Framework for a Pan-Arctic MPA Network

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Figures and Tables

1. Introduction

Development of a pan-Arctic network of marine protected areas (MPAs) and other place-based conservation measures would contribute a major conservation element to marine spatial planning (MSP) and ecosystem-based management (EBM) in the circumpolar region. The role of the pan-Arctic MPA network, composed of individual Arctic State MPA networks, is to protect and restore marine biodiversity, ecosystem function and special natural features, and preserve cultural heritage resources. Individual MPAs and MPA networks strengthen marine ecosystem resilience and contribute to human wellbeing, including traditional lifestyles, within the broader context of sustainable oceans management practices and climate change.

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

This framework is not binding; each Arctic State will proceed with MPA network development based on its own priorities and timelines. However, having a common 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;
- Encouraging a consistent and predictable approach for establishing domestic MPAs and MPA networks in keeping with international best practices;
- Supporting achievement of domestic conservation objectives and international commitments and targets (The World Summit on Sustainable Development in 2002), and achieving 10% coastal and marine conservation by 2020 (2010 Conference of the Parties to the Convention on Biological Diversity); and
- Strengthening administrative and scientific linkages among Arctic MPA authorities.

A pan-Arctic MPA network framework also contributes significantly to a number of ongoing Arctic Council objectives, including:

- Implementing several elements of the Kiruna Ministerial Declaration of 2013, including those relating to ecosystem-based management (EBM), biodiversity conservation, and a cooperative, coordinated and integrated approach to the management of the Arctic marine environment ;
- Advancing Goal 2 of the Arctic Council's Arctic Marine Strategic Plan (AMSP) for 2015-2024;
- Support the ongoing work objectives of Protection of the Arctic Marine Environment Working Group (PAME) ; and
- Building on previous Arctic Council work led by the Circumpolar Protected Area Network (CPAN) of the Conservation of Arctic Flora and Fauna (CAFF) Working Group, the Ecosystem Approach to Management Expert Group (EA-EG) of the Protection of the Arctic Marine Environment

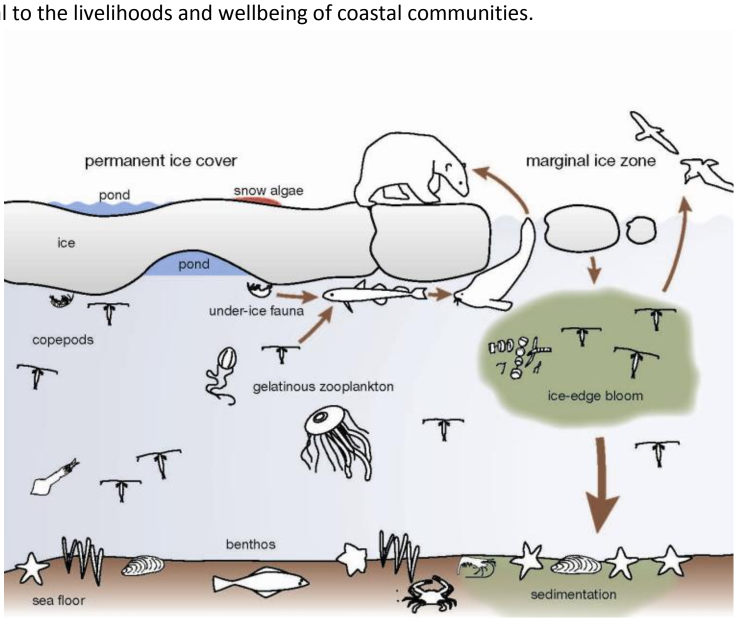
(PAME) Working Group, and the PAME expert group on Ecosystem Based Management. Also, the framework responds to recommendations 5-7 under "I*dentifying and safeguarding important areas for biodiversity*" in the CAFF 2013 Arctic Biodiversity Assessment (ABA) report and recommendations II C and II D in PAME's 2009 Arctic Marine Shipping Assessment (AMSA) ("Identify areas of heightened ecological and cultural significance" and "Explore the need for internationally designated areas for the purpose of environmental protection in regions of the Arctic Ocean", respectively).

This framework was drafted by an MPA Network Expert Group (MPA-EG) reporting to PAME. The Expert Group was co-led by Canada, the US and Norway; all Member States of the Arctic Council were active participants (see Annex 1 for the full list of participants).

2. Value of a Pan-Arctic Marine Protected Area Network

2.1 Sense of Urgency

Ensuring conservation and protection of the Arctic marine environment (Figure 1) is an important Arctic Council priority, due to the role of the Arctic Ocean in moderating the global climate, protecting marine biodiversity, and providing food security, income and cultural identity for Arctic peoples and communities. Arctic biodiversity is an essential and unique part of global biodiversity and central to the livelihoods and wellbeing of coastal communities.



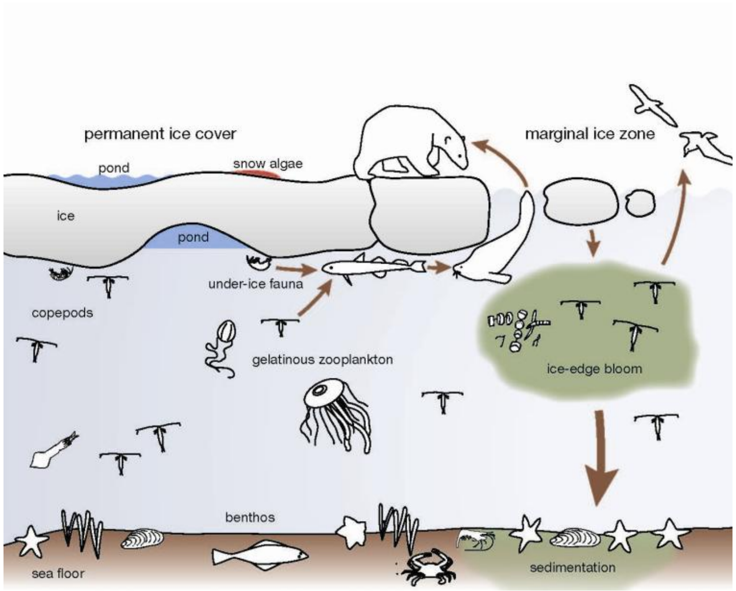


Figure 1 – The Arctic Sea Ice Food Web (CAFF. 2010. Arctic Biodiversity Trends: Selected indicators of change)

