4.4.3 Faroe haddock in ICES Division Vb

State of the stock

Spawning biomass in relation to precautionary limits	Fishing mortality in relation to precautionary limits	Fishing mortality in relation to highest yield	Fishing mortality in relation to agreed target	Comment
Increased risk	Harvested sustainable	Overfished	Below agreed target	

Based on the most recent estimates of SSB (in 2009) and fishing mortality (2008), ICES classifies the stock as being at risk of reduced reproductive capacity but being harvested sustainably. The fishing mortality in 2008 is estimated just below F_{pa}. SSB increased until 2003 as a result of strong recruitments, including the record-high 1999 year class, but has declined since. Recruitment of the year classes from 2003 onwards has been well below average.

Management objectives

The effort management system implemented in the Faroese demersal fisheries in Division Vb since 1996 aims at harvesting on average 33% of the haddock exploitable stock in numbers. This translates into an average F of 0.45, above the F_{pa} of 0.25. ICES considers this to be inconsistent with the precautionary approach.

Reference points

	Type	Value	Technical basis
Precautionary approach	B_{lim}	22 000 t	Lowest observed SSB
	B_{pa}	35 000 t	$B_{lim}e^{1.645\sigma}$, assuming a σ of about 0.3 to account for the uncertainties in the assessment.
	F_{lim}	0.40	2 × std. dev. above F_{pa}
	F_{pa}	0.25	F_{med} (1998) = 0.25.
Targets	F_y	~ 0.45	harvesting on average 33% of the exploitable stock in numbers.

(unchanged since 2007)

Yield and spawning biomass per Recruit F-reference points:

	Fish Mort Ages 3-7	Yield/R	SSB/R
Average last 3 years	0.29	0.62	2.56
Fmax			
F0.1	0.18	0.56	3.32
Fmed	0.30	0.62	2.53

Candidates for reference points consistent with high long-term yields and a low risk of depleting the productive potential of the stock are in the range of $F_{0.1}$–F_{pa}.

Single-stock exploitation boundaries

ICES advises on the basis of the precautionary approach to close the fishery in the fishing season 2009/2010 and to develop a recovery plan aimed at rapidly rebuilding the stock to above B_{pa} .

Exploitation boundaries in relation to existing management plans

The management objective implied in the effort management scheme is to achieve an average exploitation rate equivalent to a fishing mortality of 0.45, compared to the current estimate of 0.22 in 2008, and the average fishing mortality 1997-2008 of 0.36.

Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential, and considering ecosystem effects

The current fishing mortality, estimated at 0.22, and the average fishing mortality 1997-2008 of 0.36.
is above $F_{0.1}$ (0.18).

Exploitation boundaries in relation to precautionary limits

Given the recent poor recruitment and slow growth and the rapidly declining SSB, the forecast indicates that even a zero fishing mortality in 2010 will not result in getting the stock above B_{pa} in 2011. ICES recommends to close the fishery in the fishing season 2009/2010 and to develop a recovery plan aimed at rapidly rebuilding the stock to above B_{pa}

Short-term implications

Outlook for 2010

Basis: F(2009) = F(2006–2008) rescaled to 2008 = 0.22 ; SSB(2009) = 27 ; SSB(2010) = 23; catch (2009) = 6 .

Rationale	**F (2010)**	**Basis**	**Landings 2010**	**SSB (2011)**	**%SSB change [1)]**
Zero catch	0,00	F=0	0	28	21
Management target reference point	**0,45**	F_{target}	9	18	-20
Status quo	**0,22**	F_{sq}	5	22	-2
High long-term yield	0,18	F(long-term yield) $F_{0.1}$	4	23	1
Average under current man. system	0,36	Avg. F(1997-2008)	8	20	-13
Precautionary limits	0,03	$F(F_{pa})$* 0.1	1	27	18
	0,06	$F(F_{pa})$* 0.25	2	26	14
	0,13	$F(F_{pa})$* 0.5	3	25	7
	0,19	$F(F_{pa})$* 0.75	4	23	1
	0,23	$F(F_{pa})$* 0.90	5	22	-3
	0,25	F_{pa}	6	22	-5
	0,28	$F(F_{pa})$* 1.1	6	21	-7
	0,31	$F(F_{pa})$* 1.25	7	21	-10

Weights in ‘000 t. Shaded scenarios are not considered consistent with the precautionary approach.
[1)] SSB 2011 relative to SSB 2010.

