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Proceedings of the Regional Peer Review on the Assessment of the Green Sea Urchin Stocks in the Northern Estuary and Gulf of St. Lawrence in 2022

June 15-16, 2022
Virtual meeting

Chairperson: Charley Cyr
Editor: Sonia Dubé

Maurice Lamontagne Institute
Fisheries and Oceans Canada
850, route de la mer
Mont-Joli, Quebec, G5H 3Z4

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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[http://www.dfo-mpo.gc.ca/csas-sccs/
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SUMMARY

This document contains the proceeding from the meeting held within the regional assessment process on Green Sea Urchin stocks in the Estuary and the northern Gulf of St. Lawrence in 2022. This review process was held on June 15-16th, 2022 via the Zoom platform (virtual meeting). This meeting gathered about twenty participants from sciences, management and industry. This proceeding contains the essential parts of the presentations and discussions held and relates the main recommendations and conclusions that were presented during the review.

INTRODUCTION

The Quebec Region of Fisheries and Oceans Canada (DFO) is responsible for assessing a number of fish and invertebrate stocks exploited in the Estuary and Gulf of St. Lawrence. Most of the stocks are periodically assessed as part of a regional peer review process held at the Maurice Lamontagne Institute in Mont-Joli. This document constitutes the proceedings of the Assessment of the green sea urchins stocks in the Estuary and northern Gulf of St. Lawrence in 2022 held virtually via Zoom on June 15-16, 2022. The purpose of this review was to develop a Science Advisory Report for the 2022-2023 to 2024-2025 fishing seasons for fishing areas 8, 9 and 11.

These proceedings report on the main points discussed in the presentations and deliberations resulting from the activities of the regional stock assessment committee. Regional peer reviews are a process open to any participant who is able to provide a critical outlook on the status of the assessed resources. Consequently, participants from outside DFO are invited to take part in the committee's activities within the defined Terms of Reference for this review (Appendices 1 and 2). The proceedings also set out the recommendations made by the meeting participants.

RESOURCE ASSESSMENT

The chair of the meeting, Charley Cyr, welcomed the participants. He went over the science review process and objectives, the role of the participants, and the terms of reference for the peer review. After the participants introduced themselves, the stock assessment biologist, Hacène Tamdrari, reviewed the agenda and highlighted collaborators' contributions. He summarized the 2016 science advisory report and then outlined the distribution of the green sea urchin, aspects of the species' biology, the Quebec fishery, fishing areas, and management measures.

Annual landings of green sea urchins in Quebec were sporadic and generally low (< 200 t) until 2005. They have remained above 415 t since 2006, except in 2009 (341 t), and peaked at 762 t in 2007 and 2016. Although landings have been reported for Areas 3, 7, 10, 11, 12 and 14 since 1991, they have been intermittent or small. Of those areas, since 2007 Area 11 had average landings of 33.4 t from 2016 to 2020. Since 2004, nearly 98% of Quebec's cumulative landings have come from Areas 8 and 9, with the largest proportion from subarea 9-1. Area 9 is the only green sea urchin harvesting area in Quebec that has commercial fishery status.

ZONE 9

Les données pour la zone 9 (sous-zone 9-1) sont présentées par le biologiste: mesures de gestion, distribution de l'effort et des PUE, débarquements, effort et PUE, tailles. From 2017 to 2021, average annual landings totalled 315.1 t and came almost exclusively from Batture aux Alouettes in subarea 9-1. Since 2018, the daily catch limit has dropped from 6,000 kg to 4,200 kg in subarea 9-1, which partly explains the 26.9% decrease in average landings relative to the 2012-2016 period (431.2 t). The total number of authorized fishing days (80 boat-days) for subarea 9-1 has been used every year since this measure first came into effect in 2010, except in 2020 (61 boat-days) due to the pandemic. The average fishing effort in diver-hours (dh) for the 2017-2021 period (967.0 dh) is comparable to what it was in 2012-2016 (977.8 dh). The annual CPUE decreased between 2017 and 2019 and has been relatively stable since then. The average CPUE for the 2017-2021 period (324.1 kg/dh) was 15.6% lower than that of the 2004-2016 historical series (384.1 kg/dh). The average size of landed sea urchins appears to have been stable since 2010 and ranges from 59 to 62 mm. The proportion of sublegal-sized sea urchins (< 50 mm) in landings is less than 5% on average.

The results of the surveys conducted by DFO (2008 and 2010) and the Agence Mamu Innu Kaikusseth (AMIK, 2016) indicate an increase in the biomass density of legal- and sublegal-sized sea urchins in 2016 relative to 2008 and 2010 in the area fished. A modal value of around 20 to 30 mm in diameter is seen in 2008, 2010 and 2016, indicating that recruitment to the fishery could continue. AMIK's 2019 survey suggests some stability in the density of legal-sized sea urchins relative to 2016 for the entire Batture aux Alouettes.

