

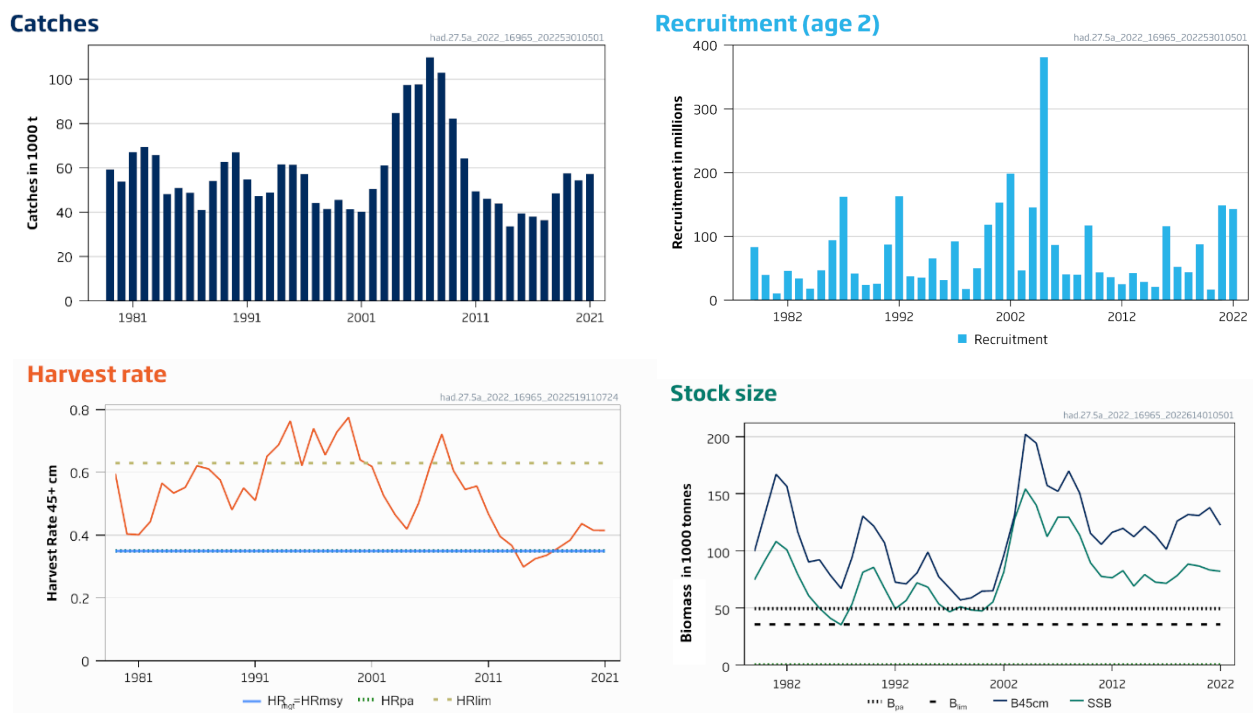
## Haddock (*Melanogrammus aeglefinus*) in Division 5.a (Iceland grounds)

### ICES advice on fishing opportunities

ICES advises that when the Icelandic management plan is applied, catches in the fishing year 2022/2023 should be no more than 62 219 tonnes.

### Stock development over time

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  $B_{lim}$ .



**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. Values in the forecast and for the interim year.

Variable	Value	Notes
HR (2022)	0.35	Annual HR, based on catch constraint until 31 August and management plan from 1 September to 31 December
SSB (2023)	115 369	From the assessment; tonnes
Reference biomass ( $B_{45\text{ cm}+}$ ; 2023)	177 709	From the assessment; tonnes
$R_{age\ 2}$ (2022)	142 885	From the assessment; thousands
$R_{age\ 2}$ (2023)	91 748	From the assessment; thousands
$R_{age\ 2}$ (2024)	55 925	Geometric mean recruitment based on the whole timeseries; thousands
Total catch (2022)	43 356	Estimated catch until the end of the fishing year (31 August 2022) and estimated catch in the first four months of the next fishing year (1 September – 31 December 2022); tonnes

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

ICES advice basis	Total catch (2022/2023)	HR (2022/2023) *	SSB (2024)	% SSB change**	% TAC change***	% advice change
Management plan	62 219	0.35	158 527	37 %	46 %	23 %

\* HR (2022/2023) is expressed relative to the  $B_{45cm+}$  in 2023.

\*\* SSB 2024 relative to SSB 2023 (115 369 tonnes).

\*\*\* Advised catches for 2022/2023 relative to TAC for 2021/2022 (42 429 tonnes).

Advised catches have increased as a result of the predicted increase in reference biomass ( $B_{45cm+}$ ) in 2023.

## Basis of the advice

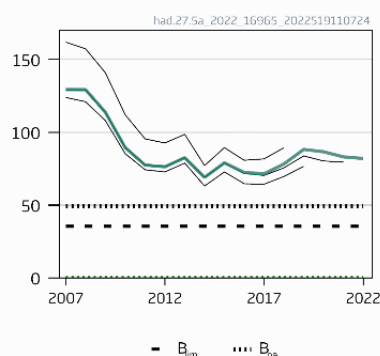
**Table 3** Haddock in Division 5.a. The basis of the advice.

