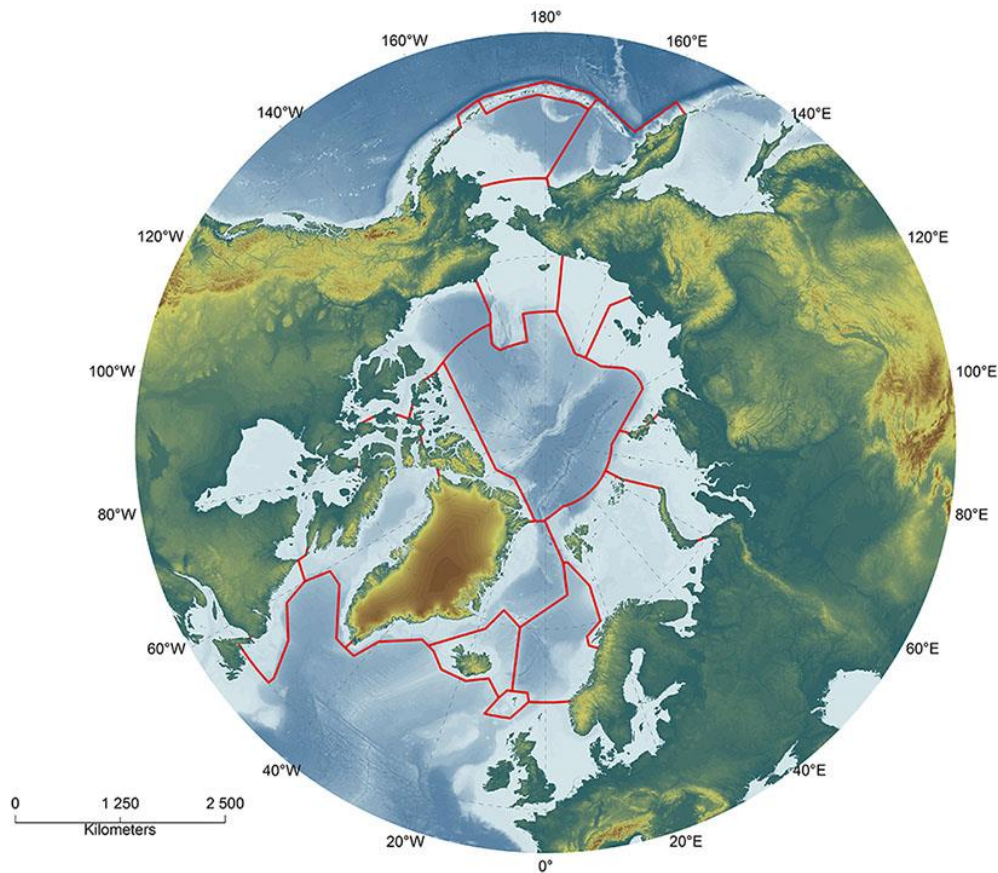


PAME-led Joint Group of Experts on the Ecosystem Approach to Management

Terms of Reference

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Map of the 18 Arctic Large Marine Ecosystems (LMEs)

Background

The Arctic Council (AC) adopted in 2004 the Arctic Marine Strategic Plan (AMSP) which had the ecosystem approach to management (EA) as a core and overarching principle. One of the strategic actions (7.4.1) was to identify the Large Marine Ecosystems (LMEs) of the Arctic, and PAME developed a working map of 17 Arctic LMEs which was adopted by the Arctic Council in 2006. The map was revised during the 2011-2013 period to include 18 Arctic LMEs. The revised map was approved by the Arctic Council in May 2013.

PAME established in 2007 an expert group (EG) on the Ecosystem Approach to marine management (EA, or the equivalent term Ecosystem-based management, EBM) co-lead by the USA and Norway with work activities identified in PAMEs biennial work plans. The revision of the Arctic LME map was done under this EG with input from other Working Groups and Arctic States.

With reference to the AC approval of the PAME Work Plan 2011-2013 (May 2011), with particular reference to the updating of the Arctic Marine Strategic Plan (2004) and the EA work, PAME was given the mandate to broaden the scope and membership of its EA EG. PAME extended its invitation to the other Arctic Council working groups dealing with marine-related issues to participate in this work in 2011. The rationale for extending the PAME EA-EG was based on increased emphasis on the EA as the foundation of the Arctic Council's work and the essential need to apply the EA to manage Arctic marine-related issues. 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.

