Framework for a Pan-Arctic Network of Marine Protected Areas

An Network of Places and Natural Features Specially-managed for the Conservation and Protection of the Arctic Marine Environment

Table of Contents

[1. Introduction 4](#_Toc406667700)

[2. Value of a Pan-Arctic Marine Protected Area Network 5](#_Toc406667701)

[2.1 Vision 5](#_Toc406667702)

[2.2 Sense of Urgency 6](#_Toc406667703)

[2.3 Benefits of MPAs and MPA Networks 7](#_Toc406667704)

[2.3.1 Ecological Resilience 7](#_Toc406667705)

[2.3.2 Cultural and Socio-economic Benefits 8](#_Toc406667706)

[2.4 Key Challenges 9](#_Toc406667708)

[3. Principles, Goals and Objectives of a Pan-Arctic MPA Network 11](#_Toc406667709)

[3.1 Common Principles 11](#_Toc406667710)

[3.2 Goals 12](#_Toc406667711)

[3.3 Objectives 12](#_Toc406667712)

[3.3.1 Strengthen Ecological Resilience 12](#_Toc406667713)

[3.3.2 Sustain cultural, social and economic values and ecosystem services: 13](#_Toc406667714)

[3.3.3 Enhance Public Awareness and Support 13](#_Toc406667715)

[3.3.4 Foster Coordination and Collaboration 14](#_Toc406667716)

[4. Key Definitions and Concepts 14](#_Toc406667717)

[4.1 Marine Protected Area (MPA) 14](#_Toc406667718)

[4.1.1 Criteria for MPAs in the Pan-Arctic Network 15](#_Toc406667719)

[4.2 Marine Protected Area Network and Aichi Target 11 15](#_Toc406667720)

[4.3 Other Conservation Measures 17](#_Toc406667721)

[4.4 Identification of Significant Areas in the Wider Seascape 17](#_Toc406667722)

[4.4.1 Ecologically or Biologically Significant Areas 18](#_Toc406667723)

[4.4.2 Areas of heightened ecological and cultural significance 18](#_Toc406667724)

[5. Arctic Approaches to Design and Management of MPAs and MPA Networks 21](#_Toc406667725)

[5.1 Arctic State’s Approaches 21](#_Toc406667726)

[5.2 Regional Initiatives 24](#_Toc406667727)

[5.3 Tracking Progress 24](#_Toc406667728)

[5.4 Moving Forward: A Regional Arctic Approach 25](#_Toc406667729)

[6. Arctic Council Implementation – Recommended Near-term and Long-Term Actions 26](#_Toc406667730)

[6.1 Near Term Actions (2015-2017) 26](#_Toc406667731)

[6.2 Long Term Actions (2015-2020) 27](#_Toc406667732)

[7. Conclusion 27](#_Toc406667733)

[References 28](#_Toc406667734)

[Annex 1: PAME Intercessional Expert Group for a Pan-Arctic Network of Marine Protected Areas 35](#_Toc406667735)

[Annex 2 – Glossary of terms and acronyms 37](#_Toc406667736)

[2.1 Acronyms 37](#_Toc406667737)

[2.2 Terms 38](#_Toc406667738)

[Annex 3 – IUCN MPA Definitions and Categories 42](#_Toc406667739)

[Annex 4 – Status of MPAs, “other measures” and MPA networks in the Arctic 44](#_Toc406667740)

[Annex 5 - Additional International Efforts to Build MPA Networks 45](#_Toc406667741)

[Circumpolar Protected Areas Network Group 45](#_Toc406667742)

[Circumpolar Biodiversity Monitoring Program 45](#_Toc406667743)

[Convention on Biological Diversity – Guidance on MPA Network Design 46](#_Toc406667744)

[Commission for Environmental Cooperation – Guidance on Designing an MPA Network for Resilience to Climate Change 46](#_Toc406667745)

[Annex 6. Tools for Design and Implementation of MPA Networks 50](#_Toc406667748)

[Annex 7. Strengthening Management Effectiveness of Existing MPA and MPA Networks 51](#_Toc406667749)

Figures and Tables

[Figure 1 – Example of an Arctic Marine Food Web . 6](#_Toc406667787)

[Table 1. Comparison of criteria for identifying Ecologically and Biologically Significant Areas (EBSAs) and Particularly Sensitive Sea Areas (PSSAs). Source: Skjoldal and Toropova (2010). 15](#_Toc390693708)

[Table 2. Summary of Arctic State MPAs. 20](#_Toc390693709)

[Table 3. IUCN Protected Areas Categories. 44](#_Toc390693710)

Figure **2** – Boundaries of Large Marine Ecosystems in the Arctic

Figure 3 – Map of areas of heightened ecological significance (such as areas with aggregations of fish, birds and mammals for purposes of migration, staging, breeding, feeding and resting) within Arctic Large Marine Ecosystems (http://arkgis.org/). 50

FFigure 4 – The framework for assessing management effectiveness of protected areas

# Introduction

This framework for a pan-Arctic network of marine protected areas (MPAs) sets out a common vision for international cooperation in MPA network development and management, based on international best practices and previous Arctic Council initiatives. It aims to support the efforts of Arctic States to develop their own MPAs and networks and chart a course for future collaborative planning, management and actions for the conservation and protection of the Arctic marine environment.

This framework offers guidance; it is not binding. Each Arctic State pursues MPA development based on its own authorities, priorities and timelines.

The purpose of the pan-Arctic MPA network, composed of individual Arctic State MPA networks and other area-based conservation measures, is to protect and restore marine biodiversity, ecosystem function and special natural features, and preserve cultural heritage and subsistence resources for present and future generations. Individual MPAs and MPA networks strengthen marine ecosystem resilience that underpins human wellbeing, including traditional and current livelihoods and ways of life. A network of MPAs can fulfill ecological aims more effectively and comprehensively than individual sites could alone by providing spatial links needed to maintain ecosystem processes and connectivity, as well as improving resilience by spreading risk in the case of localized disasters, climate change and other hazards (IUCN-WCPA, 2008). Development of a pan-Arctic network of MPAs can also contribute a major conservation element to and benefit from marine spatial planning (MSP) and ecosystem-based management (EBM) in the circumpolar region.

This framework aims to inform the development of MPA networks under the national jurisdiction of the Arctic States. While the principal aspects of the framework are relevant for the entire Arctic Ocean, the framework does not pursue MPA approaches specific to Areas Beyond National Jurisdiction (ABNJ).

This framework uses the following definitions for MPA and the Pan-Arctic MPA Network:

Marine Protected Area: 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.( IUCN/WCPA).

Pan Arctic MPA Network: A collection of individual marine protected areas and other effective area-based conservation measures in the Arctic that operate cooperatively, at various spatial scales, and with a range of protection levels, in order to achieve the long-term conservation of nature with associated ecosystem services and cultural values aims more effectively and comprehensively than individual sites could alone.

Having a joint framework in place confers a number of advantages that can support and enhance the work of individual Arctic States, such as:

* Advancing cohesion and conservation effectiveness by strengthening ecological linkages among MPAs and MPA networks across the Arctic;
* Applying international best practices for establishing and managing MPAs and MPA networks to the unique Arctic environment;
* Supporting achievement of domestic conservation objectives and international commitments and targets; and
* Strengthening intergovernmental cooperation on MPA management and scientific issues among Arctic MPA authorities.

A pan-Arctic MPA network framework also contributes significantly to a number of ongoing Arctic Council objectives, including: several elements of the Kiruna Ministerial Declaration of 2013; implementing ecosystem-based management; responding to the Arctic Biodiversity Assessment recommendations; furthering management of “areas of heightened ecological and cultural significance” identified under the Arctic Marine Shipping Assessment; advancing goals of the Arctic Marine Strategic Plan; and operating in a cooperative, coordinated and integrated approach to the management of the Arctic marine environment.

This framework was drafted by an MPA Network Expert Group (MPA-EG) reporting to the Arctic Council’s Protection of the Arctic Marine Environment Working Group (PAME). The Expert Group was co-led by Canada, Norway, and the United States; all Member States of the Arctic Council were active participants (see Annex 1 for the full list of participants). The Arctic Council first called for the establishment of MPAs, including representative networks, in its 2004 Strategic Plan. The Framework also builds on work of the Ecosystem Approach to Management Expert Group (EA-EG) led by PAME, and the Arctic Council Expert Group on ecosystem-based management (EBM), as well as the previous work of the Conservation of Arctic Flora and Fauna (CAFF) Working Group on a Circumpolar Protected Area Network (CPAN).

# Value of a Pan-Arctic Marine Protected Area Network

## Vision

In the context of ongoing efforts to implement EBM in the Arctic, which recognizes humans and their activities as an integral part of the ecosystem, the vision for a pan-Arctic MPA network is:

*An ecologically connected, representative and effectively-managed network of protected and specially managed areas that protects and promotes the resilience of the biological diversity, ecological processes and cultural heritage of the Arctic marine environment, and the social and economic benefits they provide to present and future generations.*

## Sense of Urgency

Protecting and conserving the Arctic marine environment and biodiversity (Figure 1) is an important Arctic Council priority, due to the role of Arctic waters in moderating the global climate, protecting marine biodiversity, and providing food security, income and cultural identity for Arctic peoples and communities.



Figure 1 – Example of an Arctic Marine Food Web (Adapted from Darnis et al. 2012).

The Arctic is experiencing some of the most rapid and large scale climate and CO2-related impacts occurring anywhere on the planet. Significant ecological changes underway in the Arctic have been documented by the Arctic Council (e.g., AMAP 2012; CAFF 2013; Eamer et al. 2013; PAME 2013a) and many other organizations (e.g., WWF (Sommerkorn and Hassol 2009); IPCC 2013). Of particular concern from a marine biodiversity perspective are the climate-related trends of diminishing sea ice, resulting in habitat loss; melting permafrost and glaciers and reduced snow cover, resulting in changes in ocean chemistry; releases of methane; increasing sea surface temperatures; and increased coastal erosion of some shorelines. The distribution of many species of flora and fauna is shifting or expanding northwards as the Arctic continues to warm (CAFF 2013). This includes non-indigenous species which may also arrive in the Arctic through increased vessel travel and may pose a serious threat to the ecosystem. In addition, the increasing concentration of atmospheric carbon dioxide and absorption by the ocean is leading to acidification of ocean waters, and may impact many groups of organisms such as plankton, shellfish, deep sea corals, fish (including larval stages of fish), and marine mammals, which rely on sound to fulfill basic life functions (acidity affects sound transmission in the marine environment), therefore altering the composition of the Arctic ecosystem ([Yamamoto-Kawai](http://www.sciencemag.org/search?author1=Michiyo+Yamamoto-Kawai&sortspec=date&submit=Submit) et al 2009).

The reduction in sea ice is contributing to the increased accessibility of the Arctic for industrial activities, including shipping, oil and gas, mining, commercial fishing and tourism. These activities can impact the quality of marine habitats and the fitness of species that depend on those habitats for survival, as well as threatening the rich cultural heritage of the Arctic region. Marine and coastal habitat alteration and additional pollution loads, some land-based, add to the incremental and cumulative pressures on the Arctic marine environment (PAME 2013a; Arctic Council 2014). A well-designed MPA network can add to regulatory certainty and inform sound and sustainable business plans by allowing . resource users to better plan development to avoid ecologically sensitive areas and undesirable costs, and reduce conflict with other interests.

Coastal communities have expressed concern about the impacts of environmental changes on their livelihoods and wellbeing. In one study on climate change impacts, public hearings held across Alaska showed that rural communities had concerns about erosion, flooding, loss of permafrost, and subsistence (impacts on fish and game) (Alaska Climate Impact Assessment Commission 2008). Changes in the timing of the ice season were reported to impact the frequency and timing of hunting activities, with implications for food security and nutritional health among communities that rely significantly on subsistence (Furgal and Seguin 2006).

The complex, interconnected and trans-boundary nature of these drivers of change and pressures on the Arctic marine environment , including its peoples, requires a collaborative international response. Building on previous protected area work of CPAN/CAFF and other circumpolar initiatives, this framework responds to the need for enhanced management and conservation of the coastal and offshore marine environments in light of increasing changes and pressures.

## Benefits of MPAs and MPA Networks

A well-coordinated Pan-Arctic network of effectively-managed MPAs and other area- based conservation measures that are situated within a system of broader sustainable management practices will provide benefits beyond what individual MPAs can provide. Some of these benefits are described below.

### 2.3.1 Ecological Resilience

A pan-Arctic MPA network can strengthen the ecological resilience of the Arctic, for example by:

* Protecting natural ecological values (e.g., species habitats, especially habitats of species at risk or IUCN red-listed species; key species for Arctic food webs and human harvest; places of importance for ecological processes, such as primary productivity);
* Connecting and protecting spatially separate habitats essential to the life cycles of trans-boundary marine species, such as feeding, breeding, and nursery grounds for marine mammals, fish and seabirds;
* Providing refuge for marine species, as a biodiversity insurance policy (often referred to as redundancy or replication). For example, by protecting multiple examples of important habitat features, a network can provide insurance that at least one sample of the habitat type and its associated biodiversity will remain intact, should a catastrophic event occur in the area;
* Protecting and connecting features and habitats that support the ability of species to be resilient to, or adapt to, climate change (e.g., sea ice areas with forecasted persistence);
* Supporting or restoring marine community structure, productivity, and food web complexity; and
* Protecting natural bio-physical values (e.g., sequestration of carbon; filtration of pollutants; features such as recurring leads and polynyas and corals that are important for ecosystem structure and function).

