ICES Advice on fishing opportunities, catch, and effort
Bay of Biscay and the Iberian Coast ecoregion
Published 30 June 2022

ICES
CIEM

International Council for
the Exploration of the Sea
Conseil International pour
l'Exploration de la Mer

Hake (*Merluccius merluccius*) in divisions 8.c and 9.a, Southern stock (Cantabrian Sea and Atlantic Iberian waters)

ICES advice on fishing opportunities

ICES advises that when the EU multiannual plan (MAP) for the Western Waters and adjacent waters is applied, catches in 2023 that correspond to the F ranges in the plan are between 8322 tonnes and 15 925 tonnes. According to the MAP, catches higher than those corresponding to F_{MSY} (11 791 tonnes) can only be taken under conditions specified in the MAP, while the entire range is considered precautionary when applying ICES advice rule.

Stock development over time

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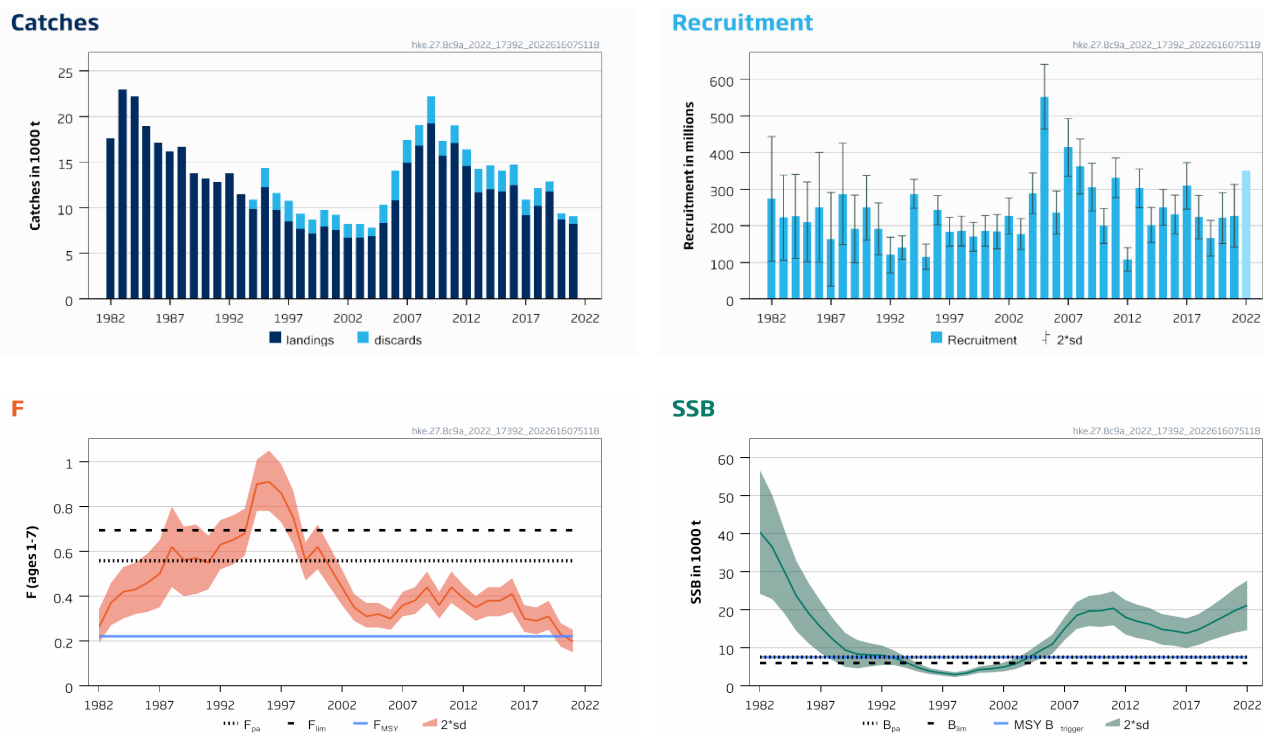

Figure 1   Hake in divisions 8.c and 9.a, Southern stock. Summary of the stock assessment. The assumed recruitment value for 2022 is shaded in a lighter colour. Discards are included since 1994. Estimates for SSB are for females only and the 2022 SSB estimate is a model forecast.

