

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 2020 should be no more than 83 954 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 (1983–2018). SSB has been declining since 2006 and has been around B_{lim} since 2015. Fishing mortality has decreased since 2013, but remains above F_{MSY} .

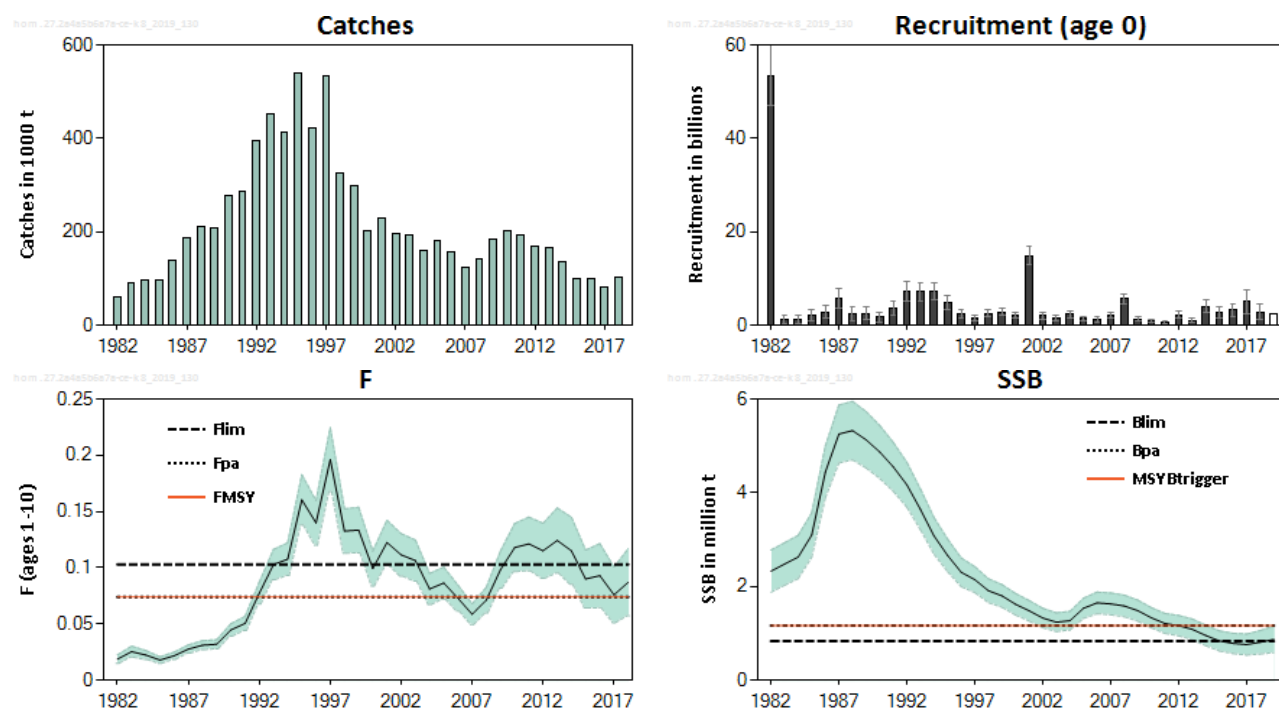


Figure 1 Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. Summary of the stock assessment. Plots show 95% confidence intervals (shaded area). Assumed recruitment value for 2019 is unshaded.

Stock and exploitation status

ICES assesses that fishing pressure on the stock is above F_{MSY} , between F_{pa} and F_{lim} ; spawning stock size is below $MSY B_{trigger}$, 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		
		2016	2017	2018	2017	2018	2019
Maximum sustainable yield	F_{MSY}	✘	✘	✘ Above	$MSY B_{trigger}$	✘	✘ Below trigger
Precautionary approach	F_{pa}, F_{lim}	○	○	○ Increased risk	B_{pa}, B_{lim}	✘	✘ 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
$F_{\text{ages 1–10}}$ (2019)	0.087	$F_{2019} = F_{2018}$
SSB (2020)	950867	Short-term forecast; in tonnes.
$R_{\text{age 0}}$ (2019–2020)	2572649	Geometric mean (1983–2018); in thousands.
Catch (2019)	110381	Short-term forecast; in tonnes.

