Hake (*Merluccius merluccius*) in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock (Greater North Sea, Celtic Seas, and the northern Bay of Biscay)

ICES advice on fishing opportunities

Please note: The present advice replaces the advice given in June 2020 for catches in 2021.[1]

ICES advises that when the MSY approach is applied, catches in 2021 should be no more than 102 888 tonnes.

ICES notes the existence of a precautionary management plan developed and adopted by one of the relevant management authorities for this stock.

Note: This advice sheet is abbreviated due to the COVID-19 disruption. The previous advice issued for 2020 is attached as Annex 1.

Stock development over time

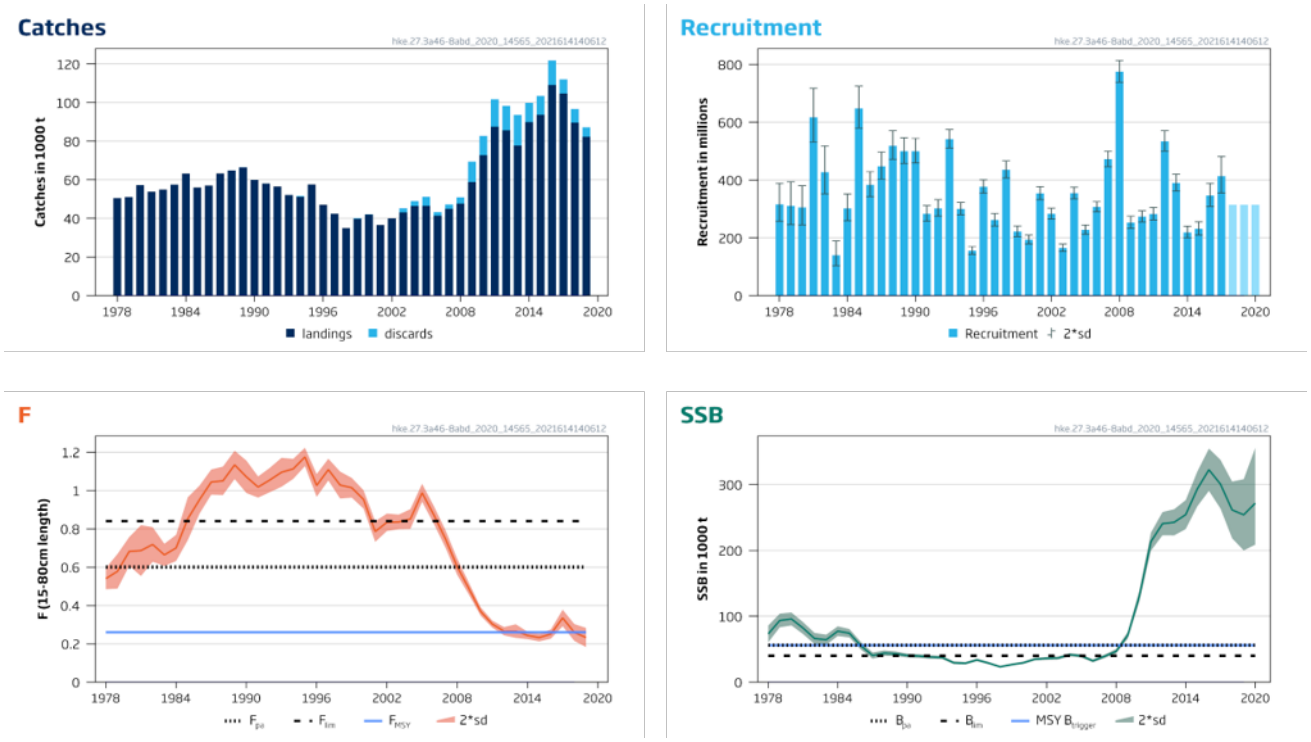

Figure 1 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Summary of the stock assessment. Complete discard estimates are available only since 2003. Plots show 95% confidence intervals (shaded area). F confidence intervals derived from standard deviations calculated internally by the model for F at-age values. Assumed recruitment values are unshaded.

[1] This advice has been updated due to the correction of a mistake in the recruitment estimate, this updated advice is 4 231 tonnes greater than the originally published advice (98 657 tonnes).

Stock and exploitation status

Table 1 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. State of the stock and fishery relative to reference points.

		Fishing pressure				Stock size			
		2017	2018	2019		2018	2019	2020	
Maximum sustainable yield	F_{MSY}	✗	✓	✓	Appropriate	MSY $B_{trigger}$	✓	✓	✓ Above trigger
Precautionary approach	F_{pa},F_{lim}	✓	✓	✓	Harvested sustainably	B_{pa},B_{lim}	✓	✓	✓ Full reproductive capacity
Management plan	F_{MGT}	–	–	–	Not applicable	B_{MGT}	–	–	– Not applicable

Catch scenarios

Table 2 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
F (2020)	0.28	Mean $F_{2017\text{-}2019}$.
SSB (2021)	274559	Short-term forecast; in tonnes.
R (2020-2021)	314897	Geometric mean 1990–2017; in thousands.
Total catch (2020)	103967	Forecast catch from the assessment model (based on F_{2020} = mean F); in tonnes.
Wanted catch (2020)	93533	Assuming average landings rate during 2017–2019; in tonnes.
Unwanted catch (2020)	10434	Assuming average discards rate during 2017–2019; in tonnes.

