

WGHANSA 2021

Anchovy in Division 9a

West component

S. Garrido, F. Ramos, M. Rincón



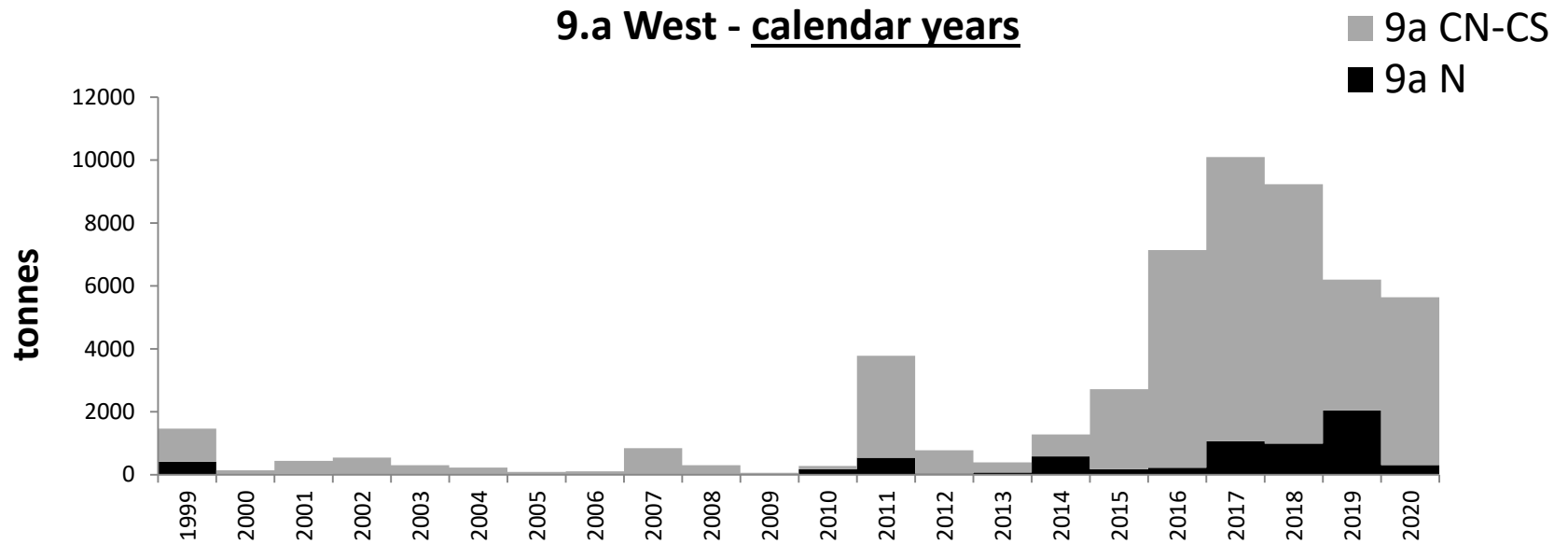
ICES WGHANSA 24 – 28 May 2021, online



Fishery in 2020/2021 ^{1st sem}

Catches

CATCHES



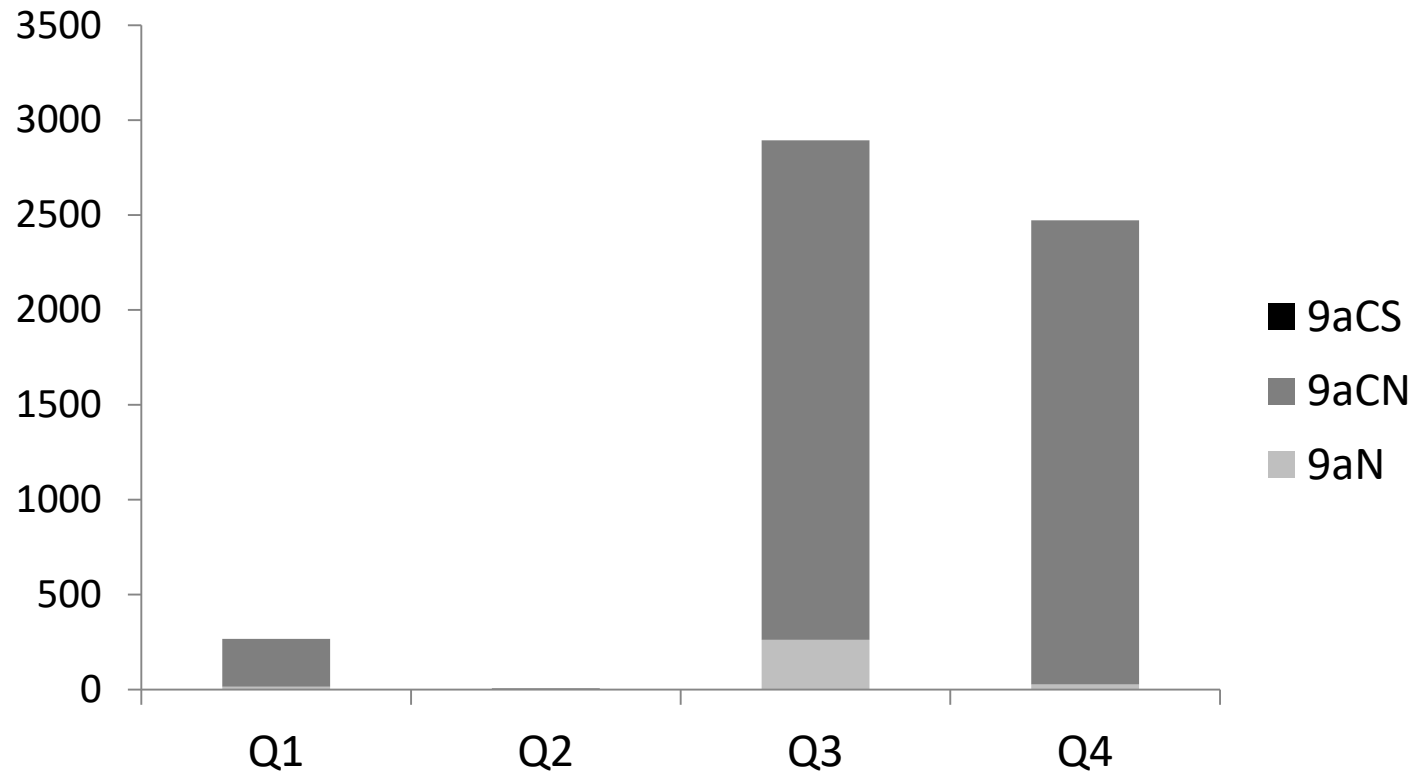
Catches for the west coast similar to 2019 (5639 tonnes in 2020, 6200 tonnes in 2019, <9%).

Mean catches 1989-2019: **2011** tonnes

Majority in the 9a-CN (**92%**), followed by 9a-N (**5%**) and 9a-CS (**3%**).

Purse-seiners: 97.5% of total catches.

CATCHES BY QUARTER 2020

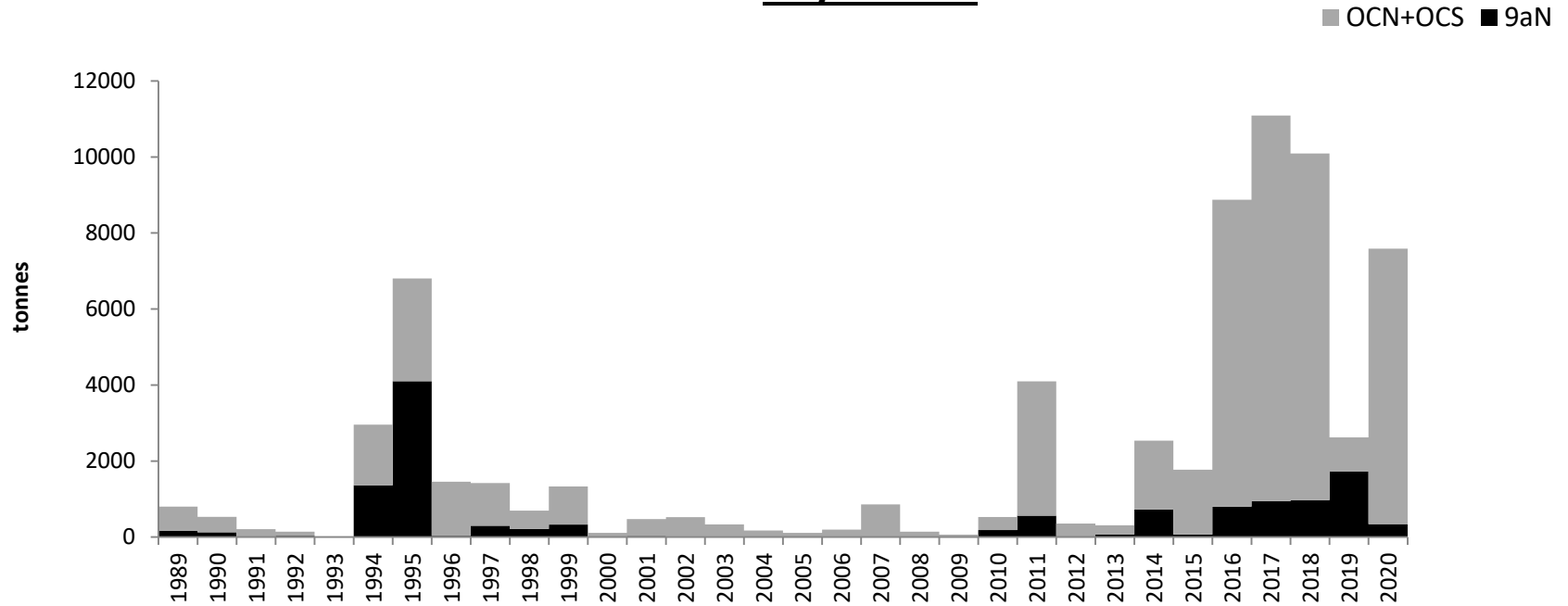


Most catches on Q3 and Q4.

Contrary to 2018 and 2019, when most catches were on Q1 and Q3.

CATCHES

9.a West - July to June



Increase in catches (7586 tons) for the west coast in 2020 (9233 ton in 2018, 2618 ton in 2019).

