Changes in Arctic marine biodiversity indicate environment on verge of major shift

Says new State of the Arctic Biodiversity Report, released at the Arctic Council Ministerial

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Changing food availability, loss of ice habitat, increases in contagious diseases, and the impending invasion of southern species are taking their toll on Arctic marine animals, and pointing to an ecosystem on the verge of a shift, says new report released by the Conservation of Arctic Flora and Fauna (CAFF), the biodiversity working group of the Arctic Council.

The State of the Arctic Marine Biodiversity Report identifies trends in key marine species and points to important gaps in biodiversity monitoring efforts across key ecosystem components in: sea ice biota, plankton, benthos, marine fishes, seabirds and marine mammals. Changes in these species are likely to indicate changes in the overall marine environment.

Over 60 international experts in CAFFs Circumpolar Biodiversity Monitoring Program (CBMP) sifted through existing data on key elements of the Arctic marine species. Key findings and evidence include:

Food resources are being lost for many Arctic species in Arctic marine environments. Many species must travel further and expend more energy to feed, leading to concerns about individual health and potential effects at the population level.

- Reduced ice cover has led to increased polar bear predation on ground-nesting common eiders and cliff-nesting murres.
- Barents Sea harp seals have reduced body condition associated with reduced food availability as their travel time to the ice edge to feed is longer.
- Some Indigenous communities have noted a change in walrus stomach contents, with more open water fishes and less clams, indicating that the distribution and availability of benthic resource species are changing in some areas.
- Ivory gull declines coincide with reduction in their sea ice feeding areas.

Current trends indicate that **species reliant on sea ice for reproduction, resting or foraging will experience range reductions** as sea ice retreat occurs earlier and the open water season is prolonged. Although there are no documented cases of widespread population changes, some Arctic-breeding seabirds and some resident marine mammals have been observed shifting behaviours.

- Belugas in Hudson Bay varied timing of migration in response to variations in temperatures. These migrations may affect the ability of people to find and use these resources.
- Changes in sea ice conditions are probably linked to declines in the abundance of hooded seals, lower reproduction rates of Northwest Atlantic harp seals, reduced body condition of Barents Sea harp seals, and changes in prey composition of bearded seals.
- Extirpation of some stocks of ice-dependent seals are possible, but is expected to vary locally because of large regional variation in ice cover decline.
- Early spring sea ice retreat also reduces suitable breeding and pup rearing habitat for ringed seals. This affects the ability for polar bears, which feed on ringed seals, to rebuild energy stores after fasting during their own breeding period.

- Walruses have rested on sea ice located over prime feeding areas, but due to late season ice formation, are increasingly using coastal haul-out sites instead. In addition to travelling further to access foods, this also increases the risk of calf mortality from stampede.

Some Arctic species are shifting their ranges northwards to seek more favourable conditions as the Arctic warms. These movements pose unknown consequences for Arctic species and their interactions, such as predation and competition.

- The northward expansion of capelin has led to changes in seabird diet in northern Hudson Bay. It also may affect marine mammals.

Northward movement is easier for more mobile open-water species. Open water species are more mobile compared to those linked to shelf regions, such as benthic species, for which suitable habitat may be unavailable if they move northward.

Increasing numbers and diversity of southern species are moving into Arctic waters. In some cases, they may outcompete and prey on Arctic species, or offer a less nutritious food source for Arctic species.

- Complex patterns of benthic biomass change in the Barents Sea are related to, amongst other pressures, warming of the Barents Sea improving conditions for boreal species to move further north.
- The distribution of Atlantic cod is expanding in the Atlantic Arctic and increasing predation pressure on the polar cod, an important nutrient-rich prey fish, important for other fishes, seabirds and marine mammals, especially seals.
- The more temperate killer whale is expanding in Arctic waters and may compete with other apex predators for nutritious seals.

Arctic marine species and ecosystems are undergoing pressure from cumulative changes in their physical, chemical and biological environment. Some changes may be gradual, but there may also be large and sudden shifts that can affect how the ecosystem functions.

Increases in the frequency of contagious diseases are being observed.

- Incidents of avian cholera have increased in the northern Bering Sea and Arctic Archipelago.
- The first designated Unusual Mortality Event in the U.S. Arctic occurred in 2011 and involved species of seals and walrus—essential food resources—affecting coastal community health, nutrition, cultural and economic well-being in areas of Canada, the U.S., and Russia.

The report provides advice to improve Arctic biodiversity monitoring activities to provide scientific information to policy makers more quickly. These include better coordination, standardisation of methods, improved consideration of Traditional and Local Knowledge, and attention to filling key information gaps.

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Conservation of Arctic Flora and Fauna

CAFF is the biodiversity working group of the Arctic Council and consists of National Representatives assigned by each of the eight Arctic Council Member States, representatives of Indigenous Peoples' organizations that are Permanent Participants to the Council, and Arctic Council observer countries and organizations. CAFF's mandate is to address the conservation of Arctic biodiversity, and to communicate its findings to the governments and residents of the Arctic, helping to promote practices which ensure the sustainability of the Arctic's living resources. For more information: **www.caff.is**

Circumpolar Biodiversity Monitoring Program (CBMP)
The Circumpolar Biodiversity Monitoring Program (CBMP) is an international network of scientists, governments, Indigenous organizations and conservation groups working to harmonize and integrate efforts to monitor the Arctic's living resources. The goal is to facilitate more rapid detection, communication, and response to the significant biodiversity-related trends and pressures affecting the circumpolar world. The CBMP organizes its efforts around the major ecosystems of the Arctic: marine, freshwater, terrestrial and coastal. The CBMP has been endorsed by the Arctic Council and the UN Convention on Biological Diversity and the official Arctic Biodiversity Observation Network of the Group on Earth Observations Biodiversity Observation Network (GEOBON). For more information: **www.caff.is/monitoring**

Arctic Council
The Arctic Council is a high level intergovernmental forum to provide a means for promoting cooperation, coordination and interaction among the Arctic States, with the involvement of the Arctic Indigenous communities and other Arctic inhabitants on common Arctic issues, in particular issues of sustainable development and environmental protection in the Arctic. Arctic Council Member States are Canada, Denmark (including Greenland and the Faroe Islands), Finland, Iceland, Norway, Russian Federation, Sweden, and the United States of America. In addition to the Member States, the Arctic Council has the category of Permanent Participants who include the Arctic Athabaskan Council (AAC), Aleut International Association (AIA), Gwich'in Council International (GGI), Inuit Circumpolar Council (ICC), Russian Association of Indigenous Peoples of the North (RAIPON) and the Saami Council (SC). For more information: **www.arctic-council.org**

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