The Arctic is experiencing some of the most rapid and large scale climate and CO^2-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); HELCOM 2010; IPCC 2013). Of particular concern from a marine biodiversity perspective are the climate-related trends of diminishing sea and freshwater ice; melting permafrost and glaciers, resulting in changes in ocean chemistry, releases of methane; a shortened winter ice season; reduced snow cover; 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 though increased vessel travel and may pose a serious threat to the ecosystem. In addition, rising carbon dioxide concentrations in the atmosphere is leading to acidification of ocean waters, impacting both planktonic and benthic biota 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 et al 2009).

Expanding industrial activities in the Arctic, including shipping, oil and gas, commercial fishing and tourism, have the ability to 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. The loss of sea ice is now contributing to the rapid expansion of a wide range of human activities, which in turn can bring major additional impacts to the region. Acute accidental events, 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).

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 pressures on the Arctic marine environment (Figure 1), 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 protection of the coastal and offshore marine environments within the Exclusive Economic Zones (EEZs) of Arctic States.

2.2 Benefits of MPAs and MPA Networks

A well-coordinated Pan-Arctic network of well-managed MPAs and other spatial 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.

2.2.1 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 adapt to climate change (e.g., series of underwater canyons along shelf-breaks running North-South; sea ice areas with forecasted persistence);
- Supporting, increasing, 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 polynyas and corals that are important for ecosystem structure and function).

**This list was adapted from CAFF (2004) and Fisheries and Oceans Canada (DFO) (2011a).*

2.2.2 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 MPAs and 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 characteristics 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);
- 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 train or teach people about their physical and natural surroundings and local biodiversity);
- Scientific and research values (e.g., contributing to an understanding of the natural environment and the consequences of natural vs. human-caused, or anthropogenic, changes); and
- Management values (e.g., more coordinated international effort, adoption of best practices).

**This list was adapted from CAFF (2004).*

The loss of sea ice may lead to potential increasing activities. Industries are seeking opportunities to expand into previously inaccessible areas. These activities can have profound impacts on the socio-economics of northern communities. A well-designed MPA network can add to regulatory certainty and inform sound and sustainable business plans. Resource users will be better able to plan development to avoid ecologically sensitive areas and reduce conflict with other interests.

Arctic MPA network processes can facilitate incorporation of Traditional Ecological Knowledge (TEK) into decision-making. The relevance of TEK for resource management purposes is recognized in both the 1982 United Nations Convention on the Law of the Sea (UNCLOS; the international constitution of the world's oceans), and the 2007 United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP). The UNDRIP is 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).

2.3 Key Challenges and Opportunities

As changing ice conditions, ocean acidification, and CO^2-related impacts worsen, the Arctic Nations will look to MPA network establishment as one tool to strengthen ecological resilience, conserve marine biodiversity and mitigate and adapt to changes in the marine environment. This will provide the opportunity to demonstrate the role of MPAs and MPA networks and intensify marine conservation efforts. On the other hand, there will need to be a better understanding of how knowledge of ecological impacts can inform spatial planning so that necessary adjustments can be made to MPA boundaries, conservation designations and zoning conditions. It can take a long time—a decade or more—to establish new MPAs and other habitat conservation measures (Beaufort Sea Partnership 2009). 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).

Changing Arctic conditions will also affect the conservation requirements of various high-profile species such as polar bears; Pacific walrus; ringed and bearded seals; spectacled and king eiders; and beluga, narwhal and bowhead whales (Eamer et al 2013). Changes in the population levels and distributions of such species will likely lead to public debate about the balancing of socio-economic and ecological and societal imperatives, sustainable development practices, and the role of MPA networks in species conservation.

Data limitations in regions of the Arctic seas have been identified as a challenge in earlier sections of this framework. International databases such as the World Database on Protected Areas track MPA establishment globally (www.wdpa.org), and databases developed through Arctic Council initiatives, and the GRID database (www.grida.no) provide timely and usable environmental data to the world community of researchers and policy makers. Ongoing efforts to fill knowledge gaps include the CBD EBSA Arctic Workshop held in Helsinki March 2014[1] and the April 2014 OSPAR meeting in Gothenburg, Sweden to explore how MPA network effectiveness can be evaluated. Gathering pertinent TEK will also complement, and compensate for a lack of, western science. Given the pace of change in the Arctic, there is a critical need to move forward with the further development of MPA networks, even in the face of data limitations. A proactive approach, using the best available data, will best equip Arctic States to meet the challenges of rapid environmental change in the region.

[1] http://www.cbd.int/doc/meetings/sbstta/sbstta-18/information/sbstta-18-ebsaws-2014-01-05-en.pdf

3. Purpose of a Pan-Arctic MPA Network

3.1 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 within the EEZs of Arctic States is:

> *An ecologically connected, representative and well-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.*

3.2 Common Principles

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

1. **Coherent or systematic approach**. Where possible, ensure that MPA networks within the EEZs of Arctic States are linked to ecosystem-based management schemes 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 plan new MPAs and other spatial 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 that are in "full force and effect".
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 ecological, community, and industry knowledge to conservation efforts, as appropriate. Imperfect knowledge should not be used as a reason to avoid or delay protecting priority areas.
5. **Focus on resilience and adaptation to change**. As a priority, design and implement the pan-Arctic MPA network for ecological conservation and the protection of marine biodiversity in the context of actual and projected climate and CO^2 related changes.
6. **Take cultural and socio-economic considerations into account.** Once the ecological conservation needs have been identified, take cultural and socio-economic needs into account to achieve an optimal, cost-effective MPA network design to inform placement of future MPAs and "other area-based conservation measures" (as defined in Section 4.3).
7. **Apply appropriate protection measures.** Ensure that the level of protection afforded is appropriate to the stated goals and objectives for the network. Network MPAs or "other conservation measures" should have a high enough level of protection that ecosystems are functioning naturally and are not significantly affected by human activities.

