INDIGENOUS FOOD SECURITY IN THE ARCTIC

Implications of a Changing Ocean

This brief focuses on how climate change affects Arctic Indigenous food systems, in particular resources, culture, and health tied to marine environments, and highlights examples of adaptive responses in ocean management.

INFORMATION BRIEF
2021

ARCTIC COUNCIL

PAME
Protection of the Arctic Marine Environment

Indigenous Food Security in the Arctic

Rapid social and environmental change in the Arctic—including climate change—affect the health and well-being of millions of people and animals that call the Arctic home.[1] To understand and manage these impacts effectively, one needs to look at the ecosystem as a whole for a healthy environment, healthy humans, and healthy animals[1]– a conceptual framework often referred to as One Health.

Food security can be an important indicator of ecosystem health[2] and a major determinant of health among Indigenous Peoples.[3] Indigenous communities rely on plants and animals from their environment (often termed "traditional," "wild," or "country" foods), supplemented by imported store-bought food. This use of natural resources is a central part of Indigenous cultures. However, rapid climate change is drastically changing the physical dynamics of the environment, and consequently affecting acquisition of traditional foods.

Major environmental changes are linked to the warming Arctic, with rapid deterioration of the Arctic sea ice ecosystem among the most drastic effects.[4] Such changes are altering the availability and accessibility of traditionally harvested species, with consequences to health and cultural well-being. The number and types of harvested species, as well as hunting and storage methods, vary by region, culture, and community.[5] While understanding these differences is important for considering the potential climate change consequences for and adaptation needs of each community,[5] several common themes are outlined in this information brief.

Aleut (Unangan)
Steller sea lion; northern fur seal, salmon, halibut, crab, seabird eggs

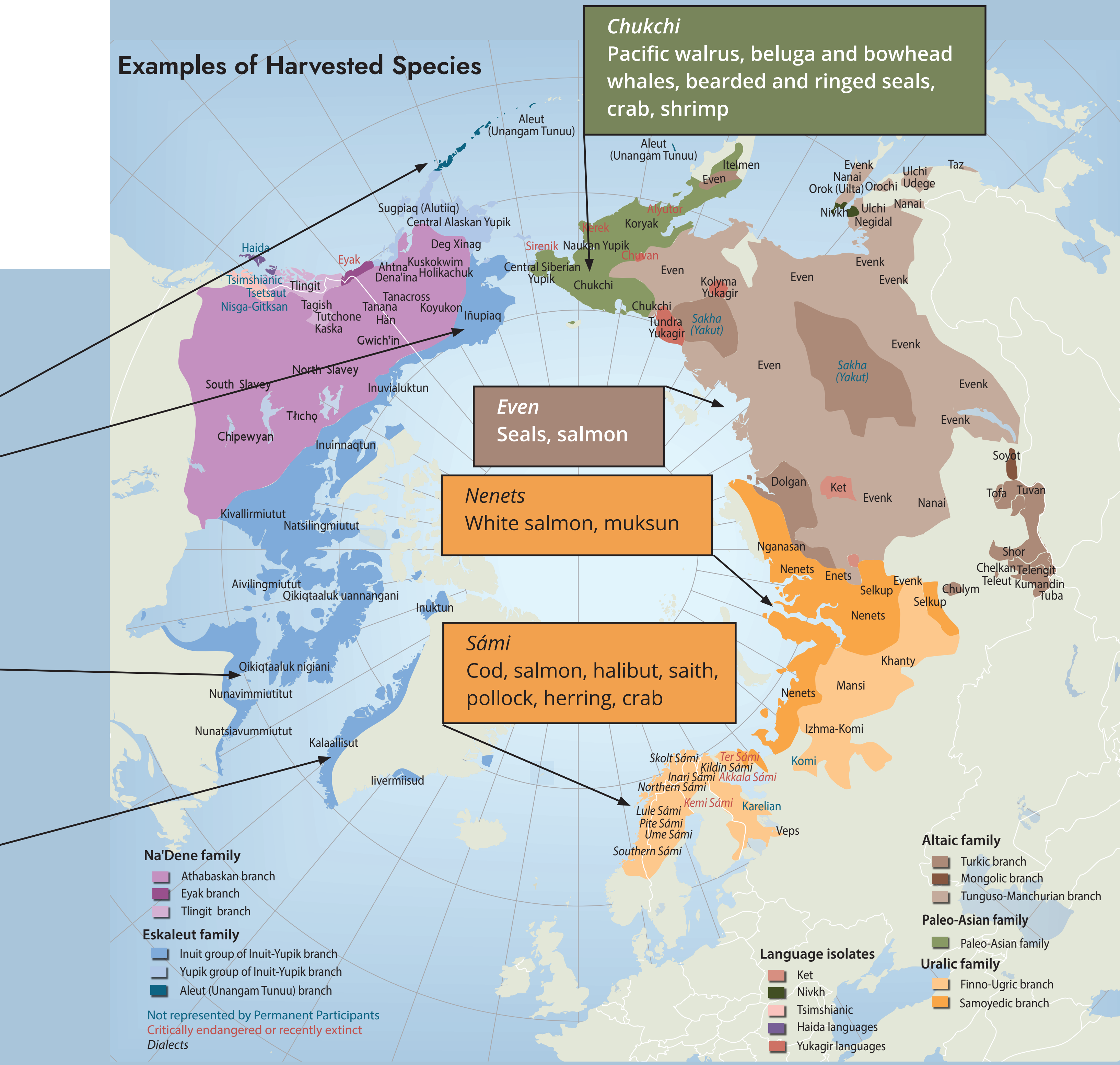
Iñupiaq
Beluga and bowhead whales, bearded and ringed seals, walrus, polar bears

