

Cod (*Gadus morhua*) in ICES Subarea 14 and NAFO Division 1.F (East Greenland, South Greenland)

ICES stock advice

Please note: This advice was updated in June 2018 (ICES, 2018)

ICES advises that when the precautionary approach is applied, catches in 2018 should be no more than 6344 tonnes.

Stock development over time

Survey indices indicate an increase in stock size following the stock collapse in the 1990s. In the last decade, the fishery has increased along with the increasing stock. Since 2014 the stock indicators have been decreasing. Fishing pressure has increased over the past 4 years.

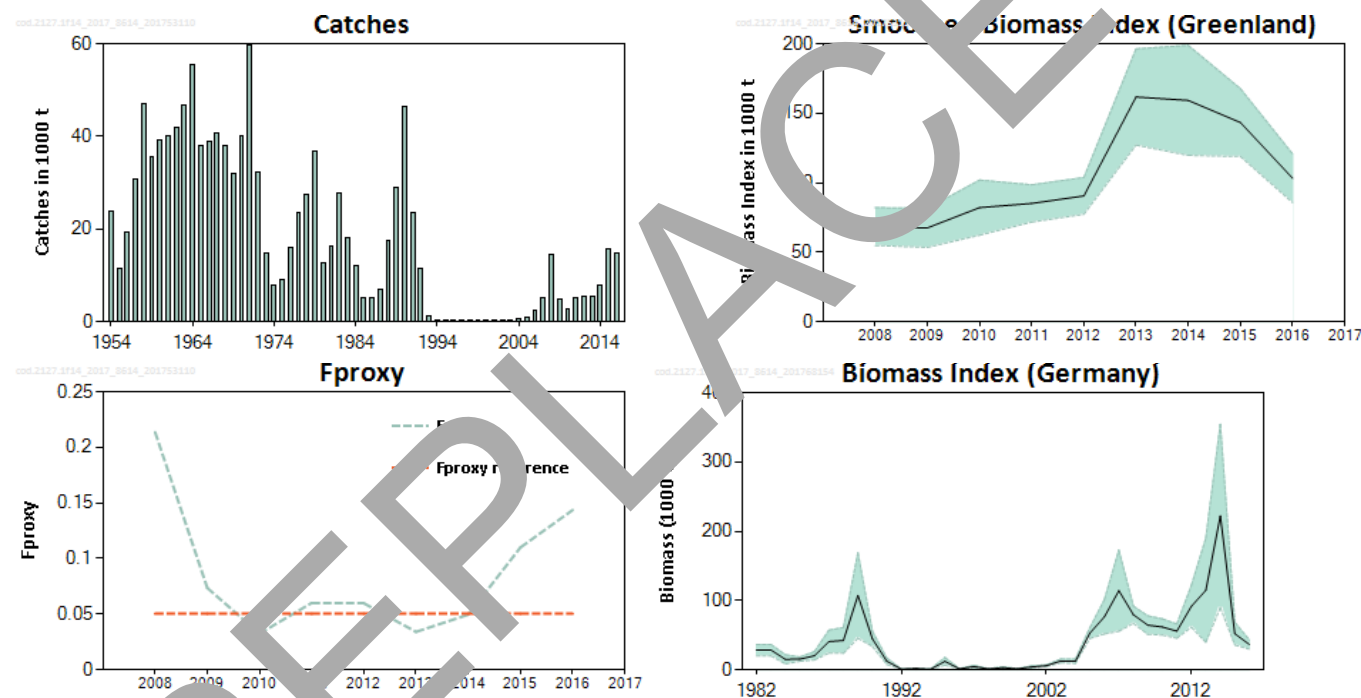


Figure 1 Cod in ICES Subarea 14 and NAFO Division 1.F. Upper left: Catch in thousand tonnes. Upper right: Stock size index from the smoothed Greenland survey with one standard deviation. Lower left: F_{proxy} based on catch/Greenland survey biomass (the dashed line is the reference F_{proxy} , calculated as the average F_{proxy} for the reference period 2011 to 2014). Lower right: Additional biomass index from the German survey with one standard deviation.

Stock and exploitation status

Table 1 Cod in ICES Subarea 14 and NAFO Division 1.F. State of the stock and fishery relative to reference points.

