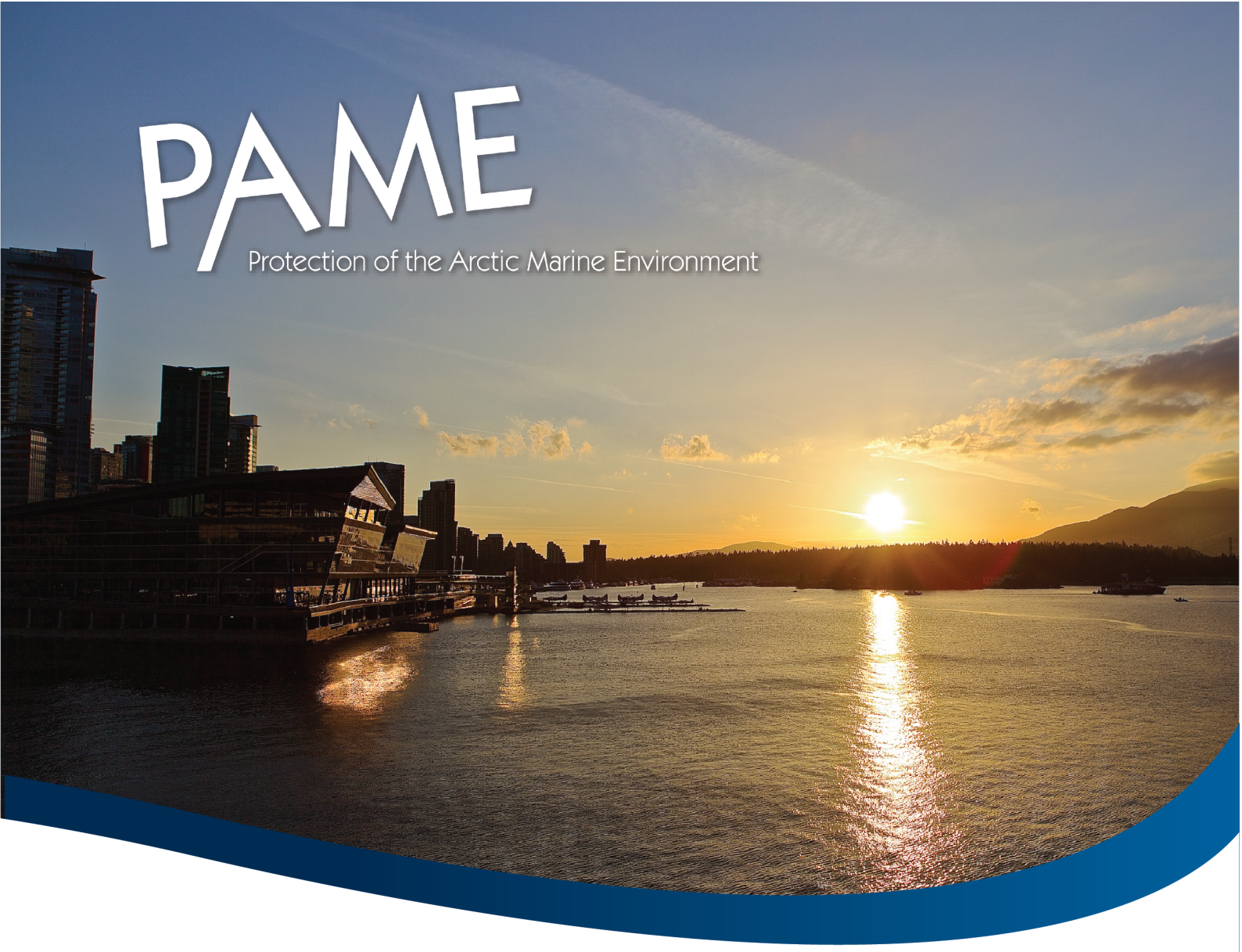
PAME

Protection of the Arctic Marine Environment



WORKSHOP REPORT

4th Ecosystem Approach to Management Workshop:
Integrated Ecosystem Assessment (IEA)
–
Understanding National Approaches and Reviewing Progress on IEA
in Arctic LMEs straddling national boundaries:
The Beaufort and Barents Seas

Vancouver, Canada
June 16-18
2014

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List of Acronyms

AACA	-	Adaptation Actions For A Changing Arctic
ABA	-	The Arctic Biodiversity Assessment
AC	-	Arctic Council
AMAP	-	Arctic Monitoring and Assessment Programme
AMSA	-	Arctic Marine Shipping Assessment
AMSP	-	Arctic Marine Strategic Plan
ANIMIDA	-	Arctic Nearshore Impact Monitoring in the Development Area
AOOS	-	Alaska Ocean Observing System
BASIS	-	Bering Arctic Subarctic Integrated Survey
BePOMAr	-	Best Practices for Ecosystem-Based Ocean Management in the Arctic
BOEM	-	Bureau of Ocean Energy Management
BSOP	-	Beaufort Sea Online Platform
BSP	-	Beaufort Sea Partnership
CAFF	-	Conservation of Arctic Flora and Fauna
CBMP	-	Circumpolar Biodiversity Monitoring Program
DBO	-	Distributed Biological Observatory
DFO	-	Fisheries and Oceans Canada
EA	-	Ecosystem Approach to Management
EA-EG	-	Ecosystem Approach Expert Group
EBFM	-	Ecosystem Based Fishery Management
EBM	-	Ecosystem Based Management
EBSA	-	Ecologically and Biologically Significant Areas
EEZs	-	Exclusive Economic Zone
ESP	-	Environmental Studies Program
FEAST	-	Forage and Euphausiid Abundance in Space and Time
GIS	-	Geographic Information Systems
IASC	-	International Arctic Science Committee
ICES	-	International Council for Exploration of the Sea
IEA	-	Integrated Ecosystem Assessment
IGC	-	Inuvialuit Game Council
IOM	-	Integrated Ocean Management
IUU	-	Illegal, Unreported, and Unregulated
LME	-	Large Marine Ecosystem
LOMA	-	Beaufort Sea Large Ocean Management Area
LOSI	-	Loss of Sea Ice
MSP	-	Marine Spatial Planning
NGOs	-	Non Governmental Organizations
NOAA	-	National Oceanic and Atmospheric Administration
OCS	-	Outer Continental Shelf
PAG	-	Pacific Arctic Group
PAME	-	Protection of Arctic Marine Environment
RCC	-	Regional Coordination Committee
SDWG	-	Sustainable Development Working Group
ToR	-	Terms of Reference
USFWS	-	U.S. Fish and Wildlife Service
USGS	-	U.S. Geological Survey
WWF	-	World Wide Fund for Nature

Summary and Conclusions

1. The Arctic Council (AC) and its working groups, Arctic Monitoring and Assessment Programme (AMAP), Conservation of Arctic Flora and Fauna (CAFF), Protection of Arctic Marine Environment (PAME), Sustainable Development Working Group (SDWG) have laid an extensive foundation for the understanding and implementation of the Ecosystem Approach to management (EA)/Ecosystem-based Management (EBM)[1] in the Arctic marine environment.

2. It has become apparent that all AC working groups produce products that support the implementation of the EA, where many of the products are found to be complementary and substantial synergies have been identified.

3. It is recognized that a wide range of environmental assessment activities related to Integrated Ecosystem Assessment (IEA) are conducted for a wide range of purposes among the members of the Arctic Council. There is a need to better understand how much integration is required for these activities to be considered an IEA. A further issue is how such assessments can collectively contribute to an IEA.

4. Progress on the EA and IEA in the Barents Sea Large Marine Ecosystem LME has been considerable on national and international levels. The progress within the Beaufort Sea Large Marine Ecosystem (LME) is at an earlier stage of implementation.

5. The Beaufort Sea LME provides an important and timely opportunity to build international cooperation and understanding on the EA and IEA.

6. The Beaufort Sea LME is recommended for development of the sort of transboundary EA/IEA pilot project suggested by the Kiruna declaration.

