Fisheries and Oceans Canada | Pêches et Océans Canada
Ecosystems and Oceans Science | Sciences des écosystèmes et des océans

Canadian Science Advisory Secretariat (CSAS)

Proceedings Series 2018/021

Maritimes Region

Proceedings of the Regional Peer Review of an Integrated Ecosystem Assessment Framework for Assessing the Proposed St. Anns Bank Marine Protected Area (MPA), Scotian Shelf

March 29-30, 2016
Dartmouth, Nova Scotia

Chairperson: Tana Worcester
Editor: Kristian Curran

Fisheries and Oceans Canada
Bedford Institute of Oceanography
1 Challenger Drive, PO Box 1006
Dartmouth, Nova Scotia B2Y 4A2

October 2019

Canada

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.

Published by:

Fisheries and Oceans Canada
Canadian Science Advisory Secretariat
200 Kent Street
Ottawa ON K1A 0E6

http://www.dfo-mpo.gc.ca/csas-sccs/
csas-sccs@dfo-mpo.gc.ca

ISSN 1701-1280

Correct citation for this publication:

DFO. 2018. Proceedings of the Regional Peer Review of an Integrated Ecosystem Assessment Framework for Assessing the Proposed St. Anns Bank Marine Protected Area (MPA), Scotian Shelf; March 29-30, 2016. DFO Can. Sci. Advis. Sec. Proceed. Ser. 2018/021.

Aussi disponible en français :

MPO. 2018. Compte rendu de la réunion d'examen par les pairs du cadre d'évaluation intégrée des écosystèmes aux fins d'évaluation de la zone de protection marine (ZPM) du banc de Sainte-Anne proposée sur le plateau néo-écossais; du 29 au 30 mars, 2016. Secr. can. de consult. sci. du MPO, Compte rendu 2018/021.

TABLE OF CONTENTS

SUMMARY

A Regional Peer Review process was held on March 29-30, 2016, at the Bedford Institute of Oceanography in Nova Scotia, to review a proposed Integrated Ecosystem Assessment (IEA) framework that could be used to monitor the status of Marine Protect Areas (MPAs) and assess the effectiveness of an MPA in meeting its conservation objectives within a regional context. The focus of this meeting was to review the proposed IEA approach, to review the data that have been selected for the application of the approach to the proposed St. Anns Bank MPA, to identify gaps and sources of uncertainty, and to discuss next steps in the development of the approach.

Meeting participants felt that the proposed approach had potential for making effective use of regional synoptic data for providing an overview of ecosystem health (natural variability), which may prove useful context in evaluating the status and effectiveness of MPAs; however, further exploration is required to determine how the results would be integrated into the monitoring plan of an individual MPA, and ultimately used to inform MPA management advice.

It was agreed that the proposed approach should be further explored, and a follow-up meeting was proposed for a later date to review the final results. This Proceedings document is a record of the meeting discussions and conclusions.

INTRODUCTION

In support of Fisheries and Oceans Canada's (DFO) Marine Protected Areas (MPA) Program, DFO Science has been developing monitoring indicators, protocols, and strategies for assessing whether individual *Oceans Act* MPAs are meeting their conservation objectives. In the DFO Maritimes Region, monitoring plans that include these elements have been prepared for both the existing Gully and Musquash MPAs, and monitoring advice has been provided for the proposed St. Anns Bank MPA (Kenchington 2014; DFO 2012; DFO 2014). Under DFO's *National Conservation Plan* initiative (2014-2019), DFO Maritimes Science is continuing to advance work on the effective monitoring of MPAs by developing a systematic, integrated, and holistic approach to assessing monitoring data and determining the effectiveness of MPAs within a broader regional context.

As part of the regional peer review process, a meeting was held on March 29-30, 2016, at the Bedford Institute of Oceanography in Dartmouth, Nova Scotia, to review a proposed Integrated Ecosystem Assessment (IEA) framework and its application to the proposed St. Anns Bank MPA on the Scotian Shelf. The first day of the meeting focused on a review on the background/context for the work, including a review of the Maritimes Region's approach to MPA Network Planning, work to date on the proposed St Anns Bank MPA, and the proposed IEA approach. Day two focused on reviewing the data that have been selected for the application of the approach to the proposed St. Anns Bank MPA, identifying gaps and sources of uncertainty, and discussing next steps in the development of the approach. It was expected that additional meetings whould be required to review the results of the assessment and apply the approach to other areas of the DFO Maritimes Region.

The meeting Chairperson, Ms. Tana Worcester, introduced herself, followed by an introduction of meeting participants (Appendix 1). The Chair thanked meeting participants for attending the DFO Regional Peer Review Process. The Chair provided a brief overview of the Canadian Science Advisory Secretariat (CSAS) science advisory process and invited participants to review the meeting Terms of Reference (Appendix 2) and Agenda (Appendix 3). To guide discussion, one Working Paper was provided to meeting participants on March 29, 2016, and at the meeting. The Chair acknowledged the late distribution of the Working Paper, noting that it would be reviewed in detail by the Science Lead on the second day of the meeting. This Proceedings document constitutes a record of the meeting discussions and conclusions.

DAY ONE

MARINE PROTECTED AREA NETWORK PLANNING

Presenter: M. Westhead
Rapporteur: K. Curran

Presentation

Canada has committed to achieving the Aichi Targets (nationally 5% by 2017 and 10% by 2020). Marine conservation will proceed in cooperation with Parks Canada and Environment and Climate Change Canada (ECCC). Not all areas set aside for marine conservation to meet these targets will be *Oceans Act* MPAs. Other forms of management include fishery closures, coral conservation areas, national wildlife area, migratory birds sanctuaries, and national marine conservation areas, to name a few (designated under a range of existing legislation). Moving forward, Marine Protected Area network planning will be the foundation for identifying future MPAs by DFO, Parks Canada and ECCC. This will ensure individual sites are considered

collectively (not *ad hoc*) and will work together towards comprehensive protection. Network planning is occurring across Canada.

Once St. Anns Bank (SAB) is designated, the total area covered by MPAs and anticipated 'other effective measures' is only about 1.6% of the DFO Maritimes Region; however, regional conservation measures will feed up into national reporting on the targets (it is not expected that every region will reach 5% and 10%). The intent is to have a proposed, draft MPA network (i.e., map of potential sites) for consultation by the beginning of 2017. Funding for DFO MPAs has been inconsistent to date. Moving forward, $81.3 million has been set aside for DFO and Natural Resources Canada over the next 5 years commencing in 2016-2017. This provides more certainty in proceeding with MPA network planning and designation over the next 5 years. Some conservation areas other than MPAs (e.g., *Fisheries Act* closures) currently do not have dedicated management or monitoring plans, although it is anticipated these areas will have to be managed and monitored. As more sites are added to the MPA network (MPAs and other effective area-based conservation measures), the approach to management and monitoring of the network may have to change from a detailed site-by-site approach to a more generalized approach (or a combination of the two). It was noted that the monitoring approach for the Musquash Estuary MPA has been similar to that pursued for the Gully MPA and the proposed SAB MPA.

