Proceedings of the Regional Peer Review of Marine Protected Area Network (MPAN) Design Strategies for the Western Arctic Biogeographic Region, Part 1; May 8, 2018

Laura Murray, Joclyn Paulic, Leah Brown, Karen Dunmall, Steve Ferguson, John Iacozza, Tracey Loewen, Lisa Loseto, Shannon MacPhee, Andrew Majewski, Jessica Mitchell, Andrea Niemi, Mark Ouellette, Colleen Parker, Evan Richardson, Virginie Roy, Bethany Schroeder, Ashley Stasko, and David Yurkowski

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PROCEEDINGS OF THE REGIONAL PEER REVIEW OF MARINE PROTECTED AREA NETWORK (MPAN) DESIGN STRATEGIES FOR THE WESTERN ARCTIC BIOGEOGRAPHIC REGION, PART 1; MAY 8, 2018

by

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Canada has committed to establishing a national network of Marine Protected Areas (MPAs) in support of integrated coastal and oceans management. Under the National Conservation Plan, Fisheries and Oceans Canada (DFO) is responsible for coordinating the development of an MPA network (MPAN) in the Western Arctic Biogeographic Region (WAB). The development of this MPAN includes identifying design strategies that achieve the conservation goals for the bioregion.

DFO Oceans Program has been tasked with leading the development of the WAB MPAN. To better inform the development of design strategies for the MPAN, DFO Oceans Program has requested science advice on methods for developing design strategies to address the conservation priorities, set conservation targets, provide recommendations on the types of areas (features) to be protected within the network, and ensure that the requirements to achieve Operational Objectives (OOs) are adequately captured within the MPAN design.

A regional science peer-review meeting was held May 8, 2018 in Winnipeg, Manitoba to provide an overview of both the national and regional MPAN planning process, an overview of the conservation priorities identified for the WAB MPAN, and to review available information (including geospatial) to identify data requirements to support Operational Objectives. The meeting included participants from DFO Science and Oceans Program, the Centre for Earth Observation Science, Environment and Climate Change Canada, and World Wildlife Fund Canada. This meeting is Part 1 of a two-part science advisory process that will focus on developing design strategies for the WAB MPAN.

This Proceedings report summarizes presentations and breakout group discussions from the peer-review meeting.

RÉSUMÉ

Murray, L., Paulic, J., Brown, L., Dunmall, K., Ferguson, S., Iacozza, J., Loewen, T., Loseto, L., MacPhee, S., Majewski, A., Mitchell, J., Niemi, A., Ouellette, M., Parker, C., Richardson, E., Roy, V., Schroeder, B., Stasko, A., and Yurkowski, D. 2026. Proceedings of the Regional Peer Review of Marine Protected Area Network (MPAN) Design Strategies for the Western Arctic Biogeographic Region, Part 1; May 8, 2018. Can. Manuscr. Rep. Fish. Aquat. Sci. 3328: vi + 26 p. https://doi.org/10.60825/zzyh-ef16

Le Canada s'est engagé à établir un réseau national d'aires marines protégées (AMP) à l'appui de la gestion intégrée des côtes et des océans. Dans le cadre du Plan de conservation national, Pêches et Océans Canada (MPO) est chargé de coordonner l'élaboration d'un réseau d'AMP (RAMP) dans la biorégion de l'ouest de l'Arctique (BOA). L'élaboration de ce RAMP comprend l'identification de stratégies de conception permettant d'atteindre les objectifs de conservation pour la biorégion.

Le Programme des océans du MPO a été chargé de diriger l'élaboration du RAMP de la BOA. Afin de mieux éclairer l'élaboration de stratégies de conception pour le RAMP, le Programme des océans du MPO a demandé des avis scientifiques sur les méthodes d'élaboration de stratégies de conception pour donner suite aux priorités de conservation, établir des cibles de conservation, fournir des recommandations sur les types de zones (caractéristiques) à protéger au sein du réseau et veiller à ce que les exigences pour atteindre les objectifs opérationnels soient adéquatement prises en considération dans la conception du RAMP.

Une réunion régionale d'examen scientifique par les pairs a eu lieu le 8 mai 2018 à Winnipeg (Manitoba) afin de donner un aperçu du processus de planification national et régional du RAMP et un aperçu des priorités de conservation établies pour le RAMP de la BOA et d'examiner l'information disponible (y compris géospatiale) pour déterminer les besoins en données pour appuyer les objectifs opérationnels. La réunion a réuni des participants du Secteur des sciences et du Programme des océans du MPO, du Centre des sciences de l'observation de la Terre, d'Environnement et Changement climatique Canada et du Fonds mondial pour la nature-Canada. Cette réunion constitue la première partie d'un processus consultatif scientifique en deux parties qui sera axé sur l'élaboration de stratégies de conception pour le RAMP de la BOA.

Le présent compte rendu résume les présentations et les discussions des petits groupes de la réunion d'examen par les pairs et reflète les commentaires.

LIST OF ACRONYMS

AOI – Area of Interest

BREA – Beaufort Regional Environmental Assessment

CCP – Community Conservation Plan

CO – Conservation Objectives

CP – Conservation Priority

CSAS – Canadian Science Advisory Secretariat

CWS – Canadian Wildlife Service

DFO – Fisheries and Oceans Canada

EBSA – Ecologically and Biologically Significant Area

ECCC – Environment and Climate Change Canada

Eco-Unit – Ecological Unit

ESSCP – Ecologically Significant Species and Community Properties

GNWT – Government of the Northwest Territories

HTC – Hunters and Trappers Committee

ISR – Inuvialuit Settlement Region

MBS – Migratory Bird Sanctuary

LOMA – Large Ocean Management Area

MCT – Marine Conservation Target

MPA – Marine Protected Area

MPAN – Marine Protected Area Network

NCRI – Nunavut Coastal Resources Inventory

NMCA – National Marine Conservation Area

NRCan – Natural Resources Canada

OO – Operational Objective

OEABCMs – Other Effective Area Based Conservation Measures

SAGE - Science Advice for Government Effectiveness

SO – Strategic Objective

TK – Traditional Knowledge

ToR – Terms of Reference

USGS – United States Geological Survey

WAB – Western Arctic Biogeographic Region

WWF – World Wildlife Fund

INTRODUCTION

A Fisheries and Oceans Canada (DFO) Canadian Science Advisory Secretariat (CSAS), regional peer-review meeting was held on May 8, 2018 at the Freshwater Institute in Winnipeg, Manitoba (with some participants participating through teleconference and WebEx). The purpose of the meeting was to provide review of Marine Protected Area Network (MPAN) Design Strategies for the Western Arctic Biogeographic Region (WAB).

Terms of Reference (ToR) for the review (Appendix 1) were developed in response to a request for advice from DFO Oceans Program, Central and Arctic Region. Participants included DFO (Science, Oceans Program), Environment and Climate Change Canada, the Centre for Earth Observation Science, and the World Wildlife Fund (Appendix 2). Unlike most CSAS meetings there was no working paper to review.

The meeting Chair welcomed participants and described the role of CSAS in the provision of DFO peer-reviewed science advice. Participants introduced themselves and described the expertise that they brought to the discussion. The Chair reviewed the Agenda (Appendix 3) and the Terms of Reference for the meeting, highlighted the objectives, and identified the expected products from the review (i.e., Proceedings). Participants were reminded that everyone at the meeting was a participant and that they were expected to contribute fully to the discussions. Laura Murray (DFO Science) was identified as rapporteur for the meeting. The conclusions and advice resulting from this review will be used to inform the development of a design strategy methodology to address conservation priorities, set conservation targets, provide recommendations on the types of areas to be protected, and ensure that the requirements to achieve Operational Objectives (OOs) are adequately captured within MPAN design.

