

8.4.3

Advice May 2013

ECOREGION

Baltic Sea

STOCK

Cod in Subdivisions 25–32 (Eastern Baltic Sea)

Advice for 2016

ICES advises on the basis of the EU management plan (EC 1098/2007) a TAC of 70 301 tonnes in 2014. This is conditional on the discard rates remaining unchanged from the average of the last three years.

Stock status

F (Fishing Mortality)			
	2010	2011	2012
MSY (F_{MSY})	✓	✓	✓ Appropriate
Precautionary approach (F_{pa}, F_{lim})	?	?	? Undefined
Management plan (F_{MGT})	✗	✗	✗ Above target
SSB (Spawning-Stock Biomass)			
	2011	2012	2013
MSY ($B_{trigger}$)	✓	✓	✓ Above trigger
Precautionary approach (B_{pa}, B_{lim})	✓	✓	✓ Full reproductive capacity

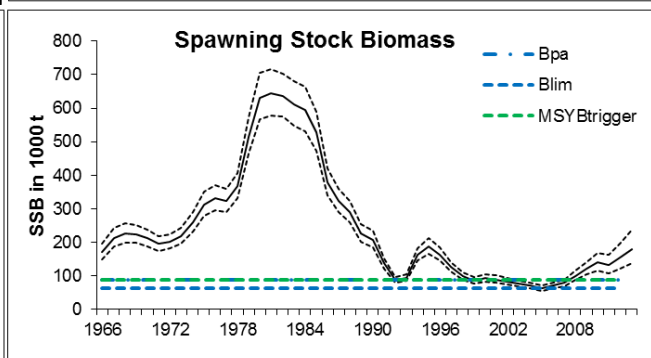
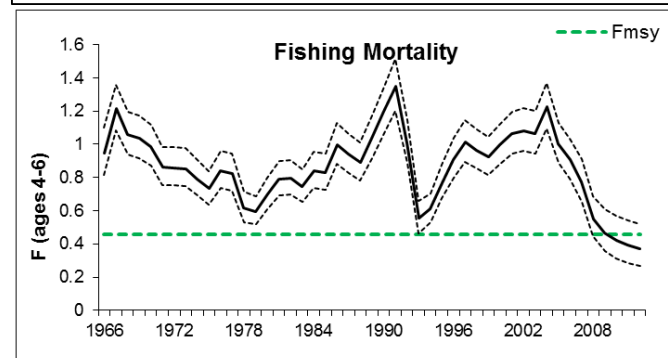
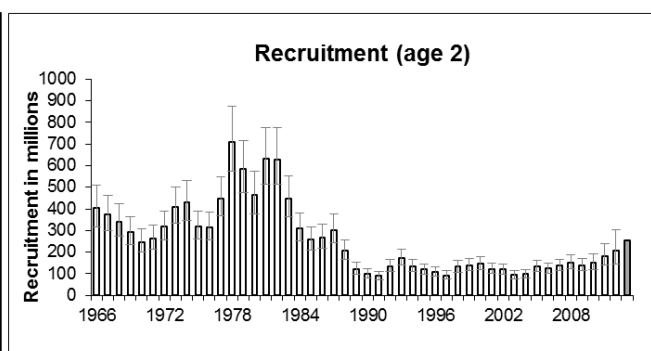
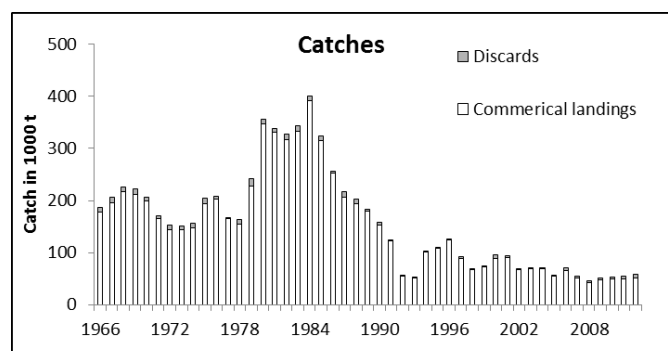
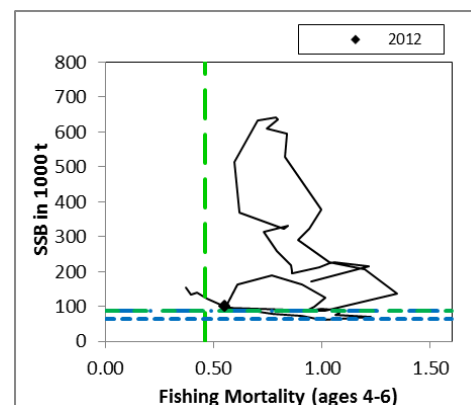


Figure 8.4.3.1 Cod in Subdivisions 25–32. Summary of stock assessment (weights in thousand tonnes). Predicted values are shaded. Top right: SSB and F for the time-series used in the assessment. Management target fishing mortality cannot be displayed due to the difference in reference F age range compared to the current assessment.

