

Haddock (*Melanogrammus aeglefinus*) in Division 6.b (Rockall)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2019 should be no more than 10 469 tonnes.

Stock development over time

The spawning-stock biomass (SSB) has increased from the lowest observed in 2014 and is estimated to be well above MSY $B_{trigger}$. Fishing mortality (F) is highly variable; in 2017 it is below F_{MSY} . Recruitment during 2008–2012 is estimated to have been extremely weak, but has improved since. Recruitment in 2017 and 2018 is estimated to be above average.



Figure 1 Haddock in Division 6.b. Summary of the stock assessment.

Stock and exploitation status

ICES assesses that fishing pressure on the stock is below F_{MSY} , 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 Division 6.b. 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}	—	—	—		B_{MGT}	—	—
								Above trigger
								Full reproductive capacity

Catch scenarios

Table 2 Haddock in Division 6.b. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
F ₂₀₁₈	0.195	F consistent with assumed catches in 2018.
SSB (2019)	37465 tonnes	Fishing at F = 0.195.
Rage 1 (2018)	56535 thousands	Survey estimate in 2017 (RCT3).
Rage 1 (2019)	14155 thousands	Recruitment corresponding to the 25th percentile rank of the recruitment time-series.
Catch (2018)	7472 tonnes	Wanted and unwanted catch.
Wanted catch (2018)	6163 tonnes	EU TAC 5163 tonnes + estimated Russian catch 1000 tonnes.
Unwanted catch (2018)	1309 tonnes	EU discards based on mean discard rate-at-age for the period 2008–2017.

Table 3 Haddock in Division 6.b. Annual catch options. All weights are in tonnes. No information on % TAC change is shown because TAC area differs from the stock distribution area.

Basis	Total catch * (2019)	Wanted catch** (2019)	Unwanted catch** (2019)	F _{total} (2019)	F _{wanted} (2019)	F _{unwanted} (2019)	SSB (2020)	% SSB change ***	% Advice change ^
ICES advice basis									
MSY approach: F _{MSY}	10469	8932	1537	0.200	0.157	0.043	42258	12.8	103
Other scenarios									
Proposed management strategy^^	9408	8034	1374	0.177	0.138	0.039	43356	15.7	82
F = 0	0	0	0	0	0	0	59316	58	-100
F _{pa}	20446	17280	3166	0.46	0.360	0.100	31982	-14.6	296
F _{lim}	26877	22535	4342	0.69	0.540	0.150	25431	-32	421
SSB ₂₀₂₀ = B _{lim}	45990	36857	9133	2.441	1.910	0.531	6800	-82	791
SSB ₂₀₂₀ = B _{pa} = MSY B _{trigger}	42313	34361	7952	1.811	1.417	0.394	10200	-73	720
F = F ₂₀₁₈	10230	8730	1500	0.195	0.152	0.043	42505	13.5	98
MSY F _{lower}	7129	6099	1030	0.130	0.102	0.028	45720	22	38
MSY F _{upper}	10469	8932	1537	0.200	0.157	0.043	42258	12.8	103

* Total catch includes EU, non EU (Russian, Norway, etc.) “wanted catch” (landings) and discards.

** “Wanted” and “unwanted” catch are used to describe fish that would be landed and discarded in the absence of the EU landings obligation.

*** SSB 2020 relative to SSB 2019.

^ Advice value for 2019 relative to the advice value for 2018 (5163 tonnes).

^^ F_{HCR} is derived from a two-step process: F = 0.200 followed by the TAC constraint, where the TAC₂₀₁₉ = TAC_{F=0.200} + 0.2 × (TAC₂₀₁₈ – TAC_{F=0.200}). To calculate the catch option of the proposed management strategy, ICES uses the advised catches for 2018 as the TAC₂₀₁₈; therefore, the formula for TAC₂₀₁₉ corresponds to catches of 10469 + 0.2 × (5163 – 10 469) = 9408 tonnes.

Estimated SSB is increasing and has in addition been revised upwards in this year's assessment, which results in a substantial increase in advised catch.

Basis of the advice

Table 4 Haddock in Division 6.b. The basis of the advice.