SESSION 1 – MPAN 101: INTRODUCTION TO CANADA'S FRAMEWORK FOR MPA NETWORK PLANNING

WELCOME AND INTRODUCTIONS

Presenter: Joclyn Paulic

Participants were welcomed to the meeting and the agenda was reviewed. The Chair provided an overview of DFO's science advisory process, as well as the objectives and plans for the meeting. It was explained that DFO is a science-based department, and that science advice is guided by a set of principles and guidelines outlined by SAGE (Science Advice for Government Effectiveness). SAGE principles include early identification, inclusiveness, sound science and advice, uncertainty and risk, openness, and review. Science advice is developed through the Canadian Science Advisory Secretariat (CSAS) peer review and advisory process. This process provides review of many topics such as stock assessment, Species at Risk, Oceans management, and others. The present meeting was planned as Part 1 of a two part peer review process. Anticipated CSAS products include Proceedings (Part 1, Part 2), as well as a Science Advisory Report and Research Document (Part 2 only).

This science advisory process resulted from a request for Science to provide a review toward the development of MPAN design strategies. Objectives for Part 1 of the regional peer review are to: (1) provide an information session on the DFO National Framework for MPANs in Canada and an update of the regional MPAN planning process; (2) provide an overview of conservation priorities (CPs) identified for the Western Arctic Bioregion (WAB) MPAN; (3) review available information (including geospatial) to identify data requirements (e.g., species distribution, migration routes, proxies, habitat mapping) to support the development of targets for CPs (e.g., life history features) in the WAB; and, (4) develop the work plan and Terms of Reference for Part 2 of this process.

An additional outcome of the meeting will be to develop a work plan for DFO Oceans program to follow-up with subject-matter experts regarding information sources that can be used to develop geospatial layers, and to develop and validate those layers for the creation of a geospatial database for CPs for the WAB.

Looking ahead, objectives for Part 2 of the regional peer review will be to: (1) evaluate OOs and associated conservation targets for CPs to determine if they are appropriate to support MPAN goals, (2) evaluate the methodology used to develop design strategies for the WAB, (3) determine if the methods may be appropriate to apply in other regions, and (4) identify and discuss uncertainties, knowledge gaps, and research needs.

PRESENTATIONS

The purpose of the presentations and discussion in this first part of the meeting were to provide an overview of the MPAN planning process to address Objectives #1 and #2 of the Terms of Reference, which were to:

1. Provide an information session on the DFO National Framework for MPANs in Canada and an update of the regional MPAN planning process; and,
2. Provide an overview of the conservation priorities identified for the WAB MPAN.

NATIONAL FRAMEWORK FOR MPA NETWORK PLANNING

Presenter: Jessica Mitchell

MPAN planning in Canada is guided by Canada's international commitments, specifically to the United Nation's Convention on Biological Diversity (Aichi Target 11), which includes a target of protecting at least 10% of coastal and marine areas by 2020. Additionally, the Mandate letter for the Minister of Fisheries and Oceans stated a conservation target of protecting 5% of the marine environment by 2017. The budget prescribed for these targets included in 2016 $81.3 million over 5 years to DFO and Natural Resources Canada (NRCan) to support marine conservation activities, and $42.4 million over 5 years to Parks Canada and NRCan for the creation of new National Parks and National Marine Conservation Areas (NMCAs). These targets represent a milestone and may increase past 2020. Foundational principles to achieve marine conservation targets (MCT) include:

- Science-based decision making;
- Transparency; and,
- Advancing reconciliation with Indigenous groups.

The five-point plan for implementation of marine conservation targets includes:

- Finishing what was started (i.e., gazetting existing marine areas up for designation);
- Protecting large offshore areas;
- Protecting areas under pressure;
- advancing development of other effective area-based conservation measures (OEABCMs); and,
- Fast-tracking the establishment of *Oceans Act* MPAs.

An MPAN is a collection of conservation areas that work together to protect ecological components of the ocean, and marine biodiversity overall. Goals for MPANs (as set out in the *National Framework for Canada's Network of MPAs* (Government of Canada 2011)) include:

1. Providing long-term protection of marine biodiversity, ecosystem function, and special natural features;
2. Supporting the conservation and management of marine resources and their habitats, as well as the socio-economic values and ecosystem services they provide; and,
3. Enhancing public awareness and appreciation of marine environments and maritime history and culture.

There are 13 marine biogeographic regions identified in Canada (DFO 2009a). MPAN planning is currently underway in 5 priority bioregions: Northern Shelf, Western Arctic, Newfoundland – Labrador Shelves, Estuary and Gulf of St Lawrence, and Scotian Shelf. The MPAN development process includes:

- Data and information gathering (collecting/mapping/validating ecological, social, and economic data, as well as identifying existing conservation measures);
- MPAN design (identifying objectives and conservation priorities, considering existing data and conservation measures, developing the draft design);
- Implementation (designating areas); and,
- Management and monitoring (managing, monitoring, and evaluating the effectiveness of the sites, as well as the MPAN overall, with adaptive management as needed).

National guidance has been provided for incorporating economic use and Conservation Objectives into MPAN planning (DFO 2007, DFO 2009b, Government of Canada 2005, 2011). In addition, national science advice has been provided to identify marine bioregions (DFO 2009a), inform conservation objectives, and guide the incorporation of 'representativity' (DFO 2013b), as well as for MPAN monitoring (DFO 2013a). Key decision points where DFO Oceans Program is required to obtain formal science advice include for MPAN design strategies, and to inform approaches to MPAN monitoring. Engagement of partners and stakeholders is an essential part of the process, and may include reviewing documents, assisting in identifying and mapping areas, and providing feedback at various stages in the process.

Comments and Questions

A participant asked about where the WAB bioregion was in the MPAN process in comparison to other bioregions. The presenter explained that some regions are farther along (having draft MPAN design scenarios, such as the Scotian Shelf, or Newfoundland and Labrador Shelves), while others are at earlier stages than the WAB planning process.

Another participant asked about the inclusion of socio-economic issues into MPAN development. It was noted that regional co-management partners and stakeholders have previously been included in the MPAN planning process, but have recently stepped back for the time being. It was recognized that partner and stakeholder buy-in is an integral part of the MPAN planning process.

There was clarification regarding the 10% by 2020 target, i.e., that it may not be fully implemented but that that is the goal that is being worked toward.

MPA NETWORK PLANNING IN CANADA'S WESTERN ARCTIC BIOREGION

Presenter: Bethany Schroder

An MPAN is a collection of protected areas within a bioregion that work together to meet ecological conservation goals. They may be made up of various conservation measures, such as National Marine Conservation Areas (NMCAs) created by Parks Canada, National Wildlife Areas (NWAs) created by Environment and Climate Change Canada (ECCC), as well as *Oceans Act* MPAs (Government of Canada 1996) created by DFO. They will build upon conservation measures that already exist within the bioregion (e.g., existing MPAs and Migratory Bird Sanctuaries (MBS)).

