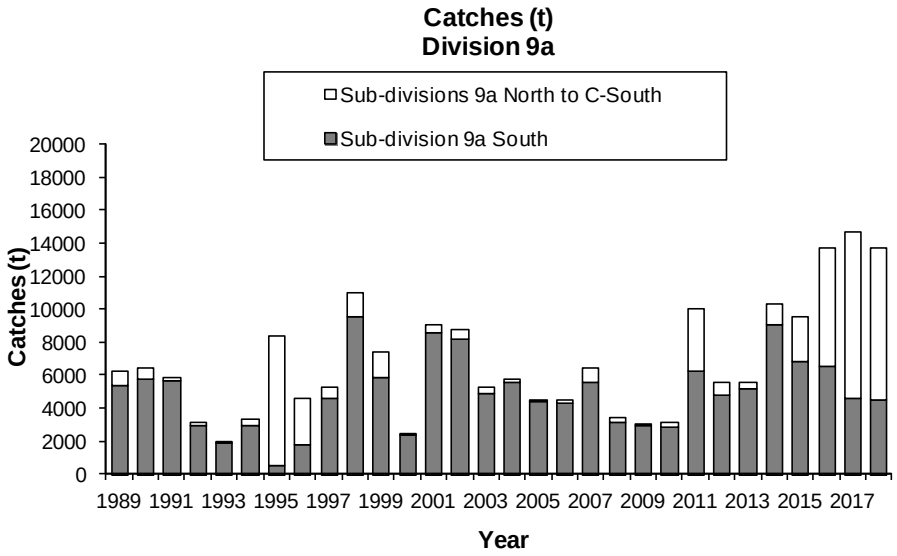
Anchovy in Division 9a Southern Component Input data WGHANSA-1 2019

ICES WGHANSA-1 2019, 3–7 June 2019. By correspondence.

The fishery in 2018: Catches

The Anchovy fishery in the Southern component in 2018:



Recent Agreed TACs:

2013-2014: 8 778 t (PT: 4 580 t; ES: 4 198 t).

2015: 9 656 t (PT: 5 038 t, ES: 4 618 t).

2016: 10 622 t (PT: 5 542 t; ES: 5 080 t).

Revised and increased up to 15 000 t (PT: 7 826 t, ES: 7 174 t).

2017-2018: 12 500 t (PT: 6 522 t; ES: 5 978 t).

July 2018-June 2019: 17 068 t.

Western comp.: 13 308 t; Southern comp.: 3 760 t.

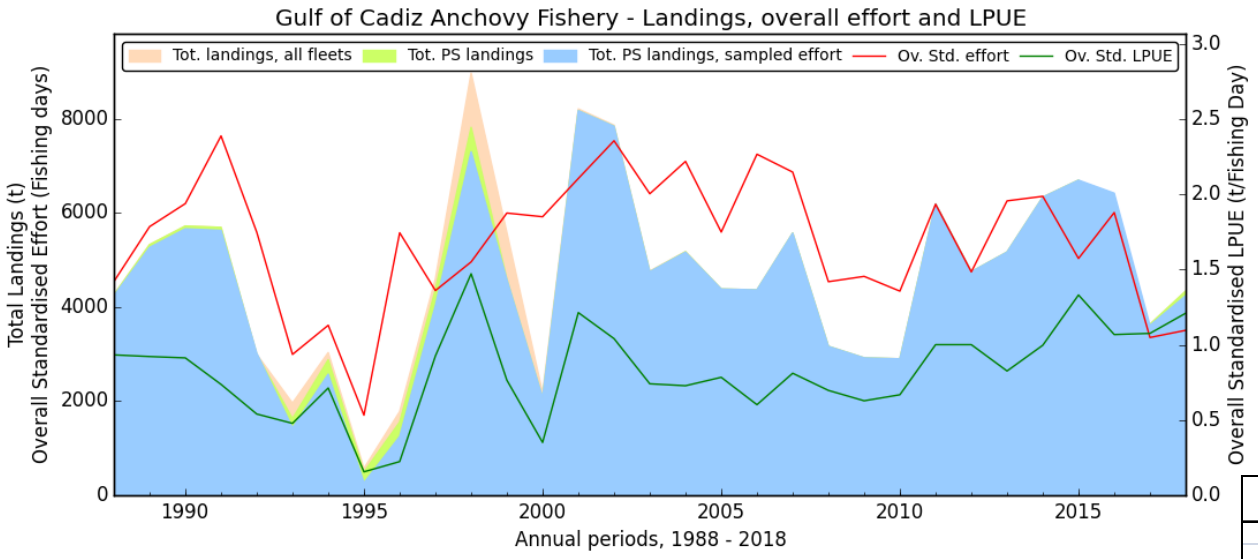
Provis. offic. Landings (July 2018-June 2019): 15 391 t.

Western comp.: 12 521 t; Southern comp.: 2 870 t.

- ⬇ Division 9a: 13 732 t, a 7% decrease in relation to 2017 (14 705 t). Consecutive historical maxima in the recent historical series (since 1989).
- ⬇ Western Component: 9 233 t (10 094 t in 2017). 9% decrease. 67% of catches in the Division. 3rd Historical Record (since 1995).

- ⬇ Southern Component (9a S): 4 499 t (4 611 t in 2017). 2% decrease. 33% of landings in the Division.
  - PT: 65 t (26 t in 2017).
  - ES: 4 433 t (4 585 t in 2017):
    - Official: 4 342 t.
    - Unallocated: 0 t.
    - Discards: 91 t. (1 t PS; 90 t OTB) (2% of total catch).
- Purse-seiners: 98.0% of total catches in the Southern Component.

Southern Component: the Gulf of Cadiz Anchovy Spanish PS fishery. Anchovy specific effort and CPUE.



- Strong decrease in effort in 2017-2018 coupled with decreased catches resulted in a similar LPUEs than in 2015-2016 .
- LPUE, however, relatively stable and high (0,7-1,0 t/day)....But, warning !!:
  - LPUE= total landings/total positive fishing trips (=daily sales per vessel).
  - LPUE probably overestimated. Probably the fleet invests more searching time than expected.

Year	Purse-Seine Landings	Standardised Effort	Standardised CPUE
1988	4263	4545	0.933
1989	5330	5713	0.922
1990	5726	6203	0.913
1991	5697	7642	0.737
1992	2995	5594	0.540
1993	1629	2996	0.478
1994	2883	3616	0.713
1995	495	1704	0.156
1996	1556	5583	0.224
1997	4376	4354	0.926
1998	7824	4963	1.472
1999	4594	6002	0.765
2000	2078	5923	0.351
2001	8180	6737	1.214
2002	7847	7539	1.041
2003	4754	6412	0.741
2004	5177	7100	0.728
2005	4386	5598	0.784
2006	4367	7253	0.602
2007	5575	6873	0.811
2008	3168	4542	0.697
2009	2922	4655	0.628
2010	2901	4341	0.668
2011	6196	6189	1.001
2012	4754	4750	1.001
2013	5172	6261	0.826
2014	6340	6358	0.997
2015	6701	5035	1.331
2016	6424	6013	1.068
2017	3636	3356	1.076
2018	4342	3508	1.210

Southern Component: Starting catch for C_{y-1} for the advice this year (July 2019).

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

C_{y-1}: Catch advice for the previous management period, i.e. the period July 2018 to June 2019, for a management year lasting from July in the year *y* to June in the year *y+1*.

