PAME I-2020 – MPA Expert Group Pre-meeting
Agenda item 4.1.2

DRAFT TEXT - PAME Arctic Fact Sheet 1 (v7)
Marine Protected Areas in a Changing Arctic

COVER PAGE

Will be mostly title and visual. May include a short paragraph summarizing key points.

MPAs as a conservation tool

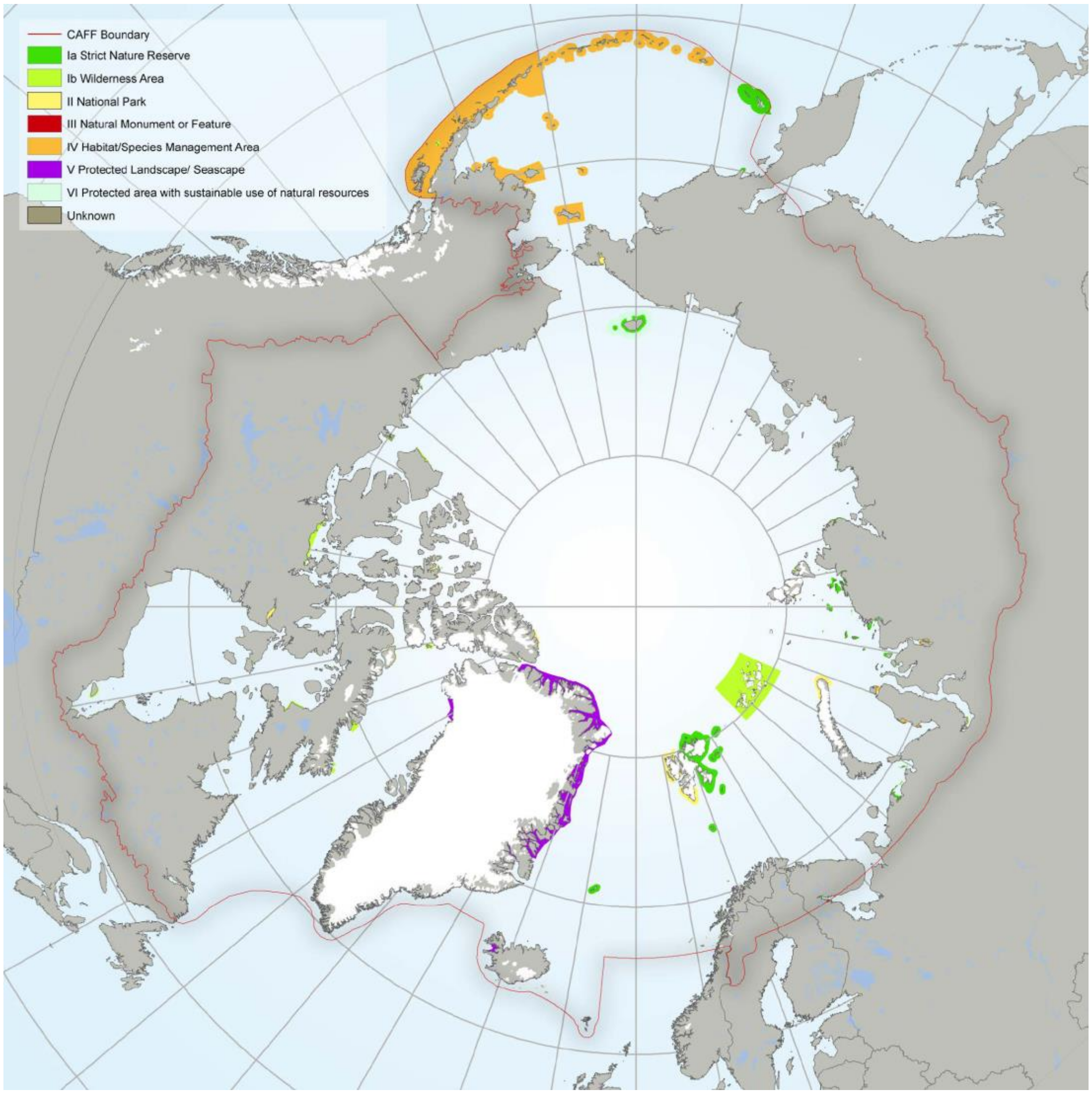
Marine protected areas (MPAs) are a proven tool for conserving species, habitats and ecosystems, and provide social and economic benefits to Arctic communities. Under the Convention for Biological Diversity (CBD), Aichi Target 11 calls for the protection of 10% of coastal and ocean waters by 2020, with a focus on areas of particular importance for biodiversity and ecosystem services. In 2016, 4.7% of Arctic marine waters were protected, below the global coverage of 7.4%.[1] *[NOTE: will update with latest figures when available from the new CAFF/PAME Indicators report. This will be consistent with ProtectedPlanet data (UNEP/IUCN).]*

