



22. september 2022

J.nr. 20.00-11

## Sammendrag af rådgivning for 2023 om fiskeri på rejebestandene ved Vest- og Østgrønland

Dette sammendrag beskriver kort ændringer i forhold til sidste års rådgivning og præsenterer de anbefalede fangstmængder fra NAFO. Anbefalingerne uddybes i Appendiks.

Den anbefalede fangst af rejer ved Vestgrønland i 2023 er på 110.000 tons, hvilket er en nedgang på 5.000 t i forhold til 2022. Den anbefalede fangst af rejer ved Østgrønland i 2023 er på 2.000 tons, hvilket er en nedgang på 1.000 tons i forhold til 2022.

### Rådgivning om rejer for 2023

#### Vestgrønland

110.000 tons.

Rådgivning for 2022: 115.000 tons.

Total fangst forventet i 2022: ca. 120.000 tons.

#### Østgrønland

2.000 tons.

Rådgivning for 2022: 3.000 tons.

Total fangst forventet i 2022: < 5.300 tons.

Den officielle rådgivning, som Departementet for Fiskeri modtager en kopi af, vil være tilgængelig på NAFOs hjemmeside ([www.nafo.int](http://www.nafo.int)) senere på året. Dette gælder også de af Grønlands Naturinstitut udarbejdede baggrundsdokumenter til rådgivningen. Hvis der ønskes yderligere dokumentation, står Naturinstituttet naturligvis til rådighed.

Grønlands Naturinstitut vil snarest invitere repræsentanter fra forvaltningen og erhvervet til en grundig gennemgang af baggrunden for rådgivningen, herunder besvarelse af spørgsmål og udveksling af viden.

Med venlig hilsen

Helle Siegstad  
Afdelingschef

## Rejer i Vestgrønland

NAFO rådgiver, at fangsterne i 2023 ikke bør overstige 110.000 tons, hvilket er 5.000 mindre end rådgivningen for 2022.

### Om rådgivningen

Det rådgivne fangstniveau ved *Vestgrønland* er fastsat med udgangspunkt i, at resultaterne fra årets bestandsvurdering viser, at rejebestanden er stabil, men at der samtidig er kommet flere torsk, som forventes at spise flere rejer. Derudover forventes det, at der i 2022 fiskes 5.000 tons flere rejer end den fastsatte TAC som følge af kvote overført fra 2021. Dette medfører en risiko på 43 % for at overskride den optimale dødelighed i indeværende år.

Modellen, der beregner udviklingen i bestanden, anvender som i tidligere år rejefiskeriets *fangster* (Figur 1), *rejebiomassen* beregnet ud fra de biologiske undersøgelser, fiskeriets *fangstrater* og *biomassen af de torsk*, der spiser rejer. Der er beregnet en maksimal biomasse i 2004 og herefter et fald frem til 2014. Siden 2017 har biomassen været stabil og er i slutningen af 2022 beregnet til at være over den biomasse, der kan sikre et optimalt, bæredygtigt udbytte af rejebestanden (Figur 2).

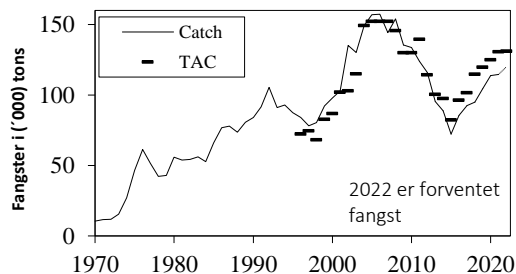
Antallet af 2-årige rejer, der forventes at komme ind i fiskeriet inden for de næste 3 år, var i både 2019, 2020 og 2022 over gennemsnittet for tidsserien (Figur 4).

Den totale dødelighed (Figur 3) falder i perioden efter 2014 kortvarigt, men stiger igen frem til 2022 til et niveau tæt på  $Z_{msy}$ .

