

4.3.1 Cod (*Gadus morhua*) in Subdivision 5.b.1 (Faroe Plateau)

ICES stock advice

ICES advises that when the MSY approach is applied, fishing mortality in 2017 should be no more than 0.16. ICES is not in a position to advise on the corresponding level of fishing effort.

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 2014–2015 and is now above F_{pa} . The 2009–2014 year classes are estimated to be below average size.

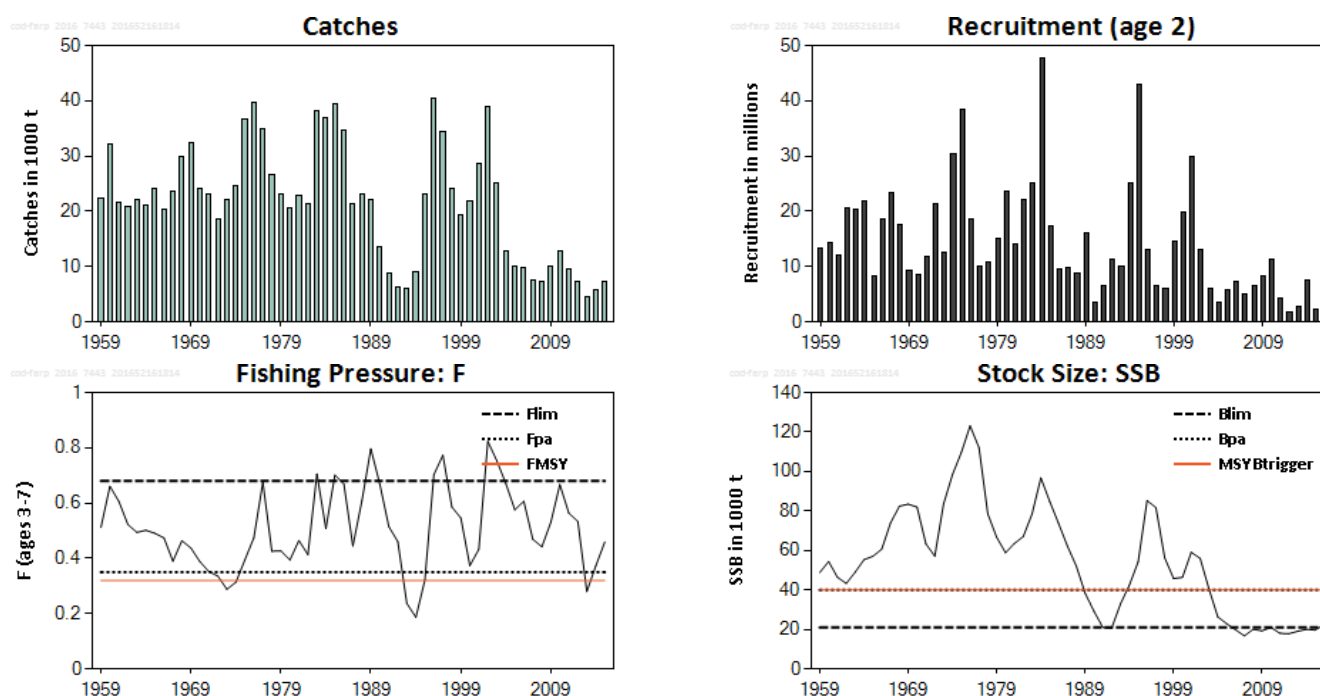


Figure 4.3.1.1 Cod in Subdivision 5.b.1 (Faroe Plateau). Summary of stock assessment (weights in thousand tonnes).

Stock and exploitation status

Table 4.3.1.1 Cod in Subdivision 5.b.1 (Faroe Plateau). State of the stock and fishery relative to reference points.

		Fishing pressure				Stock size			
		2013	2014	2015		2014	2015	2016	
Maximum sustainable yield	F_{MSY}	✓	✗	✗	Above F_{MSY}	✗	✗	✗	Below trigger
Precautionary approach	F_{pa} , F_{lim}	✓	○	○	Increased risk	✗	✗	○	Increased risk
Management plan	F_{MGT}	-	-	-	Not applicable	SSB _{MGT}	-	-	Not applicable

Catch options

Table 4.3.1.2 Cod in Subdivision 5.b.1 (Faroe Plateau). The basis for the catch options.

