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Report of the ICES Advisory Committee 2013

Book 4

The Faroe Plateau Ecosystem

International Council for the Exploration of the Sea

Conseil International pour l'Exploration de la Mer

4 FAROE PLATEAU ECOSYSTEM

4.1 Ecosystem overview

This Section has not been updated in 2013. The most recent ecosystem overview is available in ICES Advisory Report 2008, Section 4.1. This overview can also be found on the ICES website: http://www.ices.dk/committe/acom/comwork/report/2008/2008/4.1-4.2%20Faroe%20plateau%20ecosystem%20overview.pdf

4.2 The status of stocks and fisheries in 2013

Species	Basis for stock status and advice
Cod in Subdivision Vb_1 (Faroe Plateau)	Analytical
Cod in Subdivision Vb_2 (Faroe Bank)	Data limited
Haddock in Division Vb	Analytical
Saithe in Division Vb (Faroe Saithe)	Analytical

The state and advice of the individual stocks are presented in the stock sections. An overview of the status of the stocks for which information on fishing mortality and spawning stock biomass is available, as assessed for 2012 in 2013, is presented in table 4.2.1.

Table 4.2.1 Status of data rich stocks (n=3) for the Faro Plateau ecosystem stocks relative to MSY and PA reference points for Fishing Mortality (F) and Spawning Stock Biomass (SSB). Table shows percentage of stocks per stock status. Values in brackets denote the number of data rich stocks per stock status.

			Spawning Stock Biomass		
			is at or above MSY $B_{trigger}$ $SSB_{2013} \geq$ MSY $B_{trigger}$	is below MSY $B_{trigger}$ $SSB_{2013} <$ MSY $B_{trigger}$	is not defined
	Fishing Mortality		✅	❌	❓
MSY Approach	is at or below MSY ($F_{2012} \leq F_{MSY}$)	✅	-	33% (1)	-
	is above MSY ($F_{2012} > F_{MSY}$)	❌	33% (1)	33% (1)	-
	is not defined	❓	-	-	-
			is at or above PA $SSB_{2013} \geq B_{pa}$	is at increased risk $B_{pa} > SSB_{2013} > B_{lim}$	is below limit $SSB_{2013} < B_{lim}$	is not defined
	Fishing Mortality		✅	🟠	❌	❓
Precautionary Approach	is at or below P ($F_{2012} \leq F_{pa}$)	✅	-	-	-	-
	is at increased risk ($F_{lim} > F > F_{pa}$)	🟠	-	33% (1)	33% (1)	-
	is above PA ($F_{2012} > F_{pa}$)	❌	33% (1)	-	-	-
	is not defined	❓	-	-	-	-

Although there is considerable variation between stocks and large year-to-year variation for most stocks, the overall fishing mortality has been constant over the last couple of decades. The biomasses have overall decreased in the same period (figure 4.2.1).

F/(average F over time), 3 stocks

SSB/(average SSB over time), 3 stocks
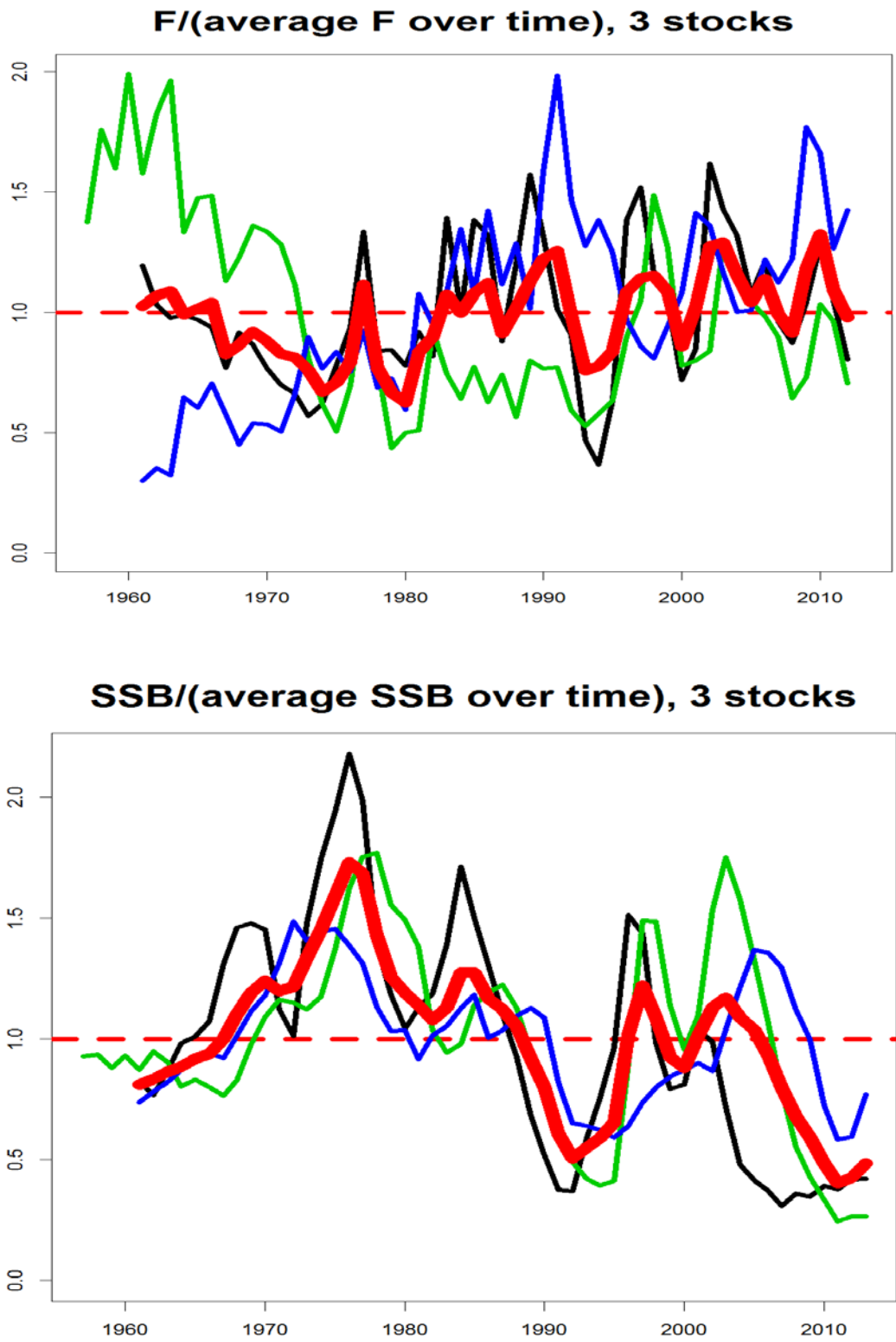
Figure 4.2.1.   Trend in fishing mortality and spawning stock biomass relative to the average for each stock over the time for which data are available. The graphs includes data for the stocks for which such estimates are available. The thick (red) line represents the average for all the stocks.

Of the stocks for which information exists, 2 out of 3 is above Fmsy. For 2 out of 3 stocks SSB are below MSY Btrigger (figure 4.2.2).

F/Fmsy, 3 stocks

SSB/MSY Btrigger, 3 stocks
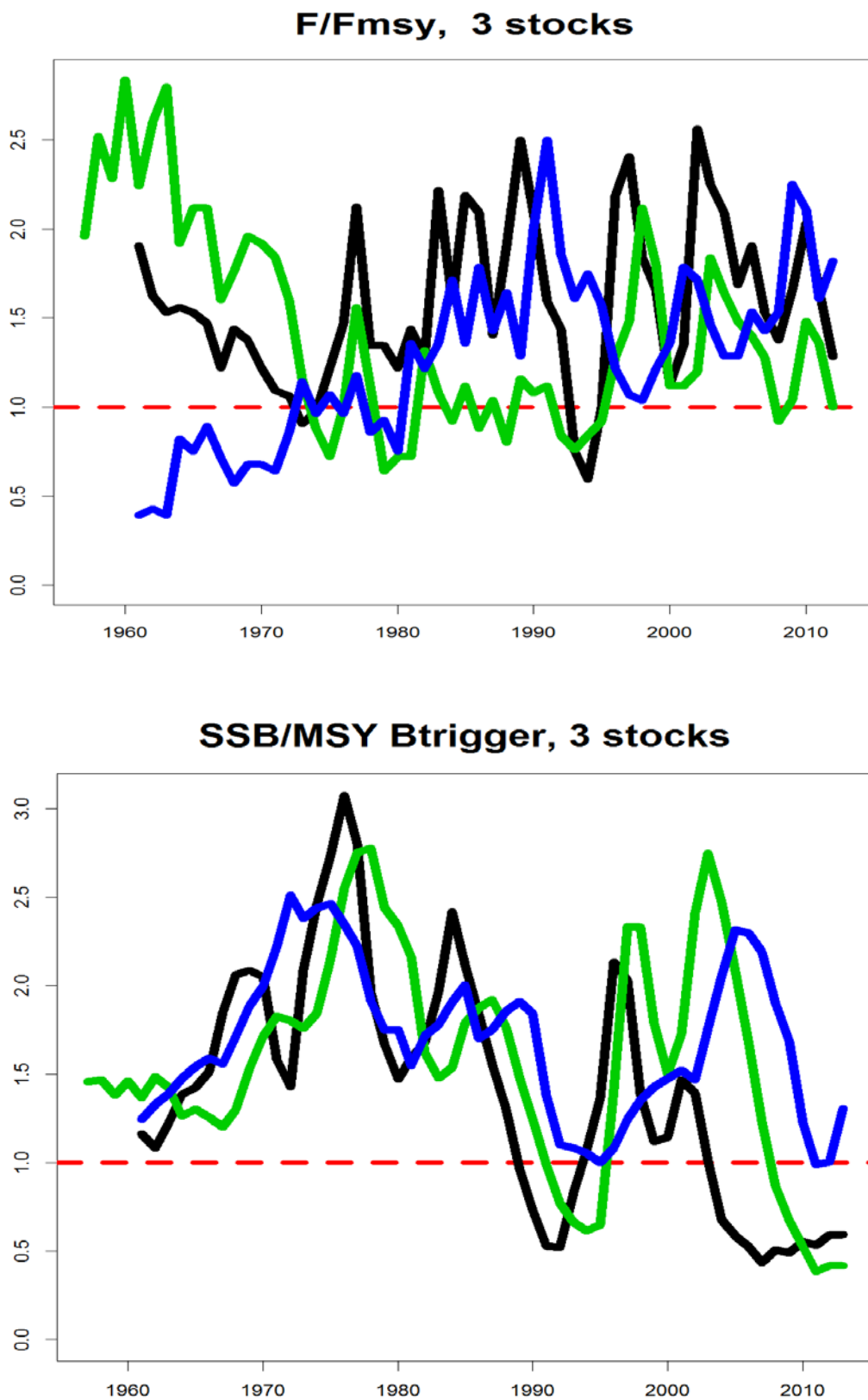
Figure 4.2.2. The status of fish stocks relative to reference points (Fmsy, MSY Btrigger) for those stocks for which this is available. The dotted (red) line represents the ratio 1.