Advice basis	MSY approach
Management plan	<ul style="list-style-type: none"> There is no agreed management plan for haddock in this area. A management strategy is under consideration and not yet adopted. The strategy was evaluated by ICES in 2013 (ICES, 2013). ICES concluded that a maximum F value of 0.2 in the harvest control rule was required to ensure consistency with the precautionary approach under low recruitment conditions. The EU has proposed a multiannual management plan for the Western Waters, which is not yet finalized (EU, 2018).

Quality of the assessment

SSB in 2017 has been revised upwards by 53% compared to last year's assessment.

In recent years the number of sampled trips for both landings and discards has been very low. This leads to higher variability in the catch estimates, increasing the uncertainty in F .

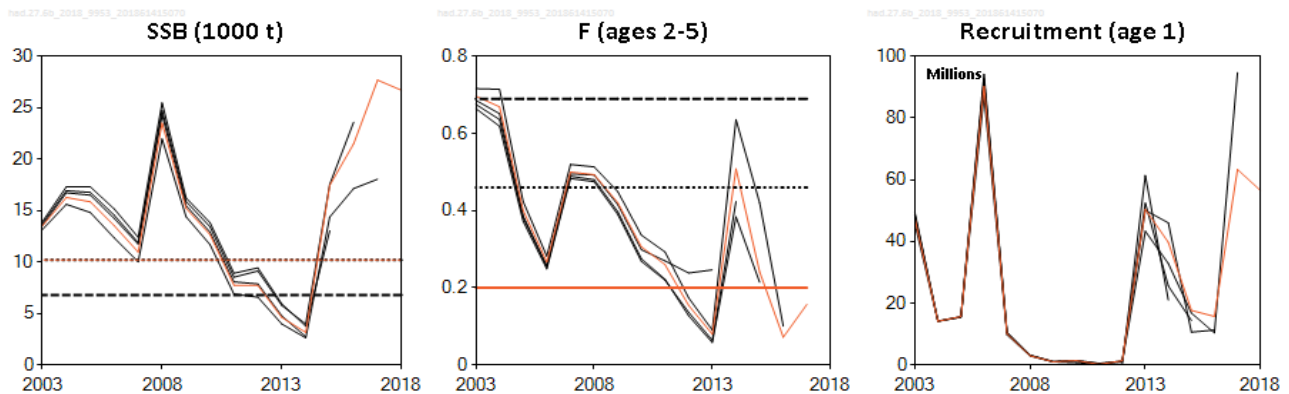


Figure 2 Haddock in Division 6.b. Historical assessment results.

Issues relevant for the advice

Five-year average of exploitation patterns and ten-year average mean weights and discard proportions were used in the catch options to account for sampling variability and density-dependent growth.

Reference points

Table 5 Haddock in Division 6.b. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY B_{trigger}	10 200 tonnes	B_{pa}	ICES (2016a)
	F_{MSY}	0.20	Segmented regression with B_{loss} , the lowest observed spawning–stock biomass (EqSim).	ICES (2016a)
Precautionary approach	B_{lim}	6800 tonnes	$B_{\text{lim}} = B_{\text{loss}}$, the lowest observed spawning–stock estimated in previous assessments.	ICES (2016b)
	B_{pa}	10 200 tonnes	$B_{\text{pa}} = B_{\text{lim}} \times 1.5$. This is considered to be the minimum SSB required to obtain a high probability (95%) of maintaining SSB above B_{lim} , taking into account the uncertainty of assessments.	ICES (2016b)
	F_{lim}	0.69	Based on a 50% probability of being above B_{lim} in a stochastic simulation with a segmented regression using breakpoint at B_{lim} .	ICES (2016b)
	F_{pa}	0.46	$F_{\text{pa}} = F_{\text{lim}}/1.5$	ICES (2016b)
Management plan	SSB _{mgt}	10 200 tonnes	B_{pa}	ICES (2013)
	F_{mgt}	0.2	Based on harvest control rule evaluations.	ICES (2013)
Management plan*	MAP MSY B_{trigger}	10 200 tonnes	MSY B_{trigger}	
	MAP B_{lim}	6800 tonnes	B_{lim}	
	MAP F_{MSY}	0.20	F_{MSY}	
	MAP range F_{lower}	0.13	Consistent with ranges provided by ICES (2016a), resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2016a)
	MAP range F_{upper}	0.20	Consistent with ranges provided by ICES (2016a), resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2016a)