Catch scenarios

Table 1   Hake in divisions 8.c and 9.a, Southern stock. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
$F_{ages\ 1-7}$ (2022)	0.25	F_{sq} = Average F (2019–2021).
SSB (2023)	21850	Short-term forecast (STF);for females in tonnes.
$R_{age\ 0}$ (2022)	350934	Estimated by the model based on the stock–recruitment relationship; in thousands.
$R_{age\ 0}$ (2023)	354110	Estimated by the model based on the stock–recruitment relationship; in thousands.
Total catch (2022)	11738	STF; in tonnes.
Projected landings (2022)	10703	STF; assuming average landings ratio by length (2019–2021); in tonnes.
Projected discards (2022)	1035	STF; assuming average discards ratio by length (2019–2021); in tonnes.

Table 2   Hake in divisions 8.c and 9.a, Southern stock. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2023)	Projected landings (2023)	Projected discards (2023)	$F_{ages\ 1–7}$ total (2023)	$F_{ages\ 1–7}$ projected landings[^^] (2023)	$F_{ages\ 1-7}$ projected discards[^^] (2023)	SSB (2024)	% SSB change*	% advice change**
ICES advice basis									
EU MAP F = F_{MSY}[^]	11791	10599	1192	0.22	0.199	0.022	23936	10	70
EU MAP F = $F_{MSY\ lower}$	8322	7491	830	0.15	0.136	0.0150	25747	18	20
EU MAP F = $F_{MSY\ upper}$	15925	14288	1637	0.31	0.28	0.032	21794	0	129
Other scenarios									
F = 0	0	0	0	0	0	0	30141	38	−100
F = F_{lim}	30055	26752	3303	0.69	0.62	0.076	14641	−33	333
F = F_{pa}	25611	22861	2750	0.56	0.50	0.060	16859	−23	269
SSB (2024) = B_{lim}	48198	42169	6030	1.56	1.37	0.196	6011	−72	594
SSB (2024) = B_{pa}	44814	39373	5441	1.34	1.18	0.163	7556	−65	545
SSB (2024) = MSY $B_{trigger}$	44814	39373	5441	1.34	1.18	0.163	7556	−65	545
SSB (2024) = SSB(2023)	15816	14191	1625	0.31	0.28	0.032	21850	0	128
F = F_{2022}	12950	11635	1315	0.25	0.22	0.025	23334	7	86

* SSB 2024 relative to SSB 2023.
** Advice values for 2023 relative to the corresponding 2022 values (category 3 advice; ICES, 2021).
^ The EU multiannual plan (MAP; EU, 2019).
^^ $F_{landings}$ and $F_{discards}$ were calculated using the ratios of the projected landings and discards ($F_{landings} = F_{total}$*landings/catch; $F_{discards} = F_{total}$*discards/catch).

The advice increases by 70% due to a change in assessment and advice basis from PA (category 3) to MSY (category 1) and a change in the perception of the stock with an increase in SSB in recent years with the new assessment (ICES, 2022a).

Basis of the advice

Table 3   Hake in divisions 8.c and 9.a, Southern stock. The basis of the advice.

Advice basis	Management plan approach
Management plan	The EU multiannual plan (MAP) for stocks in the Western Waters and adjacent waters applies to this stock. The plan specifies conditions for setting fishing opportunities depending on stock status and making use of the F_{MSY} range for the stock. In accordance with the MAP, "provided that the stock is above MSY Btrigger: (a) if, on the basis of scientific advice or evidence, it is necessary for the achievement of the objectives laid down in Article 3 in the case of mixed fisheries; (b) if, on the basis of scientific advice or evidence, it is necessary to avoid serious harm to a stock caused by intra- or inter-species stock dynamics; or (c) in order to limit variations in fishing opportunities between consecutive years to not more than 20 %." ICES considers that the F_{MSY} range for this stock used in the MAP is precautionary. Full details of the plan are described in Regulation 2019/472 (EU, 2019).

Quality of the assessment

The stock was benchmarked in 2022 and is now in category 1. A new model was developed in Stock Synthesis framework with sex-separated growth and natural mortality (ICES, 2022a).