4.3   Assessments and Advice

4.3.1   Assessment and advice regarding protection of biota and habitats

In 2013, ICES has not provided advice regarding protection of biota and habitats for this area.

4.3.2   Assessments and Advice regarding fisheries

Mixed fisheries and fisheries interactions

This Section has not been updated in 2013. The most recent description on mixed fisheries and fisheries interactions is available in ICES Advisory Report 2008, Section 4.3. This description can also be found on the ICES website: http://www.ices.dk/committe/acom/comwork/report/2008/2008/4.3%20Faroe%20Islands%20Fisheries%20Advice.pdf.

Sources of Information

ICES. 2008. Report of the ICES Advisory Committee, 2008. ICES Advice, 2008. Book 4.

4.4 Stock Summaries

4.4.1

ECOREGION	Faroe Plateau ecosystem
STOCK	Cod in Subdivision Vb₁ (Faroe Plateau)

Advice for 2014

ICES advises on the basis of the MSY approach that effort should be reduced such that fishing mortality in 2014 will be no more than F = 0.16, corresponding to a 69% reduction in the present fishing mortality. All catches are assumed to be landed.

Stock status

	F (Fishing Mortality)		
	2010	2011	**2012**
MSY (F_{MSY})	❌	❌	❌ Above target
Precautionary approach (F_{pa}, F_{lim})	⊙	⊙	⊙ Increased risk

	SSB (Spawning-Stock Biomass)		
	2011	2012	**2013**
MSY ($B_{trigger}$)	❌	❌	❌ Below trigger
Precautionary approach (B_{pa}, B_{lim})	⊙	⊙	⊙ Increased risk
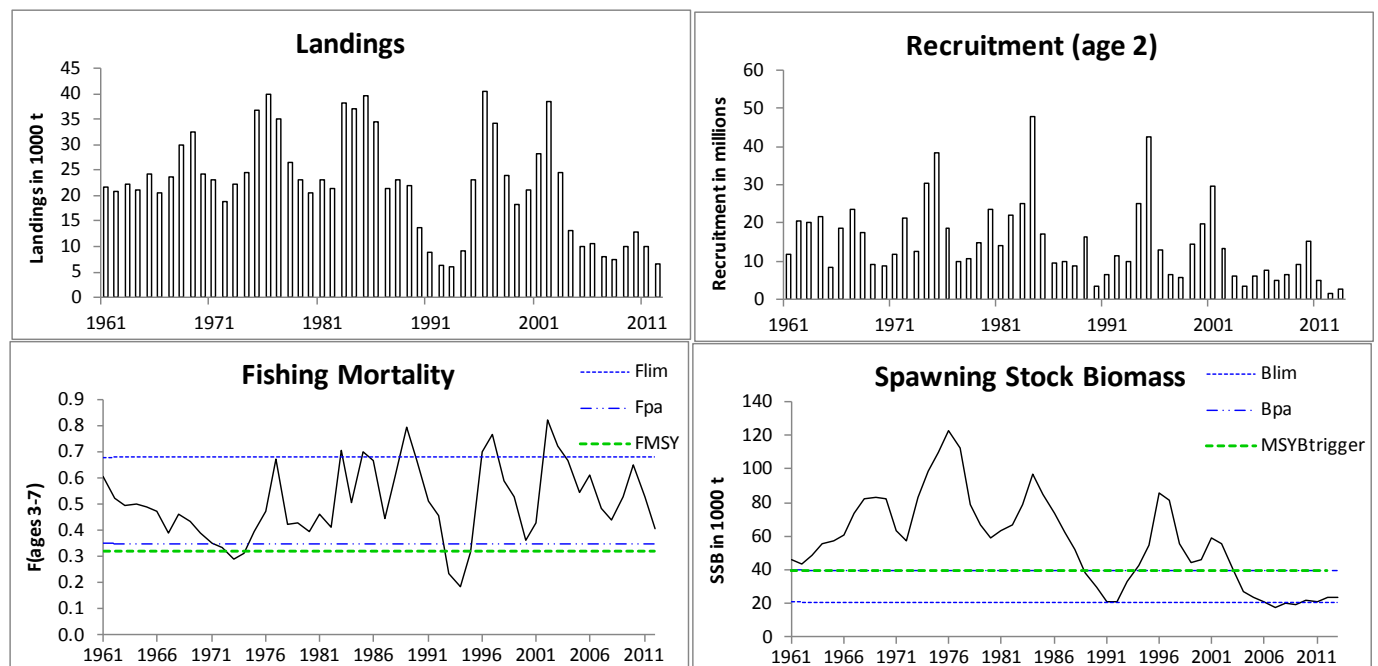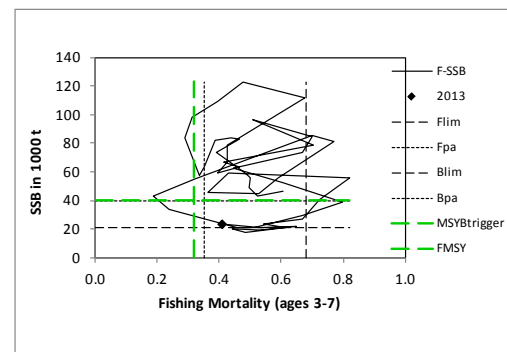
Figure 4.4.1.1   Cod in Subdivision Vb₁ (Faroe Plateau). Summary of stock assessment (weights in thousand tonnes). Top right: SSB/F for the time-series used in the assessment.

SSB has remained around B_{lim} since 2005. Fishing mortality has decreased since 2010 and now below F_{lim}, but still above F_{pa} and F_{MSY}. The 2009–2011 year classes are estimated to be below 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 approved by the authorities.

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 near-shore nursery areas of 1-group cod, which reduces 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. Cod recruitment depends both on stock size and primary production of the Faroe Shelf ecosystem. The indices of primary production on the Faroe Shelf (water depth< 130 m) have been low since 2002, except in 2004 and 2008–2010 when they were estimated to be above average. The indices of primary production over the outer areas (water depth 130-500 m) have remained high since 2000. Cod individual growth is highly correlated with the ratio of total phytoplankton production (Faroe Shelf + outer areas) to total fish biomass (cod+haddock+saithe). Over the last five decades, total fish biomass has fluctuated without any time trend, whereas the cod+haddock biomasses have decreased.

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.

Catch distribution	Total catch (2012) is 6 kt, where 59% was taken by longlines, 5% by jigging, 35% by trawlers, and less than 0.1% by other gear types. There was no industrial bycatch or unaccounted removals.

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.
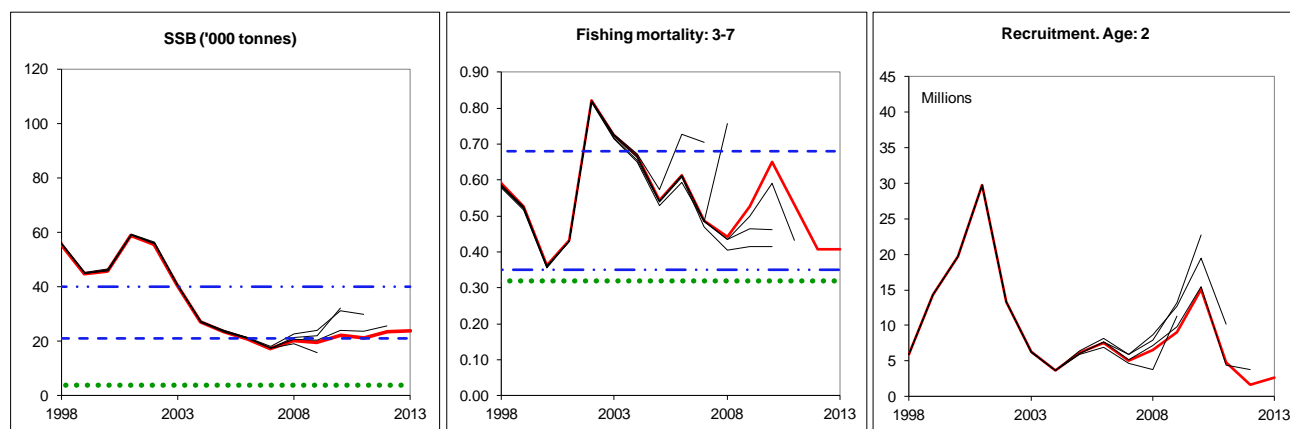
Figure 4.4.1.2   Cod in Subdivision Vb_1 (Faroe Plateau). Historical assessment results (final-year recruitment estimates included).

Scientific basis

Assessment type	XSA using landings-at-age data and age-disaggregated indices.
Stock data category	Category 1.
Input data	Commercial catches: Mainly Faroese landings, ages and length frequencies from catch sampling. ;
	survey indices (FO-GFS-Q1 and FO-GFS-Q3);
	no commercial indices;
	annual maturity data from FO-GFS-Q1;
	natural mortalities set at 0.2.
Discards and bycatch	Discards are not included and are assumed neglible.
Indicators	Primary production index.
Other information	None.
Working group report	NWWG (ICES, 2013).

ECOREGION	**Faroe Plateau ecosystem**	
STOCK	**Cod in Subdivision Vb₁ (Faroe Plateau)**	

Reference points

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{trigger}$	40 000 t.	B_{pa}.
	F_{MSY}	0.32	Provisional maximum sustainable yield, FLR stochastic simulations.
Precautionary Approach	B_{lim}	21 000 t.	Lowest observed SSB (1998 assessment).
	B_{pa}	40 000 t.	$B_{lim}e^{1.645\sigma}$, assuming a σ of about 0.40 to account for the relatively large uncertainties in the assessment.
	F_{lim}	0.68	$F_{pa}e^{1.645\sigma}$, assuming a σ of about 0.40 to account for the relatively large uncertainties in the assessment.
	F_{pa}	0.35	Close to F_{max} (0.34) and F_{med} (0.38) (1998 assessment).

