



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 2020/007**

**Newfoundland and Labrador Region**

### **Proceedings of the Regional Peer Review - Adapting Monitoring Protocols and Strategies for the Gilbert Bay Marine Protected Area**

**Meeting date: December 8, 2016**

**Location: St. John's, NL**

**Chairperson: Robyn Jamieson**

**Editor: K. Bøe**

Science Branch  
Fisheries and Oceans Canada  
PO Box 5667  
St. John's, NL A1C 5X1

---

## 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](http://www.dfo-mpo.gc.ca/csas-sccs/csas-sccs@dfo-mpo.gc.ca)



© Her Majesty the Queen in Right of Canada, 2020  
ISSN 1701-1280

### Correct citation for this publication:

DFO. 2020. Proceedings of the Regional Peer Review - Adapting Monitoring Protocols and Strategies for the Gilbert Bay Marine Protected Area; December 8, 2016. DFO Can. Sci. Advis. Sec. Proceed. Ser. 2020/007.

### ***Aussi disponible en français :***

*MPO. 2020. Compte rendu de la réunion régionale d'examen par les pairs – Adapter les protocoles et les stratégies de surveillance pour la zone de protection marine de la baie Gilbert; le 8 décembre 2016. Secr. can. de consult. sci. du MPO, compte rendu 2020/007.*

---

---

## TABLE OF CONTENTS

SUMMARY .....	IV
INTRODUCTION .....	1
PRESENTATIONS.....	1
OVERVIEW OF GILBERT BAY MPA PROGRAM.....	1
GILBERT BAY COD MONITORING PROGRAM.....	1
A GENOMIC APPROACH TO ATLANTIC COD CONSERVATION IN THE GILBERT BAY MPA .....	3
COD POT PILOT PROJECT IN THE GILBERT BAY AREA.....	4
FINAL DISCUSSIONS AND UNCERTAINTIES .....	4
RESEARCH RECOMMENDATIONS .....	5
APPENDIX 1: AGENDA.....	6
APPENDIX 2: TERMS OF REFERENCE.....	7
APPENDIX 3: LIST OF PARTICIPANTS.....	9

---

## **SUMMARY**

A Regional Peer Review Process for the Gilbert Bay Marine Protected Area (MPA) was held December 8, 2016, in St. John's, Newfoundland and Labrador (NL). The purpose was to review the existing monitoring program and consider potential changes to the existing long-term monitoring process.

Participation included representatives from Fisheries and Oceans Canada (DFO) Science and Fisheries Management Branches, Aboriginal groups, and other invited experts.

Detailed rapporteur's notes of the discussion that followed each presentation were produced. This Proceedings Report includes abstracts of presentations and summaries of meeting discussions, as well as a list of research recommendations. The meeting's Terms of Reference, agenda, and list of participants are appended.

---

## INTRODUCTION

A Regional Peer Review Process for the Gilbert Bay Marine Protected Area (MPA) was held December 8, 2016, in St. John's, Newfoundland and Labrador (NL). The purpose was to review the existing monitoring program and consider potential changes to the existing long-term monitoring process.

Participation included representatives from Fisheries and Oceans Canada (DFO) Science and Fisheries Management Branches, Aboriginal groups, and other invited experts.

Detailed rapporteur's notes of the discussion that followed each presentation were produced. This Proceedings Report includes abstracts of presentations and summaries of meeting discussions, as well as a list of research recommendations. The meeting's Terms of Reference, agenda, and list of participants are appended.

## PRESENTATIONS

### OVERVIEW OF GILBERT BAY MPA PROGRAM

M. Abbott

Presenter – M. Abbott

#### Abstract

The Gilbert Bay MPA was one of the first *Oceans Act* MPAs established in Canada. The 60 km<sup>2</sup> MPA was designated in 2005 after seven years of monitoring and being identified as an Area of Interest (AOI). The primary conservation objective for the MPA is to conserve and protect the genetically distinct Gilbert Bay cod and its habitat. The MPA also aims to conserve and protect the Gilbert ecosystem, and to promote research, public awareness, education and support of the MPA. The MPA is managed as three zones with varying restrictions on commercial and recreational fishing activity. The original management plan guided decisions on the Gilbert Bay ecosystem over a three-year period which ended in 2010. Currently, there is a five-year management plan (2013-18) in place which outlines management and monitoring changes to address the declining cod population. Although there is opportunity to implement adaptive management changes throughout the management cycle, it is important to consider potential changes in a transparent, inclusive, science-based peer-review process.

