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Proceedings of the Regional Peer Review of the Assessment of the Estuary and Northern Gulf of St. Lawrence Snow Crab Stocks

**February 13-14, 2018
Mont-Joli, Quebec**

**Chairperson: Denis Chabot
Rapporteur: 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 process on Snow crab in the Estuary and Northern Gulf of St. Lawrence. This review process was held on February 13-14, 2018 at the Maurice Lamontagne Institute in Mont-Joli. This meeting gathered about sixty participants from science, management and industry. These proceedings contain the essential parts of the presentations and discussions held, and report the recommendations and conclusions that were presented during the review.

INTRODUCTION

The Quebec Region of the Department of Fisheries and Oceans (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 13-14, 2018 on the assessment of the Estuary and Northern Gulf of St. Lawrence Snow Crab stock.

The objective of the review 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 was to provide scientific advice on managing the Snow Crab stock in the Estuary and Northern Gulf of St. Lawrence for the 2018 fishing season.

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.

BACKGROUND

The meeting chairperson, Denis Chabot, summarizes the peer review objectives and process. He presents the agenda and the Terms of Reference for the meeting. Assessing biologist Cédric Juillet highlights the contributions made by his collaborators. He presents an overview of landings on the Atlantic Coast as a whole and by fishing area (12A, 12B, 12C, 13, 14, 15, 16, 16A and 17). In 2017, landings totalled 8,350 t, down by 9% from 2016. Area 16 contributes the largest share of landings although the contribution of Area 17 is increasing.

The conservation principle that applies to these areas targets the protection of reproductive potential. Management measures include limits imposed on catches via a total allowable catch (TAC), effort controls (number of traps, number of licenses and fishing season) and a minimum legal carapace size set at 95 mm. In addition, the fishery is closed when catches in one area include more than 20% white crab.

The data used in the assessment are mainly from the fishery (ZIFF and logbooks, commercial sampling) and independent sources (post-season survey, trawl survey). These data provide the key stock status indicators, including the commercial catch per unit effort (CPUE), post-season number per unit effort (NPUE), combined CPUE and NPUE index, carapace condition at landing, prospects for recruits/adolescents and crab left by the fishery, distribution of fishing effort, average size and size frequency.

Mr. Juillet then briefly describes the species biology and defines the various carapace conditions and crab categories mentioned in the review. Categories 1 and 2 are recruits, and categories 3 to 5 are crabs left by the fishery. Mr. Juillet states that the combined index is based on the average of both commercial biomass indices (standardized CPUE from the commercial fishery and NPUE of adults ≥ 95 mm in the post-season survey).

Before getting into the details of the assessment, area by area, a few environmental considerations are introduced, including the minimum temperature of the CIL and the preferred temperatures at different life stages (0 to 2°C for early benthic stages, less than 3-4°C for large crabs) and temporal trend in bottom area $\leq 3^\circ\text{C}$ per area.

Participants noted a contraction of preferential habitat for snow crab ($\leq 3^{\circ}\text{C}$) in several areas, in connection with the observed warming of the deep waters of the Gulf of St. Lawrence.

ASSESSMENT OF THE RESOURCE

Mr. Juillet reviews the key indicators for each fishing area. A summary is presented as well as the text of three harvest scenarios and their potential impact on the biomass. Participants ask questions and make comments. In this meeting, participants must agree on the wording of all three scenarios (intensive, intermediate, careful). The preferred option will be discussed at the Advisory Committee meeting.

AREA 16

Indicators: Area 16

The total allowable catch (TAC), which decreased by 20% to 3,648 t between 2016 and 2017, was reached. The commercial fishery's catch per unit effort (CPUE) was close to the 2016 value and remained slightly below average. Landings were made up mostly of recruits. The mean size of crab caught in the commercial fishery remained stable between 2016 and 2017 and was above average.

Based on the 2017 post-season survey, the abundance index for adult males ≥ 95 mm has been stable over the last two years and remains at the average level. The abundance of adolescents ≥ 78 mm in the post-season survey returned to the average level after a few years of higher abundance, suggesting that recruitment will decrease in the short term.

The combined index of commercial CPUE and number per unit effort (NPUE) from the post-season survey remained unchanged relative to 2016 (-0.3%), suggesting that the biomass available to the fishery in 2018 should be comparable to the 2017 level.

