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Proceedings of the regional peer review meeting on the Assessments on scallop stocks in the Quebec's inshore waters

**February 26, 2020
Mont-Joli, Quebec**

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Editor: Sonia Dubé**

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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 Stock Assessment of Scallop in Quebec Inshore Waters following the 2016 to 2019 fishing seasons. This review process was held on February 26, 2020 at the Maurice Lamontagne Institute in Mont-Joli. This meeting gathered close to thirty participants from sciences, management and 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.

INTRODUCTION

The Quebec Region of Fisheries and Oceans Canada (DFO) is responsible for assessing the stocks of several exploited fish and invertebrate species in the Estuary and Gulf of St. Lawrence. Most of these stocks are assessed periodically within a regional advisory process, which is conducted at the Maurice Lamontagne Institute in Mont-Joli. This document consists of the proceedings of the meeting held on February 26, 2020, on the stock assessment of Scallop in Quebec inshore waters.

The objective of the meeting was to determine whether there were any changes in the resource's status and whether adjustments were required to the management plans based on the chosen conservation approach, the ultimate goal being to provide a scientific advice on the management of Scallop stocks in Quebec coastal waters for the 2020–2022 fishing seasons.

These proceedings report on the main points discussed in the presentations and deliberations stemming from the activities of the regional stock assessment committee. 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 defined framework for this review (Appendices 1 and 2). The proceedings also list the recommendations made by the meeting participants.

CONTEXT

The chair, Charley Cyr, reminded all those present of the meeting objectives and agenda. A round table of introductions followed. Rénaud Belley, assessment biologist, highlighted the work done by contributors, in particular Patrice Goudreau's close collaboration, and then presented the meeting outline and the terms of reference. Mr. Belley described a few aspects of the biology of scallops, including the two species, the sea scallop and the Iceland scallop. He also provided a picture of the dredge fishery, which consists of 24 areas (78 licences) distributed in 3 regions: North Shore (13 areas), Magdalen Islands (5 areas) and the Gaspé (6 areas). He briefly outlined the existing management measures, which vary considerably from one fishing area to another: overall quota, individual quota, number of days at sea, minimum size. The information sources used to calculate the indicators consist of commercial fishery statistics (logbooks, Vessel Monitoring System [VMS], purchase slips, at-sea and dockside sampling), research surveys and research projects. An overview of the DeLury depletion model was provided. This approach is used in the scallop stock assessment in area 29 in Nova Scotia to estimate the exploitation rate.

ASSESSMENT OF THE RESOURCE

In Quebec, annual scallop landings totalled 73.8 t of muscle on average during the 2016 to 2019 period, an increase of 16% relative to the 2013 to 2015 period. Total fishing effort decreased by 5% from the 2013 to 2015 period. The Magdalen Islands contributed 66% of the total landings, the North Shore 32% and the Gaspé 2%.

The indicators were reviewed for all the areas with significant fishing effort, specifically 16E, 16F and 16A1 (North Shore), 19A (the Gaspé) and 20A (Magdalen Islands).

NORTH SHORE (16E, 16F and 16A1)

Indicators

The landings, made up mostly of Iceland scallop, increased by 59% for the 2016 to 2019 period relative to the 2013 to 2015 period, whereas fishing effort rose by 15% due to the resumption of fishing in area 16A1. From 2016 to 2019, there was no fishing effort in areas 16A2, 16D, 16G, 16H, 16I, 18D and very little in areas 15, 16B, 16C and 18A. Historically low landings have been recorded since 2013 in areas 16E and 16F, with higher levels prior to 2007. Two exploratory surveys carried out by Agence Mamu Innu Kaikusseth (AMIK) in 2016 and 2018 in areas 16E and 16F show that densities of commercial size scallop (≥ 70 mm) outside the known beds are generally not promising.

In area 16E, landings have been below 16 t since 2013 compared with levels generally higher than 50 t before 2007. Since 2008, fishing has been directed mainly at scallop bed “D” located south of La Grande Île, where recruitment in the preceding years was very good. The average weight of landed meat has been below the historical average since 2005. The most recent research surveys show that densities of non-commercial size scallops (< 70 mm) have followed a sharp downtrend since 2016 and were well below the reference level in 2019. Densities of commercial size scallop remain very low and below the reference average. However, between the mainland and the islands, two cohorts of small scallops (< 30 mm) were observed in the 2019 survey.

In area 16F, landings have been lower than 5 t since 2009, compared with levels greater than 25 t before 2007. Since 2011, fishing has been directed primarily at bed “C.” The average weight of landed meat in recent years has been close to the historical average. The last two research surveys showed that densities of commercial and non-commercial size scallop were below the series average in 2018 and close to the average in 2019.

Fishing activities resumed in area 16A1 in 2017, and were concentrated on the Ile Rouge bed. The Total Allowable Catch (TAC) of 10.9 t was exceeded slightly in 2018 and 2019. The landed weight of meat was close to the historical average. From 1998 to 2002, this bed was unable to support an annual exploitation level of about 10 t. It is likely that the bed is more vulnerable to overexploitation because it is located at the western limit of the known distribution of scallops and is geographically isolated; it likely receives smaller or less frequent inputs of larvae than the beds in the other areas.