The CBD is now in the process of establishing a post 2020 Framework, which will set global conservation goals for the coming decades. Many scientists have stated that the 10% goal for marine protection is insufficient to sustain a healthy ocean and the ecosystem services it provides, and have called for broader protection goals of 30% or more.[2] The CBD and International Union for the Conservation of Nature have also recognized that well-managed areas that are not MPAs can contribute to conservation outcomes, and that these “other effective conservation measures” (OECMs) can be an important component of MPA networks.

Arctic MPAs are diverse in their objectives, locations and scale, extending from coastal and estuarine waters to deep sea canyons. Biodiversity benefits are closely linked to levels of protection with higher levels of protection providing the greatest scope for ecosystem resilience and recovery. Several MPAs have been established in partnership with Indigenous peoples as part of a long term strategy to maintain food security and cultural well-being by conserving ecosystem health. However, given the scale and pace of global climate change impacts and biodiversity loss, MPAs are only part of the solution for a healthy ocean, and must be complemented by other measures to manage human activities (e.g., fisheries management, pollution management). With new species arriving in Arctic waters, and ice-dependent species concentrated in shrinking ice areas, scientists and managers have also identified a growing need for dynamic place-based measures that can manage species in rapidly changing conditions.[3]

BOX:
A protected area is a clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long term conservation of nature with associated ecosystem services and cultural values.

An other effective conservation measure is a geographically defined area other than a protected area, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the in situ conservation of biodiversity, with associated ecosystem functions and services and where applicable, cultural, spiritual, socio–economic, and other locally relevant values.



Note: Graphic is from CAFF/PAME Protected Areas Indicators Report, 2017. Will be updated to use 2020 version of report.

Climate Drivers

The Arctic is one of the most rapidly changing regions on Earth. In recent decades, Arctic air temperatures have risen at more than double the average rate of the Northern hemisphere,[4] with the potential for some areas to see winter air temperatures rise 20^{o}C in the next century.[5,6] In the Arctic Ocean, melting sea ice,[7,8] ocean warming,[7,9] sea-level rise,[10,11] and rapidly acidifying waters[12,13] are altering the environment at an unprecedented rate, while emerging issues such as changing winds and weather patterns, stratification of the water column, deoxygenation, and changes to ocean circulation could greatly alter the Arctic further in the coming century. Tracking, understanding, and projecting these drivers is key to understanding the role of Arctic MPAs in conserving species, habitats, and ecosystems and the benefits they provide within the context of a changing ocean.

Confidence ratings were applied as available in the cited source literature. they do not necessarily imply the view or consensus of PAME, the arctic council, or the contributors to this fact sheet.

What is Happening?	**What Could Happen?**
Sea Ice Change • Sea ice extent has shown decreasing trends in all months and virtually all regions of the Arctic (*Very likely*).[7,8] • The 2018 sea ice cover minimum ice extent was 26% less than the 1981-2000 average[8] and observed reductions in sea ice volume are *likely* unprecedented in at least the past 1000 years.[7] • Sea ice has undergone a transition from thick multi-year ice to thinner seasonal ice (*High confidence*).[7,9] • The Barents Sea has seen particularly large declines in seasonal sea ice.[5]	Sea Ice Change • Arctic sea ice extent will continue to decline in all months of the year (*High confidence*).[7] • According to some models, if global warming is stabilized at 2°C, the probability of an ice-free summer occurring in any given year after 2050 would be 19–34%[7,9] (*High confidence*) with the Barents sea expected to become the first region free of ice year round as early as 2050.[5,6]
Ocean Warming • Sea surface temperatures are increasing over much of the Arctic,[7,9] largely due to increased absorption of solar radiation as a result of sea ice loss (*Virtually certain*).[7] • Over large sectors of the ice-free Arctic, summer upper mixed-layer temperatures have increased at 0.5^{o}C per decade since 1982 (*High confidence*),[7] with linear warming	Ocean Warming • Marine heatwaves in the Arctic will increase in frequency, duration, and extent (*High confidence*).[7]

