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

ICES advice on fishing opportunities

ICES advises that when the EU multiannual plan (MAP) is applied, total catches in 2019 that correspond to the F ranges in the plan are between 9094 tonnes and 23 992 tonnes. According to the MAP, catches higher than those corresponding to F_{MSY} (15 021 tonnes) can only be taken under conditions specified in the MAP, whilst the entire range is considered precautionary when applying the ICES rule. Depending on the management decision for recreational catches, assumed to be between 1754 tonnes and 3227 tonnes, the corresponding commercial catches are between 5867 tonnes and 22 238 tonnes.

Stock development over time

The spawning-stock biomass (SSB) has been below the limit reference point (B_{lim}) since 2008, but has increased significantly in the last year. The fishing mortality (F) is well above F_{MSY}. Recruitment (R) has been low since 1999; however, recruitment in 2017 (age 1, the 2016 year class) is estimated to be the highest since 1998. The recruitment in 2016 and 2018 (age 1) are historically low.

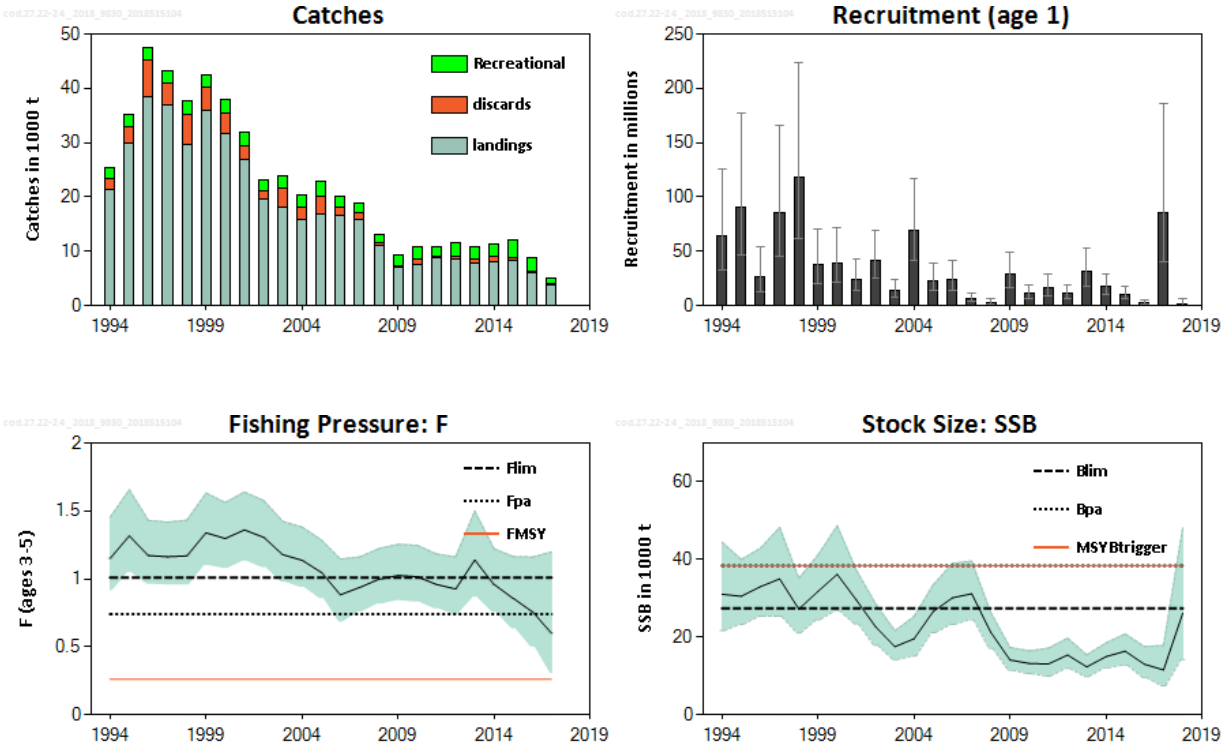

Figure 1 Cod in subdivisions 22–24, western Baltic stock. Summary of the stock assessment (weights in thousand tonnes). Recruitment, F, and SSB have confidence intervals (95%) in the plot. The EU landing obligation entered into force in 2015; therefore, landings since 2015 include fish above and below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