C_{y-1}= **3 760 t**

I_y and I_i are Gadget outputs (Biomass estimates)

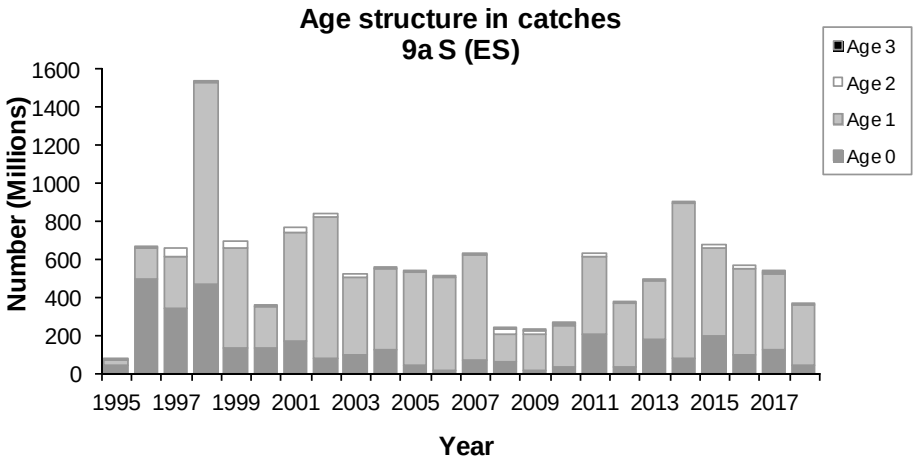
The fishery in 2018:
Sizes and Ages in catches

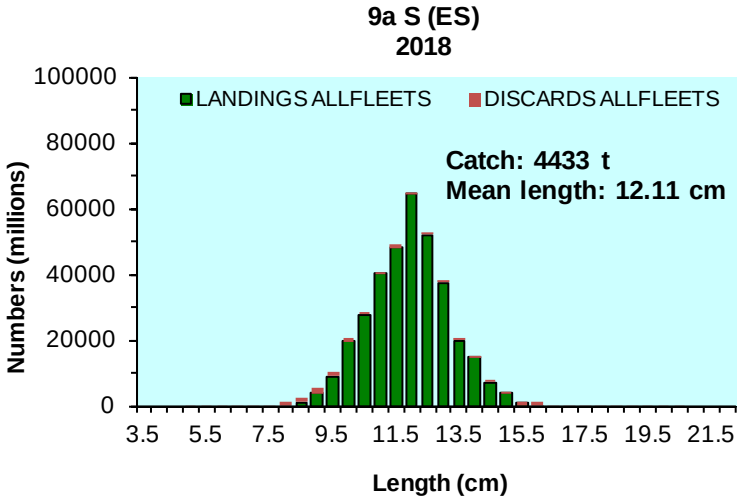
Southern component: the Portuguese fishery. CANUM, LFD, Mean size & Weight in catches.

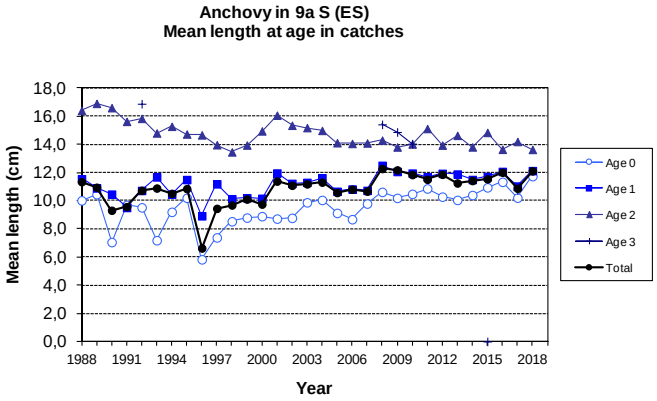
- Total catches in 2018:
  - ✓ 9a S (PT): **65 t**:
    - PS= 64.5 t.
    - OTB= 0.8 t.
- Mainly in Q3 and in a lesser extent in Q2.
- No discards. Landings=Catches.
- Neither LFD nor age structure available for 2018 catches.

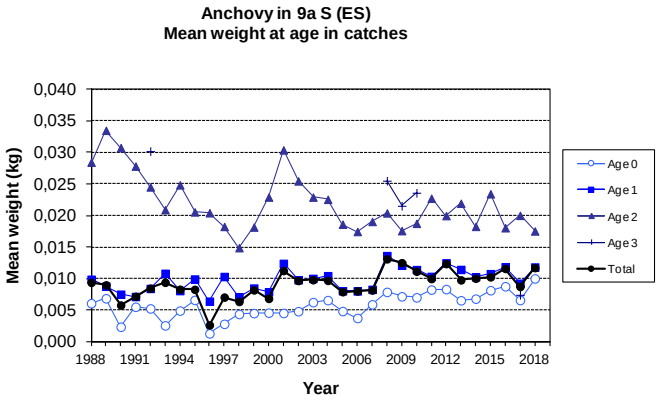
Southern component: the Spanish fishery. CANUM, LFD, Mean size & Weight in catches.

- Total catches in 2018: **4 433 t** (4 342 t L + 91 t D)
  - 362 million fish (31% decrease in numbers with respect to 2017=525 millions). 67% decrease in age 0 anchovies. 21% decrease in age group 1. 49% increase in age 2. Age 1 dominated the catches (87%). No age 3 fish. Incidental occurrence of age group 3 in the catch time-series.
  - Total mean length and weight: 12.1 cm and 11.7 g.







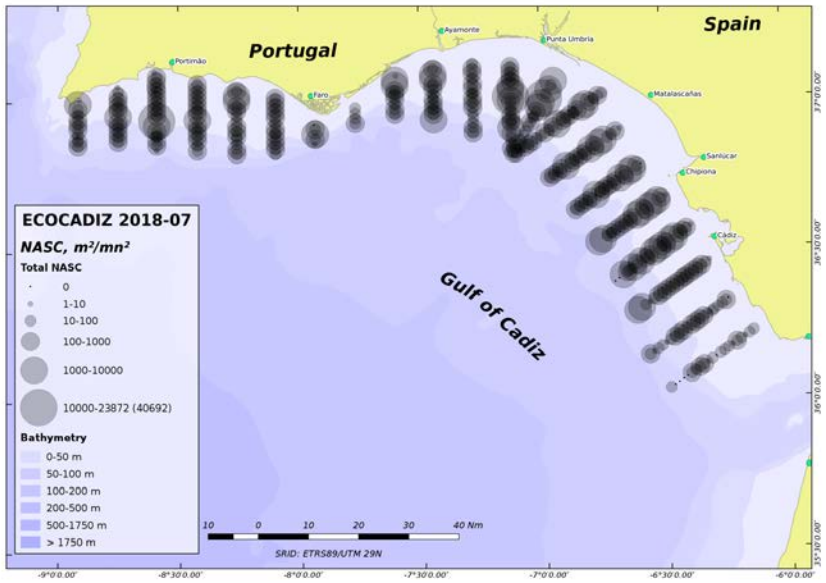


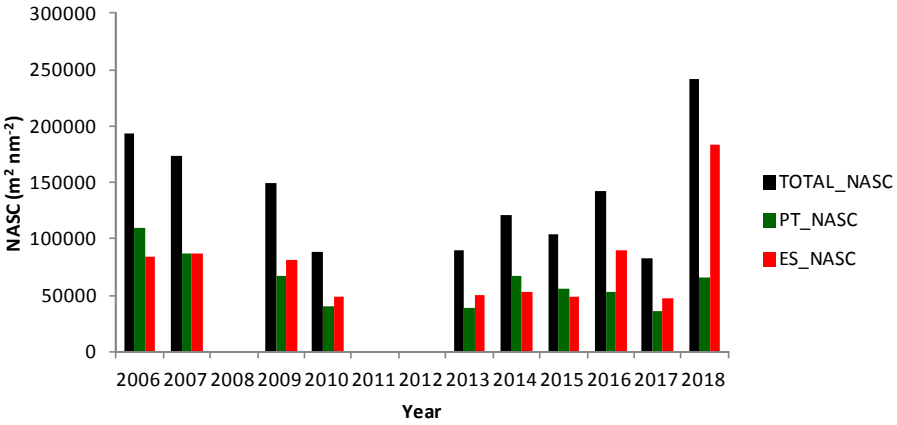
Surveys’ direct information

Fishery-independent information: Surveys in 2017 (postWG)-2018

Sub-division	Summer 2018	Autumn 2018	Spring 2019
9a N		IBERAS 1118 (PT & ES)	PELACUS 0319 (ES)
9a CN			PELAGO 19 (PT)
9a CS			
9a S	ECOCADIZ 2018-07 (ES)	ECOCADIZ-RECLUTAS 2018-10 (ES)	

Fishery-independent information: Acoustic surveys in 2018 (post-WG). Summer survey. *ECOCADIZ 2018-07*: 31/07-13/08/2018. 9a South. (I)





ECOCADIZ 2018-07 survey: Gulf of Cadiz pelagic ecosystem survey (20-200 m depth). Summer.

