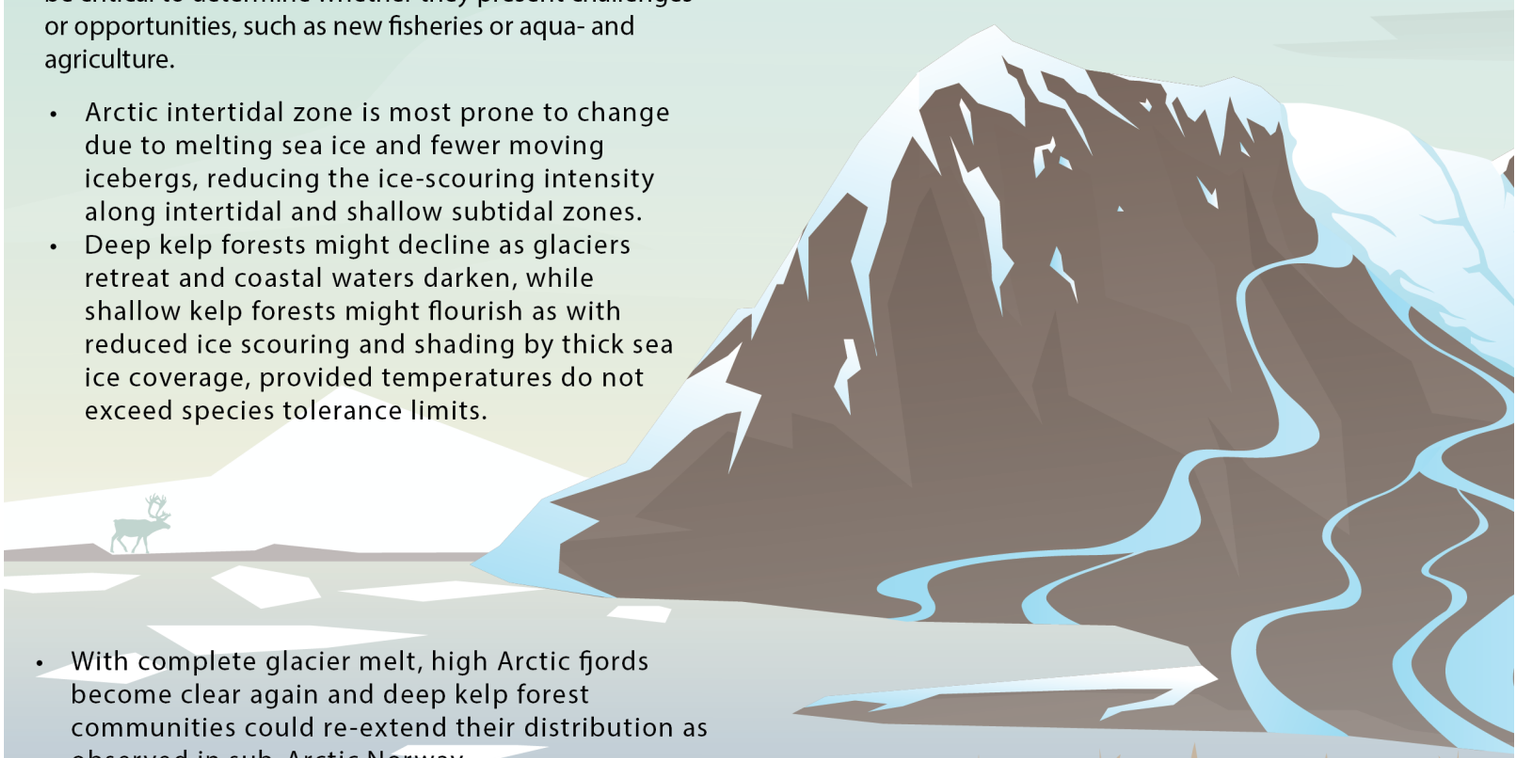
BIODIVERSITY AND NOVEL ECOSYSTEMS

The following factsheet presents the joint results, research gaps and priorities identified by the H2020-funded ECOTIP, FACE-IT, and CHARTER projects on Arctic biodiversity changes on land, coasts and in the ocean.

