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Report of the ICES Advisory Committee 2012

Book 4

The Faroe Plateau Ecosystem

International Council for the Exploration of the Sea

Conseil International pour l'Exploration de la Mer

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BOOK 4

Section **Page**

4 FAROE PLATEAU ECOSYSTEM

4.1 Ecosystem overview

This Section has not been updated in 2012. 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 Human impacts on the ecosystem

4.2.1 Fishery effects on benthos and fish communities

This Section has not been updated in 2012. The most recent description on Fishery effects on benthos and fish communities is available in ICES Advisory Report 2008, Section 4.2. This description 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:

4.3 Assessments and Advice

4.3.1 Assessment and advice regarding protection of biota and habitats

In 2012, 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 2012. 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.

The state and advice of the individual stocks are presented in the stock sections. The state of stocks and advice (according to the Section 1.2) are summarized in the table below.

Table 4.3.2.1 State of the stock and advice in the Faroe Plateau ecoregion.

Stock	State of the stock				Outlook options			ICES advice (in tonnes or effort)
	Fishing mortality in relation to F_{MSY}	**Fishing mortality in relation to precautionary approach (F_{PA}/F_{lim})**	**Spawning biomass in relation to MSY $B_{trigger}$**	**Spawning biomass in relation to precautionary approach (B_{PA}/B_{lim})**	**MSY approach** (within the precautionary approach)	**Precautionary approach / considerations**	**Management plan**	
Faroe Plateau Cod	Above target	Increased risk	Below trigger	Increased risk	Effort should be reduced such that fishing mortality in 2013 will be no more than F = 0.20, corresponding to a 63% reduction in the present fishing mortality	F below Fpa of 0.35 translate into reduction in fishing mortality by 30% as compared to the average of the last 3 years	-	MSY approach: F<0.20
Faroe Bank Cod	Unknown	Unknown	Unknown	Unknown	-	Closure of the fishery	-	Same advice as last year: Zero catch
Faroe Haddock	Above target	Increased risk	Below trigger	Reduced reproductive capacity	F in 2013 should be no more than FMSY * B2013 / MSY Btrigger = 0.15	No direct fishing; minimize bycatch; implement recovery plan	-	Precautionary considerations: Zero catch
Faroe Saithe	Above target	Harvested unsustainably	Above trigger	Full reproductive capacity	Effort should be reduced such that fishing mortality in 2013 will be no more than F = 0.28, corresponding to an 44% reduction in the present fishing mortality	Fishing mortality to be no more than Fpa = 0.28, resulting in a reduction of 44% in present fishing mortality	-	MSY approach: F<0.28

The advice for Ling appears in ICES Advice 2012, Section 9.4.10.3 on Widely Distributed Stocks. This is a biennial advice.

Table 4.3.2.2 Summary of the stock categories in the Faroe Plateau ecoregion (see section 1.2 for category definitions).

Total Number of stock in the ecoregion	4
Data rich stocks	3
Data-limited stocks	1

Table 4.3.2.3 Status of data rich stocks (n=3) for the Faroe Plateau ecoregion 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 $B_{trigger}$ $SSB_{2012} \geq$ MSY $B_{trigger}$	is below MSY $B_{trigger}$ $SSB_{2012} <$ MSY $B_{trigger}$		is not defined
MSY Approach	**Fishing Mortality…**		✓	✗		?
	is at or below MSY ($F_{2011} \leq F_{MSY}$)	✓	-	-		-
	is above MSY ($F_{2011} > F_{MSY}$)	✗	33% (1)	67% (2)		-
	is not defined	?	-	-		-
			is at or above PA $SSB_{2012} \geq B_{pa}$	is at increased risk $B_{pa} > SSB_{2012} > B_{lim}$	is below limit $SSB_{2012} < B_{lim}$	is not defined
Precautionary Approach	**Fishing Mortality…**		✓	○	✗	?
	is at or below PA ($F_{2011} \leq F_{pa}$)	✓	-	-	-	-
	is at increased risk ($F_{lim} > F > F_{pa}$)	○	-	33% (1)	33% (1)	-
	is above PA ($F_{2011} > F_{pa}$)	✗	33% (1)	-	-	-
	is not defined	?	-	-	-	-

ECOREGION Faroe Plateau ecosystem
STOCK Cod in Subdivision Vb_1 (Faroe Plateau)

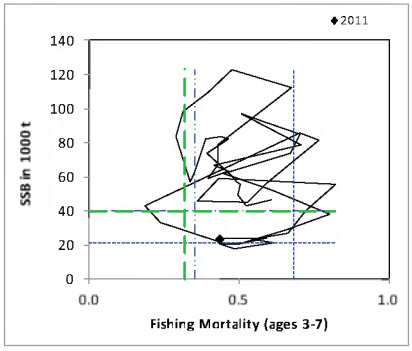
Advice for 2013

ICES advises on the basis of the MSY approach that effort should be reduced such that fishing mortality in 2013 will be no more than F = 0.20, corresponding to a 63% reduction in the present fishing mortality.

Stock status

F (Fishing Mortality)	2009	2010	2011	
MSY (F_{MSY})	✗	✗	✗	Above target
Precautionary approach (F_{pa},F_{lim})	o	o	o	Increased risk

SSB (Spawning-Stock Biomass)	2010	2011	2012	
MSY ($B_{trigger}$)	✗	✗	✗	Below trigger
Precautionary approach (B_{pa},B_{lim})	o	o	o	Increased risk



