

ECOREGION Baltic Sea
STOCK Cod in Subdivisions 22–24

Advice for 2013

ICES advises on the basis of the EU management plan (EC 1098/2007) that landings in 2013 should be 20 800 tonnes.

Stock status

F (Fishing Mortality)			
	2009	2010	2011
MSY (F_{MSY})	✗	✗	✗ Above target
Precautionary approach (F_{pa}, F_{lim})	?	?	? Undefined
Management plan (F_{MGT})	✗	✓	✓ Below target
SSB (Spawning Stock Biomass)			
	2010	2011	2012
MSY ($B_{trigger}$)	✓	✓	✓ Above trigger
Precautionary approach (B_{pa}, B_{lim})	✓	✓	✓ Full reproductive capacity
Management plan (SSB_{MGT})	?	?	? Undefined

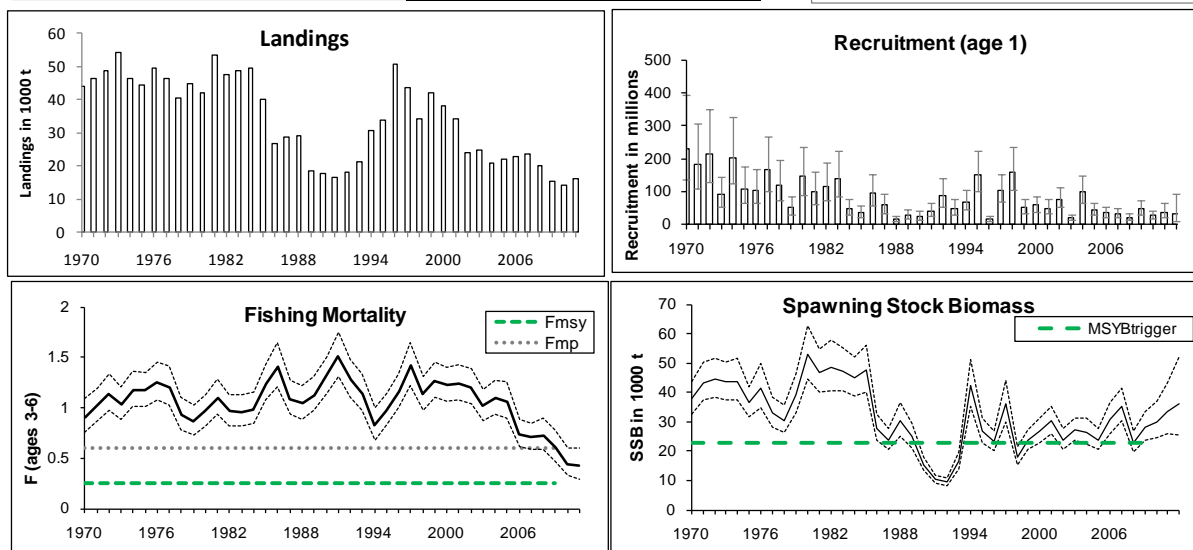
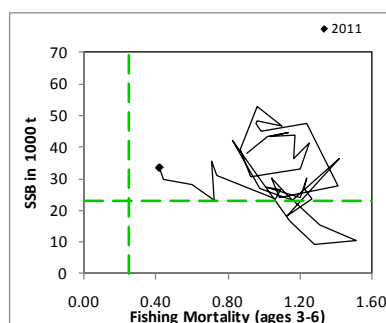


Figure 8.4.1.1 Cod in Subdivisions 22–24. Summary of stock assessment (weights in thousand tonnes) (Recruitment, F, and SSB have uncertainty boundaries (95%) in the plot). Top right: SSB/F for the time-series used in the assessment.

SSB has been fluctuating just above B_{pa} since 2000 with an increase in recent years. F (ages 3–6) has decreased since the late 1990s and fell below the target F specified in the management plan in 2010. The latest year classes have been below the 10-year average. The 2003 year class is the latest above-average year class.

