

## 4.4

## Stock Summaries

### 4.4.1

### Advice June 2011

#### ECOREGION

Faroe Plateau Ecosystem

#### STOCK

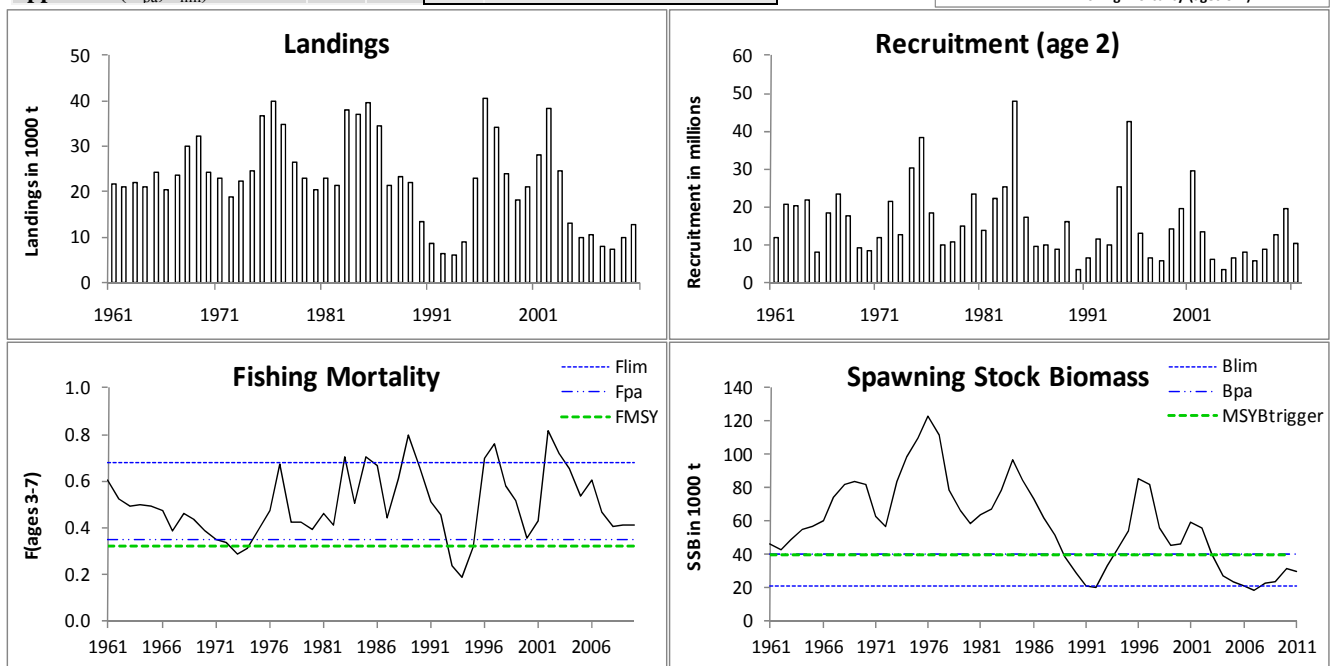
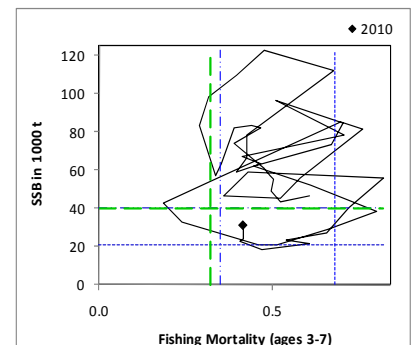
Cod in Subdivision Vb<sub>1</sub> (Faroe Plateau)

#### Advice for 2012

ICES advises on the basis of the MSY approach to reduce fishing mortality by 30% in 2012.

#### Stock status

F (Fishing Mortality)			
	2008	2009	2010
MSY ( $F_{MSY}$ )	✗	✗	✗ Above target
Precautionary approach ( $F_{pa}, F_{lim}$ )	○	○	○ Increased risk
SSB (Spawning Stock Biomass)			
	2009	2010	2011
MSY ( $B_{trigger}$ )	✗	✗	✗ Below trigger
Precautionary approach ( $B_{pa}, B_{lim}$ )	○	○	○ Increased risk



**Figure 4.4.1.1** Cod in Subdivision Vb<sub>1</sub> (Faroe Plateau). Summary of stock assessment (weights in '000 tonnes). Top right: SSB and F over the years.

SSB has shown some increase after reaching a historical minimum in 2007, but remains below MSY  $B_{trigger}$ . Fishing mortality has decreased since 2002 and is now between  $F_{lim}$  and  $F_{pa}$ , but still above  $F_{MSY}$ . The 2008 year class is estimated to be above average.

#### Management plans

There is no explicit management plan for this stock.

## Biology

Recent work suggests that cannibalism is a controlling factor of recruitment. In periods with low ecosystem productivity, the individual growth of cod is slow, and some of them move into the nearshore nursery areas of 1-group cod, which hampers the recruitment of 2-year-old cod the following year.

### Environmental influence on the stock

The productivity of the Faroe Shelf ecosystem is important to the cod stock and recruitment depends both on the stock size and on the productive state of the Faroe Shelf ecosystem. The indices of primary production have been low since 2002 except for 2004 and 2008–2010, when it was estimated to be above average.

The individual growth of cod also depends on the productivity in the outer areas of the Faroe Plateau because cod growth is highly correlated with the ratio of total phytoplankton production to total fish biomass (cod+haddock+saithe) on the Faroe Plateau, i.e. “food per fish”. Phytoplankton production in the outer areas of the Faroe ecosystem (water depth 130–500 m) has stayed above average since 2000.

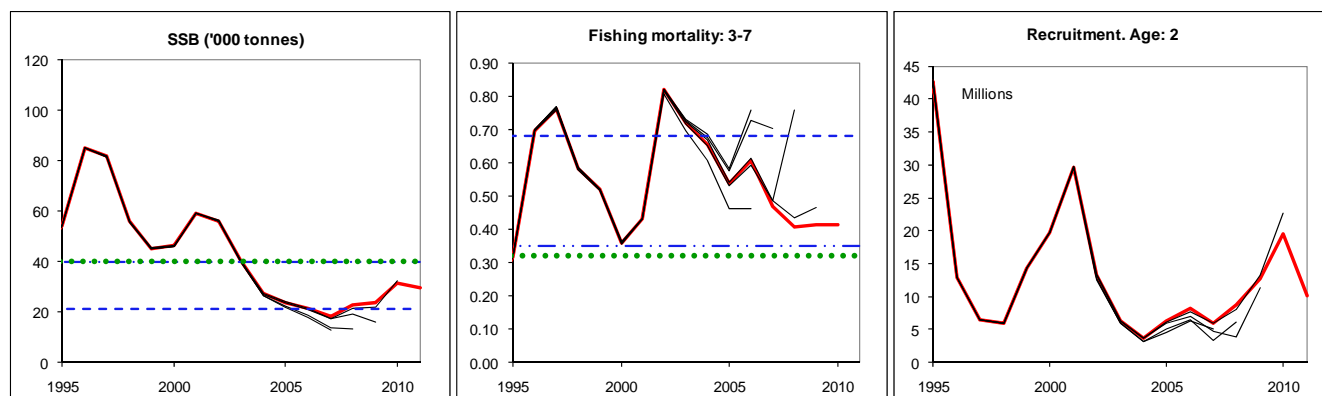
### The fisheries

Cod are mainly taken in a directed cod and haddock fishery with longlines, in a directed jigging fishery, and as bycatch in the trawl fishery for saithe.

<b>Catch by fleet</b>	Total catch (2010) = 13 kt, where 69% were taken by longlines, 13% by jigging, and 18% by trawls.
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### Quality considerations

The landing 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. Estimates of  $F$  in the terminal year have varied considerably.



**Figure 4.4.1.2** Cod in Subdivision Vb<sub>1</sub> (Faroe Plateau). Historical assessment results (final year recruitment estimates included).

### Scientific basis

<b>Assessment type</b>	XSA using landings-at-age data and age-disaggregated indices.
<b>Input data</b>	Two survey indices (spring and summer survey).
<b>Discards and bycatch</b>	There are no discard data, but discarding is not considered to be a major problem in this fishery.
<b>Indicators</b>	None.
<b>Other information</b>	None.
<b>Working group report</b>	<a href="#">NWWG</a>

**ECOREGION** Faroe Plateau Ecosystem  
**STOCK** Cod in Subdivision Vb<sub>1</sub> (Faroe Plateau)

**Reference points**

	<i>Type</i>	<i>Value</i>	<i>Technical basis</i>
MSY Approach	MSY B <sub>trigger</sub>	40 000 t	B <sub>pa</sub> .
	F <sub>MSY</sub>	0.32	Provisional maximum sustainable yield, FLR stochastic simulations.
Precautionary Approach	B <sub>lim</sub>	21 000 t	Lowest observed SSB (1998 assessment).
	B <sub>pa</sub>	40 000 t	B <sub>lim</sub> e <sup>1.645σ</sup> , assuming a σ of about 0.40 to account for the relatively large uncertainties in the assessment.
	F <sub>lim</sub>	0.68	F <sub>pa</sub> e <sup>1.645σ</sup> , assuming a σ of about 0.40 to account for the relatively large uncertainties in the assessment.
	F <sub>pa</sub>	0.35	Close to F <sub>max</sub> (0.34) and F <sub>med</sub> (0.38) (1998 assessment).

(unchanged since: 2011)

*Yield and spawning biomass per Recruit F-reference points (2011):*

	Fish Mort Ages 3–7	Yield/R	SSB/R
Average last 3 years	0.41	1.41	3.80
F <sub>max</sub>	0.24	1.45	5.97
F <sub>0.1</sub>	0.11	1.30	9.86
F <sub>med</sub>	0.41	1.41	3.80

**Outlook for 2012**

Basis: F (2011) = F (2008–2010) = 0.41; SSB (2012) = 36 ; R (2011) = 10 million; landings (2011) = 17.

