

Cod (*Gadus morhua*) in Subarea 2 between 62°N and 67°N (Norwegian Sea), southern Norwegian coastal cod

ICES advice on fishing opportunities

ICES advises that when the precautionary approach is applied, catches in 2022 should be no more than 7613 tonnes. Assuming recreational catches of 4202 tonnes, this implies a commercial catch of no more than 3411 tonnes.

Stock development over time

Fishing pressure on the stock is above F_{MSY} and stock size is below possible reference points (Figure 2). The stock size indicator has fluctuated without a trend over time.

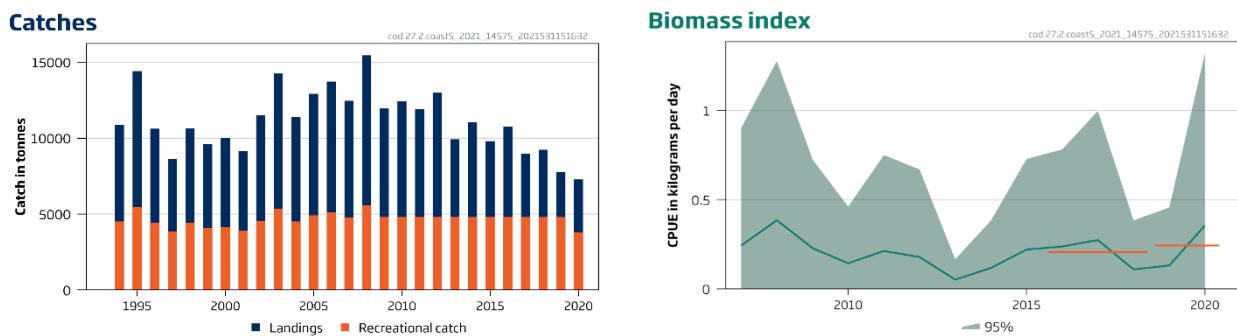


Figure 1 Cod (*Gadus morhua*) in Subarea 2 between 62°N and 67°N, southern Norwegian coastal cod. Commercial and recreational catches. Recreational catches are fixed from 2009–2019 at 4800 tonnes. Composite standardized CPUE index from the coastal reference fleet (9–15 m vessel length) in areas 6 and 7 during quarters 3 and 4, 2007–2020, as stock indicator. The horizontal orange lines indicate the average of the most recent two years and the previous three years.

Catch scenarios

ICES guidance for completing single-stock advice for category 3 stocks was applied (ICES, 2012, 2021a). A composite standardized CPUE index from the coastal reference fleet (9–15 m vessel length) in coastal waters between 62°N and 67°N during quarters 3 and 4, between 2007–2020, is used for the stock development. The advice is based on the ratio of the two latest index values (index A) with the three preceding values (index B), multiplied by the average catches for the years 2018–2020. The index is estimated to have increased by less than 20% and thus the uncertainty cap was not applied. Fishing pressure is thought to be above, and stock size is thought to be below, possible MSY reference points; therefore, the precautionary buffer was applied in the advice (Figure 2). Discarding (of dead fish) is known to take place (less than 5% in the commercial fishery [Berg and Nedreaas, 2021] and about 7% in the rod and line sector of the recreational fishery), but ICES cannot quantify the corresponding catch.

Table 1 Cod (*Gadus morhua*) in Subarea 2 between 62°N and 67°N, Southern Norwegian coastal cod. The basis for the catch scenarios [^].

Index A (2019–2020)		0.243
Index B (2016–2018)		0.207
Index ratio (A/B)		1.18
Uncertainty cap	Not applied	-
Average catches for 2018–2020		8 096
Discard rate		Not quantified
Precautionary buffer	Applied	0.8
Catch advice for 2022*		7 613
Projected commercial catch		3 411
Projected recreational catch**		4 202
% Advice change ***		-6%

[^] The figures in the table are rounded. Calculations were done with unrounded inputs, and computed values may not match exactly when calculated using the rounded figures in the table.

* [Average catches for 2018–2020] × [index ratio] × [precautionary buffer].

** [Average recreational catches for 2018–2020] × [index ratio] × [precautionary buffer].

*** Advice value for 2022 relative to average catches for 2018–2020.

The catch advice has decreased relative to the average catches 2018–2020 because of the application of the precautionary buffer but has increased relative to the catch in 2020.

