Proceedings of the regional peer review meeting on the Review of the indicators and recommendations of an Ecological Monitoring Plan for the Banc-des-Américains proposed Marine Protected Area (MPA)

May 22-23, 2018
Mont-Joli, QC

Chairperson: Guy Cantin
Editor: Virginie Christopherson

Maurice Lamontagne Institute
Fisheries and Oceans Canada
850 Route de la Mer, P.O. Box 1000
Mont-Joli, Quebec G5H 3Z4)

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.

Correct citation for this publication:

DFO. 2019. Proceedings of the regional peer review meeting on the Review of the indicators and recommendations of an Ecological Monitoring Plan for the Banc-des-Américains proposed Marine Protected Area (MPA), May 22-23, 2018. DFO Can. Sci. Advis. Sec. Proceed. Ser. 2019/024.

Aussi disponible en français :

MPO. 2019. Compte rendu de l'examen régional par des pairs sur la revue des indicateurs et recommandations d'un plan de suivi écologique pour l'aire marine protégée (AMP) proposée du Banc-des-Américains, du 22 au 23 mai 2018. Secr. can. de consult. sci. du MPO, Compte rendu 2019/024.

TABLE OF CONTENTS

SUMMARY

This document contains the proceedings from the meeting held within the regional peer review process on the Review of the indicators and recommendations of an Ecological Monitoring Plan for the Banc-des-Américains proposed MPA. This review process was held on May 22-23, 2018 at the Maurice Lamontagne Institute in Mont-Joli. This meeting gathered about thirty participants from Sciences, Ocean management, Parks Canada and Aboriginal communities. These proceedings contain the key points of the presentations and discussions that occurred, and report the recommendations and conclusions that were presented during the review.

INTRODUCTION

In 2010, under the United Nations Convention on Biological Diversity, the Government of Canada made a commitment to protect 10% of its marine and coastal areas by 2020. This international conservation target, referred to as Aichi Target 11, includes protecting our oceans through networks of marine protected areas (MPAs) and other conservation measures. In 2011, Fisheries and Oceans Canada (DFO) selected the Banc-des-Américains[1] as an Area of Interest (AOI) for the establishment of a Marine Protected Area under the *Oceans Act*. In the interim, the governments of Canada and Quebec have undertaken to work together to establish a marine protected area network in Quebec. The proposed Banc-des-Américains Marine Protected Area is the first initiative to be carried out as part of this collaboration, and it is intended to encourage productivity and diversity of fisheries resources as well as the recovery of species at risk. More specifically, the conservation objectives of this MPA are to: 1) conserve and protect benthic habitats; 2) conserve and protect pelagic habitats and forage species; and 3) promote the recovery of whale and wolffish species at risk.

With respect to the potential designation of a Marine Protected Area (MPA) under the *Oceans Act*, the Oceans Management Division (OMD) is required to assess the effectiveness of the management plan and the achievement of the objectives of the MPA. Accordingly, the OMD has mandated the Regional Science Branch (RSB) to develop an ecological monitoring plan including performance indicators for management measures. In keeping with this mandate, the objectives of this peer review are to: 1) assess the selected ecosystem components in relation to the conservation objectives and evaluate the proposed indicators for monitoring those components, and 2) evaluate the proposed ecological monitoring plan and suggest other additional potential monitoring approaches for these indicators, as necessary.

Several participants were invited to contribute to this regional review within the terms of reference for the review (Appendices 1 and 2). This document sets out the proceedings of this regional review, which took place on May 22 and 23, 2018 (Appendix 3), and resulted in the revision of the working document: Review of Indicators and Recommendations for an Ecological Monitoring Plan for the Proposed Banc-des-Américains Marine Protected Area.

CONTEXT

The meeting Chair, Guy Cantin, welcomed the participants and gave a short presentation on the peer review and its objectives. This was followed by a roundtable introduction of the participants.

BANC-DES-AMÉRICAINS AOI SELECTION PROCESS

Élaine Albert outlined the selection process for the Banc-des-Américains Area of Interest and the conservation goal and objectives (CO). The proposed regulatory measures that will apply once the MPA is formally implemented are based on two zones: Zone 1 corresponding mainly to the ridge of the American Bank and Zone 2 encompassing the adjacent plains.

---

[1]In this document, the term "Banc-des-Américains" refers to the Area of Interest. The underwater slope is called the "American Bank."

