

Anchovy (*Engraulis encrasicolus*) in Division 9.a (Atlantic Iberian waters)

ICES stock advice

ICES cannot give catch advice for 2018. This is due to the lack of available data on year classes that constitute the bulk of the biomass and catches.

Stock development over time

The biomass stock size indicator in Subdivision 9.a South (where the main part of the catch is normally taken) is highly variable without clear trends. The stock biomass is variable because it is largely composed of one-year-old fish. The observed harvest rates for anchovy in Subdivision 9.a South (10–49%) are considered low, since they result in 50–90% of the potential spawning biomass being allowed to spawn.

In the central and northern parts of Division 9.a the anchovy abundance has been generally low, showing occasional outbursts of biomass, such as in 2011, 2015, and 2016. In 2017 there is an increase of biomass in 9.a North, which is a small part of the western area. Estimates for the rest of the western area are not available.

There is no information on the recruitment that will form the bulk of the catches in 2018.

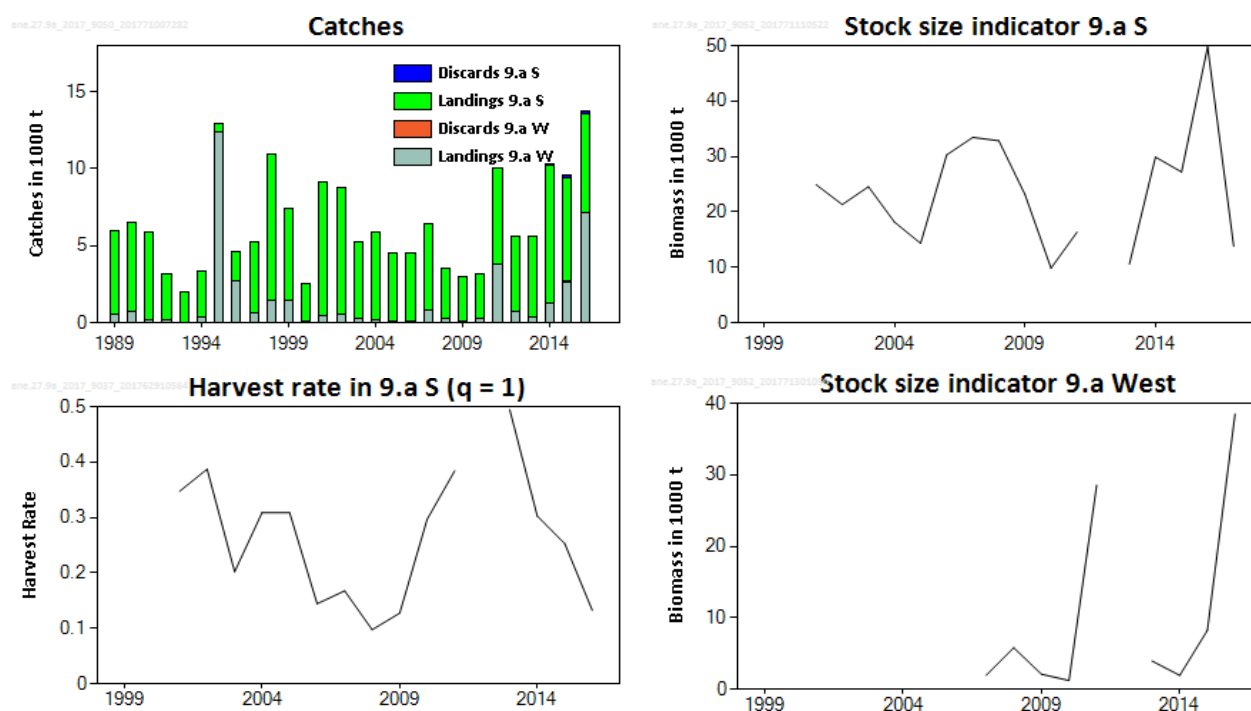


Figure 1 Anchovy in Division 9.a. Summary of the stock assessment. Catches (in thousand tonnes) differentiated between western (W; subdivisions 9.a North to 9.a Central-South) and southern (S; Subdivision 9.a South) areas. Discard estimates are included from 2014. Stock biomass survey indices for southern and western areas. The 2017 data point for 9.a South reflects only the PELAGO acoustic estimate. Harvest rates correspond to Subdivision 9.a South, with the assumption of survey catchability equal to one ($q = 1$).