Discussion

A participant asked if the draft network plan will include areas designated by other federal departments. The presenter noted it would.

A participant asked how existing MPAs (e.g., under the *Oceans Act* and the *Fisheries Act*) are contributing to the objectives of a MPA network. The presenter noted that they are expected to contribute to meeting conservation objectives, although upcoming analysis will demonstrate and explore this further.

A participant asked about the conservation objectives for SAB given they have changed from those in the previous CSAS Science Advisory Report. The presenter noted they were discussed with the St. Anns Bank Advisory Committee and changes in wording were proposed and accepted; however, the basic structure remained.

A participant noted that how a network is to be monitored will require further consideration, particularly as MPAs are staggered in their designation, triggering different 5-10 year review periods. The participant further noted that as more MPAs are added, there is a need to consider how common indicators within individual MPAs are reviewed collectively to present a broader scale understanding of the attribute throughout the region (e.g., wolffishes).

The Chair noted that MPA monitoring will have to change from the approach undertaken to date, especially given the 2017 and 2020 targets. Work completed to date will require further consideration in terms of how it fits in with future work and approaches to MPA network management and monitoring.

A participant inquired about the 2012 framework (DFO 2012) and how it might fit into the IEA framework for monitoring the MPA. It was agreed that there is a need to have a further discussion on the integration of these. It was noted that the 2012 framework was essentially a 'wish list' of many possible indicators that could be used to monitor the MPA. The IEA approach would draw upon a short list of regional indicators, some of which were noted in the 2012 work.

The Chair noted there is a lot of discussion within DFO Science regarding how to proceed with science and monitoring of MPAs and other conservation areas. Discussions are still in an exploratory phase and will evolve over the coming years.

The Science Lead noted that the IEA approach considers the regional scale and then nests specific monitoring needs for specific MPAs and other conservation areas within this.

ST. ANNS BANK

Presenter: T. Worcester and D. Fenton
Rapporteur: K. Curran

Presentation

St. Anns Bank was identified early-on as a potential Area of Interest (AOI) through a MARXAN analysis, supported by community consultation in 2009-2010. In 2011, the SAB site was officially announced as an AOI by DFO.

The SAB Ecosystem Overview Report (EOR) was completed in 2011 and published as a DFO Technical Report in 2013 (Ford and Serdynska 2013). The EOR provided an in-depth description of ecological features of the AOI (e.g., physical and chemical oceanography, plankton, benthic classification, species profiles), included discussion on long-term changes in SAB, as well as data gaps.

Conservation priorities, objectives, and a preliminary risk assessment were peer-reviewed in January 2012 using the draft EOR as the basis of discussion (Ford and Serdynska 2013). Conservation priorities for SAB were identified for habitat, biodiversity, and productivity. Conservation objectives for each of these priorities were then described. There was a lot of discussion at the 2012 peer review meeting regarding the terminology used in the conservation objectives, including an attempt to distinguish between common terms such as conserve, protect, and restore. Draft conservation objectives for SAB reviewed at the 2012 meeting were subsequently refined by Oceans sector in consultation with stakeholders. Data gaps and human activities were also discussed at the January 2012 CSAS meeting.

In November 2012, there was a CSAS Science Response process to review the proposed monitoring framework for SAB, which was consistent with the approach undertaken for the Gully MPA (DFO 2014; Kenchington 2014), and 51 potential indicators were identified. In addition to these 51 ecological indicators, the background document included discussion of potential socio-economic indicators for SABS, although these were not peer reviewed by CSAS.

An ecological risk assessment for SAB was undertaken by Oceans sector in 2013 and published as a DFO Technical Report (Aker et al. 2013). This was supplemented by additional research on benthic habitat mapping, Snow Crab research, passive acoustic monitoring, oceanography, species tracking (OTN), and human-use.

From 2012-2013, site information was collected and public consultations proceeded. Site boundaries and zones were discussed with stakeholders via an Advisory Committee forum throughout 2013 and 2014. Late 2014, a decision was forwarded to National Headquarters (NHQ) to proceed with regulations. It is proposed that a SAB MPA would have four zones. Zone 1 is to be a high protection zone (minimal use) with Zones 2-4 considered as fishery zones, differing by fishery gear. It was noted that the boundary and zones of the proposed MPA have changed significantly since it was initially proposed in 2011.

Draft regulations are underway in 2016, with the intent of formalizing the MPA through official designation in regulation sometime in late-2016 or early-2017. The intent is to continue to undertake science and monitoring of SAB throughout this time.

Once the MPA is designated, a management plan and monitoring plan will be drafted. A monitoring plan will finalize those indicators that are to be monitored. It is expected that

management and monitoring will be reviewed within a 5-10 year time frame following official designation.

Science work undertaken in SAB from 2014-2016 was reviewed, including multibeam/benthic habitat work, Ocean Tracking Network (OTN) tracking of Snow Crab (with a few more species proposed to be tracked in 2016), joint DFO/industry surveys, acoustic monitoring of cetaceans, and addition of Atlantic Zonal Monitoring Program (AZMP) stations.

Discussion

A participant asked if the 51 indicators proposed in the Science Monitoring Framework review were prioritized in terms of feasibility or whether they were presented as a list of things that could be done. The Chair noted that a prioritization of these indicators was not undertaken.

A participant asked if the SAB goals and objectives are available for distribution, and the Chair indicated they are published in the SAB risk assessment (Aker et al. 2013). The Chair indicated they would be distributed to meeting participants.

INTEGRATED ECOSYSTEM ASSESSMENT (IEA) FRAMEWORK APPROACH

Presenter: J. Choi
Rapporteur: K. Curran

Presentation

While the initial focus of this work was on St. Anns Bank, a regional, synoptic approach to IEA was ultimately taken, which differs from the area-specific approaches to monitoring adopted to date. The guiding principle was developing an approach that is simplified in terms of meeting operational needs and that draws upon existing data sets. The approach focuses on four elements: productivity, biodiversity, habitat, and species of interest. SAB is a large and complex ecosystem that operates at various scales in space, time, and organizational scale. It is connected in various ways to its surroundings (both near and far), so it cannot be treated as an isolated system. Existing ecosystem measures of components of interest are often ambiguous and imperfect.

