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

February 11–12, 2020
Mont-Joli, Quebec

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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 outlines the proceedings of the regional peer review meeting on the assessment of the Estuary and northern Gulf of St. Lawrence snow crab stocks. This meeting, which was held on February 11–12, 2020, at the Maurice Lamontagne Institute in Mont-Joli, brought together more than 60 participants from science, industry and management. These proceedings detail the essential parts of the presentations and discussions held during the meeting, as well as the recommendations and conclusions made.

INTRODUCTION

The Quebec Region of Fisheries and Oceans Canada (DFO) is responsible for assessing several stocks of fish and invertebrate species harvested in the Estuary and Gulf of St. Lawrence. Most of these stocks are periodically assessed as part of a regional advisory process that is conducted at the Maurice Lamontagne Institute in Mont-Joli. This document outlines the proceedings of the meeting on the assessment of the Estuary and northern Gulf of St. Lawrence snow crab stocks held on February 11–12, 2020.

The objective of the meeting was to determine whether there were any changes in the resource's status and whether management plans need to be adjusted based on the chosen conservation approach, with the ultimate goal being to provide a science advisory report on the management of Estuary and northern Gulf of St. Lawrence snow crab stocks for the 2020 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 peer review meeting 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 meeting (Appendices 1 and 2). The proceedings also list the recommendations made by the meeting participants.

CONTEXT

The meeting chair, Mr. Denis Chabot reviewed the objectives, the meeting rules and agenda of the peer review meeting. The participants introduced themselves. Stock assessment biologist Cédric Juillet presented the terms of reference and noted the contributions made by his collaborators. He provided a general overview of landings on the Atlantic coast and by fishing area (17, 16, 12A, 12B, 15, 16A, 12C, 14, 13). In 2019, landings totalled 6,386 t, a decrease of about 25.6% compared with 2018.

The conservation principle that applies to these areas seeks to protect reproductive potential. Management measures include limits imposed on catches via a Total Allowable Catch (TAC), effort controls (number of traps, number of licences and fishing season), and a minimum legal carapace size set at 95 mm. In addition, an area's fishery is closed when catches in it 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 of effort (CPUE), post-season number per unit of effort (NPUE), combined CPUE and NPUE index, carapace condition at landing, the relative abundance of adult crab left by the fishery, new adult crab (recruits) and adolescents in post-season surveys, distribution of fishing effort, long-term recruitment (trawl surveys), size frequencies and spermatheca load.

Mr. Juillet then provided a brief overview of the various carapace conditions and crab categories mentioned during the meeting. Categories 1 and 2 are recruits, and categories 3 to 5 are crabs left by the fishery. Mr. Juillet explained the CPUE standardization method (since 2009), as well as the approach to determine the combined index based on the average of the two commercial biomass indices (standardized commercial CPUE and NPUE of adults ≥ 95 mm in the post-season survey).

Mr. Juillet provided additional information about how the outlooks were developed using the method validated by peers the previous year. These include three possible harvesting scenarios (high, intermediate, low) for each area. These are based on the results of the combined index analysis and modulated as necessary on the basis of related indicators of stock health and population dynamics of the species, with the objective of sustainable management of the resource.

Before going into the details of the assessment, area by area, certain environmental considerations were introduced, including seafloor temperature conditions in 2019. A warming of the Gulf of St. Lawrence deep waters has been observed since 2012. A favourable habitat index by area, based on the snow crab's thermal preferences (large crabs: -1 to 3°C; small crabs: 0 to 2°C), was briefly presented. In 2019, an overall trend of erosion of the favourable thermal habitat was observed for large crab in fishing areas 17, 16, 12A, 12B and 12C and for small crab in areas 16, 17 and 12A. Vulnerability and resilience to warming of the different life stages (larvae, juvenile, adult) were also examined. Furthermore, it was noted that snow crab is a species that is very tolerant to hypoxia and that its mobility allows it to avoid very hypoxic areas.