- Some participants emphasized that the effort in diver-hours (dh) should be clarified due to divers' different levels of experience. Other factors might also be involved (e.g. environmental phenomena). Consequently, some uncertainty is definitely involved in interpreting the CPUE, and it does not necessarily reflect resource abundance.
- Questions were raised about the comparability of the DFO (2008 and 2010) and AMIK surveys (2016). It was noted that the sampling plans for the two surveys may differ slightly (number of quadrats), which makes the comparison somewhat uncertain. The idea of treating the quadrats as random factors should offset these differences. It was also suggested that the same quadrats be compared in the fishing grounds.
- Densities seemed to be higher in 2016, but individuals seemed to be smaller in size than previously. It can be assumed that substantial recruitment events had occurred up to 2016. An additional survey had been conducted in 2019 and the results suggested that the situation had subsequently remained stable.
- The survey locations were said to correspond to the fishing sites. Questions were raised about the possibility of investing more effort in other sectors to get an idea of what was happening elsewhere.

AREA 11

The data for Area 11 were also presented, including management measures, distribution of effort and CPUE, landings, and effort and CPUE. Annual landings averaged 40.0 t from 2016 to 2019, for an average effort of 188.5 dh (26 boat-days). These are the highest landings since the start of the fishery. In 2020, only 6.7 t of sea urchins were landed, representing an effort of 5 boat-days over the 60-day fishing period. The 2021 data were not available at time of the assessment. The mean CPUE from 2017 to 2020 (211.9 kg/dh) is comparable to that of the 2002-2016 historical series (205.9 kg/dh). There has been a lack of size structure data since fishing started in the area.

- Regarding the effort distribution map, questions were raised about how the information was presented, because it did not seem to adequately reflect reality according to some participants.
- Participants were reminded that this was still an exploratory fishery. Harvesters were still exploring the fishery and were moving around to find the resource.

AREA 8

The data for area 8 were presented, including management measures, distribution of effort and CPUE, landings, effort and CPUE, and sizes. Fishing has historically been conducted at the eastern tip of Île Verte (subarea 8D) and, since 2008, on the southeast side of the eastern tip of Île aux Lièvres and Batture de l'Île Blanche (subarea 8E). An annual TAC of 110.7 t has been in effect in subarea 8E since 2017. In subarea 8D, the fishing and landings data for the period prior to 2018 are unreliable or incomplete. From 2018 to 2021, landings averaged 103.3 t, for an average effort of 36 boat-days and a mean CPUE of 353.8 kg/dh. The average landed size appears to have been stable since 2012 and is between 59 and 62 mm. The proportion of

sublegal-sized sea urchins in landings is less than 2% on average. In subarea 8E, annual landings averaged 105.7 t for the 2017-2021 period, which equals 95.5% of the TAC. The average effort in dh decreased by 4.1% relative to the 2012-2016 period, whereas the average effort in boat-days was comparable. The mean CPUE from 2017 to 2021 (148.5 kg/dh) remains below the historical average for 2003-2016 (234.7 kg/dh), but has been increasing since the historical low in 2019. The average size of landed sea urchins has varied from year to year, but there is no clear trend. The proportion of sublegal-sized sea urchins in landings is less than 2% on average.

- Uncertainties were raised about the data on effort in sub-area 8D between 2015 and 2017.
- It was noted that the presence of cameras on board vessels since 2018 made it possible to determine whether the catches reported by harvesters on their forms made sense. Participants wondered about the possibility of using this tool to verify the data on effort in particular.
- For the time being, introducing a quota in sub-area 8D was not deemed necessary. This fishery still remained very exploratory in nature.
- It was noted that the failure to reach the TAC in sub-area 8E could be explained by the lack of a market.
- The data on landings in sub-area 8E for 2021 were to be verified, according to a member of management, and this was done the next day. Therefore, the decrease in 2021 appears less significant.

GREEN SEA URCHIN BIOMASS SURVEY BY WOLASTOQIYIK WAHSIPEKUK FIRST NATION (WWFN) IN 2021

Marie-Hélène Rondeau gave a presentation on the 2021 sea urchin biomass survey by Wolastoqiyik Wahsipekuk First Nation (WWFN). The objectives of this survey were to examine the large-scale spatial distribution of the green sea urchin and its size structure and densities, and to assess the harvestable quantities in sub-areas 8A, 8B, 8C, and 8E. The survey methodology and the results for density per sub-area were presented, along with the sources of uncertainty. The average density of sea urchins in sub-area 8E (2.5 individuals/m² and 0.25 kg/m²) was higher than in sub-areas 8A and 8B. The size distribution ranges from 15 to 94 mm in diameter, with an average of 46.1 mm. Sixty-two percent of individuals were sublegal-sized. Sub-areas 8A and 8B offer few commercial opportunities for divers. Sea urchin harvesting by WWFN appeared to occur in 8E's main recruitment area.

