

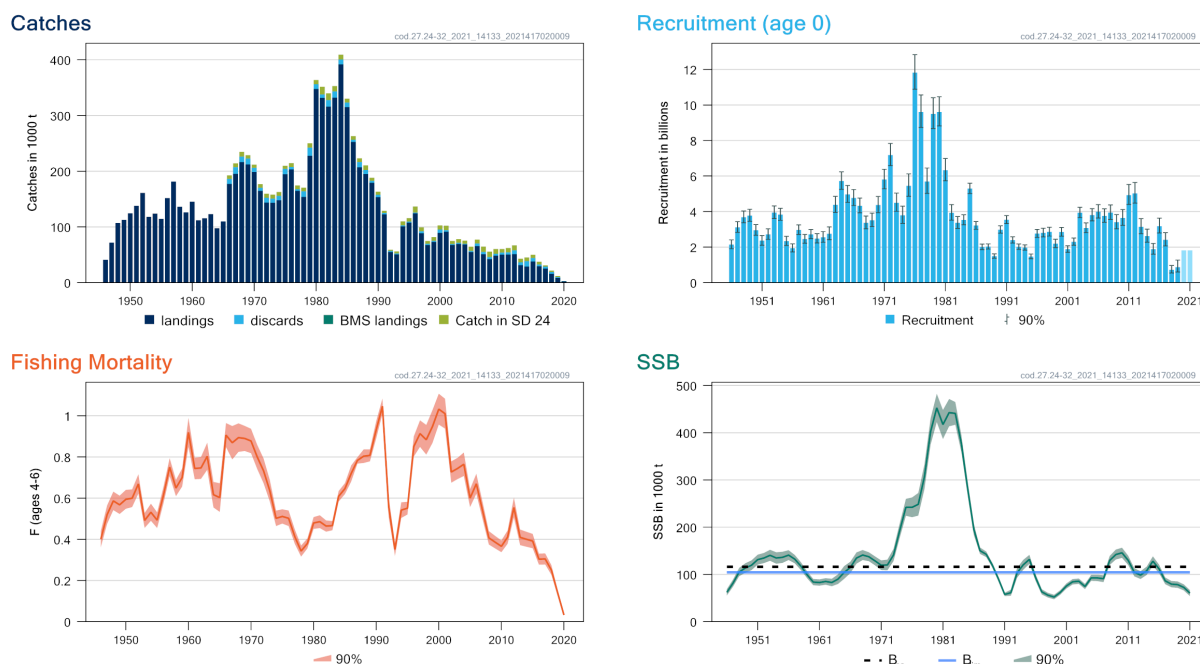
## Cod (*Gadus morhua*) in subdivisions 24–32, eastern Baltic stock (eastern Baltic Sea)

### ICES advice on fishing opportunities

ICES advises that when the precautionary approach is applied, there should be zero catch in 2022. This advice applies to all catches from the stock in subdivisions (SDs) 24–32.

### Stock development over time

ICES assesses that spawning-stock size is below  $B_{lim}$  and  $B_{pa}$ . No reference points for fishing pressure have been defined for this stock.



**Figure 1** Cod in subdivisions 24–32, eastern Baltic stock. Summary of the stock assessment. The assumed recruitment (R) values for 2020 and 2021 are shaded in a lighter colour.

### Catch scenarios

**Table 1** Cod in subdivisions 24–32, eastern Baltic stock. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
$F_{ages\ 4-6}$ (2021)	0.04	F based on catch constraint
SSB (2021)	60 366	From assessment; tonnes
$R_{age\ 0}$ (2020–2023)	1 813 170	Average of 2015–2019; thousands
$M_{ages\ 4-6}$ (2021–2023)	0.74	Natural mortality estimated by the assessment in 2020
Total catch (2021)	3595	EU TAC 595 tonnes + Russian quota 3000; tonnes

**Table 2** Cod in subdivisions 24–32, eastern Baltic stock. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2022)	F (2022)	SSB* (2022)	SSB* (2023)	Probability of SSB (2023) > B <sub>lim</sub> (%)	% SSB change	% Catch change**	% advice change***
ICES advice basis								
F = 0	0	0	59450	63775	< 0.01	7	-100	0
Other scenarios								
F = 0.05	3689	0.050	58081	61062	< 0.01	5	27	-
F = F (2020)	2399	0.033	58524	62078	< 0.01	6	-17	-
Catch = TAC (2021)	3595	0.050	58032	60938	< 0.01	5	24	-
Catch = 0.75 × TAC (2021)	2696	0.037	58334	61676	< 0.01	6	-7	-

\*SSB at the spawning time.

\*\*Catch in 2022 compared to catch in 2020 (2899 tonnes).