Stock and exploitation status

Table 1 Anchovy in Division 9.a. State of the stock and fishery relative to reference points.

		Fishing pressure				Stock size				
		2014	2015	2016		2015		2016	2017	
Maximum Sustainable Yield	F _{MSY}	?	?	?	Undefined	MSY B _{Trigger}	?	?	?	Undefined
Precautionary Approach	F _{pa'} F _{lim}	?	?	?	Undefined	B _{pa'} , B _{lim}	?	?	?	Undefined
Management plan	F _{MGT}	—	—	—	Not applicable	B _{MGT}	—	—	—	Not applicable
Qualitative evaluation	-	✓	✓	✓	Below possible reference points	-	➡	↗	↘	Decreasing

Catch options

No catch advice can be given for 2018 because of lack of available data for the year classes that will constitute the bulk of the biomass and catches.

Basis of the advice

Table 3 Anchovy in Division 9.a. The basis of the advice.

Advice basis	No catch advice can be given for 2018.
Management plan	ICES is not aware of any agreed precautionary management plan for anchovy in this area.

Quality of the assessment

The time-series of surveys until 2017 provide information on the current state of the stock. The stock indicator for the southern component is computed by averaging the estimates from the PELAGO, ECOCADIZ, and BOCADEVA surveys, but the information for 2017 corresponds only to the PELAGO estimate, as it is the only available survey at this time of year. The stock size indicator for 9.a West is not available for 2017. The survey indices do not provide information on the incoming year classes that will constitute the bulk of the biomass and catches in 2018.

Issues relevant for the advice

Spring and summer survey indices do not provide sufficient information on the incoming year classes that will constitute the bulk of the biomass and catches in 2018 (Figure 3). The autumn acoustic surveys JUVESAR and ECOCADIZ-RECLUTAS may give information on incoming recruits in western Portugal and the Gulf of Cadiz, respectively, but the time-series are so far too short. ICES has responded to a special request for in-year catch advice for 2017. The advice can be found in ICES library (ICES, 2017a).

Recent studies on genetics suggest that the stock inhabiting Subdivision 9.a South (Algarve and Cadiz) is different genetically from the one inhabiting the remaining parts of Division 9.a (Zarraonandia *et al.*, 2012). However, after revision of all the available evidence (Ramos, 2015), the ICES Stock Identification Methods Working Group (ICES, 2015) recommended that the current stock structure and spatial explicit monitoring remain as they currently are until new evidence is available.

The harvest rates for anchovy in the southern part of Division 9.a, calculated using the biomass indicator and observed catches, have fluctuated between 0.10 and 0.49 from 1999 to 2016, with a mean of 0.26 (Table 1); this is assuming a catchability of 1 for the surveys. A sensitivity analysis over a range of potential survey catchabilities (0.6 to 1.6) suggests that these harvest rates lead to spawning per recruit (SPR) levels above 50%, which is considered a sustainable level of exploitation (Figure 4).