The SSB has increased in recent years and is now estimated to have been above B_{pa} since 2008. Fishing mortality has declined and is now estimated to be below F_{MSY} , since 2009. The abundance of the 2006–2011 year classes is above the average of the last 20 years.

Management plans

EU has agreed on a multi-annual plan for cod in the Baltic Sea 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. It should be noted that there is a large difference between the F_{MSY} and the target F in the management plan, regardless of the different reference age.

Biology

&RG LV WKH PDLQ SUHGDWRU RQ VSUDW DQG KHUULQJ DQG JLYHQ WKH U SHODJLF VWRFNV LV OLNHO\ WR EH DIIHFWISIGVWG DQRZLQYHUDDW SQHFDQ EHWZHHQ FRG DQG WKH SHODJLF VWRFNV LV UHGXFHG &RQVLVWHQW ZLWI WKH FXUUHQW PDLQ GLVWULEXWLRQ DUHD RI FRG 6XEGLYLVLRQ DQG VKDUSO\ GHFOLQHG LQ UHFHQW \HDUV

Environmental influence on the stock

(DVWHUQ %DOWLF &RG UHFUXLWPHQW LV PDLQO\ GULYHQ E\ K\GURORJLF RFFXUV RQO\ LQ WKH %RUQKROP %DVLQ 6XEGLYLVLRQ 7KH GLVWULEX GHJUHH 6XEGLYLVLRQ DQG ZLWK YHU\ ORZ DEXQGDFH LQ QRUWKHUQ D

The fisheries

7KH GHPHUVD OLVKHULHV IRU FRG LQ WKH HDVWHUQ %DOWLF KDYH E\FDWF

Catch distribution	7RWDO FDW NW ZKHUH DUH ODQGLQJV E\ JLO
	WUDZOHUV DQG GLVFDUGV

Effects of the fisheries on the ecosystem

%HFDXVH VSUDW DQG KHUULQJ DUH WKH PDMRU SUH\ IRU FRG WKH FRG SUHGDWLRQ PRUWDOLW\ RQ WKHVH VSHFLHV)XUWKHUPRUH WKH OLVKH DYDLODEOH IRRG EDVH IRU FRG

Quality considerations

\$JHLQJ SUREOHPV DUH D FRQFHUQ IRU WKH TXDOLW\ RI WKH DVVHVPHQW DQG ZLOO JUHDWO\ LPSURYH WKH EDVLV IRU DSSOLFDWLRQ RI PXOWLVL PL[LQJ RI FRG EHWZHHQ HDVWHUQ DQG ZHVWHUQ WKH %DOWLF 6HD DUHDV

