

THE 3RD INTERNATIONAL CONFERENCE ON THE ECOSYSTEM APPROACH
TO MANAGEMENT IN ARCTIC LARGE MARINE ECOSYSTEMS

ECOSYSTEM BASED MANAGEMENT IN A RAPIDLY WARMING ARCTIC: SHARING EXPERIENCES AND CHALLENGES

CONFERENCE
SPEAKERS AND
ABSTRACTS



DAY 1: 15TH APRIL: ICEBREAKER



Welcome by Mayor of Tromsø Municipality **Gunnar Wilhelmsen** (Labour Party) who has been the mayor of Tromsø city since 2019.

Wilhelmsen will open the icebreaker together with Norway's Ambassador for the Arctic and Chair of the Senior Arctic Officials of the Arctic Council **Morten Høglund**



Dr. Maria Fossheim is Programme Director for the Barents Sea and Arctic Ocean Programme at the Institute of Marine Research (IMR). She is responsible for monitoring, research and advice in these areas, and additionally all IMR deliverables to the Norwegian Management Plan for Norwegian waters. She is Head of Office in IMR Tromsø, and deputy leader of the steering group for Fram – High North Research Centre for Climate and the Environment.

DAY 2: 16TH APRIL

Opening Session



Norway's Ambassador for the Arctic and Chair of the Senior Arctic Officials of the Arctic Council **Morten Høglund**. Høglund is a former politician and was a member of the Norwegian Parliament from 2001-2013. From 2010-2013 Mr. Høglund served as the Chair of the Standing Committee of the Parliamentarians of the Arctic Region.



Research Director Dr **Karin Kroon Boxaspen** is responsible for the formal Advisory Process within the Institute of Marine Research (IMR). IMR have more than 1000 employees and is one of the largest marine Institutes in Europe. IMR is the main advisor to the Norwegian Ministry of Trade, Industry and its underlying Directorates and Agencies within Norway in matters of the Ocean. This includes stock assessment, sustainable aquaculture, safe and healthy seafood and environment and climate change.



Head of Arctic- and Environmental Unit at Saami Council **Gunn-Britt Retter** is born and raised in the coastal Saami community Unjárga-Nesseby in Finnmark county, Norway. She has a background in teaching and holds an MA in Bilingual studies from University of Wales. Since 2001, Retter has worked with Arctic Environmental issues, first at Arctic Council Indigenous Peoples' Secretariat (IPS) and since 2005 in the present position as Head of Arctic and Environmental Unit of the Saami Council. Here, Retter has worked on issues related to indigenous peoples and indigenous knowledge related to climate change, biodiversity, language, pollution and management of natural resources.



The PAME EA co-lead of the 3rd International EA Conference **Dr. Lis Lindal Jørgensen**, senior scientist at the Institute of Marine Research, Tromsø, Norway and **Director and Senior Advisor Elizabeth McLanahan** (for *Dr. Cathy Coon* (the US co-lead)), from the National Oceanic and Atmospheric Administration (NOAA) International Affairs serves as the U.S.

They will present the Ecosystem Approach framework that has been and is still being developed within the EA expert group in PAME and how the Arctic Council can contribute to the knowledge needed to do Ecosystem Based Management. They will also explain how the conference is built to reflect the present and ongoing work.

SESSION 1 (09:00-19:00):

COOPERATION AND GOVERNANCE FOR EBM - STATUS AND SHARED EXPERIENCES ACROSS ARCTIC MARINE ECOSYSTEMS



Convener for PAME Dr. Martin Sommerkorn is Head of Conservation for the WWF Arctic Programme. He brings science underscoring the role of nature for social-ecological resilience to the policy-making table and leads work on Arctic biodiversity conservation and governance. In his first career as an Arctic ecosystem scientist Martin gathered first-hand experience of the Arctic's unique places, peoples and concerns while working in Siberia, Alaska, Greenland, Svalbard and Scandinavia. Martin was lead author for several Arctic Council assessments and coordinating lead author for the Polar Regions chapter of the IPCC's Special Report on the Ocean and Cryosphere in a Changing Climate.



Keynote speaker Dr. Jason S. Link: Senior Scientist for Ecosystem Management, NOAA-NMFS, Woods Hole, MA, USA. Jason Link is the Senior Scientist for Ecosystem-based Management at NOAA Fisheries. In this role, he leads efforts to support the development of ecosystem-based management plans and activities throughout the agency, serving as the agency's senior-most authority on ecosystem science. Dr. Link has been a champion of ecosystem science and ecosystem-based management, both as a discipline and as a practice, for resource management agencies in the U.S. and around the world. His research interests include marine resource-ecosystem modeling methodologies, marine food web topology, globally consistent patterns in ecosystem cumulative biomass distributions, and delineation of ecosystem overfishing thresholds. Dr. Link has extensive experience working in marine and Great Lakes systems around the world. He has written the best practices for two widely used ecosystem models, and has advanced several aspects of trophic ecological theory.

Title: Ecosystem-based management in USA Arctic marine ecosystems: Some global EBM best practices that may be useful for the Arctic

Abstract Ecosystem-based management (EBM) is recognized as the best approach to address the multi-multi challenges facing marine ecosystems, the Arctic included. The Arctic Ocean and its associated communities exemplify the multi-multi challenge, with multiple geographies, jurisdictions, ocean-use sectors, pressures, taxa, stakeholders, and objectives. Recent syntheses and reviews of global EBM have confirmed the need for EBM to address the many issues facing marine ecosystems, but have also identified impediments to implementing EBM. Solutions to overcome these impediments have also been identified, and they are noted here to indicate that there is global progress on EBM and to perhaps suggest areas for continued

consideration in the Arctic. In particular, four items to highlight that have been leading to successful EBM implementation include: 1) adopting an Integrated Ecosystem Assessment or similar process that explicitly designed to iterate and adapt to accommodate changing conditions (social, environmental, political, etc.); 2) developing a better business case for EBM (to address costs, benefits, risks); 3) producing better communication materials about EBM applied to specific cases; and 4) establishing clearer and more obvious EBM performance metrics. These are all predicated on clear understanding of EBM mandates and the associated governance structures to implement them. As the discipline and practice of EBM continues to mature, the Arctic is well-positioned to provide a leading role in the operational development of EBM.



Speaker Fredrik Juell Theisen is Specialist Director at the Norwegian Ministry of Climate and Environment, and Norway's Head of Delegation to PAME. Mr. Theisen has been working with ocean and polar issues at the Ministry of Climate and Environment since 1998. His main tasks include Norway's integrated ocean management plans, environmental management in Svalbard, and international processes such as Arctic Council/PAME, the International Polar Bear Agreement, CCAMLR, and ATCM/CEP. Mr. Theisen holds a MSc in Geology from the University of Oslo in 1985. Prior to his position at the Ministry for Climate and Environment, Mr. Theisen worked as an advisor at the Norwegian Polar Institute, and as a Head of section at Friends of the Earth Norway.

Title: Norway's Integrated Ocean Management Plans

Abstract: Norway has since 2002 developed a system for Integrated Ocean Management Plans (IOMs). These plans cover all sea-areas under Norwegian jurisdiction in the Barents Sea, Norwegian Sea and North Sea/Skagerrak. The plans apply an ecosystem approach in order to achieve two main objectives: To promote value creation through sustainable use of marine resources and ecosystem services, and to maintain ecosystem structure, functioning, productivity and biodiversity. The management plans clarify the overall framework and priorities for Norway's Ocean Management and promote closer coordination among sectors. They also increase predictability and facilitate co-existence between ocean industries and activities. A keystone in Norway's system for Integrated Ocean Management Plans is a cross-sectorial system for assessing current knowledge and establish and update a common knowledge base. The IOMs are developed, updated and presented as white papers by the Government every 4. year and then adopted by the Storting (Parliament). This means that the plans are anchored at the highest political level to ensure political commitment. The latest revised plans were presented as a white paper on April 5. this year and has not yet been adopted by the parliament. In this presentation the system and processes to develop the Plans will be briefly described, as well as some new measures in Norway's Arctic waters proposed in the recently updated plans. Some reflections and lessons learnt from 20 years of work with Integrated Ocean Management Plans in Norway will also be given.



Speaker Dr. Hermanni Kaartokallio (Leading researcher, Finnish Environment Institute, Helsinki, Finland) Is a marine biologist with long-term experience in marine ecosystem-based management frameworks both in the Baltic Sea and in the Arctic through PAME EA-EG expert group. He has followed the development of EU legislation on marine ecosystem-based management since its inception in 2006. His current research concentrates on sea ice ecosystem, marine microbes and biodegradation of plastics in the sea. He is also involved in work on Arctic marine microplastic pollution.