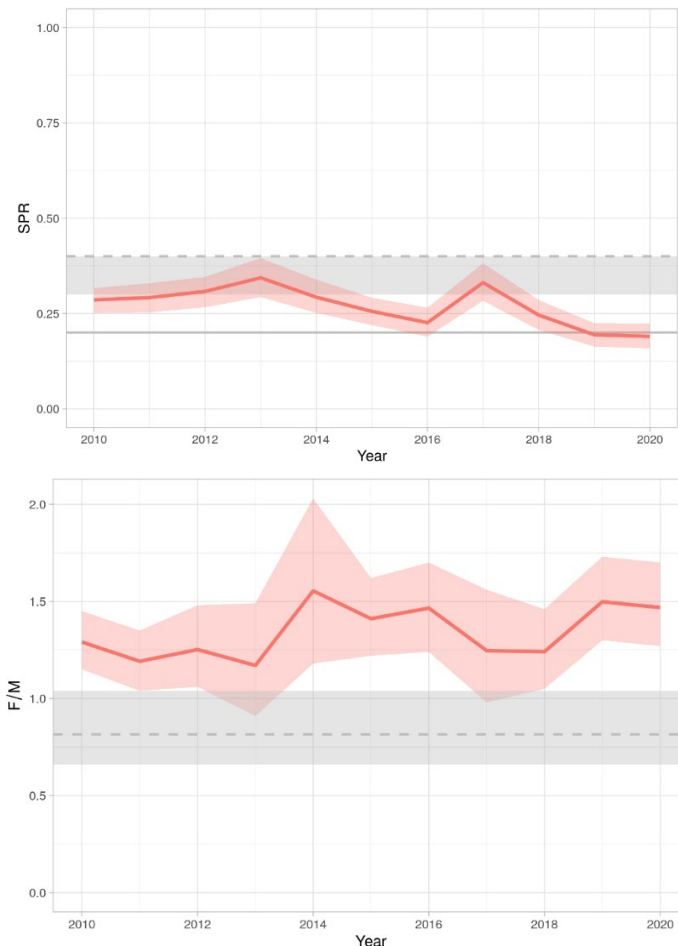


Figure 2 Cod (*Gadus morhua*) in Subarea 2 between 62°N and 67°N, southern Norwegian coastal cod. Top panel: length-based spawning potential ratio (LBSPR). Estimated spawning potential ratio (SPR) per year. Mean (solid red line) and confidence intervals (shaded red area, 95% interquartile range [IQR]), based on the stochastic LBSPR. The grey shaded area delimits the SPR30%–40% zone (common targets) and the solid grey horizontal line the SPR20% limit reference point. Bottom panel: Estimated fishing mortality, relative to natural mortality (F/M) per year. Mean (solid line) and confidence intervals (shaded red area, 95% IQR), based on the stochastic LBSPR.

Basis of the advice

Table 3 Cod (*Gadus morhua*) in Subarea 2 between 62°N and 67°N, southern Norwegian coastal cod. The basis of the advice.

Advice basis	Precautionary approach
Management plan	ICES is not aware of any agreed precautionary management plan for the stock

Quality of the assessment

A benchmark in 2021 (ICES, 2021b) resulted in a new stock definition. The assessment is uncertain. The reasons for this include highly uncertain data for the recreational catch and uncertainty in the catch split between Northeast Arctic cod and coastal cod, although the CPUE series is calculated for the 2nd half of the year to minimize the mixing of the two stocks in the data series. The assessment is also dependent on the representativeness of the coastal reference fleet's gillnet CPUE series.

Recreational catches are poorly estimated, and a prerequisite for more accurate future assessments is a better estimation of these catches.

Issues relevant for the advice

The previous advice issued for Norwegian coastal cod was for the entire stock complex north of 62°N (cod.27.1-2.coast). After the 2021 benchmark (ICES, 2021b), the stock was split into two units; cod.27.2.coastS: Cod (*Gadus morhua*) in Subarea 2 between 62°N and 67°N, southern Norwegian coastal cod, presented in this advice sheet; and, cod.27.1-2.coastN: Cod (*Gadus morhua*) in subareas 1 and 2 north of 67°N, northern Norwegian coastal cod, presented in a separate advice sheet.

