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## **Canadian Science Advisory Secretariat (CSAS)**

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**Quebec Region**

**Proceedings of the regional peer review meeting on the assessment of the lobster  
in Quebec's inshore waters in 2018**

**March 12-14, 2019  
Mont-Joli, Quebec**

**Chairperson: Charley Cyr  
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## Foreword

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

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## **SUMMARY**

This document contains the proceeding from the meeting held within the regional assessment of the lobster in Quebec's inshore waters. This review process was held on March 12-14, 2019 at the Maurice Lamontagne Institute in Mont-Joli. This meeting gathered about thirty participants from sciences, to management to industry. This proceeding contains the essential parts of the presentations and discussions held and relates the recommendations and conclusions that were presented during the review.

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## **INTRODUCTION**

The Quebec Region of Fisheries and Oceans Canada (DFO) is responsible for assessing several stocks of fish and invertebrate species harvested in the Estuary and Gulf of St. Lawrence. Most of these stocks are periodically assessed as part of a regional advisory process conducted at the Maurice Lamontagne Institute in Mont-Joli. This document reports on the proceedings of the meeting held on March 12-14, 2019 on the assessment of lobster stocks in Quebec's coastal waters.

The objective of the review was to determine whether there were any changes in the resource's status and whether management plans needed to be adjusted based on the chosen conservation approach, the ultimate goal being to formulate a Science Advisory Report on the management of lobster stocks in Quebec's coastal waters for the 2019–2021 fishing seasons.

These proceedings report on the main points of the presentations and deliberations that arise from the regional stock assessment committee's activities. The regional review is a process open to all participants who are able to provide a critical outlook on the status of the assessed resources. Accordingly, participants from outside DFO are invited to take part in the committee's activities within the framework defined for this review (Appendices 1 and 2). The proceedings also list the recommendations made by meeting participants.

## **BACKGROUND**

Meeting chairperson Charley Cyr welcomes the participants. He goes over the peer review objectives and meeting rules. After the participants introduce themselves, stock assessment biologist Benoit Bruneau, assisted by Nathalie Paille, highlight the contribution of their collaborators. He presents the agenda and the terms of reference. The last lobster stocks assessment was conducted in the winter of 2016. Benoit Bruneau provides some background information by presenting the conservation framework established for the lobster. Some components of the lobster's biology (life cycle, distribution, reproduction, growth, natural mortality) are also reviewed.

The indicators used to assess stock status (abundance, demography, exploitation rate and productivity) are mainly derived from fishery statistics, sea and dockside commercial catch sampling data, logbooks (mandatory and voluntary), trawl and scuba-diving surveys for the Magdalen Islands, and projects involving experimental traps and a post-season survey in the Gaspé Peninsula and fishermen's buoys and minilog. A brief reminder is made on how to calculate certain indicators, including CPUE (commercial sampling and logbooks, densities (trawl), size structures and exploitation rate.

## **ASSESSMENT OF THE RESOURCE**

Lobster landings in Quebec in 2018 totalled 8,127 t. The Magdalen Islands (MI) account for 58% of these landings, while the Gaspé Peninsula ranks second with 28%. Anticosti and the North Shore account for 10% and 3% of the total landings, respectively.

For each area (MI, Gaspé Peninsula, Anticosti, North Shore), Mr. Bruneau briefly presents the highlights of the last assessment, the management measures and the data available for estimating indicators. The biologist then reviews the results obtained for each indicator category (abundance, demographics, exploitation rate, and productivity). Given that most of the indicators are based on fishing data, he also refers to fishing effort (number of fishing trips and traps) and temperature during the fishing season. Questions and comments by the participants are

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documented in the proceedings for each category of indicator. A summary of the current stock status concludes the presentations for each area and advice is formulated.

## **MAGDALEN ISLANDS (LFA 22)**

### **Abundance indicators**

Landings reached a historic high of 4,757 t in 2018, which is 91% higher than the 25-year average for a similar or lesser fishing effort. The increase in landings between 2015 and 2018 was greater in the south (40%) than in the north (31%).

