

# ECOTIP

## Investigating Ecological Tipping Cascades in the Arctic Seas

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This project is funded by the European Union  
under grant agreement No 869383

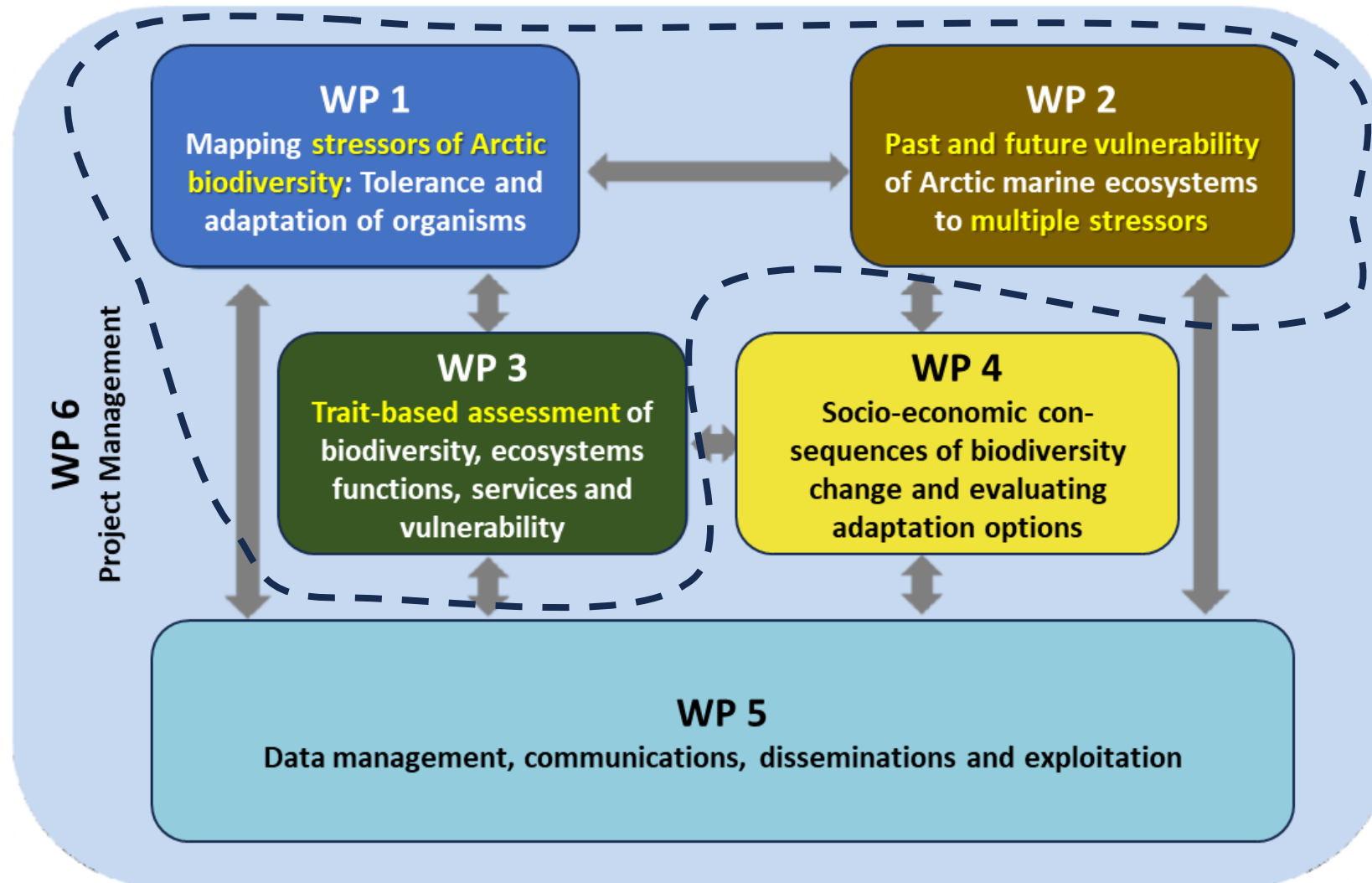


**Causes for tipping points** (climate and other anthropogenic stressors),  
their **consequences** for marine ecosystem services such as fisheries and carbon sequestration,  
and **adaptation** strategies of humans.

