ICES Advice on fishing opportunities, catch, and effort
Bay of Biscay and the Iberian Coast Ecoregion
hom.27.9a

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ICES
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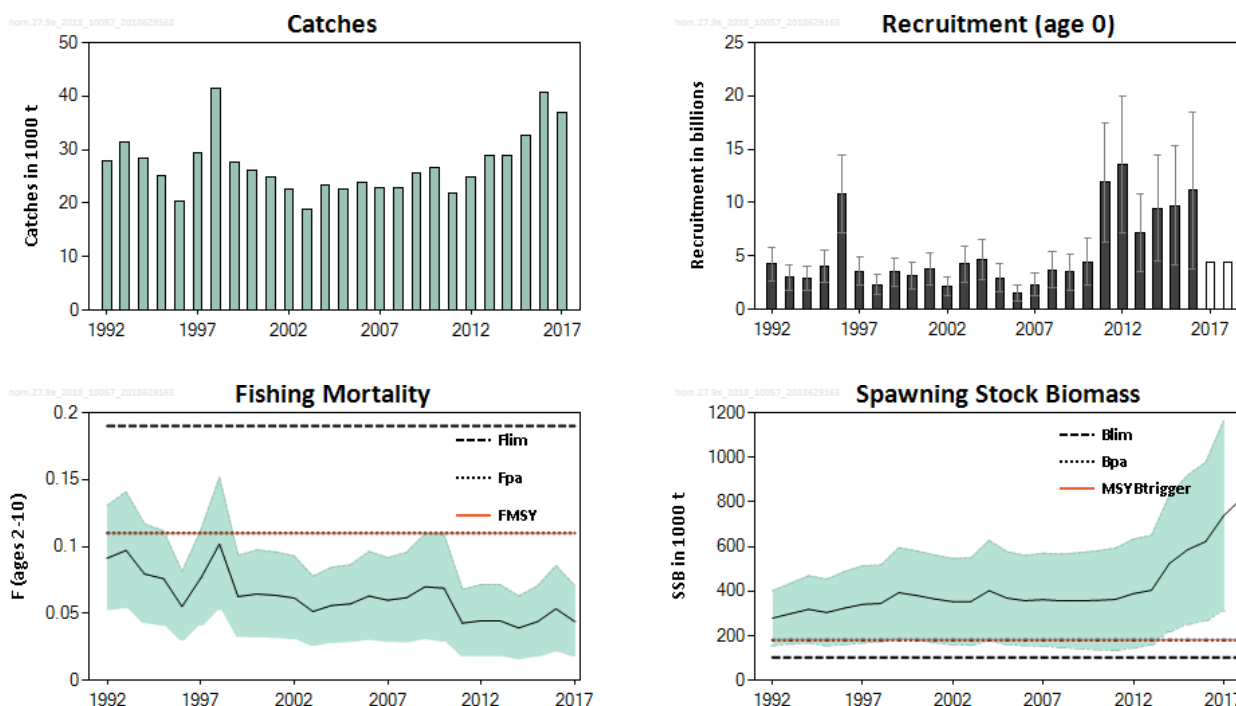# Horse mackerel (*Trachurus trachurus*) in Division 9.a (Atlantic Iberian waters)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2019 should be no more than 94 017 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 increase in the last five 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 1992–2016.

Stock and exploitation status

ICES assesses that fishing pressure on the stock is below F_{MSY}, F_{pa}, and F_{lim}, and 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			
		2015	2016	2017			2016	2017	2018
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}	✅	✅	✅ Below		B_{MGT}	✅	✅	✅ Above target

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
$F_{ages\ 2-10}$ (2018)	0.044	F2017
SSB (2018)	815682	Deterministic short-term forecast
R_{age0} (2018–2019)	4.46	Geometric mean (1992–2016) (billion)
Total catch (2018)	39016	Catch corresponding to the assumed F2018 from a deterministic short-term forecast
Landings (2018)	39016	
Discards	0	Negligible

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

Basis	Catches (2019)	F (2019)	SSB * (2019)	SSB * (2020)	% SSB change **	% Catch change ***	% Advice change^
ICES advice basis							
MSY approach: F_{MSY}	94017	0.11	849635	801104	-5.71	+154	+69
Other scenarios							
F = 0	0	0	853506	897128	+5.11	-100	-100
F = F_{2018}	38802	0.044	851956	857383	+0.64	+5	-30
Mgt Plan^^	46368	0.053	851646	849209	-0.23	+26	-17
F = F_{2018} × 1.2	46368	0.053	851646	849652	-0.23	+26	-17
F = F_{2018} × 1.6	61308	0.07	851027	834403	-1.95	+66	+10
F = F_{2018} × 2.0	75999	0.088	850408	819433	-3.64	+106	+37
F_{pa}	94017	0.11	849635	801104	-5.71	+154	+69
F_{lim}	156490	0.19	846828	737846	-13	+324	+182
SSB (2020) = Blim	836006	2.153	780975	103000	-87	+2163	+1405
SSB (2020) = Bpa	741060	1.581	799600	181000	-77	+1906	+1234
SSB (2020) = MSY Btrigger	741060	1.581	799600	181000	-77	+1906	+1234

