

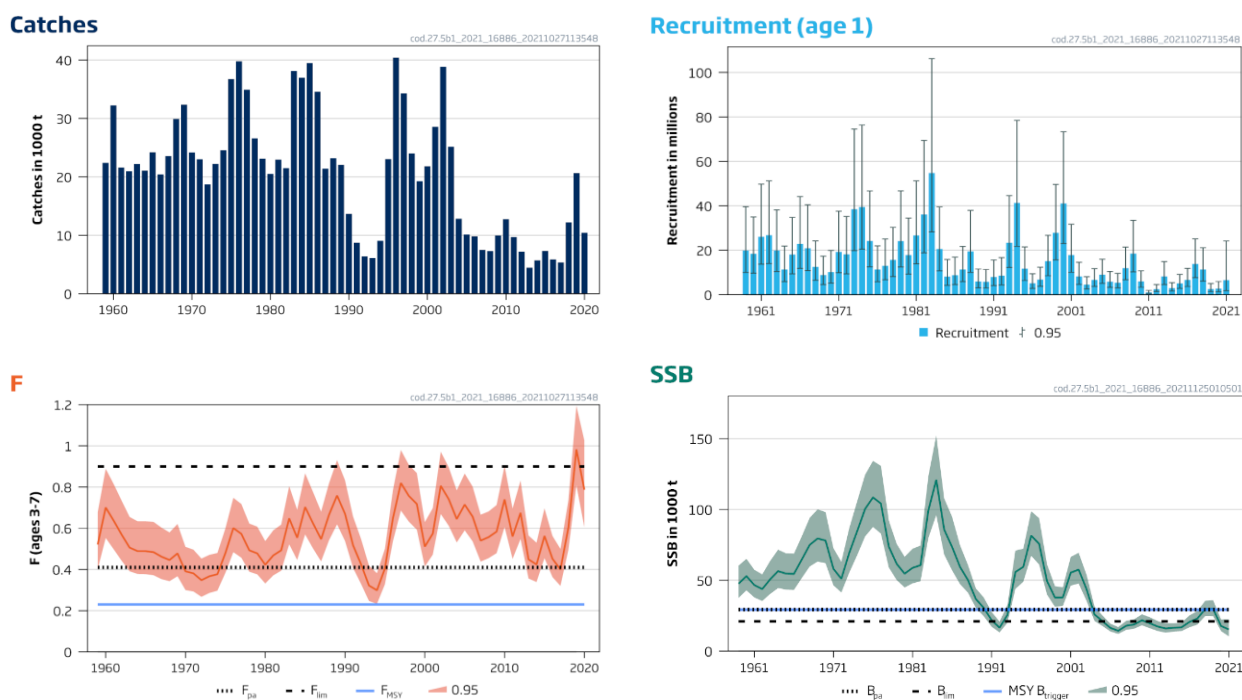
## Cod (*Gadus morhua*) in Subdivision 5.b.1 (Faroe Plateau)

### ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2022 should be no more than 2206 tonnes. ICES is not in a position to advise on the corresponding level of fishing effort.

### Stock development over time

ICES assesses that fishing pressure on the stock is above  $F_{MSY}$  and and between  $F_{pa}$ , and  $F_{lim}$ , while spawning stock size is below MSY  $B_{trigger}$ ,  $B_{pa}$ , and  $B_{lim}$ .



**Figure 1** Cod in Subdivision 5.b.1. Summary of the stock assessment. Catches, recruitment, fishing mortality (F), and spawning-stock biomass (SSB).

### Catch scenarios

**Table 1** Cod in Subdivision 5.b.1. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
$F_{ages\ 3-7}$ (2021)	0.43	Based on catch estimate of 5454 tonnes in 2021
SSB (2022)	17289	Based on $F = 0.43$ ; tonnes
$R_{age\ 1}$ (2022)	2978	Median of resampled estimates from 2011 to 2020; thousands
Landings (2021)	5454	Catch estimate for 2021 based on catch statistics to the end of September extrapolated to the entire year; tonnes
Discards (2021)	0	Discarding is considered negligible; tonnes

**Table 2** Cod in Subdivision 5.b.1. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2022)	$F_{(3-7)}$ (2022)	SSB (2023)	% SSB change*	% advice change**	Probability (SSB < $B_{lim}$ ) in 2023
ICES advice basis						
MSY approach: $F_{MSY} \times SSB_{2022}/MSYB_{trigger}$	2206	0.136	23848	38	-65	0.35
Other scenarios						
$F = 0$	0	0	26451	53	-100	0.22
$F = F_{2021}$	5950	0.43	19382	12	-5	0.60
$F = F_{pa}$	5778	0.41	19530	13	-8	0.59
$F = F_{lim}$	10093	0.90	14723	-15	62	0.81

\* SSB (2023) relative to SSB (2022) (17 289 tonnes).

