



Biologisk rådgivning 2013 - rejer

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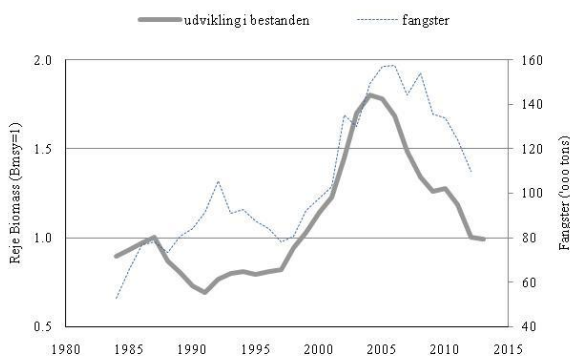
## Orientering vedrørende den biologiske rådgivning for fiskeri på rejebestandene ved Vest- og Østgrønland for 2013

### Rejer Vestgrønland:

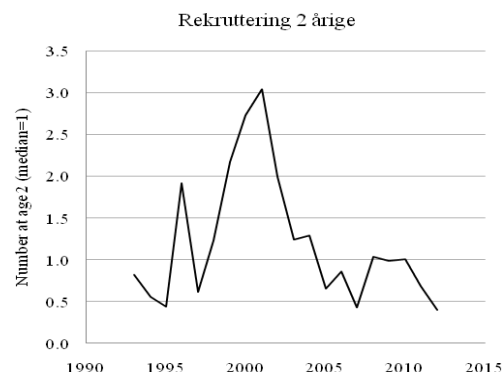
Rejebestanden i Vestgrønland falder fortsat og rådgivningen for 2013 er, at fangsterne ikke bør overstige 80.000 tons. Rådgivningen for 2012 var på 90.000 tons (og 120.000 tons i 2011).

Fangstniveauet for 2013 er fastsat med udgangspunkt i:

- fortsat faldende biomasse
- rekord lav rekruttering af små rejer til det kommende fiskeri
- biomassen i de udenskærs områder består af mange hunner og fiskeriet forventes hermed at reducere den gydende del af bestanden, hvilket igen påvirker rekrutteringen i negativ retning
- biomassen af torsk i 2012 i rejeområderne er på samme niveau som sidste år og dødeligheden forårsaget af torsk er derfor fortsat høj.



Figur 1. rejebestandens udvikling (som biomasse) siden 1983 og totale fangster i samme periode.



Figur 2. antal af 2 årige rejer fra 1993 til 2012.

Faldet i rejebestanden har været ventet og rådgivningen har siden 2005 påpeget dette. Bestanden befandt sig på et meget højt niveau fra 2003 til 2006 og har siden været på vej ned.

Herunder en kort gennemgang af baggrunden for rådgivningen – se figurer på side 3:

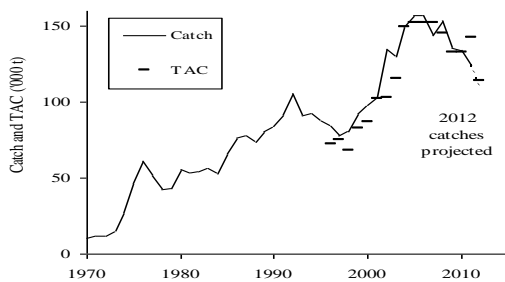
1. De samlede fangster steg fra 80.000 tons i 1998 til ca. 150.000 tons/år i perioden 2004-2008 (figur 3). Siden 2009 faldt fangsterne som følge af lavere kvotefastsættelse i Grønland. Fangsterne i 2011 forventes på 110.000 tons (heraf 1.300 tons i canadisk farvand).

Fangsterne i 2003 – 2005 (150.000 tons /år) udgjorde kun en mindre del af en meget høj biomasse (udnyttelsesraten: fangst/biomasse). Efter bestanden (biomassen) af rejer er faldet udgør fangsterne en større andel end tidligere og dermed påvirkes bestanden mere.

