

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

ICES stock advice

ICES advises that when the MSY approach is applied, catches in 2017 should be no more than 8049 tonnes.

Since this stock is only partially under the EU landing obligation, ICES is not in a position to advise on landings corresponding to the advised catch.

Stock development over time

The spawning-stock biomass (SSB) has increased since 1998 and is above $MSY B_{trigger}$ in 2016. The fishing mortality (F) is above F_{MSY} . Recruitment (R) has since 2010 been close to the historical mean.

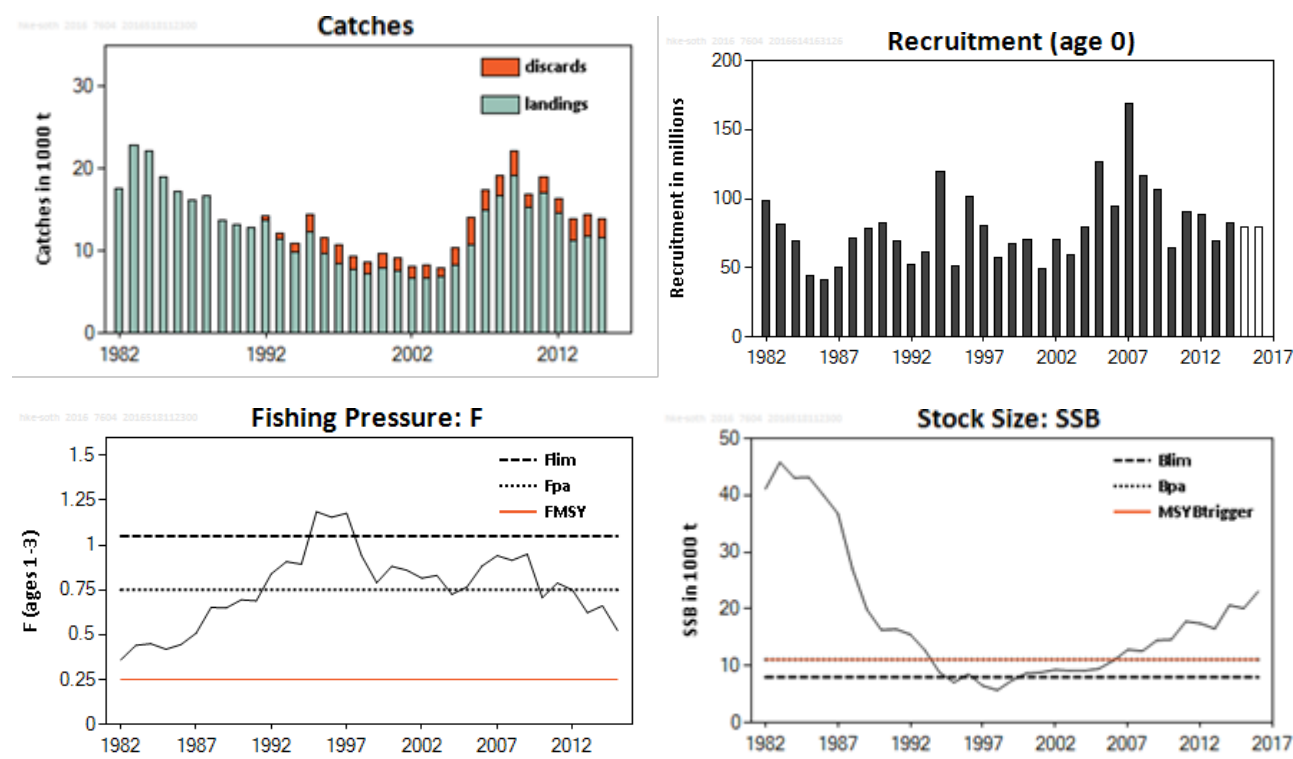


Figure 7.3.21.1 Hake in divisions 8.c and 9.a (Southern stock). Summary of stock assessment (weights in thousand tonnes). Assumed recruitment values are not shaded.