- It was explained that sub-area 8C could not be covered in the survey.
- Participants were reminded that freshwater events could cause sea urchin mortality in areas closer to the coast.
- In 8E, the sea urchin concentration area was still the same. A passive colonization process may have been occurring due to storm surges.
- However, caution should be exercised because it cannot be determined with certainty whether this is local recruitment or is coming from neighbouring areas.
- A potential selection effect resulting from the selection of large sea urchins by the fishery in shallow-water portions of 8E was noted.
- It was also noted that the shallow areas in 8A and 8B were largely populated by small individuals. The osmotic stress at these shallow depths might prevent growth in young sea

urchins. The gentler slopes in 8A and 8B (larger areas of shallow water over the shelves) and the deeper distribution of algae were also suggested as possible explanations.

- It was noted that the work in 2016 on a method to assess age structure had been inconclusive.

CONCLUSION

HIGHLIGHTS AND RECOMMENDATIONS

Hacène Tamdrari presented the key points for areas 9, 11, and 8 and the participants commented on them.

Area 9

- It was suggested to talk about annual landings in the first key point. In addition, the first point should state that, since 2018, greater restrictions had been placed on daily catches in sub-area 9-1; the daily catch limit went from 6,000 kg to 4,200 kg, which partially explains the 26.9% decrease in average landings relative to 2012-2016. This key point was to be divided into two separate points, one on landings and the other on effort, and the key point on effort was to be simplified.
- The key point on CPUE was to be reworded and to focus instead on the annual CPUE, which decreased from 2017 to 2019 and has been stable since then.
- The suggestion was made to add a key point on surveys, including the 2019 survey. The participants agreed on the wording to be used.
- Some harvesters stressed that sea urchins were still present in the same quantities and quality at Batture aux Alouettes, especially in the last few years.
- However, other participants noted that sea urchins were smaller than before.
- There was agreement that it was not a quota that being managed, but rather a daily limit not to be exceeded.
- The introduction to the summary should state that, among all the sea urchin fishing areas in Quebec, area 9 was the only one with commercial status.
- According to a number of participants, the situation was likely not worrisome, and maintaining harvests near the average level for 2017-2021 should not have a major impact on sea urchin abundance during the next three seasons.

Thus, the meeting's conclusion for Area 9 is worded as follows:

For Area 9 (subarea 9-1), keeping catches near the average level for 2017-2021 should not have a major impact on sea urchin abundance over the next three seasons.

Area 11

- For the various areas, it is important to specify that the year 2020 was affected by the COVID pandemic.
- Regarding the average CPUE from 2017 to 2020, the decision was made to compare it to the historical series (2002-2016).
- Someone added that the information on size structures in area 11 was still insufficient.

The meeting's conclusion for Area 11 is worded as follows:

In Area 11, owing to the lack of information, it is not possible to comment on the status of the resource.

Area 8

- In the first key point, the word “traditionally” should be replaced by “historically.”
- It was noted that, in sub-area 8D, there were still uncertainties about the landings and fishery data for the period before 2018 (the 2017 data were missing).
- In the key point on sub-area 8E, information on landings was to be added, including the percentage that they represent relative to the TAC. Industry representatives reminded participants that the failure to reach the TAC was due to socio-economic factors. It was important to mention that CPUE values had been increasing since the historical low in 2019.
- A key point was added about the industry survey (WWFN) in 2021.
- It appears that the current management measures had resulted in a return to the 2012-2013 levels. A number of stakeholders did not seem to have any significant concerns about the viability of this stock in the short term.

The meeting's conclusion for Area 8 is worded as follows:

For Area 8 (subareas 8D and 8E), keeping catches near the average level for 2017-2021 should not have a major impact on sea urchin abundance over the next three seasons.

IDENTIFICATION OF RESEARCH PRIORITIES

Research needs were identified, along with their objectives:

- Develop an assessment model and precautionary approach that integrate the ecosystem approach. Assess the gaps in the available data.
- Update the demographic parameters specific to each fishing area (growth, maturity, natural mortality, etc.).
- Develop a mass-size (diameter) relationship for sea urchins specific to each fishing area and to various times of the year.
- Study indirect mortality in sub-legal and legal-size sea urchins linked to harvesting activities.
- Study larval dynamics (local recruitment versus recruitment from outside) on the fishing grounds (e.g. sub-areas 9-1 and 8E).
- Study spatio-temporal dynamics in the green sea urchin (sea urchin behaviour),
- Study the relationship between kelp beds and sea urchin concentrations.
- Study the spatial variability in gonad quality.