In 2018, for the Islands as a whole, the capture per unit effort (CPUE) in weight for commercial sampling was higher (69%) than in 2015 and 111% higher than the average of the historical series (1985–2017). The CPUE in number and the logbook CPUE showed a similar trend. The density of commercial lobsters in the trawl survey showed a strong increase in 2015 followed by a downward trend since then. In 2018, it was 22% lower than in 2015, but 58% higher than the historical average (1995-2017).

- It is specified that in the landings graph, "north" and "south" refer to the landing port.
- Some concerns were raised about the decline in abundance indicators in 2016, which is probably related to unfavourable environmental conditions at the beginning of the season, combined with the good condition of lobster at the beginning of the season (not very hungry). However, it should be noted that the other indicators for the Magdalen Islands do not show a drop. The abundance indicators for the years 2017 and 2018 are also very good.
- With respect to the trawl survey, it was noted that the pattern observed for commercial densities (including the large increase in abundance in 2015 followed by a decrease) is also observed for other indicators (e. g. density of mature females, density of pre-recruit). It is also noted that the increase observed in commercial lobsters was anticipated via pre-recruit densities.
- In general, there is a good correlation between the various abundance indicators.

### **Demographic indicators**

The demographic indicators show that the average size of commercial lobsters sampled during the fishery has increased slightly, but in a sustained manner since the end of the legal size increase in 2003. In contrast, in the trawl survey, the average size has been decreasing for males since 2013 and relatively stable for females since 2003.

- With regard to the size structure, a question arises as to what is the most appropriate to use: the actual measured value, a weighting according to landing or a relative frequency (landings indicated in brackets). Participants recommend to use a relative frequency presented on the same scale. This comment will also apply to all the size structures presented in this assessment.
- Jumbo lobsters are important because we are in a recruitment fishery. It is therefore necessary to ensure that this sub-component of the stock is protected. However, there is no target to be reached in terms of management measure.
- It is suggested that jumbo lobsters be examined in absolute value, rather than as a percentage, for a more accurate picture (to eliminate the effect of recruits).
- With regard to the sex ratio, we want to at least ensure that there is one male for every female.

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- It is pointed out that berried females are not included in the sex ratio because they are not available for breeding.

### **Exploitation rate**

Fishing pressure indicators show a slight decrease in exploitation rates since 2011.

- It was noted that the two exploitation rate indicators from the commercial survey (north and south) follow each other quite well, unlike the trawl survey, which could be explained in part by the difficulties experienced during the trawl survey (2018).

### **Productivity indicators**

The productivity indicators remained high. For the Islands as a whole, theoretical egg production compared to the 1994-1996 period was 3.9 times higher in 2018 compared to 2.6 times higher in 2015. However, since 2015, there has been a downward trend in the proportion of post-molt females who have been inseminated.

Fishing recruitment indicators suggest that landings will remain high for the next 2-3 years. The benthic recruitment index decreased between 2010 and 2016, which could suggest a decrease in fishing recruitment in the medium term.

- With regard to size structures, as discussed above, relative frequencies on the same scale will be used.
- With regard to the frequency of reproduction, it is mentioned that it is closely linked to moulting. More information on moulting (period, extent) is therefore needed to increase our knowledge of lobster, its relationship to the environment and to better interpret some clues.
- There is a decreasing trend in the proportion of postmoulting females who have been inseminated. This is a concern for participants, as it seems that something is happening with regard to fertility (sperm limitation). This is a priority research issue.
- In the mating success figure, it may be interesting to compare each year to a fixed reference level (period).
- Questions are being raised about the possibility of combining the figures of theoretical egg production and mating success. Eventually, there could be a figure linking these two pieces of information. We are talking about integrating an index for reproductive success by having a real measure of egg production. This aspect can be further explored. Efforts have already been made on the deposition and need to be continued. We also want to understand what modulates productivity (e.g., environmental conditions). This is a very complex system.
- More and more small females with eggs are being observed. It would be interesting to review the sexual maturity ogive since the sexually mature sizes are lower in warmer waters.
- Recent researches suggest that the stock productivity has increased in terms of the time required to recruit to the fishery, from 7-8 years to 5-6 years.
- There is a particularly strong cohort in 2010. It seems that 2017 is also a good year for deposition.