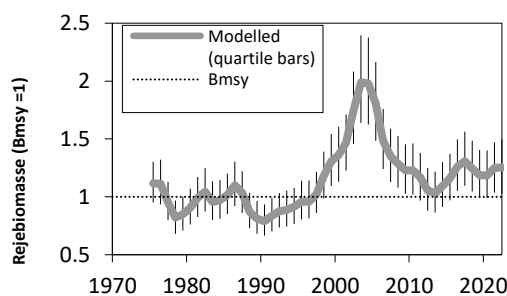
Tabel 1. Totale landinger (tons) af rejer i Vestgrønland og Canada fra 2013 til 2022

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
NIPAG	95 381	88 765	72 256	85 527	92 584	94 878	104 314	113 758	114 569	120 000 <sup>2</sup>

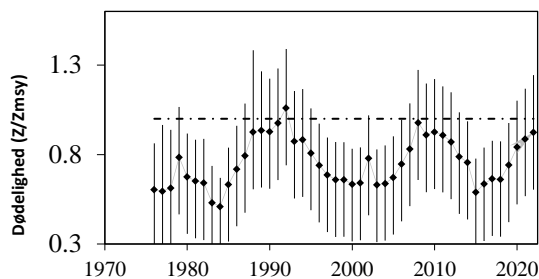
<sup>1</sup> forventet



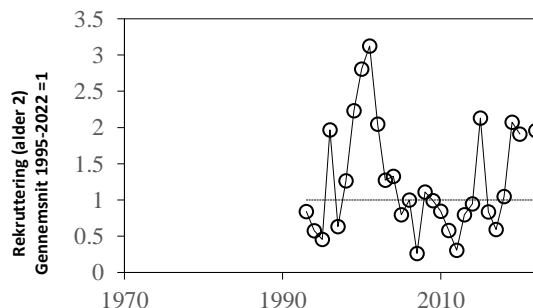
Figur 1. Samlede fangster (1970-2022)



Figur 2. Biomasse af rejer (fra model; 1970-2022)



Figur 3. Total dødelighed (fiskeri og torskens prædation; 1970-2022)



Figur 4. Rekruttering (alder 2; 1970-2022)

## Appendiks

Det videnskabelige råd har med udgangspunkt i de af Naalakkersuisut fastsatte forvaltningskriterier for reje-fiskeriet i Vestgrønland vurderet, at et fiskeri på 110.000 t i 2023 vil sikre en bæredygtig udnyttelse af be-standen. Det betyder, at risikoen for at overskride en dødelighed, hvor fiskeriet ikke længere er bæredygtigt, ( $Z_{msy}$ ), holder sig inden for 35 %, og risikoen for, at biomassen kommer under det laveste niveau ( $B_{lim}$ ), er lav.

### Rejer i Østgrønland

NAFO rådgiver, at fangsterne i 2023 ikke bør overstige 2.000 tons, hvilket er 1.000 mindre end rådgivningen for 2022. Der er usikkerhed om udbredelse af bestanden, men tilgængelige data fra biologiske undersøgelser og fiskeri peger på, at bestanden er koncentreret i et begrænset område. NAFOs videnskabelige råd har i år accepteret anvendelse af SPiCT-modellen som værktøj til vurdering af rejebestanden i Østgrønland.

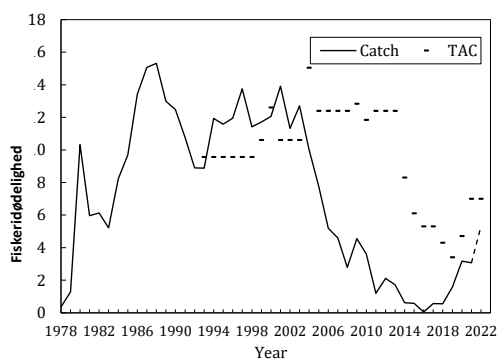
#### Om rådgivningen

Fangsterne har været stigende siden 2017 (Figur 5). Rejebestanden ligger i 2022 15 % under den optimale biomasse (Figur 6), og fiskeridødeligheden ligger over den optimale fiskeridødelighed (Figur 7). Fiskeriindsat-sen har været meget lav, så det er usikkert, om fangstraterne afspejler bestandens status i hele området. Endvidere har surveybiomassen i 2020 og 2022 samt fiskeriet siden 2014 været koncentreret i et meget begrænset geografisk område. Der er intet rekrutteringsindeks for bestanden, da kun meget få unge (juve-nile) rejer fanges i surveyområdet.

