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Proceedings of the Regional Science Peer Review of Design Guidance for a Network of Marine Protected Areas in the Scotian Shelf Bioregion (Part 1)

July 6-7, 2016
Halifax, Nova Scotia

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Foreword

The purpose of these Proceedings is to document the activities and key discussions of the meeting. The Proceedings may include research recommendations, uncertainties, and the rationale for decisions made during the meeting. Proceedings may also document when data, analyses or interpretations were reviewed and rejected on scientific grounds, including the reason(s) for rejection. As such, interpretations and opinions presented in this report individually may be factually incorrect or misleading, but are included to record as faithfully as possible what was considered at the meeting. No statements are to be taken as reflecting the conclusions of the meeting unless they are clearly identified as such. Moreover, further review may result in a change of conclusions where additional information was identified as relevant to the topics being considered, but not available in the timeframe of the meeting. In the rare case when there are formal dissenting views, these are also archived as Annexes to the Proceedings.

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SUMMARY

A Regional Science Peer Review meeting was held on July 6-7, 2016, at the Delta-Barrington Hotel in Halifax, Nova Scotia, to review design guidance for a network of Marine Protected Areas (MPAs) in the Scotian Shelf Bioregion. This was the first of a 2-part process to provide science advice on proposed design strategies and associated targets for protecting conservation priorities, addressing strategic and operational objectives, and guiding MPA network design in the region. Specifically, for each conservation priority, design strategies must be developed that specify the types of areas or features to be conserved (e.g., significant concentrations, feeding aggregations, nursery areas), and the relative targets for each area type. The focus of this meeting was to review the proposed general approach along with preliminary design strategies, and to consider the effects of these design strategies using exploratory Marxan outputs. A work plan and Terms of Reference for Part 2 were also developed. Participation in this meeting included Fisheries and Oceans Canada, Environment and Climate Change Canada, Parks Canada, non-DFO scientists, First Nations and Aboriginal organizations, industry representatives, provincial government departments, and environmental non-government organizations.

The proposed general approach started with a fixed baseline target to capture 10% of each conservation priority in the network. This baseline target was then modified for each conservation priority based on a derived conservation value. This value was determined by scoring each conservation priority using a series of factors such as size, uniqueness/rarity, vulnerability, and population status. While participants generally supported the proposed approach, several important gaps were identified, including the need to incorporate Aboriginal and Traditional Ecological Knowledge into the process, and the need to expand or adjust the approach to develop design strategies for coastal conservation priorities. Additional elements were also suggested for consideration, such as the possibility of increasing weighting for functional importance, enduring features, naturalness, intactness, and resilience, and the need to incorporate considerations of connectivity, including size and spacing of selected areas, into the overall network design.

A Research Document and Science Advisory Report will be produced during Part 2 of this process. This Proceedings document is the record of the first meeting’s discussions and conclusions.

Procès-verbal de l'examen scientifique régional par les pairs de l'orientation pour la conception d'un réseau d'aires marines protégées dans la biorégion du plateau néo-écossais (partie 1)

SOMMAIRE

Un examen scientifique régional par les pairs a eu lieu les 6 et 7 juillet 2016 à l'hôtel Delta-Barrington d'Halifax (Nouvelle-Écosse) en vue d'étudier l'orientation pour la conception d'un réseau d'aires marines protégées (AMP) dans la biorégion du plateau néo-écossais. Il s'agissait de la première de deux réunions qui serviront à formuler un avis scientifique sur les stratégies de conception et les cibles connexes proposées pour assurer le respect des priorités de conservation, répondre aux objectifs stratégiques et opérationnels, et orienter la conception du réseau d'AMP dans la région. En particulier, pour chaque priorité de conservation, il faut élaborer des stratégies de conception qui précisent les types de zones ou de caractéristiques à conserver (p. ex. concentrations importantes, aires d'alimentation, aires d'alevinage); les cibles relatives pour chacun de ces types de zones. Cette réunion visait à examiner l'approche générale proposée et les stratégies de conception préliminaires, ainsi qu'à envisager les effets de ces stratégies à l'aide de résultats préliminaires de Marxan. Le plan de travail et le cadre de référence de la deuxième partie ont également été élaborés. Les participants à cette réunion comprenaient des représentants de Pêches et Océans Canada, d'Environnement et Changement climatique Canada, de l'Agence Parcs Canada, des scientifiques ne faisant pas partie du MPO, des Premières Nations et des organisations autochtones, de l'industrie, de ministères des gouvernements provinciaux et d'organisations non gouvernementales de l'environnement.

L'approche générale proposée commençait avec une cible de référence fixe cherchant à représenter 10 % de chaque priorité de conservation dans le réseau. Cette cible a ensuite été ajustée pour chaque priorité en fonction d'un calcul de la valeur pour la conservation. Ce calcul était effectué en notant chaque priorité de conservation selon une série de facteurs tels que la taille, le caractère unique ou la rareté, la vulnérabilité et l'état de la population. Dans l'ensemble, les participants ont approuvé l'approche proposée, mais ils ont relevé plusieurs lacunes importantes, comme la nécessité d'intégrer le savoir traditionnel et les connaissances écologiques traditionnelles dans le processus et celle d'élargir ou d'ajuster l'approche pour élaborer des stratégies de conception pour les priorités de conservation des milieux côtiers. D'autres éléments ont été proposés, comme la possibilité d'accroître la pondération pour l'importance fonctionnelle, les éléments persistants, le caractère naturel, l'intégrité et la résilience et la nécessité d'inclure des facteurs de connectivité, notamment la taille et la distance entre les zones choisies, dans la conception globale du réseau.

Un document de recherche et un avis scientifique seront rédigés pendant la deuxième partie de ce processus. Le présent document est un compte rendu des discussions et des conclusions de la première réunion.

INTRODUCTION

Canada has made various domestic and international commitments related to Marine Protected Areas (MPAs) and MPA networks, including the current Government's commitment to increase protection of coastal and marine areas to 5% by 2017 and 10% by 2020[1]. As the lead department for national MPA network development, Fisheries and Oceans Canada (DFO) is working with other federal, provincial and territorial departments and in collaboration with other interested parties to design and establish a network of MPAs in Canada's bioregions.

To address National requirements for MPA network design, science advice is needed on Design Strategies for the Maritimes Region MPA network. Specifically, a Science Advisory Process is required to determine, for each Conservation Priority:

1. the types of areas to be conserved (e.g., aggregations, nursery, spawning, etc.), and
2. the relative target (amount) for each of those areas.

It is recognized that a general lack of empirical evidence will prevent the development of specific scientifically-supported, objective targets for regional Conservation Priorities (e.g., Hillborn, 2012). As a result, this Science Advisory Process aims to provide feedback on the science-based approach used to develop Design Strategies and associated targets.

The first of two meetings to provide science advice on MPA network Design Strategies was held on July 6-7 at the Delta Halifax Hotel in Halifax, Nova Scotia. The two chairpersons, Tanya Koropatnick and Tana Worcester, welcomed participants (Appendix 1) and called for a round of introductions, after which a brief overview of the Canadian Science Advisory Secretariat (CSAS) peer review process was provided. It was noted that, as a science meeting, the focus would be on the review of science information, rather than on the management implications of that information. The role of participants would be to ensure the proposed approach was reasonable and to provide constructive suggestions for improvements. Everyone was invited to participate fully in the discussion and contribute knowledge to the process.

