

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

ICES stock advice

ICES advises that when the Icelandic management plan is applied, catches in the fishing year 2016/2017 should be no more than 34 600 tonnes.

Stock development over time

The spawning-stock biomass (SSB) increased from 2001 to 2004 after several strong year classes and was large from 2004 to 2008. Since 2008 the SSB has decreased, but it remains above B_{pa} . The harvest rate is currently estimated near the management target of 0.4. Recruitment (R) is highly variable. The 2008–2013 year classes are estimated to be weak while the 2014 year class is estimated to be strong.

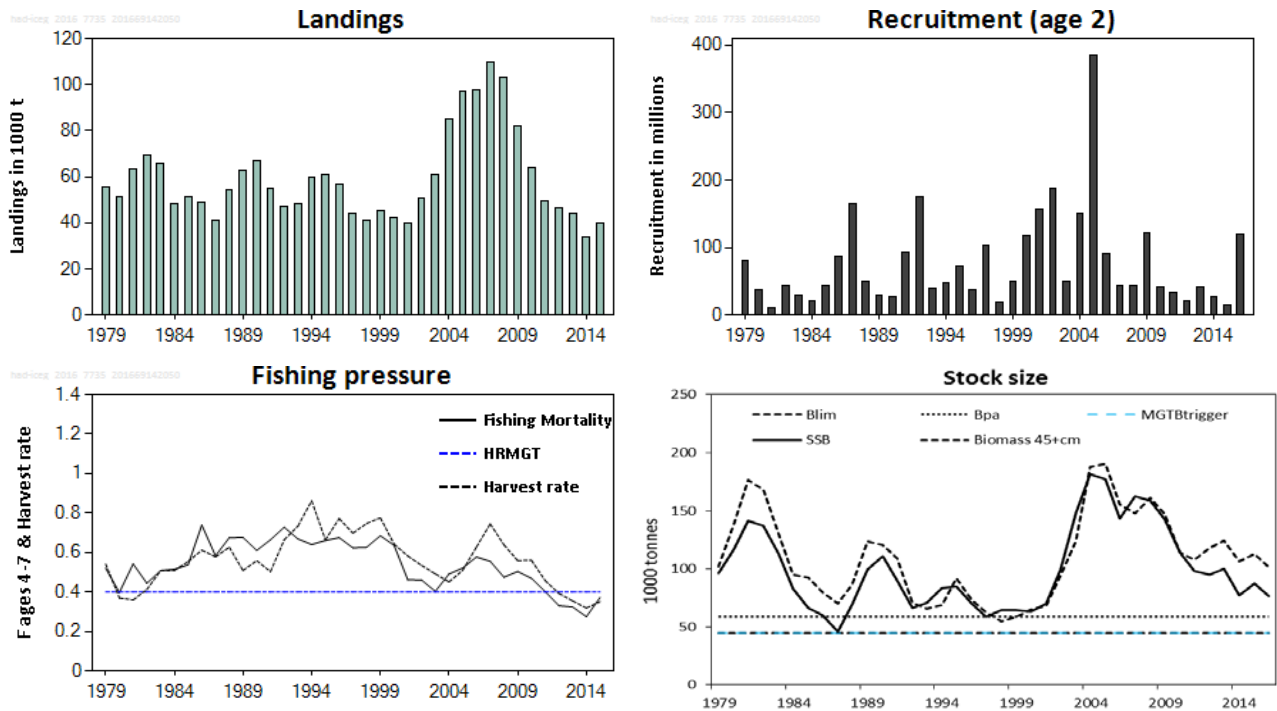


Figure 2.3.7.1 Haddock in Division 5.a. Summary of stock assessment (weights in thousand tonnes). Harvest rates are calculated based on biomass of fish of 45+ cm. All biomass reference points refer to SSB levels. $MGT B_{trigger} = B_{lim}$ so the lines overlap.

Stock and exploitation status

Table 2.3.7.1 Haddock in Division 5.a. State of the stock and fishery relative to reference points. The expected range of realized harvest rate (HR) following the management plan (HR_{MGT}) can be found in the management plan evaluation advice (ICES, 2013a).