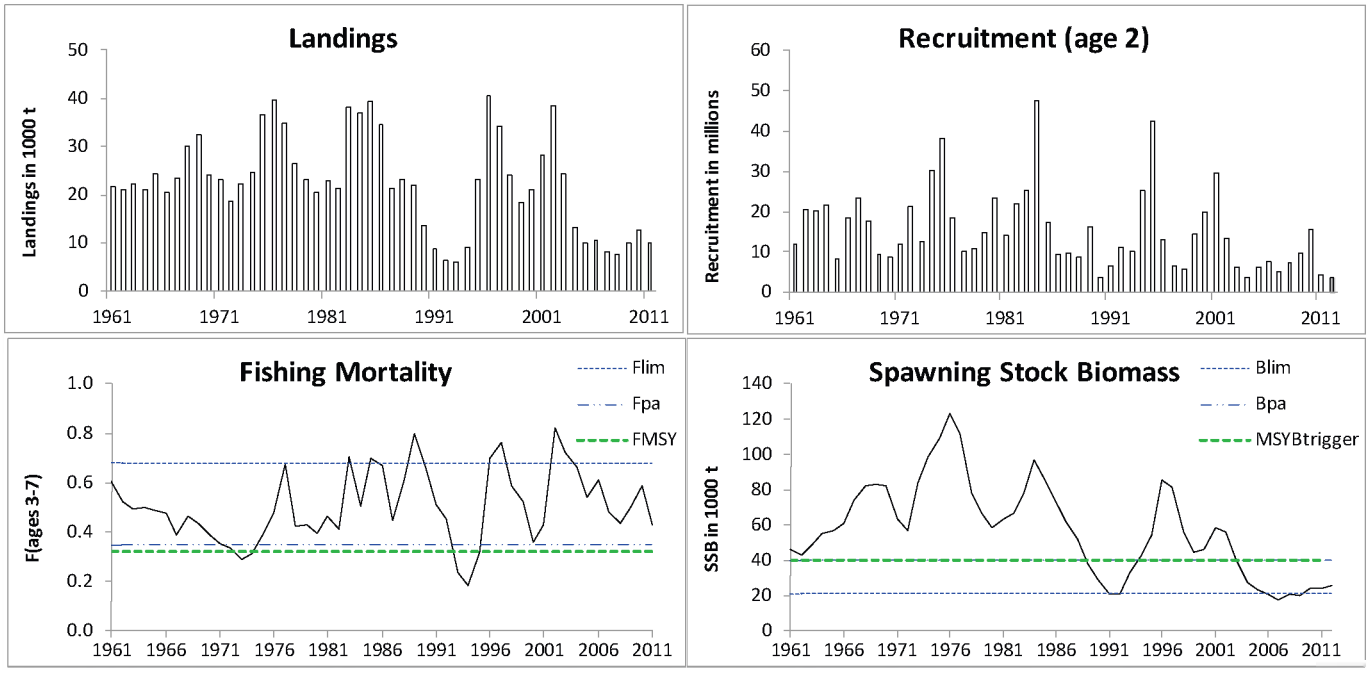


Figure 4.4.1.1 Cod in Subdivision Vb_1 (Faroe Plateau). Summary of stock assessment (weights in thousand tonnes). Top right: SSB/F for the time-series used in the assessment.

SSB has remained around B_{lim} since 2005. Fishing mortality has decreased since 2002 and is now between F_{lim} and F_{pa}, but still above F_{MSY}. The 2009 year class is 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 discussed by the political system.

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 reduce 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 have been low since 2002, excepting 2004 and 2008–2010 when they were estimated to be above average. Cod individual growth is highly correlated with the ratio of total phytoplankton production to total fish biomass (cod+haddock+saithe), i.e. "food per fish", in the outer areas (water depth 130–500 m) of the Faroe Plateau. Phytoplankton production in those areas has remained 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.

Catch distribution	Total landings (2011) are 10 kt, where 62% was taken by the longlines, 7% by jigging, 31% by trawlers, and 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.

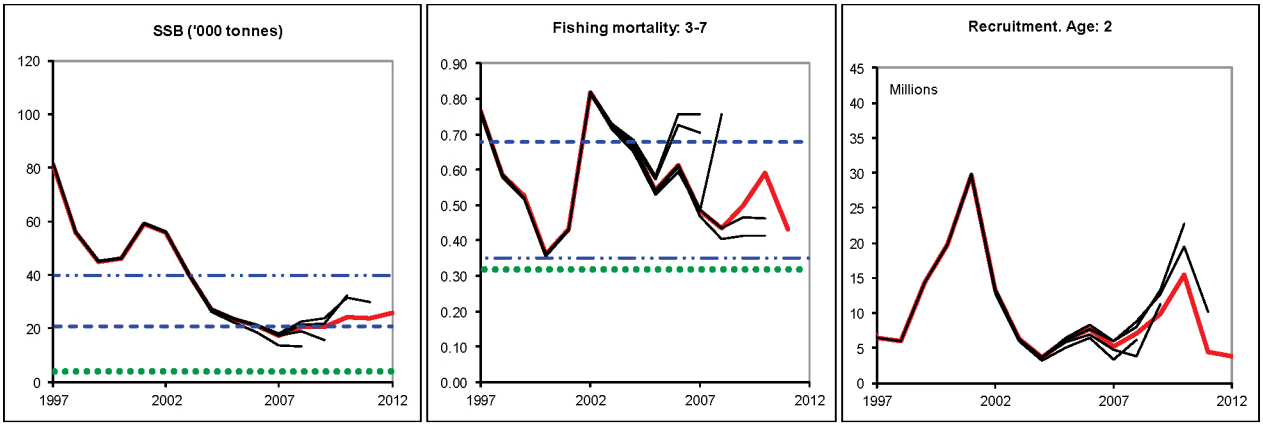


Figure 4.4.1.2 Cod in Subdivision Vb_1 (Faroe Plateau). Historical assessment results (final year recruitment estimates included).

Scientific basis

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

ECOREGION Faroe Plateau ecosystem
STOCK Cod in Subdivision Vb_1 (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	0.51	1.38	3.18
F_{max}	0.25	1.45	5.78
$F_{0.1}$	0.11	1.31	9.72
F_{med}	0.41	1.41	3.85

Outlook for 2013

Basis: F (2012) = F (2009–2011) = 0.51; SSB (2013) = 26; R (2012) = 4 million; landings (2012) = 11.0.

Rationale	F (2013)	Landings (2013) [2)]	Basis	SSB (2014)	%SSB change [1)]
MSY framework	0.20	4.8	$F_{MSY} * SSB_{2013}/B_{trigger} = F_{sq} * 0.37$	29	21
Precautionary Approach	0.35	7.8	F_{pa} (=F_{sq}*0.68)	26	12
Zero catch	0	0	F=0	34	32
Status quo	0.51	10.5.	F_{sq}	23	0
	0.25	5.8	$F_{sq} * 0.50$	28	18
	0.38	8.2	$F_{sq} * 0.75$	25	8
	0.32	7,2	$F_{MSY} = F_{sq} * 0.65$	26	12
	0.46	9,7	$F_{sq} * 0.90$	24	4
	0.56	11,3	$F_{sq} * 1.1$	22	-5

Weights in thousand tonnes.
[1)] SSB 2014 relative to SSB 2013.
[2)] Landings 2013.

Management plan

A management system based on number of fishing days, closed areas, and other technical measures was introduced in 1996 to ensure sustainable demersal fisheries in Division Vb. This was before ICES introduced precautionary approach (PA) and MSY reference values, and at that time it was believed that the purpose was achieved if the total allowable number of fishing days was set such that on average 33% of the haddock exploitable stock in numbers would be harvested annually. This translates into an average F of 0.45, above the F_{pa} and F_{MSY} of 0.35 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 $F_{MSY} * B_{act}/B_{trigger}$ 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 63% in 2013 to 0.20. This is 38% below F_{MSY}, because SSB in 2013 is 38% 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 30% as compared to the average of the last 3 years (0.51).

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 in order 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 2010 estimates in last year's assessment (2011) with this year's assessment (2012) shows that recruitment has been revised downwards by 21%, the spawning-stock biomass revised downwards by 23%, and the fishing mortality revised upwards by 42%.