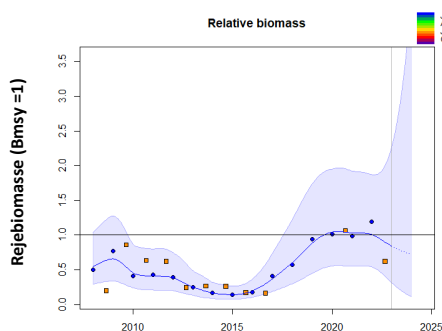
Tablet 2. Totale landinger (tons) af rejer i Østgrønland fra 2013 til 2022

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
NIPAG fangst	1 717	622	576	49	561	547	1 580	3 172	3 067	5 295 <sup>1</sup>

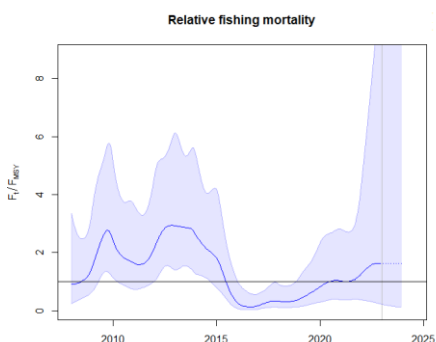
<sup>1</sup> forventet



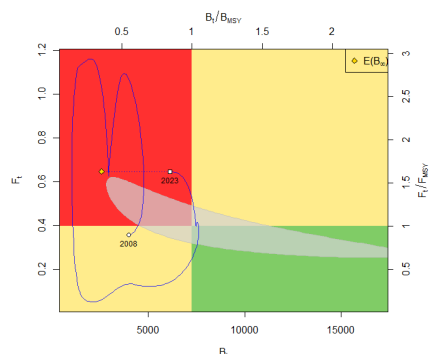
Figur 5. Samlede fangster (1978-2022)



Figur 6. Biomasse af rejer fra model (1987-2022).



Figur 7. Fiskeridødelighed fra model (1987-2022)



Figur 8. Bestandsstatus fra model (1987-2022)

## Appendiks

### Northern shrimp in Subarea 1 and Div. 0A

Advice September 2022 for 2023




#### 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 2023 should not exceed 110 000 t.

With regard to the Canadian harvest strategy, Scientific Council notes that catches of 110 000 t in 2023 would result in less than 35% risk of exceeding  $Z_{msy}$  in 2023 and 2024, and a 35% risk of exceeding  $Z_{msy}$  in 2025, assuming catches at the same level as in 2023.

#### 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 no more than 35%, based on the 3-year projections. Advice was also drafted to be consistent with the NAFO precautionary approach (FC Doc. 04-12).

<i>Objective</i>	<i>Status</i>	<i>Comment/consideration</i>
Maintain risk of being above $Z_{msy}$ at no more than 35%		The TAC set for 2022 equates to a risk of being above $Z_{msy}$ by the end of 2022 of 43%
Maintain the stock in the Healthy Zone (>80% of $B_{msy}$ )		The stock is above $B_{msy}$ in 2022
Maintain risk of biomass being below $B_{lim}$ of less than 1%		The risk of biomass in 2022 being below $B_{lim}$ is less than 1%



