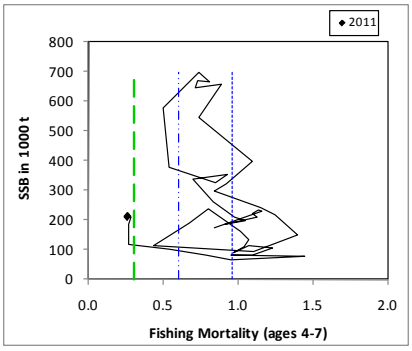
ECOREGION Baltic Sea
STOCK Cod in Subdivisions 25–32

Advice for 2013

ICES advises on the basis of the EU management plan (EC 1098/2007) that landings in 2013 should be 65 900 tonnes.

Stock status

F (Fishing Mortality)	2009	2010	2011	
MSY (F_{MSY})	✓	✓	✓	Appropriate
Precautionary approach (F_{pa},F_{lim})	✓	✓	✓	Harvested sustainably
Management plan (F_{MGT})	✓	✓	✓	Below target
SSB (Spawning-Stock Biomass)	2010	2011	**2012**	
MSY ($B_{trigger}$)	?	?	?	Undefined
Precautionary approach (B_{pa},B_{lim})	?	?	?	Undefined
Qualitative evaluation	↗	↗	✓	Above poss. reference points



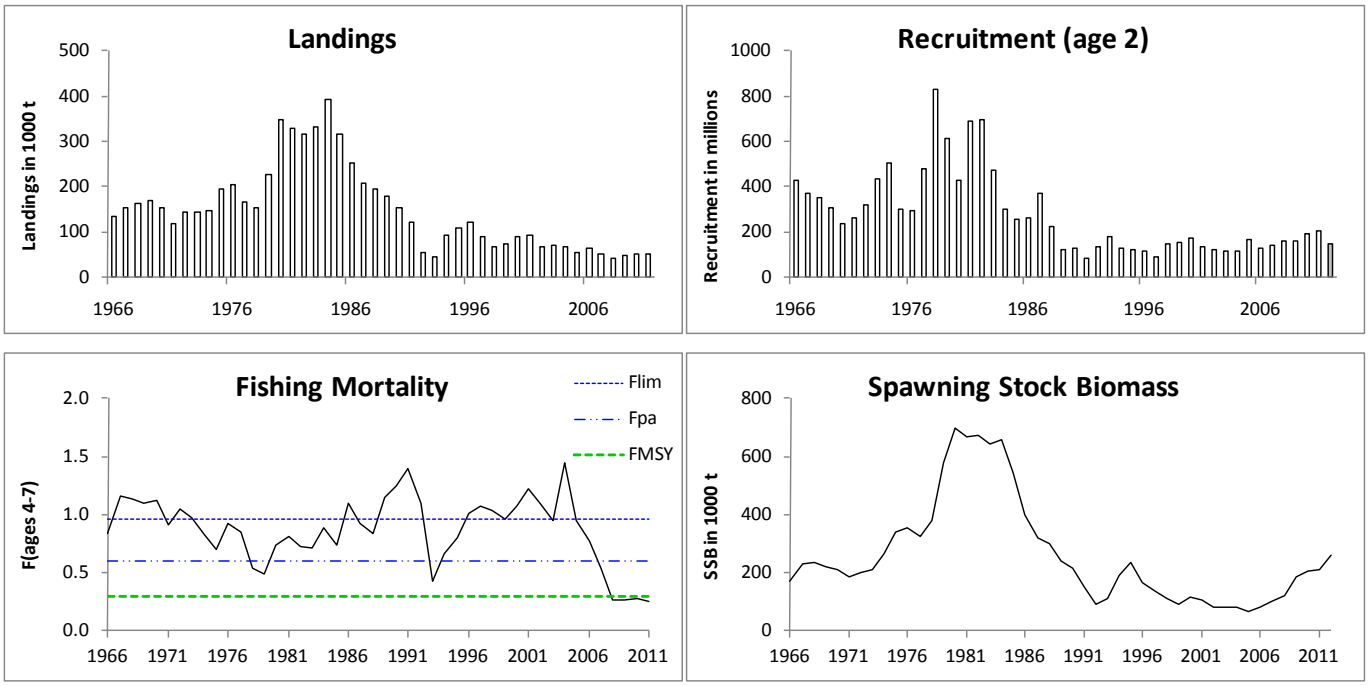


Figure 8.4.2.1 Cod in Subdivisions 25–32. Summary of stock assessment (weights in '000 tonnes). Predicted values are shaded. Top right: SSB and F for the time-series used in the assessment.

