

# Anchovy in Division 9a. Southern Component. Input data. WGHANSA-1 2022.

F. Ramos<sup>(1)</sup>, J. Tornero<sup>(1)</sup>, M.M. Rincón<sup>(1)</sup> S. Garrido<sup>(2)</sup>



# Gaps of information in 2021

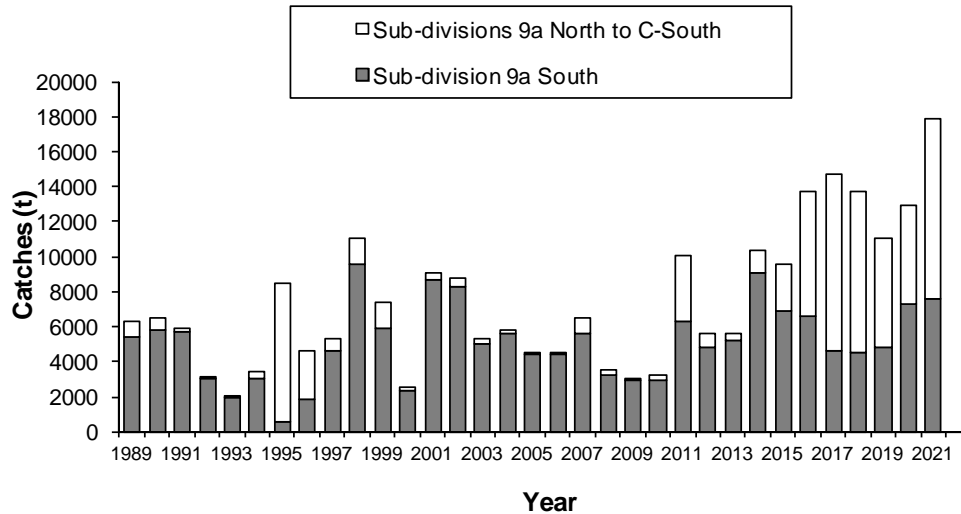
## Gaps of information in 2021.

- No *ECOCADIZ 2021-07* survey. See Surveys' slides.
- No *ECOCADIZ 2022-07* survey. See Surveys' slides.

# The Anchovy fishery in the Southern component in 2021

# Southern component (SC): landings, discards & catches in 2021.

**Catches (t)  
Division 9a**



↑ **Southern Component (9a S): 7562 t** (7317 t in 2020). 3% increase. 42% of catches in the Division. Well above the historical mean (5029 t). **2020-2021 with high catches.**

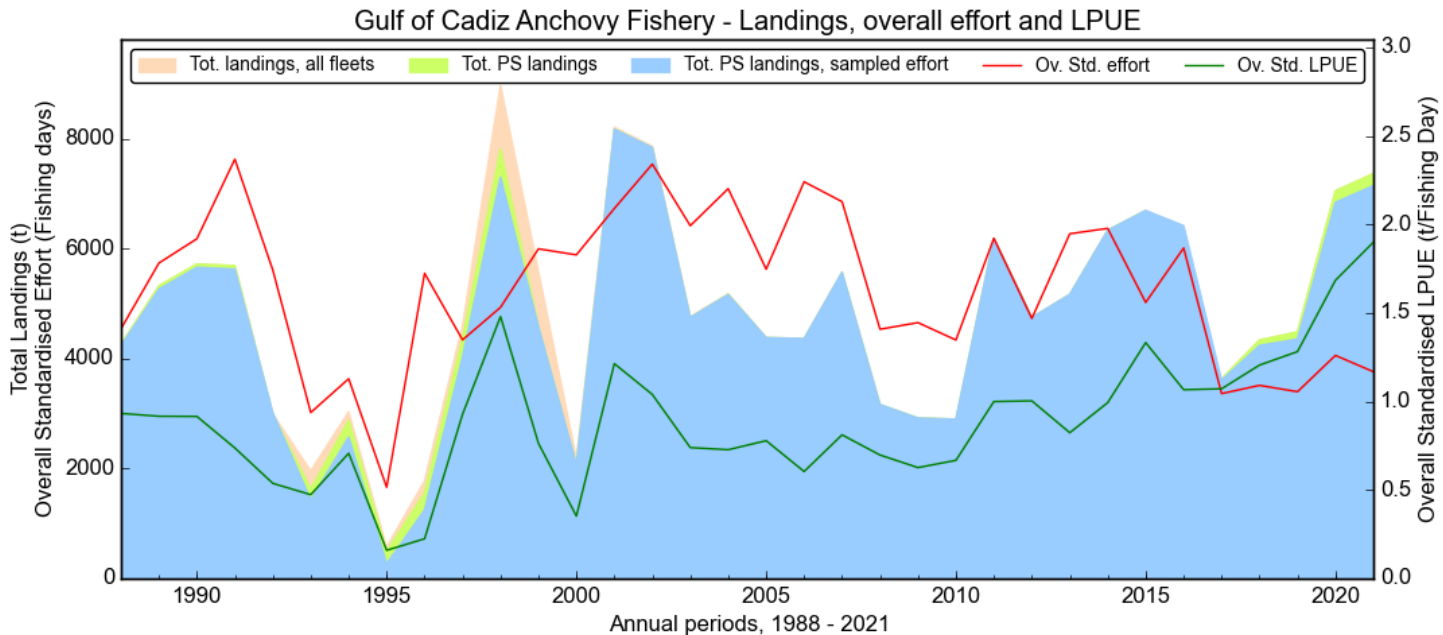
- PT: **109 t** (155 t in 2020), 1.4% SC.
- ES: **7452 t** (7163 t in 2020), 98.6% SC:
  - Official: **7373 t**, 97.5% SC.
  - Discards: **80 t**. (14 t PS; 66 t OTB), 1.1% SC.

- Purse-seiners: 99.1% of total catches in the Southern Component.

↑↑ **Division 9a: 17 837 t**, a 38% increase in relation to 2020 (12 956 t). Historical maximum. Consecutive historical maxima in the recent historical series (since 2016).

↑↑ **Western Component: 10 276 t** (5639 t in 2020). 82% increase. Historical maximum. 58% of catches in the Division. Well above the historical mean (2097 t). **2016-2021 recent period of high catches.**

# Southern component (SC): Spanish P-S fishery. Anchovy standardised effort and CPUE.



- Strong decrease in effort and landings in 2017.
- 2018-2021: relatively stable trend in effort (some increase in 2020-2021) coupled with steeply increasing catches resulted in a increasing trend in lpue (from less than 1 t to at around 1.2-1.9 t/fishing day).
- But, warning !!:
  - LPUE= total landings/total positive fishing trips.
  - Is LPUE probably overestimated? The fleet may invest more searching time than expected. Null trips not taken into account.

# Southern component (SC): Last Catch Advice. Agreed TAC.

## **Last catch advice (July 2021-June 2022):**

Total stock: **15 005 t.**

Western comp.: **7824 t**; Southern comp.: **7 181 t.**

## **Agreed TAC (July 2021-June 2022):**

Total stock: **15 005 t.**

PT: **7829 t.** Final quota: **8571 t .**

ES: **7176 t.** Final quota: **8023 t** (9a N: 113 t; **9a S: 7910 t**).

