7.3.2 Anchovy (*Engraulis encrasicolus*) in Subarea 8 (Bay of Biscay)

ICES stock advice

ICES advises that when the management strategy is applied, catches in 2017 should be no more than 33 000 tonnes.

Stock development over time

The spawning-stock biomass (SSB) has been above B_{lim} since 2010. Recruitment and SSB have been well above the historical average in recent years. The incoming recruitment in 2017 is above average. Harvest rates since the reopening of the fishery in 2010 have been below average.

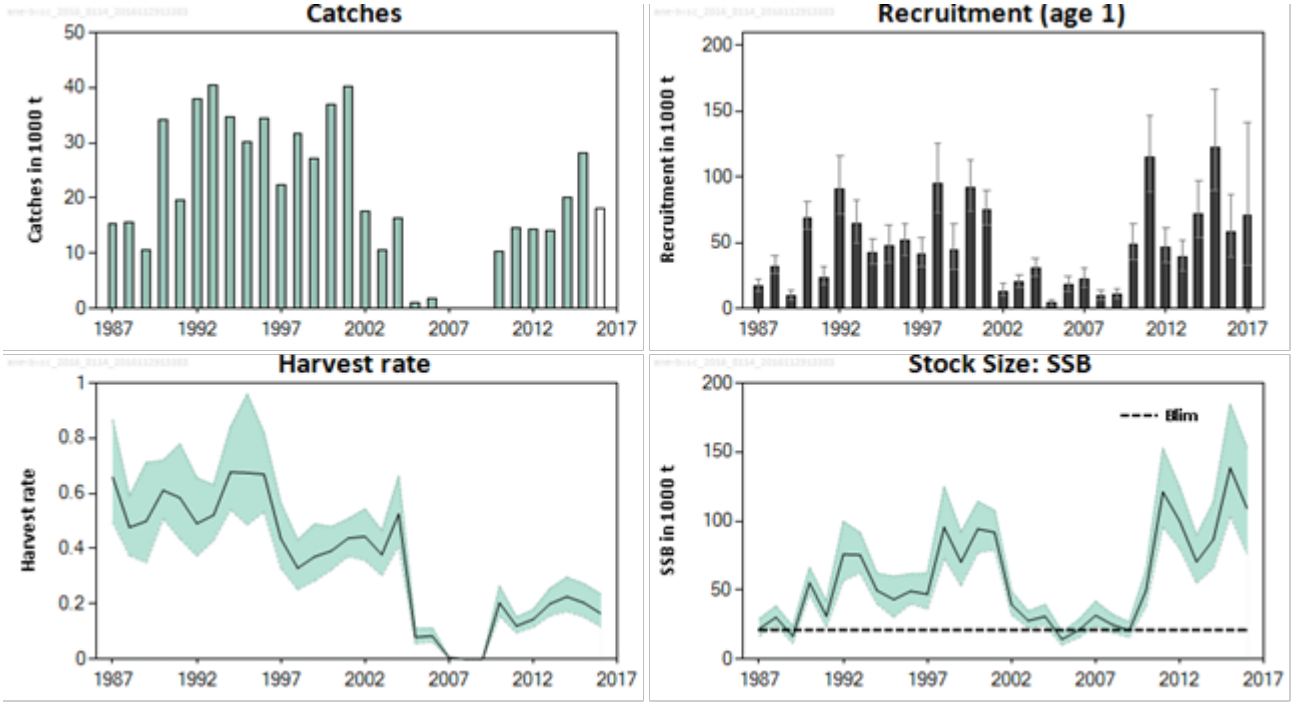

Figure 7.3.2.1 Anchovy in Subarea 8. Trends in catch (preliminary value not shaded), recruitment (age 1 biomass, January 1st), harvest rates (catch/SSB), and spawning-stock biomass (mid-May). 90% confidence limits are indicated for recruitment, harvest rate, and SSB.

Stock and exploitation status

Table 7.3.2.1 Anchovy in Subarea 8. State of the stock and fishery relative to reference points.