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

Sources

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

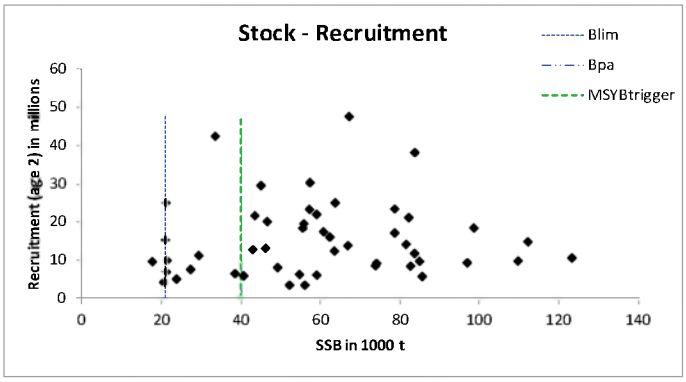


Figure 4.4.1.1 Cod in Subdivision Vb_1 (Faroe Plateau). Stock–recruitment plot.

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	F<0.20	4.8		11.5

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 Vb_1). 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	-	-	8,310
1992	-	5,938	3 [2]	12		39	-		74	-	-	6,068
1993	-	5,744	1 [2]	+		57	-		186	-	-	5,990
1994	-	8,724	-	2		36	-		56	-	-	8,818
1995	-	19,079	2 [2]	2		38	-		43	-	-	19,166
1996	-	39,406	1 [2]	+		507	-		126	-	-	40,042
1997	-	33,556	-	+		410	-		61 [2]	-	-	34,029
1998	-	23,308	- *	-		405	-		27 [2]	-	-	23,742
1999	-	19,156	- *	39	-	450	-		51	-		19,696
2000			1	2	-	374	-		18	-		395
2001		29,762	9 [2]	9	-	531 *	-		50	-		30,363
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	-		17,977
2005		13,556	-			201			24	-		13,781
2006		11,629	7	1 [2]		49	5		1	-		11,694
2007		9,905	1 [2]			71	7		3	358		10,347
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	1									11,497

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

Table 4.4.1.3 Faroe Plateau cod (Subdivision Vb_1). Officially reported catches as well as the corrections done to obtain the catches, which were used in the assessment.

		Faroese catches:				Catches reported as Vb2:			Foreign catches:				Used in the
	Officially reported	in Vb1	Corrections in Vb1	on Faroe-Iceland ridge	in IIA within Faroe area jurisdiction	UK (E/W/NI)	UK (Scotland)	UK	French [2]	Greenland [2]	Russia [2]	UK [2]	assessment
1986	34595												34595
1987	21391												21391
1988	22467				715								23182
1989	20827				1229				12				22068
1990	12380				1090	-	205		17				13487
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 [1]		-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			4.812			12757
2011	11497 [1]		-682	-918						3.297			9901

[1] Preliminary, [2] Reported to Faroese Coastal Guard, [3] expected misreporting/discard.

Table 4.4.1.3 Faroe Plateau cod (Subdivision Vb_1). Summary of the stock assessment.

Year	Recruitment Age 2 thousands	SSB tonnes	Landings tonnes	Mean F Ages 3–7
1961	12019	46439	21598	0.606
1962	20654	43326	20967	0.523
1963	20290	49054	22215	0.494
1964	21834	55362	21078	0.502
1965	8269	57057	24212	0.491
1966	18566	60629	20418	0.474
1967	23451	73934	23562	0.390
1968	17582	82484	29930	0.464
1969	9325	83487	32371	0.438
1970	8608	82035	24183	0.389
1971	11928	63308	23010	0.353
1972	21320	57180	18727	0.336
1973	12573	83547	22228	0.289
1974	30480	98434	24581	0.314
1975	38319	109565	36775	0.395
1976	18575	123077	39799	0.475
1977	9995	112057	34927	0.676
1978	10748	78497	26585	0.426
1979	14997	66722	23112	0.427
1980	23582	58886	20513	0.395
1981	14000	63560	22963	0.465
1982	22127	67031	21489	0.414
1983	25157	78539	38133	0.706
1984	47754	96760	36979	0.508
1985	17313	84766	39484	0.702
1986	9501	73661	34595	0.670
1987	9895	62189	21391	0.446
1988	8691	52049	23182	0.609
1989	16222	38300	22068	0.800
1990	3651	29188	13487	0.659
1991	6665	21213	8750	0.512
1992	11403	20953	6396	0.456
1993	10113	33353	6107	0.236
1994	25171	42794	9046	0.185
1995	42610	54578	23045	0.320
1996	12865	85401	40422	0.700
1997	6455	81372	34304	0.766
1998	5927	55667	24005	0.586
1999	14356	44879	18306	0.526
2000	19723	46031	21033	0.362
2001	29695	58926	28183	0.431
2002	13262	55918	38457	0.820
2003	6254	40488	24501	0.722
2004	3652	27144	13178	0.662
2005	6102	23616	9906	0.542
2006	7706	21054	10480	0.613
2007	5207	17549	8016	0.483
2008	7117	20792	7465	0.434
2009	9801	20412	10002	0.499
2010	15453	24065	12757	0.590
2011	4400	23813	9901	0.432
2012*	3651	25829		
Average	15293	57249	22526	0.5040

*1990 value.

ECOREGION Faroe Plateau ecosystem
STOCK Cod in Subdivision Vb_2 (Faroe Bank)

Advice for 2013

New data on landings and indices from the two annual Faroese surveys (2011 summer, 2012 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 2013 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 2010 and 2011, respectively, a total of 61 and 100 fishing days were allowed to small jiggers in the shallow waters of the Bank. The closure advice should apply to all fisheries.

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		
2013	Same advice as last year	0		

