Published 28 September 2018
https://doi.org/10.17895/ices.pub.4535

Horse mackerel (*Trachurus trachurus*) in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k (the Northeast Atlantic)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2019 should be no more than 145 237 tonnes.

Stock development over time

The stock and the fishery are very dependent on occasional high recruitments. After a series of low recruitments, the estimates since 2014 are above average (1983–2017). SSB has been declinging since 2007 and has been around MSY $B_{trigger}$ since 2014. Fishing mortality has decreased since 2013 and is currently below F_{MSY}.

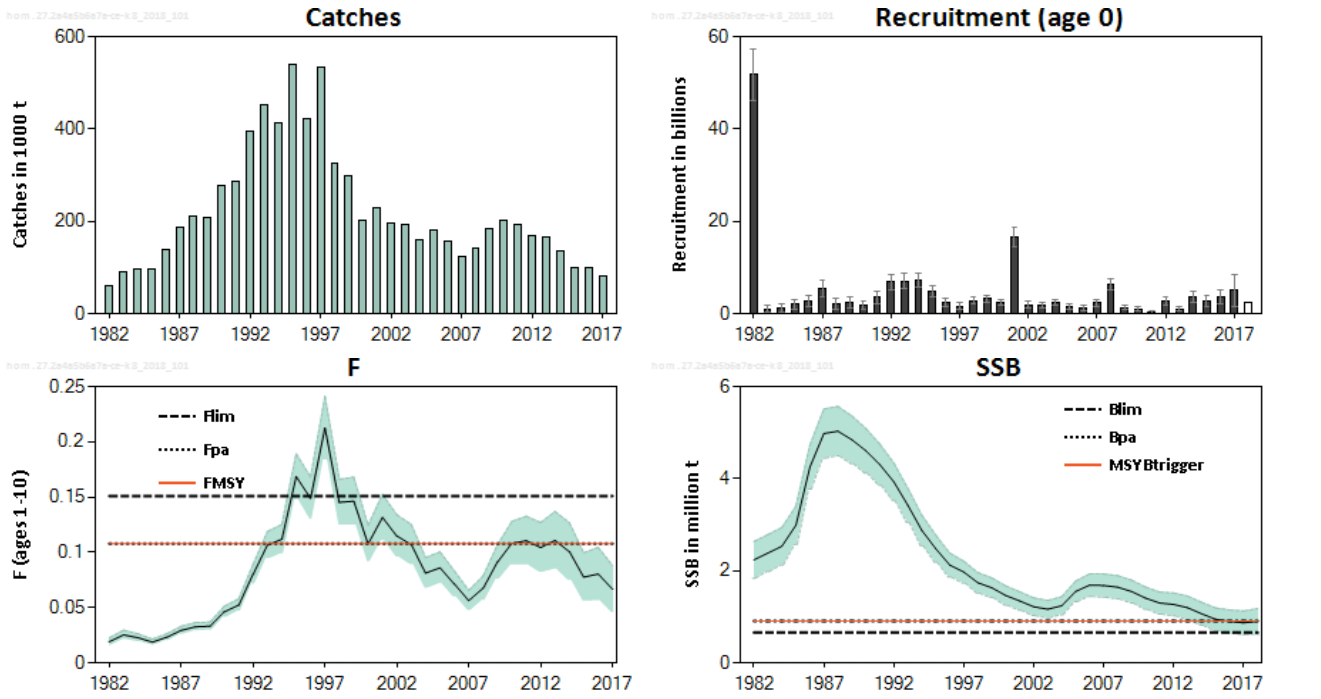

Figure 1 Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. Summary of the stock assessment. Plots show 95% confidence intervals (shaded area). Assumed recruitment value for 2018 is unshaded.

Stock and exploitation status

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

Table 1 Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. 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 $B_{trigger}$	✗	✗	✗	Below trigger
Precautionary approach	F_{pa},F_{lim}	✓	✓	✓	Harvested sustainably	B_{pa},B_{lim}	o	o	o	Increased risk
Management plan	F_{MGT}	–	–	–	Not applicable	B_{MGT}	–	–	–	Not applicable

Catch scenarios

Table 2 Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. The basis for the catch scenarios.

Variable	Value	Notes
$F_{ages\ 1–10}$ (2018)	0.067	Catch constraint
SSB (2019)	941821 t	Based on the ICES estimate of the total catch for 2017
$R_{age\ 0}$ (2018–2019)	2584327 thousands	GM 1983–2017
Catch (2018)	115470 t	EU TAC – which is also the expected catch. The catches since 2007 – with few exceptions – have been below the total TAC (EU TAC plus national quotas of other countries) and closer to the EU TAC.