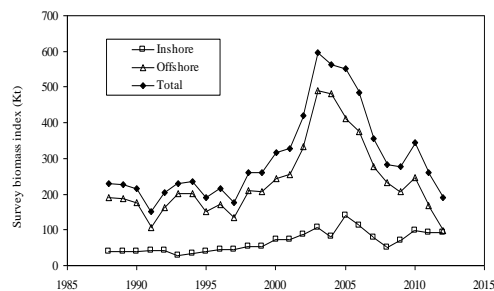
2. De biologiske undersøgelser (surveys) viser, at rejebiomassen fra 2003 til 2012 er faldet til et niveau, der svarer til den biomasse, der var til stede i slutningen af 1990'erne (figur 4). De biologiske undersøgelser viser et meget stort fald i biomassen udenskærs og en biomasse i Diskobugten på et stabilt og relativt højt niveau.
3. Fangstraterne jf. logbøger (CPUE-indekset) har i perioden 2009 til 2012 ligget på et lavere niveau i forhold til 2005-2008. Der har gennem flere år været indikationer på, at fangstraterne ikke afspejler udviklingen i bestanden: Dette skyldtes, at de biologiske undersøgelser har vist et relativt stort fald i biomassen siden 2003, hvor fangstraterne først har vist et mindre faldt siden 2008 (figur 4).
4. Torsk (torsken spiser rejer): Forekomsten af torsk har historisk haft en stor indflydelse på rejebestanden, der falder ved stigende torskeforekomster. De biologiske undersøgelser fra 2012 viser, at bestanden af torsk i rejeområderne er på samme niveau som i 2011 (effektive torskebiomasse). Den høje forekomst af torsk vurderes til at være medvirkende til faldet i rejebestanden.
5. Rekruttering (tilgangen af små rejer) af 2-årige rejer har været for nedad gående siden 2002 og ligger i 2012 på laveste niveau i tidsserien (figur 2). Antallet af 2-årige rejer, der vil indgå i den fiskbare bestand om 2 til 4 år har været lav siden 2005 og kan derfor ikke forventes en umiddelbar opgang i rejebestanden. Endvidere er biomassen af rejer i størrelsen (15–22 mm CL) lav og der forventes derfor en nedgang i rekrutteringen til den fiskbare bestand i 2013 (næste år).
6. Fiskeriet har i flere år koncentreret indsatsen til stadig mindre områder og fiskeriet foregår i dag, i området nord for Store Hellefiskebanke og i Diskobugten, hvilket svarer til rejefiskeriet udbredelsesområde i slutningen af 1980'erne.
7. Den matematiske model, der benyttes i rådgivningen inddrager fangsterne (det samlede udtag af bestanden), fangstrater (CPUE fra logbøger) og biologiske undersøgelser (surveys på biomasse), samt et mål for biomassen af torsk (fordi torsk spiser af rejer)(figur 3).

Modellen viser, at ved fangster på 80.000 tons i 2013 er risikoen for at overskride den bæredygtige dødelighed ( $Z_{msy}$ ) på 34 %. Dette er samme risikoniveau som i rådgivningen for 2012. Modelberegninger viser, at fangster på 80.000 tons vil medføre at bestanden holder sig på og over et bæredygtigt niveau. Det videnskabelige råd anbefaler derfor, at fangsterne ikke overstiger 80 000 t.

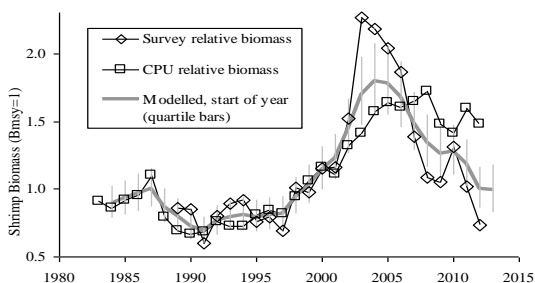
8. I forvaltningsplanen for reje fiskeriet i Vestgrønland, vedtaget af Naalakkersuisut fremgår det: ”at kun i yderst ekstreme tilfælde kan være tale om årlige udsving i TAC’en på mere end 10%”. Fangsterne i 2012 forventes at være på 110.000 tons. Såfremt rådgivningen følges er der tale om en nedgang på 30.000 tons eller 27 %.



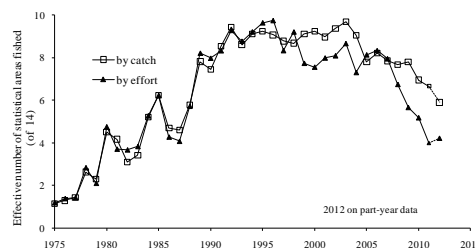
Figur 3. Totale fangster (2011: Grønland 124.000 tons, Canada 1.300 tons).