The estimate of total NASC allocated to the "pelagic fish species assemblage" has been the highest one ever recorded within the time series, denoting a high fish density during the survey.

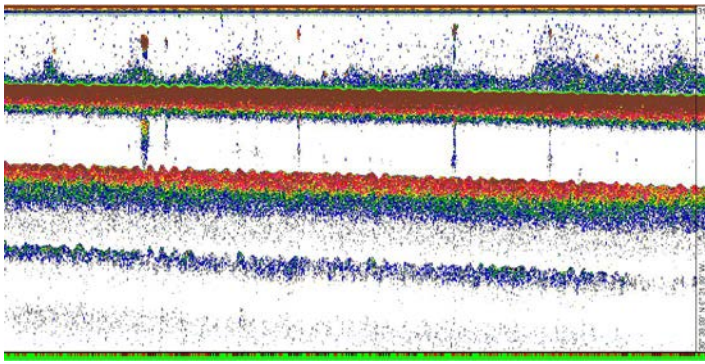
Sardine (49%), chub mackerel (22%) and anchovy (18%) the main contributors to the total NASC.

Sardine: occurrence of many dense schools (mainly Age-0 fish) in the shallowest limits of the central part of the surveyed area, a situation which was not usually recorded in the most recent years.

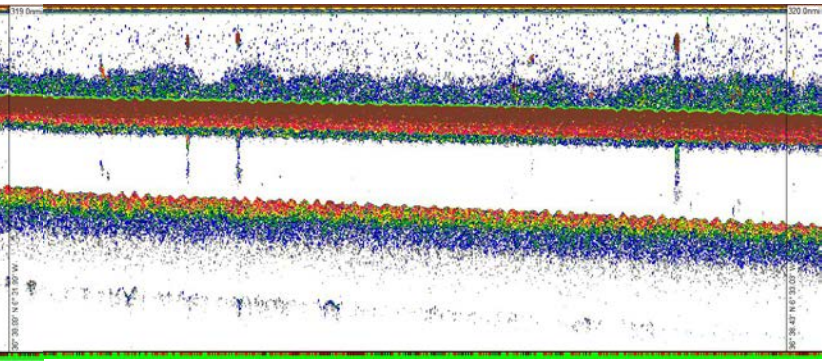
Fishery-independent information: Acoustic surveys in 2018 (post-WG). Summer survey. *ECOCADIZ 2018-07*: 31/07-13/08/2018. 9a South. (II)

Sardine: coastal waters of the R05 (Chipiona).

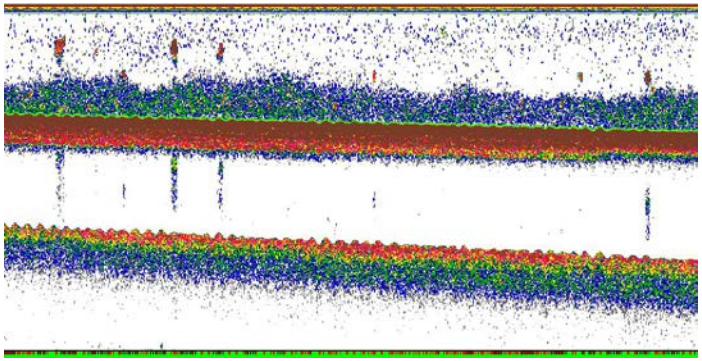
23-25 m



27-29 m

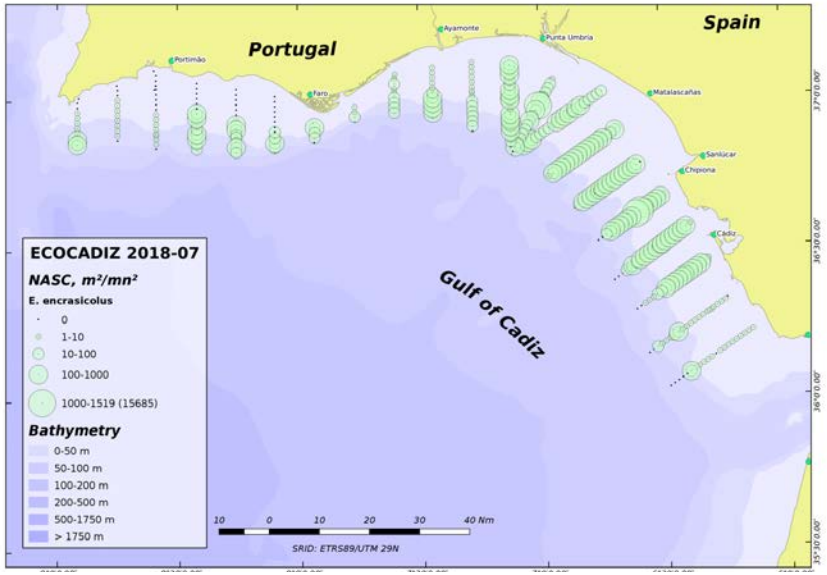


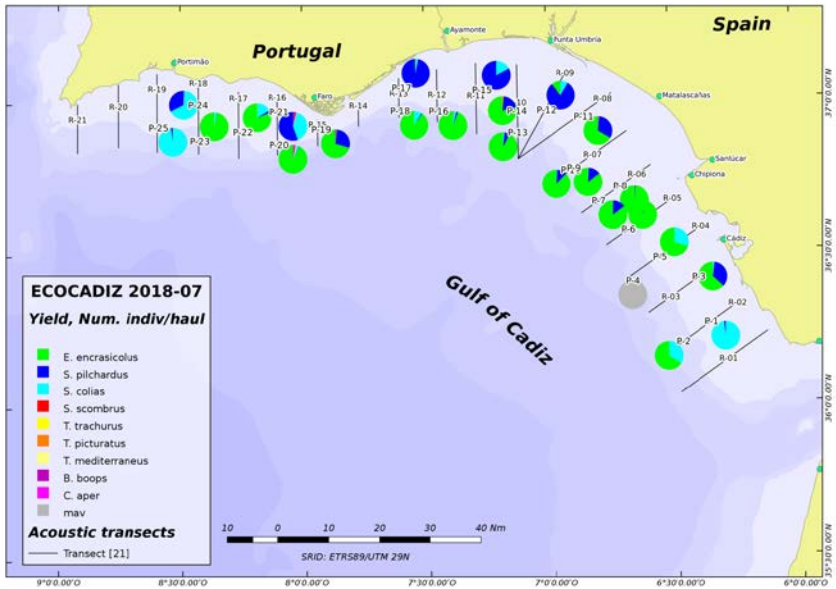
31-37 m



This situation was repeated in transects R06 (Doñana), R08 (Mazagón) y R10 (El Rompido).

Fishery-independent information: Acoustic surveys in 2018 (post-WG). Summer survey. *ECOCADIZ 2018-07*: 31/07-13/08/2018. 9a South. (III)





Anchovy showed a very high frequency of occurrence (86%) in the 22 valid hauls.