In addition to revision of the LME map, the EA-EG has produced an EA concept paper and considered various aspects of Integrated Ecosystem Assessment (IEA) as a key component of the EA. The EA-EG has arranged four workshops as part of its work (Tromsø, Norway, January 2011; Stockholm, Sweden, March 2012; Reykjavik, Iceland, June 2013; and Vancouver, Canada, June 2014). Reports from these workshops as well as progress reports on the EA work are available at the [PAME webpage, here](#).

The Arctic Council established an Expert Group on Ecosystem-based Management (EBM) in 2011 which delivered their report back to ministers at the meeting in 2013. One of the recommendations of the EBM Expert Group which was adopted by the Arctic Council in May 2013 in Kiruna was to: *"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 Terms of Reference is developed in response to this and other marine-specific EBM recommendations in the Kiruna Declaration (refer to Annex I). The Arctic Council working groups addressing marine issues have identified a need for a mechanism to facilitate exchange of information and experiences gained to support the development of a common and coordinated approach to the implementation of the EA by Arctic states. The EA-EG with the participation of relevant Arctic Council working groups is well suited to serve as such a mechanism with the aim to contribute collectively to the integration of EA implementation into the overall work of the Arctic Council.

Purpose of the EA Expert Group

The EA expert group will consider scientific and technical aspects related to the implementation of the EA to the management of the Arctic LMEs and contribute to ongoing Arctic Council projects of relevance.

The aims of the group are to:

- ✓ Provide a forum for and facilitate exchange of information and experiences that will support implementation of the EA by Arctic states and AC working groups.
- ✓ Consider methodological development, and develop appropriate documents to support the development.
- ✓ Contribute to and review progress in the development of IEA within the Arctic, and provide advice and guidance as appropriate.
- ✓ Give input to the development of recommendations for further work in AC working groups.

- ✓ Help to develop consistency in the EA work performed by states and in the working groups.
- ✓ Identify, discuss and address issues of common concern, and prepare scoping papers, if requested.
- ✓ Facilitate access to supporting activities and resources.

It is not intended that the EA-EG will produce IEAs for any specific area but rather to facilitate exchange of information and provide guidance to contribute to a common approach among Arctic Council member states.

The issues and needs identified in Annex III for the 6 elements of implementation of the EA will form the basis for the more detailed work plans for the EA-EG. The EA concept paper, [available here](#), describes a framework for implementation of the EA with 6 main elements. The main focus of the work will be on scientific, technical and methodological issues related to *elements 3 (ecological objectives), 4 (IEA), and 5 (valuation)*.

EA Expert Group membership, co-chairs and ways of working

The members of the EA expert group are nominated by AC member states, working groups and permanent participants.

The EA co-chairs are nominated for the period as defined by the EA work plan (2015-2017).

The work of the EA-EG will be guided by the co-chairs following-up on the decisions made by PAME and the other contributing working groups, including development of EA-EG work plans. The co-chairs call and chair EA meetings and workshops.

The co-chairs are primarily responsible for the conduct of EA work, developing an equitable division of work among EA expert group members. The EA co-chairs are responsible for reporting to Arctic Council working groups. It is expected that some of the recommendations for further work will be accomplished throughout the Arctic Council's working groups and their associated expert groups and expert networks. By whom specific tasks will be accomplished (e.g. which working group) will depend on topics, available expertise and other resources. In addition Arctic Council member states are engaged in developing these elements and they will be part of and contribute to these continuing efforts.

The EA-EG is expected to meet twice annually either in-person or by teleconference. In addition, members of the group are expected to participate in organizing and convening EA-EG related workshops as stipulated within work plans of relevant working groups.. In addition members may expect to be contacted by the co-chairs and secretariat between meetings for advice when the need arises.

A list of members of the expert group (which needs updating) is attached in Annex IV.

Annex I – Responses from Arctic Council Working Groups to Recommendations regarding Ecosystem-Based Management (2013)

NOTE: This version was prepared by the Arctic Council Secretariat on 13 October 2014. This is a draft version. Feedback is welcome.

