

## Haddock (*Melanogrammus aeglefinus*) in Division 5.a (Iceland grounds)

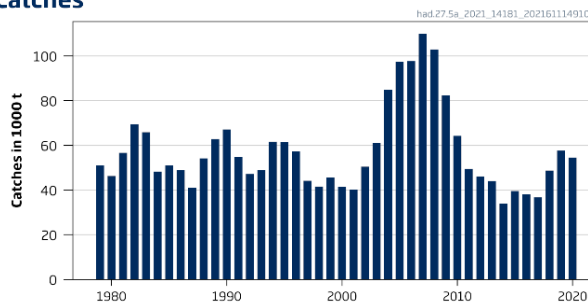
### ICES advice on fishing opportunities

ICES advises that when the Icelandic management plan is applied, catches in the fishing year 2021/2022 should be no more than 50 429 tonnes.

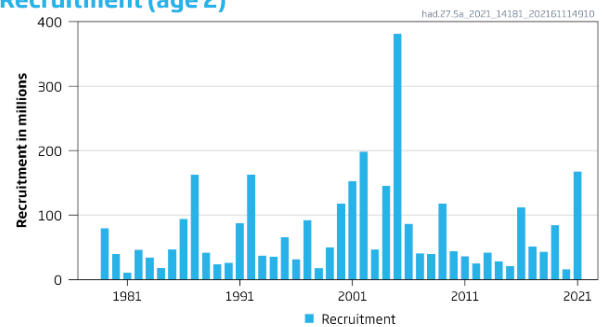
### Stock development over time

ICES assesses that fishing pressure on the stock is above both  $HR_{MSY}$  and  $HR_{pa}$  and below  $HR_{lim}$ . Spawning stock size is above  $MSY B_{trigger}$ ,  $B_{pa}$ , and  $B_{lim}$ .

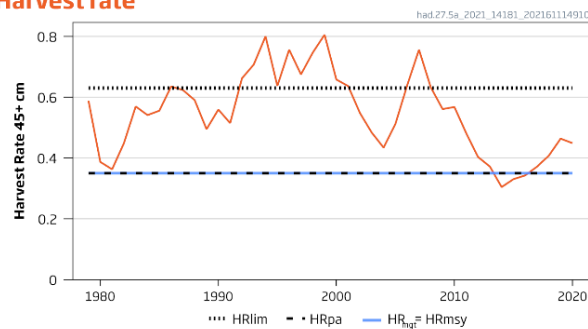
#### Catches



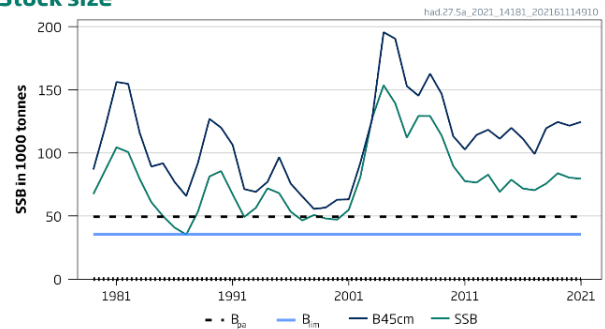
#### Recruitment (age 2)



#### Harvest rate



#### Stock size



**Figure 1** Haddock in Division 5.a. Summary of the stock assessment. Calculation of harvest rates is based on biomass of fish at length 45+ cm ( $MSY B_{trigger} = B_{pa} = MGT B_{trigger}$ ).

### Catch scenarios

**Table 1** Haddock in Division 5.a. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
HR (2021)	0.316	Annual HR, based on catch constraint until 31 August and management plan from 1 September to 31 December.
SSB (2022)	104 519	From the assessment; tonnes.
Reference biomass ( $B_{45cm+}$ ; 2022)	144 083	From the assessment; tonnes.
$R_{age\ 2}$ (2021)	169 030	From the assessment; thousands.
$R_{age\ 2}$ (2022)	55 488	Geometric mean recruitment based on the whole time series; thousands.
Total catch (2021)	39 373	Estimated catch until the end of the fishing year (31 August 2021) and estimated catch in the first four months of the next fishing year (1 September – 31 December 2021); tonnes.

