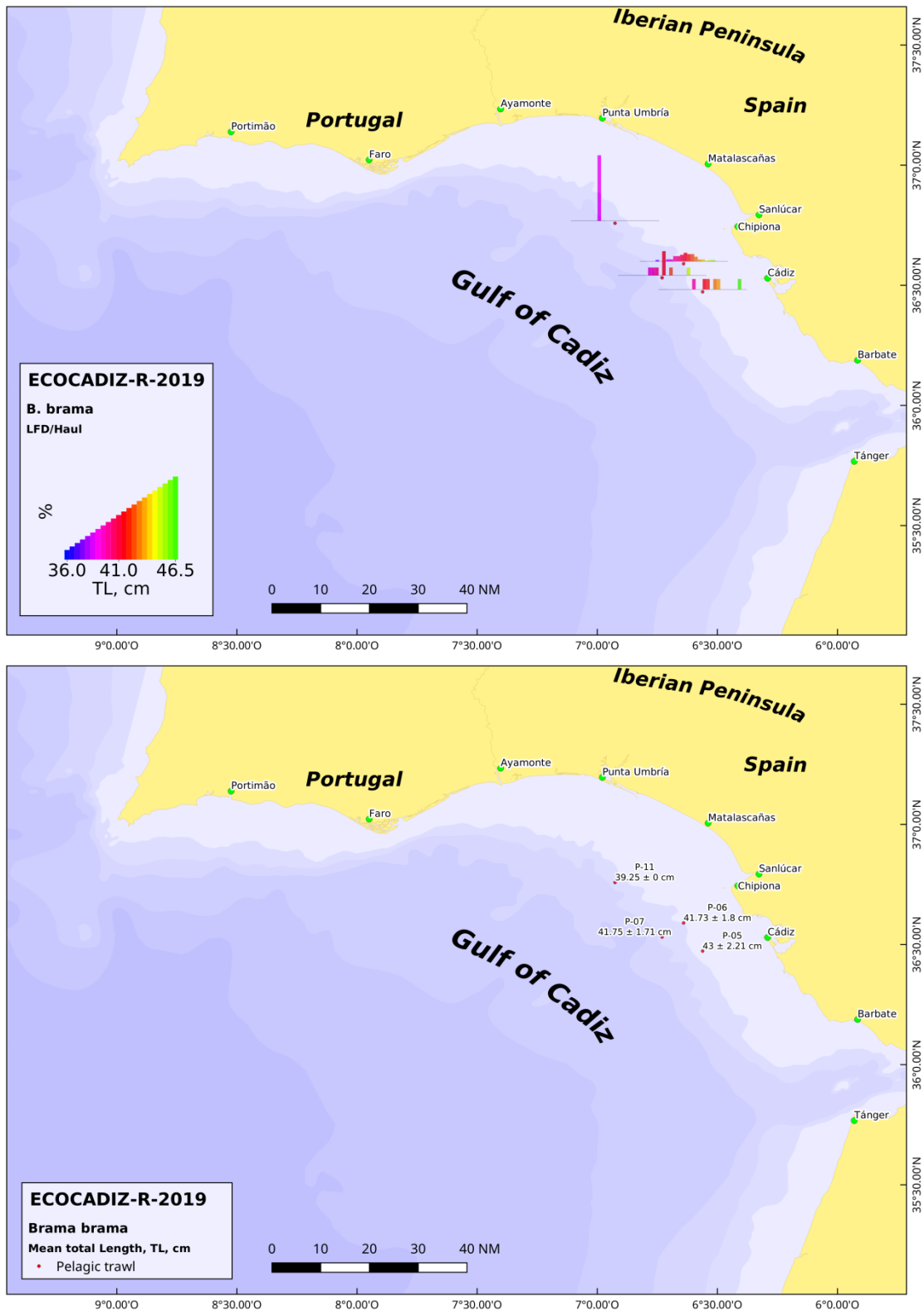


Figure 33. ECOCADIZ-RECLUTAS 2019-10 survey. Atlantic pomfret (*Brama brama*). Top: length frequency distributions in fishing hauls. Bottom: mean ± sd length by haul.

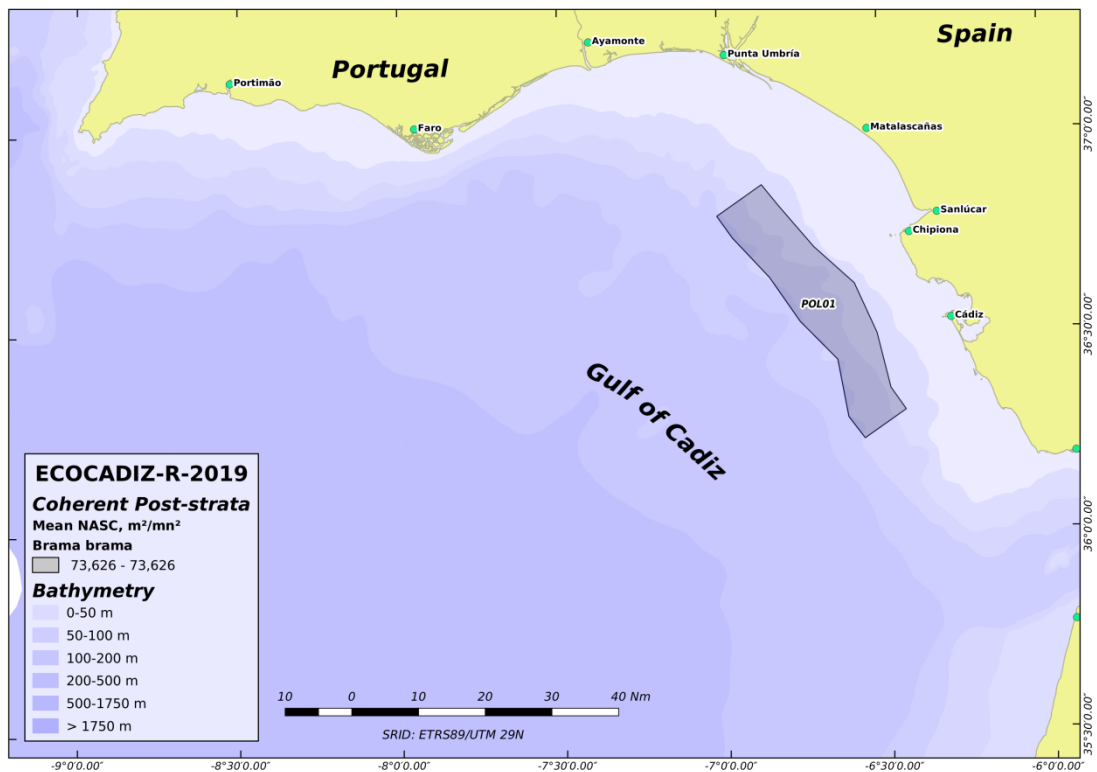
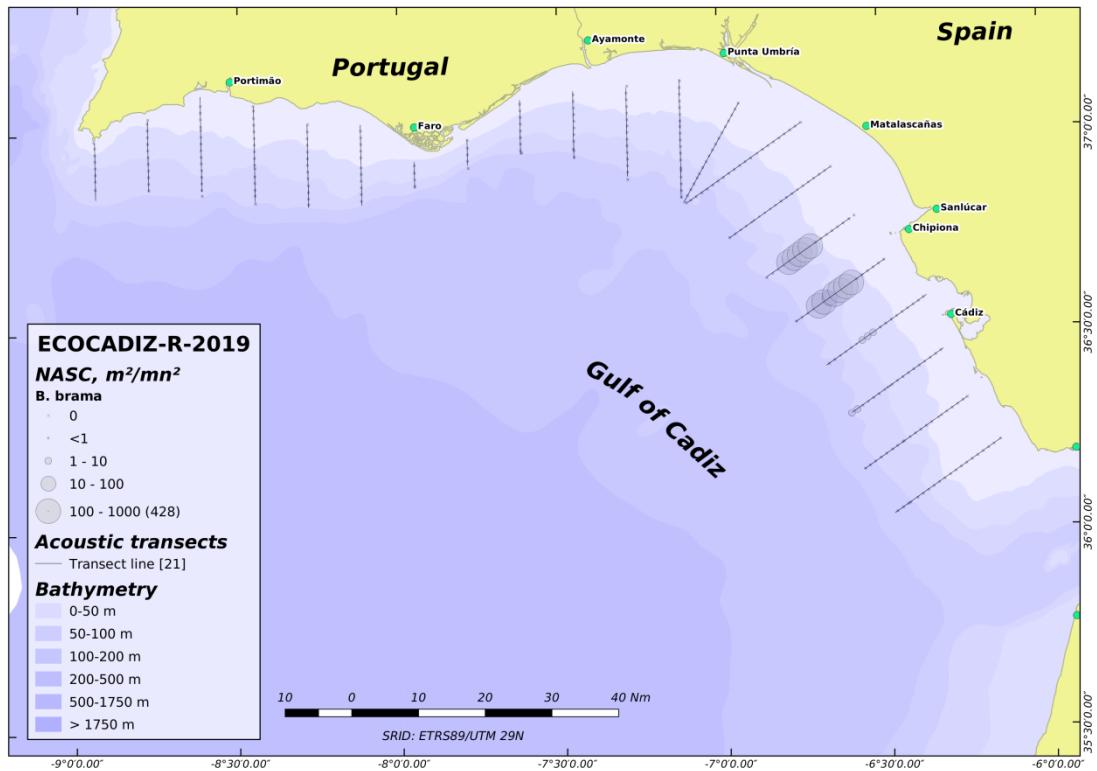