During the introduction to the meeting, several participants raised questions about how First Nations and Aboriginal organizations were being engaged, both within the overall MPA Network Planning process, as well as through the Science Process. It was observed that the Minister's mandate letter reiterates the Government of Canada's commitment to "a renewed, nation-to-nation relationship with Indigenous peoples, based on recognition of rights, respect, cooperation, and partnership." A question was also posed about international Aboriginal engagement efforts, as neighboring Nations across the border in Maine are also very interested in protected area development. In response, it was explained that it is DFO's intent to include First Nations and Aboriginal organizations in all aspects of the MPA Network development process, including this Science Process, hence the invitation to participate in this meeting. It was recognized that more discussion is needed to determine the best way to consider Traditional Knowledge either within or parallel to this Science Peer-Review Process, and this topic will be revisited as part of the discussion on next steps for Part 2. It was acknowledged that First Nations participation in this Science meeting is not intended to constrain future negotiations or to infringe on treaty rights. It was acknowledged that First Nations and Aboriginal Organization perspectives are an essential component of MPA network development, and the government has stated that the process used to meet marine conservation targets will respect treaties in existence and support advancing the completion of treaties that are currently under

[1] Minister of Fisheries, Oceans and the Canadian Coast Guard Mandate Letter (accessed Feb 14, 2017)

development. It was explained that for the broader MPA network development process, DFO's Oceans and Coastal Management Division (OCMD) has initiated First Nations engagement using established formal engagement mechanisms, but additional conversations are welcome.

It was further observed that the provinces of Nova Scotia and New Brunswick have an important role to play, in particular with respect to MPA network development for coastal MPAs. A question was raised about whether cooperation between DFO and the provinces of Nova Scotia and New Brunswick has been formalized via a Memorandum of Understanding (MOU). In response, it was acknowledged that dialogue is on-going between DFO and the provinces, but no MOUs are in place. In Nova Scotia, the Department of Energy has been identified as the lead for MPAs, and a new Oceans Task Group is being established to re-invigorate cooperation with provinces and territories under the Canadian Council of Fisheries and Aquaculture Ministers.

The Terms of Reference for this meeting (Appendix 2) was reviewed, including the following objectives:

1. Review the proposed approach for setting targets for Conservation Priorities identified in the coastal and offshore planning areas.
2. Review proposed design strategies and associated targets for each of the Conservation Priorities in the coastal and offshore planning areas. For the offshore planning area, exploratory Marxan outputs using the proposed design strategies and associated targets will be considered.
3. Develop the work plan and Terms of Reference for Part 2 of this process.

The agenda (Appendix 3) was reviewed and no additions were suggested.

To guide discussion, a working paper was provided to meeting participants on June 30, 2016, ahead of the meeting.

PRESENTATIONS AND DISCUSSIONS

CONTEXT, MPA NETWORK OBJECTIVES AND CONSERVATION PRIORITIES

Presenters: M. King
Rapporteur: E. Will

Presentation

The Government of Canada has committed to increase the proportion of Canada's marine and coastal protected areas to 5% by 2017 and 10% by 2020. DFO is responsible for leading the development and implementation of a national network of MPAs in support of these commitments. DFO is working work with Parks Canada, Environment and Climate Change Canada, the provinces and territories, First Nations and Aboriginal groups, stakeholders, academia and the public throughout this process. DFO's contribution to the network will consist of Oceans Act MPAs and certain other conservation measures (e.g., Sensitive Benthic Area closures) in both coastal and offshore areas.

In the Scotian Shelf Bioregion, differences in available information mean that different approaches for identifying contributions to the network will be taken. For offshore waters (roughly defined as areas deeper than the 100-m isobath), systematic, long term research surveys and detailed human use data, such as catch and effort from fisheries logbooks, allow for a data driven approach using conservation planning software. In contrast, information available for coastal areas (including the Bay of Fundy and near shore waters shallower than 100 m) is patchy and more descriptive in nature. Thus, the process for identifying coastal contributions to the MPA network will focus on Ecologically and Biologically Significant Areas (EBSAs) that have been identified for the Atlantic coast of Nova Scotia and the Bay of Fundy. Not all of these EBSAs will become part of the MPA network, and inclusion of an EBSA in the network does not mean that the entire EBSA will be protected. Every effort will be made to select areas that offer strong biodiversity protection, while also minimizing any potential economic impacts.

A draft MPA network plan for the Scotian Shelf Bioregion, which will include a map of all existing MPAs as well as priority areas for protection, is expected to be released for consultation in 2017 and finalized by 2018. To contribute to the target of 5% marine and coastal protection by 2017, work to advance several specific sites in parallel with the broader network planning process will occur, including the designation of St. Anns Bank MPA and establishment of fisheries closures under DFO's *Policy for Managing the Impact of Fishing on Sensitive Benthic Areas (*if any are determined to "count" towards the Aichi target).

The design of each regional MPA network is guided by a National Objectives Hierarchy:

1. National Goals,
2. Strategic Objectives,
3. Conservation Priorities,
4. Operational Objectives, and
5. Design Strategies.

National Goals and Strategic Objectives are high-level statements that outline what the national MPA network and what a regional MPA network aim to achieve, respectively. Conservation Priorities are what a regional network aims to protect, and can be populations, species or species groups, habitats, communities, ecological processes or other ecological features. The three categories of Conservation Priorities identified for the Scotian Shelf Bioregion MPA network are: Representative Features, Special Features and Depleted Species. Operational Objectives are specific and measurable statements that indicate the desired state for each Conservation Priority for a regional MPA network. Finally, Design Strategies are detailed statements that, for each Conservation Priority/Operational Objective, specify the type of area or feature to be conserved and the relative target for that area or feature.

Discussion

There was a request for clarity in terms of the proposed scope of the MPA network plan: there is Departmental focus on the 10% by 2020 target. However, in support of that target, and in addition to that target, the intention is to develop a long term, comprehensive plan for the protection of biodiversity and maintenance of ecosystem function in the region, which may require the protection of more than 10% of coastal and marine areas, and will be implemented over time (i.e., including past 2020).

A participant suggested that reference be made to Canada's long-standing commitment to a representative network of MPAs, which came out of the 1992 Tri-Council Ministers' Statement, and that there should be a clarification of the linkages between Canada's UN Convention on Biological Diversity (CBD) commitments, the 2011-2020 Strategic Plan for Biodiversity, Aichi Target 11 and other Aichi Targets (e.g., Target 6 calling for 100% of fisheries to be sustainable by 2020), and Canada's Target 1). It was noted by a participant that the current commitments and targets arise out of our ratification of the CBD, and agreement to the current strategic plan and targets.

It was observed that the Strategic Objective to help maintain ecosystem structure, functioning and resilience within the bioregion is not fully addressed. It was also observed that the Strategic Objectives are missing a social engagement component. Likewise, the strategic objective to help maintain healthy populations of species of commercial, recreational and/or Aboriginal importance is also not fully addressed, as the list of conservation priorities does not yet include species and areas of importance for Aboriginal communities. However, it was noted the list of Conservation Priorities are expected to evolve to incorporate gaps such as this one.

There was some discussion about how Aboriginal Traditional Knowledge (ATK) might be best incorporated into this Science Process. It was observed that there have been discussions nationally about the inclusion of ATK in CSAS processes, so this is certainly an area of interest for DFO. Specific to the working paper, it was suggested that ATK should be used to identify culturally significant species and areas, and to help build design strategies for these Conservation Priorities.

