IUCN/NRDC Workshop to Identify Areas of Ecological and Biological Significance or Vulnerability in the Arctic Marine Environment

Workshop Report

Prepared by Lisa Speer and Thomas L. Laughlin

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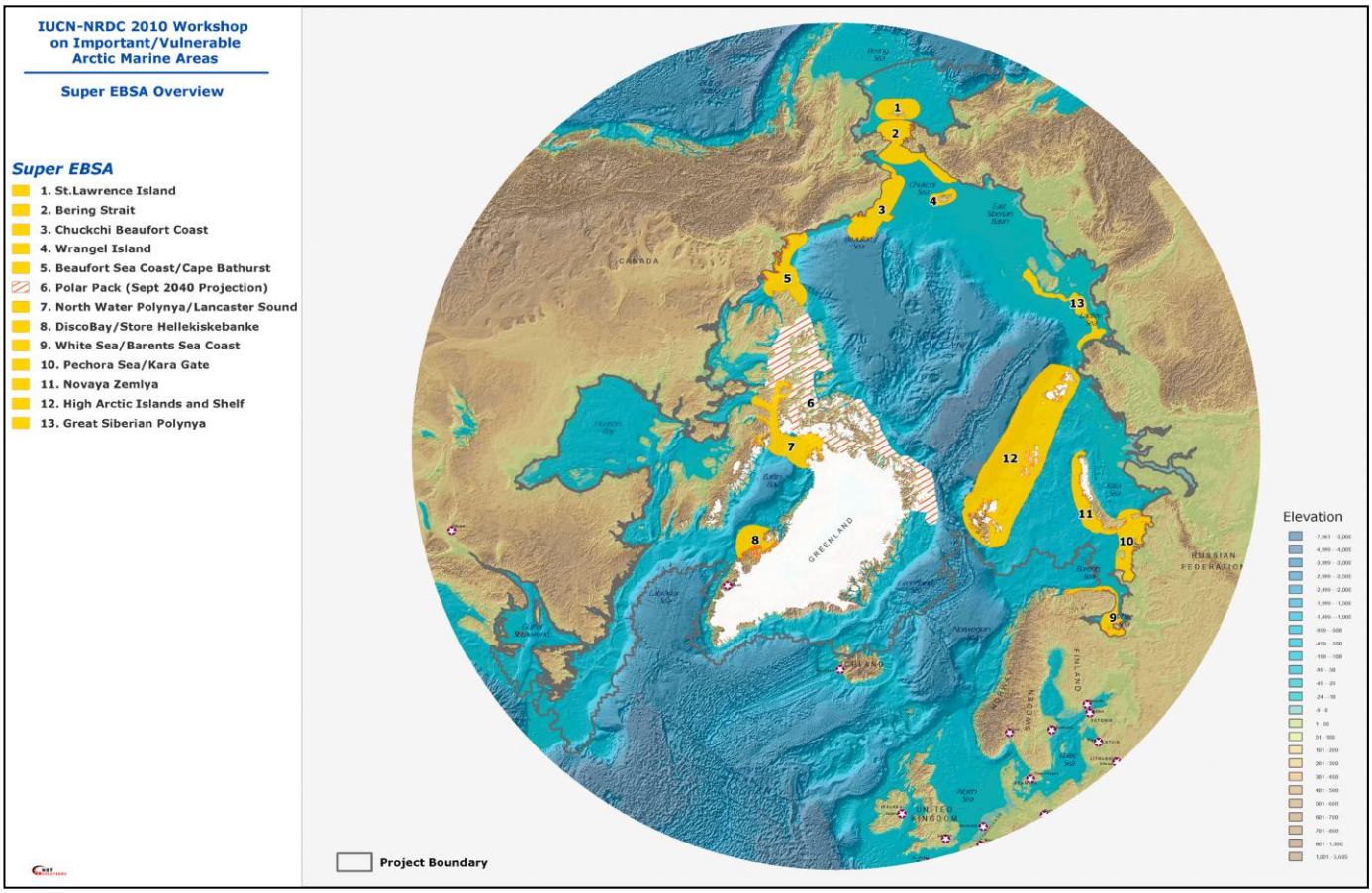

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1. Introduction

1.1 The IUCN/NRDC Project on Ecosystem-based Management in the Arctic Marine Environment

Human activity is expanding in the Arctic marine environment, in part due to warming ocean temperatures and the dramatic loss of summer sea ice. New and expanding human uses include fishing, shipping and offshore oil and gas development. All have the potential to place major additional stress on ocean ecosystems which are already undergoing profound change related to warming, sea ice loss, and alterations in ocean chemistry.

Because activities conducted in one nation's waters can affect other parts of the region, effective management of some human uses in the Arctic marine environment will require international cooperation. The United Nations Convention on the Law of the Sea, in conjunction with other international agreements and national laws and regulations, provides a general legal foundation. However, new rules may be necessary to protect the Arctic marine environment. Examples of possible areas of international cooperation include: development of new standards for Arctic marine shipping, regulation of new or expanding Arctic fisheries, rules to protect the environment in the course of natural resource development, stricter regulation of Arctic tourism, mechanisms to assess and manage the cumulative impacts of multiple activities affecting the same ecosystems, and procedures for the establishment of representative networks of protected marine areas.

Ecosystem-based management has the potential to provide an organizing framework for these new or enhanced management measures in the Arctic. Such an approach, as generally accepted at the international level, includes defining portions of ocean space for management purposes based on oceanographic and ecological criteria, and the development of management arrangements that address all human uses of that space in an integrated fashion. A central element of ecosystem-based management is the identification of ecologically significant or vulnerable areas that should be considered for protection due to their role in maintaining valued ecosystem functions and resilience.

The International Union for the Conservation of Nature (IUCN) and the Natural Resources Defense Council (NRDC) have undertaken a project to explore ways of advancing implementation of ecosystem-based management in the Arctic marine environment through invited expert workshops.

The first workshop, held in Washington, D.C. on 16-18 June, 2010, explored possible means to advance policy decisions on ecosystem-based marine management in the Arctic region. Twenty nine legal and policy experts from around the region participated in the June workshop. The report and recommendations of the June policy workshop can be found here: http://cmsdata.iucn.org/downloads/arctic_workshop_report_final.pdf.

The second workshop, the subject of this report, was held at the Scripps Institution of Oceanography in La Jolla, California on 2-4 November, 2010. The La Jolla workshop utilized criteria developed under the

auspices of the Convention on Biological Diversity[1] to identify ecologically significant and vulnerable marine areas that should be considered for enhanced protection in any new ecosystem-based management arrangements. A list of participants, the meeting agenda and other relevant documents are attached as appendices to this report.

Partners in the overall project include the Ecologic Institute and the Center for Marine Biodiversity and Conservation (CMBC) at the Scripps Institution of Oceanography, University of California, San Diego. The project was made possible by the generous support of the Prince Albert II of Monaco Foundation, and for IUCN only, the Shell Oil Company.

2. Workshop Description

2.1 Purpose and Underlying Premises

The purpose of the La Jolla workshop was to advance the process of identifying Ecologically and Biologically Significant Areas (EBSAs) in the Arctic marine environment. In addition, the workshop served as a venue to bring together and build on the work of several parallel projects, including those undertaken under the auspices of the Arctic Council, the World Heritage Arctic marine site identification process, and mapping efforts by non-governmental organizations including the World Wildlife Fund, Oceana and the National Audubon Society.

The basic premises of the workshop were outlined in the introductory session:

1. Expanding human activity in the Arctic marine environment has the potential to pose significant additional stress on ecosystems already undergoing major change related to ocean warming and loss of sea ice;
2. Arrangements for managing human activities should consider appropriate protections for ecologically or biologically significant and vulnerable areas ;
3. Identifying such areas is a matter of urgent priority, given the pace of change underway in the Arctic;
4. Identification should be based on the best scientific information available, recognizing that such information is less than perfect in many areas and in many respects.