Mean catches 1989-2020: **2163** tonnes

Provisional catches 2021 - First semester

Month	9a.N	9a.CN	9a.CS
January	0	0.9	0
February	6.1	0.2	0
March	44.7	0.8	0.01
April	2.8	0	0.2
total	16.0	252.6	0

(tonnes)

Total for the July 2020-April 2021 period

9a. CN: $5075 + 2 = 5077$ ton (94%)

9a. CS: $2 + 0 = 2$ ton (0.05%)

9a. N: $288 + 54 = 294$ ton (6%)

Advice for Western componente 2020: 4347 tonnes

So far: 5420 tonnes (125%)

Fishery in 2020

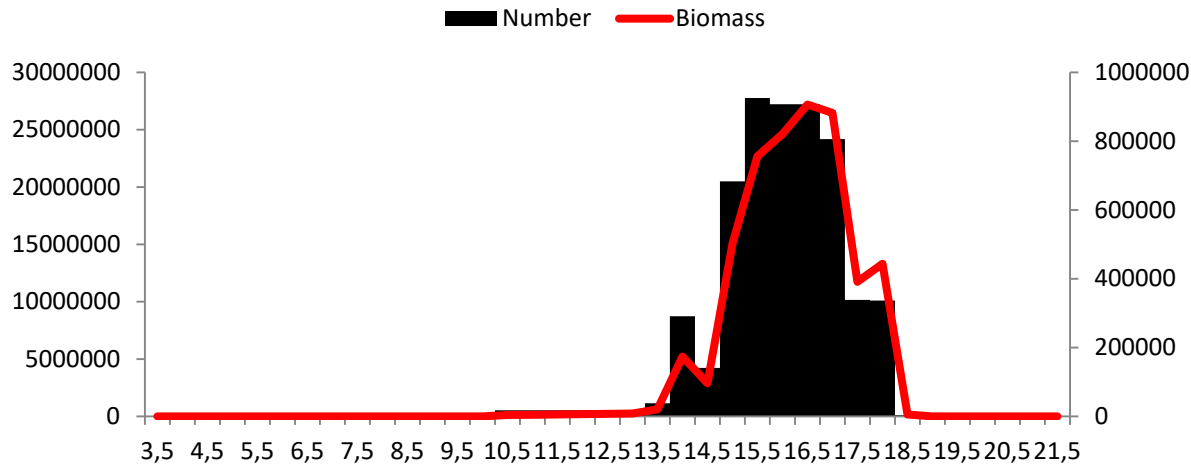
Size and Age composition in catches

Data available for 9aCN (92% catches). LFD and ALK from this area used for 9aN.

Discards for 9aN unknown: assumed to be negligible.

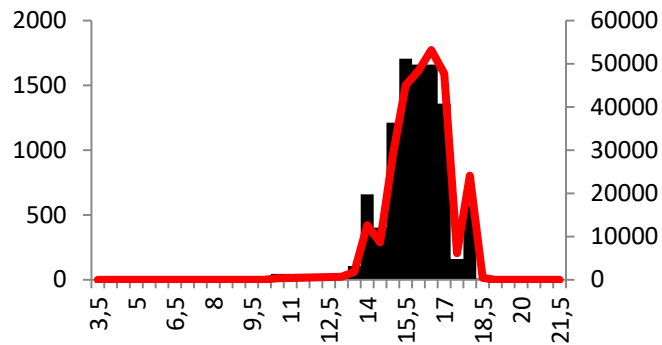
Size composition of catches 2020

9a-west

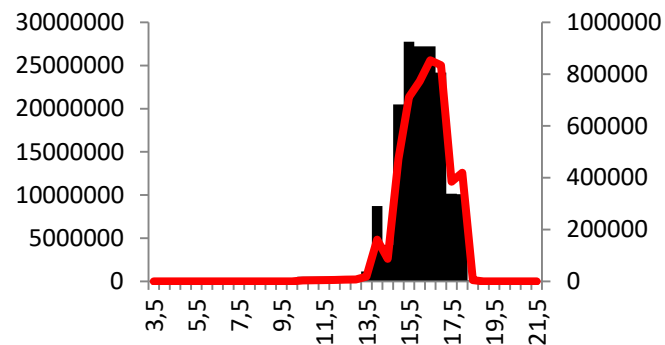


L avg: 16.2 cm
W avg: 28.9 g

9aN

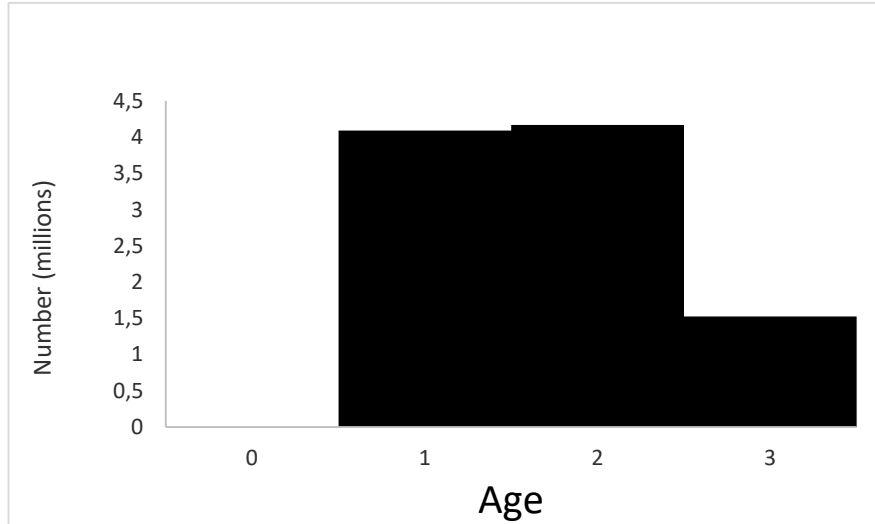


9aCN+CS

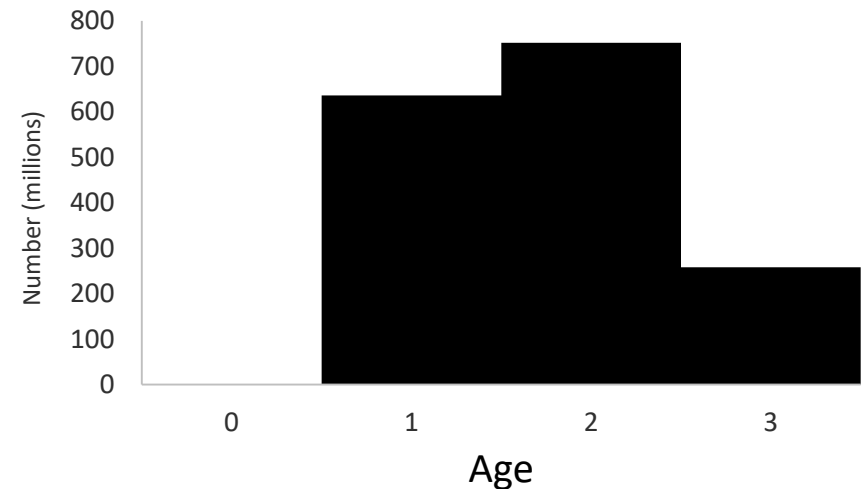


Age composition of catches 2020

9aN



9aCN+CS



2020: **43%** age 2 for 9aN and 9aCN.

42% age 1 for 9aN and 9aCN.

(2019: **62%** and **76%** age 2 for 9aN and 9aCN, respectively.)

(2018: 79% and 74% age 1 for 9aN and 9aCN, respectively.)

Survey information

ACOUSTIC SURVEYS

Sub-division	Fall 2020	Spring 2021
9a N	IBERAS	PELACUS 19 (ES)
9a CN		PELAGO 19 (PT)
9a CS		

Combination = Survey Index

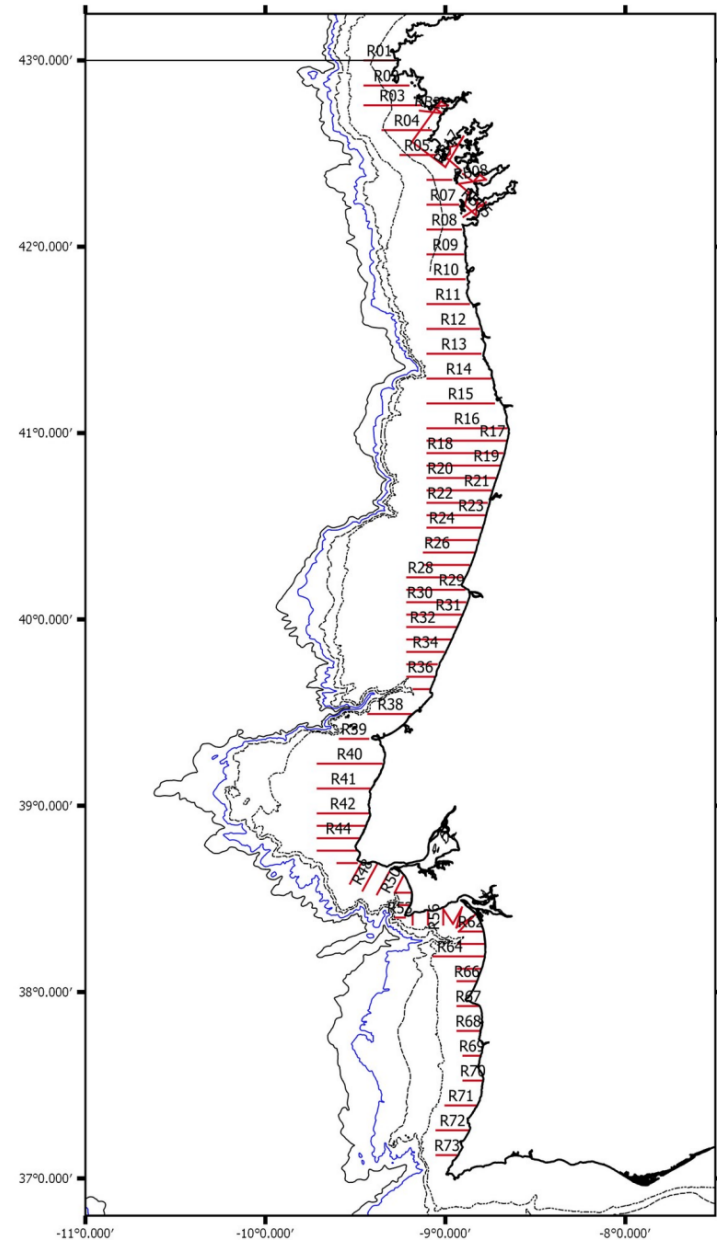
IBERAS/JUVESAR 2020

Aims to improve the estimation of the recruitment strength of Ibero Atlantic sardine and the western component of the anchovy population.