7. A pilot project would initiate a dialog and ultimately develop an Ecosystem Status Report for the Beaufort LME, working in concert with the AMAP Adaptation Actions For A Changing Arctic project, Part C (AACA-C).

8. A Barents – Beaufort LME comparative effort should be investigated based on oceanographic and climatic connections between these LMEs.

9. Continued cooperation in the form of data and metadata sharing between the Alaska Ocean Observing System (AOOS) and Fisheries and Oceans Canada (DFO) is strongly encouraged.

10. Establishing an online bibliographic resource to hold a prioritized set of key references on the science and policy of the Beaufort and Barents LMEs is recommended.

[1] Ecosystem-based management (EBM) and ecosystem approach to management (EA) are synonymous within the Arctic Council.

Overview of Sessions and Workshop Summary

The workshop was attended by 21 participants (Annex I) from 5 countries (Canada, Iceland, Japan, Norway and USA). The workshop's objectives (Annex II) and agenda (Annex III) were developed by the planning group from a set of assignments and opportunities provided by the Arctic Council and PAME (Annex IV). The planning group consisted of the two co-leads (Phil Mundy and Hein Rune Skjoldal) in addition to Joclyn Paulic (DFO), Catherine Coon (BOEM), Jon Fuglestad (AMAP), Kari Larusson (CAFF), Soffia Gudmundsdottir (PAME), Dan Slavik (WWF) and Molly McCammon and Will Koeppen (AOOS). Management of the communications and other information technology at the workshop, coordination of production of the workshop's report, and editorial services were provided by Bjarni Eiriksson (PAME).

The workshop was organized into following sessions:

- Session 1: Introduction – History, approaches, current projects on EA and IEA within the Arctic Council
- Session 2: National overviews from the Beaufort, Approaches to IEA in the Beaufort Sea
- Session 3: National overviews from the Barents, Approaches to IEA in the Barents
- Session 4: Discussions of Lessons Learned
- Session 5: Discussions and Specifications of Products and Next Steps
- Session 6: Drafting Session of Workshop Summary and Conclusions

All presentations can be downloaded from Annex 5 by clicking on their titles. Other linked references in this document can also be downloaded directly. To review and/or download any of the workshop's background materials please contact the PAME Secretariat at pame@pame.is .

Session 1: Introduction – History, approaches, current projects on EA and IEA within the Arctic Council

The workshop opened with a history that outlined the development of the EA within PAME and the Arctic Council (Hein Rune Skjoldal). This was followed by a short brief on one of the current IEA projects within the Arctic Monitoring and Assessment Programme (AMAP), that will lay the scientific foundation for making adaptation decisions in a rapidly changing Arctic called Adaptation Actions for a Changing Arctic – Part C (AACA-C; Jon Fuglestad). A briefing on a project that is currently working to enable participation by Arctic communities in the process of implementing the EA was provided on behalf of the Sustainable Development Working Group (SDWG; Stephen Roddick). Three projects being conducted under the auspices of the Committee on Arctic Flora and Fauna (CAFF) that contribute to the implementation of EA, Arctic Biodiversity Assessment, Circumpolar Biodiversity Monitoring Program (CBMP) and the Arctic Biodiversity Data Service (ABDS) were also presented (Kari Fannar Larusson). Abstracts of these talks are given below (Summaries of Presentations).

Hein Rune Skjoldal, Institute of Marine Research, Norway - PAME-led EA expert group – background, concepts and work plan

The Arctic Council (AC) agreed in 2004 on an Arctic Marine Strategic Plan that included the ecosystem approach to management (EA) as a key principle. One of the strategic actions was to identify the Large Marine Ecosystems (LMEs) of the Arctic as geographical entities for applying the EA. A working map of 17 Arctic LMEs was adopted by the AC in 2006. PAME established in 2007 an expert group (EG) on the EA lead by the USA and subsequently from 2010 co-lead by Norway. One of the work items for the EA-EG was to revise the map of Arctic LMEs which was completed and approved by the AC in 2013. Another item of the work plan has been to produce a concept paper on the EA, reviewing the history and principles involved. Six main elements of a framework for implementing the EA have been identified:

1) identify the ecosystem (LMEs),
2) describe the ecosystem,
3) set ecological objectives,
4) assess the ecosystem (IEA),
5) value the ecosystem, and
6) manage human activities in an adaptive manner.

The EA-EG has arranged 3 previous EA workshops:

- 1st in Tromsø, January 2011 on LME boundaries,
- 2nd in Stockholm, March 2012 on EA concept, scale issues and role of IEA, and
- 3rd in Reykjavik, June 2013 on various data issues in relation to IEA.

Other items on the work plan for the EA-EG are the issue of setting ecological objectives, aspects of marine spatial planning and management, and the use of information on

identified areas of heightened ecological significance (AMSA IIC) in the context of EA and LMEs.

Jon Fuglestad - AMAP Adaptation Actions for a Changing Arctic (AACA-C)

The AACA-C project is an Arctic Council project led by AMAP. The project will lay the scientific foundation for making adaptation decisions in a rapidly changing Arctic. AACA is performed in three pilot areas, Barents, Baffin Bay/Davis Strait and Bering/Beaufort/Chukchi. All three regions consist of both marine and terrestrial areas. The marine boundaries are the Large Marine Ecosystems in the area. AACA will work within two time frames; 2030 and 2080. Projections of climate change are the backbone of the projects; looking into how the extent of sea-ice, permafrost and ice sheets will change in the future. For example, climate change will lead to increased water temperatures and changes in the marine environment. These changes may lead to increased pressures from drivers like mineral extraction, oil and gas development, shipping and tourism. But also new opportunities for local communities can arise from these changes. A regional integrated report will be produced in each of the three pilot regions looking into how these drivers and pressures act together.

Stephen Roddick - SDWG *Arctic Adaptation Exchange* project

SDWG Project P#132, "Arctic Adaptation Exchange: Facilitating Adaptation to Climate Change" will develop an online adaptation information portal that aims to improve dialogue and knowledge exchange on climate change impacts and adaptation in the Arctic. The portal, which will be launched at the Arctic Council Ministerial meeting in the spring of 2015, has an important role to play in opening new channels for information sharing within northern communities impacted by climate change and amongst individuals and organizations seeking to understand and adapt to these changes. This initiative is co-lead by Canada, the United States, the Aleut International Association, and Gwich'in Council International.

Kari Fannar Larusson - CAFF Arctic Biodiversity Assessment, Circumpolar Biodiversity Monitoring Programme and the Arctic Biodiversity Data Service (ABDS).

The Arctic Biodiversity Assessment (ABA) was presented to the ministers of the Arctic Council in 2013 and represents the first overall assessment of Arctic biodiversity. The ABA consists of a number of reports which include;

- Arctic Biodiversity Trends 2010; Indicators of change
- Scientific assessment of Arctic biodiversity
- Synthesis
- Summary for Policy Makers

Work is currently on-going in cooperation with a variety of stakeholders in the Arctic to formulate an implementation plan based on the recommendations coming from the report. The implementation plan is scheduled to be released in time for the Arctic Biodiversity Congress which will take place in Trondheim, Norway December 2-4 2014. The implementation plan will be further informed and possible on the ground implementation activities identified.

The information on the Arctic marine environment, presented in the ABA, is anticipated to contribute to ongoing work on the EA within PAME.

The Circumpolar Biodiversity Monitoring Programme (CBMP) is an international network of scientists, government agencies, Indigenous organizations and conservation groups working together to harmonize and integrate efforts to monitor the Arctic's living resources. The goal of the CBMP is to facilitate more rapid detection, communication, and response with respect to the significant biodiversity-related trends and pressures affecting the circumpolar world.

The CBMP consists of four expert monitoring groups Marine, Coastal, Freshwater and Terrestrial, of which the Marine group will be the most relevant to the work of PAME. The Marine Expert Monitoring Group is governed by the Marine Steering Group and includes six marine expert networks focusing on Sea-Ice Biota, Plankton, Benthos, Fish, Seabirds and Marine Mammals.