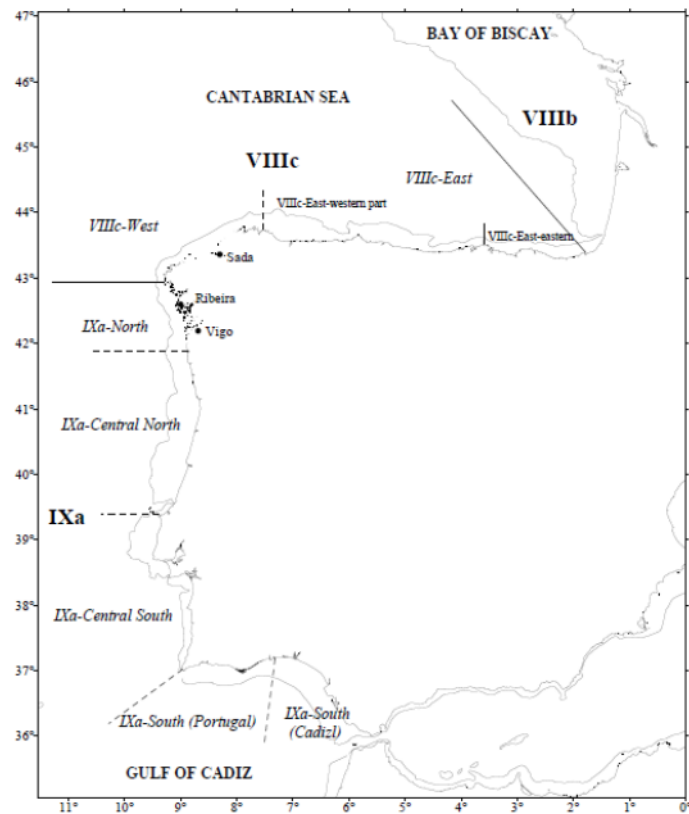


Figure 2 Anchovy in Division 9.a. ICES divisions and subdivisions in southern Europe. The terminology “9.a West” refers to the geographical area from Subdivision 9.a North to Subdivision 9.a Central-South, whereas “9.a South” refers to the rest of Division 9.a.

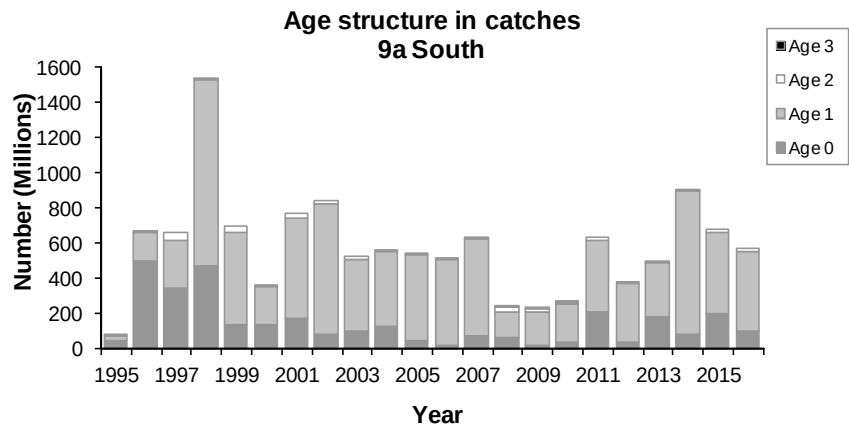


Figure 3 Anchovy in Subdivision 9.a. Age composition in catches (in millions) of anchovy in Subdivision 9.a South.