There was additional discussion on the need for DFO to better describe how it is engaging First Nations and incorporating their perspectives and knowledge into the broader network planning process. It was acknowledged that a section should be added to the introduction that describes the history and process of engagement with First Nations and Aboriginal organizations on MPA network planning in this region.

It was further requested that more information be provided on how the results of this Science Process and other sources of information, such as social, cultural, and economic information, will be incorporated into the larger network planning process. It was also suggested that an exploration of trade-offs (and their methodologies) be discussed, either as part of the context or in the discussion section of the working paper.

The current list of Conservation Priorities was developed with input from an internal Science Technical Working Group, and was presented as part of the context for this Science Process. However, there were some expressions of concern that the full list had not been shared externally before this meeting, and further discussion is required on the inclusion of certain species and species groups. In response, it was explained that while the conservation priorities are not being reviewed as part of the current Science Process, discussions will continue through other OCMD-led processes (e.g., the Science Technical Working Group and the Fisheries Round Table Working Group). It was suggested that more information be provided in the working paper to better explain how the Conservation Priorities were chosen and what species are included under each functional group. In response, it was noted that a separate report is under development that will provided additional details about the Conservation Priorities, including the functional groups.

It was observed that, as currently written, the Operational Objectives are specific but not yet measurable. In response, it was acknowledged that these objectives are a starting point and will be revised through an iterative process. For now the Operational Objectives are being used to help select appropriate targets for each Conservation Priority. Eventually they will be modified so that they can be used for the basis of monitoring, at which point measurability will be much more important. For more clarity, it was suggested a flow chart be developed to show the movement from Conservation Priorities to Operational Objectives to Design Strategies.

A question was raised about why EBSAs were not considered for the offshore planning area in the same way that they are for the coastal area. In response, it was explained that because empirical data is available for the offshore, it is possible to use a data driven approach, which allows for more flexibility in meeting targets for specific Conservation Priorities. The data layers that were used to identify the offshore EBSAs are also inputs for the Marxan analysis, so it is expected that the outputs will still include EBSAs or parts of EBSAs. The plan is to overlay the EBSA polygons on the proposed network design to ensure nothing has been missed.

Some concerns were expressed about areas beyond Canada's Exclusive Economic Zone, as human activities beyond Canada's jurisdiction can still impact Canadian waters and there is a general lack of knowledge about these areas.

It was observed that while MPAs are one tool for achieving the targets, it is unclear how other management tools (e.g., Critical Habitat for Species at Risk) are being considered. As well, how will this spatial planning exercise take into account spatial constraints such as energy development leases? In response, it was clarified that as part of the broader MPA network planning process, existing spatial conservation measures that provide adequate levels of protection, including Oceans Act MPAs, certain fisheries closures and Critical Habitat areas, and a variety of other spatial management tools, will be considered for inclusion in the network. Spatial restrictions such as oil and gas leases will also be taken into account during the step when socioeconomic considerations are incorporated.

There was some discussion on the need for better definitions for the various terminology used in the working paper. For example, it was observed that the terms 'conservation' and 'protection' seemed to be used interchangeably in the document. It was suggested that a list of definitions be included in the Research Document. The Convention on Biological Diversity includes definitions of terms such as "biological diversity", "ecosystem", "habitat", and "sustainable use". In addition, the International Union for the Conservation of Nature (IUCN) has developed a glossary of definitions that could be used to define certain key terms used in the document.

It was further observed that there is a need to check that the Operational Objectives are consistent with wording used in the Strategic Objectives. For example, some Strategic Objectives use the word 'protect', while others say 'help maintain'. It was acknowledged that the term 'protect' is stronger than 'help maintain' and that the Operational Objectives should be reviewed to ensure terms are used appropriated.

DESIGN STRATEGIES AND TARGETS

Presenter: M. King
Rapporteur: E. Will

Presentation

Design Strategies were developed for each Conservation Priority/Operational Objective. They specify: (A) the type of area or feature to be conserved, and (B) the relative target for that type of area or feature. Some Conservation Priorities may have multiple features to be conserved. For Special Features and Depleted Species, the types of features to be conserved are the most important or significant areas and not the entire range or distribution. For example, the type of area to be conserved for Russian Hat sponges (*Vazella pourtalesi*) is "identified significant concentrations" of the species.

The approach for setting targets follows three steps:

1. set a 10% baseline target for all features,
2. adjust the target based on the Conservation Value Score (CVS) for each feature, and
3. adjust the target based on existing management measures and data quality.

Step 3 will be addressed at a later stage in network design. The 10% baseline for Step 1 was chosen based on the international target of protecting 10% of coastal and marine areas by 2020. Determining the CVS for each feature in Step 2 was based on four factors: Size, Uniqueness/Rarity, Vulnerability, and Current Status. Each feature was assigned a score of 1 to 5 for all relevant factors. Not every feature was scored on all factors (e.g., all Representative Features were only scored on Size). To determine the CVS, the sum of the scores for a feature was divided by the number of factors scored. The CVS determines the target range assigned to the feature (e.g., low-medium 20-40%, medium 40-60%).

For the Size factor, smaller features were assigned higher targets than larger features. The total area of the feature in km^2 was considered. This factor was considered for all categories of Conservation Priorities and was based on defined size classes. For the Uniqueness/Rarity factor, unique features were assigned higher targets than common features. This factor was considered only for Special Features and Depleted Species, and was scored based on documented evidence. For the Current Status factor, endangered species were assigned higher targets than those with a lower status. This factor was considered only for Depleted Species and took into account the current health or conservation status of a feature based on defined categories, mainly using the most recent status from COSEWIC and the DFO Precautionary Approach Framework, as well as other reliable evidence of depleted status.

Two main issues were identified with the approach for determining the CVS for Representative Features: (1) relatively high targets for some features that cover a very large area, and (2) very high targets for the smallest Representative Features. Options presented to resolve issue 1 were either to set low targets for all Representative Features, or to apply a formula for scaling targets for these features, referred to as the Ardron (2008) approach. Options presented to resolve issue 2 were either to not set targets for very small Representative Features, or to merge small Representative Features with broader representative classes. The strengths and limitations of the overall target setting approach were presented, and the Ardron (2008) approach was put forward as the preferred solution to address scoring issues for Representative Features.

Discussion

General Approach

The reviewers agreed that the general approach was sensible, follows accepted best practices for conservation planning, and is consistent with international guidance. It was further acknowledged that it was unreasonable to seek a perfect system; a general lack of knowledge precludes the assignment of precise targets, but stakeholder and expert consultation will help further refine targets going forward.

It was observed that the intermingling of "coarse" and "fine" filter features is common practice, but when doing so it is important to ensure alignment of complementary objectives when setting targets across features of differing scales. Otherwise, counter-intuitive results may occur, such as the selection of “representative” areas where depleted species occur (i.e., those areas might be the most impacted by human activities and thus not actually good examples for representativity). Given such potential pitfalls, it is always necessary to check that the results make sense ecologically. It was further suggested that naturalness might be factored in to help address this potential issue.

More information is required to document when and how there was consideration of multiple features in the assessment of a conservation priority, including how targets for multiple features were developed and evaluated together.

It was observed that expert opinion is often used in MPA network design and, if properly documented, can be a defensible way to set targets. However, several participants commented that, as currently written, the working paper does not identify how or when expert opinion was applied. It was acknowledged that the process would be strengthened if relevant experts for each Conservation Priority were consulted to review and revise the assigned scores. It was further observed that Traditional Ecological Knowledge could be used to evaluate some factors, such as current status.