The Marine group is currently working on the publication and data gathering of the State of the Arctic Marine Biodiversity Report scheduled for release in 2016. This process is anticipated to have great potential with regard to feeding biodiversity data into the work of the Ecosystem Approach Expert Group (EA-EG).

Arctic Biodiversity Data Service (ABDS) is an online, interoperable and circumpolar data management system that will access, integrate, analyse and display biodiversity information for a variety of stakeholders. The ABDS is constantly being developed and building on its data and metadata holdings and will be a valuable source for data to feed into the EA-EG.

Alf Håkon Hoel - Russian-Norwegian cooperation in fisheries and environmental management - *Arctic Council products relevant to EA/EBM:*

The Arctic Council has over the years produced a substantial number of documents relating to EA/EBM. An important document is the 2004 Arctic Marine Strategic Plan (AMSP), which promotes EBM. The AMSP is now under revision, with a view to adoption at the 2015 ministerial. An early attempt at devising guidelines for how governments could implement EBM is the Best Practices for Ecosystem-based Oceans Management in the Arctic (BePOMAr), which built on a review of management arrangements in seven of the Arctic Council countries and a set of Observed Best Practices that were adopted by the 2009 ministerial. Following up on that, the Arctic Council at its ministerial in 2013 adopted the outcomes of two, parallel efforts to develop guidelines for EBM/EA and oceans management: The final report from the Arctic Ocean Review Project under PAME (2009-

2013) contains specific recommendations for EBM/EA as well as related recommendations pertaining to science, among other things. The report of the EBM Expert Group that was appointed by the 2011 Ministerial contains Guidelines for EBM as well as a definition and background material.

Session 2: National overviews from the Beaufort, Approaches to IEA in the Beaufort Sea

Dan Slavik - World Wildlife Fund, Arctic Program: Canada Overview and Socio-ecological Context of EBM in the Beaufort Sea.

A broad overview was provided of the socio-ecological context in the Beaufort Sea in relation to Ecosystem-based Management (EBM), illustrating the shared species and ecological features of the ecoregion, the shared risks facing the waters and communities, and the shared culture and values of the people across the Beaufort Sea. There is a close relationship and long history of collaborative management and stewardship of species across the Beaufort Sea between the Inupiat and Inuvialuit. The "Polar Bear Management Agreement for the Southern Beaufort Sea" and the "Alaska and Inuvialuit Beluga Whale Committee" were identified as two existing examples of transboundary collaboration to manage species across the ecosystem. A short summary of the Inuvialuit Final Agreement / Western Arctic Land Claim was also provided to explain the co-management structure within the Canadian Beaufort.

Joclyn Paulic - Implementation of Ecosystem-based Management (EBM) in Canada's Marine waters – The Beaufort Sea: Fisheries & Oceans Canada, Central & Arctic Region

The Government of Canada, through the *Oceans Act* (1997), is committed to the principles of sustainable development, precautionary approach and integrated management. Within Canada Integrated Ocean Management (IOM) is implemented through an EA/EBM approach. The Beaufort Sea Large Ocean Management Area (LOMA) is one of 5 pilot projects identified to implement EBM in Canada. This process was initiated in 2006 and involves more than 53 partner organizations (herein referred to as the Beaufort Sea Partnership - BSP) (October 28-30 in Inuvik, NWT). Work within the LOMA is currently moving from planning to implementation using an integrated/holistic approach to resource management under the common vision for a "healthy and productive ecosystem that supports sustainable communities and economies for the benefit of current and future generations" (Beaufort Sea Partnership).

Fisheries and Oceans Canada (DFO) no longer refers to the LOMAs within management, since the transition to bioregional eco-regions in 2009 (DFO 2009), the boundaries of the LOMA are still used within the BSP and other IOM projects within the western Canadian Arctic.

In order to achieve the goals of the BSP, objectives were formulated by four working groups: governance, social, economic and cultural, ecosystem, and traditional knowledge. Under IOM the partnership and working groups are given direction from the Regional Coordination Committee (RCC) and supported by the Secretariat (Figure 1).

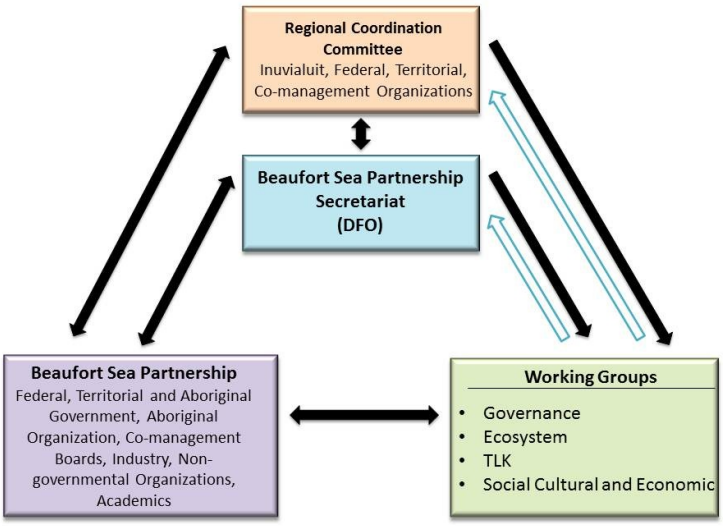

Figure 1 - Beaufort Sea Integrated Oceans Management Governance Structure.

A general overview of what each of the working groups are currently working on was provided. This includes the development of a web-based platform for central storage and enhanced visualization of geospatial information to improve decision making and support IOM planning. Details with respect to the geospatial platform are provided in Jennifer Parrott's presentation summary below. Two databases were identified and context was provided for their objectives under the social, cultural and economic and traditional knowledge working groups. Partners from the ecosystem working group participated and provided information and knowledge to the evaluation of ecologically and biologically significant areas (EBSA) and are now researching and exploring the potential for future risk assessments to support decision making.

DFO has also been working on the development of pathways of effects (e.g., shipping), monitoring and management of marine protected areas, and field sampling in collaboration with Alaskan research scientists (e.g., BOEM). All of which support the advancement of an EBM approach to ecosystem management.

Reference: DFO. 2009. Development of a Framework and Principles for the Biogeographic Classification of Canadian Marine Areas. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2009/056.

Jennifer Parrott - Beaufort Sea Online Platform: Fisheries and Oceans Canada (Webex)

The Beaufort Sea Partnership (BSP) is the primary forum for stakeholder engagement and integrated ocean management of the Beaufort Sea region. The BSP consists of over 53 organizations and provides a forum for all groups who have an interest in the Beaufort Sea Large Ocean Management Area (LOMA) to share information about their activities/interests. Given the volume of participants and breadth of data, a web-based platform for central storage and enhanced visualization of spatial and non-spatial information has been developed.

Pioneering oceans management in Canada, the Beaufort Sea Online Platform (BSOP) provides its members with a cloud-based environment for communication and collaboration. Aiming to improve information sharing between partners, the BSOP includes over 100 spatial layers and dynamically connects to several external platforms. Capable of hosting spatial analysis, application development, mapping, field data collection and feature editing, the BSOP is being used by Government of Canada departments, non-government organizations and aboriginal groups. Additionally, a data sharing partnership with National Oceanic and Atmospheric Administration (NOAA)-Alaska Ocean Observing System (AOOS) has broken down international oceans management barriers within the Beaufort Sea by providing 100's of spatial files to the BSOP. Currently, this data is used for many applications including ecosystem management of marine species in the entire Beaufort Sea region (i.e., migration patterns, critical habitat, species distribution).

