

8.3.3 Cod (*Gadus morhua*) eastern Baltic stock in Subdivisions 25–32 (Eastern Baltic Sea) and Subdivision 24

ICES stock advice

ICES advises that when the precautionary approach is applied, catches in 2016 for the eastern Baltic cod stock should be no more than 29 220 tonnes.

Stock development over time

Catch per unit effort (cpue) from the Baltic International Trawl Survey (BITS) of fish larger than or equal to 30 cm has decreased between 2011 and 2014. There has been a steep decline of harvest rate between 2004 and 2009, followed by a slight increase.

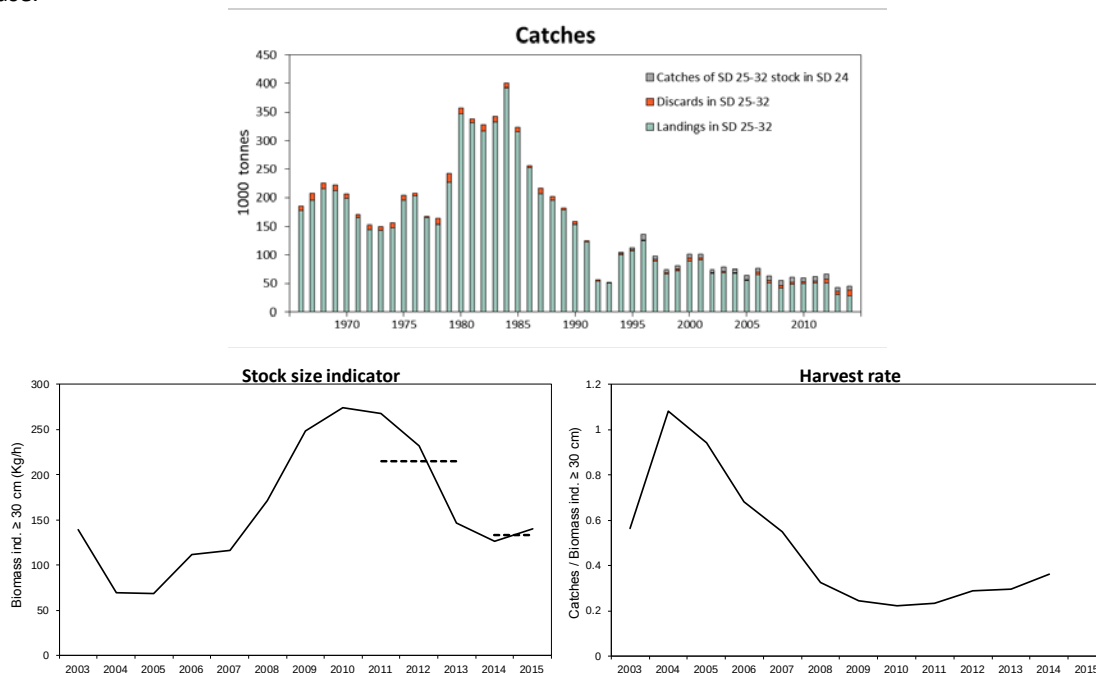


Figure 8.3.3.1 Eastern Baltic cod stock in Subdivisions 25–32 and Subdivision 24. Upper panel: catches in Subdivisions 25–32 (in thousand tonnes), divided in official landings and estimated discards, and catches of the eastern Baltic cod stock taken in Subdivision 24. Lower left panel: stock size indicator, calculated as cpue (kg hour^{-1}) of fish ≥ 30 cm from the 1st and 4th quarters, from the BITS survey in Subdivisions 25–28. Lower right panel: harvest rate (catches of the eastern Baltic cod stock/SSB proxy).

Stock and exploitation status

Table 8.3.3.1 Eastern Baltic cod stock in Subdivisions 25–32 and Subdivision 24. State of the stock and fishery, relative to reference points.

		Fishing pressure				Stock size			
		2012	2013	2014		2013	2014	2015	
Maximum Sustainable Yield	F_{MSY}	?	?	?	Unknown	MSY	?	?	?
						$B_{trigger}$			Unknown
Precautionary approach	F_{pa} , F_{lim}	?	?	?	Unknown	B_{pa} , B_{lim}	?	?	?
									Unknown
Management Plan	F_{MGT}	-	-	-	Not applicable	SSB_{MGT}	-	-	-
									Not applicable
Qualitative evaluation	-	↗	→	↗	Increasing	-	↘	↘	→
									Stable

Catch options

The ICES framework for category 3 stocks was applied (ICES, 2012). A combined length-based biomass index from the Baltic International Trawl Survey (Q1 and Q4) was used as the index of stock development. The index is based on the average between Q1 and Q4 shifted one year forward. The advice is based on a comparison of the two latest index values (index A) with the three preceding values (index B), multiplied by the recent landings.