		Fishing pressure				Stock size				
		2014	2015	2016		2014	2015	2016		
Maximum Sustainable Yield	F_{MSY}	?	?	?	Undefined	$MSY B_{Trigger}$?	?	?	Undefined
Precautionary Approach	F_{pa}, F_{lim}	?	?	?	Undefined	B_{pa}, B_{lim}	?	?	?	Undefined
Management plan	F_{MGT}	—	—	—	Not applicable	B_{MGT}	—	—	—	Not applicable
Qualitative evaluation	-	↗	↗	↗	Increasing	-	↘	↘	↘	Declining

Catch options

The ICES framework for category 3 stocks was applied (ICES, 2012). The smoothed deep and shallow-water survey was used as the biomass indicator. The reference F_{proxy} (catch divided by smoothed survey biomass) was defined as the mean from the reference period 2011 to 2014 (ICES, 2017). The advice is based on multiplying the reference F_{proxy} with the most recent smoothed index value. The uncertainty cap was applied because the reduction relative to the advice for 2017 is greater than 20%.

The F_{proxy} used to provide advice is considered precautionary because it is based on exploitation during a period when no detrimental effects were observed on the stock. The stock status relative to candidate reference points is unknown. The precautionary buffer was applied in 2015 and was therefore not applied in 2017.

Discarding is considered to be negligible.

Table 2 Cod in ICES Subarea 14 and NAFO Division 1.F. For stocks in ICES data categories 3–6, one catch option is provided.

Index A (2016)		103 194 t
Reference F_{proxy} (2011–2014)		0.050
Advised catch for 2017		7930 t
(Index A × reference F_{proxy}) / Advised catch for 2017		0.66
Uncertainty cap	Applied	0.80
Discard rate		Negligible
Precautionary buffer	Not applied	-
Catch advice (= Advised catch for 2017 × Uncertainty cap)		6344 t

Note: 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.

Basis of the advice

Table 3 Cod in ICES Subarea 14 and NAFO Division 1.F. The basis of the advice.

Advice basis	Precautionary approach
Management plan	Greenland has a management plan. It has not been evaluated by ICES.

Quality of the assessment

The Greenland survey targets cod and is considered a reliable indicator of stock development. However, the index is associated with high uncertainty due to single large hauls. To accommodate this the advice is based on smoothed survey values.

The German survey has been conducted since the early 1980s and provides a more complete perspective of the historical stock dynamics. Both surveys indicate stock decline in recent years. The Greenland survey has a better stock coverage compared to the German survey, and it is considered to be a better index of the current situation.

Exploratory analytical assessments (SAM) have shown promise and should be developed as a basis for the advice following a benchmark process.

Issues relevant for the advice

Cod in this area is considered to represent a discrete spawning unit. However, the cod stock is distributed to both West Greenland and Iceland, which may result in large year-to-year variations in fishable biomass. Current recruitment to this stock appears to be poor.

In 2014 a management plan was implemented with a regulated TAC. The TACs have historically exceeded the ICES advice.

Reference points

No reference points are defined for this stock.

Basis of the assessment

Table 5 Cod in ICES Subarea 14 and NAFO Division 1.F. Basis of assessment and advice.

ICES stock data category	3 (ICES, 2016).
Assessment type	Survey trends-based assessment with F_{proxy} (German / Greenland survey index), with reference F_{proxy} taken from the average of the period 2011–2014 (ICES, 2017).
Input data	Catch, Greenland survey index (smoothed)
Discards and bycatch	Discarding is assumed to be negligible.
Indicators	German Greenland fish and shrimp survey in south and east Greenland
Other information	Benchmarked in 2015 (ICES, 2015)
Working group	North-Western Working Group (NWWG)

Information from stakeholders

Industry considers that a study investigating in greater detail the stock structure across the whole Greenland-Iceland area would be beneficial for management.

History of the advice, catch and management

Table 6 Cod in ICES Subarea 14 and NAFO Division 1.F. ICES advice and official landings. Separate advice for this cod stock was provided for the first time in this area for 2016. The advice up to 2011 was included in the advice for inshore cod in NAFO Subarea 1 and Offshore cod in NAFO divisions 1.A–1.E (ICES, 2011). The advice for 2012–2015 was combined advice and TAC with offshore cod in NAFO divisions 1.A–1.E (ICES, 2014). All weights are in tonnes.

