PINNGORTITALERIFFIK
GRØNLANDS NATURINSTITUT
GREENLAND INSTITUTE OF NATURAL RESOURCES

**Rejerådgivning for 2015**

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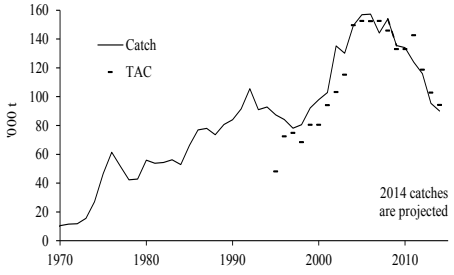
**Orientering vedrørende den biologiske rådgivning om fiskeri på rejebestandene ved Vest- og Østgrønland for 2015**

Rejebestanden i Vestgrønland er fortsat nedadgående, og NAFO/ICES anbefaler, at fangsterne i 2015 ikke overstiger 60.000 tons. I både 2013 og 2014 var rådgivningen om fiskeri efter rejer langs vestkysten 80.000 tons.

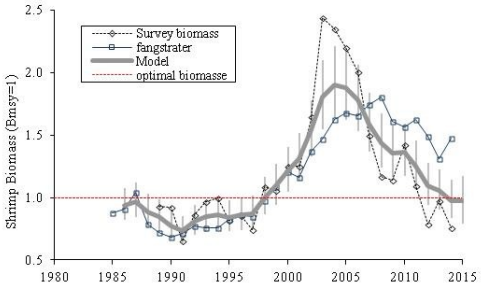
Rådgivningen om fiskeri på rejer i Østgrønland i 2015 er 2.000 tons og er uændret i forhold til 2014.

Fangstniveauet for **Vestgrønland** i 2015 er fastsat med udgangspunkt i:

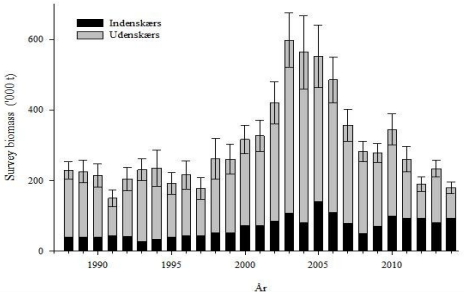
- fortsat faldende rejebiomasse – markant fald i udenskærsområderne
- et lavt antal af små rejer, der er på vej ind i det kommende fiskeri
- mindre udbredelse af bestanden i området
- stigning i biomassen af torsk i rejeområderne (primært i den sydlige del af Vestgrønland) over de sidste 3 år og et forventet højt indhug i bestanden af rejer forårsaget af torsk



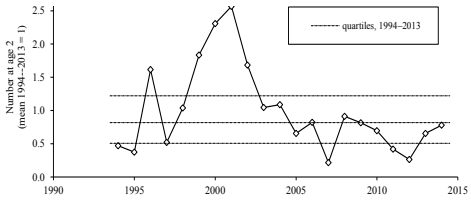

Figur 1. Vest. Totale fangster ('000 tons)




Figur 2. Vest. Biomasseudvikling fra model




Figur 3. Vest. Biomasse fra survey




Figur 4. Vest. Antal af 2-årige i bestanden fra de biologiske undersøgelser 1994-2014.

**RÅDGIVNINGEN om rejefiskeri i Vestgrønland**

Beregninger forudsiger, at bestanden vil kunne blive på den optimale størrelse ($B_{msy}$) og fortsat vokse, hvis fangsten i 2015 ikke overstiger 60.000 tons. Det videnskabelige råd anbefaler derfor, at fangster i 2015 ikke overstiger 60.000 tons[1].

Ud over rejefangsterne og torskens indhug i bestanden kan rejebestanden påvirkes af en række ukendte faktorer såsom eventuelle ændringer i havets temperatur, rejens biologi og andre rovdyr end torsk, der spiser rejer. Disse andre mulige faktorer arbejder biologerne på at blotlægge, således at der kan tages højde for dem i fremtidige videnskabelige rådgivninger.