Table 3 Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2019)	F_{total} (2019)	SSB (2020)	% SSB change *	% Advice change **
MSY approach: F_{MSY}	145237	0.108	987878	+5	+24
F = 0	0	0	1113644	+18	-100
$F = F_{MSY} = F_{pa}$	145237	0.108	987878	+5	+24
$F = F_{lim}$	198662	0.151	941821	0	+70
$SSB\ (2020) = B_{lim}$	529777	0.47	661917	-30	+353
$SSB\ (2020) = MSY\ B_{trigger} = B_{pa}$	234063	0.181	911587	-3	+100
$F = F_{2018}$	92028	0.067	1033814	+10	-21

* SSB 2020 relative to SSB 2019.
** Advice value for 2019 relative to advice value for 2018 (117070 t).

Catch advice for 2019 is 24% higher than that for 2018. This is due to an upward revision in the perception of the stock biomass from the assessment, combined with the results of the short-term forecast which includes an increase in biomass to above MSY $B_{trigger}$ and hence no reduction in the F to be applied based on the ICES F_{MSY} advice rule.

Basis of the advice

Table 4 Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. The basis of the advice.

Advice basis	MSY approach
Management plan	The Pelagic Advisory Council proposed a management plan for horse mackerel in 2007 (see Annex 9.3.12.1 in ICES, 2014). ICES does not advise according to the management plan because it is not consistent, in its current configuration, with the precautionary approach (ICES, 2013).

Quality of the assessment

The stock was benchmarked in 2017. The new method used – Stock Synthesis – shows the same trend in the stock development as the previous assessment, but rescales the absolute level of SSB and F. There is a tendency to underestimate SSB and overestimate F in the current assessment model.

Due to mechanical breakdown, the 2017 French groundfish survey only covered a small proportion of the planned survey area. This has resulted in highly uncertain value for the 2017 recruitment index estimate. This has a minor impact on the estimated SSB.

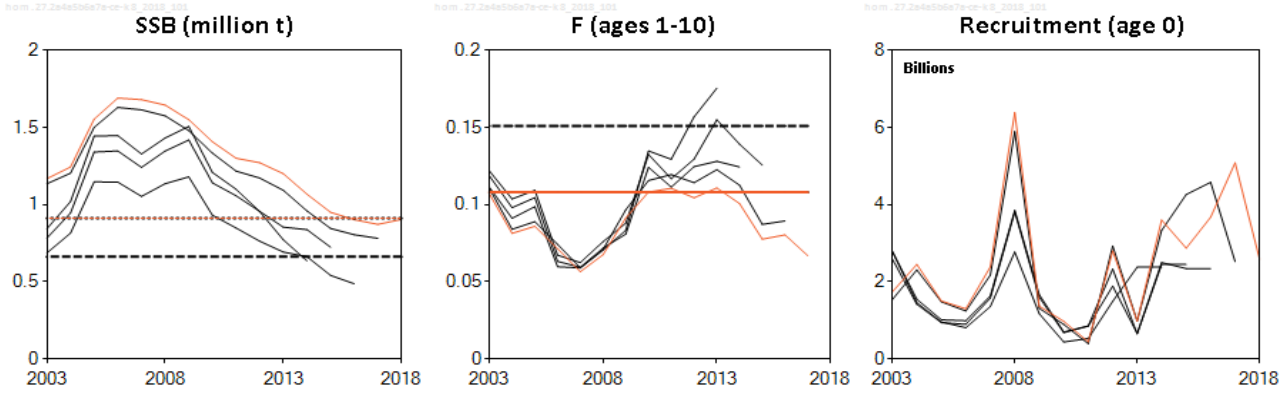

Figure 2 Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. Historical assessment results. Note: since the 2017 assessment, SSB is estimated on 1 January. Prior to 2017 SSB has been estimated in May (spawning time). Final year assumed recruitment included.

Issues relevant for the advice

While the stock is currently at its historical low, this year advice is for a substantial increase in catches compared to last year. One of the reasons is the revision of the biomass estimates. However, given the recent higher recruitments, the stock is predicted to increase in 2019 to 8% above this historical low (SSB_{2017}), and the increase will continue if this year advice is followed (SSB_{2020} being 13% higher than SSB_{2017}).

The stock reference points were revised in March 2017 (ICES, 2017). The biomass reference points (B_{lim} and B_{pa}) were derived from the B_{loss}, that corresponded to SSB in 2015. The subsequent update assessments in 2017 and 2018 rescaled upwards the biomass in the most recent years. Advice based on the update 2018 assessment but using it as relative would result in similar level of catches (i.e. ~10% lower catches). The increased advice is mainly because the stock size is increasing.