Management considerations

SSB increased until 2003 as a result of strong recruitments, including the record-high 1999 year-class. Recruitment of the year-classes 2003 onwards have all been well below average. Individual fish growth has been low in recent years (Figure 4.4.3.4). As a result, SSB is estimated to have declined rapidly to below B_{pa} in 2008, and is predicted to stay below B_{pa} even in the absence of fishing. Fishing mortality does not appear to be the major driver for the decline in the stock. Despite this, the advice for haddock is the same as for the Plateau cod and applies to the same fleets. ICES advises to close the haddock fisheries; this advice must also include all fleets presently not in the fishing days regulations, e.g. the single trawlers. Moreover, ICES recommends a rebuilding plan. A rebuilding plan should take into account that haddock is a by-catch in the saithe trawl fishery and that haddock and cod are caught together in longline fisheries. The advice for saithe is not as restrictive as for haddock (and cod). There can be a fishery for saithe, whereas the fishery for haddock (and cod) should be kept to a minimum. The only way to achieve this goal in the effort management system would be to close more areas for haddock and cod fishing and for a longer time than currently, preferably year-round. A recovery plan should include monitoring the trajectory of the stock, clearly stating specified reopening criteria, and monitoring the fishery when it is reopened

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 on 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 is 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. Also, the ever increasing efficiency in an effort system needs to be carefully monitored.

Factors affecting the fisheries and the stock

Regulations and their effects

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

Changes in fishing technology and fishing patterns

The effort management system invites improvement of fishing technology and fishing patterns. Presently, ICES is not able to quantify these changes.

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. The indices of primary production has been low since 2002 except for 2004 and 2008 when it was estimated above average. The estimate of the primary production in 2009 will not be available until July but preliminary estimates suggest it to be higher than in 2008. It will have little effect on the spawning biomass in 2011, but more effect on the total biomass. The above average primary production may also be responsible for the estimated low fishing mortality in 2008 since most of the haddock catches are taken by longlines, and it has been demonstrated that the primary production and the catchability of longlines are negatively correlated. This may also apply for 2009.

Scientific basis

Data and methods

The advice is based on an analytical assessment (XSA) using age-disaggregated indices from two research surveys. Recruitment estimates were available from the surveys.

No estimates of discards of haddock are available, but it is assumed that there is no strong incentive to discard in order to high-grade landings as quotas are not used in the management of this stock. Additionally, there is a ban on discarding. Hence, the landings statistics are regarded as reflecting the true level of catch and are considered to be appropriate for assessment purposes.

Uncertainties in assessment and forecast

The information used for the assessment is considered to be of high quality. In the estimation of F and SSB is in recent years a consistent retrospective pattern overestimating SSB and underestimating F. Mean weight-at-age used in the short term prediction may well be optimistic, but information from surveys suggest that the reduction in growth is reversed.

Comparison with previous assessment and advice

This year's assessment confirms the trends in fishing mortality and SSB as seen in last year's assessment (Figure 4.4.3.3). SSB in 2008 has been revised 23% downward and F in 2007 has been revised 13% upward. This year the advice is the same as that given last year for no fishing and the development of a recovery plan because the continued low recruitment is forecasted to lead SSB towards B_{lim} in 2010.

Source of information

Report of the North-Western Working Group, 29 April – 5 May 2009 (ICES CM 2009/ACOM:04).

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		27.1
2004	F<proposed F_{pa} (0.25)	21		23.3
2005	F<proposed F_{pa} (0.25)	19		20.3
2006	F<proposed F_{pa} (0.25)	18		17.0
2007	F < 0.20	16		12.6
2008	F_{pa}	14		7.6
2009	No fishing and recovery plan	0		
2010	No fishing and recovery plan	0		

Fishing year: 1 September–31 August the following year
Weights in ‘000 t.