2.2 Conduct

The workshop convened 34 scientists and indigenous peoples' representatives with expertise in various aspects of Arctic marine ecosystems and species to identify biologically or ecologically significant or vulnerable habitats using internationally accepted criteria developed under the auspices of the Convention on Biological Diversity (CBD).[2] These criteria were chosen because they benefit from broad global acceptance. The seven CBD criteria are: uniqueness, life history importance, importance to endangered/threatened species; vulnerable/fragile/slow recovery areas; areas of high productivity;

[1] 9th Conference of the Parties (COP) to CBD in May 2008 in Decision IX/20 (http://www.cbd.int/decision/cop/?id=11663).

[2] See Appendix 6 for a fuller description of the CBD criteria and other international criteria.

areas of high diversity; and "naturalness." Importance of an area for subsistence or cultural heritage was also considered.

Base maps, showing the distribution of oceanographic and biological features and species distribution, were prepared in advance by compiling existing databases that are publicly available. These maps were made available to participants one month prior to the workshop, with provision for receipt of preliminary comments via a web-based GIS mapping program (Google Earth, Ocean Layer 2008). At the workshop, the participants reviewed these preliminary maps and created new ones based on their expert knowledge and additional data they brought to the meeting. Where published information was lacking or insufficient, the experts were asked to use the CBD criteria to identify marine Ecologically and Biologically Significant Areas, based on their personal cumulative scientific knowledge, best professional judgment, or experience.

The workshop focused most intensely on that portion of the marine Arctic that roughly corresponds with the extent of winter sea ice, i.e. the high Arctic, with some areas of the Bering, Barents, Greenland and other regional seas that are ecologically related to the high Arctic Ocean. This choice was based on several considerations. First, resource constraints limited the number of participants that could be brought to La Jolla. Such constraints also limited mapping resources. Faced with such limitations, the project managers felt it most productive to focus on marine areas of the Arctic where the least amount of scientific work has been done and where loss of summer sea ice is exposing new areas to human development. In the course of the discussion, participants were generally of the view that it is important to identify EBSAs in the full area identified by the Arctic Council. The workshop product partially, but not fully, reflects this extension. Additional work will be necessary to identify EBSAs within the full area defined by the Arctic Council.

The principal work at the La Jolla meeting took place in six breakout groups, each chaired by one of the participants (as indicated in Annex 6). On the first day, participants divided into three faunal groupings: fish/invertebrates, birds and mammals. The information developed by these groups was then considered in three sub-regional groups:

(1) Pacific: North Bering/Chukchi/Beaufort/E. Siberian Seas;

(2) NW Atlantic: Labrador/Hudson Bay/Baffin Bay/Canadian Arctic; and

(3) NE Atlantic: Greenland Sea/Barents Sea/Kara Sea/Laptev Sea.

The products of the breakout groups, a series of maps noting the location of EBSAs, were then discussed and modified in plenary.

In the final plenary session, the idea emerged that some EBSAs are of particular importance due to the fact that they meet most or all of the CBD criteria, or meet one or more of them at a global level of significance. [3] The participants decided to name these areas "Super EBSAs."

[3] For example, an area that provided habitat for the entire world population of a species or species group was classified as a Super EBSA.

2.3 Outcomes

The workshop produced a set of maps depicting 77 Arctic marine EBSAs based on the CBD criteria. Thirteen "Super EBSAs" were identified. The 77 EBSAs identified by the participants are depicted in three maps covering different geographical regions of the Arctic (Annex 1) along with a table indicating which of the EBSA criteria each site meets (Annex 2). The 13 Super EBSAs are depicted by region and briefly described in Section 3 below. A bibliography of supporting references is attached as Appendix 3. The cover of this report depicts all 13 Super EBSAs identified at the workshop.

2.4 Review

This report was compiled by IUCN and NRDC based on the discussion, mapping and reference material identification that took place at the workshop. All participants were asked to review the report for accuracy and provide comments, clarifications and corrections. In addition, the report was sent to outside reviewers identified by the workshop participants for review and comment. *The final report represents the best efforts of IUCN and NRDC to reflect the results of the workshop. It does not necessarily reflect the views of individual participants or the reviewers.*

2.5 Caveats and Limitations

The list of caveats on and limitations to this process is long. Stitching together different efforts to identify important and vulnerable areas inevitably runs into issues of scale, methodology and compatibility. Attempts to compile data prior to the workshop faced many constraints. Overall, the availability of data ranges from fair to non-existent for many species and areas. Data quality is also extremely variable, and some data and information are decades old. Most data reflect conditions prevalent at only certain seasons or times of the year. Due to the large scale study area of the workshop and the dynamic nature of ocean ecosystems, the boundaries of the EBSAs and Super EBSAs are proximate and do not always completely correspond due to both the uncertainty of the data and the approach used at the workshop to identify Super EBSAs.

The project was limited in the number of people it could bring to La Jolla. The participant list was further restricted by the language used at the workshop (English), which ruled out non-English speaking experts. The project coordinators are acutely aware that many experts, particularly in indigenous communities around the Arctic, were unable to participate.

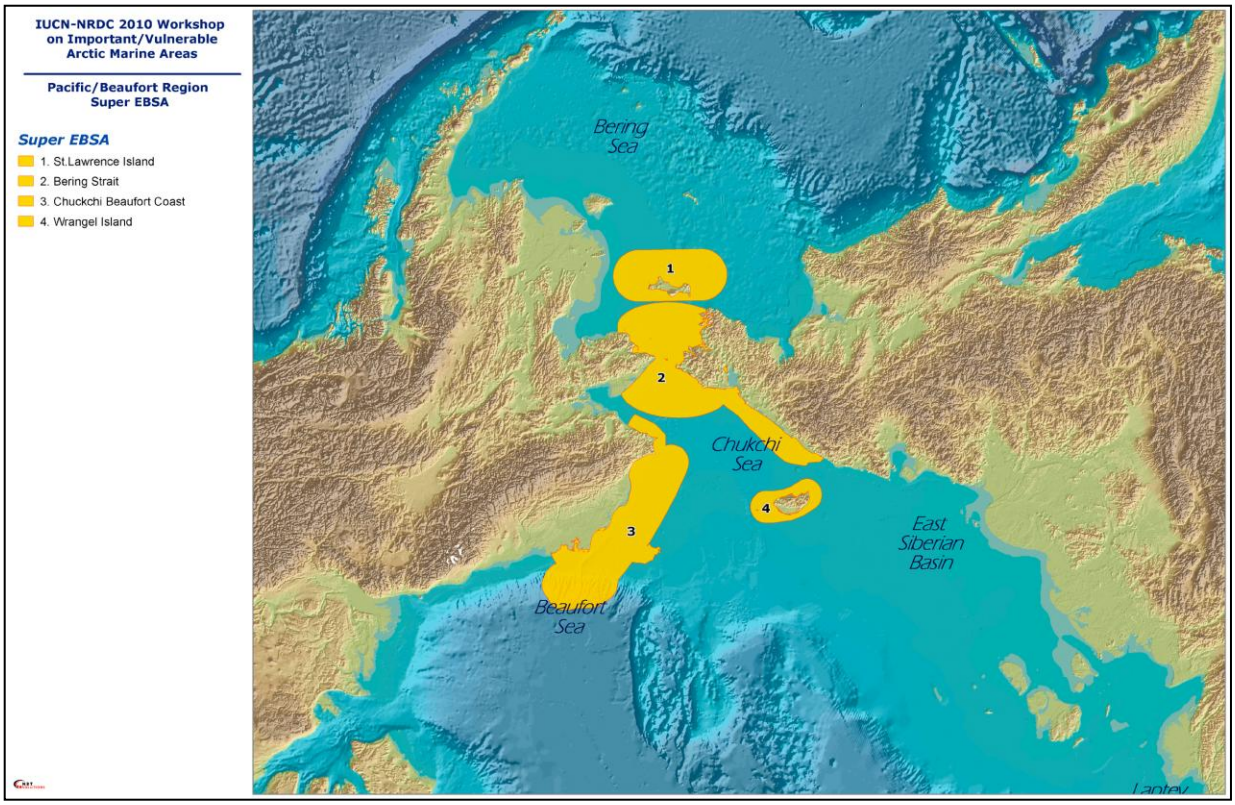
The discussion above reflects only a partial summation of the limitations of the approach taken at the workshop. Despite such limitations, workshop participants generally agreed that management decisions will be made with or without scientific input, and that all efforts should be made to provide the best scientific information available to inform those decisions. It is in this spirit that the workshop proceeded.

