

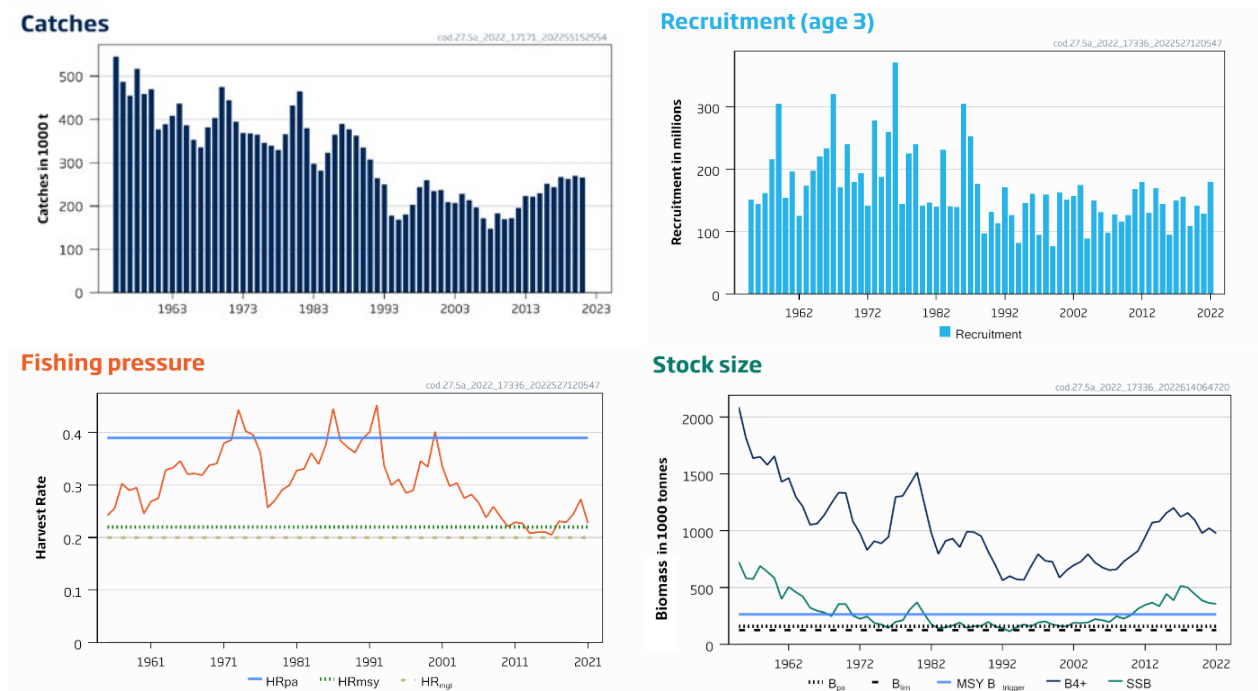
## Cod (*Gadus morhua*) in Division 5.a (Iceland grounds)

### ICES advice on fishing opportunities

ICES advises that when the Icelandic management plan is applied, catches in the fishing year 2022/2023 should be no more than 208 846 tonnes.

### Stock development over time

Fishing pressure on the stock is above  $HR_{MSY}$  and below  $HR_{pa}$ . Spawning-stock size is above  $MSY B_{trigger}$ ,  $B_{pa}$ , and  $B_{lim}$ .



**Figure 1** Cod in Division 5.a. Summary of the stock assessment. Harvest rates are calculated based on biomass age 4+. All biomass reference points refer to SSB levels.

### Catch scenarios

**Table 1** Cod in Division 5.a. Values in the forecast and for the interim year.

Variable	Value	Notes
HR (2022)	0.22	Catch constraint
SSB (2023)	370488	Tonnes
B4+ (2023)	1074370	Tonnes
$R_{age\ 3}$ (2022)	179427	From the assessment; thousands
$R_{age\ 3}$ (2023)	147870	From the assessment; thousands
$R_{age\ 3}$ (2024)	127681	From the assessment; thousands
Total catch (2022)	215624	Estimated catch until the end of the fishing year (31 August 2022) and estimated catch in the first four months of the next fishing year (1 September–31 December 2022); tonnes

**Table 2** Cod in Division 5.a. Annual catch scenarios. All weights are in tonnes (t).

Rationale	Catch (2022/2023)	HR (2023)	SSB (2024)	Biomass age 4+ (2024)	% SSB change*	% advice change**
Management plan	208846	0.20	393257	1124180	6%	-6%

\* SSB<sub>2024</sub> relative to SSB<sub>2023</sub>.

\*\* Advice value for 2022/2023 relative to the advice value for 2021/2022 (222 373 tonnes).

