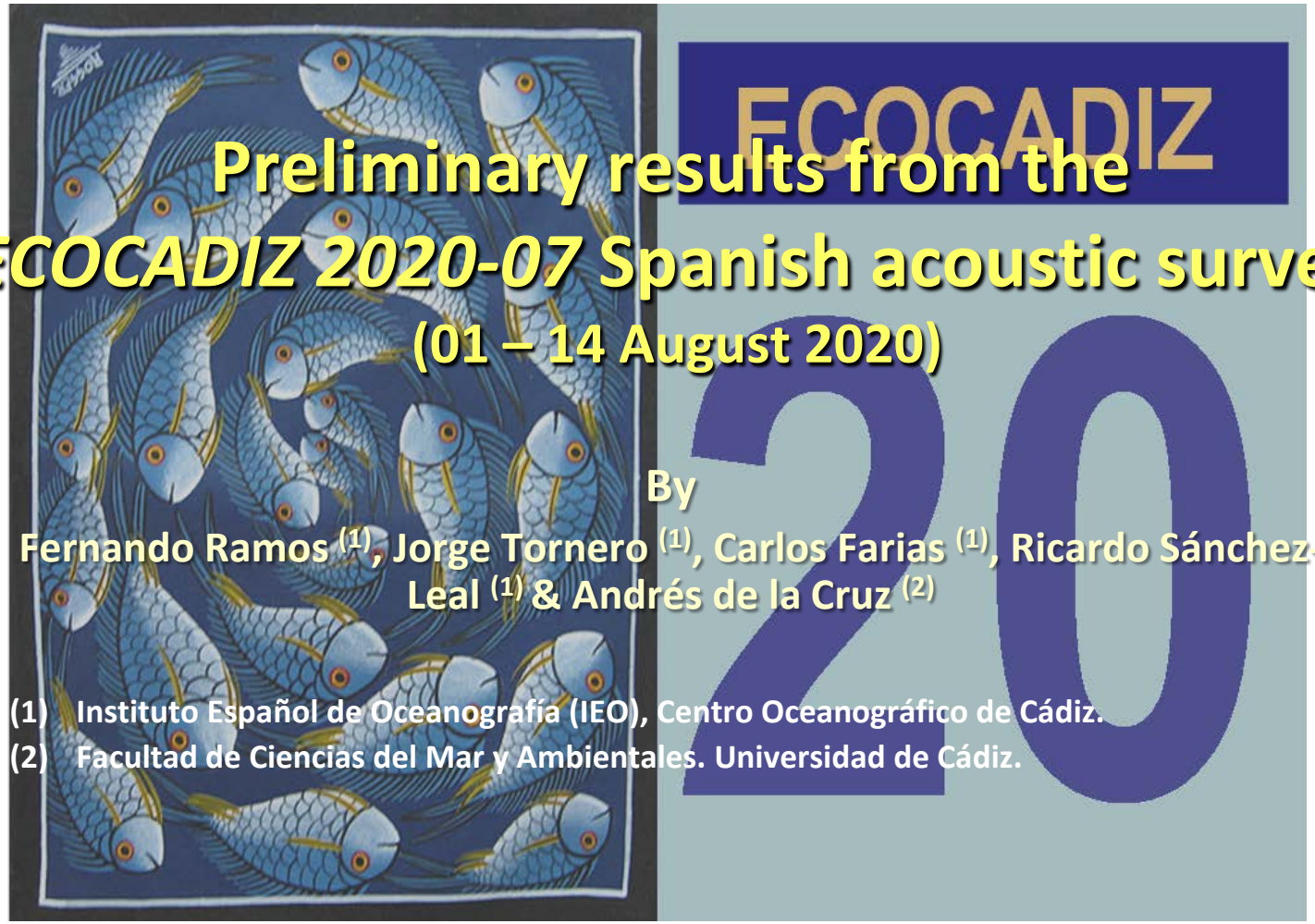


# Preliminary results from the *ECOCADIZ 2020-07* Spanish acoustic survey (01 – 14 August 2020)

By

Fernando Ramos [(1)], Jorge Tornero [(1)], Carlos Farias [(1)], Ricardo Sánchez-Leal [(1)] & Andrés de la Cruz [(2)]

(1) Instituto Español de Oceanografía (IEO), Centro Oceanográfico de Cádiz.

(2) Facultad de Ciencias del Mar y Ambientales. Universidad de Cádiz.

# ECOCADIZ 2020-07: Main objectives

- Acoustic assessment (by echo-integration) and mapping of neritic fish resources and of the oceanographic and biological conditions off the Gulf of Cadiz continental shelf.
- Biological characterization of assessed fish species.
- Collection of biological samples and extra bio-sampling for *BOCADEVA* Anchovy DEPM Adults parameters.
- (CUFES sampling in *BOCADEVA 0720*).
- Mapping of the distribution and abundance of top predators.
- Mapping of the distribution of the abundance and biomass of marine litter. (No micro-plastics sampling due to a COVID-19 disruption).
- Hydrological characterization of the surveyed area (CTD/LADCP/VMADCP & TSG-F).

# *ECOCADIZ 2020-07: Methods and samplers*

| Variable | *ECOCADIZ 2020-08* |
|---|---|
| **Dates** | 01 – 14/08/2020 |
| **Research vessel** | *Miguel Oliver* (SGP) |
| **Survey design** | 21 transects, 8 nm interspaced, 20 – 200 m |
| **Acoustic sampling** | 21 transects |
| ***EK 60* echosounder *w*orking freq.** | 18, 38, 120, 200 kHz |
| **Fishing gear (mean vert. op.)** | *Tuneado* 63.5/51 (15 m) |
| **Fishing gear performance monitoring** | Net Sonar (FS 20) & Marport NBTE |
| **Valid fishing hauls (total)** | 26 (26) (+ 4 night hauls (hydrated females)) |
| **CUFES (# st.)** | No (in *BOCADEVA 0720*) |
| **VMADCP/TSG-F /AANDERAA** | Yes |
| **CTD-LADCP (# casts)** | Yes (158, over 15 transects) |
| **Bongo 90 (# st.)** | No |
| **Manta Trawl (# st.)** | No |
| **Top Predator census** | Yes (over 21 transects) |

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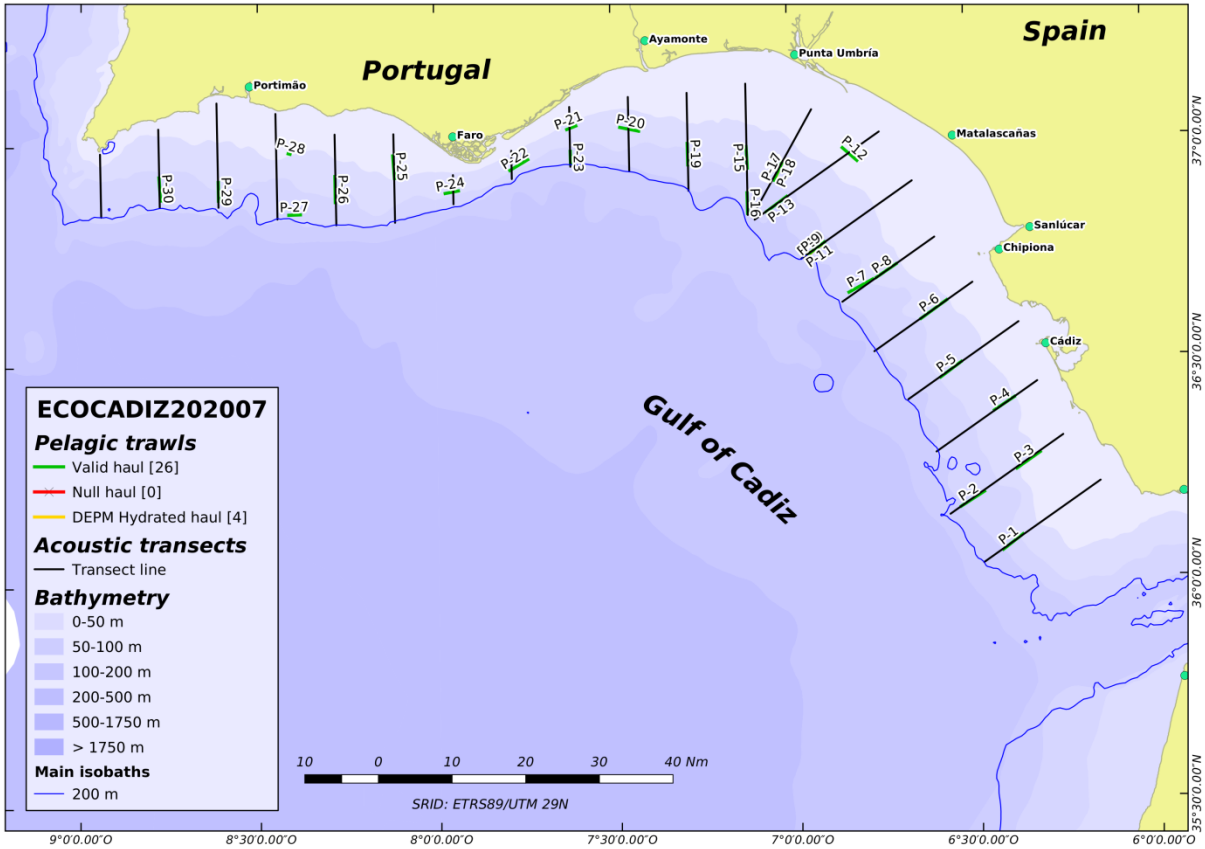
# ECOCADIZ 2020-07 survey: Available estimates

- Estimates available the last week(end).
- Only size-based N & B estimates for anchovy, sardine and chub-mackerel.
- NACs distribution maps for the remaining species.

# ECOCADIZ 2020-07: Methods (acoustics and fishing hauls)




- ACOUSTICS: 21 transects.
- TOP PREDATOR CENSUS: 21 transects.

- GROUNDTRUTHING PELAGIC HAULS: 26 hauls, valid all of them.

- DEPM-Hydrated females HAULS: 4 night hauls (PE10, PE11, PE17, PE18).

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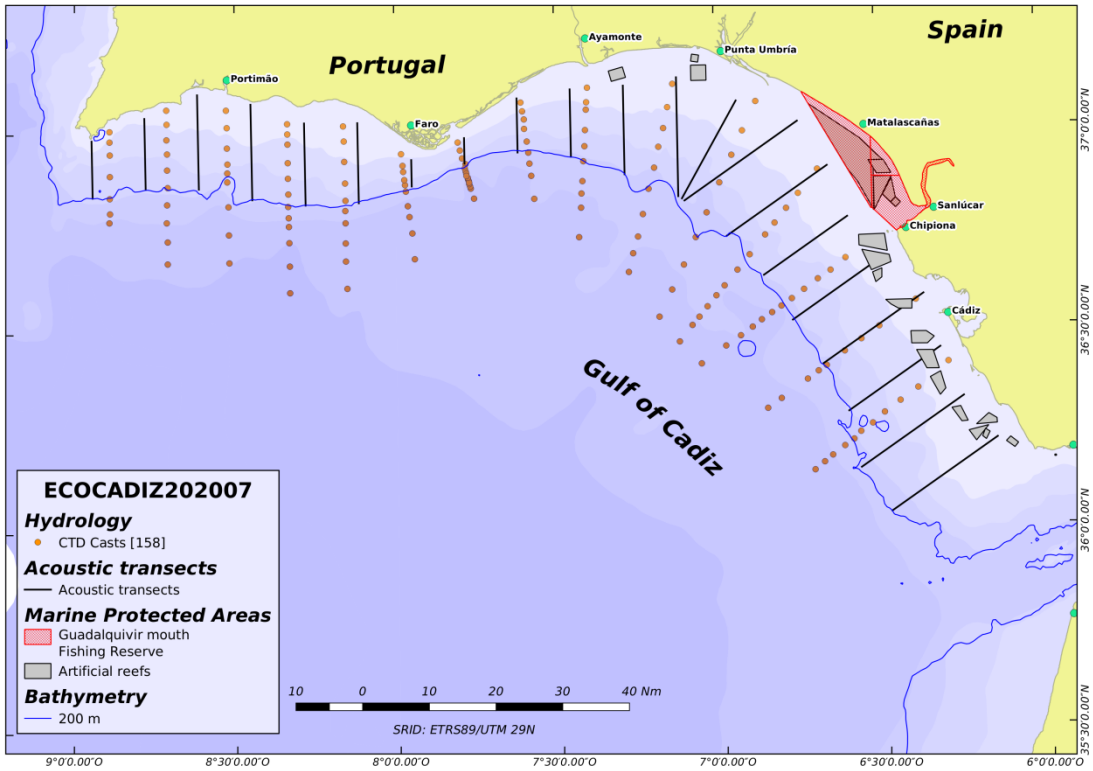
# ECOCADIZ 2020-07 : Methods (CTD+LADCP)




- CTD-LADCP: 158 stations in 15 transects.
- VMADCP (in night tracks).
- TSG-F (24 h).
- AANDERAA (24 h).