Stock and exploitation status

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

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

	Fishing pressure				Stock size			
		2015	2016	2017		2016	2017	2018
Maximum sustainable yield	F_{MSY}	✗	✗	✗ Above	MSY $B_{trigger}$	✗	✗	✗ Below trigger
Precautionary approach	F_{pa},F_{lim}	○	○	✓ Harvested sustainably	B_{pa},B_{lim}	✗	✗	✗ Reduced reproductive capacity
Management plan	F_{MGT}	✗	✗	✗ Above	B_{MGT}	✗	✗	✗ Increased risk

Catch scenarios

Table 2 Cod in subdivisions 22–24, western Baltic stock. Assumptions made for the interim year and in the forecast. Weights are in tonnes. Recruitment is in thousands.

Variable	Value	Notes
$F_{ages\ 3–5}$ (2018)	0.20	Based on catch constraint for 2018.
SSB (2019)	48 734	Based on catch constraint for 2018.
R_{age1} (2018)	1633	SAM assessment.
R_{age1} (2019)	15 685	Sampled from the last ten years.
R_{age1} (2020)	15 240	Sampled from the last ten years.
Total catch (2018)	5612	Commercial + recreational catches.
Commercial catches (2018)	3858	Calculated as the 2018 TAC (5597 tonnes) plus an assumed discard ratio as in 2017 (4.8%), and accounting for the proportion of western Baltic cod in commercial catches in subdivisions 22–24 in 2017 (66%).
Recreational catches (2018)	1754	As it is unclear how the bag limit will affect the fisheries in 2018, the same recreational catch (1754 tonnes) assumed for 2017 was applied in the forecast, i.e. average over 3 years (2014–2016) of recreational catch (2654 tonnes) minus the estimated reduction (900 tonnes) 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 scenarios. All weights are in tonnes.

Basis	Total catch * (2019)	Recreational catch	Commercial catch	F_{total} (2019)	$F_{commercial}$ (2019)	SSB (2020)	% SSB change ***	% Advice change ^
ICES advice basis								
EU MAP**: F_{MSY}	15021	1754	13267	0.26	0.23	75334	55	184
F = MAP $F_{MSY\ lower}$	9094	1754	7340	0.15	0.12	82691	70	191^^
F = MAP $F_{MSY\ upper}$	23992	1754	22238	0.45	0.42	63804	31	NA ^^^
EU MAP**: F_{MSY}	15021	3227‡	11794	0.26	0.20	75334	55	184
F = MAP $F_{MSY\ lower}$	9094	3227‡	5867	0.15	0.10	82691	70	191^^
Other scenarios								
F_{MSY}	15021	1754	13267	0.26	0.23	75334	55	184
Zero commercial catch	1754	1754	0	0.03	0.00	91905	89	−67
F = F_{pa}	35123	1754	33369	0.74	0.70	49290	1	563
F = F_{lim}	43288	1754	41534	1.01	0.97	39365	−19	718
SSB (2020) = B_{lim}	53332	1754	51578	1.46	1.41	27400	−44	907
SSB (2020) = B_{pa}	44086	1754	42332	1.04	1.00	38401	−21	733
SSB (2020) = MSY $B_{trigger}$	44086	1754	42332	1.04	1.00	38401	−21	733
F = F_{2018}	12067	1754	10313	0.2	0.17	78916	62	128

* Includes commercial and recreational catch.
** EU Multi-Annual Plan for the Baltic Sea (EU, 2016a).
*** SSB 2020 relative to SSB 2019.
^ Total catch in 2019 relative to total catch corresponding to the advice for 2018 (5295 t, MAP F_{MSY}), including commercial and recreational catch.
^^ Total catch in 2019 relative to total catch corresponding to the advice for 2018 for $F_{MSY\ lower}$ (3130 t, MAP $F_{MSY\ lower}$), including commercial and recreational catch.
^^^ For 2018, no advice was given for F_{MSY} upper and therefore no comparison is made.
‡ Recreational catch scaled proportionally to advised increase in total catch.