RESOURCE ASSESSMENT

Mr. Juillet reviewed the key indicators for each fishing area. He then presented an overview of the area, along with wording for three possible scenarios (high, intermediate, low) for harvesting in 2020. Participants asked questions and made comments. As part of this meeting, participants have to agree on the scenarios, but the preferred option will be discussed at the Advisory Committee meeting.

AREA 17

Review of indicators: Area 17

The TAC increased by 15% to 2,230 t from 2018 to 2019, and it was not reached. Landings totalled 1,702 t in 2019. The commercial fishery CPUE decreased significantly from 2018 to 2019 (-41%). It is below the historical average of the time series, at a value comparable to the lowest values observed over the last 25 years. Landings were mostly made up of recruits, a slight decrease between 2018 and 2019 in the proportion of recruits in favour of more advanced-shell crabs.

After a sharp decrease in 2018, the commercial abundance index from the post-season survey declined again in 2019 and remained below the mean. The values recorded on the north and south shores in 2019 showed a sharp drop in relation to the most recent increases, which date back to 2017. The abundance of adolescents with a carapace width (CW) of 78–95 mm in the post-season survey decreased between 2018 and 2019, and was below the mean. For adolescents ≥ 95 mm, however, the trend differed between the two shores, with a slightly higher value observed on the north side and a slightly lower value on the south side. The 2019 values were below the historical mean for each shore and for the two shores combined.

The scientific trawl survey conducted in 2019 indicates low recruitment in 2020 for both shores, with high commercial adult abundance values recorded since 2017. Owing to external constraints, however, the survey on the north shore could not be completed (48 out of 68 stations were covered).

Although the mean weight of the spermathecal load of primiparous females was among the highest ever recorded in the scientific trawl surveys on both shores, the abundance of spawning

females declined sharply in the 2017 and 2019 surveys on the north shore and in the 2019 survey on the south shore, reaching some of the lowest values in the series for both shores.

The combined index for both shores is down 30% from the 2018 value, to the lowest value since the beginning of the time series in 2000. This sharp decline suggests that the biomass available to the fishery will be even lower in 2020 than in 2019.

Participants made a few comments:

- The sharp decrease in the NPUE from the post-season survey on the north shore in 2018 may be related to the abundant presence of capelin (as observed during the trawl survey), which may have resulted in low attraction to traps. Participants therefore suggested that the 2018 value be considered uncertain.
- Participants found the presentation of the data as a density plume interesting, as it illustrates the small crabs that are entering the system and that could be recruited to the fishery in the coming years.
- Strong recruitment to the fishery is not expected in the coming years, although industry members reported seeing a large number of white crab at the end of the fishing season in 2019. However, this observation could not be confirmed based on the post-season survey data.
- The participants noted a discrepancy in 2019 in the abundance of adults ≥ 95 mm from the trawl survey in relation to other data sources (fishery and post-season).

Summary and outlook: Area 17

Participants discussed the summary and scenarios presented:

- In the key point on the trawl survey, it was suggested that the abundance of adults ≥ 95 mm recorded since 2017 be discussed in addition to the expected low recruitment on both shores in 2020. Participants felt it was important to point out that the 2019 survey was incomplete (48 out of 68 sites covered) and therefore possibly not representative of the north side in 2019.
- For the key point dealing with the mean weight of the spermathecal load, participants added that the abundance of spawning females was at an all-time low.
- With regard to the key point on the combined index, the participants felt it was unnecessary to specify the composition of this index. They agreed that this comment could be included in the preamble.
- As regards the wording used in the scenarios, the participants decided to apply the decrease to total landings in 2019, as decided in the peer review of inputs. This approach is all the more appropriate when the TAC has not been reached. However, some industry participants would be more comfortable with wording that is based on TACs. It was noted that the work related to the precautionary approach would eventually lead to a better framework for the procedure.
- Some industry members felt that the proposed decreases were too severe (-30%, -35%, -40%). However, other participants felt that the current stock status justified those levels. All the indicators point to the need for caution.