The index is estimated to have decreased by more than 20% and thus the uncertainty cap was applied to calculate the catch advice. The stock status relative to candidate fishing reference points is unknown. The exploitation on the stock is considered to have increased since 2009; therefore, an additional precautionary buffer was applied. Discarding is known to take place and the discard ratio has been estimated based on 2014 data.

Table 8.3.3.2 Eastern Baltic cod stock in Subdivisions 25–32 and Subdivision 24. For stocks in ICES data categories 3–6, one catch option is provided.

Index A (2014, 2015)		133.1
Index B (2011, 2012, 2013)		215.5
Index ratio (A/B)		0.62
Uncertainty cap	Applied	0.8
Recent landings (2014)**		34 347 t
Discard rate (2014)		0.25
Precautionary buffer	Applied	0.8
Catch advice*		29 220 t

*(recent landings × cap × buffer)/(1 – discard rate).

** The stock definition has changed in 2015. There is no recent advised catch available for this stock.

Basis of the advice

Table 8.3.3.3 Eastern Baltic cod stock in Subdivisions 25–32 and Subdivision 24. The basis of the advice.

Advice basis	Precautionary approach.
Management plan	ICES is not using the management plan as basis for advice, due to the several problems experienced in the current analytical assessment, which results in no well-founded understanding of the fishing mortality. A management plan for cod in the Baltic Sea was agreed in September 2007 by the EU (EC, 2007). Between 2006 and 2013 ICES provided advice based on the Management Plan (10 % annual reduction in F). There is a new management plan under development.

Quality of the assessment

The advice is based on a combined biomass index from two surveys, used as proxy for SSB. The uncertainty associated with the index values is not available.

The stock was benchmarked in 2015 (WKBALTCOD; ICES, 2015c) but it was not possible to determine the most appropriate assessment.

There are three main areas of quality concerns important for the analytical assessment, which is the reason for not applying an analytical assessment. The main issues are:

- Inability to determine age in eastern Baltic cod;
- Potential changes in growth which have not been quantified;
- A rapid decrease in the abundance of larger cod in recent years, which could be caused either by an increase in natural mortality or by increased fishing mortality on large cod.

Issues relevant for the advice

This advice is for the eastern Baltic cod stock. Historically catches of eastern Baltic cod have been taken in both eastern and western Baltic management areas. If it is necessary to be consistent with the historical catch allocations the advice for the eastern Baltic cod stock needs to be given by area. ICES provides two examples to illustrate a procedure to derive area-based TACs. This should not be considered as advice. For the consideration of the impact on the western Baltic cod stock see Section 8.3.2. The option of allocating all of the eastern Baltic cod stock advised catch in the eastern Baltic area TAC will result in a small increase in the fishing mortality of the eastern Baltic cod stock since some eastern Baltic cod will unavoidably be taken in the western Baltic (Subdivision 24).

The eastern Baltic cod catches in the management area of Subdivisions 22–24 were 7121 tonnes in 2014. The proportion of the total eastern Baltic cod stock catch taken in Subdivision 24 in the last three years (2012, 2013, 2014) was 15.2% (Table 8.3.3.4).

Example 1: Eastern Baltic cod assumed to be caught in Subdivision 24 in 2016 is 4450 t (based on 15.2% of the advised 29 220 t for the eastern Baltic cod stock). This would result in a TAC of 24 770 t for the Subdivisions 25–32 management area.

Example 2: Eastern Baltic cod assumed to be caught in Subdivision 24 in 2016 is 7121 t (same catch value as in 2014). This would result in a TAC of 22 099 t for the Subdivisions 25–32 management area.

Table 8.3.3.4 Eastern Baltic cod stock in Subdivisions 25–32 and Subdivision 24. Cod landings, discards, and catch in Subdivisions 24 and 25–32. Weights in thousand tonnes.