National Network Goals for MPANs are to:

1. Provide long-term protection of marine biodiversity, ecosystem function and special natural features;
2. Support the conservation and management of Canada's living marine resources and their habitats, as well as the socio-economic values they provide; and,
3. Enhance public awareness and appreciation of Canada's marine environments and rich maritime history and culture.

These goals inform Strategic Objectives (SOs), which are developed at a bioregional level. SOs in turn inform Conservation Priorities (CPs), which are identified for each SO. Operational Objectives (OOs) are created for each CP as goals for each, which will guide MPAN monitoring strategies. Design strategies can then be developed from OOs to guide the implementation of the MPAN (Figure 1). See List of Acronyms for further definitions.

The Western Arctic Bioregion (WAB) represents a large area that encompasses both the Inuvialuit Settlement Region (ISR) and the Kitikmeot region of Nunavut. Strategic Objectives for the WAB are to:

- Conserve and promote marine biodiversity, ecological representativity and unique natural features in the bioregion;
- Help maintain healthy and productive ecosystem structure, function and resilience within the bioregion;
- Conserve and protect traditional use, cultural heritage and archeological resources within the bioregion;
- Provide opportunities for awareness, research, and educational opportunities; and,
- Contribute to the mitigation of climate change impacts, where possible.

Considerations for identifying CPs included the species and areas identified by communities, features associated with SOs, human use, as well as considering previous national science advice (e.g., from Large Ocean Management Areas (LOMAs) (DFO 2007), representativity (DFO 2013b), Ecologically and Biologically Significant Areas (EBSAs) (DFO 2011, 2014), Ecological Units (Eco-Units) (DFO 2015), and Ecologically Significant Species and Community Properties (ESSCPs) (DFO 2018b). Design strategies involve considering the *types* of areas that should be protected, as well as *how much* of each area should be protected within a network. Principles of MPAN development include:

- EBSAs;
- Representativity;

- Connectivity;
- Replicated ecological features; and,
- Adequate and viable sites.

The timeline for the MPAN planning process for the WAB began in 2015 when co-management partners were engaged by DFO Oceans Program. To-date, the planning process has continued with gathering ecological and socio-economic data, and creating maps from those data. Current and future activities include identifying knowledge gaps and research priorities, creating a methodology for developing MPAN design strategies, developing draft MPAN design scenarios, and engaging with partners to review various MPAN design scenarios.

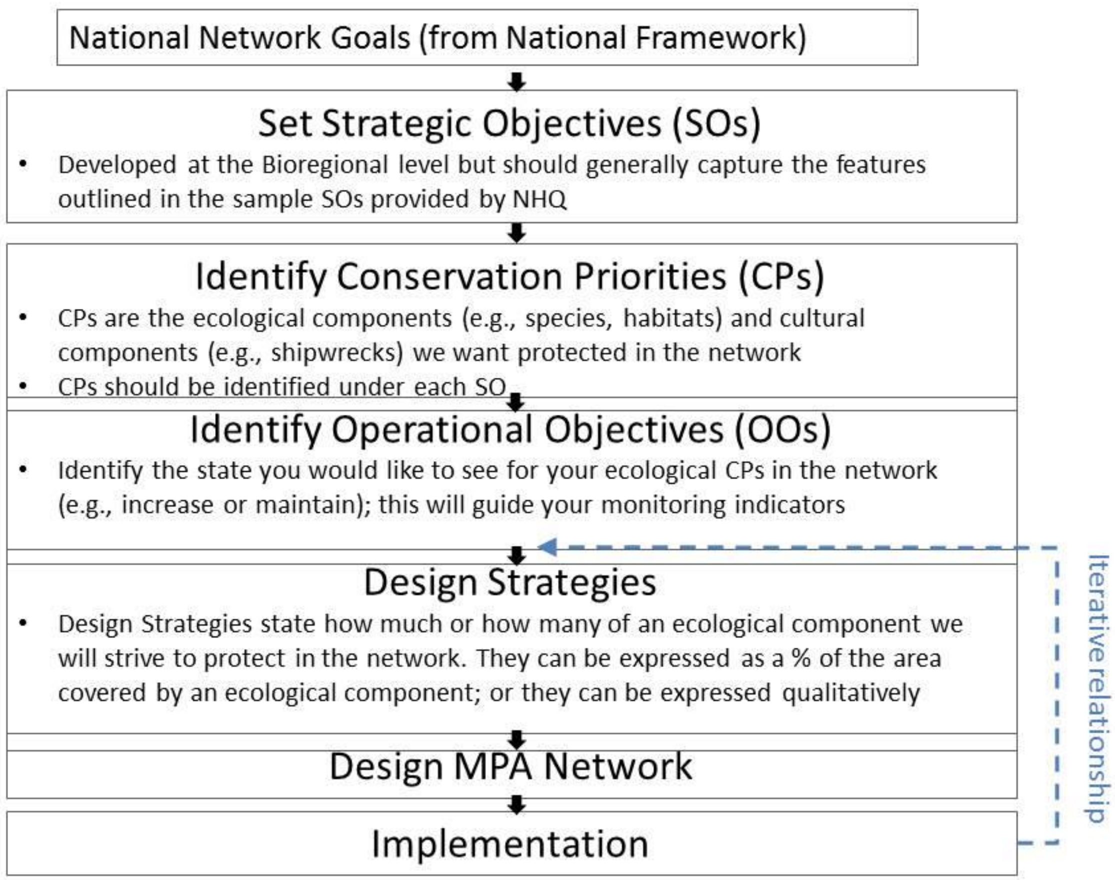

Figure 1. Flowchart of DFO's nationally-consistent MPA Network planning process (from: DFO Oceans program, National Capital Region).

Comments and Questions

A participant noted that other processes are on-going alongside the MPAN planning process (e.g., development of new Areas of Interest (AOIs) under DFOs Marine Conservation Targets). This was acknowledged by the presenter, who added that various marine conservation processes are not mutually exclusive, and information gathered from all activities can be incorporated into the final MPAN design process.

Another participant asked if an MPA could potentially be removed if it was found not to contribute toward MPAN goals. The presenter answered that this was technically possible but very unlikely; it would be more likely for the MPA to be modified to ensure it was meeting overall MPAN goals.

A participant asked if potentially the reason why co-management partners are not involved in MPAN development is due to the nature of the process. The presenter explained that the main reason why there was currently lack of involvement was due to higher-level political issues.

There was a question as to what the upcoming CSAS (Part 2) review would involve, and if it would involve the creation of a design or map, and if a Bayesian approach would be used to analyze MPAN design scenarios. It was answered that the next review would involve development of the methodology to identify design strategies, which DFO Oceans Program would eventually use to develop MPAN design scenarios.

CONSERVATION PRIORITIES FOR THE WESTERN ARCTIC BIOREGION

Presenter: Bethany Schroeder

Many information sources were considered in the creation of conservation priorities (CPs) in the WAB. These included species and areas identified by the communities, ecological features associated with SOs, human use of areas and resources, previous national science advice, and previous regional science advice. Sources of community input included community tours, Hunters and Trappers (HTC) meetings, ISR Community Conservation Plans (CCPs), and Nunavut Coastal Resource Inventory (NCRI) reports (NCRI 2010, 2011, 2014, 2015). Sources of previous national science advice included the identification of CPs and formulation of Conservation Objectives (COs) for LOMAs (DFO 2007), representativity (DFO 2013b), and guidance on the development of MPANs (DFO 2009b), and Ecologically Significant Species and Community Properties (ESSCPs) (DFO 2006). Sources of previous regional science advice included objectives and data considerations for MPAN planning (DFO 2015), as well as the identification of EBSAs (DFO 2011, 2014), Eco-Units (DFO 2015), and ESSCPs (DFO 2018b).