OK



Intermediate

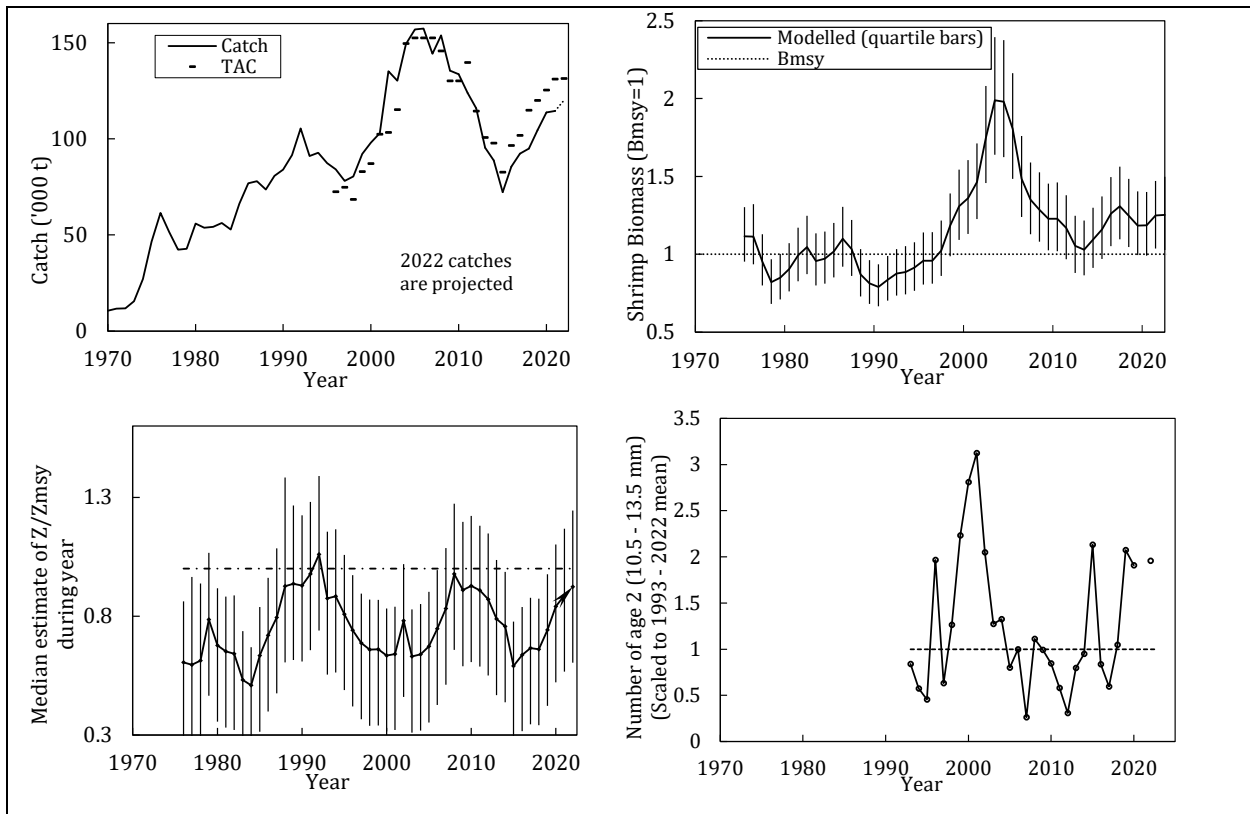
#### Management unit

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 2021, more than 99% of the landings were from Greenland.

#### Stock status

Biomass in 2022 is above  $B_{msy}$  and the probability of being below  $B_{lim}$  is very low (<1%). The probability of mortality in 2022 being above  $Z_{msy}$  is 43%. Recruitment (number of age-2 shrimp) in 2022 was above average.

# Appendiks



## Reference points

$B_{lim}$  has been established as 30%  $B_{msy}$ , and  $Z_{msy}$  has been set as the mortality reference point.  $B_{msy}$  and  $Z_{msy}$  are estimated directly from the assessment model.

## Projections

Predicted probabilities of transgressing precautionary reference points in 2023 – 2025 under eight catch options and subject to predation by a cod stock with an effective biomass of 19 Kt.

19 Kt cod Risk of:	Catch option ('000 tons)							
	95	100	105	110	115	120	125	130
falling below Bmsy end 2023 (%)	24	24	23	25	25	25	26	26
falling below Bmsy end 2024 (%)	25	25	26	27	28	29	30	29
falling below Bmsy end 2025 (%)	25	27	27	29	30	32	33	33
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
falling below Blim end 2025 (%)	0	0	0	0	0	0	0	0
exceeding Zmsy in 2023 (%)	22	25	29	32	36	39	43	46
exceeding Zmsy in 2024 (%)	22	26	30	33	38	40	44	47
exceeding Zmsy in 2025 (%)	23	27	30	34	38	42	45	49
falling below Bmsy 80% end 2023 (%)	8	8	8	8	9	9	9	9
falling below Bmsy 80% end 2024 (%)	9	9	10	11	11	11	13	12
falling below Bmsy 80% end 2025 (%)	10	11	12	13	14	13	16	16

# Appendiks

## Assessment

Advice is based on risk analysis from a quantitative model. The analytical assessment was run in 2022 with updated input data series.