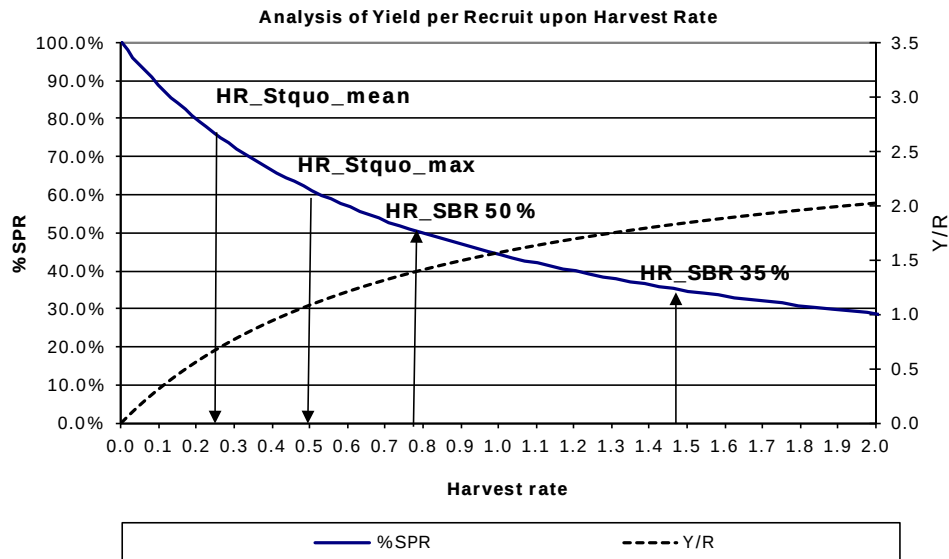


Figure 4 Anchovy in Subdivision 9.a South. Yield and spawning biomass per recruit analysis. The harvest rates (HR) correspond to a selectivity-at-age fitted with an assumed $F_{at-age 1} = 1.0$.

Reference points

No reference points are defined for this stock.

Basis of the assessment

Table 5 Anchovy in Division 9.a. Basis of assessment and advice.

ICES stock data category	3 (ICES, 2016)
Assessment type	Survey based assessment without catch advice (ICES, 2017b)
Input data	Commercial landings, ages and length frequencies from landing sampling. Survey indices for 9.a South: SAR Q2/PELAGO, ECOCÁDIZ, and BOCADEVA (triennial DEPM survey). Survey indices for 9.a West: acoustic spring surveys PELACUS (Subdivision 9.a North) and SAR Q2/PELAGO (Subdivision 9.a Central-North, Central-South)
Discards and bycatch	Discard estimates are available for some fisheries since 2014 and are considered negligible.
Indicators	None
Other information	JUVESAR and ECOCADIZ-RECLUTAS surveys have very short time-series at the moment. These surveys aim at obtaining recruitment indicators potentially useful for advice in the future.
Working group	Working Group on Southern Horse mackerel, Anchovy and Sardine (WGHANSA)

Information from stakeholders

There is no additional available information.

History of the advice, catch, and management

Table 6 Anchovy in Division 9.a. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice	Predicted catch/landings corresp. to advice	Agreed TAC*	Official landings	ICES landings **
1987	Not assessed	-	4600	5516	n/a
1988	Not assessed	-	6000	4173	4721
1989	Not assessed	-	6000	5259	5944
1990	Not assessed	-	9000	2889	6487
1991	Not assessed	-	9000	3753	5922
1992	Not assessed	-	12000	2351	3166
1993	If required, precautionary TAC	-	12000	1130	1984

Year	ICES advice	Predicted catch/landings corresp. to advice	Agreed TAC*	Official landings	ICES landings **
1994	If required, precautionary TAC	-	12000	1619	3388
1995	If required, precautionary TAC	-	12000	10106	12956
1996	If required, precautionary TAC	-	12000	6256	4595
1997	If required, TAC at pre-95 catch level	-	12000	4614	5295
1998	No advice		12000	8717	10962
1999	If required, TAC at pre-95 catch level	4600	13000	7486	7409
2000	Fishery less than pre-95 level and develop and implement management plan	4600	10000	2717	2502
2001	Average catch excl. 95 and 98	4900	10000	5907	9098
2002	Average catch excl. 95 and 98	4900	8000	5636	8806
2003	Average catch excl. 95, 98, and 01	4700	8000	6146	5269
2004	Average catch excl. 95, 98, 01, and 02	4700	8000	6644	5844
2005	Average catch excl. 95, 98, 01, and 02	4700	8000	4596	4515
2006	Average catch excl. 95, 98, 01, and 02	4700	8000	4131	4491
2007	Average catch 1988–2005 excl. 95, 98, 01, 02	4800	8000	6282	6454
2008	Average catch 1988–2006 excl. 95, 98, 01, 02	4800	8000	3244	3508
2009	Same advice as last year	4800	8000	2349	3013
2010	Same advice as last year	4800	8000	3291	3210
2011	See scenarios	-	7600	10134	10076
2012	Reduce catches	-	8600	5589	5589
2013	Historical fishery appears sustainable	-	8800	5632	5632
2014	Historical fishery appears sustainable	-	8800	7739	10332
2015	No catch advice	-	9700	9420	9597
2016	in-year-advice	≤ 15000	15000	13583	13740
2017	No catch advice	-	12500		
2018	No catch advice	-			

*TAC for subareas 9 and 10 and CECAF 34.1.1.

