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Proceedings of the regional peer review meeting of the assessment of Quebec inshore waters Softshell clam

February 25, 2020
Mont-Joli, QC

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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 Softshell Clam Stocks in Quebec's Inshore Waters. This review process was held on February 25, 2020 at the Maurice Lamontagne Institute in Mont-Joli. This meeting gathered twenty-four participants from sciences 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 25, 2020, on the assessment of the Quebec inshore waters Softshell clam.

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 Softshell clam 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 meeting chair, Charley Cyr, reviewed the peer review objectives and process, and the participants introduced themselves. Sylvie Brulotte, the biologist who conducted the review, outlined the collaborators' work and presented the terms of reference. Ms. Brulotte provided a brief summary of the biology of the softshell clam (habitat, distribution, growth, reproduction, burial and dispersal), referring to the work done over the years. Softshell clams, familiar shellfish in the intertidal zone, occurs in beds along most of Quebec's coastline, in soft sediments. Populations in the northern Gulf of St. Lawrence differ genetically from those in the Magdalen Islands and the southern Gulf. Growth in the species varies according to immersion time and site quality. The grow rate is also linked to the initial size. Softshell clams take five to seven years to reach the minimum legal size of 51 mm. The sexes are separate and the sex ratio is generally balanced. Gametes are released into the water and fertilization occurs externally. Following a short larval stage (roughly 5 weeks), the clams metamorphose into the adult form and establish on the seabed, where they remain buried for the rest of their life. Burial time is primarily influenced by clam size and water temperature, while dispersal is linked to clam size and substrate type. Climate change (e.g., storm surges, shrinking ice cover) and coastal erosion and reshaping can affect beds, particularly the establishment of young individuals. Also, stress can lead to the formation of additional growth rings (ridges), affect growth and reduce the accuracy of aging data.

Softshell clams are exploited by commercial and recreational harvesters, although the extent of the recreational harvest is unknown. Ms. Brulotte addressed various aspects of this fishery, including the history of landings in Quebec; the classification of shellfish harvest areas under the Canadian Shellfish Sanitation Program (CSSP) (approved, conditionally approved, restricted, prohibited); the fact that the commercial fishery has been limited almost exclusively to the Upper North Shore since 1993, with intensive exploitation from 1997 to 2005; measures by DFO to control this activity; and the history of clam processors on the Upper North Shore, with two processing plants closing in the spring of 2010, and one plant reopening in 2015 and

then closing in the fall of 2016. Total allowable catches (TACs) were introduced in 2015, implemented by shellfish harvest area. The main shellfish harvest areas on the Upper North Shore were presented, along with the three sub-areas on the North Shore for the commercial fishery (1A, 1B and 1C), including a brief overview of the management measures implemented from 2002 onwards. Commercial fishing activities on the Upper North Shore are regulated by the number of licences, a fishing season and a landings quota by shellfish harvest area. A number of research projects and surveys have been conducted since 2000, and the methodology used for the surveys was presented. The softshell clam has been included in the Bill C-68 since 2019, which will require the implementation of a precautionary approach.

RESOURCE ASSESSMENT

There is no commercial harvest along the Lower St. Lawrence or Gaspé coasts. Commercial landings in the Magdalen Islands are low (< 3 t) and little information is available to assess the status of this resource. Consequently, the peer review participants will not issue any recommendations for this region. Since 2010, softshell clam landings have come mainly from 10 shellfish harvest areas on the Upper North Shore. Therefore, the review of indicators is mainly concerned with hand harvesting on the Upper North Shore. Information was presented for the shellfish harvest areas of Baie des Chevaux, Banc Marie-Marthe, Baie des Plongeurs, Cran à Gagnon, Pointe-aux-Outardes Ouest and Pessamit Sud. The fishery indicators presented included landings, fishing effort, catch per unit effort (CPUE), size structure and average size, while survey indicators included the delineation and area of beds, density, yield, abundance and biomass by size class, size structure, harvestable area and comparison with the 1967-1977 historical data.

A few questions were raised, and clarifications provided.

- Fishing effort is expressed in vendor-days rather than harvester-days since the actual number of harvesters involved for each vendor is unknown. Some participants suggested that the number of hours be used instead, but the level of uncertainty was deemed to be too great.
- The harvestable bed area is based on the fact that harvesters choose the most viable areas—those with a certain density of commercial-sized clams (arbitrary choice of 12-16 clams/m^2) and where fertilization success is likely the greatest.
- The historical data (1967-1977) used for the comparisons were obtained from surveys of portions of commercially viable beds and inspire a fair amount of confidence.