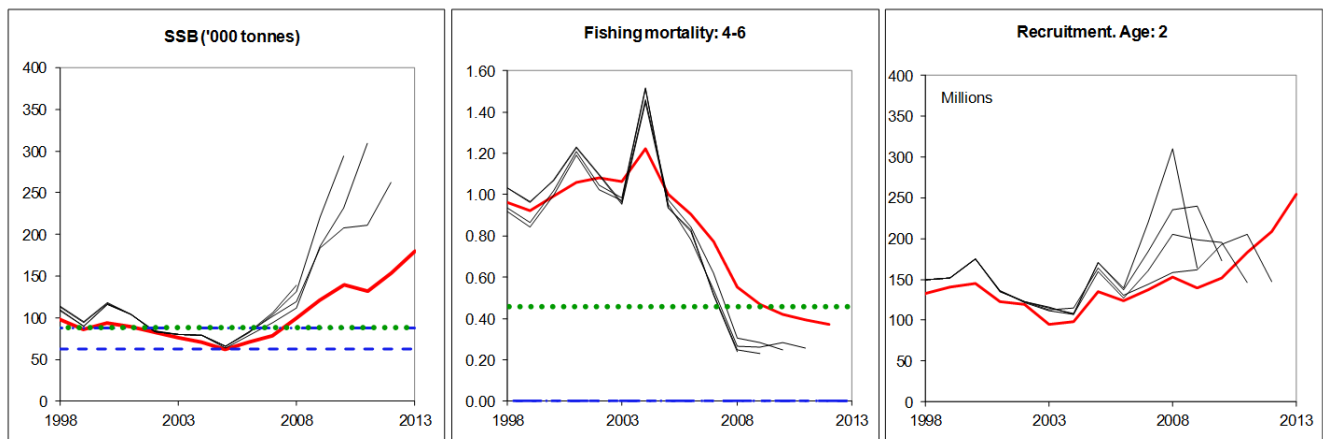


Figure 8.4.3.2 &RG LQ 6XEGLYLVLRQV ± +LVWRULFDO DVVHVPHQW UHVXOWV EHQFKPDUNHG LQ)LVKLQJ PRUWDOLW\ EHIRUH WKH DVVHVPHQW \HDU K

Scientific Basis

Assessment type	\$JH EDVHG DQDO\WLFDO DVVHVPHQW 6\$0
Stock data category	&DWHJRU\
Input data	&RPPHUFLDO FDWFKHV LQWHUQDWLRQDO ODQGLQJV DJH D LQGLFH -4 %,-6 DQG-%,76LQFH -4 %RQH FRPPHUFLDO LQ 'DQLVKB7UDZOHUVB! PP PDWXULW\ GDWD FRQVWDQW V FRQVWDQW IRU DOO DJHV
Discards and bycatch	'LVFDUGV DUH LQFOXGHG LQ WKH DVVHVPHQW
Indicators	1RQH
Other information	7KL VWRFN ZDV EHQFKPDUNHG LQ :.%\$/7 ,&(6
Expert Group report	:*%)\$6

8.4.3

Supporting information May 2013

ECOREGION

Baltic Sea

STOCK

Cod in Subdivisions 25–32 (Eastern Baltic Sea)

Reference points

	Type	Value	Technical basis
06 < \$SSURDFK	U L J J H U		% S D
) 06 <			% D V H G R Q V W R F K D V W L F ± W H L P U X O L D W P L H P Q W ±
0 X O W L V S H F L H V			0 X O W L V S H F L H V P R G H O 6 0 6
) 06 <			
3 U H F D X W L R Q D U \			% O R V L Q
\$SSURDFK	% S D		% O L P
) O L P		8 Q G H I L Q H G	
) S D		8 Q G H I L Q H G	
0 D Q D J H P H Q W S O D Q E D V H G R Q V W R F K D V W	Q V 8 7	8 Q G H I L Q H G	
3 O D Q) 0 * 7		(8 P D Q D J H P H Q W S O D Q E D V H G R Q V W R F K D V W ±

(Changed in 2013, WKBAL (ICES, 2013a)).

Outlook for 2014

% D V L V) V T)) E D Q D P H Q R I W K H O D V W \ H D U V V F D O H G W R) 6 6 %
 G L V F D U G V 5 5 J H R P H W U L F P H I

Rationale	Catch Total 2014	Commercial landings 2014	Discards 2014	Basis	F Total 2014	F comm. landings 2014	F discards 2014	SSB 2015	%SSB change ¹	%TAC change ²
Management plan	75.718	70.301	5.417	F _{MP (4-7)}	0.3	0.28 ³⁾	0.02 ³⁾	264.712	15%	2%
MSY framework	101.758	94.380	7.378	F _{MSY}	0.46	0.42	0.04	235.464	3%	37%
Zero catch	0	0	0	F = 0	0	0	0	334.857	46%	-100%
Other options	54.192	50.315	3.877	F ₂₂ × 0.6	0.22	0.2	0.02	281.629	23%	-27%
	67.045	62.135	4.91	-15% TAC (F ₂₂ × 0.76)	0.28	0.26	0.02	269.097	17%	-10%
	70.163	65.122	5.041	F ₂₂ × 0.8	0.3	0.27	0.03	266.064	16%	-5%
	77.794	72.193	5.601	F ₂₂ × 0.9	0.34	0.31	0.03	258.648	13%	5%
	78.919	73.100	5.819	0% TAC (F ₂₂ × 0.9)	0.34	0.31	0.03	257.556	12%	6%
	85.2	79.053	6.147	F ₂₂ × 1	0.37	0.34	0.03	251.466	10%	15%
	90.968	84.065	6.903	+15% TAC (F ₂₂ × 1.08)	0.4	0.37	0.03	245.884	7%	22%
	92.388	85.708	6.68	F ₂₂ × 1.1	0.41	0.33	0.04	244.51	7%	25%
	99.365	92.165	7.022	F ₂₂ × 1.2	0.44	0.41	0.04	237.773	4%	34%
	106.138	98.432	7.706	F ₂₂ × 1.3	0.48	0.44	0.04	231.245	1%	43%
	112.714	104.513	8.201	F ₂₂ × 1.4	0.52	0.48	0.05	224.922	-2%	52%
	119.099	110.416	8.683	F ₂₂ × 1.5	0.56	0.51	0.05	218.795	-5%	61%
117.836	109.249	8.587	Multispecies F _{MSY}	0.55	0.5	0.05	220.005	-4%	59%	

