

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

ICES advice on fishing opportunities

ICES advises that when the EU multiannual plan (MAP) for Western Waters and adjacent waters is applied, catches in 2021 that correspond to the F ranges in the MAP are between 12 128 tonnes and 25 454 tonnes. According to the MAP, catches higher than those corresponding to F_{MSY} (18 382 tonnes) can only be taken under conditions specified in the MAP, while the entire range is considered precautionary when applying the ICES advice rule.

Stock development over time

Following a decline from its peak in 2011, the spawning-stock biomass (SSB) has increased since 2014 and is above $MSY B_{trigger}$. Fishing mortality (F) has been above F_{MSY} for the entire time-series but has been gradually declining. Recruitment in 2018 and 2019 was above average.

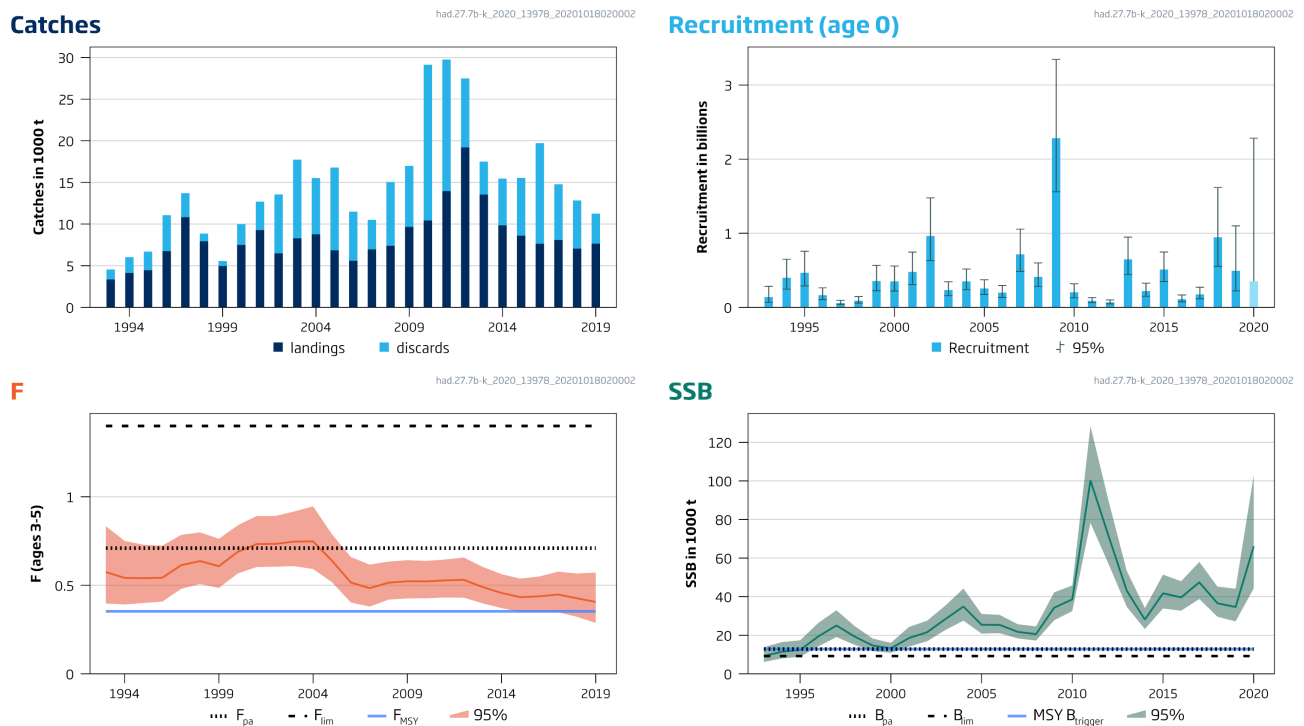


Figure 1 Haddock in divisions 7.b–k. Summary of the stock assessment. Discard estimates are available from 2005; prior to 2005, discard estimates are based on limited sampling. The paler shaded recruitment value is assumed.

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 the fishery relative to reference points.