From 9 to 30 September

Acoustic estimates (abundance and distribution).

Radials perpendicular to the bathymetry, from 20 -100 m depth.

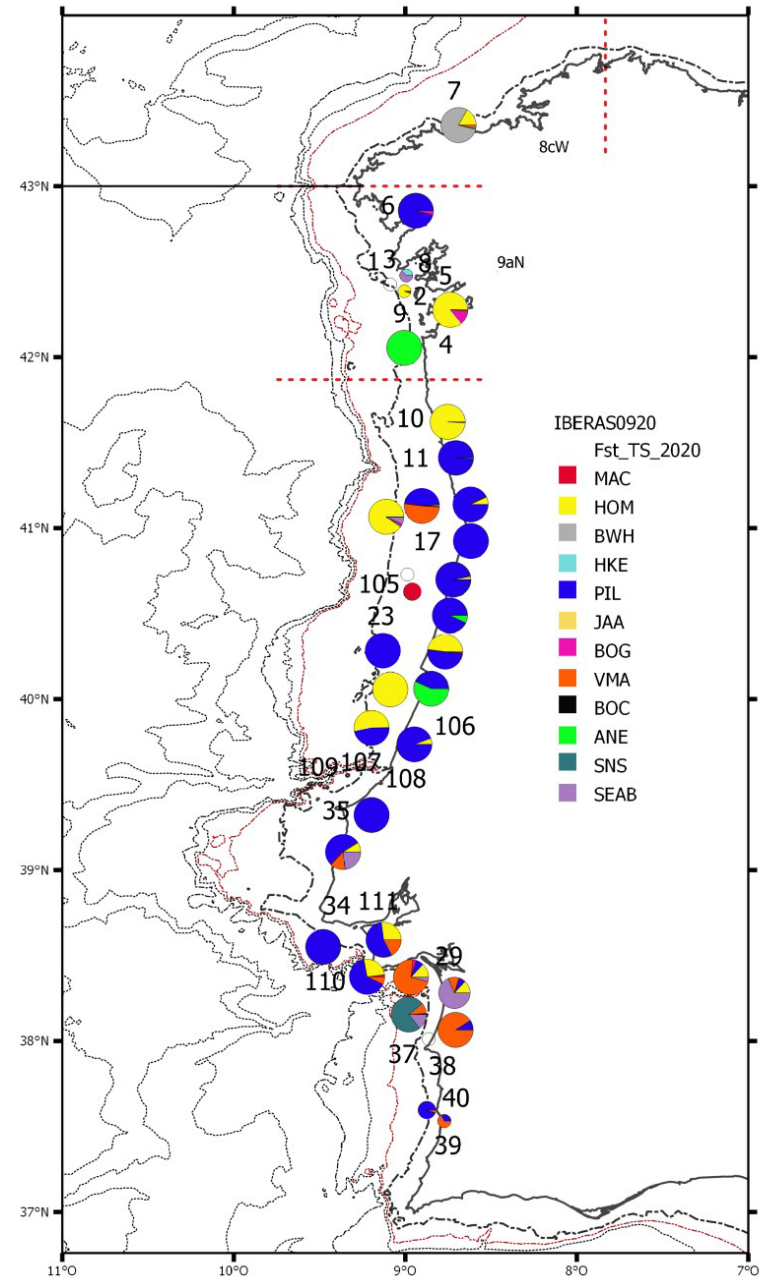


IBERAS/ JUVESAR 2020

Most NASC attributed to PIL (74%) and VMA (27%).

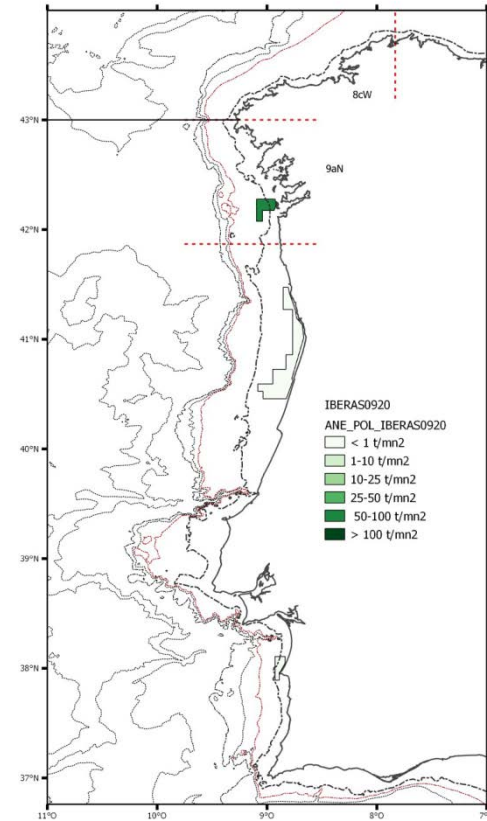
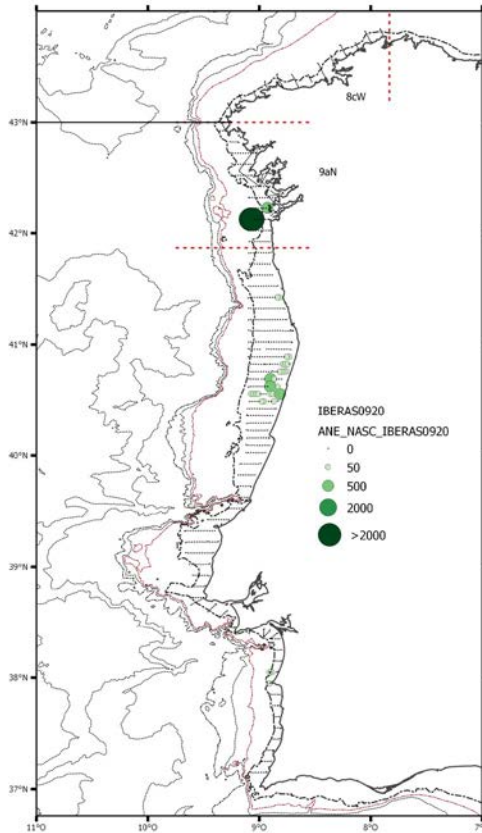
Very low occurrence of ANE, similar to 2019.

ANE mainly in Galicia (9a.N).



IBERAS/ JUVESAR 2020

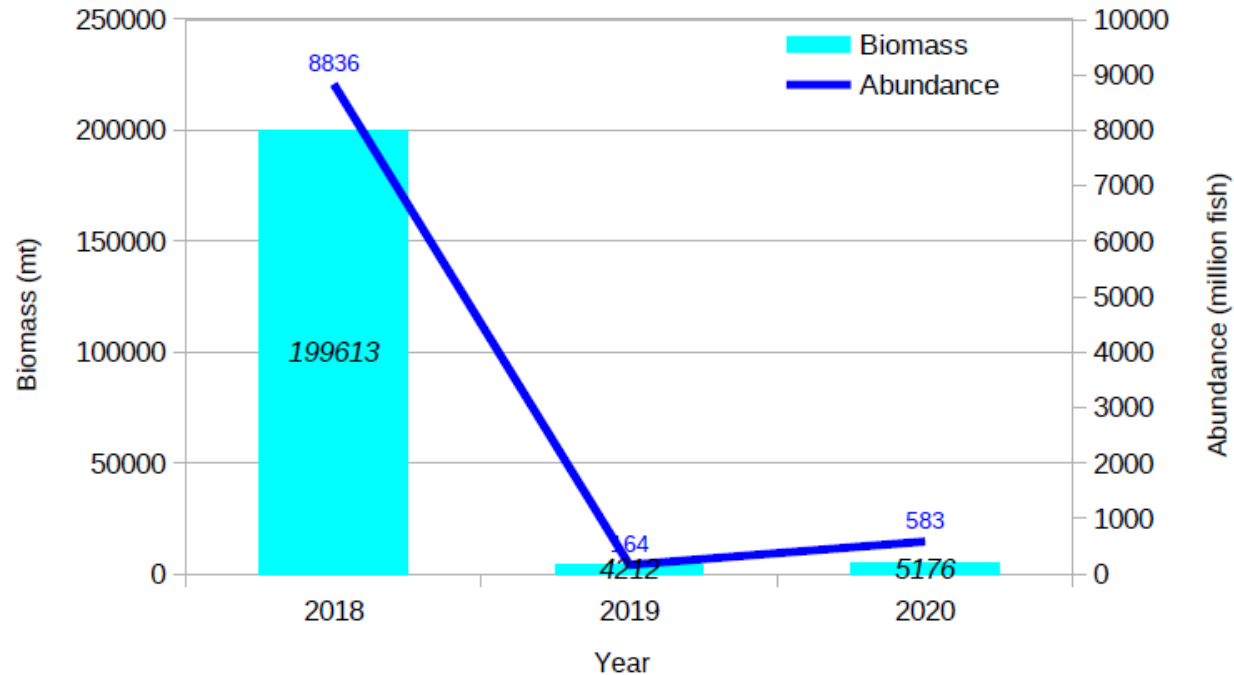
ANCHOVY



Low anchovy abundance, center of gravity near SP-PT border (9aN), close to the slope (depth 130-150 m). First time near slope aggregation recorded.

Similar behaviour to the observed in Bay of Biscay?? (pre-recruits mainly offshore, approaching the coast at larger sizes, finally recruiting on the continental shelf).

IBERAS20 report: Given the complementarity between sardine and anchovy recruitment areas, it seems difficult to cover both during IBERAS given the duration of the survey.