Discussion

- Regarding the goal and objectives, it was pointed out that when the COs were selected, far less information was available than at present, which explains their very broad and general scope.

- It was noted that there are no ballast water discharge restrictions for domestic vessels (vessels operating within Canadian waters). However, international vessels are covered by Transport Canada's *Ballast Water Control and Management Regulations* (*Canada Shipping Act*). If necessary, a control measure could be implemented that would require vessels to remain at a certain distance from the coast when making ballast water discharges or to carry out ballast water exchanges before making such discharges.

- The MPA regulatory intent does not include specific measures for the North Atlantic right whale, as the issues related to this species in the Gulf of St. Lawrence did not emerge until 2017. Since it is not known whether these issues will persist, the adaptive management measures implemented in 2018, which also apply in the Banc-des-Américains AOI, are the most appropriate approach.

- It is recommended that a more complete list of the human activities that take place in the area concerned be drawn up.

DEVELOPMENT OF THE ECOLOGICAL MONITORING PLAN

Geneviève Faille presented the principles and considerations to be taken into account when developing an ecological monitoring plan. The latter must be based on the COs of the MPA and must define the ecosystem components and pressures to be monitored, the related indicators and the required monitoring protocols. It was proposed that a scientific committee, including MPA managers and representatives from Science and other organizations, be set up to assist in developing, implementing and maintaining the monitoring plan.

In addition, a series of considerations and criteria for selecting indicators were outlined with a view to developing a realistic plan and optimizing its implementation. The indicators can be divided into three categories: 1) direct indicators for monitoring ecosystem components that can be used to assess the achievement of COs; 2) indirect indicators that provide information on the status of the ecosystem, but that do not allow possible changes to be directly linked to management; and finally, 3) pressure indicators that can be used to monitor human activities and natural threats that may affect the achievement of COs, both within and outside of the MPA.

Ms. Faille briefly presented the existing surveys and monitoring protocols for the Gulf of St. Lawrence, which can be used as a basis for the monitoring indicators. While several types of monitoring methods exist such as the *control-impact* method, the BACI (*Before-After-Control-Impact*) approach should be given priority, whenever possible. This approach involves monitoring sites both within and outside of the MPA, and using data collected prior to the implementation of management measures, in order to ascertain whether the changes observed in the MPA are the result of the management measures.

Discussion

- Participants questioned the use of the three types of indicators and proposed a different nomenclature and clarification of the definitions. It was decided to maintain the three types as is: direct, indirect and pressure.

- Some participants questioned whether direct indicators should be given priority over indirect indicators since only direct indicators can be used to assess the achievement of COs.

Indirect indicators are important for explaining possible variations in direct indicators and are mostly collected and processed by other monitoring programmes (e.g. the Atlantic Zone Monitoring Program [AZMP]). It was therefore agreed that both types of indicators are essential for monitoring and one should not be given priority over the other.

- It was noted that since the AOI is not currently subject to significant pressures, monitoring will be used primarily to assess whether or not the current status is maintained over time. Some improvements may be observed, but this is likely to be over the long-term. In this sense, the MPA objectives are largely preventive in nature.

- Whenever possible, the monitoring protocol should be implemented both within and outside of the MPA for comparison purposes.

- It was noted that the list of existing surveys does not include annual summer monitoring using collectors for aquatic invasive species. For the past three years, a complete analysis of all the species present on the plates has been carried out, which also provides information on native species. This type of monitoring must be added to the list.

- A point was raised regarding the taxonomic accuracy of the benthic invertebrate data collected in the southern Gulf trawl survey. It was recommended that identification efforts be optimized through approaches such as harmonizing the protocols used with those of the northern Gulf survey through knowledge-sharing and external support.

- Regarding the existing seabird monitoring efforts, it was specified that during multi-species north and south surveys, a Canadian Wildlife Service (CWS) observer is on board to collect the data. The type of inventory done by the CWS at Bonaventure Island should be specified.