Widely distributed over the surveyed area.

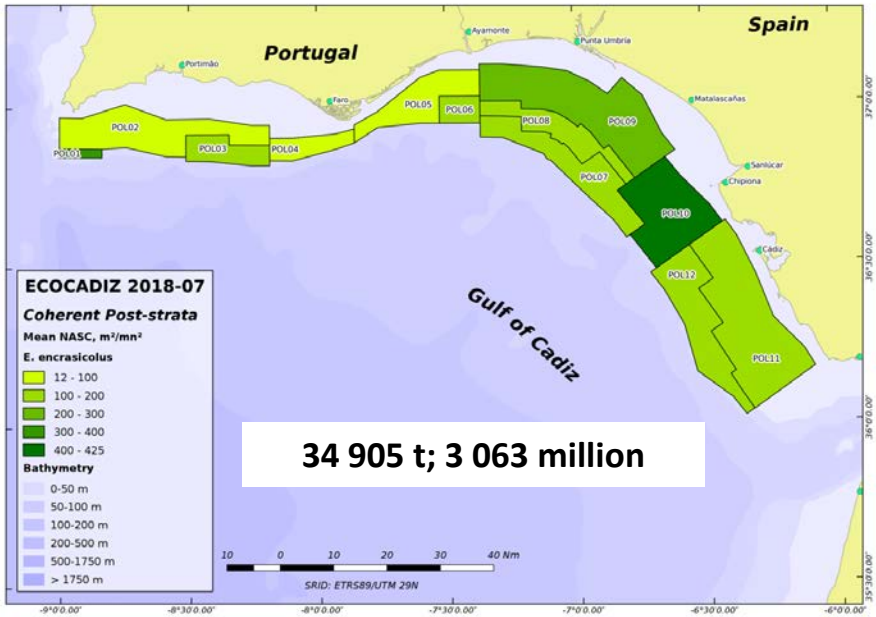
Bulk of the anchovy population, as usual, in the central part of the surveyed area (El Rompido (R10)-Bay of Cadiz (R03)). All over the shelf, but specially in the inner shelf.

Secondary nucleus to the west of Cape Santa Maria, in mid-/outer shelf waters.

Anchovy population in *PELAGO 18* (spring) between Guadiana and Bay of Cadiz only.

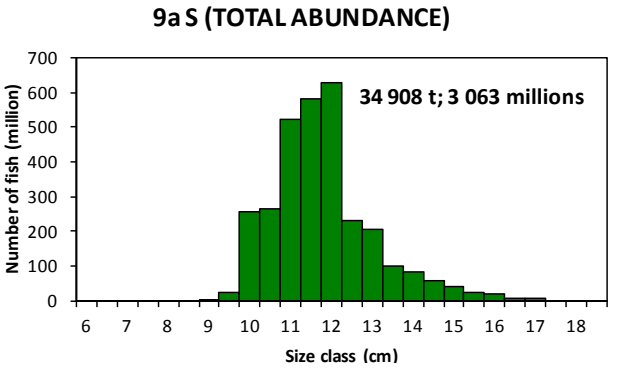
The smallest anchovies mainly occurring in the surroundings of the Guadalquivir river mouth and Bay of Cadiz, and larger/older anchovies occurring in the westernmost and easternmost waters.

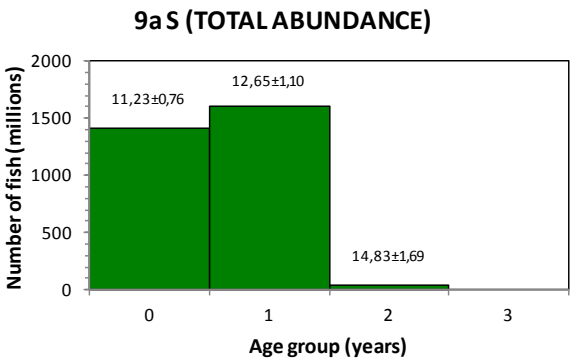
Fishery-independent information: Acoustic surveys in 2018 (post-WG). Summer survey. *ECOCADIZ 2018-07*: 31/07-13/08/2018. 9a South. (IV)



A total of **34 905 t** and **3 063 million** fish were estimated for this species for the whole surveyed area. (**PT: 4 224 t; 224 million. ES: 30 683 t; 2 839 million**).

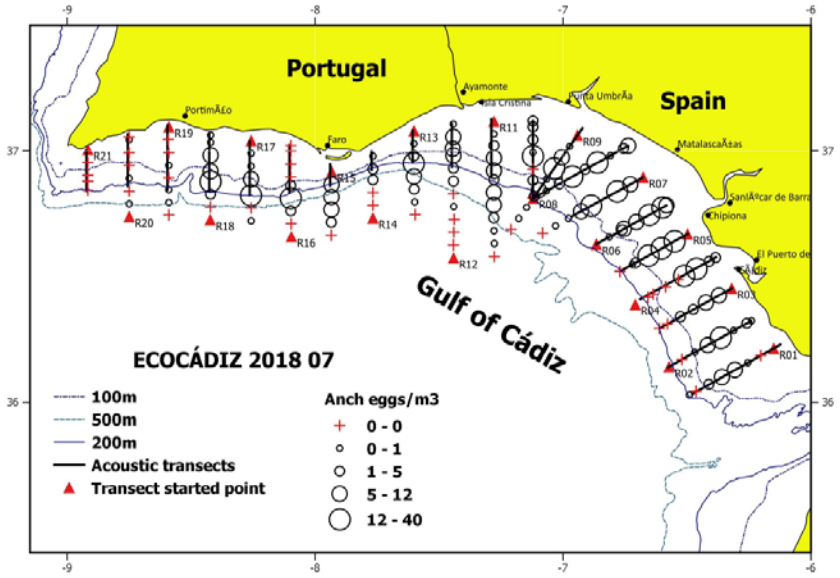
PELAGO 18 previously estimated in Spring for this area relatively lower estimates: 23 473 t and 2 157 million (All the anchovy to the east of Cape Sta. Maria).





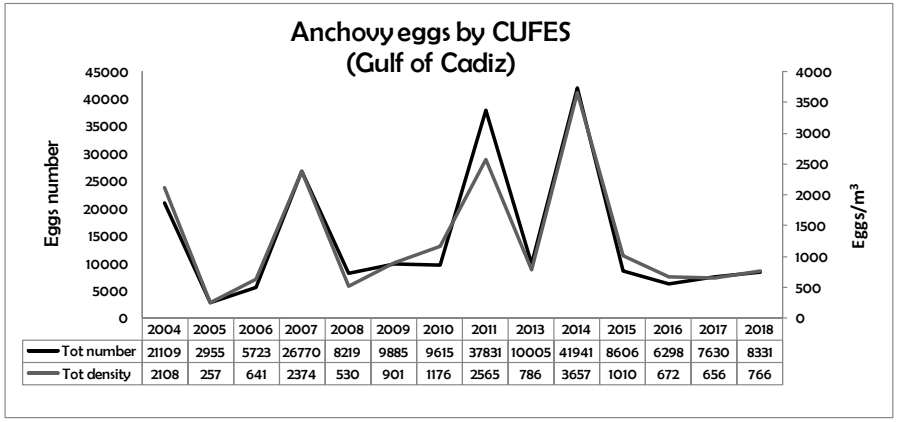
As evidenced in the last surveys in the series, some **recruitment** (age-0 fish) was recorded, probably as a consequence of the delayed survey dates in relation to the spawning peak. Contribution of age-0 fish (46%) almost equal to age-1+ ones in this survey (53%).