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

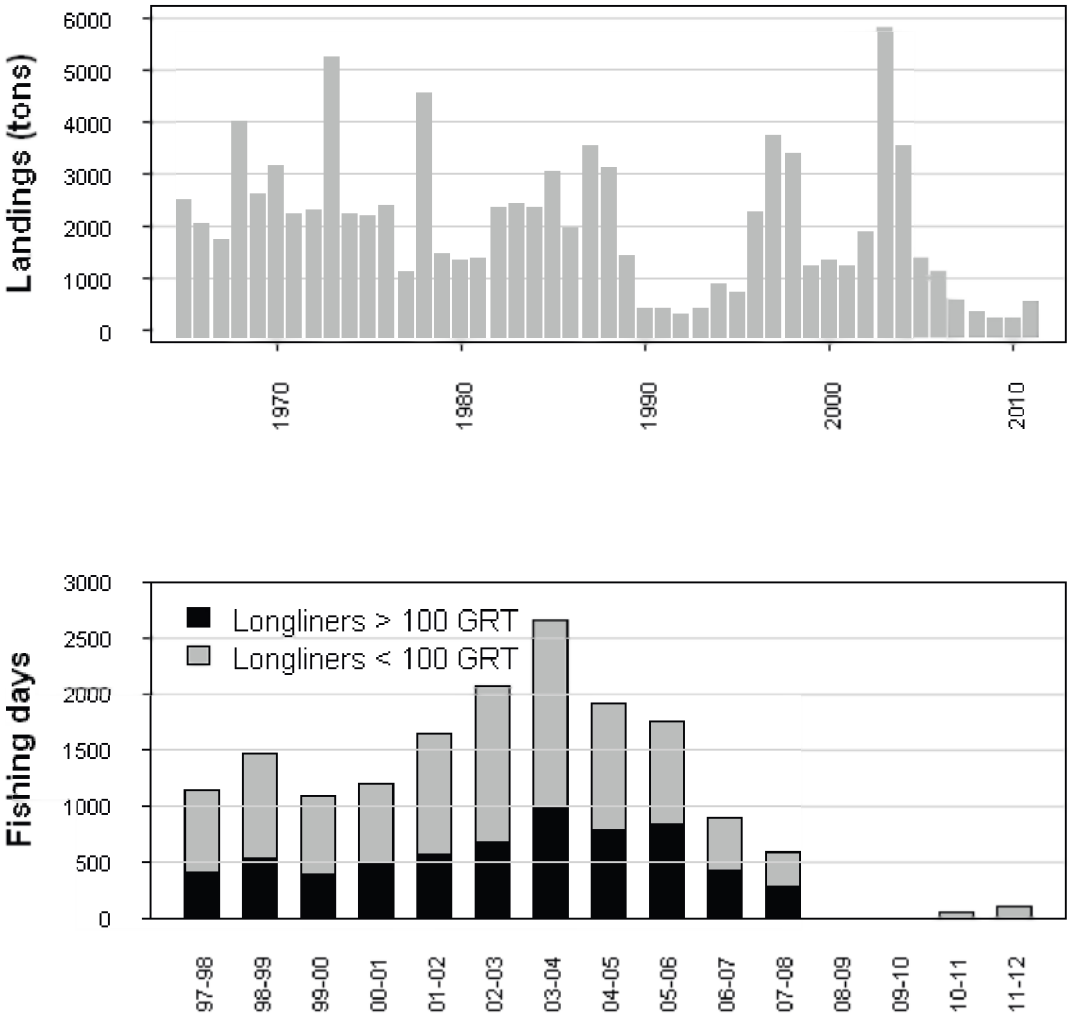


Figure 4.4.2.1 Cod in Subdivision Vb_2 (Faroe Bank). Top panel: Reported landings 1965–2011. Since 1992 only catches from Faroese and Norwegian vessels are considered to be taken on the Faroe Bank. Bottom panel: Fishing days 1997–2012 for longline gear types on the Faroe Bank.

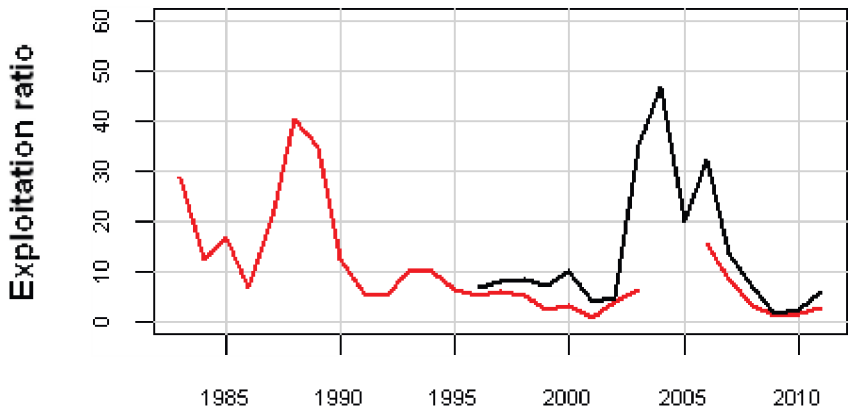


Figure 4.4.2.2 Cod in Subdivision Vb_2 (Faroe Bank). Exploitation ratio (ratio of landings to survey interpreted as an index of exploitation rate). Red = spring survey, Black = summer survey.

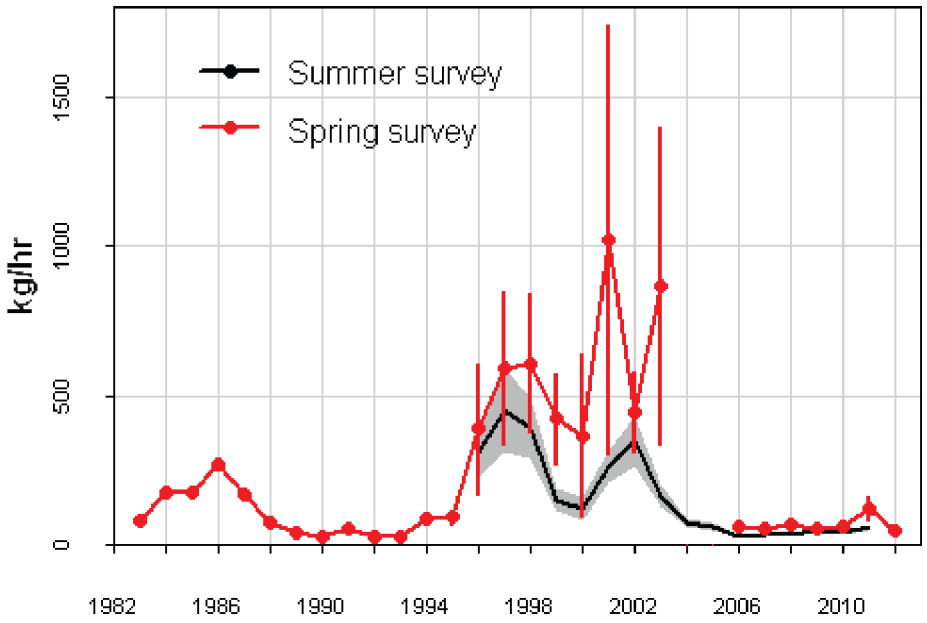


Figure 4.4.2.3 Cod in Subdivision Vb_2 (Faroe Bank). Catch per unit of effort in the spring and summer groundfish survey. Vertical bars and shaded areas show the standard error in the estimation of indices.

Table 4.4.2.2 Cod in Subdivision Vb_2 (Faroe Bank). Nominal catches (tonnes) by countries 1986–2011 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	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
Faroe Islands	1001		1094	1840	5957	3607	1270	1005	471	231	81	111	381 [1]
Norway	88	49	51	25	72	18	37	10	7	1	4	1	
Greenland	-	-	-	-	-	-	-	-	-	-	-	5	
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	171	381
Correction of Faroese catches in Vb2			-65	-109	-353	-214	-75	-60	-28	-14	-5	-7	-23
Used in assessment	1089	1194	1080	1756	5676	3411	1232	955	450	218	80	105	358

[1] Preliminary

[2] Included in Vb1.