Figure 34. ECOCADIZ-RECLUTAS 2019-10 survey. Atlantic pomfret (*Brama brama*). Top: distribution of the total backscattering energy (Nautical area scattering coefficient, NASC, in m² nmi⁻²) attributed to the species. Bottom: distribution of homogeneous size-based post-strata used in the biomass/abundance estimates. Colour scale according to the mean value of the backscattering energy attributed to the species in each stratum.

ECOCADIZ-RECLUTAS 2019-10: Atlantic pomfret (*B. brama*)

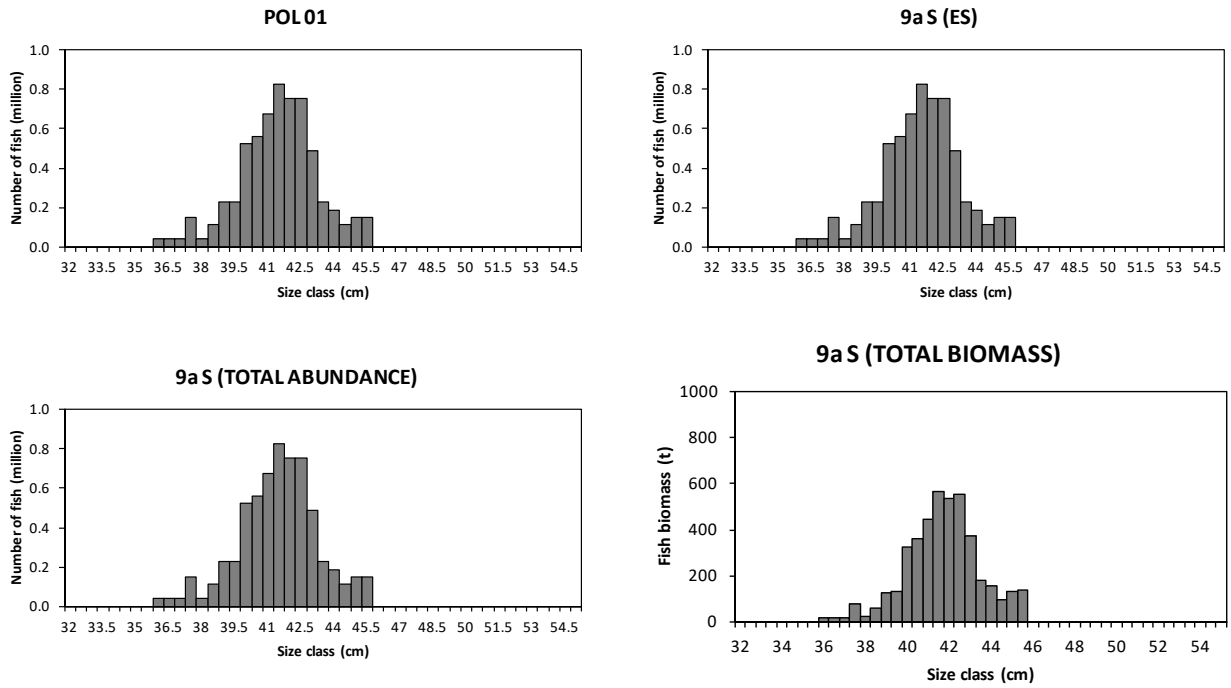


Figure 35. ECOCADIZ-RECLUTAS 2019-10 survey. Atlantic pomfret (*Brama brama*). Estimated abundances (number of fish in millions) by length class (cm) by homogeneous stratum (POL01-POLn, numeration as in **Figure 34**) and total sampled area. Post-strata ordered in the W-E direction. The estimated biomass (t) by size class for the whole sampled area is also shown for comparison. Note the different scales in the y axis.