ICES considers the present SSB to be above any candidate precautionary biomass reference points. The SSB has increased in recent years and is estimated to be 263 000 tonnes at the start of 2012. Fishing mortality in 2008–2011 was estimated to be the lowest in the series. The abundance of the 2006, 2007, 2008, and 2009 year classes (at age 2) is above the average of the last 20 years.

Management plans

A multi-annual plan for cod in the Baltic Sea has been agreed by the EU in 2007 ((EC) No. 1098/2007). ICES has evaluated the management plan in 2009 and considers it to be in accordance with the precautionary approach. The target F in the management plan is equal to the recent estimate of F_{MSY} for this stock. The management plan is currently under revision.

Biology

Cod is the main predator on sprat and herring, and given the recent increase of the eastern Baltic cod stock the natural mortality of the pelagic stocks is likely to be affected. However, as the adult sprat and herring predate on cod eggs and larvae, an increased predation on clupeids can also have a positive effect on cod recruitment. At present, there is limited geographical overlap between cod and the pelagic stocks during parts of the year. Consistent with declining availability of sprat and herring and an increasing cod stock in the current main distribution area of cod (Subdivision 25), the mean weight of larger cod has sharply declined in this area in recent years.

Environmental influence on the stock

Recruitment is strongly driven by hydrological factors. At present, successful reproduction of the eastern Baltic cod occurs only in the Bornholm Basin (Subdivision 25). The distribution of cod is currently mainly confined to Subdivision 25 and to a lesser degree Subdivision 26, with very low abundance in northern areas (Subdivisions 27–32).

The fisheries

The fisheries for cod in the eastern Baltic have very little bycatch of other species.

Catch distribution	Total catch (2011) is 54.2 kt, where 93% are landings (20% by gillnetters, 80% by trawlers) and 7% discards.

Effects of the fisheries on the ecosystem

Because sprat and herring are the major prey for cod, the cod fishery can indirectly affect the sprat and herring stocks by changing predation mortality on these species. Furthermore, the fishery for sprat and herring in the distribution area of cod can influence the available food base for cod.

Quality considerations

The SBB has been consistently overestimated in the last three years. The longest survey series has a break in 2001 when the survey design was altered. The commercial fleet, on which the cpue index has been based, was subjected to a new quota regulation system prohibiting high-grading and aimed at improving selectivity of gears. Substantial underreporting of catches occurred in 1993–1996 and 2000–2007. In this situation, ICES has chosen to include estimates of non-reported landings in the assessment. These estimates are likely to be lower than the actual non-reported landings. Ageing problems are a concern for the quality of the assessment. Collection of cod stomach contents data would improve the basis for application of multispecies stock assessment models. Data are needed to quantify the amount of mixing of cod by age groups between the eastern and western Baltic. Tagging experiments or/and genetic analysis could provide such data.

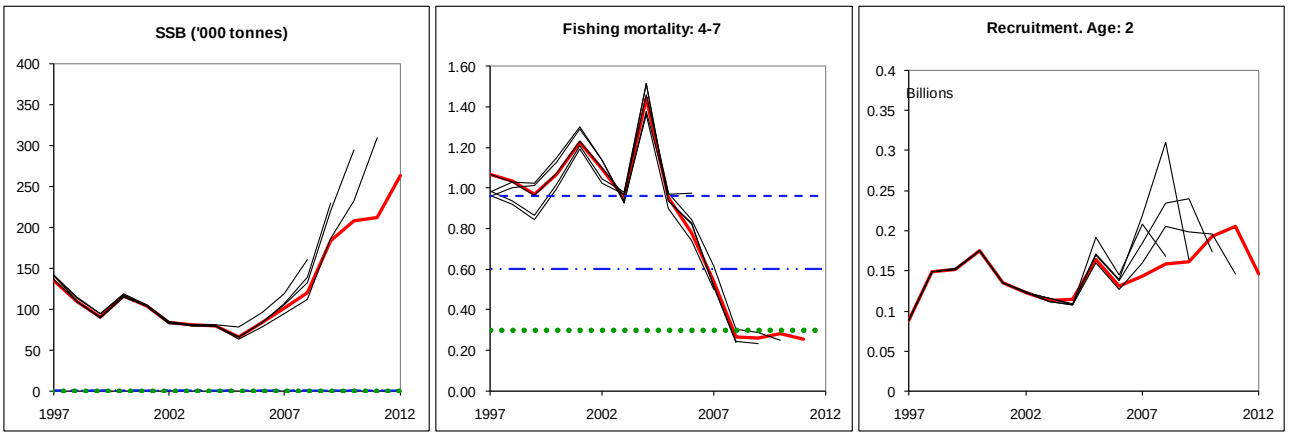


Figure 8.4.2.2 Cod in Subdivisions 25–32. Historical assessment results (final-year recruitment estimates included).