Herunder en kort gennemgang af baggrunden for rådgivningen (den engelske tekst af rådgivningen findes i bilag 1):

De samlede **fangster** steg fra 80.000 tons i 1998 til 150.000 tons i 2008 og er siden faldet i takt med faldende kvotefastsættelse. Fangster i 2014 forventes at ligge på 90.000 tons (Figur 1). **Mængden af rejer**, der i gennemsnit fanges pr. time af en trawler (CPUE), giver et fingerpeg om bestandens status, fordi det giver et indirekte tal for tætheden af rejer. Dette tal (CPUE) er generelt faldet fra 2008, dog med en mindre fremgang i 2014 sammenlignet med 2013. Fiskeriet har i flere år koncentreret indsatsen til stadig mindre områder, og fiskeriet foregår i dag i området nord for Store Hellefiskebanke og i Disko Bugt.

De biologiske undersøgelser i 2014 har registreret et fald i bestanden i forhold til tidligere år (Figur 3). Faldet er særlig udtalt i de udenskærs områder, hvor **biomassen** (dvs. den samlede vægt af rejer) er på det laveste niveau siden 1988. Samme nedgang er ikke set i de indenskærs områder, og biomassen i Disko Bugt i 2014 er beregnet til at være over gennemsnittet. Det samlede antal af små rejer (**rekruttering**) på vej ind i fiskeriet har været lavt gennem de senere år, og det forventes at påvirke den fiskbare bestand negativt. Antallet af 2-årige rejer har været under middel i de senere år, og der er endvidere et rekordlavt antal af 3-4 årige rejer. Rekrutteringen til bestanden forventes derfor at være på et lavt niveau i nær fremtid. Den fiskbare bestand består hovedsageligt af hunner og et fåtal af hanner.

Den matematiske model, der benyttes i til at vurdere bestanden samt forudsige bestandens udvikling ved forskellige fangstniveauer, anvender fangsterne (det samlede udtag af bestanden), fangstrater (CPUE fra logbøger) og biologiske undersøgelser samt et mål for biomassen af torsk (fordi torsk spiser rejer).

Modellen viser, at bestanden i slutningen af 2014 vil være under den optimale størrelse (biomasse, $B_{msy}$), og at der bliver fjernet lidt mere fra bestanden, end bestanden kan bære (dvs. den totale dødelighed vil være lidt over den bæredygtige dødelighed, $Z_{msy}$).

**Biomassen af torsk** i rejeområderne er steget i de senere år, og mængden af rejer, som spises af torsk, er derfor steget. I 2014 er torskebiomassen lidt over niveauet i 2012 og 2013.

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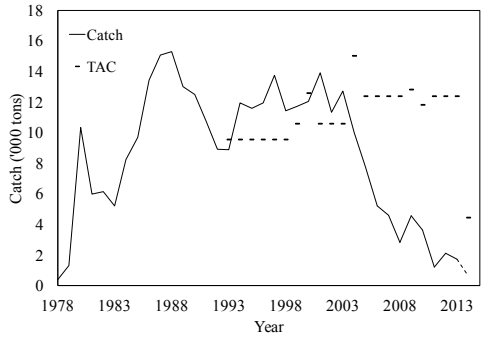
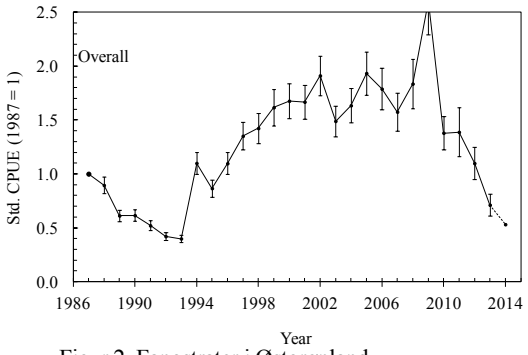
[1] De 60.000 tons svarer til en beregnet risiko på under 35 % for at fjerne så meget af bestanden, at den ikke længere kan holde sig på et niveau svarende til den optimale biomasse ($B_{msy}$) eller højere. Tidligere arbejde har vist, at hvis man holder sig under risikogrænsen på 35 % med den mængde af rejer, der dør (pga. af fiskeri og anden påvirkning, også kaldet dødelighed), vil bestanden holdes på eller over den optimale biomasse ($B_{msy}$).