	Fishing pressure			Stock size			
		2013	2014	2015	2014	2015	2016
Maximum sustainable yield	HR_{MSY}	✓	✓	✓ Below	$MSY B_{trigger}$?	?
Precautionary approach	HR_{PA} , HR_{lim}	✓	✓	✓ Harvested sustainably	B_{PA} , B_{lim}	✓	✓ Full reproductive capacity
Management plan	HR_{MGT}	✓	✓	✓ Within expected range	$MGT B_{trigger}$	✓	✓ Above

Catch options

Table 2.3.7.2 Haddock in Division 5.a. The basis for the catch options.

Variable	Value	Source	Notes
F _{ages 4-7} (2016)	0.35	ICES (2016a)	Based on catch constraint
SSB (2017)	88	ICES (2016a)	
R _{age2} (2017)	54	ICES (2016a)	Assessment model
R _{age2} (2018)	55	ICES (2016a)	Geometric mean
Total catch (2016)	34	ICES (2016a)	Estimated catch until the end of the fishing season (31.08.2016) and estimated catch in the first four months of the next fishing season (01.09–31.12.2016).
Landings (2016)	34	ICES (2016a)	Discarding is considered to be negligible.
Discards (2016)	0	ICES (2016a)	Discarding is considered to be negligible.

Table 2.3.7.3 Haddock in Division 5.a. The catch options. All weights are in thousand tonnes.

Rationale	Landings (2016/2017)	Basis	F _{ages 4-7} (2016)	SSB (2018)	B _{45+cm} (2017)	% SSB change *	% TAC change
Management plan	34.6	HR _{45+cm} = 0.4	0.35	99	87	12	-5

* SSB 2018 relative to SSB 2017.

Basis of the advice

Table 2.3.7.4 Haddock in Division 5.a. The basis of the advice.

Advice basis	Management plan
Management plan	<p>Management plan 0.4 of reference biomass . According to the plan:</p> $TAC_{y/y+1} = 0.4B_{45cm+,y+1} \text{ if } SSB_{y+1} \geq SSB_{trigger}$ $TAC_{y/y+1} = \frac{SSB_{y+1}}{SSB_{trigger}} \cdot 0.4B_{45cm+,y+1} \text{ if } SSB_{y+1} < SSB_{trigger}$ <p>where $SSB_{trigger} = 45\ 000$ tonnes, y is the assessment year, $TAC_{y/y+1}$ is the TAC for the fishing year starting September 1st in the assessment year, and $B_{45cm+,y+1}$ is the estimated biomass of haddock ≥ 45 cm at the beginning of the year following the assessment year.</p>

The reference biomass of fish 45+ cm is on average similar to the spawning stock, but it is less affected by variability in maturity at age. It is also close to what would be defined as fishable stock.

Quality of the assessment

The assessment is considered very consistent. Discards are not included in the assessment. Discarding in 2015 was negligible, as it has been in most years since 2001. The main uncertainty in the assessment relates to the differences between the assessments based on each of the two surveys. The main uncertainty in the assessment relates to the differences between the assessments based on each of the two surveys (Icelandic spring and autumn ground fish surveys).