The CPs that were developed for the WAB include 5 marine mammals, 29 fish species/species groupings, 25 avian species/species groupings, and 15 oceanographic features. Input obtained from community tours included the following 14 high priority CPs: beluga whale (*Delphinapterus leucas*), bowhead whale (*Balaena mysticetus*), narwhal (*Monodon monoceros*), ringed seal (*Pusa hispida*), bearded seal (*Erignathus barbatus*), harp seal (*Pagophilus groenlandicus*), walrus (*Odobenus rosmarus*), polar bear (*Ursus maritimus*), Arctic Char (*Salvelinus alpinus*), Cisco (*Coregonus artedi*), Dolly Varden (*Salvelinus malma*), Whitefish (*Coregonus clupeaformis*), Loche (burbot) (*Lota lota*), and Coney (Inconnu) (*Stenodus leucichthys*). Not surprisingly, there were some differences in the priorities listed by each community, which highlights the challenges of planning across a broad geographic area, as well as the importance of gathering community-specific input. Next steps in the process include analyzing data availability and screening for availability of spatial information, as well as a follow-on prioritization exercise to reduce the list of CPs to a manageable size (e.g., DFO 2017a).

Comments and Questions

A participant asked if existing layers from past processes had been mapped. The presenter clarified that they had been mapped and that the layers had been pulled apart into their components to feed into the current process. It was also commented that the goal of the current meeting was to create species information maps which would be built upon as the planning process continues.

It was noted that the information available is biased toward coastal areas. This comment was acknowledged, and it was explained that gaps were being identified as well as considerations for how they could be filled (e.g., using ecological proxies). In the case of invertebrate CPs, substrate type or bottom depth could be used as a proxy for community composition.

A participant asked if more CPs could be added, and it was confirmed that more could be added. Caribou sea ice crossings were mentioned as a potential CP. This was not being considered at this point but it could be in future. Caribou crossings were a conservation concern identified by World Wildlife Fund (WWF) in the Eastern Arctic, and were also identified by DFO Oceans at the Ulukhaktok and Sachs Harbour community meetings. Maps for caribou crossings are available for the Kitikmeot region.

It was asked if the layers created were going to be used in Marxan for analysis. It was explained that this was a possibility but not necessarily the process that would be followed. Part of the reason for the current meeting was to gather available geospatial information and make it possible to use Marxan for analysis of MPAN design scenarios. There may also be a result where some areas would be analyzed qualitatively (e.g., offshore where there is less information, or the Kitikmeot region which has less information that the ISR) and others quantitatively with Marxan (i.e., coastal areas with more information).

It was asked when something final would be created from this process. It was explained that the final layers would be ready for review at Part 2 of this meeting. Due to the lack of partner participation at present, MPAN design scenarios would not be created in the immediate future.

SESSION 2 – BREAKOUT GROUPS: KEY GEOSPATIAL INFORMATION TO SUPPORT MAPPING OF CONSERVATION PRIORITIES

As part of the MPAN design process, DFO Oceans Program is developing a geospatial database that will include spatial layers for each CP. The breakout group sessions were for participants to provide guidance on how to develop the spatial layers for each CP, as well as provide direction to any additional sources of information. This would address Objective #3 outlined in the ToR, to:

- Review available information (including geospatial) to identify data requirements (e.g., species distribution, migration routes, proxies, habitat mapping) to support the development of targets for conservation priorities (e.g., life history features) in the WAB.

Breakout groups included groups discussing Marine mammals, Fish, and Lower Trophic CPs. In addition there was a short presentation to describe example geospatial database map layers.

EXAMPLE GEOSPATIAL DATABASE MAP LAYERS

Presenter: Jarret Friesen

DFO Oceans Program has been developing a geospatial database of CPs for the WAB, to use in development of MPAN design scenarios. An example of geospatial database map layers from this database was shown for Arctic Char and beluga whale, and the different ways layers (e.g., core feeding areas, areas of aggregation) could be viewed was demonstrated. Different layers can be turned on and off to view together or separately. Both science and Traditional Knowledge (TK) data are mapped according to species life histories. The goal is to have both the metadata and layers available on the Open Data Portal so they are publicly available. There is a process to this but it is being worked towards.

Comments and Questions

A participant asked if it was possible to map physical characteristics such as sea ice. The presenter explained that sea ice could not be mapped at this time, however this type of data could be accessed through the references linked to the layers. The Canadian Ice Service produces maps of percent concentration of sea ice coverage. The presenter explained that seasonality could be incorporated into the geodatabase in future. Ideas for displaying seasonality included different maps for summer/winter, or possibly adding multiple layers on a single map.

A participant asked about the inclusion of data-poor species or areas, such as areas in the High Arctic were there are no communities nearby. The presenter explained that proxies would be used where they could. Feedback on how to include data-poor species or features into database design is welcome.

A comment was made to remember that the MPAN process is designed to capture two different scales; representative features, as well as special features.

There was a discussion on the difference between sharing raw versus interpreted data. The layers that are being created are from data that is already publicly available.

The challenges in representing three dimensional data as layers was recognized, such as displaying different water masses and different seasons. It was asked if oceanographic experts had been consulted. The presenter explained that they had been consulted during the creation of Eco-Units so their expertise is embedded in the database, and DFO Oceans Program will also be consulting experts to vet layers included in the geospatial database in the future.

BREAKOUT GROUP SESSIONS

Marine mammals

Conservation priorities discussed by the marine mammal breakout group included: bearded seal, polar bear, ringed seal, bowhead and beluga. Narwhal were not identified as a conservation priority for the WAB network.

Bearded seal

It was discussed that for bearded seals benthic habitat is important, and likely more important than sea ice conditions. Flaw leads and areas with consistently open water (e.g., polynyas) were identified as important as well. Temporal differences in habitat use were identified, with more information available on winter distribution (i.e., during the ice-covered period) based on a polar bear kill dataset. Less is known about summer habitats of bearded seals. Rearing/mating areas are likely located on moving ice, not on fast ice. Differences in distribution by age were also identified, with younger seals utilising habitat closer to shore than do older seals. When diving, bearded seals spend the majority of their time in the upper water column. Their diet consists of molluscs, clams, and crabs.

Bearded seals were identified as widely distributed, occurring within the WAB from the Yukon to Banks Island. Important areas include the Cape Bathurst polynya, Amundsen Gulf between Nelson head to Cape Parry (with lots of polar bear kills in this area), and Cape Kellet. It was recognized that less is known for this seal species as it is not the focus in the Canadian Arctic (there is more harvest of ringed seals). Data sources include polar bear kill data, and community harvest data. Other sources of data that could be used include using Alaskan data to learn more about life history characteristics of bearded seal. Other experts to consult include Ian Stirling, Lois Harwood, and Tom Smith. It was asked if DFO has conducted spring bearded seal surveys, and what the distribution would be at this time. Suggested proxies included open water leads, benthic data, with core feeding zones potentially developed from a benthic proxy.