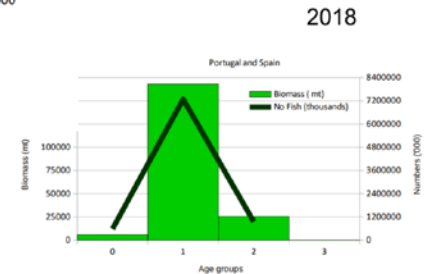
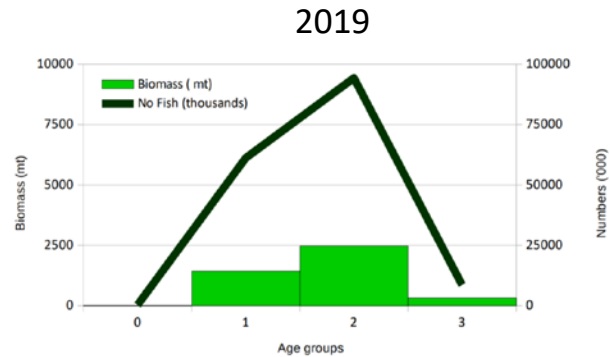
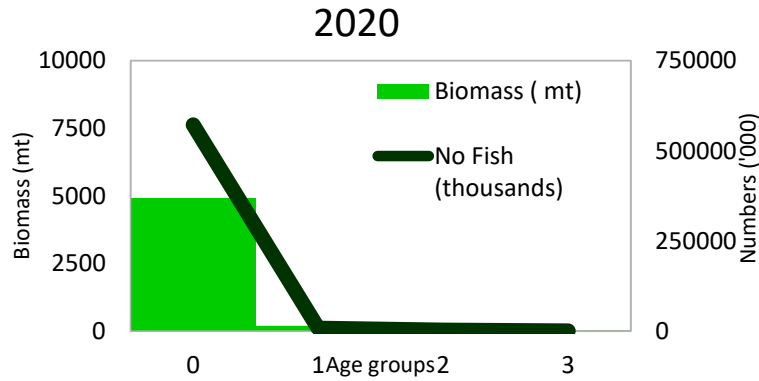


Low anchovy abundance (\approx 2019).

Number: 98%: 9aN; 2% 9aCN; 0.1% 9aCS

Biomass: 94%: 9aN; 6% 9aCN; 0.2% 9aCS

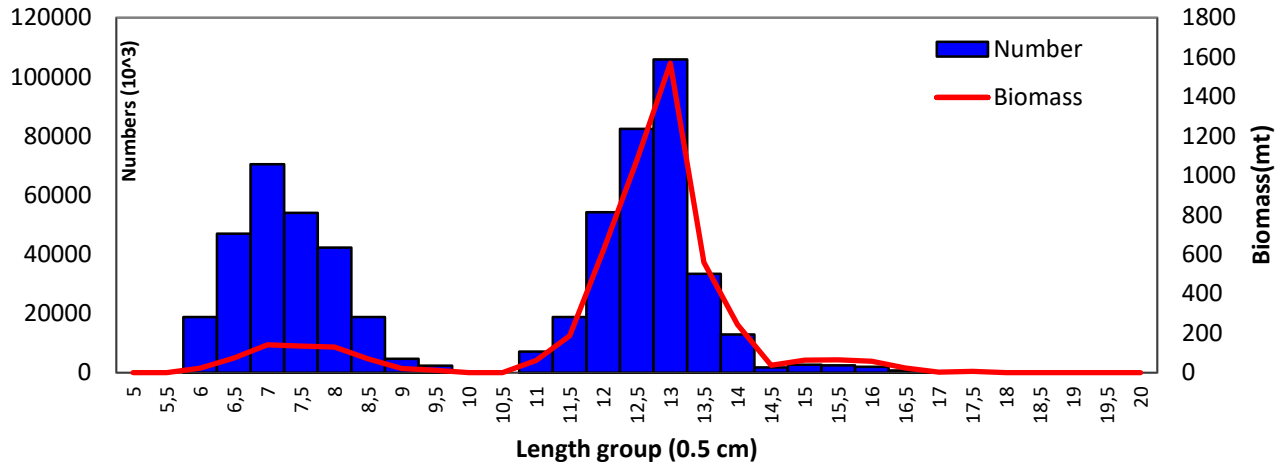
IBERAS/ JUVESAR 2020



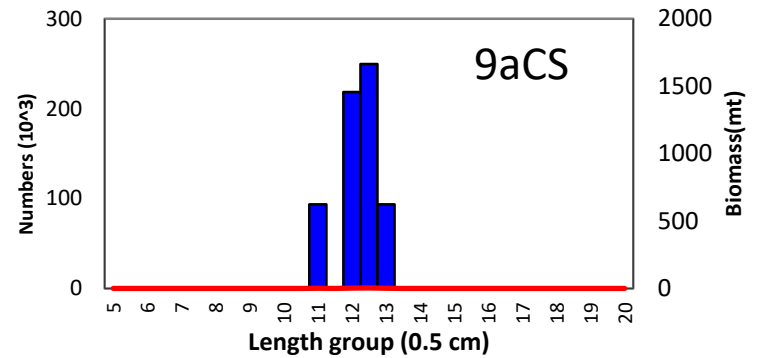
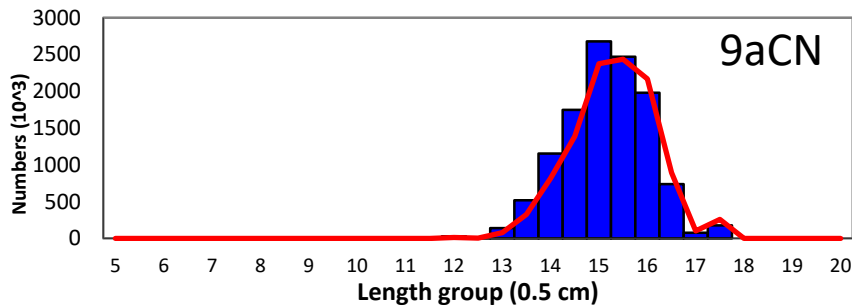
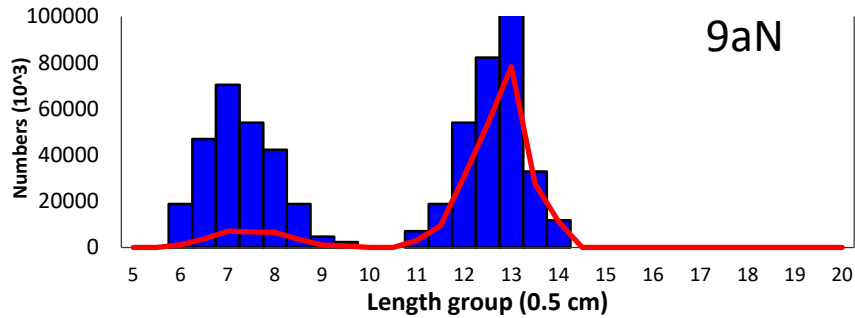
Very low anchovy abundance compared to IBERAS2018, similar to IBERAS2019 in terms of number.

This year, 98% were recruits, contrasting to 2019 with almost no recruits.

IBERAS/ JUVESAR 2020



Small fish, two modes, at 7 and 13 cm.



IBERAS/ JUVESAR

ANCHOVY

Cruise	Total (millions)	Total (mil tons)	Juveniles (millions)	Juveniles (mil tons)	
JUVESAR13	-	-	-	-	
JUVESAR15	3870	30,0	3835	29,0	→ 99% in number
JUVESAR16	2836	14,4	2835	14,4	→ 99% in number
JUVESAR17	2145	38,0	570	4,7	→ 26% in number
IBERAS18	8835	181	618	13	→ 7% in number
IBERAS19	164	4	0,2	0,003	→ 0,1% in number
IBERAS20	582	5.1	572	4.9	→ 98% in number

PELACUS 2021

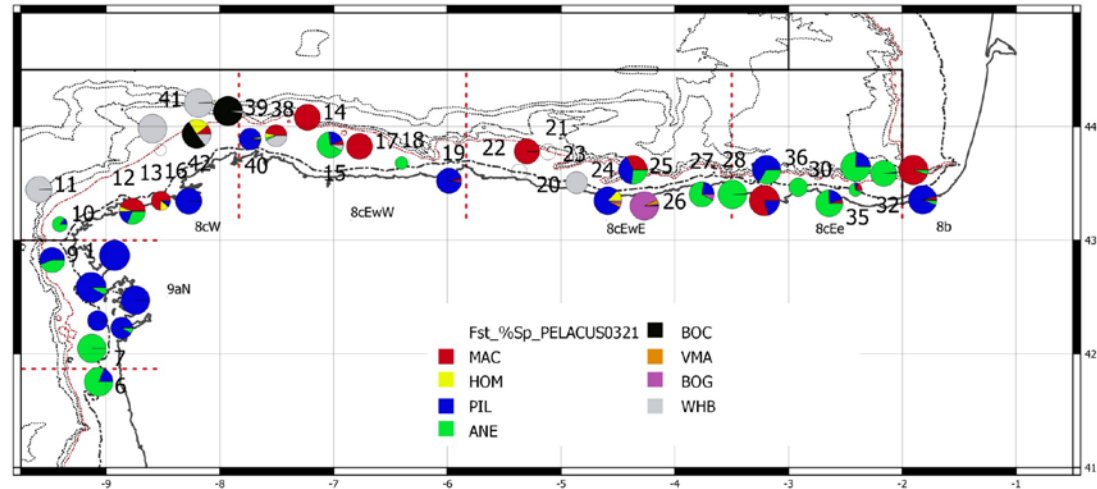
Aim: Pelagic ecosystem survey.

Area: Spanish waters off Galicia and Cantabrian Sea, between 20 and 1000 m depth (ICES Subdivisions 9a N and 8c).

Survey method: Acoustics. Echo-integration.
EK60_Multifrequency.

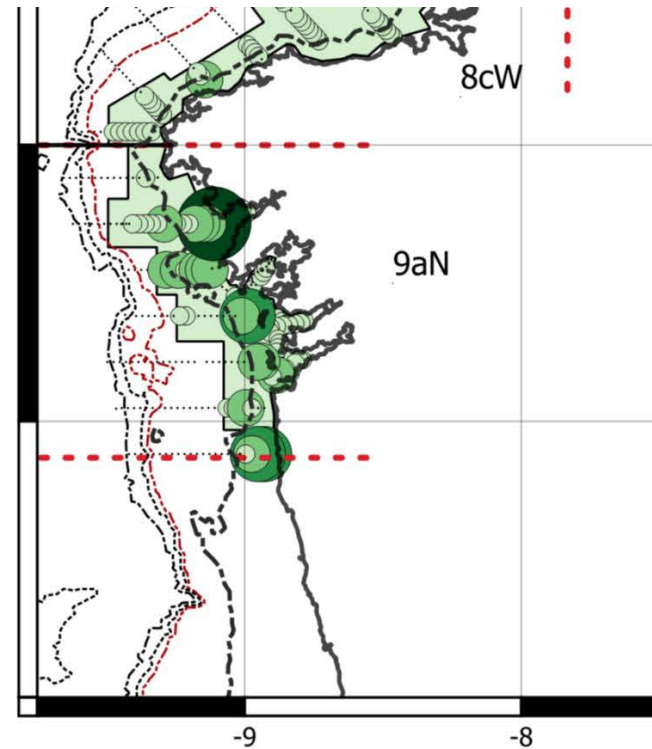
44 fishing stations.

ANE all area, including 9aN.



