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

Advice November 2021 for 2022

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 2022 should not exceed 115 000 t.

With regard to the Canadian harvest strategy, Scientific Council notes that catches of 115 000 t in 2022 would result in less than 35% risk of exceeding Z_{msy} in 2022, and a 35% risk of exceeding Z_{msy} in 2023 and 2024, assuming catches at the same level as in 2022.

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 the stock in the Healthy Zone (>80% of B_{msy}); when the biomass is above 80% of B_{msy}, the risk of being above Z_{msy} should be less than 35%, based on the 3-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

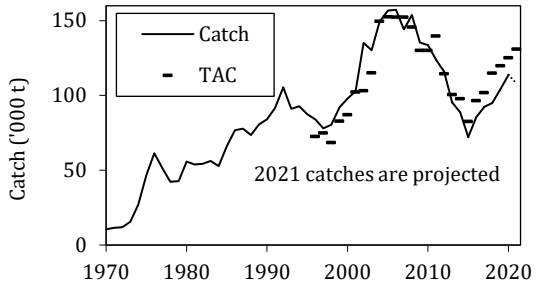
 OK

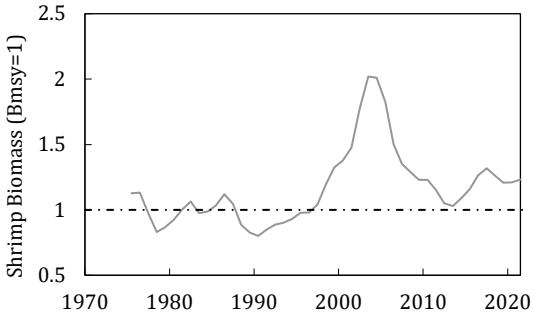
Management unit

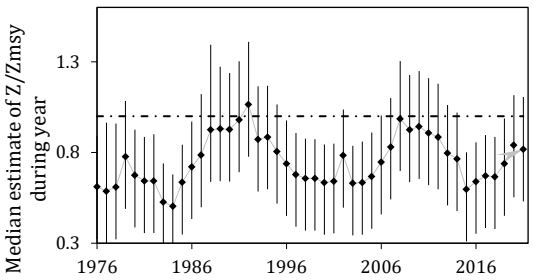
The stock, considered distinct from all others, is distributed throughout Subarea 1, extends into Div. 0A east of 60°30'W, and is assessed as a single stock. In 2020, more that 99% of the landings were from Greenland.

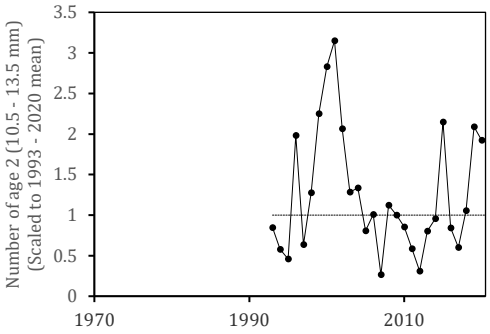
Stock status

Biomass at the end of 2021 is above B_{msy} and the probability of being below B_{lim} is very low (<1%). The probability of mortality in 2021 being above Z_{msy} is 33%. Recruitment (number of age-2 shrimp) in 2020 was above average.









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 2022 – 2024 under eight catch options and subject to predation by a cod stock with an effective biomass of 6 Kt.

6 000 t cod	**Catch option ('000 tons)**							
Risk of:	**95**	**100**	**105**	**110**	**115**	**120**	**125**	**130**
falling below Bmsy end 2022 (%)	26	26	26	26	28	27	27	27
falling below Bmsy end 2023 (%)	26	27	27	27	29	30	30	30
falling below Bmsy end 2024 (%)	26	28	28	29	30	32	32	34
falling below Blim end 2022 (%)	0	0	0	0	0	0	0	0
falling below Blim end 2023 (%)	0	0	0	0	0	0	0	0
falling below Blim end 2024 (%)	0	0	0	0	0	0	0	0
exceeding Zmsy in 2022 (%)	20	23	26	30	33	37	40	43
exceeding Zmsy in 2023 (%)	21	24	27	31	35	38	41	44
exceeding Zmsy in 2024 (%)	21	25	28	31	35	38	42	45
falling below Bmsy 80% end 2022 (%)	9	10	10	10	10	11	10	11
falling below Bmsy 80% end 2023 (%)	10	11	11	11	13	13	13	14
falling below Bmsy 80% end 2024 (%)	11	12	12	13	14	16	16	16

Assessment

Advice is based on risk analysis coming from a quantitative model. The analytical assessment was run in 2021 with revised treatment of the input data (SCR Doc. 20/053, 20/057, 21/040, 21/042) and with updated data series.

The next assessment is scheduled for 2022.

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:

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Enacted TAC[1]	114 425	100 596[1]	97 649[1]	82 561[1]	96 426[1]	101 706[1]	114 876[1]	119 875[1]	125 229[1]	130 937[1]
STATLANT 21	114 970	91 802	88 834	71 779	84 303	91 725	91 869	102 706	110 229	
NIPAG	115 977	95 381	88 765	72 256	85 527	92 584	94 878	104 314	113 868	108 000[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

No survey has been conducted in the assessment area in 2021, due to delay of the new Greenlandic research ship.

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.

SC recommend that the catch table should be given in increments of no less than 5 t due to uncertainty in calculating risk levels.

Source of Information

SCS Doc 13/04, FC Docs 04-18, SCR Docs. 20/053, 20/057, 21/040, 21/041, 21/042