Design Principles

Design principles included: consider an expansive area of relevance\concern (all of Scotian Shelf); leverage data from existing monitoring programs that go beyond MPA proper (e.g., AZMP); and build on methods that are collaborative, transparent, and transferable to other regions.

Biodiversity

Biodiversity is a complex idea (space, time and components to be considered), and there are many different ways that it can be assessed. From the spectrum of possible indicators, taxonomic richness was proposed as a readily quantifiable and easily monitored indicator. It was proposed that a statistical correction (rarefaction) be applied for spatial and temporal sampling intensity in order to compare across location and time. The Science Lead proposed to model the spatial/temporal patterns of biodiversity, and then integrate these into a risk-based approach to permit formal statements of risk and probability of exceeding thresholds.

Productivity

Productivity is also a complex idea. It was noted that production is not the same as standing biomass, but is correlated. The approach proposes to estimate production based on a modeled

solution to a logistic state space model. The modeled approaches allow for analysis of variation within modeled domains, which is of more interest than the average state. The probability of variability in space and time is of interest as potential indicators of change. Work done for Snow Crab (predicted biomass density) was used as an example.

Habitat

Concepts of functional habitat versus integrative habitat (also known as potential and realized habitat) were presented. Functional habitat draws upon characteristics of a habitat where you would expect to find a particular species. To represent functional habitat, probability models can be developed using presence/absence information (Bernoulli – generalized additive models and autoregressive models) for key species (wolffishes, cod). Integrative habitat is more complex, drawing upon Eigen analysis of chi-square and principle component analysis to say something about variations in species composition, as an indicator of habitat. The Science Lead emphasized that habitat is more time-dynamic than generally assumed due to changes in environmental conditions and influences of species themselves on influencing characteristics of their habitat.

Connectivity

The notion of connectivity relates back to the spatial and temporal relationships between areas. This is achieved by looking at a range of variability where an attribute (e.g. depth) changes significantly from background error. The concept of range allows a determination of what scale and frequency monitoring is most effective (a balance between detail and affordability). Estimating spatial-temporal patterns are still computationally demanding. Two approaches to pursue were: Markov Random Field representation and stochastic spatio-temporal simulation models. In absence of these two methods providing reasonable results, tagging and mark-recapture data could be used to help inform connectivity. Connectively analysis may be useful in determining which species could best be protected by MPAs

Spatial Scale / Spatial Correlation

There is a relationship between the scale of a process of interest and the ability of an MPA to influence that process. Spatial scale is also informative to assess the appropriate scale of monitoring. This IEA approach considers processes larger than one km^2.

Temporal Scale / Temporal Correlation

Better understanding and analysis of temporal correlation of processes can be used to assess the effectiveness of MPAs to influence short-term vs long-term processes. It can also be used to inform the frequency of monitoring. This IEA approach considers processes greater than one year.

Space-time Models

Use of space-time models, including Random Markov Field processes and their relationship to the Matern model / Stochastic spatio-temporal simulation models was discussed. There is currently no commitment to this approach, as there are real issues for Science in terms of processing power and speed.

Traditional Connectivity

Tagging data can be used in the development of movement models to define spatial connectivity and range of species. While mark-recapture data would also be useful in this kind of analysis, its availability for turtles, sharks, etc. was uncertain.

Uncertainty (Risk)

In this case, uncertainty/risk was linked to propagation of error. In this approach, error is empirically quantified and then propagated using statistical/correlation methods.

Logistic Model

The intent to use a logistic model to describe the system state, and a Bayesian approach to solving this, was briefly outlined.

Discussion

Integrated Ecosystem Assessment (IEA)

It was proposed and agreed that a background section on IEA be added to the Working Paper.

A participant asked if the IEA metrics are intended to track and respond to human activities (fishing) or broader ecosystem changes. The proposed approach appears to be aimed at assessing the status of the ecosystem rather than on determining causality. The Science Lead indicated that it is difficult to tease out causality, so he was not intending to do this. The IEA approach would simply identify a change and additional science would presumably be undertaken to infer causality. A participant noted that several indicators exist in the literature that could be used to track causality.

It was suggested that the National Oceanic and Atmospheric Administration (NOAA) approach to IEA be reviewed, in an effort to develop more power to study cause-and-effect. The Science Lead noted that investigations of causality require very good data.

The ability of this approach to assess the effectiveness (or not) of MPAs was questioned. The Science Lead noted that effectiveness can only be assessed once the status of the ecosystem is understood, so assessing status is the primary task. Since estimating effectiveness is an objective of this CSAS process, it was suggested that the role of the IEA approach in assessing MPA effectiveness should be discussed in the Working Paper in some manner.

A participant noted that IEA should be viewed as a tool to start evaluating the status of the ecosystem, but that additional work would still be required.

A participant noted that some of the findings presented could be integrated into the analysis being carried out in support of network planning.

It was suggested that this exercise could identify data gaps that could be used to prioritize future monitoring work.

Scope

A participant asked why the spatial domain of the whole Scotian Shelf was chosen, rather than focusing on a smaller scale of the shelf around St. Anns Bank. The Science Lead noted that the larger area allows for more statistical power and ultimately will inform a network of MPAs on the Scotian Shelf. It was suggested this context be included in the Working Paper.

The proposed IEA approach is intended to operate at a broader regional scale, with opportunity to undertake specific studies within specific protected areas, if necessary.

Biodiversity

A participant noted that for fish, removal of a large predator leads to increased biodiversity with a decrease in species size. It was suggested that it would be good to estimate our expectations for biodiversity in closed areas relative to the entire Scotian Shelf. The Science Lead indicated that a framework for this exists and could be included in future analysis.

Another participant asked if a biodiversity index could be measured using classification of species. The Science Lead indicated this could be done and is an effective way to proceed, in order to see how the various indices vary relative to each other. The Science Lead cautioned, however, that it cannot be subdivided to a point that it cannot be integrated in a coherent manner.

The Chair reflected on a comment that species size structure does not fit well within the concepts of productivity, biodiversity, and habitat, inquiring why a changing species size structure does not fit within these concepts. The Science Lead noted that species size is an important consideration, especially relative to species of interest, and could be analyzed further pending available data. Another participant noted that these types of considerations are being applied to plankton, although the state of knowledge is presently limited and should be considered as a data gap.

A participant noted that analysis associated with spatial-temporal variability in plankton species' habitat is being explored (particularly to try and capture the seasonal component). In particular, how would plankton change be expected using environmental variables from climate change projection models.