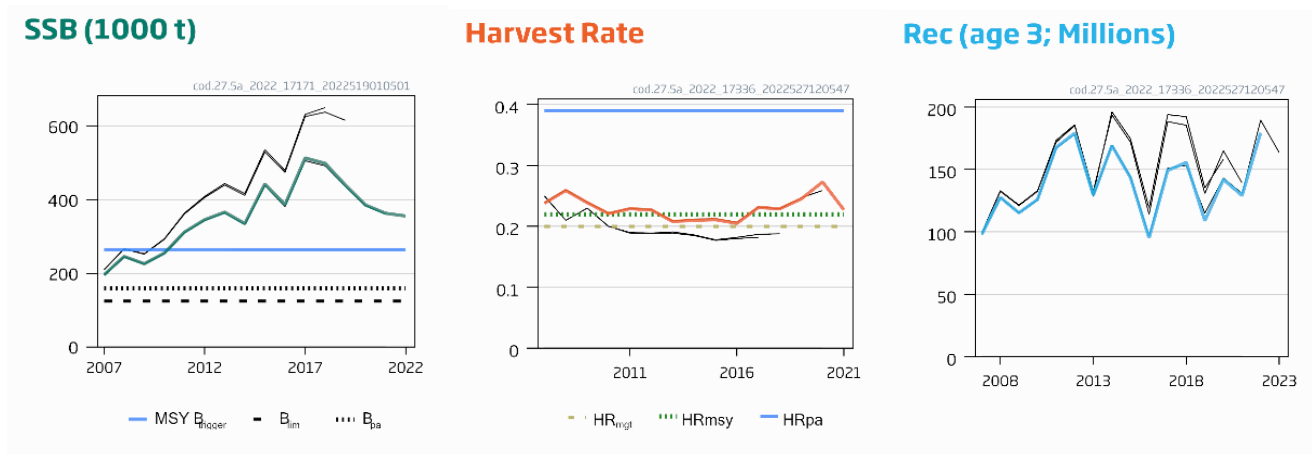
### Basis of the advice

**Table 3** Cod in Division 5.a. The basis of the advice.

Advice basis	Management plan (MII, 2015)
Management plan	<p>The Icelandic Ministry of Industries and Innovation has a fisheries management plan for Icelandic cod (MII, 2015). The plan, which aims at providing maximum sustainable yield, was re-evaluated by ICES, found to be consistent with both the precautionary principle and ICES MSY approach (ICES, 2021a). According to the management plan, the TAC for the fishing year Y/Y + 1 (1 September of year Y to 31 August of year Y + 1) is calculated as follows:</p> $TAC_{Y/Y+1} = \frac{\min\left(\frac{SSB_Y}{MGT B_{trigger}}, 1\right) HR_{mgt} B_{4+,Y} + TAC_{Y-1/Y}}{2}$ <p>where B<sub>4+,Y</sub> is the biomass of cod aged 4 and older in year Y and MGT B<sub>trigger</sub> = 220 000 tonnes.</p> <p>The expected range of realized harvest rate (HR) following the management plan (HR<sub>mgt</sub>) is between 0.15 and 0.27 (ICES, 2021a).</p>

### Quality of the assessment

The current population dynamic estimates are in line with last year's estimates.



**Figure 2** Cod in Division 5.a. Historical assessment results. The fishing pressure reference points and MSY B<sub>trigger</sub> were revised in 2021 following a benchmark, and only assessment results from the last two years should be compared to the reference points indicated. The recruitment trajectory from 2022 does not include the estimates for 2023 or 2024. There was no ICES assessment in 2020.

### Issues relevant for the advice

There is no information to present for this stock.

## Reference points

**Table 4** Cod in Division 5.a. Reference points, values, and their technical basis. All weights are in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	265 000	The trigger point is the lower 5th percentile of the SSB when fishing at $HR_{MSY}$	ICES (2021b)
	$HR_{MSY}$	0.22	Stochastic HCR evaluation. Percentage of age 4+ biomass.	ICES (2021b)
Precautionary approach	$B_{lim}$	125 000	$B_{loss}$	ICES (2010a)
	$B_{pa}$	160 000	$B_{pa} = B_{lim} \times \exp(1.645\sigma_B)$ ; $\sigma_B = 0.15$	ICES (2016)
	$HR_{lim}$		Undefined	ICES (2021b)
	$HR_{pa}$	0.39	HR leading to $P(SSB > B_{lim}) > 95\%$ with $B_{trigger} = 265\ 000$	ICES (2021b)
Management plan	MGT $B_{trigger}$	220 000	From the management plan	ICES (2010b)
	$HR_{mgt}$	0.20	Proportion of age 4+ biomass, from the management plan, which uses a catch stabilizer	ICES (2010b)

