

Cod (*Gadus morhua*) in divisions 7.e–k (western English Channel and southern Celtic Seas)

ICES advice on fishing opportunities

ICES advises that when the MSY approach and precautionary considerations are applied, there should be zero catch in 2022.

ICES notes the existence of a precautionary management plan, developed and adopted by some of the relevant management authorities for this stock.

Stock development over time

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

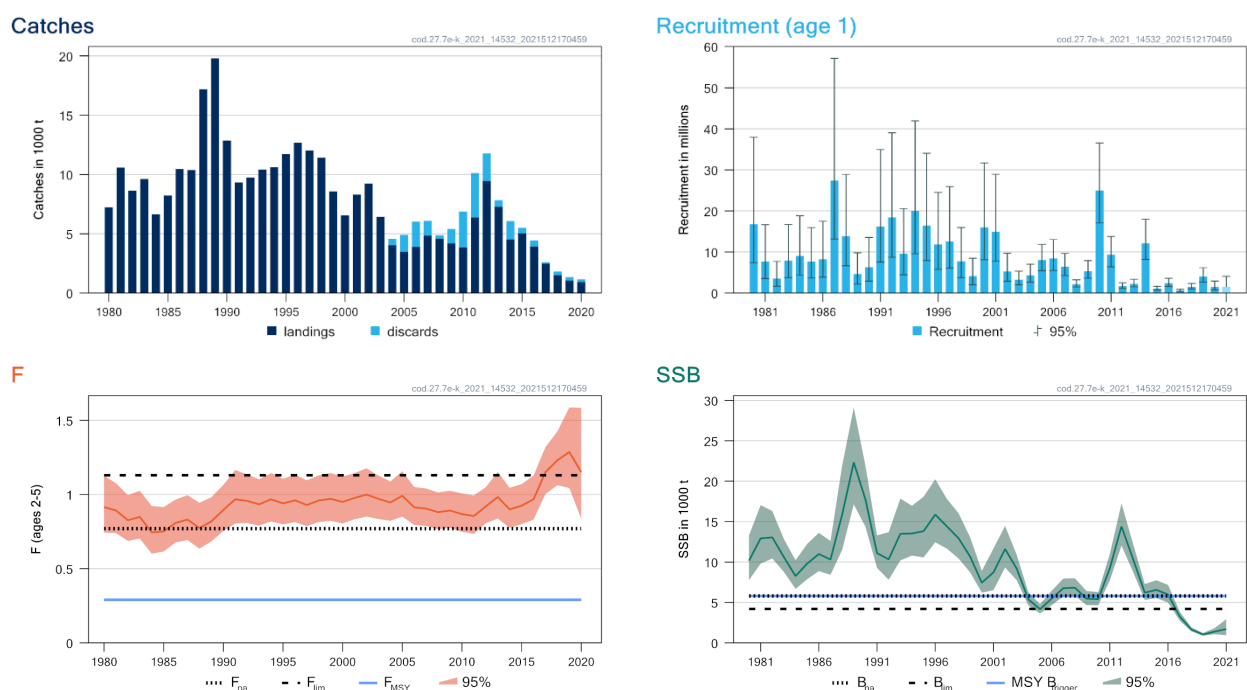


Figure 1 Cod in divisions 7.e–k. Summary of the stock assessment. Discard estimates are available from 2004. The assumed recruitment value for 2021 is shaded in a lighter colour.

Catch scenarios

Table 2 Cod in divisions 7.e–k. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
F ages 2–5 (2021)	1.23	$F_{sq} = F_{average} (2018–2020)$.
SSB (2022)	1354	Fishing at F_{sq} ; in tonnes.
Recruitment _{age 1} (2021)	1526	Median from resampled (2015–2020); in thousands*
Recruitment _{age 1} (2022)	1488	Median from resampled (2015–2020); in thousands*
Total catch (2021)	1881	Fishing at F_{sq} , in tonnes
Projected landings (2021)	1609	Short-term forecast assuming average 2018–2020 landings pattern; in tonnes
Projected discards (2021)	272	Short-term forecast assuming average 2018–2020 discards pattern; in tonnes

* Random resampling of historical recruitment estimates leads to different values.