Title: Navigating multi-layer legislative and cooperation framework- Ecosystem- based marine environment management in Finland

Abstract: Finland has a long history of implementing marine ecosystem-based management in the regional seas cooperation under Helsinki Convention (HELCOM 1974), which adopted ecosystem-based management as its core principle already in year 2003. Finland is an EU member state and also implements relevant EU legislation in marine management, including EU's Marine Strategy Framework Directive (2008/56/EC), which obliges Finland among other coastal Member States to draw up marine strategies for their marine areas. EU legislation is adequately transposed into national legislation. Marine strategy and its adjacent programme of measures are key tools of ecosystem-based management of human actions affecting the marine environment in Finland. A diverse set of indicators is employed to monitor the status of the marine environment and status assessment reports are published on a regular basis. The implementation of the programme of measures concerning the marine areas that aims to improve and maintain the status is monitored closely. Baltic sea is subject to intense human pressures originating from the catchment area and management is carried out in close coordination with national implementation of the EU Water framework directive (2000/60/EC), covering inland and coastal waters. Also other EU legislation as Directive 2014/89/EC regulating Maritime Spatial Planning are highly relevant for successful ecosystem-based management. Integrating multiple levels of legislative and cooperation frameworks may create challenges in coordination and reporting but also opens up synergies and possibilities not available to single-jurisdiction management approaches. The experiences and development trajectory of marine ecosystem-based management in Finland are discussed with relevance to the Arctic ecosystem-based management.



Convener Senior Arctic Adviser Marianne Kroglund (Norwegian Environment Agency and previous AMAP Chair) is a biologist by training and spent the first years of her career researching the biological effects of acidification. Later, she started working in the Norwegian Ministry for Environment, mainly engaged in international policy work related to the UN Commission on Sustainable Development, the UN Environment Programme, and the Convention on Biological Diversity. Later she got the opportunity to work on the development of integrated management plans for areas of the North Sea and Skagerrak, compiling information about the environmental conditions, causes, and impacts of environmental pressures - a process that required cooperation between the authorities, scientists, and stakeholders. She has also been part of the Norwegian delegation to PAME. Today, her main task is to coordinate and integrate Arctic activities and initiatives at the Environment Agency. She is Norway's head of delegation to AMAP, and supports Norway's delegation to IPCC on Arctic issues.



Keynote speaker Dr. Kevin J. Hedges (Fisheries and Oceans Canada / Government of Canada) research program is focused on understanding the population and community ecology of aquatic organisms, especially fishes and their trophic relationships. Dr. Hedges' research is highly collaborative with other DFO scientists, co-management partners in the Canadian Arctic, and academic researchers. He is a member of DFO's Ecosystem-Based Approach to Fisheries Management Working Group, the Ocean Tracking Network Arctic Program, and represents Canada on several international groups including the Circumpolar Marine Biodiversity Monitoring Program, the ICES/PICES/PAME Working Group on an Integrated Ecosystem Assessment of the Central Arctic Ocean, and the Science Coordinating Group of the Central Arctic Ocean Fisheries Agreement. All of these efforts are to improve our understanding of Arctic marine ecosystems and management of marine fisheries within an ecosystem context.

Title: Ecosystem-based management in Canadian Arctic marine ecosystems: status and efforts to expand, improve and adapt to changing priorities.

Abstract Ecosystem-based management (EBM) requires sufficient understanding of ecosystem structure and processes to assess diverse and interacting impacts of human activities. Decades of single-species stock assessments of fishes, invertebrates, and marine mammals have provided considerable data regarding the distribution, abundance and environmental conditions experienced by individual species, but ecosystem-level assessments have been generally lacking. To address this gap and collect scientific data needed to support EBM, integrated ecosystem assessments have been developed in several marine regions of the Canadian Arctic. Some programs were developed explicitly as integrated ecosystem assessments and others have grown from trophically-limited surveys into fuller assessments. In the Canadian Arctic, Indigenous co-management bodies bring a wholistic world view to management discussions, elevating the importance of EBM approaches. Several co-management bodies exist across the Canadian Arctic, therefore management priorities are not uniform across the Arctic, but are specific to the needs and interests of local communities, and reflect local anthropogenic impacts, particularly subsistence and commercial harvesting, and shipping. Long-term sustainability of ecosystems and

extractive activities is supported by consistent management goals and objectives. When goals shift management decisions can effectively chase the objective, creating a series of decisions that are each reasonable for the current goal but counter-productive when taken as a whole. By sharing responsibilities for management decisions, the co-management frameworks between federal and territorial Indigenous bodies create consistency in management goals and decision making, providing a buffer against political change.

Prerecorded speaker Dr. Eydna í Homrum is department leader for Resource Department at Faroe Marine Research Institute. Current work consists of tasks related to stock assessment and advisory processes, in addition to ecological research. Recent research has been on fish ecology of small pelagic species whereas earlier research topics have been related to the demersal fish community in Faroese waters.



Dr. Anni Djurhuus will be present in person for the panel discussions and to answer questions. Djurhuus is an assistant professor at the University of the Faroe Islands and her main research interest is in conservation and climate change especially regarding biodiversity changes. Most of Anni's research is regarding the natural environment and ranges from hydrothermal vents, seamounts, deep-sea, tropics, penguins, and much more. Anni's main research focus currently is on eDNA for biodiversity and impact assessments on the Faroe Shelf, virus fluctuation on the Faroe Shelf, municipality sewage contamination, and the Marine Biodiversity Observation Network (MBON) project.



Title: Status on Ecosystem Based Management in Faroese waters.

Abstract Marine resources and utilization thereof are the backbone of livelihood on the Faroe Islands. Utilization of marine resources in Faroese waters are governed by mainly Faroese legislation, but also according to international agreements. Even though Ecosystem Based Management is still in the early stages, to some extent the ecosystem has been regarded in the management for decades - sometimes with focus on fish stocks, other times on habitats. Faroe Marine Research Institute is the institution with largest research effort on the Faroese marine environment and extensive monitoring is in place for both hydrography and living resources. As procedures are developed for Ecosystem Based Management existing monitoring data may prove to be valuable input for providing Ecosystem Based Advice for Faroese Waters.



Speaker Special advisor Palle Smedegaard Nielsen works within the Ministry of Agriculture, Self-Sufficiency, Energy and Environment, Government of Greenland

Title: Greenlandic and Ecosystem Based Management

Abstract: Through examples of management of human activities in and around Greenland the presentation will highlight the processes in place to move towards ecosystem approach (EA). It will touch upon the challenges we see in a Greenlandic context and the basic methods for gathering inputs on management. Examples will include the Pikialasorsuaq - a large polynya spanning across the northern part of Baffin Bay and the soon-to-be-published management plan for the sea bed covering the entire Greenland EEZ. The presentation will also describe the political foundation for management and the relevant goals in "Greenlands Biodiversity Strategy 2030".

Speaker Dr. Warsha Singh is a senior scientist at the Marine and Freshwater Research Institute, Iceland. Her professional background is marine ecosystem research in Arctic and Sub-Arctic seas for the last decade. She is chairing the ICES working group on Integrated Ecosystem Assessment of Iceland waters. She also leads the aquatic resources assessment and monitoring specialization line for the UNESCO GRÓ Fisheries Training Programme.

Title: Ecosystem based management plans for Iceland waters - connecting the fundamental components.

Abstract: The Iceland ecoregion is situated where the Mid-Atlantic Ridge intersects with the Greenland-Scotland Ridge with an interplay of different water masses which creates a highly productive environment rich in marine and associated terrestrial life. The region is also highly susceptible to oceanographic changes. In concert with recent changing oceanic conditions, spatial range shifts of key marine species have been observed, which can create profound knock-on effects on socioeconomics. Marine and coastal fisheries play a significant economic and cultural role for Icelandic society. The region has ample data from research and governing institutions on various components of the ecosystem. The recent initiation of an Integrated Ecosystem Assessment (IEA) for the region will facilitate compilation of the ecosystem status for informed integrated management measures. In this talk, the national and international laws and policies that lay the foundation for ecosystem approach will be discussed linking IEA, biodiversity conservation efforts, and avenues to incorporate the human dimension. This will elucidate the inception of a formal ecosystem-based management framework for the region.



Interview and discussion



Our interviewer

Ph.D. Einar Pétur Jónsson is studying multiple stressors in the marine environment. He employs experimental approaches to understand stressors' effects on model organisms, putting an emphasis on understanding the physiological performance curve of each stressor on its own before choosing treatment levels to combine in a multiple stressor setup.



Title: Ecosystem risks from human activities in the fast-changing Central Arctic Ocean – Possible Management option in The Arctic Toolbox.