The split of the coastal cod stock into two units—one data-rich in the north and one data-limited in the south—combined with improved genetic stock identification techniques improves the spatial resolution of the assessment and allows development of more targeted management measures. The stock split follows the Norwegian catch reporting areas, with areas 0, 3, 4, and 5 encompassing the northern stock and areas 6 and 7 encompassing the southern stock (Figure 3).

Norwegian coastal cod is taken as part of a mixed fishery with Northeast Arctic cod (cod.27.1-2), from which it cannot be visually distinguished. Without the option of setting a direct TAC, the coastal cod stocks are managed by technical regulatory measures. A new plan is required, with regulations better targeted to areas and seasons where catches of coastal cod are high.

The fact that the catch advice of 7 613 tonnes for cod.27.2.coastS (southern Norwegian coastal cod) is similar to the catch advice of 7 865 tonnes for cod.27.1-2.coastN[†] (northern Norwegian coastal cod) despite a considerably higher fraction of the coastal cod being in the north is not necessarily indicative of a better state for the southern stock. There is a more certain knowledge base supporting the assessment of the northern stock than the southern one. The northern stock is assessed to be below B_{lim} , and there is less evidence for this with the southern stock. The difference in advice basis is primarily due to the default ICES advice arising from the use of an analytic category 1 assessment for the northern stock and a data-limited category 3 assessment for the southern one.

[†] Version 2: Text corrected given the change to a non-zero advice for cod.27.1-2.coastN.

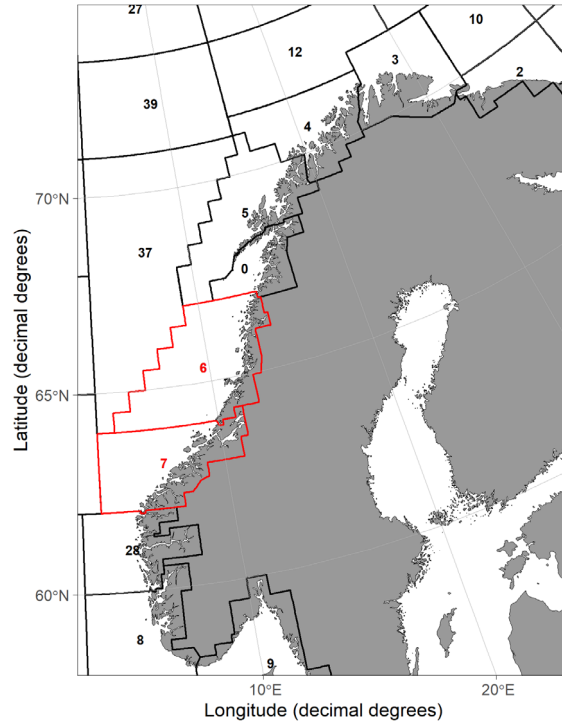


Figure 3. Cod (*Gadus morhua*) in Subarea 2 between 62°N and 67°N, southern Norwegian coastal cod. Norwegian catch reporting areas 6 and 7 (marked in red) are included in the new stock definition.

Reference points

Table 4 Cod (*Gadus morhua*) in Subarea 2 between 62°N and 67°N, southern Norwegian coastal cod. Reference points estimated with length-based indicator (LBI).

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY B _{trigger}	Not defined	Relative value from LBI analysis, assuming M/K = 0.92 at L _{inf} . L _{F=M} is based on L _c (Length at 50% of modal abundance), which varies each year	ICES (2021)
	F _{MSY}	$\frac{L_{\text{mean}}}{L_{F=M}} = 1$		
Precautionary approach	B _{lim}	Not defined		
	B _{pa}	Not defined		
	F _{lim}	Not defined		
	F _{pa}	Not defined		
Management plan	SSB _{MGT}	Not defined		
	F _{MGT}	Not defined		

Basis of the assessment

Table 5 Cod (*Gadus morhua*) in Subarea 2 between 62°N and 67°N, Southern Norwegian coastal cod. Basis of the assessment and advice.