: H L J K W V L Q W K R X V D Q G W R Q Q H V

6 6 % U H O D W L Y H W R 6 6 %

& R P P H U F L D O O D Q D Q W L Y H W R W K H (8 7 \$ & 5 X V V L D Q D X W R Q R P R X V T X R W D V

5 H I H U H Q F H) J D Q J H D J H

' L V F D U G S U R S R U W L R Q V L Q W K H S U R M H F W L R Q V Z H U H D V V X P H G W R E H W K H D Y L Q O D Q G L Q J V D Q G G L V F D U G V D Q G W D N H Q D V D Q D Y H U D J H

Management plan

)ROORZLQJ WKH DJUHHG (8 0DQDJHPH QW SODZKLP & OULHWHXIQW KLIQQWDRVSDHLYQ
FRQGLWLRQDO RQ WKH GLVFDUG UDWHV UHPDLQLQJ XQFKDQJHG IURP WK
66% WR WRQQHV LQ

MSY approach

)ROORZLQJ WKH ,&(6 06< DSSURDFK LPSOLHV ILVKLQJ PRUWDOLW\ VKRXOC
WRQQHV LQ 7KLV LV H[SHFWHG WR OBBBYHRODQ 86% GRMFDUG UDWV
IURP WKH DYHUDJH RI WKH ODVW WKUHH \HDUV WKLV LPSOLHV ODQGLQJV
1R WUDQVLWLRQ LV QHHG DV) LQ LV EHZ)

Precautionary approach

\$V WKHU SIDHWLQHG IRU WKLV VWRFN WKH FDWFK FRUHVSRQGLQJ WWR V
WRQQHV DQG DOO RSWLRQV LQ WKH DQWORN ZLOO UHVXOW LQ DQ 66%

Multispecies considerations

&RG PXOWLVLVHHQDV RQH YDOXH GRHV QRW H[LVW LQ D PXOWLVSFLI
SRSXODWLRQ VL]H RI WKH RWKHU VWRFNV LQ WKH %DOWLF 6HD /RQJ W
UDQJH RI KRZHYHU WKH ELRPDVV ZLOO GLIIHU VLJQLILFDQWO\)LVKL
DYDLODELOLW\ IRU FRG DQG WKUHE\ WKH OHYHO RI FRG FDQQLEDOLVP
UDQJH ZLOO RQO\ PDUJLQDOO\ DIIHFW WKH ORQJ WHUP \LHOG R6<KVB
LQ WKH RXWORN)LVKLQJ DW P%QWLVSARKOV)JLYH FDWFKHV LQ RI
DW WRQQHV

Additional considerations

Management considerations

,&(6 KDV UHYLVHG W6KHWKLIQJ OHDVSHFUDQJH RI YDOXHV ZHUH FRQVLGHUH
FXUUHQW VWDWXV RI SURGXFWLYLW\ JURZWK DQG QDWXUDO PRUWDOLW\
YDOXH LV FORVHU W6RWDOKHPKORVLFRGFWKVDQ WKH SUHYLRXV VLQJOH VSH
PDQDJHPHQW SODQ (DUOLHU ZRUN 67(&) VXJJHVWV WKDW PHDQ \LHC
RI) ± KRZHYHU WKH ELRPDVV ZRXOG 6EGRHV\QRW\HQFQXGHKHVWED
) YDOXHV ZLOO KDYH KLJKH SURSRWV DWRV WKH FRQVLGHSHQGH SHFDXWLRQD
PXOWLVSFLHV PPDQDJHUV PLJKW OLNH WR FRQVLGHU WKH ULNV DQ
FDQGLGDWH YDOXHV