OCEANOGRAPHY

STATE OF KNOWLEDGE

Peter Galbraith presented the physical oceanographic data acquired for the Area of Interest in recent years. In June 2016, CTD sampling was conducted at nine stations on the site. In 2016 and 2017, an oceanographic mooring was deployed to collect very fine-scale data, and a Viking oceanographic buoy was deployed from June to October 2017. These deployments and the resulting measurements have shown that the Banc-des-Américains Area of Interest is very dynamic, almost as dynamic as the head of the Laurentian Channel. Strong mixing of the cold intermediate layer was noted in front of the cliff, when compared with data obtained from CTD stations installed a few kilometers away. Large-amplitude internal waves affecting the cold intermediate layer were also observed, in addition to vertical oscillations of the internal tide attaining an amplitude of 50 m. Within a one-month period (winter), the deep water masses (measured at 160 m) experienced significant temperature variations, from 1.7°C to 4.8°C. This dynamic may play an important role in local production. In addition, buoy data acquired in 2017 indicate that in the spring, fluorescence, an indicator of primary production, was higher than the other two sites monitored using the same type of buoy: the Shediac Valley and the East Southern Gulf. Mr. Galbraith noted that the buoy would be redeployed at the site in 2018, and suggested that additional AZMP stations be added and visited during the scientific crew changes in the Gaspé Peninsula.

Discussion on the proposed components and indicators

Component and indicator selection

- For "physical and chemical oceanography," only one ecosystem component was selected, specifically the physico-chemical characteristics of water, which would be monitored using three indicators (O1-T°, salinity, nutrients, dissolved oxygen, pH, turbidity in the different water layers; O2- dynamics of currents, waves and internal tides; and O3 – ice cover).

- A question was raised about the relevance of subdividing the indicator "T°, salinity, nutrients, dissolved oxygen, pH, turbidity in the different water layers," into several indicators. It was decided to keep it as is, but the key parameters should be specified. For example, what T° should be monitored: summer average, spring maximum, surface, bottom, etc.? In selecting the parameters to be used, consideration should be given, among other things, to the potential effects of climate change on ecosystem components and habitat optimization, for example, for the Atlantic wolffish.

- For the "current dynamics" indicator, the question was raised as to whether one or more parameters already exist that can already be used for monitoring, or whether a research project should first be conducted to better characterize the site. Modelling would be helpful for defining current dynamics. It was suggested that this question be referred to the scientific committee, which would make a decision regarding the relevance of the indicator and the scale to be recommended in the event that the indicator is retained.

Protocols and surveys

- It was mentioned that the AZMP can provide large-scale data. In addition, parameters can be extracted for the Area of Interest and additional parameters can be collected with the Viking buoy.

- An additional mooring could be deployed on the southwest side of the ridge.

- Other data sources, such as Canadian Ice Service charts and remote sensing of surface temperature, are processed and included in the AZMP and could therefore easily be used to monitor the Banc-des-Américains MPA.

PELAGIC ECOSYSTEM

STATE OF KNOWLEDGE

Stéphane Plourde outlined the present monitoring activities that could support the pelagic habitat monitoring plan for the Area of Interest. Given the strong dynamics of the water bodies, a large temporal and spatial scale was recommended for monitoring pelagic components such as phytoplankton and zooplankton. At this scale, the indicators of ecosystem status are necessarily indirect ones. The Gaspé Current, as well as the movement of water bodies south of Anticosti Island, play a crucial role in the overall pelagic habitat in the Area of Interest. Available data sources associated with DFO's annual sampling and monitoring activities may be useful, including the AZMP survey, the mackerel egg survey, the CCGS *Creed*'s multifrequency acoustic mission, and the CCGS *Teleost*'s multifrequency data. For pelagic fish, it was recommended that data from stock assessments be used.

Arnaud Mosnier presented the information available on marine mammals present in the area. He began by outlining sampling effort. The available data come from recent projects in the study area conducted mainly in summer, and are based on airborne and at-sea inventories conducted periodically. With the monitoring program for the North Atlantic right whale in place, a lot more

data should become available for the study area over the next few years. Data collected in the area indicate that the whales appear to be concentrated in the bottleneck at the tip of the Gaspé Peninsula.

Discussion on the proposed components and indicators

Component and indicator selection

- With regard to the pelagic ecosystem components, it was agreed that no direct indicators would be selected because pelagic habitat is very dynamic and the components identified are not confined to the boundaries of the proposed MPA (very large spatial scale).

- With respect to capelin, the participants agreed that this species should be retained as an ecosystem component even if no indicators are currently available. Biomass is not measured in the stock assessment for this species and multispecies surveys do not adequately sample pelagic fish (presence data only). A new monitoring approach under development at the MLI would provide an indicator that can be used in the future.