**Catch estimates since 2014. In previous years discards are considered negligible and landings are assumed equal to catch.

History of the catch and landings

Table 7 Anchovy in Division 9.a. Catch distribution by fleet in 2016 as estimated by ICES.

Catch (2016)	Landings		Discards
13 740 tonnes	99% purse-seiners	1% other gear types	156 tonnes
	13 583 tonnes		

Table 8 Anchovy in Division 9.a. History of commercial catch and landings; both the official and ICES estimated values are presented by area for each country participating in the fishery. All weights are in tonnes.

Year	Official landings			ICES catch								
	Portugal	Spain	Total	Portugal*				Spain**			Total	Total
	Total 9.a	Total 9.a	9.a	9.a C-N	9.a C-S	9.a S	Total	9.a N	9.a S	Total	9.a S	9.a
1943	-	-	-	7121	355	2499	9975	-	-	-	-	-
1944	-	-	-	1220	55	5376	6651	-	-	-	-	-
1945	-	-	-	781	15	7983	8779	-	-	-	-	-
1946	-	-	-	0	335	5515	5850	-	-	-	-	-
1947	-	-	-	0	79	3313	3392	-	-	-	-	-
1948	-	-	-	0	75	4863	4938	-	-	-	-	-
1949	-	-	-	0	34	2684	2718	-	-	-	-	-
1950	4145	11645	15790	31	30	3316	3377	-	-	-	-	-
1951	4145	13784	17929	21	6	3567	3594	-	-	-	-	-
1952	3619	13243	16862	1537	1	2877	4415	-	-	-	-	-
1953	4656	17103	21759	1627	15	2710	4352	-	-	-	-	-
1954	1550	16959	18509	328	18	3573	3919	-	-	-	-	-
1955	5031	27290	32321	83	53	4387	4523	-	-	-	-	-
1956	5574	23699	29273	12	164	7722	7898	-	-	-	-	-
1957	7810	23921	31731	96	13	12501	12610	-	-	-	-	-
1958	13562	28807	42369	1858	63	1109	3030	-	-	-	-	-
1959	3132	22808	25940	12	1	3775	3788	-	-	-	-	-
1960	6815	32992	39807	990	129	8384	9503	-	-	-	-	-
1961	9890	30098	39988	1351	81	1060	2492	-	-	-	-	-
1962	3557	37718	41275	542	137	3767	4446	-	-	-	-	-
1963	4638	22493	27131	140	9	5565	5714	-	-	-	-	-
1964	5714	27337	33051	0	0	4118	4118	-	-	-	-	-
1965	7610	44581	52191	7	0	4452	4460	-	-	-	-	-
1966	4461	41226	45687	23	35	4402	4460	-	-	-	-	-
1967	3824	36754	40578	153	34	3631	3818	-	-	-	-	-
1968	1161	14078	15239	518	5	447	970	-	-	-	-	-
1969	1364	12636	14000	782	10	582	1375	-	-	-	-	-
1970	1193	23127	24320	323	0	839	1162	-	-	-	-	-
1971	0	91	91	257	2	67	326	-	-	-	-	-
1972	0	1563	1563	-	-	-	-	-	-	-	-	-
1973	126	2458	2584	6	0	120	126	-	-	-	-	-
1974	437	2845	3282	113	1	124	238	-	-	-	-	-
1975	372	3114	3486	8	24	340	372	-	-	-	-	-
1976	88	8703	8791	32	38	18	88	-	-	-	-	-
1977	3261	11306	14567	3027	1	233	3261	-	-	-	-	-
1978	1022	9023	10045	640	17	354	1011	-	-	-	-	-
1979	790	20879	21669	194	8	453	655	-	-	-	-	-
1980	994	994	1988	21	24	935	980	-	-	-	-	-
1981	1370	1370	2740	426	117	435	978	-	-	-	-	-
1982	699	715	1414	48	96	512	656	-	-	-	-	-
1983	1015	1115	2130	283	58	332	673	-	-	-	-	-
1984	461	463	924	214	94	84	392	-	-	-	-	-
1985	2435	2487	4922	1893	146	83	2122	-	-	-	-	-
1986	2152	3223	5375	1892	194	95	2181	-	-	-	-	-
1987	1621	3895	5516	84	17	11	112	-	-	-	-	-
1988	892	3281	4173	338	77	43	458	-	4263	4263	4306	4721
1989	824	4435	5259	389	85	22	496	118	5330	5448	5352	5944
1990	644	2245	2889	424	93	24	541	220	5726	5946	5750	6487
1991	222	3531	3753	187	3	20	210	15	5697	5712	5717	5922
1992	138	2213	2351	92	46	0	138	33	2995	3028	2995	3166
1993	28	1102	1130	20	3	0	23	1	1960	1961	1960	1984
1994	236	1383	1619	231	5	0	236	117	3035	3152	3035	3388
1995	2530	7576	10106	6724	332	0	7056	5329	571	5900	571	12956
1996	2775	3481	6256	2707	13	51	2771	44	1780	1824	1831	4595