FISHERY

Although commercial landings on the Upper North Shore reached a peak of 1,173 t in 2000, they have averaged only 26 t in the last three years (2017-2019). TACs have not been reached due to the low fishing effort.

Since 2017, the average size of clams landed has been between 65 mm and 74 mm in the six areas sampled on the Upper North Shore. Clams of sub-legal size (< 51 mm) make up a very small proportion of landings.

SURVEYS

From 2016 to 2019, 24 shellfish harvest areas on the Upper North Shore were surveyed; eight of these had previously been surveyed from 2002 to 2014. The density of commercial-sized

clams increased significantly in five of the eight areas. However, the area of some of these beds is much smaller than that measured in surveys from 1967 to 1977.

- It was suggested that information on the biomass of individuals 20-50 mm long not be included in the table with interannual comparisons.
- In the same table, presenting median instead of average values (non-parametric tests) was deemed to be more appropriate.

CRITERIA FOR A "HEALTHY" BED

Ms. Brulotte presented a table summarizing all the criteria used to identify a "healthy" bed. Participants made a number of comments and suggestions on the table.

- First, a proposal was made to refer to these criteria as "criteria for vulnerability to the fishery" rather than criteria for a "healthy bed."
- The purpose of describing these criteria was clarified: first, to provide a better understanding of what makes a bed "healthy" and, second, to define TAC values that can be supported by the resource over the long term.
- Regarding the criterion related to having an adequate density of adults to ensure reproductive success, the table should refer to sexually mature individuals (≥ 40 mm) rather than individuals of minimum legal size (≥ 51 mm).
- In terms of predominantly sandy sediments being more conducive to juvenile dispersal, some participants suggested that the table should refer to loss of juveniles rather than juvenile dispersal.
- It was agreed that the reference value for density (25 clams/m^2) in the graph showing density by harvestable area remains an arbitrary one.
- In the graph showing the density of individuals 20-50 mm long, the use of percentages was deemed questionable. It was suggested that a density value be employed instead (e.g., 15 clams/m^2). However, participants were reminded that this would still be arbitrary.
- An analysis of 15 variables and their correlations was performed to describe beds. It was suggested that fishery indicators be excluded from this analysis. Although this exploratory exercise was deemed promising, it would not be included in the science advisory report.
- The degree of importance assigned to each criterion in the table was questioned. Some participants believed that the main criterion for determining a bed's vulnerability to the fishery should be biomass as a function of area. However, other criteria were deemed equally important, particularly pre-recruitment (density of 20-50 mm individuals) as well as the density of mature individuals, given the effect of density on reproductive success. The minimum harvestable area was also an essential criterion.
- The way to protect areas considered to be productive was questioned. Participants were reminded of the existence of areas closed to harvesting.
- Some participants suggested that a mathematical link be established between 20-50 mm long individuals and commercial-size individuals (> 51 mm). However, this is not so easy due to the multiple sources of mortality, which are difficult to estimate.
- It was suggested that resources be invested in certain areas to better understand the dynamics of this population, including recruitment.

- It was noted that the current industry demand for softshell clams was not very great given the socio-economic context (i.e., absence of processing plants).
- Participants agreed that an exploitation rate of 5% would not be detrimental to the resource, although some believed that this rate should be adjusted in order to protect areas with small individuals (20-50 mm). The idea that a minimum harvestable area (0.05 km^2) should be a requirement for exploitation was also supported.
- It was also noted that the volume of recreational harvests remains unknown. The participants recommended that the magnitude of this activity be better documented. In addition, the exploitation rates suggested in the science advisory report should include recreational harvesting.
- Lastly, it was suggested that the exploitation rate be limited to no more than 5% of the biomass of legal-size clams. It was agreed that this rate should be adjusted downward in areas where the density of clams 20-50 mm long was less than 15 clams/m^2 and in areas where the harvestable area was less than 0.05 km^2. Rates of 2.5% and a minimal rate of around 0% were proposed for these areas respectively.

CONCLUSION

ASSESSMENT FREQUENCY AND MONITORING INDICATORS

In terms of the assessment frequency and monitoring indicators, the next scientific review is expected to take place in three years, with no updates to the indicators in the intervening years.

