

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

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2019 should be no more than 6317 tonnes.

Stock development over time

Spawning–stock biomass has declined since 2011 and is above MSY $B_{trigger}$. Fishing mortality (F) has been above F_{MSY} for the entire time-series. Recruitment in 2017 was below the average and among the lowest estimated.

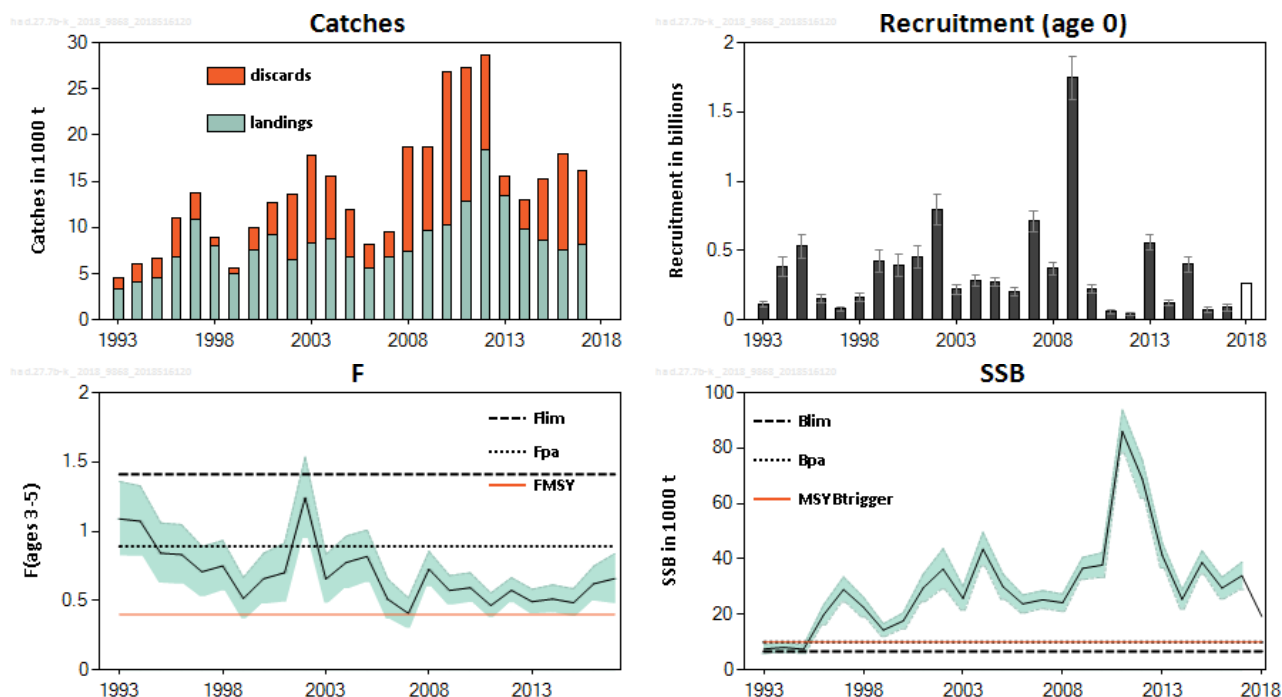


Figure 1 Haddock in divisions 7.b–k. Summary of the stock assessment. The assumed 2018 recruitment value is not shaded. Shaded areas in F and SSB plots and error bars in the recruitment plot represent $1 \times$ standard deviation. Uncertainty boundaries are not available for 2018.

Stock and exploitation status

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

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

	Fishing pressure			Stock size			
		2015	2016	2017	2016	2017	2018
Maximum sustainable yield	F_{MSY}	✗	✗	✗ Above	MSY	✓	✓ 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 Haddock in divisions 7.b–k. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
$F_{\text{ages 3–5}}$ (2018)	0.66	$F_{\text{sq}} = F_{\text{Average}}(2015–2017)$, rescaled to 2017
SSB (2019)	13 365 tonnes	$F_{\text{sq}} = 0.66$
$R_{\text{age 0}}$ (2018–2019)	265 133 thousands	Geometric mean (1993–2015)
Catch (2018)	10 837 tonnes	$F_{\text{sq}} = 0.66$
Landings (2018)	8 225 tonnes	Average discard rate (1993–2017)
Discards (2018)	2 612 tonnes	Average discard rate (1993–2017)