Fishery-independent information: Acoustic surveys in 2018 (post-WG). Summer survey. *ECOCADIZ 2018-07*: 31/07-13/08/2018. 9a South. (V)

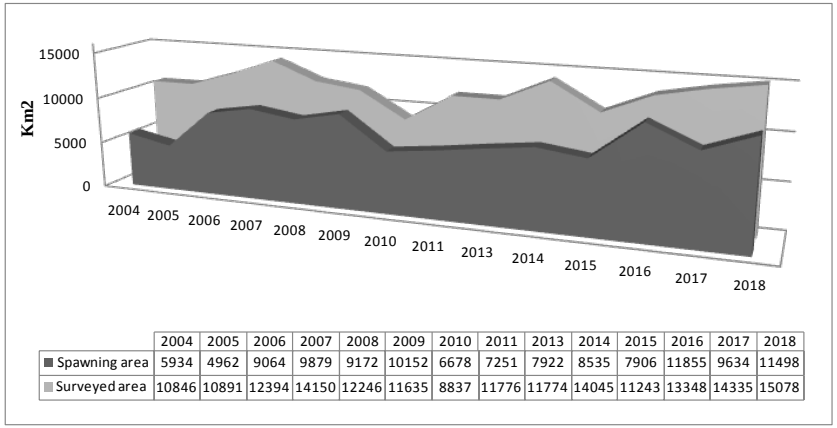


ECOCADIZ 2018-07	
CUFES st	151
Positive anchovy st	111 (73.5 %)
Max number eggs by st	485
Total anchovy eggs (in number)	8331
Max density by st (eggs/100 m^3)	40.5
Total density (eggs/100 m^3)	766

- Total egg density below the historical average (1333 eggs/m^3).
- But, spawning area with an increased extension.

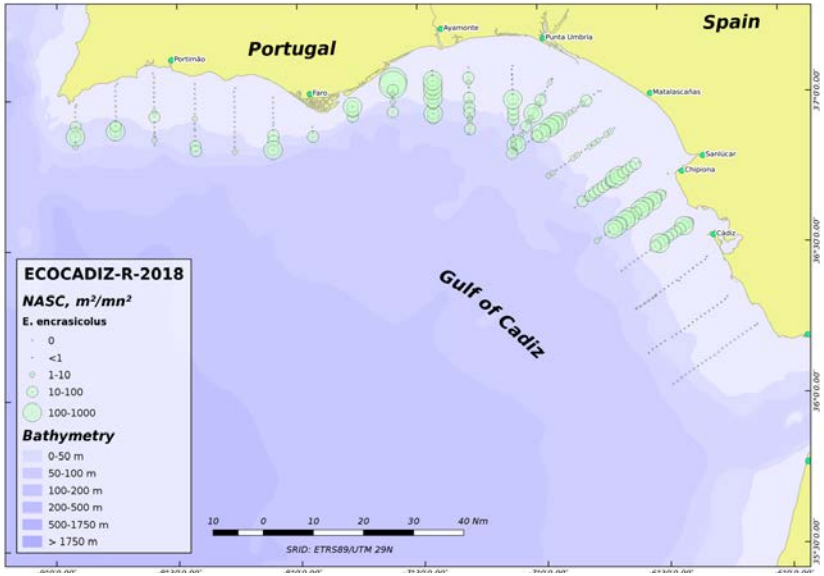


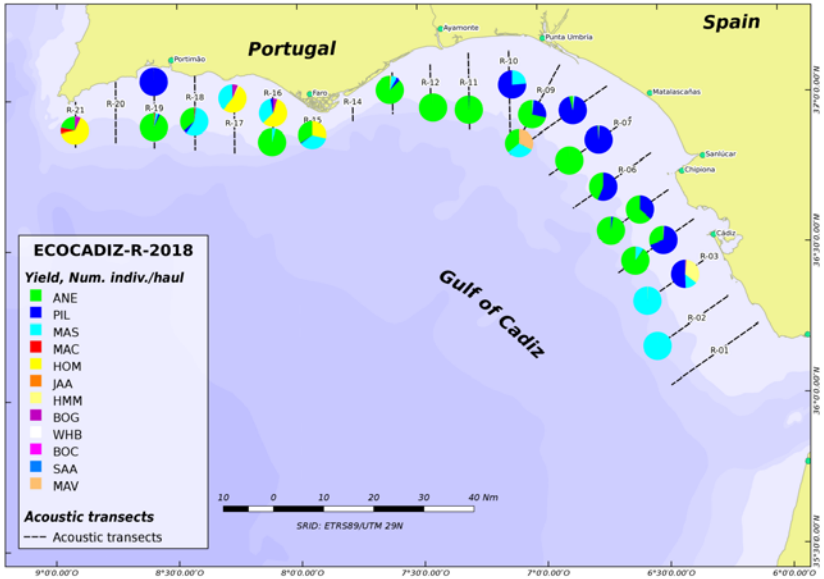
	2004	2005	2006	2007	2008	2009	2010	2011	2013	2014	2015	2016	2017	2018
Tot number	21109	2955	5723	26770	8219	9885	9615	37831	10005	41941	8606	6298	7630	8331
Tot density	2108	257	641	2374	530	901	1176	2565	786	3657	1010	672	656	766



	2004	2005	2006	2007	2008	2009	2010	2011	2013	2014	2015	2016	2017	2018
Spawning area	5934	4962	9064	9879	9172	10152	6678	7251	7922	8535	7906	11855	9634	11498
Surveyed area	10846	10891	12394	14150	12246	11635	8837	11776	11774	14045	11243	13348	14335	15078

Fishery-independent information: Acoustic surveys in 2018 (post-WG). Autumn surveys. *ECOCADIZ-RECLUTAS 2018-10*: 12-29/10/2018. 9a South. (I)





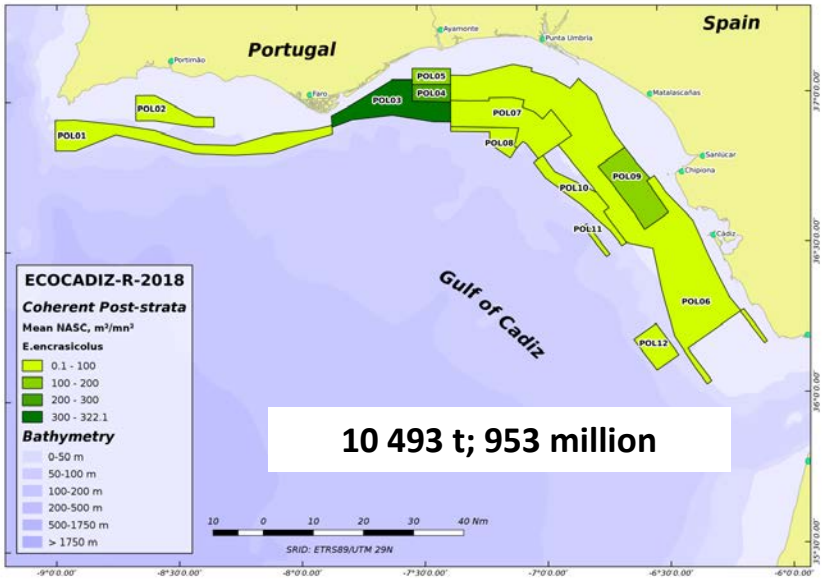
ECOCADIZ-RECLUTAS 2018-10 survey: acoustic assessment of the abundance of anchovy and sardine juveniles in their main recruitment areas off the Gulf of Cadiz (20 -200 m depth), (surveys in 2012, 2014-2017). Autumn.