Productivity

The Chair asked for greater detail on what is meant by functional groups within the productivity analysis. The Science Lead noted that functional groups allow you to organize multiple species data sets into a few functional groups although, in doing this, you also loose information or incorporate error (e.g., such as for pelagics). A functional group approach, however, requires more information than simply assessing individual species.

Habitat

There was significant discussion on what was meant here by habitat (potential vs. realized habitat), and what habitat features should be the focus of monitoring (static features vs. dynamic, changing conditions). It was noted that timescale is important (geological timeframe vs. management timeframe).

A participant noted that in 2003 habitat was characterized as physical-chemical elements, which is challenging the current notion of the inter-play between habitat and species. Another participant noted that the current thought on this is reflected in potential (areas an organism could theoretically occupy based on physical attributes) and realized (areas where an organism is actually found based on the complex inter-play between organisms with the physical attributes and organisms amongst themselves; e.g., predation).

A participant suggested further discussion occur on the 'habitat' element. Again, this element was initially viewed as physical-chemical attributes, but now we are trying to fit in the biological relationships within it.

Connectivity

A participant noted that the spatial and temporal methods used for connectivity seemed reasonable, but sought clarity of how they would be employed in monitoring. The Science Lead indicated that output from this analysis would feed into other models used to estimate productivity, biodiversity, and habitat.

A participant noted that Ian Bradbury has pursued research on genetic connectivity.

The Chair asked about connectivity, noting that it is typically considered in context of species movement and not in context of spatial variability. The Science Lead indicated that analysis on spatial variability is typically species-specific. A participant noted that spatial similarity is not the

same as connectivity, and caution should be taken in the presentation of findings related to connectivity.

A participant noted that connectivity is not an explicit MPA objective, and asked whether connectivity could be rolled into the habitat objective. Another meeting participant felt that breaking out connectivity is a good approach, as it will allow greater consideration to think about connectivity amongst multiple MPAs, this might be lost by embedding connectivity under the habitat objective. Another participant noted that an alternate way to think about it is spatial correlation. The Science Lead indicated the intent is to determine if an MPA has a positive effect on a category of species or variables. A participant suggested additional text be added to the Working Paper to clarify what is meant by connectivity relative to how it is viewed in the literature.

Uncertainty

(NOTE: Defined as “Risk” in the Working Paper, but was asked to be renamed “Uncertainty”)

A participant asked how carrying-capacity is incorporated into the risk analysis. The Science Lead again clarified that risk in this sense is referring to error around uncertainty and not risk in terms of magnitude, likelihood, and persistence of an impact.

DAY TWO

The Chair welcomed everyone back to Day Two of this Science Peer Review of the proposed Integrated Ecosystem Assessment Framework for Assessing the Proposed St. Anns Bank Marine Protected Area (MPA), Scotian Shelf (and beyond), and started with a summary of the previous day’s discussion. Since there had been some questions about the SAB Conservation Goals and Objectives, including how these evolved from those outlined in the Science Advisory Report (DFO 2012) to those included in the Technical Report prepared by Oceans (Aker et al. 2014), these were shown again and discussed briefly.

SUMMARY OF DAY ONE

Day One started with a review of the oceans and science work that has been done to date on St Anns Bank, including:

- its initial identification as a potential AOI through a MARXAN analysis (2009);
- its official announcement as an AOI in 2011;
- development of an ecosystem overview report for the area (based on existing science information);
- the CSAS review of Conservation Priorities, Objectives and the proposed Risk Assessment approach in January 2012;
- the CSAS review of a monitoring framework for St. Anns Bank in Nov 2012;
- public consultations on the MPA outer boundaries and zones (resulting in change in shape from the original AOI);
- the 2014 decision to proceed with development of regulations; and
- additional data collection focusing on data gaps (such as benthic mapping, acoustics) and enhancement of ecosystem monitoring in this area.

An overview of the next steps for MPA network planning was provided, noting the accelerated timeframe to achieve the Aichi Targets of 5% protection by 2017 and 10% protection by 2020.

The Science Lead then provided an overview of the proposed Integrated Ecosystem Assessment (IEA) approach, starting with some design principles, including that the approach should:

- be applicable both within the boundaries of an MPA (such as St. Anns Bank) and at a regional scale;
- use methods that are reproducible, transparent, easy to share;
- be applicable to other areas, and can be used with other data;
- provide the scaffolding to which new data can be added (i.e., provide a way to organize monitoring data); and
- address conservation objectives related to Biodiversity, Habitat and Productivity.

The Science Lead then described the intended approach to assess biodiversity, habitat and productivity. This led to discussion of whether Biodiversity, Habitat and Productivity are the right "bins", and how to incorporate things such as changing size structure (fish/plankton) as an indicator of ecosystem change (i.e., what bin does this fit into?).

DISCUSSION

Biodiversity

There was discussion on the use of taxonomic richness as an indicator, including the issue that there could be potentially unexpected consequences of human impact (removal of predators) on something like a diversity index, which has the potential to increase diversity (negative), i.e., this indicator does not always respond as expected. History is important, and it is important to be aware of shifting baselines. However, there are also data limitations (may not have data to reflect past conditions). The greater the ability of science to interpret monitoring results (changes in indices), the more helpful these results will be for management. While it may not be possible to describe causality, which is difficult to interpret, effort should be made to describe how indicators are expected to respond. The intent of this approach is to fit data to a time series to more accurately describe the trend in the indicator, and then allow for analysis of causality afterwards. Modelling approaches may be more effective at exploring causality, but they require very good data as inputs.

Connectivity

There was discussion around the use of the term "connectivity". It was suggested that what was presented here was only one aspect of connectivity, and that investigation of the connectivity between MPAs may be more necessary for MPA network monitoring than for monitoring of individual MPAs. It was suggested that additional context about what was meant by connectivity should be added to the Working Paper.

It was noted that understanding of connectivity would be important in the design of a network, in addition to its monitoring. Connectivity will be important for designing sampling strategies and monitoring.

Spatial Scale

A participant wanted to know the number of species for which there is sufficient information to calculate spatial scale. The Science Lead suggested that presently there is sufficient information for approximately 20-30 fish species, 5 macro-invertebrates, and a total of 50-100 species (or

groups). For context, it was noted that, in the offshore, approximately 500 faunal species are known, and coastally it is more like 2000-3000 species.

Uses of the IEA Approach

There was discussion around the best use of the proposed IEA approach, including what the work is able to do and what we would want it to do. Potential uses included:

- network design;
- network evaluation;
- prioritization of monitoring; and
- state of the Ecosystem Reporting.

Other questions included:

- How new data streams would be added to the analysis (e.g., genetic diversity).
- How the results would be used for management.

