Haddock (*Melanogrammus aeglefinus*) in divisions 7.b–k (southern Celtic Seas and English Channel)

ICES stock advice

ICES advises that when the MSY approach is applied, catches in 2018 should be no more than 8358 tonnes. If discard rates do not change from the long-term average, this implies landings of no more than 5911 tonnes.

Stock development over time

SSB declined after 2011 but is currently well above MSY $B_{trigger}$. Fishing mortality (F) has been above F_{MSY} for the entire time-series. Recruitment in 2016 is below average.

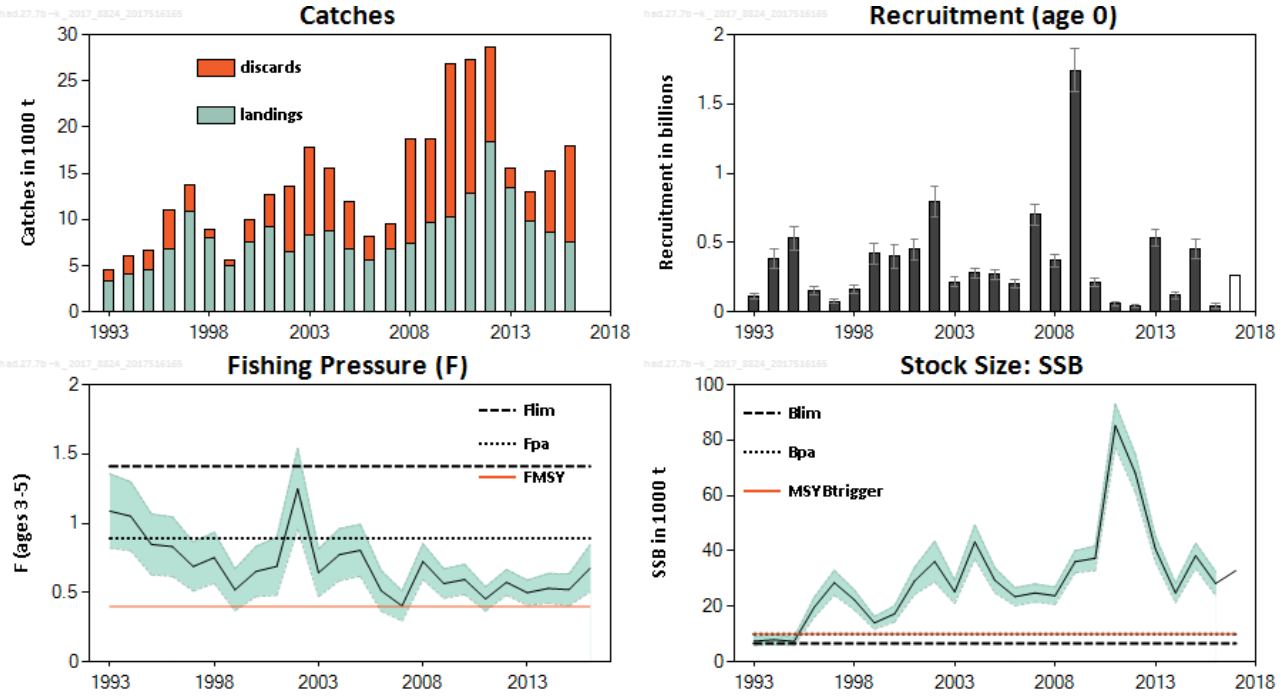

Figure 1 Haddock in divisions 7.b–k. Summary of stock assessment. Recruitment, F, and SSB have uncertainty boundaries (1 × standard deviation) in the plot. The assumed 2017 recruitment value is not shaded. Uncertainty boundaries not available for 2017.

Stock and exploitation status

Table 1 Haddock in divisions 7.b–k. State of the stock and fishery relative to reference points.

		Fishing pressure				Stock size			
		2014	2015	2016		2015	2016	2017	
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	B_{MGT}	–	–	– Not applicable

Catch options

Table 2 Haddock in divisions 7.b–k. The basis for the catch options.