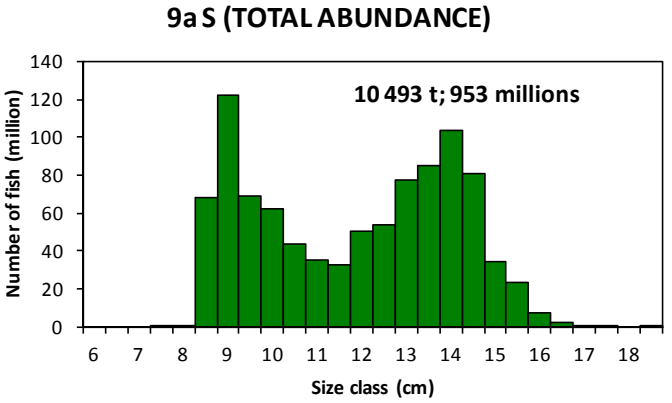
Acoustic sampling with the recently installed *Simrad™ EK80* echo-sounder working in multi-frequency and in CW mode. A misconfiguration of the range of the acoustic active layer entailed to slow down the ping rate (1.5-2.0 seconds) in relation to the standard values (at about 0.3 seconds), resulting an acoustic sampling rate much lower than it should be. Estimates should be considered with caution.

The highest densities in the shelf waters comprised between Cape of Sta. Maria and the Guadiana River mouth and the remaining population was widely distributed between this last landmark and the Bay of Cadiz

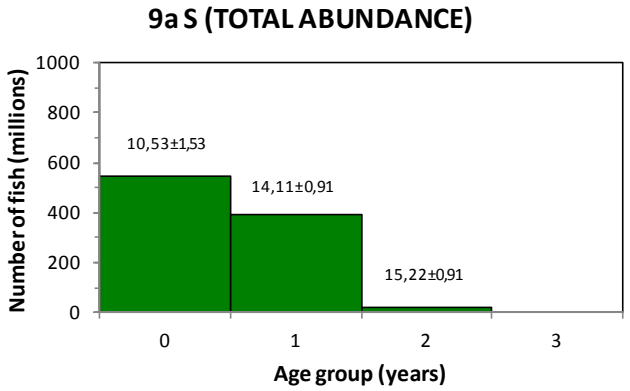
The size composition of anchovy catches indicates that Age-0 juveniles occurred mainly in the Spanish coastal and inner-shelf waters .

Fishery-independent information: Acoustic surveys in 2018 (post-WG). Autumn surveys. *ECOCADIZ-RECLUTAS 2018-10*: 12-29/10/2018. 9a South. (II).





The abundance and biomass of **age 0** anchovies in the surveyed area were estimated at **543 million fish** and **3 834 t**, respectively, *i.e.* **57% and 36% of the total estimated anchovy abundance and biomass**.



Fishery-independent information: Acoustic surveys in 2018 (post-WG). Autumn surveys. *ECOCADIZ-RECLUTAS 2018-10*: 12-29/10/2018. 9a South. (III).

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

Remember that 2018 estimates may be underestimated. The magnitude of this possible underestimation is hard to be assessed. Notwithstanding the above, such a decreasing trend in anchovy population levels should not be discarded (the 2017 abundance estimates, despite being only very partial ones, covering only a part of the Spanish waters, were even higher than the 2018 estimates).

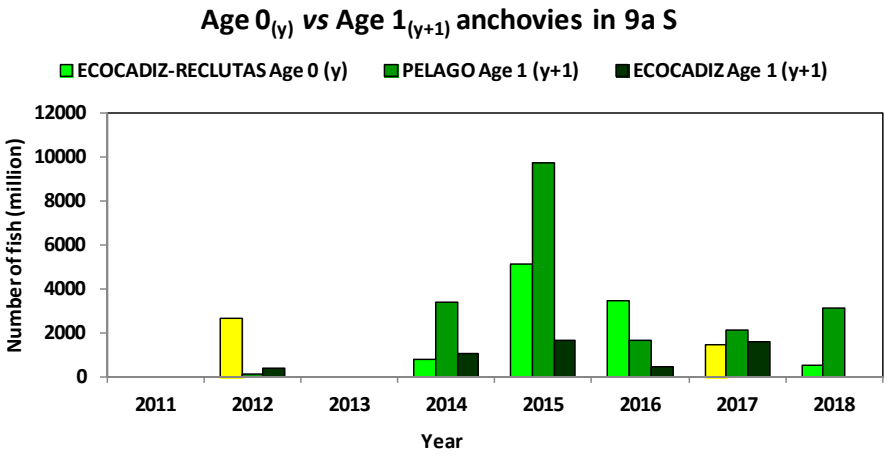
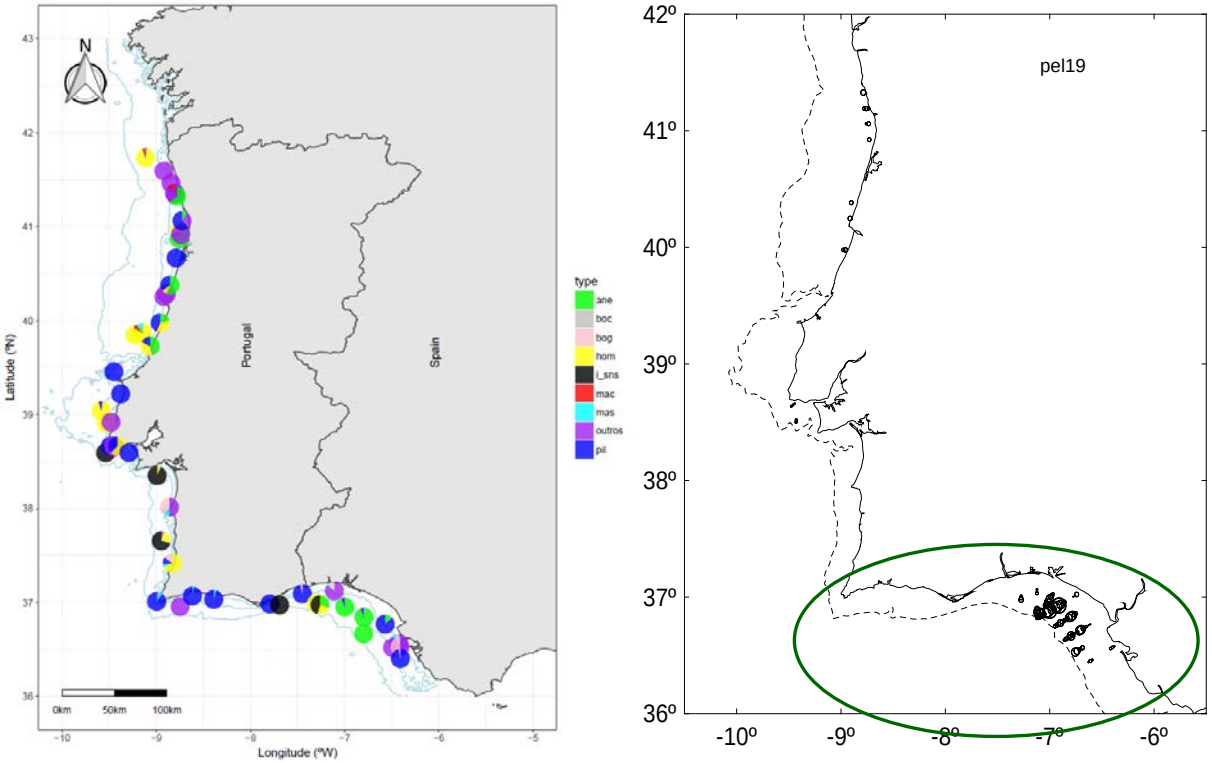


Figure still incomplete. *ECOCADIZ* 2019 will start after WG .

