

3.3.5 Cod (*Gadus morhua*) in Subareas I and II (Norwegian coastal waters cod)

ICES stock advice

ICES advises on the basis of the Norwegian rebuilding plan, which requires access to the 2015 autumn survey results that will be available in December 2015. If the spawning-biomass index in the 2015 autumn survey is lower than the index in 2014, the fisheries regulations should aim at a reduction of F in 2016 of at least 45% relative to 2009. If the survey index is higher than in 2014, the plan stipulates that measures taken in 2015 should continue in 2016.

Stock development over time

This is a trends-based assessment. The survey indicates some increase in spawning-stock biomass (SSB) over the last two years. In view of the survey uncertainty there is a considerable risk that the SSB may still be close to its lowest value. Recruitment has remained low in recent years. Fishing mortality appears variable without a clear trend since 2000.

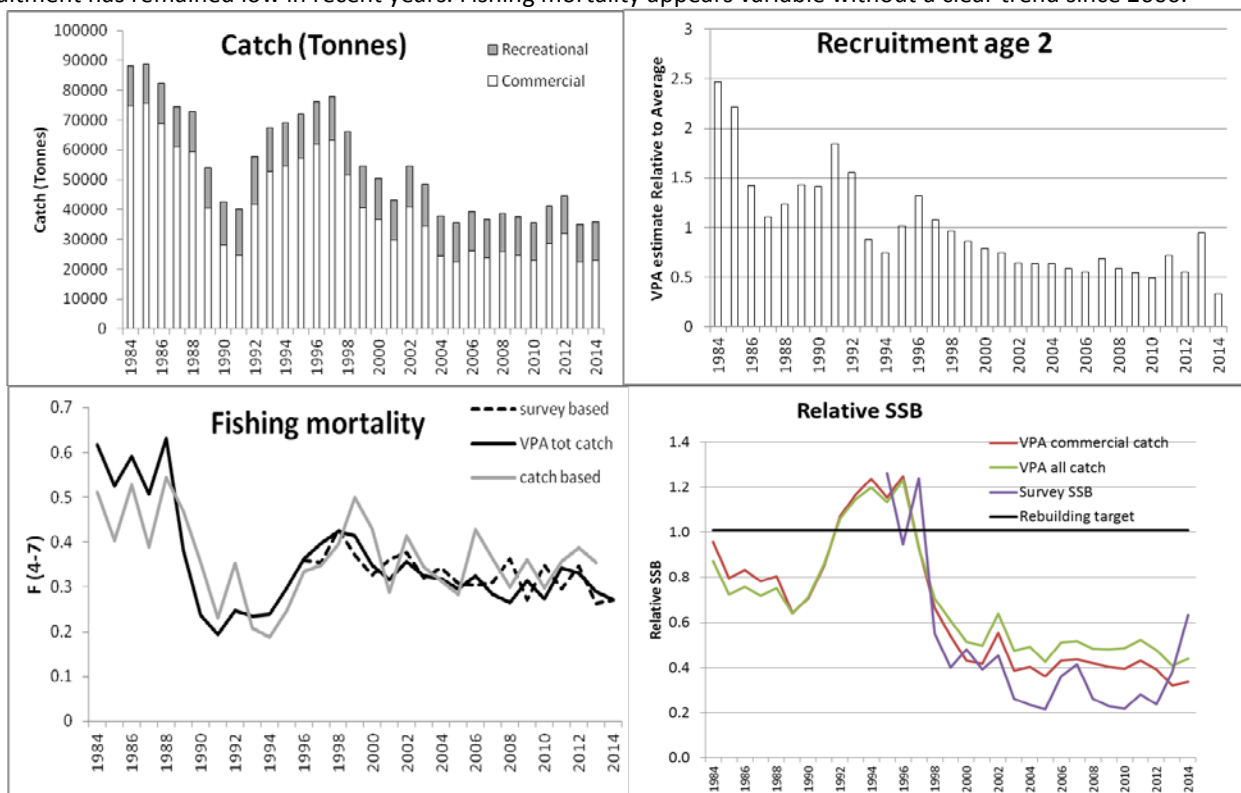


Figure 3.3.5.1 Cod in Subareas I and II (Norwegian coastal waters cod). Landings, recruitment, fishing mortality estimates, and relative SSB estimates (1 = average 1995–1998). Rebuilding target refers to survey SSB.

