

ECOREGION Iceland and East Greenland
STOCK Cod in ICES Subarea XIV and NAFO Subarea 1 (Greenland cod)

Advice summary for 2011

No fishery should take place in 2011 to improve the likelihood of establishing offshore spawning stocks in West and East Greenland.

Stock status

Fishing mortality	2007	2008	2009
F_{MSY}	Undefined	Undefined	Undefined
F_{PA}/F_{lim}	Undefined	Undefined	Undefined
Spawning Stock Biomass (SSB)	2008	2009	2010
$MSY B_{trigger}$	Undefined	Undefined	Undefined
B_{PA}/B_{lim}	Undefined	Undefined	Undefined

All information indicates that the cod biomass is low compared to prior to 1990s. The offshore component has been severely depleted since 1990, but has started to recover since 2005. An offshore cod directed fishery has started for the first time since 1992 with recent annual catches up to 22 000 t. Surveys indicate a large 2003 year-class, and the first significant year-class since 1985. Following the 2003 year class recruitment has been low. Dense concentrations of large spawning cod have been found off East Greenland in 2007 and 2009.

The landings by the coastal fleet component have increased by a factor of ten over the last decade. Inshore recruitment since 2000 shows some signs of improvement.

Stock size and exploitation rate of the inshore component are unknown.

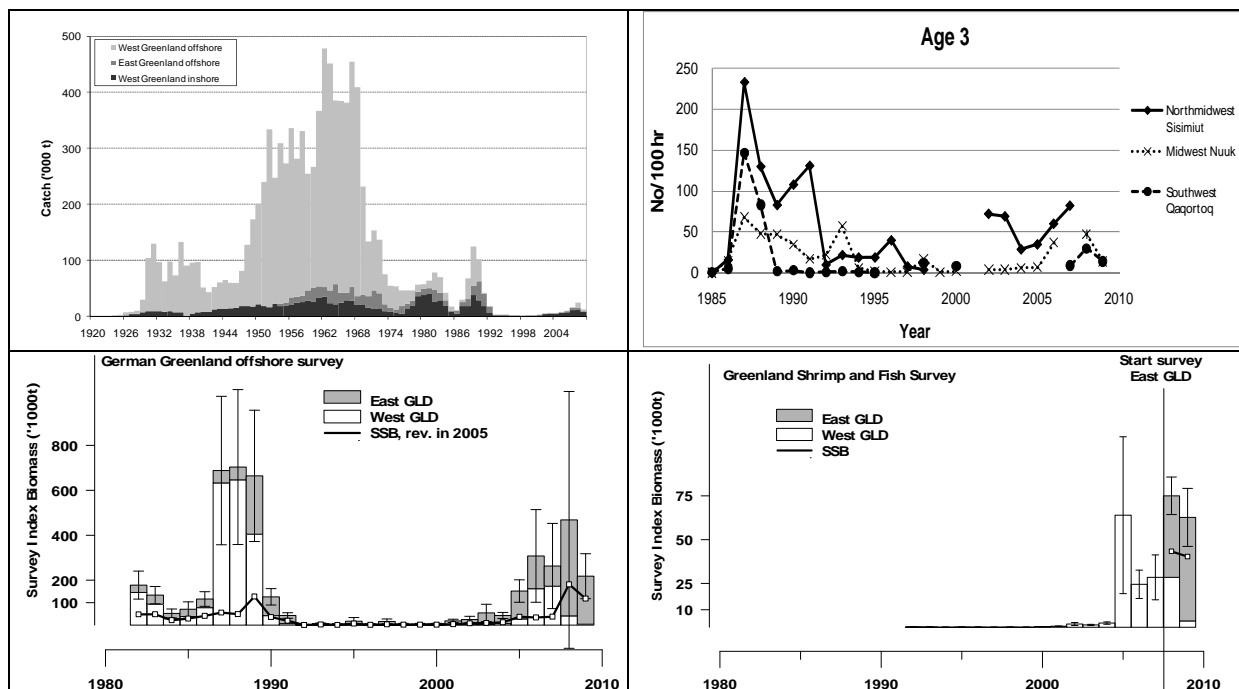


Figure 2.4.1.1 Landings, inshore recruitment indices and offshore survey indices for Greenland Cod. Upper right: Recruitment index from inshore areas; Lower: biomass indices from German (left) and Greenland surveys (right).