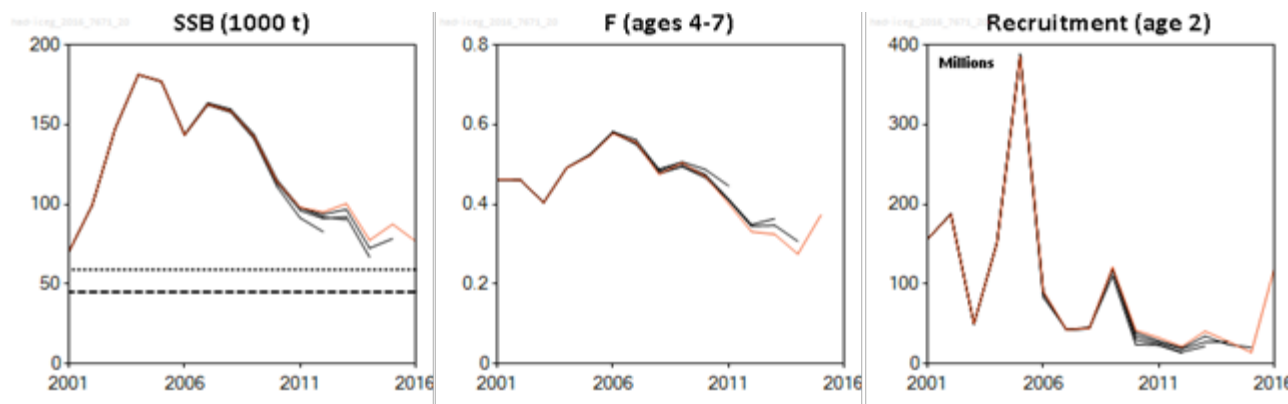


Figure 2.3.7.2 Haddock in Division 5.a. Historical assessment results (final-year recruitment and SSB values included).

Issues relevant for the advice

There is no information to present for this stock.

Reference points

Table 2.3.7.5 Haddock in Division 5.a. Reference points, values, and their technical basis. H refers to the harvest ratio.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	Not defined		
	F_{MSY}	Not defined		
	HR_{MSY}	0.52	Stochastic simulations	Björnsson (2013)
Precautionary approach	B_{lim}	45 000 t	B_{loss}	ICES (2012)
	B_{pa}	59 000 t	$B_{lim}e^{1.645 \times 0.16}$	ICES (2016a)
	HR_{lim}	Not defined		
	F_{pa}	Not defined		
	HR_{pa}	0.46	Stochastic simulations	Björnsson (2013)
Management plan	MGT $B_{trigger}$	45 000 t	Stochastic simulations	Björnsson (2013)
	F_{MGT}	Not defined		
	HR_{MGT}	0.40	Management plan	

Basis of the assessment

Table 2.3.7.6 Haddock in Division 5.a. The basis of the assessment.

ICES stock data category	1 (ICES, 2016b)
Assessment type	Adapt-type model (in ADMB) that uses catches in the model and in the forecast.
Input data	Landings-at-age and two survey indices (Icelandic spring and autumn ground fish surveys).
Discards and bycatch	Bycatch is included and discarding has been less than 2% in recent years.
Indicators	None
Other information	The stock was benchmarked in February 2013 (ICES, 2013b) and a harvest control rule evaluated in April 2013 (ICES, 2013a).
Working group	North-Western Working Group (NWWG)

Information from stakeholders

There is no available information.

History of the advice, catch, and management

Table 2.3.7.7 Haddock in Division 5.a. History of ICES advice, the agreed TAC, and ICES estimates of landings by national fishing year. All weights are in thousand tonnes.

Year	ICES advice	Predicted catch corresp. to advice	Agreed TAC	ICES landings for the fishing year	ICES landings for the calendar year
1987*	National advice	< 50	60		41
1988*	National advice	< 60	65		54
1989*	National advice	< 60	65		63
1990*	National advice	< 60	65		67
1991**	National advice	< 38	48		54
1991/1992	National advice	< 50	50	48	47
1992/1993	National advice	< 60	65	48	49
1993/1994	National advice	< 65	65	57	59
1994/1995	National advice	< 65	65	61	61
1995/1996	National advice	< 55	60	54	57
1996/1997	National advice	< 40	45	51	44
1997/1998	National advice	< 40	45	38	41
1998/1999	National advice	< 35	35	46	45
1999/2000	F reduced below F_{med}	< 35	35	42	42
2000/2001	F reduced below provisional F_{pa}	< 31	30	40	40
2001/2002	F reduced below provisional F_{pa}	< 30	41	45	50
2002/2003	F reduced below provisional F_{pa}	< 55	55	56	61
2003/2004	F reduced below provisional F_{pa}	< 75	75	79	84
2004/2005	F reduced below provisional F_{pa}	< 97	90	98	97
2005/2006	F reduced below provisional F_{pa}	< 110	105	98	98
2006/2007	F reduced below provisional F_{pa}	< 112	105	110	110
2007/2008	F reduced below provisional F_{pa}	120	100	102	102
2008/2009	F reduced below 0.35	< 83	93	82	82
2009/2010	F reduced below 0.35	< 57	63	73	64
2010/2011	F reduced below 0.35	< 51	50	53	49
2011/2012	F reduced below 0.35	< 42	45	49	46
2012/2013	F reduced below 0.35	< 32	36	40.6	44
2013/2014	TAC $0.4 \times B_{45+cm,2014}$	< 38	38	39.6	34
2014/2015	TAC $0.4 \times B_{45+cm,2015}$	< 30.4	30.4	36.6	39.6
2015/2016	TAC $0.4 \times B_{45+cm,2016}$	< 36.4	36.4		
2016/2017	TAC $0.4 \times B_{45+cm,2017}$	≤ 34.6			

* Calendar year.