The next assessment is scheduled for 2023.

### *Human impact*

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

### *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:

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Enacted TAC <sup>1</sup>	100 596	97 649	82 561	96 426	101 706	114 876	119 875	125 229	130 937	131 292
STATLANT 21	91 802	88 834	71 779	84 303	91 725	91 869	102 706	110 250	107 571	
NIPAG	95 381	88 765	72 256	85 527	92 584	94 878	104 314	113 758	114 569	120 000 <sup>2</sup>

<sup>1</sup> Sum of TACs autonomously set by Canada and Greenland.

<sup>2</sup> 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.

SC recommends that the projection table should be given in projected catch increments of no less than 5 Kt due to uncertainty in calculating risk levels.

## Source of Information

SCS Doc 13/04, FC Docs 04-18, SCR Docs. 20/053, 20/057, 22/045, 22/046, 22/047, 22/048.

Northern shrimp in Denmark Strait and off East Greenland

Advice September 2022 for 2023

**Recommendation**

Catches of 2 500 t in 2023 will result in a low risk (6%) of biomass falling below  $B_{lim}$ . However, fishing at this level will result in a risk of more than 50% of fishing mortality exceeding  $F_{msy}$  and likely impede growth of the stock towards  $B_{msy}$ . SC recommends that catches should not exceed 2 000 t in 2023.

**Management objectives**

No explicit management plan or management objectives have been defined by the Government of Greenland. Advice was drafted to be consistent with the NAFO precautionary approach (FC Doc 04-12).

Objective	Status	Comment/consideration
Apply Precautionary Approach	<span style="color: green;">●</span>	$B_{lim}$ is defined as 30% of $B_{msy}$

