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

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2020 should be no more than 116 871 tonnes.

Management of southern horse mackerel, blue jack mackerel, and Mediterranean horse mackerel under a combined TAC prevents effective control of the single-species exploitation rates and could lead to overexploitation of any of the species.

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, with a continuous and steep increase in the last few years, and is currently at its highest level. Recruitment (R) has been above the time-series average since 2011.
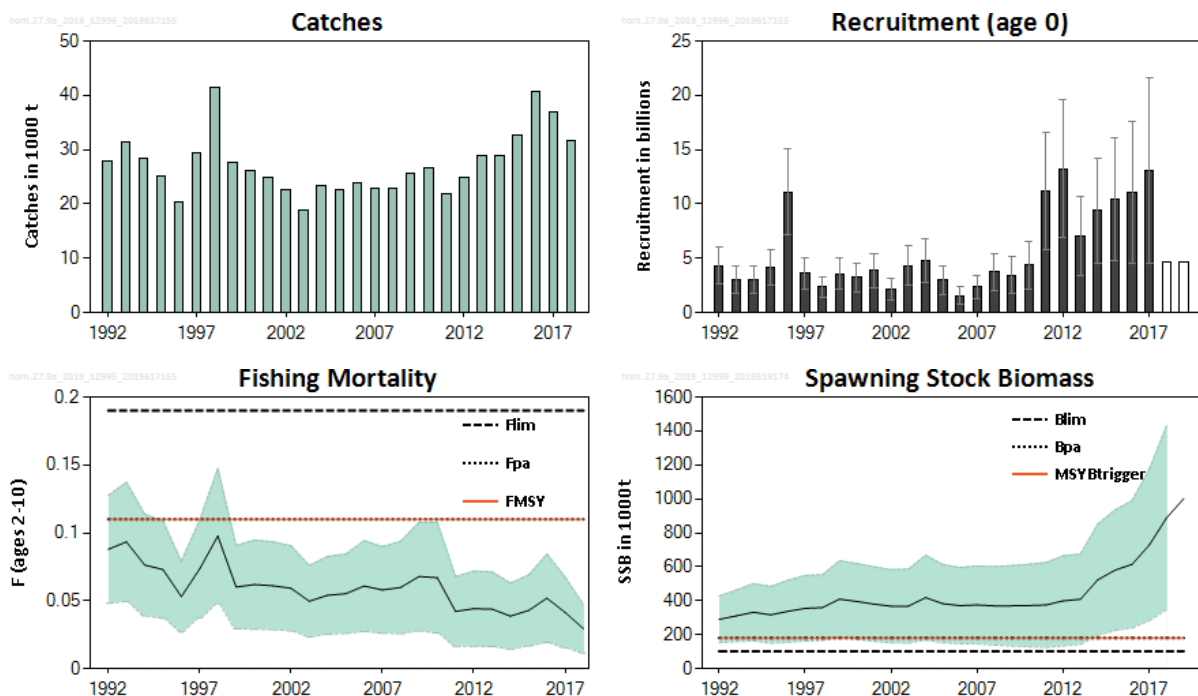

Figure 1 Horse mackerel (*Trachurus trachurus*) in Division 9.a. Summary of the stock assessment (weights in thousand tonnes), with 95% confidence intervals displayed for recruitment, fishing mortality (F), and spawning–stock biomass (SSB). Unshaded recruitment is geometric mean over 1992–2017.

Stock and exploitation status

ICES assesses that fishing pressure on the stock is below F_{MSY}, F_{pa}, and F_{lim}, and that spawning–stock size is above MSY $B_{trigger}$, B_{pa}, and B_{lim}.

Table 1 Horse mackerel (*Trachurus trachurus*) in Division 9.a. State of the stock and fishery relative to reference points.

		Fishing pressure					Stock size			
		2016	2017	2018			2017	2018	2019	
Maximum sustainable yield	F_{MSY}	✓	✓	✓	Appropriate	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 scenarios

Table 2 Horse mackerel (*Trachurus trachurus*) in Division 9.a. Assumptions made for the interim year and in the forecast. All weights are in tonnes.