Scientific basis

Assessment type	Age-based analytical (XSA).
Input data	Two surveys (BITS Q1&4), five indices (two BITS Q1 of ages 3–6 backshifted, two BITS Q1_of age 2, and one commercial index (Den_Trawl_>90 mm)).
Discards and bycatch	Discards included in the assessment.
Indicators	None.
Other information	Last benchmarked in 2009. The next benchmarking for this stock is scheduled for 2013.
Working group report	WGBFAS

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Reference points

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{trigger}$	Undefined	
	F_{MSY}	0.30	Based on stochastic simulations.
Precautionary Approach	B_{lim}	Undefined	
	B_{pa}	Undefined	
	F_{lim}	0.96	F_{med} (estimated in 1998).
	F_{pa}	0.60	5th percentile of F_{med}.
Management Plan	SSB_{MGT}	Undefined	
	F_{MGT}	0.30	EU management plan based on stochastic simulations.

(unchanged since: 2010)

Outlook for 2013

Basis: F(2012) = F_{sq} = 0.27; SSB (2013) = 303; human consumption (HC) landings (2012) = 59.4; R(2012) = 147 million; Discards (2012) = 3.9.

Rationale	**Human consumption landings (2013)**	**Basis**	**F Total (2013)**	**F HC (2013)**	**F Disk (2013)**	**Catch Total (2013)**	**Discards (2013)**	**SSB (2014)**	**%SSB change 1)**	**%TAC change 2)**
Management plan	65.9	F_{MP}	0.30	0.27	0.02	69.9	4.0	313	+3	-11
MSY framework	65.9	F_{MSY}	0.30	0.27	0.02	69.9	4.0	313	+3	-11
Precautionary approach	118	$F_{PA} = F_{sq}*2.22$	0.60	0.55	0.05	125	7.1	239	-21	+59
Zero catch	0	F = 0	0	0	0	0	0	409	+35	-100
Other options	49.8	F_{sq} *0.8	0.22	0.2	0.02	52.7	2.9	336	+11	-33
	55.3	F_{sq} *09	0.24	0.22	0.02	58.6	3.3	328	+8	-25
	60.7	F_{sq} *1	0.27	0.25	0.02	64.3	3.6	321	+6	-18
	63.1	−15%TAC	0.28	0.26	0.02	66.8	3.7	317	+5	-15
	66.0	F_{sq} *1.1	0.29	0.27	0.02	69.9	3.9	313	+3	-11
	71.1	F_{sq} *1.2	0.32	0.3	0.02	75.3	4.2	306	+1	-4
	74.2	TAC change=0	0.34	0.31	0.03	78.6	4.4	301	-1	0
	76.2	F_{sq} *1.3	0.35	0.32	0.03	80.7	4.5	298	-2	+3
	81.1	F_{sq} *1.4	0.38	0.35	0.03	85.9	4.8	291	-4	+9
	85.3	+15%TAC	0.40	0.37	0.03	90.4	5.1	285	-6	+15
	85.8	F_{sq} *1.5	0.40	0.37	0.03	90.9	5.1	285	-6	+16

Weights in thousand tonnes.
[1)] SSB 2014 relative to SSB 2013.
[2)] Human consumption landings 2013 relative to TAC 2012.
Discard proportions in the projections were assumed to be the average proportions discarded per age in 2009–2011 (fishing pattern partitioned in landings and discards and taken as an average 2009–2011).

Management plan

Following the agreed EU Management plan implies fishing at an F of 0.3, which results in a TAC in 2013 of 65 900 tonnes. This is expected to lead to an increase in SSB to 313 000 tonnes in 2014.

MSY approach

As no MSY $B_{trigger}$ has been identified for this stock, the ICES MSY framework has been applied with F_{MSY} without consideration of SSB in relation to MSY $B_{trigger}$.

Following the ICES MSY framework implies fishing at an F of 0.30, resulting in landings of 65 900 tonnes in 2013. This is expected to lead to an SSB of 313 000 tonnes in 2014.

No transition is needed as F in 2011 is below F_{MSY}.

Precautionary approach

The fishing mortality of F_{pa} = 0.6 corresponds to landings of 118 000 tonnes in 2013. This is expected to reduce SSB to 239 000 tonnes in 2014.