Stock and exploitation status

Table 3.3.5.1 Cod in Subareas I and II (Norwegian coastal waters cod). 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}	?	?	?	Undefined	MSY	?	?	?	Undefined
Precautionary approach	F_{pa}, F_{lim}	?	?	?	Undefined	B_{pa}, B_{lim}	?	?	?	Undefined
Management Plan	F_{MGT}	?	?	?	Undefined	SSB_{MGT}	?	?	?	Undefined
Qualitative evaluation	-	→	→	→	Variable without trend	-	✗	✗	✗	Close to its lowest value

Catch forecast and outlook

A trends-based assessment is provided for this stock. No fishing possibilities can be projected on this basis.

Rebuilding plan

The rebuilding plan was put into operation in 2011. The plan specifies the following reductions in fishing mortality:

Action step*	1	2	3	4	5	6 and later
Reduction of F relative to F_{2009}	15%	30%	45%	60%	75%	keep F at or below 0.1

* A new step is initiated when the most recent survey index for SSB is lower than the index in the previous year (and at the same time the most recent estimate of F is above 0.10).

The spawning-stock biomass (SSB) index in the 2010 survey was below the index in the 2009 survey. Step 1 was thus initiated in 2011. This means that the regulation in 2011 was aimed at a 15% reduction of F relative to F_{2009} . The 2011 survey gave a higher SSB index than in 2010, allowing the regulation for step 1 to continue in 2012. The 2012 survey resulted in a lower SSB index compared to 2011; accordingly step 2 was set in motion in 2013, with regulations aiming for an F at least 30% below F_{2009} . The 2013 and 2014 surveys provided an increased SSB index, allowing for the existing regulations to be continued in 2014 and 2015 (still step 2).

The trend for the stock appears stable. Under these circumstances regulations should be put in place that reduce catches according to the required reductions in F. If the 2015 SSB index is above the 2014 index, application of the rebuilding plan implies that the regulations should ensure that catches in 2016 are consistent with no less than 30% reduction in F relative to the 2009 value. If the SSB index in 2015 is lower than the index in 2014, the fisheries regulations should ensure that catches in 2016 are consistent with no less than 45% reduction in F relative to the 2009 value (step 3).

Until a biologically founded rebuilding target is defined, the stock complex will only be regarded as restored when the survey index of spawning stock in two successive years is observed to be above 60 000 tonnes (1995–1998 average).

Basis of the advice

Table 3.3.5.2 Cod in Subareas I and II (Norwegian coastal waters cod). The basis of the assessment and advice.

<p>Advice basis</p> <p>Management plan</p>	<p>Rebuilding plan.</p> <p>Norwegian rebuilding plan for coastal cod (ICES, 2010).</p> <p>The rebuilding plan, as communicated to ICES by the Norwegian Ministry of Fisheries and Coastal Affairs, states:</p> <p><i>“The overarching aim is to rebuild the stock complex to full reproductive capacity, as well as to give sufficient protection to local stock components. Until a biologically founded rebuilding target is defined, the stock complex will only be regarded as restored when the survey index of spawning stock in two successive years is observed to be above 60 000 tons¹. Importantly, this rebuilding target will be redefined on the basis of relevant scientific information. Such information could, for instance, include a reliable stock assessment, as well as an estimate of the spawning stock corresponding to full reproductive capacity.</i></p> <p><i>Given that the survey index for SSB does not increase, the regulations will aim to reduce F² by at least 15 per cent annually compared to the F estimated for 2009. If, however, the latest survey index of SSB is higher than the preceding one – or if the estimated F for the latest catch year is less than 0.1 – the regulations will be unchanged.</i></p> <p><i>Special regulatory measures for local stock components will be viewed in the context of scientific advice. A system with stricter regulations inside fjords than outside fjords is currently in operation, and this particular system is likely to be continued in the future.</i></p> <p><i>The management regime employed is aiming for improved ecosystem monitoring in order to understand and possibly enhance the survival of coastal cod. Potential predators are – among others – cormorants, seals and saithe.</i></p> <p><i>When the rebuilding target is reached, a thorough management plan is essential. In this regard, the aim will be to keep full reproductive capacity and high long-term yield.”</i></p>
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Quality of the assessment

Estimated catches in the recreational fishery represented about 35% of the total catch in 2009. However, total catches from the recreational fisheries have not been monitored on an annual basis since 2009; the assumption that they have not changed is questionable. This assumption does not influence the information on the state of the stock but may influence the effectiveness of management actions.