Table 3 Cod in divisions 7.e–k. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2022)	Projected landings (2022)	Projected discards (2022)	F _{total} (2022)	F _{projected landings} (2022)	F _{projected discards} (2022)	SSB (2023)	% SSB change*
ICES advice basis								
MSY approach: F = 0	0	0	0	0	0	0	3449	155
Other scenarios								
F _{MSY} × SSB ₂₀₂₂ /MSY B _{trigger}	134	113	21	0.068	0.065	0.003	3246	140
F _{MSY lower} × SSB ₂₀₂₂ /MSY B _{trigger}	79	67	12	0.040	0.038	0.002	3329	146
F _{MSY upper} × SSB ₂₀₂₂ /MSY B _{trigger}	186	158	28	0.096	0.091	0.005	3167	134
F = F _{MSY}	519	437	82	0.290	0.277	0.013	2667	97
F = 0	0	0	0	0	0	0	3449	155
F = F _{lim}	1461	1203	258	1.13	1.080	0.05	1306	
F = F _{pa}	1137	943	194	0.77	0.736	0.034	1763	30
SSB ₂₀₂₃ = B _{lim} **								
SSB ₂₀₂₃ = B _{pa} = MSY B _{trigger} **								
F = F ₂₀₂₁	1536	1261	275	1.231	1.176	0.055	1202	-11
SSB ₂₀₂₂ = SSB ₂₀₂₃	1426	1174	252	1.085	1.037	0.048	1354	0

* SSB₂₀₂₃ relative to SSB₂₀₂₂.

**The B_{lim}, B_{pa} and MSY B_{trigger} options were left blank because B_{lim}, B_{pa}, and MSY B_{trigger} cannot be achieved in 2023, even with zero catch in 2022.

The advice for 2022 is the same as the advice for 2021, because there is no change in the perception of the stock.

Basis of the advice

Table 4 Cod in divisions 7.e–k. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is aware of the multiannual management plan (MAP) which has been adopted by the EU for this stock (EU, 2019) and which ICES considers to be precautionary. There is no agreed shared management plan with UK for this stock, and ICES provides advice according to ICES MSY approach. Catch scenarios consistent with the MAP F _{MSY} ranges are provided.

Quality of the 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.

Catch sampling of the fisheries was reduced in 2020 because of the COVID-19 disruption, which may result in a higher uncertainty associated with discard estimates and age structure of the catch. However, this is considered to have had minimal impact on the perception of the stock in relation to reference points.