Management plan

A management plan for cod in the western Baltic Sea was agreed in September 2007 by the EU (EC 1098/2007). This plan aims for a reduction in F by 10% each year until the target F is reached. ICES has evaluated the management plan in 2009 and considered it to be in accordance with the precautionary approach. The management plan is currently under revision and it should be noted that there is a large difference between the current estimate of F_{MSY} proxy and the target F in the management plan.

Biology

There is a mixture of the eastern and western Baltic cod stocks, especially in Subdivision 24. The mixing has not been quantified, but it is likely that it has increased in recent years, as the eastern Baltic stock is increasing. The increase seems to be larger for older age groups and this has had an effect on the stock assessment, with a higher proportion of larger cod than expected showing up in the catches. At present three main spawning sites are considered for this stock: the Sound (Subdivision 23), the Belt Sea (Subdivision 22), and the Arkona Basin (Subdivision 24). There are indications of juvenile cod migrating from the western Baltic to the east, but also of adult cod migrating the other way. Furthermore, a recent study indicates that the cod in the Sound might constitute a separate resident stock.

The fisheries

The main portion is taken by trawl, but also by gillnets and to a minor extent by longlines and Danish seines. Bycatch consists mainly of flatfish, with flounders being the most abundant. Western Baltic cod is usually taken in mixed demersal fisheries. In Subdivision 22, different flatfish species (flounder, plaice, dab, and turbot) are caught with cod; in Subdivision 24, flounder is the main bycatch, at least in some periods.

Catch distribution Total catch (2011) is 17.2 kt, where 16.3 kt are landings (68% trawlers, 32% gillnetters) and 907 t discards.

Quality considerations

Mixing of the eastern and western Baltic cod stocks in recent years is considered an increasing problem for the quality of the assessment. A larger part of the commercial fleet targets cod in Subdivision 24 (considered the mixing zone) and some of these fish are considered to be of eastern origin.

Data are needed to quantify the amount of mixing of cod by age groups between the Baltic areas. Tagging experiments or/and genetic analysis could provide such data.

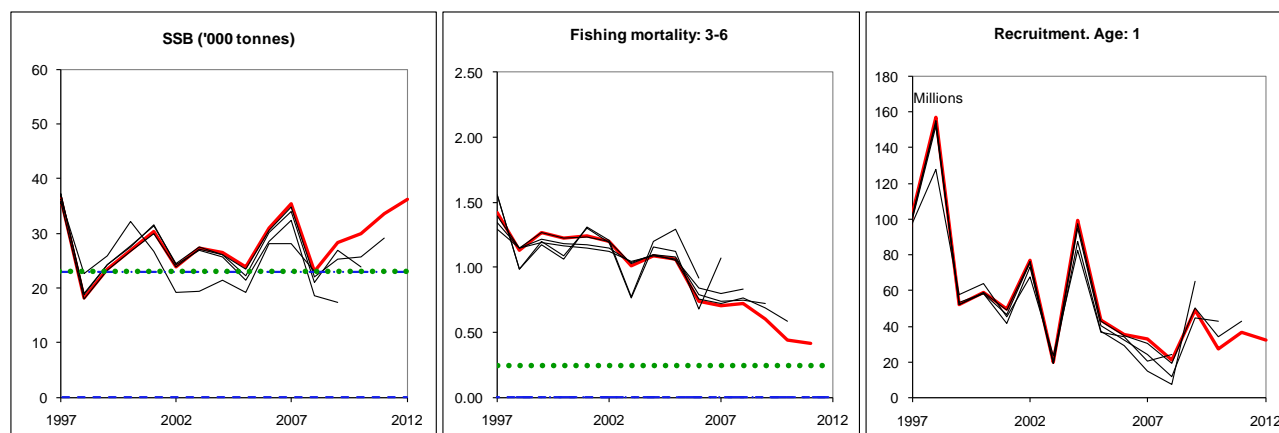


Figure 8.4.1.2 Cod in Subdivisions 22–24. Historical assessment results (final-year recruitment estimates included). The stock was benchmarked in 2009, which caused a revision in data input.