[3] Reported as Vb.

ECOREGION Faroe Plateau ecosystem
STOCK Haddock in Division Vb

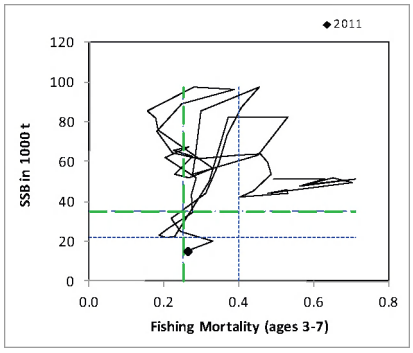
Advice for 2013

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

Stock status

F (Fishing Mortality)	2009	2010	2011	
MSY (F_{MSY})	✓	✗	✗	Above target
Precautionary approach (F_{pa},F_{lim})	✓	o	o	Increased risk

SSB (Spawning-Stock Biomass)	2010	2011	2012	
MSY ($B_{trigger}$)	✗	✗	✗	Below trigger
Precautionary approach (B_{pa},B_{lim})	✗	✗	✗	Reduced reproductive capacity



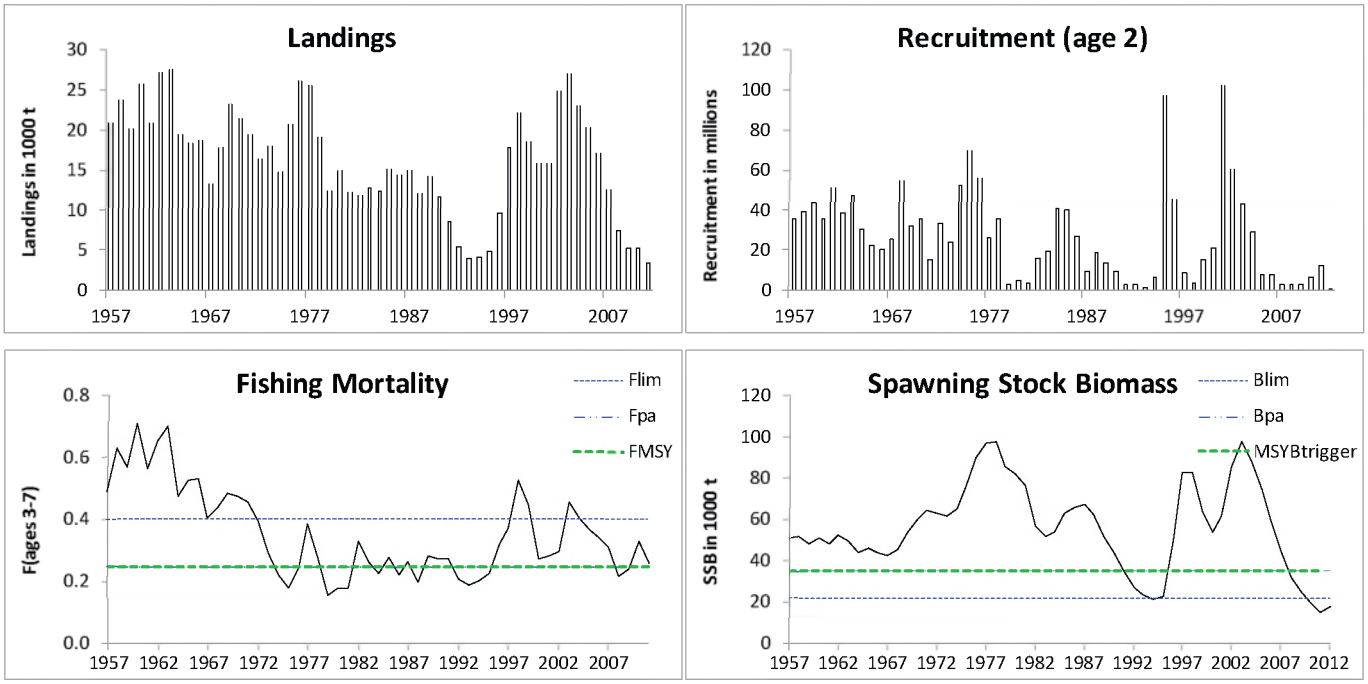


Figure 4.4.3.1 Haddock in Division Vb. Summary of stock assessment (weights in thousand tonnes). Top right: SSB/F for the time-series used in the assessment.

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

Management plans

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

Biology

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

Environmental influence on the stock

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

The fisheries

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

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

Quality considerations

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

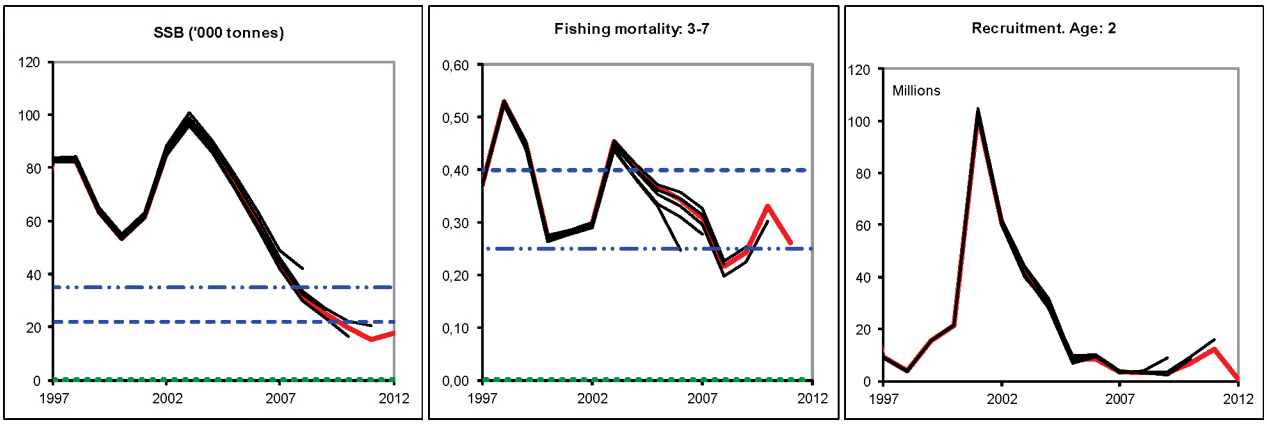


Figure 4.4.3.2 Haddock in Division Vb. Historical assessment results (final-year recruitment estimates included).

Scientific basis

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

ECOREGION Faroe Plateau ecosystem
STOCK Haddock in Division Vb

Reference points

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

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

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

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

[*] F_{max} is poorly defined.