Reference points

Table 5 Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	911 587 t	Stochastic simulations (EqSim)	ICES (2017b)
	F_{MSY}	0.108	Stochastic simulations (EqSim)	ICES (2017b)
Precautionary approach	B_{lim}	661 917 t	B_{loss} (lowest value in the time-series; SSB in 2015 as estimated by the benchmark assessment)	ICES (2017b)
	B_{pa}	911 587 t	$B_{lim} \times \exp(1.645 \times \sigma)$; $\sigma = 0.195$	ICES (2017b)
	F_{lim}	0.151	Stochastic simulations (EqSim)	ICES (2017b)
	F_{pa}	0.108	$F_{lim} \times \exp(-1.645 \times \sigma)$; $\sigma = 0.195$	ICES (2017b)
Management plan	SSB_{mgt}			
	F_{mgt}			

Basis of the assessment

Table 6 Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2016)
Assessment type	Length- and age-based analytical assessment (Stock Synthesis 3; NOAA Toolbox)
Input data	Commercial catches: international catches, length and age data from catch sampling. Three survey indices: Triennial egg survey index (1992–2016); IBTS recruitment index; PELACUS acoustic biomass index. Length frequency distribution from the PELACUS survey. Constant maturity at age. Natural mortalities: constant = 0.15.
Discards and bycatch	Partial (prior to 2014) and full (since 2014) discard volumes are included in the assessment. Overall discarding is considered negligible.
Indicators	PELGAS (French acoustic survey in the Bay of Biscay)
Other information	The stock was benchmarked in 2017 (WKWIDE, ICES 2017b).
Working group	Working Group on Widely Distributed Stocks (WGWIDE)

Information from stakeholders

The industry, in conjunction with the Pelagic AC (PELAC), has been working actively on a number of issues, namely a large-scale genetics project on stock identification, development of a management strategy with the scientists, and a number of voluntary industry measures to protect juveniles.

The genetic work is now close to being finalized. Samples have been collected during the years 2015–2017 from area between Mauritania and the Northern North Sea. DNA has been extracted from the samples and is currently being worked up. It is expected that the genetic analysis will be finished in the first half of 2019.

The Irish, Dutch, and Danish fishing industry reported good horse mackerel catches west of Scotland (Division 6.a) and Dutch fishing industry southwest of Ireland (Division 7.j) and during the first months of 2018, also including bigger sizes of horse mackerel. The Irish demersal fleet encountered increased numbers of juvenile (ages 1 and 2) horse mackerel to the south and west of Ireland, in 2016, 2017, and 2018.

The development of a management strategy is at an advanced stage, and it is hoped a draft will be available in the new year.

History of the advice, catch, and management

Table 7 Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. ICES advice and landings. All weights are in tonnes.

Year	ICES advice	Predicted catch corresp. to advice**	Agreed TAC*	ICES estimated landings***	ICES estimated discards***	ICES estimated catch***
1987	Not assessed	-	155000	187338	-	187338
1988	No increase in catches	102000	169000	210989	3740	214729
1989	If sustained catches required; TAC	100000	153000	294887	1150	296037
1990	TAC	~200000	203000	388721	9930	398651
1991	Within safe biological limits	-	230000	284623	5440	290063
1992	Within safe biological limits	-	250000	395559	1820	397379
1993	Within safe biological limits	-	250000	445484	8600	454084
1994	Prudent not to increase F	-	300000	408968	3935	412903
1995	Reduction in catch	-	300000	538611	2046	540657
1996	Reduction in catch	-	300000	403869	16870	420739
1997	Reduction in F	173000	300000	470252	158	470410
1998	Reduction in F to 0.15	150000	320000	381411	913	382324
1999	Effectively limit catches to 200 000 t	< 200000	265000	299431	0	299431
2000	Effectively limit catches to 200 000 t	< 200000	240000	202350	382	202732
2001	Effectively limit catches to 224 000 t	< 224000	233000	228827	254	229081
2002	Effectively limit catches to 98 000 t	< 98000	150000	195813	307	196120
2003	Effectively limit catches to 113 000 t	< 113000	137000	191014	842	191856
2004	Limit catches to less than 130 000 t	< 130000	137000	157386	2356	159742
2005	Limit catches to less than 150 000 t	< 150000	137000	180199	1802	182001
2006	Limit catches to less than 150 000 t	< 150000	137000	154474	1353	155827
2007	Limit catches to less than 150 000 t	< 150000	137000	122985	370	123356
2008	Follow proposed management plan	180000	170000	142875	474	143349
2009	Follow proposed management plan	180000	170000	183335	447	183782
2010	Follow proposed management plan	180000	183191	202680	432	203112
2011	See scenarios	181000–229000	195130	193268	430	193698
2012	MSY framework	≤ 211000	183000	166579	3279	169858
2013	MSY framework	≤ 126000	181000	160676	4582	165258
2014	MSY approach	≤ 110546	133220	134463	1896	136360
2015	MSY approach	≤ 99304	97603	94192	4228	98419
2016	MSY approach	≤ 126103	124403	94394	4417	98811
2017	MSY approach	≤ 69186	95500	79033	3928	82961
2018	MSY approach	≤ 117070	115470			
2019	MSY approach	≤ 145237				