- It was mentioned that the AOI is not an important area for the sand lance and that no quantitative data are available. The sand lance was therefore not selected as a component to be monitored.

- For indicator P4 (abundance of dominant/key zooplankton species), it was suggested that the link between the different species (e.g. *Calanus, Pseudocalanus, Temora*) and the predatory species in the Area of Interest be examined. For example, the North Atlantic right whale may feed on *Calanus finmarchicus*.

- For whales, it was agreed that monitoring must be done for species protected under the *Species at Risk Act* (blue whale, North Atlantic right whale, fin whale, and humpback whale), even if the data sources are not complete.

- In the northwestern part of the Area of Interest, the bathymetry forms a certain bottleneck where there appears to be a consistent pattern in zooplankton concentration, pelagic fish, and whales.

Protocols and surveys

- For phytoplankton, the chlorophyll *a* biomass estimated by the AZMP is the current data source. The data could be enhanced through the addition of fluorescence profiles obtained with Viking buoys and the deployment of an additional mooring. It was stated that satellite imagery in this area cannot provide reliable productivity values since the waters contain high levels of organic matter.

- For krill, the *Creed* mission provides a biomass estimate, while the AZMP, the mackerel egg survey mission, the pelagic acoustic survey in the estuary and northwestern Gulf and the annual acoustic survey of southern Gulf (SGSL) herring can provide an indication of the zooplankton biomass.

- For forage species, information from stock assessments is the best biomass indicator for pelagic fish such as herring and mackerel. For the latter, the spawning habitat monitoring grid will also provide information on the presence of eggs.

- Monitoring of whales should be conducted using existing monitoring programs, including data from the ROMM (Réseau d'observation des mammifères marins) and the Mingan Island Cetacean Study. It should be noted that these data are incomplete since they are

limited to the area near the coast and are obtained from tourist cruises. Despite these limitations, these are the only recurrent data available.

- DFO aerial surveys conducted occasionally in the Gaspé Peninsula sector can provide additional data. Beginning in 2017, survey efforts were stepped up in the area targeted for North Atlantic right whale monitoring, but these very expensive surveys may not be sustainable. DFO's winter beluga whale surveys should also be reviewed to determine whether they overlap the area. The accumulation of opportunistic data may help complement other surveys.

- Passive acoustics could be an option for whale monitoring; to this end, a hydrophone could be located near the bottleneck in the northwestern part of the Area of Interest.

BENTHIC COMMUNITY

STATE OF KNOWLEDGE

Claude Savenkoff described the state of knowledge of the benthic community and the type of substrate present in the Area of Interest. Data were collected from two optical imaging systems: a towed system and a deployed system. Five surveys were conducted between 2012 and 2016, for a total of 1,301 photographs and 316 videos taken at depths between 14 m and 204 m. The three components of the Banc-des-Américains Area of Interest, i.e., the ridge and the adjacent southwest and northeast plains, were surveyed including five different depth strata (0–20, 21–50, 51–100, 101–150 and 151–210 m). An analysis of all living organisms and the nature of the substrate was performed based on the photos. A decreasing gradient of sediment size with increasing depth was observed, with pebbles representing on average the highest proportion of coverage in the 21–50 m stratum, and fine sediments dominant as of the 51–100 m stratum. A total of 131 taxa in 11 phyla were identified. At-sea missions also provided the opportunity to assess the presence of wolffish (Atlantic wolffish) on the ridge. In addition, an aquatic invasive species may have been observed in the photographs, but its identity could not be confirmed.

Discussion on the proposed components and indicators

Component and indicator selection

- For benthic fauna, three components were selected: endobenthic, epibenthic and suprabenthic communities. Participants pointed out that all three components were important.

- It was agreed that for the endo- and suprabenthic components, due to the lack of precise information, it would not be possible at present to develop related indicators. It would therefore be necessary to acquire new knowledge to characterize these communities hence to have a reference point.

- For the endobenthos, one participant suggested the possibility of using proxy indicators to characterize this component (e.g. holes in the substrate indicative of the presence of bivalves and arthropods), since direct monitoring on the basis of endobenthos samples would require a lot of time and expertise.