Additional considerations

Management considerations

Following the management plan, F in 2012 is predicted to be at 0.27, which is 4% higher than F estimated for 2011. No direct effort reduction is required according to the management plan, as F in both 2011 and 2012 are estimated to be below the target F of 0.3. This leads to a discrepancy between available effort and catching opportunities. In addition the 2006, 2007, 2008, and 2009 year classes appear to be above the recent average. These factors may lead to an increased risk of highgrading and discarding. Since 2010, the management has prohibited high-grading and aimed at improving selectivity of gears to mitigate these risks. There are indications that discards of older age-groups of cod have increased in recent years.

STECF re-evaluated the management plan in 2011 (ICES, 2011), and considered that, within the historical stock sizes, an exploitation of the two Baltic cod stocks at target fishing mortalities of 0.33 is consistent with the objective of reaching MSY (by 2015 at the latest). If the stock size increases sufficiently that growth or recruitment is reduced, it may be necessary to increase the target fishing mortalities to obtain MSY. The harvest control rules of the present management plan were considered appropriate in defining the TACs. However, the simulations indicated that a 15% constraint on inter-annual variation in the TACs is not required to achieve the biological objectives. Although discards appear at present not to be a problem in relation to limiting fishing mortality, a management plan should include explicit rules for addressing discards. This could be implemented by defining the TAC as total allowable catch and by ensuring that all catches (landings as well as discards) are counted against the TAC.

During WKMULTBAL (ICES, 2012b) and STECF (2012) candidate multispecies F_{MSY} values were estimated, which were higher for cod than defined in the current single-species management plan. This is mainly due to cannibalism being taken into account in multispecies F_{MSY} estimates. The present distribution pattern implies that an increase in F on cod will not necessarily result in increasing Baltic wide clupeid stock sizes, and conversely a decrease in F on cod will not necessarily result in a decrease of the Baltic clupeid stock size if it is not accompanied by a cod expansion to northern areas. However, cod cannibalism will be higher, and slower cod growth due to food deprivation will be a bigger problem. On the other hand, a reduction of clupeid F in Subdivision 25 will likely improve growth and condition of cod as well as reduce cannibalism. An increase in clupeid F in northern areas (Subdivisions 27–32) will likely not have a negative effect on cod, since this will not affect the stock component distributed in southern areas (Subdivisions 25–26). Furthermore, a higher F on clupeids in northern areas would likely reduce density dependence and improve the growth and condition of clupeid stocks. The multispecies F_{MSY} (+ 0.60) is twice the single-species estimate of F_{MSY} (0.30). Increasing F on cod would not result in substantial increase in yield but would imply higher risks of low SSBs.

To optimize the growth potential and yield of cod, sprat, and herring, a spatially explicit management plan needs to be developed.

Regulations and their effects

The fishery is managed through TAC, effort, seasonal fisheries restrictions, and technical measures.

The Baltic cod management plan (EC Regulation 1098/2007) *inter alia* called for a reduction in fishing effort (10% annually in terms of number of fishing days per year) until the target F has been reached. The maximum number of fishing days for the Subdivisions 25–28.2 was fixed at 160 in 2010, and kept at 160 days in 2011 and 2012. In 2012, member states may allocate additional days absent from port to vessels if an equal amount of days absent from port is withdrawn from other vessels. The number of receiving vessels may not exceed 10% of the total number of vessels.

The provisions in the management plan (EC 1098/2007, Art 8 Para 5), however, would have allowed an increase in the days-at-sea to 192 in 2012 and to 224 in 2013 (days-at-sea $_{\text{current year}}$ x $F_{\text{preceeding year}}$ / F_{target}).

The cod fisheries in the eastern Baltic are also regulated by a seasonal closure during 1 July to 31 August to protect spawning fish. A closure of a central part of the main spawning area in the Bornholm Deep has been implemented during the main spawning seasons since the mid-1990s for all fisheries. A year-round area closure for all fisheries in specific areas of the Bornholm Deep, the Gotland Basin, and the Gdansk Deep was introduced in 2005 aimed at reducing fishing mortality. Since 2006, area closures have been implemented from 1 May to 31 October.

Highgrading has been prohibited since 1 January 2010 in all Baltic Sea fisheries.