Outlook for 2013

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

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

Weights in thousand tonnes.
[1)] SSB 2014 relative to SSB 2013.

Management plan

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

MSY approach

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

Precautionary approach

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

Additional considerations

Management considerations

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

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

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

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

Impacts of the environment on the fish stocks

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

Regulations and their effects

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

Changes in fishing technology and fishing patterns

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

Uncertainties in assessment and forecast

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

Comparison with previous assessment and advice

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

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

Source

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

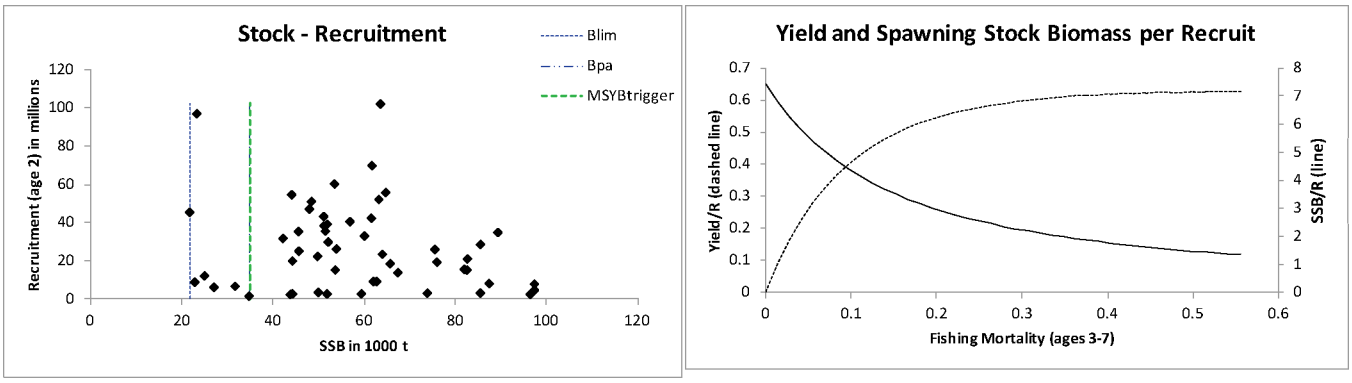


Figure 4.4.3.3 Haddock in Division Vb. Stock–recruitment and yield- and spawning-stock biomass-per-recruit plots.

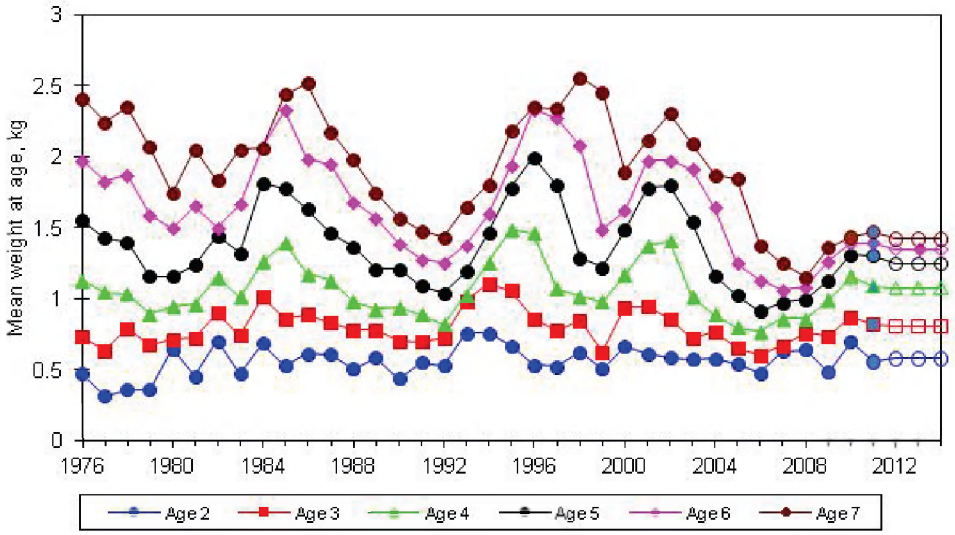


Figure 4.4.3.4 Haddock in Division Vb. Mean weights-at-age (2–7). The 2012–2014 values are the ones used in the short-term prediction (open symbols).

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

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

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

Table 4.4.3.2 Haddock in **Division Vb_1** only. Official catches (tonnes) by country, and ICES estimates.

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

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

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

2) Preliminary data

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

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

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

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

7) Reported as Division Vb.

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

9) Included in Vb2

10) Includes 14 reported as Vb

Table 4.4.3.3 Haddock in **Division Vb_2** only. Official catches (tonnes) by country, and ICES estimates.

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

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011 [2]
Faroe Islands	1,565 [5]	1,948	3,698	4,934	3,594	2,444	1,375	810	556	192	178	187
France1						+						
Norway	48	66	28	54	17	45	1	8		3	1	
UK (Engl. and Wales)	:	:	:	:	:	1						
UK (Scotland)3	185	148	177	:	:	4		15	5	27 [4]		
Total	1,798	2,162	3,903	4,988	3,611	1,944	1,376	833	561	222	179	187

1) Catches included in Sub-division Vb1.

2) Provisional data

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

4) Reported as Division Vb.

5) Provided by the NWWG

Table 4.4.3.4 Haddock in Division Vb. Summary of the assessment.

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

ECOREGION Faroe Plateau ecosystem
STOCK Saithe in Division Vb

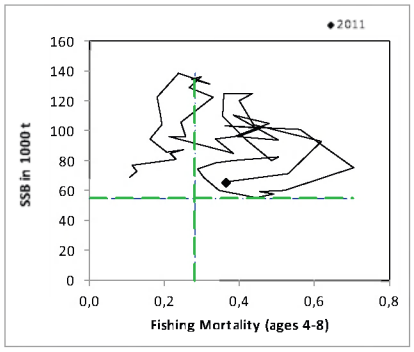
Advice for 2013

ICES advises on the basis of the MSY approach that effort should be reduced such that fishing mortality in 2013 will be no more than F = 0.28, corresponding to an 44% reduction in the present fishing mortality.