The decline in recruitment observed in the annual research survey in Baie Sainte-Marguerite (a site representative of the area) suggests that recruitment is decreasing. However, the survey revealed a new pulse of young crabs (2014-2015 year-classes) that are very abundant, with recruitment to the fishery expected around 2021-2022.

Several comments were made:

- Warming has led to an increase in the size of the crab, increasing their availability to the fishery. The possibility that the legal size of 95 mm would no longer protect the resource as effectively was mentioned.
- Contraction of available habitat could lead to an increase in internal control through competition and cannibalism.

Summary and outlook: Area 16

The summary and scenarios presented were discussed:

- It was suggested that a general summary on the state of the ecosystem and the effect of warming on snow crab habitat be added to the science advisory report.
- It was suggested that, in the Area 16 summary, a key point be added regarding the trawl survey to indicate that recruitment is declining, but that a new pulse of young crabs could result in recruitment to the fishery around 2021-2022.

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- With regard to the proposed scenarios, it was suggested that the preamble be reformulated by indicating that, despite the stability shown by the indicators, a downtrend is occurring and recruitment is likely to decrease in the coming years.

Finally, the participants agree on the following scenarios:

The commercial fishery and post-season survey indicators are stable, but the scientific surveys suggest a decline in recruitment over the next few years:

- 1) An unchanged TAC could lead to a decrease in the biomass if recruitment decreases as the post-season survey suggests.
- 2) A 10% decrease could help maintain the biomass available to the fishery.
- 3) A greater decrease would help maintain the biomass available to the fishery over a longer period.

AREA 17

Indicators: Area 17

The TAC increased by 25% between 2016 and 2017 to 2,098 t and was reached. The catch rate increased very slightly in 2017 and was above the historical average. Landings consisted of an equal proportion of intermediate-shell crab and recruits, which have been increasing since 2014. The average size of crabs caught during commercial fishing has been increasing since 2015, but remains below the historical average.

The abundance index for adult males ≥ 95 mm in the post-season survey increased as a result of a slight increase in recruits and crabs left by the fishery. The index is close to the average.

The combined index of commercial CPUE and of NUE in the post-season survey increased (+8.5%). This suggests that there will be more biomass available in the 2018 fishing season than there was in 2017.

The density of legal-size crab in the research trawl survey reached a record high level (2011-2017) on the south shore and was near the record high level (1992-2017) on the north shore. The abundance of adolescents ≥ 78 mm in the research survey was still high, which suggests that recruitment to the fishery could be good in 2018. However, the abundance of smaller adolescents is decreasing, which suggests a decline in recruitment within two years.

A number of comments were made:

- It seems appropriate to clearly distinguish between north and south in the trawl survey data.
- There is some consistency between the trawl survey data for Area 17 and the data from the Baie Sainte-Marguerite survey (Area 16 west), with a certain amount of lag.
- Industry representatives would like the delta for the combined index to be reported, as in previous assessments.
- It was also suggested that the size structure of the post-season survey be included.
- In the next stock assessment document, care should be taken to ensure page numbering is correct and graphs are properly labelled.

Summary and outlook: Area 17

A discussion took place on the summary and scenarios presented:

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- As a reminder, it was noted that a summary covering all the areas would describe the state of the ecosystem and the contraction of snow crab habitat related to warming.
 - DFO Science and industry concurred that the CPUE increased in 2017, but fishers had a more optimistic outlook, considering the lower effort expended to achieve the same performance, among other things.
 - It was agreed that the indices for this area were quite positive; however, it is conceivable that recruitment may decrease in the medium term.
 - The actual percentage values related to the scenarios presented were discussed and then a consensus was reached.

Finally, the participants agree on the following scenarios:

The rise in the combined index and the high values of the scientific survey suggest a potential increase in catches in 2018 compared to 2017:

- 1) A 25% increase in catches could lead to a high harvesting intensity and a stabilization of the biomass available to the fishery in 2019.
- 2) An increase of approximately 15% in catches should lead to a moderate harvesting intensity and help increase the biomass available to the fishery in 2019.
- 3) An increase in catches below 10% would help maintain the biomass available to the fishery over a longer period.