	Fishing pressure					Stock size				
		2014	2015	2016			2014	2015	2016	
Maximum sustainable yield	F_{MSY}	?	?	?	Undefined	MSY $B_{trigger}$	?	?	?	Undefined
Precautionary approach	F_{pa}, F_{lim}	?	?	?	Undefined	B_{lim}*	✓	✓	✓	Full reproductive capacity
Management plan	F_{MGT}	?	?	?	Undefined	SSB_{MGT}	✓	✓	✓	Above upper trigger

* The SSB is estimated to be significantly above B_{lim}.

Catch options

Table 7.3.2.2 Anchovy in Subarea 8. The basis for the catch options.

Variable	Value	Source	Notes
Catch (2016)	18050 tonnes	ICES (2016a)	Preliminary value, used as input in the stock assessment.
Discards (2016)	negligible	ICES (2016a)	Discarding is considered to be negligible.
SSB (2016)	109147 tonnes	ICES (2016a)	SSB estimate from the stock assessment (mid-May).
HR (2016)	0.165	ICES (2016a)	Harvest rate estimate from the stock assessment.
R_{age1} (2017)	70423 tonnes	ICES (2016a)	Recruitment estimate from the stock assessment (January 1st).

Table 7.3.2.3 Anchovy in Subarea 8. The catch options.

Rationale	Basis	Catch (2017)	Probability SSB (2017) < B_{lim}*	Median SSB (2017) *	HR (2017) **	% TAC change ***
Management strategy (MS)	Harvest control rule in the MS^	33000	< 0.001	100569	0.328	0
Other options	HR(2017) = 0	0	< 0.001	114363	0	−100
		10000	< 0.001	110241	0.091	−70
	HR(2017) = HR(2016)	17701	< 0.001	107032	0.165	−46
		20000	< 0.001	106070	0.189	−39
		30000	< 0.001	101857	0.295	−9
		40000	< 0.001	97573	0.410	+21
		50000	< 0.001	93294	0.536	+52

Weights are in tonnes.

* The SSB corresponds to mid-May, with 60% of the catch assumed to be taken in the first semester.

** Harvest rate (HR) is calculated as Catch/(Median SSB).

*** Catch (2017) relative to the 2016 TAC (33 000 t).

^ Because SSB (2017) is above 89 000 t, the management strategy option is based on the upper bound for the TAC (33 000 t).

Basis of the advice

Table 7.3.2.4 Anchovy in Subarea 8. The basis of the advice.

Advice basis	Management strategy
Management plan	A set of harvest control rules for a management calendar from January to December was evaluated by STECF (2013, 2014). The European Commission requested ICES to provide its advice in 2015 according to one of the rules, and according to a different one in 2016. ICES has reviewed the harvest control rule selected in 2016 and concluded that it is precautionary (Annex 9 in ICES, 2016a). The harvest control rule upon which the current advice is based sets the TAC from January to December as: $TAC_{Jan_y-Dec_y} = \begin{cases} 0 & if\ \widehat{SSB}_y \leq 24000 \\ -2600 + 0.4 \cdot \widehat{SSB}_y & if\ 24000 < \widehat{SSB}_y \leq 89000 \\ 33000 & if\ \widehat{SSB}_y > 89000 \end{cases}$ where $\widehat{SSB}_y$ is the expected spawning-stock biomass in year y.

Quality of the assessment

The current assessment results align well with the observed trends in the surveys (SSB and the proportion of 1-group in the biomass from the spring surveys, and the index of incoming (age 1) recruitment from the autumn acoustic surveys on age 0). The two spring biomass surveys, BIOMAN and PELGAS, usually follow similar trends, with a few exceptions (e.g. in 2012). In 2016 both spring surveys show a similar proportion of age 1 and a decrease in biomass with respect to the previous year, but the decrease is larger for PELGAS than for BIOMAN.

The catch data for 2016 are preliminary. Therefore, the harvest rate estimate for 2016 is also preliminary.

Growth and natural mortality of anchovy are assumed constant over the time-series. Additionally, the spring surveys are assumed to have the same catchability for all ages. After a period with negative residuals for the age 1 proportion (in biomass) in the catch of the first semester, the residual was positive in 2016. This needs to be further investigated.