Abstract: The remote, ice-covered 2,8 million km² large Central Arctic Ocean (CAO) extending to 4000 m depth, are subjected to global warming. The CAO is possibly becoming ice-free by 2050 and human activities and pressures are likely to increase in the future. We present the first Integrated Ecosystem Assessment (IEA) of the present living ecosystem providing knowledge on what parts of the ecosystems are at risk toward current local and global pressures from human activities. A major challenge in performing the IEA is the limited scientific information from this, which may contain species still to be identified and missing insights to be filled. We identified long-lived ice-obligated seabirds and marine mammals, and possible undiscovered endemic benthos and vulnerable habitats, to be at possible risk from pollution, noise, and seabed disturbance, respectively, given high enough exposure in space and/or time. In this presentation we identify possible research opportunities such as mapping vulnerable biodiversity of the sea floor, establishing ecosystem trends in pollution levels, and monitoring of ship traffic and noise, to facilitate and guide management efforts to protect and maintain ecosystem integrity. We also describe international agreements and their management tools that enable protection and conservation of the Arctic marine environment.

Speaker Dr. Lis Lindal Jørgensen, senior scientist at the Institute of Marine Research, Tromsø, Norway is a principal scientist with more than 20 years of experience in ecosystem-based and seabed science within the Norwegian Institute of Marine Research. She leads the international ICES-PICES-PAME working-group identifying ecosystem risk in the Central Arctic Ocean and has been engaged in the Arctic Council for the last 15 years within PAME. She is co-lead of the expert group developing the Ecosystem Approach to Management in the Large Marine Ecosystems.

Speaker Dr. Charlotte Carrier Belleau is a marine biologist interested in the effect of multiple environmental stressors on benthic communities, ecosystem functioning and services in polar regions and along environmental gradients. Her work focuses on determining how organisms respond to different stress intensities, combinations, duration and frequencies. She focuses on species that are directly or indirectly consumed by Arctic communities and measure cellular, physiological and responses that can affect different environmental processes.



Speaker Director and Senior Advisor Elizabeth McLanahan from the National Oceanic and Atmospheric Administration (NOAA) International Affairs serves as the U.S. Representative to the Arctic Council's Protection of the Marine Environment (PAME) and the Sargasso Sea. She also represents the U.S. in a number of important international fora including the United Nations Environment Program (UNEP), the Convention on Biological Diversity, and Biodiversity Beyond National Jurisdiction (BBNJ) Negotiations.

Speaker PhD. Konstantinos Deligiannis-Virvos is a Research Fellow with the Norwegian Centre for the Law of the Sea (NCLoS) at UiT-The Arctic University of Norway. He is focusing on shipping and ecosystem approach. Konstantinos study law and holds a master's degree in Public International Law and in the Law of the Sea. He has worked as a lawyer in Greece and as a BlueBook trainee in the European Union Commission, in the Directorate-General responsible for the EU's Common Fisheries Policy.

DAY 3: 17 APRIL

SESSION 2. EXPLORING MULTIPLE KNOWLEDGE SYSTEMS TO IMPROVE INTEGRATED ECOSYSTEM ASSESSMENTS.



Convener Cand.scient Biology / Stud. Jur Inge Thaulow, MSc in Biology, brings a wealth of expertise to her role as an international chief advisor for the Government of Greenland. With a profound understanding of climate-related issues, marine scientific and management initiatives, as well as in-depth knowledge of the legal regimes and challenges facing the world's oceans, Inge is dedicated to addressing international biodiversity concerns and environmental conventions and agreements. Her leadership spans various capacities, including chairing the Conservation of Arctic Flora and Fauna (CAFF) from 2006 to 2009 and assuming the CAFF chair from 2023 to 2025. Moreover, she represented the Kingdom of Denmark as the Head of Delegation within CAFF from 2009 to 2023. Inge's commitment extends to numerous Arctic Council projects, particularly those focusing on marine issues, such as the identification of Arctic Marine areas of heightened ecological and cultural significance. She also chaired the Steering Committee of the Arctic Biodiversity Assessment in 2010. Her engagement in climate-related issues and marine scientific and management initiatives within the UN and other related fora underscores her dedication to addressing pressing environmental challenges on a global scale



Keynote speaker Herb Nakimayak (ICC Executive Council Member) was elected as the Vice-President (International) for ICC Canada at the 14th General Assembly held in Kuujjuaq, Canada in July 2022. Mr. Nakimayak previously held the seat of ICC Canada Vice President (International) from July 2014-2018. Mr. Nakimayak was elected to the 18th Legislative Assembly of the Northwest Territories in November 2015 until 2019, serving as MLA for the constituency of Nunakput. Mr. Nakimayak began working for Fisheries and Oceans Canada as Senior Manager in 2020 promoting marine conservation activities in the development of the new “Arctic Region” based in Canada’s Western Arctic. He serves as chairperson for the Fisheries Joint Management Committee in Inuvik, NT and was appointed chair of the Joint Secretariat in 2022. Herb believes that Indigenous knowledge is the key to conservation and protection of our ways of life which will protect the ecosystems we live in. How we interact with the ecosystem says a lot about us.

Title: Co-Management: a way to mobilize Inuit Knowledge to inform ocean management

Abstract: Inuit are stewards of the marine environment in a holistic way, inherently with an ecosystem view and understanding. The co-application of scientific evidence and Indigenous knowledge in decision-making about ocean management is of paramount importance. Indigenous views and approaches, when authentically and equitably mobilized and applied, are key to informing sound ocean management, conservation, and protected areas in the Arctic. Examples of Inuit led and co-management agreements for the conservation and management of species and habitats highlight the effectiveness of application of both scientific and Indigenous Knowledge systems for fully informed ocean management. Through co-management, community-based research and engagement has become a reality and provides a mechanism for a wealth of both Inuit Knowledge and scientific knowledge to be applied. In the Inuvialuit Settlement Region, where I am from, these knowledge systems have been brought together to co-deliver multiple programs across decades, including one of the longest and most comprehensive monitoring programs for beluga whales globally. This has included a spectrum of activities, from enumerating harvested animals to the sampling of tissues to determine mercury loads. Similarly, co-management activities to conserve Arctic char have benefitted from extensive mobilization and application of Inuit Knowledge to inform collective understanding of the linkages of char with environment. Co-management continues to illustrate and foster an understanding of the importance of responding to and valuing Indigenous Knowledge of this species and environmental changes that are impacting this species and communities. Leadership of Inuit to develop boundary crossing conservation areas, such as Pikialasorsuaq, again point to the importance of relying on Inuit Knowledge that spans colonial borders to better protect and understand critical regions for many species. My talk will highlight such examples, showing the benefits of fully acknowledging Inuit and Inuit Knowledge for National and International Ocean management.



Speaker Dr. Tom Christensen is the section manager at department of Ecoscience - Arctic Environment at Aarhus university, Denmark. He is the co-chair of the Arctic Council working group of the Conservation of Arctic Flora and Fauna (CAFF) and established the Circumpolar Biodiversity Monitoring Programme (CBMP).

Title: The Circumpolar Biodiversity Monitoring Program: Developing harmonized and adaptive monitoring techniques, methods, and data to inform an Ecosystem Approach to Management

Co-author: Cathy Coon (NOAA).

Abstract: The Arctic Council working group, the Conservation of Arctic Flora and Fauna (CAFF) established the Circumpolar Biodiversity Monitoring Program (CBMP), an international network of scientists, governments, Indigenous organizations, and conservation groups working to harmonize and integrate efforts to extend and develop monitoring and assessment of the Arctic's biodiversity two decades ago. Its relevance stretches beyond the Arctic to a broad range of regional and global initiatives and agreements and lends itself towards scientific input into Ecosystem Based Management. The CBMP program which provides monitoring advice can serve as an addition into the implementation of EBM and morph the identified six element approach to the EA framework into an iterative and circular process. Arctic marine biodiversity faces increasing threats from a variety of anthropogenic stressors including, chemical pollutants, climate change, and ocean acidification. The primary objective of CAFF's Circumpolar Biodiversity Monitoring Programme, CBMP, is to provide early detection of changes in biodiversity and ecosystems and to coordinate ongoing monitoring and measure trends that can be used to inform the development of international policies to mitigate further degradation of Arctic biodiversity. CBMP, is an adaptive and question driven ecosystem based monitoring programme. This ecosystem-based approach integrates information across ecosystems, species, and their interactions, and lends itself to monitoring central biotic aspects of Arctic ecosystems called Focal Ecosystem Components (FECs). Changes in FECs status likely indicate changes in the overall marine and Coastal environment and which therefore CBMP monitors and tracks. The release of the State of Arctic Biodiversity reports as first outcomes from implementation of the CBMP ecosystem monitoring plans demonstrates how cooperative efforts to monitor and report on biodiversity can both help identify status and trends, as well as identify vital gaps in monitoring. The following are overarching prerequisites identified in the implementation of the CBMP: effective coordination, sufficient and sustained funding, improved standards and protocols, co-production of knowledge and equitable involvement of IK approaches, data management to facilitating regional analysis and comparisons, communication and outreach to raising awareness and engagement in the program, ensuring resources to engage in international fora to ensuring program implementation.



Speaker Dr. Øystein Leiknes is the head of Section for ocean management and marine biodiversity at the Norwegian Environmental Agency and co-chair for the CBMP Marine Steering Group.