Year	Eastern Baltic cod stock in Subdivisions 25–32			Eastern Baltic cod stock in Subdivision 24			Eastern Baltic cod stock in Subdivisions 24+25–32			
	landings	discards	catches	landings	discards	catches	landings	discards	catches	% catch in SD 24
2003	69.48	2.02	71.50	6.57	0.02	6.59	76.04	2.04	78.09	8.43
2004	68.58	1.20	69.78	4.92	0.00	4.92	73.50	1.20	74.70	6.59
2005	55.03	1.67	56.70	5.19	2.98	8.17	60.22	4.65	64.87	12.60
2006	65.53	4.64	70.17	6.28	0.00	6.28	71.81	4.64	76.45	8.21
2007	50.84	4.15	54.99	7.88	1.19	9.06	58.72	5.33	64.05	14.15
2008	42.23	3.75	45.98	8.93	1.02	9.95	51.17	4.77	55.93	17.80
2009	48.44	3.33	51.77	8.46	0.57	9.02	56.90	3.90	60.79	14.84
2010	50.28	3.54	53.82	6.48	0.43	6.91	56.76	3.97	60.73	11.37
2011	50.37	3.85	54.22	7.49	0.55	8.04	57.86	4.40	62.26	12.91
2012	50.97	6.80	57.77	8.42	0.60	9.02	59.39	7.39	66.78	13.50
2013	31.17	5.02	36.20	5.23	1.98	7.20	36.40	7.00	43.40	16.60
2014	28.91	9.63	38.54	5.44	1.68	7.12	34.35	11.31	45.66	15.60

Reference points

No reference points are defined for this stock.

Basis of the assessment

Table 8.3.3.5 Eastern Baltic cod stock in Subdivisions 25–32 and Subdivision 24. The basis of the assessment.

ICES stock data category	3.2.0 (ICES, 2015a).
Assessment type	Survey trends (ICES, 2015b).
Input data	International catches and length-based survey indices (BITS–Q1 since 2001; BITS–Q4 since 2002).
Discards and bycatch	Discards are available and used to provide catch advice, with data series from all the main fleets.
Indicators	Harvest rate.
Other information	This stock was benchmarked in 2015 (WKBALTCOD 2015; ICES, 2015c).
Working group	Baltic Fisheries Assessment Working Group (WGBFAS).

Information from stakeholders

There is no available information.

History of advice, catch, and management

Table 8.3.3.6 Eastern Baltic cod stock in Subdivisions 25–32 and Subdivision 24. History of ICES advice, the agreed TAC, and ICES estimates of landings. Weights in thousand tonnes.

Year	ICES advice	Predicted landings corresp. to advice	Agreed TAC*	ICES landings (Subdivisions 25–32)
1987	Reduce towards $F_{\max}$	245		207
1988	TAC	150		194
1989	TAC	179	220	179
1990	TAC	129	210	153
1991	TAC	122	171	123
1992	Lowest possible level	-	100	55**
1993	No fishing	0	40	45**
1994	TAC	25	60	93**
1995	30% reduction in fishing effort from 1994 level	-	120	108**
1996	30% reduction in fishing effort from 1994 level	-	165	122
1997	20% reduction in fishing mortality from 1995 level	130	180	89
1998	40% reduction in fishing mortality from 1996 level	60	140	67
1999	Proposed F_{pa} (= 0.6)	88	126	73
2000	40% reduction in F from 96–98 level	60	105	89**
2001	Fishing mortality of 0.30	39	105	91**
2002	No fishing	0	76	68**
2003	70% reduction in F	See option table	75	69**
2004	90% reduction in F	< 13.0	45.4	68**
2005	No fishing	0	42.8	55**
2006	Develop Management plan	< 14.9	49.2	66**
2007	No fishing	0	44.3	51**
2008	No fishing	0	42.3***	42**
2009	Limit (total) landings to 48 600 t	≤ 48.6	49.38***	48**
2010	Follow management plan	56.8	56.1***	50
2011	See scenarios	-	64.5***	50
2012	Follow management plan	74.2	74.2***	51
2013	Follow management plan	65.9	68.7***	31
2014	Follow management plan	70.3	73.4***	38.5
2015	20% reduction in catches	29.085^	55.8 ***	
2016^^^	Precautionary approach^^	≤ 29 220^		

*For total Baltic until and including 2003.

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

*** TAC is calculated as EU + Russian autonomous quotas.

^ Total catches.

^^ Eastern Baltic cod stock.

^^^ In 2016 ICES gives stock-based advice.

History of catch and landings

Table 8.3.3.7 Eastern Baltic cod stock in Subdivisions 25–32 and Subdivision 24. Catch distribution by fleet in 2014 as estimated by ICES.

Total catch (2014)	Landings		Discards
45 657 t	84% by active gears	16% by passive gears	11 309 t
	34 347 t		

Table 8.3.3.8 Eastern Baltic cod stock in Subdivisions 25–32 and Subdivision 24. History of ICES estimates of landings, discards, and catch by area. Weights in tonnes.