Year	ICES advice procedure	ICES advice	TAC	ICES estimated landings
2004	Precautionary approach	0	5000	775
2005	Precautionary approach	0	5000	890
2006	Precautionary approach	0	5000	2456
2007	Precautionary approach	0	5000	5205
2008	Precautionary approach	0	15000	14628
2009	Precautionary approach	0	10000	4965
2010	Precautionary approach	0	5000	2669
2011	Precautionary approach	0	5000	5113
2012	Precautionary approach	0	5500	5411

Year	ICES advice procedure	ICES advice	TAC	ICES estimated landings
2013	Precautionary approach	0	6500	5509
2014	Precautionary approach	0	10000	7893
2015	Precautionary approach	0	18104	15755
2016	Precautionary approach	7577	16000	14818
2017	Precautionary approach	≤ 7930	16000	
2018	Precautionary approach	≤ 6344		

History of the catch and landings

Table 7 Cod in ICES Subarea 14 and NAFO Division 1.F. Catch distribution by fleet in 2016 as estimated by ICES.

Catch (2016)	Landings		Discards
14 818 tonnes	Trawl 58%	Longline 42%	Considered negligible
	14 818 tonnes		

Table 8 Cod in ICES Subarea 14 and NAFO Division 1.F. Total catch as estimated by ICES.

Year	Catch (t)	Year	Catch (t)	Year	Catch (t)	Year	Catch (t)
		1971	59789	1991	3538	2011	5113
		1972	32188	1992	1149	2012	5411
		1973	14725	1993	113	2013	5509
1954	23759	1974	7950	1994	437	2014	7893
1955	11567	1975	9091	1995	284	2015	15755
1956	19189	1976	15922	1996	192	2016	14818
1957	30659	1977	2345	1997	355		
1958	46972	1978	2756		345		
1959	35500	1979	36775	1999	116		
1960	39219	1980	12724	2000	152		
1961	40212	1981	16255	2001	125		
1962	41874	1982	27720	2002	401		
1963	46626	1983	18054	2003	485		
1964	55451	1984	1190	2004	775		
1965	38063	1985	187	2005	890		
1966	38956	1986	5074	2006	2456		
1967	407		7093	2007	5205		
1968	5344	1987	17388	2008	14628		
1969	31879	1989	28917	2009	4965		
1970	40023	1990	46519	2010	2669		

Summary of the assessment

Table 9 Cod in ICES Subarea 14 and NAFO Division 1.F. Assessment summary. Weights are in tonnes. SD stands for “Standard Deviation”

Year	Smoothed Biomass Index (Greenland Survey)	Greenland Survey + 1 SD	Greenland Survey - 1 SD	Fproxy	Biomass index (German survey)	German Survey + 1 SD	German Survey - 1 SD
	tonnes				tonnes		
1982					28352	36111	19937
1983					28621	36822	20420
1984					15188	21838	8538
1985					15593	23692	12494
1986					20337	26007	14279
1987					40005	57320	24284
1988					5531	61182	23880
1989					10700	16890	45800
1990					44755	50564	33854
1991					12426	17083	7769
1992					10700	1320	748
1993					20800	2672	1496
1994					7000	1302	274
1995					10000	17937	6837
1996					1591	1924	1258
1997					4873	6673	3073
1998					1370	1924	816
1999					3148	4332	1964
2000					1608	1974	1242
2001					4361	5954	2768
2002					6071	7377	4765
2003					12877	15694	10060
2004					12316	15386	9246
2005					53030	60802	45258
2006					76542	101222	51862
2007					114240	172692	55788
2008	60001	82111	54871	0.214	79568	92001	67135
2009	67490	81500	53469	0.074	64576	77934	51218
2010	20920	100000	62254	0.033	61931	73557	50305
2011	5104	98509	71699	0.06	55917	66157	45677
2012	60000	103762	77304	0.06	91670	121724	61616
2013	161676	196287	127065	0.034	114884	190032	39736
2014	159237	198798	119676	0.05	222174	354383	89965
2015	143259	167660	118858	0.11	52301	68655	35947
2016	103194	120709	85679	0.144	36656	43408	29904

Sources and references

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