DATA SOURCES

Presenter: J. Choi
Rapporteur: K. Curran

Presentation

The Science Lead reviewed characteristics of data to be included in IEA. It should be easily accessible, with sufficient and regular spatial and temporal coverage, and informative to assess productivity, biodiversity, habitat, and/or species of interest. It was noted that all datasets were vetted for quality and being informative, although the science team has yet to fully explore all datasets for consideration in the framework. The Science Lead then reviewed the various datasets, outlining the spatial and temporal coverage, underlying considerations, and linkages to the IEA objectives of productivity, biodiversity, and habitat.

Datasets considered included:

- AZMP/chlorophyll-a and nutrients: BioChem bottle data;
- AZMP/Zooplankton: BioChem database;
- Remote Sensing Data: ocean colour and SST (Remote Sensing Group);
- Temperature records from various sources, especially groundfish, Snow Crab and AZMP surveys;
- Salinity (Groundfish surveys/AZMP, BioChem);
- Oxygen and pH (once the data have been reloaded; groundfish surveys/AZMP, BioChem);
- Bathymetry (CHS, groundfish survey, Snow Crab survey);
- Groundfish: Research Vessel Surveys;
- Snow Crab survey, focus upon benthic invertebrates;
- Clam survey data in Banquereau and Western banks (though it does not pass the temporal coverage conditions, it offers very high resolution multispecies data on the banks;)

- Logbook records of catch and effort (DFO Maritimes Fisheries Information System [MARFIS] / Zonal Interchange File Format [ZIFF]);
- AIS tracks – Radio-based Automatic Identification System; and
- VMS potentially – Satellite-based Vessel Monitoring System.

BioChem discrete bottle data: chlorophyll-*a* and nutrients. Water chemistry and plankton data is stored in the BioChem database; however, data is presently being re-analyzed for quality control. Approximately 140,000 stations sampled with data from 1955 to present is the focus of analysis, as it reflects a period when spatial coverage is good. Consistent data collection really begins in late-1980s to early-1990s. It has good seasonal coverage, as stations are revisited on a monthly basis. Spatial coverage of zooplankton data is more limited and available from 1999 to 2014, due to divergent methodologies applied to the data prior to 1999. The plankton abundance and size datasets that have been compiled for the IEA are consistent with data in AZMP reports, which is promising.

Remote sensing data is used to fill-in gaps in chlorophyll-*a*. Aspects of this dataset were reviewed.

Sea Surface Temperature (SST) and bottom temperature data was presented. On its own, this data may not be informative, but it does factor into habitat, productivity, and biodiversity.

Demersal fish and macro-invertebrate datasets were reviewed (groundfish and Snow Crab surveys). Many of the species-specific surveys have limited spatial and temporal coverage defined largely by fishery management requirements (e.g., Snow Crab survey began in mid-1990s). Effort was required to resolve net mensuration issues associated with the Research Vessel (RV) Survey. It was noted that net mensuration has not been recorded systematically, which has an impact on the surface area swept by the net and, in turn, influences the estimate of catch effort.

Fishery footprint data was briefly reviewed.

Discussion

A participant noted the Continuous Plankton Recorder time series is used by DFO, but should be considered in context of the plankton net tow data. The two datasets can both be used but should not be combined.

A participant noted that the *in situ* chlorophyll-*a* data likely has errors associated with depth. That is, profiles are not corrected based on fluorometer data, rather is corrected on the more limited in situ bottle data (so structure in profile may be lost). It was clarified that the remote sensing chlorophyll-a data represents in general the upper 5-metres of the water column.

A participant asked if datasets were reviewed systematically to remove any errors. The Science Lead indicated this type of analysis is underway. For the BioChem data, a few points were located on land, so it was suggested this dataset be revisited to look at these points (remove them from the dataset).

A participant suggested that the Working Paper provide more detail on each method and what dataset it is to be applied to (to be applied to individual datasets or if multiple datasets are to be aggregated). In addition, the paper could acknowledge existing methods, noting how these methods could be included in the IEA (or not). Last, the participant noted that the Working Paper did not have much discussion on productivity indices, noting that NOAA has thought about analyses for this objective.

A participant asked how chlorophyll-*a* could be used to evaluate the effectiveness of the MPA, and the Science Lead indicated it likely could not be applied to evaluating the MPA. It was suggested by another participant that chlorophyll-*a* could say something meaningful about the MPA in the sense that it could rule out human-induced change in an MPA. Another participant noted that the IEA would provide context and then another set of indicators specific to evaluating MPA effectiveness might have to be applied. Participant were encouraged to think of the IEA in terms of a network of MPAs rather than being applied to SAB specifically.

Participants noted that AZMP reports have several indicators of primary production across the Scotian Shelf that could be incorporated into IEA, rather than developing separate primary productivity for this analysis. The Science Lead noted that this would be helpful, but that having the data available gives individuals more power to manipulate and evaluate beyond the existing limitations of what AZMP presently reports upon. The participant noted that AZMP data layers and data scripts are available from AZMP, although noted coordination is not as effective as it could be. The Chair noted that alignment with existing monitoring programs will require consideration to optimize resources.

A participant inquired about what the concern really is regarding net mensuration, as the participant felt for purposes of inferring changes in productivity, biodiversity, and habitat the potential error in net mensuration was not significant. The Science Lead noted that the error is of order 50%, which could have an impact on catch effort estimates. It was agreed that accounting for this error would ultimately improve the RV data results and should continue to be explored. The participant suggested the spatial bias be included in the Working Paper, as it has implications for other RV-based data layers being used in network analysis.

A participant noted that all data presented is to set a baseline prior to MPA designation. It was then asked if the MPA will be trawled post-MPA designation and, if not, there may not be a need to explore these datasets in the IEA. It was noted that efforts are made to accommodate trawling for monitoring purposes; particularly, not to compromise the overall RV trawl dataset for future comparison.

A participant asked how many different taxa does the Snow Crab survey (using the Nephrops trawl) capture and it was noted that upwards of 100 taxa are typically observed. The participant noted that the snow crab survey would be an effective survey tool to apply to other areas (it can operate down to 350 m depth). The Science Lead indicated that use of this type of survey has been considered by various individuals within DFO, but it has not yet been employed beyond the Snow Crab survey. Another participant asked if this type of trawl has been used in Newfoundland and Labrador Region (NL) waters and the Science Lead was not aware of its use in NL waters.

The Chair asked if the various taxa being observed in the Nephrops trawl have been analyzed against what is observed in the RV survey to determine if they are comparable. A participant noted this has been attempted in network planning exercises, but has not been fully explored.