Qikiqtaaluk
Beluga and bowhead whales; bearded, harp, and ringed seals; narwhals; polar bears; cod, salmon, Arctic char

Kalaallisut
Minke, fin, and beluga whales; bearded, harp, hooded, and ringed seals; narwhals; polar bears

Map from Ságastallamin: Telling the Story of Arctic Indigenous Languages Exhibition, 2019: https://www.arcticpeoples.com/arctic-languages

Sources: Arctic Biodiversity Assessment (CAFF, 2013). GRID-Arendal (GRID-Arendal/UN Environment, 2019), W.K. Dallmann (Norwegian Polar Institute, 2012), experts from the Arctic Council Permanent Participant organizations. The language classification for Haida is based on Schoonmaker et al., 1997, for Yukagir on advice from the Institute for the Peoples of the North, 2019.



Note: The map broadly demonstrates Arctic Indigenous languages spoken by members of the Arctic Council Permanent Participant organizations (Indigenous Peoples Secretariat, 2019), as well as the diversity of species harvested and importance of these stocks across Indigenous communities. The borders between the language families and locations are illustrative and not entirely precise, and the species listed are not intended to be interpreted as a comprehensive representation of species used. Most languages are written in English and not in their traditional orthographies. Different dialects are marked in italics to demonstrate diversity within languages. The present map is under further improvement with the help of a network of linguists and Indigenous language experts. The goal is to create a comprehensive online educational resource. Please submit improvements, corrections, or interesting information about the revitalization of Arctic indigenous languages to: ips@arctic-council.org

Impacts of Climate Change on Availability and Accessibility

Climate change interacts with other environmental and health stressors, along with a range of other factors that are fundamentally changing the nature of the Arctic.* These changes challenge the ability of Arctic communities to adapt.[9] Climate change is leading to range expansions of some species, contractions of others, loss of habitats, and a wide range of other impacts on the Arctic's interconnected ecosystems and the services they provide,[4] with implications for food availability. The trend toward shorter snow cover season, loss of sea ice, and other changes in the Arctic affect traditional activities, such as hunting, and access to certain food sources.

> **"The two most important parts of our food security were the availability of the animals and the hunter's ability to hunt. Over the past hundred years, this has changed."**
> —Maggie Emudluk, Vice-President, Kativik Regional Government, Canada[7]

Note: Confidence ratings were applied as available in the cited source literature.

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* Climate change also affects how contaminants cycle within the Arctic,[8] but this issue is beyond the scope of this information brief.

