Anchovy in Division 9aWest (ane.27.9aN, 9aCN and 9aCS).

Fishery and Surveys data: Data availability and trends

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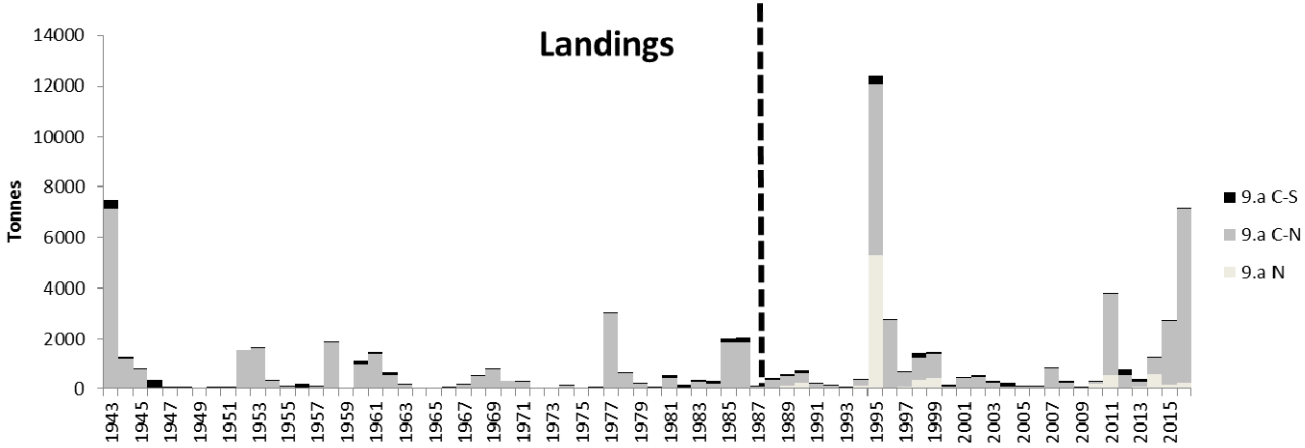
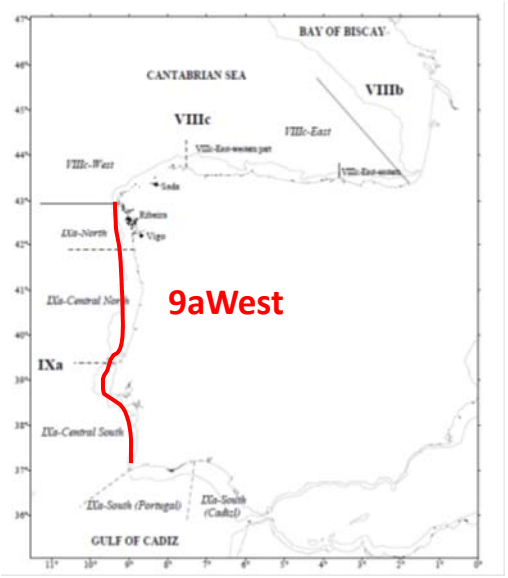
Ane.27.9aWest. LANDINGS by sub-division, country and métier



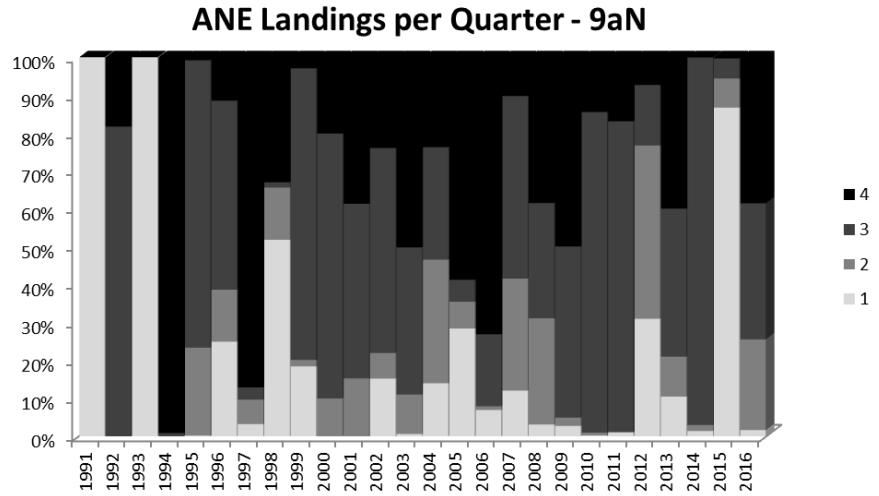


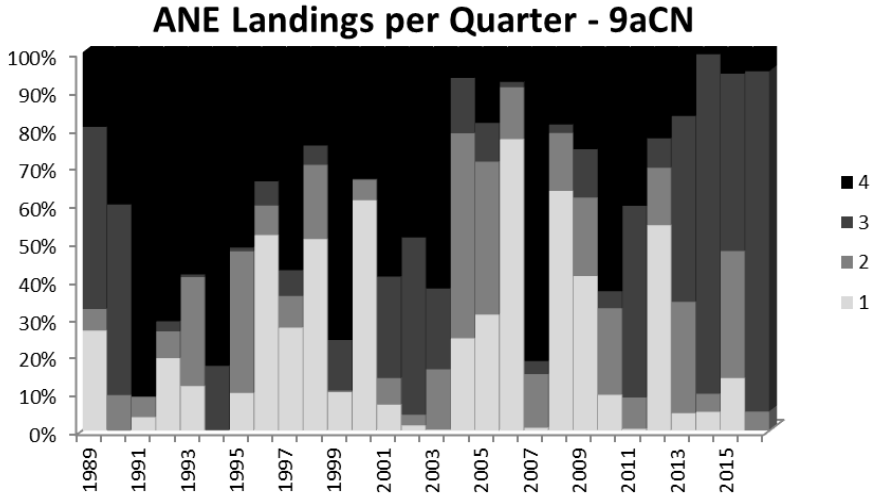
- PT_Data since 1943, SP: Data since 1989.

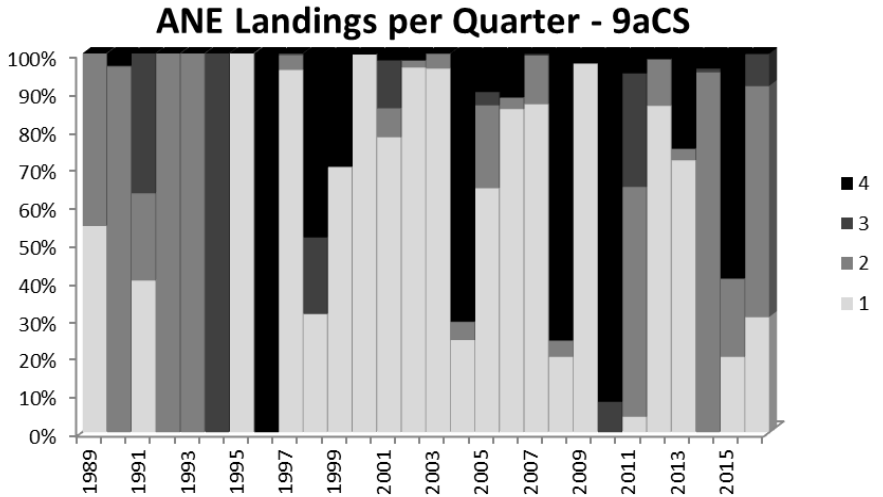
- Mean % of landings (1989 to 2016): 1065.8 tons (70.8%) for the 9a-CN, 309.3 tons (16.3%) for the 9a-N and 61.7 tonnes (12.9%) for the 9a-CS.