7KH FDQGLGDWH PDXMSLHFLHW\ LPDWHG VOLKRWIO\ KLVKMUIRU WVKVDQW
WR FDQQLEDOLVP EHLQJ WDNHQ <LQWR DFRXQZKLOHPKDWLVSEFLRHW\DOLW
WKH VLQJOH VWRFN SUHVHVVHQLW WULEXWLRQ SDWWHUQ LPSOLHV WKDW D
%DOWLF ZLGH FOXSHLG VWRFN VL]HV DQG FRQYHUVHO\ D GHFUHDVH LQ)
VL]H LI LW LV QRW DFRPSDQLHG E\ D FRG H[SDQVLRQ WR QRUWKHUQ DUH
WR IRRG GHSULYDWLRQ ZLOO EH D ELJJHU SUREOHP 2Q WKH RWKHU KI
JURZWK DQG FRQGLWLRQ RIFRG DV ZHOO DV UHGXFH FDQQLEDOLVPLQD
QRW KDYH D QHJDWLYH HIIHFW RQ FRG VLQFH WKLV ZLOO QRW DIIHFW
)XUWKHUPRUH D KLJKHU) RQ FOXSHLGV LQ QRUWKHUQ DUHDV ZRXOG OLI
FOXSHLG VWRFNV ,QFUHDVLQJ) RQ FRG ZRXOG QRW UHVXOW LQ D VXEVI

7KHUH DUH LQGLFDWLRQV WKDW GLVFDUGV LQ JHQHUDO KDYH LQFUHDV
FRQGLWLRQ

7R RSWLPL]H WKH JURZWK SRWHQWLDO DQG \LHOG RI FRG VSUDW DQG KH

Changes in fishing technology and fishing patterns

&RG LQ WKH HDVWHUQ %DOWLF DUH WDNHQ SULPDULO\ E\ WUDZOHUV DG
V ,Q JLOOQHW FDWFKHV DFRXQWHG IRU DERXW RI WKH WRWDO

Regulations and their effects

7KH ILVKHU\ LV PDQDJHG WKURXJK 7& HIIRUW VHDVRQDO ILVKHULHV UHV
7KH %DOWLF FRG PDQDJHPHQW SODA FOCHEBWRQHGXFWRQ LQ ILVKL
QXPEHU RI ILVKLQJ GD\V SHU \HDU XQWLO WKH WDUJHW) KDV EHQJHDF
ZDV IL[HG DW LQ DQG NHSW DW GD\V LQ DQG 6LQ
DGGLWLRQDO GD\V DEVHQW IURP SRUW WR YHVHVOV LI DQ HTXDO DPRXQW

not fully understood. In addition the unexplained overestimation of SSB and underestimation of F uncertainties in the assessment are also due to historical underreporting, discarding, and inconsistencies in age-reading.

Sampling intensity for discards is insufficient and raising procedures have been problematic in the recent past.

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 Sea 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 affects the quality of the assessment.

Problems with the commercial tuning fleets have been identified (e.g. spatial coverage of the commercial tuning fleet) in the recent benchmark, but has not been resolved yet (ICES, 2013a).

Comparison with previous assessment and advice

The stock was benchmarked this year, with a revision of the reference F age range. The current perception of the status of the eastern Baltic cod stock in terms of trends is similar to that of the 2012 assessment. However, the expected increase in SSB has been downgraded, partly because of the lower stock weight-at-age used for the last years.

The basis for the advice is the same as last year, the management plan (EC [1098/2007](#)).

Sources

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ICES. 2013b. Report of the Baltic Fisheries Assessment Working Group (WGBFAS). ICES Headquarters, 10–17 April 2013. ICES CM 2013/ACOM:10.

STECF. 2011. Impact Assessment of Baltic cod multi-annual plans (STECF 11-05). Edited by John Simmonds. EUR – Scientific and Technical Research series – ISSN 1831-9424. 230 pp.

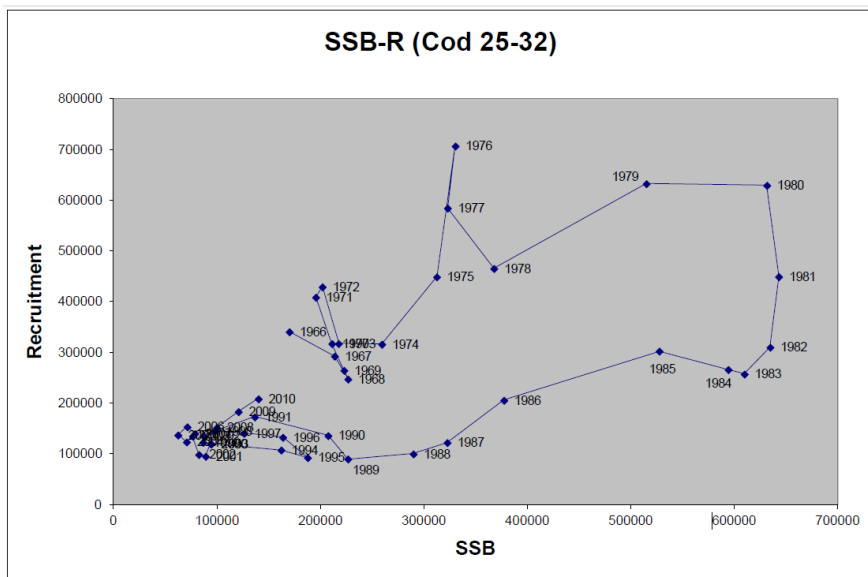


Figure 8.4.3.3 Cod in Subdivisions 25–32 (Eastern Baltic Sea). Stock (tonnes) and recruitment (thousands, age 2) plot.