U.S. Overview - Phil Mundy and Catherine Coon

There is a long history of geophysical exploration in the US Arctic in connection with oil and gas exploration. Although continuous time series of subsurface observations of ocean physics, geology and biology are lacking, a large amount of information in all these areas has accumulated since the 1950s. In all US marine waters, only the Gulf of Mexico has more kilometers of seismic surveys. Research in the US section of the Beaufort LME is supported and conducted by a variety of US national and international entities, US Federal (BOEM , USFWS, USGS (DOI), NOAA and others), Private (Shell Oil, Conoco Phillips, BP and others), International (Pacific Arctic Group; Japan, China, Korea, Russia, Canada and USA), Non-governmental Organizations, NGOs (World Wildlife Fund, Audubon, Oceana, Alaska Ocean Observing System; Inuit Circumpolar Conference, Aleut International Association), and by Arctic Council Working Groups & Programmes (CAFF, AMAP, PAME, SDWG). Other than international efforts of Japan, China and Korea, most of the non-military federal research in the US Beaufort is supported directly or indirectly by the Department of Commerce (NOAA) and the Department of Interior (BOEM). BOEM provides the conceptual design for applied research, operating dollars and logistic support to a number of key NOAA projects in the Beaufort. Relative to the objectives of this workshop (Annex II) Aspects of US Arctic Policy emphasized in implementing the EA are Foundational Science (e.g., Distributed Biological Observatory (DBO), Resource Stewardship (e.g., Assessment of fish stocks, marine mammals and ecosystems, ship-based surveys, Bering Arctic Subarctic Integrated Survey (BASIS), Loss of Sea Ice (LOSI), and Interagency Cooperation (e.g., NOAA's Integrated Ecosystem Assessment (IEA) and Department of Interior's Integrated Arctic Management (IAM)). Further examples of work in each of these areas are available in the power point presentation in Annex V.

The Bureau of Ocean Energy Management (BOEM) develops, conducts and oversees applied science to specifically inform decisions regarding development of Outer Continental Shelf (OCS) and mineral resources in US waters as part of the US Department of the Interior. BOEM's Environmental Studies Program (ESP) has invested about $450 million studying the OCS environment of offshore Alaska, and developed more than 500 reports since 1973. The studies have led to mitigation measures to protect OCS areas and resources, increased

knowledge of the marine, coastal, and human environments; and provided long-term monitoring of the effects of OCS oil and gas activity.

The BOEM has historic information from along the US Beaufort Sea and is conducting several relevant research efforts that will lead to a better understanding of the dynamics of the Beaufort ecosystem including the human dimension. Two recent Beaufort studies are particularly relevant for the selection of boundaries for a DBO long term monitoring. The first is the Transboundary Beaufort Sea Marine Fish and Lower Trophic Survey conducted in collaboration with the University of Alaska Fairbanks as well as Fisheries and Oceans Canada. The Second is the Arctic Nearshore Impact Monitoring in the Development Area (ANIMIDA III), an interdisciplinary research project that includes benthic ecology, chemistry and physical oceanography. This work is a continuation of work undertaken since 1985.

Overall the US has developed Arctic Policy that would focus on an Integrated Arctic Management approach for stewardship and development decisions in the US Arctic. Integrated Arctic Management, IAM, is defined as: a science-based, whole-of-government approach to stewardship and planning in the U.S. Arctic that integrates and balances environmental, economic, and cultural needs and objectives. It is an adaptive, stakeholder-informed means for looking holistically at impacts and sensitivities across the U.S. Arctic and generating sustainable solutions. The practical steps of implementing IAM parallel many of the same steps of IEA, where both serve to support EA/EBM with specific objectives in mind. IAM is the umbrella policy and EBM is one of many management tools available in the IAM toolbox. EBM is a protocol that, like IAM, strives to balance economic, cultural, and ecological needs. As is the case with NOAA's IEA, IAM, encompasses EBM in a framework of building partnerships, engaging stakeholders, and improving federal processes in the region. Integrated Arctic Management is analogous to, and compatible with, NOAAs concept of Integrated Ecosystem Assessment, IEA. Both IAM and IEA are processes that provide products to managers to enable decision-making for specific objectives within the context of ecosystem based management.

Kerim Aydin - US Approaches to IEA in Eastern Bering Sea & Northern Bering - Chukchi LMEs including coupled biophysical modeling, FEAST.

As developed within NOAA, Integrated Ecosystem Assessment, IEA, is an iterative science-based process that provides products to resource managers who are operating under the principles of ecosystem based management, EBM, and as an application to exploited fish stocks, Ecosystem Based Fishery Management, EBFM. NOAA Fisheries, Alaska Fisheries Science Center, is implementing EBFM in four Arctic Large Marine Ecosystems, LMEs, as an active part of the NOAA Integrated Ecosystem Assessment Program. The fisheries in the Bering Sea were perhaps the first in the United States to be managed under an ecosystem-level annual harvest cap implemented about three decades ago. Under the ecosystem-level cap, the North Pacific Fishery Management Council, NPFMC, limits annual harvests of all fish species to no more than two million metric tons. NPFMC is also guided in its management decisions by an Alaska Marine Ecosystems Considerations Report, which is an annual snapshot of ecosystem indicators and their time trends. In addition, estimates of the risks

posed to twenty-two types of fish habitats, such as rocky coastal habitats, by twenty risk factors, such as ecotourism. The synthesized ecosystem level information is synthesized into a written report which is factored into the decisions on total allowable catch, TAC, made by the NPFMC each year. Observations from physics, through primary and secondary production are also used to estimate the impacts of climate change on fish species in a vertically integrated coupled biophysical model driven by IPCC climate projections. The upper trophic level component of the biophysical model is known as Forage and Euphausiid Abundance in Space and Time (FEAST). FEAST exchanges information on distribution and abundance of upper trophic level organisms with the lower trophic level model and the economic and spatial fishery predictions model in this vertically integrated series of models. At the base of the models are the IPCC climate scenarios, which drive the physical oceanographic model which in turn drives the lower trophic level model that interacts with FEAST. Work is continuing to extend FEAST beyond the eastern Bering Sea LME to make predictions about the impact of climate change on other species and other locations.

Will Koeppen - Alaska Ocean Observing System (AOOS) Cooperation, Beaufort Data Sources

The Alaska Ocean Observing System's (AOOS) Arctic Data Integration portal hosts data and metadata from a variety of sources describing the biological and physical characteristics of the Arctic region. The portal currently contains a number of Beaufort-wide data sets that can be spatially and temporally explored and compared including satellite measurements (sea ice, salinity and wind speed), sea ice mapping from the National Weather Service and Shell, operational oceanographic and atmospheric models (ROMS, NDFD, ARSC) and numerous GIS data sets from the Arctic Marine Synthesis, Essential Fish Habitat, Arctic and Alaska shipping lanes, and ShoreZone characterizations. AOOS data is made available to Canada's DFO using Open Web Services, which allow for a relatively seamless sharing of spatial data layers across the web.

Session 3: National overviews from the Barents Sea, Approaches to IEA in the Barents Sea

Alf Håkon Hoel - Russian-Norwegian cooperation in fisheries and environmental management *Norway - Russia cooperation in the Barents Sea:*

Due to the benign influence of the Atlantic current, the Northeast Atlantic, including the Barents Sea, has a more temperate climate than other regions in the Arctic at the same latitude. For that reason, it is also the most populous region of the Arctic with cities like Murmansk (Russia) and Tromsø (Norway) and well developed economies and institutions. Economic activities are commercial, and fisheries are a very important component of the regional economy. The fisheries in the Barents Sea bring some 3 billion USD in landed value. The cooperation between Norway and Russia on the management of the Barents Sea has a long history, in marine science more than 50 years. Cooperation between the governments was initiated in the mid-1970s with the establishment of a Joint Norway - Russia Fisheries Commission, a cooperation that over time has developed into a robust management regime. In recent years, most major fish stocks in the region have been at healthy, sustainable levels, and the cod stock has reached record levels providing for a total allowable catch of 1 million tons in 2014. The establishment of Harvest Control Rules and elimination of Illegal, Unreported and Unregulated (IUU) fishing have been important in bringing this achievement about. The bilateral cooperation on environment was established in 1988. This is a project-based cooperation, with the marine environment as one of its areas of work. A milestone in the bilateral cooperation was the establishment of a boundary in the Barents Sea, dividing a disputed area of 175,000 km^2 in two halves. The 2010 boundary agreement also contains provisions relating to fisheries management and the approach to possible petroleum deposits straddling the boundary line.