- For the epibenthos, a discussion ensued on whether to select as an indicator a list of species that would indicate the integrity of the site, or to assess the diversity as a whole. In the case of an indicator consisting of a list of species, it would be preferable to select easily identifiable species and species that should respond to the decrease in fishing effort on the

plains. The participants agreed to retain the three proposed indicators and to let the scientific committee discuss them by examining the existing survey data.

- For the indicator of demersal community composition, it was suggested that existing surveys be used to define functional groups that could be monitored rather than a specific species. The same suggestion was made for the benthos.

- For the commercial species component (benthic and demersal), it was pointed out that more precise data on size, gender, etc. are collected and could be used as an indicator. It was suggested that lobster be monitored on the ridge along with snow crab for the epibenthos, and northern shrimp for the demersal component on the adjacent plains. In addition, it was mentioned that total landings from the fisheries are not an indicator of abundance, so it is agreed that this indicator should be dropped.

- For the "substrate characteristics" component, the dead shell bank abundance indicator was eliminated, as dead shells can be transported massively seaward during storm surges.

- The sediment biogeochemistry indicator was also removed from the list, as there is no information available and it is a very complex and difficult subject to monitor. With the help of experts (possibility of external collaborations), it would first be necessary to characterize the sediments and determine whether there is a signal that is correlated with the endobenthos. For the time being, it was suggested that the particle-size distribution protocols with imaging surveys be continued.

- For wolffish species at risk, it was recommended that only the Atlantic wolffish, be monitored since the other species (the Northern wolffish and Spotted wolffish) have not been observed in the Area of Interest.

Protocols and surveys

- Trawl surveys sample demersal and epibenthos communities adequately, but do not (or barely) sample endobenthos and suprabenthos, and do not cover the ridge. Trawl surveys were therefore suggested as a means of monitoring demersal and epibenthic fauna on the plains.

- As a complement, for the epibenthic component, it was suggested that benthic imaging continue to be used to sample sites on the ridge, among other things. A benthic imaging monitoring protocol would be developed, including monitoring and control sites outside of the proposed MPA selected on the basis of community and physical habitat analyses (depth, sediment type).

- In the short term, for the communities on the ridge, diving was identified as the best approach for monitoring lobsters, Atlantic wolffish and other demersal fish species. Given the costs, this survey could not be done annually.

- Environmental DNA (eDNA) is a proposed technique for monitoring the Atlantic wolffish which may replace the use of divers, once it has been developed. Beginning in summer 2018, samples would be collected to develop and test a protocol.

- It was suggested that a box corer be used rather than a grab sampler to obtain valid quantitative data for endobenthos sampling. However, the use of a grab sampler was not excluded, given its ease of handling and the sampled volume and given that efficiency of the corer varies depending on the type of bottom, such as heterogeneous substrates or thin layers of loose sediment. However, the use of the grab sampler would require a protocol for measuring its relative effectiveness during each sampling campaign.

PRESSURE

DISCUSSION ON THE PROPOSED COMPONENTS AND INDICATORS

Six types of pressure that could affect the Area of Interest have been identified in relation to monitoring.

- The potential presence of aquatic invasive species (AIS) may be confirmed by installing structures (e.g. PVC slabs) on the ridge in order to collect samples.

- The participants questioned the use of eDNA to monitor AIS, given the strong dynamics of the currents around the Banc-des-Américains site, which would make it difficult to determine the origin of the DNA. The participants agreed that further research is needed to better understand local current dynamics and to better document the life span of the eDNA of AIS in the environment.

- With regard to noise, which affects marine mammals in particular, it was suggested that noise levels be monitored using hydrophones which could be installed on Viking buoys. It was mentioned, however, that this monitoring has not yet been implemented and would be very costly to develop. Currently, traffic intensity (commercial vessels) is already monitored and could be used to get an approximation of noise levels. Since vessel traffic could also be used as an estimate of collision risk, it was retained as an indicator. For collisions and entanglements, the RQUMM (*Réseau québécois d'urgences pour les mammifères marins*) (the Quebec Marine Mammal Emergency Network) produces an annual accident report. These are basic data, but they are incomplete and inaccurate. Monitoring vessel speed and traffic density (AIS beacon on most vessels) is also an effective way to assess collision risk.