Discards are estimated by the model, which shows a tendency to underestimate them. If this pattern continues, there is a risk that the catch advice will be overestimated.
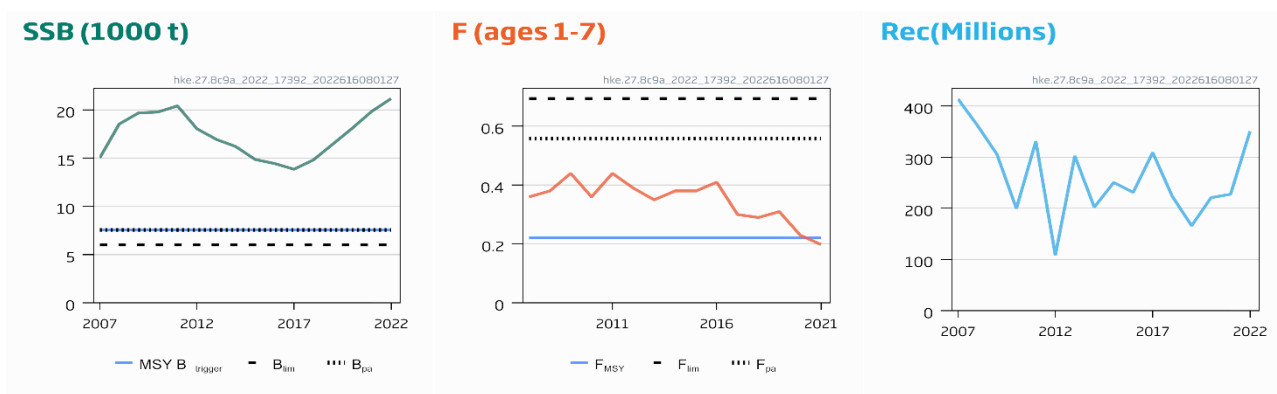
SSB (1000 t) **F (ages 1-7)** **Rec(Millions)**

Figure 2   Hake in divisions 8.c and 9.a, Southern stock. Historical assessment results. The basis for the advice has changed from a trends-based analysis (category 3) to an analytical assessment (category 1) in 2022 and there are no previous estimates of SSB, F, or R.

Issues relevant for the advice

There is no information to present for this stock.

Reference points

Table 4   Hake in divisions 8.c and 9.a, Southern stock. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	7556	B_{pa}; females only, in tonnes.	ICES (2022a)
	F_{msy}	0.221	Stock Synthesis simulations.	ICES (2022a)
Precautionary approach	B_{lim}	6011	The breakpoint of the segmented regression stock–recruitment relationship; females only, in tonnes.	ICES (2022a)
	B_{pa}	7556	$\exp(1.654 \times \sigma) \times B_{lim}$, $\sigma = 0.139$; females only, in tonnes.	ICES (2022a)
	F_{lim}	0.694	The F that provides a 50% probability for SSB to be above B_{lim}.	ICES (2022a)
	F_{pa}	0.558	F_{P05} with advice rule (AR): the F that provides a 95% probability for SSB to be above B_{lim}.	ICES (2022a)
Management plan	F_{MGT}	Not defined		
	SSB_{MGT}	Not defined		
	MAP MSY $B_{trigger}$	7556	MSY $B_{trigger}$; females only, in tonnes.	ICES (2022a)
	MAP B_{lim}	6011	B_{lim}; females only, in tonnes.	ICES (2022a)
	MAP F_{msy}	0.221	F_{MSY}	ICES (2022a)
	MAP range F_{lower}	0.151	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared to MSY.	ICES (2022a)
	MAP range F_{upper}	0.311	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared to MSY.	ICES (2022a)

Basis of the assessment

Table 5   Hake in divisions 8.c and 9.a, Southern stock. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022b).
Assessment type	Length-based and sex-disaggregated model (Stock Synthesis; ICES, 2022c) that uses landings and discards in the assessment and forecast.
Input data	Commercial catches (international landings, discards, and length frequencies from catch sampling); three survey indices: SP-NSGFS-WIBTS-Q4 (1983 to 2021; G2784), SPGCGFS-WIBTS-Q4 (1997 to 2020; G4309), and Pt-PGFS-Q4 (1989-2021; G8899); two commercial indices (SP-TRAWL [2004 to 2021] and SP-VOLPAL (2009 to 2021); constant maturity, and sex and age dependent natural mortality.
Discards and bycatch	Included in the assessment since 1994.
Indicators	None.
Other information	Benchmarked in 2022 (ICES, 2022a).
Working group	Working Group for the Bay of Biscay and the Iberian Waters Ecoregion (WGBIE).

