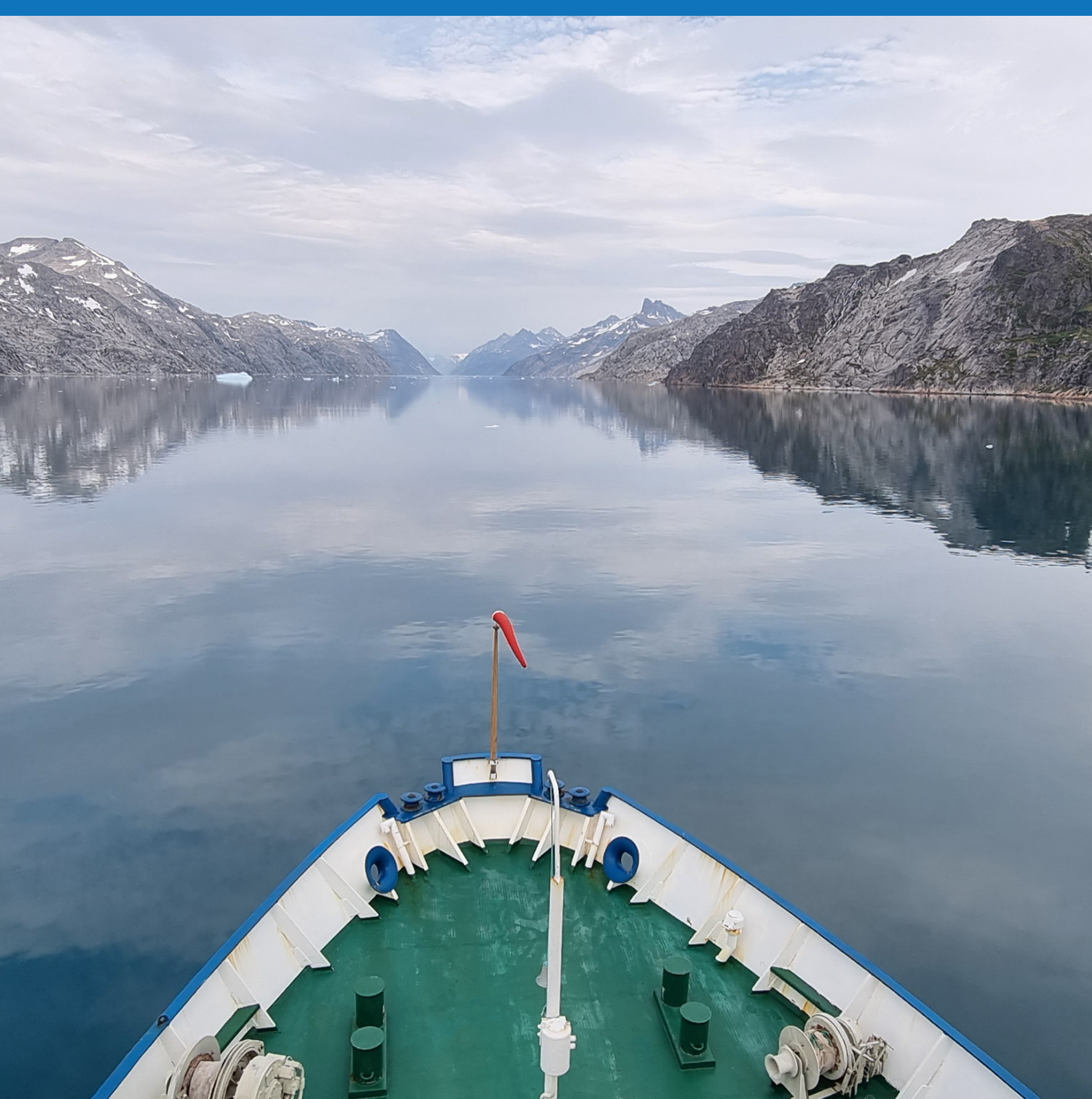


**POLICY BRIEF**

# **RECOMMENDATIONS FOR ENHANCED AND OPTIMIZED BIODIVERSITY MONITORING *IN THE ARCTIC REGION***



The climate change and resulting stressors such as for example increasing temperature, declining sea-ice and melting of the Greenland Ice sheet, are altering biodiversity and the marine ecosystem functions in Greenland and elsewhere in the Arctic. However, we are still limited in our understanding and ability to predict how the changing environment and related multiple stressors continue to impact the Arctic marine ecosystems, and the key services they depend on, such as fisheries.