	Fishing pressure				Stock size					
	2017	2018	2019		2018	2019	2020			
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}	✓	✓	✓	Within the range	B_{MGT}	✓	✓	✓	Above trigger

Catch scenarios

Table 2 Haddock in divisions 7.b–k. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
$F_{\text{ages 3-5}}$ (2020)	0.41	Average $F = (2017-2019)$ scaled to $F_{\text{ages 3-5}}$ in 2019.
SSB (2021)	71323	Short-term forecast; in tonnes.
R_{age0} (2020–2021)	351066	Median resampled (1993–2019); in thousands.
Total catch (2020)	20274	Short-term forecast; in tonnes.
Projected landings (2020)	9190	Short-term forecast, assuming average 2017–2019 discard pattern; in tonnes.
Projected discards (2020)	11084	Short-term forecast, assuming average 2017–2019 discard pattern; in tonnes.

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

Basis	Total catch (2021)	Projected landings (2021)	Projected discards (2021)	F_{total} (2021)	$F_{\text{projected landings}}$ (2021)	$F_{\text{projected discards}}$ (2021)	SSB (2022)	% SSB change *	% advice change ^
ICES advice basis									
EU MAP ^^: F_{MSY}	18382	9770	8612	0.353	0.25	0.107	70434	-1.25	10.3
$F = \text{MAP } F_{\text{MSY lower}}$	12128	6485	5643	0.221	0.154	0.07	77851	9.2	6.2
$F = \text{MAP } F_{\text{MSY upper}}$	25454	13418	12036	0.521	0.36	0.157	62142	-13	9.4
Other scenarios									
$F = 0$	0	0	0	0	0	0	92336	30	-100
F_{pa}	32273	16908	15365	0.71	0.49	0.21	54327	-24	94
F_{lim}	50744	25951	24793	1.40	0.98	0.42	34378	-52	204
$\text{SSB}_{2022} = B_{\text{lim}}$	78240	37584	40656	4.0	2.8	1.20	9259 **	-87	369
$\text{SSB}_{2022} = B_{\text{pa}} = \text{MSY } B_{\text{trigger}}$	73405	35759	37646	3.2	2.2	0.97	12859 **	-82	340
$F = F_{2020}$	20690	10980	9710	0.41	0.28	0.123	67674	-5.1	24

* SSB_{2022} forecast relative to SSB_{2021} .

** Numbers presented are approximations of the reference point values.

^ Advice values for 2021 relative to the corresponding 2020 values (MAP advice of 16 671, 11 418, and 23 262 tonnes, respectively; other values are relative to F_{MSY}).

^^ EU multiannual plan (MAP) for the Western Waters (EU, 2019).

The advised catch for 2021 is higher than the advised catch for 2020, owing to a revision in the perception of the stock following the benchmark of the assessment, and the above-average incoming recruitment (2018 and 2019) resulting in an increase in biomass.

Basis of the advice

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

Advice basis	Management plan.
Management plan	<p>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.</p> <p>Full details of the plan are described in EU (2019).</p>

Quality of the assessment

The stock assessment was benchmarked in 2020 (ICES, 2020a). The model was changed to a stochastic state–space assessment model (SAM). Maturity and natural mortality information were updated, catch (landings and discards) time-series were reviewed and updated from 2005 to 2018, and survey indices updated to a single-modelled time-series, using a vector-autoregressive spatio-temporal model (VAST). These changes result in an upward revision in recent SSB estimates resulting in a change to an increasing trend in stock size in recent years. There is a downward revision in F , which also shows less variability, relative to previous assessment results (Figure 2).