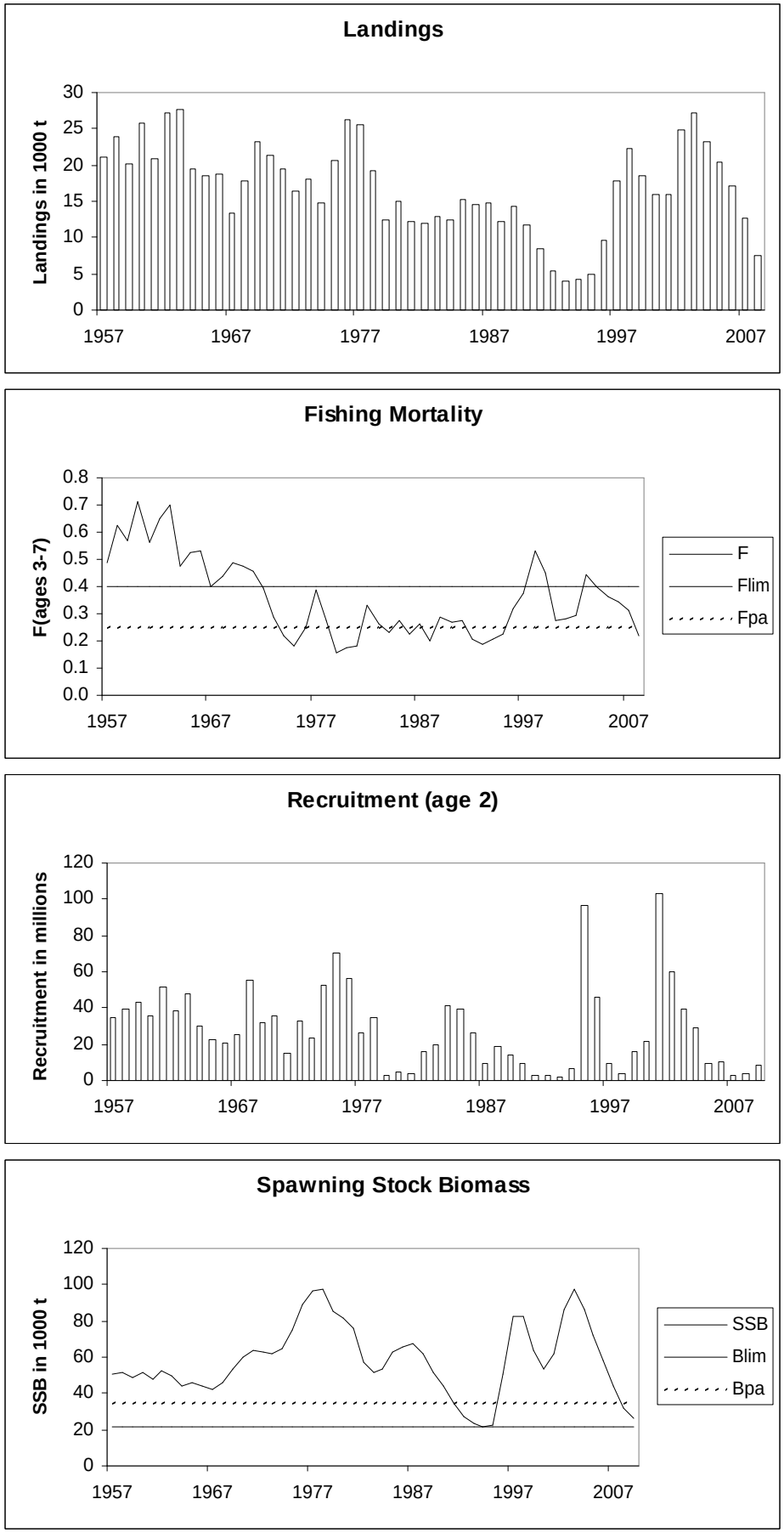
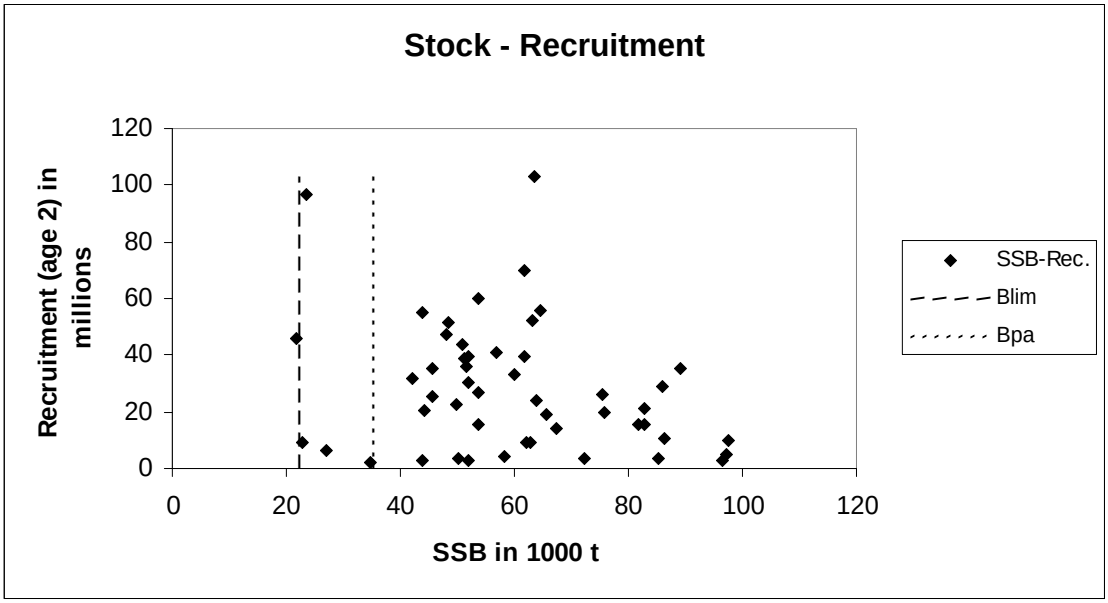