### 2.3.2 Cultural and Socio-economic Benefits

Closely aligned with the ecological benefits listed above are the cultural and socio-economic values and benefits stemming from Arctic MPA networks. Protecting marine biodiversity and ecosystem processes is important for maintaining associated ecosystem goods and services (i.e., the range of benefits people receive from nature), which comprise:

* Direct economic values (e.g., monetary, commercial, and employment benefits to communities and countries);
* Cultural and heritage values (e.g., preservation of cultural connections to the sea and the way of life in coastal communities; preservation of the elements that formed a society’s distinct character; protection of historically important sites that had a role in shaping a society or people; honoring spiritual values attributed to a site; protection of subsistence resources);
* Societal and existence values (e.g., importance to society at large, including people who are not visitors or users);
* Landscape / seascape values (e.g., visual aesthetics of importance locally, nationally, or globally);
* Educational values (e.g., opportunities to teach people about their physical and natural surroundings and local biodiversity);
* Scientific and research values (e.g., contributing to a better understanding of the natural environment and the consequences of natural vs. human-caused, or anthropogenic, changes by providing undisturbed ecological benchmarks to compare and assess environmental change in surrounding areas); and
* Management values (e.g., better coordinated international effort, adoption of best practices).

# Arctic MPA network processes can facilitate incorporation of Traditional Knowledge (TK) and local knowledge into decision-making. The relevance of TK for resource management purposes is recognized in many Arctic Council documents including the Arctic Offshore Oil and Gas Guidelines (AOOGG, 2009), the AMSP (2004), ABA (2013), AMSA (2009), and the AMSAIIc (2013). Currently the Permanent Participants to the Arctic Council are developing principles and guidelines for use of TK in the work of the Arctic Council that will assist using TK in the development and management of an Pan-Arctic MPA Network. TK is also recognized in the 2007 United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), an aspirational document that speaks to the individual and collective rights of indigenous peoples, taking into account their specific cultural, social and economic circumstances. The UNDRIP principles include respecting indigenous knowledge, cultures and traditional practices; indigenous peoples’ contributions to sustainable and equitable development; and the proper management of the environment (DFO 2011b).

# 2.4 Key Challenges

Advancing toward a pan-Arctic Network of MPAs is likely to face a variety of challenges. The scientific and policy complexities of MPAs and MPA networks are made even more prominent by the Arctic’s dynamic marine environment and the region’s multiple governing structures. Among the more pronounced challenges likely to be encountered are: limitations in the availability of scientific information, diverse and widely-dispersed stakeholder communities, variability in governance regimes and national priorities, sustainable funding, and a shifting environmental baseline. While these challenges are real, and in some cases considerable,

Natural and social science data limitations in regions of the Arctic seas remain, fueled by insufficient scientific funding driven in part by the high cost of doing science in the remote, hostile Arctic environment. The lack of a robust scientific baseline on which to base analyses and inform decision-making about a pan-Arctic network of MPAs is a key consideration and will require concerted efforts to address. Ongoing efforts to fill knowledge gaps include the CBD EBSA Arctic Workshop held in Helsinki March 2014[[1]](#footnote-2) and the April 2014 meeting in Gothenburg, Sweden of the Convention for the Protection of the Marine Environment of the North East Atlantic (OSPAR Convention) to explore how MPA network effectiveness can be evaluated. Gathering TK will also contribute valuable information and help to fill science gaps. International databases such as the World Database on Protected Areas track MPA establishment globally ([www.protectedplanet.org](http://www.protectedplanet.org); [www.MPAtlas.org](http://www.MPAtlas.org)), and databases developed through Arctic Council initiatives, and the GRID database ([www.grida.no](http://www.grida.no)) provide timely and usable environmental data to the world community of researchers and policy makers. Cooperation on Arctic marine science, TK, data sharing, and rigorous scientific analyses, complimented by a proactive approach to decision-making using the best available scientific data will best equip Arctic States to meet this challenge.

Engaging stakeholders to build awareness and ensure local input in the context of a pan-Arctic network will be challenged by the geographic expanse of the Arctic region and subsequent remote and isolated location of most communities. In addition, other interested stakeholder groups are geographically located far from the Arctic region altogether – e.g., conservation organizations to industry – also making engagement difficult. Involving all interested stakeholders is nevertheless a cornerstone of establishing and managing effective MPAs and MPA networks. Deliberate, well-planned and resourced stakeholder engagement around a pan-Arctic MPA network will be required. Through its extensive network of stakeholders and convening power, the Arctic Council offers a significant contribution to coordination broader stakeholder engagement efforts and sharing information and best practices about the stakeholder engagement efforts of Members.

A similarly diverse range of MPA governance regimes, national priorities, and planning approaches across Arctic States may also present challenges in the context of coordinating a pan-Arctic MPA Network. At the most basic level, each State’s approach to MPA is uniquely defined its statutory authorities, MPA programs, and related conservation objectives for which MPAs are authorized (see section xxx for more information on each State’s MPA authorities and programs). Adding to the complexity, and partly due to the diversity of stakeholder interests, prioritization of MPAs in the context of marine management varies across Arctic States generally, but also shifts over time as changes in ruling political party and public opinion occur. To this end, a pan-Arctic Network that emphasizes intergovernmental cooperation and information sharing will be necessary to create a stable basis for long-term relationships that can cultivate synergies and opportunities for improved collaboration and coordination on the range of MPA issues.

To facilitate and encourage robust participation in a pan-Arctic MPA network, the effort will need to produce useful and value-added outcomes to the States and others involved. Doing so will require funding to engage and convene interested parties, develop and disseminate useful science and management tools and products, and advance cooperation in advancing a network. The specific amount of funding is scalable to the level of effort being undertaken and may be complemented or offset by in-kind contributions from States or other possible sources of funding.

Finally, as impacts from changing ice conditions, warming ocean waters, ocean acidification, and other CO2-related continue and are expected to increase in the Arctic, conservation needs and priorities will also need to respond accordingly. MPAs and MPA networks offer Arctic States a key tool to strengthen ecological resilience in the marine environment in the face of these changes. The rapidly changing landscape and dynamics of the Arctic marine environment will require multi-faceted, and likely new approaches to planning and mainstreaming adaptive management in MPAs. A better understanding of how knowledge of ecological impacts can inform spatial planning is needed so that necessary adjustments can be made to MPA boundaries, conservation objectives and management measures. It can take a long time—a decade or more—to establish new MPAs and other habitat conservation measures (Beaufort Sea Partnership 2009). Processes to update management plans and regulations can also span long time periods. The rate of change in habitat conditions might exceed the capacity of Arctic States, co-management institutions and partners to reassess and establish MPAs early enough to be effective and avoid critical tipping points (Eamer et al 2013).

These challenges to a pan-Arctic MPA network must not be overlooked. Any such effort that does not consider the core social and environmental characteristics of the surrounding landscape not only risks near-term lack of success, but could also jeopardize the prospects for intergovernmental coordination on Arctic MPAs for many years to come. A pan-Arctic MPA network that emphasizes and mainstreams the principles outlined in Section xxx will be well-suited to addressing these and other institutional and environmental challenges.

# Principles, Goals and Objectives of a Pan-Arctic MPA Network

## **Common Principles**

All stages in the development and implementation of the pan-Arctic MPA network should be guided by these nine principles:

1. **Coherent or systematic approach**. Where possible, ensure that MPA networks are linked to ecosystem-based management efforts within the broader seascape, across EEZ boundaries, in the high seas, and with terrestrial areas. Also, identify priority conservation gaps in MPA network design and recommend improvements, including new MPAs and other area-based conservation measures to fill those gaps.
2. **Respect existing rights and activities.** Respect the rights of government authorities and provisions of applicable agreements and treaties; and take into consideration harvesting by indigenous peoples and others, and other activities carried out in accordance with existing licenses, regulations and legal agreements.
3. **Ensure open and transparent processes.** Employ open, transparent and inclusive processes, with opportunities for partnership, participation, consultation and timely information exchange. Enhance awareness, promote benefits, and encourage public support.
4. **Utilize the full suite of best available knowledge**. Apply the best available scientific, traditional , community, and industry knowledge to conservation efforts, as appropriate. Use a precautionary approach when evaluating information needed to make decisions about the protection of priority areas.
5. **Focus on resilience and adaptation to change**. Design and strive to implement the pan-Arctic MPA network for ecological conservation and the protection of marine biodiversity in the context of actual and projected climate and other CO2 related changes given the accelerating nature of associated impacts.
6. **Take cultural and socio-economic considerations into account.** Take cultural and socio-economic needs and benefits provided by MPA networks into account in the development of an optimal, cost-effective MPA network design to inform placement of future MPAs and “other area-based conservation measures.
7. **Apply appropriate protection measures.** Make every effort to ensure that the level of protection afforded is appropriate to the stated goals and objectives for the network. Network MPAs or other area-based conservation measures should provide enough protection so that ecosystems are functioning naturally and are not significantly affected by human activities.
8. **Employ and evaluate best management practices**. Develop and implement management plans for both individual MPAs and MPA networks so that they are effective in achieving their conservation objectives. Monitor and report on effectiveness of management policies and practices on an ongoing basis, and adjust them in response to new ecological or socio-economic information and emerging issues.
9. **Integrate across institutions.** Ensure cooperation and integration of relevant institutions in managing MPAs for conservation effectiveness. These may be national, multilateral, and international institutions or organizations, including those that govern economic sectors.

## **Goals**

These goals of the Pan-Arctic MPA network support several goals of the Arctic Council, including; conserving Arctic marine biodiversity and ecosystem functions; promoting the health and prosperity of all Arctic inhabitants; and advancing sustainable Arctic marine resource use. They also address many other conservation and sustainable development goals, including Goal 1.1. of the Convention on Biological Diversity, which is “to establish and strengthen national and regional systems of protected areas integrated into a global network as a contribution to globally agreed goals.”

The pan-Arctic MPA network has four inter-related goals:

1. To strengthen **ecological resilience** to direct human pressures and to climate change impacts, to promote the long-term protection of marine biodiversity, ecosystem function and special natural and cultural features in the Arctic.
2. To support the **integrated stewardship**, conservation and management of living Arctic marine resources and species and their habitats, and the cultural and socio-economic values and ecosystem services they provide.
3. To enhance **public awareness** and appreciation of the Arctic marine environment and rich maritime history and culture.
4. To **foster coordination and collaboration** among Arctic states to achieve more effective MPA planning and management in the Arctic.

## **Objectives**

3.3.1 Strengthen Ecological Resilience

Protection and manage for conservation

* Areas of high natural biological productivity, such as polynyas;
* Linked and replicated habitats necessary for biological processes and life histories such as feeding and reproduction;
* Areas of high species and/or habitat diversity and such as coral and sponge aggregations;
* Ecologically important geological features and enduring/recurring oceanographic features, such as underwater canyons, hydrothermal vents, retention areas and oceanographic fronts;
* Critical habitat of endangered and threatened species, such as IUCN red-listed habitats and species;
* Unique or rare species, habitats, and associated communities, such as seabird colonies;
* Areas important for migratory species, such as molting, wintering or resting sites;
* Areas important for sustaining food webs, such as areas important to forage species;
* Pristine areas that safeguard core ecosystem characteristics and offer long-term sustainable conservation that can balance possible impacts from future development in other areas, or have a role as refugias in anticipated changed conditions; and
* Examples of all natural marine habitat types, in order to safeguard biodiversity, ecological processes and ecological function overall.

3.3.2 Sustain cultural, social and economic values and ecosystem services:

. Protect and manage for conservation:

* Marine and coastal areas of high spiritual or cultural value, such as archaeological sites and traditional use areas of indigenous peoples and coastal communities;
* Areas of high primary productivity that capture and store carbon to mitigate the effect of climate change, such as coastal wetlands.
* Reproduction areas of important commercial or subsistence harvestable species, such as spawning and nursery grounds;
* Areas for maintaining natural age/sex structure of important harvestable species, such as groundfish;
* Areas that sustain or restore high-priority fishing or hunting;
* Areas that mitigate the impacts of bycatch;
* Areas that provide compatible opportunities for education and research;
* Cultural sites that are important to a culture’s identity and/or survival; and
* Cultural and historic sites that may be threatened.

3.3.3 Enhance Public Awareness and Support

* Conduct education and outreach activities to demonstrate and share the ecological, social, and economic values of MPAs and MPA networks with indigenous peoples and local communities as well as members of the general public and business communities who benefit from functioning Arctic ecosystems but may never visit these remote areas;
* Conserve and manage areas that provide compatible and sustainable opportunities for recreation and ecotourism; and
* Conserve and manage cultural and historic sites that provide opportunities for heritage tourism.

3.3.4 Foster Coordination and Collaboration

* Conduct capacity development to improve MPA management effectiveness;
* Establish mechanisms for intergovernmental coordination and cooperation for MPA network management and planning;
* Identify priorities and opportunities for scientific cooperation; and
* Develop best practices for priority MPA management and planning issues.

# Key Definitions and Concepts

The following terms and concepts are central to this framework; see Annex 2 for a complete glossary of terms and acronyms used.

