ICES Advice on fishing opportunities, catch, and effort
Baltic Sea Ecoregion
cod.27.22-24

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Cod (*Gadus morhua*) in subdivisions 22–24, western Baltic stock (western Baltic Sea)

ICES stock advice

ICES advises that when the EU multiannual plan (MAP) is applied, total catches from the stock in 2018 that correspond to the F ranges in the plan are between 3130 tonnes and 5295 tonnes. If recreational catch in 2018 is similar to that estimated for 2017 (1754 tonnes), the corresponding commercial catches are between 1376 tonnes and 3541 tonnes.

Stock development over time

The spawning-stock biomass (SSB) has been below the limit reference point (B_{lim}) since 2008. The fishing mortality (F) is well above F_{MSY}. Recruitment (R) has been low since 1999; however, recruitment in 2017 is estimated to be the highest since 2005.

Figure 1   Cod in subdivisions 22–24, western Baltic stock. Summary of the stock assessment (weights in thousand tonnes). Recruitment, F, and SSB have confidence intervals (95%) in the plot. The EU landing obligation started in 2015; therefore, landings since 2015 include fish above and below the minimum conservation reference size (MCRS).

Stock and exploitation status

Table 1   Cod in subdivisions 22–24, western Baltic stock. State of the stock and fishery relative to reference points.

		Fishing pressure				Stock size		
		2014	2015	2016		2015	2016	2017
Maximum sustainable yield	F_{MSY}	❌	❌	❌ Above	MSY $B_{trigger}$	❌	❌	❌ Below trigger
Precautionary approach	F_{pa}, F_{lim}	🟠	🟠	🟠 Increased risk	B_{pa}, B_{lim}	❌	❌	❌ Reduced reproductive capacity

| Management plan | F_{ranges} | ❌ | ❌ | ❌ | Above range | | MSY $B_{trigger}$ | ❌ | ❌ | ❌ | Below |

Catch options

Table 2 Cod in subdivisions 22–24, western Baltic stock. The basis for the catch options.

Variable	Value	Source	Notes
F_{ages} 3–5 (2017)	0.37	ICES (2017)	Based on catch constraint for 2017.
SSB (2018)	27771	ICES (2017)	Based on catch constraint for 2017. In tonnes.
R_{age1} (2017)	65408	ICES (2017)	SAM assessment (in thousands).
R_{age1} (2018)	14206	ICES (2017)	Sampled from the last ten years (in thousands).
R_{age1} (2019)	14499	ICES (2017)	Sampled from the last ten years (in thousands).
Total catch (2017)	5090 t	ICES (2017)	Based on catch constraint. Calculated as the 2017 TAC (5597 t) plus an assumed discard ratio as in 2016 (2.4%), and accounting for the proportion of western Baltic cod in commercial catches in subdivisions 22–24 in 2014–2016 (58%), and assumed recreational catch for 2017 (1754 t) – based on bag limitation*.
Commercial landings (2017)	3255 t	ICES (2017)	Based on total catch minus recreational catch. The 2016 discard ratio (2.4%) was used to split the commercial catch into landings and discards.
Commercial discards (2017)	82 t	ICES (2017)	Based on total catch minus recreational catch. The 2016 discard ratio (2.4%) was used to split the commercial catch into landings and discards.
Recreational catches (2017)	1754 t	ICES (2017)	3 years average (2014–2016) of recreational catch (2654 t) minus the estimated reduction (900 t) due to the introduction of the bag limit in 2017*.

* Strehlow and Zimmermann (2016).

Table 3 Cod in subdivisions 22–24, western Baltic stock. Annual catch options. All weights are in tonnes.

Basis	Total catch (2018)*	Commercial catch, assuming recreational catch of 1754 tonnes	F_{total} (2018)	$F_{commercial}$ (2018) **	SSB (2019)	% SSB change ***	% advice change ^
ICES advice basis							
EU MAP^^: $F_{MSY} \times (SSB_{2018}/$ MSY $B_{trigger})$	5295	3541	0.188	0.13	48929	76	52
EU MAP: $F_{lower} \times (SSB_{2018}/$ MSY $B_{trigger})$	3130	1376	0.11	0.05	51190	84	−10
Other options							
ICES MSY approach: $F = F_{MSY} \times (SSB_{2018}/$ MSY $B_{trigger})$	5295	3541	0.188	0.13	48929	76	52
F_{MSY}	7154	5400	0.26	0.20	46848	69	106
Zero commercial catch	1754	0	0.06^^^	0.00	52747	90	−50
F_{pa}	17569	15815	0.74	0.67	35931	29	406
F_{lim}	22078	20324	1.01	0.93	31076	12	535
SSB (2019) = B_{lim}	25804	24050	1.27	1.18	27399	−1	643
SSB (2019) = B_{pa}	15195	13441	0.62	0.55	38399	38	337
SSB (2019) = MSY $B_{trigger}$	15195	13441	0.62	0.55	38399	38	337
$F = F_{2017}$	9792	8038	0.37	0.30	43779	58	182
F = MAP $F_{MSY\ lower}$ $F = F_{lower} \times (SSB_{2018}/$ MSY $B_{trigger})$^^^	3130	1376	0.11	0.05	51190	84	−10
F = MAP $F_{MSY\ lower}$ + 0.01	3462	1708	0.12	0.06	50841	83	0
F = MAP $F_{MSY\ lower}$ + 0.02	3736	1982	0.13	0.07	50503	82	8

