

4.3.1 Cod (*Gadus morhua*) in Subdivision Vb₁ (Faroe Plateau)

ICES stock advice

ICES advises that when the precautionary approach is applied, catch in 2016 should be at the lowest possible level and a mixed-fishery management plan be developed.

Stock development over time

The spawning-stock biomass (SSB) has remained around B_{lim} since 2005. Fishing mortality (F) decreased from 2010 to 2013, but increased in 2014 and is now above F_{pa} . The 2009–2013 year classes are estimated to be below average.

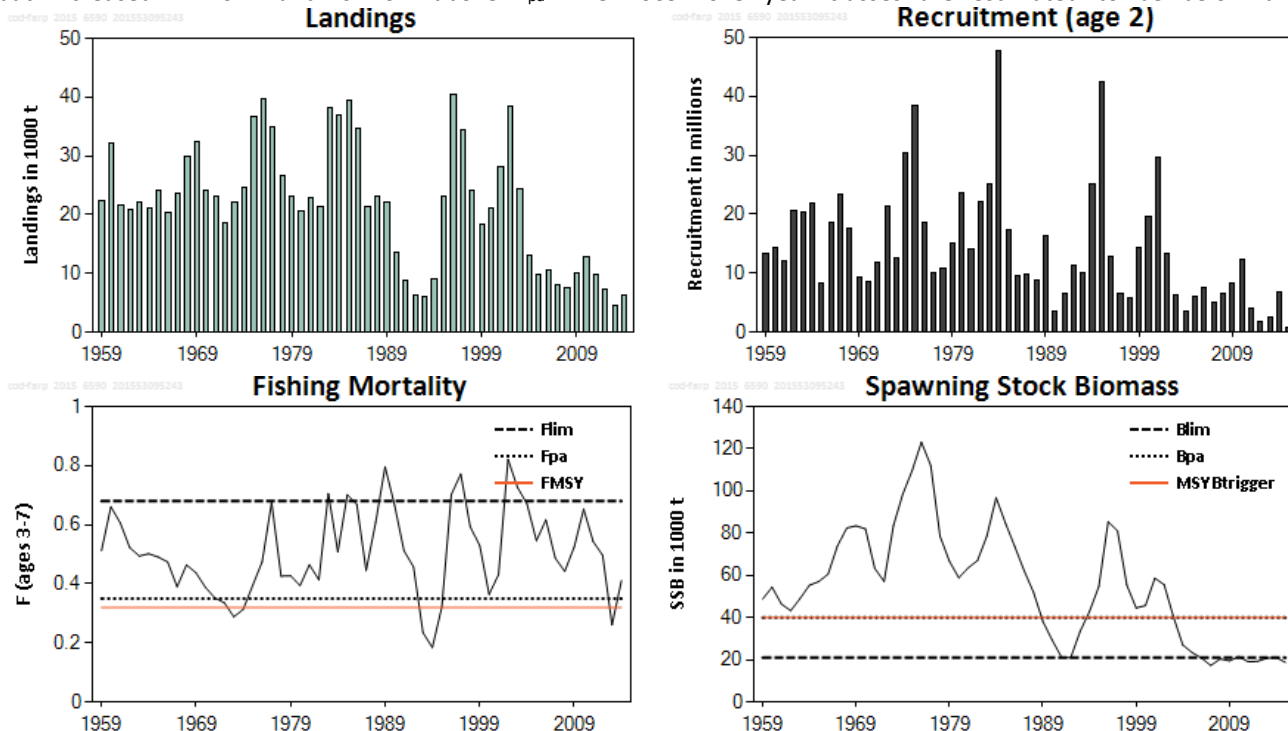


Figure 4.3.1.1 Cod in Subdivision Vb₁. Summary of stock assessment (weights in thousand tonnes).

Stock and exploitation status

Table 4.3.1.1 Cod in Subdivision Vb₁. State of the stock and fishery, relative to reference points.

		Fishing pressure			Stock size		
		2012	2013	2014	2013	2014	2015
Maximum Sustainable Yield	F_{MSY}	✘	✔	✘ Above F_{MSY}	$B_{trigger}$	✘	✘ Below $B_{trigger}$
Precautionary approach	F_{pa} , F_{lim}	⊙	✔	⊙ Increased risk	B_{pa} , B_{lim}	✘	⊙ Below B_{lim}
Management Plan	F_{MGT}	-	-	- Not applicable	SSB_{MGT}	-	- Not applicable

Catch options

Table 4.3.1.2 Cod in Subdivision Vb₁. The basis for the catch options.