The high recruitment in 2017 (age 1), together with the assumed large decrease in fishing pressure in 2018 is expected to increase the stock substantially in 2019. This leads to a large increase in the advice for 2019.

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, 2016a). The advice, based on the F_{MSY} ranges used in the management plan, 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 data for stock separation is available for 12 of the 24 years in the present 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, because it is currently not possible to split the survey data into the stocks. A large part of the commercial fishing is conducted in this area and, therefore, the lack of survey coverage in Subdivision 24 could result in a bias in the assessment.

In 2017 the recreational catches (for one nation only) included in the stock assessment constituted 18% of the total catches. The uncertainty around recreational catches is considered higher than in commercial catches.

The short-term forecast is very dependent on the high estimate of the 2016 year class. This year class has now been observed in both spring and autum surveys from 2016 to 2018, indicating that it is strong and widely distributed in the western Baltic area.

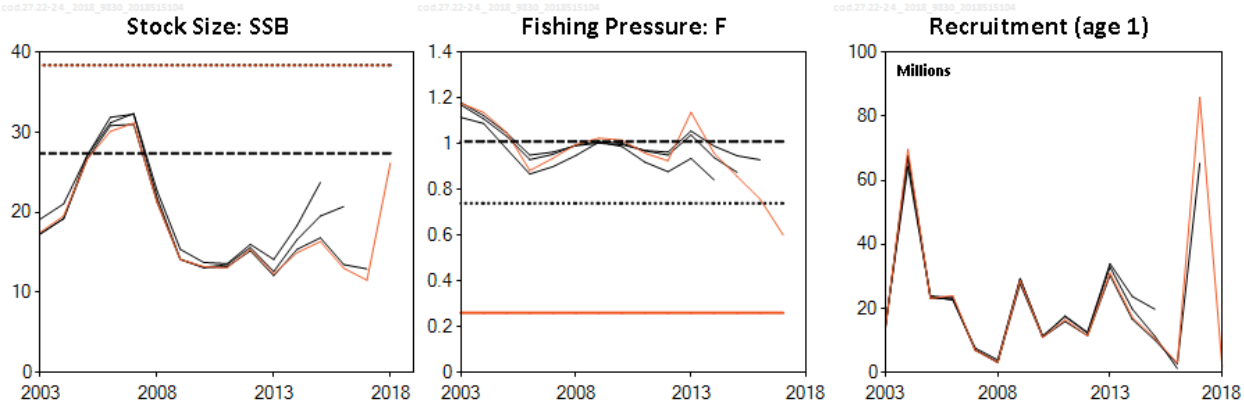

Figure 2 Cod in subdivisions 22–24, western Baltic stock. Historical assessment results (final-year recruitment estimates included). The assessments conducted in the years before 2015 were for cod in the area of subdivisions 22–24 that contains also a fraction of the eastern Baltic cod stock.

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 (2015a); these were evaluated to result in no more than 5% reduction in long-term yield compared with MSY. The advice based on the F_{MSY} ranges used in the management plan are considered precautionary. The SSB in 2019 is predicted to be above MSY $B_{trigger}$. In this situation, catch scenarios applicable under the MAP correspond to fishing mortalities between F_{lower} and F_{upper}. However, according to the MAP, catches corresponding to F higher than F_{MSY} (i.e. column B of Annex I in the MAP) can only be taken under conditions specified in the MAP.

The positive perspective of the stock development in the forecast is mainly due to one strong year class (the 2016 year class). Although the spawning-stock biomass has increased until 2018, it is still below B_{lim}. Fishing mortality in 2017 was still considerably above F_{MSY}. The 2016 year class is the only strong year class in more than ten years and the present advice is highly dependent on predicted development of this year class, which is not yet fully recruited to the fishery. The 2016 year class will account for the majority of the predicted catches in 2019 (83%) and SSB in 2020 (81%) (Figure 3). Additionally, the 2015 and 2017 year classes are at historical low. There is a risk of growth overfishing because the 2016 year class fish have not yet reached their full growth potential. Therefore, to make use of the full growth potential of the 2016 year class, ICES suggests to use the $F_{MSY\ lower}$ value in the MAP when setting the TAC.