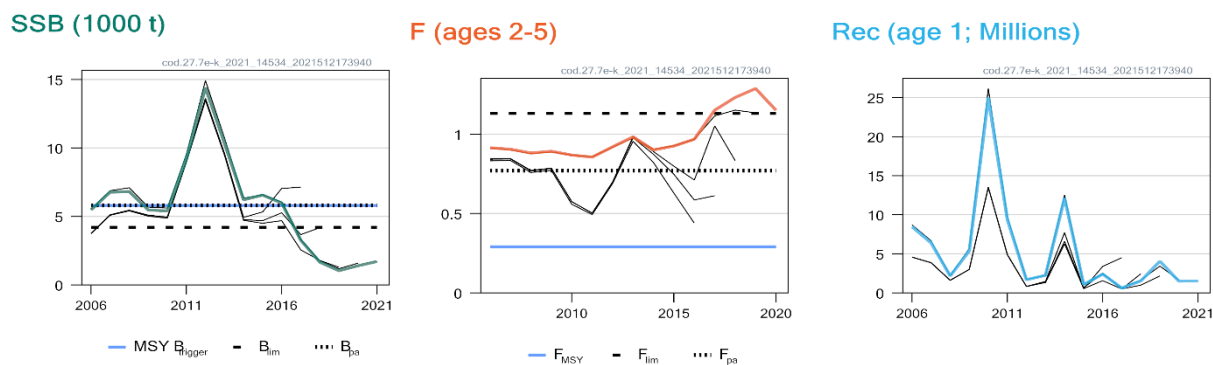


Figure 2 Cod in divisions 7.e-k. Historical assessment results (final-year SSB estimate and recruitment assumption included). The assessment was benchmarked in 2020 (ICES, 2020).

Issues relevant for the advice

ICES provides zero-catch advice for this stock in 2022 because the median SSB remains below B_{lim} by 2023 under all catch scenarios.

The assumed recruitment in 2022 and 2023 used in the forecast constitutes a significant part (67%) of the projected SSB in 2023.

The advice from last year was based on a catch constraint. This year F *status quo* was considered to better reflect the current fishing pressure, and it was used for the assumption for 2021. ICES notes that the forecasted catches for 2021 are much higher than those observed in 2020.

Landings are adjusted to include those reported from rectangles 33E2 and 33E3 in Division 7.a because they are considered part of this stock. The 2020 reallocation (71 tonnes) accounts for 7.7% of ICES estimated division 7.b-k landings and 28% of the Irish Sea (Division 7.a) landings. This should be taken into consideration when setting TACs for the two management areas (divisions 7.a and 7.e-k) as a portion of the catch taken under the Division 7.a TAC is considered to be part of the divisions 7.e-k stock.

Mixed-fisheries considerations

Mixed-fisheries advice will be provided in the Celtic Seas fisheries overview later in the year.

Reference points

Table 5 Cod in divisions 7.e–k. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	5800	B_{pa} ; in tonnes	ICES (2020)
	F_{MSY}	0.29	Segmented regression with B_{lim} (EqSim)	ICES (2020)
Precautionary approach	B_{lim}	4200	B_{loss} , lowest observed SSB from which there has been some recovery (2005) rounded value; in tonnes	ICES (2020)
	B_{pa}	5800	$B_{lim} \times 1.4$; in tonnes	ICES (2020)
	F_{lim}	1.13	Segmented regression with B_{lim} (EqSim)	ICES (2020)
	F_{pa}	0.77	F_{POS} ; the F that leads to SSB $\geq B_{lim}$ with 95% probability	ICES (2020)
Management plan	MAP MSY $B_{trigger}$	5800	MSY $B_{trigger}$; in tonnes	EU (2019), ICES (2020)
	MAP B_{lim}	4200	B_{lim} ; in tonnes	EU (2019), ICES (2020)
	MAP F_{MSY}	0.29	F_{MSY}	EU (2019), ICES (2020)
	MAP range F_{lower}	0.17	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY	EU (2019), ICES (2020)
	MAP range F_{upper}	0.41	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY	EU (2019), ICES (2020)

Basis of the assessment

Table 6 Cod in divisions 7.e–k. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2021a)
Assessment type	Age-based stochastic analytical assessment (SAM) (ICES, 2021b)
Input data	Commercial landings, ages, and length frequencies from sampling by métier; one combined VAST-modelled survey index (combined IGFS-WIBTS-Q4 [G7212] and EVHOE-WIBTS-Q4 [G9527]); one commercial index (FR-OTDEF Q2+3+4 trawlers in divisions 7.e–k); fixed maturity ogive derived from UK-WCGFS survey Q1 data; age-dependent natural mortalities (Lorenzen, 1996).
Discards and bycatch	Included in the assessment. Observer-based estimates from 2004; discards and bycatch prior to that (between 1980 and 2003) are model estimated.
Indicators	None
Other information	Benchmarked at WKCELTIC 2020 (ICES, 2020a)
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE).