Figur 5. Biomassen fra de biologiske undersøgelser indenskærs og udenskærs



Figur 4. Bestandens udvikling fra 1975–2012 (modelberregning).



Figur 6. Bestandens udbredelsesområde (fra logbøger). Fra 1975 til 2012.

### Rejer Østgrønland:

Rådgivningen for rejebestanden ved Østgrønland for 2013 er uændret på 12.400 tons. Data fra fiskeriet og fra de biologiske undersøgelser antyder en mindre nedgang i bestanden siden 2009. Såfremt nedgangen i bestanden fortsætter, bør fangsterne reduceres. Kvoterne har siden 2004 været på 12.400 tons. Fangsterne er siden 2003 faldet fra ca. 13.000 tons til under 3.000 tons. I 2011 forventes fangsterne at ligge under 2.000 tons.

Bilag 1 og bilag 2 er de engelske sammendrag af rådgivningen fra NAFO for henholdsvis Vest- og Østgrønland.

GN har skrevet og fremlagt i alt 7 dokumenter, der tilsammen danner baggrunden for rådgivningen for Vest- og Østgrønland. Rådgivningen for rejer er formuleret på det seneste møde under NAFO/ICES, som blev afholdt 17.–24. oktober 2012. På mødet deltog i alt 15 forskere fra Canada, EU, Norge, Rusland og fra Grønland (GN) deltog seniorforsker Michael Kingsley, Nanette Hammeken Arboe og afdelingschef Helle Siegstad. Den officielle rådgivning findes på NAFOs ([www.NAFO.int](http://www.NAFO.int)) hjemmeside. Den engelske rapport over rådgivningen fra NAFO består af mere end 100 sider A4, som Departement og Styrelsen for Fiskeri modtager en kopi af.

Med venlig hilsen

Helle Siegstad, Afdelingschef

## Bilag 1. Northern shrimp in Subareas 0 and 1

**Recommendation:** Recent catches are not estimated to be sustainable. Scientific Council therefore recommends that catches in 2013 should be substantially lower.

The risk of exceeding  $Z_{msy}$  in 2013 at a catch level of 80 000 t with an effective cod stock at the 2012 level (22 700 t) is estimated to be around 34%. Model results estimate catches at that level in the medium term to be associated with an increasing stock above  $B_{msy}$ .

Given the level of risk which was accepted in 2012, Scientific Council recommends that catches in 2013 should not exceed 80 000 t.

**Background:** The shrimp stock off West Greenland is distributed in Subarea 1 and Div. 0A east of 60°30'W. A small-scale inshore fishery began in SA 1 in the 1930s. Since 1969 an offshore fishery has developed.

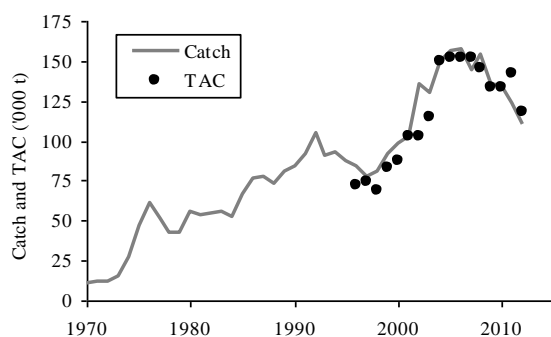
**Fishery and Catches:** The fishery is prosecuted mostly by Greenland in SA 1 and Canada in Div. 0A. Canada did not fish in 2008 and fished little in 2009, but has since resumed fishing. Recent catches are:

Year	Catch ('000 t)		TAC ('000 t)	
	NIPAG	STATLANT 21	Advised	Actual <sup>2</sup>
2009	135.5	134.0	110	133.0
2010	134.0	129.2 <sup>1</sup>	110	133.0
2011	124.0	122.1 <sup>1</sup>	120	142.4
2012	110.0 <sup>3</sup>		90	117.9

<sup>1</sup> Provisional.

<sup>2</sup> Total of TACs set independently by Greenland and Canada.

<sup>3</sup> Predicted to year end by industry observers.



