

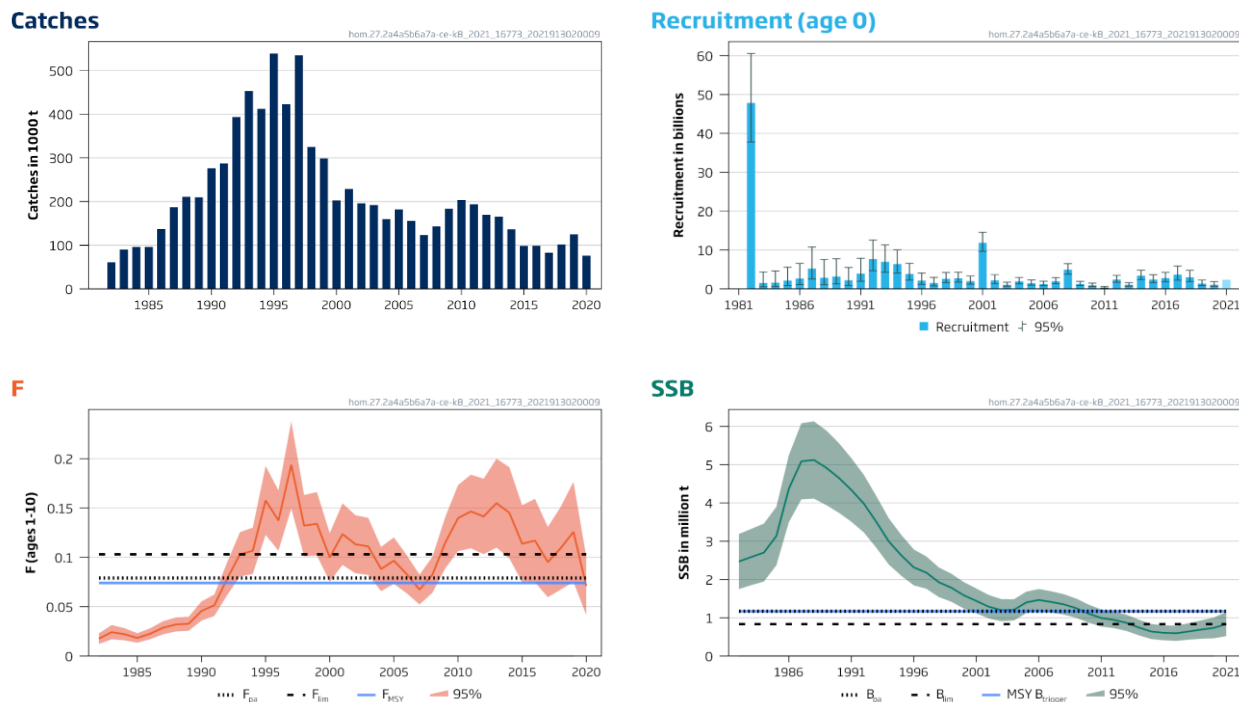
## Horse mackerel (*Trachurus trachurus*) in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k (Northeast Atlantic)

### ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2022 should be no more than 71 138 tonnes.

### Stock development over time

Fishing pressure on the stock is below  $F_{MSY}$  and spawning-stock size is below MSY  $B_{trigger}$  and between  $B_{pa}$  and  $B_{lim}$ .



**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. The assumed recruitment value for 2021 is shaded in a paler colour.

### Catch scenarios

**Table 1** Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. Values in the forecast and for the interim year

Variable	Value	Notes
$F_{ages\ 1-10}$ (2021)	0.070	Based on estimated catches in 2021
SSB (2022)	912 868	Short-term forecast; in tonnes
$R_{age\ 0}$ (2021–2022)	2 345 380	Geometric mean (1983–2020); in thousands
Catch (2021)	81 375	TAC for 2021 (assumed 100% uptake based on the current fishing pattern); in tonnes.

**Table 2** 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 (2022)	F (2022)	SSB (2023)	% SSB change*	% advice change**
ICES advice basis					
MSY approach: $F_{MSY} \times SSB_{2022} / MSY B_{trigger}$	71 138	0.058	942 827	3.3	-12.6
Other scenarios					
$F = F_{MSY}$	90 214	0.074	925 208	1.35	10.9
$F = 0$	0	0	1 008 671	10.5	-100
$F = F_{P05} = F_{pa}$	96 038	0.079	919 832	0.76	18.0
$F = F_{lim}$	123 540	0.103	894 468	-2.0	52
$SSB_{2023} = B_{lim}$	188 749	0.163	834 480	-8.6	132
$SSB_{2023} = MSY B_{trigger} = B_{pa}^{***}$					
$F = F_{2021}$	85 078	0.070	929 950	1.87	4.6
PelAC proposed HCR <sup>^</sup>	36 423	0.029	974 909	6.8	-55

\* SSB 2023 relative to SSB 2022.

\*\* Advice value for 2022 relative to advice value for 2021 (81 375 tonnes).

\*\*\* The  $B_{pa}$  and  $MSY B_{trigger}$  options were left blank because  $B_{pa}$  and  $MSY B_{trigger}$  cannot be achieved in 2023, even with a zero catch in 2022.