Erik Olsen on behalf of Cecilie von Quillfeldt - Norwegian integrated management plans

Norway initiated an integrated management plan process in 2002 as an answer to both international drivers pushing for ecosystem-based management and to national petroleum-industry drivers seeking access to new areas. The Lofoten - Barents sea area was the first regional ecosystem for which a plan was developed (implemented in 2006, revised in 2011), and this initial plan served as the blueprint for the subsequent two plans for the Norwegian Sea (implemented in 2009, revised in 2014) and North Sea (implemented in 2013). Governance of the process was top-down, with an inter-ministerial steering group headed by the Ministry of Environment leading the process. Government institutions and directorates did the actual development work, starting with baselining the ecosystem and the associated human uses. The initial baselines were followed by environmental impact assessments of current and future uses and potential accidents (e.g., oil-spills). Common goals for environmental status and the human footprint were developed and coordinated with spatial management measures for shipping (routing regiemes) and petroleum activities (designating what areas the industry can operate in and which not to operate in). A key

factor in deciiding upon these management regimes were the identification of particularly valuable and vulnerable areas based on the areas biology and ecology.

The Norwegian plans are built around existing legislation, rather than developing new law and/or government institutions. Sectoral ministries and directorates still exercise power, but they are now tasked to cooperate on tracking the achievement of the plans, goals, risk status, as well as the status of the ecossytem, which is monitored yearly and reported on using an indicator-based system. Cooperation occurs in several round-table groups set up by government mandate that issue yearly reports to the central government and is tasked with revising and updating the plans.

Tight time-contraints have been mandatory through the development processes, so there has been no time to develop new knowledge to cover identified gaps. Rather, knowledge-gaps have been identified, reported, assessed and prioritized to serve as priority issues for the research council and other funding agency strategies. Examples of large-scale research and mapping projects that have resulted from the management plan process are MAREANO - a seabed mapping project (bathymetry, biology, chemistry and geology project) and SEAPOP- a seabird mapping and biology project.

Stanislav Fomin, WWF Global Arctic Programme - Russian Integrated Ocean Management. Marine Spatial Planning in the Barents LME

Currently in Russia, the management of marine resources are divided between functional bodies; there is no one Federal Ministry or Agency that has maritime activities as their single or at least, main goal. In addition, the use of terms such as, “marine spatial planning” and “ecosystem-based management” are not found in current Russian legislation. In order to forward the work on implementation of EBM in Russia, WWF has identified four aspects: political will, legislation, management technique and system, and ecosystem knowledge. On each of these four directions of work, WWF has achieved notable results.

The issue of EBM and the necessity of integrated ocean management were raised at the meeting regarding the efficient and safe development of the Arctic with President Putin (St-Petersburg, Russia, June 5, 2014).

The concept of Federal Law “About Marine Spatial Planning” is under discussion.

WWF has also produced a road map titled: “The Development of Integrated Sea Use Management System for the Russian Federation and Related Pilot Testing in the Barents Sea Ecoregion”, which was developed as a result of a round table arranged by WWF.

A number of scientific projects were supported by WWF in the Barents Sea ecosystem.

Edda Johannessen (IMR, Norway) and Yury Kovaljev (PINRO, Russia) - ICES WGIBAR and the current status and changes in the Barents Sea ecosystem (presented by Hein Rune Skjoldal)

The International Council for Exploration of the Sea (ICES) places much emphasis on Integrated Ecosystem Assessment (IEA) as a key element in the ecosystem approach where it provides a bridge between science and advice. ICES has over recent years created regional working groups (WG) for IEA for the Baltic Sea, North Sea, Norwegian Sea, Western European Shelf Seas, and Northwest Atlantic Regional Sea. A new group for the Barents Sea, WG on Integrated Assessment of the Barents Sea - WGIBAR, was established in 2014 with Edda Johannesen and Yury Kovaljev as co-chairs. WGIBAR met in Kirkenes in northern Norway 24-28 March 2014 with participation of Norwegian and Russian scientists. The WGIBAR report is available at the ICES web page:

http://www.ices.dk/community/groups/Pages/WGIBAR.aspx

The Barents Sea has seen a warming trend over recent decades from a cold climate period in the 1970s. The area of Atlantic water has expanded and the sea ice distribution has become more restricted both in winter and summer; the whole Barents Sea has been ice-free in most recent summers. The zooplankton biomass, measured as dry weight, in a joint Norwegian-Russian ecosystem survey in the autumn, has shown a declining trend since the mid 2000s but is still relatively high at about 5 g dw m^{-2}. Capelin is a key species in the Barents Sea ecosystem, providing a link between lower and higher trophic levels. The Barents Sea capelin stock has shown strong fluctuations with 3 stock collapses over the last 3 decades with associated effects on other parts of the ecosystem. The stock has been up at 2-5 million tons since 2006, but there are now indications that it may decrease and perhaps collapse over the next few years. The Barents Sea stock of Atlantic cod has increased to a record high level with a spawning stock biomass of about 2 million tons and supporting an annual fishery of about 1 million tons. The cod distribution has shifted northwards in response to the warming, and major concentrations were found in the northern Barents Sea at 78-79^{o}N in autumn 2013. A key issue to be considered in future work is to what extent cod has reached the carrying capacity of the ecosystem and how the cod stock will respond should the capelin stock decline and the climate oscillate to a colder mode in the next few years.

Takashi Kikuchi (JAMSTEC) (presenting) and Jacqueline Grebmeier (CBL/UMCES) - International Cooperation Related to PAG/DBO Activities

The Pacific Arctic Group (PAG), which was organized under the International Arctic Science Committee (IASC) in April 2003, is a consensus-driven international consortium. It has the mission to serve as a Pacific Arctic regional partnership to plan, coordinate, and collaborate on science activities of mutual interest. The PAG members (Canada, China, Japan, Korea, Russia, and US) facilitate coordinating efforts on Arctic marine science and are developing a rich set of data to describe the Pacific sector of the Arctic. As one of the PAG synthesis activities, the Springer book, “The Pacific Arctic Region: Ecosystem Status and Trends in the

Rapidly Changing Environment", was published on June 13, 2014. The book is dedicated to Dr. Marty Bergmann (1956-2011) who was the first chair of the PAG. The Distributed Biological Observatory (DBO), which was initiated by the PAG, is being developed as a change detection array along a latitudinal gradient of transects extending from the northern Bering Sea to the Arctic Basin in the Pacific Arctic region. A series of coordinated, multi-trophic level observations include select physical, biogeochemical and biological measurements along five biologically significant transects from the northern Bering Sea to the Barrow Canyon area. Seasonal measurements are made simultaneously with hydrographic surveys, satellite observations, and biophysical moorings. These efforts are very useful to evaluate the current status of the marine ecosystem and to clarify on-going changes in the Pacific Arctic region. The PAG members are also interested in sampling in the Beaufort Sea and Chukchi Borderland to investigate marine ecosystem as well as climate, oceanographic and sea ice interactions in a developing time series format.

Next steps for international cooperation on EA and IEA in the Beaufort

The Beaufort Sea LME provides an important and timely opportunity to build international cooperation and understanding on the EA and IEAs. It is increasingly important to facilitate and build mechanisms for further international cooperation, specifically when considering the sustainability of shared resources (e.g., marine mammals, fishes). In the Beaufort Sea LME, where the ecosystem is considered relatively pristine, there is considerable concern with the impacts of increasing pressures, such as oil and gas exploration and development, marine shipping associated with commerce and tourism and climate change.

In order to promote and facilitate the initial steps of EA/IEA in the Beaufort Sea LME the EA Expert Group supports a possible pilot project (also suggested by the Kiruna declaration). To do this, the findings of this workshop suggest the US and Canada: 1) broadening the dialog between countries; and 2) develop and approve a terms of reference, including clearly defined goals and objectives for the project.

As a suggestion, representatives of the US/Canada EA Expert Group should plan to attend key EA/IEA meetings in Canada and the US in order to advance US/Canada Beaufort cooperation and promote further dialogue. This would commit key staff, from relevant management agencies, to attend specific meetings that convey the concepts of EA and IEA. Some suggested meetings in 2014-2015 could include the:

- Northern Oil and Gas Forum: November 4-6th, 2014 in Yellowknife, Canada,
- Inuvialuit Game Council (IGC) meeting: September 17, 2014 in Whitehorse, Canada, and;
- Beaufort Sea Partnership: October 28-30, 2014 in Inuvik, NT.