8. **Employ best management practices**. Develop and implement management plans for the MPAs and "other conservation measures" so that they are effective in achieving their conservation objectives. Monitor 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.

3.3 Goals

Goal 1.1 of the Convention on Biological Diversity is "to establish and strengthen national and regional systems of protected areas integrated into a global network as a contribution to globally agreed goals." With this broader aim in mind, the pan-Arctic MPA network has three 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 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.

Note that targets such as Aichi Target 11 are indicators of progress rather than end-points, and should not be considered conservation goals. The milestone is often moved ahead once achieved. For example, once Aichi target 11 was reached for the Baltic Sea in 2010, the 2010 HELCOM Ministerial Meeting set up an additional goal of protecting 10% of each sub-basin, when scientifically justified (HELCOM 2010b). This Framework does not set a target for percent of the Arctic EEZs that will be protected through an MPA network by any given date. Individual Arctic States may choose to set their own protection and conservation targets.

3.4 Objectives

3.4.1 Strengthen Ecological Resilience

Within the EEZ of Arctic States, conserve and manage:

a. Areas of high natural biological productivity, such as polynyas;
b. Linked or individual habitats necessary for biological processes and life histories such as feeding and reproduction;
c. Areas of high species and/or habitat diversity and such as coral and sponge aggregations;
d. Ecologically important geological features and enduring / recurring oceanographic features, such as underwater canyons and hydrothermal vents;
e. Critical habitat of endangered and threatened species, such as IUCN red-listed species;
f. Unique or rare species, habitats, and associated communities, such as seabird colonies;
g. Areas important for migratory species, such as molting, wintering or resting sites;

h. Pristine areas that safeguard core ecosystem characteristics and offer long-term sustainable conservation that can balance possible impacts from future development in other areas; and
i. Examples of all other natural marine habitat types, in order to safeguard biodiversity, ecological processes and ecological function overall.

**This list was adapted from HELCOM (2013a) and NOAA (2008).*

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

Within the EEZ of Arctic States, conserve and manage:

- Marine areas of high spiritual or cultural value, such as archaeological sites and traditional use areas of indigenous 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;
- Cultural and historic sites that may be threatened; and
- Cultural and historic sites that are under-represented;

**This list was adapted from DFO (2011a) and NOAA (2008).*

3.4.3 Enhance Public Awareness and Appreciation

Within the EEZ of Arctic States:

- Conduct education and outreach activities to share the ecological, social, and economic values of MPAs and MPA networks with local communities as well as members of the general public who may never visit these remote areas;
  - Conserve and manage areas that provide compatible opportunities for recreation and ecotourism; and
  - Conserve and manage cultural and historic sites that provide opportunities for heritage tourism.

4. 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.

4.1 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), 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.*

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 2014-2024. For reporting purposes, the 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 a strip of shoreline, the MPA will be the narrow area between high and low water marks.

Level of Protection refers to the extent to which human activities are regulated within an MPA. Although there is a growing body of scientific evidence supporting the ecological benefits of MPAs that are fully protected or "no-take" reserves (e.g., Lester and Halpern 2008), many MPAs allow industrial and traditional activities that are deemed compatible with achievement of the conservation objectives of the MPA in order to provide social and economic benefits. Such areas typically have regulations that restrict particular activities, extraction periods or ship / gear types, and may include different management zones (horizontal and/or vertical).

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. In order to compare protected areas at a global scale, the IUCN has developed guidelines for applying six categories of protected area (Dudley 2008). Supplementary guidelines for the application of these categories to MPAs were released by the IUCN in 2012 (Day et al. 2012).

4.1.1 Criteria to be Recognized as an MPA

To standardize reporting of MPAs in the pan-Arctic MPA 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) (Dudley 2008; Day et al 2011).
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 4).
3. There is a corresponding management plan, or protection regime explicitly specified in supporting legislation or regulation, and the measure is being effectively managed for achievement of the MPA network goal(s).

4.2 Marine Protected Area Network and Aichi Target 11

Marine Protected Area Network was defined by the IUCN in 2007 as:

> *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.*

A few years later, Parties to the Convention on Biological Diversity (CBD), including seven Arctic States, adopted a conservation target known as 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)*

The wording of Aichi Target 11 acknowledges the important contribution of "*other effective area-based conservation measures"* in achieving conservation outcomes. To be consistent with the spirit of this language and to enable the pan-Arctic MPA network to benefit from the full suite of spatial conservation measures used in the marine environment, the definition of the Pan-Arctic Marine Protected Area Network is:

> *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 fulfill ecological aims more effectively and comprehensively than individual sites could alone.*

4.2 Other Conservation Measures

The term other effective area-based conservation measure was still being defined by the IUCN as this framework was being drafted. Generally the term is understood to refer to place-based / spatial conservation measures that have some protection under domestic law or policy, and make a contribution to biodiversity conservation, but do not meet the definition of an MPA. Such measures may contribute to achievement of conservation objectives including MPA network objectives. It is anticipated that some fisheries management measures, protected important bird areas, critical habitat of 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 IUCN definition once it is finalized.

It will be important for countries to distinguish between areas that have been identified as ecologically important (such as EBSAs) but that do not yet have any formal formal protection, and areas that are legally protected. EBSAs and other ecologically important areas will usually not be considered "other effective area-based conservation measures," but are useful in helping to identify places that should be formally protected under law and policy.

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 legally 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 Sensitive Areas in the Wider Seascape

The language of Aichi Target 11 also recognizes that MPAs and other spatial 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 Ocean management regime such as EBM which has protected area components (see Figure 1). Consideration should also be given to EEZ interfaces with 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.