Variable	Value	Notes
$F_{ages\ 2-10}$ (2019)	0.029	F_{2018}
SSB (2019)	1 001 747	Deterministic short-term forecast
$R_{age\ 0}$ (2019–2020)	4692	Geometric mean (1992–2017) (millions)
Total catch (2019)	32 624	Catch corresponding to F_{2018} from a deterministic short-term forecast
Landings (2019)	32 624	
Discards	0	Negligible

Table 3 Horse mackerel (*Trachurus trachurus*) in Division 9.a. Annual catch scenarios. All weights are in tonnes (t).

Basis	Catches (2020)	F (2020)	SSB * (2020)	SSB * (2021)	% SSB change **	% Catch change ***	% Advice change ^
ICES advice basis							
MSY approach: F_{MSY}	116871	0.11	1074657	1024476	−5	+269	+24
Other scenarios							
F = 0	0	0	1079518	1146911	+6	−100	−100
F = F_{2019}	32624	0.029	1078220	1112876	+3	+2	−65
Management Plan ^^	46659	0.043	1077636	1097070	+2	+47	−50
F = F2019 × 1.2	38750	0.035	1077960	1106193	+3	+22	−59
F = F2019 × 1.6	51378	0.047	1077442	1092949	+1	+62	−45
F = F2019 × 2.0	63865	0.059	1076923	1079867	+0.3	+102	−32.1
F_{pa}	116871	0.11	1074657	1024476	−5	+269	+24
$F_{p.05}$^^^	156017	0.15	1072913	983726	−8	+398	+64
F_{lim}	195077	0.19	1071107	943205	−12	+516	+107
SSB (2021) = B_{lim}	1071480	2.40	978470	103000	−89	+3284	+1040
SSB (2021) = B_{pa}	977149	1.83	1001615	181000	−82	+2986	+939
SSB (2021) = MSY $B_{trigger}$	977149	1.83	1001615	181000	−82	+2986	+939

*For this stock, the SSB is determined at spawning time (assumed to be mid-January) and is influenced by fisheries before spawning.
** SSB 2021 relative to SSB 2020.
*** Catches 2020 relative to ICES estimates of catches in 2018 (31 661 t).
^ Advice value 2020 relative to advice value 2019.
^^ The proposed Management Plan where $F_{2020} = 0.043$ and $F_{2021} = 0.056$ corresponds to a linear increase from $F_{2019} = F_{sq}$ towards F = F_{MSY} in 2025; SSB in 2021 is estimated assuming the F_{2021}.
^^^ FP.05 is the maximum value of F applied when SSB > MSY Btrigger and that will result in SSB ≥ Blim with a 95% probability.

The advice for 2020 has increased compared to the advice provided in 2019, because of the increasing trend in stock size and above average recruitments in recent years.

Basis of the advice

Table 4   Horse mackerel (*Trachurus trachurus*) in Division 9.a. The basis of the advice.

Advice basis	MSY approach
Management plan	An MP was proposed for this stock (ICES, 2018a) that has been evaluated as precautionary by ICES (ICES, 2018b). ICES was requested by the EU to base its advice for 2020 on the ICES MSY approach.