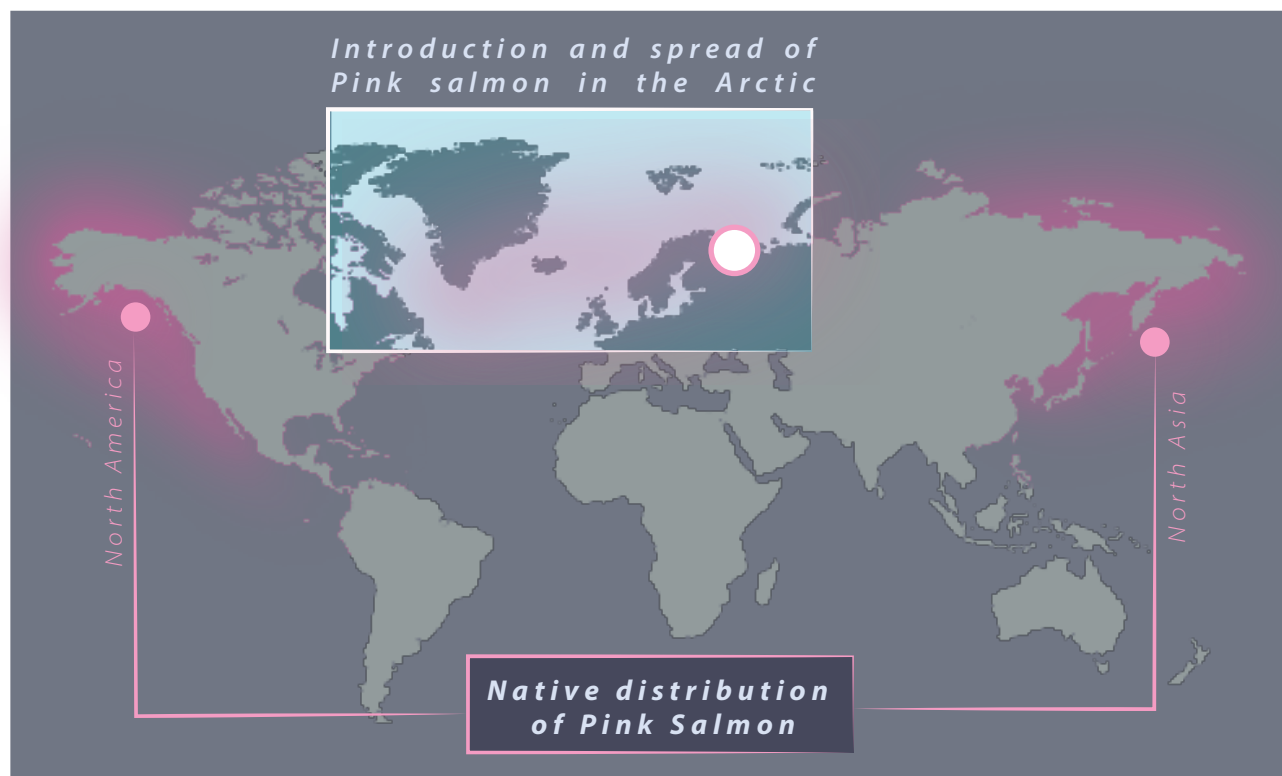
Data from long-term observations and monitoring programs are crucial for understanding the status and trends in fish and shellfish stocks as well their ecosystem functions, and provide critical baseline information for assessment of commercial fisheries resources. In addition, they enable the assessment of ecosystem health and early detection of ecosystem shifts and new threats, such as occurrence of invasive species.

In ECOTIP – a flagship EU Horizon 2020 research project that focuses on understanding and predicting changes in Arctic marine biodiversity and their implications for fisheries production and carbon sequestration - we review the current state of biodiversity and ecosystem monitoring in Greenland waters, and provide recommendations for their enhancement and optimization.

Fish and shrimp monitoring programs have been annually conducted offshore West Greenland since

1988, in East Greenland since 1998, and inshore at selected locations with different time-series since 1993. Since 2015 pelagic surveys for capelin and mackerel have been conducted offshore East Greenland. Those surveys provide very valuable and highly important information and are essential for assessment of the most important commercial species and understanding of the ecosystem. **Data from these long-term and consistent monitoring programs provide critical baseline information for understanding changes in ecosystem functioning and stock assessment of commercial fisheries in Greenland.**

Other Greenland monitoring programs include MarinBasis, a marine subprogram of the Greenland Ecosystem Monitoring (including 18 year long time-series in Nuuk, 21 year long time-series in Zackenberg and 6 year long time-series in Disko) that aims to establish long-term data series of key parameters in order to understand how the distribution and composition of marine plants



**Figure 1.** Introduction and spread of Pink Salmon in the Arctic (small inset) and its native distribution (large map). Map credit: GRID-Arendal