## Basis of the assessment

**Table 5** Cod in Division 5.a. Basis of the assessment and advice.

ICES stock data category	1 ( <a href="#">ICES, 2022a</a> )
Assessment type	Separable catch at age model using catches in the assessment and forecast (ICES, 2022b)
Input data	Catch-at-age and age-structured Icelandic bottom trawl survey – Spring (G3239 [IS-SMB]) age 1–14 and Autumn (G4493 [IS-SMH]) age 3–13 survey indices
Discards and bycatch	Discarding is considered negligible and is not included
Indicators	None
Other information	The stock was benchmarked and harvest control rules evaluated in 2021 (ICES, 2021b)
Working group	Northwestern Working Group ( <a href="#">NWWG</a> )

## History of the advice, catch, and management

**Table 6** Cod in Division 5.a. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Agreed TAC	ICES catch for the fishing year	ICES catch for the calendar year <sup>#</sup>
1988*	National advice	300 000	350 000		377 554
1989*	National advice	300 000	325 000		363 125
1990*	National advice	250 000	300 000		335 316
1991*	National advice	240 000	245 000		307 759
1991/1992	National advice	250 000	265 000	274 000	264 834
1992/1993	Reduce F by 40%	154 000	205 000	241 000	250 704
1993/1994	Reduce F by 40%	150 000	165 000	197 000	178 138
1994/1995	Reduce F by 50%	130 000	155 000	165 000	168 592
1995/1996	Apply catch rule	155 000	155 000	170 000	180 701
1996/1997	Apply catch rule	186 000	186 000	202 000	203 112
1997/1998	Apply catch rule	218 000	218 000	227 000	243 987
1998/1999	Apply catch rule	250 000	250 000	254 000	260 147
1999/2000	Apply catch rule	247 000	250 000	257 000	235 092
2000/2001	Apply catch rule	203 000	220 000**	221 000	236 702
2001/2002	Apply catch rule	164 000	190 000**	219 000	209 544
2002/2003	Apply catch rule	183 000	179 000**	202 000	207 246
2003/2004	Apply catch rule	210 000	209 000	227 000	228 342
2004/2005	Apply catch rule	205 000	205 000	217 000	213 867
2005/2006	Apply catch rule	198 000	198 000	207 000	197 202
2006/2007	Apply catch rule	187 000	193 000	191 000	171 646
2007/2008	Apply catch rule	152 000	130 000	143 000	147 676
2008/2009	Apply $F_{max}$	< 124 000	160 000^	171 000	183 320
2009/2010	Apply $F_{max}$	< 135 000	150 000^^	170 000	170 025
2010/2011	Apply catch rule	160 000	160 000	167 000	172 218
2011/2012	Apply catch rule	177 000	177 000	185 000	196 171

Year	ICES advice	Catch corresponding to advice	Agreed TAC	ICES catch for the fishing year	ICES catch for the calendar year <sup>#</sup>
2012/2013	Apply catch rule	196 000	196 000	213 000	223 582
2013/2014	Apply catch rule	215 000	215 000	226 000	222 021
2014/2015	Apply catch rule	218 000	218 000	223 000	230 165
2015/2016	Apply catch rule	239 000	239 000	249 000	251 219
2016/2017	Management plan	244 000	244 000	237 644	243 945
2017/2018	Management plan	257 572	257 572	270 217	267 221
2018/2019	Management plan	264 437	264 437	265 385	263 025
2019/2020	Management plan	≤ 272 411	274 411	272 385	270 302
2020/2021	No advice requested***	-	256 593	272 137	265 740
2021/2022	Management plan	≤ 222 373	222 373		
2022/2023	Management plan	≤ 208 846			

\* Calendar year.

\*\* Amended catch rule.

\*\*\* Advice for 2020/2021 was issued by MFRI (256 593 tonnes).

^ Initial TAC set to 130 000 tonnes according to the catch rule, raised to 160 000 tonnes in January 2009.

^^ Set according to the catch rule.