History of the advice, catch, and management

Table 7 Cod in divisions 7.e-k. ICES advice and official landings and ICES catch estimates. All weights are in tonnes.

Year	ICES advice	Landings corresponding to advice	Catch corresponding to advice	Agreed TAC*	ICES landings ^{^^^}	ICES discards
1987	Reduce F	< 6400**			10390	
1988	No increase in F; TAC	7000**			17196	
1989	No increase in F; TAC	8600**			19804	
1990	No increase in F; TAC	9200**			12878	
1991	TAC; SSB mean	4500**			9336	
1992	Appropriate to reduce F	-			9747	
1993	20% reduction in F	6500**		17500	10416	
1994	20% reduction in F	5600**		17000	10620	
1995	20% reduction in F	4700***		17000	11710	
1996	20% reduction in F	4700***		20000	12681	
1997	20% reduction in F	7400***		20000	12028	
1998	10% reduction in F	8800^		20000	11418	
1999	Reduce F below F _{pa}	9200^		19000	8580	
2000	Reduce F below F _{pa}	< 7600^^		16000	6539	
2001	40% reduction in F	< 4300^^		10500	8316	
2002	45% reduction in F	< 5300^^		8700	9239	
2003	60% reduction in F	< 3800^^		n/a	6425	
2004	90% reduction in F or management plan	< 700		n/a	4027	543
2005	17% reduction in F	< 5200		6200	3478	1426
2006	No increase in effort (should have been "reduce effort")	Cannot be estimated		5580	3902	2118
2007	Zero catch	0		4743	4842	1248
2008	Zero catch	0		4316	4577	306
2009	50% reduction in F	< 2600		4023	4187	1229
2010	Substantial catch reduction	-		4023	3831	3040
2011	Catch and effort reduction	-		5379	6376	3749
2012	MSY framework	< 10000		10059	9443	2341
2013	MSY framework	< 10200		10200	7273	562
2014	MSY approach	< 6848		6848	4512	1569
2015	MSY approach	< 4024		5072	5028	483
2016	MSY approach	≤ 3569		4565	3924	525
2017	MSY approach	≤ 1447		2830	2471	134
2018	MSY approach	≤ 3076	≤ 3428	3076	1496	316
2019	MSY approach		0	1610	1051	300
2020	MSY approach		0	805	922	231
2021	MSY approach and precautionary considerations		0	805		
2022	MSY approach		0			

* TAC covers subareas 7 (except Division 7.a) and 8. From 2009 onwards, the TAC covers divisions 7.b-c and 7.e-k, subareas 8-10, and EU waters of CECAF Division 34.1.1 (with a separate TAC established for Division 7.d).

** For the division 7.f-g stock component.

*** For the division 7.f-h stock component.

^ For the divisions 7.e-h stock component.

^^ For the division 7.e-k stock component.

^^^ Landings have been adjusted to include landings taken or reported in rectangles 33E2 and 33E3 since 2004.

History of the catch and landings

Table 8 Cod in divisions 7.e-k. Catch distribution by fleet in 2020, as estimated by ICES.

Catch	Landings				Discards			
	Otter trawls	Seine nets	Beam trawls	Other gears	Otter trawls	Seine nets	Beam trawls	Other gears
1152 tonnes	71%	11%	9%	9%	63%	10%	21%	6%
	922 tonnes				231 tonnes			

Table 9 Cod in divisions 7.e-k. History ICES commercial landings, presented by country and discard estimates. All weights are in tonnes.