3. "Super EBSAs"

'Super' EBSAs were so named because they met most or all seven of the CBD EBSA criteria, or met one or more of the criteria at a global level of significance. The workshop participants agreed that the areas depicted and described below meet these "Super EBSA" criteria. The sites are grouped into three geographical areas that combine several of the Large Marine Ecosystems (LMEs) identified by the Arctic Council.[4] References cited by the participants for all EBSAs are listed in Appendix 4.

Although many of the animals associated with the sites are prominent upper trophic level animals, it should be recognized that each location is critical to those organisms because of the richness, abundance, and availability of their lower trophic level prey, such as benthic organisms and plankton. Benthic communities, for example, serve as particularly important feeding grounds for bottom feeding marine mammals and seabirds. For some of these benthic communities changing sea ice conditions may alter the tightness of the benthic-pelagic coupling and a decline in the production made available to benthic communities. Resulting changes in prey base are likely to have significant effects on population dynamics and survival of upper trophic levels.

A. Super EBSAs in the Pacific Region: North Bering / Chukchi / Beaufort / E. Siberian Seas



[4] See: http://portal.inter-map.com/#mapID=26&groupID=&z=1.0&up=-0.0&left=0.0 for a map of LMEs identified under the auspices of the Arctic Council.

1. *St. Lawrence Island:* The polynyas south of St. Lawrence Island likely support nearly the total world population of Spectacled eiders for six months of each year. The polynyas also provide key habitat for Alcids, Kittiwakes, Shearwaters, overwintering Pacific walrus, bowhead whales, ice seals and polar bears, and are an important subsistence hunting area.

2. *Bering Strait*: This area met all CBD criteria, as it exhibits the highest levels of productivity and diversity in the Arctic. This narrow strait is the only connection between the Pacific and Arctic Oceans, making it a hotspot of global significance. The Bering Strait/Anadyr Current region provides key breeding, pupping, feeding, and/or migratory habitat for many species of marine mammals, including bearded, ringed and spotted seals; Pacific walrus; gray, bowhead, and beluga whales, all of which pass through the Strait twice per year when migrating between the Bering and Chukchi Seas. Arctic cod (*Boreogadus saida)* and other species of forage fishes are abundant and important to many marine predators, and the region supports populations of whitefishes and char which are important seasonally for native community subsistence. The region also supports immense numbers of seabirds during most of the year for breeding, migration, and/or foraging, including Least and Crested auklets; Tufted and Horned puffins, Black-legged kittiwakes; Short-tailed shearwaters, Spectacled and King eiders, Thick-billed and Common murres; Ivory and Ross's gulls; Black guillemot, and at least 30 additional, abundant species of seabirds, sea ducks, geese, loons and phalaropes; and the only nesting sites of Little auks, which are endemic to the Northwest Atlantic, in the Western Arctic. The region has an ancient human history and enduring cultural heritage to coastal and island residents.

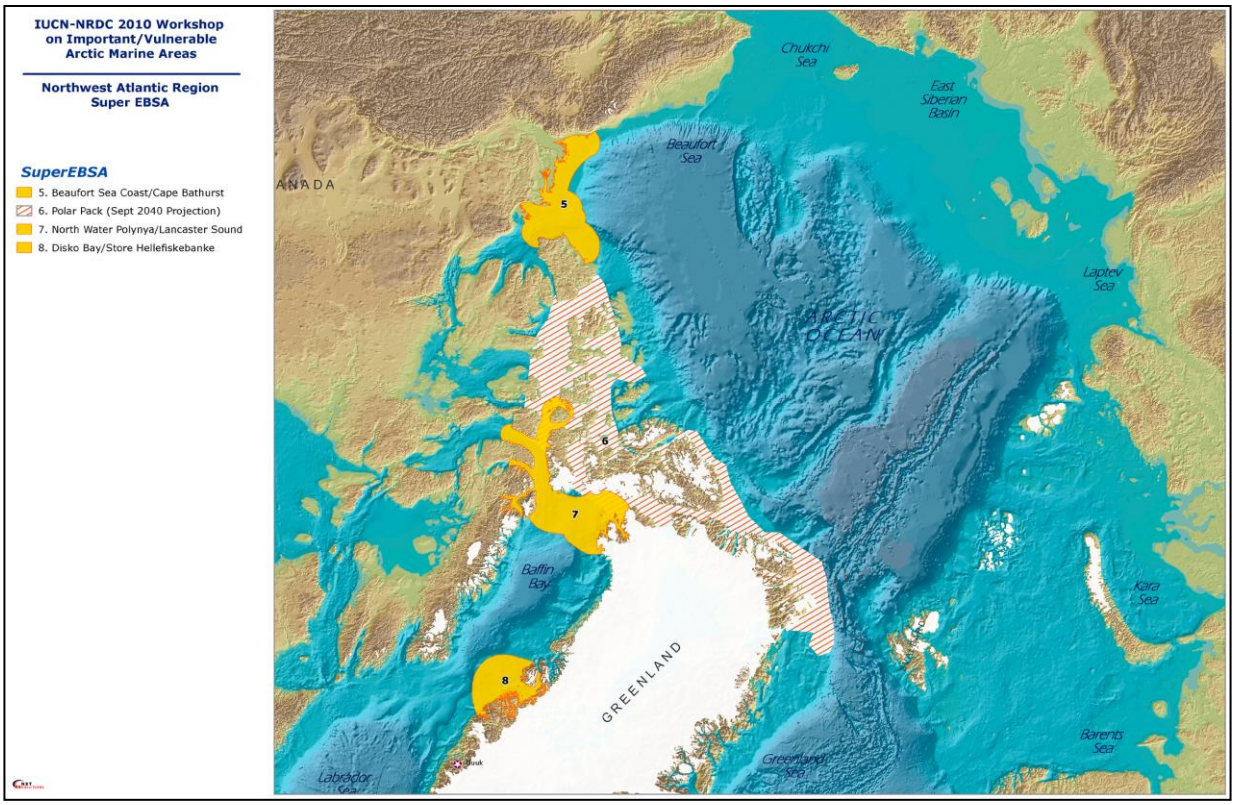
3. *Chukchi Beaufort Coast*: The lead system at the transition between landfast and drifting ice was described by workshop participants as "a wonder of nature," providing a spring migratory pathway for hundreds of bowhead whales daily, as well as beluga whales, polar bears, Pacific walrus and gray whales during summer and autumn. The Chukchi Sea has massive phytoplankton blooms, which along with annual sea ice algae production, cannot be fully exploited by the zooplankton communities. Hence, much of this high production is exported unmodified to the benthos, resulting in an impressively high biomass of benthic infauna and epifauna. Capelin occurs in summer along the sandy seaward beaches of barrier islands in the area of Point Lay and also near Point Barrow. Coastal waters provide whitefish nursery areas and migration corridors for juvenile and adult humpback whales and broad whitefish, least and Bering ciscoes and Dolly Varden Char. Gray whales of the large migratory eastern population (about 20-25,000 animals) have important benthic feeding grounds in coastal areas in the eastern Chukchi Sea, primarily near Point Hope and along the coast between Icy Cape and Point Barrow. Gray whales have been commonly seen feeding offshore at Hanna Shoal in the 1980s - 1990s, but have not been seen there in recent surveys. Hanna Shoal tends to retain sea ice, making it a very important area for pinnipeds in late summer when sea ice is absent over the rest of the continental shelf.