Sea Ice Loss

Driver

Sea ice extent has shown decreasing trends in all months and virtually all regions of the Arctic (*very likely*).[4, 10] Arctic sea ice extent will continue to decline in all months of the year (*high confidence*).[4]

Availability

Loss of biodiversity in sea ice habitats appears to be linked to the decline of sea ice, although observations also show that some species traditionally associated with open water or warmer locations are expanding their ranges or are present during a longer portion of the year.[9, 11] 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.[12]

Accessibility

Sea ice is becoming less stable as its extent and thickness decrease, increasing ice-related hazards, such as greater wave action.[13] Some northern communities have found it harder to obtain traditional foods due to the shorter snow cover season, which affects travel to hunting grounds as well as animal habitat. The thinning of sea ice and the lengthening melt season also alter access to resources.[13]

In Qaanaaq (northwest Greenland), communities have reported that the spring hunt of walrus used to be mainly over the sea ice edge. However, with the reduction of sea ice, hunters here are increasingly using skiffs to hunt walruses resting on ice floes.[14, 15] In the Bering-Chukchi-Beaufort region, hunters have reported that autumn open water conditions with high winds and waves and low visibility have become more common and are less in line with longstanding traditional skill sets and patterns.[16]

Ocean Warming

Driver

Sea surface temperatures are increasing over much of the Arctic Ocean,[4, 9] largely due to increased absorption of solar radiation as a result of sea ice loss, as well as the inflow of warmer water from lower latitudes (*high confidence*).[4]

Availability

Many species are shifting northward as the Arctic warms, with largely unknown consequences for Arctic species and ecosystems. In some cases, southern species may outcompete and prey on Arctic species, or offer a less nutritious food source for Arctic species. Changes in plankton species can have cascading food web effects throughout the ecosystem.[12]

Accessibility

Some species, such as belugas in Canada's Hudson Bay, have shifted the timing of their migration in response to warming waters, which may affect the ability of Indigenous communities to find and use these resources.[12]

Warming also affects the availability of valued fishery species throughout the Arctic. For example, in Northern Norway, the Atlantic cod (*Gadus morhua*) fishery is important to small-scale and Indigenous fishermen.[17] So far, warming has benefited this fishery, helping stocks to increase in recent years. However, further warming is expected to have negative effects, as the survival rates of juvenile cod begin to decline in response.[18]

Ocean Acidication

Driver

The Arctic Ocean is experiencing some of the fastest rates of acidification in the world, due mainly to the higher capacity of colder water to absorb CO_2.[18] Increased freshwater input from rivers and melting ice also contribute to ocean acidification,[19] among other impacts,[13] by decreasing the ocean's ability to neutralize CO_2's acidifying effects. The acidification of the Arctic ocean will continue to increase (*high confidence*).[4]

Availability

The future effects of ocean acidification will not be uniform across the Arctic, nor can they be reliably predicted. While some marine organisms may experience some benefits under conditions associated with ocean acidification, such as weakly enhanced growth in kelp, others will be disadvantaged, possibly to the point of local extinction.[18] Dozens of harvested species of fish, crustaceans, seals, whales, and seabirds are at risk due to effects of ocean acidification on their prey.[19]

Other Combined Effects

Driver

Declining coastal sea ice results in greater coastal erosion due to the effects of warmer air and water combined with increasing storm, wave, and tidal activity due to climate change.[9] Sea ice loss in the Arctic has increased wave heights over the past 30 years (*medium confidence*).[4]

Accessibility

Many coastal communities in the Arctic are affected by increasing exposure to storms, coastal erosion, and flooding of coastal wetlands.[9] For some of these communities, such as in the Bering-Chukchi-Beaufort Region, changing coastal sea ice regimes, river runoff, and coastal erosion can also impact community provisioning—for example, by blocking food and fuel shipments.[16]

Effects and Consequences

Cultural Wellbeing

Identity and Community

The Arctic has extensive, valuable cultural sites and practices along nearly the entire coastline.[20] Indigenous communities have noted that the value of traditional foods is interlinked with self- and cultural-identity.[21] Hunting, harvesting of marine mammals, and fishing define a sense of family and community, while reinforcing and celebrating the relationship between Arctic Indigenous peoples and the environment.[5, 22]