Table 3 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Annual catch scenarios. All weights are in tonnes. Note: The % change in TAC is not computed because the stock area does not correspond to the area for the TAC.

Basis	Total catch (2021)	Projected landings^ (2021)	Projected discards^ (2021)	F_{total} (2021)	$F_{projected\ landings}$ (2021)	$F_{projected\ discards}$ (2021)	SSB (2022)	% SSB change *	% advice change **
ICES advice basis									
MSY approach = F_{MSY}	102888	92233	10655	0.26	0.197	0.063	304738	11.0	-1.79
Other scenarios									
EU MAP ***: F_{MSY}	102888	92233	10655	0.26	0.197	0.063	304738	11.0	-1.79
F = MAP $F_{MSY\ lower}$	74524	66917	7607	0.18	0.136	0.044	332323	21	-29
F = MAP $F_{MSY\ upper}$	146543	130991	15551	0.4	0.3	0.097	262254	-4.5	40
F = 0	0	0	0	0	0	0	404772	47	-100
F_{pa}	197746	176064	21682	0.6	0.45	0.146	212333	-23	89
F_{lim}	245437	217542	27896	0.84	0.64	0.2	165660	-40	134
SSB (2022) = B_{lim}	369784	320720	49064	2.3	1.76	0.57	40000	-85	253
SSB (2022) = B_{pa}	354883	309148	45735	1.96	1.48	0.48	56002	-80	239
SSB (2022) = MSY $B_{trigger}$	354883	309148	45735	1.96	1.48	0.48	56002	-80	239
F = F_{2020}	108076	96852	11224	0.276	0.209	0.067	299692	9.2	3.2

^ "Projected landings" is the predicted landed catch above the minimum conservation reference size. "Projected discards" refers to landings below the minimum conservation reference size and discards.
* SSB 2022 relative to SSB 2021.
** Total catch advice for 2021 relative to the catch advice for 2020 (104 763 tonnes).
*** The EU multiannual plan (MAP; EU, 2019).

The advice for 2021 is about 2% lower than the advice for 2020 because the perception of the stock has been revised downwards.

Quality of the assessment

The perception of the stock has been revised downwards compared to the previous assessment.

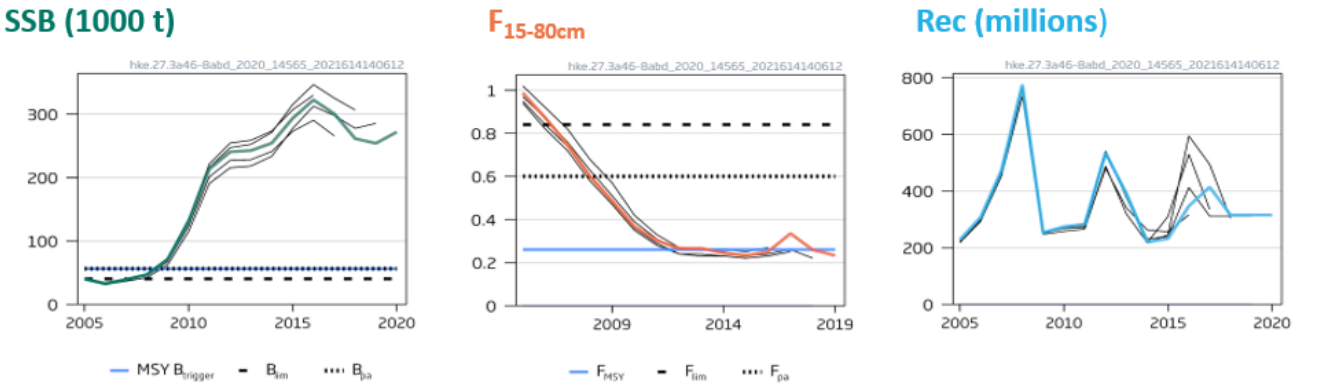

Figure 2 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Historical assessment results. The last three years of geometric mean recruitment are included.

History of the advice, catch, and management

Table 4 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. ICES advice and catch. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC*	ICES landings	Discards	ICES catch
1987	Precautionary TAC; juvenile protection			63500	63369		
1988	Precautionary TAC; juvenile protection		54000	66200	64823	**	
1989	Precautionary TAC; juvenile protection		54000	59700	66473	**	
1990	Precautionary TAC; juvenile protection		59000	65100	59954		
1991	Precautionary TAC; juvenile protection		59000	67000	58129		
1992	If required, precautionary TAC		61500	69000	56617		
1993	Enforce juvenile protection legislation		-	71500	52144		
1994	F significantly reduced		-	60000	51259	**	
1995	30% reduction in F		31000	55100	57621		
1996	30% reduction in F		39000	51100	47210		
1997	20% reduction in F		54000	60100	42465		
1998	20% reduction in F		45000	59100	35060		
1999	Reduce F below Fpa		-	55100	39814	**	
2000	50% reduction in F		-	42100	42026	**	
2001	Lowest possible catch/recovery plan		-	22600	36675		
2002	Lowest possible catch/recovery plan		-	27000	40105		
2003	Lowest possible catch/recovery plan		-	30000	43162	1393	44555
2004	70% reduction in F or recovery plan		-	39100	46416	2614	49029
2005	F = 0.19		33000	42600	46550	4583	51133
2006	F = 0.25		44000	43900	41469	1222	42691
2007	Recovery plan limits		50500	52700	45093	2165	47258
2008	Recovery plan limits		54000	54000	47822	3368	51190