### **Precautionary approach**

According to the precautionary approach, the Magdalen Islands lobster stock is currently in the healthy zone.

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- The Industry has no desire for the stock to be in the precautionary zone. Action would then be taken quickly.

### **Summary and opinion – Magdalen Islands**

The key points of the assessment are presented and the participants suggest some changes. Only comments on substance (and not form) are reported.

- With respect to abundance indicators, some participants suggested referring to the year 2016 in the text of the Science advisory report (SAR).
- It was proposed to simplify the highlight on CPUE.
- In the productivity highlight, it is proposed to focus on the trend towards reduced mating success.
- There is agreement that recruitment indicators suggest that landings will remain high for the next 2 to 3 years. In addition, it is important to note that the benthic deposition index decreased between 2010 and 2016, suggesting a decrease in fishing recruitment in the medium term.

Finally, the participants' recommendation is as follows:

High abundance and productivity indicate that the Magdalen Islands lobster stock is in good condition and that current exploitation levels are adequate. According to the precautionary approach, the Magdalen Islands lobster stock is currently in the healthy zone.

### **NORTH SHORE (LFAS 15, 16 AND 18) AND ANTICOSTI (LFA 17)**

#### **Abundance indicators**

Lobster landings on the North Shore increased significantly between 2015-2018 (82% in LFA 15, 305% in LFA 16, and 423% in LFA 18). The 2018 values are at historic peaks and two-thirds of the increase would be due to increased fishing effort. On Anticosti Island (17B), landings also reached an all-time peak, rising from 504 t in 2015 to 782 t in 2018

In Areas 15 and 16, catch per unit effort (CPUE) by weight from commercial sampling increased by 27% between 2015 and 2018 and by 137% compared to the historical average (1993-2017), while fishing effort has been increasing since 2015. In Area 18, the 2018 CPUE by weight was 44% higher than in 2015 and 112% higher than the historical average (2012-2017) for fishing effort that has been increasing since 2014. In Area 17, the 2018 CPUE by weight from logbooks was 33% higher than in 2015 and 114% higher than the historical average (2006-2017) for an increased fishing effort since 2011.

- Given the current abundance, the Industry confirms an increased fishing effort.
- Few comments are provided here.

#### **Demographic indicators**

Commercial sampling for demographic indicators is very limited on the North Shore and at Anticosti Island, especially in LFAs 15, 16 and 18. In LFA 17B, size structures are broad, but the average size is decreasing possibly due to increased recruitment.

- The increase in size among commercial lobsters on the North Shore for the 1998-2005 period would be mainly associated with the increase of the minimum size, but also with recruitment. However, it seems difficult to separate these two causes.

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- It was noted that the size structures are less truncated than for the Magdalen Islands, which probably indicates a lower exploitation rate.
  - For Anticosti Island, it is mentioned that the increase in the proportion of females in 2018 would be linked to changes in fishing behaviour (e. g. effort further offshore at the end of the season).
  - It is also added that the minimum legal size should be adjusted for these regions since it is lower than the size at sexual maturity. However, this adjustment requires first of all an update of biological knowledge.

### **Summary and opinion – North Shore and Anticosti**

The key points of the assessment are presented and the participants suggest some changes. Only comments on substance (and not form) are reported.