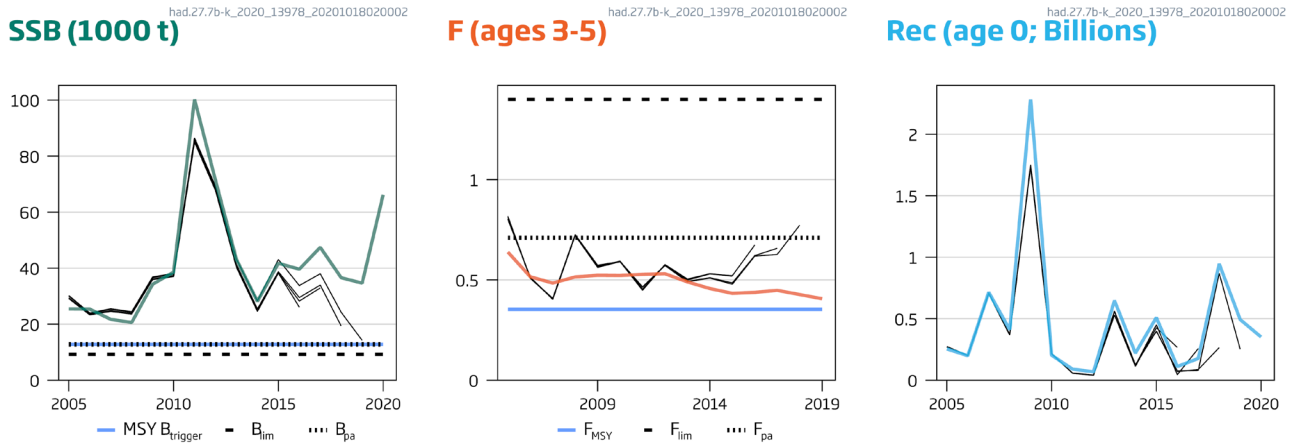


Figure 2 Haddock in divisions 7.b–k. Historical assessment results (final-year recruitment assumptions included). The assessment was benchmarked in 2020. Black lines show the results of the previous assessments of the stock.

Issues relevant for the advice

The assessment and the advice are for divisions 7.b–k, including rectangles 33E2 and 33E3 in Division 7.a, as they are considered part of this stock. This reallocation has increased since first applied in 2006. The 2019 reallocation (760 tonnes) is the largest to date, accounting for 9.9% of the ICES estimated division 7.b–k landings, and 43% of the Irish Sea (Division 7.a) landings. This should be taken into consideration when setting TACs for the two management areas (divisions 7.a and 7.b–k), as a portion of the catch taken under the Division 7.a TAC is considered to be part of the divisions 7.b–k stock.

Forecast catches in 2020 (20 274 tonnes) are estimated to be in excess of the TAC (10 859 tonnes) because of the large incoming recruitment. High abundance of the 2018 year class is expected to give rise to discards greater than landings in 2020, considering recent discarding patterns. The discarding of the current year class in 2021 is likely to decrease as they become larger; however, the high 2019 recruitment is likely to extend this high discarding situation.

Mixed-fisheries considerations

Haddock in divisions 7.b–k is caught as part of a mixed fishery with cod and whiting. Mixed-fisheries advice will be provided in the Celtic Seas fisheries overview later in the year.

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 $B_{trigger}$	12822	B_{pa} ; in tonnes.	ICES (2020a)
	F_{MSY}	0.353	Based on simulation using a segmented regression stock–recruitment relationship (EqSim)	ICES (2020a)
Precautionary approach	B_{lim}	9227	Lowest observed SSB; in tonnes	ICES (2020a)
	B_{pa}	12822	B_{lim} combined with the assessment error; $B_{lim} \times \exp(1.645 \times \sigma)$; $\sigma = 0.20$ (default setting); in tonnes	ICES (2020a)
	F_{lim}	1.40	F with 50% probability of $SSB < B_{lim}$	ICES (2020a)
	F_{pa}	0.71	$F_{p0.5}$; the F that leads to $SSB \geq B_{lim}$ with 95% probability	ICES (2020a)
EU MAP	MAP MSY $B_{trigger}$	12822	MSY B_{pa} ; in tonnes	EU (2019), ICES (2020a)
	MAP B_{lim}	9227	Lowest observed SSB; in tonnes	EU (2019), ICES (2020a)
	MAP F_{MSY}	0.353	F_{MSY}	EU (2019), ICES (2020a)
	MAP range F_{lower}	0.221	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY	EU (2019), ICES (2020a)
	MAP range F_{upper}	0.521	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY	EU (2019), ICES (2020a)

Basis of the assessment

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

ICES stock data category	1 (ICES, 2019).
Assessment type	Age-based stochastic analytical assessment (SAM; ICES, 2020a).
Input data	Commercial catches (age composition of landings and discards); vector autoregressive spatio-temporal (VAST) standardized survey index (combined IGFS-WIBTS-Q4 and EVHOE-WIBTS-Q4); maturity data (surveys and observer data; constant for all years); age-dependent natural mortality (Lorenzen, 1996).
Discards and bycatch	Included in the assessment for the full time-series. Full observer-based estimates from 2005, partial observer-based estimates from 1993 to 2004.
Indicators	None.
Other information	This stock was benchmarked in 2020 (ICES, 2020b).
Working groups	Working Group for the Celtic Seas Ecoregion (WGCSE).