ICTIOPLANCTON SAMPLING (CUFES, PairoVET) in *BOCADEVA* (GoC anchovy DEPM) survey

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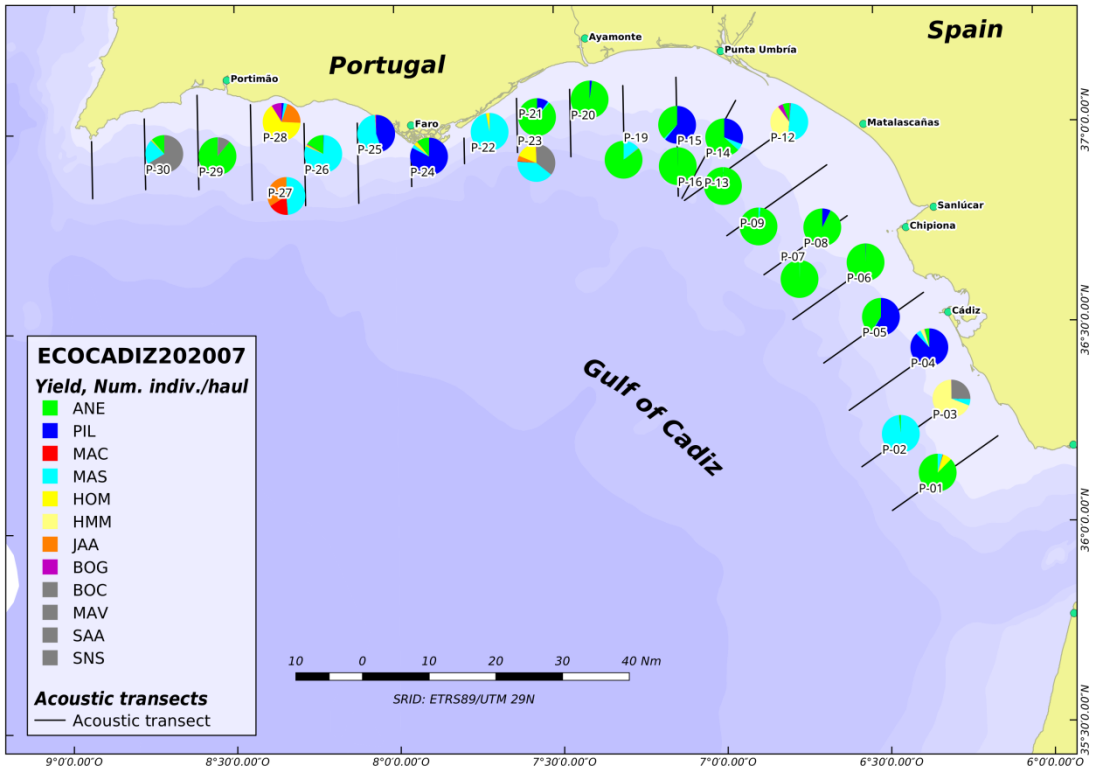
# ECOCADIZ 2020-07 : fishing stations and their species composition




- 26 valid fishing hauls: 20 949 kg, 1 125 thousand fish of captured species.
- MAS & MAC the most frequent. ANE, HOM, HMM, BOG & PIL frequent. JAA less frequent. SAA, SNS, BOC, MAV rare.
- ANE, PIL & MAS: high yields; HOM & HMM: medium yields; rest: low or very low yields.

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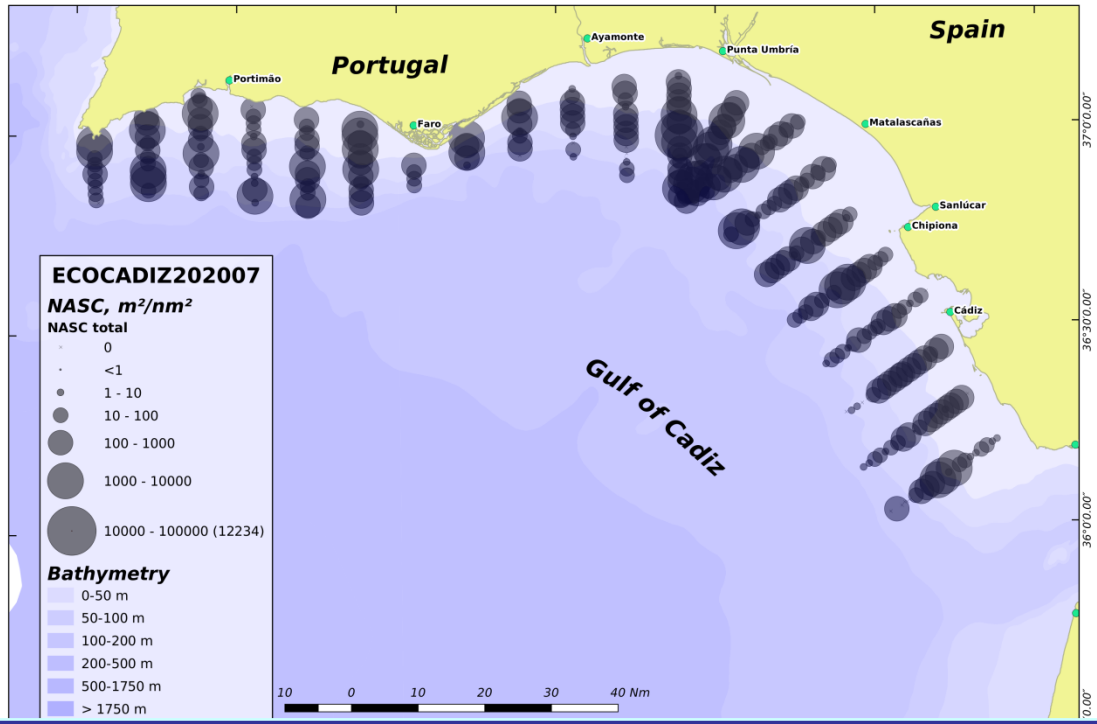
# ECOCADIZ 2020-07: "pelagic fish species assemblage"




- Assessed ESDUs: Total = 322. Portugal = 111; Spain = 211.
- $S_A$ ($m^2$ $nmi^{-2}$): Total = 184 301. Portugal = 61 499 (33.4%); Spain = 122 802 (66.6%).

| $S_{A\ (m^2\ nmi^{-2})}$ | Total spp. | Sardine | Round sardinella | Anchovy | Mackerel | Chub mack. | Horse-mack. | Medit. h-mack. | Blue jack-mack. | Bogue | Boarfish | Longspine snipefish | Pearlside |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Area | 184301 | 43118 | 2028 | 64869 | 6 | 44927 | 5415 | 16096 | 1143 | 1849 | 124 | 227 | 4499 |
| (%) | (100.0) | (23.4) | (1.1) | (35.2) | (0.003) | (24.4) | (2.9) | (8.7) | (0.6) | (1.0) | (0.1) | (0.1) | (2.4) |
| Portugal | 61499 | 12983 | 0 | 7245 | 1 | 32915 | 5090 | 0 | 1141 | 1312 | 124 | 227 | 461 |
| (%) | (33.4) | (30.1) | (0.0) | (11.2) | (22,2) | (73,3) | (94,4) | (0.0) | (99,8) | (70,9) | (100,0) | (100,0) | (10.2) |
| Spain | 122802 | 30135 | 2028 | 57623 | 5 | 12012 | 325 | 16096 | 2 | 537 | 0 | 0 | 4038 |
| (%) | (66.6) | (69.9) | (100.0) | (88.8) | (77.8) | (26.7) | (6.0) | (100.0) | (0.2) | (29.1) | (0.0) | (0.0) | (89.8) |

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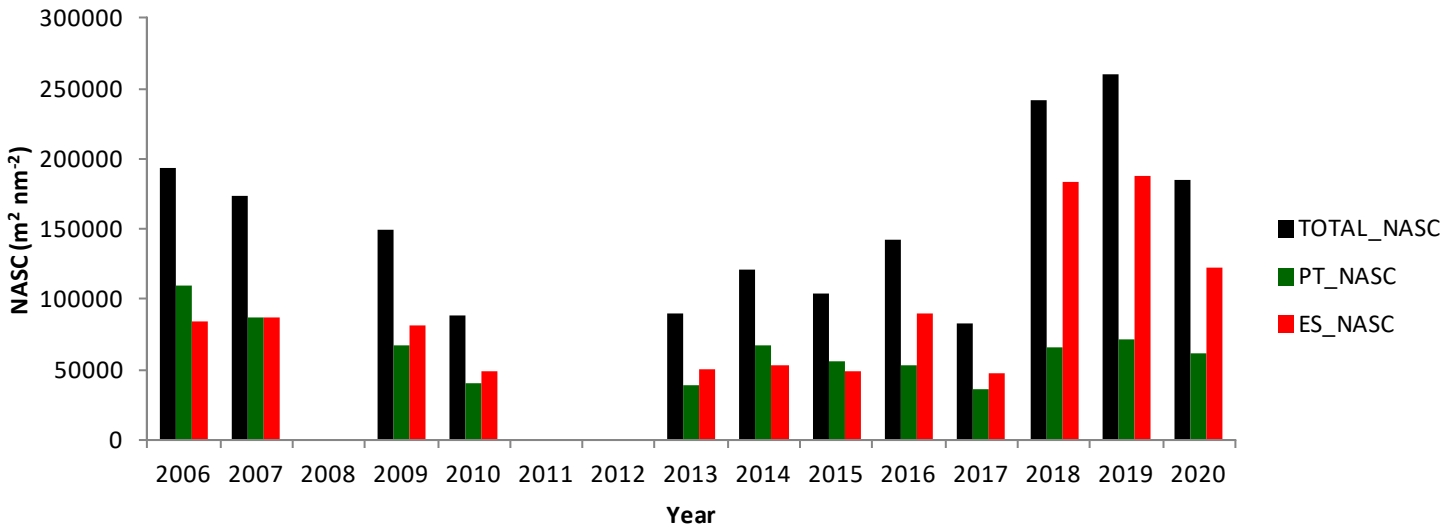
# ECOCADIZ 2020-07: "pelagic fish species assemblage"




- $S_A$ ($m^2$ $nmi^{-2}$): Slight decrease in relation to the time-series maxima for TOTAL-NASC and ES_NASC recorded in 2018 and 2019. Even so, above the historical mean.
- Possible causes:
  - High total PIL_NASC: again, occurrence of dense schools in coastal (20-40 m) waters in the Spanish waters.
  - High total ANE_NASC (Spanish waters) and MAS_NASC (Portuguese waters).