INTRODUCTION

In the Kiruna Declaration of 2013, ministers of the Arctic Council states “*Welcome[d] the report on Ecosystem Based Management, approve[d] the definition, principles and recommendations, encourage[d] Arctic States to implement recommendations both within and across boundaries, and ensure[d] coordination of approaches in the work of the Arctic Council’s Working Groups.*”

Following upon that directive, and referring to the report which was welcomed by ministers at Kiruna, at the Whitehorse SAO meeting in fall of 2013, the Senior Arctic Official from the United States “asked that the Working Groups affected by the recommendations of the EBM Expert Group [Note: includes AMAP, CAFF, PAME and SDWG] report regularly on their efforts ... [and] that a summary report detailing work towards the EBM recommendations from all Working Groups be prepared for the 2015 ministerial meeting.”

SAOs tasked the ACS to “follow up with the Working Groups to ensure that a joint report on the Arctic Council’s follow up of the EBM recommendations” is prepared as desired.

Accordingly, the Working Groups named above – AMAP, CAFF, PAME and SDWG – have all submitted concise responses detailing their efforts in support of each of the recommendations contained in the report “Ecosystem-Based management in the Arctic”. The responses below have been collated but not edited.

1. POLICY AND IMPLEMENTATION

Advancing further EBM efforts across the Arctic will build upon existing EBM implementation and involve transboundary and sub-national or regional arrangements, integrated approaches, shared goals, and consideration of traditional knowledge as appropriate. The Expert Group on Arctic EBM recommends the following actions:

1.1 Develop an overarching Arctic EBM goal, derived from established Arctic Council goals and visions, and provide guidance on how to develop and operationalize objectives supporting this goal.

1.1.PAME

This is not an appropriate task for the Ecosystem-Approach Experts Group / PAME working alone. Must be collaborative.

1.1.CAFF

The release of the Arctic Biodiversity Assessment (ABA – www.arcticbiodiversity.is) has placed renewed emphasis on EBM:

One of the ABAs three cross-cutting themes focuses on the necessity of taking an ecosystem-based approach to management. It stressed the need for a comprehensive and integrated approach to address the interconnected and complex challenges facing biodiversity and to ensure informed policy decisions in a changing Arctic.

One of the six thematic groups into which ABA recommendations were divided focused on EBM and recommended to

Advance and advocate ecosystem-based management efforts in the Arctic as a framework for cooperation, planning and development. This includes an approach to development that proceeds cautiously, with sound short and long-term environmental risk assessment and management, using the best available scientific and traditional ecological knowledge, following the best environmental practices, considering cumulative effects and adhering to international standards.

Results from the ABA implementation plan and Arctic Biodiversity Congress (ongoing) will provide assistance in achieving these goals.

Life Linked to Ice: under Appendix 1, point 3.3 the report provides an analysis of Ecosystem Based Management, which echo the importance of this EBM recommendation.

(See also: Annex 4, general comments)

1.1.AMAP

AMAP is not currently engaged in developing management goals or objectives; however, AMAP assessments do lead to various types of recommendation that are intended to inform the policy debate. AMAP assessments should therefore serve as an important input to formulating EBM goals and objectives.

1.1.SDWG

SDWG is not involved in developing management goals or objectives but would be happy to so if requested. SDWG's Social Economic Cultural Expert Group (SECEG) can potentially play a role to look at how EBM policy outcomes can advance social and economic goals, and help Arctic residents adapt to changing ecological and social-economic conditions.

1.2 Explore ways in which Arctic States can cooperate to advance conservation and management of biologically, ecologically, and culturally significant areas.

1.2.PAME

Already addressing this with PAME's work on LMEs. In addition, workshop on EBSA coming up through the CBD.

1.2.CAFF

CAFF active in UN CBD efforts

attending and providing information for the Arctic EBSA workshop.

CAFF addressed the marine area in development of AMSA 2C which identified Arctic marine areas of heightened ecological and cultural significance.

Working to better understand biodiversity change through the CBMP- CBMP can be an information provider into this process.

(See also: Annex 4, general comments)

1.2.AMAP

AMAP, together with CAFF and SDWG prepared the AMSA IIC follow-up report "Identification of Arctic marine areas of heightened ecological and cultural significance: Arctic Marine Shipping Assessment (AMSA) IIC", which also used information from the AMAP coordinated assessment of Oil and Gas activities in the Arctic.

