

## Haddock (*Melanogrammus aeglefinus*) in Division 7.a (Irish Sea)

### ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2019 should be no more than 3739 tonnes.

### Stock development over time

The spawning–stock biomass (SSB) is currently estimated at the highest level, well above MSY  $B_{trigger}$ . Fishing mortality (F) has been below  $F_{MSY}$  since 2012. Recruitment is highly variable throughout the time-series but is estimated to be below average in 2016 and 2017.



**Figure 1** Haddock in Division 7.a. Summary of stock assessment (weights in tonnes). 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 below  $F_{MSY}$ ,  $F_{pa}$ , and  $F_{lim}$ , and that spawning stock size is above MSY  $B_{trigger}$ ,  $B_{pa}$ , and  $B_{lim}$ .

**Table 1** Haddock in Division 7.a. State of the stock and fishery relative to reference points.

		Fishing pressure				Stock size		
		2015	2016	2017		2016	2017	2018
Maximum sustainable yield	$F_{MSY}$	✓	✓	✓	Below	MSY $B_{trigger}$	✓	✓
Precautionary approach	$F_{pa}, F_{lim}$	✓	✓	✓	Harvested sustainably	$B_{pa}, B_{lim}$	✓	✓
Management plan	$F_{MGT}$	—	—	—	Not applicable	$B_{MGT}$	—	—
								Above trigger
								Full reproductive capacity
								Not applicable

## Catch scenarios

**Table 2** Haddock in Division 7.a. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
$F_{\text{ages 2-4}} (2018)$	0.18	Catch constraint. TAC 2018 adjusted for annual reallocation of landings from rectangles 33E2 and 33E3 (3-year average value) = 3207 t – 497 t = 2710 t.
SSB (2019)	17356 tonnes	Short-term forecast.
$R_{\text{age 0}} (2018 \text{ and } 2019)$	351889 thousands	Geometric mean(1993–2015).
Catch (2018)	2940 tonnes	Short-term forecast.
Wanted catch * (2018)	2710 tonnes	Average discard rate (2015–2017).
Unwanted catch * (2018)	230 tonnes	Average discard rate (2015–2017).

\* “Wanted catch” is used to describe fish that would be landed in the absence of the EU landing obligation. The “unwanted catch” refers to the component that was previously discarded.

**Table 3** Haddock in Division 7.a. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2019)	Wanted catch* (2019)	Unwanted catch* (2019)	$F_{\text{total}}$ (2019)	$F_{\text{wanted}}$ (2019)	$F_{\text{unwanted}}$ (2019)	SSB (2020)	% SSB change **	% TAC change ***	% Advice change ^
ICES advice basis										
MSY approach: $F_{\text{MSY}}$	3739	3334	405	0.28	0.21	0.07	13095	–25	16.6	9
Other scenarios										
$F_{\text{MSY lower}}$	2764	2468	296	0.20	0.15	0.05	14137	–18.5	–13.8	–19.7
$F_{\text{MSY upper}}$	4536	4041	495	0.35	0.27	0.08	12248	–29	41	32
$F = 0$	0	0	0	0.00	0.00	0.00	17127	–1.32	–100	–100
$F_{\text{pa}}$	4863	4330	533	0.38	0.29	0.09	11902	–31	52	41
$F_{\text{lim}}$	6088	5411	677	0.50	0.38	0.12	10614	–39	90	77
$\text{SSB}_{2020} = B_{\text{lim}}$	13863	12075	1788	1.85	1.41	0.44	2994	–83	332	303
$\text{SSB}_{2020} = B_{\text{pa}}$	12564	11001	1564	1.49	1.14	0.35	4160	–76	292	265
$\text{SSB}_{2020} = \text{MSY } B_{\text{trigger}}$	12434	10891	1542	1.46	1.12	0.34	4281	–75	288	261
$F = F_{2018}$	1773	1585	188	0.12	0.09	0.03	15204	–12.4	–45	–49

\* “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 discard rate estimates for 2015–2017.

\*\* SSB 2020 relative to SSB 2019.