#### Discussion

A participant questioned whether any activities are performed in the interim period between stock assessments to assess changes that are observed. It was clarified that activities may be performed when necessary. There is room to perform changes in implementations of the management plan throughout the management period.

### GILBERT BAY COD MONITORING PROGRAM

C. Morris, J.M. Green and C. Pennel

Presenter – C. Morris

---

## Abstract

In 2005, Gilbert Bay, Labrador was given MPA status under Canada's *Oceans Act* to protect a local population of Atlantic cod and its habitat. The population of Atlantic cod living in Gilbert Bay has had continuous science monitoring since 1998. MPA monitoring was first reviewed in 2010, and five existing monitoring indicators were determined sufficient to provide population trends important to evaluate the MPA conservation objectives. Monitoring information indicates that the Gilbert Bay cod population is at a low level of abundance compared to its abundance in 1998. Shortcomings pertaining to some monitoring indicators are identified, specifically with respect to the sampling of pelagic juveniles. Observed changes within the Gilbert Bay fish community and harvest levels of Northern Cod outside the MPA are presented. Preliminary results from related ongoing research, in addition to existing indicator data, are provided to suggest that Gilbert Bay cod are locally adapted and that migratory Northern cod overlap spatially and temporally with the distribution of Gilbert Bay cod. Adapting the existing monitoring program, and related research, to focus on improving effectiveness of the MPA to meet conservation objectives could be warranted, however changes could impact consistency of the long term MPA monitoring program.

## Discussion

It was questioned whether long-term temperature changes have been observed in Gilbert Bay. The response provided was that long-term temperature trends have not been investigated. The temperature conditions in Gilbert Bay are in general highly variable compared to oceanic conditions.

A question was asked regarding the spatial extent of the home range of Gilbert Bay cod in relation to the MPA boundaries. The response provided was that the home range of Gilbert Bay cod is typically small but may extend beyond the MPA's boundaries.

A participant questioned why changes to the fishing season of Northern cod and MPA boundaries have not yet come into effect in an attempt to reduce bycatch of Gilbert Bay cod. Several consultations occurred after 2008 in response to the observed population declines where the objective was to limit fishing near the MPA. During consultations, consideration was given to altering the MPA boundaries. However, this was rejected due to a lack of interest. It was subsequently suggested to delay the season opening date to reduce the impact of fishing on Gilbert Bay cod by enabling fish to return to the MPA before the start of the commercial fishery. It was then recognized that a delayed season opening would have less support when the Northern Cod appear earlier in the year as this would require harvesters to start earlier in order to catch their quotas. Further, there was significant opposition from harvesters during the years when delayed season openings were implemented because it was perceived to provide an unfair advantage to other fish harvesters. As a result of the consultations, the season opening date of the Northwest Atlantic Fisheries Organization (NAFO) Div. 2J was delayed (between August 15 and September 1).

Changes in catch per unit effort (CPUE) as a result of delayed season opening dates have not been analyzed. A correlation between commercial landings and CPUE in the MPA was noted by participants. It was also explained that measuring the effect of changes to season dates is challenging. Due to the low abundance of the Gilbert Bay cod, it is difficult to obtain enough fish for tagging and telemetry tracking.

There was a discussion regarding a figure in the working paper showing population declines during a period where no commercial harvest occurred, and how to interpret this in terms of the importance of harvest as a cause of the declines in the Gilbert Bay cod population. It was

---

explained that the figure does not include Aboriginal or recreational fishing data, which may also contribute to the negative trend. It was emphasized that the most concerning data point in the data set presented was the large drop in MPA CPUE between 2007 and 2008, which coincided with a large increase in stewardship fishery landings. This drop, combined with previous tag return data from commercial landings and fish movement data suggests that harvesting is an important mechanism. There was also extensive monitoring performed by DFO Conservation and Protection in this period which implies that poaching is not likely an issue.