1.2.SDWG

SDWG worked with AMAP and CAFF to prepare the AMSA IIC follow-up report "Identification of Arctic marine areas of heightened ecological and cultural significance: Arctic Marine Shipping Assessment (AMSA) IIC". Currently, ICC is leading the SDWG project ***A Circumpolar-Wide Inuit Response to the Arctic Marine Shipping Assessment***. ICC's objectives for this project are twofold: 1) to communicate AMSA findings to Inuit and seek their guidance on moving AMSA forward, and 2) to expand its earlier survey on Inuit use of sea and sea ice. The project and final draft report in 2015 will help Arctic States work more cooperatively with Inuit and other Indigenous Peoples to advance conservation efforts.

In addition, the ***Electronic Memory of the Arctic*** project and the ***Arctic Adaptation Exchange: Facilitating Adaptation to Climate Change*** project will involve the collection and dissemination of materials that advance conservation and management of biologically, ecologically, and culturally significant areas. SECEG participation in the AACA Part C project (AMAP) and the Arctic Marine Tourism project (PAME) will also help advance this objective.

Note: SECEG participation in the cross-cutting activities noted above is anticipated but still needs to be confirmed.

1.3 Develop and adopt a policy and best practices for incorporating traditional knowledge into EBM activities as appropriate.

1.3.PAME

Seems like a better fit for SDWG, but PAME is of course exploring this within its work.

1.3.CAFF

Life Linked to Ice: under Appendix 1, point 3.3 the report provides an analysis of Ecosystem Based Management, which echo the importance of this EBM recommendation.

(See also: Annex 4, general comments)

1.3.AMAP

AMAP monitoring and assessment activities take account of TK where appropriate.

1.3.SDWG

Permanent Participants in the SDWG have led the work to produce seven draft "guiding principles" for integrating Traditional Knowledge into the work of the AC and identified several ideas to translate these proposed principles into concrete next steps. This work will help inform how traditional knowledge can be incorporated into EBM activities.

1.4 Encourage initiatives between two or more Arctic States to advance implementation of EBM in the Arctic and demonstrate how knowledge is collected, shared, processed and used to contribute to EBM in the Arctic.

1.4.PAME

The Ecosystem-Approach Experts Group has its fourth workshop coming up in spring [2015] for the Beaufort LME. Also there is the pilot study of the Norwegian-Russian joint management of the Barents.

1.4.CAFF

CAFF's CBMP Marine, Terrestrial and Freshwater groups contain country representatives that actively collect, share and process national data to better understand biodiversity change. This is an opportunity for countries to analyze data and partner on issue of mutual concern.

(See also: Annex 4, general comments)

1.4.AMAP

The AMAP coordinated work on 'Adaptation Actions for a Changing Arctic' (AACA-C) is establishing regional implementation activities in the Barents, Baffin/Davis Strait and Bering/Chukchi/Beaufort Sea regions that will have strong links to and support EBM objectives.

1.4.SDWG

The SDWG project *Arctic Adaptation Exchange: Facilitating Adaptation to Climate Change* involves the creation of an adaptation portal to facilitate access to adaptation resources and create a space where Northern decision-makers can exchange experiences, lessons learned and best practices. This could provide an opportunity to demonstrate how EBM-related knowledge is collected, shared and processed.

1.5 Review, update and adjust the Observed Best Practices in Ecosystem-based Ocean Management in the Arctic, endorsed by the 2009 Arctic Council Ministerial, to be applicable to all environments, including marine, coastal and terrestrial.

1.5.PAME

Appropriate task for PAME, with terrestrial extension covered by CAFF. **1.5.CAFF**

CAFFs CBMP marine biodiversity monitoring plan (in implementation) and its coastal biodiversity monitoring plan (in development) may provide information of value to follow-up on the above recommendation.

(See also: Annex 4, general comments)

1.5.AMAP

AMAP is not generally involved in this type of activity though its assessment work provides input on management of marine, freshwater and terrestrial systems.