Table 8.4.3.1 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 level	-	120	108 ²	142 ²
1996	30% reduction in fishing effort from 1994 level	-	165	122	173
1997	20% reduction in fishing mortality from 1995 level	130	180	89	132
1998	40% reduction in fishing mortality from 1996 level	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	51	*
2013	Follow management plan	65.9	68.7 ³		
2014	Follow management plan	70.3			

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 8.4.3.2 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	10 842	1 180	958	3 054	4 916	3 017	11 348	5 022	10 031		50 368
2012 ¹	12 102	686	1 201	2 432	4 269	2 212	14 007	3 954	10 109		50 972

¹Provisional data. The actual total landings are 51 225 tonnes. The difference is due to problems in the upload of the catches from Finland and Lithuania in InterCatch.

²Includes landings from October to December 1990 of Fed. Rep. Germany.

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

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

Table 8.4.3.3 Cod in Subdivisions 25–32. Summary of stock assessment (weights in tonnes). Recruits (age 2, in thousand ind.), Low = 2.5% confidence limit, High = 97.5% confidence limit. F4–6 = Fbar 4–6 ages.

Year	Recruitment (thousands)			TSB (tonnes)			SSB (tonnes)			F (ages 4–6)			F (ages 4–7)		
	Medium	Low	High	Medium	Low	High	Medium	Low	High	Medium	Low	High	Medium	Low	High
1966	402721	317769	510385	347319	302635	398602	169906	148003	195050	0.948	0.82	1.1	0.99	0.854	1.148
1967	372503	299773	462879	410446	359638	468433	213630	187893	242892	1.214	1.09	1.36	1.361	1.21	1.531
1968	340783	274460	423132	412504	364070	467380	226613	199383	257562	1.058	0.94	1.2	1.066	0.942	1.205
1969	292728	236197	362790	390428	346538	439878	222793	197418	251430	1.034	0.91	1.17	1.036	0.916	1.173
1970	247459	199890	306349	355400	317033	398411	211082	187896	237128	0.987	0.87	1.12	1.001	0.88	1.139
1971	264607	214267	326773	329391	295077	367695	195438	174608	218754	0.862	0.75	0.99	0.825	0.722	0.942
1972	317426	258079	390421	350109	314370	389911	201793	181212	224712	0.859	0.75	0.98	0.834	0.731	0.95
1973	408808	332309	502917	397918	357045	443468	217510	195560	241924	0.854	0.75	0.98	0.829	0.727	0.945
1974	429338	347778	530025	476394	425345	533569	259367	232576	289244	0.792	0.69	0.91	0.79	0.69	0.904
1975	317426	258906	389173	526497	469739	590112	312388	279092	349656	0.732	0.64	0.84	0.736	0.641	0.845
1976	316159	258115	387256	515555	464759	571904	330380	295919	368855	0.842	0.74	0.96	0.862	0.755	0.984
1977	449100	366942	549652	528607	478831	583556	322868	291197	357985	0.823	0.72	0.94	0.86	0.746	0.991
1978	707151	572999	872711	665304	600912	736597	367692	332671	406399	0.616	0.53	0.71	0.624	0.536	0.727
1979	584785	477328	716433	878525	786862	980867	515040	463648	572128	0.597	0.52	0.69	0.615	0.53	0.713
1980	465562	378594	572507	958380	862469	1064958	631593	565792	705046	0.7	0.61	0.8	0.707	0.618	0.811
1981	632857	515762	776537	958380	868532	1057523	643064	578093	715338	0.788	0.69	0.9	0.816	0.714	0.933
1982	629701	512164	774211	990535	896796	1094071	634759	573863	702116	0.795	0.7	0.91	0.833	0.728	0.954