Year	Belgium	France	Ireland	UK	Others	Total	Discard estimates	Landings taken or reported in rectangles 33E2 and 33E3 *
1971	n/a	n/a	n/a	n/a	n/a	5782	n/a	n/a
1972	n/a	n/a	n/a	n/a	n/a	4737	n/a	n/a
1973	n/a	n/a	n/a	n/a	n/a	4015	n/a	n/a
1974	n/a	n/a	n/a	n/a	n/a	2898	n/a	n/a
1975	n/a	n/a	n/a	n/a	n/a	3993	n/a	n/a
1976	n/a	n/a	n/a	n/a	n/a	4818	n/a	n/a
1977	n/a	n/a	n/a	n/a	n/a	3059	n/a	n/a
1978	n/a	n/a	n/a	n/a	n/a	3647	n/a	n/a
1979	n/a	n/a	n/a	n/a	n/a	4650	n/a	n/a
1980	n/a	n/a	n/a	n/a	n/a	7243	n/a	n/a
1981	n/a	n/a	n/a	n/a	n/a	10597	n/a	n/a
1982	n/a	n/a	n/a	n/a	n/a	8766	n/a	n/a
1983	n/a	n/a	n/a	n/a	n/a	9641	n/a	n/a
1984	n/a	n/a	n/a	n/a	n/a	6631	n/a	n/a
1985	n/a	n/a	n/a	n/a	n/a	8317	n/a	n/a
1986	n/a	n/a	n/a	n/a	n/a	10475	n/a	n/a
1987	n/a	n/a	n/a	n/a	n/a	10228	n/a	n/a
1988	554	13863	1480	1292	2	17191	n/a	n/a
1989	910	15801	1860	1223	15	19809	n/a	n/a
1990	621	9383	1241	1346	158	12749	n/a	n/a
1991	303	6260	1659	1094	20	9336	n/a	n/a
1992	195	7120	1212	1207	13	9747	n/a	n/a
1993	391	8317	766	945	6	10425	n/a	n/a
1994	398	7692	1616	906	8	10620	n/a	n/a
1995	400	8321	1946	1034	8	11709	n/a	n/a
1996	552	8981	1982	1166	0	12681	n/a	n/a
1997	694	8662	1513	1166	0	12035	n/a	n/a
1998	528	8096	1718	1089	0	11431	n/a	n/a
1999	326	5488	1883	897	0	8594	n/a	n/a
2000	208	4281	1302	744	0	6535	n/a	n/a
2001	347	6033	1091	838	0	8309	n/a	n/a
2002	555	7368	694	618	0	9235	n/a	n/a
2003	136	5222	517	346	0	6221	n/a	n/a
2004	153	2934	657	281	1	4027	543	108
2005	186	2127	855	309	1	3478	1426	54
2006	101	2431	995	371	3	3902	2118	103
2007	107	3113	1208	411	3	4842	1248	527
2008	65	2994	1222	295	1	4577	306	558
2009	48	3020	847	267	5	4187	1229	193
2010	52	2449	1030	296	3	3831	3040	143
2011	123	4808	1010	427	7	6376	3749	147

Year	Belgium	France	Ireland	UK	Others	Total	Discard estimates	Landings taken or reported in rectangles 33E2 and 33E3 *
2012	290	6900	1539	706	8	9443	2341	85
2013	202	5051	1470	548	3	7273	562	76
2014	141	2715	1189	466	0	4512	1569	24
2015	121	3373	1109	422	3	5028	483	39
2016	97	2579	881	365	1	3924	525	40
2017	82	1578	623	188	0	2471	134	19
2018	49	611	706	130	0	1496	316	20
2019**	43	369	554	84	n/a	1051	300	37
2020**	18	371	487	44	2	922	231	71

* Included in Ireland landings estimates. Landings in the southern part of Division 7.a (rectangles 33E2 and 33E3) are included in the assessment and are considered to be part of the stock.

** Preliminary official landings.

n/a = not available.

Summary of the assessment

Table 10 Cod in divisions 7.e-k. Assessment summary. Recruitments are in thousands, weights in tonnes.