\*\*\* Total catch in 2019 relative to TAC in 2018 (3207 tonnes).

^ Advice value for 2019 relative to advice value for 2018 (3444 tonnes).

The stock biomass is estimated to decline between 2018 and 2019. Despite this decline, the advised catch for 2019 represents a 9% increase over that for 2018. This is due to a slight upward (0.27 to 0.28) revision in the  $F_{\text{MSY}}$  and because the selection of older fish in the fishery is estimated to have increased to full selection.

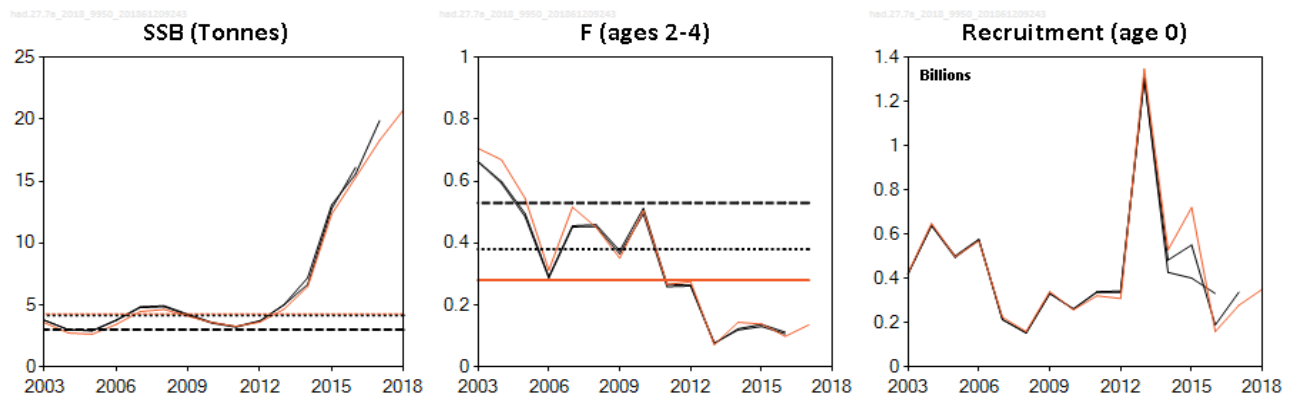
## Basis of the advice

**Table 4** Haddock in Division 7.a. 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

The recent changes from bycatch to targeted fishing activity are accounted for with the inclusion of an updated selectivity pattern from 2014 onwards in the 2018 assessment. This has resulted in a marginal downward revision of SSB relative to previous assessments.



**Figure 2** Haddock in Division 7.a. Historical assessment results.

### Issues relevant for the advice

The reference points for haddock in Division 7.a were updated in March 2018 (ICES, 2018a).

Landings have been adjusted since 2003 to exclude landings taken from rectangles 33E2 and 33E3 in the Irish Sea, as they are not considered to be part of this stock (Table 10). This should be considered when setting TACs for the two management areas for haddock in divisions 7.a and 7.b–k. Changes in the TAC for the haddock stock in Division 7.a may have implications for the fishing pressure on haddock in divisions 7.b–k.

The forecast is based on estimated landings in 2018, which assumes full uptake of the TAC, taking into consideration annual reallocated landings from the southern rectangles 33E2 and 33E3.