Stock status

F (Fishing Mortality)	2009	2010	2011	
MSY (F_{MSY})	✗	✗	✗	Above target
Precautionary approach (F_{pa})	✗	✗	✗	Harvested unsustainably

SSB (Spawning-Stock Biomass)	2010	2011	2012	
MSY ($B_{trigger}$)	✓	✓	✓	Above trigger
Precautionary approach (B_{pa})	✓	✓	✓	Full reproductive capacity



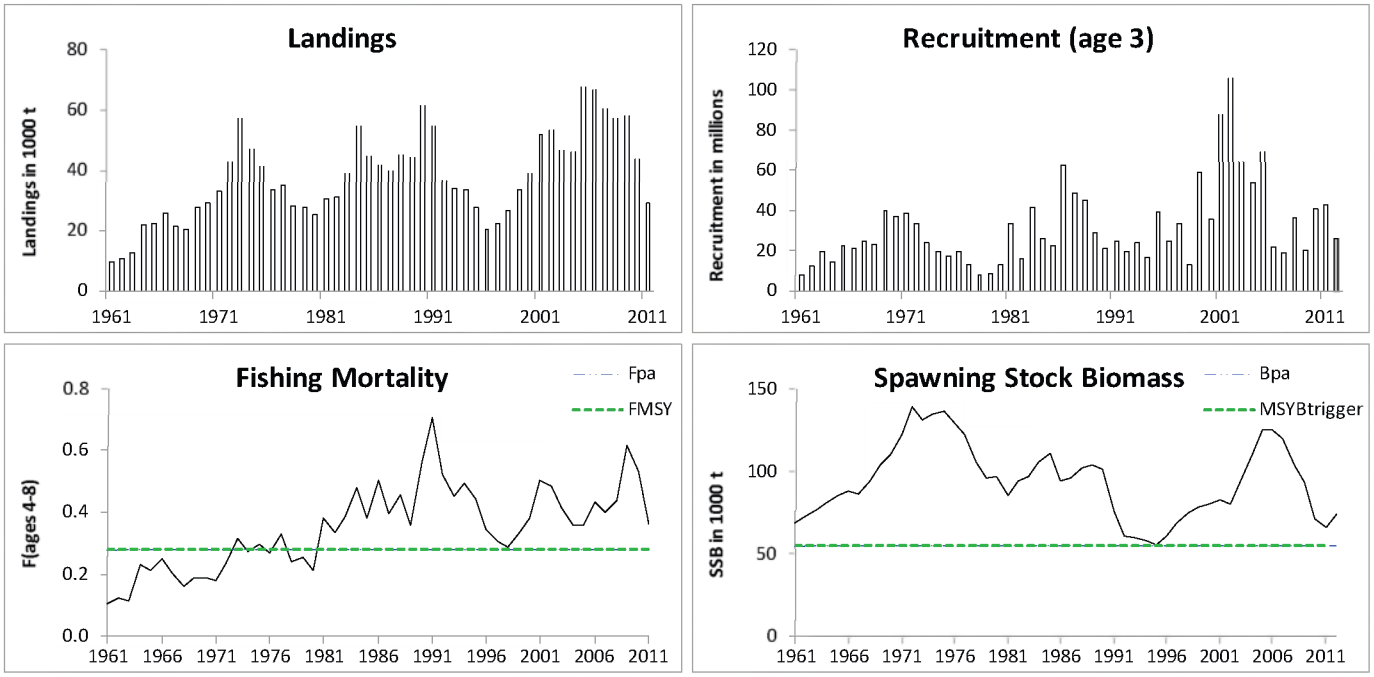


Figure 4.4.4.1 Saithe in Division Vb. Summary of stock assessment (weights in thousand tonnes). Top right: SSB/F for the time-series used in the assessment.

SSB has decreased substantially since 2006 but remains above MSY $B_{trigger}$. Recruitment in 2011 was above average. Fishing mortality has decreased since 2009 and is above F_{MSY}.

Management plans

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

Biology

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.

Catch distribution	Total landings (2011) are 29 kt, of which 91% was taken by pair trawlers, 4.5% by single trawlers, and 3.6% by jiggers.

Quality considerations

There are no incentives to discard fish under the effort management system. The sampling of the landings has increased since 2009 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.

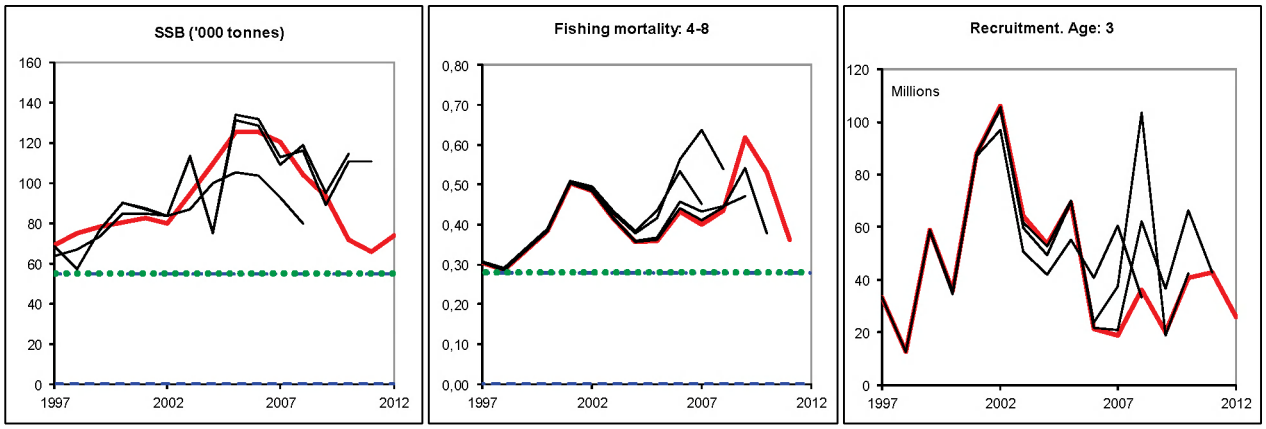


Figure 4.4.4.2 Saithe in Division Vb. Historical assessment results (final-year recruitment estimates included).

Scientific basis

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

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.
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	0.50	1.33	1.97
F_{max}	0.44	1.33	2.26
$F_{0.1}$	0.18	1.21	5.65
F_{med}	0.31	1.32	3.29

Outlook for 2013

Basis: F (2012) = F (2009–2011) unscaled = 0.50; SSB (2013) = 72; R (2012) (GM2006–2010) = 26 million; catch (2012) = 51.1.

Rationale	**F (2013)**	**Landings (2013)**	**Basis**	**SSB (2014)**	**%SSB change [1)]**
MSY approach	0.28	29.1	F_{MSY} (=F_{sq}*0.56)	79	+10
Precautionary Approach	0.28	291	F_{pa} (=F_{sq} *0.56)	79	+10
Zero catch	0	0	F=0	105	+46
Status quo	0.15	16.6	F_{sq} * 0.30	92	+28
	0.25	26.4	F_{sq} * 0.50	84	+17
	0.35	35.3	F_{sq} * 0.70	76	+6
	0.45	43.2	F_{sq} * 0.90	70	-3
	0.50	46.9	F_{sq}	67	-7

Weights in thousand tonnes.

[1)] SSB 2014 relative to SSB 2013.