To decrease discards, a "Bacoma" codend with a 120 mm mesh was introduced by the International Baltic Sea Fisheries Commission (IBSFC) in 2001 in parallel with an increase in diamond mesh size to 130 mm in traditional codends. The expected effect of introducing the "Bacoma" 120 mm exit window was nullified by compensatory measures in the industry. This was to some extent explained by the mismatch between the selectivity of the 120 mm "Bacoma" trawl and the minimum landing size. In October 2003, the regulation was changed to a 110 mm "Bacoma" window. This was expected to enhance the compliance and to be in better accordance with the minimum landing size, which was changed from 35 to 38 cm in the same year. On 1 March 2010 the "Bacoma" 120 mm was re-introduced along with an extended "Bacoma" window (5.5 m) to further decrease discarding, and the minimum landing size was kept at 38 cm.

Changes in fishing technology and fishing patterns

Cod in the eastern Baltic are taken primarily by trawlers and gillnetters. There was a substantial increase in the use of gillnets in the 1990s. In 2011, gillnet catches accounted for about 20% of the total catch.

Data and methods

The assessment is based on commercial landings and discards data, one commercial cpue index, and two survey indices. The longest survey series has a break in 2001 when the survey design was altered.

Substantial underreporting of catches occurred in 1993–1996, and also from 2000 to 2007. In this situation, ICES chose to include mis- and non-reported landings in the assessment. Estimates of the amount of misreporting are available from the national industries and control agencies, and indicated that total catches during 2000–2007 were about 32–45% higher than the reported figures. This information is highly uncertain and incomplete, and no data were available for some countries where misreporting was suspected to occur. ICES considers that, in 2008 and 2009, the enforcement of fishing control led to a significant reduction of non-reporting; the available information suggests that unreported landings in 2009 were only 6% of the reported landings. In 2010 and 2011 the unreported landings are assumed to be zero. Although the adjusted landings values in previous years derived by ICES are the best possible estimates, they are likely to be minimum estimates.

Discard data have been available since 1996 and are applied in the assessment as yearly proportions discarded per age-group. For 1966–1995, an average proportion discarded per age-group, estimated for 1996–2003, was applied. From 2004 onwards, annual estimates of discards have been derived from the biological sampling of catches. The season and area coverage of discard sampling still requires improvement. Due to changes in technical regulations (e.g. increase in minimum landing size, the introduction of different codend sizes, highgrading ban, and various fishery closures), discard rates have been variable.

The benchmark workshop in 2009 identified problems with the commercial tuning fleets (ICES, 2009). In the recent assessment the commercial tuning fleets have been revised and a new standardized Danish trawler tuning fleet is used as the only commercial index.

The analysis of the output of another alternative model (XSA) indicates that indices of cohort size from subsequent surveys produce lower estimates of survivors than the indices referring to younger ages of the cohorts. This contributes to retrospective overestimation of stock size by the XSA and may be related to survey catchability underestimated at younger ages and/or overestimated at older.

In the 2011 assessment, the mean weights-at-age for 2010 were taken as average mean weights-at-age in 2005–2009 because of the substantial decrease in mean weights, especially in Subdivision 25, about which the expert group was doubtful. Inspection of the DATRAS database and otolith re-reading revealed that the decrease in growth of Eastern cod is real. Taking this into account, the mean weights-at-age for both 2010 and 2011 were taken directly from the BITS survey (DATRAS database).

Information from the fishing industry

Some of the information on mis- and underreporting came from industry sources, indicating that the estimates used in the assessment are minimum values. However, from 2010 the mis- and underreporting has been negligible. Discards of juveniles increased in 2011 and 2012.

The increase in flatfish abundance interferes with the selectivity of the "Bacoma" codend, and discarding has increased in 2011 and 2012.

Uncertainties in assessment and forecast

Uncertainties in the assessment are mainly due to problems with underreporting, discarding, and age-reading.

Sampling for discards is insufficient and raising procedures have been problematic in the recent past. This led to revisions in this year's assessment of the strength of incoming year classes. Predicted discards for 2012 are based on the average proportions discarded per age in 2009–2011. Relatively strong year classes are entering the fishery from 2010 onwards. This may lead to increased discarding of juveniles.

Large inconsistencies exist in age determinations for the eastern Baltic cod stock owing to the lack of clear growth rings in the otoliths. ICES attempted to resolve the inconsistencies in age determinations for this stock, but no consensus was reached on the age determinations. An EU-funded study initiated in 2007 (project DECODE) has taken a different approach to delivering validated aging data for the assessment, but this method is not fully validated from tagging studies.

Removals of cod in recreational fisheries in the Baltic are currently not consistently and completely sampled, and are therefore not included in the assessment.