Scientific basis

Assessment type

Analytical (SAM – statespace–assessment model).

Input data

Three survey indices: Havfisken in the 1st and 4th quarters (KASU-1Q, KASU-4Q) and Solea in the 1st quarter (SOLEA-1Q); one commercial cpue index (Danish trawlers).

Discards and bycatch

Discards included in the assessment (since 1970).

Indicators

None.

Other information

Last benchmarked in 2009 (WKROUND 2009). The next benchmarking for this stock is scheduled for 2013.

Working group report

WGBFAS

8.4.1

Supporting information May 2012

ECOREGION Baltic Sea
STOCK Cod in Subdivisions 22–24

Reference points

	<i>Type</i>	<i>Value</i>	<i>Technical basis</i>
MSY Approach	MSY B_{trigger}	23 000 t	B_{pa} (23 000 t)
	F_{MSY}	0.25	F_{max} (ICES, 2011)
Precautionary Approach	B_{lim}	not defined	
	B_{pa}	23 000 t	MBAL
	F_{lim}	not defined	
Management Plan	F_{pa}	not defined	
	SSB_{MGT}	not defined	
	F_{MGT}	0.60	EU management plan based on stochastic simulations.

(unchanged since 2011)

Outlook for 2013

Basis: $F = \text{TAC constraint (2012)} = 0.57$; $SSB (2013) = 35.7$; $R \text{ age } 1 (2012) = 32.1$ million; human consumption (HC) landings (2012) = 21.3; Discards (2012) = 1.5.

Rationale	Human consumption (2013)	Basis	F Total (2013)	F (HC) (2013)	Catch Total (2013)	Discards (2013)	SSB (2014)	%SSB change ¹⁾	% TAC change ²⁾
Management plan	20.8	$F = 0.6$	0.60	0.54	22.3	1.42	35.2	-1.6	-2.2
MSY framework	9.9	F_{MSY}	0.25	0.23	10.6	0.68	44.1	+23.3	-53.4
MSY transition	12.7	$0.4 * F_{2010} + 0.6 * F_{\text{MSY}}$	0.33	0.30	13.5	0.86	41.7	+16.8	-40.4
Zero catch	0	$F = 0$	0.00	0.00	0	0	52.63	+47.1	-100
Other options	13.1	$F_{2012} * 0.6$	0.34	0.31	14.0	0.90	41.40	+15.9	-38.4
	16.7	$F_{2012} * 0.8$	0.46	0.42	17.9	1.15	38.4	+7.6	-21.4
	18.1	-15% TAC change ($F_{2012} * 0.88$)	0.50	0.46	19.3	1.25	37.4	+4.6	-15.0
	18.4	$F_{2012} * 0.9$	0.51	0.47	19.7	1.27	37.1	+3.8	-13.5
	20.0	$F_{2012} * 1.0$	0.57	0.52	21.4	1.38	35.8	+0.2	-5.9
	21.3	0% TAC change ($F_{2012} * 1.08$)	0.62	0.57	22.8	1.45	34.8	-2.6	0.0
	21.6	$F_{2012} * 1.1$	0.63	0.58	23.1	1.48	34.6	-3.3	+1.4
	24.5	+15% TAC change ($F_{2012} * 1.3$)	0.74	0.68	26.3	1.78	32.2	-9.8	+15.0
	25.8	$F_{2012} * 1.4$	0.80	0.73	27.7	1.88	31.1	-12.9	+21.2
29.6	$F_{2012} * 1.7$	0.97	0.89	31.7	2.11	28.2	-21.2	+39.0	

Weights in thousand tonnes.

¹⁾ SSB 2014 relative to SSB 2013.

²⁾ Human consumption landings 2013 relative to TAC 2012.

Management plan approach

Following the agreed EU management plan implies fishing at an F management plan of 0.6, which will lead to a TAC of 20 800 tonnes in 2013. This is expected to lead to an SSB of 35 200 tonnes in 2014. No further reduction in days-at-sea is required.

