2. Requests from Coastal States

a) Northern shrimp in Subarea 1 and Div. 0A

Advice November 2019 for 2020

Recommendation

In line with Greenland's stated management objective of maintaining a mortality risk of no more than 35% (subject to a risk of biomass being below B_{lim} of less than 1%), Scientific Council advises that catches in 2020 should not exceed 110 000 t.

Management Objectives

A management plan and management objectives have been defined by the Government of Greenland in 2018. The objective is to maintain a mortality risk of no more than 35% (subject to a risk of biomass being below B_{lim} of less than 1%). Canada has a harvest strategy with the objective to maintain a mortality risk less than 35%, based on three year projections. Advice was also drafted to be consistent with the NAFO precautionary approach (FC Doc. 04-12).

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

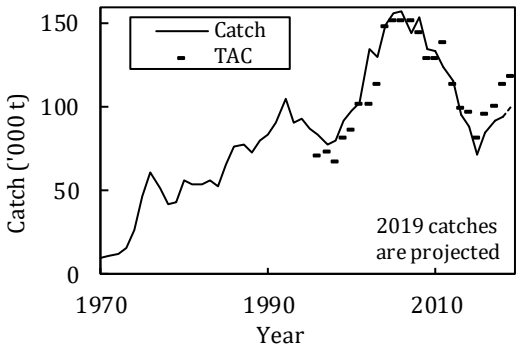
 OK

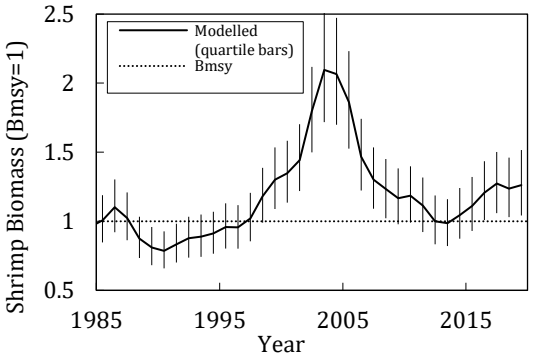
Management unit

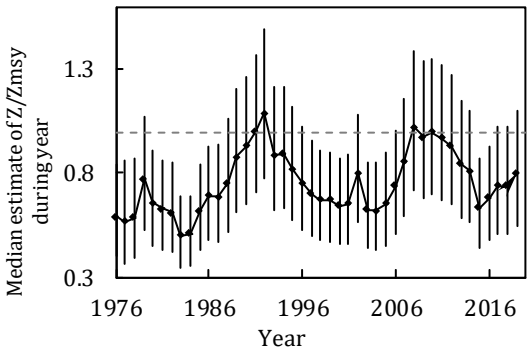
The stock, considered distinct from all others, is distributed throughout Subarea 1, extends into Div. 0A east of 60°30'W, and is assessed as a single stock. In 2018, 97% of the landings were from Greenland.

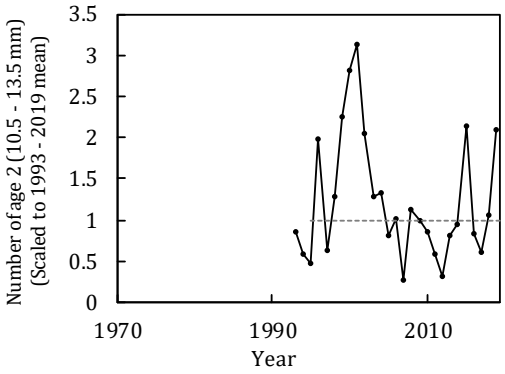
Stock status

Biomass at the end of 2019 is above B_{msy} and the probability of being below B_{lim} is very low (<1%). The probability of mortality in 2019 being above Z_{msy} is 32%. Recruitment (number of age-2 shrimp) in 2019 is above verage.









Reference points

B_{lim} has been established as 30% B_{msy}, and Z_{msy} (fishery and cod predation) has been set as the mortality reference point (FC Doc. 04-18). B_{msy} and Z_{msy} are estimated directly from the assessment model.