Advice basis	Management plan
Management plan	<p>The Icelandic Ministry of Industries and Innovation has adopted a management plan for Icelandic haddock fisheries (MII, 2019). The TAC is set in the following way according to the plan:</p> $TAC_{y/y+1} = 0.35B_{45cm+,y+1} \text{ if } SSB_{y+1} \geq MGT B_{trigger}$ $TAC_{y/y+1} = \frac{SSB_{y+1}}{MGT B_{trigger}} \cdot 0.35B_{45cm+,y+1} \text{ if } SSB_{y+1} < MGT B_{trigger}$ <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 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>

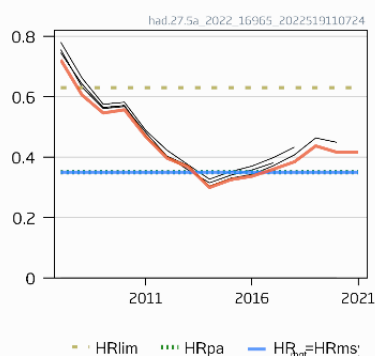
## Quality of the assessment

This assessment is considered to be internally consistent.

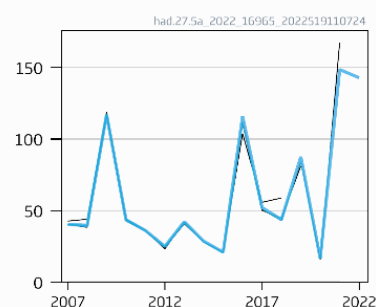
### SSB (1000 t)



### Harvest rate 45+ cm



### Rec (age 2; Millions)



**Figure 2** Haddock in Division 5.a. Historical assessment results. The assessment and reference points were revised in 2019 following a benchmark, and only assessment results from the last three assessments 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 2020/2021 fishing year. This increase was subtracted from the TAC in 2021/2022. 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 $HR_{p05}$	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 (2021)
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 ( <a href="#">ICES, 2022a</a> )
Assessment type	Statistical catch at age model, that uses catches in the model and in the forecast (ICES, 2022b)
Input data	Catch-at-age and two survey indices (Icelandic bottom trawl surveys: Spring (IS-SMB [G3239]), and Autumn (IS-SMH [G4493]))
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	Northwestern Working Group ( <a href="#">NWVG</a> )

## 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
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

Year	ICES advice	Catch corresponding to advice	Agreed TAC	ICES landings for the fishing year	ICES landings for the calendar year
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***	-	53 389 <sup>^</sup>	59 143	57 599
2021/2022	Management plan	$\leq 50 429$	42 429 <sup>^</sup>		
2022/2023	Management plan	$\leq 62 219$			

\* Calendar year.

\*\* January to August.

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

<sup>^</sup> 8000 tonnes moved from the fishing year 2021/2022 to 2020/2021

## History of the catch and landings

**Table 7** Haddock in Division 5.a. Catch distribution by fleet in 2021 as estimated by ICES. All weights are in tonnes.

Table 7. Haddock in Division 3.B: Catch distribution by fleet in 2021 as estimated by ICES. All weights are in tonnes.					
Catch (2021)	Landings				Discard
57 599	62% Bottom trawls	29% Longline	9% Demersal seine	< 0.5 % Other gears	Discarding is negligible
	57 599				

## 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	Harvest rate	Biomass 45cm+
1979	83386	74568	59327	0.60	99471
1980	39648	92018	53870	0.40	133306
1981	10611	108179	67126	0.40	167054
1982	45933	100806	69378	0.44	156362
1983	34031	79279	65869	0.57	116436
1984	17996	60773	48236	0.53	90242
1985	46826	49747	50953	0.55	92180
1986	93945	40975	48862	0.62	78628
1987	162119	35198	40983	0.61	67036
1988	41639	53200	54126	0.58	94023
1989	23712	81223	62732	0.48	130389
1990	25729	85529	67075	0.55	121774
1991	87380	67120	54715	0.51	107050
1992	163003	49225	47199	0.65	72477
1993	37252	56497	48894	0.69	71055
1994	35343	71976	61608	0.76	80615
1995	65643	68194	61510	0.62	98928
1996	31344	53541	57223	0.74	77303
1997	92139	46584	44141	0.66	67270
1998	17523	50965	41502	0.73	56939
1999	49988	48232	45603	0.78	58805
2000	118211	47316	41390	0.64	64667
2001	153153	55197	40220	0.62	64931

Year	Recruitment (Age 2)	Stock size	Total catch	Harvest rate	Biomass 45cm+
2002	198539	81246	50508	0.53	95816
2003	46513	127748	61036	0.47	131183
2004	145467	154242	84824	0.42	202053
2005	381255	139999	97443	0.50	194299
2006	86629	112472	97722	0.62	157265
2007	40381	129477	109826	0.72	152080
2008	39739	129398	102888	0.61	169880
2009	117152	113840	82268	0.55	150667
2010	43659	89588	64237	0.56	115394
2011	36113	77594	49440	0.47	105662
2012	25062	76375	46032	0.40	116137
2013	42325	82642	43987	0.37	119655
2014	28694	69109	33649	0.30	112403
2015	20943	79169	39515	0.33	121557
2016	116033	72500	38090	0.34	113170
2017	52231	71579	36459	0.36	101279
2018	43746	78312	48491	0.38	126098
2019	87672	88338	57580	0.44	131736
2020	16548	86713	54459	0.42	130911
2021	148599	83214	57318	0.42	137844
2022	142885	82088			122369

## Sources and references

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

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