Some French catches taken in Subarea 7 near the border with Subarea 8 (ICES rectangles 25E4 and 25E5) are considered to belong to the same stock and same fishery and have therefore been included in the assessment. Checks in previous years indicated that results of the assessment are not sensitive to the inclusion of these catches (typically less than 1%, but in 2015 and 2016 around 5% of the total catch).

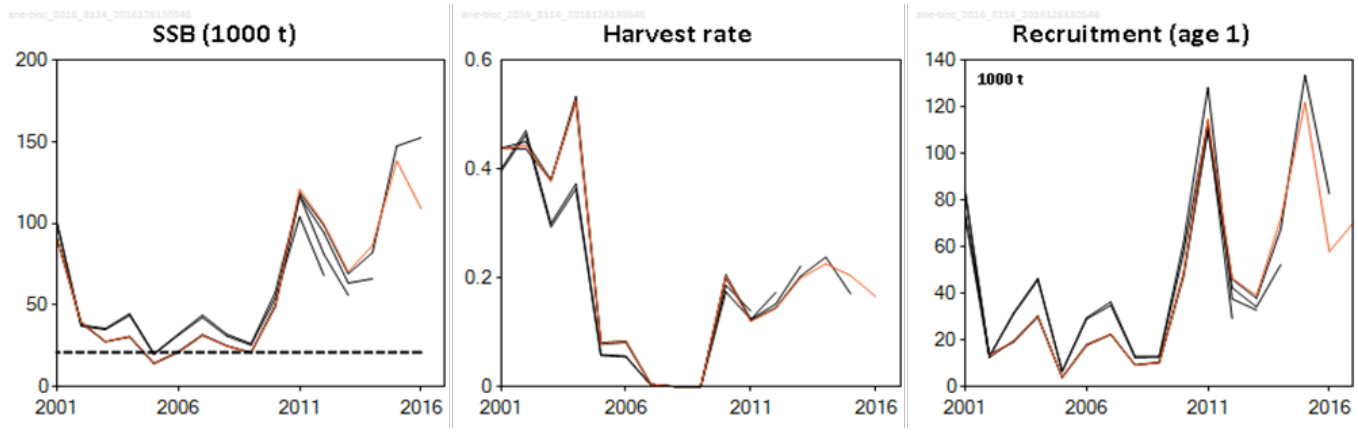

Figure 7.3.2.2 Anchovy in Subarea 8. Historical assessment results.

Issues relevant for the advice

At the request of the European Commission the ICES advice this year is based on a different harvest control rule from the one used last year.

Reference points

Table 7.3.2.5 Anchovy in Subarea 8. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{escapement}$	Not defined		
	F_{MSY}	Not defined		
Precautionary approach	B_{lim}	21 000 t	B_{lim}: B_{loss} (median of SSB estimates in the years 1987 and 2009, the minimum estimated biomass that produced substantial recruitment; Annex 8 in ICES, 2013)	ICES (2013)
	B_{pa}	Not defined		
	F_{lim}	Not defined		
	F_{pa}	Not defined		
Management plan	SSB_{MGT}	24 000 t (lower trigger) 89 000 t (upper trigger)	TAC set to zero if SSB is below the lower trigger, and to 33 000 t if SSB is above the upper trigger. The harvest control rule results in 5% probability of SSB < B_{lim} in the long term.	STECF (2014)
	F_{MGT}	Not defined		

Basis of the assessment

Table 7.3.2.6 Anchovy in Subarea 8. The basis of the assessment.

ICES stock data category	1 (ICES, 2016b).
Assessment type	Two-stage Bayesian biomass dynamic model (CBBM) assessment that uses catches in the model and in the forecast (ICES, 2016a).
Input data	Commercial catches (international landings, ages and length frequencies from catch sampling), three surveys (BIOMAN, PELGAS, JUVENA); annual maturity data from DEPM survey (BIOMAN) and natural mortalities from past models fitted to spring surveys.
Discards and bycatch	Discarding and bycatch are considered negligible.
Indicators	None.
Other information	The assessment was benchmarked in 2013 (WKPELA; ICES, 2013).
Working group	Working Group on Southern Horse Mackerel, Anchovy and Sardine (WGHANSA).