Basis	Total catch (2018)*	Commercial catch, assuming recreational catch of 1754 tonnes	F_{total} (2018)	$F_{commercial}$ (2018) **	SSB (2019)	% SSB change ***	% advice change ^
F = MAP $F_{MSY\ lower}$ + 0.03	4009	2255	0.14	0.08	50226	81	15
F = MAP $F_{MSY\ lower}$ + 0.04	4281	2527	0.15	0.09	49949	80	23
F = MAP $F_{MSY\ lower}$ + 0.05	4551	2797	0.16	0.10	49693	79	31
F = MAP $F_{MSY\ lower}$ + 0.06	4820	3066	0.17	0.11	49425	78	39
F = MAP $F_{MSY\ lower}$ + 0.07	5085	3331	0.18	0.12	49149	77	46
F = MAP $F_{MSY\ lower}$ + 0.08	5347	3593	0.19	0.13	48874	76	54
F = MAP $F_{MSY\ lower}$ + 0.09	5608	3854	0.20	0.14	48602	75	61
F = MAP $F_{MSY\ lower}$ + 0.10	5867	4113	0.21	0.15	48332	74	69
F = MAP $F_{MSY\ lower}$ + 0.11	6126	4372	0.22	0.16	48064	73	76
F = MAP $F_{MSY\ lower}$ + 0.12	6386	4632	0.23	0.17	47792	72	84
F = MAP $F_{MSY\ lower}$ + 0.13	6643	4889	0.24	0.18	47469	71	91
F = MAP $F_{MSY\ lower}$ + 0.14	6899	5145	0.25	0.19	47133	70	99
F = MAP $F_{MSY\ lower}$ + 0.15	7154	5400	0.26	0.20	46848	69	106
F = MAP $F_{MSY\ lower}$ + 0.16	7407	5653	0.27	0.21	46568	68	113
F = MAP $F_{MSY\ lower}$ + 0.17	7658	5904	0.28	0.22	46289	67	120
F = MAP $F_{MSY\ lower}$ + 0.18	7908	6154	0.29	0.23	46012	66	128
F = MAP $F_{MSY\ lower}$ + 0.19	8154	6400	0.30	0.24	45738	65	135
F = MAP $F_{MSY\ lower}$ + 0.20	8399	6645	0.31	0.25	45466	64	142
F = MAP $F_{MSY\ lower}$ + 0.21	8643	6889	0.32	0.26	45201	63	149
F = MAP $F_{MSY\ upper}$ F = F_{upper} × (SSB$_{2018}$/ MSY B$_{trigger}$)^^^	8774	7020	0.33	0.26	45098	62	152

* Includes commercial and recreational catch.

** The split of total F into commercial and recreational in the short-term forecast corresponds to assuming the same selection pattern and weight of fish in the commercial and recreational fisheries. However, the commercial and recreational fisheries have different selection patterns and, therefore, changes in the relative balance between the two fisheries will result in a change in overall selection pattern and may impact the MSY reference points.

*** SSB 2019 relative to SSB 2018.

^ Total catch in 2018 relative to total catch corresponding to the advice for 2017 (3475 t, including commercial and recreational catch).

^^ MAP = EU multiannual plan (EU, 2016).

^^^ As SSB(2018) is below MSY B$_{trigger}$, the F_{lower} and F_{upper} values in the MAP are adjusted by the SSB$_{2018}$/MSY B$_{trigger}$ ratio. In this situation, values of F larger than F_{MSY} × SSB$_{2018}$/MSY B$_{trigger}$ = 0.26 × 0.7232 = 0.188 (corresponding to total catches of 5295 t in 2018) are not applicable under the MAP.

Basis of the advice

Table 4   Cod in subdivisions 22–24, western Baltic stock. The basis of the advice.

Advice basis	EU Baltic multiannual plan.
Management plan	The EU multiannual plan (MAP) in place for stocks in the Baltic Sea includes cod (EU, 2016). The advice is based on the provisions of the plan and is considered precautionary.