Polar bear

It was recognized that different types of individuals use different habitats depending on sex and age – with males, older females, and females with cubs all using different habitats. The North Beaufort, South Beaufort, and Viscount Melville Sound populations all use the WAB. There is a lot of knowledge on polar bears in the region. Sources of information include work by Evan Richardson (Environment and Climate Change Canada (ECCC)), the United States Geological Service (USGS), Government of Northwest Territories (GNWT) data on the Viscount Melville Sound population (with ECCC collaborating with GNWT, but GNWT retaining data), and the recent ISR TK report (Joint Secretariat 2015). There may also be relevant information in the Inuvialuit Settlement Region Polar Bear Joint Management Plan (Joint Secretariat 2017).

Possible conservation approaches were discussed, such as if subpopulations should be treated separately, and if the amount of animals or the genetic makeup of the animals should be the focus for conservation (i.e., conserving based on abundance or population?). It was also suggested that the conservation focus could be on more northern habitats that have not been as greatly affected by climate change (and where ice will persist for longer) as areas of resilience, such as the pack ice off the archipelago (ice being pushed by gyre).

Ringed seal

Ringed seal are more ice-associated than some other seal species, and shallower habitats are important. They are found closer to shore during certain periods of the year. The Amundsen Gulf fast ice is important for adults, while the pack ice west of the Cape Bathurst polynya is important for younger individuals. There is a fall migration of younger individuals along the Commonwealth shelf into Russia. The Amundsen Gulf is used in spring for fast ice and feeding during summer. In spring adult seals out-compete younger seals for shore pack ice. There also seems to be a barrier that causes seals (and mammal species in general) to move from west to east, and east to west. It was recognized that there are fewer ringed seals in the Kitikmeot region, and that there is also less known about them in this region. Sources of information include work by Dave Yurkowski, Lois Harwood and Tom Smith.

Beluga whale

Eastern Beaufort Sea beluga whales migrate from Alaska in springtime following leads in the sea ice. Every summer they aggregate in the Mackenzie River Estuary, where they are a conservation priority for Tarium Niryutait Marine Protected Area (TNMPA). They are also part of the conservation priority for Anguniaqvia niqiqyuam Marine Protected Area (AN MPA). Information from aerial surveys and telemetry programs provide information on beluga migration and movement (Richard et al. 2001, Hauser et al. 2014) and high use areas and high use areas have been identified along the Beaufort Sea Shelf, slope, Amundsen Gulf and Viscount Melville sound (Hauser et al. 2015, Citta et al. 2018). Habitat selection models are available for the estuary and offshore (Loseto et al. 2006, Hauser et al. 2017).

Bowhead whale

Participants identified that some bowheads come from the east and enter the west, e.g., in Viscount Melville Sound. It was also recognized that the majority of spatial data available is from tagged juvenile male whales (Harwood et al. 2017, Citta et al. 2018). An aerial survey (to distinguish between adults and juveniles) would be a useful exercise for future information.

Marine Birds

Sources of information for birds was also discussed, with MoveBank and Birdlife International (both mentioned as good sources for telemetry data). It was recognized that the entire Mackenzie shelf area is important for conservation, with the shelf break an especially important hotspot, as well as flaw leads. The Shelf area is used as a migration route or feeding location by many species. Some areas may be used as 'gas stations' – feeding areas along these migratory corridors, and if these areas are selected consistently year after year these may be important to protect.

Fishes

The best way to group fish CPs was discussed. It was suggested that species with more information known could be separated out (e.g., Arctic Cisco (*Coregonus autumnalis*), Arctic Char, Dolly Varden, Capelin (*Mallotus villosus*)), while data-poor species could be grouped (e.g., offshore species). This could be a coarse- and a fine-filter approach, with both functional groupings, and individual species pulled out if there is enough information for them, and if they were identified as CPs. The "Nearshore less mobile anadromous fishes" group could include Round Whitefish (*Prosopium cylindraceum*) and Inconnu. Elsewhere, marine fish communities have been grouped by depth, with groupings including the nearshore shelf (20–50 m), offshore shelf (50–200 m), upper slope (200–500 m), and lower slope (500 + m) (Majewski et al. 2017). Another grouping system by depth includes marine coastal (0–10 m), marine (with grouping of 10–50 m, 50–200 m, and > 200 m), pelagic (> 50 m), anadromous (with groupings of 0 – 5 m, and > 5m). This information is based on research in the Beaufort Sea, and may not be as relevant to the Kitikmeot region. It was noted that very little data is available for some species, such as Blackline Prickleback (*Acantholumpenus mackayl*) and Northern Wolfish (*Anarhichas denticulatus*). Several species with substantial data available were discussed in detail, below.

Arctic Cod

Arctic Cod are known to spawn in dense aggregations at depth, with the eggs floating up to sea ice (ice association). They then hatch under the ice. Franklin Bay is likely an important spawning area (Benoit et al. 2008, Geoffroy et al. 2011), however spawning areas are not known with certainty. The larval stage falls from the ice when they reach 35–55 mm to approximately 200 m depth to join the adults. They are widely dispersed during the larval stage, with higher concentrations found in the Amundsen Gulf, and embayments. They are associated with sea ice and the upper 60–100 m of the water column in open water. Geoffroy et al. (2016) has investigated the distribution of biomass in open water and noted high interannual variability. The timing of ice-off (and therefore sea surface temperature) is important for recruitment. Important areas include Amundsen Gulf embayments, polynya and flaw leads, Cape Bathurst, Dolphin and Union Strait, Lambert Channel, and Franklin Strait. Polynas and flaw leads provide feeding opportunities for larvae (Bouchard and Fortier 2008). Juveniles are associated with multi-year ice and open water (within the upper 60–100 m), and also passively get carried with currents. They are more dispersed than other life stages. Based on limited data (1 year), it appears they have a higher distribution in Amundsen Gulf. Adults are found at 200–500 m depth (generally at the Upper North Atlantic water mass), and are widely distributed and abundant in some years (Geoffroy et al. 2016, Majewski et al. 2016, 2017, Crawford et al. 2012). High interannual variability in biomass has been observed (Geoffroy et al. 2019).

There is seasonality in the distribution of Arctic Cod, with polynyas being important in spring, but not a relevant proxy in summer. Mapping should focus on the larval life stage and known areas of occurrence such as Amundsen Gulf embayments, polynya and flaw leads, Cape Bathurst, Dolphin and Union Strait, Lambert Channel, and Franklin Strait. It should also incorporate their ice association, and their association with the upper 60–100m of the water column. Knowledge gaps include areas that have not been studied as extensively (e.g., Viscount Melville Sound, northern areas such as the Canada Basin, and the Kitikmeot region). Also the summer aggregation occurs for a short period of time and is highly variable in both space and time. Winter distributions and spawning ecology are mostly unstudied in the Canadian Beaufort. Additional references include Bouchard et al. (2017, 2018) and information synthesized in DFO (2018b). Contacts for vetting information include Andy Majewski.

Dolly Varden

Dolly Varden reproduce in freshwater, with high site fidelity. Mouths of rivers along the North Slope are important. Mapping should include areas of reproduction such as mouths of rivers along the Yukon North Slope, as well as access to these rivers. Areas of feeding, migration, and aggregation should also be mapped, such as offshore marine areas (Colin Gallagher can provide information on general areas of aggregations), and migration in the upper water column. Knowledge gaps include the Kitikmeot region, where there is also confusion between Arctic Char and Dolly Varden populations. In addition there is a knowledge gap as to their dispersal habitats, as it appears that Dolly Varden do travel at depth exceeding 20 m offshore. Sources of information include Colin Gallagher's satellite telemetry dataset, which provides information on movement in the marine environment. There are also plans to use satellite tags in the Copper Mine area in future. Contacts for vetting information include Colin Gallagher and Tracey Loewen.