## **Provisional estimated catches (July 2021-June 2022):**

Western comp.: **1037 t.**

Southern comp.: **2465 t.**

Southern component (SC): Starting catch for  $C_{y-1}$  for the advice this year (July 2022).

$$C_y = C_{y-1} \frac{I_y}{\sum_{y-2}^{y-1} I_i / 2}$$

$C_{y-1}$ : Catch advice for the previous management period, i.e. the period July 2021 to June 2022, for a management year lasting from July in the year  $y$  to June in the year  $y+1$ .

$$C_{y-1} = \mathbf{7\ 181\ t}$$

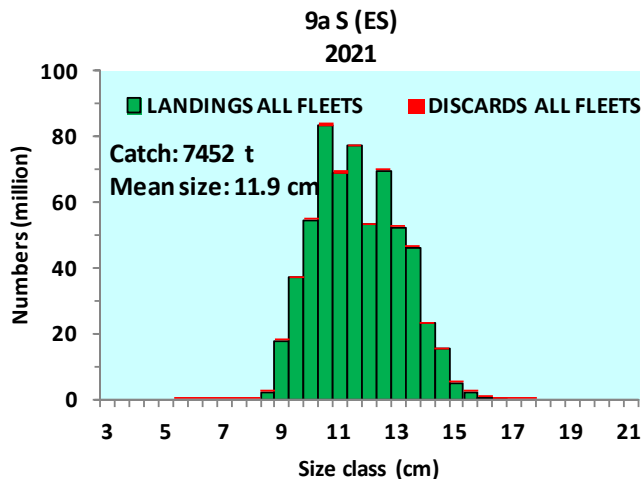
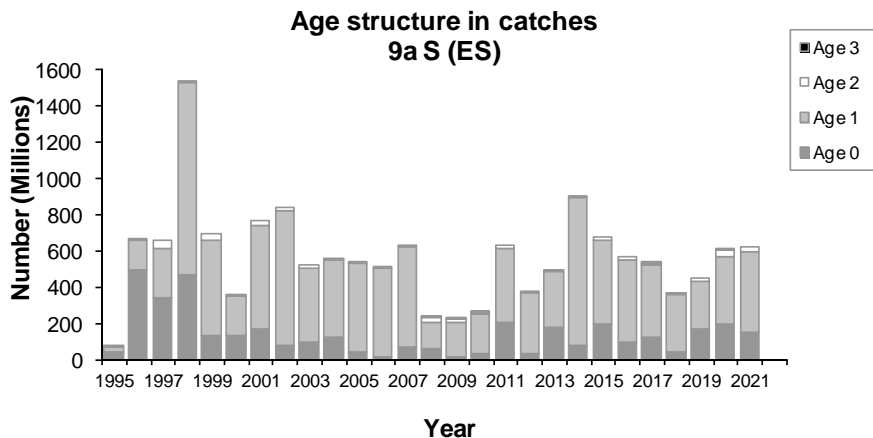
$I_y$  and  $I_i$  are Gadget outputs (Relative biomass estimates)



# Southern component (SC): Portuguese fishery. CANUM, LFD, Mean size & Weight in catches.

- Total catches in 2021:
  - ✓ 9a S (PT): **109 t**:
    - PS= 107 t.
    - MIS\_MIS= 2 t.
    - OTB\_DEF= 0.1 t.
- Mainly in Q3.
- No discards. Landings=Catches.
- Neither LFD nor age structure available for 2021 catches. Raised to the adjacent 9a S\_ES LFDs & ALKs.

# Southern component (SC): Spanish fishery. CANUM, LFD, Mean size & Weight in catches.

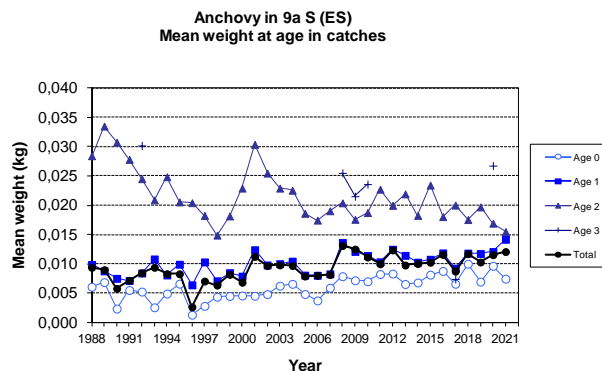
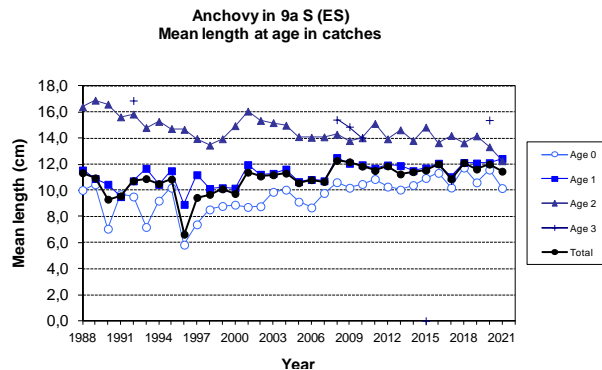


Size range; modes:

- Catch: 5.5-17.5 cm; 10.5 cm (11.5 cm, 12.5 cm).
- Landings: 8.5-16.5 cm; 10.5 cm (12.5cm).
- Discards: 5.5-17.5 cm; 10.5 cm (8.0 cm).

Total catches in 2021: **7452 t** (7373 t L + 80 t D)

- 618 million fish (3% increase in numbers with respect to 2020 = 599 millions). 26% decrease in age 0 anchovies. 19% increase in age group 1. 2% increase in age 2. Age 1 dominated the catches (72%). No age 3 fish. Incidental occurrence of age group 3 in the catch time-series.
- Total mean length and weight: 11.9 cm and 12.1 g. Similar values than in precedent years.



