



## Climate Change and the Arctic: Alaska Native Subsistence Hunting

Arctic climate change is threatening the food security, safety, and health of Alaska Natives who rely on marine mammals.

### Background

- Arctic marine mammals hold a significant place in the Arctic Indigenous worldview, providing physical and spiritual sustenance and cultural identity to many Alaska Native communities.
- The Marine Mammal Protection Act recognizes the importance of subsistence hunting and cultural practices by Alaska Natives. Through a process called co-management, Alaska Native Organizations partner with federal agencies to ensure the conservation of marine mammals and their sustainable subsistence use by Alaska Natives.
- Climate change has resulted in loss of sea ice, warming air and sea temperatures, and increased storm severity in the Arctic, which impacts subsistence hunting of marine mammals and thereby Alaska Native food security, safety, and health.

### Food Security & Safety

Safe and successful Indigenous hunting relies on knowing how and when to operate on the land and sea. Loss of sea ice and extreme environmental conditions due to climate change, such as extended open water periods, thin and unstable sea ice, high winds, and stronger currents, are all major safety concerns for hunters. Sea ice loss and warming ocean waters also impact the migration timing of marine mammal species in the Arctic. These ecological changes, combined with safety concerns, make it harder and riskier for Alaska Native hunters to access, harvest, and transport subsistence foods. These changes can have dramatic consequences for the success of hunts and undermine food security.

### Food Security & Human Health

Changes to the environment that impact marine mammal health have implications for food safety and thereby human health. For example, the occurrence of harmful algal blooms (HABs) is increasing in offshore Alaska as sea ice declines and water temperatures increase. HAB toxins, such as saxitoxin and domoic acid, have been found in some Arctic marine mammals and their prey, which may pose health threats to humans that consume them. In addition, temperature-sensitive bacteria, such as *Vibrio parahaemolyticus*, can cause gastrointestinal disease, and are now found in marine mammals in Alaskan waters, further north than previously recorded.



Many Arctic marine mammals, such as this ribbon seal, rely on sea ice for suitable habitat. Loss of sea ice and warming seas alter food webs and reduce habitat for marine mammals (M. Cameron, NMFS).

## Increasing Human Activity

Longer open-water seasons and warmer temperatures have resulted in an increase in offshore human activities in the Arctic, impacting both access to, and the health of, marine mammals. Unless effectively managed, shipping, commercial fishing, military activities, oil and gas operations, scientific research, tourism, and coastal development in the Arctic have strong potential to disrupt subsistence harvests by directly interfering with hunting activities or by disturbing marine mammals through increased human presence and noise. Increased vessel traffic and offshore industrial activities will also increase the risk of ship strikes, oil spills, marine debris, and pollution in the marine ecosystem, thereby impacting the health of marine mammals hunted for subsistence.

## What We Don't Know

- Climate change impacts are not uniform across the Arctic, leading to uncertainties in assessing regional marine mammal impacts. The risks to marine mammal species hunted for subsistence will differ across sub-populations and regions.
- The impacts of a changing climate also raise uncertainties about the health of marine mammal species hunted for subsistence. In some cases, human health risks may be associated with consuming marine mammals. While the effects of some HAB biotoxins on pinnipeds are well known, effects on cetaceans are less clear, as is the relationship between consumption of contaminated marine mammals and human health.
- It is largely unknown how the continued influence of climate change on economic, social, cultural, and political factors will also impact Alaska Native food security.



Subsistence harvests, such as of this bowhead whale in Kaktovik, are important not only as a food source, but also as an opportunity for people to connect with their culture and community when teaching, learning, and sharing with one another (Dania Moss).

## What We Can Do

### Reduce Carbon Dioxide Emissions

Arctic Indigenous communities have long been at the frontlines of climate change and are often disproportionately affected by its impacts. We need to address the sources of the problem by reducing carbon dioxide emissions on an individual, regional, and global scale.

### Co-production of Knowledge

Alaska Native subsistence hunters continuously monitor environmental conditions and the marine mammals they rely on for subsistence. That information can help with real-time detection of environmental changes. Indigenous Knowledge systems can help guide collaborative approaches to research and decision-making to mitigate and adapt to climate change in a way that addresses Alaska Native priorities.

For example, local observations and health data collected from marine mammals taken for subsistence can be coupled with environmental data from existing platforms like the Integrated Ocean Observing System and the Alaska HAB Network to monitor for real-time changes to marine ecosystems and marine mammals, which can improve awareness and response to food safety risks at the community level.

### Adaptive and Flexible Research and Management

We need flexible research methods that integrate traditional observations and new technologies to detect changing environmental conditions on regional and local scales, strong and effective co-management structures that inform decision-making at all government levels, and adaptive management approaches to ensure continued conservation of marine mammals and their sustainable subsistence use by Alaska Natives.