Aside from the Forum, the IGC and BSP meetings would require a meeting invitation to participate from each of the respective secretariats. However, participation would serve as a key venue for discussion with a variety of interested stakeholders (e.g., government and nongovernment agencies, co-management boards, community members). If attendance is

successful, the subsequent discussions and future EA Expert Group meetings could develop a draft terms of reference for future work with clear goals and objectives that could be approved by the respective governments. The project would build from the existing documentation compiled by other AC working groups and further benefit from Indigenous and industry participation.

A related step that would help to support the progress of the pilot project would be to continue the already established, informal data sharing arrangement between AOOS and BSOP. This would continue to broaden the population of a data visualization tool with existing scientific information, further assisting managers with decision-making.

Lastly, the idea to establish a transboundary DBO as a model for IEA monitoring was also appealing to the group and should be further investigated.

Sessions 4 and 5: Discussions of Lessons learned and Specifications of Products and Next Steps

Erik Olsen, Senior Scientist, Institute of Marine Research, Norway - MARINE SPATIAL MANAGEMENT AND THE ECOSYSTEM APPROACH

Ecosystem-based management and marine spatial planning are partially overlapping strategies for marine management that have become more and more relevant over the past decades. Climate change, international agreements such as the Johannesburg-declaration (2002), drive for exploiting resources, new and cost-effective shipping lanes and food security are all driving the need for more holistic and comprehensive marine management. Marine Spatial Planning (MSP) affords one intuitive and practical way of implementing the ecosystem approach to marine management and has been put in practice in countries like Norway, Belgium, Australia, New Zealand, and China. The majority of the worlds EEZs are however lacking MSP developments. Several practical guides for implementation (e.g. UNESCO 10-step approach) as well as evaluation procedures do exist. New statistical and modeling approaches afford methods for evaluating vulnerability and cumulative impacts, and end-to-end ecosystem models (eg. Atlantis) can be used to evaluate future human use scenarios. Together these support a holistic and integrated ecosystem-based management and assessment. Communication of MSP and ecosystem-based management is complex, but increasingly important. Projects in the US and Europe have shown the utility of using games as a tool to engage and teach participants about the rational and processes for carrying out MSP.

The human dimension of ecosystem-based management must not be forgotten, especially the cultural and historical dimension which may have great importance for the acceptance of new management measures in a country or society.

In the future MSP developments can be expected to increase, especially in the Arctic which will experience the largest changes in climate, and the ecological, social and economic activities that are structured by climate. MSP is facing challenges in the human dimension of need for strong and sustained political leadership to ensure integration and achieving necessary cross-border cooperation. Culture and history are aspects of human society that must not be neglected in MSP planning and implementation. The science of MSP must also be ensured by providing spatial data, populating mapping portals, further developing modeling approaches and communicating clearly and concisely to the public and managers. Successful MSP science is multi-disciplinary, transparent, open to stakeholders and cognizant of the political implications.

Lessons from the Barents Sea case:

The Barents Sea LME is very different in many respects from the Beaufort Sea LME. The Barents has high productivity supporting major commercial fisheries, including the world's largest cod fishery. Total commercial harvest of all species excluding herring is approximately 1.5M tons per year. In contrast, the Beaufort has no large-scale commercial

fisheries, nonetheless subsistence fisheries and harvests of marine mammals are essential to local economies.

Despite the obvious differences, there are similarities. Biologically and ecologically there are many of the same species: polar bears, seals, polar cod (*Boreogadus ssp.*), and zooplankton (*Calanus*, *Themisto*). Both regions are high latitude systems that are expected to change in response to climate change, and both are linked by the effect of common water masses on regional climate. Currents that transit the Barents Sea and the Arctic Ocean eventually drive deep circulation in the Beaufort Gyre. Knowing what happens in the Barents LME will help to interpret developments in the Beaufort LME as changes in the strength of these currents strongly influence regional climate. **This linkage suggests the need for development of a joint monitoring program, especially for manifestations of climate change that will affect both areas in the same way.**

Socioeconomic assessment of benefits is greatly needed for implementing EBM and MSP. This includes valuing the ecosystem in economic terms (ecosystem services). Risk analysis can give you the value of EBM for policy makers. Oil spills in arctic environments have longer lasting impacts than at lower latitudes, possibly persisting for more than fifty years. We are accepting different risk levels in warm environments (e.g., Gulf of Mexico) than we do in northern areas. In the Barents Sea the additional risk to be avoided is overfishing.

The greatest benefit of EBM is the holistic and complete evaluation of ecosystem effects – enabling decision makers to face the cumulative effects of development actions.

The Barents Sea case offers an example of long lasting cooperation between Norway and Russia including joint management of fisheries resources. The cooperation includes monitoring and assessment work with coordinated joint cruises by the two countries that have provided common data sets that go back more than 50 years.

Discussion and adoption of the metadata overview documents

Common understandings of EA and IEA: Foundations for Moving Forward. What is the relationship of EA to IEA?

The workshop considered the example document from the Convention on Biological Diversity Workshop on identifying Ecologically or Biologically significant Areas in the Arctic. http://www.cbd.int/doc/meetings/mar/ebsaws-2014-01/official/ebsaws-2014-01-03-en.pdf Participants recommended continuing discussions on the best approach for making the data essential to EA and IEA readily available. Participants also recommended continuing cooperation between the US and Canada and members of the Pacific Arctic Group to develop pan-Beaufort data delivery systems. The Alaska Ocean Observing System Arctic Data Portal was widely accepted as a useful product. Ongoing discussions will be necessary to come to agreement on this matter.

Discussion and adoption of key workshop documents on EA and IEA for Beaufort and Barents Seas, as identified by participants and circulated prior to the workshop.

During the workshop, participants accepted the list of documents provided as a good start toward developing a bibliography of primary literature in EA and IEA. Workshop participants will submit additional references to the PAME Secretariat. The PAME Secretariat will make a list of references in an online bibliographic tool (Zotero). Workshop participants agreed to provide opinions on prioritizing the literature according to its importance.

Presentation: Marine Spatial Management and the Ecosystem Approach (Erik Olsen)

Two of the items on the current Work Plan of PAME and the EA-EG for 2013-2015 are:

- PAME will consider the use of identified areas of heightened ecological significance in relation to EA for the Arctic LMEs.
- (Review the use of) Planning tools include mapping of human uses and habitats in LMEs in relation to integrated assessments and other tools for EA.

Marine spatial planning integrates key features of the large marine ecosystem and subsets through synoptic graphic visualizations. An issue is how MSP can be incorporated into the work of the EA EG going forward? There are at least three different thematic information layers that are relevant and of interest in the context of IEA and EA:

i) the identified areas of heightened ecological and cultural significance identified in the AMSA II report by AMAP/CAFF/SDWG,

ii) coastal and marine habitats, and;

iii) human activities (infrastructure, usage areas, etc.)

The areas of heightened ecological significance have been identified from a review of the biology and ecology of all species of birds and mammals and many species of fish, partly as a product of the AMAP Assessment of Oil and Gas Activities in the Arctic. The identified areas link species and habitats in a functional ecological sense since they have been identified as sites that are important use areas by animal species during the life and migratory cycles for purposes such as breeding, feeding, resting, wintering, etc. The areas have been identified for each of the 17 Arctic LMEs and are in GIS format so that can be used in map based information systems.

CAFF has produced detailed Arctic vegetation maps and a circumpolar boreal vegetation map is under development. It would be very valuable to have similar maps for the coastal and marine habitats for the circum-Arctic in a comparable manner. Habitat classifications can be seen as hierarchical, and a first generation and coarse-scale map could be produced with information primarily on the physical environmental conditions (depth, seafloor properties, hydrography including seasonal variation). It is possible that a first level of

biological information on dominant plankton and benthic species and communities could also be included as a basis for such maps.