AREA 12A

Indicators: Area 12A

The TAC decreased by 7% to 98.6 t between 2016 and 2017, and it was reached. The commercial catch rate decreased slightly between 2016 and 2017, and is still below average. Landings consisted primarily of intermediate-shell crabs, but there has been a moderate increase in the proportion of crabs with new carapace (recruits) since 2014. The average size of crabs caught in the commercial fishery is increasing after 4 years of decline, to be slightly below average.

Based on the post-season survey, the number per unit effort (NPUE) of legal-size adults (≥ 95 mm) was low in 2015 and 2017, but recruitment is increasing.

The combined index composed of the commercial CPUE and the post-season survey NPUE is at its lowest since 2000, and similar to 2007.

Participants made a few comments:

- It was suggested that the standardized CPUEs be reviewed because they do not appear to reflect the raw data, as pointed out by industry.
- It was noted that crabs move to shallower waters in response to warming of deep waters and suggested that a stratum be added to the post-season survey to reflect this fact.

Summary and outlook: Area 12A

Comments were provided in relation to the summary and scenarios presented:

- With regard to the key point concerning standardized CPUEs, it was agreed that the values were simply below average.

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- It was recommended that a key point be added concerning the post-season survey to mention the low values in 2015 and 2017.
 - It was suggested that it be mentioned that recruitment is increasing in the post-season survey.
 - It was also suggested that the increase in crab size after four consecutive years of decline be highlighted.
 - Despite the absence of a combined index, it should still be possible to establish scenarios.
 - In the preamble to the scenarios, it should be mentioned that the recruitment related indices point to an increase in biomass.

Finally, the participants agree on the following scenarios:

Indicators of biomass available to the fishery remain low for 2018, but the post-season survey suggests increased recruitment

- 1) An increase in catches of up to 10% could result in biomass levels decreasing or staying the same depending on the recruitment level next year.
- 2) A status quo in catches would help maintain the biomass in the absence of recruitment.
- 3) A decrease in catches of more than 10% could help maintain or increase the biomass available to the fishery.

AREA 15

Indicators: Area 15

The TAC decreased by 20% between 2016 and 2017, to 632 t and was reached. The commercial fishery catch rate has declined in the last two years, but is just above average. Landings consisted almost equally of crabs with intermediate-shell carapace and recruits. The average size of crabs caught during commercial fishery is relatively stable and above the historical average.

The abundance index for adult males ≥ 95 mm from the post-season survey remained stable between 2016 and 2017. The post-season survey indicated that adolescent crabs ≥ 78 mm decreased to slightly below average, suggesting low recruitment in the short to medium term

The combined index of the commercial CPUE and the post-season survey number per unit effort (NUE) decreased by 5%, suggesting that the biomass available to the fishery will be lower in 2018 than in 2017.

Participants made a few comments:

- The presence of ice in 2017 seems to have affected fishing performance. Since ice occurs in several areas within the eastern Gulf, it was suggested that this factor be addressed in a more general summary on those areas. This information will colour the interpretation of the results. It was strongly recommended that tools for monitoring conditions in the field be put in place.
- Questions were raised about the impact of switching traps (replacing standard traps with Japanese traps) and about the method used to standardize the series. Although concerns were raised and industry would prefer to keep both trends, it was pointed out that standardization should make it possible to convert historical data without penalizing fishers working in the area.

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- Concern was expressed with respect to the reliability of NPUEs for crabs left by the fishery and recruits in the post-season survey. The reliability of the assessment of carapace condition (by an observer) was considered questionable. The same concerns about post-season survey sampling were raised in relation to Areas 16A and 12C.
 - According to industry representatives, since the exploitation level in this area remains moderate, it is difficult to identify the current phase of the cycle.

Summary and outlook: Area 15

Participants discussed the summary and scenarios presented:

- In the key point regarding the post-season survey, some participants recommended that recruitment not be mentioned given the uncertainty.
- It was agreed that the combined index was decreasing slightly.
- Some participants suggested mentioning in the preamble that the indices were nonetheless high.

The participants accepted the following scenarios:

The combined index suggests that the biomass available to the fishery will be slightly lower in 2018 than in 2017:

- 4) An increase of 10% could lead to a high harvesting intensity and decrease the biomass.
- 5) The status quo should maintain the biomass or limit the decline if recruitment is low.
- 6) A 10% decrease could maintain a higher residual biomass.