Variable	Value	Source	Notes
F ages 3–7 (2016)	0.46	ICES (2016a)	F_{2015}
SSB (2017)	20 kt	ICES (2016a)	
R_{age2} (2017)	4.3 millions	ICES (2016a)	Average of the recruitment in 2013–2015
R_{age2} (2018)	4.3 millions	ICES (2016a)	Average of the recruitment in 2013–2015
Total catch (2016)	7.5 kt	ICES (2016a)	Resulting from the assumption of $F_{2016} = F_{2015}$.
Landings (2016)	7.5 kt	ICES (2016a)	Discarding is considered negligible.

Table 4.3.1.3 Cod in Subdivision 5.b.1 (Faroe Plateau). The catch options.

Rationale	F (2017)	Catch (2017)	Basis	SSB (2018)	%SSB change *
MSY approach	0.16	2.8	$F_{MSY} \times SSB_{2017} / MSY B_{trigger}$	23.6	17
Zero catch	0	0	$F = 0$	26.7	33
Other options	0.46	7.1	$F_{sq} = F_{2016}$	18.9	-6
	0.23	3.9	$F_{sq} \times 0.50$	22.4	11
	0.35	5.6	$F_{pa} (= F_{sq} \times 0.75)$	20.5	2
	0.32	5.2	F_{MSY}	20.9	4
	0.41	6.5	$F_{sq} \times 0.90$	19.5	-3
	0.51	7.6	$F_{sq} \times 1.1$	18.3	-9

Weights in thousand tonnes.

* SSB 2018 relative to SSB 2017.

Basis of the advice

Table 4.3.1.4 Cod in Subdivision 5.b.1 (Faroe Plateau). The basis of the advice.

Advice basis	MSY approach.
Management plan	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.

Quality of the assessment

The landings data are considered accurate. There are no strong incentives to discard fish under the effort management system. The sampling of the landings is believed to be adequate.

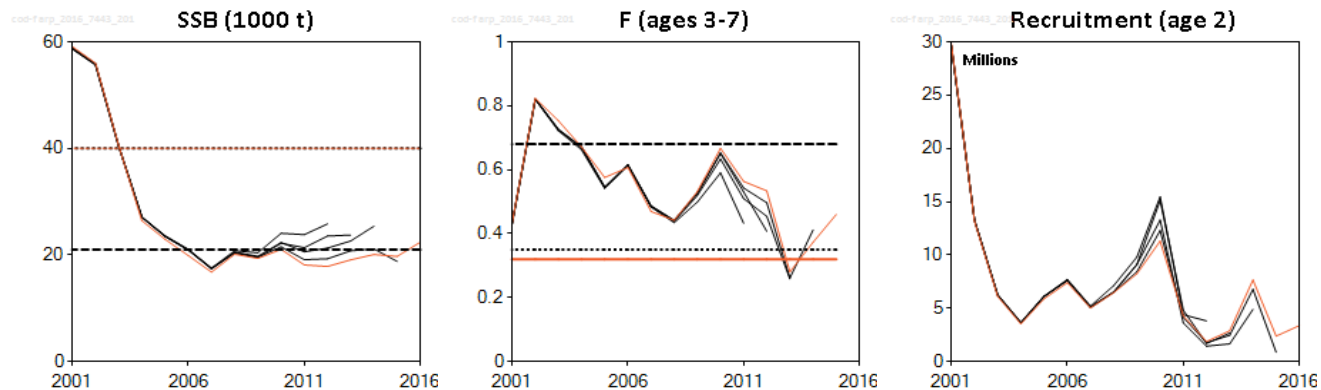


Figure 4.3.1.2 Cod in Subdivision 5.b.1 (Faroe Plateau). Historical assessment results (final-year recruitment estimates included).

Issues relevant for the advice

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 fishing days used by the main fleet targeting cod (longliners) only amounts to around half of the allocated days. With surplus allocated fishing days, current effort control is not limiting fishing pressure.

ICES has not quantified the relationship between effort and F for this stock, since there is no apparent relationship between effort and F in the available data.

Faroe Plateau cod and Faroe haddock are caught in a mixed fishery. In the current state of both stocks (around B_{lim}), and with effort control not limiting fishing pressure, further development of management measures that includes the mixed-fishery issue would be useful.

The advice is given by calendar year, though the fishing year runs from 1 September to 31 August of the following year.