Sharing of Traditional Knowledge

Sharing extends beyond the physical harvest of traditional foods. Obtaining traditional foods has been characterized as a family-oriented activity that builds bridges between generations through the passing of knowledge.[21] Indigenous community members have described how many core values, such as sharing, responsibility, and the inter-generational importance of the foods, are taught through harvesting and preparing foods.[24] Indigenous communities have expressed concern that rapid climate change has made some traditional practices less dependable, requiring adjustments in type, timing, and location in response to changing ice conditions and wildlife migration patterns.[25]

Health Impacts

Nutritional and Mental Health

Traditional knowledge holders emphasize the relationship between food security, health, and quality of life.[25] In addition to providing energy, traditional foods contain key nutrients and vitamins that contribute to individual health and may lower the risk of disease.[7] Among Inuit communities, for example, narwhal and beluga are important sources of Vitamin C.[25] Indigenous communities of Chukotka (Russia) depend on a successful autumn hunt of Pacific walrus as a critical source of protein and fat during the long winter.[16] Additionally, community-driven reports have suggested that people who are food insecure are more susceptible to a range of mental health issues, including depression and social exclusion.[25]

Safe Food Storage and Preservation

Because traditional foods are often transported and stored outdoors using traditional practices,[15] for example in underground chambers cut into permafrost,[16] rising temperatures may increase the risk of food-borne disease.[15] Inuit communities have expressed concern that they may be forced to find new ways to store food as a result of permafrost loss and melting of ice cellars, which also play an important social role as family caches and food stores for village feasts.[26]

Climate change may affect the effectiveness and safety of other traditional food preservation techniques as well. Indigenous communities are concerned that warmer and wetter weather may cause bacteria buildup during traditional preservation processes, such as drying fish.[22, 27]

Adaptive Management Case Studies

In addition to the changes in the marine environment that are affecting food security, the decline of sea ice makes way for new economic activities, particularly for shipping and resource extraction.[9] Oil and gas activities, mining, tourism, shipping, fisheries, economic development, and pollutants are just some of the other stressors faced by the Arctic today. Many of these factors interact with each other.[13] Many Indigenous communities are taking action to prepare for and adapt to climate change and are working with State governments on management solutions. Marine Protected Areas (MPAs) are an example of adaptive management, one in which traditional knowledge, local knowledge, and science can combine in innovative ways.

CASE STUDY
Bering Strait Port Access (United States and Russia)

1

As ship traffic increases through the Bering Strait, the U.S. Coast Guard conducted a Port Access Routing Study to plan shipping routes for increased ship traffic. Several Indigenous tribes and organizations expressed concern about potential shipping impacts on subsistence activities. In addition, Kawerak, an Alaska Native regional non-profit corporation, worked with multiple tribal communities to map important habitat and subsistence areas to inform the study. After considering all public comments, the United States and Russia submitted a proposal to the International Maritime Organization to implement a set of voluntary routing measures in the Bering Sea and Bering Strait for safety and environmental protection, which went into effect in 2018. These include a two-way route that would not restrict access for subsistence activities, but provided additional safety measures for increased shipping and three Areas to Be Avoided around St. Lawrence, King, and Nunivak islands.

2

CASE STUDY
Northwest Alaska Conflict Avoidance Agreement (United States)

The 2016 Open Water Season Programmatic Conflict Avoidance Agreement, between the Alaska Eskimo Whaling Commission and the oil and gas industry along the Northwest Alaskan coast, aims to reduce noise impacts and potential use conflicts in whaling areas. Additionally, in accordance with the Marine Mammal Protection Act, federal agencies enter into co-management agreements with Alaska Native Organizations to co-manage marine mammal populations, including through monitoring, research, and data collection.

3 CASE STUDY
Tarium Niryutait MPA (Canada)

The Tarium Niryutait MPA was established in 2010 to conserve important summering habitat for beluga. The area was chosen using a Beluga Management Plan which identified traditional harvesting and concentration areas of beluga whales in the Beaufort Sea. The Tarium Niryutait MPA protects important areas for beluga and from an Inuvialuit cultural and subsistence perspective. The Tarium Niryutait MPA's objective is to conserve and protect beluga whales, other marine species (e.g., anadromous fish, water fowl, and seas birds), their habitats, and their supporting ecosystem. Ensuring food security and the continuation of traditional practices are important outcomes of this conservation tool.