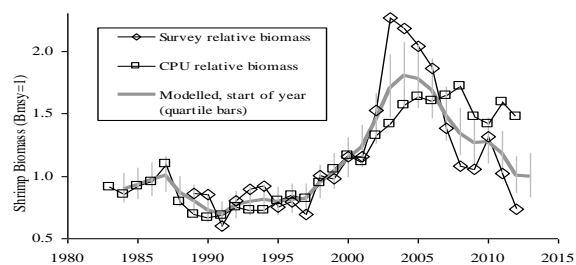
**Data:** Catch, effort, and position data were available from all vessels. Indices of how widely the stock and the fishery were distributed were calculated from catch positions in the fishery and the survey.

Series of biomass and recruitment indices and size- and sex-composition data were available from research surveys. Series of cod biomass and cod consumption were also available.

**Assessment:** An analytical assessment framework was used to describe stock dynamics in terms of biomass ( $B$ ) and mortality ( $Z$ ) relative to biological reference points.

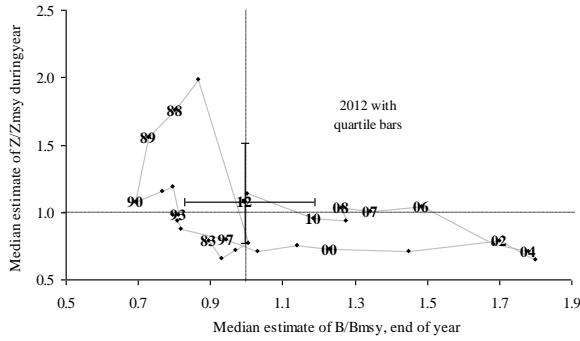
The model used was a stochastic version of a surplus production model including an explicit term for predation by Atlantic cod, stated in a state-space framework and fitted by Bayesian methods.  $MSY$  (Maximum Sustainable Yield) defines maximum production, and  $B_{msy}$  is the biomass level giving  $MSY$ .

A precautionary limit reference point for stock biomass ( $B_{lim}$ ) is 30% of  $B_{msy}$  and the limit reference point for mortality ( $Z_{lim}$ ) is  $Z_{msy}$ . Recent CPUE values have stayed high, while the area fished has contracted and survey biomass indices have decreased, and CPUE is not now considered a reliable index of biomass. The weight given to it in the model was therefore reduced in 2011. The median estimate of  $MSY$  in 2012 was 132 000 t/yr.

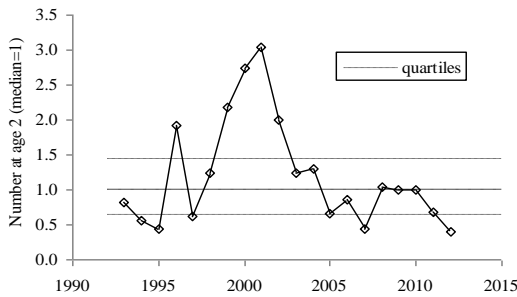


**Biomass.** A stock-dynamic model showed a maximum biomass in 2003 with a continuing decline since; the probability that biomass will be below  $B_{msy}$  in 2012 with projected catches at 110 000 t was estimated at 51%; of its being below  $B_{lim}$  at 1–2%.

**Mortality.** The mortality caused by fishing and cod predation ( $Z$ ) is estimated to have stayed below the upper limit reference ( $Z_{msy}$ ) from 1996 to 2005, but is estimated to have averaged 2.6% over the limit value in 2006 - 2012. With catches projected at 110 000 t the risk that total mortality in 2012 would exceed  $Z_{msy}$  was estimated at about 56%. Atlantic cod is, in 2012, more concentrated in southerly areas where shrimps are now scarce, and predation is expected to be moderate or low.



**Recruitment.** The stock structure in 2012 is deficient in fishable males, presaging poor short-term recruitment to the spawning stock. Pre-recruits (CL 14–16.5 mm), expected to enter the fishery in 2013, have been few since 2008 in absolute terms. Numbers at age 2 in 2012 have declined to their lowest-ever level, so medium-term recruitment is also expected to be poor.