Quality of the assessment

Mixing of the eastern and western Baltic cod stocks is substantial in Subdivision 24. The stock mixing within Subdivision 24 is variable spatially and possibly between seasons and age groups. This introduces uncertainty in the allocation of catches to stock. Catch separation has been applied since 1994 and year-specific data for stock separation is available for 11 of the 23 years in the time-series. The allocation of catches to stock for the remaining years was performed by extrapolation. The longest gap in the data is from 2001 to 2007. A stock-splitting key is available for every year since 2013. The survey data from the main part of Subdivision 24 are not included in the assessment, due to a lack of splitting data. A large part of the commercial fishing is conducted in this area and, therefore, there could be an inconsistency in data.

In 2016 the recreational catches included in the stock assessment constitute 27% of the total catches in the stock assessment. The uncertainty around recreational catches is considered higher than the uncertainty in commercial catches. Recreational catches are underestimated for the whole time-series as presently they include only German data. The German recreational catch data are considered reliable after 2005 and were extrapolated for previous years. Denmark and Sweden are the two other countries with recreational catches in the western Baltic and efforts to incorporate these data in the stock assessment are ongoing.

The short-term forecast is very dependent on the high estimate of the 2016 year class. Recruitment estimates are always uncertain as they are based on few data points. However, this year class has already been observed in two surveys that have indicated it is strong and widely distributed in the western Baltic area.

A catch constraint assumption for the intermediate year (2017) has been applied in the short-term forecast. The expected catch of western Baltic cod in 2017, 5090 t, is derived by applying the split between eastern and western Baltic cod stocks to the TAC, adjusting for the recent discard rate, and adding the assumed recreational catch. This is the same procedure applied in previous years and it is considered an appropriate assumption.

The downward revisions of SSB and upward revisions of F estimates in recent years are a matter of concern and are under investigation.
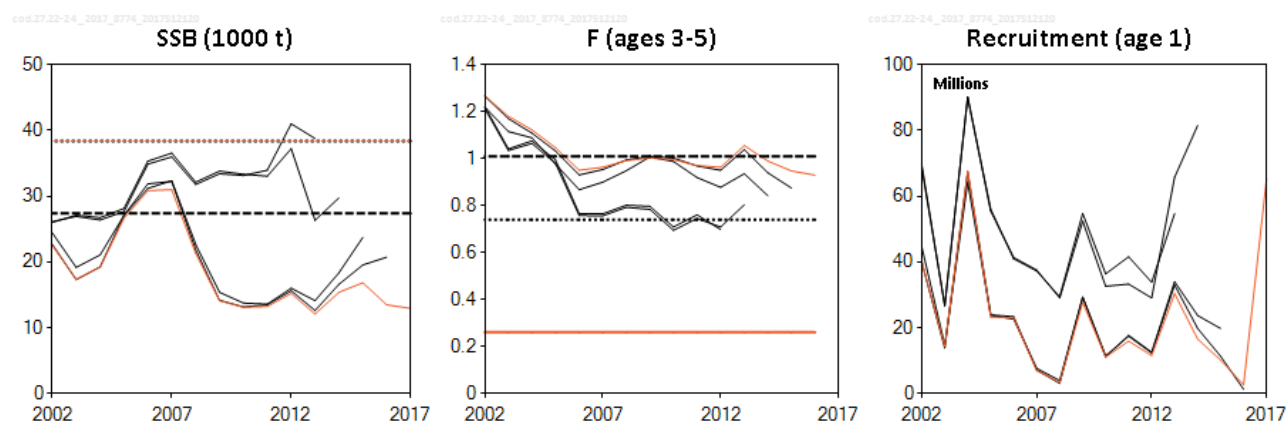
Figure 2   Cod in subdivisions 22–24, western Baltic stock. Historical assessment results (final-year recruitment estimates included). The assessments conducted in the years before 2015 were for cod in the area of subdivisions 22–24 that contains also a fraction of the eastern Baltic cod stock. Since the benchmark in 2015 the assessment is conducted for the western Baltic cod stock only, and is not comparable with the previous assessments conducted for subdivisions 22–24.

Issues relevant for the advice

The F_{MSY} ranges in the EU Baltic Sea Multiannual Plan (MAP) are consistent with the ranges provided by ICES (2015); these were evaluated to result in no more than 5% reduction in long-term yield compared with MSY. The ICES advice according to the MAP is based on the provisions of the plan and is considered precautionary. The ICES advice rule is used, i.e. F is adjusted by the factor SSB/MSY $B_{trigger}$ when SSB is below MSY $B_{trigger}$. For this stock, the SSB in 2018 is above B_{lim} but below MSY $B_{trigger}$. In such a situation, the MAP specifies that the upper part of the F_{MSY} range cannot be used. Therefore, catch options applicable under the MAP correspond to fishing mortalities between F_{lower} × SSB(2018)/MSY $B_{trigger}$ and F_{MSY} × SSB(2018)/MSY $B_{trigger}$ (i.e. Column A of Annex I in the MAP adjusted by the factor SSB(2018)/MSY $B_{trigger}$).