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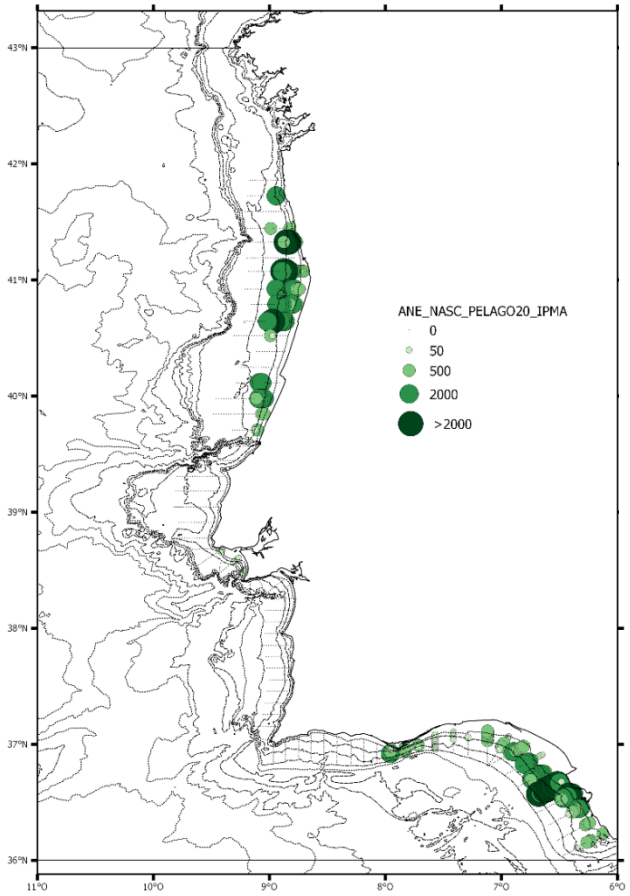
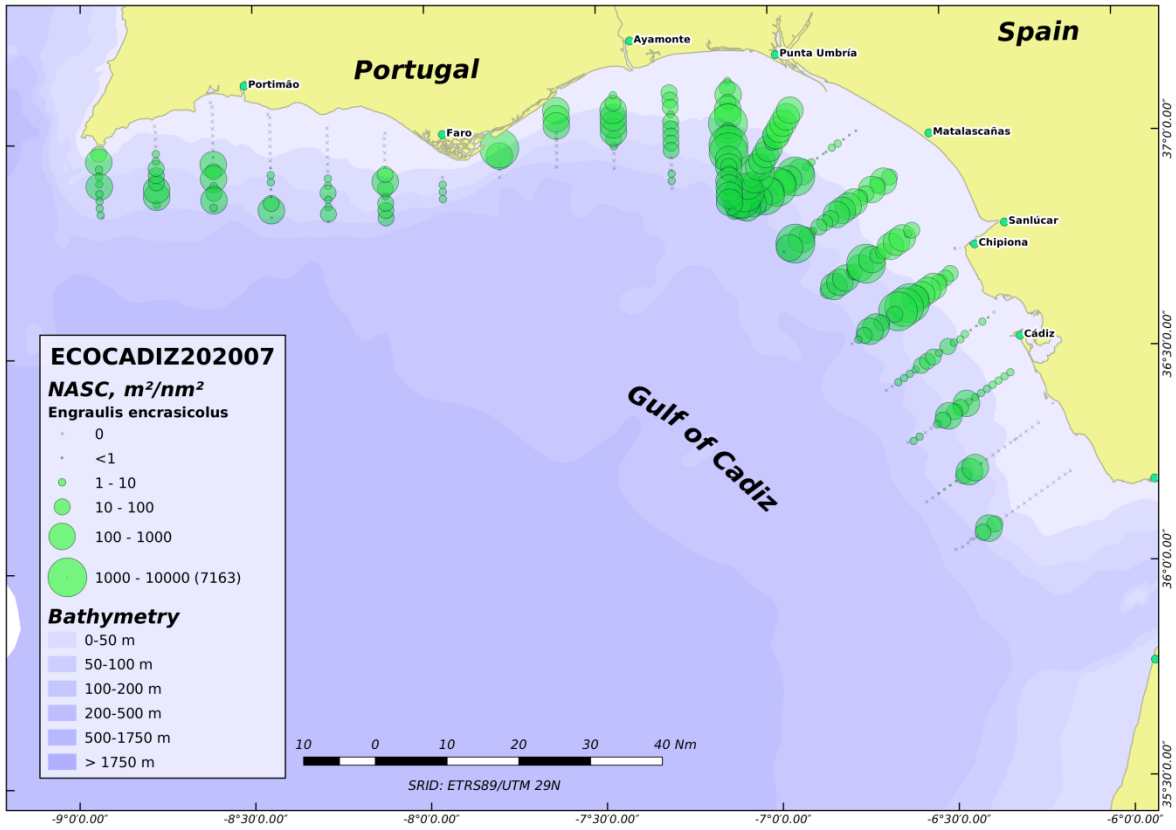
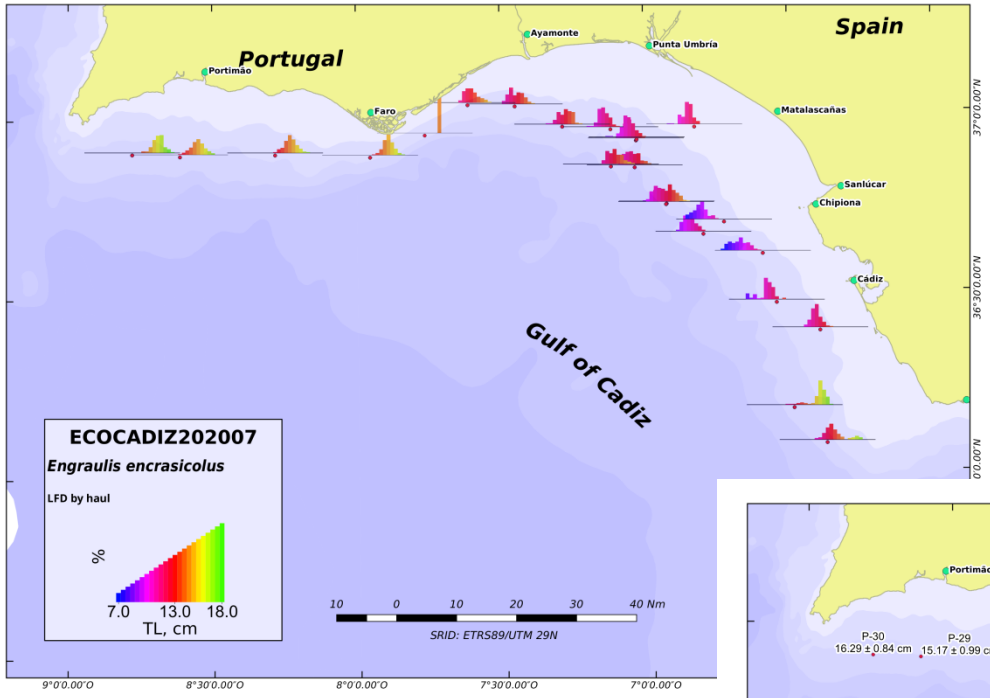
# ECOCADIZ 2020-07: Anchovy. NASC.



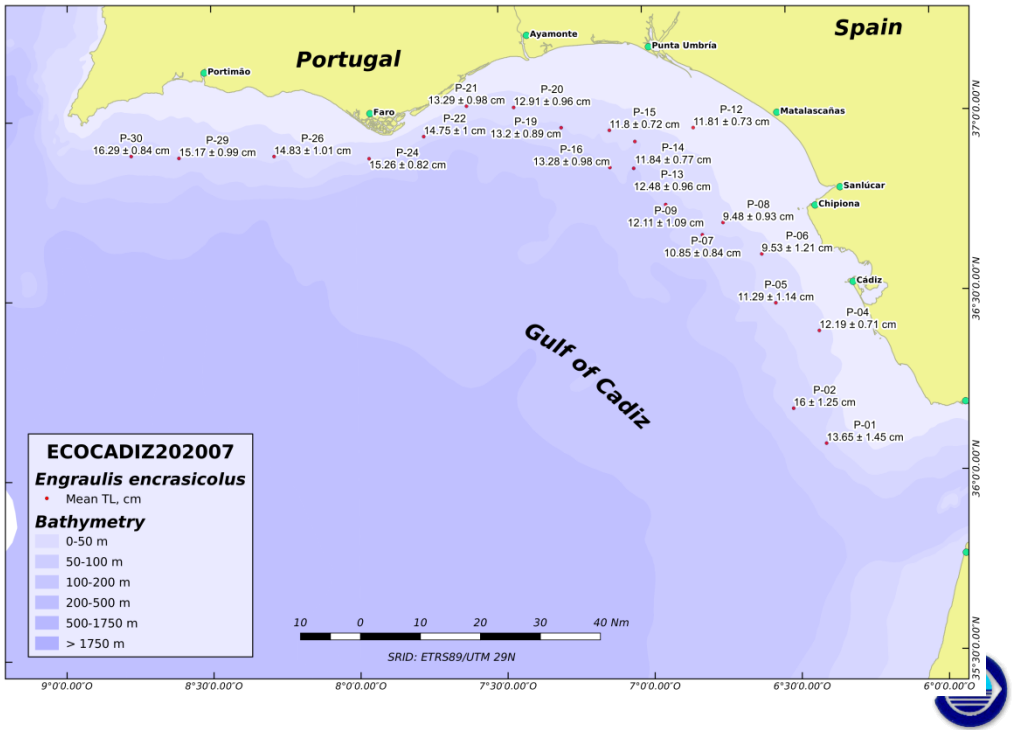




- Anchovy widely distributed. Higher densities in Algarve waters than those recorded ones in the *PELAGO* spring survey.

# ECOCADIZ 2020-07: Anchovy. LFD and mean size in fishing hauls.




- The largest fish in western Algarve and easternmost waters.
- The smallest fish in coastal waters between Cadiz Bay and Guadalquivir river mouth.

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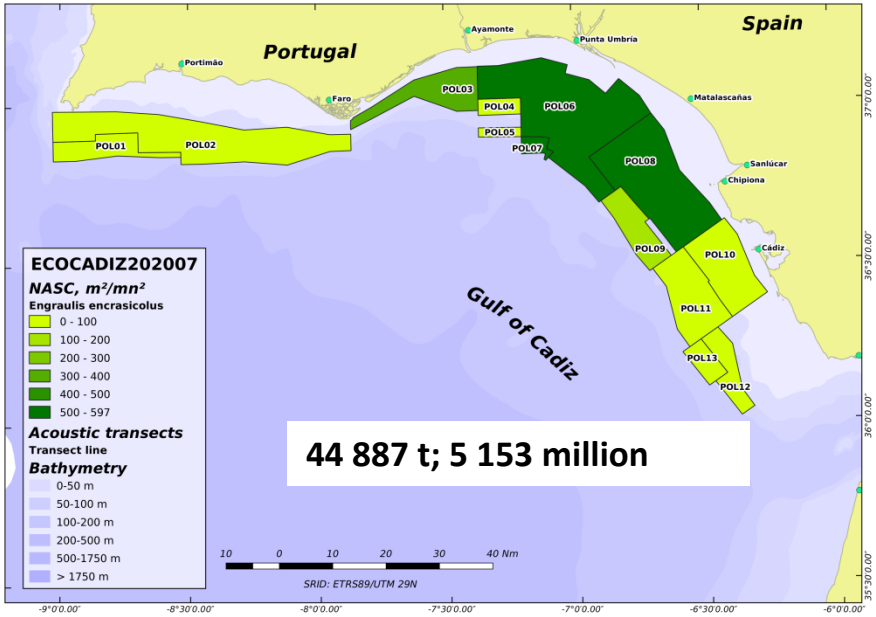
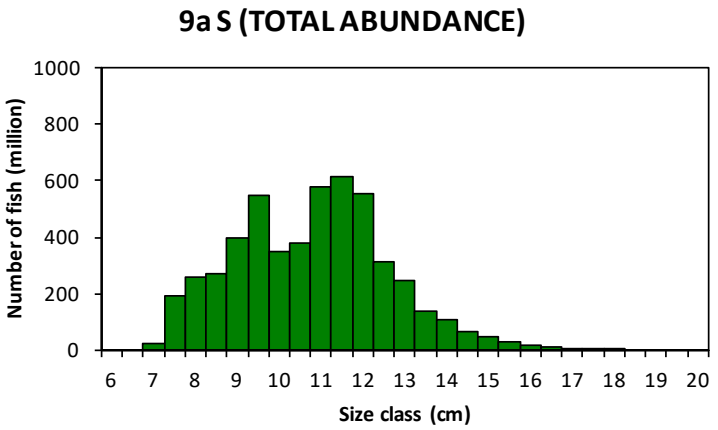
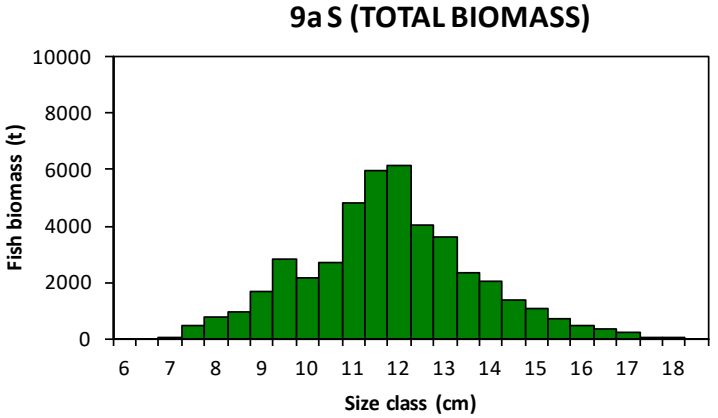
# ECOCADIZ 2020-07: Anchovy. Acoustic estimates.




A total of **44 887 t** and **5 153 million** fish were estimated for this species for the whole surveyed area. (**PT: 7 773 t; 439 million. ES: 37 114 t; 4 714 million**).

***PELAGO 20* previously estimated in Spring for this area: 49 787 t and 5 639 million (PT: 1 789 t; 89 million. ES: 47 998 t; 5 550 million).**

(*ECOCADIZ 2019-07*: 57 700 t; 5 485 million; historical maximum in the time-series).