**Focus area:** Arctic marine ecosystem  
(mainly E/W-Greenland)



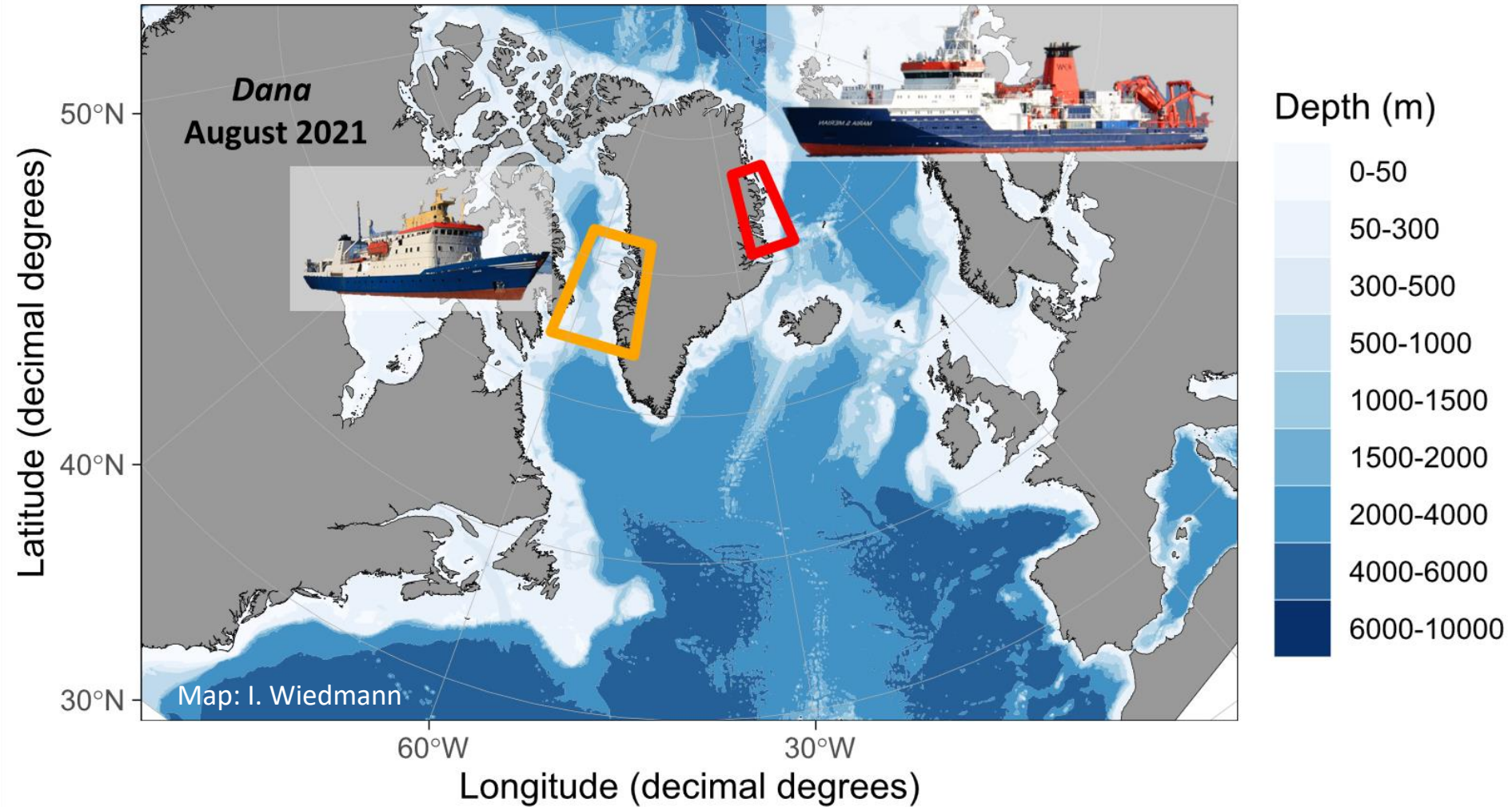






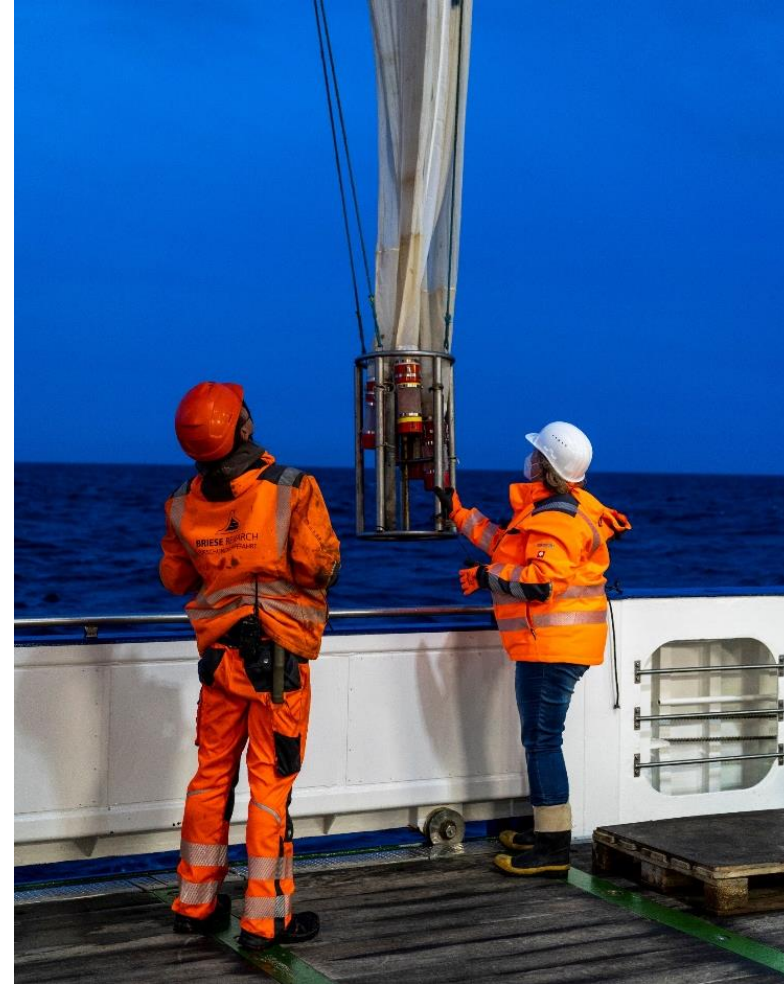
# WP1-3: Mapping stressors and the current biodiversity of Arctic marine ecosystems