MSY approach

Following the ICES MSY framework implies fishing mortality being reduced to 0.25, resulting in landings of 9900 tonnes in 2013. This is expected to lead to an SSB of 44 100 tonnes in 2014.

Following the transition scheme towards the ICES MSY framework implies fishing mortality being reduced to 0.33, resulting in landings of 12 700 tonnes in 2013. This is expected to lead to an SSB of 41 700 tonnes in 2014.

Precautionary approach

As there is no F_{pa} defined for this stock, the catch corresponding to the precautionary approach cannot be calculated. B_{pa} is 23 000 tonnes, and all options in the outlook will result in an SSB above B_{pa} in 2014.

Additional considerations

The fishery is largely based on recruiting year classes. The last three year classes have been estimated to be below the average of the last 10 years, and much lower than the average of the entire time-series.

Removals of cod in recreational fisheries in the Baltic are substantial, but currently not consistently and completely sampled, and therefore not included in the assessment. Work is ongoing to harmonize sampling procedures to include recreational fisheries data in the assessment.

The spawning stock has increased, especially age groups 4+ are showing up in relatively large numbers compared to the younger ages for the same cohorts. This may be an effect of older age groups migrating from the eastern Baltic Sea into the western Baltic (Figure 8.4.1.6). This situation might be expected when the eastern Baltic cod stock in Subdivision 25 is increasing and its expansion into more northern areas is prevented by poor hydrological conditions. The increase of SSB since 2008 could to some extent explain this spillover. However, migrations of younger cod from the western Baltic stock into the eastern Baltic also occur.

Management plan evaluations

ICES evaluated the EC management plan in March 2009 and concluded that the plan is in accordance with the precautionary approach. In its evaluation, ICES assumed that the annual effort reduction is fully achieved. Under the evaluations, F is assumed to decrease in line with the annual 10% effort reduction. The plan is sensitive to assumptions about implementation error, and the effectiveness of effort limitations. However, it should be noted that the target F in the EC management plan is much larger than the current estimate of the F_{MSY} proxy.

STECF re-evaluated the management plan in 2011 (ICES, 2011b), 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 sizes increase 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.

In the past, F has not been reduced as much as anticipated by the management plan, indicating that effort limitations are not effectively limiting the fishery.

Information from the fishing industry

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

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 169 in 2012 and to 241 in 2013 (days-at-sea_{current year} $\times F_{\text{target}} / F_{\text{preceding year}}$).

The cod fisheries in the western Baltic have also been regulated since 2009 by a seasonal closure from 1 April to 30 April to protect spawning aggregations of cod. The TAC was not fully utilized in 2011 (87%).

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 to 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 compliance and to be in better accordance with the minimum landing size, which was changed from 35 to 38 cm in the same year. As of 1 January 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.

From 1 January 2009 a small area (“the triangle”) in Subdivision 23 (the Sound) was closed for all fisheries in February and March, when traditionally the directed cod fishery was large. This has implied a reduction of the cod catch in Subdivision 23 by close to 50% compared to the time period from 2001–2008 (Table 8.4.1.2).

In Denmark, annual quota shares for individual vessels were introduced on 1 January 2007. Since then, fishers can fish, trade, exchange, or pool their share with other fishers. This could potentially affect the efficiency of the vessels, but an effective change in efficiency has not been found so far.

Scientific basis

Data and methods

The assessment includes catch data, supplemented with one commercial cpue index and three survey indices. The assessment is based on the recently developed stochastic state-space model (SAM) that provides statistically sound estimates of uncertainty in the model results. The model was adopted at the benchmark workshop in 2009.

Discard data have been available since 1996 and are used in the assessment as yearly proportions discarded per age-group. Thus, for 1970 to 1996 an average proportion discarded per age-group, estimated for 1996–2003, is applied. The season and area coverage of discard sampling requires improvement. A relationship between year-class strength and discard rates cannot be estimated from the available data. Recent changes in technical regulations such as the increase of minimum landing size, the introduction of “Bacoma”, a ban on highgrading, and varying closures may contribute to the variability in discard rates.