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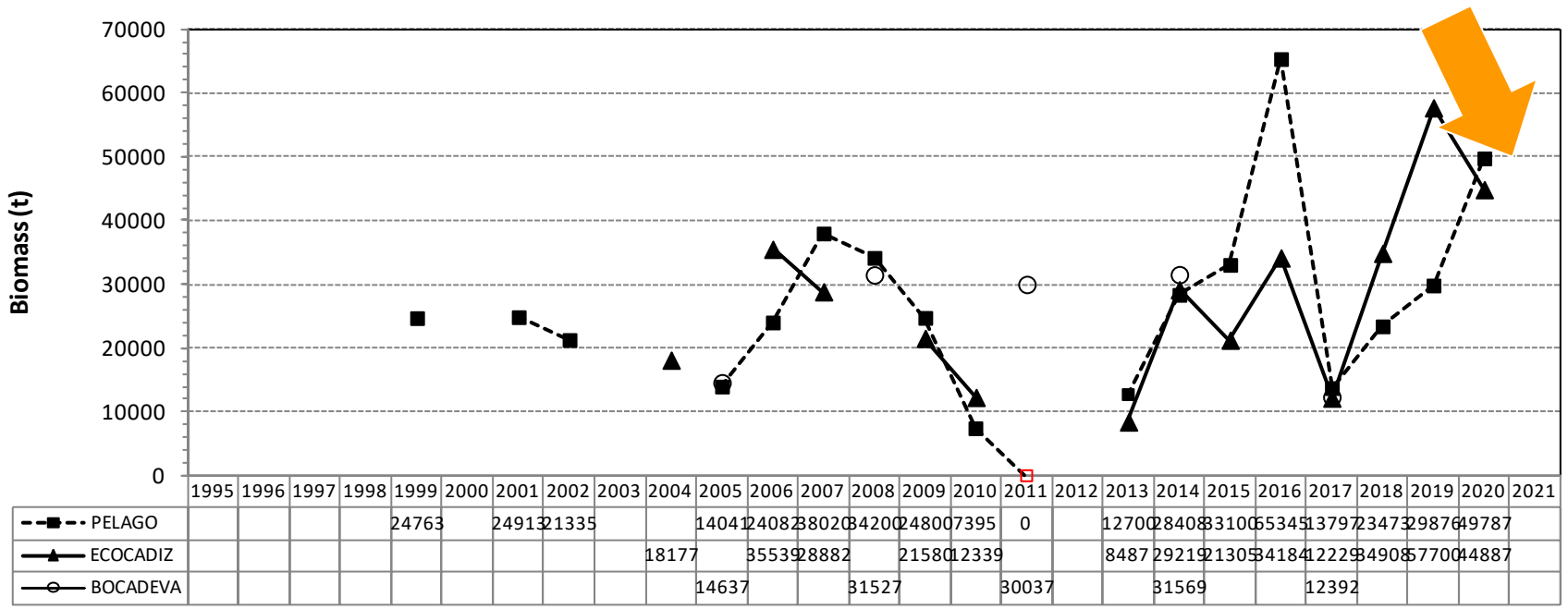
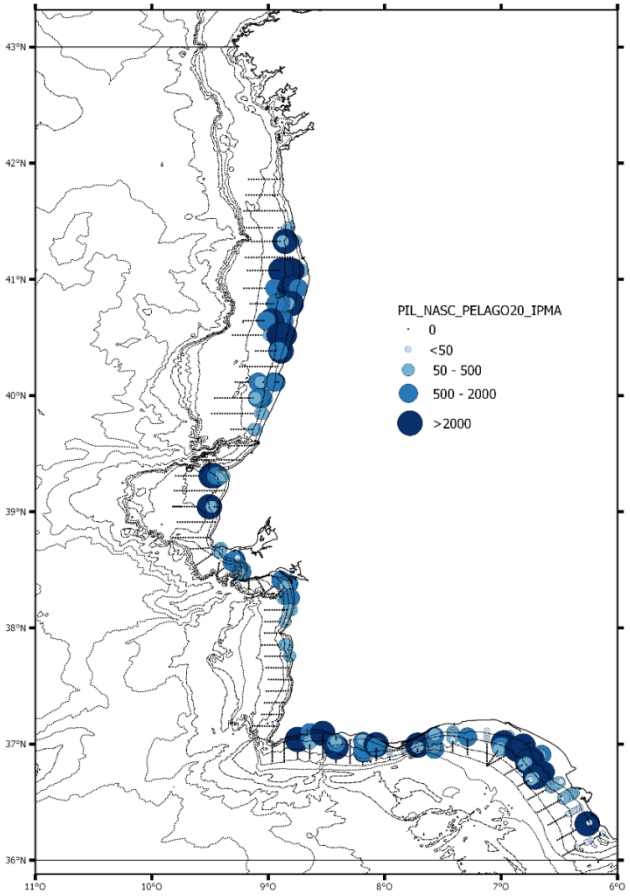
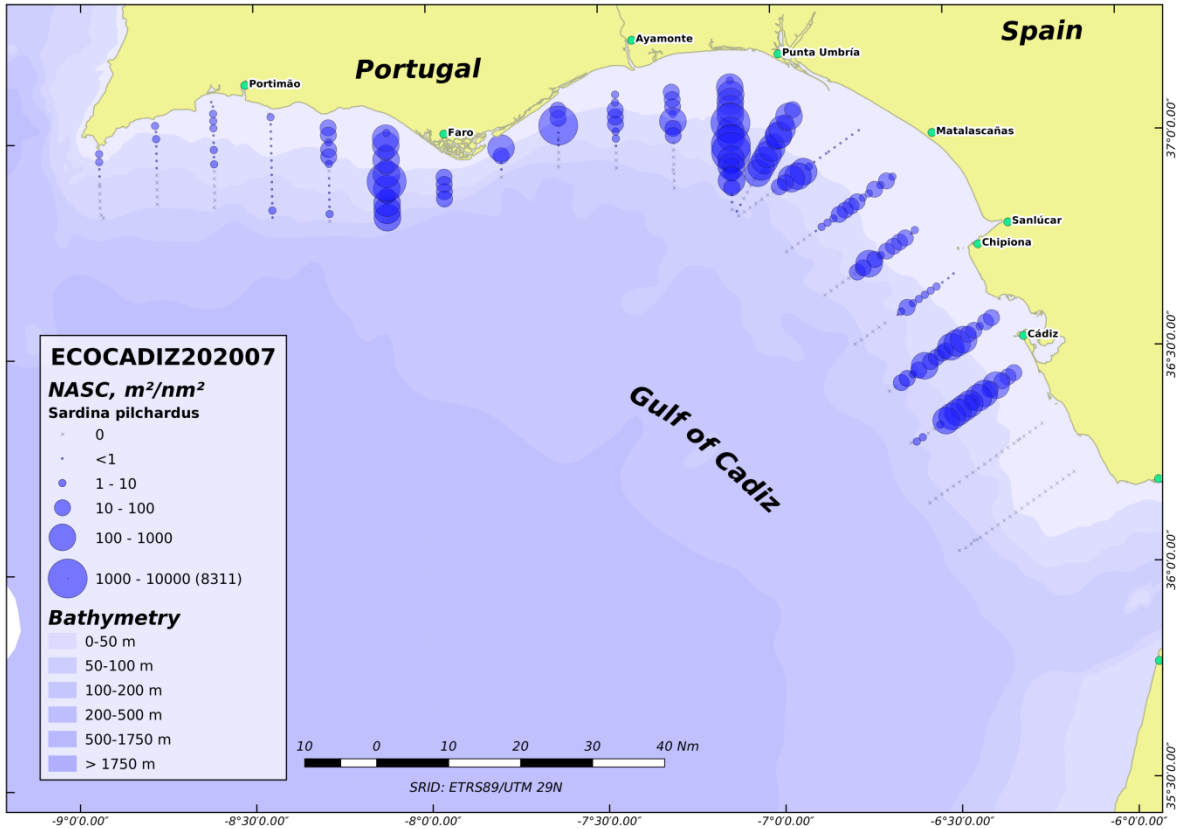
# ECOCADIZ 2020-07: Anchovy. Trends.




| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PELAGO | | | | | 24763 | | 24913 | 21335 | | | 14041 | 24082 | 38020 | 34200 | 24800 | 7395 | 0 | | 12700 | 28408 | 33100 | 65345 | 13797 | 23473 | 29876 | 49787 | |
| ECOCADIZ | | | | | | | | | | 18177 | | 35539 | 28882 | | 21580 | 12339 | | | 8487 | 29219 | 21305 | 34184 | 12229 | 34908 | 57700 | 44887 | |
| BOCADEVA | | | | | | | | | | | 14637 | | | 31527 | | | 30037 | | | 31569 | | | 12392 | | | | |

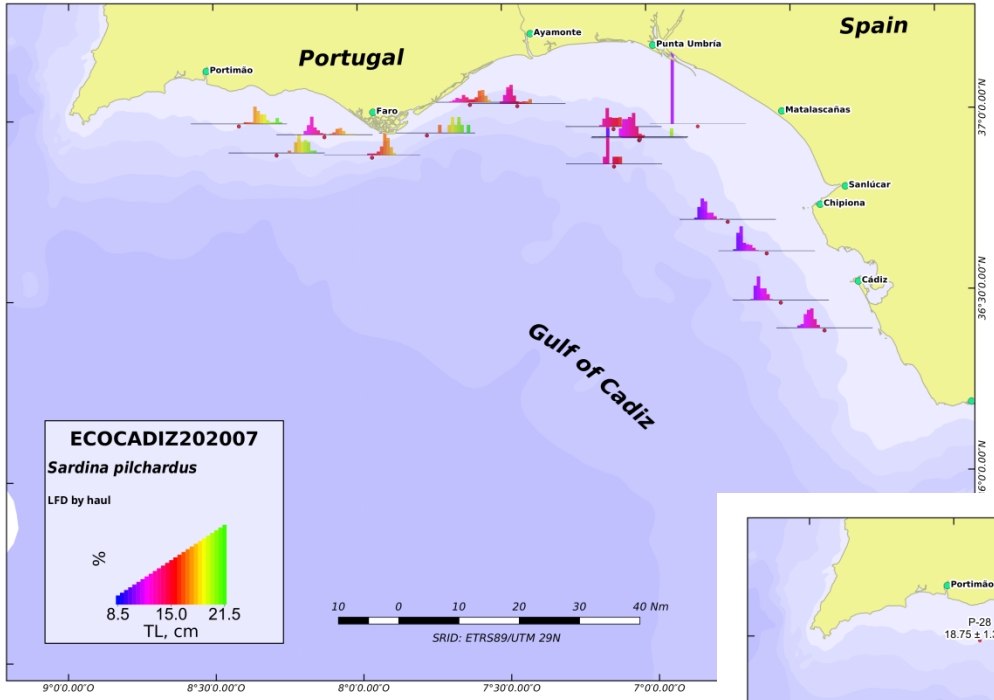
# ECOCADIZ 2020-07: Sardine. NASC.



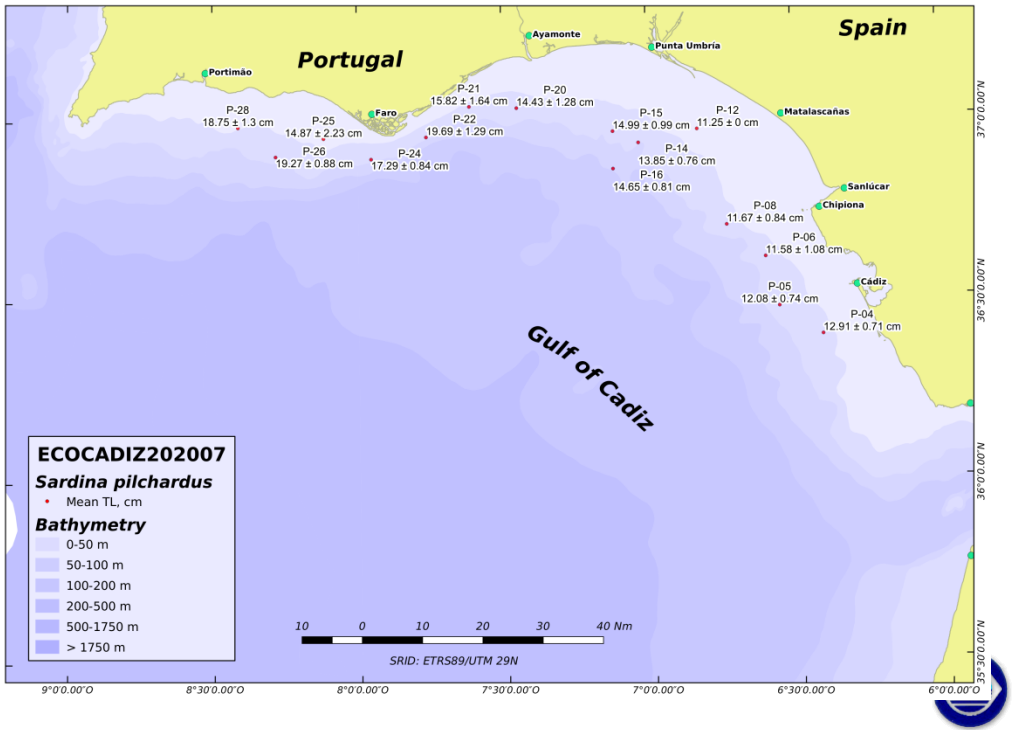




- Although weaker sardine detections in western Algarve than in spring, a distribution pattern quite similar to the one provided by *PELAGO* survey in spring.

# ECOCADIZ 2020-07: Sardine. LFD and mean size in fishing hauls.




- The largest fish in Portuguese waters.
- The smallest fish in coastal waters between Cadiz Bay and Tinto-Odiel river mouth.

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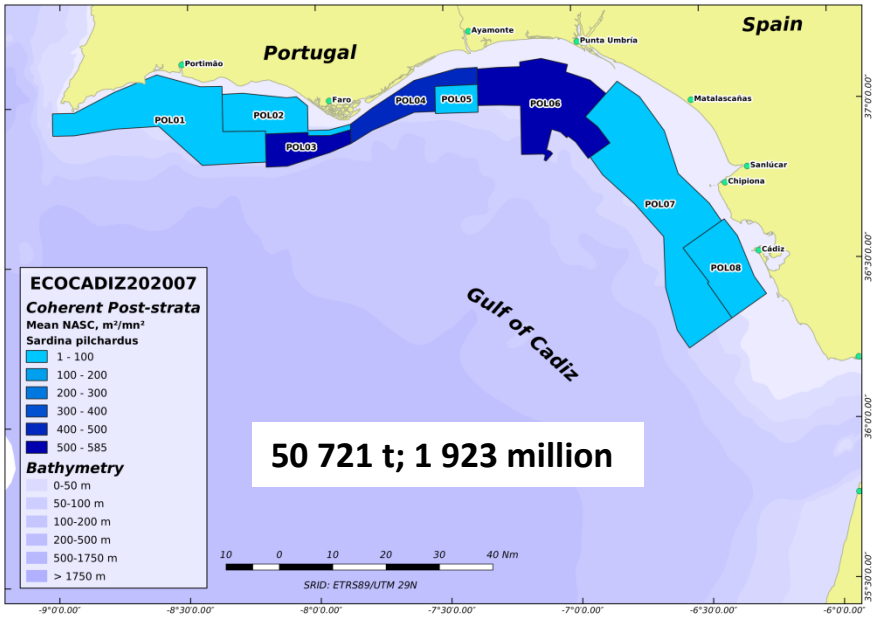
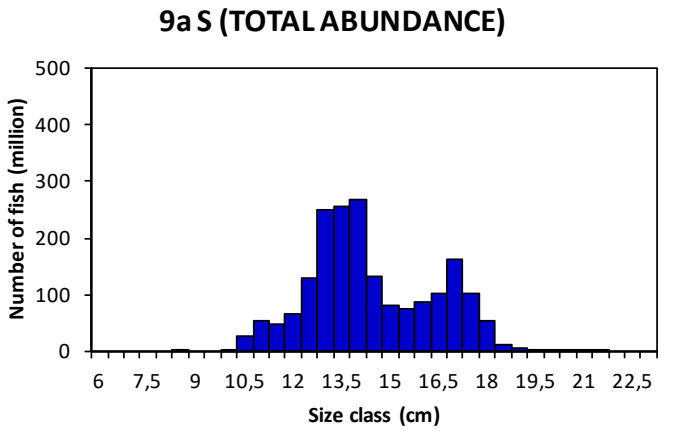
# ECOCADIZ 2020-07: Sardine. Acoustic estimates.