There was agreement among harvesters that catches of Gilbert Bay cod are presently low as a result of the lower abundance.

A question was asked relating to causes of the population decline and whether cannibalism could be a contributing factor. The response provided was that cannibalism in cod is usually associated with years of strong juvenile year classes. Juvenile cod have not been observed in the stomachs of large fish. The potential for cannibalism has also decreased with the declines in the numbers of larger fish.

Concerns were raised regarding a table in the working paper denoting a tenfold increase in Individual Quotas (IQ) from 2015 to 2016. It was commented that this number is not 'real' but reflects a fishing plan and not actual landings.

## **A GENOMIC APPROACH TO ATLANTIC COD CONSERVATION IN THE GILBERT BAY MPA**

M. Sinclair-Waters, I. Bradbury, C. Morris, D. Ruzzante and P. Bentzen

Presenter: M. Sinclair Waters

### **Abstract**

A genomic approach was used to help inform management and conservation of the Gilbert Bay Atlantic cod population. Evidence of strong genome-wide genetic differentiation between Gilbert Bay and offshore cod was observed. We developed a cost-effective genomic tool for identifying Gilbert Bay cod in areas outside MPA boundaries where they are mixing with offshore cod. Genomic analysis of individuals collected during late summer for a seven-year period (2009-15) shows evidence of Gilbert Bay cod mixing with offshore cod in areas adjacent to the MPA. Gilbert Bay cod comprised 0-65% (mean=17.3%) of cod in samples collected outside MPA boundaries. Effective population size (i.e., number of individuals that contribute offspring to next generation) in 2015 was estimated at 914 (95% C.I.s: 835-1,009) individuals.

### **Discussion**

There was a discussion in regards to whether the data presented indicates that Gilbert Bay cod may contribute to genetic variation in the offshore cod gene pool. The response was that the two populations are temporally and spatially reproductively isolated which prevents gene flow between the populations.

The data presented shows there is little genetic structuring in the offshore cod. Offshore samples were only collected from the NL shelf and little variation was observed within these samples. More genetic structuring would likely have been observed if samples from the Flemish Cap had been included. However, this difference would likely be minor compared to the difference that is observed between Gilbert Bay and offshore cod. In order to encompass genetic structuring in the offshore cod, samples would have to cover the full spectrum of the genetic diversity of cod from the Newfoundland and Labrador shelf. To obtain this, samples

---

would have to be collected with a knowledge of spawning areas and times, which presently is lacking for cod in areas 3K and 3J.

## **COD POT PILOT PROJECT IN THE GILBERT BAY AREA**

Presenters: P. Meintzer and B. Favaro

### **Abstract**

A 2016 pilot study focused on assessing the utility of cod pots for catching Atlantic cod (*Gadus morhua*) in the vicinity of the Gilbert Bay MPA located in southeastern Labrador. During the pilot project, the presenters provided pots for usage during the study, assisted with use of the pots in the field, and consulted with fishermen about the benefits and drawbacks of the gear.

### **Discussion**

It was questioned to what extent the cod pots are size selective. The response provided was that the cod pots are not selectively exploiting one size group over another and that selectivity can be modified by altering the size of the mesh used in the pots. A smaller mesh would catch a higher frequency of smaller cod, however the pots would catch a wide range of size classes. It was asked to what extent ghost fishing is a problem when using cod pots. The risk of ghost fishing with pots is generally low. However, when the bait disappears, pot gear may 'self-bait' when fish die in the trap. Adding a biodegradable panel to the pots would remove this threat.

The objective of using cod pots in the Gilbert Bay MPA is to release golden cod (i.e. Gilbert Bay cod) alive if caught. The use of cod pots could assist with conservation measures as golden cod can be identified visually and subsequently be released.