**RÅDGIVNINGEN om rejefiskeri i Østgrønland** (den engelske tekst af rådgivningen findes i bilag 2 nedenfor)

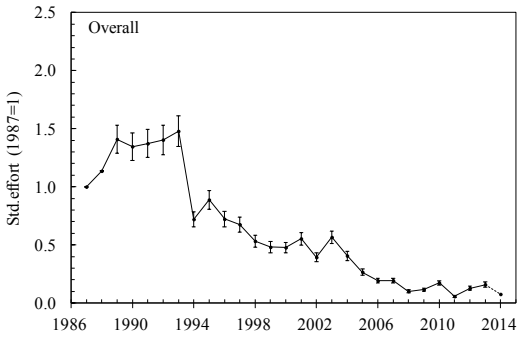
Rådgivningen om fiskeri efter rejer ved Østgrønland for 2015 er uændret på 2.000 tons. De biologiske undersøgelser og data fra fiskeriet viser, at bestanden fortsat er relativt lille på trods af faldende fangstmængder i de senere år. Nedgangen i bestanden falder sammen med en stigning i forekomsten af torsk (torsk spiser rejer).



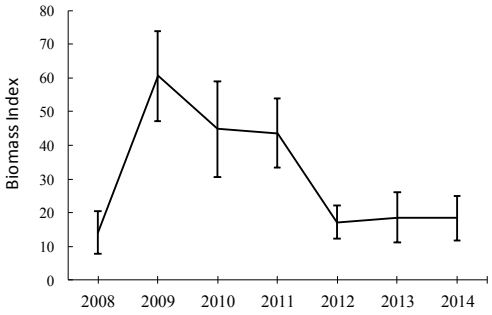

Figur 1. Fangster i Østgrønland




Figur 2. Fangstrater i Østgrønland




Figur 3. Fiskeridødelighed (indeks)




Figur 4. Biomasse fra survey

**Om rådgivningen**

Rådgivningen om rejer er formuleret på det seneste møde under NAFO/ICES, som er afholdt i Nuuk den 10.–17. september 2014. Grønlands Naturinstitut har skrevet og fremlagt 8 dokumenter, der tilsammen danner baggrunden for rådgivningen. Status for andre rejebestande i Nordatlanten blev endvidere vurderet på samme møde, og den samlede rapport indeholder status og rådgivning om rejer på Flemish Cap og Grand Bank samt status for bestandene af rejer i Barentshavet og Skagerrak. På mødet deltog i alt 17 forskere fra Canada, EU, Norge, Rusland og fra Grønland. Fra Grønland deltog seniorforsker Michael Kingsley, forsker Nanette Hammeken Arboe, forsker AnnDorte Burmeister og afdelingschef Helle Siegstad. Den officielle rådgivning findes på NAFOs (www.NAFO.int) hjemmeside. Den engelske rapport over rådgivningen fra NAFO består af mere end 100 sider, som Departement og Styrelsen for Fiskeri modtager en kopi af.

Grønlands Naturinstitut vil snarest invitere forvalterne og rejefiskerne til en grundig gennemgang af baggrunden for rådgivningen, herunder besvarelse af spørgsmål og udveksling af viden.

Med venlig hilsen
Helle Siegstad, Afdelingschef

# Bilag 1: Northern Shrimp in Subarea 1 and Div. 0A

*Advice September 2014 for 2015*

**Recommendation**

Previous work has shown that a maintained mortality risk of 35% is low enough to keep stock levels safely at or above $B_{msy}$. A catch of 60 000 t in 2015 would entail an estimated mortality risk below 35% and is projected to allow stock growth. Scientific Council therefore advises that catches in 2015 should not exceed 60 000 t.