Spatial information and maps are at various stages of development on both sides of the Beaufort. This includes human dimension information, which has often been underutilized in marine spatial planning and production of IEAs. When conducting an IEA it is important to appreciate the cultural context in which it occurs.

Discussion of Terms of Reference for the PAME-led EA Expert Group.

PAME agreed in 2011 to a Terms of Reference for the EA-EG as a basis for the Work Plan for 2011-2013. The EA Work Plan was revised as part of the PAME Work Plan for 2013-2015 using the same terms of references (ToR) as agreed in 2011.

PAME has asked for revised ToRs in response to recommendations of the EBM expert report adopted by Arctic Council in May 2013. During discussion it was felt that that the ToRs from 2011 were still broadly applicable but with inclusion of a specific point that the EA-EG could be lead on the EA for the marine part of the Arctic, responding to the recommendation from the EBM expert group ("Identify a lead to assure coordination of a common approach to the work of the Arctic Council on EBM in the Arctic and ensure appropriate reporting of progress to the Senior Arctic Officials."*)* This is already implicit in the old ToRs but needs explicit recognition. It is also important to continue the efforts to make the EA-EG a truly joint group with participation and ownership by other AC WGs. A first step in this direction can be discussed at the joint meeting between PAME and AMAP in Whitehorse in September this year.

The co-leads will draft a revised ToRs to be presented and discussed at the PAME II-2014 meeting and the joint meeting between PAME and AMAP in September.

Annex I – List of Participants

4th EA Workshop 16-18 June 2014, Vancouver, Canada - List of Participants (version 11 June, 2014)						
First Name	**Last Name**	**Attendance**	**E-mail**	**Position / Job title**	**Country**	**Name of institution**
Karoline	Andaur	Present	kandaur@wwf.no	Head of the Marine Programme	Norway	WWF-Norway
Kerim	Aydin	Remote access	kerim.aydin@noaa.gov	Program Manager	USA	NOAA Alaska Fisheries Science Center
Leah	Brown	Remote access	leah.brown@dfo-mpo.gc.ca	Oceans Biologist	Canada	Fisheries and Oceans Canada
Catherine	Coon	Present	catherine.coon@boem.gov	Marine Biologist	USA	Bureau of Ocean Energy Management
Bjarni	Eiríksson	Present	bjarni@pame.is	Project Manager	Iceland	PAME
Maryann	Fidel	Present	maryann_aia@alaska.net	Project Manager	USA	Aleut International Association
STANISLAV	FOMIN	Present	sfomin76@mail.ru	expert	Canada	WWF GAP
Jon L.	Fuglestad	Present	jon.fuglestad@amap.no	Deputy Executive Secretary	Norway	AMAP
Alf Håkon	Hoel	Present	alf.haakon.hoel@imr.no	Research Director	Norway	Institute of Marine Research
Takashi	KIKUCHI	Present	takashik@jamstec.go.jp		Japan	
William	Koeppen	Present	will@axiomalaska.com	Staff Scientist	USA	Alaska Ocean Observing System
Kari	Larusson	Remote access	kari@caff.is	Project Manager	Iceland	CAFF
Phillip	Mundy	Present	phil.mundy@noaa.gov	Director	USA	Auke Bay Laboratories AFSC NMFS NOAA
Erik	Olsen	Present	erik.olsen@imr.no	Principal Scientist	Norway	Institute of Marine Research
Jennifer	Parrott	Remote access	Jennifer.parrott@dfo-mpo.gc.ca	GIS Analyst	Canada	Fisheries & Oceans Canada
Joclyn	Paulic	Present	joclyn.paulic@dfo-mpo.gc.ca	Oceans Program Biologist	Canada	Fisheries and Oceans Canada
Stephen	Roddick	Remote access	Stephen.Roddick@gov.yk.ca	Adaptation and Outreach Coordinator	Canada	Yukon Government
Whit	Sheard	Present	whitsheard@yahoo.com	Executive Vice President	USA	Circumpolar Conservation Union
Hein Rune	Skjoldal	Present	hein.rune.skjoldal@imr.no	head of Department of Marine Environment	Norway	Institute of Marine Research
Dan	Slavik	Present	dslavik@wwfcanada.org	Sr. Officer, Government and Community Relations	Canada	WWF-Canada
NOMAKI	TOMOMI	Present	tomomi.o@jamstec.go.jp		Japan	

Annex II – Objectives of the workshop

Objective 1: Understanding progress in measuring the state of the Large Marine Ecosystems of the Beaufort and Barents Sea

Objective 2: Understanding similarities and differences in approaches and terminology for IEA and EA among government agencies of Arctic states, and among the Arctic Council work groups and programs in which they participate; AMAP, CAFF, PAME, SDWG. Developing a clear understanding of the terminology for the ecosystem approach and integrated ecosystem assessment used by the Arctic Council, AC committees, expert groups and programs, and the agencies of the Arctic States is a major goal of this series of workshops (See Appendix D).

Objective 3: Identify next steps for international cooperation on EA and IEA in the Beaufort including a possible US/Canada pilot project (See Appendix A & B & C).

Objective 4: Establish a common information base of data sources and written work relevant to EA and IEA in the Beaufort, Barents and Arctic. It is important to identify resources available from the Alaska Ocean Observing System AOOS which has worked with Canada to develop a "seamless" view of Beaufort Sea marine data.

Objective 5: Develop Draft Prospectus for the 5th EA workshop where common international ecological objectives for EA/IEA will be the theme.

Annex III – Workshop Agenda

10:00 AM June 16 – 4:00 PM June 18 2014
Sheraton Hotel Wall Centre, Granville Conference Room
Vancouver, Canada

Title:

Integrated Ecosystem Assessment (IEA) – Understanding National Approaches and Reviewing Progress on IEA in Arctic LMEs straddling national boundaries: The Beaufort and Barents Seas

Workshop Objectives:

Objective 1: Understanding progress in measuring the state of the Large Marine Ecosystems of the Beaufort and Barents Sea

Objective 2: Understanding similarities and differences in approaches and terminology for IEA and EA among government agencies of Arctic states, and among the Arctic Council work groups and programs in which they participate; AMAP, CAFF, PAME, SDWG. Developing a clear understanding of the terminology for the ecosystem approach and integrated ecosystem assessment used by the Arctic Council, AC committees, expert groups and programs, and the agencies of the Arctic States is a major goal of this series of workshops (See **Appendix D**).

Objective 3: Identify next steps for international cooperation on EA and IEA in the Beaufort including a possible US/Canada pilot project (See **Appendix A & B & C**).

Objective 4: Establish a common information base of data sources and written work relevant to EA and IEA in the Beaufort, Barents and Arctic. It is important to identify resources available from the Alaska Ocean Observing System AOOS which has worked with Canada to develop a "seamless" view of Beaufort Sea marine data.

Objective 5: Develop Draft Prospectus for the 5th EA workshop where common international ecological objectives for EA/IEA will be the theme.