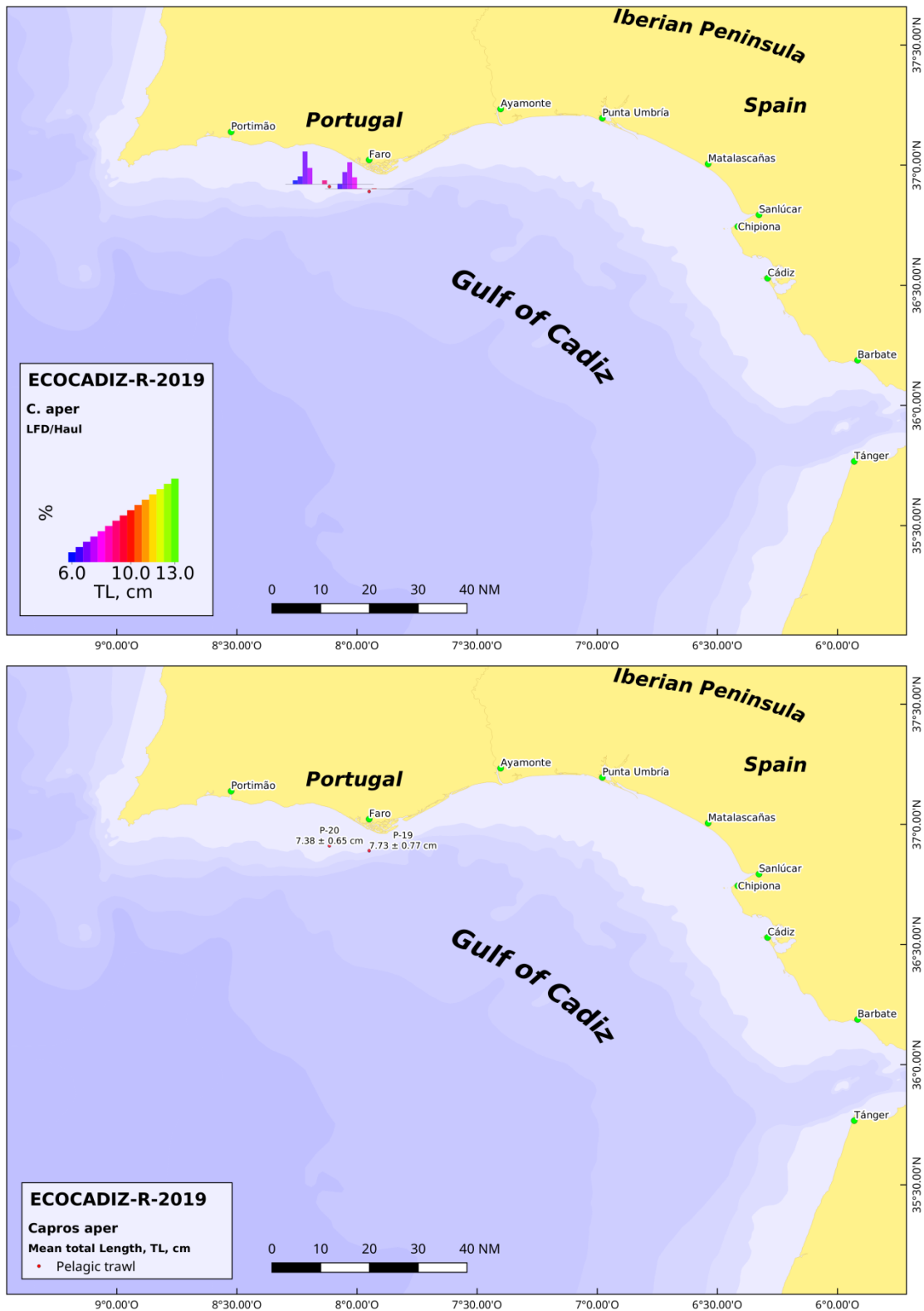


Figure 36. ECOCADIZ-RECLUTAS 2019-10 survey. Boarfish (*Capros aper*). Top: length frequency distributions in fishing hauls. Bottom: mean \pm sd length by haul.

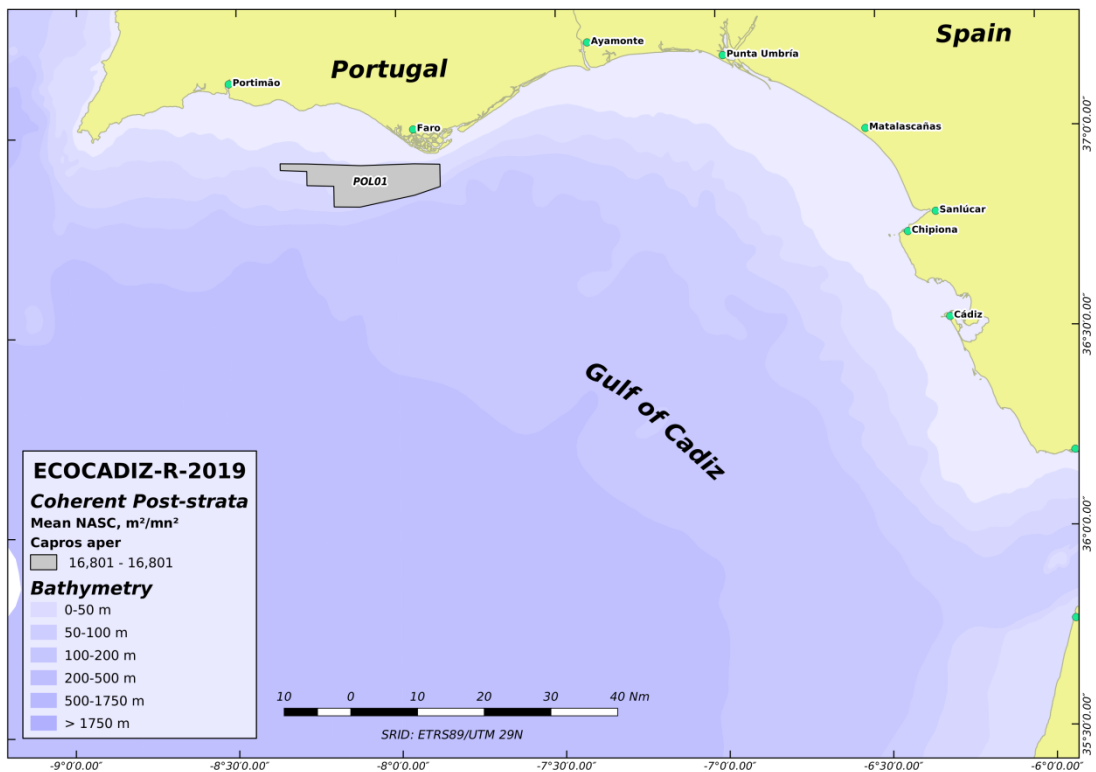
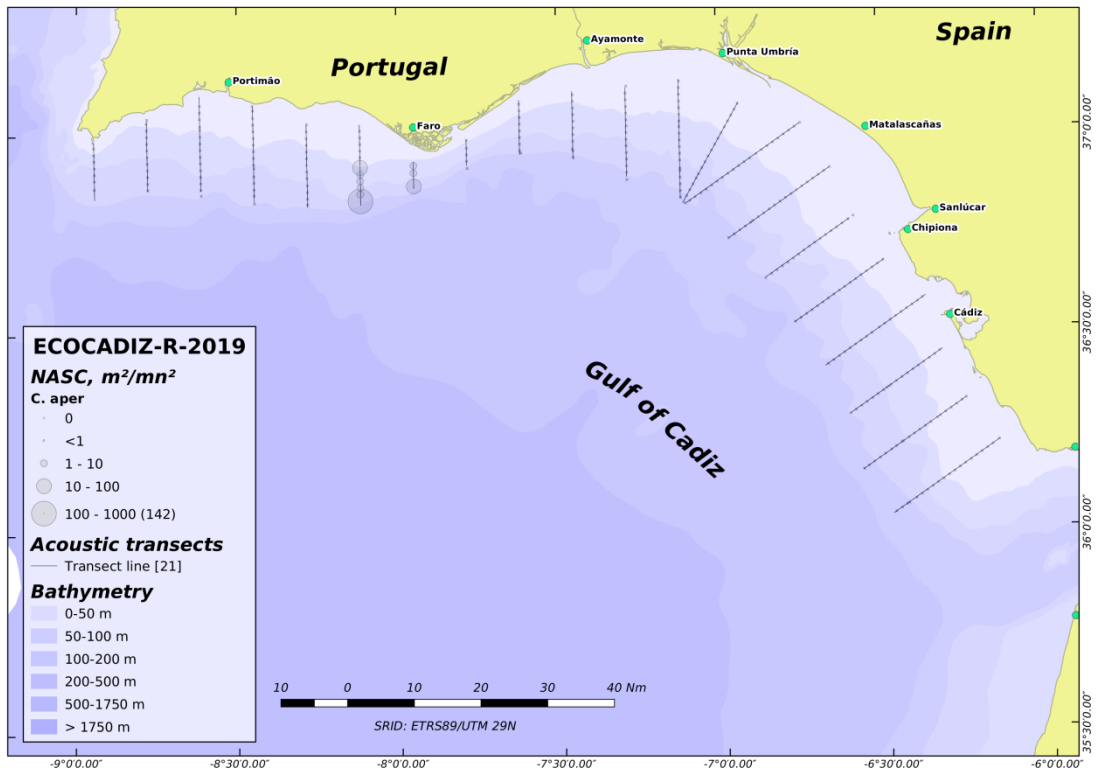


Figure 37. ECOCADIZ-RECLUTAS 2019-10 survey. Boarfish (*Capros aper*). Top: distribution of the total backscattering energy (Nautical area scattering coefficient, NASC, in m² nmi⁻²) attributed to the species. Bottom: distribution of homogeneous size-based post-strata used in the biomass/abundance estimates. Colour scale according to the mean value of the backscattering energy attributed to the species in each stratum.

