

ECOREGION Faroe Plateau ecosystem
STOCK Haddock in Division Vb

Advice for 2013

ICES advises that there should be no directed fishery on haddock in 2013. Measures should be put in place to minimize by-catches of haddock in other fisheries. A recovery plan should be developed and implemented as a prerequisite to reopening the directed fishery.

Stock status

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	✓	✗	✗ Above target
Precautionary approach (F_{pa}, F_{lim})	✓	○	○ Increased risk
SSB (Spawning-Stock Biomass)			
	2010	2011	2012
MSY ($B_{trigger}$)	✗	✗	✗ Below trigger
Precautionary approach (B_{pa}, B_{lim})	✗	✗	✗ Reduced reproductive capacity

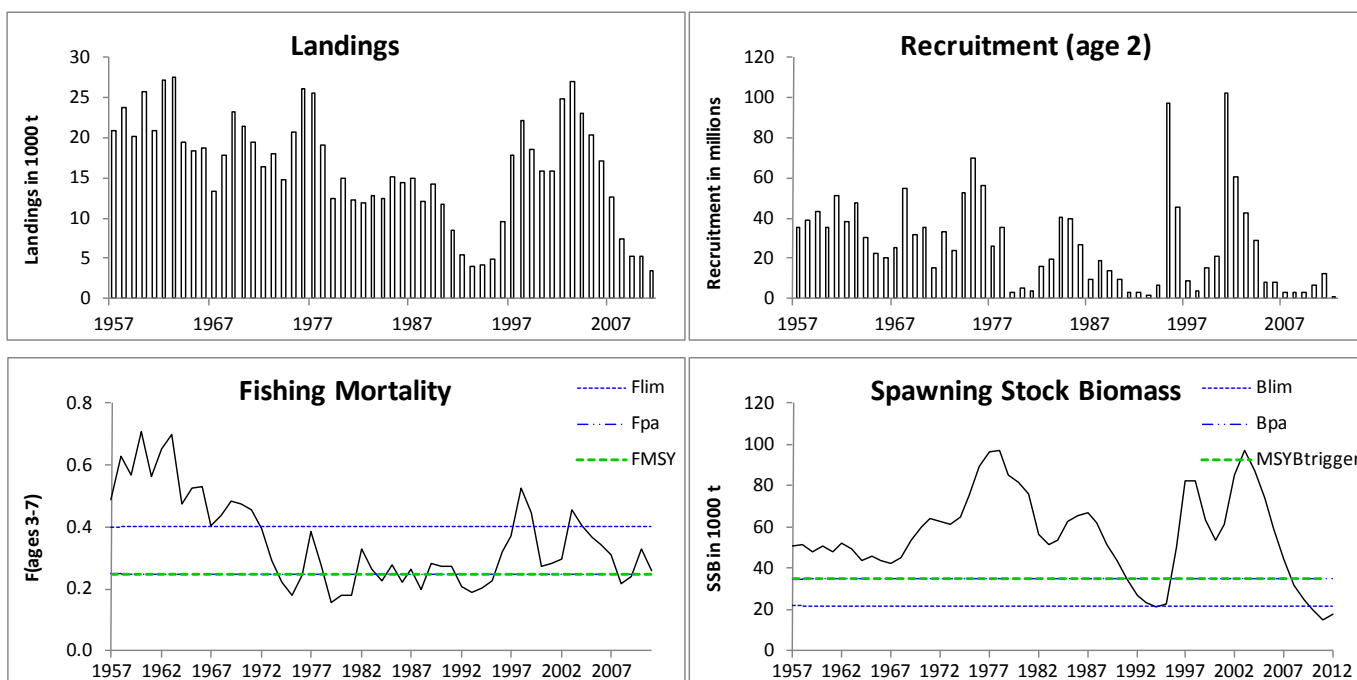
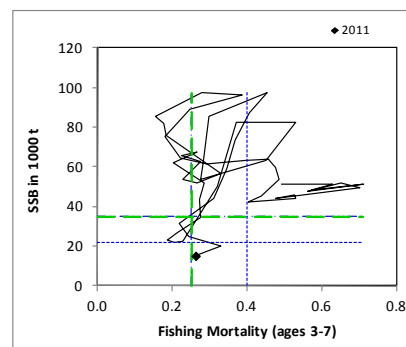


Figure 4.4.3.1 Haddock in Division Vb. Summary of stock assessment (weights in thousand tonnes). Top right: SSB/F for the time-series used in the assessment.