PELACUS 2021

Cruise	9aN (thousands)	9aN (ton)
PELACUS15	0	0
PELACUS16	8104	205
PELACUS17	122973	3566
PELACUS18	770847	10660
PELACUS19	6892	192
PELACUS20	NO SURVEY	
PELACUS21	357776	6075



2nd highest peak, in number and biomass in area 9a.N since 2015.

PELAGO 2021

3 to 21 March 2021

R/V Miguel Oliver

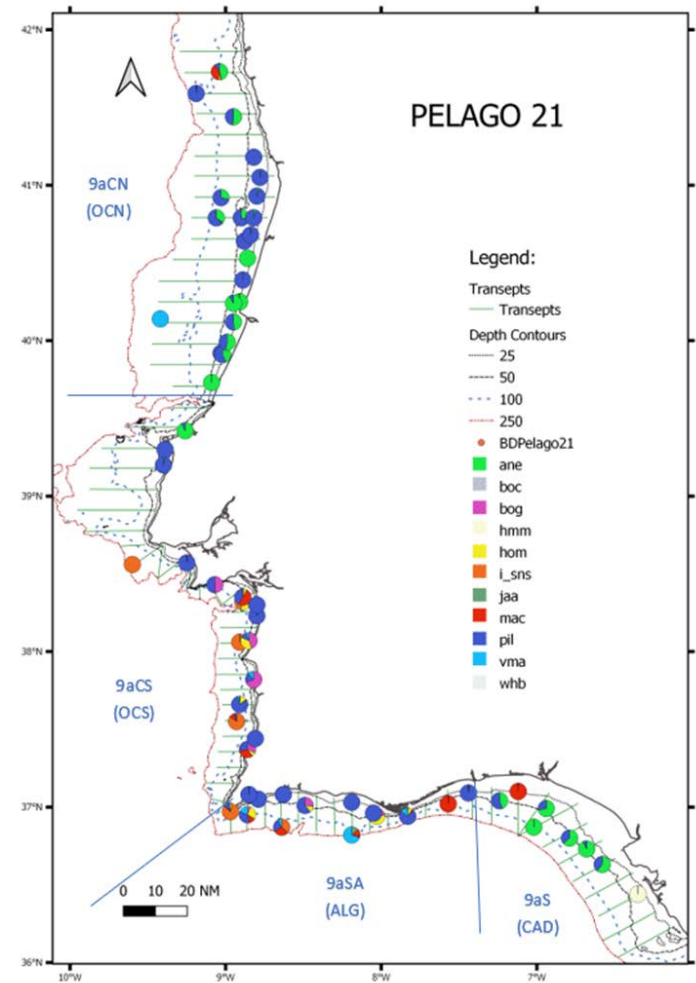
30 to 200 m isobath

18-38-70-120-200 kHz

Areas: 9a.CN, 9a. CS, 9a. S_alg,
9a. S_cad

Purse-seiners: extra fishing
hauls

PIL and ANE dominant spp.
ANE in 58% fishing hauls.



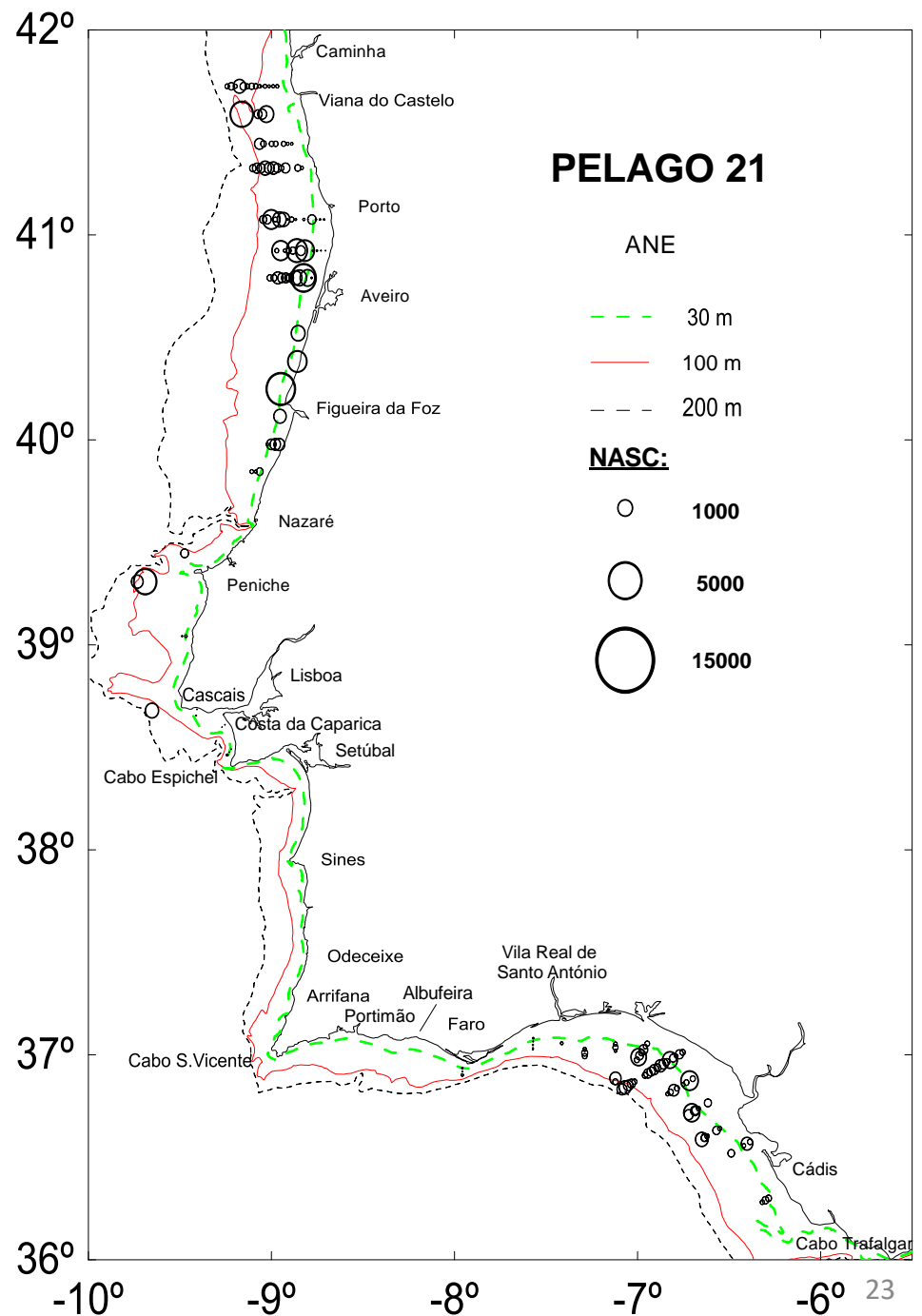
38 trawl hauls +26 purse seiners.

PIL, ANE and VMA present in more than 50%
of the hauls.

PELAGO 2021

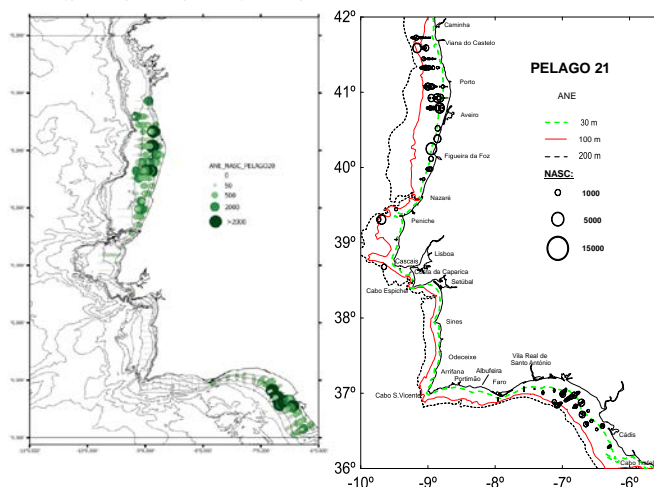
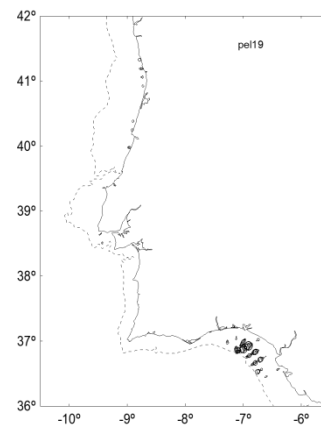
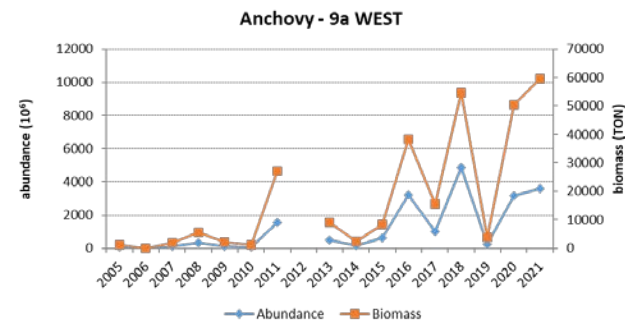
Anchovy concentrated in 9aCN and 9aS-CAD.

Large decrease in 9a S and increase in 9a west (80% biomass, 70% number).