ECOCADIZ-RECLUTAS 2019-10: Boarfish (*C. aper*)

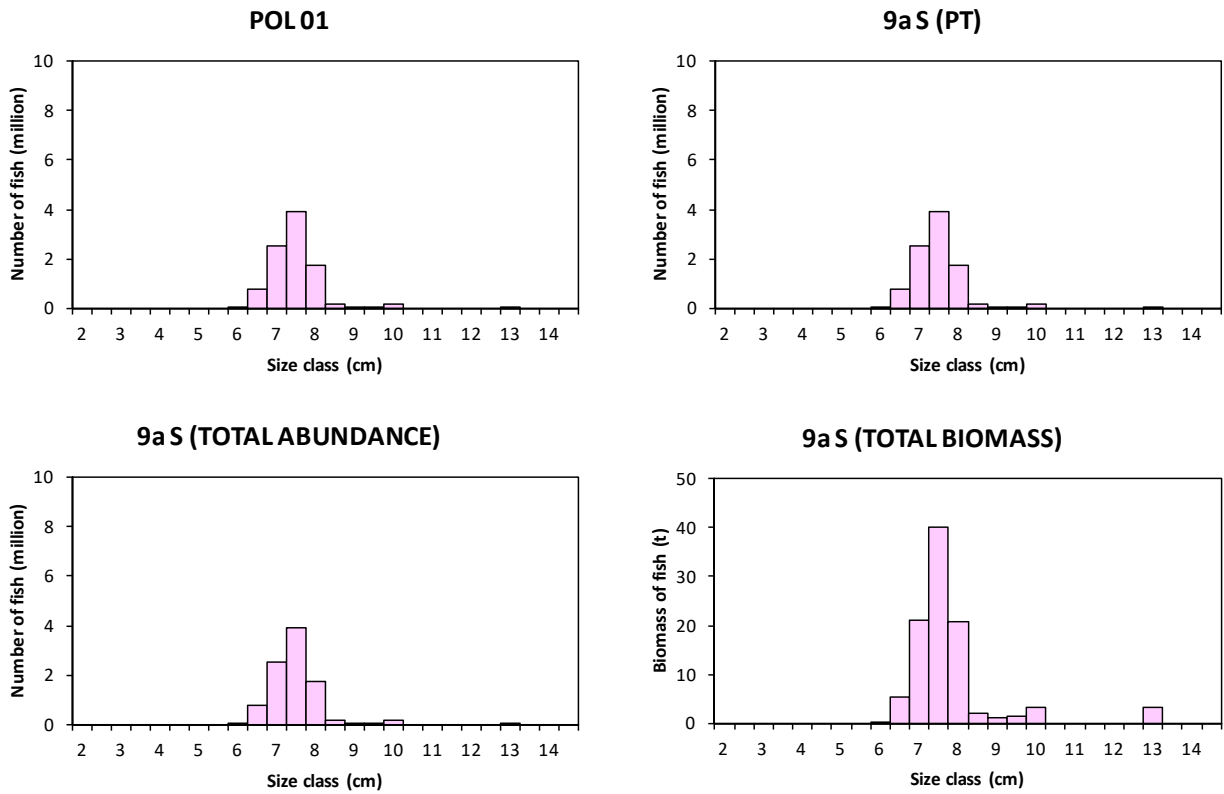


Figure 38. ECOCADIZ-RECLUTAS 2019-10 survey. Boarfish (*Capros aper*). Estimated abundances (number of fish in millions) by length class (cm) by homogeneous stratum (POL01-POLn, numeration as in **Figure 37**) and total sampled area. Post-strata ordered in the W-E direction. The estimated biomass (t) by size class for the whole sampled area is also shown for comparison. Note the different scales in the y axis.

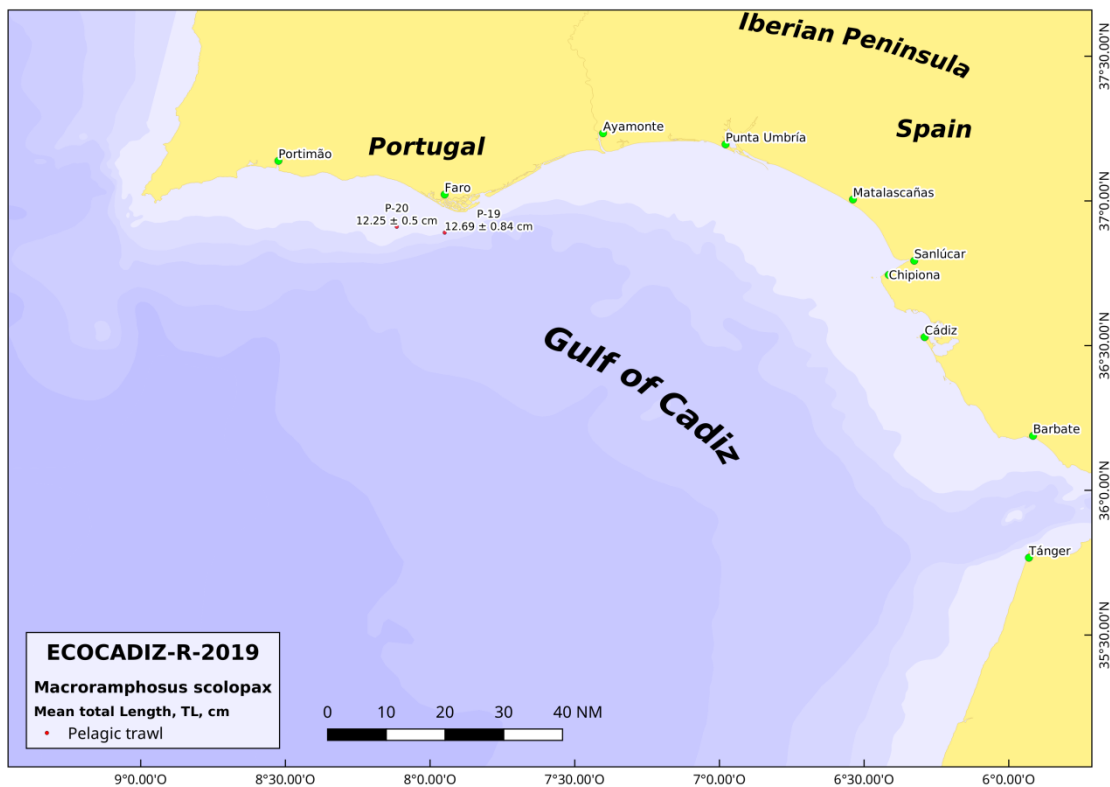
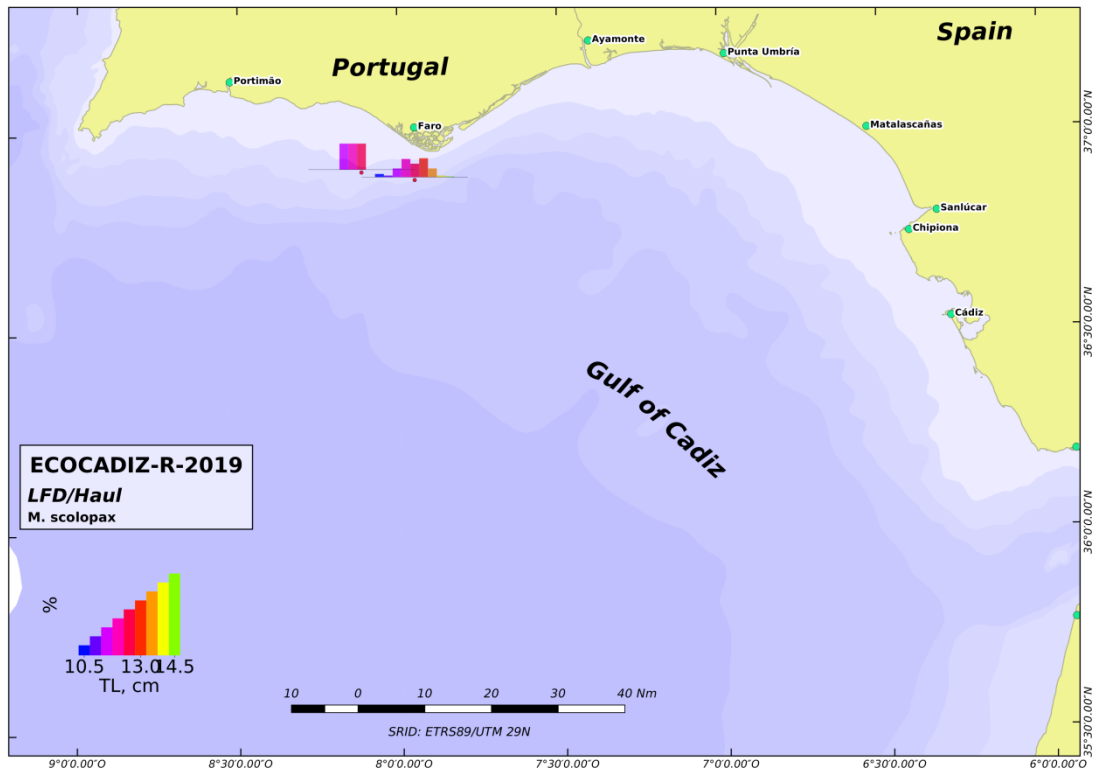