- It was suggested that a "disturbance" component be added, which would be mainly related to observation and recreational activities. For this, it would be necessary to check whether ROMM conducts monitoring that could serve as an indicator. With regard to recreational vessel traffic intensity, the participants suggested using indicators such as the number of marinas in the area, the number of members, the number of visitors they expect to receive, and the number of nights they spent there. This information was previously collected by the DFO AIS team in 2012, and the situation is not likely to have changed significantly since then. The same is true for companies involved in at-sea observation activities, i.e., the number of trips could be used as an indicator to monitor the potential for disturbance.

- As for pollution, it was mentioned that it would be preferable to establish a reference level for sediment quality rather than conduct monitoring, given the low level of pollution expected in the area. Pollution has been identified as a pressure that should be monitored in the proposed MPA, but due to a lack of available data, no indicators have been specified at this time. Since contaminant monitoring does not fall within DFO's mandate, a partnership with Environment and Climate Change Canada (ECCC) or the academic community would be required. It was noted that it may be relevant to monitor the presence of microplastics in the area. In fact, a project to monitor clams is currently being set up with the Gulf Region.

- As for commercial fisheries, two indicators were proposed, namely total landings, and the distribution of fishing effort in the area and around it. Fishing effort can be determined using data from the Vessel Monitoring System (VMS) and logbooks.

- With respect to climate change, it was suggested that this component be removed and that parameters such as dissolved oxygen, pH, and temperature be integrated into oceanographic monitoring, and that it be clearly specified that they are key parameters

related to climate change. It was proposed that the scientific committee make a final decision regarding this component.

CONCLUSION

SCIENTIFIC ADVICE HIGHLIGHTS

Highlights of the meeting were presented and commented on by the participants for the drafting of the scientific advisory report. Some points were removed and others were added and modified.

These are the meeting's main conclusions:

- To properly monitor the MPA, a series of indirect indicators was identified for physical and chemical oceanography and the pelagic ecosystem. For the benthic and demersal ecosystem, the indicators are mainly direct ones. Monitoring indicators were also selected for the pressure component.

- Several existing monitoring programs may be used to monitor the identified components and associated indicators. However, new monitoring initiatives would need to be implemented (e.g. benthic imaging) to overcome the knowledge gaps related to some components.

- The scientific committee would need to review the relevance of certain components and indicators, such as current dynamics, epibenthic community indicators and how climate change will be integrated into monitoring (with or without oceanographic data).

- The BACI approach would be used for the MPA monitoring plan.

APPENDIX 1 – TERMS OF REFERENCE

Review of the indicators and recommendations of an Ecological Monitoring Plan for the Banc-des-Américains proposed MPA

Regional Peer Review – Quebec Region

May 22-23, 2018
Mont-Joli, Quebec

Chairperson : Guy Cantin

Context

The Banc-des-Américains Area of Interest (AOI) is currently being reviewed as a potential marine protected area (MPA). The Banc-des-Américains AOI is characterized by a submarine bank lying off the eastern tip of the Gaspé Peninsula in the Quebec portion of the Gulf of St. Lawrence which culminates at 12 metres deep and is surrounded by two deeper plains. The American Bank lies entirely within the 1,000 km^2 Area of Interest. The Banc-des-Américains AOI is characterized by the diversity of its habitats, seasonal or year-round occurrence of many commercially important species and whales, the presence of species at risk, and a high diversity of benthic invertebrates.

The purpose of the proposed MPA is to promote the productivity and diversity of fishery resources in the American Bank and its adjacent plains, and to promote the recovery of species at risk.

The Oceans Management Branch has an obligation to assess the effectiveness of the management plan and the achievement of the MPA objectives, if it's designated under the *Oceans Act*. Ecological monitoring is necessary to assess whether the management measures in place are adequate to achieve the conservation objectives. This review meets the Science sector commitment which aims to develop performance indicators for MPAs in Canada.

In June 2010, an Intersectoral Consultation Workshop on the Banc-des-Américains AOI identified conservation objectives and ecosystem components. The conservation objectives set in the Banc-des-Américains proposed MPA management plan are:

- To conserve and protect benthic habitats;
- To conserve and protect pelagic habitats and forage species;
- To promote the recovery of whales and wolffish at risk.

Objectives

The objectives of the review are:

1. To assess the ecosystem components chosen on the basis of conservation objectives and assess the indicators suggested for monitoring them;
2. To assess the ecological monitoring plan proposed and to suggest, if necessary, other ways that these indicators could be monitored.

This review will propose an ecological monitoring plan that will become an integral part of the MPA's management plan.