Title: New data and assessments to inform marine planning

Abstract: Humans are an important part of the marine ecosystems and it's the human activity that is managed through national policies and regional and global agreements. With global warming showing great impact on marine ecosystems and ambitions to increase the "blue" value-creation it is vital to collect and share knowledge on marine ecosystems across borders. An essential part of ecosystem-based management is a system for updating a knowledge base on environmental status to evaluate if environmental goals are met and if not, what measures need to be implemented to achieve the agreed goals. The Circumpolar Biodiversity Monitoring Program (CBMP) is the biodiversity monitoring program of the Conservation of Arctic Flora and Fauna (CAFF), the biodiversity Working Group of the Arctic Council. Through its network of scientists, Indigenous organizations, and conservation groups, CBMP coordinates, collects and synthesizes existing monitoring data from the Arctic States. The data/knowledge syntheses produced by CAFF-CBMP are designed to assist policy and decision-making at global, regional, national, and local levels. The State of the Arctic Marine Biodiversity Report (SAMBR), published in 2017, represents a focal product of the CBMP-Marine. The implementation plan includes updating the SAMBR and to develop an online monitoring guide and metadata inventory.



Speaker Dr. Donald McLennan is a terrestrial ecologist with over 30 years of Arctic experience both as a consulting ecologist, as a senior scientist at Parks Canada and the Canadian High Arctic Research Station (CHARS), as Chief Scientist at the Arctic Research Foundation (ARF), and now as an independent researcher at COENOSIS. Donald led a team that developed the Parks Canada Ecological Integrity Monitoring Program and worked to implement co-production of knowledge projects in several communities in the western Canadian Arctic. Donald is co-chair of the CAFF Coastal Steering Group and is co-representative for Canada's Terrestrial Monitoring Steering Group. Donald's present research focus is developing useful ecosystem classification and maps for Arctic tundra and coastal ecosystems.

Title: Bridging knowledge systems to inform ecosystem assessments: Co-production approaches in the CBMP Coastal Plan

Abstract: Arctic coasts support one of the most rapidly changing ecosystems in the world. These changes are having important impacts on Arctic coastal biodiversity and supporting ecosystem processes, with resulting effects on the food security of Arctic coastal communities and Indigenous cultural continuity. By drawing on diverse knowledge bases, including science, Indigenous Knowledge, and local knowledge, subject experts can provide multiple kinds of information on the condition of Arctic coastal species. We will present and discuss opportunities and challenges in the implementation of co-production approaches and highlight efforts underway in several Arctic states to bring these diverse knowledge sources together to create a shared platform for co-production of knowledge in Canada and around the circumpolar Arctic. The presentation will be informative to those interested in

understanding the potential contributions of co-production approaches to climate change impacts, and for helping to mitigate impacts of increased shipping and industrial activity oil spill prevention and response, food security and sovereignty, and the blue economy in Arctic coastal and marine areas.

Speaker Joshua Komangapik is an Inuk from Iqaluit, Nunavut and is where he currently lives. He has a background in protected area planning for Environment and Climate Change Canada (ECCC) and Parks Canada. He is currently on leave from his position with ECCC to pursue his MSc in Environmental Practice at Royal Roads University. He is passionate about the environment, Inuit rights, and for Inuit to be represented in governing Inuit Nunangat.

Title: Using SIKU as a source of Indigenous Knowledge to implement the CBMP Coastal Plan in Canada and beyond to inform ecosystem assessment. Indigenous Canadian Youth Fellowship Joshua Komangapik (CAFF, Canada)

Abstract: The Indigenous Canadian Youth Fellowship is a partnership between the Conservation of Arctic Flora and Fauna (CAFF), the Inuit Circumpolar Council (ICC), and the Arctic Eider Society (AES) to provide career development opportunities for an Inuit youth that will inform the Circumpolar Biodiversity Monitoring Program's (CBMP) Coastal Monitoring Program. The CBMP Coastal Monitoring Program is taking a co-production of knowledge approach to understanding and assessing the current state of biodiversity in coastal ecosystems of the circumpolar Arctic. As a component of plan implementation, the CBMP Coastal Monitoring Program is creating a geo-tagged and mapped data base of metadata describing monitoring and research that may inform an assessment of the state of Arctic coastal biodiversity. The goals of the Fellowship is for the Fellow to work with CAFF, ICC, and AES to use data within the AES-led SIKU app (<https://siku.org/>) which is a mobile app and web platform by and for Inuit providing tools and services for ice safety, wildlife, language preservation and weather. The Fellow is currently working with data in the SIKU app to help inform the Indigenous Knowledge component of the CBMP monitoring program. Using Inuit observation data from the app, the Fellow is compiling wildlife data to help inform the state of coastal, terrestrial, and freshwater species in the Qikiqtaik region in Nunavut, adjacent to the community of Sanikiluaq.





Speaker Dr. Laurene Divine is the Director, Ecosystem Conservation Office, Tribal Government of St. Paul Island. She is also the HoD for the Aleut International Association: PAME and AMAP, support CAFF CBMP. Her education and experiences in Alaska have brought her to a unique position where she spans the boundaries across western sciences; knowledge systems; tribal, federal and state management; and stakeholder engagement through community-based and citizen science program management. She seeks to strengthen relationships across these boundaries in order to better serve community, wildlife, and ecosystems of the Pribilof Islands, Alaska, and broader Arctic. She identifies as a white, middle class, American female from Tybee Island, Georgia, the ancestral homelands of the Mvskoke (Muscogee), Yamasee, and Guale. She has had the privilege to live and work as a guest on Unangaꝰ, Dĕnĕndeh, Tanana and Dena'ina lands and waters for over ten years. She recognizes her own identity and positionality can influence all aspects of [research](#), including the questions, study design, data collection, and analysis. She strives to respectfully operate through an Indigenous lens to realize positive benefits to the Indigenous communities she works with.

Title: Strength of knowledge systems to improve collective understanding of climate change

Coauthor: Maya Reda-Williams

Abstract: Knowing is a process. The way that each comes to know, through being, experiences, and listening, is important to the generation and transfer of knowledge, but western science and colonialism aim to separate for the purpose of de-humanization of both people and place. We must remember that people matter in ocean governance, and Indigenous Peoples are not a monolith. There exists numerous accessible examples that showcase the strength of knowledge systems that have improved our collective understanding of climate change. Indeed, this type of work has been documented in various forms for decades. Rather than walk through specific, detailed examples of how knowledge systems have been applied improve understanding of climate change, this presentation will demonstrate how we as researchers can shift from using dominant colonial western scientific frameworks to Indigenous frameworks, such as food security and two-eyed seeing, and Indigenous-led approaches, which have been refined over time by Original land defenders and water protectors. If researchers seek to to improve ecosystem-based management in a changing climate, there is incredible strength in self-education to honor and respect Indigenous and traditional knoweldge; relationship building to effectively engage in co-production of knowledge methodologies; and honoring Indigenous ethics and best practices.



Convenir Dr Marie-Julie Roux is a research scientist at the Maurice-Lamontagne Institute of Fisheries and Oceans Canada. She has conducted research in the Canadian Arctic, South Atlantic and South Pacific, working across scales from local artisanal to regional and high seas fisheries. Her areas of expertise are fisheries ecology, risk assessments, knowledge co-production and scientific communication. Her current work focuses on the incorporation of climate and ecosystem considerations in the formulation of scientific advice for marine resource use, and on climate adaptation of socio-ecological fisheries systems in Canada.



Convenir Assistant Professor Enooyaq Sudlovenick is Inuk from Nunavut in the Qikiqtaaluk region (Baffin). She is an Assistant Professor at the University of Prince Edward Island in the Faculty of Indigenous Knowledge, Education, Research, and Applied Studies. She is also completing a PhD at the University of Manitoba, working on beluga whale health and Inuit Qaujimagatuqangit (IQ - Inuit Knowledge). Mrs. Sudlovenick specializes in Arctic marine mammal health through contaminants, pathogen serosurveys, One Health approaches, and IQ. She also works to document Inuit knowledge and uses it as a research framework in her research projects (see <https://www.enooyaqsudlovenick.com/>). She has completed a Master of Science in veterinary medicine at the Atlantic Veterinary College in University of Prince Edward Island, working on ringed seal health in Iqaluit, NU. Additionally, she holds a BSc in Marine Biology from the University of Guelph. Mrs. Sudlovenick was born and raised in Iqaluit Nunavut and grew up hunting and camping throughout Baffin Island. Inuktitummit sivulliqpaa uqausiqqtunga (Inuktitut is my mother tongue).