Figure 39. ECOCADIZ-RECLUTAS 2019-10 survey. Longspine snipefish (*Macroramphosus scolopax*). Top: length frequency distributions in fishing hauls. Bottom: mean \pm sd length by haul.

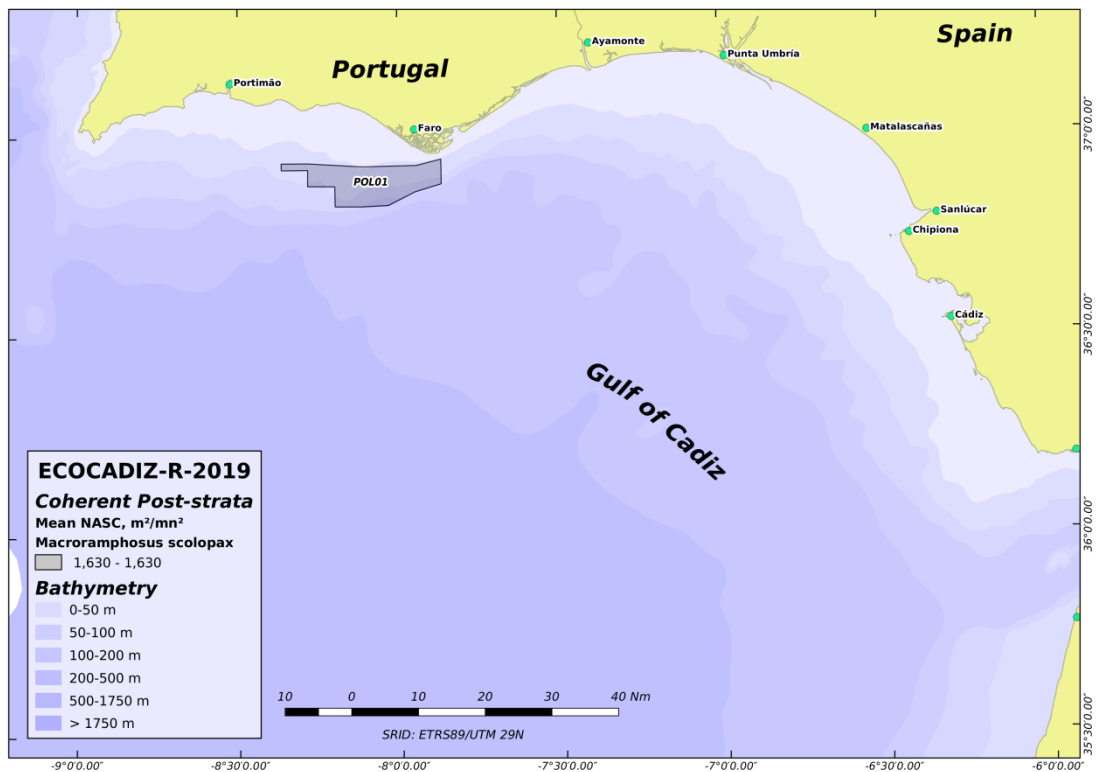
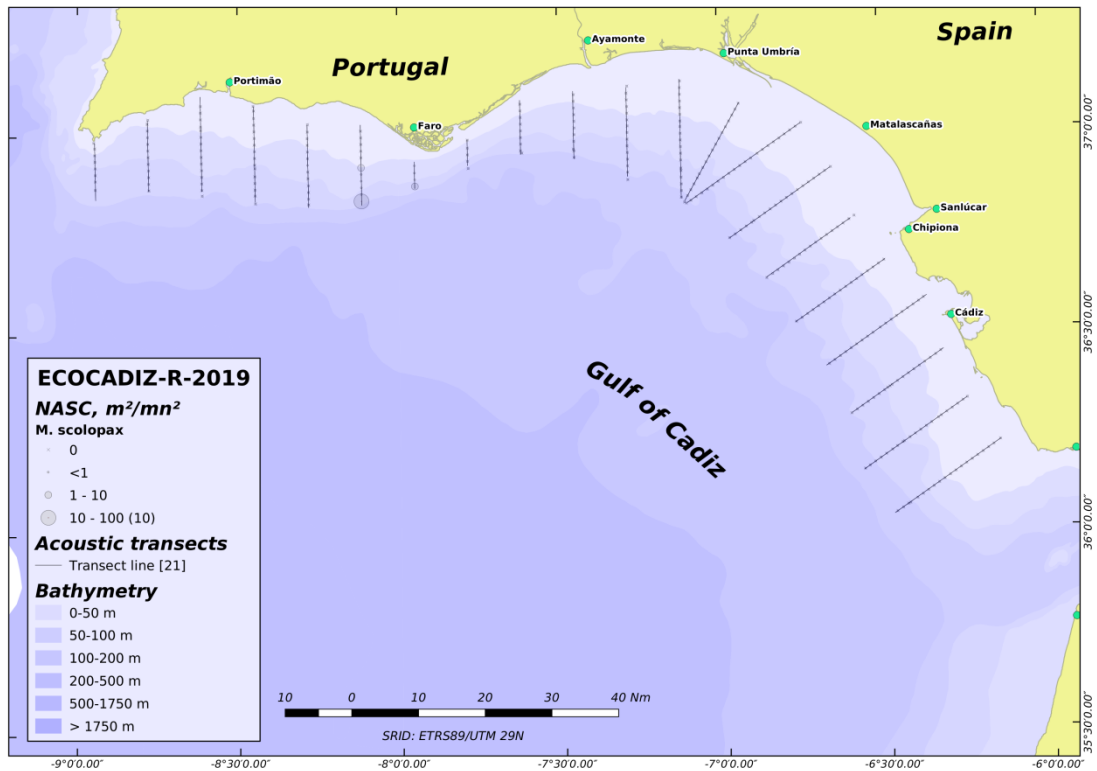


Figure 40. ECOCADIZ-RECLUTAS 2019-10 survey. Longspine snipefish (*Macroramphosus scolopax*). Top: distribution of the total backscattering energy (Nautical area scattering coefficient, $NASC$, in $m^2\ nmi^{-2}$) attributed to the species. Bottom: distribution of homogeneous size-based post-strata used in the biomass/abundance estimates. Colour scale according to the mean value of the backscattering energy attributed to the species in each stratum.