<sup>^</sup> Double breakpoint HCR proposed by PelAC 2020 and reviewed by ICES (ICES, 2021a)

The catch advice for 2022 is 12.6% lower compared to that provided in 2021. This is due to the assumption for the forecast (higher catches assumed for the interim year, which leads to lower biomass for the short-term forecast) and a downward revision in the perception of the stock biomass from the assessment.

### Basis of the advice

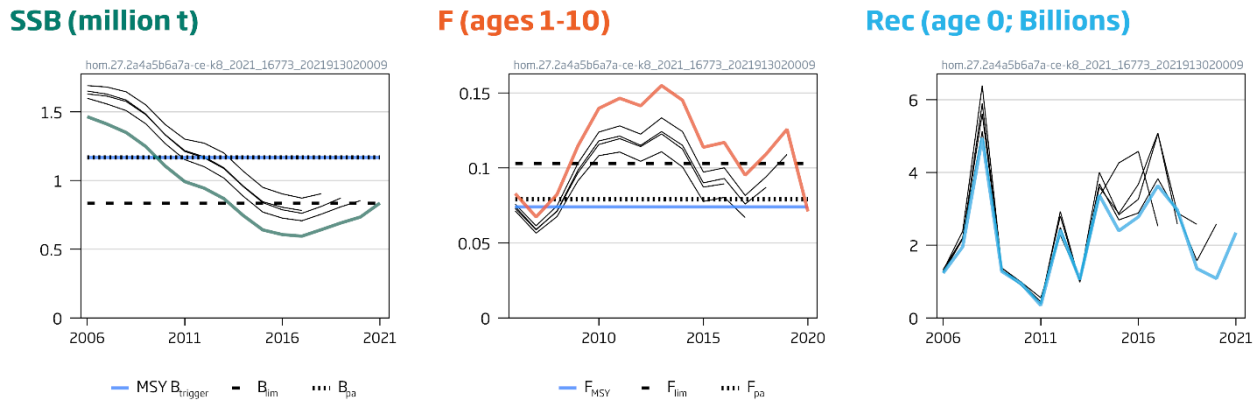
**Table 3** Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is not aware of any agreed precautionary management plan for horse mackerel in this area

### Quality of the assessment

The model shows a consistent retrospective pattern. It rescales the absolute level of SSB and F, with a downward revision in spawning-stock biomass and an upward revision in F.

Data from the Spanish acoustic survey PELACUS is used as an abundance index in the assessment model. The survey could not be carried out in 2020 due to the COVID-19 disruption and therefore the model was performed without this data for 2020. The results of a sensitivity test show that this missing data is unlikely to have had a significant impact on the assessment outputs (ICES, 2021b).



**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. The reference points were revised in 2019 following an interbenchmark (ICES, 2019), and only the last three assessment results should be compared to the reference points.

### Issues relevant for the advice

The forecast uses the assumption that 100% of the TAC will be taken in 2021. This assumption is based on the fishing pattern observed for some of the fleets between January and July 2021 showing higher uptake for this time period than in previous years.

### Reference points

**Table 4** 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 $B_{trigger}$	1 168 272	$B_{pa}$ ; in tonnes	ICES (2019)
	$F_{MSY}$	0.074	Stochastic simulations (EqSim)	ICES (2019)
Precautionary approach	$B_{lim}$	834 480	$B_{pa}/1.4$ ; in tonnes	ICES (2019)
	$B_{pa}$	1 168 272	SSB <sub>2003</sub> ; in tonnes	ICES (2019)
	$F_{lim}$	0.103	Stochastic simulations (EqSim)	ICES (2019)
	$F_{pa}$	0.079	The F that provides a 95% probability for SSB to be above $B^{lim}$ ( $F_{P05}$ )	ICES (2019, 2021b)
	$F_{P05}$	0.079	Stochastic simulations (EqSim)	ICES (2019)
Management plan	SSB <sub>mgt</sub>			
	$F_{mgt}$			

### Basis of the assessment

**Table 5** 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, 2021d)
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 (I4189, 1992–2019); a combined recruitment index (2003–2020) derived from EVHOE (G9527), IGFS (G7212), SCOWCGFS (G4748 and G4815), and SWC-IBTS (G1179 and G4299); PELACUS acoustic biomass index (A2548, 1992–2019). Length frequency distribution from the PELACUS survey. Constant maturity-at-age. Natural mortality: constant = 0.15.
Discards and bycatch	Partial (prior to 2014) and full (since 2014) discard volumes are included in the assessment.
Indicators	None
Other information	The stock was benchmarked in 2017 (ICES, 2017). The reference points were updated in 2019 (ICES, 2019) and 2021 (ICES, 2021b)
Working group	Working Group on Widely Distributed Stocks (WGWIDE)

## History of the advice, catch, and management

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

Year	ICES advice	Catch corresponding 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	99072	2609	101682
2019	MSY approach	≤ 145237	136376	121806	3141	124947
2020	MSY approach	≤ 83954	81796	73682	2740	76422
2021	MSY approach	≤ 81376	81375			
2022	MSY approach	≤ 71138				

\* 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 7** 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 2020 as estimated by ICES.