<b>Rationale</b>	<b>F (2012)</b>	<b>Landings (2012)<sup>2)</sup></b>	<b>Basis</b>	<b>SSB (2013)</b>	<b>%SSB change<sup>1)</sup></b>
MSY framework	0.29	10	$F_{MSY} * SSB_{2012}/B_{trigger}$ $= F_{sq} * 0.7$	39 %	7 %
Precautionary Approach	0.35	12	F <sub>pa</sub> (=F <sub>sq</sub> *0.85)	37 %	2 %
Zero catch	0	0	F=0	49 %	34 %
<i>Status quo</i>	0.41	14	F <sub>sq</sub>	36 %	1 %
	0.21	8	F <sub>sq</sub> * 0.50	42 %	14 %
	0.31	11	F <sub>sq</sub> * 0.75	38 %	5 %
	0.32	11	F <sub>MSY</sub> = F <sub>sq</sub> * 0.78	38 %	4 %
	0.37	13	F <sub>sq</sub> * 0.90	37 %	1 %
	0.45	15	F <sub>sq</sub> * 1.1	35 %	-5 %

Weights in '000 t.

<sup>1)</sup> SSB 2013 relative to SSB 2012.

<sup>2)</sup> Landings 2012 relative to TAC 2011.

**Management plan**

No explicit management plan exists for this stock. A management system based on number of fishing days, closed areas and other technical measures was introduced in 1996 with the purpose of ensuring sustainable demersal fisheries in Division Vb. This was before ICES introduced PA and MSY reference values, and at the 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 cod exploitable stock in numbers would be harvested annually. This translates into an average F of 0.45, above the F<sub>pa</sub> of 0.35. ICES considers this to be inconsistent with the PA and MSY approaches. Work is ongoing in the Faroes to move away from the F<sub>target</sub> of 0.45 in order to be consistent with the ICES advice.

**MSY approach**

ICES advises on the basis of the MSY approach to reduce fishing mortality by 30% in 2012 to 0.29. This is 10% below F<sub>MSY</sub>, because SSB in 2012 is 10% below MSY B<sub>trigger</sub>.

## ***PA approach***

The fishing mortality should be kept below an  $F_{pa}$  of 0.35. This translates into a reduction in fishing mortality by 15% as compared to the average of last 3 years (0.41).

## **Additional considerations**

### *Management considerations*

The present estimate of  $F_{MSY}$  should be regarded as provisional. Simulation studies that take the productivity of the ecosystem into account have been tried but this model is still under development.

Fishing mortalities have been well above  $F_{pa}$  since 1996 and were estimated to be above  $F_{lim}$  in 2003 and 2004. Fishing mortality has declined since then but is still above  $F_{pa}$  and should be reduced by 30% to below  $F_{MSY}$ . The SSB estimated in 2007 was the lowest in the time-series, but has since increased and is now estimated to be between  $B_{lim}$  and  $B_{pa}$ . Given the poor state of the Faroe haddock, measures should be taken to reduce catches of haddock while still allowing a cod fishery, e.g. closure of areas with high abundance of haddock.

One of the expected benefits 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. However, low prices on saithe and haddock and high prices for cod have kept the fishing mortality high on cod; the economic factors seem to be more important than the relative abundance of the stocks in determining which species is targeted. When considering future management, protection mechanisms should be included to ensure that appropriate action is taken when one or more stocks or fisheries develop in an unfavourable way.

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 cod production and increase the catchability of longline gear. Also, the ever-increasing efficiency in an effort system needs to be carefully monitored.

### *Regulations and their effects*

An effort management system was implemented 1st of 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 for trawling, and are mainly utilized by longliners. The main spawning areas for cod are closed for nearly all fishing gears during spawning time.

### *Changes in fishing technology and fishing patterns*

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

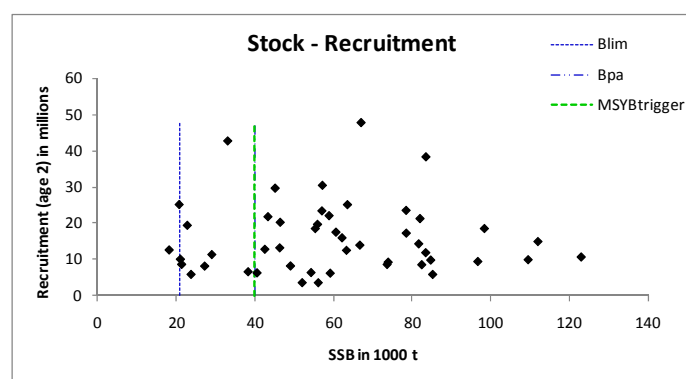
### *Comparison with last year's assessment and advice*

The perception of the stock in this year's assessment is similar to that estimated in last year's assessment.

The advice in 2010 was to minimize haddock catches while allowing a fishery for cod. The advice this year aims to optimize cod catches according to the MSY approach.

## **Sources**

ICES. 2011. Report of the North-Western Working Group, 26 April–3 May 2011. ICES CM 2011/ACOM:07.



**Figure 4.4.1.1** Cod in Subdivision Vb<sub>1</sub> (Faroe Plateau). Stock–recruitment plot.

**Table 4.4.1.1** Cod in Subdivision Vb<sub>1</sub> (Faroe Plateau). ICES advice, management, and landings.

Fishing Year	ICES Advice	Predicted catch corresp. to advice	Agreed TAC	ICES Landings
1987	No increase in F	<31		21.4
1988	No increase in F (Revised estimate)	<29 (23)		23.2
1989	No increase in F	<19		22.1
1990	No increase in F	<20		13.5
1991	TAC	<16		8.8
1992	No increase in F	<20		6.4
1993	No fishing	0		6.1
1994	No fishing	0	8.5/12.5 <sup>1,2</sup>	9.0
1995	No fishing	0	12.5 <sup>1</sup>	23.0
1996	F at lowest possible level	-	20 <sup>2</sup>	40.4
1997	80% of F(95)	<24	-	34.3
1998	30% reduction in effort from 1996/97	-	-	24.0
1999	F less than proposed F <sub>pa</sub> (0.35)	<19		18.3
2000	F less than proposed F <sub>pa</sub> (0.35)	<20		21.0
2001	F less than proposed F <sub>pa</sub> (0.35)	<16		28.2
2002	75% of F(2000)	<22		38.5
2003	75% of F(2001)	<32		24.5
2004	25% reduction in effort	-		13.2
2005	Rebuilding plan involving large reduction	-		9.9
2006	Rebuilding plan involving large reduction	-		10.5
2007	Rebuilding plan involving large reduction in effort	-		8.1
2008	No fishing. Development of a rebuilding plan.	0		10.5
2009	No fishing. Development of a rebuilding plan.	0		
2010	No fishing. Development of a rebuilding plan.	0		
2011	Reduce F to below F <sub>pa</sub>	<16		
2012	MSY framework, reduce F by 30%	<10		

Fishing year: 1 September–31 August the following year

Weights in '000 t.

<sup>1)</sup> In the quota year 1 September–31 August the following year.

<sup>2)</sup> The TAC was increased during the quota year.

**Table 4.4.1.2** Faroe Plateau cod (Subdivision Vb<sub>1</sub>). Nominal catch statistics (in tonnes) per country.

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Denmark	8	30	10	-	-	-	-	-	-	-	-	-	-
Faroe Islands	34,492	21,303	22,272	20,535	12,232	8,203	5,938	5,744	8,724	19,079	39,406	33,556	23,308
France	4	17	17	-	-	- <sup>1</sup>	3 <sup>2</sup>	1 <sup>2</sup>	-	2 <sup>2</sup>	1 <sup>2</sup>	-	- <sup>*</sup>
Germany	8	12	5	7	24	16	12	+	2 <sup>2</sup>	2	+	+	-
Norway	83	21	163	285	124	89	39	57	36	38	507	410	405
Greenland	-	-	-	-	-	-	-	-	-	-	-	-	-
UK (E/W/Nl)	-	8	-	-	-	1	74	186	56	43	126	61 <sup>2</sup>	27 <sup>2</sup>
UK (Scotland)	-	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	34,595	21,391	22,467	20,827	12,380	8,309	6,066	5,988	8,818	19,164	40,040	34,027	23,740

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010 <sup>*</sup>
Denmark	-	-	-	-	-	-	-	-	-	-	-	-
Faroe Islands	19,156	-	29,762	40,602	30,259	17,540	13,556	11,629	9,905	9,394	10,736	13,873
France	- <sup>*</sup>	1	9 <sup>2</sup>	20	14	2	-	7	1 <sup>2</sup>	1	1	1
Germany	39	2	9	6	7	3 <sup>2</sup>	-	1 <sup>2</sup>	-	-	-	-
Iceland	-	-	-	5	-	-	-	-	-	-	-	-
Norway	450	374	531 <sup>*</sup>	573	447	414	201	49	71	40	14	10
Greenland	-	-	-	-	-	-	-	5	7	-	7	-
Portugal	-	-	-	-	-	1	-	-	-	-	-	-
UK (E/W/Nl) <sup>2</sup>	51	18	50	42	15	15	24	1	3	-	-	-
UK (Scotland) <sup>1</sup>	-	-	-	-	-	-	-	-	358	383	300	-
United Kingdom	-	-	-	-	-	-	-	-	-	-	-	-
Total	19,696	395	30,361	41,248	30,742	17,975	13,781	11,692	10,345	9,818	11,058	13,884

\* Preliminary

<sup>1)</sup> Included in Vb2.<sup>2)</sup> Reported as Vb.**Table 4.4.1.3** Faroe Plateau cod (Subdivision Vb<sub>1</sub>). Officially reported catches as well as the corrections done to obtain the catches, which were used in the assessment.