* EU TAC.
**Division 8.c is not included prior to 2005.
*** Division 8.c is not included prior to 2003.

History of the catch and landings

Table 8 Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. Landings distribution by fleet in 2017 as estimated by ICES.

Catch (2017)	Landings			Discards
82961 tonnes	Pelagic trawl 41.6%	Otter trawl 11.8%	Undefined and other gears 46.6%	3928 tonnes
	79033 tonnes			

Table 9 Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. History of commercial catch and landings; official landing values presented by area and ICES estimated discards. All weights are in tonnes.

Year	ICES divisions						Discards	Total Western stock
	2.a and 5.b	3.a	4.a	6.a–b	7.a–c and 7.e–k	8.a–e		
1982	-		-	6283	32231	22683	-	61197
1983	412		-	24881	36926	28223	-	90442
1984	23		94	31716	38782	25629	500	96744
1985	79		203	33025	35296	27740	7500	103843
1986	214		776	20343	72761	43405	8500	145999
1987	3311		11185	35197	99942	37703	-	187338
1988	6818		42174	45842	81978	34177	3740	214729
1989	4809		85304*	34870	131218	38686	1150	296037
1990	11414	14878	112753*	20794	182580	46302	9930	398645
1991	3200	2725	56157*	29726	149975	42840	5440	290063
1992	13457	2374	103725	39061	182770	54172	1820	397379
1993		850	141220	65397	193291	44726	8600	454084
1994	759	2492	106911	69616	193689	35501	3935	412903
1995	13151	128	92728	83568	320329	28707	2046	540657
1996	3366	0	16783	81311	254049	48360	16870	420739
1997	2601	2037	63646	40145	321017	40806	158	470410
1998	2544**	3693	17001	35073	284529	38571	913	382324
1999	2557^	2095	47315	40381	158733	48350		299431
2000	919^^	1014	4314	20735	121171	54197	382	202732
2001	310	134	11438	24839	117038	75067	254	229081
2002	1324	174	36221	14843	87354	55897	307	196120
2003	36	1843	21272	23772	102379	41711	842	191856
2004	42	48	11708	22177	99284	24126	2356	159746
2005	176	284	24983	22053	91211	41491	1802	182001
2006	27	58	27156	15722	77394	34121	1353	155827
2007	366	110	4940	25949	63224	28396	370	123356
2008	572^^^	2.98	12107	25867	70570	33756	474	143349
2009	1847	17	58738	17775	71378	33580	447	183782
2010	1667	88	11442	23199	126624	39659	432	203112
2011	648	0.23	14723	39496	103156	35245	430	193698
2012	66	8.9	3311	44971	101012	17209	3279	169858
2013	30	10.0	6702	43266	83684	26983	4582	165258
2014	424	4096	10573	32444	56081	30844	1896	136360
2015	10	65	9078	24153	41063	19822	4228	98419
2016	45		8960	32186	35692	17511	4417	98811
2017	5	712	9405	28286	23340	21213	3928	82961

* Norwegian catches from Division 4.b included.
** Includes 1937 t from Division 5.b.
^ Includes 132 t from Division 5.b.
^^ Includes 250 t from Division 5.b.
^^^ All from Division 5.b.

Summary of the assessment

Table 10 Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. Assessment summary. High and Low refers to 95% confidence intervals. Weights are in tonnes.