SSB has decreased since 2003 and in 2012 it is estimated to be below B_{lim} . The fishing mortality has decreased from above F_{lim} in 2003 to just above F_{MSY} for the last 3 years. Year classes from 2003 onwards have all been well below the long-term average.

Management plans

A group representing the Ministry of Fisheries, the Faroese industry, the University of the Faroe Islands, and the Faroe Marine Research Institute has developed a management plan based on general maximum sustainable yield (MSY) principles developed by ICES. The plan has not yet been discussed by the political system.

Biology

Since the mid-1970s, recruitment has fluctuated with 1–3 strong year classes followed by several weak to moderate ones. Mean weights-at-age have also fluctuated in this period.

Environmental influence on the stock

A positive relationship has been documented between primary production and the individual fish growth and recruitment 1–2 years later.

The fisheries

Haddock are mainly caught in a directed longline fishery for cod and haddock and as by-catches in trawl fisheries for saithe. Normally, longline gears account for 80–90% of the catches. In 2011 longlines accounted for 82% of the catches.

Catch distribution Total landings (2011) are 3.5 kt, where longliners accounted for 82% and trawlers for 18%. No discards and no unaccounted removals.

Quality considerations

The landings data are considered accurate. There are no incentives to discard fish under the effort management system. The sampling of the landings is believed to be adequate. No major problems have been observed with the tuning indices (the two surveys).

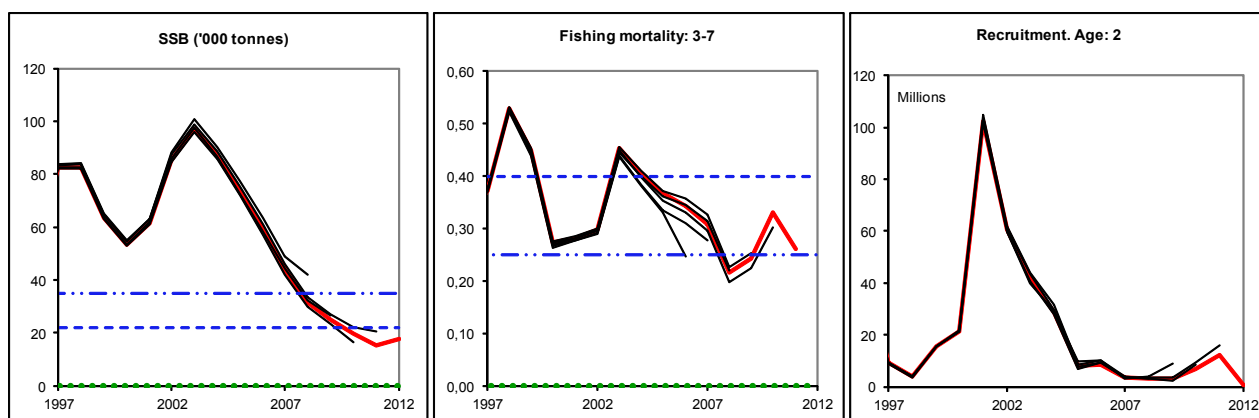


Figure 4.4.3.2 Haddock in Division Vb. Historical assessment results (final-year recruitment estimates included).

Scientific basis

Assessment type	XSA using age-disaggregated indices.
Input data	Two survey indices (spring and summer survey).
Discards and bycatch	No discards included. Discarding is not considered to be a major problem in this fishery.
Indicators	Primary productivity index.
Other information	Biomass indices from two commercial fleets.
Working group report	NWWG

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Reference points

	<i>Type</i>	<i>Value</i>	<i>Technical basis</i>
MSY Approach	MSY $B_{trigger}$	35 000	B_{pa}
	F_{MSY}	0.25	Stochastic simulations.
Precautionary Approach	B_{lim}	22 000 t	Lowest observed SSB.
	B_{pa}	35 000 t	$B_{lim} e^{1.645\sigma}$, with σ of 0.3.
	F_{lim}	0.40	$F_{pa} e^{1.645\sigma}$, with σ of 0.3.
	F_{pa}	0.25	F_{med} (1998) = 0.25.