Information from stakeholders

There is no available information.

History of the advice, catch, and management

Table 7.3.2.7 Anchovy in Subarea 8. History of ICES advice, the agreed TAC, and ICES estimates of landings. Weights are in thousand tonnes.

Year	ICES advice	Predicted catch corresp. to advice	Agreed TAC	Official catch	ICES catch
1987	Not assessed	-	32	14	15
1988	Not assessed	-	32	14	16
1989	Increase SSB; TAC	10.0*	32	6	11
1990	Precautionary TAC	12.3	30	22	34
1991	Precautionary TAC	14.0	30	12	20
1992	No advice	-	30	25	38
1993	Reduced F on juveniles; closed area	-	30	29	40
1994	Reduced F on juveniles; closed area	-	30	28	35
1995	Reduced F on juveniles; closed area	-	33	29	30
1996	Reduced F on juveniles; closed area	-	33	25	34
1997	Reduced F on juveniles; closed area	-	33	18	22
1998	Reduced F on juveniles; closed area	-	33	27	32
1999	Reduced F on juveniles, closed area	-	33	16	27
2000	Closure of the fishery	0	33	35	37
2001	Preliminary TAC at recent exploitation	18	33	37	40
2002	Preliminary TAC at recent exploitation	33	33	19	18
2003	Preliminary TAC at recent exploitation	12.5	33	10	11
2004	Preliminary TAC at recent exploitation	11	33	16	16
2005	Rebuilding SSB	5	30	1	1
2006	Closure of the fishery	0	5	2	2
2007	Closure of the fishery	0	0	0.1	0.1**
2008	Closure of the fishery	0	0	0	0
2009	Closure of the fishery	0	0	0.1	0
2010	Closure of the fishery	0	7	11	6.1***
2010/2011^	See scenarios	-	15.6	-	15.1
2011/2012^	Risk of SSB falling below B_{lim} < 5%	< 47	29.7	-	12.2
2012/2013^	Risk of SSB falling below B_{lim} < 5%	< 28	20.7	-	16.7
2013/2014^	Risk of SSB falling below B_{lim} < 5%	< 18	17.1	-	17.5
2014/2015^	Risk of SSB falling below B_{lim} < 5%	< 23	20.1	-	5.8^^
2015	Management plan	< 25	25	-	28.3
2016	Management plan	≤ 25	33^^^^	-	18.050^^^
2017	Management strategy	≤ 33			

* Mean catch in 1987–1989.
** Experimental fisheries.
*** Catch from January 2010 to June 2010.
^ From 2011 to 2014 the advice, TAC, and landings are valid from 1 July to 30 June.
^^ Catch restricted to the second semester 2014 due to a change in the management calendar.
^^^ Provisional catch in 2016.
^^^^ The initial TAC was set to 25 000 t; in June 2016 it was raised to 33 000 t.

History of catch and landings

Table 7.3.2.8 Anchovy in Subarea 8. Catch distribution by fleet in 2015 as estimated by ICES.

Total catch	Landings		Discards
28 258 t	92.7% purse-seine	7.3% pelagic trawlers	Discarding is considered negligible
	28 258 t		

Table 7.3.2.9 Anchovy in Subarea 8. History of commercial catch; both the official and ICES estimated values are presented. Weights are in tonnes.