Keynote speaker Dr. Mette Skern-Mauritzen; Institute of Marine Research (IMR), Norway have a research interests revolve around drivers of variation in trophic interactions, food webs and ecosystem structure and dynamics. I use both empirical and modelling approaches, and have in recent years assisted the implementation of ecological processes in an Atlantis ecosystem model for the Nordic and the Barents Sea. I am furthermore involved in developing ecosystem-based management and ecosystem-based fisheries management, including Integrated Ecosystem Assessments (IEA) and use of IEAs for management advice.

Title: Working across multiple disciplines, perspectives, and information sources in Integrated Ecosystem Assessments

Abstract: Integrated Ecosystem Assessment (IEA) is a comprehensive approach used to evaluate and understand the dynamics, interactions, and status of marine ecosystems. It involves the systematic collection, analyses, and synthesis of data and information on various components

within the ecosystem, including biological, ecological, social, and economic aspects. Hence, IEAs are used to provide a holistic view of the ecosystem, and often involves interdisciplinary collaboration among natural and social scientists, managers, policymakers, and stakeholders, to evaluate the impacts and potential threats of human activities and climate change, and to identify and evaluate solution options for sustainable management and conservation.

IEAs are often considered as data and information hungry approaches most suited for data rich systems. However, a number of qualitative, semiquantitative and quantitative methods are in use, that efficiently utilize a range of data and information sources that are also adaptable to data poor systems. In Norway, we have applied a range of these methods both in research projects and specifically to support the spatial cross sector management plans for the Norwegian sectors of the Barents, Norwegian and North Seas. In this presentation, I will present some of the assessment methods and results and discuss challenges regarding interdisciplinarity and working across a diversity of perspectives, data and information availability, and knowledge gaps and uncertainties. Finally, I will address challenges we face when bridging IEAs and management to support sustainable development.



Speaker Assistant Professor Enooyaq Sudlovenick Faculty of Indigenous Knowledge, Education, Research, and Applied Studies, University of Prince Edward Island

Bio: See above

Title: Forming wholistic research in Inuit Nunaat

Abstract: Northern research is currently undergoing a paradigm shift. Most funding agencies and institutions require some semblance of 'incorporating' other ways of knowing or to include some form of qualitative research methodologies to traditionally 'hard' or natural sciences. There are many different models to bring both scientific inquiries together in a project. This presentation will aim to address some of the big-picture questions and to provide some basic resources for researchers as they move through their northern research. Various models and qualitative theories will be explored to clarify terminology often used in research involving interviews or community partnerships



Speaker Dr. Shelley Denny is a Mi'kmaq from Eskasoni First Nation and the Senior Advisor at the Unama'ki Institute of Natural Resource (UINR). She attended Acadia University where she obtained her BSc in Biology and later obtained her MSc in Biology at St. F.X University, and PhD at Dalhousie University.

Her research interests are in exploring ways Indigenous and western knowledge can be used for the benefit of all, known as Two-Eyed Seeing. Her doctoral research built on her current interest and experience at UINR by exploring how Aboriginal and treaty fisheries can be governed in Nova Scotia using Two-Eyed Seeing.

Title: How Indigenous Knowledge Can Strengthen EBM Approaches

Abstract: As Canada enters an era of reconciliation, opportunities for the application of Indigenous knowledge to current fisheries management is becoming a new and exciting reality. Similarities exist between Ecosystem Based Management (EBM) and Indigenous knowledge systems (IKS) as both strive for a holistic form of management, however, understanding differences between EBM and IKS can offer alternatives. In this presentation, a common understanding of Indigenous knowledge systems and the nuances identified between Mi'kmaq knowledge and EBM will be used to suggest how EBM approaches can be strengthened.



Speaker Dr. Anne-Sophie Crépin is associate professor of Economics, the deputy director of the Beijer Institute and Principal researcher at Stockholm Resilience Centre. Her research focuses on the complex interactions between society and nature on a human-dominated planet and how these intertwined dynamics influence the risk of large-scale abrupt changes and how can society deal with this risk and sustain long term human well-being. To address these topics, she combines economic theory with behavioral economics, theories of resilience, complex systems, regime shifts, and the Anthropocene. Most of her work is collaborative and crosses disciplinary borders, including for example economics, ecology, sustainability science, earth system science, and hydrology. She has studied all kinds of natural systems including the Arctic Ocean, fisheries, grasslands, coral reefs, and forests, focusing on optimal and common property management, policy interventions, and how to address fast and slow dynamics, uncertainty, and diversity often with a strong focus on regime shifts, which are large, abrupt and persistent changes in a system's structure and function.

Title: Social-ecological systems interactions and decisions on sea food in Arctic and sub-Arctic seas.

Abstract: Integrated ecosystem assessments (IEAs) are central to support ecosystem-based management. IEAs are conducted to document the past and current state of marine ecosystems. They also contribute to a better understanding of ecosystem processes and of the impact of human activities and climate on ecosystem state and their

potential for the provision of goods and services. A key feature of IEA is that they bring together scientists and other actors to decide what the assessment should focus on, how to do it, and how to interpret the results. This requires participatory approaches in which scientists and non-scientists interact to jointly elaborate the assessment. In this presentation I will discuss some opportunities and challenges associated with the operational development of participatory science in IEAs. I'll discuss on how scientists think about and understand knowledge (the scientific attitude). I will review IEA steps where participatory approach might be most beneficial, the risks and limitation associated with participatory work, and the specific case of participatory science in the context of the integrated assessment of the Arctic Ocean.



Speaker Dr. Benjamin Planque from IMR, Norway holds a PhD in biological oceanography from the University 'Pierre et Marie Curie' (Paris, France, 1996). He has worked as a research scientist at the Center for Environment Fisheries and Aquaculture Science (CEFAS, UK), the French Institute for the Exploitation of the Sea (Ifremer, France) and is now based at the Institute of Marine Research in Tromsø (IMR, Norway). His research is focused on fish ecology, climate impact on marine populations, spatial ecology, foodweb ecology, fish stock assessment, integrated ecosystem assessment, modeling of complex systems, quantitative approaches to evaluate resilience and predictability in marine ecosystems and scenario building.

Title: Participatory science to support Integrated Ecosystem

Assessment.

Abstract: The multitude of human activities with global scale impacts has now become a dominant force shaping and changing the planet in general, the Arctic and sub-Arctic seas, in particular. This modifies the intertwined natural and socioeconomic dynamics in the Arctic to such an extent that the future is becoming more and more uncertain due, for example, to possible abrupt transitions in the region that may result from global warming, change in socioeconomic activities and potential geopolitical threats. We cannot reliably predict what might happen in the future by just extrapolating from past data trends. We need to explore new ways to use our existing knowledge to guide stewardship efforts for the Arctic. These ways must recognize the scale, multiple sources, and intertwined properties of change, as well as multiple knowledges. Here we integrate methods from multiple fields to generate a methodological approach to study and plan with change in social-ecological systems. We apply this approach to five case studies linked to food production from the Arctic and Sub-Arctic Oceans to analyze them separately and jointly and propose possible stewardship actions to guide their future developments.



Speaker Dr. Eirini Glyki is a marine scientist with a background in physics and ecology and focus on Marine Socio-Ecological systems. She provides advice for Ecosystem Based Management with expertise in the science to policy interface. Her focus is on Marine Spatial Planning trade-offs with multi-level stakeholder engagement; and incorporating the human dimension in ICES advice. Eirini collaborates with senior ICES leadership to support the ICES Science Plan goal to deliver marine ecosystem and sustainability science, provides subject-matter guidance to ICES Steering Groups, and leads work on strengthening the ICES strategic science cooperation with special attention to Arctic research and Climate Change Resilience.

Title: Providing Ecosystem Based Management advice in the Arctic: an ICES case study

Abstract: ICES is an intergovernmental organization of twenty member states and a global scientific community engaging over 5000 scientists from nearly sixty countries. Its mission is to advance and share scientific understanding of marine ecosystems and the services they provide and to use this knowledge to generate advice for meeting conservation, management, and sustainability goals. The ICES Strategic Plan establishes the ecosystem approach as the central tenet that governs how ICES provides independent advice on the management of human activities in our seas and oceans. How can an advice process gathering the best available scientific knowledge be transparent, documented, and unbiased? What Ecosystem Based Management advice products are readily available, and which are the questions advice requestors need to ask? How can ICES EBM existing products contribute to bringing forward Arctic EBM and what are the new pathways that need exploration?

DAY 4: 18 APRIL

SESSION 3. HOW CAN WE ESTABLISH PARTICIPATION, KNOWLEDGE EXCHANGE AND SCIENTIFIC INTEGRITY IN EBM POLICY-MAKING?



Convener Senior Arctic Adviser Marianne Kroglund (Norwegian Environment Agency and previous AMAP Chair) is a biologist by training and spent the first years of her career researching the biological effects of acidification. Later, she started working in the Norwegian Ministry for Environment, mainly engaged in international policy work related to the UN Commission on Sustainable Development, the UN Environment Programme, and the Convention on Biological Diversity. Later she got the opportunity to work on the development of integrated management plans for areas of the North Sea and Skagerrak, compiling information about the environmental conditions, causes, and impacts of environmental pressures - a process that required cooperation between the authorities, scientists, and stakeholders. She has also been part of the Norwegian delegation to PAME. Today, her main task is to coordinate and integrate Arctic activities and initiatives at the Environment Agency. She is Norway's head of delegation to AMAP, and supports Norway's delegation to IPCC on Arctic issues.