Catch (2020)	Landings				Discards
	Pelagic trawl	Otter trawl	Purse seine	Unspecified and other gears *	
76 422 tonnes	31.7%	6.1%	20.5%	41.6%	2 740 tonnes
73 682 tonnes					

\* Most of those catches are taken by pelagic trawls.

**Table 8** 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	0	8960	32186	35692	17511	4417	98811
2017	5	697	9332	28170	22510	18307	3939	82961
2018	718	380	8547	38896	27140	23393	2609	101682
2019	867	490	8314	47351	35144	29640	3141	124947
2020	290	96	10387	19037	24232	19639	2740	76422

\* 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 9** 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. All weights are in tonnes and recruitment in thousands. F is the fishing mortality weighted by population numbers.

Year	Recruitment			SSB			Total Catch	F		
	Low	Value at age 0	High	Low	Value	High		Low	Mean ages 1–10	High
1982	37786770	47836900	60560058	1749329	2469210	3189091	61197	0.0121	0.0176	0.023
1983	521495	1506360	4351184	1851663	2587600	3323537	90442	0.0169	0.024	0.031
1984	570806	1618940	4591692	1944833	2702620	3460407	96244	0.0159	0.022	0.028
1985	813406	2127570	5564938	2370526	3134920	3899314	96343	0.0135	0.0183	0.023
1986	1080114	2659390	6547788	3496188	4372860	5249532	137499	0.0170	0.023	0.028
1987	2534965	5227420	10779605	4092555	5087090	6081625	187338	0.022	0.029	0.035
1988	1057215	2828290	7566320	4112447	5122550	6132653	210989	0.025	0.032	0.039
1989	1296098	3172420	7765037	3941753	4916890	5892027	209583	0.026	0.033	0.040
1990	887561	2213230	5518932	3742852	4654220	5565588	275968	0.036	0.046	0.055
1991	1948030	3917750	7879121	3507302	4339050	5170798	287438	0.041	0.051	0.062
1992	4676563	7659570	12545327	3228442	3981390	4734338	393631	0.062	0.078	0.095
1993	4278224	6961380	11327320	2827558	3503640	4179722	453246	0.081	0.103	0.126
1994	4071059	6385880	10016919	2387404	2992100	3596796	412291	0.083	0.107	0.130
1995	2252367	3836720	6535533	2094976	2629550	3164124	538950	0.123	0.158	0.193
1996	1139974	2155970	4077469	1845763	2315190	2784617	422396	0.107	0.137	0.168
1997	760563	1497210	2947342	1756927	2179160	2601393	534673	0.150	0.194	0.24
1998	1573091	2574170	4212313	1539115	1927560	2316005	325340	0.101	0.132	0.163
1999	1723358	2711470	4266131	1418008	1784670	2151332	298992	0.102	0.134	0.166
2000	1206873	1999390	3312330	1239259	1585430	1931601	202732	0.075	0.100	0.125
2001	9647662	11846100	14545503	1114283	1439890	1765497	229081	0.092	0.124	0.155
2002	1302929	2179360	3645332	980637	1287020	1593404	196120	0.084	0.113	0.143
2003	657321	1064110	1722645	907420	1197440	1487460	191856	0.082	0.111	0.140
2004	1291234	1949000	2941837	927305	1204550	1481795	159742	0.066	0.088	0.111
2005	953096	1481480	2302794	1119274	1400640	1682007	182001	0.073	0.097	0.120
2006	778089	1231430	1948903	1178236	1464720	1751204	155827	0.064	0.083	0.102
2007	1327619	1956800	2884160	1132502	1411860	1691218	123356	0.052	0.067	0.082
2008	3777467	4945330	6474257	1082653	1349390	1616127	143349	0.064	0.082	0.101
2009	843764	1277190	1933258	995629	1247790	1499951	183782	0.089	0.115	0.141
2010	593023	938294	1484589	868664	1105300	1341936	203112	0.106	0.140	0.173
2011	191994	344757	619069	768900	991969	1215038	193698	0.109	0.146	0.184
2012	1678714	2417070	3480181	727190	944091	1160992	169859	0.103	0.141	0.180
2013	696426	1053240	1592869	655488	868583	1081678	165258	0.110	0.155	0.200
2014	2376419	3375470	4794524	539209	744841	950473	136360	0.099	0.145	0.191
2015	1581451	2396120	3630457	442928	640294	837660	98419	0.075	0.114	0.153
2016	1824880	2777670	4227922	410688	606453	802218	98810	0.075	0.117	0.159
2017	2241954	3633800	5889729	395120	594977	794835	82961	0.060	0.095	0.131
2018	1848231	2968230	4766931	426547	642427	858307	101682	0.067	0.109	0.151
2019	808630	1356420	2275301	451375	691329	931284	124947	0.075	0.126	0.177
2020	635928	1083960	1847645	462617	734333	1006049	76422	0.041	0.071	0.101
2021		2345380 *		520294	836074	1151854				

\* R (age 0) is the geometric mean of the time-series from 1983 to 2020.

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[Download the stock assessment data and figures.](#)

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