**Management Objectives**

Scientific Council is aware of the Greenland management plan for shrimp and of general management objectives specified in the Greenland Fisheries Act; however the contents of these have not been conveyed to the Council. Canada requested Scientific Council to provide advice on this stock within the context of the NAFO Precautionary Approach Framework (SCS Doc. 13/04).

Advice is based on risk analysis coming from a quantitative model, and on qualitative evaluation of biomass and stock-composition indices.

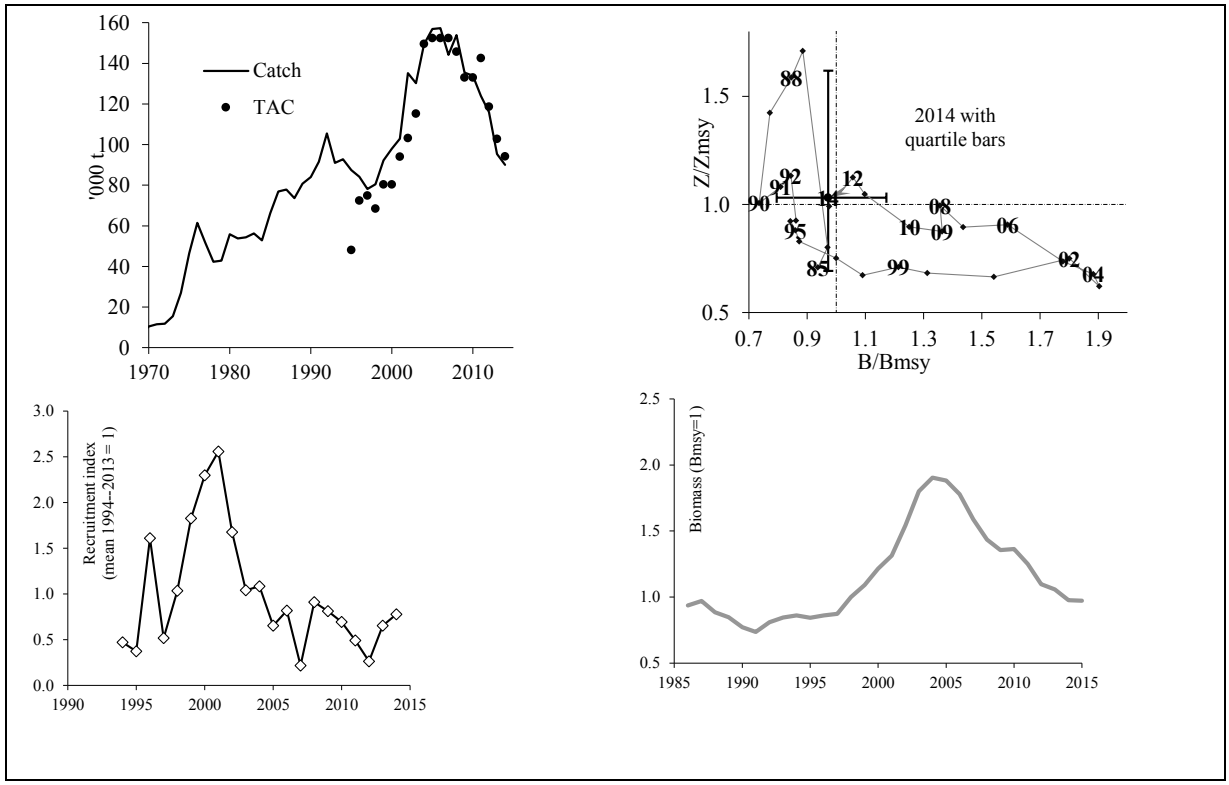
| *Objective* | *Status* | *Comment/consideration* | |
|---|---|---|---|
| Apply Precautionary Approach |  | Stock status is both estimated and forecast relative to precautionary reference points |  OK |

**Management unit**

The stock, considered distinct from all others, is distributed throughout Subarea 1, extends into Div. 0A east of 60°30'W, and is assessed as a single stock.

**Stock status**

Biomass is estimated to have been declining since 2004, and at the end of 2014 is projected to be near $B_{msy}$ with a risk of being below $B_{lim}$ of <2%. The risk that total mortality in 2014 will exceed $Z_{msy}$ is estimated at 53%.