Variable	Value	Source	Notes
F ages 3–7 (2015)	0.39	ICES (2015a)	
SSB (2016)	20 kt	ICES (2015a)	
R _{age2} (2016)	3.7 millions	ICES (2015a)	Average of the recruitment in 2012–2014
R _{age2} (2017)	3.7 millions	ICES (2015a)	Average of the recruitment in 2012–2014
Total catch (2015)	6.6 kt	ICES (2015a)	
Commercial landings (2015)	6.6 kt	ICES (2015a)	

Table 4.3.1.3 Cod in Subdivision Vb₁. The catch options.

Rationale	F (2016)	Catch (2016)	Basis	SSB (2017)	%SSB change *
MSY approach	0.16	3.0	$F_{MSY} \times SSB_{2016} / B_{trigger}$	23.5	19
Precautionary approach	0.35	6.0	F_{pa}	20.1	2
Zero catch	0	0	$F = 0$	26.8	36
<i>Status quo</i>	0.39	6.6	F_{sq}	19.5	-1
	0.19	3.6	$F_{sq} \times 0.50$	22.8	16
	0.29	5.1	$F_{sq} \times 0.75$	21.1	7
	0.32	5.6	F_{MSY}	20.6	5
	0.37	6.3	$F_{sq} \times 0.90$	19.8	0
	0.42	7.1	$F_{sq} \times 1.1$	18.9	-4

Weights in thousand tonnes.

* SSB 2017 relative to SSB 2016.

ICES notes that when the MSY approach is applied, effort should be reduced such that fishing mortality in 2016 will be no more than $F = 0.16$, corresponding to a 60% reduction compared to the 2012–2014 fishing mortality and a catch in 2016 of 3000 t.

However, Faroe Plateau cod and Faroe haddock are caught in mixed fishery and it is difficult to target one of them without fishing the other. Given the stock status for haddock, and unless it is possible to fish in such a way that gears only catch cod, ICES recommends cod catches at the lowest possible level (LPL) and the development of a mixed-fishery management plan that avoids catches of haddock.

Basis of the advice

Table 4.3.1.4 Cod in Subdivision Vb₁. The basis of the advice.

Advice basis	Precautionary approach.
Management plan	There is no management plan for this stock.

Quality of the assessment

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.

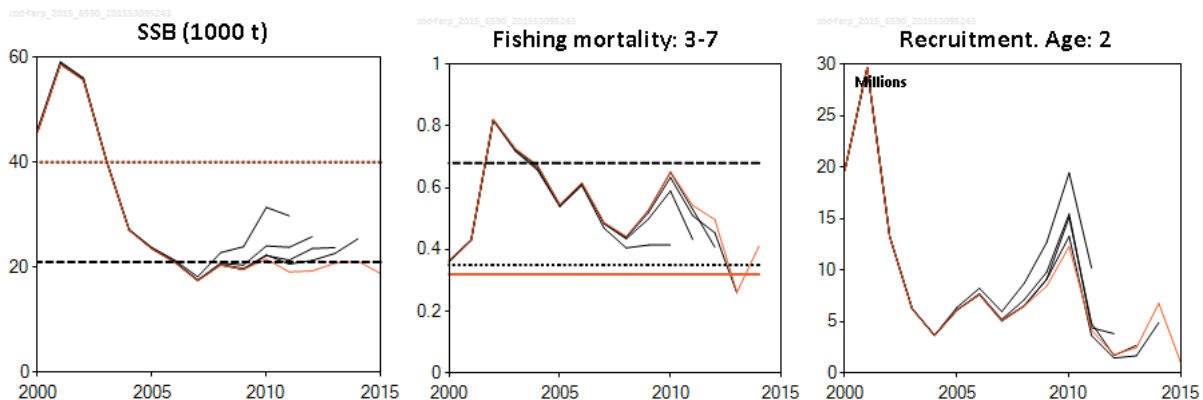


Figure 4.3.1.2 Cod in Subdivision Vb₁. Historical assessment results (final-year recruitment estimates included).

Issues relevant for the advice

There is no management plan for this stock. A preliminary management plan, including a recovery plan, was formulated in 2011, but has not been implemented. An effort management system has been used since 1996. The Faroese Parliament decides the number of allocated fishing days for each new fishing season. The number of used fishing days is, for some of the Faroese fleets, only around half of the allocated days, but requires further reductions. In this situation, with surplus days, effort control is unlikely to be effective.