Uncertainties in assessment and forecast

Including the commercial tuning index in the assessment results in a lower fishing mortality and higher SSB, than using the scientific surveys alone. The commercial cpue is the only tuning index with information on the abundance of the older age groups (4–7).

A recent study indicates strong natal homing and spawning fidelity for the cod in the Sound (Subdivision 23). This could indicate that the cod in this area constitute a separate resident stock (Svedäng *et al.*, 2010) with distinct dynamics.

Comparison with previous assessment and advice

The SSB estimates for 2011 have been revised upwards by 15% compared to last year’s assessment, and the 2010 fishing mortality was revised downwards by 24%. The recruitment of the 2010 year class has been revised upwards by 20%.

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

Sources

- ICES. 2011a. Report of the Baltic Fisheries Assessment Working Group (WGBFAS). ICES Headquarters, 12–19 April 2011. ICES CM 2011/ACOM:10. 824 pp.
- ICES. 2011b. Report of the ICES WKROUNDMP2 2011 / STECF EWG 11-07. Evaluation and Impact Assessment of Management Plans PT II, 20–24 June 2011, Hamburg, Germany. ICES CM 2011/ACOM:56. 331 pp.
- ICES. 2012. Report of the Baltic Fisheries Assessment Working Group (WGBFAS). ICES Headquarters, 12–19 April 2012. ICES CM 2012/ACOM:10.
- Svedäng, H., André, C., Jonsson, P., Elfman, M., and Limburg, K. E. 2010. Migratory behaviour and otolith chemistry suggest fine-scale sub-population structure within a genetically homogenous Atlantic cod population. *Environmental Biology of Fishes*, 89:383–397.

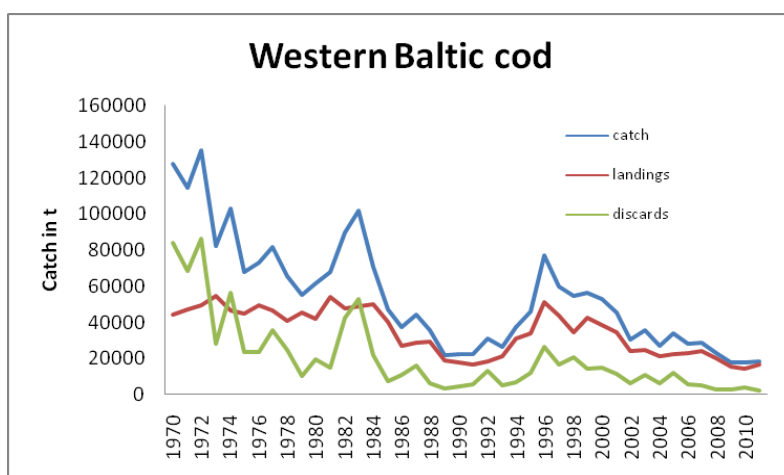


Figure 8.4.1.3 Cod in Subdivisions 22–24. Landings, discards, and catches in tonnes.