**Reference points**

$B_{lim}$ is 30% of $B_{msy}$ and the limit reference point for mortality is $Z_{msy}$ (FC Doc. 04/18).

**Projections**

Projections for 2015 were made with catch levels ranging from 50 to 90 Kt/yr and a cod stock biomass at 50 Kt.

| 50 000 t cod | Catch option ('000 tons) | | | | | | |
|---|---|---|---|---|---|---|---|
| Risk (%) of transgressing: | 50 | 55 | 60 | 65 | 70 | 80 | 90 |
| $B_{msy}$, end 2015 | 50 | 51 | 51 | 52 | 52 | 53 | 54 |
| 2016 | 47 | 47 | 48 | 49 | 49 | 52 | 53 |
| 2017 | 45 | 46 | 47 | 48 | 49 | 52 | 54 |
| $B_{lim}$, end 2015 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 2016 | 3 | 4 | 4 | 4 | 4 | 4 | 4 |
| 2017 | 5 | 5 | 5 | 5 | 5 | 5 | 6 |
| $Z_{msy}$ during 2015 | 27 | 30 | 32 | 36 | 39 | 47 | 53 |
| 2016 | 28 | 30 | 33 | 37 | 40 | 47 | 54 |
| 2017 | 28 | 31 | 34 | 37 | 41 | 47 | 55 |

**Assessment**

The analytical assessment was run with the same methods as in 2011–13, with the exception that cod-stock biomass index series were combined within the model, and with updated data series.

The next assessment is scheduled for 2015.

*Human impact*

Mainly fishery related mortality has been documented. Other sources (e.g. pollution, shipping, oil-industry) are considered minor.

*Biological and Environmental Interactions*

Cod is an important predator on shrimps. This assessment incorporates this interaction.

**Fishery**

Shrimps are caught in a directed trawl fishery. Bycatch of fish in the shrimp fishery is around 1% by weight. The fishery is regulated by TAC.

Recent catches and TACs (t) have been as follows:

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|---|
| NIPAG | 144 190 | 152 749 | 135 458 | 133 990 | 123 985 | 115 975 | 95 380 | 90 000[1] |
| STATLANT 21 | 144 123 | 148 550 | 133 990 | 129 179 | 123 195 | 115 080 | 91 802 | — |
| Enacted TAC[2] | 152 417 | 145 717 | 132 987 | 132 987 | 142 597 | 118 596 | 102 767 | 94 140 |

[1] provisional—projected to year end; [2] sum of TACs autonomously set by Canada and Greenland.

**Effects of the fishery on the ecosystem**

Measures to reduce effects of the fishery on the ecosystem include area closures and moving rules to protect sponges and cold-water corals and to reduce bycatch, and gear modifications to reduce damage to benthic communities, and, again, to reduce bycatch.

**Special comments**

The future trajectory of the stock is likely to depend on the evolution of the stock of cod, which has recently been increasing and is difficult to predict.

The stock comprises a low proportion of males, and recruitment to both the fishable and the spawning stocks in the short term are expected to remain low.

**Source of Information**

SCR Docs 04/75, 04/76, 08/6, 11/053, 11/057, 11/058, 12/44, 13/54, 13/56, 13/57, 13/58, 13/59, SCS Doc. 04/12.

# Bilag 2: Northern Shrimp in Denmark Strait and off East Greenland

Advice September 2014 for 2015

**Recommendation**

In 2013 Scientific Council advised that catches should not exceed the current catch level of 2 000 t, and there is no basis to change this advice.

## Management objectives

Scientific Council is aware of general management objectives specified in the Greenland Fisheries Act; however the contents of these have not been conveyed to the Council.