- >95% purse-seine fisheries in Portugal and Spain.

Ane.27.9aWest. LANDINGS by quarter and discards







- Most catches in sub-divisions 9aN and 9aCN in 3rd and 4th quarter.
- Most catches in the 1st quarter for 9aCS.

- Discards are considered null in Portugal and ranging 0-0.001% in Spain.

Ane.27.9aWest. LANDINGS: size composition – data availability

area	quarter	1998	1999	2009	2011	2012	2013	2014	2015	2016
9aN	1									
	2									
	3									
	4									
9aCN	1		3 (319)		3 (214)	1 (78)			3 (662)	1 (134)
	2					1 (101)	1 (153)		4 (408)	6 (714)
	3		2 (195)		2 (171)			1 (104)	4 (495)	8 (1440)
	4		8 (965)	1 (120)		1 (115)			1 (55)	
9aCS	1						1 (101)			
	4								1 (58)	

- Length–frequency distribution of catches only available on a regular basis in recent years and for sub-divisions 9aN and 9aCN.

- Due to the low anchovy abundance in 9aCS in recent years, very few LFD data.

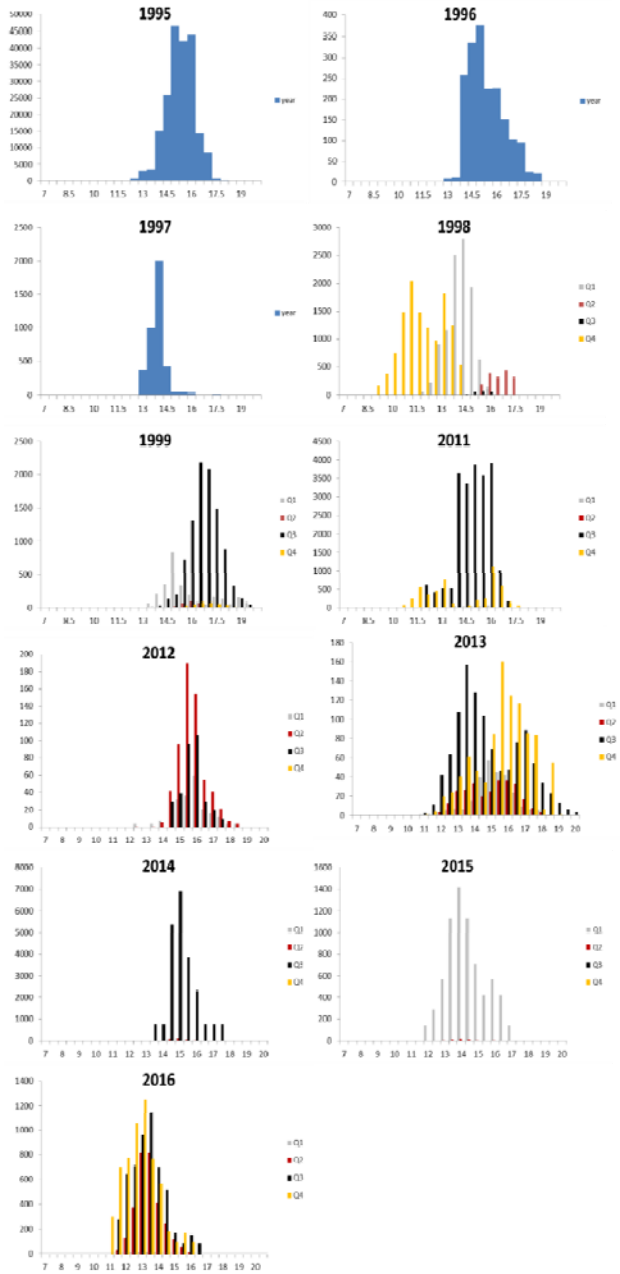
Ane.27.9aWest. LANDINGS: size composition by sub-division