1.5.SDWG

Outcomes from *A Circumpolar-Wide Inuit Response to the Arctic Marine Shipping Assessment* and the *Arctic Adaptation Exchange: Facilitating Adaptation to Climate Change* project could be examined in respect to revising the Observed Best Practices in Ecosystem-based Ocean Management in the Arctic. SECEG participation in the AACA Part C project (AMAP) and the Arctic Marine Tourism project (PAME) will also help advance this objective.

2. INSTITUTIONAL

Recognizing the important ongoing EBM work within the Arctic Council, particularly in the marine environment, sustaining and strengthening EBM will require building greater coordination and integration capacity across the Arctic Council and taking steps to further advance EBM in terrestrial environments. The Expert Group on Arctic EBM recommends the following actions:

2.1 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.

2.1.PAME

This makes sense as an assignment for the Ecosystem-Approach Expert Group, which could collect info from the states and assess whether there is a need for common guidelines.

2.1.CAFF

(No response)

2.1.AMAP

The AMAP coordinated AACA-C work includes activities that compare and could potentially promote harmonization of EBM approaches applied in different regional settings.

2.1.SDWG

Input or reporting related to EBM is not as relevant to SDWG as other Working Groups since our projects focus more on the human dimension. Nonetheless, there are links to a number of SDWG projects (e.g., *A Circumpolar-Wide Inuit Response to the Arctic Marine Shipping Assessment*, *Arctic Adaptation Exchange: Facilitating Adaptation to Climate Change*, *Electronic Memory of the Arctic*, *Review of Cancer Among Circumpolar Indigenous Peoples*). The SDWG Executive Secretary is best-placed to report on these initiatives.

2.2 Institute periodic Arctic Council reviews of EBM in the Arctic to exchange information on integrated ecosystem assessment and management experiences, including highlighting examples from Arctic States.

2.2.PAME

This reporting could be funneled through the Ecosystem-Approach Expert Group, with PAME focused on marine and CAFF/AMAP focused on terrestrial.

2.2.CAFF

CAFF conducts marine work through the CBMP and through its assessments programme e.g. the Arctic Biodiversity Assessment that can be used to inform information exchange. CAFF also has capacity in not just terrestrial, but freshwater and coastal environments.

(See also: Annex 4, general comments)

2.2.AMAP

AMAP intends to support such reviews instituted by the Arctic Council.

2.2.SDWG

SDWG will participate in any reviews of EBM instituted by the Arctic Council. SDWG is well-placed to provide input on the human dimension of EBM.

3. SCIENCE AND INFORMATION

Advancing Arctic EBM will require the identification of important coastal, marine, and terrestrial areas, improved data comparability and compatibility, enhanced information exchange and monitoring, and improvements in the development and use of integrated ecosystem assessments. In order to achieve this, the Expert Group on Arctic EBM recommends the following actions:

3.1 Encourage the use of the revised map of 17 Large Marine Ecosystems as the oceans management unit to implement EBM in the Arctic; and explore the development of terrestrial assessment units (landscape equivalents to LMEs) based upon ecological criteria or existing eco-regions.

3.1.PAME

The revised map has been delivered with 18 Arctic LMEs; next step is to encourage use by AMAP and CAFF and use the revised map as a basis for work.

3.1.CAFF

CAFF's CBMP utilizes eight Arctic Marine Areas identified in the Arctic Marine Biodiversity Monitoring Plan (published 2011) these were communicated to the team developing the LMEs. CAFF is also working on terrestrial EBM issues - a key aspect of which is the implementation of the CBMP Terrestrial and freshwater biodiversity monitoring plans.

(See also: Annex 4, general comments)

3.1.AMAP

The AMAP coordinated AACA is considering the potential for using LMEs as a basis for its work. [It should be noted that for terrestrial areas in particular there exist a number of alternatives to eco-regions when it comes to defining 'terrestrial assessment units' for management purposes, e.g. river basins].

3.1.SDWG

The use of the LME map is not applicable for the majority of SDWG projects.

3.2 Identify biologically, ecologically, and culturally significant areas in the coastal, marine and terrestrial environments, and consider EBM-related needs for these areas. Identify the coastal, marine and terrestrial areas most vulnerable to human impacts.

3.2.PAME

This ties in with bullet 1.2 [Note: "Explore ways in which Arctic States can cooperate to advance conservation and management of biologically, ecologically, and culturally significant areas"]. The AMSA IIc is done, and someone is needed to take over the terrestrial and, to a lesser extent, coastal sections.

