ECOREGION Iceland and East Greenland
STOCK Haddock in Division Va (Icelandic haddock)

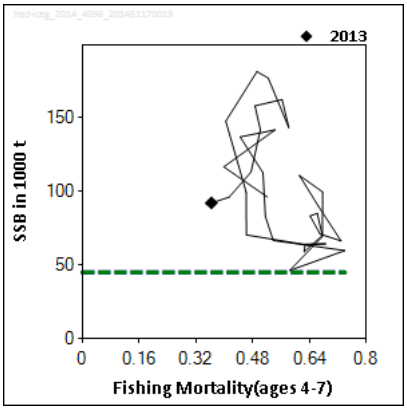
Advice for 2014/2015

ICES advises on the basis of a management plan (Annex 2.3.6) that catches in the fishing year 2014/2015 should be no more than 30 400 t. All catches are assumed to be landed.

Stock status

Fishing pressure	2011	2012	2013	
MSY (F_{MSY})	✓	✓	✓	Below
Precautionary approach (F_{pa},F_{lim})	✓	✓	✓	Below
Management plan (F_{MGT})	✗	✓	✓	Within expected range

Stock size	2012	2013	2014	
MSY ($B_{trigger}$)	✓	✓	✓	Above
Precautionary approach (B_{pa},B_{lim})	✓	✓	✓	Above



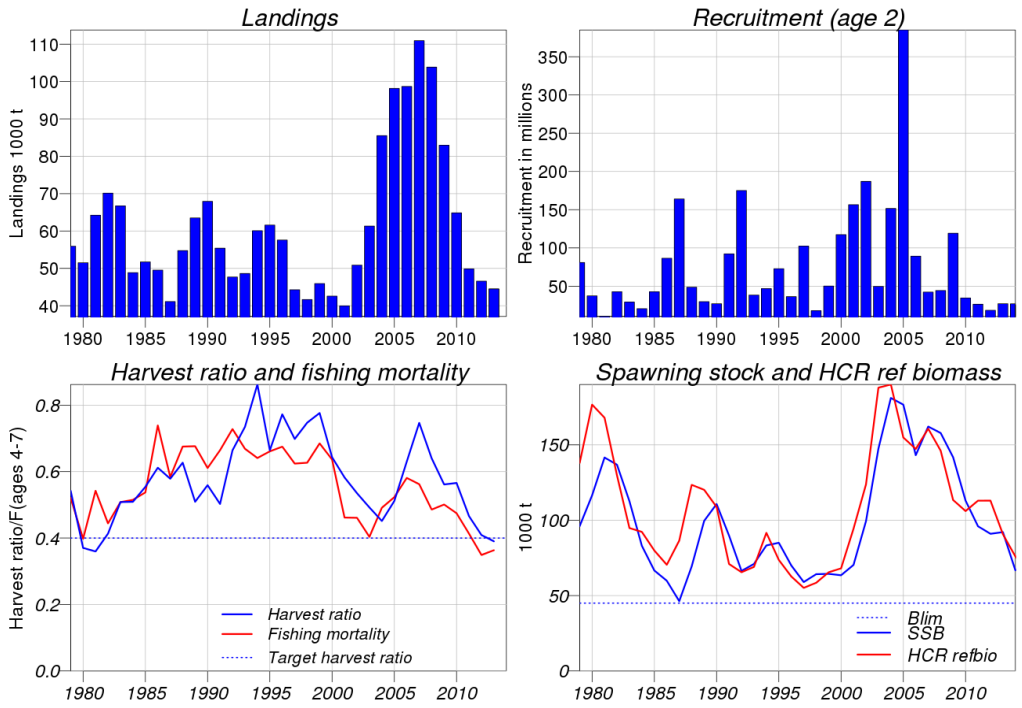


Figure 2.3.6.1 Haddock in Division Va. Summary of stock assessment (weights in thousand tonnes). Top right: SSB/F for the time-series used in the assessment. (HCR $B_{trigger}$ equal to B_{lim}).