Quality of the assessment

The landings of this stock are believed to be fairly accurate, given the good sampling coverage, few discards, and the existence of well-defined ageing criteria. The upward revision of stock size in last year assessment is confirmed by this year's assessment. The recruitment for 2017 was revised upwards and estimated as the second highest in the time-series.
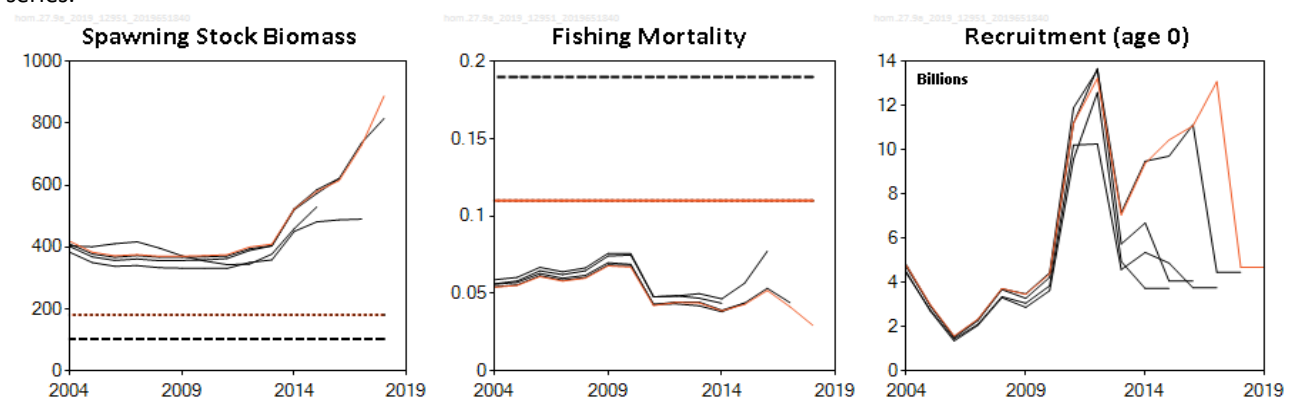

Figure 2   Horse mackerel (*Trachurus trachurus*) in Division 9.a. Historical assessment results. For each line in the recruitment plot, the last two values are the geometric mean (1992–last assessment year).

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 2018, less than 10% of the catch consisted of the other species (around 3100 tonnes). 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.

There has been a significant shift in relative catch contribution from bottom trawls to purse-seines in 2018. This has led to a change in the age composition of catches, with an increase in the proportion of age-1 individuals. Juveniles have been targeted by the traditional fishery for a long time, and this exploitation pattern combined with a low exploitation rate does not seem to have been detrimental to the stock.

ICES was requested by the EU to evaluate a long-term management strategy for this stock (ICES, 2018a). The management plan was considered by ICES to be precautionary and, it was found that when the HCR is applied, the stock is maintained at levels that can lead to catches around MSY. ICES advised that none of the elements of the HCR are in contradiction with ensuring that the stock is fished and maintained at levels that can lead to MSY (ICES, 2018b), now and in the future. ICES was requested by the EU, however, to base the advice for 2020 on the ICES MSY approach again.

ICES notes that the long-term average recruitment assumed in the forecast for the 2018 and 2019 year-classes is lower than the estimated abundance of the 2011 to 2017 year-classes. However, the forecast of catches is considered relatively robust to this assumption because the 2018 and 2019 year-classes are expected to only be lightly exploited by the fishery in 2020.

The TAC for these species was not limiting in the last years, because of low market demand.

The EU requested that ICES provide catch advice for 2020 based on the MSY approach, which leads to an increase of catch opportunities of 269% compared to the catches in 2018. The application of the MP would lead to an increase of 47% compared to the catches in 2018. ICES notes that the management strategy includes a +/ - 15% stability clause which is implemented after the first year of the plan being applied. Since the plan has not previously been applied, the 2019 TAC is not based on the plan and the stability clause would not apply in 2020[*].

Reference points

Table 5   Horse mackerel (*Trachurus trachurus*) 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 (2016; 2017)
	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 (2016, 2017)
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 (2016, 2017)
	B_{pa}	181000	MSY $B_{trigger}$.	ICES (2016, 2017)
	F_{lim}	0.19	Equilibrium scenarios with stochastic recruitment: F corresponding to 50% probability of (SSB < B_{lim}).	ICES (2016, 2017)
	F_{pa}	0.11	Derived from F_{lim} and assessment uncertainty ($F_{pa} = F_{lim} \times \exp(-1.645\sigma)$; $\sigma = 0.32$).	ICES (2016, 2017)
Management plan	MP MSY $B_{trigger}$	181000		ICES (2018a)
	MP B_{lim}	103000		ICES (2018a)
	MP F_{MSY}	0.11		ICES (2018a)
	MP $F_{bycatch}$	0.01	F to be applied when SSB ≤ B_{lim} to allow for bycatches.	ICES (2018a)

Basis of the assessment

Table 6   Horse mackerel (*Trachurus trachurus*) in Division 9.a. Basis of assessment and advice.