It was further suggested that sources of uncertainty should be communicated as part of the determination of the CVSs and targets for each Conservation Priority. This is of particular importance when expert opinion is used to derive the scores.

Several participants observed that the coastal Conservation Priorities were not adequately assessed via the proposed approach. In some cases, some targets for coastal areas came out as much higher than might be expected (e.g., 40% target for Bay of Fundy). In response, it was clarified that while the outputs from the proposed design strategies do in some cases include targets for coastal areas, these should be disregarded for the time being. It was further acknowledged that given the descriptive nature of the available information in the coastal planning area, the general approach to target setting will need to be modified accordingly. Design Strategies for coastal Conservation Priorities will be explored further during Part 2 of this CSAS process, as will an approach for ‘stitching together’ the coastal and offshore approaches.

Several participants expressed concerns that the proposed Design Strategies place either too much or too little emphasis on certain Conservation Priorities. For example, it was acknowledged that the current proposal places more weighting on species that are both depleted and vulnerable. It was further observed that the weighting for depleted groundfish may be biased due to the inclusion of a target for important habitat for groundfish as a functional group along with targets for important habitat for individual depleted groundfish species.

There was some discussion about how lumping or splitting Conservation Priorities into different layers with separate targets might impact the outcomes. For example if a target for important cod habitat is applied at a region-wide geographic scale, protection of one area may address the target but do nothing to help a subpopulation located elsewhere in the region. Alternatively, if targets are set for the subpopulations separately, then areas must be set aside in both parts of the region to address the targets.

Likewise, several participants asked how the outcomes might differ if the oceanographic and geomorphic classifications were addressed separately or combined into one layer. Would important details be missed if layers were combined? If two separate layers are included to address the same Conservation Priority and separate targets are set for each of these layers, does that not bias the weighting for that Conservation Priority in the analysis? These questions can be answered through experimentation with Marxan (see below for further discussion).

There was some discussion about the decision to set a minimum target of 10% for all Conservation Priorities in alignment with international policy adopted by signatories to the Convention on Biological Diversity to protect 10% of coastal and marine areas by 2020, in the current absence of scientific knowledge to support ecologically-based minimum targets for each Conservation Priority. While some asserted that the 10% minimum target for each Conservation Priority was appropriate, others argued that this policy was intended to apply to the total area protected within a bioregion, and not to individual Conservation Priorities. It was further noted that common and widespread coarse filter features, such as abyssal soft sediments (“deep mud”), can amount to vast areas, which if given a 10% minimum target could dominate the network plan. It was, therefore, suggested that more consideration is needed on the applicability of the 10% minimum, particularly for the biophysical and geomorphic units. In response, it was clarified that the Ardron (2008) formula proposed for scaling targets for representative features could address this concern. However, it was also observed that the 10% minimum target is precautionary - little information exists about some of the course filter features, and if less than 10% is captured, it is possible that some of the finer scale variability within them could be missed.

There was general support for the idea of using target ranges for Conservation Priorities rather than trying to determine precise targets. However, there was some concern about the numerical conservation target ranges. One suggestion was to revisit the target ranges by first determining what is low, medium or high for each factor, and then determining meaningful numerical target ranges using real features as working examples to help refine the approach.

Conservation Value Score (CVS)

There was some discussion about the approach used to calculate each Conservation Priority's total CVS. Specifically, it was observed that while it is useful to combine scores to simplify decision making, care must be taken to combine the scores in such a way as to minimize loss of information. To determine the optimum approach to combining scores, one needs to first determine whether the factors under consideration are independent of one another. If they are related (i.e., different aspects of the same trait), then combining scores using the arithmetic mean is appropriate. If the factors are independent, it is better to take the square-root of the sum of squares and then divide by the number of factors. An example was provided to illustrate the different approaches further:

> Consider the case of two conservation priorities: Priority A is assigned four 2s and Priority B is assigned three 1s and one 5. Using an arithmetic mean calculation, both conservation priorities would receive the same overall score of 2 [i.e., Priority A:(2+2+2+2)/4 = 2; Priority B: (1+1+1+5)/4 = 2]. However, it is likely that Priority B is in somewhat greater need of protection, as indicated by that single high score, despite its low scores in other factors. By contrast, if the square-root of the sum of squares approach is taken, Priority A would still receive a score of 2 [$((4+4+4+4)/4)^{0.5}$], whereas Priority B would get a score about one-third greater, of 2.64 (i.e., $((1+1+1+25)/4)^{0.5}$.

There was general agreement amongst participants that the square-root of the sum of squares was the more appropriate approach for calculating the total Conservation Value Score using the proposed four primary factors (size, uniqueness or rarity, vulnerability and current status), as these factors are considered mostly independent.

Primary Factors

Several participants noted that more detail is required in the document to better explain each of the four primary factors. Comments specific to each of the four factors are detailed below.

Size

There was general agreement that there is a need to account for the size of representative features; larger biophysical features should be assigned lower targets, while very small features should be assigned higher targets.

There was some discussion on the approach used to select the score classes for size (Table 3 in the working paper). It was suggested that natural breaks be used rather than the 'arbitrary threshold' approach described. As well, the number of classes should not be fixed at 5, but rather, should be determined by the distribution of the data. It was suggested that a histogram of area distribution be included to support whatever classification decision is made.

It was observed that more thought is needed on how to address size considerations for depleted species, as it is not logical to reduce a species' target range because it requires a large feeding area.

Uniqueness or Rarity

It was observed that uniqueness/rarity is an important consideration for special features, but the application of this factor with respect to depleted species requires further consideration and clarification. In many of the depleted species examples provided in the working paper, the uniqueness/rarity factor is assigned a low score, which impacts the overall CVS as calculated using the arithmetic mean approach. This issue may be addressed by applying the square-root of the sum of squares approach to calculating the CVS, as suggested above.

There was support for the suggestion that for depleted species, uniqueness or rarity should be applied to habitat, rather than the species itself (e.g., Blue Whales receive a low score for uniqueness/rarity because although they are endangered, their habitat is widespread). The current status factor accounts for the number of individuals within a species, so scoring a depleted species as 'rare' based on numbers would be redundant.

It was also suggested that uniqueness or rarity might also apply to representative features. For example, for a feature such as the Bay of Fundy, which is unique to this region (and likely the world), it may be appropriate to incorporate a score for uniqueness.

It was observed that while the working paper acknowledges the need to anticipate shifts in species distribution due to environmental change when assessing uniqueness or rarity, the paper does not explain how such considerations would be addressed in terms of scoring.

It was further observed that rarity might be further sub-divided into naturally rare versus rare due to climate change or direct human-induced causes because each case has different implications in terms of management action. For example, for naturally rare features, high protection of existing occurrences is likely sufficient; whereas, for human-induced rare features, recovery plans may require the protection of areas that no longer harbour the feature in anticipation of future re-establishment. In response to this suggestion, it was observed that human-induced rarity is addressed via the current status factor, and these two considerations should be kept separate.