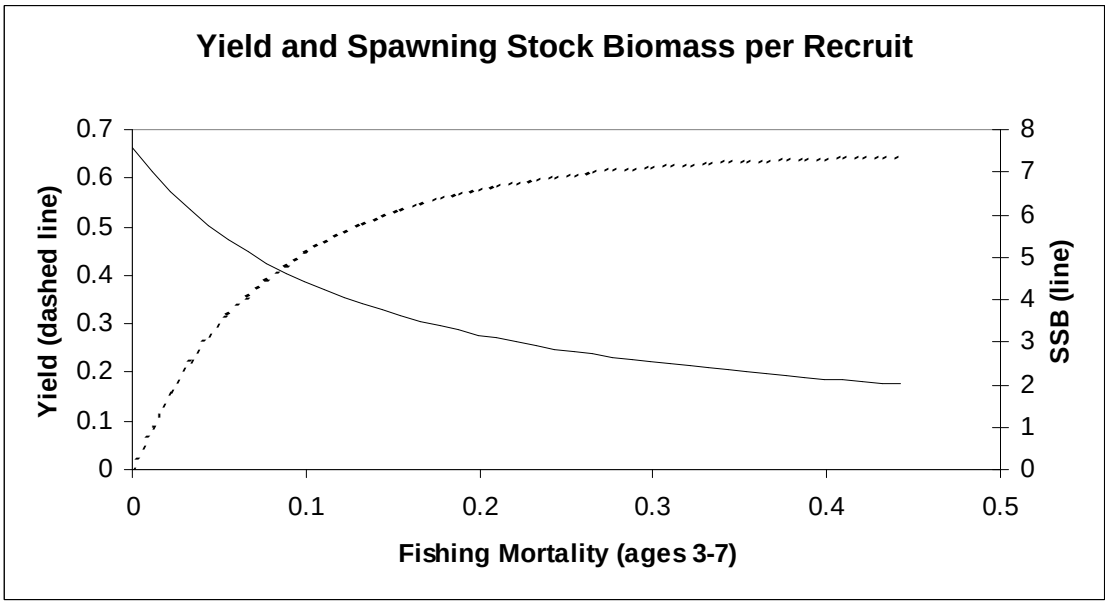