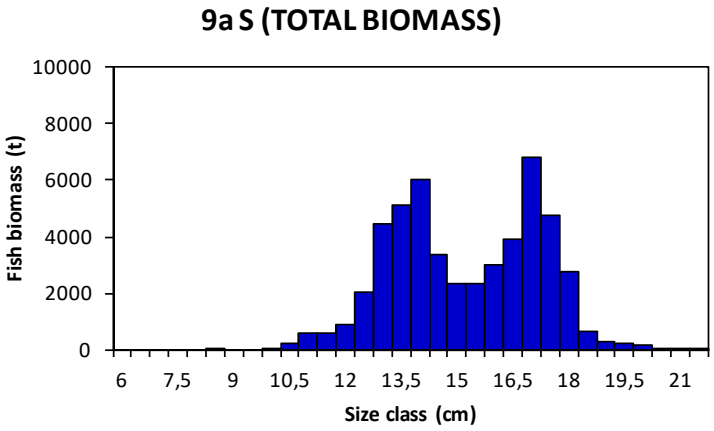



A total of **50 721 t** and **1 923 million** fish were estimated for this species for the whole surveyed area. (**PT: 19 464 t; 554 million. ES: 31 257 t; 1 369 million**).

***PELAGO 20* previously estimated in Spring for this area: 155 017 t and 6 547 million (PT: 47 415 t; 1 024 million. ES: 107 602 t; 5 523 million).**

(*ECOCADIZ 2019-07*: 62 682 t; 2 917 million).

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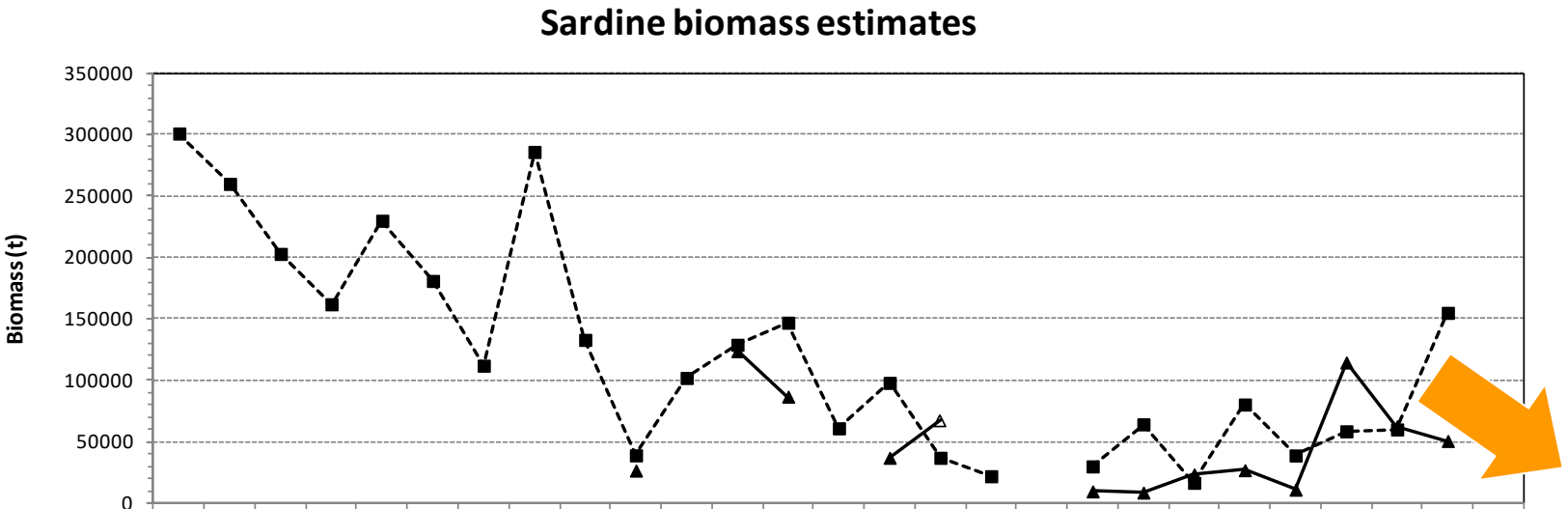
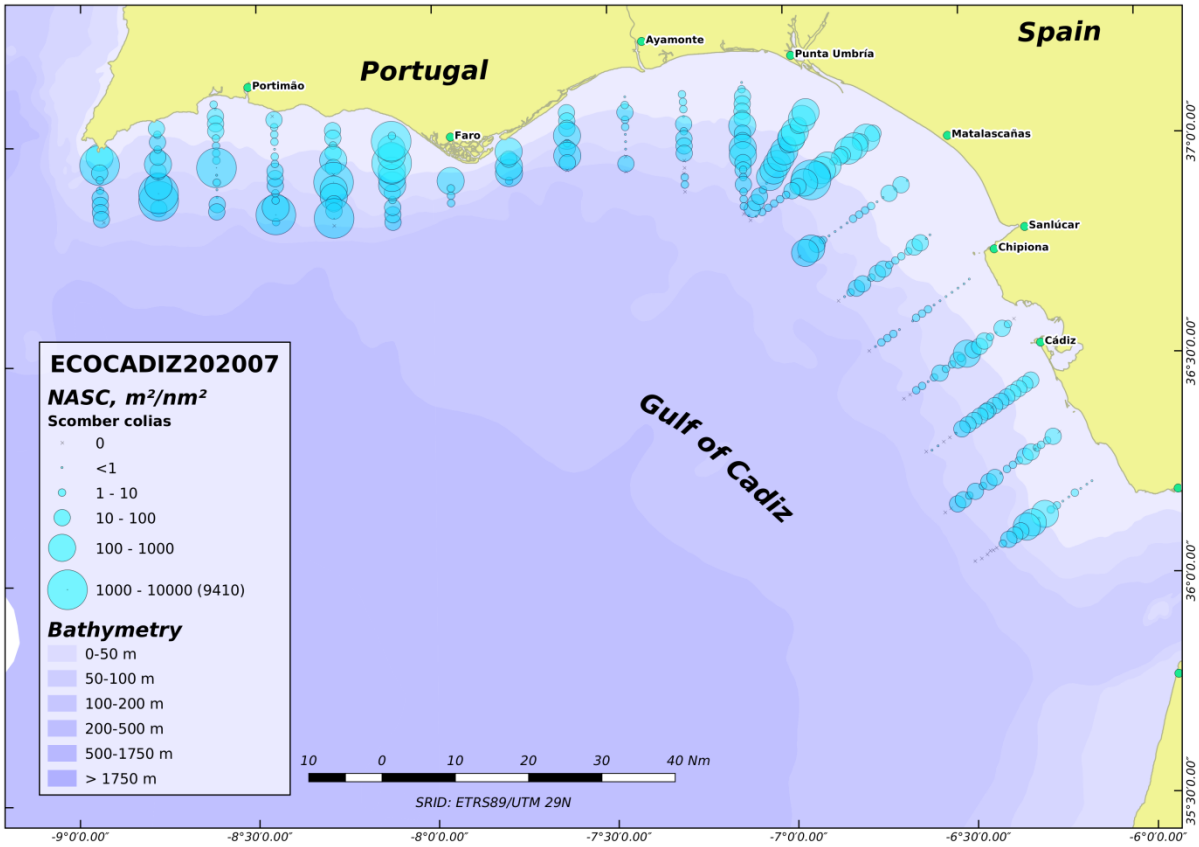
# ECOCADIZ 2020-07: Sardine. Trends.



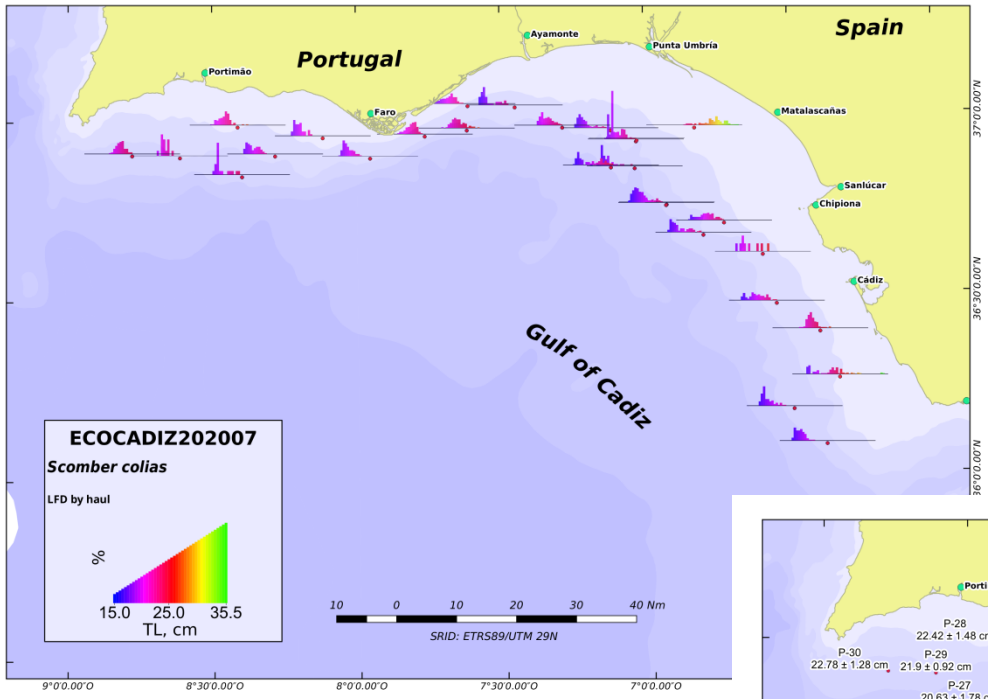

| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PELAGO | 301000 | 260000 | 203000 | 162000 | 230000 | 181000 | 112000 | 286000 | 133000 | 39000 | 102000 | 129000 | 147000 | 61000 | 98000 | 37000 | 22000 | | 30000 | 64227 | 16663 | 80356 | 38873 | 58561 | 60088 | 155017 | |
| ECOCADIZ | | | | | | | | | | 26568 | | 123849 | 86777 | | 37020 | 66964 | | | 9670 | 8697 | 23460 | 26919 | 11053 | 114631 | 62682 | 50721 | |

# ECOCADIZ 2020-07: Chub mackerel. NASC.

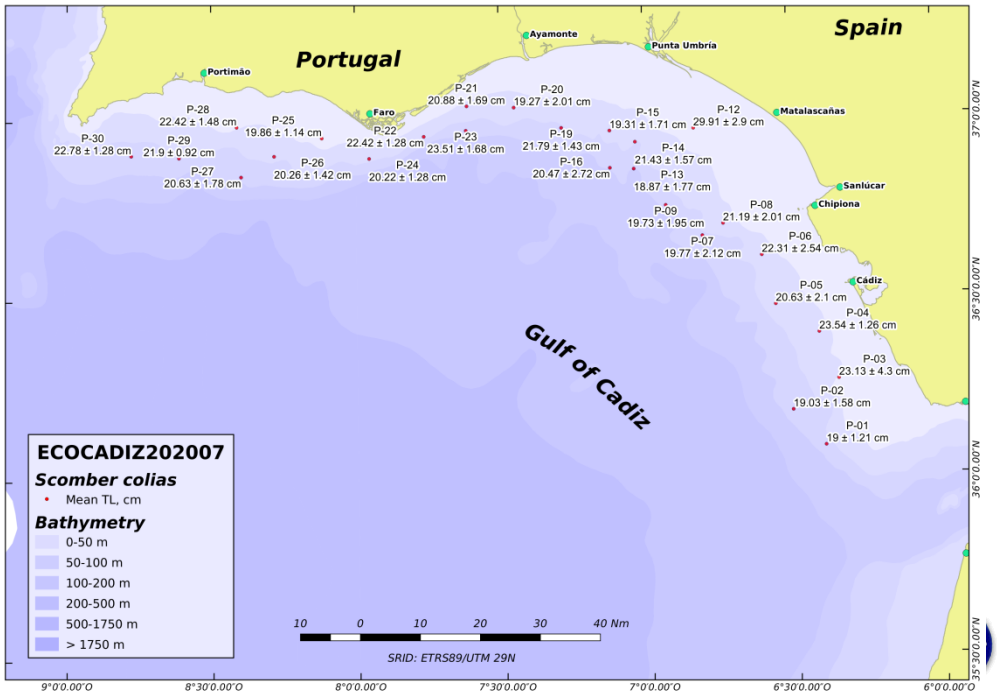



- **Widely distributed, mainly in the central and western shelf waters, although the highest densities in the western Algarve.**