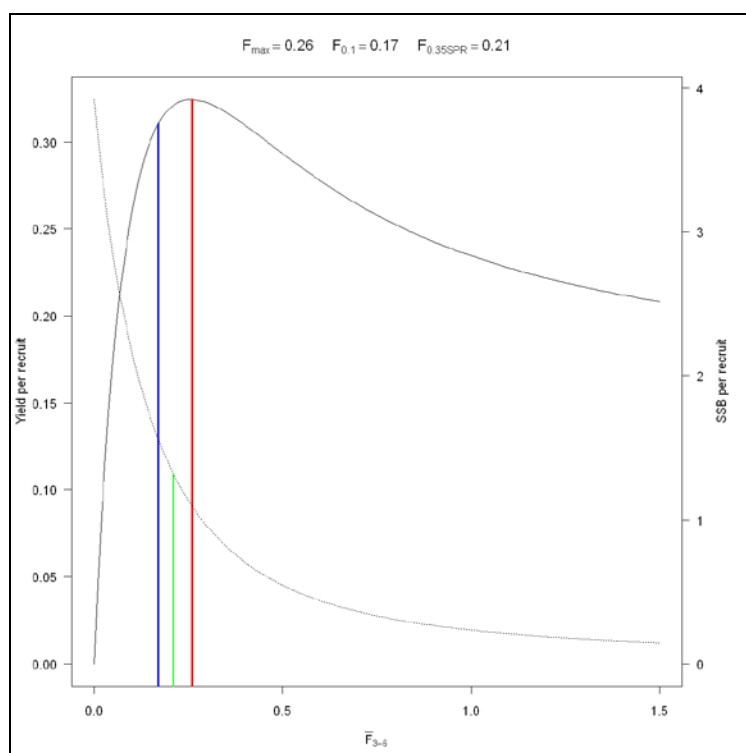


Figure 8.4.1.4 Cod in Subdivisions 22–24. Yield- and SSB-per-recruit plots. The vertical lines represent biological reference points (blue: $F_{0.1}$, green: $F_{0.35SPR}$, and red: F_{max}).

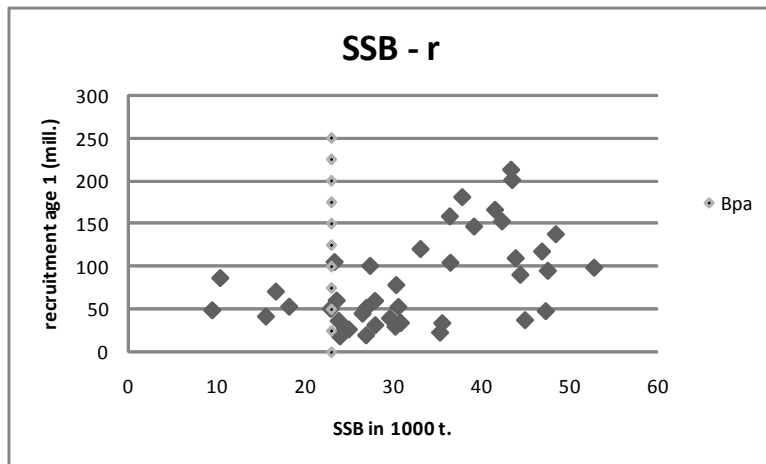


Figure 8.4.1.5 Cod in Subdivisions 22–24. Stock and recruitment plot.

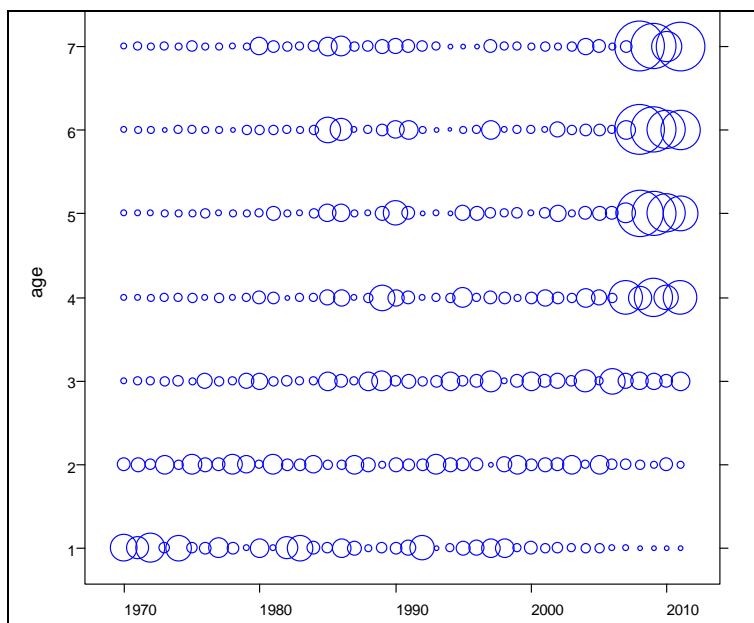


Figure 8.4.1.6 Cod in Subdivisions 22–24. Relative distribution of cod catches standardized by age and year. First every year is standardized to 1, and then the age group within a year is compared to the average of that age group. Larger bubbles for age groups 4–7 in the time frame 2007–2011 are overrepresented in the catches compared to the cohort in the same years.