The predicted positive development of the stock depends largely on the strength of the 2016 year class. Once this year class enters the fishery, the discard rate could increase well above the 2.4% assumed for the short-term forecast in 2017. In 2016 the spawning closure was changed in time and duration, and it now covers the peak spawning time; it is, however, too early to evaluate the effect of the relocated closure.

A mixture of eastern (EB) and western Baltic (WB) cod stocks is caught in the western Baltic management area (subdivisions 22–24). The assessment and this advice is for the western Baltic cod stock.

Recreational catches of cod in the western Baltic management area are considered to consist exclusively of WB cod. As the recreational catches are being restricted with bag limits in 2017, the assumed recreational catch with enforced bag limits has been subtracted from the advised catch of WB cod to arrive at the catch for commercial fishing. ICES has implemented this calculation assuming a recreational catch of 1754 t, corresponding to the observed average in the most recent three years (Table 6) minus the estimated reduction (900 t) resulting from the bag limits (Strehlow and Zimmermann, 2016).

To derive a management area-based total commercial cod catch for the western and eastern Baltic areas (subdivisions 22–24 and 25–32) consistent with the ICES advice for the two cod stocks, ICES considers that the following issues should be taken into account:

1.	The distribution area of the WB cod stock is subdivisions 22–24. The proportions of the WB cod stock commercial catch taken in subdivisions 22–23 and Subdivision 24 have been quite stable since 1994, amounting to 69% and 31%, respectively, on average in the most recent three years (Table 6).
2.	The distribution area of the EB cod stock is subdivisions 24 and 25–32.
3.	Commercial fishing in subdivisions 22–23 will provide a catch of the WB cod stock only.
4.	Commercial fishing in subdivisions 25–32 will provide a catch of the EB cod stock only.
5.	Commercial fishing in Subdivision 24 will provide a mixed catch of the EB and WB cod stocks. In the most recent three years, the ratio EB cod / WB cod commercial catch in Subdivision 24 has been 2.30 (Table 6).
6.	Species TAC for an area that includes two stocks of the species should be set to minimize the risk of overexploitation of the weakest stock, which at present is the WB cod stock. Assuming the same stock distribution and fishing pattern as in recent years, this implies that the intended catch of the WB cod stock in Subdivision 24 will determine the amount of EB cod that may be caught in that subdivision.

Assuming the geographical distribution of the commercial catch in 2018 remains as outlined in point 1 above, the distribution of a commercial catch of 3541 t of WB cod will be 2443 t in subdivisions 22–23 and 1098 t in Subdivision 24. The additional amount of EB cod fished in Subdivision 24 is estimated to be 2525 t, assuming the same ratio between EB cod and WB cod as observed on average during 2014–2016 in the commercial catches (i.e. 2.30, see point 5 above). This gives a total estimated commercial catch in 2018 of 6066 t for cod in subdivisions 22–24.

Figure 3 provides a graphic presentation of the procedure how to arrive at area-based TACs from the ICES stock advice; Table 5 illustrates the calculation for the upper and lower limit of the MAP F range.

The European Commission has requested ICES to only provide information on catch opportunities by management area consistent with the stock advice, assuming a *status quo* distribution of the fisheries on subareas and stocks. There could be other allocation schemes also consistent with the advice per stock. There is no optimal biological solution for these allocation issues.
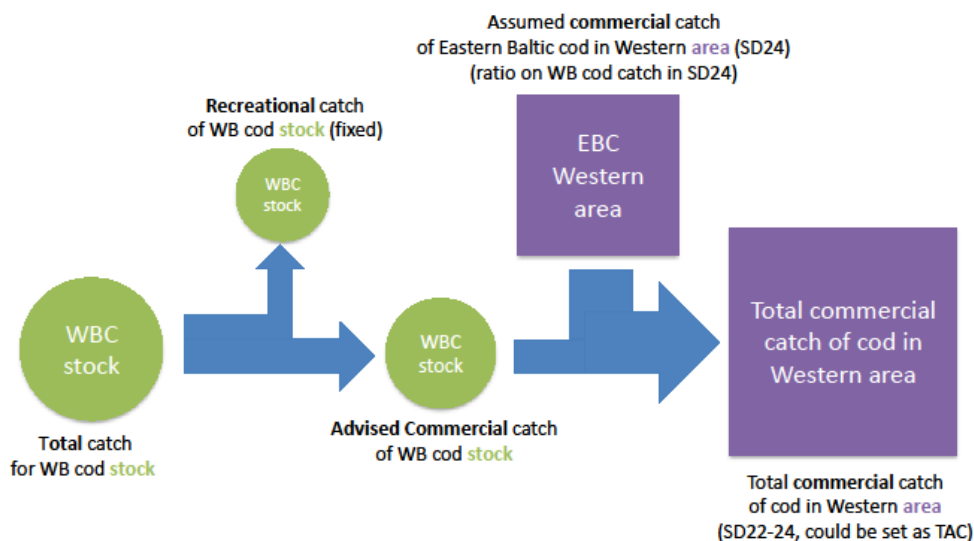