Keynote speaker Former Mayor Harry K. Brower Jr. (Utqiagvik, Alaska, USA) was the Mayor of the North Slope Borough and lifelong resident of its northernmost community, Barrow Alaska. Harry is a whaling captain and is a proud provider to his wife and five children, numerous relatives, and members of his community as a very active subsistence hunter. Harry has served previously as the Deputy Director of the Borough's Wildlife Management Department, Chairman of the Alaska Eskimo Whaling Commission, and Chairman of the Subsistence Subcommittee of the Arctic Waterways Safety Committee. In addition to his work on behalf of bowhead whale and other marine mammal subsistence hunters, Harry has been heavily involved in the design and implementation of efforts to document levels of subsistence harvest in the North Slope villages and land use by subsistence hunters. Harry also serves as a member in numerous committees and councils in Alaska and has involved himself internationally, representing the Inupiat people at meetings of the International Whaling Commission. He has participated in numerous public hearings and public meetings regarding potential impacts of industrial activity to wildlife and subsistence hunting activities. Harry is a regular guest presenter on subsistence related topics at various local, state, and national conferences.

Title: Inuit On the Periphery of Ecosystem-Based Management: Implementation will be more Successful where Inuit Food Security is Recognized and Inuit are Ethically and Equitably Engaged.

Abstract: Inuit hold a deep, intricate knowledge and understanding of the Arctic, our homeland, where we utilize the ocean, the ice, marine

mammals, birds, and fish for our food security, transportation, economy, and cultural sustainability. The ecosystem approach is not new to Inuit. It is how we see and understand the world around us. Our approach is holistic and recognizes that our people and our culture are a part of the ecosystem, which is made up of multiple and diverse parts that are equally important. For example, a youth sharing his first catch and our community feasts are just as important as the zooplankton. Our Inuit worldview on the environment we live within aligns with the ecosystem approach. However, there are significant gaps in recognizing Inuit within the Arctic ecosystems through outside management approaches. These gaps put Inuit on the periphery regarding outside human impacts on the Arctic from activities like commercial fishing, shipping, and even research. The Inuit Circumpolar Council has been working over several years to bring understanding of what Indigenous Knowledge is and advocate for Indigenous Knowledge to be equitably and ethically included in research, management, and all matters that affect our way of life. We truly believe that bringing Indigenous Knowledge and science together through a co-production of knowledge can generate new knowledge and understandings of the world that would only be achieved through utilizing more than one knowledge system. If done right, a co-production of knowledge will bring a more holistic understanding of the Arctic ecosystem, and the results will be more equitable and inclusive and will benefit the health and overall well-being of the entire Arctic ecosystem.



Speaker Dr. Vito De Lucia is a Full Professor of (International) Law and Director of the Norwegian Centre for the Law of the Sea. He teaches courses on International Environmental Law, Law of the Sea, Comparative Law and Legal Philosophy. His main research interests are located at the intersection of critical theory, law and ecology, with particular focus on international environmental law, ecosystem governance and ocean commons. He has been academic observers on the intergovernmental negotiating process that led to the adoption of a new global treaty on the conservation and sustainable use of marine biodiversity in areas beyond national jurisdiction. He is author of "The Ecosystem Approach in International Environmental Law. Genealogy and Biopolitics" (Routledge, 2019)

Title: Caught in the middle? The Ecosystem Approach between Law, Policy and Science

Abstract: The Ecosystem Approach (EA) is one of (several) concepts that emerged within conservation science and later developed into legal concepts aimed at facilitating the sustainable management of biological diversity. One such journey is not without peril though, as concepts traverse vocabularies, conceptual frameworks, goals, and ultimately (must) function in a diverse array of institutional contexts. One branch of this journey has led to the integration of EA in the new treaty on marine biodiversity in areas beyond national jurisdiction, as one of the guiding principles and/or approaches. This offers an opportunity to explore the relationship between law, policy and science as it has been captured in the BBNJ treaty and how it may develop once (and if) the treaty enters into force.



Speaker Dr. Catherine Chambers is a senior scientist at the Stefansson Arctic Institute and Research Manager at the University Centre of the Westfjords in Ísafjörður, Iceland. Her specialties focus on human dimensions of fisheries, cultural heritage, ocean governance, human relationships with marine resources, changing coastal communities, fishers' knowledge, ocean literacy, and small-scale fisheries. Recent research involves intergenerational justice in small-scale fisheries and climate change mitigation in fisheries-dependent communities. Professional appointments include chair of the Social and Human working group of the International Arctic Science Committee and vice chair of the University of the Arctic Thematic Network on Ocean Food Systems. Catherine serves on the Icelandic Ministry for the Environment and Natural Resources task force on Arctic affairs and the Icelandic Ministry of Fisheries and Agriculture strategic policy formation working group.

Title: Lessons learned from using a Simple Social Ecological Systems approach in analysing international pelagic fisheries

Abstract: Pelagic fisheries (including mackerel, herring, capelin, and blue whiting) in the Northeast Atlantic involve a complex of political, environmental, social, and economic factors in a system dependent on industrial fishing and vertically integrated companies that operate internationally, compete internationally, and yet depend on international cooperation for long-term sustainability and continued access to fisheries with shifting distributions. In this way, the Northeast Atlantic pelagic fisheries make for an interesting case study in how to establish participation and knowledge exchange between sectors, stakeholders, and rightsholders. This research aims to develop and demonstrate a generally applicable Social Ecological System framework for supporting ecosystem-based management and marine spatial planning in a rapid and integrative manner, with co-design and co-production by stakeholders. The approach is based on systems analysis to describe as simply as possible the baseline system function, and use it to test scenarios, identify options for adaptation, and set goals and objectives for the fishery. Scenarios will be designed to analyse motivations and identify opportunities for behavioural change that could strengthen sustainability or have other positive social impacts. This case study contrasts greatly from other common implementations of tools used to implement ecosystem-based management in fisheries as it does not from the outset include quantitative ecological modeling nor a place-based approach, but instead has the potential to reveal drivers of competition, cooperation, and adaptation among large business operations.



Speaker Dr. Camilla Brattland (UiT, Tromsø, Norway) is a coastal Sámi person and an associate professor in Sami cultural history and research at the Norwegian Arctic University Museum at UiT - the Arctic University of Norway. She has an interdisciplinary background in Indigenous studies and fisheries social science. Her current projects include a focus on the transformation of local ecological and traditional knowledge into usable information for marine ecosystem-based management and restoration efforts.

Title: Facilitating and transforming local and Indigenous knowledge production for ecosystem-based management.

Abstract: This talk centres on ongoing efforts to restore social-ecological systems with a basis in local ecological and traditional knowledge of fjord systems in coastal Norway. Based on several projects centred on mapping and documentation of traditional and contemporary subsistence harvest in the Porsangerfjord, one of the main take-aways is the need to facilitate the production of local ecological knowledge through systematic community-based research. This involves not only collection of local ecological knowledge by external or local researchers, but building capacity to make knowledge usable and transform it into a format that has the power to influence ecosystem-based management and policy. In terms of documentation and inclusion of Indigenous and in this context coastal Sámi knowledge, the projects have also piloted ways to include the values and worldviews of Sámi knowledge holders through the development of video narratives and StoryMaps to counteract the extraction of knowledge from its place- and space-specific context. Ultimately, further local and Indigenous knowledge production depends on the development of university-community research alliances to sustain systematic transformation of knowledge for sustainable management.



Speaker Dr. Kirstin Holsman (NOAA, Alaska Fisheries Science Center, Seattle, USA) kirstin.holsman@noaa.gov began her work at the Alaska Fisheries Science Center working on climate-enhanced multispecies assessments with the Resource Ecology and Ecosystem Modeling program. With a focus on Alaska fisheries, she developed quantitative methods to support climate-informed Ecosystem Based Management, including methods to identify climate risk, adaptation, and resilience in ecosystems and marine communities. This includes multiple collaborations to develop and implement climate-informed stock assessment models for fish species, engagement and coordination across Integrated Ecosystem Assessments, research to advance bioenergetics and food-web models, and authorship on national and international Climate Assessments. Since 2016 she has co-lead the Alaska Climate Integrated Modeling Project evaluating climate-change impacts on the Bering Sea ecosystem and fisheries under various future management and climate scenarios.