Reference points

Table 4.3.1.5 Cod in Subdivision 5.b.1 (Faroe Plateau). 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	$B_{lim} \times e^{1.645\sigma}$, assuming $\sigma = 0.40$ to account for the relatively large uncertainties in the assessment.	ICES (1998)
	F_{lim}	0.68	$F_{pa} \times e^{1.645\sigma}$, assuming $\sigma = 0.40$ 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 applicable		
	F_{MGT}	Not applicable		

Basis of the assessment

Table 4.3.1.6 Cod in Subdivision 5.b.1 (Faroe Plateau). The basis of the assessment.

ICES stock data category	1 (ICES, 2016b)
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	Discarding is considered negligible.
Indicators	None
Other information	The stock assessment was last benchmarked by NWWG in 2004. A benchmark is planned for 2017.
Working group	North-Western Working Group (NWWG)

Information from stakeholders

There is no available information.

History of the advice, catch, and management

Table 4.3.1.7 Cod in Subdivision 5.b.1 (Faroe Plateau). 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		13.7
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		19.2
2000	F less than proposed F_{pa} (0.35)	< 20		21.8
2001	F less than proposed F_{pa} (0.35)	< 16		28.6
2002	75% of F(2000)	< 22		38.8
2003	75% of F(2001)	< 32		25.2
2004	25% reduction in effort	-		12.8
2005	Rebuilding plan involving large reduction	-		10.1
2006	Rebuilding plan involving large reduction	-		9.8
2007	Rebuilding plan involving large reduction in effort	-		7.5
2008	No fishing. Development of a rebuilding plan.	0		7.3
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		9.7
2012	MSY framework, reduce F by 30%	< 10		7.2
2013	MSY approach, $F < 0.20$	< 4.8		4.5
2014	MSY approach, reduce F by 69 %	< 3.6		5.7
2015	MSY approach, reduce F by 23 %	< 4.5		7.4
2016	Lowest possible level (LPL) and develop a mixed-fishery management plan	LPL		
2017	MSY approach ($F \leq 0.16$)	≤ 2.8		

Weights in thousand tonnes.

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

** The TAC was increased during the quota year.

*** Not applicable since 1997.

History of catch and landings

Table 4.3.1.8 Cod in Subdivision 5.b.1 (Faroe Plateau). Catch distribution by fleet in 2015 as estimated by ICES.

Total catch (2015)	Landings				Discards
7.394 kt	62% longlines	29% trawlers	9% jigging	0.1% other gear types	Negligible
	7.394 kt				

Table 4.3.1.9 Cod in Subdivision 5.b.1 (Faroe Plateau). History of commercial catch and landings; both the official and ICES estimated values are presented by area for each country participating in the fishery.

Year	Denmark	Faroe Islands	France	Germany	Iceland	Norway	Greenland	Portugal	UK (E/W/Ni)	UK (Scotland)	United Kingdom	Total
1986	8	34492	4	8		83	-		0	0	-	34595
1987	30	21303	17	12		21	-		8	0	-	21391
1988	10	22272	17	5		163	-		0	0	-	22467
1989	-	20535	-	7		285	-		0	0	-	20827
1990	-	12232	-	24		124	-		0	0	-	12380
1991	-	8203	-**	16		89	-		1	0	-	8309
1992	-	5938	3***	12		39	-		74	0	-	6066
1993	-	5744	1***	+		57	-		186	0	-	5988
1994	-	8724	-	2***		36	-		56	0	-	8818
1995	-	19079	2***	2		38	-		43	0	-	19164
1996	-	39406	1***	+		507	-		126	0	-	40040
1997	-	33556	-	+		410	-		61***	0	-	34027
1998	-	23308	-*	-		405	-		27***	0	-	23740
1999	-	19156	-*	39	-	450	-		51	0		19696
2000		0	1	2	-	374	-		18	0		395
2001		29762	9***	9	-	531*	-		50	0		30361
2002		40602	20	6	5	573			42	0		41248
2003		30259	14	7	-	447	-		15	0		30742
2004		17540	2	3***		414		1	15	0		17975
2005		13556	-			201			24	0		13781
2006		11629	7	1***		49	5		0	0		11691
2007		9905	1***			71	7		0	360		10344
2008		9394	1			40			0	383		9818
2009		10736	1			14	7		0	300		11058
2010		13878	1			10			0	312		14201.28
2011		11348	-			0			0	0		11348

Year	Denmark	Faroe Islands	France	Germany	Iceland	Norway	Greenland	Portugal	UK (E/W/Ni)	UK (Scotland)	United Kingdom	Total
2012		8437	0		28	0			0	0		8465
2013		5331	0		20	0	2		0	0		5333.01
2014		6655				6			0	226		6887.414
2015*		7812				33	14		0	382		8241

* Preliminary

** Included in 5.b.2

*** Reported as 5.b

Table 4.3.1.10 Cod in Subdivision 5.b.1 (Faroe Plateau). ICES estimated catch (tonnes) used in the assessment.