Management plan

A management system based on number of fishing days, closed areas, and other technical measures was introduced in 1996 to ensure sustainable demersal fisheries in Division Vb. This was before ICES introduced precautionary approach (PA) and MSY reference values, and at that time it was believed that the purpose was achieved if the total allowable number of fishing days was set such that on average 33% of the haddock exploitable stock in numbers would be harvested annually. This translates into an average F of 0.45, above the F_{pa} and F_{MSY} of 0.25. ICES considers this to be inconsistent with the PA and the MSY approaches. Work is ongoing in the Faroes to move away from the F_{target} of 0.45 to be consistent with the ICES advice. This management plan includes a stepwise reduction of the fishing mortality to F_{MSY} in 2015 and a recovery plan if the SSB declines below the MSY $B_{trigger}$. The MSY $B_{trigger}$ has been defined at 55 kt (the former B_{pa}) and F_{MSY} at 0.28. 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, resulting in a reduction of 44% 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 44% in present fishing mortality.

Additional considerations

Management considerations

The number of fishing days for pair trawlers was reduced by 10% for the fishing year (2010/2011), but 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 78%, 17%, and 4%, respectively. The pair trawlers, jiggers, and single trawlers are regulated by 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 potential for bias in commercial cpue (for example hyper-stability) is a serious concern for shoaling species such as saithe. For this assessment, in addition to the pairtrawler cpue, which is a measure of saithe density in its core area of distribution, the range of the spatial distribution of saithe was considered, using survey information, when constructing an abundance index for saithe. This approach is considered to reduce the bias. The assessment is very uncertain, with large revisions from year to year. 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

SSB in 2010 and 2011 has been revised downwards by 35% and 40%, respectively, compared to last year's estimates. F in 2009 and 2010 has been revised upwards by 14% and 40%, respectively. The basis for the advice is the same as last year.

Sources

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

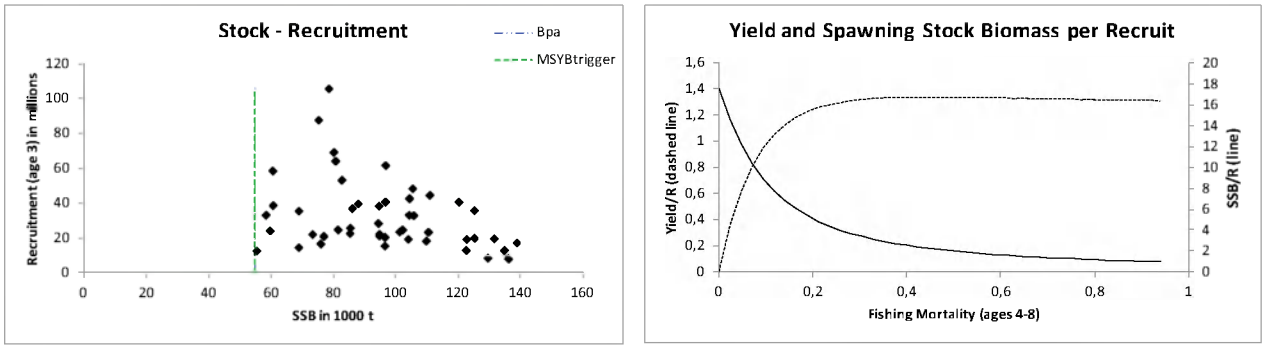


Figure 4.4.4.3 Saithe in Division Vb. Left: Stock–recruitment plot, SSB at spawning time. Right: Yield and spawning-stock biomass-per-recruit plot.

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[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		
2013	F<0.28	<29.1		

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, 1988–2011, 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 [3]	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 [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		
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		

Country	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011 [1]
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	46.686	31.439
France	-	273	934	607	370	147	123	315	108	97	68	46	
Germany	100	230	667	422	281	186	1	49	3	3	0		
Greenland	-	-	-	125	-			73	239	0	1		6
Irland	-	-	5	-	-	-	-	-	-	-	-		
Iceland	-	-	-	-	-	-	-	-	-	-	148	-	
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	28	
Portugal	-	-	-	-	-	5	-	-	-	-	-		
Russia	-	20	1	10	32	71	210	104	159	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	-	-	-	-	-	-	-	-	-	-	-	706	
Total	33.207	1.161	52.131	57.004	49.377	49.546	76.266	72.405	65.557	61.692	62.857	47.469	31.445
Working Group estimate [4,5,6,7]	33.207	39.020	51.786	53.546	46.555	46.355	67.967	66.902	60.785	57.043	57.949	43.885	29.087
							30.135	200.57	69.109	0	1	74.018	

[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.

Table 4.4.4.3 Saithe in Division Vb. Summary of the assessment (weights in tonnes).

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Year	Recruitment Age 3 thousands	SSB tonnes	Landings tonnes	Mean F Ages 4–8
1961	7827	68804	9592	0.106
1962	12256	73260	10454	0.125
1963	19837	76841	12693	0.114
1964	14811	81392	21893	0.230
1965	22362	85254	22181	0.214
1966	21229	87908	25563	0.250
1967	24897	86057	21319	0.204
1968	22879	94602	20387	0.160
1969	39798	104218	27437	0.191
1970	37092	110399	29110	0.189
1971	38446	122699	32706	0.179
1972	33424	138788	42663	0.236
1973	23621	131517	57431	0.318
1974	19420	134752	47188	0.272
1975	17327	136090	41576	0.297
1976	19709	129480	33065	0.267
1977	13105	122531	34835	0.328
1978	8332	105627	28138	0.243
1979	8686	96431	27246	0.257
1980	13074	96614	25230	0.211
1981	33144	85351	30103	0.382
1982	15672	94692	30964	0.336
1983	40828	96673	39176	0.385
1984	26072	105324	54665	0.478
1985	22325	110840	44605	0.382
1986	61844	94321	41716	0.505
1987	48593	96432	40020	0.396
1988	44826	102149	45285	0.456
1989	28598	103956	44477	0.360
1990	20707	101103	61628	0.562
1991	24968	75841	54858	0.704
1992	19542	60601	36487	0.521
1993	23777	59632	33543	0.452
1994	16871	58310	33182	0.492
1995	38968	55355	27209	0.443
1996	24290	60512	20029	0.344
1997	33451	68864	22306	0.305
1998	12740	75171	26421	0.287
1999	58774	78479	33207	0.335
2000	35754	80603	39020	0.383
2001	87894	82618	51786	0.503
2002	105884	80090	53546	0.484
2003	64371	94680	46555	0.415
2004	53416	109720	46355	0.356
2005	69410	125154	67967	0.359
2006	21483	125234	66902	0.434
2007	18628	120163	60785	0.400
2008	36005	104291	57043	0.437
2009	20054	93514	57950	0.617
2010	40771	71601	43885	0.531
2011	42887	65919	29087	0.362
2012	25956*	74151		
Average	31474	94127	37480	0,349

* GM 2006–2010.