4 CASE STUDY
Anguniaqvia niqiqyuam MPA (Canada)

The Anguniaqvia niqiqyuam MPA was established in 2016 with two conservation objectives: to maintain the integrity of the marine environment offshore of the Cape Parry Migratory Bird Sanctuary so that it supports a healthy marine food chain, and to maintain habitat to support populations of key species such as beluga whales, anadromous Arctic char, and ringed and bearded seals. The MPA is located in the Inuvialuit Settlement Region on the northern coast of the Northwest Territories. The second objective was identified based on Inuvialuit traditional knowledge in the region, making this the first MPA in Canada with a conservation objective based solely on traditional knowledge. The MPA helps ensure that important species—which are also important for subsistence—and their habitats are protected.

5

CASE STUDY
Tallurutiup Imanga - Lancaster Sound National Marine Conservation Area (Canada)

In 2017, Parks Canada, the Government of Nunavut, and the Qikiqtani Inuit Association signed a landmark agreement to establish Tallurutiup Imanga. The inclusion of Inuit traditional knowledge in the planning and design of this MPA led to a more ecologically and socially holistic boundary recommendation. The 2019 Inuit Impact and Benefit Agreement that formed the foundation for the MPA noted that ecosystem health and biodiversity of Tallurutiup Imanga is of fundamental importance to Inuit and Canadians, and that Inuit "views, expertise and understanding should, to the fullest extent possible, be applied to encourage the wise use of wildlife, on which Inuit depend, and this traditional knowledge and understanding will be imparted to younger generations."[28]

CASE STUDY
Sarvarjuaq/Pikialasorsuaq (Canada and Greenland)