Year	ICES advice	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC*	ICES landings	Discards	ICES catch
2009	F = 0.25 = Fpa		51500	51500	58781	11033	69814
2010	F = 0.25 = Fpa		55200	55105	72760	12118	84878
2011	See scenarios		50600	55105	87540	13903	101443
2012	MSY transition		51900	55105	85677	14870	100547
2013	MSY transition		45400	69440	77708	15400	93108
2014	MSY approach		81846	81846	89928	9800	99728
2015	MSY approach		78457	90849	95023	10900	105923
2016	MSY approach	≤ 109592	≤ 96651	108764	107530	11114	118644
2017	MSY approach	≤ 123777		119765	104670	7100	111770
2018	MSY approach	≤ 115335		111785	89695	6493	96188
2019	MSY approach	≤ 142240		141160	82298***	4940***	87238***
2020	MSY approach	≤ 104763		112903			
2021^	MSY approach	≤ 102888					

* Sum of area TACs, corresponding to northern stock plus Division 2.a (EC zone only) and 3.b-d (except for 2019 and 2020).

** Partial discard estimates are available and used in the assessment. For remaining years for which no values are presented, some estimates are available but not considered valid and thus not used in the assessment.

*** Preliminary

^ Advice updated in June 2021 because of a mistake in the recruitment assumption in the previously published assessment and advice (ICES, 2021).

Summary of the assessment

Table 5 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Assessment summary. Weights are in tonnes and recruitment is in thousands of individuals. Highs and lows are 95% confidence intervals.

Year	Recruitment	High	Low	SSB	High	Low	Landings	Discards	$F_{15\text{-}80cm\ length}$	High	Low
1978	315996	388583	256968	73090	85920	60261	50551		0.54	0.59	0.48
1979	310857	393618	245497	93587	104035	83140	51096		0.58	0.67	0.49
1980	305081	380259	244766	95892	105762	86022	57265		0.68	0.76	0.61
1981	617154	717512	530833	82151	91304	72998	53918		0.69	0.82	0.55
1982	427138	517828	352331	66162	74728	57596	54994		0.72	0.81	0.63
1983	139974	189226	103541	64255	72049	56460	57507		0.66	0.72	0.61
1984	302111	351756	259472	77359	84743	69975	63286		0.70	0.77	0.63
1985	648048	724559	579617	74200	80650	67749	56099		0.85	0.96	0.74
1986	383385	429068	342566	55031	60823	49239	57092		0.95	1.03	0.88
1987	447444	496833	402965	40350	45143	35557	63369		1.04	1.11	0.98
1988	518750	570645	471575	43899	48067	39730	64823	2	1.05	1.12	0.98
1989	499813	546249	457325	43064	46711	39416	66473	73	1.13	1.21	1.06
1990	499783	544355	458861	40374	43316	37431	59954		1.07	1.16	0.99
1991	283311	311662	257539	39593	42402	36784	58129		1.02	1.07	0.96
1992	301963	331981	274659	38086	40853	35319	56617		1.05	1.12	0.99
1993	541699	574573	510706	37336	39753	34920	52144		1.10	1.17	1.02
1994	300480	322694	279796	29358	31437	27279	51259	356	1.11	1.17	1.06
1995	155659	169691	142787	28628	30527	26729	57621		1.17	1.22	1.13
1996	376780	400394	354559	33657	35621	31693	47210		1.03	1.09	0.97
1997	261910	284406	241193	28857	30703	27011	42465		1.11	1.17	1.05
1998	435630	466057	407190	23203	24739	21667	35060		1.03	1.10	0.96
1999	221903	241156	204188	26578	28248	24909	39814	349	1.01	1.07	0.96
2000	193479	209398	178770	29353	31174	27532	42026	83	0.95	1.00	0.91
2001	353789	376905	332090	34893	36934	32853	36675		0.79	0.84	0.73
2002	283151	302782	264793	35956	38220	33692	40107		0.83	0.88	0.79
2003	164980	178300	152655	36558	38914	34202	43162	2110	0.84	0.87	0.80
2004	354644	375410	335027	41636	44119	39152	46417	2552	0.85	0.90	0.80
2005	228008	244201	212889	39748	42241	37255	46550	4676	0.99	1.04	0.94
2006	307150	325025	290258	32233	34471	29995	41467	1816	0.87	0.92	0.83