(unchanged since: 2011)

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

	Fish Mort Ages 3–7	Yield/R	SSB/R
Average last 3 years	0.53	1.37	3.12
F_{max}	0.25	1.45	5.76
$F_{0.1}$	0.12	1.31	9.70
F_{med}	0.40	1.41	3.95

Outlook for 2014

Basis: F (2013) = F (2010–2012) = 0.41; SSB (2014) = 20; R (2013) = 3 million; catch (2013) = 7.

Rationale	F (2014)	Catch (2014)	Basis	SSB (2015)	%SSB change [1]
MSY approach	0.16	3.6	F_{MSY} * $SSB_{2013}/B_{trigger}$	26	26
Precautionary approach	0.35	7.1	F_{pa}	22	7
Zero catch	0	0	F = 0	30	46
Status quo	0.41	8.0	F_{sq}	21	2
	0.20	4.4	$F_{sq} \times 0.50$	25	21
	0.31	6.3	$F_{sq} \times 0.75$	23	11
	0.32	6.5	$F_{MSY} = F_{pa} \times 0.90$	22	10
	0.37	7.4	$F_{sq} \times 0.90$	21	6
	0.45	8.6	$F_{sq} \times 1.1$	20	−1

Weights in thousand tonnes.
[1] SSB 2015 relative to SSB 2014.

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 cod 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 0.35 and 0.32, respectively. 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 new management plan should include a stepwise reduction of the fishing mortality to F_{MSY} in 2015 and a recovery plan if the SSB declines below the $B_{trigger}$. The MSY $B_{trigger}$ has been defined at 40 kt (the former B_{pa}) and F_{MSY} at 0.32. If the SSB declines below the MSY $B_{trigger}$, the fishing mortality will be reduced by the relationship $F_{MSY} \times B_{act}/B_{trigger}$ until the SSB has increased again above the MSY $B_{trigger}$ and is thereafter kept at F_{MSY}.

MSY approach

ICES advises on the basis of the MSY approach to reduce fishing mortality by 69% in 2014 to 0.16. This is 49% below F_{MSY}, because SSB in 2014 is 49% below MSY $B_{trigger}$.

Precautionary approach

The fishing mortality should be kept below an F_{pa} of 0.35. This translates into a reduction in fishing mortality by 33% as compared to the average of the last three years (0.52).

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.

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 at low levels. 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.

It is not easy to control fishing mortality by effort management if catchability varies. For baited hook gear, catchability may be related to the amount of food available in the ecosystem (Steingrund *et al.*, 2009). Therefore, during the current low-productive period, fishing mortality may increase even though the number of fishing days is decreased.

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. The main spawning areas for cod are closed for nearly all fishing gears during spawning time. In 2011, additional areas were closed to protect incoming year classes of cod.

Changes in fishing technology and fishing patterns

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

Comparison with last year's assessment and advice

The perception of the status of the stock with respect to reference points and trends in this year's assessment is similar to that of last year's assessment. Comparing the 2011 estimates in last year's assessment (2012) with this year's assessment (2013) shows that recruitment has been revised upwards by 11%, the spawning-stock biomass revised downwards by 8%, and the fishing mortality revised upwards by 23%.

The basis of the advice is the same as last year.

Sources

ICES. 2013. Report of the North-Western Working Group, 25 April–2 May 2013. ICES CM 2013/ACOM:07.
Steingrund, P., Clementsen, D. H., and Mouritsen, R. 2009. Higher food abundance reduces the catchability of cod (*Gadus morhua*) to longlines on the Faroe Plateau. Fisheries Research, 100: 230–239.
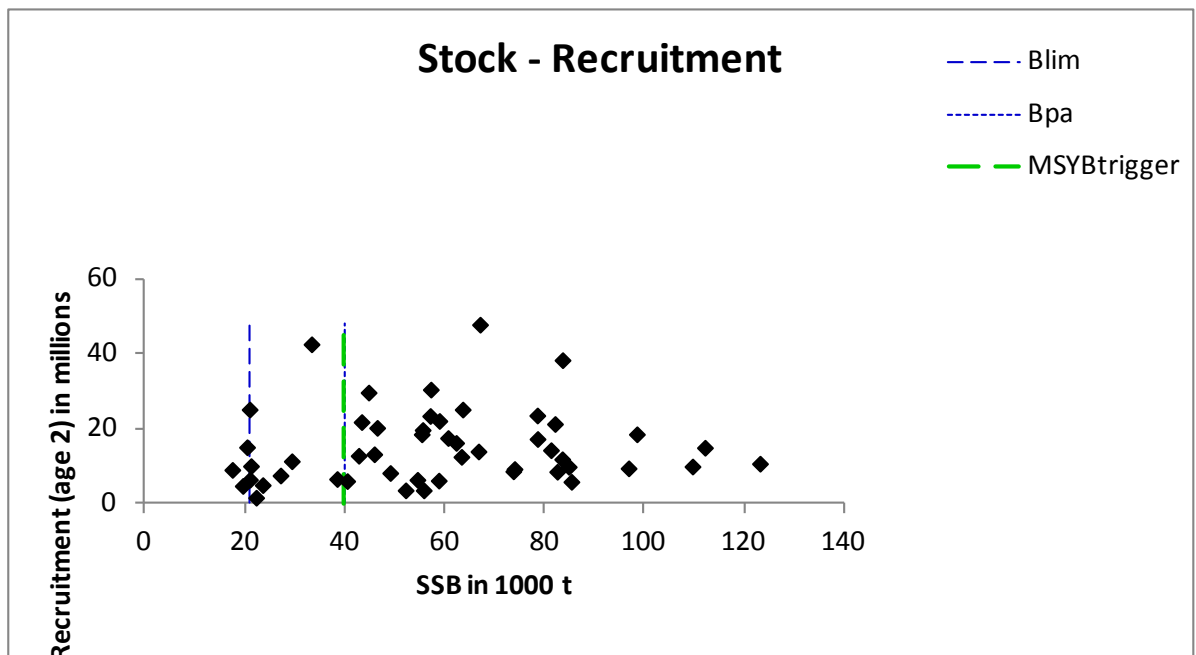
Figure 4.4.1.3 Cod in Subdivision Vb₁ (Faroe Plateau). Stock–recruitment plot.

Table 4.4.1.1   Cod in Subdivision Vb_1 (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[1,2]	9.0
1995	No fishing	0	12.5[1]	23.0
1996	F at lowest possible level	-	20[2]	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_{pa} (0.35)	< 19		18.3
2000	F less than proposed F_{pa} (0.35)	< 20		21.0
2001	F less than proposed F_{pa} (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		7.5
2009	No fishing. Development of a rebuilding plan.	0		10.0
2010	No fishing. Development of a rebuilding plan.	0		12.8
2011	Reduce F to below F_{pa}	< 16		9.9
2012	MSY framework, reduce F by 30%	< 10		11.3
2013	MSY approach, F< 0.20	4.8		11.5
2014	MSY approach, reduce F by 69 %	3.6		

Fishing year: 1 September–31 August the following year.
Weights in thousand tonnes.
[1] In the quota year 1 September–31 August the following year.
[2] The TAC was increased during the quota year.

Table 4.4.1.2 Faroe Plateau cod (Subdivision Vb₁). Nominal catch statistics (in tonnes) per country.

	Denmark	Faroe Islands	France	Germany	Iceland	Norway	Greenland	Portugal	UK (E/W/NI)	UK (Scotland)	United Kingdom	Total
1986	8	34,492	4	8		83	-		-	-	-	34,595
1987	30	21,303	17	12		21			8		-	21,391
1988	10	22,272	17	5		163					-	22,467
1989	-	20,535	-	7		285					-	20,827
1990	-	12,232	-	24		124					-	12,380
1991	-	8,203	- [1]	16		89			1		-	8,309
1992	-	5,938	3 [2]	12		39			74		-	6,066
1993	-	5,744	1 [2]	+		57			186		-	5,988
1994	-	8,724	-	2		36			56		-	8,818
1995	-	19,079	2 [2]	2		38			43		-	19,164
1996	-	39,406	1 [2]	+		507			126		-	40,040
1997	-	33,556	-	+		410			61 [2]		-	34,027
1998	-	23,308	- *	-		405			27 [2]		-	23,740
1999	-	19,156	- *	39	-	450			51			19,696
2000			1	2	-	374			18			395
2001		29,762	9 [2]	9	-	531 *			50			30,361
2002		40,602	20	6	5	573			42			41,248
2003		30,259	14	7	-	447	-		15			30,742
2004		17,540	2	3 [2]		414		1	15			17,975
2005		13,556	-			201			24			13,781
2006		11,629	7	1 [2]		49	5		1		-	11,692
2007		9,905	1 [2]			71	7		3	358		10,345
2008		9,394	1			40				383		9,818
2009		10,736	1			14	7			300		11,058
2010		13,878	1			10				312		14,201
2011		11,497	-									11,497
2012 *		7,671	0		29							7,700

* Preliminary, 1) Included in Vb2, 2) Reported as Vb.

Table 4.4.1.3 Faroe Plateau cod (Subdivision Vb₁). Officially reported catches as well as the corrections done to obtain the catches, which were used in the assessment.

	Officially reported	Faroese catches: in Vb1	Corrections in Vb1	on Faroe-Iceland ridge	in IIA within Faroe area jurisdiction	Catches reported as Vb2: UK (E/W/NI)	UK (Scotland)	UK	Foreign catches: French [2]	Greenland [2]	Russia [2]	UK [2]	Used in the assessment
1986	34595												34595
1987	21391												21391
1988	22467					715							23182
1989	20827					1229				12			22068
1990	12380					1090	-	205	17				13692
1991	8309					351	-	90					8750
1992	6066					154	+	176					6396
1993	5988						1	118					6107
1994	8818						1	227					9046
1995	19164	3330 [3]					-	551					23045
1996	40040						-	382					40422
1997	34027						-	277					34304
1998	23740						-	265					24005
1999	19696			-1600			-	210					18306
2000	395	21793 *		-1400			-	245					21033
2001	30361		-1766	-700			-	288					28183
2002	41248		-2409	-600				218	-				38457
2003	30742		-1795	-4700				254	-				24501
2004	17975		-1041	-4000				244	-				13178
2005	13781		-804	-4200				1129	-				9906
2006	11692		-690	-800				278					10480
2007	10345		-588	-1800				53		6			8016
2008	9818		-557	-1828				32					7465
2009	11058		-637	-487				38			26	4	10002
2010	14201		-823	-680				54			5		12757
2011	11497		-682	-918							3		9900
2012	7700 *		-455	-760							5		6490

*) Preliminary, 1) In order to be consistent with procedures used previous years, 2) Reported to Faroese Coastal Guard, 3) expected misreporting/discard.