History of the advice, catch, and management

Table 6   Hake in divisions 8.c and 9.a, Southern stock. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice	Catch/landings corresponding to advice**	Agreed TAC***	ICES estimated landings	ICES estimated discards	ICES estimated catch
1987	Precautionary TAC; juvenile protection	15000	25000	16185	-	-
1988	TAC; juvenile protection	15000	25000	16653	-	-
1989	TAC; juvenile protection	15000	20000	13786	-	-
1990	TAC; juvenile protection	15000	20000	13190	-	-
1991	Precautionary TAC	10000	18000	12827	-	-
1992	Precautionary TAC	10300	16000	13798	473	14271
1993	F = 10% of F_{91}	1000	12000	11489	683	12172
1994	F lowest possible, at least reduced by 80%	2000	11500	9865	994	10859
1995	F lowest possible	-	8500	12239	2102	14341
1996	F lowest possible	-	9000	9730	1910	11640
1997	F lowest possible	-	9000	8499	2270	10769
1998	60% reduction in F	4000	8200	7683	1681	9364
1999	Reduce F below F_{pa}	9500	9000	7171	1519	8690
2000	20% reduction from 1994–1998 average landings	< 7700	8500	7902	1835	9737
2001	Reduce F below F_{pa}; no increase in landings	8500	8900	7581	1662	9243
2002	F below F_{pa}	< 8000	8000	6697	1492	8189
2003	Lowest possible catch/ rebuilding plan	0	7000	6745	1461	8206
2004	Zero catch	0	5950	6940	913	7854
2005	Zero catch	0	5968	8302	1978	10280
2006	Zero catch	0	6661	10799	3262	14061
2007	Zero catch	0	6128	14934	2504	17438
2008	Zero catch	0	7047	16773	2311	19084
2009	Zero catch	0	8104	19242	2935	22177
2010	Reach B_{pa} in 2011	4900	9300	15736	1580	17316
2011	See scenarios	< 9900	10695	17072	1948	19020
2012	MSY transition	< 14323	12299	14573	1822	16395
2013	MSY transition	< 10552	14144	11661	2549	14209
2014	MSY transition	< 13123*	16266	12011	2602	14614

Year	ICES advice	Catch/landings corresponding to advice**	Agreed TAC***	ICES estimated landings	ICES estimated discards	ICES estimated catch
2015	MSY approach	< 8417*	13826	11786	2292	14077
2016	MSY approach	≤ 6078	10674	12443	2313	14756
2017	MSY approach	≤ 8049	10520	9171	1676	10847
2018	MSY approach	≤ 8561	9258	10183	1942	12125
2019	MSY approach	≤ 8281	9258	11800	1061	12861
2020	Management plan	6615 (range 4694–8991)#	8752	8732	438^	9171
2021	Precautionary approach	≤ 7825	8517	8214	851	9065
2022	Precautionary approach	≤ 6947	7836			
2023	Management plan	11791 (range 8322–15925)#				

*This value refers to total catch, including discards.

** From 2016 this refers to total catch, including unwanted catch.

*** Applies to ICES Division 8.c and subareas 9 and 10; EU waters of CECAF 34.1.1.

Catches corresponding to F_{MSY}, EU MAP range in brackets (EU, 2019).

^ 2020 discards were not used because of poor sampling and were estimated by the model as 650 t.

History of catch and landings

Table 7   Hake in divisions 8.c and 9.a, Southern stock. Catch distribution by fleet in 2021 as estimated by ICES. All weights are in tonnes.

Catch	Landings		Discards
9065	43% trawlers	57% other fleets	851
	8214		

Table 8   Hake in divisions 8.c and 9.a, Southern stock. History of commercial catch and landings by country. All weights are in tonnes.