trends of up to 1°C per decade in some locations.[14]	
Sea-Level Rise • Arctic glaciers, led by the Greenland Ice Sheet, are the largest land-ice contributors to global sea-level rise.[4] • The rate of relative sea-level rise is highly variable around the Arctic. Relative sea level is rising along the Beaufort coast of Canada, the northern coast of Alaska, and the Chukchi coast. However, sea level is falling around the Arctic Archipelago Islands and in many areas of the Canadian Arctic due to changing gravitational resulting from the recent loss of ice from the Greenland ice shelf and the continued rising of the Earth's crust in these locations as a result of the removal of the weight of ice sheets from the last ice age.[10,11]	Sea-Level Rise • Relative sea-level rise is expected to continue to vary from place to place dependent on crustal uplift and other factors. • Arctic glaciers will continue to lose mass over the course of this century (*Very likely*),[4,7] further contributing to global sea-level rise.
Ocean Acidification • The Arctic Ocean is experiencing some of the fastest rates of acidification in the world due to the higher capacity of cold water to absorb CO_2, dilution by river runoff and ice melt, and the oxidation of methane from the melting of subsea permafrost.[12,13] • Some areas of the Arctic Ocean were among the first regions of the ocean to experience surface and near-surface waters corrosive to aragonite,[15,16] one of the primary minerals used by calcifying organisms to make skeletons and shells.	Ocean Acidification • The acidification of the Arctic ocean will continue to increase (*High confidence*).[7,10,11] • The water column above the continental shelves of the Beaufort and Chukchi Seas are especially vulnerable to ocean acidification because of low pH water from the Pacific and dilution by high freshwater inflows.[10,11]

Ecosystems, Habitats and Species

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What Is Happening?

Compared to other parts of the world, locally-driven, human-induced habitat change has affected only limited areas of the Arctic.[17,18] However, globally, biodiversity is declining faster than at any time in human history,[20] and the Arctic is no exception. Arctic marine species and ecosystems are experiencing multiple pressures due to cumulative changes in the physical, chemical, and biological environment.[20] While many impacts are likely in the future, warming waters, melting sea ice, and ocean acidification are already stressing the ability of organisms to adapt to rapidly changing conditions. Some of these changes, such as reductions in sea ice leading to higher phytoplankton productivity at the expense of ice algae,[5] are already causing major ecosystem-level changes in the Arctic (*High confidence*).[7,20]

What Could Happen?

Rising temperatures, changing ocean circulation, melting sea ice, and alterations to ocean chemistry could alter biological communities with unknown consequences for ecosystem function. Changes to the productivity of Arctic plankton, benthos, and fishes as a result of these climate drivers is expected to affect a range of species from seabirds to marine mammals.[7] Further, sea ice loss could have large impacts on the many Arctic species that have highly seasonal and specialized feeding, reproduction, and migration patterns dependent on the timing and duration of ice retreat and the ice-free ocean (*High confidence*).[18] While species reliant on sea ice could see range reductions,[18] those dependent on open water may benefit from climate change[5] highlighting the complex possible future impacts of climate change on Arctic ecosystems and biodiversity.[18]

[NOTE: The information below will likely be presented in map format, indicating where these impacts are being experienced.]

What is Happening?	**What Could Happen?**
• Northward range shifts are the most prominent climate related changes to biodiversity in the Arctic and have been documented across a wide range of taxa (*High confidence*).[7,17] These shifts include increasing numbers of southern species moving into Arctic waters (*High confidence*),[7] such as Atlantic zooplankton replacing arctic species,[18] with unknown	• Whether directly or indirectly through prey species and ecological cascades, ocean acidification will impact a wide range of organisms (*High confidence*)[7] including plankton, shellfish, deep-sea corals, fishes, and marine mammals, altering the composition of the Arctic ecosystem.[19,22] These effects could have ecological and societal impacts.[20]