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 marine 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 EBSA 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 as identified in annex I to decision IX/20

A CBD regional EBSA workshop for the Arctic was convened in early 2014 and participating States are now in the process of identifying Ecologically and Biologically Significant Areas (EBSAs) within their EEZs and in Areas Beyond National Jurisdiction (ABNJ). [2]

[2] http://www.cbd.int/doc/?meeting=EBSAWS-2014-01
***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.*

Some EBSAs support processes for marine biodiversity that may need the protection afforded by an MPA (e.g., EBSAs that are subject to multiple impacts, or that represent natural areas). Other EBSAs may be appropriately managed by "other effective area-based conservation measures" or wider seascape management regimes (e.g., EBM, MSP). Additionally, some EBSAs face no threats necessitating no management needs at this time.

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 IMO criteria for PSSAs 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)

CBD EBSA Criteria	**IMO PSSA Criteria**
Uniqueness or rarity ·Species, populations, communities ·Habitats or ecosystems ·Geomorphological or oceanographic features	Uniqueness or rarity
Special importance for life history stages of species ·Breeding grounds, spawning areas, nursery areas, juvenile habitat, etc. ·Habitats of migratory species	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	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	Productivity
Biological diversity ·Ecosystems, habitats, communities	Diversity

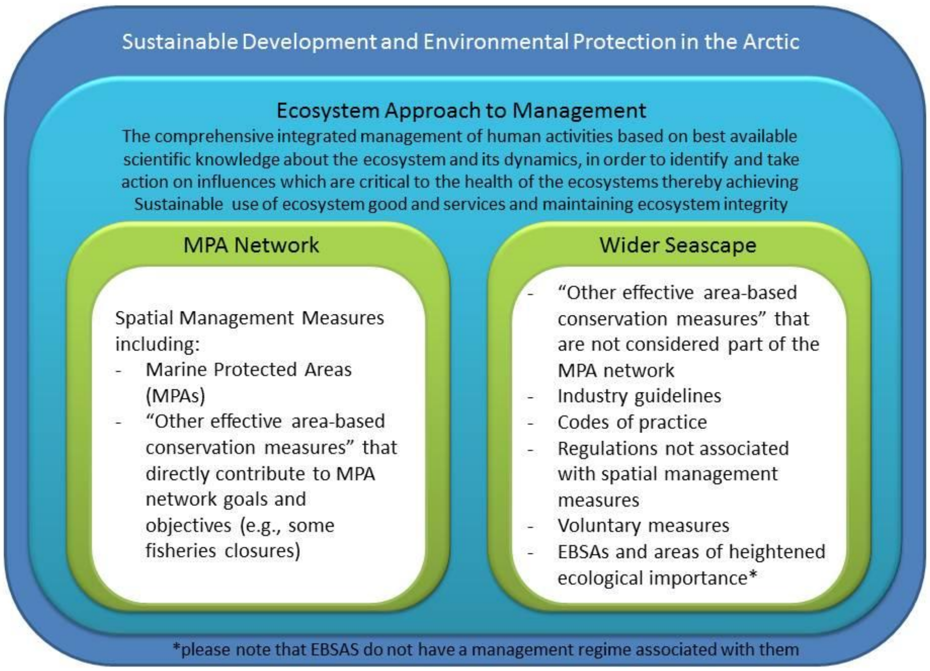
·Species ·Genetic diversity	
Naturalness	Naturalness
	Integrity
	Dependency
	Representativity - Bio-geographic importance, representative of a biogeographic "type" or types

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

With respect to the high seas, a report called for by PAME assessed the risks posed by international shipping activities and reviewed the available International Maritime Organization (IMO) measures suited to protect vulnerable areas, in particular the Special Area (SA) and Particularly Sensitive Sea Area (PSSA) options. The authors concluded that while it is difficult to find support for Special Area (SA) designation under the International Convention for the Prevention of Pollution from Ships (MARPOL), establishing PSSA "core area protection" may be worth considering (DNV 2013).

4.4.3 Rapid Assessment of Circum-Arctic Ecosystem Resilience

Rapid Assessment of Circum-Arctic Ecosystem Resilience (RACER), a tool developed by WWF (Christie and Sommerkorn 2012), may also be useful for informing conservation priorities (e.g., identifying Arctic areas that are important sources of ecosystem resilience; identifying key ecosystem features driving Arctic ecosystem viability that confer resilience to change).


Sustainable Development and Environmental Protection in the Arctic
Ecosystem Approach to Management
The comprehensive integrated management of human activities based on best available scientific knowledge about the ecosystem and its dynamics, in order to identify and take action on influences which are critical to the health of the ecosystems thereby achieving Sustainable use of ecosystem good and services and maintaining ecosystem integrity
MPA Network
Spatial Management Measures including:
- Marine Protected Areas (MPAs)
- "Other effective area-based conservation measures" that directly contribute to MPA network goals and objectives (e.g., some fisheries closures)
Wider Seascape
- "Other effective area-based conservation measures" that are not considered part of the MPA network
- Industry guidelines
- Codes of practice
- Regulations not associated with spatial management measures
- Voluntary measures
- EBSAs and areas of heightened ecological importance*
*please note that EBSAS do not have a management regime associated with them