Year	Eastern Baltic cod stock in Subdivisions 25–32				Eastern Baltic cod stock in Subdivision 24			Eastern Baltic cod stock in Subdivisions 24+25–32
	Unallocated*	Discards	Landings	Catch	Landings	Discards	Catch	Total catch
1965			147 352	147 352				
1966		8 735	177 318	186 053				
1967		11 733	195 446	207 179				
1968		9 700	216 353	226 053				
1969		10 654	212 160	222 814				
1970		7 625	198 451	206 076				
1971		5 426	164 840	170 266				
1972		8 490	143 833	152 323				
1973		7 491	143 164	150 655				
1974		7 933	147 815	155 748				
1975		9 576	194 649	204 225				
1976		4 341	203 303	207 644				
1977		2 978	164 792	167 770				
1978		9 875	154 009	163 884				
1979		14 576	227 699	242 275				
1980		8 544	347 619	356 163				
1981		6 185	331 642	337 827				
1982		11 548	316 052	327 600				
1983		10 998	332 148	343 146				
1984		8 521	391 952	400 473				
1985		8 199	315 083	323 282				
1986		3 848	252 558	256 406				
1987		9 340	207 081	216 421				
1988		7 253	194 787	202 040				
1989		3 462	179 178	182 640				
1990		4 187	153 546	157 733				
1991		2 741	122 517	125 258				
1992		1 904	54 882	56 786				
1993	18 978	1 558	50 711	52 269				
1994	44 000	1 956	100 856	102 812				
1995	18 993	1 872	107 718	109 590				
1996	10 815	1 443	124 189	125 632				
1997**		3 462	88 600	92 062				
1998		2 299	67 428	69 727				
1999		1 838	72 995	74 833				
2000	23 118	6 019	89 289	95 308				
2001	23 677	2 891	91 328	94 219				
2002	17 562	1 462	67 740	69 202				
2003	22 147	2 024	69 476	71 500	6 569	17	6 586	78 086
2004	19 563	1 201	68 578	69 779	4 925	0	4 925	74 704
2005	14 991	1 670	55 032	56 702	5 191	2 981	8 172	64 874
2006	17 836	4 644	65 532	70 176	6 279	0	6 279	76 455
2007	12 418	4 146	50 843	54 989	7 876	1 186	9 062	64 051
2008	2 673	3 746	42 235	45 981	8 934	1 020	9 954	55 935
2009	3 189	3 328	48 439	51 767	8 456	568	9 024	60 791
2010		3 543	50 277	53 820	6 479	429	6 907	60 727
2011		3 850	50 368	54 218	7 487	551	8 038	62 256
2012		6 795	51 225	58 020	8 419	598	9 017	67 037
2013		5 020	31 355	36 375	5 226	1 976	7 202	43 577
2014		9 627	28 908	38 535	5 439	1 682	7 122	45 657

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

**For 1997 landings were not officially reported – estimated by the WG.

Table 8.3.3.9 Eastern Baltic cod stock in Subdivisions 25–32 and Subdivision 24. History of ICES estimates of landings, discards, and catch of cod caught in the eastern Baltic area by country. Weights in tonnes.