1983	449549	365580	552805	941284	845986	1047317	609869	547761	679020	0.744	0.65	0.85	0.762	0.665	0.873
1984	310209	251757	382231	845768	760741	940298	594217	531561	664258	0.839	0.74	0.95	0.867	0.761	0.987
1985	257301	208480	317553	722159	650312	801942	527551	471971	589676	0.829	0.73	0.94	0.852	0.748	0.971
1986	266199	215729	328476	531788	481008	587928	377377	339129	419939	0.998	0.88	1.13	1.051	0.929	1.189
1987	302549	241915	378382	483110	436447	534762	322546	290418	358227	0.938	0.83	1.06	0.973	0.858	1.103
1988	205664	164983	256376	439327	392978	491143	289816	259898	323177	0.888	0.78	1.01	0.897	0.789	1.02
1989	122272	98192	152256	333034	295676	375112	226613	201136	255317	1.035	0.92	1.17	1.016	0.901	1.146
1990	99907	80680	123718	256530	228173	288410	207316	183401	234349	1.199	1.07	1.35	1.177	1.05	1.32
1991	89859	73431	109963	183873	165484	204305	136353	121981	152417	1.348	1.2	1.51	1.352	1.208	1.514
1992	135944	111648	165528	128027	115708	141659	86855	78263	96391	1.01	0.89	1.15	1.046	0.916	1.195
1993	172819	140879	212000	139665	126259	154494	94466	85261	104666	0.553	0.47	0.66	0.541	0.453	0.646
1994	135944	110822	166762	223686	200764	249226	161943	145122	180713	0.61	0.53	0.7	0.61	0.53	0.703
1995	119731	97702	146726	237994	212693	266304	187587	166080	211880	0.767	0.67	0.87	0.781	0.683	0.892
1996	107581	87973	131560	209819	188089	234059	163571	144935	184602	0.909	0.8	1.04	0.874	0.77	0.992
1997	92503	75459	113398	181317	164014	200444	126121	113399	140271	1.013	0.9	1.15	0.991	0.877	1.12
1998	132588	108105	162615	149343	135261	164891	98027	87874	109353	0.964	0.85	1.09	0.934	0.827	1.056
1999	140365	114042	172764	134996	121998	149378	86422	77505	96365	0.924	0.82	1.05	0.89	0.787	1.007
2000	144929	117390	178928	150542	134779	168150	93714	83252	105490	0.994	0.88	1.12	0.949	0.842	1.07
2001	122762	100246	150335	142201	127010	159210	88965	78784	100462	1.061	0.94	1.2	1.001	0.89	1.126
2002	119970	98129	146673	129444	116011	144431	82372	73074	92853	1.081	0.96	1.22	1.037	0.922	1.166
2003	95130	78045	115955	122027	109483	136008	76420	68004	85878	1.063	0.94	1.2	1.016	0.903	1.144
2004	98617	81670	119080	111525	99844	124572	70545	62333	79838	1.224	1.09	1.37	1.244	1.11	1.393
2005	134996	111729	163108	103777	93324	115401	62193	55335	69901	1.003	0.89	1.13	1.011	0.895	1.141
2006	123500	102534	148755	127772	114835	142166	71182	63635	79625	0.906	0.79	1.04	0.922	0.804	1.056
2007	137036	113074	166076	126374	112496	141964	78590	69274	89159	0.771	0.65	0.91	0.785	0.658	0.936
2008	153277	125567	187101	155127	136379	176452	99708	86787	114552	0.552	0.45	0.69	0.55	0.436	0.695
2009	139665	114051	171031	193107	167252	222959	120692	103079	141316	0.468	0.36	0.61	0.466	0.35	0.622
2010	151903	120978	190735	202602	171563	239258	139944	115864	169029	0.422	0.31	0.57	0.411	0.297	0.569
2011	183322	139480	240944	198392	165768	237436	132191	107833	162050	0.392	0.28	0.54	0.379	0.265	0.541
2012	208564	144229	301595	232815	187306	289381	153584	120454	195826	0.373	0.27	0.52	0.328	0.232	0.465
2013	254486						179872	136459	237096						