### Reference points

**Table 5** Haddock in Division 7.a. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	4281 tonnes	The 5th percentile of $B_{MSY}$ ; Irish Sea haddock has been fished at, or below $F_{MSY}$ for > five years.	ICES (2018a)
	$F_{MSY}$	0.28	Median point estimates of EqSim with a segmented regression stock–recruitment relationship.	ICES (2018a)
Precautionary approach	$B_{lim}$	2994 tonnes	Lowest observed SSB with >75th percentile recruitment.	ICES (2018a)
	$B_{pa}$	4160 tonnes	$B_{lim}$ combined with the assessment error; $B_{lim} \times \exp(1.645 \times \sigma)$ ; $\sigma = 0.20$ .	ICES (2018a)
	$F_{lim}$	0.50	F with 50% probability of $SSB < B_{lim}$ .	ICES (2018a)
	$F_{pa}$	0.38	$F_{lim}$ combined with the assessment error; $F_{lim} \times \exp(-1.645 \times \sigma)$ ; $\sigma = 0.2$ .	ICES (2018a)
Management plan*	MAP MSY $B_{trigger}$	4281 tonnes	MSY $B_{trigger}$	
	MAP $B_{lim}$	2994 tonnes	$B_{lim}$	
	MAP $F_{MSY}$	0.28	$F_{MSY}$	
	MAP range $F_{lower}$	0.20	Consistent with ranges provided by ICES (2018a), resulting in no more than 5% reduction in long-term yield compared with MSY.	
	MAP range $F_{upper}$	0.35	Consistent with ranges provided by ICES (2018a), 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 Division 7.a. Basis of the assessment and advice.

ICES stock data category	1 ( <a href="#">ICES, 2016</a> ).
Assessment type	ASAP (Age-Structured Assessment Programme; NOAA toolbox) that uses catches in the model and in the forecast.
Input data	Four survey indices (NIGFS-WIBTS-Q1 NIGFS-WIBTS-Q4, NIMIK, UKFSPW); annual maturity and growth data from the NIGFS-WIBTS-Q1 survey and from commercial landings in quarter 1. Commercial catch-at-age.
Discards and bycatch	Included in the assessment for the full time-series.
Indicators	None.
Other information	This stock was benchmarked in 2017 ( <a href="#">ICES, 2017a</a> ). Revision in reference points in 2018 (ICES, 2018a).
Working group	Working Group for the Celtic Seas Ecoregion ( <a href="#">WGCSE</a> )

## Information from stakeholders

No additional information is available.

## History of the advice, catch, and management

**Table 7** Haddock in Division 7.a. 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 catches
1987	Not dealt with			6000	1287	1287		
1988	Not dealt with			6000	747	747		
1989	Not dealt with			6000	560	560		
1990	Not dealt with			6000	582	582		
1991	Not dealt with			6000	616	616		
1992	Not dealt with			6000	703	656		
1993	Not dealt with			6000	730	813		
1994	Not dealt with			6000	681	1042		
1995	Not dealt with			6000	841	1736	780	2516
1996	No advice			10000	1453	2981	709	3690
1997	Means of setting catch limits req'd			14000	1925	3547	895	4442
1998	Catch limit for Division 7.a		3000	20000	3015	4874	1015	5889
1999	No increase in F; catch limit for Division 7.a		7000	4990	2370	4095	634	4729
2000	Reduce F below $F_{pa}$		< 2800	3400	2447	1357	802	2159
2001	Reduce F below $F_{pa}$		< 1710	2700	2229	2246	269	2515
2002	Reduce F below $F_{pa}$		< 1200	1300	1115	1817	387	2204
2003	No cod catches		-	585	674	659^	-	-
2004	$F < F_{pa}$		< 1500	1500	761	1217	392	1609
2005	$F < F_{pa}$		< 1370	1500	547	666	551	1217
2006	Substantial reduction in fishing mortality	-		1275	655	633	306	939
2007	Substantial reduction in fishing mortality	-		1179	1078	886	722	1608
2008	No increase in effort	-		1238	879	786	643	1429
2009	No increase in effort	-		1424	846	581	579	1160
2010	No increase in effort	-		1424	939	679	508	1187
2011	See scenarios	-		1317	813	446	307	753

Year	ICES advice	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC*	Official landings	ICES landings	ICES discards	ICES catches
2012	Reduce catch and improved selectivity	-		1215	813	343	599	942
2013	Decrease catch by 18%	-	< 710	1189	656	254	283	537
2014	Increase catch by 17%	1120	< 572	1181	974	518	488	1006
2015	Increase catch by 20%	< 893	< 425	1181	1154	833	652	1485
2016	Precautionary approach (increase catch by 20%)	≤ 1072	≤ 481	1654	1463**	1008	298	1306
2017	MSY approach	≤ 3061	≤ 2348	2615***	2363**	1662	333	1995
2018	MSY approach	≤ 3444	≤ 2796	3207				
2019	MSY approach	≤ 3739						

\* Precautionary TAC for subareas 7–10 and CECF 34.1.1 up to 1998. Since 1999 a special condition or separate TAC has been set for Division 7.a.