Figure 3   Cod in subdivisions 22–24, western Baltic cod. Illustration of calculations to obtain area TACs for western and eastern Baltic cod from ICES stock-based catch advice, taking into account stock mixing in Subdivision 24 and recreational catches for the western stock.

Table 5   Cod in subdivisions 22–24, western Baltic stock. Catch options by management area consistent with the ICES advice for the western and eastern Baltic cod stocks. Weights are in tonnes.

Area	Commercial catch WB cod stock			Commercial catch EB cod stock			Commercial catch of cod by management area (TAC)			
	A	B	C	D	E	F	G		H	
	Total	SDs 22–23	SD 24	Total	SD 24	SDs 25–32	SDs 22–24	% TAC change (SDs 22–24)*	SDs 25–32	% TAC change (SDs 25–32)**
Status quo distribution										
Calculation		= A × 0.69^	= A × 0.31^		= C × 2.30^^	= D − E	= B + C + E		= F	
EU MAP: F_{MSY} × (SSB_{2018}/ MSY $B_{trigger}$)	3541	2443	1098	26071	2525	23546	6066	+9%	23546	−36%
EU MAP: F_{lower} × (SSB_{2018}/ MSY $B_{trigger}$)	1376	949	427	26071	981	25090	2357	−58%	25090	−32%

* Compared to the 2017 TAC for subdivisions 22–24 (5597 tonnes).
** Compared to the 2017 TAC for subdivisions 25–32 (36 957 tonnes)
^ Average proportions of the WB cod stock commercial catch caught in subdivisions 22–23 and Subdivision 24 in the most recent three years (2014–2016; Table 6).
^^ The EB cod catch / WB cod commercial catch ratio observed in Subdivision 24 in the most recent three years (2014–2016; Table 6).

Table 6 Cod in subdivisions 22–24, western Baltic stock. Catches (tonnes) used in the stock assessments of the western (WB) and eastern (EB) Baltic cod stocks.

Year	WB cod stock					EB cod stock					EBC / WBC stock Comm catch in SD 24
	Landings	Discards	Recreational catch*	fraction of comm. catch in SDs 22–23	fraction of comm. catch in SD 24	Landings in SD 24	Discards in SD24	Landings in SDs 25–32	Discards in SDs 25–32	fraction of catch in SD 24	
1994	21409	2069	1828	0.46	0.54	1784	166	100856	1956	0.02	0.15
1995	29854	3143	2133	0.66	0.34	4041	541	107718	1872	0.04	0.41
1996	38335	6897	2190	0.68	0.32	10210	1087	124189	1443	0.08	0.79
1997	37009	3994	2280	0.67	0.33	6615	629	88600	3462	0.07	0.53
1998	29628	5577	2372	0.63	0.37	4588	630	67428	2299	0.07	0.40
1999	35817	4390	2243	0.68	0.32	6338	588	72995	1838	0.08	0.53
2000	31653	3794	2386	0.68	0.32	6694	1153	89289	6019	0.08	0.70
2001	26983	2456	2494	0.67	0.33	7261	383	91328	2891	0.08	0.79
2002	19592	1410	2215	0.72	0.28	4566	548	67740	1462	0.07	0.88
2003	18055	3482	2361	0.66	0.34	6569	854	69477	2024	0.09	1.00
2004	15916	2193	2284	0.74	0.26	4925	184	68578	1201	0.07	1.09
2005	16845	3186	2835	0.63	0.37	5191	1808	55032	1670	0.11	0.94
2006	16472	1689	1887	0.74	0.26	6279	142	65531	4644	0.08	1.37
2007	15859	1344	1698	0.66	0.34	7876	855	50843	4146	0.14	1.48
2008	11148	355	1513	0.69	0.31	8934	768	42234	3746	0.17	2.69
2009	7093	341	1921	0.60	0.40	8456	474	48438	3328	0.15	3.02
2010	7641	814	2287	0.67	0.33	6479	557	50276	3543	0.12	2.55
2011	8845	272	1794	0.75	0.25	7487	508	50368	3850	0.13	3.48
2012	8654	349	2657	0.69	0.31	8419	556	51225	6795	0.13	3.20
2013	7742	945	2029	0.70	0.30	5226	1305	31355	5020	0.15	2.48
2014	8099	867	2485	0.67	0.33	5439	1268	28909	9627	0.15	2.25
2015	8372	449	3161	0.71	0.29	5047	912	37342	6328	0.12	2.35
2016	6233	156	2316	0.68	0.32	4430	293	29312	3620	0.13	2.31
Average 2014–2016			2654	0.69	0.31						2.30

* These recreational catches are from Germany only.