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Officially reported	34,595	21,391	22,467	20,827	12,380	8,309	6,066	5,988	8,818	19,164	40,040	34,027	23,740
Faroe catches in IIA within Faroe area jurisdiction			715	1,229	1,090	351	154						
Expected misreporting/discard										3330			
French catches as reported to Faroese authorities				12	17								
Catches reported as Vb2:													
UK (E/W/Nl)					-	-	+	1	1	-	-	-	-
UK (Scotland)					205	90	176	118	227	551	382	277	265
Used in the assessment	34,595	21,391	23,182	22,068	13,487	8,750	6,396	6,107	9,046	23,045	40,422	34,304	24,005

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010 <sup>*</sup>
Officially reported	19,696	395	30,361	41,248	30,742	17,975	13,781	11,692	10,345	9,818	11,058	13,884
Faroe catches in Vb1		21,793 <sup>*</sup>										
Correction of Faroese catches in Vb1 <sup>1</sup>			-1,766	-2,409	-1,795	-1,041	-804	-690	-588	-557	-637	-823
Faroe catch on the Faroe-Iceland ridge	-1,600	-1,400	-700	-600	-4,700	-4,000	-4,200	-800	-1,800	-1,828	-487	-680
Greenland <sup>2</sup>									6		26	5
Russia <sup>2</sup>											4	
United Kingdom <sup>2</sup>												351
Catches reported as Vb2:												
UK (E/W/Nl)	-	-	-	-	-	-	-	-	-	-	-	-
UK (Scotland)	210	245	288	218	254	244	1,129	278	53	32	38	
United Kingdom												
Used in the assessment	18,306	21,033	28,183	38,457	24,501	13,178	9,906	10,480	8,016	7,465	10,002	12,737

<sup>\*</sup> Preliminary<sup>1)</sup> In order to be consistent with procedures used previous years.<sup>2)</sup> Reported to Faroese Coastal Guard.

Table 4.4.1.3

Faroe Plateau cod (Subdivision Vb<sub>1</sub>). Summary of the stock assessment.

Year	Recruitment	SSB	Landings	Mean F
	Age 2			Ages 3–7
	thousands	tonnes	tonnes	
1961	12019	46439	21598	0.6059
1962	20654	43326	20967	0.5226
1963	20290	49054	22215	0.4944
1964	21834	55362	21078	0.5017
1965	8269	57057	24212	0.4909
1966	18566	60629	20418	0.4743
1967	23451	73934	23562	0.3900
1968	17582	82484	29930	0.4642
1969	9325	83487	32371	0.4375
1970	8608	82035	24183	0.3882
1971	11928	63308	23010	0.3526
1972	21320	57180	18727	0.3358
1973	12573	83547	22228	0.2886
1974	30480	98434	24581	0.3139
1975	38319	109565	36775	0.3947
1976	18575	123077	39799	0.4749
1977	9995	112057	34927	0.6757
1978	10748	78497	26585	0.4259
1979	14997	66722	23112	0.4273
1980	23582	58886	20513	0.3945
1981	14000	63560	22963	0.4648
1982	22127	67031	21489	0.4138
1983	25156	78538	38133	0.7057
1984	47752	96758	36979	0.5082
1985	17311	84763	39484	0.7016
1986	9500	73657	34595	0.6695
1987	9896	62182	21391	0.4458
1988	8684	52041	23182	0.6089
1989	16021	38278	22068	0.8002
1990	3671	29027	13487	0.6605
1991	6679	21030	8750	0.5141
1992	11418	20713	6396	0.4580
1993	10127	33068	6107	0.2379
1994	25186	42530	9046	0.1863
1995	42711	54299	23045	0.3182
1996	12870	85267	40422	0.6961
1997	6456	81711	34304	0.7598
1998	5931	55932	24005	0.5808
1999	14370	45151	18306	0.5210
2000	19731	46314	21033	0.3588
2001	29699	59179	28183	0.4302
2002	13265	56132	38457	0.8183
2003	6272	40548	24501	0.7185
2004	3661	27204	13178	0.6563
2005	6371	23738	9906	0.5389
2006	8230	21345	10480	0.6072
2007	5957	18169	8016	0.4691
2008	8718	22787	7465	0.4051
2009	12685	23900	10002	0.4143
2010	19456	31404	12737	0.4148
2011	11403	29801		
Average	15828	58258	22778	0.4987

**ECOREGION**      **Faroe Plateau Ecosystem**  
**STOCK**            **Cod in Subdivision Vb<sub>2</sub> (Faroe Bank)**

**Advice for 2012**

New data on landings and indices from the two annual Faroese surveys (2010 summer, 2011 spring) do not change the perception of the stock since 2008 and do not give reason to change the advice from 2010. The advice for the fishery in 2012 is therefore the same as the advice given since 2008: *“Because of the very low stock size ICES advises that the fishery should be closed. Reopening the fishery should not be considered until both survey indices indicate a biomass at or above the average of the period 1996–2002”*.

*Management considerations*

The Bank has been closed to fishing since 1 January 2009. In 2010, however, a total of 61 fishing days was allowed to small longliners (<15 BRT) in the shallow waters of the Bank.

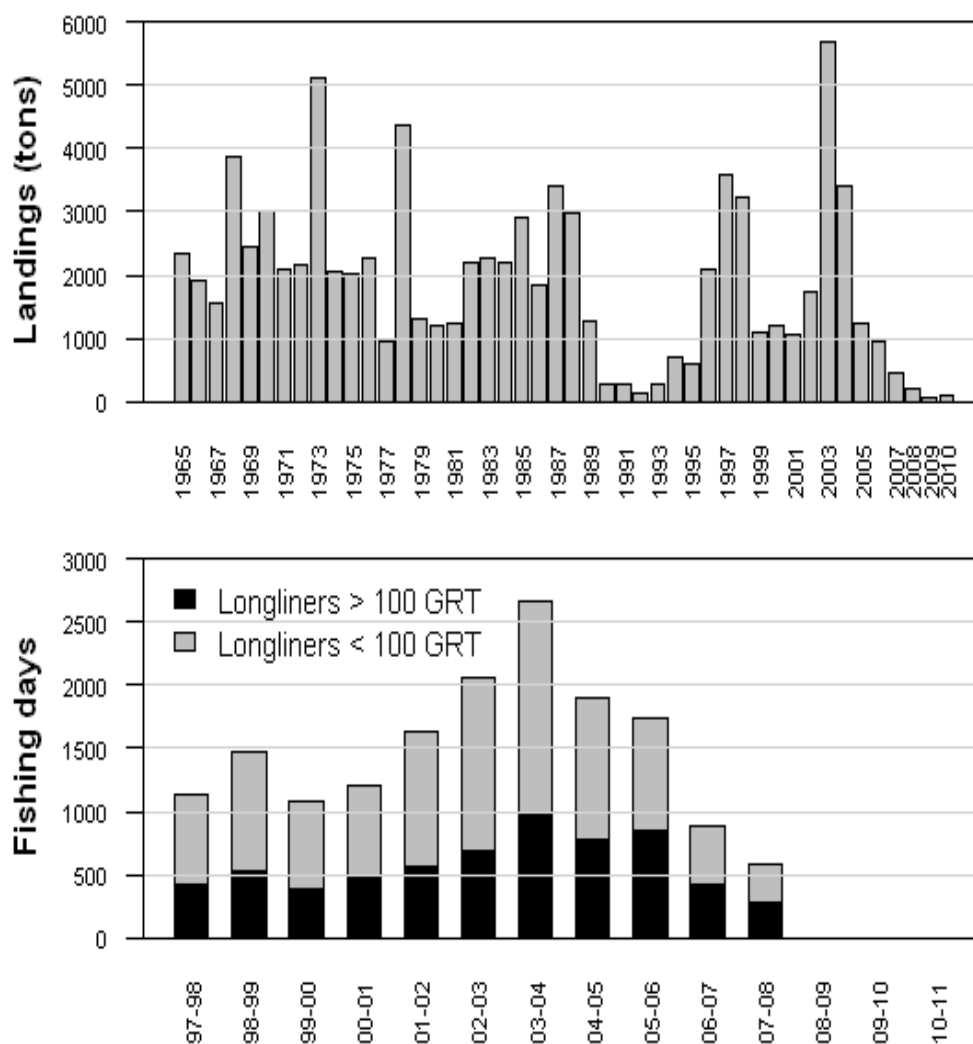
**Table 4.4.2.1**      Cod in Subdivision Vb<sub>2</sub> (Faroe Bank). ICES advice, management, and landings.

Year	ICES Advice	Predicted catch corresp. to advice	Agreed TAC	Official Landings
1987	No assessment	-		3.5
1988	No assessment	-		3.1
1989	Addition to Faroe Plateau TAC	~2.0		1.4
1990	Access limitation may be required	-		0.6
1991	Access limitation may be required	-		0.4
1992	No fishing	0.3		0.3
1993	TAC	0.5		0.4
1994	TAC	0.5		1.0
1995	Precautionary TAC	0.5		1.2
1996	Precautionary TAC	0.5	1.0	2.5
1997	Effort at present levels	0.7	Not applicable	3.9
1998	Effort at present levels	-		3.5
1999	Effort not to exceed that exerted in 1996–1997	-		1.3
2000	Effort not to exceed that of 1996–1998	-		1.2 <sup>1)</sup>
2001	Effort not to exceed that of 1996–1999	-		1.8 <sup>1)</sup>
2002	Effort not to exceed that of 1996–2000	-		1.9 <sup>1)</sup>
2003	Effort not to exceed that of 1996–2001	-		5.7 <sup>1)</sup>
2004	Effort not to exceed that of 1996–2002	-		4.3 <sup>1)</sup>
2005	Effort not to exceed that of 1996–2002	-		1.0 <sup>1)</sup>
2006	Effort not to exceed that of 1996–2002	-		0.95 <sup>1)</sup>
2007	Effort not to exceed that of 1996–2002	-		0.45 <sup>1)</sup>
2008	No fishing	0		0.22 <sup>1)</sup>
2009	No fishing	0		0.08 <sup>1)</sup>
2010	Same advice as last year	0		0.1 <sup>1)</sup>
2011	Same advice as last year	0		
2012	Same advice as last year	0		

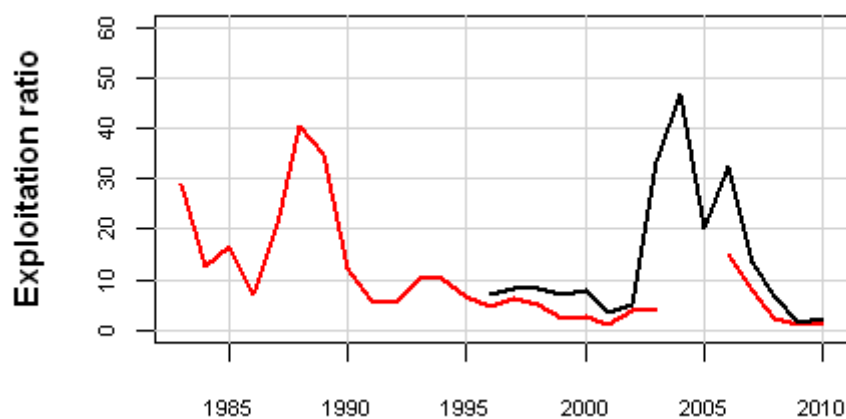
Weights in '000 t.