3.2.CAFF

CAFF through the CBMPs Freshwater, Coastal, Marine and Terrestrial biodiversity monitoring plans may provide biodiversity related information into processes aimed at responding to this recommendation. (See also: Annex 4, general comments)

3.2.AMAP

This work has been completed for the marine environments under the AMSA iic work. AMAP has no plans for such initiatives within the coastal and terrestrial environments.

3.2.SDWG

Outcomes from *A Circumpolar-Wide Inuit Response to the Arctic Marine Shipping Assessment* and the *Arctic Adaptation Exchange: Facilitating Adaptation to Climate Change* project could help towards this objective. The SECEG could possibly play a role in identifying culturally significant coastal, marine and terrestrial areas through participation in the AACA Part C project (AMAP) and the Arctic Marine Tourism project (PAME).

3.3 Assess the value of significant Arctic ecosystem services relevant to the well-being of local communities and regional economies and ecosystem services, and those of particular global significance.

3.3.PAME

This is mostly appropriate for SDWG. The AACA will address this goal as well.

3.3.CAFF

CAFF is undertaking a TEEB Arctic scoping study for the Arctic in partnership with TEEB, UNEP, WWF, UNEP-GRID Arendal which is scheduled for completion for the 2015 Ministerial.

(See also: Annex 4, general comments)

3.3.AMAP

The ‘value of significant Arctic ecosystem services’ will most likely be addressed for selected regions in AACA.

3.3.SDWG

SDWG/SECEG involvement in the AACA Part C will support the objective of assessing the well-being of local communities and economies vis-à-vis ecosystem services.

3.4 Enhance access to, and use of, the multidisciplinary data required for the implementation of EBMs by building upon ongoing work in the Arctic Council to contribute to an Arctic Council data portal.

3.4.PAME

As part of the next bullet, PAME is looking into the data issue for the Barents, Beaufort, etc. – the regional level. There are many obstacles. In many ways, the Arctic Council is already addressing this with its existing data portals, and gathering experience from smaller-scale portals rather than plunging in to making a huge one is wise.

3.4.CAFF

The Arctic Biodiversity Data Service is CAFF’s data portal and is the data-management framework for managing data generated via the Conservation of Arctic Flora and Fauna (CAFF – www.caff.is) and its Circumpolar Biodiversity Monitoring Programme (CBMP – www.cbmp.is). It is an online, interoperable data management system which serves as a focal point and common platform for all CAFF programs and projects as well as be a dynamic source for up-to-date circumpolar Arctic biodiversity information and emerging trends. It will allow for discovery, archiving and access to data at various spatial, temporal, and taxonomic scales (e.g., populations, regions, nations, circumpolar,

biomes, habitats) allowing users to explore relationships and factors driving change. It could feed into this recommendation. (See also: Annex 4, general comments)

3.4.AMAP

AMAP is already addressing this in a number of data-related initiatives. SAON has the objective to enhance access to Arctic observational data.

3.4.SDWG

SDWG is working to develop an adaptation portal (*Arctic Adaptation Exchange: Facilitating Adaptation to Climate Change* project) and is gathering and digitizing circumpolar related information on a variety of topics from AC state libraries, museums and archives (Electronic Memory of the Arctic project). These sources of information can potentially be linked to an AC data portal.

3.5 Exchange information and experiences with integrated assessments of ecosystem status, trends and pressures for coastal, marine, and terrestrial areas and provide guidance on approaches for integrating existing assessments.

3.5.PAME

This is the focal activity of the Ecosystem-Approach Expert Group.

3.5.CAFF

The use of an ecosystem based approach to conservation and management is inherent in all of CAFF's work and has remained integral to all CAFF activities since its formation under the Arctic Environmental Protection Strategy in 1992.

(See also: Annex 4, general comments)

3.5.AMAP

Information exchange for integrated assessment purposes is a key component of the AACA activity. AMAP (together with CAFF) are the primary AC working groups responsible for assessments of status, trends and impacts (on coastal, marine, and terrestrial areas) in the Arctic - and many of these assessments now involve integration of physical, biological and social-economic aspects.

3.5.SDWG

SDWG provides human dimension input into assessments as requested. SECEG participation in the AACA Part C project will help identify the socio-economic implications of assessments/scenarios and the development of possible adaptation strategies.