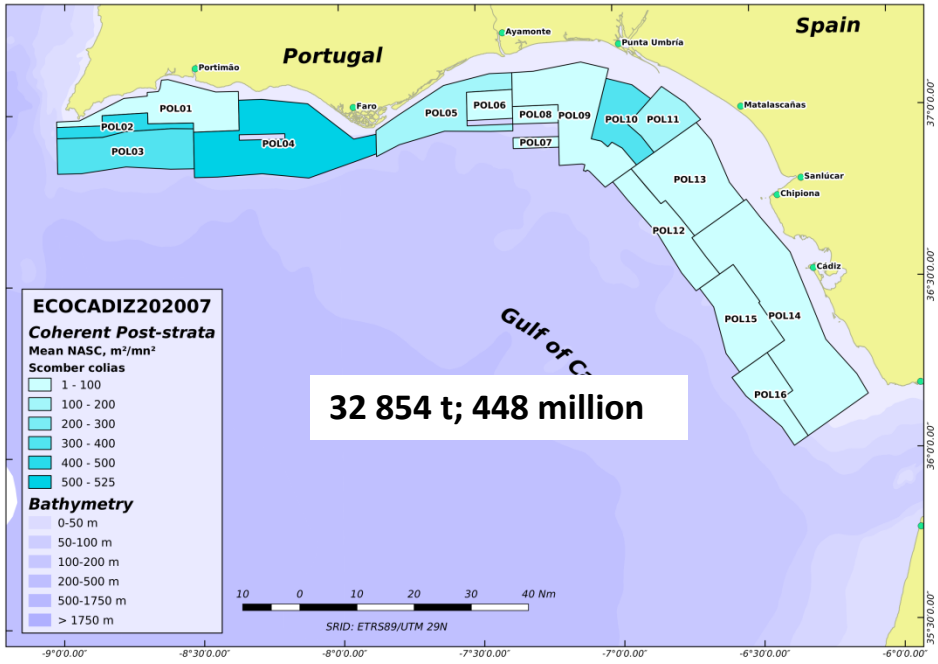
# ECOCADIZ 2020-07: Chub mackerel. LFD and mean size in fishing hauls.

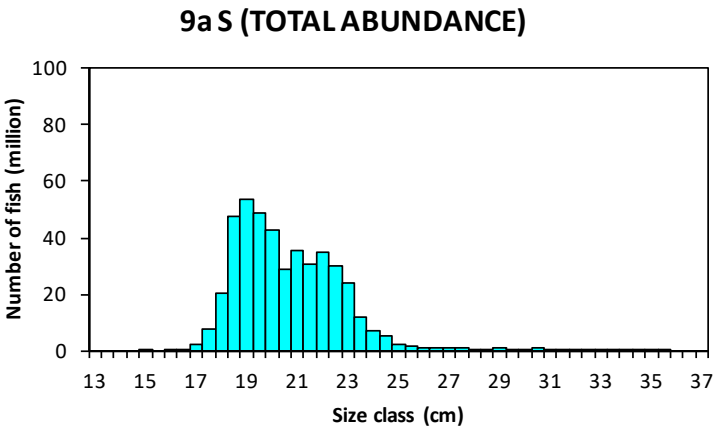


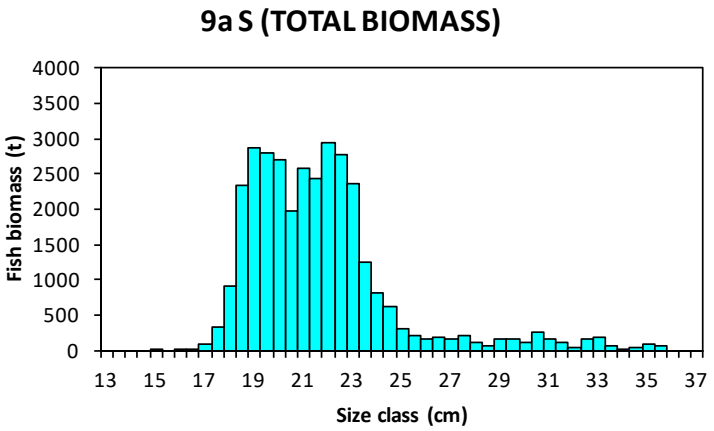

- Larger fish in Portuguese waters, although the largest ones were recorded in the coastal waters in front Matalascañas. Smaller sub-adult fish in the Spanish outer shelf waters.



# ECOCADIZ 2020-07: Chub mackerel. Acoustic estimates.



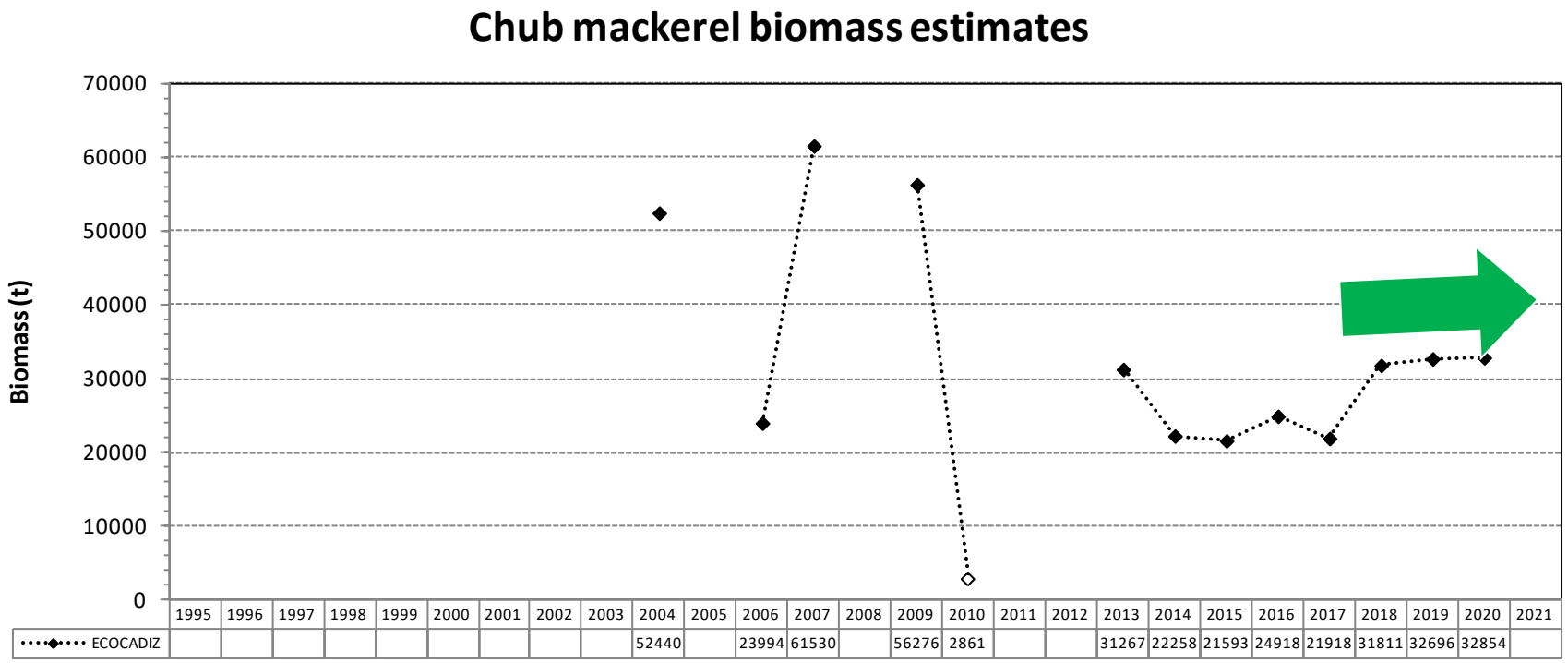




A total of **32 854 t** and **448 million** fish were estimated for this species for the whole surveyed area. (**PT: 24 495 t; 356 million. ES: 8 358 t; 92 million**).

(*ECOCADIZ 2019-07*: 32 696 t; 465 million).

# ECOCADIZ 2020-07: Chub mackerel. Trends.




| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ECOCADIZ | | | | | | | | | | 52440 | | 23994 | 61530 | | 56276 | 2861 | | | 31267 | 22258 | 21593 | 24918 | 21918 | 31811 | 32696 | 32854 | |

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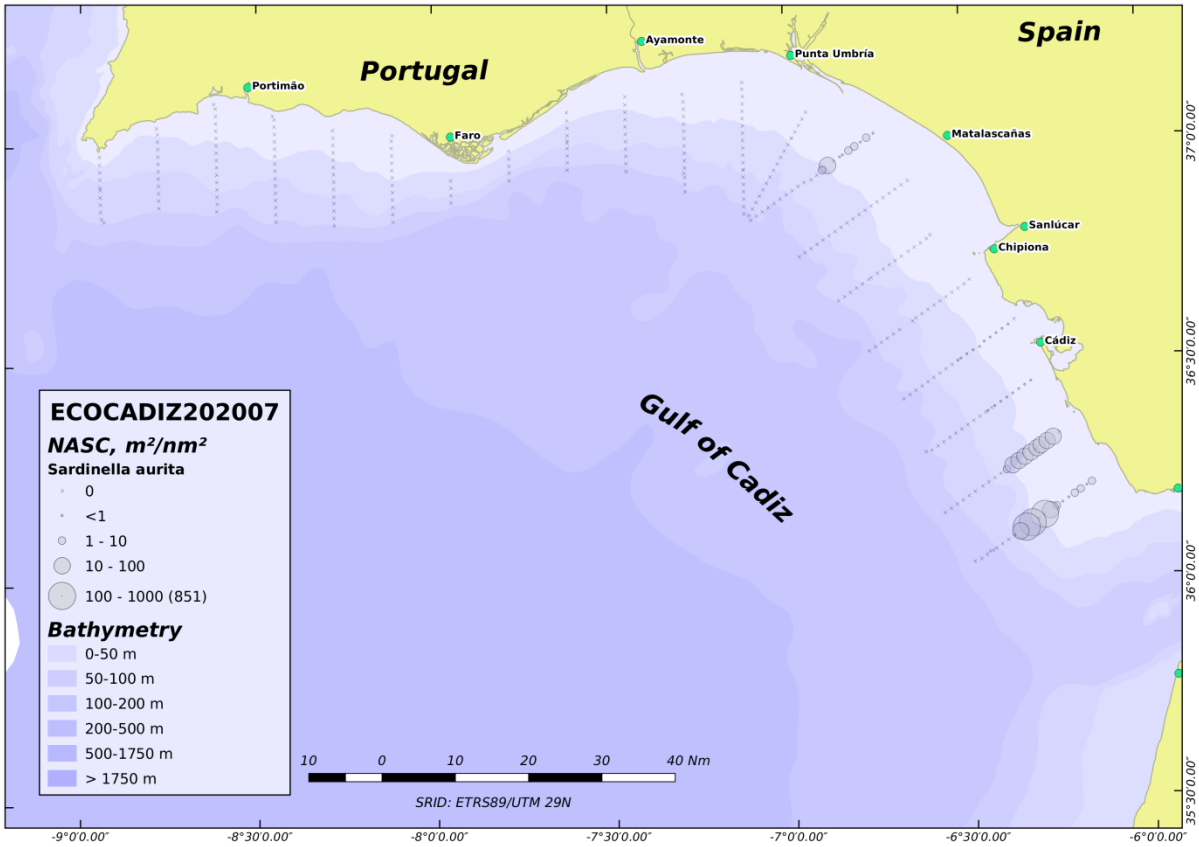
# ECOCADIZ 2020-07: Round sardinella. NASC.




- Weak detections mainly restricted to the easternmost coastal waters in the Gulf.