<sup>1)</sup> Working group estimates.

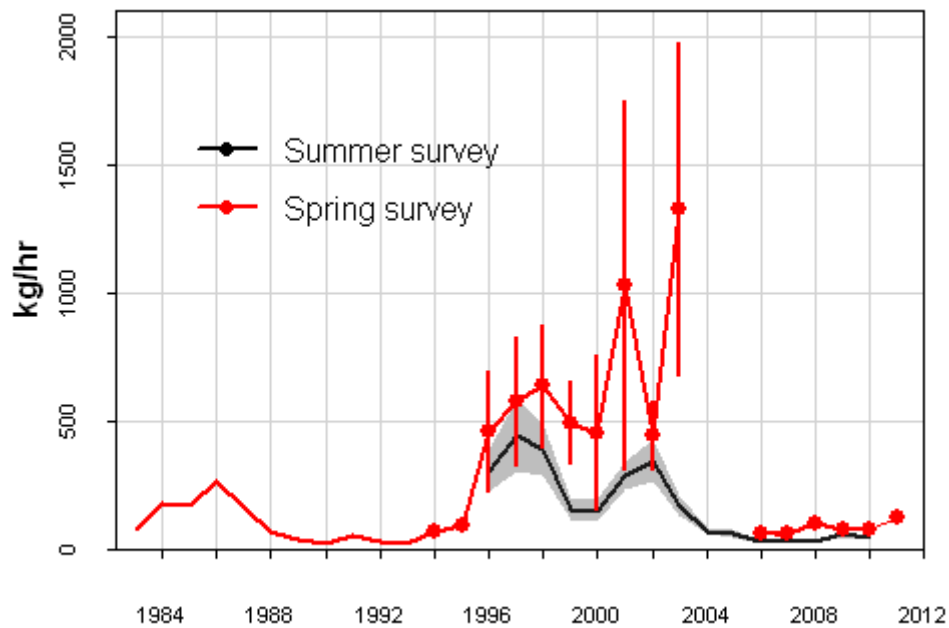




**Figure 4.4.2.1** Cod in Subdivision Vb2 (Faroe Bank). Reported landings 1965–2010. Since 1992 only catches from Faroese and Norwegian vessels are considered to be taken on the Faroe Bank. Lower plot: fishing days 1997–2011 for longline gear types on the Faroe Bank.



**Figure 4.4.2.2** Cod in Subdivision Vb2 (Faroe Bank). Exploitation ratio (ratio of landings to survey interpreted as an index of exploitation rate). Red = spring survey, Black = summer survey.



**Figure 4.4.2.3** Cod in Subdivision Vb2 (Faroe Bank). Catch per unit of effort in the spring and summer groundfish survey. Vertical bars and shaded areas show the standard error in the estimation of indices.

**Table 4.4.2.2** Cod in Subdivision Vb2 (Faroe Bank). Nominal catches (tonnes) by countries 1986–2010 as officially reported to ICES. From 1992 the catches by Faroe Islands and Norway are used in the assessment.

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997		
Faroe Islands	1836	3409	2966	1270	289	297	122	264	717	561	2051	3459		
Norway	6	23	94	128	72	38	32	2	8	40	55	135		
UK (E/W/Nl)	-	-	-	-	2 <sup>2</sup>	1 <sup>2</sup>	74 <sup>2</sup>	186 <sup>2</sup>	56 <sup>2</sup>	43 <sup>2</sup>	126 <sup>3</sup>	61 <sup>3</sup>		
UK (Scotland)	63 <sup>3</sup>	47 <sup>3</sup>	37 <sup>3</sup>	14 <sup>3</sup>	205 <sup>3</sup>	90 <sup>3</sup>	176 <sup>3</sup>	118 <sup>3</sup>	227 <sup>3</sup>	551 <sup>3</sup>	382 <sup>3</sup>	277 <sup>3</sup>		
Total	1905	3479	3097	1412	568	426	404	570	1008	1195	2614	3932		
Used in assessment					289	297	154	266	725	601	2106	3594		
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010 <sup>*</sup>	
Faroe Islands	3092	1001		1094	1840	5957	3607	1270	1005	471	231	81	111	
Norway	147	88	49	51	25	72	18	37	10	7	1	4	1	
UK (E/W/Nl)	27 <sup>3</sup>	51 <sup>3</sup>	18 <sup>3</sup>	50 <sup>3</sup>	42 <sup>3</sup>	15 <sup>3</sup>	15 <sup>3</sup>	24 <sup>3</sup>	1 <sup>3</sup>				366 <sup>3</sup>	
UK (Scotland)	265 <sup>3</sup>	210 <sup>3</sup>	245 <sup>3</sup>	288 <sup>3</sup>	218 <sup>3</sup>	254 <sup>3</sup>	244 <sup>3</sup>	1129 <sup>3</sup>	278 <sup>3</sup>	53	32	38		
Total	3531	1350	312	1483	2125	6298	3884	2460	1294	531	264	123	478	
Correction of Faroese catches in Vb2				-65	-109	-353	-214	-75	-60	-28	-14	-5	-7	
Used in assessment	3239	1089	1194	1080	1756	5676	3411	1232	955	450	218	80	105	
<sup>*</sup> Preliminary														
<sup>1</sup> Includes Vb1.														
<sup>2</sup> Included in Vb1.														
<sup>3</sup> Reported as Vb.														

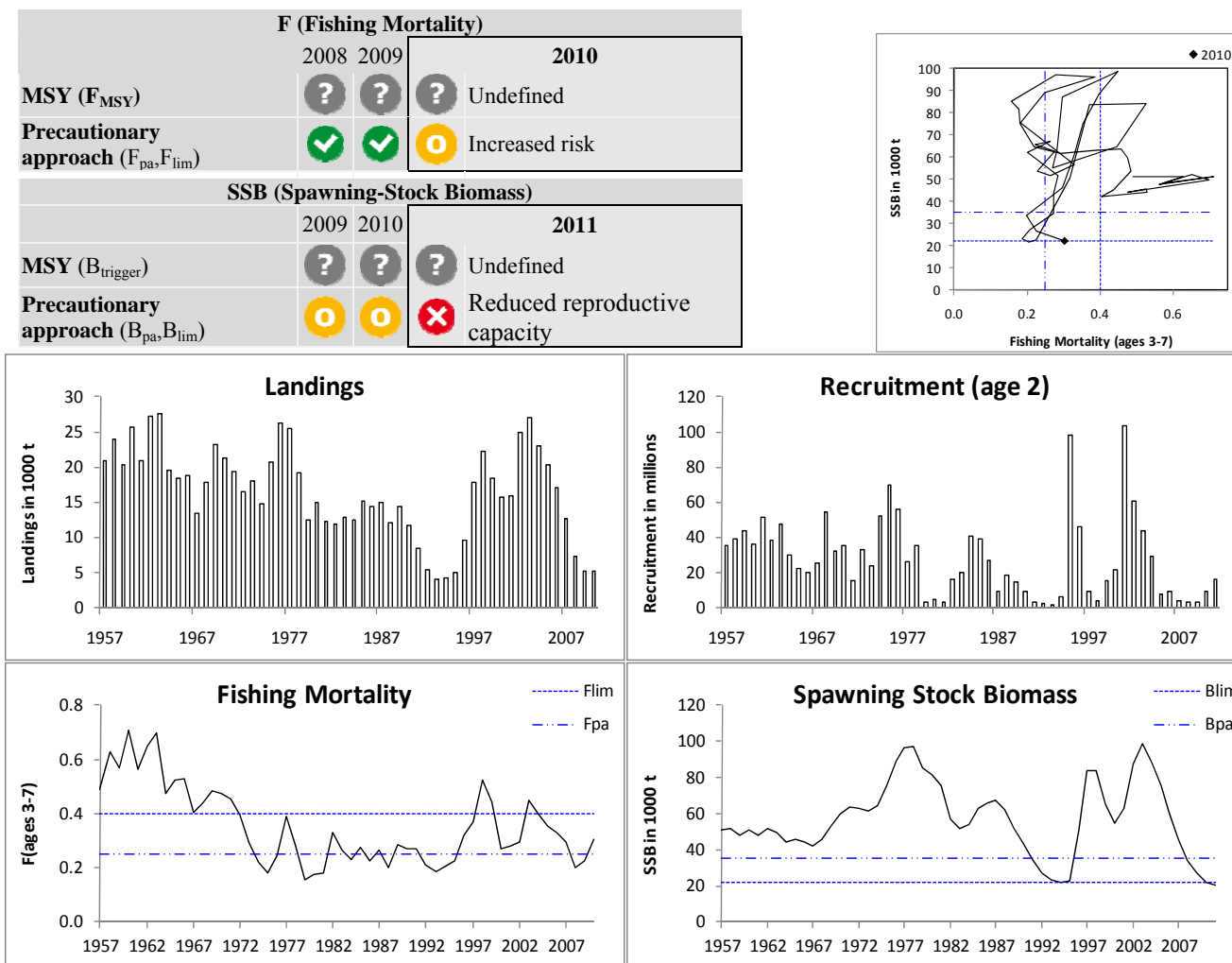
## ECOREGION Faroe Plateau Ecosystem

### STOCK Haddock in Division Vb

#### Advice for 2012

ICES advises on the basis of the precautionary approach that there should be no directed fishery on haddock in 2012. 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.