There was some discussion on the score classes for the uniqueness/rarity factor (Table 3 in the working paper). It was observed that more information is required to justify the class breaks. For example, what was the rationale for "rare (less than 10 known occurrences) = 4"? What qualifies as an "occurrence"? How are sampling effort and life history characteristics factored in? It was suggested that a literature review of methods for determining rarity be conducted, and classification methods be considered that allow for considerations of the nature of the data (e.g., sampling methods and density) and life history and/or physical characteristics of the feature in question. It was further suggested that expert and local knowledge (including ATK) should be used to identify Conservation Priorities that should receive high scores for this factor.

It was suggested that a histogram of features plotted according to rarity be used to help determine meaningful classification breaks for this factor.

Vulnerability

There were some questions about how vulnerability was being defined and, therefore, scored in the proposed approach. It was suggested that more detail be added to the paper to better explain the scoring for vulnerability, including how human uses and pressures may be considered. It was acknowledged that vulnerability is an important factor to consider, as species vulnerable to human activities need more protection. It was observed that ideally we should be providing protection to vulnerable species before they become depleted. It was suggested that this factor might be weighted more strongly and that it be applied to functional groups. There might also be an opportunity to incorporate considerations of resilience to disturbance, as well as susceptibility to climate change. It may be appropriate to consider vulnerability differently for each type of Conservation Priority.

References suggested for consideration included internationally accepted Food and Agriculture Organization guidance on Vulnerable Marine Ecosystems, as well as papers in the peer-reviewed literature that break vulnerability into various dimensions (e.g., by Simon Jennings).

Current Status

There was some discussion about how current status was taken into account in the scoring. It was suggested that further detail be provided to explain how the thresholds were determined (e.g., species in significant decline were defined as having been at < 40% of long term mean biomass for 5 of the last 10 years). Alternative proposals for the scoring approach were discussed, such as considering trends in the last 5 years. As well, it was noted that a DFO Science Working Group in Newfoundland and Labrador Region has looked at ecosystem indicators and proposed that highly productive species be considered in decline at higher percentages of the long-term mean biomass; as a result, many more species were scoped into their analysis. While this work was never published, a working paper exists that may be of use in the current analysis.

It was also suggested that ATK could be used to help evaluate current status.

It was also observed that not all species caught in the Research Vessel survey that meet the scoring criteria for this factor are included in the list of conservation priorities; these additional species should be considered in order to be consistent.

Other Factors that Might be Considered

There was some discussion about how functional importance might be factored in the scoring system. For example, it was suggested that apex predators and other ecologically significant species should receive more weight. It was noted that in previous iterations, the Conservation Priorities list included ecologically significant species, including keystone species. The functional group categories were intended to simplify the approach while also capturing areas important to these key species. It was suggested that apex predators and certain other keystone or vulnerable species be added back to the Conservation Priority list.

It was further suggested that functional importance might be factored in to the scoring for representative features. For example, certain biophysical units may support key ecological processes or may be important from a connectivity standpoint and, thus, might receive a higher CVS. In response to this suggestion, it was argued that all biophysical units are important to some species and are connected in some way and, thus, it would be very difficult to objectively apply a functional importance score to these features.

It was suggested that naturalness or intactness be incorporated into the scoring system in some way.

The need to incorporate considerations for climate change was also discussed. While there has been some predictive modeling work done to look at potential shifts in species distribution, it is currently unclear how to incorporate these outputs. One idea would be to lower targets for species predicted to move out of the bioregion within a given timeframe. Another suggestion to address climate change was to add “areas of high resilience” to the list of Conservation Priorities. It was further suggested that Conservation Priorities that are enduring features should be weighted higher than features whose distributions may shift overtime. It was acknowledged that the use of enduring features as a proxy for biodiversity is standard practice, and these features are already accounted for via the geomorphic unit layer. However, additional weighting for enduring features may be warranted.

There was some discussion about how, in addition to setting targets, there is a need to consider other elements of network design, such as connectivity, spacing, replication, and size of the selected areas. Such considerations would help address the Strategic Objective to help maintain ecosystem structure, functioning and resilience. In response, it was acknowledged that connectivity, size and spacing are important considerations that have not yet been addressed, and more thought is needed on how best to incorporate them. This topic will be examined in further detail during Part 2 of the process.

Several participants expressed concern that the proposed Design Strategies do not take into account human stressors/threats. While it was acknowledged that it is more difficult to impose conservation measures on areas of high conflict, the best protected area networks must include protection for a portion of these areas, as they are also often the most biologically productive areas. It was observed that features under the most threat would likely also receive high scores for vulnerability and conservation status. Additional considerations for threat could also be considered as part of the vulnerability score, as discussed above. In response to these concerns, it was clarified that threats will also be factored in to the network planning process at a later stage, as part of site prioritization. For areas under threats, measures such as fisheries closures under the Sensitive Benthic Area Policy could be used to protect vulnerable features quickly.

It was suggested that Conservation Priorities that would benefit the most from spatial management should receive higher weighting. Alternatively, perhaps only the Conservation Priorities that will benefit from spatial management measures should be assigned targets (e.g., including important areas for cetaceans only makes sense if future MPAs will restrict activities that impact on cetaceans). It was further suggested that the anticipated protection levels might also be used to determine whether more or less of a feature will need to be captured. Lower protection levels may mean that more of a feature requires protection (Ardron et al. 2015; Patterson et al. 2016).

Data Availability and Quality

It was acknowledged that while data quality and availability have a strong influence on the analysis and results, data will never be perfect or complete. It is, therefore, important to document data gaps so that the 'blind spots' in the analysis are clearly communicated and the need for future research and/or local and expert consultations are identified.

While it was observed that apex predators such as sharks should be a Conservation Priority, the data for sharks is very limited and, thus, should not be weighted the same as the more robust data layers. The bird and cetacean layers will be used to ensure pelagic features are considered as part of the Marxan analysis. Consideration of offshore EBSA areas during later stages of the network design process can further address data gaps. The network design is intended to evolve overtime, so as new information becomes available, it will be incorporated into future iterations of the plan.

There was a question about how historical abundance was considered in the proposed approach. In response, it was explained that long term datasets were used where they were available. For example, the fish species richness layer incorporated 45 years of Research Vessel survey data to identify persistent areas of abundance. The same long-term dataset was used to identify persistently important areas for fish functional groups and depleted fish species over time.

It was observed that factors such as climate change are influencing population distributions. The data used to identify important areas for climate change-susceptible species may soon be obsolete. It was acknowledged that uncertainty associated with climate change does affect data quality. This might be addressed in Step 3 of the process, where targets can be adjusted based on existing management measures and data quality.

It was observed that the language used to explain Step 3 in the working paper should be revisited to provide further clarification about how existing management measures and data quality will contribute to the adjustment of target levels. In cases where there are effective spatial management measures already in place, these should be 'locked in' to the solution, as an alternative to decreasing the target.

There was some concern expressed about the use of species distribution models as data inputs for Marxan. It was agreed that it is important to ensure models are validated and the use of model outputs as data layers in Marxan are appropriately reviewed.

More generally, there was consensus that data layers to be used in Marxan require some level of peer review. Data layers that have received an appropriate level of review may include: previously published data, data that has been reviewed through a CSAS process, or a well-documented review by relevant experts.

Preliminary Design Strategies

Representative Features

It was suggested that the representativity (coarse scale) feature targets be reviewed, as they currently appear to be driving the analysis and may in some instances be higher than necessary. It was further suggested that more than one biogeographic classification system be used to ensure the representative features are comprehensive. Several participants also stressed the importance of intactness in selecting representative features for inclusion in the network.