Figure 4.4.3.1 Faroe haddock (Division Vb). Landings, recruitment, fishing mortality, and SSB.





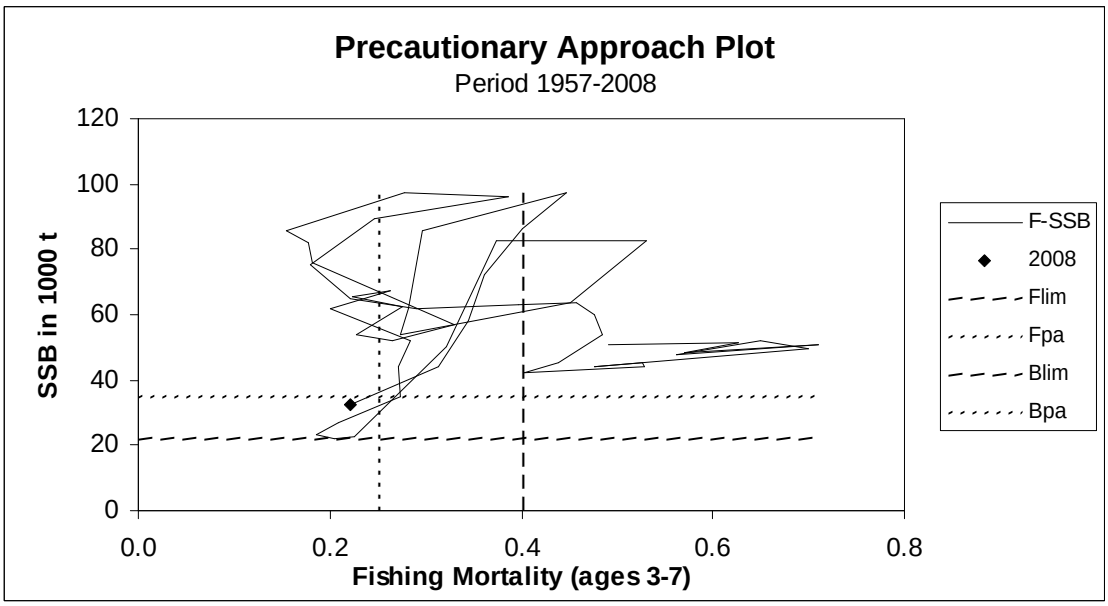


Figure 4.4.3.2 Faroe haddock (Division Vb). Stock and recruitment, yield, and SSB per recruit

Table 4.4.3.1 Faroe haddock (Division Vb).

Year	Recruitment Age 2 thousands	SSB tonnes	Landings tonnes	Mean F Ages 3-7
1957	35106	51049	20995	0.4900
1958	39212	51409	23871	0.6270
1959	43417	48340	20239	0.5696
1960	35763	51101	25727	0.7101
1961	51279	47901	20831	0.5624
1962	38537	52039	27151	0.6506
1963	47362	49706	27571	0.7002
1964	30110	44185	19490	0.4753
1965	22644	45605	18479	0.5260
1966	20203	44027	18766	0.5288
1967	25356	42086	13381	0.4031
1968	54852	45495	17852	0.4377
1969	31976	53583	23272	0.4853
1970	35601	59958	21361	0.4762
1971	15457	63921	19393	0.4564
1972	33213	63135	16485	0.3962
1973	23703	61623	18035	0.2902
1974	52335	64632	14773	0.2206
1975	70063	75408	20715	0.1799
1976	55980	89225	26211	0.2475
1977	26197	96385	25555	0.3873
1978	35107	97245	19200	0.2781
1979	2785	85415	12424	0.1551
1980	4945	81920	15016	0.1779
1981	3492	75867	12233	0.1813
1982	15841	56823	11937	0.3307
1983	19633	51833	12894	0.2652
1984	40799	53854	12378	0.2283
1985	39499	62649	15143	0.2758
1986	26529	65675	14477	0.2235
1987	9462	67407	14882	0.2638
1988	18807	62030	12178	0.2005
1989	14280	51869	14325	0.2844
1990	9440	43873	11726	0.2715
1991	2979	34852	8429	0.2729
1992	2668	27151	5476	0.2088
1993	1825	23384	4026	0.1861
1994	6401	21759	4252	0.2043
1995	96505	22904	4948	0.2264
1996	45757	50162	9642	0.3207
1997	9064	82728	17924	0.3743
1998	3747	82670	22210	0.5310
1999	15562	63612	18482	0.4521
2000	21382	53581	15821	0.2732
2001	102864	61823	15890	0.2816
2002	59665	85960	24933	0.2962
2003	39712	97536	27128	0.4462
2004	29251	86462	23287	0.4000
2005	9533	72287	20305	0.3612
2006	10240	58369	17082	0.3450
2007	3275	44356	12656	0.3141
2008	3990	32312	7582	0.2213
2009	8906	26543		
Average	28345	58221	16905	0.3591