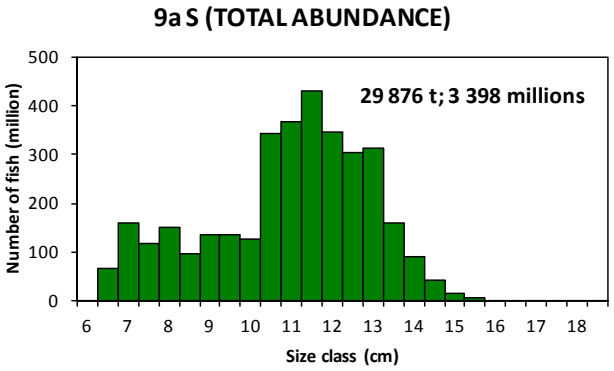
Fishery-independent information: Acoustic surveys in 2019. Spring surveys. *PELAGO 19*: 12/04 - 19/05/2019. 9a South. (I).

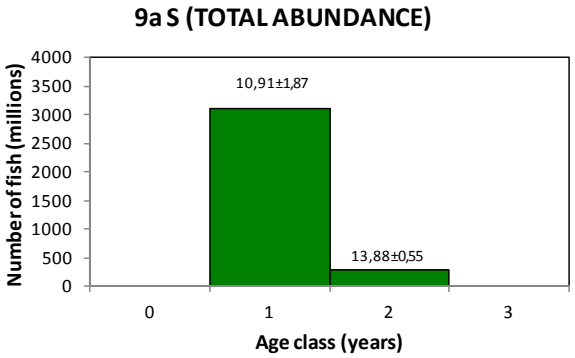


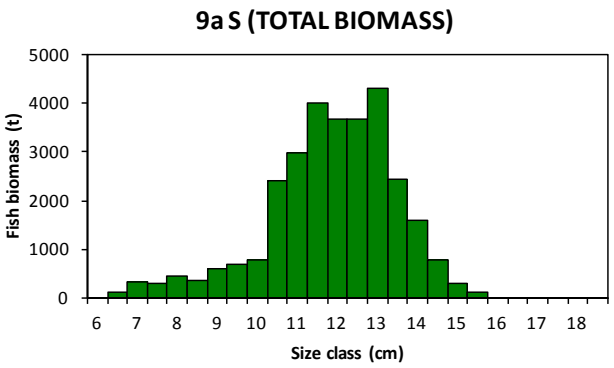
PELAGO 19 survey: Pelagic ecosystem survey of the Portuguese and Gulf of Cadiz shelf waters (20-200 m depth). Spring.

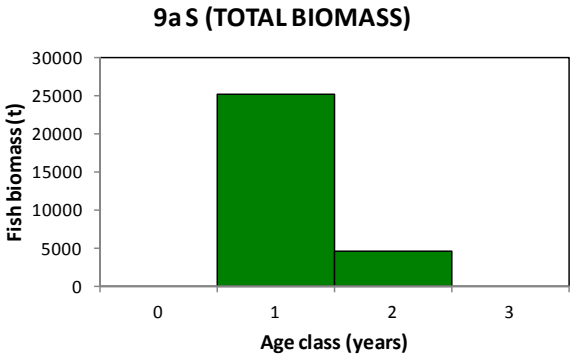
Anchovy population in 9a S restricted to the Spanish waters.

Fishery-independent information: Acoustic surveys in 2019. Spring surveys. *PELAGO 19*: 12/04 - 19/05/2019. 9a South. (II).



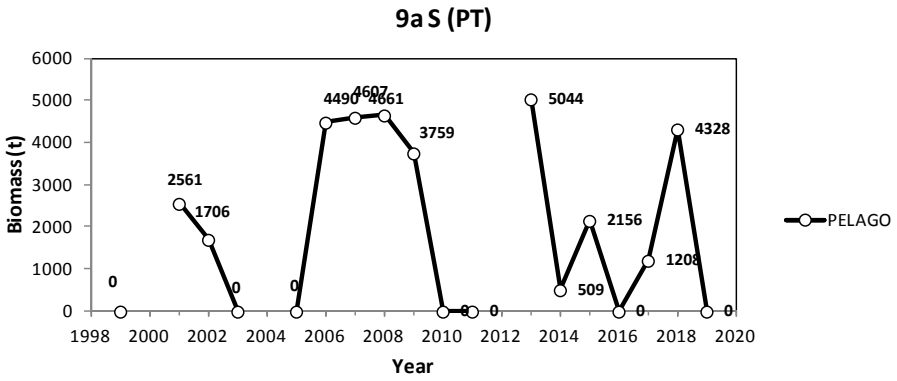


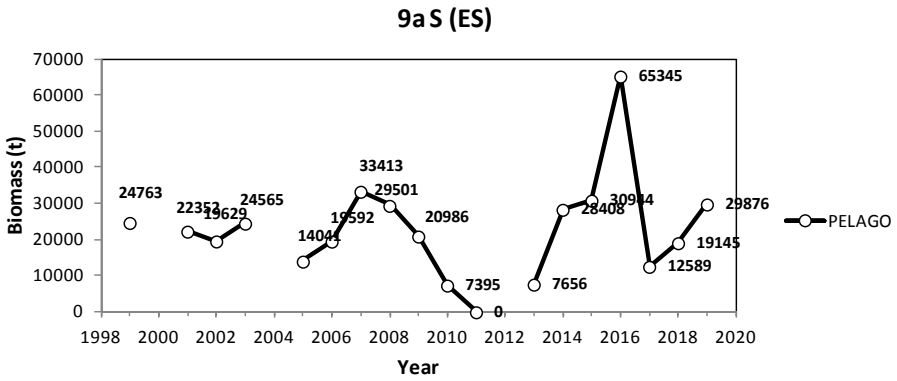




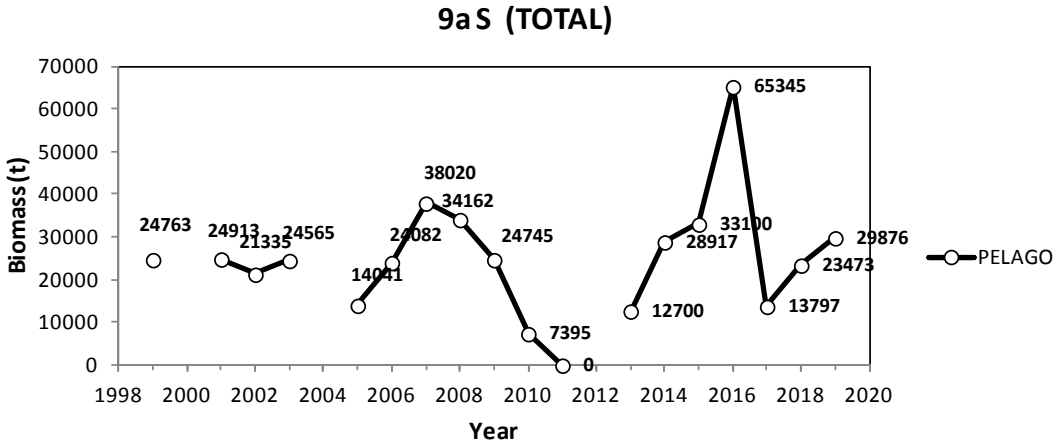
A total of **29 876 t** and **3 398 million** fish were estimated for this species for the whole surveyed area (all the population in Spanish waters). Only Age-1 and Age-2 fish. Age 1 olds the dominant age group.