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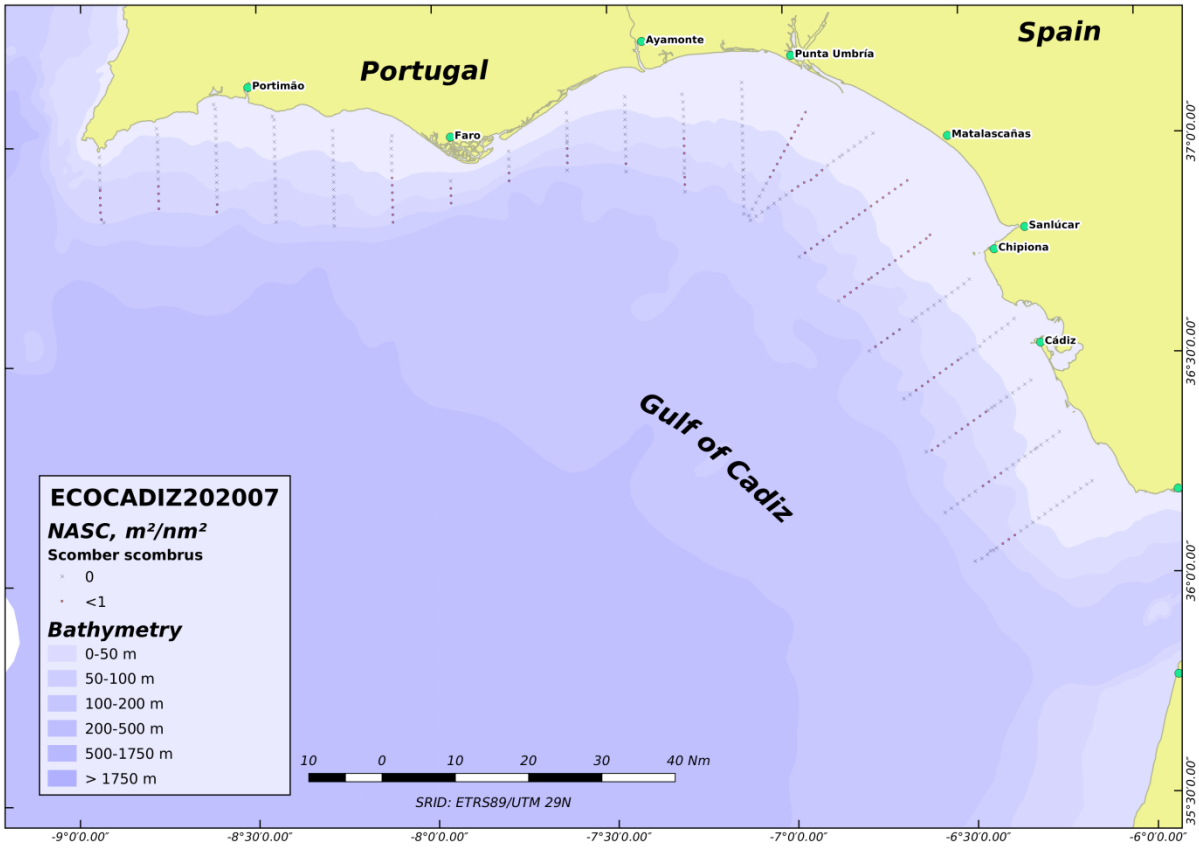
# ECOCADIZ 2020-07: Mackerel. NASC.




- A relatively wide distribution all over the surveyed area, but showing somewhat higher densities in Spanish waters.

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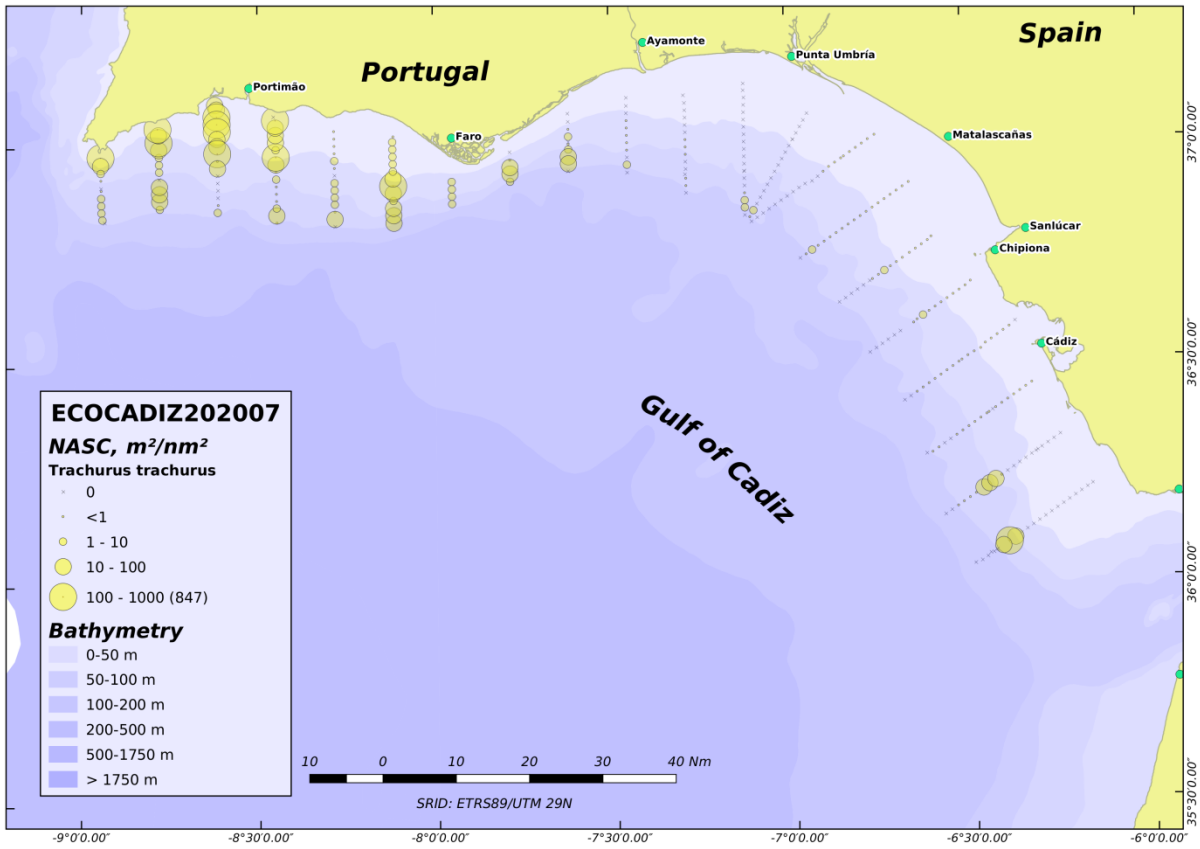
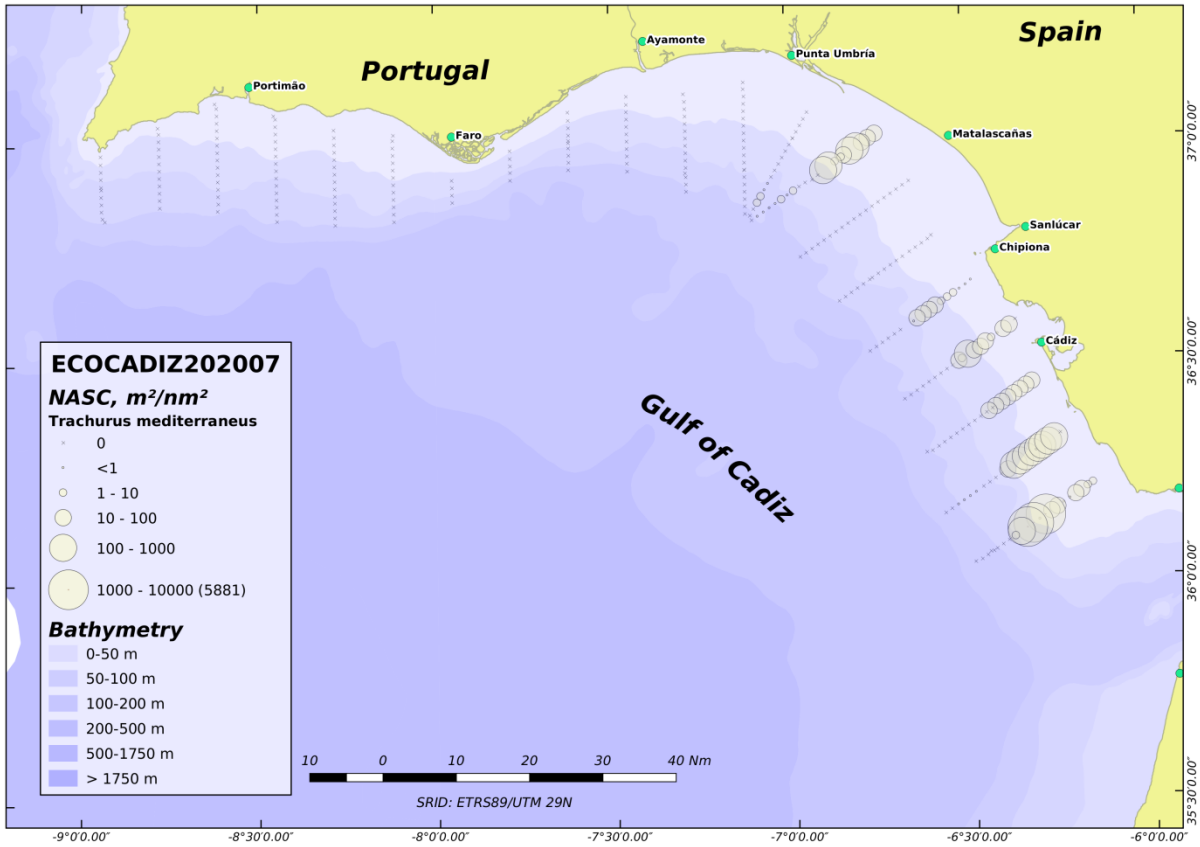
# ECOCADIZ 2020-07: Horse mackerel. NASC.




- A typically Algarve species in summer 2020. Almost absent in the Spanish waters.

# ECOCADIZ 2020-07: Mediterranean horse mackerel. NASC.




- A typically Spanish species in summer 2020 (as usual). Distributed as far as the Tinto-Odiel river mouth, mainly over the inner-mid shelf waters.

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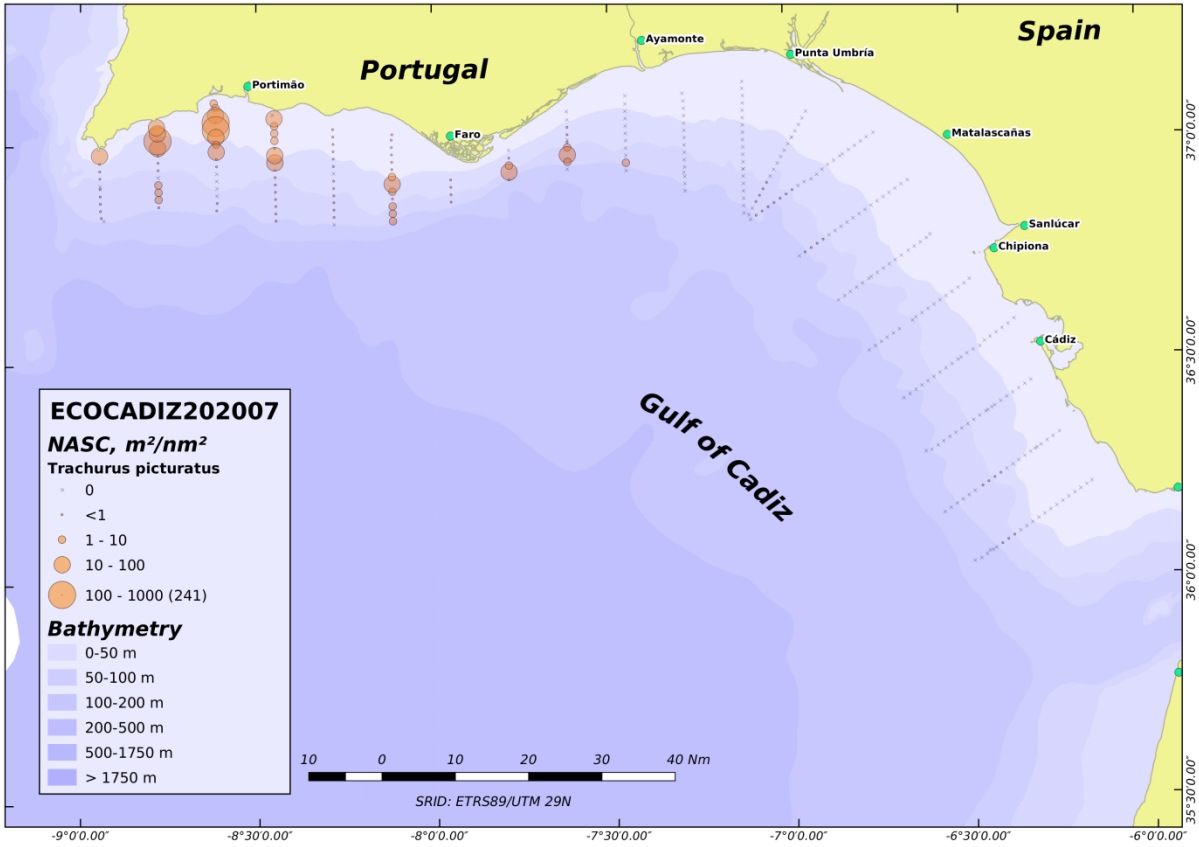
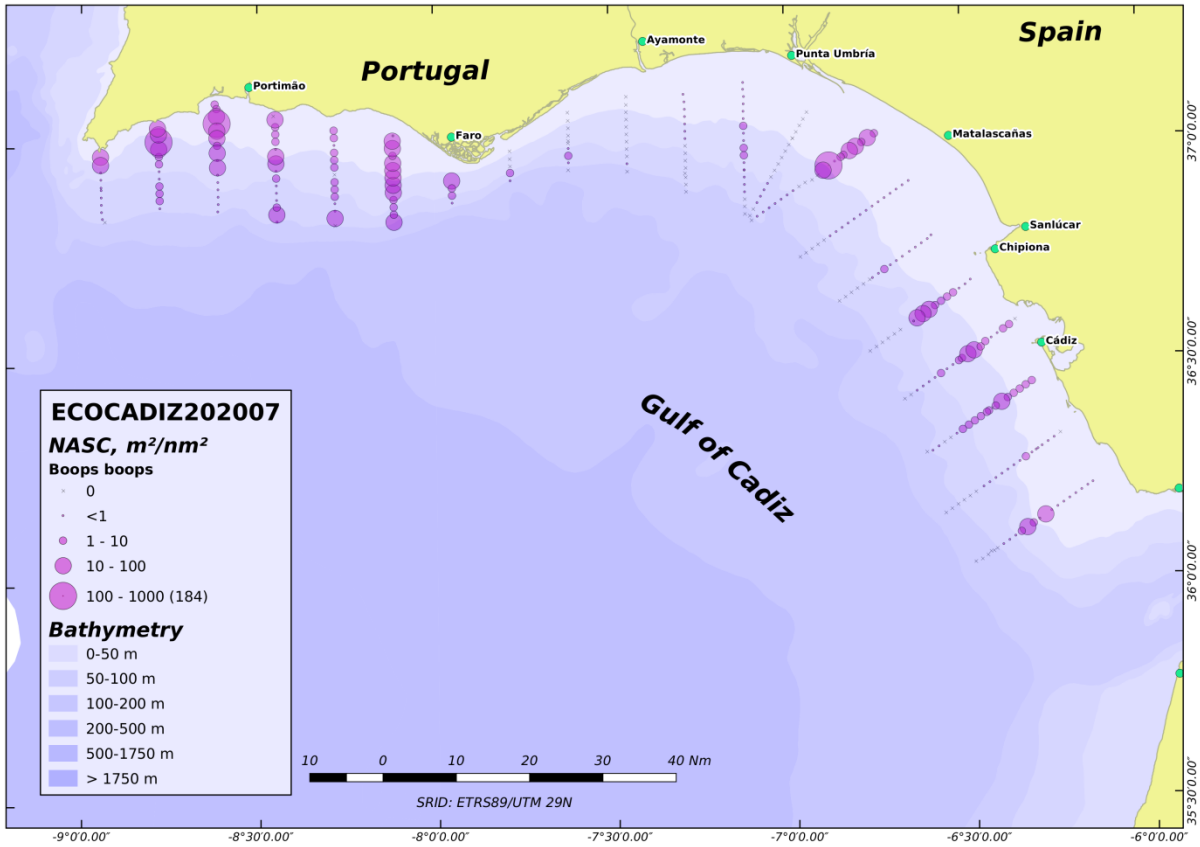
# ECOCADIZ 2020-07: Blue jack mackerel. NASC.