# Surveys' direct information

# Fishery-independent information: Surveys in 2021 (postWG)-2022

Sub-division	Summer 2021	Autumn 2021	Spring 2022
9a N		IBERAS 0921 (PT & ES)	PELACUS 0322 (ES)
9a CN			
9a CS			PELAGO 22 (PT)
9a S	<del>ECOCADIZ-2021-07 (ES)</del>	ECOCADIZ-RECLUTAS 2021-10 (ES)	

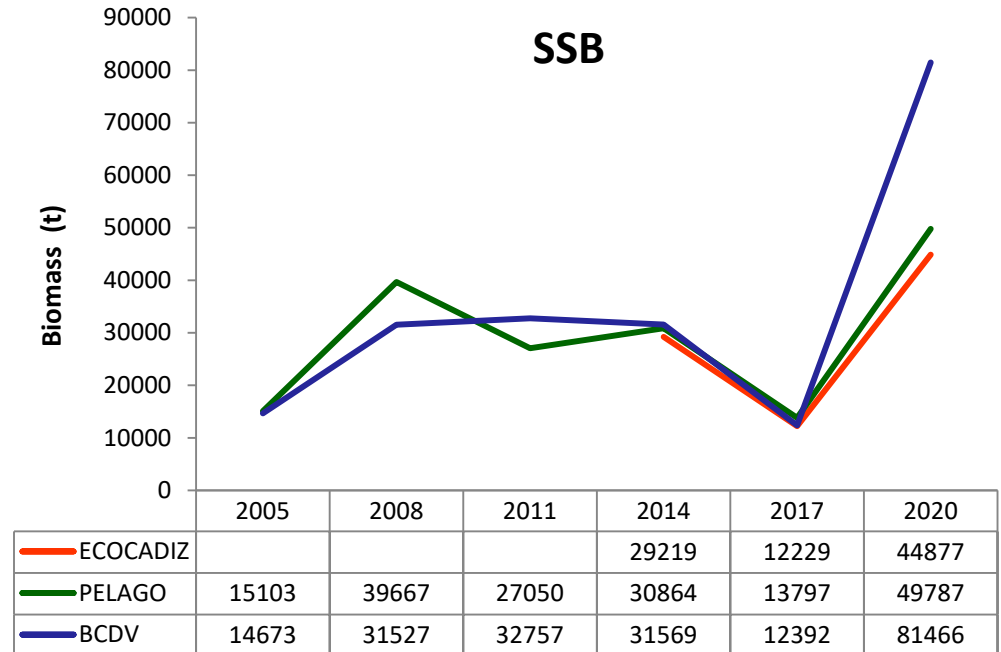
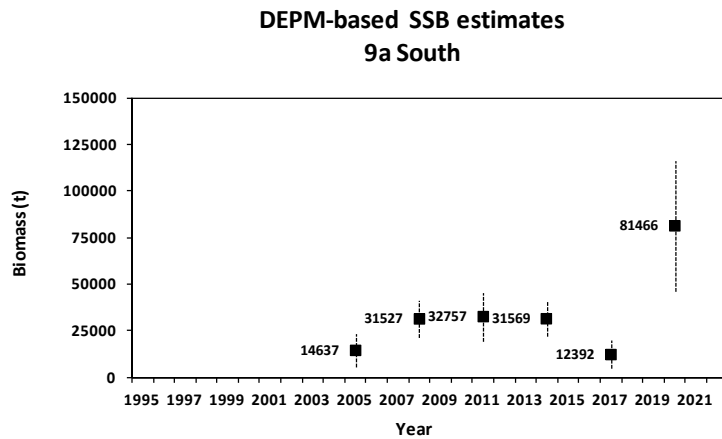
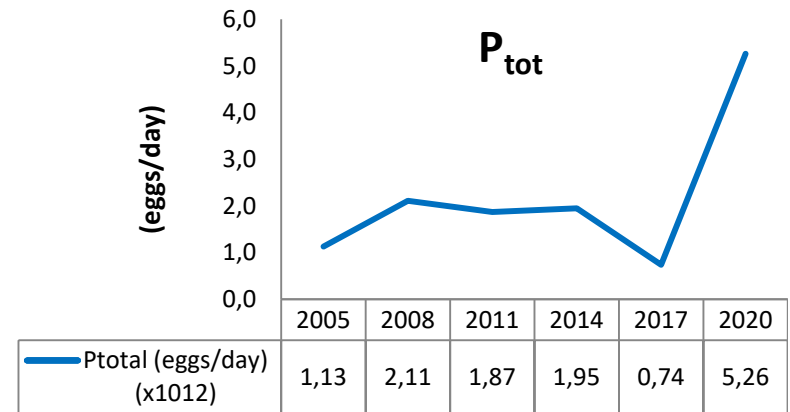
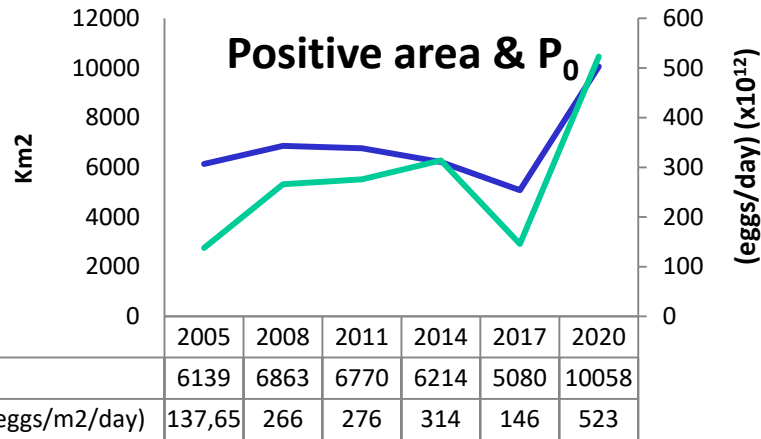
Fishery-independent information: DEPM. Summer survey. *BOCADEVA* series.  
9a South. Trends (I).

Year	2005	2008	2011	2014	2017	2020
<b>Eggs</b>						
$P_0$ (eggs/m <sup>2</sup> /day)	138	266	276	314	146	523
Z (day <sup>-1</sup> ) (CV)	-0.039	-1,43	-0.29	-0.33	-0,16	-1.11
$P_{total}$ (eggs/day) (x10 <sup>12</sup> )	1,13	2,11	1,87	1,95	0,74	5,26
Surveyed area (km <sup>2</sup> )	11982	13029	13107	14595	15556	16223
Positive area (km <sup>2</sup> )	6139	6863	6770	6214	5080	10058
<b>Adults</b>						
Female Weight (g)	25.2 / 16.7	23,7	15,2	18,2	16,2	16,6
Batch Fecundity	13820/ 11160	13778	7486	7502	7507	8212
Sex Ratio	0.53 / 0.54	0,528	0,531	0,54	0,53	0,54
Spawning Fraction	0.26 / 0.21	0,218	0,276	0.276	0,243	0,241 (1)
<b>SSB</b>						
SSB (t)	14673	31527	32757	31569	12422	81466

(1) Time-series mean value

# Fishery-independent information: DEPM. Summer survey. *BOCADEVA* series.

## 9a South. Trends (II).



**Fishery-independent information: Acoustic surveys in 2021 (post-WG).  
Summer survey. *ECOCADIZ 2021-07*: 31/07-13/08/2021. 9a South.**