Stock and exploitation status

Table 7.3.21.1 Hake in divisions 8.c and 9.a (Southern stock). State of the stock and fishery relative to reference points.

		Fishing pressure				Stock size				
		2013	2014	2015				2014	2015	2016
Maximum sustainable yield	F _{MSY}	✗	✗	✗	Above	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	SSB _{MGT}	-	-	-	Not applicable

Catch options

Table 7.3.21.2 Hake in divisions 8.c and 9.a (Southern stock). The basis for the catch options.

Variable	Value	Source	Notes
F_{2016}	0.52	ICES (2016a)	F 2015
SSB (2017)	25.359	ICES (2016a)	
R(2016)	79.272	ICES (2016a)	GM (1989–2014)
R (2017)	79.272	ICES (2016a)	GM (1989–2014)
Catch (2016)	13.473	ICES (2016a)	Based on $F(2016) = F(2015)$
Wanted catch (2016)*	11.337	ICES (2016a)	According to 2013–2015 average discard rates at length estimated by the assessment.
Unwanted catch (2016)*	2.136	ICES (2016a)	According to 2013–2015 average discard rates at length estimated by the assessment.

* “Wanted” and “unwanted” catch are used to describe fish that would be landed and discarded in the absence of the EU landing obligation, based on discarding ogives estimated by the assessment model.

Table 7.3.21.3 Hake in divisions 8.c and 9.a (Southern stock). The catch options. All weights are in thousand tonnes.

Rationale	Total catch (2017)	Wanted catch (2017)	Unwanted catch (2017)	Basis	F Total* (2017)	F Wanted catch (2017)	F Unwanted catch (2017)	SSB (2018)	%SSB change*	% advice change **
MSY approach	8.049	6.838	1.21	F_{MSY} ($F_{sq} \times 0.48$)	0.25	0.21	0.04	37.110	46	32
EU recovery plan ***	12.275	10.411	1.86	$TAC_{2016} \times 1.15$ ($F_{sq} \times 0.8$)	0.41	0.35	0.06	30.535	20%	102
Precautionary approach	18.895	15.969	2.93	F_{PA} ($F_{sq} \times 1.45$)	0.75	0.63	0.12	20.550	–19	211
Zero catch	0.000	0.000	0.00	Catch = 0	0.00	0.00	0.00	49.982	97	–100
Other options	22.989	19.372	3.62	F_{lim} ($F_{sq} \times 2.02$)	1.045	0.88	0.16	14.582	–42	278
	13.595	11.523	2.07	$F_{sq} \times 0.9$	0.47	0.40	0.07	28.512	12	124
	14.540	12.318	2.22	F_{sq}	0.52	0.44	0.08	27.074	7	139
	25.433	21.381	4.05	SSB in 2018 = MSY $B_{trigger} = B_{PA} (F_{sq} \times 2.48)$	1.28	1.08	0.20	11.100	–56	318
	27.638	23.172	4.47	SSB in 2018 = B_{lim} ($F_{sq} \times 3.04$)	1.57	1.31	0.25	8.000	–68	355

* SSB 2018 relative to SSB 2017.

** Total catch 2017 relative to advised catch for 2016 (6078 t).

***Applying a 10% reduction in F relative to F_{2016} corresponds to a total catch in 2017, which is more than 15% greater than the 2016 TAC. Therefore, ICES has calculated this option as corresponding to a total catch in 2017 equal to $TAC_{2016} \times 1.15$.

Basis of the advice

Table 7.3.21.4 Hake in divisions 8.c and 9.a (Southern stock). The basis of the advice.

Advice basis	MSY approach
Management plan	A recovery plan was agreed by the EU in 2005 (EU, 2005, Appendix 7.3.7). This plan is based on precautionary reference points that are no longer appropriate.