Workshop Agenda with Timeline

Monday June 16

10:00: Welcome, Announcements, and Introductions **Bjarni Eiriksson**

10:10-12:00 **Session 1 -** Introduction – History, approaches, current projects on EA and IEA within the Arctic Council

10:10 - PAME History LME, EA, IEA **Hein Rune Skjoldal**

10:40 -AMAP Adaptation Actions for a Changing Arctic (AACA-C) **Jon Fuglestad**

11:10 -SDWG *Arctic Adaptation Exchange project* **Stephen Roddick** (Webex or other means of remote connection)

11: 40 -CAFF Arctic Biodiversity Assessment, Circumpolar Biodiversity Monitoring Program and the Arctic Biodiversity Data Service (ABDS).**Kari Fannar Larusson** (Webex or other means of remote connection)

12:00-13:30 **Lunch**

13:30-15:40 **Session 2** - National overviews from the Beaufort, Approaches to IEA in the Beaufort Sea

13:30 –Implementation of Ecosystem-based Management (EBM) in Canada's marine waters: The Beaufort Sea **Joclyn Paulic and Dan Slavik**

14:00 -Beaufort GIS/ Geospatial Portal **Jennifer Parrott** (Webex or other means of remote connection)

14:30 -U.S. Overview **Phil Mundy and Catherine Coon**

15:00 -US Approaches to IEA in Eastern Bering Sea & No Bering Chukchi LMEs incl FEAST coupled biophysical model). **Kerim Aydin** (Webex or other means of remote connection)

15:15 -Alaska Ocean Observing System Cooperation, Beaufort Data Sources **Will Koeppen**

15:30-15:45 **Coffee Break**

15:45-17:15 **Session 3** - National overviews from the Barents, Approaches to IEA in the Barents

15:45 -Russian-Norwegian cooperation in fisheries and environmental management **Alf Håkon Hoel**

16:15 -Norwegian integrated management plans **Cecilie von Quillfeldt**

16:35 -Russian Integrated Ocean Management/Marine Spatial Planning in the Barents LME **Stanislav Fomin**

16:50 -ICES WGIBAR and the current status and changes in the Barents Sea ecosystem **Hein Rune Skjoldal**

17:15 Announcements

17:30 Adjourn for the day

Tuesday June 17

09:00-12:00 **Session 4** – Discussions and Lessons learned

09:00 -Approaches from the Barents that could be used in the Beaufort (**Skjoldal, Hoel, von Quillfeldt**)

09:40 -Next steps for international cooperation on EA and IEA in the Beaufort.

Possibility of US/Canada pilot project in the Beaufort? (See **Appendix A & B & C**) (**Paulic, Slavik, Mundy, Coon**)

10:20-10:30 **Coffee Break**

10:30-12:00 **Next steps:** Process and requirements for implementing international IEA (group discussion)

12:00-13:30 **Lunch**

13:30-15:15 **Session 5** - Discussions and Specifications of Products

13:30 -Identification and Discussion: Common understandings of EA and IEA: Foundations for Moving Forward. What is the relationship of EA to IEA? (Rapporteurs to capture the discussion, see **Appendix D**)

14:30 -Discussion and adoption of the metadata overview documents. (**Attachment 1**) for the Beaufort and Barents circulated prior to the meeting (see http://www.cbd.int/doc/meetings/mar/ebsaws-2014-01/official/ebsaws-2014-01-03-en.pdf (led by EA Co-chairs)

15:00-15:30 **Coffee Break**

15:30 -Discussion and adoption of key workshop documents on EA and IEA for Beaufort and Barents Seas, as identified by participants and circulated prior to the workshop. (**Attachment 2**) (EA Co-chairs)

17:00 **Adjourn for day**

Annex IV - Workshop Appendices

Appendix A: The Beaufort Sea LME provides an exceptional opportunity to build international cooperation and understanding on the ecosystem approach to management (EA) and Integrated Ecosystem Assessment (IEA). Heavy national investment in environmental studies and extensive private investment in geological surveys is occurring on both sides of the border in the Beaufort Sea in preparation for the large scale industrialization attendant to oil and gas development. Political motivation for international cooperation is provided by the close proximity of licensed Canadian oil and gas prospects to the U.S./Canada border. National willingness to cooperate by U.S. and Canadian governments is evident in the current transboundary environmental survey funded by US Bureau of Ocean Energy Management (BOEM) and Canadian Department of Fisheries and Oceans, DFO, as well as other mutual environmental projects. To a degree unique in the Arctic, large scale industrialization of the marine environment of the Beaufort LME is intimately related to, and under the direction of, the governments of indigenous peoples, principally Inuit peoples (Inuit and Inuvialuit in Canada, Inupiat in U.S.). Close cultural ties between Alaska North Slope Inupiat and Canadian Inuvialuit are emblematic of the cultural similarities and grass-roots collaborations already in place. For examples are the Inuvialuit-Inupiat user to user agreements. In the U.S. the Alaska Native Claims Settlement Act and in Canada the Inuvialuit Final Agreement together provide an unprecedented basis in law for representation of indigenous cultural and economic interests in all forms of development over the very large marine area of the Beaufort Sea and adjacent coasts.

Appendix B: The adoption in Kiruna of the EA report included a mandate from the Council for implementation of EA throughout the Arctic. One of the methods suggested by the Council is "Pilot projects between two or more Arctic States … which would showcase movement towards EBM implementation in the Arctic." The concept of a proposal for such a pilot project in the Beaufort Sea has been advanced by Canada (DFO), most recently at the PAME/CAFF Workshop on EA in Reykjavik (June).

Appendix C: Partners in the Beaufort pilot projects would include key partners BOEM (US), NOAA (US) and DFO (Canada), as well as Arctic Slope Regional Corporation (and subsidiaries), North Slope Wildlife Department, the Alaska Eskimo Whaling Commission, Inuit Circumpolar Conference Alaska, Inuvialuit Regional Corporation (and subsidiaries), and World Wildlife Fund Canada and Alaska. Other partners will be identified in the process of developing the concept of the pilot project.

Appendix D: Differences in perspective on the relation of EA to IEA. The Ecosystem Approach to Management (EA) differs from the conventional sector-wise management of the past by focusing on the overall state of the ecosystem. This focus has two sides to it. One side is to define what good or acceptable

states of the ecosystem enable sustainability, along with a corresponding set of *ecological objectives* that can guide management decisions toward achieving and maintaining good or acceptable status. The other side is to *assess or evaluate the state* in order to determine how much it is influenced by human uses and activities. This is done through what is known as Integrated Ecosystem Assessment (IEA) which is a central component of EA. IEA is an activity that examines the status and trends in the conditions of the natural ecosystem, including the impacts of human activities. It builds on data from past and on-going monitoring and research, and it forms the basis for scientific advice for management measures as part of an adaptive management system guided by established ecological objectives of a general nature.

Annex V - List of Presentations

Click on the underlined text to open/download the presentations.

PAME History LME, EA, IEA - **Hein Rune Skjoldal**

AMAP Adaptation Actions for a Changing Arctic (AACA-C) - **Jon Fuglestad**

SDWG Arctic Adaptation Exchange project - **Stephen Roddick**

CAFF Arctic Biodiversity Assessment, Circumpolar Biodiversity Monitoring Programme and the Arctic Biodiversity Data Service (ABDS) - **Kari Fannar Larusson**

Canada Overview

Joclyn Paulic

Dan Slavik

Beaufort GIS/ Geospatial Portal - **Jennifer Parrott**

U.S. Overview

Phil Mundy

Catherine Coon

US Approaches to IEA in Eastern Bering Sea & No Bering Chukchi LMEs incl FEAST coupled biophysical model) - **Kerim Aydin**

Alaska Ocean Observing System Cooperation Beaufort Data Sources - **Will Koeppen**

Russian-Norwegian cooperation in fisheries and environmental management - **Alf Håkon Hoel**

Norwegian integrated management plans - **Hein Rune Skjoldal / Cecilie von Quillfeldt**

Russian Integrated Ocean Managemnt / Marine Spatial Planning in the Barents LME - **Stanislav Fomin**

Arctic Council EBM/ EA products - **Alf Håkon Hoel**

International cooperation related to PAG/DBO activities - **Takashi Kikuchi and J. Grebmeier**

Norwegian integrated management plans - **Cecilie H. von Quillfeldt and Erik Olsen**

Marine Spatial Management and the Ecosystem Approach - **Erik Olsen**

Annex VI -Video link and further disseminations

The workshop had important input from the following five people/experts via video link where they held presentations and/or participated in discussions via WebEx.

- Soffia Gudmundsdottir
- Stephen Roddick
- Kari Fannar Larusson
- Jennifer Parrott
- Kerim Aydin

The WebEx allowed those who were not able to travel and physically participate in the workshop a broadcast of what was happening when needed. However, no recordings were made.

It might be pointed out that it is possible to record both video and audio of selected presentation for publication on free online streaming services such as Vimeo or YouTube for interested parties. Such publication can strengthen the dissemination of the work of the expert group, as well as the working groups of the Arctic Council. Such remote presentations should be relatively short or not much longer than 15 minutes in length.