It was also observed that some of the smaller representative feature classes may need further validation to ensure that they represent ecologically distinct areas rather than spatial data processing artifacts. These small features can act as 'seeds' for planning unit selection in Marxan and, thus, have the potential to strongly influence the results. In response, it was suggested that this 'seeding' phenomenon could be avoided by adding in the small ecologically distinct areas post-Marxan so that they do not drive the analysis.

There was some discussion about the application of the 'Ardron Approach' to scaling targets for representative features. While there was general support for using this approach for the biophysical and geomorphic units, a number of participants expressed reservations with the idea of applying the approach to the functional groups.

It was observed that the functional groups are important Conservation Priorities as they help address Strategic Objective 3 (help maintain ecosystem structure, functioning and resilience within the bioregion), and they should not necessarily be scaled. It was further suggested that, in addition to size, other factors that might be considered for the functional group categories include vulnerability and role in the ecosystem.

Depleted Species

There was some discussion about the scoring of size for depleted species. Under the proposed approach, species with larger habitat requirements receive a lower score. While this logic was appropriate for representative (course scale) features, it does not follow that a smaller proportion of a depleted species' habitat should be conserved if its habitat requirements are large. It was suggested that size should not be a factor for determining targets for this group.

Concerns were expressed by several participants that the scoring approach for depleted species may be influenced by political or practical considerations. The design strategy for these species should be based on what is actually needed to support a viable population, rather than economic costs, which will be factored in later in the process.

It was suggested that 100% of those areas where precisely defined Critical Habitat areas for at risk species exist (e.g., Northern Bottlenose Whale Critical Habitat), should be included in the network.

Participants were reminded that MPAs are not the only tool for conserving depleted species. For cases where species ranges are large, or change considerably from year to year, spatial conservation may not be the best approach.

Some concern was expressed about the inclusion of design strategies for certain depleted fish species. For example, because Unit 2 and 3 redfish are commercial species with existing stock management regimes, it was argued that these species should be excluded from the MPA network planning process. The Unit 3 redfish stock is currently above its limit reference point and, thus, should not be considered depleted. In response, it was observed that there is a 3-step process for target setting, and existing management measures are considered at the third step. If effective non-spatial management measures are in place, the target may be reduced accordingly. It was identified that there was need for further discussion of the validity of this approach (i.e., reduction of spatial targets to account for non-spatial measures).

Special Features

For biogenic habitats, concerns were expressed about the proposal to consider only “significant concentrations” (i.e., areas where there is greater than 70% probability of occurrence as predicted by species distribution models) of the different species or species groups. Modelling is inherently uncertain, and the level of confidence with the outputs may vary with species. If the starting point is a subset of the full predicted distribution and the target range is a subset of that subset, important areas may not be considered in deriving the solution. Alternatively, one could use the full distribution as an input layer. As the software strives for spatial efficiency when meeting its targets, the higher density areas will tend to be selected.

It was also observed that a vulnerability score of 2 for “other sponge concentrations” may not be adequately precautionary, as it is acknowledged in the working paper that some sponges in this category have slow growth rates and are highly vulnerable.

It was observed that because the biodiversity hotspots were identified as the top 20% of biodiversity based on point data from the Research Vessel survey dataset, the same “subset of a subset” issue identified for the biogenic habitat layers applies. Some concerns were also expressed about the decision to select a low to medium target range for biodiversity hotspots. The description of this Conservation Priority seems to have been written in order to ‘fit’ a predetermined CVS so that the target range is practical. It was explained that because the hotspots were large in area, a higher target would strongly influenced the network design.

EFFECTS OF DESIGN STRATEGIES AND TARGETS: EXPLORATORY MARXAN OUTPUTS

Presenter: M. King
Rapporteur: E. Will

Presentation

The conservation planning software Marxan was used to generate exploratory MPA network design outputs for illustrative purposes. Marxan is a decision support tool and will be only part of the process to generate the final MPA network design. A suite of outputs using different target combinations were generated for the offshore component of the Scotian Shelf Bioregion and compared to a baseline example. The primary focus of the comparisons was to determine how different targets influence the total area required in a given example. Four groups of examples were developed (Groups A, B, C, and D) and compared to the baseline example. The baseline example included all Conservation Priorities with targets set at the bottom of the range. Aside from the targets, all other Marxan parameters were set the same for each run. For each example, the output shown is the most spatially efficient, low cost run of 100 runs.

The purpose of the three Group A outputs was to look at scenarios where the same target (10%, 30%, and 50%) was set for all features. The interpretation was that these were not adequate solutions and this highlighted the need for a more tailored approach.

The purpose of the four Group B outputs was to test the effects of applying the original size-based scoring method for Representative Features and to illustrate the Ardron (2008) approach. Interpretation was that the original size-based approach produced targets that were likely higher than necessary and that the Ardron (2008) approach reduced the total area required.

The purpose of the six Group C outputs was to test the effects of incrementally increasing targets for the three Conservation Priority categories. The interpretation was that these outputs showed significant overlap with the baseline scenario. It also showed that there was little difference in required area when the targets were incrementally increased for each Conservation Priority category.

The purpose of the eight Group D outputs was to determine where targets for different Conservation Priority categories could be met most efficiently, and to better understand the influence each category may have on the overall network design. The interpretation was that the special features and depleted species outputs were less flexible and more closely aligned with the baseline than representative features. Increasing targets for representative features was shown to increase the overall area requirements proportionally more than for other Conservation Priority categories.

Discussion

While there was general support for the sensitivity analysis presented here, a number of participants admitted to having some difficulty following this section in the working paper. It was suggested that further details describing Marxan parameters (boundary length modifier, cost, number of runs) be included in the report. It was also suggested that in addition to showing the ‘best’ (most efficient, low cost) run for each scenario, maps showing selection frequency (i.e., summed solutions) should also be shown, and the differences between these outputs should be fully explained. In response to this, it was explained that the summed solutions would have added an additional layer of information, and made it even harder to follow this section. The intent of this section was to explore the effects of adjusting target levels on the overall area requirements.

It was observed that Marxan is a decision support tool and, as such, it should be used to help illustrate the effects of various parameter adjustments on outputs. Suggestions for further sensitivity analyses included exploring the effects of adjustments on the boundary length modifier (BLM) to show how this variable influences the size of areas selected. The BLM was set to 1 for all outputs shown here, but this variable can be set much higher (e.g., 100). It was further suggested that quantitative comparisons be done to better explain the effects of various adjustments. For example, how does the average size or number of areas change with changing parameters?

There was a request for more information on what features each of the selected areas captures. This might help to better understand what is driving the selection of specific areas. In response, it was explained that, while the Marxan software does not provide information on the content of individual areas, information is provided on what is captured in the entire output. However, there are other ways to do this type of post hoc analysis. The draft MPA network plan will include details on features captured in each proposed area.

There were questions about why certain known important areas (e.g., the Gully) did not show up in the Marxan outputs. Does this mean that not all the key layers were included? In response, it was observed that because the Gully was not ‘locked in’ in the current analysis, Marxan was able to find other areas that met the targets for Northern Bottlenose Whale and other Gully features like corals. It was further clarified that the scenarios presented in the working paper are meant to be illustrative only, and they should in no way be interpreted as potential network designs. As part of the actual network design process, existing management areas like MPAs will be incorporated, along with considerations for socio-economic impacts.