   It is believed that all the King eiders breeding in Western North America (~500,000) use Ledyard Bay as a staging area. Coastal waters, including Ledyard Bay, provide staging, molting and feeding habitat for many species of birds, including seabirds, King, Common, Spectacled and

Stellers' eiders, Red-throated, Pacific and Yellow-billed loons, Long-tailed ducks and Brant. The seabird colony at Cape Lisburne is the largest colony in the eastern Chukchi and Beaufort Seas, supporting roughly half a million breeding birds of eight species. In recent years, thousands of walrus have hauled out along the coast in late summer and autumn as sea ice has retreated farther north into the Arctic Basin. Barrier islands/lagoon systems, such as Kasegaluk Lagoon in the eastern Chukchi Sea, are important to large numbers of spotted seals in summer and denning polar bears in winter. This region also has an ancient human history and enduring cultural heritage to coastal residents, for example, the annual bowhead whale hunt in villages in the region is a subsistence activity of large sociocultural significance.

4. *Wrangel Island*: The polynyas, leads and coastal waters around Wrangel Island provide important spring and summer feeding habitat for polar bears, migratory and feeding habitat for Pacific walrus, and breeding and feeding for extensive seabird colonies including Thick-billed and Common murres, Black-legged kittiwakes, Horned puffins and Black guillemots.

B. Super EBSAs in the Northwest Atlantic Region: Labrador / Hudson Bay / Baffin Bay / Canadian Arctic



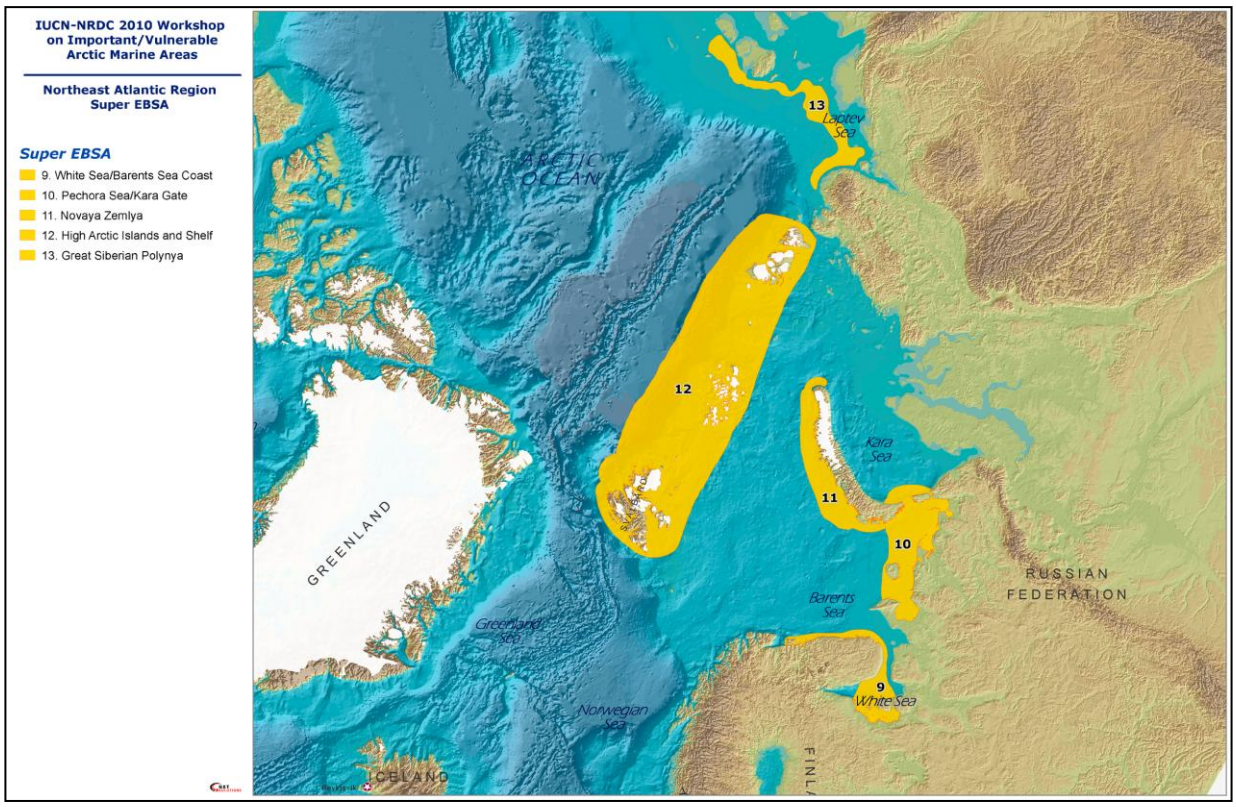
5. *Beaufort Sea Coast/Cape Bathurst*: This is a highly productive area, including a large, recurring polynya and lead system. It is vital spring and summer foraging habitat for bowhead whales (>90% of the Western Arctic populations). In the spring and summer, the area is used by belugas for foraging and in the summer for calving. Most of the eastern Beaufort Sea stock congregates here (>40,000 individuals). The area provides prime ringed seal breeding habitat and important summer foraging areas. Bearded seals are also common throughout the area. The area includes two polar bear populations, numbering approximately 2,700 individuals. The polynya and lead systems are critical spring staging areas and migratory corridors for numerous marine birds, notably Waterfowl, significant numbers of western populations of King and Common eiders and Long-tailed ducks, as well as the entire local breeding population of Glaucous gulls and Red-throated loons. The area is also a major fall staging area for Brant and Northern and Red phalaropes and provides critical coastal habitat for moulting seaducks, geese and swans. It includes the only Thick-billed murre colony along the Arctic Ocean coast of North America.

6. *Polar Pack*: The multiyear pack ice provides habitat for distinctive fauna and flora. The extent of the multi-year ice is extremely variable inter-annually and is not a static geographic area but rather an ever-changing feature that provides critical habitat for many Arctic creatures. Future projections suggest that multi-year polar pack ice will continue to rapidly disappear and be replaced by younger and more seasonal ice. It is expected that the longest remaining portions will be along the northwestern Canadian Archipelago. This “ice refugium” is reflected in area 6. The remnant pack ice will likely be the only refugium for many ice-dependent animals such as ringed seals, polar bears, and other species.