\*\*The advice value for 2022 relative to the advice value for 2021 as issued in 2020 (6247 tonnes).

The catch advice for 2022 has decreased compared to the advice for 2021; this is due to the lower estimate of biomass.

### Basis of the advice

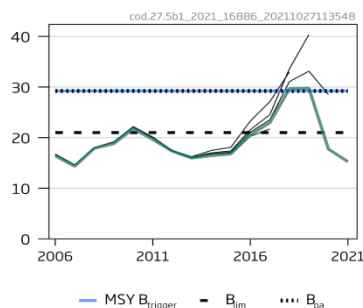
**Table 3** Cod in Subdivision 5.b.1. The basis of the advice.

Advice basis	MSY approach
Management plan	A management plan (Anon., 2019) was implemented in 2021, but ICES has not been requested to evaluate it.

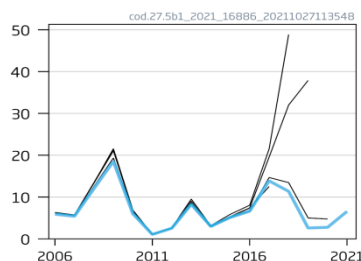
### Quality of the assessment

The 2018 to 2020 recruitment estimates have been revised downwards in the updated assessment. There is a tendency for the assessment to result in overestimates of biomass and underestimates of fishing mortality, which may indicate model or data issues. The estimate of  $F$  in 2019 has been revised upwards in the 2021 assessment compared to the assessment conducted in 2020.

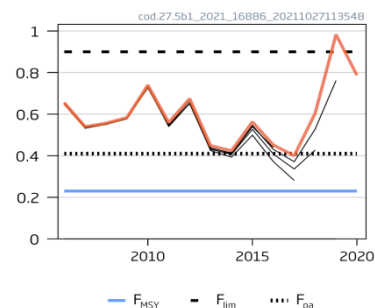
#### SSB (1000 t)



#### Rec (age 1; Millions)



#### F (ages 3-7)



**Figure 2** Cod in Subdivision 5.b.1. Historical assessment results. Results of the last five assessments are plotted, with the solid coloured line representing the current assessment.

### Issues relevant for the advice

Faroe Plateau cod and Faroe haddock are caught in a mixed fishery. The application of the MSY approach implies reductions in fishing effort for both stocks in 2022 relative to recent years. However, Faroe Plateau cod is assessed to be in poorer state (below  $B_{lim}$  in 2021), and the MSY approach implies a much larger reduction in fishing effort for cod than for haddock. The advice for 2022 for cod is based on a fishing mortality of 0.13. Fishing mortality on the stock has rarely been less than 0.4 in the past 60 years and was larger than 0.7 in the last three years.

In 2021 the Faroese authorities implemented a management plan (Anon., 2019) with a control rule that regulates the number of fishing days for cod, haddock, and saithe in the Faroe Plateau fishery. The management plan has not been evaluated by ICES and therefore ICES bases its advice on the MSY approach.

ICES cannot quantify the relationship between effort and  $F$  for this stock.

## Reference points

**Table 4** Cod in Subdivision 5.b.1. Reference points, values, and their technical basis. All weights are in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	29226	$B_{pa}$	ICES (2017)
	$F_{MSY}$	0.23	Stochastic simulations assuming segmented regression, Ricker and Beverton and Holt stock–recruitment relationships	ICES (2017)
Precautionary approach	$B_{lim}$	21000	$B_{loss}$ in 1992 from the 1998 assessment	ICES (1998, 2017)
	$B_{pa}$	29226	$B_{lim} \times \exp(1.645 \times \sigma)$ , where $\sigma = 0.20$	ICES (2017)
	$F_{lim}$	0.90	Stochastic simulations (ICES, 2017): the F that gives a 50% probability of $SSB > B_{lim}$	ICES (2017)
	$F_{pa}$	0.41	$F_{P05}$ ; the F that leads to $SSB \geq B_{lim}$ with 95% probability	ICES (2017, 2021a)*
Management plan	$SSB_{mgt}$	Not applicable		
	$F_{mgt}$	Not applicable		

\* In 2021, both the technical basis and the value of  $F_{pa}$  were revised.