Reference points

Table 4.3.1.5 Cod in Subdivision Vb₁. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY B _{trigger}	40 000 t	B _{pa} .	ICES (2011)
	F _{MSY}	0.32	Provisional maximum sustainable yield, FLR stochastic simulations.	ICES (2011)
Precautionary approach	B _{lim}	21 000 t	Lowest observed SSB (1998 assessment).	ICES (1998)
	B _{pa}	40 000 t	B _{lim} e ^{1.645σ} , assuming a σ of about 0.40 to account for the relatively large uncertainties in the assessment.	ICES (1998)
	F _{lim}	0.68	F _{pa} e ^{1.645σ} , assuming a σ of about 0.40 to account for the relatively large uncertainties in the assessment.	ICES (1998)
	F _{pa}	0.35	Close to F _{max} (0.34) and F _{med} (0.38) (1998 assessment).	ICES (1998)
Management plan	SSB _{MGT}	Not defined		
	F _{MGT}	Not defined		

Basis of the assessment

Table 4.3.1.6 Cod in Subdivision Vb₁. The basis of the assessment.

ICES stock data category	1 (ICES, 2015b).
Assessment type	XSA with catch-at-age data and age-disaggregated indices, using catches in the model and in the forecast.
Input data	Commercial catches, ages, and length frequencies from catch sampling; survey indices (FO-GFS-Q1 and FO-GFS-Q3); annual maturity data from FO-GFS-Q1; natural mortalities set at 0.2.
Discards and bycatch	Not included, considered negligible.
Indicators	None.
Other information	The stock assessment was last benchmarked by NWWG in 2005.
Working group	North-Western Working Group (NWWG).

Information from stakeholders

There is no available information.

History of advice, catch, and management

Table 4.3.1.7 Cod in Subdivision Vb₁. History of ICES advice, the agreed TAC, and ICES estimates of 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***	9.0
1995	No fishing	0	12.5*	23.0
1996	F at lowest possible level	-	20**	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	-		8.0
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		9.8
2012	MSY framework, reduce F by 30%	< 10		7.2
2013	MSY approach, $F < 0.20$	< 4.8		4.6
2014	MSY approach, reduce F by 69 %	< 3.6		6.3
2015	MSY approach, reduce F by 23 %	< 4.5		
2016	Lowest possible level (LPL) and develop a mixed-fishery management plan	LPL		

Weights in thousand tonnes.

* In the quota year 1 September–31 August the following year.

** The TAC was increased during the quota year.

The fishing year runs from 1 September to 31 August the following year.

History of catch and landings

Table 4.3.1.8 Cod in Subdivision Vb₁. Catch distribution by fleet in 2014 as estimated by ICES.

Total catch (2014)	Commercial landings				Commercial discards	Unaccounted removals
	65% longlines	28% trawlers	6% jigging	0.4% other gear types		
6 kt	6 kt				0 kt	0 kt

Table 4.3.1.9 Cod in Subdivision Vb₁. History of commercial catch and landings; both the official and ICES estimated values are presented by area for each country participating in the fishery.

	Denmark	Faroe Islands	France	Germany	Iceland	Norway	Greenland	Portugal	UK (E/W/Nl)	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	- **	16		89	-		1	-	-	8,309
1992	-	5,938	3 ***	12		39	-		74	-	-	6,066
1993	-	5,744	1 ***	+		57	-		186	-	-	5,988
1994	-	8,724	-	2		36	-		56	-	-	8,818
1995	-	19,079	2 ***	2		38	-		43	-	-	19,164
1996	-	39,406	1 ***	+		507	-		126	-	-	40,040
1997	-	33,556	-	+		410	-		61 ***	-	-	34,027
1998	-	23,308	-	-		405	-		27 ***	-	-	23,740
1999	-	19,156	-	39		450	-		51	-	-	19,696
2000		0	1	2		374	-		18	-	-	395
2001		29,762	9 ***	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 ***		414		1	15	-	-	17,975
2005		13,556	-			201			24	-	-	13,781
2006		11,629	7	1 ***		49	5		1	-	-	11,691
2007		9,905	1 ***			71	7		3	358		10,344
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		11,348	-									11,348
2012		8,437	0		28							8,465
2013		5,331	0		20		2					5,333
2014		7,037 *				6				270		7,314

* Preliminary, ** Included in Vb2, *** Reported as Vb.