## Marine Protected Area (MPA)

Marine Protected Area (or MPA) is a generic term that includes a variety of types of protected areas in the marine environment, some of which are known by other terms. As defined by the International Union for the Conservation of Nature / World Commission on Protected Areas (IUCN/WCPA), and as used in this framework, an MPA 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.*

All Arctic states have legal tools for designating and managing MPAs in the Arctic that offer flexibility with respect to level of protection and management regime. IUCN has developed categories in order to compare protected areas at a global scale, and guidelines for applying these categories (See Annex 3).

**Geographic Boundaries of the Pan-Arctic Network**

Several separate yet linked and overlapping spatial frameworks are in place for dividing the circumpolar Arctic into a manageable set of marine ecological regions that have relevance for the pan-Arctic MPA network. These initiatives by the Arctic Council and other organizations define regions of the Arctic based on bio-geographical aspects and identify regions based on their distinct sets of biota and geophysical characteristics (see Figure 2).

The Framework focuses on and links MPA networks within the EEZs of Arctic states, but recognizes linkages to inland areas and the high seas, since activities that are land-based or occur in the high seas may impact the health of EEZ and coastal habitats and biodiversity. It encompasses MPA network planning that occurs at any spatial scale (e.g., within an LME; within an EEZ; within a multi-national management region).

The term ‘marine’ in MPA is considered to include coastal zones, estuaries and other areas that are connected to Arctic marine ecosystems, to be consistent with the Arctic Council’s Arctic Marine Strategic Plan (AMSP) for 2015-2025. For reporting purposes, the mean high water mark within a coastal protected area will be considered the boundary between marine and terrestrial protection. The MPA portion will extend from the high water mark out to sea to the protected area boundary. If the protected area is mainly terrestrial but includes the shoreline, the MPA will be the intertidal area between mean high and mean low water marks. Where a protected area includes both terrestrial and marine components, only the marine area is included within MPA figures in this Framework.

**Geographic Boundaries of the Pan-Arctic Network**

Several separate yet linked and overlapping spatial frameworks are in place for dividing the circumpolar Arctic into a manageable set of marine ecological regions that have relevance for the pan-Arctic MPA network. These initiatives by the Arctic Council and other organizations define regions of the Arctic based on bio-geographical aspects and identify regions based on their distinct sets of biota and geophysical characteristics, and are described in more detail in Annex ???.

The Framework focuses on and links MPA networks within the EEZs of Arctic states, but recognizes linkages to inland areas and the high seas, since activities that are land-based or occur in the high seas may impact the health of EEZ and coastal habitats and biodiversity. It encompasses MPA network planning that occurs at any spatial scale (e.g., within an LME; within an EEZ; within a multi-national management region).

The term ‘marine’ in MPA is considered to include coastal zones, river basins and other areas that are connected to Arctic marine ecosystems, to be consistent with the Arctic Council’s Arctic Marine Strategic Plan (AMSP) for 2015-2025. For reporting purposes, the mean high water mark within a coastal protected area will be considered the boundary between marine and terrestrial protection. The MPA portion will extend from the high water mark out to sea to the protected area boundary. If the protected area is mainly terrestrial but includes the shoreline, the MPA will be the intertidal area between mean high and mean low water marks. Where a protected area includes both terrestrial and marine components, only the marine area is included within MPA figures in this Framework.

### **4.1.1 Criteria for MPAs in the Pan-Arctic Network**

In order for them to fully contribute to the Pan-Arctic network, Arctic States should ensure that each MPA that is included meets all three of these criteria:

1. It conforms to the IUCN definition of a marine protected area, including each of the key terms as described by the IUCN (such as ‘effectively protected’; see Annex 3).
2. It contributes to achieving at least one of the pan-Arctic MPA network goals and one or more of the corresponding objectives (see Section 3).
3. There is a corresponding management plan, or protection regime explicitly specified in supporting legislation or regulation, and the plan is being implemented.

## Marine Protected Area Network and Aichi Target 11

The definition of the Pan-Arctic Marine Protected Area Network is:

*A ecologically representative and well-connected collection of individual marine protected areas and other effective area-based conservation measures in the Arctic that operate cooperatively, at various spatial scales, and with a range of protection levels, in order to achieve the long-term conservation of nature with associated ecosystem services and cultural values more effectively and comprehensively than individual sites could alone.*

This definition supports and aligns with the conservation target known as Aichi Target 11, adopted in 2010 by Parties to the Convention on Biological Diversity (CBD):

*By 2020, at least…10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider… seascape. (CBD 2010)*

Figure 2 – Boundaries of Large Marine Ecosystems in the Arctic (SOURCE?).

## Other Conservation Measures

The term “*other effective area-based conservation measure*”, as used in Aichi Target 11, was evolving as this framework was being drafted. Generally the term is understood to refer to place-based / spatial conservation measures that have some protection under national or subnational law or policy, or regional management regime, but do not meet the definition of an MPA. These measures may also have a temporal component, such as areas protected during fish spawning or bird nesting periods. For our purposes, such measures contribute to achievement of conservation objectives including MPA network objectives. It is anticipated that some fisheries management measures, protected important bird areas, critical habitat for species at risk, and conservation areas established by indigenous peoples may qualify as such measures. The list of other measures provided here is based on the working definition in this document, and may be modified to align with the internationally accepted definition once it is finalized.

Various areas have been established for specific conservation or management purposes, for example to protect vulnerable marine ecosystems from the impacts of fishing. The 2006 United Nations General Assembly Resolution on Sustainable Fisheries includes a protocol for protecting vulnerable marine ecosystems from the impacts of bottom fishing; this protocol was reviewed in 2009 and 2011. In 2009, the Food and Agriculture Organization of the United Nations adopted *International Guidelines for the Management of Deep-Sea Fisheries in the High Seas* to provide guidance on implementing the General Assembly’s commitments. States, individually and through regional fisheries management organizations (RFMOs), continue to identify vulnerable marine ecosystems and implement fishing restrictions as necessary in order to protect such ecosystems from significant adverse impacts.

Including *other effective area-based conservation measures* in the pan-Arctic MPA network provides more flexibility in choice of management tools for addressing conservation gaps and responding to climate change effects. These areas have been established for specific conservation or management purposes that are spatial in nature (e.g., to protect benthic habitat from destructive fishing gear or protect the breeding grounds of pelagic seabirds). Because these measures are already formally established, if additional threats need to be addressed and/or a higher level of protection is deemed necessary, they may be strengthened or expanded and may then meet the definition of an MPA.

## 4.4 Identification of Significant Areas in the Wider Seascape

The language of Aichi Target 11 also recognizes that MPAs and other area-based conservation measures must be “*integrated into the wider… seascape*”. The pan-Arctic MPA Network will not wholly achieve its conservation objectives unless it is integrated into a broader Arctic management regime such as EBM (see Figure 2). There are several possible approaches to identify ecologically significant areas in the wider seascape.

### **4.4.1 Ecologically or Biologically Significant Areas**

The Conference of the Parties to the Convention on Biological Diversity (CBD) has established a global process for describing ecologically or biologically significant areas (EBSAs). This work has been carried out through the organization of a series of regional workshops at which the application of scientific criteria and other relevant compatible and complementary nationally and inter-governmentally agreed scientific criteria is applied to define the EBSAs within that region. A list of the CBD EBSA criteria is found in Table 1.

EBSAs have been defined by the CBD as:

*Geographically or oceanographically discrete areas that provide important services to one or more species/populations of an ecosystem or to the ecosystem as a whole, compared to other surrounding areas or areas of similar ecological characteristics, or otherwise meet the criteria (See Table 1).*

A CBD regional EBSA workshop for the Arctic was convened in March 2014 in Helsinki, Finland. [[2]](#footnote-3) The workshop described 11 areas as meeting the scientific criteria for EBSAs, and these descriptions, alongside those of areas from other marine regions, were subsequently approved by the CBD Conference of the Parties (COP) in October 2014 for inclusion in the EBSA repository.[[3]](#footnote-4)[[4]](#footnote-5)

The EBSA process uses the best available scientific information to identify significant marine areas. This provides useful information in designing MPA networks, but is a separate process from identifying appropriate protection measures where needed.

4.4.2 Areas of heightened ecological and cultural significance

“Areas of heightened ecological and cultural significance” have also been identified by Arctic States within their EEZs (Skjoldal et al 2013 and AMAP/CAFF/SDWG, 2013). Areas are identified as having heightened ecological and cultural significance using the International Maritime Organization (IMO) criteria for Particularly Sensitive Sea Areas (PSSA) which is similar to the CBD criteria (Table 1) for EBSAs. The term stems from Recommendation IIC of the Arctic Council’s 2009 Arctic Marine Shipping Assessment (AMSA): *“That the Arctic states should identify areas of heightened ecological and cultural significance in light of changing climate conditions and increasing multiple marine use and, where appropriate, should encourage implementation of measures to protect these areas from the impacts of Arctic marine shipping, in coordination with all stakeholders and consistent with international law.”* (PAME 2009)

Table 1 – Comparison of criteria for identifying Ecologically and Biologically Significant Areas (EBSAs), Marine Protected Areas (MPA) and Particularly Sensitive Sea Areas (PSSAs). Source: Skjoldal and Toropova (2010).

|  |  |  |
| --- | --- | --- |
| **CBD EBSA** | **IUCN MPA** | **IM0 PSSA** |
| Uniqueness or rarity  · Species, populations, communities  · Habitats or ecosystems  · Geomorphological or oceanographic features | Rare biogeographic qualities  Unique or unusual geological features  Rare or unique habitat | Uniqueness or rarity |
| Special importance for life history stages of species  · Breeding grounds, spawning areas, nursery areas, juvenile habitat, etc.  · Habitats of migratory species | Presence of nursery or juvenile areas  Presence of feeding, breeding or rest areas | Spawning, breeding and nursery grounds  Migratory routes  Critical habitat for the survival, function, or recovery of fish stocks |
| Importance for threatened, endangered or declining species and/or habitats | Presence of habitat for rare or endangered species  Rare or unique habitat for any species | Critical habitat for rare or endangered marine species |
| Vulnerability, fragility, sensitivity, or slow recovery  · Sensitive habitats, biotopes or species that are functionally fragile or with slow recovery |  | Fragility |
| Biological productivity | Ecological processes or life-support systems | Productivity |
| Biological diversity  · Ecosystems, habitats, communities  · Species  · Genetic diversity | The variety of habitats  Degree of genetic diversity within species | Diversity |
| Naturalness | Naturalness | Naturalness |
|  | Integrity | Integrity |
|  |  | Dependency |
|  | Representative of a biogeographic “type”  or types | Representativity - Bio-geographic importance, representative of a biogeographic “type” or types |

With respect to the high seas, a report called for by PAME assessed the risks posed by international shipping activities and reviewed available International Maritime Organization (IMO) measures suited to protect vulnerable marine areas, including routeing and reporting measures, Special Area designation under the International Convention for Prevention of Pollution from Ships (MARPOL, and Particularly Sensitive Sea Areas (PSSA). The report authors recommended as the preferred option that Arctic States pursue a PSSA for one or more core sea ice areas within the high seas area of the Central Arctic Ocean with non-mandatory areas to be avoided (ATBAs) as the underlying routeing area. (DNV 2013). At PAME II-2014, no Arctic State embraced this recommendation. PAME member governments instead decided additional work and analysis was needed to evaluate the feasibility of the recommended options, and that additional options needed to explored.

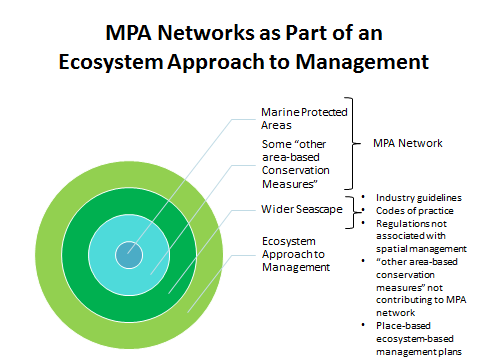


Figure 3 – Relationship between MPAs, “other area-based conservation measures,” wider seascape and an ecosystem approach to management. The pan-Arctic MPA network is composed of spatial measures (both MPAs and some “other effective area-based conservation measures”). Not every spatial management measure is part of the MPA network, as not all contribute to MPA network goals and objectives. Other management practices, such as industry guidelines and codes of practice, and an ecosystem approach to management, help conserve the marine environment and support many of the objectives of the Pan-Arctic MPA Network.

# Arctic Approaches to Design and Management of MPAs and MPA Networks

## Arctic State’s Approaches

The eight Arctic States involved in development of this framework for a pan-Arctic MPA network have taken a variety of approaches to design and management of their MPAs and MPA networks. The regional information used to generate these statistics is summarized in Table 2 and Figure 3.