AREA 16A

Indicators: Area 16A

The TAC decreased by 10% between 2016 and 2017 to 459 t and was reached. The commercial catch rate decreased in 2017 and was below average at the lowest value since the beginning of this series. Landings consisted primarily of intermediate-shell crab. The average size of legal-size crab caught at sea has been decreasing since 2015 and was slightly above the historical average

The post-season survey indicates that the abundance of adult males ≥ 95 mm has been stable since 2016, but the value is slightly below the average. The number of adolescents per unit effort (NPUE) has increased slightly over the past three years to a value close to the historical average.

The combined index of commercial CPUE and NUE from the post-season survey has been decreasing since 2014, and the value was 15% lower in 2017 than in 2016; this suggests that the commercial biomass available to the fishery will be lower in 2018 than in 2017

In 2017, the exceptional presence of ice during the fishing season was reported, and may have caused a reduction of the CPUE in 2017.

Participants made a few comments:

- The same bias as in Area 15 with respect to crabs left by the fishery and recruits in the post-season survey was observed.
- The same comment was made regarding the presence of ice and its negative impact on fishing performance and on the post-season survey. In the text of the advisory report it

should be mentioned that the post-season survey was not conducted continuously, which is unusual. It would be interesting to examine the data from the period before the ice cover formed and afterward.

- A change in the distribution of crab was mentioned which appears to be related to the warming of deep waters in recent years.
- Even if the number of adolescent crabs ≥ 95 mm and adults ≥ 95 mm increased in 2017, it was agreed that the 2016 and 2017 values were record lows.

Summary and outlook: Area 16A

Participants commented briefly on the summary and scenarios presented:

- Discussion centred on how to take into account the effect of ice on the standardized CPUEs in the science advisory report. While some participants would like to see this factor modulate the values used in the scenarios, others felt that this effect would be taken into consideration when a scenario is selected at the advisory committee meeting.
- While the industry would like to see the status quo in the second scenario, DFO Science believes that it should be presented in the first scenario, which is the riskiest. The participants reached agreement by reformulating the preamble in order to emphasize the uncertainty associated with standardized CPUEs.

The participants agreed on the following scenarios:

The drop in the combined index suggests that 2018 catches should decrease compared to 2017, although the CPUE could underestimate the stock status because of the presence of ice:

- 1) The status quo could lead to a high harvesting intensity and cause a decrease in the biomass if the CPUE has not been underestimated.
- 2) A 10% decrease could stabilize the biomass available to the fishery.
- 3) A greater decrease would maintain a higher biomass over a longer period.

AREA 12C

Indicators: Area 12C

The TAC remained the same between 2016 and 2017, at 285 t, and was reached. The catch rate for the commercial fishery declined and fell below average. Landings consisted of a majority of intermediate-shell crab. The average size of crabs caught during the commercial fishery decreased between 2016 and 2017 and is close to the historical average.

The abundance index for adult males ≥ 95 mm in the post-season survey decreased in 2016 and 2017 owing to a decline in the residual biomass, which is currently well below the average level. The post-season survey indicates that recruitment to the fishery will be low in the short and medium term.

The combined index of commercial CPUE and NUE from the post-season survey decreased by 32% and was below average, suggesting that the biomass available to the fishery will be lower in 2018 than 2017.

In 2017, the exceptional presence of ice during the fishing season was reported, and may have caused a reduction of the CPUE in 2017.

A participant made the following comment:

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- It was noted that the same potential bias was present as in Areas 15 and 16A regarding crabs left by the fishery and recruits in the post-season survey.

Summary and outlook: Area 12C

Participants made some comments on the summary and scenarios presented:

- No comments were made concerning the summary.
- A brief discussion took place on the value to be used for the decrease in the middle scenario. A 20% decrease was agreed on finally in light of the disappointing indices.

The participants agreed on the following scenarios:

The drop in the combined index suggests that 2018 catches should decrease compared to 2017:

- 1) A decrease of 10% or less would lead to a high harvesting intensity and a decrease in the commercial biomass.
- 2) A 20% decrease would be unlikely to lead to an excessively high harvesting intensity and would mitigate the decrease in the commercial biomass.
- 3) A decrease of more than 20% could help maintain the biomass available to the fishery over a longer period of time.