	Faroese catches:				Catches reported as Vb2:			Foreign catches:				Used in the assessment	
	Officially reported	in Vb1	Corrections in Vb1 **	on Faroe-Iceland ridge	in IIA within Faroe area jurisdiction	UK (E/W/Nl)	UK (Scotland)	UK	French ***	Greenland ***	Russia ***		UK ***
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 ****			-		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	11691		-690		-800		278						10479
2007	10344		-588		-1800		53			6			8015
2008	9818		-557		-1828		32						7465
2009	11058		-637		-487		38			26	4		10002
2010	14201		-823		-680		54			5			12757
2011	11348		-673		-918					3			9760
2012	8465		-500		-760					5			7210
2013	5333		-316		-387						0.2		4630
2014	7314 *		-417		-547								6349

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

Summary of the assessment

Table 4.3.1.10 Cod in Subdivision Vb₁. Assessment summary (weights in tonnes).

Year	Recruitment Age 2	SSB	Landings	Mean F Ages 3–7
	thousands	tonnes	tonnes	
1959	13 238	48 869	22 415	0.512
1960	14 245	54 447	32 255	0.661
1961	12 019	46 439	21 598	0.606
1962	20 654	43 326	20 967	0.523
1963	20 290	49 054	22 215	0.494
1964	21 834	55 362	21 078	0.502
1965	8 269	57 057	24 212	0.491
1966	18 566	60 629	20 418	0.474
1967	23 451	73 934	23 562	0.39
1968	17 582	82 484	29 930	0.464
1969	9 325	83 487	32 371	0.438
1970	8 608	82 035	24 183	0.388
1971	11 928	63 308	23 010	0.353
1972	21 320	57 180	18 727	0.336
1973	12 573	83 547	22 228	0.289
1974	30 480	98 434	24 581	0.314
1975	38 319	109 566	36 775	0.395
1976	18 575	123 077	39 799	0.475
1977	9 995	112 057	34 927	0.676
1978	10 748	78 497	26 585	0.426
1979	14 998	66 723	23 112	0.427
1980	23 583	58 887	20 513	0.395
1981	14 001	63 562	22 963	0.465
1982	22 128	67 033	21 489	0.414
1983	25 162	78 543	38 133	0.706
1984	47 769	96 774	36 979	0.508
1985	17 323	84 789	39 484	0.701
1986	9 513	73 698	34 595	0.669
1987	9 914	62 249	21 391	0.445
1988	8 726	52 134	23 182	0.607
1989	16 408	38 427	22 068	0.796
1990	3 646	29 450	13 692	0.666
1991	6 662	21 301	8 750	0.512
1992	11 392	21 073	6 396	0.458
1993	10 097	33 502	6 107	0.235
1994	25 156	42 937	9 046	0.185
1995	42 508	54 735	23 045	0.321
1996	12 858	85 457	40 422	0.702
1997	6 454	81 121	34 304	0.772
1998	5 922	55 445	24 005	0.593
1999	14 338	44 611	18 306	0.53
2000	19 710	45 736	21 033	0.364

Year	Recruitment Age 2	SSB	Landings	Mean F Ages 3–7
	thousands	tonnes	tonnes	
2001	29 687	58 652	28 183	0.432
2002	13 258	55 679	38 457	0.822
2003	6 240	40 399	24 501	0.726
2004	3 631	27 059	13 178	0.671
2005	6 095	23 470	9 906	0.546
2006	7 619	20 897	10 479	0.616
2007	5 120	17 387	8 015	0.487
2008	6 506	20 433	7 465	0.442
2009	8 425	19 563	10 002	0.525
2010	12 297	21 525	12 757	0.653
2011	4 145	19 114	9 760	0.543
2012	1 773	19 290	7 210	0.497
2013	2 453	20 785	4 630	0.261
2014	6 772	21 142	6 349	0.412
2015	874	18 781		
Average	14 477	54 827	21 817	0.505

Sources and references

ICES. 1998. Report of the North-Western Working Group (NWWG), 28 April–06 May, 1998, ICES Headquarters, Copenhagen. ICES CM 1998/ACFM:19. 350 pp.

ICES. 2011. Report of the North-Western Working Group (NWWG), 26 April–03 May, 2011, ICES Headquarters, Copenhagen. ICES CM 2011/ACOM:07. 989 pp.

ICES. 2015a. Report of the North-Western Working Group (NWWG), 28 April–5 May, 2015, ICES Headquarters, Copenhagen, Denmark. ICES CM 2015/ACOM:07.

ICES. 2015b. Advice basis. *In* Report of the ICES Advisory Committee, 2015. ICES Advice 2015, Book 1. In preparation.