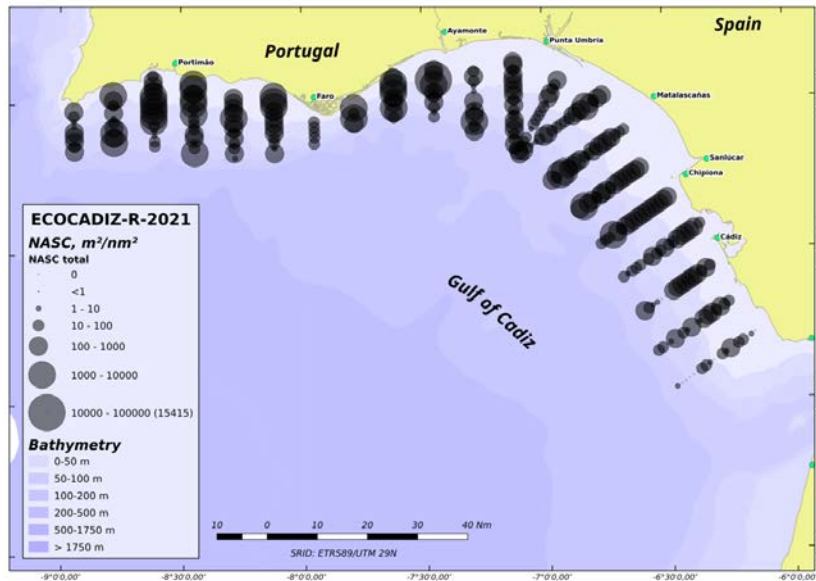
- ***ECOCADIZ 2021-07*** survey: Gulf of Cadiz pelagic ecosystem survey (20-200 m depth). RV *Miguel Oliver* (SGP). Summer.
- Survey planned to be conducted from 31/07 – 13/08/2021.
- Malfunctioning of the echo-sounder (RV's electric problems affecting to the echo-sounder?) during the previous acoustic survey (*MEDIAS*) caused the interruption of that survey.
- Failed attempts of solving such problems also led to the definitive suspension of the *ECOCADIZ* survey.
- Replacement of the R/V *Miguel Oliver's* EK60 by the EK80 this winter, including the corresponding further checks (calibration, self-noises, acoustic recording, etc.).
- Impact of this gap in the stock assessment (Gadget model) of the ane.27.9a southern component needs to be explored. *ECOCADIZ* is not used in the sardine stock assessment (pil.27.8c9a).
- No survey, No data, No estimates.

Fishery-independent information: Acoustic surveys in 2022 (post-WG).  
Summer survey. *ECOCADIZ 2022-07*: July-August 2022. 9a South.

- ***ECOCADIZ 2022-07*** survey: No survey this summer.
- Priority was given to increasing survey days of *MEDITS – ES* (bottom-trawl) and *MEDIAS –ES* (acoustic-trawl) surveys for surveying Balearic Islands and a new survey in Spanish Western Mediterranean waters.
- Provisional interruption?
- Impact of this (new) gap in the stock assessment (Gadget model) of the ane.27.9a southern component needs to be explored.



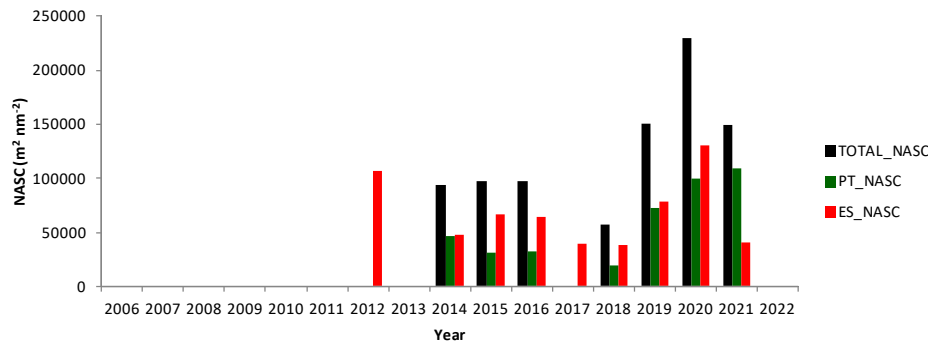
# Fishery-independent information: Acoustic surveys in 2021 (post-WG). Autumn surveys. *ECOCADIZ-RECLUTAS 2021-10*: 25/10-06/11/2021. 9a South. (I)



***ECOCADIZ-RECLUTAS 2021-10*** survey: acoustic assessment of the abundance of anchovy and sardine juveniles in their main recruitment areas off the Gulf of Cadiz (20 -200 m depth), (surveys in 2012, 2014-2021). RV *Ramón Margalef* (IEO). Autumn.

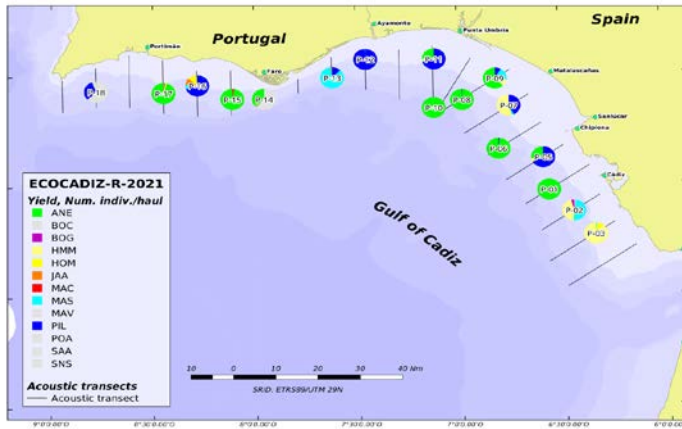
21 transects. 18 valid hauls. No CUFES. 168 CTD-LADCP st. TSG-F & VMADCP. No Top predator census.

Decrease in NASC allocated to the “pelagic fish species assemblage” for the total area and noticeably in Spanish waters.



Sardine (55%), anchovy (16%) and chub mackerel (9%) the main contributors to the total NASC.

# Fishery-independent information: Acoustic surveys in 2021 (post-WG). Autumn surveys. *ECOCADIZ-RECLUTAS 2021-10: 25/10-06/11/2021. 9a South. (I)*

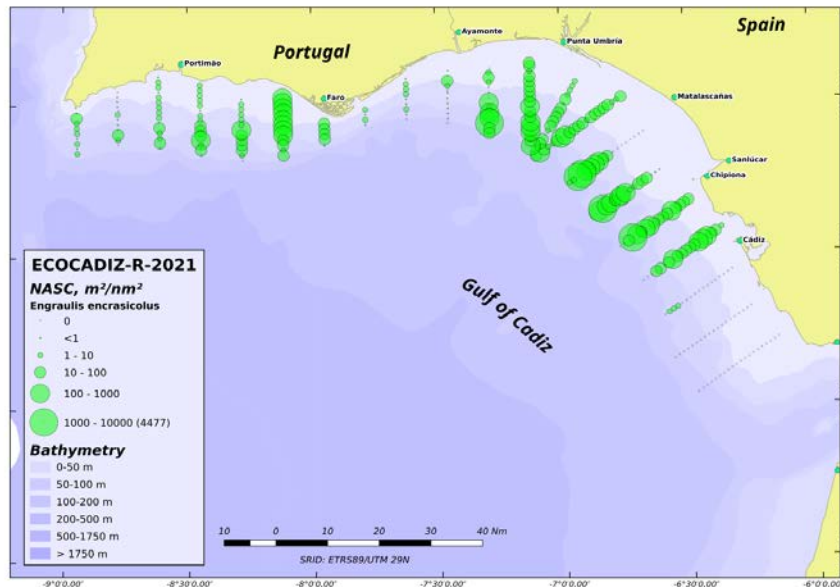


Anchovy showed a high frequency of occurrence (78%) in the 18 valid hauls.