Year	Officially reported	Faroe catches				Catches reported as 5.b.2			Foreign catches				Used in the assessment
		In 5.b.1	Corrections in 5.b.1	On Faroe-Iceland ridge	in 2.a within Faroe area jurisdiction	UK (E/W/Ni)	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			-661		-	210						19245
2000	395	21793*		-600		-	245						21833
2001	30361		-1766	-306		-	288						28577
2002	41248		-2409	-223		-	218	-				-	38834
2003	30742		-1795	-4034		-	254	-				-	25167
2004	17975		-1041	-4338		-	244	-				-	12840

Year	Officially reported	Faroese catches				Catches reported as 5.b.2			Foreign catches				Used in the assessment
		In 5.b.1	Corrections in 5.b.1	On Faroe-Iceland ridge	in 2.a within Faroe area jurisdiction	UK (E/W/Ni)	UK (Scotland)	UK	French**	Greenland**	Russia**	UK**	
2005	13781		-804	-3987			1129	-				-	10119
2006	11691		-690	-1435			278						9844
2007	10344		-588	-2304			53			6			7511
2008	9818		-557	-1978			32						7315
2009	11058		-637	-510			38			26	4		9979
2010	14201		-823	-680			54			5			12757
2011	11348		-673	-986						3			9692
2012	8465		-500	-766						5			7204
2013	5333		-316	-544							0		4473
2014	6887		-395	-777									5715
2015	8241*		-463	-384									7394

* Preliminary

** Reported to Faroese Coastal Guard.

*** Expected misreporting/discard.

Summary of the assessment

Table 4.3.1.11 Cod in Subdivision 5.b.1 (Faroe Plateau). Assessment summary (weights in tonnes).

Year	Recruitment Age 2 thousands	Stock size: SSB tonnes	Catches tonnes	Fishing pressure: F Ages 3–7 Year ⁻¹
1959	13238	48869	22415	0.512
1960	14245	54447	32255	0.661
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	0.39
1968	17582	82484	29930	0.464
1969	9325	83487	32371	0.438
1970	8608	82035	24183	0.388
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	109566	36775	0.395
1976	18575	123077	39799	0.475
1977	9995	112057	34927	0.676
1978	10748	78497	26585	0.426
1979	14998	66723	23112	0.427
1980	23582	58887	20513	0.395
1981	14000	63562	22963	0.465
1982	22128	67033	21489	0.414
1983	25161	78542	38133	0.706
1984	47766	96773	36979	0.508
1985	17322	84786	39484	0.701
1986	9511	73693	34595	0.669
1987	9913	62241	21391	0.445
1988	8729	52125	23182	0.608
1989	16169	38406	22068	0.796
1990	3636	29270	13692	0.668
1991	6658	21069	8750	0.515
1992	11380	20755	6396	0.461
1993	10087	33068	6107	0.237
1994	25220	42475	9046	0.187
1995	42867	54320	23045	0.322
1996	13092	85321	40422	0.703
1997	6590	81714	34304	0.773
1998	6064	56284	24005	0.586
1999	14629	45830	19245	0.546
2000	19972	46396	21833	0.374
2001	29888	59118	28577	0.433
2002	13160	56006	38834	0.823
2003	6112	40542	25167	0.753
2004	3527	26435	12840	0.671
2005	5880	22942	10119	0.576
2006	7393	19879	9844	0.607

Year	Recruitment Age 2 thousands	Stock size: SSB tonnes	Catches tonnes	Fishing pressure: F Ages 3–7 Year ⁻¹
2007	5030	16786	7511	0.47
2008	6465	20129	7315	0.442
2009	8237	19359	9979	0.531
2010	11303	21047	12757	0.667
2011	4294	18135	9692	0.564
2012	1884	17848	7204	0.534
2013	2890	19083	4473	0.28
2014	7654	20087	5715	0.373
2015	2389	19729	7394	0.46
2016	3374	22408		
Average	14327	54165	21579	0.507

Sources and references

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