Table 8.4.1.1 Cod in Subdivisions 22–24. ICES advice, management, and landings.

Year	ICES Advice	Predicted landings corresp. to advice	Agreed TAC ¹	ICES Landings (22–24)	ICES Landings (22–32)
1987	TAC	9		29	236
1988	TAC	16		29	223
1989	TAC	14	220	19	198
1990	TAC	8	210	18	171
1991	TAC	11	171	17	140
1992	Substantial reduction in F	-	100	18	73 ²
1993	F at lowest possible level	-	40	21	66 ²
1994	TAC	22	60	31	124 ²
1995	30% reduction in fishing effort from 1994 level	-	120	34	142 ²
1996	30% reduction in fishing effort from 1994 level	-	165	51	173
1997	Fishing effort should not be allowed to increase above the level of recent years	-	180	44	132
1998	20% reduction in F from 1996	35	160	34	102
1999	At or below F_{sq} with 50% probability	38	126	42	115
2000	Reduce F by 20%	44.6	105	38	128
2001	Reduce F by 20%	48.6	105	34	126
2002	Reduce F to below 1.0	36.3	76	24	92
2003	Reduce F to below 1.0	22.6–28.8 ³	75	25	94
2004	Reduce F to below 1.0	< 29.6	29.6	21	*
2005	Reduce F to below 0.92	< 23.4	24.7	22	*
2006	Management plan	< 28.4	28.4	23	*
2007	Keep SSB at B_{pa}	< 20.5	26.7	24	*
2008	Rebuild SSB to B_{pa}	< 13.5	19.2	20	*
2009	Rebuild SSB to B_{pa}	< 13.7	16.3	15.3	
2010	Management plan	<17.7	17.7	14.1	
2011	See scenarios	-	18.8	16.3	
2012	Management plan	21.3	21.3		
2013	Management plan	20.8			

Weights in thousand tonnes. ¹ Included in TAC for total Baltic, until and including 2003.

² The reported landings in 1992–1995 are known to be incorrect due to incomplete reporting.

³ Two options based on implementation of the adopted mesh regulation.

* Separate management for western and eastern Baltic cod since 2004.

Table 8.4.1.2 Cod in Subdivisions 22–24. Official and ICES landings (thousand tonnes) by country and area.

	Denmark		Finland	German Dem.Rep. ¹	Germany, FRG	Estonia		Lithuania	Latvia	Poland	Sweden		Total				
	23	22+24	24	22+24	22+24	22	24	24	24	24	23	24	22	23	24	Unalloc.	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

¹Includes landings from October to December 1990 of Fed. Rep. Germany.

Table 8.4.1.2 cont.

	Denmark		Finland	German Dem.Rep. ²	Germany, FRG	Estonia		Lithuania	Latvia	Poland	Sweden		Total				
	23	22+24				24	22+24				22	24	24	24	24	23	24
			22	23	24			Unalloc.	Total								
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
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 ²	783	7799	149		4521				24	487	414	2153	5493	1198	9641		16332

²Provisional data.

Table 8.4.1.3 Cod in Subdivisions 22–24. Summary of stock assessment (weights in tonnes). Recruits (age 1, in thousand), Low = 5% confidence limit, High = 95% confidence limit. $F_{3-6} = F_{\text{bar}}$ 3–6 years.