Table 4.4.1.4   Faroe Plateau cod (Subdivision Vb₁). Summary of the stock assessment. * Prediction.

Year	Recruitment Age 2 thousands	SSB tonnes	Landings tonnes	Mean F Ages 3–7
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	109566	36775	0.3947
1976	18575	123077	39799	0.4749
1977	9995	112057	34927	0.6757
1978	10748	78497	26585	0.4259
1979	14998	66723	23112	0.4273
1980	23583	58887	20513	0.3945
1981	14001	63562	22963	0.4648
1982	22128	67033	21489	0.4138
1983	25162	78543	38133	0.7056
1984	47768	96774	36979	0.5081
1985	17323	84788	39484	0.7013
1986	9513	73696	34595	0.6691
1987	9918	62247	21391	0.4452
1988	8716	52136	23182	0.6073
1989	16283	38417	22068	0.7961
1990	3650	29351	13692	0.6670
1991	6665	21179	8750	0.5133
1992	11398	20912	6396	0.4583
1993	10103	33301	6107	0.2376
1994	25168	42738	9046	0.1855
1995	42544	54495	23045	0.3206
1996	12861	85325	40422	0.7006
1997	6455	81232	34304	0.7689
1998	5924	55547	24005	0.5898
1999	14344	44726	18306	0.5275
2000	19716	45857	21033	0.3633
2001	29691	58765	28183	0.4312
2002	13259	55766	38457	0.8207
2003	6245	40436	24501	0.7244
2004	3641	27094	13178	0.6679
2005	6113	23528	9906	0.5441
2006	7600	20967	10480	0.6145
2007	5041	17443	8016	0.4861
2008	6499	20391	7465	0.4412
2009	9100	19533	10002	0.5271
2010	15126	22211	12757	0.6505
2011	4819	21369	9900	0.5306
2012	1693	23561	6490	0.4074
2013*	2678	23747		
Average	14986	56448	21943	0.5047

ECOREGION   **Faroe Plateau ecosystem**
STOCK   **Cod in Subdivision Vb$_2$ (Faroe Bank)**

Advice for 2014

New data on landings and indices from the two annual Faroese surveys (2012 summer, 2013 spring) do not change the perception of the stock since 2008 and do not give reason to change the advice from 2011. The advice for the fishery in 2014 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 Faroe Bank has been closed to fishing since 1 January 2009. However, in the fishing years 2010–2011 and 2011–2012, respectively, a total of 78 and 100 fishing days were allowed to small jiggers in the shallow waters of the Bank. The closure advice should apply to all fisheries.

Sources

ICES. 2013. Report of the North-Western Working Group, 25 April–2 May 2013. ICES CM 2013/ACOM:07.

Table 4.4.2.1   Cod in Subdivision Vb$_2$ (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[1]
2001	Effort not to exceed that of 1996–1999	-		1.8[1]
2002	Effort not to exceed that of 1996–2000	-		1.9[1]
2003	Effort not to exceed that of 1996–2001	-		5.7[1]
2004	Effort not to exceed that of 1996–2002	-		4.3[1]
2005	Effort not to exceed that of 1996–2002	-		1.0[1]
2006	Effort not to exceed that of 1996–2002	-		0.95[1]
2007	Effort not to exceed that of 1996–2002	-		0.45[1]
2008	No fishing	0		0.22[1]
2009	No fishing	0		0.08[1]
2010	Same advice as last year	0		0.1[1]
2011	Same advice as last year	0		0.36[1]
2012	Same advice as last year	0		0.11[1]
2013	Same advice as last year	0		
2014	Same advice as last year	0		

Weights in thousand tonnes.
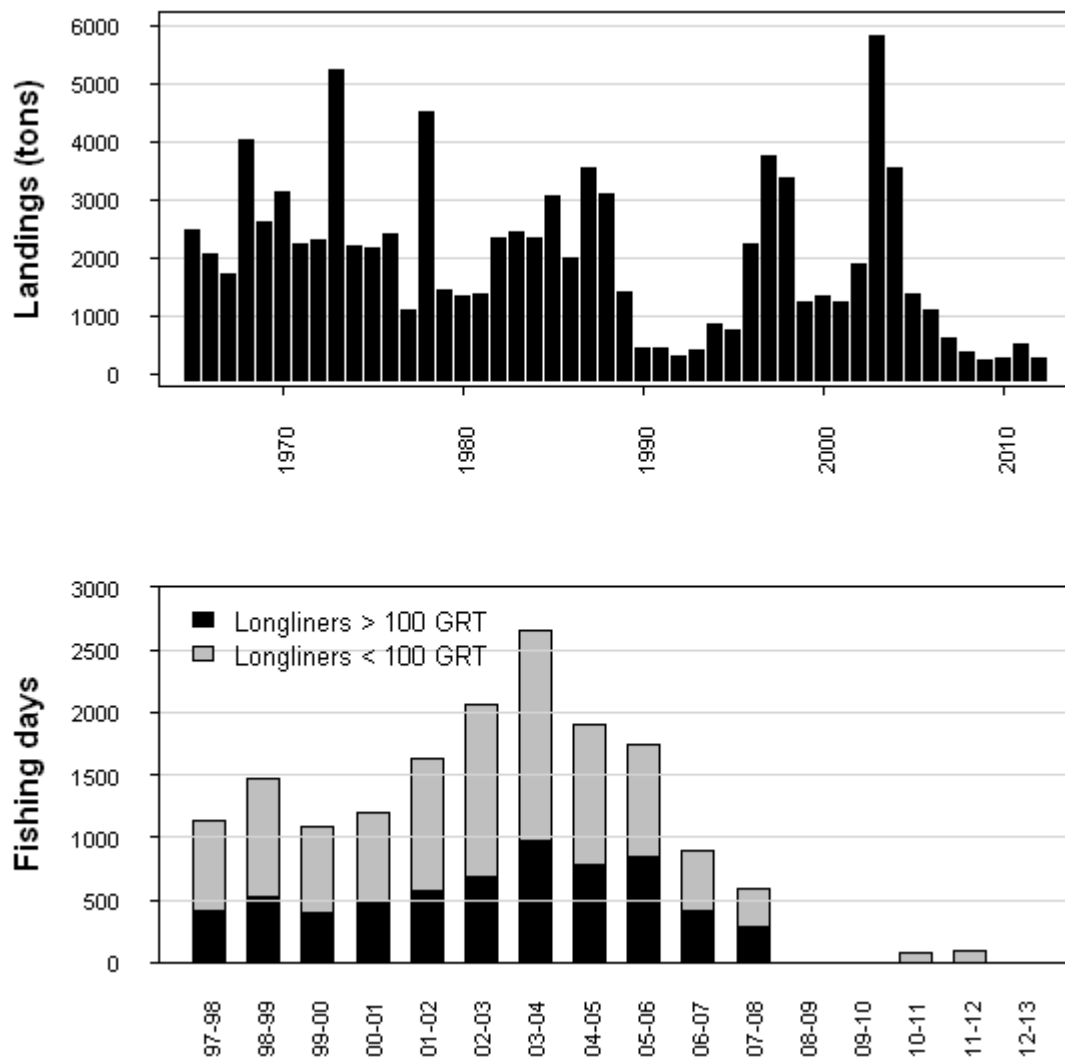[1] Working group estimates.

Figure 4.4.2.1   Cod in Subdivision Vb₂ (Faroe Bank). Top panel: Reported landings 1965–2012. Since 1992 only catches from Faroese and Norwegian vessels are considered to be taken on the Faroe Bank. Bottom panel: Fishing days 1997–2013 for longline gear types on the Faroe Bank.
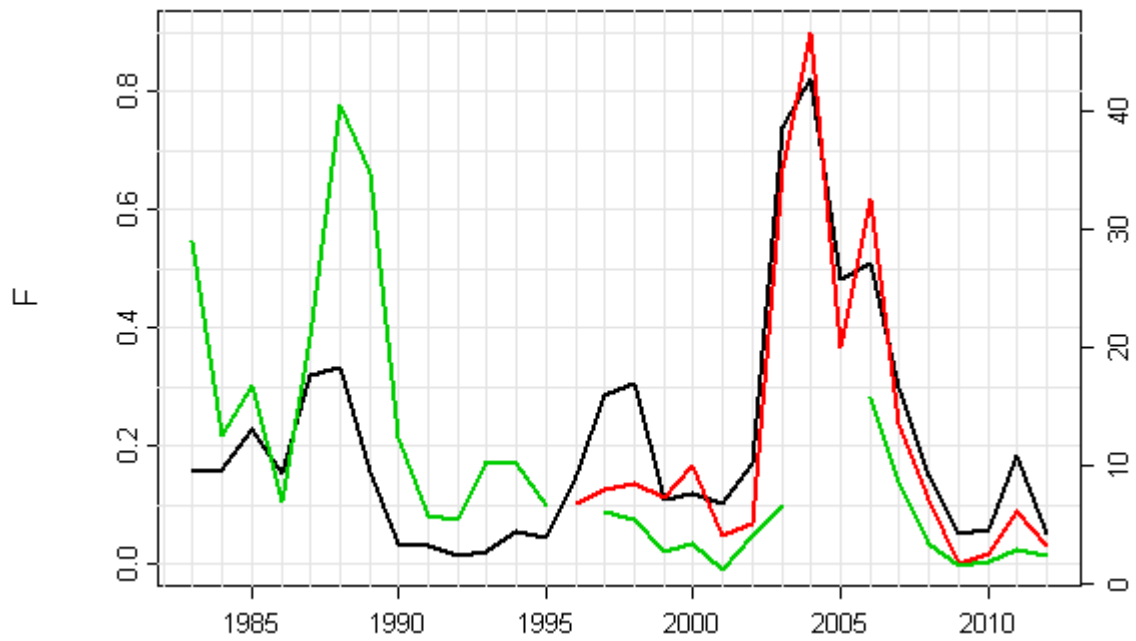
Figure 4.4.2.2   Cod in Subdivision Vb₂ (Faroe Bank). Estimated fishing mortality from the production model (black line) and exploitation ratio (ratio of landings to survey interpreted as an index of exploitation rate). Red = summer survey, Green = spring survey.
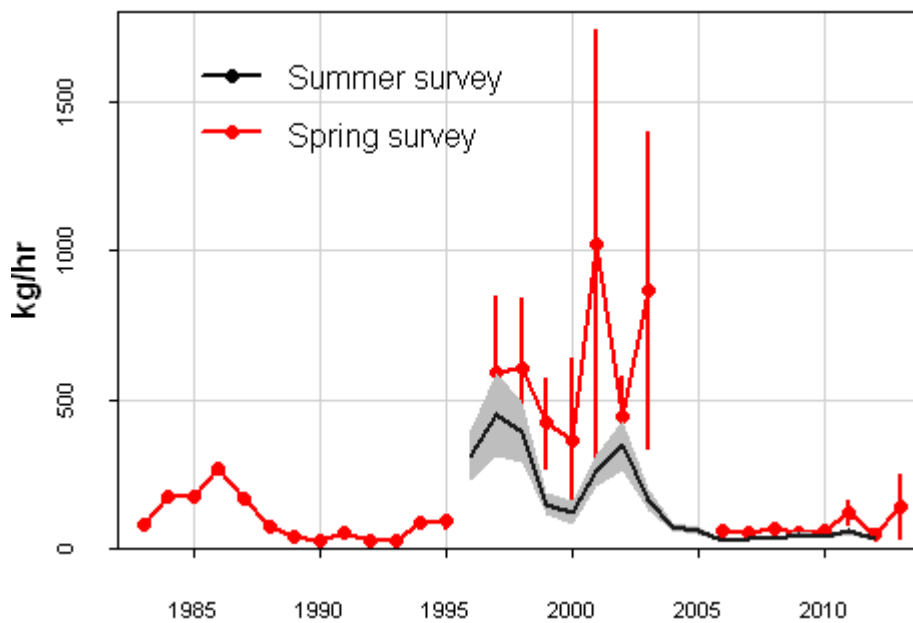