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

Basis	Total catch (2019)	Wanted catch* (2019)	Unwanted catch* (2019)	F_{total} (2019)	F Wanted (2019)	F Unwanted (2019)	SSB (2020)	% SSB change **	% TAC change ***	% Advice change ^
ICES advice basis										
MSY approach:	6317	3761	2556	0.4	0.35	0.049	21650	62	–9	–24
Other scenarios										
$F_{\text{MSY lower}}$	4310	2592	1718	0.26	0.23	0.032	23559	76	–38	–48
$F_{\text{MSY upper}}$	8863	5205	3659	0.6	0.53	0.074	19245	44	28	6
$F = 0$	0	0	0	0			27695	107	–100	–100
F_{pa}	11991	6905	5087	0.89	0.78	0.11	16324	22	74	43
F_{lim}	16326	9095	7232	1.41	1.24	0.174	12356	–8	136	95
$\text{SSB}_{2020} = B_{\text{lim}}$	22818	11868	10950	2.7	2.4	0.33	6700	–50	230	173
$\text{SSB}_{2020} = B_{\text{pa}} = \text{MSY } B_{\text{trigger}}$	18969	10309	8660	1.83	1.6	0.23	10000	–25	175	127
$F = F_{2018}$	9536	5578	3959	0.66	0.58	0.081	18613	39	38	14.1
Mixed-fisheries options										
A: Max.	9593	–	–	0.66	–	–	18560	38	40	–
B: Min.	0	–	–	0	–	–	27695	107	–100	–
C: Stock	6317	–	–	0.4	–	–	21650	62	–9	–
D: SQ effort	9948	–	–	0.7	–	–	18228	36	40	–
E: Value	6718	–	–	0.43	–	–	21320	59	–3	–
F: Range	4381	–	–	0.26	–	–	23491	76	37	–

* Wanted catch is the predicted landed catch above the minimum conservation reference size (MCRS). Unwanted catch are the landings below MCRS and discards.

** SSB 2020 relative to SSB 2019.

*** Total catch in 2019 relative to TAC in 2018 (6910 tonnes).

^ Advice value for 2019 relative to advice value for 2018 (8358 tonnes).

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 2018 and 2019 is the same as in 2017.
- 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 (price × weight) of each stock in the fleet’s portfolio.
- F. Range scenario: The potential for TAC mismatch in 2019 is minimized 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 divisions 7.b–k, and whiting in divisions 7.b–c and 7.e–k).

Total advised catch for 2019 is lower than the advice for 2018 owing to a decrease in the SSB. This follows low recruitment over the past two years, and F is still above F_{MSY} .

Basis of the advice

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

Advice basis	MSY approach
Management plan	The EU has proposed a multiannual management plan for the Western Waters, which is not yet finalized (EU, 2018).

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.

The French contribution to the combined IBTS survey tuning index was not available for 2017 and was partially replaced by extended Irish survey coverage. This was not considered to have impacted on the quality of the assessment.

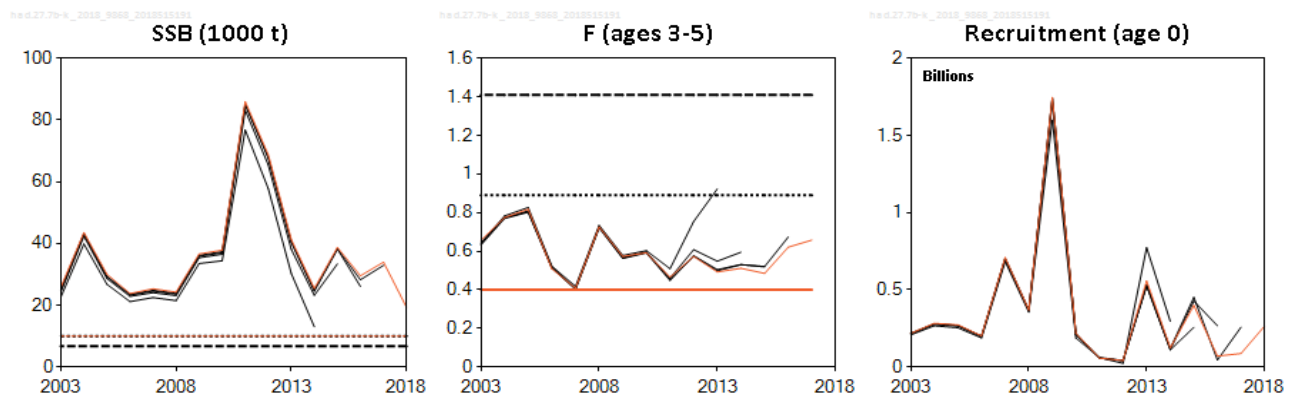


Figure 2 Haddock in divisions 7.b–k. Historical assessment results (final-year recruitment estimates included).