- With regard to the increase in fishing effort in these regions, it would be important to point this out at the beginning.
- For the highlight about abundance indicators, it is suggested to simplify them by presenting either percentages or tonnages, or to go by LFA or zone. The objective is to emphasize the fact that we are at historical highs. Thus, several comments contribute to reformulating the highlights.
- For the highlight on the demographic indicators, it is important to mention that they remain limited on the North Shore and Anticosti Island, particularly in areas 15, 16 and 18, and to link the decline in the average size in 17B to the increase in recruitment.
- There is a clear need for research to better understand the biology of lobster in these regions, but also to reassess the relevance of adjusting the minimum legal size to protect reproductive potential and manage these stocks in a sustainable manner. This issue seems important considering the increase in fishing effort and environmental changes.

The participants' **recommendation** is as follows:

Abundance indicators (landings and CPUE) are up sharply on the North Shore and at Anticosti Island. Lobster populations in these areas appear to be in good condition, but are characterized by slow growth as well as late sexual maturity and at larger size (90 mm and over). Given that legal size is smaller than size at sexual maturity, these populations may be vulnerable to over-harvesting. In the context of increasing fishing effort in these regions and changes in the environment, it would be important to rapidly develop or update the biological knowledge essential for the sustainable management of these stocks.

### **GASPÉ (LFAS 19, 20 AND 21)**

#### **Abundance indicators**

Landings are up sharply and reached a record 2,509 t in 2017, followed by a decline to 2,315 t in 2018 associated with Right Whale conservation measures. Landings in 2018 were 26% greater than in 2015 and 116% higher than the historical average (1993-2017). Fishing effort has decreased slightly since 2009 and is below the 1994-2004 level. In 2018, 78% of Gaspé landings came from LFA 20, 10% from LFA 21 and 12% from LFA 19.

For the entire Gaspé area, the catch per unit effort (CPUE) in weight from commercial sampling rose sharply from 2015 to 2018. In LFA 19, the CPUE by weight in 2018 was 60% higher than in 2015 and 202% higher than the historical average (2001-2017). In LFA 20, the CPUE by weight



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in 2018 was 59% higher than in 2015 and 133% higher than the historical average. In LFA 21B, the CPUE in the fall of 2018 was 74% higher than in 2015 and 162% higher than the historical average (2001-2017). The logbook CPUEs follow the same trend.

- It is mentioned that major fishing effort reduction programs have been implemented since 2006 in the Gaspé. This reduction was implemented gradually.
- For LFA 21B, a clear distinction should be made between the fall and summer fisheries to ensure clarity of information. It was noted that there is an increasing amount of data available, which will allow us to further develop our analyses in future assessments. We would like to have a better idea of the catchability in the fall versus in the spring.
- The installation of thermographs should provide better temperature data for the Gaspé.
- We can see that the abundance indices for the Gaspé are at historical highs.

### **Demographic indicators**

In LFAs 19 and 21, demographic indicators showed that the average size of commercial lobsters was large in 2018 (95.8 mm and 92.8 mm respectively), but 4% lower than in 2015, possibly due to increased recruitment. In LFA 20, the average size of commercial lobsters has changed little since 2008 ( $\approx$  88 mm). Commercial lobster size structures are much wider in LFAs 19 and 21 than in LFA 20.

- It can be seen that recruitment constitutes a large part of the fishery in Area 20. Work remains to be done to improve the situation.
- Lobsters in LFA 19 are larger in size compared to other areas (colder temperature, lower fishing effort).
- For LFA 21, there are questions about what could explain a sex ratio in favour of males. The possibility of gender segregation in habitat and redistribution of lobsters in relation to environmental changes was mentioned.

### **Exploitation rate**

Fishing pressure indicators could not be estimated for LFAs 19 and 21. In LFA 20, exploitation rates were lower between 2015-2017 (76%) than between 2011 and 2014 (81%) but remained very high.

- There is agreement that high levels of exploitation rates remain in LFA 20 (although 2016 is slightly lower), despite efforts to reduce effort.
- In the next assessment, the summary table will present the current year's exploitation rate versus the last year and the current year's exploitation rate versus the historical average.