Figure 4.4.2.3   Cod in Subdivision Vb₂ (Faroe Bank). Catch per unit of effort in the spring and summer groundfish survey. Vertical bars and shaded areas show the standard error in the estimation of indices.

Table 4.4.2.2 Cod in Subdivision Vb$_2$ (Faroe Bank). Nominal catches (tonnes) by country 1986–2012 as officially reported to ICES. From 1992 catches by the Faroe Islands and Norway are used in the assessment.

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
Faroe Islands	1836	3409	2966	1270	289	297	122	264	717	561	2051	3459	3092	
Norway	6	23	94	128	72	38	32	2	8	40	55	135	147	
UK (E/W/NI)	-	-	-	-	2[2]	1[2]	74[2]	186[2]	56[2]	43[2]	126[3]	61[3]	27[3]	
UK (Scotland)	63[3]	47[3]	37[3]	14[3]	205[3]	90[3]	176[3]	118[3]	227[3]	551[3]	382[3]	277[3]	265[3]	
Total	1905	3479	3097	1412	568	426	404	570	1008	1195	2614	3932	3531	
Used in assessment					289	297	154	266	725	601	2106	3594	3239	

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Faroe Islands	1001		1094	1840	5957	3607	1270	1005	471	231	81	111	381	114
Norway	88	49	51	25	72	18	37	10	7	1	4	1		
Greenland	-	-	-	-	-	-	-	-	-	-	-	-		
UK (E/W/NI)	51[3]	18[3]	50[3]	42[3]	15[3]	15[3]	24[3]	1[3]						
UK (Scotland)	210[3]	245[3]	288[3]	218[3]	254[3]	244[3]	1129[3]	278[3]	53	32	38	54		
Total	1350	312	1483	2125	6298	3884	2460	1294	531	264	123	166	381	114
Correction of Faroese catches in Vb2			-65	-109	-353	-214	-75	-60	-28	-14	-5	-7	-23	-7
Used in assessment	1089	1194	1080	1756	5676	3411	1232	955	450	218	80	105	358	107

[*] Preliminary

[1] Includes Vb1.

[2] Included in Vb1.

[3] Reported as Vb.

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

Advice for 2014

ICES advises on the basis of the MSY approach that there should be no directed fishery on haddock in 2014. 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. All catches are assumed to be landed.

Stock status

		F (Fishing Mortality)		
	2010	2011	**2012**	
MSY (F_{MSY})	❌	❌	✅	At target
Precautionary approach (F_{pa}, F_{lim})	🟠	🟠	🟠	Increased risk

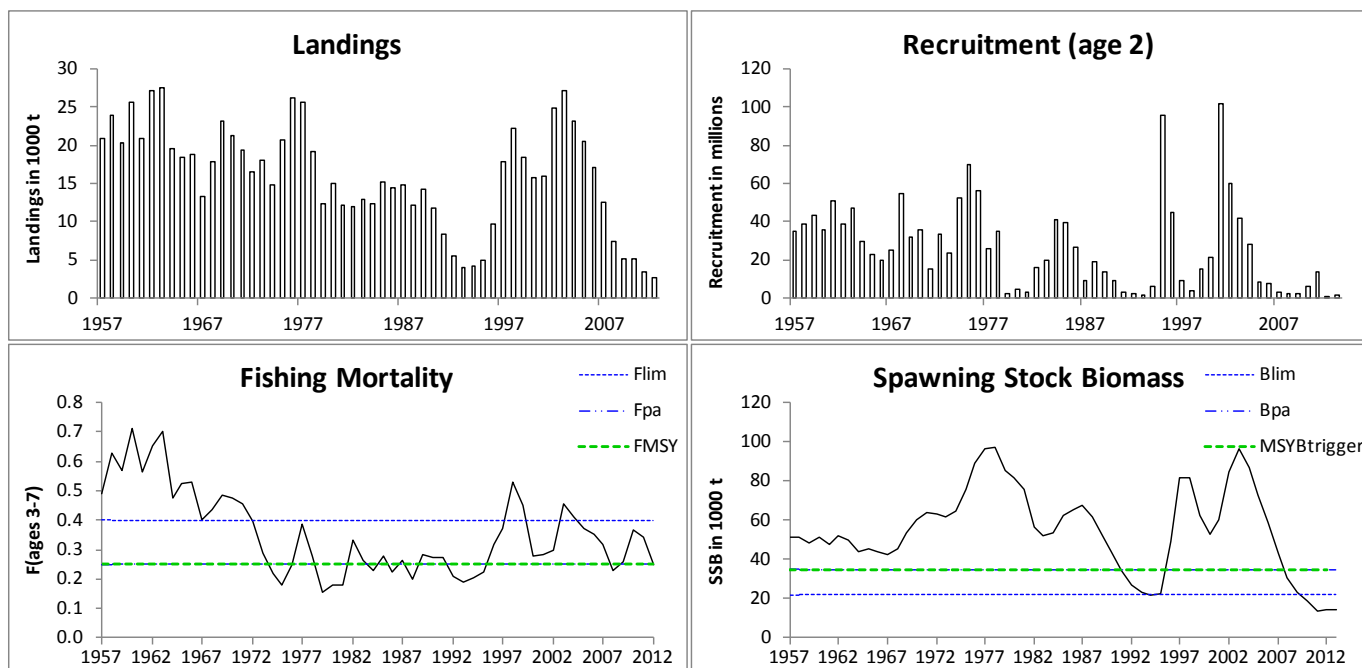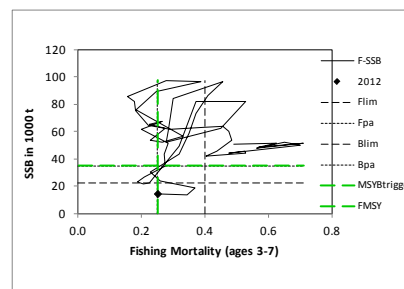|		SSB (Spawning-Stock Biomass)		
	2011	2012	**2013**	
MSY ($B_{trigger}$)	❌	❌	❌	Below trigger
Precautionary approach (B_{pa}, B_{lim})	❌	❌	❌	Reduced reproductive capacity

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 has since 2010 been estimated to be below B_{lim}. The fishing mortality has decreased from above F_{lim} in 2003 to F_{MSY} in 2012; average F for the last three years is, however, above F_{MSY}. Recruitment from 2003 onwards has been well below the long-term average.

Management plans

There is no explicit management plan for this stock. A group representing the Ministry of Fisheries, the Faroese industry, the University of the Faroe Islands, and the Faroe Marine Research Institute has, however, proposed a management plan based on general maximum sustainable yield (MSY) principles developed by ICES. The plan has not yet been approved by the authorities.

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 bycatches in trawl fisheries for saithe. Normally, longline gears account for 80–90% of the catches. In 2012 longlines accounted for 81% of the catches.

Catch distribution	Total landings (2012) are 3 kt, where longliners accounted for 81% and trawlers for 19%. 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).
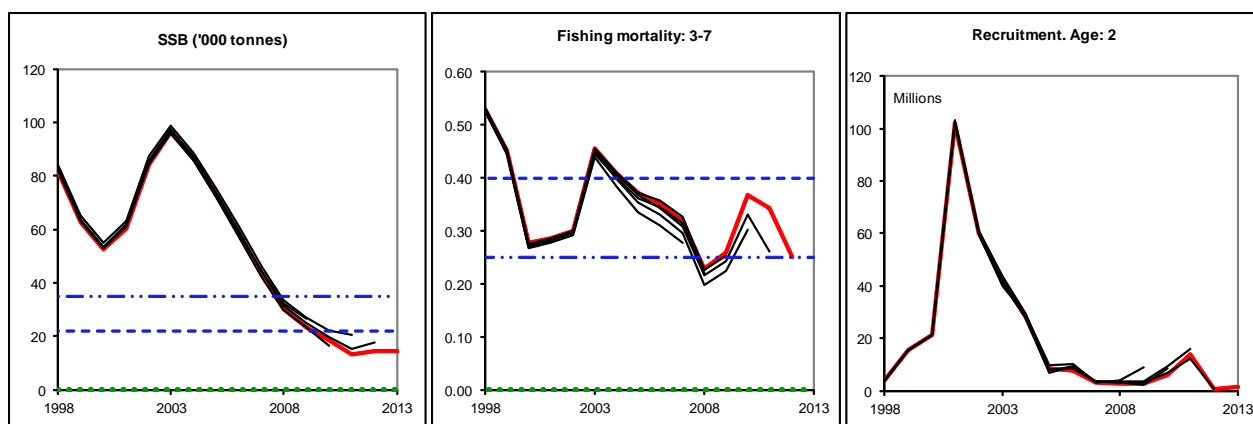

Figure 4.4.3.2   Haddock in Division Vb. Historical assessment results (final-year recruitment estimates included).