PELAGO 2021

Cruise	9aCN (thousands)	9aCN (ton)	9aCS (thousands)	9aCS (ton)
PELAGO15	644567	8237	0	0
PELAGO16	3198016	38302	0	0
PELAGO17	1015135	15481	0	0
PELAGO18	4844655	54437	0	0
PELAGO19	229018	3814	7121	123
PELAGO20	3152255	50282	288	9
PELAGO21	3068507	53513	519419	6095



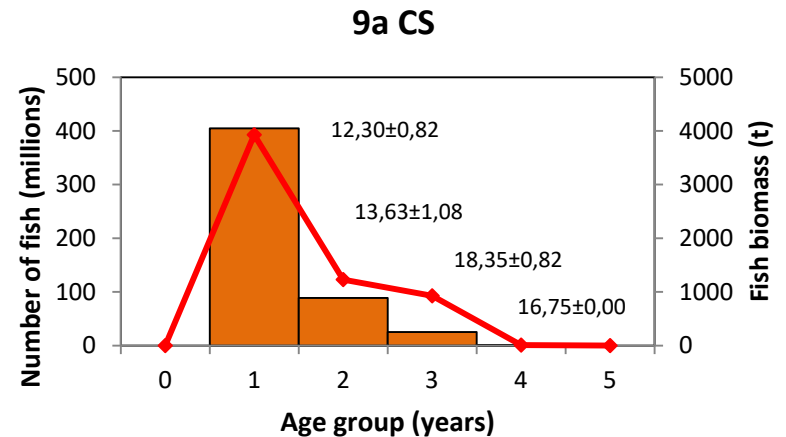
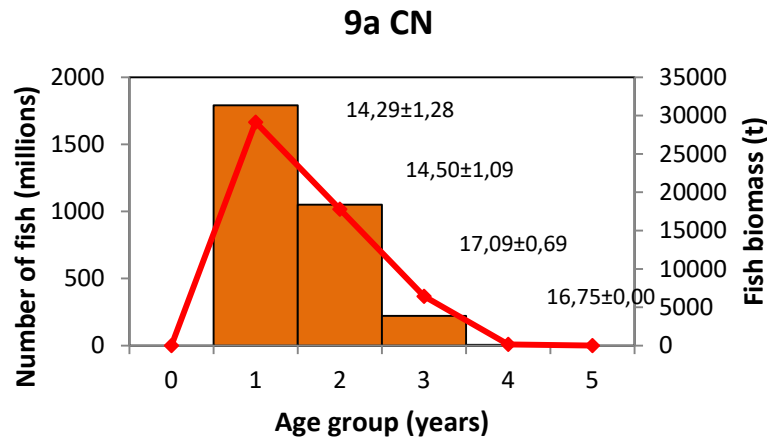
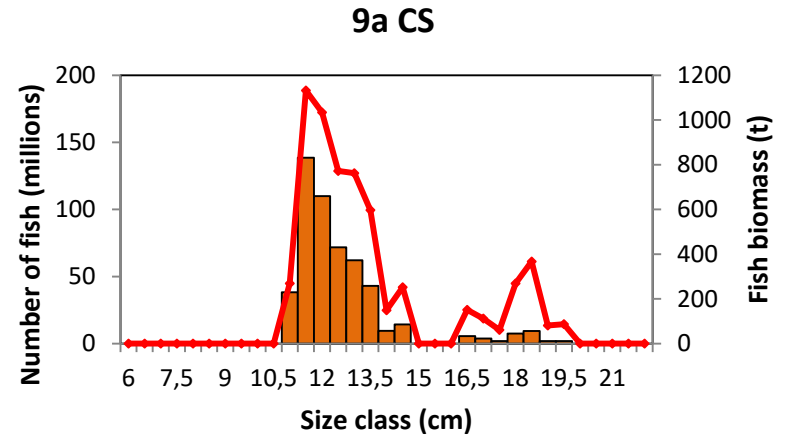
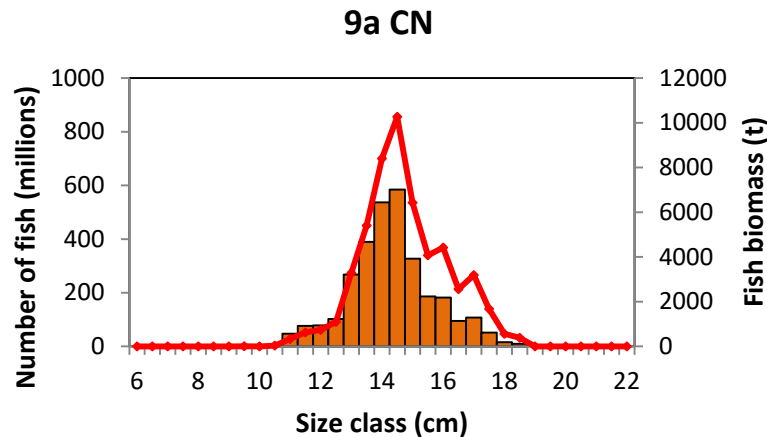
Increase of anchovy abundance in areas 9a.CN and 9a.CS.

2018 to 2019: 9a.CN+CS – **↓ 95% number & 93% biomass.**

2019 to 2020: 9a.CN+CS – **↑ 1276% number & 1218% biomass.**

2020 to 2021: 9a.CN+CS – **↑ 14% number & 19% in biomass.**

PELAGO 2021

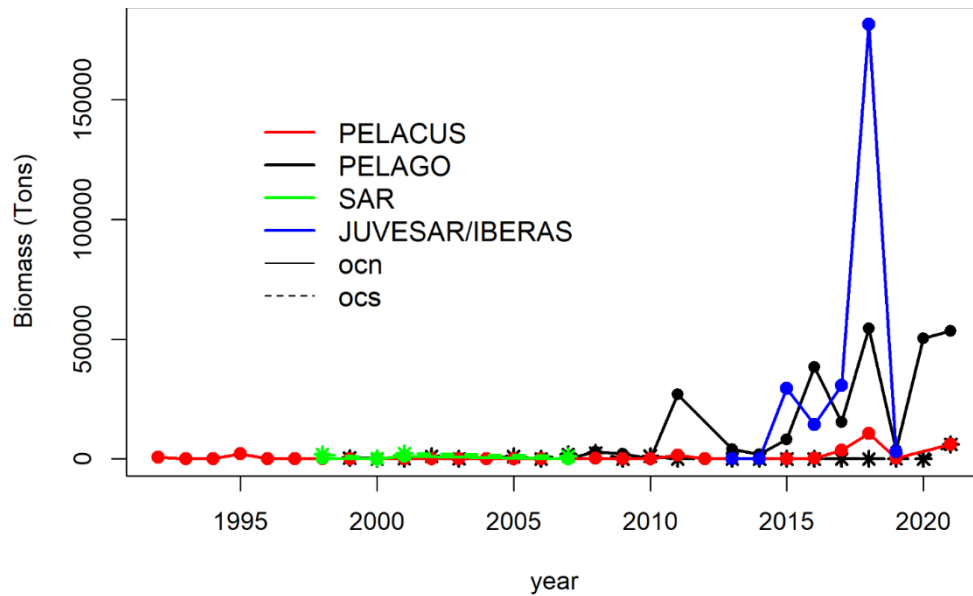
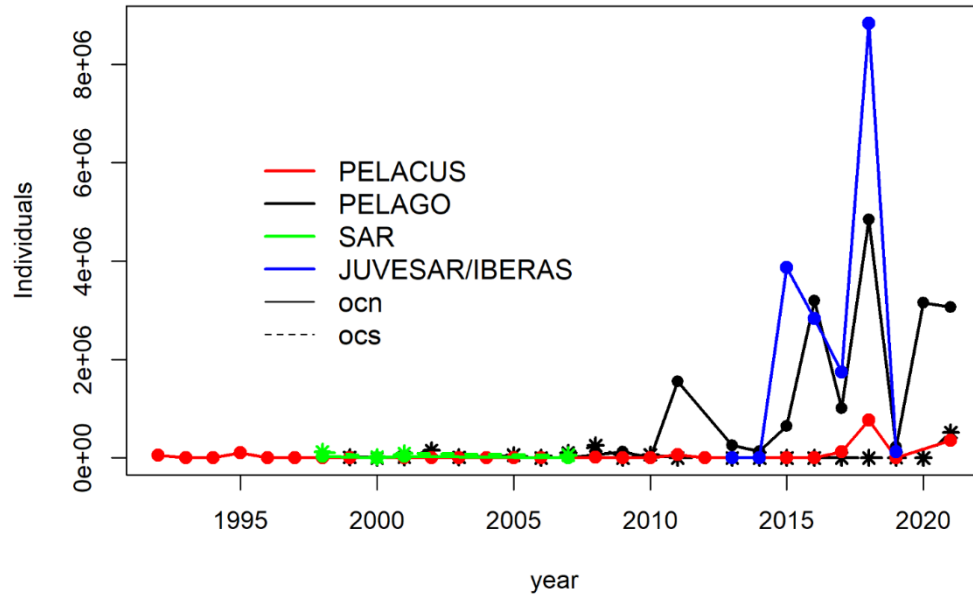


In 9aCN the length distribution shows a mode at **14.5 cm** corresponding to a majority of **Age 1** individuals. (2018=10.5; 2019=14.5 cm, 2020=12 cm).