The participants provided a number of comments and suggestions:

- For area 16E, a distinction is made between the inner and outer part of the islands because conditions differ greatly there.
- Some participants mentioned that fishing takes place later now than it used to in this area.
- Questions were raised about the impact of warming. According to some participants, more sea scallops have been observed within the islands than in the past and more sea stars, a predator of scallops.
- The size structure in area 16E precludes effective monitoring of the population dynamics. It is better to study it locally in each bed.
- Fishing effort in bed “Q” (area 16E) appears to have been too high in the past, causing depletion of the stock.

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- In general, there is little confidence in the CPUE values from the fishery, particularly for areas containing several beds. In addition, it appears to be difficult to reconcile the data from logbooks with purchase slips.
 - For area 16E, some participants pointed out that the CPUE appears to have decreased more in recent years than is indicated by the results obtained from the depletion model, as presented. This is due to the way the model divides the data between years. It is therefore recommended that the model results not be given too much weight.
 - The participants indicated that it was risky to formulate conclusions based on the results obtained from the depletion model. It is mainly a complementary source of information. According to them, the survey provides more information (density indices). The participants said they had little confidence in the output from the depletion model.
 - No size structure was presented for area 16A1. Following verification, it was mentioned that in recent years a peak of slightly over 80 mm has been observed.
 - Industry members mentioned that the use of a more effective dredge in area 16A1 may have contributed to the high yields observed over the past three years.
 - The scientists agreed that the stock in area 16A1 may not be able to support the current exploitation level.
 - It would be helpful to be able to establish an exploitation rate that would support self-sustaining populations in the areas covered by a rebuilding plan (16E, 16F and 18A).

Summary and recommendations – North Shore

The participants commented on the summary. Only substantive comments are reported.

- With regard to the key point concerning areas with little or no fishing effort, it was suggested that it be made clear that little information is available to assess the status of the resource and that no recommendation will be formulated for these areas.
- The decision was made to add a key point to indicate that a rebuilding plan is being developed for areas 16E, 16F and 18A.
- It was also proposed that a key point be added concerning the two exploratory surveys conducted by AMIK in 2016 and 2018 in areas 16E and 16F.
- In the key point regarding landings, it was agreed that recent landings and historical landings should be compared to be better able to assess current stock status. This comment applies to areas 16E and 16F.
- It was decided to exclude from the summary the information obtained from the DeLury depletion model. In addition, a number of participants expressed the view that the commercial CPUE is not a good indicator of stock status. It was agreed to drop it from the discussion. This comment applies to areas 16E, 16F and 16A1.
- In the key point concerning the research survey indices for area 16E, it was agreed that the densities of non-commercial size scallop have declined sharply since 2016 and are markedly below the reference mean, since the densities of commercial size scallop are still very low and below the reference mean. It should be specified that two cohorts of small scallop were observed within the islands in the 2019 survey.
- For area 16E, it was mentioned that additional conservation measures are necessary to promote an increase in densities. In addition, it was indicated that reducing fishing to the

lowest possible level within the islands should promote the survival of the two strong cohorts of small scallop observed in 2019.

- For area 16F, with regard to the key point on research survey indices, it was agreed to state that the densities of commercial- and non-commercial size scallops were lower than the series average in 2018 and close to the series average in 2019. In addition, maintaining an average level of fishing effort should promote the stability of the current densities.
- For area 16A1, it is appropriate to indicate that fishing activities resumed in 2017. A number of participants said that they were concerned about a potential decrease in CPUE values over the coming years and they pointed out the need to exercise caution. Considering that the sector failed to support an annual exploitation level of 10 t per year for 5 years (1998–2002), and considering that the target bed is isolated and at the western edge of the known distribution of scallop, the participants indicated that this bed is more vulnerable to overharvesting. This consideration was added to the key point concerning area 16A1.

GASPÉ (19A)

Indicators

Annual landings, which consist mainly of sea scallops, reached a level higher than 60 t before 2001, and then gradually declined to a total of less than 2 t from 2016 to 2019. Since 2014, the fishery in this region has been concentrated mainly in area 19A. Scallop landings decreased by 30% and fishing effort by 63% during the 2016 to 2019 period relative to the 2013 to 2015 period.

From 2016 to 2019, there was no fishing effort in areas 17A1, 17A2, 18B2, 18C and 18D and very little in area 18B1. In area 19A, landings and fishing effort were both very low from 2016 to 2019. Over the last six years, fishing effort has been concentrated on two beds, and a number of beds were not harvested. The CPUE fell to the lowest value on record in 2017 but has been on the rise since then. The average CPUE for the past four years is slightly below the historical average. The landed weight of scallop muscle has decreased slightly and is currently below the historical average.

No comments were made, so discussion moved on to the summary.