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 (2020)	F (2020)	SSB (2021)	% SSB change *	% Advice change **
ICES advice basis					
MSY approach: $F_{\text{MSY}} \times \text{SSB}_{2020} / \text{MSY } B_{\text{trigger}}$	83954	0.06	1083932	13.99	-42.20
Other scenarios					
$F = F_{\text{MSY}} = F_{\text{pa}}$	102391	0.074	1067472	12.26	-29.5
$F = 0$	0	0	1159081	21.9	-100
$F = F_{\text{p05}}$	109017	0.079	1061560	11.64	-24.9
$F = F_{\text{lim}}$	140328	0.103	1033654	8.71	-3.38
$\text{SSB (2021)} = B_{\text{lim}}$	365559	0.297	834480	-12.24	151.7
$\text{SSB (2021)} = \text{MSY } B_{\text{trigger}} = B_{\text{pa}}^{***}$					
$F = F_{2019}$	119658	0.087	1052071	10.64	-17.61

* SSB (2021) relative to SSB (2020).

** Advice value for 2020 relative to advice value for 2019 (145 237 t).

*** The B_{pa} and $\text{MSY } B_{\text{trigger}}$ options were left blank because B_{pa} and $\text{MSY } B_{\text{trigger}}$ cannot be achieved in 2021, even with a zero catch in 2020.

Catch advice for 2020 is 42% lower than that for 2019. This is due to both an update of the reference points and a downward revision in the perception of the stock biomass from the assessment.

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	ICES is not aware of any agreed precautionary management plan for horse mackerel in this area.

Quality of the assessment

The assessment method was changed in 2017 and shows the same trend in the stock development as the previous assessment, but rescales the absolute level of SSB and F, with a downward revision in spawning-stock biomass and an upward revision in F.

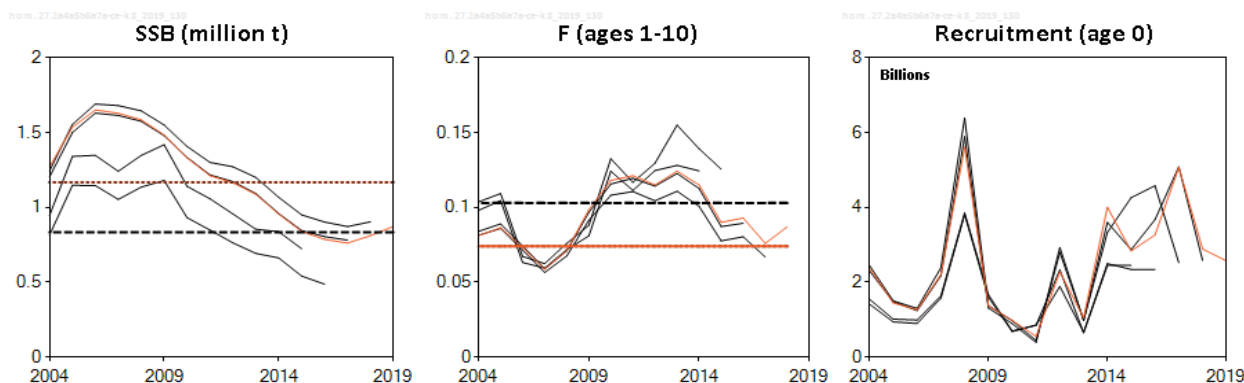


Figure 2 Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. Historical assessment results. Note: since the 2017 assessment, SSB is estimated on 1 January. Prior to 2017 SSB was estimated in May (spawning time). Final year assumed recruitment included.