## Basis of the assessment

**Table 5** Cod in Subdivision 5.b.1. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2021b)
Assessment type	SAM with catch-at-age data and age-disaggregated indices, using catches in the model and in the forecast (ICES, 2021a)
Input data	Commercial catches, ages, and length frequencies from catch sampling; survey indices (FO-GFS-Q1, G1264, and FO-GFS-Q3, G3284); annual maturity data from FO-GFS-Q1 (G1264); natural mortality set at 0.2
Discards and bycatch	Discarding is considered negligible
Indicators	Co-occurrence of high recruitment of cod with sandeel abundance
Other information	The stock was benchmarked in 2017 (ICES, 2018)
Working group	North-Western Working Group (NWWG)

## History of the advice, catch, and management

**Table 6** Cod in Subdivision 5.b.1. ICES advice and catch. All weights are in tonnes.

Fishing year	ICES advice	Catch corresponding to advice	Agreed TAC***	ICES catch
1987	No increase in F	< 31000		21391
1988	No increase in F (revised estimate)	< 29000 (23000)		23182
1989	No increase in F	< 19000		22068
1990	No increase in F	< 20000		13692
1991	TAC	< 16000		8750
1992	No increase in F	< 20000		6396
1993	No fishing	0		6107
1994	No fishing	0	8500/12500***	9046
1995	No fishing	0	12500*	23045
1996	F at lowest possible level	-	20000**	40422
1997	80% of F(95)	< 24000		34304
1998	30% reduction in effort from 1996/97	-		24005
1999	F less than proposed $F_{pa}$ (0.35)	< 19000		19245
2000	F less than proposed $F_{pa}$ (0.35)	< 20000		21833
2001	F less than proposed $F_{pa}$ (0.35)	< 16000		28577
2002	75% of F(2000)	< 22000		38834
2003	75% of F(2001)	< 32000		25167
2004	25% reduction in effort	-		12840
2005	Rebuilding plan involving large reduction	-		10119
2006	Rebuilding plan involving large reduction	-		9844

Fishing year	ICES advice	Catch corresponding to advice	Agreed TAC***	ICES catch
2007	Rebuilding plan involving large reduction in effort	-		7511
2008	No fishing; development of a rebuilding plan	0		7315
2009	No fishing; development of a rebuilding plan	0		9979
2010	No fishing; development of a rebuilding plan	0		12762
2011	Reduce F to below $F_{pa}$	< 16000		9692
2012	MSY framework, reduce F by 30%	< 10000		7205
2013	MSY approach, $F < 0.20$	< 4800		4473
2014	MSY approach, reduce F by 69%	< 3600		5711
2015	MSY approach, reduce F by 23%	< 4500		7329
2016	Lowest possible level (LPL) and develop a mixed-fishery management plan	-		5876
2017	MSY approach ( $F \leq 0.16$ )	$\leq 2800$		5360
2018	MSY approach ( $F \leq 0.22$ )	$\leq 4579$		12214
2019	MSY approach	$\leq 9354$		20670
2020	MSY approach	$\leq 11679$		10431
2021	MSY approach	$\leq 6247$		
2022	MSY approach	$\leq 2206$		

\* From 1 September in the quota year to 31 August the following year.

\*\* The TAC was increased during the quota year.

\*\*\* Not applicable since 1997.

### History of the catch and landings

**Table 7** Cod in Subdivision 5.b.1. Catch distribution by fleet as estimated by ICES. All weights are in tonnes.

Catch (2020)	Landings				Discards
10431	Longlines 63 %	Handlines 12 %	Trawls 24 %	Gillnets 1 %	Negligible
	10431				

**Table 8** Cod in Subdivision 5.b.1. History of commercial catch and landings; catches in this table are those officially reported by each country and may differ from the ICES estimated catch. All weights are in tonnes.

Year	Denmark	Faroe Islands	France	Germany	Iceland	Norway	Greenland	Portugal	UK	Total
1986	8	34492	4	8		83			-	34595
1987	30	21303	17	12		21			8	21391
1988	10	22272	17	5		163				22467
1989		20535		7		285				20827
1990		12232		24		124				12380
1991		8203	*	16		89			1	8309
1992		5938	3**	12		39			74	6066
1993		5744	1**	+		57			186	5988
1994		8724		2**		36			56	8818
1995		19079	2**	2		38			43	19164
1996		39406	1**	+		507			126	40040
1997		33556		+		410			61**	34027
1998		23308				405			27**	23740
1999		19156		39		450			51	19696
2000		***	1	2		374			18	395
2001		29762	9**	9		531*			50	30361
2002		40602	20	6	5	573			42	41248
2003		30259	14	7		447			15	30742
2004		17540	2	3**		414		1	15	17975

Year	Denmark	Faroe Islands	France	Germany	Iceland	Norway	Greenland	Portugal	UK	Total
2005		13556				201			24	13781
2006		11629	7	1**		49	5			11691
2007		9905	1**			71	7		360	10344
2008		9394	1			40			383	9818
2009		10736	1			14	7		300	11058
2010		13878	1			10			312	14206
2011		11348								11348
2012		8437			28					8466
2013		5331			20		2			5333
2014		6655				2			226	6883
2015		7812				33	14		367	8174
2016		6736				31	5		456	7232
2017		6208	2			16			388	6625
2018		13297	2			69			504	13872
2019		22342	1			219			238	22800
2020		10614	2			163			683	11463

\* Included in ICES Subdivision 5.b.2.