*For this stock, the SSB is determined at spawning time (assumed to be mid-January) and is influenced by fisheries before spawning.
** SSB 2020 relative to SSB 2019.
*** Catches 2019 relative to ICES estimates of catches in 2017 (36 946 t).
^ Advice value 2019 relative to advice value 2018.
^^ Management Plan where F_{2019} corresponds to a linear increase from $F_{2018}=F_{sq}$ towards $F=F_{MSY}$ in 2025; SSB 2020 corresponds to an $F_{2020}=0.062$. As 2019 is the first year of application of the plan, the stability element (± 15% interannual variation in TAC) was not applied.

The advice for 2019 has increased compared to the advice provided for 2018 due to an upward revision in the perception of stock size and abundance of recent (2012–2015) year classes compared to the previous assessment and the above average abundance of the newly estimated 2016 year class.

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	There is a MP for this stock (ICES, 2018c) that has been evaluated as precautionary by ICES (ICES, 2018b). ICES was requested by the EU to base its advice for 2019 on the ICES MSY approach.

Quality of the assessment

The current assessment revised the SSB and the R estimates upwards when compared with the assessment in 2017. 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 assessment is also tuned with the stratified mean abundance-at-age estimated for the combined Portuguese and Spanish IBTS surveys. The 2017 input from IBTS survey index is the highest in the time-series (six times above average). Sensitivity analysis revealed that the observed pattern in R and SSB, showing major deviations from the previous assessments, is likely due to a combination of high proportion of catches in ages 1–2 and the historical high abundance observed in the survey index in 2017 (ICES, 2018c). This upward revision of stock abundance resulted in F being revised downwards relatively to previous years.
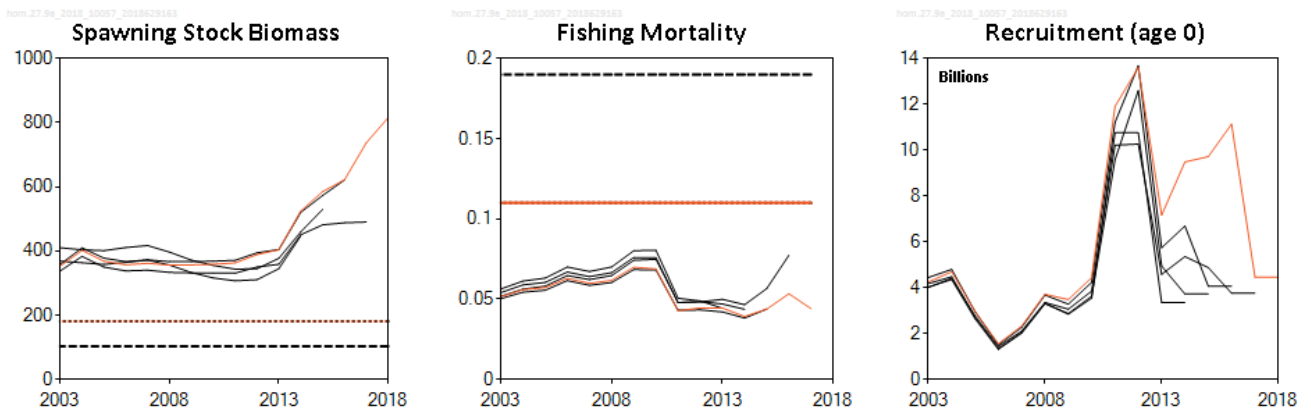
Figure 2   Horse mackerel (*Trachurus trachurus*) in Division 9.a. Historical assessment results. For each line in the recruitment plot, the last two values are assumed.

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 2017, less than 10% of the catch consisted of the other species (around 3700 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 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.

ICES was requested by the EU to evaluate a long-term management strategy for this stock (ICES, 2018a). The management plan is defined by a management F at F_{MSY} (linear increase in F until 2025) being applied when SSB is above MSY $B_{trigger}$ at the beginning of the TAC year, a linear reduction of F down to $F_{bycatch}$ = 0.01 when SSB is in the range MSY $B_{trigger}$ to B_{lim}, and an F at $F_{bycatch}$ when SSB is below or at B_{lim}. In addition, the harvest control rule (HCR) includes an interannual catch constraint of ±15% to be applied when SSB is above B_{lim}. The management plan was considered by ICES to be precautionary and also 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, also in the future, at levels that can lead to MSY (ICES, 2018b). However, ICES was requested by the EU to base the ICES advice for 2019 on the ICES MSY approach. The catch advice for 2019 under the MSY approach, of 94 017 tonnes, represents an increase in catches in 2019 of 103% when compared to the catch corresponding to the management plan.