7. *North Water Polynya/Lancaster Sound*: The area includes the large, recurring North Water polynya, one of the largest and most productive in the Northern Hemisphere, as well as the Coburg Island and Lancaster Sound polynyas and associated leads. This open water provides vital spring and summer feeding areas for several whale species and a wide variety of marine birds. There are year-round concentrations of walrus and significant numbers of polar bear (approximately 4,000 individuals in several populations), including important denning areas. The area provides critical wintering and migratory habitat for the Baffin Bay beluga population and summering areas for a portion of the North Baffin narwhal population (some 80,000 individuals). In spring, it may support most of the world’s Narwhal population. The area provides important wintering areas for bowheads and summering areas for harp seals as well, and encompasses critical breeding and feeding areas for the bulk of the world population of Little auk (>30,000,000 pairs), and large numbers of Black-legged kittiwakes (>200,000 individuals), Northern fulmars (>250,000 individuals) and Thick-billed murres (>1,500,000 individuals). Ice edges are critical spring staging habitat for fulmars, kittiwakes and alcids that are heading to breeding colonies, including many millions of Little auks. Several million non-breeding birds also spend all or part of the summers in these waters. The polynyas are important winter/spring feeding areas for Ivory gull (threatened) and Black guillemot, and harbor significant concentrations of spring staging and moulting Common and King eiders and Long-tailed ducks. Parts of this region provide important subsistence hunting grounds.

8. *Disko Bay/Store Hellefiskebanke*: The area is an important recruitment area for shrimp and sand eels, an important forage fish for seals and whales. It is a vital wintering area for King eider (more than 50% of the flyway populations), for Common eider and for Thick-billed murre, as well as other seabirds. It includes a very large colony of Arctic tern (over 20,000 pairs). The area serves as a key wintering area for red-listed species including bowhead and beluga whales and narwhal. There is a significant concentration of bearded seals on the ice at Store Hellefiskebanke and winter occurrence of walrus and seals, making the area an important hunting area. In addition, the shrimp and Greenland halibut fisheries in this area are quite important to the Greenland economy.[5]

C. Super EBSAs of the Northeast Atlantic Region: Greenland / Barents / Kara / Laptev Seas



[5] Recent unpublished information indicates that the entire area between Disko Bay, south to Cape Farewell and west to the mouth of Hudson Strait, appears to be a winter hotspot for seabirds.

9. *White Sea/Barents Sea Coast*: This region is characterized by highly productive coastal waters influenced by a coastal branch of warm current originating from the North-Atlantic current. The area supports diverse and productive benthic communities including kelp, provides important nursery habitat for several species of pelagic fishes, and supports Atlantic salmon as well as seabird colonies with diverse species composition. The area is important for breeding Common eiders, and provides staging, molting and wintering grounds for three eider species including Steller's eider, which is considered globally vulnerable by IUCN. The White Sea/Barents Sea coast also supports local populations of White Sea beluga whales and provides pupping and molting areas for the entire East Ice harp seal population.

10. *Pechora Sea/Kara Gate*: The Pechora Sea/Kara Gate area supports diverse and abundant benthic communities, a high diversity and abundance of white fishes, a large breeding stock of Atlantic salmon, as well as Arctic char, navaga, and local relict races of Pacific herring (Chesha-Pechora herring *Clupea pallassi suworovi),* and is an important spawning ground for polar cod (*Boreogadus saida*). The region contains important areas for wildfowl, both locally breeding (it supports the largest breeding population of Barnacle goose), and migrating from West and Central Siberia. It provides the principal molting and staging grounds for the Atlantic Flyway population of King eider, as well as important staging and migrating areas for Steller's eider, Long-tailed duck, Scoters, and Brant geese. The Pechora Sea region has important post-breeding feeding/staging areas for Thick-billed murres and Kittiwakes and supports the southern herd of Atlantic walrus. Numerous migration routes cross in the Pechora Sea and the straits adjoining Vaigach Island, which work as a southern gate from the Atlantic to the Siberian Arctic seas. It supports migrating beluga whales*,* Atlantic walrus, polar cod and some whitefishes, and is a bottleneck for water birds breeding in West and Central Siberia and wintering in the East Atlantic.

11. *Novaya Zemlya*: The western waters around Novaya Zemlya constitute a highly productive marine area that supports the largest seabird colonies in the Northeast Atlantic, including a large breeding population of Common eiders. It represents an area of high biodiversity for zooplankton, benthic species, fishes, seabirds, marine mammals. Rare and threatened species/habitats include staging and molting grounds for the endangered Steller's eider, and the northern stock of the East-Atlantic meta-population of Atlantic walrus.

12. *High Arctic Islands and Shelf:* This area includes a mix of large and small islands that together are the northern-most archipelago in the Russian and Norwegian Arctic. The region harbors abundant and diverse coastal benthic communities, and supports colonies of high Arctic seabirds (Dovekies, Thick-billed murres, Kittiwakes), ice-associated marine mammals and polar bears. Atlantic water masses along the continental shelf break in the northern part of the area are associated with summer ice edge habitat supporting abundant and diverse zooplankton and polar cod (*Boreogadus saida*). It is a key area for the endangered Spitsbergen stock of bowhead whale, the northern stock of the East-Atlantic meta-population of Atlantic walrus (*Odobaenus rosmarus rosmarus),* and most of the world's breeding population of the threatened Ivory gull

(the region provides post-breeding staging grounds for ivory gulls from all North-East Atlantic populations). The waters around Franz Josef Land support diverse seabird species, ice-associated marine mammals, productive benthic communities, walrus, and bowhead whales. Finally, the marine area around Northeast Svalbard is a highly productive area for fishes, seabirds, marine mammals, zooplankton, benthos, and is an important summer feeding area for blue, beluga and humpback whales as well as narwhal.

13. *Great Siberian Polynya*: Recurrent flaw polynyas stretching off land fast ice are a prominent feature over all of the Siberian shelf seas, and the Great Siberian polynya is one of the most stable and ecologically important within this system. It influences ice production in the Arctic Ocean and affects thermo-haline circulation in much of the Laptev and East-Siberian Seas. Annual development of the Great Siberian polynya influences spawning phenology and growth rates of Polar cod (*Boreogadus saida*), the key prey species of the High Arctic ecosystem. The Great Siberian polynya supports large seabird colonies, serves as a spring migration route for marine birds, and allows all-year-round maintenance of the local Laptev population of walrus, considered by some to be a separate Laptev race. The Great Siberian polynya is an area with a concentration of ice seals and polar bears as well as of highly diverse and productive benthos communities.

4. The High Seas of the Central Arctic Ocean

Participants discussed the unusual conditions present in the high seas of the Central Arctic Ocean. Participants noted that this region has the lowest primary productivity of any of the world's oceans. This is unlikely to change as summer sea ice melts, as marine waters in this area are very strongly stratified with low nutrient levels in the top layer. Some participants expressed the view that the high seas of the Central Arctic Ocean are a "biological desert", while others cited lack of sufficient research and information on what species occur there, particularly in the benthos. Some participants were of the view that despite the relative dearth of scientific information, the region nevertheless can be characterized as meeting several of the CBD criteria: 1) it is a globally unique feature due to its very low productivity and the presence of year round sea ice; 2) it may serve as an important refugium as summer sea ice retreats from coastal areas; and 3) its very low productivity may make the ecology of the region exceedingly vulnerable to extractive and polluting activities and very slow to recover from disturbance.

5. Next Steps

Participants generally agreed that this type of effort to bring existing mapping efforts together with the knowledge, expertise and experience of scientists and indigenous peoples with deep experience with Arctic marine ecosystems should continue. Options discussed at the meeting include the following.

5.1 Incorporating Traditional Knowledge

Indigenous communities around the Arctic possess enormous knowledge about important and vulnerable habitats. A systematic effort to gather and incorporate that knowledge would contribute significantly to this exercise and others. To the extent that the results feed into management decisions, such an effort would also help ensure that the views of indigenous peoples about these areas were included.

5.2 A "Wiki" Approach

Bringing scientists and experts to one location, as this workshop did, is expensive, time consuming and carbon-intensive, and resource and time limitations end up excluding many with substantial expertise from participating. Workshop participants discussed putting the maps and reference information up on the web in a transparent, interactive format that would permit other experts who were not able to attend the workshop to contribute their knowledge and information and to collaborate with others in identifying new EBSAs and refining those identified at the workshop. Participants noted that such an effort would have to be "supervised", to prevent inaccuracies or distortions from undermining the quality of the initiative, but agreed that such an approach would allow a far greater number of experts to participate in the process.