Variable	Value	Notes	Source
F ages 3–5 (2017)	0.58	$F_{sq}=F_{Average}$(2014–2016)	ICES (2017a)
SSB (2018)	20 257 tonnes	$F_{sq=}$ 0.58	ICES (2017a)
$R_{age\ 0}$ (2017 and 2018)	257 583 thousands	Geometric mean (1993–2014)	ICES (2017a)
Catch (2017)	14 995 tonnes	$F_{sq=}$ 0.58	ICES (2017a)
Landings (2017)	9 984 tonnes	Average discard pattern (1993–2016)	ICES (2017a)
Discards (2017)	5 011 tonnes	Average discard pattern (1993–2016)	ICES (2017a)

Table 3 Haddock in divisions 7.b–k. Annual catch options. All weights are in tonnes.

Basis	Total catch (2018)	Landings (2018)	Discards (2018)	F_{total} (2018)	$F_{Landings}$ (2018)	$F_{Discards}$ (2018)	SSB (2019)	% SSB change *	% TAC change **
ICES advice basis									
MSY approach: FMSY	8358	5911	2446	0.40	0.36	0.044	24953	23	-24
Other options									
F = 0	0	0	0	0	0	0	32908	62	-100
F_{pa}	15622	10817	4805	0.89	0.79	0.10	18170	-10.3	40
F_{lim}	20959	14206	6753	1.41	1.25	0.16	13311	-34	83
SSB (2019) = B_{lim}	28588	18494	10094	2.7	2.4	0.31	6700	-67	139
SSB (2019) = $B_{pa=}$ MSY	24702	16415	8287	1.93	1.71	0.22	10000	-51	112
F = F_{2017}	11267	7908	3359	0.58	0.51	0.06	22218	9.7	2.0
Mixed fisheries options									
A: Max.	13193			0.77			18803	-7.2	
B: Min.	7455			0.38			24213	20	
C: Stock	7806			0.40			23880	17.9	
D: SQ effort	11864			0.67			20047	-1.04	
E: Value	10853			0.60			20998	3.7	
F: Range	10913			0.55			22550	11.3	

* SSB 2019 relative to SSB 2018.

** Landings in 2018 relative to TAC in 2017 (7751 t). The % change is not indicated for the mixed fishery options as calculations are available for total catch.

Mixed-fisheries assumptions (note: "fleet's stock share" is used to describe the share of the fishing opportunities for each particular fleet, which has been calculated based on the single-stock advice for 2018 and the historical proportion of the stock landings taken by the fleet):

A. Maximum scenario: Each fleet stops fishing when its last stock share is exhausted.
B. Minimum scenario: Each fleet stops fishing when its first stock share is exhausted.
C. Stock scenario: Each fleet stops fishing when its individual stock share is exhausted.
D. SQ (*status quo*) effort scenario: The effort of each fleet in 2017 and 2018 is as in 2016.
E. Value scenario: The effort of each fleet is equal to the weighted average of the efforts required to catch the fleet's quota share of each of the stocks, where the weights are the relative catch values of each stock in the fleet's portfolio.
F. Range scenario: where the potential for TAC mismatch in 2018 is minimised within the F_{MSY} range, for the demersal fish stocks for which such a range is available (Cod in divisions 7.e–k, Haddock in divisions7.b–k, and Whiting in divisions 7.b–ce–k).

Basis of the advice

Table 4 Haddock in divisions 7.b–k. The basis of the advice.

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

Quality of the assessment

There is uncertainty around the historical discard estimates, but the stock trends in the assessment appear to be robust to this uncertainty.

Despite the introduction of square-mesh panels since 2012, the assessment does not show evidence for changes in selectivity. The assumption of a constant selectivity pattern in the model still appears to be valid.

Since 2014 estimates of fishing mortality and SSB are consistent between years (Figure 2).