M.S. Merian August 2022





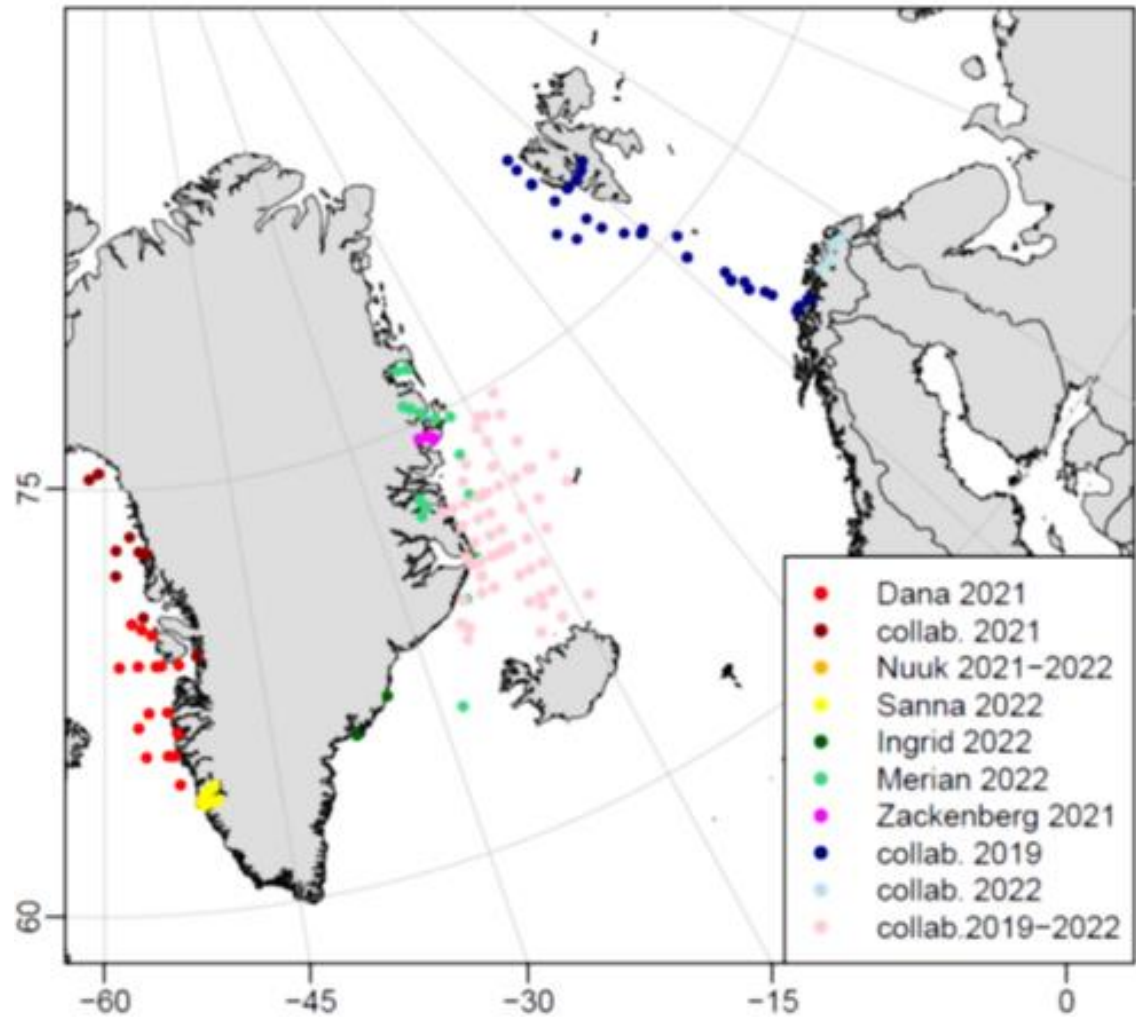
## WP1-3: Mapping stressors and the current biodiversity of Arctic marine ecosystems