5.3 EBSA Locations in a Changing Arctic

Meeting participants noted that sea ice plays a central role in Arctic marine ecosystems, and that many EBSAs are tied to sea ice presence and dynamics. Therefore the location of some ice-related EBSAs is likely to change as the ocean continues to warm and sea ice continues to melt. It will be important to monitor these changes closely.

Participants also noted that although the location of some EBSAs will change, others will likely not. For example, winter sea ice will continue to form in all climate modeling projections. That means that while timing is likely to change, coastal polynyas and leads will likely continue to form in roughly the same places, although the ice types and their seasonality may shift. Similarly, high levels of abundance and diversity are not likely to move in areas where currents drive productivity, such as the Bering Strait, or where underwater topography favors high productivity or diversity (e.g., seamounts, canyons, hard bottom areas).

5.4 Relationship to Other Processes

It is hoped that the products of the workshop will be valuable to other ongoing or planned processes. These include follow-up efforts to implement Recommendations of the Arctic Council Arctic Marine Shipping Assessment, in particular Recommendations IIA, calling for a survey of Arctic indigenous marine use; IIC, with respect to identification of areas of heightened ecological and cultural significance and IID, regarding specially designated Arctic marine areas. The full text of these recommendations may be found in Annex 6. Further, the Circumpolar Biodiversity Monitoring Programme (CBMP) and the Arctic Biodiversity Assessment (ABA) under Conservation of Arctic Flora and Fauna (CAFF) will contribute important information even though they are not specific site identification projects.

The work has already served to inform another ongoing process to identify potential marine World Heritage sites in the Arctic. To this end, a special one day workshop, including many of the same participants, was held at the conclusion of this workshop.

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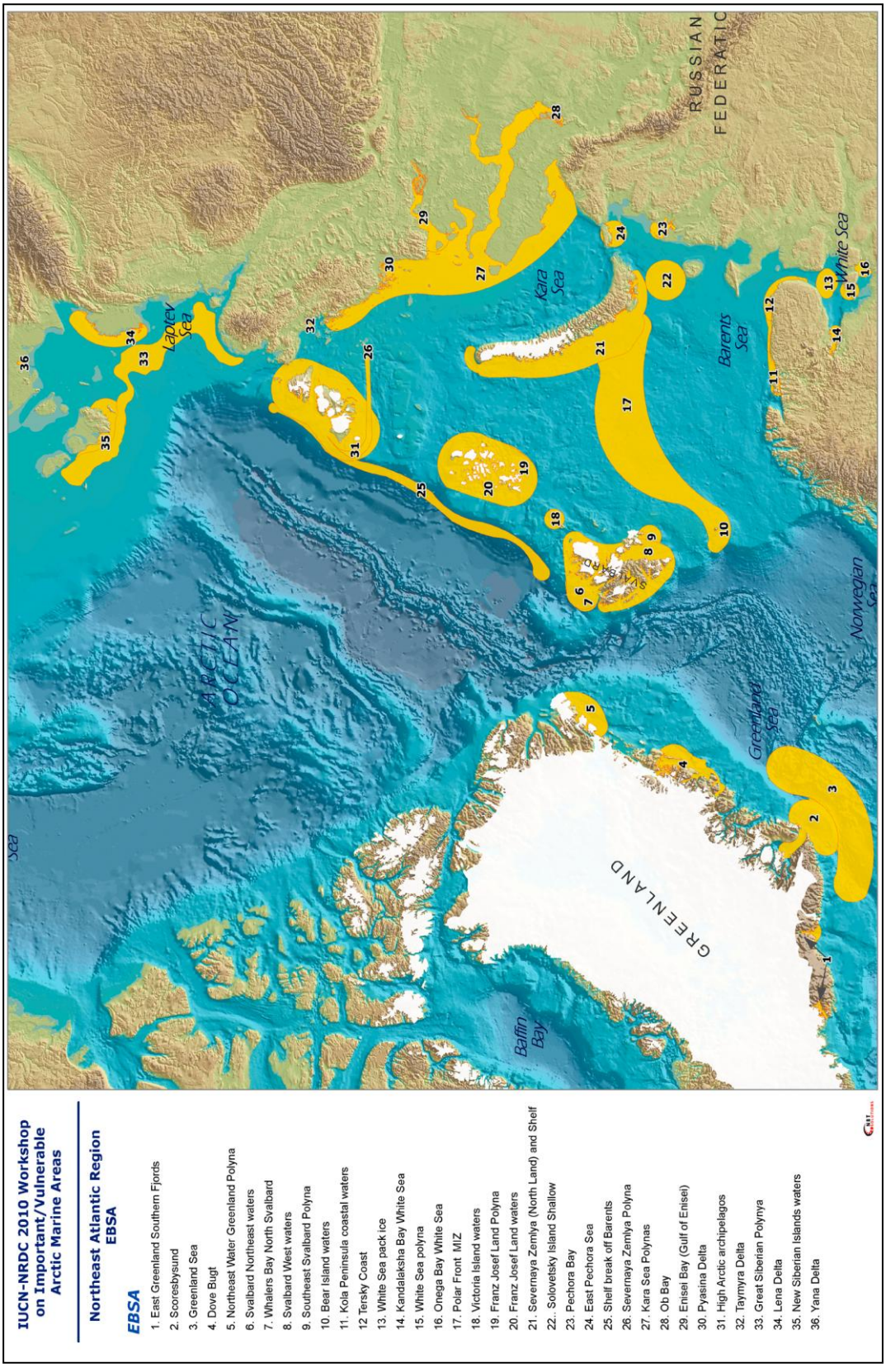
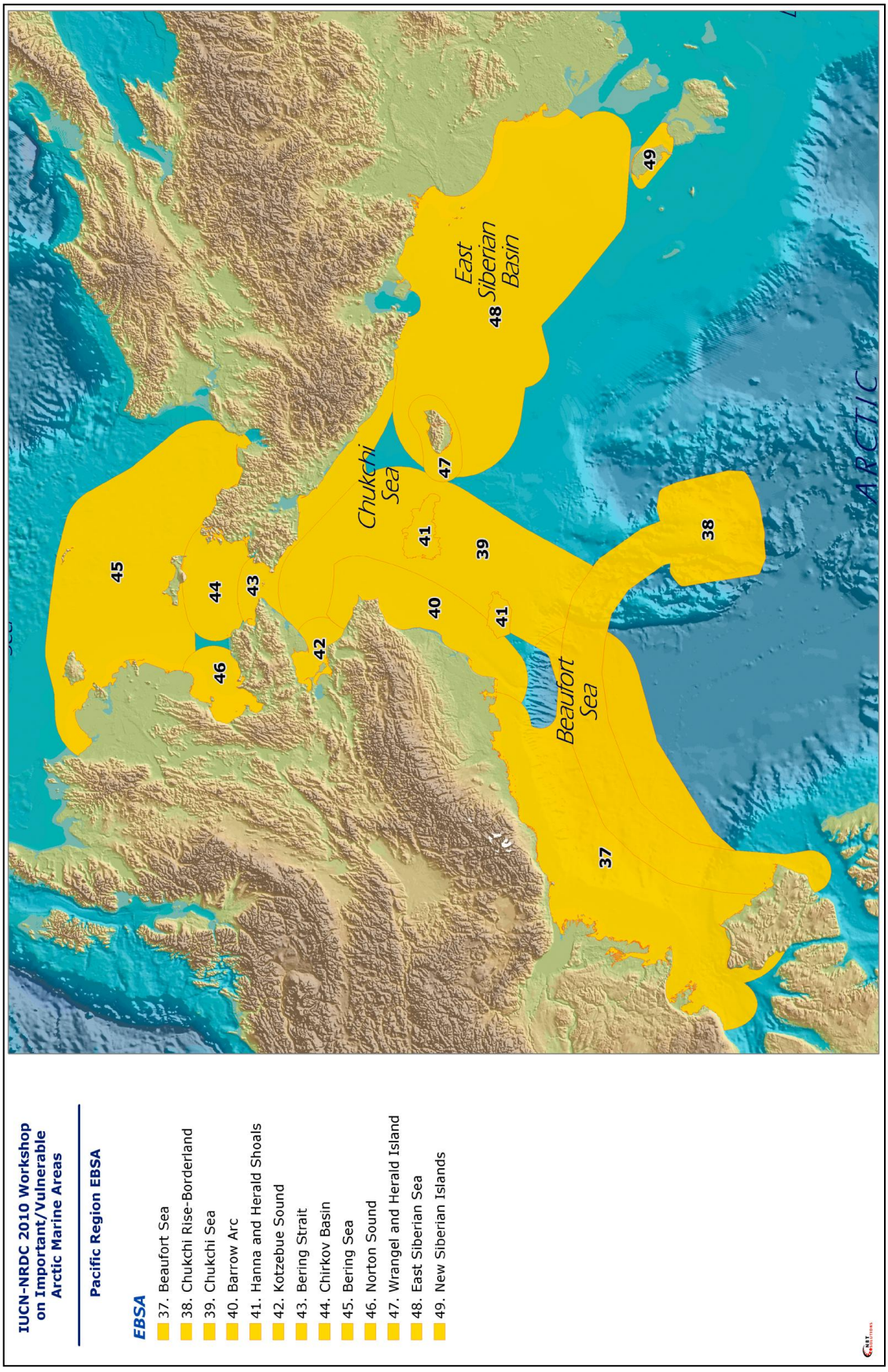
Annex 1: Regional Maps of EBSAs Identified by Workshop Participants Using the CBD EBSA Criteria