Canada

Canada has 40 areas protected by spatial conservation measures, as well as bioregional MPA networks in each of Canada’s five Arctic bioregions (loosely consistent with the five corresponding LMEs). Status: Canada uses different kinds of conservation approaches; under the Oceans Act, 1 MPA has been established in the Western Arctic (Beaufort Sea) and one is in progress. Canada has identified key habitat sites for marine birds in the Eastern and Western Arctic, and ecologically and biologically sensitive areas across the Arctic. In the Eastern Canadian Arctic, the Nunavut Planning Commission is developing a draft Nunavut Land Use Plan to guide and direct resource use and development in the Nunavut Settlement Area. The Land Use Plan will replace existing regional land use plans, and apply to both land and marine areas and take into account environmental protection and management needs, including wildlife conservation, protection and management areas mainly, but covers the land-fast ice zone of takes

Greenland/Denmark

In Greenland 12 areas are protected (all within three nautical miles) according to the Nature Protection Act. Five of these can be recognized as MPAs according to the criteria in this Framework. Greenland also has other area-based protection measures to protect fauna, flora or ecosystems, such as areas designated as seabird breeding sanctuaries and regulation of activities near and at seabird colonies in the breeding season. Over the past decade, considerable effort has been invested in identifying marine areas and coastlines vulnerable to oil spills as well as key habitats, migration routes, and the population size and ecology of sensitive species and resources in Greenland, resulting in a number of strategic environmental impact assessments (SEIAs) for hydrocarbon exploration and exploitation activities (Boertmann, D. & Mosbech 2011, Boertmann et al. 2013, Boertmann, D. & Mosbech, A. b 2011, Frederiksen et al. 2012, Merkel et al. 2012). Recent (and ongoing) processes that build on the SEIAs have been made to identify ecologically valuable and sensitive marine areas. Two of these processes were based on IMO´s Criteria for Particular Sensitive Sea Areas (PSSA) (Christensen et al., 2012, and Mosbech, Christensen & Falk in AMAP/ CAFF/ SDWG, 2013 – the AMSA II C report). Through these processes 12 areas have been identified and ranked in four priority categories.

Another ongoing study will result in a report identifying important biodiversity areas (including hotpots) in Greenland. Included is a thorough analysis of the distribution of single species (including IUCN Red Listed species), ecosystems, areas with high diversity of certain groups, etc. The study includes a ranking, based on internationally accepted criteria (such as the EBSA criteria) and nationally criteria (such as importance for ecosystem services).

Iceland

Iceland has protected around 30 marine areas on the basis of the Law on Nature Conservation and Law on Fishery within its EEZ. Some of those areas have the aim of protecting vulnerable bird species based on the Nature Conservation Strategy. Many areas have been closed and designated as MPAs in order to protect cold-water corals. Two areas include hydrothermal vents and one area, Surtsey, is a World Heritage site. The 30 areas are either multiple use areas or no-take zones depending on the objective of the protection. Fourteen of the 30 areas have been submitted to the OSPAR MPAs network. All the areas are within the large marine ecosystem (LME) that surrounds Iceland. In addition to the 30 MPAs, extensive areas are protected within Iceland’s EEZ either with temporary closures or by permanently closing areas. Within those areas, either all fishing is prohibited or the use of certain fishing gears is prohibited in order to protect fish stocks, spawning grounds or benthic species. The number and sizes of those additionally protected areas are not available at this time. Efforts to strengthen and expand the national system of MPAs are ongoing

Norway

In the inaugural declaration of the Norwegian government that came into power in the autumn of 2001, ecosystem-based plans for all Norwegian Sea areas were promised. The management plan for the Barents Sea–Lofoten area (set in place in 2006) identified particularly valuable and vulnerable areas within the management plan area that were identified as being of great importance for biodiversity and for biological production in the entire management plan area. Adverse impacts in these areas, especially as a result of climate change, might be long-lasting or irreversible. Special caution will be required in these areas. Furthermore, Norway submitted the marine part of seven national parks and four nature reserves in Svalbard as OSPAR Marine Protected Areas. The aim of designating these areas as OSPAR MPAs reflects that of the national regulation, and also aims to protect and conserve several species and habitats on the OSPAR list in a part of the OSPAR maritime area not presently covered by existing OSPAR MPAs. In ad­dition, a network of smaller marine protected areas will be established along the coast of Norway, in order to maintain biodiversity and keep certain areas more or less undisturbed to facilitate research and monitoring. A plan for marine protected areas has been drawn up, but the final selection of areas must still be decided.

Russia

In the Arctic zone of the Russian Federation there is a national protected area network as well as seven regional networks. Efforts to strengthen and expand the national and regional systems of protected areas are ongoing. Five new federal MPAs are currently in the process of being established. The identification and planning of new protected areas are initiated by federal and regional governments through independent processes. There is no independent planning system for MPAs. The identification and planning of new MPAs is part of general protected area system planning. In 2008, a national gap analysis was conducted that identified 37 key marine areas in need of protection in the Arctic (<http://www.wwf.ru/resources/publ/book/eng/293>). In 2011, an atlas of marine and coastal biodiversity in the Russian Arctic was issued (available at <http://www.wwf.ru/resources/publ/book/eng/500>). Gap analysis for Arctic MPAs is in preparation.

United States

The United States has established 15 MPAs in the Arctic, all of which allow multiple uses. Eight of these MPAs are managed by the National Marine Fisheries Service to protect marine mammals from fisheries impacts, and do not provide broad protection for biodiversity or marine ecosystems generally. Two are national parks and two are national wildlife refuges. . The National System of MPAs is made up of existing MPA managed by federal, state and tribal agencies, and aims to enhance management through collaboration on shared issues. Efforts to strengthen and expand the National System of MPAs are ongoing, and three of the MPAs in the U.S. Arctic are members of the National System. The U.S. is not conducting a separate regional MPA network planning process. Efforts to identify and plan new MPAs are initiated by individual MPA programs, states and communities, not through a single central planning process.

## Regional Initiatives

OSPAR is a Regional Seas Convention which has an extended geographical scope across five regions, including the Arctic. MPAs are distributed unevenly across the five OSPAR regions and show a major gap in the Arctic Region, Region I. Only 1.94% of Arctic waters in the OSPAR region is protected by OSPAR MPAs (In print: Document presented at OSPAR ICG-MPA 2014: 2014 Status report on the OSPAR network of Marine Protected Areas). OSPAR lists 19 species and 7 habitats that are f threatened or declining in this region.

.

The 2012 assessment of the OSPAR MPA network identified major gaps in ecological coherence in the offshore and high seas areas of the Arctic. OSPAR has a mandate that can be instrumental in the establishment of MPAs within the geographical scope of the Convention. Recently, OSPAR contracting parties have begun discussing possible gaps in fulfilling the OSPAR’s obligations in the Arctic, and will consider the Arctic Council’s findings and recommendations [Laura Píriz, pers. comm. 2014].

## Tracking Progress

Globally, nations report their progress in establishing protected areas to the United Nations Environment Programme (UNEP) /IUCN World Database on Protected Areas (WDPA). As of August 2014, MPAs covered 3.4% of the world’s oceans, with most of such areas occurring in coastal waters and only a fraction (0.25%) occurring in Areas Beyond National Jurisdiction (ABNJ) (Thomas et al 2014). This indicates significant scope for scaled-up action and increasing practical experience with MPAs (IUCN 2013). The IUCN and UNEP-World Conservation Monitoring Centre used the WDPA to assess the percent coverage of protected areas for the Arctic, determining that in 2014 the Arctic realm had a 6.4% coverage of MPAs, up significantly from 1.8% in 1990 (Juffe-Bignoli et al. 2014).

Table 2 – Summary of Arctic State MPAs in Arctic waters (2014).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ARCTIC STATE:** | **Total area of**  **EEZ (km2)** | **Total #**  **MPAs (within the EEZ)** | **Total Area of**  **MPAs (km2)** | **Total % EEZ in**  **MPAs** |
| **CANADA** | **3,587,926** | **40** | **29,670** | **0.83%** |
| **DENMARK GREENLAND** | **2,287,815** | **5** | **96,889** | **4.08%** |
| **FINLAND** | **Finland does not have any marine national waters in the Arctic** | **NA** | **NA** | **NA** |
| **ICELAND** |  | **30** | **3,424** | **0.45%** |
| **NORWAY** | **819,620** | **8** | **255,695** | **10.20%** |
| **RUSSIAN**  **FEDERATION** | **4,195,875** | **55** | **100,701** | **2.40%** |
| **SWEDEN** | **Sweden does not have marine national waters in the Arctic** | **NA** | **NA** | **NA** |
| **USA** | **2,001,420** | **16** | **430,503** | **22%** |

Note: Data provided by Arctic States.

## 5.4 Moving Forward: A Regional Arctic Approach

Given the unique circumstances of the Arctic, the following approaches will be particularly important to the successful development of MPA networks in this region.

* **Managing for change**. As noted, climate change impacts are already being felt in the region, together with associated economic and social changes. A pan-Arctic network must be designed to adaptively manage areas in light of current and expected changes. This will require a proactive approach, and a recognition that the spatial distribution of resources is likely to change over time, including the introduction of new species. Connectivity is particularly important as a network principle in a dynamic environment.
* **Being flexible**. MPAs have been a successful management tool in many diverse regions because they can be adapted to local circumstances. Arctic managers will need to consult with indigenous peoples and local communities to identify appropriate boundaries and levels of protection. Examples could include dynamic MPAs that protect ecologically important areas that move over time, or seasonal protective measures.
* **Engaging indigenous peoples.** Indigenous communities are closely tied to and dependent on the land and sea for survival, and must be active partners in decisions regarding the design and management of MPAs. Moreover, traditional knowledge embodies a broad and deep understanding of this environment and the changes it is undergoing – providing information essential to the effective management of these areas.
* **Communicating about MPAs**. Given many common misperceptions about MPAs, it will be critical to communicate to both indigenous peoples, local communities and more distant but interested stakeholders about the purpose and goals of MPAs, and the benefits they can provide.
* **Building on and connecting with related Arctic Council work**. Because MPA networks are place-based, and address a wide range of issues within those geographic spaces, there are many opportunities for strengthening the network through collaboration between Arctic Council working groups.
* **Cooperate with and through relevant competent authorities to support the implementation of the actions identified in this framework.**

# Arctic Council Implementation – Recommended Near-term and Long-Term Actions

Arctic States and the MPA-EG in particular could collaborate on several common actions to build and strengthen the pan-Arctic MPA network from both ecological and administrative perspectives, in support of network objectives.

## 6.1 Near Term Actions (2015-2017)

1. Develop communications tools for a general audience to expand public understanding and support for Arctic MPAs and MPA networks.
2. Describe how this Framework will be implemented within the context of ecosystem-based management, including available options for institutional arrangements securing stakeholder participation..
3. Develop a consistent approach for achieving ecological network design properties (e.g. representativity, replicated ecological features, adequate and viable site size and density, and connectivity), for example by aligning habitat classification schemes used in different areas of the Arctic to identify the major habitat types within each Large Marine Ecosystem or other management region that could be represented.
4. Refine and map the existing draft inventory of MPAs, “other effective area-based conservation measures” and MPA networks, in order to identify opportunities to apply network design properties such as, representativity, replication, and connectivity at the pan-Arctic scale.
5. Identify types of important marine areas for protection at the pan-Arctic scale based on common criteria, goals, or objectives developed by the MPA-EG, as well as identify areas/species in need of joint conservation measures.
6. Identify practical measures to addressing change in the Arctic through adaptive management of MPA networks, including developing options for management measures designed to address changing conditions (e.g. special management for marginal ice zone, seasonal MPAs, etc).
7. Develop and communicate options to muster resources for financing Arctic MPAs and MPA networks, including addressing comprehensive and sustained stakeholder engagement.
8. Identify the range of benefits that MPAs and MPA networks have for sustaining livelihoods and ecosystem services to Arctic indigenous peoples and local residents, especially in light of supporting social-ecological resilience and the capacity to adapt to rapid Arctic change. Communicate these benefits to Arctic decision makers.

## 6.2 Long Term Actions (2015-2020)

1. Work with other Arctic Council workgroups to identify and collaborate on shared issues. For example:
   1. Ecosystem Approaches (e.g. LME Strategic Objectives, data sharing, risk assessments, etc).
   2. Sustainable Development Working Group (e.g. best practices for consulting with indigenous peoples and Arctic communities, incorporating traditional knowledge, etc)
   3. AMAP and CAFF (e.g. MPA monitoring strategies, community based monitoring, links to existing circumpolar biodiversity monitoring program)
   4. Pacific Arctic Group and DBO. (distributed biological observatories)
2. Establish a regular mechanism for reviewing implementation progress towards national MPA network development and assessing the effectiveness of the pan-Arctic MPA network, and communicate status and progress to the Arctic Ministers..
3. Widen the remit of the MPA-EG so that it becomes a forum for Arctic nation’s implementing agencies to discuss shared issues and develop and apply best practices and adaptive management in implementing the Framework for a pan-Arctic MPA network.

# Conclusion

Advancing the pan-Arctic MPA network is an iterative process that will take time, public engagement and support, political will and sufficient financial investment. This work should be undertaken as a matter of urgency, given the rapidity of change underway in the Arctic marine environment. The Arctic States may choose to identify additional MPAs to strengthen the biodiversity and ecological resilience of the circumpolar Arctic. The actions identified above represent specific opportunities to begin to realize the potential of the pan-Arctic MPA network and the benefits of collaboration across the region.

# References

Alaska Climate Impact Assessment Commission. 2008. Final Report to the Legislature. (<http://housemajority.org/coms/cli/cli_finalreport_20080301.pdf>)

AMAP (Arctic Monitoring and Assessment Programme Working Group). 2012. Arctic Climate Issues 2011: Changes in Arctic Snow, Water, Ice and Permafrost. SWIPA 2011 Overview Report.