Pictures: Olivia Rempel,  
GRID Arendal



## WP1-3: Mapping stressors and the current biodiversity of Arctic marine ecosystems

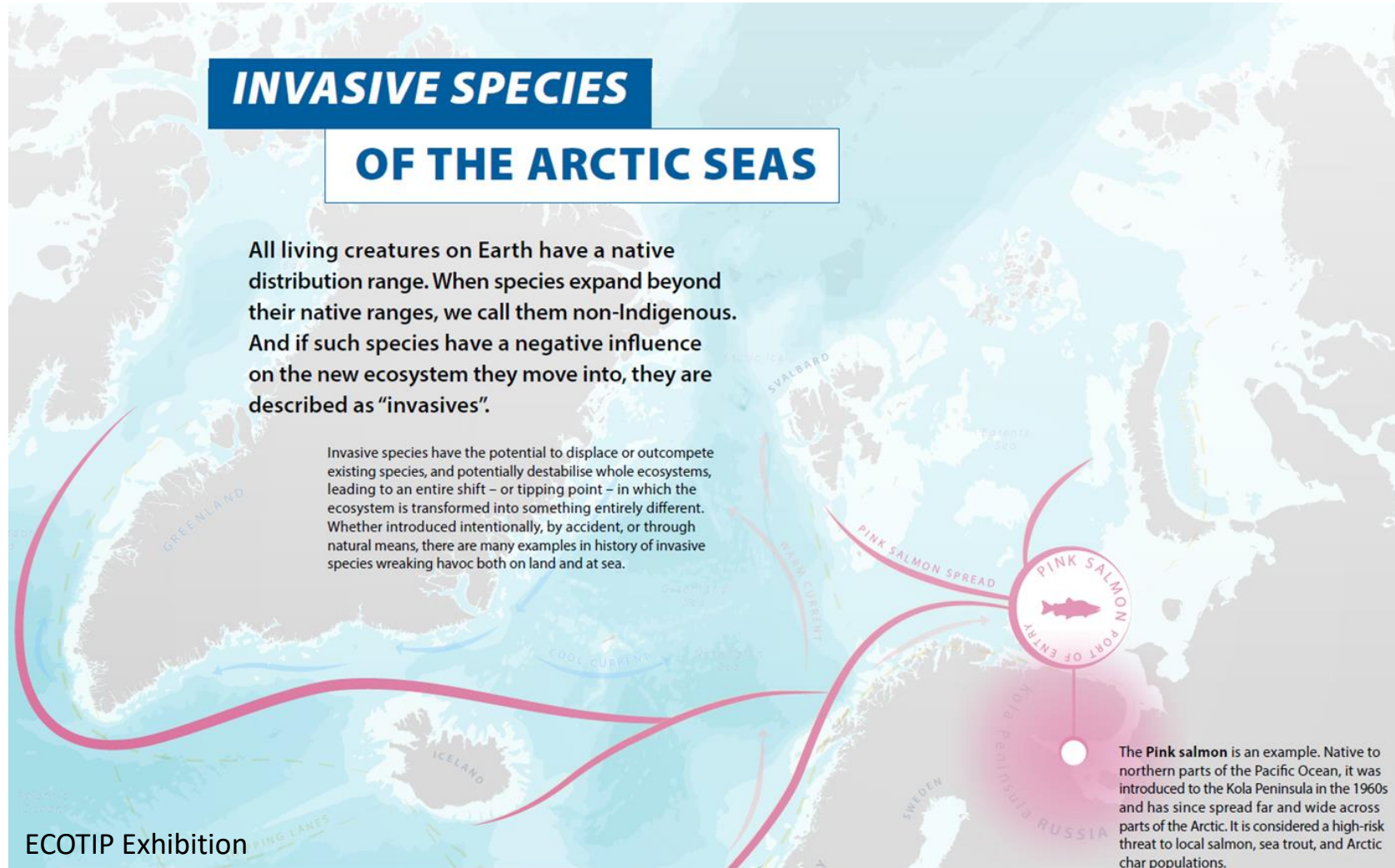


Monitoring of biodiversity and non-native species by eDNA





## WP1-3: Mapping stressors and the current biodiversity of Arctic marine ecosystems





## WP1-3: Mapping the biodiversity of Arctic marine ecosystems in the past and its interaction with external drivers

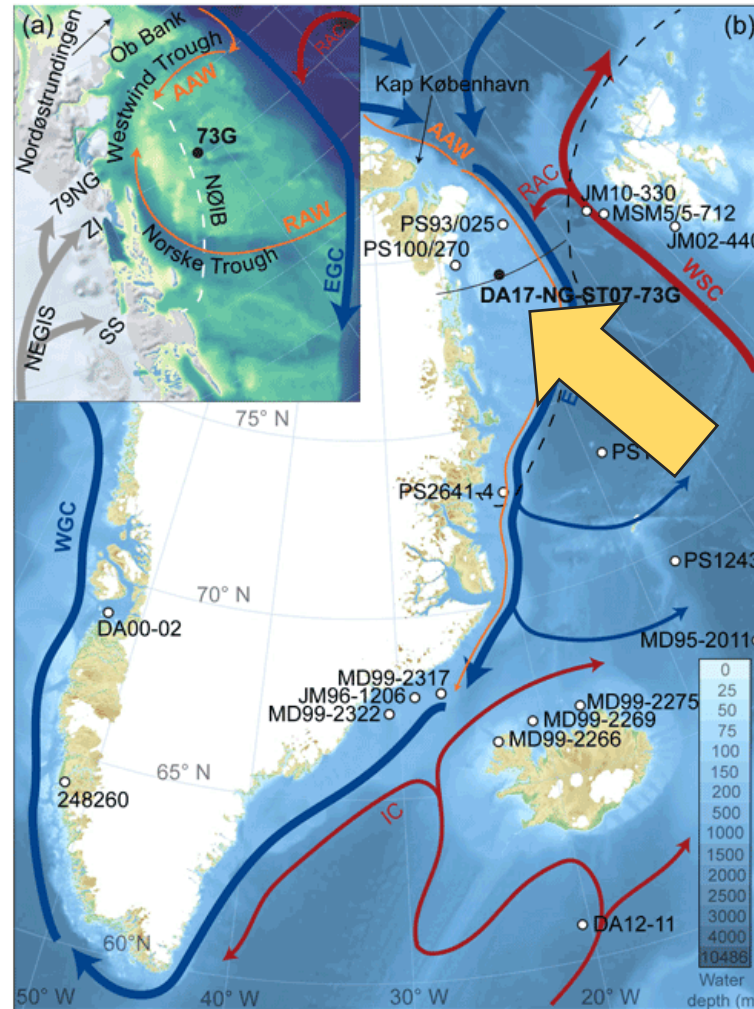


Pictures: Olivia Rempel,  
GRID Arendal





## WP1-3: Mapping the biodiversity of Arctic marine ecosystems in the past and its interaction with external drivers



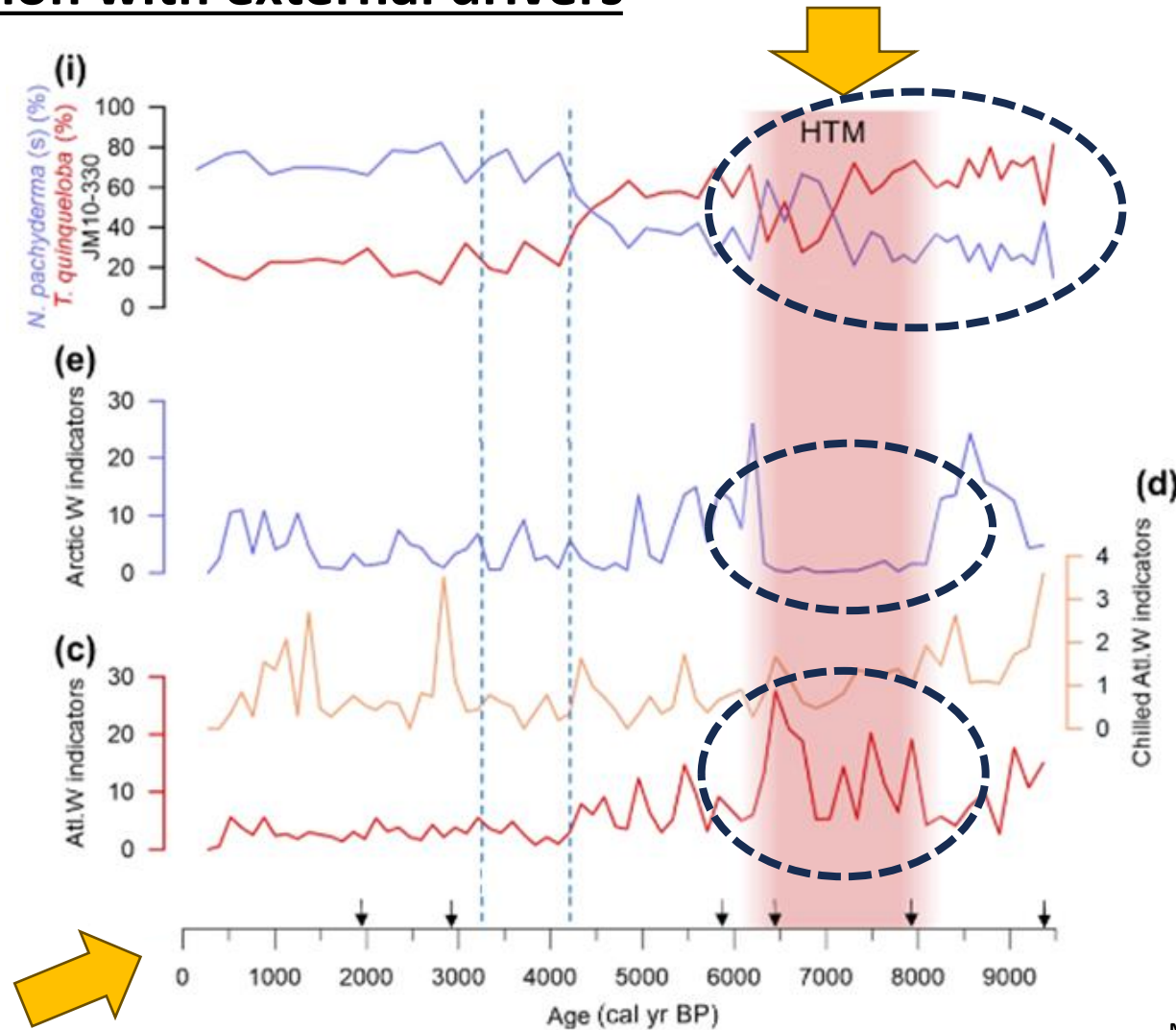
Sediment core  
from this sampling  
site has been analyzed