9aN

Length ranged between 9-20 cm

Most frequent and abundant size-classes landed: 13.5 – 16.5 cm

Similar sizes in different quarters



Ane.27.9aWest. LANDINGS: size composition by sub-division

9aN

Length ranged between 9-20 cm

Most frequent and abundant size-classes landed: 13.5 – 16.5 cm

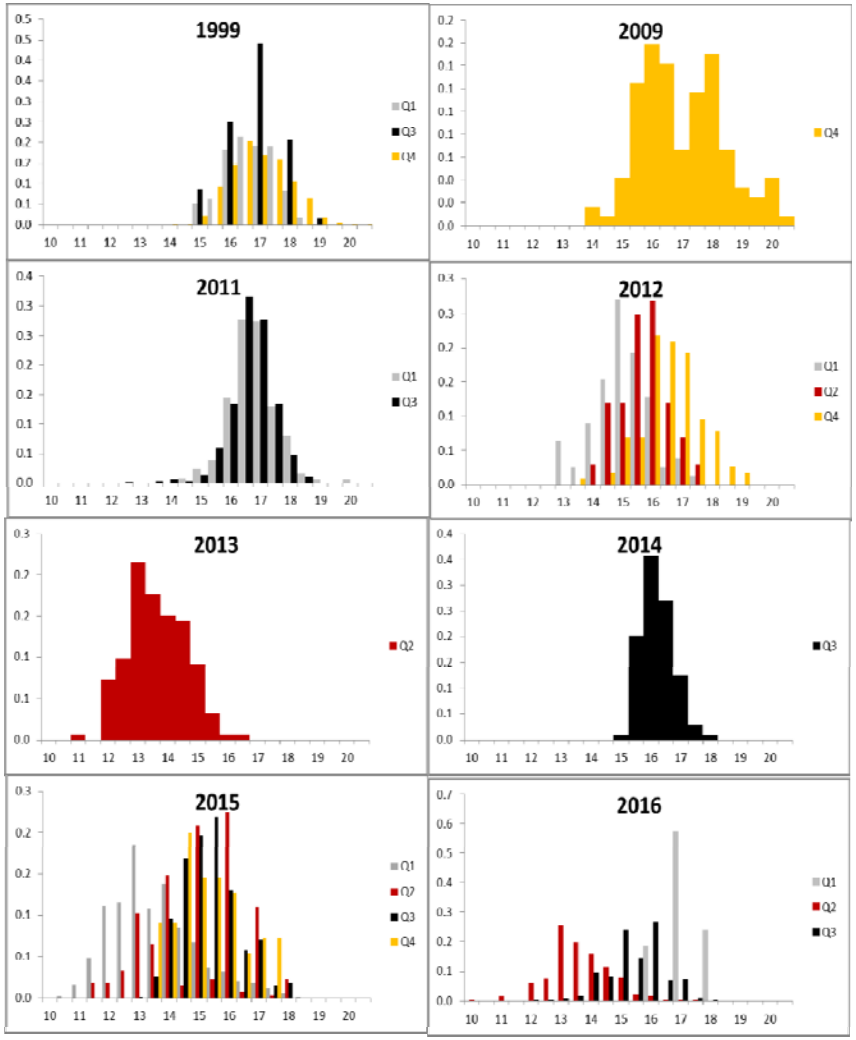
Similar sizes in different quarters

9aCN

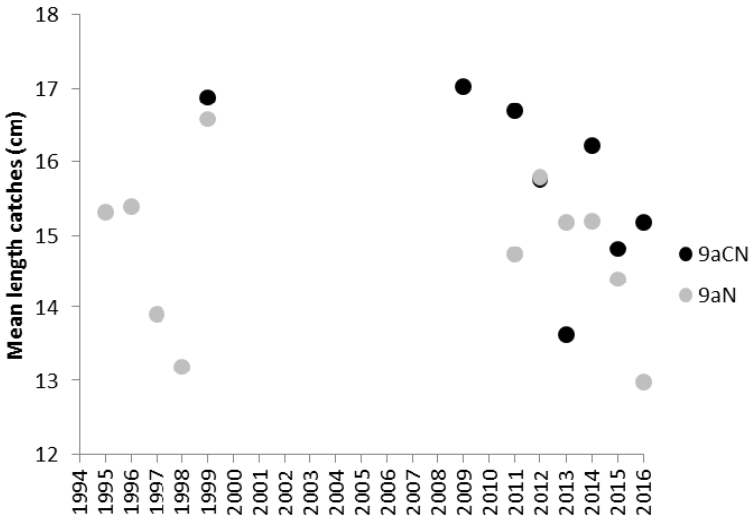
Length ranged between 10-20.5 cm

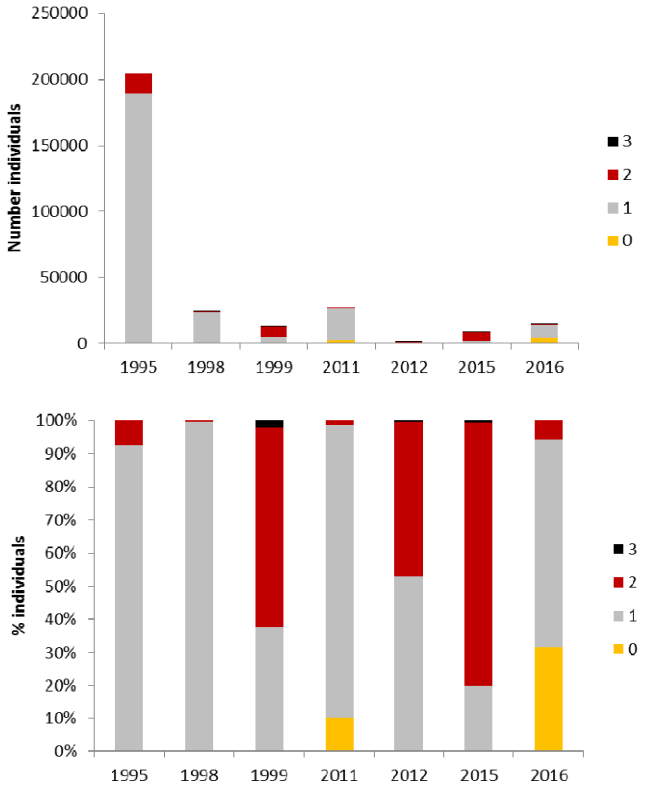
Most frequent and abundant size-classes landed: 14.5 – 17 cm

Similar sizes in different quarters for larger fish, although smaller fish also caught in 2nd quarter (12-14.5 cm)



Ane.27.9aWest. LANDINGS: weight by sub-division and age





- Mean length of anchovy in catches was smaller in sub-division 9aN when compared to sub-division 9aCN.
- Age structure of the population in the catches: only data from the Spanish fishery (9aN). Dominated by 1 and 2 year old fish.

Ane.27.9aWest. LANDINGS: biological data - availability

AREA	YEAR	QUARTER	DATA_AM	Total
IXaCN	2011	3	06-09-2011	58
			08-08-2011	38
			12-07-2011	45
			21-09-2011	47
			25-07-2011	41
	2011	4	13-10-2011	49
			29-11-2011	44
			31-10-2011	54
	2012	1	10-01-2012	54
			31-01-2012	60
	2013	2	28-05-2013	78
	2016	2	06-04-2016	52
			25-05-2016	56
			29-06-2016	48
	2016	3	06-07-2016	40
IXaCS	2011	3	06-09-2011	44
TOTAL				808

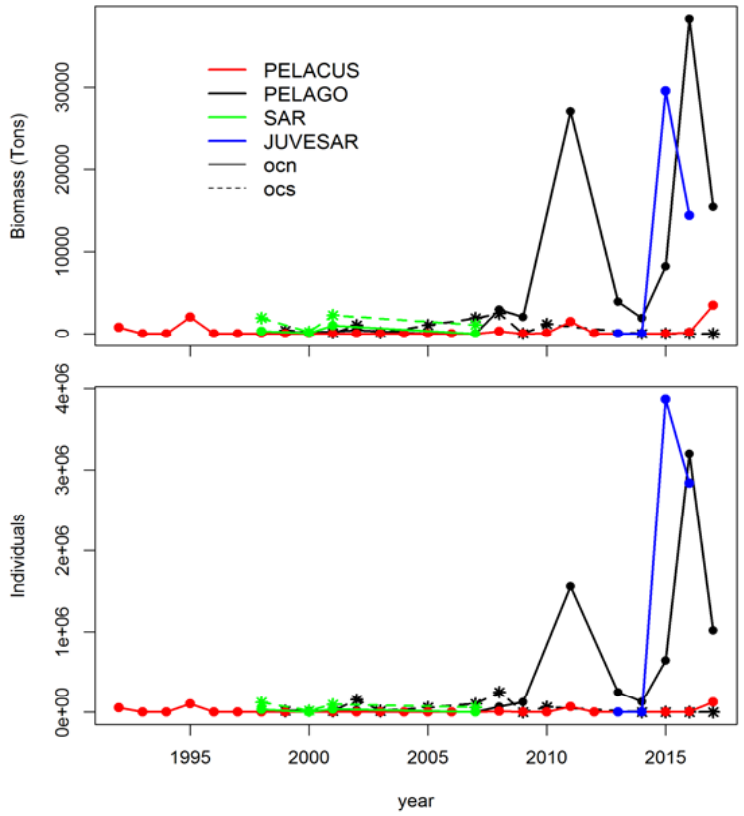
- Very few data.
- Not possible to estimate growth and maturity ogives from landings.