Information from stakeholders

French fleets operating in the Celtic Seas and the western English Channel mixed fisheries reported increasingly large catches of haddock from 2010 to 2018, stabilizing in 2019 and 2020. Owing to restrictive TAC (since 2012), the industry reported an increased discarding of haddock, especially for small commercial sizes. Furthermore, the industry reported that the 2019 regulatory changes in the Celtic Seas (EU Regulation 2018/2034 – EU, 2018; and EU Regulation 2020/123 – EU, 2020), introducing new selective devices and vessel strategy adaptations, modified the size and species composition of catches.

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 ##	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

Year	ICES advice	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC	Official landings	ICES landings ##	ICES discards	ICES catch
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	10270	10827	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	6839	9953	16 792
2006	No increase in effort			11 520 ***	5647	5592	5899	11 491
2007	No increase in effort			11 520 ***	6629	6961	3552	10 513
2008	Same advice as last year			11 579 ***	6234	7392	7660	15 052
2009	Same advice as last year			11 579 ^	9307	9664	7322	16 986
2010	Same advice as last year			11 579 ^	9999	10 429	18 701	29 130
2011	See scenarios			13 316 ^	13 709	13 957	15 807	29 764
2012	No increase in catch and technical measures to reduce discard rates			16 645 ^	18 222	19 196	8285	27 481
2013	MSY transition		< 9500	14 148 ^	13098	13 538	3962	17 501
2014	MSY transition	< 5281	< 3602	9479 ^	9171	9846	5619	15 464
2015	MSY approach	< 10 434	< 5605	8342 ^	8342	8608	6941	15 549
2016	MSY approach	≤ 8590	≤ 6078	7258 ^	7007	7648	12 065	19 713
2017	MSY approach	≤ 12 444	≤ 7751	7751 ^	7344	8099	6691	14 789
2018	MSY approach	≤ 8358	≤ 5911	6910 ^	6591 #	7046	5798	12 844
2019	MSY approach	≤ 6317		8329 ^	8342 #	7656	3603	11 259
2020	Management plan	16 671 (range 11 418–23 262)		10 859 ^				
2021	Management plan	18 382 (range 12 128–25 454)						

* 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.

^^ 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 2019, as estimated by ICES.

Catch	Landings				Discards			
	Otter trawls	Beam trawls	Gillnets	Other	Otter trawls	Beam trawls	Gillnets	Other
11259 tonnes	83%	4%	3%	10%	68%	20%	0%	12%
	7656 tonnes				3603 tonnes			

Table 9 Haddock in divisions 7.b–k. History of commercial catch and landings. All weights are in tonnes.

Year	Official landings						Landings taken or reported in rectangles 33E2 and 33E3 **	ICES estimates		
	Belgium	France	Ireland	UK	Others	Total		Landings	Discards	Catch
1993	51	1839	1262	256	0	3408		3348	1208	4556
1994	123	2788	908	240	17	4076		4131	1886	6017
1995	189	2964	966	266	83	4468		4470	2218	6688
1996	133	4527	1468	439	86	6653		6756	4309	11065
1997	246	6581	2789	569	85	10270		10827	2883	13710
1998	142	3674	2788	444	312	7360		7928	934	8862
1999	51	2725	2034	278	159	5247		4970	586	5556
2000	90	3088	3066	289	123	6656		7499	2503	10002
2001	165	4842	3608	422	665	9702		9278	3418	12696
2002	132	4348	2188	315	106	7089		6488	7073	13561
2003	118	5781	1867	393	82	8241	64	8292	9456	17748
2004	136	6130	1715	313	159	8453	53	8777	6750	15527
2005	167	4174	2037	292	197	6867	35	6839	9953	16792
2006	99	3191	1874	274	183	5621	26	5592	5899	11491
2007	119	4143	1931	385	50	6627	222	6961	3552	10513
2008	109	3638	1800	566	121	6234	194	7392	7660	15052
2009	131	5430	2983	716	48	9307	285	9664	7322	16986
2010	170	6240	2609	852	128	9998	267	10429	18701	29130
2011	211	8389	3323	1657	129	13709	374	13957	15807	29764
2012	232	11793	4129	1901	166	18221	473	19196	8285	27481
2013	174	8747	2699	1455	23	13099	410	13538	3962	17501
2014	99	6375	2092	785	21	9371	444	9846	5619	15464
2015	118	5679	1657	769	6	8229	322	8608	6941	15549
2016	88	4487	1730	692	27	7024	468	7648	12065	19713
2017	110	4885	1677	690	12	7374	715	8099	6691	14789
2018*	89	4470	1444	583	9	6595	532	7046	5798	12844
2019*	90	4259	1323	516	74	6262	760	7656	3603	11259