Quality of the assessment

The Portuguese standardized LPUE has been calculated for the previously missing years (2011 to 2015). This has changed the perception of the stock compared with last year.

The change in the method to estimate effort and landings for the A Coruña Trawl LPUE prevents the incorporation of these data after 2012. To what extent this affects the quality of the assessment is unknown.

There are indications of good recruitment in 2015 coming from the three surveys. Since the estimates of this age group is highly uncertain they are replaced by the geometric mean.

In previous years the assessment has shown a tendency to overestimate SSB and underestimate F. However, this year shows a reversal compared to the assessment last year.



Figure 7.3.21.2 Hake in divisions 8.c and 9.a (Southern stock). Historical assessment results (final-year recruitment estimates included).

Issues relevant for the advice

Some fleets fishing this stock are under the EU landing obligation from 2016.

A mixed-fisheries analysis covering the Iberian waters stocks of hake, megrim, four-spot megrim, and white anglerfish is provided for the first time this year (ICES, 2016b).

Reference points

Table 7.3.21.5 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}	11100 t	B_{pa}	ICES (2016c)
	F_{MSY}	0.25	Stochastic simulations using segmented regression	ICES (2016c)
Precautionary approach	B_{lim}	8000 t	Break point in segmented regression	ICES (2016d)
	B_{pa}	11100	$B_{\text{lim}} \times e^{1.645\sigma}$; $\sigma = 0.20$	ICES (2016d)
	F_{lim}	1.05	F corresponding with the slope of the segmented regression	ICES (2016d)
	F_{pa}	0.75	$F_{\text{lim}} \times e^{-1.645\sigma}$; $\sigma = 0.20$	ICES (2016d)
Management plan	SSB_{MGT}	Not defined		
	F_{MGT}	Not defined		

Basis of the assessment

Table 7.3.21.6 Hake in divisions 8.c and 9.a (Southern stock). The basis of the assessment.

ICES stock data category	1 (ICES, 2016e)
Assessment type	Length–age analytical assessment (GADGET; ICES, 2016a) that uses catches in the model and in the forecast.
Input data	Commercial catches (international landings, discards and length frequencies from catch sampling); three survey indices (SpGFS-WIBTS-Q4 [1983 to 2015], SPGFS-caut-WIBTS-Q4 [1997 to 2015], and PtGFS-WIBTS-Q4 [1989-2015]); two commercial indices (SP-CORUTR [1985 to 2012] and P-TR [1989 to 2015]); annual maturity data from commercial catch; for natural mortality a constant value (0.4) was used.
Discards and bycatch	Included in the assessment since 1992. Data series from the main fleets raised to the effort.
Indicators	None
Other information	Benchmarked in 2014 (WKSOUTH; ICES, 2014).
Working group	Working Group for the Bay of Biscay and the Iberian Waters Ecoregion (WGBIE)

Information from stakeholders

There is no available information.

History of the advice, catch and management

Table 7.3.21.7 Hake in divisions 8.c and 9.a (Southern stock). History of ICES advice, the agreed TAC, and ICES estimates of landings, discards, and catch. All weights are in thousand tonnes.