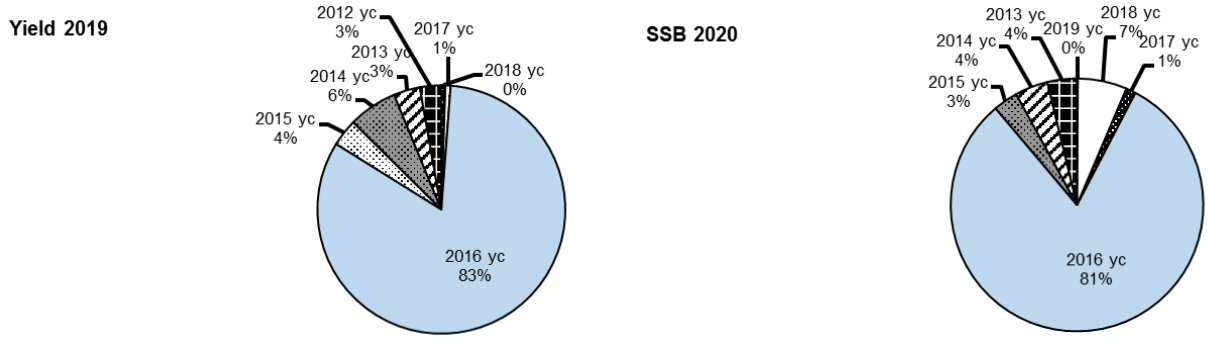

Figure 3 Cod in subdivisions 22–24, western Baltic stock. Relative predicted distribution of year classes in the yield 2019 and spawning-stock biomass 2020.

Landings of fish below the minimum conservation reference size (MCRS, 35 cm) are very low (32 t below minimum size [BMS] reported in 2017) and discarding still takes place despite the fact that the landing obligation has been in place since 2015. The estimated discard amount is 191 tonnes in 2017 (approximately 4.8%), based on observer data (an increase from 2.5% in 2016 due to the strong 2016 year class entering the fishery). ICES understands this to be not in accordance with the current regulations.

Since 2016 the spawning closure (no directed cod fishing in February* and March; EU, 2015, 2016b, 2017) covers the peak spawning time; in 2016 and 2017 both a very large and a historical low recruitment were produced with a similar spawning stock size. Hence, it is too early to evaluate any 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. A bag-limit introduced for the first time in 2017 (EU, 2016b) and the poor stock status lead to a drop in the recreational catches to below 1000 t in 2017. As the stock is expected to show a strong increase in 2018, the impact on the recreational catches is unknown and the recreational catch value used for the intermediate year (1754 t) is similar to the one assumed in 2017. The recreational catch in 2019 will depend on a management decision on the regulations for the recreational fishery. Two different options (same catch as assumed for the interim year and recreational catch, proportionally scaled with the ICES catch advice for the stock) are provided in Table 3.

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 could 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 73% and 27%, 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 2.38 (Table 6). With a rapidly increasing WB cod stock and a decreasing EB cod stock, it appears likely that this ratio will change towards a higher fraction of WB cod in the catch (Option C in Table 5).
6. In an area that includes two stocks of a species, the species TAC should be set such that the risk of overexploitation of the weakest stock is minimized. Assuming the same stock distribution and fishing pattern as in recent years, this implies that the intended catch of the EB cod stock in Subdivision 24 will determine the amount of WB cod that are expected to be caught in that subdivision (Option B in Table 5).