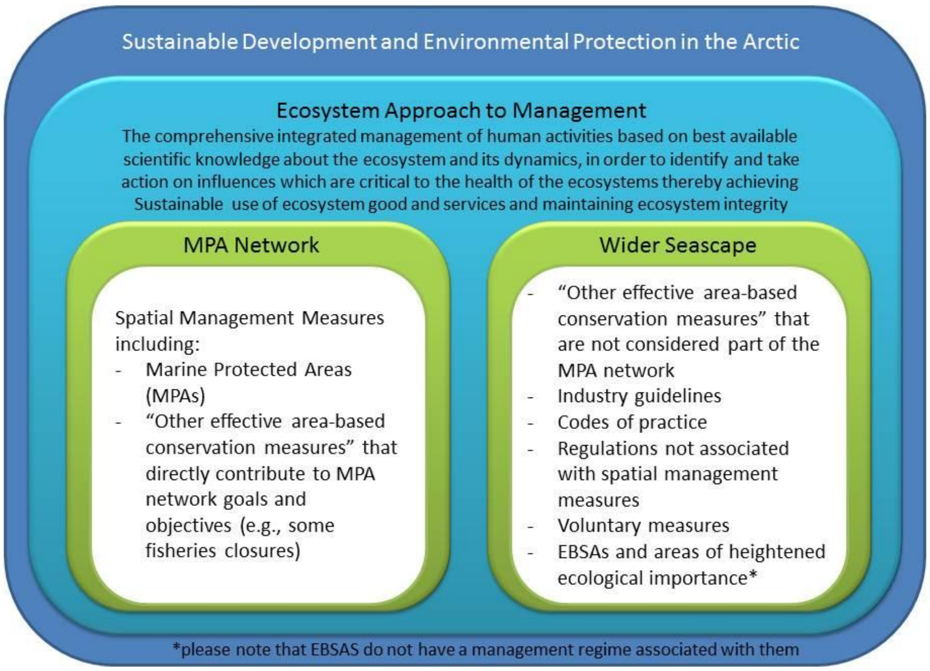


Figure 2 **– Relationship between sustainable development, ecosystem based management (as defined by the EA-EG), and spatial and non-spatial management measures. The pan-Arctic MPA network is composed of spatial measures (both MPAs and "other effective area-based conservation measures"). Not every spatial management measure is part of the MPA network, as not all contribute to MPA network goals and objectives.**

5. Arctic Nation Approaches to Design and Management of MPAs and MPA Networks

5.1 Geographical Management Areas

There are several separate yet linked and overlapping spatial frameworks in place for dividing the circumpolar Arctic into a manageable set of marine ecological regions that have relevance for the pan-Arctic MPA network, as illustrated in Figure 2. Arctic States may be implicated in more than one of these initiatives. Independent, or integrated to various degrees in such initiatives are efforts that define regions of the Arctic based on bio-geographical aspects and that identify regions based on their distinct sets of biota and succinct combination of geophysical characteristics.

- CAFF has delineated the sub-, low and high Arctic outer limits, based on the Circumpolar Arctic Vegetation Map developed in 2003 (CAFF 2013).This framework applies to the outer limits of the sub-Arctic region.
- The Arctic Council has adopted 17 Large Marine Ecosystems (LMEs), identified by the EA-EG on the basis of ecological criteria (PAME 2013b), to implement EBM in the Arctic seas.
- The marine ecoregions of the World (MEOW) project and WWF's RACER project have identified 27 marine ecoregions in the Arctic based on ecological and geophysical criteria (Spalding et al. 2007, Christie and Sommerkorn 2012).
- OSPAR has delineated five regions in the North-East Atlantic, of which only Region 1 is considered Arctic. Denmark, Finland, Sweden, Iceland and Norway are Contracting Parties.
- The European Union (EU) has identified nine biogeographical regions for Natura 2000 (an EU-wide network of protected bird sites and habitat sites for the long-term survival of Europe's most valuable and threatened species and habitats), of which the Boreal and Alpine regions (Fennoscandian) are Arctic. Denmark, Finland and Sweden are Member States of Natura 2000.
- Some of the Arctic states including, the Russian Federation, US, Canada, Norway and Greenland are developing domestic networks of MPAs.
- The Russian Federation, Canada, Norway and Greenland and have also divided their EEZs into discrete regions for management purposes.
- There are other spatial management delineations that are relevant to the pan-Arctic MPA network, such as the Convention Area of the Northwest Atlantic Fisheries Organization (NAFO), which applies to the Arctic areas straddling and outside the EEZs of Canada and Greenland.

This framework for the pan-Arctic MPA network 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 pan-Arctic network may ultimately be composed of:

- An MPA network in Region 1 of OSPAR that incorporates Natura 2000 sites among others. Status: The goal of protecting 10% of the Greater North Sea has been reached, and Contracting Parties are now expanding their MPA network into areas outside the exclusive economic zone (OSPAR 2013).
- Expecting information for the Russian Federation

- In the United States, Alaska sites are included in the National System of MPAs, there is not a separate regional MPA network planning process. Status: Efforts to strengthen and expand the National System of MPAs are ongoing. Efforts to identify and plan new MPAs are initiated by individual MPA programs, states and communities, not through a single central planning process.
- Expecting information for Greenland in August
- Bioregional MPA networks in each of Canada's five Arctic bioregions (loosely consistent with the five corresponding LMEs). Status: The Western Arctic (Beaufort Sea) is the only bioregion where MPA network planning has been initiated (DFO pers. comm.). In the Eastern Canadian Arctic, the Nunavut Planning Commission is developing land use plans to guide and direct resource use and development in the Nunavut Settlement Area. The land use plans will apply to both land and marine areas and take into account environmental protection and management needs, including wildlife conservation, protection and management (Nunavut Planning Commission pers. comm.).
- Expecting information for Norway

Comment [D1]: Greenland: Please update with information

Advancing the pan-Arctic MPA network is an iterative process that will take time, political will and sufficient financial investment. The Arctic States working together may choose to identify additional MPAs to strengthen the biodiversity and ecological resilience of the circumpolar Arctic. This work should be undertaken as a matter of urgency, given the rapidity of change underway in the Arctic marine environment.