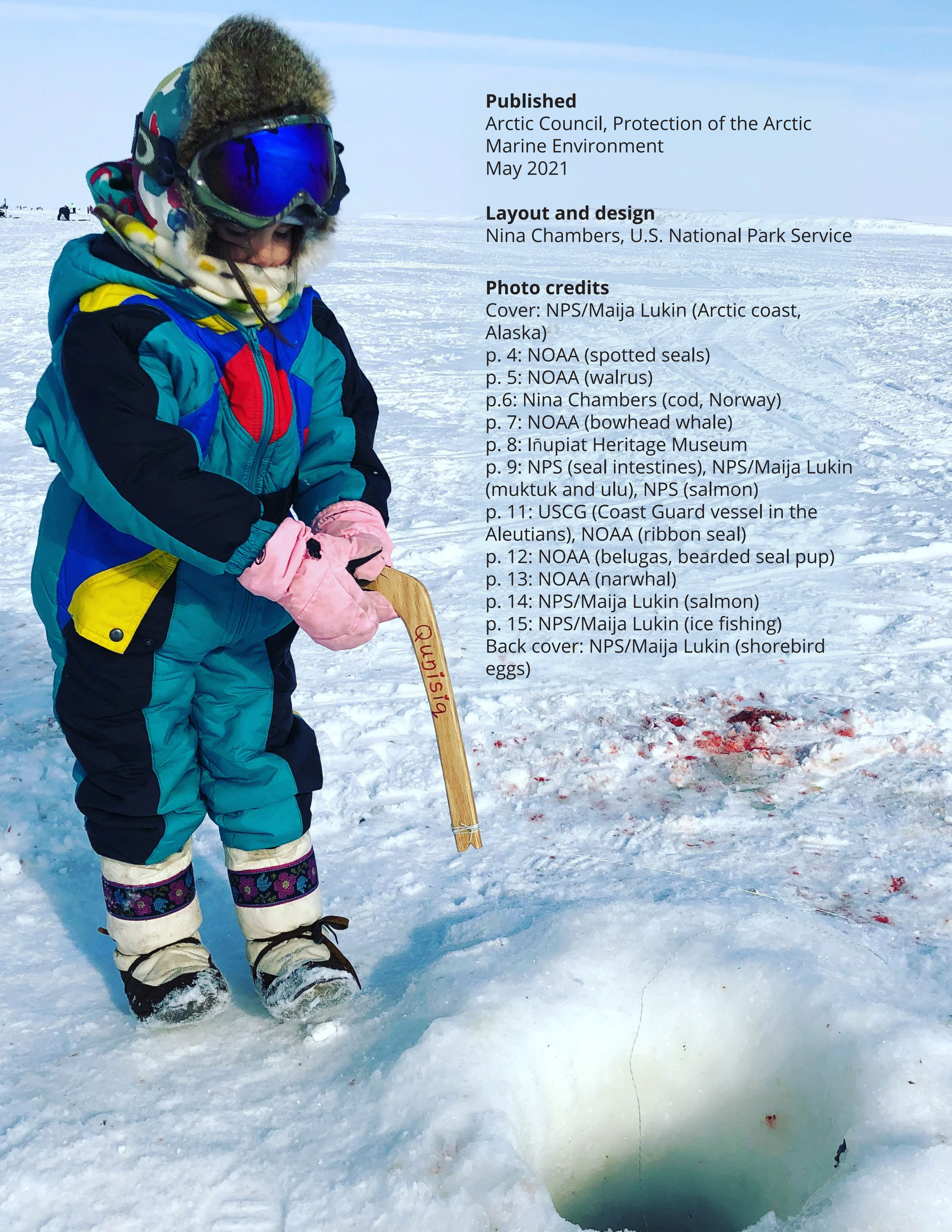
6

Pikialasorsuaq means "great upwelling" in Greenlandic, and *Sarvarjuaq* is the name Qikiqtani Inuit (Inuit of the Qikiqtaaluk region in Canada) give this polynya, an area of year-round open water and surrounding ice. It is connected to the Tuvaijuittuq (High Arctic Basin) MPA, Talluruptiup Imanga, and the whole of Baffin Bay on both the Canadian and Greenlandic sides. For thousands of years, this polynya has sustained Inuit culture. Today it is at risk from the impacts of climate change. In 2016, the Inuit Circumpolar Council created the Pikialasorsuaq Commission to develop recommendations consistent with existing Inuit governance for tackling climate change impacts. The Qikiqtani Inuit Association (QIA) is working with Canada to advance the Commission's recommendations, presented in a 2017 report *People of the Ice Bridge: The Future of the Pikialasorsuaq*, based on the Inuit vision of a conservation economy. The Governments of Greenland and Denmark, together with Inuit organizations, are working on bi-national management options.

7

CASE STUDY
The Njauddâm (Näätämö) Project (Finland)

The Njauddâm River (Näätämö in Finnish, Neiden in Norwegian) is an important waterway for Atlantic salmon, located in Sápmi (Finland) and emptying out into the Várjjat Fjord (Norway). The Finnish-Norwegian Transboundary River Commission decides uses of the river and quotas for fisheries, in accordance with the associated international fisheries agreements and commissions. In 2011, the Skolt Sámi in Finland embarked on a collaborative management project of the Njauddâm basin in response to the impacts of climate change, especially visible on the Atlantic salmon. The ongoing project has involved many successful efforts combining the Skolt Sámi traditional knowledge with science and local knowledge to study and identify ongoing changes and their causes, as well as restore key areas of the habitat. The Skolt Sámi also participate in Commission meetings and have periodically agreed upon and initiated self-imposed harvest limitations of Atlantic salmon within state structures to increase the number of fish reaching the spawning areas.



Published
Arctic Council, Protection of the Arctic Marine Environment
May 2021

Layout and design
Nina Chambers, U.S. National Park Service

Photo credits
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p. 4: NOAA (spotted seals)
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p. 8: Iñupiat Heritage Museum
p. 9: NPS (seal intestines), NPS/Maija Lukin (muktuk and ulu), NPS (salmon)
p. 11: USCG (Coast Guard vessel in the Aleutians), NOAA (ribbon seal)
p. 12: NOAA (belugas, bearded seal pup)
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p. 14: NPS/Maija Lukin (salmon)
p. 15: NPS/Maija Lukin (ice fishing)
Back cover: NPS/Maija Lukin (shorebird eggs)

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