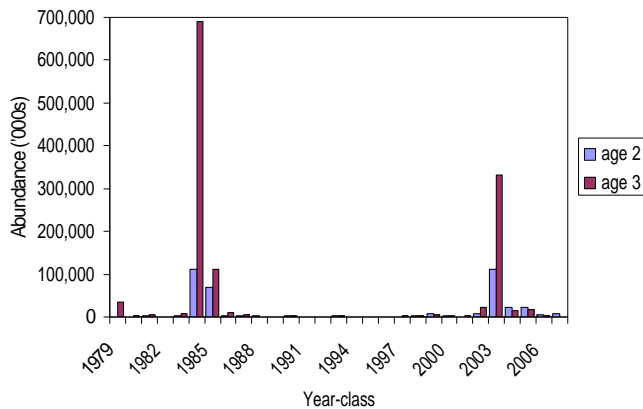


Figure 2.4.1.2 Abundance indices of cod ages 2 and 3 (West and East Greenland total) from the German survey in Greenland.

Management plans

Greenland and EC established an agreement on offshore fisheries valid from 2007 to 2012. A variable TAC regulation has been agreed. The agreement also provides for a transfer of unutilized quota into future years, should a rapid increase in the stock occur.

The management agreement between EC and Greenland has not been evaluated by ICES.

Biology

Cod in Greenland derives from three stock components, labeled by their spawning areas: I) an offshore Greenland spawning stock, II) inshore West Greenland fiords spawning populations, and III) Icelandic spawned cod that drift to Greenland with the Irminger Current.

Environmental influence on the stock

Deterioration of the environmental conditions, combined with high fishing mortality, caused the offshore cod stock to be severely depleted in the 1970s.

The present environmental and biological conditions (high temperatures and large shrimp stocks) have facilitated re-colonization of the offshore areas.

The fisheries

Cod is taken in a targeted trawl fishery. By-catches of juvenile cod occur mainly in the shrimp fishery. Before the introduction of the sorting grid in 2002, larger amounts of juvenile cod may have been caught in the shrimp fishery than at present. The by-catches of cod in the present shrimp fisheries are estimated to be insignificant.

Quality considerations

The main uncertainties in the assessment are related to difficulties in distinguishing and sampling different cod stock components, changes in survey design, and low sampling intensity from commercial catches. However these uncertainties do not affect the overall conclusions on stock status and advice.

Scientific basis

Assessment type	Stock trends
Input data	3 survey indices: Greenland fish and shrimp survey, German groundfish survey, West Greenland young cod gill-net survey.
Discards and by-catch	
Indicators	None
Other information	
Working group report	NWWG

ECOREGION **Iceland and East Greenland**
STOCK **Cod in ICES Subarea XIV and NAFO Subarea 1 (Greenland cod)****Outlook for 2011**

No offshore fisheries have taken place over a period of 15 years. No analytical assessment is available for this stock because of the lack of a time series of landings since 1990.

MSY approach

Further work is required on implementation of the MSY approach.

PA approach

No fishery should take place in 2011 to allow for rebuilding of the spawning stock.

Management agreement

There is no explicit management objectives for the cod stocks in Greenland. A multi-annual management plan should include monitoring the trajectory of the stock, clearly stating specified reopening criteria, and monitoring the fishery when it is reopened.

Additional considerations***Management considerations***

Presently no management objectives have been set for this stock. The elements to consider when setting the management objective could include consideration of robust offshore spawning at both East and West Greenland. The SSB should in both areas comprise several year-classes.

In the last century, emigration of adult cod from Greenland to Icelandic waters is indicated by results from tagging returns and catch at age anomalies. High abundance of larvae in East Greenland waters in years where recruitments has been high in Iceland indicate that some of these year classes have originated from spawning in Iceland. Based on catch at age data anomalies attempts have been made to estimate the amount of immigration in the historic part of the assessment. Tag returns, survey estimates in Greenlandic waters as well as anomalies in the catch-at-age matrix in Iceland indicate that a portion of the moderate 2003 year class that has been observed in Greenlandic waters in recent years may have migrated to Icelandic waters in 2009.