Arctic Cisco

Arctic Cisco reproduce in freshwater in the Peel and Arctic Red rivers. They forage in coastal areas and can be found in offshore marine waters. Aggregations of coregonids (including Arctic Cisco) can be found in the nearshore marine environment up to 20 m from shore (termed a 'coastal highway'). The Mackenzie River plume is important for foraging, including Stamukhi Lake, and is important overwintering habitat. Migratory corridors include following coastal currents towards Alaska. Mapping should include foraging areas in the coastal environment, the Mackenzie Delta and plume, and Stamuki Lake for foraging and overwintering, as well as areas of aggregation including the 'coastal highway' (can be combined into a single geospatial layer). Knowledge gaps include the Kitikmeot region. Sources of information include Melanie Toyne's telemetry data from 2005–2007, which includes movement within the Mackenzie River plume out to Tuktoyaktuk, as well as coastal movement data. Tracey Loewen is a contact for vetting geospatial layers.

Arctic Char

Arctic Char reproduce in freshwater in rivers such as the Mackenzie River tributaries (Peel, Arctic Red rivers), as well as the Copper Mine, Richardson, and Ray rivers. Access to river mouths are therefore critical. There appears to be less site fidelity for this species than for Dolly Varden. The 'coastal highway' area of 0–20 m from shore is important for summer feeding and migration. Mapping should include feeding and migration areas, with the coastal highway being important for summer feeding/foraging, and migration (can be combined into one layer). There is likely comprehensive information available for Arctic Char as they are a sought-after subsistence species and therefore communities would be aware of their distribution. Other sources of information include the 2018–2019 Arctic Char telemetry program at Ulukhaktok (Colin Gallager/Nigel Hussey). There is also telemetry data available for char in the Kitikmeot region (Heidi Swanson). Proxy data could include tagging data from other regions (Les Harris, Jean-Sebastien Moore), as well as Aaron Spare's tagging data from the Frobisher Bay for summer movements (Spares et al. 2012). Contacts for vetting information include Tracey Loewen and Les Harris.

Capelin

Spawning locations for capelin are found in and around Kugaluktuk, as well as Darnley Bay, and potentially Herschel Island. Sources for data include NCRI reports for Nunavut, and data from the Beaufort Regional Environmental Assessment (BREA) for Franklin and Darnley Bay. Darcy McNichol is a contact person for more information on Capelin.

Lower Trophics

Benthic remineralization (nutrients being released into the water column, a benthic-pelagic coupling process) was recognized as an important indicator of productivity, with oxygen, nitrate, phosphate, and silicate being key indicator nutrients for this process. Remineralization respiration is more an indicator of benthic activity. It was suggested that it should be a layer as remineralization indicates habitat (benthic-pelagic) coupling. It was also suggested that Eco-units could be combined with remineralization. Cobb (2014) includes coverage of sample stations. Heike Link's work includes up-to-date locations of sampling locations and values. Link et al. (2013) could be used to generalize locations important for benthic remineralization for large-scale mapping. Link et al. (2011) presents the most up-to-date values and station names. Darnis et al. (2012) identifies hotspots and cold spots, and overlays three types of activities for benthic-pelagic coupling (to map benthic remineralization or benthic coupling) (Darnis et al 2012). Heike Link has also captured this information in Kenchington et al. (2011). There is also surface sediment organic matter and benthic pigment data from BREA offshore program stations (which could feed into pelagic-benthic coupling) (contact Ashley Stasko).

Surface sediment (benthic) pigments (chlorophyll *a* (chl *a*) and phaeopigments) represent a potential food source for benthic organisms and illustrates a pelagic-benthic coupling process. It often indicates where phytoplankton have been deposited (chl *a* being a proxy of fresh phytodetritus and phaeopigments being a proxy of degraded phytodetritus). These measurements cannot be used though to infer primary productivity origin. There has been no strong link found between surface sediment pigments and currents. There has also not been a strong link found between surface sediment organic matter content and currents.

Chl *a* amounts will differ by depth in the water column, and it is important to map maximum chl *a* at any given depth. For example, primary productivity at the surface may cause subsurface productivity to be missed, such as subsurface chlorophyll maximum (SCM). It is also important to consider that chl *a* amounts change seasonally, which will be difficult to capture with satellite imagery that may only give snapshot data. The recent Arctic Ocean sea ice loss has triggered new fall phytoplankton blooms. Sources of information for primary productivity at depth include Tremblay and Gagnon (2009) and Ardyna et al. (2013, 2011). Ardyna et al. (2014) discuss recent Arctic Ocean sea ice loss triggers changes in primary productivity. There is also a database comparing primary productivity sampling over 50 years (Ashley Stasko will provide). Ardyna et al. (2017) describes vertical phytoplankton niches of the Beaufort Sea. Paul Renauld is a resource for information about ice algae. Sources of information on seafloor substrate include papers covering the Mackenzie Shelf (Jerosch, 2013, Jerosch et al., 2019). There are also shapefiles from NRCAN (should be requested).

Phytoplankton presence leads to zooplankton presence, which in turn can lead to feeding aggregations. In the ESSCP (DFO 2018b), two species of pelagic phytoplankton were identified. Most of the literature discusses pelagic phytoplankton in terms of size. Species > 5 microns are more dominant, contribute more to biomass, are consumed by a wider variety of species, indicate key blooms and key primary productivity, and are more important for trophic transfer. Species < 5 microns are more likely to feed into the microbial loop. Ice algae > 5 microns (mostly represented by pinnate diatoms) are most common on first-year ice, but can also be found on multi-year ice. It can be found more on land-fast ice than pack ice. No ice algae are found in the estuary (i.e., where ice scour occurs). This ice scour also destroys benthos, but is good for detritivores. The zone of ice scour has been mapped by Steve Blasco, and is different than Stamuki Lake (Blasco et al. 2011).

Toxin-producing algae (*Pseudonitzia*, donoflagellates) are present in the WAB. The occurrence of *Pseudonitzia* has been mapped, and there is a potential for blooms (one bloom has been recorded in the WAB). This species may occur more frequently, but without begin measured. It can be sampled through water or shellfish. While difficult to map, WWF mapped a model/scenario for dangerous algae blooms. Sources of information on phytoplankton include BREA new data (2012, 2013, 2014), which will be available later in summer 2018.

Zooplankton is usually expressed as abundance in the literature, although it is sometimes expressed as biomass. Zooplankton species richness is usually expressed by area (square meters = standing stock). Species with more information known include those from the genera *Calanus* and *Themisto*. Eco-units could be used to represent zooplankton habitat type (which drive assemblage changes). In cases where there are stacked water masses this could also be noted. There is more information available for some areas more than others, such as Dolphin and Union Strait. Sources of information on water masses include Smoot's State of the Ocean Report, which recognizes differences in water masses (one vs multiple), as well as Bill Williams' mapping of oceanographic masses. Smoot and Hopcroft (2017) has information on the association of zooplankton species composition to water mass/habitat; although newer papers have linked this more to oceanography. Zooplankton data can also be found in (Walkusz et al. (2012), and Walkusz et al. (2009) describe macro-, meso-, and micro-zooplankton communities in the Beaufort Sea. There is also BREA data available (2012, 2013, 2014, 2017).