ICES stock data category	3 (ICES, 2021c).
Assessment type	Trends-based assessment based on standardized CPUE index from the reference fleet. LBSPR model to see if the precautionary buffer is needed (ICES, 2021d).
Input data	CPUE (2007–2020) from a coastal reference fleet (9–15 m). Commercial catches (landings, age and length frequencies from commercial catch sampling); catches reported from tourist fishing businesses raised to total recreational catches, annual maturity data from the Norwegian coastal survey Q4 (A6335).
Discards and bycatch	Bycatch is included. Discarding is not included in the commercial catch, but discarding in the rod and line sector of the recreational fishery is included in the recreational catch estimate.
Indicators	Length-based indicators.
Other information	Benchmarked in 2021 (WKBARFAR; ICES, 2021b).
Working group	Arctic Fisheries Working Group (AFWG).

History of the advice, catch, and management

Table 6 Cod (*Gadus morhua*) in Subarea 2 between 62°N and 67°N, southern Norwegian coastal cod. ICES advice, TAC, and catches. All weights are in tonnes. During WKBARFAR (ICES, 2021b), the Norwegian coastal cod stock north of 62°N was split into two stocks. [See the history of the former stock \(comprising the current stocks cod.27.1-2coastN and cod.27.2coastS\)](#).

Year	ICES advice	Catch corresponding to advice	Agreed TAC	ICES estimates of commercial catches *	ICES estimates of recreational catch*	ICES estimates of total catch*
2020	-			3 806	3 481	7 287
2021	-					
2022	Precautionary approach	7 613				

* Estimated according to otolith type.

History of the catch and landings

There are no reported catches in the NEAFC Regulatory Area.

Table 7 Cod (*Gadus morhua*) in Subarea 2 between 62°N and 67°N, southern Norwegian coastal cod. Catch distribution by fleet in 2020 as estimated by ICES.

Catch (2020)	Commercial landings			Recreational catch estimates (unreported catches)	Discards
7 287 tonnes	67% gillnets	30% others incl. Danish seine and longline/handline	3% bottom trawl	3 806 tonnes*	Discarding is not included in the commercial catch, but discarding in the rod and line (from boat) sector of the recreational fishery is included in the recreational catch estimate
	3 481 tonnes				

* Estimated as 4 800 t in 2009 and assumed at the same value since, except in 2020 when it was estimated to 3 806 t (reduced fishing tourism due to COVID-19).

Summary of the assessment

Table 8 Cod (*Gadus morhua*) in Subarea 2 between 62°N and 67°N, southern Norwegian coastal cod. Assessment summary. Weights are in tonnes.

Year	CPUE index (catch [kg] per gillnet day)*	CPUE index 97.5%	CPUE index 2.5%	Recreational catch**	Commercial catch	Total catch
1994				5556	6381	11937
1995				5556	8936	14492
1996				5480	6207	11687
1997				5480	4746	10226
1998				5518	6200	11718
1999				5254	5522	10776
2000				5140	5838	10979
2001				5065	5250	10315
2002				5140	6937	12077
2003				5254	8905	14159
2004				5065	6866	11931
2005				4989	8005	12994
2006				4913	8612	13525
2007	0.242	0.90	0	4913	7695	12609
2008	0.385	1.28	0	4838	9889	14727
2009	0.228	0.73	0	4800	7145	11945
2010	0.143	0.46	0	4800	7634	12434
2011	0.212	0.75	0	4800	7128	11928
2012	0.178	0.67	0	4800	8187	12987
2013	0.052	0.166	0	4800	5131	9931
2014	0.117	0.38	0	4800	6244	11044
2015	0.220	0.73	0	4800	5004	9804
2016	0.237	0.78	0	4800	5962	10762
2017	0.274	1.00	0	4800	4159	8959
2018	0.109	0.38	0	4800	4436	9236
2019	0.131	0.46	0	4800	2965	7765
2020	0.355	1.32	0	3806	3481	7287

*Standardized CPUE from the coastal reference fleet fishing with gillnets in the area in the 2nd half of the year (to minimize the mixing with Northeast Arctic cod).

**Discarding in the rod and line (from boat) sector of the recreational fishery is included in the recreational catch estimate since 2019. Recreational catches are fixed from 2009–2019 at 4 800 t.

Sources and references

Berg, H. S. F. and Nedreaas, K. 2021. Estimation of discards in Norwegian coastal gillnet fisheries. *Fisken og havet*, 2021–1. Havforskningsinstituttet. In Norwegian. Summary in English. <https://www.hi.no/en/hi/nettrapporter/fisken-og-havet-2021-1>.

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[Download the stock assessment data and figures.](#)

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