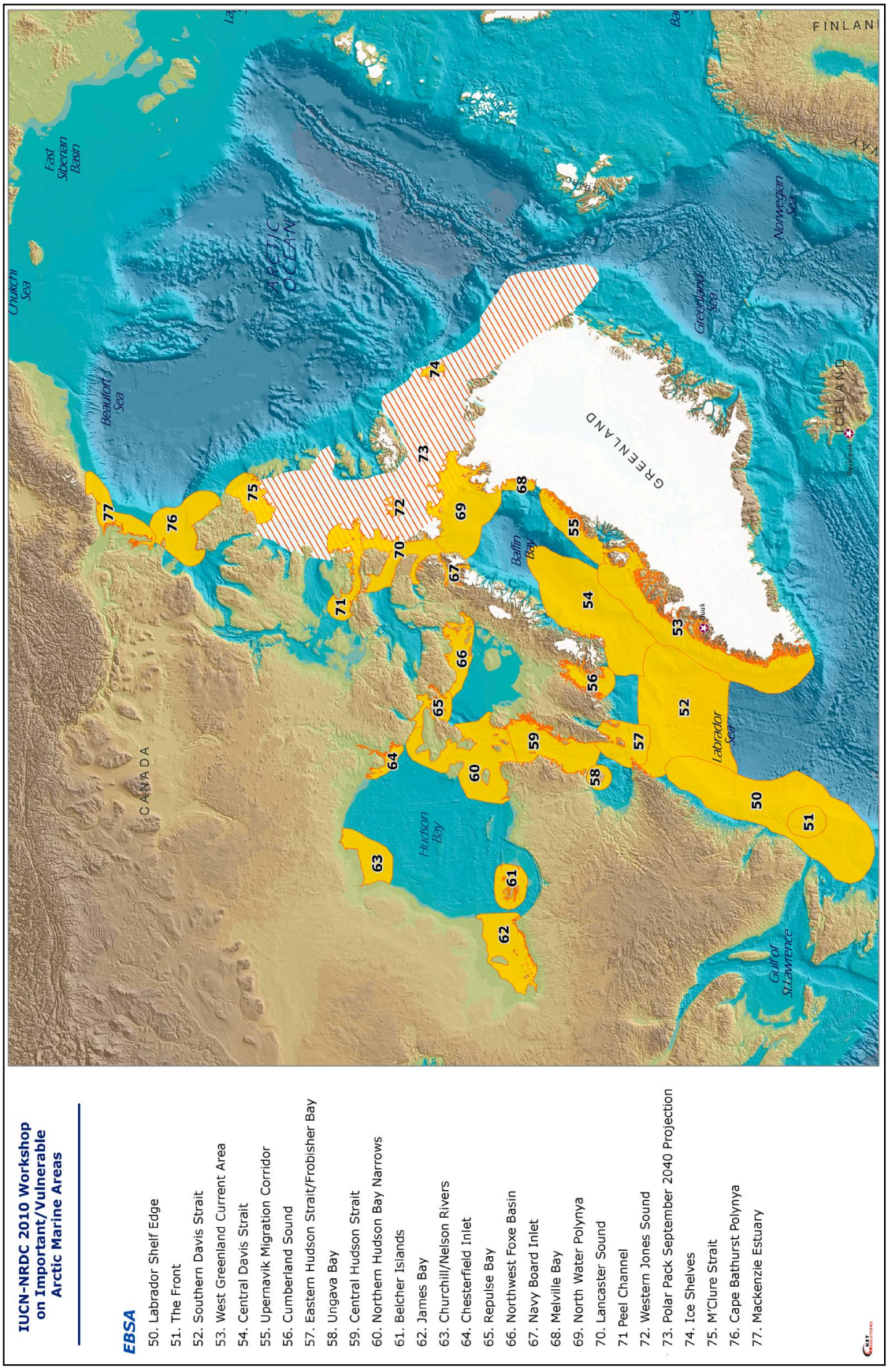
Annex 1.1: Northeast Atlantic Area



Annex 1.2: Pacific Area



Annex 1.3: Northwest Atlantic Area



Annex 2: CBD Criteria Met by Each of the 77 EBSAs

ID #	EBSA Name	Uniqueness	Life history	Endangered/ Threatened	Vulnerability	Productivity	Diversity	Naturalness
1	East Greenland Southern Fjords				x	x		
2	Scoresbysund	x	x	x	x	x	x	x
3	Greenland Sea		x		x	x	x	x
4	Dove Bugt	x	x	x	x			x
5	Northeast Water Greenland Polyna	x		x		x	x	x
6	Svalbard Northeast waters					x		
7	Whalers Bay North Svalbard				x	x		
8	Svalbard West waters					x	x	
9	Southeast Svalbard Polyna				x	x		
10	Bear Island waters					x	x	
11	Kola Peninsula coastal waters				x	x	x	
12	Tersky Coast				x	x	x	
13	White Sea pack ice				x		x	
14	Kandalaksha Bay White Sea				x	x	x	
15	White Sea polyna				x	x	x	
16	Onega Bay White Sea				x	x	x	
17	Polar Front MIZ					x	x	
18	Victoria Island waters				x	x	x	
19	Franz Josef Land Polyna				x	x	x	
20	Franz Josef Land waters				x	x		
21	Severnaya Zemlya (North Land) and Shelf				x	x	x	
22	Solovetsky Island Shallow				x	x	x	
23	Pechora Bay				x	x	x	
24	East Pechora Sea				x	x	x	
25	Shelf break off Barents					x	x	
26	Severnaya Zemlya Polyna				x	x	x	