As an example (Option A in Table 5), assuming the geographical distribution of the commercial catch in 2019 remains as outlined in point 1 above and with no increase in recreational catch in 2019, the distribution of a commercial catch of 13 267 t of WB cod will be 9685 t in subdivisions 22–23 and 3582 t in Subdivision 24. The additional amount of EB cod fished in Subdivision 24 is estimated to be 8520 t, assuming the same ratio between EB cod and WB cod as observed on average during 2015–2017 in the commercial catches (i.e. 2.38, see point 5 above). This gives a total estimated commercial catch in 2019 of 21 787 t for cod in subdivisions 22–24, leaving 8165 t as commercial TAC in subdivisions 25–32 to remain consistent with the ICES advice for both cod stocks.

Figure 4 provides a graphic presentation of 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 for three different methods to partition catches across areas.

* Version 2: month corrected

The European Commission has requested ICES to 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 (option A in Table 5). There could be other allocation schemes also consistent with the advice per stock (options B and C), but such management targets are not known to ICES.

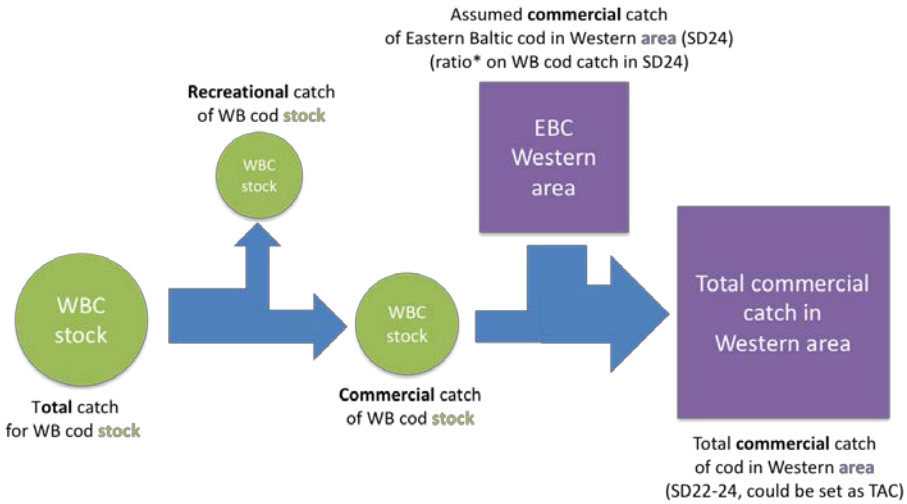

Figure 4 Cod in subdivisions 22–24, western Baltic cod. Illustration of calculations to obtain area TACs for western and eastern Baltic cod from ICES stock-based catch advice, taking into account stock mixing in Subdivision 24 and recreational catches for the western stock – corresponding to Options A and C in Table 5 below. *ratio based either on the historical catch distribution (option A in Table 5) or on an assumed distribution, taking the development of both stocks into account (option C in Table 5).

Table 5 Cod in subdivisions 22–24, western Baltic stock. Catch scenarios by management area consistent with the ICES advice for the western and eastern Baltic cod stocks and assuming a recreational catch of 1754 tonnes in 2019. Weights are in tonnes.

	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	
Area	Total	SDs 22–23	SD 24	Total	SD 24	SDs 25–32	SDs22–24	% TAC change (SDs 22–24)*	SDs 25–32	% TAC change (SDs 25–32)**
A. Status quo distribution – same settings as last year										
Calculation		= A × 0.73^	= A × 0.27^		= C × 2.38^^	= D – E	= B + C + E		= F	
EU MAP: F_{MSY}	13267	9685	3582	16685	8520	8165	21787	289	8165	−76
F=MAP F_{MSY} lower	7340	5358	1982	16685	4714	11971	12054	115	11971	−65
B. EB cod catch in SD 24 limits WB cod catch – ratio in catches is mean of 2015–2017, max. 10.5% of EB cod total catch in SD 24										
Calculation		= A × 0.73^	=E/ 2.38^^		= D x 0.105***	= D – E	= B + C + E		= F	
EU MAP: F_{MSY}	13267	9685	737	16685	1754	14931	12176	118	14931	−56
F=MAP F_{MSY} lower	7340	5358	737	16685	1754	14931	7849	40	14931	−56
C. EB cod to WB cod ratios in SD 24 catch changed according to stock development – other parameters as in option A										
Calculation		= A × 0.73^	= A × 0.27^		= C × 0.79^^^	= D – E	= B + C + E		= F	
EU MAP: F_{MSY}	13267	9685	3582	16685	2827	13858	16094	188	13858	−60
F=MAP F_{MSY} lower	7340	5358	1982	16685	1564	15121	8904	59	15121	−56