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 October 2013, MPAs covered 2.8% of the world's oceans, with most of such areas occurring in coastal waters and only a fraction (0.79%) occurring in Areas Beyond National Jurisdiction (ABNJ). This indicates significant scope for scaled-up action and increasing practical experience with MPAs (IUCN 2013). . The IUCN and UNEP-WCMC (2011) used the WDPA to assess the percent coverage of protected areas for this area. In 2010 the arctic realm had a 4.1% coverage of marine protection, which was up significantly from 1.8% in 1990. *(To be updated when the 'Protected Planet report' comes out at the end of the summer)*

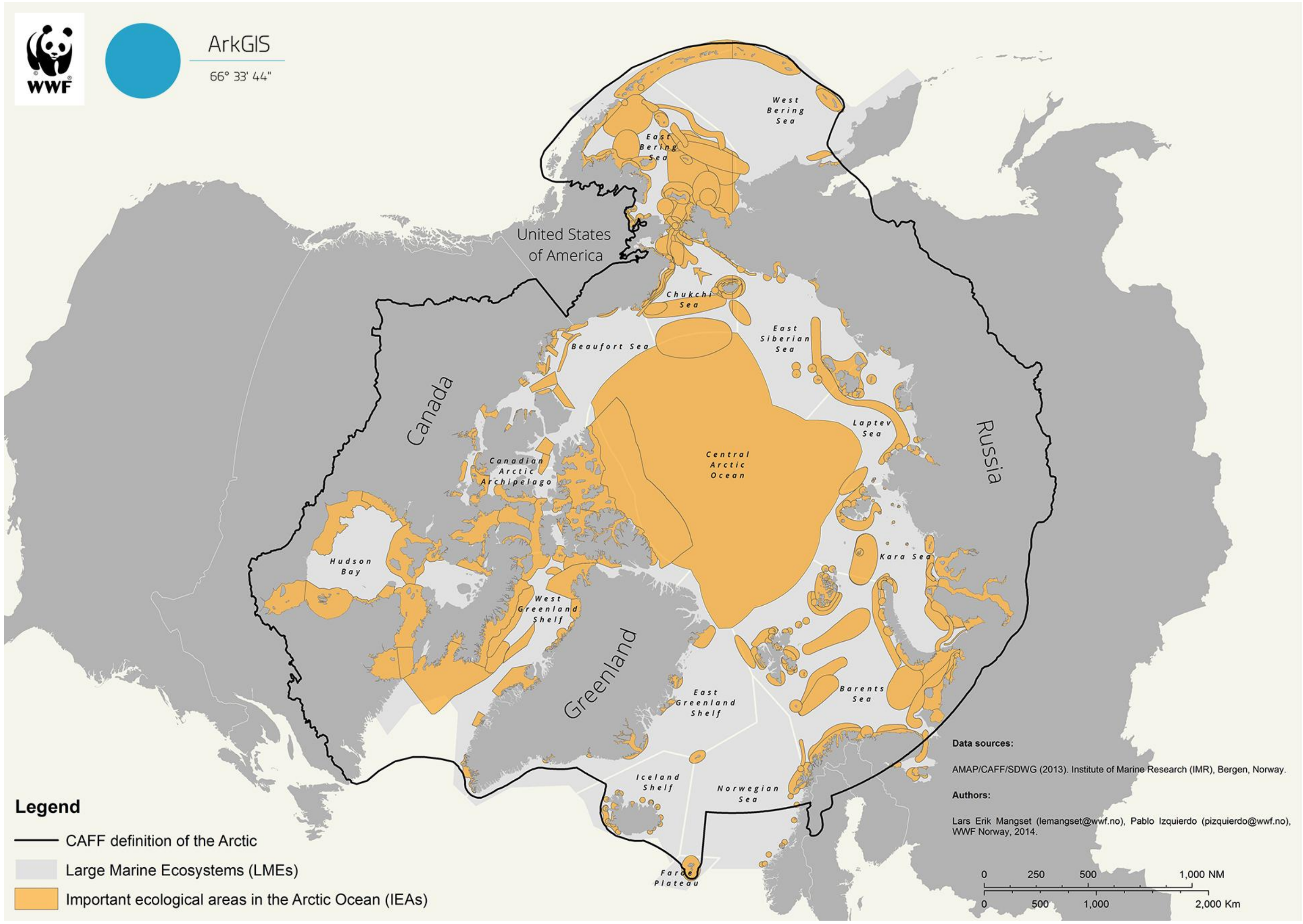


Figure 3 – Map of spatial frameworks for regional management processes in the circumpolar Arctic, including the 17 Large Marine Ecosystems (LMEs) as delineated by PAME and the areas of heightened ecological significance within the LMEs (such as areas with aggregations of fish, birds and mammals for purposes of migration, staging, breeding, feeding and resting) (http://arkgis.org/). (*this map will be updated with the EBSAs that are identified through COP in October).*

5.2 Arctic Nation 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 .

Table 2. Summary of Arctic State MPAs (2014).

ARCTIC STATE:	Total area of EEZ (km2)	Total # MPAs (within the EEZ)	Total Area of MPAs (km^2)	Total % EEZ in MPAs
CANADA	3,587,926	40	29,892	0.83%
USA	2,659,128	13	226,025	8.46%
NORWAY	819,620	8	255,695	10.20%
FINLAND	Finland does not have any marine national waters in the Arctic			
SWEDEN	Sweden does not have any marine protected areas in the Arctic			
DENMARK and GREENLAND	Expecting information in August			
ICELAND				
RUSSIAN FEDERATION	4,195,875	55	100,701	2.40%
TOTAL:				

Comment [D2]: Greenland: Please provide information, including the information for Faroe Islands