SSB increased from 2001 to 2004 after several strong year classes and was large from 2004 to 2008. Since 2008 the spawning stock has decreased. The harvest ratio is currently estimated near H_{target} (0.4). Recruitment was high for the year classes 1998–2003, with five strong year classes, of which the 2003 year class was very strong. The 2008–2013 year classes are all estimated to be weak.

Management plans

A management plan was introduced last year and evaluated by ICES in March 2013 (Björnsson, 2013). It was considered to be precautionary and in conformity with the MSY approach. The plan was adopted by the Icelandic

government in April 2013 (see Annex 2.3.6). The management plan implies substantial reduction in fishing effort compared to the last 30 years.

Biology of the stock

Growth of haddock is considered density dependent. The stock was large in 2003–2009 and growth very slow. Since 2009 the stock size has decreased and growth gradually improved. In 2013 growth is estimated to be above the average of the last 30 years. In 2014, mean weight-at-age is high for the youngest age groups, but around average for the older fish that contribute most to the spawning stock and the fishable stock.

Environmental influence on the stock

Haddock in Icelandic waters is near the northern boundary of its distribution. In cold periods the area north and east of Iceland is probably too cold for haddock, but in warmer periods the temperature in this area is suitable for haddock. The areas north and east of Iceland constitute a large part of the Icelandic continental shelf, so in warm periods much larger areas are available for haddock. Landing figures from the early 1960s support the observation that the stock can become very large in warm periods. The groundfish surveys show that the proportion of the haddock stock inhabiting the waters north of Iceland has increased from 2000 to 2006 and has remained high since then.

The fisheries

Haddock is caught in directed haddock fisheries, as well as in mixed demersal fisheries targeting cod. Recent changes in seawater temperature have had considerable effects on the spatial distribution and the distribution of the catches. Since 2000, an increasing proportion of haddock has been caught by longliners. The discard estimates for haddock have been ranging between 0.7% and 5% by weight since 2001.

Catch distribution	Total landings (2013) were 44.1 kt, with 44% taken by bottom trawl, 44% by longlines, 11% by Danish seine, and 2% by other gear. The discards have been between 0.04% and 4.4% by weight since 2001, less than 2% in recent years.

Quality considerations

The assessment is considered very consistent. Discards are not included in the assessment. Discards in 2013 were negligible, as they have 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.

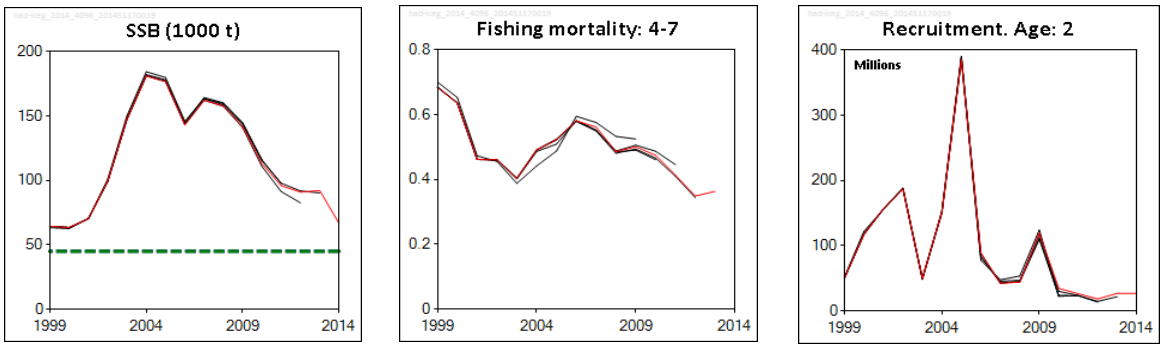


Figure 2.3.6.2 Haddock in Division Va. Historical assessment results (final-year recruitment estimates included).