Reference points

Table 7 Cod in subdivisions 22–24, western Baltic stock. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	38 400 t	B_{pa}	ICES (2015b)
	F_{MSY}	0.26	Stochastic simulations with segmented regression stock–recruitment relationship.	ICES (2015a)
Precautionary approach	B_{lim}	27 400 t	Break point of the stock–recruitment relationship.	ICES (2015b)
	B_{pa}		1.4 × B_{lim} 38 400 t	ICES (2015b)
	F_{lim}	1.01	Equilibrium scenarios with stochastic recruitment: F value corresponding to 50% probability of (SSB < B_{lim}).	ICES (2016a)
	F_{pa}	0.74	Flim × $e^{-1.645\sigma}$; σ = 0.19	ICES (2016a)
Management plan	MAP MSY $B_{trigger}$	38 400 t	MSY $B_{trigger}$	EU (2016 – Annex II column A)
	MAP B_{lim}	27 400 t	B_{lim}	EU (2016) – Annex II column B）
	MAP F_{MSY}	0.26	F_{MSY}	EU (2016 – Annex I columns A and B)
	MAP target range $F_{MSY\ upper}$	0.26–0.45	Consistent with the ranges provided by ICES (2015a), resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2015a) and EU (2016 – Annex I column A)
	MAP target range $F_{MSY\ lower}$	0.15–0.26	Consistent with the ranges provided by ICES (2015a), resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2015a) and EU (2016 – Annex I column B)

Basis of the assessment

Table 8 Cod in subdivisions 22–24, western Baltic stock. Basis of assessment and advice.

ICES stock data category	1 (ICES, 2016b).
Assessment type	Age-based analytical assessment SAM (ICES, 2017) that uses catches in the model and in the forecast.
Input data	Commercial catches (international landings, ages and length frequencies from catch sampling), recreational catch (only German data included). Two survey indices (BITS-Q1 and BITS-Q4); annual maturity data from BITS-Q1 surveys. Natural mortalities for age 1 derived from multispecies assessment, unchanged since 1996. Annual stock separation key to split catches in Subdivision 24 into eastern and western Baltic cod, derived from otolith shape analyses combined with genetics.
Discards and bycatch	Included in the assessment since 1994, data series from the main fleets.
Indicators	None.
Other information	Benchmarked in 2015 (ICES, 2015b). The basis for the assessment changed in 2015 to being for the western Baltic cod stock, whereas assessments in earlier years were for the area of subdivisions 22–24.
Working group	Baltic Fisheries Assessment Working Group (WGBFAS)

Information from stakeholders

There is no available information.

History of the advice, catch, and management

Table 9 Cod in subdivisions 22–24, western Baltic stock. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice	Predicted total catch from the stock corresponding to the advice	Predicted commercial catch corresponding to advice*	Agreed TAC**	ICES estimated total commercial landings subdivisions 22–24 (eastern and western Baltic cod stocks)
1987	TAC		9000		28566
1988	TAC		16000		29159
1989	TAC		14000	220000	18516
1990	TAC		8000	210000	17780
1991	TAC		11000	171000	16693
1992	Substantial reduction in F		-	100000	17996
1993	F at lowest possible level		-	40000	21228
1994	TAC		22000	60000	30695
1995	30% reduction in fishing effort from 1994 level		-	120000	33895
1996	30% reduction in fishing effort from 1994 level		-	165000	50845
1997	Fishing effort should not be allowed to increase above the level of recent years		-	180000	43624
1998	20% reduction in F from 1996		35000	160000	34216
1999	At or below F_{sq} with 50% probability		38000	126000	42155
2000	Reduce F by 20%		44600	105000	38347
2001	Reduce F by 20%		48600	105000	34244
2002	Reduce F to below 1.0		36300	76000	24158
2003	Reduce F to below 1.0		***22600 or 28800	75000	24624
2004	Reduce F to below 1.0		< 29600	29600	20854
2005	Reduce F to below 0.92		< 23400	24700	22045
2006	Management plan		< 28400	28400	22751
2007	Keep SSB at B_{pa}		< 20500	26700	23736
2008	Rebuild SSB to B_{pa}		< 13500	19200	20082
2009	Rebuild SSB to B_{pa}		< 13700	16300	15549
2010	Management plan		< 17700	17700	14120
2011	See scenarios		-	18800	16332
2012	Management plan		21300	21300	17072
2013	Management plan		20800	20000	12968
2014	Management plan		17037	17000	13538
2015	MSY approach		8793	15900	13418
2016	MSY approach (F = 0.23)	≤ 7797		12720	10629
2017	MSY approach (F = 0.15)	≤ 3475	≤ 917	5597	
2018	MAP F ranges: F_{lower} to F_{MSY} adjusted by SSB_{2018}/MSY $B_{trigger}$ (F = 0.11–0.188)	3130–5295	1376–3541		