ECOCADIZ-RECLUTAS 2019-10: Longspine snipefish (*M. scolopax*)

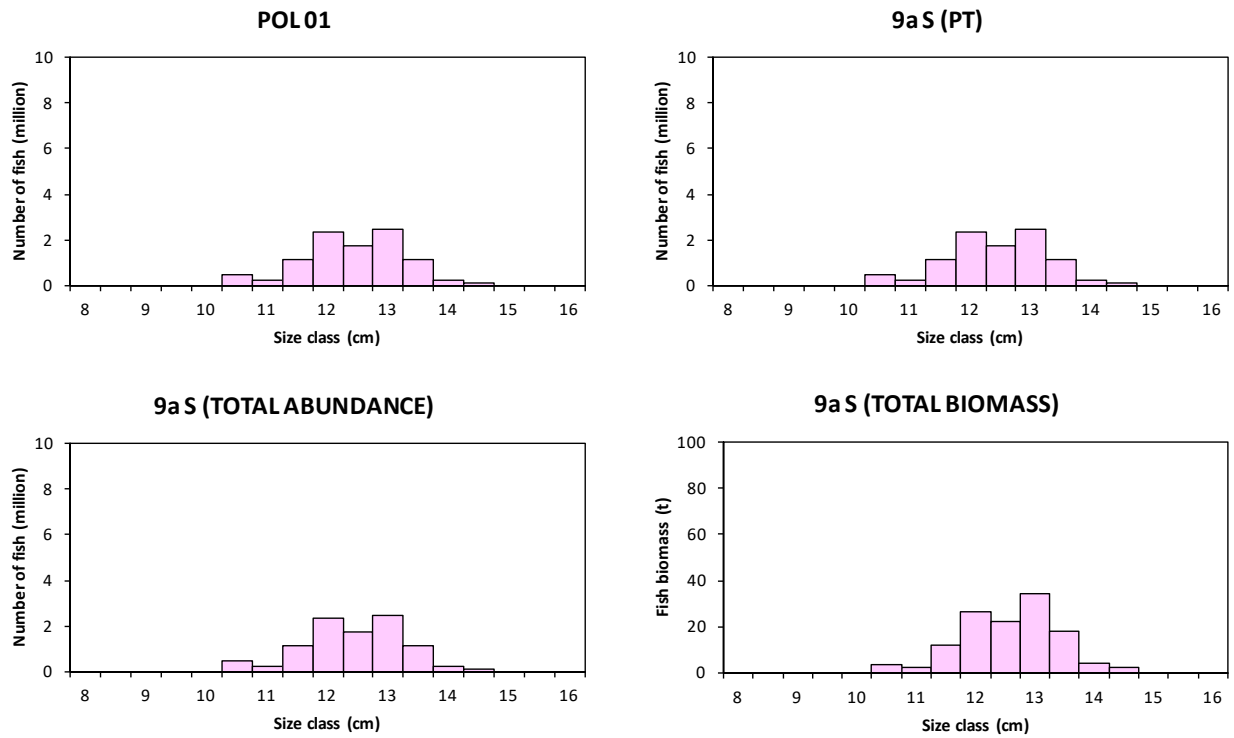


Figure 41. ECOCADIZ-RECLUTAS 2019-10 survey. Longspine snipefish (*Macroramphosus scolopax*). Estimated abundances (number of fish in millions) by length class (cm) by homogeneous stratum (POL01-POLn, numeration as in **Figure 40**) and total sampled area. Post-strata ordered in the W-E direction. The estimated biomass (t) by size class for the whole sampled area is also shown for comparison. Note the different scales in the y axis.

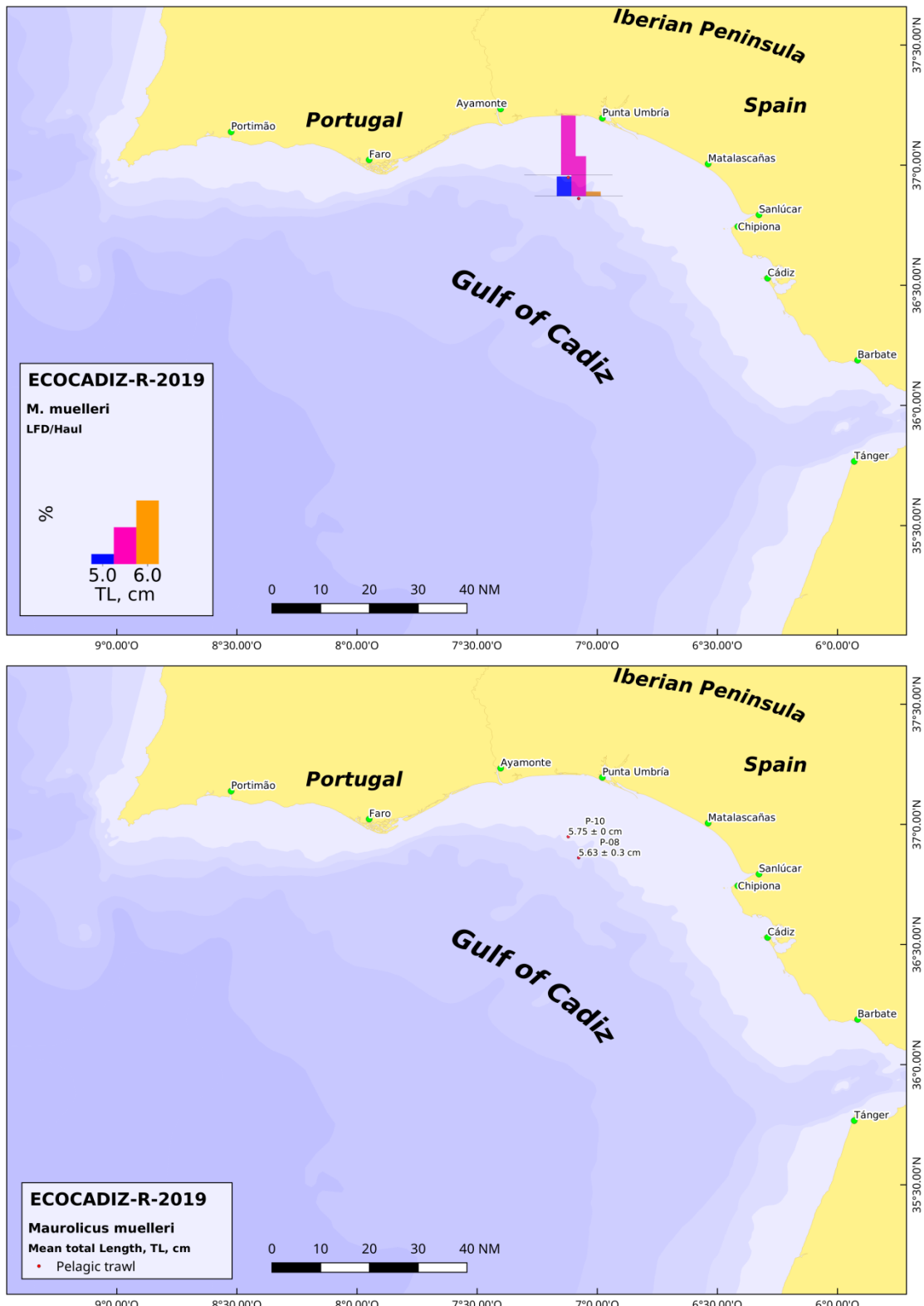


Figure 42. ECOCADIZ-RECLUTAS 2019-10 survey. Pearlside (*Maurolicus muelleri*). Top: length frequency distributions in fishing hauls. Bottom: mean \pm sd length by haul.