* Compared to the 2018 TAC for subdivisions 22–24 (5597 tonnes).
** Compared to the 2018 TAC for subdivisions 25–32 (34 288 tonnes).
***0.105 (average proportion [2015–2017] of eastern Baltic cod caught in Subdivision 24).
^ Average proportions of the WB cod stock commercial catch that has been caught in subdivisions 22–23 and Subdivision 24 in the most recent three years (2015–2017; Table 6).
^^ The EB cod catch / WB cod commercial catch ratio observed in Subdivision 24 in the most recent three years (2015–2017; Table 6).
^^^ 0.79 = 2.38 x (0.73/2.2), where 0.73 = the relative SSB for eastern Baltic cod 2018/2017 and 2.2 = the western Baltic SSB 2018/2017.

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 in the western Baltic management area.

Year	WB cod stock					EB cod stock			Management area 22–24				
	Landings	Discards	Rec. catch	% of Comm. catch in SDs 22–23	% of Comm. catch in SD 24	Landings in SD 24	Discards in SD 24	% of catch in SD 24	Total landings	Discards	Rec. catch*	total catch	EBC / WBC stock Comm. catch in SD 24
1994	21409	2069	1828	0.46	0.54	1784	166	2	23193	2235	1828	27256	0.15
1995	29854	3143	2133	0.66	0.34	4041	541	4	33895	3684	2133	39712	0.41
1996	38335	6897	2190	0.68	0.32	10210	1087	8	48545	7984	2190	58719	0.79
1997	37009	3994	2280	0.67	0.33	6615	629	7	43624	4623	2280	50526	0.53
1998	29628	5577	2372	0.63	0.37	4588	630	7	34216	6207	2372	42795	0.40
1999	35817	4390	2243	0.68	0.32	6338	588	8	42155	4978	2243	49376	0.53
2000	31653	3794	2386	0.68	0.32	6694	1153	8	38347	4947	2386	45680	0.70
2001	26983	2456	2494	0.67	0.33	7261	383	8	34244	2839	2494	39576	0.79
2002	19592	1410	2215	0.72	0.28	4566	548	7	24158	1958	2215	28331	0.88
2003	18055	3482	2361	0.66	0.34	6569	854	9	24624	4336	2361	31321	1.00
2004	15916	2193	2284	0.74	0.26	4925	184	7	20841	2377	2284	25503	1.09
2005	16845	3186	2835	0.63	0.37	5191	1808	11	22036	4994	2835	29866	0.94
2006	16472	1689	1887	0.74	0.26	6279	142	8	22751	1831	1887	26468	1.37
2007	15859	1344	1698	0.66	0.34	7876	855	14	23736	2199	1698	27634	1.48
2008	11148	355	1513	0.69	0.31	8934	768	17	20082	1123	1513	22717	2.69
2009	7093	341	1921	0.60	0.40	8456	474	15	15549	815	1921	18285	3.02
2010	7641	814	2287	0.67	0.33	6479	557	12	14120	1371	2287	17778	2.55
2011	8845	272	1794	0.75	0.25	7487	508	13	16332	780	1794	18907	3.48
2012	8654	349	2657	0.69	0.31	8419	556	13	17072	905	2657	20634	3.20
2013	7742	945	2029	0.70	0.30	5226	1305	15	12968	2250	2029	17248	2.48
2014	8099	867	2485	0.67	0.33	5439	1268	15	13538	2135	2485	18158	2.25
2015	8372	449	3161	0.71	0.29	5047	912	12	13419	1361	3161	17941	2.35
2016	6233	156	2316	0.68	0.32	4430	293	13	10663	449	2316	13428	2.31
2017**	3923	191	932	0.79	0.21	1942	214	7	5865	405	932	7202	2.47
Average (3 years)				0.73	0.27								2.38

* These recreational catches are from Germany only.