Therefore, the participants recommended the following scenarios:

A second consecutive year of sharp decline in the combined index, coupled with a failure to reach the TAC and lower anticipated recruitment in the short and medium term, suggest a sharp decline in removal in 2020.

1) *High scenario: A 25% decrease applied to 2019 total landings.*
2) *Intermediate scenario: A 30% decrease applied to 2019 total landings.*
3) *Low scenario: A 35% decrease applied to 2019 total landings.*

AREA 16

Review of indicators: Area 16

The Total Allowable Catch (TAC) of 3,101 t in 2019, down 15% from 2018, was reached. The commercial fishery catch rate has been declining sharply since the high CPUE values recorded in 2013–2015. The catch rate was at the lowest level observed in 30 years and below the historical mean. Landings consisted primarily of recruits, with a slightly lower percentage of intermediate-shell crab.

With the exception of 2015, the commercial abundance index from the post-season survey has been declining since 2013, when the highest value in the series was recorded. The 2019 index is the lowest value observed since 2002.

The combined index decreased by 28% relative to 2018, to the lowest value in the time series which began in 1995. This value indicates that the biomass available to the fishery in 2020 should be lower than in 2019, and among the lowest ever.

Monitoring of the snow crab population in Sainte-Marguerite Bay indicates that recruitment of legal size crab there will be low in 2020 and should begin to increase in 2022.

Participants provided a few comments:

- They requested clarification on how standardization takes trap diversity into account.
- They expressed reservations about the mean carapace width obtained at sea in the commercial fishery, given the low at-sea observer coverage.
- The trawl survey in Sainte-Marguerite Bay showed that more males had reached legal size since 2004–2005, possibly owing to the warming of waters. However, if fewer sub-legal-size males are left in the water, this could affect reproductive potential.
- The extrapolation of results from the Sainte-Marguerite Bay trawl survey to all of Area 16 was discussed.

Summary and outlook: Area 16

The participants discussed the summary and the scenarios presented:

- In the key point on landings, it was suggested that the second sentence be removed because it could create confusion.
- With respect to the key point on adolescents with a CW of 78 to 95 mm and those ≥ 95 mm, questions were raised about how the trends should be interpreted and about the usefulness of this information. It was decided to exclude this point because it does not provide any information on stock status.
- It was decided to include a key point on the thermal habitat indices in a general summary rather than in each area summary.

The scenarios proposed on the basis of the combined index, and accepted by the participants, are described below.

A second consecutive year of sharp declines in the combined index (22% in 2018 and 28% in 2019), in a context where recruitment to the fishery is expected to decline in 2020, suggests that the TAC needs to be sharply reduced in 2020.

1) *High scenario: A 25% decrease applied to 2019 total landings.*
2) *Intermediate scenario: A 30% decrease applied to 2019 total landings.*
3) *Low scenario: A more than 30% decrease applied to 2019 total landings.*

AREA 12B

Review of indicators: Area 12B

For socio-economic reasons and in order to allow monitoring of yields in the area, the TAC was set at 125 t in 2018 and 2019. Fishing effort was low in 2019, with landings of 30 t. As of 2016, the commercial fishery catch rate has been at the lowest level observed since 1995.

The average size of legal crabs caught in the commercial fishery was similar to that observed in 2017 and 2018 and is above the historical average. Landings consisted primarily of intermediate-shell crabs.

The commercial abundance index from the post-season survey has been declining since 2013, and is now close to zero.

Participants made a few comments:

- It was mentioned that the Figure on shell condition at dockside seems to reflect mainly a harvest strategy.
- In the key point on average crab size, it should be explained that these are legal size crab, and this should be specified on the Figure. This clarification should be provided for all areas.
- It was noted that a post-season survey was conducted in 2019 after a two-year hiatus.
- It was pointed out that areas 12A, B, and C represent overflow areas, not production areas.