Mixing of the eastern and western Baltic cod stocks is considered to have increased in recent years. This can introduce uncertainty and affect the quality of the assessment. This is a bigger problem for the western than for the eastern Baltic cod stock.

Environmental conditions

Cod distribution in the Baltic is affected by environmental conditions, specifically lack of oxygen. This is taken into account in the way the survey results are raised, assuming that no cod occur in oxygen-depleted areas. As a consequence, two (the Gotland and the Gdansk basins) out of three spawning areas have ceased to significantly contribute to the reproduction of the eastern Baltic cod. In recent years, even though the stock has substantially increased in Subdivision 25 and is apparently suffering from food limitation, there is no strong northwards expansion (Figure 8.4.2.5). This could potentially be related to continued poor hydrographic conditions in the northeastern areas of the Baltic Sea.

In the 2000s, salinity conditions have been reasonably good, which corresponds to relatively strong year classes formed since 2005. However, the estimates of reproductive volume have been variable by year.

Comparison with previous assessment and advice

The current perception of the status of the eastern Baltic cod stock in terms of trends is similar to that of the 2011 assessment (SSB has been increasing and F has been on relatively stable below F = 0.3 over the past 4 years). The estimate of SSB in 2011 has been revised downwards by 31% and the F in 2010 upwards by 13%.

The basis for the advice is the same as last year.

Sources

ICES. 2009. Report of the Benchmark and Data Compilation Workshop for Roundfish (WKROUND), January 16–23 2009, Copenhagen, Denmark. ICES CM 2009/ACOM:32. 259 pp.

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STECF. 2012. EWG 12-02 – Management Plans – part 1 (joint with ICES). Rostock (Germany), 26–30 March 2012.

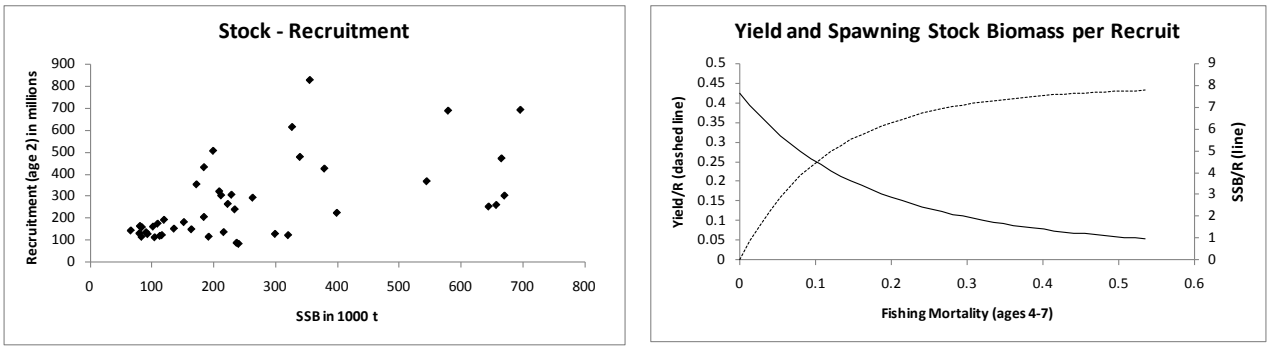

Figure 8.4.2.3 Cod in Subdivisions 25–32 (Baltic Sea). Stock–recruitment plot and yield-per-recruit analysis.

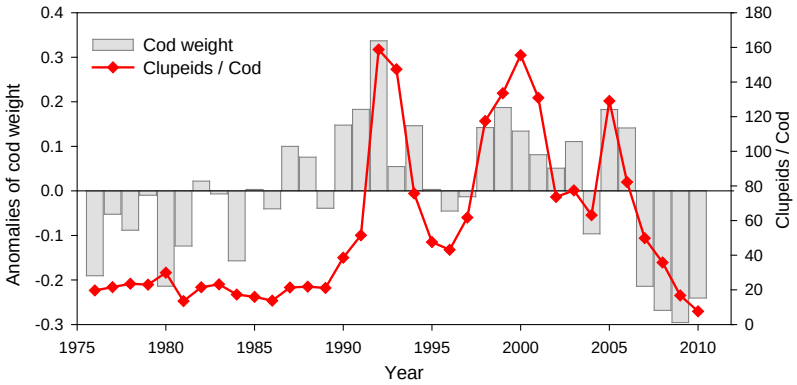

Figure 8.4.2.4 Cod in Subdivisions 25–32 (Baltic Sea). Anomalies in mean weight of cod (average of age-groups 4–7) in Subdivision 25 (bars) compared to changes in the biomass of clupeids (sprat plus herring) relative to the number of adult cod (at age 4 and older) in the same area (line).