A redfish fishery in East Greenland has been developing in recent years and the fishery takes place in regions of cod spawning aggregations. Measures should be implemented to minimize bycatch of cod.

Regulations and their effects

In the offshore fisheries the regulations in force include quota constraints, closed areas, minimum mesh size and minimum landing size (40 cm). Greenland has set an offshore cod TAC of 5000 t in 2010. To protect the spawning stock in the Greenland EEZ all fisheries for cod are prohibited north of 62°N latitude off East Greenland. Off West Greenland the offshore areas west of 44°N longitude are closed to fisheries for cod to protect the 2005 year-class that will enter the SSB in 2010–12.

The coastal fleets TAC is set at 5000 t in 2010. The fleet is limited by gear, vessel size, and minimum landing size, and is mostly operating in inshore and coastal waters.

Comparison with previous advice

The advice is the same as previous years.

Sources

ICES. 2010. Report of the North-Western Working Group, 27 April – 4 May 2010. ICES CM 2010/ACOM:07.

Table 2.4.1.1 Cod in ICES Subarea XIV and NAFO Subarea 1 (Greenland cod).ICES advice, management and catches

Year	ICES advice for Subarea XIV ¹	Pred. catch for Corresp. to advice	TAC				West inshore	East	West in+off	Total
			East	Coastal	West	Total				
1987	TAC	5	11.5		12.5		8	7	12	19
1988	No increase in F	10 ²	11.5		53		23	9	63	72
1989	TAC	5	15		90		39	15	112	126
1990	No specific recommendation	-	15		110	125	30	34	98	132
1991	No advice	-	25		90	115	19	22	20	42
1992	No advice	-	17.25		66	99.25	6	11	6	17
1993	No fishing	0	17.25		66	83.25	2	1	2	3
1994	No fishing on offshore stock complex	0	17.25		66	83.25	2	<1	2	3
1995	No fishing on offshore stock complex	0	17.25		66	83.25	2	<1	2	2
1996	No fishing on offshore stock complex	0	17.25		66	83.25	1	<1	1	1
1997	No fishing on offshore stock complex	0	17.25		66	83.25	1	<1	1	1
1998	No fishing on offshore stock complex	0	17.25		66	83.25	<1	<1	<1	<1
1999	No fishing on offshore stock complex	0	17.25		66	83.25	<1	<1	<1	<1
2000	No commercial fishing	0	17.25		66	83.25	<1	<1	<1	<1
2001	No commercial fishing	0	17.25		66	83.25 ³	2	<1	2	2
2002	No commercial fishing	0				54.25 ³	4	<1	4	4
2003	No commercial fishing	0				54.25 ³	5	<1	5	5
2004	No commercial fishing	0				5	5	<1	5	5
2005	No fishing	0				5	6	<1	6	7
2006	No fishing	0				5	7	2	8	10
2007	No fishing	0				5	12	3	13	16
2008	No fishing	0				15	13	3	22	25
2009	No fishing	0		10	10 ⁴	20	8	2	11	13
2010	No fishing	0		5	5 ⁴	10				
2011	No fishing									

Weights in '000 t.

¹Advice for NAFO Subarea 1 provided by NAFO Scientific Council.

²Preliminary catch corresponding to advice.

³Since 2001 the agreed TAC has been based on a variable system accounting for the actual stock status and more flexibility between East and West Greenland. The given TAC figures represent the maximum levels that could be taken in case of stock recovery only.

⁴ Combined offshore East and West

Table 2.4.1.2

Greenland cod in ICES Subarea XIV and NAFO Subarea 1, Nominal landings in tonnes of cod in NAFO Subarea 1, 1988–2008 as officially reported to ICES.