F_{MSY} and MSY $B_{trigger}$ updated in 2012

Yield and spawning biomass per Recruit F-reference points (2012):

	Fish Mort	Yield/R	SSB/R
Ages 3–7			
Average last 3 years	0.28	0.59	2.36
F_{max}^*	0.61	0.63	1.24
$F_{0.1}$	0.22	0.56	2.82
F_{med}	0.25	0.58	2.54

[*] F_{max} is poorly defined.

Outlook for 2013

Basis: $F(2012) = F(2009–2011) = 0.28$; $SSB(2013) = 15$; $R(2012) = 0.5$ million; catch (2012) = 4.

Rationale	F (2013)	Landings (2013)	Basis	SSB (2014)	%SSB change ¹⁾
MSY approach	0.15	1.9	$F_{MSY} * B_{2013}/MSY$ $B_{trigger} = F_{sq} * 0.50$	13	-15
MSY	0.25	3.0	$F_{sq} * 0.90$	12	-20
Zero catch	0	0	$F = 0$	17	13
<i>Status quo</i>	0.14	1.8	$F_{sq} * 0.50$	13	-13
	0.21	2.6	$F_{sq} * 0.75$	12	-20
	0.25	3.0	$F_{sq} * 0.90$ (F_{MSY} and F_{pa})	12	-20
	0.28	3.3	F_{sq}	11	-27
	0.45	5.0	F	10	-33

Weights in thousand tonnes.

¹⁾ SSB 2014 relative to SSB 2013.

Management plan

A management system based on number of fishing days, closed areas, and other technical measures was introduced in 1996 to ensure sustainable demersal fisheries in Division Vb. This was before ICES introduced precautionary approach (PA) and MSY reference values, and at that time it was believed that the purpose was achieved if the total allowable number of fishing days was set such that on average 33% of the haddock exploitable stock in numbers would be harvested annually. This translates into an average F of 0.45, above the F_{pa} and F_{MSY} of 0.25. ICES considers this to be inconsistent with the PA and the MSY approaches. Work is ongoing in the Faroes to move away from the F_{target} of 0.45 to be consistent with the ICES advice. This management plan includes a stepwise reduction of the fishing mortality to F_{MSY} in 2015 and a recovery plan if the SSB declines below the MSY $B_{trigger}$. The MSY $B_{trigger}$ has been defined at 35 kt (the former B_{pa}) and F_{MSY} at 0.25. If the SSB declines below the MSY $B_{trigger}$, the fishing mortality will be reduced by the relationship $F_{MSY} * B_{act}/MSY B_{trigger}$ until the SSB has increased again above the MSY $B_{trigger}$ and is thereafter kept at F_{MSY} .

MSY approach

Based on stochastic simulations MSY preliminary analyses suggested an $F_{MSY} = 0.25$. Work is still needed to confirm these analyses. Using this F_{MSY} value and given that SSB in 2013 is estimated below MSY $B_{trigger}$, fishing mortality should be reduced further. F in 2013 should be no more than $F_{MSY} * B_{2013} / MSY B_{trigger} = 0.15$.

Precautionary approach

Given the recent poor recruitment and slow growth and the low SSB, the forecast indicates that even a zero fishing mortality in 2013 will not result in getting the stock above B_{lim} in 2014. There should therefore be no directed fishery on haddock. Measures should be put in place to minimize bycatches of haddock in other fisheries. A recovery plan should be developed and implemented as a prerequisite to reopening the directed fishery.

Additional considerations

Management considerations

An expected benefit of the effort management system was more stability for the fishing fleet. The fleets were expected to target the most abundant fish species, thus reducing the fishing mortality on stocks that are in bad shape. This assumption is, however, not always correct; e.g. low prices for saithe and haddock and high prices for cod kept the fishing mortality higher than expected for cod. Management should include measures that avoid a disproportionate targeting of depleted stocks.

The effort management system needs to consider changes in catchability of the fishery. For baited hook gear, catchability may be related to the amount of food available in the ecosystem. Therefore, low ecosystem production may decrease haddock production and increase the catchability of longline gear.