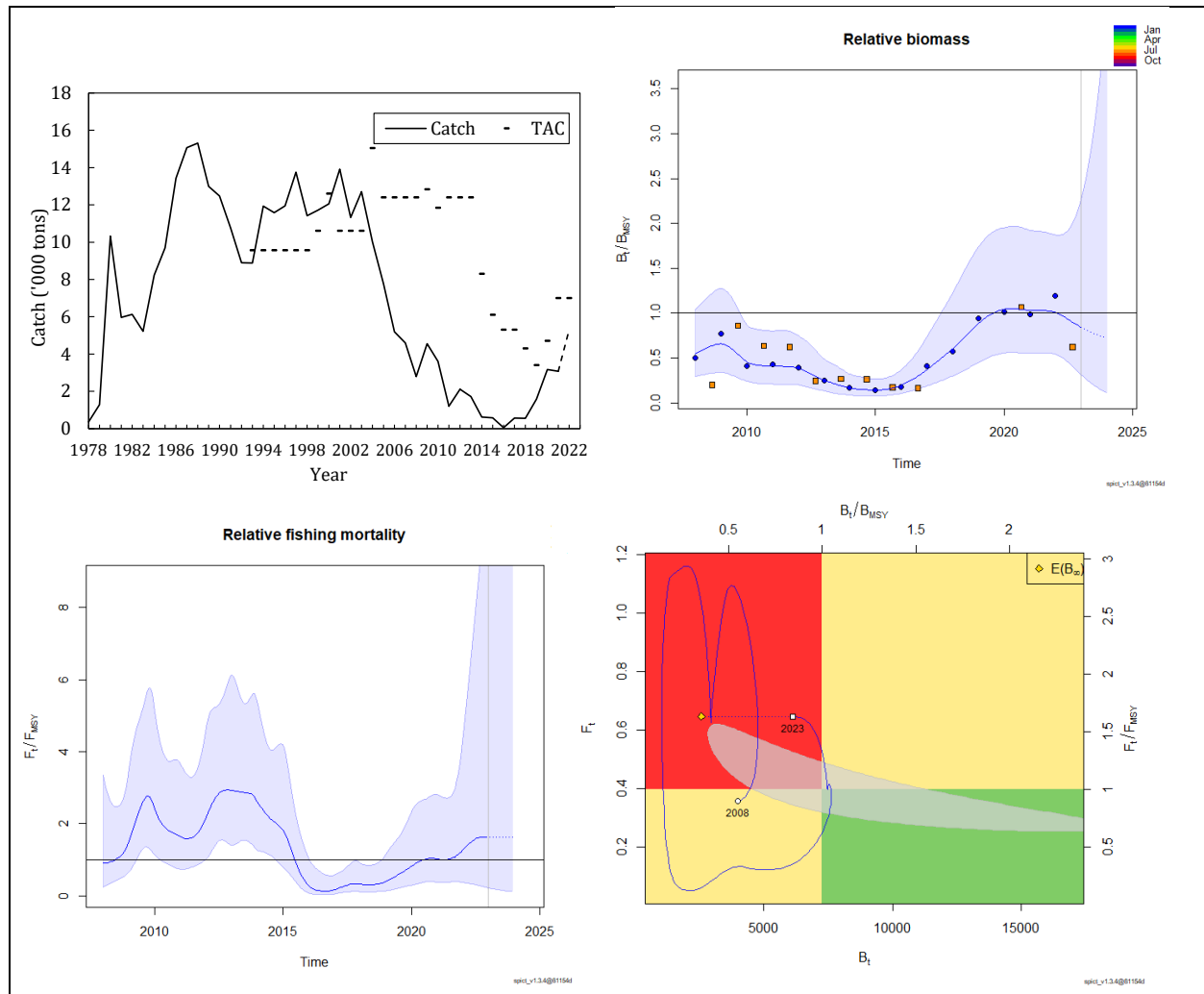
● OK

**Management unit**

The shrimp stock is distributed off East Greenland in ICES Div. 14b and 5a and is assessed as a single stock.

**Stock status**

Biomass is currently below  $B_{msy}$  ( $B/B_{msy} = 0.85$ ). The probability of being below  $B_{lim}$  is currently 0.015. Fishing mortality is currently above  $F_{msy}$  ( $F/F_{msy} = 1.63$ ). No estimates of recruitment are available.



# Appendiks

## Reference points

$B_{lim}$  is 2 180 t which corresponds to 30% of  $B_{msy}$ . The SPiCT model uses relative reference points  $B/B_{msy}$  and  $F/F_{msy}$ . The current relative  $B/B_{msy}$  is 0.85 and the relative  $F/F_{msy}$  is 1.63. The probability of being below  $B_{lim}$  is currently 0.015.

## Projections

Relative reference points are estimated for six catch options for 2023.

Catch (t)	B/B <sub>msy</sub>	F/F <sub>msy</sub>	Prob B > B <sub>msy</sub>	Prob B < B <sub>lim</sub>
1 500	1.03	0.56	0.52	0.01
2 000	0.96	0.77	0.47	0.03
2 500	0.89	1.01	0.43	0.06
3 000	0.81	1.26	0.40	0.10
3 500	0.74	1.54	0.37	0.16
4000	0.66	1.86	0.34	0.22

## Assessment

A comprehensive sensitivity analyses of the surplus production model in continuous time (SPiCT) was performed as recommended by NIPAG 2021 (SCR Doc 21/044). During the 2022 SC shrimp meeting an updated SPiCT model was presented and accepted as a valid assessment tool for this stock (SCR Doc. 22/051) based on a review of the model diagnostics.

The next assessment is scheduled for 2023.

### Human impact

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

### Biological and Environmental Interactions

Cod is an important predator on shrimp. The cod stock has fluctuated in East Greenland waters since 2014. The impact on the shrimp biomass is unknown.

## Fishery

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

Recent catches and TAC (t) were as follows:

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Enacted TAC	12 400	8 300	6 100	5 300	5 300	4 300	3 384	4 750	7 000	6 850
SC Recommended TAC	12 400	2 000	2 000	2 000	2 000	2 000	2 000	3 000	3 000	3 000
NIPAG catch	1 717	622	576	49	561	547	1 580	3 172	3 067	5 295 <sup>1</sup>

<sup>1</sup> To June 30

## 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 Docs. 22/049, 22/050, 22/051, 21/044, FC Doc. 04-18