Several participants stressed the importance of ensuring that the solutions are selecting areas known to be important. If those areas are missing from the output, then something may be wrong with the inputs. There may be a need to reconsider the list of conservation priorities to make sure all key features are included. There may be a need to lock in important areas or add them in post-hoc. It was observed that the outputs suggest that Marxan is much more sensitive to the data inputs than the target levels.

It was suggested that Marxan could be used primarily to help identify the important and irreplaceable areas (i.e., the core areas that are consistently selected in the outputs). It was reiterated that an important next step for working with Marxan outputs would be to overlay the offshore EBSAs to help validate and modify the results. For participants from data poor regions who will be relying on descriptive information and EBSAs for network planning, it would be of particular interest to learn more about how well Marxan captures these areas.

There was some discussion about the variable outputs in the abyssal plain. There was very little overlap between the areas selected in the baseline versus the various test scenarios in that part of the region. It was explained that the abyssal plain is quite homogenous from a Marxan perspective. The only targets that Marxan must meet in that area are for representation, so there is a lot of flexibility in where the targets can be met.

It was observed that scenarios D7 and D8, which used only the oceanographic (temperature and salinity) and geomorphic (seabed feature) layers, are both very different than the baseline. If the rationale for including these layers is that they are proxies for marine ecological processes and functions, why is there so little concurrence with the biological layers? In response, it was explained that these layers actually serve as proxies for habitat diversity. For example, different communities will be found on banks versus basins, so some of each is required for a fully representative the network. The lack of concurrence with the baseline scenario provides another example of the flexibility of Marxan to meet its targets when constraints are limited. It is important to include coarse filter features such as the oceanographic and geomorphic layers to achieve true representativity, as the more fine-filter features are biased on limited data.

It was further observed that in Scenario B2 (only representative features), large areas of representative features are captured, while other large areas are completely missed (e.g., the western Scotian Shelf). It was suggested that the representative feature scenarios be rerun using a combined oceanographic and geomorphic layer to see how this influences the outputs.

REVIEW OF THE DRAFT SCIENCE ADVISORY REPORT

Presenter: T. Worcester

The Science Advisory Report (SAR) for this CSAS process will be produced during Part 2, to be held in the Fall of 2016. In preparation for that second meeting, a draft SAR was presented to meeting participants. Summary bullets for the draft SAR were revised with input from participants, and are included below:

- The focus of this meeting was to review the proposed approach to setting Design Strategies for a Network of MPAs in the Scotian Shelf Bioregion.
- Design Strategies are meant to specify, at a minimum: (1) the types of areas or features to be conserved (e.g., significant concentrations, feeding aggregations, nursery areas), and; (2) the relative targets for each area type. Design strategies may also include specific elements of connectivity, size, and spacing, if such information exists.
- Conservation targets will have a strong influence on the size and configuration of protected area networks.
- Conservation targets should be revised and adapted over time as more information becomes available. A timeline for review and revision should be established and followed.
- Setting of specific conservation targets (e.g., 40%) can imply a false level of precision, so the uncertainty and limitations of targets should be clearly described.
- There is no single ideal method for setting conservation targets.
- The method used to set conservation targets for a Network of MPAs in the Scotian Shelf Bioregion is intended to be a practical, logic-based, and qualitative (but reproducible) approach. It uses a fixed target of 10% as a baseline that is modified for certain Conservation Priorities based on their conservation value.
- Conservation value is established based on the evaluation of [4] primary factors: [size, uniqueness/rarity, vulnerability and status]. How these are assessed may vary for the different Conservation Priorities:
    - Size: [brief summary of how size was assessed]
    - Uniqueness/rarity: [brief summary of how uniqueness/rarity was assessed]
    - Vulnerability: [brief summary of how vulnerability was assessed]
    - Status: [brief summary of how Status was assessed]
- Available data should be used to inform these assessments, in addition to validation by relevant experts. Where data does not exist, expert opinion and traditional ecological knowledge can be applied and the method used should be clearly described.
- In an EBSA-based approach, such as will be applied in the coastal zone of the Scotian Shelf Bioregion [brief summary of the approach for developing design strategies for coastal Conservation Priorities].

Feedback on the rest of the draft SAR was provided by participants and noted in the document, which will be further developed during Part 2.

NEXT STEPS

Presenter: T. Worcester
Rapporteur: E. Will

Over the course of this 2-day meeting, there were many constructive suggestions for improving the working paper and the proposed approach for developing MPA network Design Strategies for the Scotian Shelf Bioregion. These suggestions are documented throughout this Proceedings. Specific topics that require further consideration prior to Part 2 include:

- How to incorporate considerations for size, spacing, and connectivity.
- Additional factors to consider (naturalness, intactness, resilience, etc.).
- Incorporation of climate change considerations.
- Subset of a subset issue (target setting for biodiversity hotspots and other special feature layers derived from species distribution model outputs).
- Are conservation priorities conducive to area-based management?
- Engagement of subject matter experts to validate scores.
- Incorporation of ATK.
- Development of coastal design strategies.

The last two topics required a more focused discussion during this next steps session, as follows.

Incorporating ATK into the Science Process

While it was generally recognized that there is a need to incorporate Traditional Knowledge into this Science Process, the most appropriate way to do this was not clear. Options could include the review and incorporation of ATK into the current CSAS process, or the development of a parallel process.

It was observed that ATK is a living knowledge, which encompasses modern indigenous perspectives as well as traditional stories. The community to be engaged is very large.

It was suggested that Aboriginal communities and groups be asked how they want to provide their input. It may be appropriate to include a separate section in the CSAS documents for ATK, or alternatively there may be a need to generate a separate document.

For this process, there is a clear role for ATK to help inform Conservation Priorities and Design Strategies for the coastal planning area. It was, therefore, suggested that, in preparation for Part 2, efforts should be made to engage with elders and gather their insights on important coastal species and areas.

Developing Design Strategies for Coastal Conservation Priorities

Because the information on ecologically or biologically important areas in the coastal planning area is more descriptive in nature, Marxan is not an appropriate decision support tool for this part of the region. Instead, the selection of coastal contributions to the MPA network will focus on EBSAs that have been identified in the Bay of Fundy (Buzeta 2014) and the Atlantic Coast of Nova Scotia (Hastings et al. 2014). Collectively, these coastal EBSAs encompass a range of important biological, ecological, and geomorphological features, which have been distilled into a generalized set of coastal Conservation Priorities.

While it was suggested that the coastal Design Strategies be as consistent with the offshore strategies as possible, it was acknowledged that additional work is required to determine how this might be done, as the generalized wording and lack of empirical data makes it difficult to specify the type or amount of area to be conserved in a meaningful way.

It was suggested that, for areas where available datasets include inshore areas, these data should be used to help inform inshore targets and ‘stitch’ together the two planning areas. Empirical data should also be used where available to help confirm EBSA descriptions (e.g., whale aggregation areas in the Bay of Fundy).

TERMS OF REFERENCE FOR PART 2

Presenter: T. Koropatnick

A draft Terms of Reference for Part 2 of this CSAS process was presented for review and discussion with participants, with a focus on the proposed objectives for the meeting. The objectives were revised with input from participants. They are as follows:

1. Review the proposed approach for incorporating size, spacing and connectivity into MPA network design.
2. Finalize approach, design strategies and associated targets for each of the Conservation Priorities in the offshore planning areas.
3. Review and finalize the proposed design strategies for Conservation Priorities identified in the coastal planning area.
4. Review the proposed approach for ‘stitching together’ the offshore and inshore processes.