Issues relevant for the advice

The stock is just above its historical low and this year’s advice is for a decrease in catches compared to last year. The main reasons are the downward revision of the biomass estimates and the update of reference points in the recent inter-benchmark (ICES, 2019a). Given the recent above-average recruitments, the stock is predicted to increase in 2020.

The stock reference points were revised in August 2019 (ICES, 2019a), from 911 587 to 1 168 272 tonnes for MSY $B_{trigger}$ and 0.108 to 0.074 for F_{MSY} . The biomass reference points were derived from the lowest biomass estimate (SSB in 2003) from the stable period where there was no indication of reduced recruitment.

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 $B_{trigger}$	1 168 272 t	B_{pa} in tonnes.	ICES (2019a)
	F_{MSY}	0.074	Stochastic simulations (EqSim)	ICES (2019a)
Precautionary approach	B_{lim}	834 480 t	$B_{pa}/1.4$; in tonnes.	ICES (2019a)
	B_{pa}	1 168 272 t	SSB ₂₀₀₃ ; in tonnes.	ICES (2019a)
	F_{lim}	0.103	Stochastic simulations (EqSim)	ICES (2019a)
	F_{pa}	0.074	$F_{lim}/1.4$	ICES (2019a)
	F_{p05}	0.079	Stochastic simulations (EqSim)	ICES (2019a)
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, 2018).
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 mortality: 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 (ICES, 2017). The reference points were updated in 2019 (ICES, 2019a).
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 two key issues, namely a large-scale genetics project on stock identification and the development of a rebuilding plan with the scientists. The development of a rebuilding plan is at an advanced stage and it is hoped to have a draft available next year.

The research project on genetic composition of horse mackerel stocks was initiated in 2015 with University College Dublin (Ireland). Genetic samples have been taken over the whole distribution area of horse mackerel during the years 2015, 2016, and 2017, with a specific focus on the separation between horse mackerel in the western waters and horse mackerel in the North Sea. A full genome sequencing exercise has been initiated to allow for future mixed-sample analyses.

The industry reported that the main fishery for horse mackerel by the Irish, Dutch, and Danish vessels took place west of Scotland (Division 6.a) at the end of 2018 and during the first months of 2019. The fleets reported observing an increase in small horse mackerel. The Irish demersal fleet reported encountering increased numbers of small horse mackerel to the south and west of Ireland, in 2016, 2017, and 2018.

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, TACs and catches. 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

Year	ICES advice	Predicted catch corresp. to advice **	Agreed TAC *	ICES estimated landings ***	ICES estimated discards ***	ICES estimated catch ***
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			
2020	MSY approach	≤ 83954				

* 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 2018 as estimated by ICES.

Catch (2018)	Landings				Discards
101 682 tonnes	Pelagic trawl 39.4%	Otter trawl 2.7%	Purse seine 19.5%	Unspecified and other gears * 38.6%	2 609 tonnes
	99 072 tonnes				

* Most of those catches are taken by pelagic trawls.

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

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		
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

* 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. All weights in tonnes and recruitment in thousands.

