

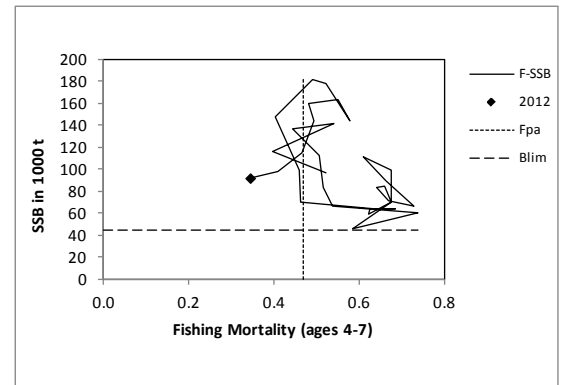
ECOREGION Iceland and East Greenland
STOCK Haddock in Division Va (Icelandic haddock)

Advice for 2013/2014

ICES advises on the basis of a management plan that catches in the fishing year 2013/2014 should be no more than 38 000 t. All catches are assumed to be landed.

Stock status

H (Harvest ratio)			
	2010	2011	2012
MSY (H_{MSY})	✘	✔	✔ Below
Precautionary approach (H_{pa})	✘	✔	✔ Below
Management target (H_{target})	✘	✔	✔ Management plan has not been implemented.
SSB (Spawning-Stock Biomass)			
	2012	2013	2014
Management plan ($B_{trigger}$)	✔	✔	✔ Above
Precautionary approach (B_{lim})	✔	✔	✔ Above



The colour on some of the lights for harvest ratio might change when the assessment has converged. This may take a few years as the fishing mortality is not very high. It is on the other hand very unlikely that $SSB < B_{lim}$ for any of the years 2013–2015.

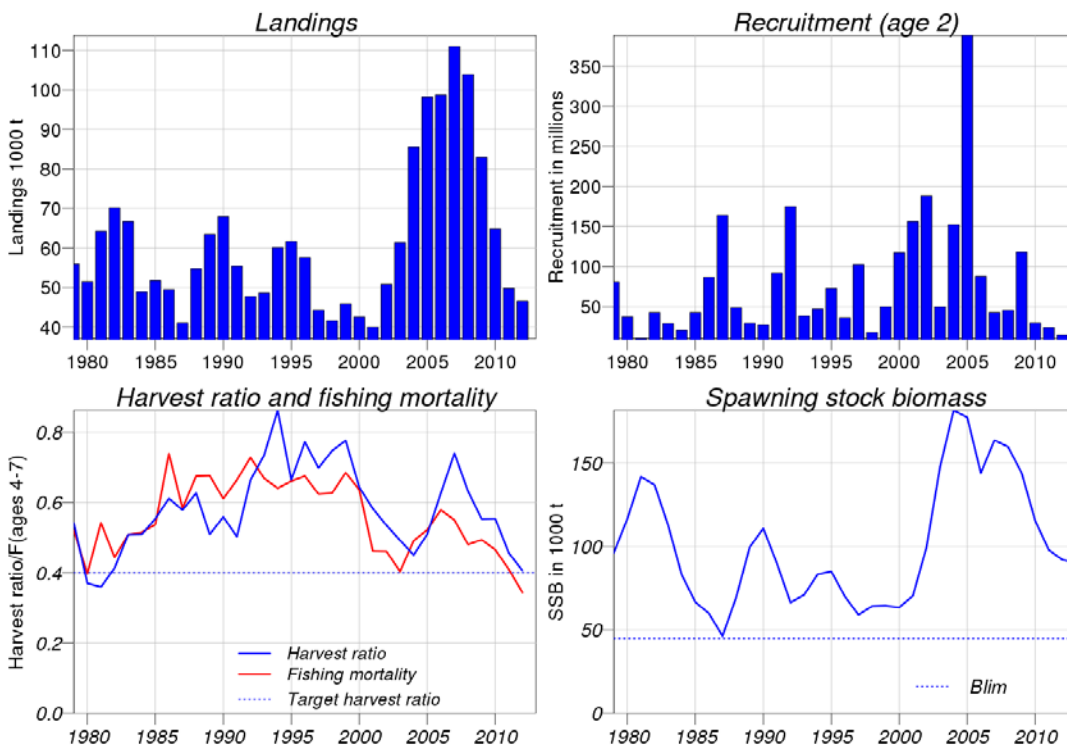


Figure 2.4.6.1 Haddock in Division Va. Summary of stock assessment (weights in thousand tonnes). Top right: SSB/F for the time-series used in the assessment.

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. 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 2008–2012 year classes are all estimated to be small.

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.

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 in the beginning of the year following the assessment year. The management plan calls for 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 2012 growth is estimated to be above the average of the last 30 years. In 2013, 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. In recent years 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 (2012) are 46.2 kt, with 44% taken by bottom trawl, 41% by longlines, 13% by Danish seine, and 2% by other gear. Discarding is considered minor since 2001.
---------------------------	--

Quality considerations

The assessment is considered very consistent. Discards are not included in the assessment. Discards in 2012 were small, 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, with the final assessment fitting in between.