**Table 2** Haddock in Division 5.a. Annual catch scenarios. All weights are in tonnes.

ICES advice basis	Total catch (2021/2022)	HR (2021/2022) *	SSB (2023)	% SSB change **	% TAC change ***	% Advice change ^
Management plan	50 429	0.35	144 430	38	11	-

\* HR (2021/2022) is expressed relative to the  $B_{45cm+}$  in 2022.

\*\* SSB 2023 relative to SSB 2022.

\*\*\* Advised catches for 2021/2022 relative to TAC for 2020/2021 (45 389 tonnes).

^ No advice was requested for 2020/2021. Advice for 2020/2021 was issued by MFRI based the same method agreed by ICES (45 389 tonnes).

Advice has increased as a result of the predicted increase in reference biomass ( $B_{45cm+}$ ) in 2022.

### Basis of the advice

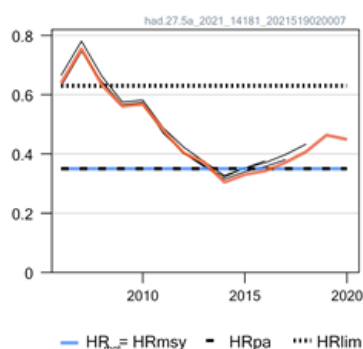
**Table 3** Haddock in Division 5.a. The basis of the advice.

Advice basis	Management plan
Management plan	<p>The Icelandic Ministry of Industries and Innovation has adopted a management plan for the fisheries of Icelandic haddock (Icelandic MII, 2019). The TAC is set in the following way according to the plan:</p> $TAC_{y/y+1} = 0.35B_{45cm+,y+1} \text{ if } SSB_{y+1} \geq MGTB_{trigger}$ $TAC_{y/y+1} = \frac{SSB_{y+1}}{MGTB_{trigger}} \cdot 0.35B_{45cm+,y+1} \text{ if } SSB_{y+1} < MGTB_{trigger}$ <p>where <math>MGT B_{trigger} = 49\,400</math> tonnes, <math>y</math> is the assessment year, <math>TAC_{y/y+1}</math> is the TAC for the fishing year starting 1 September in the assessment year, and <math>B_{45cm+,y+1}</math> is the estimated biomass of haddock <math>\geq 45</math> cm at the beginning of the year following the assessment year.</p> <p>ICES evaluated this HCR in 2019 (ICES, 2019a; 2019b) and concluded that it is precautionary and in accordance with the ICES MSY approach. The expected range of realized harvest rate (HR) following the management plan (<math>HR_{MGT}</math>) is between 0.23 and 0.57.</p>

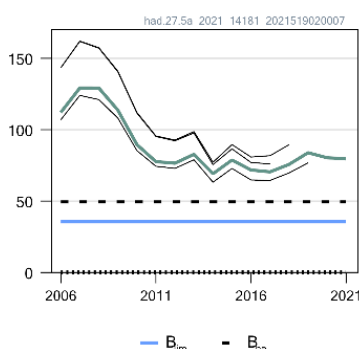
### Quality of the assessment

This assessment is considered to be internally consistent and of good quality. The stock was benchmarked in 2019 (ICES, 2019a), resulting in a redefinition of the spawning-stock biomass. Fishing and natural mortality before spawning are now taken into account.

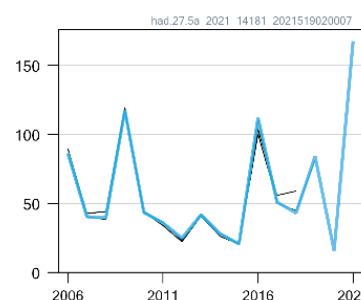
Harvest rate 45+ cm



SSB (1000 t)



Rec (age 2; Millions)



**Figure 2** Haddock in Division 5.a. Historical assessment results. The reference points were revised in 2019 following a benchmark, and only assessment results from the last three years should be compared to the reference points indicated. There was no ICES assessment in 2020.

## Issues relevant for the advice

The Government of Iceland increased the TAC by 8000 tonnes for the remainder of the 2020/2021 fishing year. This increase is planned to be subtracted from the TAC in 2021/2022. This decision was not included in the basis for advice. This type of interannual TAC transfer was not considered during the evaluation of the HCR (ICES, 2019a).