Summary and outlook: Area 12B

Participants made a few comments:

- A lengthy discussion was held on how to formulate the first key point so as to put the situation in Area 12B into context, while simplifying the information presented.
- Some participants suggested that a reminder be issued about this being an overflow area, in order to put the current situation into perspective, at least in the science advisory report.
- Some industry members felt that the TAC should remain at a level that justifies the participation of fishers, in order to allow data to be collected and the status of the resource to be monitored, especially in the face of uncertainty about the future of the resource in this area.
- According to the participants, the conclusion should highlight the fact that all indices are in agreement and that the short-term outlook is not very encouraging. The current biomass may not be able to support a commercial fishery.

The participants drew the following conclusions:

The non-attainment of the TAC, low catch rates, the small size of the snow crab and the low recruitment suggest that stock status did not improve in 2019. The short-term outlook is not favourable.

According to all the indicators available in 2019, the biomass is very low and might not be able to support a commercial fishery.

AREA 12A

Review of indicators: Area 12A

In 2019, the TAC was the same as in 2018 (105.5 t), and was not reached (80.5 t). Some licences remained inactive. In addition, in 2019 the commercial fishery catch per unit effort (CPUE) was similar to the values observed in the two previous years, and was among the lowest on record. Landings consisted primarily of intermediate-shell crab.

The post-season survey was not conducted in 2019 and the combined index was not calculated. All abundance indices derived from the 2018 post-season survey were declining or stable and were among the lowest values in the historical series.

In 2018 the combined index reached the lowest value in the time series that began in 2000.

Participants made a few comments:

- Some participants pointed out that the TAC was not reached for socio-economic reasons, and that this does not reflect a scarcity of the resource.
- Reservations were expressed about the carapace width data, given the low observer coverage.
- A change in the distribution of snow crab and a decrease in the efficiency of deeper traps were mentioned.

Summary and outlook: Area 12A

Participants made comments about the summary and agreed on the scenarios:

- In the first key point, it was mentioned that the 2019 TAC, which was the same as the year before, was not reached. Some participants felt that it should be noted that some licences remained inactive. Others suggested that it be mentioned that the non-attainment of the TAC was linked to unfavourable socio-economic circumstances.
- The decision was made to remove the key point concerning the average size of the crabs caught, given the uncertainty surrounding this parameter and the low coverage.
- It should be mentioned in a key point that the post-season survey could not be conducted in 2019 and that the combined index could therefore not be calculated.
- It was agreed that the CPUE values were among the lowest recorded, but had been stable for the past three years. In view of this situation and in the absence of a post-season survey in 2019, it was necessary to exercise caution. In addition, this is an overflow area which is associated with areas of low abundance. Therefore, a consistent approach is required for these areas (e.g. areas 17 and 12), although some felt that the situation in Area 12A was different in view of the unfavourable socio-economic circumstances.

The participants agreed on the following scenarios, which were established in the absence of the combined index:

Historically low commercial fishing yields, along with uncertainty due to the lack of a post-season survey, suggest that removals should be reduced in 2020.

1) *High scenario: The same total landings in 2020 as in 2019.*
2) *Intermediate scenario: A 10% decrease applied to 2019 total landings.*
3) *Low scenario: A more than 10% decrease applied to 2019 total landings.*

AREA 15

Review of indicators: Area 15

The TAC decreased by 30% to 442 t and was almost reached (413 t or 93%). The commercial fishery catch rate declined for the fourth consecutive year and in 2019 was among the lowest in the time series. The average size of legal crabs observed at sea during the commercial fishery has been fairly stable for 13 years and is among the highest values on record. In 2019 landings consisted primarily of intermediate-shell crab and there was a decrease in recruits.

The commercial abundance index from the post-season survey decreased between 2017 and 2019. The abundance of adolescents ≥ 78 mm was relatively stable in the survey between 2018 and 2019.

The combined index was down 41% from the 2018 value, marking the fourth consecutive annual decline. This decline in the index suggests that the biomass available to the fishery will be lower in 2020 than in 2019.