Projections

Predicted probabilities of transgressing precautionary reference points in 2020 – 2022 under eight catch options and subject to predation by a cod stock with an effective biomass of 21 Kt.

21 000 t cod	Catch option ('000 tonnes)							
Risk of:	85	90	95	100	105	110	115	120
falling below Bmsy end 2020 (%)	23	23	23	24	24	24	24	25
falling below Bmsy end 2021 (%)	24	24	25	25	26	27	27	27
falling below Bmsy end 2022 (%)	24	25	26	27	29	29	30	31
falling below Blim end 2020 (%)	0	0	0	0	0	0	0	0
falling below Blim end 2021 (%)	0	0	0	0	0	0	0	0
falling below Blim end 2022 (%)	0	0	0	0	0	0	0	0
exceeding Zmsy in 2020 (%)	17	20	24	27	30	34	37	40
exceeding Zmsy in 2021 (%)	18	21	25	28	32	35	38	41
exceeding Zmsy in 2022 (%)	19	22	26	29	33	36	39	43

Assessment

Advice is based on risk analysis coming from a quantitative model. The analytical assessment was run in 2019 with revised treatment of the input data (SCR Doc.19-46, 19-48) and with updated data series.

The next assessment is scheduled for 2020.

Human impact

Mortality related to the fishery has been documented. Other human sources (e.g. pollution, shipping, oil-industry) are considered minor.

Biological and Environmental Interactions

Cod is an important predator on shrimp. This assessment incorporates this interaction. Other predation is likely but not explicitly considered. Shrimps might be important predators on, for example, fish eggs and larvae.

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:

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Enacted TAC[1]	130 153	139 583	114 425	100 596[1]	97 649[1]	82 561[1]	96 426[1]	101 706[1]	114 876[1]	119 875[1]
STATLANT 21	129 179	123 195	114 970	91 802	88 834	71 779	84 303	91 725	91 869	
NIPAG	133 991	123 989	115 977	95 381	88 765	72 256	85 527	92 584	94 878	*102 000*[2]

[1] Sum of TACs autonomously set by Canada and Greenland.
[2] Projected to year end

Effects of the fishery on the ecosystem

Measures to reduce effects of the fishery on the ecosystem include area closures, moving rules and gear modifications to reduce damage to benthic communities and reduce bycatch.

Special comment

From 1993 to 2010 the Greenlandic survey in the Canadian area (SFA1) was conducted annually. In that period, average biomass in that area was 2% of the total biomass estimated in Subarea 1 and Div. 0A. Since 2011, due

to ice cover, there has only been sporadic information from the Greenlandic survey in the Canadian area (SFA1). The area was surveyed only in 2013 and 2017. In 2013, the biomass in that area (SFA1) was less than 1% of the total estimated biomass in Subarea 1 and Div. 0A, whereas it was about 2% in 2017.

Source of Information SCS Doc 13/04, FC Docs 04-18, SCR Docs 19-43, 44, 45, 46, 48, 49.

b) Northern shrimp in Denmark Strait and off East Greenland

Advice November 2019 for 2020

Recommendation

In 2016 the stock remained at a low level, comparable to previous years. CPUE has increased in recent years and in the first half of 2019 was at a record high level. However, fishing in recent years has been carried out in a localized area and the effort has been relatively low, so CPUE may not reflect stock status. Given the limited amount of current information, SC is not able to provide advice on the sustainable exploitation of this stock. Therefore, SC has no information to change the advice from the last five years that, as an interim measure, catches should not exceed 2 000 t. SC advises that a survey should be carried out in future years.

Management objectives

No explicit management plan or management objectives have been defined by the Government of Greenland.