### **Productivity indicators**

Productivity indicators were high in LFA 20. The abundance of berried females has continued to increase since 2011. Theoretical egg production was 8.6 times higher in 2018 against to 4.6 times higher in 2015 compared to the period 1994-1996. In 2018, the abundance of prerecruits increased by 16% compared to 2015 in LFA 20, suggesting that landings may continue to increase. This information is not available for the other LFAs of the Gaspé.

- To explain some of the differences observed, the impact of a shorter season on the CPUE of berried females compared to commercial lobsters is questioned. The berried females would mainly be caught at the end of the season.

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- There is little concern about the decline in multiparous egg production, which is probably due to the increase in primiparous given the strong recruitment events of recent years.
  - In the summary table, it is suggested to indicate that the multiparous contribution is in relative value (percentage).
  - Finally, a monitoring of the spermatheca is recommended.

### **Post-season survey**

A post-season survey in LFA 20 was implemented in 2011. The data for 2018 indicate a high abundance of pre-recruit -1. Recruitment could therefore increase.

- This survey will eventually be an important source of information for the next assessment.

### **Precautionary approach**

The Gaspé lobster stock is in good condition and in the healthy zone according to the precautionary approach.

### **Summary and opinion – Gaspé**

The key points of the assessment are presented and the participants suggest some changes. Only comments on substance (and not form) are reported.

- As already discussed, for the key point about abundance indicators, it is suggested that they be simplified by presenting either percentages or tonnages. It is important to emphasize that we are at historic highs. It is also proposed to refer to the interruption of fishery in 2018.
- In LFAs 19 and 21, it should be noted that the average size of commercial lobsters was high in 2018, but 4% smaller than in 2015, possibly due to increased recruitment. In LFA 20, the main message is that the average size of commercial lobsters has changed little since 2008.
- Participants agreed that exploitation rates remain at high levels in LFA 20.
- The highlight on the productivity indicators in LFA 20 is being restructured to make the information clearer.
- Work already undertaken to reduce fishing effort in Area 20 should be continued given the small average size of commercial lobsters. In addition, given environmental changes, it is important to update biological knowledge in order to manage this stock in a sustainable manner.

As such, the participants' recommendation is as follows:

High abundance, productivity and landings indicate that the Gaspé lobster stock is in good condition and in the healthy zone according to the precautionary approach. In recent years, indicators have remained the same or improved based on prevailing environmental conditions and exploitation levels. However, in LFA 20, the small average size of commercial lobsters suggests that actions on reducing fishing effort must be pursued. Considering the environmental changes, it would be important to rapidly develop or update the biological knowledge essential for the sustainable management of these stocks.

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## **CONCLUSION**

### **MONITORING INDICATORS FOR INTERIM YEARS**

The Science Advisory Report is issued for three years (2019–2021). An update of landings and indicators for the trawl survey is expected in the meantime.

### **RESEARCH IDENTIFICATION AND PRIORITIZATION**

There is an obvious need for research to better understand lobster biology. Biological knowledge essential for the sustainable management of stocks, particularly in the context of environmental change, must be developed or updated.

Some variables to be updated are targeted: sexual maturity ogive, moulting growth rate, female insemination rate, condition indices, egg quality, size structure by sex, exploitation rate (North Shore), fall versus spring catchability (Gaspé). Some issues are identified and aim to:

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## APPENDIX 1 – TERMS OF REFERENCE

### Assessment of the lobster in the Quebec's inshore waters

#### Regional Peer Review: Quebec Region

March 12-14, 2019

Mont-Joli, Quebec

Chairperson: Charley Cyr

#### Context

Lobster fishing is practiced by over 550 fishermen in Quebec scattered along the coast of Îles-de-la-Madeleine, Gaspésie, the North Shore and Anticosti Island. The exploitation is practiced using traps in shallow water.