** January/August.

History of catch and landings

Table 2.3.7.8 Haddock in Division 5.a. Catch distribution by fleet in 2015 as estimated by ICES.

Total catch (2015)	Landings				Discards
	44% bottom trawl	43% longline	11% Danish seine	2% other gears	
39.6 kt	39.6 kt				Negligible

Summary of the assessment

Table 2.3.7.9 Haddock in Division 5.a. Assessment summary.

Year	Recruitment at age 2 (thousands)	Biomass Age 3+ (tonnes)	Biomass 45+cm (tonnes)	SSB (tonnes)	Yield_SSB	Landings (kt)	Harvest rate (45+cm)	F _{ages 4-7}
1979	80923	162177	102046	96072	0.576	55330	0.542	0.521
1980	37390	192244	138008	116521	0.439	51110	0.37	0.398
1981	10426	206988	176712	141628	0.449	63558	0.36	0.542
1982	42788	180380	167992	136817	0.507	69428	0.413	0.444
1983	29306	148112	129725	112589	0.586	65942	0.508	0.508
1984	20574	112797	94816	82961	0.582	48282	0.509	0.515
1985	42788	102394	92245	66652	0.767	51102	0.554	0.537
1986	86501	96480	79885	59837	0.817	48859	0.612	0.739
1987	164036	105395	70459	46298	0.88	40760	0.578	0.584
1988	48742	153708	86468	69391	0.781	54204	0.627	0.675
1989	29778	168184	123495	99537	0.632	62885	0.509	0.676
1990	27094	145507	120191	110745	0.607	67198	0.559	0.611
1991	92280	122708	108816	89825	0.609	54692	0.503	0.664
1992	175094	106310	70980	66379	0.71	47121	0.664	0.728
1993	38437	130461	65525	71000	0.678	48123	0.734	0.669
1994	46842	127836	69023	83295	0.714	59502	0.862	0.641
1995	72857	124042	91664	85054	0.716	60884	0.664	0.661
1996	36341	108036	73657	70008	0.813	56890	0.772	0.675
1997	102509	87152	62686	58993	0.742	43764	0.698	0.624
1998	17976	97121	55132	64203	0.642	41192	0.747	0.627
1999	50160	91024	58497	64439	0.705	45411	0.776	0.685
2000	117423	90674	65450	63509	0.663	42105	0.643	0.636
2001	156535	115046	68081	70366	0.564	39654	0.582	0.462
2002	187267	168427	94392	99344	0.508	50498	0.535	0.461
2003	50394	219757	123728	147523	0.413	60883	0.492	0.404
2004	151137	252826	188076	181303	0.468	84828	0.451	0.491
2005	384765	258912	190482	176994	0.549	97225	0.51	0.522
2006	90617	298798	155316	143410	0.681	97614	0.628	0.577
2007	42783	297360	147607	162516	0.677	109966	0.745	0.555
2008	44466	249662	161113	158368	0.65	102872	0.639	0.475
2009	121069	192792	146869	142494	0.576	82045	0.559	0.504
2010	41838	168658	114411	114084	0.562	64168	0.561	0.469
2011	32441	153885	107936	97987	0.504	49433	0.458	0.402
2012	21413	144883	117683	95026	0.486	46208	0.393	0.331
2013	40472	138496	124049	100228	0.44	44097	0.355	0.324
2014	27875	125286	106205	77383	0.438	33900	0.319	0.275
2015	14093	127585	112852	87450	0.453	39646	0.351	0.373
2016	119694	109241	101081	76722				
Avg	76240	154772	109562	99657	0.606	58956	0.562	0.54

Sources and references

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