(sampling influenced by  
**cold Arctic derived water**  
and by  
**warmer Atlantic derived water**)



## WP1-3: Mapping the biodiversity of Arctic marine ecosystems in the past and its interaction with external drivers

Holocene Thermal Maximum  
(8.2 to 6.2 ka ago) with a  
strong influence of the Return  
Atlantic Current and a  
weakened transport of Polar  
Water in the upper East  
Greenland Current



Modified from Pados-Dibattista et al. 2022

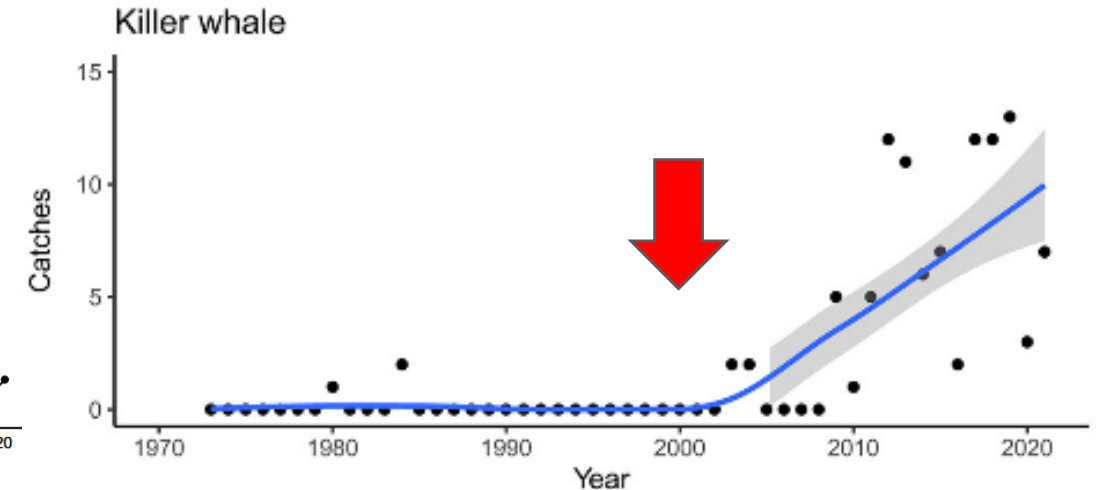
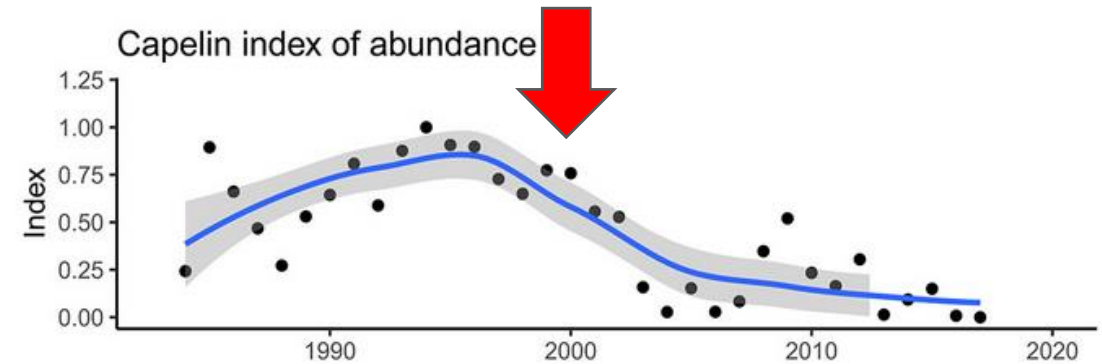
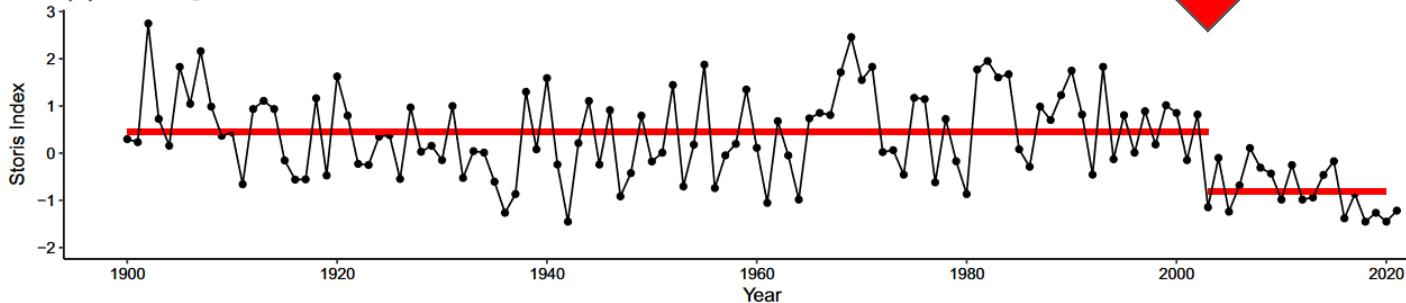