Ane.27.9aWest. SURVEYS: data availability

Method	Acoustics				
Survey	PELACUS	PELAGO		SAR	JUVESAR
Institute	IEO	IPMA		IPMA	IPMA
(Country)	(Spain)	(Portugal)		(Portugal)	(Portugal)
Subareas	9.a N	9.a CN-9.a S		9.a CN-9.a S	9.a CN
Year/Quarter	Q2	Q1	Q2	Q4	Q4
1998				Nov	
1999		Mar			
2000		Mar		Nov	
2001		Mar		Nov	
2002		Mar			
2003		Feb		Nov	
2004			Jun		
2005			Apr	Nov	
2006			Apr	Nov	
2007			Apr	Nov	
2008	Apr		Apr	Nov	
2009	Apr		Apr		
2010	Apr		Apr		
2011	Apr		Apr		
2012	Apr				
2013	Mar		Apr		Nov
2014	Mar		Apr		Nov
2015	Mar		Apr		Dec
2016	Mar		Apr		Dec
2017	Mar		Apr		Dec

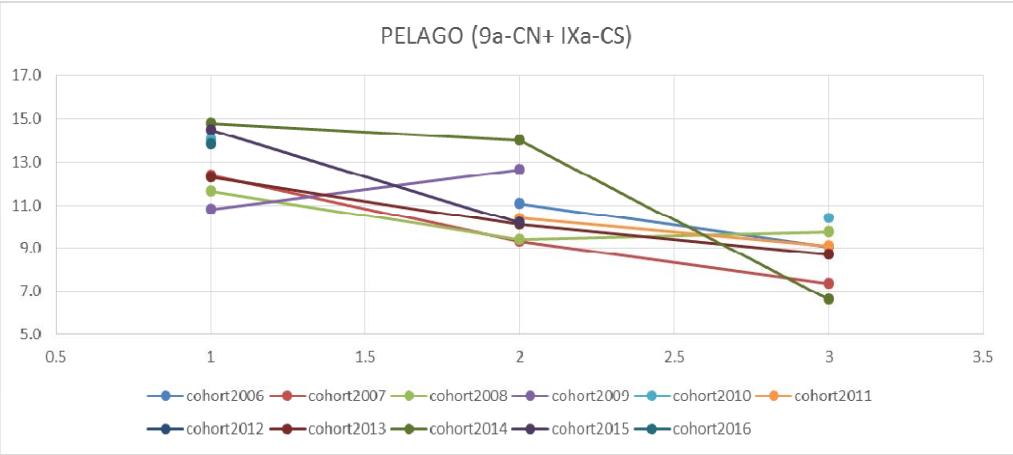
- 2 complementary spring acoustic surveys
- 2 autumn surveys (one discontinued) the other aiming sardine juveniles (9aCN), recent.

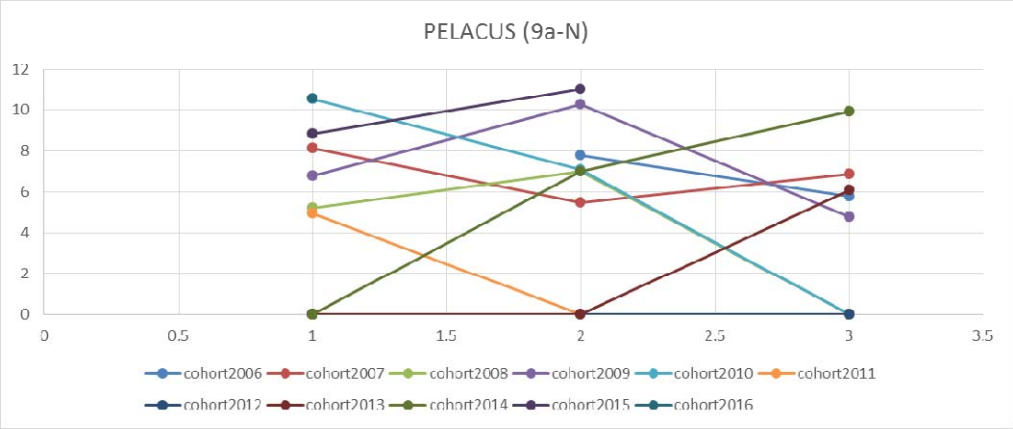
Ane.27.9aWest. SURVEYS: time series of acoustic surveys



- **PELACUS** (9aN): Very low abundance, periods of absence. Historical maximum in 2017 (3525 tons).
- **SAR** (9aCN and CS, 1998-2008 w/ gaps). Highest in 2001 (2276 tons). >68% anchovy in 9a.CS
- **JUVESAR** (9aCN, 2013-present). Highest in 2015 (29556 tons).
- **PELAGO (**9aCN + 9aCS**).** Highest for 9aCN in 2016 (38302 tons). Highest in 9a.CS in 1998 (2505 tons).

Ane.27.9aWest. SURVEYS: internal consistency



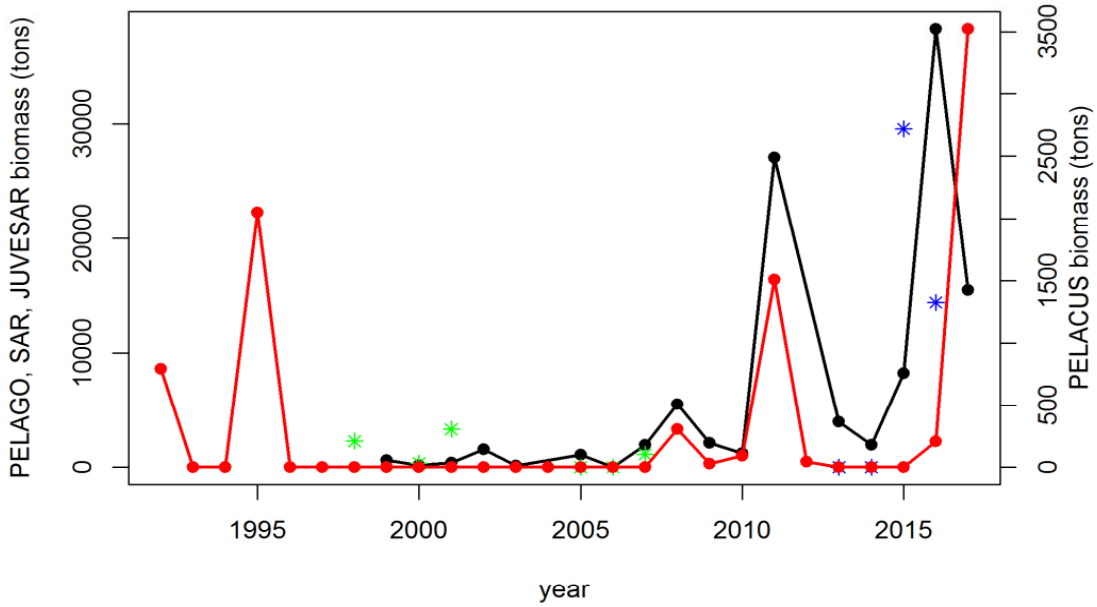


- Age estimates from PELACUS (9a.N) and PELAGO (9aCN and CS) since 2008 to present.