Year	Official landings			ICES catch								
	Portugal	Spain	Total	Portugal*				Spain**			Total	Total
	Total 9.a	Total 9.a	9.a	9.a C-N	9.a C-S	9.a S	Total	9.a N	9.a S	Total	9.a S	9.a
1997	632	3982	4614	610	8	13	632	63	4600	4664	4613	5295
1998	1613	7104	8717	894	153	566	1613	371	8977	9349	9543	10962
1999	1374	6112	7486	957	96	355	1408	413	5587	6000	5942	7409
2000	265	2452	2717	71	61	178	310	10	2182	2191	2360	2502
2001	748	5159	5907	397	19	439	855	27	8216	8244	8655	9098
2002	916	4720	5636	433	90	393	915	21	7870	7891	8262	8806
2003	519	5627	6146	211	67	200	478	23	4768	4791	4968	5269
2004	663	5981	6644	83	139	434	657	4	5183	5187	5617	5844
2005	129	4467	4596	82	6	38	126	4	4385	4389	4423	4515
2006	111	4020	4131	79	15	14	108	15	4368	4383	4381	4491
2007	871	5411	6282	833	7	34	874	4	5576	5580	5610	6454
2008	335	2909	3244	211	87	37	335	5	3168	3173	3204	3508
2009	72	2277	2349	35	5	32	72	19	2922	2941	2954	3013
2010	130	3161	3291	100	2	28	130	179	2901	3080	2929	3210
2011	3318	6816	10134	3239	1	78	3318	541	6216	6758	6294	10076
2012	796	4793	5589	521	220	56	796	39	4754	4793	4810	5589
2013	391	5241	5632	192	131	67	391	69	5172	5241	5240	5632
2014	818	6921	7739	678	21	118	818	581	8933	9515	9051	10332
2015	2546	6874	9420	2533	10	2	2546	173	6878	7051	6880	9597
2016	6937	6647	13583	6908	10	19	6937	222	6581	6803	6599	13740

(-) Not available

(0) Less than 1 tonne

*Discards considered negligible.

**Catch estimates available since 2014. In previous years discards are considered negligible and landings are assumed equal to catch.

Summary of the assessment

Table 9 Anchovy in Division 9.a. Biomass estimates (in tonnes) from each survey series on a regional basis. In the column headings “N”, “C” and “S” stand for North, Central and South, respectively.