It was commented that there was positive feedback and local support for the use of cod pots as opposed to changes to season dates and MPA boundaries. The use of cod pots results in a much higher fish quality than gillnetting. It was noted that the local community has a strong desire to establish a sustainable fishery, and see the use of cod pots as a good management measure. Further, it was highlighted that communities in the Gilbert Bay area, NunatuKavut Community Council (NCC), and DFO Science not only look at the cod pots as a means to reduce bycatch, but to monitor Gilbert Bay cod movements and distribution by means of tagging and acoustic telemetry.

It was suggested that residents of the Gilbert Bay area could be trained to assist with future research and help overcome current DFO Science logistical issues regarding tagging and telemetry.

## **FINAL DISCUSSIONS AND UNCERTAINTIES**

The objective of the Gilbert Bay monitoring program is to evaluate the conservation objective which is the protection of the cod population and its habitat. It is evident that strong population differentiation exists between the Gilbert Bay population and offshore cod which provides evidence for potential local adaptation. Research presented at the meeting suggested that the Gilbert Bay cod population conforms to the COSEWIC criteria of a Designatable Unit.

There was discussion regarding the coincidence of the observed population declines with the creation of the MPA in 2005. It is clear that environmental changes have, and are, occurring in the MPA, but the causes are still unclear. There may be no correlation between the establishment of the MPA and the population decline.



---

It was stated that changing monitoring methods risks one type of monitoring plan being exchanged for another. This would affect the ability to determine inferences as different and inconsistent monitoring methods would result in incomparable data across years.

It was concluded that the cause of the Gilbert Bay cod decline is surrounded with uncertainty but harvesting likely impacts the population. Although the number of Gilbert Bay cod caught are presently low, the proportion of the population succumbed to harvest may be significant. A greater understanding of removals of Gilbert Bay cod is therefore needed. Higher abundances of species not previously found in the MPA, such as sculpins, rock cod and flounder, are potential competitors and predators to golden cod, but the nature and extent of new interactions is surrounded with uncertainty. To ensure the integrity of the monitoring program, existing monitoring methods should not be replaced with new monitoring tools. Changes to the monitoring program with the objective to further investigate causes of population declines should therefore be additional in nature.

### **RESEARCH RECOMMENDATIONS**

- Research Gilbert Bay cod removals, accounting for all activities, within the MPA.
- Support research related to Northern cod in the vicinity of Gilbert Bay using conventional tagging, acoustic telemetry and pot fishing.
- Continue to integrate additional Aboriginal and local ecological knowledge in the MPA monitoring program.
- Investigate species identification of pelagic juveniles and eggs using DNA barcoding and genomic techniques.
- Research local adaptation in Gilbert Bay cod.
- Investigate fish community composition, competition and predation.
- Investigate potential impacts of environmental change (including climate change) on Gilbert Bay cod.
- Collect more evidence on presence and quantity of Gilbert Bay cod in commercial catches.
- Investigate the utility of cod pots to sample Gilbert Bay cod and Northern cod.
- The role of cannibalism as a factor affecting the recruitment of cod.

It was noted that continued monitoring of cod removals from all sources and the ability to visually identify a Gilbert Bay cod when caught in a cod pot was considered important.

---

## APPENDIX 1: AGENDA

### *Regional Peer Review – Adapting Monitoring Protocols and Strategies for the Gilbert Bay Marine Protected Area*

*Chair: Robyn Jamieson*

**December 8, 2016**

Memorial Room - Northwest Atlantic Fisheries Centre  
80 East White Hills Road, St. John's

<b>Time</b>	<b>Topic</b>	<b>Presenter</b>
09:00	Opening remarks and overview of Regional Peer Review Process	<i>Chair</i>
-	Overview of Gilbert Bay MPA Program	<i>Melissa Abbott</i>
-	- Biological overview - Gilbert Bay Research Program - Monitoring - Genetics	<i>Corey Morris</i>
-	A genomic approach to Atlantic cod conservation in the Gilbert Bay MPA	<i>Marion Sinclair-Waters</i>
-	Cod Pot Pilot Project in the Gilbert Bay Area	<i>Phillip Meintzer/ Brett Favaro</i>
-	Reviewer Report	<i>Bob Gregory</i>
-	Summary Bullets and other SAR items	<i>All</i>
-	Research Recommendations	<i>All</i>
-	Upgrading of Working Paper to Research Document	<i>All</i>
-	Closing remarks	<i>Chair</i>