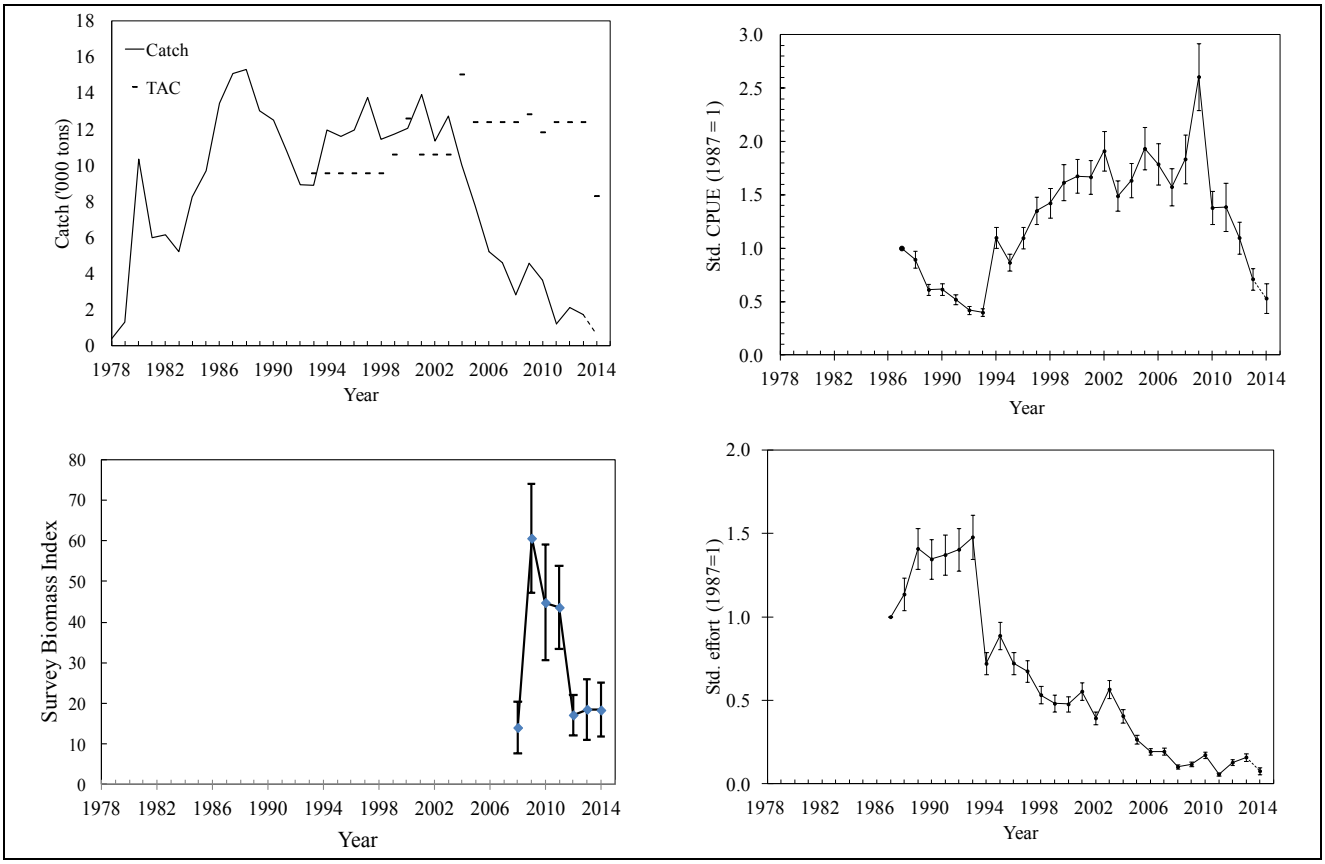
Advice is based on qualitative evaluation of biomass indices in relation to historic levels.

## Management unit

The shrimp stock is distributed off East Greenland in ICES Div. XIVb and Va and is assessed as a single population

## Stock status

The stock size remained at a very low level in 2014 despite several years of very low exploitation rates.



Reference points
No reference points have been established for this stock

**Projections**

Quantitative assessment of risk at various catch options is not possible for this stock at this time.

**Assessment**

No analytical assessment is available. Evaluation of stock status is based upon interpretation of commercial fishery and research survey data.

Next full assessment is scheduled for 2015.

*Human impact*

Mainly fishery related mortality has been documented. Other sources (e.g. pollution, shipping, oil-industry) are considered minor.