Year	Recruitment at age 0	High	Low	SSB	High	Low	Catch	F at ages 1–10	High	Low
	thousands			tonnes			tonnes			
1982	51838500	57412681	46264319	2237440	2635398	1839482	61197	0.0193	0.023	0.0159
1983	1085870	1846987	324753	2386510	2787212	1985808	90442	0.025	0.030	0.021
1984	1266350	2099493	433207	2534530	2940579	2128481	96244	0.023	0.026	0.0193
1985	2026820	3085769	967871	2990120	3402577	2577663	96343	0.0189	0.022	0.0161
1986	2721850	3950903	1492797	4251360	4728649	3774071	137499	0.023	0.027	0.020
1987	5485220	7244445	3725995	4980480	5513727	4447233	187338	0.030	0.033	0.026
1988	2187010	3340303	1033717	5030810	5567485	4494135	210989	0.033	0.037	0.029
1989	2358060	3506344	1209776	4846530	5362388	4330672	209583	0.033	0.037	0.030
1990	1779760	2714764	844756	4606770	5089828	4123712	275968	0.046	0.051	0.041
1991	3521350	4796853	2245847	4303910	4748963	3858857	287438	0.052	0.058	0.047
1992	6862720	8591530	5133910	3932390	4339408	3525372	393631	0.080	0.089	0.071
1993	7113760	8816667	5410853	3422420	3790867	3053973	453246	0.107	0.119	0.094
1994	7240170	8829371	5650969	2878890	3209342	2548438	412291	0.112	0.125	0.099
1995	4825480	6056321	3594639	2480760	2774158	2187362	538950	0.168	0.189	0.148
1996	2441730	3261629	1621831	2125500	2385061	1865939	422396	0.149	0.168	0.130
1997	1686490	2321702	1051278	1973210	2209029	1737391	534673	0.21	0.24	0.184
1998	2882240	3652112	2112368	1741720	1962698	1520742	325340	0.145	0.166	0.124
1999	3206590	3977086	2436094	1633280	1846855	1419705	298992	0.146	0.168	0.125
2000	2386090	3049911	1722269	1465660	1671952	1259368	202732	0.108	0.124	0.091
2001	16647700	18726594	14568806	1346660	1545237	1148083	229081	0.131	0.153	0.110
2002	1972870	2659293	1286447	1220330	1412836	1027824	196120	0.115	0.134	0.096
2003	1737630	2342053	1133207	1168270	1357484	979056	191856	0.107	0.125	0.089
2004	2449740	3193721	1705759	1244030	1438397	1049663	159742	0.081	0.095	0.067
2005	1500930	2057813	944047	1554580	1777489	1331671	182001	0.086	0.100	0.071
2006	1301330	1816600	786060	1691260	1936238	1446282	155827	0.071	0.083	0.060
2007	2386320	3134005	1638635	1680980	1931695	1430265	123356	0.056	0.066	0.047
2008	6390190	7704395	5075985	1645700	1895992	1395408	143349	0.068	0.079	0.056
2009	1369100	1873443	864757	1550930	1796581	1305279	183782	0.091	0.107	0.076
2010	972188	1396753	547623	1407530	1646485	1168575	203112	0.108	0.128	0.088
2011	441585	706504	176666	1301230	1538510	1063950	193698	0.111	0.133	0.089
2012	2799910	3718119	1881701	1271950	1518218	1025682	169859	0.104	0.127	0.082
2013	980873	1391740	570006	1200660	1452451	948869	165258	0.111	0.137	0.085
2014	3600950	4877659	2324241	1067470	1316498	818442	136360	0.101	0.127	0.075
2015	2871080	4081507	1660653	949935	1194600	705270	98419	0.078	0.100	0.056
2016	3674910	5277559	2072261	902625	1150788	654462	98810	0.080	0.105	0.056
2017	5084700	8618854	1550546	872011	1128193	615829	82961	0.067	0.088	0.046
2018	2584327*			904098						

* R(age 0) is the geometric mean of the time-series 1983 to 2017.

Sources and references

ICES. 2013. EC request to ICES to evaluate possible modifications of the long-term management arrangement for the Western horse mackerel stock. *In* Report of the ICES Advisory Committee, 2013. ICES Advice 2013, Book 9, Section 9.3.3.4. 7 pp.

ICES. 2014. Horse mackerel (*Trachurus trachurus*) in Divisions IIa, IVa, Vb, VIa, VIIa–c, e–k, and VIIIa–e (Western stock). *In* Report of the ICES Advisory Committee, 2014. ICES Advice 2014, Book 9, Section 9.3.12. 21 pp.

ICES. 2016. Advice basis. *In* Report of the ICES Advisory Committee, 2016. ICES Advice 2016, Book 1, Section 1.2.

ICES. 2017. Report of the Benchmark Workshop on Widely Distributed Stocks (WKWIDE), 30 January–3 February 2017, ICES HQ, Copenhagen, Denmark. ICES CM 2017/ACOM:36. 196 pp.

ICES. 2018. Report of the Working Group on Widely Distributed Stocks (WGWIDE), 28 August- 3 September 2018, Torshavn, Faroe Islands . ICES CM 2018/ACOM: 23. 488 pp