Year	Recruitment	High	Low	SSB	High	Low	Landings	Discards	$F_{15\text{-}80cm\ length}$	High	Low
2007	472319	499805	446344	39132	41816	36449	45028	2191	0.75	0.79	0.70
2008	775084	813890	738129	46746	50201	43290	47739	3248	0.60	0.64	0.56
2009	252712	274646	232529	71095	76292	65897	58818	10590	0.49	0.52	0.46
2010	273747	293791	255071	130446	139084	121808	72799	9978	0.37	0.39	0.35
2011	282614	304935	261927	213190	226986	199394	87540	14156	0.30	0.32	0.28
2012	534220	570653	500113	240596	258258	222934	85677	12680	0.27	0.29	0.24
2013	389935	420269	361790	242607	262503	222711	77753	15886	0.27	0.30	0.23
2014	218976	240226	199605	254288	276373	232203	89940	9913	0.24	0.26	0.22
2015	231543	255794	209591	293299	319781	266817	93670	9820	0.23	0.25	0.21
2016	346319	388803	308477	322440	354597	290283	109106	12741	0.25	0.28	0.23
2017	413588	481625	355162	300478	337560	263396	104671	7386	0.33	0.38	0.29
2018	314897*			261398	304498	218298	89671	7034	0.26	0.30	0.21
2019	314897*			254003	308149	199857	82298	4940	0.23	0.28	0.182
2020	314897*			271731	355837	208623					

***** Recruitment estimated by the model; to carry out the short-term forecast, these values were replaced by 314 897 which is the geometric mean (1990–2017)

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. 17 pp. http://data.europa.eu/eli/reg/2019/472/oj.

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Recommended citation ICES. 2021. Hake (*Merluccius merluccius*) in subareas 4, 6, and 7, and divisions 3.a, 8.a–b, and 8.d, Northern stock (Greater North Sea, Celtic Seas, and the northern Bay of Biscay). *In* Report of the ICES Advisory Committee, 2021. ICES Advice 2021, hke.27.3a46–8abd, https://doi.org/10.17895/ices.advice.8221.

Annex 1

ICES Advice on fishing opportunities, catch, and effort
Bay of Biscay and the Iberian Coast ecoregion
Published 5 July 2019
Version 2: 25 Sept 2019

Hake (*Merluccius merluccius*) in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock (Greater North Sea, Celtic Seas, and the northern Bay of Biscay)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2020 should be no more than 104 763 tonnes.

Stock development over time

The spawning-stock biomass (SSB) has increased substantially since 2006. In 2016 it reached the maximum in the time series, and since then it has declined slightly. Fishing mortality (F) decreased markedly between 2005 and 2012, and has been stable below F_{MSY} since then. Recruitment is variable without trend. Recent recruitment is uncertain.

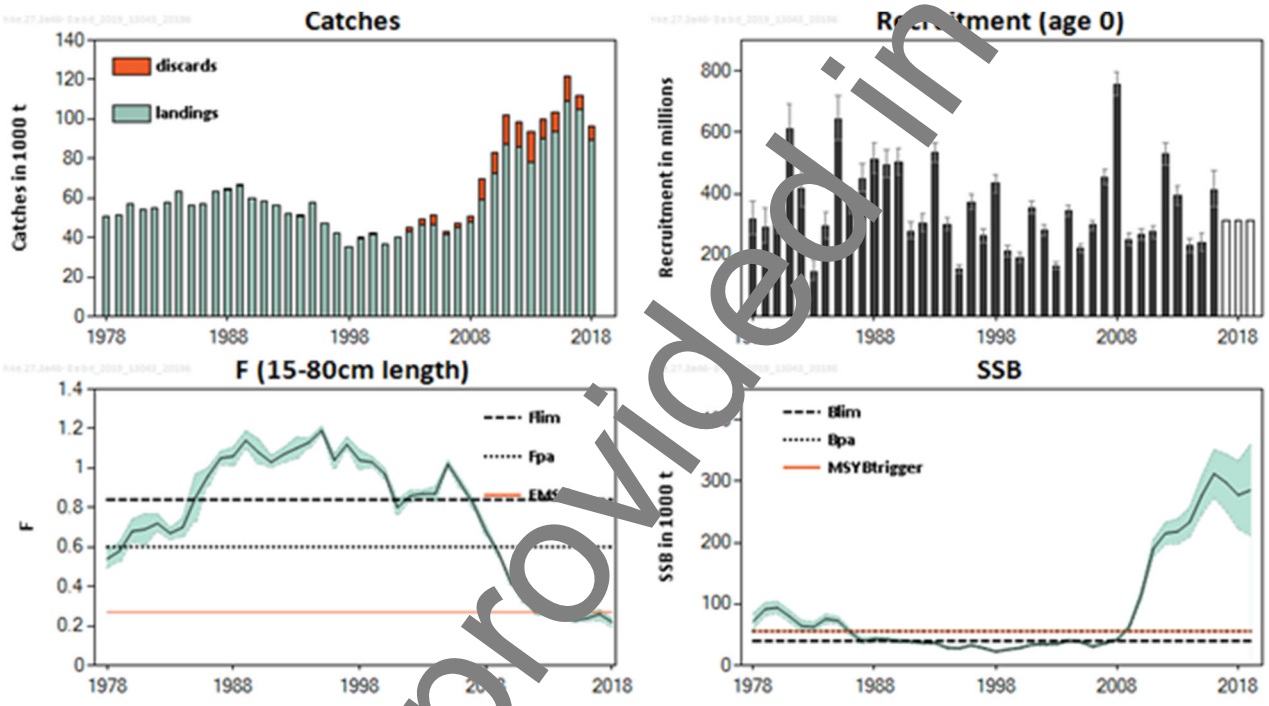

Figure 1 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Summary of the stock assessment. Complete discard estimates are available only since 2003. Plots show 95% confidence intervals (shaded area). F confidence intervals derived from standard deviations calculated internally by the model for F at-age values. Assumed recruitment values are unshaded.