Year	Official catch	ICES catch
1960	80947	58085
1961	89969	75494
1962	65295	59123
1963	51956	48652
1964	80381	76973
1965	85296	83615
1966	48909	48358
1967	41460	41175
1968	38429	39619
1969	33098	36083
1970	23637	23485
1971	29086	28612
1972	32927	33067
1973	28196	28009
1974	31312	31117
1975	26426	26302
1976	36166	37261
1977	48319	48191
1978	45367	45219
1979	22673	26349
1980	22256	22102
1981	10876	10815
1982	4712	4991
1983	15699	14153
1984	28423	35179
1985	10816	11486
1986	7698	7923
1987	14188	15308
1988	14045	15581
1989	5898	10614
1990	22053	34272
1991	11581	19634
1992	25370	37885
1993	29266	40393
1994	28474	34631
1995	28626	30115
1996	25452	34373
1997	18179	22337
1998	27026	31617
1999	15757	27259
2000	34567	36994
2001	37086	40149
2002	19118	17507
2003	9964	10595
2004	15528	16361
2005	1086	1128
2006	1807	1753
2007**	141	0
2008	0	0
2009	190	0
2010	10664	10317
2011	14369	14530
2012	16636	14402
2013	14366	14192
2014	20611	20126
2015	27507	28258
2016	NA	18050*

* Preliminary estimate.

** Experimental fisheries.

NA: Not available.

Summary of the assessment

Table 7.3.2.10 Anchovy in Subarea 8. Assessment summary with weights in tonnes. High and low refer to 90% confidence limits.

Year	Recruitment (age 1), January 1st	High	Low	Stock size: SSB, mid-May	High	Low	Total catch	Harvest rate Ages 1+	High	Low
	tonnes			tonnes			tonnes			
1987	16513	22353	12285	21833	29008	16605	15308	0.659	0.866	0.496
1988	32035	40358	26271	30209	38389	24418	15581	0.477	0.59	0.375
1989	9514	13705	6775	16505	23588	11575	10614	0.499	0.712	0.349
1990	69121	81424	59898	55206	66289	46912	34272	0.611	0.719	0.509
1991	23415	31340	17715	31009	41562	23248	19634	0.584	0.779	0.436
1992	91261	115940	71360	75821	99657	56737	37885	0.491	0.656	0.373
1993	64856	81982	50133	75401	91610	62363	40393	0.521	0.63	0.429
1994	42396	53227	33643	49673	62099	40060	34631	0.677	0.839	0.541
1995	47362	62973	35185	43161	59842	30340	30115	0.674	0.959	0.486
1996	51289	64441	40617	49132	61668	40179	34373	0.669	0.819	0.533
1997	40946	54275	31621	46937	62077	36225	22337	0.436	0.565	0.329
1998	95156	125448	73182	95325	124764	72784	31617	0.329	0.431	0.252
1999	44487	64397	29521	70169	91815	53142	27259	0.371	0.489	0.283
2000	91701	112612	74219	94242	114026	77023	36994	0.391	0.479	0.324
2001	74867	90111	62907	91751	107747	79101	40149	0.437	0.507	0.373
2002	13295	18755	9487	39432	48973	32192	17507	0.444	0.543	0.357
2003	19709	24942	15509	27730	34598	22565	10595	0.378	0.464	0.303
2004	30399	38338	24392	30833	39504	24483	16361	0.525	0.661	0.41
2005	4001	6041	2596	14291	19804	10213	1128	0.079	0.11	0.057
2006	17643	24524	12759	20979	28421	15573	1753	0.084	0.113	0.062
2007	22604	31143	16249	31580	41771	23746	0	0.004	0.006	0.003
2008	9314	13420	6443	24854	32293	19031	0	0	0	0
2009	10262	14745	7213	20627	26768	15915	0	0	0	0
2010	48556	64056	36860	49669	64539	38248	10317	0.203	0.264	0.156
2011	114834	146401	89166	120979	152527	95690	14530	0.12	0.151	0.095
2012	46518	61664	34970	99829	124240	80168	14402	0.144	0.179	0.116
2013	39149	52105	29071	70381	89484	55018	14192	0.2	0.256	0.157
2014	71963	96986	53874	86571	113578	66035	20126	0.226	0.296	0.172
2015	121962	166591	89514	138408	184499	103663	28258	0.204	0.273	0.153
2016	57943	86634	39097	109147	153329	76454	18050*	0.165	0.236	0.118
2017	70423	140950	33050							
Average	**48177**	**64577**	**36309**	**59105**	**77349**	**45439**	**19946**	**0.353**	**0.453**	**0.275**

* Preliminary.

Sources and references

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