Issues relevant for the advice

For 2013 the rebuilding plan specified a 30% reduction of F compared to 2009. For 2013–2015 no additional regulations, supplementing those already in place in 2011 and 2012, have been communicated to ICES. According to the catch estimates the commercial catches of coastal cod in 2013 and 2014 were reduced by about 30% compared to 2012, but less than 10% compared to 2009. To obtain the reductions implied by the rebuilding plan, stronger restrictions are required in all areas where coastal cod is distributed. This includes coastal cod that are taken as bycatch in fisheries for Northeast Arctic cod, haddock, and saithe.

¹The average survey index in the years 1995–1998.

² Ages 4–7.

Reference points

No reference points have been defined for this stock. There is a rebuilding target of 60 000 t (survey SSB).

Basis of the assessment

Table 3.3.5.3 Cod in Subareas I and II (Norwegian coastal waters cod). The basis of the assessment.

ICES stock data category	3.0 (ICES, 2015c).
Assessment type	Based on survey trends.
Input data	Catch-at-age and an acoustic survey; commercial catches (landings, ages and length frequencies from catch sampling); one survey index (coastal survey, NOcoast-Aco-4Q); annual maturity data from surveys; natural mortalities assumed, $M = 0.2$. Total recreational catch.
Discards and bycatch	Not included, considered negligible.
Indicators	None.
Other information	Last benchmarked in 2015 (WKARCT; ICES, 2015a).
Working group	Arctic Fisheries Working Group (AFWG).

Information from stakeholders

The Norwegian reference fleets provide information on catch composition.

History of advice, catch, and management

Table 3.3.5.4 Cod in Subareas I and II (Norwegian coastal waters cod). History of ICES advice, the agreed TAC, and ICES estimates of landings. Weights in thousand tonnes.

Year	ICES advice	Predicted catch corresp.to advice	Agreed TAC [#]	Official landings ^{###}	ICES landings ^{##}
1987	Not assessed		40		61
1988	Not assessed		40		59
1989	No advice		40		40
1990	No advice		40		28
1991	Included in TAC for Subareas I and II		40		25
1992	Shot forecast included in TAC for I and II		40		42
1993	Shot forecast included in TAC for I and II		40		53
1994	No advice		40		55
1995	No advice		40		57
1996	No advice		40		62
1997	No advice		40		63
1998	No advice		40		52
1999	No advice		40		41
2000	No advice		40		37
2001	Reduce F considerably	22	40		30
2002	Catches should be reduced by the same proportion as for Northeast Arctic cod	13	40		41
2003	Reduce F considerably	8	40		35
2004	A recovery plan	0	20		24
2005	A recovery plan	0	21		22
2006	A recovery plan	0	21		26
2007	A recovery plan	0	21		23
2008	A recovery plan	0	21		26
2009	Zero catch and a recovery plan	0	21		25
2010	Zero catch and a recovery plan	0	21		23
2011	Same advice as last year	0	21*		29
2012	Rebuilding plan, action dependent on autumn survey	-	21*		32
2013	Rebuilding plan, action dependent on autumn survey	-	21*		22
2014	Rebuilding plan, action dependent on autumn survey	-	21*		23
2015	Rebuilding plan, action dependent on autumn survey	-	21*		
2016	Rebuilding plan, action dependent on autumn survey	-			

[#] These TACs have been added to the Norwegian TAC of Northeast Arctic cod.

^{##} Estimated according to otolith type, does not include estimated recreational catches.

^{###} Official landings are the sum of these coastal cod landings and the NEA cod landings by Norway in Table 3.3.2.2 (NEA cod Advice).

* Additional regulations were introduced to meet the objectives of the recovery plan, while the 21 000 t were still included in the combined TAC for coastal cod and Northeast Arctic cod.

History of catch and landings

Table 3.3.5.5 Cod in Subareas I and II (Norwegian coastal waters cod). Catch distribution by fleet in 2014 as estimated by ICES.

Commercial landings				Recreational catch (unreported catches)
44% gillnets	28% Danish seine	27% longline/handline	1% bottom trawl	Unreported catches in recreational fishing were estimated at 12.7 kt in 2009 and the tonnage is assumed to be constant for 2010–2014.
23.2 kt				

Table 3.3.5.6 Cod (*Gadus morhua*) in Subareas I and II (Norwegian coastal waters cod). History of commercial catch and landings, both the official and ICES estimated values are presented.