Stock and exploitation status

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

Table 1 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. 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}	✓	✓	✓	Appropriate	MSY $B_{trigger}$	✓	✓	✓ Above trigger
Precautionary approach	F_{pa},F_{lim}	✓	✓	✓	Harvested sustainably	B_{pa},B_{lim}	✓	✓	✓ Full reproductive capacity
Management plan	F_{MGT}	–	–	–	Not applicable	B_{MGT}	–	–	– Not applicable

Catch scenarios

Table 2 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
F (2019)	0.24	an $F_{2017–2019}$
SSB (2020)	276 565	Tonne short-term forecast
R (2019–2020)	310 754	Thousands; geometric mean 1990–2016
Total catch (2019)	100 240	Tonnes; forecast catch from the assessment model (based on F_{2019} = mean F)
Wanted catch (2019)	93 834	Tonnes; assuming average landings rate during 2016–2018
Unwanted catch (2019)	6 406	Tonnes; assuming average discards rate during 2016–2018

Table 3 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Annual catch scenarios. All weights are in tonnes. Note: The % change in TAC is not computed because the stock area does not correspond to the area for the TAC.

Basis	Total catch (2020)	Wanted catch (2020)	Unwanted catch(2020)	F_{total} (2020)	F_{wanted} (2020)	$F_{unwanted}$ (2020)	SSB (2021)	% SSB change **	% Advice change ***
ICES advice basis									
MSY approach = F_{MSY}	104763	97949	6814	0.26	0.2	0.048	263204	−5%	−26%
Other scenarios									
EU MAP ^: F_{MSY}	104763	97949	6814	0.26	0.21	0.048	263204	−5%	−26%
F = MAP $F_{MSY\ lower}$	76334	71455	4878	0.18	0.147	0.033	290273	5%	−46%
F = MAP $F_{MSY\ upper}$	147839	137934	9905	0.40	0.33	0.074	222251	−20%	4%
F = 0	0	0	0	0	0	0	363109	31%	−100%
F_{pa}	197127	183380	13747	0.60	0.49	0.111	175485	−37%	39%
F_{lim}	241643	224025	17618	0.84	0.68	0.155	133316	−52%	70%
SSB (2021) = B_{lim}	339516	310343	29174	2.0	1.64	0.37	40037	−86%	139%
SSB (2021) = B_{pa}	323035	296383	26652	1.66	1.35	0.31	56000	−80%	127%
SSB (2021) = MSY $B_{trigger}$	323035	296383	26652	1.66	1.35	0.31	56000	−80%	127%
F = F_{2019}	97699	91373	6326	0.24	0.195	0.044	269927	-2%	−31%
EU Recovery Plan ^^	101394	94814	6580	0.25	0.20	0.046	266410	−4%	−29%

** SSB 2021 relative to SSB 2020.
*** Total catch 2020 relative to the catch advice for 2019 (142 240 tonnes).
^ MAP multiannual plan (EU, 2018).
^^ Catch scenario corresponding to F_{2020} = 0.25.

The catch for 2020 corresponding to the MSY framework is 26% lower than the advice given for 2019 (ICES, 2018). The decrease is a consequence of rescaling of stock size following the interbenchmark, re-estimated lower reference points, and a lower assumption this year of recruitment in 2017.

Basis of the advice

Table 4 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. The basis of the advice.

Advice basis	MSY approach.
Management plan	The EU multiannual plan (MAP) for stocks in the Western Waters and adjacent has bee agree by the EU for this stock (EU, 2019). This plan is not adopted by Norway; thus, it was not used as basis f the advice for this shared stock. ICES was requested to provide advice based on th MSY appr and to include the MAP as a catch option.

Quality of the assessment

An interbenchmark was conducted on the stock in early 2019 and resulted in the incl of discard estimates which were missing for some of the fleets. The assessment is now based on total catch estimates. Reference points were revised as a result.

The historical FR-EVHOE-WIBTS-Q4 survey was revised and resulted in some minor changes in the perception of the stock.

The recruitment in 2017 and 2018 were replaced by the geometric mean of the recruitments from 1990 to 2016, owing to the uncertainty of the 2017 estimate, retrospective pattern in the recruitment, and lack of EVHOE survey in 2017.

Given the expansion of the stock into northern areas (ICES, 2017), northern abundance indices, biological sampling and discard quantification in the northern area may be limited and should be considered in the future.