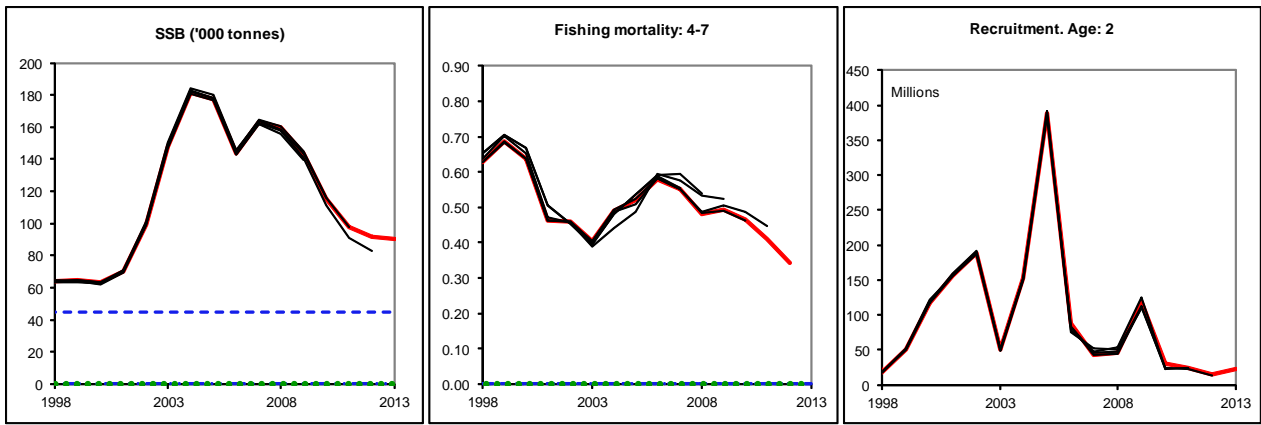


Figure 2.4.6.2 Haddock in Division Va. Historical assessment results (final-year recruitment estimates included).

Scientific basis

Assessment type	Adapt-type model (in ADMB).
Stock data category	Category 1.
Input data	Landings-at-age and two survey indices (Icelandic spring and autumn groundfish surveys).
Discards and bycatch	Discards are not included in the assessment and considered negligible.
Indicators	None.
Other information	The stock was benchmarked in February 2013 and a Harvest Control rule evaluated in March 2013.
Working group report	NWWG (ICES, 2013).

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

Reference points

	<i>Type</i>	<i>Value</i>	<i>Technical basis</i>
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.

(unchanged since: 2013)

Outlook for 2014

Basis: 25 kt landings from 1 January to 31 August 2013. 1/3 of the predicted catch in the fishing year 2013/2014 was taken in the calendar year 2013. SSB (2014) = 88; R (2014) = 25 million (Adapt).

Rationale	Landings (2013/2014)	Basis	F_{4-7} (2014)	SSB (2015)	% SSB change ¹⁾	% TAC change ²⁾
Management plan 0.4 of Reference biomass	38	$H_{45+\text{cm}} = 0.4$	0.32	73	-18	5

Weights in thousand tonnes.

¹⁾ SSB 2015 relative to SSB 2014.

²⁾ Advice 2013/2014 relative to TAC 2012/2013.

Management plan

The TAC for the fishing year 2013/2014 should be no more than 0.4 times the estimated biomass of 45 cm and larger haddock in the beginning of 2014, corresponding to a TAC of 38 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 (2008–2012) year classes. In the present prediction the catch might be in the range of 25–30 kt and the spawning stock at 65 kt when the 2007 year class has disappeared from the stock. The current assessment paints a more optimistic picture of the year classes 2008–2011 compared to last year's assessment; both of the estimated numbers have increased and growth has improved.

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. The cpue data show much more stability than the results from the assessment.

Last year cpue from most fleets increased considerably when the stock is predicted to have been stable or decreasing. The discrepancy between cpue and stock abundance is partly due to the increase in haddock biomass occurring in areas north of Iceland, where there is little fishing effort.

Data and methods

The assessment is based on age-disaggregated landings from 1979 to 2012 and on survey data from the March survey 1985–2012 and the October survey 1995–2012. The models used are the Adapt-type model, Time-Series analysis (Gudmundsson, 2013), XSA, and a separable model used for evaluation of the harvest control rule for the stock in March 2013. The selection pattern in the separable model is a function of mean weight-at-age, not age directly. The assessment does not include discards. The stock was benchmarked in February 2013, where the Adapt-type model tuned with both the March and the October survey was proposed as the basis for assessment.

Comparison with previous assessment and advice

This year's assessment is conducted in the same way as last year. The assessment indicates a larger stock than last year's assessment. The change is both caused by higher stock numbers and better growth than predicted. The spawning stock in 2013 is estimated at 92 thousand tonnes compared to 83 thousand tonnes last year (or 11% higher), and fishing mortality in 2011 is estimated to be 0.41 compared to 0.45 last year.

The basis for the advice is a management plan that was approved by the Icelandic government in April 2012.