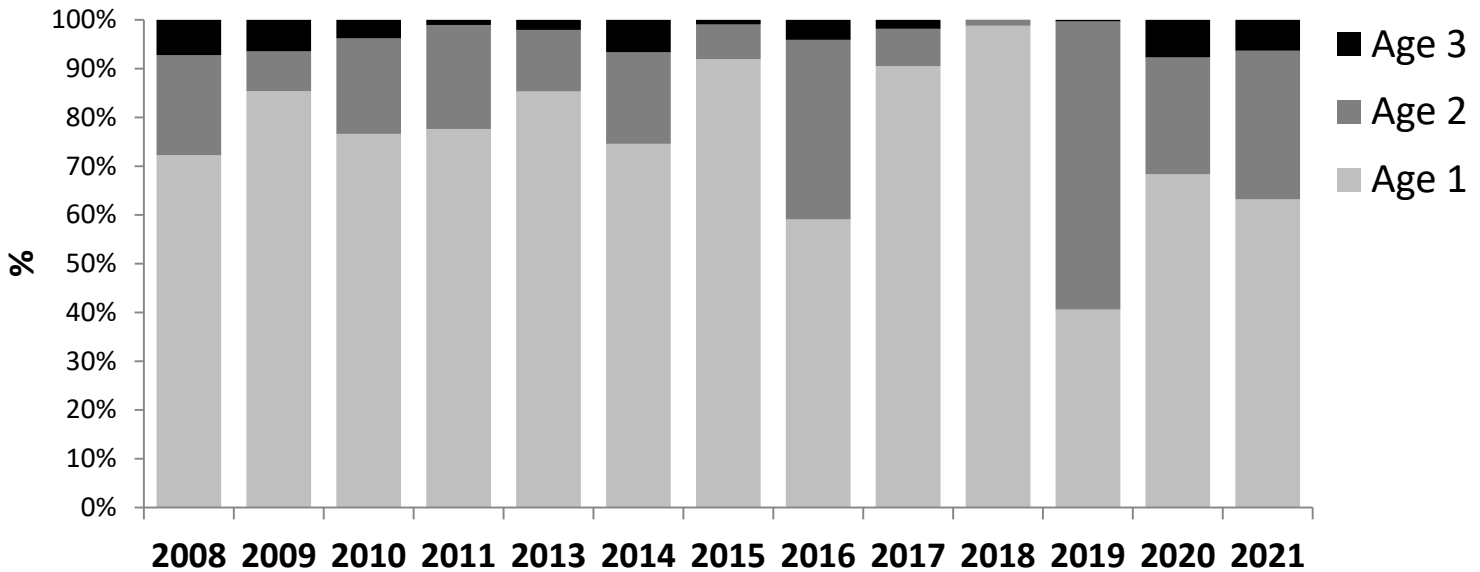
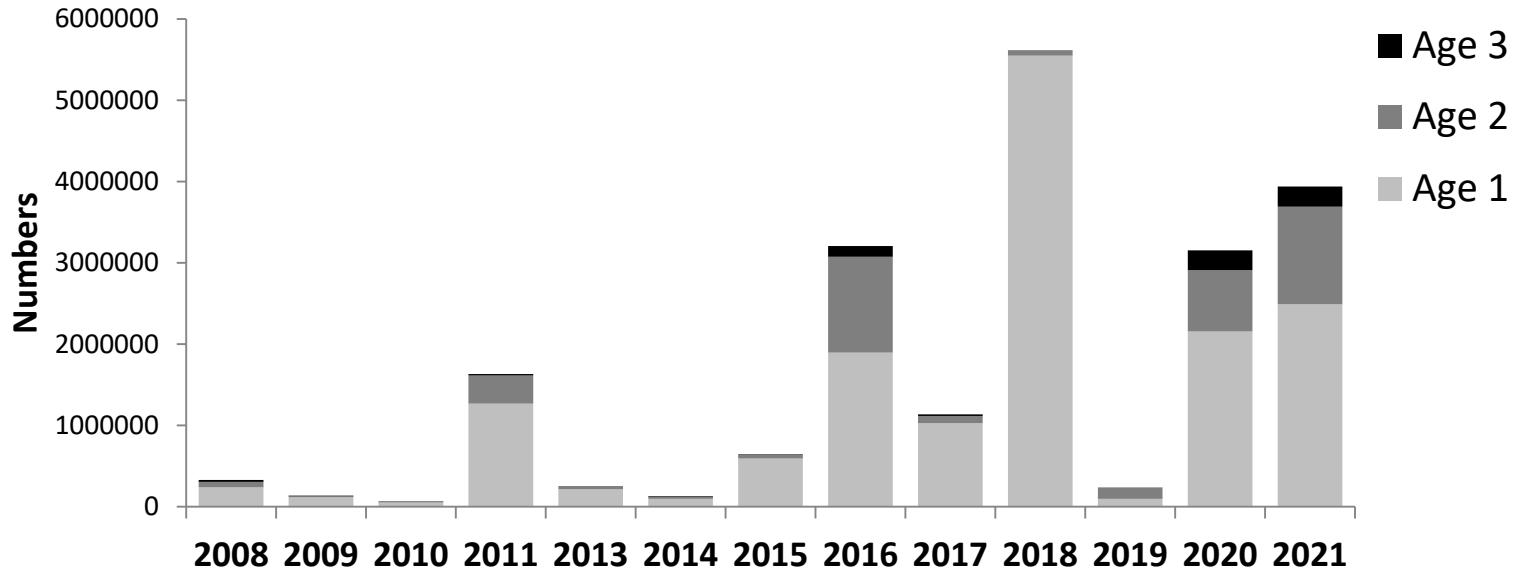
In 9aCS the mode was 11 cm and Age 1 individuals.

Age distribution of both subdivisions: **Age 1 = 61%**, Age 2 = 32% and Age 3 = 7% in **number**
Age 1 = 55%, Age 2 = 32% and Age 3 = 12% in **biomass**.

All surveys

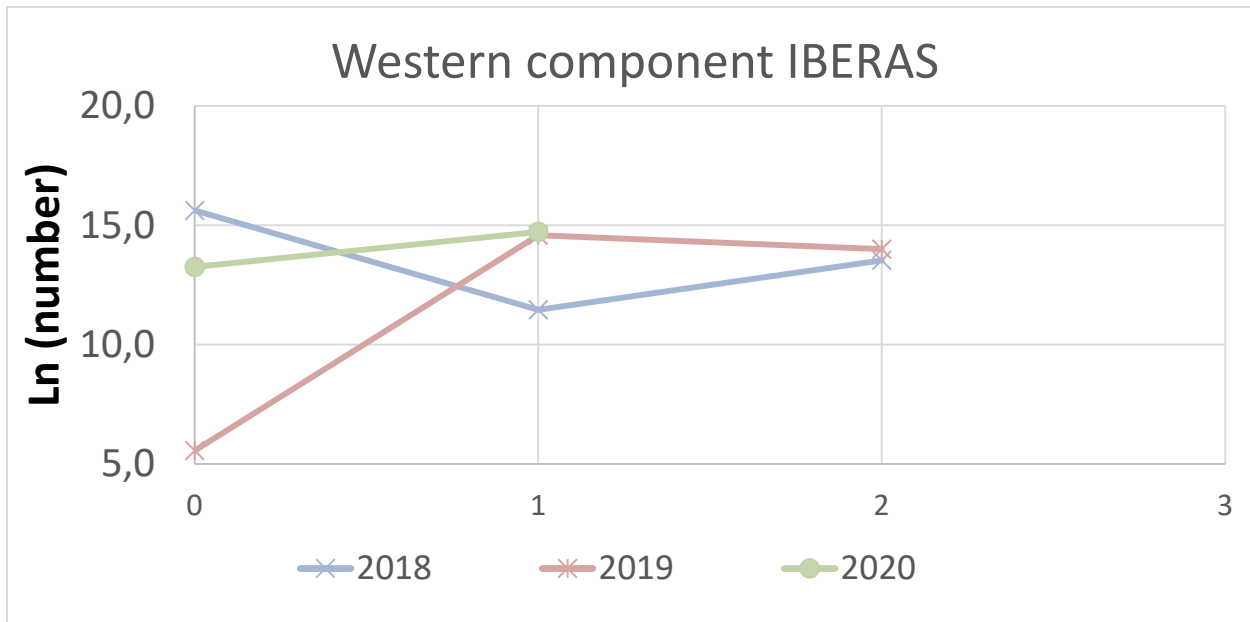
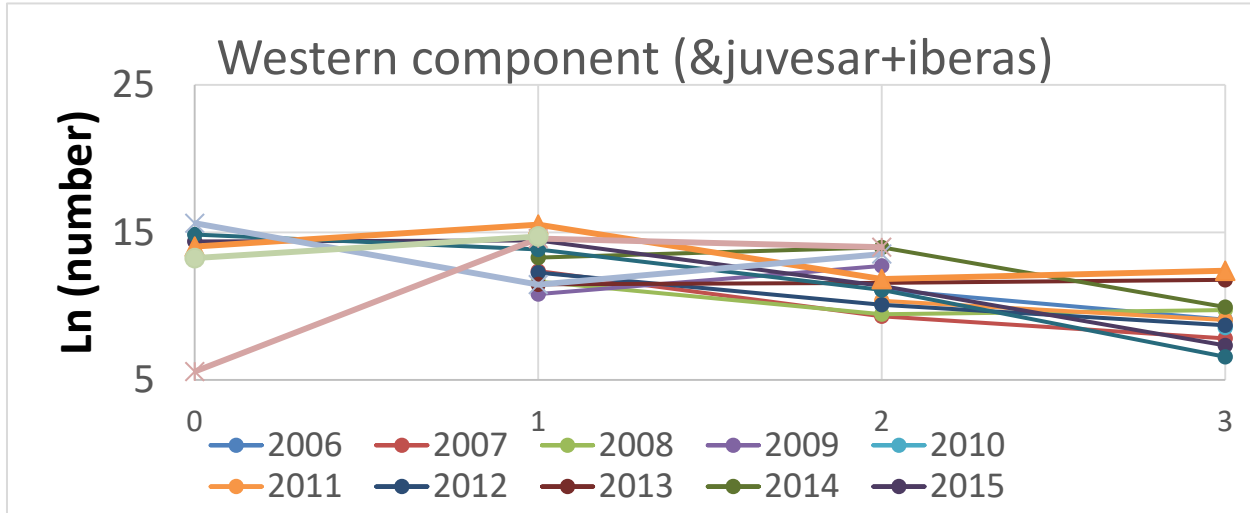


AGE COMPOSITION (number) IN THE WEST COMPONENT (9aN to 9aCS)



Only 9aCN and 9aCS

Cohort tracking

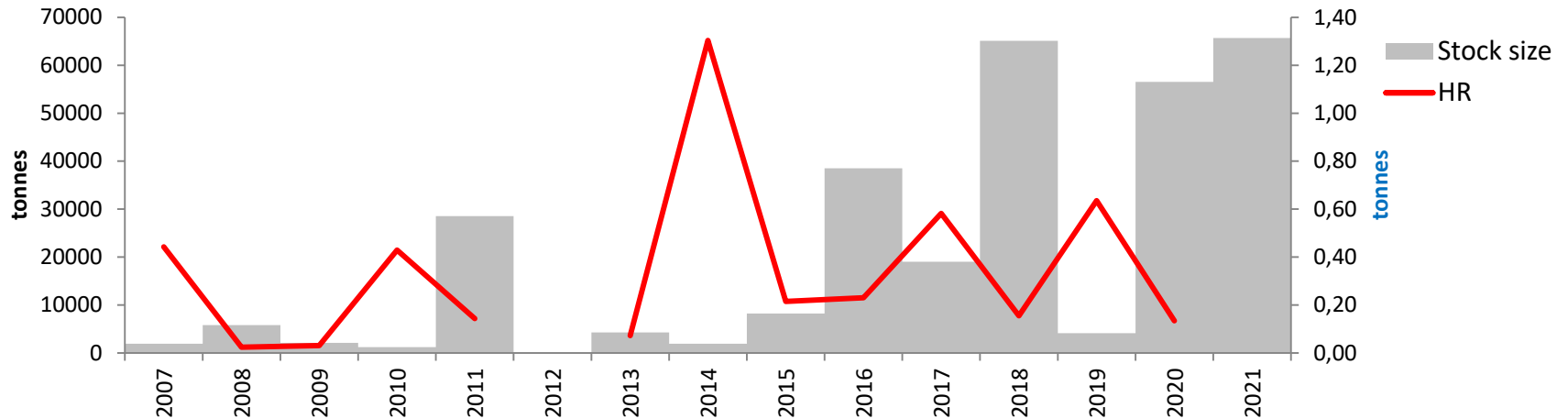
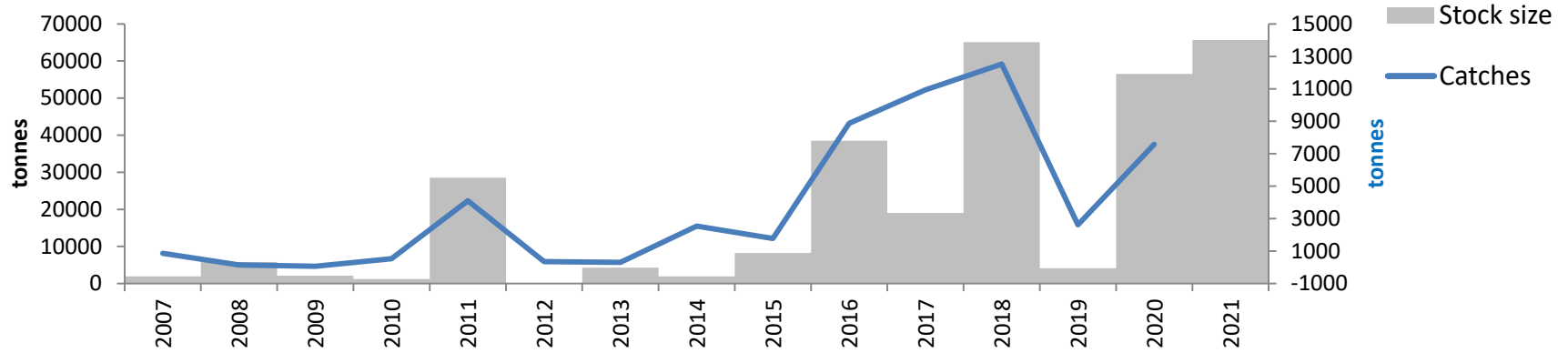