Year	Recruitment Age 1			SSB			Landings	Discards	F Ages 2-5		
	Low	Value	High	Low	Value	High			Low	Value	High
1980	7382	16740	37959	7770	10166	13301	7241		0.74	0.92	1.13
1981	3520	7657	16656	9800	12924	17044	10595		0.74	0.89	1.08
1982	1641	3551	7684	10436	13050	16321	8639		0.69	0.83	1.00
1983	3756	7917	16689	8764	10605	12833	9635		0.70	0.85	1.03
1984	4333	9034	18835	6675	8264	10232	6642		0.60	0.75	0.92
1985	3645	7623	15942	7868	9816	12247	8241		0.62	0.75	0.92
1986	3869	8227	17493	8874	10992	13616	10475		0.68	0.81	0.97
1987	13157	27431	57192	8421	10305	12610	10390		0.69	0.83	1.00
1988	6635	13844	28885	11475	15858	21916	17196		0.64	0.77	0.95
1989	2171	4611	9790	17131	22338	29127	19804		0.68	0.82	0.98
1990	2916	6289	13566	14362	17747	21930	12878		0.75	0.90	1.06
1991	7530	16225	34959	9271	11103	13296	9336		0.80	0.97	1.17
1992	8721	18451	39037	7803	10339	13699	9747		0.81	0.96	1.14
1993	4430	9545	20564	10192	13492	17860	10416		0.79	0.93	1.10
1994	9565	20029	41940	10796	13533	16963	10620		0.82	0.97	1.15
1995	7904	16407	34057	10571	13827	18087	11710		0.80	0.94	1.11
1996	5753	11876	24513	12444	15873	20245	12681		0.81	0.96	1.13
1997	6072	12548	25933	11651	14406	17813	12028		0.79	0.93	1.10
1998	3738	7725	15965	10443	12947	16051	11418		0.82	0.96	1.13
1999	2010	4133	8501	8710	10667	13063	8580		0.82	0.97	1.15
2000	8100	16020	31685	6210	7440	8914	6539		0.81	0.95	1.12
2001	7720	14945	28933	6516	8724	11681	8316		0.83	0.98	1.15
2002	2869	5272	9688	9317	11612	14472	9239		0.85	1.00	1.18
2003	2001	3263	5323	7736	9174	10878	6425		0.84	0.97	1.13
2004	2633	4292	6996	4625	5382	6263	4027	543	0.82	0.95	1.09
2005	5417	8015	11860	3627	4169	4792	3478	1426	0.85	0.99	1.16
2006	5485	8455	13033	4648	5471	6440	3902	2118	0.80	0.91	1.05
2007	4240	6387	9622	5747	6765	7963	4842	1248	0.79	0.91	1.04
2008	1457	2164	3214	5814	6818	7995	4577	306	0.77	0.88	1.01
2009	3616	5344	7897	4659	5465	6409	4187	1229	0.78	0.89	1.03
2010	17074	24984	36559	4645	5403	6285	3831	3040	0.75	0.87	1.01
2011	6360	9366	13791	7737	9240	11035	6376	3749	0.74	0.86	0.99
2012	1130	1683	2506	12030	14412	17264	9443	2341	0.81	0.92	1.05
2013	1504	2246	3355	8756	10347	12227	7273	562	0.84	0.98	1.15
2014	8189	12135	17982	5309	6214	7274	4512	1569	0.78	0.90	1.05
2015	716	1074	1612	5534	6552	7756	5028	483	0.80	0.93	1.07
2016	1599	2398	3595	4988	5981	7173	3924	525	0.83	0.97	1.13
2017	407	620	943	2752	3265	3873	2471	134	1.00	1.15	1.32
2018	1006	1526	2314	1420	1655	1927	1496	316	1.06	1.23	1.43
2019	2668	4056	6165	878	1036	1224	1051	300	1.04	1.29	1.59
2020	756	1488	2929	1066	1395	1825	922	231	0.84	1.15	1.59
2021	620	1526*	4056	950	1710	2929					

*Median resampled (2015-2020).

Sources and references

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

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