# WP1-3: Determine the potential for ecosystem tipping points – Fisheries and marine mammals

## A regime shift in the Southeast Greenland marine ecosystem

Mads Peter Heide-Jørgensen<sup>1</sup> | Philippine Chambault<sup>1,2</sup> | Teunis Jansen<sup>3,4</sup> |  
Caroline V. B. Gjelstrup<sup>3</sup> | Aqqalu Rosing-Asvid<sup>4</sup> | Andreas Macrander<sup>5</sup> |  
Gísli Víkingsson<sup>5</sup> | Xiangdong Zhang<sup>6</sup> | Camilla S. Andresen<sup>7</sup> | Brian R. MacKenzie<sup>3</sup>

(a) Storis regime shift



Heide-Jørgensen et al. 2022



## WP1-3: Determine the potential for ecosystem tipping points – Carbon sequestration

Melting ice



Increased stratification



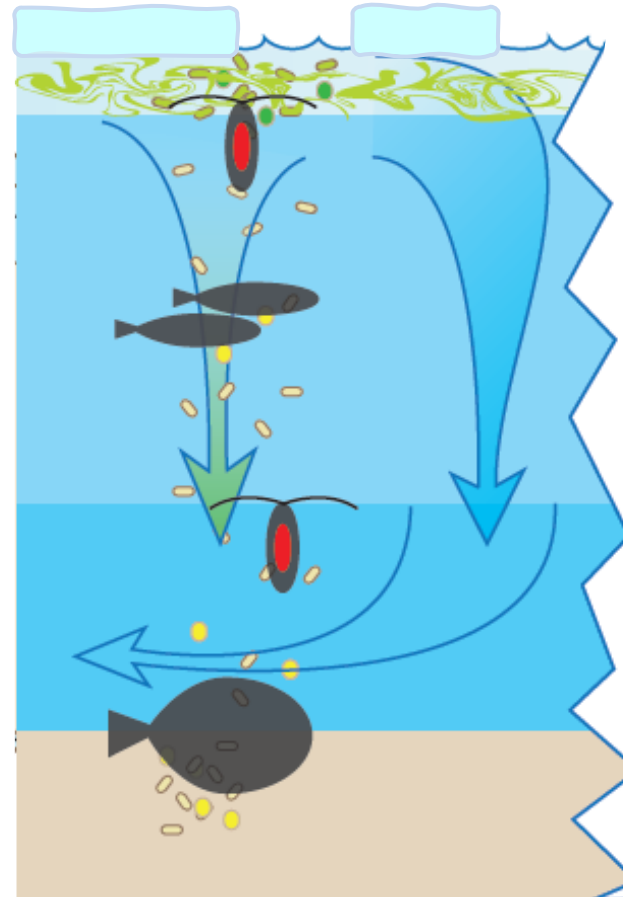
Decrease in the cell size of primary producers



Shift towards small detritus-feeding copepods



Effects on the biological carbon pump,  
food supply for the benthic communities,  
and food web efficiency