An explicit management plan based on the MSY approach needs to be implemented, clearly stating what to do when the stock is very low.

In recent years only a fraction of the allocated number of fishing days has actually been utilized.

Impacts of the environment on the fish stocks

The productivity of the Faroe Shelf ecosystem is important to the haddock stock. The recruitment depends both on the spawning-stock biomass and on the productive state of the Faroe Shelf ecosystem. A positive relationship has been demonstrated between primary production and the cod and haddock individual fish growth and recruitment 1–2 years later. The primary production indices were above average in 2008–2010; however, this has resulted in only marginally improved recruitment of haddock.

Regulations and their effects

An effort management system was implemented 1 June 1996. Fishing days are allocated to all fleets fishing in waters < 380 m depth for the period 1 September–31 August. In addition, the majority of the waters < ca. 200 m depth are closed to trawlers and are mainly utilized by longliners.

Changes in fishing technology and fishing patterns

The effort management system can lead to improvement of fishing technology efficiency. Presently, ICES is not able to quantify these changes.

Uncertainties in assessment and forecast

Recent years have revealed a consistent retrospective pattern of overestimating SSB and underestimating F . This bias seems to be small in the most recent years, however.

Comparison with previous assessment and advice

This year's assessment shows that the 2011 assessment overestimated the 2010 recruitment by around 30%, underestimated the fishing mortality in 2010 by 8%, and overestimated the 2010 total and spawning-stock biomasses by 15% and 12%, respectively.

The advice last year was for no directed fishery on haddock in 2012, based on the precautionary approach, and to minimize bycatches in other fisheries. This year's advice is based on the MSY approach.

Source

ICES. 2012. Report of the North-Western Working Group. 26 April–3 May 2012. ICES CM 2012/ACOM:07.

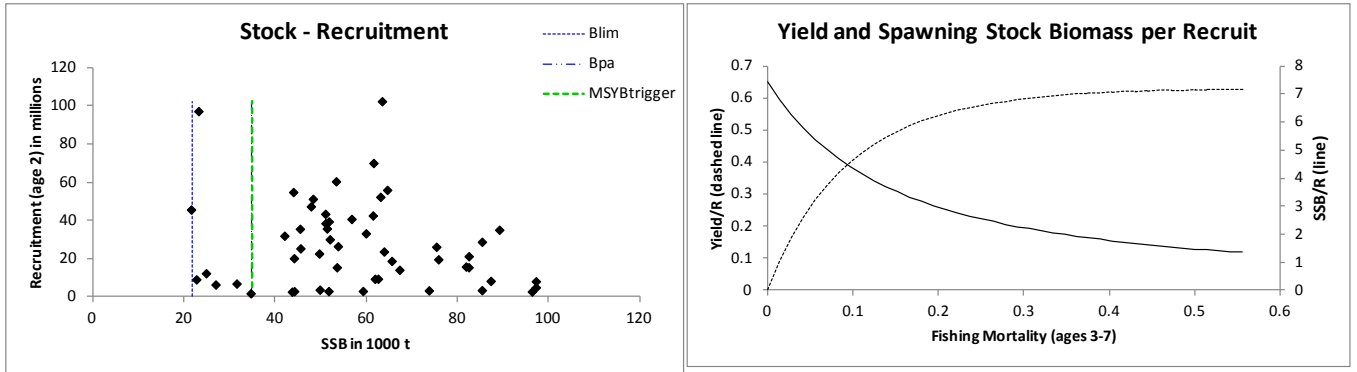


Figure 4.4.3.3 Haddock in Division Vb. Stock–recruitment and yield- and spawning-stock biomass-per-recruit plots.