Year	Recruits	Low	High	TSB	Low	High	SSB	Low	High	F36	Low	High
1970	231422	135996	393808	105451	87964	126415	37873	32759	43786	0.906	0.757	1.085
1971	181498	107641	306030	113777	96121	134677	43391	37482	50231	1.019	0.872	1.191
1972	213844	130431	350600	109207	92721	128624	44445	38300	51576	1.139	0.974	1.332
1973	89859	55440	145647	105662	89584	124626	43521	37565	50421	1.035	0.887	1.207
1974	201793	123963	328489	97052	82464	114221	43915	37439	51510	1.176	1.015	1.363
1975	109426	67734	176780	93714	78722	111560	36498	31655	42080	1.169	1.01	1.354
1976	103881	64414	167530	94561	79636	112284	41523	34680	49716	1.254	1.081	1.454
1977	166542	103043	269170	80017	68146	93956	33057	28362	38531	1.202	1.023	1.411
1978	120211	74307	194471	85905	71682	102950	30607	26300	35621	0.925	0.779	1.099
1979	51948	31733	85042	87904	74057	104341	39222	33076	46511	0.87	0.734	1.032
1980	146679	90897	236693	83868	71616	98216	52839	44409	62869	0.966	0.826	1.129
1981	98223	60233	160175	90219	76514	106380	46864	40186	56251	1.097	0.934	1.289
1982	117125	72286	189780	87466	74662	102465	48533	40790	57746	0.965	0.819	1.136
1983	137448	84390	223865	86682	74247	101199	47335	40425	55426	0.958	0.816	1.124
1984	46864	28884	76036	79380	67668	93118	44981	38665	52330	0.983	0.84	1.15
1985	36316	22356	58991	70898	60946	82476	47524	40181	56210	1.238	1.074	1.428
1986	94466	58448	152680	44712	38733	51614	27889	23901	32543	1.414	1.212	1.649
1987	58924	36351	95513	55826	45959	67812	23933	20551	27871	1.087	0.93	1.27
1988	17123	10500	27924	48679	40913	57919	30242	25104	36432	1.041	0.891	1.215
1989	28481	17367	46708	37086	31743	43329	24959	21004	29659	1.129	0.976	1.305
1990	25261	15547	41043	31320	26846	36539	15508	13390	17961	1.314	1.146	1.506
1991	40498	25010	65576	19936	17289	22990	10305	8901	11931	1.512	1.306	1.751
1992	85905	52891	139528	22137	18411	26617	9399	8076	10940	1.279	1.107	1.478
1993	47810	28843	79251	38988	32060	47412	16649	13935	19891	1.141	0.974	1.338
1994	69913	45699	106955	59635	50135	70935	42362	35086	51146	0.825	0.683	0.998
1995	151297	101967	224493	60295	51963	69963	26876	22950	31474	0.974	0.832	1.141
1996	18356	11984	28115	72984	61980	85942	23295	20215	26844	1.157	1.003	1.334
1997	103881	70305	153491	62944	52972	74793	36388	30030	44093	1.417	1.223	1.642
1998	157157	105219	234732	59397	50771	69488	18160	15434	21368	1.132	0.977	1.313
1999	52000	35269	76668	60174	51302	70580	23553	20468	27103	1.266	1.101	1.455
2000	59160	40243	86970	49662	42943	57433	26930	23085	31416	1.224	1.064	1.407
2001	49961	32767	76177	47524	41251	54752	30303	26152	35112	1.239	1.076	1.426
2002	76957	52228	113394	40015	34801	46009	23933	20776	27568	1.2	1.035	1.39
2003	19885	13213	29924	44091	37771	51468	27337	23743	31475	1.015	0.869	1.184
2004	99211	66459	148103	44981	38553	52482	26503	22481	31243	1.093	0.942	1.267
2005	43739	29642	64541	48194	41121	56484	23790	20484	27628	1.063	0.9	1.255
2006	35383	23360	53594	50413	42909	59229	30884	26046	36622	0.738	0.612	0.889
2007	32794	21678	49611	55437	47678	64458	35454	30226	41587	0.707	0.591	0.846
2008	21465	14016	32874	40215	34684	46629	23086	19821	26890	0.725	0.588	0.895
2009	48825	32341	73712	48243	40713	57165	28339	23818	33718	0.604	0.468	0.779
2010	27255	17270	43015	46444	37970	56808	30001	24420	36859	0.443	0.327	0.599
2011	36938	21239	64241	47620	37359	60699	33523	25901	43390	0.42	0.296	0.596
2012	32241	10967	94786	55271	39202	77926	36279	25337	51946			