Infauna and epifauna are organized by depth range and substrate type (hard vs soft) in the ESSCP. This grouping could be used to map broad habitat types; alternatively, the Eco-Units could be used as potential representatives of benthic assemblages (since delineation of Eco-Units incorporated depth, water masses, sills, etc.). There have been local accounts of kelp (macrophytes) washing up on shore (Cobb et al. 2008). There is an assessment of biodiversity being created, incorporating food web structure being scored on a set of traits plus biomass. This may not be ready for fall. It was asked if maps of socio-economic species of interest were desired, and it was noted that this would be generally accounted for by Eco-Units.

ROUND-TABLE WRAP-UP: ISSUES/CHALLENGES, KEY POINTS TO CONSIDER

Breakout group discussions were summarized by each facilitator. The lower trophic breakout group discussed additional resources available, as well as potential proxies (such as areas of upwelling). The fishes group also discussed additional resources that could be incorporated, as well as the best way to group fishes for the creation of geospatial layers (some species were considered individually, while others were grouped based on availability of information). Both the lower trophic and the fishes groups required follow-up discussions to finish the review of treatment of CPs and identify relevant data sources that could be used for geospatial mapping. The marine mammals group discussed additional resources, representative and special habitats, and potential ways to refine CPs. Specifically, it was discussed that CPs could focus on sub-populations, or important general habitats. It was commented that there is a goal to protect genetic diversity, and that unless there was demonstrably different habitat requirements, there could be protected suitable habitat throughout the range of a species (i.e., replication).

DEVELOPING DESIGN STRATEGIES FOR MPA NETWORK PLANNING IN THE WESTERN ARCTIC BIOGEOGRAPHIC REGION

The following presentation was delivered to look ahead to Part 2 of the regional peer review, during which time a working paper to develop MPAN design strategies will be assessed.

Presenter: Shannon MacPhee

The location of the planning area was reviewed, with the WAB being bound in the west by the 200 m depth contour of the Beaufort Sea, bound in the east by the Boothia Peninsula, Prince of Wales Island, and Bathurst Island, and bound in the north by Melville and Prince Patrick Islands. It includes a very small part of the Qikiqtaaluk Region (Resolute lands) (DFO 2009a). Designs for MPANs are guided by both national (DFO) and international (PAME 2015, United Nations 1992, UNEP 2008) frameworks to ensure a consistent approach is followed. Design principles from these frameworks include EBSAs, representativity (Eco-Units), connectivity, replication of ecological features, and ensuring sites are adequate to ensure ecological viability and integrity.

Preparatory work for the creation of design strategies includes the development of SOs, CPs, OOs, and gathering and mapping spatial data, led by DFO Oceans Program in consultation with partners and stakeholders, as well as science review for EBSAs, Eco-Units, and ESSCPs.

An MPAN design strategy describes how CPs will be incorporated so that the network objectives are met. For each CP, design strategies specify the *type* of areas to protect (such as nursery or feeding habitat), and the *amount* of protection (% conservation target – e.g., protect 10% of Arctic Char feeding habitat). These CPs may be coarse- or fine- filter in nature, with coarse-filter CPs generally being area-based and intended to represent the full range of ecological diversity in the planning area (i.e., Eco-Units), and fine-filter CPs being area-based but representing spatially discrete places (such as polynyas or flaw leads), or species-based.

As part of the process to recommend MPAN design strategies, each CP will be assessed against scoring criteria, and assigned a Conservation Value Score, which will inform its Conservation Target Range of low, medium, or high (with % conservation target ranges associated with Low/Med/High) (Figure 2). Design strategies will be assessed alongside the geospatial data layers that are created to inform MPAN design scenarios.

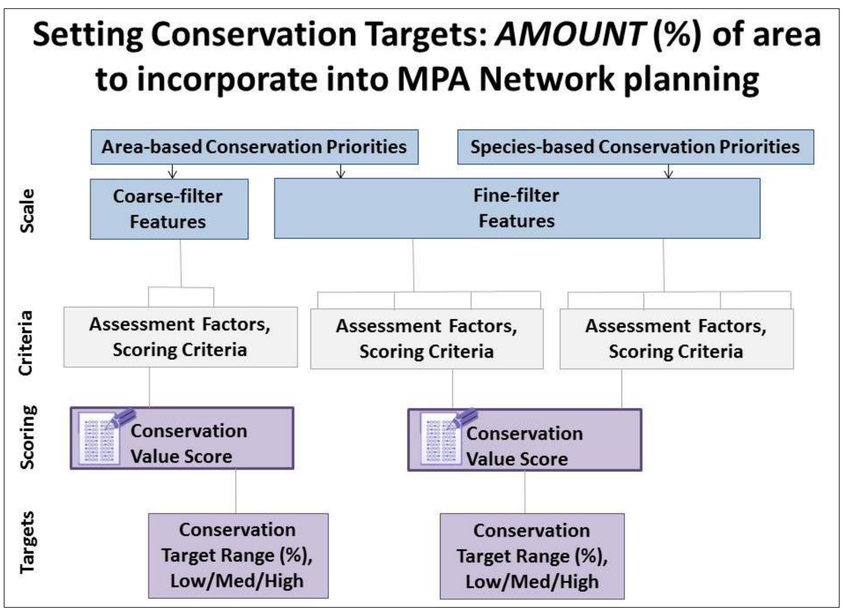

Figure 2. General process for setting conservation targets for MPA Network design strategies.

Comments and Questions

There was a recommendation to review other regions processes from beginning to end, to become more familiar with MPAN development (e.g., DFO 2017, 2018). The presenter indicated that this information is already included in the draft Working Paper on MPAN design strategies. There was also a request for more information on the ESSCP process. It was explained that documents from this process are awaiting final approval from senior management and are expected to be available in advance of Part 2 of the design strategies regional peer review (Proceedings, Research Document, Science Advisory Report[1]).

WRAP-UP AND WORK PLAN

Following this meeting OOs will be developed along with geospatial data layers. The geospatial database will be reviewed at Part 2 of the regional peer review. These products as well as a draft ToR and the Proceedings will be available in advance of Part 2 of the review. Objectives for the ToR for Part 2 will include a review of OOs, evaluating the methodology used to recommend MPAN design strategy, and identifying uncertainties/gaps in knowledge. A Working Paper is currently being drafted.

Breakout group facilitators will organize follow-up discussions if needed. There is also a need to approach the Canadian Wildlife Service (CWS) in Yellowknife, NT, for review of geospatial mapping for marine birds. An analysis to develop MPAN design scenarios may occur after partners are further engaged in the planning process. Based on the guidance provided at this Part 1 meeting, the participant group is well-positioned to consider design strategies for Part 2 of the regional peer review.

[1]Documents from the ESSCP process have since been published (DFO 2019a, Cobb et al. 2020, and DFO 2019b)

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APPENDIX 1. TERMS OF REFERENCE

Design Strategies for the Western Arctic Biogeographic Region Marine Protected Area Network (Part 1)

Regional Peer Review – Central and Arctic Region

May 8, 2018

Winnipeg, MB
Teleconference and WebEx

Chairperson: Joclyn Paulic

Context

Canada has committed to establishing a national network of Marine Protected Areas (MPAs) in support of integrated coastal and oceans management. Under the National Conservation Plan, Fisheries and Oceans Canada (DFO) is responsible for coordinating the development of MPA networks, one within each of the five DFO regions across Canada. The Western Arctic Biogeographic Region (WAB), within DFO's Central and Arctic Region has been identified as one of the priority areas for the development of a MPA network plan.