Year	Acoustic survey biomass estimates								DEPM
	Spring				Summer	Autumn			Summer
	Sp. survey 9.a N	Port. survey 9.a C-N to 9.a C-S	Sp.+Port. Surveys 9.a N to 9.a C-S	Port. survey 9.a S	Sp. survey 9.a S	Port. survey 9.a C-N to 9.a C-S *	Port. survey 9.a S	Sp. survey 9.a S	Sp. survey 9.a S
	PELACUS	PELAGO	PELACUS+PELAGO	PELAGO	ECOCADIZ	JUVESAR	SAR-NOV	ECOCADIZ RECLUTAS	BOCADEVA
Months	March–April	March–April	March–April	March–April	July		Oct–Nov	Oct–Nov	June–July
1998							30695		
1999		596		24763					
2000							33909		
2001		368		24913			25578		
2002		1542		21335					
2003		112		24565					
2004					18177				
2005		1062		14041					14637
2006		0		24082	36521				
2007	0	1945	1945	38020	28882		23723		
2008	306	5505	5811	34162					31527
2009	26	2089	2115	24745	21580				
2010	42	1188	1230	7395	12339				
2011	1508	27050	28558	0					32757
2012	45							13680	
2013	0	3955	3955	12700	8487				
2014	0	1947	1947	28917	29219			8113	31569
2015	0	8237	8237	33100	21305	29556		30827	
2016	205	38302	38507	65345	34184	14397		19861	
2017	3566	n.a. **		13797					

* The survey covers only partially Subdivision 9.a Central-South

** not available

Table 10 Anchovy in Division 9.a. Harvest rates for anchovy in 9.a South (southern component). Catchability assumed equal to 1 for all surveys. Stock sizes are calculated as the average of the PELAGO, ECOCADIZ, and BOCADEVA survey values, shown in Table 9.

Year	Stock size indicator 9.a South	Landings in 9.a South	Discards in 9.a South	Harvest rate in 9.a South (q = 1)
1989		5352		
1990		5750		
1991		5717		
1992		2995		
1993		1960		
1994		3035		
1995		571		
1996		1831		
1997		4613		
1998		9543		
1999	24763	5942		0.24
2000		2360		
2001	24913	8655		0.35
2002	21335	8262		0.39
2003	24565	4968		0.20
2004	18177	5617		0.31
2005	14339	4423		0.31
2006	30301	4381		0.145
2007	33451	5610		0.168
2008	32845	3204		0.098
2009	23163	2954		0.128
2010	9867	2929		0.30
2011	16379	6294		0.38
2012		4810		
2013	10593	5240		0.49
2014	29902	8921	130	0.30
2015	27203	6704	176	0.25
2016	49764	6443	156	0.133
2017	13797*			

*Provisional estimate (computed with the PELAGO survey only). Averaging needed with the ECOCADIZ estimate (survey in late July).

Sources and references

- ICES. 2015. Interim Report of the Stock Identification Methods Working Group (SIMWG), 10–12 June 2015, Portland, Maine, USA. ICES CM 2015/SSGEPI:13. 67 pp.
- ICES. 2016. Advice basis. *In* Report of the ICES Advisory Committee, 2016. ICES Advice 2016, Book 1, Section 1.2.
- ICES. 2017a. EU request to ICES on in-year advice for Anchovy (*Engraulis encrasicolus*) in Division 9.a (Atlantic Iberian waters). *In* Report of the ICES Advisory Committee, 2017. ICES Advice 2017, sr.2017.14.
- ICES. 2017b. Working Group on Southern Horse Mackerel, Anchovy and Sardine (WGHANSA), 24–29 June 2017, Bilbao, Spain. ICES CM 2017/ACOM:17.
- Ramos, F. 2015. On the population structure of the European anchovy (*Engraulis encrasicolus*) in ICES Division IXa: a short review of the state of art. Working document presented in the ICES Stock Identification Methods Working Group (SIMWG). 10–12 June 2015. 23 pp.
- Zarraonaindia, I., Iriondo, M., Albaina, A., Pardo, M. A., Manzano, C., Grant, W. S., Irigoien, X., *et al.*, 2012. Multiple SNP Markers Reveal Fine-Scale Population and Deep Phylogeographic Structure in European Anchovy (*Engraulis encrasicolus* L.). PLoS ONE, 7(7): e42201. doi:10.1371/journal.pone.0042201.