Abundant benthic fish  
more C sequestration



## WP1-3: Determine the potential for ecosystem tipping points – Carbon sequestration

Melting ice



Increased stratification



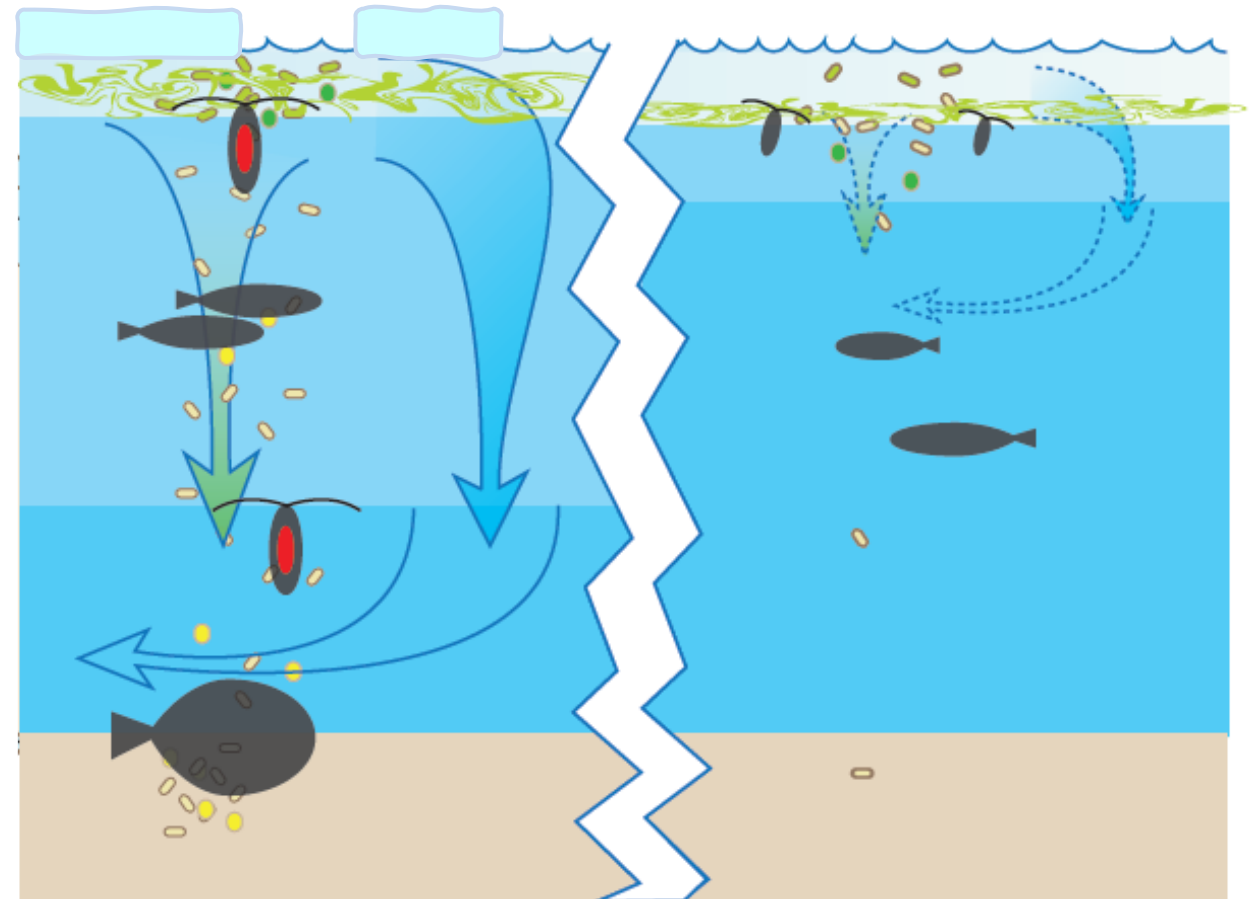
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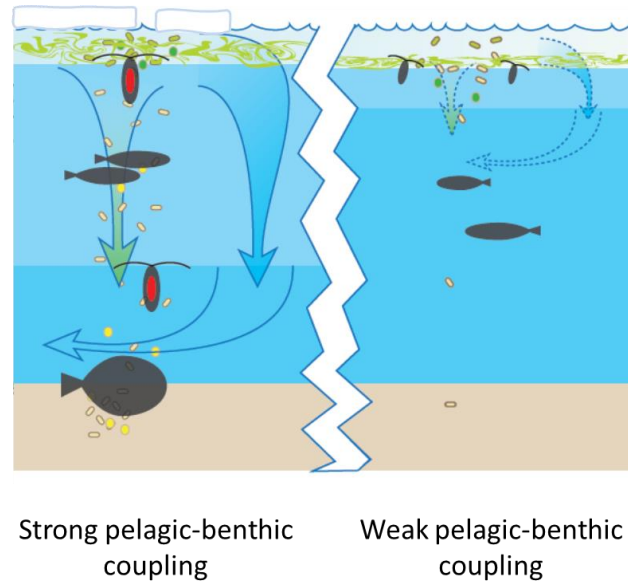
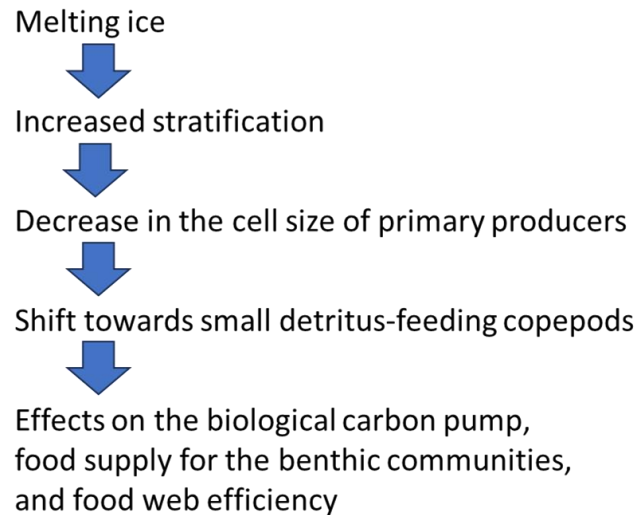
Abundant benthic fish  
more C sequestration

Little benthic fish/  
little C sequestration



## WP1-3: Determine the potential for ecosystem tipping points – Carbon sequestration

### *How to identify stressors that may induce a tipping of the carbon sequestration??*





## WP1-3: Determine the potential for ecosystem tipping points – Carbon sequestration



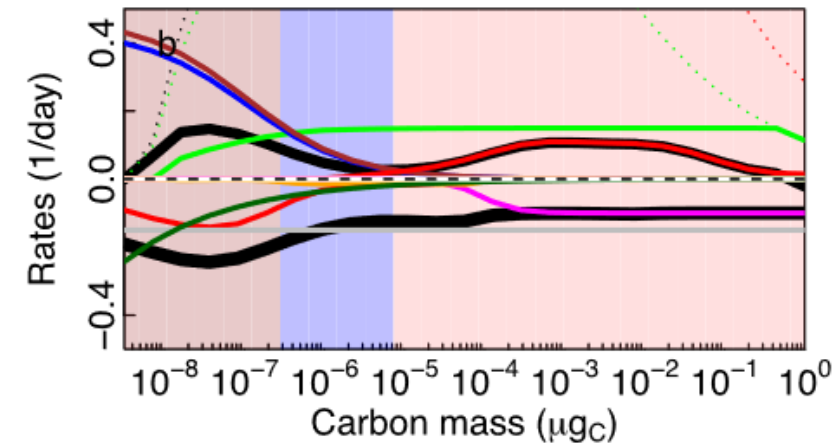
+ many other field samples

Field & experimental studies to get insight in current state

Picture: Olivia Rempel, GRID Arendal

Use models to determine rates and understanding for distinct processes

- Light harvesting
- Nutrient uptake
- DOC uptake
- Food consumption
- Division rate
- Predation
- Virulysis
- Higher trophic levels
- Respiration
- Passive



Andersen & Visser, 2023



## WP1-3: WP1-3: Determine the potential for ecosystem tipping points – Carbon sequestration



Action organized by ECOTIP and EU4OceanObs to advance the understanding between observational scientists and the modelling community

A wide-angle photograph of an Arctic landscape. In the foreground, there is a body of water with ice floes. In the background, there are steep, snow-covered mountains under a cloudy sky. The image is split vertically, with the left half showing a closer view of a mountain and the right half showing a wider view of the fjord and mountains.