Participants made a few comments:

- In comparison with the situation in several other areas, there has been an improvement in the favourable thermal habitat for small crabs.
- It should be kept in mind that the experimental trap provides useful information for predictions.
- Although a protocol to replace the traps used in the post-season survey with larger traps was implemented between 2014 and 2017, the difficulty of obtaining a valid correction factor for the two types of traps used was mentioned. Participants were in agreement concerning the trend of the survey results.
- It was agreed that the combined index had some shortcomings. It should be kept in mind that research on the precautionary approach is under development, which in general would change the approach for issuing a science advisory report.

Summary and outlook: Area 15

The participants discussed the summary and the wording of the scenarios:

- According to some participants, it is important to consider the historical context and not just the combined index when proposing scenarios.
- Questions were raised about the usual application of the combined index as an intermediate scenario. Some participants felt that this index should not be applied in the way it is in Area 15. However, since this rule has been used in the past, the use of a different approach needs to be justified. This would be done in the preamble to the scenarios.
- The key point about the average size of the crabs caught was retained because it is useful in this case.

- All the discussions highlighted the need to review the procedure for issuing a science advisory report.

The participants agreed on the following scenarios:

A fourth decline in the combined index in a context where recruitment to the fishery is expected to remain low in the short term suggests that removals should be reduced in 2020. However, the carapace width of legal males in the commercial fishery remains high and stable, suggesting that the reduction in removals may be lower than the observed decrease in the combined index.

1) *High scenario: A 25% decrease applied to 2019 total landings.*
2) *Intermediate scenario: A 35% decrease applied to 2019 total landings.*
3) *Low scenario: A more than 35% decrease applied to 2019 total landings.*

AREA 16A

Review of indicators: Area 16A

The TAC, which was decreased by 24.9% in 2019, to 310 t, was reached. The commercial fishery catch rate decreased for the fifth year in a row. The 2019 catch rate was the lowest since the series began in 2004. As in 2018, landings consisted primarily of recruits in 2019.

The commercial abundance index from the trap survey declined between 2014 and 2019, with a slight decrease in 2019. Although low, the abundance of adolescents 78–95 mm in the post-season survey increased for the fifth consecutive year, whereas the abundance of adolescents with a ≥ 95 mm remained stable during the same period.

The combined index declined for the fifth consecutive year (-12% from 2018 to 2019). This decline in the index suggests that the biomass available to the fishery in 2020 will be lower than in 2019.

Participants made a few comments:

- In comparison with the situation in several other areas, there was a slight improvement in the favourable thermal habitat for small crabs.
- It is noted that landings do not correspond to the trend in the indicators. This may be related to the establishment of a TAC when the area was opened.
- Participants noted the presence of adolescents 78–95 mm, which they found encouraging.
- Trends very similar to those observed in Area 16 were noted.
- Questions were raised about simple methods that could be used to align the two series (small and large traps). The option chosen for the present review was to keep both series, but participants felt that it would be more useful to align the series. To this end, it would be useful to examine the fishing yields of large and small traps.

Summary and outlook: Area 16A

Participants commented on the summary and the proposed scenarios:

- In the key point regarding the commercial abundance index from the trap survey, a decline was observed between 2014 and 2019, with a less marked decline in 2019.

- In the preamble to the scenarios, it was agreed that the combined index has been declining since 2014, which suggests the need to reduce removals in 2020. According to the participants, recruitment should remain stable in the short term.
- It should be noted that the presence of sub-legal adolescents remains a positive point.

Following discussion, the participants agreed on the following scenarios:

The decline in the combined index since 2014 suggests that removals should be reduced in 2020. However, recruitment is expected to remain stable in the short term.

1) *High scenario: A 5% decrease applied to 2019 total landings.*
2) *Intermediate scenario: A 12% decrease applied to 2019 total landings.*
3) *Low scenario: A more than 12% decrease applied to 2019 total landings.*

AREA 12C

Review of indicators: Area 12C

The TAC, which decreased by 25.1%, to 192 t, was not reached (landings totalled 149.5 t). Some licences were inactive in 2019. The commercial fishery catch rate decreased for the third consecutive year, and the 2019 value was the lowest in the time series. Landings consisted primarily of intermediate-shell crab.