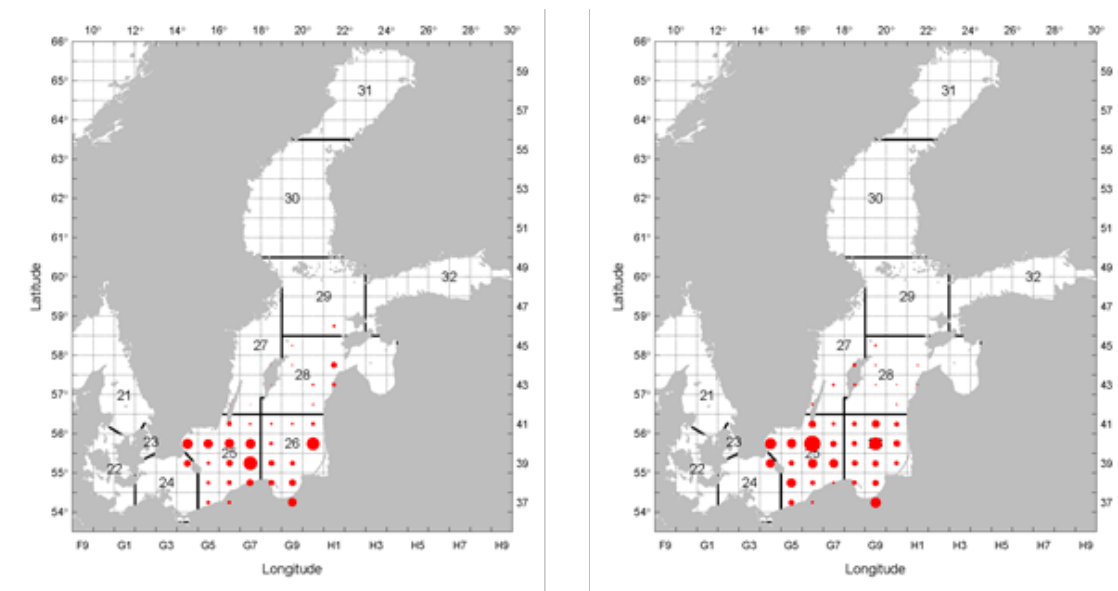


Figure 8.4.3.4 Cod in Subdivisions 25–32 (Baltic Sea). Distribution from bottom trawl surveys (BITS) during (left) the 4th quarter 2012 (Subdivisions 25–29 South) and (right) the 1st quarter 2013 (Subdivisions 25–28).

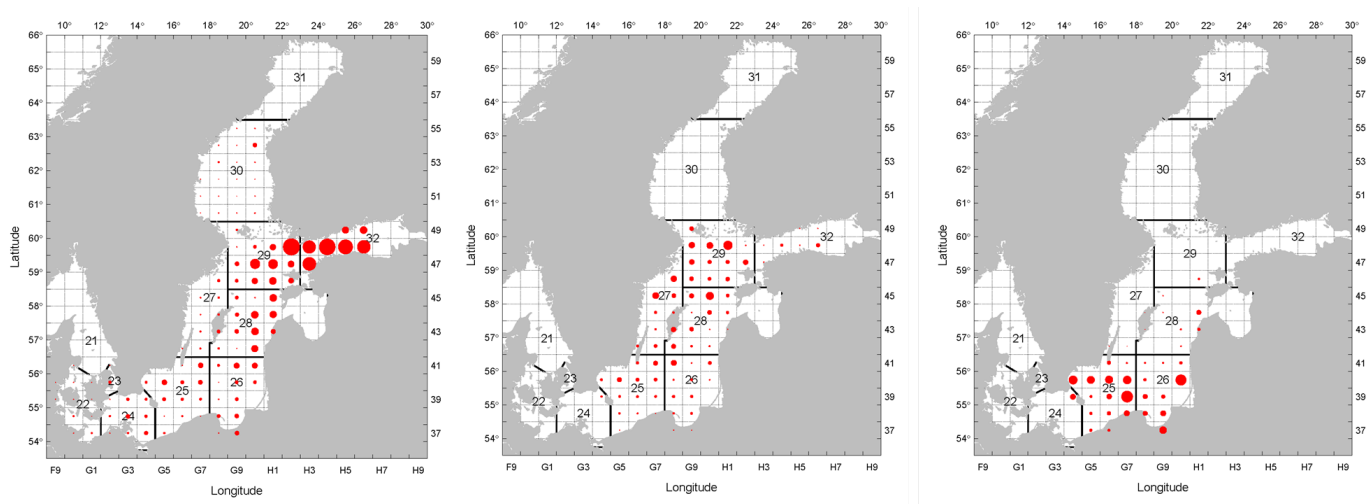


Figure 8.4.3.5 Distribution of Baltic sprat from the acoustic survey (BIAS) in the 4th quarter in 2012 (in Subdivisions 22–30) (left panel); herring in Subdivisions 25 to 29 and 32, excluding the Gulf of Riga from the BIAS survey (BIAS) in the 4th quarter in 2012 (in Subdivisions 25–29 and 32) (middle panel); Eastern Baltic Sea cod (Subdivisions 25–32) from bottom trawl survey (BITS) in the 4th quarter in 2012 (in Subdivisions 25–29 South) (right panel).