Sources

- Gudmunsson, G. 2013. Fish stock assessment by time series analysis. ICES NWWG 2013, WD 29.
Björnsson, H. 2013. Evaluation of the Icelandic haddock management plan. ICES CM 2013/ACOM:59.
ICES. 2012. Report of the North-Western Working Group, 26 April–3 May 2012. ICES CM 2012/ACOM:07.
ICES. 2013. Report of the North-Western Working Group, 25 April–02 May 2013. ICES CM 2013/ACOM:07.

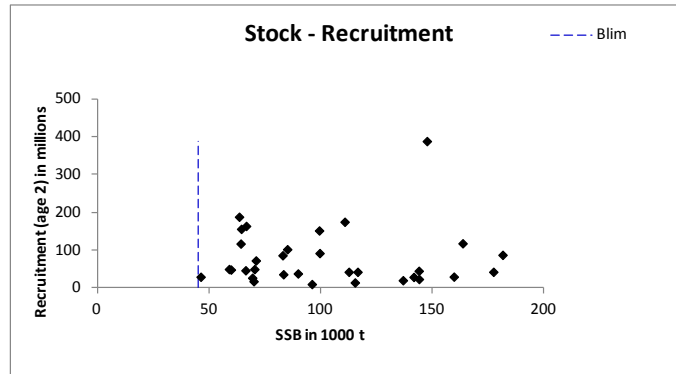


Figure 2.4.6.3 Haddock in Division Va. Stock–recruitment plot.

Table 2.4.6.1 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 ¹	National advice	< 60	65		54
1989 ¹	National advice	< 60	65		63
1990 ¹	National advice	< 60	65		67
1991 ²	National advice	< 38	48		54
1991/1992 ³	National advice	< 50	50	48	47
1992/1993 ³	National advice	< 60	65	48	49
1993/1994 ³	National advice	< 65	65	57	59
1994/1995 ³	National advice	< 65	65	61	61
1995/1996 ³	National advice	< 55	60	54	57
1996/1997 ³	National advice	< 40	45	51	44
1997/1998 ³	National advice	< 40	45	38	41
1998/1999 ³	National advice	< 35	35	46	45
1999/2000 ³	F reduced below F_{med}	< 35	35	42	42
2000/2001 ³	F reduced below provisional F_{pa}	< 31	30	40	40
2001/2002 ³	F reduced below provisional F_{pa}	< 30	41	45	50
2002/2003 ³	F reduced below provisional F_{pa}	< 55	55	56	61
2003/2004 ³	F reduced below provisional F_{pa}	< 75	75	79	84
2004/2005 ³	F reduced below provisional F_{pa}	< 97	90	98	97
2005/2006 ³	F reduced below provisional F_{pa}	< 110	105	98	98
2006/2007 ³	F reduced below provisional F_{pa}	< 112	105	110	110
2007/2008 ³	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		
2013/2014	TAC 0.4 times $B_{45+cm,2014}$	< 36			

Weights in thousand tonnes.

¹ Calendar year.

² January/August.

³ National TAC for year ending 31 August.

Table 2.4.6.2 Icelandic haddock (Division Va). Summary of the assessment.

	R age 2	Biomass 3+ kt	SSB kt	Landings kt	F 4-7	Harvest rate
1979	80923	162	96	55	0.521	0.542
1980	37390	192	117	51	0.398	0.370
1981	10426	207	142	64	0.542	0.360
1982	42788	180	137	69	0.444	0.413
1983	29306	148	113	66	0.508	0.508
1984	20574	113	83	48	0.515	0.509
1985	42788	102	67	51	0.537	0.554
1986	86501	96	60	49	0.739	0.612
1987	164036	105	46	41	0.584	0.578
1988	48742	154	69	54	0.675	0.627
1989	29778	168	100	63	0.676	0.509
1990	27094	146	111	67	0.611	0.559
1991	92280	123	90	55	0.664	0.503
1992	175094	106	66	47	0.728	0.664
1993	38437	130	71	48	0.669	0.734
1994	46842	128	83	60	0.641	0.862
1995	72857	124	85	61	0.661	0.664
1996	36341	108	70	57	0.675	0.772
1997	102509	87	59	44	0.624	0.698
1998	17976	97	64	41	0.627	0.747
1999	50160	91	64	45	0.685	0.776
2000	117423	91	64	42	0.636	0.643
2001	156306	115	70	40	0.462	0.582
2002	188325	168	99	50	0.461	0.535
2003	49938	220	148	61	0.404	0.492
2004	152053	253	181	85	0.491	0.451
2005	388281	259	177	97	0.522	0.51
2006	87667	300	144	98	0.579	0.626
2007	42825	299	164	110	0.550	0.740
2008	45468	251	160	103	0.481	0.632
2009	118143	194	144	82	0.494	0.553
2010	30040	169	115	64	0.466	0.554
2011	23750	150	98	49	0.410	0.456
2012	14692	135	92	46	0.344	0.406
2013	21888	120	90	-	-	-
Mean 1979- 2012	78463	158	101	60.7	0.560	0.581