#### Stock status



**Figure 4.4.3.1** Haddock in Division Vb. Summary of stock assessment (weights in '000 tonnes). Top right: SSB and F over the years.

SSB has decreased since 2003 and is in 2011 estimated to be just below  $B_{lim}$ . The fishing mortality has decreased from above  $F_{lim}$  in 2003 to around  $F_{pa}$  in the last 3 years; the  $F_{2010}$  of 0.3 is, however, above  $F_{pa}$ . Year classes from 2003 onwards have all been well below the long-term average.

#### Management plans

There is no explicit management plan for this stock.

## Biology

Since the mid-1970s, recruitment has fluctuated with 1–3 strong year classes followed by several weak ones. Mean weights-at-age have also fluctuated in this period and are at present increasing from a low level.

## Environmental influence on the stock

There is a positive relationship between primary production and the individual fish growth and recruitment 1–2 years later.

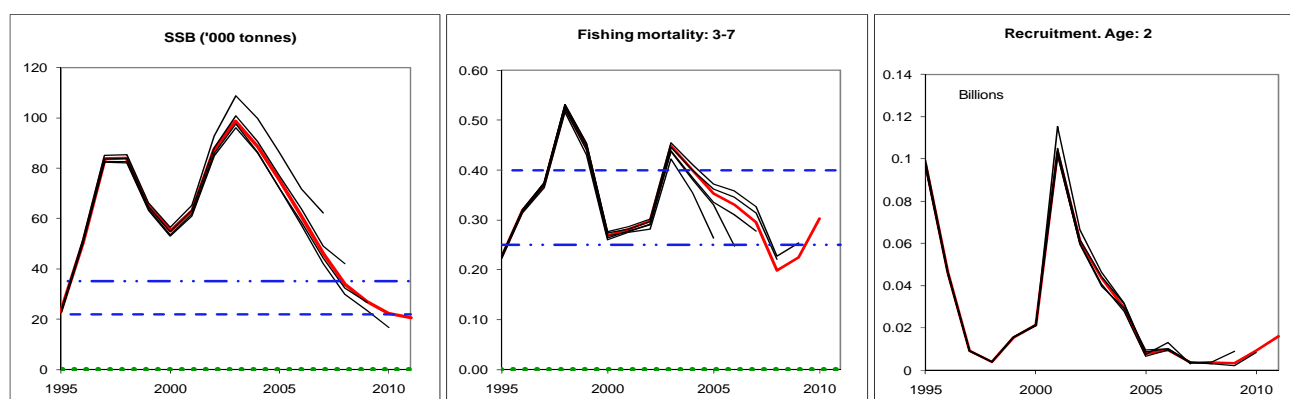
## The fisheries

Haddock are mainly caught in a directed longline fishery for cod and haddock and as bycatches in trawl fisheries for saithe. Normally, longline gears account for 80–90% of the catches. In 2009, however, (see below) longlines only accounted for 64% of the catches, primarily because only a fraction of the allocated number of fishing days to the longliners was actually used.

**Catch by fleet** Total catch (2010) = 5 kt, where the longliners accounted for 79% and the trawlers for 21%.

## Quality considerations

The landing 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

<b>Assessment type</b>	XSA using age-disaggregated indices.
<b>Input data</b>	Two survey indices (spring and summer survey).
<b>Discards and bycatch</b>	No discards included. Discarding is not considered to be a major problem in this fishery.
<b>Indicators</b>	Primary productivity index.
<b>Other information</b>	Biomass indices from 2 commercial fleets.
<b>Working group report</b>	<a href="#">NWWG</a>

**ECOREGION** Faroe Plateau Ecosystem  
**STOCK** Haddock in Division Vb

**Reference points**

	<i>Type</i>	<i>Value</i>	<i>Technical basis</i>
MSY Approach	MSY $B_{\text{trigger}}$	Not defined	
	$F_{\text{MSY}}$	Not defined	
Precautionary Approach	$B_{\text{lim}}$	22 000 t	Lowest observed SSB.
	$B_{\text{pa}}$	35 000 t	$B_{\text{lim}} e^{1.645\sigma}$ , with $\sigma$ of 0.3.
	$F_{\text{lim}}$	0.40	$F_{\text{pa}} e^{1.645\sigma}$ , with $\sigma$ of 0.3.
	$F_{\text{pa}}$	0.25	$F_{\text{med}}(1998) = 0.25$ .

(unchanged since: 2007)

Yield and spawning biomass per Recruit  $F$ -reference points (2011):

	Fish Mort Ages 3–7	Yield/R	SSB/R
Average last 3 years	0.24	0.57	2.68
$F_{\text{max}}^{[*]}$	-	-	-
$F_{0.1}$	0.22	0.56	2.88
$F_{\text{med}}$	0.25	0.58	2.62

[\*]  $F_{\text{max}}$  is poorly defined.

**Outlook for 2012**

Basis:  $F(2011) = F(2008\text{--}2010)$  rescaled to 2010 = 0.30;  $SSB(2012) = 20$ ;  $R(2011) = 16$  mill; catch (2011) = 5 t.

<b>Rationale</b>	<b>F (2012)</b>	<b>Landings (2012)</b>	<b>Basis</b>	<b>SSB (2013)</b>	<b>%SSB change<sup>1)</sup></b>
Zero catch	0	0	$F=0$	25	20
<i>Status quo</i>	0.15	3	$F_{\text{sq}} * 0.50$	22	9
	0.23	4	$F_{\text{sq}} * 0.75$	21	5
	0.25	4	$F_{\text{pa}} (=F_{\text{sq}} * 0.83)$	21	5
	0.27	5	$F_{\text{sq}} * 0.90$	20	0
	0.3	5	$F_{\text{sq}}$	20	0
	0.45	7	$F_{\text{MP}}$	18	-11

Weights in '000 t.

<sup>1)</sup> SSB 2013 relative to SSB 2012.

**Management plan**

There is no explicit management plan for this stock. 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 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  $F_{\text{pa}}$  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  $F_{\text{target}}$  of 0.45 to be consistent with the ICES advice.

**MSY approach**

Work is ongoing to define MSY reference points using stochastic simulations. Preliminary analyses suggested an  $F_{\text{MSY}} = 0.25$ . However, historically fishing at  $F$  in this range since 1972 has led to SSB reductions to  $B_{\text{lim}}$  twice.

## ***PA approach***

Given the recent poor recruitment and slow growth and the low SSB, the forecast indicates that even a zero fishing mortality in 2012 will not result in getting the stock above  $B_{pa}$  in 2013 and there should 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 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 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. Also, the ever-increasing efficiency in an effort system needs to be carefully monitored.

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

### *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 have been above average in 2008–2010; this has, however, resulted in only marginally improved recruitment of haddock. The estimate of primary production in 2011 will not be available until July, but preliminary estimates suggest it to be lower than in 2008–2010.

### *Regulations and their effects*

An effort management system was implemented 1st of 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 for trawling and are mainly utilized by longliners. Some fleets (e.g. gillnetters) are presently not under the fishing days regime, but it is expected that within a few years all fleets will be included.

### *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.

### *Uncertainties in assessment and forecast*

Recent years have seen a consistent retrospective pattern of overestimating SSB and underestimating  $F$ . This bias seems to be small in the most recent years, however, and now the SSB has been underestimated and the  $F$  overestimated compared to the previous assessment.

The *status quo* assumption in the prediction may not be valid, since only a fraction of the allocated number of fishing days in recent years have actually been utilized; most of these days may become active again since the cod stock is increasing rapidly.

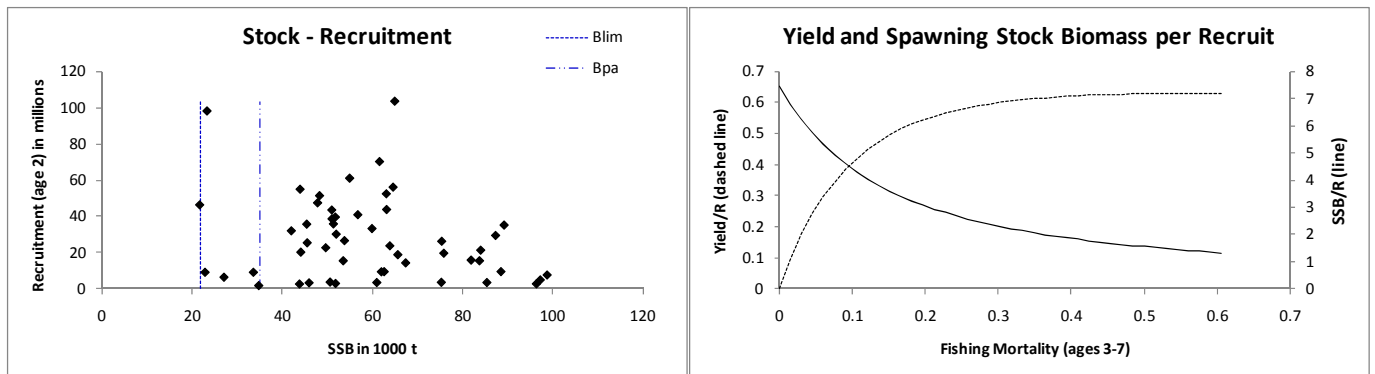
### *Comparison with previous assessment and advice*

This year's assessment indicates that the 2010 assessment overestimated the 2009 recruitment and fishing mortality by 19% and 13%, respectively, and underestimated the 2009 spawning-stock biomass by 13%.