** Preliminary.

Reference points

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

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	38 400	B_{pa}	ICES (2015b)
	F_{MSY}	0.26	Stochastic simulations with segmented regression stock–recruitment relationship.	ICES (2015a)
Precautionary approach	B_{lim}	27 400	Break point of the stock–recruitment relationship.	ICES (2015b)
	B_{pa}	38 400	$1.4 \times B_{lim}$	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	$F_{lim} \times e^{-1.645\sigma}$; $\sigma = 0.19$	ICES (2016a)
Management plan	MAP MSY $B_{trigger}$	38 400	MSY $B_{trigger}$	EU (2016a – Annex II column A)
	MAP B_{lim}	27 400	B_{lim}	EU (2016a – Annex II column B)
	MAP F_{MSY}	0.26	F_{MSY}	EU (2016a – Annex I columns A and B)
	MAP target range $F_{MSY\ upper}$ to F_{MSY}	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 (2016a – Annex I column A)
	MAP target range F_{MSY} to $F_{MSY\ lower}$	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 (2016a – Annex I column B)

Basis of the assessment

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

ICES stock data category	1 (ICES, 2016b).
Assessment type	Age-based analytical assessment SAM (ICES, 2018) that uses catches (landings, discards, and recreational catch) in the model and in the forecast.
Input data	Commercial catches (international landings, age distributions 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 (from commercial catches) 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); next benchmark planned for 2019. 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 additional 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	Total catch from the stock corresponding to the advice	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

Year	ICES advice	Total catch from the stock corresponding to the advice	Commercial catch corresponding to advice*	Agreed TAC**	ICES estimated total commercial landings subdivisions 22–24 (eastern and western Baltic cod stocks)
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	5865
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	5597	
2019	MAP range: F_{MSY} F_{lower} to F_{upper} (F = 0.15–0.45)	9094–23992	5867–22238		

* 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 in 2017 as estimated by ICES.

Catch (2017)	Commercial landings		Commercial discards	Recreational catch
5046 t	active gears 53%	passive gears 47%	191 t	932 t
	3923 t			

Table 11 Cod in subdivisions 22–24, western Baltic management area. History of commercial catch; both the official and ICES estimated values are presented by area. 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	Total for management area							
	Human consumption landings (HC)				BMS	Discards	Unallocated	Total catch
	22	23	24	HC (SDs 22–24)				
1992	9887	2739	5370	17996				17996
1993	7296	1275	7129	15700			5528	21228
1994	8229	1628	13336	23193		2235	7502	32930
1995	16936	3158	13801	33895		3684		37579
1996	21417	4031	23097	48545		7984	2300	58829
1997	21966	2663	18995	43624		4623		48247
1998	15093	3074	16049	34216		6207		40423
1999	20409	3521	18225	42155		4978		47133
2000	18934	3149	16264	38347		4947		43294
2001	14976	2817	16451	34244		2839		37083
2002	11968	2409	9781	24158		1958		26116
2003	9573	1925	13127	24624		4336		28960
2004	9091	2320	9430	20841		2377	13	23231
2005	8729	2621	10686	22036		4994	9	27039
2006	9979	1914	10858	22751		1831		24582
2007	7840	2713	13183	23736		2199		25935

Year	Total for management area							
	Human consumption landings (HC)				BMS	Discards	Unallocated	Total catch
	22	23	24	HC (SDs 22–24)				
2008	5687	2139	12256	20082		1123		21205
2009	3451	839	11259	15549		815		16364
2010	3925	1179	9016	14120		1371		15491
2011	5493	1198	9641	16332		780		17112
2012	4896	1123	11053	17072		905		17977
2013	4675	960	7333	12968		2250		15218
2014	4316	1361	7862	13538		2135		15673
2015	4994	1232	7193	13419		1361		14780
2016*	3196	1123	6344	10663		449		11112
2017 **	2195	941	2697	5833	32	405		6271

* Landings include BMS.
** Preliminary.