Scientific basis

Stock data category	1 (ICES, 2014a).
Assessment type	Adapt-type model (in ADMB).
Input data	Landings-at-age and two survey indices (Icelandic spring and autumn groundfish surveys).
Discards and bycatch	Haddock is caught in mixed demersal fisheries, sometimes as a large proportion of the catch, sometime as bycatch. Discarding due to high-grading was up to 20% by weight in the late 1990s, but has been less than 2% in recent years.
Indicators	None.
Other information	The stock was benchmarked in February 2013 and a harvest control rule evaluated in March 2013.
Working group	North-Western Working Group (NWWG).

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Reference points

	Type	*Value*	*Technical basis*
MSY approach	HCR $B_{trigger}$	45 000 t.	Stochastic simulations (Björnsson, 2013).
	H_{MSY}	0.52	Stochastic simulations (Björnsson 2013).
Precautionary approach	B_{lim}	45 000 t.	B_{loss} (ICES, 2012).
	H_{pa}	0.46	Stochastic simulations (Björnsson, 2013).
Management plan	H_{target}	0.40	Management plan.

(Last changed in: 2013)

Outlook for 2015

Basis: Landings (2014)[3)] = 35; SSB (2015) = 70; R (2015) = 25 million; B_{45+cm} (2015) = 76; F (2014) = 0.37; SSB (2014) = 67; R (2014) = 27 million**.**

Rationale	Landings (2014/2015)	Basis	$F_{4–7}$ (2015)	SSB (2016)	B_{45+cm} (2016)	% SSB change [1)]	% TAC change [2)]
Management plan 0.4 of Reference biomass	30.400 t	H_{45+cm} = 0.4	0.375	61	59	−14%	−20%

Weights in thousand tonnes.
[1)] SSB 2016 relative to SSB 2015.
[2)] Advice 2014/2015 relative to TAC 2013/2014.
[3)] Estimated from recorded landings/TAC until 31 August; predicted catch for the remainder of the calendar year.

Management plan

The TAC for the fishing year 2014/2015 should be no more than 0.4 times the estimated biomass of 45 cm and larger haddock at the beginning of 2015, corresponding to a TAC of 30.4 kt.

Additional considerations

Management considerations

SSB and catch are predicted to decrease over the next years when the average year classes (2004–2007) disappear from the stock and are replaced by the small (2008–2013) year classes. In the present prediction the catch might be in the range of 25–30 kt and the spawning stock at less than 65 kt when the 2007 year class has disappeared from the stock. The current assessment paints a more optimistic picture of the numbers in year classes 2008–2012 compared to last year's assessment, but growth is slower than last year's prediction. The stock biomass is therefore similar to last year's prediction.

Regulations and their effects

The regulation is a TAC supplemented with technical measures like area closures for protecting juveniles, and minimum mesh size. The regulatory system includes provision for real-time closures of areas where juveniles are a high proportion of the catch. The effects of these measures have not been evaluated. Trawl grids are mandatory in certain areas.

Changes in fishing technology and fishing patterns

Discards have been low since 2001. Prior to this discard numbers of undersized fish were variable and sometimes high, especially from 1994 to 1997. Discarding seems related to the overlap between the spatial distribution of the fisheries and recruits and is higher when fishing mortality is high and stock size low.

Information from the fishing industry

Commercial cpue from the most important fleets targeting haddock are available for 20 years or more, but these data are not used in the analytical assessment. Cpue has been stable or increasing in recent years while the stock has been decreasing, and the relationship between stock size and cpue is weak.

Data and methods

The assessment is based on age-disaggregated landings from 1979 to 2013 and on survey data from the March survey 1985–2014 and the October survey 1995–2013. The stock was benchmarked in February 2013, where an Adapt-type model tuned with both the March and the October survey was selected as the basis for assessment.

Comparison of the basis of previous assessment and advice

The basis for assessment and advice is the same as last year.

