ICES Advice on fishing opportunities, catch, and effort
Bay of Biscay and the Iberian Coast Ecoregion
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Horse mackerel (*Trachurus trachurus*) in Division 9.a (Atlantic Iberian waters)

ICES stock advice

ICES advises that when the MSY approach is applied, catches in 2018 should be no more than 55 555 tonnes.

Stock development over time

Fishing mortality has been below F_{MSY} over the whole time-series. The spawning-stock biomass (SSB) has been above MSY $B_{trigger}$ over the whole time-series and has slightly increased in recent years. Recruitment (R) in 2011–2015 has been above the time-series average.
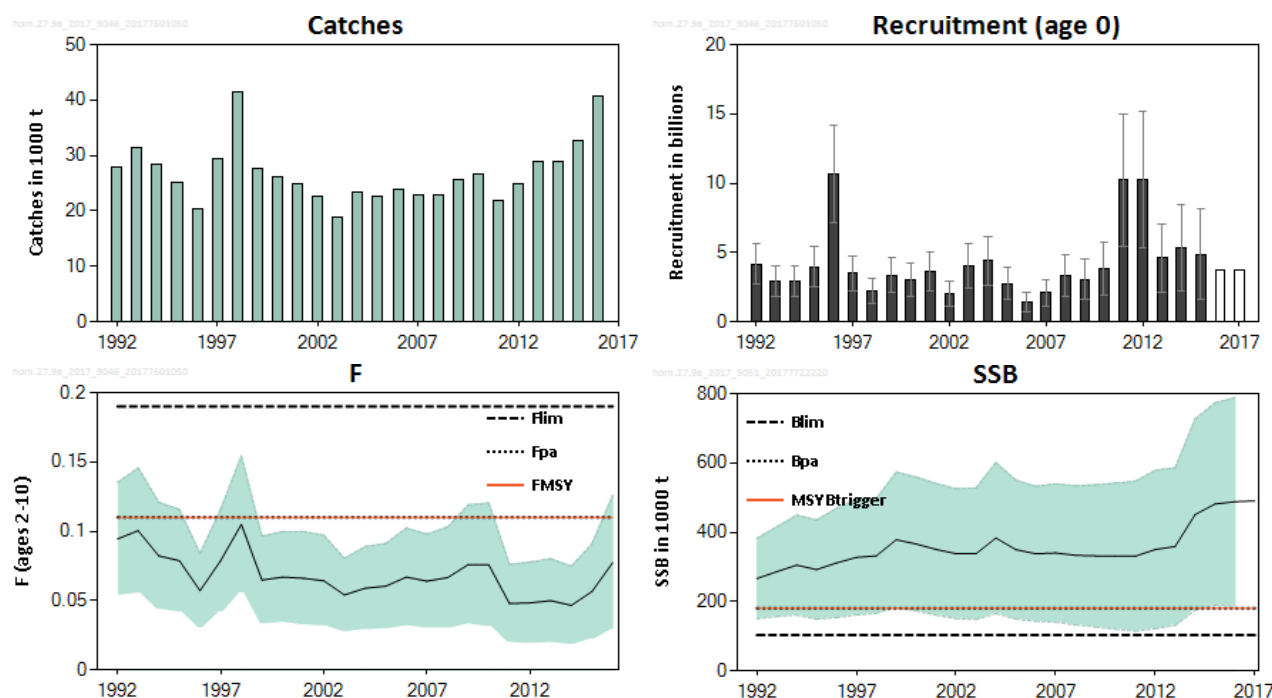

Figure 1   Horse mackerel in Division 9.a. Summary of the stock assessment (weights in thousand tonnes), with 95% confidence intervals included for recruitment, fishing mortality (F), and spawning-stock biomass (SSB). Predicted values are not shaded.

Stock and exploitation status

Table 1   Horse mackerel 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}	✓	✓	✓ Below	MSY $B_{Trigger}$	✓	✓	✓ Above trigger
Precautionary Approach	F_{pa}, F_{lim}	✓	✓	✓ Harvested sustainably	B_{pa}, B_{lim}	✓	✓	✓ Full reproductive capacity
Management plan	F_{MGT}	—	—	— Not applicable	B_{MGT}	—	—	— Not applicable

Catch options

Table 2   Horse mackerel in Division 9.a. The basis for the catch options. All weights are in tonnes.

Variable	Value	Source	Notes
$F_{ages\ 2-10}$ (2017)	0.077	ICES, 2017a	F_{2016}
SSB (2017)	490476	ICES, 2017a	Deterministic short-term forecast (in tonnes)
R_{age0} (2017/2018)	3757649	ICES, 2017a	Geometric mean (1992–2015) (in thousands)
Total catch (2017)	40805	ICES, 2017a	Catch corresponding to the assumed F for 2017 (in tonnes)
Landings (2017)	40805	ICES, 2017a	In tonnes
Discards	0	ICES, 2017a	Negligible

Table 3   Horse mackerel in Division 9.a. Annual catch options. All weights are in tonnes.