Participants added the following research needs:

- Compare the CPUE with the research survey data or other additional data to improve CPUE reliability.
- Examine other potential indicators for assessing the stock, including those derived from survey data.

-
- Look at what is being done elsewhere (e.g. British Columbia) as a source of inspiration for an assessment model.
 - Examine the relationships between ecosystem conditions and demographic parameters for the species (e.g. salinity, predation), which will involve integrating the ecosystem approach.
 - Assess the influence of the market on the sea urchins targeted in the fishery; factoring in a social-ecological approach was also discussed. Integrate the concept of sea urchin quality. Study the variability in gonad quality.
 - Improve monitoring by improving industry research surveys in management areas 9-1 and 8E, and possibly in area 8D. Align them with the stock assessment process and improve communication between DFO Science and the industry.
 - Explore the potential of collecting data using new electronic monitoring tools.

MONITORING INDICATORS

No updates will be performed between stock assessments, which are planned for every three years.

APPENDIX 1- TERMS OF REFERENCE

Assessment of the Green Sea Urchin stocks in the Northern Estuary and Gulf of St. Lawrence in 2022

Regional Peer Review – Quebec Region

June 15-16, 2022
Virtual meeting

Chairperson : Charley Cyr

Context

The green sea urchin fishery began in the Estuary and northern Gulf of St. Lawrence in 1991, but did not develop consistently in all regions. Landings can sometimes be quite high and spread over a long period or even cease after only a few years. Since 2004, nearly 98% of green sea urchin landings in Quebec have come from fishing areas 8 and 9 in the St. Lawrence Estuary, mainly from subarea 9-1.

The Quebec Region coastline is divided into 14 fishing areas to which access is limited to a restricted number of fishers and divers. The effort is also controlled by the number of dive fishing days, a daily catch limit or a total allowable catch (TAC), a limit on the number of traps (when applicable), and a minimal legal size of 50 mm. The fishery is mostly conducted from March to May and from September to December when gonad yield and quality are highest.

The last assessment of this fishery dates back to 2016 and mainly targeted Areas 9 and 11 on Quebec's North Shore. The Fisheries Management Branch requested a Science Advisory Report on the Estuary and northern Gulf of St. Lawrence sea urchin stocks for the 2022 to 2024 fishing seasons. The purpose of the review is to determine whether changes in the status of the resource require adjustments to the management measures in accordance with the chosen conservation approach.

Objectives

To develop a Science Advisory Report for the management of green sea urchin stocks in the Estuary and the northern Gulf of St. Lawrence for the 2022-2023 to 2024-2025 fishing seasons for fishing areas 8, 9 and 11.

The advisory report will include:

- a description of the biology of the green sea urchin and its distribution in Quebec's inshore waters;
- an assessment of the status of sea urchin populations in the areas for which data are available in the form of:
 - landings and effort;
 - catches per unit effort;
 - size structures of the sea urchins landed;
- the most recent knowledge from research surveys conducted on this species;
- identification and prioritization of research projects to be considered for the future;
- perspectives and/or recommendations on management measures for the 2022-2023 to 2024-2025 fishing seasons.

Expected Publications

- Proceedings
- Science Advisory Report

Participation

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

APPENDIX 2- LIST OF PARTICIPANTS

Name	Affiliation
Belley, Reynald	DFO – Science
Bernier, Denis	DFO – Science
Busawon, Dheeraj	DFO – Science
Couillard, Catherine	DFO – Science
Croussette, Yolaine	DFO – Fisheries management
Cyr, Charley	DFO – Science
Dubé, Sonia	DFO – Science
Gendreau, Yanick	DFO – Science
Gianasi, Bruno	DFO – Science
Hardy, Magalie	Fisheries management
Juillet, Cédric	DFO – Science
Lacasse, Olivia	DFO – Science
Léonard, Pierre	Essipit First Nation
Loboda, Sarah	DFO – Science
MacGregor, Kathleen	DFO – Science
Morneau, Jacques	Fisher
Ouellette-Plante, Jordan	DFO – Science
Rondeau, Marie-Hélène	AGHAMM
Roy, Marie-Josée	Fisheries management
Roy, Virginie	DFO – Science
Sainte-Marie, Bernard	DFO – Science
Tamdrari, Hacène	DFO – Science
Tremblay, Jason	Fisher
Weiner, Guy-Pascal	Wolastoqiyik Wahsipekuk First Nation