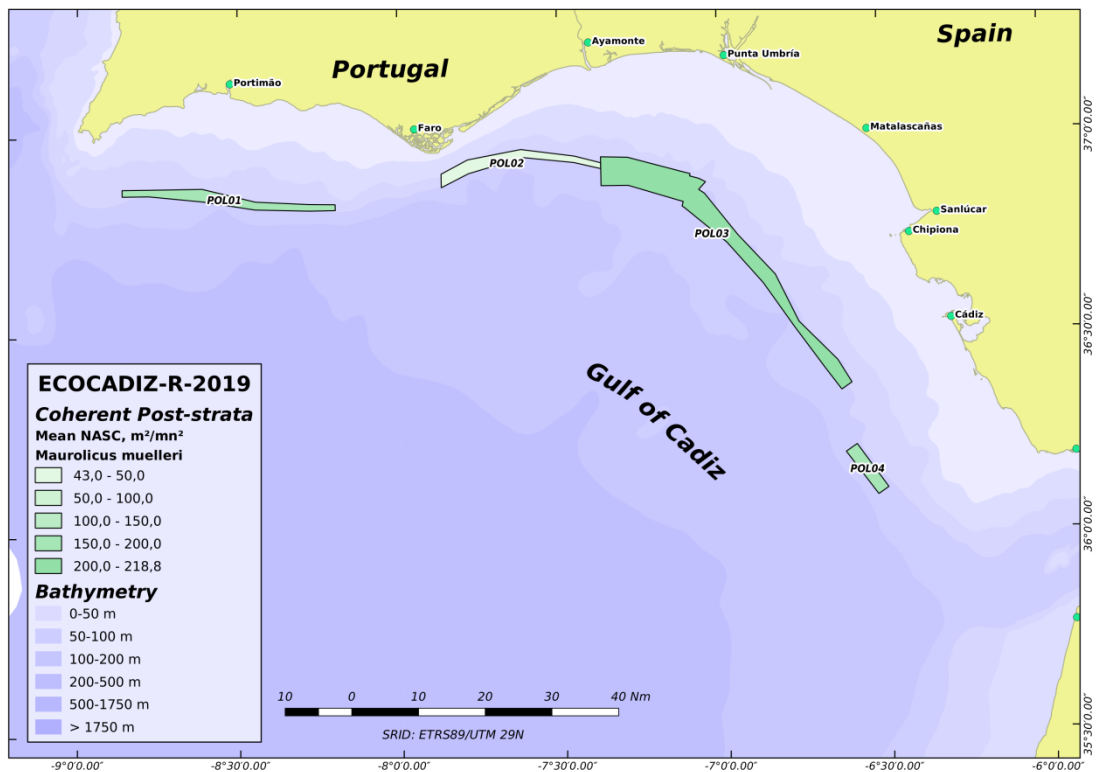
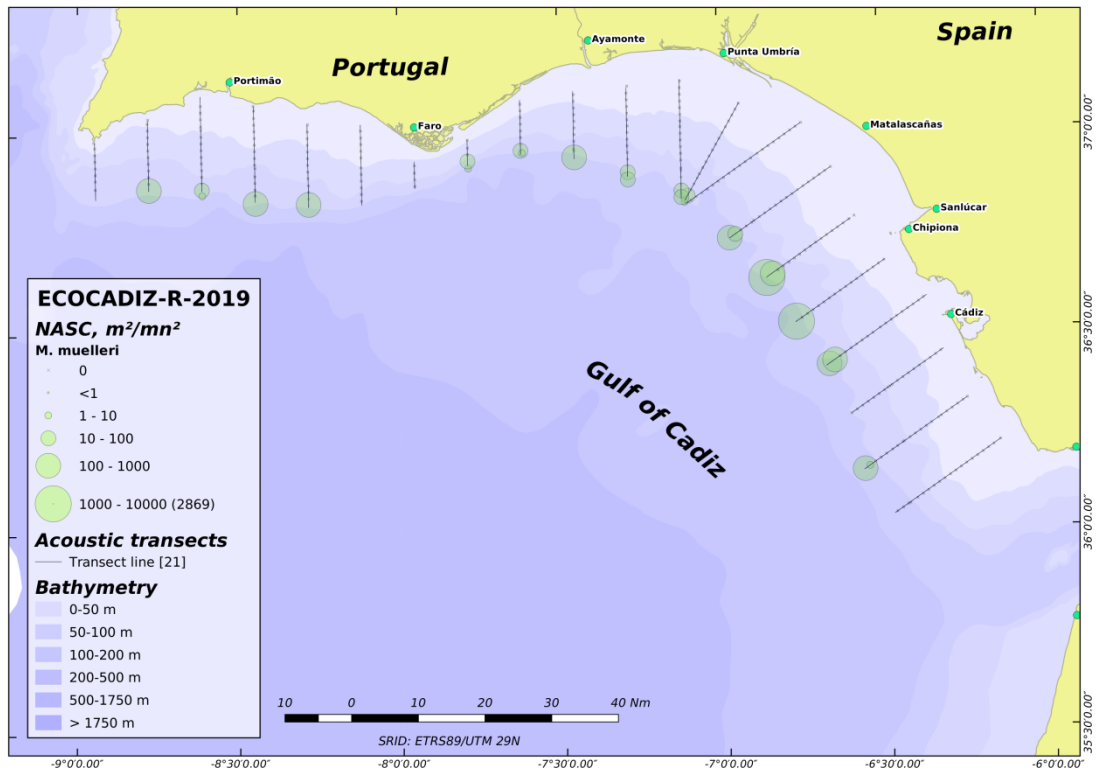


Figure 43. ECOCADIZ-RECLUTAS 2019-10 survey. Pearlside (*Maurolicus muelleri*). Top: distribution of the total backscattering energy (Nautical area scattering coefficient, NASC, in m² nmi⁻²) attributed to the species. Bottom: distribution of homogeneous size-based post-strata used in the biomass/abundance estimates. Colour scale according to the mean value of the backscattering energy attributed to the species in each stratum.