Basis	Catches *T. trachurus* (2018)	F (2018)	SSB (2018)*	SSB (2019)*	% SSB change **	% Catch change ***
ICES advice basis						
MSY approach: F_{MSY}	55555	0.11	487407	462707	-5	+36
Other options						
F = 0	0	0	489532	516525	6	-100
F = F_{2017}	40249	0.077	488013	477475	-2	-1
F = $F_{2017} \times 1.2$	47957	0.093	487710	470032	-4	+18
F = $F_{2017} \times 1.6$	63046	0.124	487104	455497	-6	+55
F = $F_{2017} \times 2.0$	77708	0.155	486499	441418	-9	+91
F_{pa}	55555	0.11	487407	462707	-5	+36
F_{lim}	95457	0.19	485743	424437	-13	+134
SSB (2019) = B_{lim}	455403	1.60	459043	103000	-78	+1018
SSB (2019) = B_{pa}	360990	1.04	469570	181000	-61	+786
SSB (2019) = MSY $B_{trigger}$	360990	1.04	469570	181000	-61	+786

* For this stock, the SSB is determined at spawning time (assumed to be mid-January) and is influenced by fisheries before spawning.
** SSB 2019 relative to SSB 2018.
*** Catches 2018 relative to ICES estimates of catches in 2016 (40 730 t).

Basis of the advice

Table 4   Horse mackerel in Division 9.a. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is not aware of any agreed precautionary management plan for horse mackerel in this area. A management plan is being developed by initiative of the Pelagic Advisory Council (PELAC).

Quality of the assessment

A benchmark was conducted in 2017 and did not result in significant changes in the overall stock perception (ICES, 2017b). The reference points previously available for this stock are still appropriate.
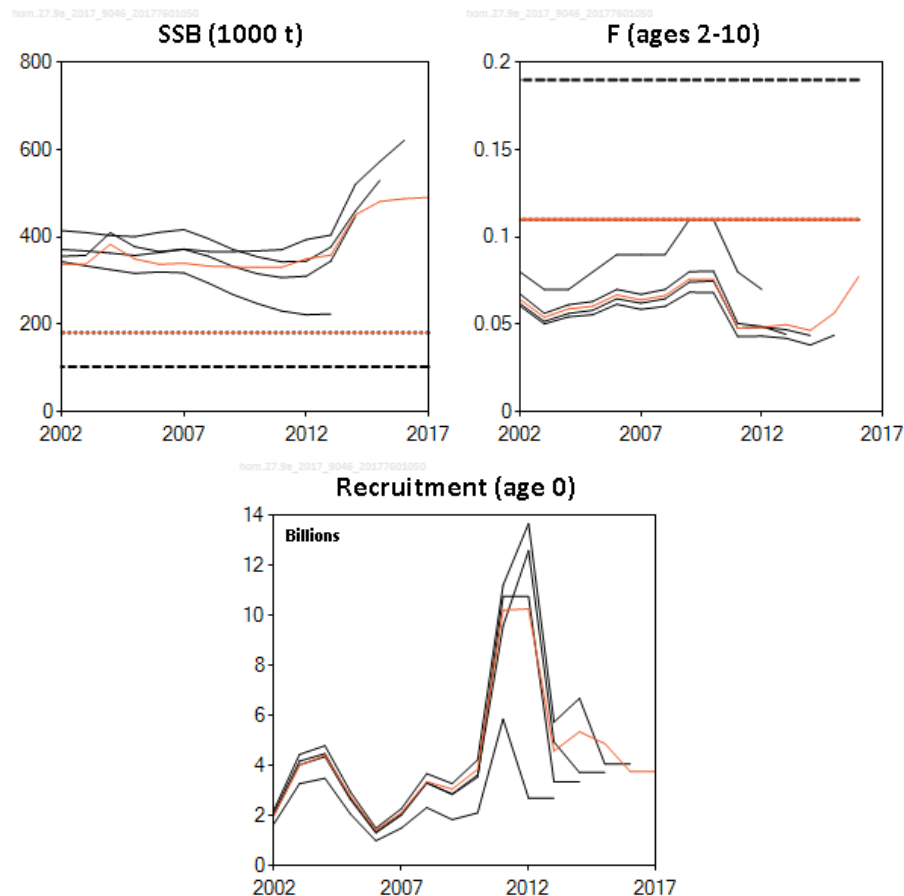
Figure 2   Horse mackerel in Division 9.a. Historical assessment results.