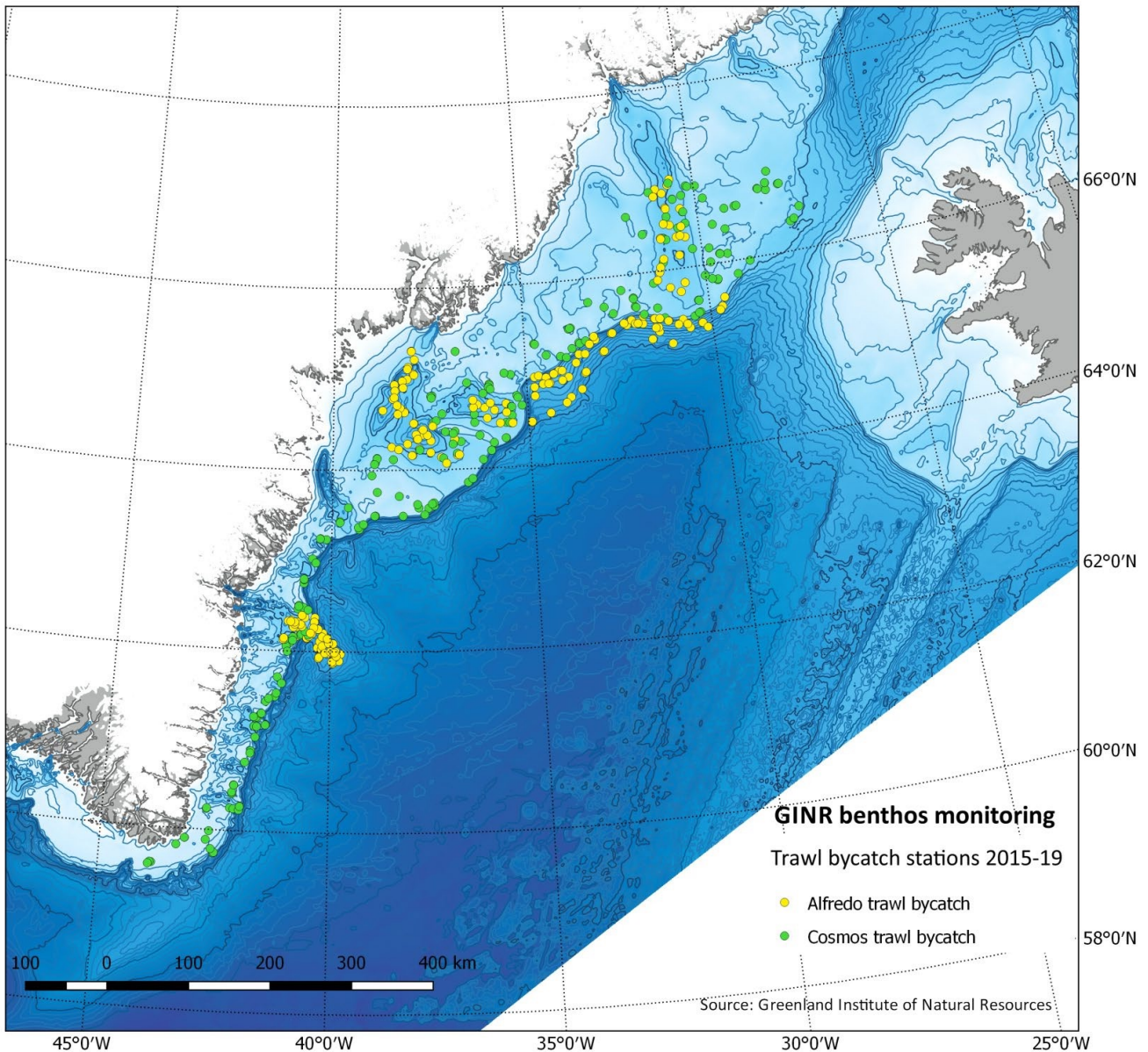


and animals and the marine carbon cycle are affected by climatic changes. The benthic Monitoring Program, INAMOM, conducted since 2015, integrates a “trawl bycatch-program” on the fish and shrimp surveys. The bycatch of benthic invertebrates in assessment trawl hauls are analysed and identified to highest possible taxonomic resolution. Both provide invaluable information on the status and trends in the monitored ecosystem.



In order to enhance and optimize monitoring efforts and improve assessment of ecosystem condition it is recommended that:

1. Existing and ongoing monitoring: fish and shellfish efforts are maintained at the current level of coverage and frequency.
2. Monitoring efforts are augmented by including benthic sampling.
3. New sampling techniques, such as eDNA measurements, are introduced in selected locations as complementary to the existing surveys to enable efficient and reliable invasive species monitoring.



**Figure 2.** Overview of Greenland Institute of Natural Resources’s assessment trawl stations ( $n = 423$ ) where the bycatch of benthic invertebrates has been identified by specialist taxonomists. Credit: ICES 2020 Working Group on Integrated Ecosystem Assessment of the Greenland Sea (WGIEAGS). ICES Scientific Reports. 2:75. 72 pp. <http://doi.org/10.17895/ices.pub.7450>