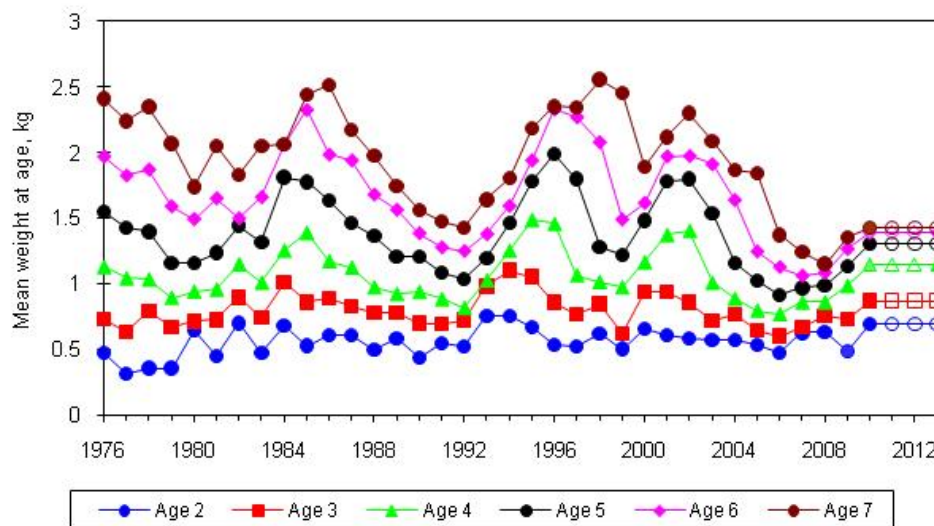
The advice last year was to minimize catches of haddock. This year's advice is for no directed fishery on haddock in 2012, based on the precautionary approach.

## Sources

ICES. 2011. Report of the North-Western Working Group. 26 April–3 May 2011. ICES CM 2011/ACOM:07.



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



**Figure 4.4.3.4** Haddock in Division Vb. Mean weight-at-age (2–7). The 2011–2013 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 bycatch, implement recovery plan	0		
2012	No direct fishing; minimize bycatch, implement recovery plan	0		

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

Weights in '000 t.



**Table 4.4.3.2** Haddock in **Division Vb<sub>1</sub>** only. Official catches (tonnes) by country, and ICES estimates.

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 <sup>1</sup>	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) <sup>2</sup>	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 <sup>4,5</sup>	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	2009	2010 <sup>2</sup>
Faroe Islands	4,549	9,152	16,585	19,135	16,643	13,620 <sup>3</sup>	13,457 <sup>3</sup>	20,776 <sup>3</sup>	21,615	18,995	18,022	15,600	11,689	6,628	4,895	4,928
France <sup>1</sup>				2 <sup>2,7</sup>	- <sup>2</sup>	6	8 <sup>7</sup>	2	4	1 <sup>5</sup>	+	12 <sup>7</sup>	4 <sup>7</sup>	3 <sup>7</sup>	2 <sup>7</sup>	1 <sup>7</sup>
Germany	5	-	-		33	1	2	6	1	6		1				
Greenland					30 <sup>6</sup>	22 <sup>6</sup>	0 <sup>6</sup>	4 <sup>6</sup>				1	9 <sup>5</sup>		6 <sup>7</sup>	12 <sup>6</sup>
Iceland								4								
Norway	28	45	45	71	411	355	257 <sup>2</sup>	227	265	229	212	57	61	26	8	5
Russia										16						
Spain										49				10		
UK (Engl. and Wales)	23	5	22	30 <sup>1</sup>	59 <sup>7</sup>	19 <sup>7</sup>	4 <sup>7</sup>	11 <sup>7</sup>	14	8	1	1				
UK (Scotland) <sup>1,1</sup>	-	...	...	...					185	186	126	106	35	60	64	
United Kingdom																73 <sup>7</sup>
Total	4,605	9,202	16,652	19,238	17,176	14,023	13,728 <sup>8</sup>	21,030	22,084	19,490	18,361	15,778	11,798	6,727	4,975	5,019
Working Group estimate <sup>4,5,9</sup>	4,948	9,642	17,924	22,210	18,482	15,821	15,890	24,933	26,942	23,101	20,305	17,154	12,631	7,288	5,197	5,198

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 IIIa 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 NWVG by the Faroe Marine Research Institute

9) Included in Vb2

10) Includes 14 reported as Vb

18 **Table 4.4.3.3** Haddock in **Division Vb<sub>2</sub>** only. Official catches (tonnes) by country, and ICES estimates.

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
France <sup>1</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-
Norway	1	2	5	3	10	5	43	16	97	4	23	8	1
UK (Engl. a)	-	-	-	-	-	-	-	-	-	-	+	+	+
UK (Scotla	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	2009	2010 <sup>2</sup>
Faroe Islands	303	338	1,133	2,810	1,110	1,565 <sup>3</sup>	1,948	3,698	4,804	3,594	1,899	1,375	810	556	192	178
France <sup>1</sup>	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-
Norway	1	40	4	60	3	48	66	28	54	17	45	1	8	-	3	1
UK (Engl. a)	... <sup>1</sup>	... <sup>1</sup>	... <sup>1</sup>	... <sup>1</sup>	...	...	...	...	...	...	1	4	4	-	-	-
UK (Scotla	39	62	135	102	193	185	148	177	4	...	4	4	15	5	27 <sup>4</sup>	-
Total	343	440	1,272	2,972	1,306	1,798	2,162 <sup>1</sup>	3,903	4,858	3,611	1,944	1,376	833	561	222	179

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.

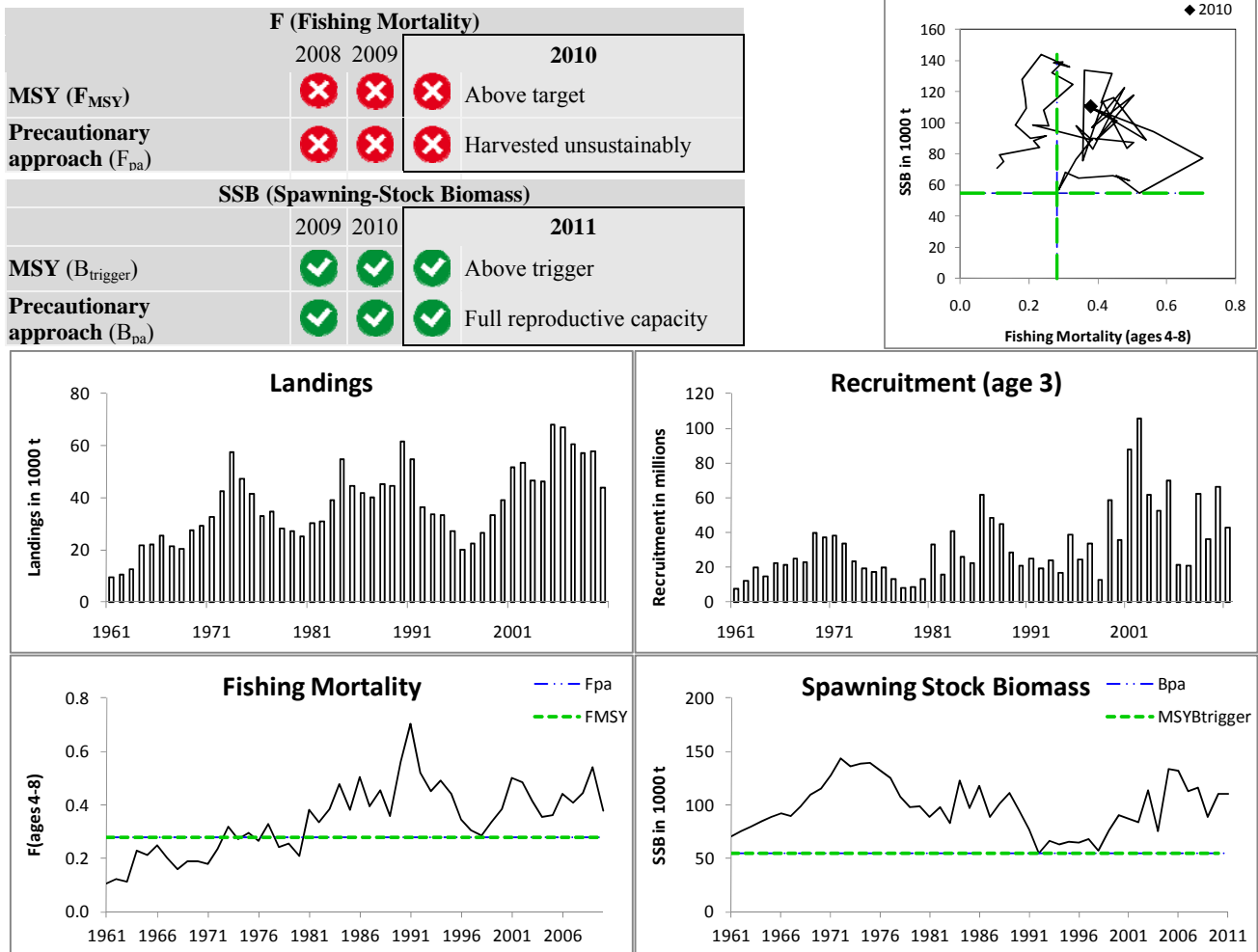
Year	Recruitment Age 2 thousands	SSB tonnes	Landings tonnes	Mean F Ages 3–7
1957	35106	51049	20995	0.490
1958	39212	51409	23871	0.627
1959	43417	48340	20239	0.570
1960	35763	51101	25727	0.710
1961	51279	47901	20831	0.562
1962	38537	52039	27151	0.651
1963	47362	49706	27571	0.700
1964	30110	44185	19490	0.475
1965	22644	45605	18479	0.526
1966	20203	44027	18766	0.529
1967	25356	42086	13381	0.403
1968	54852	45495	17852	0.438
1969	31976	53583	23272	0.485
1970	35601	59958	21361	0.476
1971	15457	63921	19393	0.456
1972	33213	63135	16485	0.396
1973	23703	61623	18035	0.290
1974	52335	64633	14773	0.221
1975	70064	75408	20715	0.180
1976	55981	89226	26211	0.248
1977	26197	96386	25555	0.387
1978	35108	97247	19200	0.278
1979	2785	85416	12424	0.155
1980	4945	81921	15016	0.178
1981	3492	75869	12233	0.181
1982	15842	56825	11937	0.331
1983	19634	51835	12894	0.265
1984	40803	53857	12378	0.228
1985	39502	62654	15143	0.276
1986	26534	65682	14477	0.223
1987	9466	67415	14882	0.264
1988	18816	62040	12178	0.200
1989	14293	51882	14325	0.284
1990	9411	43891	11726	0.271
1991	2992	34865	8429	0.273
1992	2677	27161	5476	0.209
1993	1826	23397	4026	0.186
1994	6425	21779	4252	0.204
1995	97916	22961	4948	0.226
1996	46246	50681	9642	0.319
1997	9116	83771	17924	0.371
1998	3729	84040	22210	0.526
1999	15478	64997	18482	0.445
2000	21305	55009	15821	0.269
2001	103292	63202	15890	0.281
2002	60933	87338	24933	0.298
2003	43678	98753	26942	0.449
2004	29404	88536	23101	0.399
2005	7651	75320	20305	0.353
2006	9506	61025	17154	0.330
2007	3615	46020	12631	0.295
2008	3486	33675	7288	0.199
2009	3328	26968	5197	0.225
2010	9117	22262	5198	0.303
2011	15950	20496		
Average	27758	57266	16460	0.354