ID #	EBSA Name	Uniqueness	Life history	Endangered/ Threatened	Vulnerability	Productivity	Diversity	Naturalness
27	Kara Sea Polynas				x	x	x	
28	Ob Bay				x	x	x	
29	Enisei Bay (Gulf of Enisei)				x	x	x	
30	Pyasina Delta				x	x	x	
31	High Arctic archipelagos				x		x	
32	Taymyra Delta				x	x	x	
33	Great Siberian Polynya				x	x	x	
34	Lena Delta				x	x	x	
35	New Siberian Islands waters				x	x	x	
36	Yana Delta				x	x	x	
37	Beaufort Sea	x	x	x	x	x		
38	Chukchi Rise-Borderland	x	x	x	x	x	x	x
39	Chukchi Sea	x	x	x	x	x		
40	Barrow Arc	x	x	x	x	x	x	x
41	Hanna and Herald Shoals	x	x	x	x			
42	Kotzebue Sound	x	x	x	x	x		
43	Bering Strait	x	x	x	x	x	x	x
44	Chirkov Basin							
45	Bering Sea	x	x	x	x	x	x	x
46	Norton Sound		x	x	x	x		
47	Wrangel and Herald Island	x	x	x	x	x		
48	East Siberian Sea		x					
49	New Siberian Islands	x	x			x		
50	Labrador Shelf Edge		x			x		x
51	The Front	x	x		x	x		x
52	Southern Davis Strait	x	x	x		x	x	x
53	West Greenland Current	x	x	x	x	x	x	x

ID #	**EBSA Name**	**Uniqueness**	**Life history**	**Endangered/ Threatened**	**Vulnerability**	**Productivity**	**Diversity**	**Naturalness**
54	Central Davis Strait	x	x	x		x		x
55	Upernavik Migration Corridor		x	x	x		x	x
56	Cumberland Sound	x	x	x	x		x	x
57	Eastern Hudson Strait/Frobisher Bay	x	x	x		x	x	x
58	Ungava Bay	x	x					x
59	Central Hudson Strait	x	x	x		x		x
60	Northern Hudson Bay Narrows		x			x		x
61	Belcher Islands	x	x	x			x	x
62	James Bay	x	x	x	x		x	
63	Churchill/Nelson Rivers	x	x		x		x	
64	Chesterfield Inlet		x	x			x	x
65	Repulse Bay	x	x	x		x		x
66	Northwest Foxe Basin	x	x	x	x		x	x
67	Navy Board Inlet	x	x	x				x
68	Melville Bay		x	x				
69	North Water Polynya	x	x	x	x	x	x	x
70	Lancaster Sound	x	x	x	x	x	x	x
71	Peel Channel		x					x
72	Western Jones Sound	x	x			x	x	x
73	Polar Pack September 2040 Projection	x	x	x	x		x	x
74	Ice Shelves	x		x	x	x	x	x
75	M'Clure Strait		x					x
76	Cape Bathurst Polynya	x	x		x		x	x
77	Mackenzie Estuary	x	x		x	x	x	

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Annex 5: EBSA Criteria Description and Comparison to Other International Criteria.[6]

CBD EBSA	IUCN MPA	IMO PSSA	UNESCO WHS
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	**Outstanding Universal Value** (superlative, exceptional, outstanding, most important and significant)
			Are outstanding examples representing **major stages of earth's history**, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features
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	Significant on-going **ecological and biological processes** in the evolution and development of terrestrial fresh water, coastal and marine ecosystems and communities of plans and animals
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	Contain the most important and significant **natural habitats** for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation

[6] See also, CBD Updates to EBSA Criteria, COP 10 Decision X/29; Marine and coastal biodiversity. http://www.cbd.int/decision/cop/?id=12295

CBD EBSA	IUCN MPA	IMO PSSA	UNESCO WHS
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	Contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance
	Integrity	Integrity	**Integrity**
		Dependency	
	Representative of a biogeographic "type" or types	Representativity - Bio-geographic importance, representative of a biogeographic "type" or types	

Annex 6: Workshop Agenda

Tuesday, November 2

9:00- 10:30 **Meeting welcome** (Thomas Laughlin, IUCN and Lisa Speer, NRDC)

a. Host welcome and logistics (Jeremy Jackson, Scripps)
b. Purpose of the workshop, expected outcomes (Lisa Speer)
c. Outline of international processes that workshop outcomes can inform (e.g. AMSA, Oil and Gas Assessment, World Heritage Sites; Thomas Laughlin)
d. Introductions of participants (All)
e. Overview of process (Thomas Laughlin)
f. Data (Caitlyn Toropova, Dan Agro, Hein Rune Skjodal)
g. Criteria (Caitlyn Toropova)

10:30-10:45 **Coffee Break**

10:45-12:30 **Methods** (Caitlyn Toropova, Dan Agro)

12:30-1:30 **Lunch** (catered at Scripps)

1:30-3:00 **Breakout groups by species** (Participants self-select to groups of their expertise)

a. Birds (Chair, Tony Gaston))
b. Fish/invertebrates/plankton (Chair, Jim Reist)
c. Marine Mammals (Chair, Sue Moore)

3:00-3:15 **Coffee Break**

3:15-5:30 **Species breakout groups continued**

6:00-8:00 **Hosted reception** for participants at Robert Paine Scripps Forum

8:00 **Dinner** on your own

Wednesday, November 3

9:00-9:30 **Recap** from Day 1 and plan for Day 2 (Lisa Speer and break-out Chairs)

9:30-10:45 **Breakout groups by geography**

a. Group A (Pacific: Northern Bering, Chukchi, Beaufort, and E. Siberian Seas; Chair-Dennis Thurston)

b. Group B (NW Atlantic: Labrador, Hudson Bay, Baffin Bay, Canadian Arctic; Chair-Francine Mercier)

c. Group C (NE Atlantic: Greenland Sea, Barents Sea, Kara Sea, Laptev Sea; Chair-Maria Gavrilo)

10:45-11:00 **Coffee Break**

11:00-12:30 **Breakout groups** by geography continued

12:30-1:30 **Lunch** (catered at Scripps)

1:30-3:00 **Breakout groups** by geography continued

3:00-3:15 **Coffee Break**

3:15-5:00 **Plenary:** Combining species maps (Thomas Laughlin)

Presentation of findings by Species' Breakout Chairs

6:00 **Dinner** on your own

Thursday, November 4

9:00-10:30 **Plenary:** Combining geography maps (Thomas Laughlin)

Presentation of findings by Geography Breakout Chairs

10:30-10:45 **Coffee Break**

10:45-12:00 **Continued plenary discussion**

12:00-1:00 **Lunch** (catered at Scripps)

1:00-3:00 **Continued plenary discussion**

3:00-3:15 **Coffee Break**

3:15-5:00 **Discussion and next steps** (Thomas Laughlin and Lisa Speer)

Annex 7: Relevant Recommendations of the Arctic Council's Arctic Marine Shipping Assessment

II A Survey of Indigenous Marine Use: That the Arctic states should consider conducting surveys on Arctic marine use by indigenous communities where gaps are identified to collect information for establishing up-to-date baseline data to assess the impacts from Arctic shipping activities.

II C Areas of Heightened Ecological and Cultural Significance: 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.

II D Specially Designated Arctic Marine Areas: That the Arctic states should, taking into account the special characteristics of the Arctic marine environment, explore the need for internationally designated areas for the purpose of environmental protection in regions of the Arctic Ocean. This could be done through the use of appropriate tools, such as "Special Areas" or Particularly Sensitive Sea Areas (PSSA) designation through the IMO and consistent with the existing international legal framework in the Arctic.

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