ICES stock data category	1 (ICES, 2018c)
Assessment type	Analytical assessment (AMISH model) that uses catches in the model and in the forecast (ICES, 2019)
Input data	Commercial catches (international landings, ages, and length frequencies from catch sampling). One survey index (combined PT and SP-IBTS-Q4), maturity data from DEPM surveys.
Discards and bycatch	Not included and considered negligible
Indicators	None
Other information	This stock was benchmarked in 2017 (WKPELA; ICES, 2017)
Working group	Working Group Southern Horse Mackerel, Anchovy and Sardine (WGHANSA)

Information from stakeholders

There is no additional available information.

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[*] Version 2: last two sentences of paragraph added for clarification.

History of the advice, catch, and management

Table 7   Horse mackerel (*Trachurus trachurus*) in Division 9.a. ICES advice, agreed TAC, and official landings. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice (T.trachurus) *	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 $F_{0.1}$; 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 <Fpa	< 59000	68000 ^	26160
2001	F <Fpa	< 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 ^^	36946
2018	MSY approach	≤ 55555	55555 ^^	31661
2019	MSY approach	≤ 94017	94017 ^^	
2020	MSY approach	≤ 116 871		

* Advice referred to divisions 8.c and 9.a until 2010, and to Division 9.a since then, because of a change in the stock definition.
** Division 8.c, subareas 9 and 10 and CECAF Division 34.1.1 (EU waters only).
^ Division 8.c and Subarea 9.
^^ Subarea 9.
^^^ Not including Spanish catches in 9.a South-Cadiz.

History of the catch and landings

Table 8   Horse mackerel (*Trachurus trachurus*) in Division 9.a. Catch distribution by fleet in 2018 as estimated by ICES. (Note: Spanish catches in 9.a South-Cadiz are not included).

Catch (2018)	Landings			Discards
31 661 tonnes	31% trawl	64% purse-seine	5% other gears	Negligible
	31 661 tonnes			

Table 9   Horse mackerel (*Trachurus trachurus*) in Division 9.a. History of ICES estimated catch (in tonnes). Spanish catches from 9.a South-Cadiz are included from 2002 onwards. Catches from 2002–2012 are uncertain. These catches are not included in the assessment, and are less than 1% of the total catches.

Year	Catch used in the assessment (excluding Spanish catch in 9.a South-Cadiz)	Spanish catches in ICES 9.a South-Cadiz	Total catch in 9.a
1992	27858		
1993	31521		
1994	28441		
1995	25147		
1996	20400		
1997	29491		
1998	41564		
1999	27733		
2000	26160		
2001	24910		
2002	22506	1157	23663
2003	18887	679	19566
2004	23252	325	23577
2005	22695	416	23111
2006	23902	656	24558
2007	22790	634	23424
2008	22993	600	23593
2009	25737	760	26497
2010	26556	660	27216
2011	21875	700	22575
2012	24868	448	25316
2013	28993	389	29382
2014	29017	188	29205
2015	32723	455	33178
2016	40730	351	41081
2017	36946	143	37089
2018	31661	259	31920