4. Annex: General comments

- ✓ Examples of recent CAFF activities which build upon the nine EBM principles defined by the EBM task force and respond to the activities recommended by Ministers in Kiruna to advance EBM in the Arctic include:
- ✓ The ABA action plan to implement the ABA recommendation is underway with early implementation already ongoing e.g. the Arctic Migratory Bird Initiative (AMBI).
- ✓ In cooperation with AMAP and SDWG the development of the AMSA IIC report on the Identification of Arctic marine areas of heightened ecological and cultural significance: Arctic Marine Shipping Assessment (AMSA) IIC.
- ✓ The report "Life Linked to Ice: A guide to sea-ice-associated biodiversity in this time of rapid change" was completed and released.
- ✓ Completion of the Arctic Terrestrial Biodiversity Plan.
- ✓ Completion of the CBMP strategic plan (2013-2017) phase II implementation of the CBMP
- ✓ Implementation of the Arctic biodiversity Freshwater, Marine and Terrestrial monitoring Plans.
- ✓ Commencement of a scoping study on the Arctic's ecosystem services.

- ✓ Commencement of a project to address protection of Arctic lifestyles and people through migratory bird conservation.

Annex II – A tentative list of work plan items to be considered

A tentative list of work plan items to be considered when Arctic Council working groups are drawing up their respective work plan for the 2015-2017 period may include, if so decided the following items:

- ✓ Contribute to existing coordinating monitoring initiatives (such as SAON, CBMP, AMAP Trends and Effect Monitoring Programme) with information on which elements of monitoring are needed to further strengthen the science-based policy and decision making of EA
- ✓ Review the status of development of ecological objectives for Arctic LMEs.
- ✓ Consider issues of scale in EA such as linking the specific ecosystem (LME) scale with the wider pan-Arctic (and global) scale(s).
- ✓ Develop areas of cooperation on EA and IEA with ICES and PICES.
- ✓ Contribute to the development of a bibliographic resource that identifies key works in EA and IEA.
- ✓ Contribute to the development of a network of experts (community of practice) working to implement EA in the Arctic.

Annex III - Framework for implementation of the EA

The EA concept paper, [available here](#), describes a framework for implementation of the EA with 6 main elements:

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

Regarding the first element, *identify the ecosystem*, we have completed the assigned task of identifying the Arctic LMEs, which form the starting point for management and management cooperation in the case of transboundary LMEs. However, significant ongoing issues related to integration and differentiation of spatial scales will need to be addressed. For example is the important matter of how to integrate issues and results of work at the scale of LMEs to address the larger, pan-Arctic scale, and *vice versa*.

Regarding the second element, *describe the ecosystem*, there is a large body of information and many descriptions of the Arctic marine ecosystems including the recent Arctic Biodiversity Assessment (ABA) by CAFF. As part of the Assessment of Oil and Gas Activities in the Arctic (OGA), AMAP has produced extensive descriptions of each of the Arctic LMEs including detailed information on species of fish, birds and mammals. There is a need to consider and clarify how existing and emerging descriptions of Arctic marine ecosystems can be applied in the context of the EA, for instance in relation to conducting IEAs. The third element, *setting ecological objectives*, provides an important component of the EA, defining in practical terms sustainability in relation to the extent of human use of natural resources and associated environmental impacts. There is a need to compare ongoing efforts to set regional and national ecological objectives in order to support development of transboundary ecological objectives. The work of the International Council for Exploration of the Sea (ICES) is expected to make important contributions to identifying and applying ecological objectives in the EA.

The fourth element, *assess the ecosystem, or Integrated Ecosystem Assessment (IEA)*, is essential to implement EA. There is a need to continue work to compile information on, and compare regional and national approaches to the basic methodology for conducting IEA, as well as promoting and facilitating the production of IEAs for the various Arctic LMEs. An IEA provides information on status and trends of the main ecosystem components, including evaluation of impacts by various human activities such as fishing, pollution, coastal development, and others, as well as the overall or cumulative impacts of those activities. The state of development toward IEA is quite different across the Arctic, being reasonably well developed in some of the boreal and sub-Arctic areas where there are large fisheries (e.g. Barents and Bering seas), and being less well developed in some of the high Arctic LMEs (e.g. Beaufort and Kara seas) that lack large fisheries. A specific issue to consider is the relationship of IEA to other types of environmental assessments, such as Environmental Impact Assessments (EIAs), and how such assessments can support the work on IEA for specific LMEs. A related issue is how to coordinate and integrate across assessments carried out for various purposes both outside the Arctic Council (e.g. fish stocks and multispecies assessments) and by working groups inside the Arctic Council (e.g. AMAP AACA-C project). Collaboration with relevant organizations in particular ICES will be sought to further advance international understandings on IEA.