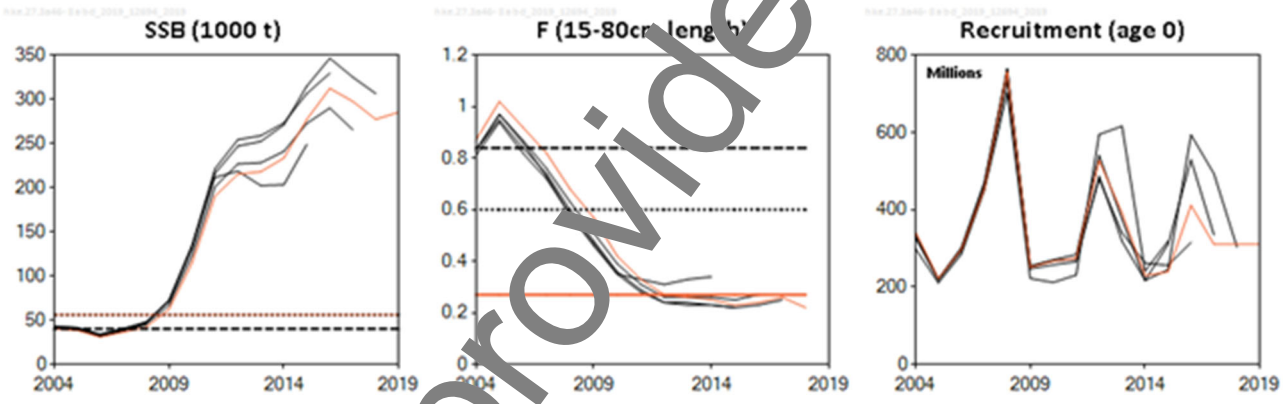

Figure 2 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Historical assessment results. Last three years of geometric mean recruitment included.

Issues relevant for the advice

Discarding of juvenile hake (undersized and above minimum conservation reference size) can be substantial in some areas and fleets. In the most recent period, discarding of large individuals increased because of quota restrictions in certain fleets and continued monitoring is required. Since 2015, the observed discards have decreased.

Reference points

Table 5 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Reference points, values, and their technical basis. All weights are in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	56000		ICES (2019b)
	F_{MSY}	0.26	Stochastic simulations on a segmented regression stock–recruitment relationship	ICES (2019b)
Precautionary approach	B_{lim}	40000	The breakpoint of the segmented regression stock–recruitment relationship	ICES (2019b)
	B_{pa}	56000	1.4 × B_{lim}	ICES (2019b)
	F_{lim}	0.84	†Fishing mortality resulting in a 50% probability of SSB falling below B_{lim}	ICES(2019b)
	F_{pa}	0.6	F_{lim} / 1.4	ICES(2019b)
Management plan	F_{MGT}	Not defined		
	SSB_{MGT}	Not defined		
	MAP MSY $B_{trigger}$	56000	MSY $B_{trigger}$	ICES (2019b) and EU (2019)
	MAP B_{lim}	40000	B_{lim}	ICES (2019b) and EU (2019)
	MAP F_{MSY}	0.27	F_{MSY}	ICES (2019b) and EU (2019)
	MAP range F_{lower}	0.180	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY (ICES, 2019b)	ICES (2019b) and EU (2019)
	MAP range F_{upper}	0.40	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY (ICES, 2019b)	ICES (2019b) and EU (2019)

Basis of the assessment

Table 6 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2018).
Assessment type	Length-based model (SS3; ICES, 2019a) that uses landings and discards in the assessment and forecast.
Input data	Commercial landings; four survey indices (FR-EVHOE-WIBTS-Q4, SP-PORC-WIBTS-Q3, IE-IGFS-WIBTS-Q4, and RESSGASC); maturity ogive: constant maturity (Martin, 1991); natural mortality: constant value of 0.4.
Discards and bycatch	Data series from most fleets are available. All the observed discards are included in the assessment (ICES, 2019a, 2019b).
Indicators	None.
Other information	Benchmark in 2014 (ICES, 2014). Interbenchmark in 2019 (ICES, 2019a).
Working group	Working Group for the Bay of Biscay and the Iberian Waters Ecoregion (WGBIE).

Information from stakeholders

Anecdotal information provided by industry suggests that the mean weight at length of individuals has decreased since 2011. This was corroborated by analyses using national laboratories data (ICES, 2019b).

† Version 2: Corrected typo.

History of the advice, catch, and management

Table 7 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. ICES advice and catch. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC*	ICES landings	Discards	ICES catch
1987	Precautionary TAC; juvenile protection			63500	63369		
1988	Precautionary TAC; juvenile protection		54000	66200	64822	**	
1989	Precautionary TAC; juvenile protection		54000	59700	66473	**	
1990	Precautionary TAC; juvenile protection		59000	65100	59991		
1991	Precautionary TAC; juvenile protection		59000	67000	58329		
1992	If required, precautionary TAC		61500	69000	56617		
1993	Enforce juvenile protection legislation		-	71500	52174		
1994	F significantly reduced		-	60000	51259	**	
1995	30% reduction in F		31000	55100	57621		
1996	30% reduction in F		39000	51100	47210		
1997	20% reduction in F		54000	60100	42465		
1998	20% reduction in F		45000	59000	35060		
1999	Reduce F below Fpa		-	55100	39814	**	
2000	50% reduction in F			42100	42026	**	
2001	Lowest possible catch, recovery plan		-	32600	36675		
2002	Lowest possible catch / recovery plan			27100	40105		
2003	Lowest possible catch / recovery plan		-	39000	43162	1393	44555
2004	70% reduction in F or recovery plan			39100	46416	2614	49029
2005	F = 0.19		43000	42600	46550	4583	51133
2006	F = 0.25		44100	43900	41469	1222	42691
2007	Recovery plan limits		50500	52700	45093	2165	47258
2008	Recovery plan limits		51000	54000	47822	3368	51190
2009	F = 0.25 = Fpa		51500	51500	58781	11033	69814
2010	F = 0.25 = Fpa		55200	55105	72760	12118	84878
2011	See scenarios		50600	55105	87540	13903	101443
2012	MSY transition		51900	55105	85677	14870	100547
2013	MSY transition		45400	69440	77708	15400	93108
2014	MSY approach		81846	81846	89928	9800	99728
2015	MSY approach		78457	90849	95023	10900	105923
2016	MSY approach	≤ 109592	≤ 96651	108764	107530	11114	118644
2017	MSY approach	≤ 123777		119765	104670	7100	111770
2018	MSY approach	≤ 115335		111785	89695	6493	96188
2019	MSY approach	≤ 142240		141160			
2020	MSY approach	≤ 104763					

* Sum of area TACs, corresponding to Northern stock plus Division 2.a (EC zone only) and 3.b-d (except for 2019).