Summary and recommendations – Gaspé

The participants made several comments:

- It was suggested that a key point be added to describe the situation in the Gaspé.
- For the key point concerning areas with no fishing effort, it should be indicated that little information is available to assess the status of the resource and therefore no recommendations will be made for these areas.
- No particular concerns were expressed in connection with the key point on area 19A, since several beds were not harvested there. It was agreed that both landings and fishing effort were very low from 2016 to 2019 and effort was concentrated on two beds, which meant that a number of beds were not harvested. Instead of indicating that fishing effort could become sustainable in the long term, it could be stated that effort could become sustainable by the time of the next assessment.

MAGDALEN ISLANDS (20A)

Indicators

In area 20A, sea scallop landings and CPUEs rose sharply in 2007 and have been relatively stable ever since. Fishing effort is distributed over all the beds.

The 2019 research survey indicated that densities of commercial size scallop (≥ 100 mm) are still high and close to the historical maximum values. The densities of pre-recruits measuring 70–84 mm and < 70 mm are slightly higher than the median value of the historical series. However, the density of pre-recruits measuring 85–99 mm is lower than the median value of the historical series. The densities of scallop available to the fishery are expected to be lower in 2020 than in 2019.

The participants provided a few questions and comments:

- It was indicated that control via fishing effort provides good results. However, some participants mentioned that certain parameters related to the decision rule could be explored in greater depth.
- It was noted that recent CPUEs are not comparable to those recorded prior to 2007 considering the major changes to the management measures.
- Fishing effort appears to be well distributed.

Decision rules

Decision rules for determining fishing effort have been in place since 2010. Effort is calculated using CPUE values derived from logbook data and research survey abundance indices. The upper reference level is derived from the average of the CPUEs from the 1975 to 1984 period, whereas the lower reference level comes from the maximum CPUE for the 1997 to 2006 period. Fishing effort needs to be reviewed annually after the indicators are updated. For 2020, maximum fishing effort established for area 20A is 305.5 days at sea.

- It was suggested that fishing effort values for earlier years be shown on the graph of effort as a function of the CPUE and adjustment of secondary indicators.

Summary and recommendation – Magdalen Islands

The participants made a few comments and a recommendation:

- For the key point on meat weight, the participants asked about the link to be established with various factors (increase in the legal size, recruitment). It was decided to include this point only in the advice.
- In the key point related to the research survey, the following addition was suggested: the densities of scallops available to the fishery are expected to be lower in 2020 than in 2019.

Thus, for 2020, maximum fishing effort established for area 20A is 305.5 days at sea.

CONCLUSION

MONITORING INDICATORS FOR THE MAGDALEN ISLANDS

The indicators to be monitored during the intervening years for the Magdalen Islands are as follows:

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- Landings
 - CPUEs from logbooks
 - Abundance index from research surveys (commercial and non-commercial)
 - Update of fishing effort in the Magdalen Islands on the basis of these indicators (for seasons 2021 and 2022)

RESEARCH ACTIVITIES

Research priorities were established, including:

- Development of a rebuilding plan for areas 16E, 16F and 18A.
- Development of a stock assessment model for area 16E and proposed reference points.
- Research on the impacts of acidification.
- A number of research projects beginning in 2020 for areas 16E and 16F: scallop condition and shell shape, new method for determining scallop age, growth, recruitment and environmental conditions from the shells, sexual maturity and maturity ogives, population genetics.

APPENDIX 1- TERMS OF REFERENCE

Stock Assessment of Scallop in Quebec Inshore Waters

Regional Peer Review – Quebec Region

February 26, 2020

Mont-Joli, Quebec

Chairperson : Charley Cyr

Context

In the Gulf of St. Lawrence, two species of scallops are commercially fished, namely the sea scallop (*Placopecten magellanicus*) and the Iceland scallop (*Chlamys islandica*). The scallop fishery is an inshore fishery using the Digby dredge and catches are landed mostly as meat (muscle). Given the difficulty in visually distinguishing between the meat of the two species, commercial fishing statistics are presented regardless of the species. However, catches in any one area usually consist of just one species.

Quebec waters are divided into 24 fishing areas to which access is limited to a small number of fishermen. Fishing effort is controlled by a fishing season and catches are limited by quotas or by a limited number of fishing days.

At the request of the Fisheries Management Branch, resource assessment is done every three years. The last scallop 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 based on the conservation approach used.

Objectives

Provide scientific advice on the management of scallop stocks in Quebec's inshore waters (management units 15 to 20) for the 2020-2022 fishing seasons. This advice shall include:

- Description of the biology of scallop 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 catch per unit effort from the fishery;
- Analysis of data from the commercial at-sea and dockside sampling program;
- Results of the comparative fishing between CCGS Calanus II and Leim in 2013 in unit 20A;
- Analysis of data gathered during research surveys in unit 16E, 16F (Mingan), and 20 (Magdalen Islands);
- A review of the decision rule for the adjustment of fishing effort in the Magdalen Islands;
- Identification of indicators to follow the stock status during the years without a formal stock assessment;
- The identification and prioritization of research projects to be considered for the future;
- Perspectives for the 2020-2022 fishing seasons.

Expected Publications

- CSAS Science Advisory Report on Quebec inshore waters scallop
- Research Document
- CSAS Proceedings summarizing the discussion

Participation

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

APPENDIX 2- LIST OF PARTICIPANTS

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