The commercial abundance index from the post-season survey has decreased sharply over the past five years. The abundance of adolescents ≥ 78 mm remained low and fairly stable in the post-season survey between 2014 and 2019, which indicates that there will be no increase in recruitment to the fishery in 2020.

The combined index decreased for the fifth consecutive year, with a 39% decline from 2018 to 2019. This decline in the index suggests that the biomass available to the fishery in 2020 will be lower than in 2019.

No comments were made.

Summary and outlook: Area 12C

Participants discussed the summary and the proposed scenarios:

- As regards the key point on the TAC, it was pointed out that there were socio-economic reasons for the non-attainment of the TAC. It should be noted that some licences remained inactive in 2019.
- It was agreed that the stock in this area was in very poor condition. However, some participants felt that the proposed decreases were too severe (-35%, -40%, more than -40%). It was suggested that the decrease in the high scenario be set at -30% taking into account the inactive licences.
- Some industry members pointed out that if removals are reduced too severely, there is a risk of losing some players.

The participants agreed on the wording of the scenarios:

The 39% drop in the combined index, during a period of low but stable recruitment, suggests that removals should be greatly reduced in 2020.

1) *High scenario: A 30% decrease applied to 2019 total landings.*

2) *Intermediate scenario: A 40% decrease applied to 2019 total landings.*

3) *Low scenario: A more than 40% decrease applied to 2019 total landings.*

AREA 14

Review of indicators: Area 14

In 2019 the TAC decreased by 25% to 463 t. It was almost reached (439 t or 95%). The commercial fishery catch rate declined sharply for the third consecutive year and in 2019 reached its lowest level since 1991. Landings consisted primarily of intermediate-shell crab in 2019.

The commercial abundance index from the post-season survey increased slightly between 2018 and 2019, but was among the lowest values in the time series. The abundance of adolescents ≥ 78 mm has remained low and fairly stable in the scientific post-season and trawl surveys over the past five years, which suggests that recruitment to the fishery will not increase in 2020.

The combined index for this area decreased by 11% from 2018 to 2019, which suggests that the biomass available to the fishery will be lower in 2020 than in 2019.

Some comments were made:

- It is interesting to note an upward trend in the favourable thermal habitat for small and large crabs in this area.
- According to the participants, the data presented (e.g. primiparous, males 40–6 2 mm CW) point to recruitment to the fishery in the medium term (around 2024), but not in the short term.

Summary and outlook: Area 14

The participants discussed the summary and the wording of the scenarios:

- In the summary, it would be relevant to refer to the data from the trawl survey, particularly with regard to the abundance of adolescents ≥ 78 mm. The participants agreed that their abundance has remained low and fairly stable, suggesting that recruitment to the fishery will not increase in 2020.
- There were no comments on the proposed scenarios.

The participants quickly agreed on the following scenarios:

A decrease in the combined index (-11%) with no indication that recruitment will improve in the short term suggests that removals should be reduced in 2020.

1) *High scenario: A 5% decrease applied to 2019 total landings.*

2) *Intermediate scenario: A 10% decrease applied to 2019 total landings.*

3) *Low scenario: A more than 10% decrease applied to 2019 total landings.*

AREA 13

Review of indicators: Area 13

The TAC was decreased by 25%, to 304.5 t, and was reached.

After a number of years of relatively high values, the commercial fishery catch rate declined sharply between 2017 and 2019, reaching one of the lowest values on record. The average size of legal-size crabs measured at sea during the commercial fishery declined over the last three years, falling below the historical average in 2019. Landings consisted primarily of intermediate-shell crab in 2019.