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). Discards by weight continued to be high in 2017, comprising 50% of the catch, despite the introduction of the square-mesh panels in 2012.

Forecast catches at F_{sq} in 2018 are calculated to be higher than the TAC, which could result in a continued high discard rate.

Mixed-fisheries considerations

Haddock are caught in mixed fisheries with cod and whiting, and this should be taken into account when managing the fishery. The mixed-fisheries analysis carried out by ICES shows that cod will be the limiting species for all fleets (representing 100% of fleet effort) in 2019 (Section 5.2.2.1 in ICES, 2018). Haddock is fished at above F_{MSY} in 2019 under all scenarios except for the 'min', 'had' and 'cod_fm_{sy}' scenarios, reflecting that it is a limiting stock for some fleets (representing 32% of fleet effort; ICES, 2018).

This year, two “range” scenarios are presented; the traditional range scenario which uses ICES advice of zero catches for cod, and a new range scenario which uses the uncapped reduced MSY approach for cod. Both of these scenarios search for the minimum sum of differences between potential catches by stock under the “min” and the “max” scenarios within the F_{MSY} ranges. The outcome of both of these scenarios are driven by the limiting cod catch in 2019. All fleets within the Celtic Sea catch cod to a greater or lesser extent; therefore, these large reductions in fishing mortality of cod result in a choke for both haddock and whiting in all fleets.

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 $B_{trigger}$	10000 t	B_{pa}	ICES (2016a)
	F_{MSY}	0.40	Median point estimates of EqSim with a segmented regression stock–recruitment relationship.	ICES (2016a)
Precautionary approach	B_{lim}	6700 t	Lowest observed SSB	ICES (2016a)
	B_{pa}	10000 t	B_{lim} combined with the assessment error; $B_{lim} \times \exp(1.645 \times \sigma)$; $\sigma = 0.26$	ICES (2016a)
	F_{lim}	1.41	F with 50% probability of $SSB < B_{lim}$	ICES (2016a)
	F_{pa}	0.89	F_{lim} combined with the assessment error; $F_{lim} \times \exp(-1.645 \times \sigma)$; $\sigma = 0.28$	ICES (2016a)
Management plan*	MAP MSY $B_{trigger}$	10000 t	MSY $B_{trigger}$	
	MAP B_{lim}	6700 t	B_{lim}	
	MAP F_{MSY}	0.40	F_{MSY}	
	MAP range F_{lower}	0.26	Consistent with ranges provided by ICES (2016b), resulting in no more than 5% reduction in long-term yield compared with MSY.	
	MAP range F_{upper}	0.60	Consistent with ranges provided by ICES (2016b), resulting in no more than 5% reduction in long-term yield compared with MSY.	

* Proposed EU multiannual plan (MAP) for the Western Waters (EU, 2018).

Basis of the assessment

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

ICES stock data category	1 (ICES, 2016c).
Assessment type	ASAP (Age-Structured Stochastic 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

An apparent misalignment between the TAC for haddock and the widespread abundance of the species across the main fishing grounds in the Celtic Sea, has generated a high rate of discards of mature haddock. Since 2010 the fleets operating in the mixed fisheries of the Celtic Sea and Western Channel have experienced increasingly large numbers of haddock in their catch. There are signs that there has been an expansion in both the stock size and its distribution. The haddock stock seems to have expanded in distribution further south and west of its historical distribution.

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	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC	Official landings	ICES landings ^{###}	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	11065
1997	Not dealt with			1400	10270	10827	2883	13710
1998	Not dealt with			2000	7361	7928	934	8862
1999	Not dealt with			2200***	5247	4970	586	5556
2000	No expansion of catches			16600***	6656	7499	2503	10002
2001	No expansion of catches			1200***	9702	9278	3418	12696
2002	No expansion of catches		8000	9300***	7089	6488	7073	13561
2003	No expansion of catches		7200	8185***	8241	8292	9456	17748
2004	No increase in F			9600***	8453	8777	6750	15527
2005	No increase in effort			11520***	6859	6787	5191	11978
2006	No increase in effort			11520***	5647	5593	2484	8077
2007	No increase in effort			11520***	6629	6781	2739	9520
2008	Same advice as last year			11579***	6234	7455	11187	18642
2009	Same advice as last year			11579 [^]	9307	9608	9080	18688
2010	Same advice as last year			11579 [^]	9999	10262	16547	26809
2011	See scenarios			13316 [^]	13709	12879	14378	27257
2012	No increase in catch and technical measures to reduce discards rates			16645 [^]	18222	18376	10191	28567
2013	MSY transition		< 9500	14148 [^]	13098	13424	2085	15509
2014	MSY transition	< 5281	< 3602	9479 [^]	9171	9854	3177	13031
2015	MSY approach	< 10 434	< 5605	8342 [^]	8342	8545	6694	15239
2016	MSY approach	≤ 8590	≤ 6078 ^{^^}	7258 [^]	7007 [#]	7594	10337	17931
2017	MSY approach	≤ 12 444	≤ 7751	7751 [^]	6685 [#]	8097	7975	16072
2018	MSY approach	≤ 8358	≤ 5911	6910 [^]				
2019	MSY approach	≤ 6317						