Year	Norway		Total catch/tonnes
	Commercial catch/tonnes	Recreational catch/tonnes	
1984	74.8	13.3	88.1
1985	75.5	13.4	88.9
1986	68.9	13.5	82.4
1987	61	13.5	74.5
1988	59.3	13.6	72.9
1989	40.3	13.7	54
1990	28.1	14.5	42.6
1991	24.8	15.3	40.1
1992	41.7	16.1	57.8
1993	52.6	14.8	67.4
1994	54.6	14.7	69.3
1995	57.2	14.7	71.9
1996	61.8	14.5	76.3
1997	63.3	14.5	77.8
1998	51.6	14.6	66.2
1999	40.7	13.9	54.6
2000	36.7	13.6	50.3
2001	29.7	13.4	43.1
2002	41	13.6	54.6
2003	34.6	13.9	48.5
2004	24.5	13.4	37.9
2005	22.4	13.2	35.6
2006	26.1	13	39.1
2007	23.8	13	36.8
2008	25.8	12.8	38.6
2009	24.8	12.7	37.5
2010	22.9	12.7	35.6
2011	28.6	12.7	41.3
2012	31.9	12.7	44.6
2013	22.5	12.7	35.2
2014	23.2	12.7	35.9

Summary of the assessment

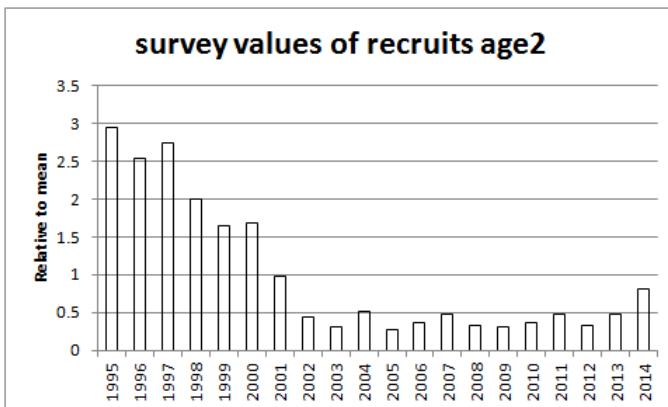


Figure 3.3.5.2 Cod in Subareas I and II (Norwegian coastal waters cod). Survey values of recruits at age 2 relative to mean.

Table 3.3.5.7 Survey estimates by number-at-age. Spawning biomass based on the annual survey observations of maturity and weights-at-age. Weights in tonnes.

Year	Age									SSB
	2	3	4	5	6	7	8	9	10+	
1995	20 191	13 633	15 636	16 219	9 550	3 174	1 158	781	579	74 992
1996	17 378	22 815	12 382	12 514	6 817	3 180	754	242	5	56 237
1997	18 827	28 913	17 334	12 379	10 612	3 928	1 515	26	663	73 660
1998	13 659	15 003	13 239	7 415	3 137	1 578	315	169	128	32 691
1999	11 309	12 171	10 123	7 197	3 052	850	242	112	54	23 771
2000	11 528	11 612	8 974	7 984	5 451	1 365	488	85	97	28 579
2001	6 729	7 994	7 578	4 751	2 567	1 493	487	189	116	23 230
2002	2 990	4 103	4 940	3 617	2 593	1 470	408	29	128	26 885
2003	2 145	3 545	3 880	2 788	2 389	1 144	589	364	80	15 521
2004	3 541	3 696	4 320	2 758	1 940	783	448	98	110	13 959
2005	1 843	3 525	3 198	3 217	1 700	1 120	552	330	78	12 709
2006	2 525	4 049	3 783	3 472	2 509	1 811	399	229	13	21 546
2007	3 300	4 080	5 518	3 259	2 447	1 444	760	197	34	24 689
2008	2 181	2 475	2 863	2 101	1 219	815	403	319	177	15 493
2009	2 059	2 722	3 959	2 536	1 603	1 259	793	443	141	13 508
2010	2 513	2 729	2 820	2 417	1 098	501	426	260	305	12 901
2011	3 266	3 950	4 571	3 012	2 185	448	478	171	339	16 725
2012	2 292	3 003	2 993	1 990	1 125	814	339	144	430	14 143
2013	3 222	2 780	3 545	2 742	2 072	1 164	971	449	431	22 856
2014	5 516	3 425	2 659	4 514	2 660	2 053	1 189	980	676	37 659

Sources and references

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