\*\*\*The advised catch for 2021 was 0 tonnes.

### Basis of the advice

**Table 3** Cod in subdivisions 24–32, eastern Baltic stock. The basis of the advice.

Advice basis	Precautionary approach
Management plan	This stock is shared between the EU and Russia. An EU multiannual plan (MAP) that includes cod is in place for stocks in the Baltic Sea (EU, 2016, 2019,) but F <sub>MSY</sub> ranges are not available for this stock. Russia does not have a management plan for this stock.

### Quality of the assessment

Sampling of landings and discards was considerably reduced in 2020 due to a combination of COVID-19 disruption and low catches. Low quotas may also have caused misreporting of landings. However, the perception of the stock status and present advice were found robust to possible uncertainties in catch data in 2020.

The estimated decline in growth and increase in natural mortality are in line with biological knowledge on the stock. The exact values for growth parameters estimated for recent years are uncertain, however, because of imprecise age information. This is also affecting the natural mortality estimates, because growth and natural mortality are related in the assessment model. The results of the stock assessment in terms of SSB and F, however, were found to be robust in spite of these uncertainties (ICES, 2019).

In the forecast, the slight increase in SSB from 2022 to 2023 in all catch scenarios (Table 2) is greatly influenced by the assumption on recruitment in 2020 (average of age 0 over the last five years), as SSB is dominated by small cod (from these recruitments). This assumed recruitment is higher than that estimated in the most recent two years.



**Figure 2** Cod in subdivisions 24–32, eastern Baltic stock. Historical assessment results (recruitment estimates for two final years in each assessment are assumed as an average). The stock was benchmarked in 2019.

### Issues relevant for the advice

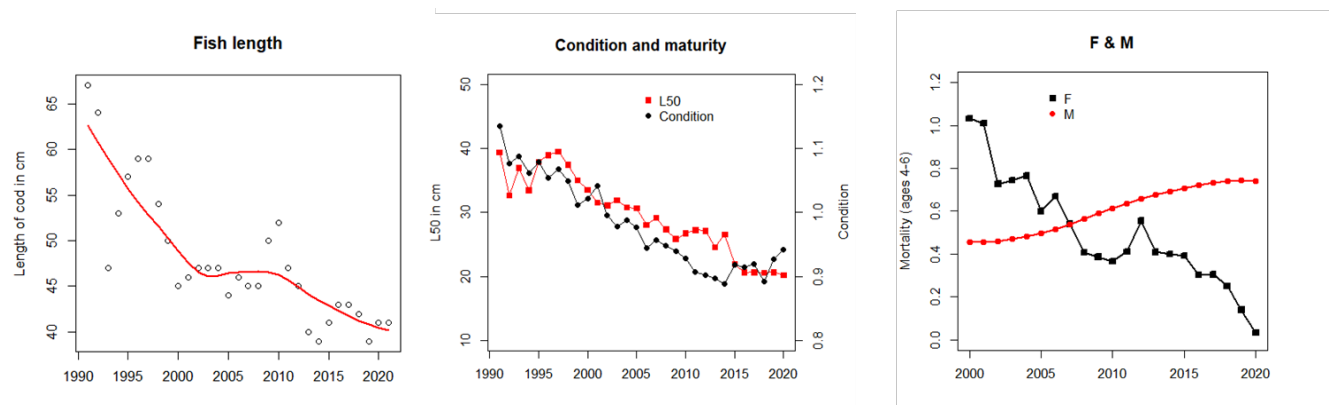
The poor status of the eastern Baltic cod is largely driven by biological changes in the stock during the last decades. Growth, condition (weight-at-length), and size-at-maturation have substantially declined (Figure 3). These developments indicate that the stock is distressed and is expected to have reduced reproductive potential. Natural mortality has increased and is estimated to be considerably higher than the fishing mortality in recent years. The size of the largest fish in the population has shown a decline since 1990 (Figure 3).

The declining trend in size at maturation over time means that the development of the commercial sized cod biomass ( $\geq 35$  cm) is not consistent with SSB, especially since 2000 (Figure 4). This is because SSB in recent years included small mature cod that were not part of the SSB in earlier years. The 2020 biomass of both commercial sized cod and SSB are close to the lowest level observed since the 1950s.