consequences for Arctic species and ecosystems.[18,21] • Climate impacts that reduce the availability of food sources can, and are, negatively impacting Arctic animals (*Very high confidence*).[7,18] In many instances, reductions in prey driven by a loss of sea ice are forcing individuals to travel further to feed, expending more energy, which is leading to concerns about individual and population health *(High confidence)*.[18] In fact, Ringed seals on Svalbard have experienced major reductions in breeding habitat since 2006, when local sea ice suddenly declined, and now must travel further to reach summer foraging areas and, once there, must spend more time travelling and diving and less time resting.[5] • The size of the polar cod stock has decreased since 2007 due to reduced recruitment driven by warming and reductions in sea ice and well as the expansion of Atlantic cod into the region.[5] • Primary production, the building block of food webs, increased by 20% from 1998 to 2009, driven by a 45-day increase in the open-ice period and a reduction in summer ice cover of 27%.[20]	• In Norway, acidification, in combination with warming, could strongly reduce green sea urchin populations, reducing the harvest potential of this unexploited fishery sevenfold by 2050.[12,13] • The expansion of other species into the Arctic could also alter ecosystems. The replacement of Arctic species of zooplankton and fishes by less energy-rich southern species could have cascading effects throughout the food web (*High confidence*).[7,17,18,20]

Changes in Human Activities

Sea ice retreat in the Arctic is opening up the region to increased shipping, driven by new economic activity and changes in existing human uses. Cruise tourism, commercial fishing activity, and other natural resource extraction such as oil and gas and mining all contribute to the rise in shipping, though usually on a seasonal timeframe and in localized areas. While coastal communities can benefit from increased economic activity, sea ice decline, in particular multi-year ice loss, can negatively affect local food security by altering species migratory pathways and introducing safety risks to accessing hunting grounds. Furthermore, impacts from new and expanded commercial activity can further exacerbate the challenges communities and ecosystems face from the impacts of a changing climate. For example, while oil spills are the most significant threat associated with Arctic marine shipping,[23] longer navigation seasons could also result in increased risk of introducing non-indigenous species, underwater noise, and ship strikes of marine mammals, as well as impacts to migration patterns and habitat.[5]

Suggested format: Icons for each major use with a short statement about what is happening/projected.

Shipping *(add icon for shipping; show use of this activity is increasing in the Arctic)*

- Shipping is increasing in the Arctic, with contributions from the sectors described below.

Tourism *(add icon for tourism; show use of this activity is increasing in the Arctic)*

- Summertime Arctic ship-based tourism increased over the past two decades concurrent with sea ice reductions.[7]
- Some of the main impacts to marine ecosystems from tourism are environmental degradation, disturbance of wildlife, introduction of non-indigenous species, and pollution.[5]
- In some areas, climate-driven events such as harmful algal blooms negatively impact the coastal tourism industry.[23]

Fishing *(add icon for fishing; show use of this activity is increasing in the Arctic)*

- Ice retreat is opening new grounds for fishing trawling and for transport routes, as distribution of commercial species such as Atlantic cod[4] also shifts northward.
- The number of unique vessels entering the region increased by 25% between 2013 and 2019, and in 2019 fishing vessels accounted for the largest portion (41%) of all unique vessels in the region, as defined by the International Maritime Organization's Polar Code.[24]

Mineral Resource Extraction *(show icon; no information on trend)*

- Oil and gas development has the potential to be one of the most important drivers of additional change. Oil prices, technological developments, sovereignty, and energy security all play a role in setting the pace and magnitude of future development in the region.[24]

- Land-based mining also contributes to increased shipping. For example, the Mary River mine on Baffin Island, Nunavut, Canada is one of the northernmost mines in the world and involves shipping of 3.5 million tons of iron ore during open water season.[23]

International Governance
The international community has come together to address some of these activities, including through two landmark agreements:

- The International Maritime Organization developed an International Code for Ships Operating in Polar Waters (Polar Code) to improve shipping safety through regulations on ice navigation and ship design. It came into force on January 1, 2017.
- Nine countries and the European Union have signed an agreement to prevent unregulated commercial fishing in the Central Arctic Ocean and conduct science and monitoring to inform future management decisions.

Addressing Climate Change in MPAs

[NOTE: This section will likely be presented as a map and/or a series of short case studies from around the Arctic about how climate is affecting MPAs and how they are being managed to address climate impacts. We are working with country contacts to identify additional case studies.]

Tuvaijuittuq (Canada)

Canada's Tuvaijuittuq, meaning "the place where the ice never melts" in Inuktut, has some of the oldest and thickest sea ice in the Arctic Ocean -- ice that is expected to last the longest in the face of climate change. This makes the area a unique and potentially important future summer habitat for ice-dependent species, including walrus, polar bears, beluga and seals. However, a possible increase in Arctic activities, particularly ice breaking, could negatively impact the multi-year ice environment.