Table 12 Cod in subdivisions 22–24, western Baltic management area. History of commercial landings for human consumption 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				
	22	23	22+24	24	22+24	22	22+24	22	24	24	24	24	22	23	22+24	22	23	24	Unalloc.	Grand total
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
2000		2451	19876	171			11572		5		84	926		698	2564	18934	3149	16264		38347

Year	Denmark			Finland	German Dem.Rep.*	Germany, FRG		Estonia		Lithuania	Latvia	Poland	Sweden			Total				
	22	23	22+24	24	22+24	22	22+24	22	24	24	24	24	22	23	22+24	22	23	24	Unalloc.	Grand total
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
2017**	1167	506	2352			1029	1267					926		435	348	2195	941	2697		5833

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

Summary of the assessment

Table 13 Cod in subdivisions 22–24, western Baltic stock. Assessment summary. Weights are in tonnes. Recruitment in thousands. High and Low refer to 95% confidence intervals.

Year	Recruitment (Age 1)	High	Low	Stock size: SSB	High	Low	Landings	Discards	Recreational	Fishing pressure: F (ages 3–5)	High	Low
1994	64280	125357	32961	31039	44454	21673	21409	2069	1828	1.15	1.45	0.91
1995	90944	176886	46758	30516	39995	23283	29854	3143	2133	1.31	1.66	1.04
1996	25926	54609	12308	32991	42910	25365	38335	6897	2190	1.17	1.43	0.96
1997	86077	165215	44846	34996	48300	25357	37009	3994	2280	1.16	1.42	0.95
1998	117595	224058	61719	27228	35125	21107	29628	5577	2372	1.17	1.43	0.95
1999	37609	71057	19906	31793	41210	24528	35817	4390	2243	1.34	1.63	1.10
2000	39144	72124	21245	36171	48690	26870	31653	3794	2386	1.30	1.56	1.08
2001	24416	42592	13997	29525	37176	23449	26983	2456	2494	1.36	1.64	1.13
2002	41564	69797	24752	22652	28586	17950	19592	1410	2215	1.31	1.58	1.08
2003	13679	23675	7903	17532	21612	14222	18055	3482	2361	1.18	1.42	0.98
2004	69703	117404	41383	19561	25326	15108	15916	2193	2284	1.14	1.38	0.94
2005	23133	38650	13845	26609	33500	21135	16845	3186	2835	1.05	1.29	0.85
2006	23981	41180	13965	30122	38985	23274	16472	1689	1887	0.88	1.15	0.68
2007	6889	11538	4114	31163	39582	24535	15859	1344	1698	0.94	1.16	0.76
2008	3138	6267	1572	21256	26313	17171	11148	355	1513	1.00	1.22	0.81
2009	28653	48961	16768	14109	17309	11502	7093	341	1921	1.02	1.25	0.84
2010	10971	18418	6535	13216	16456	10614	7641	814	2287	1.02	1.25	0.83
2011	16480	28429	9553	13068	17134	9966	8845	272	1794	0.96	1.18	0.78
2012	11474	19315	6816	15373	19730	11979	8654	349	2657	0.93	1.16	0.74
2013	31039	53045	18162	12331	15434	9852	7742	945	2029	1.14	1.50	0.86
2014	17183	29338	10064	14962	18510	12095	8099	867	2485	0.96	1.22	0.75
2015	10608	18306	6147	16362	20821	12858	8372	449	3161	0.86	1.16	0.63
2016	2939	5516	1566	13019	17570	9647	6233	156	2316	0.76	1.16	0.50
2017	85991	185869	39783	11533	17855	7450	3923	191	932	0.60	1.20	0.30
2018	1633*	6112*	418*	25317	48535	12595						

*Output from SAM analysis based on survey data.

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