* Values since 2016 are for the western Baltic cod stock only, whereas in earlier years they are for the area of subdivisions 22–24 and include a fraction of the eastern Baltic cod stock.

** Included in TAC for total Baltic, until and including 2003.

*** Two options based on implementation of the adopted mesh regulation.

History of the catch and landings

Table 10   Cod in subdivisions 22–24, western Baltic stock. Catch distribution by fleet in 2016 as estimated by ICES.

Catch (2016)	Commercial landings		Commercial discards	Recreational catch
8705 t	active gears 61%	passive gears 39%	156 t	2316 t
	6233 t			

Table 11 Cod in subdivisions 22–24, western Baltic management area. History of commercial landings; both the official and ICES estimated values are presented by area for each country participating in the fishery. The table includes landings of the western Baltic cod stock as well as of the eastern Baltic cod stock in Subdivision 24. All weights are in tonnes.

Year	Denmark			Finland	German Dem.Rep.*	Germany, FRG		Estonia		Lithuania	Latvia	Poland	Sweden			Total			Unalloc.	Grand total
	22	23	22+24	24	22+24	22	22+24	22	24	24	24	24	22	23	22+24	22	23	24		
1965			19457		9705		13350								2182	27867		17007		44874
1966			20500		8393		11448								2110	27864		14587		42451
1967			19181		10007		12884								1996	28875		15193		44068
1968			22593		12360		14815								2113	32911		18970		51881
1969			20602		7519		12717								1413	29082		13169		42251
1970			20085		7996		14589								1289	31363		12596		43959
1971			23715		8007		13482								1419	32119		14504		46623
1972			25645		9665		12313								1277	32808		16092		48900
1973			30595		8374		13733								1655	38237		16120		54357
1974			25782		8459		10393								1937	31326		15245		46571
1975			23481		6042		12912								1932	31867		12500		44367
1976		712	29446		4582		12893								1800	33368	712	15353		49433
1977		1166	27939		3448		11686							550	1516	29510	1716	15079		46305
1978		1177	19168		7085		10852							600	1730	24232	1777	14603		40612
1979		2029	23325		7594		9598							700	1800	26027	2729	16290		45046
1980		2425	23400		5580		6657							1300	2610	22881	3725	15366		41972
1981		1473	22654		11659		11260							900	5700	26340	2373	24933		53646
1982		1638	19138		10615		8060							140	7933	20971	1778	24775		47524
1983		1257	21961		9097		9260							120	6910	24478	1377	22750		48605
1984		1703	21909		8093		11548							228	6014	27058	1931	20506		49495
1985		1076	23024		5378		5523							263	4895	22063	1339	16757		40159
1986		748	16195		2998		2902							227	3622	11975	975	13742		26692
1987		1503	13460		4896		4256							137	4314	12105	1640	14821		28566
1988		1121	13185		4632		4217							155	5849	9680	1276	18203		29159
1989		636	8059		2144		2498							192	4987	5738	828	11950		18516
1990		722	8584		1629		3054							120	3671	5361	842	11577		17780
1991		1431	9383				2879							232	2768	7184	1663	7846		16693
1992		2449	9946				3656							290	1655	9887	2739	5370		17996
1993		1001	8666				4084							274	1675	7296	1275	7129	5528	21228
1994		1073	13831				4023							555	3711	8229	1628	13336	7502	30695
1995		2547	18762	132			9196				15			611	2632	16936	3158	13801		33895
1996		2999	27946	50			12018		50		32			1032	4418	21417	4031	23097	2300	50845
1997		1886	28887	11			9269		6			263		777	2525	21966	2663	18995		43624
1998		2467	19192	13			9722		8		13	623		607	1571	15093	3074	16049		34216
1999		2839	23074	116			13224		10		25	660		682	1525	20409	3521	18225		42155