Haddock in Division Vb

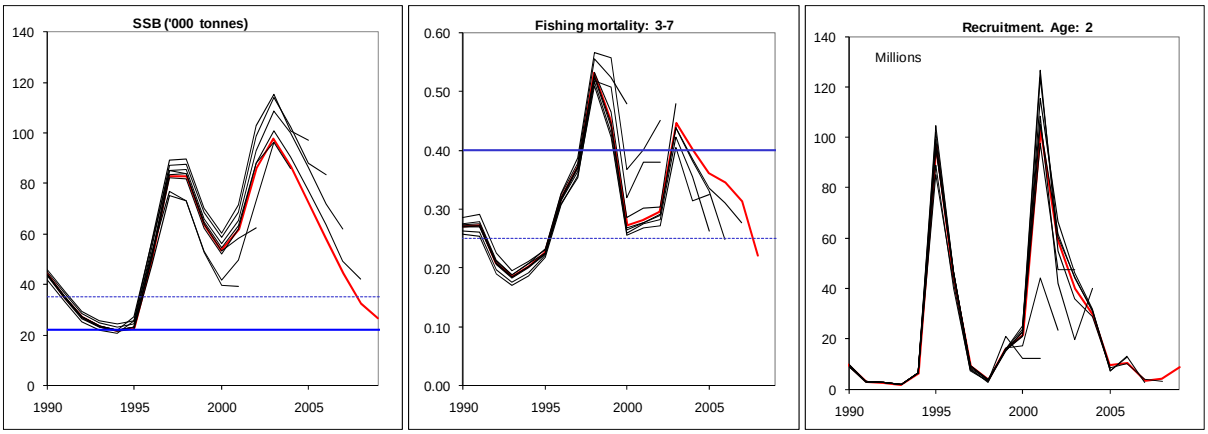


Figure 4.4.3.3 Faroe haddock (Division Vb). Historical performance of the assessment.

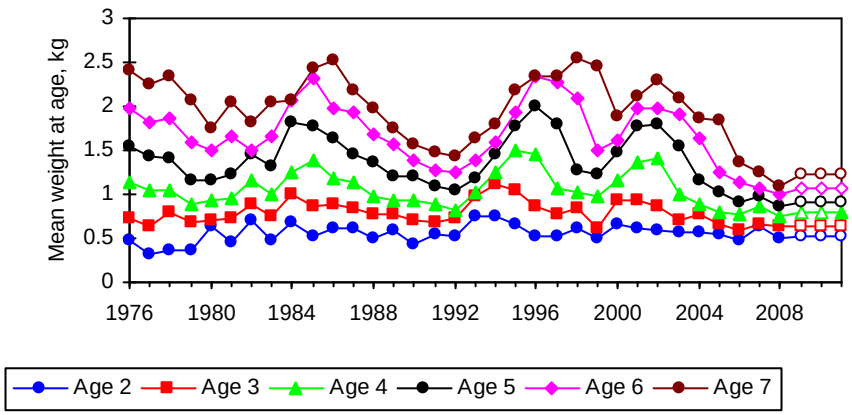


Figure 4.4.3.4 Faroe haddock (Division Vb). Mean weights-at-ages 2–7. 2009–2011 are predicted values used in the short-term prediction.