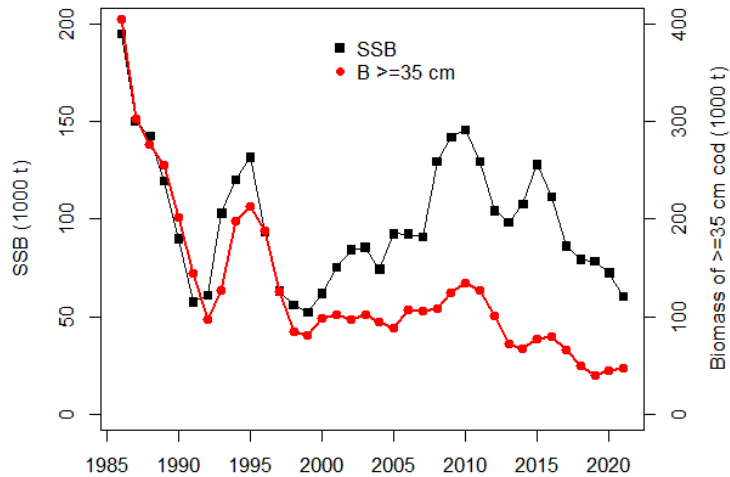
The low growth, poor condition, and high natural mortality of cod are related to changes in the ecosystem that include:

- i) poor oxygen conditions that can affect cod both directly through altering their metabolism and indirectly through a shortage of benthic prey, as well as the survival of offspring;
- ii) reduced availability of fish prey in the main distribution area of cod. Sprat and herring have had a more northerly distribution in recent years, and there is less overlap with the distribution of the cod stock. It is, however, unclear whether the small remaining cod stock would be impacted by this shift of distribution.
- iii) high levels of parasite infestations; these coincide with an increased abundance of grey seals. It is unknown whether the parasite infection is the cause or an effect of the poor condition of cod.

These drivers are interrelated, and their cumulative effect on the cod stock is unclear.



**Figure 3** Cod in subdivisions 24–32, eastern Baltic stock . Left panel: indicator of size structure of the stock (length at the 95th percentile of the length distribution, data from BITS-Q1 survey). Middle panel: length at which half of the stock has become mature ( $L_{50}$ ) and condition (weight-at-length) of 40–60 cm cod (data from BITS-Q1 survey). Right panel: estimates of fishing mortality (F) and natural mortality (M) for ages 4–6 in stock assessment.



**Figure 4** Cod in subdivisions 24–32, eastern Baltic stock. Spawning stock biomass at the spawning time and biomass of commercial sized cod ( $\geq 35$  cm in length) in the beginning of the year.

The concept of  $F_{MSY}$  assuming long-term equilibrium is not presently considered appropriate for this stock due to a large decline in productivity in later years. At the current low productivity the stock is estimated to remain below  $B_{lim}$  in the medium term, even with no fishing. Furthermore, fishing at any level will target the remaining few commercial-sized ( $\geq 35$  cm) cod; this will deteriorate the stock structure further and reduce its reproductive potential.

The eastern Baltic cod (EB) stock is mainly distributed and caught in the eastern Baltic cod management area (SDs 25–32), but it is also distributed and caught mixed with western Baltic (WB) cod in SD 24; this is part of the western Baltic management area (SDs 22–24). The assessment and this advice is for the eastern Baltic cod stock in the entire area of its distribution (SDs 24 and 25–32).

### Reference points

**Table 4** Cod in subdivisions 24–32, eastern Baltic stock. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	Undefined		ICES (2019)
	$F_{MSY}$	Undefined		ICES (2019)
Precautionary approach	$B_{lim}$	104 402 t	SSB in 2012 which produced the last strong year-class, in the recent period of low productivity	ICES (2021b)
	$B_{pa}$	116 061 t	$B_{lim} \times \exp(1.645 \times \sigma)$ , where $\sigma = 0.07$	ICES (2021b)
	$F_{lim}$	Undefined		
	$F_{pa}$	Undefined		
Management plan	SSB <sub>mgt</sub>	Undefined		
	$F_{mgt}$	Undefined		

## Basis of the assessment

**Table 5** Cod in subdivisions 24–32, eastern Baltic stock. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2021a)
Assessment type	Age-length based analytical assessment with Stock Synthesis model (ICES, 2021b)
Input data	Commercial catches (international landings, length distributions from catch sampling). Survey indices include two trawl surveys (BITSQ1 [G2916] and BITS-Q4 [G8863]); indices of spawning-stock biomass and larval abundance from ichthyoplankton surveys; three commercial historical CPUE indices and two historical CPUE survey indices. Maturity and weight-at-length are from BITS-Q1 surveys (regularly updated). Age-length keys (annual) are from BITS-Q1 and BITS-Q4 surveys. 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	Discard estimates are available from observer programmes and included in the catch data
Indicators	Condition (weight-at-length), size-at-maturation, size structure of the stock
Other information	This stock was benchmarked in 2019 (WKBALTCOD2; ICES, 2019)
Working group	Baltic Fisheries Assessment Working Group (WGBFAS)

## History of the advice, catch, and management

**Table 6** Cod in subdivisions 24–32, eastern Baltic stock. ICES advice, TACs, ICES landings, and ICES catches. All weights are in tonnes.