A participant asked about all other surveys that occur on Scotian Shelf (e.g. DFO-Industry Halibut survey) to see if they might provide useful information for consideration in IEA. The Science Lead noted that these surveys typically have bias associated with their design to meet fishery management needs, and this requires consideration. The Science Lead indicated that these surveys were not explored due to time and available resources.

Another participant asked how less abundant species are assessed (e.g., Leatherback Turtle). The Science Lead indicated that IEA would draw upon species specific assessments currently underway on these types of species.

In terms of data gaps, a participant noted that it has been suggested a winter survey in SAB might be informative.

A participant noted that other, long-term datasets exist outside the Department, and perhaps these datasets can be considered for inclusion in the IEA.

It was cautioned that similar data, in perhaps different structures and compilation, are being used throughout the Department for different tasks in support of common objectives (e.g., fishery data for IEA may differ from layers being used in MARXAN).

There was a brief discussion regarding the open source data and analytical tools approach. It was agreed that this approach might inspire innovation.

A participant noted that many of the approaches and datasets are similar to those being used in MPA network planning analysis, and there is opportunity to ensure common datasets are being used in each analysis. The Science Lead noted that both the data and methods are “Open Source”.

HUMAN-USE

Presenter: M. McMahon and A. Vanderlaan
Rapporteur: K. Curran

Overview

M. McMahon reviewed fishery data available from MARFIS. Extractions used for this analysis (e.g., Scallop landings) were compared to maps produced by Oceans for comparative purposes. The Presenter noted that extracting using R adds flexibility in terms of the formatting of data products (e.g., can aggregate to different levels – not just 2-minute aggregations). It also allows retention of many of the fields associated with the original data held in MARFIS, which is lost when data are aggregated by other users. For example, the ‘catch usage’ field in MARFIS includes catch associated with bait, discards, and dead discards, which represents additional biomass removed from the ecosystem that is not accounted for in landings alone.

A. Vanderlaan presented work to date on cleaning and processing of vessel activity data. Most of the work to date has been on Automatic Identification System (AIS) data, and Vessel Monitoring System (VMS) data has not yet been explored in detail. AIS data typically represents larger commercial shipping and passenger vessels and VMS typically represents fishing vessels. It was noted that AIS data is Canadian Coast Guard data.

The Science Lead noted that the static data associated with AIS is prone to key entry error (e.g., trip location spelling areas). The terrestrial network has limited range, with reception in the range of 100-km from coastline where receivers are located. There are “holes” along our coastline where receiver stations are not available. There is a move to satellite-based AIS, but data availability is presently limited by the limited number of satellites (8). Interpolation functions can be used to fill in gaps in vessel paths associated with land or depth obstructions (these functions are slow in operation).

Discussion

The Presenter noted that erroneous data was identified and re-apportioned across the non-erroneous data. In contrast, Oceans does not re-incorporate this data out of concerns of over- or under-estimating actual landings from any given area. In NL, non-georeferenced fishery data was often validated using Traditional Ecological Knowledge (TEK). Similarly, Gulf Region used home port as a proxy for fishery capture locations. Methods are detailed, but available.

A participant noted that the above methods address erroneous data found on land, asking if erroneous georeferenced data at sea could be validated. The Presenter indicated that this was not explored in any detail. The Science Lead noted that misreporting of fishery catch locations is problematic and one that requires consideration in making use of the data.

A participant noted that some of this data could be used to estimate risk. The presenter noted that data is limited to evaluate risk (e.g., vessel strikes) and can only be applied at this time in context of threat.

A participant noted that other methods have been developed at Dalhousie University (Halifax, Nova Scotia) to interpolate gaps in vessel tracks. The Presenter was aware of these techniques. It was noted that a workshop on AIS data might be worth pursuing. A participant noted there is a need to think about use of this data nationally, in order to fully exploit its real value in ocean monitoring.

The Chair asked if seismic data (e.g., exploratory seismic lines that have been run by the petroleum industry) has been explored and it was noted it has not. It was indicated that Oceans has both seismic data and national aerial surveillance data on marine pollution (e.g., oil) and ballast water exchange data. It was acknowledged that Oceans and Science will have to continue to discuss their respective roles regarding analysis of human use data.

DATA GAPS

Presenter: J. Choi
Rapporteur: K. Curran

Overview

Perceived data gaps were briefly reviewed, including:

- feeding relationships (i.e., stomach database);
- pelagic fish (small and large bodied);
- pelagic invertebrates (e.g., squid, jellyfish);
- substrate characterisation;
- large marine mammals, reptiles, birds;
- genetic diversity;
- seismic activity*;
- pollution*; and
- ballast water*.

It was reminded that data gaps pertain to datasets of Scotian Shelf and not SAB, as the approach is being applied to Scotian Shelf in order to say something about SAB that is nested within it. (*Note: It was subsequently determined that Oceans had information on these activities that had not been fully explored.)

Discussion

A participant noted that many of the data gaps are costly and difficult to measure, but other data gaps could be easily addressed. As an example, remotely-sensed chlorophyll-*a* data translated to plankton and acoustic data to estimate krill require minimal additional cost to analyze. The

participant suggested the list of data gaps be organized by difficult/costly and close to completion/cheap, in order to prioritize which gaps to address. The Chair noted that prioritization itself can be difficult to achieve depending on management needs, but still needs to be addressed.

A participant indicated that knowledge of benthic invertebrates is a large regional data gap not effectively monitored using existing approaches (e.g., RV survey). It was noted that another filter for prioritization would be importance of data to fill the gap.

Some data noted as being a gap above was thought to be available and could be shared with the assessment team (e.g., seismic data, sea bird data). A participant inquired how existing data in adjacent waters (e.g., NL) was viewed. The Science Lead indicated that this data is not viewed as a gap, but is just not being explored at this time.

NEXT STEPS

Presenter: J. Choi
Rapporteur: K. Curran

Presentation

Methods to be used in the IEA were reviewed again from the perspective of determining next steps.

The Science Lead indicated that taxonomic richness was chosen as an index of biodiversity but recognized that other indices of biodiversity could be pursued. Similarly, the Science Lead was open to other scientists adding indices of their choice to the analysis. Next steps are to review the richness index with respect to the proposed SAB MPA and Gully MPA relative to sites adjacent to these two areas. In terms of productivity, predicted biomass will be used to estimate productivity in a structured yet simplistic manner. Uncertainty associated with biomass will also be estimated. In terms of habitat, this will be evaluated using a functional and integrative approach, largely constrained by the available data. Last, species of interest will focus on species whereby more data is available (e.g., wolffishes vs. marine mammals), with further guidance on how to address marine mammals based on the expertise for these types of species.