Table 4.4.3.2

Faroe Plateau (Sub-division Vb1) HADDOCK. Nominal catches (tonnes) by countries
1982-2008, I.e. Working Group estimates in Vb1.

Country	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Denmark	-	-	-	-	1	8	4	-	-	-			
Faroe Islands	10,319	11,898	11,418	13,597	13,359	13,954	10,867	13,506	11,106	8,074	4,655	3,622	3,675
France[1]	2	2	20	23	8	22	14	-	-	-	164	-	
Germany	1	+	+	+	1	1	-	+	+	+		-	
Norway	12	12	10	21	22	13	54	111	94	125	71	28	22
UK (Engl. and Wales)	-	-	-	-	-	2	-	-	7	-	54	81	31
UK (Scotland)[3]	1	-	-	-	-	-	-	-	-	-	-	-	
United Kingdom													
Total	10,335	11,912	11,448	13,641	13,391	14,000	10,939	13,617	11,207	8,199	4,944	3,731	5,722
Working Group estimate[4,5]	11,937	12,894	12,378	15,143	14,477	14,882	12,178	14,325	11,726	8,429	5,476	4,026	4,252

Country	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004 #	2005	2006	2007	2008 [2]
Faroe Islands	4,549	9,152	16,585	19,135	16,643	13,620 [8]	13,457 [8]	20,776 [8]	21,615	18,995	18,022	15,600	11,688	7,119
France[1]				2 [2,7]	- [2]	6	8 [7]	2	4	1 [5]	+	12 [7]	4 [7]	1 [7]
Germany	5	-	-		33	1	2	6	1	6		1		
Greenland					30 [6]	22 [6]	0 [6]	4 [6]				1	13 [5]	
Iceland								4						
Norway	28	45	45	71	411	355	257 [2]	227	265	229	212	57	61	26
Russia										16				10 [7]
Spain										49				
UK (Engl. and Wales)	23	5	22	30 [1]	59 [7]	19 [7]	4 [7]	11 [7]	14 [7]	8 [7]	1 [7]	1 [7]		
UK (Scotland)[11]	-	…	…	…					185 [7]	186 [7]	126 [7]	106 [7]	35 [7]	
United Kingdom														65 [7]
Total	4,605	9,202	16,652	19,238	17,176	14,023	13,728	21,030	22,084	19,490	18,361	15,778	11,801	7,221
Working Group estimate[4,5,8]	4,948	9,642	17,924	22,210	18,482	15,821	15,890	24,933	27,128	23,287	20,305	17,082	12,656	7,582

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 Faroese Fisheries Laboratory

9) Included in Vb2

10) Includes 14 reported as Vb

Table 4.4.3.3.

Faroe Bank (Sub-division Vb2) HADDOCK. Nominal catches (tonnes) by countries,
1982-2008, I.e. Working Group estimates in Vb2.

Country	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Faroe Islands	1,533	967	925	1,474	1,050	832	1,160	659	325	217	338	185	353
France1	-	-	-	-	-	-	-	-	-	-	-	- -	
Norway	1	2	5	3	10	5	43	16	97	4	23	8	1
UK (Engl. and Wales)	-	-	-	-	-	-	-	-	-	-	+	+ +	
UK (Scotland)3	48	13	+	25	26	45	15	30	725	287	869	102	170
Total	1,582	982	930	1,502	1,086	882	1,218	705	1,147	508	1,230	295	524

Country	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008 [2]
Faroe Islands	303	338	1,133	2,810	1,110	1,565 [5]	1,948	3,698	4,804	3,594	1,899	1,412	832	361
France1	-	-	-								+			
Norway	1	40	4	60	3	48	66	28	54	17	45	1	8	
UK (Engl. and Wales)	... [1]	… [1]	… [1]	… [1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[4]	[4]	
UK (Scotland)3	39	62	135	102	193	185	148	177	[4]	[1]	[4]	[4]	15	
Total	343	440	1,272	2,972	1,306	1,798	2,162 1	3,903	5,044	3,797	1,944	1,304	855	361

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