* Applies to subareas 7–10.

** Increased in-year to 14 000 tonnes.

*** Includes separate Division 7.a allocation.

[^] Applies to divisions 7.b–k and subareas 8–10.

^{^^} Wanted catch.

^{^^^} Values presented to the nearest 100.

[#] Preliminary.

^{###} Including landings from rectangles 33E2 and 33E3 since 2003.

History of the catch and landings

Table 8 Haddock in divisions 7.b–k. Catch distribution by fleet in 2017 as estimated by ICES.

Catch	Landings				Discards			
	Otter trawls	Beam trawls	Gillnets	Other	Otter trawls	Beam trawls	Gillnets	Other
16072 t	80%	5%	3%	12%	81%	8%	0.3%	11%
	8097 t				7975 t			

Table 9 Haddock in divisions 7.b–k. History of commercial catch and landings (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	10002	
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	11793	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	4487	1713	692	27	7007	587	7594	10337	17931	468
2017*	111	4615	1256	690	13	6685	1412	8097	7975	16072	715

* Preliminary data.

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

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 and recruitment in thousands.

Year	Recruitment age 0	High	Low	SSB	High	Low	Landings	Discards	F ages 3–5	High	Low
	thousands			tonnes			tonnes				
1993	111532	135085	87979	7540	9123	5956	3348	1208	1.09	1.36	0.82
1994	382807	452620	312994	8092	9868	6316	4131	1886	1.07	1.33	0.82
1995	532867	618032	447702	7448	8888	6008	4470	2218	0.84	1.06	0.62
1996	150283	179812	120754	19845	23424	16267	6756	4309	0.83	1.05	0.62
1997	76571	93472	59670	28984	33512	24456	10827	2883	0.71	0.89	0.53
1998	159915	190679	129151	22620	26197	19042	7928	934	0.75	0.93	0.57
1999	422340	498928	345752	14339	16612	12065	4970	586	0.52	0.67	0.37
2000	396396	477197	315595	17680	20611	14749	7499	2503	0.66	0.84	0.47
2001	452634	531340	373928	29554	34463	24645	9278	3418	0.70	0.91	0.49
2002	797626	907856	687396	36391	43730	29052	6488	7073	1.24	1.53	0.95
2003	217938	251728	184148	25777	30016	21539	8292	9456	0.66	0.83	0.48
2004	282811	319527	246095	43538	49610	37467	8777	6750	0.77	0.97	0.58
2005	272584	306279	238889	30029	34574	25483	6787	5191	0.82	1.01	0.63
2006	200903	228751	173055	23780	27012	20549	5593	2484	0.51	0.66	0.36
2007	709314	784105	634523	25315	28563	22066	6781	2739	0.41	0.52	0.30
2008	368837	416733	320941	24233	27338	21127	7455	11187	0.73	0.85	0.60
2009	1746597	1901947	1591247	36610	40552	32668	9608	9080	0.57	0.68	0.47
2010	217895	247810	187980	37828	42268	33387	10262	16547	0.59	0.70	0.48
2011	57154	68041	46267	85975	93755	78195	12879	14378	0.47	0.55	0.38
2012	41199	49516	32881	68826	75633	62019	18376	10191	0.57	0.66	0.48
2013	557346	614932	499760	41265	45808	36722	13424	2085	0.49	0.58	0.40
2014	123363	143861	102865	25429	28873	21984	9854	3177	0.51	0.61	0.41
2015	398840	451806	345874	38740	42942	34537	8545	6694	0.48	0.58	0.38
2016	69868	86838	52898	29518	33391	25646	7594	10337	0.62	0.75	0.49
2017	87039	110375	63703	33960	38872	29048	8097	7975	0.66	0.84	0.48
2018	265133*			19319							

*Geometric mean (1993–2015).

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