\*\* Reported as ICES Division 5.b.

\*\*\* No reported catch.

## Summary of the assessment

**Table 9** Cod in Subdivision 5.b.1. Assessment summary.

Year	Recruitment			SSB			Catch	F		
	Age 1	97.5 percentile	2.5 percentile	SSB	97.5 percentile	2.5 percentile		Mean F <sub>ages 3-7</sub>	97.5 percentile	2.5 percentile
	Thousands			Tonnes			Tonnes			
1959	19919	39575	10026	47528	60268	37481	22415	0.52	0.68	0.40
1960	18377	35014	9645	52884	65159	42921	32255	0.70	0.89	0.55
1961	26117	49763	13707	46615	57394	37860	21598	0.64	0.82	0.50
1962	26784	51218	14007	43770	54158	35375	20967	0.57	0.73	0.44
1963	19942	38165	10421	50650	63602	40336	22215	0.51	0.66	0.39
1964	11348	21871	5888	56446	71587	44508	21078	0.49	0.63	0.38
1965	18071	34794	9386	54740	69033	43406	24212	0.49	0.63	0.38
1966	22882	44163	11856	54436	68699	43134	20418	0.48	0.63	0.37
1967	20949	40452	10849	64625	81010	51554	23562	0.46	0.60	0.35
1968	12515	24231	6464	74973	94091	59740	29930	0.45	0.58	0.34
1969	8890	17306	4567	79513	100067	63181	32371	0.48	0.62	0.37
1970	10175	19896	5204	78025	98136	62035	24183	0.39	0.51	0.30
1971	19280	37578	9892	58066	72637	46418	23010	0.38	0.50	0.29
1972	18145	35222	9348	51044	62998	41358	18727	0.35	0.45	0.27
1973	38472	74592	19843	69306	86753	55367	22228	0.37	0.47	0.29
1974	39524	76360	20458	84633	105764	67724	24581	0.38	0.48	0.30
1975	24205	46675	12552	100337	124439	80904	36775	0.48	0.60	0.38
1976	11337	21975	5849	108465	134291	87605	39799	0.60	0.75	0.48
1977	12971	25068	6712	104149	130780	82940	34927	0.57	0.72	0.46
1978	15684	30325	8112	73701	92121	58964	26585	0.49	0.62	0.39
1979	24140	46700	12478	61553	75629	50097	23112	0.48	0.61	0.38
1980	17869	34475	9262	54654	66534	44896	20513	0.42	0.54	0.33
1981	26664	51214	13883	58766	72255	47794	22963	0.47	0.59	0.37
1982	36177	69440	18848	60594	74480	49296	21489	0.49	0.62	0.39
1983	54788	106260	28249	99269	123439	79831	38133	0.65	0.81	0.52