# The values refer to the catches in the second year within the specified fishing year.

## History of the catch and landings

**Table 7** Cod in Division 5.a. Catch distribution by fleet in 2021 as estimated by ICES. All weights are in tonnes.

Catch (2021)	Landings					Discards
265 740	Bottom trawl 53%	Longline 27%	Gillnet 7%	Demersal seine 7%	Jigging 6%	Discarding is considered negligible
	265 740					

## Summary of the assessment

**Table 8** Cod in Division 5.a. Assessment summary. Weights are in tonnes. Recruitment in thousands.

Year	Recruitment (Age 3)	SSB	Total catch	Harvest rate	Biomass age 4+	Fishing pressure (Age 5–10)
1955	151014	726287	545250	0.24	2090380	0.348
1956	143756	583865	486909	0.26	1818210	0.346
1957	161468	574634	455182	0.30	1639830	0.387
1958	215102	690021	517359	0.29	1650440	0.436
1959	304142	639289	459081	0.30	1580370	0.384
1960	153654	583577	470121	0.25	1657820	0.429
1961	195928	399325	377291	0.27	1430540	0.402
1962	125151	505488	388985	0.28	1464290	0.403
1963	173214	460458	408800	0.33	1298690	0.46
1964	197572	420077	437012	0.33	1210680	0.521
1965	219611	322929	387106	0.35	1052730	0.563
1966	233049	295716	353357	0.32	1063300	0.519
1967	320333	280608	335721	0.32	1139650	0.483
1968	171147	248437	381770	0.32	1242780	0.565
1969	239615	354205	403205	0.34	1335700	0.458
1970	179502	354810	475077	0.34	1332680	0.565
1971	193003	253013	444248	0.38	1083460	0.675
1972	141890	225481	395166	0.39	978391	0.671
1973	277773	244958	369205	0.44	830101	0.706
1974	187011	188447	368133	0.40	908431	0.728
1975	259287	174471	364754	0.40	889532	0.722
1976	370746	145135	346253	0.36	946192	0.709
1977	144057	198192	340086	0.26	1297730	0.574
1978	225138	211522	329602	0.27	1307230	0.464
1979	239412	307151	366462	0.29	1410180	0.439

Year	Recruitment (Age 3)	SSB	Total catch	Harvest rate	Biomass age 4+	Fishing pressure (Age 5–10)
1980	141344	369493	432237	0.30	1513860	0.485
1981	145812	268949	465032	0.33	1246070	0.617
1982	139361	178333	380068	0.33	982289	0.703
1983	230373	140074	298049	0.36	795748	0.658
1984	140407	149501	282022	0.34	909695	0.613
1985	139253	165679	323428	0.38	931199	0.688
1986	304350	192296	364797	0.45	856081	0.837
1987	252412	145121	389915	0.39	992122	0.886
1988	175919	160566	377554	0.37	988243	0.904
1989	96453	162074	363125	0.36	952690	0.745
1990	131054	197937	335316	0.39	816241	0.755
1991	113339	156179	307759	0.40	696964	0.9
1992	170454	142297	264834	0.45	563496	1.001
1993	126162	114903	250704	0.34	600233	0.982
1994	81362	152802	178138	0.30	572888	0.665
1995	145447	174584	168592	0.31	568306	0.579
1996	160310	158421	180701	0.28	686994	0.551
1997	93942	192365	203112	0.29	794598	0.564
1998	158668	201138	243987	0.35	735256	0.682
1999	76440	176040	260147	0.34	727314	0.801
2000	162550	161451	235092	0.40	587904	0.813
2001	150427	158282	236702	0.34	652560	0.75
2002	156840	190365	209544	0.30	697062	0.62
2003	174457	186811	207246	0.30	728622	0.606
2004	88400	193412	228342	0.28	794511	0.646
2005	149958	221675	213867	0.28	719230	0.618
2006	130876	212724	197202	0.27	677717	0.585
2007	97868	196537	171646	0.24	652804	0.538
2008	127615	246662	147676	0.26	661153	0.39
2009	115215	226776	183320	0.24	728730	0.418
2010	125928	255878	170025	0.22	775171	0.355
2011	167612	313000	172218	0.23	821969	0.331
2012	179149	346497	196171	0.23	944292	0.337
2013	129313	367227	223582	0.21	1071480	0.363
2014	169171	336090	222021	0.21	1082680	0.326
2015	143418	443964	230165	0.21	1157530	0.312
2016	94981	387901	251219	0.21	1201250	0.32
2017	149155	514595	243945	0.23	1122360	0.321
2018	155717	499909	267221	0.23	1157120	0.348
2019	108846	441162	263025	0.25	1092400	0.383
2020	141829	386745	270302	0.27	978667	0.432
2021	129060	364187	265740	0.23	1023090	0.42
2022	179427	356697			976590	

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[Download the stock assessment data and figures.](#)

*Recommended citation:* ICES. 2022. Cod (*Gadus morhua*) in Division 5.a (Iceland grounds). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, cod.27.5a, <https://doi.org/10.17895/ices.advice.19447886>.