AMAP/CAFF/SDWG, 2013. Identification of Arctic marine areas of heightened ecological and cultural significance: Arctic Marine Shipping Assessment (AMSA) IIc. Arctic Monitoring and Assessment Programme (AMAP), Oslo. 114 pp.

Airamé, S., J. E. Dugan, K. D. Lafferty, H. Leslie, D.A. Mcardle, and R.R. Warner. 2003. Applying ecological criteria to marine reserve design: A case study from the California Channel Islands. *Ecological Applications* 13.Sp1 (2003): 170-84.

Arctic Council. 2014. Arctic Council Arctic Marine Strategic Plan 2014-2024.

Beaufort Sea Partnership. 2009. Beaufort Sea Partnership Integrated Ocean Management Plan (IOMP) for the Beaufort Sea: 2009 and Beyond. Beaufort Sea Planning Office, Inuvik, NT.

Bertzky, B., C. Corrigan, J. Kemsey, S. Kenney, C. Ravilious, C. Besançon and N. Burgess. 2012. Protected Planet Report 2012: Tracking progress towards global targets for protected areas. IUCN, Gland, Switzerland and UNEP-WCMC, Cambridge, UK.

Brock, R. J., E. Kenchington and A. Martínez‐Arroyov (Eds.). 2011. Scientific Guidelines for Designing Marine Protected Area Networks in a Changing Climate. Commission for Environmental Cooperation. Montreal, Canada. 90 pp.

CAFF (Conservation of Arctic Flora and Fauna). 1994. The State of Protected Areas in the Circumpolar Arctic. CAFF Habitat Conservation Report No. 1. (<http://www.caff.is/protected-areas-cpan>)

CAFF. 1996a. Proposed Protected Areas in the Circumpolar Arctic. CAFF Habitat Conservation Report No. 2. (<http://www.caff.is/protected-areas-cpan>)

CAFF. 1996b. National Principles and Mechanisms for Protected Areas in the Arctic Countries. CAFF Habitat Conservation Report No. 3. (<http://www.caff.is/protected-areas-cpan>)

CAFF. 1996c. Circumpolar Protected Area Network (CPAN). Principles and Guidelines. CAFF Habitat Conservation Report No. 4. (<http://www.caff.is/protected-areas-cpan>)

CAFF. 1996d. Gaps in Habitat Protection in the Arctic: A Preliminary Analysis. CAFF Habitat Conservation Report No. 5. (<http://www.caff.is/protected-areas-cpan>)

CAFF. 1996e. Circumpolar Protected Area Network (CPAN) – Strategy and Action Plan. CAFF Habitat Conservation Report No. 6. (<http://www.caff.is/protected-areas-cpan>)

CAFF. 2000. Gap Analysis in Support of CPAN: The Russian Arctic. CAFF Habitat Conservation Report No. 9. (<http://www.caff.is/protected-areas-cpan>)

CAFF. 2004. Values of Arctic Protected Areas: A Summary. (This publication is a summary of “Protected Areas of the Arctic: Conserving a Full Range of Values”, released by CAFF in 2002). (<http://www.caff.is/protected-areas-cpan>)

CAFF. 2013. Arctic Biodiversity Assessment: Report for Policy Makers. CAFF, Akureyri, Iceland.

CBD Secretariat. 2009. Report from an expert workshop held in the Azores, Portugal in October 2007, which summarizes the scientific guidance from the Convention on Biological Diversity (CBD) COP 9 Decision IX/20. (<http://www.cbd.int/marine/doc/azores-brochure-en.pdf>)

CBD. 2010. *Decision Adopted by the Conference of the Parties to the Convention on Biological Diversity at its Tenth meeting. X/2. The Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets.* Retrieved from <http://www.cbd.int/decision/cop/?id=12268>

CEC. 2012. *Guide for Planners and Managers to Design Resilient Marine Protected Area Networks in a Changing Climate*. Montreal, Canada. Commission for Environmental Cooperation. 42 pp. (<http://www3.cec.org/islandora/en/item/10856-guide-planners-and-managers-design-resilient-marine-protected-area-networks-in-en.pdf>)

Christie, P. and M. Sommerkorn. 2012. RACER: Rapid Assessment of Circumpolar Arctic Ecosystem Resilience, 2nd ed. Ottawa, Canada: WWF Global Arctic Programme. 72 pp.

Day J., N. Dudley, M. Hockings, G. Holmes, D. Laffoley, S. Stolton and S. Wells. 2012. Guidelines for applying the IUCN Protected Area Management Categories to Marine Protected Areas. Gland, Switzerland: IUCN. 36 pp. (<http://www.iucn.org/about/work/programmes/gpap_home/gpap_capacity2/gpap_bpg/?11131/Guidelines-for-Applying-the-IUCN-Protected-Area-Management-Categories-to-Marine-Protected-Areas>)

Darnis, G., Robert, D., Pomerleau, C., Link, H., Archamault,P., Nelson, R.J., Geoffroy, M., Tremblay, J.E., Lovejoy, C., Ferguson, S.H., Hunt, B.P.V., and L. Fortier. 2012. Current state and trends in Canadian Arctic marine ecosystems: II. Heterotrophic food web, pelagic-benthic coupling, and biodiversity. *Climatic Change* 115:179-205.

DFO (Fisheries and Oceans Canada). 2011a. Marine Protected Areas and MPA Networks: The Benefits and Costs to the Fishing Industry. Fisheries and Oceans Canada. Ottawa. 4 pp.

DFO. 2011b (obtained March 2014). ‘Traditional Ecological Knowledge Strategy for Oceans Management’, and the corresponding ‘Traditional Ecological Knowledge Guide for Oceans Management – with Best Practices for Aboriginal Engagement in Integrated Ocean Management’. Both in draft, available from DFO-Central and Arctic Region (<http://www.dfo-mpo.gc.ca/regions/central/index-eng.htm>).

DFO. 2013. Guidance for Establishing Canada’s Network of Marine Protected Areas. In draft, 18 October 2013. Fisheries and Oceans Canada. Ottawa. 102 pp.

DFO 2014. Eastport Marine Protected Area (MPA) Case Study in Support of Ecosystem Goods and Services Valuation. DFO Can. Sci. Advis. Sec. Sci. Resp. 2014/014.

DNV (Det Norske Veritas). 2013. Specially Designated Marine Areas in the Arctic High Seas. A follow-up project to Recommendation IID of the Arctic Marine Shipping Assessment, 2009. AMSA II D Final Report, commissioned by the Norwegian Environment Agency.

Dudley, N. (Ed.) 2008. Guidelines for Applying Protected Area Management Categories. Gland, Switzerland: IUCN. x + 86 pp. (<http://www.iucn.org/about/work/programmes/gpap_home/gpap_capacity2/gpap_pub/gpap_catpub/?13959/Guidelines-for-applying-protected-area-management-categories>)

Eamer, J., G.M. Donaldson, A.J. Gaston, K.N. Kosobokova, K.F. Larusson, I.A. Melnikov, J.D. Reist, E. Richardson, L. Staples and C.H. von Quillfeldt. 2013. Life Linked to Ice: A guide to sea-ice-associated biodiversity in this time of rapid change. CAFF Assessment Series No. 10. Conservation of Arctic Flora and Fauna, Iceland. ISBN: 978-9935-431-25-7.

FGDC-STD (US Federal Geographic Data Committee - Marine and Coastal Spatial Data Subcommittee.2012. Coastal and Marine Ecological Classification Standard, June 2012. (<http://www.csc.noaa.gov/digitalcoast/publications/cmecs>)

Furgal, C., and J. Seguin. 2006. [Climate Change, Health, and Vulnerability in Canadian Northern Aboriginal Communities](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1764172/). Environ Health Perspect. 2006 December; 114(12): 1964–1970. (<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1764172/>)

Grorud-Colvert, K., J. Claudet, B.N. Tissot, J.E. Caselle, and M.H. Carr. 2014. Marine protected area networks: Assessing whether the whole is greater than the sum of its parts. PLoS ONE 9(8): e102298. doi:10.1371/journal.pone.0102298

Government of Canada. 2011. National Framework for Canada’s Network of Marine Protected Areas*.* Fisheries and Oceans Canada, Ottawa. 31 pp.

Green, A.L., L. Fernandes, G. Almany, R. Abesamis, E. McLeod, P. Ali˜no, A.T. White, R. Salm, J. Tanzer, and R. Pressey. 2014. Designing marine reserves for fisheries management, biodiversity conservation, and climate change adaptation. *Coastal Management* 42:143–159.

HELCOM (Helsinki Convention – or, Convention on the Protection of the Marine Environment of the Baltic Sea Area) /OSPAR (Convention for the Protection of the Marine Environment of the North-East Atlantic). 2003. Agenda item 6, Joint HELCOM/OSPAR Work Programme on Marine Protected Areas. Agenda item 6, First Joint Ministerial Meeting of the Helsinki and OSPAR Commissions (JMM). Bremen, 25-26 June 2003. (http://www.bmub.bund.de/fileadmin/bmu-import/files/pdfs/allgemein/application/pdf/JM06R1.pdf)

HELCOM. 2010a. Ecosystem Health of the Baltic Sea 2003–2007: HELCOM Initial Holistic Assessment. Balt. Sea Environ. Proc. No. 122.

HELCOM. 2010b. Towards an ecologically coherent network of well-managed Marine Protected Areas – Implementation report on the status and ecological coherence of the HELCOM BSPA network: Executive Summary. Balt. Sea Environ. Proc. No. 124A.

HELCOM. 2013a. HELCOM PROTECT- Overview of the status of the network of Baltic Sea marine protected areas. 31 pp.

HELCOM. 2013b. HELCOM HUB – Technical Report on the HELCOM Underwater Biotope and habitat classification. Balt. Sea Environ. Proc. No. 139.

Hockings, M., S. Stolton, F. Leverington, N. Dudley, and J. Courrau. 2006. Evaluating Effectiveness: A framework for assessing management effectiveness of protected areas. 2nd edition.IUCN, Gland, Switzerland and Cambridge, UK. xiv + 105 pp. (<http://data.iucn.org/dbtw-wpd/edocs/PAG-014.pdf>)

Hsu, C.-C. 2007. The Delphi Technique: Making Sense of Consensus. Practical Assessment, Research & Evaluation, Volume 12, Number 10, August 2007.

ICES (International Council for the Exploration of the Sea). 2011. Report of the Study Group on Designing Marine Protected Area Networks in a Changing Climate (SGMPAN) (http://www.ices.dk/workinggroups/ViewWorkingGroup.aspx?ID=500)

IPCC (Intergovernmental Panel on Climate Change). 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovern­mental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp. (<http://www.ipcc.ch/report/ar5/wg1/>)

IUCN (International Union for the Conservation of Nature). 2013. News release on tracking progress towards global targets for protected areas (<http://www.iucn.org/news_homepage/>)

IUCN/Natural Resources Defense Council (NRDC). 2010. Report on IUCN/NRDC workshop to Identify EBSAs in the Arctic Marine Environment, held November 2-4, 2010 in La Jolla, CA.

IUCN-WCPA (World Commission on Protected Areas). 2008. Establishing Marine Protected Area Networks—Making It Happen*.* Washington, D.C.: IUCN-WCPA, National Oceanic and Atmospheric Administration and The Nature Conservancy. 118 pp.

IUCN and UNEP-WCMC .2011. The World Database on Protected Areas (WDPA): January 2011. Cambridge, UK: UNEP-WCMC.

Juffe-Bignoli, D., Burgess, N.D., Bingham, H., Belle, E.M.S., de Lima, M.G., Deguignet, M., Bertzky, B.,Milam, A.N., Martinez-Lopez, J., Lewis, E., Eassom, A., Wicander, S., Geldmann, J., van Soesbergen, A.,Arnell, A.P., O’Connor, B., Park, S., Shi, Y.N., Danks, F.S., MacSharry, B., Kingston, N. (2014). Protected Planet Report 2014. UNEP-WCMC: Cambridge, UK

Kirkman, H. 2013. Choosing boundaries to marine protected areas and zoning the MPAs for restricted use and management." *Ocean & Coastal Management* 81 (2013): 38-48.

Lester, S.E. and B.S. Halpern. 2008. Biological responses in marine no-take reserves versus partially protected areas. Marine Ecology Progress Series, Vol. 367:49-56.

Lemieux, C.J., T.J. Beechey, D.J. Scott and P.A. Gray. 2010. Protected Areas and Climate Change in Canada: Challenges and Opportunities for Adaptation. Canadian Council on Ecological Areas (CCEA) Occasional Paper No 19. CCEA Secretariat, Ottawa, Canada. Xii + 170 pp. (<http://www.ccea.org/Downloads/en_papers_occasional19.pdf>)

Livingston, D. (et al). 2011. Circumpolar Protected Areas Monitoring. Arctic Protected Areas Monitoring Scheme Background Paper. CAFF International Secretariat, CAFF Monitoring Series Report Nr. 5. ISBN: 978-9935-431-10-3.

Miradi (<https://miradi.org/files/miradi_overview.pdf>)

Natura 2000. General information was obtained from: <http://ec.europa.eu/environment/nature/natura2000/index_en.htm>.