Year	ICES advice	Predicted landings corresponding to advice	Agreed TAC***	ICES estimated landings	ICES estimated discards	ICES estimated catch
1987	Precautionary TAC; juvenile protection	15.0	25.0	16.2	-	-
1988	TAC; juvenile protection	15.0	25.0	16.4	-	-
1989	TAC; juvenile protection	15.0	20.0	13.8	-	-
1990	TAC; juvenile protection	15.0	20.0	13.2	-	-
1991	Precautionary TAC	10.0	18.0	12.8	-	-
1992	Precautionary TAC	10.3	16.0	13.8	0.5	14.3
1993	F = 10% of F ₉₁	1.0	12.0	11.5	0.7	12.2
1994	F lowest possible, at least reduced by 80%	2.0	11.5	9.9	1.0	10.9
1995	F lowest possible	-	8.5	12.2	2.1	14.3
1996	F lowest possible	-	9.0	9.7	1.9	11.6
1997	F lowest possible	-	9.0	8.5	2.3	10.8
1998	60% reduction in F	4.0	8.2	7.7	1.7	9.4
1999	Reduce F below F _{pa}	9.5	9.0	7.2	1.5	8.7
2000	20% reduction from 1994–98 average landings	< 7.7	8.5	7.9	1.83	9.7
2001	Reduce F below F _{pa} ; no increase in landings	8.5	8.9	7.6	1.66	9.2
2002	F below F _{pa}	< 8.0	8.0	6.7	1.49	8.2
2003	Lowest possible catch / rebuilding plan	0	7.0	6.7	1.46	8.1
2004	Zero catch	0	5.95	6.9	0.91	8.0
2005	Zero catch	0	5.968	8.30	1.98	10.3
2006	Zero catch	0	6.661	10.80	3.26	14.1
2007	Zero catch	0	6.128	14.93	2.50	17.4
2008	Zero catch	0	7.047	16.77	2.31	19.1
2009	Zero catch	0	8.104	19.24	1.98	22.4
2010	Reach B _{pa} in 2011	4.9	9.300	15.74	1.58	17.3
2011	See scenarios	< 9.9	10.695	17.07	1.95	19.0
2012	MSY transition	< 14.3	12.299	14.57	1.823	16.396
2013	MSY transition	< 10.6	14.144	11.661	2.553	14.214
2014	MSY transition	< 13.123*	16.266	12.011	2.602	14.614
2015	MSY approach	< 8.417*	13.826	11.786	2.292	14.077
2016	MSY approach	≤ 6.078 **	10.674			
2017	MSY approach	≤ 8.049 **				

* This value refers to total catch, including discards.

** This value 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.

History of catch and landings

Table 7.3.21.8 Hake in divisions 8.c and 9.a (Southern stock). Catch distribution by fleet in 2015 as estimated by ICES.

Total catch (2015)	Landings			Discards
14.077 kt	36% trawlers	40% other fleets	24% unallocated	2.292 kt
	11.786 kt			

Table 7.3.21.9 Hake in divisions 8.c and 9.a (Southern stock). History of commercial catch and landings, as estimated by ICES by country and gear.