Scientific basis

Assessment type	XSA using landings-at- age data and age-disaggregated indices.
Stock data category	Category 1.
Input data	Commercial catches (mainly Faroese catches, ages and length frequencies from catch sampling); survey indices (FO-GFS-Q1&3); no commercial indices; annual maturity data from FO-GFS-Q1; natural mortalities set at 0.2.
Discards and bycatch	Discards are not included and are assumed negligible.
Indicators	Primary productivity index.
Other information	Biomass indices from two commercial fleets.
Working group report	NWWG (ICES, 2013).

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

Reference points

	Type	Value	Technical basis
MSY	MSY $B_{trigger}$	35 000 t.	B_{pa}
Approach	F_{MSY}	0.25	Stochastic simulations.
	B_{lim}	22 000 t.	Lowest observed SSB.
Precautionary	B_{pa}	35 000 t.	$B_{lim}e^{1.645\sigma}$, with σ of 0.3.
Approach	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 Ages 3–7	Yield/R	SSB/R
Average last 3 years	0.32	0.61	2.14
F_{max}	0.61	0.63	1.29
$F_{0.1}$	0.20	0.55	2.98
F_{med}	0.24	0.58	2.62

[*] F_{max} is poorly defined.

Outlook for 2014

Basis: F (2013) = F (2010–2012) = 0.32; SSB (2014) = 15; R (2013) = 2 million; catch (2013) = 4.

Rationale	F (2014)	Landings (2014)	Basis	SSB (2015)	%SSB change [1]
MSY approach	0.10	1	$F_{MSY} \times B_{2013}$/MSY $B_{trigger} = F_{sq} \times 0.50$	15	0
MSY and F_{pa}	0.25	2	$F_{sq} \times 0.78$	14	−7
Zero catch	0.00	0	F = 0	16	7
Status quo	0.16	2	$F_{sq} \times 0.50$	14	−7
	0.32	3	F_{sq}	13	−13
	0.45	4	$F_{sq} \times 1.40$	12	−20

Weights in thousand tonnes.
[1] SSB 2015 relative to SSB 2014.

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% in numbers of the haddock exploitable stock 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. The Faroese authorities have realized this and have reduced the number of allocated days substantially. In addition, some areas close to land have recently been closed in order to protect young cod; this will also have a protection effect on haddock. At present, there is no explicit management plan for this stock. A group representing the Ministry of Fisheries, the Faroese industry, the University of the Faroe Islands, and the Faroe Marine Research Institute has, however, proposed a management plan based on general maximum sustainable yield (MSY) principles developed by ICES. 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 $F_{MSY} \times B_{act}/MSY\ B_{trigger}$ until the SSB has increased again above the MSY $B_{trigger}$ and is thereafter kept at F_{MSY}. The plan has not yet been approved by the authorities.

MSY approach

Based on stochastic simulations in 2012 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 2014 is estimated below MSY $B_{trigger}$, fishing mortality should be reduced further. F in 2014 should be no more than $F_{MSY} \times B_{2013}$ / MSY $B_{trigger}$, however, because current biomass is estimated to be below B_{lim}. ICES recommends no directed fishing in 2014 and that 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.

Precautionary approach

Given the recent poor recruitment and slow growth and the low SSB, the forecast indicates that even a zero fishing mortality in 2014 will not result in getting the stock above B_{lim} in 2015. 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, and the indices in 2011 and 2012 were below average.

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.

Comparison with previous assessment and advice

This year's assessment shows that the 2012 assessment underestimated the 2011 recruitment by around 32%, underestimated the fishing mortality in 2011 by 31%, and overestimated the 2011 total and spawning-stock biomasses by 5% and 11%, respectively.

The advice is the same as last year.

Source

ICES. 2013. Report of the North-Western Working Group. 25 April–2 May 2013. ICES CM 2013/ACOM:07.
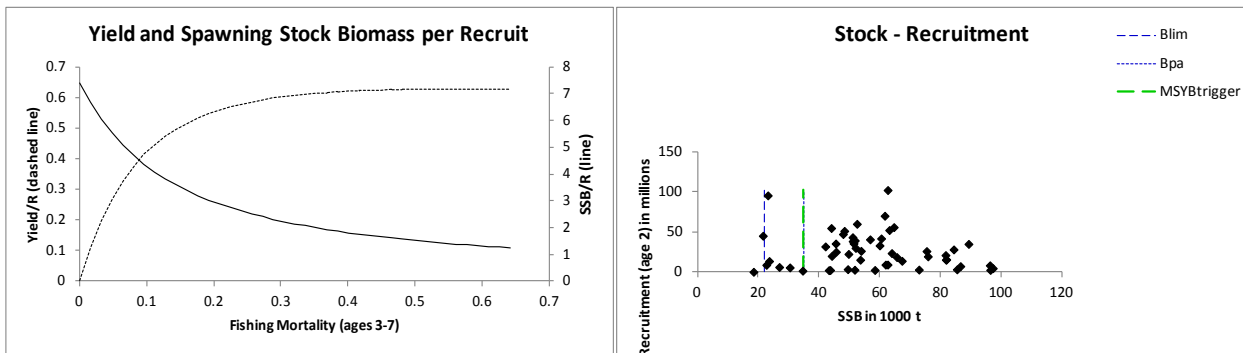

Figure 4.4.3.3   Haddock in Division Vb. Stock–recruitment and yield- and spawning-stock biomass-per-recruit plots.
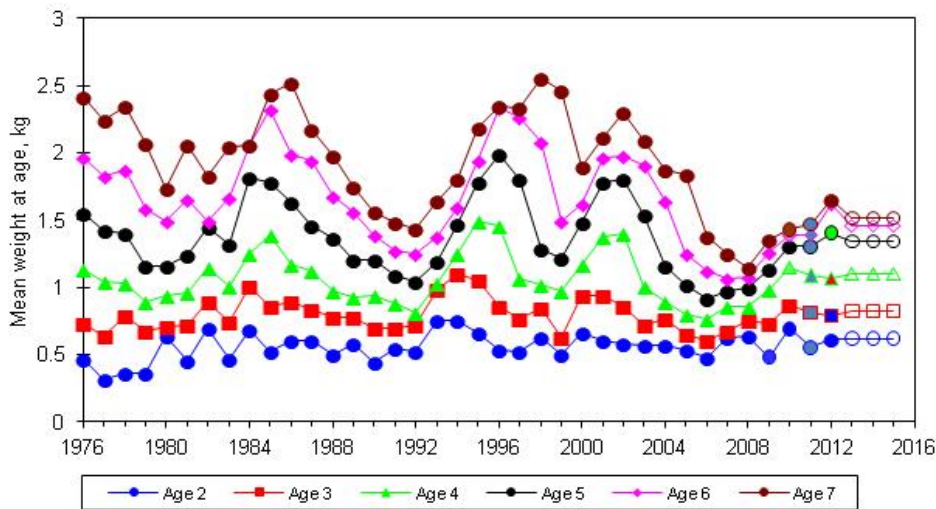

Figure 4.4.3.4   Haddock in Division Vb. Mean weights-at-age (2–7). The 2013–2015 values are the ones used in the short-term prediction (open symbols).

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		3.5
2012	No direct fishing; minimize bycatch, implement recovery plan	0		2.6
2013	No direct fishing; minimize bycatch, implement recovery plan	0		
2014	No direct fishing; minimize bycatch, implement recovery plan	0		

Fishing year: 1 September–31 August the following year.
Weights in thousand tonnes.

Table 4.4.3.2.   Faroe Plateau (Subdivision Vb1) HADDOCK. Nominal catches (tonnes) by country.

2000–2012 and Working Group estimates in Vb.

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012 [2]
Faroe Islands	13,620	13,457	20,776 [6]	21,615	18,995	18,172	15,600	11,689	6,728	4,895	4,932	3,350	2,475
France1	6	8	2	4	1	+	12 [5]	4 [5]	3 [5]	2 [5]	1	3	
Germany	1	2	6	1	6		1						
Greenland	22	0	4 [4]				1	9 [4]		6 [4]	12	+	1 [4]
Iceland			4										3
Norway	355	257	227	265	229	212	57	61	26	8	5		
Russia					16				10				
Spain					49								
UK (Engl. and Wales)	19	4	11 [5]	14	8	1	1						
UK (Scotland)5				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	3,353	2,479
Working Group estimate4	15,821	15,890	24,933	27,072	23,101	20,455	17,154	12,631	7,388	5,197	5,202	3,540	2,613

1) Including catches from Subdivision Vb2. Quantity unknown 1989–1991, 1993, and 1995–2001.

2) Preliminary data

3) From 1983 to 1996 catches included in Subdivision Vb2.

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

5) Reported as Division Vb.

6) Includes Faroese landings reported to the NWWG by the Faroes Marine Research Institute.

Table 4.4.3.3.   Faroe Bank (Subdivision Vb2) HADDOCK. Nominal catches (tonnes) by country, 2000–2012.

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012 [2]
Faroe Islands	1,565 [5]	1,948	3,698	4,934	3,594	2,444	1,375	810	556	192	178	194	134
France1						+							
Norway	48	66	28	54	17	45	1	8		3	1		
UK (Engl. and Wales)	[1]			[1]	[1]	[1]							
UK (Scotland)3	185	148	177	[4]	[1]	[1]		15	5	27 [4]			
Total	1,798	2,162	3,903	4,988	3,611	1,944	1,376	833	561	222	179	194	134

1) Catches included in Subdivision Vb1.

2) Provisional data.

3)From 1983 to 1996 includes also catches taken in Subdivision Vb1.