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

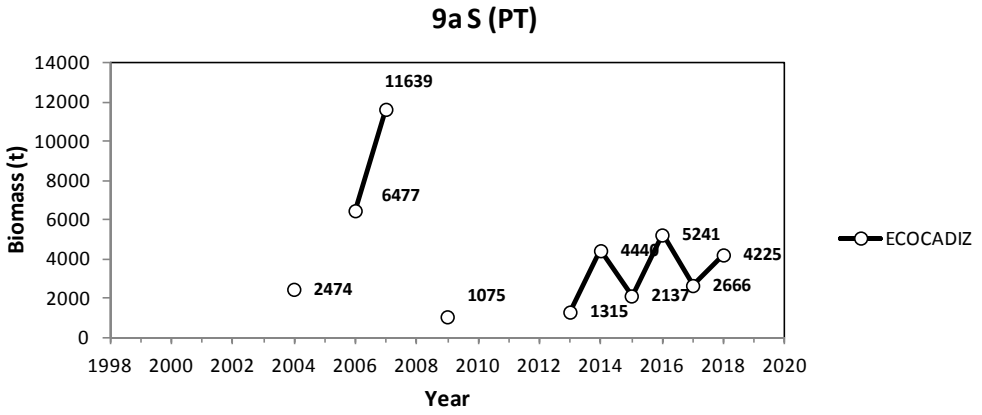


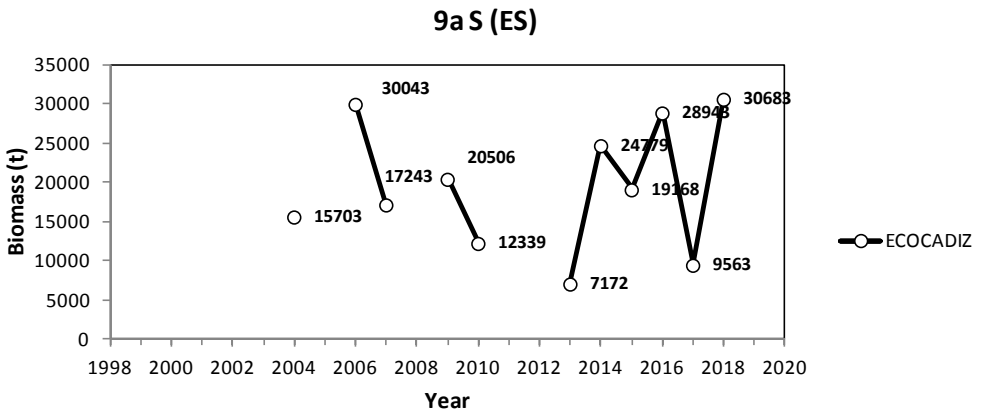


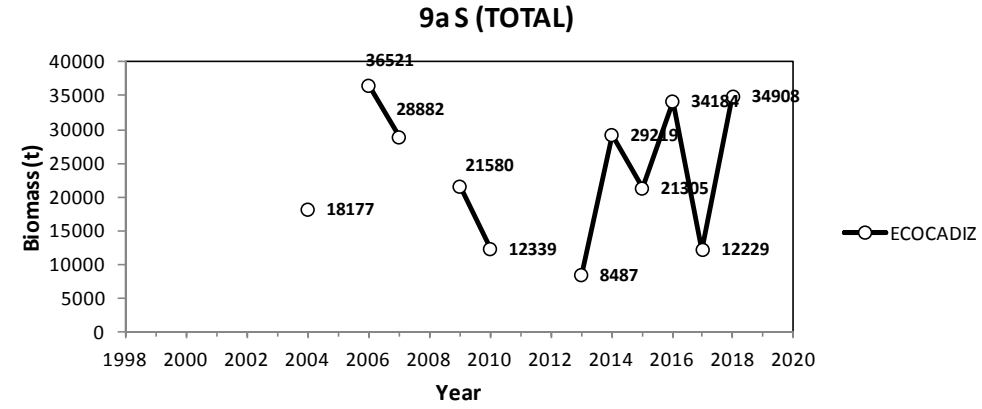
- 2010: strong drop.
- 2011: No anchovy detected (but DEPM estimated later on in summer 33 kt for the South).
- 2012: No survey.
- 2014-2016: increasing trend with historical peak in 2016.
- 2017: Strong decrease, below the historical mean.
- 2018-2019: new increasing trend. 2019 above the historical mean (26 kt).



Trends in *ECOCADIZ* acoustic estimates



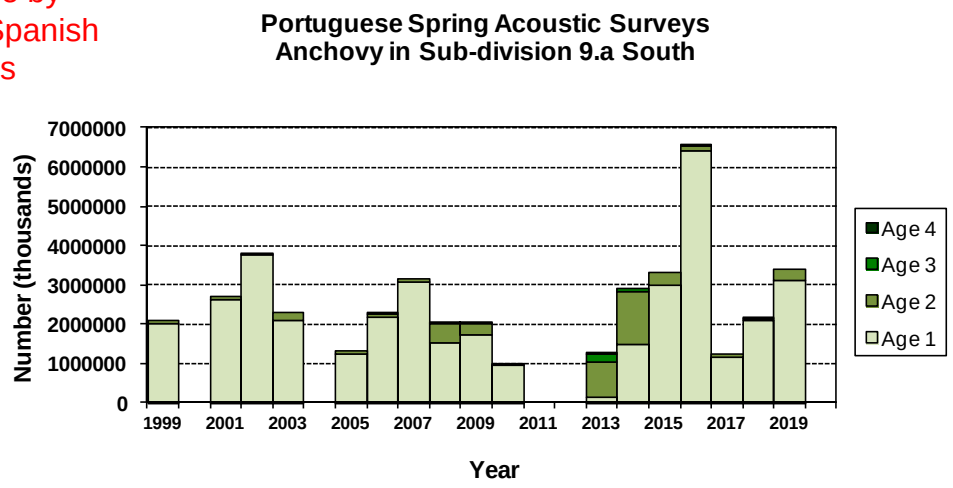




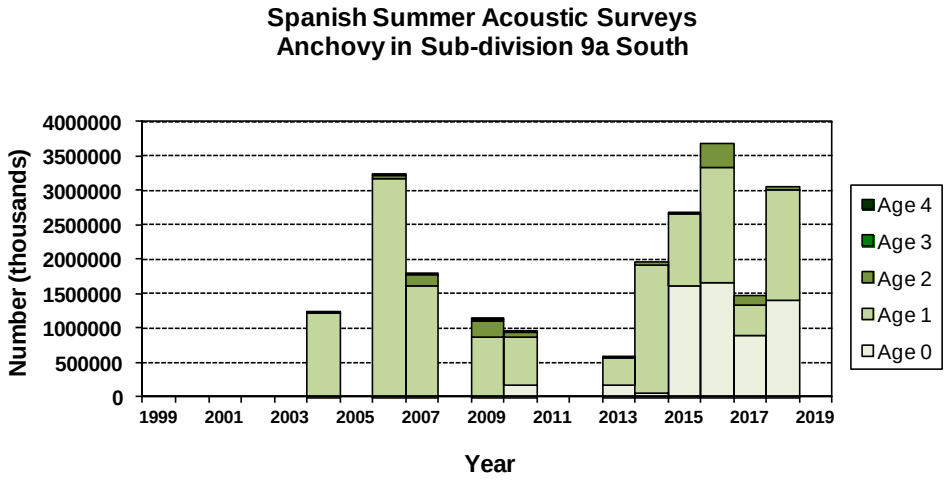
- Gaps in 2005, 2008 and 2011 (when DEPM surveys), and in 2012 (no standard survey).
- Partial estimate in 2010 (only Spanish part): 12 339 t.
- Similar trends than *PELAGO* but with a relatively different magnitude.

Population Age structure in 9a South

Until 2012 Age structure by applying Spanish ALKs



- Successive fails in the recruitment strength in 2007-2010 as inferred from Age 1 anchovies in the next year.
- Strong recruitment in 2014…even stronger in 2015.
- Probable fail in the recruitment in 2016.
- Relatively good recruitment in 2018.



- Fails in the recruitment strength in 2008, 2009 and 2012 also evidenced.
- Occurrence of Age 0 anchovies in 2010, 2013-2018 due to the later dates of the survey (late July-early August).
- Better inferred recruitments between 2013 and 2015.
- Fail in the recruitment in 2016 also evidenced.