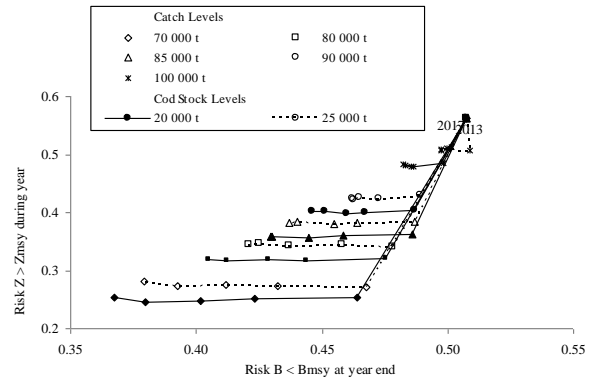
**State of the Stock.** Modelled biomass is estimated to have been declining since 2004. At the end of 2012 biomass is projected to be close to  $B_{msy}$ . Total mortality is projected to exceed  $Z_{msy}$ . Recruitment to the fishable and spawning stock in the short- and medium-term is expected to remain low.

**Short-term predictions:** Estimated risks for 2013 with an “effective” (the amount of cod biomass overlapping the shrimp biomass) 25 000 t cod stock are:

25 000 t cod	Catch option ('000 t)						
	70	75	80	85	90	95	100
Risk of transgressing (%):							
Bmsy, end 2013	47	48	48	49	49	50	51
Blim, end 2013	1	1	1	1	1	1	2
Zmsy, in 2013	27	31	34	38	43	47	51
Zmsy, in2014	27	31	34	38	42	47	51

**Medium-term Predictions:** Projected probabilities of transgressing precautionary reference levels after 3 years in the fishery for Northern Shrimp on the West Greenland shelf with ‘effective’ cod stocks assumed at 20 000 t (20Kt) and 25 000 t (25Kt) were estimated at:

Catch (Kt/yr)	Prob. biomass < $B_{MSY}$ (%)		Prob. biomass < $B_{lim}$ (%)		Prob. mort > $Z_{msy}$ (%)	
	20 Kt	25 Kt	20 Kt	25 Kt	20 Kt	25 Kt
	70	40	41	2	3	25
75	41	43	2	3	28	31
80	43	44	2	3	32	34
85	44	45	3	3	36	38
90	46	47	3	3	40	43
95	47	49	3	3	44	46
100	48	50	3	3	48	51



**Special Comments:** Scientific Council notes that the fishable biomass offshore comprises a high proportion of females, so fishing on this stock in this state will disproportionately reduce the spawning stock biomass. Recruitment in absolute terms is expected to be low in both the short and medium term.

Scientific Council was not in a position to predict the cod stock so assumed that the cod stock in 2013 would be at the same level as 2012 in its analysis. Should the cod stock increase beyond this assumption, catches may have to be decreased further.

**Sources of Information:** SCR Docs 04/75, 04/76, 08/62, 12/44, 12/45, 12/46, 12/48, 11/57, SCS Doc. 04/12.

## Bilag 2. b) Northern shrimp in Denmark Strait and off East Greenland

**Recommendation:** Scientific Council finds no basis to change its previous advice at this time and recommends that catches should remain below 12 400 tons in 2012.

Scientific Council notes that stock indicators have declined after 2009. If this trend continues, future catch levels may need to be reduced.

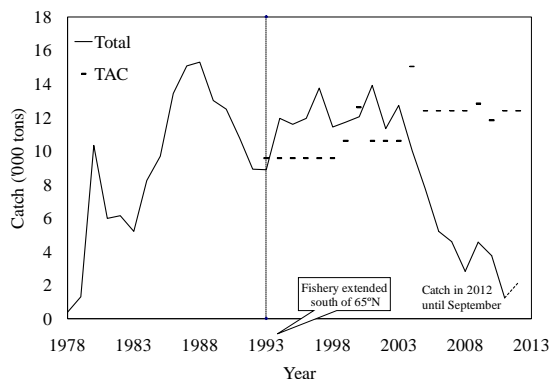
**Background:** The fishery began in 1978 in areas north of 65°N in Denmark Strait, where it occurs on both sides of the midline between Greenland and Iceland. Areas south of 65°N in Greenlandic waters have been exploited since 1993. Until 2005 catches in the area south of 65°N accounted for 50 - 60% of the total catch but since 2006 catches in the southern area has decreased and since 2008 accounted for about 10% of the total catch.