Year	Spain									Portugal				France *	Unallocated**	Total		
	Artisanal	Gillnet	Longline	Cd-Trw	Pr-Bk TRW	Pa-Trw	Ba-Trw	Discards	Landings	Artisanal	Trawl	Discards	Landings	Total		Discards	Landings	Catch
1972	7.10	-	-	-	10.20				17.3	4.70	4.10	-	8.8			-	26.1	26.1
1973	8.50	-	-	-	12.30				20.8	6.50	7.30	-	13.8	0.20		-	34.8	34.8
1974	1.00	2.60	2.20	-	8.30				14.1	5.10	3.50	-	8.6	0.10		-	22.8	22.8
1975	1.30	3.50	3.00	-	11.20				19.0	6.10	4.30	-	10.4	0.10		-	29.5	29.5
1976	1.20	3.10	2.60	-	10.00				16.9	6.00	3.10	-	9.1	0.10		-	26.1	26.1
1977	0.60	1.50	1.30	-	5.80				9.2	4.50	1.60	-	6.1	0.20		-	15.5	15.5
1978	0.10	1.40	2.10	-	4.90				8.5	3.40	1.40	-	4.8	0.10		-	13.4	13.4
1979	0.20	1.70	2.10	-	7.20				11.2	3.90	1.90	-	5.8	-		-	17.0	17.0
1980	0.20	2.20	5.00	-	5.30				12.7	4.50	2.30	-	6.8	-		-	19.5	19.5
1981	0.30	1.50	4.60	-	4.10				10.5	4.10	1.90	-	6.0	-		-	16.5	16.5
1982	0.27	1.25	4.18	0.49	3.92				10.1	5.01	2.49	-	7.5	-		-	17.6	17.6
1983	0.37	2.10	6.57	0.57	5.29				14.9	5.19	2.86	-	8.0	-		-	22.9	22.9
1984	0.33	2.27	7.52	0.69	5.84				16.7	4.30	1.22	-	5.5	-		-	22.2	22.2
1985	0.77	1.81	4.42	0.79	5.33				13.1	3.77	2.05	-	5.8	-		-	18.9	18.9
1986	0.83	2.07	3.46	0.98	4.86				12.2	3.16	1.79	-	4.9	0.01		-	17.2	17.2
1987	0.53	1.97	4.41	0.95	3.50				11.4	3.47	1.33	-	4.8	0.03		-	16.2	16.2
1988	0.70	1.99	2.97	0.99	3.98				10.6	4.30	1.71	-	6.0	0.02		-	16.7	16.7
1989	0.56	1.86	1.95	0.90	3.92				9.2	2.74	1.85	-	4.6	0.02		-	13.8	13.8
1990	0.59	1.72	2.13	1.20	4.13				9.8	2.26	1.14	-	3.4	0.03		-	13.2	13.2
1991	0.42	1.41	2.20	1.21	3.63				8.9	2.71	1.25	-	4.0	0.01		-	12.8	12.8
1992	0.40	1.48	2.05	0.98	3.79			0.14	8.7	3.77	1.33	0.33	5.1	-		0.5	13.8	14.3
1993	0.37	1.26	2.74	0.54	2.67			0.24	7.6	3.04	0.87	0.44	3.9	-		0.7	11.5	12.2
1994	0.37	1.90	1.47	0.32		0.82	1.90	0.29	6.8	2.30	0.79	0.71	3.1	-		1.0	9.9	10.9
1995	0.37	1.59	0.96	0.46		2.34	2.94	0.93	8.6	2.56	1.03	1.18	3.6	-		2.1	12.2	14.3
1996	0.23	1.15	0.98	0.98		1.46	2.17	0.91	7.0	2.01	0.76	0.99	2.8	-		1.9	9.7	11.6
1997	0.30	1.04	0.76	0.88		1.32	1.78	1.07	6.1	1.52	0.90	1.20	2.4	-		2.3	8.5	10.8
1998	0.32	0.75	0.62	0.53		0.88	1.95	0.57	5.0	1.67	0.97	1.11	2.6	-		1.7	7.7	9.4
1999	0.33	0.60	0.00	0.57		0.87	1.59	0.35	4.0	2.12	1.09	1.17	3.2	-		1.5	7.2	8.7
2000	0.26	0.85	0.15	0.58		0.83	1.98	0.62	4.7	2.09	1.16	1.21	3.3	-		1.83	7.90	9.7
2001	0.32	0.55	0.11	1.20		1.06	1.12	0.37	4.4	2.02	1.20	1.29	3.2	-		1.66	7.58	9.2
2002	0.22	0.58	0.12	0.88		1.37	0.75	0.38	3.9	1.81	0.97	1.11	2.8	-		1.49	6.70	8.2
2003	0.37	0.43	0.17	1.25		1.36	1.07	0.41	4.7	1.13	0.96	1.05	2.1	-		1.46	6.74	8.2
2004	0.48	0.42	0.13	1.06		1.66	1.13	0.22	4.9	1.27	0.80	0.69	2.1	-		0.91	6.94	7.9
2005	0.72	0.63	0.09	0.88		2.77	1.14	0.38	6.2	1.10	0.96	1.60	2.1	-		1.98	8.30	10.3
2006	0.48	0.71	0.35	0.63		4.70	1.81	2.65	8.7	1.22	0.91	0.61	2.1	-		3.26	10.80	14.1