AREA 14

Indicators: Area 14

The TAC decreased by 10% between 2016 and 2017 to 686 t and was reached. The standardized CPUE decreased sharply in 2017 but remains above the average. Landings consisted primarily of intermediate-shell crab, the proportion of recruits has been decreasing since 2013. The average size of crab caught during commercial fishing has been increasing since 2012 and is among the highest values since 1986.

The abundance index for adult males ≥ 95 mm in the post-season survey decreased to the average value of the historical series owing to a decline in the residual biomass and low recruitment. The post-season survey indicates a low abundance of adolescents ≥ 78 mm, suggesting a decrease in recruitment in the short to medium term.

The combined index of commercial CPUE and NUE in the post-season survey decreased (-33%). This indicator suggests that the biomass available to the fishery will be lower in 2018 than in 2017.

In 2017, the exceptional presence of ice during the fishing season was reported, and may have caused a reduction of the CPUE in 2017.

Participants made a few comments:

- No particular concerns were raised regarding the classification of crab in this area.
- The presence of ice would affect standardized CPUEs, with the effect being more pronounced in Areas 14 and 13.
- A problem with beach fleas which appear to affect the catchability associated with traps was reported. The assessment biologist would like to obtain more information in this regard.

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- It was agreed that there is a real decline in the resource in this area although the values were still high. The consistency between the fishery indices and those from the post-season survey was mentioned.

Summary and outlook: Area 14

Participants made some comments on the summary and scenarios presented:

- In the highlight related to the post-season survey, it should be noted that the decline is related to low recruitment, among other things.
- The participants accepted the scenarios as proposed.

The participants agreed on the following scenarios:

The drop in the combined index suggests that 2018 catches should decrease compared to 2017:

- 1) A decrease of 10% would lead to a high harvesting intensity.
- 2) A decrease of approximately 20% would be unlikely to lead to an excessively high harvesting intensity and would moderate the effect of expected low recruitment.
- 3) A decrease of more than 20% could help maintain a substantial biomass available to the fishery over a longer period of time.

AREA 13

Indicators: Area 13

The TAC increased by 20% to 406 t between 2016 and 2017, and it was reached. Fishing effort, which was significantly higher on the south side than on the north side of the area from 2009 to 2014, then almost divided equally between the two sides in 2015 and 2016, was more significant on the north side in 2017. The catch per unit effort (CPUE) of the commercial fishery decreased slightly in 2017, but is still high and well above the 1988 to 2016 average. Landings consisted primarily of intermediate-shell crab, the proportion of recruits is decreasing since 2015. The average size of legal-size crab caught at sea remained relatively stable since 2008, and the value of 2017 is slightly above average (1986-2016).

The post-season survey indicates a decrease of adult males ≥ 95 mm. The decline is much more pronounced on the southern part, where the NUE is much lower than average than on the northern part, where the NUE is still above average. The post-season survey suggests an increase of adolescents ≥ 78 mm on the northern part and a decrease on the southern part.

The combined index of commercial CPUE and NUE from the post-season surveys decreased by 42% but was still above the reference period average (2000 to 2012). This result suggests a decrease in the available biomass in 2018 compared with 2017.

Commercial fishing performance is consistent with the results of the 2016 trawl scientific survey conducted in Area 13, which forecasts a decline in recruitment for a few years. This survey also shows, for 2016, a very high abundance of crab less than 35 mm that should start recruiting to the fishery as of the early 2020s.

In 2017, the exceptional presence of ice during the fishing season was reported, and may have caused a reduction of the CPUE in 2017.

Participants made a few comments:

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- As mentioned in previous assessments, it would be useful to give full consideration to the north and south portions of the area to better judge their relative weight.
 - It is thought that the south side (Newfoundland) affects the performance of the combined index.
 - The strong increase in the number of adolescents in the 2017 post-season survey was questioned, as it seems inconsistent with trawl survey data. Additional data would help to better understand this situation.

Summary and outlook: Area 13

Participants discussed the summary and scenarios presented:

- With respect to the highlight regarding the post-season survey, it was recommended that the trend be determined by focusing on adults ≥ 95 mm, because this is the indicator used in calculating the combined index.
- In the highlights, participants suggested mentioning that a wave of recruitment should occur in four or five years according to the research survey.
- In the first scenario, the industry suggested maintaining the status quo because the CPUE is still high. DFO Science representatives also agreed that this area is not fully exploited.