* Preliminary data.

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

Summary of the assessment

Table 10 Haddock in divisions 7.b–k. Assessment summary. High and low refer to 95% confidence intervals. All weights are in tonnes and recruitment in thousands.

Year	Recruitment (age 0)			SSB			Landings	Discards	Fishing mortality ages 3–5		
	Low	Value	High	Low	Value	High			Low	Value	High
1993	67244	138345	284625	6164	9227	13811	3348	1208	0.40	0.57	0.83
1994	246025	399725	649446	7981	11474	16498	4131	1886	0.39	0.54	0.75
1995	288573	467464	757253	8840	12397	17386	4470	2218	0.40	0.54	0.73
1996	102913	164566	263153	14217	19372	26395	6756	4309	0.41	0.54	0.72
1997	37128	59414	95079	19040	25052	32963	10827	2883	0.48	0.61	0.79
1998	56711	90819	145438	15073	19342	24819	7928	934	0.51	0.64	0.80
1999	223101	355678	567038	11751	14668	18311	4970	586	0.49	0.61	0.76
2000	220914	351066	557897	10906	13246	16088	7499	2503	0.57	0.69	0.84
2001	306453	478013	745616	14130	18536	24316	9278	3418	0.60	0.73	0.89
2002	629751	964657	1477668	16907	21591	27572	6488	7073	0.61	0.73	0.89
2003	158479	233720	344683	22702	28331	35356	8292	9456	0.61	0.75	0.92
2004	238746	351353	517072	27547	34893	44198	8777	6750	0.59	0.75	0.95
2005	173861	254303	371963	20857	25454	31063	6839	9953	0.52	0.64	0.79
2006	134290	198880	294538	21069	25375	30560	5592	5899	0.40	0.52	0.66
2007	485286	715742	1055639	18351	21721	25711	6961	3552	0.38	0.48	0.62
2008	282123	411306	599640	17252	20604	24607	7392	7660	0.42	0.52	0.63
2009	1558676	2283436	3345198	27768	34259	42267	9664	7322	0.43	0.52	0.64
2010	129987	203340	318088	32517	38596	45813	10429	18701	0.43	0.52	0.64
2011	62113	90043	130531	78231	100253	128473	13957	15807	0.43	0.53	0.65
2012	46251	68005	99992	56863	71377	89595	19196	8285	0.43	0.53	0.66
2013	442510	647545	947582	34769	43110	53452	13538	3962	0.40	0.49	0.60
2014	149029	220385	325906	23226	28142	34097	9846	5619	0.37	0.46	0.56
2015	348175	509828	746533	33886	41749	51436	8608	6941	0.35	0.43	0.54
2016	74238	111283	166814	32718	39627	47993	7648	12065	0.35	0.44	0.55
2017	114812	176611	271674	38780	47446	58048	8099	6691	0.35	0.45	0.58
2018	553266	946209	1618231	29591	36590	45244	7046	5798	0.32	0.43	0.57
2019	221176	493214	1099848	27181	34642	44151	7656	3603	0.29	0.41	0.57
2020	59414	351066 *	2283436	44270	66169	103056					

* Median resampled (1993–2019), as estimated by stochastic projection.

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Recommended citation: ICES. 2020. Haddock (*Melanogrammus aeglefinus*) in divisions 7.b–k (southern Celtic Seas and English Channel). *In* Report of the ICES Advisory Committee, 2020. ICES Advice 2020, had.27.7b-k. <https://doi.org/10.17895/ices.advice.5897>.