- Cohort tracking PELAGO: Generally, abundance decreases with increasing age (exception of cohorts e.g. 2004 & 2009). High variability of mortality per age between cohorts.

- Cohort tracking PELACUS: no clear tendency in the abundance per age (small area, very low abundance when compared to the contiguous 9a.CN).

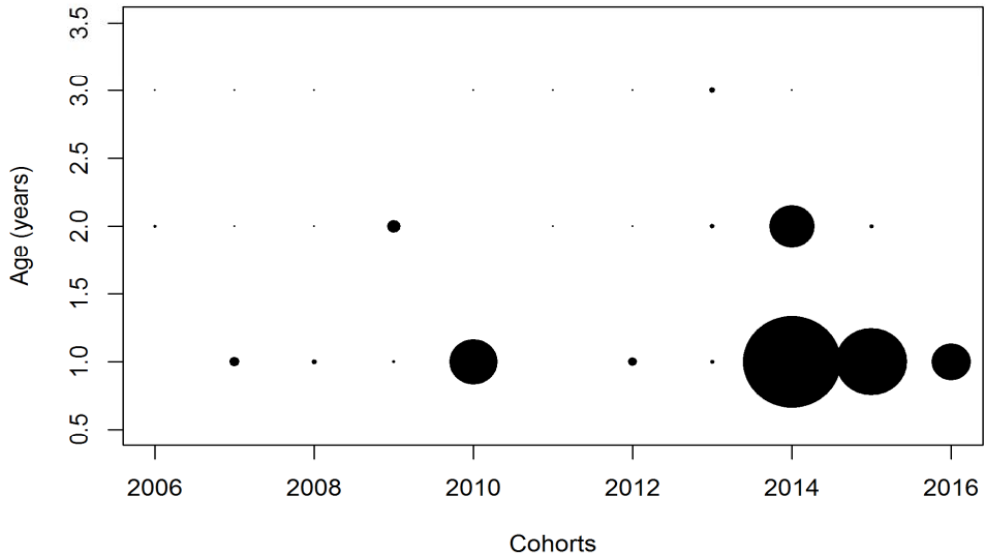
Ane.27.9aWest. SURVEYS: between survey consistency



- General trends are fairly consistent.

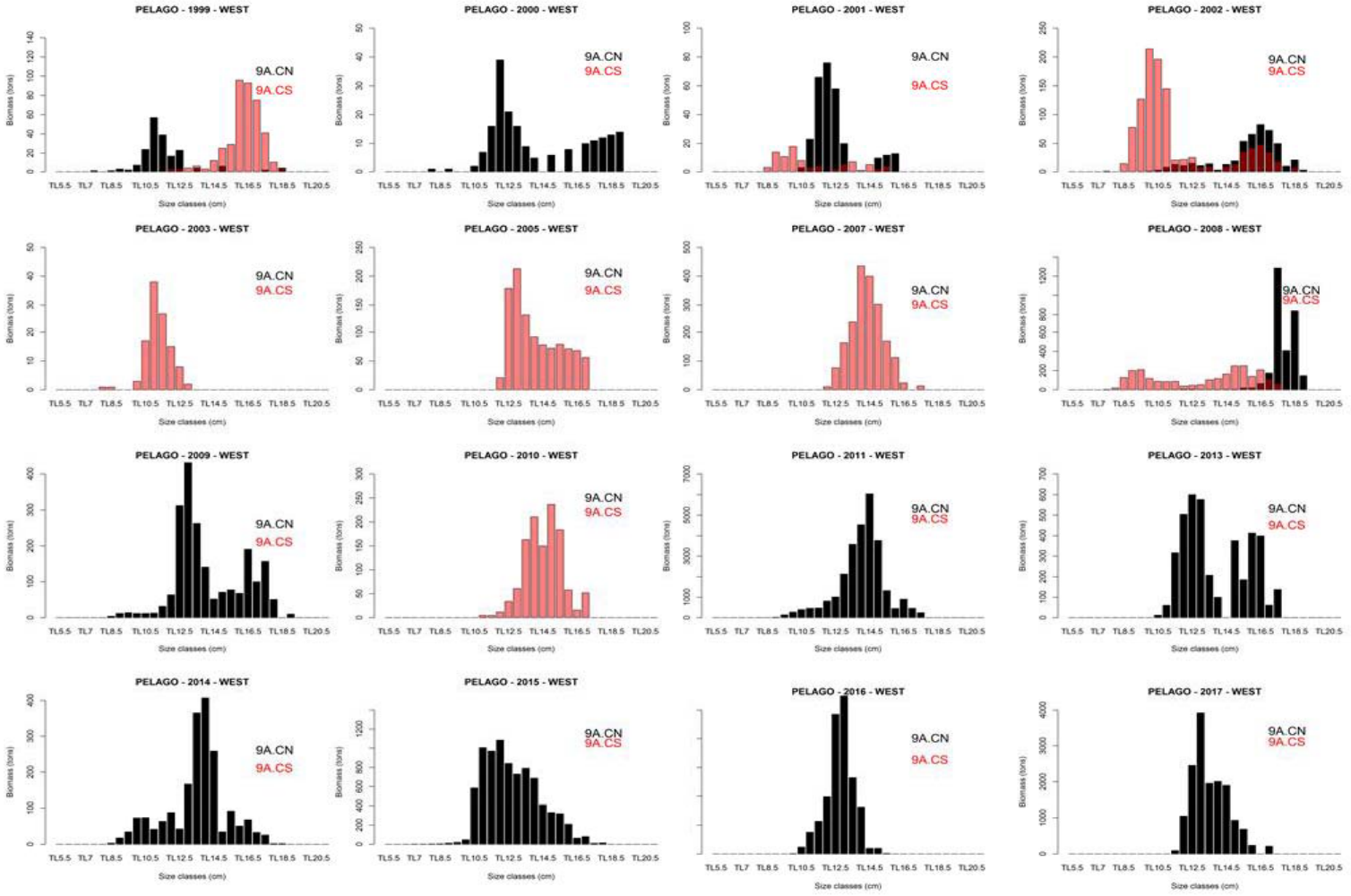
- Periods of low abundance detected by **PELAGO+SAR+PELACUS** from 1998 to 2007.
- Small peak in 2008 and larger during 2011 estimated by **PELAGO+PELACUS**.
- Highest peak in abundance for the 9a.CN (2016) and for the western stock was only estimated by the **PELACUS** survey during the **following year** (2017).