The participants agreed on the following scenarios:

This stock was reopened to fishing in 2008, following a moratorium from 2003 to 2007, and the TAC is still at a historically low and cautious level. Constraints on the spatial distribution of the commercial fishing effort may have negatively affected the CPUE:

- 1) The status quo would lead to a high harvesting intensity and increase the effect of expected low recruitment.
- 2) A decrease of approximately 10% would be unlikely to lead to an excessively high harvesting intensity and would moderate the effect of expected low recruitment.
- 3) A decrease of 20% or more could help maintain a substantial biomass available to the fishery over a longer period of time.

AREA 12B

Indicators: Area 12B

The TAC decreased by 44% between 2016 and 2017, to 175 t. Landings were only 58 t and the TAC was not reached. The area was abandoned by several fishers, for various reasons, and fishing effort was low, which could partly explain why the TAC was not reached. In 2017, the standardized CPUE decreased sharply (-57%) to, by far, the lowest value in the 1995–2017 series. Landings consisted primarily of intermediate-shell crabs. The average size of crabs caught in the commercial fishery has been decreasing for the last five years and is well below average.

The lack of a post-season survey in 2017 creates uncertainty with regard to future stock prospects.

A marked decrease in the preferred habitat of snow crab in Area 12B has been observed in recent years, which could have affected snow crab productivity and abundance.

Participants made a few comments:

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- According to industry representatives, the difference between the TAC and landings is attributable to fishers moving to other areas. Socio-economic factors could also explain the failure to reach the TAC. This area appears to be one of the most affected by warming and therefore by the loss of preferred habitat for snow crab.
 - The presence of northern stone crab was also mentioned.
 - Strong currents would also affect catchability.
 - Concerns were raised about the future of the resource in this area. It is hard to predict what is going to happen, but the outlook is bleak.

Summary and outlook: Area 12B

The presentation of the summary generated some comments:

- It was suggested that the socio-economic circumstances that may explain the failure to reach the TAC be mentioned in one of the key points.
- It was agreed that the available indices were not very optimistic and that they point to a decrease in the TAC. However, given the high uncertainty associated with the socio-economic circumstances and the lack of a post-season survey in 2017, it is difficult to develop scenarios for this area.
- It was indicated that the TAC should remain at a level that justifies the participation of fishers, so that data can be collected and the status of the resource can be monitored.
- There is a real need for co-ordination between Industry and Management.

The following recommendations are formulated by the assembly:

The fact that the TAC was not reached, the sharp decline in the catch rate, and the decline in crab size suggest that stock status continues to deteriorate. Because of the limited amount of data and the high degree of uncertainty regarding the status of the biomass for this area, it is impossible to make specific recommendations.

It is recommended to set the harvest level at the lowest possible level that can allow monitoring of the area, following consultation between industry and fisheries management.

APPENDIX 1 – TERMS OF REFERENCE

Assessment of the Estuary and northern Gulf of St. Lawrence Snow Crab stocks

Regional Peer Review - Quebec Region

February 13-14, 2018

Mont-Joli, Québec

Chairperson: Denis Chabot

Context

The snow crab fishery in the Estuary and the northern Gulf of St. Lawrence began in the late 1960s. Landings have varied depending on the adjusted Total Allowable Catches (TACs) based on the recruitment waves and troughs. In 2016, landings have totaled 9,167 t, up by 7% from 2015.

The Estuary and northern Gulf of St. Lawrence are divided into nine management areas (13 to 17, 16A, 12A, 12B and 12C). The effort is controlled by a fishing season as well as a limited number of licences and traps and catches are limited by quotas. The legal size is 95 mm.

The resource is assessed each year to determine whether changes that have occurred in the stock status necessitate adjustments to the conservation approach and management plan.

Objectives

Provide scientific advice to determine TACs for the snow crab stocks in the Estuary and northern Gulf of St. Lawrence: management units 13 to 17, 16A, 12A, 12B and 12C for the 2018 fishing season. The advice shall include:

- Description of the biology of the snow crab in the Estuary and northern Gulf of St. Lawrence;
- Description of the fishery including landings, fishing effort, carapace condition, size structure and mean carapace width for males;
- Analysis of catches per unit effort from the fishery;
- Analysis of data from post-season trap surveys conducted annually in collaboration with fishers. Indicators: number per unit of effort (NPUE) of legal-size and sub-legal-size crabs, mean carapace width for males and spermatheca load;
- Analysis of data from trawl survey(s) conducted annually in certain sectors or areas. Indicators: abundance index of legal-size and sub-legal-size males, size structure and maturity of both males and females;
- Identification and prioritization of research projects to be considered for the future;
- Perspectives and/or recommendations on management measures in effect for the 2018 fishing season, among others, harvest levels and their possible effects on the abundance and maintenance of the reproductive potential, based on a summary table of main indicators for the precautionary approach and short- and medium-term predictions.