NOAA (National Oceanic and Atmospheric Administration). 2008. Framework for the National System of Marine Protected Areas of the United States of America. ([www.mpa.gov](http://www.mpa.gov))

NOAA. 2013. Key Findings from *Fisheries* R*esearch*: Marine Protected Areas as a Fisheries Management Tool. ([www.marineprotectedareas.noaa.gov](http://www.marineprotectedareas.noaa.gov)), extracted from Brock, R.J., D. Hart and S. McDermott (eds.). 2013. Marine Protected Areas as a Fisheries Management Tool. Fisheries Research Volume 144, 116pp. (http://www.sciencedirect.com/science/ journal/01657836/144)

Nye J.A., J.S. Link, J.A. Hare and W.J. Overholtz. 2009. Changing spatial distribution of fish stocks in relation to climate and population size on the Northeast United States continental shelf. Mar Ecol Prog Ser 393:111-129

OSPAR Commission. 2006. Guidance on developing an ecologically coherent network of OSPAR marine protected areas. Reference number: 2006-3. (<http://www.ospar.org/content/content.asp?menu=00700302210000_000000_000000>)

OSPAR Commission. 2007. Guidance for the design of the OSPAR Network of Marine Protected Areas: a self-assessment checklist. Reference number: 2007-6. (<http://www.ospar.org/content/content.asp?menu=00700302210000_000000_000000>)

OSPAR Commission. 2010. The North-East Atlantic Environment Strategy: Strategy of the OSPAR Commission for the Protection of the Marine Environment of the North-East Atlantic 2010–2020 (OSPAR Agreement 2010-3). (<http://www.ospar.org/html_documents/ospar/html/10-03e_nea_environment_strategy.pdf#BDC>).

OSPAR Commission. 2013. 2012 Status Report on the OSPAR Network of Marine Protected Areas. (<http://www.ospar.org/content/content.asp?menu=01511400000000_000000_000000>)

OSPAR ICG-MPA 2014: 2014 Status report on the OSPAR network of Marine Protected Areas (In press)

PAME (Protection of the Arctic Marine Environment). 2009. Arctic Marine Shipping Assessment (AMSA). Arctic Council, April 2009, second printing. (http://www.pame.is/amsa-2009-report)

PAME. 2013a. The Arctic Ocean Review Project, Final Report, (Phase II 2011-2013), Kiruna May 2013. Protection of the Arctic Marine Environment (PAME) Secretariat, Akureyri.

PAME. 2013b. Large Marine Ecosystems (LMEs) of the Arctic area. Revisionof the Arctic LME map, 15th of May 2013. Second Edition. (<http://www.pame.is/arctic-large-marine-ecosystems-lme-s>)

Penhale, P. and S. Grant. 2007. Workshop on Bioregionalization of the Southern Ocean. (Brussels, Belgium, 13 to 17 August 2007). Report of the Workshop. (http://www.ccamlr.org/en/system/files/e-sc-xxvi-a9.pdf)

PISCO (Partnership for Interdisciplinary Studies of Coastal Oceans). 2007. The Science of Marine Reserves (2nd Edition, International Version). ([www.piscoweb](http://www.piscoweb).org). 22 pp.

Pomeroy, R.S., Parks, J.E., and L.M. Watson. 2004. How is your MPA doing? A Guidebook of Natural and Social Indicators for Evaluating Marine Protected Area Management Effectiveness. IUCN, Gland. Switzerland and Cambridge, UK. 216 pp.

Saarman, E., M. Gleason, J. Ugoretz, S. Airamé, M. Carr, E. Fox, A. Frimodig, T. Mason, and J. Vasques. 2013. The role of science in supporting marine protected area network planning and design in California. *Ocean & Coastal Management* 74 (2013): 45-56.

Skjoldal, H. R., T. Christensen, E. Eriksen, M. Gavrilo, F. Mercier, A. Mosbech, D. Thurston, J. Andersen and K. Falk. 2013. A follow-up project to Recommendation IIC of the Arctic Marine Shipping Assessment, 2009. AMSA II C Final Report.

Skjoldal, H.R. and C. Toropova 2010. Criteria for identifying ecologically important and vulnerable marine areas in the Arctic. Background document prepared for AMSA IIC and the IUCN ‘EBSA Workshop’ in San Diego, November 2010.

Smith, J., M. Patterson, H.M. Alidina and J. Ardron. 2009. Criteria and Tools for Designing Ecologically Sound Marine Protected Area Networks in Canada’s Marine Regions. WWF-Canada. (<http://awsassets.wwf.ca/downloads/criteriaandtools_designingecologicallysoundmpanetworks.pdf>)

Sommerkorn, M., and S.J. Hassol (Eds.). 2009. Arctic Climate Feedbacks: Global Implications. WWF International Arctic Programme, Oslo. 97 pp.

Spalding, M.D., H.E. Fox, G.R. Allen, N. Davidson, Z.A. Ferdaña, M. Finlayson, B.S. Halpern, M.A. Jorge, A. Lombana, S.A. Lourie, K.D. Martin, E. McManus, J. Molnar, C. A. Recchia and J. Robertson. 2007. Marine Ecoregions of the World: A Bioregionalization of Coastal and Shelf Areas. BioScience July/August 2007: Vol. 57 No. 7 pp.573-583. (<http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/colorado/scienceandstrategy/marine-ecoregions-of-the-world.pdf>)

Speer, L., and T.L. Laughlin. 2010. IUCN/NRDC Workshop to Identify Areas of Ecological and Biological Significance or Vulnerability in the Arctic Marine Environment. Report on Workshop held November 2-4, 2010, La Jolla, CA, USA. (<https://cmsdata.iucn.org/downloads/arctic_workshop_report_2011_2.pdf>)

Stewart, G.B., I.M. Cote, M.J. Kaiser, B.S. Halpern, S.E. Lester, H.R. Bayliss, K. Mengersen and A.S. Pullin.2008. Are marine protected areas effective tools for sustainable fisheries management? I. Biodiversity impact of marine reserves in temperate zones. CEE review 06-002 (SR23). Collaboration for Environmental Evidence: [www.environmentalevidence.org/SR23.html](http://www.environmentalevidence.org/SR23.html)

Thomas, H.L., MacSharry, B., Morgan, L., Kingston, N., Moffitt, R., Stanwell-Smith, D. & Wood, L. (2014). Evaluating official marine protected area coverage for Aichi Target 11: appraising the data and methods that define our progress. Aquatic Conservation: Marine & Freshwater Ecosystems. 24 (Suppl. 2).

UNEP-WCMC (United Nations Environment Programme – World Conservation Monitoring Centre). 2008. National and Regional Networks of Marine Protected Areas: A Review of Progress. UNEP-WCMC, Cambridge.

Vierros, M., I. Cresswell, E.E. Briones, J. Rice and J. Ardron. 2008. Global Open Oceans and Deep Sea-habitats (GOODS) bioregional classification. In draft. (http://www.ias.unu.edu/resource\_centre/ocean%20bioregionalisation.pdf)

WWF (World Wildlife Fund)-United Kingdom (UK). 2011. Developing Networks of MPAs. Marine Update 63; WWF Newsletter January 2011.

WWF. 2013. ArkGIS (Arctic Geographical Information System). [http://www.arkgis.org/#](http://www.arkgis.org/)

[Yamamoto-Kawai](http://www.sciencemag.org/search?author1=Michiyo+Yamamoto-Kawai&sortspec=date&submit=Submit), M., [F.A. McLaughlin](http://www.sciencemag.org/search?author1=Fiona+A.+McLaughlin&sortspec=date&submit=Submit), [E.C. Carmack](http://www.sciencemag.org/search?author1=Eddy+C.+Carmack&sortspec=date&submit=Submit), S. [Nishino](http://www.sciencemag.org/search?author1=Shigeto+Nishino&sortspec=date&submit=Submit) and K. [Shimada](http://www.sciencemag.org/search?author1=Koji+Shimada&sortspec=date&submit=Submit). 2009. Aragonite Undersaturation in the Arctic Ocean: Effects of Ocean Acidification and Sea Ice Melt. Science 20 November 2009: Vol. 326 no. 5956 pp. 1098-1100. (http://www.sciencemag.org/content/326/5956/1098.full)

# Annex 1: PAME Intercessional Expert Group for a Pan-Arctic Network of Marine Protected Areas

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Country** | **Affiliation** | **Email address** |
| **Member governments** | | | |
| Mary Rothfels / Leah Brown (until August 2014)  Trish Kelley | Canada  **Co-lead** | Fisheries and Oceans Canada – Marine Conservation | [Leah.Brown@dfo-mpo.gc.ca](mailto:Leah.Brown@dfo-mpo.gc.ca)  [Trish.kelley@dfo-mpo.gc.ca](mailto:Trish.kelley@dfo-mpo.gc.ca) |
| \*Cal Wenghofer | Canada | Fisheries and Oceans Canada – Marine Conservation / IOM | Calvyn.Wenghofer@dfo-mpo.gc.ca |
| Renée Sauvé / Maya Gold | Canada | Fisheries and Oceans Canada – International Affairs | [Renee.Sauve@dfo-mpo.gc.ca](mailto:Renee.Sauve@dfo-mpo.gc.ca) /  [Maya.Gold@dfo-mpo.gc.ca](mailto:Maya.Gold@dfo-mpo.gc.ca) |
| \* Francine Mercier | Canada | Parks Canada – National Marine Conservation Areas Program | [Francine.Mercier@pc.gc.ca](mailto:Francine.Mercier@pc.gc.ca) |
| \*Rachel Joo | Canada | Environment Canada | [Rachel.Joo@ec.gc.ca](mailto:Rachel.Joo@ec.gc.ca) |
| Elizabeth McLanahan | USA  **Co-lead** | NOAA/Office of International Affairs | [elizabeth.mclanahan@noaa.gov](mailto:elizabeth.mclanahan@noaa.gov) |
| Lauren Wenzel | USA | NOAA/National Marine Protected Areas Center | [lauren.wenzel@noaa.gov](mailto:lauren.wenzel@noaa.gov) |
| Grantly Galland  Laura Henson | USA | NOAA/Office of International Affairs | [grantly.galland@noaa.gov](mailto:grantly.galland@noaa.gov)  [laura.henson@noaa.gov](mailto:laura.henson@noaa.gov) |
| Catherine Coon  Matthew Blazek | USA | Bureau of Ocean Energy Management | [Catherine.coon@boem.gov](mailto:Catherine.coon@boem.gov)  Matthew.blazek@boem.gov |
| Anja Elisenberg | Norway  **Co-lead** | Ministry of Climate and Environment | [ae@kld.dep.no](mailto:ae@kld.dep.no) |
| Erlend Standal | Norway | Norwegian Environment Agency | [erlend.standal@miljodir.no](mailto:erlend.standal@miljodir.no) |
| Cecilie von Quillfeldt | Norway | Norwegian Polar Institute | [quillfeldt@npolar.no](mailto:quillfeldt@npolar.no) |
| Penina Blankett | Finland | Ministry of Environment, Marine Protection Unit | [penina.blankett@ymparisto.fi](mailto:penina.blankett@ymparisto.fi) |
| Jan Ekebom | Finland | Metsahallitus Natural Heritage Services | [jan.ekebom@metsa.fi](mailto:jan.ekebom@metsa.fi) |
| Laura Píriz | Sweden | Swedish Agency for Marine and Water Management | [laura.piriz@havochvatten.se](mailto:laura.piriz@havochvatten.se) |
| Staffan Danielsson | Sweden | Swedish Agency for Marine and Water Management | [Staffan.Danielsson@havochvatten.se](mailto:Staffan.Danielsson@havochvatten.se) |
| Irina Onufrenya | Russian Federation | Ministry of Natural Resources and Environment | [ionufrenya@wwf.ru](mailto:ionufrenya@wwf.ru) |
| Tina Mønster | Greenland | Ministry of Environment | [tinm@nanoq.gl](mailto:tinm@nanoq.gl) |
| \*Suni Petersen | Faroe Islands | Environment Agency | [sunip@us.fo](mailto:sunip@us.fo) |
| \*Bjørn Tirsgaard | Denmark | Danish Nature Agency | [bjoti@nst.fk](mailto:bjoti@nst.fk) |
| **Permanent Participants** | | | |
| Jim Gamble | USA | Aleut International Association (AIA) | [aia@alaska.net](mailto:aia@alaska.net) |
| James Stotts (Jimmy) | USA | ICC Alaska | [jimmy@iccalaska.org](mailto:jimmy@iccalaska.org) |
| **Arctic Council Working Groups / Expert Group Contacts** | | | |
| \*Soffía Guðmundsdóttir | Iceland | PAME Secretariat | [soffia@pame.is](mailto:soffia@pame.is) |
| \*Phil Mundy | USA | Co-Chair, EA Expert Group | [Phil.mundy@noaa.gov](mailto:Phil.mundy@noaa.gov) |
| \*Trish Hayes | Canada | CAFF | [Trish.Hayes@ec.gc.ca](mailto:Trish.Hayes@ec.gc.ca) |
| **Non-government Observers** | | | |
| Martin Sommerkorn | Norway | WWF | [msommerkorn@wwf.no](mailto:msommerkorn@wwf.no) |
| **Other Experts** | | | |
| Lisa Speer | USA | Natural Resources Defense Council (NRDC) | [lspeer@nrdc.org](mailto:lspeer@nrdc.org) |