The commercial abundance index from the post-season survey on the north side of the area was comparable for 2018 and 2019 and close to the historical average. The 2019 value for the south side was down from the previous year and remained among the lowest values in the historical series. In the northern part of the area, the abundance of adolescents ≥ 78 mm in the post-season survey was above the historical average, while in the south it was below the historical average.

A high abundance of 40–62 mm male crabs in the 2018 trawl survey points to recruitment to the fishery in the medium term. In 2018, the abundance of primiparous females reached the highest level recorded since 1994 in the same survey, while the average weight of spermatheca content (load) in primiparous females in 2018 (trawl survey) and 2019 (post-season survey) was among the lowest values observed since data collection began in 2003.

The combined index decreased by 15% from 2018 to 2019 and was among the lowest values in the time series. The biomass available to the fishery in 2020 is expected to be lower than in 2019.

Participants made a number of comments:

- It was recommended that the catch distribution figures in the post-season survey be revised to provide clearer information. All suggestions for improving figures and charts were welcomed.
- Some participants mentioned the need to pay attention to the scales in the NPUE Figures (post-season survey) so as to better gauge variations.
- A review of how the post-season survey is conducted in Area 13, namely how traps are set in the water, seems in order. It appears that the instructions are interpreted differently between the north and south shores. Reservations were expressed about the results of this survey given the different way the traps are set.
- As suggested in previous assessments, the abundance indices were presented by region (north versus south) to get a better idea of what is happening on each side.
- Some participants noted a decrease in the size of the crabs. It was recommended that the possibility of a link between this decrease and the distribution of catches (north versus south) be examined.
- It was pointed out that the majority of commercial catches have been made on the north side in recent years.
- Participants noted that the presence of a large number of primiparous females, but a small number of large males, could explain the low spermathecal loads.
- Participants discussed the weighting method used for the combined index (north versus south).
- The importance of taking a closer look at the yields of large and small traps in order to align the two series was reiterated.

Summary and outlook: Area 13

Participants discussed the summary and the scenarios to be recommended:

- It was requested that the key point on the average size of crabs be removed since the observed decrease may be a reflection of catch distribution.
- With regard to the abundance of adolescents ≥ 78 mm, it was noted that above average values were recorded on the north side and below average values on the south side.
- In the key point on recruitment to the fishery, the high abundance of 40–62 mm males (trawl) was considered to be indicative of medium-term recruitment.
- As regards the key point on the average weight of spermathecal load in primiparous females, it was agreed that this value is among the lowest recorded since data collection began in 2003.
- With respect to the proposed scenarios (-10%, -15%, -15%), several participants felt that more severe reductions should be recommended, particularly to make up for lost time.
- It was decided to bring the high scenario into line with the combined index (-15%), and to specify in the preamble the rationale for this change in approach (decrease in the size of legal crabs, low spermathecal load, low short-term recruitment).
- Some industry members found this decision to be unjustified, leading to a weaker consensus for this area.

Therefore, the participants recommended the following scenarios:

The decline in the combined index (-15%) in 2019, coupled with a decrease in the size of legal crabs in the commercial fishery and low spermathecal loads in primiparous females, at a time when short-term recruitment is expected to remain low, points to the need to reduce removals in 2020. Taking into account the negative indices, the 2019 value of the combined index was used as the basis for the high scenario.

1) *High scenario*: A 15% decrease applied to total landings from 2019.

2) *Intermediate scenario*: A 25% decrease applied to total landings from 2019.

3) *Low scenario*: A decrease of over 25% applied to total landings from 2019.

RESEARCH IDENTIFICATION AND PRIORITIZATION

With respect to research priorities, brief reference was made to the following issues:

- Examination of the catchability of small and large traps;
- Development of a precautionary approach;
- Continuation of the capture-mark-recapture in the northern Gulf of St. Lawrence.

APPENDIX 1 – TERMS OF REFERENCE

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

Regional Peer Review – Quebec Region

February 11-12, 2020
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 2018, landings have totaled 8,502 t, up by 2% from 2017.