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

Basis of the assessment

Table 6 Haddock in Division 6.b. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2016c).
Assessment type	Age-structured model (XSA) that uses catches in the model and in the forecast.
Input data	Commercial landings, estimated discards, age composition of catches; one survey index (Rock-WIBTS-Q3); fixed maturity ogive (knife-edge at age 3), fixed natural mortality (0.2).
Discards and bycatch	Discards are included in the assessment.
Indicators	Russian trawl-acoustic survey and the trawl survey-based assessment, statistical catch-at-age analysis (StatCam analytical model).
Other information	This stock has never been benchmarked.
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

Information from stakeholders

Since 2014, there has been effort by the Scottish industry/science observer sampling scheme to improve coverage in subareas 4 and 6. However, the number of samples remains low for this stock. Increasing observer coverage of catches at Rockall, including the collection of age data from the landing component of the catch during observer trips, will help improve the overall biological sampling for the stock. Recognizing the low sampling levels, Scottish industry will continue to liaise with science on sampling opportunities.

History of the advice, catch, and management

Table 7 Haddock in Division 6.b. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice single-stock exploitation boundaries from 2004 onwards	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC [^]	Official landings	ICES landings	Discards
1987	Precautionary TAC	10000			7995	8432	n/a
1988	Precautionary TAC	10000			7574	7929	n/a
1989	Status quo F; TAC	18000			6643	6728	n/a
1990	Precautionary TAC	5500			8213	3884	n/a
1991	Precautionary TAC	5500			5853	5655	13228
1992	Precautionary TAC	3800			4520	5320	11871
1993	80% of F(91)	3000			4113	4784	9853
1994	If required, precautionary TAC	-			3735	5733*	11023
1995	No long-term gain in increasing F	5100**			5491	5112	9168
1996	No long-term gains in increasing F	6900**			6818	6275	9356
1997	No advice given	4900**			5220	4629	5894
1998	No increase in F	4900			5098	4499	10862
1999	Reduce F below F _{pa}	3800	-		5990	5139	11062
2000	Reduce F below F _{pa}	< 3500	-		5688	5331	6609
2001	Reduce F below F _{pa}	< 2700	-		2315	2036	1535
2002	Reduce F below 0.2	< 1300	-		3037	3336	4152
2003	Lowest possible F	-	-		6148	6242	5521
2004	Lowest possible catch ^		-	702	6306	6445	883
2005	Lowest possible catch ^		-	702	5178	5179	505
2006	Lowest possible catch ^		-	597	2765	2765	386
2007	Reduce F below F _{pa} ^	< 7110	-	4615	3349	3349	2242
2008	Keep F below F _{pa} ^	< 10600	-	6916	4221	4221	2100
2009	No long-term gains in increasing F ^	-	< 4.300	5879	3445	3445	1557
2010	No long-term gains in increasing F ^	-	< 3.300	4997	3405	3405	306
2011	See scenarios	-		3748	1903	1903	152

Year	ICES advice single-stock exploitation boundaries from 2004 onwards	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC^^	Official landings	ICES landings	Discards
2012	MSY approach	-	< 3.300	3300	710	710	16
2013	No directed fisheries, minimize bycatch and discards	0	0	990	826	826	1143
2014	MSY approach	< 1620	< 980	1210	1675	1675	274
2015	MSY approach	< 4310	< 2930	2580	2445	2445	527
2016	MSY approach	≤ 3932	≤ 3225	3225	2585^^^	2585	301
2017	MSY approach	≤ 4690	≤ 4130	4690	4610^^^	4610	396
2018	MSY approach	≤ 5163		5163			
2019	MSY approach	≤ 10469					

* Including misreporting.

** Landings at *status quo* F.

^ Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries, protecting stocks outside safe biological limits.

^^ Agreed EU TAC for Division 6.b and subareas 12 and 14.

^^^ Preliminary.

n/a = not available.

History of the catch and landings

Table 8 Haddock in Division 6.b. Catch distribution by fleet in 2017 as estimated by ICES.

Haddock in Division G.D. Catch distribution by fleet in 2017 as estimated by ICES.			
Catch	Landings		Discards
5005 t	Otter trawl 99.4 %	Longline 0.6%	396 t
	4610 t		

Table 9 Haddock in Division 6.b. History of commercial catch and landings. All weights are in tonnes.