Widely distributed, although avoiding the easternmost waters.

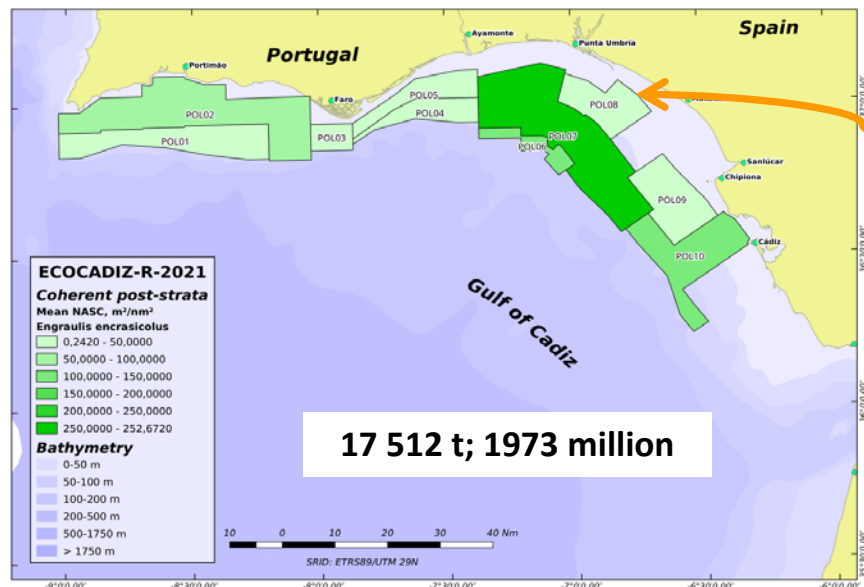
Hotspots:

- Alfanzina-West Cape Santa Maria.
- Isla Cristina-Bay of Cadiz.



Usual pattern: the smallest anchovies in the surroundings of the Guadalquivir river mouth and adjacent coastal waters. Larger/older anchovies in the westernmost waters.

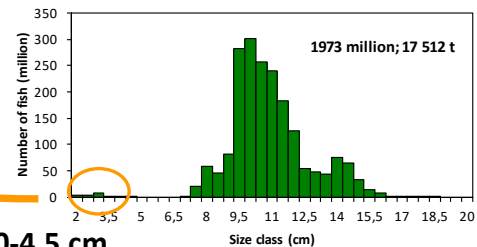
Fishery-independent information: Acoustic surveys in 2021 (post-WG). Autumn surveys. *ECOCADIZ-RECLUTAS 2021-10*: 25/10-06/11/2021. 9a South. (II).



A total of **17 512 t** and **1973 million** fish were estimated for this species for the whole surveyed area. (PT: **4143 t**; **211 million**. ES: **13 370 t**; **1763 million**).

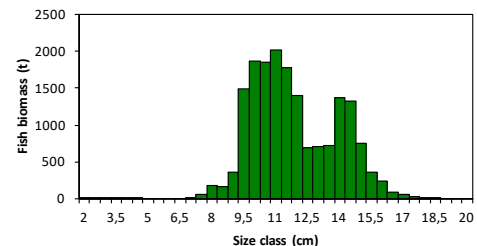
(51% and 38% decreases in B and N in relation to *ECOCADIZ-RECLUTAS 2020-10*: 36 070 t; 3197million).

9a S (TOTAL ABUNDANCE)

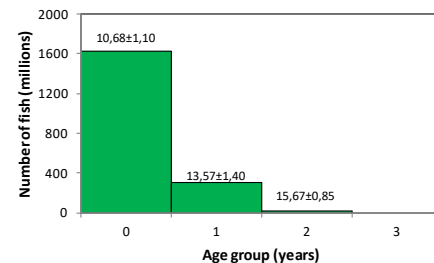


2.0-4.5 cm

9a S (TOTAL BIOMASS)



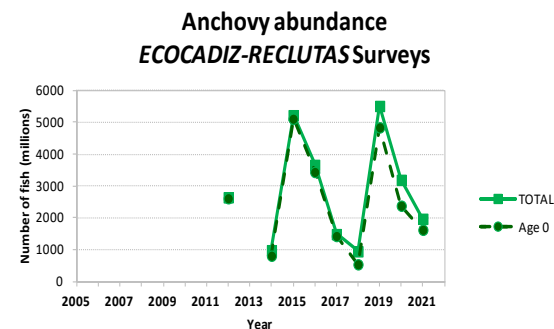
9a S (TOTAL ABUNDANCE)



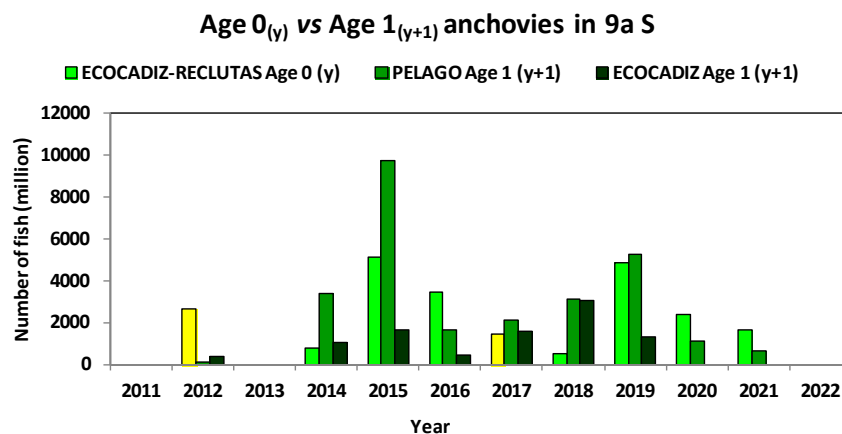
4 modes (10.0, 14.0, 8.0 and 3.0 cm). Ages 0, 1 and 2. **Age-0** anchovies in the surveyed area were estimated at **1629 million fish** and **12 063 t**, respectively, *i.e.* **83%** and **69%** of the total estimated anchovy abundance and biomass.

# Fishery-independent information: Acoustic surveys in 2021 (post-WG). Autumn surveys. *ECOCADIZ-RECLUTAS 2021-10*: 25/10-06/11/2021. 9a South. (III).