Summary of the assessment

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

Year	Recruitment (age 0)	High	Low	Spawning Stock Biomass **	High	Low	Catches	Fishing Mortality (ages 2–10)	High	Low
1992	4341370	5997064	2685676	290448	427429	153466	27858	0.088	0.127	0.048
1993	3039670	4263874	1815466	311530	463232	159827	31521	0.093	0.137	0.049
1994	3001400	4223007	1779793	332307	500977	163637	28441	0.076	0.114	0.039
1995	4113460	5738472	2488448	317578	484461	150695	25147	0.073	0.109	0.037
1996	11072000	15028534	7115466	338222	521259	155185	20400	0.053	0.079	0.027
1997	3644270	5079347	2209193	355798	548793	162804	29491	0.073	0.109	0.037
1998	2337250	3324116	1350384	359916	552789	167042	41564	0.098	0.147	0.048
1999	3564000	4994439	2133561	409961	635979	183942	27733	0.060	0.091	0.029
2000	3251070	4592804	1909336	396407	619805	173009	26160	0.062	0.095	0.029
2001	3844530	5422916	2266144	380541	599925	161158	24910	0.061	0.093	0.029
2002	2176610	3152122	1201098	368150	583254	153045	22506	0.059	0.091	0.028
2003	4323000	6126565	2519435	368634	586400	150867	18887	0.050	0.076	0.023
2004	4769950	6761545	2778355	418824	668423	169226	23252	0.054	0.083	0.025
2005	3003100	4327476	1678724	383467	614019	152916	22695	0.055	0.084	0.026
2006	1571490	2343352	799628	371764	595782	147745	23902	0.061	0.094	0.027
2007	2340330	3450878	1229782	375750	605376	146123	22790	0.058	0.090	0.026
2008	3722960	5466307	1979613	370131	600996	139266	22993	0.060	0.094	0.026
2009	3463290	5169166	1757414	370644	607237	134051	25737	0.068	0.108	0.028
2010	4384510	6596233	2172787	372295	615285	129306	26556	0.067	0.108	0.026
2011	11195000	16604835	5785165	375522	625444	125601	21875	0.042	0.068	0.0166
2012	13235700	19581357	6890043	399925	665323	134526	24868	0.044	0.072	0.0165
2013	7057550	10671124	3443976	409582	675639	143526	28993	0.044	0.071	0.0164
2014	9391370	14235647	4547093	523347	850715	195979	29017	0.039	0.063	0.0145
2015	10450900	16124022	4777778	579817	934820	224814	32723	0.043	0.069	0.0168
2016	11087100	17583716	4590484	615367	990281	240452	40730	0.052	0.085	0.0194
2017	13087800	21651824	4523776	729278	1174809	283747	36946	0.041	0.067	0.0154
2018	4692300*			888422	1429489	347356	31661	0.029	0.047	0.0115
2019	4692300*			1001740						

* Geometric mean (1992–2017).

** SSB is estimated at spawning time (mid-January).

Sources and references

ICES. 2016. Working Group on Southern Horse Mackerel, Anchovy and Sardine (WGHANSA), 24–29 June 2016, Lorient, France. ICES CM 2016/ACOM:17. https://doi.org/10.17895/ices.pub.5349

ICES. 2017. Report of the Benchmark Workshop on Pelagic Stocks (WKPELA), 6–10 February 2017, Lisbon, Portugal. ICES CM 2017/ACOM:35. 294 pp. https://doi.org/10.17895/ices.pub.5350

ICES. 2018a. Report on the Assessment of a Long-term Management Strategy for Southern Horse Mackerel (hom27.9a), 15–16 February 2018. Manuela Azevedo, Hugo Mendes, Gersom Costas, Ernesto Jardim, Iago Mosqueira, Finlay Scott (Authors.) ICES CM 2018/ACOM:42. 45 pp. https://doi.org/10.17895/ices.pub.5351

ICES. 2018b. EU request to ICES on the assessment of a long-term management strategy for southern horse mackerel (*Trachurus trachurus*) in ICES Division 9.a. ICES special Request Advice, Bay of Biscay and the Iberian Coast Ecoregion, 23 March 2018, 8 pp. https://doi.org/10.17895/ices.pub.4180

ICES. 2018c. Advice basis. In Report of the ICES Advisory Committee, 2018. ICES Advice 2018, Book 1, Section 1.2. https://doi.org/10.17895/ices.pub.4503

ICES. 2019. Working Group on Southern Horse Mackerel, Anchovy and Sardine (WGHANSA). ICES Scientific Reports. 1:34. XXX pp. http://doi.org/10.17895/ices.pub.4983