The fifth element, *valuing ecosystem goods and services*, provides an essential link between the natural ecosystem (of which man is part) and the human subsystem with its cultural, social and economic aspects. CAFF, in partnership with TEEB, UNEP, WWF Arctic and GRID-Arendal have launched a TEEB Arctic Scoping Study as a first step towards mainstreaming Arctic biodiversity and ecosystem services into policy and decision-making processes. There is a need to further develop and

use methodology for valuing ecosystem services and to integrate this aspect into IEA in its fully integrated form (including socio-economic information from societal drivers to response).

The sixth and final element, the *adaptive management of human activities* is implemented by the Arctic States, and needs ultimately to be based on comprehensive IEAs on the geographic scale of LMEs, which may require transboundary cooperation. IEAs identify management actions and interventions that are necessary to achieve the overarching goals of sustainable use of resources and conservation of biodiversity that are expressed by operational ecological objectives. Adaptive management of human activities requires practical scientific advice based on the outcome of the IEA process. Such practical scientific advice serves as the basis for decision-making that allow managers to achieve specific management objectives in an ecosystem context. ICES has a long history of providing scientific advice to management in an international context, making it a relevant and important partner for the work on this topic.

Annex IV - Nominated experts by Member States, PPs and working groups 2015-2017

Needs to be updated

Members	Ecosystem Approach Expert Group
	Co-leads: Norway and USA
Canada	Martine Giangioppi (Martine.Giangioppi@dfo-mpo.gc.ca) Cc. Renee Sauve Renee.Sauve@dfo-mpo.gc.ca
Denmark Greenland Faroe Islands	Tina Mønster tinm@nanoq.gl Talea Weissang tawe@nanoq.gl Ditte Mandøe Andreassen diman@nst.dk Bjørn Tirsgaard bjoti@nst.dk Inge Thaulow inth@ghsdk.dk
Finland	Hermanni Kaartokallio hermanni.kaartokallio@ymparisto.fi
Iceland	Cc. Sesselja Bjarnadottir Sesselja.bjarnadottir@umh.stjr.is
Norway	Hein Rune Skjoldal hein.rune.skjoldal@imr.no Cecile von Quillfeldt quillfeldt@npolar.no Cc. Anja Elisenberg Anja.Elisenberg@md.dep.no
Russia	Dr. Aleksander Bagin abagin@hse.ru Professor Gennady G. Matishov icd@mmbi.info
Sweden	Patrik Brodd Ministry of Environment Patrik.brodd@environment.ministry.se
USA	Phil Mundy phil.mundy@noaa.gov

Members	Ecosystem Approach Expert Group
<p>Permanent Participants</p>	<p>AIA: Jim Gamble aia@alaska.net</p> <p>GCI: Victoria Lorraine Peter (no email address but Chief Joe Linklater is also a regular participant Email: jlinklater@vgfn.net)</p> <p>ICC: James Stotts, Chair jimmy@iccalaska.org</p> <p>Saami Council (SC): Gunn-Britt Retter gbr@saamicouncil.net</p> <p>IPS: ips@arcticpeoples.org</p> <p><u>Cc for information sharing (AAC)</u></p> <p>Colleen Henry (AAC) Colleen.Henry@cyfn.net</p> <p>Terry Fenge (AAC) Ttfenge7006@rogers.com</p>
<p>Observers / Working groups / experts</p>	<p>Martin Sommerkorn/WWF msommerkorn@wwf.no</p> <p>Working Groups contacts: AMAP: Lars Otto Reiersen lars-otto.reiersen@amap.no</p> <p>Jon L Fuglestad jon.fuglestad@amap.no</p> <p>CAFF: Kari Larusson kari@caff.is</p>