### Biogenic Data Products to Advance Ocean Carbon Sequestration Modelling in the Arctic

With this survey, we invite you to join an action organized by the EU-funded projects ECOTIP and EU4OceanObs towards advancing modeling carbon sequestration in the Arctic. The final goal is the publication of a community-perspective article submitted in winter 2024.

The action has 3 phases:

**Phase 1- present survey:** Community perspectives on identifying important processes for advancing modelling carbon sequestration in the Arctic.

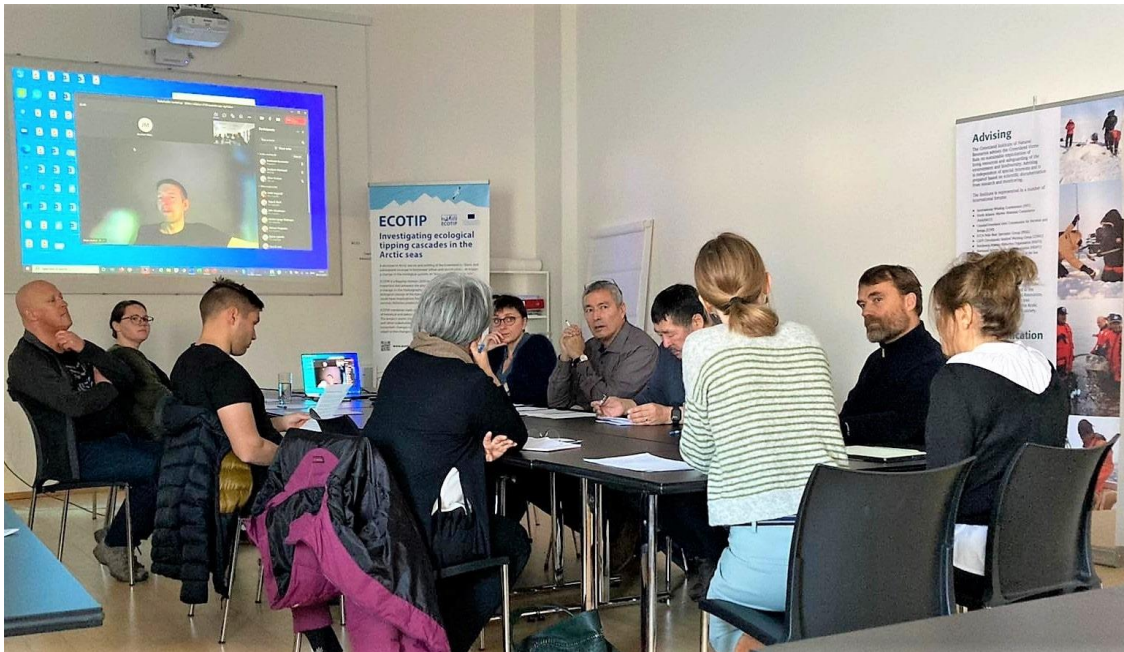
**Phase 2- online workshop:** Online workshop for identifying biogenic products related to the priorities from the survey, their observing status, and model readiness.

**Phase 3- manuscript preparation:** Engaged participants from phases 1 & 2 will work as co-authors for the submission of a perspective article on biogenic data products for advancing ocean carbon.

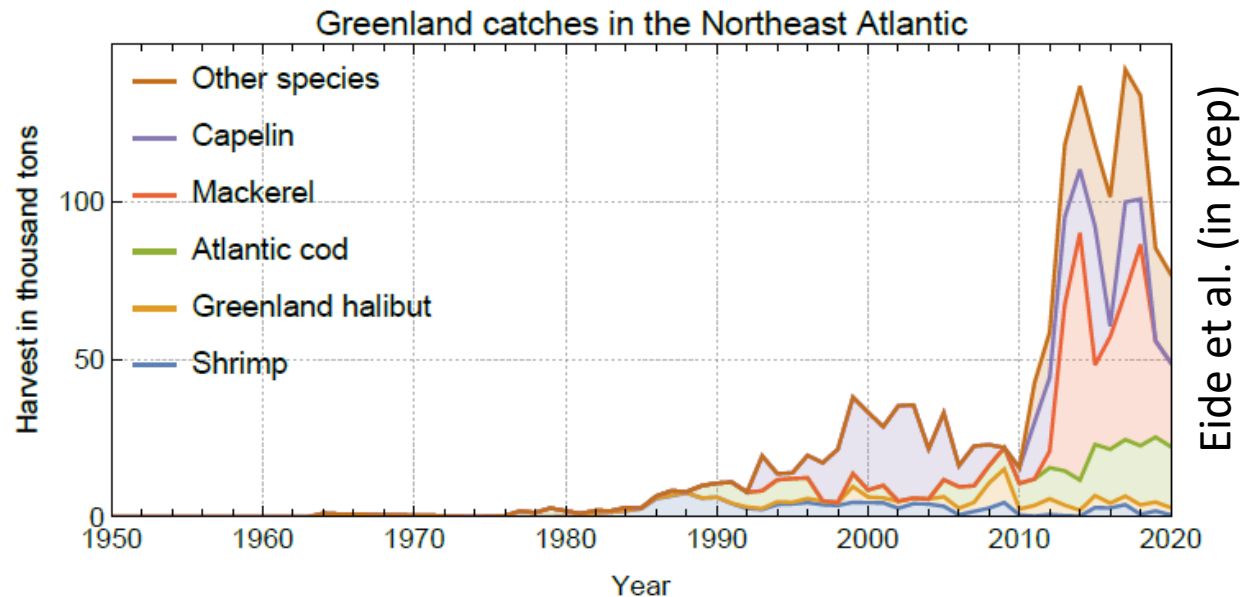


# WP4: Dialogue and co-creation of advice for improved governance and adaptation strategies with local and indigenous communities, industries and regulatory authorities

## Communicating with Greenlandic communities



## Analysis of fleet structure and markets





# Thank you for your attention