## Reference points

**Table 4** Haddock in Division 5.a. Reference points, values, and their technical basis. All weights are in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	49 400	$B_{pa}$	ICES (2019b)
	$HR_{MSY}$	0.35	The harvest rate that maximizes the median long term catch in stochastic simulations, limited by $HR_{p0.05}$	ICES (2019b)
Precautionary approach	$B_{lim}$	35 500	$B_{loss}$	ICES (2019b)
	$B_{pa}$	49 400	$B_{lim} \times e^{1.645 \times 0.2}$	ICES (2019b)
	$HR_{lim}$	0.63	HR leading to median SSB at $B_{lim}$	ICES (2019b)
	$HR_{pa}$	0.35	HR leading to $P(SSB > B_{lim}) > 95\%$ with $B_{trigger}$	ICES (2021a)
Management plan	MGT $B_{trigger}$	49 400	Stochastic simulations	ICES (2019b)
	$F_{MGT}$	Not defined		
	$HR_{MGT}$	0.35	Management plan. Realized harvest rates can range from 0.23 to 0.57	ICES (2019b)

## Basis of the assessment

**Table 5** Haddock in Division 5.a. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2021b).
Assessment type	Statistical catch at age model, that uses catches, and in the forecast (ICES, 2021a).
Input data	Catch-at-age and two survey indices (Icelandic bottom trawl surveys: Spring IS-SMB [G3239] - Marsrall, and Autumn IS-SMH [G4493] - Haustrall).
Discards and bycatch	Discarding is considered negligible.
Indicators	None.
Other information	The stock was benchmarked and harvest control rules evaluated in 2019 (ICES, 2019a; 2019b).
Working group	North-Western Working Group (NWWG).

## History of the advice, catch, and management

**Table 6** Haddock in Division 5.a. ICES advice, TAC, and landings estimates. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Agreed TAC	ICES landings for the fishing year	ICES landings for the calendar year
1987 *	National advice	< 50 000	60 000		40 760
1988 *	National advice	< 60 000	65 000		54 204
1989 *	National advice	< 60 000	65 000		62 885
1990 *	National advice	< 60 000	65 000		67 198
1991 **	National advice	< 38 000	48 000		54 692
1991/1992	National advice	< 50 000	50 000	48 123	47 121
1992/1993	National advice	< 60 000	65 000	47 255	48 123
1993/1994	National advice	< 65 000	65 000	58 443	59 502
1994/1995	National advice	< 65 000	65 000	60 829	60 884
1995/1996	National advice	< 55 000	60 000	53 972	56 890
1996/1997	National advice	< 40 000	45 000	49 764	43 764
1997/1998	National advice	< 40 000	45 000	37 811	41 192
1998/1999	National advice	< 35 000	35 000	45 146	45 411
1999/2000	F reduced below $F_{med}$	< 35 000	35 000	41 150	42 105
2000/2001	F reduced below provisional $F_{pa}$	< 31 000	30 000	39 143	39 654
2001/2002	F reduced below provisional $F_{pa}$	< 30 000	41 000	41 069	50 498
2002/2003	F reduced below provisional $F_{pa}$	< 55 000	55 000	55 269	60 883

Year	ICES advice	Catch corresponding to advice	Agreed TAC	ICES landings for the fishing year	ICES landings for the calendar year
2003/2004	F reduced below provisional $F_{pa}$	< 75 000	75 000	77 916	84 828
2004/2005	F reduced below provisional $F_{pa}$	< 97 000	90 000	96 617	97 225
2005/2006	F reduced below provisional $F_{pa}$	< 110 000	105 000	99 926	97 614
2006/2007	F reduced below provisional $F_{pa}$	< 112 000	105 000	99 763	109 966
2007/2008	F reduced below provisional $F_{pa}$	< 120 000	100 000	109 810	102 872
2008/2009	F reduced below 0.35	< 83 000	93 000	88 617	82 045
2009/2010	F reduced below 0.35	< 57 000	63 000	67 579	64 169
2010/2011	F reduced below 0.35	< 51 000	50 000	50 042	49 433
2011/2012	F reduced below 0.35	< 42 000	45 000	49 179	46 208
2012/2013	F reduced below 0.35	< 32 000	36 000	40 512	44 097
2013/2014	TAC $0.4 \times B_{45+cm}$ , 2014	< 38 000	38 000	39 628	33 900
2014/2015	TAC $0.4 \times B_{45+cm}$ , 2015	< 30 400	30 400	36 656	39 646
2015/2016	TAC $0.4 \times B_{45+cm}$ , 2016	< 36 400	36 400	40 117	38 109
2016/2017	TAC $0.4 \times B_{45+cm}$ , 2017	< 34 600	34 600	36 399	37 058
2017/2018	TAC $0.4 \times B_{45+cm}$ , 2018	< 41 390	41 390	43 700	48 864
2018/2019	Management plan	< 57 982	57 982	59 382	58 044
2019/2020	Management plan	$\leq 41 823$	41 823	48 991	54 781
2020/2021	No advice requested***	-	45 389		
2021/2022	Management plan	$\leq 50 429$			

\* Calendar year.