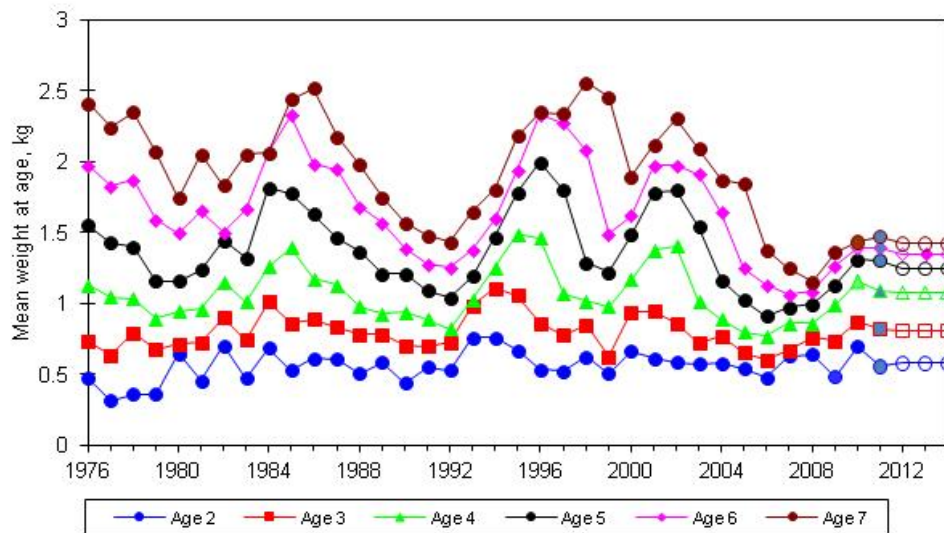


Figure 4.4.3.4 Haddock in Division Vb. Mean weights-at-age (2–7). The 2012–2014 values are the ones used in the short-term prediction (open symbols).

Table 4.4.3.1 Haddock in Division Vb. ICES advice, management, and catches.

Fishing Year	ICES Advice	Predicted catch corresp. to advice	Agreed TAC	ICES Catch
1987	No increase in F	17		14.9
1988	No increase in F	18		12.2
1989	No increase in F	11		14.3
1990	No increase in F	11		11.7
1991	TAC	11		8.4
1992	TAC	13–15		5.5
1993	Reduction in F	8		4.0
1994	No fishing	0	6.2	4.3
1995	No fishing	0	6.2	4.9
1996	TAC	8.3	12.6	9.6
1997	F= F(95)	9.3		17.9
1998	F =F(96)	16		22.2
1999	F < proposed F_{pa} (0.25)	9		18.5
2000	F < proposed F_{pa} (0.25)	22		15.8
2001	F < proposed F_{pa} (0.25)	20		15.9
2002	No fishing	0		24.9
2003	F<proposed F_{pa} (0.25)	12		26.9
2004	F<proposed F_{pa} (0.25)	21		23.1
2005	F<proposed F_{pa} (0.25)	19		20.3
2006	F<proposed F_{pa} (0.25)	18		17.2
2007	F < 0.20	16		12.6
2008	F_{pa}	14		7.3
2009	No fishing and recovery plan	0		5.2
2010	No fishing and recovery plan	0		5.2
2011	No direct fishing; minimize by-catch, implement recovery plan	0		3.5
2012	No direct fishing; minimize by-catch, implement recovery plan	0		
2013	No direct fishing; minimize by-catch, implement recovery plan	0		

Fishing year: 1 September–31 August the following year.

Weights in thousand tonnes.

Table 4.4.3.2 Haddock in **Division Vb₁** only. Official catches (tonnes) by country, and ICES estimates.

Faroe Plateau (Sub-division Vb1) HADDOCK. Nominal catches (tonnes) by countries
2000-2011 and Working Group estimates in Vb.

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011 ²
Faroe Islands	13,620	13,457	20,776 ⁸	21,615	18,995	18,172	15,600	11,689	6,728	4,895	4,932	3,299
France ¹	6	8	2	4	1	+	12 ⁷	4 ⁷	3 ⁷	2 ⁷	1	3
Germany	1	2	6	1	6		1					
Greenland	22	0	4 ⁶				1	9 ⁵		6 ⁷	12	+ ⁶
Iceland			4									
Norway	355	257	227	265	229	212	57	61	26	8	5	
Russia					16				10			
Spain					49							
UK (Engl. and Wt)	19	4	11 ⁷	14	8	1	1					
UK (Scotland) ¹¹				185	186	126	106	35	60	64		
United Kingdom											73	
Total	14,023	13,728	21,030	22,084	19,490	18,511	15,778	11,798	6,827	4,975	5,023	3,302
Working Group e:	15,821	15,890	24,933	27,072	23,101	20,455	17,154	12,631	7,388	5,197	5,202	3,489

1) Including catches from Sub-division Vb2. Quantity unknown 1989-1991, 1993 and 1995-2001.