Year	Denmark			Finland	German Dem.Rep.*	Germany, FRG		Estonia		Lithuania	Latvia	Poland	Sweden			Total			Unalloc.	Grand total
	22	23	22+24	24	22+24	22	22+24	22	24	24	24	24	22	23	22+24	22	23	24		
2000		2451	19876	171			11572		5		84	926		698	2564	18934	3149	16264		38347
2001		2124	17446	191			10579		40		46	646		693	2479	14976	2817	16451		34244
2002		2055	11657	191			7322				71	782		354	1727	11968	2409	9781		24158
2003		1373	13275	59			6775				124	568		551	1899	9573	1925	13127		24624
2004		1927	11386				4651				221	538		393	1727	9091	2320	9430	13	20854
2005		1902	9867	2			7002	72	67		476	1093		720	835	8729	2621	10686	9	22045
2006		1899	9761	242			7516		91		586	801			1855	9979	1914	10858		22751
2007		2169	8975	220			6802		69		273	2371		534	2322	7840	2713	13183		23736
2008		1612	8582	159			5489		134		30	1361		525	2189	5687	2139	12256		20082
2009		567	7871	259			4020		194		23	529		269	1817	3451	839	11259		15549
2010		689	6849	203			4250			9	159	319		490	1151	3925	1179	9016		14120
2011		783	7799	149			4521				24	487		414	2153	5493	1198	9641		16332
2012		733	8381	260			4522		3		11	818		390	1955	4896	1123	11053		17072
2013		580	6566	50			3237				128	708		380	1317	4675	960	7333		12968
2014	2206	795	6804	7		2109	3243				39	854	1	565	1231	4316	1361	7862		13538
2015	2781	738	6623	28		2213	2915				7	755		493	1858	4994	1232	7193		13418
2016	1576	675	4881	29		1617	2390					657	1	448	1550	3193	1123	6313		10629

* Includes landings from October to December 1990 of Federal Republic of Germany.

Summary of the assessment

Table 12   Cod in subdivisions 22–24, western Baltic stock. Assessment summary. Weights are in tonnes. High and Low refer to 95% confidence intervals.

Year	Recruits (age 1)	Low[†]	High[†]	SSB	Low	High	F (ages 3–5)	Low	High	Commercial landings	Commercial discards	Recreational catch
1994	64602	33416	124894	31729	21640	46523	1.184	0.97	1.444	21409	2069	1828
1995	90219	47123	172729	29822	22700	39178	1.246	1.043	1.487	29854	3143	2133
1996	27889	13388	58096	33124	25350	43281	1.19	1.01	1.403	38335	6897	2190
1997	85050	44989	160784	34475	24877	47777	1.19	1.012	1.4	37009	3994	2280
1998	114005	60707	214096	26930	20809	34851	1.209	1.03	1.419	29628	5577	2372
1999	37235	20048	69155	31445	24061	41095	1.296	1.104	1.521	35817	4390	2243
2000	37647	20864	67929	36279	26822	49071	1.294	1.108	1.51	31653	3794	2386
2001	24077	14033	41308	29057	23065	36605	1.314	1.115	1.548	26983	2456	2494
2002	40135	24108	66817	22494	17824	28388	1.268	1.079	1.491	19592	1410	2215
2003	14241	8236	24625	17361	14070	21422	1.181	1.011	1.38	18055	3482	2361
2004	67711	40610	112898	19205	14870	24803	1.123	0.957	1.318	15916	2193	2284
2005	23225	14086	38294	26635	21129	33576	1.047	0.886	1.239	16845	3186	2835
2006	22948	13580	38781	30853	23773	40043	0.951	0.775	1.167	16472	1689	1887
2007	6920	4163	11501	31008	24387	39426	0.964	0.806	1.152	15859	1344	1698
2008	3298	1656	6567	21314	17172	26453	0.992	0.839	1.173	11148	355	1513
2009	27695	16258	47177	14098	11491	17297	1.003	0.848	1.187	7093	341	1921
2010	11015	6651	18241	13100	10501	16343	0.996	0.841	1.18	7641	814	2287
2011	15891	9338	27041	13212	9999	17457	0.971	0.818	1.153	8845	272	1794
2012	11509	6934	19102	15205	11826	19551	0.964	0.809	1.149	8654	349	2657
2013	30333	18072	50913	12087	9694	15072	1.056	0.852	1.308	7742	945	2029
2014	16543	9839	27814	15387	12390	19109	0.99	0.8	1.224	8099	867	2485
2015	10098	5833	17481	16828	13063	21679	0.948	0.729	1.233	8372	449	3161
2016	2600	1222	5529	13479	9689	18752	0.93	0.668	1.294	6233	156	2316
2017	65408*	15580*	272653*	12932*	7448*	20492*						

*Predicted from the short-term forecast.

[†] Version 2: 95% confidence intervals corrected.

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