The Science Lead noted that logistical models and Bayesian approaches for estimation will be applied in the analysis. The intent is to complete the analysis over the next year.

Discussion

A participant sought clarity on the overall objective of the analysis and what it is intended to say about the ecosystem. The Science Lead indicated that the intent is to look at a short list of regional indicators for productivity, biodiversity, and habitat, in order to evaluate current and future status of the regional ecosystem, including how it relates to reference locations or particular MPAs. This longer-term analysis, however, is not achievable until the proper datasets and variables have been identified. In short, IEA is a screening tool to track regional ecosystem well-being.

A participant noted that bentho-scape mapping could be used to pursue and design new approaches to developing surveying techniques.

It was agreed that the most obvious use for this approach would be to assess ecosystem status. It was asked whether management strategy evaluation could be used to evaluate the effectiveness of MPAs. By going through this process, some recommendations related to

monitoring could potentially be made. It was suggested that IEA would not be the single tool for MPA assessment, but it could be one tool (primarily contextual) in a suite of tools. Site specific surveys and data collection will still be important to conduct.

There was a discussion regarding assessment frequency. A participant noted that IEA has application far beyond MPA management and can be scaled up to inform all management within DFO be it fishery management, SARA management, and more. It remains that robust datasets, indicators, and analysis still need to be agreed upon for common use, as they are used now in many different ways using many different post-processing tools.

It was noted that IEA could be used to assess status of the broader ecosystem, but a discussion on process and indicators to evaluate effectiveness of an individual MPA is more difficult. The Science Lead acknowledged this point, but reiterated the goal is to evaluate the ecosystem on a broad level. A participant noted that this should be described more clearly in the Working Paper.

The Chair asked how the IEA approach could be used in other areas, such as the coastal zone or in other DFO regions. The Science Lead believed all regions are collecting comparable data (e.g., AZMP comparable across regions) for application to IEA. The methods, being open sourced, are available for application (which would be ideal to update and modify methods). In terms of expertise, the methods are intentionally kept simple for broader application. The challenge is more in understanding the history associated with data collection, as well as changes in human activity, in order to understand analytical outputs and how they relate to data collection and changes in human activity through time.

A participant familiar with monitoring the coastal zone indicated the general approach could be applied to a coastal environment, but noted such analysis may be limited to available data, including its spatial and temporal resolution. The participant noted that a next step for IEA analysis is to incorporate human activity in terms of the risks it poses to aspects of the ecosystem such as productivity, biodiversity, and habitat.

A participant from NL indicated that there is a lot overlap with the IEA approach and how it relates to development of a Laurentian Channel AOI monitoring plan, noting there is opportunity for DFO Maritimes and DFO NL to meet and discuss common data sets, tools, etc., that could be used to monitor both SAB and the Laurentian Channel MPAs. The Chair asked if DFO NL has given consideration to how it will evaluate risk associated with human activity, and the participant noted this remains a challenge, but that data gaps are being prioritized for further analysis to assist with this task.

A participant inquired how the framework would be applied to the deep-sea or coastal zone, as many of the datasets discussed at the meeting are non-existent for these areas. Another participant responded that the same general framework could be applied, but that new data sources and monitoring approaches might be warranted. The Science Lead indicated that current model scaling is fixed at one km^2, but this could be adjusted to higher or lower resolution based on size of MPAs.

A participant noted that the proposed approach seemed overly-complicated. Data vetting is good, and making methods more widely available is good, but there was concern about:

1. the time it will take to fully roll this out;
2. whether it will truly be an IEA; and
3. how coherent it will be with other results/analyses being used for MPA development in the Region.

In terms of next steps, Biodiversity could be assessed using more than just species richness. It was cautioned that species richness can have a mixed response to fishing mortality (F),

i.e., species richness may not increase or decrease as expected in response to a pressure, such as fishing pressure. Functional diversity and a measure of species diversity (perhaps habitat diversity too) should be included. In terms of Productivity, it was not clear to the participant what the time line was for the remaining modelling work. Developing models for the 50+ species mentioned is very time consuming, and it was not clear whether this was necessary. There are lots of empirical measures of productivity that could be explored. Similar concerns were expressed about the approach to Functional Habitat.

Another participant noted that the IEA approach needed to be considered in the context of the existing MARXAN analysis, which is being used for MPA network design in the Maritimes Region, recognizing that they are achieving two different end points. It was suggested that MARXAN is used for spatial optimization of multiple criteria while this IEA approach explores the spatial relationships between multiple criteria.

A participant suggested that the IEA biodiversity data layers could be cross-referenced with those layers used in the MARXAN analysis for further consideration. Specifically, it was suggested that the data layers used in the MARXAN analysis to establish the network design should be used in the design of subsequent monitoring of that network.

It was generally agreed that the proposed framework is promising but that the Working Paper should explain the approach in more detail. There was agreement regarding a need for further thought on establishing Science priorities.

CONCLUSIONS

Meeting participants felt that the proposed approach had potential for making effective use of regional synoptic data for providing an overview of ecosystem health (natural variability), which may provide useful context in evaluating the status and effectiveness of MPAs; however, further exploration is required to determine how the results would be integrated into the monitoring plan of an individual MPA, and ultimately used to inform MPA management advice.

The method presented was a model to describe and assess the ecosystem for the entire Scotian Shelf, but it was not yet a framework for assessing the St. Anns Bank MPA. It was a first step, but the content of what was presented did not fully address all the Terms of Reference.

It was agreed that the proposed approach should be explored further, and a follow-up meeting was proposed for a later date to review progress.

REFERENCES CITED

Aker, J., J. Ford, A. Serdynska, and T. Koropatnick, 2014. Ecological Risk Assessment of the St. Anns Bank Area of Interest. Can. Tech. Rep. Fish. Aquat. Sci.. 3047: iv + 161 p.

DFO. 2012. Conservation Priorities, Objectives, and Ecosystem Assessment Approach for the St Anns Bank Area of Interest (AOI). DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2012/034.

DFO. 2014. Review of a Monitoring Framework for the St. Anns Bank Area of Interest. DFO Can. Sci. Advis. Sec. Sci. Resp. 2013/028.

Ford, J., and A. Serdynska (Editors). 2013. Ecological Overview of St. Anns Bank. Can. Tech. Rep. Fish. Aquat. Sci. 3023: xiv + 252 p.

Kenchington, T.J. 2014. A Monitoring Framework for the St. Anns Bank Area of Interest. DFO Can. Sci. Advis. Sec. Res. Doc. 2013/117. vi + 77 p.