2) Preliminary data

3) From 1983 to 1996 catches included in Sub-division Vb2.

4) Includes catches from Sub-division Vb2 and Division IIa in Faroese waters.

5) Includes French and Greenlandic catches from Division Vb, as reported to the Faroese coastal guard service

6) Reported as Division Vb, to the Faroese coastal guard service.

7) Reported as Division Vb.

8) Includes Faroese landings reported to the NWWG by the Faroe Marine Research Institute

9) Included in Vb2

10) Includes 14 reported as Vb

∞ **Table 4.4.3.3** Haddock in **Division Vb₂** only. Official catches (tonnes) by country, and ICES estimates.

Faroe Bank (Sub-division Vb2) HADDOCK. Nominal catches (tonnes) by countries, 2000-2011.

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011 ²
Faroe Islands	1,565 ³	1,948	3,698	4,934	3,594	2,444	1,375	810	556	192	178	187
France ¹						+						
Norway	48	66	28	54	17	45	1	8		3	1	
UK (Engl. and Wales)	:	:	:	:	:	1						
UK (Scotland) ³	185	148	177	4	:	4		15	5	27 ⁴		
Total	1,798	2,162	3,903	4,988	3,611	1,944	1,376	833	561	222	179	187

1) Catches included in Sub-division Vb1.

2) Provisional data

3) From 1983 to 1996 includes also catches taken in Sub-division Vb1 (see Table 2.4.1)

4) Reported as Division Vb.

5) Provided by the NWWG

Table 4.4.3.4

Haddock in Division Vb. Summary of the assessment.

Year	Recruitment Age 2 thousands	SSB tonnes	Landings tonnes	Mean F Ages 3–7
1957	35106	51049	20995	0.490
1958	39212	51409	23871	0.627
1959	43417	48340	20239	0.569
1960	35763	51101	25727	0.710
1961	51279	47901	20831	0.562
1962	38537	52039	27151	0.650
1963	47362	49706	27571	0.700
1964	30110	44185	19490	0.475
1965	22644	45605	18479	0.526
1966	20203	44027	18766	0.528
1967	25356	42086	13381	0.403
1968	54852	45495	17852	0.437
1969	31975	53583	23272	0.485
1970	35600	59958	21361	0.476
1971	15457	63921	19393	0.456
1972	33213	63134	16485	0.396
1973	23703	61622	18035	0.290
1974	52334	64631	14773	0.220
1975	70058	75405	20715	0.179
1976	55975	89221	26211	0.247
1977	26194	96378	25555	0.387
1978	35103	97235	19200	0.278
1979	2784	85403	12424	0.155
1980	4944	81907	15016	0.177
1981	3491	75852	12233	0.181
1982	15837	56810	11937	0.330
1983	19622	51818	12894	0.265
1984	40773	53831	12378	0.228
1985	39446	62612	15143	0.276
1986	26497	65617	14477	0.223
1987	9446	67325	14882	0.264
1988	18780	61935	12178	0.200
1989	14140	51769	14325	0.285
1990	9408	43743	11726	0.272
1991	2990	34684	8429	0.274
1992	2677	26989	5476	0.210
1993	1826	23231	4026	0.187
1994	6425	21611	4252	0.205
1995	97217	22765	4948	0.226
1996	45689	49837	9642	0.319
1997	9126	82493	17924	0.372
1998	3730	82521	22210	0.528
1999	15468	63495	18482	0.449
2000	21245	53414	15821	0.274
2001	102408	61482	15890	0.282
2002	60463	85419	24933	0.298
2003	42574	97246	27072	0.453
2004	28798	87339	23101	0.406
2005	8130	73779	20455	0.367
2006	8325	59301	17154	0.343
2007	3343	44233	12631	0.308
2008	3030	31596	7388	0.216
2009	2941	24896	5197	0.242
2010	6928	19958	5202	0.330
2011	12339	15177	3489	0.261
2012	471	17958		
Average	27049	56001	16231	0.3548