Ane.27.9aWest. SURVEYS: consistency



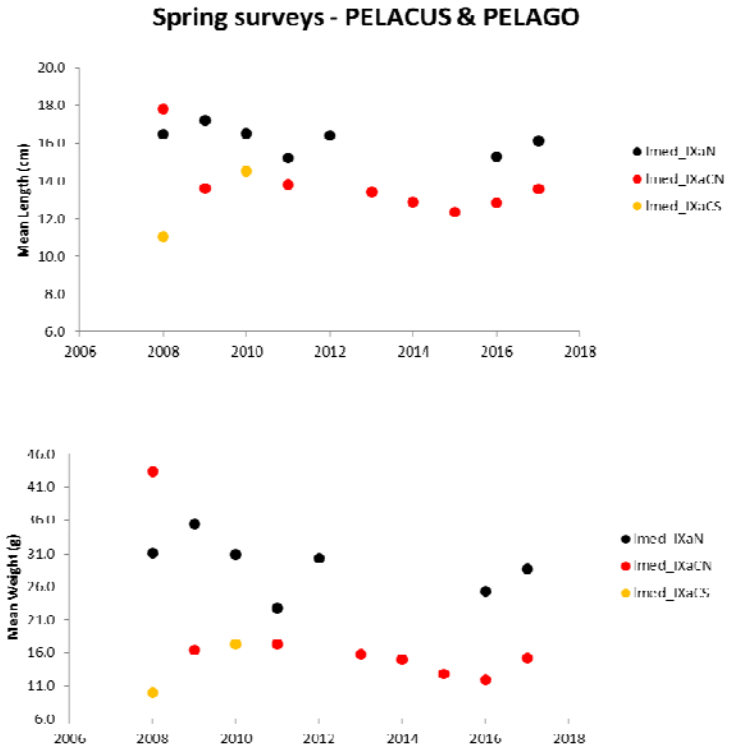
• Graphical analysis of cohort tracking does not show a clear signal of strong cohorts being detected at several ages.

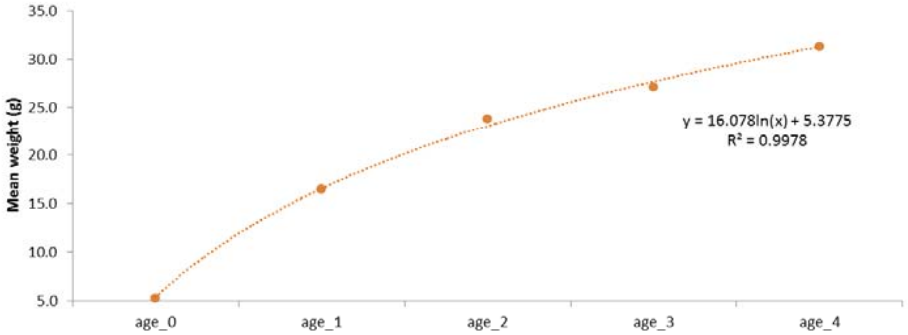
Ane.27.9aWest. SURVEYS: size composition



- LFD for surveys in 9aN: modal size class 15-16.5 cm.
- LFD for surveys in 9aCN: modal size class 11-17.5 cm, frequently bi-modal .
- LFD for surveys in 9aCS: modal size class 10-16 cm.

Ane.27.9aWest. SURVEYS: weight at age

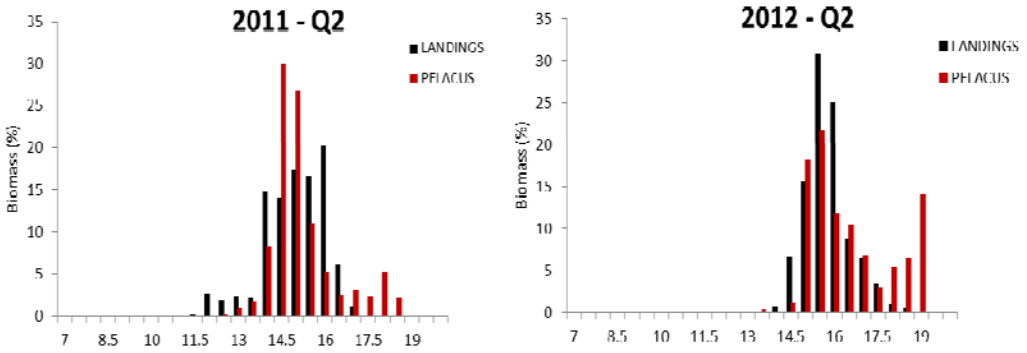


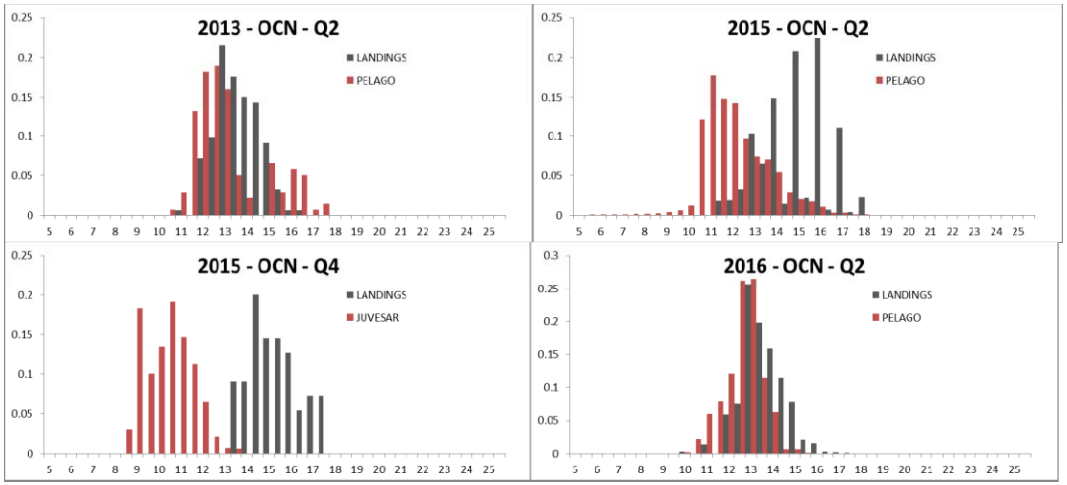


• Mean length estimated during spring for the western population (PELAGO + PELACUS surveys) was generally lower in the 9a.CN and 9a.CS when compared to the 9a.N, which contrasts with the data from landings.

•JUVESAR: mean weight at age 0: 5.3 g. PELAGO+PELACUS: mean weight 16.41 g at age 1, 23.79 g at age 2, 27.08 g at age 3, 31.28 g at age 4.