** Partial discard estimates are available and used in the assessment. For remaining years for which no values are presented, some estimates are available but not considered valid and thus not used in the assessment.

History of the catch and landings

Table 8 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Catch distribution by fleet in 2018 as estimated by ICES.

Catch (2018)	Landings				Discards
96 188 tonnes	7% unspecified gear	31% longline	32% gillnet	30% trawl	6 493 tonnes
	89 695 tonnes				

Table 9 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. History of commercial catch and landings; both the official and ICES estimated values are presented by area for each country participating in the fishery. All weights are in tonnes.

Year	Landings *							Discards *						Total catches ***
	3	4	6	7	8abd	Unallocated	Total	3	4	6	7	8abd	Total	
1961			-	-	-	95600	95600						-	95600
1962			-	-	-	86300	86300						-	86300
1963			-	-	-	86200	86200						-	86200
1964			-	-	-	76800	76800						-	76800
1965			-	-	-	64700	64700						-	64700
1966			-	-	-	60900	60900						-	60900
1967			-	-	-	62100	62100						-	62100
1968			-	-	-	62000	62000						-	62000
1969			-	-	-	54900	54900						-	54900
1970			-	-	-	64900	64900						-	64900
1971	8500			19400	23400	0	51300						-	51300
1972	9400			14900	41200	0	65500						-	65500
1973	9500			31200	37600	0	78300						-	78300
1974	9700			28900	34500		73100						-	73100
1975	11000			29200	32500	0	72700						-	72700
1976	12900			26700	28500	0	68100						-	68100
1977	8500			21000	24700	0	54200						-	54200
1978	8000			20300	24500	-249	50551						-	50551
1979	8700			17600	27200	-2404	51096						-	51096
1980	9700			22000	28400	-2835	57265						-	57265
1981	8800			25600	22300	-2782	53918						-	53918
1982	5900			25200	26200	-2306	54994						-	54994
1983	6200			26300	27100	-2093	57507						-	57507
1984	9500			33000	22900	-2114	63286						-	63286
1985	9224			27459	21044	-1628	56099						-	56099
1986	7320			27403	23903	-1539	57092						-	57092
1987	7800			29900	24700	-2031	63369						-	63369
1988	8800			30900	26600	-1477	64823						-	64823
1989	737			26038	31957	203	66473						-	66473
1990	6680			23011	34424	-4161	59954						-	59954
1991	8328			21546	31635	-3380	58129						-	58129
1992		61		22475	23465	2116	56617						-	56617
1993		2484		20465	19849	3346	52144						-	52144
1994	542			21080	24727	31	51259						*	51259
1995	532			24056	28144	86	57621						-	57621
199		4445		24738	18036	-9	47210						-	47210
1997		3312		18949	20339	-135	42465						-	42465
1998		3208		18705	13147	0	35060						-	35060
1999		4256		23955	11604	-1	39814						*	39814
2000		4033		25991	11998	4	42026						*	42026

Year	Landings *							Discards **						Total catches ***
	3	4	6	7	8abd	Unallocated	Total	3	4	6	7	8abd	Total	
2001		4367		23065	9244	0	36675						-	36675
2002		2944		21226	15935	0	40105							40105
2003		3284		25438	14440	0	43162							44555
2004		4438		27483	14494	0	46416							49029
2005		5461		26623	14467	0	46550						4583	51133
2006		6127		24709	10633	0	41469							42691
2007		7017		27456	10620	0	45093						2165	47258
2008		10654		22834	14334	0	47822						3368	51190
2009		13057		25300	20424	0	58781						11033	69814
2010		14187		33500	25073	0	72760						12118	84878
2011		18789		18574	16604	32000 ^	87540						13903	101443
2012		22415		22166	16716	19300 ^	85677						14870	100547
2013	292	10684	5232	28500	19900	13100 ^	77708	313	2942		6583	4059	15400	93108
2014	348	12077	11415	40536	25552	0 ^	89928	287	3105	951	4021	1458	9800	99728
2015	447	14618	7065 ^^	44396	28497	0 ^	95023	93	34		4208	3096	10900	105923
2016	695	19603	11365 ^^	49377	26490	0	107530	1	4189	344^^	2281	4150	11114	118644
2017	775	19690	9614 ^^	45737	28853	0	104670	1	1	314	1168	3692	7100	111770
2018	698	18915	7281 ^^	36906	25894	0	89695		1395	273	2281	2257	6493	96188

* Spanish data for 1961–1972 are not revised; data for Subarea 8 for 1973–1978 include data for divisions 8.a and 8.b only. Data for 1979–1981 are revised based on French surveillance data. Divisions 3.a and 4.bc are included in the column "3, 4, and 6" only after 1976. There are some unallocated landings (moreover for the period 1961–1970).
** Discard estimates from observer programmes.
*** The working group used total catches from 1978.
^ Unallocated landings for the years 2011–2014 were revised in 2015.
^^ Landings and discards data from Subarea 5 are included.