#### **Notes:**

- Health breaks will occur at 10:30 a.m. and 3 p.m. Coffee and tea can be purchased from the cafeteria.
- Lunch (not provided) will normally occur 12:00-1:00 p.m.
- Agenda remains fluid – breaks to be determined as meeting progresses.
- This agenda may change.

---

## **APPENDIX 2: TERMS OF REFERENCE**

### **Adapting Monitoring Protocols and Strategies for the Gilbert Bay Marine Protected Area Regional Peer Review Process - Newfoundland and Labrador Region**

**December 8, 2016**

**St. John's, NL**

Chairperson: Robyn Jamieson

#### **Context**

The Gilbert Bay Marine Protected Area (MPA) was established in 2005 with the conservation objective of protecting and conserving the unique population of Atlantic cod and its habitat. The monitoring framework developed for Gilbert Bay is based upon the conservation objective. The Gilbert Bay cod population has been monitored since 1998 (Morris and Green 2010) and the MPA monitoring program was reviewed in 2009. As a result, several indicators, protocols, and strategies were identified and adapted as part of the ongoing monitoring program (DFO 2010).

Scientific data including existing indicator data, suggest that the Gilbert Bay cod population has declined. Concerns for the population's health have raised important questions regarding future research, mitigation, and options for improved management. The Regional Peer Review Process will review existing monitoring information and consider potential changes to the existing long-term monitoring process. If appropriate, specific changes (or lack thereof) to the existing monitoring program will be considered.

#### **Objectives**

- Review existing indicator data used to assess the Gilbert Bay cod population.
- Consider relative importance of existing indicators and determine if additional research or indicators are required.
- Recommend adaptations to the monitoring program should they be required.
- Summarize the status of the Gilbert Bay cod population based on indicators and available literature.

#### **Expected Publications**

- Science Advisory Report
- Proceedings
- Research Document

#### **Participation**

- Fisheries and Oceans Canada (DFO) (e.g., Ecosystems and Oceans Science, and Fisheries Management sectors)
- Industry
- Aboriginal communities/organizations
- Academia

---

## References

- DFO. 2010. Review of the Gilbert Bay Marine Protected Area monitoring indicators, protocols and strategies, and an assessment of the Gilbert Bay cod population. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2010/027.
- Morris, C. J. and Green J. M. 2010. Gilbert Bay Marine Protected Area science indicator monitoring. DFO Can. Sci. Advis. Sec. Res. Doc. 2010/060. iv + 22 p.

---

### APPENDIX 3: LIST OF PARTICIPANTS

<b>Name</b>	<b>Affiliation</b>
Dale Richards	Centre for Science Advice – NL Region
Erika Parrill	Centre for Science Advice – NL Region
Shelley Dwyer	Department of Fisheries, Forestry and Agrifoods
Laura Park	DFO - Oceans
Melissa Abbott	DFO - Oceans
Victoria Howse	DFO - Oceans
Wayne King	DFO - Resource Management
Julie Diamond	DFO - Resource Management
Andry Ratsimandresy	DFO - Science
Bob Gregory	DFO - Science
Corey Morris	DFO - Science
Curtis Pennell	DFO - Science
John Bratney	DFO - Science
Nadine Templeman	DFO - Science
Robyn Jamieson	DFO - Science
Erin Carruthers	FFAW
Johan Joensen	FFAW
Marion Sinclair-Waters	Graduate Student – Dalhousie University
Phillip Meintzer	Graduate Student - Marine Institute
Brett Favaro	Marine Institute
John Green	Memorial University - Biology
Patricia Nash	NCC
Sigrid Kuehnemund	WWF - Canada