Title: Collaboration, engagement, and planning to identify needs, challenges, and opportunities for climate-informed EBM in the North Pacific and Arctic

coauthor: Diana Stram (North Pacific Fishery Management Council, Anchorage, USA); Sarah Wise (NOAA, Alaska Fisheries Science Center, Seattle, USA); Anne Hollowed (University of Washington, Seattle, USA); Katie Latanich (North Pacific Fishery Management Council, Anchorage, USA)

Abstract: The Bering Sea in Alaska (USA) is one of the most productive marine ecosystems worldwide, supporting vibrant ecosystems, critical subsistence harvests, and some of the world's largest sustainable commercial fisheries. Food, protein, and macronutrients from these harvests are fundamental to food and nutritional security at regional to global scales and are a core component of food sovereignty, social cohesion, and personal identity for Alaska communities of practice and place. Yet, climate change and attendant climate shocks pose an unprecedented challenge to regional social-ecological connections and fisheries which are increasingly disrupted by ecological and human responses to altered conditions. Ecosystem-Based Management provides a framework to navigate some of the novel challenges of rapid change, but requires accelerated implementation of climate-informed management processes and advice. We present an overview of approaches to operationalize climate-informed advice and discuss progress and challenges from two recent efforts in the Bering Sea: the North Pacific Fishery Management Council's Bering Sea Fishery Ecosystem Plan Climate Change Task Force and the Alaska Climate Integrated Modeling project. We discuss lessons learned from these and broader efforts to operationally deliver climate-informed advice across multiple Large Marine Ecosystems in North America through a nascent Climate, Ecosystem, and Fisheries Initiative.



Speaker Parnuna Egede Dahl is an Inuk from Nuuk, Greenland. She works as a Special Advisor for Oceans North Kalaallit Nunaat, focusing on science, communication, and campaigns for the sustainable use of marine living resources and marine protection in Greenland. As a former Advisor on Environmental Issues for ICC – Greenland, and research assistant for Brown University, she has experience on interfaces between science, policy, and engagement of Indigenous Peoples. She holds a MSc in biology with specialty in biological oceanography. She recently submitted her PhD dissertation for assessment at Ilisimatusarfik - University of Greenland and Aalborg University in collaboration with ICC – Greenland.

Title: Means of engagement using EBM approach in Greenlandic Ocean Governance processes.

Abstract: Oceans North Kalaallit Nunaat (ONKN) is a Greenland-based environmental NGO and non-profit charitable organization. ONKN promotes marine protection and the sustainable use of marine living resources in partnership with the Greenlandic society. Drawing on examples from past and current engagement processes in relation to e.g. Pikiyasorsuaq, the PISUNA project, and the proposed new

Fisheries Act, ONKN will highlight challenges and workarounds in implementing an EBM approach in Greenlandic Ocean Governance processes. ONKN will also offer perspectives on how Greenland could move towards an EBM approach and will share its plans for engaging Greenlandic communities in suggesting potential marine protected areas in Greenland waters.



Convener Tonje Margrete Winsnes Johansen works as an advisor in the Saami Council's Arctic and Environmental Unit and is the head of delegation to the Sustainable Development Working Group in the Arctic Council. Johansen has studied Political Science at the Norwegian University of Science and Technology. Through her studies she has focused on gender equality, statistical analysis, and resource conflict. This continues to be matters of particular interest in her current work. Currently, Johansen leads the Saami Council's project *Gender Talks in Sápmi*. In the Saami Council, she also focuses on socio-economic issues, climate change and sustainable development in the Arctic. She is from the small sea Sámi community Gussanjárga in Lágesvuotna on the northern Norwegian side of Sápmi, and is currently residing in Tromsø.



Keynote Speaker: Dr. Professor David Natcher, University of Saskatchewan, Canada and University of the Arctic Chair in Water, Energy and Food Security in the Arctic.

Title: Cascading Impacts of Climate Change on the Water, Energy and Food (WEF) Nexus Security in the Arctic

Abstract: Arctic regions are being disproportionately affected by climate change. Although contributing negligibly to global greenhouse gas emissions, the Arctic receives some of the most severe climate related impacts. While propagating significant changes in key ecological systems, the cascading impacts of climate change are simultaneously disrupting the social and economic conditions of Arctic communities. Cascading effects can be understood as a consequence of direct climate impacts that generate secondary changes in social and ecological systems. Because the cascading effects of climate change follow dynamic and non-linear pathways, effective interventions and adaptive societal responses have proven elusive. To date, the implementation of adaptive strategies has been uneven, and due to the wicked nature of climate change, risk compounding existing vulnerabilities. This has proven particularly true when responses are siloed in design. My objective in this presentation is to introduce the conceptual utility of the Water, Energy, Food (WEF) nexus as a starting point for forecasting, visualizing, and anticipating the cascading impacts of climate change on Arctic WEF systems. I do not offer a blueprint or 'masterplan' for community responses, but rather encourage iterative and adaptive approaches to problem solving that recognizes that both climate change impacts and societal response(s) can be simultaneously wicked in nature.



Speaker Dr. Martin Sommerkorn is Head of Conservation for the WWF Arctic Programme. He brings science underscoring the role of nature for social-ecological resilience to the policy-making table and leads work on Arctic biodiversity conservation and governance. In his first career as an Arctic ecosystem scientist Martin gathered first-hand experience of the Arctic's unique places, peoples and concerns while working in Siberia, Alaska, Greenland, Svalbard and Scandinavia. Martin was lead author for several Arctic Council assessments and coordinating lead author for the Polar Regions chapter of the IPCC's Special Report on the Ocean and Cryosphere in a Changing Climate.

Title: What internationally agreed goals inform the implementation of the ecosystem approach – do we have the guidance and tools we need to sustainably use Arctic marine ecosystems and maintain their integrity under rapid change?

Abstract: The Arctic Ocean and its adjacent seas are being rapidly transformed by the impacts of climate change and mounting economic activities driven by actors responding to climatic, political and economic developments. At the same time, the global community is establishing and implementing new goals and mechanisms to counter steer the continued degradation of our planet driven by human expansionism and overexploitation. For example, in embedding biodiversity conservation and the ecosystem approach, the United Nations Global Biodiversity Framework sets out targets for Parties to safeguard and sustainably manage biodiversity, the objective of the United Nations emerging High Seas Treaty is to ensure the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction, and the goal of the Central Arctic Ocean Fisheries Agreement is to prevent unregulated fishing through the application of precautionary conservation and management measures. This presentation will discuss those objectives and targets asking what they may mean for the implementation of the ecosystem approach in and across Arctic LMEs in conditions of rapid change, whether we have and apply the tools we need, and whether stakeholders gather and can access the necessary information. Emphasis will be placed on ecological objectives and on tools that allocate and manage ocean space for current and future need with an ecosystem approach.



Speaker Senior Legal Adviser **Gunnstein Bakke**. Directorate of Fisheries in Norway since 2001. Fisheries management, Monitoring, Control and Surveillance, MCS, international fisheries negotiations with emphasis on ecosystembased management. Since 2009 engaged in national and international processes where fisheries and environmental issues meet.

Title: Other Effective Area based Conservation Measures, OECMs, within the high Arctic Norwegian Ocean Territories

Abstract: The northernmost commercial fisheries in the world take place in the northern Barents Sea up to around 80° N. This is an area where global warming is particularly intense and where large, previously ice-covered areas are now more accessible to fishing vessels. This raised questions whether existing conservation and management measures are adequate and the answer for several reasons was no. New

regulatory measures, including four large preliminary closed areas covering 442,022 km² and an additional ten closed areas covering more than 3260 km² that protects sites with biodiversity, specific to the region where developed in response to the conclusion. The new measures, which came in the form of an amendment to a 2011 regulation related to the management of impacts from bottom fisheries on ecosystems, is based on knowledge derived from more than 10 years of scientific surveys of the seabed ecology. A key finding here is that cost-efficient, large-scale mapping and monitoring of seabed ecosystems is important for the development of area-based regulations of fishing activities. In the process of developing the regulation the Directorate of Fisheries made its own analysis of the data from the scientific surveys by a novel approach using commercially available software. Such area-based measures also contribute to the achievement of the 30 x 30 target and UN Sustainable Development Goal 14.5 on protecting maritime areas.

Interview and discussion



Our interviewer Olivia Lassalineas (*Fisheries and Oceans Canada*) is a Policy Advisor with the International Ocean Policy team at Fisheries and Oceans Canada and support to the Head of Delegation to the Protection of the Arctic Marine Environment Working Group for Canada. She works on foreign policy and diplomacy matters related to ocean conservation in the Arctic and Antarctic. Olivia holds a master's degree in International Affairs.