Table 10 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. History of commercial catches by country. All weights are in tonnes.

Year	Belgium	Denmark	France	Germany	Ireland	Netherlands	Norway	Spain	Sweden	UK (England)	UK (Northern Ireland)	UK (Scotland)
2013	177	3727	31684		4205	135	2666	46374	89	1905	66	10004
2014	218	3407	41290	835	4919	221	3031	30747	106	2310	29	12659
2015	144	4242	46074	786	3873	693	4181	33471	103	3148	134	9154
2016	155	4617	47103	845	4168	883	5781	34503	94	2722	116	15675
2017	451	5127	41557	737	3477	188	3974	33317	90	2329	222	14303
2018	212	4529	40260	1212	4440	519	3960	26078	119	2689	130	11039

Summary of the assessment

Table 11 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Assessment summary. Weights are in tonnes. Highs and lows are 95% confidence intervals.

Year	Recruitment Age 0	High	Low	SSB	High	Low	Landings	Discards	F 15–80 cm length	High	Low
1978	316562	377770	265271	71702	84329	59076	50551		0.5	0.58	0.50
1979	291398	352814	240673	91895	102240	81551	51096		0.58	0.62	0.53
1980	321687	383486	269847	94241	104046	84437	57265		0.68	0.74	0.62
1981	608284	690769	535649	80167	89268	71066	53918		0.69	0.77	0.61
1982	418243	487572	358772	64406	72878	55935	54994		0.72	0.77	0.68
1983	147050	185041	116861	62898	70599	55198	57507		0.67	0.70	0.64
1984	293380	341321	252173	76056	83396	68716	63286		0.70	0.75	0.65
1985	643145	719072	575235	72957	79373	66541	56099		0.85	0.97	0.73
1986	373157	417909	333199	54100	59837	48363	57092		0.96	1.00	0.91
1987	449506	498813	405073	39906	44650	35162	6336		1.05	1.08	1.02
1988	511711	563657	464552	43169	47312	39025	6493	2	1.06	1.11	1.01
1989	495038	541631	452453	42492	46113	38871	66479	73	1.14	1.19	1.10
1990	503507	548798	461954	39704	42640	36769	59954		1.08	1.15	1.02
1991	277635	305905	251979	38676	41469	35883	58129		1.03	1.06	1.01
1992	303104	333112	275799	37236	39984	34489	56617		1.07	1.10	1.03
1993	532745	565563	501831	36649	39058	34239	52144		1.10	1.16	1.05
1994	300750	322712	280281	28823	30890	26756	51259	356	1.13	1.15	1.10
1995	152607	166245	140088	28062	29948	26176	57621		1.19	1.21	1.17
1996	372604	396138	350468	33133	35093	31173	47210		1.04	1.07	1.00
1997	262295	284793	241575	28370	30211	26527	42465		1.12	1.16	1.09
1998	432554	462950	404154	22678	24202	21154	35060		1.04	1.09	0.99
1999	213948	232442	196926	26026	27684	24368	39814	349	1.03	1.06	1.00
2000	192163	207486	177972	28722	30529	26914	42026	83	0.97	1.00	0.95
2001	354782	377710	333246	34027	36053	31999	36675		0.80	0.84	0.77
2002	281646	300816	263698	34673	36906	32440	40107		0.86	0.89	0.83
2003	163911	176642	152098	35009	37310	32708	43162	2110	0.87	0.89	0.85
2004	343418	363574	324379	40083	42502	37667	46417	2552	0.87	0.91	0.84
2005	221999	237615	207409	38523	40939	36106	46550	4676	1.02	1.04	0.99
2006	296671	313949	280344	30922	32969	28675	41467	1816	0.92	0.94	0.90
2007	453127	479568	428144	36353	38857	33849	45028	2191	0.82	0.84	0.79
2008	756719	795226	720076	42909	45092	38726	47739	3248	0.68	0.71	0.66
2009	251180	272770	231298	62188	67024	57353	58818	10590	0.57	0.58	0.55
2010	267234	287033	248199	114775	123059	106491	72799	9978	0.42	0.43	0.41
2011	274040	296056	253661	190397	203990	176804	87540	14156	0.33	0.34	0.32
2012	527664	565325	492512	215395	232931	197859	85677	12680	0.27	0.28	0.26
2013	392229	426619	360602	218143	238538	197748	77753	15886	0.26	0.28	0.25
2014	230026	255083	207439	233524	257489	209559	89940	9913	0.25	0.26	0.24
2015	239321	270040	212096	277274	307847	246701	93670	9820	0.23	0.25	0.22
2016	411718	474980	356882	312407	351334	273480	109106	12741	0.24	0.27	0.22
2017	310754 *			297848	344168	251528	104671	7386	0.26	0.28	0.23
2018	310754 *			277482	332692	222272	89695	6493	0.22	0.24	0.196
2019	310754			285371	359344	211398					

* Geometric mean.

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