**ECOREGION** Faroe Plateau Ecosystem  
**STOCK** Saithe in Division Vb

**Advice for 2012**

ICES advises on the basis of the MSY approach that fishing mortality in 2012 should be reduced by 38% to  $F_{MSY}$ .

**Stock status**



**Figure 4.4.4.1** Saithe in Division Vb. Summary of stock assessment (weights in '000 tonnes). Top right: SSB and F over the years.

SSB has increased since the mid-1990s and is above MSY  $B_{trigger}$ . Recruitment in 2010 is above average while fishing mortality is above  $F_{MSY}$ .

**Management plans**

There is no explicit management plan for this stock.

## Biology

Saithe in Division Vb is regarded as one management unit although tagging experiments have demonstrated migrations between the Faroes, Iceland, Norway, west of Scotland, and the North Sea. Nursery areas for saithe are found very close to land (in the littoral zone). These areas are not covered by the existing surveys and therefore recruitment estimates are not available until saithe enter the fishery at age 3; this hampers the prediction of biomass and catch.

## Environmental influence on the stock

Preliminary studies suggest a positive relationship between ocean productivity (gyre index) and the biomass of saithe.

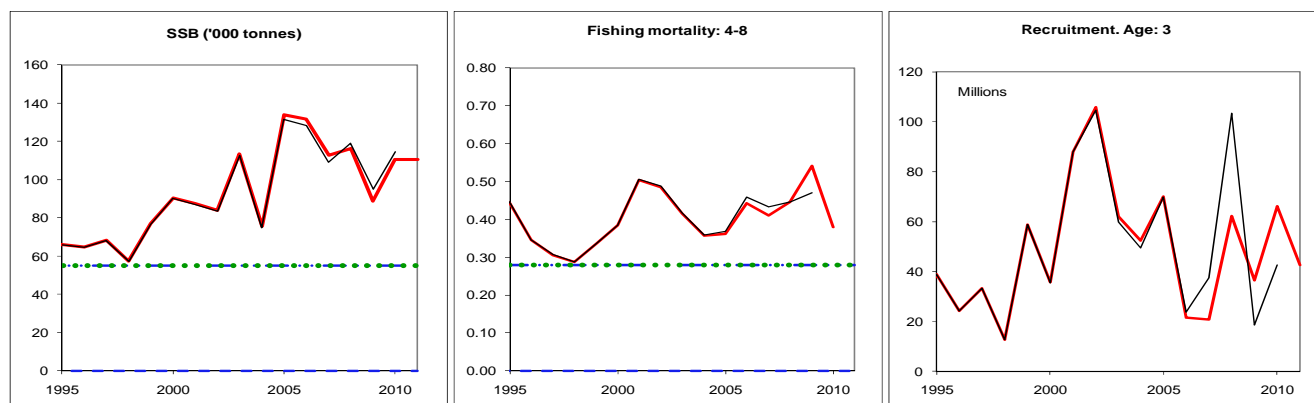
## The fisheries

Saithe are mainly caught in a directed trawl fishery (pair and single trawlers), with bycatches of cod and haddock.

<b>Catch by fleet</b>	Total landings (2010) = 44 kt, of which 83% was taken by pair trawlers, 12% by single trawlers, and 3.9% by jiggers.
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## Quality considerations

There are no incentives to discard fish under the effort management system. The sampling of the landings is believed to be adequate. Recruitment indices are only available from age 3.



**Figure 4.4.4.2** Saithe in Division Vb. Historical assessment results (final year recruitment estimates included).

## Scientific basis

<b>Assessment type</b>	Age-based analytical assessment – XSA.
<b>Input data</b>	Commercial catch-at-age data and an age-disaggregated pair trawlers series.
<b>Discards and bycatch</b>	There are no discard data, but discarding is not considered to be a major problem in this fishery.
<b>Indicators</b>	None.
<b>Other information</b>	A benchmark assessment was performed in 2010.
<b>Working group report</b>	<a href="#">NWWG</a>

**ECOREGION** Faroe Plateau Ecosystem  
**STOCK** Saithe in Division Vb

**Reference points**

	<i>Type</i>	<i>Value</i>	<i>Technical basis</i>
MSY Approach	MSY $B_{\text{trigger}}$	55 000 t	Breakpoint in segmented regression.
	$F_{\text{MSY}}$	0.28	Provisional, stochastic simulations.
Precautionary Approach	$B_{\text{lim}}$	Undefined	
	$B_{\text{pa}}$	55 000 t	$B_{\text{loss}}$ in 2011.
	$F_{\text{lim}}$	Undefined	
	$F_{\text{pa}}$	0.28	Consistent with 1999 estimate of $F_{\text{med}}$ .

(Unchanged since 2011)

Yield and spawning biomass per Recruit F-reference points (2011):

	Fish Mort Ages 4–8	Yield/R	SSB/R
Average last 3 years	0.46	1.30	2.32
$F_{\text{max}}$	0.43	1.30	2.48
$F_{0.1}$	0.17	1.17	5.66
$F_{\text{med}}$	0.30	1.28	3.41

**Outlook for 2012**

Basis:  $F(2011) = F(2008\text{--}2010)$  unscaled = 0.45;  $SSB(2012) = 107$ ;  $R(2011) = 42$  mill; catch (2011) = 55.9.

<b>Rationale</b>	<b>F (2012)</b>	<b>Landings (2012)</b>	<b>Basis</b>	<b>F (2012)</b>	<b>SSB (2013)</b>	<b>%SSB change <sup>1)</sup></b>
MSY approach	0.28	40	$F_{\text{MSY}} (=F_{2011} * 0.62)$	0.28	119	2
Precautionary Approach	0.28	40	$F_{\text{pa}} (=F_{2011} * 0.62)$	0.28	119	2
Zero catch	0	0	$F=0$	0	154	44
<i>Status quo</i>	0.23	33	$F_{2011} * 0.50$	0.23	125	5
	0.33	47	$F_{2011} * 0.75$	0.33	113	-9
	0.40	54	$F_{2011} * 0.90$	0.40	107	-17
	0.42	57	$F_{2011} * 0.95$	0.42	104	-11
	0.45	59	$F_{2011}$	0.45	101	-12

Weights in '000 t.

<sup>1)</sup> SSB 2013 relative to SSB 2012.

**Management plan**

There is no explicit management plan for this stock. 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 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 saithe exploitable stock in numbers would be harvested annually. This translates into an average  $F$  of 0.45, above the  $F_{\text{pa}}$  and  $F_{\text{MSY}}$  of 0.28. ICES considers this to be inconsistent with both the PA and the MSY approaches. Work is ongoing in the Faroes to move away from the  $F_{\text{target}}$  of 0.45 to be more consistent with the ICES advice.

**MSY approach**

Following the ICES MSY framework implies that fishing mortality in 2012 should be no more than  $F_{\text{MSY}} = 0.28$ , which results in a reduction of 38% in  $F$ .

## PA approach

Following the precautionary approach implies that fishing mortality in 2012 should be no more than  $F_{pa} = 0.28$ , which results in a reduction of 38% in  $F$ .

## Additional considerations

### Management considerations

ICES considers that the current fishing mortality on this stock is unlikely to result in maximum sustainable yield and should be reduced. The number of fishing days were reduced by 5% for the fishing year (2009/2010), but a further reduction of effort is required to bring  $F$  at or below  $F_{MSY}$ . This advice applies to all fleets fishing saithe, including the single trawlers that are not presently regulated by fishing days, but which have accounted for about 17% of the annual landings on average since the introduction of the present management system. The present spawning closures should be maintained.

### Regulations and their effects

The principal fleets fishing for saithe are pair trawlers, single trawlers, and jiggers. The average annual landings from these fleets since the introduction of the present management system are about 75%, 20% and 5%, respectively. The pair trawlers and jiggers are mainly regulated by total number of allocated fishing days, whereas the single trawlers have so far mainly been regulated by the number of licenses and area closures, but not by fishing days.

Limited sampling in the blue whiting fishery in Faroese waters indicates that bycatches of saithe have been minor since the mandatory use of sorting grids from 15 April 2007 in the areas west and northwest of the Faroe Islands.

### Changes in fishing technology and fishing patterns

The effort management system implemented in 1996 is likely to lead to improvement of fishing technology. The present system offers no incentives to discard fish. The sampling of the landings is believed to be adequate.