Year	Faroe Islands	France	Iceland	Ireland	Norway	Portugal	Russian Federation	Spain	UK (E, W, & NI)	UK (Scot.)	Total	Unallocated catch	Landings from NEAFC area	ICES landings estimate
1996	-	-**	-	747	24	-	-	1	293	5753	6818	-543	NA	6275
1997	-	-	+	895	24	-	-	22	165	4114	5220	-591	NA	4629
1998	-	-	-	704	40	4	-	21	561	3768	5098	-599	NA	4499
1999	-	-	167	1021	61	-	458	25	288	3970	5990	-851	NA	5139
2000	NA	5	-	824	152	-	2154	47	36	2470	5688	-357	NA	5331^
2001	NA	2	-	357	70	-	630	51	-	1205	2315	-279	NA	2036^
2002	-	-	-	206	49	-	1630	7	-	1145	3037	299	NA	3336^
2003	-	1	-	169	60	-	4237	19	56	1607	6148	94^^	NA	6242^
2004	-	-	-	19	32	-	5844	-	-	411***	6306	139^^	NA	6445
2005	-	-	-	105	33	-	4708	-	-	332***	5178	1	NA	5179
2006	2	-	-	41	123	-	2154	5	-	440***	2765	0	NA	2765
2007	2	-	-	338	84	-	1282	-	-	1643***	3349	0	NA	3349
2008	16	-	-	721	36	-	1669	-	-	1779***	4221	0	NA	4221
2009	16	-	-	352	71	-	55	-	-	2951***	3445	0	NA	3445
2010	42	-	-	169	65	-	198	-	-	2931***	3405	0	NA	3405

Year	Faroe Islands	France	Iceland	Ireland	Norway	Portugal	Russian Federation	Spain	UK (E,W, & NI)	UK (Scot.)	Total	Unallocated catch	Landings from NEAFC area	ICES landings estimate
2011	2	< 1	-	123	40	-	-	-	-	1738***	1903	0	NA	1903
2012	53	-	-	31	48	-	1	-	-	577***	710	0	26	710
2013	-	-	-	105	121	-	4	-	-	596	826	0	91	826
2014	1	2	-	95	38	-	388	-	-	1152	1675	0	86	1675
2015	1	-	-	190	66	-	136	-	-	2052	2445	0	202	2445
2016*	-	-	-	362	63	-	-	-	-	2160	2585	0	624	2585
2017*	-	-	-	500	26		153			3930	4610	0	309	4610

* Preliminary.

** Included in Division 6.a.

*** Includes UK England, Wales, and N. Ireland landings.

^ Includes the total Russian catch.

^^ Non-official.

NA = not available.

Summary of the assessment

Table 10 Haddock in Division 6.b. Assessment summary. Weights are in tonnes and recruitment in thousands.

Year	Recruitment age 1	SSB	Landings	Discards	F ages 2–5
1991	109428	15386	5655	13228	0.73
1992	109196	18568	5320	11871	0.83
1993	123709	19537	4784	9853	0.63
1994	68353	23887	5733	11023	0.60
1995	61431	29175	5587	9168	0.61
1996	62462	25209	7075	9356	0.57
1997	71699	21779	5166	5894	0.39
1998	72346	21001	4984	10862	0.59
1999	48638	16303	5221	11062	0.86
2000	28093	11635	4558	6609	1.11
2001	78821	6607	1918	1535	0.43
2002	103570	6916	2571	4152	0.48
2003	47412	13526	5961	5521	0.70
2004	14155	16286	6400	883	0.67
2005	15669	15858	5191	505	0.40
2006	90261	13536	2759	386	0.27
2007	10053	10967	3348	2242	0.50
2008	2970	23517	4205	2100	0.49
2009	1014	15226	3237	1557	0.42
2010	1381	12679	3404	306	0.31
2011	197	7742	1905	152	0.26
2012	1337	7717	710	16	0.154
2013	50464	4607	825	1143	0.080
2014	39735	3155	1675	274	0.51
2015	17672	17463	2445	527	0.24
2016	15703	21498	2585	301	0.072
2017	63355	27697	4610	396	0.157
2018	56535*	26704			

* RCT3 estimate.

Sources and references

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