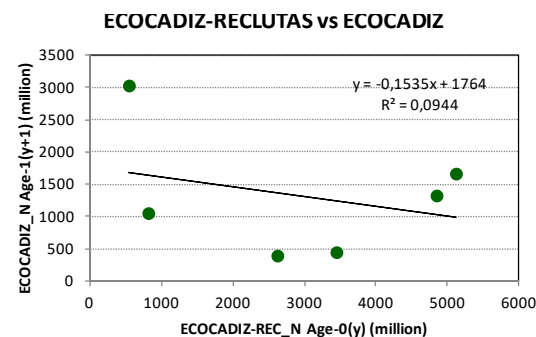
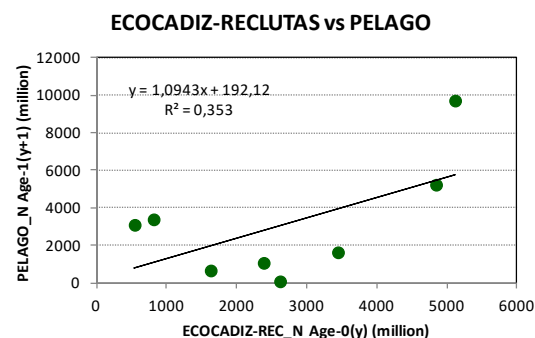
Estimate/Year	Total Population (Recruits at age 0)								
	2012	2014	2015	2016	2017	2018	2019	2020	2021
<b>Biomass (t)</b>	13680 (13354)	8113 (5131)	30827 (29219)	19861 (15969)	7642 (7290)	10493 (3834)	48357 (36405)	36070 (21060)	17512 (12063)
<b>Abundance (millions)</b>	2469 (2619)	986 (814)	5227 (5117)	3667 (3445)	1492 (1433)	953 (543)	5505 (4845)	3197 (2385)	1973 (1629)



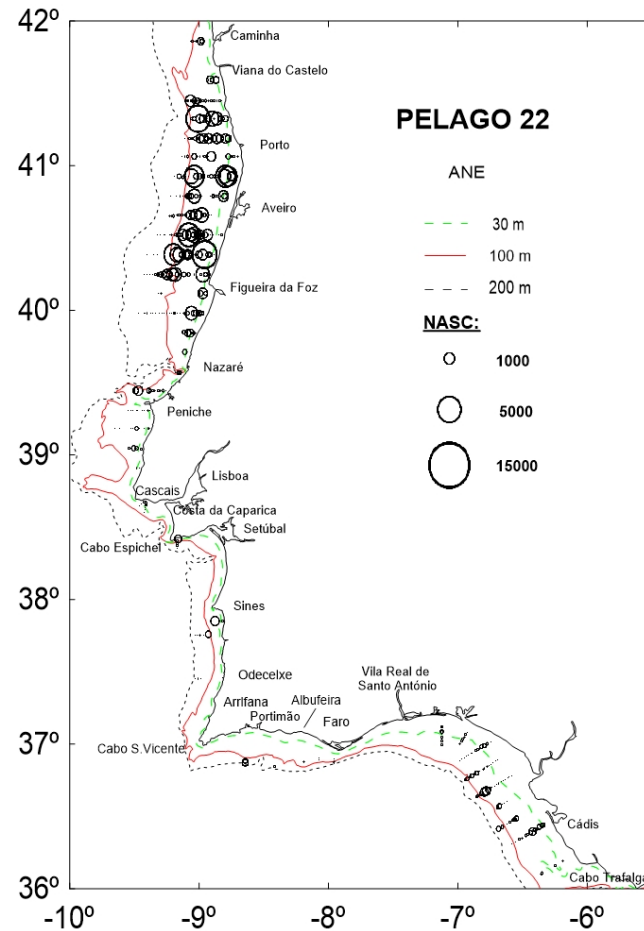
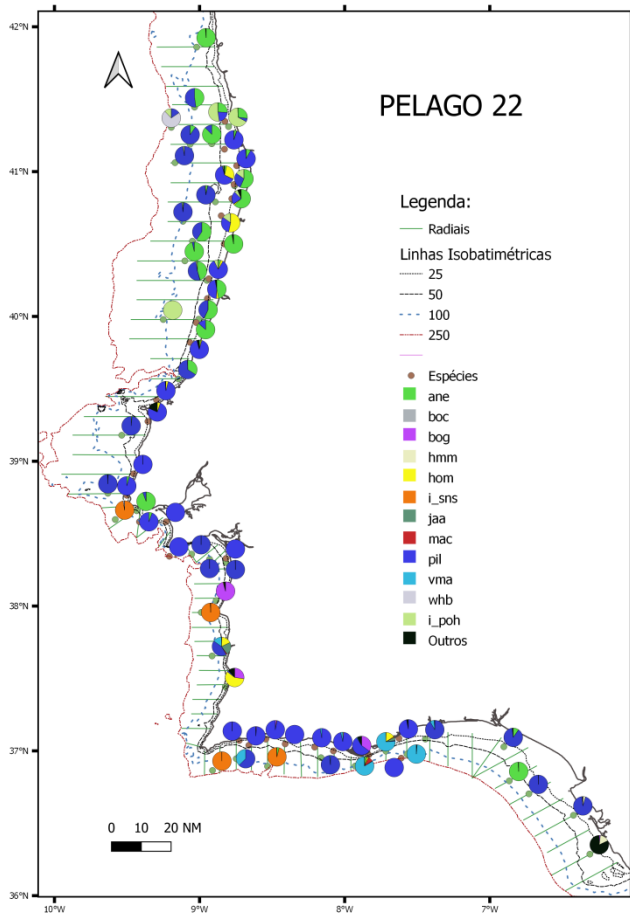
The 2021 estimates of age-0 fish experienced a similar decreasing trend than the one showed by the whole population in relation to the historical peak recorded in 2019 and in the last year, but with values still close to the time-series average.



No estimates from *ECOCADIZ 07-2021* (no survey).



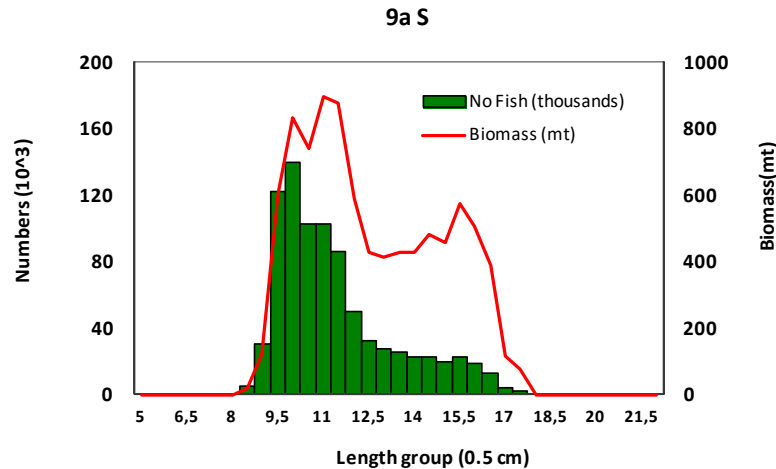
# Fishery-independent information: Acoustic surveys in 2022. Spring surveys. *PELAGO 22*: 01 – 09 & 16 – 30/03/2022. 9a South. (I).