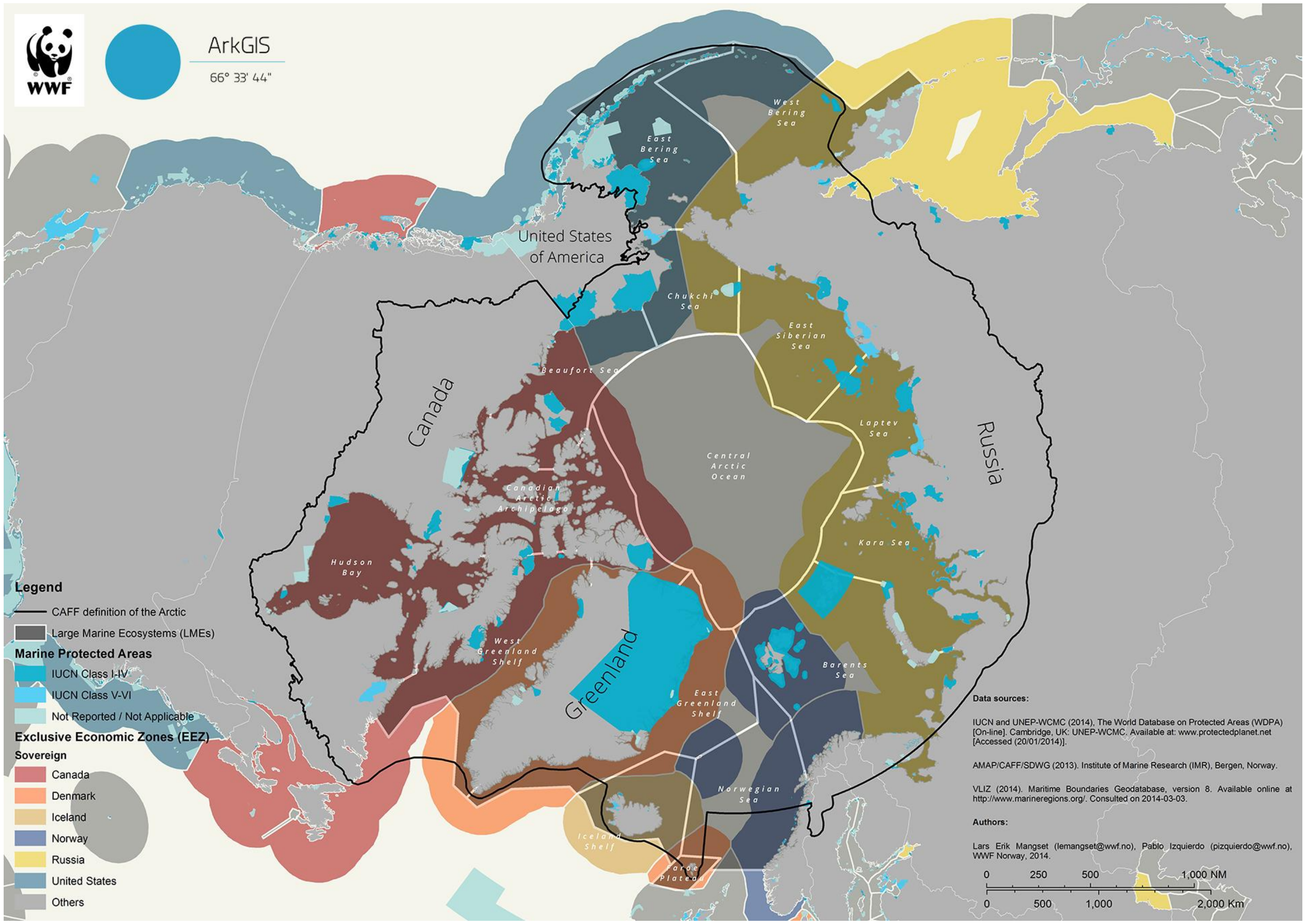


Figure 4 – Map of current Arctic MPAs including the EEZ's ***(this map will be updated to show land/marine interface)***

6. Building a Pan-Arctic MPA Network: Designing, Connecting and Strengthening Domestic Networks

6.1 Work of the 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*, provided the starting point 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* (CAFF 1994) and *Proposed Protected Areas in the Circumpolar Arctic* (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 and the Arctic Biodiversity Assessment.

6.2 MPA Network Design – CBD Guidance

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:

1. <u>EBSAs</u>, which were previously described in Section 3.4.
2. <u>Representativity</u>, 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.

3. 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.
4. 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.
5. 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.

6.2 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.

6.3 Approaches to Optimizing MPA Network Design

The use of decision-support tools can be helpful when developing and consulting on MPA networks. The Ecosystem Based Management Tools Network database (www.ebmtools.org) provides information about the different types of decision-support tools available world-wide. Tools such as Marxan, Marxan with Zones, SeaSketch and MarineMap overlay geospatial data layers of ecological, cultural and socio-economic information and perform trade-off analyses based on ecological and socio-economic criteria set by MPA managers, stakeholders and other participants in the planning process. Possible applications include identifying and developing MPA / MPA network scenarios or options for further assessment through a transparent public process; adaptive management of MPA networks; and evaluating how well MPA network objectives are being met.

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, or scoring methodology can be used.

Ecologically important areas within an MPA network design can be prioritized for protection through 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 Delphic method is widely used and accepted as a structured process for collecting and distilling knowledge from a group of experts, including holders of traditional ecological knowledge. Usually a series of questions is independently answered by each expert, then the group collaborates on the common problem and iteratively refines the solution until consensus is reached (Hsu 2007). In practice the Delphic approach can take various forms, and may be as informal as a group discussion of experts.

6.4 Strengthening Management Effectiveness of Existing MPA and MPA Networks

In the context of this framework, 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).

Monitoring the effectiveness of conservation measures is especially important in the Arctic, since all spatial management measures are geographically fixed, climate change effects may degrade the quality of the protected habitat and drive protected species in or out of the area. 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).

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.

In 1997, the IUCN/WCPA created an international task force to develop guidelines to measure and evaluate the effectiveness of management and provide tools to better understand and improve the management of protected areas worldwide. The task force recognized the impracticality of trying to recommend a particular evaluation tool that would apply globally, so instead it created a framework for assessing the management of protected areas (Hockings et al 2000).

In the IUCN/WCPA framework, protected area management is seen as a process that follows 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).

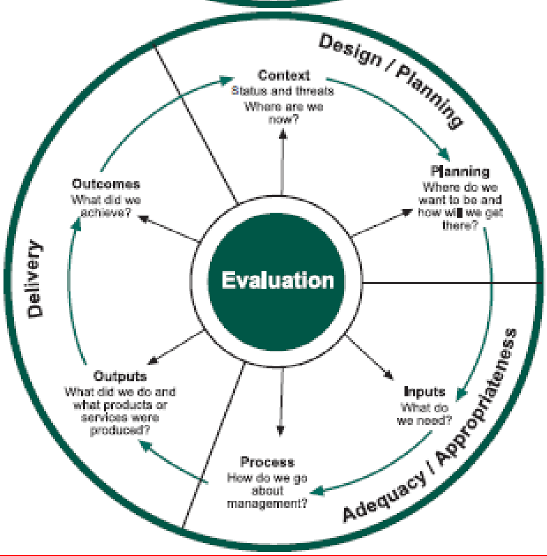


Figure 5. The framework for assessing management effectiveness of protected areas (from Hockings et al 2000).