In August 2019, Tuvaijuittuq became the first Marine Protected Area designated for interim protection for up to five years while Qikiqtani Inuit Association, the Government of Nunavut and the Government of Canada work with Inuit and northern partners to explore the feasibility of longer term protection. The potential ecological, economic, social and cultural benefits of designation are expected to outweigh costs through research support, ecosystem and biodiversity maintenance, and its intrinsic value.

Alaska Maritime National Wildlife Refuge (AMNWR) (United States)

Alaska Maritime NWR, which covers most of Alaska's coastline, is experiencing widespread impacts from climate change, including sea ice loss and ocean warming.

The refuge has a long-term monitoring program dating back to the early 1970s to track changes in the marine system, using seabirds as sentinels. Scientists collect time series data on a suite of seabird species, including on timing of laying, reproductive success, diet, and population trends. Long-term datasets support climate modeling improvements and commercial fisheries management, among other uses.

The effects of ocean warming are mostly mediated through the marine food web and vary depending on species and location.In recent years mass seabird mortality events have increased, thought to be related to warm ocean temperatures. Statewide, 50% of seabird groups declined between 2009 and 2018. Colony-based data improve understanding of the population level effects of these events on seabirds.

In addition to conducting ecosystem monitoring and research, the refuge focuses management efforts on reducing stressors indirectly linked to climate, such as marine shipping and invasive species.

Svalbard MPAs (Norway)

Almost the entire territorial waters of the Svalbard archipelago are covered by three MPAs (Svalbard West, Svalbard East and Bjørnøya) with a total area of 78,411 km² and varying levels of protection.[25] Most of the area is within the Norwegian portion of the Barents Sea, the management of which is advised by a regularly updated integrated management plan—most recently updated in 2020. Svalbard and the sea territory out to 12 nm are protected through the Svalbard Environmental Act.

The management plan is informed by scientific background information, including on climate impacts, and addresses oil and gas development, fisheries, marine transport, and marine conservation. It is one of the few plans anywhere in the world that integrates fisheries management actions with those in other marine sectors.

The Barents Sea is experiencing several climate change impacts, including sea ice loss, resulting in changes in the type, amount, and distribution of ice-dependent species . New fisheries regulations were implemented in 2019, as shrinking sea ice around Svalbard opened new areas to fishing. The area is also seeing an increase in temperate fish and marine mammal species.

New Siberian Islands Nature Reserve (Russia)
The New Siberian Islands Nature Reserve was created in 2018 to protect 66,000 km^2 of pristine seascapes and landscapes of the northern Laptev and East-Siberian Seas, including the Great Siberian Polynya. The MPA protects a high-Arctic sea shelf ecosystem, supporting polar bears, bearded and ringed seals, arctic cod and seabirds. The area is known for its high benthic biomass providing food for the rare Laptev walrus, which are present year-round.

The area was identified as a priority for conservation through a systematic planning process conducted for the Russian Arctic Seas in 2015-2017 to create an Arctic MPA network. The New Siberian Islands is one of the most stable climate refugia for marine animals in the Russian Arctic. The area was once home to many thousands of mammoths, and now has one of the highest densities of valuable mammoth tusks in the world. The establishment of the protected area has reduced the destructive removal of tusks, which led to accelerated coastal erosion and illegal hunting and gathering.

MPAs as Tools for Arctic Resilience (p. 7)

[Note: An infographic would be re-drawn with an Arctic background and the following updated text.]

Effective, well designed networks of MPAs can play a key role in promoting resilience to climate change as part of an ecosystem approach to management. MPAs can:[3]

- Protect marine ecosystems by reducing harmful impacts from non-climate stressors, such as new or expanded ocean uses, so healthy resources can better withstand climate impacts and sustain livelihoods.
- Support food security, livelihoods and ways of life for indigenous peoples.
- Protect carbon-storing habitats, such as salt marshes and seagrasses, as well as the carbon stored in other marine life.
- Protect coastlines and coastal communities from storm impacts (e.g. wetland buffers).
- As networks, protect species on the move due to climate impacts and provide “insurance” if some MPA resources are harmed due to climate-driven warming, storms, or disease, by protecting them in other areas.[23]
- Protect climate refugia -- areas that are less affected by climate impacts, where species may have more time to adapt to climate change.

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