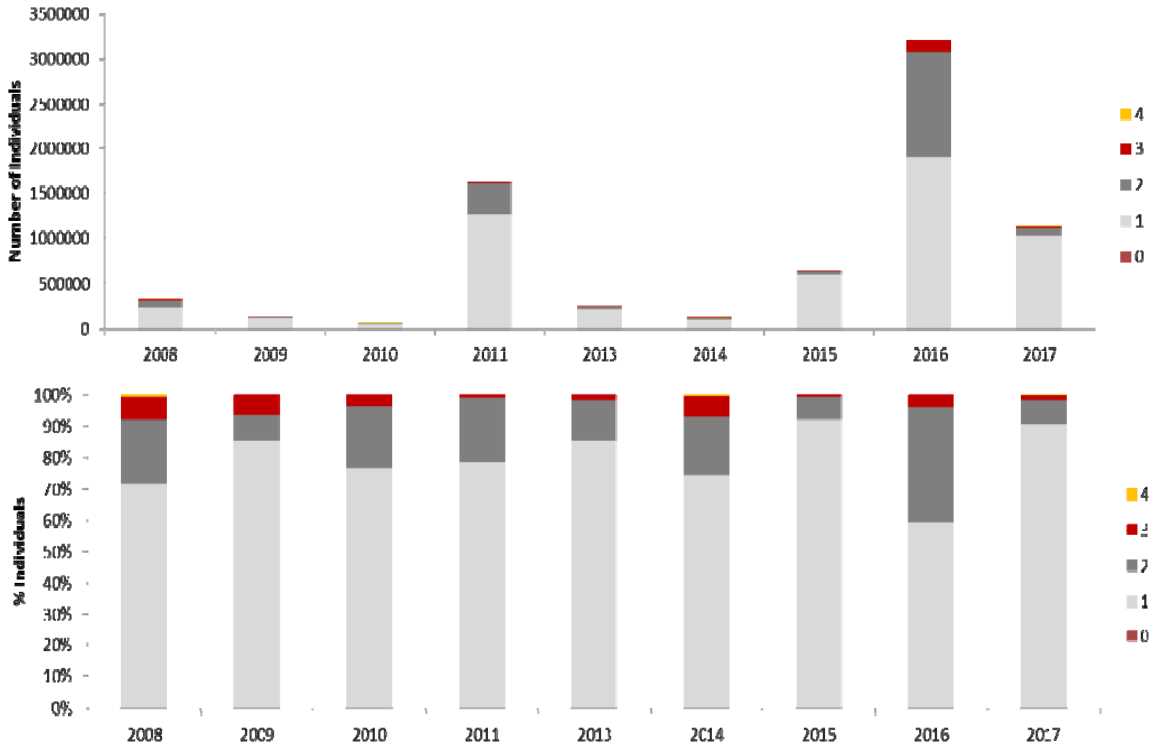
Ane.27.9aWest. SURVEYS AND LANDINGS: comparison of length composition





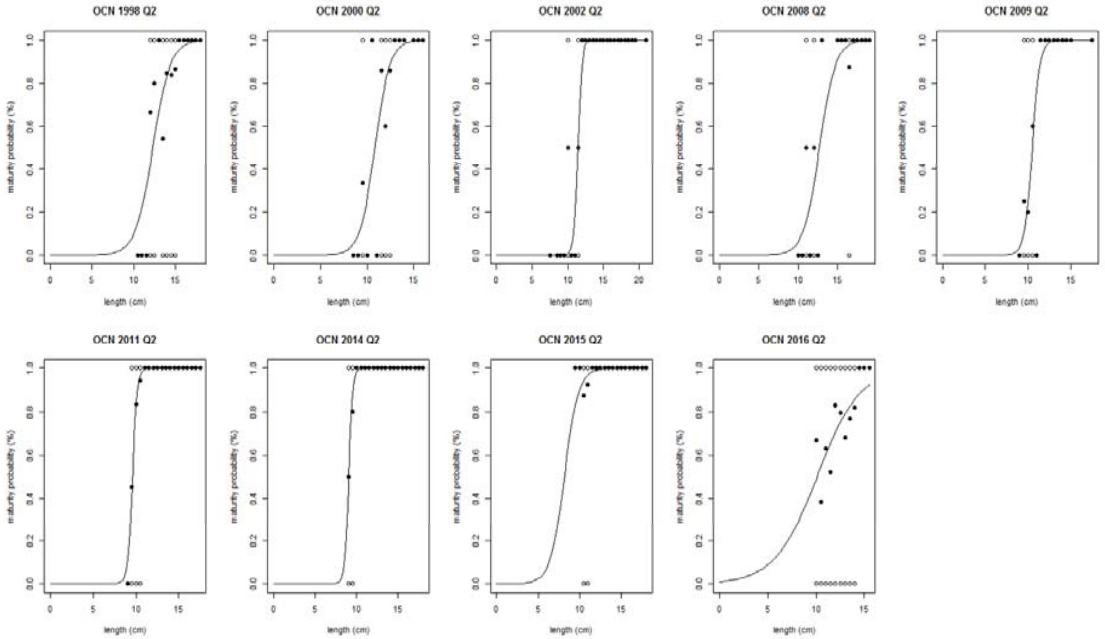
- Similar length composition in 9a.N.
- In the main area of west (9a.CN) generally coincident between PELAGO and landings, except 2015 and JUVESAR : size class mode of the surveys significantly lower than that of landings: landings target only the larger fish.

Ane.27.9aWest. SURVEYS: age composition



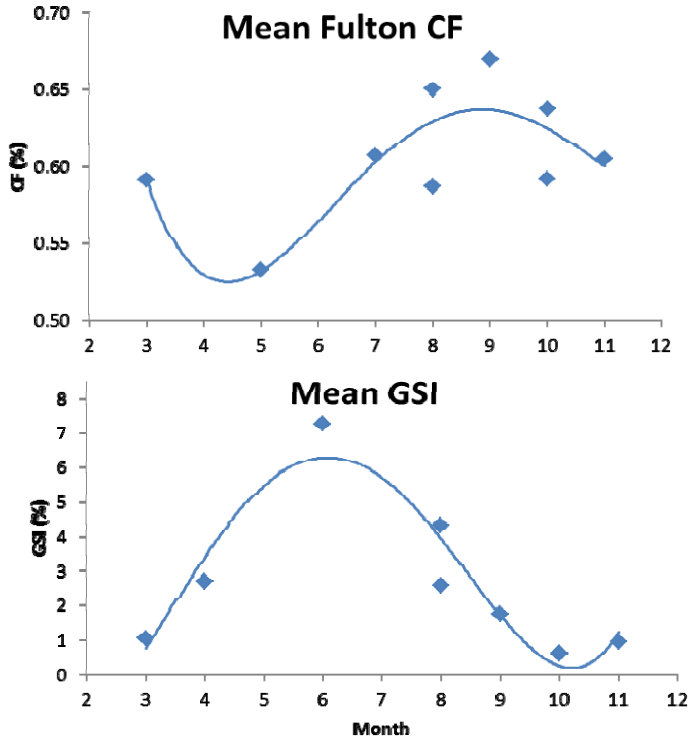
- Age 1 largely dominates during all years, followed by age 2.
- Age 3 very low abundance during all years (>10% of the stock).
- 2016: Age 2 was comparatively more abundant during the year of peak abundance for the stock.