Specific methodologies for linking management actions to outcomes are provided in an IUCN guidebook of natural and social indicators for evaluating MPA management effectiveness, entitled *How is your MPA Doing?* (Pomeroy et al 2004). There are also simpler score card tools for evaluating MPA effectiveness developed by WWF and the World Bank

(http://www.wdpa.org/me/PDF/WWFWBMPA.pdf), OSPA (OSPAR 2007), and the CEC (http://www3.cec.org/islandora/en/item/4184-guide-ecological-scorecards-marine-protected-areas-in-north-america-en.pdf).
Software such as Miradi (https://miradi.org/files/miradi_overview.pdf) can be helpful in identifying monitoring indicators needed to determine the effectiveness of management strategies. The software helps practitioners to prioritize which actions and monitoring indicators should be focused on and then to develop a work plan for achieving the specific tasks required, together with associated budgets and fundraising.

Arctic States have experience established monitoring programs and undertaken evaluations of the management effectiveness of individual MPAs. There have also been evaluations of "other effective area-based conservation measures" rather than of MPA networks overall, given that MPA networks are a relatively new construct and more difficult to evaluate. For example, Fisheries and Oceans Canada (DFO) undertook a pilot assessment of the ecological and socio-economic benefits of the Eastport MPA in temperate Atlantic Canada (DFO pers. comm.).

A 2010 assessment of the ecosystem health of the Baltic Sea (HELCOM 2010a,b) highlighted the important role an ecologically coherent network of well-managed MPAs has in protecting marine biodiversity in the region, but concluded the status of biodiversity appeared to be unsatisfactory in most parts of the Baltic Sea, particularly in coastal areas. A 2012 assessment of ecological coherence of the OSPAR MPA network (OSPAR 2012) tested the whole OSPAR Maritime Area at a basic level and certain sub-regions, which had greater numbers of MPAs and more complete data, at a more sophisticated level. On the basis of applying these tests it was concluded that the OSPAR MPA network as a whole is not yet ecologically coherent, for example there is under-representation of biogeographic provinces and bathymetric zones. Data quality, consistency and coverage were identified as the main barriers to effective testing of ecological coherence in the OSPAR Regions.

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).

7. Recommended Collaborative 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 – perhaps in a future "Phase II" of the MPA Network project. (What phase II means and how to it will be implemented will be discussed at the upcoming meeting in September) Among the most pressing and feasible actions that could be undertaken are to:

- Evaluate options for mapping, managing metadata and undertaking spatial analyses. Maps of Arctic marine planning regions, EBSAs, existing and planned MPAs and "other effective area-based conservation measures", MPA network design scenarios and priority conservation gaps, and other such geospatial products will be important in developing, communicating and consulting on the pan-Arctic MPA network.
- Develop a process to compile an inventory of conservation objectives and indicators of Arctic MPAs, "other effective area-based conservation measures" and MPA networks, in order to identify opportunities to apply network design properties such as connectivity, representativity, and replication at the pan-Arctic scale.
- Make linkages with the LME strategic objectives being compiled by the EA-EG.
- Develop a consistent approach for achieving representativity in MPA network design, for example by aligning habitat schemes used in different areas of the Arctic to identify the major habitat types within each LME or other management region that need to be represented. Arctic areas where such habitat schemes have been applied include a portion of the Canadian of the Beaufort Sea (DFO pers. comm.), the North-East Atlantic (OSPAR 2006), and the US (Spalding et al 2007; FGDC-STD 2012). Lessons can also be learned from experience in classifying benthic and pelagic habitats in the Southern Ocean (see Penhale and Grant 2007) and in global open ocean and deep sea areas (Vierros et al 2008).
- Develop communications tools for a general audience, to expand public understanding and support for Arctic MPAs and MPA networks.
- Develop MPA data sharing and monitoring strategies (in close cooperation with the CAFF Community Based Monitoring Program) to facilitate evaluating progress and reporting back to PAME and other Arctic Council bodies on the status and value of the pan-Arctic MPA network.
- Identify important marine areas for protection at the pan-Arctic scale based on common criteria, goals, or objectives to be developed by the MPA-EG.
- Identify and prioritize knowledge gaps and TEK/science needs related to MPA networks, such as data regarding subsistence use areas and priority cultural heritage sites, and development of models to forecast climate change impacts on MPAs and strengthen ecosystem resilience at the pan-Arctic scale.
- Develop best practices (in close cooperation with the Sustainable Development Working Group) for consulting with Arctic communities and nations across political boundaries.
- Establish a regular mechanism for reviewing and assessing the effectiveness of the pan-Arctic framework, and adjusting it as necessary (in collaboration with Ecosystem Approach Expert Group) .
- Other actions to build management capacity of Arctic states based on identified priorities.
- Identify gaps in representativity, connectivity, and other aspects of the current pan-Arctic MPA network, to allow each state to develop options for addressing these gaps constant with domestic processes.

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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 km^2, 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 km^2. (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.

Contributory site: An "other effective area-based conservation measure" that contributes to network objectives and conservation targets.

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 integrity: a condition that is determined to be characteristic of a natural region and is likely to persist, including abiotic components and the composition and abundance of native species and biological communities, rates of change and supporting processes.

Ecological resilience: The capacity of an ecosystem to respond to a perturbation or disturbance 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 with the potential to influence the achievement of an organization's objectives.

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 Ecological Knowledge (TEK): A cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment. Traditional ecological knowledge is a way of knowing; it is dynamic, building on experience and adapting to changes. The word *traditional* refers to the continuity of culture, transmitted in the form of beliefs, principles, social attitudes and patterns of practice and behaviour shaped by historical experience.

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 – Status of MPAs, "other measures" and MPA networks in the Arctic

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.