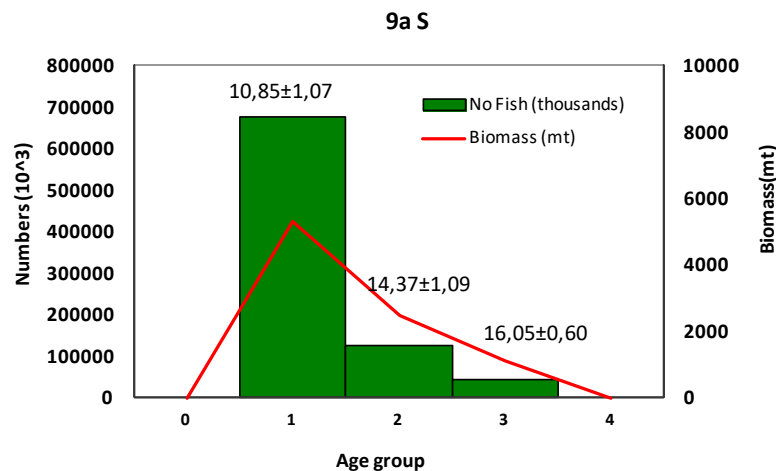
**PELAGO 22** survey: Pelagic ecosystem survey of the Portuguese and Gulf of Cadiz shelf waters (30-150/200 m depth). Spring. Two vessels (*Miguel Oliver* in 9a S, *Vizconde de Eza* in 9a CN-CS-west Algarve).

Anchovy population in 9a S scattered distributed in 2 areas restricted to the outer shelf off West Cape Sta. Maria in the Algarve and between El Rompido and Bay of Cádiz in Spanish waters. Very low NASC values .

# Fishery-independent information: Acoustic surveys in 2022. Spring surveys. PELAGO 22: 01 – 09 & 16 – 30/03/2022. 9a South. (II).



A total of **8 972 t** and **849 million** fish were estimated for this species for the Sub-division 9a S (77% and 61% of the population and biomass in Spanish waters, respectively).

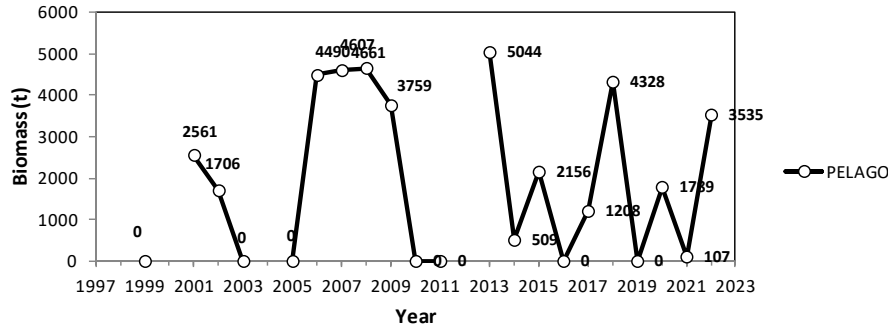


The estimates represent **36% and 43% decreases in B and N**, respectively, in relation to the already decreased 2021 estimates (14 065 t; 1494 million).

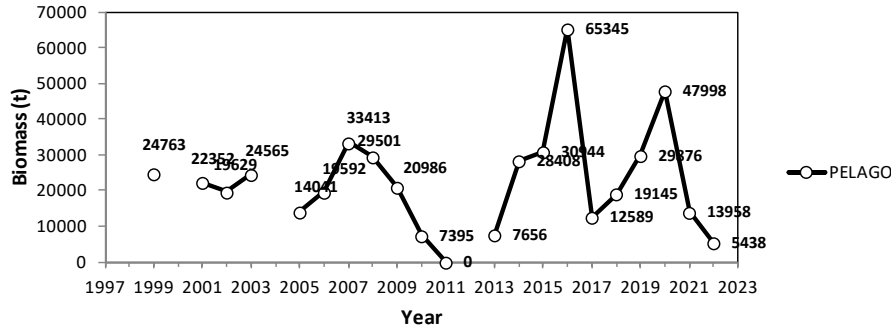
Mode at 10.0 cm. Age-1, Age-2 and Age-3 fish. Age-1 olds the dominant age group.

# Trends in *PELAGO* acoustic estimates (9a S)

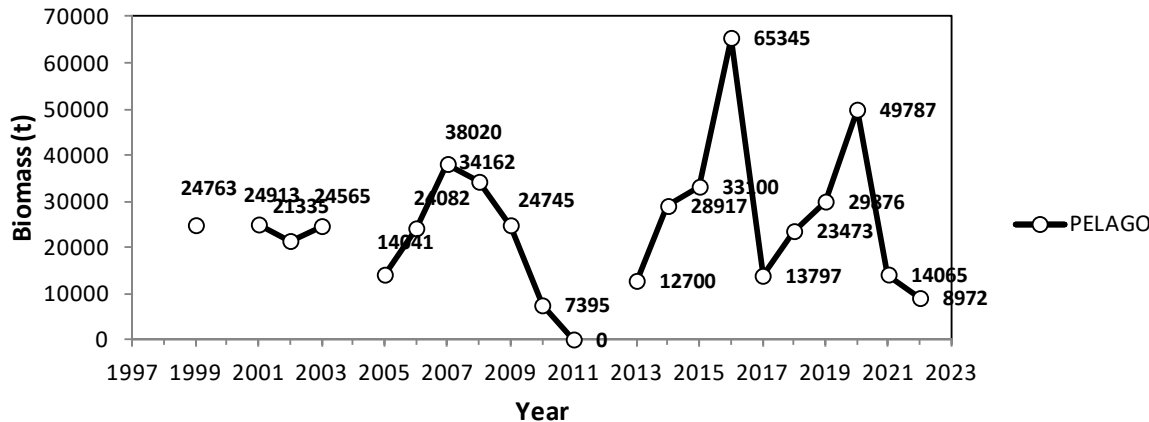
9a S (PT)



9a S (ES)