Year	ICES advice	Catches corresp. to advice	Landings corresp. to advice	Agreed TAC	ICES landings (SDs 25–32)	ICES eastern Baltic stock catches (SDs 24 and 25–32)
1987	Reduce towards $F_{max}$		245000		207000	223295
1988	TAC		150000		194000	210527
1989	TAC		179000	220000*	179000	188361
1990	TAC		129000	210000*	153000	163276
1991	TAC		122000	171000*	123000	129020
1992	Lowest possible level		-	100000*	55000**	59110
1993	No fishing		0	40000*	45000**	56154
1994	TAC		25000	60000*	100856**	109984
1995	30% reduction in fishing effort from 1994 level		-	120000*	107718**	115843
1996	30% reduction in fishing effort from 1994 level		-	165000*	124189	136788
1997	20% reduction in fishing mortality from 1995 level		130000	180000*	88600	99251
1998	40% reduction in fishing mortality from 1996 level		60000	136950*	67428	74940
1999	Proposed $F_{pa}$ (= 0.6)		88000	126000*	72995	81653
2000	40% reduction in F from 1996–1998 level		60000	105000*	89289**	102833
2001	Fishing mortality of 0.30		39000	105000*	91328**	102402
2002	No fishing		0	76000*	67740**	74824
2003	70% reduction in F		See option table	75000	69476**	78093
2004	90% reduction in F		< 13000	45400	68578**	75276
2005	No fishing		0	42800	55032**	64495
2006	Develop management plan		< 14900	49200	65532**	77086

Year	ICES advice	Catches corresp. to advice	Landings corresp. to advice	Agreed TAC	ICES landings (SDs 25–32)	ICES eastern Baltic stock catches (SDs 24 and 25–32)
2007	No fishing		0	44300	50843**	64656
2008	No fishing		0	42300***	42235**	55578
2009	Limit (total) landings to 48 600 tonnes		≤ 48600	49380***	48439**	60513
2010	Follow management plan		56800	56100***	50277	60400
2011	See scenarios		-	64500***	50368	62245
2012	Follow management plan		74200	74200***	51225	67024
2013	Follow management plan		65900	68700***	31355	42977
2014	Follow management plan		70301	73400***	28909	45289
2015	20% reduction in catches	29085		55800***	38079	50008
2016	Precautionary approach^	≤ 29220		46900***	29313	37438
2017	Precautionary approach^	≤ 26994		36957***	25496	30965
2018	Precautionary approach^	≤ 26071		34288***	15907	21605
2019	Precautionary approach^	≤ 16685		29912***	8383	11938
2020	Precautionary approach^	0		7500***	2319	2899
2021	Precautionary approach^	0		3595***		
2022	Precautionary approach^	0				

\* For the total Baltic Sea until and including 2003.

\*\* Reported landings in 1992–1995 and 2000–2009 are likely to be minimum estimates due to incomplete reporting.

\*\*\* TAC is for SDs 25–32 and is calculated as EU + Russian autonomous quotas.

^ ICES provides stock-based advice (for the eastern Baltic cod stock).

## History of the catch and landings

**Table 7** Cod in subdivisions 24–32, eastern Baltic stock. Catch distribution by fleet in 2020 as estimated by ICES.

Catch (2020)	Landings		Discards
2899 tonnes	Active gears 91%	Passive gears 9%	152 tonnes
	2747 tonnes		

**Table 8** Cod in subdivisions 24–32, eastern Baltic stock. History of ICES estimates of landings, discards, and catch by area. Weights are in tonnes. The landings obligation has been in place since 2015, though landings below minimum conservation reference size (also known as ‘below minimum size’ [BMS]) have only been possible to separate since 2017.

Year	Eastern Baltic cod stock in subdivisions 25–32				Eastern Baltic cod stock in Subdivision 24				Eastern Baltic cod stock in subdivisions 24 and 25–32	
	Unallocated*	Discards	Landings BMS	Total landings	Catch	Discards	Landings BMS	Total landings	Catch	Total catch
1966		8735		177318	186053			6624	6624	192677
1967		11733		195446	207179			6899	6899	214078
1968		9700		216353	226053			8614	8614	234667
1969		10654		212160	222814			5980	5980	228794
1970		7625		198451	206076			5720	5720	211796