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 2020 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 and changes in size structure over time;
- 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, changes in size structure over time and spermatheca load when available;
- 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, changes in size structure over time 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 2020 fishing season, among others, harvest levels and their possible effects on the abundance and maintenance of the reproductive potential, based on a combined indicator (CPUE and NPUE) and 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.

Expected Participation

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

- Provincial representatives
- Aboriginal Communities / Organizations

APPENDIX 2 – LIST OF PARTICIPANTS

Name	Affiliation	February 11	February 12
Belley, Rénald	DFO – Science	x	-
Benoît, Hugues	DFO – Science	x	x
Bermingham, Tom	DFO – Science	x	-
Blais, Rosaire	Fisher Area 16	x	-
Boucher, Jean-René	RPPNG-OPCNZ Area 16	x	-
Boucher, Larry	Fisher Area 16	x	-
Boudreau, Mathieu	DFO – Science	x	-
Bourassa, Luc	Consultant	x	x
Bourdages, Hugo	DFO -–Science	x	x
Bourdages, Yan	Fisher Area 12B	x	-
Brassard, Claude	DFO – Science	x	x
Brulotte, Sylvie	DFO – Science	x	-
Bruneau, Benoit	DFO – Science	x	x
Chabot, Denis	DFO – Science	x	x
Collier, Frank (tel)	APBCN – LNSFA	-	x
Couillard, Catherine	DFO – Science	x	x
Cyr, Charley	DFO – Science	x	x
Desgagnés, Mathieu	DFO – Science	x	x
Desjardins, Christine	DFO – Science	x	x
Doucet, Marc	Fisher Area 17	x	-
Dubé, Carmel	Fisher Area 12A	x	x
Dubé, Sonia	DFO – Science	x	x
Gauthier, Pierre	DFO – Science	x	-
Gauthier, Sylvain	Fisher Area 16	x	-
Girard, Mathieu	Fisher Area 12B	x	-
Gionet, Paolo	Office des pêcheurs de la CN Area 16	x	-
Gosselin, Claude	Fisher Area 17	x	-
Huard, Georges	Fisher Area 17	x	-
Jenniss, Pierre	Fisher Area 17	x	-
Jerome, Adam	AGHAMM/MMAFMA	x	x
Joncas, Jean-Richard (tel)	Fisher LNS	-	x
Juillet, Cédric	DFO – Science	x	x
Labrie, Luc	Fisher Area 17	x	-
Lacasse, Olivia	DFO – Science	x	x
Landry, René	Président crabiers Area 17	x	-
Langelier, Serge	AMIK	x	x
Lavallée, Dean	Fisher Area 12C	x	x
Leclerc, Caroline (tel)	DFO – Fisheries Management	x	x
Lelièvre, Lauréat	Fisher Area 12A	x	-
Lemelin, Dario	DFO – Fisheries Management	x	x
Léonard, Pierre	Essipit First Nation	x	-
Lévesque, Isabelle	DFO – Science	x	x
Loboda, Sarah	DFO – Science	-	x
Monger, Marc	Fisher Area 14	x	x
Munro, Daniel	DFO – Science	x	-
Nadeau, Paul (tel)	APBCN – LNSFA	x	x
Ouellette-Plante,Jordan	DFO – Science	x	-
Pinette, Majoric	Pessamit	x	-
Pomerleau,Corinne	DFO – Science	x	x
Roux, Marie-Julie	DFO – Science	x	-
Sainte-Marie, Bernard	DFO – Science	x	x

Name	Affiliation	February 11	February 12
Senay, Caroline	DFO – Science	x	x
Smith, Andrew	DFO – Science	x	-
Stubbert, Curtis	Fisher Area 15	x	x
Tambrari, Hacène	DFO – Science	x	x
Tanguay, Pierre-Nicolas	Fisher Area 17	x	-
Turcotte, Christian	DFO – Science	x	-
Vallée, Simon	Fisher Area 17	x	-
Vigneault, Guy	Fisher Area 16	x	-