

Threats to Arctic Biodiversity

– Climate change impacts on sea mammals and sea birds

If temperatures increase, many southern species will head north towards the pole. If sea ice reduction (extent and thickness) turns out to be as dramatic as is currently predicted by many models, profound negative consequences for ice-associated Arctic species can be expected. In a worst-case scenario extinctions of some Arctic specialists will occur.

Many Arctic marine mammals are long-lived animals that do not deal particularly well with competition. They have evolved in an environment where only a few species have become adapted to the harsh physical conditions and the extreme changes from one season to another that are characteristic of the Arctic. Most Arctic mammals reach sexual maturity quite late in life and have few young. Marine birds that live at high latitudes share these

features, although they are not usually full-time Arctic residents. A warmer climate will cause a greater outflow of freshwater from the big northern rivers as well as increased freshwater release from currently frozen reservoirs, such as glaciers and multiyear sea ice, in the Arctic. This increase of freshwater input in the ocean will be another serious threat to Arctic marine ecosystems, especially in the fjords. The

small inhabitants of the waters will be affected, which in turn will have an impact on the sea mammals and sea birds.

There is a concern that Arctic species don't have enough flexibility to deal with rapid changes, but will keep up their old habits – e.g. returning to the place they were born – even if this no longer can comply with their needs. Removal of keystone species (like polar bears) could result in rapid ecosystem change.



Threats to Arctic Biodiversity

- ◆ Climate change
- ◆ Overharvesting – which is occurring for some species in some sectors of the Arctic
- ◆ Increased development in the Arctic
- ◆ Pollution

Polar Bears

Polar bears are intimately tied to the sea ice and an alteration to sea ice distribution or its character will affect them. They hunt ringed seals, and other ice-associated seals, and also use sea ice to move from one area to another. For winter denning, pregnant females move into areas with thick snow cover on land, or on sea ice in some areas; the new mothers require good spring ice conditions when they emerge from these dens with young cubs and resume their hunting for seals. Reduction in the sea ice will affect the availability of food, and in turn the distribution and the reproduction of polar bears.

Seals

Ice-living seals are particularly vulnerable to changes in the Arctic ice because they depend on the ice as a platform for giving birth and for resting, and some seals eat prey species that live on in the underside of sea ice. Outside the essential period for breeding, it is also important that they have the ice to rest on during the early summer when they shed their skin and hair, as having dry, relatively warm skin during this process saves them a lot of energy compared to if the process must occur in the cold water. Ringed seals do not normally come onto land and performing this behaviour would be a rather dramatic change for this species. Also, they require sufficient snow cover to construct snow dens for breeding and both the ice and the snow must be present late into the spring in order for ringed seals to successfully rear young. Ringed seals are perhaps the most vulnerable of the high Arctic seals because so many aspects of their life-history are tied to sea ice.

Whales

The responses of whales to climate changes are somewhat less certain than those for ice-breeding seals and polar bears. However, it is likely that bowhead whales, belugas, and narwhales would be impacted negatively by predicted climate changes. These species spend much of their time in areas that contain significant amounts of ice cover and specialize in eating ice-associated species. Increased competition from other large baleen and toothed whales would likely be problematic

for these Arctic specialists; should killer whales spread further north, this would be a serious issue for the slow-swimming Arctic whales if they did not have ice to retreat into.

Sea birds

Sea birds are likely to be influenced most by climatic change indirectly via changes in food availability. Species with narrow food or habitat requirements will be most sensitive. Sea birds are dependent on having enough food available within a reasonable distance from their nests. Eggs must be incubated and chicks must be brooded and fed, so sea bird parents cannot leave the nest site for long periods of time. If climate change induces dramatic shifts in the distribution of macrozooplankton and small fish species that travelling in groups, sea bird breeding distribution patterns are likely to change. If suitable breeding areas are not available nearby new areas of high productivity, Arctic sea birds may not be able to take advantage of them which would result in reproductive failure.

It is likely that impacts of climate changes on sea birds are going to be extremely variable in a geographic context. Two sea birds in the Barents region that are likely to be negatively impacted by climate change are ivory gulls and little auks. These two species both depend on a significant input of fat to their diet. Ivory gulls feed on marine mammal fat whenever it is available, from polar bear or fox kills or whale strandings etc., and little auks concentrate their feeding on small aquatic animals that store a lot of fat in their bodies in order to survive the high Arctic winters. If these species are replaced by less fat, southern species, it will have negative consequences for little auks and other sea birds.

Changing patterns of precipitation could also affect sea birds quite dramatically. More frequent bouts of freezing rain, if they occur during nesting, could reduce reproductive success. More stormy weather in general could make it hard to find food, which is critical during the period when the sea birds are feeding their young as well as supporting their own requirements. Other complexities that could

influence seabirds include changes to large-scale patterns of wind speed and direction, which could alter the cost of flight, particularly when migrating.

Climate change may have a profound impact on Arctic sea mammals and sea birds. Concerns for Arctic marine mammals and sea birds include:

- ◆ changes to their food base, with more southern species replacing many of the fat-rich Arctic species that they currently feed on
- ◆ more direct and indirect competition from species moving up from further south
- ◆ increased disease risks
- ◆ higher pollution loads due to increased run-off from rivers in industrialized areas further south
- ◆ greater impacts from human activity, including increased shipping, and increased development in oil, gas or, mining as well as tourism.