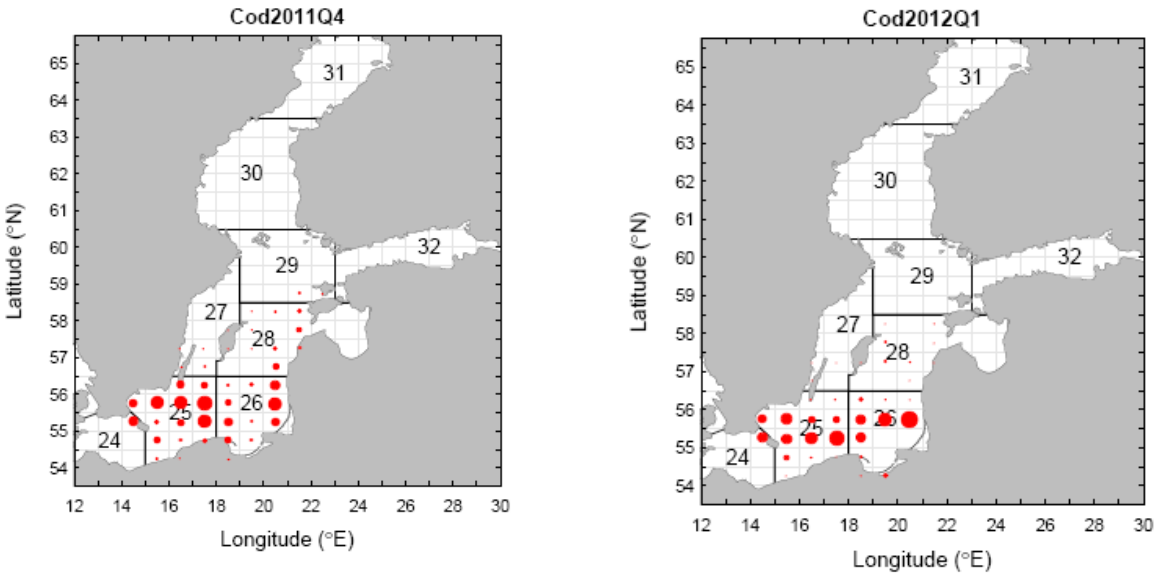

Figure 8.4.2.5 Cod in Subdivisions 25–32 (Baltic Sea). Distribution from bottom trawl surveys (BITS) during the 4th quarter 2011 and the 1st quarter 2012.

Table 8.4.2.1 Cod in Subdivisions 25–32. ICES advice, management, and landings.

Year	ICES Advice	Predicted landings corresp. to advice	Agreed TAC[1]	ICES landings (25–32)	ICES landings (22–32)
1987	Reduce towards F_{max}	245		207	236
1988	TAC	150		194	223
1989	TAC	179	220	179	198
1990	TAC	129	210	153	171
1991	TAC	122	171	123	140
1992	Lowest possible level	-	100	55[2]	73[2]
1993	No fishing	0	40	45[2]	66[2]
1994	TAC	25	60	93[2]	124[2]
1995	30% reduction in fishing effort from 1994	-	120	108[2]	142[2]
1996	30% reduction in fishing effort from 1994	-	165	122	173
1997	20% reduction in fishing mortality from 1995	130	180	89	132
1998	40% reduction in fishing mortality from 1996	60	140	67	102
1999	Proposed F_{pa} (= 0.6)	88	126	73	115
2000	40% reduction in F from 96–98 level	60	105	89[2]	128
2001	Fishing mortality of 0.30	39	105	91[2]	126
2002	No fishing	0	76	68[2]	92
2003	70% reduction in F	See option table	75	69[2]	94
2004	90% reduction in F	< 13.0	45.4	68[2]	*
2005	No fishing	0	42.8	55[2]	*
2006	Develop Management plan	< 14.9	49.2	66[2]	*
2007	No fishing	0	44.3	51[2]	*
2008	No fishing	0	42.3[3]	42[2]	*
2009	Limit (total) landings to 48 600 t	≤ 48.6	49.38[3]	48[2]	*
2010	Follow management plan	56.8	56.1[3]	50	*
2011	See scenarios	-	64.5[3]	50	*
2012	Follow management plan	74.2	74.2[3]		
2013	Follow management plan	65.9			

Weights in thousand tonnes.
[1] For total Baltic until and including 2003.
[2] The reported landings in 1992–1995 and 2000–2009 are likely to be minimum estimates due to incomplete reporting.
[3] TAC is calculated as EU + Russian autonomous quotas.
* Separate management for western and eastern Baltic cod since 2004.