Issues relevant for the advice

The advice pertains to *T. trachurus*, while the total allowable catch (TAC) is set for all *Trachurus* species, including *T. picturatus* (blue jack mackerel) and *T. mediterraneus* (Mediterranean horse mackerel). Part of the catches consist of other horse mackerel species than *T. trachurus*, and this percentage can vary from year to year. Estimates indicate that in 2016 less than 10% of the catch consisted of the other species. ICES considers that management of several species under a combined TAC prevents effective control of the single-species exploitation rates and could lead to overexploitation of any of the species.

ICES information on current discarding indicates it is negligible.

The traditional fishery across several fleets has for a long time targeted juvenile age classes. This exploitation pattern combined with a low exploitation rate does not seem to have been detrimental to the dynamics of the stock.

Reference points

Table 5   Horse mackerel in Division 9.a. Reference points, values, and their technical basis. Weights in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	181000	Lower bound (average) of 90% confidence intervals of the SSB time-series in a stock being exploited well below F_{MSY}.	ICES (2016a; 2017b)
	F_{MSY}	0.11	Constrained by F_{pa} ($F_{MSY}=F_{pa}$). Stochastic long-term simulations using a segmented regression with breakpoint at MSY $B_{trigger}$.	ICES (2016a, 2017b)
Precautionary approach	B_{lim}	103000	Derived from B_{pa} and assessment uncertainty ($B_{lim}= B_{pa} \times exp(-1.645\ \sigma)$; $\sigma = 0.34$	ICES (2016a, 2017b)
	B_{pa}	181000	MSY $B_{trigger}$	ICES (2016a, 2017b)
	F_{lim}	0.19	Equilibrium scenarios with stochastic recruitment: F value corresponding to 50% probability of ($SSB < B_{lim}$)	ICES (2016a, 2017b)
	F_{pa}	0.11	Derived from F_{lim} and assessment uncertainty ($F_{pa}= F_{lim} \times exp(-1.645\ \sigma)$; $\sigma = 0.32$	ICES (2016a, 2017b)
Management plan	SSB_{mgt}	Not defined		
	F_{mgt}	Not defined		

Basis of the assessment

Table 6   Horse mackerel in Division 9.a. Basis of assessment and advice.

ICES stock data category	1 (ICES, 2016b).
Assessment type	Analytical assessment (AMISH model) that uses catches in the model and in the forecast (ICES, 2017a)
Input data	Commercial catches (international landings, ages, and length frequencies from catch sampling). One survey index (combined PT and SP-IBTS-Q4), annual maturity data from DEPM surveys
Discards and bycatch	Not included and are considered negligible
Indicators	None
Other information	This stock was benchmarked in 2017 (WKPELA; ICES, 2017b).
Working group	Working Group Southern Horse Mackerel, Anchovy and Sardine (WGHANSA)

Information from stakeholders

There is no additional available information.

History of the advice, catch, and management

Table 7   Horse mackerel in Division 9.a. ICES advice and official landings. All weights are intonnes.

Year	ICES advice	Predicted catch corresp. to advice*	Agreed TAC** *Trachurus spp.*	ICES catches *T. trachurus**
1987	Not assessed	-	72500***	55000^
1988	Mesh size increase	-	82000***	56000^
1989	No increase in F; TAC	72500	73000***	56000^
1990	F at F0.1; TAC	38000	55000^	49000^
1991	Precautionary TAC	61000	73000^	22000
1992	If required, precautionary TAC	61000	73000^	27858
1993	No advice	-	73000^	31521
1994	Status quo prediction (Catch at *status quo* F)	55000	73000^	28441
1995	No long-term gains in increasing F (Catch at *status quo* F)	63000	73000^	25147
1996	No long-term gains in increasing F (Catch at *status quo* F)	60000	73000^	20400
1997	No advice	-	73000^	29491
1998	F should not exceed the F(94–96)	59000	73000^	41564
1999	No increase in F	58000	73000^	27733
2000	F <F_{pa}	< 59000	68000^	26160
2001	F <F_{pa}	< 54000	68000^	24910
2002	F < 0.113	< 34000	57500^	22506
2003	Average of last 3 years	< 49000	55200^	18887
2004	Should not exceed the recent average (2000–2002)	< 47000	55000^	23252
2005	Should not exceed the recent average (2000–2002)	< 25000	55000^	22695
2006	Should not exceed the recent average (2000–2004, excluding 2003)	< 25000	55000^	23902
2007	Same advice as last year	< 25000	55000^	22790
2008	Same advice as last year	< 25000	57800^	22993
2009	Same advice as last year	< 25000	57800^	25737
2010	Same advice as last year	< 25000	31100^^	26556
2011	Same advice as last year	< 25000	29585^^	21875
2012	No increase in F	< 30800	30800^^	24868
2013	No increase in F	< 26000	30000^^	28993
2014	MSY approach	< 35000	35000^^	29017
2015	MSY approach	< 71824	59500^^	32723
2016	MSY approach	≤ 68583	68583^^	40730
2017	MSY approach	≤ 73349	73349^^	
2018	MSY approach	≤ 55555		

*Only *T. trachurus*
**All *Trachurus* spp.
***Division 8.c, subareas 9 and 10 and CECAF Division 34.1.1 (EU waters only).
^Division 8.c and Subarea 9.
^^Subarea 9.