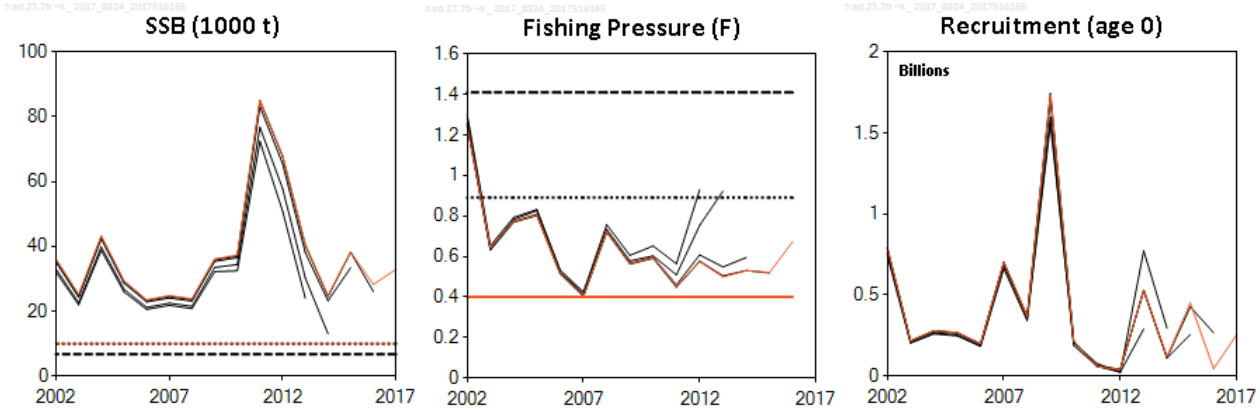

Figure 2 Haddock in divisions 7.b–k. Historical assessment results (final-year recruitment estimates included).

Issues relevant for the advice

The TAC has been restrictive in recent years, which has resulted in increased levels of discarding of fish over the minimum conservation reference size (MCRS). Total discards increased in 2016 and are above the level of the landings for the first time since 2011. There is no evidence of improved selectivity of young fish due to the introduction of square-mesh panels in 2012.

Haddock are caught in mixed fisheries with cod and whiting; management should take this into account. The mixed-fisheries analysis carried out by ICES shows that haddock will be the limiting species for over half the fleets (64%) in 2018. Haddock is fished at above F_{MSY} in 2018 under all scenarios except the 'min' and 'haddock' scenarios, reflecting that it is the most limiting stock for the majority of fleets (ICES, 2017b).

This year, a “range” scenario is presented. This scenario searches for the minimum sum of differences between potential catches by stock under the “min” and the “max” scenarios within the F_{MSY} ranges. The outcomes of this scenario are largely driven by the restrictive nature of haddock this year, needing to bring the stocks fishing mortality to within the F_{MSY} range, which imply that many mixed fisheries should reduce their effort to avoid over-catching this stock.

Landings in the south of Division 7.a (33E2 and 33E3) are included in the assessment as they are considered to be part of this stock.

Forecasted catches at F_{sq} in 2017 are calculated to be higher than the TAC, which could result in an increase of the discard rate.

Reference points

Table 5 Haddock in divisions 7.b–k. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	10 000 t	B_{pa}	ICES (2015)
	F_{MSY}	0.40	Median point estimates of EqSim with segmented regression S–R relationship (landings: 0.36 + discards: 0.04)	ICES (2015)
Precautionary approach	B_{lim}	6 700 t	Lowest observed SSB	ICES (2015)
	B_{pa}	10 000 t	B_{lim} combined with the assessment error; $B_{lim} \times \exp(1.645 \times \sigma)$; $\sigma = 0.26$	ICES (2015)
	F_{lim}	1.41	F with 50% probability of SSB< B_{lim}	ICES (2015)
	F_{pa}	0.89	F_{lim} combined with the assessment error; $F_{lim} \times \exp(-1.645 \times \sigma)$; $\sigma = 0.28$	ICES (2015)
Management plan	SSB_{mgt}	Not applicable		
	F_{mgt}	Not applicable		

Basis of the assessment

Table 6 Haddock in divisions 7.b–k. Basis of assessment and advice.

ICES stock data category	1 (ICES, 2016a)
Assessment type	ASAP (Age-Structured Assessment Programme; NOAA toolbox) that uses catches in the model and in the forecast
Input data	Commercial catches (age composition of landings and discards); survey index (combined IGFS-WIBTS-Q4 and EVHOE-WIBTS-Q4); commercial index (IRL_OTB_HAD); maturity data (surveys and observer data; constant for all years); natural mortalities (based on Lorenzen, 1996).
Discards and bycatch	Included in the assessment for the full time-series
Indicators	None
Other information	This stock was benchmarked in 2012 (ICES, 2012)
Working groups	Working Group for the Celtic Seas Ecoregion (WGCSE) and Working Group on Mixed Fisheries Advice (WGMIXFISH-ADVICE)

Information from stakeholders

There is no additional available information for this stock.