COUNTRY	1988	1989	1990	1991	1992	1993
Faroe Islands	-	-	51	1	-	-
Germany	6.574	12.892	7.515	96	-	-
Greenland	52.135	92.152	58.816	20.238	5.723	1.924
Japan	10	-	-	-	-	-
Norway	7	2	948	-	-	-
UK	927	3780	1.631	-	-	-
Total	59.653	108.826	68.961	20.335	5.723	1.924
WG estimate	62.653 ²	111.567 ³	98.474 ⁴	-	-	-

COUNTRY	1994	1995	1996	1997	1998	1999
Faroe Islands	-	-	-	-	-	-
Germany	-	-	-	-	-	-
Greenland	2.115	1.710	948	904	319	622
Japan	-	-	-	-	-	-
Norway	-	-	-	-	-	-
UK	-	-	-	-	-	-
Togo	2.115	1.710	-	-	-	-
Total	-	-	948	904	319	622
WG estimate	-	-	-	-	-	-

COUNTRY	2000	2001	2002 ¹	2003 ¹	2004 ¹	2005
Faroe Islands						
Germany						
Greenland	764	1680	3698	3989	4948	
Japan						
Norway				693 ⁵		
UK						
Togo				533 ⁵		
Total	764	1680	3698	5215		
WG estimate	-	-				6118

COUNTRY	2006	2007	2008	2009
Faroe Islands				
Germany				
Greenland				
Japan				
Norway				
UK				
Togo				
Total				
WG estimate	7769	13313	21921	10956

¹) Provisional data reported by Greenland authorities

²) Includes 3,000 t reported to be caught in ICES Sub-area XIV

³) Includes 2,741 t reported to be caught in ICES Sub-area XIV

⁴) Includes 29,513 t caught inshore

⁵) Transshipment from local inshore fishers

Table 2.4.1.3

Greenland cod in ICES Subarea XIV and NAFO Subarea 1, Nominal landings in tonnes of cod in ICES Subarea XIV, 1988–2008 as officially reported to ICES.

COUNTRY	1988	1989	1990	1991	1992	1993
Faroe Islands	12	40	-	-	-	-
Germany	12.049	10.613	26.419	8.434	5.893	164
Greenland	345	3.715	4.442	6.677	1.283	241
Iceland	9	-	-	-	22	-
Norway	-	-	17	828	1.032	122
Russia		-	-	-	126	
UK (Engl. and Wales)	-	1.158	2.365	5.333	2.532	-
UK (Scotland)	-	135	93	528	463	163
United Kingdom	-	-	-	-	-	46
Total	12.415	15.661	33.336	21.800	11.351	-
WG estimate	9.457 ¹	14.669 ²	33.513 ³	21.818 ⁴	-	736

COUNTRY	1994	1995	1996	1997	1998	1999
Faroe Islands	1	-	-	-	-	6
Germany	24	22	5	39	128	13
Greenland	73	29	5	32	37 ⁵	+ ⁵
Iceland	-	1	-	-		-
Norway	14	+	1	-	+	2
Portugal					31	-
UK (E/W/NI)	-	232	181	284	149	95
United Kingdom	296					
Total	408	284	192	355	345	116
WG estimate	-	-	-	-	-	-

COUNTRY	2000	2001	2002 ⁵	2003 ⁵	2004	2005
Faroe Islands					329	205
Germany	3	92	5	1		
Greenland		4	232	78	23	1
Iceland	-	210				
Norway	- ⁵	43	13		5	507
Portugal	-	278				
UK (E/W/NI)	149	129				55
United Kingdom			34			
Total	152	756	284	79	357	
WG estimate	-		448 ⁶	294 ⁷		836 ⁸

¹) Excluding 3,000t assumed to be from NAFO Division 1F and including 42t taken by Japan²) Excluding 2,74 t assumed to be from NAFO Division 1F and including 1,500t reported from other areas assumed to be from Sub-area XIV and including 94t by Japan and 155t by Greenland (Horsted, 1994)³) Includes 129t by Japan and 48 t additional catches by Greenland (Horsted, 1994)⁴) Includes 18t by Japan⁵) Provisional data⁶) Includes 164t from Faroe Islands⁷) Includes 215t from Faroe Islands⁸) Includes 68t from Norway

Table 2.4.1.3 Cont Nominal catch (t) of cod in ICES Subarea XIV.

COUNTRY	2006	2007	2008	2009
Faroe Islands		305		
Germany	775	772		5
Greenland				
Iceland				
Norway	479	613		8
Portugal				
UK (E/W/NI)				544
United Kingdom		180		
Total				
WG estimate	1981	3221	2997	1720