\*\* Preliminary.

\*\*\* Revised TAC in March 2017.

^ Underestimate because of inadequate sampling.

### History of the catch and landings

**Table 8** Haddock in Division 7.a. Catch distribution by fleet in 2017 as estimated by ICES.

Catch		Estimated landings			
1995 tonnes	otter trawls		Scottish seines	mid-water trawl	other gear types
	<i>Nephrops</i> directed fishery	Demersal fish directed fishery	10%	28%	2%
	16%	44%			
	1662 tonnes				
	Estimated discards <sup>†</sup>				
	otter trawls		Scottish seines	mid-water trawl	other gear types
	<i>Nephrops</i> directed fishery	Demersal fish directed fishery	1%	1%	8%
	85%	5%			
	333 tonnes				

<sup>‡</sup> Version 2: Estimated discard percentage by fleet corrected.

**Table 9** Haddock in Division 7.a. History of commercial catch and landings (tonnes).

Year	Belgium	France	Ireland	Netherlands	UK (England & Wales)*	UK (Isle of Man)	UK (N. Ireland)*	UK (Scotland)**	United Kingdom**	Total	ICES landings^
1984	3	38	199	-	29	2	38	78		387	387
1985	4	31	341	-	28	5	215	104		728	728
1986	5	39	275	-	22	4	358	23		726	726
1987	10	50	797	-	41	3	230	156		1287	1287
1988	12	47	363	-	74	3	196	52		747	747
1989	4	n/a	215	-	252	3	-	86		560	560
1990	4	n/a	80	-	177	5	-	316		582	582
1991	1	n/a	254	-	204	14	-	143		616	616
1992	8	73	251	-	244	13	-	114		703	656
1993	18	41	252	-	260	19	-	140		730	813
1994	22	22	246	-	301	24	-	66		681	1042
1995	32	58	320	-	294	27	-	110		841	1736
1996	34	105	798	1	463	38	-	14		1453	2981
1997	55	74	1005	14	717	9	-	51		1925	3547
1998	104	86	1699	10	1023	13	-	80		3015	4874
1999	53	n/a	759	5	1479	7	-	67		2370	4095
2000	22	49	1238	2	1061	19	-	56		2447	1357
2001	68	184	652	-	1238	1	-	86		2229	2246
2002	44	72	401	-	551	-	-	47		1115	1817
2003	20	146	229	-	248	-	-	31		674	n/a
2004	15	20	296	-	421	-	-	9		761	1217
2005	22	36	139	-	344	-	-	6		547	666
2006	23	20	184	-	419	-	-	9		655	633
2007	30	11	477	-	559	-	-	1		1078	886
2008	15	6	319	-	521	1	-	17		879	786
2009	7	3	388	-	446	1	-	1		846	581
2010	9	2	333	-	593	-	-	2		939	679
2011	16	8	434	-	355	-	-			813	446
2012	13	3	561	-		-	-		236	813	343
2013	6	1	492	-		<1	-		155	656	254
2014	7	0	541	-		<1	-		426	974	518
2015	7	7	507	-		<1	-		634	1154	833
2016***	5	1	632	-			-		825	1463	1008
2017***	5	5	1114	-			-		1240	2363	1662

\* From 1989 to 2011 Northern Ireland is included with England and Wales.

\*\* Since 2012 Northern Ireland and Scotland have been included with UK.

\*\*\* Preliminary.

^ Landings in the southern part of Division 7.a (rectangles 33E2 and 33E3) are excluded.

n/a = not available.

**Table 10** Haddock in Division 7.a. ICES landings, discards, catch, and % discards by weight for Division 7.a haddock. All weights are in tonnes.