*Biological and Environmental Interactions*

Cod is an important predator on shrimp. The cod stock has been increasing in East Greenland waters in recent years.

**Fishery**

Shrimp is caught in a directed trawl fishery. The fishery is regulated by TAC and bycatch reduction measures include move on rules and Nordmøre grates.

Recent catches were as follows:

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014[1] |
|---|---|---|---|---|---|---|---|---|
| NIPAG | 4600 | 2794 | 4555 | 3735 | 1235 | 2109 | 1702 | 609 |
| SC Recommended TAC | 12400 | 12400 | 12400 | 12400 | 12400 | 12400 | 12400 | 2000 |
| Enacted TAC | 12400 | 12400 | 12835 | 11835 | 12400 | 12400 | 12400 | 8300 |

1 To July 2014

**Effects of the fishery on the ecosystem**

Measures to reduce effects of the fishery on the ecosystem include move-on rules to protect sponges and cold-water corals, and gear modifications to reduce damage to benthic communities.

**Source of Information**

SCR Doc. 14/057, 14/060

## Bilag 3: c) Harvest Control Rule (Item 7 of Annex II)

In connection with the certification of the West Greenland Cold Water Prawn Trawl Fishery, Denmark (on behalf of Greenland) asks the NAFO Scientific Council to view the below suggested Harvest Control Rules to be applied in the context of the present risk-based management of the fishery:

1. *The management of the fishery must be based on long-term goals.*
2. *The total TAC should be set in such a way as to ensure that the estimated risk of the overall stock mortality exceeding Fmsy does not exceed 35%.*
3. *The above 35% risk level must be maintained regardless of the estimated size of the stock relative to Bmsy.*
4. *Efforts must be made to ensure that the TAC does not vary by more than a maximum of 12.5% from year to year, either up or down.*

*Scientific Council is asked to assess whether the above proposed HCR, in relation to the management of the West Greenland prawn fishery, are likely to maintain biomass in a safe zone above Bmsy, and to recommend research studies that would improve its ability to make such an assessment.*

The Council responded: Scientific Council is presently unable to determine whether the proposed HCR is sustainable over the long term. In order to address this matter, SC **advises** that simulation studies can be undertaken that can determine whether this and/or other candidate management plans will meet management goals, but, before undertaking such studies, management goals need to be established and an acceptable risk of not attaining them defined. These goals could include metrics of stock sustainability, fishery performance and socio-economic factors *inter alia*.

For example, if a long-term goal is to maintain biomass above the $B_{msy}$ level, then the risk of the stock being below $B_{msy}$ after some predefined period must be agreed to and explicitly tested against the above rule or any rules that could become part of the stock management plan.

Initial work was presented to Scientific Council in 2013 (SCR. Doc 13/055). Preliminary conclusions from these experiments were:

> Catch smoothing costs. Keeping the inter-annual change in catch small appears to reduce mean catches and reduces mean biomass—i.e. is less safe. Even worse is unsymmetrical catch smoothing, a policy under which catches can be increased when things look good but cannot be brought down when they don't. Such a policy tends to drive the stock into a hole from which it is eternally trying to climb out.
>
> Responsive HCRs aren't so much the good idea that they appear to be at first sight. It looks as though an unresponsive HCR which keeps to a fixed mortality risk regardless of the biomass risk is, under most circumstances, at least as good if not better.
>
> Conservative levels of mortality risk do give more safety and higher mean levels of biomass, but carry a cost in lower mean catches. They appear to bring the CV of catch down a little bit. A conservative level of mortality risk looks like something of a palliative to unsymmetrical catch smoothing, reducing its worst effects. The effect of changing mortality risk is greater if assessments are imprecise, less if assessments are precise. Might it therefore be useful to change the allowable mortality risk according to the perceived level of uncertainty associated with the assessment?
>
> A maintained mortality risk of 35% appeared to be low enough to keep stock levels safely at or above $B_{msy}$.

Scientific Council advises that work continues and that experience gained elsewhere in NAFO could be considered in this context.