Year	Spain		Portugal		France	Unallocated	Total		
	Discards	Landings	Discards	Landings	Landings		Discards	Landings	Catch
1960								16073	16073
1961								17655	17655
1962								17553	17553
1963								19139	19139
1964								24658	24658
1965								28516	28516
1966								23074	23074
1967								20771	20771
1968								19769	19769
1969								18254	18254
1970								11707	11707
1971								11267	11267
1972		17300		8800	0			26100	26100
1973		20800		13800	200			34800	34800
1974		14100		8600	100			22800	22800
1975		19000		10400	100			29500	29500
1976		16900		9100	100			26100	26100
1977		9200		6100	200			15500	15500
1978		8500		4800	100			13400	13400
1979		11200		5800				17000	17000
1980		12700		6800				19500	19500
1981		10500		6000				16500	16500
1982		10098		7494				17592	17592
1983		14906		8044				22950	22950
1984		16664		5515				22179	22179
1985		13121		5820				18941	18941

Year	Spain		Portugal		France	Unallocated	Total		
	Discards	Landings	Discards	Landings	Landings		Discards	Landings	Catch
1986		12207		4947	7			17161	17161
1987		11362		4798	25			16185	16185
1988		10612		6017	24			16653	16653
1989		9187		4583	16			13786	13786
1990		9765		3399	26			13190	13190
1991		8866		3955	6			12827	12827
1992	143	8700	329	5098			473	13798	14271
1993	242	7577	441	3912			683	11489	12172
1994	286	6778	709	3087			994	9865	10859
1995	927	8648	1175	3591			2102	12239	14341
1996	915	6966	995	2765			1910	9730	11640
1997	1070	6084	1199	2415			2270	8499	10769
1998	571	5045	1110	2638			1681	7683	9364
1999	353	3961	1166	3210			1519	7171	8690
2000	622	4651	1213	3251			1835	7902	9737
2001	370	4359	1292	3222			1662	7581	9243
2002	379	3923	1112	2774			1492	6697	8189
2003	411	4653	1050	2092			1461	6745	8206
2004	222	4845	691	2065			913	6910	7824
2005	379	6240	1599	2061			1978	8301	10279
2006	2654	8673	608	2126			3262	10799	14061
2007	1192	12802	1312	2132			2504	14934	17438
2008	1455	14563	856	2210			2311	16773	19084
2009	976	16887	1959	2353			2935	19240	22175
2010	1004	13026	575	2341	362		1580	15729	17309
2011	1209	6452	739	2214		8396	1948	17062	19010
2012	1353	5831	470	2607		6136	1823	14573	16396
2013	2223	7154	330	2744	308	1455	2553	11661	14213
2014	2020	7256	582	2374	136	2246	2602	12011	14614
2015	2061	6758	231	2000	238	2789	2292	11786	14077
2016	2149	8063	164	1973	233	2174	2313	12443	14756
2017	1432	6857	244	1484	67	763	1676	9171	10847
2018	1765	6441	177	1489	60	2193	1942	10183	12125
2019	754	7267	307	1915	5	2612	1061	11800	12861
2020	211	6570	227	1904	52	206	438	8732	9171
2021	573	6161	277	1963	90	0	851	8214	9065

Summary of the assessment

Table 9   Hake in divisions 8.c and 9.a, Southern stock. Assessment summary. Weights are in tonnes and recruitment is in thousands. 'High' and 'Low' refer to two standard deviations (sd) confidence intervals. The SSB is for females only.

Year	Recruitment			Stock size			Landings (tonnes)	Discards (tonnes)	Fishing pressure		
	$R_{age\ 0}$	High	Low	SSB	High	Low			$F_{ages\ 1-7}$	High	Low
1982	273723	444260	103186	40456	56742	24169	17592	0	0.26	0.34	0.19
1983	222433	338956	105910	36570	50305	22834	22950	0	0.37	0.46	0.27
1984	225682	340510	110854	30139	41198	19080	22179	0	0.42	0.53	0.3
1985	210797	319908	101686	23612	32850	14373	18941	0	0.43	0.55	0.32
1986	250260	400464	100056	19117	27071	11163	17161	0	0.46	0.59	0.33
1987	163263	291151	35375	15389	22215	8564	16185	0	0.5	0.65	0.35
1988	287486	425979	148993	12201	17743	6658	16653	0	0.62	0.8	0.44
1989	191758	283988	99528	9460	13942	4979	13786	0	0.56	0.71	0.4
1990	249786	338116	161456	8339	12077	4601	13190	0	0.57	0.72	0.41
1991	192034	262797	121271	8147	11237	5057	12827	0	0.55	0.67	0.43
1992	120216	169140	71292	8056	10629	5482	13798	0	0.63	0.74	0.52