History of the advice, catch, and management

Table 7 Haddock in divisions 7.b–k. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice	Predicted	Predicted	Agreed TAC	Official	ICES	Discards	ICES catch
1987	Not dealt with				3000^^^	2600^^^	n/a	2600^^^
1988	Not dealt with				4000^^^	3600^^^	n/a	3600^^^
1989	Not dealt with				4200^^^	3200^^^	n/a	3200^^^
1990	Not dealt with				2900^^^	2000^^^	n/a	2000^^^
1991	Not dealt with				2900^^^	2300^^^	n/a	2300^^^
1992	Not dealt with				2900^^^	2700^^^	n/a	2700^^^
1993	Not dealt with				3400^^^	3348	1208	4556
1994	Not dealt with				4076	4131	1886	6017
1995	Not dealt with			600*	4468	4470	2218	6688
1996	Not dealt with			700**	6653	6756	4309	11 065
1997	Not dealt with			1400	10 270	10 827	2883	13 710
1998	Not dealt with			2000	7361	7928	934	8862
1999	Not dealt with			2200***	5247	4970	586	5556
2000	No expansion of catches			16 600***	6656	7499	2503	10 002
2001	No expansion of catches			1200***	9702	9278	3418	12 696
2002	No expansion of catches		8000	9300***	7089	6488	7073	13 561
2003	No expansion of catches		7200	8185***	8241	8292	9456	17 748
2004	No increase in F			9600***	8453	8777	6750	15 527
2005	No increase in effort			11 520***	6859	6787	5191	11 978
2006	No increase in effort			11 520***	5647	5593	2484	8077
2007	No increase in effort			11 520***	6629	6781	2739	9520
2008	Same advice as last year			11 579***	6234	7455	11 187	18 642
2009	Same advice as last year			11 579^	9307	9608	9080	18 688
2010	Same advice as last year			11 579^	9999	10 262	16 547	26 809
2011	See scenarios			13 316^	13 709	12 879	14 378	27 257
2012	No increase in catch and technical measures to reduce discards rates			16 645^	18 222	18 376	10 191	28 567
2013	MSY transition		< 9500	14 148^	13 098	13 424	2085	15 509
2014	MSY transition	< 5281	< 3602	9479^	9171	9854	3177	13 031
2015	MSY approach	< 10 434	< 5605	8342^	8342	8545	6694	15 239
2016	MSY approach	≤ 8590	≤ 6078^^	7258^	7007	7594	10 337	17 931
2017	MSY approach	≤ 12 444	≤ 7751	7751^				
2018	MSY approach	≤ 8358	≤ 5911					

* Applies to subareas 7–10.
** Increased in-year to 14 000 t.
*** Includes separate Division 7.a allocation.
^Applies to divisions 7.b–k and subareas 8–10.
^^ Wanted catch.
^^^ Values presented to the nearest 100.

History of the catch and landings

Table 8 Haddock in divisions 7.b–k. Catch distribution by fleet in 2016 as estimated by ICES.

Catch (2016)	Landings				Discards			
17 931 t	Otter trawls	Seines	Beam trawls	Others	Otter trawls	Seines	Beam trawls	Others
	83%	9%	5%	3%	88%	6%	5%	1%
	7 594 t				10 337 t			