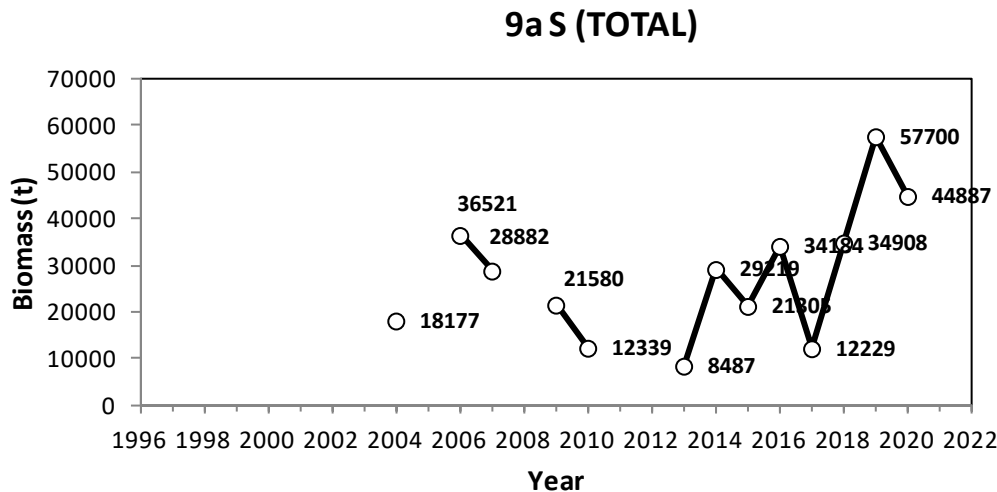
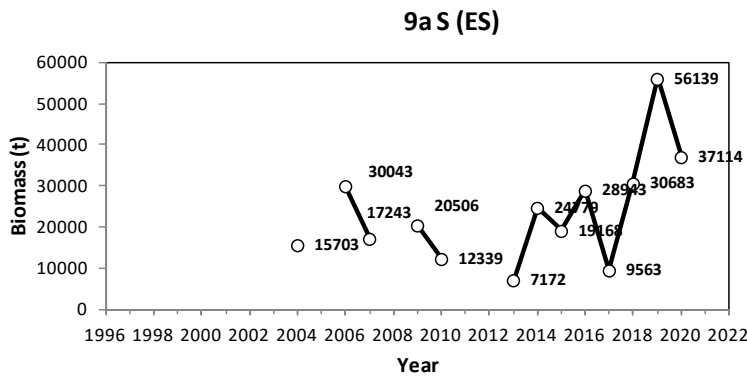
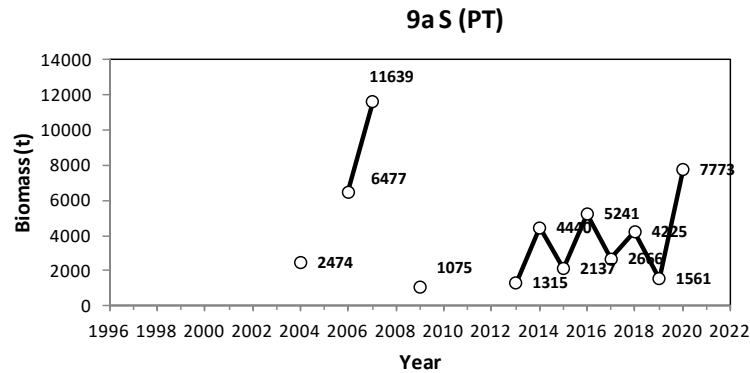


9a S (TOTAL)



- 2010: strong drop.
- 2011: No anchovy detected (but DEPM estimated later on in summer 33 kt for the South).
- 2012: No survey.
- 2014-2016: increasing trend with **historical peak in 2016**.
- 2017: Strong decrease, below the historical mean.
- **2018-2020: new increasing trend.**
- **2020 is the second highest record in the time-series....but...**
- **Strong (-74% in B) decrease in 2021.**
- **2022: new (-36% in B) decrease.**

# Trends in *ECOCADIZ* acoustic estimates



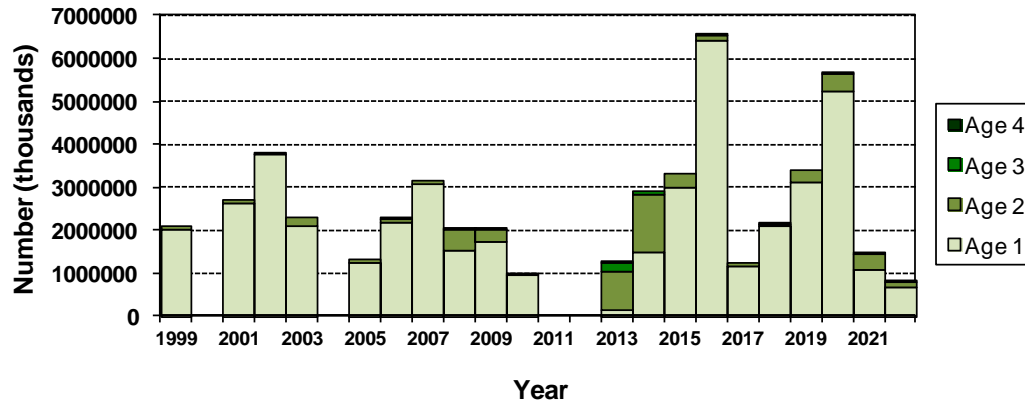
- Gaps in 2005, 2008 and 2011 (when DEPM surveys), in 2012 and 2021 (no standard survey).
- Partial estimate in 2010 (only Spanish part): 12 339 t.
- **Similar trends than *PELAGO* but with a relatively different magnitude.**
- **Historical record in 2019.**
- **-22% decrease in 2020, but still well above the time-series average (26.3 kt).**
- **Situation in 2021 (and 2022) is unknown (no survey).**



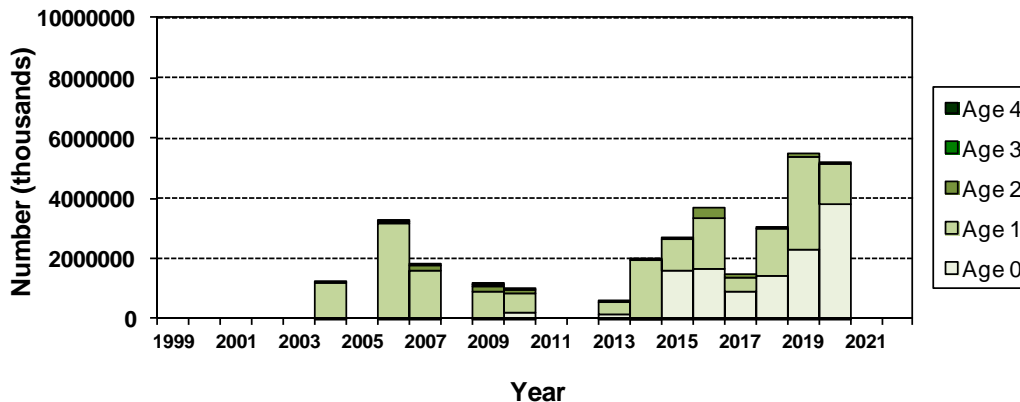
# Population Age structure in 9a South

Age structure estimated applying Spanish ALKs until 2012

Portuguese Spring Acoustic Surveys Anchovy in Sub-division 9.a South



Spanish Summer Acoustic Surveys Anchovy in Sub-division 9a South



- Ages 1-4.
  - Failed recruitment in 2016.
  - Progressively good recruitments since 2017, especially in 2019.
  - Failed recruitment in 2020-2021.
  - Strong 2015 and 2018-2019 year classes.
- 
- Ages 0-4. Occurrence of Age 0 anchovies in 2010, and 2013-2021 due to the later dates of the survey (late July-early August).
  - Failed recruitment in 2016 also evidenced.
  - Relatively good recruitment in 2018 is confirmed.
  - Strong 2018 year class.