Year	Denmark	Estonia	Finland	German Dem. Rep. **	Germany Fed. Rep.	Latvia	Lithuania	Poland	Russia	Sweden	USSR	Faroe Islands ^	Norway	Unallocated ***	Total
1965	35 313		23	10 680	15 713			41 498		21 705	22 420				147 352
1966	37 070		26	10 589	12 831			56 007		22 525	38 270				177 318
1967	39 105		27	21 027	12 941			56 003		23 363	42 980				195 446
1968	44 109		70	24 478	16 833			63 245		24 008	43 610				216 353
1969	44 061		58	25 979	17 432			60 749		22 301	41 580				212 160
1970	42 392		70	18 099	19 444			68 440		17 756	32 250				198 451
1971	46 831		53	10 977	16 248			54 151		15 670	20 910				164 840
1972	34 072		76	4 055	3 203			57 093		15 194	30 140				143 833
1973	35 455		95	6 034	14 973			49 790		16 734	20 083				143 164
1974	32 028		160	2 517	11 831			48 650		14 498	38 131				147 815
1975	39 043		298	8 700	11 968			69 318		16 033	49 289				194 649
1976	47 412		287	3 970	13 733			70 466		18 388	49 047				203 303
1977	44 400		310	7 519	19 120			47 702		16 061	29 680				164 792
1978	30 266		1 437	2 260	4 270			64 113		14 463	37 200				154 009
1979	34 350		2 938	1 403	9 777			79 754		20 593	75 034	3 850			227 699
1980	49 704		5 962	1 826	11 750			123 486		29 291	124 350	1 250			347 619
1981	68 521		5 681	1 277	7 021			120 901		37 730	87 746	2 765			331 642
1982	71 151		8 126	753	13 800			92 541		38 475	86 906	4 300			316 052
1983	84 406		8 927	1 424	15 894			76 474		46 710	92 248	6 065			332 148
1984	90 089		9 358	1 793	30 483			93 429		59 685	100 761	6 354			391 952
1985	83 527		7 224	1 215	26 275			63 260		49 565	78 127	5 890			315 083
1986	81 521		5 633	181	19 520			43 236		45 723	52 148	4 596			252 558
1987	68 881		3 007	218	14 560			32 667		42 978	39 203	5 567			207 081
1988	60 436		2 904	2	14 078			33 351		48 964	28 137	6 915			194 787
1989	57 240		2 254	3	12 844			36 855		50 740	14 722	4 520			179 178
1990	47 394		1 731		4 691			32 028		50 683	13 461	3 558			153 546
1991	39 792	1 810	1 711		6 564	2 627	1 865	25 748	3 299	36 490		2 611			122 517
1992	18 025	1 368	485		2 793	1 250	1 266	13 314	1 793	13 995		593			54 882
1993	8 000	70	225		1 042	1 333	605	8 909	892	10 099		558		18 978	50 711
1994	9 901	952	594		3 056	2 831	1 887	14 335	1 257	21 264		779		44 000	100 856
1995	16 895	1 049	1 729		5 496	6 638	4 513	25 000	1 612	24 723		777	293	18 993	107 718
1996	17 549	1 338	3 089		7 340	8 709	5 524	34 855	3 306	30 669		706	289	10 815	124 189
1997	9 776	1 414	1 536		5 215	6 187	4 601	31 396	2 803	25 072		600			88 600
1998	7 818	1 188	1 026		1 270	7 765	4 176	25 155	4 599	14 431					67 428
1999	12 170	1 052	1 456		2 215	6 889	4 371	25 920	5 202	13 720					72 995
2000	9 715	604	1 648		1 508	6 196	5 165	21 194	4 231	15 910				23 118	89 289
2001	9 580	765	1 526		2 159	6 252	3 137	21 346	5 032	17 854				23 677	91 328
2002	7 831	37	1 526		1 445	4 796	3 137	15 106	3 793	12 507				17 562	67 740
2003	7 655	591	1 092		1 354	3 493	2 767	15 374	3 707	11 297				22 147	69 476
2004	7 394	1 192	859		2 659	4 835	2 041	14 582	3 410	12 043				19 563	68 578
2005	7 270	833	278		2 339	3 513	2 988	11 669	3 411	7 740				14 991	55 032
2006	9 766	616	427		2 025	3 980	3 200	14 290	3 719	9 672				17 836	65 532
2007	7 280	877	615		1 529	3 996	2 486	8 599	3 383	9 660				12 418	50 843
2008	7 374	841	670		2 341	3 990	2 835	8 721	3 888	8 901				2 673	42 235
2009	8 295	623			3 665	4 588	2 789	10 625	4 482	10 182				3 189	48 439
2010	10 739	796	826		3 908	5 001	3 140	11 433	4 264	10 169					50 277
2011	10 842	1 180	958		3 054	4 916	3 017	11 348	5 022	10 031					50 368
2012	12 102	686	1 405		2 432	4 269	2 261	14 007	3 954	10 109					51 225
2013	6 052	249	399		541	2 441	1 744	11 760	2 870	5 299					31 355
2014*	6 035	166	350		676	1 999	1 088	11 026	3 444	4 125					28 908

* Provisional data.

** Includes landings from October to December 1990 of Fed. Rep. Germany.

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

^ Landings for 1997 were not officially reported – estimated by the WG.

Summary of the assessment

Table 8.3.3.10 Cod eastern Baltic stock in Subdivisions 25–32 and Subdivision 24. Base of the assessment. Cpue index ($\text{kg} \times \text{hr}^{-1}$) of fish equal to or larger than 30 cm. Weights in thousand tonnes.

Year	cpue	Catches	Catches $\geq$ 30 cm	Exploitation rate
2003	138.82	78.09	71.54	0.56
2004	69.02	74.70	69.58	1.08
2005	68.93	64.87	56.34	0.94
2006	112.00	76.45	70.12	0.68
2007	116.70	64.05	54.90	0.55
2008	171.36	55.93	45.79	0.33
2009	248.52	60.79	51.65	0.24
2010	274.28	60.73	51.35	0.22
2011	267.62	62.26	53.71	0.23
2012	231.98	66.78	57.11	0.29
2013	146.81	43.40	36.32	0.30
2014	126.22	45.66	37.89	0.36
2015	139.93			

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