Year	Eastern Baltic cod stock in subdivisions 25–32				Eastern Baltic cod stock in Subdivision 24				Eastern Baltic cod stock in subdivisions 24 and 25–32	
	Unallocated*	Discards	Landings BMS	Total landings	Catch	Discards	Landings BMS	Total landings	Catch	Total catch
1971		5426		164840	170266			6586	6586	176852
1972		8490		143833	152323			7307	7307	159630
1973		7491		143164	150655			7320	7320	157975
1974		7933		147815	155748			6923	6923	162671
1975		9576		194649	204225			5676	5676	209901
1976		4341		203303	207644			6972	6972	214616
1977		2978		164792	167770			6643	6643	174413
1978		9875		154009	163884			6553	6553	170437
1979		14576		227699	242275			7745	7745	250020
1980		8544		347619	356163			7721	7721	363884
1981		6185		331642	337827			13759	13759	351586
1982		11548		316052	327600			12239	12239	339839
1983		10998		332148	343146			9853	9853	352999
1984		8521		391952	400473			8709	8709	409182
1985		8199		315083	323282			6971	6971	330253
1986		3848		252558	256406			6604	6604	263010
1987		9340		207081	216421			6874	6874	223295
1988		7253		194787	202040			8487	8487	210527
1989		3462		179178	182640			5721	5721	188361
1990		4187		153546	157733			5543	5543	163276
1991		2741		122517	125258			3762	3762	129020
1992		1904		54882	56786			2324	2324	59110
1993	18978	1558		50711	52269			3885	3885	56154
1994	44000	1956		100856	102812	621		6551	7172	109984
1995	18993	1872		107718	109590	668		5585	6253	115843
1996	10815	1443		124189	125632	1116		10040	11156	136788
1997**		3462		88600	92062	641		6547	7189	99251
1998		2299		67428	69727	631		4582	5213	74940
1999		1838		72995	74833	599		6221	6820	81653
2000	23118	6019		89289	95308	1209		6316	7525	102833
2001	23677	2891		91328	94219	389		7794	8183	102402
2002	17562	1462		67740	69202	562		5060	5622	74824
2003	22147	2024		69477	71501	862		5729	6592	78093
2004	19563	1201		68578	69779	188		5309	5497	75276
2005	14991	1670		55032	56702	1729		6064	7793	64495
2006	17836	4644		65531	70175	144		6767	6911	77086
2007	12418	4146		50843	54989	875		8792	9667	64656
2008	2673	3746		42234	45980	787		8811	9598	55578
2009	3189	3328		48438	51766	464		8284	8747	60513
2010		3543		50276	53819	533		6049	6581	60400
2011		3850		50368	54218	482		7545	8027	62245
2012		6795		51225	58020	536		8469	9004	67024
2013		5020		31355	36375	1243		5359	6602	42977
2014		9627		28909	38536	1298		5455	6753	45289
2015		5970		38079	44049	930		5029	5959	50008
2016		3279		29313	32591	306		4541	4847	37438
2017		3238	179	25496	28734	227	22	2004	2231	30965
2018		3103	108	15907	19010	300	15	2295	2595	21605
2019		1337	57	8383	9720	621	8	1598	2219	11938
2020		101	8	2319	2420	50	1	429	479	2899

\* ICES estimates. No information available for years prior to 1993.

\*\* For 1997 landings were not officially reported – estimated by ICES.

**Table 9** Cod in subdivisions 24–32, eastern Baltic stock. History of ICES estimates of landings of cod caught in the eastern Baltic management area (SDs 25–32) by country. Weights are in tonnes.