Sources

Björnsson, H. 2013. Evaluation of the Icelandic haddock management plan. ICES CM 2013/ACOM:59.

ICES. 2012. Report of the North-Western Working Group (NWWG), 26 April–3 May 2012, ICES Headquarters, Copenhagen. ICES CM 2012/ACOM:07. 1425 pp.

ICES. 2013. Report of the North-Western Working Group (NWWG), 25 April–02 May 2013, ICES Headquarters, Copenhagen. ICES CM 2013/ACOM:07. 1538 pp.

ICES. 2014a. Advice basis. *In* Report of the ICES Advisory Committee, 2014. ICES Advice 2014, Book 1, Section 1.2.

ICES. 2014b. Report of the North-Western Working Group (NWWG), 24 April–1 May 2014, ICES Headquarters, Copenhagen, Denmark. ICES CM 2014/ACOM:07. 902 pp.

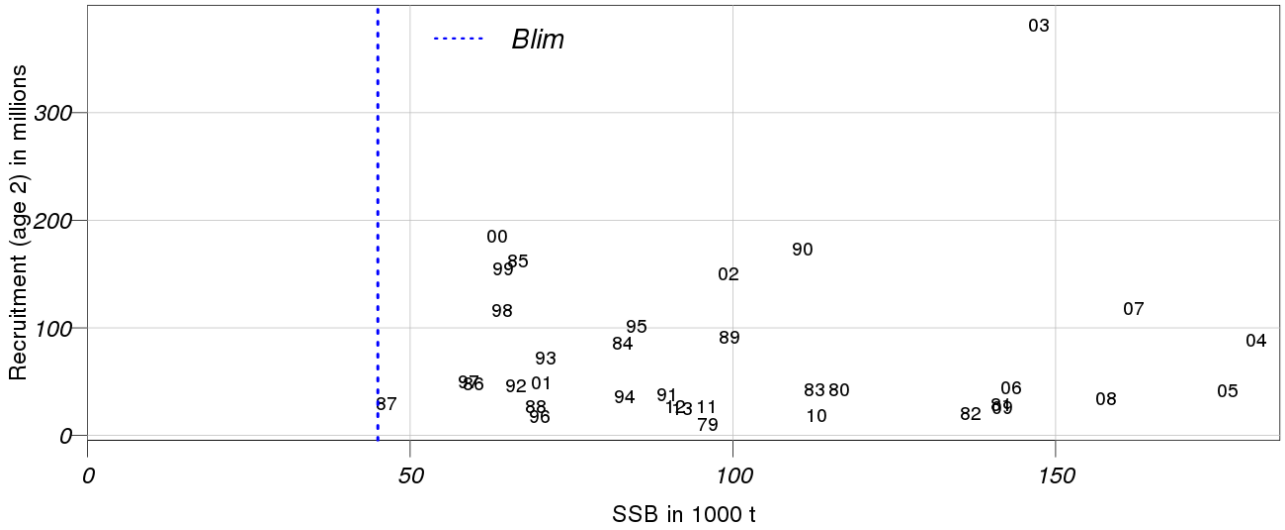

Figure 2.3.6.3 Haddock in Division Va. Stock–recruitment plot.

Table 2.3.6.1 Haddock in Division Va. ICES advice, management, and landings.