Stock indicator West component

STOCK INDICATOR AND CATCHES

*LANDINGS: not calendar year, i.e. 2007 corresponds to 07/2007 to 06/2008)

9.a West



Highest survey index of the time series, similar to 2018.

Low HR (0.13), comparing to previous low abundance year (HR 0.65)

year_junejuly	landings	discards	catches	cruise_year	pelacus_9an	pelago_9acncs	stock_index	hr	advised_landings
1989	803		803.0						
1990	531		531.1						
1991	208		207.8						
1992	143		143.3						
1993	14		14.1						
1994	2956		2956.5						
1995	6803		6803.4						
1996	1456		1456.0						
1997	1420		1420.4						
1998	696		695.6						
1999	1331		1330.5	1999		596			
2000	111		111.1	2000					
2001	474		474.0	2001		368			
2002	523		523.5	2002		1542			
2003	333		333.4	2003		112			
2004	173		173.2	2004					
2005	113		112.6	2005		1062			
2006	198		197.8	2006		0			
2007	862		861.7	2007	0	1945	1945	0.44	
2008	142		141.6	2008	306	5505	5811	0.02	
2009	66		65.6	2009	26	2089	2115	0.03	
2010	529		528.5	2010	42	1188	1230	0.43	
2011	4097		4097.3	2011	1508	27050	28558	0.14	
2012	356		355.6	2012	45				
2013	311		311.5	2013	0	4284.29405	4284	0.07	
2014	2538		2538.1	2014	0	1947	1947	1.30	
2015	1774	0.2	1774.0	2015	0	8237	8237	0.22	
2016	8874	6.5	8880.9	2016	205	38302	38507	0.23	
2017	11090	0.0	11090.2	2017	3566	15481	19047	0.58	
2018	12521	1	12522.0	2018	10660	54437	65097	0.19	13308
2019	2619	0	2619.0	2019	192	3937	4129	0.63	2661.6
2020				2020	6234.9	50291	56525.9	0.00	4347
2021				2021	6075	59608	65683	0.00	

STOCK SIZE AND SURVEY TREND

STOCK SIZE – PELACUS + PELAGO

SURVEY TREND -

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

	Stock size	Survey trend
	West	Trend (1/2)
1999		
2000		
2001		
2002		
2003		
2004		
2005		
2006		
2007	1945	
2008	5811	
2009	2115	0.5
2010	1230	0.3
2011	28558	17.1
2012		
2013	4284	
2014	1947	
2015	8237	2.6
2016	38507	7.6
2017	19047	0.8
2018	65097	2.3
2019	4129	0.1
2020	56517	1.6
2021	65683	2.2

Category 3: Stocks for which survey-based assessments indicate trends

Method 3.2. If there are survey data on abundance (...) but there is no survey-based proxy for MSY Btrigger and F values or proxies are not known.

Method is an ad-hoc variant of the 3.2 method, modified to better suit a short-lived species with very high interannual variability (similar to the one developed for in-year advice of sprat in area 27.3.a).

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

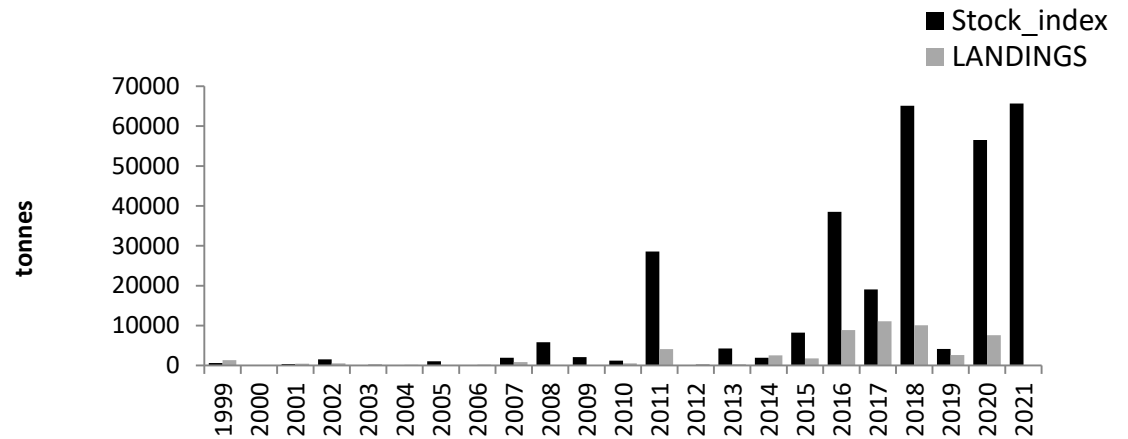
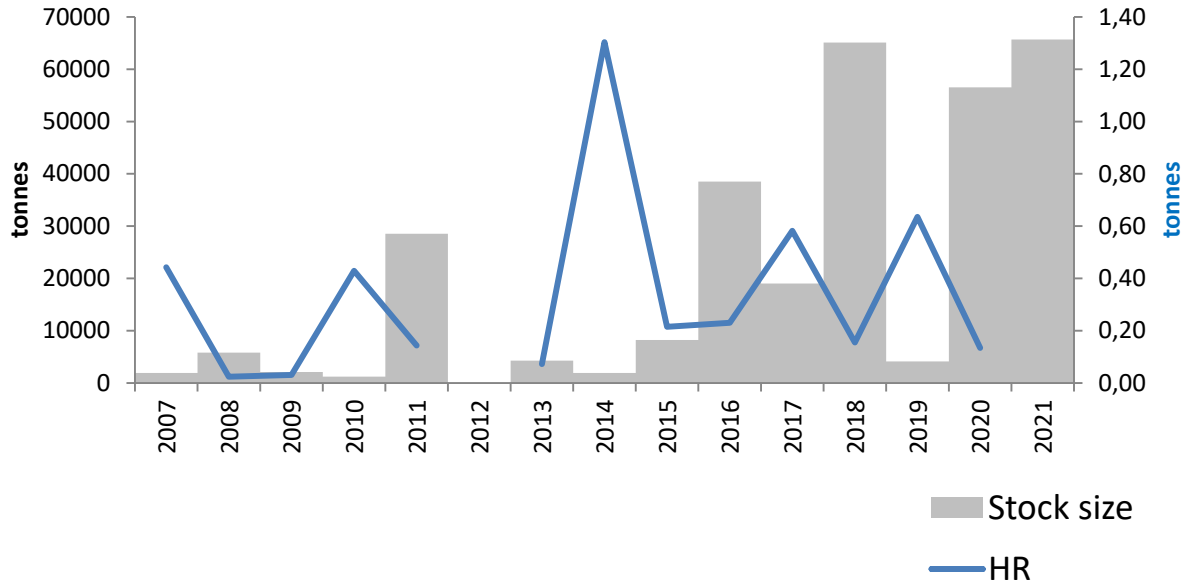
a) Apply the 80% **Uncertainty Cap** to the catch advice (If C_{y+1} is 80% greater or less than C_{y-1} , then apply a cap of 80% change in C_{y+1} ; to address uncertainty or noise in the data and its potential influence on the catch advice.).

Uriarte et al. (2018, WKLIFE III):

*Showed that Rules T(1/2) and T(1/3), **applied with no uncertainty cap or with 80% uncertainty cap**, outperform other rules in terms of increasing biomasses while still allowing substantial catches (similar or higher to the ones produced with the other HCR).*

Index A (2020)	65683	
Index B (2018-2019)	30327	
Index ratio (A/B)	2.2	
Uncertainty cap	1.8	
advised landings previous year (1 July 2018 to 30 June 2019)	4347	
Discard rate	0	
Precaucionary buffer	no	
Catch advice (total catch*uncertainty cap)	7824	
% advice change	80.0	
	HR (%)	0.12

9.a West



HR last 3 years: 2018=0.19; 2019=0.63, 2020=0.07 (2021– 0.12)

Poor cohort tracking. No consistency of recruitment survey and recruits at the outer limit of survey's distribution, likely full area not covered.

1 - In the absence of a DLS approach for short-lived species and for in-year advice, WKPELA 2018 suggested an **interim procedure** for the anchovy in the Western area of Division 9a variation of the 3.2 rule (**1/2 with 20% cap**). It was in use for 1 year (2018).

2 - In 2019 the **survey index decreased by 95%** and the rule, as it was, would lead to a HR=2.1. As a consequence, the rule was changed to **80% cap** and no buffer that year.

3 - In **2020**, the index has reached the **second highest value** (50282 tonnes without the PELACUS, 56526 tonnes extrapolating the regression between surveys), similar to the historical maximum (65096 tonnes) that corresponded to an advise of 13308 tonnes (HR=0.16). This year the advise will be 4347 tonnes, corresponding to a **HR=0.07**.

4 – In 2021 the index reached the highest value, similar to 2018 but catch advice according to the rule will be nearly half.

A new method is commended for this stock component. WKDLSSLS 2021 – MSE evaluation of different HCR (including fixed HR).