**Fishery and Catches:** Greenland, EU (Denmark) and EU (Estonia) participated in the fishery in 2012. Catches in the Icelandic EEZ decreased from 2002-2005 and since 2006 no catches have been taken. Recent catches and recommended TACs are as follows:

Year	Catch ('000 t)		TAC ('000 t)	
	NIPAG	Recommended	Greenland EEZ	Iceland EEZ <sup>1</sup>
2008	2.8	12.4	12.4	
2009	4.6	12.4	12.8	
2010	3.7	12.4	11.8	
2011	1.2	12.4	12.4	
2012	2.1 <sup>2</sup>	12.4	12.4	

<sup>1</sup> Fishery unregulated in Icelandic EEZ;

<sup>2</sup> Catch till September 2012.

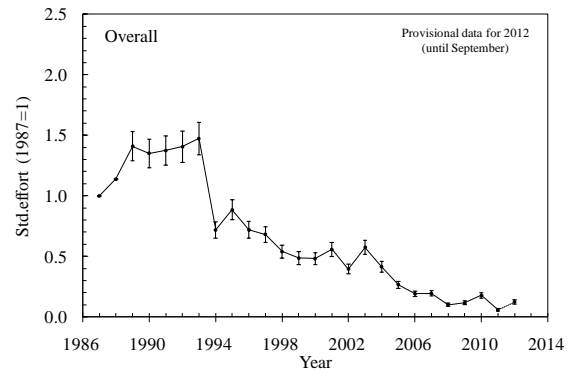


**Data:** Catch and effort data were available from trawlers of several nations. Annual surveys have been conducted since 2008.

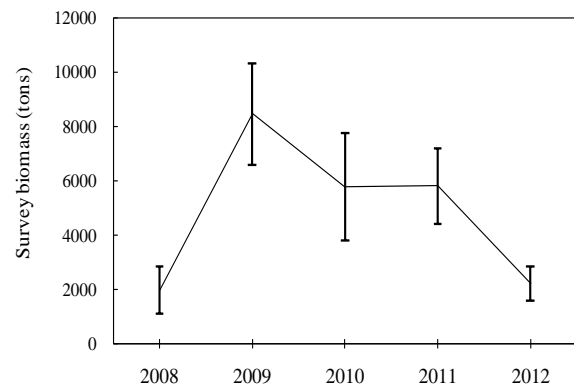
**Assessment:** No analytical assessment is available. Evaluation of the status of the stock is based on analysis of commercial fishery data and survey data.

**Recruitment:** No recruitment estimates were available.

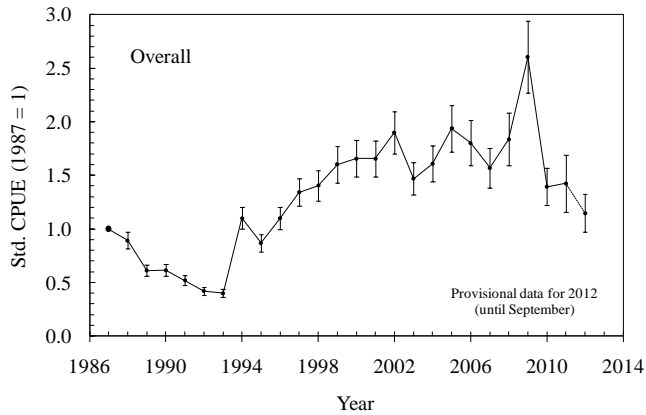
**Exploitation rate:** Since the mid 1990s exploitation rate index (standardized effort) has decreased, reaching the lowest levels seen in the time series from 2008 - 2012.



**Biomass:** The survey biomass index has decreased since 2009 and is now at the level seen at the beginning of the short time series in 2008.



**CPUE:** The combined standardized catch rate index for the total area remained at a high level from 2000 to 2009. Since then the combined index has been declining and is now lower than seen during the 2000s,



**State of the Stock:** Indices of stock biomass indicate a decline during the last 3 years. The biomass is now believed to be slightly lower than the relatively high level seen during most of the 2000s.

**Special Comments:** Effort has decreased in recent years. This decrease may be related to the economics of the fishery.

**Sources of Information:** SCR Doc. 12/62, 12/63.

### Coastal States

Scientific Council is informed that a Working Group has been established in Greenland to consider a revision of the harvest control rule and to propose one or more candidate rules of which a preferred one would presumably be included in a revised Management Plan. Until more information is available on how the Working Group will proceed and what it will recommend as a harvest control rule, SC is unable to make much progress with complying with this request from Greenland.