Year	ICES landings	ICES discards estimates	ICES catch estimates	% discard	Landings taken or reported in rectangles 33E2 and 33E3 (belonging to the 7.b–k stock)**
1995	1736	780	2516	31.0	16
1996	2981	709	3690	19.2	33
1997	3547	895	4442	20	36
1998	4874	1015	5889	17.2	28
1999	4095	634	4729	13.4	34
2000	1357	802	2159	37	11
2001	2246	269	2515	10.7	74
2002	1817	387	2204	17.6	82
2003*	659	-	-		64
2004	1217	392	1609	24	53
2005	666	551	1217	45	35
2006	633	306	939	33	26
2007	886	722	1608	45	222
2008	786	643	1429	45	194
2009	581	579	1160	50	285
2010	679	508	1187	43	267
2011	446	307	753	41	374
2012	343	599	942	64	473
2013	254	283	537	53	410
2014	518	488	1006	49	444
2015	833	652	1485	44	322
2016	1008	298	1306	23	455
2017	1662	333	1995	17	715

\* Underestimate or low confidence due to inadequate sampling.

\*\* Landings in the southern part of Division 7.a (rectangles 33E2 and 33E3) are not included in the assessment and are considered to be part of the stock (had.27.7b–k).

## Summary of the assessment

**Table 11** Haddock in Division 7.a. Assessment summary. All weights are in tonnes. Low and high refer to 1 × std deviation.

Year	Recruitment age 0	High	Low	SSB	High	Low	Landings	Discards	F ages 2–4	High	Low
	thousands			tonnes			tonnes				
1993	153215	171861	134569	2274	2602	1946	813	365	0.65	0.79	0.51
1994	525050	576512	473588	2323	2738	1908	1042	468	0.67	0.83	0.52
1995	62004	74036	49972	2460	2915	2006	1736	780	0.89	1.10	0.68
1996	1357236	1488746	1225726	4980	5618	4342	2981	709	0.72	0.86	0.59
1997	209217	239985	178449	4146	4854	3438	3547	895	0.90	1.08	0.72
1998	341164	383051	299277	8282	9174	7389	4874	1015	0.95	1.10	0.80
1999	674674	742290	607058	5765	6547	4984	4095	634	1.39	1.63	1.15
2000	96922	114188	79656	2806	3293	2320	1357	802	0.98	1.19	0.76
2001	703481	777956	629006	3952	4541	3363	2246	269	0.69	0.81	0.57
2002	133031	154080	111982	3019	3556	2482	1817	387	0.87	1.05	0.70
2003	423596	480254	366938	3565	4151	2978	1517	390	0.71	0.86	0.56
2004	648892	722350	575434	2731	3311	2152	1217	392	0.67	0.83	0.51
2005	497829	553254	442404	2632	3174	2090	666	551	0.54	0.68	0.41
2006	569141	625868	512414	3430	4047	2814	633	306	0.31	0.39	0.24
2007	224590	251477	197703	4471	5159	3783	886	722	0.52	0.62	0.41
2008	159559	180655	138463	4629	5391	3868	786	643	0.45	0.54	0.36
2009	340748	379744	301752	4092	4903	3281	581	579	0.35	0.42	0.28
2010	257452	289807	225097	3567	4336	2797	679	508	0.50	0.62	0.39
2011	321144	361511	280777	3273	4025	2521	446	307	0.27	0.33	0.20
2012	309196	354087	264305	3609	4388	2830	343	599	0.28	0.34	0.21
2013	1348257	1514337	1182177	4648	5616	3679	254	282	0.071	0.086	0.056
2014	528565	604730	452400	6487	7632	5342	518	488	0.144	0.177	0.111
2015	720756	832556	608956	12351	14244	10459	833	652	0.138	0.168	0.108
2016	159171	192704	125638	15307	17725	12889	1008	298	0.098	0.120	0.077
2017	278181	346920	209442	18300	21256	15344	1662	333	0.136	0.167	0.105
2018	351889*			20780							

\*Geometric mean recruitment 1993–2015.

## Sources and references

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