Objective	*Status*	*Comment/consideration*
Apply Precautionary Approach		B_{lim} is defined. No fishing mortality reference point defined

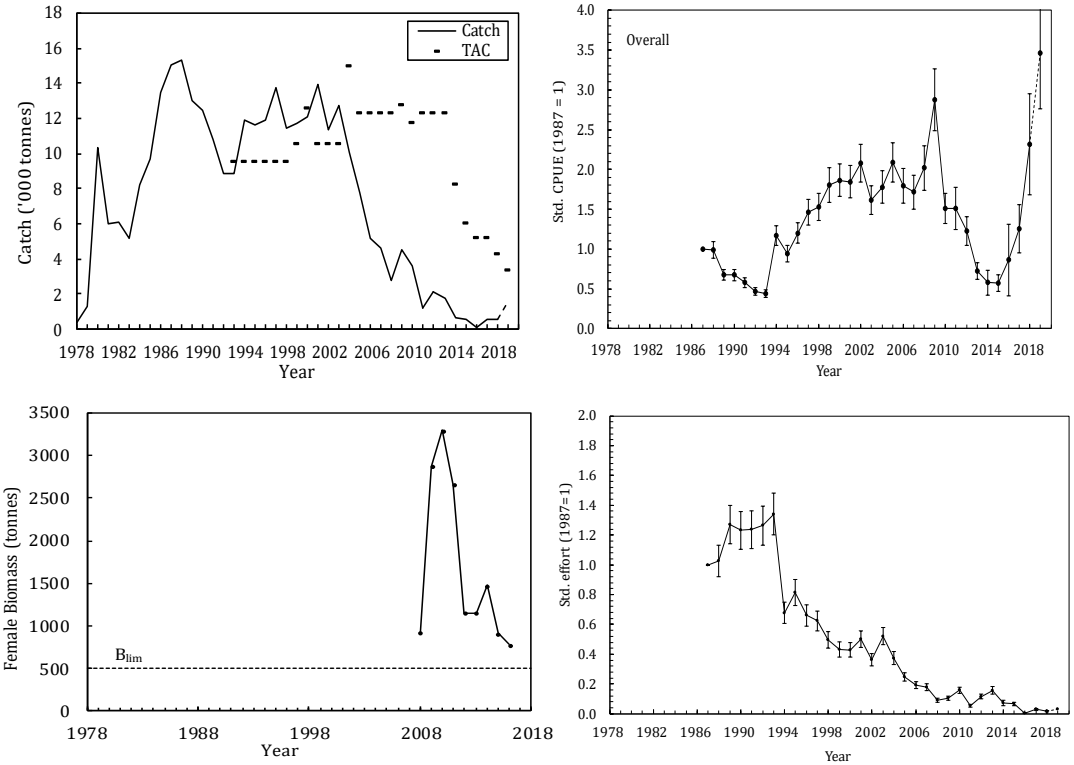
 Intermediate

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 (relatively close to B_{lim}) in 2016 despite several years of very low exploitation rates. There is no new fishery independent information to indicate a change in stock status.



Reference points

Scientific Council considers that a female survey biomass index of 15% of its maximum observed level provides a proxy for B_{lim} (SCS Doc. 04-12).

Projections

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

Assessment

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

Evaluation of stock status is based upon interpretation of commercial fishery and research survey data. The trends in the survey and the standardized CPUE have been similar since the start of the survey; however, they diverged in 2016, the last year for which there are survey data available. Recent increasing CPUE values may indicate an improvement of the shrimp density in the northern area; however, this may not reflect overall stock status as the fishery occurs in a localized area and includes only a small number of hauls. No survey was carried out in the period 2017 to 2019.

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 generally been decreasing in East Greenland waters since 2012.

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 (tonnes) were as follows:

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Enacted TAC	11 835	12 400	12 400	12 400	8 300	6 100	5 300	5 300	4 300	3 384
SC Recommended TAC	12 400	12 400	12 400	12 400	2 000	2 000	2 000	2 000	2 000	2 000
NIPAG	3 602	1 199	2 109	1 717	622	576	49	561	547	1579[1]

[1] To July 2019

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 corals.

Source of Information

SCR Doc. 19-059