RESEARCH PRIORITIES

Several issues were identified as research priorities:

- Carry out periodic monitoring of certain areas to better understand population dynamics.
- Deepen the understanding of the recruitment process (origin, stock-recruitment relationship, genetics, etc.).
- Continue surveys in closed areas.
- Study the effects of storm surges, ice cover, shoreline erosion and the reshaping of mudflats on juvenile establishment.
- Study surface water (and sediment) acidification in relation to larval and juvenile survival.

SUMMARY AND RECOMMENDATIONS

The key points of the assessment were presented, and some modifications were suggested by participants. Only comments about content are reported.

- The first two key points were summarized in a single point that provides details on the context.
- The key point on landings on the Upper North Shore was rephrased in order to emphasize the low values in the last three years and the fact that the TAC was not reached owing to low fishing effort. Consequently, the subsequent point on fishing effort can be removed.
- In the key point involving the average size of clams landed, the fact that the proportion of clams of sub-legal size in landings is currently very low should be emphasized.

- Regarding the information on surveys, first, the context should be presented (surveys conducted, comparison with historical data), followed by the results obtained for the various indices.
- In the next key point, it should first be specified that the biomass of legal-sized clams was calculated for each area surveyed; next, it should be stated that the exploitation rate should be limited to no more than 5% of the legal biomass in order to protect the reproductive potential of each shellfish harvest area.
- It should be added that some areas could be more vulnerable to a 5% exploitation rate and this rate should be adjusted downward on the basis of two criteria: a minimal rate for harvestable areas smaller than 0.05 km^2 and a rate of roughly 2.5% for areas where the density of clams 20-50 mm long is less than 15 clams/m^2.
- A key point on recreational harvesting, whose impact is unknown, should be included. It should state that quantifying the effort associated with, and quantities harvested in, this activity is crucial. A statement should be added that the suggested exploitation rates apply to all harvests (both commercial and recreational).

Therefore, the meeting participants made the following recommendations:

The biomass of legal-sized clams was calculated for each area surveyed. In order to protect the reproductive potential of each shellfish harvest area, it is suggested that the exploitation rate be limited to no more than 5% of legal biomass.

Certain areas could be more vulnerable to a 5% exploitation rate. It is therefore suggested that this rate be adjusted downward for these areas. Consequently, a minimal rate should be used for areas with a harvestable area smaller than 0.05 km^2, while a rate of roughly 2.5% should be used for areas with a density of 20-50 mm clams that is less than 15 clams/m^2.

The suggested exploitation rates apply to all quantities harvested (both commercial and recreational harvests). The impact of recreational harvesting, an activity valued by coastal communities, remains unknown. Quantifying the effort and the amounts harvested in this activity, which is also a source of juvenile mortality, is crucial.

APPENDIX 1 – TERMS OF REFERENCE

Assessment of Quebec inshore waters Softshell clam

Regional peer review – Quebec Region

February 25, 2020
Mont-Joli, QC

Chairperson : Charley Cyr

Context

The softshell clam (*Mya arenaria*) is present along most of Quebec's shoreline. Recreational harvesting of softshell clams has been practised for a long time in Quebec without being well documented. Commercial harvesting is permitted on the Upper North Shore and the Magdalen Islands. Only hand tools are allowed and there is a minimum legal size for both types of harvesting. In addition, commercial activities on the Upper North Shore are regulated by the number of licences, a fishing season and a landing quota by shellfish harvest area. For recreational harvesting, the number of daily catches is regulated for all of Quebec and there is a fishing season on the Upper North Shore.

At the request of the Fisheries Management Branch, resource assessment is done every three years. The last assessment of Quebec inshore waters Softshell clam was done in 2017. 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 a scientific advice on the stock status of Softshell clam in Quebec's inshore waters for the 2020-2022 fishing seasons. This advice shall include:

- Description of the species biology and its distribution in Quebec's coastal waters;
- Description of the fishery including management measures by region and landings and fishing effort by shellfish harvest areas
- Analysis of catch per unit effort from the commercial fishery;
- Analysis of data from the commercial dockside sampling program;
- Analysis of the research survey data realized from 2016 to 2019 in Upper North Shore;
- Determination of the monitoring process of these populations for the interim years;
- Identification and prioritization of research projects to be considered for the future;
- Perspectives for the 2020-2022 fishing seasons based on indicators derived from fishing and research activities.

Expected Publications

- Science Advisory Report
- Research document
- Proceedings

Expected Participations

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

APPENDIX 2 – LIST OF PARTICIPANTS

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