\* These individuals are not active participants, but are contributing expertise and monitoring progress

# Annex 2 – Glossary of terms and acronyms

## 2.1 Acronyms

[Need to delete any acronyms and terms that were not used]

ABA – Arctic Biodiversity Assessment

ABNJ – Areas Beyond National Jurisdiction (high seas)

AMAP – Arctic Monitoring and Assessment Programme Working Group (of the Arctic Council)

AMSP – Arctic Marine Strategic Plan (of the Arctic Council)

ArkGIS – Arctic Geographical Information System (developed by WWF)

BSPA – Baltic Sea Protected Area (of HELCOM)

CAFF – Conservation of Arctic Flora and Fauna Working Group (of the Arctic Council)

CBD – Convention on Biological Diversity

CBMP – Circumpolar Biodiversity Monitoring Program (of CAFF)

CEC – Commission for Environmental Cooperation (under North American Free Trade Agreement)

CPAN – Circumpolar Protected Area Network (of CAFF)

DFO – Fisheries and Oceans Canada

EA-EG – Ecosystem Approach to Management Expert Group (of PAME)

EBM – Ecosystem-based management

EBSA – Ecologically and Biologically Significant Area

EEZ – Exclusive Economic Zone

EU – European Union

GIS – Geographic Information System

HELCOM – Helsinki Commission

ICES – International Council for the Exploration of the Sea

IMO – International Maritime Organization

IOMP – Integrated Ocean Management Plan

IUCN – International Union for the Conservation of Nature

LME – Large Marine Ecosystem

MARPOL – International Convention for the Prevention of Pollution from Ships (of the IMO)

MPA – Marine Protected Area

MPA-EG – Pan-Arctic MPA Network Expert Group (of PAME)

MSP – Marine Spatial Planning

NAFO – Northwest Atlantic Fisheries Organization

NMCA – National Marine Conservation Area (of Parks Canada)

NOAA – National Oceanic and Atmospheric Administration

NRDC – Natural Resources Defense Council

NWA – National Wildlife Area (of Environment Canada)

OSPAR – Convention for the Protection of the Marine Environment of the North-East Atlantic

PAME – Protection of the Arctic Marine Environment Working Group (of the Arctic Council)

PISCO – Partnership for Interdisciplinary Studies of Coastal Oceans

PSSA – Particularly Sensitive Sea Area

SA – Special Area (under MARPOL)

SWIPA - Snow, Water, Ice and Permafrost in the Arctic (of AMAP)

TEK – Traditional Ecological Knowledge

UNCLOS – United Nations Convention on the Law of the Sea

UNDRIP – United Nations Declaration on the Rights of Indigenous Peoples

UNEP – United Nations Environment Programme

VEC – Valued Ecosystem Component

WCPA – World Commission on Protected Areas (of IUCN)

WDPA – World Database on Protected Areas (of UNEP / IUCN)

WCMC – World Conservation Monitoring Centre (of UNEP)

WWF – World Wildlife Fund

## 2.2 Terms

**Adaptive management:** A systematic process for continually improving management policies and practices by learning from the outcomes of previously employed policies and practices.

**Adequacy and viability**: CBD network design criterion related to ensuring that all MPAs in the network have the size and protection necessary for ecological viability and integrity. MPAs need to be large enough and sited appropriately to protect and maintain ecological processes that help to maintain biodiversity (such as nutrient flows, disturbance regimes and food-web interactions).

**Aichi Target 11**: By 2020, at least 17 per cent of terrestrial and inland water areas and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscape and seascape. (CBD)

**Arctic**: The land and sea north of the Arctic Circle, where the sun does not set on the summer solstice and does not rise on the winter solstice. This includes the land north of the tree line (comprising about 7.1 million km2, or some 4.8% of the land surface of Earth) and the extent of cold Arctic water bordering temperate waters (EEZs + high seas), covering about 10 million km2. (CAFF-ABA)

**Connectivity**: CBD network design criterion related to ensuring that individual MPAs can benefit from each other, for example, by establishing functional linkages between larval production areas and other geographically separate areas required for subsequent life stages.

**Conservation feature:** A valued ecosystem component (VEC) that has an operational network objective and conservation target associated with it. In systematic conservation planning, a conservation feature is: “a measurable, spatially definable component of biodiversity that is to be conserved within a reserve network. Conservation features can be defined at different levels of ecological scale, e.g., it is possible to protect species, communities, habitat types, populations, and genetic subtypes.

**Conservation Target:** In general terms, a target is a clearly defined development goal that should be “SMART” (i.e., specific, measureable, achievable, realistic and time related). In the context of the network, a conservation target is a spatial, quantitative interpretation of a network objective (usually in the form of a percentage, but not always) that reflects the desired coverage of each conservation feature in the network. Conservation targets may also relate to spatial rules of thumb for size and spacing of individual spatial conservation measures in the network.

**Culture:** The totality of the created world,including the constructed physical and social environments, material artefacts, social institutions, knowledge systems and worldviews. Culture is comprised of multifaceted, interconnected systems that cannot be understood without giving attention to the different parts.

**Culturally important area:** An area identified as having cultural importance according to criteria in the framework. These areas are incorporated into the MPA network design process.

**Cumulative impact:** The impact on the environment caused by a human activity which results in an incremental impact in combination with other past, present and reasonably foreseeable future human activities.

**Depleted or rare species:** Depleted or Rare species are species that are both currently at a very low abundance, and usually were much more abundant at some time in the past. Because of their status, they warrant particularly risk averse management to ensure their survival and recovery.

**Ecologically and Biologically Significant Area (EBSA):** As defined by the CBD, an EBSA is a geographically or oceanographically discrete area that provides important services to one or more species/populations of an ecosystem or to the ecosystem as a whole, compared to other surrounding areas or areas of similar ecological characteristics, or that otherwise meets the criteria as identified in annex I to decision IX/20. (Annex I is more commonly known as the Azores Report, published by the CBD Secretariat in 2009)

**Ecological risk assessment:** The process that evaluates the likelihood that adverse ecological effects may occur or are occurring as a result of exposure to one or more stressors.

**Ecological component:** Ecosystems consist of various non-living abiotic and living biotic components. The abiotic components of an ecosystem include various physical and chemical factors.

**Ecological resilience:** The capacity of an [ecosystem](http://en.wikipedia.org/wiki/Ecosystem) to respond to a [perturbation](http://en.wikipedia.org/wiki/Perturbation_(biology)) or [disturbance](http://en.wikipedia.org/wiki/Disturbance_(ecology)) by resisting degradation and recovering quickly.

**Ecosystem:** A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit. The concept is applicable at any scale, from the planet as an ecosystem to a microscopic colony of organisms and its immediate surroundings.

**Ecosystem Approach:** A strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way.

**Ecosystem services:** Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as regulation of floods, drought, land degradation, and disease; supporting services such as soil formation and nutrient cycling; and cultural services such as recreational, spiritual, religious and other nonmaterial benefits.

**Focal species:** Focal species are those which, for ecological or social reasons, are believed to be valuable for the understanding, management and conservation of natural environments.

**Functional food web:** A food web that consider the impact of each species or trophic species on the population sizes and dynamics of the other species in the food web.

**Human activities:** Human activities, sources or sub-activities are entities or actions that are released or impose pressures on the environment.

**Marine Protected Area (MPA)**: 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*.* (IUCN)

**Marine Protected Area Network**: A collection of individual marine protected areas that operates cooperatively and synergistically, at various spatial scales, and with a range of protection levels, in order to fulfill ecological aims more effectively and comprehensively than individual sites could alone. (IUCN)

**Measurable endpoint:** A measurable ecological, social, cultural or economic value that is related to the valued component chosen as the endpoint. A measurable endpoint establishes the link between an endpoint and the management or conservation objective identified by resource managers.

**Other Effective Area-Based Conservation Measure:** A spatial conservation measure that meets certain criteria for inclusion in domestic or international reporting against the CBD target known as Aichi Target 11.

**Pan-Arctic Marine Protected Area Network**: A collection of individual marine protected areas and other effective area-based conservation measures in the Arctic that operate cooperatively and synergistically, at various spatial scales, and with a range of protection levels, in order to fulfill ecological aims more effectively and comprehensively than individual sites could alone.

**Pressure:** Any chemical, physical or biological entity that can cause an adverse effect on a measurable endpoint(s).

**Replication**: CBD network design criterion related to ensuring that more than one example of each ecological feature (e.g., species such as whales, fish, seabirds, invertebrates; habitats such as seamounts, banks, basins, canyons; ecological processes such as upwellings) is protected to safeguard against unexpected loss from natural events or human disturbance.

**Representative habitat classification scheme:** A scheme to subdivide regions, such as LMEs or bioregions, based on habitat differences and species data, where available.

**Representative habitat:** The more commonly used term for a bioregional subdivision identified through a representative habitat classification scheme.

**Representativity**: This CBD network design criterion is captured in a bioregional MPA network when the network consists of areas that reasonably reflect the full range of ecosystems within the bioregion, including the biotic and habitat diversity of those marine ecosystems.

**Risk:** Risk refers to the uncertainty that surrounds future events and outcomes. It is the expression of the likelihood and impact of an event on the environment.

**Social, cultural or economic values:** Social, cultural or economic values (market or non-market) that can be affected by a change in an ecosystem component or function.

**Spatial conservation measure**: An inclusive term that can refer to an MPA, an “other effective area- based conservation measure”, or any other spatial conservation measure.

**Threshold:** A limit of change in an ecosystem component/attribute which, if exceeded, requires a change in management for protecting the ecosystem component/attribute. A threshold is defined here as a point between alternate regimes in ecological or social-ecological systems. When a threshold along a controlling variable in a system is passed, the nature and extent of feedbacks change, such that there is a change in the direction in which the system moves. A shift occurs when internal processes of the system (e.g., rates of birth, mortality, growth, consumption, decomposition, leaching, etc.) have changed such that the variables that define the state of the system begin to change in a different direction, towards a different attractor. In some cases, crossing the threshold brings about a sudden, large and dramatic change in the responding variables, whilst in other cases the response in the state variables is continuous and more gradual.

**Traditional Knowledge (TK)** Traditional knowledge (TK) refers to a body of evolving practical knowledge based on observations and personal experience of local residents over an extensive, multi-generational time period. TK typically finds expression in a specific environmental context, as technical mastery or expertise that promotes survival and well-being in that location and is shared primarily through kinship or household networks (Clement, et al., 2013).

**Valued ecosystem component (VEC):** Any part of the environment that is considered important by proponents, members of the public, scientists and/or governments. Importance may be determined on the basis of cultural values or scientific concerns.

# Annex 3 – IUCN MPA Definitions and Categories

Marine Protected Area Network (2007):

*A collection of individual marine protected areas that operates cooperatively and synergistically, at various spatial scales, and with a range of protection levels, in order to fulfill ecological aims more effectively and comprehensively than individual sites could alone.*

Convention on Biological Diversity (CBD) Aichi Target 11:

*By 2020, at least…10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider… seascape. (CBD 2010)*

Table 3. IUCN Protected Areas Categories.

**IUCN Protected Areas Categories System**

IUCN protected area management categories classify protected areas according to their management objectives; they represent the global standard for defining and recording protected areas.

**Ia Strict Nature Reserve:** Strictly protected areas set aside to protect biodiversity and also possibly geological/geomorphical features, where human visitation, use and impacts are strictly controlled and limited to ensure protection of the conservation values.

**Ib Wilderness Area**: Usually these are large unmodified or slightly modified areas, retaining their natural character and influence without permanent or significant human habitation, which are protected and managed so as to preserve their natural condition.

**II National Park**: Large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible, spiritual, scientific, educational, recreational, and visitor opportunities.

**III Natural Monument or Feature**: Areas set aside to protect a specific natural monument, which can be a landform, sea mount, submarine cavern, geological feature such as a cave or even a living feature such as an ancient grove. They are generally quite small protected areas and often have high visitor value.

**IV Habitat/Species Management Area**: Areas that aim to protect particular species or habitats and management reflects this priority.

**V Protected Landscape/ Seascape**: A protected area where the interaction of people and nature over time has produced an area of distinct character with significant, ecological, biological, cultural and scenic value; and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values.

**VI Protected area with sustainable use of natural resources**: Protected areas that conserve ecosystems and habitats together with associated cultural values and traditional natural resource management systems. They are generally large, with most of the area in a natural condition, where a proportion is under sustainable natural resource management and where low-level non-industrial use of natural resources compatible with nature conservation is seen as one of the main aims of the area.

See the IUCN guidelines (Dudley 2008; Day et al. 2012) for guidance in applying these categories.

# Annex 4 – Status of MPAs, “other measures” and MPA networks in the Arctic

(Country level tables with data listing each MPA, other measure and totals…)S

## Annex 5 - Additional International Efforts to Build MPA Networks

## Circumpolar Protected Areas Network Group

The Circumpolar Protected Areas Network (CPAN) Group that provided advice to CAFF was operational from 1996 to 2010. It promoted development of a protected areas network that would maintain ecosystem health and dynamic biodiversity of the Arctic region overall (both terrestrial and aquatic components). Its objective was to identify current and emerging protected area issues that required management attention, and to work to resolve them. It aimed to ensure sufficient protection of all habitat types in the Arctic (<http://www.caff.is/protected-areas-cpan/about-cpan>).