Year	Denmark	Estonia	Finland	Germany, Dem. Rep.	Germany, Fed. Rep.	Latvia	Lithuania	Poland	Russia	Sweden	USSR	Faroe Islands*	Norway	Unallocated**	Total
1966	37070		26	10589	12831			56007		22525	38270				177318
1967	39105		27	21027	12941			56003		23363	42980				195446
1968	44109		70	24478	16833			63245		24008	43610				216353
1969	44061		58	25979	17432			60749		22301	41580				212160
1970	42392		70	18099	19444			68440		17756	32250				198451
1971	46831		53	10977	16248			54151		15670	20910				164840
1972	34072		76	4055	3203			57093		15194	30140				143833
1973	35455		95	6034	14973			49790		16734	20083				143164
1974	32028		160	2517	11831			48650		14498	38131				147815
1975	39043		298	8700	11968			69318		16033	49289				194649
1976	47412		287	3970	13733			70466		18388	49047				203303
1977	44400		310	7519	19120			47702		16061	29680				164792
1978	30266		1437	2260	4270			64113		14463	37200				154009
1979	34350		2938	1403	9777			79754		20593	75034	3850			227699
1980	49704		5962	1826	11750			123486		29291	124350	1250			347619
1981	68521		5681	1277	7021			120901		37730	87746	2765			331642
1982	71151		8126	753	13800			92541		38475	86906	4300			316052
1983	84406		8927	1424	15894			76474		46710	92248	6065			332148
1984	90089		9358	1793	30483			93429		59685	100761	6354			391952
1985	83527		7224	1215	26275			63260		49565	78127	5890			315083
1986	81521		5633	181	19520			43236		45723	52148	4596			252558
1987	68881		3007	218	14560			32667		42978	39203	5567			207081
1988	60436		2904	2	14078			33351		48964	28137	6915			194787
1989	57240		2254	3	12844			36855		50740	14722	4520			179178
1990	47394		1731		4691			32028		50683	13461	3558			153546
1991	39792	1810	1711		6564	2627	1865	25748	3299	36490		2611			122517
1992	18025	1368	485		2793	1250	1266	13314	1793	13995		593			54882
1993	8000	70	225		1042	1333	605	8909	892	10099		558		18978	50711
1994	9901	952	594		3056	2831	1887	14335	1257	21264		779		44000	100856
1995	16895	1049	1729		5496	6638	4513	25000	1612	24723		777	293	18993	107718
1996	17549	1338	3089		7340	8709	5524	34855	3306	30669		706	289	10815	124189
1997	9776	1414	1536		5215	6187	4601	31396	2803	25072		600			88600
1998	7818	1188	1026		1270	7765	4176	25155	4599	14431					67428
1999	12170	1052	1456		2215	6889	4371	25920	5202	13720					72995
2000	9715	604	1648		1508	6196	5165	21194	4231	15910				23118	89289
2001	9580	765	1526		2159	6252	3137	21346	5032	17854				23677	91328
2002	7831	37	1526		1445	4796	3137	15106	3793	12507				17562	67740
2003	7655	591	1092		1354	3493	2767	15374	3707	11297				22147	69476
2004	7394	1192	859		2659	4835	2041	14582	3410	12043				19563	68578
2005	7270	833	278		2339	3513	2988	11669	3411	7740				14991	55032
2006	9766	616	427		2025	3980	3200	14290	3719	9672				17836	65532
2007	7280	877	615		1529	3996	2486	8599	3383	9660				12418	50843



Year	Denmark	Estonia	Finland	Germany, Dem. Rep.	Germany, Fed. Rep.	Latvia	Lithuania	Poland	Russia	Sweden	USSR	Faroe Islands*	Norway	Unallocated**	Total
2008	7374	841	670		2341	3990	2835	8721	3888	8901				2673	42235
2009	8295	623			3665	4588	2789	10625	4482	10182				3189	48439
2010	10739	796	826		3908	5001	3140	11433	4264	10169					50277
2011	10842	1180	958		3054	4916	3017	11348	5022	10031					50368
2012	12102	686	1405		2432	4269	2261	14007	3954	10109					51225
2013	6052	249	399		541	2441	1744	11760	2870	5299					31355
2014	6035	166	350		676	1999	1088	11026	3444	4125					28908
2015	9526	183	388		1477	2873	1845	12896	3845	4438					37471
2016	6756	2	57		918	2656	1637	9583	3392	3995					28996
2017***	6140	1	191		347	2079	1726	6484	4124	4405					25496
2018***	2684	1	53		241	1253	694	5695	3376	1912					15907
2019***	1058	2	85		299	260	112	3184	2701	683					8383
2020***	21	2	24		13	79	12	377	1778	12					2319

\* Landings for 1997 were not officially reported – estimated by ICES.

\*\* Working group estimates. No information was available for years prior to 1993.

\*\*\* Includes landings below minimum conservation reference size (BMS)

## Summary of the assessment

**Table 10** Cod in subdivisions 24–32, eastern Baltic stock. Assessment summary. Weights are in tonnes, recruitment in thousands. High and Low refer to 90% confidence intervals.

Year	Recruitment			SSB			Biomass fish ≥ 35 cm	Landings	Discards	Catch in SD 24	Fishing mortality		
	Recruitment (age 0)	High	Low	SSB	High	Low					F (ages 4–6)	High	Low
1946	2142740	2405970	1908309	61984	68701	55267	89854	40985			0.40	0.44	0.36
1947	3114960	3432851	2826507	81627	89279	73976	122687	71831			0.52	0.56	0.47
1948	3686940	4037390	3366909	104998	113879	96117	174400	107104			0.59	0.63	0.54
1949	3776440	4130779	3452496	113596	123706	103486	193700	112735			0.57	0.61	0.52
1950	2951930	3266353	2667773	119470	129883	109057	201916	124509			0.59	0.64	0.55
1951	2361070	2647608	2105543	131329	141885	120773	221540	137815			0.60	0.64	0.56
1952	2714750	3028060	2433858	134695	145526	123864	242887	161103			0.67	0.72	0.62
1953	3945770	4316949	3606505	140502	152224	128780	233581	118132			0.49	0.53	0.46
1954	3830840	4185415	3506303	134802	146990	122614	230840	123947			0.53	0.57	0.49
1955	2335780	2607492	2092381	136155	148050	124260	219652	114415			0.49	0.53	0.45
1956	1940320	2181055	1726156	140869	151338	130400	241879	151985			0.61	0.65	0.57
1957	2964810	3249152	2705352	132390	141375	123405	254134	181366			0.75	0.79	0.71
1958	2452410	2712315	2217410	117482	125866	109098	218536	136301			0.65	0.69	0.61
1959	2721340	2992929	2474396	99213	106572	91854	185600	126033			0.70	0.74	0.66