An MPA Network is a collection of individual marine protected areas that operate synergistically to achieve an overarching conservation goal(s) that would benefit the ecosystem more than any one individual site. The network consists of a broad range of protection measures (e.g., fishery closure, MPA) that operate at various spatial scales. Guidance on bioregional MPA network planning is set out in the National Framework for Canada's Network of MPAs, the Framework for a Pan-Arctic Network of Marine Protected Areas, and the Convention on Biological Diversity Conference of the Parties Decision IX/20.

In order to achieve a scientifically defensible MPA network a regional approach must be developed to achieve the desired goals and objectives (i.e., design strategy). The design strategy describes the types of features to be conserved, the relative targets for those area types, and identifies a methodology which can be applied. This is achieved by defining the specific species, habitat or other ecological features that the network aims to protect (i.e., conservation priorities), the specific and measurable operational objective to indicate the desired state for each priority and an appropriate treatment method to incorporate the specific attributes of network design.

For the WAB MPA network the bioregional strategic objectives are to:

- Conserve and promote marine biodiversity, ecological representativity and unique natural features in the bioregion
- Help maintain healthy and productive ecosystem structure, function and resilience within the bioregion (DFO 2015)
- Conserve and protect traditional use, cultural heritage and archeological resources within the bioregions
- Provide opportunities for awareness, research, and educational opportunities within the bioregion
- Contribute to the mitigation of climate change impacts, where possible.

As part of the steps to design the WAB regional MPA network, DFO Science has provided review of the identification of EBSAs (DFO 2014), national guidance on the development of MPA networks (DFO 2010, 2013), and the delineation of WAB representative coastal and marine eco-units (DFO 2015). Additionally, an overarching MPAN conservation objective for the WAB was provided within the DFO (2015) review: "to ensure as much as possible that ecosystems and ecosystem services of the Western Arctic Bioregion remain healthy and productive for future generations". Finally, DFO Science has also recently provided review on the identification of ecologically significant species, functional groups and community properties (ESSCP) for consideration as conservation priorities within the MPA network design (DFO 2018b).

DFO Oceans has requested that DFO Science develop a design strategy methodology to address the conservation priorities, set conservation targets, provide recommendations on the types of areas to be protected and ensure that the requirements to achieve the Operational Objectives are adequately captured within the MPA network design. Additional guidance on how to incorporate specific attributes of network design principles is also requested.

Objectives

The request for Science Advice to develop MPA Network design strategies will be addressed in a two part meeting. The objectives of Part 1 of this Science Advisory Process are to:

1. provide an information session on the DFO National Framework for Marine Protected Area Networks in Canada and an update of the regional MPA network planning process;
2. provide an overview of the conservation priorities identified for the WAB MPA network;
3. review available information (including geospatial) to identify data requirements (e.g., species distribution, migration routes, proxies, habitat mapping) to support the development of targets for conservation priorities (e.g., life history features) in the WAB; and,
4. develop the work plan and Terms of Reference for Part 2 of this process.

Expected Publications

- Proceedings

Expected Participation

- Fisheries and Oceans Canada (DFO) (Science and Ecosystems and Fisheries Management sectors)
- Environment Canada
- Academia
- Other invited experts

References

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APPENDIX 2. LIST OF MEETING PARTICIPANTS

Name	Affiliation/Organization	Expertise	Breakout Group
Brown, Leah	DFO Oceans Program	Marine spatial planning, GIS	Fishes (facilitator)
Dunmall, Karen	DFO Science	Anadromous fishes, Western Arctic MCT	Fishes
Ferguson, Steve	DFO Science	Pinnipeds, cetaceans	Marine Mammals
Iacozza, John	CEOS	Sea ice, polar bear	Marine Mammals
Loewen, Tracey	DFO Science	Eastern Arctic, MCT	Fishes
Loseto, Lisa	DFO Science	Eastern Beaufort Sea beluga	Marine Mammals
MacPhee, Shannon	DFO Science	Beluga, marine conservation	Marine Mammals (facilitator)
Majewski, Andy	DFO Science	Marine fishes, Beaufort Sea	Fishes
Mitchell, Jessica	DFO Oceans Program	Marine conservation	Fishes
Murray, Laura	DFO Science	Rapporteur	Fishes
Niemi, Andrea	DFO Science	Ecosystems, productivity	Lower Trophics
Ouellette, Mark	DFO Science	Data management, GIS	Lower Trophics
Parker, Colleen	WWF	Marine spatial planning, western Arctic	Fishes
Paulic, Joclyn (Chair)	DFO Science	CSAS Coordinator	Chair
Richardson, Evan	ECCC	Polar bear	Marine Mammals
Roy, Virginie	DFO Science	Benthic ecology, hotspots/coldspots	Lower Trophics
Schroeder, Bethany	DFO Oceans Program	Client – Oceans Program	Lower Trophics (facilitator)
Stasko, Ashley	DFO Science	Trophic ecology , Beaufort Sea	Lower Trophics
Yurkowski, Dave	DFO Science	Telemetry, marine mammal and bird hotspots	Marine Mammals

APPENDIX 3. MEETING AGENDA

Marine Protected Area Network (MPAN) Design Strategies for the Western Arctic Biogeographic Region, Part 1

Tuesday, May 8th, 2018

Large and Small Seminar Rooms
Freshwater Institute, Winnipeg, MB
WebEx and Teleconference Information:
1-877-413-4782
Conference ID: 3333969

Chair: Joclyn Paulic

Session 1 – MPAN 101: Introduction to Canada's Framework for MPA Network Planning

8:30 a.m. Welcome (Chair)

- Overview of CSAS peer review process
- Terms of Reference and Meeting Objectives M
- Participant Introductions
- Review Agenda

8:45 a.m. National Framework for MPA Network Planning (J. Mitchell)

- Canada's Commitment to UN CBD
- How MPAN fits within Integrated Oceans Management Planning and other marine conservation initiatives (e.g., Marine Conservation Targets)
- DFO's Hierarchical National Framework for MPA Network Planning

9:30 a.m. MPA Network planning in Canada's Western Arctic Bioregion (B. Schroeder)

10:15 a.m. BREAK

10:30 a.m. Conservation Priorities for the Western Arctic Bioregion (B. Schroeder)

Session 2 – Breakout Groups: Key geospatial information to support mapping of Conservation Priorities

11:00 a.m. Introduction to the afternoon breakout group session (Chair)

11:15 a.m. Example geospatial database map layers (J. Friesen)

12:00 p.m. LUNCH

Session 2 Continued…

1:00 p.m. Breakout Group Session (All)

- For each Conservation Priority, recommend available geospatial data or relevant proxies for marine spatial planning

2:30 p.m. BREAK

2: 45 p.m. Round-table wrap-up: issues/challenges, key points to consider

3:15 p.m. Developing Design Strategies for MPA Network Planning in the Western Arctic Biogeographic Region (S. MacPhee)

- Existing regional science advice
- Methodology to develop MPA Network Design Strategies

3:30 p.m. Wrap-up and Work Plan (All)

- Identify relevant science contacts for geospatial information
- Reiterate plan for Part 2 of the Regional Peer Review Meeting

4:30 p.m. Meeting adjourned – THANK YOU!