CPAN produced a series of nine Habitat Conservation Reports published by CAFF between 1994 and 2000 (see References section, under CAFF). The sixth report, the [*Circumpolar Protected Areas Network Strategy and Action Plan*](http://arcticportal.org/uploads/3v/kl/3vklGMBX4PY7yUyECXLhAQ/HCR6-CPAN-Protected-Areas-Network-CPAN---Strategy-and-Action-Plan.pdf), provided an important foundation for the current pan-Arctic MPA network framework. The document contains many similar elements such as status of protected areas in the circumpolar Arctic; rationale, goal and objectives for a protected areas network; and an implementation section that lists actions to be taken at both national and international levels (CAFF 1996e). An annex to the Strategy and Action Plan summarizes the fourth report in the series, *Circumpolar Protected Area Network Principles and Guidelines* (CAFF 1996c), which together with  [*State of the Protected Areas in the Circumpolar Arctic*](http://arcticportal.org/uploads/FM/Xm/FMXmguMbLOrI_HIAsz68wQ/Habitat-report-no.-01.pdf) (CAFF 1994) and [*Proposed Protected Areas in the Circumpolar Arctic*](http://arcticportal.org/uploads/z8/Py/z8Pyuu9lFDVj0WBoXdluwg/Habitat-report-no.-02.pdf) (CAFF 1996a) contributed useful information and ideas for how countries could work together to achieve a protected areas network.

CPAN is now dormant. Aspects of protected areas work have since been picked up in other CAFF projects and programs including the [Circumpolar Biodiversity Monitoring Program](http://www.caff.is/index.php?option=com_content&view=article&id=387&Itemid=1187) and the [Arctic Biodiversity Assessment](http://www.caff.is/index.php?option=com_content&view=article&id=457&Itemid=1065" \t "_self).

## Circumpolar Biodiversity Monitoring Program

At the broader seascape level, CAFF has been active in harmonizing and integrating biodiversity monitoring efforts across the Arctic (e.g., through its Circumpolar Biodiversity Monitoring Program (CBMP), <http://www.caff.is/monitoring>). Representatives from various agencies responsible for national and regional Arctic protected area management are engaged in identifying a suite of biodiversity measures to be commonly monitored across the Arctic and implemented in a standardized way by each agency. This will enable coordinated reporting of biodiversity in Arctic protected areas (both terrestrial and marine) and provide a circumpolar understanding of change occurring within protected areas around the Arctic region (Livingston et al 2011).

## Convention on Biological Diversity – Guidance on MPA Network Design

Having a common approach to design of domestic MPA networks and identification of conservation priorities will bring greater cohesion to the pan-Arctic MPA network, though Arctic States will follow their individual MPA / MPA Network establishment processes as described in Section 5.

The international standard for MPA network design was set out in the previously mentioned CBD Secretariat’s Azores Report (CBD 2009). This guidance defines and describes five MPA network properties and components:

* EBSAs, described in Section 4.4.1.
* Representativity, captured in a network when it consists of areas representing the different biogeographical subdivisions of the management region that reasonably reflect the full range of ecosystems, including the biotic and habitat diversity of those marine ecosystems.
* Connectivity, allowing for linkages whereby protected sites benefit from larval and/or species exchanges, and functional linkages from other network sites. In a connected network, individual sites benefit one another.
* Replicated ecological features, meaning that more than one site contains examples of a given feature in the given biogeographic area – where “features” means “species, habitats and ecological processes” that naturally occur in the given biogeographic area.
* Adequate and viable sites, indicating that all sites within a network should have sufficient size and protection to ensure the ecological viability and integrity of the feature(s) for which they were selected.

Several other international reports provide complementary ecological guidance on designing MPA networks to achieve fisheries management, biodiversity conservation and climate change adaptation outcomes; see for example PISCO 2007, IUCN-WCPA 2008, UNEP-WCMC 2008, Smith et al 2009, and Green et al 2014. CBD guidance on MPA network components is well supported in the literature (Airamé et al. 2003, Grorud-Colvert et al. 2014, Kirkman, 2014, Saarman et al. 2013,).

## Commission for Environmental Cooperation – Guidance on Designing an MPA Network for Resilience to Climate Change

Design and management of the pan-Arctic MPA network is intended to strengthening the resilience of Arctic marine ecosystems in the face of climate change. The CBD design properties and components listed above were developed with climate change in mind, but may not adequately prepare the Arctic for the significant rate of climate change occurring and being projected for the future.

The North American Commission for Environmental Cooperation (CEC) undertook a science assessment of climate change effects in 2010 in association with an International Council for the Exploration of the Sea Study Group on Designing Marine Protected Area Networks in a Changing Climate (ICES‐SGMPAN; ICES 2011) and then produced scientific guidelines based on that assessment (Brock et al 2011). For the benefit of MPA practitioners and managers, the CEC then published detailed guidance for designing resilient MPA networks in a changing climate (CEC 2012), which overlaps to some extent with the CBD guidance.

As stated in the 2012 CEC guidance: “MPA networks must be designed to be integrated, mutually supportive and focused on sustaining key ecological functions, services and resources. As such, they can provide a mechanism to adapt to and mitigate climate change effects on ecosystems. MPA networks are especially suited to addressing spatial issues of connectivity (e.g., connecting critical places for life stages of key species), habitat heterogeneity and the spatial arrangement and composition of constituent habitats, all of which can contribute to ecosystem resilience. Some of these properties can be supported through the size and placement of protected areas (e.g., abundance and size structure of upper trophic levels, species richness), and the reduction of other stressors such as fishing pressure. A highly coordinated, integrated and adaptive approach to oceans governance will clearly be central to implementing this new imperative, necessitating some mechanism to enhance consistency and coherence across sectors and regions. This will be particularly important with regard to establishing and operating transboundary MPA networks.”

The CEC guidance describes specific steps to undertake four recommended actions:

1. Protect species and habitats with crucial ecosystem roles or those of special conservation concern. Some of the species or habitats that are crucial to a particular species, group of species or the functioning of an ecosystem may differ from those already identified following other network design criteria. Consider the vulnerability of the species or habitats to climate change impacts (e.g., habitats that could be lost due to rising sea levels) and whether or not an MPA or “other effective area-based conservation measures” could lessen their vulnerability.
2. Protect potential carbon sinks. Areas such as coastal salt marshes and sea grasses and kelp beds that sequester and store carbon should be protected so that they can continue to sequester carbon and also so that the carbon they have already stored is not released back into the atmosphere as a result of habitat loss or degradation. Protecting such habitats also helps to shelter and buffer coastal communities from extreme storm events.
3. Protect ecological linkages and connectivity pathways for a wide range of species. This action entails developing, applying and validating dynamic models of adult movement and migration, as well as larval transport, to test hypothesized connectivity among areas, including potential source-sink regions and migratory patterns. The objective is to optimize connectivity among MPAs and “other effective area-based conservation measures” by protecting areas of high biological productivity and key life-stage habitats that are important for maintaining and enhancing ecological linkages.
4. Protect the full range of biodiversity present in the target biogeographic area. The guidelines for this action, which is similar to the CBD property of representativity, describe how to identify representative examples of each habitat type using a habitat classification scheme, and then select for protection the individual habitat units that best represent the classification type.

Among other guidance on designing MPA networks to mitigate and adapt to climate change impacts are publications by Lemieux et al (2010) and WWF-UK (2011).

Well designed MPA networks can help build resilience to climate change by incorporating the approaches described above. Already, ecosystems are changing due to climate impacts. For example, fish are temperature sensitive and cannot control their body temperature so they try to stay in their optimal temperature range. Increases in sea surface temperature resulting from global warming will change physiological processes (e.g., metabolism, growth), spawning season timing (temporal shifts) and where spawning may occur (spatial shifts). Fish can avoid higher temperatures by shifting poleward or into deeper water. For example, scientists at the NOAA’s Woods Hole Laboratory examined 40 years (1968-2007) of distribution data in North-East US waters and found that a majority of the fish species either moved northward or into deeper water during this period (Nye et al, 2009).

Such temporal and spatial shifts and other climate change impacts will require MPA managers to adapt their management plans to changing conditions. This could include adopting new management approaches, changing geographic boundaries, and enhancing collaboration within the national and Pan-Arctic networks on both science and management.

# Figure 3 – Map of areas of heightened ecological significance (such as areas with aggregations of fish, birds and mammals for purposes of migration, staging, breeding, feeding and resting) within Arctic Large Marine Ecosystems (<http://arkgis.org/>).

# Annex 6. Tools for Design and Implementation of MPA Networks

The use of decision-support tools can be helpful when developing and consulting on MPA networks. Such tools overlay geospatial data layers of ecological, cultural and socio-economic information and perform trade-off analyses based on criteria set by MPA managers, stakeholders and other participants in the planning process. Their utility is in ensuring transparent public process, in adaptive management of MPA networks, and in evaluating how well MPA network objectives are being met. Software like Marxan is designed to aid systematic MPA design by generating networks that achieve particular biodiversity representation goals with reasonable optimality in a transparent way. The Ecosystem Based Management Tools Network database (www.ebmtools.org) provides information about the different types of decision-support tools available world-wide. Mapping traditional and local knowledge (TK) can add new aspects especially in areas poorly covered by science and monitoring but nevertheless travelled by hunters.

Ecologically important areas within an MPA network design can be prioritized for protection through ecosystem-based risk analysis (e.g., to identify which areas of high ecological value are most vulnerable to current or anticipated cumulative impacts of human activities), or by resilience analysis (i.e. by identifying areas where ecosystem processes are extraordinary vibrant and strengthen ecosystems against shock and disturbance, e.g. WWF-RACER: Christie & Sommerkorn 2012). Conservation priorities can also be informed by MPA network objectives and lists of threatened and/or declining species and habitats (e.g., IUCN red and green lists).

The choice of decision-support tool depends on the amount, quality and type of data available; the technical skill of practitioners; and resource availability. Where use of computer software is not appropriate (e.g., data are sparse or communities do not have the necessary infrastructure), a simple GIS overlay analysis, Delphic approach (using expert knowledge), or scoring methodology can be used.

## Annex 7. Strengthening Management Effectiveness of Existing MPA and MPA Networks

Management effectiveness is the degree to which management actions are achieving the goals and objectives of a given MPA, “other effective area-based conservation measure” or MPA network. Evaluation of management effectiveness leads to better (adaptive) management in a changing environment; assists in effective resource allocation; provides accountability and transparency; and helps involve communities and promote protected area values ([Hockings et al 2000](https://portals.iucn.org/library/efiles/html/PAPS-012/section57.html#HM2000)).

Monitoring the effectiveness of conservation measures is especially important in the Arctic given the rapid change occurring in this region. It is therefore crucial to establish ongoing monitoring of the status and trends of resources of concern within MPAs and to consider adjusting their boundaries or otherwise modifying management measures as necessary (Kujala 2012, in HELCOM 2013a). Engaging local people as environmental monitors can contribute to improved monitoring.

Evaluating the management effectiveness of MPAs is challenging, since it is often difficult to evaluate the added value of the protected areas or MPA network separately from trends in the broader environment. For example, natural or anthropogenic disturbances can radically alter ecosystems regardless of how well an MPA or MPA network is being managed. The evaluation needs to be appropriate and accurate in linking the degree of achievement to specific management actions. There are also challenges related to the additional costs and logistics of evaluating remote Arctic MPAs.

IUCN/WCPA have created a management effectiveness framework, with protected area management following six distinct stages or elements. It begins with reviewing context and establishing a vision for site management (within the context of existing status and pressures), progresses through planning and allocation of resources (inputs), and as a result of management actions (process), eventually produces goods and services (outputs) that result in impacts or outcomes. It does not contain a detailed methodology, but explains the steps in designing and conducting an assessment (i.e., defining assessment objectives, scope and resourcing; choosing and developing a methodology, including establishing an assessment team and defining indicators; implementing the assessment in the field and office; and interpreting, communicating and using results) and presents case studies as well as a list of helpful resources (Figure 4).

Arctic States have established monitoring programs and undertaken evaluations of the management effectiveness of individual MPAs, other conservation measures and MPA networks. Arctic states involved with HELCOM and OSPAR have been involved in evaluations of MPA networks through those organizations.



Figure 4 – The framework for assessing management effectiveness of protected areas (from [Hockings et al 2000](https://portals.iucn.org/library/efiles/html/PAPS-012/section57.html#HM2000)).

1. http://www.cbd.int/doc/meetings/sbstta/sbstta-18/information/sbstta-18-ebsaws-2014-01-05-en.pdf [↑](#footnote-ref-2)
2. <http://www.cbd.int/doc/?meeting=EBSAWS-2014-01> and

   http://www.cbd.int/doc/?meeting=sbstta-18

   *\*\*Note-text in this paragraph to be updated based on the outcome of the decision on Arctic EBSA’s at CBD COP in October 2014.*  [↑](#footnote-ref-3)
3. *Ibid*., para. 8. [↑](#footnote-ref-4)
4. <http://www.cbd.int/doc/?meeting=EBSAWS-2014-01> and

   http://www.cbd.int/doc/?meeting=sbstta-18

   *\*\*Note-text in this paragraph to be updated based on the outcome of the decision on Arctic EBSA’s at CBD COP in October 2014.*  [↑](#footnote-ref-5)