Year	Recruitment			SSB			Biomass fish ≥ 35 cm	Landings	Discards	Catch in SD 24	Fishing mortality		
	Recruitment (age 0)	High	Low	SSB	High	Low					F (ages 4–6)	High	Low
1960	2479850	2757166	2230426	83701	90433	76969	171215	145408			0.92	0.99	0.85
1961	2554460	2874251	2270249	82822	89509	76134	151134	112034			0.74	0.80	0.69
1962	2751350	3133368	2415907	85098	92059	78138	155987	115553			0.75	0.80	0.69
1963	4381690	4858606	3951588	82853	90776	74929	157784	123047			0.80	0.87	0.74
1964	5721170	6232786	5251549	89934	100236	79631	152784	97788			0.62	0.68	0.55
1965	4969040	5469211	4514611	104105	117689	90521	170002	109809			0.60	0.67	0.53
1966	4766340	5238290	4336911	114800	126963	102637	212399	177318	8735	6624	0.91	0.96	0.85
1967	4323740	4759707	3927705	134710	146711	122709	247658	195446	11733	6899	0.87	0.95	0.79
1968	3370100	3753752	3025659	141043	151698	130388	274060	216353	9700	8614	0.89	0.96	0.82
1969	3512050	3914197	3151220	137477	146974	127980	270742	212160	10654	5980	0.89	0.95	0.83
1970	4369200	4848584	3937213	128661	138203	119119	256660	198451	7625	5720	0.88	0.94	0.82
1971	5805080	6381505	5280722	119461	129773	109149	229755	164840	5426	6586	0.80	0.86	0.74
1972	7180620	7833200	6582406	120000	131400	108600	216015	143833	8490	7307	0.73	0.79	0.67
1973	4495680	5039509	4010537	141158	154199	128117	232529	143164	7491	7320	0.64	0.69	0.58
1974	3787900	4306746	3331561	192945	208365	177525	290488	147815	7933	6923	0.50	0.54	0.46
1975	5453080	6118091	4860353	242072	260086	224058	389101	194649	9576	5676	0.51	0.55	0.48
1976	11818100	12831440	10884786	242068	263089	221047	424448	203303	4341	6972	0.50	0.54	0.46
1977	9605150	10563589	8733671	248476	272528	224424	401322	164792	2978	6643	0.41	0.45	0.38
1978	5691000	6452223	5019585	306579	333003	280155	421788	154009	9875	6553	0.34	0.37	0.32
1979	9499160	10407559	8670048	402719	430727	374711	581134	227699	14576	7745	0.38	0.40	0.36
1980	9607160	10462952	8821365	452632	482746	422518	734269	347619	8544	7721	0.48	0.51	0.45
1981	6330050	6990261	5732194	417425	448272	386578	710284	331642	6185	13759	0.49	0.52	0.45
1982	3928820	4390146	3515971	442611	471639	413583	693817	316052	11548	12239	0.46	0.49	0.44
1983	3367980	3725052	3045136	440964	465090	416838	734323	332148	10998	9853	0.47	0.49	0.44
1984	3526670	3821191	3254850	375841	394332	357350	713172	391952	8521	8709	0.61	0.63	0.58
1985	5296790	5595350	5014160	282223	296170	268276	554863	315083	8199	6971	0.65	0.67	0.62
1986	3212140	3437519	3001538	195202	207124	183280	404657	252558	3848	6604	0.72	0.76	0.68
1987	2005520	2169269	1854132	150258	157065	143451	302722	207081	9340	6874	0.78	0.80	0.77
1988	2027740	2178082	1887776	142675	148608	136742	276951	194787	7253	8487	0.80	0.84	0.77
1989	1490820	1620413	1371591	119519	124722	114316	255393	179178	3462	5721	0.81	0.84	0.78
1990	2983480	3196290	2784839	89969	94852	85086	201664	153546	4187	5543	0.93	0.97	0.89
1991	3544030	3774439	3327686	57626	61235	54018	144941	122517	2741	3762	1.05	1.08	1.01
1992	2393320	2576812	2222895	61172	67556	54788	96671	54882	1904	2324	0.56	0.61	0.51