\*\* January to August.

\*\*\* No advice was requested for 2020/2021. Advice for 2020/2021 was issued by MFRI based the same method agreed by ICES (45 389 tonnes).

## History of the catch and landings

**Table 7** Haddock in Division 5.a. Catch distribution by fleet in 2020 as estimated by ICES. All weights are in tonnes.

Catch (2020)	Landings				Discard
	58.4% Bottom trawls	31.8% Longline	9.3% Demersal seine	0.5% Other gears	
54 781	54 781				Discarding is negligible

## Summary of the assessment

**Table 8** Haddock in Division 5.a. Assessment summary. Weights are in tonnes. Recruitment in thousands.

Year	Recruitment (Age 2)	Stock size	Total catch (tonnes)	Harvest rate (Age 4–7)	$B_{45cm}$ (tonnes)
1979	79 447	67 386	51 009	0.59	86 748
1980	39 612	85 824	46 314	0.39	119 679
1981	10 503	104 420	56 655	0.36	156 183
1982	46 016	100 650	69 385	0.45	154 722
1983	33 976	79 269	65 869	0.57	115 673
1984	17 879	60 868	48 236	0.54	89 157
1985	46 675	49 929	50 953	0.56	91 739
1986	93 923	40 824	48 881	0.63	76 991
1987	162 144	35 291	41 028	0.62	65 807
1988	41 538	53 256	54 148	0.59	91 793
1989	23 664	81 298	62 782	0.49	126 926
1990	25 715	85 590	67 117	0.56	120 026
1991	87 224	67 134	54 715	0.51	106 308
1992	162 777	49 259	47 198	0.66	71 318
1993	37 077	56 530	48 893	0.71	69 119
1994	35 219	71 919	61 608	0.8	77 013
1995	65 434	68 089	61 510	0.64	96 583
1996	31 298	53 414	57 223	0.76	75 673
1997	91 867	46 454	44 164	0.67	65 448

Year	Recruitment (Age 2)	Stock size	Total catch (tonnes)	Harvest rate (Age 4–7)	B <sub>45cm</sub> (tonnes)
1998	17 454	50 808	41 528	0.75	55 626
1999	49 840	48 059	45 603	0.81	56 618
2000	117 823	47 119	41 398	0.66	62 927
2001	152 668	54 956	40 220	0.64	63 203
2002	198 124	80 911	50 509	0.55	92 242
2003	46 303	127 226	61 036	0.48	126 325
2004	145 241	153 562	84 918	0.43	195 621
2005	381 132	139 350	97 443	0.51	190 460
2006	86 388	112 099	97 724	0.64	152 907
2007	40 367	129 224	109 880	0.76	145 318
2008	39 624	129 184	102 888	0.63	162 762
2009	117 267	113 700	82 268	0.56	146 694
2010	43 484	89 556	64 237	0.57	113 168
2011	35 950	77 610	49 449	0.48	102 713
2012	24 886	76 515	46 049	0.4	114 217
2013	41 752	82 738	44 028	0.37	118 342
2014	28 189	69 123	33 853	0.3	111 243
2015	20 594	78 745	39 574	0.33	119 813
2016	112 058	71 757	38 090	0.34	111 157
2017	50 884	70 443	36 831	0.37	99 152
2018	42 968	75 675	48 725	0.41	119 526
2019	84 128	83 853	57 713	0.46	124 500
2020	15 733	80 347	54 548	0.45	121 551
2021	167 484	79 569			124 565

## Sources and references

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[Download the stock assessment data and figures.](#)

*Recommended citation:* ICES. 2021. Haddock (*Melanogrammus aeglefinus*) in Division 5.a (Iceland grounds). *In* Report of the ICES Advisory Committee, 2021. ICES Advice 2021, had.27.5a, <https://doi.org/10.17895/ices.advice.7760>.