APPENDICES

APPENDIX 1: LIST OF MEETING PARTICIPANTS

Day One	Day Two	Name	Affiliation
x	x	Blanchard, Marc	DFO Maritimes / Coastal Ecosystem Science
x	x	Bundy, Alida	DFO Maritimes / Ocean and Environmental Science
x	x	Choi, Jae	DFO Maritimes / Population Ecology Division (BIO)
x		Cook, Adam	DFO Maritimes / Population Ecology Division (BIO)
x	x	Cooper, Andrew	DFO Maritimes / Coastal Ecosystem Science
x	x	Crouse, Lee Ann	Nova Scotia Department of Energy
x	x	Curran, Kristian	DFO Maritimes / Centre for Science Advice Maritimes
x	x	Devillers, Rodolphe	Memorial University / Geography
x		Devred, Emmanuel	DFO Maritimes / Science
x	x	Fanning, Lucia	Dalhousie University / Marine Affairs Program
x	x	Fenton, Derek	DFO Maritimes / Oceans and Coastal Management
x	x	Gullage, Mardi	DFO Newfoundland and Labrador / Oceans Management
x	x	Jamieson, Robyn	DFO Newfoundland and Labrador / Environmental Science
x	x	Janes, Jennifer	DFO Newfoundland and Labrador / Oceans Management
x	x	Johnson, Catherine	DFO Maritimes / Oceans and Ecosystem Science
x	x	Keith, David	DFO Maritimes / Population Ecology Division (BIO)
x	x	Koropatnick, Tanya	DFO Maritimes / Oceans and Coastal Management
x	x	Lawton, Peter	DFO Maritimes / Coastal Ecosystem Science
x	x	Lazin, Gordana	DFO Maritimes / Oceans and Ecosystem Science
x	x	Macnab, Paul	DFO Maritimes / Oceans and Coastal Management
x	x	McMahon, Mike	DFO Maritimes / Population Ecology Division (BIO)
x	x	Regnier-McKellar, Catriona	DFO Maritimes / Science (SABS)
x	x	Saunders, Sarah	World Wildlife Fund, Canada
x	x	Shackell, Nancy	DFO Maritimes / Oceans and Ecosystem Science
x	x	Sprague, Ashley	Nova Scotia Department of Fisheries and Aquaculture
x	x	Vanderlaan, Angelia	DFO Maritimes / Population Ecology Division (BIO)
x	x	Westhead, Maxine	DFO Maritimes / Oceans and Coastal Management
x	x	Worcester, Tana (Chair)	DFO Maritimes / Centre for Science Advice Maritimes

APPENDIX 2: MEETING TERMS OF REFERENCE

An Integrated Ecosystem Assessment Framework for Assessing the Proposed St. Anns Bank Marine Protected Area (MPA), Scotian Shelf

Regional Peer Review – Maritimes Region

March 29-30, 2016
Dartmouth, NS

Chairperson: Tana Worcester

TERMS OF REFERENCE

Context

In support of DFO's Marine Protected Areas (MPA) program, DFO Science has been developing monitoring indicators, protocols, and strategies for assessing whether individual *Oceans Act* MPAs are meeting their conservation objectives. In the Maritimes Region, monitoring plans that include these elements have been prepared for both the existing Gully and Musquash MPAs, and a monitoring framework has been developed for the proposed St Anns Bank MPA (Kenchington 2014; DFO 2012; DFO 2014). Under DFO's *National Conservation Plan* initiative (2014-2019), DFO Maritimes Science is continuing to advance work on the effective monitoring of MPAs by developing a systematic, integrated, and holistic approach to assessing monitoring data and determining the effectiveness of MPAs within a broader regional context. This regional peer review process is being held to evaluate a proposed Integrated Ecosystem Assessment (IEA) framework that could be used to monitor the status of MPAs and assess the effectiveness of an MPA in meeting its conservation objectives within a regional context. The focus of this meeting will be to review the proposed IEA approach, to review the data that have been selected for the application of the approach to the proposed St Anns Bank AOI, to identify gaps and sources of uncertainty, and to discuss next steps in the development of the approach.

Objectives

The objectives of this meeting are:

- To review the overall approach of using IEA to assess the status and effectiveness of MPAs in a regional context.
- To review the data selected for inclusion in this assessment, including a review of the selection criteria.
- To review the methods and assumptions associated with the filtering and integration of this data into the assessment.
- To preview some preliminary results of the analysis in relation to St Anns Bank.
- To provide recommendations on next steps in the development of the IEA approach.

Pending the results of this meeting, it is expected that an additional meeting(s) will be required to review the results of the assessment and apply the approach to other areas of the Maritimes Region.

Expected Publications

- Proceedings
- Research Document

Participation

- DFO Science
- DFO Ecosystem Management
- DFO Resource Management
- Other invited experts

References

DFO. 2012. Conservation Priorities, Objectives, and Ecosystem Assessment Approach for the St. Anns Bank Area of Interest (AOI). DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2012/034.

DFO. 2014. Review of a Monitoring Framework for the St. Anns Bank Area of Interest. DFO Can. Sci. Advis. Sec. Sci. Resp. 2013/028.

Kenchington, T.J. 2014. A Monitoring Framework for the St. Anns Bank Area of Interest. DFO Can. Sci. Advis. Sec. Res. Doc. 2013/117. vi + 77 p.

APPENDIX 3: MEETING AGENDA

An Integrated Ecosystem Assessment Framework for Assessing the Proposed St. Anns Bank Marine Protected Area (MPA), Scotian Shelf

Regional Peer Review – Maritimes Region

March 29-30, 2016
Dartmouth, NS

Chairperson: Tana Worcester

DRAFT AGENDA

Day One – Tuesday (March 29th)

1:00 Introductions

1:15 Oceans Presentation on MPAs in the Maritimes Region

1:45 St. Anns Bank MPA Science

2:30 Break

3:00 Intro to the Integrated Ecosystem Assessment Framework Approach

- Objectives of the project and methodology

4:00 Discussion

- Objective 1 -- "Review the overall approach of using IEA to assess the status and effectiveness of MPAs in a regional context".

Day Two – Wednesday (March 30th)

9:00 Summary of Day One

9:30 Review of Data Sources and Data Limitations

- Objective 2 – "To review the data selected for inclusion in this assessment, including a review of the selection criteria."
- Objective 3 – "To review the methods and assumptions associated with the filtering and integration of this data into the assessment."

12:00 Lunch

1:00 Human Use Analysis

2:00 Preliminary Results

- Objective 4 – "To preview preliminary results of the analysis in relation to St. Anns Bank."

2:30 Break

3:00 Application to Other Areas

3:30 Discussion and Next Steps

- Objective 5 – "To provide recommendations on next steps in the development of the IEA approach."