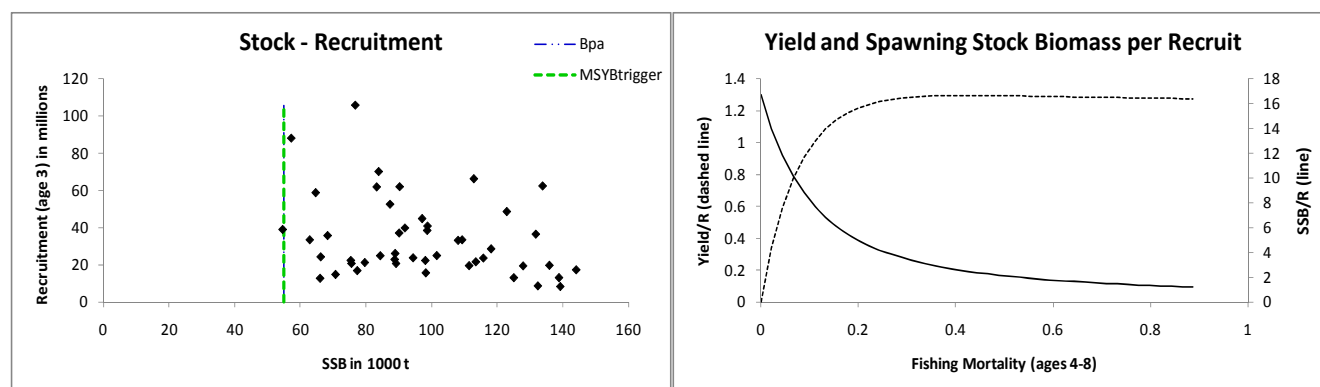
### Comparison with last year's assessment and advice

The estimate of SSB in 2009 in the 2010 assessment was slightly higher than in the 2011 assessment and fishing mortality slightly lower.

Last year's advice was based on the precautionary approach. This year's advice is based on the MSY framework.

## Sources

ICES. 2011. Report of the North-Western Working Group (NWWG), 26 April–3 May 2011. ICES CM 2011/ACOM:07.



**Figure 4.4.4.3** Saithe in Division Vb. Left: Stock–recruitment plot, SSB at spawning time. Right: Yield and spawning-stock biomass per recruit plot.

**Table 4.4.4.1** Saithe in Division Vb. ICES advice, management, and landings.

Year	ICES Advice	Predicted catch corresp. to advice	Agreed TAC	ICES Landings
1987	No increase in F	<32		40
1988	No increase in F	<32		45
1989	Reduction in F	<40		44
1990	Reduction in F	<41		62
1991	TAC	<30		55
1992	Reduction in F	<27		36
1993	Reduction in F	<37		34
1994	TAC	<26	42 <sup>1</sup>	33
1995	TAC	<22	39 <sup>1</sup>	27
1996	TAC	<39	-	20
1997	20% reduction in F from 1995 level	<21	-	22
1998	30% reduction in effort from 1996/97 level	-	-	26
1999	F below $F_{pa}$ (0.28)	<14		33
2000	F below than $F_{pa}$ (0.28)	<15		39
2001	Reduce fishing effort to generate F well below $F_{pa}$ (0.28)	<17		52
2002	Reduce fishing effort to generate F below $F_{pa}$ (0.28)	<28		54
2003	Reduce fishing effort to generate F below $F_{pa}$ (0.28)	<47		47
2004	Reduce fishing effort to generate F below $F_{pa}$ (0.28)	<48		46
2005	Reduce fishing effort to generate F below $F_{pa}$ (0.28)	<32		68
2006	Reduce fishing effort to generate F below $F_{pa}$ (0.28)	<24		67
2007	Average catch considerations	40		61
2008	Do not increase effort	-		57
2009	Reduce fishing effort by around 20%	-		58
2010	Reduce fishing effort by around 20%	-		44
2011	Reduce fishing effort to generate F below $F_{pa}$ (0.28)	<38		
2012	Reduce fishing effort to generate F below $F_{MSY}$ (0.28)	<40		

Weights in '000 t.

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

<sup>1)</sup> In the quota year 1 September–31 August the following year.



**Table 4.4.4.2** Saithe in Division Vb. Nominal catches (tonnes round weight) by countries, 1988–2010, as officially reported to ICES, and the ICES estimates.

Country	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
Denmark	94	-	2	-	-	-	-	-	-	-	-	
Estonia	-	-	-	-	-	-	-	-	-	16	-	
Faroe Islands	44402	43,624	59,821	53,321	35,979	32,719	32,406	26,918	19,267	21,721	25,995	
France <sup>3</sup>	313	-	-	-	120	75	19	10	12	9	17	
Germany	-	-	-	32	5	2	1	41	3	5	-	
German Dem.Rep.	-	9	-	-	-	-	-	-	-	-	-	
German Fed. Rep.	74	20	15	-	-	-	-	-	-	-	-	
Greenland	-	-	-	-	-	-	-	-	-	-	-	
Ireland	-	-	-	-	-	-	-	-	-	-	-	
Netherlands	-	22	67	65	-	-	-	-	-	-	-	
Norway	52	51	46	103	85	32	156	10	16	67	53	
Portugal	-	-	-	-	-	-	-	-	-	-	-	
UK (Eng. & W.)	-	-	-	5	74	279	151	21	53	-	19	
UK (Scotland)	92	9	33	79	98	425	438	200	580	460	337	
USSR/Russia <sup>2</sup>	-	-	30	-	12	-	-	-	18	28	-	
<i>Total</i>	45027	43,735	60,014	53,605	36,373	33,532	33,171	27,200	19,949	22,306	26,065	
<i>Working Group estimate</i> <sup>4,5</sup>	45285	44,477	61,628	54,858	36,487	33,543	33,182	27,209	20,029	22,306	26,421	
Country	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010 <sup>1</sup>
Denmark	-	-	-	-	-	-	-	34	-			
Estonia	-	-	-	-	-	-	-	-	-			
Faroe Islands	32,439		49,676	55,165	47,933	48,222	71,496	70,696	64,552	61,116	61,889	46,727
France	-	273	934	607	370	147	123	315	108	97	46	26
Germany	100	230	667	422	281	186	1	49	3	3		
Greenland	-	-	-	125	-			73	239	0	1	
Ireland	-	-	5	-	-	-	-	-	-	-	-	
Netherlands	0	0	0	0	0	0	0	0	3	0	0	0
Norway	160	72	60	77	62	82	82	35	81	38	23	2
Portugal	-	-	-	-	-	5	-	-	-	-	-	
Russia	-	20	1	10	32	71	210	104		38	44	3
UK (E/W/Ni)	67	32	80	58	89	85	32	88	4	-	-	
UK (Scotland)	441	534	708	540	610	748	4,322	1,011	408	400	684	
United Kingdom	-	-	-	-	-	-	-	-	-	-	-	705
<i>Total</i>	33,207	1,161	52,131	57,004	49,377	49,546	76,266	72,405	65,398	61,692	62,687	47,463
<i>Working Group estimate</i> <sup>4,5,6,7</sup>	33,207	39,020	51,786	53,546	46,555	46,355	67,997	67,103	60,716	57,043	57,950	43,959
<sup>1</sup> Preliminary.												
<sup>2</sup> As from 1991.												
<sup>3</sup> Quantity unknown 1989-91.												
<sup>4</sup> Includes catches from Sub-division Vb2 and Division IIa in Faroese waters.												
<sup>5</sup> Includes French, Greenlandic, Russian catches from Division Vb, as reported to the Faroese coastal guard service.												
<sup>6</sup> Includes Faroese, French, Greenlandic catches from Division Vb, as reported to the Faroese coastal guard service.												
<sup>7</sup> The 2001-2008 catches from Faroe Islands, as stated from Faroese coastal guard service, are corrected in order to be consistent with procedures used previous years.												

**Table 4.4.4.3**

Saithe in Division Vb. Summary of the assessment (weights in tonnes).

Year	Recruitment Age 3 thousands	SSB tonnes	Landings tonnes	Mean F Ages 4–8
1961	7827	70790	9592	0.106
1962	12256	75429	10454	0.125
1963	19837	79695	12693	0.114
1964	14811	84410	21893	0.230
1965	22362	88791	22181	0.214
1966	21229	91896	25563	0.250
1967	24897	90155	21319	0.204
1968	22879	98678	20387	0.160
1969	39798	109307	27437	0.191
1970	37091	115753	29110	0.189
1971	38446	127847	32706	0.179
1972	33424	143985	42663	0.236
1973	23621	135846	57431	0.318
1974	19420	138756	47188	0.272
1975	17327	139158	41576	0.297
1976	19709	132334	33065	0.267
1977	13105	125021	34835	0.328
1978	8332	108075	28138	0.243
1979	8686	98253	27246	0.257
1980	13074	98767	25230	0.211
1981	33144	88915	30103	0.382
1982	15672	98097	30964	0.336
1983	40828	83312	39176	0.385
1984	26071	122885	54665	0.478
1985	22325	97123	44605	0.382
1986	61844	118112	41716	0.505
1987	48591	89204	40020	0.396
1988	44829	101595	45285	0.456
1989	28597	111412	44477	0.360
1990	20706	94392	61628	0.562
1991	24968	77392	54858	0.704
1992	19536	54709	36487	0.521
1993	23777	66273	33543	0.452
1994	16870	62941	33182	0.492
1995	38967	66096	27209	0.443
1996	24276	64746	20029	0.345
1997	33433	68379	22306	0.305
1998	12742	57322	26421	0.287
1999	58764	76798	33207	0.336
2000	35712	90288	39020	0.384
2001	88036	87357	51786	0.503
2002	105756	83901	53546	0.484
2003	61960	113459	46555	0.415
2004	52540	75641	46355	0.356
2005	70116	133778	67997	0.362
2006	21608	131705	67103	0.442
2007	20723	112859	60716	0.410
2008	62346	116186	57043	0.445
2009	36460	88920	57950	0.541
2010	66251	110606	43959	0.379
2011	42680	110529		
Average	32907	98194	37652	0.345