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[a]	National advice	< 60	65		54
1989[a]	National advice	< 60	65		63
1990[a]	National advice	< 60	65		67
1991[b]	National advice	< 38	48		54
1991/1992[c]	National advice	< 50	50	48	47
1992/1993[c]	National advice	< 60	65	48	49
1993/1994[c]	National advice	< 65	65	57	59
1994/1995[c]	National advice	< 65	65	61	61
1995/1996[c]	National advice	< 55	60	54	57
1996/1997[c]	National advice	< 40	45	51	44
1997/1998[c]	National advice	< 40	45	38	41
1998/1999[c]	National advice	< 35	35	46	45
1999/2000[c]	F reduced below F_{med}	< 35	35	42	42
2000/2001[c]	F reduced below provisional F_{pa}	< 31	30	40	40
2001/2002[c]	F reduced below provisional F_{pa}	< 30	41	45	50
2002/2003[c]	F reduced below provisional F_{pa}	< 55	55	56	61
2003/2004[c]	F reduced below provisional F_{pa}	< 75	75	79	84
2004/2005[c]	F reduced below provisional F_{pa}	< 97	90	98	97
2005/2006[c]	F reduced below provisional F_{pa}	< 110	105	98	98
2006/2007[c]	F reduced below provisional F_{pa}	< 112	105	110	110
2007/2008[c]	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[d]	38		
2014/2015	TAC 0.4 times $B_{45+cm,2015}$	< 30.4			

Weights in thousand tonnes.
[a] Calendar year.
[b] January/August.
[c] National TAC for year ending 31 August.
[d] A typo (36 kt instead of 38 kt) was detected and corrected in October 2013.

Table 2.3.6.2 Icelandic haddock (Division Va). Summary of the assessment.

Year	Recruitment at age 2 thousands	Biomass 3+ tonnes	SSB tonnes	Landings tonnes	Yield/SSB	F_{4-7}
1979	80923	162177	96072	55330	0.576	0.521
1980	37390	192244	116521	51110	0.439	0.398
1981	10426	206988	141628	63558	0.449	0.542
1982	42788	180380	136817	69428	0.507	0.444
1983	29306	148112	112589	65942	0.586	0.508
1984	20574	112797	82961	48282	0.582	0.515
1985	42788	102394	66652	51102	0.767	0.537
1986	86501	96480	59837	48859	0.817	0.739
1987	164036	105395	46298	40760	0.88	0.584
1988	48742	153708	69391	54204	0.781	0.675
1989	29778	168184	99537	62885	0.632	0.676
1990	27094	145507	110745	67198	0.607	0.611
1991	92280	122708	89825	54692	0.609	0.664
1992	175094	106310	66379	47121	0.71	0.728
1993	38437	130461	71000	48123	0.678	0.669
1994	46842	127836	83295	59502	0.714	0.641
1995	72857	124042	85054	60884	0.716	0.661
1996	36341	108036	70008	56890	0.813	0.675
1997	102509	87152	58993	43764	0.742	0.624
1998	17976	97121	64203	41192	0.642	0.627
1999	50160	91024	64439	45411	0.705	0.685
2000	117423	90674	63509	42105	0.663	0.636
2001	156535	115046	70366	39654	0.564	0.462
2002	187000	168427	99342	50498	0.508	0.461
2003	49785	219667	147483	60883	0.413	0.404
2004	151630	252404	181124	84828	0.468	0.491
2005	384931	258542	176694	97225	0.55	0.523
2006	89274	298522	143151	97614	0.682	0.581
2007	42306	296738	162179	109966	0.678	0.562
2008	44372	248756	157874	102872	0.652	0.486
2009	119181	191722	141798	82045	0.579	0.501
2010	34603	166939	113030	64168	0.568	0.475
2011	26398	149052	95986	49433	0.515	0.413
2012	18470	136183	91008	46208	0.508	0.349
2013	27105	125196	92144	44097	0.479	0.363
2014	26979	104057	66792			
Mean 1979–2013	75801	155305	99853	59527	0.619	0.55

Annex 2.3.6 Management plan

According to the plan:

$$TAC_{y/y+1} = 0.4B_{45cm+,y+1} \text{ if } SSB_{y+1} \geq SSB_{trigger}$$

$$TAC_{y/y+1} = \frac{SSB_{y+1}}{SSB_{trigger}} 0.4B_{45cm+,y+1} \text{ if } SSB_{y+1} < SSB_{trigger}$$

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 $B_{45cm+,y+1}$ the estimated biomass of 45 cm and larger haddock at the beginning of the year following the assessment year.