History of the catch and landings

Table 8   Horse mackerel in Division 9.a. Catch distribution by fleet in 2016 as estimated by ICES.

Catch (2017)	Landings			Discards
40 730 tonnes	47% trawl	47% purse-seine	6% other gears	negligible
	40 730 tonnes			

Table 9   Horse mackerel in Division 9.a. History of ICES estimated catch (tonnes).

Year	Catch *T. trachurus*	Total catch *T. trachurus* including Spanish catches in ICES Subdivision 9.a South*
1992	27858	
1993	31521	
1994	28441	
1995	25147	
1996	20400	
1997	29491	
1998	41564	
1999	27733	
2000	26160	
2001	24910	
2002	22506	23663
2003	18887	19566
2004	23252	23577
2005	22695	23111
2006	23902	24558
2007	22790	23424
2008	22993	23593
2009	25737	26497
2010	26556	27216
2011	21875	22575
2012	24868	25316
2013	28993	29382
2014	29017	29205
2015	32723	33178
2016	40730	41081

* Spanish catches from Subdivision 9.a South are included from 2002 onwards.

These catches will not be included in the assessment until the rest of the time-series is completed.

Summary of the assessment

Table 10   Horse mackerel in Division 9.a. Assessment summary. Assessment summary with weights (in tonnes). Recruitment in thousands. High and low refer to 95% confidence intervals.

Year	Recruitment age 0	High	Low	SSB * tonnes	High	Low	Total Catch	F ages 2–10	High	Low
1992	4172520	5665240	2679800	266327	382636	150017	27858	0.094	0.135	0.054
1993	2917790	4026580	1809000	286326	415737	156916	31521	0.100	0.146	0.055
1994	2882430	3990845	1774015	305193	449289	161096	28441	0.082	0.121	0.044
1995	3946050	5413230	2478870	292190	435409	148970	25147	0.079	0.116	0.042
1996	10612700	14129900	7095500	311547	469244	153851	20400	0.057	0.084	0.030
1997	3482100	4770545	2193655	327387	493524	161251	29491	0.079	0.116	0.042
1998	2218680	3103716	1333644	331904	497552	166255	41564	0.105	0.154	0.056
1999	3364200	4629529	2098871	378377	573567	183187	27733	0.065	0.097	0.033
2000	3054550	4240050	1869050	366081	559169	172993	26160	0.067	0.100	0.034
2001	3599120	4987835	2210405	350598	540600	160597	24910	0.066	0.100	0.032
2002	2027470	2891409	1163531	338296	525432	151161	22506	0.064	0.097	0.032
2003	4014710	5596767	2432653	337973	527736	148210	18887	0.054	0.081	0.028
2004	4415630	6159467	2671793	383351	601034	165669	23252	0.059	0.089	0.029
2005	2767540	3929679	1605401	349969	550519	149419	22695	0.060	0.091	0.030
2006	1436960	2115702	758218	337895	532379	143410	23902	0.067	0.102	0.032
2007	2107830	3068804	1146856	340241	539781	140701	22790	0.064	0.098	0.030
2008	3355690	4866474	1844906	333415	533816	133015	22993	0.067	0.103	0.030
2009	3058930	4519167	1598693	331806	536976	126636	25737	0.076	0.119	0.033
2010	3850700	5735603	1965797	330860	541459	120261	26556	0.076	0.120	0.031
2011	10217400	15009992	5424808	330976	547231	114720	21875	0.048	0.076	0.0197
2012	10268300	15156266	5380334	350252	578644	121860	24868	0.048	0.078	0.0190
2013	4582150	7041676	2122624	358670	585834	131507	28993	0.050	0.080	0.0196
2014	5357860	8449780	2265940	450786	726698	174874	29017	0.047	0.075	0.0183
2015	4875990	8127904	1624076	481538	773533	189543	32723	0.057	0.091	0.022
2016	3757649*			487950	788207	187692	40730	0.077	0.126	0.029
2017	3757649*			490476						

*Geometric mean (1992–2015)
** SSB is determined at spawning time

Sources and references

ICES. 2016a. Working Group on Southern Horse Mackerel, Anchovy and Sardine (WGHANSA), 24–29 June 2016, Lorient, France. ICES CM 2016/ACOM:17.

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