Year	Recruitment			SSB			Biomass fish ≥ 35 cm	Landings	Discards	Catch in SD 24	Fishing mortality		
	Recruitment (age 0)	High	Low	SSB	High	Low					F (ages 4–6)	High	Low
1993	2014170	2174510	1865653	103168	113575	92761	127584	50711	1558	3885	0.35	0.38	0.32
1994	1972720	2126677	1829908	120262	130826	109698	198383	100856	1956	7172	0.54	0.58	0.50
1995	1471660	1610305	1344952	131902	141542	122262	213576	107718	1872	6253	0.55	0.58	0.52
1996	2761540	2994108	2547037	93588	100751	86424	188635	124189	1443	11156	0.85	0.90	0.80
1997	2805580	3059835	2572452	63105	68653	57558	125568	88600	3462	7189	0.91	0.98	0.85
1998	2858060	3119646	2618409	56016	61034	50998	84873	67428	2299	5213	0.88	0.96	0.81
1999	2194300	2443136	1970808	52113	56918	47309	80329	72995	1838	6820	0.95	1.03	0.87
2000	2849860	3104299	2616275	61873	66734	57011	98240	89289	6019	7525	1.03	1.11	0.96
2001	1881450	2074158	1706646	75458	80907	70008	102645	91328	2891	8183	1.01	1.08	0.94
2002	2298460	2508930	2105646	84381	90134	78628	96616	67740	1462	5622	0.73	0.78	0.67
2003	3936930	4240980	3654678	85567	91269	79864	102419	69477	2024	6592	0.74	0.80	0.69
2004	3072120	3358822	2809890	74389	80029	68748	94626	68578	1201	5497	0.76	0.82	0.71
2005	3802200	4164120	3471736	92596	98955	86237	88401	55032	1670	7793	0.60	0.64	0.56
2006	3996900	4392776	3636701	92517	99241	85792	106633	65531	4644	6911	0.67	0.72	0.62
2007	3755980	4155489	3394880	90869	98123	83615	105831	50843	4146	9667	0.54	0.58	0.50
2008	3942900	4375832	3552801	129494	139163	119825	107859	42234	3746	9598	0.41	0.44	0.37
2009	3403170	3827096	3026202	142129	152713	131545	124820	48438	3328	8747	0.39	0.42	0.36
2010	3643590	4113044	3227718	145781	156596	134966	134696	50276	3543	6581	0.37	0.39	0.34
2011	4927200	5524156	4394753	129709	139640	119778	126717	50368	3850	8027	0.41	0.44	0.38
2012	5022750	5638419	4474307	104402	113030	95774	101432	51225	6795	9004	0.55	0.60	0.51
2013	3147370	3604285	2748378	98482	106762	90202	72573	31355	5020	6602	0.41	0.45	0.37
2014	2618680	3011434	2277149	107774	116702	98846	67776	28909	9627	6753	0.40	0.44	0.36
2015	1876890	2204192	1598190	128084	138443	117725	77203	38079	5970	5959	0.39	0.43	0.36
2016	3182910	3629329	2791402	111625	120659	102591	79210	29313	3279	4847	0.30	0.33	0.28
2017	2410190	2813858	2064431	86329	93455	79203	65539	25317	3238	2231	0.30	0.33	0.28
2018	725300	969510	542604	79386	86161	72612	49420	15800	3103	2595	0.25	0.27	0.23
2019	870580	1269680	596930	78382	85230	71534	40334	8326	1337	2219	0.139	0.153	0.126
2020	1813170**			72532	78997	66066	44574	2310	101	479	0.032	0.035	0.029
2021	1813170**			60366	66771	53960	46947						

\* Landings since 2017 include landings below minimum conservation reference size or BMS .

\*\*Average of 2015–2019.

## Sources and references

EU. 2016. Regulation (EU) 2016/1139 of the European Parliament and of the Council of 6 July 2016 establishing a multiannual plan for the stocks of cod, herring and sprat in the Baltic Sea and the fisheries exploiting those stocks, amending Council Regulation (EC) No 2187/2005 and repealing Council Regulation (EC) No 1098/2007. Official Journal of the European Union, L 191, 15.7.2016. <http://data.europa.eu/eli/reg/2016/1139/oj>.

ICES. 2019. Benchmark Workshop on Baltic Cod Stocks (WKBALTCOD2). ICES Scientific Reports. 1:9. 310 pp. <http://doi.org/10.17895/ices.pub.4984>.

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

ICES. 2021b. Baltic Fisheries Assessment Working Group (WGBFAS). ICES Scientific Reports. 3:53. 717 pp. <http://doi.org/10.17895/ices.pub.8187>.

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