Table 9 Haddock in divisions 7.b–k. 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	Official landings						ICES estimates				
	Belgium	France	Ireland	UK	Others	Total	Unallocated	Landings	Discards	Catch	Landings taken or reported in 33E2 and 33E3**
1993	51	1839	1262	256	0	3408	-60	3348	1208	4556	
1994	123	2788	908	240	17	4076	55	4131	1886	6017	
1995	189	2964	966	266	83	4468	2	4470	2218	6688	
1996	133	4527	1468	439	86	6653	103	6756	4309	11065	
1997	246	6581	2789	569	85	10270	557	10827	2883	13710	
1998	142	3674	2788	444	312	7360	568	7928	934	8862	
1999	51	2725	2034	278	159	5247	-277	4970	586	5556	
2000	90	3088	3066	289	123	6656	843	7499	2503	10 002	
2001	165	4842	3608	422	665	9702	-424	9278	3418	12696	
2002	132	4348	2188	315	106	7089	-601	6488	7073	13561	
2003	118	5781	1867	393	82	8241	51	8292	9456	17748	64
2004	136	6130	1715	313	159	8453	324	8777	6750	15527	53
2005	167	4174	2037	292	197	6867	-80	6787	5191	11978	35
2006	99	3190	1875	274	209	5647	-54	5593	2484	8077	26
2007	119	4142	1930	386	52	6629	152	6781	2739	9520	222
2008	108	3639	1800	566	121	6234	1221	7455	11187	18642	194
2009	131	5429	2983	716	48	9307	301	9608	9080	18688	285
2010	170	6240	2609	852	128	9999	263	10262	16547	26809	267
2011	211	8070	3322	1658	129	13 390	-511	12879	14378	27257	374
2012	231	11 793	4130	1901	167	18 222	154	18376	10191	28567	473
2013	173	8748	2699	1455	21	13 068	328	13424	2085	15509	410
2014	99	6375	2092	785	18	9171	485	9854	3177	13031	444
2015*	117	5681	1656	759	4	8342	328	8545	6694	15239	322
2016*	88.3	4486.7	1713.3	691.9	26.5	7006.7	587.2	7594	10337	17931	468

*Preliminary data.

** Landings in the south of Division 7.a (33E2 and 33E3) are included in the assessment and are considered to be part of the stock.

Summary of the assessment

Table 10 Haddock in divisions 7.b–k. Assessment summary. High and Low refer to 1 × standard deviation. All weights in tonnes.

Year	Recruitment (age 0) (thousands)	High	Low	Stock Size: SSB	High	Low	Landings	Discards	Fishing Pressure (F) Ages 3-5	High	Low
1993	110936	134454	87418	7482	9058	5906	3348	1208	1.09	1.36	0.82
1994	381728	451981	311475	7969	9719	6219	4131	1886	1.05	1.30	0.80
1995	528864	613656	444072	7394	8833	5954	4470	2218	0.85	1.07	0.63
1996	149612	179319	119905	19671	23264	16077	6756	4309	0.83	1.05	0.62
1997	75711	92493	58929	28560	33035	24086	10827	2883	0.69	0.86	0.51
1998	158254	188800	127708	22386	25953	18820	7928	934	0.75	0.94	0.57
1999	419100	495294	342906	14060	16316	11804	4970	586	0.52	0.67	0.37
2000	398204	480640	315768	17306	20202	14409	7499	2503	0.65	0.83	0.47
2001	449757	528048	371466	29186	34056	24315	9278	3418	0.69	0.90	0.48
2002	794417	905367	683467	36181	43532	28830	6488	7073	1.25	1.54	0.96
2003	216734	250597	182871	25237	29396	21078	8292	9456	0.64	0.81	0.47
2004	279581	316204	242958	43258	49356	37160	8777	6750	0.77	0.96	0.59
2005	269409	302980	235838	29425	33899	24951	6787	5191	0.81	0.99	0.62
2006	199665	227487	171843	23503	26738	20268	5593	2484	0.51	0.66	0.37
2007	703294	777914	628674	24848	28093	21602	6781	2739	0.40	0.51	0.30
2008	367760	415802	319718	23850	26955	20746	7455	11187	0.72	0.85	0.60
2009	1738552	1894562	1582542	36168	40118	32219	9608	9080	0.57	0.67	0.46
2010	215775	245848	185702	37358	41808	32909	10262	16547	0.59	0.70	0.49
2011	56642	67554	45730	85188	93012	77365	12879	14378	0.45	0.54	0.37
2012	40546	48919	32172	68042	74895	61189	18376	10191	0.57	0.67	0.48
2013	530150	589036	471264	40647	45242	36052	13424	2085	0.50	0.59	0.41
2014	119004	142336	95672	24854	28347	21361	9854	3177	0.53	0.64	0.42
2015	450962	522535	379389	38298	42823	33773	8545	6694	0.52	0.64	0.41
2016	44344	63135	25553	28251	32579	23923	7594	10337	0.67	0.84	0.50
2017	257583*			32936							

*Geometric mean (1993–2014).

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