Year	Recruitment (age 0)			SSB			Total catch	F (ages 1–10)		
	Low	Value	High	Low	Value	High		Low	Value	High
1982	46912340	53382300	59852260	1878178	2328100	2778022	61197	0.0150	0.0188	0.023
1983	286781	1158030	2029279	2027045	2480650	2934255	90442	0.021	0.025	0.030
1984	386161	1333480	2280799	2167610	2629270	3090930	96244	0.0185	0.022	0.026
1985	892823	2088790	3284757	2626621	3097870	3569119	96343	0.0151	0.0180	0.021
1986	1399343	2795780	4192217	3893358	4443340	4993322	137499	0.0186	0.022	0.025
1987	3761496	5837920	7914344	4634816	5253010	5871204	187338	0.024	0.028	0.031
1988	1058675	2499700	3940725	4701987	5325910	5949833	210989	0.027	0.031	0.035
1989	1182401	2561810	3941219	4529988	5131330	5732672	209583	0.028	0.032	0.036
1990	731787	1778360	2824933	4306504	4871080	5435656	275968	0.039	0.045	0.050
1991	2133307	3602290	5071273	4032088	4553440	5074792	287438	0.044	0.051	0.057
1992	5249702	7301920	9354138	3692662	4170400	4648138	393631	0.068	0.077	0.087
1993	5163888	7133100	9102312	3210550	3644200	4077850	453246	0.089	0.103	0.116
1994	5329875	7142930	8955985	2687936	3078290	3468644	412291	0.093	0.108	0.122
1995	3457503	4893430	6329357	2315796	2663000	3010204	538950	0.138	0.160	0.183
1996	1429677	2363350	3297023	1995990	2302530	2609070	422396	0.120	0.140	0.160
1997	865688	1556860	2248032	1871541	2147540	2423539	534673	0.168	0.196	0.22
1998	1766465	2579310	3392155	1656750	1911070	2165390	325340	0.113	0.133	0.152
1999	2037913	2832050	3626187	1558207	1799520	2040833	298992	0.113	0.134	0.154
2000	1447824	2115690	2783556	1391374	1621070	1850766	202732	0.084	0.099	0.115
2001	12989835	14918600	16847365	1264331	1482230	1700129	229081	0.103	0.122	0.142
2002	1338274	2062900	2787526	1121032	1328200	1535368	196120	0.093	0.111	0.130
2003	1053184	1645380	2237576	1040352	1239480	1438608	191856	0.088	0.106	0.125
2004	1654958	2385730	3116502	1073667	1271170	1468673	159742	0.067	0.081	0.095
2005	909666	1447860	1986054	1321018	1536410	1751802	182001	0.072	0.086	0.101
2006	771086	1262660	1754234	1420700	1651270	1881840	155827	0.061	0.073	0.085
2007	1521151	2205920	2890689	1396706	1629560	1862414	123356	0.049	0.059	0.068
2008	4463014	5610870	6758726	1355725	1585800	1815875	143349	0.060	0.071	0.083
2009	891842	1376270	1860698	1260318	1484240	1708162	183782	0.082	0.098	0.115

Year	Recruitment (age 0)			SSB			Total catch	F (ages 1–10)		
	Low	Value	High	Low	Value	High		Low	Value	High
2010	580431	982298	1384165	1115754	1331920	1548086	203112	0.097	0.118	0.139
2011	251974	553877	855780	999356	1211620	1423884	193698	0.097	0.121	0.145
2012	1548944	2280130	3011316	947878	1164950	1382022	169859	0.091	0.115	0.140
2013	645943	1048390	1450837	867234	1087630	1308026	165258	0.095	0.124	0.153
2014	2696104	4004110	5312116	737887	955525	1173163	136360	0.085	0.115	0.145
2015	1678566	2837020	3995474	625250	838866	1052482	98419	0.064	0.090	0.116
2016	1892061	3263620	4635179	571029	786772	1002515	98810	0.064	0.093	0.121
2017	2514527	5070720	7626913	537399	761613	985827	82961	0.051	0.076	0.101
2018	1285297	2887740	4490183	562585	811685	1060785	101682	0.057	0.087	0.117
2019		2572649*		588978	872831	1156684				

* R(age 0) is the geometric mean of the time-series from 1983 to 2018.

Sources and references

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. 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. 2019a. Report of the Inter-Benchmark Protocol on reference points for Western 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) (IBPWHM). ICES Scientific Reports. In prep.

ICES. 2019b. Working Group on Widely Distributed Stocks (WGWIDE). ICES Scientific Reports. 1:36. 948 pp. <http://doi.org/10.17895/ices.pub.5574>

Recommended citation: ICES. 2019. 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). *In* Report of the ICES Advisory Committee, 2019. ICES Advice 2019, hom.27.2a4a5b6a7a-ce-k8, <https://doi.org/10.17895/ices.advice.4883>.