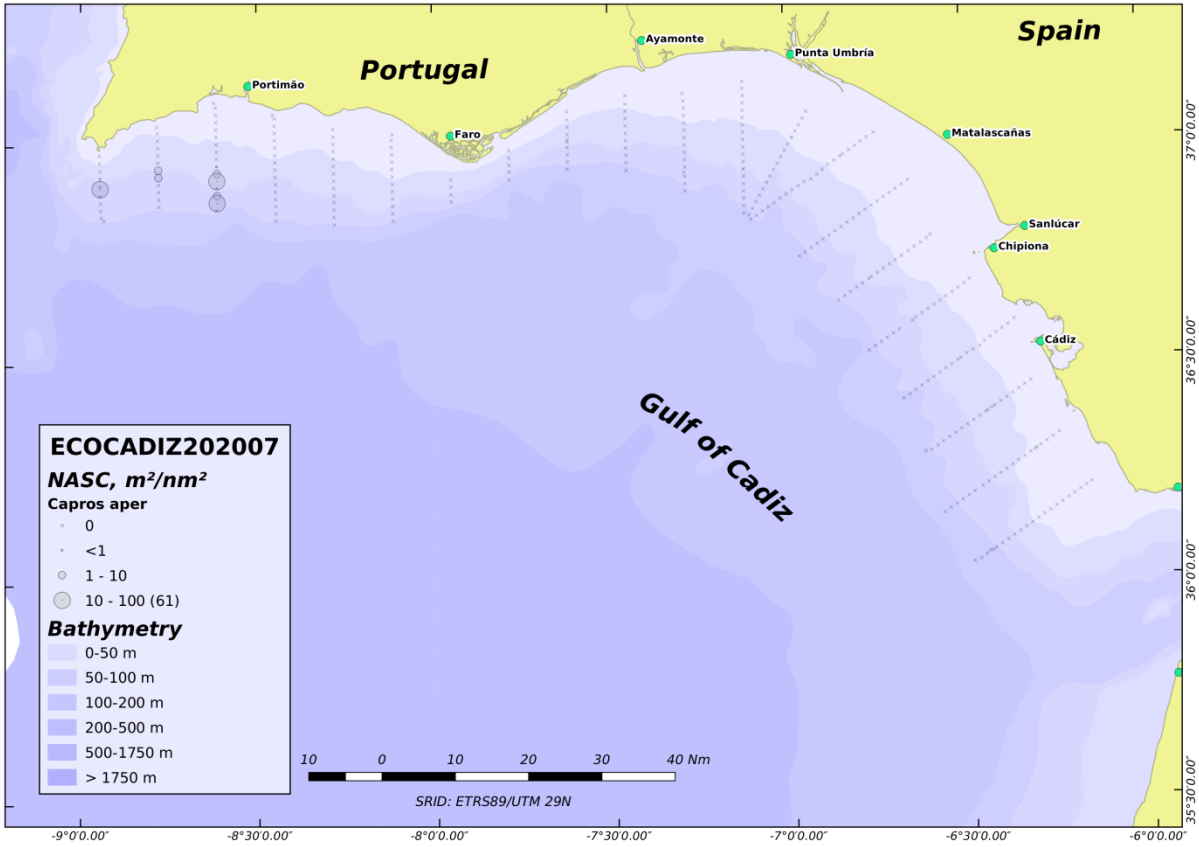

- **Restricted almost exclusively to Algarve shelf waters, with spots of higher densities in the westernmost waters. Resembles the HOM NASCs distribution.**

# ECOCADIZ 2020-07: Bogue. NASC.




- **Although widely distributed, showed higher densities in the west Algarve waters.**

# ECOCADIZ 2020-07: Boarfish. NASC.




- Incidental occurrence in the westernmost Algarve outer shelf waters.

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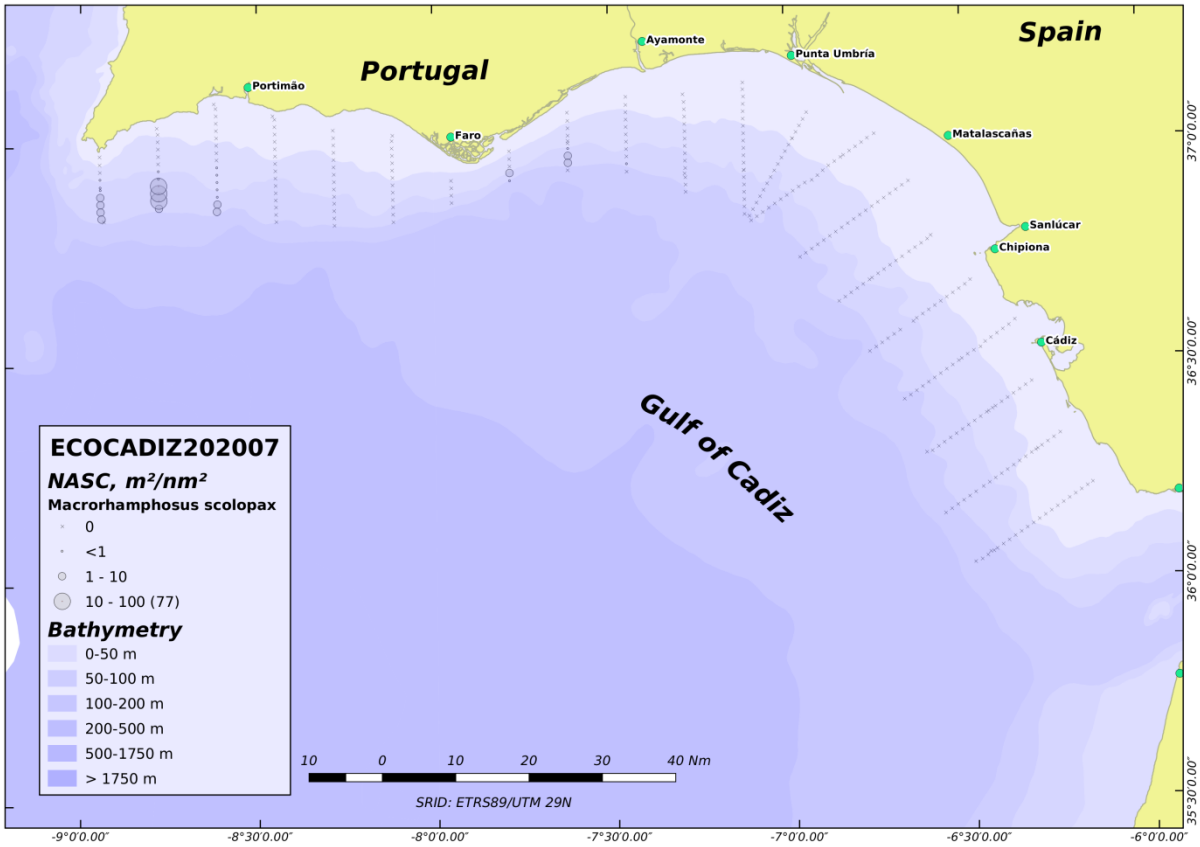
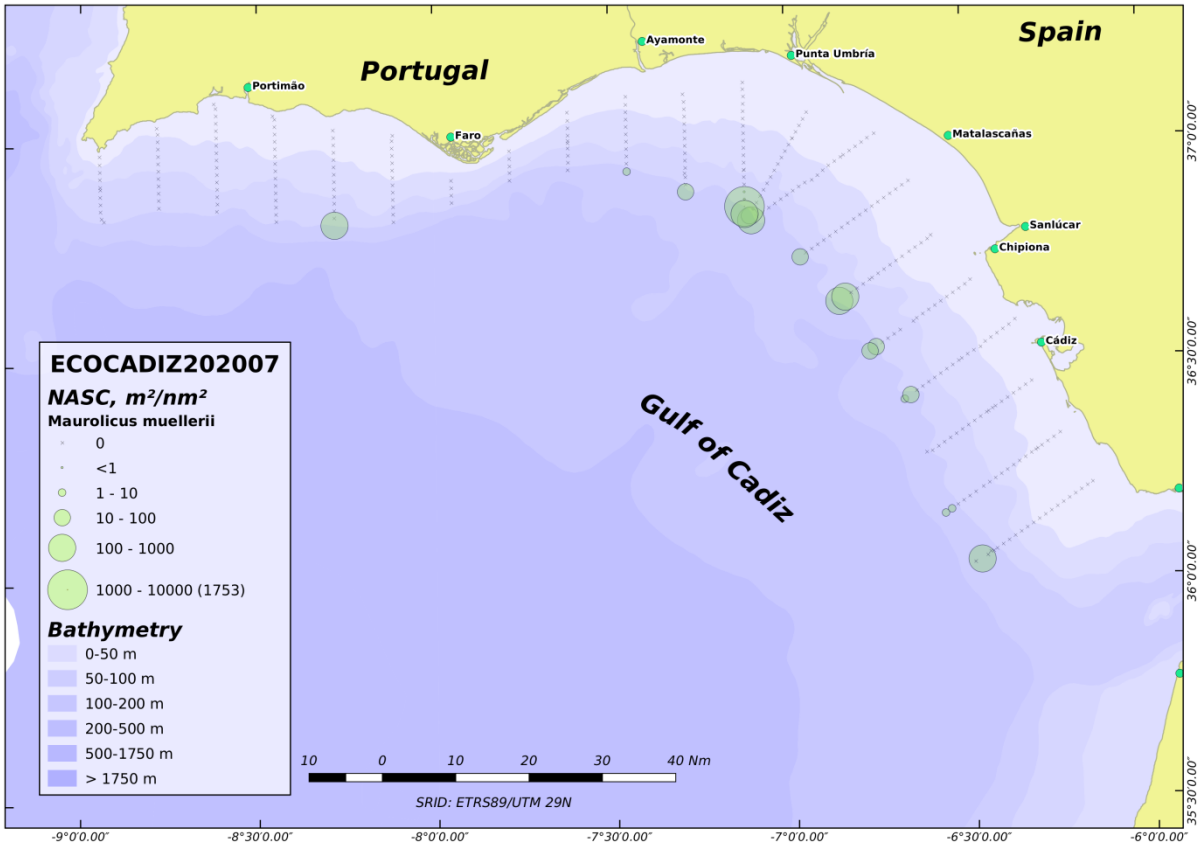
MINISTERIO DE CIENCIA E INNOVACIÓN

# ECOCADIZ 2020-07: Longspine snipefish. NASC.




- Incidental occurrence in the westernmost Algarve outer shelf waters, like boarfish, and also close to the Cape Sta. Mª.

# ECOCADIZ 2020-07: Pearlside. NASC.




- Detected only in the oceanic limit of the acoustic transects, just in the upper slope. More common in Spanish waters.

# Thanks for your attention