Ane.27.9aWest. SURVEYS: maturity



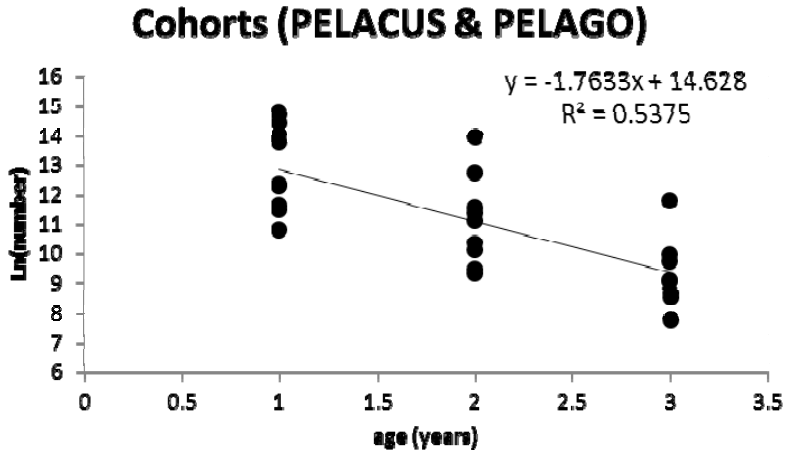
- Maturity estimated from PELAGO 9aCN an 9aCS.
- Anchovy maturity at length is very steep.
- L50 generally occurs between 10 and 12 cm

Ane.27.9aWest. SURVEYS: spawning cycle



- 2017: Matosinhos (9aCN): Spawning in March, April, peak in June and end in July/August

Ane.27.9aWest. SURVEYS: growth parameters and natural mortality



• No growth parameters are currently available for 9a.West anchovy.

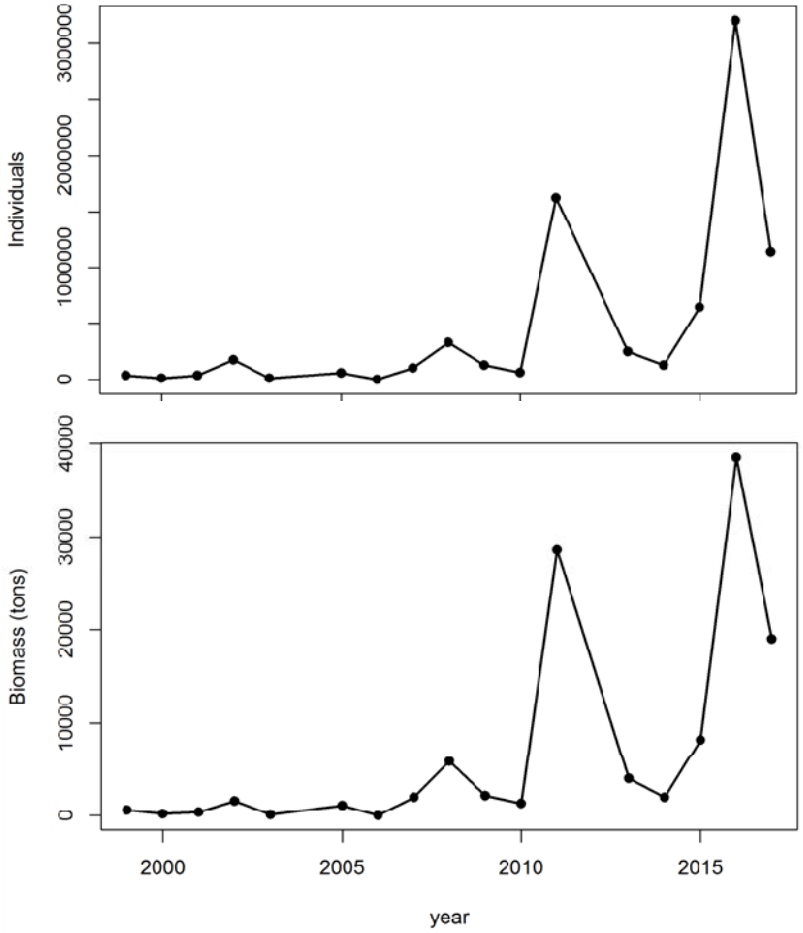
• Natural mortality, M, is unknown for this stock. Cohort tracking of the stock indicator by pooling all cohorts per age indicates that total mortality is -1.76, therefore natural mortality should be below this value. However, the total mortality estimated by cohort analysis shows high variability and occasionally inconsistent data.

• Median of total mortality is -2.18 (Ages1 to 2) and -1.39 (Ages 2 to 3).

Ane.27.9aWest. Assessment: Trend-based qualitative assessment: stock size and harvest rate indicators

• Anchovy abundance 9aWest:

Very low from the beginning of the series until 2006, increased afterwards, with 3 high peaks in 2016, 2011 and 2017 (with 38507, 28558 and 19006 tons, respectively).



Ane.27.9aWest. Assessment

- Anchovy in 9a not yet analytically assessed.

- ICES Stock Data Category 3, qualitatively assessed through a survey biomass trend-based assessment without catch advice.

- Advice from 9a-S population: more data, more stable.

- Yearly TAC since 2011, that ranged from 7600 tonnes in that year to 12500 in 2016 (peak stock size West = 38507 tonnes).

- Since 2015 both components (W, S) with stock size biomass indicator (PELAGO+PELACUS for West - ICES WGACEGG 2017).

		Western component		
		Subdiv. 9.a N + 9.a CN + 9.a CS		
Year	TAC 9a stock	Catches	Stock size	HR
1999		1466.3	596.0	2.46
2000		141.8		
2001		443.6	368.0	1.21
2002		543.4	1542.0	0.35
2003		301.0	112.0	2.69
2004		226.4		n.a
2005		92.2	1062.0	0.09
2006		109.9	0	
2007		843.9	1945.0	0.43
2008		303.3	5810.5	0.05
2009		58.6	2114.9	0.03
2010		281.1	1230.4	0.23
2011	7600	3781.5	28558.4	0.13
2012	8600	778.7		n.a
2013	8800	392.4	4284.2	0.09
2014	9700	1281.4	1947.0	0.66
2015	10600	2717.0	8237.0	0.33
2016	12500	7140.0	38507.4	0.19

Ane.27.9aWest. Assessment

- EXPLORATORY ASSESSMENT WITH SPICT –*Alexandra Silva*

- REFERENCE POINTS AND ADVICE (In year advice based on survey biomass estimates and sustainable harvest rates from YPR analysis) – *Andrés Uriarte*