ECOCADIZ-RECLUTAS 2018-10: Pearlside (*M. muelleri*)

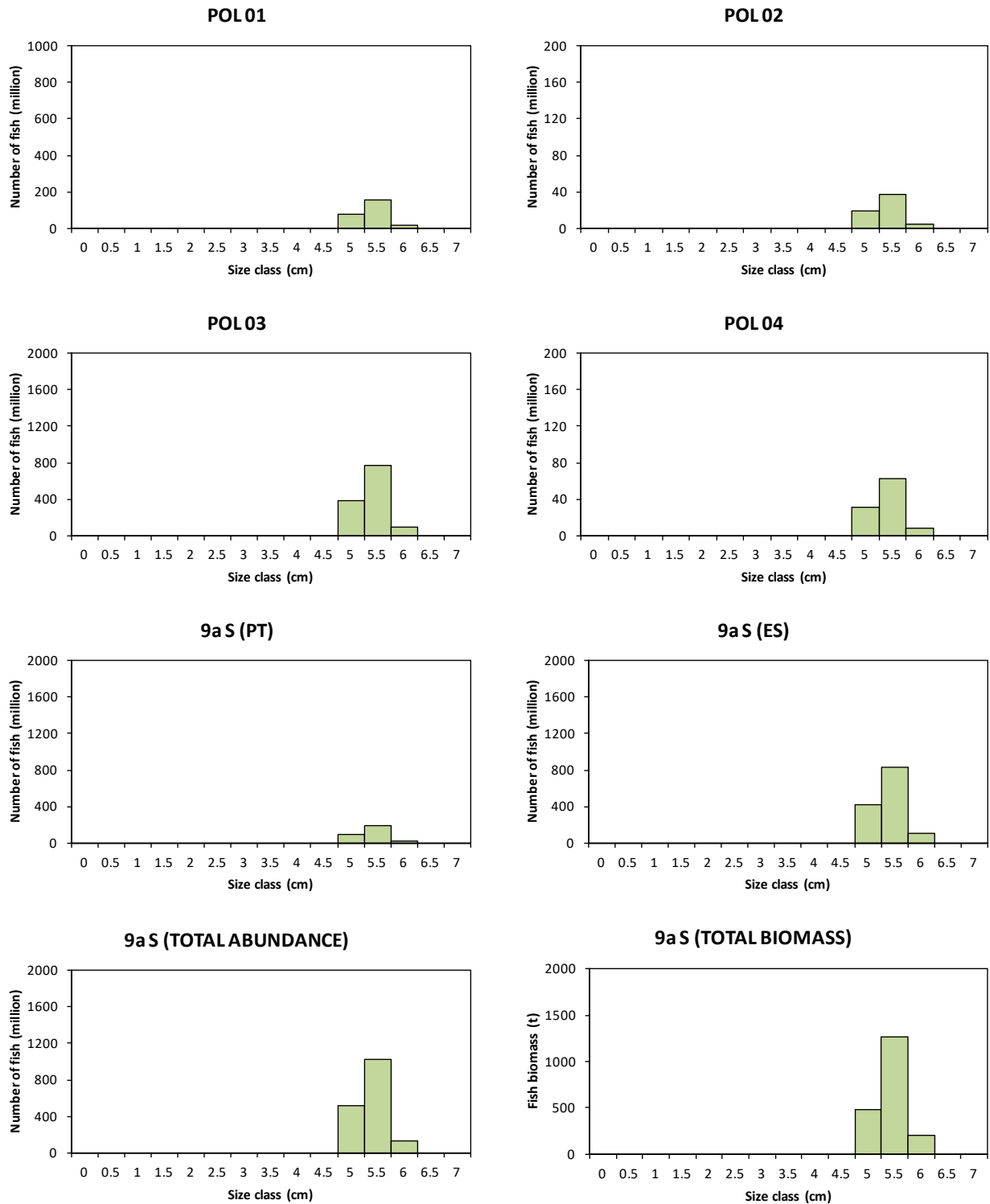


Figure 44. ECOCADIZ-RECLUTAS 2019-10 survey. Pearlside (*Maurolucus muelleri*). Estimated abundances (number of fish in millions) by length class (cm) by homogeneous stratum (POL01-POLn, numeration as in **Figure 43**) and total sampled area. Post-strata ordered in the W-E direction. The estimated biomass (t) by size class for the whole sampled area is also shown for comparison. Note the different scales in the y axis.

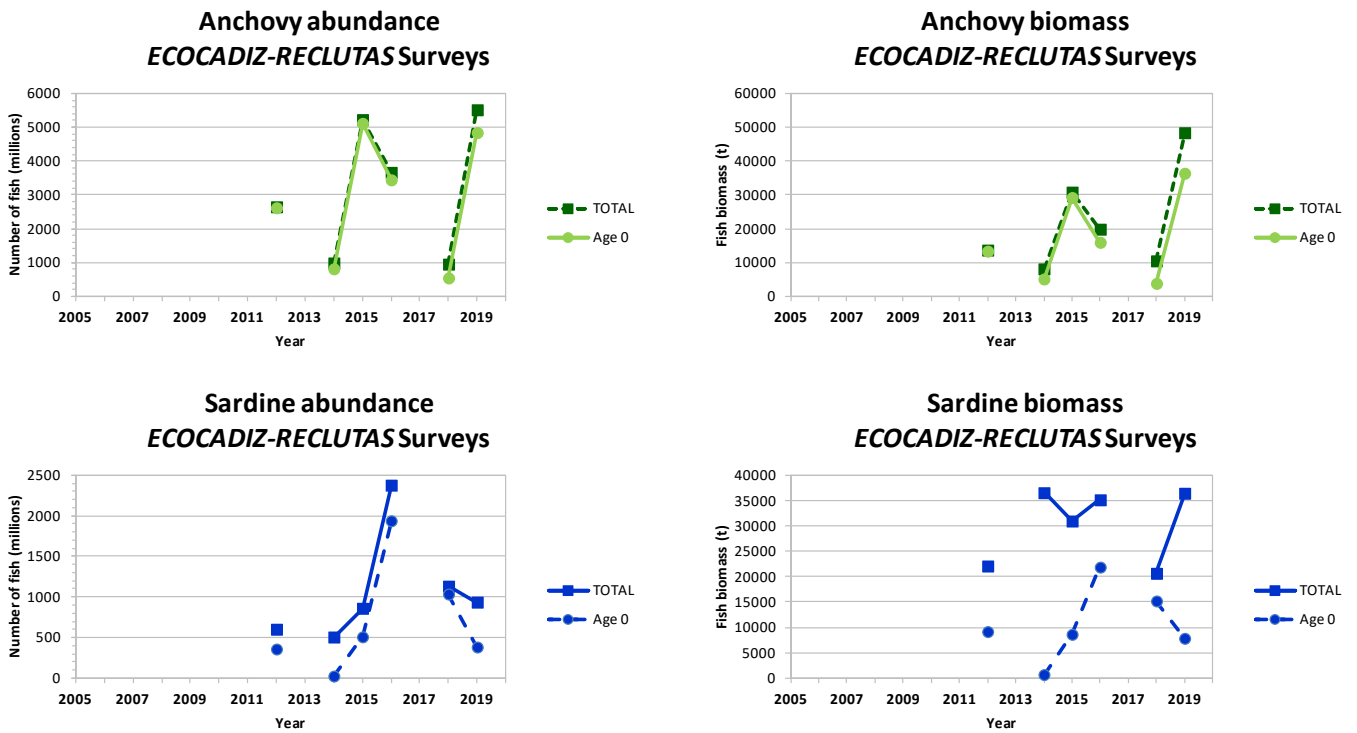


Figure 45. ECOCADIZ-RECLUTAS surveys series. Historical series of autumn acoustic estimates of anchovy and sardine abundance (million) and biomass (t) in Sub-division 9.a South. The estimates correspond to the total population and age 0 fish. The 2012 survey only surveyed the Spanish waters. No survey was conducted in 2013. Although a survey was conducted in 2017, the survey was interrupted for a serious breakdown of the vessel's propulsion system and no estimates were computed. The 2018 estimates should be considered with caution because a possible under-estimation.