CONCLUDING REMARKS

This Proceedings document constitutes the record of meeting discussions, recommendations, and conclusions. A Science Advisory Report and Research Document will be produced during Part 2 of this process.

Participants were thanked for their active participation in and contributions to this meeting.

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APPENDICES

APPENDIX 1. LIST OF PARTICIPANTS

Design Guidance for a Network of Marine Protected Areas in the Scotian Shelf Bioregion (Part 1)

Regional Peer Review – Maritimes Region

6-7July 2016
Delta Hotel
1990 Barrington Street
Halifax, Nova Scotia

Co-Chairs: Tana Worcester and Tanya Koropatnick

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APPENDIX 2. TERMS OF REFERENCE

Design Guidance for a Network of Marine Protected Areas in the Scotian Shelf Bioregion (Part 1)

Regional Peer Review – Maritimes Region

July 6-7, 2016
Dartmouth, NS

Co-Chairs: Tana Worcester and Tanya Koropatnick

Context

Canada has made various domestic and international commitments to establish a network of Marine Protected Areas (MPAs), including the current Government's commitment to protect 5% of coastal and marine areas by 2017 and at least 10% by 2020

[1]. As the lead department for national MPA network planning, Fisheries and Oceans Canada (DFO) is working with other federal, provincial and territorial departments and in collaboration with other interested parties to design and establish a Canadian network of MPAs in accordance with Decision IX/20 of the Convention on Biological Diversity (UNEP 2008).

The development of Canada's MPA network is guided by the 2011 National Framework for Canada's Network of MPAs (Government of Canada 2011). DFO Science has also provided general guidance regarding the design of MPA networks (DFO 2010), considerations for how to achieve representativity in the design of MPA networks (DFO 2013), and more specific guidance on MPA network objectives, data, and methods for the Scotian Shelf Bioregion (DFO 2012). A working group comprised of experts from DFO, Canadian Wildlife Service and Parks Canada has offered guidance on the technical aspects of MPA network development in the DFO Maritimes Region[2] since 2014. Feedback from other government agencies, Aboriginal groups, stakeholders, and academics has also helped shape the MPA network development process in this region.

From this guidance and feedback, Strategic Objectives for the MPA network in DFO Maritimes Region have been developed, as follows:

1. Protect unique, rare, or sensitive ecological features in the bioregion
2. Protect representative examples of identified ecosystem and habitat types in the bioregion
3. Help maintain ecosystem structure, functioning and resilience within the bioregion
4. Contribute to the recovery and conservation of depleted species
5. Help maintain healthy populations of species of commercial, recreational and/or Aboriginal importance

Due to differences in information and data availability for the coastal and offshore waters of DFO Maritimes Region, two distinct planning areas have been identified for MPA network development: 1) the coastal planning area (Atlantic coast of Nova Scotia and Bay of Fundy); and 2) the offshore planning area (Scotian Shelf, slope and abyssal plain). Different approaches for network planning will be undertaken in each of these planning areas. Conservation Priorities and Operational Objectives

[1] 2020 Biodiversity Goals and Targets for Canada

[2] The administrative boundaries for DFO-Maritimes Region will serve as a proxy for the Scotian Shelf bioregion for MPA network planning purposes.

[4] have been drafted for each area to more specifically address the overarching Strategic Objectives for the region.

To address National requirements for MPA network design, science advice is needed on network Design Strategies[5]. A Science Advisory Process is required to determine, for each Conservation Priority: 1) the types of areas to be conserved (e.g., aggregations, nursery, spawning, etc.) and 2) the relative target (amount) for each of those areas. It is recognized that a general lack of empirical evidence will prevent the development of scientifically supported, objective targets for regional Conservation Priorities (e.g., Hillborn, 2012). As a result, this Science Advisory Process will aim to provide feedback on the logic of the approach used to develop design strategies and associated targets.

This is the first of two meetings to provide science advice on proposed Design Strategies and associated targets for protecting Conservation Priorities, addressing Strategic and Operational Objectives, and guiding MPA network design in the region.

Objectives

The objectives of Part 1 of this Science Advisory Process are to review design strategies and associated targets for developing a network of MPAs in DFO Maritimes Region. Specifically:

a) Review the proposed approach for setting targets for Conservation Priorities identified in the coastal and offshore planning areas.
b) Review proposed design strategies and associated targets for each of the Conservation Priorities in the coastal and offshore planning areas. For the offshore planning area, exploratory Marxan outputs using the proposed design strategies and associated targets will be considered.
c) Develop the work plan and Terms of Reference for Part 2 of this process.

Expected Publications

- Proceedings
- Research Document

Participation

- DFO Science
- DFO Ecosystem Management
- DFO Resource Management
- DFO Policy and Economics
- Environment and Climate Change Canada
- Parks Canada Agency
- Aboriginal organizations
- Provincial (NS, NB) governments
- Industry representatives
- Academics
- Environmental non-government organizations

[4] An Operational Objective identifies the desired outcome (e.g., maintain, contribute to recovery) for its associated Conservation Priority.

[5] A Design Strategy describes how a Conservation Priority will be spatially incorporated into the network design, so that the Operational Objective for each Conservation Priority can be achieved.

References

DFO. 2010. Science Guidance on the Development of Networks of Marine Protected Areas (MPAs). DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2009/061.

DFO. 2012. Marine Protected Area Network Planning in the Scotian Shelf Bioregion: Objectives, Data, and Methods. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2012/064.

DFO. 2013. Science Guidance on how to Achieve Representativity in the Design of Marine Protected Area Networks. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2012/083.

Government of Canada. 2011. National Framework for Canada's Network of Marine Protected Areas. Fisheries and Oceans Canada, Ottawa. 31 pp.

Hillborn, R. 2012. The Role of Science in MPA Establishment in California: A Personal Perspective. Environ. Conserv. 39(3): 195-198.

UNEP. 2008. Decision Adopted by the Conference of the Parties to the Convention on Biological Diversity at its Ninth Meeting (UNEP/CBD/COP/DEC/IX/20), Decision IX/20 (CBD, 2008).

APPENDIX 3. AGENDA

Design Guidance for a Network of Marine Protected Areas in the Scotian Shelf Bioregion (Part 1)

Regional Peer Review – Maritimes Region

6-7July 2016
Delta Hotel
1990 Barrington Street
Halifax, Nova Scotia

Co-Chairs: Tana Worcester and Tanya Koropatnick

DRAFT AGENDA

DAY 1 (Wednesday, July 6, 2016)

Time	Topic	Leads
12:00 – 12:15	Welcome and Introductions	Chairs
12:15 – 12:45	Context, MPA network objectives and conservation priorities	M. King
12:45 – 14:45	Design strategies and targets	M. King
14:45 – 15:00	***Break*** *(Coffee/tea provided)*	
15:00 – 17:00	Design strategies and targets continued	M. King

DAY 2 (Thursday, July 7, 2016)

Time	Topic	Leads
10:00 – 10:30	Review of previous day	Chairs
10:30 – 12:00	Effects of design strategies and targets: exploratory Marxan outputs	M. King
12:00 – 13:00	***Lunch*** *(Hospitality not provided)*	
13:00 – 14:00	Development of consensus statements	Chairs
14:00 – 15:00	Development of work plan and Terms of Reference for Part 2	Chairs
15:00 – 15:15	***Break*** *(Coffee/tea provided)*	
15:15 – 17:00	Discussion continued	
17:00	Wrap up	