Year	Recruitment			Stock size			Landings (tonnes)	Discards (tonnes)	Fishing pressure		
	$R_{age\ 0}$	High	Low	SSB	High	Low			$F_{ages\ 1-7}$	High	Low
1993	140437	172587	108287	7389	9332	5446	11489	0	0.65	0.76	0.54
1994	287587	327050	248124	6151	7588	4714	9865	994	0.68	0.79	0.58
1995	115690	150351	81029	4785	5871	3699	12239	2102	0.9	1.01	0.78
1996	242718	282721	202715	3838	4623	3053	9730	1910	0.91	1.05	0.78
1997	183817	223348	144286	3367	4071	2663	8499	2270	0.86	0.99	0.73
1998	185626	226412	144840	2973	3616	2329	7683	1681	0.75	0.87	0.63
1999	170205	209715	130695	3402	4107	2696	7171	1519	0.56	0.64	0.47
2000	186244	228224	144264	4273	5129	3417	7902	1835	0.62	0.72	0.52
2001	184247	230878	137616	4517	5519	3515	7581	1662	0.53	0.62	0.44
2002	226857	276259	177455	4960	6136	3784	6697	1492	0.44	0.52	0.36
2003	177771	219741	135801	5815	7229	4401	6745	1461	0.35	0.41	0.29
2004	288913	344448	233378	7331	9024	5638	6910	913	0.31	0.37	0.26
2005	553089	641602	464576	9226	11301	7152	8301	1978	0.32	0.37	0.26
2006	236310	295282	177338	10944	13474	8414	10799	3262	0.3	0.34	0.25
2007	414119	493008	335230	15020	18061	11978	14934	2504	0.36	0.42	0.31
2008	362243	437451	287035	18521	22080	14963	16773	2311	0.38	0.44	0.32
2009	305965	371015	240915	19681	23649	15712	19240	2935	0.44	0.51	0.37
2010	199719	247468	151970	19770	24053	15488	15730	1580	0.36	0.42	0.3
2011	331296	385700	276892	20411	24911	15910	17062	1948	0.44	0.51	0.37
2012	108251	140543	75959	18040	22569	13510	14573	1823	0.39	0.45	0.33
2013	302658	355653	249663	16936	21339	12534	11661	2553	0.35	0.4	0.29
2014	202335	250529	154141	16196	20456	11937	12011	2602	0.38	0.44	0.31
2015	250613	299663	201563	14854	18890	10818	11786	2292	0.38	0.44	0.31
2016	231301	284106	178496	14435	18344	10526	12443	2313	0.41	0.48	0.33
2017	309336	372883	245789	13847	17747	9947	9171	1676	0.3	0.36	0.24
2018	223962	283546	164378	14813	18880	10746	10183	1942	0.29	0.35	0.23
2019	166006	214762	117250	16452	20880	12024	11800	1061	0.31	0.38	0.25
2020	220969	290358	151580	18095	23173	13018	8732	650*	0.23	0.28	0.17
2021	227692	313250	142134	19836	25685	13987	8214	851	0.198	0.25	0.15
2022	350934			21167	27716	14618					

*Discards estimated by the model.

Sources and references

EU. 2019. Regulation (EU) 2019/472 of the European Parliament and of the Council of 19 March 2019 establishing a multiannual plan for stocks fished in the Western Waters and adjacent waters, and for fisheries exploiting those stocks, amending Regulations (EU) 2016/1139 and (EU) 2018/973, and repealing Council Regulations (EC) No 811/2004, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007 and (EC) No 1300/2008. Official Journal of the European Union, L 83: 1–17. http://data.europa.eu/eli/reg/2019/472/oj.

ICES. 2021. Hake (*Merluccius merluccius*) in divisions 8.c and 9.a, Southern stock (Cantabrian Sea and Atlantic Iberian waters). *In* Report of the Advisory Committee, 2021. ICES Advice 2021, hke.27.8c9a, https://doi.org/10.17895/ices.advice.7776.

ICES. 2022a. Benchmark workshop on anglerfish and hake (WKANGHAKE). ICES Scientific Reports. 4:21. http://doi.org/10.17895/ices.pub.20068997.

ICES. 2022b. Advice on fishing opportunities. *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, Section 1.1.1. https://doi.org/10.17895/ices.advice.19928060.

ICES. 2022c. Working Group for the Bay of Biscay and the Iberian Waters Ecoregion (WGBIE). ICES Scientific Reports. 4:52. http://doi.org/10.17895/ices.pub.20068988.