Expected Publications

- Science Advisory Report on snow crab of the Estuary and Northern Gulf of St. Lawrence;
- CSAS Proceedings summarizing the discussion.

Participation

- Fisheries and Oceans Canada (DFO) (Science, and Ecosystems and Fisheries Management sectors)

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- Fishing industry
 - Provincial representatives
 - Aboriginal Communities / Organizations

APPENDIX 2- LIST OF PARTICIPANTS

Name	Affiliation	February13	February 14
Belley, Rénaud	DFO Science		X
Blais, Rosaire	Fisher Area 16	X	
Boucher, Jean-René (tel)	RPPNG	X	
Bourassa, Luc	Consultant	X	X
Bourdages, Hugo	DFO Science	X	X
Bourdages, Yan	Fisher Area 12B		X
Briand, Yann	Fisher	X	
Brosset, Pablo	DFO Science	X	
Brulotte, Sylvie	DFO Science	X	
Bruneau, Benoît	DFO Science	X	X
Cantin, Guy	DFO Science		X
Castonguay, Martin	DFO Science	X	
Chavez, Maité	DFO Fisheries Management	X	X
Chevalier, Jody	Fisher	X	X
Collier, Frank (tel)	LNSFA		X
Couillard, Catherine	DFO Science		X
Corriveau, Julie	DFO Science	X	
Côté, Francis	Fisher	X	
Chabot, Denis	DFO Science	X	X
Dallaire, Jean-Paul	DFO Science	X	X
de Lafontaine, Yves	DFO Science	X	X
Desgagnés, Mathieu	DFO Science	X	X
Dion, Marie-Josée	Fisher	X	
Doucet, Marc	Fisher Area 17	X	
Dubé, Sonia	DFO Science	X	X
Duguay, Guy	Fisher		X
Duplisea, Daniel	DFO Science	X	
Dupuis, Mario (tel)	Fisher	X	
Ellefsen, Hans Frederic	DFO Science	X	
Gauthier, Pierre	DFO Science	X	X
Gauthier, Sylvain	Fisher Area 16	X	
Gionet, Paolo	Fisher Area 16	X	
Girard, Mathieu	Fisher Area 12B	X	X
Gosselin, Claude	Fisher Area 17		
Hobbs, Jeffrey (tel)	Fisher		X
Jerome, Adam	AGHAMM	X	X
Joncas, Jean-Richard	Fisher Area 13	X	X
Juillet, Cédric	DFO Science	X	X
Labbé-Giguère, Stéphanie	DFO Science	X	X
Labrie, Luc	Fisher Area 17	X	
Lambert, Jean	DFO Science	X	X
Lambert, Yvan	DFO Science	X	X
Landry René	Fisher Area 17	X	
Léonard, Pierre	Essipit First Nation	X	
Monger, Marc	Fisher	X	X
Morin, Mathieu	DFO Fisheries Management	X	X

Name	Affiliation	February13	February 14
Morneau, Renée	DFO Science	X	X
Nadeau, Paul	LNSFA	X	X
Pinette, Majoric	Pessimit First Nation	X	
Poirier, Serge	Fisher Area 16	X	
Ransom, Glen (tel)	Fisher		X
Roy, Virginie	DFO Science	X	
Rowsell, Austin (tel)	Fisher		X
Sainte-Marie, Bernard	DFO Science	X	X
Senay, Caroline	DFO Science	X	
Smith, Andrew	DFO Science	X	
Stubbert, Curtis	Fisher Area 15	X	X
Tessier-Bolduc, Claude	DFO Science	X	
Thibeault, Sébastien	Fisher	X	
Vallée, Simon	Fisher	X	
Van Beveren, Elisabeth	DFO Science	X	
Vigneault, Guy	Pêcheries Shipek	X	