Year	Recruitment			SSB			Catch	F		
	Age 1	97.5 percentile	2.5 percentile	SSB	97.5 percentile	2.5 percentile		Mean F <sub>ages 3-7</sub>	97.5 percentile	2.5 percentile
	Thousands			Tonnes			Tonnes			
1984	20566	39500	10708	120968	152289	96088	36979	0.55	0.69	0.45
1985	8149	15829	4195	85740	107795	68198	39484	0.70	0.87	0.57
1986	8767	16910	4545	73510	94781	57013	34595	0.62	0.78	0.50
1987	11345	21731	5923	59460	74763	47288	21391	0.55	0.68	0.44
1988	19496	37925	10022	50161	60898	41316	23182	0.67	0.82	0.54
1989	5951	11572	3061	36798	44290	30573	22068	0.76	0.93	0.62
1990	5820	11335	2989	30507	37832	24600	13692	0.67	0.83	0.54
1991	7964	15629	4058	21799	27625	17202	8750	0.52	0.66	0.41
1992	8547	16742	4363	16550	20795	13171	6396	0.43	0.55	0.33
1993	23392	44583	12273	25584	32637	20055	6107	0.32	0.42	0.25
1994	41296	78439	21741	55813	70949	43906	9046	0.30	0.38	0.23
1995	11725	21479	6400	59462	72279	48918	23045	0.41	0.50	0.33
1996	5173	9407	2845	81529	98786	67286	40422	0.65	0.78	0.54
1997	6824	12359	3768	75744	93831	61143	34304	0.82	0.98	0.69
1998	15085	26726	8515	49425	61242	39889	24005	0.76	0.91	0.63
1999	27862	49647	15636	37848	45829	31257	19245	0.72	0.87	0.59
2000	41091	73346	23020	37912	45037	31915	21833	0.51	0.63	0.41
2001	17848	31698	10049	55412	66452	46207	28577	0.57	0.70	0.47
2002	8214	14622	4614	57522	69393	47681	38834	0.81	0.97	0.67
2003	4528	8094	2533	43579	53737	35341	25167	0.74	0.90	0.61
2004	6622	11733	3738	25905	31476	21320	12840	0.65	0.78	0.53
2005	9014	15975	5086	21150	25211	17743	10119	0.72	0.87	0.59
2006	5897	10449	3328	16404	19388	13880	9844	0.66	0.80	0.54
2007	5389	9581	3032	14335	16987	12097	7511	0.54	0.67	0.44
2008	12006	21435	6725	17874	21324	14982	7315	0.56	0.68	0.46
2009	18506	33476	10231	18807	22391	15797	9979	0.58	0.71	0.48
2010	5992	10754	3339	21764	25965	18243	12762	0.74	0.90	0.61
2011	1058	1934	579	19636	23871	16153	9692	0.56	0.70	0.45
2012	2534	4526	1418	17317	21201	14144	7205	0.68	0.83	0.55
2013	8224	14898	4540	15979	19622	13012	4473	0.45	0.56	0.36
2014	2978	5425	1635	16438	19642	13757	5711	0.42	0.53	0.34
2015	5111	9138	2859	16786	19978	14103	7329	0.56	0.70	0.46
2016	6619	11861	3694	20567	25191	16792	5876	0.45	0.56	0.36
2017	13868	25146	7648	22955	28174	18703	5360	0.40	0.50	0.32
2018	11354	21159	6092	29670	35566	24752	12214	0.60	0.74	0.50
2019	2596	5022	1342	29764	35899	24678	20670	0.98	1.20	0.81
2020	2757	5928	1282	17732	22323	14085	10431*	0.79	1.03	0.60
2021	6562	24213	1778	15240	22399	10369				

\* Preliminary.

## Sources and references

Anon. 2019. Fiskidagaskipan og umsitingarættan. Frágreiðing og tilmæli frá arbeiðsbólkinum at gera uppskot til umsitingarættan og at eftirma skipanina í fiskiskapinum eftir botnfiski undir Føroyum (Fisheries management plan and harvest control rule for cod, haddock and saithe in Faroese waters) (in Faroese). [https://lms.cdn.fo/media/12444/fiskidagaskipan-og-umsitingar%C3%A6ttan-fr%C3%A1grei%C3%B0ing-fr%C3%A1-arbei%C3%B0sb%C3%B3lki-mai-2019.pdf?s=k4aSmLc1W4eXb\\_RidnITC-WYwDA](https://lms.cdn.fo/media/12444/fiskidagaskipan-og-umsitingar%C3%A6ttan-fr%C3%A1grei%C3%B0ing-fr%C3%A1-arbei%C3%B0sb%C3%B3lki-mai-2019.pdf?s=k4aSmLc1W4eXb_RidnITC-WYwDA).

ICES. 1998. Report of the North-Western Working Group (NWWG), 28 April–6 May 1998, ICES Headquarters, Copenhagen. ICES CM 1998/ACFM:19. 350 pp.

ICES. 2017. Report of the North-Western Working Group (NWWG), 27 April–4 May, 2017, ICES Headquarters, Copenhagen. ICES CM 2017/ACOM:08. 642 pp. <https://doi.org/10.17895/ices.pub.5686>.

ICES. 2018. Report of the Benchmark Workshop on Faroese Stocks (WKFAROE 2017), 13–17 February 2017, Copenhagen, Denmark. ICES CM 2017/ACOM:33. 239 pp. <https://doi.org/10.17895/ices.pub.5687>.

ICES. 2021a. Northwestern Working Group (NWWG). ICES Scientific Reports. 3:52. 556 pp. <https://doi.org/10.17895/ices.pub.8186>.

ICES. 2021b. Advice on fishing opportunities. *In* Report of the ICES Advisory Committee, 2021. ICES Advice 2021, section 1.1.1. <https://doi.org/10.17895/ices.advice.7720>.

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