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	0.4900
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	31975	53583	23272	0.4853
1970	35600	59958	21361	0.4762
1971	15457	63920	19393	0.4564
1972	33213	63133	16485	0.3962
1973	23703	61621	18035	0.2902
1974	52334	64630	14773	0.2206
1975	70055	75404	20715	0.1799
1976	55973	89219	26211	0.2475
1977	26193	96374	25555	0.3873
1978	35100	97230	19200	0.2781
1979	2784	85398	12424	0.1551
1980	4944	81901	15016	0.1779
1981	3491	75845	12233	0.1814
1982	15835	56804	11937	0.3308
1983	19616	51811	12894	0.2654
1984	40761	53820	12378	0.2284
1985	39423	62594	15143	0.2761
1986	26480	65591	14477	0.2238
1987	9436	67287	14882	0.2643
1988	18762	61890	12178	0.2010
1989	14092	51720	14325	0.2853
1990	9393	43681	11726	0.2730
1991	2986	34609	8429	0.2750
1992	2674	26915	5476	0.2108
1993	1826	23156	4026	0.1876
1994	6426	21533	4252	0.2062
1995	95382	22673	4948	0.2263
1996	45255	49455	9642	0.3195
1997	9084	81785	17924	0.3731
1998	3730	81653	22210	0.5298
1999	15452	62608	18482	0.4517
2000	21220	52480	15821	0.2777
2001	102026	60466	15890	0.2850
2002	60042	84323	24933	0.2996
2003	41922	96244	27072	0.4555
2004	28268	86542	23101	0.4095
2005	8527	72891	20455	0.3720
2006	7487	58362	17154	0.3506
2007	3194	43230	12631	0.3194
2008	2712	30393	7388	0.2292
2009	2499	23600	5197	0.2600
2010	5884	18442	5202	0.3684
2011	13828	13492	3540	0.3433
2012	453	14641	2613	0.2505
2013	1633	14618		
Average	26508	54920	15988	0.3565

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

Advice for 2014

ICES advises on the basis of the MSY approach that effort should be reduced such that fishing mortality in 2014 will be no more than F = 0.28, corresponding to a 46% reduction in the present fishing mortality. All catches are assumed to be landed.

Stock status

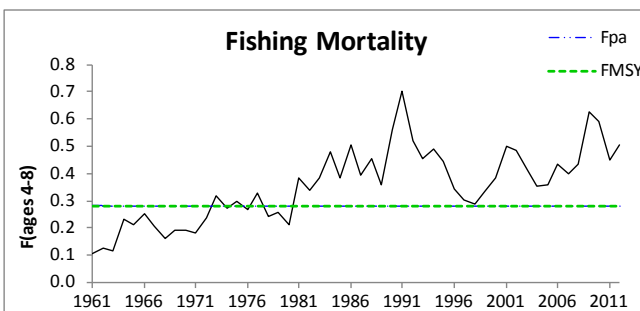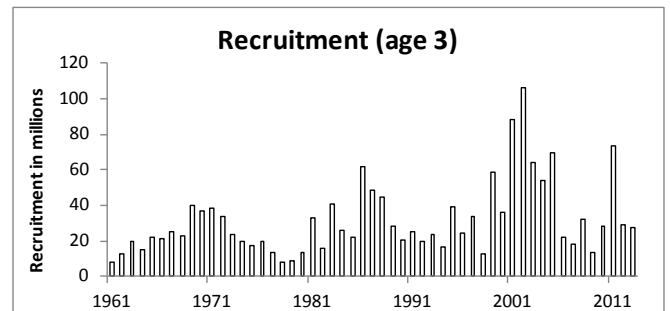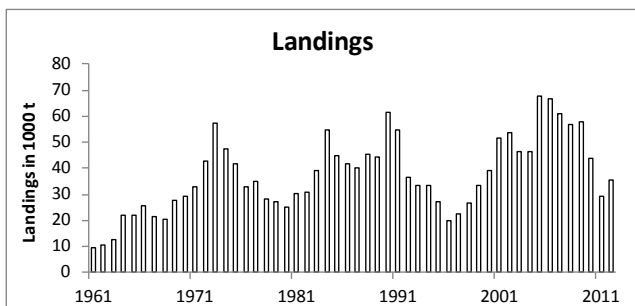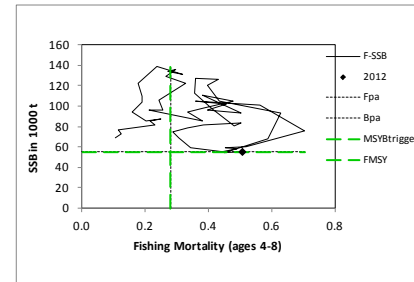|	**F (Fishing Mortality)**			
	2010	2011	**2012**	
MSY (F_{MSY})	❌	❌	❌	Above target
Precautionary approach (F_{pa})	❌	❌	❌	Harvested unsustainably
	SSB (Spawning-Stock Biomass)			
	2011	2012	**2012**	
MSY ($B_{trigger}$)	✅	✅	✅	Above trigger
Precautionary approach (B_{pa})	✅	✅	✅	Full reproductive capacity
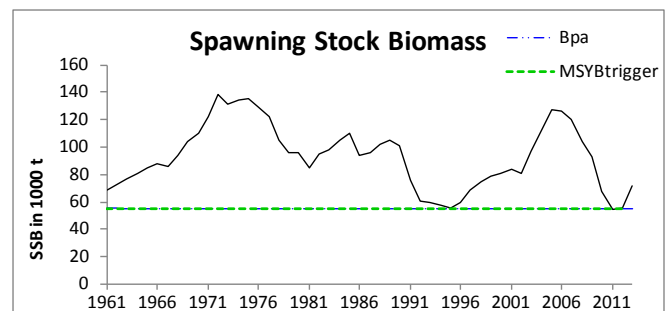
Figure 4.4.4.1   Saithe in Division Vb. Summary of stock assessment (weights in thousand tonnes). Top right: SSB/F for the time-series used in the assessment.

SSB has decreased substantially since 2005 but is estimated to be slightly above MSY $B_{trigger}$. Predicted recruitment in 2012 was below average (32 million). Fishing mortality has decreased from 2009 to 2011, but it increased in 2012 reflecting the rise in catches and is estimated above F_{MSY}.

Management plans

There is no explicit management plan for this stock. A group representing the Ministry of Fisheries, the Faroe industry, the University of the Faroe Islands, and the Faroe Marine Research Institute has, however proposed a management plan based on general maximum sustainable yield (MSY) principles developed by ICES. The plan has not yet been approved by the authorities.

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

A positive relationship between ocean productivity (gyre index) and biomass has been established for Faroe saithe.

The fisheries

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

Catch distribution	Total catch (2012) is 35 kt, of which 92% was taken by pair trawlers, 2.3% by single trawlers, and 5.6% by jiggers and other fishing fleets.

Quality considerations

There are no incentives to discard fish under the effort management system. The sampling of the landings in 2012 was 5% and is considered to be adequate. Recruitment indices are only available from age 3 and this is a source of uncertainty in recent recruitment estimates and forecast.
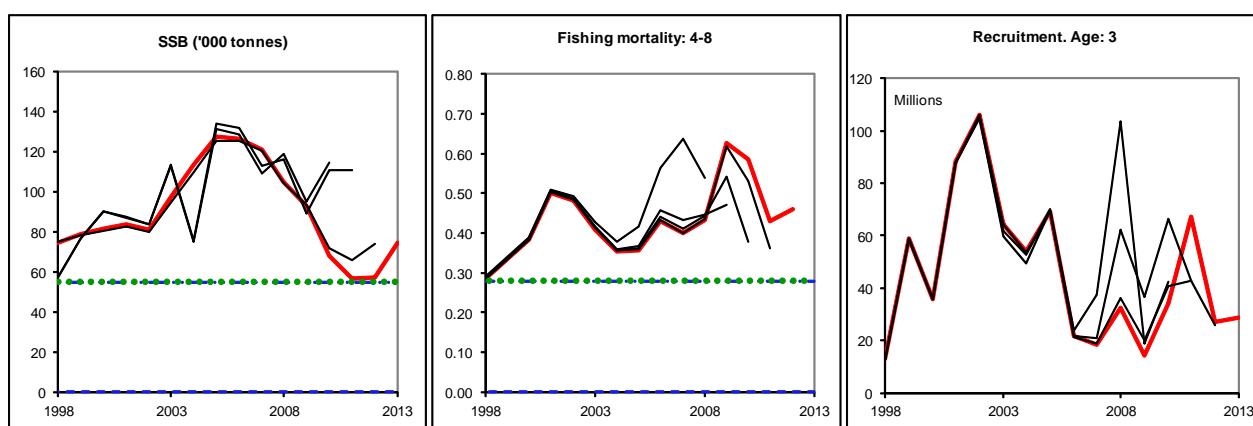
Figure 4.4.4.2   Saithe in Division Vb. Historical assessment results (final-year recruitment estimates included).

Scientific basis

Assessment type	XSA using landings-at- age data and age-disaggregated commercial and survey indices.
Stock data category	Category 1.
Input data	Commercial catches (Mainly Faroese catches, ages and length frequencies from catch sampling);
	survey indices FO-GFS-Q1;
	commercial indices: pair-trawler fleet;
	annual maturity data from FO-GFS-Q1 (commercial catch during surveys);
	natural mortalities set at M = 0.2.
Discards and bycatch	Discards are not included and are assumed negligible.
Indicators	Primary production and gyre indexes.
Other information	A benchmark assessment was performed in 2010.
Working group report	NWWG (ICES, 2013).

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

Reference points

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{trigger}$	55 000 t.	Breakpoint in segmented regression.
	F_{MSY}	0.28	Provisional stochastic simulations (performed in 2011).
Precautionary Approach	B_{lim}	Undefined.	
	B_{pa}	55 000 t.	B_{loss} in 2011.
	F_{lim}	Undefined.	
	F_{pa}	0.28	Consistent with 1999 estimate of F_{med}.

(Unchanged since 2011)

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

	Fish Mort Ages 4–8	Yield/R	SSB/R
Average last 3 years	0.49	1.31	1.93
F_{max}	0.47	1.31	2.04
$F_{0.1}$	0.19	1.19	5.21
F_{med}	0.30	1.28	3.40

Outlook for 2014

Basis: F (2013) = F (2010–2012) unscaled = 0.51; SSB (2014) = 75 kt; R (2013) (GM 2007–2011) = 28 million; catch (2013) = 54 kt.

Rationale	F (2014)	Catch (2014)	Basis	SSB (2015)	% SSB change [1]
MSY approach	0.28	29	F_{MSY} (= F_{sq} × 0.54)	88	17
Precautionary Approach	0.28	29	F_{pa} (= F_{sq} × 0.54)	88	17
Zero catch	0	0	F = 0	113	50
Status quo	0.13	15	F_{sq} × 0.25	101	34
	0.26	27	F_{sq} × 0.50	90	20
	0.39	39	F_{sq} × 0.75	80	7
	0.46	45	F_{sq} × 0.90	75	0
	0.51	49	F_{sq}	71	−5

Weights in thousand tonnes.
[1] SSB 2015 relative to SSB 2014.