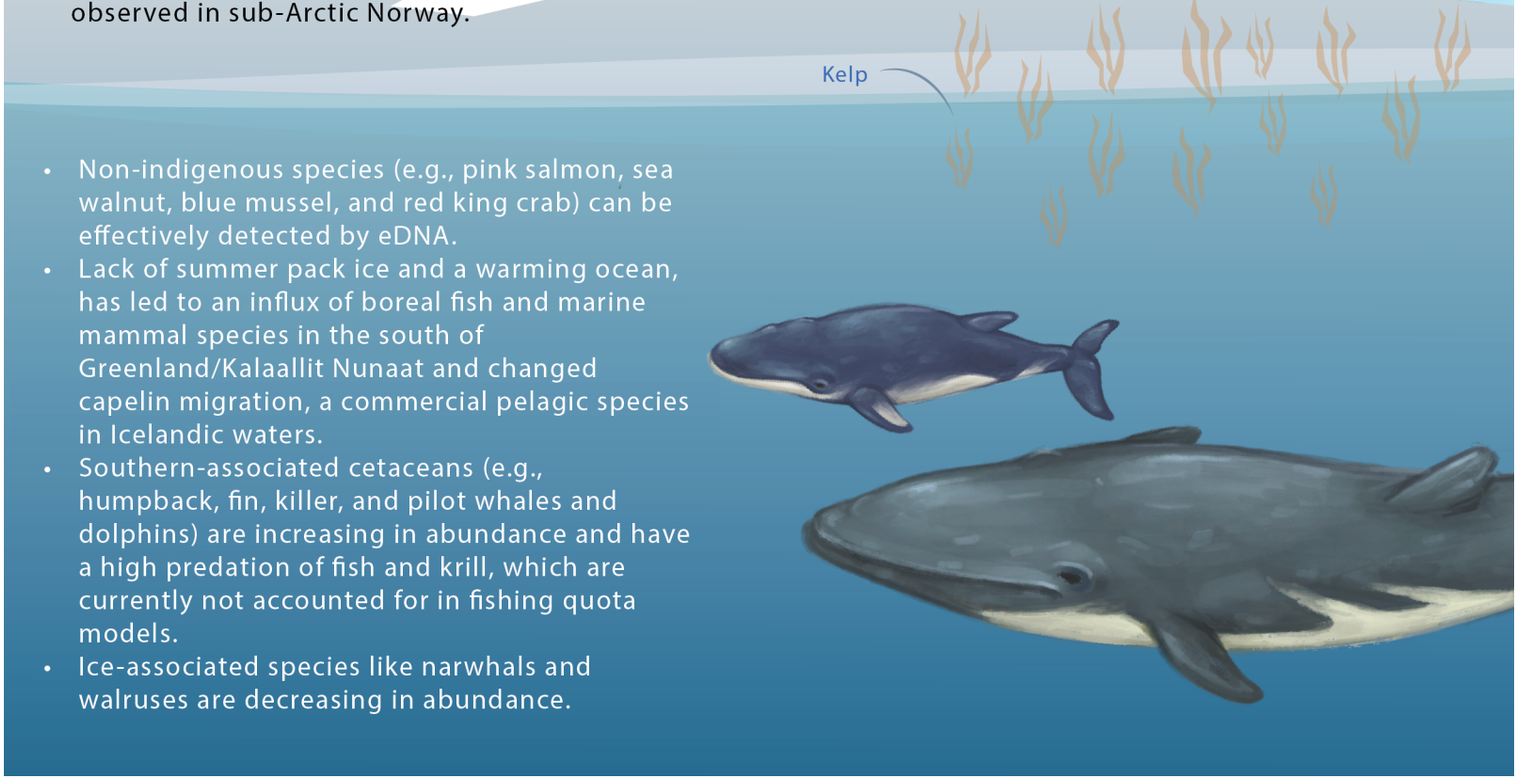
Climate change will result in a dramatic loss of unique Arctic habitats, such as sea-ice and permafrost soil microbial communities, while witnessing the emergence of totally novel ecosystems, such as intertidal communities in previously ice-locked coastlines. The effects on native flora and fauna and their related ecosystem functions and services are largely unknown. Evaluating the invasive potential of incoming species will be critical to determine whether they present challenges or opportunities, such as new fisheries or aqua- and agriculture.

- Arctic intertidal zone is most prone to change due to melting sea ice and fewer moving icebergs, reducing the ice-scouring intensity along intertidal and shallow subtidal zones.
- Deep kelp forests might decline as glaciers retreat and coastal waters darken, while shallow kelp forests might flourish as with reduced ice scouring and shading by thick sea ice coverage, provided temperatures do not exceed species tolerance limits.

- Created the Holocene Arctic Biodiversity Indicators Database (HABID) - a comprehensive, open-access resource with over 1,000 sites.
- Satellite imagery and AI were used to develop a new Rain-On-Snow dataset
- Drone monitoring was used to assess vegetation sensitivity and the magnitude of the effects of reindeer on vegetation and soil processes was assessed.
- Due to high trampling, lichens have declined the most in areas where reindeer graze during the summer.



- With complete glacier melt, high Arctic fjords become clear again and deep kelp forest communities could re-extend their distribution as observed in sub-Arctic Norway.



- Non-indigenous species (e.g., pink salmon, sea walnut, blue mussel, and red king crab) can be effectively detected by eDNA.
- Lack of summer pack ice and a warming ocean, has led to an influx of boreal fish and marine mammal species in the south of Greenland/Kalaallit Nunaat and changed capelin migration, a commercial pelagic species in Icelandic waters.
- Southern-associated cetaceans (e.g., humpback, fin, killer, and pilot whales and dolphins) are increasing in abundance and have a high predation of fish and krill, which are currently not accounted for in fishing quota models.
- Ice-associated species like narwhals and walruses are decreasing in abundance.

RESEARCH GAPS

How can we gain a holistic picture of marine genetic and functional diversity to better understand how changes in functional diversity precede changes in ecosystem functions? How can we better integrate taxonomic descriptions or morphological identification with their associated cryptic species detected by molecular methods?

Is there enough monitoring for incoming non-native, potentially invasive species?

How can pasture management activities promote lichen recovery?

How can increased development of satellite interpretation tools, extended drone campaigns, and the use of AI complement existing field efforts?

How can Arctic areas be studied as cultural landscapes rather than wilderness by including historical knowledge coupled with knowledge co-production with local and Indigenous peoples as a prerequisite for understanding contemporary ecosystems?

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ECOTIP

FACE-IT Arctic Biodiversity & Livelihoods

CHARTER