Year	Spain									Portugal				France *	Unallocated**	Total		
	Artisanal	Gillnet	Longline	Cd-Trw	Pr-Bk TRW	Pa-Trw	Ba-Trw	Discards	Landings	Artisanal	Trawl	Discards	Landings	Total		Discards	Landings	Catch
2007	0.83	1.80	0.89	0.50		6.71	2.07	1.19	12.8	1.41	0.72	1.31	2.1	-		2.50	14.93	17.4
2008	1.12	2.64	1.51	0.53		6.32	2.44	1.45	14.6	1.27	0.94	0.86	2.2	-		2.31	16.77	19.1
2009	1.41	2.92	2.10	0.55		7.37	2.54	0.98	16.9	1.39	0.96	1.96	2.4	-		2.93	19.24	22.4
2010	0.72	1.71	1.88	0.68		6.33	1.71	1.00	13.0	1.61	0.73	0.58	2.3	0.36		1.58	15.74	17.3
2011	0.42	1.09	0.76	0.53		2.18	1.48	1.21	6.5	1.72	0.49	0.74	2.2		8.40	1.95	17.07	19.0
2012	0.34	0.85	1.08	0.50		1.64	1.42	1.35	5.8	1.79	0.81	0.47	2.6		6.14	1.823	14.57	16.396
2013	0.64	1.75	1.11	0.62		1.86	1.16	2.22	7.2	1.93	0.81	0.33	2.7	0.31	1.46	2.553	11.661	14.214
2014	0.75	1.46	1.60	0.54		1.72	1.18	2.02	7.3	1.71	0.66	0.58	2.4	0.14	2.25	2.602	12.011	14.614
2015	0.90	1.11	1.23	0.36		2.01	1.13	2.06	6.8	1.24	0.76	0.23	2.0	0.24	2.79	2.29	11.79	14.08

* French catches are not considered in the assessment until the full time-series has been reviewed.

** Unallocated landings have been estimated and included since 2011.

Summary of the assessment

Table 7.3.21.10 Hake in divisions 8.c and 9.a (Southern stock). Assessment summary. Weights are in tonnes.

Year	Recruitment	Stock size: SSB tonnes	Landings** tonnes	Discards tonnes	Fishing pressure: F
	Age 0				Ages 1–3
	thousands				Year –1
1982	98402	41104	17592	0	0.36
1983	81484	45801	22950	0	0.441
1984	69479	43049	22179	0	0.45
1985	44092	43143	18941	0	0.419
1986	40966	40027	17161	0	0.445
1987	50136	36769	16185	0	0.509
1988	71235	27031	16653	0	0.653
1989	78068	19900	13786	0	0.65
1990	82329	16283	13190	0	0.695
1991	69838	16457	12827	0	0.689
1992	52403	15520	13798	473	0.841
1993	61103	12763	11484	683	0.908
1994	119547	8892	9865	994	0.894
1995	51179	7085	12239	2102	1.187
1996	101042	8521	9715	1910	1.156
1997	80794	6500	8498	2270	1.178
1998	57803	5727	7683	1681	0.94
1999	67101	7430	7170	1519	0.791
2000	70658	8699	7902	1835	0.882
2001	49611	8856	7580	1662	0.86
2002	70178	9312	6690	1492	0.816
2003	59625	9136	6744	1461	0.831
2004	79036	9142	6942	913	0.726
2005	126817	9497	8333	1978	0.767
2006	94363	10922	10816	3262	0.884
2007	169114	12852	14932	2504	0.942
2008	116978	12587	16795	2311	0.916
2009	106467	14493	19240	2935	0.95
2010	64343	14610	15368	1580	0.707
2011	90184	17817	17062	1948	0.789
2012	88925	17471	14573	1823	0.75
2013	69226	16518	11353	2553	0.623
2014	81997	20653	11875	2602	0.662
2015*	79272	20120	11547	2292	0.524
2016*	79272	23101			

* Geometric mean 1989–2014.

**Landings do not include the French landings presented in Table 7.3.21.9.

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