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% in numbers of the saithe exploitable stock 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. At present, there is no explicit management plan for this stock. A group representing the Ministry of Fisheries, the Faroese industry, the University of the Faroe Islands, and the Faroe Marine Research Institute has, however, proposed a management plan based on general maximum sustainable yield (MSY) principles developed by ICES. The MSY $B_{trigger}$ has been defined at 55 kt (the former B_{pa}) and F_{MSY} at 0.28 (ICES, 2011). If the SSB declines below the MSY $B_{trigger}$, the fishing mortality will be reduced by the relationship F_{MSY} × B_{act}/$B_{trigger}$ until the SSB has increased again above the MSY $B_{trigger}$ and is thereafter kept at F_{MSY}.

MSY approach

Following the ICES MSY framework implies that fishing mortality in 2013 should be no more than $F_{MSY} = 0.28$ (ICES, 2011), resulting in a reduction of 46% in the present fishing mortality.

Precautionary approach

Following the precautionary approach implies that fishing mortality in 2013 should be no more than $F_{pa} = 0.28$, resulting in a reduction of 46% in present fishing mortality.

Additional considerations

Management considerations

In the fishing year 2011/2012, the pair trawlers (Group 2 in the management system) and the large otter board trawlers (Group 1) were merged into one group (Group 2) and now almost all saithe fishing is performed by pair tawlers. It is not clear what effect this has on the fishing mortality on saithe. However, a further reduction of effort is required to bring F at or below F_{MSY}. The present spawning closures should be maintained for pair trawlers and applied for other fleets also.

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 92%, 2.3%, and 2.4%, respectively. The pair trawlers, jiggers, and single trawlers are regulated by the total number of allocated fishing days and by area closures.

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 was introduced 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 can lead to improvement of fishing technology and efficiency. Presently, ICES is not able to quantify these changes.

Uncertainties in the assessment and forecast

The assessment is relatively uncertain. Recruitment indices are only available from age 3 and this is a source of uncertainty in recent recruitment estimates and forecast.

Comparison with last year's assessment and advice

In addition to the pair trawler cpue the spring index was used in 2013 to calibrate the assessment. The commercial cpue was constructed as in previous years, i.e. taking into account the range of the spatial distribution of saithe using survey information.

In the 2012 assessment SSB was predicted at SSB (2012) = 74 000 t whereas the estimated value in the 2013 assessment was SSB (2012) = 57 000 t (23% overestimation). Fishing mortality was overestimated by 8% from Fbar = 0.5 to Fbar = 0.46 in the current assessment. Recruitment for 2012 was estimated at 26 million in the 2012 assessment. The estimated value in the 2013 assessment was 27 million.

Sources

ICES. 2011. Report of the North-Western Working Group (NWWG), 26 April–3 May 2011. ICES CM 2011/ACOM:07.
ICES. 2013. Report of the North-Western Working Group (NWWG), 26 April–3 May 2013. ICES CM 2013/ACOM:07.
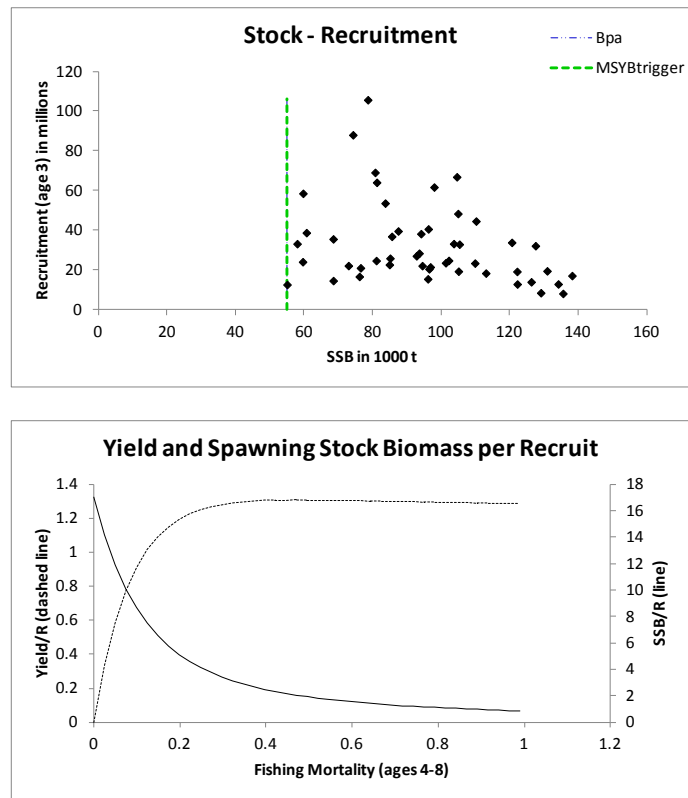
Figure 4.4.4.3   Saithe in Division Vb. Top: Stock–recruitment plot, SSB at spawning time. Bottom: Yield and spawning-stock biomass-per-recruit plot.

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[1]	33
1995	TAC	< 22	39[1]	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		29
2012	Reduce fishing effort to generate F below F_{MSY} (0.28)	< 40		35
2013	F<0.28	< 29.1		
2014	Reduce fishing effort to generate F below F_{MSY} (0.28)	< 29		

Weights in thousand tonnes.
Fishing year: 1 September–31 August the following year.
[1] 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, 1988–2012, as officially reported to ICES, and the ICES estimates.

Country	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
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	32,439	
France [3]	313	-	-	-	120	75	19	10	12	9	17	-	273
Germany	-	-	-	32	5	2	1	41	3	5	-	100	230
German Dem.Rep.	-	9	-	-	-	-	-	-	-	-	-	-	-
German Fed. Rep.	74	20	15	-	-	-	-	-	-	-	-	-	-
Greenland	-	-	-	-	-	-	-	-	-	-	-	-	-
Ireland	-	-	-	-	-	-	-	-	-	-	-	0	0
Netherlands	-	22	67	65	-	-	-	-	-	-	-	160	72
Norway	52	51	46	103	85	32	156	10	16	67	53	-	-
Portugal	-	-	-	-	-	-	-	-	-	-	-	-	20
UK (Eng. & W.)	-	-	-	5	74	279	151	21	53	-	19	67	32
UK (Scotland)	92	9	33	79	98	425	438	200	580	460	337	441	534
USSR/Russia [2]	-	-	30	-	12	-	-	-	18	28	-	-	-
Total	45027	43,735	60,014	53,605	36,373	33,532	33,171	27,200	19,949	22,306	26,065	33,207	1,161
Working Group estimate [4,5]	45285	44,477	61,628	54,858	36,487	33,543	33,182	27,209	20,029	22,306	26,421	33,207	39,020

Country	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012 [1]
Denmark	-	-	-	-	-	34	-					
Estonia	-	-	-	-	-	-						
Faroe Islands	49,676	55,165	47,933	48,222	71,496	70,696	64,552	61,117	61,889	46,686	31,439	38,336
France	934	607	370	147	123	315	108	97	68	46	94	40
Germany	667	422	281	186	1	49	3	3	0			
Greenland	-	125	-			73	239	0	1			2
Irland	5	-	-	-	-	-	-	-	-			
Iceland	-	-	-	-	-	-	-	-	148	-		
Netherlands	0	0	0	0	0	0	3	0	0	0		
Norway	60	77	62	82	82	35	81	38	23	28		
Portugal	-	-	-	5	-	-	-	-	-			
Russia	1	10	32	71	210	104	159	38	44	3		
UK (E/W/NI)	80	58	89	85	32	88	4	-	-			
UK (Scotland)	708	540	610	748	4,322	1,011	408	400	685			
United Kingdom	-	-	-	-	-	-	-	-	-	706	19	
Total	52,131	57,004	49,377	49,546	76,266	72,405	65,557	61,693	62,858	47,469	31,552	38,378
Working Group estimate [4,5,6,7]	51,786	53,546	46,555	46,355	67,967	66,902	60,785	57,044	57,949	43,885	29,087	35,463

[1] Preliminary.

[2] As from 1991.

[3] Quantity unknown 1989-91.

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

[5] Includes French, Greenlandic, Russian catches from Division Vb, as reported to the Faroese coastal guard service.

[6] Includes Faroese, French, Greenlandic catches from Division Vb, as reported to the Faroese coastal guard service.

[7] 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.

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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	68552	9592	0.106
1962	12256	72979	10454	0.125
1963	19837	76518	12693	0.114
1964	14811	81092	21893	0.230
1965	22362	84947	22181	0.214
1966	21229	87493	25563	0.250
1967	24897	85639	21319	0.204
1968	22879	94142	20387	0.160
1969	39798	103696	27437	0.191
1970	37092	109878	29110	0.189
1971	38446	122171	32706	0.179
1972	33424	138219	42663	0.236
1973	23621	130940	57431	0.318
1974	19420	134184	47188	0.272
1975	17327	135577	41576	0.297
1976	19709	129106	33065	0.267
1977	13105	122237	34835	0.328
1978	8332	105352	28138	0.243
1979	8686	96138	27246	0.257
1980	13074	96286	25230	0.211
1981	33144	85127	30103	0.382
1982	15673	94503	30964	0.336
1983	40829	97961	39176	0.385
1984	26072	104927	54665	0.478
1985	22327	110189	44605	0.382
1986	61847	93579	41716	0.505
1987	48600	96440	40020	0.396
1988	44833	102160	45285	0.456
1989	28599	105002	44477	0.360
1990	20708	101255	61628	0.562
1991	24969	76097	54858	0.704
1992	19552	60634	36487	0.520
1993	23778	59544	33543	0.452
1994	16873	57948	33182	0.491
1995	38969	55018	27209	0.443
1996	24308	59642	20029	0.344
1997	33472	68591	22306	0.305
1998	12741	74351	26421	0.287
1999	58789	78536	33207	0.335
2000	35781	81162	39020	0.383
2001	87950	83682	51786	0.502
2002	105894	80682	53546	0.483
2003	64469	96734	46555	0.414
2004	53818	112908	46355	0.355
2005	69512	127357	67967	0.358
2006	21688	126180	66902	0.433
2007	18407	120552	60785	0.398
2008	32493	104483	57044	0.434
2009	13606	92801	57949	0.628
2010	27986	67499	43885	0.589
2011	73259	54354	29087	0.449
2012	28990	55251	35463	0.506
2013	27827	71784		
Average	31621	93058	37441	0.355