Expected publications

- Science Advisory Report on the Banc-des-Américains proposed MPA Ecological Monitoring Plan
- Proceedings containing a summary of discussions.

- CSAS Research Document: Development of an Ecological Monitoring Plan for the Banc-des-Américains proposed MPA.

Participation

- Fisheries and Oceans Canada (DFO) (Science and Oceans Management Branches)

- Parks Canada
- Aboriginal communities and organizations
- Universities
- Non-governmental environmental organizations

APPENDIX 2 – LIST OF PARTICIPANTS

Name	Affiliation
Albert, Elaine	DFO Oceans management, Quebec region
Arsenault, Lisa	AGHAMM
Beauchamp, Jacinthe	DFO Oceans management, Quebec region
Ben Mustapha, Selima	DFO Science, Quebec region
Benoit, Hugues	DFO Science, Quebec region
Bourdages, Hugo	DFO Science, Quebec region
Cantin, Guy	DFO Science, Quebec region
Christopherson, Virginie	DFO Science, Quebec region
Clermont, Yves	DFO Science, Quebec region
Côté, Stéphanie	DFO Science, Quebec region
Côté, Geneviève	DFO Science, Quebec region
Cyr, Charley	DFO Science, Quebec region
Desjardins, Christine	DFO Science, Quebec region
Dionne, Suzan	Parks Canada
Faille, Geneviève	DFO Science, Quebec region
Galbraith, Peter	DFO Science, Quebec region
Gendreau, Yanick	DFO Science, Quebec region
Labbé-Giguère, Stéphanie	DFO Oceans management, Quebec region
Mark, Susanne	DFO Oceans management, Quebec region
McQuinn, Ian	DFO Science, Quebec region
Méthé, Denise (tél)	DFO Science, Gulf region
Mosnier, Arnaud	DFO Science, Quebec region
Nozères, Claude	DFO Science, Quebec region
Plourde, Stéphane	DFO Science, Quebec region
Poirier, Mélanie	DFO Science, Quebec region
Pomerleau, Corinne	DFO Science, Quebec region
Renard, Sébastien	SSLMP
Ricard, Daniel (tél)	DFO Science, Gulf region
Roy, Virginie	DFO Science, Quebec region
Sainte-Marie, Bernard	DFO Science, Quebec region
Savenkoff, Claude	DFO Science, Quebec region
Simard, Nathalie	DFO Science, Quebec region
Thorne, Marilyn	DFO Science, Quebec region
Tremblay, Claude	DFO Science, Quebec region
Velasquez, Sandra	DFO Science, Quebec region

APPENDIX 3 – AGENDA

Review of the indicators and recommendations of an Ecological Monitoring Plan for the Banc-des-Américains proposed MPA

May 22-23, 2018
Maurice Lamontagne Institute, Mont-Joli, Room A-582

Chairperson : Guy Cantin

May 22, 2018 – Tuesday

9:00	Welcome and introduction	Chairperson
	Review of the terms of reference and agenda	
9:20	Proposed Marine Protected Area of Banc-des-Américains	E. Albert
10:00	Development of a monitoring plan and indicators: criteria, steps, etc. and existing monitoring program	G. Faille
10:20	Break	
10:35	Oceanography : state of knowledge	P. Galbraith
11:00	Pelagic ecosystem: state of knowledge	S. Plourde
11:20	Pelagic Ecosystem: Proposed Components and Indicators	G. Faille
	- Discussion, questions	All
12:00	Lunch	
1:00	Pelagic Ecosystem: Proposed Components and Indicators	G. Faille
	- Discussion, questions	All
1:30	Break	
3:00	Pelagic Ecosystem: Proposed Components and Indicators	G. Faille
	- Discussion, questions	All
4:30	End of the day	

May 23, 2018 – Wednesday

8:45	Benthic community: state of knowledge	C.Savenkoff
9:10	Ecosystème benthique : composantes et indicateurs	G. Faille
	-Discussion, questions	All
10:15	Break	
10:30	Benthic ecosystem: components and indicators	G. Faille
	-Discussion, questions	All
12:00	Lunch	
1:00	Pressures : components and indicators	G. Faille
	-Discussion, questions	All
2:00	Monitorigin plan, protocols, strategies	G. Faille
	-Discussion, questions	All
2:45	Break	
3:00	Highlights review	All
4:30	End of the day	