Title: Pikialasorsuaq as an example of Inuit-led management

Abstract: The Pikialasorsuaq, or North Water Polynya, is a dynamic area of open sea shared by Canada and Greenland that remains ice-free throughout the winter and is recognized as one of the most biologically productive areas in the Arctic. It is relied upon by Inuit communities for traditional uses and as a gateway for travel. The Pikialasorsuaq is also undergoing human-induced change. In response to these rapid environmental changes, in 2017, the Inuit Circumpolar Council (ICC) released a report, *People of the Ice Bridge: The Future of the Pikialasorsuaq*, which issued key recommendations for action on the Pikialasorsuaq related to the management and protection of the region. A strong example of Inuit-led conservation, the Pikialasorsuaq showcases benefits, best practices, and lessons learned for ecosystem-based management and transboundary conservation efforts in the north. This panel discussion will reflect on efforts taken to date to protect and manage the Pikialasorsuaq, as well as next steps for its conservation.



Recorded remarks by **Sara Olsvig**. Olsvig is the International Chair of the Inuit Circumpolar Council. Olsvig is a long-time Indigenous Peoples' rights and human rights defender, and a politician who has served as member of the Parliament of Denmark (2011–2015) and the Parliament of Greenland (2013–2018). Sara Olsvig actively contributed to the work of the Constitutional Commission of Greenland as well as the Human Rights Council of Greenland. Olsvig holds a Master of Science in Anthropology and is currently a PhD candidate, Institute of Social Science, Economics & Journalism, Department of Arctic Social Science & Economics at Ilisimatusarfik, the University of Greenland. Olsvig is a recipient of the 2023 Womenomics Inclusion Award. Sara Olsvig is Inuk, and was born in Nuuk, Greenland, where she resides with her partner and their children.



Speaker **Mr. Richard Paton** Assistant Executive Director, Marine and Wildlife Stewardship, Qikiqtani Inuit Association. Richard is the Assistant Executive Director, Marine and Wildlife Stewardship at QIA. Richard joined QIA in July of 2020. Richard is an accomplished communicator, leader and strategist. Previously he held Senior Management positions within several departments of the Government of Nunavut and Chief Operating Officer for Nunavut Tunngavik. He has been a strong advocate for Inuit employment and self-governance. His 20-years of work towards advancing Inuit employment has strengthened his resolve towards advancing Inuit governance in conservation in the Qikiqtani region. He is a hunter, fisherman and father of 5 boys from the community of Iqaluit, Nunavut, Canada.



Speaker **Herb Nakimayak** (ICC) (see bio above)

Our young professional and knowledge holder group



PhD. Konstantinos Deligiannis-Virvos (Norway) is a Research Fellow with the Norwegian Centre for the Law of the Sea (NCLOS) at UiT-The Arctic University of Norway. He is focusing on shipping and the ecosystem approach. Konstantinos comes from Greece and he studied law in the Democritus University of Thrace. He also holds two master's degrees, one in Public International Law from the National and Kapodistrian University of Athens, and one in the Law of the Sea from UiT - The Arctic University of Norway. He has worked as a lawyer in Greece and as a BlueBook trainee in the European Union Commission, in the Directorate-General responsible for the EU's Common Fisheries Policy. His doctorate thesis is titled "The Implementation of the Ecosystem Approach in Shipping: Norwegian Practice and Perspectives".



Dr. Charlotte Carrier Belleau (Canada) is a marine biologist interested in the effect of multiple environmental stressors on benthic communities, ecosystem functioning and services in polar regions and along environmental gradients. Her work focuses on determining how organisms respond to different stress intensities, combinations, duration and frequencies. She focuses on species that are directly or indirectly consumed by Arctic communities such as clams and mussels and measure cellular, physiological and responses that can affect different environmental processes (e.g., nutrient cycling, energy transfer, etc.).



Ph.D. Einar Pétur Jónsson (Iceland) is studying multiple stressors in the marine environment. He employs experimental approaches to understand stressors' effects on model organisms, putting an emphasis on understanding the physiological performance curve of each stressor on its own before choosing treatment levels to combine in a multiple stressor setup.



Malou Platou Johansen (Greenland) is an Inuk who grew up in Nuuk. She has since the age of 16 lived on and off the island and residing in many different countries mostly for education purposes. Malou was a Rotary Youth Exchange student in Australia for a year after finishing 10th grade and before starting high school. After a year in the high school in Nuuk she went to finish an International Baccalaureate at Lester B. Pearson - United World College on Vancouver Island, Canada. Malou worked as student helper after graduating high school at the Greenland Institute of Natural Resources (GINR) in the Fish and Shellfish department and worked there for a few summers after. She has a bachelor's degree in joint marine biology from Memorial University of Newfoundland and is currently a master's student at the Arctic University of Norway (UiT) in Tromsø, where she is studying Arctic Marine Ecology. Her master's thesis is about the marine fish biodiversity in Northeast Greenland and is supervised by Arve Lynghammar and Laurene Pecuchet. Malou has attended multiple research cruises with GINR (2016-2024) and was part of the Arctic Ocean cruise organized by the Norwegian Polar Institute in August 2023. She likes scuba diving, cross-country skiing, snowboarding, knitting and beading as well as meeting new people and exploring the world.



Camilla Hjorth Scharff-Olsen (Denmark) is an early-career scientist with a background in biology and molecular ecology. Her work at ICES Secretariat consists in supporting and facilitating the production of science into advice. She acts as an intermediary between the Integrated Ecosystem Assessment Steering Group (IEASG) and its network of experts, ICES Secretariat, and the team behind ICES Ecosystem Overviews. Prior to joining ICES, she was involved in research projects such as; seals diet in the greater Baltic Sea and the conflict with fisheries; population structure and putative ecotypes in Arctic ringed seals and wolves; and restoration of stone reefs.



PhD. Igor Eulaers (Norway) is an ecologist focusing on risk assessment of environmental stressors on the health and functioning of wildlife and ecosystems, particularly those with high sentinel capacity or subject of rapid change. Currently, his post-doctoral research at the Norwegian Polar Institute performs integrated risk assessment of climate change and pollution with persistent organic pollutants in Arctic ecosystems. His research approach has always been interdisciplinary, across stress ecology, systems ecology, ecotoxicology and biogeochemistry, and has in recent years been focussed strongly on transdisciplinary understanding of complexity and causality. In addition to providing fundamental scientific knowledge Igor participates in the development of solutions to aid management and policy to sustainably manage and conserve Arctic wildlife and ecosystems. As such, Igor is active in several multi-stakeholder risk assessment projects, Arctic Monitoring and Assessment Programme working groups, Society of Environmental Toxicology and Chemistry Interest Groups, as well as Marine Spatial Planning.



Bonnie Hamilton (Canada) is an ecotoxicologist and National Geographic Explorer. She received her PhD from the University of Toronto and is currently a postdoctoral fellow at Environment and Climate Change Canada. Her work focuses on understanding the ecological effects of anthropogenic stressors in freshwater and coastal ecosystems. Her research combines principles from aquatic ecology, environmental toxicology, and conservation biology to investigate questions on the environmental fate, transport, and multi-stressor effects of emerging contaminants under a changing climate. To date, most of her work has been centered in the Canadian Arctic with a focus on community-based monitoring of plastic pollution and their chemical additives. Bonnie takes a transdisciplinary approach in her research by weaving different ways of knowing and fostering co-creations with community partners. In addition to her research, Bonnie serves as a technical expert on the Arctic Monitoring and Assessment Program's microplastic working group, as part of the Arctic Council, is a yearly instructor at the National Biodiversity Teach-In, and an avid science communicator across local, national, and international platforms. Website: www.bonniemhamilton.com



Joshua (Josh) Komangapik (Canada) is an Inuk from Iqaluit, Nunavut and is where he currently lives. He has a background in protected area planning for Environment and Climate Change Canada (ECCC) and Parks Canada. He is currently on leave from his position with ECCC to pursue his MSc in Environmental Practice at Royal Roads University. He is passionate about the environment, Inuit rights, and for Inuit to be represented in governing Inuit Nunangat.



Emily Stidham (USA) is a Master's student working with Dr. Russell Hopcroft at University of Alaska Fairbanks. The research has been a part of the Northern Gulf of Alaska Long Term Ecological Research (NGA-LTER) program, funded by the U.S. National Science Foundation. Her thesis is looking at a 20-year time series along the Seward Line of the Northern Gulf of Alaska of a group of zooplankton called mucus-net feeders, specifically pelagic tunicates and pteropods. In August 2023, she had the good fortune to participate in the Arctic Ocean Cruise II, sponsored by the Norwegian Polar Institute, where she got a glimpse into the world of polar zooplankton work. In the future she hopes to continue her academic career on gelatinous zooplankton, particularly in higher latitudes.



Dr. Anni Djurhuus (the Faroe Island) main research interest is in conservation and climate change especially regarding biodiversity changes. Most of Anni's research is regarding the natural environment and ranges from hydrothermal vents, seamounts, deep-sea, tropics, penguins, and much much more. Anni's main research focus currently is on eDNA for biodiversity and impact assessments on the Faroe Shelf, virus fluctuation on the Faroe Shelf, municipality sewage contamination, and the Marine Biodiversity Observation Network (MBON) project.