TAC for these species was not limiting in the last years due to low market value and opportunities.

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 (2016a; 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 (2016a, 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 (2016a, 2017)
	B_{pa}	181000	MSY $B_{trigger}$	ICES (2016a, 2017)
	F_{lim}	0.19	Equilibrium scenarios with stochastic recruitment: F corresponding to 50% probability of (SSB <B_{lim})	ICES (2016a, 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 (2016a, 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, 2016b)
Assessment type	Analytical assessment (AMISH model) that uses catches in the model and in the forecast (ICES, 2018c)
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.

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 <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^^	36946
2018	MSY approach	≤ 55555	55555^^	
2019	MSY approach	≤ 94017		

* Advice referred to divisions 8.c and 9.a until 2010, and to Division 9.a since, 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.
^^^ nort including Spanish catches in 9.a South

History of the catch and landings

Table 8   Horse mackerel (*Trachurus trachurus*) in Division 9.a. Catch distribution by fleet in 2017 as estimated by ICES. (Note: Spanish catches in 9.a South are not included)

Catch (2017)	Landings			Discards
36 946 tonnes	45% trawl	49% purse-seine	6% other gears	negligible
	36 946 tonnes			

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

Year	Catch *T. trachurus* excluding Spanish catch in 9.a South used in the assessment	Spanish catches in ICES 9.a South	Total Catch of *T. trachurus* 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			

* Spanish catches from 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 (*Trachurus trachurus*) 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	Spawning–stock Biomass**	High	Low	Catch	Fishing mortality (ages 2–10)	High	Low
1992	4240850	5787315	2694385	278425	401742	155109	27858	0.091	0.131	0.052
1993	2970300	4118850	1821750	298608	434540	162677	31521	0.097	0.141	0.053
1994	2933660	4081416	1785904	318171	469004	167339	28441	0.079	0.117	0.042
1995	4021130	5544930	2497330	304081	453428	154734	25147	0.076	0.112	0.040
1996	10822400	14500830	7143970	323834	487856	159811	20400	0.055	0.081	0.029
1997	3566900	4916413	2217387	340428	513060	167796	29491	0.076	0.112	0.040
1998	2289730	3222190	1357270	344688	516323	173054	41564	0.102	0.152	0.052
1999	3493430	4838858	2148002	392751	594408	191094	27733	0.063	0.093	0.032
2000	3189410	4455341	1923479	380027	579424	180629	26160	0.064	0.097	0.032
2001	3775050	5265020	2285080	364668	561042	168294	24910	0.064	0.096	0.031
2002	2137890	3065531	1210249	352613	545633	159593	22506	0.062	0.093	0.030
2003	4249190	5957934	2540446	353208	549229	157187	18887	0.051	0.078	0.025
2004	4694200	6584847	2803553	401928	627257	176599	23252	0.056	0.084	0.027
2005	2961190	4226411	1695969	368287	576346	160228	22695	0.057	0.086	0.028
2006	1554240	2298487	809993	356960	559103	154817	23902	0.063	0.096	0.030
2007	2325240	3399267	1251213	361481	569288	153673	22790	0.060	0.092	0.028
2008	3711720	5402365	2021075	356183	565646	146720	22993	0.062	0.096	0.028
2009	3481320	5153929	1808711	356635	571809	141460	25737	0.070	0.110	0.030
2010	4439410	6626260	2252560	358617	580364	136869	26556	0.069	0.109	0.028
2011	11905900	17502582	6309218	362844	591926	133762	21875	0.043	0.068	0.0176
2012	13606800	20003319	7210281	388811	632936	144687	24868	0.045	0.072	0.0175
2013	7165830	10824092	3507568	403733	649358	158109	28993	0.044	0.071	0.0174
2014	9487890	14490104	4485676	524645	830408	218881	29017	0.039	0.063	0.0154
2015	9717180	15320350	4114010	585152	919287	251017	32723	0.044	0.070	0.0172
2016	11141400	18472466	3810334	622192	976907	267477	40730	0.053	0.086	0.021
2017	4461359*			737556	1163217	311895	36946	0.044	0.071	0.0173
2018	4461359*			815682						

* Geometric mean (1992–2016).
** SSB is estimated at spawning time (mid-January)

Sources and references

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