Quebec waters are divided into 8 fishing areas. The lobster fishery is managed by controlling the fishing effort and by escapement measures. The management strategies introduced over the last decade were developed based on the recommendations from the Fisheries Resource Conservation Council (FRCC).

At the request of the Fisheries and Aquaculture Management Branch, resource assessment is done every three years. The last lobster stock review was done in 2016. The objective of the review is to determine whether changes that have occurred in the stock status necessitate adjustments to management plans.

#### Objectives

Provide scientific advice on the management of lobster stocks on the North Shore and Anticosti Island (units 15, 16, 17 and 18), on Gaspésie (units 19, 20 and 21) and Îles-de-la-Madeleine (unit 22) for the fishing season 2019 to 2021. This advice shall include:

- Description of the lobster biology and its distribution in Quebec's coastal waters;
- Description of the fishery including landings, fishing effort and management measures specific to the fishing areas;
- Analysis of abundance index (CPUE, density), and exploitation rate from fishery and survey data
- Analysis of data from the commercial at-sea and dockside sampling program;
- Identification and prioritization of research projects to be considered for the future.
- Identification of indicators to follow the stock status during the years without a formal stock assessment and criteria for the reopening of the advice;
- Perspectives for the 2019-2021 fishing seasons for all management units.

#### Expected publications

- Three Science Advisory Reports on lobster in Îles-de-la-Madeleine (1), Gaspésie (2) and North Shore and Anticosti Island (3)
- Research document
- Proceedings

#### Participation

- Fisheries and Oceans Canada (DFO) (Science, and Ecosystems and Fisheries Management sectors)
- Fishing industry
- Aboriginal communities/organizations

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- Provincial representatives

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## APPENDIX 2 – LIST OF PARTICIPANTS

<b>Name</b>	<b>Affiliation</b>	<b>March 12</b>	<b>March 13</b>	<b>March 14</b>
Arseneau, Cédric	DFO – Fisheries management	X	X	-
Basque, Johanne (tel)	Gespeg Micmac First Nation	-	-	X
Belley, Rénaud	DFO – Science	X	X	X
Bernier, Denis	DFO – Science	X	X	X
Bouchard, Danielle	MAPAQ	X	-	-
Bruneau, Benoît	DFO – Science	X	X	X
Côté, Jean	RPPSG	X	X	X
Couillard, Catherine	DFO – Science	-	X	X
Cyr, Charley	DFO – Science	X	X	X
Deraspe, Norman (tel)	Fisher Magdalen Islands	-	X	-
Gauthier, Pierre	DFO – Science	X	-	-
Gilbert, Michel	DFO – Science	X	-	X
Gillis, Carole Anne	Listuguj Fisheries	-	-	X
Hurtubise, Sylvain	DFO – Science	X	X	X
Jérôme, Adam	AGHAMM	X	-	X
Juillet, Cédric	DFO – Science	X	X	X
Larochelle, Mia (tel)	DFO – Fisheries management	-	-	X
Lévesque, Isabelle	DFO – Science	X	-	-
Maltais, Domyrick	DFO – Science	X	-	X
Monseau, Alexandre	Fisher Anticosti	-	X	-
Paille, Nathalie	DFO – Science	X	X	X
Parent, Shannie	DFO – Fisheries management	X	X	X
Plourde, Stéphane	DFO – Science	X	X	-
Roy, Virginie	DFO – Science	X	-	-
Sainte-Marie, Bernard	DFO – Science	X	X	X
Sean, Anne-Sara	DFO – Science	X	-	-
Smith, Andrew	DFO – Science	X	X	-
St-Cyr Leroux, Thomas	Merinov	-	X	-
Tamdradi, Hacène	DFO – Science	X	X	-
Tremblay, Claude	DFO – Science	X	-	-
Turbide, Carole	DFO – Science	X	X	X
Two-Axe, Tara	Gesgapegiag	X	-	X