Table 8.4.2.2 Cod in Subdivisions 25–32. Total landings (tonnes) by country.

Year	Denmark	Estonia	Finland	German Dem.Rep.[2]	Germany, Fed. Rep.	Latvia	Lithuania	Poland	Russia	Sweden	USSR	Faroe Islands[4]	Norway	Unallo-cated[3]	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[1]	10842	1180	958		3054	4916	3017	11348	5022	10031					50 368

[1]Provisional data. [2]Includes landings from Oct.-Dec. 1990 of Fed.Rep.Germany.

[3]Working group estimates. No information available for years prior to 1993.

[4] For 1997 landings not officially reported, estimated by the WG.

Table 8.4.2.3 Cod in Subdivisions 25–32. Summary of stock assessment (weights in tonnes).

	RECRUITS Age 2	TOTALBIO	TOTSPBIO	LANDINGS	DISCARDS	YIELD/SSB	FBAR 4–7
1966	430264	355416	172018	134867	8735	0.7840	0.8370
1967	370921	436280	228679	152378	11733	0.6663	1.1587
1968	354063	422232	233958	164472	9700	0.7030	1.1303
1969	306727	395953	222659	169909	10654	0.7631	1.0962
1970	240011	351666	208842	154492	7625	0.7398	1.1241
1971	264787	314516	184181	118217	5426	0.6419	0.9133
1972	322278	350280	198996	143833	8490	0.7228	1.0434
1973	432140	394362	211991	143164	7491	0.6753	0.9732
1974	506893	500395	262952	147815	7933	0.5621	0.8311
1975	303683	575916	339545	194649	9576	0.5733	0.6955
1976	293397	535740	355564	203303	4341	0.5718	0.9261
1977	479002	533503	326914	164792	2978	0.5041	0.8440
1978	829398	712485	379201	154009	9875	0.4061	0.5358
1979	615355	983040	579671	227699	14576	0.3928	0.4952
1980	425886	1026484	696743	347619	8544	0.4989	0.7342
1981	689813	984216	666132	330742	6185	0.4965	0.8091
1982	693590	1057369	670941	316052	11548	0.4711	0.7301
1983	472374	1003058	645258	332148	10998	0.5148	0.7124
1984	302921	920299	657667	391952	8521	0.5960	0.8896
1985	253078	737751	544911	315083	8199	0.5782	0.7334
1986	260214	547640	399371	252558	3848	0.6324	1.0936
1987	368090	492367	320470	207081	9340	0.6462	0.9196
1988	224301	462420	299274	194787	7253	0.6509	0.8400
1989	122489	352911	240274	179178	3462	0.7457	1.1478
1990	128378	271623	216027	153546	4187	0.7108	1.2432
1991	82753	193206	151596	122517	2741	0.8082	1.3958
1992	136367	133380	92879	54882	1904	0.5909	1.1003
1993	181970	172116	112719	45188	1558	0.4009	0.4321
1994	127237	265878	191724	93380	1956	0.4871	0.6682
1995	119563	311250	236986	107712	1872	0.4545	0.7965
1996	115525	224231	163717	121877	1443	0.7444	1.0142
1997	88060	195386	135486	88600	3462	0.6539	1.0690
1998	149188	175399	109014	67429	2299	0.6185	1.0341
1999	152334	180222	90246	72989	1838	0.8088	0.9672
2000	174950	214697	115928	89168	6019	0.7692	1.0704
2001	135774	171083	104229	91325	2891	0.8762	1.2262
2002	122472	140633	83094	67740	1462	0.8152	1.0947
2003	112745	135937	80394	71386	2024	0.8880	0.9526
2004	115077	131965	79488	67768	1201	0.8526	1.4457
2005	164235	122556	65577	55254	1670	0.8426	0.9534
2006	131041	154782	83503	65532	4644	0.7848	0.7801
2007	143846	161596	101652	50843	4146	0.5002	0.5397
2008	158464	182676	119417	42235	3746	0.3537	0.2656
2009	161770	272265	184040	48439	3328	0.2632	0.2625
2010	192503	279955	208152	50277	3543	0.2415	0.2826
2011	205390	290523	211344	50368	3850	0.2383	0.2571
2012	146965*		262701				
Arith. Mean	275246	409297	260509	148245	5626	0.6139	0.871
Units	(Thousands)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)		

*Output from recruitment prediction model (RCT3) using BITS survey (2001–2012).